Sorting
Selection Sort(c++)
Input Array:
64,25,12,22,11
Process:
Pass 1: Find the smallest element in the whole array (11), and swap it with the first element:
Array becomes: 11,25,12,22,64
Pass 2: Find the smallest element in the subarray starting from index 1 (12), and swap it with the element at index 1:
Array becomes: 11,12,25,22,64
Pass 3: Find the smallest element in the subarray starting from index 2 (22), and swap it with the element at index 2:
Array becomes: 11,12,22,25,64
Pass 4: Find the smallest element in the subarray starting from index 3 (25), and swap it with the element at index 3:
Array becomes: 11,12,22,25,64
The array is now sorted.

```
#include <iostream>
using namespace std;

void selectionSort(int arr[], int n) {
   for (int i = 0; i < n - 1; i++) {
      int minIndex = i;
      for (int j = i + 1; j < n; j++) {
         if (arr[j] < arr[minIndex]) {
            minIndex = j;
         }
      }
      // Swap the found minimum element with the first element
      swap(arr[i], arr[minIndex]);
   }
}

void printArray(int arr[], int n) {
   for (int i = 0; i < n; i++) {
      cout << arr[i] << " ";
   }
   cout << endl;
}

int main() {
   int arr[] = {64, 25, 12, 22, 11};
   int n = sizeof(arr) / sizeof(arr[0]);

   cout << "Original array: ";
   printArray(arr, n);
```

```
    selectionSort(arr, n);

    cout << "Sorted array: ";
    printArray(arr, n);

    return 0;
}
```

Selection Sort(Java)

```
import java.util.Arrays;

public class SelectionSort {

    // Method to perform selection sort
    public static void selectionSort(int[] arr) {
        int n = arr.length;

        // Traverse through the entire array
        for (int i = 0; i < n - 1; i++) {
            // Assume the first unsorted element is the smallest
            int minIndex = i;

            // Find the index of the smallest element in the remaining unsorted array
            for (int j = i + 1; j < n; j++) {
                if (arr[j] < arr[minIndex]) {
                    minIndex = j;
                }
            }

            // Swap the found minimum element with the first element of the unsorted part
            if (minIndex != i) {
                int temp = arr[i];
                arr[i] = arr[minIndex];
                arr[minIndex] = temp;
            }
        }
    }

    // Method to print the array
    public static void printArray(int[] arr) {
        System.out.println(Arrays.toString(arr));
    }

    // Main method to test the selection sort
    public static void main(String[] args) {
        int[] arr = {64, 25, 12, 22, 11};

        // Perform selection sort
```

```
        selectionSort(arr);

        System.out.println("Sorted array: ");
        printArray(arr);
    }
}
```

```
Enter the number of elements: 5
Enter 5 elements: 64 25 12 22 11
Final Sorted array: 11 12 22 25 64
```

Selection Sort For Each pass

```
// C++ Implementation
#include <iostream>
using namespace std;

void printArray(int arr[], int n, int pass) {
    cout << "Pass " << pass << ": ";
    for (int i = 0; i < n; i++) {
        cout << arr[i] << " ";
    }
    cout << endl;
}

void selectionSort(int arr[], int n) {
    for (int i = 0; i < n - 1; i++) {
        // Find minimum element in unsorted array
        int minIdx = i;
        for (int j = i + 1; j < n; j++) {
            if (arr[j] < arr[minIdx]) {
                minIdx = j;
            }
        }

        // Swap found minimum element with first element
        if (minIdx != i) {
            int temp = arr[i];
            arr[i] = arr[minIdx];
            arr[minIdx] = temp;
        }

        // Print array after each pass
        printArray(arr, n, i + 1);
    }
}

int main() {
    int n;
```

```
    //cout << "Enter the number of elements: ";
    cin >> n;

    int arr[n];
    //cout << "Enter " << n << " elements: ";
    for (int i = 0; i < n; i++) {
        cin >> arr[i];
    }

    //cout << "\nOriginal array: ";
    //printArray(arr, n, 0);
    //cout << "\nSorting Process:\n";

    selectionSort(arr, n);

    cout << "\nFinal Sorted array: ";
    for (int i = 0; i < n; i++) {
        cout << arr[i] << " ";
    }

    return 0;
}
```

Sample Input

5

50 40 30 20 10

Your Output

Pass 1: 10 40 30 20 50

Pass 2: 10 20 30 40 50

Pass 3: 10 20 30 40 50

Pass 4: 10 20 30 40 50

Final Sorted array: 10 20 30 40 50

Selection Sort With value displayed for each pass

```
// Java Implementation
import java.util.Scanner;

public class SelectionSort {
    public static void printArray(int[] arr, int pass) {
        System.out.print("Pass " + pass + ": ");
        for (int i = 0; i < arr.length; i++) {
            System.out.print(arr[i] + " ");
        }
        System.out.println();
    }

    public static void selectionSort(int[] arr) {
```

```
    int n = arr.length;

    for (int i = 0; i < n - 1; i++) {
        // Find minimum element in unsorted array
        int minIdx = i;
        for (int j = i + 1; j < n; j++) {
            if (arr[j] < arr[minIdx]) {
                minIdx = j;
            }
        }

        // Swap found minimum element with first element
        if (minIdx != i) {
            int temp = arr[i];
            arr[i] = arr[minIdx];
            arr[minIdx] = temp;
        }

        // Print array after each pass
        printArray(arr, i + 1);
    }
}

public static void main(String[] args) {
    Scanner scanner = new Scanner(System.in);

    System.out.print("Enter the number of elements: ");
    int n = scanner.nextInt();

    int[] arr = new int[n];
    System.out.print("Enter " + n + " elements: ");
    for (int i = 0; i < n; i++) {
        arr[i] = scanner.nextInt();
    }

    System.out.print("\nOriginal array: ");
    printArray(arr, 0);
    System.out.println("\nSorting Process:");

    selectionSort(arr);

    System.out.print("\nFinal Sorted array: ");
    for (int i = 0; i < n; i++) {
        System.out.print(arr[i] + " ");
    }

    scanner.close();
}
```

}

O/p

Sample Input

5

50 40 30 20 10

Your Output

Pass 1: 10 40 30 20 50

Pass 2: 10 20 30 40 50

Pass 3: 10 20 30 40 50

Pass 4: 10 20 30 40 50

10 20 30 40 50