3.Writing a program in Java implementing the exponential search algorithm

```
package javafsd4;

public class ExponentialSearch {

    public static int exponentialSearch(int[] array, int target) {
        int n = array.length;

        // If the target is present at the first index
        if (array[0] == target) {
            return 0;
        }

        // Find the range for binary search
        int i = 1;
        while (i < n && array[i] <= target) {
            i *= 2;
        }

        // Perform binary search within the range
        return binarySearch(array, target, i / 2, Math.min(i, n - 1));
    }

    private static int binarySearch(int[] array, int target, int low, int high) {
        while (low <= high) {
            int mid = low + (high - low) / 2;

            if (array[mid] == target) {
                return mid;
            } else if (array[mid] < target) {
                low = mid + 1;
            } else {
                high = mid - 1;
            }
        }

        // Element not found
        return -1;
    }
```

```
    public static void main(String[] args) {
        int[] array = {2, 5, 8, 12, 16, 23, 38, 56, 72, 91};
        int target = 16;
        System.out.println(".....EXPONENTIAL SEARCH.....");

        int index = exponentialSearch(array, target);

        if (index != -1) {
            System.out.println("Element " + target + " found at index " + index);
        } else {
            System.out.println("Element " + target + " not found in the array");
        }
    }
}
```

OUTPUT