ASSIGNMENT - 5

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Name of the course : Design for analysis of Algorithm

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Course code : CSA0670

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16. Sort the following elements using merge sort divide and conquer strategy [38, 27, 43, 3, 9, 82, 10, 15, 88, 52, 60, 5] and analyze complexity of algorithm.

Sol: Given

0	1	2	3	4	5	6	7	8	9	10	11
38	27	43	3	9	82	10	15	88	52	60	5

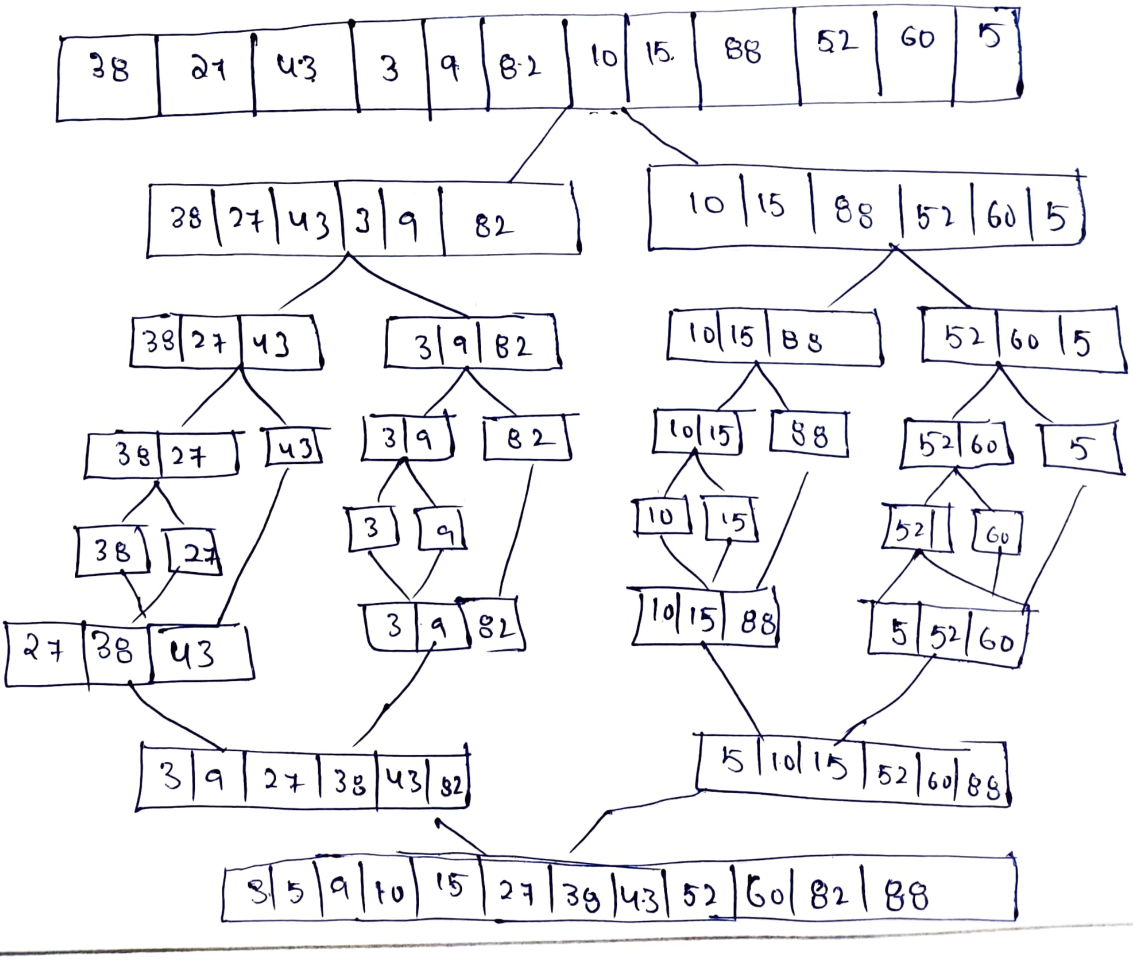
$M = \frac{l+h}{2} = \frac{0+11}{2} = 5.5 = 6$

0 1 2 3 4 5 6 7 | 8 9 10 11.

38 27 43 3 9 8 2 10 15 | 88 52 60 5

$M = \frac{l+h}{2}$ 38 27 43 | 3 | 9 82 | 10 | 15 88 | 52 | 60 | 5

38 27 | 43 | 3 | 9 | 82 | 10 | 15 | 88 52 | 60 | 5



Time Complexity:

Best - $O(n^2)$

Avg - $O(n^2)$

worst - $O(n^2)$

17. Sort the array 64, 34, 25, 12, 22, 11, 90 using Bubble sort what is time complexity of bubble sort in best, worst, avg.

Given.

64 34 25 12 22 11 90
i j

34 64 25 12 22 11 90
i j

34 25 64 12 22 11 90
i j

34 25 12 64 22 11 90
i j

34 25 12 22 64 11 90

34 25 12 22 11 64 90
i j

It-2

34 25 12 22 11 64 90
i j

25 34 12 22 11 64 90
i j

25 12 34 22 11 64 90
i j

25 12 22 34 11 64 90
i j

25 12 22 11 34 64 90
i j

a] [4, -2, 5, 3, 10, -5, 2, 8, -3, 6, 7, -4, 1, 9]
of integers.

St - 3

```
25    12    22    11    34    64    90
i     j
12    25    22    11    34    64    90
      i     j
12    22    25    11    34    64    90
      i     i     j
12    22    11    25    34    64    90
                  i     j
12    22    11    25    34    64    90    Sorted.
                              i     j
```

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

Given

64	25	12	22	11

11	25	12	22	64

11	12	25	22	64

11	12	22	25	64

Sorted

Time complexity:

Best case : $O(n^2)$

Avg case : $O(n^2)$

worst case : $O(n^2)$

19. Sort the following elements using Insertion sort using Brute force approach strategy (38, 27, 43, 3, 9, 82, 10, 15, 88, 52, 60, 5) and analyze complexity algorithm.

```
[ 38   27 . 43   3   9   82   10   15   88   52   60   5]
  i    j

27   38   43   3   9   82   10   15   88   52   60   5
```

2) 27 38 43 3 9 82 10 15 88 52 60 5

3) 27 38 3 43 9 82 10 15 88 52 60 5

4) 3 27 38 43 9 82 10 15 88 52 60 5

5) 3 9 27 38 43 82 10 15 88 52 60 5

6) 3 9 10 27 38 43 82 15 88 52 60 5

7) 3 9 10 15 27 38 43 82 88 52 60 5

8) 3 9 10 27 38 43' 82 15 88 52 60 5

9) 3 9 10 15 27 38 43 52 82 88 60 5

10) 3 9 10 15 27 38 43 52 82 60 88 5

11) 3 9 10 15 27 38 43 52 60 82 88 5

12) 3 9 10 15 27 38 43 52 60 82 88 5

13) 3 5 9 10 15 27 38 43 52 60 82 88

sorted.

Time complexity:-

Best case - O(n) - This occurs when the accuracy is already Sorted. The inner loop will run only once.

Avg case - (o(n²)):- The list is randomly ordered

Wort case - O(n²)) :- if the list is in rerese

Space Complexity:-

O(1) : insertion sort.

20. Given an array of [4, -2, 5, 3, 10, -5, 2, 8, -3, 6, 7, -4, 1, 9,
-1, 0, -6, -8, 11, -9] integers,

Sort the following elements using insertion sort using Brute force approach strategy anlyze complexity of the algorithm.

initial array : [4, -2, 5, 3, 10, -5, 2, 8, -3, 6, 7, -4, 1, 9, -1, 8, 6,
-8, 11, -9]

After first pass: [4, -2, 5, 3, 10, -5, 2, 8, -3, 6, 7, -4, 1, 9, -1,
0, -6-8, -11, -9]

Second pass:

-2, 4, 5, 3, 10, -5, 2, 8, -3, 6, 7, -4, 1, 9, -1, 0, -6-8, 11, -9]

third pass:

-2, 3, 4, 5, 10, -5, 2, 8, -5, 6, 7, -6, 1, 9, -1, 0, -6-8, 11, -9]

fourth pass:

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

fifth pass:

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

The final sorted

[-9, -8, -6, -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11]

Time Complexity:- $O(n^2)$

Space Complexity:- $O(1)$