Ranjith R 22IT085 Day 4 DSA Practice

1.Kth smallest element

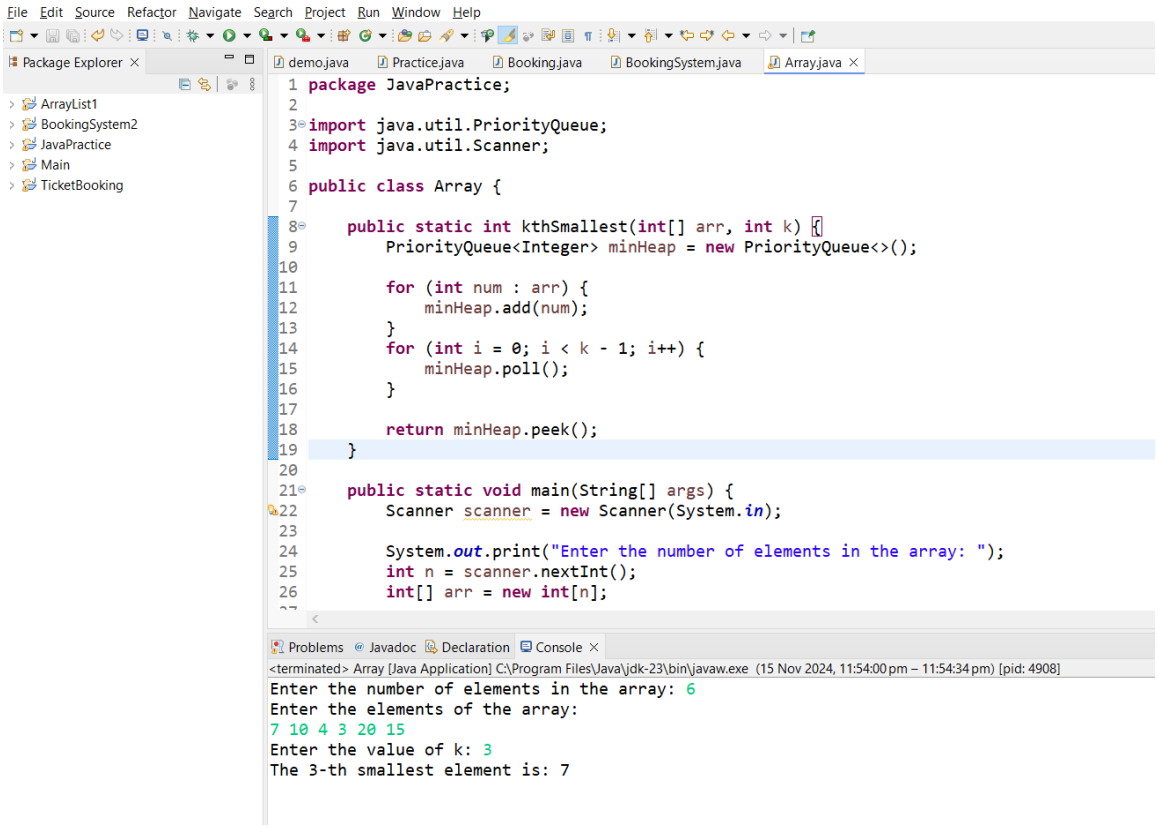
PROGRAM:

```
package JavaPractice;


import java.util.PriorityQueue;
import java.util.Scanner;


public class Array {


    public static int kthSmallest(int[] arr, int k) {
        PriorityQueue<Integer> minHeap = new PriorityQueue<>();


        for (int num : arr) {
            minHeap.add(num);
        }
        for (int i = 0; i < k - 1; i++) {
            minHeap.poll();
        }


        return minHeap.peek();
    }
```

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

        System.out.print("Enter the number of elements in the array: ");
        int n = scanner.nextInt();
        int[] arr = new int[n];

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

        System.out.print("Enter the value of k: ");
        int k = scanner.nextInt();

        int result = kthSmallest(arr, k);
        System.out.println("The " + k + "-th smallest element is: " + result);
    }
}
```

Time Complexity: O(nlogn)

OUTPUT:



2. Minimise the Heights II

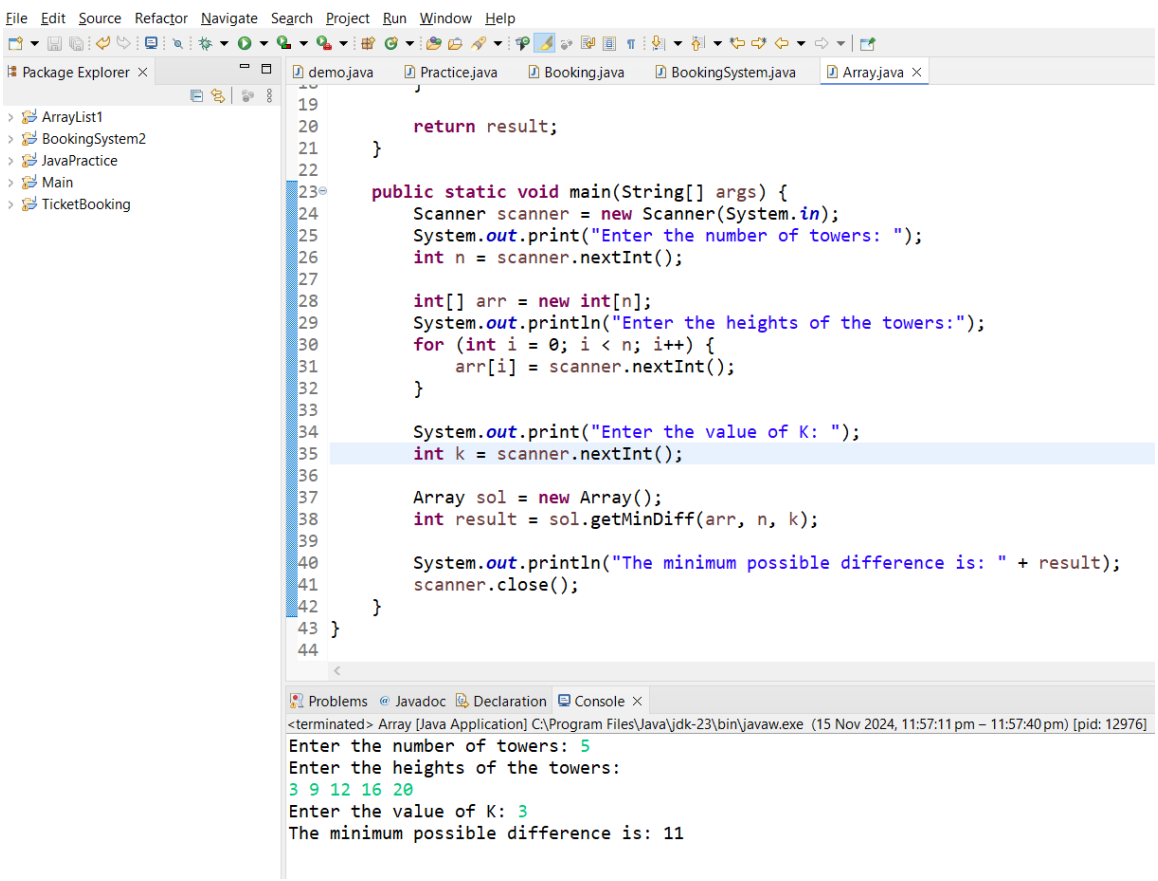
```
package JavaPractice;

import java.util.Arrays;
import java.util.Scanner;

public class Array {
    public int getMinDiff(int[] arr, int n, int k) {
        Arrays.sort(arr);
        int result = arr[n - 1] - arr[0];
        int minHeight = arr[0] + k;
        int maxHeight = arr[n - 1] - k;
```

```java
        for (int i = 1; i < n; i++) {
            if (arr[i] < k) continue;
            int minElement = Math.min(minHeight, arr[i] - k);
            int maxElement = Math.max(maxHeight, arr[i - 1] + k);
            result = Math.min(result, maxElement - minElement);
        }

        return result;
    }

    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter the number of towers: ");
        int n = scanner.nextInt();

        int[] arr = new int[n];
        System.out.println("Enter the heights of the towers:");
        for (int i = 0; i < n; i++) {
            arr[i] = scanner.nextInt();
        }

        System.out.print("Enter the value of K: ");
        int k = scanner.nextInt();

        Array sol = new Array();
        int result = sol.getMinDiff(arr, n, k);
```

```
        System.out.println("The minimum possible difference is: " +
result);

        scanner.close();

    }

}
```

Time Complexity: O(nlogn)

OUTPUT:



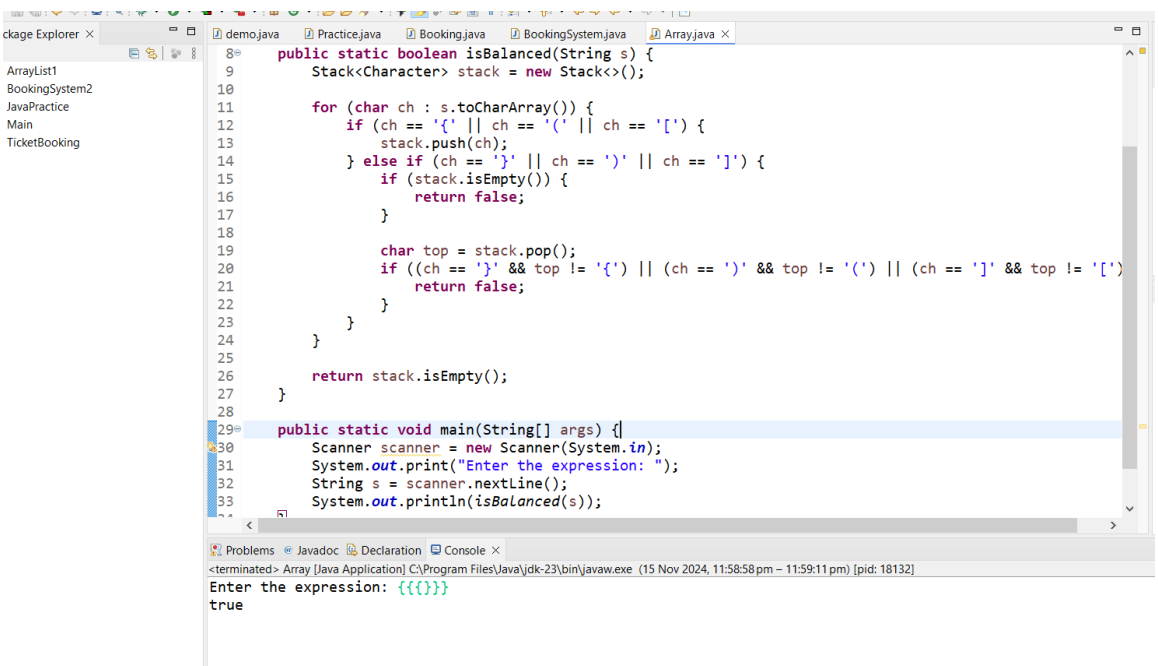
3. Parentheses Checker

```java
package JavaPractice;

import java.util.Stack;
import java.util.Scanner;

public class Array {

    public static boolean isBalanced(String s) {
        Stack<Character> stack = new Stack<>();

        for (char ch : s.toCharArray()) {
            if (ch == '{' || ch == '(' || ch == '[') {
                stack.push(ch);
            } else if (ch == '}' || ch == ')' || ch == ']') {
                if (stack.isEmpty()) {
                    return false;
                }

                char top = stack.pop();
                if ((ch == '}' && top != '{') || (ch == ')' && top !=
'(') || (ch == ']' && top != '[')) {
                    return false;
                }
            }
        }

        return stack.isEmpty();
```

```
    }

    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter the expression: ");
        String s = scanner.nextLine();
        System.out.println(isBalanced(s));
    }
}
```

Time Complexity: O(n)

OUTPUT:



4. Equllibrium Point

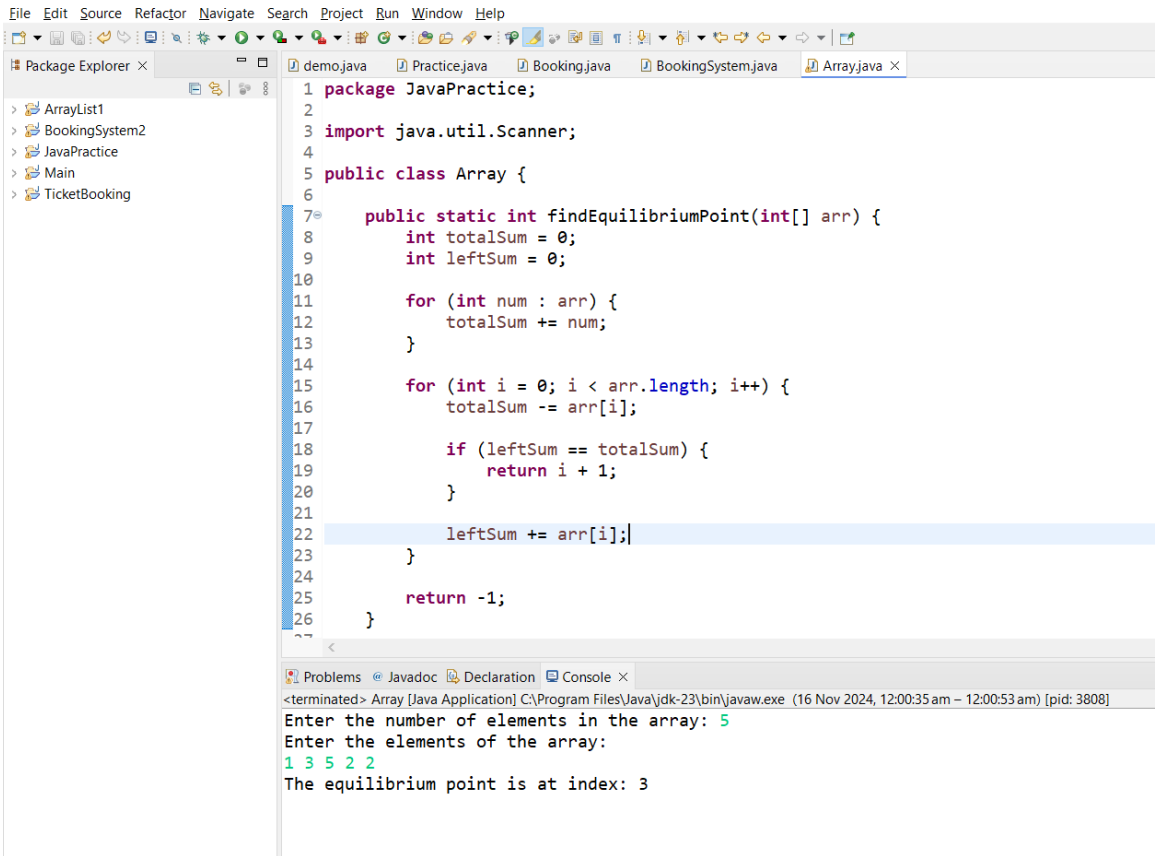
```
package JavaPractice;
```

```java
import java.util.Scanner;

public class Array {

    public static int findEquilibriumPoint(int[] arr) {
        int totalSum = 0;
        int leftSum = 0;

        for (int num : arr) {
            totalSum += num;
        }

        for (int i = 0; i < arr.length; i++) {
            totalSum -= arr[i];

            if (leftSum == totalSum) {
                return i + 1;
            }

            leftSum += arr[i];
        }

        return -1;
    }

    public static void main(String[] args) {
```

```
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter the number of elements in the array: ");
        int n = scanner.nextInt();
        int[] arr = new int[n];

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

        int result = findEquilibriumPoint(arr);

        if (result == -1) {
            System.out.println("No equilibrium point found");
        } else {
            System.out.println("The equilibrium point is at index: " + result);
        }
    }
}
```

Time Complexity: O(n)

OUTPUT:



5. Binary Search

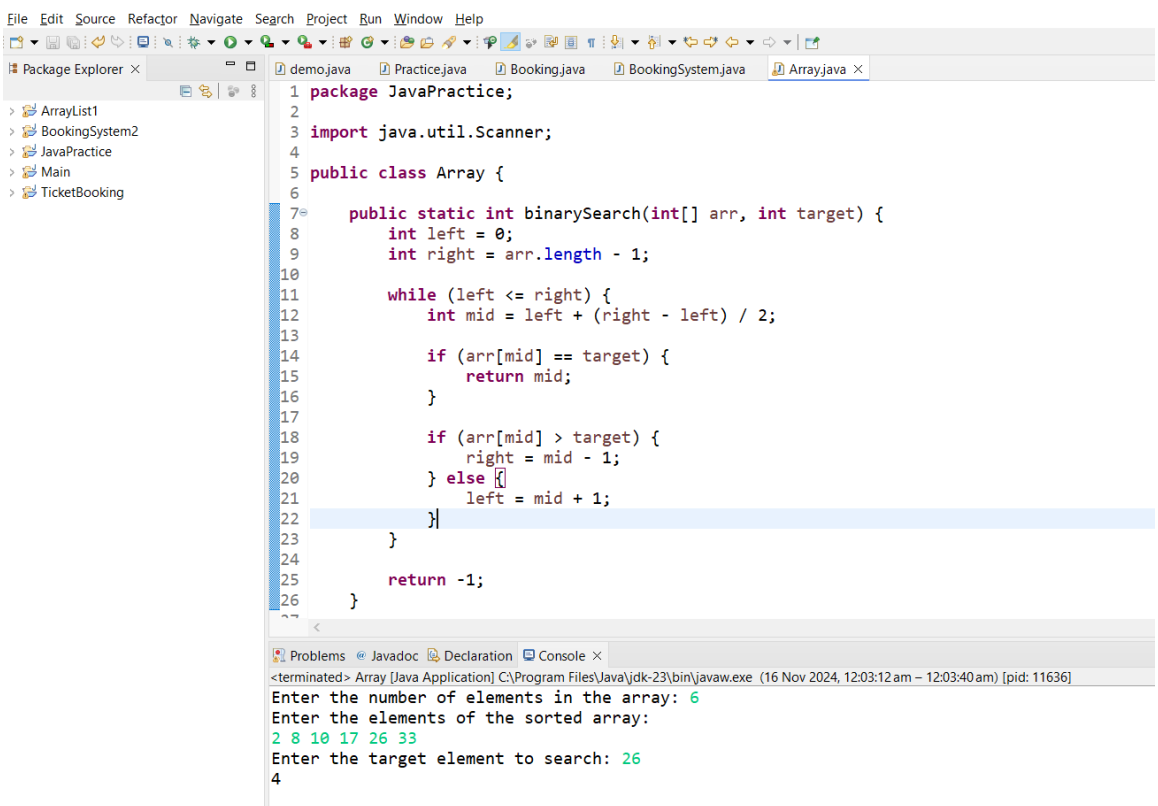
```java
package JavaPractice;


import java.util.Scanner;


public class Array {


    public static int binarySearch(int[] arr, int target) {
        int left = 0;
        int right = arr.length - 1;


        while (left <= right) {
```

```
            int mid = left + (right - left) / 2;

            if (arr[mid] == target) {
                return mid;
            }

            if (arr[mid] > target) {
                right = mid - 1;
            } else {
                left = mid + 1;
            }
        }

        return -1;
    }

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

        System.out.print("Enter the number of elements in the array:
");
        int n = scanner.nextInt();
        int[] arr = new int[n];

        System.out.println("Enter the elements of the sorted array:");
        for (int i = 0; i < n; i++) {
            arr[i] = scanner.nextInt();
```

```
        }

        System.out.print("Enter the target element to search: ");
        int target = scanner.nextInt();

        int result = binarySearch(arr, target);

        System.out.println(result);
    }
}
```

Time Complexity: O(log n)

OUTPUT:



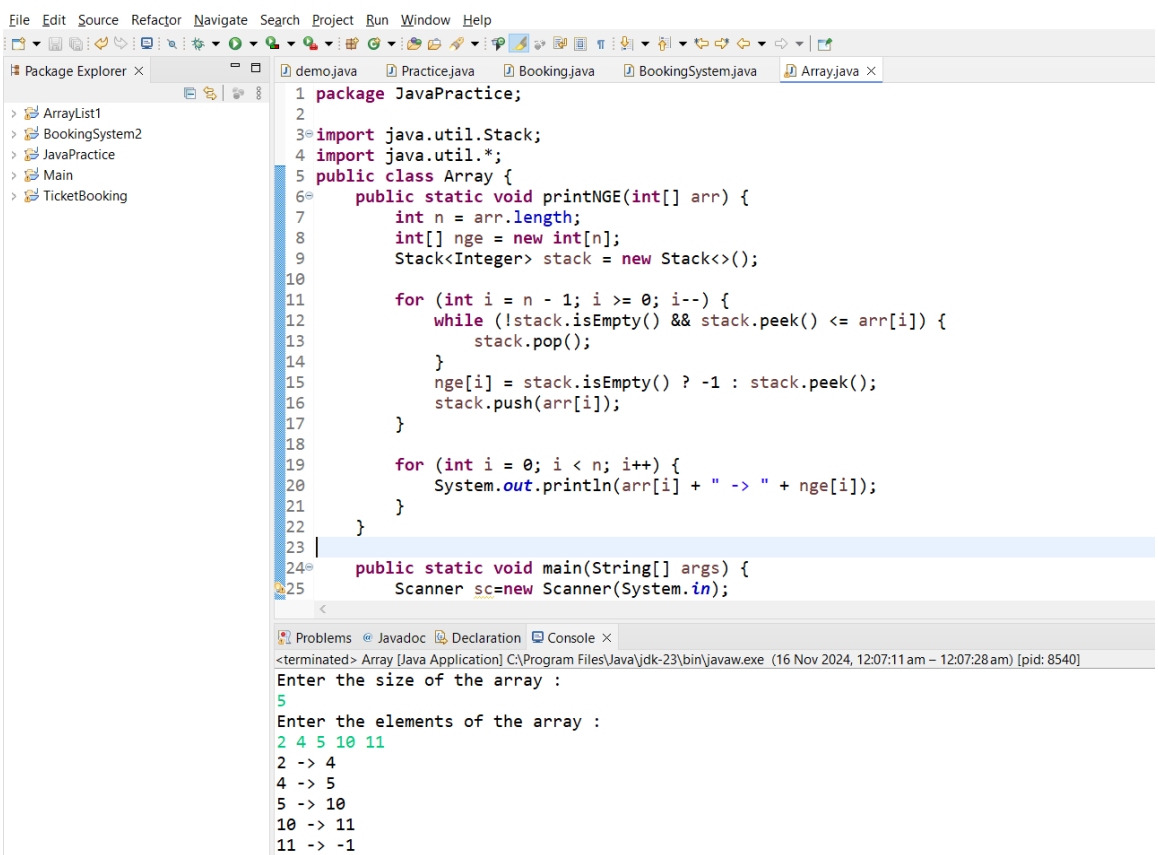
6. Next greater element

```java
package JavaPractice;

import java.util.Stack;
import java.util.*;
public class Array {
    public static void printNGE(int[] arr) {
        int n = arr.length;
        int[] nge = new int[n];
        Stack<Integer> stack = new Stack<>();

        for (int i = n - 1; i >= 0; i--) {
            while (!stack.isEmpty() && stack.peek() <= arr[i]) {
                stack.pop();
            }
            nge[i] = stack.isEmpty() ? -1 : stack.peek();
            stack.push(arr[i]);
        }

        for (int i = 0; i < n; i++) {
            System.out.println(arr[i] + " -> " + nge[i]);
        }
    }

    public static void main(String[] args) {
        Scanner sc=new Scanner(System.in);
        System.out.println("Enter the size of the array : ");
        int n=sc.nextInt();
```

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

Time Complexity: O(n)

OUTPUT:



7.Union of two arrays with duplicate elements

```java
package JavaPractice;

import java.util.HashSet;
import java.util.Scanner;

public class Array {
    public static int findUnion(int[] a, int[] b) {
        HashSet<Integer> uList = new HashSet<>();
        for (int num : a) {
            uList.add(num);
        }
        for (int num : b) {
            uList.add(num);
        }
        return uList.size();
    }

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

        System.out.print("Enter number of elements in array 1: ");
        int n1 = sc.nextInt();
        int[] arr1 = new int[n1];
        System.out.println("Enter elements of array 1:");
        for (int i = 0; i < n1; i++) {
            arr1[i] = sc.nextInt();
```

```
        }

        System.out.print("Enter number of elements in array 2: ");
        int n2 = sc.nextInt();
        int[] arr2 = new int[n2];
        System.out.println("Enter elements of array 2:");
        for (int i = 0; i < n2; i++) {
            arr2[i] = sc.nextInt();
        }

        int unionSize = findUnion(arr1, arr2);
        System.out.println("Union size (unique elements): " +
unionSize);

        sc.close();
    }
}
```

Time Complexity: O(n+m)

OUTPUT:

File Edit Source Refactor Navigate Search Project Run Window Help

Package Explorer

- ArrayList1
- BookingSystem2
- JavaPractice
- Main
- TicketBooking

demo.java | Practice.java | Booking.java | BookingSystem.java | Array.java

```java
import java.util.HashSet;
import java.util.Scanner;

public class Array {
    public static int findUnion(int[] a, int[] b) {
        HashSet<Integer> uList = new HashSet<>();
        for (int num : a) {
            uList.add(num);
        }
        for (int num : b) {
            uList.add(num);
        }
        return uList.size();
    }

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

        System.out.print("Enter number of elements in array 1: ");
        int n1 = sc.nextInt();
        int[] arr1 = new int[n1];
        System.out.println("Enter elements of array 1:");
        for (int i = 0; i < n1; i++) {
            arr1[i] = sc.nextInt();
        }
```

Problems | Javadoc | Declaration | Console

<terminated> Array [Java Application] C:\Program Files\Java\jdk-23\bin\javaw.exe (16 Nov 2024, 12:10:23 am – 12:10:38 am) [pid: 7604]

```
Enter number of elements in array 1: 5
Enter elements of array 1:
1 2 3 4 5
Enter number of elements in array 2: 3
Enter elements of array 2:
1 2 3
Union size (unique elements): 5
```