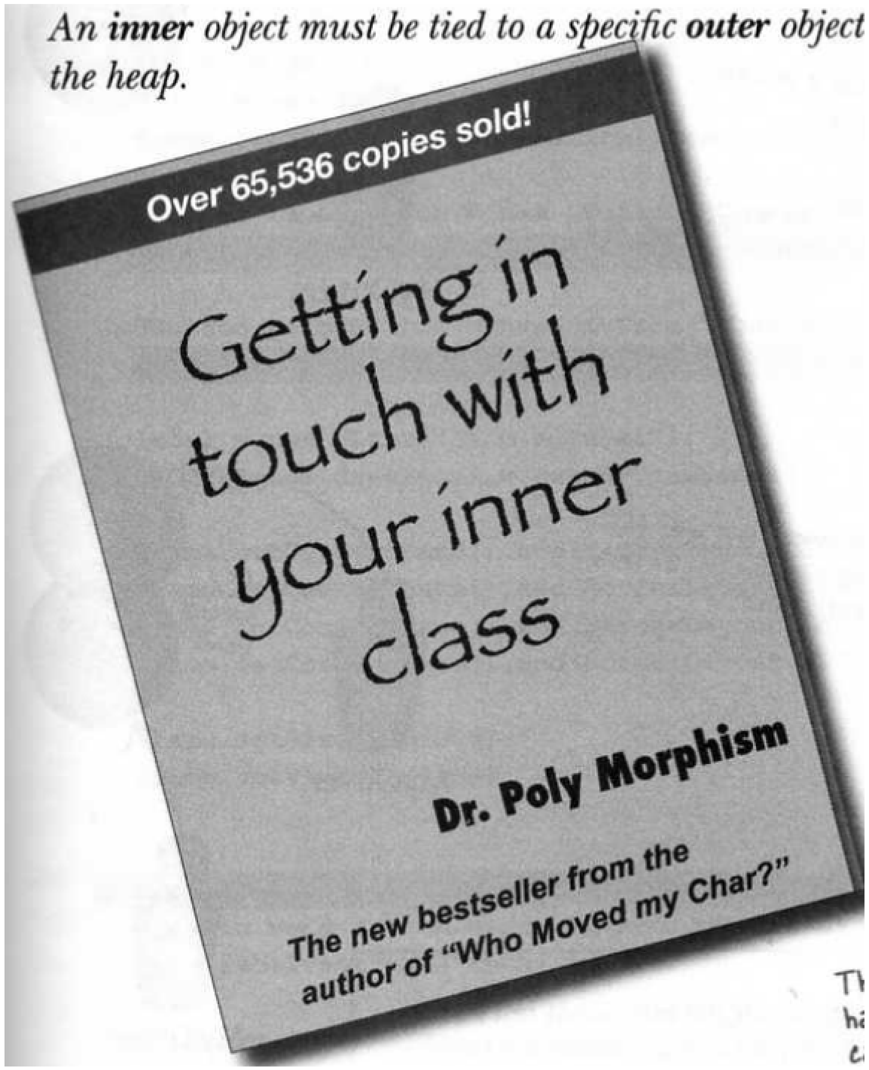
1. Inner Class

```
public class OuterClass {
 private JTextField inputField;
  private JButton button;

  class ButtonListener implements ActionListener {
    public InnerClass() { /* initialize */ }
    public void actionPerformed( . . . ) {
          String text = inputField.getText( );
     }
  }
}
```

Inner Classes


An **inner** object must be tied to a specific **outer** object
the heap.
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Getting in touch with your inner class
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Object of InnerClass *belongs* to an object of the OuterClass.

InnerClass object has access to all fields and methods of OuterClass object, including private ones.

InnerClass object does not exist without OuterClass object.

But: static inner class is independent of OuterClass object, just like a static method. Static inner class cannot access fields of outer class (just like a static method).

button listener using Inner Class

```
public class SwingDemo {
    private JTextField inputField;
    private JButton button;

   private void initCompoents() {
      button = new JButton( "Login" );
      // add an event listener to the button
      button.addActionListener(
                   new ButtonListener( ) );
     ...
  }
  // an inner class of the SwingDemo class
  class ButtonListener implements ActionListener {
   public void actionPerformed(ActionEvent evt) {
       String user = inputField.getText().trim();
       ...
    }
  }
```

Properties of Inner Classes

- An object in an *inner class* can access variables of an object from the outer class, even private ones. (see previous slide)
- Inner classes can be public or private, just like methods and attributes. The same rules apply.
- An inner class object is always associated with an object from the outer class.
  In previous slide, this means you can't write:

  new SwingDemo.ButtonListener( );

  // can't create inner class object by itself

2. Nested Class

A nested class is a class inside another class that is static, so you can create objects of the nested class without an object of the outer class. Example:

Point.Double p = new Point.Double(1.5, 2.5);

```
public class Point {
    // A nested class
    static class Double {
        public double x, y;
        public Double(double x, double y) {
            this.x = x;  this.y = y;
        }
    }
}
```

Why Use Nested Class?

1. Group together related variants of a type.
2. Nested classes can share methods of outer class. Nested classes can be defined as *subclasses* of the outer class, so you could write something like this:

```
// suppose Point.Double extends Point
Point p = new Point.Double(1.5, 0.8);
p.getLength();  // using polymorphism
```