19F-0269 Design & Analysis of
4B Algorithm
Usama

(RED)

Quick Sort :=

3, 44, 38, 5, 47, 15, 36, 26, 27, 2,
46, 4, 19, 50, 48, 43, 33, 34, 25, 1

Solution :=

- Let the first element of Array as pivot:

P (i) (j)
[3] 44, 38, 5, 47, 15, 36, 26, 27, 2,
46, 4, 19, 50, 48, 43, 33, 34, 25, 1

∴ Now search from leftside and rightside for the first element greater and Less than pivot element: And then swap those elements:

P (i) (j)
[3], 1, 38, 5, 47, 15, 36, 26, 27, 2, 46, 4,
19, 50, 48, 43, 33, 34, 25, 44

∴ Now search further until the pivot move to right position.

P (i) (i)
[3], 1, 2, 5, 47, 15, 36, 26, 27, 38,
46, 4, 19, 50, 48, 43, 33, 34, 25, 44

Now that leftside(i) and rightside(j) cross each other. Swap Pivot element with rightside(j)

P
2, 1, [3], 5, 47, 15, 36, 26, 27, 38, 46, 4,
19, 50, 48, 43, 33, 34, 25, 44.

- Now the array will divided into two Parts:

2, 1, 3

5, 47, 15, 36, 26, 27, 38, 46, 4,
19, 50, 48, 43, 33, 34, 25, 44.

- First solve Leftside:
- Take 2 as Pivot element:

P i j
[2], 1, 3

∴ Repeat the partitioning method Here:

P j i
[2], 1, 3

P
[1], [2], [3].

∴ They are sorted.

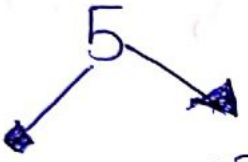
- Now Solve the righside:
- Take 5 as Pivot element:

P i j
[5], 47, 15, 36, 26, 27, 38, 46, 4, 19, 50,
48, 43, 33, 34, 25, 44

∴ Apply Partitioning method here:

- 5, 4, 15, 36, 26, 27, 38, 46, 47, 19, 50, 48, 43, 33, 34, 25, 44

- 4, 5, 15, 36, 26, 27, 38, 46, 47, 19, 50, 48, 43, 33, 34, 25, 44



- 4, 5 → Already sted.

- 15, 36, 26, 27, 38, 46, 47, 19, 50, 48, 43, 33, 34, 25, 44

- Now take righside for further Partitioning:

- Take 19 as pivot element:

- 15, 36, 26, 27, 38, 46, 47, 19, 50, 48, 43, 33, 34, 25, 44

- 15, 19, 26, 27, 38, 46, 47, 36, 50, 48, 43, 33, 34, 25, 44

- 15, 19, 26, 27, 38, 46, 47, 36, 50, 48, 43, 33, 34, 25, 44

- 15, 19 — -26, 27, 38, 46, 47, 36, 50, 48, 43, 33, 34, 25, 44.

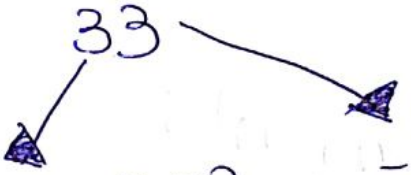
Sorted.

- Again take righside for Partitioning:

so Take 38 as pivot element:

P

- 26, 27, 38, 46, 47, 36, 50, 48, 43, 33,
  34, 25, 44.
- 26, 27, 25, 33, 47, 36, 50, 48, 43, 46,
  34, 38, 44



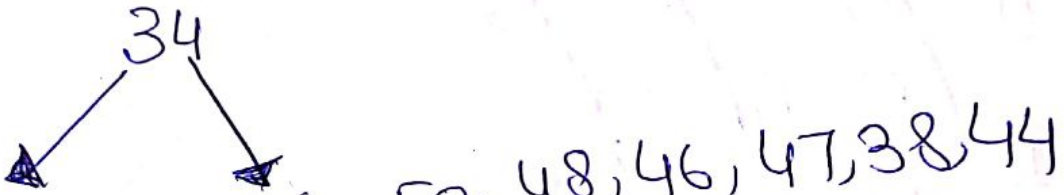
-26, 27, 25, 33 — -47, 36, 50, 48, 43, 46, 34, 38, 44

- Consider Leftside first:

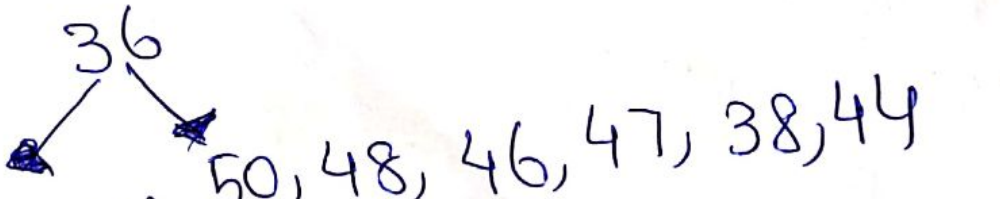
Take 26 as pivot element:

- 26, 27, 25, 33
- 26, 25, 27, 33
- 25, 26, 27, 33 → Sorted.

- Now take leftside :
- 47, 36, 50, 48, 43, 46, 34, 38, 44.
- Apply partitioning on the array:
∴ ① Take 34 as pivot:
- 47, 36, 50, 48, 43, 46, [34], 38, 44
- [34], 36, 50, 48, 46, 47, 38, 44.

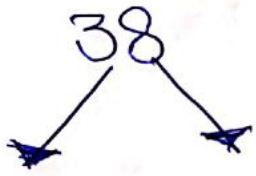


- 34
↓
sorted.
- Take left side:
∴ - [36], 50, 48, 46, 47, 38, 44
- [36], 44, 48, 46, 47, 38, 50
- [36], 50, 48, 46, 47, 38, 44



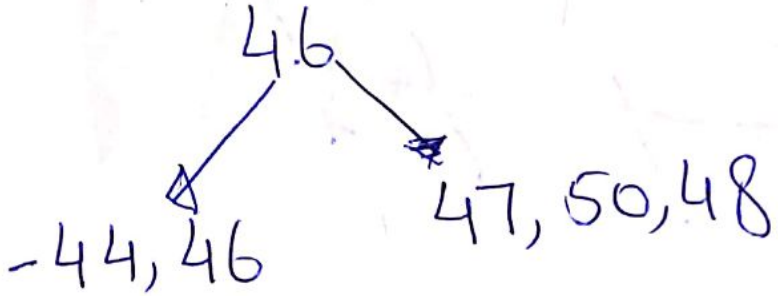
- Take right side:
∴ Take 38 as pivot:
- 50, 48, 46, 47, [38], 44

- 38, 48, 46, 47, 50, 44



- 38 - 48, 46, 47, 50, 44

- Take rightside:
- Take 46 as pivot:
  - 48, 46, 47, 50, 44
  - 50, 46, 47, 48, 44
  - 48, 46, 47, 50, 44
  - 44, 46, 47, 50, 48



- 44, 46

- Take right side:
  Take 48 as pivot
  - 47, 50, 48
  - 47, 48, 50

Now combine all the sorted parts of array:
[1, 2, 3, 4, 5, 15, 19, 25, 26, 27, 33, 34, 36, 38, 44, 46, 47, 48, 50]
sorted by Quicksort.