Critical Analysis and Evaluation of Scheduling Algorithms

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Matric #: 2130120G

Section 1: Statistics Charts

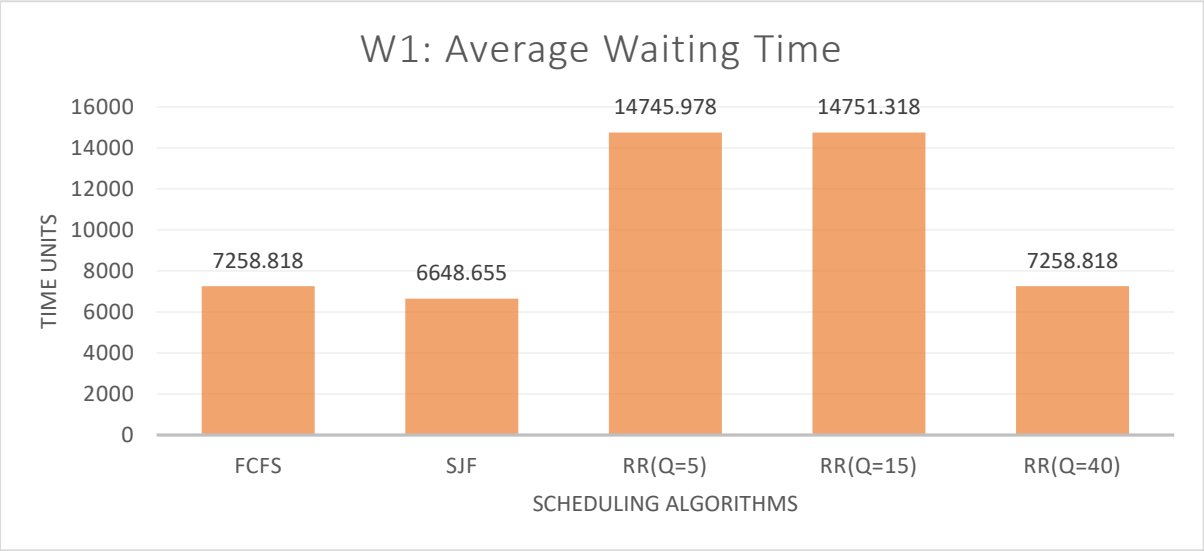

Figure 1.1

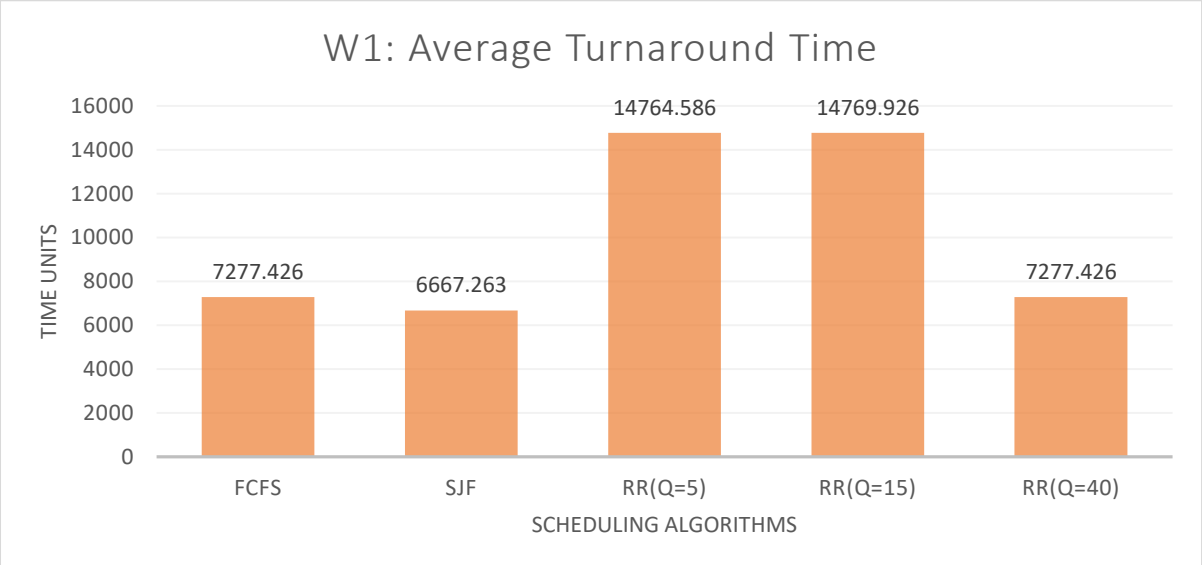

Figure 1.2

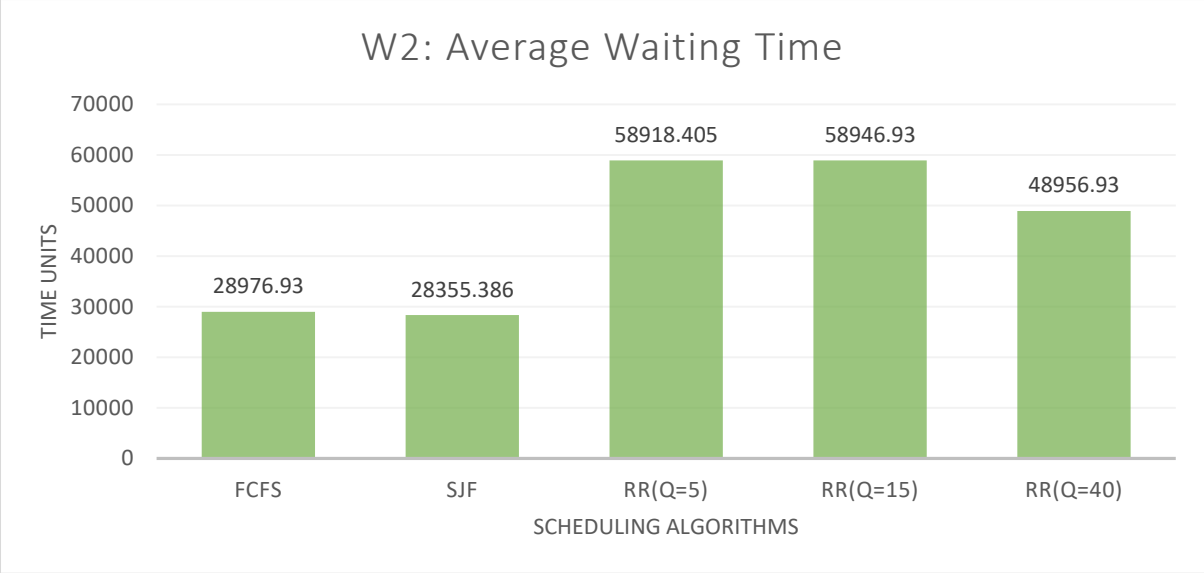

Figure 2.1

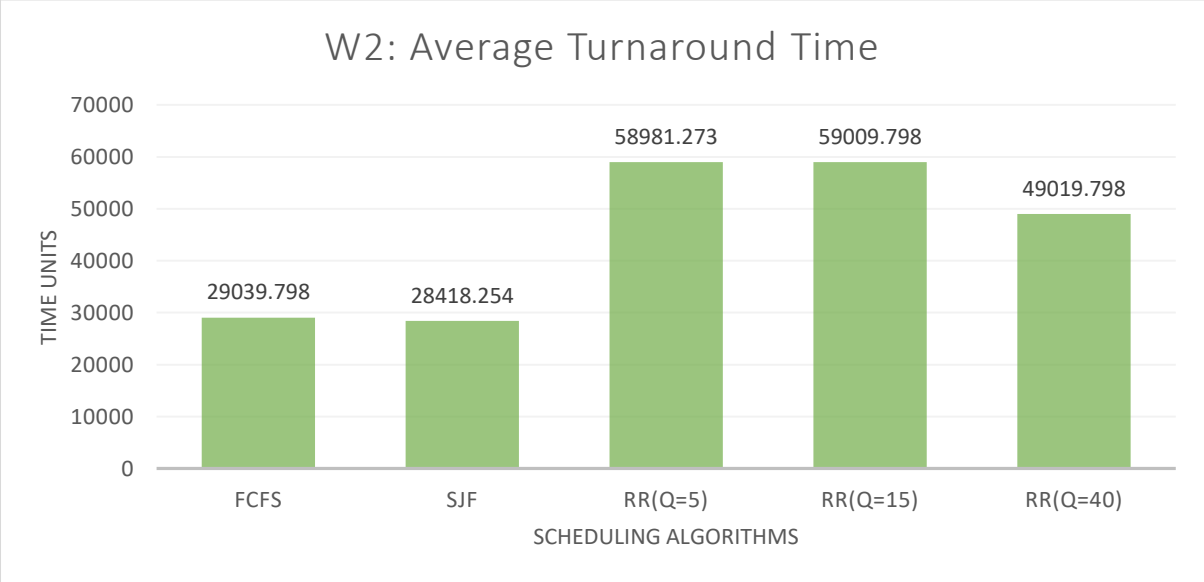

Figure 2.2

Section 2: Statistics table

Workloads	**Max** Value of all CBT times	**Min** Value of all CBT times	**Average** of all AAT values
W1	27	17	2149.643
W2	69	61	2439.388

Section 3: Critical Evaluation

The First-Come-First-Served scheduling algorithm shows a good degree of efficiency and there is proportional consistency in its metrics (compared to the other two algorithms) on the figures above. However, this algorithm is quite sensitive to the distribution of CBTs. Both AWT and ATT are highly dependent on the statistical characteristics of the process workload, because of the (possible) presence of the convoy effect: if short processes arrive after longer ones, they will be stuck waiting.

As evidenced in the same figures, the non-preemptive Short-Job-First scheduling algorithm outputs the smallest average times. It is robust with respect to the underlying distribution of CBTs as no matter what the order of arrival of the processes will be, its subjective fairness will always reduce AWT and ATT as much as possible (without using preemption) by assigning CPU times to shorter processes first. Thus, it will always be faster than FCFS and will also show scalability since when more processes are used, the difference between its metrics and the FCFS metrics will become more and more sensible.

The Round Robin scheduling algorithm is very dependent on the statistical characteristics of the processes in the workload and the quantum used for the assignment of CPU time. With a small quantum compared to the average CBT of the processes: Q=5;15 in the first pair of figures, and Q=5;15;40 in the second pair of figures, high overhead is encountered due to the constant context switch. In this case, the processes are pre-empted many times before they finish their execution, which explains the much higher AWT and ATT that are output, in comparison with the previous two algorithms. Another extreme is when the time quantum is much bigger than the CBTs (e.g. Q=40 in the first pair of figures). Then no preemption occurs and we obtain FCFS scheduling – this explains why the numbers in the first and last bar are the same.