COSC 3346

Practice Problems on Chapter 9

1. Consider the page table shown for a system with 12-bit virtual and physical addresses and with 256 byte pages. The list of free frames is D, E, F (that is, D is at the head of the list, E is the second, and F is the last).

|  |  |
| --- | --- |
| Page | Page Frame |
| 0 | - |
| 1 | 2 |
| 2 | C |
| 3 | A |
| 4 | - |
| 5 | 4 |
| 6 | 3 |
| 7 | - |
| 8 | B |
| 9 | 0 |

Convert the following virtual addresses to their equivalent physical addresses in hexadecimal. All numbers are given in hexadecimal. (A dash for a page frame indicates that the page is not in memory.)

* 9EF
* 111
* 700
* 0FF

2. Consider the following page reference strings:

1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6

How many page faults would occur for the following replacement algorithms, assuming one, two, three, four, five, six, and seven frames? Remember that all frames are initially empty, so your first unique pages will cost one fault each.

* LRU replacement
* FIFI replacement
* Optimal replacement

3. Consider the following page reference strings:

7, 2, 3, 1, 2, 5, 3, 4, 6, 7, 7, 1, 0, 5, 4, 6, 2, 3, 0, 1.

Assuming demand paging with three frames, how many page faults would occur for the following replacement algorithms?

* LRU replacement
* FIFO replacement
* Optimal replacement

4. The page table shown in the figure is for a system with 16-bit virtual and physical addresses and with 4,096-byte pages. The reference bit is set to 1 when the page has been referenced. Periodically, a thread zeroes out all values of the reference bit. A dash for a page frame indicates the page is not in memory. The page-replacement algorithm is localized LRU, and all numbers are provided in decimal.

|  |  |  |
| --- | --- | --- |
| Page | Page Frame | Reference Bit |
| 0 | 9 | 0 |
| 1 | 1 | 0 |
| 2 | 14 | 0 |
| 3 | 10 | 0 |
| 4 | - | 0 |
| 5 | 13 | 0 |
| 6 | 8 | 0 |
| 7 | 15 | 0 |
| 8 | - | 0 |
| 9 | 0 | 0 |
| 10 | 5 | 0 |
| 11 | 4 | 0 |
| 12 | - | 0 |
| 13 | - | 0 |
| 14 | 3 | 0 |
| 15 | 2 | 0 |

a. Consider the following virtual addresses (in hexadecimal) to the equivalent physical addresses. You may provide answers in either hexadecimal or decimal. Also set the reference bit for the appropriately entry in the page table.

0xE12C

0x3A9D

0xA9D9

0x7001

0xACA1

b. Using the above addresses as a guide, provide an example of a logical address (in hexadecimal) that results in a page fault.

c. From what set of page frames will the LRU page-replacement algorithm choose in resolving a page fault?