An intro to programming*

*Java

Announcements

- Professor Rodger
- The Link
  - UTAs start TONIGHT!
Announcements

• Office hours –
  • Check the website!

Homework

• Recitation prep due BEFORE recitation on Friday
  • Setup and start coding in Java
    • Post questions on Piazza
• APT Set 1 (Java coding)
  • Due September 3
• Assignment 1 – (More Java coding)
  • Due September 9
  • More discussion on Monday
Today

• JAVA JAVA JAVA JAVA JAVA JAVA JAVA
  • JAVA
    • Primitive and Object type
    • Classes
    • Code example
  • Java
    • Arrays

Java

• Object-Oriented Programming Language
Primitive types

- int
  - int myInt = 5;
- char
  - char myChar = 't';
- boolean
  - boolean myBool = false; // or true
- double
  - double myDouble = 5.5;
## Primitive types

- **int**
  - `int myInt = 5;`

- **char**
  - `char myChar = 't';`

- **boolean**
  - `boolean myBool = false; // or true`

- **double**
  - `double myDouble = 5.5;`

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### Primitive types

- **value** of primitive stored in memory
- **know memory size**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>myInt</td>
<td>5</td>
</tr>
<tr>
<td>myChar</td>
<td>'t'</td>
</tr>
<tr>
<td>myBool</td>
<td>false</td>
</tr>
<tr>
<td>myDouble</td>
<td>5.5</td>
</tr>
</tbody>
</table>

```java
int myInt = 5;
char myChar = 't';
boolean myBool = false;
double myDouble = 5.5;
```
Cats and Dogs

Are you a cat person or a dog person?

<table>
<thead>
<tr>
<th>Product</th>
<th>Choice</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cat person</td>
<td>9</td>
<td>8%</td>
</tr>
<tr>
<td>Dog person</td>
<td>67</td>
<td>57%</td>
</tr>
<tr>
<td>I don’t like animals</td>
<td>8</td>
<td>7%</td>
</tr>
<tr>
<td>I like both equally</td>
<td>33</td>
<td>28%</td>
</tr>
</tbody>
</table>

Object type

- Object – has *state* and *behavior*
  - Dog
    - State – name, breed, age
    - Behavior – barking, eating, sleeping
```java
public static void main(String[] args){
    Dog max = new Dog("Mad Max", 7, "mutt");
    max.sleeping();
}
```
public class Dog {
    String myName;
    int myAge;
    String myBreed;

    void barking(){
        System.out.println(myName + "is barking. Woof Woof");
    }

    void eating(){
        System.out.println(myName + "is eating. Yum yum");
    }

    void sleeping(){
        System.out.println("shhh " + myName + " is sleeping.");
    }
}

public class Dog {
    String myName;
    int myAge;
    String myBreed;

    void barking(){
        System.out.println(myName + "is barking. Woof Woof");
    }

    void eating(){
        System.out.println(myName + "is eating. Yum yum");
    }

    void sleeping(){
        System.out.println("shhh " + myName + " is sleeping.");
    }
}

public static void main(String[] args){
    Dog max = new Dog("Mad Max", 7, "mutt");
    max.sleeping();
}

State (Instance variables)

Behavior (Methods)
public class Dog {
    String myName;
    int myAge;
    String myBreed;

    public Dog(String name, int age, String breed) {
        myName = name;
        myAge = age;
        myBreed = breed;
    }

    void barking() {
        System.out.println(myName + " is barking. Woof Woof");
    }
}
```java
public static void main(String[] args) {
    Dog max = new Dog("Mad Max", 7, "mutt");
    max.sleeping();
}

public Dog(String name, int age, String breed) {
    myName = name;
    myAge = age;
    myBreed = breed;
}
```
public static void main(String[] args) {
    Dog max = new Dog("Mad Max", 7, "mutt");
    max.sleeping();
}

void sleeping() {
    System.out.println("shhh " + myName + " is sleeping.");
}

shhh Mad Max is sleeping.

APT demo

• Gravity

• [Link to APT demo](http://www.cs.duke.edu/csed/newapt/gravity.html)

APT: Gravity

**Problem Statement**

Eliabah has decided to try to defy gravity. She's going to drop or throw an object from the top of an infinitely tall building and see how far it falls. She knows exactly what speed she throws the object and has a stop watch the runs to time how long it falls.

Write a method called that returns the number of meters the object has fallen after time seconds have elapsed when the object is thrown with an initial velocity of m/s.

Ignore any forces due to friction, air resistance, etc. The infinitely tall building is located in a vacuum.

However, the building is on the earth, so acceleration due to earth's gravity should be part of your calculations.
APT Grading

- Complete required number by due date
- Not keeping up with APTs hurts final APT grade
  - 1/2 of APT grade is completing APTs on time
- “Required” is fair game for exams / recitation
- If you skip an APT you can go back!
  - Keep trying. Hand it in later!
APT Grading

- You can always do more than is required!
  - This will help your grade!
- If you fall behind once - make up for it next time.
  - This won’t hurt your grade. (And please don’t ask me about it)
- Handing in all APTs at the end of the semester WILL hurt your grade!
  - And could hurt your test grades.

Arrays

- An Array – a collection of items selected by index
  - fixed number of values
  - single type

```java
char[] duke = new char[5];
duke[0] = ‘d’;
```

```
0 1 2 3 4
’d’ ‘e’ ‘v’ ‘i’ ‘l’
```
Arrays

• How do you create an array of 10 Strings?

a. int[] a = new String[10];
b. String[] b = new String[9];
c. String[10] c = new String[10];
d. String[] d = new String[10];
Arrays

• Coding!
  • Create class ArrayPractice.java
  • Add method makeArray that
    • Creates an array of 50 doubles
    • Puts the number 20.5 into every entry
    • Returns the array

Recitation

• Recitation assignment due BEFORE recitation on Friday
  • Setup and start coding in Java
  • Read CirclesCountry and THINK about how to solve it