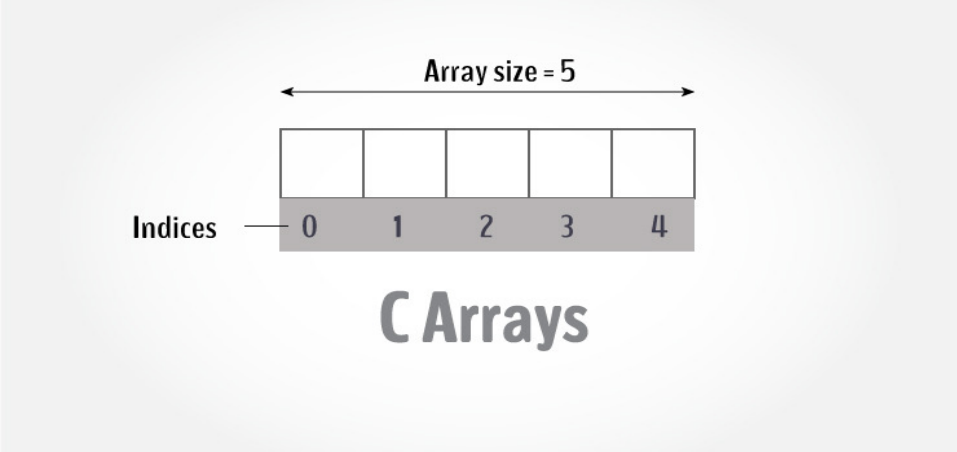
C Fundamental

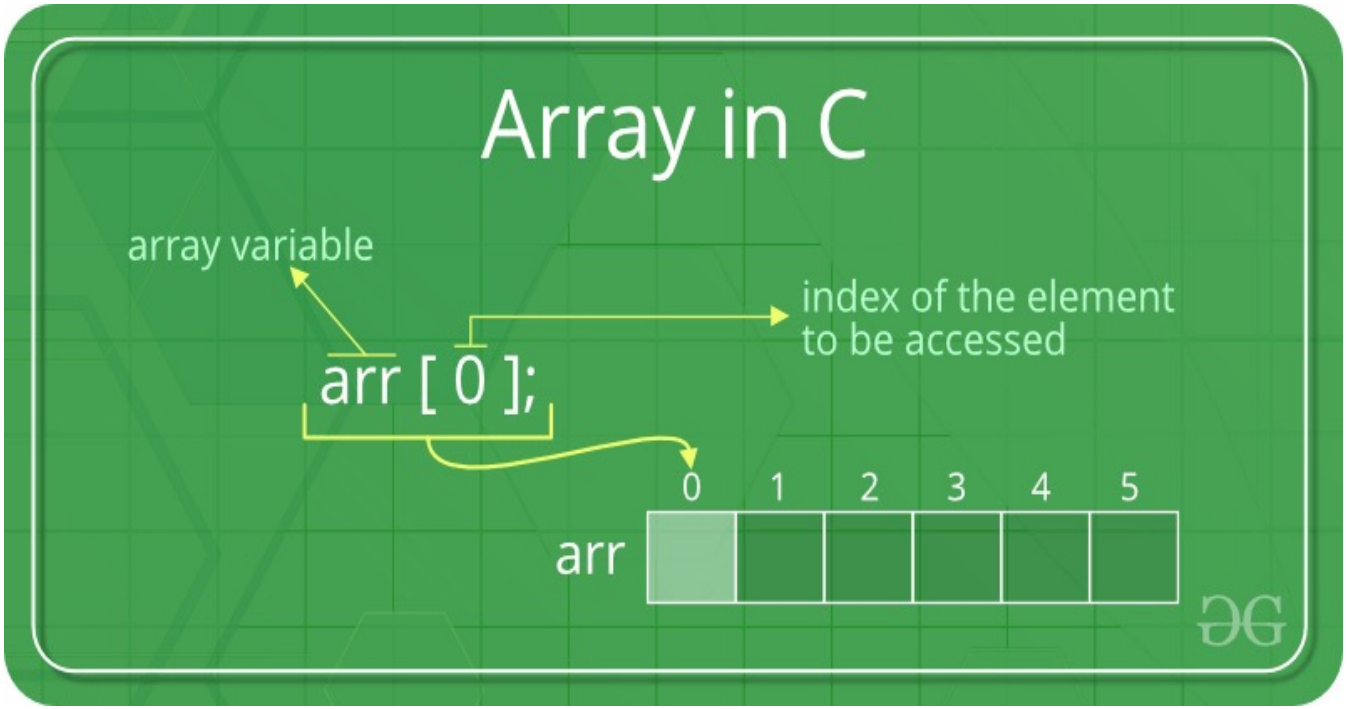
Arrays



Objectives

- Explain array elements and indices
- Define an array
- Explain array handling in C
- Explain how an array is initialized
- Explain string / character arrays
- Explain two dimensional arrays
- Explain initialization of two dimensional arrays

Array Elements & Indices (1)



Array Elements & Indices (2)

- Each member of an array is identified by unique index or subscript assigned to it
- The dimension of an array is determined by the number of indices needed to uniquely identify each element
- An index is a positive integer enclosed in [ ] placed immediately after the array name
- An index holds integer values starting with zero
- An array with 11 elements will look like:

Player[0], player[1], player[2],…. Player[10]

Defining an Array (1)

- An array has some particular characteristics and has to be defined with them
- These characteristics include –

  Storage Class

  Data Types of the elements in the Array

  Array Name (Which indicates the location of the first member of the array)

  Array Size (A constant value)

Defining an Array (2)

- An array is defined in the same way as a variable is defined.
- The only change is that the array name is followed by one or more expressions, enclosed within square brackets [], specifying the array dimension.

```
Storage_Class   data_types   array_name[size]
                int player[11];
```

Norms with Arrays

- All elements of an array are of the same type
- Each element of an array can be used wherever a variable is allowed or required
- Each element of an array can be referenced using a variable or an integer expression
- Arrays can have their data types like int, char, float or double

Array Handling in C-1

- An array is treated differently from a variable in C
- Two arrays, even if they are of the same type and size cannot be tested for equality
- It is not possible to assign one array directly to another
- Values cannot be assigned to an array on the whole, instead values are assigned to the elements of the array

Array Handling in C-2

```
/* Input values are accepted from the user into the array ary[10]*/
#include <stdio.h>
void main()
{
    int ary[10];
    int i, total, high;
    for(i=0; i<10; i++){
     printf("\n Enter value: %d : ", i+1);
     scanf("%d",&ary[i]);
    }
    /* Displays highest of the entered values */
    high = ary[0];
    for(i=1; i<10; i++){
     if(ary[i] > high)
       high = ary[i];
    }
    printf("\nHighest value entered was %d", high);
    /*  prints average of values entered for ary[10] */
    for(i=0,total=0; i<10; i++)
      total = total + ary[i];
    printf("\nThe average of the elements of ary is %d",total/i);
}
```

Array Initialization

- Each element of an Automatic array needs to be initialized separately
- In the following example the array elements have been assigned valued using the for loop

```
#include <stdio.h>
void main()
{
   char alpha[26];
   int i, j;
   for(i=65,j=0; i<91; i++,j++)
   {
     alpha[j] = i;
     printf("The character now assigned is %c \n", alpha[j]);
   }
   getchar();
}
```

- In case of extern and static arrays, the elements are automatically initialized to zero

Two-Dimensional Arrays

- The simplest and the most commonly used multi-dimensional array is the two - dimensional array
- A two-dimensional array can be thought of as an array of two single dimensional arrays
- A two-dimensional array looks like a railway time-table consisting of rows and columns
- A two–dimensional array is declared as -

```
int temp[4][3];
```

Initialization of Multidimensional Arrays-1

```
int ary[3][4] =
{1,2,3,4,5,6,7,8,9,10,11,12};
```

The result of the above assignment will be as follows :

ary [0] [0] = 1	ary [0] [1] = 2	ary [0] [2] = 3	ary [0] [3] = 4
ary[1] [0] = 5	ary [1][1] = 6	ary [1] [2] = 7	ary [1][3] = 8
ary[2] [0] = 9	ary [2][1] = 10	ary [2] [2] = 11	ary [2][3] = 12

Initialization of Multidimensional Arrays-2

```
int arrays[3][4]=
        {
            {1,2,3},
            {4,5,6},
            {7,8,3}
        };
```

Initialization of Multidimensional Arrays-3

The result of the assignment will be as follows :

ary[0][0] =1	ary[0][1]=2	ary[0][2]=3	ary[0][3]=0
ary[1][0]=4	ary[1][1]=5	ary[1][2]=6	ary[1][3]=0
ary[2][0]=7	ary[2][1]=8	ary[2][2]=3	ary[2][3]=0

A two - dimensional string array is declared in the following manner :

```
char str_ary[25][80];
```

Two-Dimensional Array-1

```
#include <stdio.h>
#include <string.h>
void main ()
{
    int i, n = 0;
    int item;
    char x[10][12];
    char temp[12];

    clrscr();
    printf("Enter each string on a separate line\n\n");
    printf("Type 'END' when over \n\n");

    /* read in the list of strings */
    do
    {
        printf("String %d : ", n+1);
        scanf("%s", x[n]);
    } while (strcmp(x[n++], "END"));
    /*reorder the list of strings */
```

contd….

Two-Dimensional Array-2

```
n = n - 1;
   for(item=0; item<n-1; ++item)
   {
     /* find lowest of remaining strings */
     for(i=item+1; i<n; ++i)
     {
          if(strcmp (x[item], x[i]) > 0)
          {
               /*interchange two stings */
               strcpy (temp, x[item]);
               strcpy (x[item], x[i]);
               strcpy (x[i], temp);
          }
      }
    }
/* Display the arranged list of strings */
printf("Recorded list of strings : \n");
     for(i = 0; i < n ; ++i)
     {
         printf("\nString %d is %s", i+1, x[i]);
     }
}
```

Thank you

Q&A