6 Menus and Dialogs

What's in This Set of Notes?

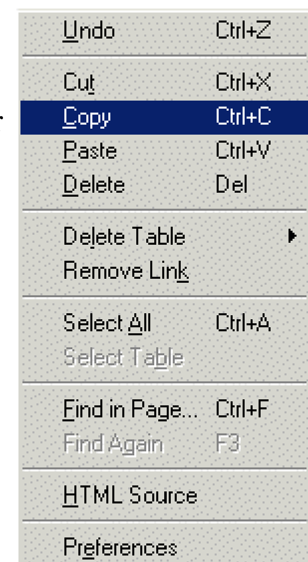
In most GUI designs, there are often many options and user preferences. In many cases it is too difficult to place everything onto one window. For this reason, menus and dialog boxes are used. Menus allow us to efficiently group/hide similar options together so that the screen does not become cluttered. Dialog Boxes allow us to momentarily take the user's attention away from the main window so as to obtain information or ask questions which are required at specific points in the application. We will look into both of these "tools" here.

Here are the individual topics found in this set of notes (click on one to go there):

- 6.1 Using Menus
- 6.2 Standard Dialog Boxes
- 6.3 Creating Your Own Dialog Boxes
- 6.4 E-mail Buddy Dialog Box Example

6.1 Using Menus

What is a Menu?



- Conceptually, a menu is a list of buttons each of which have their own corresponding action when selected.

- Types of menus include:

  - ***drop-down*** (or ***pull-down***) - usually associated with an application's menubar
  - ***popup*** - associated with any container component (i.e., often accessed via right button click)
  - ***cascaded*** - pops up when another menu item is selected (i.e. a sub menu)

What are the main Menu Classes?

- **JMenuBar**:
  - An object at the top of the frame that contains "pull down" menus. There can be only one per frame.
  - Only the names of the pull down menus are displayed on the menubar.
  - When one of the menu names is selected, the corresponding menu appears (i.e., pops up).

- **JMenu**:
  - A menu that may contain:
    - menu items (called **JMenuItems**), which the user can select from (like buttons).
    - separator lines (called **JSeparators**) to divide up the items into logical groupings.
    - other menus (i.e., JMenus) which act as cascading menus.
  - The user selects an option and an action is performed (just like clicking a button).
  - It is added to a **JMenuBar** object by specifying its name (or label) which will appear on the menubar.

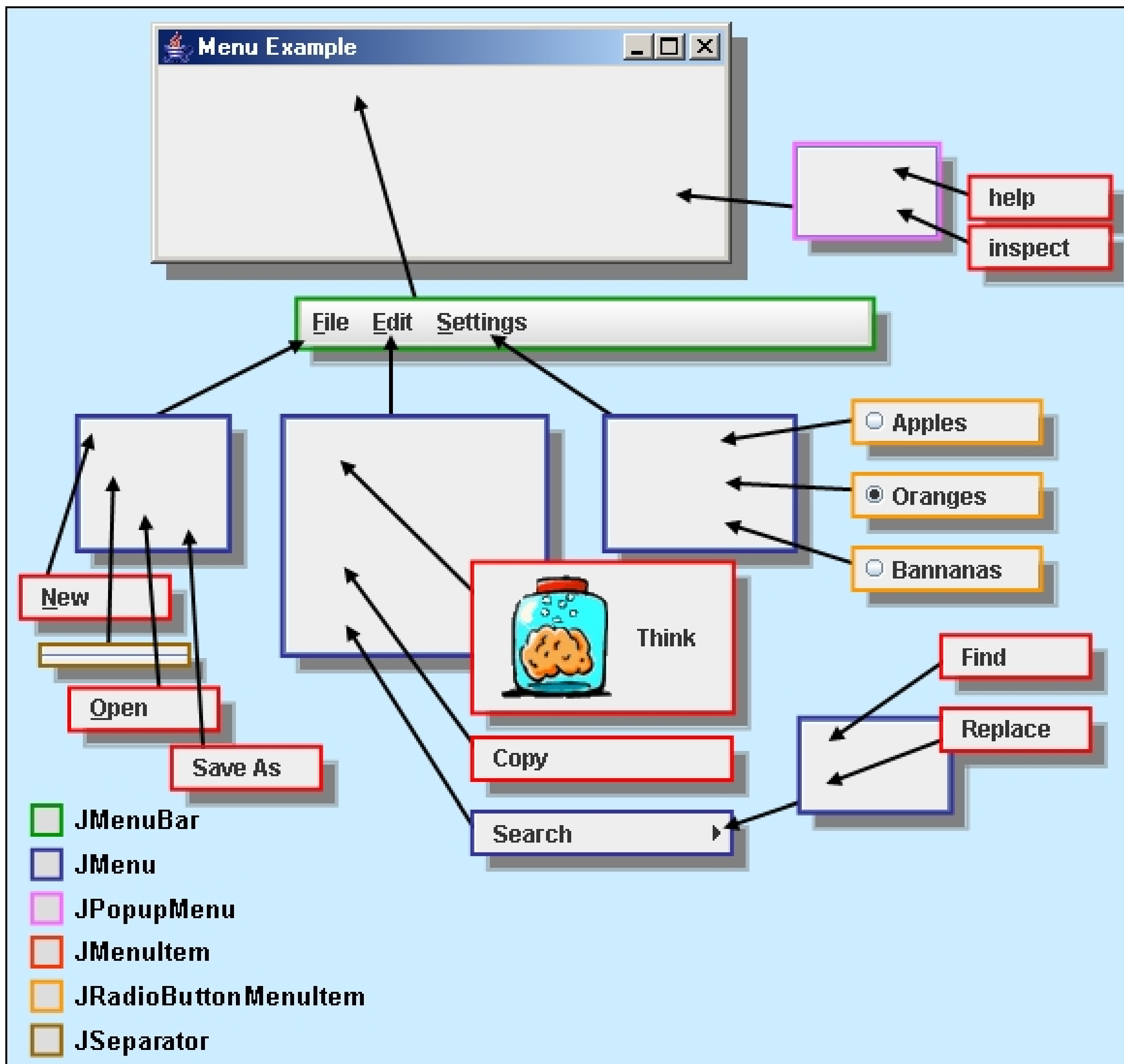
- **JMenuItem**:
  - A button on a menu. When the user selects the "button", the action associated with the menu item is performed.
  - **ImageIcons** can be used on menus as well by assigning an icon to a menuItem (just like **JButtons**).
  - There are also **JRadioButtonMenuItem** components:
    - A menu item that is part of a group of menu items in which only one item in the group can be selected.

- **JPopupMenu**:
  - A small window which pops up and displays a menu of choices.
  - Used for the menu that appears when the user selects an item on the menu bar.
  - Also used for "pull-right" menus that appear when the user selects a menu item that activates it.
  - A **JPopupMenu** can also be used anywhere else you want a menu to appear (e.g., when the user right-clicks in a specified area).

How Does it all "Hook" Together ?

This diagram shows how all these components hook together. Basically ....

- A single **JMenuBar** is added to a **JFrame**
- Multiple **JMenu**s are added to the **JMenuBar**
- **JMenuItem**s and cascaded **JMenu**s are added to other menus
- **JPopupMenu**s are added to **JFrame**s



How do we write the code to get it all hooked up ?

1. We need to create and add a **JMenuBar** to our **JFrame** by doing the following in our **JFrame** constructor:

    - Create a new instance of **JMenuBar**:

    ```
    JMenuBar myMenuBar = new JMenuBar();
    ```

    - Set the **JFrame**'s menubar to that instance:

    ```
    myFrame.setJMenuBar(myMenuBar);
    ```

2. We need to add **JMenus** to our menu bar by doing the following in our **JFrame** constructor:

- Create a new instance of **JMenu** and give it a label:

```
JMenu  fileMenu = new JMenu("File");
```

- Add the **JMenu** to the **JMenuBar**:

```
myMenuBar.add(fileMenu);
```

- Optionally set the keyboard accelerators (i.e., quick keys):

```
fileMenu.setMnemonic('F');
```

3. We can add **JMenuItems** and/or **JSeparators** to our **JMenus**, which we can also do in our **JFrame** constructor:

- Create a new instance of **JMenuItem** and/or **JSeparator** and give it a label:

```
JMenuItem  newItem = new JMenuItem("New");
JSeparator sepItem = new JSeparator();
```

- Add these items to the **JMenu**:

```
fileMenu.add(newItem);
fileMenu.add(sepItem);
```

- Set the keyboard accelerators for the **JMenuItems** if desired:

```
// This could have been done in the constructor: new
JMenuItem("New", 'N');
newItem.setMnemonic('N');
```

- Add an **ActionListener** to each **JMenuItem**:

```
// they may all go to the same event handler or to
separate ones
newItem.addActionListener(new ActionListener() {
    public void actionPerformed(ActionEvent e) {
       // Handle the selection of this item from the menu
    }
});
```

4. We can add **JRadioButtonMenuItems** to our **JMenus**, which we can also do in our **JFrame** constructor:

- Create new instances of **JRadioButtonMenuItem** and give them labels:

```
JRadioButtonMenuItem rbItem1 = new
JRadioButtonMenuItem("Apples");
JRadioButtonMenuItem rbItem2 = new
```

```
JRadioButtonMenuItem("Oranges");
JRadioButtonMenuItem rbItem3 = new
JRadioButtonMenuItem("Bananas");
```

- Add the **JRadioButtonMenuItems** to the **JMenu**:

```
settingsMenu.add(rbItem1);
settingsMenu.add(rbItem2);
settingsMenu.add(rbItem3);
```

- Add the **JRadioButtonMenuItems** to a **ButtonGroup()**:

```
ButtonGroup fruits = new ButtonGroup();
fruits.add(rbItem1);
fruits.add(rbItem2);
fruits.add(rbItem3);
```

- Add an **ActionListener** to each **JRadioButtonMenuItem:**

```
// they may all go to the same event handler (as
here), or to separate ones
rbItem1.addActionListener(this);
rbItem2.addActionListener(this);
rbItem3.addActionListener(this);

public void actionPerformed(ActionEvent e) {
     // Handle the selection of these items from the menu
}
```

5. We can add cascading menus simply by adding a **JMenu** to another **JMenu**:

   - Create a new instance of **JMenu** and give it a label

```
JMenu  searchMenu = new JMenu("Search");
```

   - Add **JMenuItems** to the new **JMenu** and set the keyboard accelerators if desired:

```
JMenuItem findItem = new JMenuItem("Find");
JMenuItem replaceItem = new JMenuItem("Replace");
searchMenu.add(findItem);
searchMenu.add(replaceItem);
```

   - Add the **JMenu** to some other **JMenu**:

```
fileMenu.add(searchMenu);
```

6. We can add a **JPopupMenu** to the **JFrame**:

   - Create a new instance of **JPopupMenu** and give it a label:

```
JPopupMenu popupMenu = new JPopupMenu();
```

- Add **JMenu** and **JMenuItems** to the new **JPopupMenu** and set the keyboard accelerators if desired:

```
JMenuItem helpItem = new JMenuItem("help");
JMenuItem inspectItem = new JMenuItem("inspect");
popupMenu.add(helpItem);
popupMenu.add(inspectItem);
```

- Add a **MouseAdapter** to the **JFrame** and then handle a **mouseReleased()** event in which the **show()** message is sent to the menu:

```
myFrame.addMouseListener(new MouseAdapter() {
    public void mouseReleased(MouseEvent e) {
        if (e.isPopupTrigger())
            popupMenu.show(e.getComponent(), e.getX(),
e.getY());
        }
    });
```

We can keep in mind that there are other settings for our **JMenus** and **MenuItems**:

- To set the **Color**:

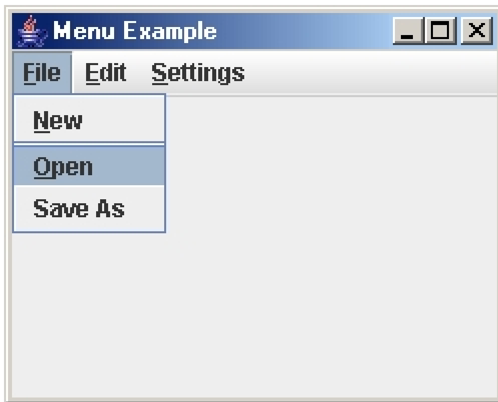
```
anItem.setBackground(Color.red);
anItem.setForeground(Color.yellow);
```

- To Enable/Disable various items:

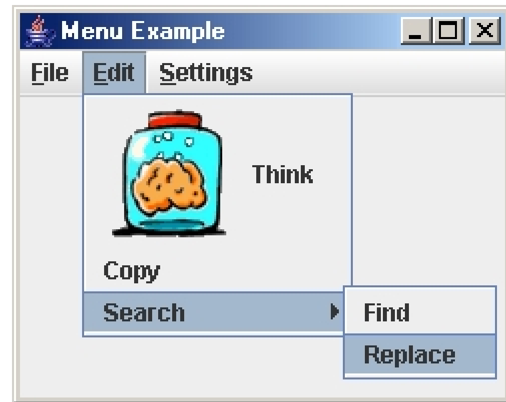
```
anItem.setEnabled(true);
anItem.setEnabled(false);
```

Example:

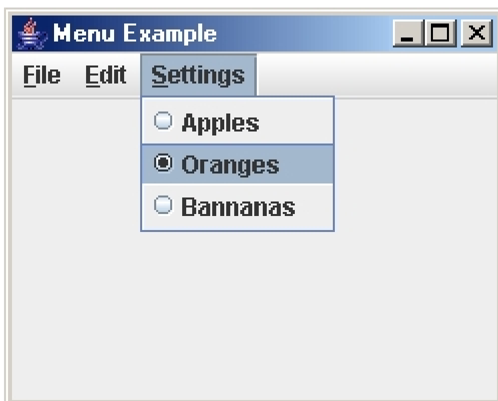
Here is an example in which we investigate the use of a menubar with menus as well as cascaded menus and a popup menu. The example has no purpose other than to show you how the different menus are created and used. Here are screen snapshots that show the menus that we will create in this example:



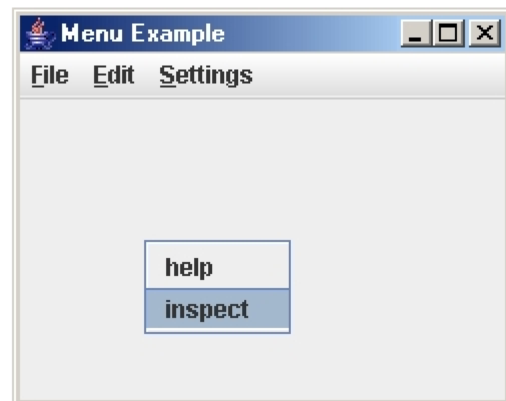
A **standard** menu



A **cascaded** menu



A menu with **radio** buttons



A **pop-up** menu

The example shows how the use of many menu items can lead to a lot of instance variables. In addition, we use a common event handler for all menu items and apply a dispatching strategy which calls the appropriate react method for the given menu item. We could have omitted the react methods and merely placed all this code within the single event handler but this could look messy if the react methods are large.

How would the example look if we used anonymous classes instead of one event handler ? It may not save much in code size but we only need to update the class in one place instead of two when a menu item is added or removed! Also, we might not need to keep all the menu items in instance variables! Why not give it a try and see what it looks like.

```
import java.awt.event.*;
import javax.swing.*;
public class MenuExample extends JFrame implements ActionListener
{
        // Store menu items and popup menu for access from
        event handlers
        JMenuItem   thinkItem, copyItem, newItem, openItem,
        saveAsItem,
```

```
            findItem, replaceItem, appleItem,
orangeItem,
            bananaItem, helpItem, inspectItem;
JPopupMenu popupMenu;

public MenuExample(String title) {

      super(title);

      // Create the menu bar
      JMenuBar menuBar = new JMenuBar();
      setJMenuBar(menuBar);

      // Create and Add the File menu to
      the Menu Bar
      JMenu  fileMenu = new JMenu("File");
      fileMenu.setMnemonic('F');
      fileMenu.add(newItem = new
      JMenuItem("New", 'N'));
      fileMenu.add(new JSeparator());
      fileMenu.add(openItem = new
      JMenuItem("Open", 'O'));
      fileMenu.add(saveAsItem = new
      JMenuItem("Save As"));
      menuBar.add(fileMenu); // Don't forget to
      do this
      newItem.addActionListener(this);
      openItem.addActionListener(this);
      saveAsItem.addActionListener(this);

      // Create and Add the Edit menu to
      the Menu Bar
      JMenu  editMenu = new JMenu("Edit");
      editMenu.setMnemonic('E');
      editMenu.add(thinkItem = new
      JMenuItem("Think", new
      ImageIcon("brain.gif")));
      editMenu.add(copyItem = new
      JMenuItem("Copy"));
      menuBar.add(editMenu);
      thinkItem.addActionListener(this);
      copyItem.addActionListener(this);

      // Create and Add the Settings
      menu to the Menu Bar
      JMenu  settingsMenu = new
      JMenu("Settings");
      settingsMenu.setMnemonic('S');
      settingsMenu.add(appleItem = new
      JRadioButtonMenuItem("Apples"));
      settingsMenu.add(orangeItem = new
      JRadioButtonMenuItem("Oranges"));
      settingsMenu.add(bananaItem = new
```

```java
        JRadioButtonMenuItem("Bananas"));
        menuBar.add(settingsMenu);

        // Ensure that only one radio button is
        on at a time
        ButtonGroup  fruits = new ButtonGroup();
        fruits.add(appleItem);
        fruits.add(orangeItem);
        fruits.add(bannanaItem);

        // Create the cascading Search
        menu on the Settings menu
        JMenu  searchMenu = new JMenu("Search");
        searchMenu.add(findItem = new
        JMenuItem("Find"));
        searchMenu.add(replaceItem = new
        JMenuItem("Replace"));
        editMenu.add(searchMenu);
        findItem.addActionListener(this);
        replaceItem.addActionListener(this);

        // Create and Add items to the popup
        menu.   Notice
        // that we do not add the popup menu to
        anything.
        popupMenu = new JPopupMenu();
        popupMenu.add(helpItem = new
        JMenuItem("help"));
        popupMenu.add(inspectItem = new
        JMenuItem("inspect"));
        helpItem.addActionListener(this);
        inspectItem.addActionListener(this);

        // Register the event handler for the
        popup menu
        addMouseListener(new MouseAdapter() {
          public void mouseReleased(MouseEvent e){
            if (e.isPopupTrigger())

        popupMenu.show(e.getComponent(),
        e.getX(), e.getY());
             }
        });

        setDefaultCloseOperation(EXIT_ON_CLOSE);
        setSize(300, 300);

}

// Handle all menu selections and dispatch to the
appripriate helper method accordingly
public void actionPerformed(ActionEvent e){
if (e.getSource() == newItem)
    reactToNewMenuSelection();
else if (e.getSource() == openItem)
```

```java
    reactToOpenMenuSelection();
else if (e.getSource() == saveAsItem)
    reactToSaveAsMenuSelection();
else if (e.getSource() == copyItem)
    reactToCopyMenuSelection();
else if (e.getSource() == thinkItem)
    reactToThinkMenuSelection();
else if (e.getSource() == findItem)
    reactToFindMenuSelection();
else if (e.getSource() == replaceItem)
    reactToReplaceMenuSelection();
else if (e.getSource() == helpItem)
    reactToHelpMenuSelection();
else if (e.getSource() == inspectItem)
    reactToInspectMenuSelection();
}
// Here are all the helper methods for handling the
menu choices
public void reactToNewMenuSelection() {
    System.out.println("reacting to NEW selection
from menu");
}
public void reactToOpenMenuSelection() {
    System.out.println("reacting to OPEN selection
from menu");
}
public void reactToSaveAsMenuSelection() {
    System.out.println("reacting to SAVE AS selection
from menu");
}
public void reactToThinkMenuSelection() {
    System.out.println("reacting to THINK selection
from menu");
}
public void reactToCopyMenuSelection() {
    System.out.println("reacting to COPY selection
from menu");
}
public void reactToFindMenuSelection() {
    System.out.println("reacting to FIND selection
from menu");
}
public void reactToReplaceMenuSelection() {
    System.out.println("reacting to REPLACE selection
from menu");
}
public void reactToHelpMenuSelection() {
    System.out.println("reacting to HELP selection
from popup menu");
}
public void reactToInspectMenuSelection() {
    System.out.println("reacting to INSPECT selection
from popup menu");
}
public static void main(String args[]) {
    new MenuExample("Menu Example").setVisible(true);
}
```

}

6.2 Standard Dialog Boxes

A ***dialog box*** is:

- a separate window that pops up in response to an event occurring in a window.
- often used to obtain information from the user (e.g., entering some values such as when filling out a form).

There are various types of commonly used dialog boxes:

1. Message Dialog - displays a message indicating information, errors, warnings etc...
2. Confirmation Dialog - asks a question such as yes/no
3. Input Dialog - asks for some kind of input
4. Option Dialog - asks the user to select some option

JAVA has a class called **JOptionPane** that can bring up one of these standard dialog boxes. There are many parameters and JAVA allows you to be very flexible in the way that you use them. For instance, there are standard icons that are displayed on these dialog boxes, but you can also make your own.

When using one of these standard dialog boxes, you may specify:

- the frame (owner)
- the title on the dialog box
- the message or question to be asked
- the icon displayed
- the buttons to be shown on the dialog box (i.e. OK, CANCEL, YES, NO)
- a set of options to be asked

Instead of describing ALL the options and all combinations here, I have decided to just give you a few templates that you can use. Here is some code that tests various standard dialog boxes. It brings up an interface with 9 buttons that allow you to "try out" the boxes. The interface looks as follows:

Here is the code for our test application. Notice the output that appears in the console when running the code. You should be able to figure out how to get information easily from your dialog boxes from this example.

```
import java.awt.*;
import java.awt.event.*;
import javax.swing.*;
public class StandardDialogTester extends JFrame {
    public StandardDialogTester (String title) {
        super(title);
        setLayout(new GridLayout(3, 3));

        JButton aButton;

        add(aButton = new JButton("Plain Message Box"));
        aButton.addActionListener(new ActionListener() {
            public void actionPerformed(ActionEvent e) {
                JOptionPane.showMessageDialog(null,
                    "This is a plain message !!!",
                    "Read This",
                    JOptionPane.PLAIN_MESSAGE);
            }});

        add(aButton = new JButton("Warning Message Box"));
        aButton.addActionListener(new ActionListener() {
            public void actionPerformed(ActionEvent e) {
                JOptionPane.showMessageDialog(null,
                    "Don't eat yellow snow.",
                    "Warning",
                        JOptionPane.WARNING_MESSAGE);
            }});

        add(aButton = new JButton("Error Message Box"));
        aButton.addActionListener(new ActionListener() {
            public void actionPerformed(ActionEvent e) {
               JOptionPane.showMessageDialog(null,
                   "Your program has stopped working !",
                   "Error",
                       JOptionPane.ERROR_MESSAGE);
            }});

        add(aButton = new JButton("Information Message Box"));
        aButton.addActionListener(new ActionListener() {
            public void actionPerformed(ActionEvent e) {
               JOptionPane.showMessageDialog(null,
                   "You better pass the final exam or else ...",
                   "Information",
                   JOptionPane.INFORMATION_MESSAGE);
            }});

        add(aButton = new JButton("Confirmation Dialog Box"));
        aButton.addActionListener(new ActionListener() {
            public void actionPerformed(ActionEvent e) {
      int result = JOptionPane.showConfirmDialog(null,
```

```
                                "Do you want me to erase your hard drive ?",
                                "Answer this Question",
                                JOptionPane.YES_NO_OPTION);
       if (result == 0)
                     System.out.println("OK, I'm erasing it now ...");
       else
                     System.out.println("Fine then, you clean it up!");
            }});

         add(aButton = new JButton("Confirmation Dialog Box with Cancel"));
         aButton.addActionListener(new ActionListener() {
             public void actionPerformed(ActionEvent e) {
                 int result = JOptionPane.showConfirmDialog(null,
                                "Do you want to overwrite the file ?",
                                "Answer this Question",
                                JOptionPane.YES_NO_CANCEL_OPTION);
       switch(result) {
         case 0: System.out.println("OK, but don't come crying to me once its
gone"); break;
         case 1: System.out.println("Well you should pick a new name then");
break;
         case 2: System.out.println("OK, I'll ask you again later"); break;
                 }
            }});

         add(aButton = new JButton("Multiple Option Dialog Box"));
         aButton.addActionListener(new ActionListener() {
      public void actionPerformed(ActionEvent e) {
                 Object[] options = {"Outstanding", "Excellent", "Good",
"Fair", "Poor"};
       int result = JOptionPane.showOptionDialog(null,
                                "How would you rate your vehicle's
performance ?",
                                "Pick an Option",
                                JOptionPane.DEFAULT_OPTION,
                                JOptionPane.QUESTION_MESSAGE,
              null,
                                options,
                                options[0]);
                 System.out.print("You have rated your vehicle's performance
as " + options[result]);
       if (result < 3)
                     System.out.println("We are glad you are pleased.");
                 else
                     System.out.println("Please explain why.");
            }});

         add(aButton = new JButton("Input Dialog Box"));
         aButton.addActionListener(new ActionListener() {
      public void actionPerformed(ActionEvent e) {
                 String inputValue = JOptionPane.showInputDialog("Please input
your name");
                 System.out.println("Your name is " + inputValue);
            }});
```

```
        add(aButton = new JButton("Chooser Dialog Box"));
        aButton.addActionListener(new ActionListener() {
            public void actionPerformed(ActionEvent e) {
                Object[] options = {"Apple", "Orange", "Strawberry",
"Banana", "Cherry"};
                Object selectedValue = JOptionPane.showInputDialog(null,
                                                   "Choose your favorite fruit",
                                                   "Fruit Information",
                                                   JOptionPane.INFORMATION_MESSAGE,
                  null,
                                                   options,
                                                   options[1]);
                System.out.println(selectedValue + "s sure do taste yummy.");
            }});

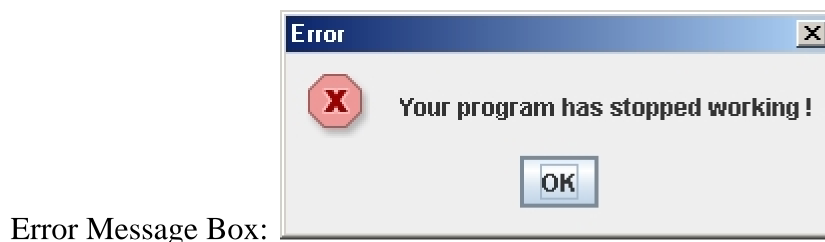
        setDefaultCloseOperation(EXIT_ON_CLOSE);
        pack(); //chooses reasonable window size based on component prefered
sizes
    }

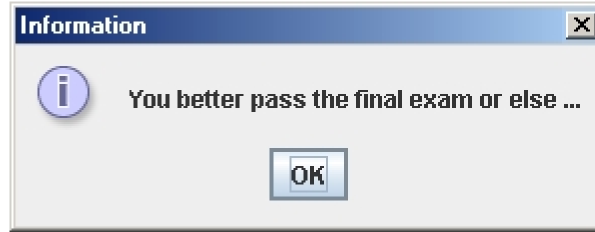
    public static void main(String args[]) {
        new StandardDialogTester("Standard Dialog Tester").setVisible(true);
    }
}
```

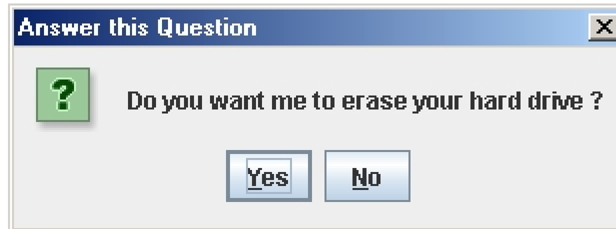
Here are the dialog boxes that will appear.

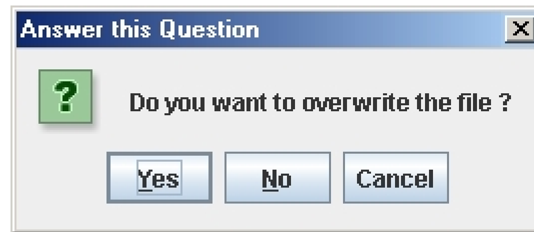
Plain Message Box:

Information Message Box:

Error Message Box: 

Information Message Box: 

Confirmation Dialog Box: 

Confirmation Dialog Box with Cancel: 

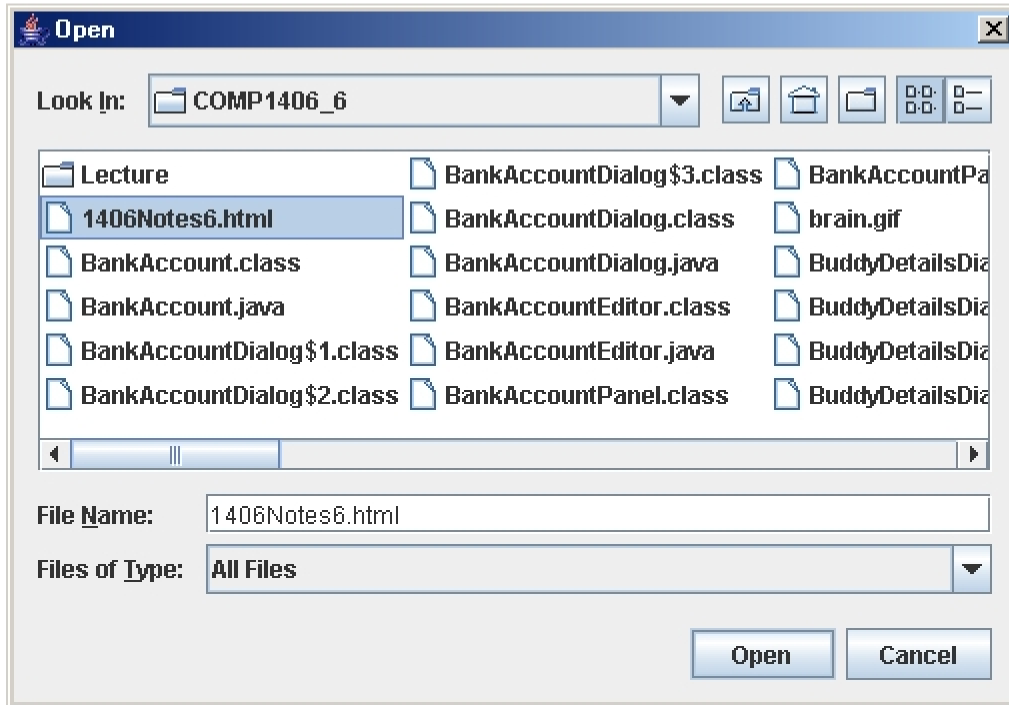
Select Option Dialog Box:

Input Dialog Box:

Option Dialog Box:

There is another useful ***standard*** dialog box in JAVA that is used for selecting files. It is called a **JFileChooser**.

Here is what it looks like:



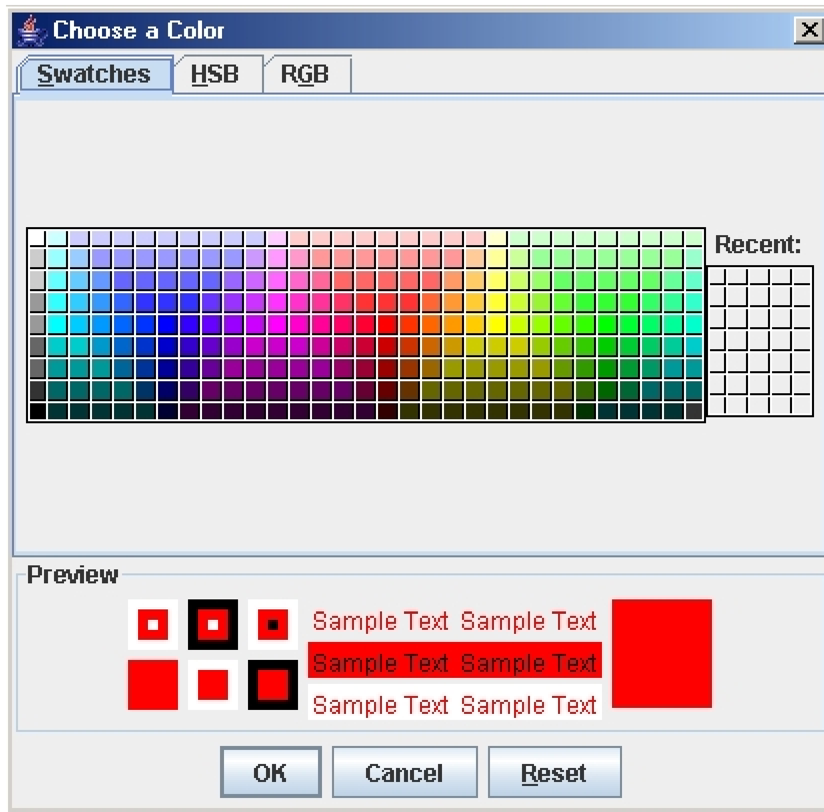
Here is some code that opens up a **JFileChooser** box and displays the filename (no path) that the user selects.

```
JFileChooser chooser = new JFileChooser();
int returnVal = chooser.showOpenDialog(this);

if (returnVal == JFileChooser.APPROVE_OPTION) {
    System.out.println("You chose to open this file: " +
                       chooser.getSelectedFile().getName());
}
```

There are more options available that allow you to set the filters and starting directories. Take a look at the Swing API.

There is also a **JColorChooser** class in JAVA that can be used to bring up a dialog box that allows you to select a colour. Here is what it looks like:



You create and add a **JColorChooser** just as you would any other component:

```
Color newColor = JColorChooser.showDialog(
                    this,                   // The parent
window
                    "Choose a Color",       // Title on
Dialog Box
                    Color.RED);             // Initial color
selected
```

Notice that the dialog box returns the colour selected when the window is closed.

6.3 Creating Your Own Dialog Boxes

Often, our user interfaces can become cluttered as many components are placed on them. Some of the components' data are not needed unless the user performs some specific action. For example, the user may hit an "Fill out Form" button which would often bring up another window with all the form fields in it. This "new" window is called a ***dialog box***. Dialog boxes can be:

- ***modal:*** no other application window will respond until this one is closed.
    - forces the user to "deal with" the dialog box information before continuing
- ***non-modal:*** can remain open while the user works in other windows

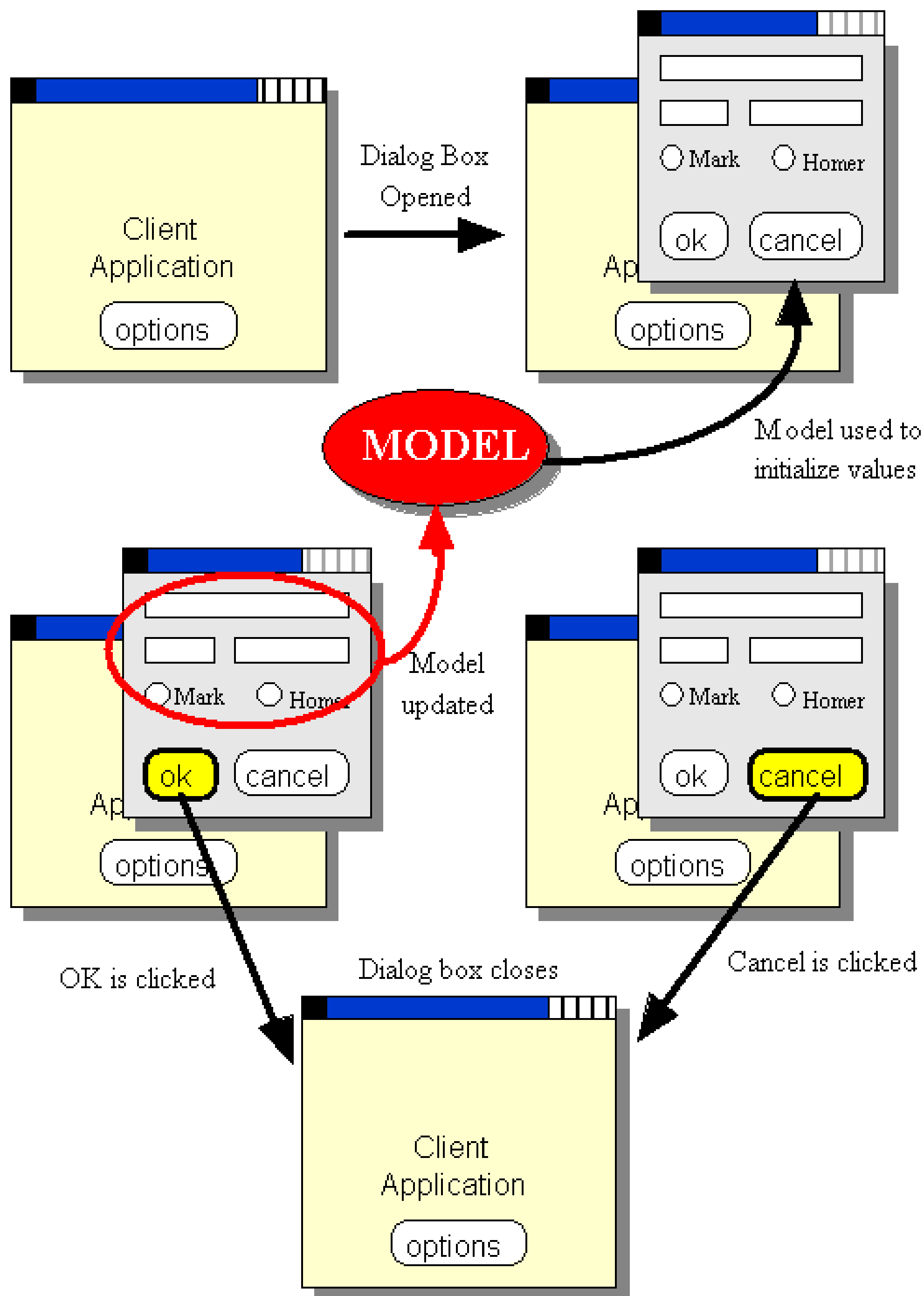
Dialog boxes have an ***owner*** which is the window that caused it to appear. This allows the owner window to close the dialog box when it closes so that all windows belonging to the same application are closed when the application shuts down. Also, when the owner window is minimized, the dialog boxes are also minimized.

There are two important terms pertaining to dialog boxes:

- ***Dialog client*** = the application that causes the dialog box to appear
- ***Dialog model*** = the object(s) that the dialog box should affect

Normally, an application communicates to its dialog box through a ***model*** of some kind. That is, the owner opens up a dialog box, passing model-specific information to it. The user may then change this information from the dialog box, which in turn modifies the ***model***. When the dialog box is closed, then the main application continues with the modified model objects.

Here is how everything should work:



Notice that the model is used as the "middle-man" between the two windows:

- When the dialog box is first opened, the model contents are used to populate the components (i.e., fill in the text fields, button selections etc...)
- The user then makes appropriate changes to the components.
- When the dialog box is closed with the OK button, the model is updated with these new changes.
- When the dialog box is closed with the CANCEL button, the model remains unchanged.

- When either button is clicked, the dialog box closes.
- The closing of the dialog box using the standard "close" (i.e., X at the top corner) should be treated as a cancel operation.

How do we make sure that we can have such interaction with the two windows ?

We make the client implement the following interface which we will define ourselves:

```
public interface  DialogClientInterface {
     public void dialogFinished();
     public void dialogCancelled();
}
```

So, if the client class implements this interface, it will be sure to have these two methods:

```
public class MyApplication implements DialogClientInterface {
    ...
    ...
    public void dialogFinished() {
        ...
    }
    public void dialogCancelled() {
        ...
    }
    ...
}
```

Now, since the client application class implements the interface, all other classes know that they can call the **dialogFinished()** method or the **dialogCancelled()** method.

Why would we want to call these methods from outside this class ? Dialog boxes are defined in separate classes, so the client (i.e., usually the main application) has no idea what is going on within those classes (nor should it need to know). The client does, however, need to know the following:

- whether or not the interaction with the dialog box was successful or whether or not it was cancelled
- whether or not the model has been changed

It is easy to see that the dialog box must of course know whether or not it was cancelled (i.e., it has the OK and CANCEL buttons on it). So, we can have the dialog box itself inform the client application whether the dialog box was canceled or not by calling one of these two methods defined in the **DialogClientInterface** that the client implements. That is how the dialog box informs the client of what just happened within it. So, we will need to pass in the client object itself to the dialog box so that the dialog box can send the **dialogFinished()** or the **dialogCancelled()** message to the client. In fact, we already need to pass in the owner to the dialog box ... which in this case will also implement a **DialogClientInterface**, so we do not need any new parameters for our constructor.

```
public class SomeDialog extends JDialog {
    // The client (usually the caller of this dialog box)
    private DialogClientInterface client;

    // A constructor that takes the model and client as parameters
    public SomeDialog(Frame owner, ...){
```

```
        ...
    }

    private void okButtonPressed() {
        ...
        ((DialogClientInterface)this.getOwner()).dialogFinished();
    }
    private void cancelButtonPressed() {
        ...
        ((DialogClientInterface)this.getOwner()).dialogCancelled();
    }
}
```

Here are the steps involved with creating a dialog box:

1. Make your own dialog box class as a subclass of **JDialog**
   - build your window as you would with a normal **JFrame** ... using components/events/listeners
   - make sure to use some kind of **ok/apply** & **cancel/close** button combination. The typical behaviour is that you should not modify any model objects for the application if the **cancel** button is pressed or if window is manually closed.
2. There are many constructors in the **JDialog** class. We will use the following format for our constructors:

   - ```
     public MyDialog(Frame owner, String title, boolean modal,

                     ClassA modelA, ClassB modelB, ...) {
       super(owner, title, modal);
       ...
     }
     ```

     - specifying the **owner** frame ensures that the dialog box is attached to the main application. In our case, the **owner** will also need to be a class that implements the **DialogClientInterface**.
     - the **title** will appear on the dialog box titlebar
     - **modal** indicates whether or not the dialog box is to be modal
     - we may supply numerous **model**-related parameters to represent any information that is to be shared between the main application (i.e., client) and the dialog box. This model data will be used for both input and output information:
       - **input:** use information in the model to set up initial contents of the dialog window's components
       - **output:** when the dialog closes the model has the information required from the dialog box interaction
     - Notice the call to the superclass constructor (this is a standard **JDialog** constructor being called).
     ```

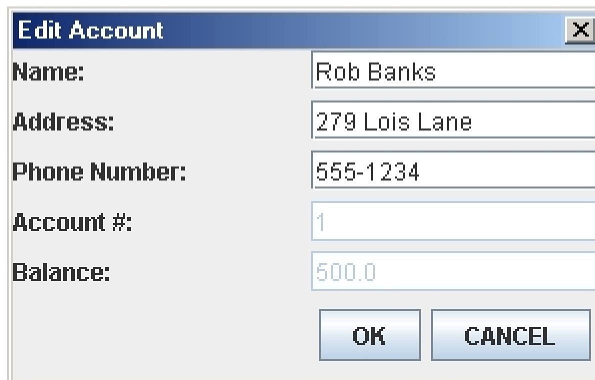
In some cases, we may not want the user of the dialog box to decide whether or not it should be modal, nor may we want them to specify the title. We can simply hard-code these into the dialog box if we wish:

```
public MyDialog(Frame owner, ClassA modelA, ClassB modelB, ...) {
        super(owner, "Mt Cool Dialog Box", true);
        ...
}
```

In addition to this, we will use the `dispose()` message to dispose of (i.e., close and delete) the dialog box from within your code.

Example:

In this example we will create a **BankAccountDialog** that allows us to modify a BankAccount's owner name, address and phone number. It will also show us the account number and balance, but we will not be allowed to alter that information. We use an extended version of the **BankAccount** class that was used in COMP1405/1005 (we added here an address and phone number). We will design the dialog box to look like this:



Notice that it shows the name, address, phone number, account number and balance, but that the account number and balance are disabled (grayed out) so that we cannot edit them. Also, notice the OK and CANCEL buttons (which typically appear at the bottom right of a dialog box). Also, notice that there are no minimize or maximize buttons on the titlebar ... we will make this window non-resizable.

We will create this window by first creating a **JPanel** containing the 5 text fields and their labels. We will set it up as the *view* part of the window so that the panel class will not have any behaviour, it will simply allow us to access the 3 editable fields through public **get** methods.

```
import java.awt.*;
import javax.swing.*;
public class BankAccountPanel extends JPanel {
    // The components needed to be used outside of this class
    private JTextField nameTextField;
    private JTextField addressTextField;
    private JTextField phoneTextField;

    // Make a get method so that the name/address/phone can be
accessed externally
```

```
    public JTextField getNameTextField() { return nameTextField;
}
    public JTextField getAddressTextField() { return
addressTextField; }
    public JTextField getPhoneTextField() { return
phoneTextField; }

    // Add a constructor that takes a BankAccount, so that we can
populate the text fields
    public BankAccountPanel (BankAccount account) {

        // Fill in the text fields with bank account's
information
        nameTextField = new JTextField(account.getName());
        addressTextField = new JTextField(account.getAddress());
        phoneTextField = new JTextField(account.getPhone());

        JTextField accField = new
JTextField(String.valueOf(account.getAccountNumber()));
        JTextField balField = new
JTextField(String.valueOf(account.getBalance()));

        // Disallow changing of balance and account number
        accField.setEnabled(false);
        balField.setEnabled(false);

        // Set the layoutManager and add the components
        setLayout(new GridLayout(5,3,5,5));
        add(new JLabel("Name:"));
        add(nameTextField);
        add(new JLabel("Address:"));
        add(addressTextField);
        add(new JLabel("Phone Number:"));
        add(phoneTextField);
        add(new JLabel("Account #:"));
        add(accField);
        add(new JLabel("Balance:"));
        add(balField);
    }
}
```

Notice:

- The constructor takes a **BankAccount** object. This is used to "fill-in" the initial values of the panel.
- Instance variables & get methods are made only for the name/address/phone text fields since the other text fields may not be changed (i.e., they are disabled).
- The code here does not make changes to the model bank account in any way!!!

Now let us use this panel in our dialog box:

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

```
public class BankAccountDialog extends JDialog {
    private BankAccount account;  // The model

    // The buttons and main panel
    private JButton okButton;
    private JButton cancelButton;
    private BankAccountPanel bankAccountPanel;

    // A constructor that takes the model and client as parameters
    public BankAccountDialog(Frame owner, String title, boolean modal,
BankAccount acc) {

        // Call the super constructor that does all the work of setting up
the dialog
        super(owner,title,modal);

        account = acc;  // Store the model

        // Make a panel with two buttons (placed side by side)
        JPanel buttonPanel = new JPanel();
        buttonPanel.setLayout(new FlowLayout(FlowLayout.RIGHT));
        buttonPanel.add(okButton = new JButton("OK"));
        buttonPanel.add(cancelButton = new JButton("CANCEL"));

        // Make the dialog box by adding the bank account panel and the
button panel
        setLayout(new BoxLayout(getContentPane(), BoxLayout.Y_AXIS));
        bankAccountPanel  = new BankAccountPanel(account);
        add(bankAccountPanel);
        add(buttonPanel);

        // Prevent the window from being resized
        setResizable(false);

        // Listen for ok button click
        okButton.addActionListener(new ActionListener() {
            public void actionPerformed(ActionEvent event){
                okButtonClicked();
        }});

        // Listen for cancel button click
        cancelButton.addActionListener(new ActionListener() {
            public void actionPerformed(ActionEvent event){
                cancelButtonClicked();
        }});

        // Listen for window closing: treat like cancel button
        addWindowListener(new WindowAdapter() {
            public void windowClosing(WindowEvent event) {
                cancelButtonClicked();
        }});
```

```
            // Set the size of the dialog box
            setSize(300, 190);
    }

    private void okButtonClicked(){
        // Update model to show changed owner name
        account.setName(bankAccountPanel.getNameTextField().getText());
        account.setAddress(bankAccountPanel.getAddressTextField().getText());
        account.setPhone(bankAccountPanel.getPhoneTextField().getText());

        // Tell the client that ok was clicked, in case something needs to be
done there
        if (getOwner() != null)
            ((DialogClientInterface)getOwner()).dialogFinished();

        dispose();  // destroy this dialog box
    }

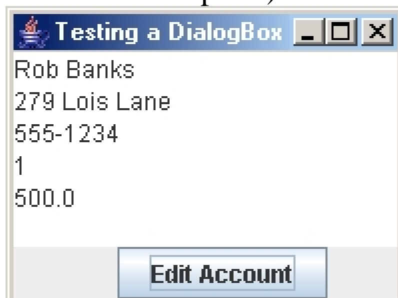
    private void cancelButtonClicked(){
        // Tell the client that cancel was clicked, in case something needs
to be done there
        if (getOwner() != null)
            ((DialogClientInterface)getOwner()).dialogCancelled();

        dispose();  // destroy this dialog box
    }
}
```

Notice:

- The window is made non-resizable by using **setResizable(false)**;
- When the OK button is clicked, the name/address/phone text of the dialog box is accessed and updated in the model.
- The client is informed when OK or CANCEL is clicked.
- After informing the client, the dialog box is disposed of.
- Window closing is treated the same as when pressing the CANCEL button.

So, how do we test out this dialog box ? We should create an application that opens it (perhaps due to a button press). Here is the application that we will create:



This application will maintain a **BankAccount** object as the model and show its contents in a **JTextArea** object. When the user clicks the **Edit Account** button, we will create/open the

dialog box. The dialog box will be ***modal***, so we will have to finish working with it before we go back to the main window here. Once the dialog box has been closed, any changes that were made should be reflected in the text area. Here is the code:

```
import java.awt.*;
import java.awt.event.*;
import javax.swing.*;
public class BankAccountEditor extends JFrame implements
DialogClientInterface, ActionListener {
    private BankAccount model;
    private JTextArea info;

    public BankAccountEditor(String title, BankAccount account){
        super(title);
        model = account; // store the model

        // create a text area and an edit button
        info = new JTextArea();
        JButton editButton = new JButton("Edit Account");
        editButton.addActionListener(this);
        setLayout(new BoxLayout(getContentPane(), BoxLayout.Y_AXIS));
        add(info);
        add(editButton);

        update();  // fill in the text area

          setDefaultCloseOperation(EXIT_ON_CLOSE);
          setSize(200, 150);
    }

    // Handle the EDIT button
    public void actionPerformed(ActionEvent e) {
        // Create a new dialog box
        BankAccountDialog dialog =  new BankAccountDialog (this, "Edit
Account", true, model);

        System.out.println("About to open the dialog box ...");

        dialog.setVisible(true);    // Open the dialog box

        System.out.println("Dialog box has been closed.");
    }

    public void dialogFinished() {
        System.out.println("Changes accepted, Account has been
changed");
        update();
    }

    public void dialogCancelled() {
        System.out.println("Changes aborted, Account has not been
changed");
        //no need to call update, since nothing has changed
    }
```

```
    private void update() {
        //update the info text area to reflect the account balance
        info.setText(
            model.getName() + '\n' + model.getAddress() + '\n' +
            model.getPhone() + '\n' + model.getAccountNumber() + '\n' +
            model.getBalance());
    }

    public static void main(String args[]) {
        BankAccount b = new BankAccount("Rob Banks", "279 Lois Lane",
"555-1234");
        b.deposit(500);

        BankAccountEditor frame = new BankAccountEditor("Testing a
DialogBox", b);
        frame.setVisible(true);
    }
}
```

Try out the code yourself. Notice that the dialog box is indeed modal. Try changing information in the dialog box and see if changes are reflected back in the editor application window. Notice that when the dialog box is not modal, we can have multiple instances of it open at the same time.

6.4 E-mail Buddy Dialog Box Example

Here we discuss another example application that shows the use of a dialog box. Consider having many buddies that you send e-mail to. You would like to make a nice little electronic address book that you can store the buddy's names along with his/her e-mail addresses. Perhaps you even want to categorize the buddies as being "hot" (i.e., you talk to them often), or not-so-hot.

What exactly is an e-mail buddy ? Well we can easily develop a model of an **EmailBuddy** as follows:

```
// This class represents a "buddy" whose email address is kept.
// An additional boolean indicates whether or not this is a
// friend that is "hot" (i.e. contacted often)
public class EmailBuddy {
    private String   name;
    private String   address;
    private boolean  onHotList;

    // Here are some constructors
    public EmailBuddy() {
        name = "";
        address = "";
        onHotList = false;
    }
    public EmailBuddy(String aName, String anAddress) {
```

```
            name = aName;
            address = anAddress;
            onHotList = false;
        }

        // Here are the get methods
        public String getName() { return name; }
        public String getAddress() { return address; }
        public boolean onHotList() { return onHotList; }

        // Here are the set methods
        public void setName(String newName) { name = newName; }
        public void setAddress(String newAddress) { address =
    newAddress; }
        public void onHotList(boolean onList) { onHotList = onList; }

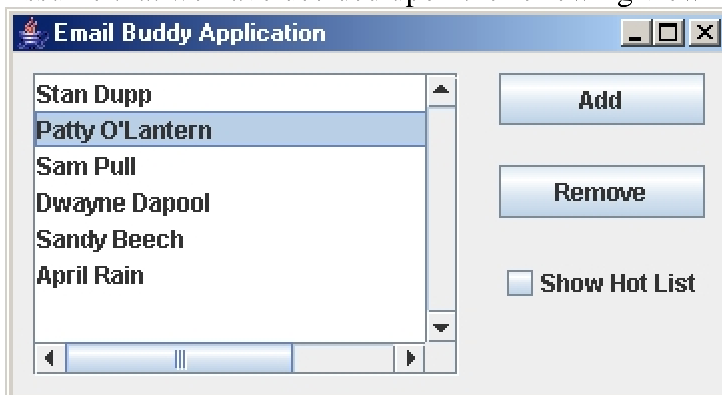
        // The appearance of the buddy
        public String toString() {
            return(name);
        }
    }
```

As can be seen, there is nothing difficult here ... just your standard "run-of-the-mill" model class. However, this class alone does not represent the whole model for our GUI since we will have many of these **EmailBuddy** objects. So, we will make a **Vector** of them when we make the interface.

The task now is to design a nice interface for the main application. To start, we must decide what the interface should do. Here is a possible interface:

- A **list** of all buddies is shown (names only)
- We should be able to
    - **Add** and **Remove** buddies from the list
    - **Edit** buddies when their name or email changes
    - Show only those buddies that are **"hot"** or perhaps show all of them

Assume that we have decided upon the following view for the interface:



Notice that the interface does not show the e-mail addresses in the list. It may look cluttered, but we could certainly have done this. Perhaps we could have made a second list box or something

that would show the e-mail addresses. Here is a good exercise: make a **JTextField** just beneath the list that will show the e-mail address of the currently selected **EmailBuddy** in the list. This is not hard to do. Nevertheless, it is not necessary for the purposes of explaining this dialog box example.

How can we build the view for this interface ? We will start with a **JPanel**. We will use **GridBagLayout** to allow nice resizing.

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

// This is the Panel that contains represents the view of the
// Email buddy application.
public class EmailBuddyPanel extends JPanel {

    private JButton   addButton;
    private JButton   removeButton;
    private JList     buddyList;
    private JCheckBox hotListButton;

    // These are the get methods that are used to access the
components
    public JButton getAddButton() { return addButton; }
    public JButton getRemoveButton() { return removeButton; }
    public JCheckBox getHotListButton() { return hotListButton; }
    public JList getBuddyList() { return buddyList; }

    // This is the default constructor
    public EmailBuddyPanel(){
        super();

        // Use a GridBagLayout (lotsa fun)
        GridBagLayout layout = new GridBagLayout();
        GridBagConstraints layoutConstraints = new
GridBagConstraints();
        setLayout(layout);

        // Add the buddy list
        buddyList = new JList();

buddyList.setPrototypeCellValue("xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
xxxxxxxx");
        JScrollPane scrollPane = new JScrollPane( buddyList,
        ScrollPaneConstants.VERTICAL_SCROLLBAR_ALWAYS,
        ScrollPaneConstants.HORIZONTAL_SCROLLBAR_AS_NEEDED);
        layoutConstraints.gridx = 0; layoutConstraints.gridy = 0;
        layoutConstraints.gridwidth = 3;
 layoutConstraints.gridheight = 5;
        layoutConstraints.fill = GridBagConstraints.BOTH;
        layoutConstraints.insets = new Insets(10, 10, 10, 10);
        layoutConstraints.anchor = GridBagConstraints.NORTHWEST;
        layoutConstraints.weightx = 1.0;
 layoutConstraints.weighty = 1.0;
```

```
        layout.setConstraints(scrollPane, layoutConstraints);
        add(scrollPane);

        // Add the Add button
        addButton = new JButton("Add");
        layoutConstraints.gridx = 3;  layoutConstraints.gridy = 0;
        layoutConstraints.gridwidth = 1;
layoutConstraints.gridheight = 1;
        layoutConstraints.fill = GridBagConstraints.BOTH;
        layoutConstraints.insets = new Insets(10, 10, 10, 10);
        layoutConstraints.anchor = GridBagConstraints.EAST;
        layoutConstraints.weightx = 0.0;
layoutConstraints.weighty = 0.0;
        layout.setConstraints(addButton, layoutConstraints);
        add(addButton);

        // Add the Remove button
        removeButton = new JButton("Remove");
        layoutConstraints.gridx = 3;  layoutConstraints.gridy = 1;
        layoutConstraints.gridwidth = 1;
layoutConstraints.gridheight = 1;
        layoutConstraints.fill = GridBagConstraints.BOTH;
        layoutConstraints.insets = new Insets(10, 10, 10, 10);
        layoutConstraints.anchor = GridBagConstraints.EAST;
        layoutConstraints.weightx = 0.0;
layoutConstraints.weighty = 0.0;
        layout.setConstraints(removeButton, layoutConstraints);
        add(removeButton);

        // Add the ShowHotList button
        hotListButton = new JCheckBox("Show Hot List");
        layoutConstraints.gridx = 3;  layoutConstraints.gridy = 3;
        layoutConstraints.gridwidth = 1;
layoutConstraints.gridheight = 1;
        layoutConstraints.fill = GridBagConstraints.BOTH;
        layoutConstraints.insets = new Insets(10, 10, 10, 10);
        layoutConstraints.anchor = GridBagConstraints.EAST;
        layoutConstraints.weightx = 0.0;
layoutConstraints.weighty = 0.0;
        layout.setConstraints(hotListButton, layoutConstraints);
        add(hotListButton);
    }
}
```

Notice that there is nothing really new here either. We did however, make some "get" methods for the components so that we can access them from outside this class.

Now for the actual dialog box. Ask yourself these questions:

1. What is the purpose of the dialog box ?
2. What causes the dialog box to appear ?

The dialog box is used to enter information/details about a particular buddy. It should appear when the user attempts to add an **EmailBuddy**. If we "*play our cards just right*", we will be able

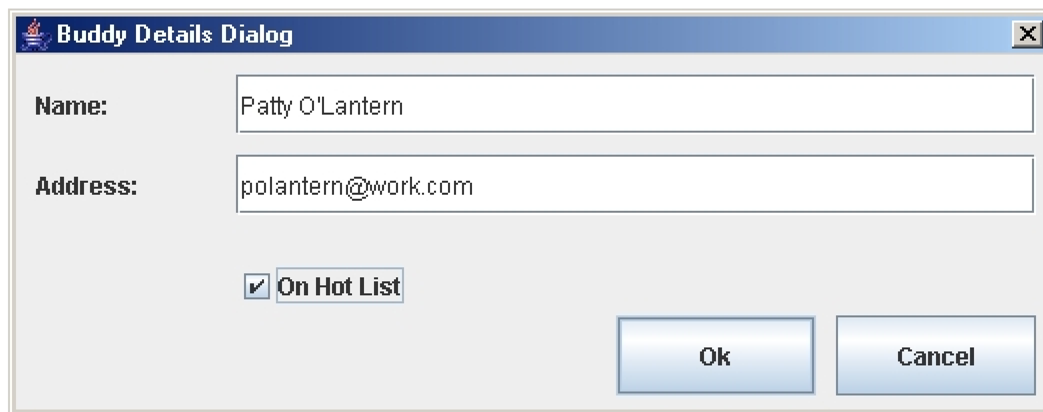
to use the same dialog box to allow an "already existing" **EmailBuddy** to have his/her details changed.

Here are some more questions that need to be answered:

- What information should the dialog box show ?
- What information needs to be changed by the dialog box ?
- What is a good descriptive title for the dialog box ?
- How can the information be shown nicely ?

Here are the answers:

1. The dialog box should show all information about a particular EmailBuddy. This includes name, address and hot list status.
2. The user should be able to change all 3 pieces of information about the buddy
3. We should call it something like "Buddy Details" or "Buddy Information"
4. Lay it out nicely. Here is an idea:



Don't forget that we need to add the OK and CANCEL buttons as well. Also, there is no need to be able to resize the dialog box so we can just disable the resizing.

Below is a method that will be called from our dialog class to add the components to the dialog box. It will take an **EmailBuddy** object as a parameter so that when the dialog box opens, we can populate the text fields with values indicating the **EmailBuddy**'s current information. This parameter will represent the model that is affected by the dialog box.

```
// This code adds the necessary components to the interface
private void buildDialogWindow(EmailBuddy aBuddy) {
    setLayout(null);

    // Add the name label
    aLabel = new JLabel("Name:");
    aLabel.setLocation(10,10);
    aLabel.setSize(80, 30);
    add(aLabel);
```

```java
    // Add the name field
    nameField = new JTextField(aBuddy.getName());
    nameField.setLocation(110, 10);
    nameField.setSize(400, 30);
    add(nameField);

    // Add the address label
    aLabel = new JLabel("Address:");
    aLabel.setHorizontalAlignment(JLabel.LEFT);
    aLabel.setLocation(10,50);
    aLabel.setSize(80, 30);
    add(aLabel);

    // Add the address field
    addressField = new JTextField(aBuddy.getAddress());
    addressField.setLocation(110, 50);
    addressField.setSize(400, 30);
    add(addressField);

    // Add the onHotList button
    hotListButton = new JCheckBox("On Hot List");
    hotListButton.setSelected(aBuddy.onHotList());
    hotListButton.setLocation(110, 100);
    hotListButton.setSize(120, 30);
    add(hotListButton);

    // Add the Ok button
    okButton = new JButton("Ok");
    okButton.setLocation(300, 130);
    okButton.setSize(100, 40);
    add(okButton);

    // Add the Cancel button
    cancelButton = new JButton("Cancel");
    cancelButton.setLocation(410, 130);
    cancelButton.setSize(100, 40);
    add(cancelButton);
}
```

We will now look at the code needed to create the dialog box and get its behaviour working correctly:

```java
import java.awt.*;
import java.awt.event.*;
import javax.swing.*;
import javax.swing.event.*;
public class BuddyDetailsDialog extends JDialog {

    // This is a pointer to the email buddy that is being edited
    private EmailBuddy aBuddy;

    // These are the components of the dialog box
    private JLabel        aLabel;
    private JTextField    nameField;
```

```
    private JTextField    addressField;
    private JCheckBox     hotListButton;
    private JButton       okButton;
    private JButton       cancelButton;

    public BuddyDetailsDialog(Frame owner, String title, boolean
modal, EmailBuddy bud){
        super(owner,title,modal);

        aBuddy = bud;

        // Put all the components onto the window and given them
initial values
        buildDialogWindow(aBuddy);

        // Add listeners for the Ok and Cancel buttons as well as
window closing
        okButton.addActionListener(new ActionListener() {
            public void actionPerformed(ActionEvent event){
                okButtonClicked();
            }});

        cancelButton.addActionListener(new ActionListener() {
            public void actionPerformed(ActionEvent event){
                cancelButtonClicked();
            }});

        addWindowListener(new WindowAdapter() {
            public void windowClosing(WindowEvent event) {
                cancelButtonClicked();
            }});

        setSize(526, 214);
    }

    private void buildDialogWindow(EmailBuddy aBuddy) {
        // This code is given above
    }

    private void okButtonClicked(){
        aBuddy.setName(nameField.getText());
        aBuddy.setAddress(addressField.getText());
        aBuddy.onHotList(hotListButton.isSelected());
        if (getOwner() != null)
            ((DialogClientInterface)getOwner()).dialogFinished();
        dispose();
    }

    private void cancelButtonClicked(){
        if (getOwner() != null)

((DialogClientInterface)getOwner()).dialogCancelled();
        dispose();
```

```
        }
    }
```

Once again, we see that we just add listeners for the **OK** and **CANCEL** buttons as well as the window closing event. Then we merely make methods that are called for each.

Notice that when the **OK** button is clicked, the 3 pieces of changed buddy data are stored in the model buddy so that the buddy will have been altered by this dialog box. Then we inform the client that **OK** was pressed. For the cancel button, there is no work to do, just informing the client that **CANCEL** was pressed.

We are not done yet ! Now we need to work on the actual application that will be calling the dialog box.

We will call the class `EmailBuddyApp` and it will extend **JFrame**. It will be the class that opens the dialog box and so it must implement the `DialogClientInterface`. We will need to store the buddies that we will be making, so we make a Vector as an instance variable. We will first make the application work such that we will be able to add buddies to the list. Here is the basic framework for the application:

```
import java.awt.*;
import java.awt.event.*;
import javax.swing.*;
import javax.swing.event.*;
import java.util.*;
public class EmailBuddyApp extends JFrame implements DialogClientInterface {
    // Store the model as a vector of email buddies
    private Vector      buddies;

    // Store the view that contains the components
    EmailBuddyPanel     view;

    // Here are the component listeners
    ActionListener      theAddButtonListener;

    // Here is the default constructor
    public EmailBuddyApp(String title){
        super(title);

        // Initially, no buddies
        buddies = new Vector();

        // Make a new viewing panel and add it to the pane
        add(view = new EmailBuddyPanel());

        // Make a listener for the add button
        theAddButtonListener = new ActionListener() {
            public void actionPerformed(ActionEvent event) {
                addBuddy();
            }};
```

```
        setDefaultCloseOperation(EXIT_ON_CLOSE);
        setSize(600,300);

        // Start off with everything updated properly
        update();
    }

    // Enable all listeners
    private void enableListeners() {
        view.getAddButton().addActionListener(theAddButtonListener);
    }

    // Disable all listeners
    private void disableListeners() {
        view.getAddButton().removeActionListener(theAddButtonListener);
    }

    // This is called when the user clicks the add button
    private void addBuddy() {
        EmailBuddy  aBuddy = new EmailBuddy();

        // Add the buddy to the end of the Vector
        buddies.add(aBuddy);

        // Now bring up the dialog box
        BuddyDetailsDialog dialog = new BuddyDetailsDialog(this, "Buddy
Details Dialog", true, aBuddy);
        dialog.setVisible(true);
    }

    // Called when the dialog box is closed with the Ok button
    public void dialogFinished() {
        update();
    }

    // Called when the dialog box is closed with the cancel button or
manually closed
    public void dialogCancelled() {
        // Remove the latest buddy that was added if in add mode
        buddies.remove(buddies.get(buddies.size()-1));
    }

    // Update the list
    private void updateList() {
        // Update the list contents and select the last buddy
        view.getBuddyList().setListData(buddies);

view.getBuddyList().setSelectedValue((EmailBuddy)buddies.get(buddies.size()-
1), true);
    }

    // Update the GUI
    private void update() {
        disableListeners();
```

```
        updateList();
        enableListeners();
    }

    // Code that starts the application
    public static void main(String args[]) {
        EmailBuddyApp frame =  new EmailBuddyApp("Email Buddy Application");
        frame.setVisible(true);
    }
}
```

Perhaps the most interesting portions of the code are the **addBuddy**(), **dialogCancelled()** and **updateList()** methods. When the user adds a buddy, we:

- make a new Buddy
- add the buddy to the end of the Vector of buddies
- open a dialog box on this buddy

Since the dialog box is modal, nothing else happens until the dialog box is closed. When closed, either the **dialogFinished** or **dialogCancelled** methods are called. If the OK button was pressed, then **dialogFinished** is called and there is no work to be done except to update the screen. This is because the dialog box already made the appropriate changes to the EmailBuddy and we merely need to reflect the changes in the interface. If **dialogCancelled** was called, then the user has canceled his "request to make changes" and therefore we need to remove the buddy that we added just before the dialog box was opened. We do not need to update anything however, since the interface appearance will not have changed.

Now ... what about the remove button ? To get the remove button to work, we will make some additions and changes to the code. What buddy gets removed ? Probably the one that is currently selected from the list. Here are the additions:

1. Add a new instance variable:

```
ActionListener         theRemoveButtonListener;
```

2. Make a new listener in the constructor:

```
theRemoveButtonListener = new ActionListener() {
  public void actionPerformed(ActionEvent event){
        removeBuddy();
    }};
```

3. Add these lines to the **enableListeners()** and **disableListeners()** methods, respectively:

```
view.getRemoveButton().addActionListener(theRemoveButtonListener)
;
view.getRemoveButton().removeActionListener(theRemoveButtonListen
er);
```

4. Add this method to do the removing:

```
private void removeBuddy() {
    EmailBuddy aBuddy =
(EmailBuddy)(view.getBuddyList().getSelectedValue());

    if (aBuddy != null) {
        buddies.remove(aBuddy);
        update();
    }
}
```

5. Add a line to the **`update()`** method (after the list is updated):

```
private void update() {
    disableListeners();
    updateList();
    updateRemove();
    enableListeners();
}
```

6. Add this method to update the remove button so that it is disabled when nothing is selected in the list:

```
private void updateRemove() {
      view.getRemoveButton().setEnabled(view.getBuddyList().
                                                   getSelectedValue() !=
null);
}
```

Notice however, that the **Remove** button code is dependent on the buddy list **JList**. That is, it accesses the selected value from this list. In order to keep our interface clean, we should alter the code by storing the selected value in a field and accessing this from the Remove button code. To do this, we create an instance field called **selectedBuddy** and add a listener to the list to set it:

```
// Add these instance variable
private EmailBuddy              selectedBuddy;
private ListSelectionListener   buddyListSelectionListener;

// In the constructor, make a listener to allow selection of buddies
from the list
buddyListSelectionListener = new ListSelectionListener() {
   public void valueChanged(ListSelectionEvent event){
        selectBuddy();
    }};

// This is called when the user selects a buddy from the list
private void selectBuddy() {
     selectedBuddy =
(EmailBuddy)(view.getBuddyList().getSelectedValue());
     update();
}
```

```java
// In the constructor, set the field to null
selectedBuddy = null;
```

- Change these methods now to use the **selectedBuddy**:

```java
private void updateRemove() {
    view.getRemoveButton().setEnabled(selectedBuddy != null);
}

private void removeBuddy() {
   if (selectedBuddy != null) {
        buddies.remove(selectedBuddy);
        update();
        selectBuddy();
    }
}
```

There are a few other places that we can now start using the **selectedBuddy** field.

What about the hot list ? Well we have to "hide" some of the buddies when it is on. We will have to make a listener as well so that when the check box is toggled, the changes occur right away. Here are the additions:

1. Add a new instance variable:

```java
ActionListener    hotListListener;
```

2. Make a new listener in the constructor:

```java
hotListListener = new ActionListener() {
   public void actionPerformed(ActionEvent event){
        toggleHotList();
    }
};
```

3. Add these lines to the **`enableListeners()`** and **`disableListeners()`** methods, respectively:

```java
view.getHotListButton().addActionListener(hotListListener);
view.getHotListButton().removeActionListener(hotListListener);
```

4. Add this method to do the toggling:

```java
private void toggleHotList() {
    update();
}
```

5. Change the **`updateList()`** method so that we display the appropriate items in the list:

```java
private void updateList() {
    boolean  foundSelected = false;

    // If the hot list is on, find all buddies that are on the hot
list
    if (view.getHotListButton().isSelected()) {
        Vector temp = new Vector();

        for (int i=0; i<buddies.size(); i++) {
            EmailBuddy aBuddy = (EmailBuddy)buddies.get(i);
            if (aBuddy.onHotList()) {
                temp.add(aBuddy);
                if (aBuddy == selectedBuddy)
                    foundSelected = true;
            }
        }
        view.getBuddyList().setListData(temp);
        if (!foundSelected)
            selectedBuddy = null;
    }
    else
        view.getBuddyList().setListData(buddies);

    if (selectedBuddy != null)
        view.getBuddyList().setSelectedValue(selectedBuddy, true);
}
```

Notice that we look for which buddy is currently selected and update the **selectedBuddy** variable accordingly.

What if we want to **edit** a buddy, not just to add one ? We will have to decide what action will cause the editing to take place. One approach is to have the user double click on the buddy in the list and the dialog box will come up with that buddy's details within it. We can then make changes to the data and close the dialog box.

To do this, notice that we currently have some small problems:

- When **CANCEL** is clicked, we are removing the last EmailBuddy from the list. This should not happen when editing.

We can solve this problem by keeping a boolean flag which indicates whether or not we are in the midst of adding a buddy or whether or not we are editing. Here are the changes:

1. Add a new instance variable to maintain the current "mode" (i.e., add or edit). Also, we will be making a listener for the double-click action.

```java
private boolean       inAddMode;
MouseListener         doubleClickSelectionListener;
```

2. Make a new listener in the constructor:

```
doubleClickSelectionListener = new MouseAdapter() {
    public void mouseClicked(MouseEvent event){
        if (event.getClickCount() == 2)
            editBuddy();
    }};
```

3. Add these lines to the **`enableListeners()`** and **`disableListeners()`** methods, respectively:

```
view.getBuddyList().addMouseListener(doubleClickSelectionListener
);
view.getBuddyList().removeMouseListener(doubleClickSelectionListe
ner);
```

4. Add this method to do the editing. It brings up a dialog box for the selected item in the list:

```
private void editBuddy() {
    inAddMode = false;
    if (view.getBuddyList().getSelectedValue() == null) return;
    BuddyDetailsDialog dialog =
        new BuddyDetailsDialog(this, "Buddy Details Dialog", true,
selectedBuddy);
    dialog.setVisible(true);
}
```

Notice that we check to make sure there is a buddy selected before we open a dialog box.

5. Add this line to the **addBuddy()** method before the dialog box is opened:

```
inAddMode = true;
```

6. Make this change to the **`dialogCancelled()`** method:

```
public void dialogCancelled() {
    if (inAddMode) {
        // Remove the latest buddy that was added if in add mode
        buddies.remove(buddies.get(buddies.size()-1));
    }
    inAddMode = false;
    update();
}
```

We are almost done now. The remove button does not refresh properly. That is, when nothing is selected, the remove button is disabled. If we then make a selection in the list (i.e., single click), the button still remains disabled. We should fix this. Do you know how ? Of course you do. Just add an event handler for making list selections. It just needs to call **update()** and the remove button will re-enable itself.