

2 Insertion Sorting

- It is very simple and efficient algorithms for the smallest lists.
- Its mechanism is very simple just take elements from the list one by one and inserting them in their correct position into a new sorted list.
- The name insertion sorting means that sorting is occurred by inserting a particular element at a proper position.
- In the second repeating process, third element is compared with all the above elements that ($arr[1]$ and $arr[0]$).
- In the first repeating, first of all second element $arr[1]$ is compare with the first element $arr[0]$.
- So in general we can say that in every repeating process, an element is compared with all the elements before it.
- When we comparing at that time if it is found that the element can be inserted at a proper place then space is created for it by shifting the other elements one position up and inserts the desired element at the suitable position.
- An example of an insertion sort occurs in everyday life while playing cards.

- To sort the cards in one's hand one extract a card, shift the remaining cards, and then insert the extracted card in the correct place.
- This process is repeated until all the cards are in the correct sequence.
- If we complement if condition in this program, it will give out the sorted array in descending order.

Sorting

1. Bubble sort insertion sort

array

	5	4	10	1	6	2	$n=6$
index	0	1	2	3	4	5	

→

temp = 4 remove 4 from array and store in temp

for $i = 0; i < n; i++$ {

temp = $a[i]$;

$j = i - 1$;

while ($j \geq 0$ && $a[j] > temp$) {

$a[j+1] = a[j]$;

$j--$;

}

$a[j+1] = temp$;

}

Step 1:

0	1	2	3	4	5
5	4	10	1	6	2

temp = $i = 4$;

temp = 4;

$j = 2 - 1 = 1$

Step 2: while ($j \geq 0$ && $a[j] > temp$)

enter loop because $j=1$ and temp=4

$$a[j+1] = a[j]$$

that means value 5 set at index 1 and

j--

j decrement to 0 - 1

Step 3: $a[j+1] = \text{temp}$

we set 4 at 0 index

this process work until the array will sorted