C-54 ⇒ Two Dimensional Arrays

Initialization

① At compile time :-

datatype name of array [rowsize] [Column size] = { Values of array };

int a[2][3] = { 0,0,0,1,1,1 };

6 elements

6 × 4 => 24 bytes

	0	1	2
Row 0	0	0	0
Row 1	1	1	1

Row 0 Row 1

```
int a[2][3] = { {0,0,0}, {1,1,1} };
```

≡

```
int a[2][3] = { 0,0,0,1,1,1 };
```

≡

```
int a[2][3] = {
                {0,0,0},
                {1,1,1},
              };
```

≡

```
int a[ ][3] = { {0,0,0}, {1,1,1} };
```

No row size.

Ex: `int a[2][3] = {0,0,1,1};`

	0	1	2
0	0	0	1
1	1	0	0

Ex: `int a[2][3] = { {0,0}, {1,1} };`

	0	1	2
0	0	0	0
1	1	1	0

Ex: `int a[2][3] = {0};`

	0	1	2
0	0	0	0
1	0	0	0

Ex: int a[ ][3] = {0};

↓

no row size then it is like one Dimensional array

	1	2	3
0	0	0	0

Ex: int a[ ][3] = {1,1,1};

	1	2	3
0	1	1	1

Ex: int a[ ][3] = {1,1,1,2};

	0	1	2
0	1	1	1
1	2	0	0

Ex:- int a[2][3] = {{0,0,3}};

	0	1	2
0	0	0	3
1	0	0	0

② At run time :-

* For this we use for loop.

```
int a[2][3];
for(i=0;i<2;i++)
  {
   for(j=0;j<3;j++)
     {
       scanf("%d", &a[i][j]);
     }
  }
```

	0	1	2
0	0,0	0,1	0,2
1	1,0	1,1	1,2

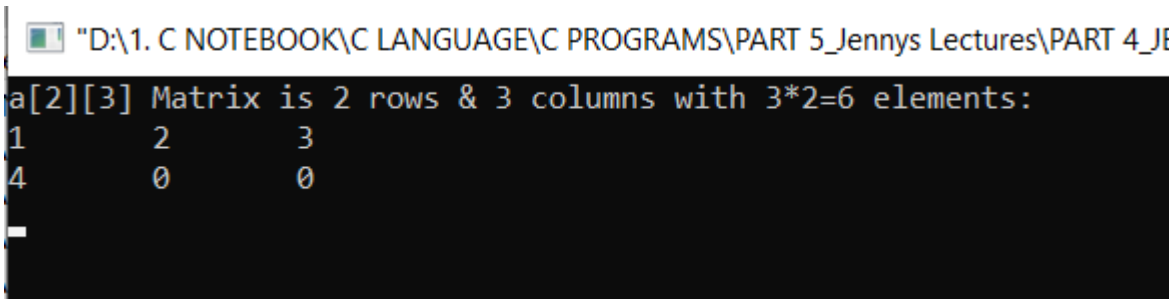
CODE 1:

```c
#include <stdio.h>
#include <stdlib.h>
/** 1 - 2D ARRAY INITIALIZATION **/
/** COMPILE TIME INITIALIZATION **/

int main()
{
  int i,j,a[2][3]={1,2,3,4,5,6};
  /** int a[2][3]={{1,2,3}, {4,5,6}}; or
      int a[2][3]={{1,2,3},
                   {4,5,6}};
      int a[][3]={1,2,3,4}; ->
      Arrays are row major representation, in memory array are stored in
      row order, like first row with their columns and second row and so on..
      Simply 2D array is a collection of 1D arrays.
      int a[][3]={1,2,3,4}; Here no row is mentioned but it is correct since
      here column is necessary to mention and in memory it will take 3 columns
      and like wise n number of columns are allocated depending upon our
      requirement
      a[][3]={{1,2,3}, {4,0,0}};-> **/

      printf("a[2][3] Matrix is 2 rows & 3 columns with 3*2=6 elements:\n");
      for(i=0;i<2;i++)
      {
       for(j=0;j<3;j++)
       {
        printf("%d\t",a[i][j]);
       }
       printf("\n");
      }

getch();
}
```

```
"D:\1. C NOTEBOOK\C LANGUAGE\C PROGRAMS\PART 5_Jennys Lectures\PART 4_JENNYS LECTURE
a[2][3] Matrix is 2 rows & 3 columns with 3*2=6 elements:
1       2       3
4       5       6
```

CODE 2:

```c
#include <stdio.h>
#include <stdlib.h>
/** 2 - 2D ARRAY INITIALIZATION **/
/** COMPILE TIME INITIALIZATION **/
int main()
{
    int i,j,a[][3]={1,2,3,4};
    printf("a[2][3] Matrix is 2 rows & 3 columns with 3*2=6 elements:\n");
      for(i=0;i<2;i++)
      {
       for(j=0;j<3;j++)
       {
        printf("%d\t",a[i][j]);
       }
       printf("\n");
      }

getch();
}
```



CODE 3:

```c
#include <stdio.h>
#include <stdlib.h>
/** 3 - 2D ARRAY INITIALIZATION **/
/** COMPILE TIME INITIALIZATION **/
int main()
{
    int a[2][]={1,2,3,4,2};
    /** Error **/
}
```

Logs & others

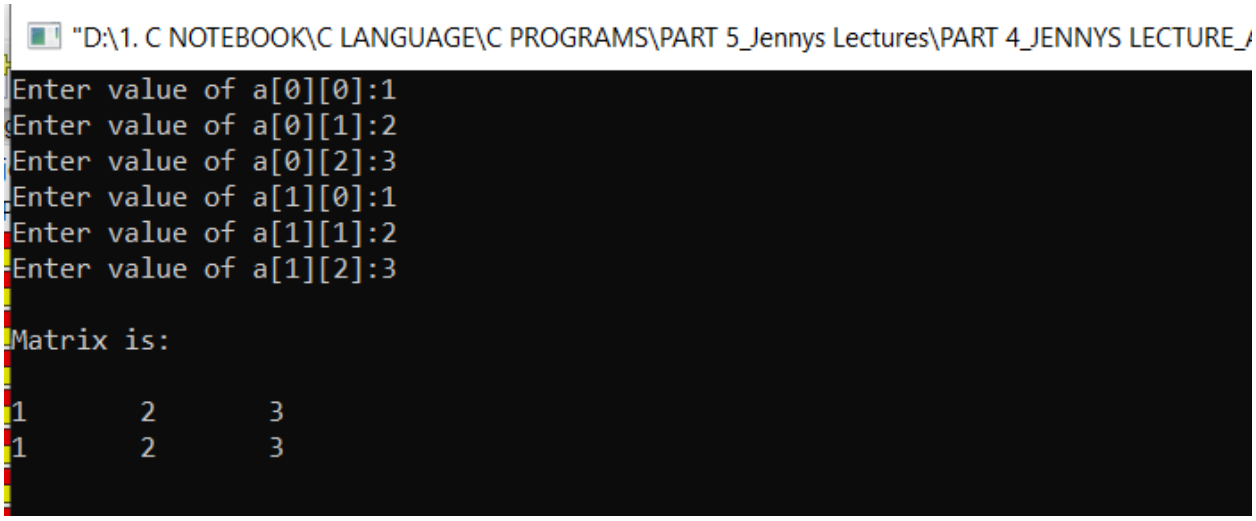
Code::Blocks | Search results | Cccc | Build log | Build messages | CppCheck/Vera

File	Line	Message
		=== Build: Debug in 3_2D ARRAY INITIALIZATION (compiler: GNU GCC C...
D:\1. C NO...		In function 'main':
D:\1. C NO...	7	error: array type has incomplete element type 'int[]'
D:\1. C NO...	7	note: declaration of 'a' as multidimensional array must have bound...
D:\1. C NO...	7	*warning: unused variable 'a' [-Wunused-variable]*
		=== Build failed: 1 error(s), 1 warning(s) (0 minute(s), 0 second(...

CODE 4:

```c
#include <stdio.h>
#include <stdlib.h>
/** 4 - 2D ARRAY INITIALIZATION **/
/** RUN TIME INITIALIZATION **/
int main()
{
    int i,j,a[2][3]; // 2Rows 3Columns
    for(i=0;i<2;i++)
    {
       for(j=0;j<3;j++)
       {
        printf("Enter value of a[%d][%d]:",i,j);
        scanf("%d",&a[i][j]);
       }
    }
```

```
16
17      printf("\nMatrix is:\n\n");
18      for(i=0;i<2;i++)
19      {
20          for(j=0;j<3;j++)
21          {
22           printf("%d\t",a[i][j]);
23          }
24          printf("\n");
25      }
26  getch();
27  }
28
```



CODE 5:

```
1   #include <stdio.h>
2   #include <stdlib.h>
3   #define N 100  // MACRO VALUE
4   /** 5 - 2D ARRAY INITIALIZATION **/
5   /** RUN TIME INITIALIZATION **/
6   int main()
7   {
8       int i,j,a[N][N],m,n; // 100 Rows and columns
9       printf("Enter the row size:\n");
10      scanf("%d",&m);
11      printf("Enter the column size:\n");
12      scanf("%d",&n);
13
14      for(i=0;i<m;i++)
15      {
16          for(j=0;j<n;j++)
17          {
18           printf("Enter value of a[%d][%d]:",i,j);
19           scanf("%d",&a[i][j]);
20          }
21      }
```

```
22
23      printf("\nMatrix is:\n\n");
24      for(i=0;i<m;i++)
25      {
26          for(j=0;j<n;j++)
27          {
28           printf("%d\t",a[i][j]);
29          }
30          printf("\n");
31      }
32  getch();
33  }
34
```