

LAB # 8

Generics in Java

OBJECTIVE:

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

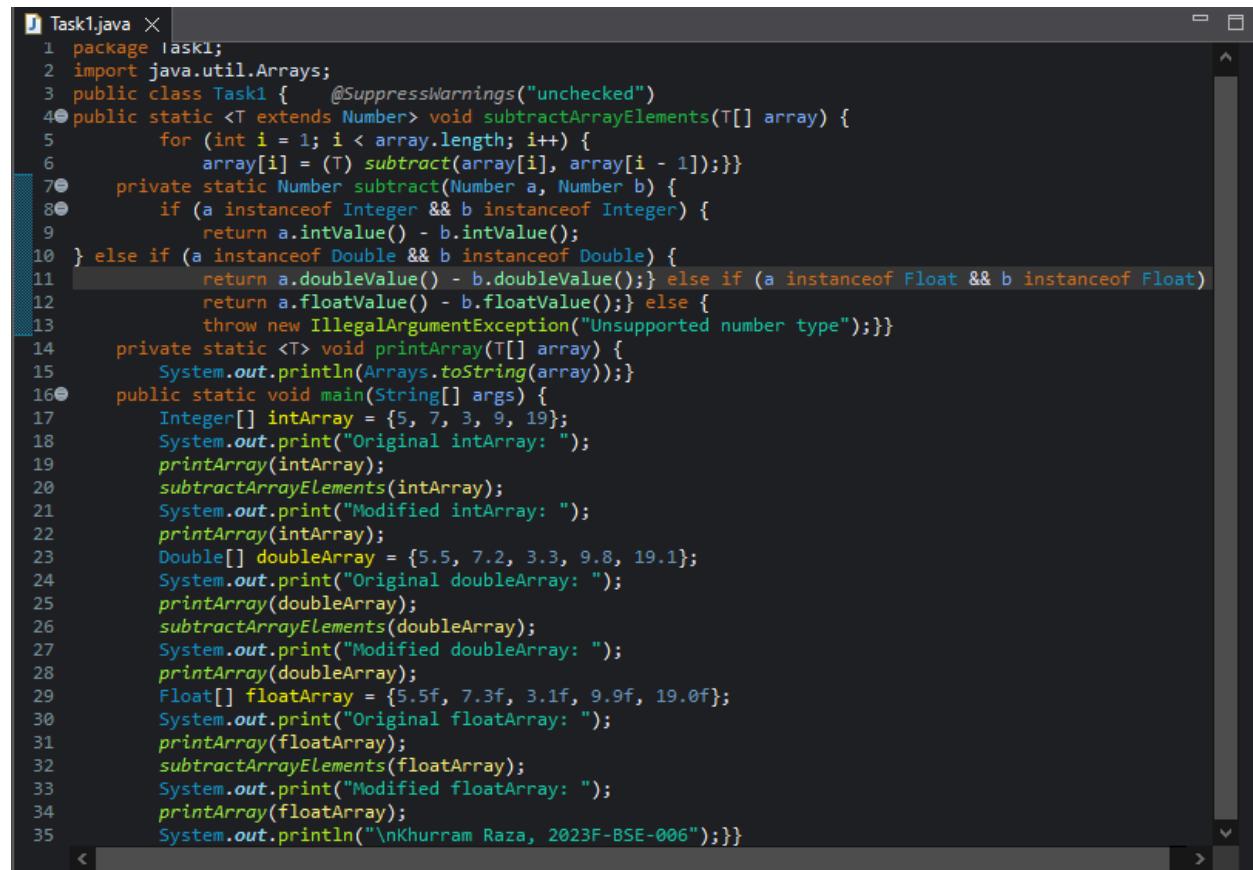
Lab Task:

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]

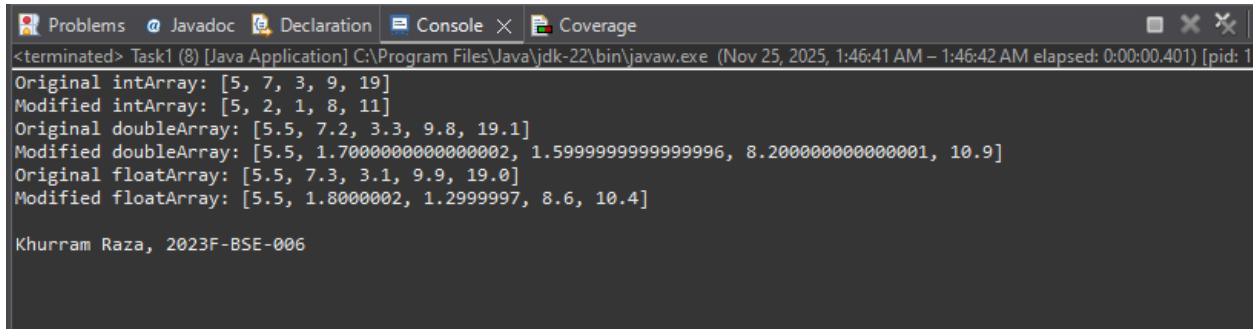
Code:



```

1 package task1;
2 import java.util.Arrays;
3 public class Task1 {    @SuppressWarnings("unchecked")
4     public static <T extends Number> void subtractArrayElements(T[] array) {
5         for (int i = 1; i < array.length; i++) {
6             array[i] = (T) subtract(array[i], array[i - 1]);}
7     private static Number subtract(Number a, Number b) {
8         if (a instanceof Integer && b instanceof Integer) {
9             return a.intValue() - b.intValue();}
10    } else if (a instanceof Double && b instanceof Double) {
11        return a.doubleValue() - b.doubleValue();} else if (a instanceof Float && b instanceof Float) {
12            return a.floatValue() - b.floatValue();} else {
13                throw new IllegalArgumentException("Unsupported number type");}
14    private static <T> void printArray(T[] array) {
15        System.out.println(Arrays.toString(array));}
16    public static void main(String[] args) {
17        Integer[] intArray = {5, 7, 3, 9, 19};
18        System.out.print("Original intArray: ");
19        printArray(intArray);
20        subtractArrayElements(intArray);
21        System.out.print("Modified intArray: ");
22        printArray(intArray);
23        Double[] doubleArray = {5.5, 7.2, 3.3, 9.8, 19.1};
24        System.out.print("Original doubleArray: ");
25        printArray(doubleArray);
26        subtractArrayElements(doubleArray);
27        System.out.print("Modified doubleArray: ");
28        printArray(doubleArray);
29        Float[] floatArray = {5.5f, 7.3f, 3.1f, 9.9f, 19.0f};
30        System.out.print("Original floatArray: ");
31        printArray(floatArray);
32        subtractArrayElements(floatArray);
33        System.out.print("Modified floatArray: ");
34        printArray(floatArray);
35        System.out.println("\nKhurram Raza, 2023F-BSE-006");}

```

Output:

The screenshot shows a Java application running in an IDE. The console tab displays the following output:

```
<terminated> Task1 (8) [Java Application] C:\Program Files\Java\jdk-22\bin\javaw.exe (Nov 25, 2025, 1:46:41 AM – 1:46:42 AM elapsed: 0:00:00.401) [pid: 1]
Original intArray: [5, 7, 3, 9, 19]
Modified intArray: [5, 2, 1, 8, 11]
Original doubleArray: [5.5, 7.2, 3.3, 9.8, 19.1]
Modified doubleArray: [5.5, 1.7000000000000002, 1.5999999999999996, 8.200000000000001, 10.9]
Original floatArray: [5.5, 7.3, 3.1, 9.9, 19.0]
Modified floatArray: [5.5, 1.800002, 1.299997, 8.6, 10.4]

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```

GitHub Screenshot: -