

ECAP770

ADVANCE DATA STRUCTURES

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Learning Outcomes



After this lecture, you will be able to

- arrays
- one dimension array
- two dimension array

Array

- An array is variable that can store multiple values.
- Arrays a kind of data structure that can store a fixed-size sequential collection of elements of the same type.
- Array is non-primitive data type. (int, float, char etc.)
- Arrays consist of contiguous memory location.

Syntax

datatype
name_of_array[size];

Datatype

Name of array

Size (integer)

Array Initializing and Memory Representation of an Array

- `int arr[5]={ 10,11,12,13,14};`

- `arr`

0	1	2	3	4	index
10	11	12	13	14	
arr[0]	arr[1]	arr[2]	arr[3]	arr[4]	

Access Array Elements

- Array elements access by indices.
- Suppose you declare an array arr as above than first element is arr[0], second element is arr[1] and so on.



arr[0]

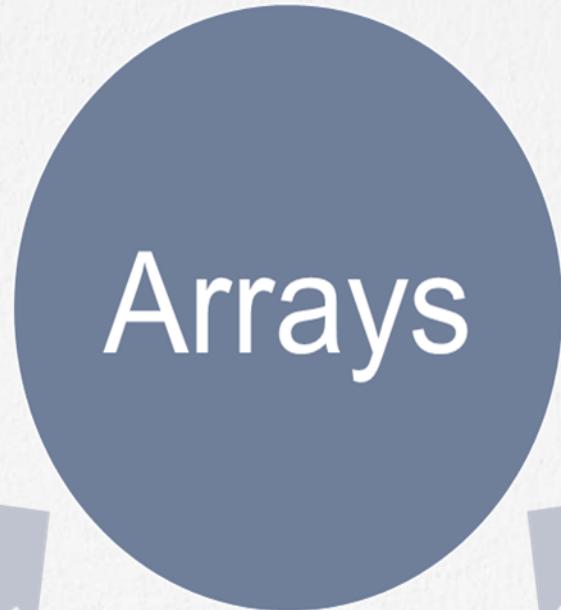
arr[1]

arr[2]

arr[3]

arr[4]

Type of Array



One
dimensional
array

Multi
dimensional
array

Type of Array

- One dimensional Array

```
int a[5];
```

- Multi-dimensional Array

```
int m[3][3];
```

Two Dimensional Array in C

- An array of arrays is known as two dimensional array.
- Two dimensional array in C language organized as matrices which is used in C programming to represent rows and columns.

Declaration of Two Dimensional Array in C

- `data_type name_of_array[rows][columns];`
- Datatype
- Name of array
- rows (integer)
- columns (integer)
- Number of elements in 2D arrays is multiply of rows and columns for eg. Int `x[3][3]` has $3*3$ i.e. 9 elements.

Array Initializing and Memory Representation of an Array

- `int x[3][4] = {{1,2,3}, {4,5,6}, {7,8,9}};`

`a[0][0]=1`

`a[1][0]=4`

`a[2][0]=7`

`a[0][1]=2`

`a[1][1]=5`

`a[2][1]=8`

`a[0][2]=3`

`a[1][2]=6`

`a[2][2]=9`



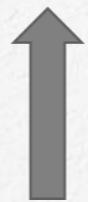
Index



Value



Index



Value



Index



Value

Advantages of 2D Arrays

- 2D Arrays represent multiple data items of the same type in the form of matrix.
- We can perform all matrices operation, sum of matrix, transpose of matrix using 2D Array.

Advantages of Arrays

- Arrays represent multiple data items of the same type using a single name.
- Elements of array can be accessed randomly by using the index number.
- Easy access to all the elements.
- Sorting and searching becomes easy.

Applications of Array

- Arrays can be used for CPU scheduling.
- Arrays can be used for reverse data elements, sort data elements etc.
- Arrays are used to Perform Matrix Operations
- Arrays are used to Store List of values
- Arrays are also used to implement stack and queues.

Program: One Dimension Array

```
#include <stdio.h>

int main()
{
    int arr[5]={10,11,12,13,14};

    for(int i=0;i<=4;i++)
    {
        printf("%d\n",arr[i]);
    }

    return 0;
}
```

Program: Two Dimension Array

```
#include <stdio.h>
int main()
{
    int x[3][4] = {{1,2,3},
{4,5,6}, {7,8,9}};
    int i,j;
    for( i=0;i<=2;i++)
    {
        for(j=0;j<=2;j++) }
```

```
    { }
```

```
    printf("%d\t",x[i][j]);
    }
```

```
    printf("\n");
}
```

```
    return 0;
}
```

That's all for now...