

Home work sheet

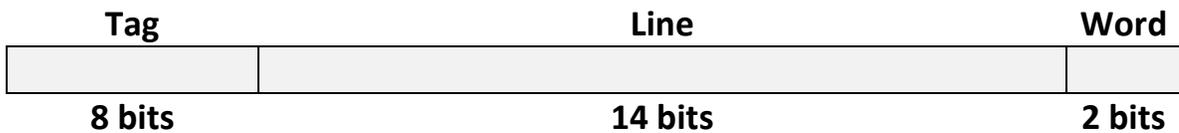
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Q1: A two-way set-associative cache has lines of 16 bytes and a total size of 8 kbytes. The 64-Mbyte main memory is byte addressable. Show the format of main memory Addresses

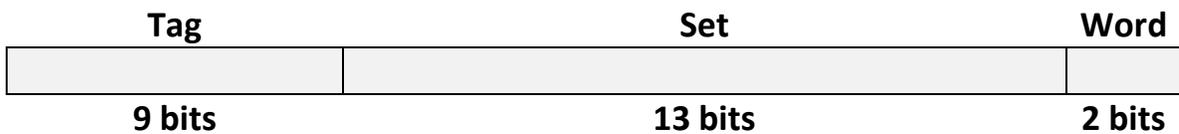
Q2: For the hexadecimal main memory addresses 111111, 666666, BBBB, show the following information, in hexadecimal format:

a. Tag, Line, and Word values for a direct-mapped cache, using the format of Figure 4.10

b. Tag and Word values for an associative cache, using the showing format



c. Tag, Set, and Word values for a two-way set-associative cache, using the showing format



Q3: Consider a machine with a byte addressable main memory of 216 bytes and block size of 8 bytes. Assume that a direct mapped cache consisting of 32 lines is used with this machine.

- a. How is a 16-bit memory address divided into tag, line number, and byte number?
- b. Into what line would bytes with each of the following addresses be stored?

0001 0001 0001 1011

1100 0011 0011 0100
1101 0000 0001 1101
1010 1010 1010 1010

- c. Suppose the byte with address 0001 1010 0001 1010 is stored in the cache. What are the addresses of the other bytes stored along with it?
- d. How many total bytes of memory can be stored in the cache?
- e. Why is the tag also stored in the cache?.

Q4: Consider a memory system that uses a 32-bit address to address at the byte level, plus a cache that uses a 64-byte line size.

- a. Assume a direct mapped cache with a tag field in the address of 20 bits. Show the address format and determine the following parameters: number of addressable units, number of blocks in main memory, number of lines in cache, size of tag.
- b. Assume an associative cache. Show the address format and determine the following parameters: number of addressable units, number of blocks in main memory, number of lines in cache, size of tag.
- c. Assume a four-way set-associative cache with a tag field in the address of 9 bits. Show the address format and determine the following parameters: number of addressable units, number of blocks in main memory, number of lines in set, number of sets in cache, number of lines in cache, size of tag.