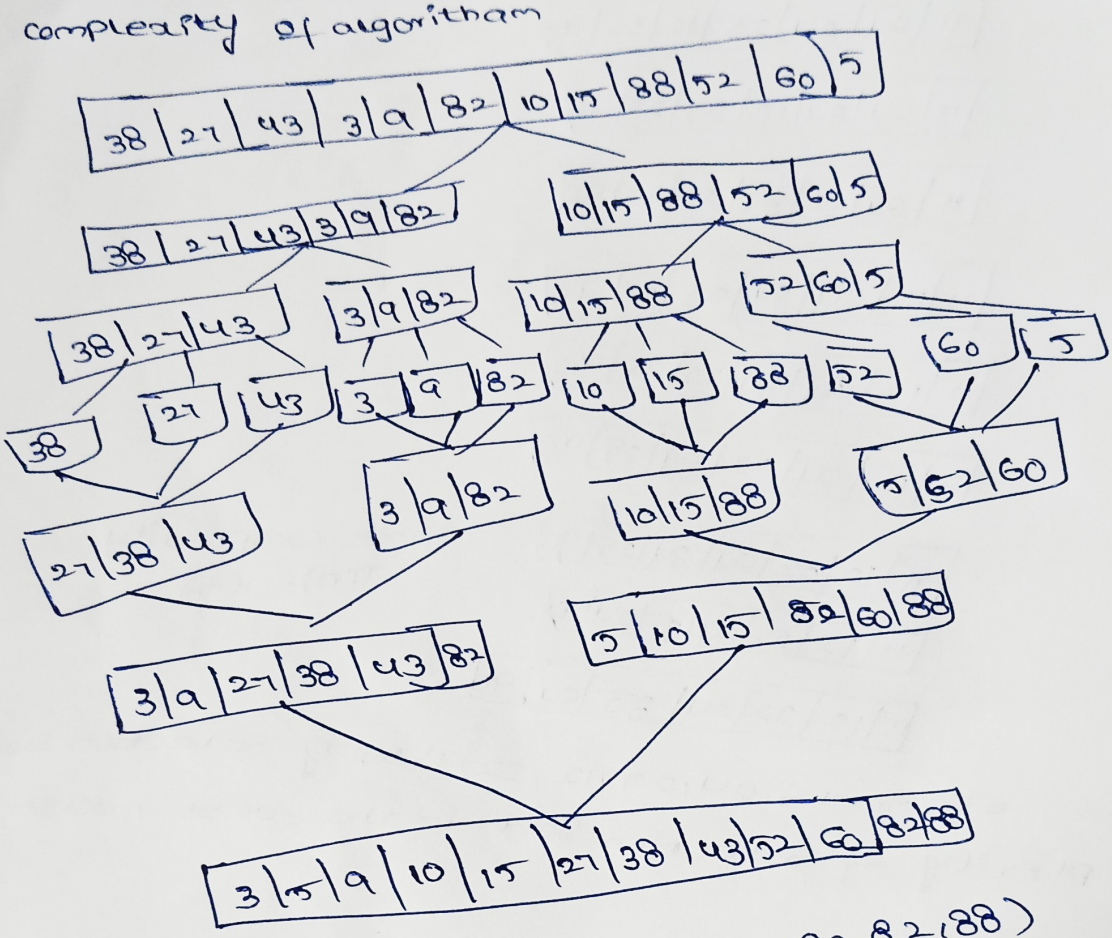
1. Sort the following elements using merge sort divide and conquer stage (38, 27, 43, 3, 9, 82, 10, 15, 88, 52, 60, 5) using analyze time complexity of algoritham



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

Time complexity: $T(n) = O(n)$

2. Sort the array 64, 34, 25, 12, 22, 11, 90 using bubble sort what is time complexity of selection sort best, worst and average case

Given array | 64 | 34 | 25 | 12 | 22 | 11 | 90 |

The bubble sort we bring smallest element correct position until reach element correct position

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

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

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

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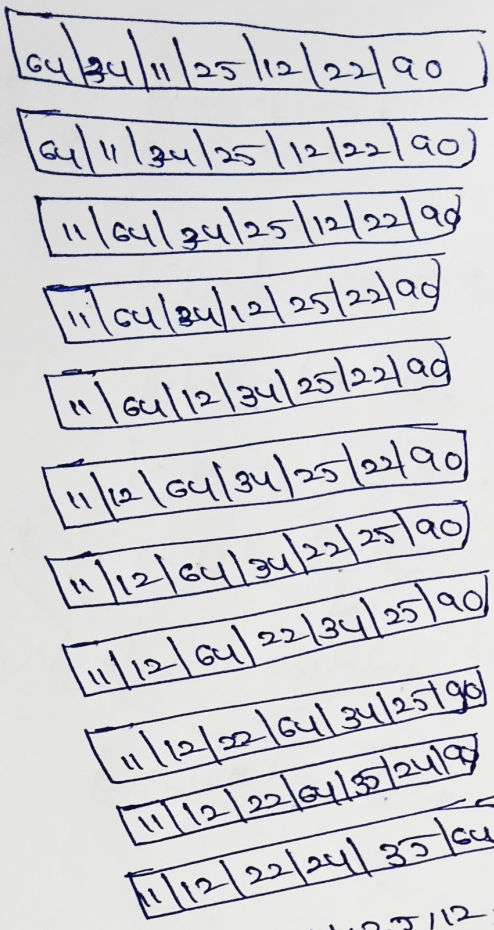
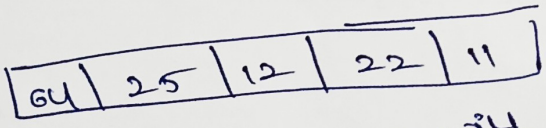
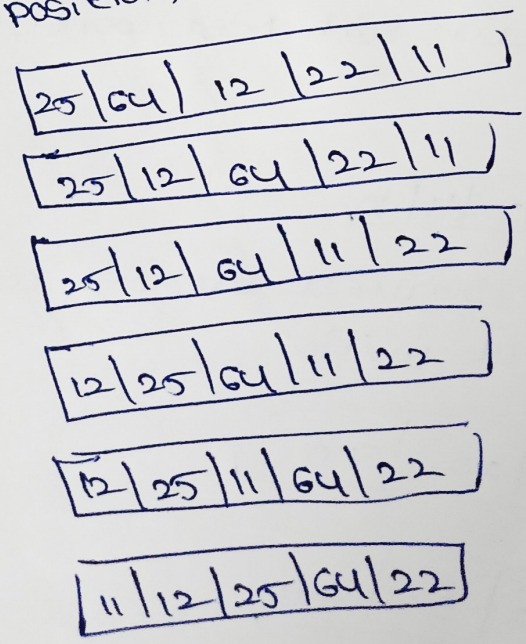


Time complexity:
$T(n) = O(n)$

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



the selection sort we will fix from the largest element in correct position



The sortest list 11, 12, 22, 25, 64

Time Complexity:

Best case: $O(n^2)$

Average case: $O(n^2)$

worst case: $O(n^2)$

4. Given array of (4, -2, -5, 3, 10, -5, 2, 8, -3, 6, 7, -4, 1, 9, -1, 0, -6, 8, 1)

insert 4, -2

-2	4

insert 5

-2	4	5

insert 3

-2	3	4	5

insert 10

-2	3	4	5	10

insert -5

-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 -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 9

-5	-3	-2	1	2	3	4	5	6	7	8	10

insert 9, 0

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

insert -6

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

insert -8

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

insert 11

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

insert -9

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

Time complexity:

Best case: $O(n)$: The occur when already sorted the inner loop run time for every element

Average case $O(n^2)$: The happens because on average the algorithm will have to move half of element for each insertion

worst case $O(n^2)$: The occur when array is sorted in reverse order each insertion $O(n)$ time

5. 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 compleaity of algorithm

insert 38, 27

27	38

insert 43

27	38	43

insert 3

3	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

insert 52

3	9	10	15	27	38	43	52	82

insert 60

3	9	10	15	27	38	43	52	60	82

insert 5

3	5	9	10	15	27	38	43	52	60	82

Time compleaity

Best case: $O(n)$

average case: $O(n^2)$

worst case: $O(n^2)$