

CPU

RAM

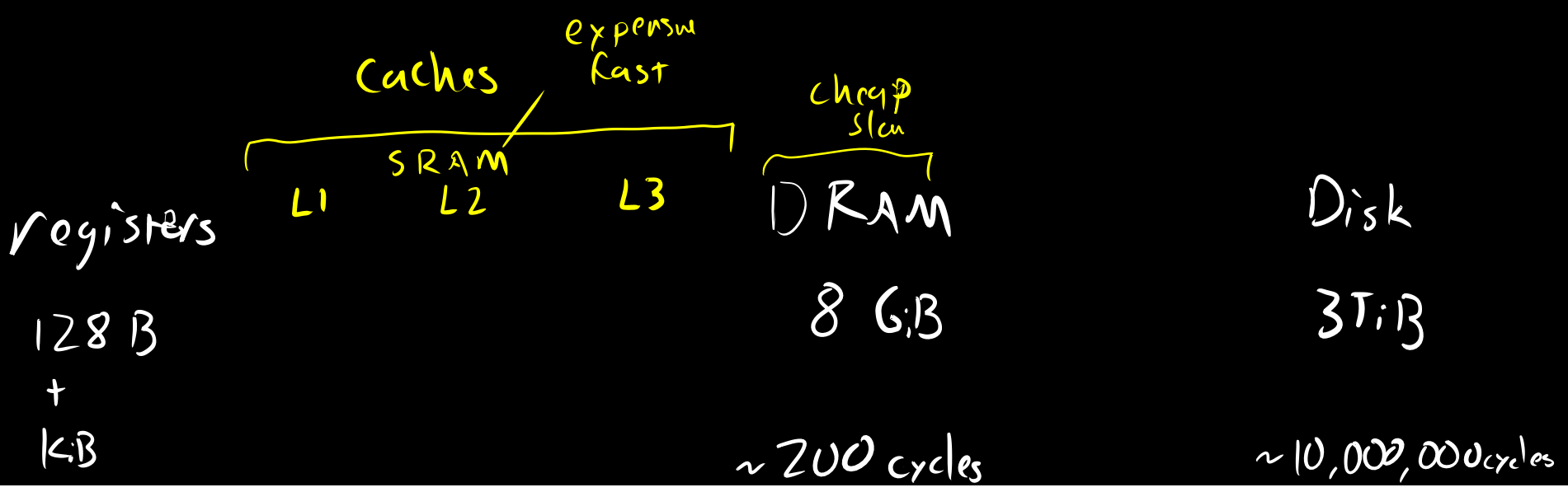
§ 6.1 — memory tech

more space = slower

more δ = faster

fast
small
expensive

slow
large
cheap



2.3 GHz

billion $\frac{1}{s}$

Locality

Temporal

likely to repeat
access to and address

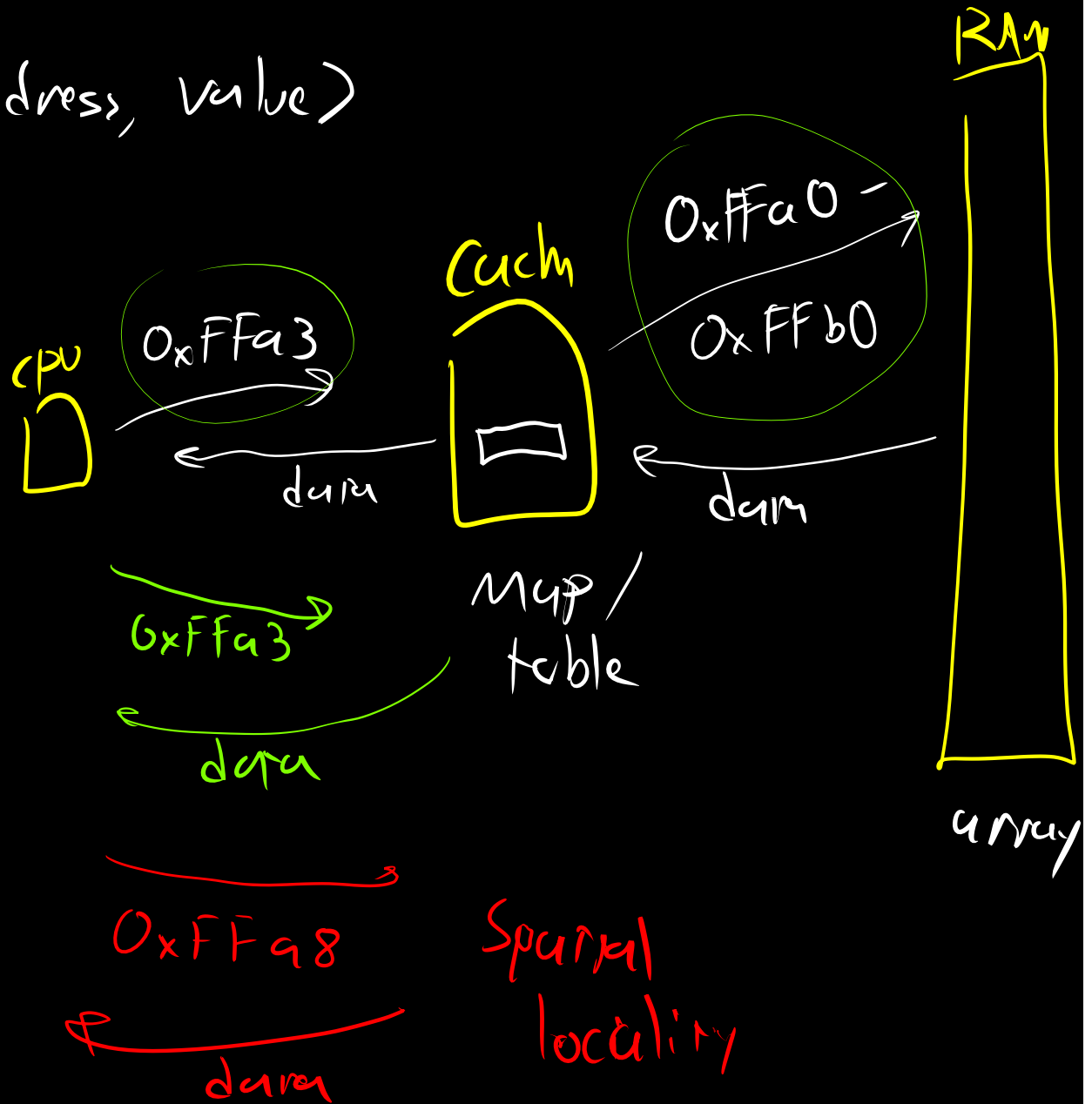
Spatial

likely to access
nearby addresses

When I access memory,

Copy stuff near it into cache.

Map(address, value)





0...15

1284

0	tag	00 FF B3 block	A2 01 line
1			
2	25		
3			
4			
5			
6			
7	x1111		

0x12A4

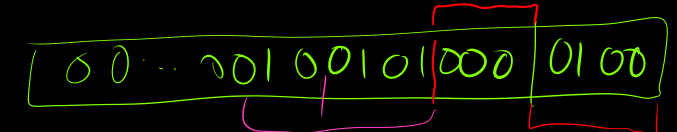
888F2

$$2^4 = 16$$



0x12A4

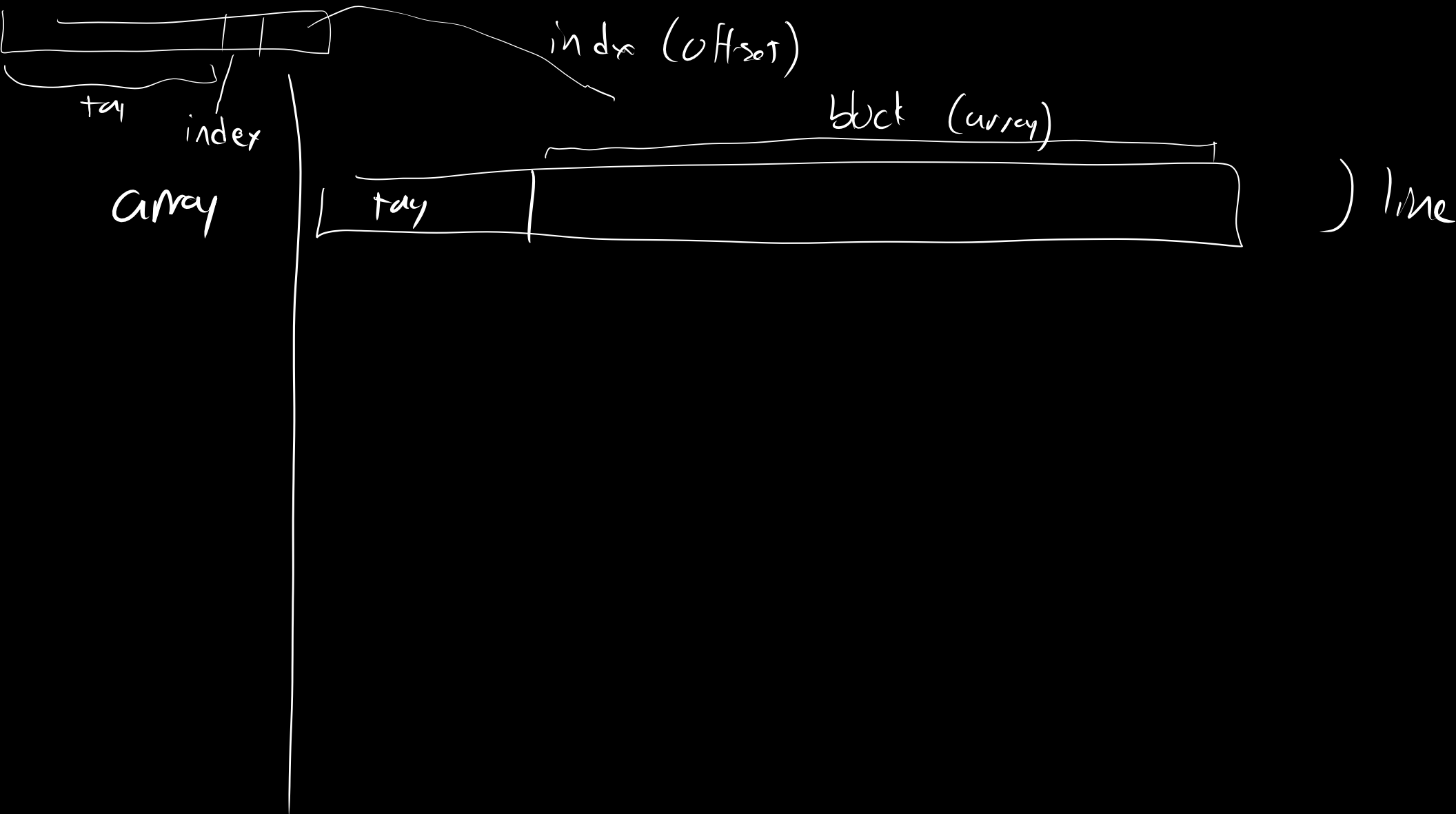
0x1284



$$0x888F2 = 10001000100011110010$$

$$0x88802 = 10001000100010000010$$

Direct-mapped cache



Fully-associative cache

- Use a set of lines,
not an array of lines

$\xrightarrow{\text{use}}$ Set-associative cache small

- use an array of sets of lines