IHSAN DOGRAMACI BILKENT UNIVERSITY

CS342 – OPERATING SYSTEMS

PROJECT #2

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SECTION 01

Experiment 1:

N	Average Waiting Time (ms)
1	0.00
2	49.40
3	279.87
4	298.13
5	380.68
6	946.30
7	939.63
8	1014.16
9	1199.11
10	1232.30

Table 1. FCFS & N

N	Average Waiting Time (ms)
1	0.00
2	0.00
3	77.33
4	222.85
5	338.04
6	575.92
7	535.59
8	821.45
9	790.37
10	1169.55

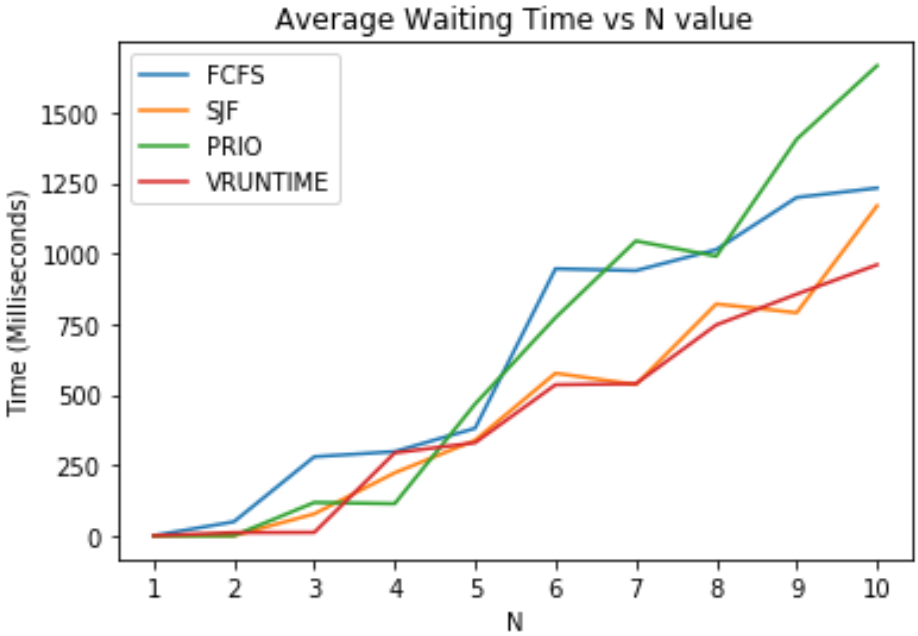
Table 2. SJF & N

N	Average Waiting Time (ms)
1	0.00
2	0.00
3	117.63
4	113.43
5	466.76
6	773.10
7	1044.81
8	990.75
9	1405.22
10	1666.19

Table 3. PRIO & N

N	Average Waiting Time (ms)
1	0.00
2	10.90
3	11.50
4	293.58
5	329.50
6	535.00
7	538.57
8	747.15
9	856.15
10	960.49

Table 4. VRUNTIME & N



This experiment was done to compare the scheduling algorithms' average waiting time with respect to N (number of threads). The command to conduct such experiments was:

./schedule N 10 100 150 250 500 ALG

There were 10 bursts for each thread which had an average length of 150 ms. Each thread had an average inter arrival time of 500 ms.

The results suggest us that the PRIO algorithm has the most average waiting time when compared with other algorithms. Its reason is the ignorance of the burst lengths and scheduling the CPU bursts according to their thread indexes. And the results suggest that the VRUNTIME algorithm has the least average waiting time when compared with other algorithms. It might be because of the effort to balance the lengths of the bursts with the calculation of the virtual runtime for a particular thread.

Experiment 2:

Thread index	Average Waiting Time (ms)
1	1646.40
2	1341.00
3	896.60
4	823.60
5	1339.80
6	1117.20
7	865.20
8	1588.20
9	1302.00
10	1207.60

Table 5. FCFS & N

Thread index	Average Waiting Time (ms)
1	776.20
2	409.40
3	546.00
4	818.00
5	974.80
6	371.80
7	361.60
8	998.20
9	569.00
10	603.20

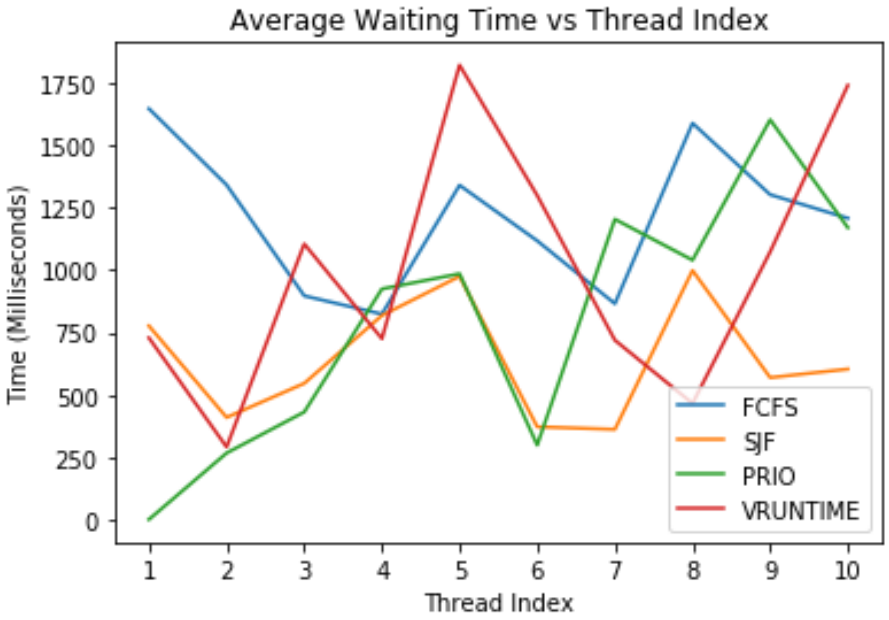
Table 6. SJF & N

N Thread index	Average Waiting Time (ms)
1	0.60
2	266.80
3	431.20
4	924.20
5	985.20
6	298.60
7	1203.60
8	1039.80
9	1602.20
10	1169.80

Table 7. PRIO & N

Thread index	Average Waiting Time (ms)
1	728.20
2	290.80
3	1104.60
4	725.00
5	1821.00
6	1298.60
7	719.00
8	465.60
9	1073.20
10	1740.00

Table 8. VRUNTIME & N



This experiment was done to compare the scheduling algorithms' average waiting time for each thread with respect to thread index. The command to conduct such experiments was:

./schedule 10 5 100 150 250 500 ALG

There were 5 bursts for each thread which had an average length of 150 ms. Each thread had an average inter arrival time of 500 ms.

The results suggest us that the waiting time for each thread in FCFS and SJF algorithms does not directly dependent on the thread indexes, since they do not schedule according to thread indexes. However, it can be seen from the graph that as thread indexes increase, the average waiting time for that particular thread increases. This is because PRIO algorithm prioritizes lowest thread indexes.

Experiment 3:

avgB	Average Waiting Time (ms)
250	551.32
500	1079.04
750	1601.08
1000	1611.40
1250	2415.36

Table 9. FCFS & avgB

avgB	Average Waiting Time (ms)
250	207.88
500	457.92
750	605.88
1000	638.72
1250	1042.08

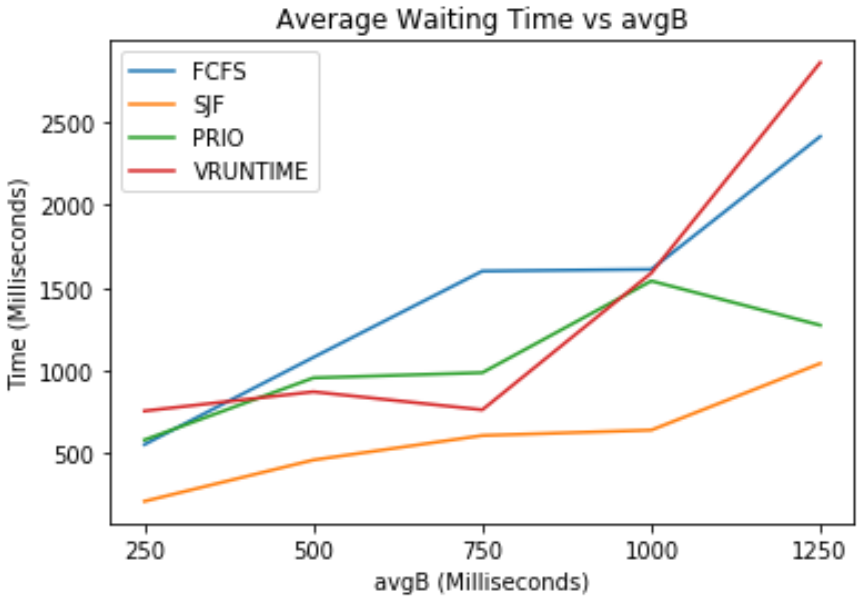
Table 10. SJF & avgB

avgB	Average Waiting Time (ms)
250	579.28
500	954.76
750	986.16
1000	1541.32
1250	1273.52

Table 11. PRIO & avgB

avgB	Average Waiting Time (ms)
250	754.56
500	870.60
750	761.56
1000	1588.88
1250	2863.08

Table 12. VRUNTIME & avgB



This experiment was done to compare the scheduling algorithms' average waiting time with respect to avgB (average burst length). The command to conduct such experiments was:

./schedule 5 5 100 avgB 250 500 ALG

There were 5 bursts for each thread which had an average length of avgB ms. Each thread had an average inter arrival time of 500 ms.

The results suggest us that the average waiting time all of the algorithms have a tendency to increase as avgB increases. This is because as burst lengths increase, the CPU bursts waiting in the ready queue waits more. When observed the graph, it can be seen that FCFS algorithm has the most average waiting times, where SJF algorithm has the least average waiting times. This is because FCFS does not optimize any metric and SJF schedules according to the burst lengths and therefore, optimizes average waiting time.

Experiment 4:

avgA	Average Waiting Time (ms)
250	269.88
500	285.16
750	81.52
1000	138.16
1250	178.40

Table 23. FCFS & avgA

avgA	Average Waiting Time (ms)
250	323.12
500	141.64
750	213.20
1000	130.68
1250	110.96

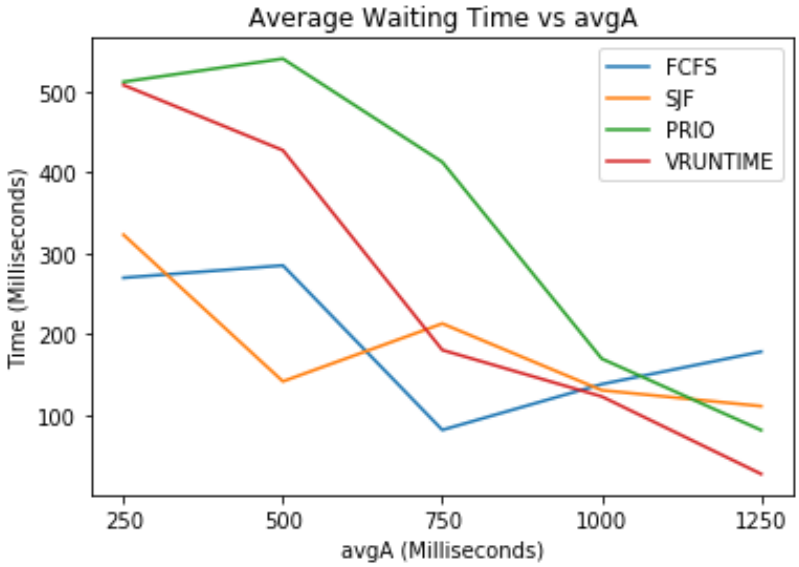
Table 14. SJF & avgA

avgA	Average Waiting Time (ms)
250	512.44
500	541.04
750	413.12
1000	169.72
1250	81.24

Table 15. PRIO & avgA

avgA	Average Waiting Time (ms)
250	508.48
500	427.72
750	180.44
1000	122.92
1250	27.00

Table 16. VRUNTIME & avgA



This experiment was done to compare the scheduling algorithms' average waiting time with respect to avgA (average inter arrival time). The command to conduct such experiments was:

./schedule 5 5 100 150 250 avgA ALG

There were 5 bursts for each thread which had an average length of 150 ms. Each thread had an average inter arrival time of avgA ms.

The results suggest us that the average waiting time all of the algorithms have a tendency to decrease as avgA increases. This is because as inter arrival times increase, the arrival time of the CPU bursts and their insertion in the ready is delayed, therefore, they spend less time in the ready queue.