DSA SERIES

- Learn Coding

Topic to be Covered today

Insertion sorting

LETS START TODAY'S LECTURE

Insertion sorting

- Simple sorting algorithm
- Builds the final sorted array one element at a time.
- It takes each element and inserts it into its correct position in the sorted part of the array.

Repeat the process until the array is sorted.

Procedure :

Example :

[5 4 3 2 1]

[5 4 3 2 1]
[4 5 3 2 1]

[4 5 3 2 1]
[4 3 5 2 1]
[3 4 5 2 1]

[3 4 5 2 1]
[3 4 2 5 1]
[3 2 4 5 1]
[2 3 4 5 1]

[2 3 4 5 1]
[2 3 4 1 5]
[2 3 1 4 5]
[2 1 3 4 5]
[1 2 3 4 5]

Time Complexity

1^{st} -- 1 comparision

2^{nd} --- 2 comparision

n ---- n-1 comparision

T.C = $O(n^2)$ -> Average and Worst case

Best case – O(n)

Learn coding

THANK YOU

Code :

```
#include <iostream>
using namespace std;

int main()
{
   // int arr[]= {9,-1,2,8,3,7,6,11,-4};

   int arr[]= {1,1,1,1,1,1};

   int size = sizeof(arr)/sizeof(arr[0]);

   cout<< "Printing the original array :";

   for(int i =0;i<size;i++){
      cout<<arr[i]<<" ";
   }
   cout<<endl;
```

```
// logic

  for(int i =1;i<size;i++){
     int temp = arr[i];
     int j = i-1;
     for(  ;j >= 0;j--){
        if(arr[j] >temp ){
           arr[j+1]= arr[j];
        }
        else {
           break;
        }
     }
     arr[j+1] = temp ;
  }
  cout<< "Printing the array after sorting :";
  for(int i =0;i<size;i++){
     cout<<arr[i]<<" ";
  }
  cout<<endl;
}
```