COMP2240 Assignment 1 - Scheduling Algorithms

By Connor Farrenden (c3374676)
26/08/2022

Introduction

This report will address and discuss the implementation of various CPU scheduling algorithms and their expected timing results including First Come First Serve (FCFS), Round Robin (RR), Narrow Round Robin (NRR), and Feedback constant (FB). This report will also include the type of testing completed, unexpected behaviour and the performance of each algorithm based on the simulated versions implemented in Java.

Type of Testing Completed

Majority of the testing conducted included various methods, such as testing different inputs and grabbing data from each process at various times and checking the id and time values, such as the time remaining for each process before it is completed. Many print statements were used at various points of the program alongside grabbing important data from each of the processes to ensure conditional/looping statements were being executed correctly with the associated process or data being tested. Alongside this included sketching and writing down notes on the movement of process data in their respective data structure. Particularly with queues, this included drawing the queues and noting down when processes were being removed or added to the queues at various points to ensure the scheduling was flowing correctly. Sketching and tracing the flow in depth was crucial to ensuring the algorithm functioned correctly and issues were resolved, particularly in comparison to the Gantt charts and their visual outline of when processes should be run, including dispatcher run times.

Relative Performance of each Algorithm

All the algorithms perform to their desired outputs based on inputted data, but with minor differences in times across the board. The FCFS algorithm performed the worst in one case and second best in the other. The RR and NRR demonstrated that either can be slightly more efficient in specific cases, but NRR tends to take slightly longer on average due to generally higher dispatching due to time quantum decrements over time for longer processes. The FB algorithm has a better overall average turnaround and waiting time for the processes, being the best overall based on the inputs. Overall, each of the algorithms were not considerably better than one another based on the average turnaround and waiting times produced and ultimately depend on the mix of arrival, dispatcher and service times provided.

Unexpected Behaviour

There wasn't a whole lot that was unexpected that appeared in the algorithms, besides the performance overall. It was interesting to see how the FCFS algorithm order of processes is essentially the same if arrival times are 0 or different in ascending order. Whereas the other algorithms demonstrated a significant difference in scheduling and flow with different inputs, specifically dispatcher times which would run more (i.e., more looping).

Conclusion

Overall, there were a variety of interesting observations gathered from the various scheduling algorithms such as the relative performance of each algorithm, some unexpected behaviour and the various types of testing conducted for each to meet the desired results.