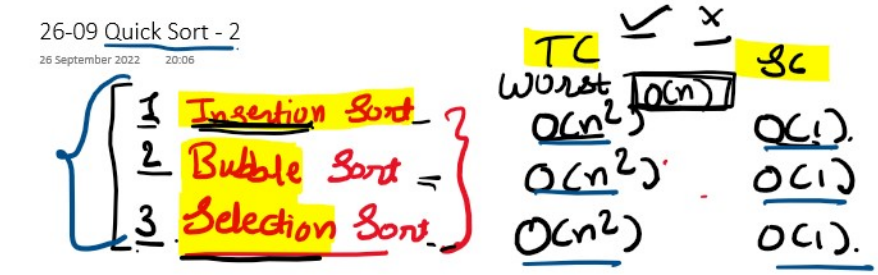
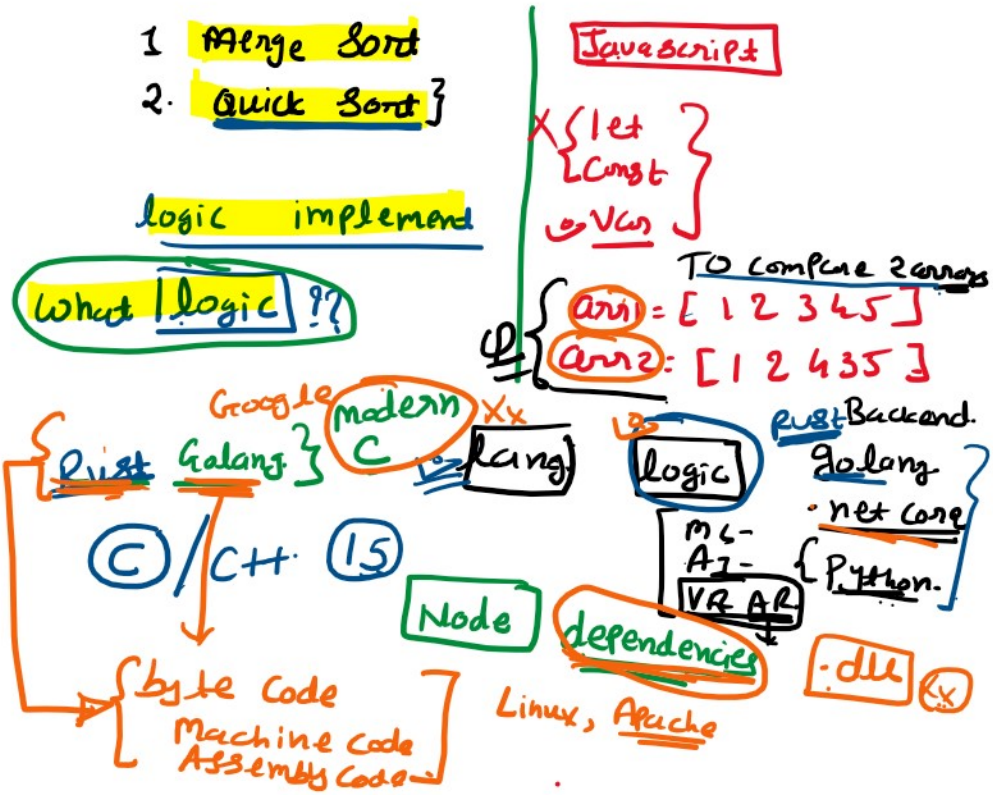
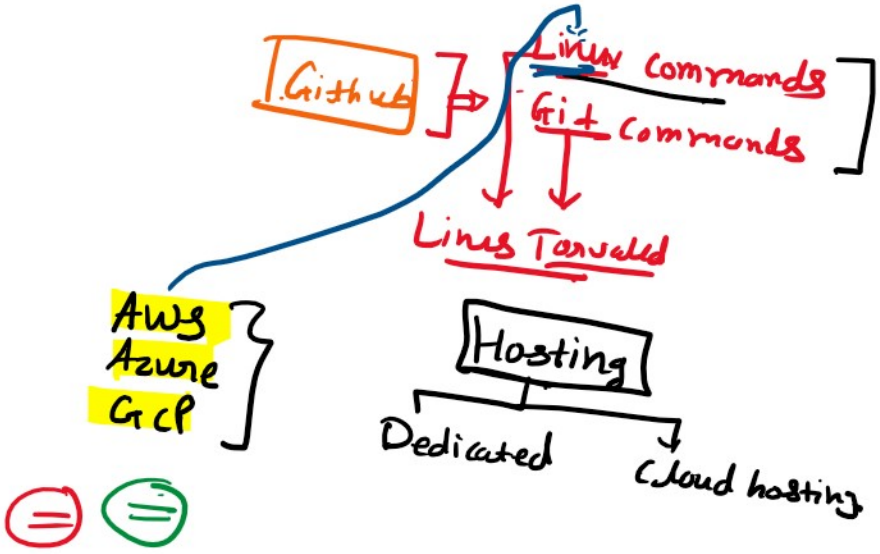
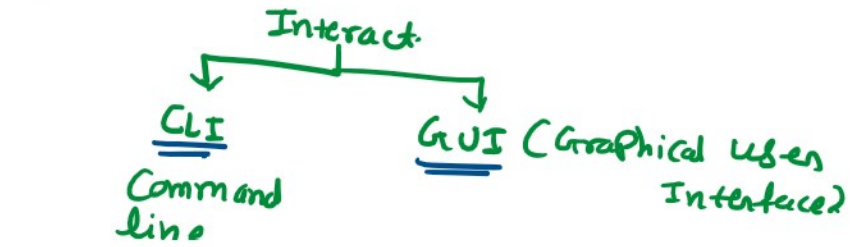
26-09 Quick Sort - 2

26 September 2022 20:06









Command line interface.

AWS

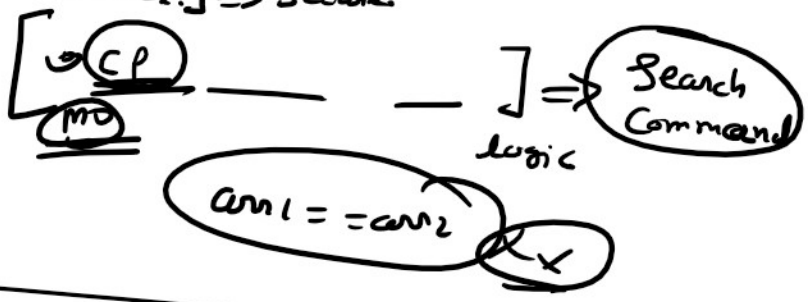
↓

Commands

↓

Linux] ⇒ Secure.

Move L> another folder



(*) Quick Sort:-

Merge Sort:- Best - O(nlogn)
Avg - O(nlogn)
Worst - O(nlogn)

Quick Sort Best - O(nlogn)
Avg - O(nlogn)
Worst - $O(n^2)$

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* Quick Sort:] Partition

↓

Sort an array.

⇒ [Quick Select Sort] Search for a single specific elem

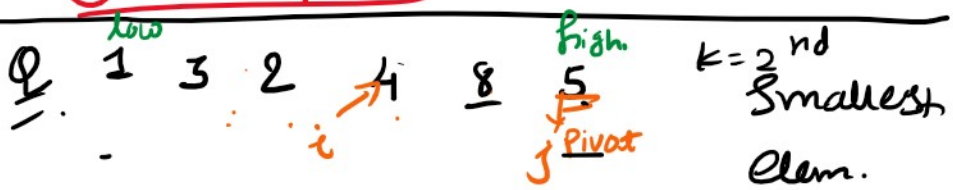
	0	1	2	3	4	5
Q	1	3	2	4	8	5

} K = 2nd

Quick Sort } Smallest element

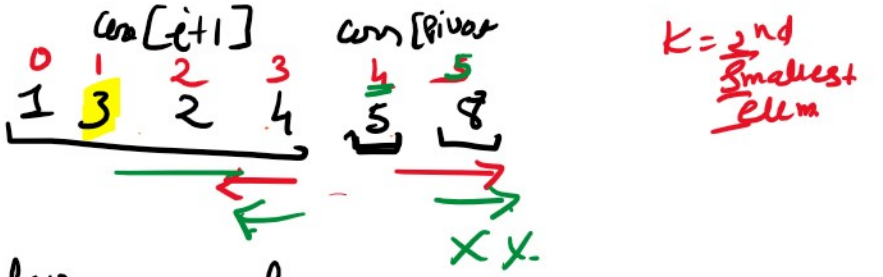
[1 (2) 3 4 5 8

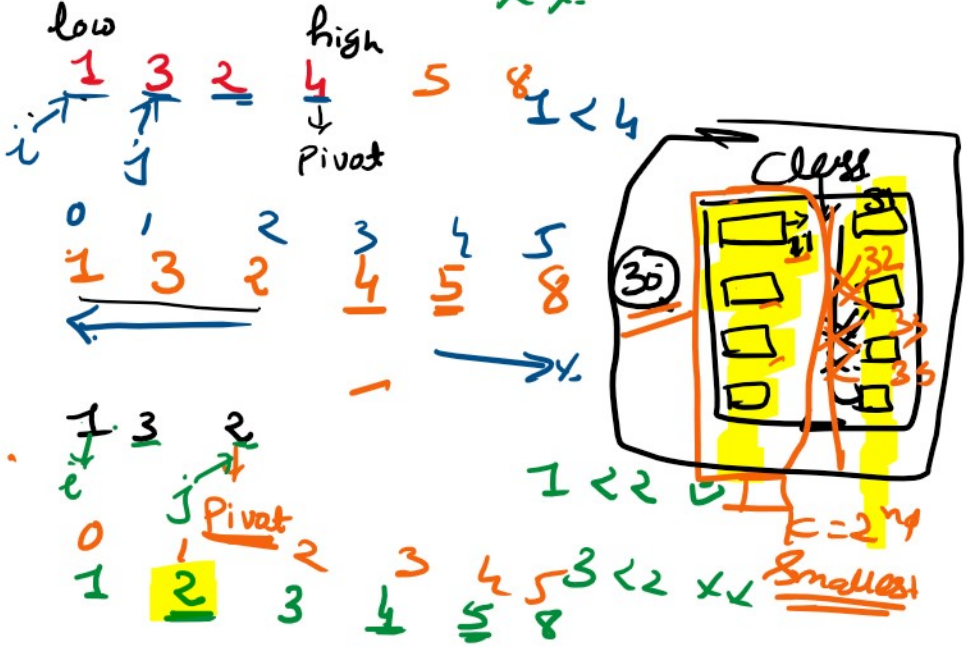
① Naive approach



1 < 5 ✓
3 < 5 ✓
8 ≮ 5 ✗✗

i++
Swap arr[i] & arr[j]





1 3 4 5 8 2
Pivot

Best 1st location

Code

Quick — Partition → index of Pivot elem.

k = 2 → 2-1 = 1

Pi = 4 k = 1

pi = 4 k = 1

function Partition(arr, low, high) {

→ return pivot's index

}

function kthSmallest(arr, low, high, k) {

let pi = Partition(arr, low, high)

k = 2

if(pi == k-1) { //Base case
  return arr[pi]
}

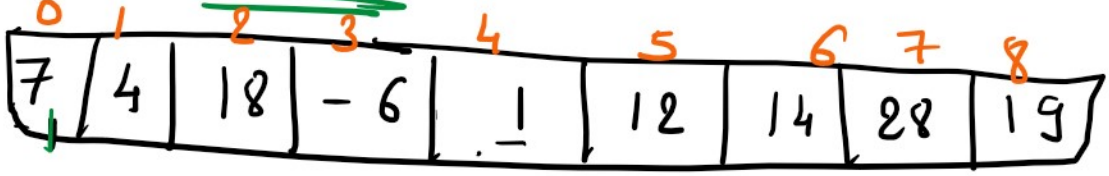
if(pi < k-1) 4 < 1 ✗

{
return kthSmallest(arr, pi+1, high, k)
}
else
{
  return kthSmallest(arr, low, pi-1, k)
}
}

---

find out a specific Pos's element

Medians



-6 1 4 7 12 14 18 19 28

Naive Approach

even $(\frac{n}{2})+(\frac{n}{2}+1)$

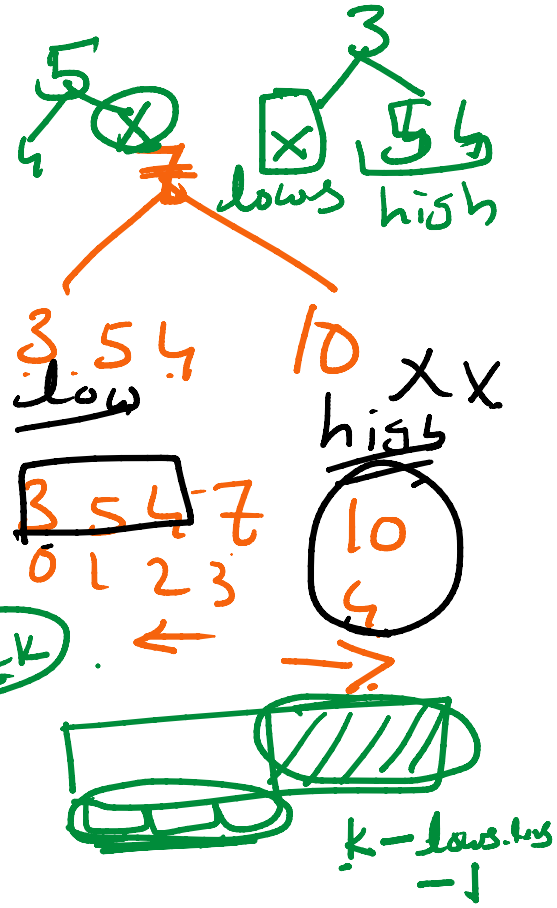
odd $\Rightarrow \frac{n}{2}$

```
function QuickSelect_Median(arr) { // 7,3,5,4,10
    let len = arr.length;//5
    let halfLength = parseInt(len / 2); //2
    if (len % 2 != 0) {
        return QuickSelect(arr,halfLength);//(arr,2)
    }
    else{
        return (QuickSelect(arr,halfLength-1)+ QuickSelect(arr,halfLength))/2;
    }
}

function QuickSelect(arr,k){
    if(arr.length == 1){
        return arr[0];
    }
    else{
        let pivot = arr[0];
        let lows = arr.filter((e) => e < pivot);
        let highs = arr.filter((e) => e > pivot);

        if(k < lows.length){
            return QuickSelect(lows,k)
        }
        else if(k<lows.length+1){
            return pivot;
        }
        else{
            return QuickSelect(highs,k-lows.length-1);
        }
    }
}

console.log(QuickSelect_Median([7,3,5,4,10]));
```



Q

$T(n) = T(n-1) + O(n)$ RR

$T(n-1) = T(n-2) + n-1$

$\frac{n(n-1)}{2}$

n^2

Q

book = [

{

]