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Course Name: O Level (2nd Sem B2 and B3 Batch) **Subject:** C Language
Topic: 2D Array in C (Contined..) **Date:** 14-May-2020

Square Matrix: An n × 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[][] is obtained by changing A[i][j] to A[j][i].
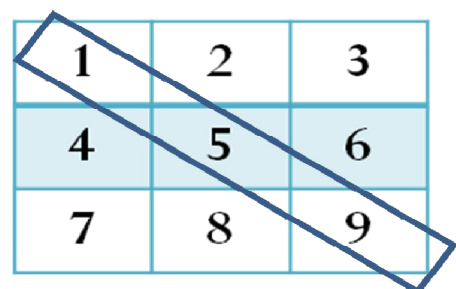
```
#include<stdio.h>
#include<conio.h>
void main()
{
   int a[3][3], i,j;
   clrscr();
   printf("enter the elements in the array");
   for(i=0 ; i<3 ; i++)
   for(j=0 ; j<3 ; j++)
   scanf("%d",&a[i][j]);
   for(j=0 ; i<3 ; i++)
   {
    for(i=0 ; j<3 ; j++)
    printf("%2d",a[j][i]);
    printf("\n");
   }
   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]);
```

```
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

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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