

Homework 12

Problem I

1. Compute the response time and turnaround time when running three jobs of length 200 with the SJF, FIFO and RR (with a time-slice of 1) schedulers.
2. How about with jobs of different lengths: 300, 200, and 100?

Problem II

1. For what types of workloads and quantum lengths does SJF deliver the same response times as RR?
2. What happens to response time with RR as quantum lengths increase? Given N jobs, what's the worst-case response time?

Problem III

Suppose we use following MLFQ scheduling poclity.

- a) There are 3 priority queues Q0, Q1, Q2. Q0 has the lowest priority, Q2 has the highest priority.
- b) FIFO is used in each queue.
- c) The time slices are 8ms(Q0), 4ms(Q1), 2ms(Q2).
- d) Priority boosting is not supported.
- e) Scheduling is carried out only at completion of processes or time slices.

Given the information of jobs in the workload: (NOTE: No I/O issues are involved)

Job	Arrival Time	Runtime
A	0ms	7ms
B	3ms	5ms
C	6ms	13ms
D	12ms	8ms

1. Please draw the table showing the state of MLFQ and processing of CPU.

Following is an example of the first 6ms.

Timeline	0	2	3	6
CPU	A->2	A->6	A->6	B->8
Q2	A(7)		B(5)	B(5)C(13)
Q1		A(5)	A(4)	
Q0				A(1)

2. Compute the response time and turnaround time. Is the turnaround time good as expected? If not, try to tell the reason.

Problem IV

Imagine a system with the following attributes:

- a) The system has 1MB of virtual memory
- b) The system has 256KB of physical memory
- c) The page size is 4KB
- d) The TLB is 4-way set associative with 16 total entries
- e) The L1 d-cache has 4 sets and 4 bytes in each line

The content of TLB, the first 20 entries of page table, and content of L1 d-cache are given below.

TLB												
Ind	Tag	PPN	Valid	Tag	PPN	Valid	Tag	PPN	Valid	Tag	PPN	Valid
00	03	-	0	09	0D	1	00	-	0	07	02	1
01	03	2D	1	02	-	0	04	-	0	0A	-	0
10	02	-	0	08	-	0	06	-	0	03	-	0
11	07	-	0	04	0D	1	0A	34	1	02	-	0

Page Table											
VPN	PPN	Valid	VPN	PPN	Valid	VPN	PPN	Valid	VPN	PPN	Valid
00	28	1	05	-	0	0A	1C	1	0F	-	0
01	-	0	06	-	0	0B	-	0	10	-	0
02	33	1	07	17	1	0C	-	0	11	3A	1
03	02	1	08	-	0	0D	2D	1	12	22	1
04	-	0	09	02	1	0E	-	0	13	0D	1

L1 d-cache						
Index	Tag	Valid	block0	block1	block2	block3
0	D27	1	0x0A	0x0B	0x0C	0x0D
1	-	0	-	-	-	-
2	1c28	0	0x1A	0x1B	0x1C	0x1D
3	D27	1	0x00	0x01	0x02	0x03

Step through the following address translation and cache accessing. If there is a cache miss, enter "-" for "Cache Byte returned". If there is a page fault, enter "-" for "PPN"&"Physical address" and leave the second table empty.

1. VA: 0x1327c

Parameter	Value
VPN	
TLB index	
TLB tag	
TLB hit?(Y/N)	

Page fault?(Y/N)	
PPN	
Physical Address	

Parameter	Value
Byte Offset	
Cache index	
Cache tag	
Cache hit?(Y/N)	
Cache Byte returned	

2. VA: 0x0A289

Parameter	Value
VPN	
TLB index	
TLB tag	
TLB hit?(Y/N)	
Page fault?(Y/N)	
PPN	
Physical Address	

Parameter	Value
Byte Offset	
Cache index	
Cache tag	
Cache hit?(Y/N)	
Cache Byte returned	