ARRAY

Q. What is array?
Ans:
Array is collection of similar data items under a common name.

Q.Define an Array? state the necessity of an array?
Ans;

An array is a fixed-size sequence collection of elements of the same data type. It is simply a grouping of like tupe data in its simplest form. An array can be used to represent a list of numbers.
Some examples wher the concept of an array can be used:

- List of temperatures recorded every hour in a day.
- List of employees in an organization.

Or

Array is a Group of consecutive memory locations

- Same name and type

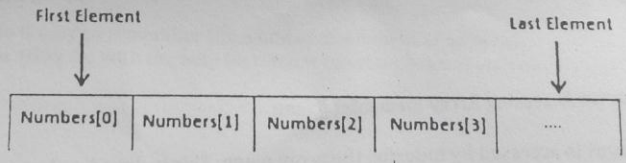
To refer to an element, specify

- Array name.
- Position number

Format:
arrayname[*position number*]
Example:

- First element at position 0
- n element array named c:
- a[0], a[1]...a[n – 1]

Instead of declaring individual variables, such as number0, number1, ..., and number99, you declare one array variable such as numbers and use numbers[0], numbers[1], and ..., numbers[99] to represent individual variables



necessity of an array or Q. what is the importance of array in c:

Consider a scenario wherein you have to store 100 integer numbers, entered by user, in order to find out the average of them. To program this scenario you have two ways – 1) Define 100 variable of integer type and at last perform the average operation. 2) Have a single integer array to store all the values.

Which solution is better as per you? Obviously the second solution, it is convenient to store same data types in one single variable and later access them using array index

Arrays are an important structure to hold data.
It allows us to hold many objects of the same type, and more importantly, to use a for loop to access the elements by their index.

Q.How to Declaring and Initialization one dimensional Array? Exam:ACCE-2013

Ans:

Declaring one dimensional Arrays: Like any other variable, arrays must be declared before they are used. To declare an array in C, a programmer specifies the type of the elements and the number of elements required by an array as follows:

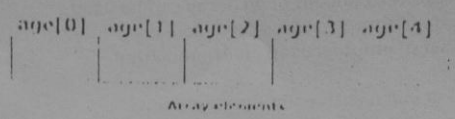
- Type of array
- Name
- size

The general from of array declaration is .

Type variable-name[size]

int age[5];

Where type=int
variable-name=a;
size=5;



Array elements

This is called a single-dimensional array. The arraySize must be an integer constant greater than zero and type can be any valid C data type.

Initialization:

Arrays can be initialized at declaration time in this source code as:

```
int age[5]={2,4,34,3,4};
int age[]={2,4,34,3,4};
```

age[0]	age[1]	age[2]	age[3]	age[4]
2	4	34	3	4

Initialization of one dimensional array

In this case, the compiler determines the size of array by calculating the number of elements of an array.

Q.How can we Accessing Array Elements? Exam:

Ans:

An element is accessed by indexing the array name. This is done by placing the index of the element within square brackets after the name of the array.

Index starts with 0, which means array_name[0] would be used to access first element in an array.

or

In C programming, arrays can be accessed and treated like variables in C.

For example:

```
scanf("%d",&age[2]);
statement to insert value in the third element of array age[].

scanf("%d",&age[i]); i=0,1,2,3,...n
The first element of array is age[0], second is age[1], ith is age[i-1]

printf("%d",age[0]);
statement to print first element of an array.

printf("%d",age[i]);
statement to print (i+1)th element of an array.

Int a=b[4];
```

You can initialize array in C either one by one or using a single statement as follows:

- double balance[5] = {1000.0, 2.0, 3.4, 17.0, 50.0};

	0	1	2	3	4
balance	1000.0	2.0	3.4	7.0	50.0

Now if want to access this arry or print any value from this array.

```
printf( "%lf", balance[ 0 ] );
```

output:1000.0

Q.Write a program to find the sum marks of n students using arrays?
Ans;

```
#include <stdio.h>
int main(){
   int marks[10],i,n,sum=0;
   printf("Enter number of students: ");
   scanf("%d",&n);
   for(i=0;i<n;++i){
      printf("Enter marks of student%d: ",i+1);
      scanf("%d",&marks[i]);
      sum+=marks[i];
   }
   printf("Sum= %d",sum);
return 0;
}
```

Q.Why array is useful in c programming? Exam-ACCE-2011,CSE-APPE,MSE,
Q.Write Advantage of using array?
Ans:

1. An array provides singe name .So it easy to remember the name of all element of an array.
2. Array name gives base address of an array .So with the help increment operator we can visit one by one all the element of an array.
3. Array has many application data structure.

Q. How declare multidimensional array? Exam:ICE ACCE-2013

Multi-dimensional Arrays:

C programming language allows programmer to create arrays of arrays known as multidimensional arrays.

or

C programming language allows multidimensional arrays.

type name[size1][size2]...[sizeN];

Tow dimensional array:

type arrayName [x][y];

For example:

float a[2][6];

Here, a is an array of two dimension, which is an example of multidimensional array.

	col 1	col 2	col 3	col 4	col 5	col 6
row 1	a[0][0]	a[0][1]	a[0][2]	a[0][3]	a[0][4]	a[0][5]
row 2	a[1][0]	a[1][1]	a[1][2]	a[1][3]	a[1][4]	a[1][5]

Figure: Multidimensional Arrays

A two-dimensional array can be think as a table which will have x number of rows and y number of columns. A 2-dimentional array a, which contains three rows and four columns can be shown as below:

Initializing Two-Dimensional Arrays:

Multidimensional arrays may be initialized by specifying bracketed values for each row. Following is an array with 3 rows and each row has 4 columns.

```
int a[3][4] = {
 {0, 1, 2, 3} , {4, 5, 6, 7}
}
Or
 int disp[2][4] = {
    {10, 11, 12, 13},
    {14, 15, 16, 17}
 };
```

Q.Write a program Passing Multi-dimensional Arrays to Function?

Ans:

To pass two-dimensional array to a function as an argument, starting address of memory area reserved is passed as in one dimensional array

```
#include <stdio.h>
void Function(int c[2][2]);
int main(){
  int c[2][2],i,j;
  printf("Enter 4 numbers:\n");
  for(i=0;i<2;++i)
    for(j=0;j<2;++j){
       scanf("%d",&c[i][j]);
    }
  Function(c);
  return 0;
}
void Function(int c[2][2]){
  int i,j;
  printf("Displaying:\n");
  for(i=0;i<2;++i)
    for(j=0;j<2;++j)
       printf("%d\n",c[i][j]);
}
```

Output

```
Enter 4 numbers:
2
3
4
5
Displaying:
2
3
4
5
```

Q. what do you mean by static array ?

Ans:

Static arrays are allocated memory at compile time and the memory is allocated on the stack. Whereas, the dynamic arrays are allocated memory at the runtime and the memory is allocated from heap.

Example:

```
int arr[] = { 1, 3, 4 }; // static integer array
```

Q. How to an array to the function?

Ans:

To pass a one dimensional array toa function it is sufficient to list the name of the array without any subscripts .

Q.How can arrays passing as a function arguments?

Passing Arrays as Function Arguments:

If you want to pass a single-dimension array as an argument in a function you would have to declare function formal parameter in one of following three ways

Way-1

Formal parameters as a pointer as follows. You will study what is pointer in next chapter.

```
void myFunction(int *param)
{
.
.}
```

Way-2

Formal parameters as a sized array as follows:

```
void myFunction(int param[10])
{ .
}
```

Way-3

Formal parameters as an unsized array as follows:

```
void myFunction(int param[])
{
..
}
```

Example of an Array:

OR

Q.Write a program Find out average of 20 integers values?

Ans:

```
#include <stdio.h>
int main()
{
  int avg = 0;
  int sum =0;
  int x=0;

                                /* Array- declaration - length 20*/
  int num[20];

                                /* for loop for receiving inputs from user and storing it in array*/
  for (x=0; x<=19;x++)
  {
    printf("enter the integer number %d\n", x);
    scanf("%d", &num[x]);
  }
  for (x=0; x<=19;x++)
  {
    sum = sum+num[x];
  }
```

```
    avg = sum/20;
    printf("%d", avg);
    return 0;
}
```

Q. Write a program to read a 3*3 square matrix, then compute and print the determinant of the matrix? Marks:3.50 Exam-ACCE-2014

Q.Write a program that add two matrics?

Matrix addition:

```
#include<stdio.h>
int main(){
 int a[3][3],b[3][3],c[3][3],i,j;
 printf("Enter the First matrix:-");
 for(i=0;i<3;i++)
   for(j=0;j<3;j++)
     scanf("%d",&a[i][j]);
 printf("\nEnter the Second matrix:-");
 for(i=0;i<3;i++)
   for(j=0;j<3;j++)
     scanf("%d",&b[i][j]);
 printf("\nThe First matrix is\n");
 for(i=0;i<3;i++){
   printf("\n");
   for(j=0;j<3;j++)
     printf("%d\t",a[i][j]);
 }
 printf("\nThe Second matrix is\n");
 for(i=0;i<3;i++){
   printf("\n");
   for(j=0;j<3;j++)
   printf("%d\t",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("\nThe Addition of two matrix is\n");
 for(i=0;i<3;i++){
   printf("\n");
   for(j=0;j<3;j++)
     printf("%d\t",c[i][j]);
 }
 return 0;
}
```

.Q. write a program that will read the values of matrices a and b and multiply the above two materics to produce the matrix c. Marks:3.50 Exam-ACCE-2013

```
include<stdio.h>
int main(){
 int a[5][5],b[5][5],c[5][5],i,j,k,sum=0,m,n,o,p;
 printf("\nEnter the row and column of first matrix");
 scanf("%d %d",&m,&n);
 printf("\nEnter the row and column of second matrix");
 scanf("%d %d",&o,&p);
 if(n!=o){
   printf("Matrix multiplication is not possible");
```

```
    printf("\nColumn of first matrix must be same as row of second matrix");
  }
  else{
    printf("\nEnter the First matrix->");
    for(i=0;i<m;i++)
    for(j=0;j<n;j++)
      scanf("%d",&a[i][j]);
    printf("\nEnter the Second matrix->");
    for(i=0;i<o;i++)
    for(j=0;j<p;j++)
      scanf("%d",&b[i][j]);
    printf("\nThe First matrix is\n");
    for(i=0;i<m;i++){
    printf("\n");
    for(j=0;j<n;j++){
      printf("%d\t",a[i][j]);
    }
    }
    printf("\nThe Second matrix is\n");
    for(i=0;i<o;i++){
    printf("\n");
    for(j=0;j<p;j++){
      printf("%d\t",b[i][j]);
    }
    }
    for(i=0;i<m;i++)
    for(j=0;j<p;j++)
      c[i][j]=0;
    for(i=0;i<m;i++){ //row of first matrix
    for(j=0;j<p;j++){  //column of second matrix
      sum=0;
      for(k=0;k<n;k++)
        sum=sum+a[i][k]*b[k][j];
      c[i][j]=sum;
    }
    }
  }
  printf("\nThe multiplication of two matrix is\n");
  for(i=0;i<m;i++){
    printf("\n");
    for(j=0;j<p;j++){
      printf("%d\t",c[i][j]);
    }
  }
  return 0;
}
```

Q. Define a one-dimensional five element floating point array named "class " and initialized the array to zero.

Ans:

```
Int class[]={0,0,0,0,0};
```

Q. write down the meaning of the following arrays:

(i) Float stack[10];
(ii) Int list[6][4]

Ans:

(i) Float type one-dimensional array with 10 elements.

(ii) Integer type two -dimensional array with 24 elements.

Q. write a program to read numbers in a one-dimensional array and then sort the numbers in ascending order? CSE-2011,ICE-2013,APPE

Ans:

```
#include<stdio.h>
int main()
{
int a[30],i,j,t;
printf("enter 30 numbersn");
for(i=0;i<30;i++)
scanf("%d",&a[i]);

for(i=0;i<30;i++)
{
for(j=i+1;j<30;j++)
{
if(a[j]>a[j])
{
t=a[j];
a[j]=a[j+1];
a[j+1]=t;
}}}
return 0;
}
```

Q.write a program to read numbers in a one-dimensional array and then sort the numbers in descending order?

Ans:

```
#include <stdio.h>

void main ()
{
 int i,j,a,n,number[30];

 printf ("Enter the value of N\n");
 scanf ("%d", &n);

 printf ("Enter the numbers \n");
 for (i=0; i<n; ++i)
  scanf ("%d",&number[i]);

 for (i=0; i<n; ++i)
 {
  for (j=i+1; j<n; ++j)
  {
   if (number[i] < number[j])
   {
    a= number[i];
    number[i] = number[j];
    number[j] = a;
   }
  }
 }
 printf ("The numbers arrenged in descending order are given below\n");
 for (i=0; i<n; ++i)
  printf ("%d\n",number[i]);}                    /* End of main() *
```

Write a program that accept the marks of 100 students from the user ad then shows the highest ,lowest and average marks. Exam:ACCE-CSE,ICE,APPE

Ans:

```
#include<stdio.h>
int main() {
 int a[30], i, num, largest,min,sum,average;
 printf("\nEnter no of elements :");
 scanf("%d", &num);
 //Read n elements in an array
 for (i = 0; i < num; i++)
   scanf("%d", &a[i]);
 //Consider first element as largest
 largest = a[0];
 for (i = 0; i < num; i++) {
   if (a[i] > largest) {
     largest = a[i];
   }
 }
 //Consider first element as minimum
 min = a[0];
  for (i = 0; i < num; i++) {
    if (a[i] < min) {
      min = a[i];
    }
  }
 //Consider Average
 for (i = 0; i < num; i++) {
  sum=sum+I;
 } average=sum/num;

    // Print out the Result
    printf("\nLargest Element : %d", largest);
    printf("\nMinimum Element : %d", min);
  printf("\nAverage Mark : %d", average);
    return (0);
        }
```

2 We want to declare a two-dimensional Inter type array called matrix for 3 rows and 5 columns which of the llowing declarations are correct? Exam:ACCE-2012

(i)int matrix[3],[5];

Ans: its wrong , is not allowed here.

(ii)int matrix[5],[3];

Ans: its wrong , is not allowed here.

(iii)int matrix[1+2][2+3];

Ans: its valid

(iv)int matrix[3,5];

Ans: its not valid

(v)int matrix[5][5];

Ans: its valid

Array can be passed as an argument to a function:
In this method of calling a function, the actual arguments gets copied into formal arguments.
Or function calling by base address and length of array.those are arr[] and n

In this example passing a single element of an array to function

```
#include <stdio.h>
void display(int a)
  {
  printf("%d",a);
  }
int main(){
  int c[3]={2,3,4};
  display(c[2]);    //Passing array element c[2] only.
  return 0;
}
Output 4
```

Or Passing array using for loop

```
#include <stdio.h>
disp( int num)
{
   printf("%d ", num);
}

int main()
{
   int arr[] = {1, 2, 3, 4, 5, 6, 7, 8, 9, 0};
   for (int i=0; i<=10; i++)
   {
                disp (arr[i]);
   }

   return 0;
}
Ouptut: 1, 2, 3, 4, 5, 6, 7, 8, 9, 0
```

Q. Write a C program to pass an array containing age of person to a function. This function should find average age and display the average age in main function.

```
#include <stdio.h>
float average(int a[],int n);
int main(){
   float avg;
   int n, c[]={23, 55, 22, 3, 40, 18};
   n=6;
   avg=average(c,n);    /* Only name of array is passed as argument. */
   printf("Average age=%.2f",avg);
   return 0;
  }
float average(int a[],int n){
   int i;
   float avg, sum=0.0;
   for(i=0;i<n;++i){
    sum+=a[i];
   }
   avg =(sum/6);
```