QoS Exercises. Scheduling

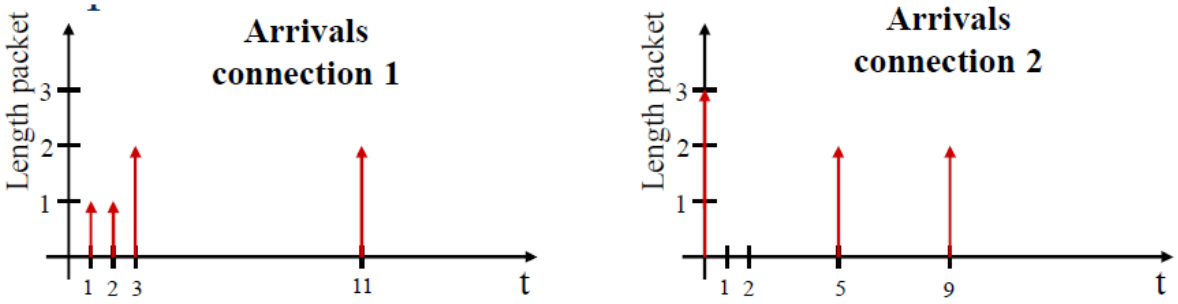
Exercise 1

We have an IP network with a nominal throughput C=10 units that is implementing a resource allocation following the max-min fair share algorithm. Four users request simultaneously the use of 2, 2.6, 4 and 5 throughput units respectively.

What amount of resources will be assigned by the Network to each user?

Exercise 2

We have a GPS system to distribute the traffic among the different established connections. These systems receive packets from two connections following the pattern shown in the next figures.



a) Plot how each packet would be transmitted if the weight assigned to each connection is the same.
b) Repeat the previous plot but now considering that the weight for the second connection is double than the weight for the first connection.

Exercise 3

Repeat the previous exercise in case the implemented system is WFQ.

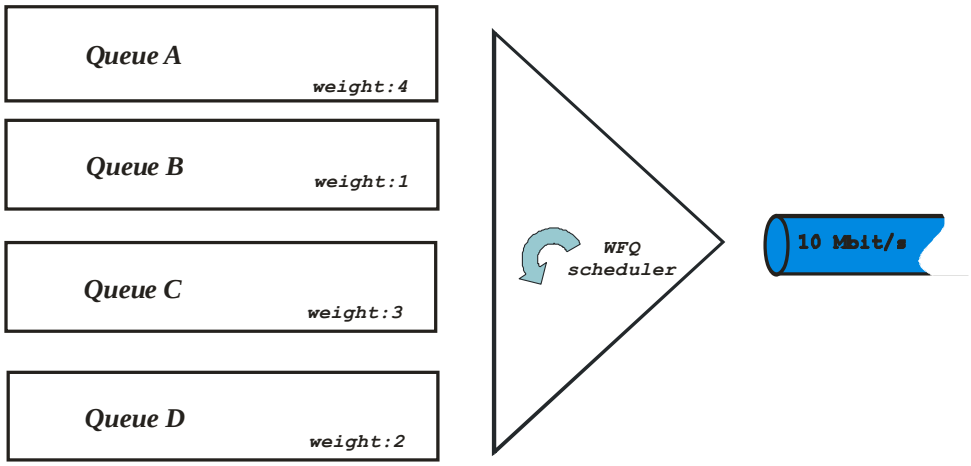
Exercise 4

We have a system with 11 connections so that the first connection has a weight of 0.5, and the rest (10 connections) have a weight of 0.05. For each connection a new packet is received each time unit. All receive packet have a length equal to 1.

a) Show the departure of the packets (until t=20) in case the system uses GPS.
b) Show the departure of the packets (until t=20) in case the system uses WFQ.

Exercise 5

We have a system with 4 different queues (A, B, C, D) that are served following the WFQ scheduling algorithm with an overall service rate of 10 Mbps. The weights assigned to each input queues are W_A=4, W_B=1, W_C=3, W_D=2.



a) The five tables below show different traffic patterns for each queue (being the units Mbps). For each pattern fill the tables with the output rates obtained.

Nota: For this problem you could consider WFQ as it was equivalent to ***Generalized Processor Sharing*** (GPS).

	A	B	C	D
Tasa Entrada:	1	1	1	1
Tasa Salida:				

	A	B	C	D
Tasa Entrada:	10	10	10	10
Tasa Salida:				

	A	B	C	D
Tasa Entrada:	6	6	2	2
Tasa Salida:				

	A	B	C	D
Tasa Entrada:	8	0	0	8
Tasa Salida:				

	A	B	C	D
Tasa Entrada:	1	5	3	5
Tasa Salida:				

Exercise 6

Let us assume a system that uses WFQ to among different flows over a link of 1Mbps. These system receives packets from 4 flows following the distribution indicated in the table below. Plot how each packet will be sent.

Queue 1 (W_1=2):

Num. Packet	Arrival time	Packet Size
1	0 ms.	1,5 Kbytes
2	1 ms.	0,375 Kbytes

Queue 2 (W_2=1):

Num. Packet	Arrival time	Packet Size
1	0 ms.	0,5 Kbytes
2	24 ms.	1 Kbytes

Queue 3 (W_3=1):

Num. Packet	Arrival time	Packet Size
1	0 ms.	0,5 Kbytes
2	24 ms.	0,5 Kbytes

Queue 4 (W_4=4):

Num. Packet	Arrival time	Packet Size
1	0 ms.	0,5 Kbytes
2	21 ms.	0,5 Kbytes
3	23 ms	1 Kbytes
4	47 ms	0,5 Kbytes

Exercise 7

Repeat the previous exercise, but now assume that the scheduler uses DRR to serve the traffic. The quantum assinged to each queue is

Q[1]=300B

Q[2]=150B

Q[3]=150B

Q[4]=600B