Binary Search Playlist

Video - 39

Leetcode - 2594

Medium

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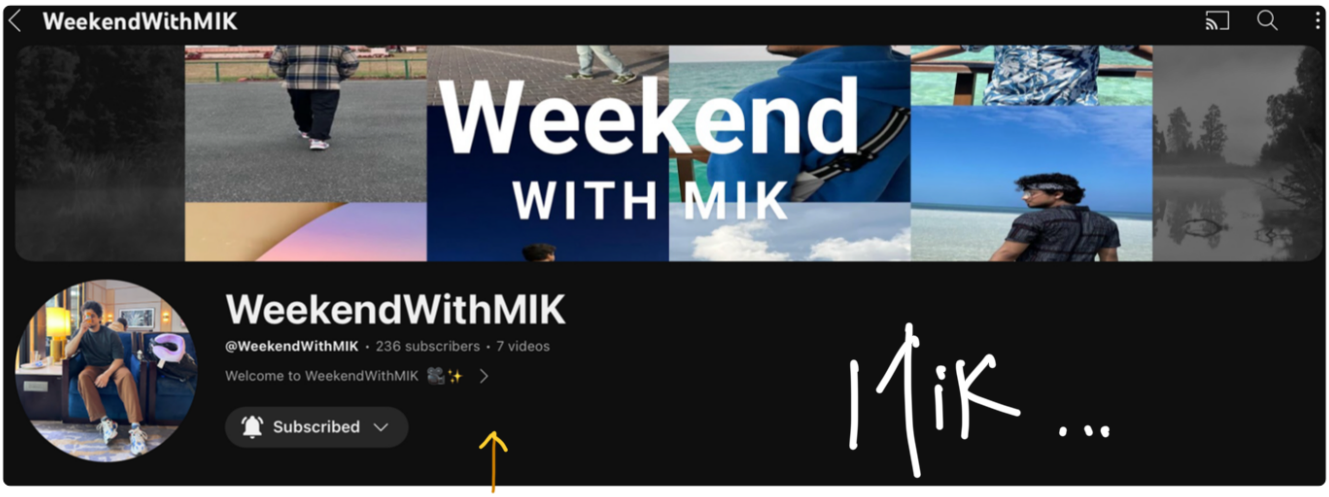

MIK ...

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ee "Life behind the Screen + tech news"

Motivation :-

One day, you'll realize that
Your dream died because you chose comfort
over effort.
Don't let that regret haunt you forever.

MIK...

2594. Minimum Time to Repair Cars

time = $(r * n^2)$ minutes

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You are given an integer array `ranks` representing the **ranks** of some mechanics. $ranks_i$ is the rank of the ith mechanic. A mechanic with a rank `r` can repair `n` cars in `r * n²` minutes.

You are also given an integer `cars` representing the total number of cars waiting in the garage to be repaired.

Return *the **minimum** time taken to repair all the cars.*

Note: All the mechanics can repair the cars simultaneously.

Example :- ranks = [4, 2, 3, 1], cars = 10

0	1	2	3
4	2	3	1
↓ 2	↓ 2	↓ 2	↓ 4

Output = 16

$4 * 2^2 = 16$ min ✓

$2 * 2^2 = 8$ min ✓

16 min

$3 * 2^2 = 12$ min

$1 * 4^2 = 16$ min

Thought Process

$$\begin{array}{cccc} 0 & 1 & 2 & 3 \\ [4, & 2, & 3, & 1] \end{array}, \text{ cars} = 10$$

$$\boxed{\text{time} = \text{rank}[i] * n^2}$$

Mechanic-0 (4)	Mechanic-1 (2)	Mechanic-2 (3)	Mechanic-3 (1)
$4 * 2^2 = 16$	$2 * 2^2 = 8$	$3 * 2^2 = 12$	$1 * 4^2 = 16$
$4 * 4^2 = 64$	$2 * 2^2 = 8$	$3 * 1^2 = 3$	$1 * 3^2 = 9$
$4 * 3^2 = 36$	$2 * 3^2 = 18$	$3 * 2^2 = 12$	$1 * 2^2 = 4$

.....

$\therefore$ Max(16, 8, 12, 16) = 16 minutes

Case - 1 : Max(16, 8, 12, 10) = 16 minutes

Case - 2 : Max (64, 8, 3, 9) = 64 minutes

Case - 3 : Max (36, 18, 12, 4) = 36 minutes

⋮

Minimize

Minimize the Maximum of each case

→ Binary Search on Answer (time).

"Binary Search on time"

ranks = [4, 2, 3, 1] , cars = 10

a b c d

time = rank * n^2

$l = 1$

$r = maxR * (cons)^2$
$= 4 * 10^2$
$= 400$

$mid = (l+r)/2 = (400+1)/2 = 200$

```
while (l <= r) {
    mid = l + (r-l)/2;
    if (isPossible( )) {
        result = mid;
        r = mid-1;
    } else {
        l = mid+1;
    }
}
return result;
```

$time = rank * n^2$

$n^2 = time/rank$

$$\boxed{n = \sqrt{time/rank}}$$