**CPSC 3600 Homework1** Name/s: **Spring 2021 (50 points)**

**Due: 2/16/2021 before 9pm EST.**

**Instructions:**

Can be done individually or in teams of two!!! If you are doing it in teams of two, please make sure that both of you know how to do all the exercises, and make only one submission per team. A great way to collaborate is to use a Zoom session and share screen while you work! You *cannot* talk to other students or teams, you can only talk to your teammate, teacher, or TA. Teammates share the grade. All the skills in this homework are very useful! When submitting your homework, clearly indicate the names on top of the file (no name, no grade). Your screenshots should be trimmed to remove the unneeded areas, so the images are clearly readable. ALL explanations should be in your own words, not copy-pasted from Internet. This file is in the editable document format, so you can make space between questions and type your answers right there. Then save it as a pdf and submit to canvas. Please do not use red font!

**Question 1 (15 points)**

Read the paper “The Unix Time Sharing System” in Files section of canvas. Based on the paper, and possibly with a bit more digging into additional material on Unix/Linux, answer the following questions.

1. Define a process. (1 point)

2. Identify three types of files in Linux. Briefly describe each type in your own words. Find an example of each and paste it here along with its path. (3 points)

3. Summarize the access control system provided by Unix. (4 points)

4. What is an i-node? (1 point)

5. What is a shell? (1 point)

6. What is I/O redirection? Explain what are standard input, standard output and standard error streams are. Please show an example or two of each. (5 points)

**Question 2 (9 points)**

1. Explain the results you see when you run the two pipelines below. A pipeline is a sequence of commands/filters/programs each having its standard output redirected to the standard input of the next command in the sequence. (3 points)

To understand what is going on on the command line, please first research and describe what *wc, head,* and *od* commands are and what their options (*-c -x -ending=big*) mean. (3 points)

a. head -c 5 /dev/urandom | wc

b. head -c 5 /dev/urandom | od -x –endian=big

2. What is the purpose of the /dev directory in Unix/Linux? What is */dev/urandom* and what is its purpose? (3 points)

**Question 3 (9 points)**

Using your VM or a standalone Linux installation, please answer the following questions.

1. Issue the ‘man man’ command on the command line. What information did you find? How many sections does the manual have? Briefly summarize all the findings. (5 points)

2. What is the difference between a ‘man 1 printf’ and ‘man 3 printf’ ? (1 point)

3. What does command *apropos* do? Give two example of how to use it. What is the difference between *man* and *apropos*? (3 point)

**Question 4 (12 points)**

1. Find out what *traceroute* command does and explain it in your own words. When will this command be useful? ( 2 points)

On the *command line*, please issue a command

traceroute www.clemson.edu

Paste a screenshot here. (Plz edit it to trim the areas that are not needed, so that the output is readable) Explain every entry of the output. Did you see any asterisks? What do they mean? There are three sets of time on each line. What are those times? (4 points)

2. Using your favorite search engine, find a visual *traceroute* tool online. (no need to download/install anything, you can use it on the website). Use a known website, other than amazon.com or google.com to run the trace. What information did you find? Does this provide more information than the command-line traceroute? Paste a trimmed screenshot here. (5 points)

**Question 5 (6 points)**

1. Search for an online speed test to determine your network bandwidth. Measure your asymmetrical bandwidth upsteam and downstream. Which one is higher and why? Run the test 4 times and calculate the average upload and download rates. Paste one of the screenshots with test results here. (3 points)

2. Now find another online speed test. Repeat the same. Get the average of the 4 tests again. Are the results consistent between the two different speed tests, or are there variations? Explain why it would be so. (3 points)

**Extra Credit (3 points)**

Using your VM or Linux installation machine, find out how to obtain information about your computer’s network interface using command line utilities. Which file/s in Linux contain your machine’s IP address and other network info. Show a screenshot of the command you ran that shown this info and a screenshot of a file you found.