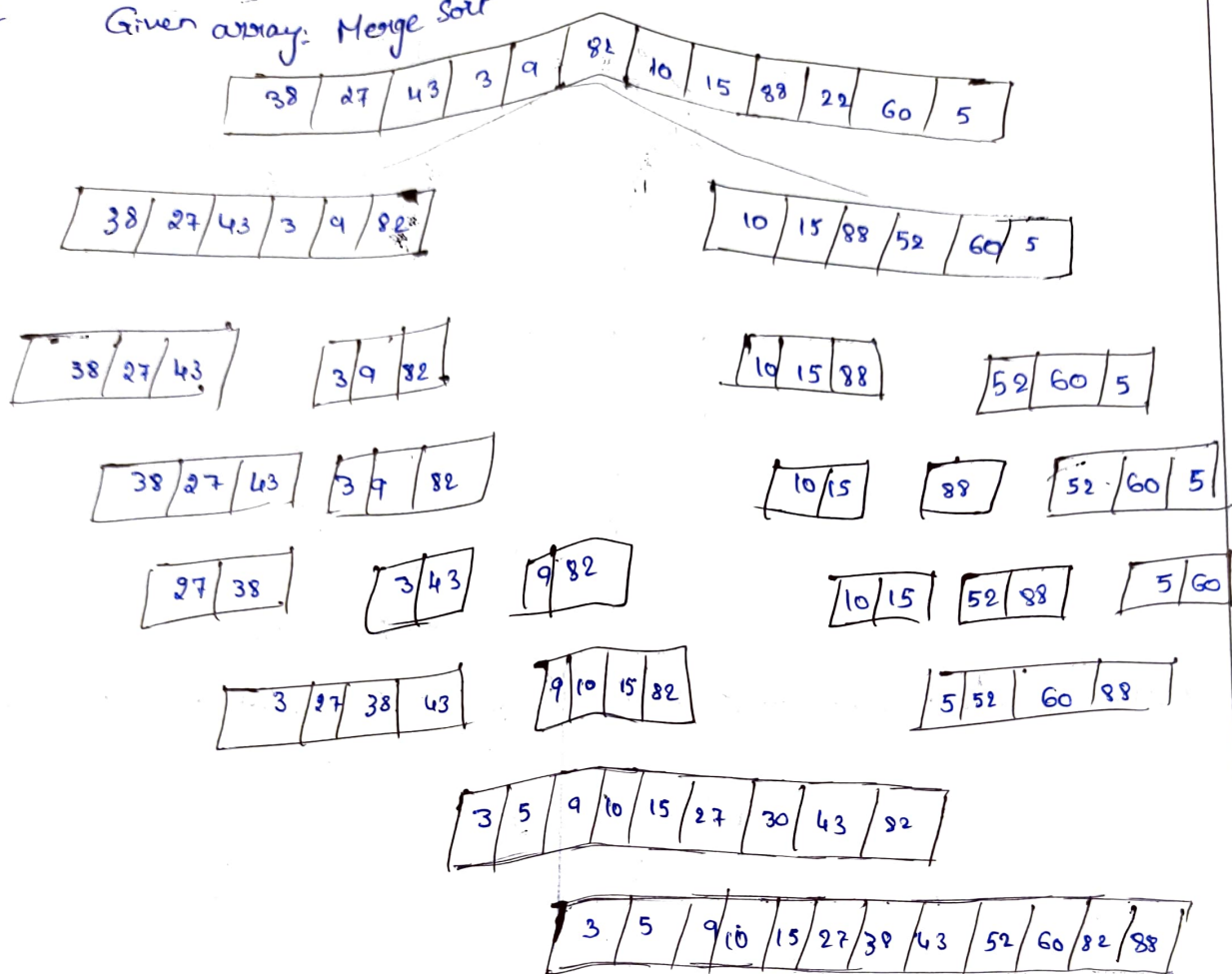


- 16) Sort the following elements using Merge sort divide and conquer stage by [38, 27, 43, 3, 9, 82, 10, 15, 88, 52, 60, 5] using and analyze time complexity of the algorithm

Ans:

Given array: Merge Sort



∴ Sorted list (3, 5, 9, 10, 15, 27, 38, 43, 52, 60, 82, 88)

Time Complexity:- $O(n \log n)$

- 17) Sort the array by 64 34 25 12 22 11 90 using bubble sort what is the time complexity of selection sort in the best worst & average case

Given array = 64 34 25 12 22 11 90

In bubble sort we bring from smallest element in there correct position continue this until each element reach there.

Correct position

64	34	25	12	11	22	90
64	34	25	11	12	22	90
64	34	11	25	12	22	90
64	11	34	25	12	22	90
11	64	34	25	12	22	90
11	64	34	12	25	22	90
11	64	12	34	25	22	90
11	12	64	34	22	25	90
11	12	64	34	34	25	90
11	12	64	22	34	25	90
11	12	22	64	34	25	90
11	12	22	64	25	34	90
11	12	22	25	64	34	90
11	12	22	25	34	64	90

Q. Sort the array 64, 25, 12, 22, 11 using selection sort. What is the time complexity of selection sort in the best worst & average case.

64 25 12 22 11

In the selection we will fix that from the largest element in here correct position first so

25	64	12	22	11
25	12	64	22	11
25	12	22	64	11
25	12	22	11	64
12	25	22	11	64
12	22	25	11	64
12	22	11	25	64
12	11	22	25	64
11	12	22	25	64

The sorted list is 11, 12, 22, 25, 64.

Time complexity :- Selection sort is an another simple comparison sorted algorithm.

Best case : $O(n^2)$

Average Case : $O(n^2)$

Worst case : $O(n^2)$

19) Given an array of $[4, -2, -5, 3, 10, -5, 2, 8, -3, 6, 7, 4, 1, 9, -10, -6, 7, 11, -9]$ integers sort the following elements using insertion sort using Brute force algorithm strategy analyze time complexity.

Ans: Given array is $4, -2, 5, 3, 10, -5, 2, 8, -3, 6, 7, -4, 1, 9, -1, 0, -6, -2, 1$

Insert $4, -2$

$-2 \ 4$

Insert 5

$-2 \ 4 \ 5$

Insert 3

$-2 \ 3 \ 4 \ 5$

Insert -10

$-10 \ -2 \ 3 \ 4 \ 5 \ 10$

Insert -3

$-5 \ -2 \ 3 \ 4 \ 5 \ 10$

Insert 2

$-5 \ -2 \ 2 \ 3 \ 4 \ 5 \ 10$

Insert 8

$-5 \ -2 \ 2 \ 3 \ 4 \ 5 \ 8 \ 10$

Insert 0

$-5 \ -4 \ -3 \ -2 \ -1 \ 0 \ 1 \ 2 \ 3 \ 4 \ 5 \ 6 \ 7 \ 8 \ 9 \ 10$

Insert 6

$-6 \ -5 \ -4 \ -3 \ -2 \ -1 \ 0 \ 1 \ 2 \ 3 \ 4 \ 5 \ 6 \ 7 \ 8 \ 9 \ 10$

Insert -8

$-8 \ -6 \ -5 \ -4 \ -3 \ -2 \ -1 \ 0 \ 1 \ 2 \ 3 \ 4 \ 5 \ 6 \ 7 \ 8 \ 9 \ 10$

Insert 11

$-8 \ -6 \ -5 \ -4 \ -3 \ -2 \ -1 \ 0 \ 1 \ 2 \ 3 \ 4 \ 5 \ 6 \ 7 \ 8 \ 9 \ 10$

Insert -9

$-9 \ -8 \ -6 \ -5 \ -4 \ -3 \ -2 \ -1 \ 0 \ 1 \ 2 \ 3 \ 4 \ 5 \ 6 \ 7 \ 8 \ 9 \ 10 \ 11$

Insert -3

$-5 \ -3 \ -2 \ 2 \ 3 \ 4 \ 5 \ 8 \ 10$

Insert 6

$-5 \ -3 \ -2 \ 2 \ 3 \ 4 \ 5 \ 6 \ 8 \ 10$

Insert 7

$-5 \ -3 \ -2 \ 2 \ 3 \ 4 \ 5 \ 6 \ 7 \ 8 \ 10$

Insert 4

$-5 \ -4 \ -3 \ -2 \ 2 \ 3 \ 4 \ 5 \ 6 \ 7 \ 8 \ 10$

Insert 1

$-5 \ -4 \ -3 \ -2 \ 0 \ 1 \ 2 \ 3 \ 4 \ 5 \ 6 \ 7 \ 8 \ 10$

Insert 9

$-5 \ -4 \ -3 \ -2 \ 0 \ 1 \ 2 \ 3 \ 4 \ 5 \ 6 \ 7 \ 8 \ 9 \ 10$

Insert -1

$-5 \ -4 \ -3 \ -2 \ -1 \ 1 \ 2 \ 3 \ 4 \ 5 \ 6 \ 7 \ 8 \ 9 \ 10$

Q2) Sort the following elements using insertion sort using Brute force approach [38, 27, 43, 3, 9, 82, 10, 15, 88, 52, 60, 5] and analyze complexity of the algorithm.

Insert 38, 27 27 38
 Insert 43 27 38 43
 Insert 3 3 27 38 43
 Insert 9 3 9 27 38 43
 Insert 82 3 9 27 38 43 82
 Insert 10 3 9 10 27 38 43 82
 Insert 15 3 9 10 15 27 38 43 82 83
 Insert 88 3 9 10 15 27 38 43 82 83 88
 Insert 52 3 9 10 15 27 38 43 52 82 83
 Insert 60 3 9 10 15 27 38 43 52 60 82 83
 Insert 5 3 5 9 10 15 27 38 43 52 60 82 88

Time Complexity :- Best Case : $O(n)$

Average Case : $O(n^2)$

Worst Case : $O(n^2)$