Arrays

=> Data Structure :-

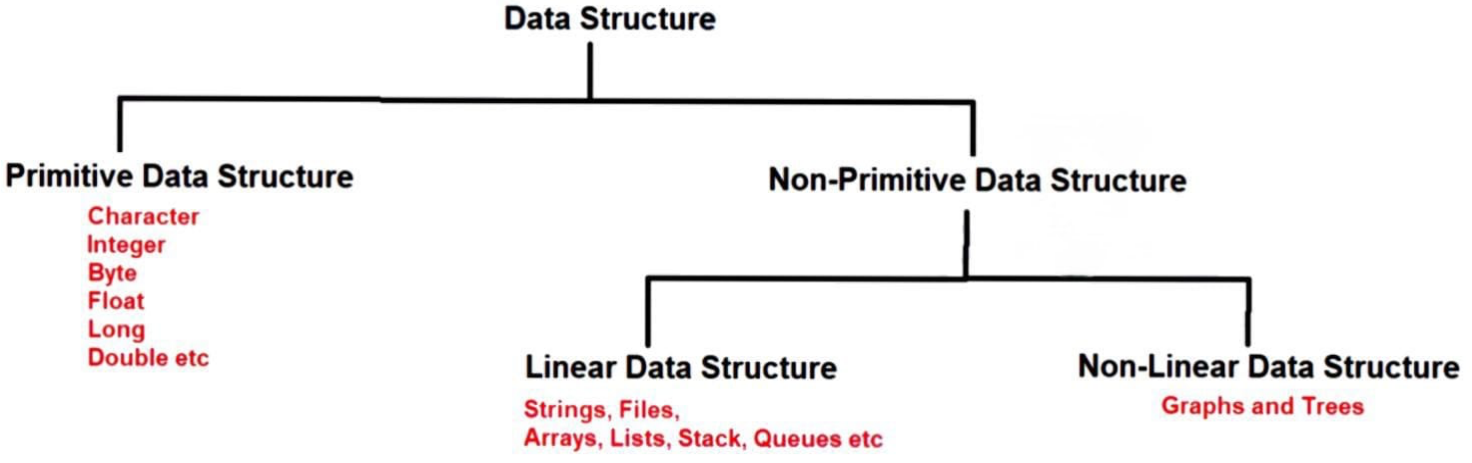
-> A data structure is a particular way by which we organize, manage and store the data in the computer so that it can be used effectively

-> Data structure is not a programming langaue like c, c++, java or python. It is a set of algorithms which we can implment in any programming langauges

-> Operations that we can perform on data :-

1. Searching
2. Sorting
3. Insertion
4. Deletion

-> Types of Data Structure :-



=> Arrays :-

1. Array is a collection of similar type of data(homogeneous data)
2. Array elements are stored in contigeous memory locations
3. Array can contain primitive or non-primitive elements
4. Array is index based data structure, first index position of an array is 0
5. Array length starts from 1

=> Types of Arrays :-

1. Single Dimensional Array
    -> 1D Array
2. Multi-Dimensional Array
    -> 2D Array
    -> 3D Array
    -> 4D, 5D, 6D.... Array
    -> Zic-Zac Array
3. Anonymous Array

=> Single Dimensional Array (for example 1D Array) :-

-> In this type of array, there is only one row or one column

-> Following points for each type of array :-

= Declaration :

1. Array can be declared normally like simple variables but we have to provide square([])
braces
2. When we declare an array, we dont need to provide the size of an array

= Creation :-

1. When we create an array by using new keyword, we have to provide the size of an array
2. When we create an array by using new keyword, all the index position will be initialized by its default values

=> We can declare and create an array within a single line

=Initialization :-

1. We can provide the values at particular index position

=> We can declare, create and initlize an array within single line

= Retrieve :-

1. We can retrieve the value by using for loop

=> Different cases for Declaration, Creation & Initialization of an array

=> Declaration :-

1. int[] a,b; //a and b are both arrays
2. int []a,b; //a and b both are arrays
3. int a[],b; //correct, a is an array but b is simple variable
4. int a,b[]; //correct, a is normal variable but b is an array
5. int a[], b[]; //both a and b are array
6. int []a, b[]; //a and b are both arrays

7.int a, []b ; //compile time error

=> Creation :-

1. a=new int[5]; //correct
2. a=new int[]; //error
3. int[] a=new int[5]; //correct
4. int a[]=new int[5]; //correct
5. int []a=new [5]int; //error
6. int[] a=new int[0]; //it will successfully compile and run
7. int[] a=new int[-3]; //it will compile but provides runtime exception i.e. java.lang.NegativeArraySizeException

=> Initialization :-

1. int[] a=new int[3];

a[3]=100; //compile successfully but will throw runtime exception saying ArrayIndexOutOfBoundsException

2. If we dont initialize any proper index position value, then it will compile and run successfully
3. a[-1]=100; //compile successfully but will provide runtime exception saying ArrayIndexOutOfBoundsException

-> Points to remember :-

1. Array are Objects in java
2. Arrays are stored in "Heap Area"

=> 2D Array :-

-> Following points for 2D array :-

= Declaration

-> For declaring 2D array, we have to use double square braces

= Creation :-

-> When we create 2D array, we have to provide the size of an array

-> a=new int[2][3]; // there are 2 rows and 3 columns

= Initialization

-> a[0][1]=100; //will initialize 100 value at 0,1 index position

-> We can declare, create and initializen an array in single line

```
int[][] a={{10,20,30}, {40,50,60}};
```

```
public class MinMaxElement
{
    static void findMinElement(int[] a)
    {
        int min=a[0];
        for(int i=1; i<a.length; i++)
        {
            if(a[i] < min)
            {
                min=a[i];
            }
        }

        System.out.println("Minimum element is : "+min);
    }
    static void findMaxElement(int[] a)
    {
        int max=a[0];
        for(int i=1;i<a.length; i++)
        {
            if(a[i] > max)
            {
                max=a[i];
            }
        }
        System.out.println("Maximum element is : "+max);
    }
    public static void main(String[] args)
    {
        int[] a={30,70,10,20,60,50,90};
        MinMaxElement.findMinElement(a);
        MinMaxElement.findMaxElement(a);
    }
}
```