GUI and Event Handling

CSC 116 – Section 002
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GUI Packages

• java.awt
  – Contains drawing and graphic manipulation classes

• java.swing
  – More advance GUI interface components
  – Components should work in a similar fashion on most platforms
Window

- The Window is a JFrame object
- Set the size:
  - setSize(int width, int height);
- Set location (from top left corner):
  - setLocation(int horizontal, int vertical);
- Set title:
  - setTitle(String title);

Window (2)

- The WindowListener - used to listen for any events (user input) and determines what to do for a given event
  - May be any object that extends WindowAdapter
    - like ActionListener
  - Assign WindowAdapter using the addWindowListener(WindowAdapter adapter) method

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Window (3)

- `getContentPane()` method of the JFrame class returns the container of the window
  - You cannot add components directly to the frame
- You will want to add your GUI components to the container - effectively adding the components to the board

JPanel

- A container for multiple objects
- Layouts:
  - Flow - build one row at a time
  - Border - one item in each border area
  - Grid - column by row grid
- Constructor:
  - JPanel() //Flow Layout
  - JPanel(LayoutManager layout)
JLabel

- Simple graphical object
- Contains text that is used as a label in the GUI
- This label can only be changed through the Java file, a user may not change the label by editing directly on the label.
- Constructor
  - JLabel(String text)

JButton

- A push button
- Contains text or graphical representation of what the button does
- Constructor:
  - JButton()
  - JButton(String text)
- Set text:
  - setText(String text)
- Set enabled:
  - setEnabled(boolean enable)
JTextField

- A single line text display or text input area
- Constructors:
  - JTextField()
  - JTextField(int columns)
  - JTextField(String text)
  - JTextField(String text, int columns)
- Set editable:
  - setEditable(boolean mayEdit)
- Set length (# of columns):
  - setColumns(int length)

JTextArea

- A single line text display or text input area
- Constructors:
  - JTextArea()
  - JTextArea(int rows, int columns)
  - JTextArea(String text)
  - JTextArea(String text, int rows, int columns)
- Methods
  - setEditable(boolean mayEdit)

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JTextArea (2)

- Set length (# of columns):
  - setColumns(int length)
- Set wrap
  - setWrapStyleWord(boolean words) //true-wrap on space
  - setLineWrap(boolean wrap)//wrap at end of line

JComboBox

- A pop-up menu that holds a finite number of choices for a user to select from
- Constructor
  - JComboBox()
  - JComboBox(Object [] items)
  - JComboBox(Vector items)
JComboBox(2)

• Methods
  – addItem(Object item)
  – getItemCountAt(int index) //returns an Object
  – getItemCount() //returns and int
  – getSelectedItemAt() //returns an Object
  – removeAllItems()
  – removeItem(Object item)
  – removeItemAt(int index)

Ways of Monitoring a Window

• ActionListener
  – monitors components inside the window
• WindowAdapter
  – monitors events on the window like closing and resizing
• Mouse Adapter and MouseMotionAdapter
  – monitors mouse events in the window
**ActionListener**

- Any object that implements ActionListener
- Handles the results of an object action
  - Pressing a button
  - Selecting an item from a combo box
- We specify that we want the GUI to listen for an action on a certain component by calling the addActionListener(ActionListener a) on the component.
  - btn.addActionListener(ActionListener a)

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**ActionListener (2)**

- The actionPerformed(ActionEvent e) method is called when an action occurs on a component
- If more than one component has an ActionListener, you determine which component to execute code on by determining the ActionEvent that occurred.
WindowAdapter

- To use the WindowAdapter use addWindowListener(WindowAdapter a)
- windowActivated(WindowEvent e)
  – invoked when a window is activated
- windowClosed(WindowEvent e)
  – invoked when a window has been closed
- windowClosing(WindowEvent e) {
  – invoked when a window is in the process of closing

WindowAdapter (2)

- windowDeactivated(WindowEvent e)
  – invoked when a window is deactivated
- windowDeiconified(WindowEvent e)
  – invoked when a window is deiconified
- windowIconified(WindowEvent e)
  – invoked when a window is iconified
- windowOpened(WindowEvent e)
  – invoked when a window is opened

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**MouseEvent**

- MouseEvent class contains information about a particular mouse event in the GUI
- MouseEvent.getX()
  - returns the x value of a selected coordinate in the GUI
- MouseEvent.getY()
  - returns the y value of a selected coordinate in the GUI

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**MouseAdapter Interface**

- Way to interact with the mouse in a GUI
- Set an object to use a MouseAdapter by addMouseListener(MouseListener m)
- mousePressed(MouseEvent e)
  - invoked when a mouse button is pressed on a component
- mouseClicked(MouseEvent e)
  - invoked when the mouse has been clicked on a component
MouseAdapter (2)

- `mouseReleased(MouseEvent e)`
  - invoked when a mouse button has been clicked on a component
- `mouseEntered(MouseEvent e)`
  - invoked when the mouse enters a component
- `mouseExited(MouseEvent e)`
  - invoked when the mouse exits a component

MouseMotionAdapter Interface

- Way to interact with mouse movements in a GUI
- Set an object to use a MouseAdapter by `addMouseListener(MouseListener m)`
- `mouseDragged(MouseEvent e)`
  - invoked when a mouse button is pressed on a component and dragged
- `mouseMoved(MouseEvent e)`
  - invoked when the mouse has been moved on a component (with no buttons on the mouse being pressed)
References

• Jason Schwarz’s Lecture 27 slides: http://courses.ncsu.edu/csc116/