Lab 0: LINUX ACCESS AND TOOLS

Objectives: Set up access to the ECEN 324 Linux VM. Create a sub-directory in your home directory, copy in a C program into the sub-directory and use the 'submit' command to submit it for grading.

The Linux system we will be using is a virtual machine (VM) that runs on a physical system in a BYU-Idaho data center. Two BYU-I data centers where the physical system might reside that the VM would be running on, would be in the Kimball building or the Clarke building. Using a remote access program on your own laptop and/or desktop (or phone) you may 'log in' to the virtual machine.

There are various remote access networking protocols. Linux systems run ssh servers and users use an ssh client to remotely log in to a remote system. Linux, MacOS and Windows 10 systems typically have ssh clients installed as one of the applications on the system. You can invoke an ssh client on one of these three platforms using a terminal/command/console command line application. There are also many other applications that provide a GUI and handle the ssh connection for the user once it is set up in the application.

This lab will have you use a terminal window to access the Linux Lab and have you do a few command line commands.

Instructions

Please follow these steps for this assignment:

1) Your username and temporary password for accessing the Linux system will be sent to you in your **BYU-Idaho** email (not I-Learn/Canvas email). If your instructor indicates that accounts have been activated/created and you have not received the email, check your junk/spam folders. If you still can't find the email, you might have rules in place on your email client that deleted it, or the 'dog in the cloud' ate it. Contact your instructor.

2) Using the username and password sent to you, use a remote access program to log in to the Linux system. Do one of the following based on the operating system (OS) you are using:

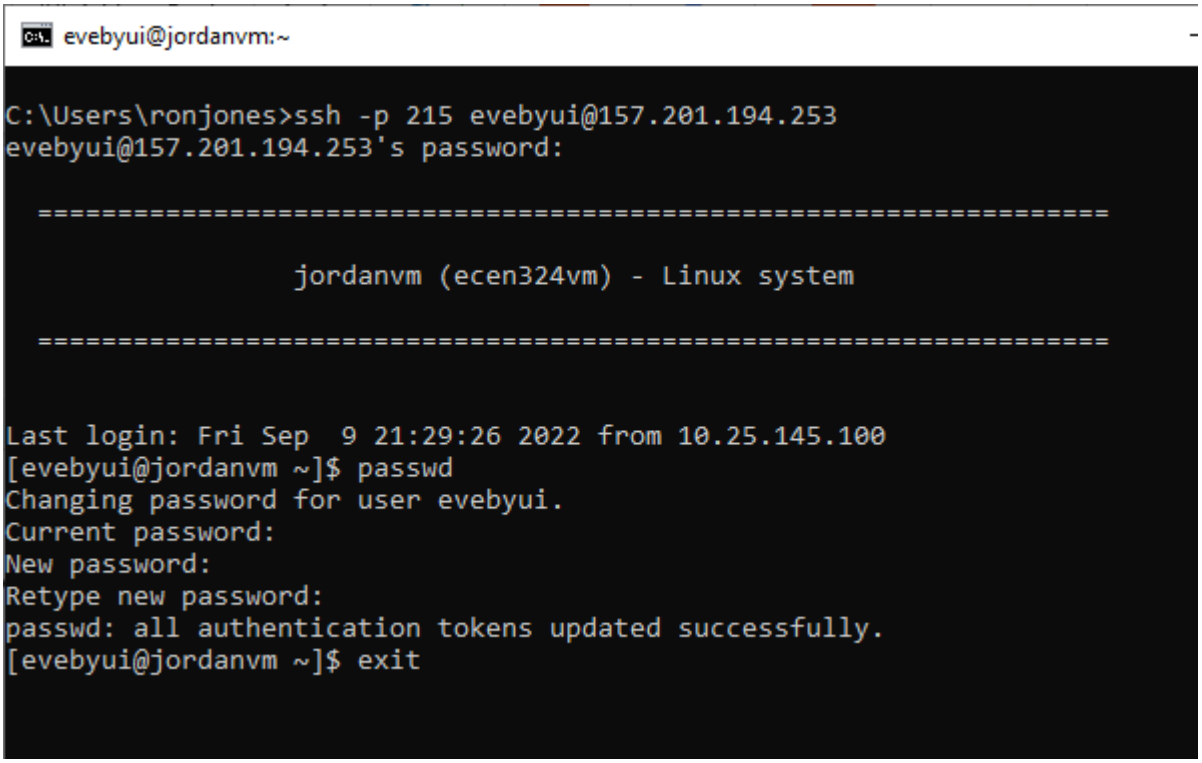
   a) Linux: Open the terminal application (exact steps vary with the Linux distribution)
   b) Windows: Click the Start icon and type in `cmd`. This should find the 'Command Prompt' app. Start it.
   c) MacOS: Finder -> Applications -> Utilities -> Terminal.app
      or: Launchpad and search for terminal

   Execute the following command in the terminal/command window to start an ssh client and connect to the Linux VM. Replace 'yourUserName' with the username sent to you in the email. The IP address of the VM you are connecting to is 157.201.194.253. The lower case 'p' is telling the ssh client to use port 215. The standard ssh port of 22 is not allowed access to the VM to help reduce attempts at illegally logging in to the Linux VM.

```
ssh -p 215 yourUserName@157.201.194.253
```

If you are trying to connect to the Linux VM while on campus using Wi-Fi, you **must be connected to the BYUI Wi-Fi**, not the BYUI_Visitor Wi-Fi.

3) If you wish to change the password given to you, you may do so using the `passwd` command. You must enter the 'old password,' the one you just used to log in with, and then a new password twice. Nothing shows up as you type in the passwords, not even * or dots.



If you change your password, it would be good to exit the VM and reconnect to the VM using your new password to make sure nothing went wrong in changing your password.

Hint: In most terminal/command windows, you may use the up-arrow key to recall previous commands you executed. Back in your terminal/command application, pressing the up-arrow key should bring up the ssh command you executed previously.

4) You are currently in what is called your home directory. You may execute a pwd command (print working/current directory) to see the name of it. You will now make a sub-directory (folder) in your home directory for doing this lab with the `mkdir` command (make directory) and change your working/current directory to that directory/folder using the `cd` command (change directory):

```
[evebyui@jordanvm ~]$ pwd
/home/evebyui
[evebyui@jordanvm ~]$ mkdir ecen324Lab0
[evebyui@jordanvm ~]$ cd ecen324Lab0
[evebyui@jordanvm ecen324Lab0]$ pwd
/home/evebyui/ecen324Lab0
[evebyui@jordanvm ecen324Lab0]$
```

5) Copy a C file from the: `/home/ecen324/lab0` directory (folder) named `ecen324_lab0.c` using the Linux `cp` command (copy). The "." at end of the line is an alias/shorthand for your current working directory (the directory name shown you by a `pwd` command).

```
cp /home/ecen324/lab0/ecen324_lab0.c .
```

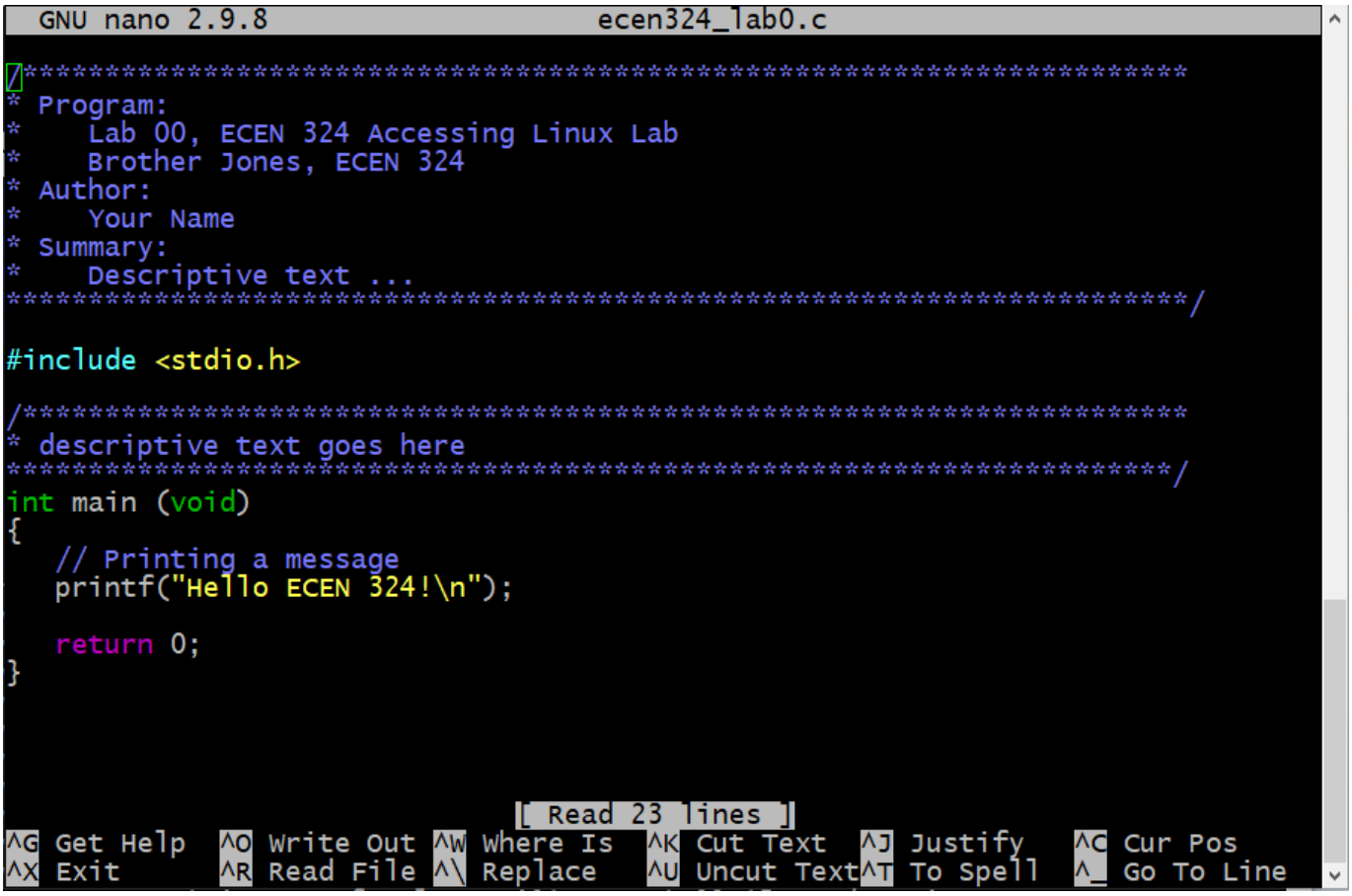
Hint: You may use the tab key for file name completion.

6) Edit the file using nano, vi, vim, or emacs to add in your name and change a couple of the comment fields.

Warning: Adding an extra line at the top or a space before the comment characters (*) will mess up the `submit` tool that you will use to submit this assignment. In short, don't change the first four lines of the header!

The following shows using the `nano` editor. You use the arrow keys to navigate in the file. The "^" to run the editor commands is the control (ctrl) keyboard key. The first screenshot below is the original contents of the ecen324_lab0.c file.

```
nano ecen324_lab0.c
```



Edit the file with your name and edit the 'descriptive text …' header comments. To write out your file after editing it, do ctrl-o. While doing a ctrl-o (Write out) command, the screen looks like:

Just hit enter to write to the file name as displayed. Note: if you change the file name, you will need to use your new file name you used in the gcc and submit commands shown below.

7) Compile your program with gcc and run it to make sure it works. If there are compile errors, fix them. Then submit the C code.

Warning: When using the submit command you must be 'cd-ed' into the directory where the file you are submitting exists.

```
[evebyui@jordanvm ecen324Lab0]$ cp /home/ecen324/lab0/ecen324_lab0.c .
[evebyui@jordanvm ecen324Lab0]$ nano ecen324_lab0.c
[evebyui@jordanvm ecen324Lab0]$ gcc ecen324_lab0.c
[evebyui@jordanvm ecen324Lab0]$ ls
a.out  ecen324_lab0.c
[evebyui@jordanvm ecen324Lab0]$ a.out
Hello ECEN 324!
[evebyui@jordanvm ecen324Lab0]$ submit ecen324_lab0.c
Submit homework to jones ecen324 and lab00. (y/n)y

Submit successful

[evebyui@jordanvm ecen324Lab0]$
```

The screen shot above shows the use of an `ls` command (list directory contents). The gcc command compiled the `ecen324_lab0.c` file and created the `a.out` executable file. The `a.out` file shows up in green in the listing because the permissions on the file are set such that the OS

knows it is a file it can figure out how to execute. This file has machine code in it that may be loaded into main memory on the computer and run.

Additional Information

After completing this lab assignment, you may desire to learn about applications that are more user friendly when working on remote systems. VS code has extensions that allow you to use the editor and other capabilities of VS code while working with files that reside on a remote system. Other programs for Microsoft Windows systems include Putty and MobaXterm. Notepad++ also has a plugin that allows editing files on a remote system (NppFTP plugin).

You will often see a "-X" option used on ssh commands. This enables the X11 protocol to be tunneled through an ssh connection. To use this, you need to be running an X server on your local system (laptop, desktop) or using an application that has an X server built in to it, such as MobaXterm. On a macOS system, you may install XQuartz. Linux systems come with an X server installed. The following document may be helpful: Linux Cloud Remote Access

When the first programming class for CS/SwE/EE/CompE majors in the CSEE Department was CS 124, which was taught in C++ and used what was called the Linux Lab (different VMs), one of the CS 124 online instructors, Br. Honeycutt, created the following video that might be interesting to you:

- Emacs, PuTTY, Bash Tips and Tricks: 19 minutes