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ADVANCED DATA STRUCTURES ASSIGNMENT

COURSE CODE : CA21

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MCA , SEMESTER 2

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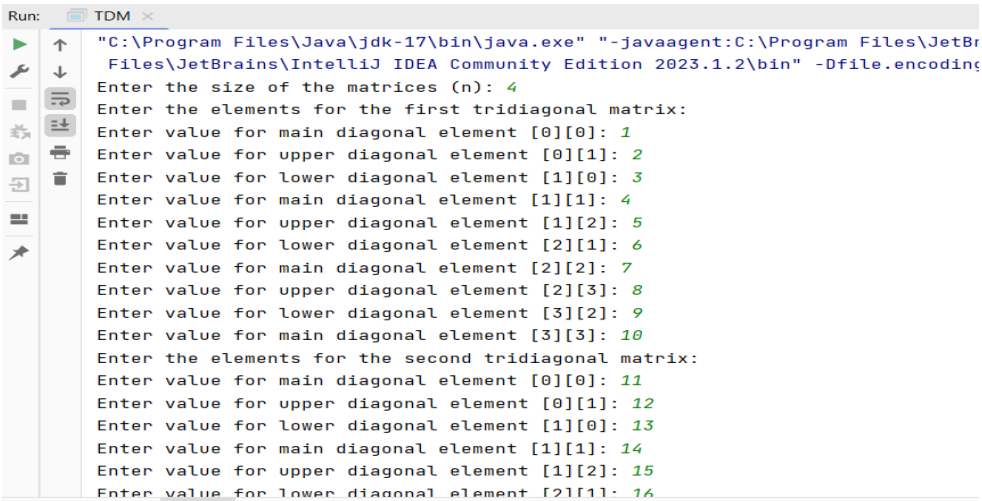
Write a Java Program for product of two Tridiagonal matrices .

Sol :

```
import java.util.Scanner;

public class TDM {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter the size of the matrices (n): ");
        int n = scanner.nextInt();

        System.out.println("Enter the elements for the first tridiagonal
matrix:");
        int[][] matrix1 = read_TDM(scanner, n);

        System.out.println("Enter the elements for the second tridiagonal
matrix:");
        int[][] matrix2 = read_TDM(scanner, n);

        int[][] result = prod_TDM(matrix1, matrix2, n);

        System.out.println("Product of the two tridiagonal matrices:");
        print_TDM(result);
    }

    public static int[][] read_TDM(Scanner scanner , int n){
        int[][] matrix = new int[n][n];
        for (int i = 0; i < n; i++) {
            for (int j = 0; j < n; j++) {
                if (i == j) {
                    System.out.print("Enter value for main diagonal element
[" + i + "][" + j + "]: ");
                    matrix[i][j] = scanner.nextInt();
                } else if (i == j - 1) {
                    System.out.print("Enter value for upper diagonal
element [" + i + "][" + j + "]: ");
                    matrix[i][j] = scanner.nextInt();
                } else if (i == j + 1) {
                    System.out.print("Enter value for lower diagonal
element [" + i + "][" + j + "]: ");
                    matrix[i][j] = scanner.nextInt();
                } else {
                    matrix[i][j] = 0;
                }
            }
        }

        return matrix;
    }

    public static void print_TDM(int a[][] ){
        for (int i = 0; i < a.length; i++) {
            for (int j = 0; j < a[i].length; j++) {
                System.out.print(a[i][j] + " ");
            }
            System.out.println();
        }
    }

    public static int[][] prod_TDM(int a[][], int b[][] , int n){
```

```
        int[][] result = new int[n][n];
        for (int i = 0; i < n; i++) {
            for (int j = 0; j < n; j++) {
                if (i == j) {
                    result[i][j] = a[i][i] * b[i][i];
                    if (i - 1 >= 0) {
                        result[i][j] += a[i][i - 1] * b[i - 1][i];
                    }
                    if (i + 1 < n) {
                        result[i][j] += a[i][i + 1] * b[i + 1][i];
                    }
                } else if (i == j - 1) {
                    result[i][j] = a[i][i + 1] * b[i + 1][j];
                } else if (i == j + 1) {
                    result[i][j] = a[i][i - 1] * b[i - 1][j];
                }
            }
        }

        return result;

    }
}
```

Output




```
Enter value for main diagonal element [2][2]: 17
Enter value for upper diagonal element [2][3]: 18
Enter value for lower diagonal element [3][2]: 19
Enter value for main diagonal element [3][3]: 20
Product of the two tridiagonal matrices:
37 28 0 0
33 172 85 0
0 84 361 160
0 0 153 362
```