

Course Name: O Level (2nd Sem B1 Batch)
Topic: 2D Array in C (Continued..)

Subject: C Language
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Square Matrix: An $n \times n$ matrix is said to be a square matrix of order n . In other words when the number of rows and the number of columns in the matrix are equal then the matrix is called square matrix.

For example:

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$$

The number of rows of the above matrix = 3

The number of columns of the above matrix = 3

Since the number of rows and the number of columns are equal, the above matrix A is a square matrix.

Example 1: Program to transpose a square matrix of 3 x 3

Transpose of a matrix is obtained by changing rows to columns and columns to rows. In other words, transpose of $A[i][j]$ is obtained by changing $A[i][j]$ to $A[j][i]$.

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int a[3][3], i, j;
    clrscr();
    printf("enter the elements in the array");
    for(i=0 ; i<3 ; i++)
        for(j=0 ; j<3 ; j++)
            scanf("%d",&a[i][j]);
    for(j=0 ; i<3 ; i++)
    {
        for(i=0 ; j<3 ; j++)
            printf("%2d",a[j][i]);
        printf("\n");
    }
    getch();
}
```

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}^T = \begin{bmatrix} 1 & 4 & 7 \\ 2 & 5 & 8 \\ 3 & 6 & 9 \end{bmatrix}$$

Transpose of a matrix

Example 2 : Write a program to print the main diagonal of square matrix.

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int x[3][3], i, j;
    clrscr();
    printf("Enter the element of array \n");
    for(i=0; i<3; i++)
        for(j=0; j<3; j++)
            scanf("%d",&x[i][j]);
```

1	2	3
4	5	6
7	8	9

```

for(i=0;i<3;i++)
for(j=0;j<3;j++)
if(i==j)
printf("\t%d",x[i][j]);
getch();
}

```

Another method without using condition

```

#include<stdio.h>
#include<conio.h>
void main()
{
int x[3][3],i,j;
clrscr();
printf("Enter the element of array \n");
for(i=0;i<3;i++)
for(j=0;j<3;j++)
scanf("%d",&x[i][j]);
for(i=0;i<3;i++)
for(j=i;j<=i;j++)
printf("\t%d",x[i][j]);
getch();
}

```

Input

1	2	3
4	5	6
7	8	9

Output

1	5	9
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Try Yourself:

1. What is a square matrix?

1. Write a program to print the sum of main diagonal of a square matrix 3 x 3.

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