PROGRAM:

Selection Sort

```
import java.util.*;

public class SelectionSort {
    public static void main(String[] args) {
        int arr[];

        System.out.println("Enter the number of elements: ");
        Scanner sc = new Scanner(System.in);
        int n = sc.nextInt();

        arr = new int[n];

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

        sc.close();

        int min = 0;

        System.out.println("Unsorted array ==> \n" + Arrays.toString(arr));

        System.out.println("The steps for sorting in SelectionSort Sort are:
\n");

        int totalComparisions,totalSwaps;
        totalComparisions=totalSwaps=0;

        while(min < arr.length-1) {
            int comp,swap;
            comp = swap = 0;
            for(int i = min+1; i < arr.length; i++) {
                if(arr[i] < arr[min]) {
                    int temp = arr[i];
                    arr[i] = arr[min];
                    arr[min] = temp;
                    totalSwaps++;
                    swap++;
                }
                totalComparisions++;
                comp++;
            }
            System.out.println(Arrays.toString(arr)+"\nComparisions:
"+comp+"\nSwaps: "+swap);
```

```
            min++;
        }

        System.out.println("totalComparisions = " + totalComparisions);
        System.out.println("totalSwaps = " + totalSwaps);

        System.out.println("\nSorted array" + Arrays.toString(arr));
    }
}
```

OUTPUT:

```
PS D:\Harsh\SEM 4\AOA\Assignment> cd "d:\Harsh\SEM 4\AOA\Assignment\" ; if ($?)
Enter the number of elements:
5
Enter the elements:
12
14
16
13
17
Unsorted array ==>
[12, 14, 16, 13, 17]
The steps for sorting in SelectionSort Sort are:

[12, 14, 16, 13, 17]
Comparisions: 4
Swaps: 0
[12, 13, 16, 14, 17]
Comparisions: 3
Swaps: 1
[12, 13, 14, 16, 17]
Comparisions: 2
Swaps: 1
[12, 13, 14, 16, 17]
Comparisions: 1
Swaps: 0
totalComparisions = 10
totalSwaps = 2

Sorted array[12, 13, 14, 16, 17]
PS D:\Harsh\SEM 4\AOA\Assignment>
```

Insertion Sort:

```
import java.util.*;

class InsertionSort{

    public static void sort(int arr[])
    {
        int n = arr.length;

        int totalSwaps = 0;
        int totalComparisions = 0;

        for (int i = 1; i < n; ++i) {
            int key = arr[i];
            int j = i - 1;
            int swaps = 0;
            while (j >= 0 && arr[j] > key) {
                arr[j + 1] = arr[j];
                j--;
                swaps++;
            }

            arr[j + 1] = key;

            totalSwaps+=swaps;

            System.out.println("\n"+Arrays.toString(arr));

            if(j==i-1){
                totalComparisions+=(1);
                System.out.println("No. of comparisions in this cycle: " +
(1));
            }
            else{
                totalComparisions+=(i-j);
                System.out.println("No. of comparisions in this cycle: " + (i-
j));
            }

            System.out.println("Swaps = " + swaps);

        }

        System.out.println("\nTotal number of comparisions: " +
totalComparisions);
```

```java
    }

    public static void main(String[] args) {

        int arr[];

        System.out.println("Enter the number of elements: ");
        Scanner sc = new Scanner(System.in);
        int n = sc.nextInt();

        arr = new int[n];

        System.out.println("\nEnter the element of the array: ");
        for(int i=0; i<n; i++){
            arr[i] = sc.nextInt();
        }

        sc.close();

        System.out.println("Unsorted array ==> " + Arrays.toString(arr));

        sort(arr);

        System.out.println("\nSorted array ==> " + Arrays.toString(arr));
    }
}
```

OUTPUT:

```
PS D:\Harsh\SEM 4\AOA\Assignment> cd "d:\Harsh\SEM 4\AOA\Assignm
Enter the number of elements:
5

Enter the element of the array:
12
45
5
4
6
Unsorted array ==> [12, 45, 5, 4, 6]

[12, 45, 5, 4, 6]
No. of comparisions in this cycle: 1
Swaps = 0

[5, 12, 45, 4, 6]
No. of comparisions in this cycle: 3
Swaps = 2

[4, 5, 12, 45, 6]
No. of comparisions in this cycle: 4
Swaps = 3

[4, 5, 6, 12, 45]
No. of comparisions in this cycle: 3
Swaps = 2

Total number of comparisions: 11

Sorted array ==> [4, 5, 6, 12, 45]
PS D:\Harsh\SEM 4\AOA\Assignment>
```