C PROGRAMMING

LECTURE 4

ARRAYS AND STRUCTURES

ARRAYS:

Arrays are data structures used to hold data of same kind.

Let us consider a simple example demonstrating the use of arrays:

```c
main( )
{
 int avg, sum = 0 ;
 int i ;
 int marks[30] ; /* array declaration */
 for ( i = 0 ; i <= 29 ; i++ )
 {
 printf ( "\nEnter marks " ) ;
 scanf ( "%d", &marks[i] ) ; /* store data in array */
 }
 for ( i = 0 ; i <= 29 ; i++ )
 sum = sum + marks[i] ; /* read data from an array*/
 avg = sum / 30 ;
 printf ( "\nAverage marks = %d", avg ) ;
}
```

- The array elements are stored in contiguous memory locations.

PASSING ARRAYS INTO FUNCTONS:

```
/* Demonstration of call by reference */

main( )

{

 int i ;

 int marks[ ] = { 55, 65, 75, 56, 78, 78, 90 } ;

 for ( i = 0 ; i <= 6 ; i++ )

 disp ( marks ) ;

}

disp ( int  n[] )

{

for ( i = 0 ; i <= 6 ; i++ )

 printf ( "%d ", n [i]) ;

}
```

TWO DIMENSIONAL ARRAYS:

It is also possible for arrays to have two or more dimensions. A two dimensional array is also called a matrix.

Let us look at a simple example:

```
main( )

{

 int stud[4][2] ;

 int i, j ;
```

```c
for ( i = 0 ; i <= 3 ; i++ )

{

printf ( "\n Enter roll no. and marks" ) ;

scanf ( "%d %d", &stud[i][0], &stud[i][1] ) ;

}

for ( i = 0 ; i <= 3 ; i++ )

printf ( "\n%d %d", stud[i][0], stud[i][1] ) ;

}
```

	Col no. 0	Col no. 1
Row no. 0	132	233
Row no. 1	344	564
Row no. 2	545	324
Row no. 3	786	341

STRUCTURES:

Structures are a collection of data of different datatypes.

Consider a simple example of the above type:

```c
main( )

{

struct book

{

char name ;

float price ;
```

```c
    int pages ;
} ;
struct book b1, b2, b3 ;

printf ( "\nEnter names, prices & no. of pages of 3 books\n" ) ;
scanf ( "%c %f %d", &b1.name, &b1.price, &b1.pages ) ;
scanf ( "%c %f %d", &b2.name, &b2.price, &b2.pages ) ;
scanf ( "%c %f %d", &b3.name, &b3.price, &b3.pages ) ;

printf ( "\nAnd this is what you entered" ) ;
printf ( "\n%c %f %d", b1.name, b1.price, b1.pages ) ;
printf ( "\n%c %f %d", b2.name, b2.price, b2.pages ) ;
printf ( "\n%c %f %d", b3.name, b3.price, b3.pages ) ;
}
```

And here is the output...

Enter names, prices and no. of pages of 3 books

A 100.00 354

C 256.50 682

F 233.70 512

Declaring a Structure :

In our example program, the following statement declares the structure type:

```
struct book
{
 char name ;
 float price ;
 int pages ;
} ;
```

ARRAY OF STRUCTURES :

```
/* Usage of an array of structures */
main( )
{
 struct book
 {
 char name ;
 float price ;
 int pages ;
 } ;
 struct book b[100] ;
```