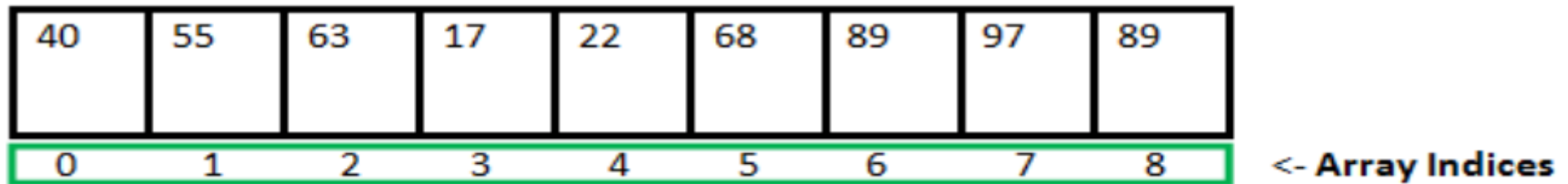# Arrays

Arrays in Java

- An array in Java is a **group of like-typed or homogeneous elements /variables stored in** contagious memory.

- Arrays are **dynamically allocated in Java unlike C++.**

- Arrays are Arrays are objects in Java, we can find their **length** using the object property length.

- Java Arrays are **ordered**, and each has an index beginning from **0**.

- Java array can also be used as a static field, a local variable, or a method parameter.

Arrays in Java

▶The direct superclass of an array type is **Object**

▶Every array type implements the interfaces **Cloneable** and **Serializable**

▶This storage of arrays helps us in randomly accessing the elements of an array [Support Random Access].

▶The size of the array cannot be changed once initialized.

Arrays in Java

- An array of primitives (int, char, etc.) and object (or non-primitive) references of a class depending on the definition of the array.

- In the case of primitive data types, the actual values are stored in contiguous memory locations.

- In the case of class objects, the actual objects are stored in a heap segment.

- **1D Array Representation**

40	55	63	17	22	68	89	97	89
0	1	2	3	4	5	6	7	8

<- Array Indices

Array Length = 9
First Index = 0
Last Index = 8

Arrays Declaration

int arr[]; or int[] arr; // 1D array of int

double[] arr1; // 1D array of double

String[] args; // 1D array of double

Object[] objectArr; // 1D array of Objects

Employee[] empArr; // 1D array of Employees

int arr[][]; // 2D array of int

String[][] strArray; // 2D array of Strings

Array Literal & Array Initialization

- If size of the array and variables of the array are already known, array literals can be used

- **1D Array Literal**

  int arr[] = new int[]{40,55,63,17,22,68,89,97,89};

  new int[] can be omitted if values are provided while creating array

  int arr1[] = {40,55,63,17,22,68,89,97,89}; // Array Literal

  String[] strArr = {"Hi","Hello","Namste"}; // Array literal

- **2D Array Literal**

int[][] array2D = {{1,2,3},{4,5,6}}; // Array of two 1D array i.2D array

String[][] strArray2D = {{"Hi","Hello","Namste"},

                           {"Bye","Tata","Chalta hu"}}; // 2D string array

Instantiating and accessing an Array in Java

```java
int intArray[];    //declaring array
intArray = new int[20];  // allocating memory to array
or
int[] intArray = new int [20]; // Array creation in one step


// Setting values to array element
for (int i = 0; i < arr.length; i++) {
arr[i] = 0;
}
// Accessing the elements of array
for (int i = 0; i < arr.length; i++) {
System.out.println("At index " + i + " : "+ arr[i]);
}
```

Arrays utility class

An Array can be converted to String for printing using Arrays.toString()
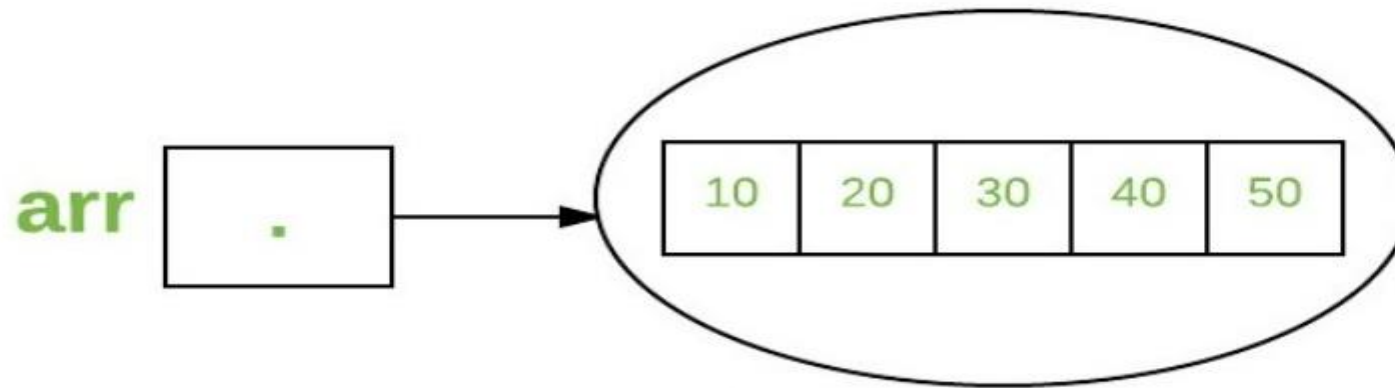
int arr1[] = {40,55,63,17,22,68,89,97,89};

// no need of loop for printing

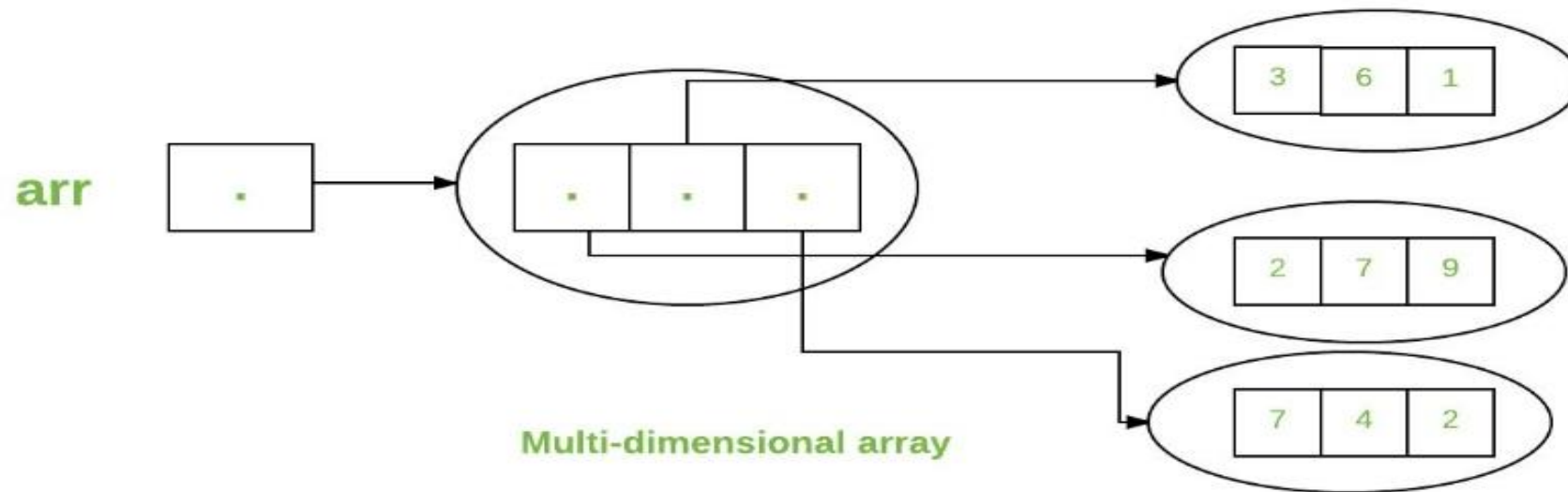**System.out.println(Arrays.toString(arr1));**

Program demo

- Create any array, get values from user, print values, modify array elements etc.

- Search in the array

- Binary search in the array

- Print class is array using getClass() method

- Print super class of Array using getClass().getSuper()

1D and 2D array representation

One-Dimensional Array

Multi-dimensional array

Multidimensional arrays

▶ Multidimensional arrays are arrays of arrays with each element of the array holding the reference of other arrays.

▶ These are also known as **Jagged Arrays.**

```java
int arr[][] = { { 2, 7, 9 }, { 3, 6, 1 }, { 7, 4, 2 } };
    // printing 2D array
    for (int i = 0; i < 3; i++) {
      for (int j = 0; j < 3; j++) {
        System.out.print(arr[i][j] + " ");
       }
      System.out.println();
    }
```

Passing arrays to methods

```java
package com.cdac.acts;

public class ArrayPrinter {
public static void printArray(int[] arr) {
    //Print Array Elements
    for (int i = 0; i < arr.length; i++) {
     System.out.println("\nElement="+ arr[i]);
     }
}

public static void printArray(String[] strArr){
    //Print Array Elements
    for (int i = 0; i < strArr.length; i++) {
     System.out.println("\nElement="+ strArr[i]);
     }
}

public static void main(String args[])  {
    int arr[] = { 10, 60, 90, 50, 40};
    // passing array to method
    printArray(arr);
    String strArr[] = { "C", "C++", "Java", "C Sharp"};
    // passing array to method
    printArray(strArr);
 }
}
```