CSc 3320: Systems Programming

Spring 2021

Homework1

KEY

1: Total points 100

PART 1

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.

A.

★ There are many differences. However, your answer must include "Linux is one of the distributions of Unix system". (3 points)

★ The following OS belongs to Unix, but not a linux:

- BSD, Solaris, Mac OS and etc.

(2 points, -1 point if missing one or two)

Refer to more details under link below

https://www.cyberciti.biz/faq/what-is-the-difference-between-linux-a nd-unix/

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

A.

★ Pipe: take the output from one command as the input of next command (2 point)

★ Example & Explanation (3 points)

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.

A. (each for half points)

★ /bin : contain binary executable files
★ /dev : contain device files
★ /boot : boot-loader related files
★ /usr : user's programs and files
★ /etc : configuration files
★ /mnt : temporary mount directories
★ /sbin : contain binary executable files
★ /var : contain variable files

Refer to more details under the link below
http://www.thegeekstuff.com/2010/09/linux-file-system-structure/?utm_source=tuicool

4. What is the meaning of Multitask and Multi-user in a Unix system?
A.
Multitask: multiple tasks are running at the same time (2 Points)
Multiuser: multiple users can access to the system at the same time. (3 Points)

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?
A.

Users can read, write, and execute. Group and others can read and execute but cannot write. (3 Points)
rwx - read "on", write "on", execute "on" – 111 – 7
r-x - read "on", write "off", execute "on" – 101 – 5
r-x - read "on", write "off", execute "on" – 101 – 5

UNIX Command:
chmod 755 <file-name> (2 Points)

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.
A.
read : list the content in the directory (2 Points)
write : create , remove the directories or files in the directory (2 Points)
execute : enter into the directory (1 Point)

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'

A. ababa, aaba, aabbaa, aa

Starts with 'a', ends with 'a', with 0 or more 'a's or 'b's in between

8) 'a(bc)?'

A. abc, a

Starts with 'a' followed by 0 or 1 'bc's

9) '.[ind]*'

A. wind, end

Start with any character but end with a combination of "i", "n" and "d"

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

A. xa

One or more lowercase letters followed by a lower-case letter. Matches any string of lowercase letters of size 2 or more

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

A. a +b+c, x +a

An expression for adding multiple variables followed by space, each variable should be represented by a lower-case letter.

12) 'a.[bc]+'

A. azbc, azbcbc, acc

"a" appears at the beginning, followed by any single character, which is then followed by a combination of "b" and "c"

13) ‘a.[0-9]’
A. a01
Starts with ‘a’ followed by any character, followed by a number

14) ‘[a-z]+[\.\?!]’
A. good! hard? cool?
Starts with 1 or more lowercase letters followed by a ‘.’, ‘?’ or a ‘!’

15) ‘[a-z]+[\.\?!]\s*[A-Z]’
A. book. Z
Starts with 1 or more lowercase letters, followed by a ‘.’, ‘?’ or a ‘!’, followed by 0 or more whitespace characters, followed by a capital letter

16) ‘(very)+(cool)?(good|bad) weather’
A. very good weather, very cool bad weather
Starts with 1 or more ‘very ‘s, followed by an optional ‘cool ‘, followed by ‘good’ or ‘bad’, followed by ‘weather’

17) ‘-?[0-9]+’
A. 3312(positive or negative integer), -2231
Starts with an optional ‘-’ followed by 1 or more numbers

18) ‘-?[0-9]*\.?[0-9]*’
A. 3312, -2231, 2/3
Starts with an optional ‘-’, followed by 0 or more numbers, followed by an optional ‘.’, followed by 0 or more numbers.

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)

A. http:\/\/.+\.edu

http:\/\/	2 point
.+	1 point
\.edu	2 point

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

A. \+?[1-9][0-9]*|0

\+?	2 point
[1-9][0-9]*	2 points
|0	1 point

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

A. \/	1 point
(\w*\/)*	2 point
(\w*|\w*.\w*)	2 point

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.

[a-zA-Z_][a-zA-Z0-9_]{0,9}

[a-zA-Z_]	2 point
[a-zA-Z0-9_]	2 point
{0,9}	1 point

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)

A. \(?[0-9]{3}\)?-?[0-9]{3}-?[0-9]{4}

\(?[0-9]{3}\)?	1 point
-?	1 point
[0-9]{3}	1 point
-?	1 point
[0-9]{4}	1 point

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

(Points per step:1)

Step1: Create homeworks directory on the local machine (mkdir homeworks)
Step2: Change the directory to homeworks (cd homeworks)
Step3: Create homework_instructions.txt file (vi homework_instructions.txt)
Step4: Press i and enter into insert mode
Step5: Copy and paste the homework instructions
Step6: Press esc key and use command wq (write and quit)
Step7: Check the current permissions (ls -la)
Step8: Change the permission as required i.e you can edit the file while anyone can only read (chmod 644 homework_instructions.txt)
Step9: use command (cat homework_instructions.txt) to display the contents in the file
Step10: Search for POINTS keyword (grep POINTS)

(Screenshot is attached below) - 5 Points

```
bash-3.2$ pwd
/Users/himajabharthepudi/Documents
bash-3.2$ ls
TA              WebEx           modified.key
bash-3.2$ cd TA
bash-3.2$ ls
bash-3.2$ mkdir homeworks
bash-3.2$ ls
homeworks
bash-3.2$ cd homeworks
bash-3.2$ vi homework_instructions.txt
bash-3.2$ vi homework_instructions.txt
bash-3.2$ ls -la
total 8
drwxr-xr-x  3 himajabharthepudi  staff   96 Jan 29 14:52 .
drwxr-xr-x  4 himajabharthepudi  staff  128 Jan 29 14:48 ..
-rw-r--r--  1 himajabharthepudi  staff  959 Jan 29 14:51 homework_instructions.txt
bash-3.2$ chmod 644 homework_instructions.txt
bash-3.2$ ls -la
total 8
drwxr-xr-x  3 himajabharthepudi  staff   96 Jan 29 14:52 .
drwxr-xr-x  4 himajabharthepudi  staff  128 Jan 29 14:48 ..
-rw-r--r--  1 himajabharthepudi  staff  959 Jan 29 14:51 homework_instructions.txt
bash-3.2$ cat homework_instructions.txt | grep POINTS
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 submission.
bash-3.2$ history
    1  clear
    2  pwd
    3  cd Documents
    4  ls
    5  TA
    6  clear
    7  pwd
    8  ls
    9  cd TA
   10  ls
   11  mkdir homeworks
   12  ls
   13  cd homeworks
   14  vi homework_instructions.txt
   15  vi homework_instructions.txt
   16  ls -la
   17  chmod 644 homework_instructions.txt
   18  ls -la
   19  cat homework_instructions.txt | grep POINTS
   20  history
bash-3.2$
```