Operating Systems Lab (CS 470):

Lab 4: Given a binary file containing PCB (Process Control Block) information about multiple processes –written in sequential order, simulate a single CPU scheduling using different scheduling algorithms. The time quantum is 1 sec. After "executing" one process, the current status of each process should be written in the same file. The process should be repeated until each process is finished (no more burst time). Such a possible binary file (to be provided as command line argument) can be downloaded from Canvas.

Overview

PCB is a data structure holding information about processes, such as id, name, activity status, CPU burst time, priority, etc. This data descriptor is necessary for the CPU to know which process is running, what is the current state of the process, where the program is in its execution, etc.

Instructions

The binary file contains multiple PCB descriptors in sequential order. In our case it will be not a real PCB descriptor, but each process has the following fields:

Offset	Type	Value	Description
0000	16 char	??	process name
0016	32 bit int	??	process_id
0020	1 char	??	activity status
0021	32 bit int	??	CPU burst time
0025	32 bit int	??	base register
0029	64 bit long	??	limit register
0037	1 char	??	priority

Notes
- Read the binary file and print out the number of processes available in the file, and the total number of memory allocated by the processes – considering all the processes.
- Each process is "executed" according to the following algorithm:
    1) For a time quantum of 30 sec Round Robin scheduling should be considered
    2) For a time quantum of 30 sec Priority scheduling should be considered
        - During Priority scheduling after each 2 quantums apply aging with a value of 1
    3) If all processes are executed stop the simulation
    4) Otherwise GoTo 1

- When there is a change between the two scheduling algorithms, the scheduling should start from the beginning (first element in the file)!
- After a process is "executed", the file should be updated (write), and the current status should be read from the file.
- "Execution" means that the burst time for the process to be executed is decremented with 1 and to simulate this "execution" a wait() or sleep() function is to be called for 500 millisecs.
- Each operation performed during the simulation should be printed on the screen.
- No partial grade will be offered!