CSci 144 Introduction to Operating Systems
Quiz 5, November 30, 2016

1. (0.6 points) Please answer the following questions.

0.15 each a. What are the two flexible memory address translation strategies?

Paging & Segmentation

b. Which one may cause internal fragmentation?

Paging (when page is large)

c. Which one may cause external fragmentation?

Segmentation

d. Which memory address translation strategy is used as the lowest level of all multi-level address translation systems?

Paging

use bit = 1 dirty bit = 1

2. (0.3 point) Suppose a page frame A, which was recently referenced and modified, needs to evicted to load a new page B, what steps need to be done for page frame A before it's replaced? Assume that a page frame is cached in *TLB* if it's recently referenced.

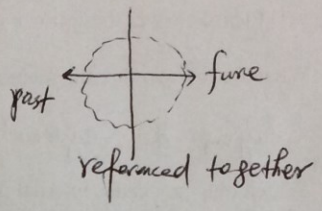
0.1 each Step 1: update page table entry for A to be "invalid"

Step 2: update TLB entry for A as in "invalid"

Step 3: Copy the modified page A to hard drive (virtual memory)

3. (0.3 point) For page replacement policy, LRU is considered an approximation of MIN. What is the underlying assumption? Briefly justify.

Spacial & temporal locality



4. (0.8 points) For the following stream of memory page references, please apply LRU and MIN to show details of page frame allocation and count the total page faults. textbook page 442

LRU

Reference	A	B	A	C	B	D	A	D	E	D	A	E	B	A	C
1	A		+				+				+			+	
2		B			+								+		
3				C					E			+			C
4						D		+		+					

Total page fault is 6.

MIN

Reference	A	B	A	C	B	D	A	D	E	D	A	E	B	A	C
1	A		+				+				+			+	
2		B			+								+		
3				C					E			+			any page
4						D		+		+					

Total page fault is 6.

explained by last sentence in Figure 9.14 caption