

Operating Systems

Project 9

Haukur Óskar Þorgeirsson
hth152@hi.is

Matthías Páll Gissurarson
mpg3@hi.is

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1. Residence time is $r_i = f_i - a_i$, where a_i is arrival time and f_i is finish time of the process, waiting time is $w_i = r_i - d_i$, where d_i is the service time. We note that $\widetilde{W} = \frac{1}{n} \cdot \sum_{i=1}^n w_i = \widetilde{R} - \frac{1}{n} \cdot \sum_{i=1}^n d_i$, where $\widetilde{R} = \frac{1}{n} \sum_{i=1}^n r_i$, and

$$\frac{1}{n} \cdot \sum_{i=1}^n d_i = \frac{1}{5}(4 + 10 + 8 + 5 + 4) = 6.2,$$

and

$$\widetilde{R} = \frac{1}{n} \sum_{i=1}^n f_i - a_i = \frac{1}{n} \sum_{i=1}^n f_i - \frac{1}{n} \sum_{i=1}^n a_i = \frac{1}{n} \sum_{i=1}^n f_i - 7.4$$

(a) FCFS:

P1			P2			P3			P4			P5		
+-----+-----+-----+-----+-----+														
	4				10			8			5		4	
+-----+-----+-----+-----+-----+														
P1	P2P3					P4		P5						
0	2 3					14		18						

Order would be P_1, P_2, P_3, P_4, P_5 , Average residence time is $19.6 - 7.4 = 12.2$ and Average waiting time is $12.2 - 6.2 = 6$

(b) SJF:

P1			P3			P2			P5			P4		
+-----+-----+-----+-----+-----+														
	4				8			10			4		5	
+-----+-----+-----+-----+-----+														
P1	P2P3					P4		P5						
0	2 3					14		18						

Order would be P_1, P_3, P_2, P_5, P_4 , Average residence time is $19 - 7.4 = 11.6$ and Average waiting time is 5.4 .

(c) SRTF:

P1			P3			P2			P4			P5			P2		
+-----+-----+-----+-----+-----+																	
	4				8		2		4			4			8		
+-----+-----+-----+-----+-----+																	
P1	P2P3					P4		P5									
0	2 3					14		18									

Order would be $P_1, P_4, P_2, P_5, P_4, P_2$, Avg. residence time is $17.8 - 7.4 = 10.4$ and Avg. waiting time is $10.4 - 6.2 = 4.2$.

(d) RR:

P1	P2	P3	P2	P3	P4	P2	P5	P4
4	4	4	4	4	4	2	4	1
0	2	3	14	18				

Order would be $P_1, P_2, P_3, P_2, P_3, P_4, P_2, P_5, P_4$, Avg. residence time is $22.2 - 7.4 = 14.8$ and Avg. waiting time is $14.8 - 6.2 = 8.6$.

(e) RR_{prio}:

P1	P3	P3	P2	P4	P5	P4	P2	P2
4	4	4	4	4	4	1	4	2
0	2	3	14	18				

Order would be $P_1, P_3, P_3, P_2, P_4, P_5, P_4, P_2, P_2$, Avg. residence time is $19.2 - 7.4 = 11.8$ and Avg. waiting time is $11.8 - 6.2 = 5.6$.

- As processes are created by running processes, and there is only one process running at each time, there can only one process be created at each time. Thus, only once process can arrive at a time, and not two at the same time.