CS 469 / CS 569: Special Topics in Computer Science: Human-Computer Interaction

Java: Advanced GUI Applications

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Chapter Topics (1 of 2)

This chapter discusses the following topics:

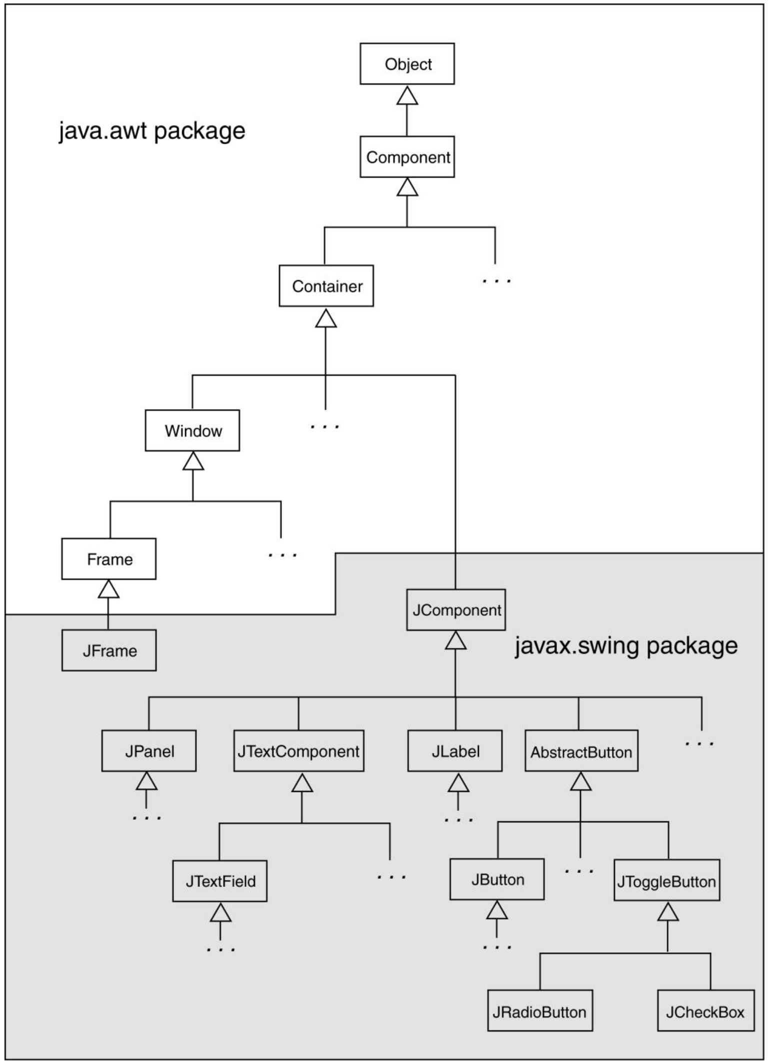
- The Swing and AWT Class Hierarchy
- Read-Only Text Fields
- Lists
- Combo Boxes
- Displaying Images in Labels and Buttons
- Mnemonics and Tool Tips

Chapter Topics (2 of 2)

This chapter discusses the following main topics:

- File Choosers and Color Choosers
- Menus
- More about Text Components: Text Areas and Fonts
- Sliders
- Look and Feel

The Swing and AWT Class Hierarchy



Read Only Text Fields

- Read only text fields are a different way to use the `JTextField` component.
- The `JTextField` component has a method named `setEditable`:

```
setEditable(boolean editable)
```

- By default a text field is editable.
- The `setEditable` method must be called and passed false to make the field read-only.

Lists

- A *list* is a component that displays a list of items and allows the user to select items from the list.
- The `JList` component is used for creating lists.
- When an instance of the `JList` class is created, an array of objects is passed to the constructor.

```
JList (Object[] array)
```

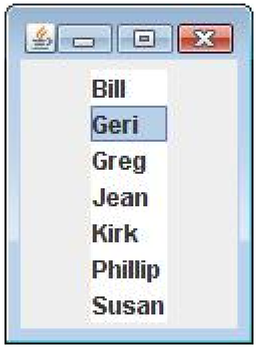
- The `JList` component uses the array to create the list of items.

```
String[] names = { "Bill", "Geri", "Greg",
   "Jean", "Kirk", "Phillip", "Susan" };
JList nameList = new JList(names);
```

List Selection Modes (1 of 3)

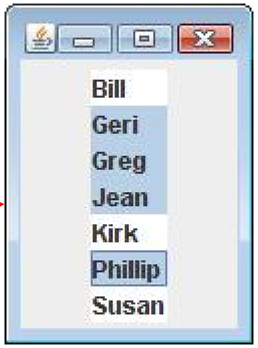
- The `JList` component can operate in any of the following selection modes:
  - **Single Selection Mode** - Only one item can be selected at a time.
  - **Single Interval Selection Mode** - Multiple items can be selected, but they must be in a single interval. An interval is a set of contiguous items.
  - **Multiple Interval Selection Mode** - In this mode multiple items may be selected with no restrictions.
    - This is the default selection mode.

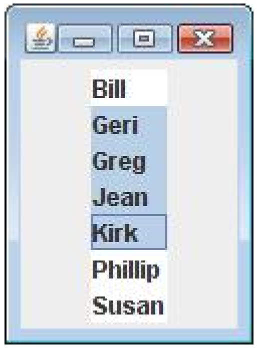
List Selection Modes (2 of 3)



Single selection mode allows only one item to be selected at a time.

Multiple interval selection mode allows multiple items to be selected with no restrictions.





Single interval selection mode allows a single interval of contiguous items to be selected.

List Selection Modes (3 of 3)

- You change a `JList` component's selection mode with the `setSelectionMode` method.
- The method accepts an `int` argument that determines the selection mode:
  - `ListSelectionModel.SINGLE_SELECTION`
  - `ListSelectionModel.SINGLE_INTERVAL_SELECTION`
  - `ListSelectionModel.MULTIPLE_INTERVAL_SELECTION`
- Example:

```
nameList.setSelectionMode(
             ListSelectionModel.SINGLE_SELECTION);
```

List Events (1 of 2)

- When an item in a `JList` object is selected it generates a *list selection event*.
- The event is handled by an instance of a *list selection listener* class, which must meet the following requirements:
  - It must implement the `ListSelectionListener` interface.
  - It must have a method named `valueChanged`. This method must take an argument of the `ListSelectionEvent` type.
- Use the `addListSelectionListener` method of the `JList` class to register the instance of the list selection listener class with the list object.

List Events (2 of 2)

- When the `JList` component generates an event:
  - it automatically executes the `valueChanged` method of the list selection listener object
  - It passes the event object as an argument.

Retrieving Selected Items (1 of 3)

- You may use:
    - `getSelectedValue` or
    - `getSelectedIndex`
  - to determine which item in a list is currently selected.
- `getSelectedValue` returns a reference to the item that is currently selected.

```
String selectedName;
selectedName = (String)nameList.getSelectedValue();
```

- The return value must be cast to `String` is required in order to store it in the `selectedName` variable.
- If no item in the list is selected, the method returns null.

Retrieving Selected Items (2 of 3)

- The `getSelectedIndex` method returns the index of the selected item, or `-1` if no item is selected.
- Internally, the items that are stored in a list are numbered (similar to an array).
- Each item's number is called its *index*.
- The first item has the index 0.
- You can use the index of the selected item to retrieve the item from an array.

```
String[] names = { "Bill", "Geri", "Greg",
   "Jean", "Kirk", "Phillip", "Susan" };
JList nameList = new JList(names);
```

Retrieving Selected Items (3 of 3)

- This code could be used to determine the selected item:

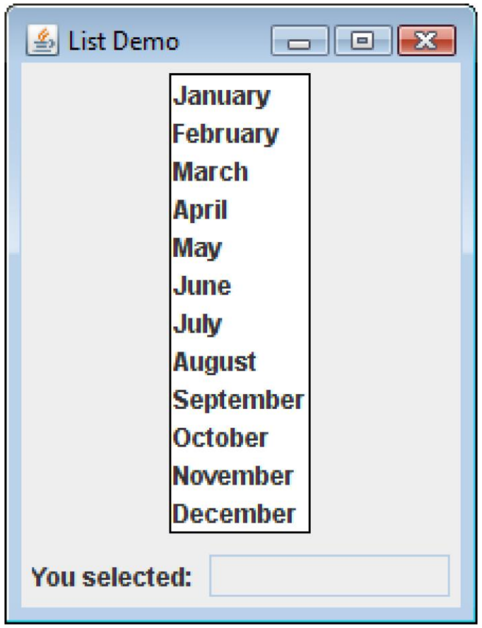
```
int index;
String selectedName;
index = nameList.getSelectedIndex();
if (index != -1)
     selectedName = names[index];
```

- Example: ListWindow.java

Bordered Lists

- The `setBorder` method can be used to draw a border around a `JList`.

```
monthList.setBorder(
    BorderFactory.createLineBorder(Color.black,1));
```



Adding A Scroll Bar To a List (1 of 5)

- By default, a list component is large enough to display all of the items it contains.
- Sometimes a list component contains too many items to be displayed at once.
- Most GUI applications display a scroll bar on list components that contain a large number of items.
- List components do not automatically display a scroll bar.

Adding A Scroll Bar To a List (2 of 5)

- To display a scroll bar on a list component, follow these general steps.
  1. Set the number of visible rows for the list component.
  2. Create a scroll pane object and add the list component to it.
  3. Add the scroll pane object to any other containers, such as panels.
- For this list:

```
String[] names = { "Bill", "Geri", "Greg",
   "Jean", "Kirk", "Phillip", "Susan" };
JList nameList = new JList(names);
```

Adding A Scroll Bar To a List (3 of 5)

- Establish the size of the list component.

```
    nameList.setVisibleRowCount(3);
```

- Create a scroll pane object and add the list component to it.
- A *scroll pane object* is a container that displays scroll bars on any component it contains.
- The `JScrollPane` class to create a scroll pane object.
- We pass the object that we wish to add to the scroll pane as an argument to the `JScrollPane` constructor.

```
    JScrollPane scrollPane = new
        JScrollPane(nameList);
```

Adding A Scroll Bar To a List (4 of 5)

- Add the scroll pane object to any other containers that are necessary for our GUI.

```
JPanel panel = new JPanel();
panel.add(scrollPane);
add(panel);
```

- When the list component is displayed, it will appear with:
  - Three items showing at a time and
  - scroll bars:

Adding A Scroll Bar To a List (5 of 5)

- By default, `JList` components added to a `JScrollPane` object only display a scroll bar if there are more items in the list than there are visible rows.
- When a `JList` component is added to a `JScrollPane` object, a border will automatically appear around the list.
- Example: ListWindowWithScroll.java

Adding Items to an Existing List (1 of 2)

- The `setListData` method allows the adding of items in an existing `JList` component.

```
void setListData(Object[] data)
```

- This replaces any items that are currently displayed in the component.
- This can be used to add items to an empty list.

Adding Items to an Existing List (2 of 2)

- You can create an empty list by using the `JList` component's no-parameter constructor:

```
JList nameList = new JList();
```

- Items can be added to the list:

```
String[] names = { "Bill", "Geri", "Greg",
   "Jean", "Kirk", "Phillip", "Susan" };
nameList.setListData(names);
```

Single Interval Selection Mode (1 of 2)

- A list is set to single interval selection mode by passing the constant

  `ListSelectionModel.SINGLE_INTERVAL_SELECTION`

  to the component's `setSelectionMode` method.

- An interval is a set of contiguous items.
- The user selects:
  - the first item in the interval by clicking on it
  - the last item by holding the Shift key while clicking on it.
- All of the items that appear in the list from the first item through the last item are selected.

Single Interval Selection Mode (2 of 2)

- The `getSelectedValue` method returns the first item in the selected interval.
- The `getSelectedIndex` method returns the index of the first item in the selected interval.
- To get the entire selected interval, use the `getSelectedValues` method.
  - This method returns an array of objects, which are the items in the selected interval.
- The `getSelectedIndices` method returns an array of int values that are the indices of all the selected items in the list.

Multiple Interval Selection Mode (1 of 3)

- Set multiple interval selection mode by passing the constant

  `ListSelectionModel.MULTIPLE_INTERVAL_SELECTION`

  to the component’s `setSelectionMode` method.
- In multiple interval selection mode:
  - multiple items can be selected
  - the items do not have to be in the same interval.
- In multiple interval selection mode the user can select single items or intervals.

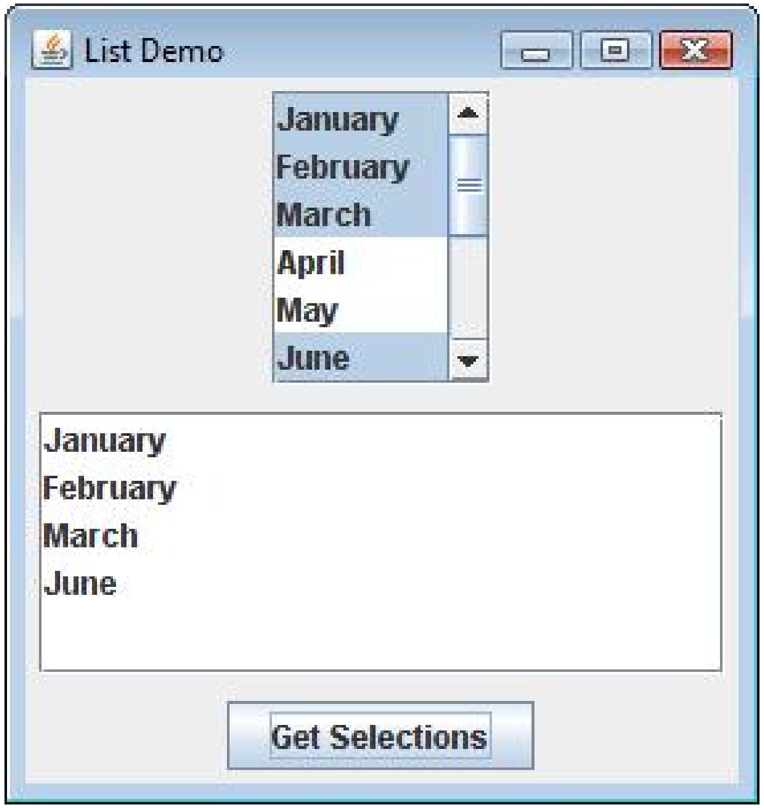
Multiple Interval Selection Mode (2 of 3)

- The user holds down the Ctrl key while clicking on an item
  - it selects the item without deselecting other items.
- The `getSelectedValue` method returns the first selected item.
- The `getSelectedIndex` method returns the index of the first selected item.
- The `getSelectedValues` method returns an array of objects containing the items that are selected.
- The `getSelectedIndices` method returns an `int` array containing the indices of the selected items.

Multiple Interval Selection Mode (3 of 3)

Example:

MultipleIntervalSelection.java



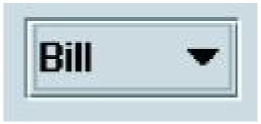
January
February
March
June

Combo Boxes (1 of 2)

- A combo box presents a drop-down list of items that the user may select from.
- The `JComboBox` class is used to create a combo box.
- Pass an array of objects that are to be displayed as the items in the drop-down list to the constructor.

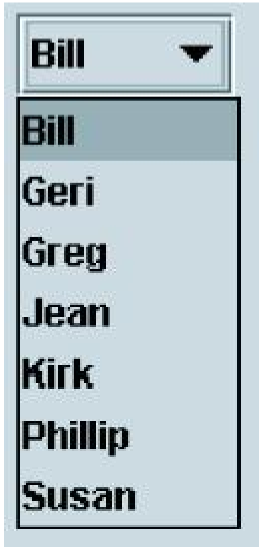
```
String[] names = { "Bill", "Geri", "Greg",
   "Jean", "Kirk", "Phillip", "Susan" };
JComboBox nameBox = new JComboBox(names);
```

- When displayed, the combo box created by this code will initially appear as the button:



Combo Boxes (2 of 2)

- The button displays the item that is currently selected.
- The first item in the list is automatically selected when the combo box is displayed.
- When the user clicks on the button, the drop-down list appears and the user may select another item.



Combo Box Events

- When an item in a `JComboBox` object is selected, it generates an action event.
- Handle action events with an action event listener class, which must have an `actionPerformed` method.
- When the user selects an item in a combo box, the combo box executes its action event listener's `actionPerformed` method, passing an `ActionEvent` object as an argument.

Retrieving Selected Items (1 of 3)

- There are two methods in the `JComboBox` class that can be used to determine which item in a list is currently selected:
  - `getSelectedItem`
  - `getSelectedIndex`
- The `getSelectedItem` method returns a reference to the item that is currently selected.

```
String selectedName;
selectedName = (String) nameBox.getSelectedItem();
```

- `getSelectedItem` returns an `Object` reference so we cast the return value to a `String`.

Retrieving Selected Items (2 of 3)

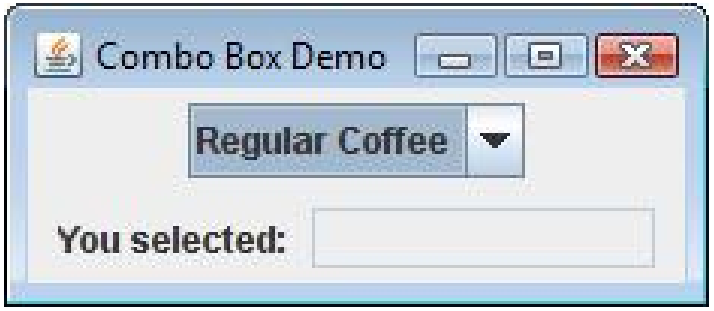
- The `getSelectedIndex` method returns the index of the selected item.

```
String[] names = { "Bill", "Geri", "Greg",
   "Jean", "Kirk", "Phillip", "Susan" };
JComboBox nameBox = new JComboBox(names);
```

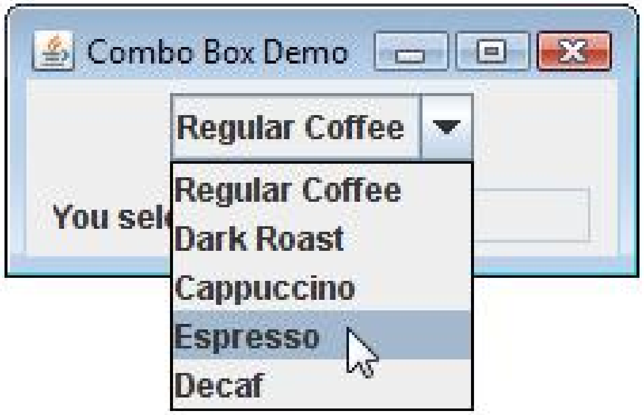
- Get the selected item from the names array:

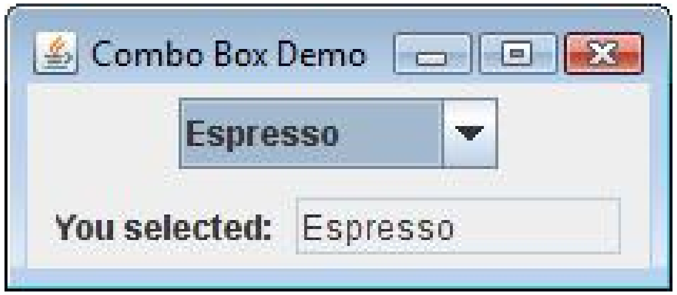
```
int index;
String selectedName;
index = nameBox.getSelectedIndex();
selectedName = names[index];
```

Retrieving Selected Items (3 of 3)



- Example:
- ComboBoxWindow.java





Editable Combo Boxes (1 of 3)

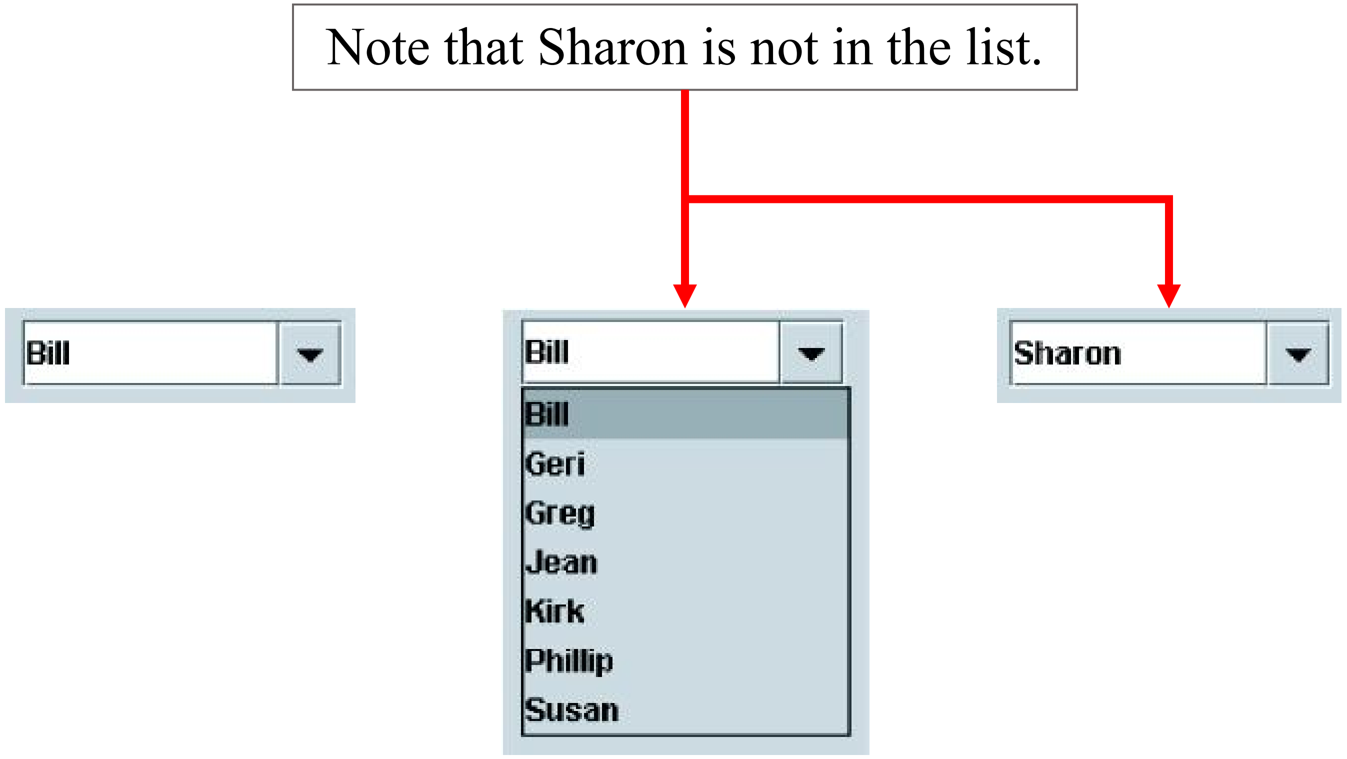
- There are two types of combo boxes:
  - uneditable – allows the user to only select items from its list.
  - editable – combines a text field and a list.
    - It allows the selection of items from the list
    - allows the user to type input into the text field
- The `setEditable` method sets the edit mode for the component.

```
String[] names = { "Bill", "Geri", "Greg", "Jean",
  "Kirk", "Phillip", "Susan" };
JComboBox nameBox = new JComboBox(names);
nameBox.setEditable(true);
```

Editable Combo Boxes (2 of 3)

- An editable combo box appears as a text field with a small button displaying an arrow joining it.
- When the user clicks on the button, the drop-down list appears as shown in the center of the figure.
- The user may:
  - select an item from the list.
  - type a value into the text field.
- The user is not restricted to the values that appear in the list, and may type any input into the text field.

Editable Combo Boxes (3 of 3)


Note that Sharon is not in the list.

Displaying Images in Labels and Buttons (1 of 5)

- Labels can display text, an image, or both.
- To display an image, create an instance of the `ImageIcon` class, which reads the image file.
- The constructor accepts the name of an image file.
- The supported file types are JPEG, GIF, and PNG.
- The name can also contain path information.

```
ImageIcon image = new ImageIcon("Smiley.gif");
```

or

```
ImageIcon image = new ImageIcon(
  "C:\\Chapter 12\\Images\\Smiley.gif");
```

Displaying Images in Labels and Buttons (2 of 5)

- Display the image in a label by passing the `ImageIcon` object as an argument to the `JLabel` constructor.

  ```
  JLabel(Icon image)
  ```

- The argument passed can be an `ImageIcon` object or any object that implements the `Icon` interface.

  ```
  ImageIcon image = new ImageIcon("Smiley.gif");
  JLabel label = new JLabel(image);
  ```

  or

  ```
  JLabel label = new JLabel("Have a nice day!");
  label.setIcon(image);
  ```

Displaying Images in Labels and Buttons (3 of 5)

- Text is displayed to the right of images by default.
- Text alignment can be modified by passing one of the following to an overloaded constructor:
  - `SwingConstants.LEFT`
  - `SwingConstants.CENTER`
  - `SwingConstants.RIGHT`
- Example:

```
ImageIcon image = new ImageIcon("Smiley.gif");
JLabel label = new JLabel("Have a nice day!",
                          image,
                          SwingConstants.RIGHT);
```

Displaying Images in Labels and Buttons (4 of 5)

- Creating a button with an image is similar to that of creating a label with an image.

```
ImageIcon image = new ImageIcon("Smiley.gif");
JButton button = new JButton(image);
```

- To create a button with an image and text:

```
ImageIcon image = new ImageIcon("Smiley.gif");
JButton button = new JButton(
                "Have a nice day!", image);
button.setIcon(image);
```

Displaying Images in Labels and Buttons (5 of 5)

- To add an image to an existing button:

```
JButton button = new JButton(
                "Have a nice day!");
ImageIcon image = new ImageIcon("Smiley.gif");
button.setIcon(image);
```

- You are not limited to small graphical icons when placing images in labels or buttons.
- Example: MyCatImage.java

Mnemonics (1 of 4)

- A *mnemonic* is a key that you press in combination with the Alt key to quickly access a component.
- These are sometimes referred to as hot keys.
- A hot key is assigned to a component through the component’s `setMnemonic` method
- The argument passed to the method is an integer code that represents the key you wish to assign.

Mnemonics (2 of 4)

- The key codes are predefined constants in the `KeyEvent` class (`java.awt.event` package).
- These constants take the form:
  - `KeyEvent.VK_`*`x`*, where *`x`* is a key on the keyboard.
    - The letters VK in the constants stand for “virtual key”.
  - To assign the `A` key as a mnemonic, use `KeyEvent.VK_A`.
- Example:

```
JButton exitButton = new JButton("Exit");
exitButton.setMnemonic(KeyEvent.VK_X);
```

Mnemonics (3 of 4)

- If the letter is in the component’s text, the first occurrence of that letter will appear underlined.
- If the letter does not appear in the component’s text, then no letter will appear underlined.

Mnemonics (4 of 4)

- You can also assign mnemonics to radio buttons and check boxes:

```
JRadioButton rb1 = new
      JRadioButton("Breakfast");
rb1.setMnemonic(KeyEvent.VK_B);
JRadioButton rb2 = new JRadioButton("Lunch");
rb2.setMnemonic(KeyEvent.VK_L);
JCheckBox cb1 = new JCheckBox("Monday");
cb1.setMnemonic(KeyEvent.VK_M);
JCheckBox cb2 = new JCheckBox("Wednesday");
cb2.setMnemonic(KeyEvent.VK_W);
```

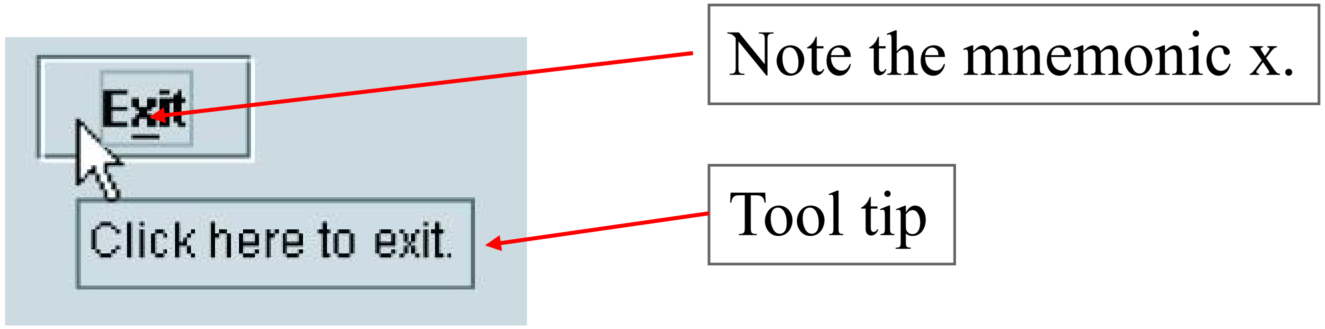
Tool Tips (1 of 2)

- A *tool tip* is text that is displayed in a small box when the mouse is held over a component.
- The box usually gives a short description of what the component does.
- Most GUI applications use tool tips as concise help to the user.

Tool Tips (2 of 2)

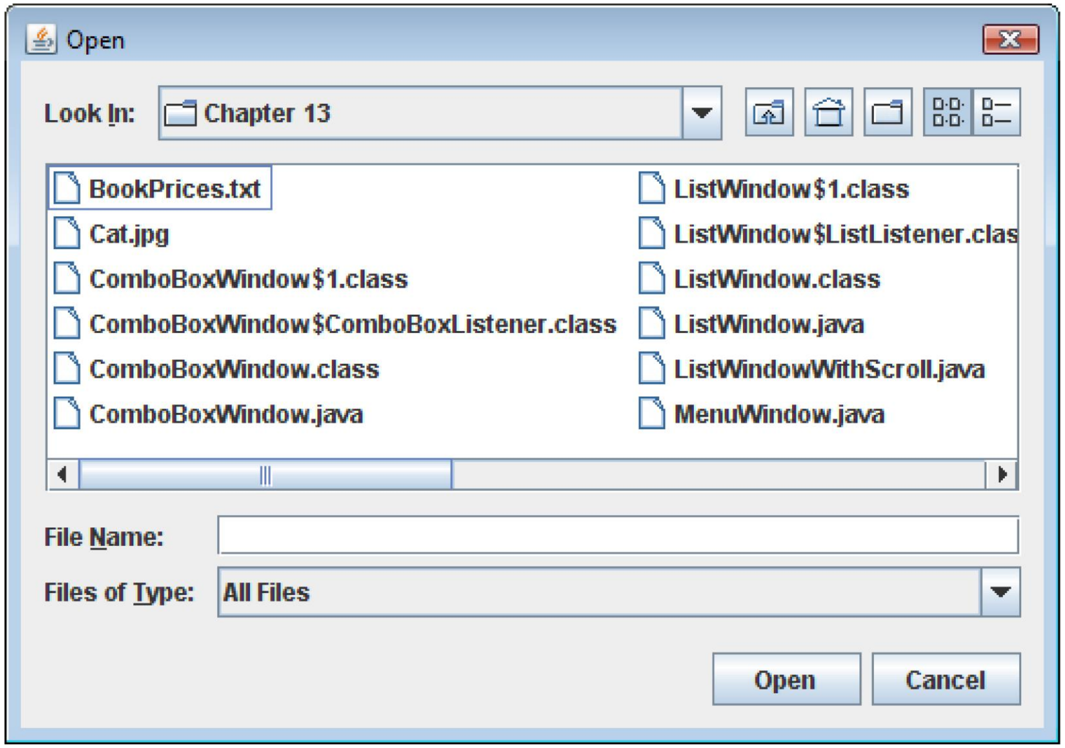
- Assign a tool tip to a component with the `setToolTipText` method.

```
JButton exitButton = new JButton("Exit");
exitButton.setMnemonic(KeyEvent.VK_X);
exitButton.setToolTipText(
  "Click here to exit.");
```



File Choosers (1 of 7)

- A file chooser is a specialized dialog box that allows the user to browse for a file and select it.



File Choosers (2 of 7)

- Create an instance of the `JFileChooser` class to display a file chooser dialog box.
- Two of the constructors have the form:

```
JFileChooser()
JFileChooser(String path)
```

- The first constructor shown takes no arguments and uses the default directory as the starting point for all of its dialog boxes.
- The second constructor takes a `String` argument containing a valid path. This path will be the starting point for the object’s dialog boxes.

File Choosers (3 of 7)

- A `JFileChooser` object can display two types of predefined dialog boxes:
  - open file dialog box – lets the user browse for an existing file to open.
  - a save file dialog box – lest the user browse to a location to save a file.

File Choosers (4 of 7)

- To display an open file dialog box, use the `showOpenDialog` method.
- General format:

```
int showOpenDialog(Component parent)
```

- The argument can be null or a reference to a component.
- If null is passed, the dialog box is normally centered in the screen.
- If you pass a reference to a component the dialog box is displayed over the component.

File Choosers (5 of 7)

- To display a save file dialog box, use the `showSaveDialog` method.
- General format:

```
int showSaveDialog(Component parent)
```

- The argument can be either null or a reference to a component.
- Both methods return an integer that indicates the action taken by the user to close the dialog box.

File Choosers (6 of 7)

- You can compare the return value to one of the following constants:
  - `JFileChooser.CANCEL_OPTION` – indicates that the user clicked on the Cancel button.
  - `JFileChooser.APPROVE_OPTION` – indicates that the user clicked on the OK button.
  - `JFileChooser.ERROR_OPTION` – indicates that an error occurred, or the user clicked on the standard close button on the window to dismiss it.
- If the user selected a file, use the `getSelectedFile` method to determine the file that was selected.
- The `getSelectedFile` method returns a `File` object, which contains data about the selected file.

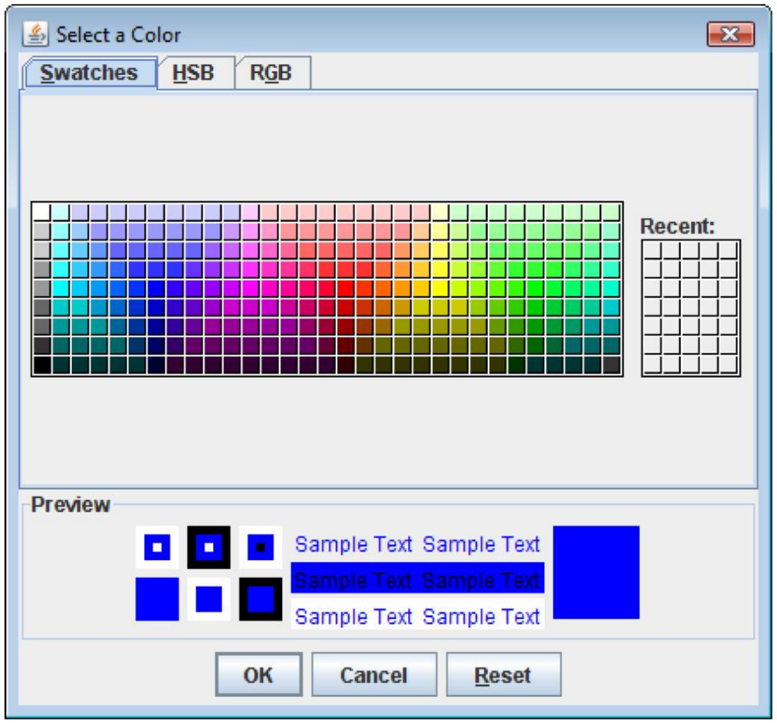
File Choosers (7 of 7)

- Use the `File` object's `getPath` method to get the path and file name as a `String`.

```
JFileChooser fileChooser = new JFileChooser();
int status = fileChooser.showOpenDialog(null);
if (status == JFileChooser.APPROVE_OPTION)
{
  File selectedFile =
          fileChooser.getSelectedFile();
  String filename = selectedFile.getPath();
  JOptionPane.showMessageDialog(null,
                "You selected " + filename);
}
```

Color Choosers (1 of 4)

- A color chooser is a specialized dialog box that allows the user to select a color from a predefined palette of colors.



Color Choosers (2 of 4)

- By clicking the HSB tab you can select a color by specifying its hue, saturation, and brightness.
- By clicking the RGB tab you can select a color by specifying its red, green, and blue components.
- The `JColorChooser` class has a static method named `showDialog`, with the following general format:

```
Color showDialog(Component parent,
                 String title, Color initial)
```

Color Choosers (3 of 4)

- If the first argument is `null`, the dialog box is normally centered in the screen.
- If it is a reference to a component the dialog box is displayed over the component.
- The second argument is the dialog title.
- The third argument indicates the color that appears initially selected in the dialog box.
- This method returns the color selected by the user.

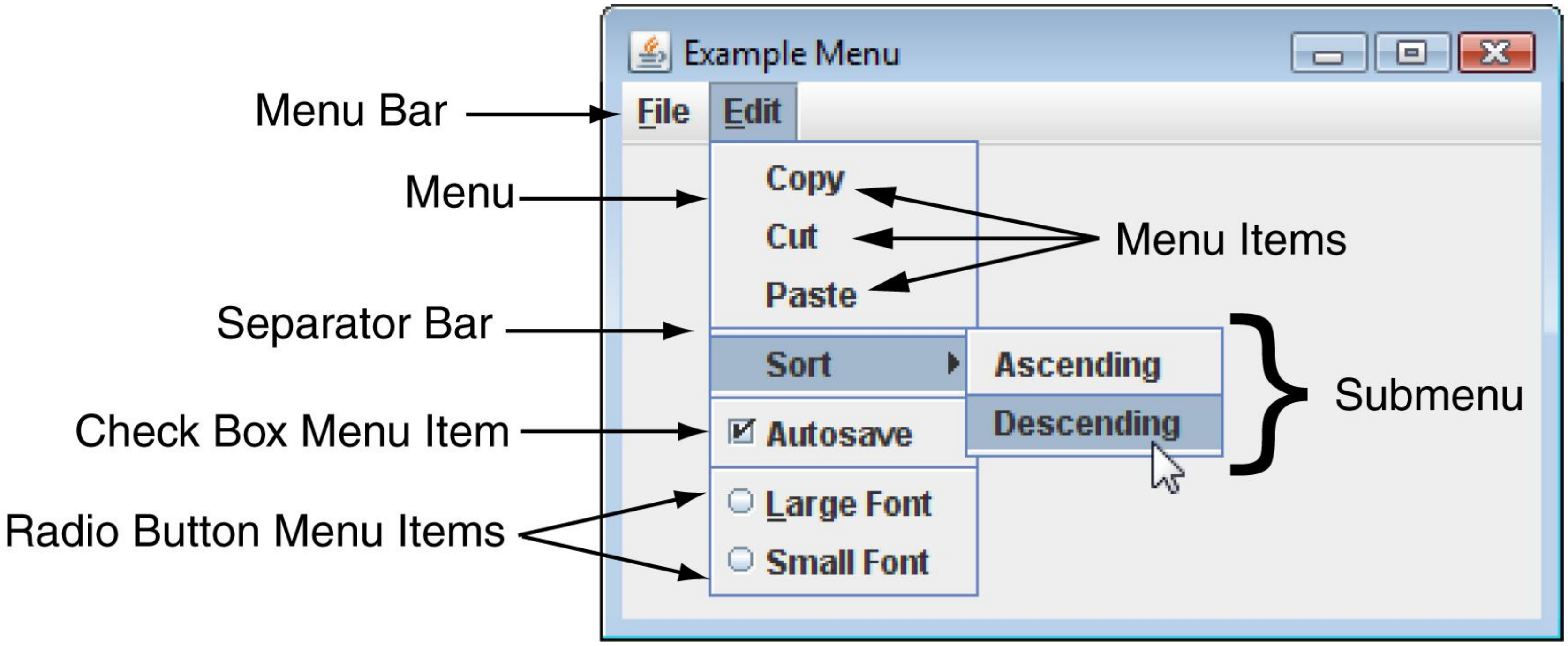
Color Choosers (4 of 4)

- Example:

```
JPanel panel = new JPanel();
Color selectedColor =
  JColorChooser.showDialog(null,
        "Select a Background Color",
        Color.BLUE);
panel.setBackground(selectedColor);
```

Menus

- A *menu system* is a collection of commands organized in one or more drop-down menus.



Components of A Menu System

- A menu system commonly consists of:
  - **Menu Bar** – A *menu bar* lists the names of one or menus.
  - **Menu** – A *menu* is a drop-down list of menu items.
  - **Menu Item** – A *menu item* can be selected by the user.
  - **Check box menu item** – A *check box menu item* appears with a small box beside it.
    - The item may be selected or deselected.
  - **Radio button menu item** – A *radio button menu item* may be selected or deselected.
  - **Submen**u – A menu within a menu is called a *submenu*.
  - **Separator bar** – A separator bar is a horizontal bar used to separate groups of items on a menu.

Menu Classes (1 of 2)

- A menu system is constructed with the following classes:
  - `JMenuBar` – Used to create a menu bar.
    - A `JMenuBar` object can contain JMenu components.
  - `JMenu` – Used to create a menu. A `JMenu` component can contain:
    - `JMenuItem`, `JCheckBoxMenuItem`, and `JRadioButtonMenuItem` components,
    - as well as other `JMenu` components.
      - A submenu is a `JMenu` component that is inside another `JMenu` component.
  - `JMenuItem` – Used to create a regular menu item.
    - A `JMenuItem` component generates an action event when selected.

Menu Classes (2 of 2)

- `JCheckBoxMenuItem` – Used to create a check box menu item.
  - The class's isSelected method returns true if the item is selected, or false otherwise.
  - A `JCheckBoxMenuItem` component generates an action event when selected.
- `JRadioButtonMenuItem` – Used to create a radio button menu item.
  - `JRadioButtonMenuItem` components can be grouped together in a `ButtonGroup` object so that only one of them can be selected at a time.
  - The class's `isSelected` method returns true if the item is selected, or false otherwise.
  - A `JRadioButtonMenuItem` component generates an action event when selected.

Menu Example

- Menu Example: MenuWindow.java

Text Areas (1 of 5)

- The `JTextField` class is used to create text fields.
- A text field is a component that allows the user to enter a single line of text.
- A text area is like a text field that can accept multiple lines of input.
- You use the `JTextArea` class to create a text area.
- The general format of two of the class's constructors:

```
JTextArea(int rows, int columns)
JTextArea(String text, int rows, int columns)
```

Text Areas (2 of 5)

- The `JTextArea` class provides the `getText` and `setText` methods for getting and setting the text.

```
String userText = textInput.getText();
textInput.setText("Modified: " + userText);
```

- `JTextArea` components do not automatically display scroll bars.
- You must add a text area to a scroll pane.

```
JTextArea textInput = JTextArea(20, 40);
JScrollPane scrollPane = new
   JScrollPane(textInput);
```

Text Areas (3 of 5)

- The `JScrollPane` object displays both vertical and horizontal scroll bars on a text area.
- By default, the scroll bars are not displayed until they are needed.
- This behavior can be altered:

```
scrollPane.setHorizontalScrollBarPolicy(
  JScrollPane.HORIZONTAL_SCROLLBAR_NEVER);
scrollPane.setVerticalScrollBarPolicy(
  JScrollPane.VERTICAL_SCROLLBAR_ALWAYS);
```

Text Areas (4 of 5)

- You can pass one of the following constants as an argument:
  - `setHorizontalScrollBarPolicy`
    - `JScrollPane.HORIZONTAL_SCROLLBAR_AS_NEEDED.`
    - `JScrollPane.HORIZONTAL_SCROLLBAR_NEVER`
    - `JScrollPane.HORIZONTAL_SCROLLBAR_ALWAYS`
  - `setVericalScrollBarPolicy`
    - `JScrollPane.VERTICAL_SCROLLBAR_AS_NEEDED`
    - `JScrollPane.VERTICAL_SCROLLBAR_NEVER`
    - `JScrollPane.VERTICAL_SCROLLBAR_ALWAYS`

Text Areas (5 of 5)

- By default, `JTextArea` components do not perform *line wrapping*.
- To enable line wrapping:

```
textInput.setLineWrap(true);
```

- There are two different styles of line wrapping:
  - word wrapping – the line breaks always occur between words.

```
textInput.setWrapStyleWord(true);
```

  - character wrapping – lines are broken between characters (default mode).

Fonts (1 of 2)

- Components display according to their font characteristics:
  - font – the name of the typeface
  - style – can be plain, bold, and/or italic
  - size – size of the text in points.
- A component's `setFont` method will change the appearance of the text in the component:

  setFont (Font *appearance*)
- *A* `Font` *constructor takes three parameters:*

  Font(String *fontName*, int *style*, int *size*)

Fonts (2 of 2)

- Java guarantees that you will have the fonts:
  - `Dialog`, `DialogInput`, `Monospaced`, `SansSerif`, and `Serif`.
- There are three font styles:
  - `Font.PLAIN`, `Font.BOLD`, and `Font.ITALIC`.
- Example:

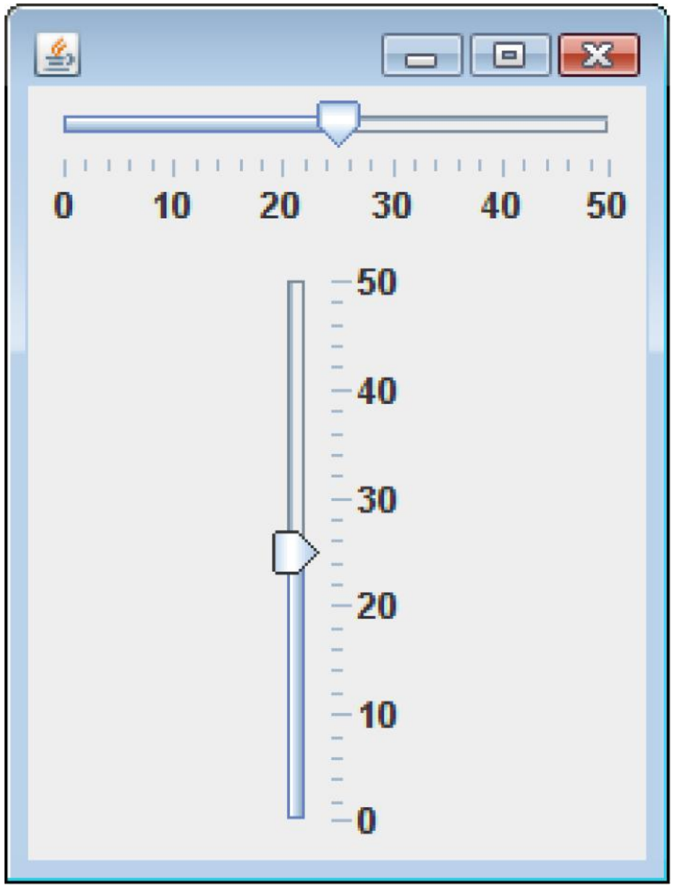
```
label.setFont(new Font(
                "Serif", Font.BOLD, 24));
```

- Font styles can be combined adding them.

```
label.setFont(new Font(
    "Serif", Font.BOLD + Font.ITALIC, 24));
```

Sliders (1 of 6)

- A slider is a component that allows the user to graphically adjust a number within a range.
- Sliders are created from the `JSlider` class.
- They display an image of a "slider knob" that can be dragged along a track.



Sliders (2 of 6)

- A slider is designed to represent a range of numeric values.
- As the user moves the knob along the track, the numeric value is adjusted accordingly.
- Between the minimum and maximum values, major tick marks are displayed with a label indicating the value at that tick mark.
- Between the major tick marks are minor tick marks.

Sliders (3 of 6)

- The `JSlider` constructor has the general format:

```
JSlider(int orientation, int minValue,
        int maxValue, int initialValue)
```

- For orientation, one of these constants should be used:
  - `JSlider.HORIZONTAL`
  - `JSlider.VERTICAL`

Sliders (4 of 6)

- Example:

```
JSlider slider1 = new JSlider(JSlider.HORIZONTAL,
  0, 50, 25);
JSlider slider2 = new JSlider(JSlider.VERTICAL, 0,
  50, 25);
```

- Set the major and minor tick mark spacing with:
  - `setMajorTickSpacing`
  - `setMinorTickSpacing`
- Example:

```
slider1.setMajorTickSpacing(10);
slider1.setMinorTickSpacing(2);
```

Sliders (5 of 6)

- Display tick marks by calling:
  - `setPaintTickMarks`

    `slider1.setPaintTickMarks(true);`
- Display numeric labels on the slider by calling:
  - `setPaintLabels`

    `slider1.setPaintLabels(true);`
- When the knob's position is moved, the slider component generates a *change event*.
- To handle the change event, write a *change listener* class.

Sliders (6 of 6)

- A change listener class must meet the following requirements:
  - It must implement the `ChangeListener` interface.
  - It must have a method named `stateChanged`.
    - This method must take an argument of the `ChangeEvent` type.
- To retrieve the current value stored in a `JSlider`, use the `getValue` method.

```
currentValue = slider1.getValue();
```

- Example: TempConverter.java

Look and Feel (1 of 7)

- The appearance of a particular system's GUI is known as its *look and feel*.
- Java allows you to select the look and feel of a GUI application.
- On most systems, Java's default look and feel is called *Metal*.
- There are also Motif and Windows look and feel classes for Java.
  - Motif is similar to a UNIX look and feel
  - Windows is the look and feel of the Windows operating system.

Look and Feel (2 of 7)

- To change an application’s look and feel, call the `UIManager` class’s static `setLookAndFeel` method.
- Java has a class for each look and feel.
- The `setLookAndFeel` method takes the fully qualified class name for the desired look and feel as its argument.
- The class name must be passed as a string.

Look and Feel (3 of 7)

- Metal look and feel:

```
"javax.swing.plaf.metal.MetalLookAndFeel"
```

- Motif look and feel:

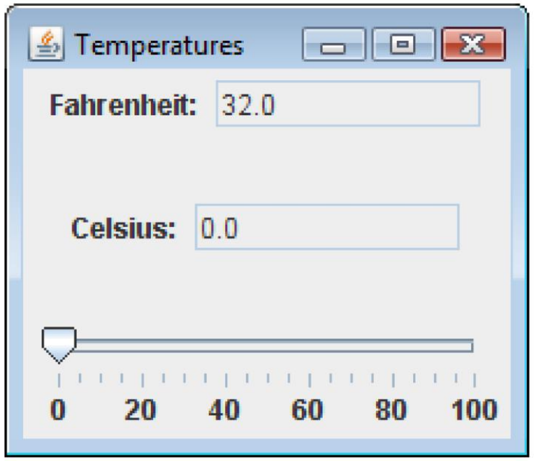
```
"com.sun.java.swing.plaf.motif.MotifLookAndFeel"
```

- Windows look and feel:

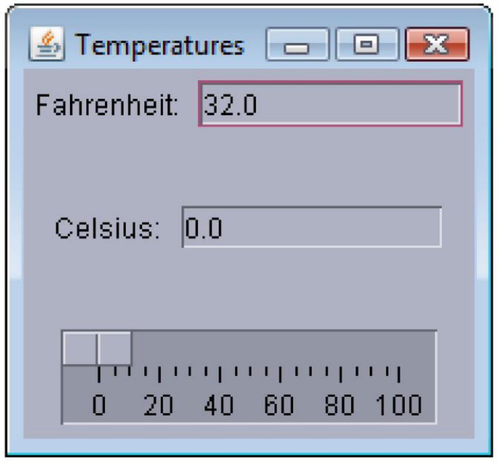
```
"com.sun.java.swing.plaf.windows.
                                    WindowsLookAndFeel"
```

Look and Feel (4 of 7)

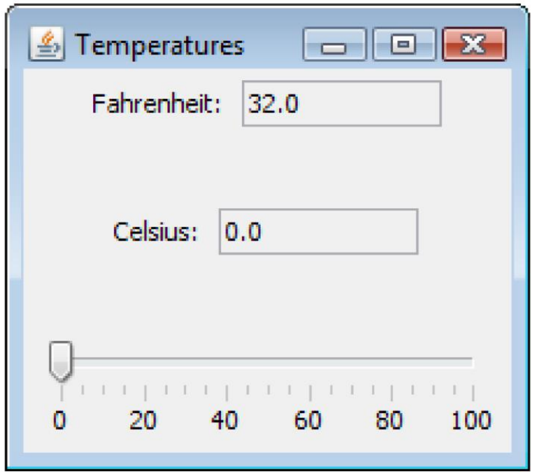
Metal look and feel



Motif look and feel



Windows look and feel



Look and Feel (5 of 7)

- Any components that have already been created need to be updated.

  `SwingUtilities.updateComponentTreeUI(…);`

- This method takes a reference to the component that you want to update as an argument.
- The `UIManager.setLookAndFeel` method throws a number of exceptions:
  - `ClassNotFoundException`
  - `InstantiationException`
  - `IllegalAccessException`
  - `UnsupportedLookAndFeelException`

Look and Feel (6 of 7)

- Example (Motif):

```
try
{
  UIManager.setLookAndFeel(
  "com.sun.java.swing.plaf.motif.MotifLookAndFeel");
  SwingUtilities.updateComponentTreeUI(this);
}
catch (Exception e)
{
  JOptionPane.showMessageDialog(null,
     "Error setting the look and feel.");
  System.exit(0);
}
```

Look and Feel (7 of 7)

- Example (Windows):

```
try
{

    UIManager.setLookAndFeel
    (
    "com.sun.java.swing.plaf.windows.WindowsLookAndFe
                                                  el");
  SwingUtilities.updateComponentTreeUI(this);
}
catch (Exception e)
{
  JOptionPane.showMessageDialog(null,
       "Error setting the look and feel.");
  System.exit(0);
}
```