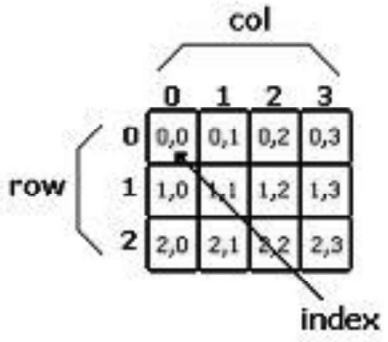
6-3 Array of Two Dimension:

1 Declaration of 2D-Arrays:

General Form of 2D-Array:

data-type Array-name [Row-size] [Col-size];

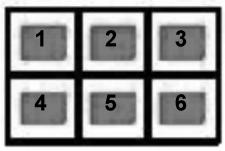
Examples:
```
int     a [10] [10];
int     num [3] [4];
```



2 Initializing 2D-Array Elements:

- The first element of array age:

```
a [2] [3] = { {1, 2, 3} , {4, 5, 6} };
```



3 Read / Write / Process Array Elements

Example 6.7

__ Write C++ program, to read 15 numbers, 5 numbers per row, the print them:

```
#include<iostream.h>
void main ( )
{
        int a [ 3 ] [ 5 ];
        int i , j;
        for ( i = 0 ; i < 3; i++ )
            for ( j = 0 ; j < 5; j++ )
                cin >> a [ i ] [ j ];

        for ( i = 0 ; i < 3; i++ )
            {
                for ( j = 0 ; j < 5; j++ )
                    cout << a [ i ] [ j ];
                cout << endl;
             }
}
```

Example 6.8

__ Write C++ program, to read 4*4 2D-array, then find the summation of the array elements, finally print these elements:

```
#include<iostream.h>
void main ( )
{
        int a [ 4 ] [ 4 ];
        int i , j, sum = 0;
        for ( i = 0 ; i < 4; i++ )
            for ( j = 0 ; j < 4; j++ )
                cin >> a [ i ] [ j ];

        for ( i = 0 ; i < 4; i++ )
            for ( j = 0 ; j < 4; j++ )
                sum += a [ i ] [ j ];
       cout << "summation is: " << sum << endl;

        for ( i = 0 ; i < 4; i++ )
            {
                for ( j = 0 ; j < 4; j++ )
                    cout << a [ i ] [ j ];
                cout << endl;
             }
}
```

Example 6.9

__ Write C++ program, to read 3*4 2D-array, then find the summation of each row:

```
#include<iostream.h>
void main ( )
{
        int a [ 3 ] [ 4 ];
        int i , j, sum = 0;
        for ( i = 0 ; i < 3; i++ )
            for ( j = 0 ; j < 4; j++ )
                cin >> a [ i ] [ j ];

        for ( i = 0 ; i < 3; i++ )
          {
                sum = 0;
                for ( j = 0 ; j < 4; j++ )
                    sum += a [ i ] [ j ];
                cout << "summation of row " << i  << " is: " << sum << endl;
          }
}
```

Example 6.10

__ Write C++ program, to read 3*4 2D-array, then replace each value equal 5 with 0:

```
#include<iostream.h>
void main ( )
{
        int a [ 3 ] [ 4 ];
        int i , j;
        for ( i = 0 ; i < 3; i++ )
            for ( j = 0 ; j < 4; j++ )
                cin >> a [ i ] [ j ];

        for ( i = 0 ; i < 3; i++ )
            for ( j = 0 ; j < 4; j++ )
                  if  ( a [ i ] [ j ] == 5 )   a [ i ] [ j ] = 0;
        for ( i = 0 ; i < 3; i++ )
            {
                for ( j = 0 ; j < 4; j++ )
                    cout << a [ i ] [ j ];
                cout << endl;
             }
}
```

Example 6.11

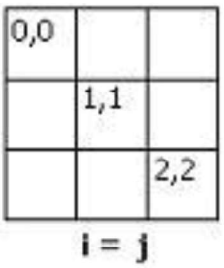
Write C++ program, to addition two 3*4 arrays:

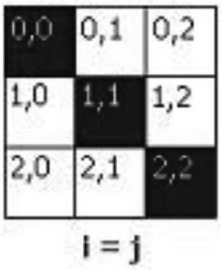
```
#include<iostream.h>
void main ( )
{
        int a [ 3 ] [ 4 ], b [ 3 ] [ 4 ], c [ 3 ] [ 4 ];
        int i , j;

       cout << "enter element of array A: \n";
       for ( i = 0 ; i < 3; i++ )
           for ( j = 0 ; j < 4; j++ )
               cin >> a [ i ] [ j ];

        cout << "enter element of array B: \n";
        for ( i = 0 ; i < 3; i++ )
           for ( j = 0 ; j < 4; j++ )
               cin >> b [ i ] [ j ];

        for ( i = 0 ; i < 3; i++ )
           for ( j = 0 ; j < 4; j++ )
                   c [ i ] [ j ] = a [ i ] [ j ] + b [ i ] [ j ];

        for ( i = 0 ; i < 3; i++ )
           {
              for ( j = 0 ; j < 4; j++ )
                  cout << c [ i ] [ j ];
              cout << endl;
            }
}
```

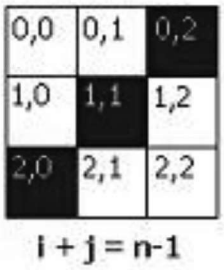
Example 6.12

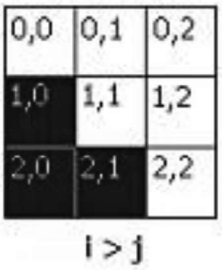
Write C++ program, to replace each element in the main diameter (diagonal) with zero:

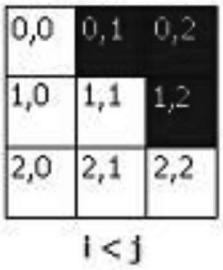
```
#include<iostream.h>
void main ( )
{
        int a [ 3 ] [ 3 ];
        int i , j;

       for ( i = 0 ; i < 3; i++ )
           for ( j = 0 ; j < 3; j++ )
              cin >> a [ i ] [ j ];

        for ( i = 0 ; i < 3; i++ )
           for ( j = 0 ; j < 3; j++ )
                 if ( i == j )     a [ i ] [ j ] = 0;

        for ( i = 0 ; i < 3; i++ )
           {
              for ( j = 0 ; j < 3; j++ )
                 cout << a [ i ] [ j ];
              cout << endl;
            }
}
```











Example 6.13

__ Write C++ program, to convert 2D-array into 1D-array:

```
#include<iostream.h>
void main ( )
{
        int a [ 3 ] [ 4 ];
        int b [ 12 ];
        int i , j, k = 0;

       for ( i = 0 ; i < 3; i++ )
           for ( j = 0 ; j < 4; j++ )
               cin >> a [ i ] [ j ];

        for ( i = 0 ; i < 3; i++ )
           for ( j = 0 ; j < 4; j++ )
                {
                     b [ k ] =  a [ i ] [ j ];
                     k++;
                }

        for ( i = 0 ; i < k; i++ )
             cout << b [ i ];
}
```