Fall 2018 (Sep4-Dec4)
Faculty of Computer Science

CSCI 2132 — Software Development

Assignment 2

Due: *Tuesday, Oct 9, 2018 by midnight*
Worth: 85 marks (= 10 + 22 + 20 + 23 + 10)
Instructor: Vlado Keselj, CS bldg 432, 902-494-2893, vlado@dnlp.ca

Assignment Instructions:

Almost all solutions to this assignment must be submitted through SVN as instructed. An exception is question 2, where one part is submitted through SVN and the other parts are about work on the '`~/public_html`' directory without submission to SVN.

The first question must be submitted in the directory *CSID*/`lab3`, the fifth question must be submitted in the directory *CSID*/`lab4`, and the other questions must be submitted in the *CSID*/`a2` directory, where *CSID* is your CSID. Parts of question 2 are not submitted through SVN but involve work on the '`~/public_html`' directory.

1) (10 marks) Complete the SVN lab tutorial as instructed in the SVN lab (lab3) and the lab notes. For this question, you do not need to submit anything. Your work will be directly checked using the directory used for the lab.

2) (22 marks) The answer for the part a) of this question should be saved in the file `a2q2.txt` and submitted using SVN in the following pathname: *CSID*/`a2/a2q2.txt` where *CSID* is your main SVN directory in the repository. The parts b) and c) of this question involve work on your `public_html` directory and they are not submitted through SVN. You could run into technical issues doing this question, and you may need help from TAs, instructor, or helpdesk; so you should try to do it as early as possible. The goal of this question is to make you more comfortable working with the Unix (Linux) command line, navigating directory tree, and understanding importance of permissions.

a) (5 marks) Check the file `~/public_html` on the `bluenose` account. What type of file is this: a regular file, a directory, a symbolic link, or something else? Give more information about this file: if it is a regular file you can specify its size, if it is a directory specify its owner and group owner, if it is a symbolic link specify where it is linking to, or if it is another type of file specify its owner and group owner.

b) (12 marks) This part of the question should demonstrate a situation where file permissions frequently come up as an issue. On your bluenose account, you need to create files and directories so that the following files exist:

```
~/public_html/csci2132/a/test.html
~/public_html/csci2132/b/test.html
~/public_html/csci2132/c/test.html
```

These files may show up on your web site as the URL:
`http://web.cs.dal.ca/~`*CSID*`/csci2132/a/test.html`
and so on for the other files.

Your task is to set up permissions of files and directories in such way that only you (the user) can modify any of the files and directories, but the files are generally visible from the web in the following way:
`http://web.cs.dal.ca/~`*CSID*`/csci2132/a/`
shows content of this directory (2 marks).
`http://web.cs.dal.ca/~`*CSID*`/csci2132/a/test.html`
is readable, and you should put a sample HTML page there, or simply a line of text if you do not know any HTML. This should not be a blank page and it should indicate that it is supposed to be in directory `a`. (2 marks)
`http://web.cs.dal.ca/~`*CSID*`/csci2132/b/`
is not readable from web. (2 marks)
`http://web.cs.dal.ca/~`*CSID*`/csci2132/b/test.html`
is readable, if we know the URL. (2 marks)
`http://web.cs.dal.ca/~`*CSID*`/csci2132/c/`
is readable from web and we can see that it contains `test.html` file. (2 marks)
`http://web.cs.dal.ca/~`*CSID*`/csci2132/c/test.html`
is not readable although we can see that it exists from the previous URL. (2 marks)

You can check how all this should look like by looking at the following URLs:

```
http://web.cs.dal.ca/~prof2132/csci2132/a/
http://web.cs.dal.ca/~prof2132/csci2132/a/test.html
http://web.cs.dal.ca/~prof2132/csci2132/b/
http://web.cs.dal.ca/~prof2132/csci2132/b/test.html
http://web.cs.dal.ca/~prof2132/csci2132/c/
http://web.cs.dal.ca/~prof2132/csci2132/c/test.html
```

Additional note: In your solution, you should use what we learned about file and directories permissions, and the fact that the files can be delivered via web if a process called web server can access them. The server process belongs to a different user, and it needs appropriate execute and read access on directories and files. To be able to display the contents of a directory, the directory should be all readable, but you will also need to create an additional file, named `.htaccess` readable to all with the following contents:

```
Options Indexes
```

c) (5 marks) Make the assignment file `a2.pdf` available in the above directory `a` over the web. You should download the file from the course website and copy it to the described directory. To do this, you will need to use a program to copy from your computer to your `bluenose` account. If you are using `putty`, there is a program in the same package called `pscp` that you can use. If you have a Mac or Linux, then you should read about and use the command `scp` to do this task.

3) (20 marks) There is a small directory tree set up at the publicly visible directory on the bluenose server: `~prof2132/public/a2q3`. You will need to login to your bluenose account, the explore this subdirectory on the file system there, and report any hard or soft link that you can identify there. Submit your results in a ASCII text file with the following pathname in your SVN directory: *CSID*`/a2/a2q3.txt` where *CSID* is your CSID. Briefly explain how you reached your conclusions. You can report your findings using a textual diagram in the following style:

```
/users/faculty/prof2132/public/a2q3
|-- a
|   |-- a1
|   |   |-- f1
|   |   |-- f2
|   |   |-- f3 =hardlink=> f1
|   |   `-- f4 -softlink-> f2
|   `-- a2
|       |-- f1
|       `-- f2
`-- b
```

The files or subdirectories in a directory should be sorted alphabetically. When you detect a hard link you should point a later file to the earlier file in the diagram. This is worthwhile mentioning since hard links do not have a direction but all files are equal. If there is a soft link to a directory, just indicate that it is a soft link and do not list its contents.

4) (23 marks) In this question, you will work with the PuTTY source code. All your answers must be submitted in the SVN directory *CSID*`/a2/a2q4/` where *CSID* is your CSID. Make sure that you submit **only** the required files. In particular, you must not submit PuTTY source code. Marks will be deducted for submitting additional files or directories that are not required.

(a) (5 mark) At the PuTTY download web site:
`https://www.chiark.greenend.org.uk/~sgtatham/putty/latest.html`

you can find the link to PuTTY source code, stored in the file named '`putty-0.70.tar.gz`'. This kind of file with extension '`.tar.gz` is sometimes called a "tarball" and is frequently used to package software source code. You will need to download this file and copy it to your bluenose account. You can use the command '`scp`' on Mac or Linux, or '`pscp`' on Windows to copy file from your machine to bluenose. The program 'pscp' comes in a package with PuTTY. You can also look into directly downloading the file to bluenose using the command '`curl`'.

You need to unpack the "tarball' using the command '`tar`'. If you do not know how to use it, you can use the '`man tar`' command to learn more about it, or find information on the web. Once you learn now to do it, record your unpacking command using the 'script' comand in the file '`a2q4a.script`' and submit this file using SVN, as a part of the *CSID*`/a2/a2q4/` directory.

If you try to run the command and unpack the tarball correctly, and then you want to repeat the command using the 'script' command, you can first remove the unpacked directory using '`rm -rfv putty-0.70`'.

(b) (4 marks) The unpacked files should be in the directory '`putty-0.70`'. Using the 'ls' command with pathname substitutions such as '`dir/*'` or '`dir/*/*'` can be used to explore to how many levels a directory has. For example, if a directory does not have any subdirectories, then it has depth of one level, and so on. What is the depth of the directory '`putty-0.70`'? Explain how the 'ls' command with the above wildcards can be used for this?

Write your answer and explanation in the file `a2q4b.txt` and submit it in using SVN (SVN pathname *CSID*`/a2/a2q4/a2q4b.txt`).

(c) (4 marks) Using a pipeline command with commads 'ls' and 'wc' print the number of C files (files with extension '`.c`') in the directory '`putty-0.70`' and all its subdirectories at all levels. Record your command and answer using the 'script' command in the file '`a2q4c.script`' and submit it using SVN in the the same directory used for this question: *CSID*`/a2/a2q4`

Hint: Before running the command, first examine to which sub-directory level the C files can be found. It is possible to solve this problem using the command 'find' but you are required to use 'ls' and 'wc'.

(d) (4 marks) Using the 'grep' command find all lines in all C files that contain string 'fprintf'. Using a pipeline with 'wc' print the number of such lines. Record these two commands and their outputs using the script command in the file '`a2q4d.script`'.

(e) (3 marks) You need to modify the first 'grep' command from (d) to print only the lines where 'fprintf' appears as a separate word. For example, a line should not be printed if it contains 'fprintf' only as a substring of 'vfprintf'. Record your command and the output using the 'script' command in the file '`a2q4e.script`' and submit it using SVN.

(f) (3 marks) The PuTTY program may sometimes print an error that starts with the string '`signal pipe`'. Use a grep command similar to the one in (e) to find in which file the function ‘fprintf’ is used with the message that contains the string ‘`signal pipe`’. Record your command the the output using the ‘script’ command in the file ‘`a2q4f.script`’, and submit it using SVN.

5) (10 marks) Make sure that you complete the Lab 4 as required. There are a set of files that need to be submitted in this lab in your SVN directory “*CSID*`/lab4`” where *CSID* is your CS userid.