Saturday, 27 March 2021 12:00 AM

Find k^{th} smallest element

Approach ①:

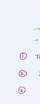
$TC = O(n \log n)$

Approach ②:

Find the 5 smallest element (pick) & pick the positioning (pick) & pick the 5th

if $pi < k$ → use that position

```
find (k, n, arr) {
    if (k > n) {
        return -1;
    }
    x = partition (l, n-1);
    ans = 0;
    for i = 1 ... n-1
        if a[i] < a[x]
            ans++;
        if (ans == k) {
            return a[x];
        }
    }
    if (ans == k)
        return find (l, x-1);
    else
        return find (x+1, k);
}
```



5 smallest odd

$\left(\frac{n}{5}\right) + \frac{n}{5} + \frac{n}{5} + \frac{n}{5} + \cdots \Big) \Rightarrow O(n)$

$\approx O(n)$

k^{th} Order statistics problem

Blum, Floyd, Pratt, Rivest, Tarjan Algorithm

Bucket sort

→ this algorithm works like buckets

→ quicker and better approach

① The elements are first scattered into buckets.

② Then the elements of each bucket are sorted.

③ elements are gathered in order.

$\lfloor \frac{n}{5} \rfloor$
$\lfloor \frac{n}{5} \rfloor$
$\lfloor \frac{n}{5} \rfloor$