**CSc 3320: Systems Programming**

Spring 2021

Homework

# 1: Total points 100

Submission instructions:

1. Create a Google doc for each homework assignment submission.
2. Start your responses from page 2 of the document and copy these instructions on page 1.
3. Fill in your name, campus ID and panther # in the fields provided. If this information is missing in your document TWO POINTS WILL BE DEDUCTED per submission.
4. Keep this page 1 intact on all your submissions. If this *submissions instructions* page is missing in your submission TWO POINTS WILL BE DEDUCTED per submission.
5. Each homework will typically have 2-3 PARTS, where each PART focuses on specific topic(s).
6. Start your responses to each PART on a new page.
7. If you are being asked to write code copy the code into a separate txt file and submit that as well.
8. If you are being asked to test code or run specific commands or scripts, provide the evidence of your outputs through a screenshot and copy the same into the document.
9. Upon completion, download a .PDF version of the document and submit the same.

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**PART 1**

**Answer the following questions briefly. Provide clear and succinct reasoning.**

**Points per question = 5**

1. Tell the differences between Unix and Linux. Then please list some operating systems (at least three) which belong to Unix but not Linux.

Linux is open source and Unix is not. Linux is free to use and Unix is licensed OS. Linux is used in wide varieties from desktop, servers, smartphones to mainframes and Unix is mostly used on servers, workstations or PCs.

Three UNIX based Operating Systems are Oracle Solaris, Darwin, and HP-UX.

2. What is the pipe mechanism in UNIX? And show one command using pipe and explain how the pipe works in it?

A pipe is a form of redirection that is used in Linux and other Unix-like operating systems to send the output of one program to another program for further processing.

cat realestate.csv | less

cat shows the content of the realestate.csv file but loads everything and reaches the bottom result. The | less function however allows the user to scroll through the file with arrow keys as the user reads.

3. In a Linux system, you can issue the command **ls /** to check the sub directories under root. Please describe the meanings of directory /bin, /dev, /boot, /usr, /etc, /mnt, /sbin, /var separately. For example, you can say that /bin contains binary executable files.

/bin contains the executable programs that must be available in order to attain minimal functionality for the purposes of booting and repairing a system.

/dev contains the device files for every hardware device attached to the system. They are files that represent each device on the computer and facilitate access to those devices.

/boot stores data that is used before the kernel begins executing user-mode programs. In other words, holds files used in booting the operating system.

/usr is where user-land programs and data are. It used to contain user home directories.

/etc is a folder that contains all the system configuration files in it.

/mnt is a generic mount point under which you mount your filesystems or devices. It mounts storage devices, such as CDROMs, floppy disks and USB. A filesystem becomes available to the system and after mounting the files will be accessible under the mount-point.

/sbin contains executable files for the user to use.

/var contains files to which the system writes data during its operation. The files are variable data like system logging files and transient and temporary files.

4. What is the meaning of Multitask and Multi-user in a Unix system?

Multitasking refers to an operating system in which multiple processes can run on the same system at the same time.

Multi-user is a computer system that allows multiple users to access a single system's OS simultaneously.

5. What does -rwxr-xr-x mean in terms of permissions for a file? What is the exact unix command (with the octal representation) for changing the permissions to this setting?

The owner can read, write, and execute. The group can read and execute. Others can read and execute.

chmod 755

6. In class, you have learned the meaning of read, write and execute permission for regular files. However, these permissions are also applied to directories. So please describe the meaning of read, write, and execute permission for directory.

Read permission means that the user may see the contents of a directory.

Write permission means that a user may create files in the directory.

Execute permission means that the user may enter the directory and make it the current directory.

**Part II-a**

**Regular Expression**

**Find outcomes for each given basic/extended regular expression (maybe multiple correct answers)**

**Points per question: 2.5**

|  |
| --- |
| *Example:*  *‘ab+a’* （*extended regex*）  ***Answer****: aba , abba ; Pattern : The matched string should begin and end with ‘a’ and ‘b’ occurs at least once between leading and ending ‘a’)* |

Note: 7) to 10) are basic regexes; Note: 11) to 18) are extended regexes.

7) ‘a[ab]\*a’

aa, aaba, abaa

8) ‘a(bc)?’

a, abc

9) ‘.[ind]\*’

find, mind, minddd, findndi, f

10) ‘[a-z]+[a-z]’

abcdz, az, by, yarn

11) ‘[a-z] (\+[a-z])+’

a+a, b+b, g+k+h

12) ‘a.[bc]+’

ab, abc, acb, ac, abb, acc

13) ‘a.[0-9]’

a0, a1, a2, a3, a4, a5, a6, a7, a8, a9

14) ‘[a-z]+[\.\?!]’

a. , a?, a! , aa. , ab? , abc!

15) ‘[a-z]+[\.\?!]\s\*[A-Z]’

a.A, a?A, a!A, a.sA, a?sA, aac!ssssB

16) ‘(very )+(cool )?(good|bad) weather’

verygood weather, veryverybad weather, verycoolgood weather

17) ‘-?[0-9]+’

-0, 0, -1, 1, 2, 3, 4, 5, 6, 7, 8, 9, -9

18) ‘-?[0-9]\*\.?[0-9]\*’

-, 0, -00.98, -8882, 4444.44

**Part II-b**

**Regular Expression**

**Write down the extended regular expression for following questions. E.g. Social security number in the format of 999-99-9999. Answer: [0-9]{3}-[0-9]{2}-[0-9]{4}**

**Points per question: 5**

19) Valid URL beginning with “http://” and ending with ".edu" (e.g. http://cs.gsu.edu, http://gsu.edu)

(http:\/\/)[a-z\.]\*(\.edu)

20) Non-negative integers. (e.g. 0, +1, 3320)

\+?[0-9]+

21) A valid absolute pathname in Unix (e.g. /home/ylong4, /test/try.c)

(\/[a-z\.0-9]+)+

22) Identifiers which can be between 1 and 10 characters long, must start with a letter or an underscore. The following characters can be letters or underscores or digits. (e.g. number, \_name1, isOK).

[a-zA-Z\_][a-zA-Z\_0-9]?[a-zA-Z\_0-9]?[a-zA-Z\_0-9]?[a-zA-Z\_0-9]?[a-zA-Z\_0-9]?[a-zA-Z\_0-9]?[a-zA-Z\_0-9]?[a-zA-Z\_0-9]?[a-zA-Z\_0-9]?

It is made so that it is 1 to 10 characters long.

23) Phone number in any of the following format: 9999999999,999-999-9999, (999)-999-9999. (Note: all of these formats should be matched by a single regular expression)

(\(?[0-9]+\)?-?)(\(?[0-9]+\)?-?)(\(?[0-9]+\)?-?)(\(?[0-9]+\)?-?)(\(?[0-9]+\)?-?)(\(?[0-9]+\)?-?)(\(?[0-9]+\)?-?)(\(?[0-9]+\)?-?)(\(?[0-9]+\)?-?)(\(?[0-9]+\)?-?)

(\(?[0-9]+\)?-?) is typed 10 times to account for the total of 10 digits.

**Part III**

**Programming**

**Points per question: 15**

24. Create a file named homework\_instructions.txt using VI editor and type in it all the submission instructions from page1 of this document. Save the file in a directory named *homeworks* that you would have created. Set the permissions for this file such that only you can edit the file while anybody can only read. Find and list (on the command prompt) all the statements that contain the word POINTS. Submit your answer as a description of what you did in a sequential manner (e.g. Step1 … Step 2… and so on..). Add a screenshot to your answer as a proof of evidence.

Step 1: cd ~

Step 2: mkdir homeworks

Step 3: cd homeworks

Step 4: vim homework\_instructions.txt

Step 5: Press I to activate insert mode

Step 6: Type in submission instructions from page 1 of document.

Step 7: Press “Esc” and type in “:wq” to save and exit

Step 8: chmod 644 homework\_instructions.txt

Step 9: vim homework\_instructions.txt

Step 10: /POINTS for command line.

The statements that contained the word “POINTS” is:

If this information is missing in your document TWO POINTS WILL BE DEDUCTED per submission.

If this submissions instructions page is missing in your submission TWO POINTS WILL BE DEDUCTED per submission.



