

## Arrays, Collections, and the class Object

In this lesson, we'll learn more about built-in arrays, ArrayList, and Java library classes in general. To do this, we'll talk about how the ArrayList class in the Java library is implemented.

### *IntArray implementation*

ArrayList is a class that 'wraps' Java's built-in array, providing a list that can grow. It is generic, in that one can use ArrayList for a list with elements of any type.

We'll begin with an IntArray class that wraps a built-in integer array.

**Instructor coding:** Write an IntArray class with append and get:

1. Define a built-in array as a 'private' data member
2. Define an additional data member: the number of elements.
3. Write the methods 'add', 'get', and 'toString'
4. Write a main which tests these functions

Our IntArray is limited, relative to ArrayList.

- It doesn't grow as needed
- It is type-specific

To make it grow as needed, we'll need to modify the 'add' method:

If we've reached the size limit of the array:

1. create a new array of twice the size
2. copy the old data to the new array
3. point the data member of intArray to the new array

**In-class assignment 1:** Modify IntArray so that it will grow as needed.

***class Object***

The Java library provides a special class called 'Object' which can be thought of as a generic placeholder.

If you define a formal parameter to be of type 'Object', then you can send an object of any class type as the actual parameter.

So if in class Foo there is a function defined as:

```
void func(Object object)
```

it can be called with:

```
Foo f = new Foo();  
f.func(person);  
f.func(car)  
f.func(token)
```

where person, car, and token are objects of the types Person, Car, or Token.

class Object is used to implement Java's ArrayList—the append method of ArrayList accepts an item of any type.

**In class Problem 2.** Copy your IntArray class and name the copy 'ArrList'. Modify the code so that the built-in array data member is of type Object and the 'add' and 'get' methods work on Object instead of int. To test your new class, add your Person and Car classes into the project, and write a main in your ArrList class that creates lists of each of these.