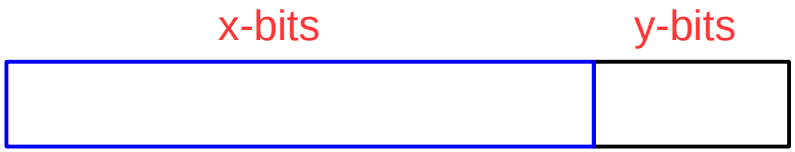
Address Partitioning (1B)

Please send corrections (or suggestions) to youngwlim@hotmail.com.

This document was produced by using OpenOffice.

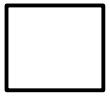
Partitioning address bits



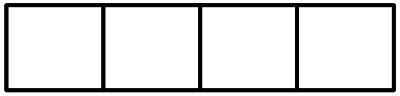
There are total 2^x entries
Each entry consists of 2^y sub-entries

Index: which entry among 2^x entries
Offset: which sub-entry among 2^y sub-entries

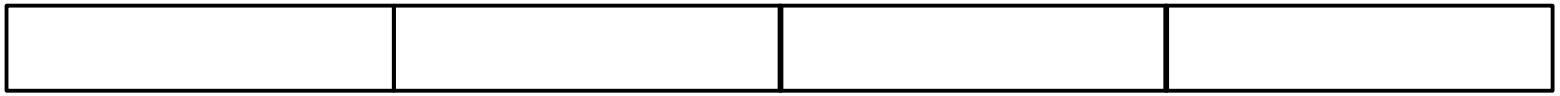
Data Units



byte

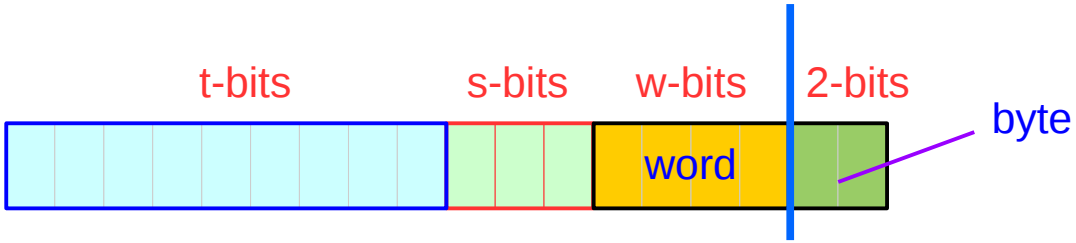


word (= 4 bytes)

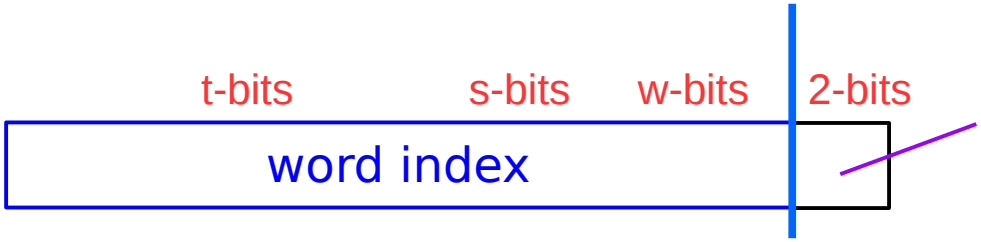


block (= 4 words assumed)

Word Partitioning

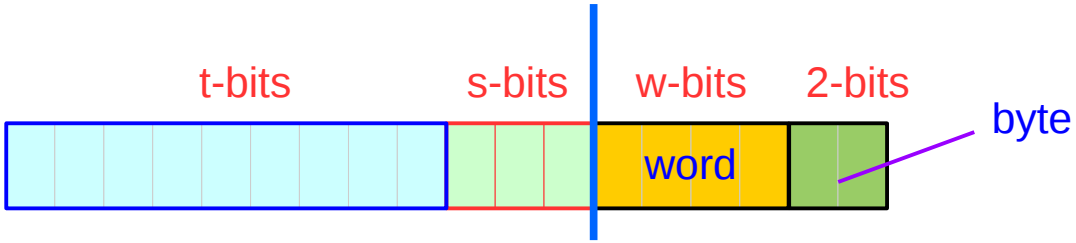


There are total 2^(t+s+b) words
Each word consists of 2^2 bytes

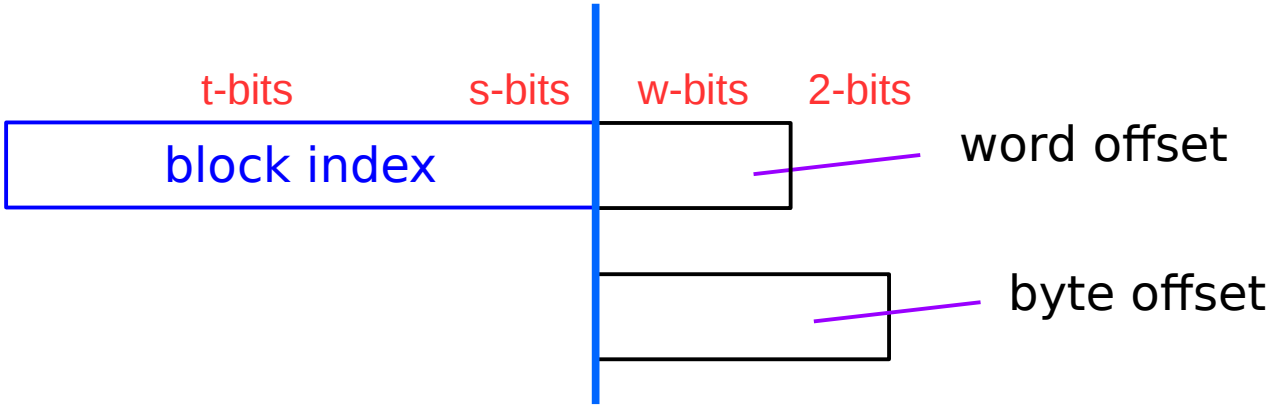


Index: which word among 2^(t+s+b) words
Offset: which byte among 2^y bytes

Block Partitioning

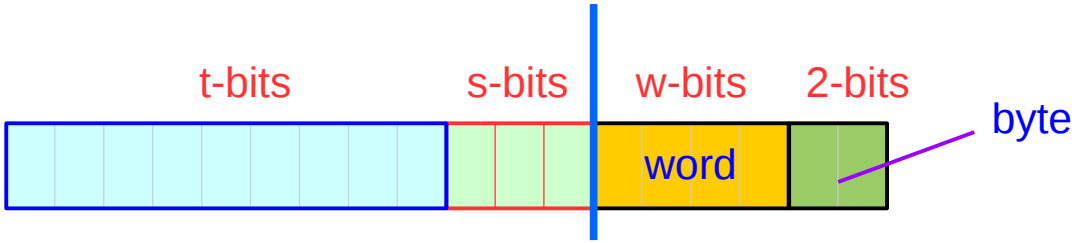


There are total 2^(t+s+b) words
Each word consists of 2^2 bytes

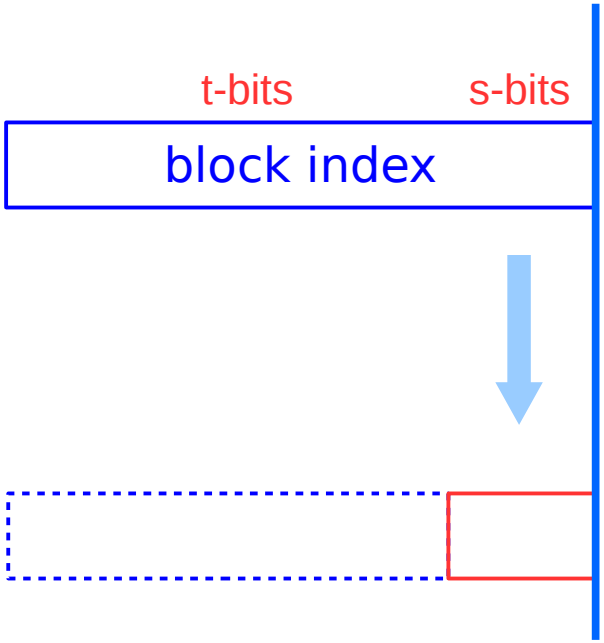


block index : which block
word offset : which word within a block
byte offset : which byte within a block

Block Index Hashing



There are total 2^(t+s+b) words
Each word consists of 2^2 bytes

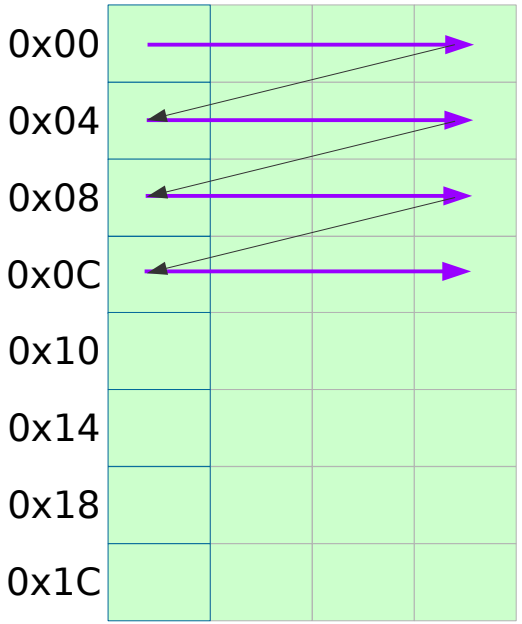


Modulo Hash Function

Use tag to avoid collision
within a bucket

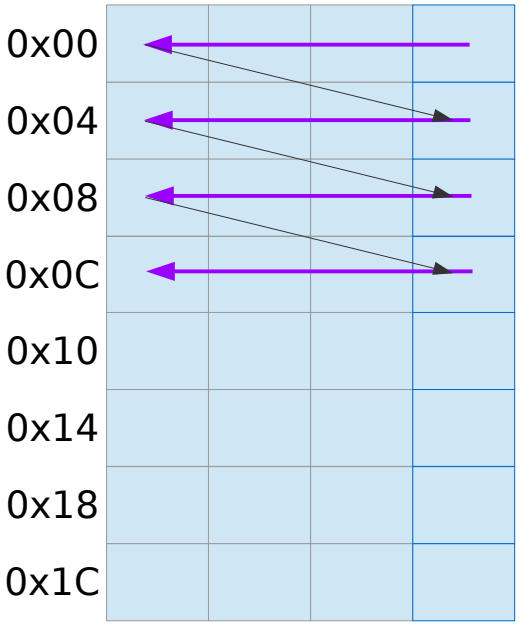
Memory Map Figures

Figure Type 1



Increasing
byte addresses

Figure Type 2



Increasing
byte addresses

Endianness

Little Endian

Figure Type 1

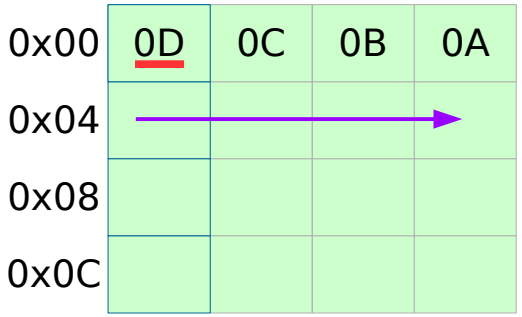
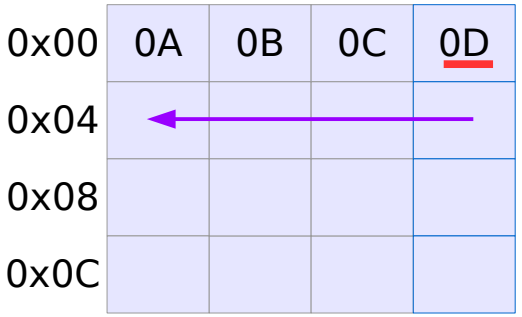
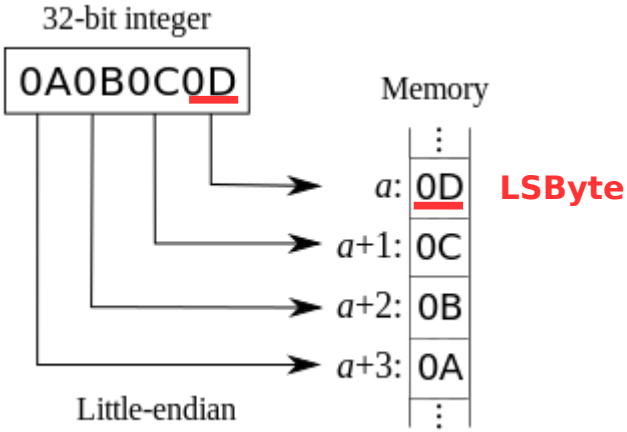


Figure Type 2





Big Endian

Figure Type 1

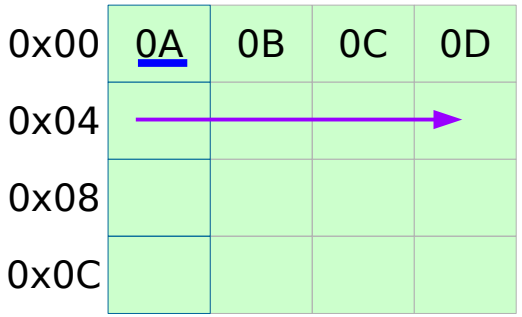
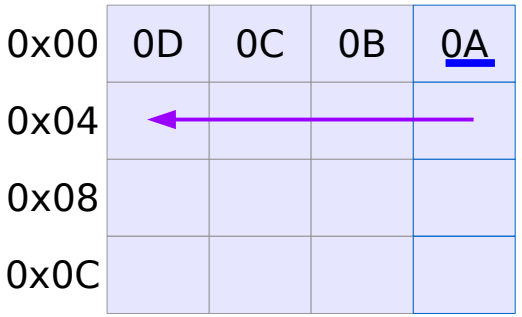
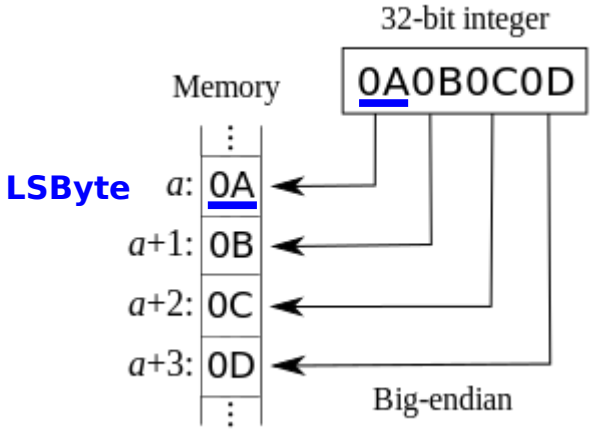


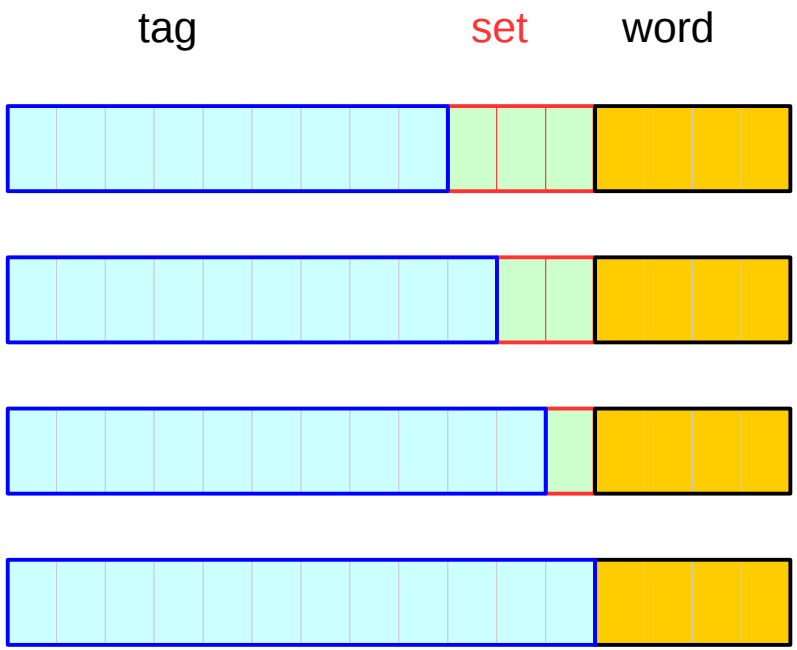
Figure Type 2





https://en.wikipedia.org/wiki/Endianness

Tag and Set Fields



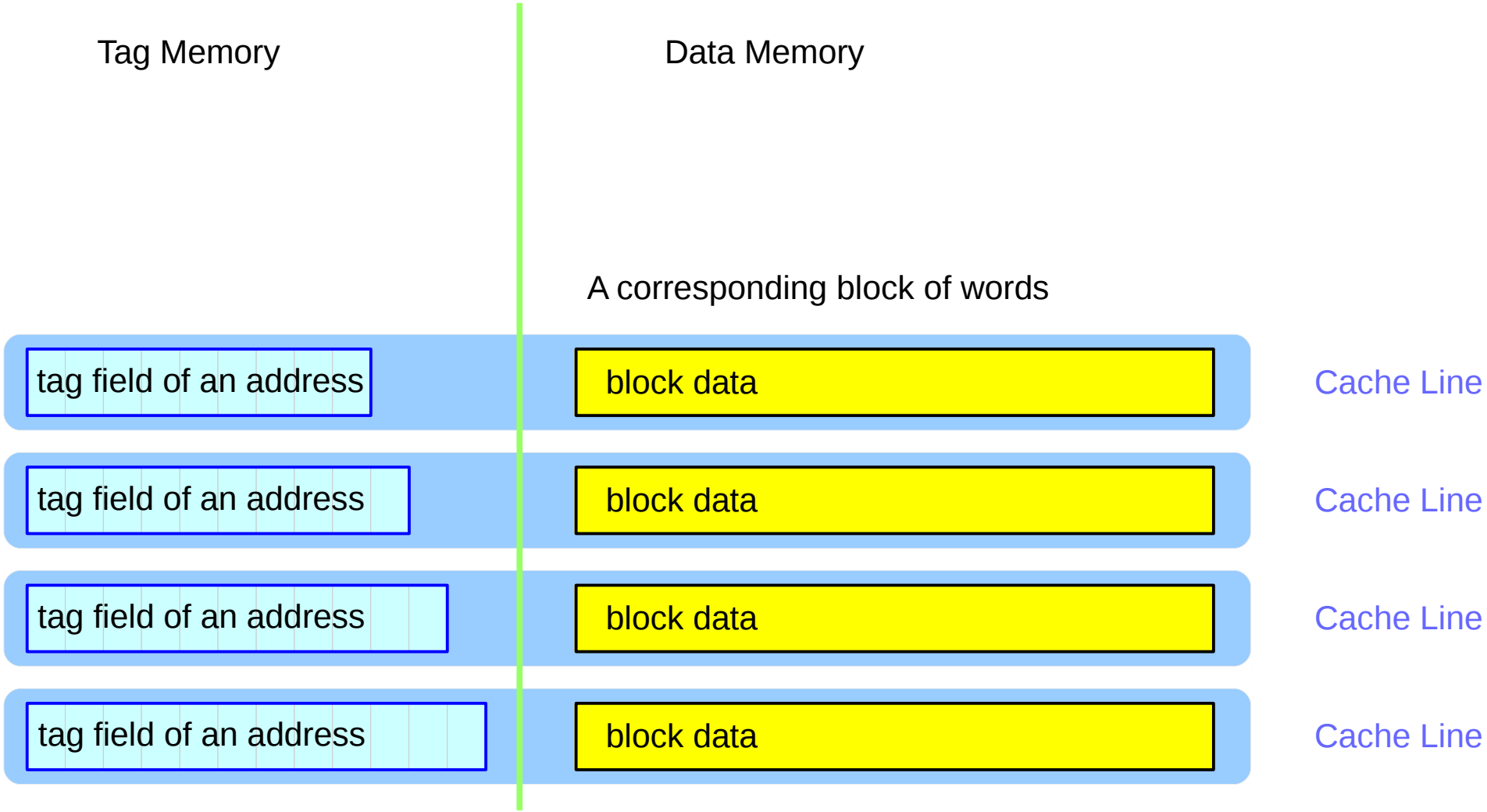
8 sets ➡ 3-bit set field

4 sets ➡ 2-bit set field

2 sets ➡ 1-bit set field

1 set ➡ 0-bit set field

Unit of Cache Memory Content



CAM (Content Addressable Memory)

CAM (Content Addressable Memory)

References

[1] http://en.wikipedia.org/
[2] https://en.wikiversity.org/wiki/The_necessities_in_SOC_Design
[3] https://en.wikiversity.org/wiki/The_necessities_in_Digital_Design
[4] https://en.wikiversity.org/wiki/The_necessities_in_Computer_Design
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[6] https://en.wikiversity.org/wiki/The_necessities_in_Computer_Organization
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[8] Digital Systems, Hill, Peterson, 1987