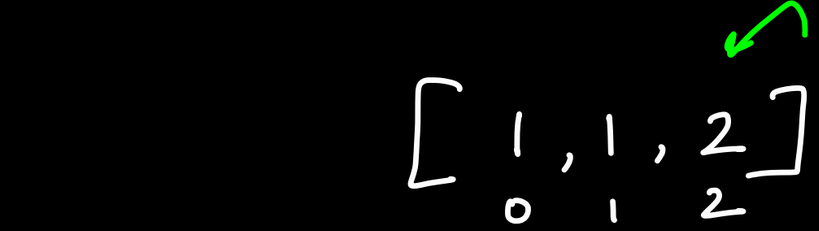
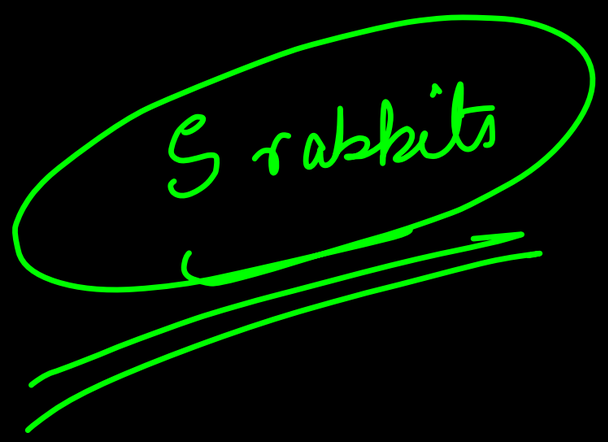




$R_0 \rightarrow$ Red $\rightarrow 2$

$R_1 \rightarrow$ Red

$R_2 \rightarrow 2$

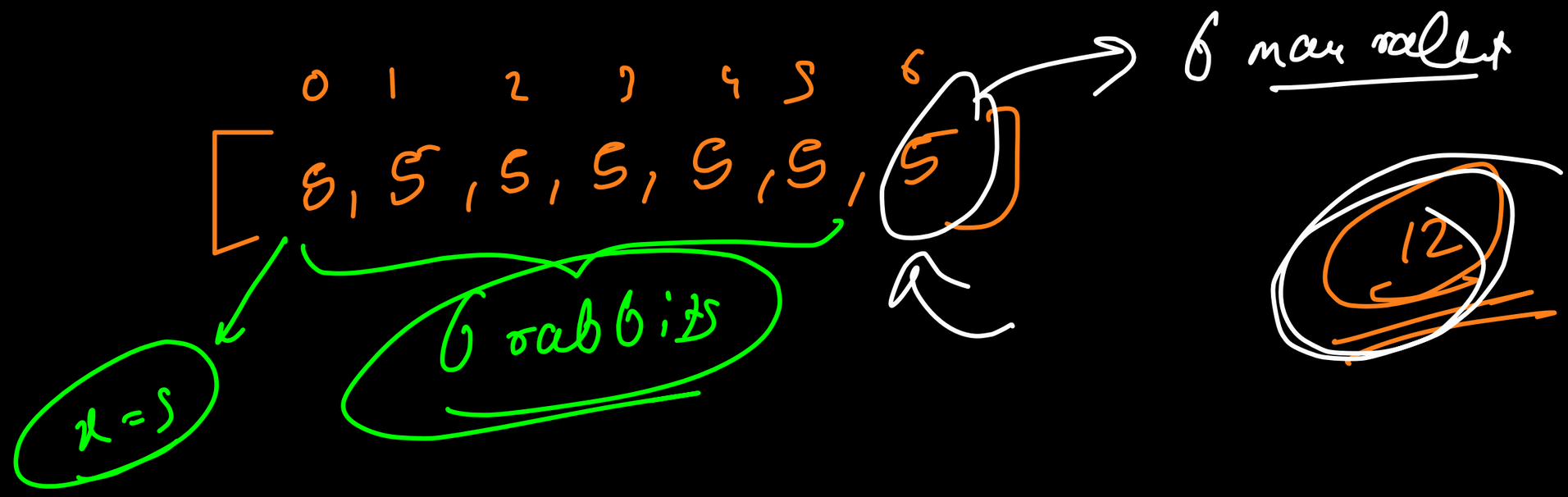
↳ blue — 3

[1, 1, 1]

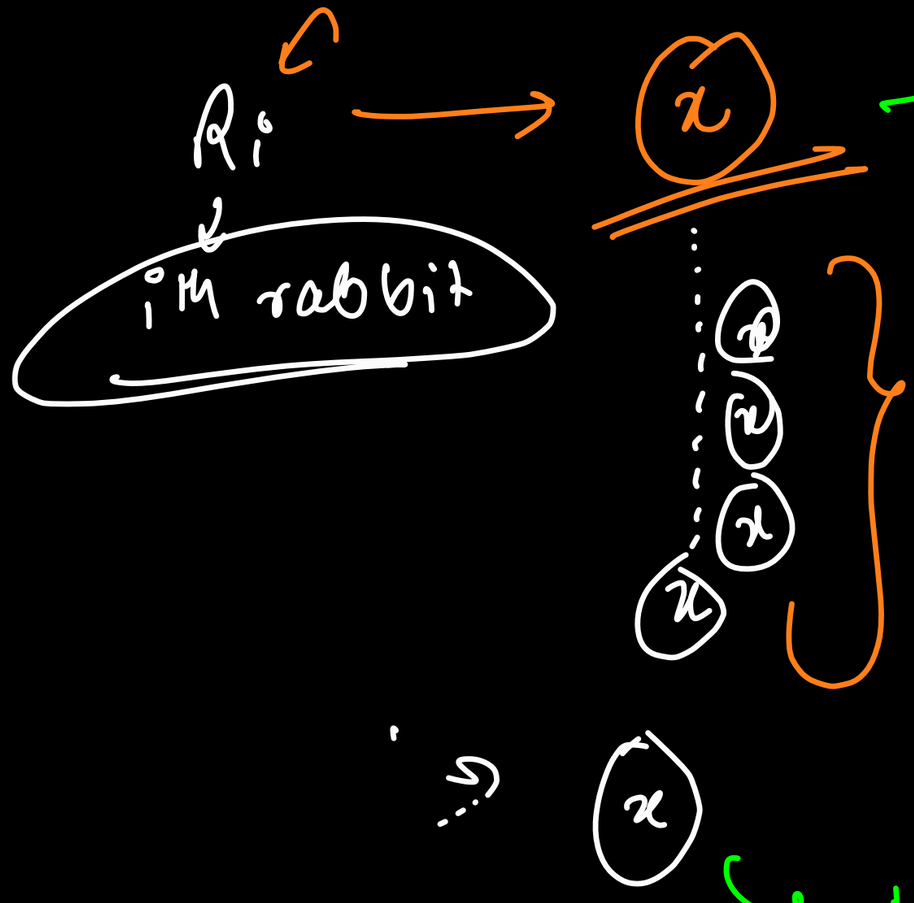
$R_0 \to 1$ → Red → 2

$R_1 \to 1$

$R_2 \to 1$ → blue → 9



x+1 → 6 = +6



→ We are given that atleast x+1 rabbits are in the forest.

if there are x more rabbits saying the any x, there are x+1 rabbits are talking abt each other

∴ x

↳ there was a 'x+2'th rabbit who answered x. i'coz this one is talking about another color.

How many rabbits answered the same ques. $O(n)$

$O(n)$

freq of x

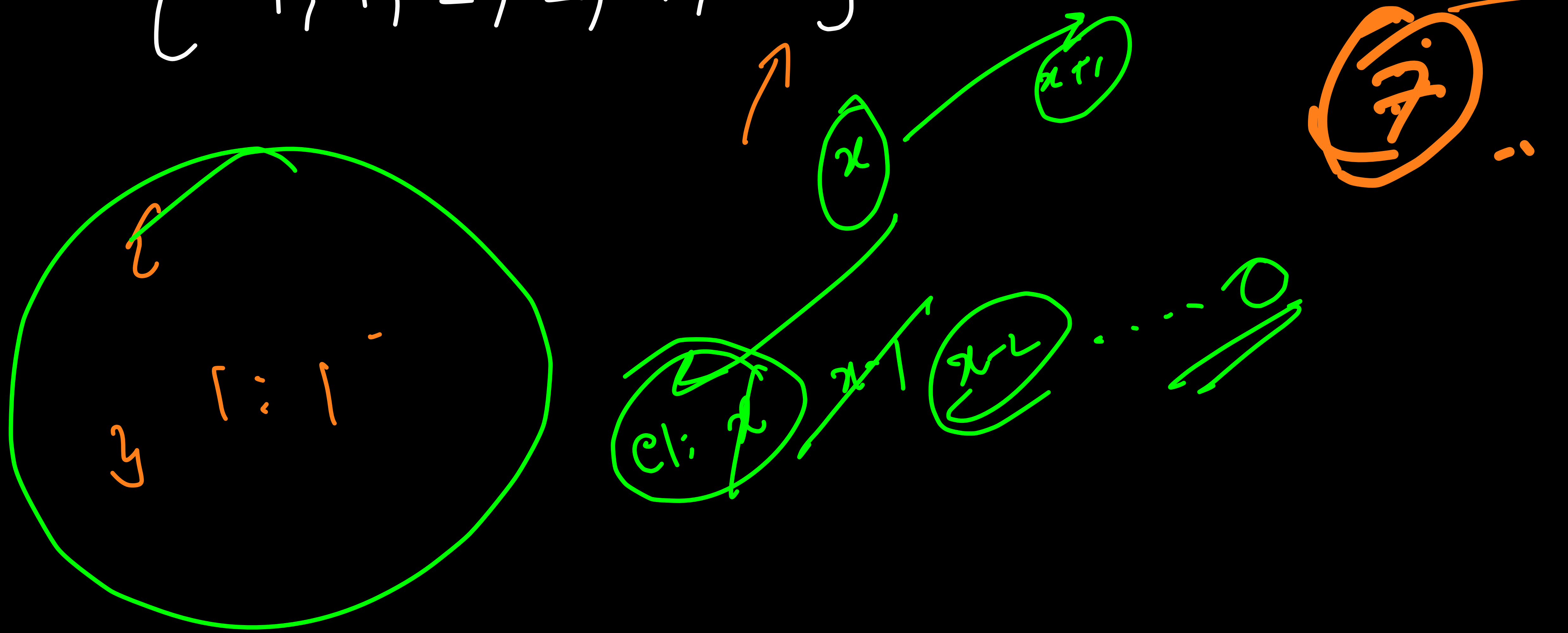
freq map

2 2

[1, 1, 2, 2, 1, 2]

ans → 2 + 3 + 2

7



```
countRabbits(answers) {
    res = 0
    mp = { }
    for(i = 0 ; i < answers.length ; i++) {
        if(!mp[answers[i]]) {
            res += (answers[i]+1);
            mp[answers[i]] = answers[i];
        } else {
            mp[answers[i]]--;
            if(mp[answers[i]] == 0)
                delete mp[answers[i]];
        }
    }
    return res;
}
```

S ⇒ a b a a b b d a b d c a a a c b c b b

t ⇒ a a c b b

→ So if a → 2, c → 1, b → 2 then we will find a window that has atleast these' frequencies. (Min length)

a b a e b b d a b d c a a a c b c b b e

O(n)

O(1)

s s

e e

smpl

a : 1 2 3 4 5 6 7 8 9 10

b : 1 2 3 4 5 6 7 8 9

c : 1 2 3 4 5 6 7 8

d : 1 2 3 4 5 6 7

e : 1 2 3 4 5 6 7 8

}

a a c b b

Emp { a : 2
c : 1
b : 2 }

length = 2 + 3 + 5

(e - s + 1)

ans → e - s + 1

11 - 2 + 1 → 10

12 - 6 + 1 → 7

6

s - i - ans →

i^s (e-s+1)

→ d c a b a a c b b a c d x a d d b a d c x y z

ic

freq map :-

{
a : 2
b : 2
c : 2
d : 2
x : 2
y : 1
z : 1
}

am = a x x z y z b

2

O(n)

O(1)

large DataSet

1
2
.
.
.
10^9

Parallel

Small dataset

1
2
.
.
.
100

Collision

Parallel Computing

520-20

520-23

520

$h(x) = x \% 100 + 1$

[1,100]

620

20

SMAI → 40 digit

100 520 520

20

41

+1 +4 +9

Java → HashTable

C++ → unordered_map

JS → objects

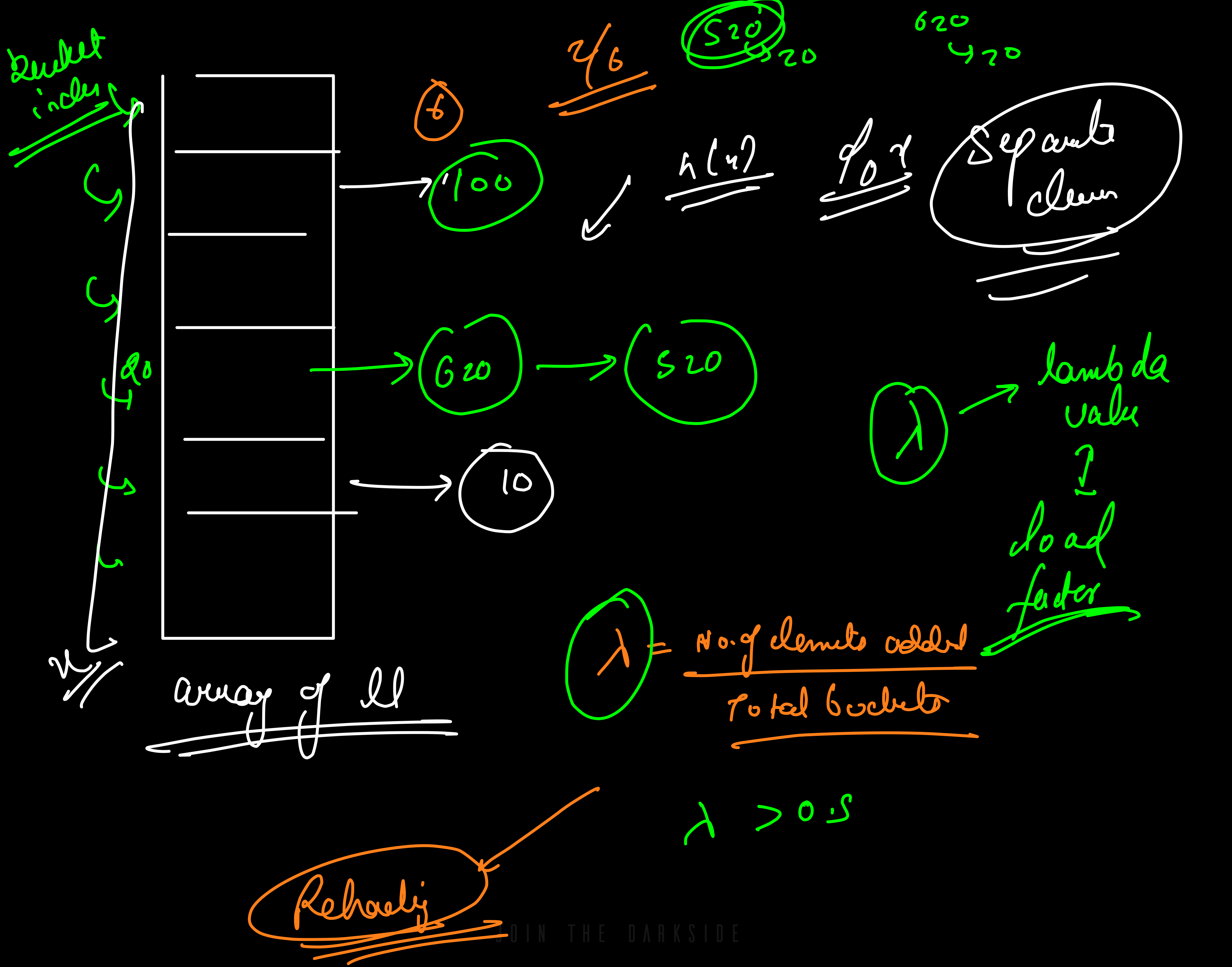
Python → dict

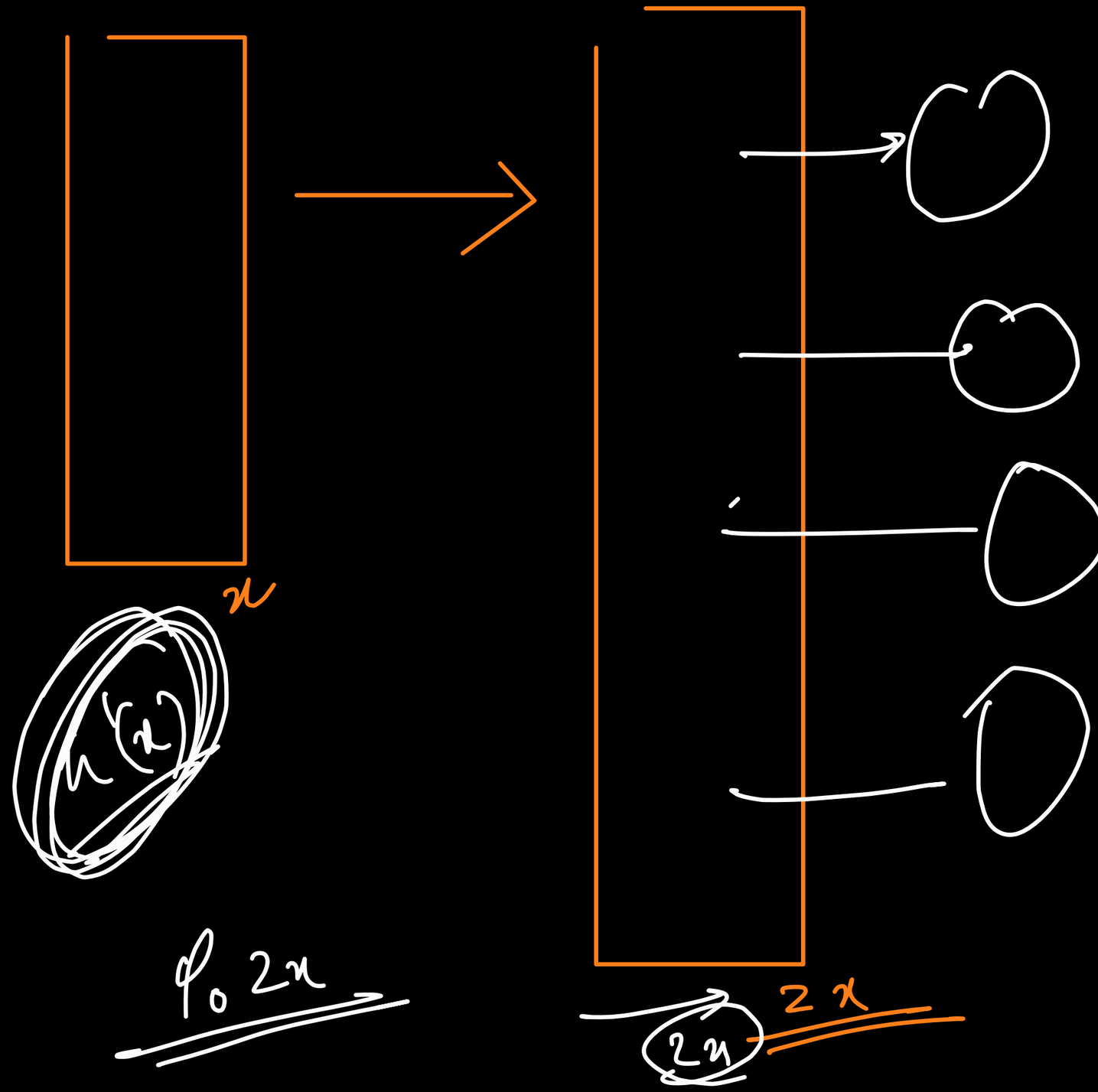
insert
erase
search

→ O(n)

→ Θ(1)

Average Case!





$h(x) \sim \qquad x \not\sim_0 m$