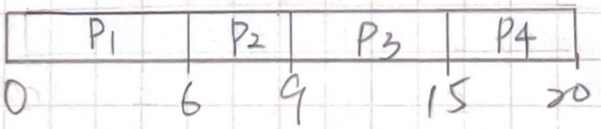
Process	Arrival Time	CPU Burst	Priority
P_1	0	6	3
P_2	2	3	1
P_3	5	6	3
P4	8	5	2

Time Slice = 2.

① FCFS ⇒ 先進先出 (non-Preemptive)

做法：先看 Arrival Time，若 Arrival time 一樣看 PID

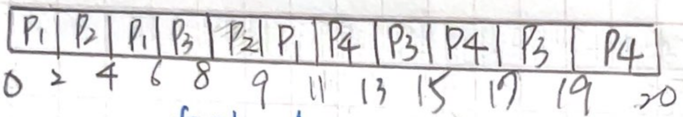


	finish time - Arrival time	Turnaround time - CPU Burst
Process	Turnaround Time	Waiting Time
P_1	6 = 6-0	0 = 6-6
P_2	7 = 9-2	4 = 7-3
P_3	10 = 15-5	4 = 10-6
P4	12 = 20-8	7 = 12-5

平均等待時間：(0+4+4+7)/4 = 3.75※

② RR (Round Robin) 知更鳥 (Preemptive)

做法：固定時間片段輪流做，Timout發生排入Queue尾，若恰有新來process先讓之排
若Process未用完就結束，必須先讓下一個process執行並擁有完整time slice



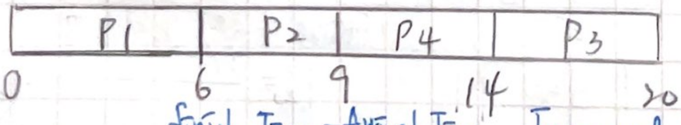
finish − Arrival time　　Turnaround Time − CPU Burst

Process	Turnaround Time	Waiting Time
P1	11 = 11-0	5 = 11-6
P2	5 = 7-2	2 = 5-3
P3	14 = 19-5	8 = 14-6
P4	12 = 20-8	7 = 12-5

平均等待時間：(5+2+8+7)/4=5.5 ※

③ SJF (Shortest Job First) (non-Preemptive)

做法：依 CPU Burst 由小至大排序，CPU Burst 同使用 FCFS



time 6 : CPU Burst P2 < P3
time 9 : CPU Burst P4 < P3

finish Time − Arrival Time　　Turnaround Time − CPU Burst

Process	Turnaround Time	Waiting Time
P1	6 = 6-0	0 = 6-6
P2	7 = 9-2	4 = 7-3
P3	15 = 20-5	9 = 15-6
P4	6 = 14-8	1 = 6-5

平均等待時間：(0+4+9+1)/4=3.5 ※

密碼
cipher key

④ SJF (Shortest Job First) (Preemptive) = SRTF

做法：依 CPU Burst 由小到大排序 (Queue)，CPU Burst 相同則使用 FCFS，可被奪取

P1	P2	P1	P4	P3

0 2 5 9 14 20

CPU Burst

time 2:	P_1	P_2	
	4	③ 奪取	
time 5:	P_1	P_3	
	④	6	
time 8:	P_1	P_3	P5
	①	6	5
time 9:	P_3	P5	
	6	⑤	

Process	finish time - Arrival time Turnaround Time	Turnaround Time - CPU Burst waiting time
P_1	9 = 9-0	3 = 9-6
P_2	3 = 5-2	0 = 3-3
P_3	15 = 20-5	9 = 15-6
P_4	6 = 14-8	1 = 6-5

平均等待時間：(3+0+9+1)/4 = 3.25 ✓ ※

⑤ HRRN (Highest Response Ratio Next) (non-Preemptive)

做法：反應時間比率「愈高」的 process「優先」處理

$$公式 = \frac{\text{Waiting Time} + \text{CPU Burst}}{\text{CPU Burst}}$$

P1	P2	P3	P4

0 6 9 15 20

time 6:

$P_2 = \frac{(6-2)+3}{3} = \boxed{2.3}$ ✓

$P_3 = \frac{(6-5)+6}{6} = 1.1$

time 9:

$P_3 = \frac{(9-5)+6}{6} = \boxed{1.6}$ ✓

$P4 = \frac{(9-8)+5}{5} = 1.2$

Process	first - Arrival Turnaround Time	Turnaround Time - CPU Burst waiting time
P_1	6 = 6-0	0 = 6-6
P_2	7 = 9-2	4 = 7-3
P_3	10 = 15-5	4 = 10-6
P_4	12 = 20-8	7 = 12-5

平均等待時間：(0+4+4+7)/4 = 3.75 ✓ ※

My Questions

Problems & Difficulties needing exploration

⑥ PPRR (Premptive Priority +RR) (Preemptive)

做法：依 Priority 大到小排序，若 Priority 相同則採用 RR原則

P1	P2	P1	P3	P4	P1	P3

0 2 5 7 8 13 15 20

time2:

	④ P1		③ P2
Priority	3	<	1

time5:

	P1		P3
Priority	3	=	3

time8:

	② P1		P3		P4
Priority	3	=	3	<	2

Process	Turnaround Time finish Time - Arrtial time		waiting Time Turnaround Time - CPU Burst	
P1	15	=15-0	9	=15-6
P2	3	=5-2	0	=3-3
P3	15	=20-5	9	=15-6
P4	5	=13-8	0	=5-5

平均等待時間：(9+0+9+0)/4=4.5＃

My Opinions

Thoughts, inspirations, and suggestions