Introduction to Event-Driven Programs

Section 7.5 Graphical/Internet Java:
Event-Driven Programming

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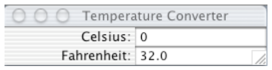
```
/** GUITemperature.java converts Celsius temperatures to
 * Fahrenheit.  It uses a graphical user interface to
 * interact with the user.
 * Author: L. Nyhoff
 * Date:   Dec. 7, 2002
 */

import ann.gui.*;            // CloseableFrame
import javax.swing.*;        // JLabel, JTextField, JPanel
import java.awt.*;           // Color
import java.awt.event.*;     // ActionEvent, ...


class GUITemperature extends CloseableFrame
                     implements ActionListener   {
```

```
//-- GUI Constructor
 public GUITemperature() {

   setTitle("Temperature Converter");

   myCelsiusLabel = new JLabel("Celsius: ",
                            SwingConstants.RIGHT);
   myCelsiusField = new JTextField(12);
   myCelsiusField.addActionListener(this);

   myFahrenheitLabel = new JLabel("Fahrenheit: ",
                            SwingConstants.RIGHT);
   myFahrenheitField = new JTextField(12);

   myPanel = new JPanel();
   myPanel.setLayout( new GridLayout(2, 2));

   myPanel.add(myCelsiusLabel);
   myPanel.add(myCelsiusField);
   myPanel.add(myFahrenheitLabel);
   myPanel.add(myFahrenheitField);

   setContentPane(myPanel);
 }
```

```
/** ActionEvent handler
  *  Receive:       an ActionEvent event
  *  Precondition:  event was generated by an "Enter" in
  *                   myCelsiusField
  *  Postcondition: event has been processed
  */
 public void actionPerformed(ActionEvent event) {

   String celsiusString = myCelsiusField.getText();
   double celsius = Double.parseDouble(celsiusString);

   double fahrenheit = ((9.0/5.0)*celsius) + 32;
   myFahrenheitField.setText("" + fahrenheit);
 }
```

```
  public static void main(String [] args)   {

    GUITemperature aGUITemp = new GUITemperature();
    aGUITemp.setBackground(Color.white);
    aGUITemp.pack();
    aGUITemp.setVisible(true);
  }

  private JLabel      myCelsiusLabel, myFahrenheitLabel;
  private JTextField  myCelsiusField, myFahrenheitField;
  private JPanel      myPanel;
}
```



Celsius:	0
Fahrenheit:	32.0

Java's Event Model

It's called the **event delegation model**. It consists of:

Event sources: objects that *generate* events (buttons, text fields, etc.). They are said to *fire* events.

Event listeners: objects that *respond* to events

Event Sources

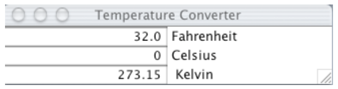
A GUI program must define an event-generating component in the GUI, usually in the constructor.

Example: **`myCelsiusField`**, a **`JTextField`** that fires an **`ActionEvent`** when the user presses the Enter key

Note that the program *implements* the **`ActionListener`** *interface*.

Our simple GUITemperature example has a single event source: **`myCelsiusField`**

The GUI Temperature example in Section 7.5 has three event sources: a Celsius field, a Fahrenheit field, a Kelvin field. (The program converts a temp. on any of these scales to the corresponding temperature in the others.)



32.0	Fahrenheit
0	Celsius
273.15	Kelvin

Event Listeners

To have a GUI respond to an event:

Create a listener for that event source

Register the listener with that event source

Usually the listener is the GUI app itself. For example, a **`GUITemperature`** object is also:

– a **`CloseableFrame`** object

– an **`ActionListener`** object

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Registering Event Listeners with Event Sources

Action event sources provide an **`addActionListener()`** method.

In the **`GUITemperature`** constructor we have:

```
myCelsiusField.addActionListener(this);
```

– **`this`** refers to the object being constructed

– the object registers itself as an **`ActionListener`**

Now the listener has been bound to the event source.

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The **`actionPerformed()`** Method

- It is invoked when an **`ActionEvent`** source fires an **`ActionEvent`**
  - the GUI class has been specified as the listener
- It must specify what to do when the event occurs. In our example:
  - get a string from **`myCelsiusField`**
  - convert it to a double
  - compute corresponding Fahrenheit temp.
  - put it (as a **`String`**) in **`myFahrenheitField`**

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Summary of Common Structure of a GUI Constructor

1. Create components & listeners, register listeners with sources that fire events
2. Create a **`JPanel`** for components
3. Specify a layout manager for the **`JPanel`**
4. Mount components on the **`JPanel`**, usually via the **`add()`** method
5. Make the **`JPanel`** the content pane of window frame

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