

## → Sorting Algorithms ←

لواء arr معکوسی  $\rightarrow [n^2]$  (4)   
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## 11 Insertion Sort

1) Is destructive?? → Yes, because it overwrites the input Data structure during execution

2) Is in Place ??  $\rightarrow$  Yes, as it doesn't need any extra Place in memory.

\* Intivation.

1) 

5	4	10	1	6	2
---	---	----	---	---	---

  
sorted      unsorted

2) 

4	<del>5</del>	<del>10</del>	1	6	2
---	--------------	---------------	---	---	---

 is 5 > 4 temp 

5
---

3) 

4	5	<del>10</del>	1	6	2
---	---	---------------	---	---	---

 10 > 5 temp 

10
----

4) 

<del>4</del>	<del>5</del>	<del>10</del>	<del>1</del>	6	2
--------------	--------------	---------------	--------------	---	---

 10 > 6 temp 

1
---

sorted 

1	4	5	<del>6</del>	<del>10</del>	2
---	---	---	--------------	---------------	---

 6 > 10 temp 

6
---

sorted 

1	<del>4</del>	<del>5</del>	<del>6</del>	<del>10</del>	2
---	--------------	--------------	--------------	---------------	---

 2 > 10 temp 

2
---

sorted 

1	2	4	5	6	10
---	---	---	---	---	----

 2 > 6 X

sorted 

1	2	4	5	6	10
---	---	---	---	---	----

 2 > 5 X

sorted 

1	2	4	5	6	10
---	---	---	---	---	----

 2 > 4 X

sorted 

1	2	4	5	6	10
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 2 > 1 ✓

\* code.

→ we have two Loops

1) increment (unsorted)

2) decrement (sorted)

$$f(i=1; i < n; i++)$$

[

$$\text{temp} = a[i];$$
$$\dot{v} = \dot{v}_1 + j\dot{v}_2$$

```
while (j >= 0 && a[j] > tem)
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$$[$$
$$a[j+1] = a[j]j$$

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3

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

3