LAB MANUAL- Operating Systems
CPU Scheduling

1. First Come First Serve (FCFS) Algorithm:

Given n processes with their burst times, the task is to find average waiting time and average turnaround time using FCFS scheduling algorithm.
First in, first out (FIFO), also known as first come, first served (FCFS), is the simplest scheduling algorithm. FIFO simply queues processes in the order that they arrive in the ready queue.
In this, the process that comes first will be executed first and next process starts only after the previous gets fully executed.
Here we are considering that arrival time for all processes is 0.

How to compute Completion, Turn Around and Waiting time:
1. Completion Time: Time at which process completes its execution.
2. Turn Around Time: Time Difference between completion time and arrival time.
   Turn Around Time = Completion Time – Arrival Time
3. Waiting Time (W.T): Time Difference between turnaround time and burst time.
   Waiting Time = Turn Around Time – Burst Time

Pseudo Code

Implementation:

```
1-  Input the processes along with their burst time (bt).
2-  Find waiting time (wt) for all processes.
3-  As first process that comes need not to wait so
    waiting time for process 1 will be 0 i.e. wt[0] = 0.
4-  Find waiting time for all other processes i.e. for
     process i ->
       wt[i] = bt[i-1] + wt[i-1] .
5-  Find turnaround time = waiting_time + burst_time
    for all processes.
6-  Find average waiting time =
              total_waiting_time / no_of_processes.
7-  Similarly, find average turnaround time =
              total_turn_around_time / no_of_processes.
```

Lab Assignment 1:

Write a code to implement the given pseudo code of FCFS CPU scheduling algorithm, example output is given below.

Output:

```
Processes  Burst time  Waiting time  Turn around time
   1          10          0              10
   2           5         10              15
   3           8         15              23
Average waiting time = 8.33333
Average turn around time = 16
```

2. Shortest Job First (SJF):

Shortest job first (SJF) or shortest job next, is a scheduling policy that selects the waiting process with the smallest execution time to execute next. SJN is a non-preemptive algorithm.

- Shortest Job first has the advantage of having a minimum average waiting time among all scheduling algorithms.
- It is a Greedy Algorithm.
- It may cause starvation if shorter processes keep coming. This problem can be solved using the concept of aging.
- It is practically infeasible as Operating System may not know burst time and therefore may not sort them. While it is not possible to predict execution time, several methods can be used to estimate the execution time for a job, such as a weighted average of previous execution times. SJF can be used in specialized environments where accurate estimates of running time are available.

Pseudocode:

1. Sort all the process according to the arrival time.
2. Then select that process which has minimum arrival time and minimum Burst time.
3. After completion of process make a pool of process which after till the completion of previous process and select that process among the pool which is having minimum Burst time.

Lab Assignment 2:

Write a code to implement the given pseudo code of SJF CPU scheduling algorithm, example output is given below.

Output:

```
Process ID       Arrival Time    Burst Time
1                2               3
2                0               4
3                4               2
4                5               4
Final Result...
Process ID       Arrival Time    Burst Time      Waiting Time    Turnaround T:
2                0               4               0               4
3                4               2               0               2
1                2               3               4               7
4                5               4               4               8
```