# CS 197U: Lab #3

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Revision 1.0 - February 8, 2019

**NOTE: Submit your question responses to Moodle as a single PDF file.**

**If a question asks for command(s), give the complete command with programs, options, arguments, pipes, redirects, etc.**
**ex: "*vim file.txt*" instead of "*vim*"**

**The PDF should be named in the format: *lastname_firstname_lab3.pdf***

## Introduction

This Lab will primarily entail working with compression, links, SSH, git, and various networking commands. We will not cover package managers with this lab as they will vary depending on operating system, and you do not have permissions to install software on the course server.

However, you should experiment with your own distribution's package manager. You will need to install software at some point in the future, if you haven't already, to your Unix-like system.

Likewise, we won't cover mounting. This is for two primary reasons:

1. The operating system typically handles this through an interface, such as Nautilus on Ubuntu. If you are using a distribution without such an interface, you likely are already familiar with mounting, or can learn it with minimal practice.

2. When you work with servers, such as cloud instances, you may have to mount file systems yourself. In this case, you'll need to practice. However, a majority of the time, this will be handled by someone else (such as the cloud interface or server operator) due to permissions and hassle.

If you would like to practice mounting, I recommend doing so with a USB drive. When you are comfortable with it, try using a tool such as **sshfs** or **google-drive-ocamlfuse** to mount remote disks locally.

## 1 Connecting

Start up your VM and connect to the course server. To do so, we want you to use the **ssh** command. The hostname of the server is **197u.adunna.me**.

You should do the following questions and include your responses in your response sheet. All of this should be done in your home directory (i.e. if you're asked to create/move/modify/remove files, it should all be done in your home directory):

Question 1

**Q:** What full command did you use to connect to the course server?

## 2 Compression

You should now be working on the remote server.
Make the ***Lab3*** directory in your home directory.

Question 2

Using **gzip**, compress the Dracula book (*/home/PUBLIC/dracula.txt*) to Lab3/dracula.txt.gz. Do this with the highest compression ratio (smallest compressed file size) you can, that still maintains the lowest compression strength. (ex: If compression strengths 7, 8, and 9 all yield the same compressed size, choose 7)

**Q:** What full command did you use to compress and write *dracula.txt.gz* to file? What command did you use to determine the compressed file size in order to determine which compression strength to use?

Question 3

Repeat **Question 2**, but for **bzip2** instead of **gzip**. The output file should be ***Lab3/dracula.txt.bz2***.

**Q:** What full command did you use to compress and write *dracula.txt.bz2* to file? What command did you use to determine the compressed file size in order to determine which compression strength to use?

Question 4

Repeat **Question 2**, but for **xz** instead of **gzip**. The output file should be ***Lab3/dracula.txt.xz***.

**Q:** What full command did you use to compress and write *dracula.txt.xz* to file? What command did you use to determine the compressed file size in order to determine which compression strength to use?

Question 5

Decompress your compressed files (with the respective compression method) to:

1. ***Lab3/dracula_gz.txt***
2. ***Lab3/dracula_bz2.txt***
3. ***Lab3/dracula_xz.txt***

For each decompressed file, use the **diff** command to check the differences between the decompressed file and the original file at ***/home/PUBLIC/dracula.txt***.

**Q:** What full commands did you use to decompress each archive? Do you notice any discrepancies using the **diff** command and if so, what?

Question 6

Use the **tar** command to wrap your ***Lab3*** directory into ***~/Lab3.tar***. This should be done without compression.

**Q:** What full command did you use?

Question 7

Use the **tar** command to wrap and compress your ***Lab3*** directory into ***~/Lab3.tar.gz***. This should be done using *gzip* compression.

**Q:** What full command did you use? What do you see when you "peek inside" using the flags ***-tvf***?

## 3 Links

You should still be working on the remote server.

Question 8

Create a symbolic link from ***/home/PUBLIC/dracula.txt*** to ***dracula.txt*** in your ***Lab3*** directory. Use the **md5sum** program to hash both the original file and the new symbolic link, and compare the hashes.

**Q:** What full command did you use to create the symbolic link? Were both hashes the same?

Question 9

Try to edit the symbolic link you created using **vim**. When you're done, remove the symbolic link using the **rm** command, like you would any other regular file.

**Q:** Were you able to modify the symbolic link? Why do you think this is?

## 4 SSH

Exit the remote shell so that you're working back from your own local system. Validate that you're working from your local system and not the course server. You can do this through a few ways, such as checking if you have the same files, if the user name is the same or different, etc.

Question 10

From your home directory on your local system, run **ssh-keygen** to create a public/private key pair. If you don't have this program, look up how to install it for your distribution and corresponding package manager. You should use a password when generating the key as well.

**Q:** Where did your private key save to? Where did your public key save to?

Question 11

Transfer your public key to the course server through using the **ssh-copy-id** command. Validate that it transferred properly by logging into the remote server through the **ssh** command. It should ask you for your private key password, and should then authenticate using your key.

**Q:** What full command did you use to transfer the public key? How do you know you logged in using your key instead of your user password?

## 5 Networking Commands

You should now be working from the remote server again.

Question 12

Use the **ping** command to ping *google.com* with 7 packets, and wait 1 second in between each packet.

**Q:** What full command did you use? What output did the command give you?

Question 13

Use the **curl** command to write the contents of `http://197u.adunna.me/dl/w2.txt` to ***Lab3/w2.txt***.

**Q:** What full command did you use? What text does the file contain?

Question 14

Use the **wget** command to download the directory `http://197u.adunna.me/dl/` to ***Lab3/DL/***. Make sure that you only download this directory, and that you do not go to the parent, as you don't want to accidentally download the virtual machine files from the server.

**Q:** What full command did you use?

## 6 git

You should now work from your local system. This is important as working with GitHub will use your private/public key pair, and you don't want to put your private key on the course server.

Question 15

If you don't already have a GitHub account, create one at `https://github.com/`.

You'll need to add your public key into GitHub. Explore around the interface and find out how to do this. Remember, you can use **cat** to get the contents of your public key file.

Create a new repository in GitHub named ***197ulab3***. Make this repository public.

**Q:** What is your GitHub username? What is the link to your ***197ulab3*** repository, if I want to open it in my web browser on GitHub?

Question 16

First, create the directory ***github*** in your home directory. That is, ***~/github***. Go into the new directory.

Now, clone your ***197ulab3*** repository into this ***github*** directory.

If you haven't used **git** before on this machine, you'll need to configure it with your name and email, which will be used to keep track of commits. At some point when you're interacting with **git**, it will prompt you to do this with the **git config** command. Follow the instructions when it prompts you to do so.

**Q:** What full command did you use to clone the remote repository?

Question 17

Go into the newly cloned repository on your local system. It should be at ***~/github/197ulab3***.

Create a few files (minimum of 3 files) with some text content (minimum of 3 lines per file). Make a folder, and copy one of your three files into the folder.

Now you'll need to **add**, **commit**, and **push** the files to your remote repository. Make sure you use a descriptive commit message!

**Q:** What full commands did you use to add, commit, and push to your remote repository?

Question 18

Go to the GitHub web interface, and go to your repository. You'll be able to make a new file by clicking the "Create new file" button. Name it whatever you'd like and fill in some content. Make sure you use a detailed commit message.

Now **pull** the change you made from the web interface to your local repository. Validate that your file you created in the web interface is in your local repository.

**Q:** What command did you use to pull the remote commit to your local repository? What was the output of the command?