LAB # 7

Generics in Java

OBJECTIVE:

Implementing generic classes and methods for ensuring compile time type safety of data.

Lab Task:

Write a program that takes integer array, double array and float array. Make a generic function that performs subtraction on array element:

Example: input→ intArray = [5, 7, 3, 9, 19]

Output→ intArray = [2, -4, 6, 10]

```java
Main.java
1  import java.util.Arrays;
2
3  public class Main {
4      // Generic method to perform subtraction of consecutive elements
5      public static <T extends Number> void subtractArray(T[] array) {
6          System.out.print("Output: [");
7          for (int i = 0; i < array.length - 1; i++) {
8              double result = array[i].doubleValue() - array[i + 1].doubleValue();
9
10             // Print based on type
11             if (array instanceof Integer[]) {
12                 System.out.print((int) result);
13             } else if (array instanceof Double[]) {
14                 System.out.print(result);
15             } else if (array instanceof Float[]) {
16                 System.out.print((float) result);
17             }
18
19             if (i != array.length - 2) System.out.print(", ");
20         }
21         System.out.println("]");
22     }
23     public static void main(String[] args) {
24         Integer[] intArray = {5, 7, 3, 9, 19};
25         Double[] doubleArray = {10.5, 4.5, 6.0, 2.0};
26         Float[] floatArray = {5.5f, 2.5f, 8.0f, 1.0f};
27         System.out.println("Int Array Input: " + Arrays.toString(intArray));
28         subtractArray(intArray);
29         System.out.println("\nDouble Array Input: " + Arrays.toString(doubleArray));
30         subtractArray(doubleArray);
31         System.out.println("\nFloat Array Input: " + Arrays.toString(floatArray));
32         subtractArray(floatArray);
33     }
34 }
35
```

Output:

```
Int Array Input: [5, 7, 3, 9, 19]
Output: [-2, 4, -6, -10]

Double Array Input: [10.5, 4.5, 6.0, 2.0]
Output: [6.0, -1.5, 4.0]

Float Array Input: [5.5, 2.5, 8.0, 1.0]
Output: [3.0, -5.5, 7.0]
```