Experiment No-1

Experiment Name: Write a C program to multiply two 3x3 matrix.

Objective:

- To write a C program that multiplies two 3×3 matrices and stores the result in a third matrix.

Problem analysis:
In this program, the goal is to multiply two 3×3 matrices and display the resultant matrix. For this purpose, the program requires two input matrices, each containing nine integer elements arranged in three rows and three columns. These values will be stored in two 2-dimensional arrays named **A** and **B**. To compute the multiplication, the program processes each element of the first matrix with the corresponding elements of the second matrix using the standard matrix multiplication rule, where each element of the result matrix **C** is obtained by multiplying the elements of a row of matrix A with the elements of a column of matrix B and summing the products. Three nested loops are used for this operation: the outer two loops select each position of the result matrix, and the inner loop performs the multiplication and addition. After all calculations are complete, the program outputs the final 3×3 resultant matrix on the screen.

Input variable	Processing variable	Output variable	Header file
i,j,k(int)	i=1, i<4, i++ j=1, j<4, j++ k=1, k<4, k++	mul[i][j]=mul[i][j]+(arr_a[4][4]×arr_b[4][4])	<stdio.h>

Algorithm:

Step1: start

Step2: define array arr_a[4][4], arr_b[4][4], mul[4][4]

Step3: Use int i, int j, int k in arrays

Step4: if i<4, j<4, k<4 then go to step 5, otherwise go to step 6

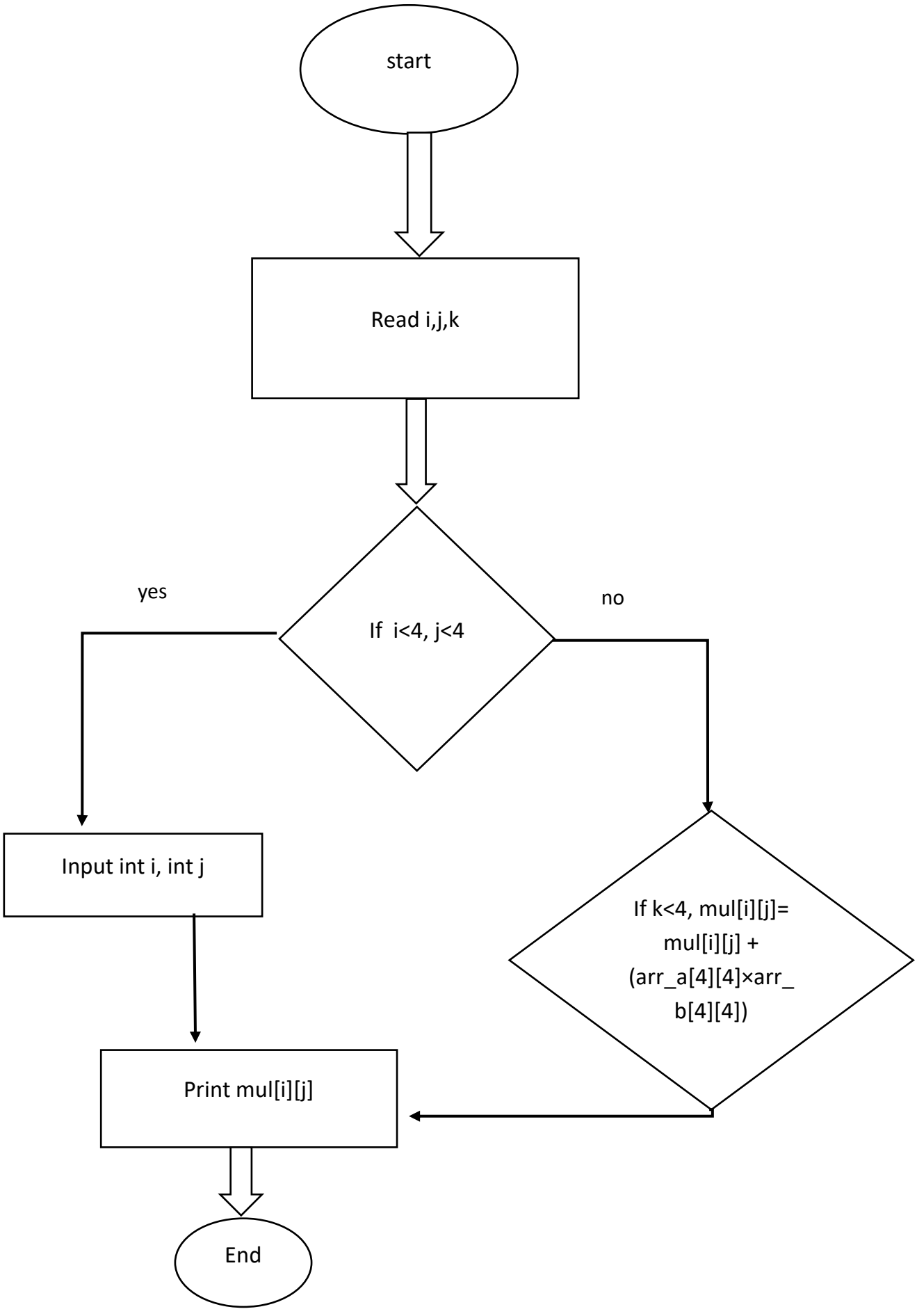
Step5: input int i, int j

Step6: if k<4, then slove mul[i][j]= mul[i][j] + (arr_a[4][4]×arr_b[4][4])

Step7: print mul [i][j]

Step8: End

Flowchart:


start
Read i,j,k
If i<4, j<4
yes
no
Input int i, int j
If k<4, mul[i][j]= mul[i][j] + (arr_a[4][4]×arr_ b[4][4])
Print mul[i][j]
End

Source code:

```c
#include <stdio.h>

int main() {
    int A[3][3], B[3][3], C[3][3], i, j, k;

    for(i = 0; i < 3; i++)
        for(j = 0; j < 3; j++)
            scanf("%d", &A[i][j]);

    for(i = 0; i < 3; i++)
        for(j = 0; j < 3; j++)
            scanf("%d", &B[i][j]);

    for(i = 0; i < 3; i++)
        for(j = 0; j < 3; j++) {
            C[i][j] = 0;
            for(k = 0; k < 3; k++)
                C[i][j] += A[i][k] * B[k][j];
        }

    for(i = 0; i < 3; i++) {
        for(j = 0; j < 3; j++)
            printf("%d ", C[i][j]);
        printf("\n");
    }

    return 0;
}
```

Output:

```
D:\lab6\bin\Debug\lab6.exe
10 20 30
40 50 60
70 80 90
1 2 3
4 5 6
7 8 9
300 360 420
660 810 960
1020 1260 1500

Process returned 0 (0x0)   execution time : 96.451 s
Press any key to continue.
```

Discussion:

The program successfully multiplies two 3×3 matrix. It utilizes nested loops two loops to iterate through the row and column of both matrix. The core operation involves multiplying corresponding elements and running the products to obtain the resulting matrix element. The final product matrix is then display.