Spring 2003 – CS186
Section exercise 1
29 Jan 2003

Consider a page reference pattern that performs three consecutive scans over a set of five pages. Assuming you start with an empty pool of three frames. 1) How many page faults will be incurred with an LRU page replacement policy, and 2) how many will be incurred with an MRU page replacement policy?

1. LRU

Frames v	Read Page >>	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
1		1	1	1	4	4	4	2	2	2	5	5	5	3	3	3
2			2	2	2	5	5	5	3	3	3	1	1	1	4	4
3				3	3	3	1	1	1	4	4	4	2	2	2	5
Page fault?		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Number of page faults = 15

2. MRU

Frames v	Read Page >>	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
1		1	1	1	1	1	1	1	1	1	1	1	2	3	3	3
2			2	2	2	2	2	2	3	4	4	4	4	4	4	4
3				3	4	5	5	5	5	5	5	5	5	5	5	5
Page fault?		Y	Y	Y	Y	Y	N	N	Y	Y	N	N	Y	Y	N	N

Number of page faults = 9

3. Some useful exercises after section:

a. What happens when the buffer pool is not started empty? For example, frame 1 starts off being occupied. How does MRU compare with LRU?
b. Repeat this exercise with an arbitrary random page reference pattern. How does MRU compare with LRU?
c. Repeat this exercise for the Clock algorithm. Does it approximate LRU as discussed in class? You can use the table below:

3. CLOCK

Frames v	Read Page >>	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
1		1	1	1	4	4	4	2	2	2	5	5	5	3	3	3
2			2	2	2	5	5	5	3	3	3	1	1	1	4	4
3				3	3	3	1	1	1	4	4	4	2	2	2	5
Page fault?		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y