IPM 13/14 – P4
Handling Events in AWT

Licenciatura em Ciência de Computadores

Miguel Tavares Coimbra

Why *Events*?

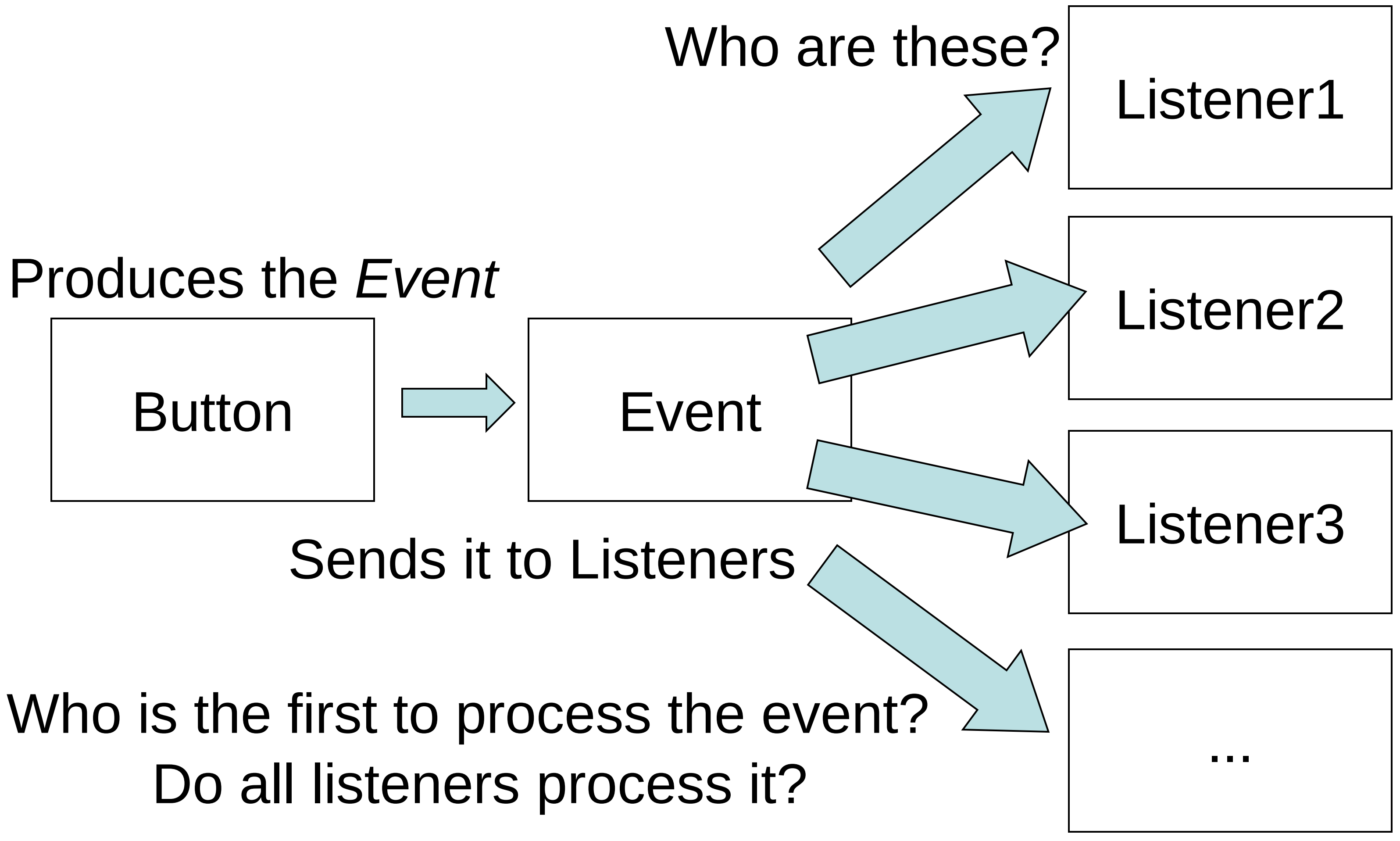
- Components need a way to:
  - Receive messages.
  - Send messages.
- Examples:
  - A TextField needs to know that a key was pressed.
  - A destroy Button wants to tell the corresponding window that it was pressed.

In Java AWT we can use *Events*

What are AWT *Events*?

- Like everything in java, an *Event* is an *Object.*
  - java.lang.Object
    - java.util.EventObject
      - java.awt.AWTEvent
- Based on a Consumer / Producer framework.
  - Producer generates *Event* objects.
  - Consumers register as listeners of *Events*.

Example



Who is the first to process the event?
Do all listeners process it?

Adding Listeners

- Producers add their Listeners
  - And not the other way around!
- Function: *AddListener(listener);*
- Example:

```
Button mybutton = new Button("Ok");
mybutton.addActionListener(this);
```

But **this** needs to know how to listen!

More examples

```
Button button = new Button("Ok");
ActionListener ac = new ActionListener()
button.addActionListener(ac);
```

```
Button button = new Button("Ok")
button.addActionListener(new ActionListner() { ... });
```

Can I be a *Listener*?

- Yes....
  - But you need to implement the listener interface.
    - What is an interface?
- This way the *Event* object can be received as a parameter.

```
public class Contador extends Frame implements ActionListener
{
        public void actionPerformed(ActionEvent e) {
                // Insert your killer code here
        }
}
```

A more complex example

- Imagine you have a TextField object.
  - You want to block every keypress that does not correspond to a number.

```
Class myTextField extends TextField (
....
)
```

- **Pause: What does extend mean?**

Inheritance

- Object-Oriented Programming
  - Inheritance
  - *Child* classes inherit methods and properties of *parent* classes.

    ```
    class child extends parent {
            // killer code here
            }
    ```
- Great way to reuse and expand code.
  - Also means we must ***always*** use good programming practices since we might later reuse this code.

Back to our example

- Imagine you have a TextField object.
  - You want to block every keypress that does not correspond to a number.

```
Class myTextField extends TextField {
....
}
```

- So **myTextField** inherits all methods and properties of **TextField**.

Managing Events

- Now myTextField wants to listen to KeyEvents.
- Need to implement the KeyListener interface:

```
public class myTextField extends TextField implements KeyListener
 {
        public void keyTyped(KeyEvent e) { // Do Something }
        public void keyPressed(KeyEvent e) { // Do Something }
        public void keyReleased(KeyEvent e) { // Do Something }
}
```

Consuming Events

I can then implement code that ignores non-numerical key presses.

- Which key was pressed?
  - Check the KeyEvent object!
- Who pressed it?

  e.getSource();
- But my Event will then be passed to TextField class.
  - Consume the event

  e.consume();

Types of Events

- ActionEvent – Button, MenuItem, TextField
- ItemEvent – Checkbox, CheckboxMenuItem, Choice
- AdjustmentEvent – Scrollbar
- WindowEvent – Dialog, Frame
- KeyEvent – Any component
- FocusEvent – Any component
- ContainerEvent – Container
- TextEvent - Text

ActionEvent example

```
import java.applet.Applet;
import java.awt.Button;
public class TestButton extends Applet {
      private Button button = null;

      public TestButton() { super(); }

      public void init() {
                button = new Button();
                button.setLabel(“Press me!");
                button.addActionListener(new java.awt.event.ActionListener() {
                                public void actionPerformed(java.awt.event.ActionEvent e) {
                                                button.setLabel("OK"); }
                                });
                add(button);
                }
      }
```

TextEvent example

```
import java.applet.Applet;
import java.awt.Label;
import java.awt.TextField;

public class TestTextField extends Applet {
        private TextField textField = null;
        private Label label = null;

        public void init() {
                label = new Label("Password:");
                textField = new TextField();
                textField.setColumns(10);
                textField.setEchoChar('*');
                textField.addTextListener(new java.awt.event.TextListener() {
                                public void textValueChanged(java.awt.event.TextEvent e) {
                                        label.setText(textField.getText()); } });
                textField.addActionListener(new java.awt.event.ActionListener() {
                                public void actionPerformed(java.awt.event.ActionEvent e) {
                                        label.setText("Password"); } });
                this.add(label, null);
                this.add(textField, null);
                }
        }
```

Summing up

- I can reuse and improve previous classes

  NewClass extends OldClass

- For a class to implement an interface, it must implement all the defined methods.

  NewClass implements AmazingInterface

- Events are:
  - Produced by components.
  - Consumed by registered Listeners.

Resources

1. Developer Resources for Java Technology
   http://java.sun.com/
2. Essentials of the Java programming language
   http://java.sun.com/developer/onlineTraining/Programming/BasicJava1/