rCSc 3320: Systems Programming
Fall 2021
Homework
1: Total points 100

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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.

> Answer : Unix is a system created at bell labs mid century. Linux is an open source "version" of Unix that mimics most of its commands exactly.
>
> Unix OS: System V, BSD, HP-UX

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

> Answer : The pipe takes output of the current command and uses it as the input for the following.
>
> example : cat myFile.txt | sort

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.

Answer :

/bin: Contains binaries for system programs.

/dev: Contains files representing devices the system can recognize. Eg. Discs, usb devices, keyboards

/boot: Contains files needed for the system to boot such as the main linux kernel, bootloader and other core files.

/usr: Contains binary programs and data for regular users.

/etc: Contains human readable config files for the system.

/mnt: files for temporary mount points like CDs, USB drives and floppy discs

/sbin: binary files available to the system admin/root user needed for booting the system. Similar to /bin

/var: For files that change often like log files for various programs.

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

Answer :

Multitask: Unix can multitask by splitting up processor time between selected applications. Typically time on the order of seconds is split up into blocks and assigned to various processes which gives the appearance that they are all running at one time.

Multi-User: System resources are accessible and shared by more than one user at a time and processes between them can be carried out simultaneously. In a classical sense, users can all access a host system via terminals simultaneously. The host takes care of how CPU and storage are allocated to users based on tasks and priority.

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?

Answer :

Owner permissions: Read, write, execute

Group permissions: Read, execute

Public permissions: Read, execute

Command: chmod 755 file.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.

Answer :

Directory level permissions allow the user to have that level of access to all items contained in that directory.

read(r): Allows user to view the files in the directory

write(w): Allows user to create or edit files within the directory. Also allows user to modify directory attributes.

execute(x): Allows user to access the directory, and files/directories within.

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'

   Example : abba, aaabaa, aba ;

   Pattern: String begins and ends with a with a or b one or more time.

8) 'a(bc)?'

   Example : a, abc ;

   Pattern : String begins with a and ends in at most one instance of 'bc'.

9) '.[ind]*'

   Example : Xiiiid, i, fnnnnnnnn ;

   Pattern : At most one of any character followed by 0 or more characters matching 'i', 'n' or 'd'.

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

   Example : ab, zabsadf ;

   Pattern : Two or more characters matching a to z.

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

Example : b +q+f, a +b+c+d+e ;

Pattern : Exactly one character in a-z and a space followed by a + symbol and one character a-z (grouped) any number of times.

12) 'a.[bc]+'

Example : aQccb, aQb ;

Pattern : 'a' and any one character followed by one or more characters matching 'b' or 'c'.

13) 'a.[0-9]'

Example : a%1, aQ4 ;

Pattern : 'a' followed by any character followed by one number in the range 0-9

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

Example : ds?, ffffff! ;

Pattern : Character in a-z one or more times followed by one period, exclamation or question mark (., !, ?)

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

Example : faa!GA, a? C ;

Pattern : Char in a-z one or more times; (.), ? or ! one time; space zero or more times and finally exactly one char A-Z.

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

   Example : very cool bad weather, very good weather ;

   Pattern : 'very ' one or more times, followed by 'cool ' at

most once; good or bad once and finally ' weather' exactly once.

Spaces present in all strings are required.

17) '-?[0-9]+'
   Example : 444, -11. -1 ;
   Pattern : '-' at most once followed by a char in 0 to 9 one or more times.

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

   Example : '-', -4.5., -4.;

   Pattern : '-' at most once followed by a char in 0 to 9 zero or more times;
At most one (.) period symbols followed by a char in 0 to 9 zero or more
times.

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)

Answer : (http:\/\/).+(\.edu)

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

Answer : ^\+*[0-9]+$

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

Answer : ^(\/\S+)

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).

Answer : ^[_a-zA-Z][\w]{1,9}$

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)

Answer : \(*[\d]{3}\)*-*[\d]{3}-*[\d]{4}

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) mkdir homeworks
2) cd homeworks
3) vi homework_instructions.txt
4) i (enter insert mode)
5) Type instructions
6) :wq (save file and quit vi)
7) Chmod g-w homework_instructions.txt
8) grep POINTS homework_instructions.txt

```
[rtognoni1@gsuad.gsu.edu@snowball homeworks]$ cat homework_instructions.txt
Submission instructions:
Create a Google doc for each homework assignment submission.
Start your responses from page 2 of the document and copy these instructions on page 1.
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
.
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 submissi
on.
Each homework will typically have 2-3 PARTS, where each PART focuses on specific topic(s).
Start your responses to each PART on a new page.
If you are being asked to write code copy the code into a separate txt file and submit that as well.
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.
Upon completion, download a .PDF version of the document and submit the same.

[rtognoni1@gsuad.gsu.edu@snowball homeworks]$ ls -l homework_instructions.txt
-rw-rw-r--. 1 rtognoni1@gsuad.gsu.edu rtognoni1@gsuad.gsu.edu 985 Sep 19 14:52 homework_instructions.txt
[rtognoni1@gsuad.gsu.edu@snowball homeworks]$ chmod g-w homework_instructions.txt
[rtognoni1@gsuad.gsu.edu@snowball homeworks]$ ls -l homework_instructions.txt
-rw-r--r--. 1 rtognoni1@gsuad.gsu.edu rtognoni1@gsuad.gsu.edu 985 Sep 19 14:52 homework_instructions.txt
[rtognoni1@gsuad.gsu.edu@snowball homeworks]$ grep POINTS homework_instructions.txt
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
.
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 submissi
on.
[rtognoni1@gsuad.gsu.edu@snowball homeworks]$
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