Bismillahhir Rahmanir Rahim

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Passing 2-D Array to a Function in C

Assalamu 'ala manit taba'al hudaa

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Just like a 1-D array, when a 2-D array is passed to a function, the changes made by function effect the original array. But before we study this, I, Sorowar Mahabub want to make a few points clear.
We have learned that when a 2-D is passed to a function it is optional to specify the size of the left most dimensions. So if we have an array of 2 rows and 3 dimensions then it can be passed to a function in the following two ways:

```
int two_d[2][3] = {
                    {99,44,11},
                    {4,66,9}
                  };
```

1st way:

```
void function(int a[][3]){
    // statements;
}
```

2nd way:

```
void function(int a[2][3]){
    // statements;
}
```

Recall that 2-D arrays are stored in row-major order i.e first row 0 is stored, then next to it row 1 is stored and so on. Therefore in C, a 2-D array is actually a 1-D array in which each element is itself a 1-D array. Since the name of the array points to the 0th element of the array. In the case of a 2-D array, 0th element is an array.

Essentially in all the two cases discussed the type of the variable to an array of integers, they differ only in the way they are represented. Okay let's come to our main discussion that Why the changes made by the function effect the main array. The following program answers this question.

Once again,
In brief, *To pass multidimensional arrays to a function, only the name of the array is passed to the function(similar to one-dimensional arrays).*

Example 1: *Passing two-dimensional arrays in Function-1E*

```
#include <stdio.h>
void displayingNumbers(int num[2][2]);

int main()
{
    int num[2][2];
    printf("Enter 4 numbers:\n");
    for (int i = 0; i < 2; ++i)
        for (int j = 0; j < 2; ++j)
            scanf("%d", &num[i][j]);

    // passing multi-dimensional array to a function
    displayingNumbers(num);
    return 0;
```

```
}

void displayingNumbers(int num[2][2])
{
    printf("Displaying:\n");
    for (int i = 0; i < 2; ++i) {
        for (int j = 0; j < 2; ++j)
           printf("%d ", num[i][j]);
        printf("\n");
    }
}
```

Output:-

Enter 4 numbers:
2 3
4 5
Displaying:
2 3
4 5

Note: In C programming, you can pass arrays to functions, however, you cannot return arrays from functions.

© Paste Bin link of Ex. 1 & 2: Click to see Main (Source) Code of Example 1 & 2

Example 2: *Passing two-dimensional arrays in Function-2E*

```
include<stdio.h>

void change_twod(int a[2][3])    {
```

```
    int i, j;
    for(i = 0; i < 2; i++)    {
        for(j = 0; j < 3; j++)
            a[i][j] = a[i][j] + 5;
    }
}

int main()
{
    int i,j;
    int two_d[2][3] = {
        {01,02,03},
        {04,05,06}
    };

    printf("Original array (A): \n");
    for(i = 0; i < 2; i++)    {
        for(j = 0; j < 3; j++)
            printf("%2d ", two_d[i][j]);
        printf("\n");
    }

    printf("\n\nAfter Addition 5 with array (A),");
    printf("\nThe Modified array : \n");
    change_twod(two_d);

    for(i = 0; i < 2; i++)    {
        for(j = 0; j < 3; j++)
            printf("%2d ", two_d[i][j]);
        printf("\n");
    }
    return 0;
}
```

Expected Output:

Original array (A):
01 02 03
04 05 06

After Addition 5 with array (A),
The Modified array :
06 07 08
09 10 11

How it works:
As discussed earlier in this section that two_d and arr are of type variable to an array of integers. In line 25, change_twod() is called with an actual argument of two_d which is then assigned to arr. Now, as a result, changes made inside the function will be visible in the function main().

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