

# Algorithm for Insertion Sort



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Steps:

1. Read the list in an array list[N]
2. For  $i=2$  to  $N$  repeat steps 3 to 8
3.  $temp = list[i]$  // pick the first element of unsorted part
4.  $j = i - 1$
5. while ( $temp <= list[j]$  AND  $j >= 0$ ) // scanning for proper place  
Repeat steps 6 to 7.
6.  $list[j+1] = list[j];$
7.  $j = j - 1$
8.  $list[j+1] = temp$  // insert element at proper place in sorted part.
9. Print the list
10. End.

1	2	3	4	5	6	7
8	5	6	1	4	19	7

Step 2:  $i=2$  to  $N$  repeat step 3 to 8

Step 3:  $temp = list[i] \Rightarrow list[2] = 5$   
 $temp = 5$

Step 4:  $j = i - 1 \Rightarrow 1$

Step 5 while ( $temp <= list[j]$  &  $j >= 0$ )

Here  $5 <= list[j]$   
 $5 <= 8$  &  $j >= 0$   
True

then.

Step 6.  $list[j+1] = list[j]$   
 $list[2] = list[1]$   
 $list[2] = 8$

Step 7.  $j = j - 1 \Rightarrow j = 0$

going to step 5 while ( $temp <= list[j]$  &  $j >= 0$ )

Here  $5 <= list[j]$  &  $0 >= 0$   
 $= 5$  & ~~True~~ false As

$list[0]$  does not exist.

then  ~~$list[j+1] = list[j]$~~

Now Step 8:  $list[j+1] = temp$   
 $list[0+1] = 5$

1	2	3	4	5	6	7
5	8	6	1	4	19	7

After first pass

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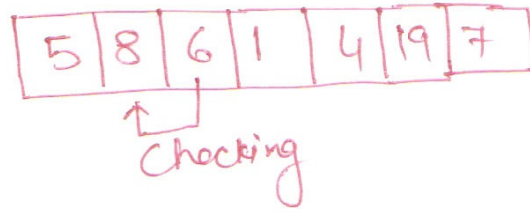
Now going to step 2

$$i = 3$$

$$\text{temp} = \text{List}[i]$$

$$\text{temp} = 6$$

$$j = i - 1 = 2$$



Steps while ( $\text{temp} \leq \text{List}[j]$  &  $j \geq 0$ )

Here ( $6 \leq 8$  &  $j \geq 0$ ) True

then

Step 6  $\text{List}[j+1] = \text{List}[j]$

$$\text{List}[3] = 8$$

Step 7.  $j = j - 1 = 1$

going to step 5

while ( $\text{temp} \leq \text{List}[j]$  &  $j \geq 0$ )

$$6 \leq \text{List}[1] \text{ \& } j \geq 0$$

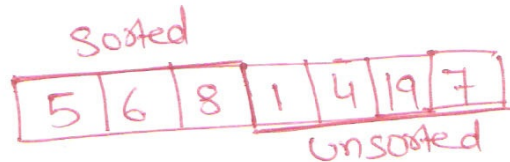
$$\underline{6 \leq 5}$$

false

going to step 8

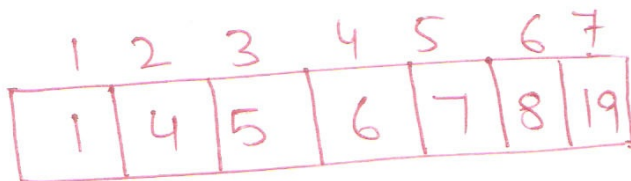
$$\text{List}[j+1] = \text{temp}$$

$$\text{List}[2] = 6$$



Going to step 2

We will go same manner until  $i \leq N$  in step 2.



SORTED



In the end.