

MTech Refresher Module

System Programming Assignment-2

Total: 100 Marks

Deadline: - 01/08/2024

Instruction:

1. You will have a Demo to evaluate this assignment.
 2. Demo is mandatory. TAs will take the Demo at a suitable time. No Marks will be given if a student doesn't give their Demo.
 3. We will check for Plagiarism in all submissions.
 4. All the doubts regarding the assignment should be posted on the Google Classroom in the public chat. Please don't post your general doubts in the private chat.
 5. Please submit the assignment before the deadline, i.e., 11:59 PM 01/08/2024
 6. The files should be named as 'question<question number>.<file extension>'
 7. Submit a zip file with the format '<Name>_Assignment2.zip' containing the relevant files on the Google Classroom. Marks will be deducted if the format is incorrect.
 8. You need to write all the programs in the Linux system you installed in the last assignment.
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Question 1:

(10 Marks)

You are required to write a C program that uses the *stat* system call to gather and display information from a given file. The program should be able to provide the following details:

1. **File Name:** The name of the file.
2. **Size:** The size of the file in bytes.
3. **Blocks:** The number of blocks allocated to the file.
4. **IO Block:** The size of the file system's block.
5. **File Type:** The type of the file (e.g., regular file, directory, character device, block device, FIFO, symbolic link, or socket).
6. **Device ID:** The ID of the device on which the file resides.
7. **Inode Number:** The unique identifier of the file within the file system.
8. **Number of Links:** The number of hard links to the file.
9. **Access Permissions:** The permission settings of the file.
10. **Owner and Group:** The user ID (UID) and group ID (GID) of the file's owner and group.
11. **Modification Times:** The access, modification, and change times of the file.

Submit a .c file.

Question 2:

(20 Marks)

Implement a C program to recursively list all files and directories starting from a given directory path. If no path is provided, the program should default to the current directory. Submit a .c file.

Example 1:

\$./a.out (When file path is not provided)

Output:

```
./script.sh
./source_code.c
./documents/project_report.txt
./docuemnts
```

Example 2:

```
$ ./a.out ./documents (when file path is explicitly mentioned)
```

Output:

```
./documents/project_report.txt
./documents/meeting_notes.txt
./documents/todos.txt
./documents
```

Question 3:**(15 Marks)**

Write an assembly program to calculate and store the n^{th} power of a number. Define and initialize the base and exponent in the data section of the code(no need to take input). You should be able to show the final output in the memory using **gdb** at the time of the Demo. Submit a .asm file.

Question 4:**(15 Marks)**

Write an assembly program to calculate and output the sum of two integers. You can define and initialize the two integers in the data section or take input. The code to sum the integers should be implemented in a new **function**(use the stack). The final value should be shown through the **standard output**. Submit a .asm file.

Question 5:**(20 Marks)**

Write a shell script to print the Pascal Triangle. Take the number of rows from the user and print the Pascal triangle to that row. Submit a .sh file.

Example:**Input:**

```
5
```

Output:

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

Question 6:**(20 Marks)**

Write a shell script to copy all files in the current directory whose name has less than or equal to 5 characters to a new directory called '**copied_files_dir**'. Also, write the names of all the

copied files into a new file called '*copied_files.txt*' and save it inside the new directory created before. Submit a .sh file.