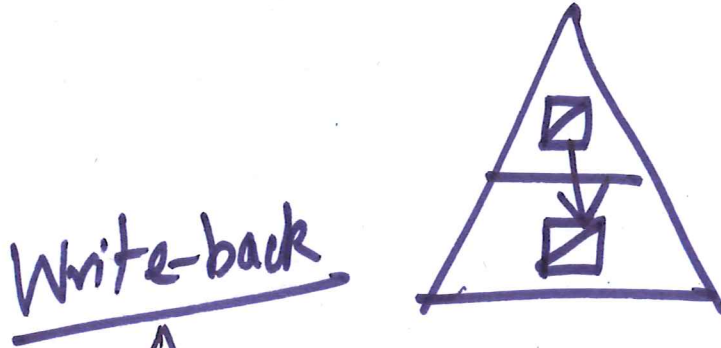


# Lecture - 29

## Review

1. Writes { write-back  
write-through  
immediately



if evicted then written to lower level storage.

2. Writes { write-allocate  
no-write-allocate.

## Real Cache Hierarchy

L1 - d - i

L2 - unified

L3 - "

# Cache Parameters

1. miss rate =  $\frac{\# \text{ misses}}{\# \text{ references}}$

2. hit rate

3. hit time =  $t_{\text{set}} + t_{\text{line}} + t_{\text{block offset}}$ .

4. miss penalty

increases

L1	—	1-3 cycles
L2	—	10 cycles
L3	—	30-40 cycles
L4 (MM)	—	100 cycles
HDD	—	100,000 cycles.

# Cache attributes

C - cache size

B - block size.

E - associativity.

S - sets.

## 1. Impact of cache size (C)

large C  $\Rightarrow$  high hit rate.

"  $\Rightarrow$  high hit time.

eg. L1  $\rightarrow$  1. low hit time  $\times$ .  
2. low hit ~~rate~~ rate.

## 2. Impact of block size

64 bytes

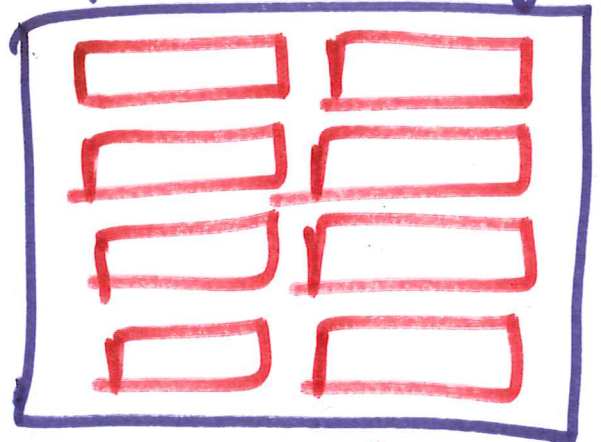
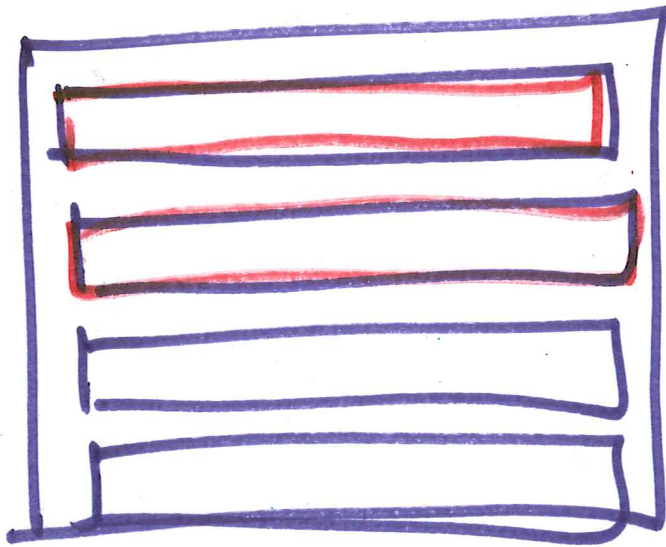
~~64~~

large block size

⇒

increase hit rate.

(arrays stride-1 ref.)  
spatial locality



For a given  $C$ ,  
larger  $B$  ⇒

less cache lines.



### 3. Impact of E

larger  $E \Rightarrow$  hit rate  $\uparrow$

$\therefore$  conflict misses  $\downarrow$

$L_1, L_2 \Rightarrow E = 8$

$L_3 \Rightarrow E = 16$

$E$  increases  $\downarrow$

