CS314 Operating Systems Laboratory - 4

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1 Introduction

SJF (Shortest Job First) and SRTF (Shortest Remaining Time First) schedulers are implemented in C program taking input file as an argument. Input file contains arrival time and alternate CPU burst and I/O burst of different processes which are to be scheduled. Given that only one CPU and one I/O device exist, only one process can run simultaneously.

2 Shortest Job First

The job with the shortest burst time is scheduled first and runs on the CPU. The scheduling scheme I used is that if the arrival time of the process is less than the current time, then that process is added to a ready queue, provided that it is not running an I/O job and is not present in Ready Queue. Processes added in sorted order to Ready Queue such that the head of the Queue has Minimum Burst time. If two processes have the same burst time, it follows the FIFO method. The process which enters first is exited first from Ready Queue. The current time has incremented with burst time. In the next CPU burst cycle, I/O processes are run in the FIFO method if they exist in I/O Queue. If any I/O is not done within that burst time, it gets resumed in the next CPU burst time. If any process after completing the CPU burst enters I/O Queue, it is run parallel with the CPU process. If required for the following CPU burst cycle, I/O processes that have completed the I/O burst are entered into Ready Queue again. This continues until all the processes have been completed.
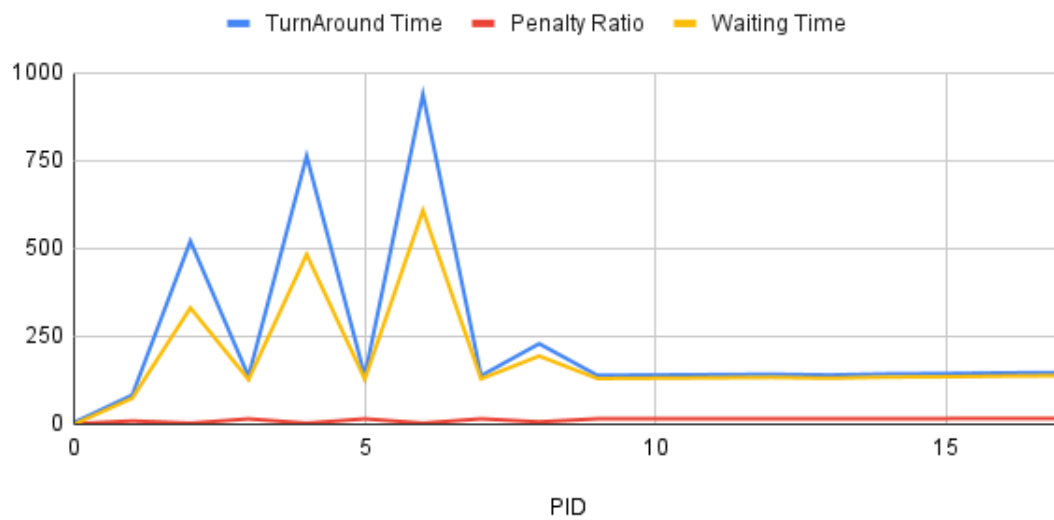
It is expected that using SJF, Average waiting time is reduced and system Throughput is increased.
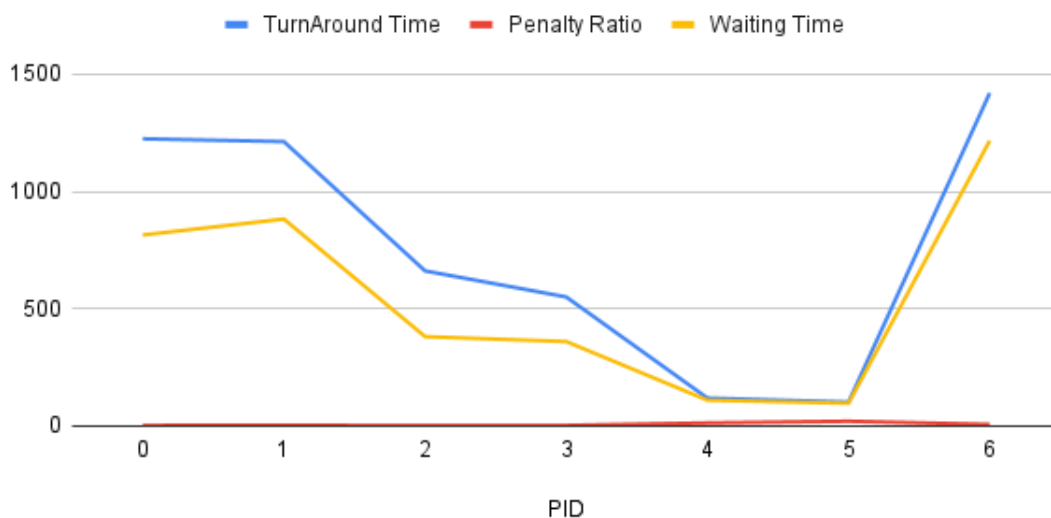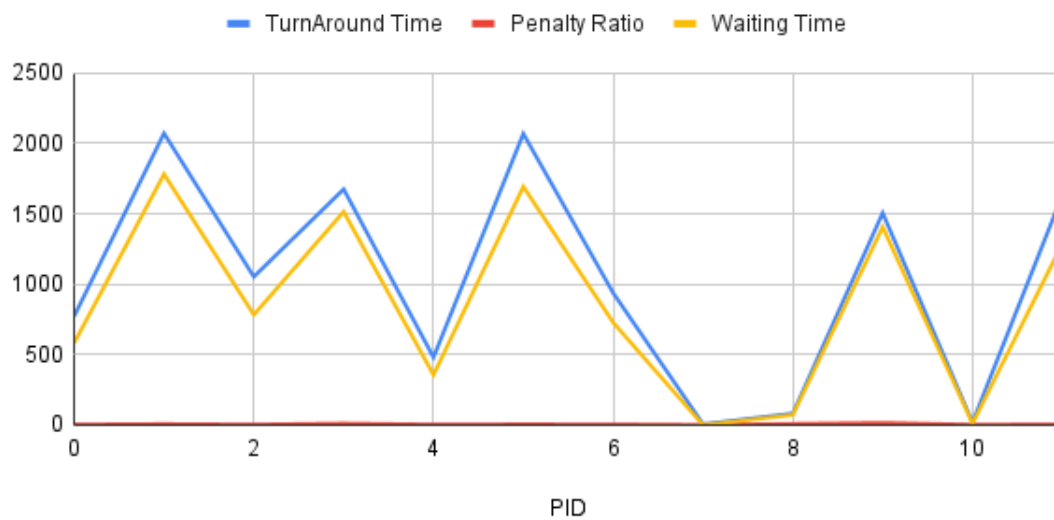

Job characteristics of process1.dat vs PID of process

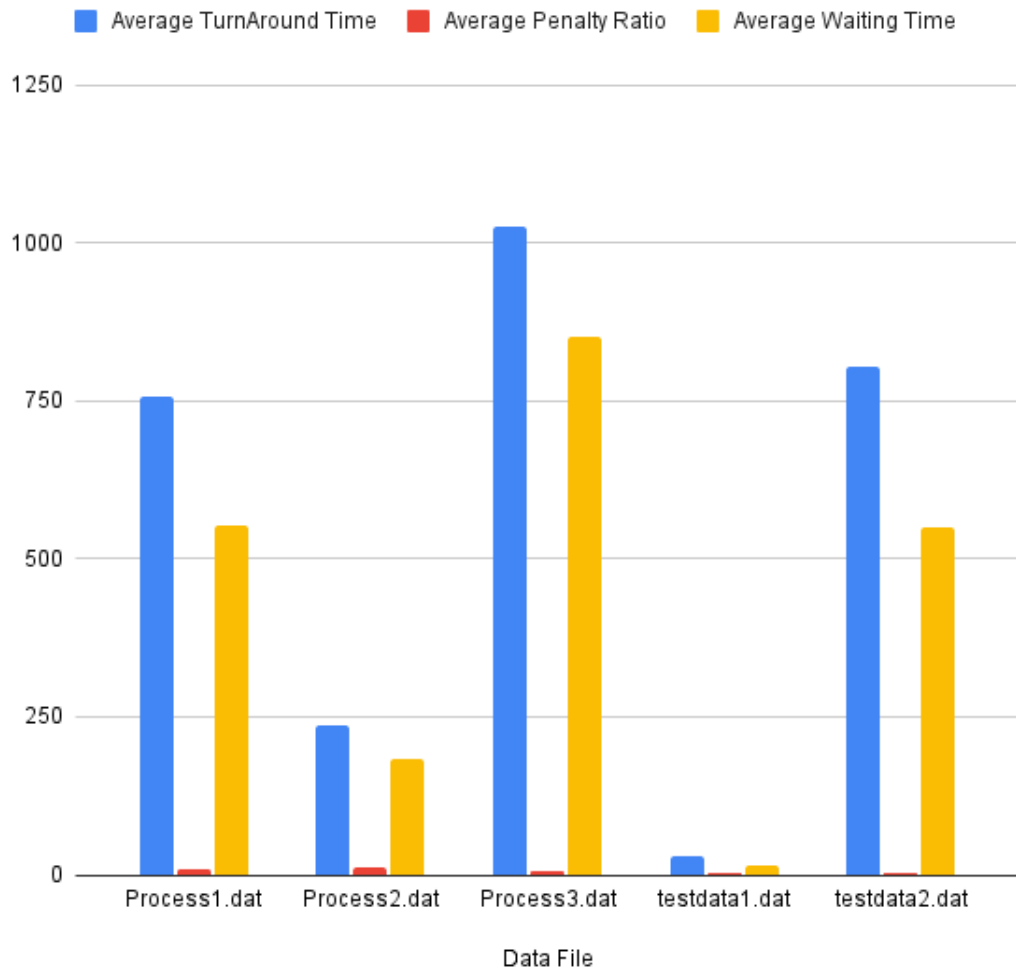TurnAround Time, Penalty Ratio and Waiting Time of process2.dat

Job characteristics of process2.dat vs PID of process

TurnAround Time, Penalty Ratio and Waiting Time of process3.dat

Job characteristics of process3.dat vs PID of process

Average TurnAround Time, Average Penalty Ratio and Average Waiting Time
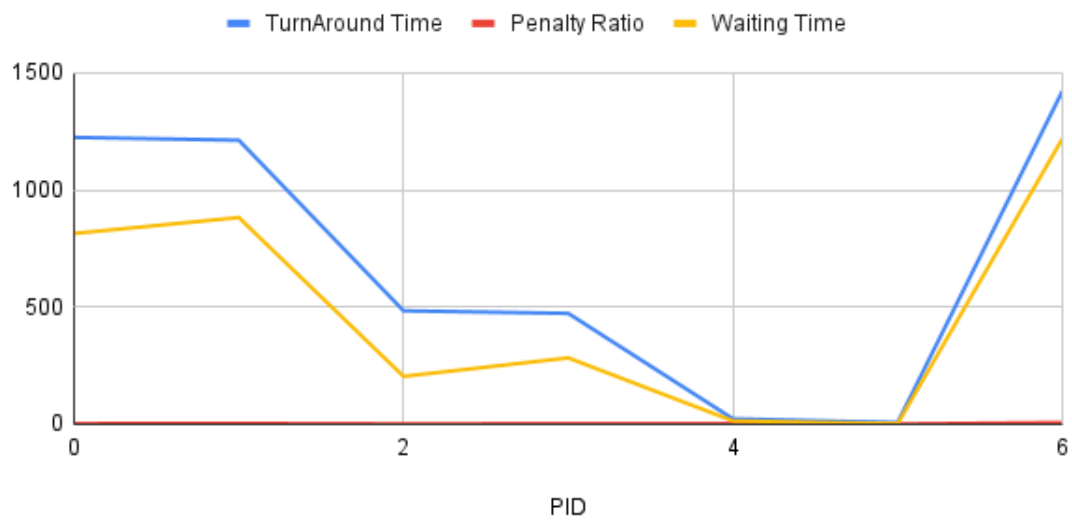

testdata1.dat is suitable for SJF and testdata2.dat has shortcomings for SJF
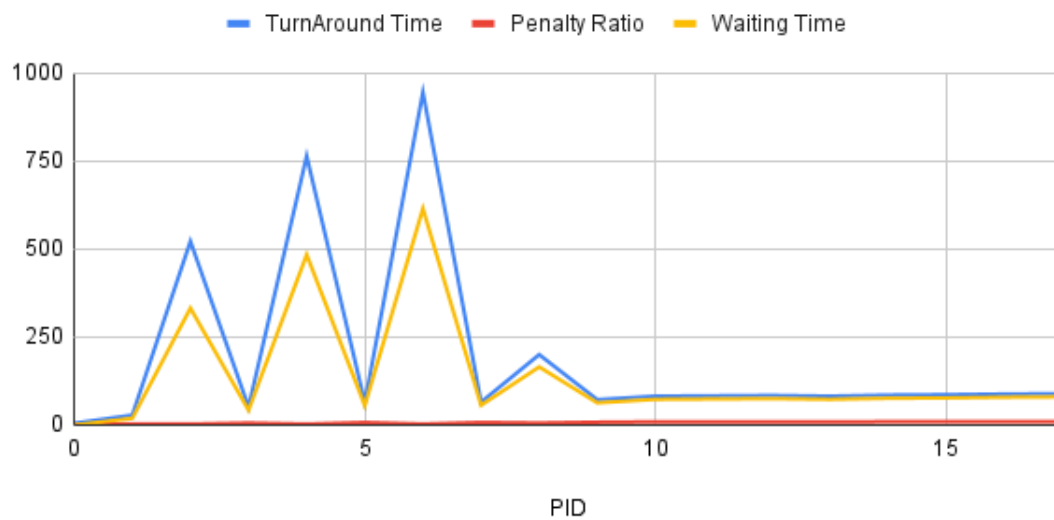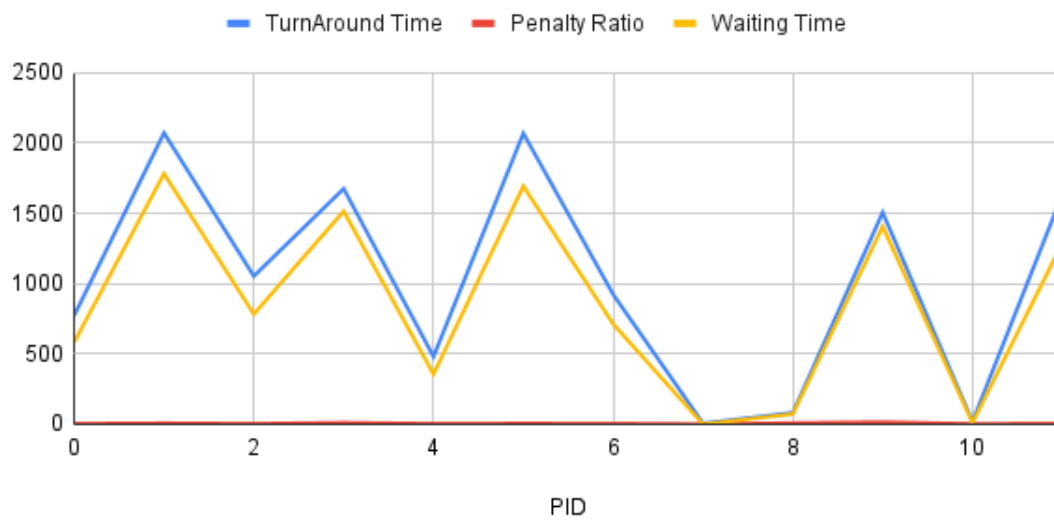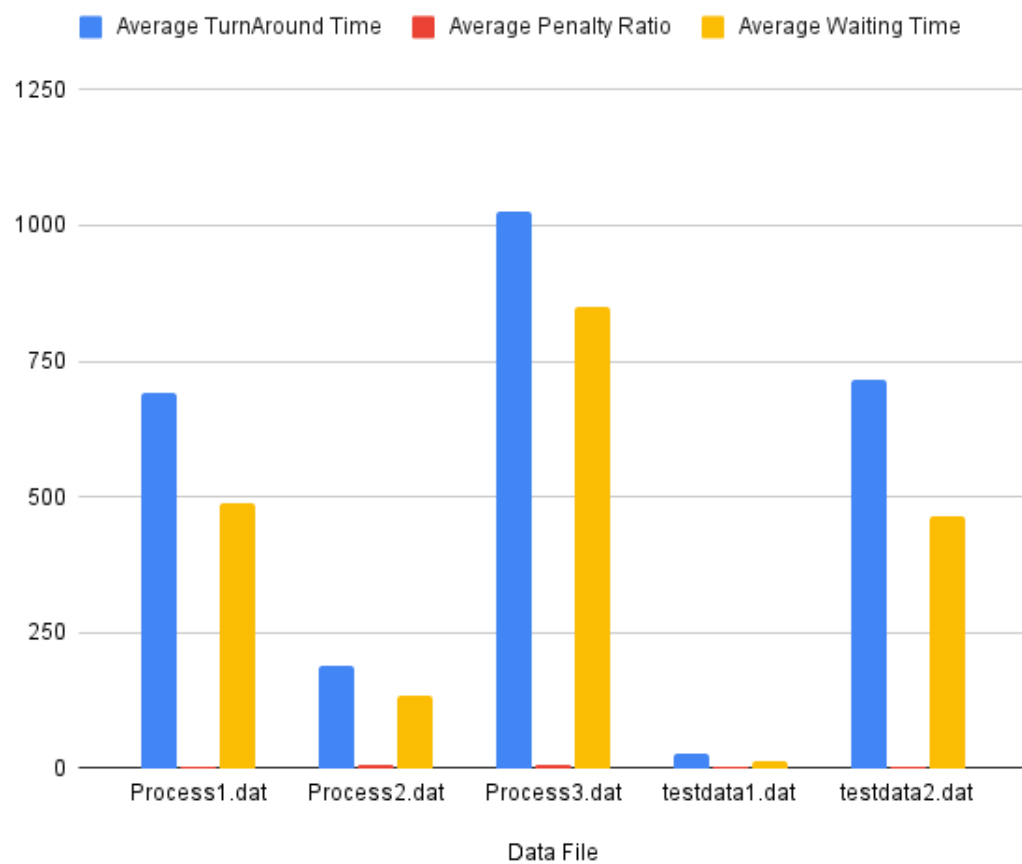
3 Shortest Remaining Time First

The job which has less time compared to remaining time left of the current running process. The scheduling scheme I used is that if the arrival time of the process is less than the current time, then that process is added to a ready queue, provided that it is not running an I/O job and is not present in Ready Queue. Processes added in sorted order to Ready Queue such that the head of the Queue has Minimum Burst time. If two processes have the same burst time, it follows the FIFO method. The process which enters first is exited first from Ready Queue. The current time has incremented with 1 everytime. In the next CPU burst cycle, I/O processes are run in the FIFO method if they exist in I/O Queue. If the burst time of head of the Ready Queue is less than remaining time left for current running process, then process is preemted. If any I/O is not done in time interval 1, it gets resumed in the next CPU burst time. If any process after completing the CPU burst enters I/O Queue, it is run parallel with the CPU process. If required for the following CPU burst cycle, I/O processes that have completed the I/O burst are entered into Ready Queue again. This continues until all the processes have been completed.
It is expected that using SRTF, Average response time is reduced

Job characteristics of process1.dat vs PID of process

Job characteristics of process2.dat vs PID of process

Job characteristics of process3.dat vs PID of process

testdata1.dat is suitable for SRTF and testdata2.dat has shortcomings for SRTF