

Q Consider a main memory with 3 page frame and the following sequence of page references: 3, 8, 2, 3, 9, 1, 6, 3, 8, 9, 3, 6, 2, 1, 3. Find out no. of page faults for FIFO, LRU, MRU, optimal page Replacement Algo's?

Ans) PF  $\Rightarrow$  5 , Refs  $\rightarrow$  3, 8, 2, 3, 9, 1, 6, 3, 8, 9, 3, 6, 2, 1, 3

a) FIFO  $\rightarrow$

3, 8, 2, 3, 9, 1, 6, 3, 8, 9, 3, 6, 2, 1, 3  
M M M H M M M M H H H M H H

3	3	3	3	3	6	6	6	6	6	6	6	6	6	6
	8	8	8	8	8	3	3	3	3	3	3	3	3	3
		2	2	2	2	2	8	8	8	8	8	8	8	8
			9	9	9	9	9	9	9	9	9	2	2	2
					1	1	1	1	1	1	1	1	1	1

Page fault  $\Rightarrow$  9

LRU  $\rightarrow$  3, 8, 2, 3, 9, 1, 6, 3, 8, 9, 3, 6, 2, 1, 3  
M M M H M M M H M H H H M M H

3	8	2	3	9	1	6	3	8	9	3	6	2	1	3
	3	8	2	3	9	1	6	3	8	9	3	6	2	1
		3	8	2	3	9	1	6	3	8	9	3	6	2
				8	2	3	9	1	6	3	8	9	3	6
					8	2	2	9	1	1	1	8	9	9

Page fault  $\rightarrow$  9

c) LFU  $\rightarrow$  3 8 2 3 9 1 6 3 8 9 3 6 2 1 3  
 m m m m m m m m m m m m m m

3	3	3	3	3	3	3	3	3	
	8	8	8	8	6	6	6	6	
		2	2	2	2	8	8	1	
			9	9	9	9	9	9	
				1	1	1	2	2	

freq  $\rightarrow$  3 = <sup>5</sup>~~4~~, 8 = <sup>9</sup>~~8~~, 2 = ~~1~~, 9 = 2, 1 = 0, 6 = 2  
~~8 = 2, 9 =~~

Page fault = 9

d) MRU  $\rightarrow$  3 8 2 3 9 1 6 3 8 9 3 6 2 1 3  
 m m m m m m m m m m m m m m

3	8	2	3	9	1	6	3	8	9	6	2	1	3
	3	6	2	3	9	9	6	3	6	9	6	6	1
		3	8	2	3	3	9	6	3	8	9	9	6
				8	2	2	2	9	6	3	6	8	9
					8	8	8	2	2	2	3	3	8

Page fault  $\rightarrow$  7



