Some background before I start the lesson...

- Initial lessons use existing classes (String, Arraylist, Random, Swing/Graphics)
  - practice reading APIs
  - practice instantiating objects
  - practice invoking static and instance methods
- Subsequent lesson on defining a new Java class
  - Delay introduction of constructors and methods
  - Initial emphasize on object state and object references
  - Use visual debuggers to clarify object concepts, avoid common misconceptions

Today's Lesson - Defining a new Java class

We've seen how to use existing Java core and utility classes (String, ArrayList, etc.) to solve some interesting problems.

Today we'll see how to define a new class to model some real world objects.

Review: What is an object?

Objects have state (properties/data) and behavior (operation that access/modify state)

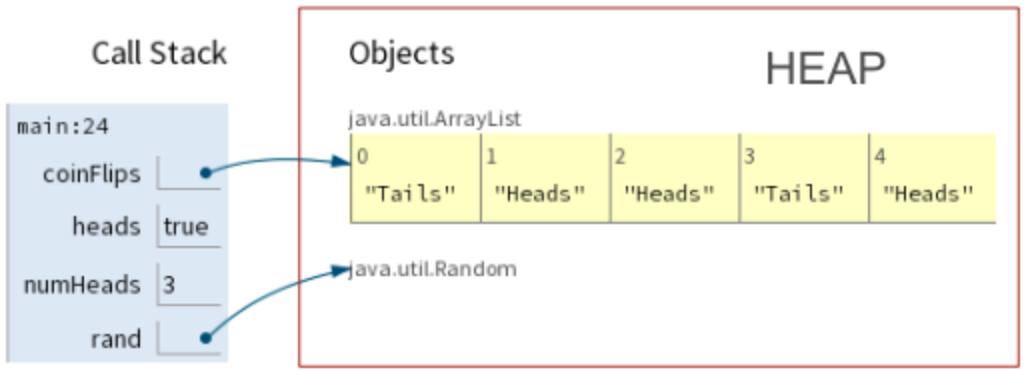
Object	State	Behavior

Review: Java Data Types

- Primitive types are predefined in Java.
- Reference types can be defined by the programmer.

Java Data Types		
Primitive Types	byte, short, int, long, float, double, boolean, char	Variable stores a primitive value
Reference Types (non-primitive)	String, ArrayList, Random, JButton, JFrame, ...	Variable stores an object reference

```
  ArrayList<String> coinFlips = new ArrayList<String>();
  Random rand = new Random();
  int numHeads = 0;
  boolean heads = rand.nextBoolean();
  while (numHeads < 3) {
      if (heads) {
          numHeads++;
          coinFlips.add("Heads");
      }
      else {
          coinFlips.add("Tails");
      }
      heads = rand.nextBoolean();
  }
  System.out.println("Total coin flips:" + coinFlips.size());
  System.out.println(coinFlips);
}
```



CHALLENGE

Consider the following code:

```
public class Cat {

    String name;
    boolean isPurring;

    public static void main(String[] args) {
        Cat calico = new Cat();
        Cat tabby = new Cat();
        Cat favorite = calico;

        tabby.name = "Maru";
        calico.name= "Chestnut";
        favorite.isPurring = true;

        System.out.printf("calico: %s %b%n", calico.name, calico.isPurring);
        System.out.printf("tabby %s %b%n", tabby.name, tabby.isPurring);
        System.out.printf("favorite: %s %b%n", favorite.name, favorite.isPurring);
```