

# Home Assignment: Question 3

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## Problem Statement

Write a Java program that takes two arrays  $a$  and  $b$  of length  $n$  storing `int` values, and returns the dot product of  $a$  and  $b$ . That is, it returns an array  $c$  of length  $n$  such that  $c[i] = a[i] \cdot b[i]$ , for  $i = 0, \dots, n - 1$ .

## Solution

```
import java.util.Scanner;

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

        System.out.print("Enter the length of the arrays: ");
        int n = scanner.nextInt();

        int[] a = new int[n];
        int[] b = new int[n];
        int[] c = new int[n]; // Result array

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

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

        for (int i = 0; i < n; i++) {
            c[i] = a[i] * b[i];
        }

        System.out.println("Resulting array c (dot product):");
        for (int i = 0; i < n; i++) {
            System.out.println("c[" + i + "] = " + c[i]);
        }

        scanner.close();
    }
}
```

## Output

Enter the length of the arrays: 4

Enter 4 elements for array a:

a[0] = 1

a[1] = 2

a[2] = 3

a[3] = 4

Enter 4 elements for array b:

b[0] = 5

b[1] = 6

b[2] = 7

b[3] = 8

Resulting array c (dot product):

c[0] = 5

c[1] = 12

c[2] = 21

c[3] = 32