ARRAY

Array

- Arrays are a collection of data items that have the same data type and referred to by a common name(a single variable name).]
- For example, an Integer array will have all integer elements ,Float array will have float elements and a String array will have Strings for each element of the array.
- **Some points about arrays:**

- Arrays are considered as objects in Java.
- All arrays in Java are dynamically allocated.
- Array organized the data in the form of elements where each element of array store a single data (no. of data = no. of elements in array).
- Each element of array store similar type of data. And the type of data is decided by us during declaration of array.
- To access or identify any element ,array provide unique **index number** for each element i.e started from 0(the first element) till n-1 where n is the length of the array. For example, an array of length 5 would have indices ranging from 0 to 4 (5-1).

- Syntax for declaring an array variable:- To declare an array, define the variable type with **square brackets[]**

  dataType var_name[];

  or , datatype[ ] var_name;

- The size of an array must be an integer value(can not be in decimal).
- Example- int [ ] marks; // declare an array

  marks = new int[5] // allocate memory that is creation

  Here, the array can store **5** elements.(**size or length** of the array is 5).

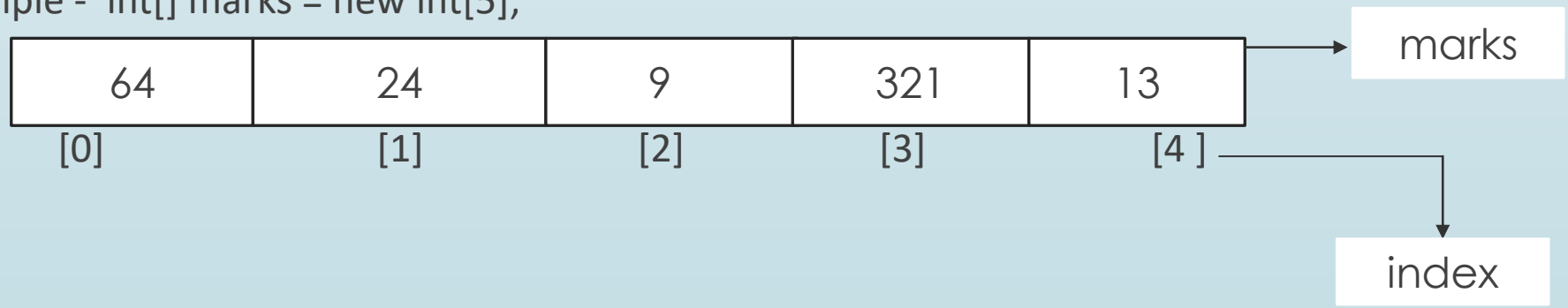
- we can declare and allocate the memory of an array in a single line(using the **new** operator).

Syntax- datatype[] arrayame = new datatype[length/size];

or, datatype arrayname[] = new datatype[lenght];

For example - int[] marks = new int[5];

Array length=5
Start index=0
Last index=4



- Like other *variables in Java*, an array must be defined before it can be used
- length of array find using the length variable.
- we can randomly access the elements of an array using their index number.

  marks[0]= 64

  marks[1]= 24

  marks[2]= 9

  marks[3]= 321

  marks[4]= 13

- The size of the array cannot be changed (once initialized).
- Array elements can be accessed by a for loop and a for each loop. But elements in the array cannot be altered by using the for each loop.

- **Initialize Arrays -** by two ways

a. Syntax- datatype [] arrayname={list of value with , separator };

Example- int[] myArray= {1,2,3,4,5} ; // declare and initialize

b. int[] myArray = new int[5]; //declare an array

myArray[0] = 1 ; // initialize array

myArray[1] = 2 ;

myArray[2] = 3 ;

myArray[3] = 4 ;

myArray[4] =5 ;

How to Access Elements of an Array

- access the element of an array using their index number

```
public class Array1 {

    public static void main(String[] args) {
        int[] arr = new int[3]; // declare and create 1D array
        arr[0]=34; // initialize first element
        arr[1]=39; // initialize second element
        arr[2]=47; // initialize third element

        // each element of array is accessed by its unique index value
        System.out.println("Accessing Elements of array: ");
        System.out.println("Element 1 at index 0:"+ arr[0]);
        System.out.println("Element 2 at index 1:"+ arr[1]);
        System.out.println("Element 3 at index 2:"+ arr[2]);

        arr[1]=23;// change the array element
        System.out.println("Element 2 at index 1 after change:"+ arr[1]);
    }

}
```

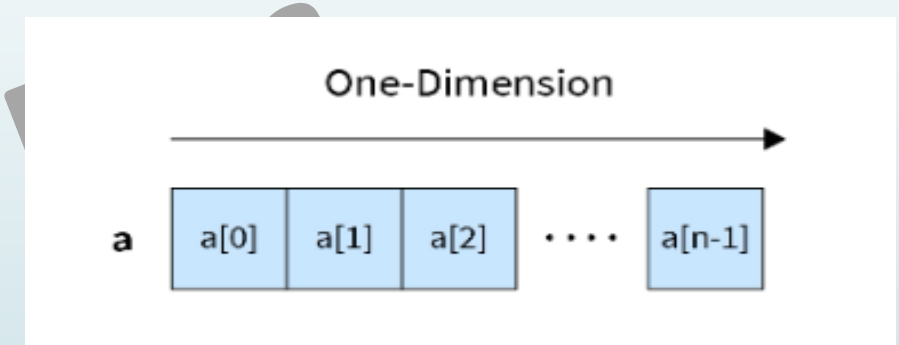
- We can also access all the elements of array at once by using loop (for loop and for each loop).For example-

```
public class Array1 {

    public static void main(String[] args) {
        // declare, create and initialize in a single line
        String strArray[] = {"Python","java","C","C++","PHP"};

        //find the size of the array
        int len= strArray.length;
        System.out.println("Size of array: "+len);
        // access using for loop
        for(int i=0;i<len;i++)
            System.out.println(strArray[i]);

        // access using for each loop
        for(String a:strArray)
            System.out.println(a);


    }

}
```

Types of Array –

- Single-Dimensional Array
- Two-dimensional Array
- Multi-Dimensional Array

1. Single Dimensional array- In this , data are arranged or store in one direction either horizontally or vertically.



In two ways we can create an array:-

- Array Creation with values-

  Syntax- datatype [] arrayname={list of value with , separator };

  Example- int[] arr = {10, 20, 30, 40};

```java
public class Array1 {

    public static void main(String[] args) {
        // declare, create and initialize in a single line
        double arr[]= {12,98,78.9,45,62.97,24};

        //find the size of the array
        int len= arr.length;
        System.out.println("Size of array: "+len);
        // access using for loop
        for(int i=0;i<len;i++)
            System.out.println(arr[i]);

        // access using for each loop
        for(double a:arr)
            System.out.println(a);


    }

}
```

- Array Creation without Values-

Syntax:

```
datatype arrayname[] = new datatype[size];
                Or
datatype arrayname[];
arrayname = new datatype[size];
```

Example - int arr[] = new int[4];

2. Multi-Dimensional Array :– Data is stored in row and column i.e in two direction

In two ways we can create an array:-

- **Array Creation with values-**

  Syntax –

  datatype[][] arrayname = {{1st row value with , separator },{2nd row value with , separator },{3rd row value with , separator },.....};

  Example-

  ```
  int[][] a= {{1,2,3,4,5},{6,7,8,9,10}} ;     // declare and initialize the array
  ```

```java
public class Array1 {

    public static void main(String[] args) {
        // declare, create and initialize in a single line
        int arr[][]= {{1,2,3,4,5},{6,7,8,9,10}};

        //find the size of the array
        int len= arr.length;
        System.out.println("Size of array: "+len);
        int len2= arr[0].length;
        System.out.println("Size of array: "+len2);

        // access using for loop
        for(int i=0;i<len;i++) {
            for(int j=0;j<len2;j++) {
                System.out.print(arr[i][j]+" ");
            }
            System.out.println();
        }

        System.out.println("----------------------");
        // access using for each loop
        for(int[] a1:arr) {
            for(int a2:a1) {
                System.out.print(a2+" ");
            }
            System.out.println();
        }

    }
}
```

- **Array Creation without Values-**

  Syntax- datatype[][] arrayname = new datatype[no. of rows][no.of column];

  Example- int [][] a = new int [2][5];

```
public class Array1 {

    public static void main(String[] args) {
        // declare, create and initialize in a single line
        int arr[][]= new int[2][5];
        //initialize array
        arr[0][0]=5;
        arr[0][1]=15;
        arr[0][2]=12;
        arr[0][3]=95;
        arr[0][4]=65;
        arr[1][0]=4;
        arr[1][1]=91;
        arr[1][2]=07;
        arr[1][3]=39;
        arr[1][4]=32;
        // access using for each loop
        for(int[] a1:arr) {
            for(int a2:a1) {
                System.out.print(a2+" ");
            }
            System.out.println();
        }
    }
}
```

- Advantages of Arrays -

- we can access any element randomly from the array with the help of indexes.
- It is easy to store and manipulate large data sets .
- we can retrieve or sort the data efficiently.

- Disadvantages of Arrays –

- The size of the array cannot be increased or decreased once it is declared—arrays have a fixed size
- cannot store heterogeneous data