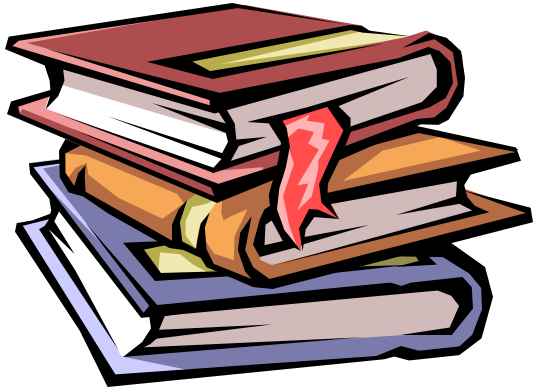
PROGRAMMING IN C - CSFIRST YEAR

ARRAYS

By
Jitendra Kumar



Session Objectives

- Explain Arrays
- Explain Declaration,Initialization of Array
- Explain Types of Array
- One Dimensional,Two Dimensional and Multi Dimensional Array

Array is defined as a set of homogeneous data items.

An Array is a group of elements that share a common name that are differentiated from one another by their positions within the array

DECLARATION OF AN ARRAY

```
Datatype arrayname[subscript];
```

POINTS TO BE NOTED :

1) Arrayname should be a valid “C” variable
2) Arrayname should be unique
3) The elements in the array should be of same type
4) Subscript (array size) cannot be negative
5) Subscript must always be an integer

TYPES OF ARRAY

One Dimensional Array

Two Dimensional Array

Multi Dimensional Array

Single or One Dimensional Arrays

- **Arrays whose elements are specified by one subscript are called One dimensional array or linear array.**
- **Syntax :**

datatype arrayname[size];

- ***For Example :***

int a [3]

- ***Note :***

By default array index should starts with zero (0)

Write a program for entering data into an array & Reading data from an array

```
#include<stdio.h>
void main()
{
int arr[10],i,n;
printf("\n ENter N Elements");
scanf("%d",&n);
for(i=0;i<n;i++)
{
printf("enter arr[%d]=",i);
scanf("%d",&arr[i]);
}
for(i=0;i<n;i++)
{
printf("%d\n",arr[i]);
}
}
```

Input

```
Enter N Elements   : 3
Enter arr[0]  :  2
Enter arr[1]  :  5
Enter arr[2]  :  3
```

Output

```
2
5
3
```

PROGRAM-ARRAY INITIALIZATION

Array Initialization

```
#include<stdio.h>
#include<conio.h>
void main()
{
int a[5]={10,20,30,40,50};
int i;
clrscr();
for(i=0;i<5;i++)
{
printf("%d\n",a[i]);
}
getch();
}
```

Output

```
10
20
30
40
50
```

Write a "C" program to sort the given number is in ascending order using one dimensional array

```
#include<stdio.h>
void main()
{
int i,j,n, a[10],temp;
printf("\n size of vector=");
scanf("%d",&n);
printf("vector elements:");
for (i=0;i<n;i++)
{
scanf("%d",&a[i]);
}
for(i=0;i<n-1;i++)
for(j=i+1;j<n;j++)
if(a[i]>a[j])
{
temp=a[i];
a[i]=a[j];
a[j]=temp;
}
printf("\n\nElements in asending order is=\n");
for(i=0;i<n;i++)
printf("%d",a[i]);
printf("\n\nElements in descending order is=\n");
for(i=n-1;i>=0;i--)
printf("%d",a[i]);
getch();
}
```

Two Dimensional Arrays

- A **Arrays whose elements are specified by two subscript such as row and column are called two dimensional array.**
- **Row → means horizontally**
- **Column → means vertically**

- **A two - dimensional array looks like a school time-table consisting of rows and columns.**
- **A two – dimensional array is declared as -**

int a [3] [3]

Two Dimensional Array Initialization

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

(OR)

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

Write a “C” program to perform the addition of two matrices

```
#include<stdio.h>
void main()
{
int a[3][3],b[3][3],c[3][3],i,j;
printf("Input A - Matrix\n");
for(i=0;i<3;i++)
for(j=0;j<3;j++)
scanf("%d",&a[i][j]);
printf("Input B - Matrix\n");
for(i=0;i<3;i++)
for(j=0;j<3;j++)
scanf("%d",&b[i][j]);
for(i=0;i<3;i++)
for(j=0;j<3;j++)
c[i][j]=a[i][j]+b[i][j];
printf("Sum of A and B Matrix=\n");
for(i=0;i<3;++i)
{
for(j=0;j<3;++j)
printf("%d",c[i][j]);
printf("\n");
}
}
```

Write a “C” program to perform the subtraction of two matrices

```
#include<stdio.h>
void main()
{
int a[3][3],b[3][3],c[3][3],i,j;
printf("Input A - Matrix\n");
for(i=0;i<3;i++)
for(j=0;j<3;j++)
scanf("%d",&a[i][j]);
printf("Input B - Matrix\n");
for(i=0;i<3;i++)
for(j=0;j<3;j++)
scanf("%d",&b[i][j]);
for(i=0;i<3;i++)
for(j=0;j<3;j++)
c[i][j]=a[i][j]-b[i][j];
printf("Sum of A and B Matrix=\n");
for(i=0;i<3;++i)
{
for(j=0;j<3;++j)
printf("%d",c[i][j]);
printf("\n");
}
}
```

Write a “C” program to sort the given names in Alphabetical order using One dimensional array

```
#include<stdio.h>
#include<string.h>
void main()
{
int i,j,n;
char a[10][10],temp[10];
printf("\n Enter the N Values");
scanf("%d",&n);
printf("Enter the Names one by one :\n");
for(i=0;i<n;i++)
{
scanf("%s",&a[i]);
}
for(i=0;i<n-1;i++)
for(j=i+1;j<n;j++)
if((strcmp(a[i],a[j]))>0)
{
strcpy(temp,a[i]);
strcpy(a[i],a[j]);
strcpy(a[j],temp);
}
printf("The Names in Alphabetical Order is =\n");
for(i=0;i<n;i++)
printf("\n%s",a[i]);
}
```

Write a "C" program to perform matrix multiplication using two dimensional array

```
#include<stdio.h>
void main()
{
int a[10][10],b[10][10],c[10][10],i,j,m,n,p,q,k;
printf("Input row and column of A matrix \n");
scanf("%d %d",&n,&m);
printf(" Input row and column of B matrix \n");
scanf("%d %d",&p,&q);
if(n==q){
printf(" Matrices can be Multiplied: \n");
printf(" Input A-matrix \n");
for(i=0;i<n;++i)
for(j=0;j<m;++j)
scanf("%d",&a[i][j]);
printf(" Input B-matrix \n");
for(i=0;i<p;++i)
for(j=0;j<q;++j)
scanf("%d",&b[i][j]);
printf("The resultant matrix is\t:\n");
for(i=0;i<n;++i){
for(j=0;j<m;++j){
c[i][j]=0;
for(k=0;k<m;++k)
c[i][j]=c[i][j]+a[i][k]*b[k][j];
printf("%d",c[i][j]);}
printf("\n");}}
else
printf("Matrices cannot be multiplied \n");
}
```

Write a "C" program to find the largest and smallest numbers given in the array

```
#include<stdio.h>
void main()
{
int i,n;
float a[20],large,small;
printf("\nEnter the N  values=");
scanf("%d",&n);
printf("Enter the values one by one :\n");
for(i=0;i<n;i++)
{
scanf("%f",&a[i]);
}
large=a[0];
for(i=1;i<n;i++)
{
if(a[i]>large)
large=a[i];
}
small=a[0];
for(i=1;i<n;i++)
{
if(a[i]<small)
small=a[i];
}
printf("Largest element is = %f\n",large);
printf("Smallest element  = %f\n",small);
}
```

Session Summary

- Arrayname should be a unique and valid “C” Variable name
- The number of elements in a multi dimensional array is the product of its subscripts
- Arrays can be initialized to the same type in which they are declared
- The character array receives the terminating ‘\0’ in the string constant
- The individual values in the array are called as elements
- It is not necessary to specify the length of an array, explicitly in case if initializers are provided for the array during declaration itself

EXERCISES

1. Write a program to search an element and to find how many times it is present in the array?
2. Write a program to find the sum of diagonal elements in a matrix
3. Write a program to find the second largest number in an array?
4. Write a program to remove the duplicate elements of the array?
5. Write a program to merge two arrays and print the merged array in ascending order?
6. Write a program to insert an element into an sorted array of integers?
7. Write a program to display only the negative elements of the array?