



**Data Structures are classified in 2 ways. They are:**

**I )Based on the arrangement of elements in the data structure**

## **1.Linear Data Structures**

Linear data structures organize their data elements in a linear fashion, where data elements are attached one after the other.

Data elements in a liner data structure are traversed one after the other, and only one element can be directly reached while traversing

Example:

arrays, linked lists, stacks and queues

## 2. Nonlinear Data Structures

In nonlinear data structures, data elements are not organized in a sequential fashion.

A data item in a nonlinear data structure could be attached to several other data elements.

Ex:

Tree , Graph

## II) Classified according to the type of information they contain

### 1. Primitive data structure

The primitive data types are the basic data types that are available in most of the programming languages.

The primitive data types are used to represent single values.

Ex:

• **Integer:** This is used to represent a number without decimal point.

Eg: 12, 90

• **Float and Double:** This is used to represent a number with decimal point.

Eg: 45.1, 67.3

• **Character :** This is used to represent single character

Eg: 'C', 'a'

• **String:** This is used to represent group of characters.

Eg: "M.A College of Engg."

• **Boolean:** This is used represent logical values either true or false.

## 2. NON-PRIMITIVE DATATYPES

The data types that are derived from primary data types are known as non-Primitive data types. These datatypes are used to store group of values.

The non-primitive data types are:

- Arrays
- Structure
- Union
- linked list
- Stacks
- Queue etc

## Arrays

Given the base address of an array  $A[1300 \dots 1900]$  as 1020 and the size of each element is 2 bytes in the memory, find the address of  $A[1700]$ .

Solution:

Given:

Base address  $B = 1020$

Lower Limit/Lower Bound of subscript  $LB = 1300$

Storage size of one element store in any array  $W = 2$  Byte

Subset of element whose address to be found  $I = 1700$

Formula used:

Address of  $A[I] = B + W * (I - LB)$

Solution:

Address of  $A[1700] = 1020 + 2 * (1700 - 1300)$

$$= 1020 + 2 * (400)$$

$$= 1020 + 800$$

Address of  $A[1700] = 1820$