Navigating Linux File System

Module 4

Module 4 Agenda

- Network Basics
- Linux Network Setup
- The Linux File System
- Linux Commands
- Important Files

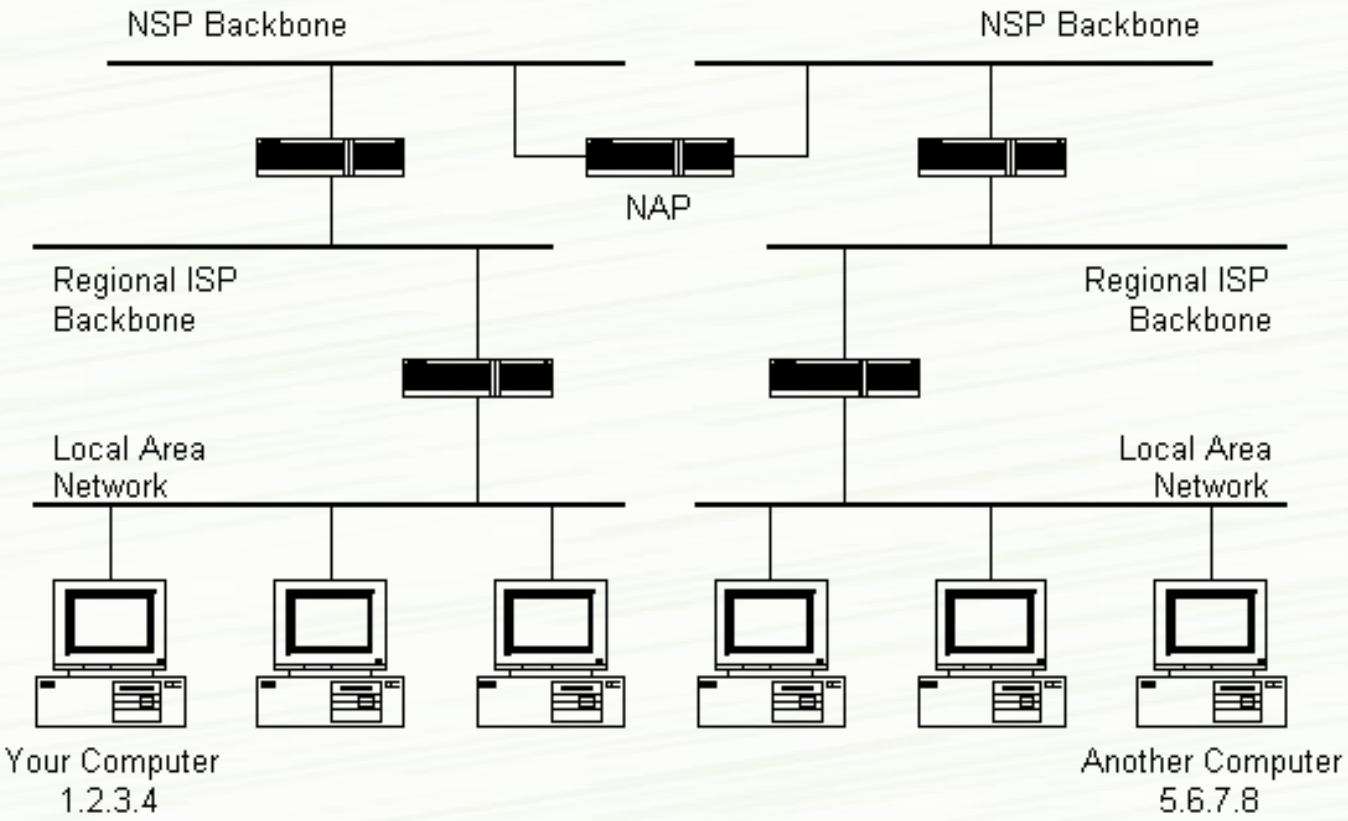
Network Basics

Network Basics

- The Internet is a collection of computers, devices, and people, spread out all across the world exchanging information.

- These networks are managed by entities known as Internet Service Providers (ISPs) “The backbone of the Internet”.

Network Basics



Network Basics

- Every computer connected to the Internet or a local network has a unique address called an Internet Protocol (IP) address.
- You will configure the IP of your Kali machine in the first module four activity.
- An IP address is composed of two parts. The network and the host portion.

  Ex. 253.782.2.15

Network Basics

IP-Addresses

- Network Portion: Denotes a set of addresses assigned to your network. It also identifies your network “class”, which will be explained soon.
- Host Portion: Helps uniquely identify each machine on your network.

  Ex. For student IDs your school assigns each student the same first three numbers “223”, but different final five numbers to uniquely identify each student “223-97104”. In this example the 223 is the network portion and 97104 is the host portion.
- A typical IP-Range: 192.168.1.0 - 192.168.1.255

Network Basics

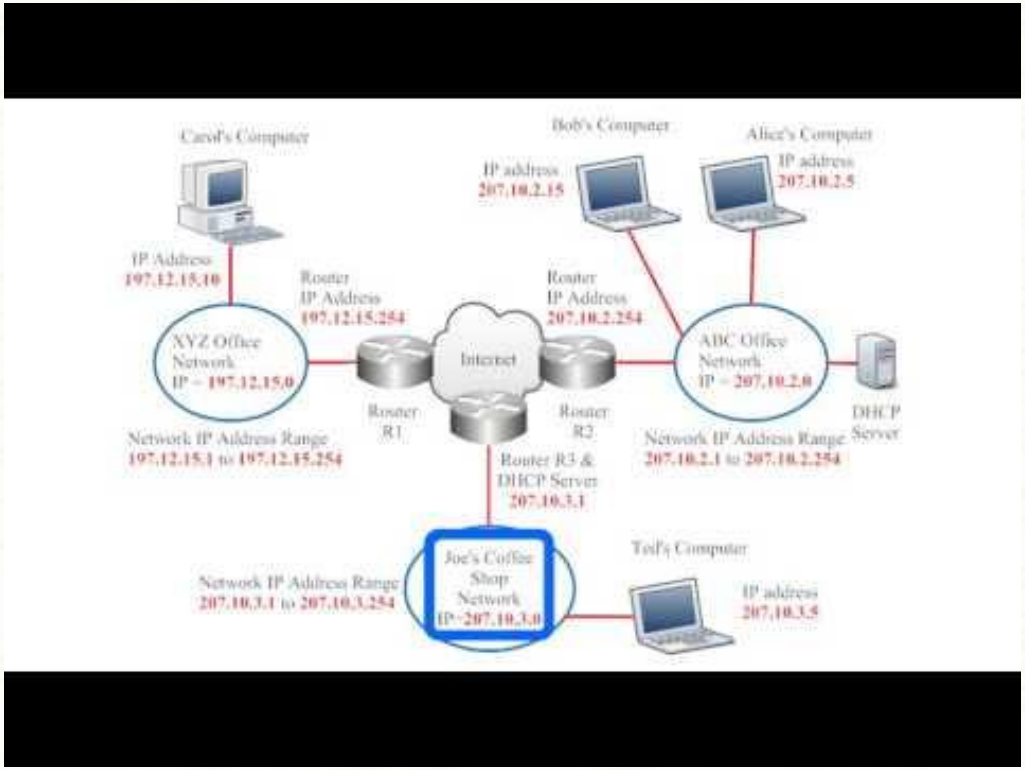
IP-Addresses (continued)

- Default gateway: One of the last addresses (.254) which serves as an exit point, and forwards traffic outside of your own network.
- Netmask: Defines the Class of an IP-Address.
  - Class A: 255.0.0.0 **or** "/8"
  - Class B: 255.255.0.0 **or** "/16"
  - Class C: 255.255.255.0 **or** "/24"

The class of an IP-Address helps us differentiate between which portion defines the network and which defines the host. There are two ways to write it, in the address format or the "/x" format.

Network Basics

Video
Lesson 7: Demystifying the Internet (Part 2)
by IowaCyber



Linux Network Setup

Linux Network Setup

Watch the following video before completing Module 4 Activity 1. It is an older version of the process we will use, but it still helps familiarize you with the main idea.

Video: Linux Network Setup

The Linux File System

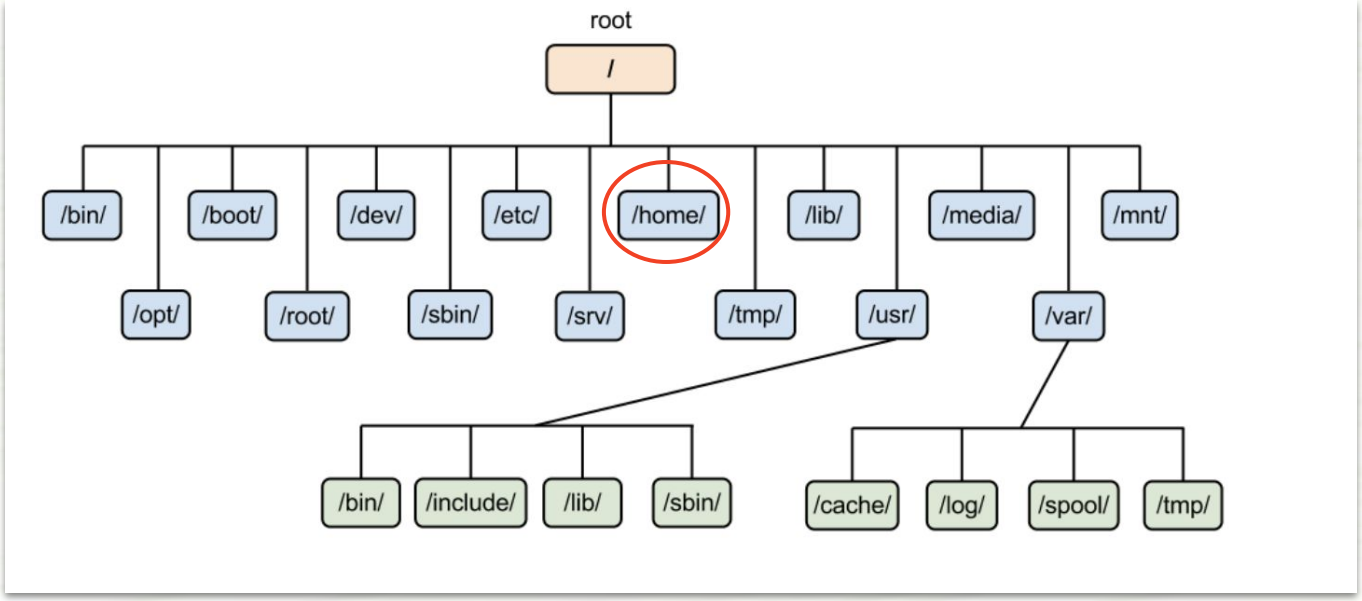
The Linux File System

- The Linux file system could be thought of as an inverted tree with the root directory at the top being represented by the **/** character.
- A directory is simply a folder.
- The root directory is the “base” of the hierarchy.
- Other directories will then branch out from the root directory (**/**).
- Ex: **/home/Joe** is the home directory of user Joe

Visit the next slide for a visual diagram of the Linux file system.

The Linux File System

File System Map:



Note: When you open a new terminal window, you will often land within the home directory of the user you are logged in as. (e.g /home/Eve).

The Linux File System

- It is important to know how to navigate a file system because you will not always have a Graphical User Interface (GUI) to find files/directories. You may find yourself working solely with a headless configuration. Which basically means using a terminal at all times.
- A GUI includes all the icons, buttons and graphics that make the computer more "user-friendly".
- Therefore, there are a list of basic commands to help you navigate it.
- We will cover a list of helpful commands.

The Linux File System

Video: The Linux File System

Linux Commands

Linux Commands

Nano and Vim/Vi

Nano and Vim are both text editors used to write files in Linux.

You will have the opportunity to use these in some of the upcoming activities.

Vim is the preferred editor for advanced users which is why I would encourage a beginner so start out with the nano tool.

This is the editor I personally started off with and I felt like it was very straightforward.

Linux Commands

Navigation Commands:

- *tree*: shows the hierarchy of a specified directory
  - **tree /var/log** will show you the contents in a tree-like format with files extending folders and directories.
- *pwd*: print working directory
  - **pwd** will print "/home/username", if this command is executed after opening a terminal window. Helps you know where you're located in the file system.
- *ls*: lists the contents of the current directory
  - use **ls /home/Ken** to list the contents of Ken's home directory

Linux Commands

Navigation:

The cd command: Helps us change directory and jump to another directory. Below are some examples of how it is used.

- **cd /home/student/Documents** Will move you to the /home/student/Documents directory
- **cd..** Moves you one ancestor “up” in the file system hierarchy
- **cd** Takes you directly to your home directory
- **cd /** Takes you all the way to the root directory
- **cd -** Moves you to your previous directory, but not necessarily to an ancestor. Akin to pressing “return” on a tv remote. It simply takes you back to the previous channel.

Linux Commands

Directory Management:

- *rmdir*: deletes an empty directory
  - **rmdir <filename>**
  - **rm -r <filename>** deletes a directory and all its contents
  - **rm <filename>** deletes an individual file

    *Be careful with this command
- *cp*: copy a directory/ file from its current place to a different directory
  - **cp <source> <dest.>** source is the name of the object and destination is its new location. Yes, there is a space there and you don't need to actually use "<" or ">", these are simply placeholders

    Ex. "cp catnames.txt /home/tom/cats"

Linux Commands

Directory Management:

- *mv*: moves files and/or renames files
  - **mv file.txt /home/username/Documents** would move file.txt to Documents
  - **mv oldname.txt newname.txt** renames the file when the destination is non-existent.

- *touch*: creates blank new file
  - **touch dogNames.txt**

- *history*: review commands you have used before

Linux Commands

Directory Management:

- *locate*: locates a file
  - use **locate -i** to make it case-insensitive
  - use **locate -i*word** to find files with a “keyword”

- *mkdir*: makes new directory
  - **mkdir Chips** makes a new directory named Chips
  - **mkdir Documents/Dogs** creates a new directory “Dogs” under Documents.

Linux Commands

Viewing Files:

- *less/more:* used to view content of a file without editing it
  - **less my_file.txt** displays the file, line by line and uses “j” and “k” to scroll up or down
  - **more my_file.txt** opens the entire file to view
- *man*: shows you several ways you can use one command. Basically a command manual.
  - **man tail** will show you how to use the tail command etc.
  - **man tree** will show you different flags/ways to use the command
  - **man nmap** provides a manual for the nmap tool
  - **man mkdir** shows you a complete command manual for the make directory command

Linux Commands

Viewing Files:

- *cat*: this command helps us quickly peek at the contents of a file without modification
- This command displays the output to the terminal, but we can also "channel" the output to another file
  - **cat groceries.txt** displays content of groceries.txt
  - **cat file1 > file2** makes a copy, if file2 was initially empty
  - **cat file_name_1 file_name_2 > file_name_3** combines the contents of file 1 and 2 and places it in file 3
  - What is the difference between using ">" and ">>" with the cat command? Find out in the activity!

Linux Commands

Processes: Are running applications or programs

- *ps:* lists the running processes by Process ID (PID), this will be important once we start running multiple processes
- *kill*: terminates a running process
  - **kill <PID>**
- *clear*: clean out the terminal of past commands, and all kinds of junk off your screen, serves more of a convenient function than a practical one. But still incredibly helpful!
- Use ";" to run multiple commands at once.
  - **Com1; Com2; Com3**

Linux Commands

Extras:

- Ctrl + C will stop and terminate a running command such as a “ping”, which could run for a long time if not indefinitely
- Ctrl + Z will pause a running command
- Ctrl + Q unpauses a command

***Note: Linux Commands are case sensitive**

Important Files

Important Files

The following are files available on every Kali machine that contain important user/system information.

- **/etc/passwd**
  - Does not store passwords, lists all users and other system accounts, historically used to store passwords, but you can guess why that is a terrible idea...
- **/etc/shadow**
  - Will not open unless you are the root user, contains password hashes, which are simply encrypted formats of passwords.
- **/var/log**
  - Can be used to examine the status of a system.
- **/home/<username>**
  - your home folder

***enter the keyword “cat” followed by one the above files to view its contents!

To Do

- Watch the Linux Network Setup video
- Complete Activity One
- Complete Activity Two
- Complete the Basic Commands Cheat Sheet

End of Module 4!

What questions do you have?

Next Module Topic:

File Permissions and Network Tools!

Questions?

Contact IT-Adventures support staff!

email:
ita@iastate.edu

Your school's IP-Range can be found at:
http://www.it-adventures.org/ip-ranges/