

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.

The older versions of Unix use either SystemV or BSD as a foundation, but newer versions incorporate features of both. Unix was developed by a single user looking to build faster OS for a video game he was creating.

Linux was written by many programmers from around the world and it is marketed and supported by several companies. Linux is a complete reimplement of Unix and does not share common code with any version of Unix so it is not a part of the 'family tree'.

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

The pipe mechanism in Unix is a one-way medium-speed data channel used to connect one process to another as long as they are located on the same machine. It helps to break down larger and more complicated tasks into smaller, more manageable tasks that are then combined using the pipe '|'. It is used to indicate that the output of a process will be used as the input for the next process.

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 binary executable files that have to be available to obtain minimal functionality for booting.

/dev - the location of special or device files such as CD drive, hard disk, etc.

/boot - contains everything needed for the boot process with the exception of configuration files not needed at boot time and the map installer.

/usr - contains the largest share of data on a system; contains all user binaries, their documentation, libraries, header files, etc.

/etc - contains all system configuration files.

/mnt - Temporary mount point for when you insert a USB stick which gets mounted under /mnt.

/sbin - Contains executable programs for system administration.

/var - Contains variable data such as news, mail spool files, and logs that are constantly modified by various programs running on the system.

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

Multitasking is when many programs run simultaneously. Multi-user means that more than one user can be working at any given time.

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?

-rwxr-xr-x means the user/owner has permission to read, write, and execute the file; the group is allowed to read and execute the file, and 'others' are allowed to read and execute the file. The exact Unix command for changing the permissions to this setting is **chomod 755 example.txt**.

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.

In regards to permissions for a directory, read means the process may read the directory, write means the process can add or remove files in the directory, and execute means the process can access files in the directory or its subdirectories.

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)

a) ababa b) aba c) abba d) aabbaa e) aa

Answer: *b,c ; 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' Outcomes: aaaa, abba, aaba

8) 'a(bc)?' Outcomes: abc, a

9) '[ind]*' Outcomes: ind, iiiiiiiii, nnnnnnn, ddddddd, bin, bininin

10) '[a-z]+[a-z]' Outcomes: be, happy,

11) '[a-z] (\+[a-z])+' Outcomes: j+l, m+m+m+m, m+l

12) 'a.[bc]+' Outcomes: anbb, a5cb, a0cc

13) 'a.[0-9]' Outcomes: a.9, at6, am3

14) '[a-z]+[\.\?!]' Outcomes: am?, be., zzzzzzzzzzzzz!

15) '[a-z]+[\.\?!]\s*[A-Z]' Outcomes: hh?k, we.Y, ch! I

16) '(very)+(cool)?(good|bad) weather' Outcomes: verycoolbad weather, verycoolgood weather, veryverybad weather

17) '-?[0-9]+' Outcomes: -888888, -9696, 55

18) '-?[0-9]*\.[0-9]*' Outcomes: -98.6, 98.6, -100

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-zA-Z]+\.(?:edu)`

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

`\+?[0-9]*`

21) A valid absolute pathname in Unix (e.g. /home/yelong4, /test/try.c)

`(\/[a-zA-Z0-9]*)+\.(?:[a-zA-Z])+`

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-Z0-9_]{0,9}))$`

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]{10}$|^[0-9]{3}\-[0-9]{4}$|^\([0-9]{3}\)\-[0-9]{3}\-[0-9]{4}$`

Part III

Programming

Points per question: 15A

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.

Step1: Create directory named Homeworks

ls to see existing files

cd public to go into the public directory

ls to see existing files in public directory

cd Submission to go into the Submission directory

cd ../ to go back to public directory to create Homeworks in public

mkdir Homeworks to create the new directory

Step 2: Create `homework_instructions.txt` in the Homeworks directory

cd Homeworks to access the new directory

vi homework_instructions.txt to create the new file and added the text while in the new .txt file

ESC to go back to command line mode

:wq to save and quit

cat homework_instructions.txt to ensure the file was saved as expected.

Step 3: Update permissions to this newly created file.

ls -l homework_instructions.txt to verify the current permissions

chmod g-w homework_instructions.txt to remove write access from the group

grep -inw 'POINTS' homework_instructions.txt to search for statements with the word POINTS in them. Statements 3 & 4 (lines 4 & 5) are showing in the output. See screenshot below.

```
es Terminal Jan 28 12:52
jrogers75@gsuad.gsu.edu@snowball:~/public/Homeworks
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```