

Two-Dimensional Array

Definition:

Two Dimensional arrays can be thought of as an array of one-dimensional arrays. In order to access an element in a two-dimensional array, we need to specify the index of the row and the index of the column in which it occurs. To declare a two-dimensional array, we specify the data type, the name, the number of rows, and the number of columns that it can store. An array which has m rows and n columns can store $m \times n$ elements.

The following figure represent a 2D array with 3 rows and 4 columns:

	Column 1	Column 2	Column 3	Column 4
Row 1	<code>x[0][0]</code>	<code>x[0][1]</code>	<code>x[0][2]</code>	<code>x[0][3]</code>
Row 2	<code>x[1][0]</code>	<code>x[1][1]</code>	<code>x[1][2]</code>	<code>x[1][3]</code>
Row 3	<code>x[2][0]</code>	<code>x[2][1]</code>	<code>x[2][2]</code>	<code>x[2][3]</code>

Example:

The following program declares and initializes an 4×5 array of integers and then prints the array elements.

```
#include<stdio.h>

int main()
{
    int array[4][5]= {{7, 0, 100, 12, 8},
                      {5, 12, 5, 9, 7},
                      {88, 3, 22, 25, 51},
                      {9, 8, 7, 6, 5}};

    int i, j;
    printf("The array is: \n");
    for (i=0; i<4; i++)
    {
        for (j= 0; j<5; j++)
            printf("%d\t", array[i][j]);
        printf("\n");
    }

    return 0;
}
```

Exercise 1:

Write a C program that adds two matrices i.e. compute the sum of two matrices and then print it. Firstly, user will be asked to enter the order of matrix (number of rows and columns) and then the elements of the two matrices. For example if the user entered order as 2, 2 i.e. two rows and two columns and matrices as:

First Matrix:

1 2

3 4

Second matrix:

4 5

-1 5

then output of the program (sum of First and Second matrix) will be:

5 7

2 9

Exercise 2:

Write a C program that finds the transpose of a A x B float matrix. A and B must be input by the User. Transpose obtained by interchanging rows and columns of a matrix.

Exercise 3:

Write a C program that reads the size and elements of a matrix and prints the maximum element the diagonal. First you have to check whether the matrix is square or not. If it is a square matrix then print the maximum of diagonal otherwise print "The matrix is not square".

Exercise 4:

Write a C program that reads a AXB integer matrix and replace negative numbers with zero.

Exercise 5:

Write a C program that finds the maximum element in each row of a 3X4 matrix and prints the result at the end of each row.