**Problem Statement:**

Design a menu-driven program that allows users to perform various operations on a 2D array representing a matrix. The program should provide options to calculate the transpose of the matrix, perform matrix multiplication, and interchange the diagonals of the matrix. The user should be able to choose any of these operations from a menu and provide the required inputs.

The program should implement the following functionalities:

1. Matrix Initialization:

2. Matrix Transpose:

3. Matrix Multiplication:

4. Diagonal Interchange:

5. Exit:

The program should display a menu with the above options and allow the user to select an operation by entering the corresponding menu number. After executing the selected operation, the program should return to the menu and continue until the user chooses the exit option.

**Source Code:**

#include<stdio.h>

int transpose(int n, int m, int arr1[][m]) //function to find transpose

{

int arr2[n][m];

int i,j;

for(i=0; i<n; i++)

{

for(j=0; j<m; j++)

{

arr2[j][i] = arr1[i][j];

}

}

printf("\nTranspose of the given 2D array is :\n");

for(i=0; i<n; i++)

{

for(j=0; j<m; j++)

{

printf("%d ", arr2[i][j]);

}

printf("\n");

}

return 0;

}

int matrixMultiply(int n, int m, int arr1[][m]) //function to find multiplication of two matrix

{

int arr2[n][m];

int arr3[n][m];

int i,j,k;

printf("\n Enter elements in array 2 :\n ");

for(i=0; i<n; i++)

{

for(j=0; j<m; j++)

{

scanf("%d", &arr2[i][j]);

}

}

for(i=0; i<n; i++)

{

for(j=0; j<m; j++)

{

arr3[i][j] = 0;

for(k=0; k<n; k++)

{

arr3[i][j] += arr1[i][k] \* arr2[k][j];

}

}

}

printf("\nMultiplication of array1 and array2 is : \n");

for(i=0; i<n; i++)

{

for(j=0; j<m; j++)

{

printf("%d ", arr3[i][j]);

}

printf("\n");

}

return 0;

}

int changeDiagonal(int n, int m, int arr1[][m]) // changing diagonals

{

int i,j;

int temp;

if(n==m)

{

for(i=0; i<n; i++)

{

temp = arr1[i][i];

arr1[i][i] = arr1[i][n-1-i];

arr1[i][n-1-i] = temp;

}

}

printf("\nArray after inter-changing diagonals is : \n");

for(i=0; i<n; i++)

{

for(j=0; j<m; j++)

{

printf("%d ", arr1[i][j]);

}

printf("\n");

}

return 0;

}

//main method

int main()

{

printf("Yogesh Pal Parmar MCA 2B 70");

int n, m;

int i,j;

int ch;

printf("\n Enter number of rows : ");

scanf("%d", &n);

printf("\n Enter number of columns : ");

scanf("%d", &m);

int arr1[n][m];

for(i=0; i<n; i++)

{

for(j=0; j<m; j++)

{

scanf("%d", &arr1[i][j]);

}

}

do

{

printf("\nEnter a choice 0 1 2 3 : ");

scanf("%d", &ch);

switch (ch)

{

case 1:

transpose(n, m, arr1);

break;

case 2:

matrixMultiply(n, m, arr1);

break;

case 3:

changeDiagonal(n, m, arr1);

break;

default:

printf("\nInvalid choice");

}

}while(ch != 0);

}

**Output:**

