OS HW3

OPERATING SYSTEM 107 FALL

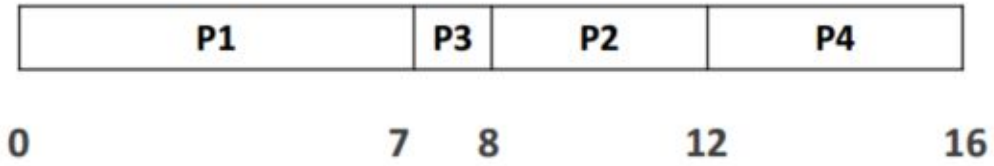
Process Scheduling

1. Shortest-Job-First (SJF)
2. Shortest-Remaining-Time-First (SRTF)
3. Round-Robin (RR)
4. Multilevel Feedback Queue

   Round-Robin (first layer) + Round-Robin (second layer) + Shortest-Job-First (third)

Shortest-Job-First (SJF)

Gantt Chart:



Waiting time : P1 = 0 ; P2 = 6 ; P3 = 3 ; P4 = 7

Average waiting time = (0 + 6 + 3 + 7)/4 = 4

Turnaround time : P1 =7 ; P2 = 10 ; P3 = 4 ; P4 = 11

Average Turnaround time : (7 + 10 + 4 + 11)/4 = 8

Process	Arrival	CPU burst
P1	0	7
P2	2	4
P3	4	1
P4	5	4

The format of input file & output

- Input file(Q1.txt):

  4 First line is the total number of process
  0 2 4 5 Second line is arrival time of each process
  7 4 1 4 Third line is burst Time of each process

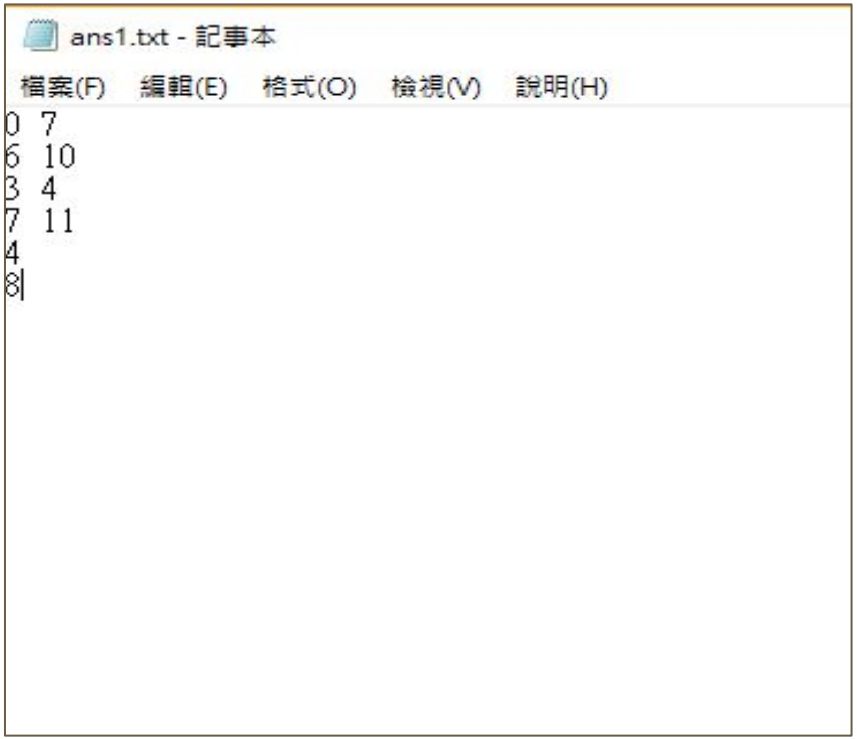
- Output:

  You should output the four things in a text file as the next page
  1. Waiting time for each process
  2. Turnaround time for each process
  3. Average waiting time
  4. Average turnaround time

The format of output file

Process	Waiting Time	Turnaround Time
P[1]	0	7
P[2]	6	10
P[3]	3	4
P[4]	7	11

Average waiting time : 4
Average turnaround time : 8



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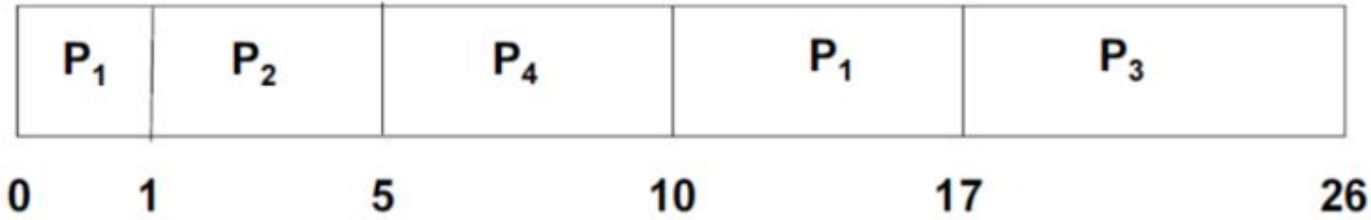
Shortest-Remaining-Time-First (SRTF)

Gantt Chart:



Waiting time : P1 = 9 ; P2 = 0 ; P3 = 15 ; P4 = 2

Average waiting time = (9 + 0 + 15 + 2)/4 = 26/4 = 6.5

Turnaround time : P1 = 17 ; P2 = 4 ; P3 = 24 ; P4 =7

Average Turnaround time = (17 + 4 + 24 + 7)/4 = 13

Process	*Arrival* Time	Burst Time
P_1	0	8
P_2	1	4
P_3	2	9
P_4	3	5

The format of input file & output

- Input file(Q2.txt):

  4 First line is the total number of process
  0 1 2 3 Second line is arrival time of each process
  8 4 9 5 Third line is burst Time of each process

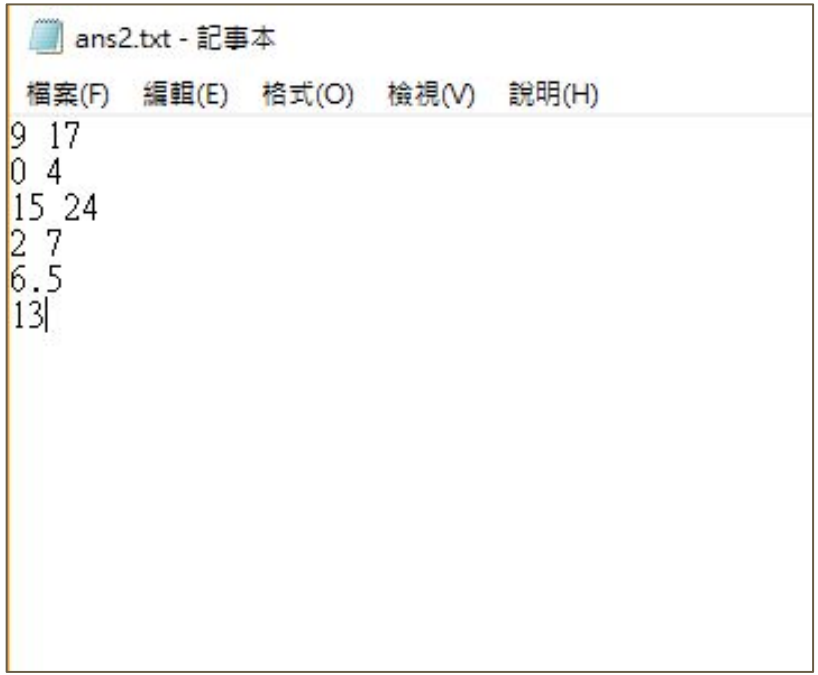
- Output:

  You should output the four things in a text file as the next page
  1. Waiting time for each process
  2. Turnaround time for each process
  3. Average waiting time
  4. Average turnaround time

The format of output file

Process	Waiting Time	Turnaround Time
P[1]	9	17
P[2]	0	4
P[3]	15	24
P[4]	2	7

Average waiting time : 6.5
Average turnaround time : 13



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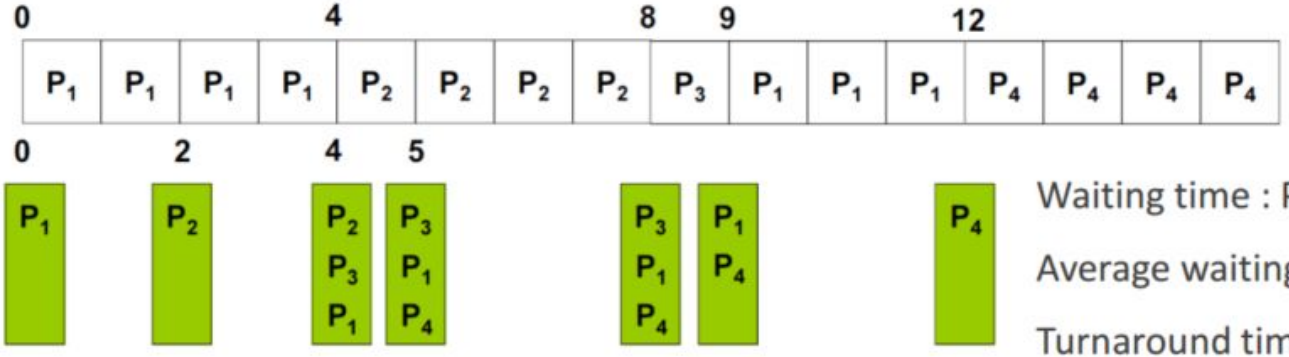
Round-Robin (RR)

Process	Arrival	CPU burst
P1	0	7
P2	2	4
P3	4	1
P4	5	4

Time quantum (time slice) = 4



Waiting time : P1 = 5 ; P2 = 2 ; P3 = 4 ; P4 = 7

Average waiting time = (5 + 2 + 4 + 7)/4 = 4.5

Turnaround time : P1 = 12 ; P2 = 6 ; P3 = 5 ; P4 =11

Average Turnaround time = (12 + 6 + 5 + 11)/4 = 8.5

The format of input file & output

- Input file(Q3.txt):

  4 First line is the total number of process
  0 2 4 5 Second line is arrival time of each process
  7 4 1 4 Third line is burst Time of each process
  4 Fourth line is the time quantum

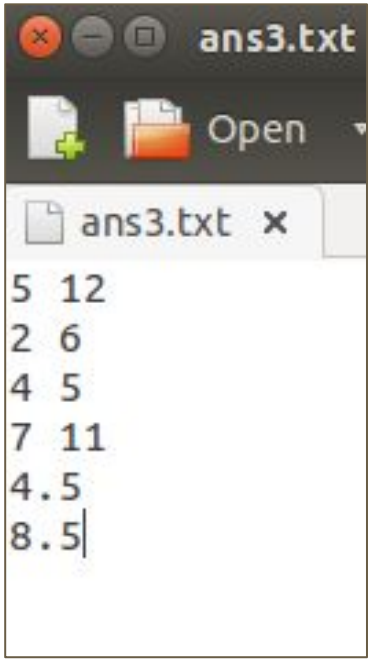
- Output:

  You should output the four things in a text file as the next page
  1. Waiting time for each process
  2. Turnaround time for each process
  3. Average waiting time
  4. Average turnaround time

The format of output file

Process	Waiting Time	Turnaround Time
P[1]	5	12
P[2]	2	6
P[3]	4	5
P[4]	7	11

Average waiting time : 4.5
Average turnaround time : 8.5



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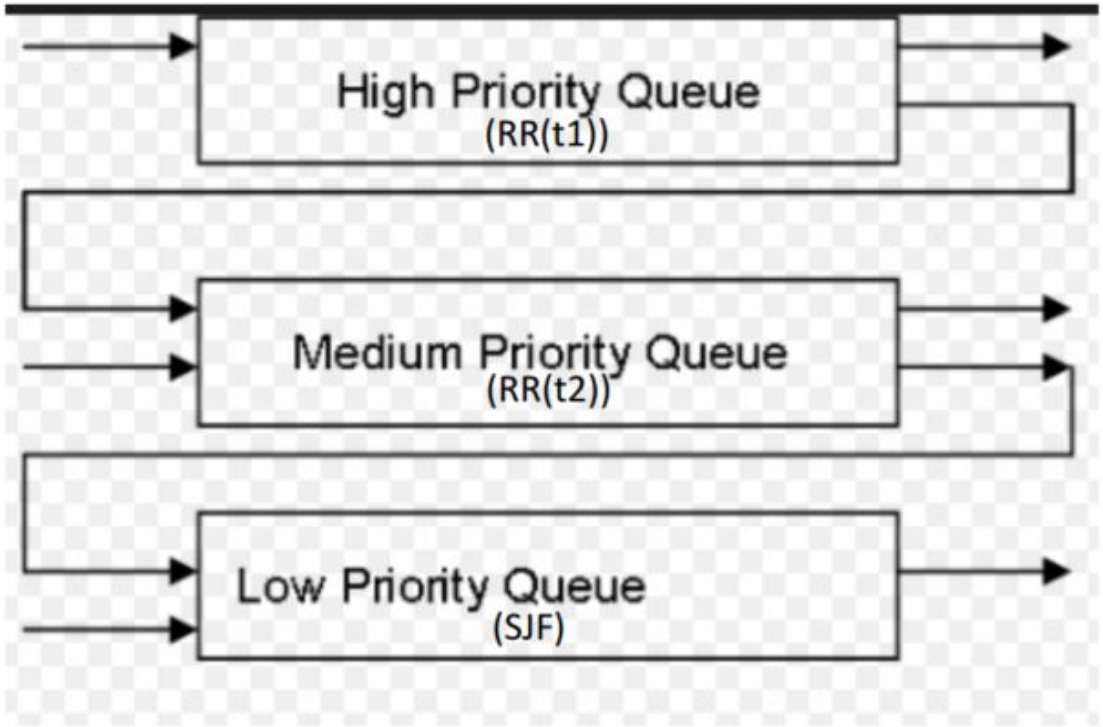
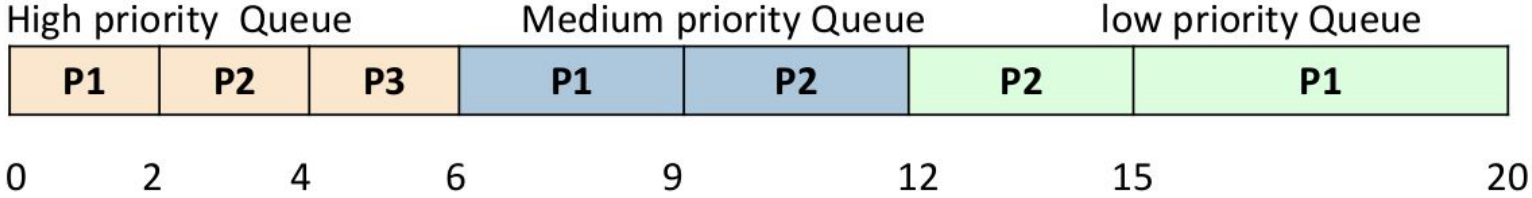
Multilevel Feedback Queue

- Processes in lower priority queue is selected if the higher queues are empty.
- A new job enters high priority queue which is served RR. When it gains CPU, job receives t1 milliseconds. If it doesn't finish in t1 milliseconds, job is moved to medium priority queue.
- If high priority queue is empty, processes at medium priority queue is served RR and receives t2 additional milliseconds. If it still does not complete, it is preempted and moved to low priority queue which is served SJF; otherwise it is kept in the same queue.



Multilevel Feedback Queue

Gantt Chart:



Waiting time : P1 = 10; P2 = 6 ; P3 = 2

Average waiting time = [10 + 6 + 2]/3 = 6

Turnaround time : P1 = 20 ; P2 = 14 ; P3 = 4

Average waiting time = [20 + 14 + 4]/3 = 12.66667

Time quantum
High priority queue(t1) : 2
Medium priority queue(t2) : 3

Process	Arrival Time	Burst Time
P[1]	0	10
P[2]	1	8
P[3]	2	2

The format of input file & output

- Input file(Q4.txt):

  3 First line is the total number of process
  0 1 2 Second line is arrival time of each process
  10 8 2 Third line is burst Time of each process
  2 3 Fourth line is burst Time quantum for high priority Queue & medium priority Queue

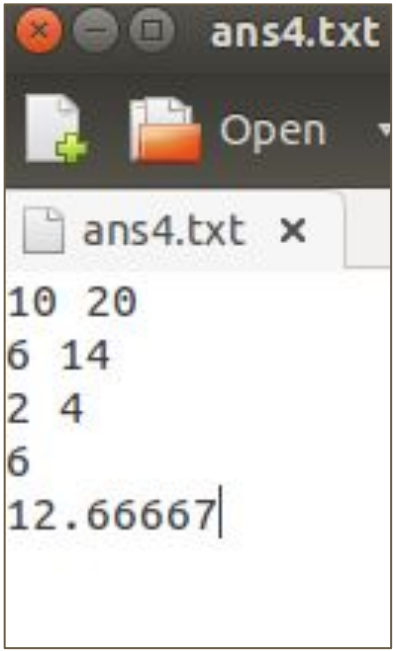
- Output:

  You should output the four things in a text file as the next page
  1. Waiting time for each process
  2. Turnaround time for each process
  3. Average waiting time
  4. Average turnaround time

The format of output file

Process	Waiting Time	Turnaround Time
P[1]	10	20
P[2]	6	14
P[3]	2	4

Average waiting time : 6
Average turnaround time : 12.66667



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	Process ID	Arrival Time	Burst Time	Rest Time		
	P1	0	12	2		
	P2	8	25	25		
	P3	21	33	33		
	P4	30	2	2		
	Time Quantum=10					
Q1					P2	
	Time Quantum=20					
Q2					P1	
	SJF					
Q3						
	Process Queue					
	P1					
0	10					

(PS: Process Queue is result, not scheduling.)

	Process ID	Arrival Time	Burst Time	Rest Time
	P1	0	12	1
	P2	8	25	15
	P3	21	33	33
	P4	30	2	2

	Time Quantum=10				
Q1					P3
	Time Quantum=20				
Q2				P2	P1
	SJF				
Q3					

	Process Queue					
	P1		P2		P1	
0		10		20		21

(PS: Process Queue is result, not scheduling.)

	Process ID	Arrival Time	Burst Time	Rest Time			
	P1	0	12	1			
	P2	8	25	15			
	P3	21	33	23			
	P4	30	2	2			
	Time Quantum=10						
Q1					P4		
	Time Quantum=20						
Q2			P3	P2	P1	rest:19	
	SJF						
Q3							
	Process Queue						
	P1	P2	P1	P3			
0	10	20	21	31			

(PS: Process Queue is result, not scheduling.)

	Process ID	Arrival Time	Burst Time	Rest Time		
	P1	0	12	0		
	P2	8	25	15		
	P3	21	33	23		
	P4	30	2	0		
	Time Quantum=10					
Q1						
	Time Quantum=20					
Q2			P3	P2		
	SJF					
Q3						
	Process Queue					
	P1	P2	P1	P3	P4	P1
0	10	20	21	31	33	34

(PS: Process Queue is result, not scheduling.)

Process ID	Arrival Time	Burst Time	Rest Time
P1	0	12	0
P2	8	25	0
P3	21	33	3
P4	30	2	0

Time Quantum=10

Q1

Time Quantum=20

Q2

SJF

Q3 P3

Process Queue

P1	P2	P1	P3	P4	P1	P2	P3
0	10	20	21	31	33	34	49	69

(PS: Process Queue is result, not scheduling.)

Process ID	Arrival Time	Burst Time	Rest Time
P1	0	12	0
P2	8	25	0
P3	21	33	0
P4	30	2	0

Time Quantum=10

Q1

Time Quantum=20

Q2

SJF

Q3

Process Queue

P1	P2	P1	P3	P4	P1	P2	P3	P3
0	10	20	21	31	33	34	49	69	72

reference : https://www.youtube.com/watch?v=VM5BEiVEsvg&fbclid=IwAR2XVhAyA6bCHG7LZ01Hd66SneKGKZuRPDc3_SlqrzDagXviluTZnzjYiT4

Requirements

1. You should write codes in c/c++

2. Put all of *.cpp source files and report into same compressed file. The type of compressed file must be “zip”

3. The name of your compressed file must have the form of “student ID_OS_hw3.zip”

4. The name of .cpp file must in the form of “student ID_hw3-1.cpp” & “student ID_hw3-2.cpp” & “student ID_hw3-3.cpp” & “student ID_hw3-4.cpp”

   (ex: ./Student ID_OS_hw3-1.out ./Q1.txt)

Grade

Total score: 100pts. COPY WILL GET A POINT!

- HW3-1: 20pts
- HW3-2: 20pts
- HW3-3: 20pts
- HW3-4: 20pts
- Report: 20pts
- Incorrect file form: -20 pts
  (Including the names of compressed file, .cpp file and the output)
- Deadline is 2018/11/18 midnight. Late submission will get 0 pts