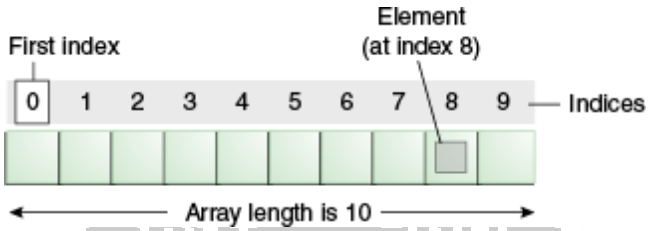
ARRAYS

Array is **a collection of elements of similar data type stored in contiguous memory location.** The array size is fixed i.e we can't increase/decrease its size at runtime. It is index basedand the first element is stored at 0^{th} index.



Advantages of Array

- Code Optimization: Multiple values can be stored under common name. Date retrieval or sorting is an easy process.
- Random access: Data at any location can be retrieved randomly using the index.

Disadvantages of Array

- Inefficient memory usage: Array is static. It is not resizable at runtime based on number of user's input. To overcome this limitation, Java introduce collection concept.

Types of Array

There are two types of array.

- One Dimensional Array
- Multidimensional Array

One Dimensional Array

Declaring Array Variables

The syntax for declaring an array variable is

Syntax:

dataType[] arrayName; //preferred way

Or

dataType arrayName [];

Here datatype can be a primitive data type like: int, char, Double, byte etc. arrayName is an identifier.

Example:

int[] a;

Instantiation of an Array

Array can be created using the *new* keyword. To allocate memory for array elements we must mention the array size. The size of an array must be specified by an *int* value and not *long* or *short*. The default initial value of elements of an array is 0 for numeric types and *false* for boolean.

Syntax:

arrayName=new datatype[size];

Or

dataType[] arrayName=new datatype[size]; //declaration and instantiation

Example:

int[] a=new int[5]; //defining an integer array for 5 elements

Alternatively, we can create and initialize array using following syntax.

Syntax:

dataType[] arrayName=new datatype[]{list of values separated by comma};

Or

dataType[] arrayName={ list of values separated by comma};

Example:

int[] a={12,13,14};

int[] a=new int[]{12,13,14};

The built-in *length* property is used to determine length of the array i.e. number of elements present in an array.

Accessing array elements

The array elements can be accessed by using indices. The index starts from 0 and ends at (array size-1). Each element in an array can be accessed using *for* loop.

Example:

Program to access array elements.

```
class Main{
  public static void main(String args[]){
    int a[]=new int[]{10,20,30,40};//declaration and initialization
    //printing array
    for(int i=0;i<a.length;i++)//length is the property of
      arraySystem.out.println(a[i]);
  }
}
```

Sample Output:

10

20

30

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The for-each loop

The for-each loop is used **to traverse the complete array sequentially without using an index variable**. It's commonly used to iterate over an array or a Collections class (eg, Array-List).

Syntax:

```
for(type ar:arrayName){
    Statements using  var;
}
```

Example:

Program to calculate sum of array elements.

```
class Main{
  public static void main(String args[]){
    int a[]=new int[]{10,20,30,40};//declaration and
    initializationint sum=0;
    for(int i:a)      // calculate sum of array
      elementssum+=i;
    System.out.println("Sum:"+sum);
  }
}
```

Sample Output:

Sum:100

Multidimensional Arrays

Multidimensional arrays are arrays of arrays with each element of the array holding the reference of other array. These are also known as Jagged Arrays.

Syntax:

```
dataType[][] arrayName=new datatype[rowsize][columnnsize];   // 2 dimensional
arraydataType[][][] arrayName=new datatype[][][];            // 3 dimensional
array
```

Example:

```
int[][] a=new int[3][4];
```

	Column 1	Column 2	Column 3	Column 4
Row 1	a[0][0]	a[0][1]	a[0][2]	a[0][3]
Row 2	a[1][0]	a[1][1]	a[1][2]	a[1][3]
Row 3	a[2][0]	a[2][1]	a[2][2]	a[2][3]

Example:

Program to access 2D array elements

```
class TwoDimEx
{
   public static void main(String args[])
   {
      // declaring and initializing 2D array
      int arr[][] = { {1,1,12},{2,16,1},{12,42,2} };
       // printing 2D array
      for (int i=0; i< arr.length; i++)
      {
         for (int j=0; j < arr[i].length ; j++)
            System.out.print(arr[i][j] + " ");
          System.out.println();
      }
   }
}
```

Sample Output:

1 1 12

2 16 1

12 42 2

Jagged Array

Jagged array is an array of arrays with different row size i.e. with different dimensions.

Example:

```
class Main {
  public static void main(String[] args) {

    int[][] a = {
        {11, 3, 43},
        {3, 5, 8, 1},
        {9},
    };
    System.out.println("Length of row 1: " + a[0].length);
    System.out.println("Length of row 2: " + a[1].length);
    System.out.println("Length of row 3: " + a[2].length);
  }
}
```

Sample Output:

Length of row 1: 3

Length of row 2: 4

Length of row 3: 1

Passing an array to a method

An array can be passed as parameter to method.

Example:

Program to find minimum element in an array

```
class Main{
   static void min(int a[]){
      int min=a[0];
      for(int
         i=1;i<a.length;i++)
         if(min>a[i])
            min=a[i];
```

```
        System.out.println("Minimum:"+min);
    }
    public static void main(String args[]){
        int a[]={12,13,14,5};
        min(a);//passing array to method
    }
}
```

Sample Output:

Minimum:5

Returning an array from a method

A method may also return an array.

Example:

Program to sort array elements in ascending order.

```
class Main{
    static int[] sortArray(int a[]){
        int tmp;
        for(int i=0;i<a.length-1;i++)  {          //code for sorting
            for(int j=i+1;j<=a.length-1;j++) {
                if(a[i]>a[j]){
                    tmp=a[i];
                    a[i]=a[j];
                    a[j]=tmp;
                }
            }
        }
        return(a);       // returning array
    }
    public static void main(String args[]){
        int a[]={33,43,24,5};
    a=sortArray(a);
    }
```