**CSc 3320: Systems Programming**

Fall 2021

Midterm 1: Redo

Submission instructions:

1. Create a Google doc for your 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 TWO POINTS WILL BE DEDUCTED.
4. Keep this page 1 intact. If this *submissions instructions* page is missing in your submission TWO POINTS WILL BE DEDUCTED.
5. Start your responses to each QUESTION on a new page.
6. If you are being asked to write code copy the code into a separate txt file and submit that as well. The code should be executable. E.g. if asked for a C program then provide myfile.c so that we can execute that script. In your answer to the specific question, provide the steps on how to execute your file (like a ReadMe).
7. If you are being asked to test code or run specific commands or scripts, provide the evidence of your outputs through a screenshot and/or screen video-recordings and copy the same into the document.
8. Upon completion, download a .PDF version of the google doc document and submit the same along with all the supplementary files (videos, pictures, scripts etc).
9. Scripts/Code without proper comments, indentation and titles (must have the name of the program, and name & email of the programmer on top the script).

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**Questions 1-5 are 20pts each**

1. (20 pts) Pick any of your 10 favorite Unix commands. For each command run the *man* command and copy the text that is printed into a mandatabase.txt. Write a shell script *helpme.sh* that will ask the user to type in a command and then print the manual’s text associated with that corresponding command. If the command the user types is not in the database, then the script must print

*sorry, I cannot help you*

Creating mandatabase.txt file

A picture containing graphical user interface

Description automatically generated

Running helpme.sh

Text

Description automatically generated

Readme for question 1: 1) Run script: ./helpme.sh 2) Enter a command such as: ls

Finally, user manual of that command will be displayed if command is found in mandatabase.txt file.

If command is not found in txt file, it will print: *sorry, I cannot help you*

2. (10pts each) On your computer open your favorite Wikipedia page. Copy the text from that page into a text file **myexamfile.txt** and then copy that file to a directory named **midterm** (use mkdir to create the directory if it doesn’t exist) in your snowball server home directory (use any FTP tool such as Putty or FileZilla to copy the file from your computer to the remote snowball server machine: see Lab 6).

a. Write a shell script that will find the number of statements in the text. A statement is defined as the collection of text between two periods (full-stops).

b. Update the script to present a tabular list that shows the number of words and number of letters in each statement.

Using WinSCP to copy myexamfile.txt to /home/aiftikhar2/midterm\_redo/q2:

Graphical user interface, application

Description automatically generated

Running script.sh:

Text

Description automatically generated

Readme for question 2: Run script: ./script.sh

Program will read myexamfile.txt and Total number of statements (part a) with no. of words and letters in each statement will be displayed in tabular form (part b).

3. (20pts) Design a calculator using a shell script using regular expressions. The calculator, at the minimum, must be able to process addition, subtraction, multiplication, division and modulo operations. It must also have cancelled and clear features.

Running calculator.sh

Text

Description automatically generated

Readme for question 3:

1) Run script ./calculator.sh

2) Enter integers or operators to perform simple calculations (Addition, subtraction, multiplication, division, modulation).

3) After performing each calculation, calculator stores result by default just like a simple calculator (to be used in next calculation)

4) Clear function: resets previously stored values to zero

5) Cancel function exits calculator program

4. (20pts) Build a phone-book utility that allows you to access and modify an alphabetical list of names, addresses and telephone numbers. Use utilities such as awk and sed, to maintain and edit the file of phone-book information. The user (in this case, you) must be able to read, edit, and delete the phone book contents. The permissions for the phone book database must be such that it is inaccessible to anybody other than you (the user).

Text

Description automatically generated

Readme: Run script ./phonebook.sh

This program will guide user to perform functions of displaying, searching, adding, editing, or deleting contacts in phonebook. After user is done with above functions, he can also exit program.

Text

Description automatically generated

5. (4 pts each) Give brief answers with examples, wherever relevant:

1. What is the use of a shell?

Shell is command line virtual interface between user and operating system. It reads commands from users, interprets them, and runs/executes programs accordingly. In addition, it also performs background processing.

1. Is there any difference between the shell that you see on your PC versus that you see on the snowball server upon login? If yes, what are they? Provide screenshots for examples.
   * + Operating System: On my PC, I have power shell which is shell for Windows operating system. Whereas on snowball server, I see bash shell which is shell for Linux operating system.
     + User Interface: Bash shell has text based CLI whereas PowerShell has graphical command line interface. (Point-and-click)
     + Commands: ls in bash works same as Ls in PowerShell

Graphical user interface, text

Description automatically generated with medium confidence

Text

Description automatically generated

1. What are the elements in a computer (software and hardware) that enable the understanding and interpretation of a C program?
   * + Preprocessor (directives commands), Compiler (translator of code), Linker (combines code with other instructions to create an executable programs), are main components in interpreting C program. In addition, other components include operating system, IO routines, assemblers, and interpreters, libraries.
2. The “printf()” C command is used for printing anything on the screen. In bash we use the command “echo”. What is the difference (if any) in terms of how the computer interprets and executes these commands?
   * + printf command does not change line at the end of output, whereas echo displays a new line character at end by default. Echo always exits with 0 status whereas printf gives error upon failure to execute, hence it has more control over output.
3. What do these shell commands do? “ssh”, “scp” and “wget”. Describe briefly using an example that you have executed using the snowball server.
   * + Ssh: allows the system to form an encrypted secure connection with the host machine/server.

A picture containing text

Description automatically generated

* + - Scp: transfers files between local and remote server or b/w two remote servers.

Text

Description automatically generated

* + - Wget: retrieves content from web servers.

Graphical user interface, text

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