1. A two-way set-associative cache has lines of 16 bytes and a total size of 8 kB. The 64-MB main memory is byte addressable. Show the format of main memory addresses. Kanza

Main memory = 64 mb = 2^6 \* 2^26 = 2^26 = 26

Cache size = 8 kb = 2^3 \* 2^10 = 2^13 = 13

Line size = 16 = 2^4 = 4

No of line = cache / line = 2^13 / 2^4 = 2^9 = 9 bits

Set = num of lines / num of way = 2^9 / 2^1 = 2^8

(two way = 2^1,four way = 2^2)

Tag = Main memory – set – line size

= 26 – 4 – 8 = 14 bits

1. Consider a direct mapped cache of size 16 KB with block size of 256 bytes. The size of the main memory is 128 KB. Find the number of bits in the tag. What are the tag and cache line address (in hex) for the main memory address (E201F)? Gilbert

16 kb = 2^4 \* 2^10 = 2^14

Block size 256 b = 2^8

Cache lines = cache size / cache line size = 2^14 / 2^8 = 2^6

= main memory / cache line = 2^17 / 2^6 = 2^11

Tag = 17 – 8 – 6 = 3

3/6/8

1110 0010 0000 0001 1111

E201F = 1110 0010 0000 0001 1111

1110 0010 0000 0001 00011111

1. with the same details as number 3 but the mapping technique change to fully-associative cache, find the tag address (in hex) for main memory address (CABBE) Gilbert

tag = main memory / block size = 17 – 8 = 9

tag : word ratio = 9:8

C A B

**1100 1010 1**011 (011 diabaikan karena 9 bit)

**(1000)**

**C A 8**