

King Saud University
Department of Computer Science
CSC227: Operating Systems
Tutorial No. 6

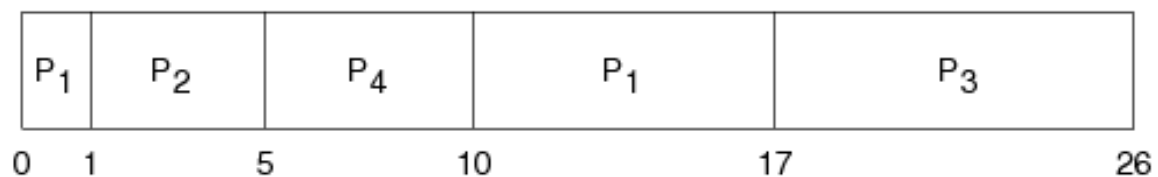
Exercise 1

Below is a table of four CPU-bound processes P1, P2, P3, and P4 and their associated arrival times and CPU burst times.

- a) Draw Gantt charts illustrating the execution of these processes using SRTF scheduling.
- b) What is the average turnaround time
- c) What is the average waiting time

Process	Arrival	Burst Time
P1	0	8
P2	1	4
P3	2	9
P4	3	5

Gantt chart:



Process	Arrival	Burst Time	Start	Wait	Finish	TA
1	0	8	0	9	17	17
2	1	4	1	0	5	4
3	2	9	17	15	26	24
4	3	5	5	2	10	7

Average waiting time: $(9+0+15+2)/4 = 6.5$

Average turnaround time: $(17+4+24+7)/4 = 13$

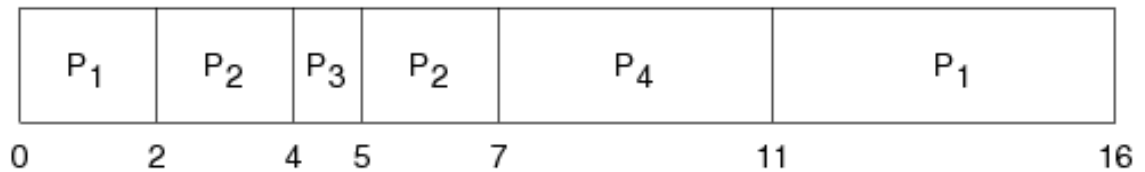
Exercise 2

Below is a table of four CPU-bound processes P1, P2, P3, and P4 and their associated arrival times and CPU burst times.

Process	Arrival	Burst Time
P1	0	7
P2	2	4
P3	4	1
P4	5	4

- Draw Gantt charts illustrating the execution of these processes using SRTF scheduling.
- What is the average turnaround time
- What is the average waiting time

- Gantt chart:



Process	Arrival	Burst Time	Start	Wait	Finish	TA
1	0	7	0	9	16	16
2	2	4	2	1	7	5
3	4	1	4	0	5	1
4	5	4	7	2	11	6

- Average waiting time: $(9+1+0+2)/4 = 3$
- Average turnaround time: $(16+5+1+6)/4 = 7$

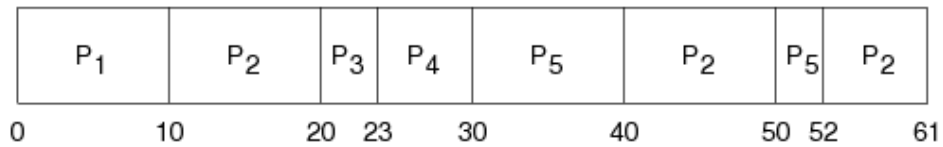
Exercise 3

Below is a table of five CPU-bound processes P1, P2, P3, P4, and P5 and their associated arrival times and CPU burst times.

Process	Arrival	Burst Time
P1	0	10
P2	0	29
P3	0	3
P4	0	7
P5	0	12

- Draw Gantt charts illustrating the execution of these processes using RR (quantum=10) scheduling.
- What is the average turnaround time
- What is the average waiting time

- Gantt chart:



Process	Arrival	Burst Time	Start	Wait	Finish	TA
1	0	10	0	0	10	10
2	0	29	10	32	61	61
3	0	3	20	20	23	23
4	0	7	23	23	30	30
5	0	12	30	40	52	52

- Average waiting time: $(0+32+20+23+40)/5 = 23$
- Average turnaround time: $(10+39+42+49+61)/5 = 35.2$

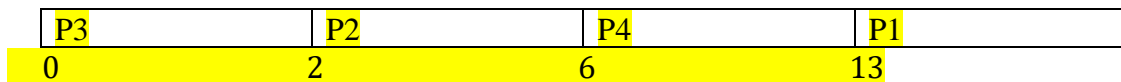
Exercise 4

Consider the following processes and their corresponding Burst time

Process	Burst Time
P1	13
P2	4
P3	2
P4	7

- a) Draw a Gantt chart that illustrates how these processes would be scheduled using the SJF algorithm.

Answer:



- b) Compute the average waiting time

Answer:

$$(13+2+0+6)/4=21/6=5.25$$

- c) Which scheduling algorithm can achieve better waiting time than the SJF

Answer:

No algorithm, because the SJF is optimal

Exercise 5:

- a) What is the main difficulty in using the SJF?

answer: we usually do not know the length of the next CPU burst.

- b) Suggest a solution to the above problem.

Answer: we can use exponential average to predict the next CPU burst time.

c) Giving the CPU burst as in the given table and assuming that $\alpha=0.5$ and the initial exponential average is 8 (i.e. $T_0=8$), compute the exponential weighting average after seeing each process burst time (i.e. complete the following table).

CPU burst (t_i)	4	6	10	4	6	
Exp avge(t_i)	8					

Answer:

CPU burst (t_i)	4	6	10	4	6	
Exp avge(t_i)	8	6	6	8	6	6