Ch. 08 FIFO Page Replacement Algo Dr. Varin

P. 8.23 FIFO Algo.

String : 1, 2, 3, 4, 1, 2, 5, 1, 2, 3, 4, 5

Light blue = Copying from the left column.
Green = Page hit.
Pink = Page miss (page fault).

Sol^n 3 frames :

Frame#	1	2	3	4	1	2	5	1	2	3	4	5
0	1	1	1	4	4	4	5	5	5	5	5	5
1		2	2	2	1	1	1	1	1	3	3	3
2			3	3	3	2	2	2	2	2	4	4

Time$_y$ ↓ Time$_x$ →

∴ # of page faults = 9 page faults. Ans. (1)

4 frames :

frame#	1	2	3	4	1	2	5	1	2	3	4	5
0	1	1	1	1	1	1	5	5	5	5	4	4
1		2	2	2	2	2	2	1	1	1	1	5
2			3	3	3	3	3	3	2	2	2	2
3				4	4	4	4	4	4	3	3	3

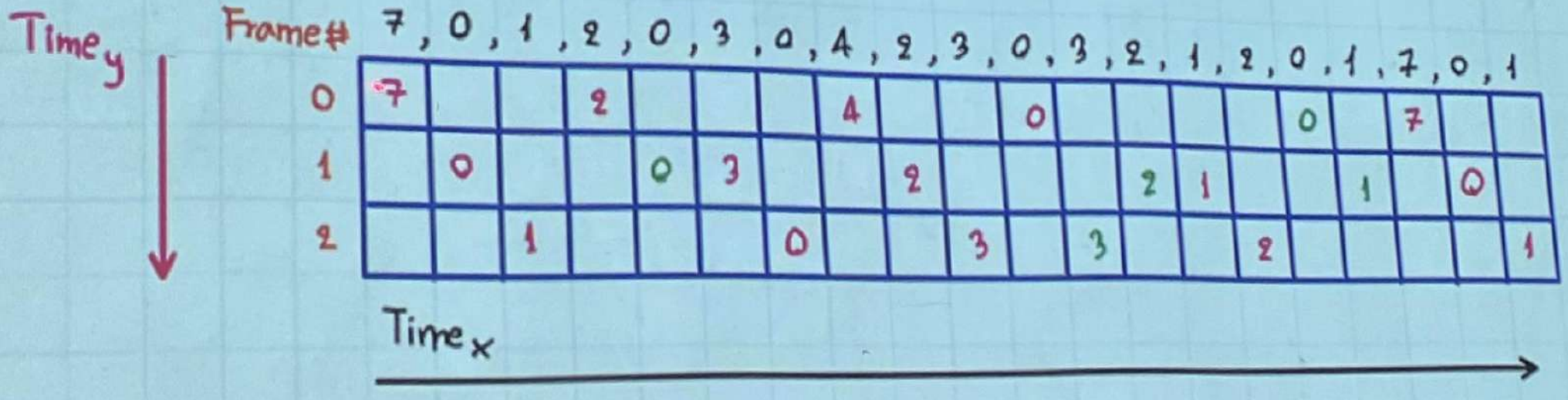
Time$_y$ ↓ Time$_x$ →

∴ # of page faults = 10 page faults. Ans. (2)

P.8.24 FIFO for 3 frames.

Reference string: 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1

Sol^{n}. 3 frames :



$\therefore$ # of page faults = 15 page faults. Ans.

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LRU Page Replacement Algo Dr. Varin

P. 8.29 LRU for 4 frames.

Soln.

Frame#	1	2	3	4	1	2	5	1	2	3	4	5
	#1	#2	#3	#4			#1	#4		#2	#3	#4
0	1											① 5
1		2			1		1	1		1	1	1
2			3			2	2		2	2	2	2
3				4			① 5			5	⑤ 4	4
							4			④ 3	3	3

Light blue = Copying from the left column.
Green = Page hit.
Pink = Page miss (page fault).

The farthest on the left.

∴ # of page faults = 8. Ans

P. 8.30 LRU for 3 frames.

Soln.

Frame#	7	0	1	2	0	3	0	4	2	3	0	3	2	1	2	0	1	7	0	1
	#1	#2	#3	#1	#4	#3	#5	#6	#4	#5	#7			#7	#4	#8		#9		
0	7			① 2		2		② 4	4	4	④ 0			⑤ 1		1	1	1		1
1		0		0	0	0	0	0	0	③ 3	3	3		3		① 0		0	0	
2			1	1		① 3		3	③ 2	2	2		2	2	2	2		② 7		

The farthest on the left.

∴ # of page faults = 12. Ans.

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h. 08 Optimal Page Replacement Algo Dr. Varin

P. 8. 26 Opimal for 4 frames.

String : 1, 2, 3, 4, 1, 2, 5, 1, 2, 3, 4, 5

Light blue = Copying
Green = Page hit.
Pink = Page miss

Sol^{n}.

Frame #	1	2	3	4	1	2	5	1	2	3	4	5
0	1				1		#1 ① 1	1			#2 ① 4	
1		2				2	2		2		②	
2			3				3			3	③	
3				4			④ 5				5	5

The farthest on the right.

Any page but 5.

∴ # of page faults = 6. Ans.

P. 8. 27 Optimal for 3 frames.

String : 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1.

Sol^{n}.

Frame #	7	0	1	#1 2	0	#2 3	0	#3 4	2	3	#4 0	3	2	#5 1	2	0	1
0	7			③ 2		2		2	2		2		2	2	2		
1		0		0	0	0	0	② 4			④ 0			0		0	
2			1	1		① 3		3		3	3	3		③ 1			1

The [illegible]

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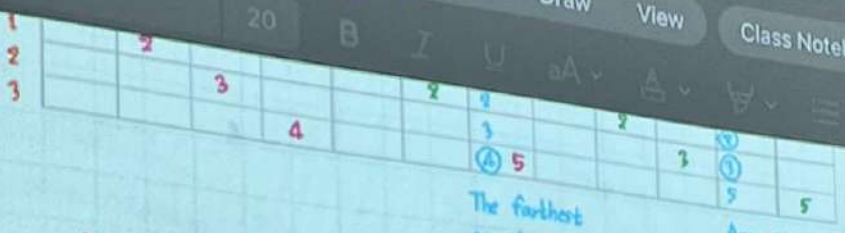


The farthest on the right.

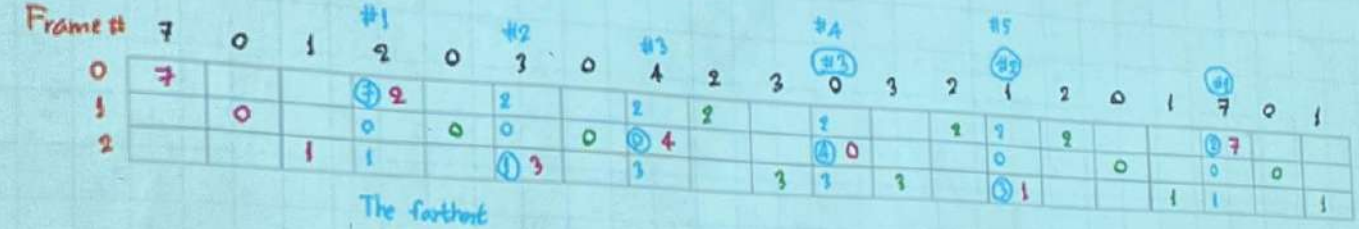
Any page but 5.

∴ # of page faults = 6. Ans.

P.8.27 Optimal for 3 frames.

String : 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1.

Sol^n.



The farthest on the right.

∴ # of page faults = 9. Ans.

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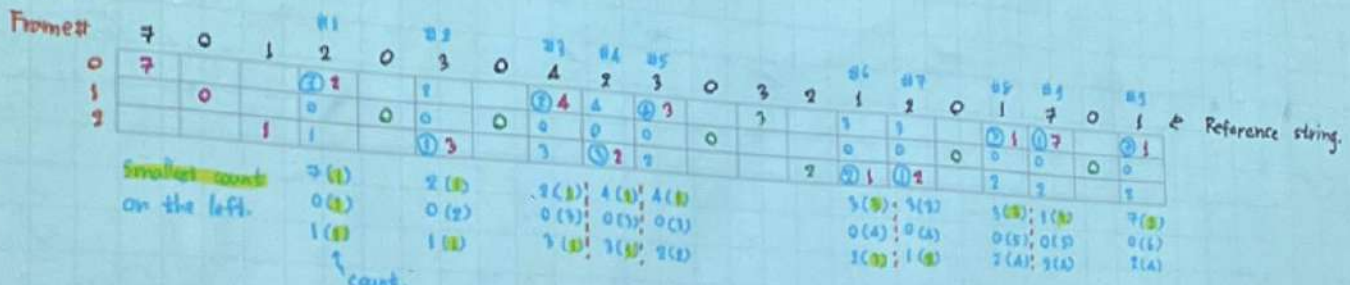
n. 08 Counting Page Replacement Algo Dr. Varin

Counting
1. LFU (Least Frequently Used) : The smallest count on the left side.
2. MFU (Most Frequently Used) : The largest count on the left side.

Ex. LFU & MFU for 3 frames.

Sol(a). LFU :

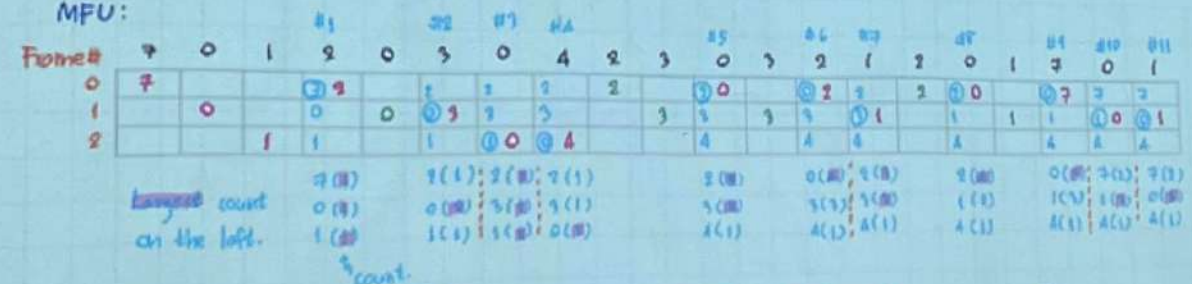


∵ All counts = 1.
∴ For #1, 7 or 0 or 1 is okay.

∴ # of page faults = 13 page faults.

Ans (a)

MFU :



∵ All counts = 1.
∴ For #1, 7 or 0 or 1 is okay.

∴ # of page faults = 14.

Ans (a)