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# csce215 — UNIX/Linux Fundamentals

## Fall 2021 — Lab Assignment 1

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*This assignment is intended to provide some practice and additional content for the material covered in lecture on Monday, August 23. You'll sign in to your Linux account and practice moving around and looking at things using the terminal. The assignment is meant to be completed in the lab sessions on Wednesday, August 25, and must be submitted by 11:59pm on Friday, August 27. A total of 40 points are available.*

### **Before we start**

This document contains instructions on what you need to do and some additional information beyond what was covered in the lecture. You should read it carefully and complete the steps as you go.

Along the way, you'll occasionally see shaded boxes with a  symbol. These boxes explain how the lab will be graded. Each one mentions a specific task that you must complete and the number of points that task is worth. The idea is to treat these like a checklist: If your submission shows that you correctly complete all of the tasks associated with each , then you should receive full credit for the lab. However, keep in mind that missing one task may make later tasks impossible or more difficult. Therefore, you should try to complete all of them, in order.

These lab assignments will give you a chance to practice the material from the lectures and to go beyond it. So the instructions here won't repeat information from the lectures. You'll want to keep your notes handy.

Please don't hesitate to ask for help from the TAs if you get stuck at any point, or if anything is unclear.

### **1 Sign in and start a terminal**

The first step will be to sign in. You'll see a place to enter your user name, followed by another place for your university password. If you know your username and password, you can use them to log in. But if you don't know either of these, you can look them up by going to

<https://my.sc.edu/>

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and following the link to 'View my IDs and manage my passwords'. You'll need to scroll down toward the bottom of the page to find it.

Once you've successfully signed in, you'll want to open a terminal window to practice some of the commands that we've been learning. There are several ways to start a terminal, but perhaps the easiest ways are to press Ctrl-Alt-T, or to click the button labeled 'Activities' and type 'terminal'.



Sign in to one of the lab computers and open a terminal window. 3 points

## 2 Start a terminal recording

Within your shiny new terminal window, the next step will be to start asciinema to record your terminal session.

Check your lecture notes for the command to start a recording into a file. In this case, the name of the file we want is lab1.cast. Enter the appropriate command, and press Enter.

If this has worked correctly, you should see message like this:

```
asciinema: recording asciicast to lab1.cast
asciinema: press <ctrl-d> or type "exit" when you're done
```

Because you will submit the recording to obtain a grade for the lab, it is essential that all of the commands you use *for the entire lab* are entered while asciinema is running. The next thought is quite important, so I'll put it in boldface.

**We cannot award points for things that are not recorded into the lab1.cast file that you submit.**

One thing to keep in mind is that asciinema records only a single terminal. So if your terminal window closes for some reason (a mistake, logging out to finish later, etc.), you'll need to resume the recording. Do this by running the record command again, adding --append to tell asciinema to add new material at the end instead of starting a totally new recording.



Start asciinema to record your terminal session to a file called lab1.cast. 2 points

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### 3 *Looking around your home directory*

Your new terminal window will start out with your home directory as its current directory. Even if you haven't used this account before, you'll likely find a few files in your home directory.

Recall that we learned three main commands for looking around: `ls` to show the files in the current directory, `cd` to change the current directory, and `pwd` to show the name of the current directory. Use these commands to find answers to the following questions:

1. What files and subdirectories are in your home directory?
2. What is full name of your home directory? This will start with a `/` and include your username at the end.
3. Files whose names begin with a period are often treated as 'hidden' files. What hidden files are in your home directory?



Execute commands that answer the three questions above. We'll check the recording you submit for outputs that answer each of them. *6 points*

### 4 *Moving to parent, root, and home directories*

Now let's try out those special directory names we learned.

First, use `cd ..` to move to the parent directory of your home directory. Then use `pwd` to confirm that you've done this correctly, and `ls` to see what's there. As an example, my home directory in this system is `/acct/jokane`, so its parent directory is `/acct`.



From your home directory, use `cd ..` to move up one level. Use `pwd` to confirm that you are in `/acct`. Then use `ls` to see what is in `/acct`. *3 points*

Hmm... looks like /acct contains the home directories of *every* user in the system. Interesting; could it be a security problem that we can see everyone else's home directory? Let's take a look at the detailed directory listing, which includes information about permissions, to find out.



Within /acct, use `ls -l` to see a detailed directory listing. *2 points*

The output of '`ls -l`' shows lots of lines, including one like this describing your instructor's home directory:

```
drwx-----x 107 jokane    domain^users 12288 Aug 22 13:29 jokane
```

We'll look at permissions in more detail later, but for now notice those `---` characters, which indicate that certain permissions are not enabled for that directory. So, for example, if you try to use `cd jokane` to visit my home directory, you'll see an error message.



From acct, use the command `cd jokane` to try to navigate to the home directory of the user jokane. Receive an error message stating 'Permission denied'. *2 points*

We also learned the special character `/` which refers to the root directory on the system. Let's see what's there.



Use `ls` to list the contents of the root directory. You'll need to either move to the root directory first, or give `ls` a parameter that tells it to look at the root directory. *2 points*

Finally, we can use `~` to refer to our home directory. Use that to return to your home directory.



Use the command `cd ~` (or, if you are lazy, just `cd` without any argument) to navigate to your home directory. Then use `pwd` to see that you are indeed in your home directory. *2 points*

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## 5 *Looking around elsewhere*

Now let's have a peek at some other parts of the system.

One interesting place is a directory called `/usr/share/dict` —that is a directory called `dict`, inside a directory called `share`, inside a directory called `usr`, which is contained in the root directory `/`. For context, `usr` —short for 'user'— is a directory that contains quite a few files that support various user programs, `share` contains files that don't depend on the specific hardware platform (i.e. files that can be 'shared' between different platforms), and `dict` is short for 'dictionary'. Anyway, go to that directory and take a look at what files are there.



Navigate to `/usr/share/dict` and show a list of the files in that directory. *3 points*

You should see several files, including separate files for American English and British English. Use `cat` to take a look at the American English one.



Use `cat` to display the contents of the American English dictionary. *2 points*

Yikes, that was a huge file that went by too fast to read. Let's try `less` instead.



Use `less` to view the contents of the American English dictionary one page at a time. Use the arrow keys to look around a little. *2 points*

Aha! Looks like this is a file that is meant to be complete list of words in the English language. (Can you imagine what such a file might be useful for?)

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Recall that inside of `less`, we can search through the file, from the current location forward, by pressing `/` and typing the word to search for. Let's use this method to search for some important words, to see if this dictionary is any good. (We'll learn better methods to search through files in the future; for today, just practice using `/` within `less`.) Don't forget that this tool is case-sensitive, and that correct spelling is important.



Use search method built into `less` to search the American English dictionary for the names of each of the four ninja turtles:

Leonardo, Raphael, Donatello, Michelangelo

(Hint: All four turtles are indeed in there.)

3 points

## 6 Getting more information

This last exercise will give you a chance to use the `man` command to figure out how to do something new.

On Linux systems, there is a directory called `/etc` that contains various system configuration files. Suppose that we wanted a list of the files and subdirectories in `/etc`, *ordered from smallest to largest*. Sounds like a job for `ls`, but the usual behavior of `ls` is to sort its output by name, and the options we know so far don't help with changing the order.

Let's use the `man` command to get more information about `ls`. What options to `ls` might help? Find out by skimming the manual page for `ls` (but it's pretty long) or by using the `/` search function to search within the manual page for keywords that might be used to describe the option you're looking for. Remember that all of the keys that work in `less` work in `man` as well.



Use the `man` command to view the documentation for `ls`. 3 points

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Based on what you found in the manual, you should be able to give a command that shows the contents of `/etc` from smallest to largest.



Use `ls` with appropriate options to obtain a list of files and subdirectories in `/etc`, ordered from smallest to largest. (Hint: There are a few ways to do this, but perhaps the simplest one requires two options: one sort by file size and one to reverse the sort order.) *5 points*

## 7 *Finishing the recording and submitting*

Now that we've finished all of the tasks, it's time to finish the recording so you can submit it. To do this, recall the instructions from when you first began the recording:

```
asciinema: recording asciicast to lab1.cast
asciinema: press <ctrl-d> or type "exit" when you're done
```

To explain this a bit more, your original `asciinema rec` command started a new copy of the `bash` shell, running inside the original one. Either of these, `Ctrl-D` or the `exit` command, will terminate this 'inner' shell. You should see a message like this when the inner shell has finished and `asciinema` has completed its work.

```
asciinema: recording finished
asciinema: asciicast saved to lab1.cast
```

If you'd like to see the recording before submitting it, you can use this command from the directory that contains `lab1.cast`:

```
asciinema play lab1.cast
```

Note that it will only replay what appeared on the screen during your session; the commands you executed will not be run again. If you get bored during the playback, you can press `Ctrl-C` to cancel it.

The last step is to go the CSE department dropbox site

<https://dropbox.cse.sc.edu/>

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to submit your work. Navigate to CSCE 215-80X-F2021, choose Lab 1, and follow the instructions to upload the file lab1.cast. Keep in mind the (strict) deadline on Friday at 11:59pm.



Upload your completed lab1.cast to submit your assignment. *(No points specifically for this, but if you do not submit, we cannot grade your work.)*

## ***Signing out***

Now that you've completed the lab, you should be sure to sign out. You can do that using the drop-down menu in the top right of the screen, shaped like a downward-facing triangle. In that menu, click your last name, and then choose 'Log Out'.



Sign out of the lab computer when you are finished.

