Operating System Lab

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Class: BCSE 3rd Year 1st Sem

Section: A3

Assignment No: 1

1. Write a shell script that has 2 user created variables, uv1 and uv2. Ask for the values of the variables from the user and take in any values (real/integer/character) for the 2 variables. Test the program for different types of uv1 and uv2.
(a) Print them as:
    (i) value of uv1 followed by value of uv2 separated by a comma and
    (ii) value of uv2 followed by value of uv1 separated by the word “and”.
(b) Print the variables in reverse order [If uv1 is 1234, then output should be 4321]

Solution: 2 numbers are taken as input. Using for loop, the string is reversed; though “**rev**” function could be used to reverse the string.

Code:

```
#!/bin/bash

echo "Enter the first variable"
read uv1
echo "Enter the second variable"
read uv2

echo "$uv1,$uv2"
echo "$uv2 and $uv1"

read -p "Enter the value:" str
# read - p "Enter string:" string

len=${#str}

for ((i = $len - 1; i >= 0; i--))
do
reverse="$reverse${str:$i:1}"
done

echo $reverse
```

Output:

```
tonmoy@tonmoy-VivoBook-ASUSLaptop-X421IAY-M413IA:~/Drive E/5th sem/OS Lab/Assignment 1$ /
bin/bash "/home/tonmoy/Drive E/5th sem/OS Lab/Assignment 1/1_a.sh"
Enter the first variable
1234
Enter the second variable
5678
1234,5678
5678 and 1234

tonmoy@tonmoy-VivoBook-ASUSLaptop-X421IAY-M413IA:~/Drive E/5th sem/OS Lab/Assignment 1$ /
bin/bash "/home/tonmoy/Drive E/5th sem/OS Lab/Assignment 1/1_b.sh"
Enter the value:1234
4321
```

---

2. Write a shell script to count the number of lines in a file. Test if the file is present. If not, create and write.

Solution: Presence of file in the directory is checked using **`-f options`** inside the if condition. If the file is present, the number of lines can be found using **"`wc -l`"** command. If the file is not present, the file must be created and input is taken using cat command.

Code:

```
#!/bin/bash

read -p "Enter the file name:" file

if ! [[ -f $file ]]
then
touch $file
echo "$file created, write something in file and do Ctrl+d to exit"
cat > $file
fi

# line_no=`wc --lines < $file`
line_no=$(wc -l < $file)
line_no=$(($line_no + 1))

echo "The number of line in the file is $line_no"
```

Output:

```
tonmoy@tonmoy-VivoBook-ASUSLaptop-X421IAY-M413IA:~/Drive E/5th sem/OS Lab/Assignment 1$ /bin/b
ash "/home/tonmoy/Drive E/5th sem/OS Lab/Assignment 1/2.sh"
Enter the file name:test.txt
test.txt created, write something in file and do Ctrl+d to exit
hello
world
hello
The number of line in the file is 3
```

---

3. Write a shell script that counts the number of ordinary files (not directories) in the current working directory and its sub-directories. Repeat the count of files including the subdirectories that the current working directory has.

Solution: This can be done by recursively calling a function for all the subdirectories. Two functions were generated, one counted only the files, and another counted the number of files as well as directories.

Code :

```
#!/bin/bash

count_files()
{
if [ $# -eq 0 ]
then
echo 0
```

```
else
PATH="$1"
no_of_files=0
for file in "$PATH"/*
do
if [ -d "$file" ]
then
rec_return=$(count_files "$file/")
no_of_files=$(($no_of_files + $rec_return))
else
no_of_files=$(($no_of_files + 1))
fi
done
echo $no_of_files
fi
}

count_files_with_dir()
{
if [ $# -eq 0 ]
then
echo 0
else
PATH="$1"
no_of_files=0
for file in "$PATH"/*
do
no_of_files=$(($no_of_files + 1))
if [ -d "$file" ]
then
rec_return=$(count_files_with_dir "$file/")
no_of_files=$(($no_of_files + $rec_return))
fi
done
echo $no_of_files
fi
}

ans=$(count_files ".")
echo "Number of files: $ans"
ans=$(count_files_with_dir ".")
echo "Number of files and directories: $ans"
```

Output:

```
tonmoy@tonmoy-VivoBook-ASUSLaptop-X421IAY-M413IA:~/Drive E/5th sem/OS Lab/Assignment 1$ /bin/b
ash "/home/tonmoy/Drive E/5th sem/OS Lab/Assignment 1/tempCodeRunnerFile.sh"
Number of files: 22
Number of files and directories: 25
```

---

4. Write a shell program to duplicate the UNIX **rm** command with the following features:
a. Instead of deleting the files, it will move them to a **my-deleted-files** directory. If the file already exists in the **my-deleted-files** directory, then the existing file (in the **my-deleted-files**) will have the version number zero (0) appended to it and the newly deleted file will have version number one (1) appended to it. Go on incrementing the version nos., if required.

b. The command will have a switch -c that will clear the entire **my-deleted-files** directory after asking for confirmation.

Solution: The count of the next file to be printed, is done by by for loop. on using –c, the whole “my-deleted-files” folder is deleted.

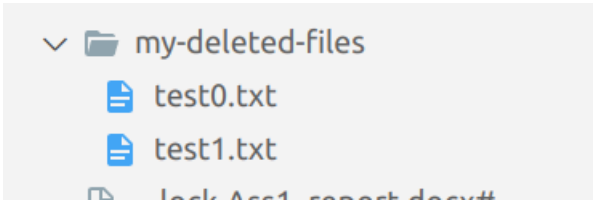
Code:

```
#!/bin/bash

deleted_dir="my-deleted-files"


# Function to move files to the my-deleted-files directory
move_to_deleted() {
file="$1"
# base_name
# extension
version=0

# Extract the base name and extension of the file
base_name="${file%.*}"
extension="${file##*.}"

if [ -e "$deleted_dir/$base_name.$extension" ]
then
mv "$deleted_dir/$file" "$deleted_dir/$base_name$version.$extension"
fi

# Check if the file already exists in the my-deleted-files directory
while [ -e "$deleted_dir/$base_name$version.$extension" ]
do
((version++))
done

if [ $version -eq 0 ]
then
# Move the file without any version number
mv "$file" "$deleted_dir/$file"
else
# Move the file to the my-deleted-files directory with the version number
mv "$file" "$deleted_dir/$base_name$version.$extension"
fi

}

# Function to clear the entire my-deleted-files directory
clear_deleted_directory() {
read -p "Are you sure you want to clear the my-deleted-files directory? (y/n): " confirm
if [ "$confirm" = "y" ]
then
rm -r "$deleted_dir"/*
echo "my-deleted-files directory cleared."
else
echo "Operation canceled."
fi
}
```

```
# Check if the my-deleted-files directory exists, and create it if not
if [ ! -d "$deleted_dir" ]
then
mkdir "$deleted_dir"
fi

# args_no=$#

if [ $1 == "-c" ]
then

clear_deleted_directory

else
# Loop through the remaining arguments (files to be deleted)
for file in "$@"
do
if [ -e "$file" ]
then
move_to_deleted "$file"
echo "Moved '$file' to $deleted_dir."
else
echo "Error: '$file' does not exist."
fi
done
fi
```

Output

```
tonmoy@tonmoy-VivoBook-ASUSLaptop-X421IAY-M413IA:~/Drive E/5th sem/OS Lab/Assignment 1$ ./4.sh
 test.txt
Moved 'test.txt' to my-deleted-files.
tonmoy@tonmoy-VivoBook-ASUSLaptop-X421IAY-M413IA:~/Drive E/5th sem/OS Lab/Assignment 1$ touch
test.txt
tonmoy@tonmoy-VivoBook-ASUSLaptop-X421IAY-M413IA:~/Drive E/5th sem/OS Lab/Assignment 1$ ./4.sh
 test.txt
Moved 'test.txt' to my-deleted-files.
```



---

5. Write a script called birthday_match.sh that takes two birthdays of the form DD/MM/YYYY (e.g., 15/05/2000) and returns whether there is a match if the two people were born on the same day of the week (e.g., Friday). And then find out the age/s in years/months/days.

Solution: 'date' commands can be used to retrieve the days, and can also detect the dates that are invalid. A function was created to generate the age from a given date.

Code:

```
#!/bin/bash
```

```
# Function to calculate the age
calculate_age() {
bd_date="$1"
current_date="$(date +'%d/%m/%Y')"
# echo "Current data $current_date"

bd_year="${bd_date##*/}"
current_year="${current_date##*/}"
# echo "Year $bd_year"
# echo "Year $current_year"

bd_month="${bd_date%/*}"
current_month="${current_date%/*}"
# echo "month $bd_month"
# echo "month $current_month"

bd_day="${bd_month%/*}"
current_day="${current_month%/*}"
# echo "day $bd_day"
# echo "day $current_day"

bd_month="${bd_month#*/}"
current_month="${current_month#*/}"
# echo "month $bd_month"
# echo "month $current_month"

# temp=$bd_date
# bd_date=$bd_month
# bd_month=$temp


# temp=$current_day
# current_day=$current_month
# current_month=$temp


age_years=$(expr $current_year - $bd_year )
# echo "Age year $age_years"
age_months=$(expr $current_month - $bd_month )
age_days=$(expr $current_day - $bd_day )
# echo "Age day $age_days"

# Adjust for negative months or days
if [ "$age_days" -lt 0 ]
then
age_days=$((age_days + 30))
age_months=$((age_months - 1))
fi

if [ "$age_months" -lt 0 ]
then
age_months=$((age_months + 12))
age_years=$((age_years - 1))
fi

echo "$age_years years, $age_months months, $age_days days"
}

# Function to check if two dates fall on the same day of the week
check_same_day_of_week() {
date1=$(echo "$1" | awk -F'/' '{print $2"/"$1"/"$3}')
```

```
date2=$(echo "$2" | awk -F'/' '{print $2"/"$1"/"$3}')

day1="$(date -d "$date1" +'%A')"
day2="$(date -d "$date2" +'%A')"

if [ "$day1" == "$day2" ]
then
echo "Same day of the week ($day1)"
else
echo "Different days of the week ($day1 and $day2)"
fi
}



read -p "Enter the first date of birth: " birthday1
read -p "Enter the second date of birth: " birthday2



# Check if the days of the week match and calculate age
check_same_day_of_week "$birthday1" "$birthday2"
echo "Age of the first"
calculate_age "$birthday1"
echo "Age of the second"
calculate_age "$birthday2"
```

Output:

```
tonmoy@tonmoy-VivoBook-ASUSLaptop-X421IAY-M413IA:~/Drive E/5th sem/OS Lab/Assignment 1$ /bin/b
ash "/home/tonmoy/Drive E/5th sem/OS Lab/Assignment 1/5.sh"
Enter the first date of birth: 19/12/2002
Enter the second date of birth: 12/12/2002
Same day of the week (Thursday)
Age of the first
20 years, 8 months, 27 days
Age of the second
20 years, 9 months, 4 days
```

---

6. Write a shell script that accepts a file name as an input and performs the following activities on the given file. The program asks for a string of characters (that is, any word) to be provided by the user. The file will be searched to find whether it contains the given word. If the file contains the given word, the program will display (a) the number of occurrences of the word. The program is also required to display (b) the line number in which the word has occurred and no. of times the word has occurred in that line (Note: the word may occur more than once in a given line). If the file does not contain the word, an appropriate error message will be displayed.

Solution: grep command was used to find the number of words in the file as well as in each line. awk was used to extract out the lines from the file, and count is shown for each line. File name is taken as command line argument

Code:

```
#!/bin/bash

read -p "Enter the file name: " filename

#to check whether the file exist
if [ ! -f "$filename" ]
then
echo "Error: File '$filename' does not exist."
exit 1
fi

read -p "Enter the word: " word

#to count the total number of occurrence and show the error message
total_count=$(grep -o -w "$word" "$filename" | wc -l)
if [ $total_count -gt 0 ]
then
echo "Total no of occurrence of $word is $total_count"
else
echo "Error: The file $filemane doesn't contain word $word"
exit 1
fi

line_no=1

# To count the number of occurrence of word line by line
while read -r line
do
# echo "Line: $line"
word_count=$(echo "$line" | grep -o -w "$word" | wc -l)
if [ $word_count -gt 0 ]
then
echo "No of occurrence of $word in line $line_no is $word_count"
fi
((line_no+=1))
done < "$filename"
```

Output :

```
20 years, 9 months, 4 days
tonmoy@tonmoy-VivoBook-ASUSLaptop-X421IAY-M413IA:~/Drive E/5th sem/OS Lab/Assignment 1$ /bin/b
ash "/home/tonmoy/Drive E/5th sem/OS Lab/Assignment 1/6.sh"
Enter the file name: test1.txt
Enter the word: line
Total no of occurrence of line is 4
No of occurrence of line in line 1 is 1
No of occurrence of line in line 2 is 2
No of occurrence of line in line 3 is 1
tonmoy@tonmoy-VivoBook-ASUSLaptop-X421IAY-M413IA:~/Drive E/5th sem/OS Lab/Assignment 1$
```

---

7. Extend the shell script written in (6) to perform the following task: User is asked to enter two different patterns or words. The first pattern will have to be matched with the contents of the file

and replaced by the second pattern if a match occurs. If the first pattern does not occur in the file, an appropriate error message will be displayed.

Solution: Same as previous, the **–w** option was removed in grep command, since we are not finding whole matching words. Replace is done by "**sed**" command
Code:

```
#!/bin/bash
read -p "Enter the file name: " filename

#to check whether the file exist
if [ ! -f "$filename" ]
then
echo "Error: File '$filename' does not exist."
exit 1
fi

read -p "Enter the word: " word

#to count the total number of occurrence and show the error message
total_count=$(grep -o -w "$word" "$filename" | wc -l)
if [ $total_count -gt 0 ]
then
echo "Total no of occurrence of $word is $total_count"
else
echo "Error: The file $filemane doesn't contain word $word"
exit 1
fi

line_no=1

# To count the number of occurrence of word line by line
while read -r line
do
# echo "Line: $line"
word_count=$(echo "$line" | grep -o -w "$word" | wc -l)
if [ $word_count -gt 0 ]
then
echo "No of occurrence of $word in line $line_no is $word_count"
fi
((line_no+=1))
done < "$filename"

read -p "Enter the word to replace with: " new_word

sed -i "s/$word/$new_word/g" "$filename"
echo "$word is replace with $new_word"
```

Output:

```
tonmoy@tonmoy-VivoBook-ASUSLaptop-X421IAY-M413IA:~/Drive E/5th sem/OS Lab/Assignment 1$ /bin/b
ash "/home/tonmoy/Drive E/5th sem/OS Lab/Assignment 1/7.sh"
Enter the file name: test1.txt
Enter the word: line
Total no of occurrence of line is 4
No of occurrence of line in line 1 is 1
No of occurrence of line in line 2 is 2
No of occurrence of line in line 3 is 1
Enter the word to replace with: LINE
line is replace with LINE
```

test1.txt

```
1  lfjlsjflks  LINE 1
2  fejrlsdfl;sjfkih LINE LINE 2
3  kjsllfjkd LINE 3
4
```

Additional Assignment

Code:

```
#!/bin/bash


filename="logfile.txt"


if [ ! -f $filename ]
then
touch $filename
fi


greeting(){
cur_time=$(date +"%H")
time="morning"
if [ $cur_time -gt 3 ]
then
time="evening"
fi
echo
echo "Hello $USER good $time"
echo "Hello $USER good $time" >> $filename
echo
}


show_disk_usage(){
disk_usage=$(df -h)


echo
echo "Disk Usage Information:"
echo "Disk Usage Information:" >> $filename
echo "-----------------------"
echo "-----------------------" >> $filename
echo "$disk_usage"
echo "$disk_usage" >> $filename
echo
}


list_files(){


read -p "Enter the minimum file size in bytes: " min_size


echo
echo "List of files greater than or equal to ${min_size} bytes:"
echo "List of files greater than or equal to ${min_size} bytes:" >> $filename
echo "----------------------------------------"
echo "----------------------------------------" >> $filename


for file in "."/*
do
size=$(du -b "$file")
for i in $size
do
# echo $i
if [ "$i" -ge "$min_size" ]
then
```

```
echo "FileName: $file | Size: $i bytes"
echo "FileName: $file | Size: $i bytes" >> $filename
fi
break
done
done

echo "----------------------------------------"
echo "----------------------------------------" >> $filename
echo
}

show_log_file(){
echo
echo "The content of $filename"
echo
cat $filename
echo
}

while true
do
echo "1. Display Greeting"
echo "2. List Large files"
echo "3. Disk usage"
echo "4. View Log File"
echo "5. Exit"
read -p "Enter the choice no: " c

case $c in

1 )
echo "$USER%Display Greeting%" >> $filename
greeting ;;
2 )
echo "$USER%List Large files%" >> $filename
list_files ;;
3 )
echo "$USER%Disk usage%" >> $filename
show_disk_usage ;;
4 )
echo "$USER%View Log File%" >> $filename
show_log_file;;
5 )
echo "$USER%Exit%" >> $filename
echo
echo "Exiting..."
echo
break ;;
* )
echo "Error: You enter a wrong key"
break;;

esac


done
```

Output:

```
tonmoy@tonmoy-VivoBook-ASUSLaptop-X421IAY-M413IA:~/Drive E/5th sem/OS Lab/Assignment 1$ /bin/bash "/home/tonmoy/Drive E/5th sem/OS Lab/Assignment 1/8.sh"
1. Display Greeting
2. List Large files
3. Disk usage
4. View Log File
5. Exit
Enter the choice no: 1

Hello tonmoy good evening

1. Display Greeting
2. List Large files
3. Disk usage
4. View Log File
5. Exit
Enter the choice no: 2
Enter the minimum file size in bytes: 1000

List of files greater than or equal to 1000 bytes:
----------------------------------------
FileName: ./3.sh   |  Size: 1275 bytes
FileName: ./4.sh   |  Size: 1774 bytes
FileName: ./5.sh   |  Size: 2158 bytes
FileName: ./8.sh   |  Size: 2371 bytes
FileName: ./Ass1_report.docx   |  Size: 429418 bytes
FileName: ./BCSE-OS-Assignments-I-2023[809].pdf   |  Size: 126270 bytes
FileName: ./dir   |  Size: 4096 bytes
FileName: ./my-deleted-files   |  Size: 4114 bytes
FileName: ./q3.sh   |  Size: 1038 bytes
FileName: ./tempCodeRunnerFile.sh   |  Size: 1038 bytes
----------------------------------------

1. Display Greeting
2. List Large files
3. Disk usage
4. View Log File
5. Exit
Enter the choice no: 3

Disk Usage Information:
----------------------
Filesystem      Size  Used Avail Use% Mounted on
```

```
tmpfs          735M  2.1M  733M   1% /run
/dev/nvme0n1p2  468G   52G  393G  12% /
tmpfs          3.6G   47M  3.6G   2% /dev/shm
tmpfs          5.0M  4.0K  5.0M   1% /run/lock
/dev/nvme0n1p1  511M  6.1M  505M   2% /boot/efi
tmpfs          735M  112K  735M   1% /run/user/1000

1. Display Greeting
2. List Large files
3. Disk usage
4. View Log File
5. Exit
Enter the choice no: 4

The content of logfile.txt

%List Large files%
List of files greater than or equal to 1000 bytes:
----------------------------------------
FileName: ./4.sh   |  Size: 2449 bytes
FileName: ./5.sh   |  Size: 2523 bytes
FileName: ./6.sh   |  Size: 1579 bytes
FileName: ./7.sh   |  Size: 1379 bytes
FileName: ./8.sh   |  Size: 3441 bytes
FileName: ./BCSE-OS-Assignments-I-2023[809].pdf   |  Size: 126270 bytes
FileName: ./q3.sh   |  Size: 1025 bytes
----------------------------------------
%Exit%
tonmoy%Display Greeting%
Hello tonmoy good evening
tonmoy%List Large files%
List of files greater than or equal to 1000 bytes:
----------------------------------------
FileName: ./3.sh   |  Size: 1275 bytes
FileName: ./4.sh   |  Size: 1774 bytes
FileName: ./5.sh   |  Size: 2158 bytes
FileName: ./8.sh   |  Size: 2371 bytes
FileName: ./Ass1_report.docx   |  Size: 429418 bytes
FileName: ./BCSE-OS-Assignments-I-2023[809].pdf   |  Size: 126270 bytes
FileName: ./dir   |  Size: 4096 bytes
FileName: ./my-deleted-files   |  Size: 4114 bytes
FileName: ./q3.sh   |  Size: 1038 bytes
FileName: ./tempCodeRunnerFile.sh   |  Size: 1038 bytes
----------------------------------------
tonmoy%Disk usage%
Disk Usage Information:
----------------------
Filesystem      Size  Used Avail Use% Mounted on
```

```
tmpfs           735M  2.1M  733M   1% /run
/dev/nvme0n1p2  468G   52G  393G  12% /
tmpfs           3.6G   47M  3.6G   2% /dev/shm
tmpfs           5.0M  4.0K  5.0M   1% /run/lock
/dev/nvme0n1p1  511M  6.1M  505M   2% /boot/efi
tmpfs           735M  112K  735M   1% /run/user/1000
tonmoy%View Log File%

1. Display Greeting
2. List Large files
3. Disk usage
4. View Log File
5. Exit
Enter the choice no: 5

Exiting...

tonmoy@tonmoy-VivoBook-ASUSLaptop-X421IAY-M413IA:~/Drive E/5th sem/OS Lab/Assignment 1$
^C
```