Programming Fundamentals

- Course Code: CS-111
- Course Instructor: Isra Naz

Goals for today:

- 2-DArrays

CLO Covered

- CLO1:Describe fundamental problem-solving techniques and logic constructs. GA 1
- CLO2: Apply basic programming concepts. GA2

2-D Arrays

- 2-D array can be considered as table that consists of rows and columns.
- Each element in 2-D array is refered with the help of two indexes.
- One index indicates row and second indicates the column.

Declaring 2-D Array

Syntax

Data_type Identifier[row][column];

Example:

int arr[4][3];

2-D array Intialization

- Assigning value at the time of declaration is termed as initialization
- The 2-D array can also be initialized at the time of declaration.
- Initialization is performed by assigning the initial values in braces seperated by commas.

Accessing Individual Elements of 2-D Array

- The array name and indexes of row and columns are used to access an individual element of 2-D array.
- For Example:

```
arr[0][1] = 100;
```

or

```
R=0;
C=1;
arr[R][C]=100;
```

Entering data in 2-D Arrays

- Any element of the array is entered by using the name of array and index of the element.
- For example

```
arr[0][0]=10;
arr[0][1]=20;
arr[0][2]=30;
arr[1][0]=40;
arr[1][1]=50;
arr[1][2]=60;
```

	0	1	2
0	10	20	30
1	40	50	60

- The **nested loops** are frequently used to enter data in two-dimensional array
  - The **outer loops** are usually used to **refer** to the **rows in arrays.**
  - The **inner loops used** to **refer** to the **columns.**

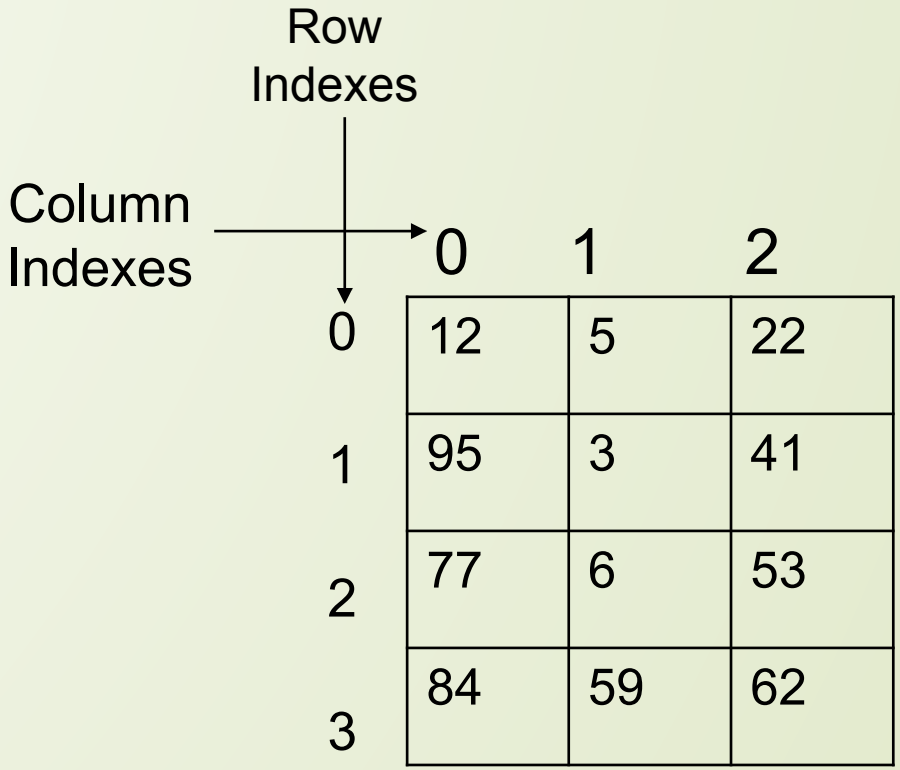
Example

```
int arr[2][4]={1,2,3,4,5,6,7,8};
int i,j;
for(i=0;i<2;i++)
{
    for(j=0;j<4;j++)
        cout<<arr[i][j]<<"\t";
    cout<<endl;
}
```

2-D Array Intialization

Syntax:

```
int arr[4][3]={{12,5,22},
               {95,3,41},
               {77,6,53},
               {84,59,62} }
```



Example

- **Write a program that initialize two dimensional array of 2 rows and 3 columns and then displays its values.**

Output:

```
arr[0][0]=15  arr[0][1]=21    arr[0][2]=9
arr[1][0]=84  arr[1][1]=33    arr[1][2]=72
```

Example

- **Write a program that initialize two dimensional array of 2 rows and 3 columns and then displays its values.**

```
int i,j,arr[2][3]={15,21,9,84,33,72};
for(i=0;i<2;i++)
{
    for(j=0;j<3;j++)
    cout<<"arr["<<i<<"]["<<j<<"]="<<arr[i][j]<<"\t";
    cout<<endl;
}
```

Example

- **Input five integers from the user and stores them in an array. It then displays all values in the array using loops.**

Example

- **Input five integers from the user and stores them in an array. It then displays all values in the array using loops.**

```
{
    int arr[5],i;
    for(i=0; i<=4; i++)
    {
        cout<<"Enter an integer:";
        cin>>arr[i];
    }
    cout<<"The values in an array are: \n";
    for(i=0; i<=4; i++)
    cout<<arr[i]<<endl;
}
```

Example

- **Input five values from the user , stores them in an array and displays the sum and average of these values.**

Example

- **Input five values from the user , stores them in an array and displays the sum and average of these values.**

```
{
    int arr[5],i,sum = 0;
    float avg = 0.0;
    for(i=0; i<=4; i++)
    {
        cout<<"Enter an integer:";
        cin>>arr[i];
        sum = sum + arr[i];
    }
    avg = sum/5.0;
    cout<<"Sum = "<<sum<<endl;
    cout<<"Average is"<<avg;
}
```

Example

- **Initialize 2-D array with 8 elements and find maximum and minimum number from the 2 dimensional array**

Output:

Maximum=84
Minimum=9

Example

```
int i,j,max,min;
int arr[2][4]={15,21,9,84,33,72,18,47}; //array initialization
max=min=arr[0][0]; //assign min & max value located at index 0
for(i=0;i<2;i++) //outer loop for row
    for(j=0;j<4;j++) //inner loop for columns
    {
    if(arr[i][j]>max) //check for max value
        max=arr[i][j]; // assign newly found max value
    if(arr[i][j]<min) //check for min value
        min=arr[i][j]; // assign newly found min value
    } //show result
cout<<"Maximum="<<max<<endl<<"Minimum="<<min<<endl;
```

Output:

Maximum=84
Minimum=9

Yours Turn

- Write a C++ program that uses a two-dimensional array to store the marks of 5 subjects for each student. The students are organized into 5 rows, with each row containing 5 subjects.

Output:
Enter row number to check student: 2
Enter subject number: 3
Score of the student:81

Task

- Write a program in C++ to find even and odd number in a given array.

Questions…