GUI Programming with Java

Session 8
Choosers and Mouse Events

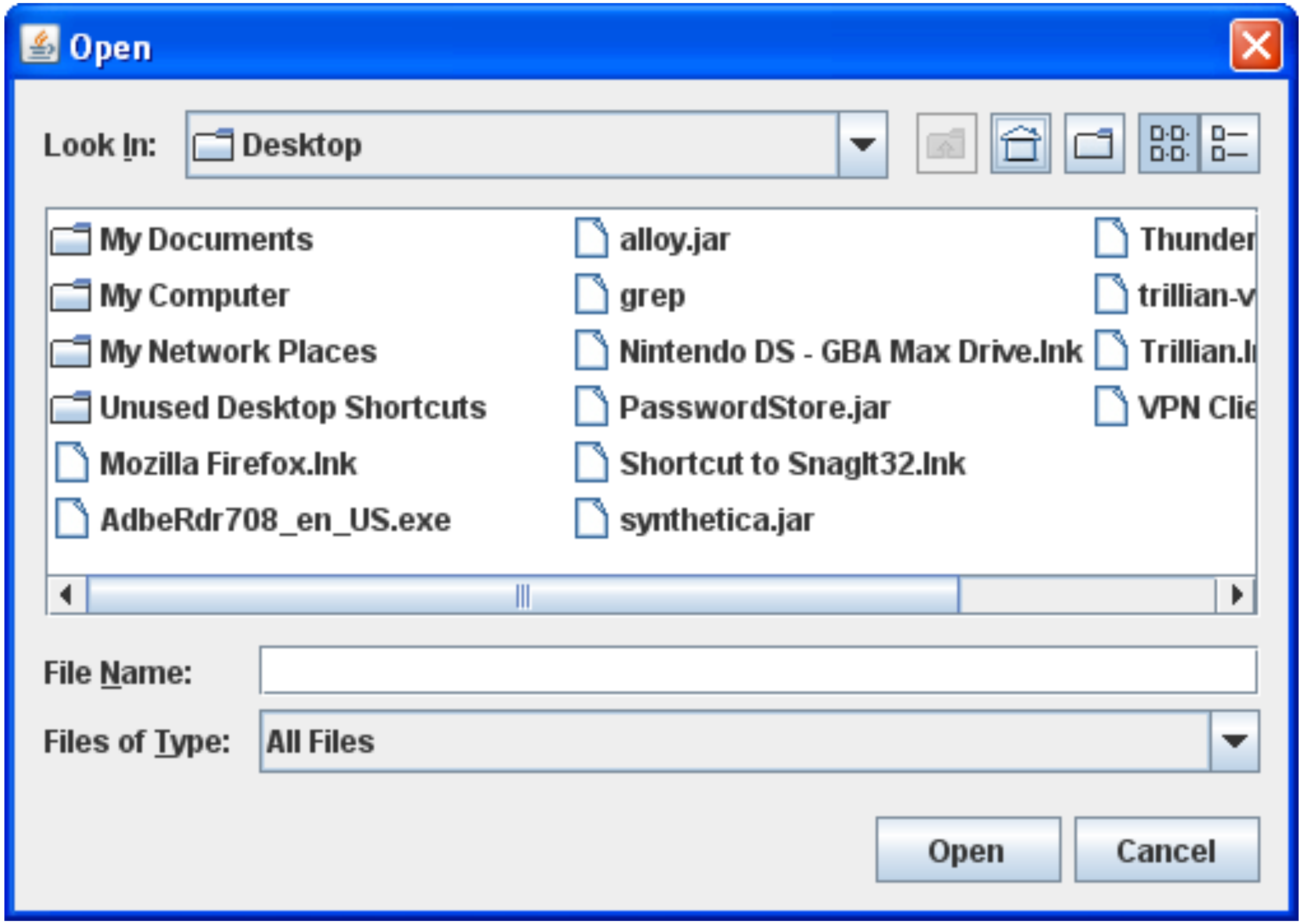
- We will look at…
  - Using file choosers
  - Mouse events

File Choosers

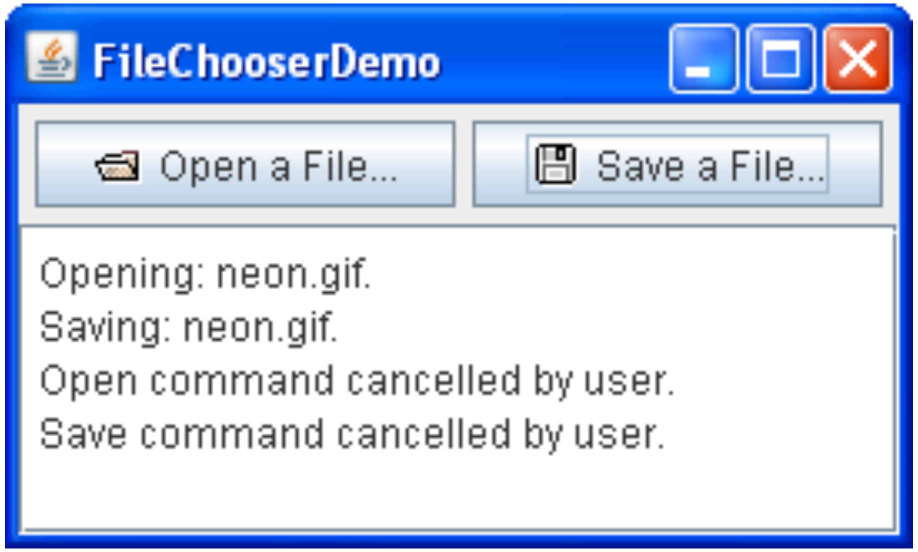
- File choosers provide a GUI for navigating the file system.
- They allow a user to choose a file or directory from a list or entering the name of a file or directory.
- To display a file chooser, you usually use the JFileChooser API to show a modal dialog containing the file chooser.
- Another way to present a file chooser is to add an instance of JFileChooser to a container.

- A JFileChooser object only presents the GUI for choosing files.
- Your program is responsible for doing something with the chosen file, such as opening or saving it.
- The JFileChooser API makes it easy to bring up open and save dialogs.
- The look and feel determines what these standard dialogs look like and how they differ.

- Here is a picture of the Java look and feel's standard open dialog:



- Lets now take a look at an example program which brings up an open dialog and a save dialog.



```
Opening: neon.gif.
Saving: neon.gif.
Open command cancelled by user.
Save command cancelled by user.
```

- Let's take a look at FileChooserDemo.java in the sample 1 - file chooser folder.

- Bringing up a standard open dialog requires only two lines of code:

```
//Create a file chooser
final JFileChooser fc = new JFileChooser();
...
//In response to a button click:
int returnVal = fc.showOpenDialog(aComponent);
```

int returnVal = fc.showOpenDialog(***aComponent***);

- The argument to the showOpenDialog method specifies the parent component for the dialog.
- The parent component affects the position of the dialog and the frame that the dialog depends on.
- For example, the Java look and feel places the dialog directly over the parent component.
- If the parent component is in a frame, then the dialog is dependent on that frame, disappearing when the frame is iconified and reappearing when the frame is deiconified.

Setting the directory

- By default, a file chooser that hasn't been shown before displays all files in the user's home directory. You can specify the file chooser's initial directory using one of JFileChooser's other constructors, or you can set the directory with the setCurrentDirectory method.
- Lets take a look at some of the constructors that may be of use to us.

Constructor Summary

JFileChooser()
Constructs a JFileChooser pointing to the user's default directory.

JFileChooser(File currentDirectory)
Constructs a JFileChooser using the given File as the path.

JFileChooser(String currentDirectoryPath)
Constructs a JFileChooser using the given path.

- The call to showOpenDialog appears in the actionPerformed method of the **Open a File...** button's action listener:

```
public void actionPerformed(ActionEvent e) {
//Handle open button action.
if (e.getSource() == openButton) {
int returnVal = fc.showOpenDialog(FileChooserDemo.this);
        if (returnVal == JFileChooser.APPROVE_OPTION) {
        File file = fc.getSelectedFile();
        //This is where a real application would open the file.   log.append
("Opening: " + file.getName() + "." + newline);
        }
        else {
                log.append("Open command cancelled by user." + newline); }
        }
... }
```

Using the file object

- Remember that last semester you studied File IO which would have included a look at the File class.
- You can call other methods on the File object, such as getPath, isDirectory, or exists to get information about the file.
- You can also call other methods such as delete and rename to change the file in some way.
- Of course, you might also want to open or save the file using one of the reader or writer classes provided by the Java platform.

- The example program uses the same instance of JFileChooser to display a standard save dialog. This time the program calls showSaveDialog:

  ```
  int returnVal = fc.showSaveDialog(FileChooserDemo.this);
  ```

  By using the same file chooser instance to display its open and save dialogs, the program reaps these benefits:

  - The chooser remembers the current directory between uses so the open and save versions automatically share the same current directory.

  - You have to customize only one file chooser, and the customizations apply to both the open and save versions of it.

- Finally, the example program has commented-out lines of code that let you change the file selection mode.

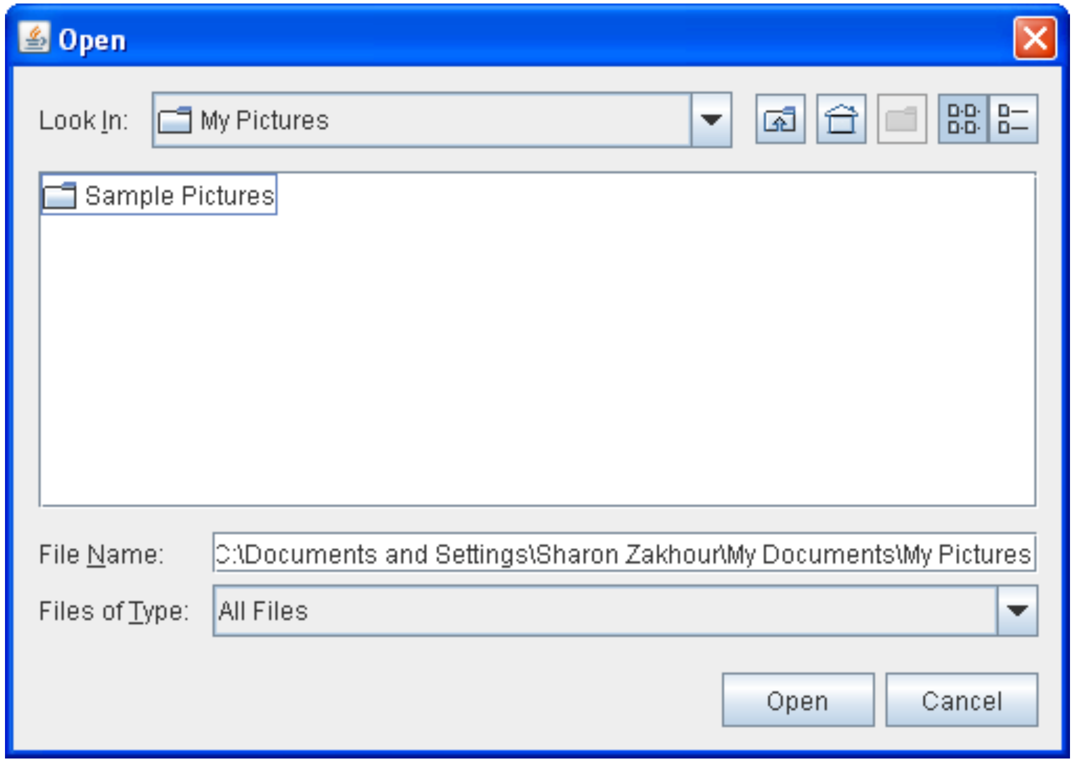
- For example, the following line of code makes the file chooser able to select only directories, and not files:

```
fc.setFileSelectionMode(JFileChooser.DIRECTORIES_ONLY);
```

- Another possible selection mode is FILES_AND_DIRECTORIES. The default is FILES_ONLY.

- The following picture shows an open dialog with the file selection mode set to DIRECTORIES_ONLY.

- Note that, in the Java look and feel at least, only directories are visible — not files.



File Name: C:\Documents and Settings\Sharon Zakhour\My Documents\My Pictures

Files of Type: All Files

Mouse Listeners and Mouse Events

- There are numerous Mouse event classes and interfaces which are available in Java

- Each of them attempt to handle different events using the Mouse

- **Mouse events** are those associated with clicking, dragging, entering, exiting etc.

- **Mouse motion events** are events that involve the mouse tracking across the screen, i.e., moving and dragging

- Some of the classes/interfaces to deal with Mouse events are listed below; many of these will be covered in this lecture (most are in the java.awt.event package):

  MouseListener

  MouseMotionListener

  MouseEvent

  MouseInputListener

  MouseWheelListener

  MouseAdapter

  MouseInputAdapter

MouseListener

- The **MouseListener** interface is used to respond to user mouse events

- Specifically it contains handlers for 5 events, namely, mouseClicked, mouseEntered, mouseExited, mousePressed, mouseReleased

MouseListener

- **mouseClicked(MouseEvent)**

  Called when the mouse button has been clicked (pressed and released) on a component.
- **mouseEntered(MouseEvent)**

  Called when mouse enters a component
- **mouseExited(MouseEvent)**

  Called when mouse exits a component
- **mousePressed(MouseEvent)**

  Called when a mouse is pressed in a component
- **mouseReleased(MouseEvent)**

  Called when a mouse is released in a component

MouseListener

- In order to listen for events at the class level using MouseListener you must add ***implements MouseListener*** to the class (import the java.awt.event package)
- Once you implement this you will have to implement all <u>five</u> handler methods
- You need only fully implement the handler method you are interested in, the others can be left blank…the compiler will not allow you to compile if you have not implemented all of the handler methods

MouseListener

```
public class BlankMouseListener implements MouseListener {

    public void mouseClicked(MouseEvent e) { //implement here }

    public void mouseEntered(MouseEvent e) { //implement here }

    public void mouseExited(MouseEvent e) { //implement here }

    public void mousePressed(MouseEvent e) { //implement here }

    public void mouseReleased(MouseEvent e) { //implement here }

}
```

MouseMotionListener

- This listener is used to respond to the movement of the mouse as it tracks across the screen
- These include the dragging and move events
- The two handle methods are:

mouseDragged(MouseEvent e)
mouseMoved(MouseEvent e)

MouseMotionListener

```
public class BlankMouseMotionExample implements MouseMotionListener {

    public void mouseDragged(MouseEvent e) {}

    public void mouseMoved(MouseEvent e) {}

}
```

MouseEvent

- In the two previous interface you can observe that a MouseEvent parameter is passed to all of the handler methods shown

- The MouseEvent class is identical in its function to the ActionEvent parameter that we've already seen numerous times when using buttons

- Just like the ActionEvent parameter the MouseEvent parameter receives an object of this type which represents the event which has occurred…and importantly contains information relating to the event that took place!

MouseEvent

- The MouseEvent parameter is given a name, this reference name can be used to retrieve information about the event that took place
- Many of the methods are the same as ActionEvent, however, many of them are specific to the mouse
- Some of the mouse specific events are listed in the next slide [you can find them all online at: MouseEvent at Oracle Site]

MouseEvent

- Assuming that **e** is the name given to the MouseEvent parameter the below are examples of information that can be retrieved from the MouseEvent object:

  e.getX(); //The x co-ordinate of where the mouse event occurred with the component that has the listener added

  e.getY(); //The y co-ordinate of where the mouse event occurred with the component that has the listener added

  e.getXOnScreen(); //The x co-ordinate of where the mouse event occurred within the program screen [absolute x position]

  e.getYOnScreen(); //The y co-ordinate of where the mouse event occurred within the program screen [absolute y position]

MouseInputListener

- This interface allows us to implement <u>both</u> the MouseListener and MouseMotionListener at the same time

- Implementing this interface requires the implementation of the five MouseListener handler methods <u>AND</u> the two MouseMotionListener handler methods

- The MouseInputListener is found in the javax.swing.event package

  [see more here MouseInputListener on Oracle site]

MouseWheelListener

- This interface can be implements to respond to mouse wheel events

- There is only one handler in this interface, namely,

  mouseWheelMoved(MouseWheelEvent e)

MouseAdapter

- Sometimes you may wish to only implement one-or-two of the mouse methods
- An ***Adapter*** is a design pattern which allows use to adapt classes that already exist in some way
- The ***MouseAdapter*** class implements the MouseListener, MouseMotionListener and MouseWheelListener interfaces
- You can extend the MouseAdapter and you need only implement the handler you wish (example on next slide)

MouseAdapter

```
import java.awt.event.MouseAdapter;
import java.awt.event.MouseEvent;


public class BlankMouseAdapterExample extends MouseAdapter {


  public void mouseClicked(MouseEvent e) {} //Compiler happy to allow just one


}
```

MouseAdapter

- The advantage of the MouseAdapter is that only the method/ methods that are required need to be implemented and so the code is much less congested
- The disadvantage of the MouseAdapter is that it requires the use of the **extends** keyword which limits the inheritance to ONE class
- Therefore if your class needs to inherit from another class (e.g. JFrame) you cannot inherit from another and the implements may have to be used (or a second external listener)

Other Adapters in GUI Programming

- The following are some of the adapter classes available in Java GUI programming, all with same purpose:

ComponentAdapter
ContainerAdapter
FocusAdapter
KeyAdapter
MouseAdapter
MouseMotionAdapter
MouseInputAdapter
WindowAdapter

Making the Mouse events respond

- The steps are the same as for other listeners
- Implement the listener
- Add the listener to the component
- Implement the handler methods required
- See the example on Moodle called MouseListenExample.java

Exercises for this week

- Create a program that a Java Jframe program that launches a JFileChooser. You need not worry about implementing the code to modify files, just instantiate the chooser and explore with it.

- Create a mouse program that has a JLabel in the middle of the screen. Make the JLabel display the name of the MouseEvent that occurs [include all events in the MouseInputListener]

END OF SESSION