Government College of Engineering, Jalgaon
Department of Computer Engineering
Experiment No: 02

Name: **PRN:**
Subject:CO310U (Application programming Lab) **Sem:**V(Odd)
Class:T.Y. B.Tech **Academic Year:**2024-25
Date of Performance: **Date of Completion:**

Aim:

A.Write a java program to search for an element in a given list of elements using binary search mechanism

B. Write a java program to sort for an element in a given list of elements using bubble sort

Required Software: OpenJDK version "1.8.0_131"
OpenJDK Runtime Environment (build 1.8.0_131-8u131-b11-2ubuntu1.16.04.3-b11)
OpenJDK 64-Bit Server VM (build 25.131-b11, mixed mode)

Java Compiler Version - JAVAC 1.8.0_131

Theory:

Binary Search:

- Search a sorted array by repeatedly dividing the search interval in half.
- Begin with an interval covering the whole array.
- If the value of the search key is less than the item in the middle of the interval, narrow the interval to the lower half.
- Otherwise narrow it to the upper half. Repeatedly check until the value is found or the interval is empty.

Bubble sort:

- Bubble sort is a simple sorting algorithm. This sorting algorithm is a comparison-based algorithm in which each pair of adjacent elements is compared and the elements are swapped if they are not in order. This algorithm is not suitable for large data sets as its average and worst case complexity are of O(n2) where n is the number of items.

Conclusion:

Name & Sign of Course Teacher

Program:A

```
import java.util.*;
class p2 {
   public static void main(String args[]) {
      int n, i, num, first, last, middle;
      int a[] = new int[20];
      Scanner s = new Scanner(System.in);

      // Input the total number of elements
      System.out.println("Enter total number of elements:");
      n = s.nextInt();

      // Input the elements in sorted order
      System.out.println("Enter elements in sorted order:");
      for (i = 0; i < n; i++) {
         a[i] = s.nextInt();
      }
     // Input the value to search for
      System.out.println("Enter the search value:");
      num = s.nextInt();

    // Initializing the binary search
      first = 0;
      last = n - 1;
      middle = (first + last) / 2;

     // Binary search algorithm
      while (first <= last) {
         if (a[middle] < num) {
            first = middle + 1;
         } else if (a[middle] == num) {
            System.out.println(num + " found at position " + (middle + 1));
            break;
         } else {
            last = middle - 1;
         }
         middle = (first + last) / 2;
      }

      // If the element is not found
      if (first > last) {
         System.out.println(num + " is not found in the list.");
      }
   }
}
```

Output:

```
koliv@J4RVIS MINGW64 /d/Codes/APL
$ javac p2.java

koliv@J4RVIS MINGW64 /d/Codes/APL
$ java p2.java
Enter total number of elements:
7
Enter elements in sorted order:
1 4 6 8 12 34 45
Enter the search value:
8
8 found at position 4
```

Program:B

```
import java.util.Scanner;
class p2 {
   public static void main(String args[]) {
      int n, i, j, temp;
      int a[] = new int[20];
      Scanner s = new Scanner(System.in);

      // Input total number of elements
      System.out.println("Enter total number of elements:");
      n = s.nextInt();

      // Input the elements
      System.out.println("Enter elements:");
      for (i = 0; i < n; i++) {
         a[i] = s.nextInt();
      }

      // Bubble sort algorithm
      for (i = 0; i < n; i++) {
         for (j = 0; j < n - 1; j++) {
            if (a[j] > a[j + 1]) {
               temp = a[j];
               a[j] = a[j + 1];
               a[j + 1] = temp;
            }
         }
      }

      // Output the sorted elements
      System.out.println("The sorted elements are:");
      for (i = 0; i < n; i++) {
         System.out.print("\t" + a[i]);
      }
   }
}
```

Output:

```
koliv@J4RVIS MINGW64 /d/Codes/APL
$ javac p2.java

koliv@J4RVIS MINGW64 /d/Codes/APL
$ java p2.java
Enter total number of elements:
8
Enter elements:
9 5 3 2 1 12 14 16
The sorted elements are:
        1       2       3       5       9       12      14      16
```