SORTING TECHNIQUES

OMKAR BASNET

INCHARGE, CSIT/BCA

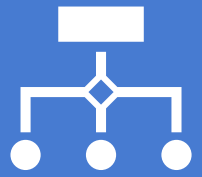
TEXAS INTERNATIONAL COLLEGE

SORTING TECHNIQUES

(8 HRS.)

- Analysis of selection sort
- Divide and conquer strategy
- Quick and merge sort
- Heap sort

ANALYSIS OF SELECTION SORT



Selection sort is an algorithm that selects the smallest element from an unsorted list in each iteration and places that element at the beginning of the unsorted list.

This sorting algorithm is an in-place comparison-based algorithm in which the list is divided into two parts, the sorted part at the left end and the unsorted part at the right end.

SET THE FIRST ELEMENT AS MINIMUM

HOW SELECTION SORT WORKS?

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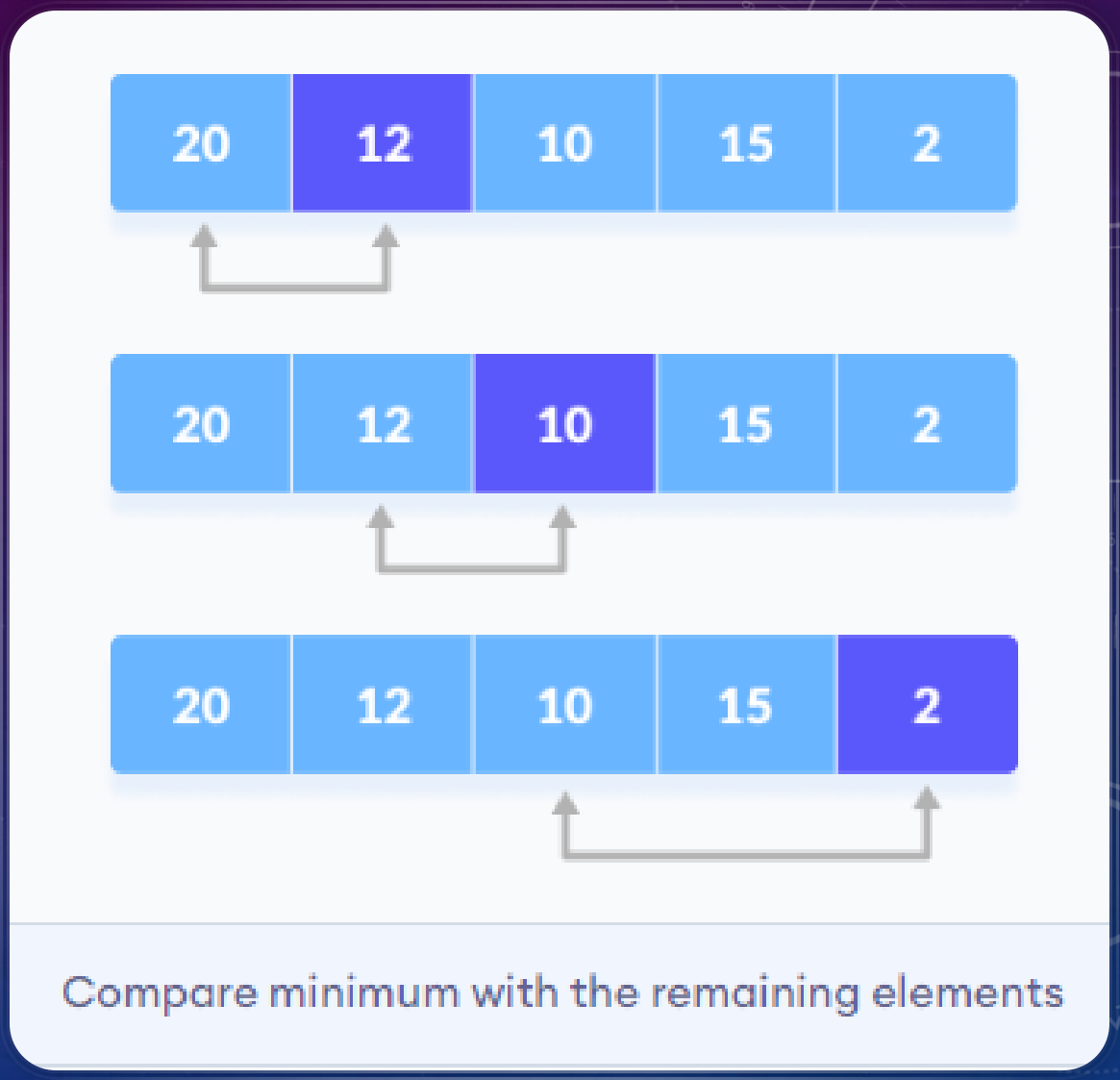
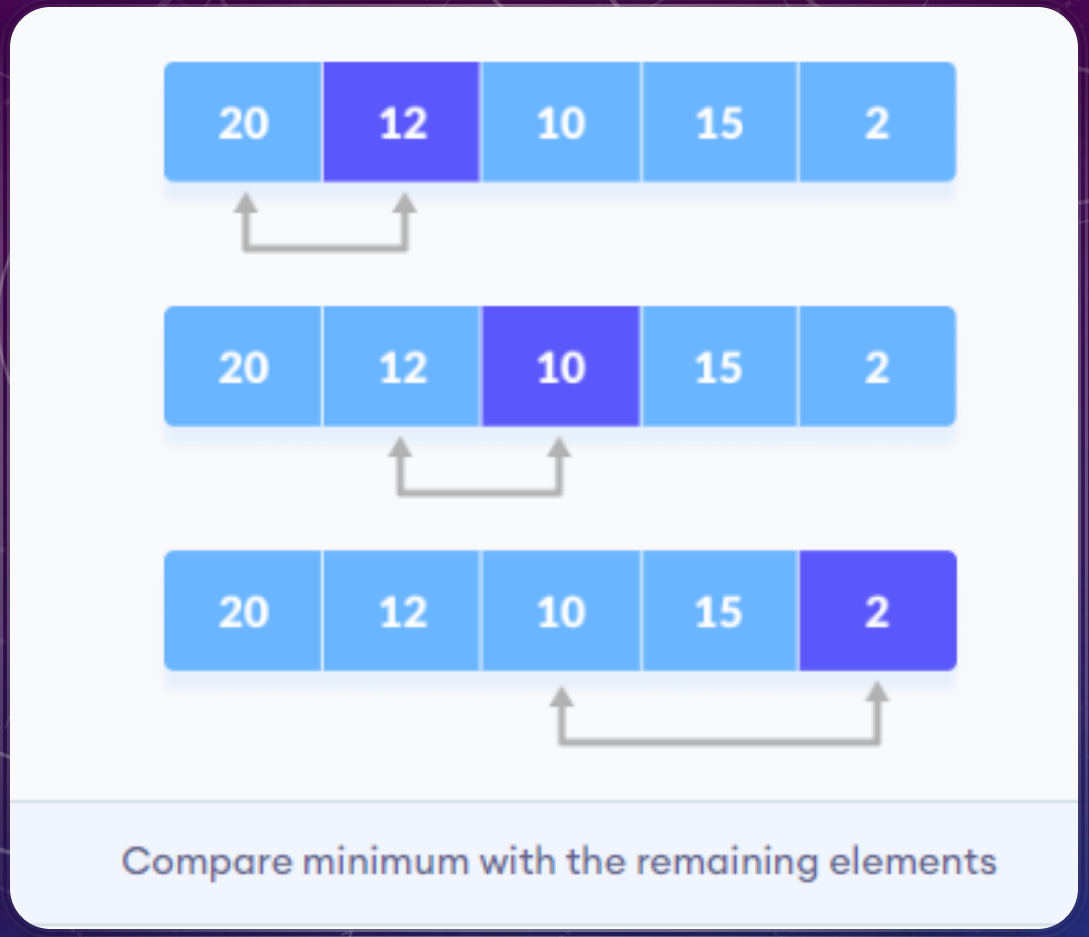
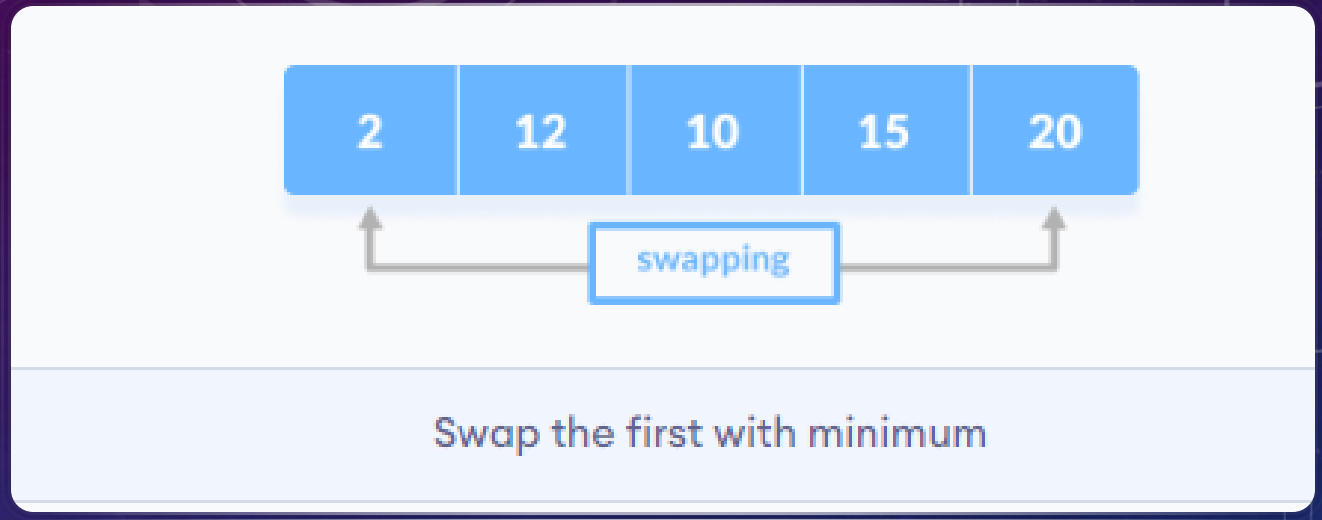
- Compare **minimum** with the second element. If the second element is smaller than **minimum**, assign the second element as **minimum**.

  Compare **minimum** with the third element. Again, if the third element is smaller, then assign **minimum** to the third element otherwise do nothing. The process goes on until the last element.





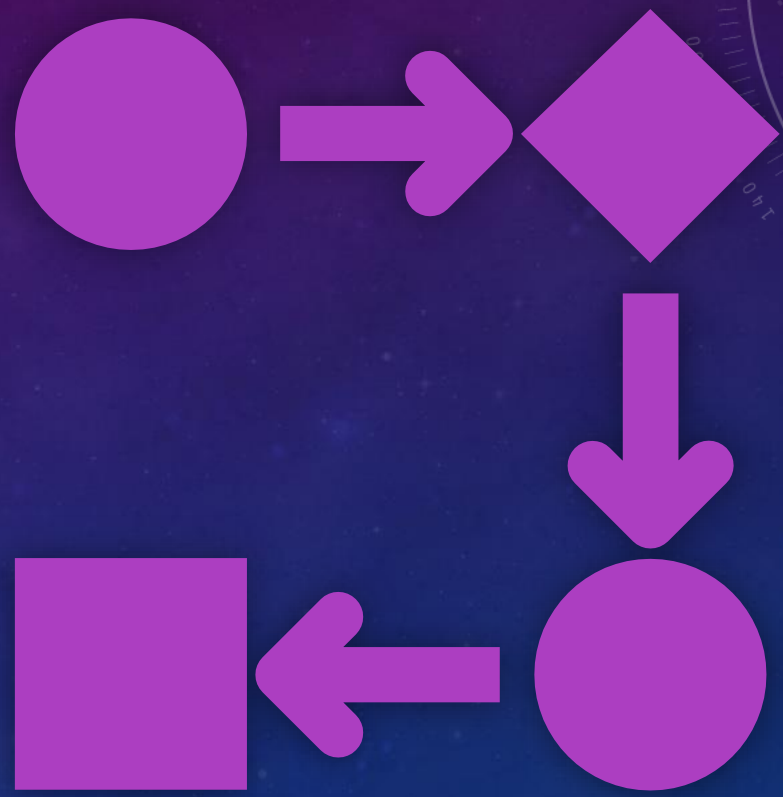


HOW SELECTION SORT WORKS?

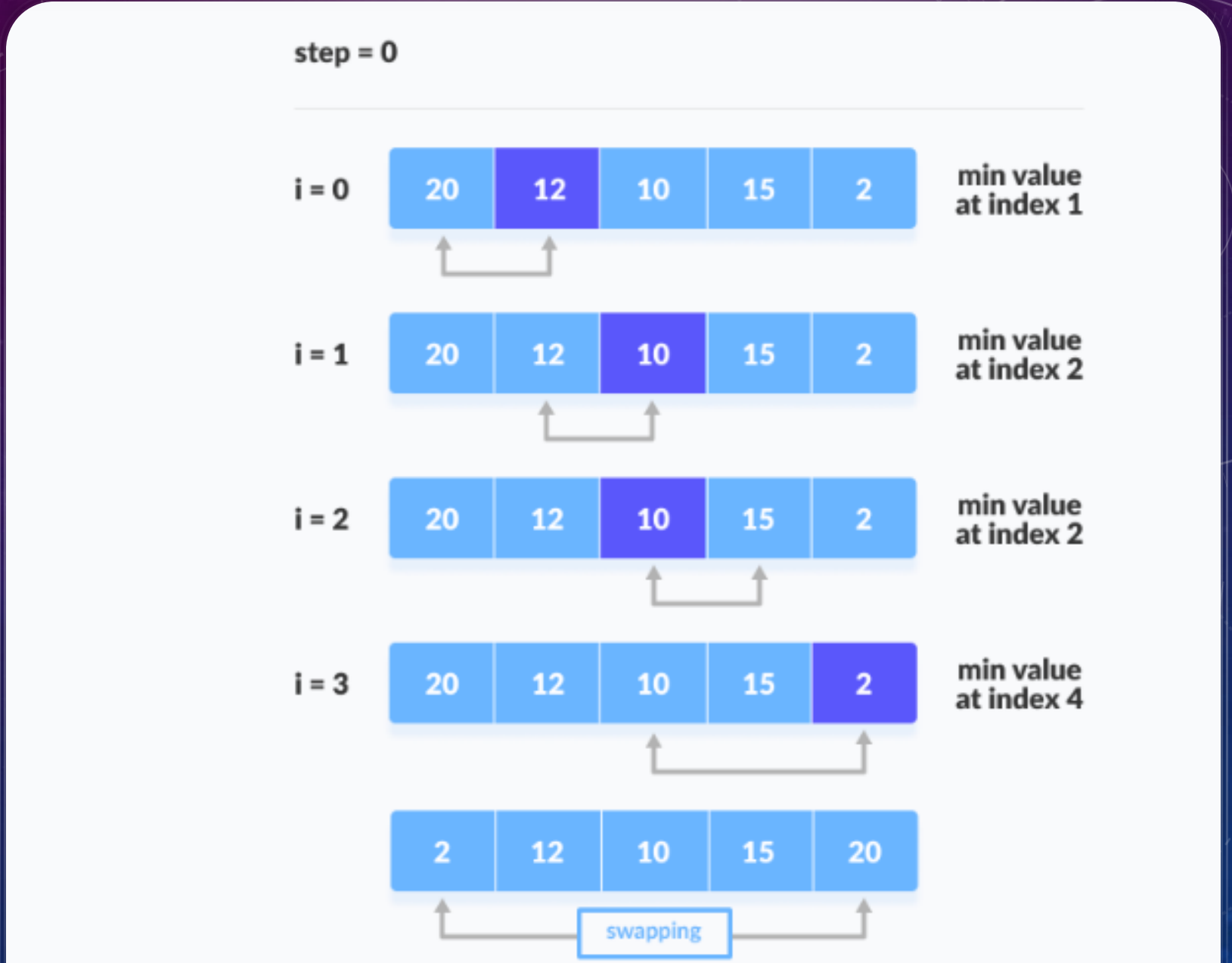
AFTER EACH ITERATION, MINIMUM IS PLACED IN THE FRONT OF THE UNSORTED LIST.

HOW SELECTION SORT WORKS?

- For each iteration, indexing starts from the first unsorted element. Step 1 to 3 are repeated until all the elements are placed at their correct positions.

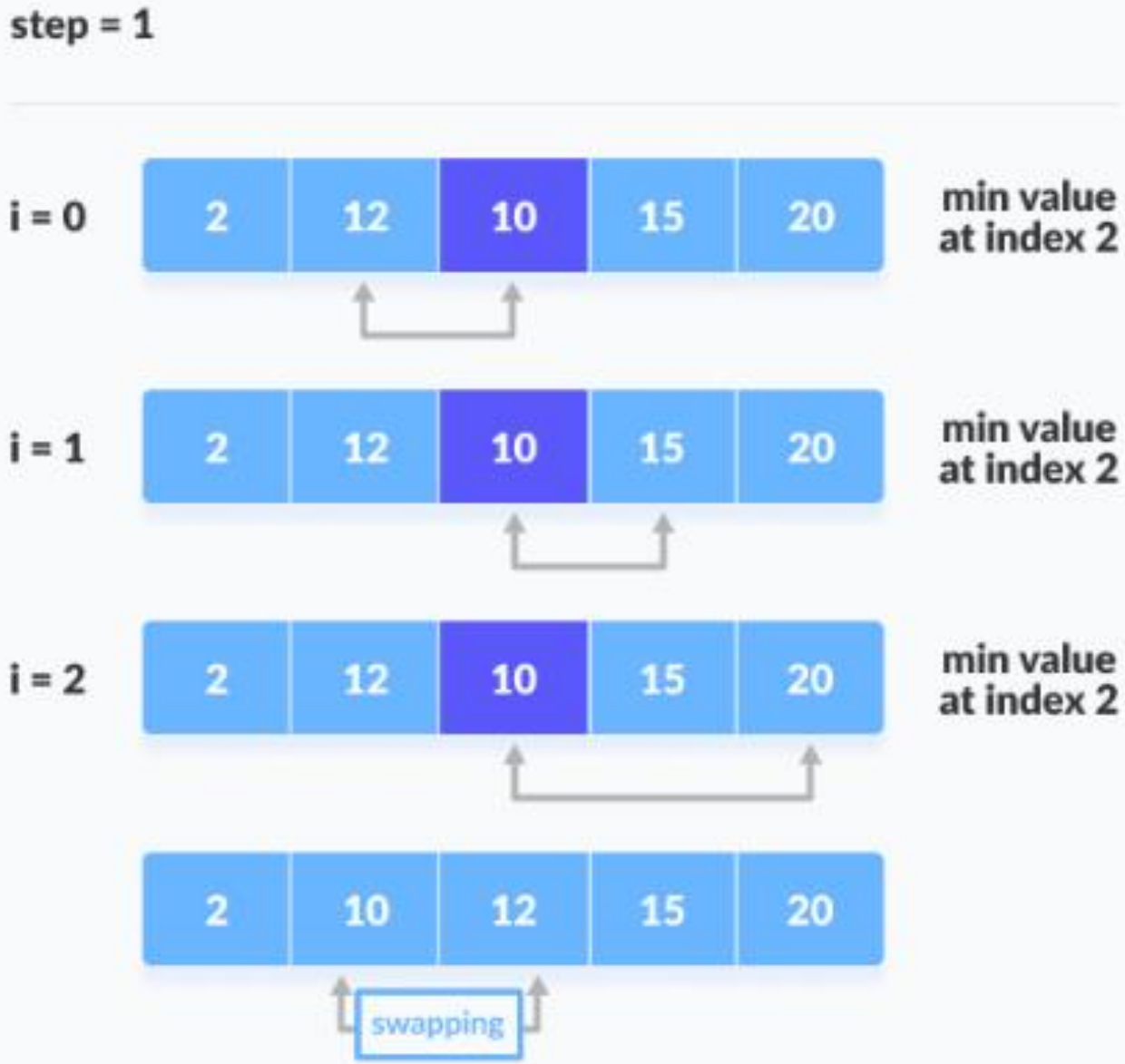


HOW SELECTION SORT WORKS?



The first iteration

HOW SELECTION SORT WORKS?



The second iteration

HOW SELECTION SORT WORKS?

The third iteration

HOW SELECTION SORT WORKS?

The fourth iteration

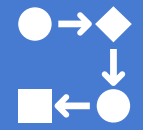
Cycle	Number of Comparison
1st	(n-1)
2nd	(n-2)
3rd	(n-3)
...	...
last	1

Number of comparisons: `(n - 1) + (n - 2) + (n - 3) + ..... + 1 = n(n - 1) / 2` nearly equals to n^2.

Complexity = $O(n^2)$

COMPLEXITY

TIME COMPLEXITIES:



Worst Case Complexity: $O(n^2)$
If we want to sort in ascending order and the array is in descending order then, the worst case occurs.

Best Case Complexity: $O(n^2)$
It occurs when the array is already sorted

Average Case Complexity: $O(n^2)$
It occurs when the elements of the array are in jumbled order (neither ascending nor descending).