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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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.

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

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.

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

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?

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.

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'

8) 'a(bc)?'

9) '.[ind]*'

10) '[a-z]+[a-z]'

11) '[a-z] (\+[a-z])+'

12) 'a.[bc]+'

13) 'a.[0-9]'

14) '[a-z]+[\.\?!]'

15) '[a-z]+[\.\?!]\s*[A-Z]'

16) '(very)+(cool)?(good|bad) weather'

17) '-?[0-9]+'

18) '-?[0-9]*\.?[0-9]*'

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)

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

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

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).

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)

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.

1. <mark>Linux and Unix share no common code, therefore Linux is not a Unix system, however they are functionally similar.</mark>

- System V by AT&T's Bell Laboratories

- Berkely Standard Distribution (BSD) by Universify of California Berkely

- Sun OS by Solaris

-OSF/1 by IBM

- HP/UX by HP

-Apollo

2. A pipe specifies that the output of one process is to be used as the input of another process, using multiple pipe to connect processes is reffered to as a pipeline

$ ls -l | head -5

ls – l outputs a 'long' list of you're current directory, then pipes it into the head utility as an input. Head in turns returns the top 5 lines from the input and prints them to the terminal

3.

/bin – contains binary executable files

/dev – location for device files

/boot – contains items required for booting the system

/usr – contains user specific files

/etc – contains system related config files

/mnt – location where you can mount various devices such as storage disks, CD

/sbin – executables that are mostly administrative tools

/var – contains files that the system writes to during operation

4. <mark>Unix allows for many users to use the system simultaneously as well as run multiple tasks each at the same time</mark>

5. The first 3 represent the permissions to the user who owns the file, the next 3 refer to the group permissions, and the last three are for others

$ chmod 755

6.

r – allows user to view the directory contents

w – allows user to create or delete files in a directory

x – allows user to enter directory and execute programs inside

Part II-a Answers

7) aa, aaa, aba, aaaa, abba, abababa

8) a(bc)?

9) 1i, 2n, 3d, Aind, And, Zinin

10) a+a, a+b, z+z, z+a

11) a +a, a +a+a, a +b+c+d

12) a1b, a1bb, a1c, aTbcbc

13) aa1, a11, ao9, ab5, a 6

14) a., aa?, zz!, abc!

15) a.A, aa? B, zz! C, abc!   D,

16) very very cool bad weather, very cool good weather, very bad weather

17) invalid, shell tries to treat the '?' as a flag at when '-' is at beginning of string

18) invalid, shell tries to treat the '?' as a flag at when '-' is at beginning of string

Part II-b Answers

19) -i '(http(s)?://)[a-zA-Z0-9\.\-]{1,63}(\.edu)'

20) '^\+?[0-9]+'

21) '^(/[a-zA-Z0-9\._]+)+(\.[a-zA-Z]+)?'

22) '[a-zA-Z_]\w{1,9}?'

23) '\(?[0-9]{3}\)?(-| |\.)?[0-9]{3}(-| |\.)?[0-9]{4}'

Part III Answers

Step 1) create homeworks directory using command

mkdir -p ~/public/homeworks

Step 2) cd to new location for ease

cd public/homeworks

Step 3) use visual editor to create txt file and type instructions into file

vim homework_instruction.txt

Step 4) use chmod to change the permissions on the file so that only I can edit while anyone else can only read

chmod 744 homework_instructions.txt

Step 5) check to make sure permissions are correct

ll

Step 6) list all statements that contain the word POINTS

grep -E –color -ni 'points' homework_instructions.txt

```
tracy@UWUntu:~$ ssh tmichaels1@snowball.gsu.edu
The authenticity of host 'snowball.gsu.edu (23.221.222.250)' can't be established.
ECDSA key fingerprint is SHA256:9TkQHR6l5j3Wi4F2pdC9y0/MvdnzElWrA6YtVydQXGc.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'snowball.gsu.edu,23.221.222.250' (ECDSA) to the list of known hosts.
tmichaels1@snowball.gsu.edu: Permission denied (publickey).
tracy@UWUntu:~$ ssh tmichaels1@snowball.cs.gsu.edu
tmichaels1@snowball.cs.gsu.edu's password:
Last login: Sun Jan 24 20:39:17 2021 from 99.64.80.138
    +
    |   GSU Computer Science
    |   Instructional Server
    |   SNOWBALL.cs.gsu.edu
    +
[tmichaels1@gsuad.gsu.edu@snowball ~]$ client_loop: send disconnect: Broken pipe
tracy@UWUntu:~$ ssh tmichaels1@snowball.cs.gsu.edu
tmichaels1@snowball.cs.gsu.edu's password:
Last login: Wed Jan 27 17:48:54 2021 from 99.64.80.138
    +
    |   GSU Computer Science
    |   Instructional Server
    |   SNOWBALL.cs.gsu.edu
    +
[tmichaels1@gsuad.gsu.edu@snowball ~]$ ls
csc3320   public   sandbox
[tmichaels1@gsuad.gsu.edu@snowball ~]$ ls csc3320
lab1    lab11   lab13   lab15   lab17   lab19   lab20   lab22   lab24   lab26   lab4   lab6   lab8
lab10   lab12   lab14   lab16   lab18   lab2    lab21   lab23   lab25   lab3    lab5   lab7   lab9
[tmichaels1@gsuad.gsu.edu@snowball ~]$ ls public
myRealEstate.csv   Others   Submission
[tmichaels1@gsuad.gsu.edu@snowball ~]$ mkdir -p public/homeworks
[tmichaels1@gsuad.gsu.edu@snowball ~]$ cd public/homeworks
[tmichaels1@gsuad.gsu.edu@snowball homeworks]$ vim homework_instructions.txt
[tmichaels1@gsuad.gsu.edu@snowball homeworks]$ chmod 744 homework_instructions.txt
[tmichaels1@gsuad.gsu.edu@snowball homeworks]$ ll
total 4
-rwxr--r--. 1 tmichaels1@gsuad.gsu.edu tmichaels1@gsuad.gsu.edu 741 Jan 27 21:35 homework_instruction
s.txt
[tmichaels1@gsuad.gsu.edu@snowball homeworks]$ grep -E --color -ni 'points' homework_instruction.txt
grep: homework_instruction.txt: No such file or directory
[tmichaels1@gsuad.gsu.edu@snowball homeworks]$ grep -E --color -ni 'points' homework_instructions.txt

4:3. Fill in your name, campus ID and panther # in the fields provided. If this information is missin
g in your document TWO POINTS WILL BE DEDUCTED per submission.
[tmichaels1@gsuad.gsu.edu@snowball homeworks]$ vim homework_instructions.txt
[tmichaels1@gsuad.gsu.edu@snowball homeworks]$ grep -E --color -ni 'points' homework_instructions.txt
4:3. Fill in your name, campus ID and panther # in the fields provided. If this information is missin
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5:4. Keep this page 1 intact on all your submission TWO POINTS WILL BE DEDUCTED per submission
[tmichaels1@gsuad.gsu.edu@snowball homeworks]$ 
```