CORE JAVA

MANUAL V8.3

MODULE CODE:

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Module 4: Array, Enumeration and Collections

Chapter 1

Objective: After completing this lesson you will be able to : * Gain an idea about Java array declaration * Gain an understanding of single and multidimensional array	**Materials Required:** 1. Computer 2. Internet access
Theory Duration: 60 minutes	**Practical Duration:** 60 minutes
Total Duration: 120 minutes	

Chapter 1

Array

Java provides a data structure known as the array to store a fixed collection of similar element types. Elements are stored sequentially within an array. This structure is used for storing data collections. However, an array can also be considered as a collection of the same variable types.

Arrays are helpful because they reduce the dependence on individual variables. For instance, a programmer does not have to declare variables like number1 or number2 individually. A single array variable can be used as it is representative of all the individual variables.

4.1 Array Declaration

A variable has to be declared to reference an array within a Java program. Programmers also have to declare what type of array is to be referenced by a variable. Take a look at the syntax of an array variable in Java –

dataType[] arrayName;

* dataType refers to a primitive data types i.e. byte, boolean, char, double, float, int, long, and short

* Here, arrayName is the identifier

An example of an array declaration for the dataType int –

int[] arrayName

Example program showcasing the intArray –

private void intArrayExample()

```
 {
   int[] intArray = new int[3];
   intArray[0] = 2;
   intArray[1] = 3;
   intArray[2] = 4;
   System.out.println('intArray output');

for (int i=0; i<intArray.length; i++)
   {
     System.out.println(intArray[i]);
   }
 }
```

4.2 Single Dimension and Multi Dimension Array

i) Single Dimension Array – A single dimension array or one-dimensional array contains multiple variables, which have a common data type and are declared with the same names. A one-dimensional array has only one value in an index.

Code example of a single-dimension array –

```
class SingleDimensionExample
{
```

```
public static void main(String args[])
{
int[] a=new int[3];
a[0]=20;
a[1]=30;
a[2]=40;

System.out.println('Single dimension array elements are');
System.out.println(a[0]);
System.out.println(a[1]);
System.out.println(a[2]);
}

}
```

Output:

```
Single dimension array elements are -
20
30
40
```

i) **Multi-Dimension Array –** In Java, a multi-dimension array or multidimensional array is considered as an array of arrays. This type of array stores data in a matrix form (with a column and row index). A multidimensional array can be a table consisting of a 3x3 or larger matrix. This array type can have 3 or more defined indexes.

Code example of a multi-dimension array –

```
class MultiDimensionExample
{
        public static void main(String args[]){
        int arr[][]={{2,3,4},{4,5,6},{6,7,8}};
        for(int i=0;i<3;i++){
         for(int j=0;j<3;j++){
           System.out.print(arr[i][j]+' ');
         }
         System.out.println();
        }
        }}
```

Output:

```
2 3 4
4 5 6
6 7 8
```

* **Example of multi-dimesion array multiplication**

The binary * operator can be used in Java to multiply two matrices. Take a look at this Java programme for the multiplication of two matrices –

```
public class MatrixMultiplicationDemo{
public static void main(String args[]){
//two matrices are created here
int a[][]={{1,1,1},{2,2,2},{3,3,3}};
int b[][]={{1,1,1},{2,2,2},{3,3,3}};
//another matrix is created here for storing the multiplication of the two above matrices
int c[][]=new int[3][3];  //3 columns and 3 rows
//multiplication and printing of 2 matrices
for(int i=0;i<3;i++){
for(int j=0;j<3;j++){
c[i][j]=0;
for(int k=0;k<3;k++)
{
c[i][j]+=a[i][k]*b[k][j];
}//k loop ends
System.out.print(c[i][j]+' ');  //print the matrix element
}//j loop ends
System.out.println();//new line
}
}}
```

Output:

```
6 6 6
12 12 12
18 18 18
```

Practical (60 minutes)

a) See the example programme for Java single dimensional array below. Write the same programme by assigning the array integer values 25, 89 and 100 for the class SingleDimensionDemo. Show the resulting output.

```
class SingleDimensionExample
```

```
{
        public static void main(String args[])
   {
   int[] a=new int[3];
   a[0]=20;
   a[1]=30;
   a[2]=40;
    System.out.println('Single dimension array elements are');
   System.out.println(a[0]);
   System.out.println(a[1]);
   System.out.println(a[2]);
   }
}
```

b) See the example programme for Java multi dimensional array below. Write the same programme by assigning the array integer value sets (1,2,3), (3,4,5) and (5,6,7) for the class MultiDimensionDemo, for int i=0;i<2,i++ and int j=0;j<2,j++. Show the resulting output.

```
class MultiDimensionExample
{
        public static void main(String args[]){
           int arr[][]={{2,3,4},{4,5,6},{6,7,8}};
        for(int i=0;i<3;i++){
```

```
for(int j=0;j<3;j++){
  System.out.print(arr[i][j]+' ');
}
System.out.println();
}
}}
```

Instructions: The progress of students will be assessed with the exercises mentioned below.

MCQ (10 minutes)

1. A Java array is a _____ structure.

a) data

b) integer

c) framework

d) None of the mentioned

2. An array is a collection of same _____ types.

a) object

b) variable

c) list

d) None of the mentioned

3. Using arrays reduce dependence on _____ variables.

a) collective

b) double

c) individual

d) None of the mentioned

4. What has to be declared to reference an array within a program?

a) a string

b) a variable

c) a sub-array

d) None of the mentioned

5. An array can be declared with the _____ data type int.

a) non-primitive

b) primitive

c) initial

d) None of the mentioned

6. arrayName in dataType[] arrayName is the _____

a) constructor

b) integer

c) identifier

d) None of the mentioned

7. A single dimension array has _____ variables.

a) multiple

b) single

c) no

d) None of the mentioned

8. Multiple variables within a single dimension array are declared with _____ names

a) same

b) different

c) unique

d) None of the mentioned

9. A multi dimension array can be considered as _____ of arrays.

a) an array

b) a string

c) a variable

d) None of the mentioned

10. A multi dimension array stores data in a _____ form.

a) box

b) chain

c) matrix

d) None of the mentioned