

2. Writing a program in Java implementing the binary search algorithm

```
public class BinarySearch {  
  
    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; // Found the target element  
            } else if (arr[mid] < target) {  
                left = mid + 1; // Search the right half  
            } else {  
                right = mid - 1; // Search the left half  
            }  
        }  
  
        return -1; // Target element not found  
    }  
  
    public static void main(String[] args) {  
  
        int[] arr = {2, 5, 8, 12, 16, 23, 38, 56, 72, 91};  
  
        int target = 23;  
  
        int result = binarySearch(arr, target);  
  
        if (result == -1) {  
            System.out.println("Element not found");  
        } else {  
            System.out.println("Element found at index " + result);  
        }  
    }  
}
```

```
}  
}
```

OUTPUT:

Element found at index 5