

# CSc 3320: Systems Programming

Fall 2021

Homework

# 2: 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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Panther #: 002 - 39 - 6860

## PART 1 (2.5 points each): 10pts

- What are the differences among **grep**, **egrep** and **fgrep**? Describe using an example.

grep: Unix utility that searches for a pattern or letters over a file or data set.

Examples

`grep -E '^n(fore|group)' /etc/group`, grep -F is similar to fgrep where -F is for fixed strings separated by newline and `grep -F -f user-list.txt /etc/group`

- Which utility can be used to compress and decompress files? And how to compress multiple files into a single file? Please provide one example for it.

Syntax: zip [Options] zipfile files... -l

Ex: zip myFile.zip filename1.txt filename2.txt, unzip myFile.zip ↳ This will unzip all files

- Which utility (or utilities) can break a line into multiple fields by defining a separator? What is the default separator? How to define a separator manually in the command line? Please provide one example for defining the separator for each utility.

awk -v RS='[\r\n]' '{a=\$0;getline b;getline c; print a,b,c}' OFS=, filename ↳ splits it into 3 columns  
awk -v RS='[\r\n]' '{a=\$0; print a}' OFS=, filename

- What does the **sort** command do? What are the different possible fields? Explain using an example.

Sort command = used for sorting the input file and arranging the records in a particular order. There're different options w/ the command on Linux. Sorting can be done in many different ways such as numerically, alphabetically, reverse, etc.

(sort -d) = option to write output to standard file (sort -n) = sort file numerically (sort -r) = sort file in reverse

(sort -t) = Sort file consisting of table and -t is used to specify table (sort -m) = sort file numerically in reverse

(-b) = sort option used to sort/duplicate at sometime  
(-M) = sort records by month  
(-p) = sort on = contains sort, prints, zeros, sort, dog

## Part IIa (5 points each): 25pts

- What is the output of the following sequence of bash commands: **echo 'Hello World' | sed 's/\$/!!!/g'**

Hello World

- What is the output for each of these awk script commands?

`~-- 1 <= NF { print $5 }` = Prints out all values of 5th column

`~-- NR >= 1 && NR >= 5 { print $1 }` = NR displays line #, greater than 5 and we print first column

`~-- 1,5 { print $0 }` = all values in file simply print files contents

`~-- {print $1}` = Prints all values of first column

- What is the output of the following command line:

**echo good | sed '/Good/d'** good

- Which **awk** script outputs all the lines where a plus sign + appears at the end of line?

`~/ + $/ { print $0 }`

- What is the command to delete only the first 5 lines in a file "foo"? Which command deletes only the last 5 lines?

**sed -i 1,5d foo**

## Part IIb (10pts each): 50pts

Describe the function (5pts) and output (5pts) of the following commands.

9. `$ cat float` • File float contains these 4 lines

Wish I was floating in blue across the sky, my imagination is  
strong, And I often visit the days  
When everything seemed so clear.

Now I wonder what I'm doing here at all...

`$ cat h1.awk` • this file contains this line of data

`NR>2 && NR<4{print NR ":" $0}`

`$ awk '/.*ing/ {print NR ":" $1}' float` • Searched for the rows (NR=rows) where there's a string w/a word containing "ing" in it. The rows that have eng are 1,3,4 Output: =@Wish @when @Now

10. As the next command following question 9,

`$ awk -f h1.awk float` • Executes to code in file h1.awk on file float

• The line that outputs is 3: When everything seemed so clear

11.

`$ cat h2.awk` • prints the line number and number of words or fields in each line

BEGIN { print .uses NF to print number of words or fields in each line  
"Start to scan file" }

{print \$1 "," \$NF}

END {print "END-", FILENAME}

`$ awk -f h2.awk float` • awk command prints first and last column in file

12. `sed 's/\s/\t/g'` float output = sed 's/(\n)\* , /g' float

13.

`$ ls *.awk | awk '{print "grep --color 'BEGIN' \"$1\"}' | sh` (Notes: **sh file** runs file as a shell script. \$1 should be the output of 'ls \*.awk' in this case, not the 1<sup>st</sup> field) • Has 3 functions (ls \*.awk) = lists all files w/ extensions .awk

(awk '{print "grep --color 'BEGIN' \"\$1\"}') → processes the text in file and colors the word BEGIN

14. In each line it encounters, and only prints that line • Sh → Executes the files in shell script

`$ mkdir test - test/test1 test/test2` output: BEGIN file linux

BEGIN of linux class  
awk class BEGIN

`$ cat>test/testt.txt`

This is a test file ^D

`$ cd test`

`$ ls -l | grep '^d' | awk '{print "cp -r \"$NF\" \"$NF\".bak"}' | sh`

→ Will create the backup file w/ the .bak extension of all the directories and sub directories

command will create a test directory one sub directory test1 and test2

This is a test file. This'll create the testt.txt file under directory

Inside the test directory

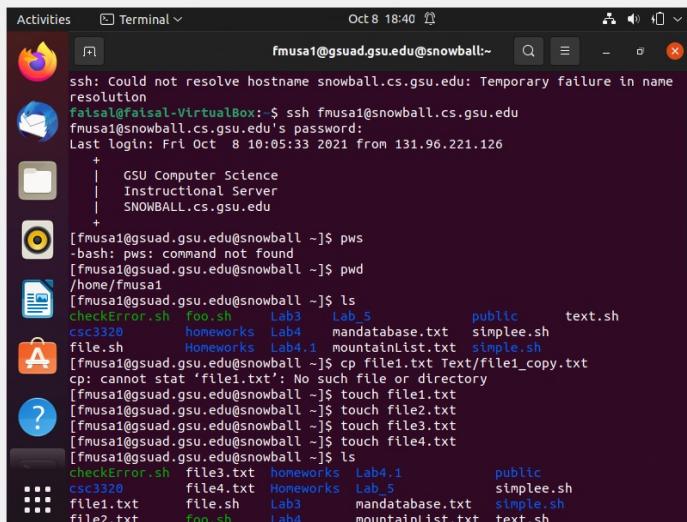
## Part III Programming: 15pts

15. Sort all the files in your class working directory (or your home directory) as per the following requirements:

- a. A copy of each file in that folder must be made. Append the string “\_copy” to the name of the file
- b. The duplicate (copied) files must be in separate directories with each directory specifying the type of the file (e.g. txt files in directory named txtfiles, pdf files in directory named pdffiles etc).
- c. The files in each directory must be sorted in chronological order of months.
- d. An archive file (.tar) of each directory must be made. The .tar files must be sorted by name in ascending order.
- e. An archive file of all the .tar archive files must be made and be available in your home directory.

As an output, show your screen shots for each step or a single screenshot that will cover the outputs from all the steps.

] - Oracle VM VirtualBox  
File Devices Help



The screenshot shows a Linux desktop environment with a terminal window open in the background. The terminal window displays a series of shell commands and their outputs. The desktop environment includes icons for a file manager, a terminal, and other system applications.

```
Activities Terminal Oct 8 18:40
fmusa1@gsuad.gsu.edu@snowball:~$ ssh Could not resolve hostname snowball.cs.gsu.edu: Temporary failure in name resolution
fmusa1@ralsal-VirtualBox: ~]$ ssh fmusa1@snowball.cs.gsu.edu
fmusa1@snowball.cs.gsu.edu's password:
Last login: Fri Oct  8 10:05:33 2021 from 131.96.221.126
+   GSU Computer Science
|   Instructional Server
|   SNOWBALL.cs.gsu.edu
+
[fmusa1@gsuad.gsu.edu@snowball ~]$ pws
-bash: pws: command not found
[fmusa1@gsuad.gsu.edu@snowball ~]$ pwd
/home/fmusa1
[fmusa1@gsuad.gsu.edu@snowball ~]$ ls
checkError.sh  foo.sh    Lab3    Lab_5      public    text.sh
csc320        homeworks Lab4    mandatabase.txt simple.sh
file.sh       Homeworks Lab4.1   mountainList.txt
[fmusa1@gsuad.gsu.edu@snowball ~]$ cp file1.txt Text/file1_copy.txt
cp: cannot stat 'file1.txt': No such file or directory
[fmusa1@gsuad.gsu.edu@snowball ~]$ touch file1.txt
[fmusa1@gsuad.gsu.edu@snowball ~]$ touch file2.txt
[fmusa1@gsuad.gsu.edu@snowball ~]$ touch file3.txt
[fmusa1@gsuad.gsu.edu@snowball ~]$ touch file4.txt
[fmusa1@gsuad.gsu.edu@snowball ~]$ ls
checkError.sh  file3.txt  homeworks Lab4.1      public
csc320        file4.txt  Homeworks Lab_5      simple.sh
file1.txt     file.sh    Lab3    mandatabase.txt
file2.txt     foo.sh    Lab4    mountainList.txt  text.sh
```

Activities Terminal Oct 8 18:40

```
[fmsua1@gsuad.gsu.edu@snowball ~]$ ls
checkError.sh file3.txt homeworks Lab4.1      public
csc3320      file4.txt Homeworks Lab_5       simplee.sh
file1.txt     file.sh   Lab3      mandatabase.txt simple.sh
file2.txt     foo.sh    Lab4      mountainlist.txt text.sh
[fmsua1@gsuad.gsu.edu@snowball ~]$ cp file1.txt Text/file1_copy.txt
cp: cannot create regular file 'Text/file1_copy.txt': No such file or directory
[fmsua1@gsuad.gsu.edu@snowball ~]$ cp file1.txt Text/file1_copy.txt
cp: cannot create regular file 'Text/file1_copy.txt': No such file or directory
[fmsua1@gsuad.gsu.edu@snowball ~]$ mkdir Pdf
[fmsua1@gsuad.gsu.edu@snowball ~]$ mkdir Text
[fmsua1@gsuad.gsu.edu@snowball ~]$ ls
checkError.sh file3.txt homeworks Lab4.1      Pdf      Text
csc3320      file4.txt Homeworks Lab_5       public   text.sh
file1.txt     file.sh   Lab3      mandatabase.txt simple.sh
file2.txt     foo.sh    Lab4      mountainlist.txt simple.sh
[fmsua1@gsuad.gsu.edu@snowball ~]$ cp file1.txt Text/file1_copy.txt
[fmsua1@gsuad.gsu.edu@snowball ~]$ cp file2.txt Text/file2_copy.txt
[fmsua1@gsuad.gsu.edu@snowball ~]$ cp file3.txt Text/file3_copy.txt
[fmsua1@gsuad.gsu.edu@snowball ~]$ cp file4.txt Text/file4_copy.txt
[fmsua1@gsuad.gsu.edu@snowball ~]$ cd Te
-bash: cd: Te: No such file or directory
[fmsua1@gsuad.gsu.edu@snowball ~]$ cd Text
[fmsua1@gsuad.gsu.edu@snowball Text]$ ls
file1_copy.txt file2_copy.txt file3_copy.txt file4_copy.txt
[fmsua1@gsuad.gsu.edu@snowball Text]$ sort -M file1_copy.txt
[fmsua1@gsuad.gsu.edu@snowball Text]$ cd ..
[fmsua1@gsuad.gsu.edu@snowball ~]$ tar -czvpf Text.tar.gz Text
Text/
```



Ubuntu (Snapshot 1) (Running) - Oracle VM VirtualBox

File Machine View Input Devices Help

Activities Terminal Oct 8 18:40

```
fmsua1@gsuad.gsu.edu@snowball:~/Desktop$ ls
file1.txt file1.sh Lab3      mandatabase.txt simplee.sh
file2.txt file2.sh Lab4      mountainlist.txt text.sh
[fmsua1@gsuad.gsu.edu@snowball ~]$ cp file1.txt Text/file1_copy.txt
cp: cannot create regular file 'Text/file1_copy.txt': No such file or directory
[fmsua1@gsuad.gsu.edu@snowball ~]$ cp file1.txt Text/file1_copy.txt
cp: cannot create regular file 'Text/file1_copy.txt': No such file or directory
[fmsua1@gsuad.gsu.edu@snowball ~]$ cp file1.txt Text/file1_copy.txt
cp: cannot create regular file 'Text/file1_copy.txt': No such file or directory
[fmsua1@gsuad.gsu.edu@snowball ~]$ cp file2.txt Text/file2_copy.txt
cp: cannot create regular file 'Text/file2_copy.txt': No such file or directory
[fmsua1@gsuad.gsu.edu@snowball ~]$ cp file3.txt Text/file3_copy.txt
cp: cannot create regular file 'Text/file3_copy.txt': No such file or directory
[fmsua1@gsuad.gsu.edu@snowball ~]$ cp file4.txt Text/file4_copy.txt
cp: cannot create regular file 'Text/file4_copy.txt': No such file or directory
[fmsua1@gsuad.gsu.edu@snowball ~]$ cd ..
[fmsua1@gsuad.gsu.edu@snowball ~]$ tar -czvpf Text.tar.gz Text
Text/
```

Windows 10 taskbar