Paper 102:

Programming & Problem solving through C

Lecture-14:Unit-II Multidimensional Arrays

Multidimensional Arrays

- Arrays can be single dimension or multidimensional int num[10];
 - This is a single dimension array
- Multidimensional arrays are defined similar to a single dimension, except that a pair of square brackets are added fro every dimension
 - i.e., int num[10] for single dimension int num[10][10] for a 2-D array int num[10][10][10] for a 3-D array
- Hence the general syntax for array definition is storage-class data-type array-name[exp 1][exp 2]...[exp n];

2-D Array

- A two dimensional array is often considered in the form of a matrix, where each array element conforms to a row and column numbers.
- It can be defined as
 int num[2][3];
 A 2-D int array with 2 rows and 3 cols
- Initial values can be assigned in any of the following ways:

The array elements are stored in memory similar to a 1-D array

num[0][0]	num[0][1]	num[0][2]	num[1][0]	num[1][1]	num[1][2]
1	2	3	4	5	6
2120	2122	2124	2126	2128	2130

Processing of a 2-D Array

int num[2][3];

To assigned values to the array at run time for(i=0;i<2;i++)
{
 for(j=0;j<3;j++)
 {
 printf("\n enter a number:");
 scanf("%d",&num[i][j]);
 }
}</pre>

A program that inputs values into a 2-D array, totals all elements and printing the total.

```
#include <stdio.h>
void main()
 int m[4][3];
 int row, column, sum;
  sum = 0;
for( row = 0; row < 4; row + + )
    for(column = 0; column < 3; column++)
    { printf("\n enter a number:");
       scanf("%d",&m[row][column]);
 for( row = 0; row < 4; row + +)
    for(column = 0; column < 3; column++)
              sum = sum + m[row][column];
 printf("The total is %d\n", sum );
```

Passing a 2-D Array to a function

- The formal argument declarations within the function definition must include explicit size specifications in all of the subscript positions except the first.
- The size specification must be consistent with the corresponding size specification in the calling program
- The first subscript position may be written as empty pair of square brackets.
- The corresponding function prototype must be written in the same manner.

```
#include <stdio.h>
void sumarray(int n[][3]);
void main()
  int m[4][3];
  int row, column, sum;
  sum = 0;
for( row = 0; row < 4; row + + )
    for(column = 0; column < 3; column++)
    { printf("\n enter a number:");
       scanf("%d",&m[row][column]);
sumarray(m);
void sumarray(int n[][3])
{ int sum=0;
  for( row = 0; row < 4; row + +)
  { for(column = 0; column < 3; column++)
       sum = sum + n[row][column];
  printf("The total is %d\n", sum );
```

Class Assignment

1. Write a program to store integer values into a 2-D array, sum each of the rows and display the array as given below

1	2	3 = 6
4	5	6 = 15
7	8	9 = 24
10	11	12 = 33

- 2. Write a program to store integer values into a matrix, and display only the elements of the diagonal of the matrix.
- 3. Write a program to store integer values into a two 2-D array, and add the elements of the two arrays correspondingly and store the result in another 2-D array. Display the resultant array on the screen. Do the same for subtraction.
- 4. Write a program to input either 1 or 0 into a two 2-D array(matrix), and display the matrix on the screen along with its complement i.e., 1 should be changed to 0 and 0 should be changed to 1.