Course code : **CSE1004**

Course title : **Problem Solving using Java**

Java – Arrays

Objectives

This session will give the knowledge about to

- Work with one dimensional and two dimensional arrays in Java

Arrays

- An array is a container object that holds a fixed number of values of a single type
- When an array is created, the length of an array is fixed
- Array elements are automatically initialized with the default value of their type, When an array is created
- Array can be created using the new keyword

- Ex:

```
int[] inAry = new int[5];     //defining integer array with size 5
```

Arrays

- Alternatively, we can create and initialize array as below format

```
int[]  x = {10, 20, 30};
int[]  x = new int[] {10, 20, 30};
```

- Here the length of an array is determined by the number of values provided between *{* and *}*

- The built-in length property determines the size of any array
- Ex:

```
int[]  x  =  new int[10];
int x_len  =  x.length;
```

Array - Demo

```
public class ArrayDemo {
    public static void main(String[] args) {
        int[] x; // declares an array of integers
        x = new int[5]; // allocates memory for 5integers
        x[0] = 11;
        x[4] = 22;
        System.out.println("Element at index 0: " + x[0]);
        System.out.println("Element at index 1: " + x[1]);
        System.out.println("Element at index 4: " + x[4]);
    }
}
```

Array Bounds, Array Resizing

- Array subscripts begin with 0
- Can't access an array element beyond the range
- Can't resize an array. Can use the same reference variable to refer new array

```
int x[]  = new int[5];
x= new int[10];
```

Array copy

To copy array elements from one array to another array, we can use arraycopy static method from System class

Syntax:

public static void arraycopy(Object s,int sIndex,Object d,int dIndex,int lngth)

Ex:

```
int source[]    = {1, 2, 3, 4, 5, 6};
int dest[]      = new int[10];
System.arraycopy(source,0,dest,0,source.length);
```

Array Copy - Example

```
public class ArrayLengthDemo {
   public static void main(String[] args) {
          int[] source = {100, 200, 300};
          int[] dest = new int[3];
          // copying an elements from source to dest array
          System.arraycopy(source, 0, dest, 0, source.length);
          for (int i =0; i < dest.length; i++)
                 System.out.println("Element at index " + i + ": " +dest[i]);
   }
}
```

Two-Dimensional Arrays

- Two-dimensional arrays are arrays of arrays
- Initializing two-dimensional arrays:

```
int[][] y = new int[3][3];
```

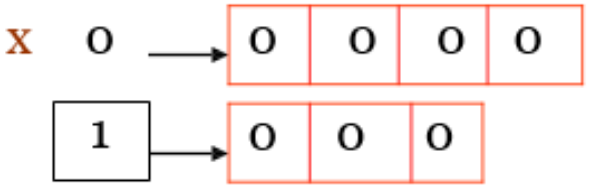
- The 1st dimension represent rows or number of one dimension, the 2nd dimension represent columns or number of elements in the each one dimensions
- Columns representation is optional in two dimensional arrays
- The curly braces { } may also be used to initialize two dimensional arrays
- Ex:

```
int[][] y = { {1,2,3}, {4,5,6}, {7,8,9} };
int[][] y = new int[3][];
```

Two-Dimensional Arrays (Contd.).

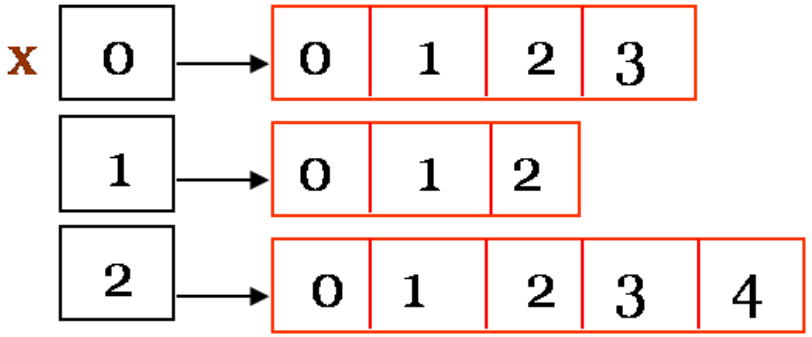
- You can initialize the row dimension without initializing the columns but not vice versa
  - **int[][] x = new int[3][];**
  - **int[][] x = new int[][3]; //error**
- The length of the columns can vary for each row and initialize number of columns in each row
- Ex1:

```
int [][]x = new int [2][]; x[0] = new int[5];
x[1] = new int [3];
```



Two-Dimensional Arrays (Contd.).

- int[][] x = new int[3][];
- x[0] = new int[] {0,1,2,3};
- x[1] = new int[] {0,1,2};
- x[2] = new int[] {0,1,2,3,4};



Two-Dimensional Array - Example

```
/* Program to under stand two-dimensional arrays */
class TwoDimDemo {
    public static void main(String[] args) {
        int [][] x = new int[3][];      // initialize number of rows
        x[0] = new int[3];  // define number of columns in each row
        x[1] = new int[2];
        x[2] = new int[5];
        for(int i=0;  i < x.length; i++) {        // print array elements
            for (int j=0;  j < x[i].length;  j++) {
                    x[i][j] = i;
                    System.out.print(x[i][j]);  }
        System.out.println(); } } }
```

Quiz-1

Select which of the following are valid array definition

1. int[] a;

   a = new int[5];
2. int a[] = new int[5]
3. int a[5] = new int[5];
4. int a[] = {1,2,3};
5. int[] a = new int[]{1,2,3};
6. int[] a = new int[5]{1,2,3,4};

Quiz-2

What will be the result, if we try to compile and execute the following codes?

```
class Sample {
    public static void main(String[] args) {
        int[] a = new int[5]{1,2,3};
        for(int i : a)
            System.out.println(i);
    }
}
```

Quiz-3

What will be the result, if we try to compile and execute the following code?

```
class Test {
    public static void main(String [ ] args) {
        int [ ] x=new int[10];
        System.out.println(x[4]);
    }
}
```

Quiz-4

What will be the result, if we try to compile and execute the following code?

```
class Test {
    public static void main(String [ ] args) {
        int x[ ][ ]=new int[10] [ ];
        System.out.println(x[4][0]);
    }
}
```

Summary

We have discussed about

- Understand how to work with single and two dimensional arrays in Java