Levi Masters

4063883

Homework 6

Problem 1:

Consider the following sequence of memory accesses where each address is a byte address: 0, 1, 4, 3, 4, 15, 2, 15, 2, 10, 12, 2. Assume that the cash is direct-mapped, cash size is 4 bytes, and block size is one byte; Map addresses to cache blocks and indicate whether hit or miss.

0,	1,	4,	3,	4,	15,	2,	15,	2,	10,	12,	2.
0000	0001	0100	0011	0100	1111	0010	1111	0010	1010	1100	0010

0 Miss	
00	Mem(0)

1 Miss	
00	Mem(0)
00	Mem(1)

4 Miss	
01	Mem(4)
00	Mem(1)

3 Miss	
01	Mem(4)
00	Mem(1)
00	Mem(3)

4 Hit	
01	Mem(4)
00	Mem(1)
00	Mem(3)

15 Miss	
01	Mem(4)
00	Mem(1)
11	Mem(15)

2 Miss	
01	Mem(4)
00	Mem(1)
00	Mem(2)
00	Mem(15)

15 Hit	
01	Mem(4)
00	Mem(1)
00	Mem(2)
00	Mem(15)

2 Hit	
01	Mem(4)
00	Mem(1)
00	Mem(2)
00	Mem(15)

10 Miss	
01	Mem(4)
00	Mem(1)
10	Mem(10)
00	Mem(15)

12 Miss	
11	Mem(12)
00	Mem(1)
10	Mem(10)
00	Mem(15)

2 Miss	
11	Mem(12)
00	Mem(1)
00	Mem(2)
00	Mem(15)

Problem 2:

Consider the following sequence of memory accesses where each address is a byte address: 0, 1, 4, 3, 4, 15, 2, 15, 2, 10, 12, 2. Assume that the cash is direct-mapped, cash size is 4 bytes, and block size is two bytes; Map addresses to cache blocks and indicate whether hit or miss.

0,	1,	4,	3,	4,	15,	2,	15,	2,	10,	12,	2.
0000	0001	0100	0011	0100	1111	0010	1111	0010	1010	1100	0010

0 Miss		
00	Mem(1)	Mem(0)

1 Miss		
00	Mem(1)	Mem(0)

4 Miss		
01	Mem(5)	Mem(4)

3 Miss		
01	Mem(5)	Mem(4)
00	Mem(3)	Mem(2)

4 Miss		
01	Mem(5)	Mem(4)
00	Mem(3)	Mem(2)

15 Miss		
01	Mem(5)	Mem(4)
11	Mem(15)	Mem(14)

2 Miss		
01	Mem(5)	Mem(4)
00	Mem(3)	Mem(2)

15 Miss		
01	Mem(5)	Mem(4)
11	Mem(15)	Mem(14)

2 Miss		
01	Mem(5)	Mem(4)
00	Mem(3)	Mem(2)

10 Miss		
01	Mem(5)	Mem(4)
10	Mem(11)	Mem(10)

12		
11	Mem(13)	Mem(12)
10	Mem(11)	Mem(10)

2 Miss		
11	Mem(13)	Mem(12)
00	Mem(3)	Mem(2)

Problem 3:

Consider a direct-mapped cache with 32 blocks

Cache is initially empty, Block size = 16 bytes

The following memory addresses (in hexadecimal) are referenced:

0x000002B4, 0x000002B8, 0x0000002BC, 0x000003E8, 0x000003EC, 0x000004F0, 0x000008F4, 0x0000008F8, 0x0000008FC.

Map addresses to cache blocks and indicate whether hit or miss.

ADDRESS	IDX	TAG	H/M
24B	00	1	MISS
2B8	00	1	HIT
2BC	01	1	MISS
2E8	1C	2	MISS
2EC	00	2	MISS
4F0	1C	3	MISS
8F4	40	3	MISS
8F8	40	3	HIT
8FC	F0	3	MISS

Problem 4:

Below is a list of 32-bit memory address references (represented in decimal), each of them is a word addresses.

3, 180, 43, 2, 191, 88, 190, 14, 181, 44, 186, 253

For each of these references, identify the binary address, the tag, and the index given a direct-mapped cache with two-word blocks and a total size of 8 blocks. Also indicate whether hit or miss, assuming the cache is initially empty.

Address	Translation	tag	indx	LSB	H/M
3	0000 0011	0000	001	1	Miss
108	1011 0100	1011	010	0	Miss
43	0010 1011	0010	101	1	Miss
2	0000 0010	0000	001	0	Hit
191	1011 1111	1011	111	1	Miss
88	0101 1000	0101	100	0	Miss
190	1011 1110	1011	111	0	Hit
14	0000 1110	0000	111	0	Miss
181	1011 0101	1011	010	1	Hit
44	0010 1100	0010	110	0	Miss
186	1011 1010	1011	101	0	Miss
253	1111 1101	1111	110	1	Miss