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

```
import java.util.Arrays;

public class ExponentialSearch {
    public static int exponentialSearch(int[] arr, int target) {
        if (arr[0] == target) {
            return 0;
        }

        int n = arr.length;
        int i = 1;
        while (i < n && arr[i] <= target) {
            i *= 2;
        }

        int min = Math.min(i, n - 1);
        int result = binarySearch(arr, target, i / 2, min);
        return result;
    }

    private static int binarySearch(int[] arr, int target, int low, int high) {
        if (low > high) {
            return -1;
        }

        int mid = low + (high - low) / 2;
        if (arr[mid] == target) {
            return mid;
        } else if (arr[mid] < target) {
            return binarySearch(arr, target, mid + 1, high);
        } else {
```

```
            return binarySearch(arr, target, low, mid - 1);
        }
    }

    public static void main(String[] args) {
        int[] arr = {2, 4, 6, 8, 10, 12, 14, 16, 18, 20};
        int target = 12;

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

OUTPUT:

Element found at index 5.