Programming Assignment

Operating Systems

Let **r** be the numeric part of your roll number. Write C programs for the problems numbered 1 and (**r** mod 4)+2. You need to Strictly follow C coding standard of GNOME project (available at this link) and DON lab C standard written by Prof. Gonsalves for completing this assignment.

1. Write a program that forks 2 child processes. Child 1 prints a message every 1 sec. Child 2 sleeps for 10 secs, then kills child 1, then sleeps for 10 secs and terminates. The parent waits for both child processes to terminate then exits. Each process should print a 1-line message including its pid before/after each significant action such as sleep, kill, terminate, etc.

2. Write a program that can display a text string (consisting only of the 26 alphabets and spaces). The program should fork 27 worker processes. Each worker process runs an infinite loop in which it waits for a signal from the controller (i.e., parent), sleeps for 1 sec, prints its pre-defined character, signals the controller, then blocks again. The controller reads a string from the keyboard, then signals the workers in the correct order to get the string displayed.

3. Write a case converter using 3 processes. One reads input from the keyboard. The second takes input from the first and flips the case of each character. The third takes input from the second and displays it. Use pipes to communicate between the processes.

4. Measure the time taken for context switching. Create two processes that switch between themselves by sending signals to one another (use kill() and signal()). Measure the time for a large number of switches. Note the system details such as OS type and version, CPU type and speed, amount of cache/RAM.

5. Write a program to create one parent process and two child processes. The program should have three variables, each of the variables should be controlled by only one among the three processes. Two child processes should modify their corresponding controlled variables and the parent process should use the child processes' values to modify its own variable.

For example,

parentVar=0 // variable controlled by parent process

child1Var=0 // variable controlled by child process 1

child2Var=0 // variable controlled by child process 2

//In Child Process 1, do:

child1Var={compute sum of even numbers <100}

//In Child Process 2, do:

child2Var={compute sum of odd numbers <100}

//In Parent Process, do :

parentVar={compute product of child1Var and child2Var};

Deliverables:

1. **A PDF report, named <RollNo>_Asg1Report.PDF, describing in detail how you completed above tasks along with sample outputs obtained. Make sure that your report is technically sound and readable. Do not forget to include plagiarism statement given below in your submitted report.**
2. **Provide all CODE that you wrote along with this report as separate files in a tarball. Name your files as <RollNo>_prg<x>.c and tarball as <RollNo>_Asg1Files.tar or <RollNo>_Asg1Files.tgz**

PLAGIARISM STATEMENT <Include it in your report>

I certify that this assignment/report is my own work, based on my personal study and/or research and that I have acknowledged all material and sources used in its preparation, whether they be books, articles, reports, lecture notes, and any other kind of document, electronic or personal communication. I also certify that this assignment/report has not previously been submitted for

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