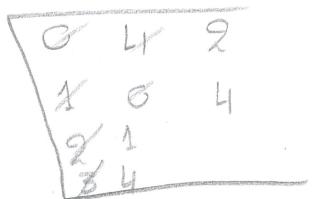


II 0, 1, 2, 3, 4, 0, 1, 5, 0, 1, 2, 3, 4, 5, 4

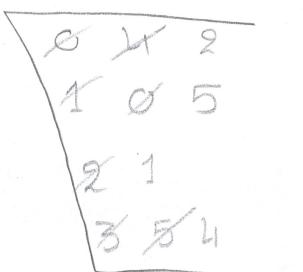
* FIFO



hits: 0, 1, 5 > 4

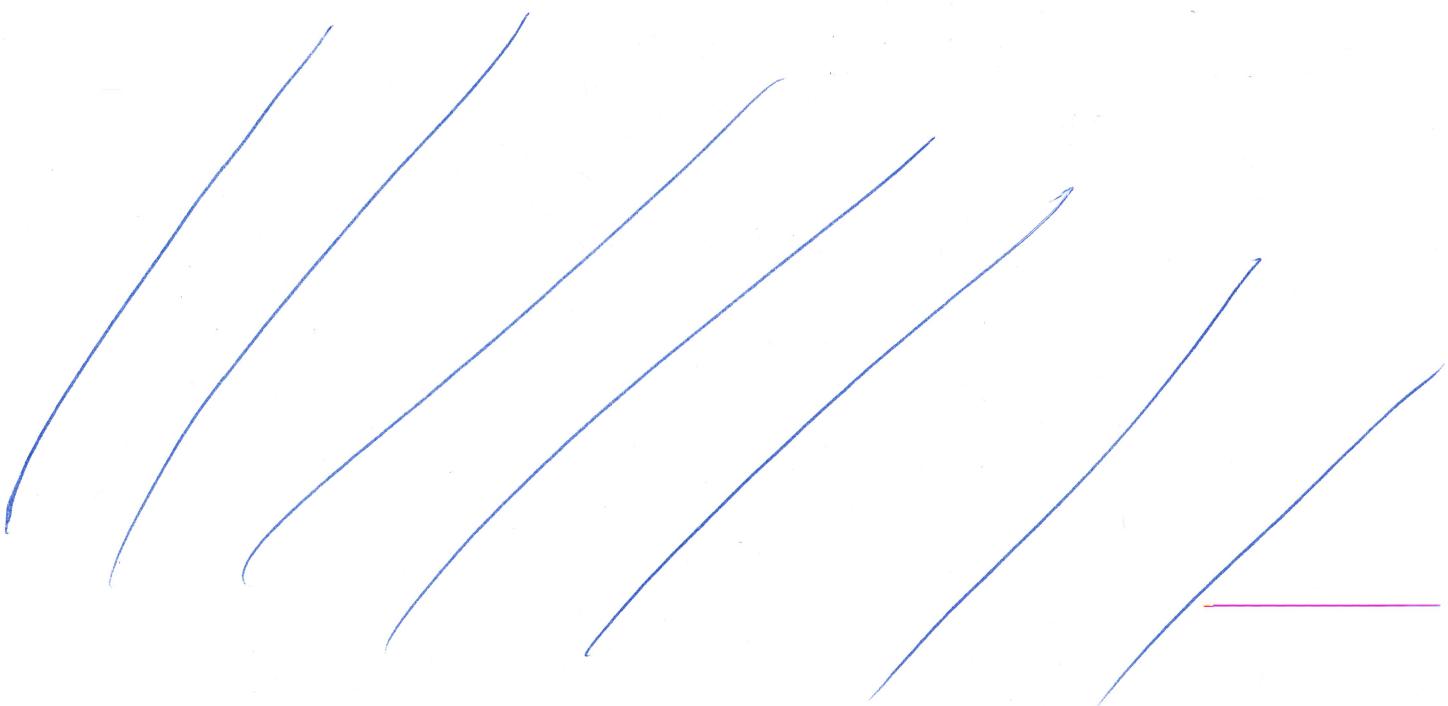
Hit ratio = 4

* LRU



hits: 0, 1, 4

Hit ratio = 3



* MRU

2

0	4
1	3
2	1
3	5

hits : 0, 1, 4, 5, 4

hit ratio = 5

2] (a)

0	0	X	0	1
1	X	8	1	
2	2			
3	3			

B. Hits : 0, 1, 2, 4, 3, 5, 3 : 7 hits

$$\rightarrow \text{Time to fetch instructions} = 16(50) + (9)(400) = \boxed{4400 \text{ ns}}$$

(b)

0	4
1	5
2	0
3	1

hits : 0, 1, 2, 4, 3, 5, 4 : 7 hits

$$\text{Time} = 16(50) + 9(400) = \boxed{4400 \text{ ns}}$$

(c)

0	5
X	4
2	1
3	3
8	2
0	3

hits: 0,4,5 : 3 hits

 \rightarrow 13 misses

$$\rightarrow \text{Time} = 16(5) + 13(400) = \boxed{6000 \text{ ns}}$$

(d)

0	4	3
1		
2	5	
3	0	

hits: 0,1,2,4,3,5,1,4 : 8 hits

 \rightarrow 8 misses

$$\rightarrow \text{Time} = 16(50) + 8(400) = 4000 \text{ ns}$$

31

1, 4, 8, 5, 20, 17, 19, 56, 9, 11, 4, 43, 5, 6, 9, 17

4

Reference	H or M
1	M
4	M
8	M
5	M
20	M
17	M
19	M
56	M
9	M
11	M
4	M
43	M
5	H
6	H
9	H
17	H

0	
1	X 17
2	
3	19
4	X 20 4
5	5
6	6
7	
8	8 56
9	9
10	
11	11 43
12	
13	
14	
15	

41

5 ~~4~~

Block #	H or M
0	M
1	M
2	M
1	H
5	M
4	M
4	H
14	M
2	M
2	H
1	M
10	M
1	H
1	H
2	M
4	H

0	∅	4
1	2	8
2	9	14
3	11	16

5 | 1, 4, 8, 5, 20, 17, 19, 56, 9, 11, 4, 43, 5, 6, 9, 17
M M M M M M M M M H M H M H H

6

of blocks = 16

/// sets = $16/2 = 8$

Cache							
0	8	56					
1	X	17	9				
2							
3	X	11	43				
4	X	20					
5	5						
6	6						
7							

hits = 4

61 1, 4, 8, 5, 20, 17, 19, 56, 9, 11, 4, 43, 5, 6, 7, 17
M M M M M M M M H M H M H H

7

Cache		
0	8	56
1	1	17 43
2		
3	19	11 43
4	4	20
5	5	
6	6	
7		

$$\text{hits} = 4$$

67 1, 4, 8, 5, 20, 17, 19, 56, 9, 11, 4, 43, 5, 6, 9, 17
M M M M M M M M H M H M H M

Cache		
0	8	56
1	1	17 9 17
2		
3	19	11 43
4	4	20
5	5	
6	6	
7		

$$\text{hits} = 3$$