Class Design

Initializing Objects

Order of initialization

What happens when we initialize a class?

1. If there is a superclass, it is initialized first
2. All static variables are processed (in order of appearance)
3. All static initializers are are processed (in order of appearance)

This all happens at most once for each class !!

* class is initialized automatically if `main()` method is inside the class, or manually by calling "`new MyClass();`"

```
class Mammal {
  static { System.out.println("Hello."); }
}
```

1

```
Hello.
Woof!
Good afternoon.
```

```
public class Dog extends Mammal {
  public static void main(String[] args) {
    System.out.println("Good afternoon.");
    new Dog();
    new Dog();
    new Dog();
  }
  static { System.out.println("Woof!"); }
}
```

main() is inside Dog class => Dog will be initialized

3

no effect

2

What happens when we initialize a class?

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```
// final instance variables must assume the value
//   by the time the constructor completes !!
// (final local variables must have value only if used)

public class Item {
  private final double TAX;
  private final double price;
  public Item() {
    this.price = 12.5;
  }
  { TAX = 0.2; }
}

// this is OK, because the instance initializer is processed before constructor
```

assignment in the constructor

assignment in the instance initializer

Order of initialization when creating an instance

What happens when we initialize an instance of a class?

1. Initialize the class if it was not already initialized (see previous slides)
2. If there is a superclass, initialize superclass.
3. Process all instance variable declarations.
4. Process all instance initializers.
5. Initialize the constructor.

```
class Mammal {
  static { System.out.println("Hello!"); }
  { System.out.println("Good Afternoon."); }
}
public class Dog extends Mammal {
  private String name = "Rex";
  { System.out.println("Name: " + name); }
  private static int i = 0;
  static { System.out.println(i); }
  {  i++;
     System.out.println(i); }
   public Dog() {
      System.out.println("Woof!");
   }
  public static void main(String[] args) {
      System.out.println("I am the main one.");
      Dog dog = new Dog();
   }
}
```

1 6 5 7 2 3 8 9 4

main() is in Dog

```
Hello!
0
I am the main one.
Good Afternoon.
Name: Rex
1
Woof!
```

What happens when we initialize an instance of a class?

1. Initialize the class if it was not already initialized
2. If there is a superclass, initialize superclass.
3. Process all instance variable declarations.
4. Process all instance initializers.
5. Initialize the constructor.