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| S.Y.B.Tech  Computer Engineering  Lab. : CE 2207 Operating Systems Laboratory (OSL)  ------------------------------------------------------------------------------------------------------  **Assignment No # 4: (Group- ‘B1’)**   |  | | --- | | **Title:** Write a Java program to implement following scheduling algorithms First Come First Serve (FCFS)(Non-Pre-emptive), Shortest Remaining Time First (SRTF) (Pre-emptive). |   **Objective:** To implement pre-emptive and non-pre-emptive CPU scheduling algorithms.  **Procedure:**  There are various Scheduling algorithms like FCFS, Round Robin, Shortest Job First, Shortest Remaining Time first, Priority Scheduling etc.  All these Scheduling algorithms are divided into two categories:   * + **Preemptive**     - Running process is interrupted before it has finished its execution     - Decision to preempt a process takes place when       * A new process arrives or       * A time out for an executing process occurs       * Preemptive policies incur a greater overhead than Non- Preemptive ones.   + **Non-preemptive**     - Running process continues to execute until       * It terminates i.e. it has finished its execution or       * It blocks itself to wait for I/O   **Terms related to Scheduling Algorithms**   * **Arrival Time (AT):** The time at which a process arrives * **Burst Time (BT):** Time required by a process to complete its execution * **Finish Time (FT)/Completion Time (CT):** Time at which a process finishes its execution * **Turnaround Time (TT):** Time between submissions of a process to time of completion. (TT= Completion Time (CT) - Arrival time (AT)) * **Waiting time (WT) :** Amount of time process waits in waiting queue for its execution   (WT= Turnaround Time (TT)– Burst time (BT))   1. **FIRST COME FIRST SERVED (FCFS)**  * Also known as FIFO :First In First Out * Non pre-emptive * Based on arrival time of the processes they are queued in order in the Ready queue * As current process finishes execution, the oldest process that is in the queue, is executed   **ALGORITHM FOR FCFS**   * Create an array of objects for Process having the resp. fields like its process Name, Arrival Time, burst Time, Finish time, Turnaround and waiting time. * Accept the no. of processes , their arrival & burst time from user * Initialize all fields of the process. * Sort the processes according to their arrival time and place it in the simple queue. Display the status of the queue. * Calculate the following parameters of each process and display in a table format:   + Completion time (CT)   + TT= Completion Time (CT) - Arrival time (AT)   + WT= Turnaround Time (TT)– Burst time (BT) * Display the Gantt Chart.   **SHORTEST REMAINING TIME FIRST (SRTF)**   * Pre-emptive policy * Scenario :   + New process arrives at RQ while previous one is still executing   + New process has shorter CPU burst than what is left of current process   + Process is preempted and CPU is given to the new process to start execution   + If two processes have the same CPU burst , FCFS is used to break the tie.   **ALGORITHM FOR SHORTEST REMAINING TIME FIRST**   1. Initialize time\_cnt=0 2. A) Check if any process’s AT=time\_cnt   Y: Insert into the priority queue using insertion sort based on the Burst Time(BT)  N: Check if queue is empty  Y: Stop  N: Go to 2 B  B) Schedule the process at the front of the queue & Copy the name of the process in the  timeline array for 1 time quantum.  C) Increment time\_cnt=time\_cnt+1  D) Update the Burst time of the scheduled process to BT= BT-1  E) Check , If BT of any process ==0  Y: Delete the process from the queue  N: Go to step 2  F) Calculate Completion time (CT), TT= Completion Time (CT) - Arrival time (AT) and WT= Turnaround Time (TT)– Burst time (BT)  F) Display the Gantt Chart.  **Sample Output:**  \*\*\* Menu\*\*\*  1.FCFS  2.SRTF  3.Exit  Enter your choice: 1 |
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Enter the number of processes to be performed: 5

Enter Arrival time: 0

Enter Burst time: 22

Enter: Arrival time: 4

Enter Burst time: 8

Enter Arrival time: 10

Enter Burst time: 20

Enter Arrival time: 14

Enter Burst time: 10

Enter Arrival time: 28

Enter Burst time: 4

AT BT FT TT WT

P1 0 22 22 22 0

P2 4 8 30 26 18

P3 10 20 50 40 20

P4 14 10 60 46 36

P5 28 4 64 36 32

The average turnaround time is: 34.0

The average waiting time is: 21.2

--Gantt Chart--

|P0| P1| P2| P3|

\*\*\* Menu\*\*\*

1.FCFS

2.SRTF

3.Exit

Enter your choice: 2

Enter the number of processes:4

Enter Arrival Time: 0

Enter Bursts Time: 6

Enter Arrival Time: 1

Enter Bursts Time: 3

Enter Arrival Time: 2

Enter Bursts Time: 5

Enter Arrival Time: 3

Enter Bursts Time: 2

Process AT BT FT TT WT

P0 0 6 11 11 5

P1 1 3 4 3 0

P2 2 5 16 14 9

P3 3 2 6 3 1

Average Turn-Around Time : 7.75

Average Wait Time : 3.75

--Gantt Chart--

P0|P1|P1|P1|P3|P3|P0|P0|P0|P0|P0|P2|P2|P2|P2|P2|