05 May 2025 15:23

3.1.2 Set-associative mapping

- Hit rate = 1 − Miss rate
- Multiple block at the same cache index

$M_2(0), M_2(1), \dots M_2(j) \dots M_2(2^m - 1)$

Main memory

- # of blocks associated to the same cache address = $k = 2^s$

k – no. of ways of the set-associative solution

When $s = 0 \Rightarrow k = 1 \Rightarrow$ 1-way SA = DM

M_1 divided in $2^{m'}$ blocks $M_1(0), M_1(1), \dots M_1(i') \dots M_1(2^{m'} - 1)$

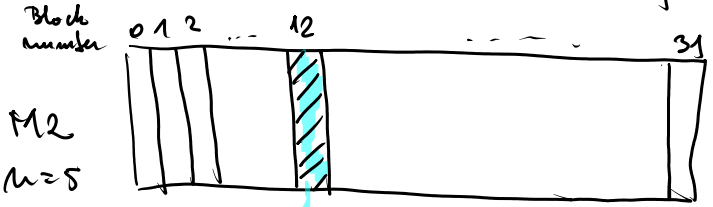
$m' = m - s$

$i' \equiv j \bmod 2^{m-s} = j \bmod 2^{m'}$

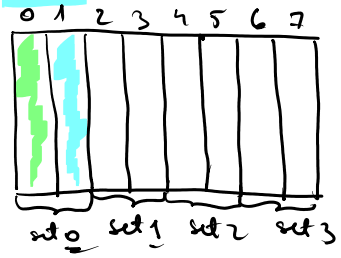
$k = 2^s$ – size of set

Example

$m = 5, m = 3, s = 1$



$i = 12 \bmod 2^{3-1} = 12 \bmod 2^2 = 0$



$k = 2^s = 2$ $(s = 1)$

Tag $m=3$

01100 Address DM

Tag $m'=2$

01100 Address 2-way SA