[[1,3], [2,6], [8,10], [15,18]] ← intervals

↳ [[1,6], [8,10] [15,18]]

→ after clubbing overlapping intervals, we will be left with all non-overlapping ones.

Sorting

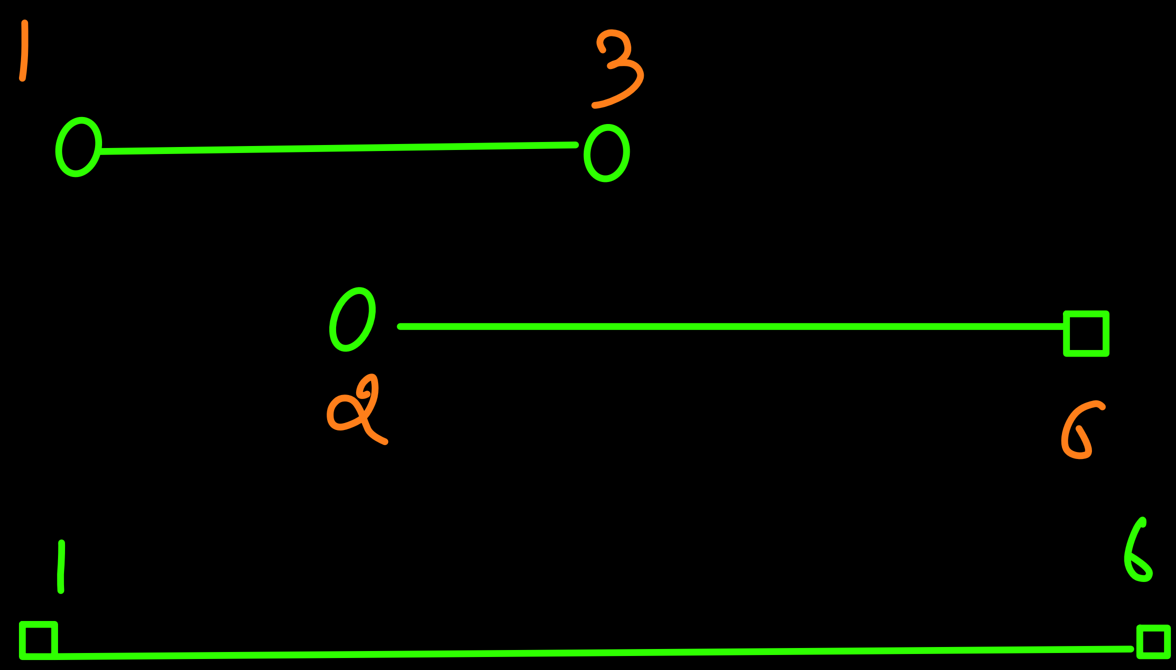
How about if we arrange all overlapping intervals together one after another (adjacent)

⇓

ending of last interval >= starting of the next intervals

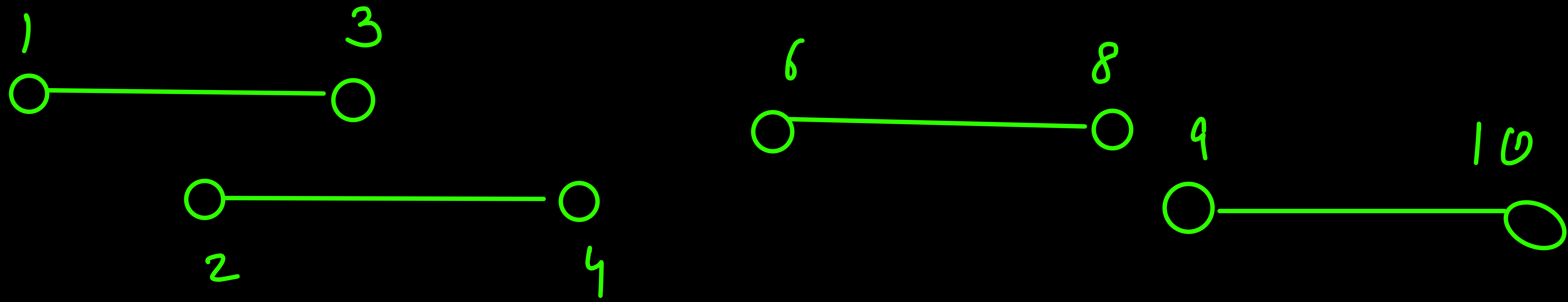
then merge

[start of last, end of next interval]



JOIN THE DARKSIDE

[[1,3], [2,4], [6,8], [9,10]]



JOIN THE DARKSIDE

[[1,3], [8,10], [2,6], [15,18]] 2 intervals

↓ 1 ↓ 8 ↓ 2 ↓ 15

How about if we arrange all the intervals based on inc order of starting value.

why not ending value ??

[[1,3], [2,6], [8,10], [15,18]]

if we just see the non-overlapping ones.

JOIN THE DARKSIDE

Starting value → intervals[i][0]

ending value → interval[i][1]

Sort (comparator)

a, b

a[0] → b[0]

Start

JOIN THE DARKSIDE

[5, 4, 3, 2, 1]

[iphn13, iphn12, iphn11, ...] → Products

→ compare price of the product

JOIN THE DARKSIDE

start el

[[1,3], [2,6] , [8,10], [15,18]]

result

[[1,6]

[[1,4] [2,3]]

if (start of next <= end of last)

result [result.length-1] [1] = max (end of last, end of next)

JOIN THE DARKSIDE

sort start

[[1, 6], [2, 3], [5, 8], [10, 12] [12, 15], [13, 14]]

i

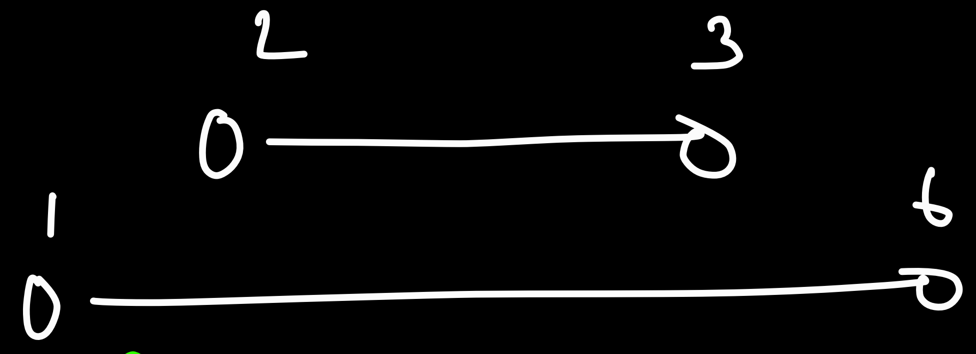
result

[[1, 8], [10, 15]]

2 i

[[2, 3], [1, 6], [5, 8], [10, 12] [13, 14] [12, 15]]

sort end



[[1, ~~6~~ 8]]

end of last >= start of next

$[a, b]$ $[c, d]$

$b < d$

endpoint value

$a < b$

$b < d$

$a < d$

$b >= c$

JOIN THE DARKSIDE

Time → $O(N \log N + N)$

$$\Downarrow$$

$O(N \log N)$

Space → $O(1)$

JOIN THE DARKSIDE

[1, 3, 4, 2, 6, 8]

→ if the length of array is odd, then we can't find the ans

JOIN THE DARKSIDE

[3, 4, 6, 8]

[1, 3, 4, 2, 6, 8] → freq map

{ 1 - 1
3 - 1
4 - 1
2 - 1
6 - 1
8 - 1
}

if we pick any element, how can we correctly decide if it is part of original or changed.

Smallest → a

2a ?

How to check if 2a exists ??

$x \rightarrow 2 \times x$

~~y~~

But if we take Smallest element of the array, then we are sure that $x/2$ won't exist.

JOIN THE DARKSIDE

$O(1) \Rightarrow \{ \text{key}, \text{value} \} \leftarrow$ search, insert, del $\} \rightarrow \underline{\underline{O(1)}}$

key → <u>element</u>

value → <u>frequency</u>

JOIN THE DARKSIDE

$[\cancel{2}, 2, 3, \cancel{1}, 6, 4]$

freq map

{
$2 - \cancel{2}\ \cancel{1}\ 0$
$3 - 1$
$1 - \cancel{1}\ 0$
$6 - 1$
$4 - \cancel{1}\ 0$
}

Smallest → $\cancel{1}$ 2

[1, 2

To get access of the Smallest element → Sort

JOIN THE DARKSIDE

$$[1, 2, 2, 3, 4, 6]$$

$$\{ 1 - \cancel{1}\ 0$$
$$2 - \cancel{2}\ \cancel{1}\ 0$$
$$3 - \cancel{1}\ 0$$
$$4 - \cancel{1}\ 0$$
$$6 - \cancel{1}\ 0 \}$$

result $\Rightarrow [1, 2, 3]$

$$O(N\log N + N + N) \approx \underline{O(N\log N)}$$

Space $\rightarrow O(N)$

JOIN THE DARKSIDE