CSC 3320: Systems Programming

Spring 2021

Midterm 1: Total points = 100

Assigned: 26th Feb 2021: 12.01 PM

Submission Deadline: 2nd Mar 2021: 12.01 PM

(No extensions. If your submission is not received by this time then it will NOT be accepted.)

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 script 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).

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Questions 1-5 are 20pts each

1. **Man Database with helpme shell script**

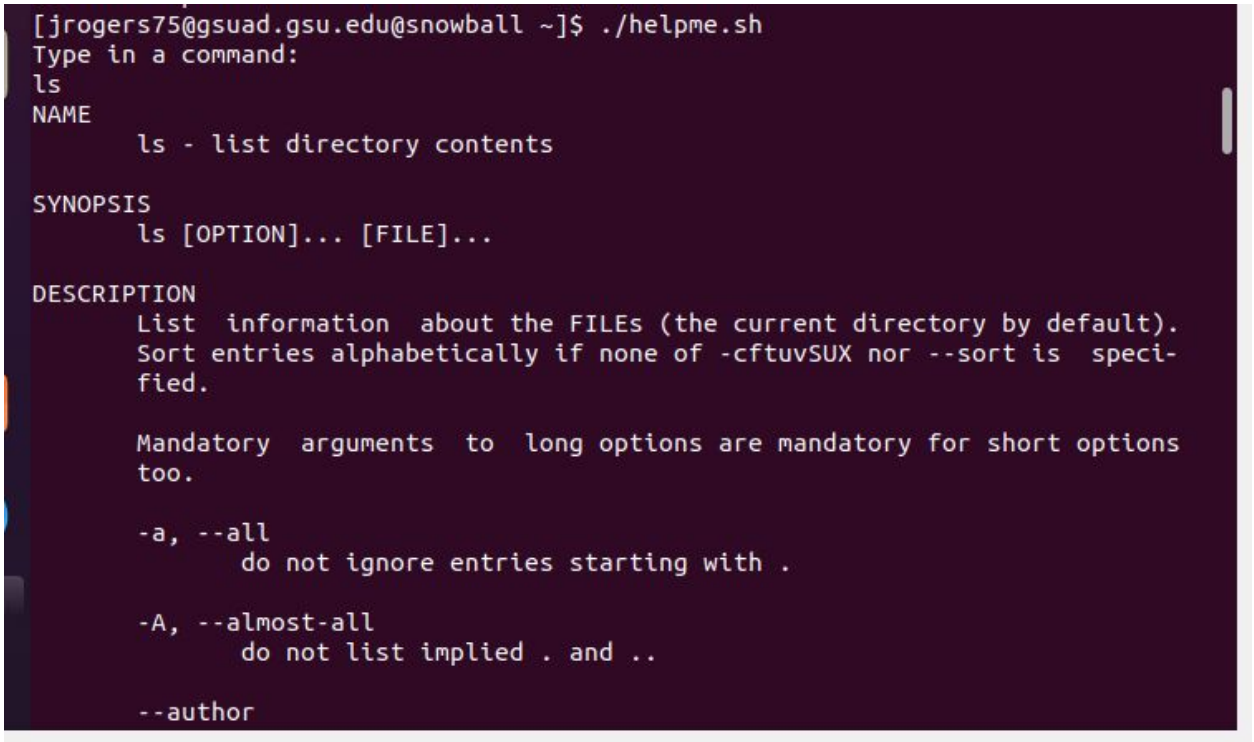
Steps to execute:

a. Save attached mandatabase.txt file in your current directory
b. Save attached shell script helpme.sh in the same directory
c. Enter command: ./helpme.sh to execute the script
d. Enter a command to see results.

Here are the 10 commands used in this exercise:

cat, ls, sort, mkdir, sed, echo, clear, vi, wc, mv

Some screenshots of the executed script and results:



```
[jrogers75@gsuad.gsu.edu@snowball ~]$ ./helpme.sh
Type in a command:
clear
NAME
       clear - clear the terminal screen

SYNOPSIS
       clear

DESCRIPTION
       clear  clears  your screen if this is possible.  It looks in the envi-
       ronment for the terminal type and then in  the  terminfo  database  to
       figure  out  how  to  clear the screen.  Some terminals can clear also
       their scrollback buffer to prevent  access  to  potentially  sensitive
       data.   If  the terminfo entry for the terminal type contains extended
       capability E3, clear will use it to clear the scrollback buffer.

       clear ignores any command-line parameters that may be present.

SEE ALSO
       tput(1), terminfo(5)

       This describes ncurses version 5.9 (patch 20130511).


[jrogers75@gsuad.gsu.edu@snowball ~]$
```

```
[jrogers75@gsuad.gsu.edu@snowball ~]$ ./helpme.sh
Type in a command:
wc
NAME
       wc - print newline, word, and byte counts for each file

SYNOPSIS
       wc [OPTION]... [FILE]...
       wc [OPTION]... --files0-from=F

DESCRIPTION
       Print  newline,  word, and byte counts for each FILE, and a total line
       if more than one FILE is specified.  With no FILE, or when FILE is  -,
       read  standard input.  A word is a non-zero-length sequence of charac-
       ters delimited by white space.  The  options  below  may  be  used  to
       select  which  counts are printed, always in the following order: new-
       line, word, character, byte, maximum line length.

       -c, --bytes
              print the byte counts

       -m, --chars
              print the character counts

       -l, --lines
              print the newline counts

       --files0-from=F
```

```
[jrogers75@gsuad.gsu.edu@snowball ~]$ ./helpme.sh
Type in a command:
mv
NAME
       mv - move (rename) files

SYNOPSIS
       mv [OPTION]... [-T] SOURCE DEST
       mv [OPTION]... SOURCE... DIRECTORY
       mv [OPTION]... -t DIRECTORY SOURCE...

DESCRIPTION
       Rename SOURCE to DEST, or move SOURCE(s) to DIRECTORY.

       Mandatory  arguments  to  long options are mandatory for short options
       too.

       --backup[=CONTROL]
              make a backup of each existing destination file

       -b     like --backup but does not accept an argument

       -f, --force
              do not prompt before overwriting

       -i, --interactive
```

2. Wikipedia Page - Dragon Con

Instructions to execute:

1. Save the file myexamfile.txt into your chosen directory
2. Save shell script dragonconfind.sh into the same directory
3. Execute the shell script with command: ./dragonconfind.sh
4. Enter a word to be found and counted.
5. Resulting word count will display on screen.

   Trial words used: Dragon, game, Atlanta, fantasy, parade, Star, cosplayer

```
[jrogers75@gsuad.gsu.edu@snowball midterm]$ ./dragonconfind.sh
Enter keyword to be counted:
Dragon
Dragon occurred 25 times.
[jrogers75@gsuad.gsu.edu@snowball midterm]$ ./dragonconfind.sh
Enter keyword to be counted:
game
game occurred 2 times.
[jrogers75@gsuad.gsu.edu@snowball midterm]$ ./dragonconfind.sh
Enter keyword to be counted:
Atlanta
Atlanta occurred 7 times.
[jrogers75@gsuad.gsu.edu@snowball midterm]$ ./dragonconfind.sh
Enter keyword to be counted:
fantasy
fantasy occurred 3 times.
[jrogers75@gsuad.gsu.edu@snowball midterm]$ ./dragonconfind.sh
Enter keyword to be counted:
parade
parade occurred 2 times.
[jrogers75@gsuad.gsu.edu@snowball midterm]$ ./dragonconfind.sh
Enter keyword to be counted:
Star
Star occurred 3 times.
[jrogers75@gsuad.gsu.edu@snowball midterm]$ ./dragonconfind.sh
Enter keyword to be counted:
cosplayer
cosplayer occurred 2 times.
[jrogers75@gsuad.gsu.edu@snowball midterm]$
```

3. Shell Script to find old files in a directory hierarchy and compress them.

Steps to execute:

a. Save shell script named compressold.sh in directory of your choice
b. Execute shell script with command ./compressold.sh
c. Enter the number of days files have not been accessed to be compressed.
d. Compressed files appear as .tar.gz

```
[jrogers75@gsuad.gsu.edu@snowball ~]$ ./compressold.sh
Input number of days old files should be for compressing:
12
./public/Homeworks/hw3_ch3_2.txt
./public/Homeworks/hw3_ch3.txt
```

```
[jrogers75@gsuad.gsu.edu@snowball Homeworks]$ ls
at.csh          float.txt                hw3_ch3_2.txt          samplecolon.txt
awktest8.txt    float.Z                  hw3_ch3_2.txt.tar.gz   sortsample.txt
backup          h1.awk                   hw3_ch3.txt            test
backup1         h2.awk                   hw3_ch3.txt.tar.gz     tmp
float           homework_instructions.txt  nohup.out            ultest.txt
float.cpy       hw3_8.txt                poem.cpy
float.crypt     hw3_8.txt.tar.gz         poem.txt
[jrogers75@gsuad.gsu.edu@snowball Homeworks]$
```

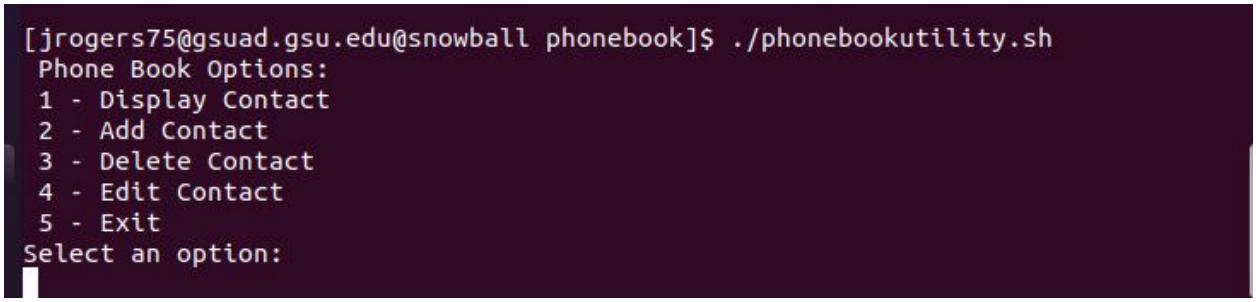
4. Phone Book Utility

Steps to execute:

a. Save file phone_database.txt in desired directory
b. Save the following shell scripts in the same directory:

   addcontact.sh
   viewcontact.sh
   editcontact.sh
   deletecontact.sh
   phonebookutility.sh

c. Run command ./phonebookutility.sh
d. Enter the option number as requested on screen



To Display contact, enter 1 and fill in string for search:

```
[jrogers75@gsuad.gsu.edu@snowball phonebook]$ ./phonebookutility.sh
 Phone Book Options:
 1 - Display Contact
 2 - Add Contact
 3 - Delete Contact
 4 - Edit Contact
 5 - Exit
Select an option:
1
Enter search criteria:
Lopez
First Name;Last Name;Street;City;State;Zip Code;Home Phone;Cell Phone
Chuck;Lopez;215 Columns Lane;Peachtree City;GA;30269;6788846684;6787721686
Jamie;Lopez;215 Columns Lane;Peachtree City;GA;30269;6788846684;7705472108
 Phone Book Options:
 1 - Display Contact
 2 - Add Contact
 3 - Delete Contact
 4 - Edit Contact
 5 - Exit
Select an option:
```

After displaying results, will return to initial phonebookutility.sh screen so user can continue to display, add, etc.

Enter 2 to add new contact. Fill in requested information:

```
Select an option:
2
Enter New Contact First Name:
Kelley
Enter New Contact Last Name:
Hix
Enter New Contact Street Address:
5160 Kings Hwy
Enter New Contact City:
Douglasville
Enter New Contact State:
GA
Enter New Contact Zip Code:
30135
Enter New Contact Home Phone:
0000000000
Enter New Contact Cell Phone:
4048887777
 Phone Book Options:
 1 - Display Contact
 2 - Add Contact
 3 - Delete Contact
 4 - Edit Contact
 5 - Exit
Select an option:
```

Select option 3 to delete a contact: phone_database.txt before deleting Dana Chitwood:

```
[jrogers75@gsuad.gsu.edu@snowball phonebook]$ cat phone_database.txt
Jamie;Lopez;215 Columns Lane;Peachtree City;GA;30269;6788846684;7705472108
Chuck;Lopez;215 Columns Lane;Peachtree City;GA;30269;6788846684;6787721686
Tiffany;Craig;61 Lane;PS;GA;30127;;7705472222
Kyra;Maldonado;101 Woodlawn Ln;Peachtree City;GA;30269;7705558989;6785552222
Mike;Rogers;6137 Willowpond Ct;Douglasville;GA;30135;;7708885555
Dana;Chitwood;213 Columns Lane;Peachtree City;GA;30269;7702259696;7704483333
Summer;Hughes;4187 North Helton Rd;Douglasville;GA;30135;770xxx1111;770xxx9999
Kelley;Hix;5160 Kings Hwy;Douglasville;GA;30135;0000000000;4048887777
[jrogers75@gsuad.gsu.edu@snowball phonebook]$
```

Delete contact Dana Chitwood:

```
Select an option:
3
 Enter Contact First Name:
Dana
Enter Contact Last Name:
Chitwood
  Help    Book Options:
 1 - Display Contact
 2 - Add Contact
 3 - Delete Contact
 4 - Edit Contact
 5 - Exit
Select an option:
```

Dana is no longer in the database:

```
[jrogers75@gsuad.gsu.edu@snowball phonebook]$ cat phone_database.txt
Jamie;Lopez;215 Columns Lane;Peachtree City;GA;30269;6788846684;7705472108
Chuck;Lopez;215 Columns Lane;Peachtree City;GA;30269;6788846684;6787721686
Tiffany;Craig;61 Lane;PS;GA;30127;;7705472222
Kyra;Maldonado;101 Woodlawn Ln;Peachtree City;GA;30269;7705558989;6785552222
Michael;Rogers;6137 Willowpond Ct;Douglasville;GA;30135;;7708885555
Summer;Hughes;4187 North Helton Rd;Douglasville;GA;30135;770xxx1111;770xxx9999
Kelley;Hix;5160 Kings Hwy;Douglasville;GA;30135;0000000000;4048887777
Delayne;Eriquezzo;4548 Dorsett Shoals Court;Douglasville;GA;30135;7709494545;40
45439172
Lillie;Hart;3243 West County Line Rd;Douglasville;GA;30134;6786781111;404404636
3
Jen;Lanno;6873 Spring Valley Ct;Douglasville;GA;30135;7709496838;7706446363
```

Select 4 to edit a record. Change Mike to Michael:

```
Select an option:
4
Enter string to be updated:
Mike
Enter new string:
Michael
 Phone Book Options:
 1 - Display Contact
 2 - Add Contact
 3 - Delete Contact
 4 - Edit Contact
 5 - Exit
```

Mike has been updated to Michael in phone_database.txt

```
[jrogers75@gsuad.gsu.edu@snowball phonebook]$ cat phone_database.txt
Jamie;Lopez;215 Columns Lane;Peachtree City;GA;30269;6788846684;7705472108
Chuck;Lopez;215 Columns Lane;Peachtree City;GA;30269;6788846684;6787721686
Tiffany;Craig;61 Lane;PS;GA;30127;;7705472222
Kyra;Maldonado;101 Woodlawn Ln;Peachtree City;GA;30269;7705558989;6785552222
Michael;Rogers;6137 Willowpond Ct;Douglasville;GA;30135;;7708885555
Summer;Hughes;4187 North Helton Rd;Douglasville;GA;30135;770xxx1111;770xxx9999
Kelley;Hix;5160 Kings Hwy;Douglasville;GA;30135;0000000000;4048887777
Delayne;Eriquezzo;4548 Dorsett Shoals Court;Douglasville;GA;30135;7709494545;40
45439172
Lillie;Hart;3243 West County Line Rd;Douglasville;GA;30134;6786781111;404404636
3
Jen;Lanno;6873 Spring Valley Ct;Douglasville;GA;30135;7709496838;7706446363
```

This can also be seen in the Display Contact option of the utility:

```
Select an option:
1
Enter search criteria:
Rogers
First Name;Last Name;Street;City;State;Zip Code;Home Phone;Cell Phone
Michael;Rogers;6137 Willowpond Ct;Douglasville;GA;30135;;7708885555
 Help  Book Options:
```

5. A. Factorial

Steps to execute this program:

a. Save the program, factorial.c, in your preferred directory
b. Compile the program with: gcc -o factorial factorial.c
c. Execute the program: ./factorial

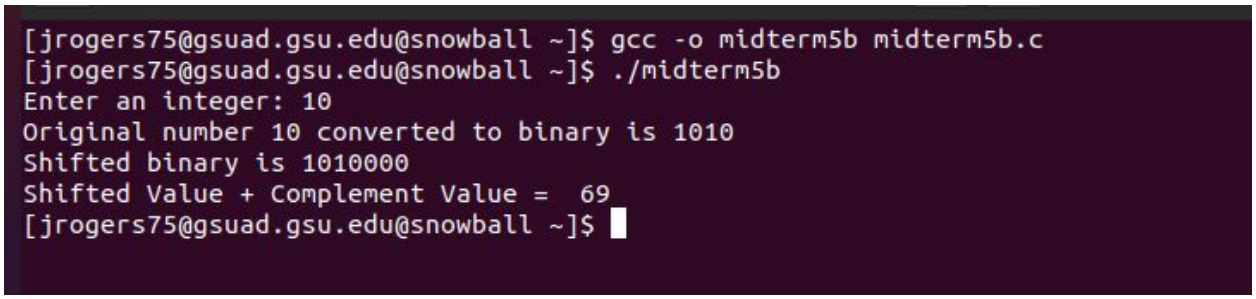
Enter the number to calculate factorial and result will be displayed:

```
[jrogers75@gsuad.gsu.edu@snowball ~]$ gcc -o factorial factorial.c
[jrogers75@gsuad.gsu.edu@snowball ~]$ ./factorial
Enter number to calculate factorial: 12
The factorial result is: 479001600
[jrogers75@gsuad.gsu.edu@snowball ~]$ ./factorial
Enter number to calculate factorial: 10
The factorial result is: 3628800
[jrogers75@gsuad.gsu.edu@snowball ~]$ ./factorial
Enter number to calculate factorial: 8
The factorial result is: 40320
[jrogers75@gsuad.gsu.edu@snowball ~]$ ./factorial
Enter number to calculate factorial: 4
The factorial result is: 24
[jrogers75@gsuad.gsu.edu@snowball ~]$
```

5.B. C Script to left shift and add complement of an integer

Steps to run program:

a. Save the program midterm5b.c to the directory of your choice
b. Compile the program: gcc -o midterm5b midterm5b.c
c. Execute the program: ./midterm5b
d. Enter an integer when prompted
e. The result will be displayed



(scroll down for extra credit step)

5. Extra Credit - Create Shell Script to run both C Scripts

Steps to complete:

a. Copy the following files to your directory:
   question5.sh
   midterm5bextra.c
   factorialextra.c

b. Execute shell program by using the following command:
   ./question5.sh

c. Enter the integer when prompted
d. Both programs will run and output will be displayed