CS1007 lecture #15 notes

tue 30 oct 2001

http://www.cs.columbia.edu/~sklar/cs1007

today:
- news
- GUI's
- reading: *ch 9*

news.

— midterm II is on Nov 1 – next class!!!

- one page of notes allowed
- bring a photo ID
- know your recitation number
- topics: everything up through hw#5
- studying resources: class notes, lecture notes, homeworks, textbook

— homework #5 is due Nov 7, after break
so do it before or after – your choice!

GUI.

- Graphical User Interface
- topics:

– components
– containers
– layout managers
– events
– listeners

components.

a component is a building block of any GUI

here are some examples:

- Label – `JLabel`
- TextField – `JTextField`
- TextArea – `JTextArea`
- PushButton – `JPushButton`
- CheckBox – `JCheckBox`
- RadioButton – `JRadioButton, ButtonGroup`
- ComboBox – `JComboBox`
- List – `JList`
- PulldownMenu – `JMenuBar, JMenu, JMenuItem`
- ... and many more!!

containers.

a container is a special component that can hold other components

- Applet – `JApplet`
- Frame – `JFrame`
- Panel – `JPanel`

layout managers.

a layout manager describes where the components are laid out within a given container

you need to "set" the layout manager for each container

you can "nest" containers (and their layour managers)

- `BorderLayout` – simplest layout manager

looks like this:

<table>
<tr><td colspan="3">north</td></tr>
<tr><td>west</td><td>center</td><td>east</td></tr>
<tr><td colspan="3">south</td></tr>
</table>

a first GUI applet: hello world.

```
import java.awt.*;
import javax.swing.*;

public class ex15a extends JApplet {

  private JPanel     panel;
  private JLabel     label;

  public void init() {
    panel = new JPanel();
    panel.setLayout( new BorderLayout());
    label = new JLabel( "this is a label",SwingConstants.CENTER );
    panel.add( label,BorderLayout.NORTH );
    setContentPane( panel );
  } // end of init method

} // end of applet
```


second GUI applet: add text field and push button

```
import java.awt.*;
import javax.swing.*;

public class ex15b extends JApplet {

  private JPanel     panel;
  private JLabel     label;
  private JTextField textfield;
  private JButton    button;

  public void init() {
    panel = new JPanel();
    panel.setLayout( new BorderLayout());
    label = new JLabel( "this is a label",SwingConstants.CENTER );
    panel.add( label,BorderLayout.NORTH );
    textfield = new JTextField( "this is an editable text field" );
    panel.add( textfield,BorderLayout.CENTER );
    button = new JButton( "okay" );
    panel.add( button,BorderLayout.SOUTH );
    setContentPane( panel );
  } // end of init method

} // end of applet
```


events.

any program that receives input from the user has a user interface

there are event driven and command driven interfaces

event driven	command driven
MacOS	MS-DOS
Windows 95/98/2k, etc	UNIX
X-Windows	

there are many kinds of events

we are concerned with *action* events:
when the user clicks on a button or selects an item from a menu, then an action event is generated

listeners.

a listener is associated with each component

it waits until it receives an event

then it runs

third example: add action event handler for button

```
import java.awt.*;
import javax.swing.*;
import java.awt.event.*;
import javax.swing.event.*;

public class ex15c extends JApplet {

  private JPanel             panel;
  private JLabel             label;
  private JTextField         textfield;
  private JButton            button;
  private ex15actionListener ex15al;

  public void init() {
    panel = new JPanel();
    panel.setLayout( new BorderLayout());
    ex15al = new ex15actionListener();
    label = new JLabel( "this is a label",SwingConstants.CENTER );
    panel.add( label,BorderLayout.NORTH );
    textfield = new JTextField( "this is an editable text field" );
    panel.add( textfield,BorderLayout.CENTER );
    button = new JButton( "okay" );
    panel.add( button,BorderLayout.SOUTH );
    button.addActionListener( ex15al );
    setContentPane( panel );
  } // end of init() method
```



```
  private class ex15actionListener implements ActionListener {
    public void actionPerformed( ActionEvent event ) {
      Object source = event.getSource();
      if ( source == button ) {
        textfield.setText( "ouch you pushed me" );
      } // end if
    } // end of actionPerformed() method
  } // end of ex15actionListener subclass

} // end of ex15c applet
```

fourth example: add check boxes

```
import java.awt.*;
import javax.swing.*;
import java.awt.event.*;
import javax.swing.event.*;

public class ex15c extends JApplet {

  private JPanel             panel;
  private JLabel             label;
  private JTextField         textfield;
  private JButton            button;
  private ex15actionListener ex15al;
  private JCheckBox          cb1, cb2, cb3;
  private JPanel             cbpanel;
```



```
  public void init() {
    panel = new JPanel();
    panel.setLayout( new BorderLayout());
    ex15al = new ex15actionListener();
    label = new JLabel( "this is a label",SwingConstants.CENTER );
    panel.add( label,BorderLayout.NORTH );
    textfield = new JTextField( "this is an editable text field" );
    panel.add( textfield,BorderLayout.CENTER );
    button = new JButton( "okay" );
    panel.add( button,BorderLayout.SOUTH );
    button.addActionListener( ex15al );
    cb1 = new JCheckBox( "one page of notes" );
    cb2 = new JCheckBox( "recitation number" );
    cb3 = new JCheckBox( "photo id" );
    cbpanel = new JPanel();
    cbpanel.setLayout( new BorderLayout() );
    cbpanel.add( cb1,BorderLayout.NORTH );
    cbpanel.add( cb2,BorderLayout.CENTER );
    cbpanel.add( cb3,BorderLayout.SOUTH );
    cb1.addActionListener( a );
    cb2.addActionListener( a );
    cb3.addActionListener( a );
    panel.add( cbpanel,BorderLayout.EAST );
    setContentPane( panel );
  } // end of init() method
```



```
  private class ex15actionListener implements ActionListener {
    public void actionPerformed( ActionEvent event ) {
      Object source = event.getSource();
      if ( source == button ) {
        textfield.setText( "ouch you pushed me" );
      }
      else if ( source == cb1 ) {
        textfield.setText( "don't forget your lunch" );
      }
      else if ( source == cb2 ) {
        textfield.setText( "don't forget a drink" );
      }
      else if ( source == cb3 ) {
        textfield.setText( "don't forget your valium" );
      } // end if-else
    } // end of actionPerformed() method
  } // end of ex15actionListener subclass

} // end of ex15c applet
```


fifth example: add radio buttons

```
import java.awt.*;
import javax.swing.*;
import java.awt.event.*;
import javax.swing.event.*;

public class ex15c extends JApplet {

  private JPanel             panel;
  private JLabel             label;
  private JTextField         textfield;
  private JButton            button;
  private ex15actionListener ex15al;
  private JCheckBox          cb1, cb2, cb3;
  private JPanel             cbpanel;
  private JRadioButton       rb1, rb2, rb3;
  private ButtonGroup        rbgroup;
  private JPanel             rbpanel;
```



```
  public void init() {
    panel = new JPanel();
    panel.setLayout( new BorderLayout());
    ex15al = new ex15actionListener();
    label = new JLabel( "this is a label",SwingConstants.CENTER );
    panel.add( label,BorderLayout.NORTH );
    textfield = new JTextField( "this is an editable text field" );
    panel.add( textfield,BorderLayout.CENTER );
    button = new JButton( "okay" );
    panel.add( button,BorderLayout.SOUTH );
    button.addActionListener( ex15al );
    cb1 = new JCheckBox( "one page of notes" );
    cb2 = new JCheckBox( "recitation number" );
    cb3 = new JCheckBox( "photo id" );
    cbpanel = new JPanel();
    cbpanel.setLayout( new BorderLayout() );
    cbpanel.add( cb1,BorderLayout.NORTH );
    cbpanel.add( cb2,BorderLayout.CENTER );
    cbpanel.add( cb3,BorderLayout.SOUTH );
    cb1.addActionListener( a );
    cb2.addActionListener( a );
    cb3.addActionListener( a );
    panel.add( cbpanel,BorderLayout.EAST );
```



```
    rb1 = new JRadioButton( "yes", true );
    rb2 = new JRadioButton( "no", false );
    rb3 = new JRadioButton( "maybe", false );
    rbs = new ButtonGroup();
    rbs.add( rb1 );
    rbs.add( rb2 );
    rbs.add( rb3 );
    rbpanel = new JPanel();
    rbpanel.setLayout( new BorderLayout() );
    rbpanel.add( rb1,BorderLayout.NORTH );
    rbpanel.add( rb2,BorderLayout.CENTER );
    rbpanel.add( rb3,BorderLayout.SOUTH );
    rb1.addActionListener( a );
    rb2.addActionListener( a );
    rb3.addActionListener( a );
    panel.add( rbpanel,BorderLayout.WEST );
    setContentPane( panel );
  } // end of init() method
```

```
  private class ex15actionListener implements ActionListener {
    public void actionPerformed( ActionEvent event ) {
      Object source = event.getSource();
      if ( source == button ) {
        textfield.setText( "ouch you pushed me" );
      }
      else if ( source == cb1 ) {
        textfield.setText( "don't forget your lunch" );
      }
      else if ( source == cb2 ) {
        textfield.setText( "don't forget a drink" );
      }
      else if ( source == cb3 ) {
        textfield.setText( "don't forget your valium" );
      }
      else if ( source == rb1 ) {
        label.setText( "goodbye!" );
      }
      else if ( source == rb2 ) {
        button.setText( "not okay" );
      }
      else if ( source == rb3 ) {
        textfield.setText( "are you sure?" );
      } // end if-else
    } // end of actionPerformed() method
  } // end of ex15actionListener subclass

} // end of ex15c applet
```