

Assignment No. 3

Date:

TITLE:

Implement the C program for CPU Scheduling Algorithms: Shortest Job First (Preemptive) and Round Robin with different arrival time.

OBJECTIVE:

- To understand the concept of process management and scheduling.
- Apply the concepts of process scheduling.

SOFTWARE REQUIREMENTS:

1. Ubuntu 16.04
2. GNU C Compiler

THEORY:

Process Scheduling

- Non-preemptive
 - Once a process is in the running state, it will continue until it terminates or blocks itself for I/O
- Preemptive
 - Currently running process may be interrupted and moved to ready state by the OS
 - Preemption may occur when new process arrives, on an interrupt, or periodically.

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 ageing.
- 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.

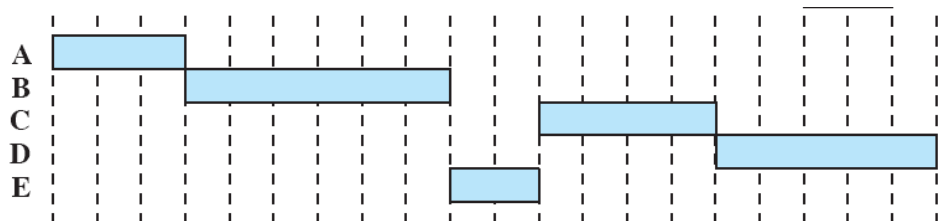
Algorithm:

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.

Process Scheduling Example

Process	Arrival Time	Service Time
A	0	3
B	2	6
C	4	4
D	6	5
E	8	2

Shortest Process
Next (SPN)

**How to compute below times in SJF using a program?**

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 turn around time and burst time. Waiting Time = Turn Around Time – Burst Time

Round Robin is a CPU scheduling algorithm

Round Robin is a CPU scheduling algorithm where each process is assigned a fixed time slot in a cyclic way.

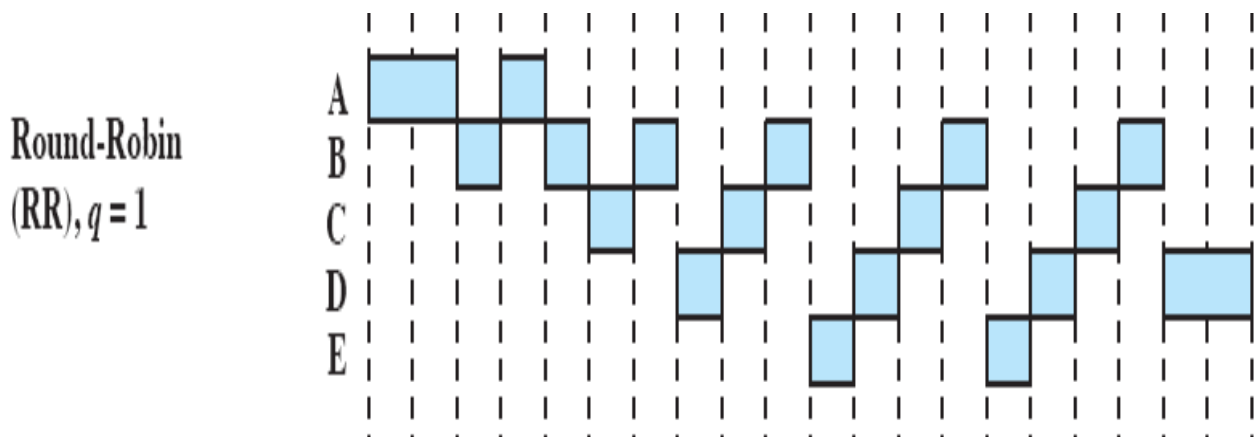
- It is simple, easy to implement, and starvation-free as all processes get fair share of CPU.
- One of the most commonly used technique in CPU scheduling as a core.
- It is preemptive as processes are assigned CPU only for a fixed slice of time at most.

- The disadvantage of it is more overhead of context switching.

Characteristics of Round-Robin Scheduling

Here are the important characteristics of Round-Robin Scheduling:

- Round robin is a pre-emptive algorithm
- The CPU is shifted to the next process after fixed interval time, which is called time quantum/time slice.
- The process that is pre-empted is added to the end of the queue.
- Round robin is a hybrid model which is clock-driven
- Time slice should be minimum, which is assigned for a specific task that needs to be processed. However, it may differ OS to OS.
- It is a real time algorithm which responds to the event within a specific time limit.
- Round robin is one of the oldest, fairest, and easiest algorithm.
- Widely used scheduling method in traditional OS.



Conclusion: Thus we have studied and Implemented Page Replacement Algorithms: FCFS, LRU, and Optimal for frame size as minimum three.