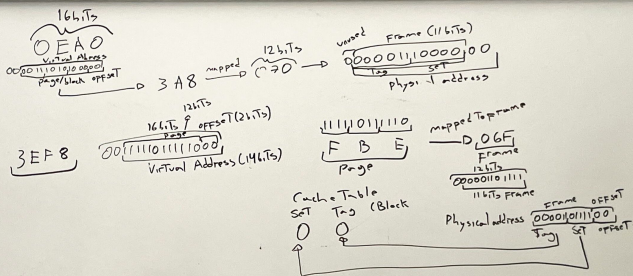
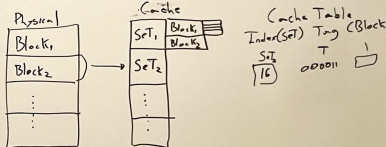


Cache  
 64 Blocks }  $64 \times 4 = 256$  Bytes each }  $2^6 \times 2^2 = 2^8$  (256 Bytes)  
 2 bits offset  
 1 bit block  
 5 bits SET  
 5 bits SET 1 bit block 2 bits offset



## Memory

PROBLEM 1. Given a physical memory with 4KB blocks of 16 words/bytes each, and a cache memory of 128 blocks, determine the address coding for both physical and cache memory for each of the following cache organizations:

1. Direct Mapping.
2. Full Associative.
3. 2-Way Set Associative.

Physical Memory  
 4KB blocks }  $2^{12} \times 2^4 = 2^{16}$  (64KB)  
 16 Bytes per block  
 12 bits block/frame 4 bits offset

Cache Memory  
 128 blocks }  $2^6 \times 2^4 = 2^{10}$  (1KB)  
 16 Bytes per block

Direct Mapping  
 Cache encoding 6 bits block 4 bits offset  
 Physical encoding 6 bits Tag 6 bits block 4 bits offset  
 Full Associative  
 Cache encoding 6 bits block 4 bits offset  
 Physical encoding 12 bits Tag 4 bits offset  
 2-Way Set Associative  
 Cache encoding 5 bits set 1 bit block 4 bits offset  
 Physical encoding 7 bits Tag 5 bits SET 4 bits offset

0x1201 SET offset  
 00010010 00000001 look at SET 0x0

0x160A SET offset  
 00010110 00001010 look at SET 0x0

0x0E00 SET offset  
 00001110 00000000 look at SET 0x0

0x1201 SET offset  
 00010010 00000001 look at SET 0x0

Cache Table  
 SET Tag (Block Age)  
 0x1E 0x01 1 6  
 0x1E 0x02 0 7  
 0x0 0x09 1 0

Accesses 7 Hits 7 Miss 7