Operating Systems (CS:3620)

Assignment 1 Total points: 100

Due: by 11:59 pm of September 5, 2017

This assignment will contribute 5% to your final grades.

Submission: Please submit your work through ICON. All of your BASH scripts should be under a single directory named "Assignment-1". You will then zip the "Assignment-1" directory and will name the zip file in the following way: *<last_name>-<first_name>-Assignment_1.zip*. You should replace <last_name> and <first_name> with your last and first name, respectively.

Instructions: For each of the following problem, you will need to write a script file containing the BASH command(s) which solve the problem. Note that, for solving each problem you may need several commands, possibly combining them with pipes. The name of the script file for each problem is mentioned in the associated problem statement below. For instance, the name of the script file for Problem 1 is "problem1.sh". To know how to include your command(s) in a script file consult the following URL: `http://tldp.org/HOWTO/Bash-Prog-Intro-HOWTO-2.html`. After creating the script file, for instance, problem1.sh, there are two ways to execute the script. (1) You can execute the script in the following way: `./problem1.sh`. (2) Another way of executing the script is through the following command: `sh problem1.sh`. **For the first approach, you may have to give the script file executable permission through the following command:** `chmod +x problem1.sh`.

Grading: We will use automated grading scripts with pre-determined inputs and some manual inspection to check each script for correctness. *Please make sure to follow the script file name convention for each problem exactly as directed.* Otherwise, your assignment may not be graded properly. Please make sure you are using an Ubuntu environment for this assignment. We will provide a Ubuntu virtual machine image. Please see the end of the assignment for detailed instructions about setting up the virtual machine image.

Hint: Please make sure you are comfortable with the `grep` BASH command (see `https://ryanstutorials.net/linuxtutorial/cheatsheetgrep.php`), pipes (see `http://tldp.org/HOWTO/Bash-Prog-Intro-HOWTO-4.html`) and also awk command (see `http://www.grymoire.com/Unix/Awk.html#uh-2`).

Cheating and Collaboration: ***This is an individual project****, you can discuss with your peers but cannot copy source code. Please do not copy source code from Internet. Think about the worst-case scenario when you get caught.*

Questions

1. (5 points) Write a BASH script that displays the name of the machine in which you are running the script. **(Do not use the "hostname" command.)** You are supposed to write a script that has the same behavior of the "hostname" command. Please name your script "`problem1.sh`".
2. (10 points) Write a BASH script that should find the 3 largest numbers from the `problem2.txt` input file (this file only contains integers), and then these 3 numbers should be written to "`problem2_highest_values.txt`". Please name your script "`problem2.sh`".
3. (5 points) Write a BASH script that displays the version of gcc running on the machine—in which you are executing the script. **(Do not use the command gcc -dumpversion)**. Your script should generate the same output as in the "`gcc -dumpversion`" command. Please name your script "`problem3.sh`".
4. (10=5+5 points) The problem is divided into the following two parts. Both problems use the XML files found in the folder called "`XML_FILES`".
   (a) Count the number of XML files that contain **AT LEAST ONE** "name" tag with text "car" (e.g., <name>car</name>) in it. Please name this script "`problem4_a.sh`".
   (b) Count the total number of XML tags ("name" tags) with text "car" in it (e.g., <name>car</name>). Please name this script "`problem4_b.sh`".

5. (10 points) Find the 3 smallest (according to their size) hidden files in the "`Problem_5_hidden_dir`" and display their information. Example of how the hidden file information should be displayed is given below.

```
5493092 0 drwxr-xr-x 3 Mitziu staff 102 Feb 19 2017 ./.anaconda
```

   Please name this script "`problem5.sh`".

6. (10 points) Write a BASH script that displays the number of cpu processors in your machine. **(Hint: Processor information can be found in an Ubuntu machine at /proc/cpuinfo)** Please name this script "`problem6.sh`".

7. (10 points) Write a BASH script to display the **command** (e.g., "`/usr/sbin/atd -f`") that is being executed by the process with ID (in short, PID) "1". Please name this script "`problem7.sh`".

8. (10 points) Write a BASH script that displays the number of processes running from the location "`/usr/lib/`". Those processes should have the prefix `/usr/lib/` in their command. Please name this script "`problem8.sh`".

9. (10 points) Continuing from Problem 8, write a BASH script that displays the number of processes running from "`/usr/lib/`" whose USER is **NOT** "root". Please name this script "`problem9.sh`".

10. (20 points) The BASH script you are going to write for this problem is supposed to do several things.

    - Unzip the "`zip_directory.tar.gz`" file. (You need a specific command for uncompressing/compressing `tar.gz` files.)
    - From the unzipped directory, the script should move the files whose names have the suffix"`.txt`" to a directory named "`TXT`".
    - From the unzipped directory, the script should move the files whose names end with "`.jpg`" to a directory named "`JPG`".
    - From the unzipped directory, the script should move the rest of the files to a directory named "`ZIP`".
    - The ZIP directory should then be compressed and named "`zip_directory_zipped.tar.gz`".
    - Finally, the script should remove the directory named `ZIP` (not the compressed one).

    Please name your script "`problem10.sh`".

Virtual Machine Instructions:

For this assignment an Ubuntu image has been provided. Please see "**Instructions**" for links and instructions on how to set everything up.

Instructions

1. Please download and install **VirtualBox** from the following link:
   https://www.virtualbox.org/wiki/Downloads
2. Please download the **sec.ova** images from the following link:
   `https://www.dropbox.com/sh/hpgt3tuyev8hlt6/AADkefjEtdzp9mP4YXU1DvFNa?dl=0`
3. Run **VirtualBox**
4. Go to **File/Import Appliance**
5. In the *Appliance to import* window choose *sec.ova* image file and press **Continue**
6. Press **Import** and then the import process will begin

7. After the *Import* process finishes you can see the imported virtual machine (VM) on the left-side window. Select the VM and then press **Start** in the toolbar.

8. Whenever prompted for username and password use the following credential

   - **Username:** sec
   - **Passowrd:** ces

9. After logging in. Go to ICON from the VM and download the Assignment 1 found in ICON.