

BCSE – 3<sup>rd</sup> year – 1<sup>st</sup> Semester – 2021  
Assignment – II  
Operating Systems Laboratory

1. a. Design a CPU scheduler for jobs whose execution profiles will be in a file that is to be read and appropriate scheduling algorithm to be chosen by the scheduler.  
Format of the profile:  
<Job id> <priority> <arrival time> <CPU burst(1) I/O burst(1) CPU burst(2) ..... >-1  
(Each information is separated by blank space and each job profile ends with -1. Lesser priority number denotes higher priority process with priority number 1 being the process with highest priority.)  
Example: 2 3 4 100 2 200 3 25 -1 7 1 8 60 10 ..... -1 etc.  
Testing:
  - a. Create job profiles for 30 jobs and use three different scheduling algorithms (FCFS, Priority and Round Robin (time slice: 25)).
  - b. Compare the average waiting time, turnaround time of each process for the different scheduling algorithms.
2. Write a program for  $p$ -producer  $c$ -consumer problem,  $p, c \geq 1$ . A shared circular buffer that can hold 50 items is to be used. Each producer process can store any number between 1 to 100 (along with the producer id) and deposit in the buffer. Each consumer process reads a number from the buffer and adds it to a shared variable TOTAL (initialized to 0). Though any consumer process can read any of the numbers in the buffer, the only constraint being that every number written by some producer should be read exactly once by exactly one of the consumers.  
The program reads in the value of  $p$  and  $c$  from the user, and forks  $p$  producers and  $c$  consumers. After all the producers and consumers have finished (the consumers exit after all the data produced by all producers have been read), the parent process prints the value of TOTAL. Test the program with different values of  $p$  and  $c$ .
3. Write a program for the Reader-Writer process for the following situations:
  - a) Multiple readers and one writer: writer gets to write whenever it is ready (reader/s wait)
  - b) Multiple readers and multiple writers: any writer gets to write whenever it is ready, provided no other writer is currently writing (reader/s wait)
4. Implement the following applications using different IPC mechanisms. Your choice is restricted to Pipes, FIFOs, and Message Queues (use different mechanisms for each program)
  - a. Broadcasting weather information (one broadcasting process and more than one listeners)
  - b. Telephonic conversation (between a caller and a receiver)
  - c. Broadcasting information regarding pesticides for agricultural fields / prices of agricultural products for marketing with a farmer having the option of putting query (one broadcasting process and more than one listeners with option of calling back)

Last Date for submission and viva: Respective groups: October 4<sup>th</sup> / 5<sup>th</sup> 2021