Advanced Object-Oriented Programming

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Course Topics

- Object-oriented programming
- Assuring correctness
- Java skills
- Introductory data structures

Software lifecycle

Requirements specification
What does the user of the software want?

- Design
  How can we organize a software solution?
- Coding
  Do it!
- Testing
  Did we do it?
- Maintenance
  Fix it and make it do more

Tuesday, January 22, 13
Our Emphasis

1. Design - think before coding
2. Coding - think while coding
3. Testing - were we thinking?

Structure of a Java Class

```java
import ...

public class MyClass {
    // Instance variable declarations

    // Constructor
    public MyClass() {
        ...
    }

    // Method declarations

    // Only in "main" class
    public static void main(String[] args) {
        ...
    }
}
```

```java
public class Rectangle {
    // Instance variable declarations
    private int left;
    private int top;
    private int width;
    private int height;
    private Color color;

    // Constructor
    public Rectangle(...) {
        ...
    }

    // Method declarations
    public void paint(...) {
        ...
    }
}
```

Instance variables define properties that can vary from one rectangle to another: its location, size, and color.
public class Rectangle {
    // Instance variable declarations
    ...

    // Constructor
    public Rectangle(int myLeft, int myTop, int myWidth,
    int myHeight, Color myColor) {
        this.left = myLeft;
        this.top = myTop;
        this.width = myWidth;
        this.height = myHeight;
        this.color = myColor;
    }

    // Method declarations
    public void paint (…) {
        ...
    }
}

Methods define how the objects of the class should behave.

The constructor creates a new object. Its main responsibility is to set all the instance variables.

Understanding Method Signatures

- The declaration of the setColor method for the Graphics looks like this:
  public void setColor (Color newColor)
  ...
  Method signature
- A call to the setColor method looks like this:
  g.setColor (Color.GREEN);
Signatures & Method Calls

```java
public class Graphics {
    ...
    public void setColor (Color newColor) {
    }
    ...
}

public class Rectangle {
    ...
    public void paint (Graphics g) {
        g.setColor (Color.GREEN);
    }
}
```

Signatures & Constructor

```java
public class Rectangle {
    ...
    public Rectangle (int x, int y, int width, int height, Color color) {
    }
    ...
}

public class DrawingProgram {
    ...
    public DrawingProgram () {
        rects = new Rectangle[5];
        rects[0] = new Rectangle (10, 20, 30, 40, Color.RED);
    }
}
```