Learning Goals

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This session will help you to understand

- What is an array ?
- Types of array.
- How to implement arrays?

Array Analogy

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A basket of balls. Basket is the container for balls.

Arrays are like baskets they hold data of similar data type (like the balls).

Array

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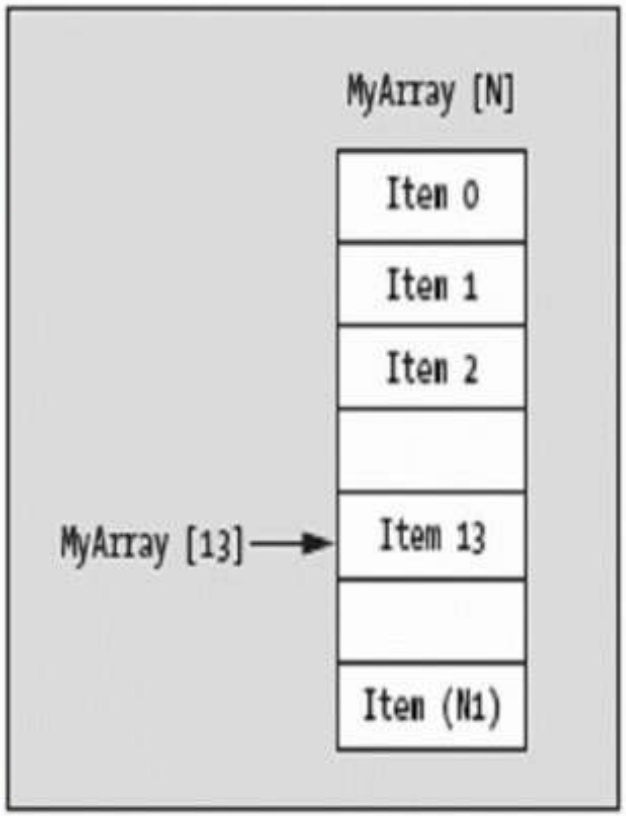
An array is data type that can hold a collection of values of ***same type*** which can be referred with a common name.

Arrays can hold primitives or wrapper objects or user defined objects.



An array with name ***DemoArray*** storing a collection of values.

Each item can be accessed using the name ***DemoArray*** and index.

Array Types

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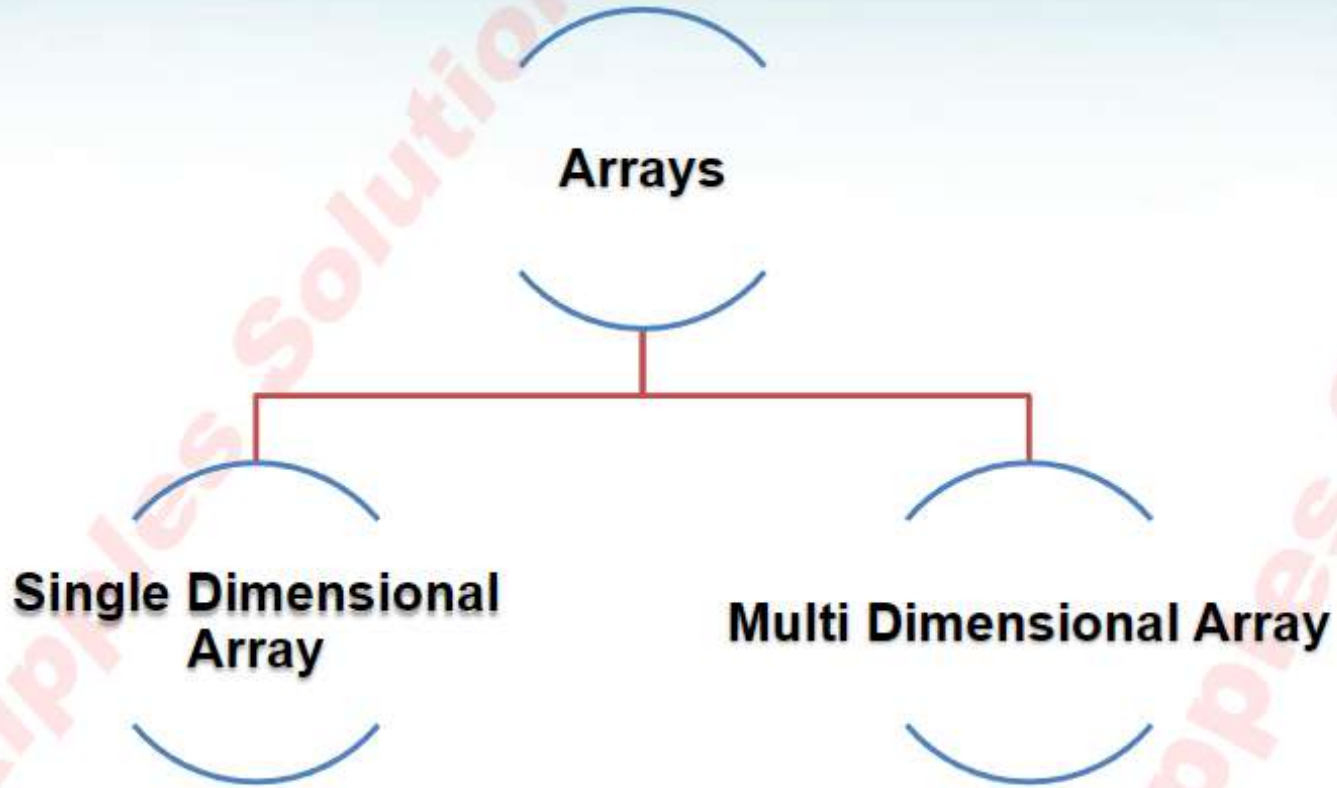

Illustration: `float[] studentId ;`
//Float array named studentId to store student id.

Illustration: `double square[ ][ ];`
// Array which stores a double value in 2*2 matrix.

Implementing Arrays

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Step 1: Array declaration:

In this step, array is declared associating to a data type and a identifier.

Syntax : <type> [ ] <array-name>;

Illustration : long [ ] studentId; } Declares an array of type long

Student[ ] student; } Declares an array of Student Object

Step 2: Array initialization:

New keyword is used to initialize an array.

Syntax: <array-name>= new <type>(<size>);

Illustration: studentId=new long[5]; } Defines array with long type which stores 5 values.

student=new Student[3]; } Creates an array that can hold 3 student objects.

Single Dimensional Arrays

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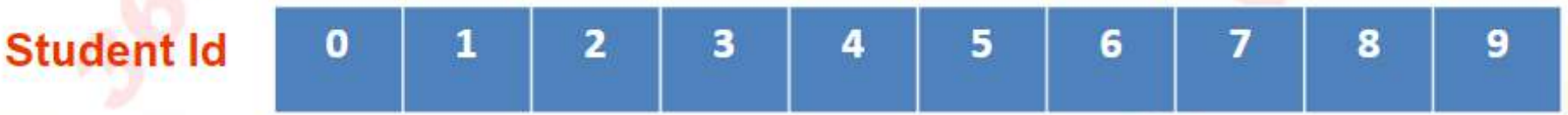
Few salient points :

- The array length is determined when the array is created.
- The array length is ***fixed*** at the time of its creation.
- Each item of an array is called as ***element***, and each element is accessed using the ***index***.

The below diagram depicts an array of ten elements



Adding Elements

Adding values to a single dimensional array:

Data can be stored in an array based on the data type of the array.

Illustration:

```
student[0]=17;
student[1]=22;
student[2]=33;
```

This adds the student ids in the array

This sets the student name and the student id value in student objects.

```
student[0]=new Student("Jack",3000);
Student[1]=new Student("Ramesh",4000);
student[2]=new Student("Rajesh",10);
```

This adds student object

Alternate Way – Adding Elements **Click to Continue**

Alternate Way to initialize and assign values in one step,

```
long[] studentId = { 6, 3, 5, 8};
```

This declares an array of type long with values 6,3,5 & 8.

```
Student[] student={new Student("Ramesh",20),new
Student("Jack",40)};
```

This declares an student object array, stores two student objects

Length of the array is determined by the number of values stored in the array.

Accessing elements

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Retrieving values from an array?

Array elements are accessed using the index.The index position of the first element is 0, last element is position is array length -1.

Illustration:

long studentId=studentId[0];

Retrieves the first element in student array

Student student=student[3];

Retrieves the fourth element in student array

Finding Length:
Use **student.length;** to get the total number of items in the array.

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Program to print odd numbers between 0 & 1000.

1. Create a program "ArrayExample" add two methods,
    1. saveNumbers – Creates and stores a array with values from 0~1000
    2. printOddNumber – traverse through the array stored and print all the odd numbers.

    From the main method invoke both the methods.

Lend a Hand–Solution

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```
package com.wrapper.demo;

public class ArrayExample {

    int numbers[] = new int[1001];

    public void saveNumbers() {
        for (int i = 0; i <= 1000; i++) {
            numbers[i] = i;
        }
    }

    public void printOddNumbers() {
        for (int i = 0; i <= 1000; i = i + 1) {
            if (numbers[i] % 2!=0) {
                System.out.println("Odd number=" + numbers[i]);
            }
        }
    }

    public static void main(String[] args) {
        ArrayExample ex = new ArrayExample();
        ex.saveNumbers();
        ex.printOddNumbers();

    }
}
```

This method stores 1000 numbers in an array.

This method prints the odd numbers between 0 and 1000.

Invokes the methods.

Multi Dimensional Arrays Click to Continue

Multi Dimensional Arrays are ***array of arrays***.

The two dimensional array is a 2*2 matrix with rows and columns, each row labeled with an index of 0 to its maximum bound.

Syntax:

```
type  array-name = new type[rows][cols];
```

Illustration:

```
int studentMarks[ ][ ] = new int[2][3 ]; // Represents the marks of the student in row 2 and column3
```

A two dimensional array illustration

	0	1	2	3
0	22	24	26	23
1	34	54	38	43
2	22	33	35	36

Multi Dimensional Arrays Click to Continue

Multi Dimensional Arrays are ***array of arrays***.

The two dimensional array is a 2*2 matrix with rows and columns, each row labeled with an index of 0 to its maximum bou

Disadvantages of arrays:

- Fixed size.
- One type of data.

Illustration:

```
int studentMarks[ ][ ] = new int[2][3 ]; // Represents the marks of the student in row 2 and column3
```

A two dimensional array illustration

	0	1	2	3
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Try It Out – 2D & 3D array

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1. Write a program which will initialize a 3X3 matrix and store the sum of the column index and row index in each matrix cell. The program then should iterate and display the values stored in a matrix format.

So for example 2X2 matrix output will be

0 1

1 2

```
public static void main(String[] args) {
    int number[][] = new int[3][3];
    // store the sum of i and j index
    for (int i = 0; i < 3; i++) {
        for (int j = 0; j < 3; j++) {
            number[i][j] = i + j;
        }
    }
    // for loop which displays the values stored
    System.out.println("Matrix Display");
    for (int i = 0; i < 3; i++) {
        for (int j = 0; j < 3; j++) {
            System.out.print(number[i][j]);
        }
        System.out.println("");
    }
    System.out.println("Matrix End");

}
```