作业十

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Practice Exercice: 10.5, 10.7, 10.8, 10.9

10.5

Consider the page table for a system with 12-bit virtual and physical addresses and 256-byte pages.

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

The list of free page frames is *D*, *E*, *F* (that is, *D* is at the head of the list, *E* is second, and *F* is last). A dash for a page frame indicates that the page is not in memory.

Convert the following virtual addresses to their equivalent physical addresses in hexadecimal. All numbers are given in hexadecimal.

- 9EF
  - 256 = 2^8 12 - 8 = 4
  - 9 => 0
  - Virtual: 0EF
- 111
  - Virtual: 211
- 700
  - Virtual: D00
- 0FF
  - Virtual: EFF

Consider the two-dimensional array A:

```
int A[][] = new int[100][100];
```

10.7 where A[0][0] is at location 200 in a paged memory system with pages of size 200. A small process that manipulates the matrix resides in page 0 (locations 0 to 199). Thus, every instruction fetch will be from page 0.

For three page frames, how many page faults are generated by the following array-initialization loops? Use LRU replacement, and assume that page frame 1 contains the process and the other two are initially empty.

a.
```
for (int j = 0; j < 100; j++)
   for (int i = 0; i < 100; i++)
      A[i][j] = 0;
```

b.
```
for (int i = 0; i < 100; i++)
   for (int j = 0; j < 100; j++)
      A[i][j] = 0;
```

- 5000 (每次i+2，就会page fault一次)
- 50（每次i+2，就会page fault一次)

10.8

Consider the following page reference string:

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.

Frame	LRU	FIFO	Optimal
1	20	20	20
2	18	18	15
3	15	16	11
4	10	14	8
5	8	10	7
6	7	10	7
7	7	7	7

10.9

Consider the following page reference string:

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: 18
- FIFO: 17
- Optimal: 13