Cmpt 250
Assignment 4

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Address Mapping Format

Memory size: $2^{10} * 8$
Blocking factor: 4
Cache size: 2^4

Blocking factor of 4 means there are 2 bits to specify a word from a block of 4 words.

There are 16 cache line which means 4 bits are required to choose one cache line out of 16.

No. of blocks = $2^{10}/2^2 = 2^8$ blocks.

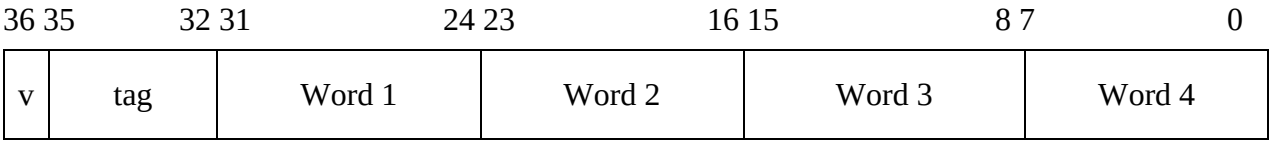
Set size = $2^8/2^4 = 2^4$ set size.

Cache line size:

There are 4 words to be stored in one cache line and each word is of 8 bits. So total space needed for 4 words = 8 * 4 = 32 bits.
The set size is 2^4 which implies that 4 bits are required for the tag.
Validity bit is of 1 bit.

So, cache line size = 32 + 4 + 1 = 37 bits.

Thus, the format for one cache line would be:



Memory Trace Table

Cache line									
2	-	2	2	2	2	2	2	2	2
3	-	-	-	-	3	3	3	3	3
4	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-

CONTINUED	2	2	2	2	2	2	2
	3	3	3	3	3	3	3
	-	-	-	-	-	-	4
	-	18	18	18	18	18	18
	-	-	19	19	19	19	19

Average Access Time

'miss' access time = 170 ns.
'hit' access time = 60 ns.

No. of misses = 5
No. of hits = 10

Hit ratio = 10 / 15.

Average access time = (5(170) + 10(60)) / 15 = **96.67 ns.**