PERIMENT NO: 8

TITLE: Develop a program to introduce 2DArray manipulation and implement Matrix multiplication and ensure the rules of multiplication are checked**.**

PROGRAM:

```
#include<stdio.h>
#include<stdlib.h>

void main()
{
        int m, n, p, q, i, j, k, a[10][10], b[10][10], c[10][10];
        printf("Enter the order of matrix A ");
        scanf("%d%d",&m,&n);
        printf("Enter the order of matrix B ");
        scanf("%d%d",&p,&q);
        if(n!=p)
        {
                printf("Matrix multiplication is not possible\n");
                exit(0);
        }
        printf("Enter elements to matrix A\n");
        for(i=0;i<m;i++)
        {
                for(j=0;j<n;j++)
                {
                        scanf("%d",&a[i][j]);
                }
        }
         printf("Enter elements to matrix B\n");
         for(i=0;i<p;i++)
        {
                for(j=0;j<q;j++)
                {
                        scanf("%d",&b[i][j]);
                }
        }

         for(i=0;i<m;i++)
         {
                for(j=0;j<q;j++)
                {
                        c[i][j]=0;
                        for(k=0;k<n;k++)
                        {
                                c[i][j]=c[i][j]+a[i][k]*b[k][j];
                        }
                }
        }
        printf("The matrix A\n");
        for(i=0;i<m;i++)
        {
                for(j=0;j<n;j++)
                {
                        printf("%d\t",a[i][j]);
                }
                printf("\n");
         }
         printf("The matrix B\n");
         for(i=0;i<p;i++)
        {
                for(j=0;j<q;j++)
                {
                        printf("%d\t",b[i][j]);
                }
                printf("\n");
        }
        printf("The Resultant matrix C\n");
        for(i=0;i<m;i++)
        {
                for(j=0;j<q;j++)
                {
                        printf("%d\t",c[i][j]);
                }
                printf("\n");
        }

}
```

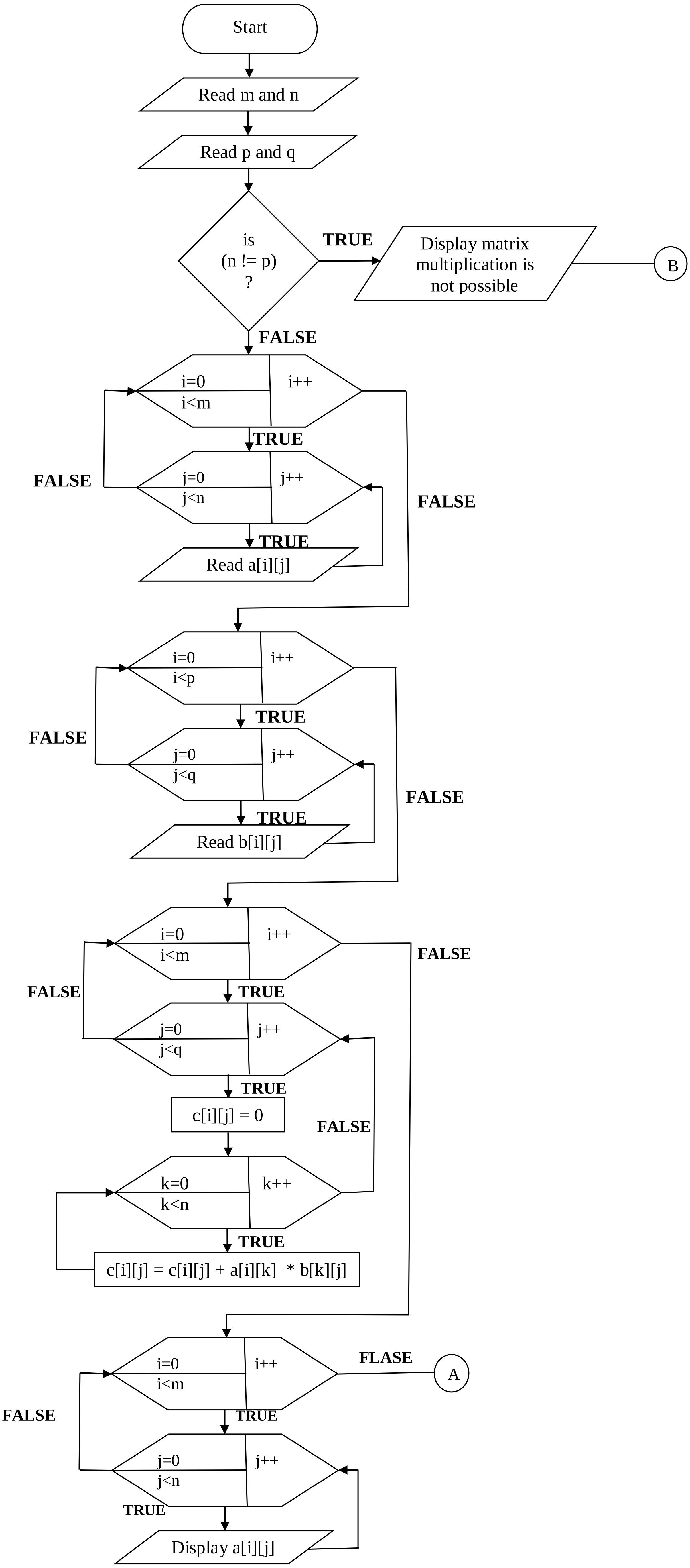
OUTPUTS:

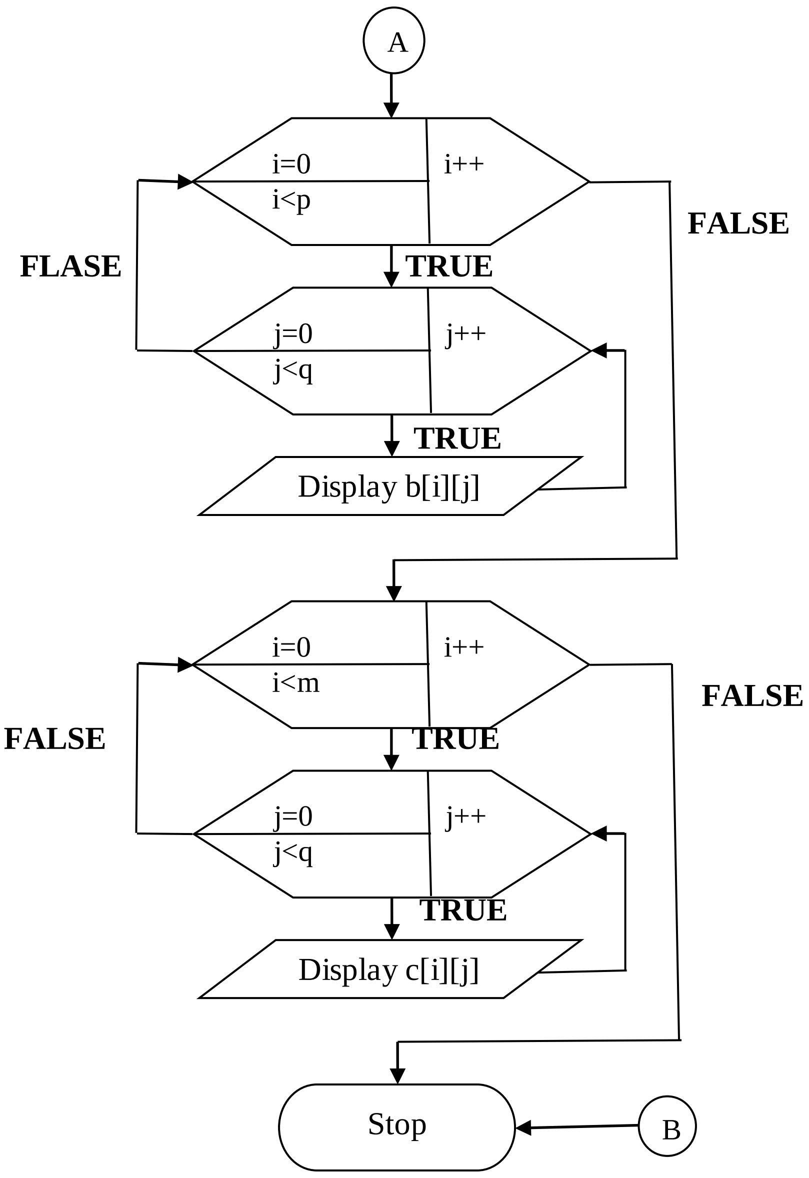
```
Enter the order of matrix A
2 2
Enter the order of matrix B
3 3
Matrix multiplication is not possible
-----------------------------------------------------------------------------------------------------------
Enter the order of matrix A

3 3

Enter the order of matrix B

3 3

Enter elements to matrix A
1    2    5
4    2    3
2    8    9
Enter elements to matrix B
4    7    2
2    3    1
8    3    5
The matrix A
1       2        5
4       2        3
2       8        9
The matrix B
4       7        2
2       3        1
8       3        5
The resultant matrix C
48      28       29
44      43       25
96      65       57
-----------------------------------------------------------------------------------------------------------
Enter the order of matrix A
2 3
Enter the order of matrix B
3 2
Enter elements to matrix A
1   2   3
4   5   6
Enter elements to matrix B
1     2
3     4
5     6
The matrix A
1       2        3
4       5        6
The matrix B
1       2
3       4
5       6
The resultant matrix C
22      28
49      64
```

ALGORITHM:

```
STEP 1: Start
STEP 2: Read the order of matrix A (m and n)
STEP 3: Read the order of matrix B (p and q)
STEP 4: if no of columns in matrix A is not equal to no of row in matrix B
            check (n!=p) then do the following:
                display "Matrix multiplication is not possible"
                goto STEP 37
STEP 5: initialize i =0
STEP 6: check (i < m)
            if no goto STEP 10
STEP 7: if yes initialize j = 0
STEP 8: check (j < n )
            if no goto STEP 6
STEP 9: if yes read a[i][j] goto STEP 8
STEP 10: initialize i =0
STEP 11: check (i < p)
            if no goto STEP 15
STEP 12: if yes initialize j = 0
STEP 13: check (j < q)
            if no goto STEP 11
STEP 14: if yes read b[i][j] goto STEP 13
STEP 15: initialize i =0
STEP 16: check (i < m)
            if no goto STEP 22
STEP 17: if yes initialize j = 0
STEP 18: check (j < q )
            if no goto STEP 16
STEP 19: if yes c[i][j] = 0, initialize k=0
STEP 20: check (k < n)
            if no goto STEP 18
STEP 21: if yes c[i][j] = c[i][j] + a[i][k]  * b[k][j]
STEP 22: initialize i =0
STEP 23: check (i < m)
            if no goto STEP 27
STEP 24: if yes initialize j = 0
STEP 25: check (j < n)
            if no goto STEP 23
STEP 26: if yes display a[i][j] goto STEP 25
STEP 27: initialize i =0
STEP 28: check (i < p)
            if no goto STEP 32
STEP 29: if yes initialize j = 0
STEP 30: check (j < q)
            if no goto STEP 28
STEP 31: if yes display b[i][j] goto STEP 30
STEP 32: initialize i =0
STEP 33: check (i < m)
            if no goto STEP 37
STEP 34: if yes initialize j = 0
STEP 35: check (j < q)
              if no goto STEP 33
STEP 36: if yes display c[i][j] goto STEP 35
STEP 37: Stop
```

FLOWCHART


Start
Read m and n
Read p and q
is
(n != p)
?
TRUE
Display matrix multiplication is not possible
B
FALSE
i=0
i<m
i++
TRUE
FALSE
j=0
j<n
j++
FALSE
TRUE
Read a[i][j]
i=0
i<p
i++
TRUE
FALSE
j=0
j<q
j++
FALSE
TRUE
Read b[i][j]
i=0
i<m
i++
FALSE
FALSE
TRUE
j=0
j<q
j++
TRUE
c[i][j] = 0
FALSE
k=0
k<n
k++
TRUE
c[i][j] = c[i][j] + a[i][k] * b[k][j]
i=0
i<m
i++
FLASE
A
FALSE
TRUE
j=0
j<n
j++
TRUE
Display a[i][j]


A
i=0
i<p
i++
FALSE
FLASE
TRUE
j=0
j<q
j++
TRUE
Display b[i][j]
i=0
i<m
i++
FALSE
FALSE
TRUE
j=0
j<q
j++
TRUE
Display c[i][j]
Stop
B