

Homework #5

COS 231 Summer 2004

Due Date: July 5, 2004

You can spend any amount of time that you have on Linux System Administration. The purpose of this homework is to acquaint you with some of the basic ideas and to get you used to solving problems by finding resources. These resources include the textbook, any other books that you might have access to, and, of course, the various websites that exist out there. To do this assignment, feel free to use any of these resources. I only ask that you reference any sources that you use.

Each of the following problems asks you to write a small essay on a topic so that you answer all of the questions. For simplicity, use Open Office to prepare the final document for submission.

Problem 1. Booting the Machine.

Write a short essay describing the boot sequence for your machine. Be sure to explain what the BIOS is and what it does. Be sure to give information about the version of BIOS in your computer including who the manufacturer is. Be sure to give the model of the computer you are using, along with details of how you can reach the BIOS setup for your machine. Tell what the hardware boot sequence is on your machine. General it is some permutation of hard drive, floppy drive and CD-ROM.

Be sure to tell which version of Linux you have. Explain what GRUB is. Explain what LILO is. Find out why GRUB is displacing LILO in the newer versions of Red Hat Linux. Be sure to explain the boot sequence and the various options that you have at each stage.

Explain what runlevels are. How many runlevels are defined for your version of Linux and what services are offered by the different runlevels? Provide a listing of files in the various runlevel directories on your computer. You will notice that some files begin with a K and some with an S. Explain the significance of that along with the significance of the number that follows the K and the S.

Discuss whether runlevels are standard across different distributions of Linux. If they are not standard, is there an effort under way to make them standard? Talk about the various configuration tools available. Provide a listing of the output of a command line configuration tool and a screen shot of a GUI configuration tool.

Explain how you would solve the following problem. Suppose that the root password has been lost on a computer. How could you set a new root password without having the old one? (Hint: consider how you can get into an appropriate runlevel when booting?). Is there a way to protect your computer from this? How safe is your computer from being compromised if the attacker has physical access to your computer?

Problem 2. File Systems

Write a short essay about the different types of file systems that Linux can support. If you are running a dual Linux/Windows machine, describe how you can or cannot access your Windows data when running Linux. How about being able to access your Linux data when you are running Windows? Explain how you read and write MS-DOS floppies when running Linux. Give the exact commands that enable you to read and write MS-DOS floppies from Linux.

Explain what soft links and hard links are. How do you create such links in your file system? Why would you want to do something like this? Explain what an INODE is. How can you tell how much disk space you are using and how much of it is left?

Problem 3. Updating the System and Installing Packages and Services

Describe how you can tell whether your system is completely up-to-date. If it is not completely up-to-date, tell how you can bring it up to date. Finally, decide whether you want to upgrade your system and then carry out your decision. Explain your reasons for the decision and what happened after you proceeded to carry out your decision. Of course, you should back up anything of importance.

Find some program that you would like to install on your computer that is not installed. You might try one of pine, pico or Windowmaker if you can't think of something that you want to install. Try to install it and explain whether you succeeded or not. In both cases give details of what happened.

Explain what "compiling the kernel" is. Explain when one would need to do that and find out how to do it for your machine. It is not necessary for you to actually compile the kernel unless you really want to.

Problem 4. User Services

Create 3 or more new accounts on your system and tell what names you used. Set them up in various groups and test permissions on different files so that group members can read certain files not accessible to the public. Document what you did and the results that you got.

Assume that one of your users is misbehaving on the system and that you want to lock up this user's account without destroying any of the data. Explain how you would do this. Describe how to set up a user account manually. Describe how to set it up using one of the GUI tools.

What are shadow passwords? Why are they used? What is a cracking program? Find the name of at least one cracking program and describe how it can be obtained. How can you make the job of a cracking program more difficult?

What are restricted shells? How do you set them up? What is the SUDO command? What is the SU command? How do they differ?

Problem 5. Monitoring System Services

Explain how you can determine the state of various resources on your computer. How can you tell what percentage of a machine's CPU cycles you are using at any particular time? How can you tell how much disk space is free? How can you tell what programs any particular user is running? How can you tell how much memory is being used? How can you tell what percent of the CPU is being used by a particular person?

How can you tell how much network traffic your system is experiencing? Describe some of the logs associated with different devices? What sort of information is kept in them? Where are the various types of logs located?

What does it mean to run a process in the background in a command window? Why would you want to do that? How can you do that when working from a terminal window? Why is this less of an issue in a GUI environment?