Response Time

Need for a new metric

Thus, if we knew job lengths, and that jobs only used the CPU, and our only metric was turnaround time, preemptive SJF or Shortest Remaining Time First would be a great policy. In fact, for a number of early batch computing systems, these types of scheduling algorithms made some sense. However, the introduction of time-shared machines changed all that. Now users would sit at a terminal and demand interactive performance from the system as well. And thus, a new metric was born: response time.

Defining response time

We define response time as the time from when the job arrives in a system to the first time it is scheduled.

More formally:

$$T_{response} = T_{firstrun} - T_{arrival}$$

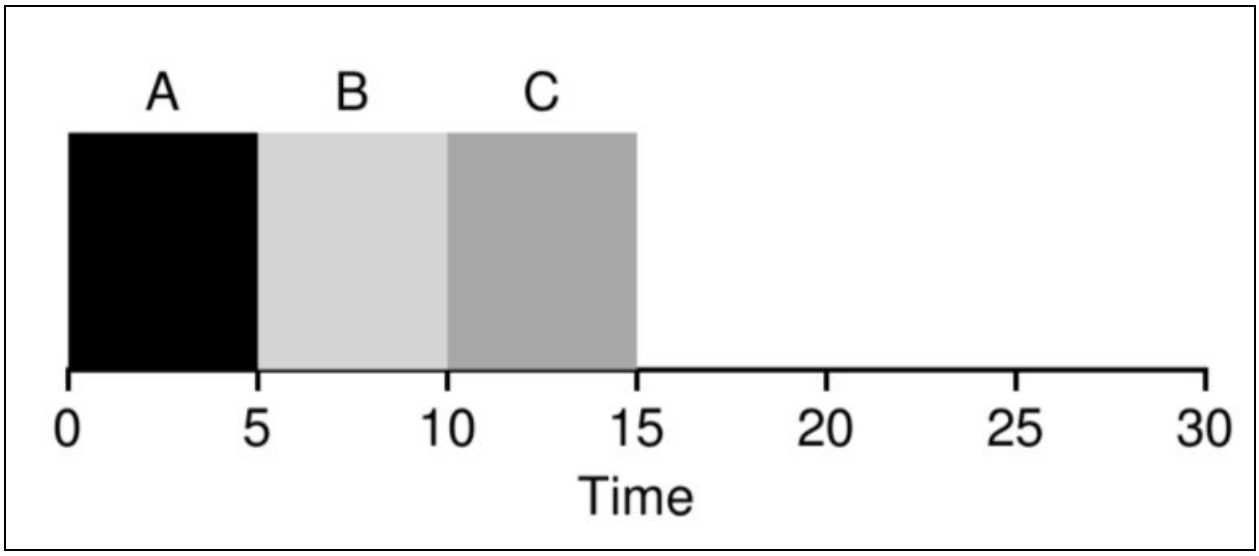
Approaches not sensitive to response time

As you might be thinking, preemptive SJF and related disciplines are not particularly good for response time. If three jobs arrive at the same time, for example, the third job has to wait for the previous two jobs to run in their entirety before being scheduled just once. While great for turnaround time, this approach is quite bad for response time and interactivity. Indeed, imagine sitting at a terminal, typing, and having to wait 10 seconds to see a response from the system just because some other job got scheduled in front of yours: not too pleasant.

Solution: Round Robin Scheduling Algorithm

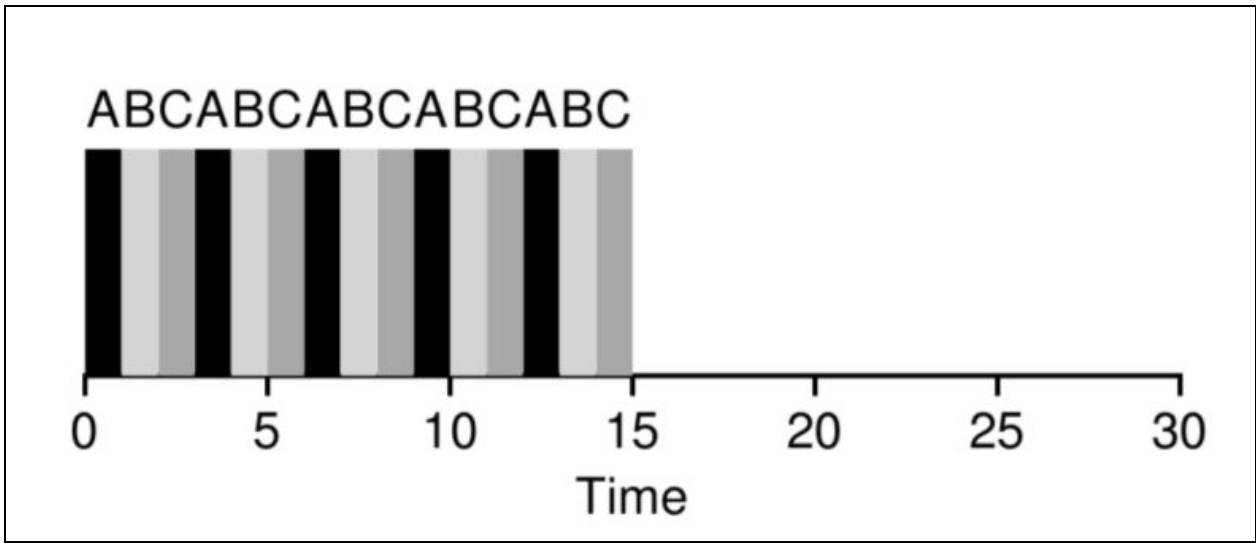
If you observe closely, the Round Robin scheduling algorithm solves this problem. To make it more clear, let us compare preemptive SJF and Round Robin scheduling algorithms with

an example. Assume three jobs A, B, and C arrive at the same time in the system, and that they each wish to run for 5 seconds. An SJF scheduler runs each job to completion before running another (as seen in the figure below).



Preemptive SJF: Bad for response Time

In contrast, RR with a time-slice of 1 second would cycle through the jobs quickly.



Round Robin: Good for response Time

Conclusion

Hence, we should not assume that preemptive SJF is a better algorithm or Round Robin scheduling algorithm is better. If the scenario demands better turnaround time, then preemptive SJF will be preferred and if the focus is on response time, then the priority will be given to Round Robin scheduling algorithm.