

CHAPTER 12
STRUCTURED DATA
TYPE
ARRAYS

INTRODUCTION

An array is a collection of variables of same type that are referenced by a common name .

C++ allows more type of data i.e its derived data type.(integer and floating point).

TYPES OF ARRAYS

1. SINGLE DIMENSION ARRAY

It is simplest type of array . indices no starts with 0.

An array must be defined before it can be used to store information . Ex.

Type array-name[size]

The data type of array elements is known as the base type of the array.

TYPES OF ARRAYS

1. SINGLE DIMENSION ARRAY

MEMORY REPRESENTATION OF SINGLE DIMENSION ARRAYS

Single dimension arrays are essentially list of information of same type and stored in contiguous memory location in their index order. Ex .

Char grade [8];

Will have element grade[0] at first location
Grade[1] in the next position.

STRING AS AN ARRAY

C++ does not have string data type rather it implements string as a single – dimension character array. A string is defined as a character array that is terminated by a null character. Ex.

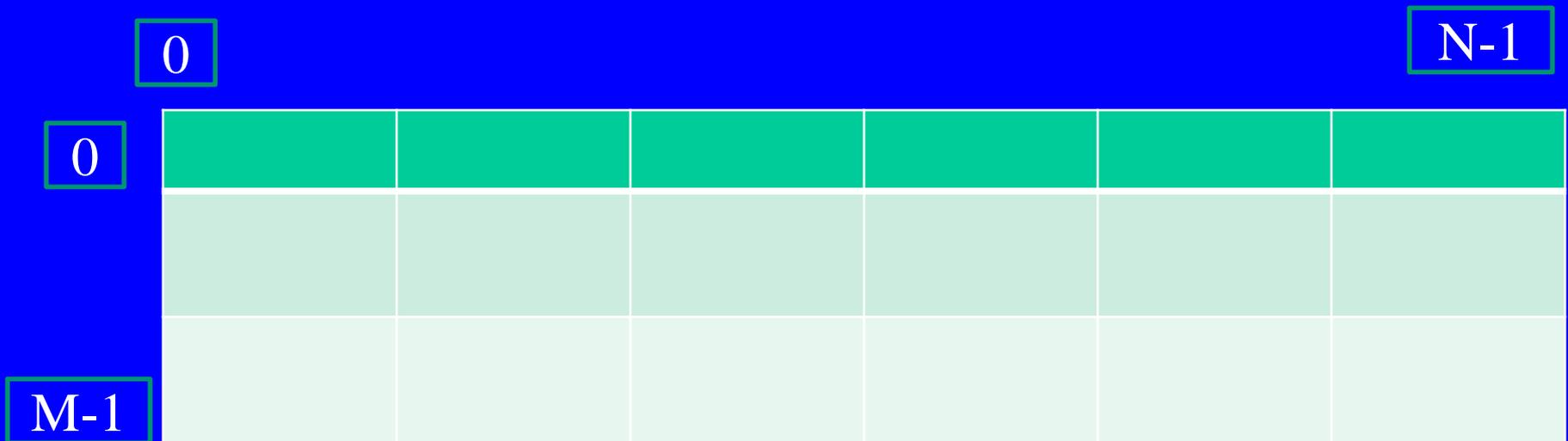
To declare an character array that hold 10 character string we would write

```
Char strg[11];
```

TWO DIMENSIONAL ARRAY

A two dimensional array is an array in which each element is itself an array. Ex

An array $A[m][n]$ is an m by n table with m rows and n columns containing $m*n$ table.



PROCESSING 2 D ARRAY

We use nested loops to process 2 d array. one loop process the rows and another columns .If outer loops is for rows and inner loop for columns then each row index,all columns are processed and then the same process is repeated.

```
int A [2] [3];
```

```
int I,j;
```

```
For(i=0;i<2;++i)
```

```
{
```

```
for (j=0;j <3 ; ++j)
```

```
{ cout<<"enter element";
```

```
cin >> A [ i ] [ j ] ;
```

```
}
```

```
}
```

MEMORY REPRESENTATION OF 2D ARRAY

Two dimension array are stored in a row column matrix, where the first index represents the row and second indicates the row. This means that the second index changes faster than first index when accessing the elements in an array order.

The formula to calculate the total number of bytes of two d array are:

Total bytes=no of rows *no of columns*size of base

MATRICES AS 2D ARRAYS

Matrix is a set of mn numbers arranged in a rectangular array of m rows and n columns. Such matrix is called m by n matrix.

```
int Mat [5] [4] ; //if matrix contains integers
```

Or

```
float Mat [5] [4] ;
```

ARRAY OF STRINGS

An array of string is a two dimensional character array . The size of the first index determines the number of strings and size of second index determines maximum length of each string.

ARRAY INITIALIZATION

C++ provides the facility of an array initialization at the time of declaration. The arrays are initialization in the same way as other variable.ex .

Type array – name [size1].....[size N]

Following code initialises an integer array with 12 elements

```
Int days of months [12]={31,28,31,30,31,31,30,31,30,31}
```

This would place 31 is month [0],28 is month [2].

ARRAY INITIALIZATION

Character arrays can be also initialized like:

```
Char string [10]="program";
```

Will initialize it as

```
Char string [10]={"'p' , 'r' , 'o' , 'g' , , 'r' , 'a' , 'm' , \0}
```

Two dimension will do it in:

```
Int cube [ 5 ] [2]= { 1 ,1,  
                      2 , 8  
                      3, 27  
                      4, 68  
                      5, 25  
};
```

UNSIZE ARRAY INITIALIZATION

C++ allows you to skip the size of an array is the initialization . This is called an unsize array. C++ calculates is size and creates it as required.

```
char s1 [ ] = "first string";
```

```
int val[ ] = {2, 3, 4, 5, 6, 7, 8, 9};
```

```
float amount [ ] = {2341.57, 1900.70, 3986.65 ,  
4466.65 , 5151.56};
```

CALLING FUNCTION WITH ARRAY

C++ interprets an array name as the address of its first element. C++ treats the name of an array as if it were a pointer.

When an array is used as an argument to a function, only the address of the array gets passed not a copy of the entire array.

AN INTERESTING THING ABOUT AN ARRAY

Since name of an array is pointer to its first element ,the array name +1 gives the address of the next element.+2 gives the address of the third element. So for an int array Val[10] ,if you pass val+2 as an argument to the function the array is passed But from its third element onward. Ex.

```
biggest =large(amount+5 , i+2) ;
```