```java
import java.util.Scanner;

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

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

        int[] array = new int[size];

        System.out.println("Enter " + size + " integers:");
        for (int i = 0; i < size; i++) {
            array[i] = scanner.nextInt();
        }

        System.out.print("Enter the index to access: ");
        int index = scanner.nextInt();

        try
{
            int value = array[index];
            System.out.println("Value at index " + index + ": " + value);
        }
 catch (ArrayIndexOutOfBoundsException e)
 {
            System.out.println("Error: Invalid index. Please enter an index between 0 and " + (size - 1) + ".");
        }
    }
}
```