

# Arrays and ArrayLists

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## Sources

Horstmann, Section 7

## Summary

An array is a sequence of values with the same type. Each value stored in an array is called an element. An array can contain any object and is an object itself.

When an array is initialized with the *new* operator each element is initialized to a default value. Number primitive types (*int*, *double*) are zero, *booleans* are false, and all object references are *null*.

Arrays can be multi-dimensional. For example, a 2-D array can be created as follows;  
*int[][] name;*

In this case, *name* is an array of arrays. In other words, *name* is an array with elements that are also arrays, and within those arrays are the *int* elements. The size of a multi-dimensional array is computed by multiplying the size of its arrays together. For example; *int[3][3]* has 9 elements total (3x3=9).

Arrays are also immutable, once they are created; their size cannot be changed. Their elements, however, can be changed.

Array Lists on the other hand are mutable. Their size can be changed at will. They are also a great example of a generic class. Contrary to what you might believe, primitive types (*int*, *double*) cannot be stored in an Array List. Only class or interface types can be stored in an Array List.

## Hints:

An array's elements are accessed with the [] ex; *name[0] ... name[1]=0*  
*name[0][0] ... name[0][1] = 0* etc...

An Array List's elements are accessed with the get and set methods. Ex,  
*name.get(0) ... name.set(1,"cat")*

## Example:

```
1  import java.util.ArrayList;
2
3  public class Arrays {
4      public static void main(String[] args) {
5          int[] intArray = new int[3];
6          double[][] doubleArray2D = new double[10][10];
7
8          ArrayList<Integer> integerArrayList = new ArrayList<Integer>();
9
10         intArray[0] = 5;
11         intArray[1] = 6;
12
13         int[] intArray2 = { 2, 6, 5, 7 };
14
15         integerArrayList.add(5);
16         integerArrayList.set(0, 11);
17         System.out.println(integerArrayList.get(0));
18
19         doubleArray2D[0][0] = 1.0;
20         doubleArray2D[5][0] = 9.0;
21         doubleArray2D[9][9] = 3.0;
22     }
23 }
```