

$\left\{ \begin{array}{l} \text{Merge sort} \\ \text{Quick sort} \end{array} \right.$

Merging two sorted arrays

Q) Two sorted arrays are given.
Combine them to form one sorted array.

$\text{ex } [2, 5, 7]$ $[3, 6]$

$[2, 3, 5, 6, 7]$

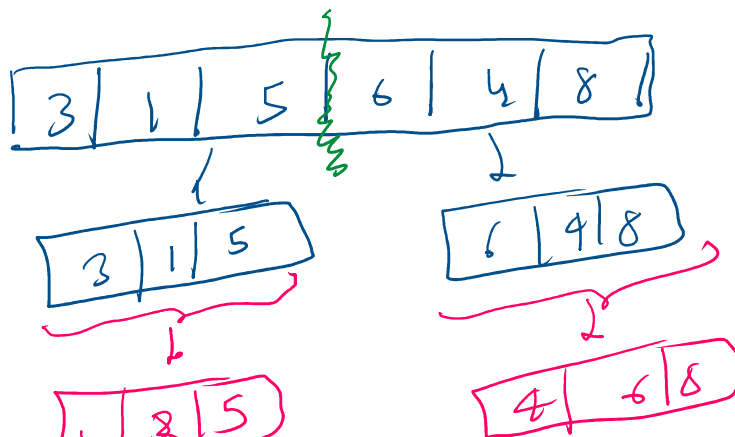
Q) $A1 = [1, 3, 6]$

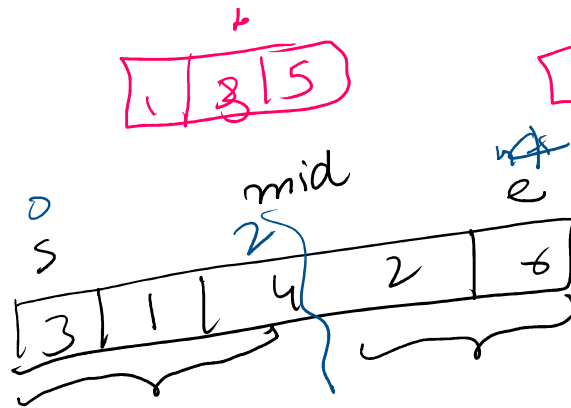
$A2 = [3, 5, 8, 11, 12]$

Ans = $[1, 3, 3, 5, 6, 8, 11, 12]$

Merge Sort

Divide and Conquer





Recursion calls for the sub-arrays:

$[1, 3, 5]$ and $[4, 6, 8]$

Formula for mid :

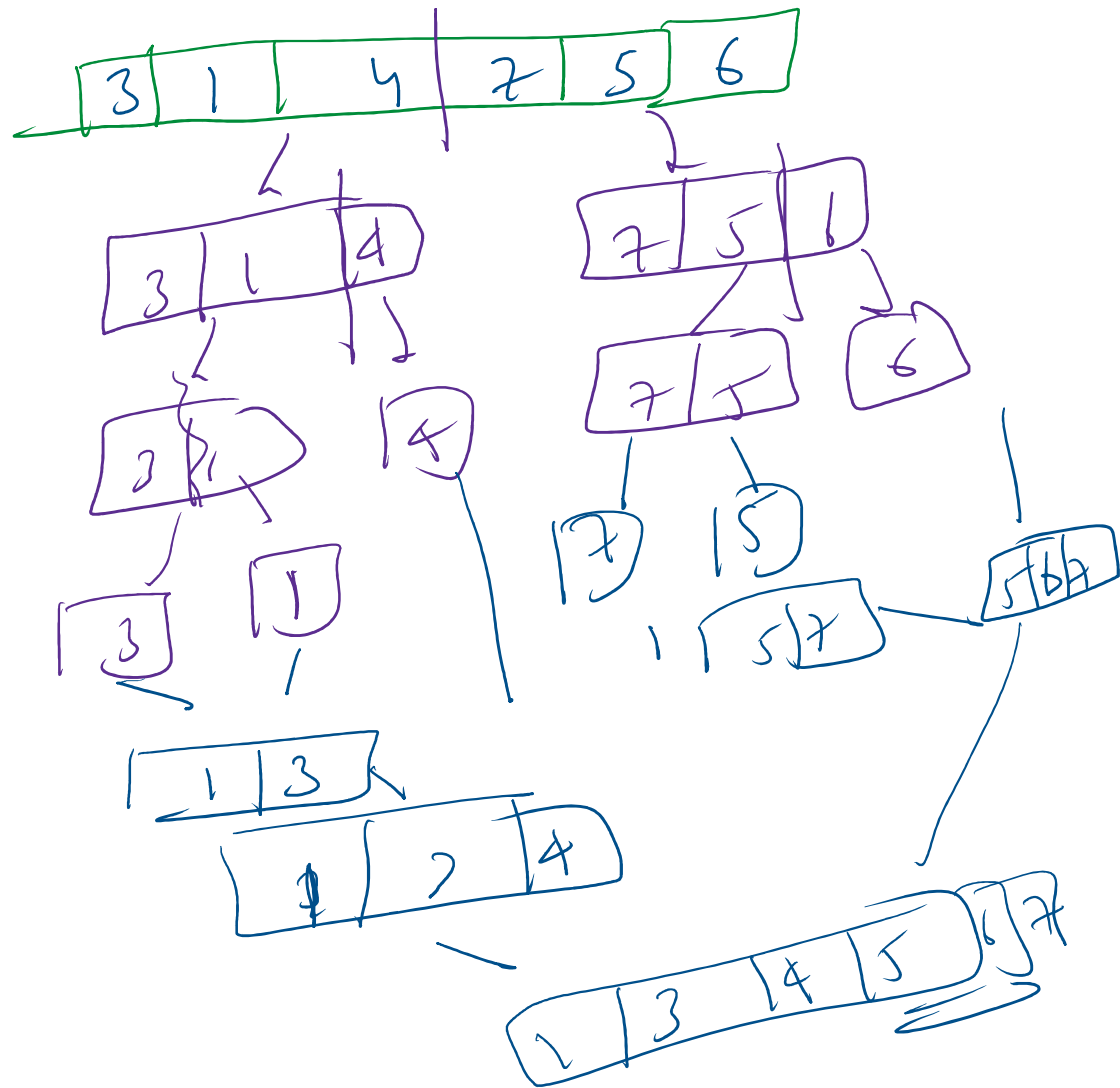
$$mid = \left\lfloor \frac{s+e}{2} \right\rfloor$$

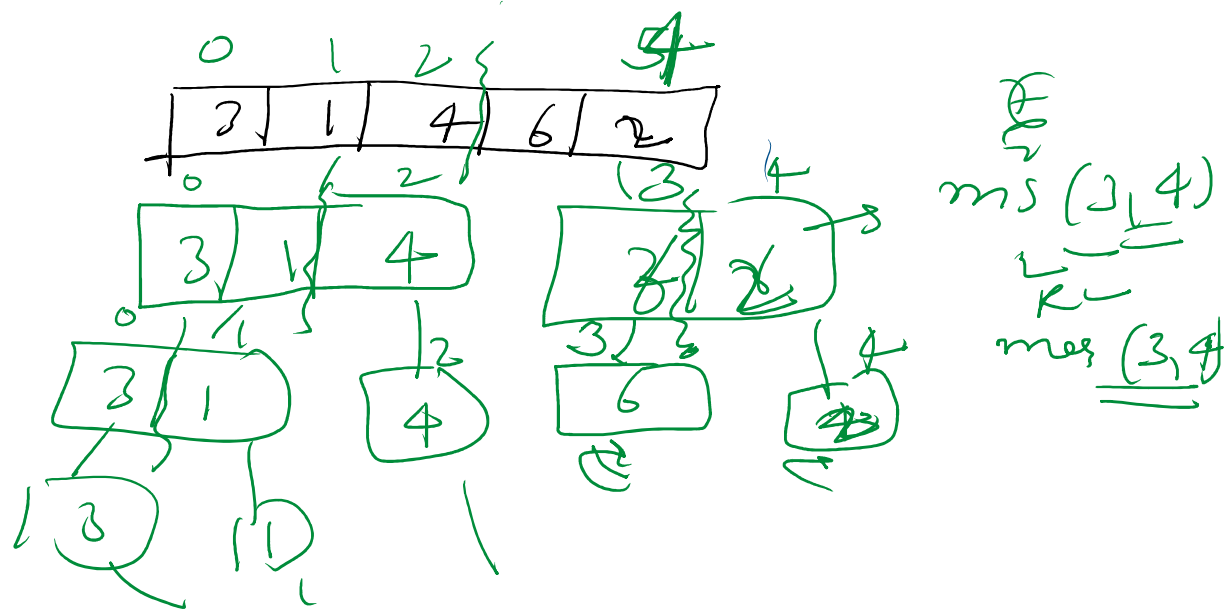
Recursion calls:

$ms(arr, s, mid)$

$ms(arr, mid+1, e)$

$merge(arr, s, mid, e)$

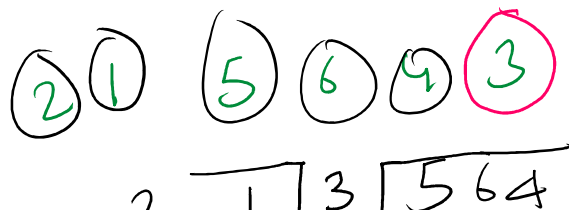


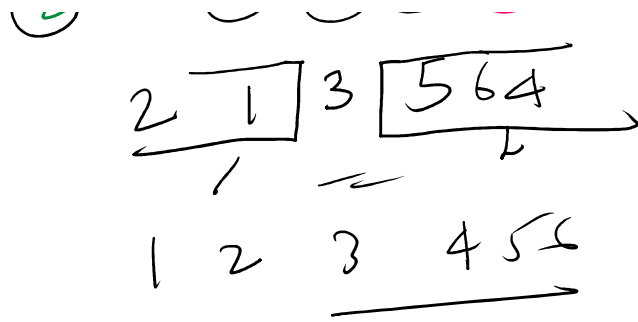


→ Divide and Conquer

Divide the bigger problem into smaller problems, solve the smaller problems and combine to solve the original problem

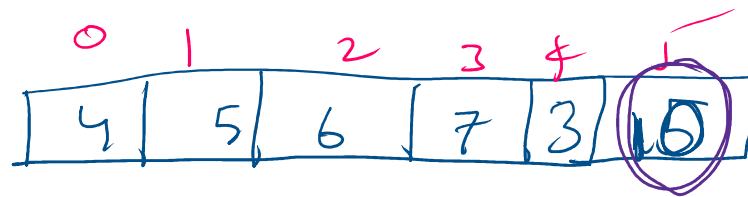
Quick Sort is in place sorting





⑧ Quick sort is $O(n^2)$ in worst case
in put is sorted

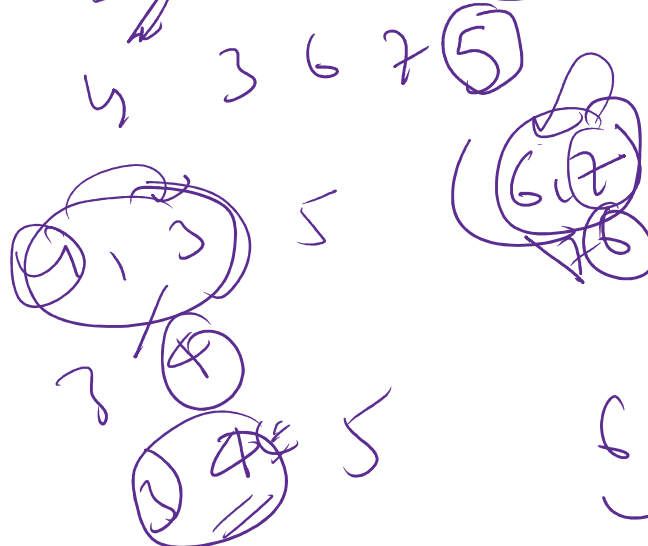
→ Randomized Quick sort is $O(n \log n)$



Ans (6, 5)



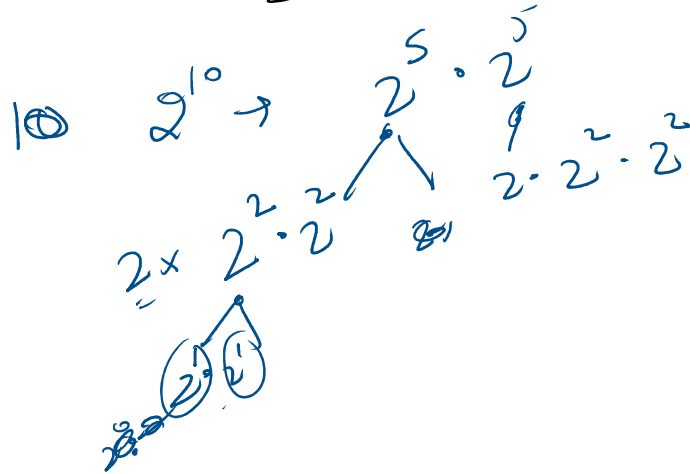
$0.3 \times 6 = 1.8$
 $1 \times 0 = 0$



$0.3 \times 4 = 1.2$
 $1 \times 0 = 0$

- Merge sort is stable
- Quick sort is unstable

Optimized Power Calculation



Tower of Hanoi

