Aror University of Art, Architecture, Design and Heritage
SUKKUR, Sindh
Department of Multimedia and Gaming
Course: Data Structures CSC-221 (Practical)
Instructor: Engr. Fatima Jaffar

LAB 10

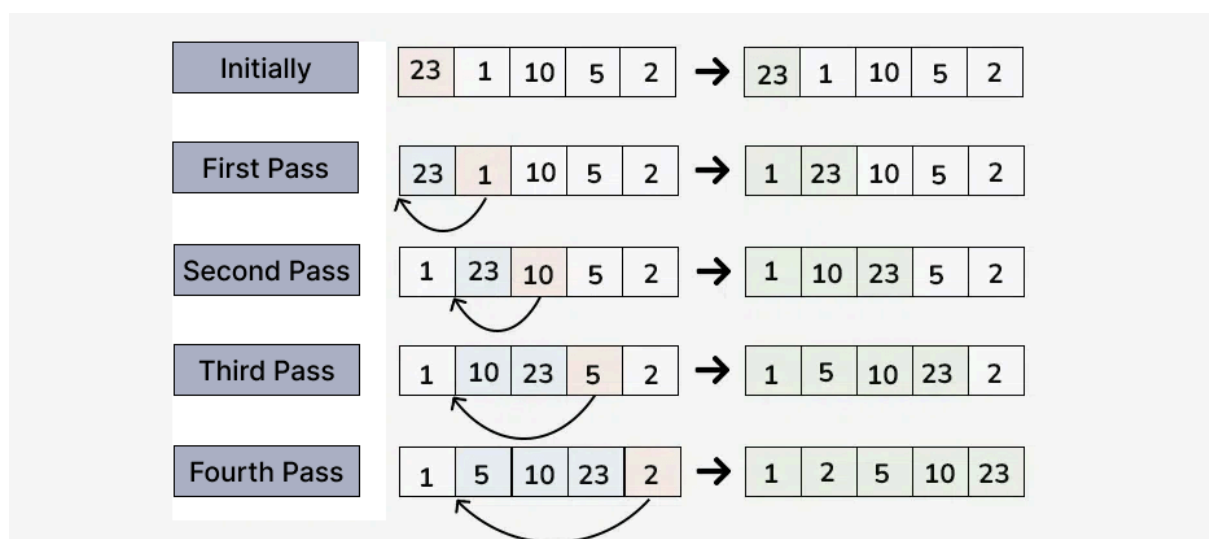**Objective:** Understanding and Implementing Insertion Sort Algorithm

Introduction:

Insertion sort is a simple sorting algorithm that works by iteratively inserting each element of an unsorted list into its correct position in a sorted portion of the list. It is like sorting playing cards in your hands. You split the cards into two groups: the sorted cards and the unsorted cards. Then, you pick a card from the unsorted group and put it in the right place in the sorted group.

Algorithm:

- We start with second element of the array as first element in the array is assumed to be sorted.

- Compare second element with the first element and check if the second element is smaller then swap them.

- Move to the third element and compare it with the first two elements and put at its correct position

- Repeat until the entire array is sorted.

Initially	23	1	10	5	2	→	23	1	10	5	2	
First Pass	23	1	10	5	2	→	1	23	10	5	2	
Second Pass	1	23	10	5	2	→	1	10	23	5	2	
Third Pass	1	10	23	5	2	→	1	5	10	23	2	
Fourth Pass	1	5	10	23	2	→	1	2	5	10	23	

Time Complexity of Insertion Sort

- **Best case: O(n)** , If the list is already sorted, where n is the number of elements in the list.

- **Average case: O(n 2)** , If the list is randomly ordered

- **Worst case: O(n 2)** , If the list is in reverse order

Lab Task

Implement Insertion sort algorithm in java.