Q. Consider a direct mapped cache of size 16 KB with block size of 256 bytes. The size of main memory is 128 KB.

1. Find number of bits in tag

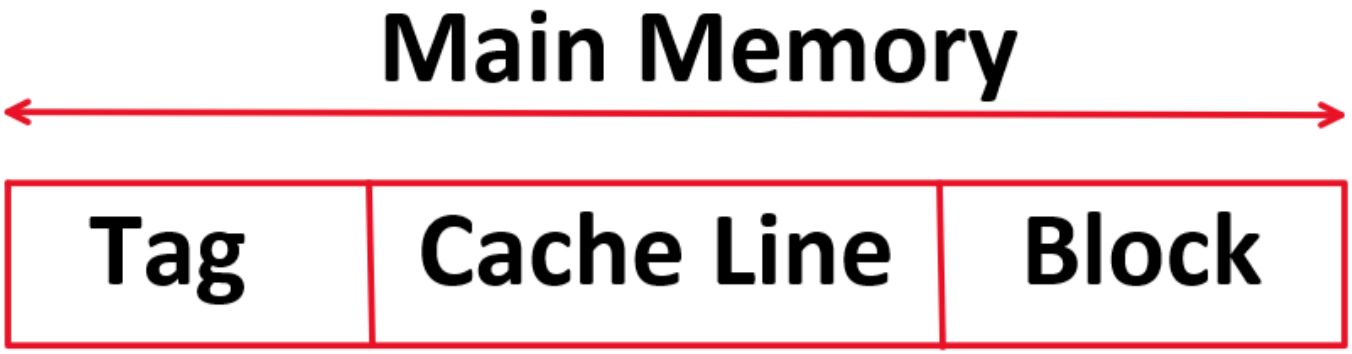
2. Find tag directory size

Ans. First we have to find the number of bits in each given memory.

Cache of size = 16 KB = $2^{14}$ bytes => Its having 14 bits

Block size = 256 bytes = $2^{8}$ bytes => Its having 8 bits

Main memory size = 128 KB = $2^{17}$ bytes => Its having 17 bits




From above image,

Number of bits in main memory = bits in tag + bits in cache line + bits in block

## Cache Line

Number of bits in Line number = Cache size / Block size

$= 2^{14}$ bytes / $2^{8}$ bytes

$= 2^{6}$

Line number having 6 bits.

## Number of bits in Tag

Number of bits in Tag =

Number of bits in main memory – number of bits in line number – number of bits in block

= 17 – Line bits – Block bits

= 17 – 6 – 8 =3

## Tag directory size

Tag directory size = Size of line number X Number of bits in tag

$=2^{6}$ X 3 bits

= 192 bits

= 192 / 8 bytes

= 24 bytes

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52. What is mapping? Name all the types of cache mapping and explain anyone in detail.
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