

Given:

There is 64 line at total in set-associative cache.

There is 4 line sections at every set because of 4 way set-associative. So, $64/4=16$ sets.

At main memory, there is 4096 (1K = 1024; 4K = 4096) blocks. Every block has 128 words.

Solution:

Block Offset: Each block in main memory has 128 words. 128 words = $2^7 \rightarrow 7$. So, we need *7 bits* for the block offset.

Set Index: 16 set = $2^4 \rightarrow 4 \text{ bits}$

Tag: 4096 = $2^{12} \rightarrow 12 \text{ bits}$

$12+7 = 19$, so $2^{19} = 524288$ words. And the total size of the main memory address is *19 bits*.

And;

Tag bits = Total address bits – Set index bits –
Block offset bits = 19 bits – 4 bits – 7 bits = *8 bits*.

So, **the main memory address is 19 bits long**, divided into an 8-bit tag, a 4-bit set index, and a 7-bit block offset.