

Queuing

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Exercise

Multimedia Technology,
Tutorial 4, section 3

Queuing

Consider a router that receives 6 packets numbered 1 to 6 at the following time instants: 1, 2, 3, 5, 7, 8 for transmission on the same output line. Each packet requires two time units to be transmitted. Show the order in which the packets will be transmitted under the following scheduling policies:

(a) FIFO (First In, First Out):

Packets are transmitted in the order they arrive.

(b) Two Priority Queues:

- Odd-numbered packets have high priority.
- Even-numbered packets have low priority.

(c) Two Priority Queues:

- Odd-numbered packets have low priority.
- Even-numbered packets have high priority.

Assume non-preemptive scheduling, meaning once a packet starts being transmitted, it cannot be interrupted.

FIFO

PACKETS

1

2

3

4

5

6

ARRIVALS SERVICE TIME

1

2

3

4

5

5

6

1

2

3

4

5

6

	7
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8

	9
--	---

10

	11

12

13

14

15

16

17

DEPARTURE

FIFO

[illegible]

FIFO

PACKETS				3	4	5	6										
ARRIVALS	1	2	3		4		5	6									
SERVICE TIME	1		2														
DEPARTURE			1		2												
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

FIFO

[illegible]

FIFO

PACKETS									5	6								
ARRIVALS	1	2	3	4		5		6										
SERVICE TIME	1	2		3		4												
DEPARTURE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
			1		2		3		4									

FIFO

PACKETS											6						
ARRIVALS	1	2	3		4		5	6									
SERVICE TIME	1		2		3		4		5								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
DEPARTURE			1		2		3		4		5						

FIFO

PACKETS																	
ARRIVALS SERVICE TIME	1	2	3		4		5	6									
	1	2	3	2	3	4	5	6									
DEPARTURE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
			1		2		3		4		5		6				

2 queues, odd-numbered packets have high priority

QUEUE Y	1		3		5												
QUEUE X	2		4		6												
ARRIVALS	1	2	3	4		5		6									
SERVICE TIME																	
DEPARTURE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

2 queues, odd-numbered packets have high priority

[illegible]

2 queues, odd-numbered packets have high priority

QUEUE Y					5												
QUEUE X	2		4		6												
ARRIVALS	1	2	3		4		5	6									
SERVICE TIME	1		3														
DEPARTURE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

2 queues, odd-numbered packets have high priority

QUEUE Y					5												
QUEUE X			4		6												
ARRIVALS	1	2	3		4		5	6									
SERVICE TIME	1		3		2												
DEPARTURE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

2 queues, odd-numbered packets have high priority

QUEUE Y																	
QUEUE X			4		6												
ARRIVALS	1	2	3		4		5	6									
SERVICE TIME	1		3		2		5										
DEPARTURE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

2 queues, odd-numbered packets have high priority

QUEUE Y																	
QUEUE X					6												
ARRIVALS	1	2	3		4		5	6									
SERVICE TIME	1		3		2		5		4								
TIME	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
DEPARTURE			1		3		2		5		4						

2 queues, odd-numbered packets have high priority

QUEUE Y																	
QUEUE X																	
ARRIVALS	1	2	3		4		5	6									
SERVICE TIME	1		3		2		5		4		6						
DEPARTURE	1		1		3		2		5		4		6				

2 queues, even-numbered packets have high priority

QUEUE Y	2	4	6													
QUEUE X	1	3	5													
ARRIVALS	1	2	3	4	5	6										
SERVICE TIME																
DEPARTURE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

2 queues, even-numbered packets have high priority

QUEUE Y	2		4		6													
QUEUE X			3		5													
ARRIVALS	1	2	3	4		5		6										
SERVICE TIME	1																	
DEPARTURE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	

2 queues, even-numbered packets have high priority

[illegible]

2 queues, even-numbered packets have high priority

QUEUE Y					6												
QUEUE X			3		5												
ARRIVALS	1	2	3		4		5	6									
SERVICE TIME	1		2		4												
DEPARTURE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

2 queues, even-numbered packets have high priority

QUEUE Y					6												
QUEUE X					5												
ARRIVALS	1	2	3		4		5	6									
SERVICE TIME	1		2		4		3										
DEPARTURE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

2 queues, even-numbered packets have high priority

QUEUE Y																	
QUEUE X					5												
ARRIVALS	1	2	3		4		5	6									
SERVICE TIME	1		2		4		3		6								
DEPARTURE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

2 queues, even-numbered packets have high priority

QUEUE Y																	
QUEUE X																	
ARRIVALS	1	2	3		4		5	6									
SERVICE TIME	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
DEPARTURE			1		2		4		3		6		5				