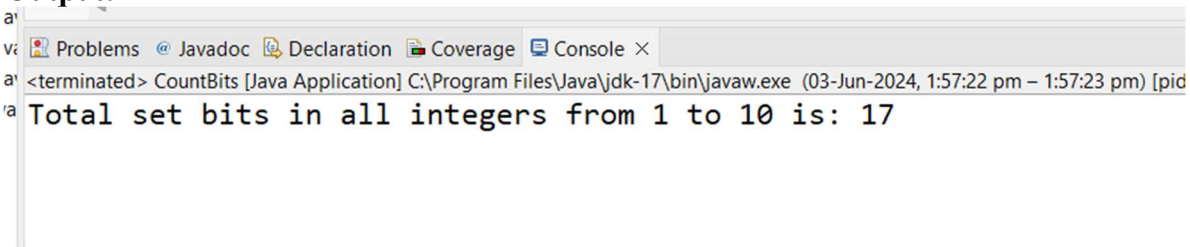
Day 12:
Task 1: Bit Manipulation Basics
Create a function that counts the number of set bits (1s) in the binary representation of an integer. Extend this to count the total number of set bits in all integers from 1 to n.

```
package com.dsassignment.day12;

public class CountBits {
    public static int countTotalSetBits(int n) {
        int total = 0;
        for (int i = 1; i <= n; i++) {
            total += countSetBits(i);
        }
        return total;
    }

    public static int countSetBits(int n) {
        int count = 0;
        while (n > 0) {
            count += n & 1;
            n >>= 1;
        }
        return count;
    }

    public static void main(String[] args) {
        int n = 10;
        System.out.println("Total set bits in all
integers from 1 to " + n + " is: " +
countTotalSetBits(n));
    }
}
```

Output:

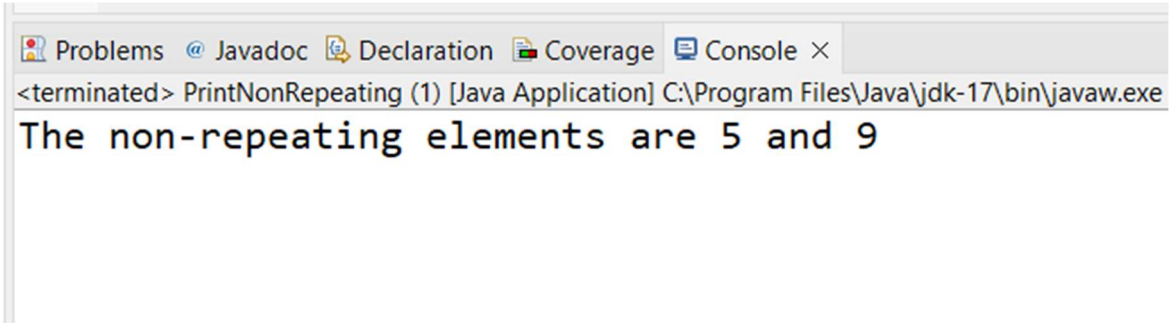


Task 2: Unique Elements Identification
Given an array of integers where every element appears twice except for two, write a function that efficiently finds these two non-repeating elements using bitwise XOR operations.

Solution:

```
package com.dsassignment.day12;

public class PrintNonRepeating {
    static int[] findNonRepeating(int arr[]) {
        int xor = 0;
        int x = 0;
        int y = 0;

        for (int num : arr)
            xor ^= num;
        int set_bit_no = xor & ~(xor - 1);

        for (int num : arr) {
            if ((num & set_bit_no) > 0)
                x ^= num;
            else
                y ^= num;
        }
        return new int[]{x, y};
    }

    public static void main(String[] args) {
        int arr[] = {2, 4, 7, 9, 2, 4, 5, 7};
        int[] result = findNonRepeating(arr);
        System.out.println("The non-repeating elements
are " + result[0] + " and " + result[1]);
    }
}
```

Output:


Problems
Javadoc
Declaration
Coverage
Console
<terminated> PrintNonRepeating (1) [Java Application] C:\Program Files\Java\jdk-17\bin\javaw.exe
The non-repeating elements are 5 and 9