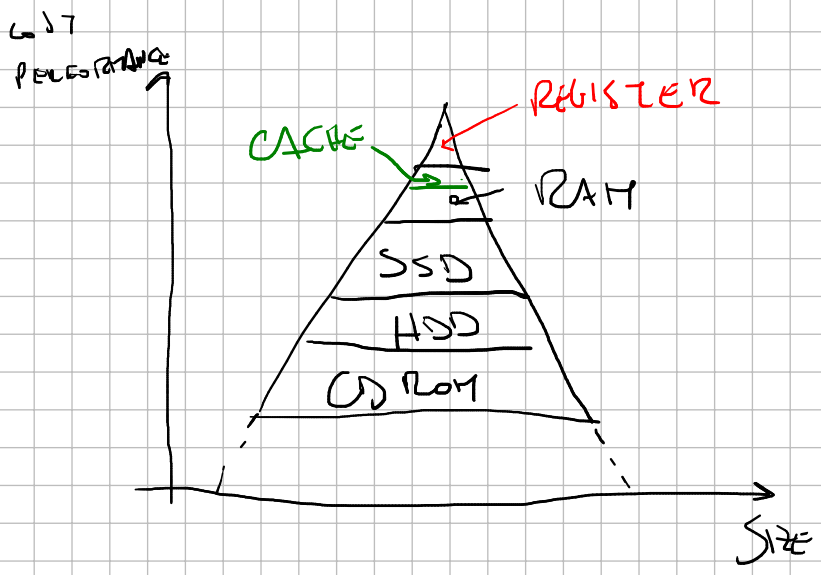
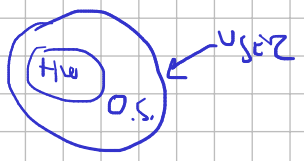
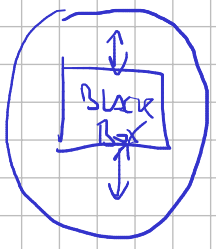
MEMORY'S HYERARCHY





"VIRTUALIZATION"

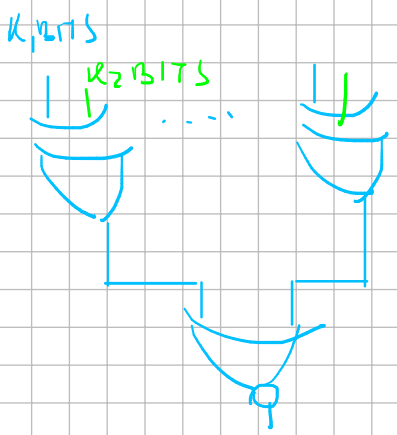


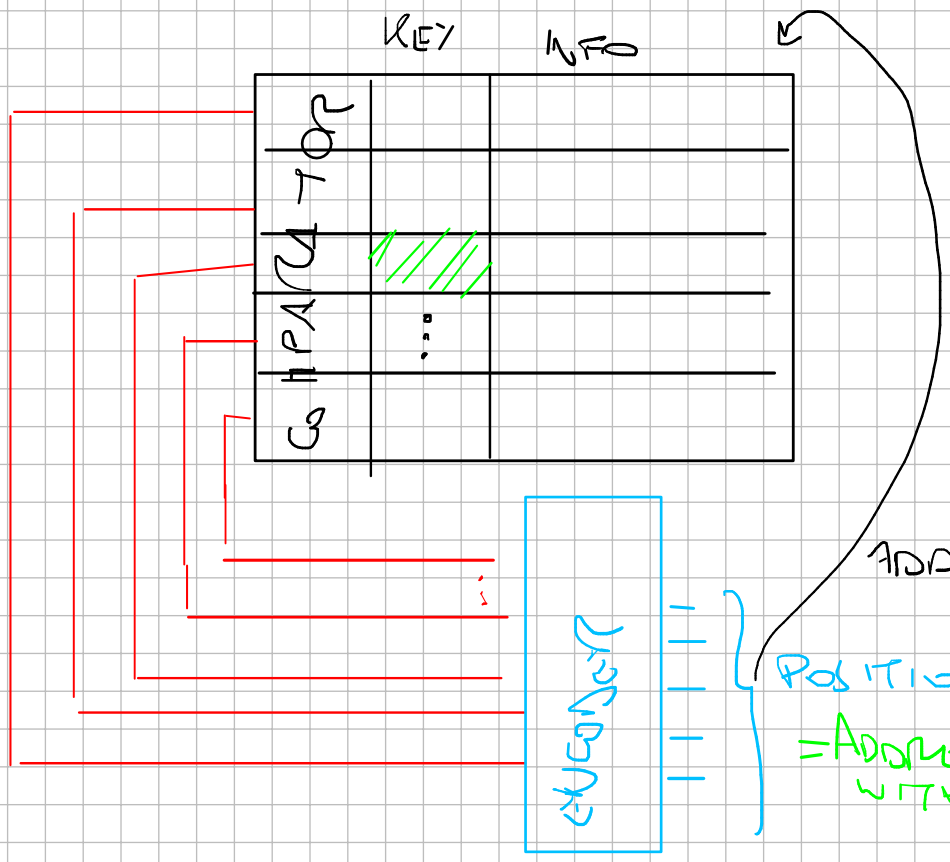
ASSOCIATIVE MEMORY

KEY	INFORMATION
K_1	
K_2	
K_4	
K_3	

K_2

COMPARE STORED KEY WITH SEARCHED KEY

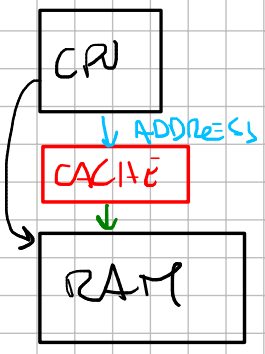




$X_3\ X_2\ X_1\ X_0$ → ENCODER → $Z_1\ Z_0$

X_3	X_2	X_1	X_0	Z_1	Z_0
0	0	0	1	0	0
0	0	1	0	0	1
0	1	0	0	1	0
1	0	0	0	1	1

CACHE



h → Probability of hit (found in cache)

t_c → Delay of cache

t_r → Delay of ram

$\bar{t}$ → Average acces time by CPU

$$\bar{t} = h t_c + (1-h)(t_r + t_c) + t_g$$

(t_r)

t_g → MANAGEMENT (check if value is in cache)

→ CONSIDERING t_g GREEN →

$$\bar{t} = t_g + t_c + (1-h)\, t_r$$

Fastest as possible with respect to t_r

t_g smallest as possible → money. in HW

h closest as possible to 1

1) Huge CACHE not affordable

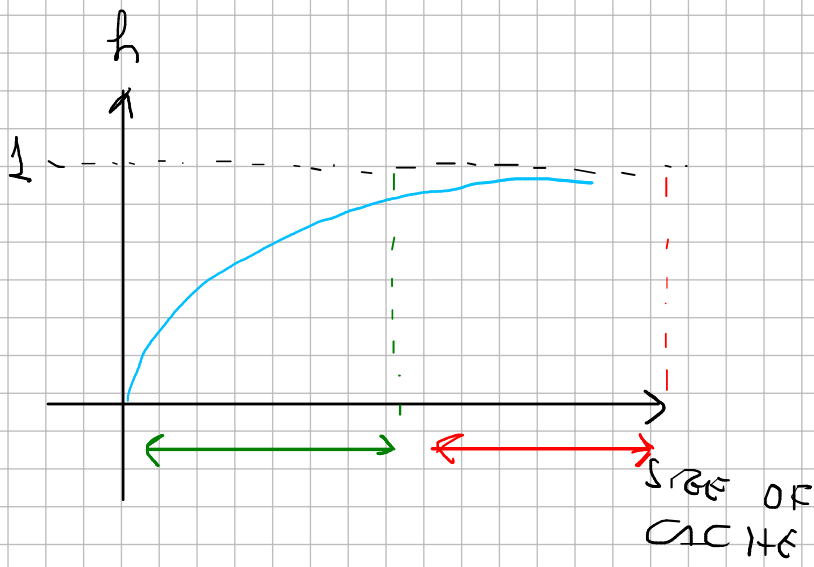
2) Previous knowledge, "bet" on entries

$$\bar{t} = t_g + t_c + (1-h)\,t_r$$

$t_c = 1$

$t_g \simeq 0$

t_r	h	$\bar{t}$
100	99%	2
1000	99%	11
10000	99%	101
1000	90%	101
1000	99%	11
1000	80%	201



COMPRESSION ALGORITHM

20 SYMBOLS 1 1 1 1 1 1 1 1 1 1 2 3 3 3 3 3 3 3

9 SYMBOLS 12 ONE - 1 TWO - 7 THREE

1 2 1 3 1 2 1 7 9 2 1 3

RUN LENGHT ENCODING

8K PICTURE

PIXEL (PICTURE ELEMENT)

COMPRESSION WITH LOSS 1 1 1 1 2 1 1 1 1 1 1

1 1 1 1 1 1 1 1 1 1 1

ORIGINAL IMAGE

IMAGE WITH LOSS BEFORE COMPRESSION

R.L.E. COMPRESSION WITHOUT LOSS

12 ONE

SOFTWARE

NEXT (time)

FOLLOWING (space)

OUR BET → NEXT IS FOLLOWING

You lose it there is a jump (goto)

LOCALITY PRINCIPLE

If I'm accessing a memory cell X now (time t0)
- Either will be accessing X again at time t0+Δ
- Or will be accessing X ± 1 at time t0+Δ