MTech Refresher Module

System Programming Assignment-1

Total: 25 Marks **Deadline: - 24/07/2024**

Instruction:

1. You will have the demo for evaluating assignments.
2. We shall not allow anyone to give a demo on another machine.
3. We shall not allow any other distribution of linux.
4. Demo is mandatory. TA will be arranging in their suitable time. 0 will be marked if the demo is not given by any student.
5. We will check plagiarism against all the submissions.
6. All the doubts regarding the assignment should be posted on the Google classroom.
7. Submit .c files for question 1, 2 and 3 each and one pdf file for question 4 (Total 4 files).
8. Late submission till 27th July 2024 will result in deduction of 8 marks, 0 Marks will be given after that.
9. Execute the C programs on the Linux else you will get wrong output.

Question 1: **(3 Marks)**

Write a C program that creates a child process using fork(). The parent process should sleep for 5 seconds and then exit. The child process should print its parent's process ID before and after the parent exits, demonstrating that the child becomes an orphan and is adopted by the init process.

Hint: Use sleep() to delay the parent's exit and getppid() to check the parent's process ID.

Question 2: **(3 Marks)**

Write a C program that creates 4 threads to compute the sum of an array of integers of size 16 in parallel. The program should divide the array into equal parts, and each thread should compute the sum of its part. Finally, the main thread should combine the results from each thread to get the total sum.

Question 3: **(3 Marks)**

Extend a C program to execute ls, echo, mkdir and rm commands concurrently using threads (pthread_create()) and exec() functions. Each thread should execute a different command, and the main program should wait for all threads to complete before exiting.

Question 4: **(16 Marks)**

Install Debian Linux on your system either by setting up a virtual machine or by configuring a dual boot environment.

RAM – 4GB (approx.) 2 Virtual CPU cores 20GB of hard drive

Deliverables:

- A document with screenshots/pictures of each step of the installation process. (You can also click pictures with your smartphone)
- A brief description of any issues encountered and their resolution.
- Verification of successful installation by providing screenshots of the Debian desktop environment.