CS 213: System Software Lab
Autumn 2024, IIT Dharwad
Assignment-2
Linux and Bash

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1) Write a bash script to sort the given list of numbers including floating point numbers in ascending order and also provides additional useful information, such as the minimum and maximum values, the average, and statistics about the number of unique and duplicate numbers. The script handles invalid numbers, invalid sorting orders, and empty inputs gracefully, providing appropriate error messages.

   Steps:
   i) Check the number of arguments, if not throw an exception. **[0.5 Mark]**
   ii) Check if all the inputs are number or not, if not throw an exception. **[0.5 Mark]**
   iii) Sort the numbers in ascending order. **[1 Mark]**
   iv) Calculate the minimum and maximum values, average, count unique and duplicate numbers. **[2 Marks]**

```
snsrl1@snsrl:~/SSL_2024/Ass-2$ ./q1.sh 5 3 8 8 6 2.4
Sorted list: 2.4 3 5 6 8 8
Minimum value: 2.4
Maximum value: 8
Average value: 5.40
Number of unique values: 5
Number of duplicate values: 1
```

2) Write a script that finds the k^{th} largest number among a set of numbers provided as command-line arguments. The script will take two inputs: the k^{th} largest number and the list of numbers. **[2 Marks]**

```
snsrl1@snsrl:~/SSL_2024/Ass-2$ ./q2.sh 4 5 4 23 12 32
The 4-th largest number is 5
```

3) Write a bash script to convert the temperature from celsius to fahrenheit or vice versa based on user input. **[2 Marks]**

```
snsrl1@snsrl:~/SSL_2024/Ass-2$ ./q3.sh 100 C
100°C is 212.00°F
snsrl1@snsrl:~/SSL_2024/Ass-2$ ./q3.sh 37 C
37°C is 98.60°F
```

4) Write a bash script to replace a word with another word in sentence and display the original as well as modified sentence in the output. **[2 Marks]**

Steps:

i) Check if exactly three arguments are passed or not, if not throw an exception.

ii) Replace the old word with the new words in the sentence.

iii) Display the original and modified sentences.

```
snsrl1@snsrl:~/SSL_2024/Ass-2$ ./q4.sh "This is SSL lab" "lab" "Labratory course"
Original Sentence: This is SSL lab
Modified Sentence: This is SSL Labratory course
```

5) Write a script that searches all files with a certain prefix in a directory, user inputs the prefix and also a true or false string to search for the files in subdirectories. If the user inputs the prefix as `true`, then it checks for the subdirectories of the `sol` which consists of any file named as todo, if it is `false`, then search in that sub directory `sol` which consists of any file named as todo.

[3 Marks]

Steps:

i) Check if exactly three arguments are passed if not then throw an exception.

ii) Check if the provided directory exists or not, if not throw an exception.

iii) Determine the search command based on whether to include subdirectories or not, if not throw an exception.

iv) Check if any files were found or not, if not throw an exception.

```
snsrl1@snsrl:~/SSL_2024/Ass-2$ ./q5.sh sol todo false
Not searching in subdirectories...
Files found with prefix 'todo' in the directory 'sol':
sol/todo.txt
snsrl1@snsrl:~/SSL_2024/Ass-2$ ./q5.sh sol todo true
Searching in subdirectories...
Files found with prefix 'todo' in the directory 'sol':
sol/todo.txt
sol/sol1/todo.txt
```

6) Write a Bash script that accepts a directory as input and performs the following tasks:

1. Recursively search through all subdirectories of the given directory. **[1 Marks]**
2. Identify and list the top 5 largest files found, sorted in decreasing order of their size. **[1 Marks]**
3. Display the file sizes in a human-readable format (e.g., KB, MB, GB). **[1 Marks]**
4. For each of the top 5 files, output additional details including: **[3 Marks]**
    a. The absolute path of the file.
    b. The owner of the file.
    c. The last modified date of the file.

If the directory contains fewer than 5 files, the script should list all available files with the above details.

Steps:
i) Check if the directory is provided or not, if not then throw an exception.
ii) Check if the provided argument is a directory or not, if not then throw an exception.
iii) Find the top 5 largest files in the directory and its subdirectories, get the file details including size, absolute path, owner, and modification time, then sort in the reverse order by size (human-readable format) and limit the output to top 5 results.

```
snsrl1@snsrl:~$ ./q6.sh Downloads/
Top 5 largest files in the directory 'Downloads/':
-------------------------------------------------
Size:   90MiB
Path: Downloads/transfer/teamviewer-host_15.54.3_amd64.deb
Owner: snsrl1
Last Modified: 2024-08-18 12:06:38.203481000 +0530
-------------------------------------------------
Size:   90MiB
Path: Downloads/teamviewer-host_15.54.3_amd64.deb
Owner: snsrl1
Last Modified: 2024-08-18 12:06:38.203481000 +0530
-------------------------------------------------
Size:  6.0MiB
Path: Downloads/transfer/anydesk_6.2.0-1_amd64.deb
Owner: snsrl1
Last Modified: 2024-08-18 12:06:38.255483000 +0530
-------------------------------------------------
Size:  6.0MiB
Path: Downloads/anydesk_6.2.0-1_amd64.deb
Owner: snsrl1
Last Modified: 2024-08-18 12:06:38.255483000 +0530
-------------------------------------------------
Size:  4.5MiB
Path: Downloads/Linux
Owner: Shell
Last Modified: scripting with Bash.pdf snsrl1 2024-08-18 17:03:32.532589734 +0530
-------------------------------------------------
```

Instructions:

- Posted on: 26/08/2024
- Due date: 1st September 2024 (11:59 PM)
- The assignment is available in the drive folder and in the moodle.
- The mode of submission is Moodle. Any other kind of submissions are not accepted.
- Save all the scripts as:
    - script1.sh,
    - script2.sh
    - script3.sh
    - script4.sh
    - script5.sh
    - script6.sh

- Please zip all your script files, and submit a single file named "<roll-no>.zip", where <roll-no> should be replaced with your IIT Dharwad roll number.
- If you have violated the naming convention then you will be awarded a **10%** penalty of your secured marks.
- There will be a 100% penalty for plagiarism.
- Introducing irrelevant code is considered as malpractice.
- Late submission files are not considered for evaluation.