

# 3CSc 3320: Systems Programming

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

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

Egrep

- Stands for extended grep
- Can use extended regular expressions

FGREP

- Doesn't understand regular/extended regular expressions
- Doesn't support regex

GREP

- supports regular expression commands
- combination of fgrep and egrep

2. 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.

Tar compress and decompress files.

```
[[jballou1@gsuad.gsu.edu@snowball musicc]$ tar -czvf media.tar.gz /home/jballou1/pics ]
/home/jballou1/musicc /home/jballou1/vids
tar: Removing leading '/' from member names
/home/jballou1/pics/
/home/jballou1/musicc/
/home/jballou1/musicc/media.tar.gz
/home/jballou1/vids/
```

3. 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.

Cut command

Default separator is the space " "

Using "," as the separator and extract the first names only for example:

```
cut -d " " -f 1 name.txt
```

```
[jballou1@gsuad.gsu.edu@snowball homework]$ cut -d "" -f1 numb3.txt  
Bobby,hill,10,Lithonia  
Hank,hill,34,Lithonia  
Peggy ,hill,32,lithonia
```

cut -d “,” -f 1 name.txt

```
[jballou1@gsuad.gsu.edu@snowball homework]$ cut -d "," -f1 numb3.txt  
Bobby  
Hank  
Peggy  
[jballou1@gsuad.gsu.edu@snowball homework]$
```

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

- Sorts files, arranging them in a order:

\$Sort numb3.txt

```
[jballou1@gsuad.gsu.edu@snowball homework]$ sort numb3.txt
```

```
Bobby,hill,10,Lithonia  
Hank,hill,34,Lithonia  
Peggy ,hill,32,lithonia
```

\$sort -r numb3.txt

```
[jballou1@gsuad.gsu.edu@snowball homework]$ sort -r numb3.txt  
Peggy ,hill,32,lithonia  
Hank,hill,34,Lithonia  
Bobby,hill,10,Lithonia
```

```
[jballou1@gsuad.gsu.edu@snowball homework]$
```

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

5. What is the output of the following sequence of bash

commands: **echo 'Hello World' | sed 's/\$/!!!/g'**

- **Hello World!!!**

```
[[jballou1@gsuad.gsu.edu@snowball ~]$ echo 'Hello World' | sed 's/$/!!!/g'
Hello World!!!
[[jballou1@gsuad.gsu.edu@snowball ~]$
```

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

-- 1 <= NF { print \$5 }

- Prints all values in the fifth column

-- NR >= 1 && NR >= 5 { print \$1 }

- NR displays line number that is greater than 5 and prints first column

-- 1,5 { print \$0 }

- prints file contents

-- {print \$1 }

-prints the first column

Using matrix:

```
1 2 3 4 5 6
1 2 3 4 5 6
1 2 3 4 5 6
1 2 3 4 5 6
1 2 3 4 5 6
```

```
[[jballou1@gsuad.gsu.edu@snowball homework]$ awk '1 <= NF { print $5 }' numb6.txt
5
5
5
[[jballou1@gsuad.gsu.edu@snowball homework]$ awk 'NR >= 1 && NR >= 5 { print $1 }' numb6.txt
1
1
1
[[jballou1@gsuad.gsu.edu@snowball homework]$ vi numb6.txt
[[jballou1@gsuad.gsu.edu@snowball homework]$ awk 'NR >= 1 && NR >= 5 { print $1 }' numb6.txt
1
1
1
[[jballou1@gsuad.gsu.edu@snowball homework]$ awk '1,5 { print $0 }' numb6.txt
1 2 3 4 5 6
1 2 3 4 5 6
1 2 3 4 5 6
1 2 3 4 5 6
1 2 3 4 5 6
[[jballou1@gsuad.gsu.edu@snowball homework]$ awk '{ print $1 }' numb6.txt
1
1
1
1
1
[[jballou1@gsuad.gsu.edu@snowball homework]$
```

7. What is the output of following command line:  
**echo good | sed '/Good/d'**  
- good (if there is a directory named Good)
8. Which **awk** script outputs all the lines where a plus sign + appears at the end of line?  
- `^+$/ {print $0}`
9. What is the command to delete only the first 5 lines in a file "foo"?  
Which command deletes only the last 5 lines?

```
[[jballou1@gsuad.gsu.edu@snowball homework]$ cat foo.txt  
1  
2  
3  
4  
5  
6  
7  
8  
9  
10
```

-sed -i 1,5d foo.txt

```
[[jballou1@gsuad.gsu.edu@snowball homework]$ sed -i 1,5d foo.txt  
[[jballou1@gsuad.gsu.edu@snowball homework]$ cat foo.txt  
6  
7  
8  
9  
10
```

-sed '6,\$ d' foo.txt

```
[[jballou1@gsuad.gsu.edu@snowball homework]$ sed '6,$ d' foo.txt  
1  
2  
3  
4  
5  
[[jballou1@gsuad.gsu.edu@snowball homework]$
```

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

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

**Red txt= function**

### 9. \$ cat float **the file float has the following data in it**

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...

```
[jballou1@gsuad.gsu.edu@snowball homework]$ cat float.txt
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 **the file h1.awk contains the following data**

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

```
[jballou1@gsuad.gsu.edu@snowball homework]$ cat h1.awk
NR>2 && NR<4{print NR ":"$0}
```

**\$ awk '/.\*ing/ {print NR ":" \$1}' float** **searched for the rows where there's a string with the word "ing" in it which is 1,3,4**  
**It prints in the format of which the first word of the row is printed**

```
[jballou1@gsuad.gsu.edu@snowball homework]$ awk '/.*ing/ {print NR ":" $1}' float.txt
1:Wish
3:When
4:Now
```

### 10. As the next command following question 9,

**\$ awk -f h1.awk float**

**Executes the file h1.awk on the file float**

**Row number which is >2 but <4 (which is 3)**

**So Row 3 will be printed**

```
[jballou1@gsuad.gsu.edu@snowball homework]$ awk -f h1.awk float.txt
3:When everything seemed so clear,
```

### 11.

**The file h2.awk contains the data**

**\$ cat h2.awk**

**BEGIN { print "Start to scan file" }**

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

**END {print "END-" , FILENAME }**

```
[[jballou1@gsuad.gsu.edu@snowball homework]$ cat h2.awk
```

```
BEGIN {print
"Start to scan file" }
{print $1      ", " $NF}
END {print      "END-" , FILENAME }
```

### \$awk -f h2.awk float

Executes the first and last column values of the filename float.txt and are spereated by commas

```
[[jballou1@gsuad.gsu.edu@snowball homework]$ awk -f h2.awk float.txt
```

```
Wish,strong
And,days
When,clear,
Now,all...
'
END- float.txt
```

### 12. sed 's/\s/\t/g' float

Tabs the words instead of using spaces

```
[[jballou1@gsuad.gsu.edu@snowball homework]$ sed 's/\s/\t/g' float.txt
Wish    I        was    floating    in    blue    across    the    sky,    my    i
magination    is    strong
And    I        often    visit    the    days
When    everything    seemed    so    clear,
Now    I        wonder    what    I'm    doing    here    at    all...

[[jballou1@gsuad.gsu.edu@snowball homework]$
```

### 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 )

Prints the lines containing 'BEGIN' from the awk files, prints in red. Also executes as ash file

```
[[jballou1@gsuad.gsu.edu@snowball homework]$ ls *.awk| awk '{print "grep --color 'BEGI
N' " $1 }' |sh
BEGIN {print
[[jballou1@gsuad.gsu.edu@snowball homework]$
```

### 14.

\$mkdir test test/test1 test/test2 creates a test directory and sub directory test1 and test2

\$cat>test/testt.txt

This is a test file ^D

**create the  
test.txt file under  
test directory**

**\$ cd test                      inside test directory**

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

**Creates a backup file with the .bak extension**

```
[[jballou1@gsuad.gsu.edu@snowball homework]$ cd ~  
[[jballou1@gsuad.gsu.edu@snowball ~]$ mkdir test test/test1 test/test2  
[[jballou1@gsuad.gsu.edu@snowball ~]$ cat>test/testt.txt  
[This is a text file ^D  
[[jballou1@gsuad.gsu.edu@snowball ~]$ vi testt.txt  
[[jballou1@gsuad.gsu.edu@snowball ~]$ cat>test/testt.txt  
[This is a test file[jballou1@gsuad.gsu.edu@snowball ~]$ cd test  
[[jballou1@gsuad.gsu.edu@snowball test]$ ls -l . | grep '^d' | awk '{print "cp -r " $NF  
F " " $NF ".bak"}' | sh  
[[jballou1@gsuad.gsu.edu@snowball test]$
```



## Part III Programming: 15pts

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

- A copy of each file in that folder must be made. Append the string “\_copy” to the name of the file
- 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).
- The files in each directory must be sorted in chronological order of months.
- An archive file (.tar) of each directory must be made. The .tar files must be sorted by name in ascending order.
- 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.

- Added directories named txtfiles and pdffiles
- Added file\*.txt files (1-4)

```
[jballou1@gsuad.gsu.edu@snowball ~]$ mkdir {txtfiles,pdffiles}
[jballou1@gsuad.gsu.edu@snowball ~]$ touch {file1.txt,file2.txt,file3.txt,file4.txt}
[jballou1@gsuad.gsu.edu@snowball ~]$ ls -lrth
total 44K
drwxrwxr-x. 4 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu 4.0K Jan 21 19:21 csc3320
drwxrwxr-x. 2 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu 4.0K Jan 28 22:26 public
drwxrwxr-x. 4 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu 4.0K Jan 28 22:38 Public
d--x--x--x. 2 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu 4.0K Feb  4 14:45 Lab3
-rw-rw-r--. 1 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu    6 Feb  4 15:48 Lab3.test.txt
drwxrwxr-x. 2 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu 4.0K Feb 11 21:17 Lab4
-rwxrwxr-x. 1 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu 127 Feb 11 21:44 simple.sh
drwxrwxr-x. 4 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu 4.0K Feb 14 15:45 homework
drwxrwxr-x. 6 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu 4.0K Feb 14 16:09 test
drwxrwxr-x. 2 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu 4.0K Feb 14 20:38 txtfiles
drwxrwxr-x. 2 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu 4.0K Feb 14 20:38 pdffiles
-rw-rw-r--. 1 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu    0 Feb 14 20:40 file4.txt
-rw-rw-r--. 1 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu    0 Feb 14 20:40 file3.txt
-rw-rw-r--. 1 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu    0 Feb 14 20:40 file2.txt
-rw-rw-r--. 1 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu    0 Feb 14 20:40 file1.txt
```

- Also added pdf files

```
[[jballou1@gsuad.gsu.edu@snowball ~]$ ls -lrth
total 44K
drwxrwxr-x. 4 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu 4.0K Jan 21 19:21 csc3320
drwxrwxr-x. 2 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu 4.0K Jan 28 22:26 public
drwxrwxr-x. 4 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu 4.0K Jan 28 22:38 Public
d--x--x--x. 2 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu 4.0K Feb  4 14:45 Lab3
-rw-rw-r--. 1 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu  6 Feb  4 15:48 Lab3.test.txt
drwxrwxr-x. 2 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu 4.0K Feb 11 21:17 Lab4
-rwxrwxr-x. 1 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu 127 Feb 11 21:44 simple.sh
drwxrwxr-x. 4 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu 4.0K Feb 14 15:45 homework
drwxrwxr-x. 6 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu 4.0K Feb 14 16:09 test
-rw-rw-r--. 1 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu  0 Feb 14 20:40 file4.txt
-rw-rw-r--. 1 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu  0 Feb 14 20:40 file3.txt
-rw-rw-r--. 1 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu  0 Feb 14 20:40 file2.txt
-rw-rw-r--. 1 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu  0 Feb 14 20:40 file1.txt
drwxrwxr-x. 2 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu 4.0K Feb 14 20:47 txtfiles
-rw-rw-r--. 1 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu  0 Feb 14 20:48 test.pdf
-rw-rw-r--. 1 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu  0 Feb 14 20:48 hw.pdf
drwxrwxr-x. 2 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu 4.0K Feb 14 20:49 pdffiles
```

#### 4. Copied text files into 'txtfiles' and 'pdffiles' directory

```
[[jballou1@gsuad.gsu.edu@snowball txtfiles]$ ls -lth
total 4.0K
131958 -rw-rw-r--. 1 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu 0 Feb 14 20:47 file1_copy.t
xt
131957 -rw-rw-r--. 1 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu 6 Feb 14 20:45 Lab3.test.tx
t
131956 -rw-rw-r--. 1 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu 0 Feb 14 20:45 file4_copy.t
xt
131955 -rw-rw-r--. 1 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu 0 Feb 14 20:45 file3_copy.t
xt
131924 -rw-rw-r--. 1 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu 0 Feb 14 20:45 file2_copy.t
xt
[[jballou1@gsuad.gsu.edu@snowball txtfiles]$
```

```
[[jballou1@gsuad.gsu.edu@snowball pdffiles]$ ls -lth
total 0
131962 -rw-rw-r--. 1 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu 0 Feb 14 20:49 test_copy.pd
f
131961 -rw-rw-r--. 1 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu 0 Feb 14 20:49 hw_copy.pdf
[[jballou1@gsuad.gsu.edu@snowball pdffiles]$
```

```
[[jballou1@gsuad.gsu.edu@snowball ~]$ ls -lth | grep -i tar
131964 -rw-rw-r--. 1 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu 198 Feb 14 20:51 pdffiles
tar.gz
131963 -rw-rw-r--. 1 jballou1@gsuad.gsu.edu jballou1@gsuad.gsu.edu 245 Feb 14 20:51 txtfiles
tar.gz
[[jballou1@gsuad.gsu.edu@snowball ~]$
```