

2D ARRAYS**Objectives:**

In this lab, student will be able to:

- Write and execute programs on 2Dimensional arrays

Introduction to 2 Dimensional Arrays

- It is an ordered table of homogeneous elements.
- It can be imagined as a two dimensional table made of elements, all of them of a same uniform data type.
- It is generally referred to as matrix, of some rows and some columns. It is also called as a two-subscripted variable.

For example

```
int marks[5][3];
float matrix[3][3];
char page[25][80];
```

- The first example tells that marks is a 2-D array of 5 rows and 3 columns.
- The second example tells that matrix is a 2-D array of 3 rows and 3 columns.
- Similarly, the third example tells that page is a 2-D array of 25 rows and 80 columns.

Sample Program code snippet to read and print a 2D array:

```
void main()
{
    int i,j,m,n,a[100][100];
    clrscr();
    cout<<"enter dimension for a:";
    cin>>m>>n;
    cout<<"\n enter elements\n";
    for(i=0;i<m;i++) // input 2D array using 2 for loops
    {
        for(j=0;j<n;j++)
            cin>>a[i][j];
    }
    for(i=0;i<m;i++) // output 2D array with 2 for loops
    {
        for(j=0;j<n;j++)
            cout<<"t"<<a[i][j];
        cout<<"\n";
    }
    getch();
}
```

Lab exercises

With the knowledge of 1D and 2D array structures,

Write C++ programs to do the following:

1. Find whether a given matrix is symmetric or not. [Hint: $A = A^T$]
2. Find the trace and norm of a given square matrix.

[Hint: Trace= sum of principal diagonal elements

Norm= SQRT (sum of squares of the individual elements of an array)]

3. Perform matrix multiplication.
4. To interchange the primary and secondary diagonal elements in the given Matrix.
5. Interchange any two Rows & Columns in the given Matrix.

Additional exercises on 2D arrays

1. Compute the row sum and column sum of a given matrix.
2. Check whether the given matrix is magic square or not.
3. Check whether the given matrix is a Lower triangular matrix or not.

Ex: 1 0 0
 2 3 0
 4 5 6