Assignment #2

Date Due: October 30, 2019

Total: 100 marks

Please, work on your VM as `sysp` user.

1. Download from moodle server `A2-Filetest.tar.gz` and store it in sysp user home directory.
2. (5 marks) Decompress and restore to content of the archive in your home directory as root.
3. (5 marks) Create a directory called `A2-Name-stdid`, where you replace `Name` with your name, and `stdid` with your student id number. Except for `stdid`, which cannot be determined automatically, all other variables should be determined using UNIX commands. In some cases some variables depending on `stdid` can be computed in advance. In this case these variables should be set to the precomputed values in the file containing commands that needs them. You must show your computations in a file `computation.txt` as indicated bellow. Your working directory should be now `A2-Name-stdid`. These commands, including the one at 2, should be stored in a file `f0` in `A2-Name-stdid`.
4. In the directory `A2-Name-stdid`, create a regular file `f1` containing UNIX commands, such that:
   (a) (5 marks) Finds a regular file or regular files in `$HOME/A2` which is (are) member(s) of the group `sysp` and its length is greater than 0.
   (b) (5 marks) If you find more than one file, select the shortest one.
   (c) (5 marks) Your sequence of UNIX commands should identify that file, copy it in the directory `$HOME/tmp`. Make sure that this directory, `$HOME/tmp`, exists. You can create it before starting the assignment or create it at the start of this sequence of commands. For that file, decompress the archive in `$HOME/tmp`.
   Execute the file `f1`.
5. Create an executable file `f2` containing a list of UNIX commands, in the directory `A2-Name-stdid`, such that:
   (a) (5 marks) Copy the entire content of the subdirectory `Sample`X of the temporary directory created at step 4 into directory `A2-Name-stdid`, where X is corresponding to the selected file (see step 4). X should not be hardcoded as you don't know it.
   (b) (5 marks) Create the directory `CS2820Out` in `A2-Name-stdid`.
   (c) (5 marks) Copy the content of `CS2820Data` in the directory `CS2820Out`, then change the group of all the files in `CS2820Out` to the group `os`. You must execute this last command as user `os` (without changing the working directory) to temporary to allow a `sudo -S` command (`sysp` is not a sudoer, so `sudo` as `sysp` will fail). The group is changed just for the files, not for the parent directory `CS2820Out`.

(d) (5 marks) Give permission to read and execute for others to the entire directory `CS2820in` of `A2-Name-stdid`).

(e) (5 marks) Restrict writing permissions for everybody for all the files in `CS2820in`.

6. The following steps should be performed off-line (on paper):

(a) Determine for your id the remainder mod 7 and store it in a variable \$U, thus \$U=\$id mod 7.

(b) For the result of dividing your id by seven, determine again the remainder mod 7 and store it in a variable \$G. Thus, if q is the quotient of dividing your id by 7, then \$G=$q =$ mod 7.

(c) Set p to be the result of dividing q by 7 and store the remainder of q divided by 7 in a variable \$O.

Example: if your id is 10000, then \$U=1000 mod 7 =6 $q = 1000/7 = 142$, therefore \$G=142 mod 7=2, $p = 142/7 = 20$, therefore \$O=20 mod 7=6.

This computation worths 6 marks and should be included in the file `computation.txt` that should be in the directory `A2-Name-stdid`.

After these computations, create an executable file `f3` containing a list of UNIX commands, in the directory `A2-Name-stdid`, such that:

(a) (5 marks) Files with names starting with letter `c`, containing letter `a` on the fourth position in the directory `CS2820in` of `A2-Name-stdid` are selected and concatenated together in the file `FA2Bout-name-stdid.txt` in `CS2820Out`, where name is your name, and `stdid` is your student id. Before the execution of this command you must ensure that it will work for the user `sysp` without errors, even if you would have a different student id!

(b) (5 marks) If your student id is

i. a multiple of 3, change the permissions for user to \$U, for group to \$G and for others to \$O

ii. a multiple of 3+1, change the permissions for user to \$G, for group to \$O and for Others to \$U

iii. a multiple of 3-1, change the permissions for user to \$O, for group to \$U and for others to \$G

for the file `FA2Bout-name-stdid.txt` in `CS2820Out`. For example, if your id is 1000, $1000 = 999 + 1 = 3 \times 333 + 1$, therefore it is a multiple of 3+1. Thus, the permissions would be 266, which means 010 110 110, equivalent to write for the owner, read and write for the group, and read and write for others. Because the values are pre-computed, your command can be hard-coded (fixed in your code, depending on your student id).

(c) (5 marks) Regardless of the pre-computed permissions, give read and write access to the owner, but disable write access for group and others for the file `FA2Bout-name-stdid.txt` in `CS2820Out`. Please make sure that this command is not hard-coded and it does not depend on your `stdid` value.

(d) (5 marks) List the number of files concatenated together and the statistic for the results in the following format: `FA24Bout-name-stdid.txt` contains `w` words, `c` characters, and `l` lines, where `w`, `c`, `l` are replaced with the actual values.

7. Create an executable file `f4` containing a list of UNIX commands, in the directory `A2-Name-stdid`, such that:

   (a) (5 marks) Execute `f2` and `f3`.

   (b) (5 marks) Moves the first three files starting with letter `b` in alphabetical order from `CS2820in` to `CS2820Out`.

   (c) (5 marks) Delete all the others starting with letter `b`, and list the names of the deleted files.

   (d) (5 marks) Disable execution for `f2` and `f3`.

   (e) (5 marks) Create a directory `temp` in `A2-Name-stdid` with all permissions for everybody.

   (f) (5 marks) Copy `f`Y in this directory giving execution rights for everybody, but `f`Y will be executed as the owner. Y will be replaced with the remainder of your student id divided by 3, then adding 1. Y should be pre-computed and set as a variable in `f4`. For example, if the student id is 10000, then Y is 2.

   (g) (5 marks) tar gzip the entire content of `A2-Name-stdid`; the archive should be created into the parent directory of `A2-Name-stdid`.

   Execute file `f4` after you save it.

8. (5 marks) for each of the files f0–f4, at every step you should print a meaningful message about the command that is about to be executed.

9. Submit the archive `A2-Name-stdid.tar.gz` to the moodle server.

Note: For this assignment, you are not allowed to use any of the commands/programs: awk, sed, Perl, PHP, python, or custom commands compiled from programs written in other high-level programming languages such as C, Java, Pascal, etc.
Because shell control were not taught up to this date, you are not allowed to use any of them. The same will be valid for other shell processing commands such as string processing or arithmetic expressions. You should use only the commands taught in the course until Thanksgiving (October 14, 2019). For using the full power of these commands you are encouraged to consult their manual on the Virtual Machine.
You are allowed/encouraged to use variables to assign various values or the results of some commands.
You are allowed to use variants of grep, but in that case, up to 4 marks could be deducted from the value of the task that grep is used.

Please ***SHOW ALL YOUR WORK!***. Just submitting the files (the samples without the `f`-files) does not award you any points if the commands are not present. Also, you must execute the `f`-files as required in the text of the assignment.

WARNING: Do not assume steps that are not written in the text of the assignment! Please read the text with care and execute commands only as indicated in the text of this assignment.