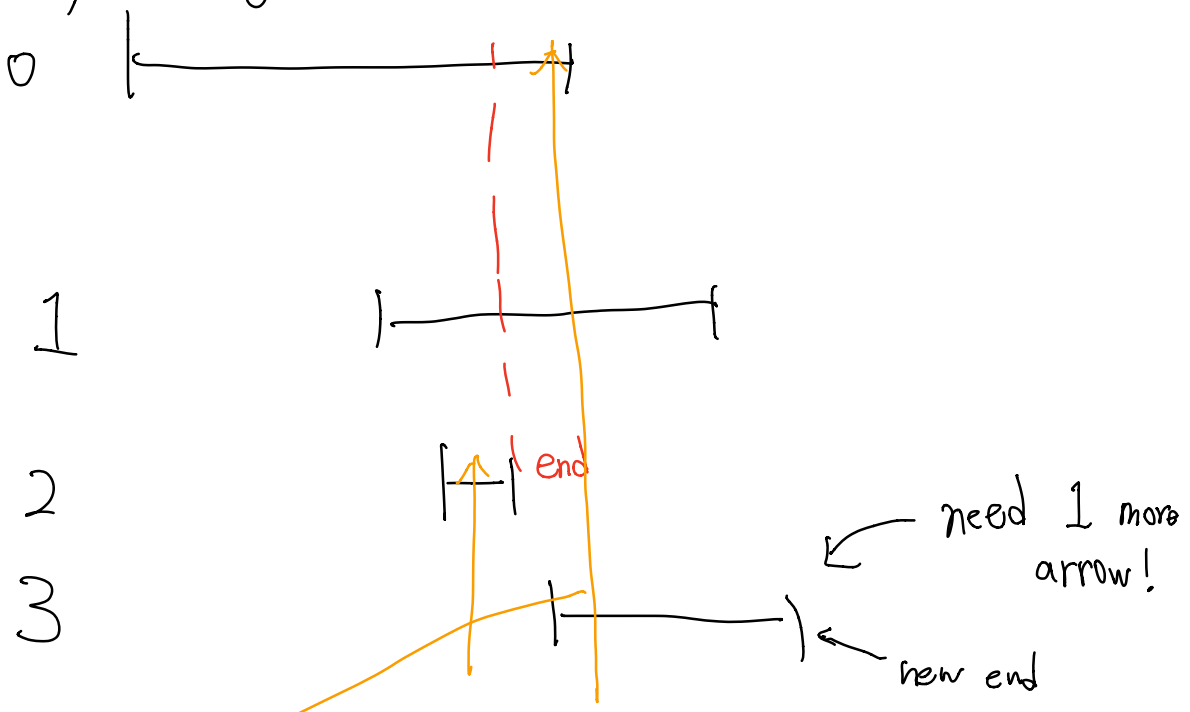
My thinking process:



And because `start` will only become greater, our arrow used before `end` can never be reused!!

⇒ Update to points[3].end

Q: Why don't we shot here?

A: I think if we want to shot 0, 1, 3, this arrow's right end will be ≤ points[3].end

And that will benefit us nothing!

That why we let the new arrow shoot in range [points[3].start, points[3].end]

Proof by induction: (Adapt a leetcode discuss post)

Assume my algorithm works on $[0, t)$ balloons

Let balloons = $[(s_0, e_0), \ldots (s_t, e_t) \ldots (s_{n-1}, e_{n-1})]$

And let end_{t-1} be the result computed after the balloon $t-1$ (s_{t-1}, e_{t-1}).

By induction hypothesis, the arrow r_{t-1} can be shot within: $[s_{t-1}, end_{t-1}]$

Case 1: $s_t \in [s_{t-1}, end_{t-1}]$

$\Rightarrow$ r_{t-1}^{th} arrow can be reused $\Rightarrow$ $r_t = r_{t-1}$

$end_t = \min(end_t, e_t)$

Case 2: $s_t > end_{t-1}$

$\Rightarrow$ r_{t-1}^{th} arrow cannot be reused

and $0 \sim r_{t-1}^{th} - 1$ arrows cannot help too! (They are all $\leq end_{t-1}$)