Operating System (CS301)

Assignment - 4

U19CS012

1) Write a shell script which takes **filename** as argument and checks whether file is *regular file, directory, block special file, character special file, named pipe, symbolic link, socket, ~~device file~~ [Block & Character are Device Files]* etc.

Script:

```
# If the Number of Arguments are Not Equal to 1, [Invalid Input]
if [ $# -ne 1 ]; then
    echo "Right usage: ./q1.sh <filename>"
    exit 2
fi

# Take File Name from Argument 1
filename=$1

# Display Directory Information Using "ls -ld" and redirect it to temp.txt
ls -ld $filename > temp.txt

# Let "file" hold that temp.txt content
file=temp.txt

# All Details about that File [Modes Author Date Create Name Size]
res=$(cat "$file")

# cut command prints first character of each line from the file.
# -rwxrwxrwx 1 bhagya bhagya 187 Aug 31 15:52 regular_file.txt
# - <- DASH

type=$(echo $res | cut -c1-1)

case $type in
    "-") echo "It is a Regular File." ;;
    "d") echo "It is a Directory." ;;
    "c") echo "It is a Character Device file" ;;
    "l") echo "It is a Symbolic Link." ;;
    "s") echo "It is a Local Socket file." ;;
    "b") echo "It is a Block Device file." ;;
    "p") echo "It is a Named Pipe." ;;
    *) echo "It is not a Valid Type." ;;
esac
```

```
# Delete the temp File
rm temp.txt
```

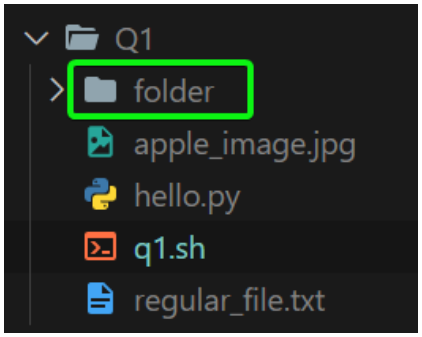
Output:

Regular File

```
bhagya@LAPTOP-1723NVO9:/mnt/c/Users/Admin/Desktop/OS_LAB_4/Q1$ ./q1.sh regular_file.txt
It is a Regular File.
bhagya@LAPTOP-1723NVO9:/mnt/c/Users/Admin/Desktop/OS_LAB_4/Q1$ ./q1.sh apple_image.jpg
It is a Regular File.
```

Directory

```
bhagya@LAPTOP-1723NVO9:/mnt/c/Users/Admin/Desktop/OS_LAB_4/Q1$ ./q1.sh folder/
It is a Directory.
```



Block Special File

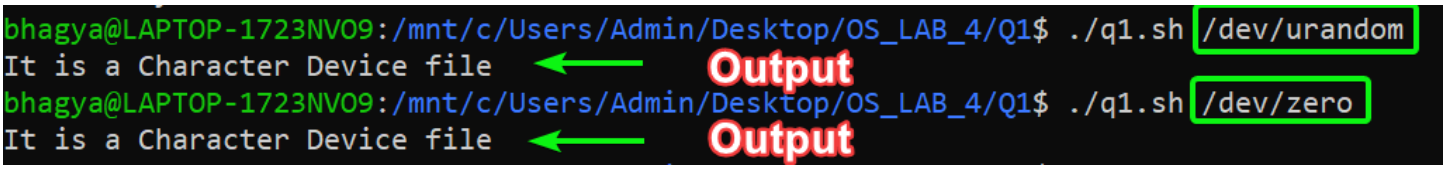
Create a Block File "**block_file**" using **mknod** Command [Sudo Mode – Since Operation Not Permitted in Normal User Mode]

```
Create Block File using mknod Command
bhagya@LAPTOP-1723NVO9:/mnt/c/Users/Admin/Desktop/OS_LAB_4/Q1$ sudo /bin/mknod /dev/block_file b 1 2
[sudo] password for bhagya:
bhagya@LAPTOP-1723NVO9:/mnt/c/Users/Admin/Desktop/OS_LAB_4/Q1$ ./q1.sh /dev/block_file
It is a Block Device file.  <-- Output
```

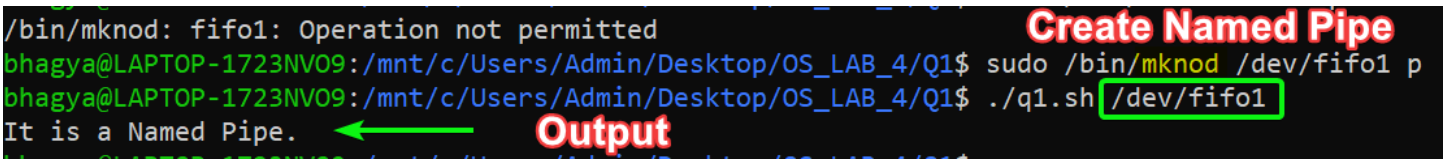
[IBM Documentation - https://www.ibm.com/docs/en/aix/7.2?topic=m-mknod-command]

Character Special File

```
bhagya@LAPTOP-1723NVO9:/mnt/c/Users/Admin/Desktop/OS_LAB_4/Q1$ ./q1.sh /dev/null
It is a Character Device file  <-- Output
```

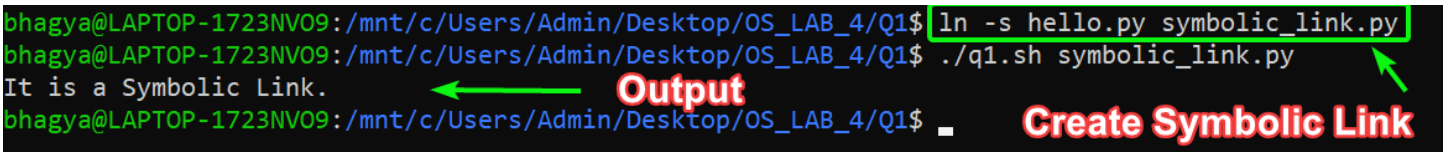


Named Pipe



Symbolic Link

Created Own Symbolic File "**symbolic_link.py**" using "ln – s" Command



[Wikipedia - https://en.wikipedia.org/wiki/Ln_(Unix)]

Default Symbolic Files

Socket

Created Own Socket File "**test.sock**"

```
bhagya@LAPTOP-1723NVO9:/mnt/c/Users/Admin/Desktop/OS_LAB_4/Q1$ python3 -c "import socket as s; sock = s.socket(s.AF_UNIX); sock.bind('/tmp/test.sock')"
bhagya@LAPTOP-1723NVO9:/mnt/c/Users/Admin/Desktop/OS_LAB_4/Q1$ ./q1.sh /tmp/test.sock
It is a Local Socket file.  <-- Output
bhagya@LAPTOP-1723NVO9:/mnt/c/Users/Admin/Desktop/OS_LAB_4/Q1$
```

[StackOverflow - https://serverfault.com/questions/358866/create-unix-named-socket-from-the-command-line/358979]

Device File

[Character and Block are Two Types of Device Files Discussed Above]

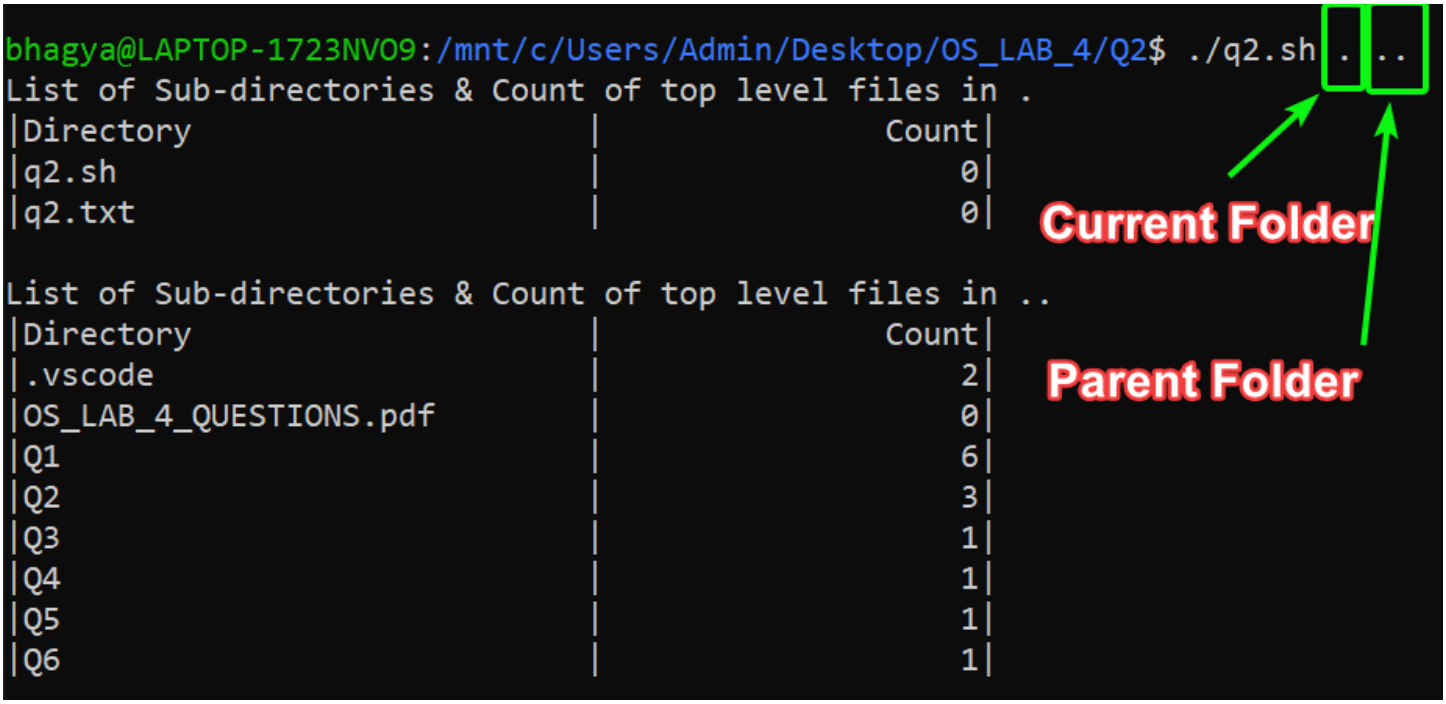
2) Write a shell script which will take file name as argument and check whether the file name is a directory or not and then proceed further only if it is a directory, else give usage message.
The script should then print in the tabular format, name of each sub-directory (within the argument directory) and a count of the number of top level files in that sub-directory.
[Modify the program to work with multiple numbers of arguments, too.]

Script:

```
if [ $# -eq 0 ]; then
    echo "Right usage: ./q2.sh [<dirs>,..]"
    exit 2
fi

for filename in "$@";
do
    # If the Given FileName is Directory
    if [ -d "$filename" ];
    then
        # Copy the Contents of File in q2.txt [STEP 1]
        find $filename -depth -maxdepth 1 > q2.txt

        # command1 && command2 -
> command2 will execute if command1 has executed successfully.
        # If "count.txt" Exist, then Remove it!
        [ -f "count.txt" ] && rm count.txt
        # If "final.txt" Exist, then Remove it!
        [ -f "final.txt" ] && rm final.txt

        echo "List of Sub-directories & Count of top level files in $filename"

        echo "Directory,Count" >>count.txt

        # Read all the Files in Given Folder  {Stored in q2.txt From Step 1}
```

```
        while read line;
        do
            if [[ $filename != $line ]]; then

                # It will Go inside $line Folder and Count all the Files in it
                count=0
                for entry in "$line"/*;
                do
                    # Increment the Count, If it is File
                    [ -f "$entry" ] && count=$(($count + 1))
                done

                # Relative Path of File
                file=$(echo basename $line)
                new="$file,$count"

                # Redirect it to "count.txt" File
                $new >> count.txt
            fi
        done < q2.txt

        # Method to Read File {count.txt} Line by Line
        while IFS=, read -r a b;
        do
            # File Name & Count redirected to "final.txt"
            echo "$a $b" >>final.txt;
        done < count.txt

        # Print in Tabular Form
        awk '{printf "|%-30s|%20s|\n",$1,$2}' final.txt
        echo ""
    else
        echo "$fileName is Not A Directory!"
    fi
done

# Remove all the Text Files Created
rm *.txt

# >,>>, < (Redirection) -
> Redirects the output of a command or a group of commands to a file or stream.
# 1.) https://www.cyberciti.biz/faq/unix-howto-read-line-by-line-from-file/
```

Output:

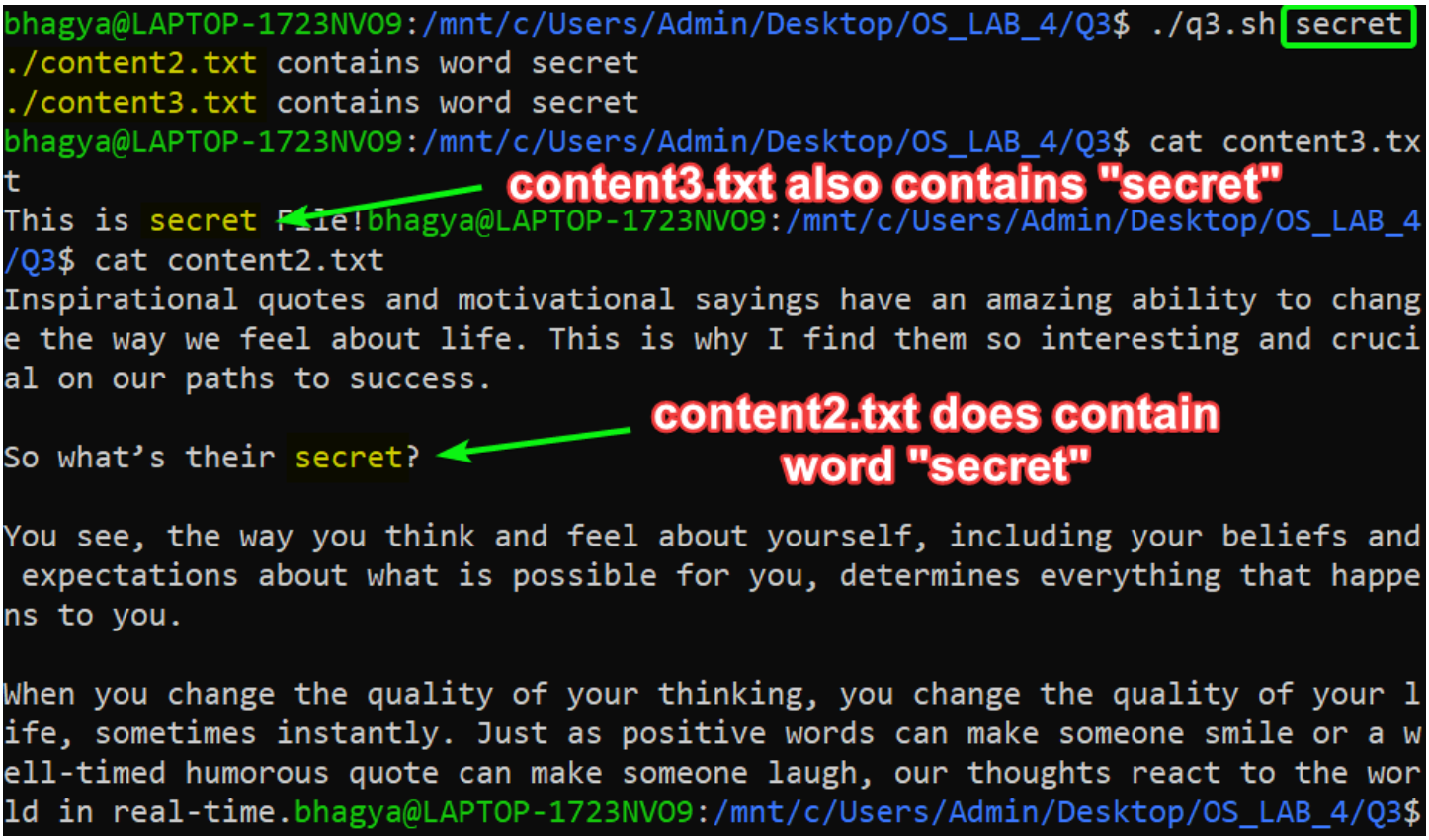


3) Write a script that will search for a specific word in all the files in the current dictionary and then prompt with the file name in which word is found.

Script:

```
# Check for Invalid Input
if [ $# -ne 1 ]; then
    echo "Right Usage: ./q3.sh <word>"
    exit 2
fi

# Get all Files in files
files=$(find . -type f)

# Get the Word as Argument
word=$1

for file in $files;
do
    res=$(grep -w $word $file)

    # -n -> string {res} is not null
    if [ -n "$res" ]; then
        echo "$file contains word $word"
    fi
done
```

Output:



4) Write a script to print only the number of executable files in each sub-dir of the argument directory specified.

Script:

```
if [ $# -ne 1 ]; then
    echo "Right usage: ./q4.sh <dir>"
    exit 2
fi

# Take Directory Name in Variable "name" from Command Line Arguments
name=$1

echo "The Executable Files are : "

find $name -executable -type f

echo "The Number of Executable Files are : "

find $name -executable -type f | wc -l

# References
# 1.) https://superuser.com/questions/38981/how-can-i-find-only-the-executable-files-under-a-certain-directory-in-linux
```

Output:

```
bhagya@LAPTOP-1723NVO9:/mnt/c/Users/Admin/Desktop/OS_LAB_4/Q4$ ./q4.sh ../
The Executable Files are :
../.vscode/c_cpp_properties.json
../.vscode/settings.json
../OS_LAB_4_QUESTIONS.pdf
../Q1/apple_image.jpg
../Q1/hello.py
../Q1/q1.sh
../Q1/regular_file.txt
../Q1/socket_file.py
../Q2/q2.sh
../Q3/content.txt
../Q3/content2.txt
../Q3/content3.txt
../Q3/content4.txt
../Q3/q3.sh
../Q4/q4.sh
../Q5/q5.sh
../Q6/q6.sh
The Number of Executable Files are :
17
```

Parent Folder

Yep - because the NTFS file system doesn't support the Linux permission system, Linux assumes all text files on NTFS files systems are executable, just in case they are supposed to be.

5) Write a non-interactive script that takes in any no. of directory name as argument and calculates total no. of blocks of disk space occupied by the ordinary files in all the directories.

Script:

```
space=0

for arg in "$@";
do
    # If Argument is Directory
    if [ -d $arg ]; then

        # Get all the Files in res
        res=$(find $arg -type f)

        # For Each File in Files Available
```

```
        for file in $res; do
            # Use Long Listing Format and List Only Directories
            ls -ld $file >tmp.txt

            fileNew=tmp.txt
            # Copy All the Contents in res
            res=$(cat "$fileNew")
            # Get the First Char in Each Line
            type=$(echo $res | cut -c1-1)

            # If it is Regular File
            if [ $type == "-" ]; then
                # du Command -> Disk Utilization {Summarize and Produce a Grand Total}
                # size=$(du -sc $file | tail -n 1 | cut -c1-1) [WRONG]
                # cut -c1-1 -> Will NOT WORK, Since Number Can be Double Digit or More
                size=$(du -sc $file | tail -n 1 | grep -o -E '[0-9]+')
                # echo $size

                space=$(($space + $size))
            fi
        done
    fi
done
rm tmp.txt

echo "Disk Space Used : $space"
```

Output:

```
bhagya@LAPTOP-1723NVO9:/mnt/c/Users/Admin/Desktop/OS_LAB_4/Q5$ ./q5.sh . ..
4 ./q5.sh 4 total
0 ../.vscode/c_cpp_properties.json 0 total
0 ../.vscode/settings.json 0 total
40 ../OS_LAB_4_QUESTIONS.pdf 40 total
1976 ../Q1/apple_image.jpg 1976 total
0 ../Q1/hello.py 0 total
4 ../Q1/q1.sh 4 total
0 ../Q1/regular_file.txt 0 total
0 ../Q1/socket_file.py 0 total
4 ../Q2/q2.sh 4 total
0 ../Q3/content.txt 0 total
1 ../Q3/content2.txt 1 total
0 ../Q3/content3.txt 0 total
4 ../Q3/content4.txt 4 total
4 ../Q3/q3.sh 4 total
4 ../Q4/q4.sh 4 total
4 ../Q5/q5.sh 4 total
0 ../Q5/tmp.txt 0 total
0 ../Q6/q6.sh 0 total
```

```
bhagya@LAPTOP-1723NVO9:/mnt/c/Users/Admin/Desktop/OS_LAB_4/Q5$ ./q5.sh . ..
Disk Space Used : 2045
```

6) Write a shell script file ~~named exercise2.sh~~ that makes a list of files in your home directory that were changed less than 24 hours ago, but leave out directories.

Script:

```
find ~ -mtime -1 -type f -maxdepth 1 2> /dev/null

# References:

# 1.) https://www.thegeekstuff.com/2009/06/15-practical-unix-linux-find-command-examples-part-2/
# 2.) https://askubuntu.com/questions/350208/what-does-2-dev-null-mean
```

Output:

```
bhagya@LAPTOP-1723NVO9:/mnt/c/Users/Admin/Desktop/OS_LAB_4/Q6$ ./q6.sh
/home/bhagya/.bash_history
/home/bhagya/.motd_shown
/home/bhagya/.sudo_as_admin_successful
```


SUBMITTED BY:

U19CS012

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