

Swing

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Introduction

Hello world window

Usage

Control examples

Abilities

Background knowledge

Threads

What is Swing?

- Sun's GUI library for the Java
- part of Oracle's Java Foundation Classes
- Model-View-Controller architecture
- replaces Abstract Window Toolkit AWT
- written entirely in Java
- part of the Java Standard Edition
- composed of 18 packages
- main package javax.swing

Swing vs AWT

- AWT is faster than Swing
- AWT applets do not need web plugin
- AWT uses platform API's
- AWT has platform specific limitations
- AWT has less features
- AWT has less support from 3rd parties
- Swing has own painting = no DirectX
- AWT for simple app on spec.platform

Hello World: class

```
package start;  
import javax.swing.*;  
public class HelloWorldSwing {  
    private static void HelloWorld() { ... }  
    public static void main(...) {...}  
}
```

Hello World: main

```
public static void main(String[] args) {  
    javax.swing.SwingUtilities.invokeLater(  
        new Runnable() {  
            public void run() {  
                HelloWorld();}  
        } );  
}
```

Hello World: helloworld

```
private static void HelloWorld() {  
    JFrame frame = new JFrame("Hi World!");  
    frame.setDefaultCloseOperation  
        (JFrame.EXIT_ON_CLOSE);  
    frame.pack();  
    frame.setVisible(true);  
}
```

Compilation

Debian package default-jdk

<http://www.java.com>

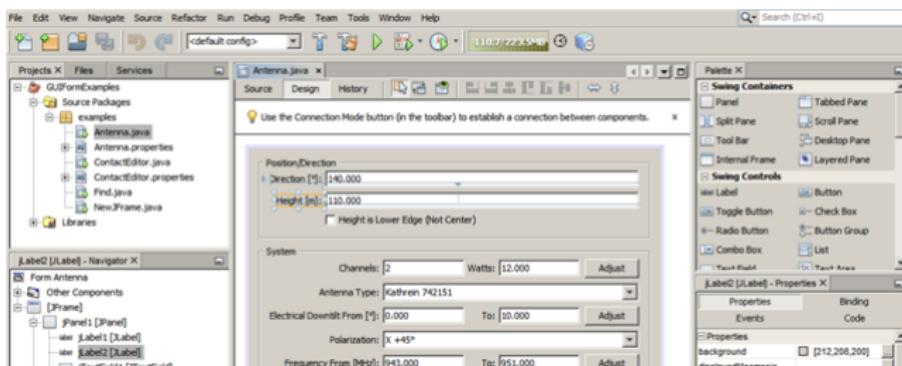
<http://openjdk.java.net>

```
$ javac start/HelloWorldSwing.java
```

```
$ java start.HelloWorldSwing
```

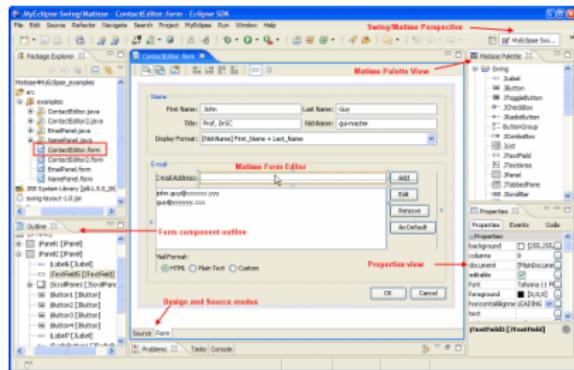
Swing IDEs

SpeedJG NetBeans Swing IDE



Swing IDEs

Window Builder Pro for Eclipse Jigloo for Eclipse



Label example

```
private static void HelloWorld() {  
    ... frame creation  
  
    JLabel label = new JLabel("Hi World");  
    frame.getContentPane().add(label);  
  
    ... size, visibility  
}
```

Button example 1

```
private static void HelloWorld() {  
    ... frame creation
```

```
    JButton button = new JButton("Zzz");  
    frame.add(button);
```

... size, visibility

}

Button example 2

```
package start;
```

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

```
public class HelloWorldSwing3 {  
    ... }
```

Button example 2

```
public static void main(String[] args) {  
    EventQueue.invokeLater(new Runnable(){  
        public void run(){  
            new HelloWorldSwing3().HelloButton();  
        }  
    });  
}
```

Button example 2

```
private void HelloButton(){  
    ...  
    button.addActionListener(  
        new ActionListener() {  
            public void actionPerformed  
                (ActionEvent e) {  
                button.setText("Whats up?");  
            } }); } }
```

Text box example

...

```
final JTextField mytextfield =  
    new JTextField(20);  
final JLabel mylabel = new JLabel();
```

...

```
frame.add(mytextfield);  
frame.add(mylabel);
```

Text box example

...

```
mytextfield.addActionListener(  
    new ActionListener() {  
        public void actionPerformed(  
            ActionEvent e) {  
            String text = mytextfield.getText();  
            mylabel.setText(text);  
            mytextfield.selectAll(); } } );
```

Controls overview

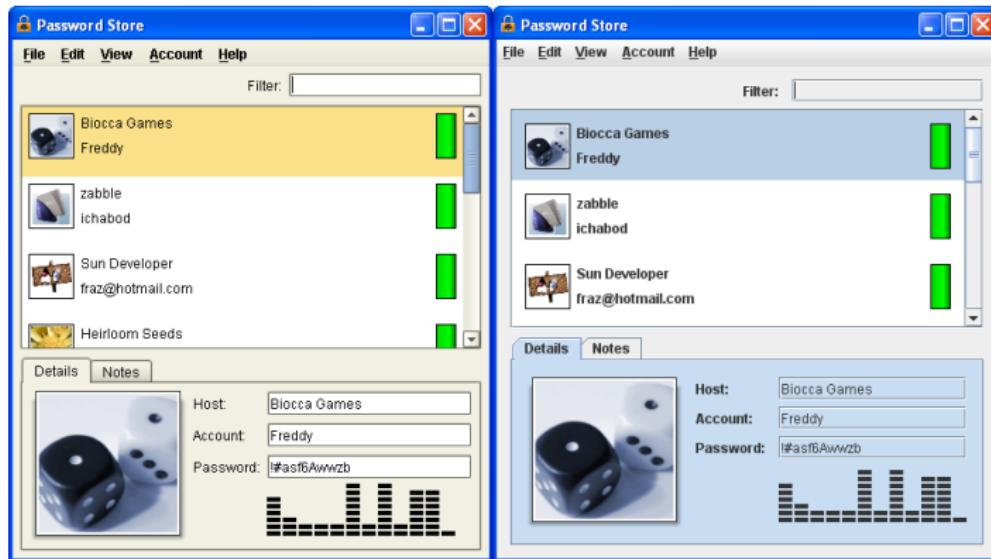
The image displays a collection of Java Swing user interface components:

- Menu:** A standard Java menu bar with items like "Menu", "Another Menu", "A text-only menu item", "Both text and icon", and "A submenu".
- Middle button:** A button with a yellow sun-like icon.
- Table:** A table showing a list of hosts, users, passwords, and last modified dates.
- Form:** A form titled "Metric System" with a numeric input field (10,000), a dropdown menu ("Centimeters"), and a slider.
- Tree:** A tree view showing a hierarchy under "Mia Familia" (Sharon, Maya, Muffin, Anya, Winky, Bongo).
- Image:** An image of a rat.
- Text Area:** An editable JTextArea containing text about plain text components.
- Internal Frame:** A frame titled "InternalFrameDemo" containing multiple internal frames labeled "Document", "Document #1", and "Document #2".
- Progress Bar:** A progress bar indicating 31% completion.
- Form:** A form with a password entry field containing "*****".
- Dialog:** A modal dialog titled "An Inane Question" asking "Would you like green eggs and ham?" with "Yes" and "No" buttons.

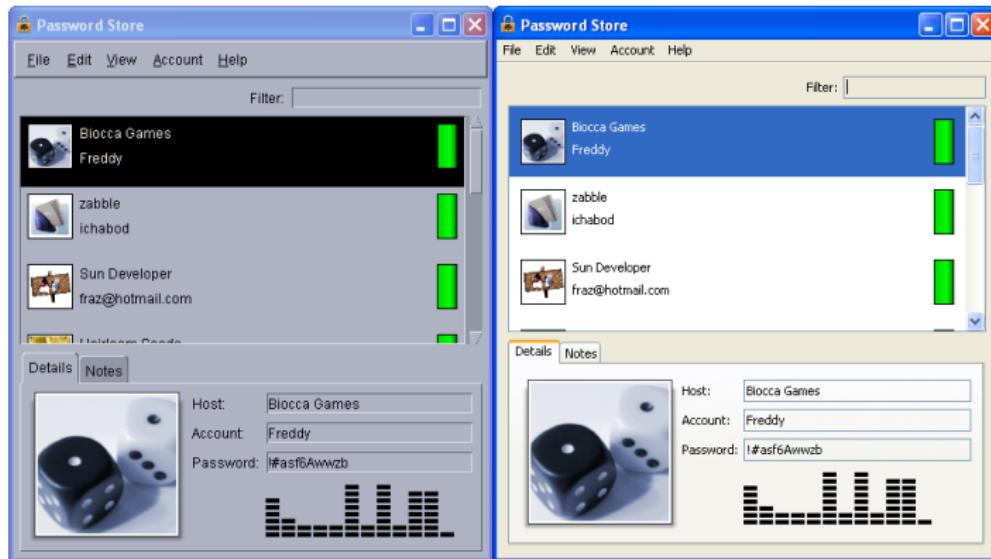
Containers overview



Themes overview



Themes overview



Other abilities

data transfer between various programs

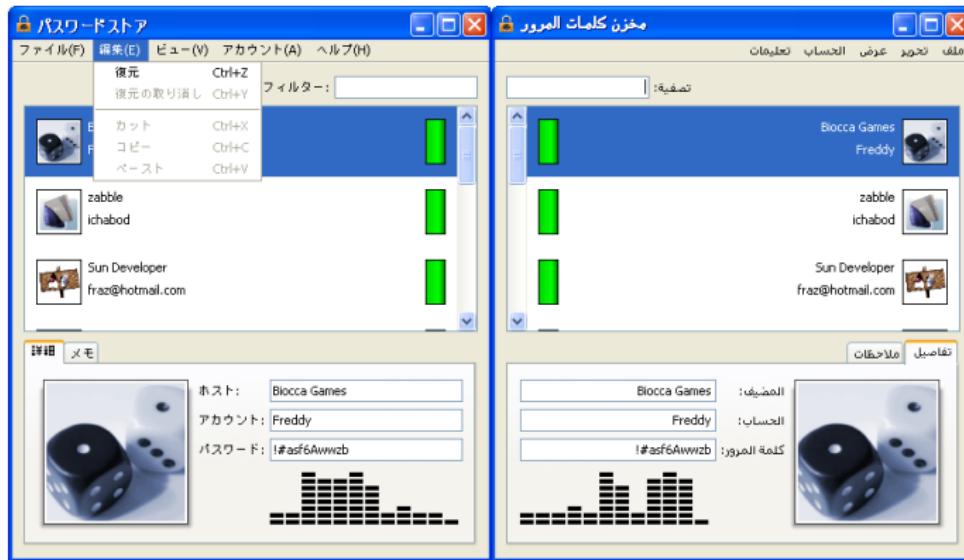
drag and drop, cut, copy, paste possible
internationalization = no recompilation

texts stored outside code

localization = translating text

various text alignment and flows

Internationalization



Other abilities 2

voice interface, keyboard enhancement

Java Access Bridge for java-windows

interface for assistive technologies

Java Accessibility Utilities

Desktop API for integrating GUI

hypertext links, email clients, printing

system tray

Concurrency

for never-freezing GUI

initial thread from the application

event dispatch thread for event-handling

background thread for time-consuming tasks

threads inter-communication needed

Initial thread

main, init, start, etc.

creates a Runnable object

for GUI initialization

schedules the object for execution

on event dispatch thread

`javax.swing.SwingUtilities.invokeLater`

`javax.swing.SwingUtilities.invokeAndWait`

Event dispatch thread

special thread for handling events

Swing object methods are not thread safe

thread interference possible

memory consistency errors possible

Swing object methods invoked from the thread

thread-safe GUI library impossible

series of short tasks

`javax.swing.SwingUtil.isEventDispatchThread`



Background thread

special thread for long tasks
each thread represented by instance
 `javax.swing.SwingWorker`
method "done" send to event thread
cancellation, partial results possible
input parameter changes possible
loading graphics, working with arrays
timeout option

Background thread

SwingWorker.publish, SwingWorker.process

SwingWorker.cancel for stopping process

SwingWorker.isCancelled often testing

bound properties: "progress" and "state"

for inter-thread communication

SwingWorker.setProgress, getProgress, 0-100

SwingWorker.getState, PENDING,

STARTED, DONE