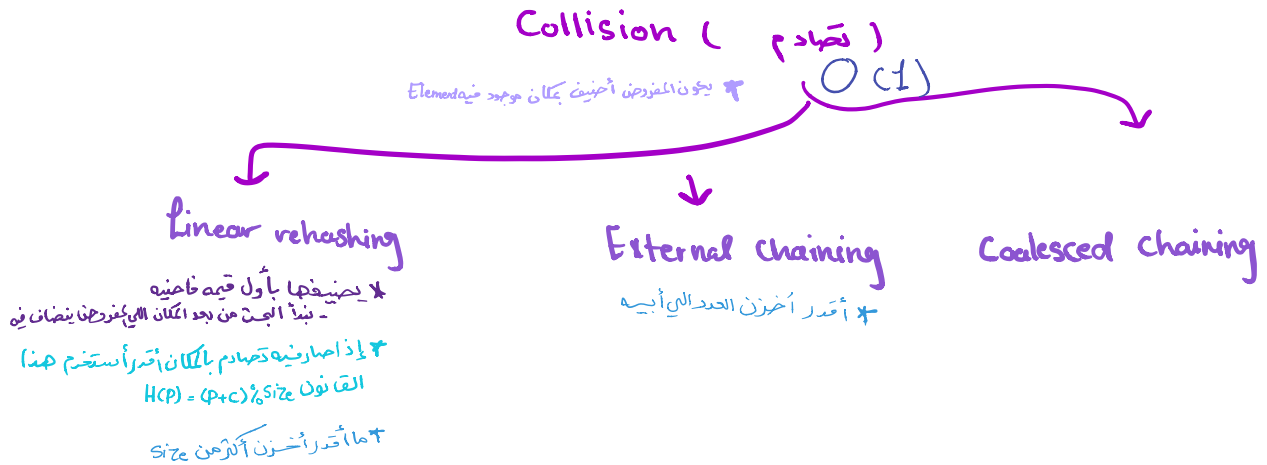


HASH Function



hash function

Flooding

- $H(key) = key \% TableSize$

- $H(p) = (p+c) \% size$
 \downarrow
 نتبته $\leftarrow [0, 1 \text{ باء } b]$

- $0 \leq H(key) \leq tablesize - 1$

$n / 100 \rightarrow$ ليكل آخر
رتمين

$n \% 100 \rightarrow$ كيب اول
رتمين

in single digit

$H(key) = d_1 + d_2 + \dots$
 Ex -
 $H(32651) = 3 + 2 + 6 + 5 + 1 = 17$
 $MAX(99999) = 9 + 9 + 9 + 9 + 9 = 45$

0	...
17	32651
	...
45	

2 digits

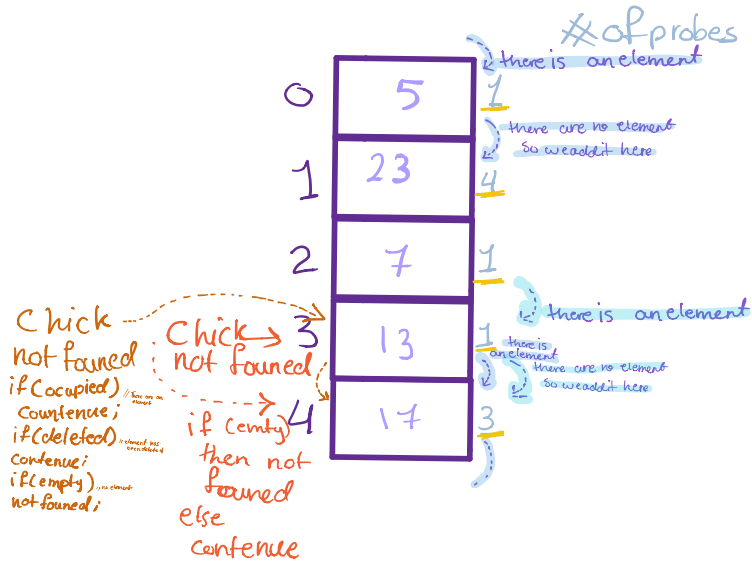
$H(key) = 0d_1 + d_2d_3 + d_4d_5$
 Ex,
 $H(32651) = 3 + 26 + 51 = 80$
 $MAX(99999) = 9 + 99 + 99 = 207$

0	...
80	32651
	...
207	

Linear rehashing

* hash function

add to the array → 5, 7, 13, 17, 23



$$H(\text{key}) = \text{key} \% (\text{table size})$$

$$H(5) = 5 \% 5 = 0$$

$$H(7) = 7 \% 5 = 2$$

$$H(13) = 13 \% 5 = 3$$

now? ← $H(17) = 17 \% 5 = 2$
2 is not empty //

$$H(23) = 23 \% 5 = 3$$

$$\text{average} = \frac{\text{\# of probes}}{\text{table size}}$$

$$= \frac{1 + 4 + 1 + 1 + 3}{5} = 2$$

* إذا قلنا في الحيف والجدول مليان ونشأنسوي؟

SEARCH IN THE TABLE

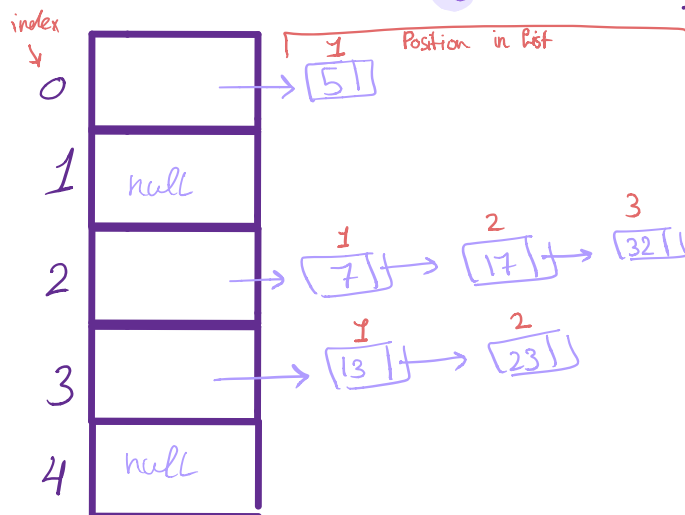
$$H(43) = 43 \% 5 = 3$$

$$H(23) = 23 \% 5 = 3$$

External chaining

* hash function

add to the array → 5, 7, 13, 17, 23, 32



$$H(\text{key}) = \text{key} \% (\text{table size})$$

$$H(5) = 5 \% 5 = 0$$

$$H(7) = 7 \% 5 = 2$$

$$H(13) = 13 \% 5 = 3$$

$$H(17) = 17 \% 5 = 2$$

$$H(23) = 23 \% 5 = 3$$

$$H(32) = 32 \% 5 = 2$$

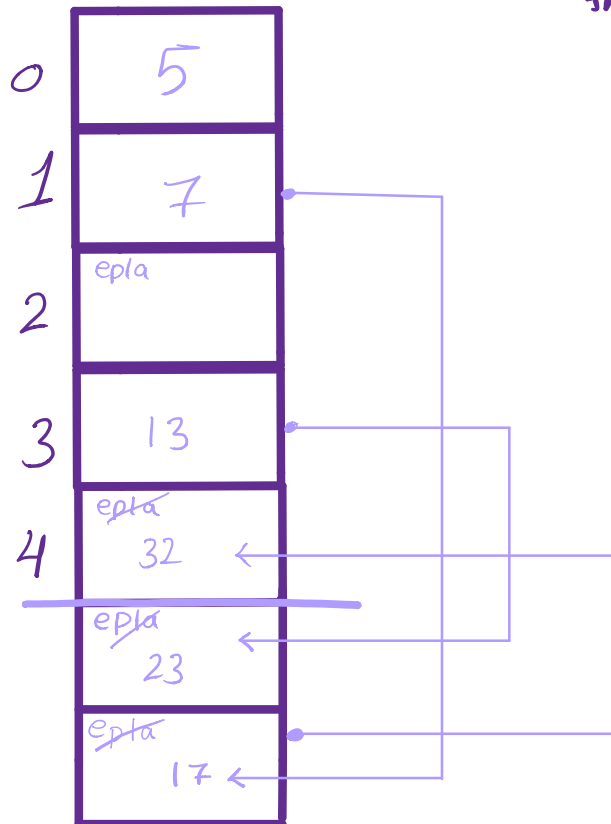
Coalesced chaining

* Cellur

* hash function

Cellur = 2

add to the array → 5, 7, 13, 17, 23, 32



$$H(\text{key}) = \text{key} \% (\text{table size})$$

$$H(5) = 5 \% 5 = 0$$

$$H(7) = 7 \% 5 = 2$$

$$H(13) = 13 \% 5 = 3$$

$$H(17) = 17 \% 5 = 2$$

$$H(23) = 23 \% 5 = 3$$

$$H(32) = 32 \% 5 = 2$$

ما قدر أطلع من الخانة الوحيدة أكثر من
سليم