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COMP 264

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Homework 7-1

Determine the cache performance of the following code when the cache is a 2048 byte direct-mapped cache with 32 byte blocks:

```
for (i=0; i<16; i++) {
    for (j=0; j<16; j++) {
        square[i][j].c = 0;
        square[i][j].m = 0;
        square[i][j].y = 0;
        square[i][j].k = 0;
    }
}
```

(a) What is the total number of writes   Since it's a 16x16 matrix of a struct that has 4 elements each, the number of writes for the entire matrix would be `16*16*4 = 1024`

(b) What is the total number of writes that miss in cache?   We're accessing the data in a linear manner and since each cache block can hold 8 structs and when we access a new cache block we always miss the first, the number of writes that miss will be 128.

(c) What is the miss rate? $128/1024 = 0.125$ or 12.5%

Homework 7-2

With the same assumptions as in the previous problem, determine the cache performance of the following code:

```
for (j=0; j<16; j++) {
    for (i=0; i<16; i++) {
        square[i][j].c = 0;
        square[i][j].m = 0;
        square[i][j].y = 0;
        square[i][j].k = 0;
    }
}
```

(a) What is the total number of writes? Since it's the same 16x16 matrix with structs of 4 elements, the number or writes for the entire matrix is `16*16*4` `= 1024`

(b) What is the total number of writes that miss in cache? Because each outer iteration jumps blocks, the first write of each struct will be a miss. Therefore, we will miss 256 writes.

(c) What is the miss rate? The miss rate will be 25%