Course Name:
Advanced Java

Lecture 18
Topics to be covered

- Java Swing Introduction

What is Java Swing?

- Part of the Java Foundation Classes (JFC)
- Provides a rich set of GUI components
- Used to create a Java program with a graphical user interface (GUI)
- table controls, list controls, tree controls, buttons, and labels, and so on…

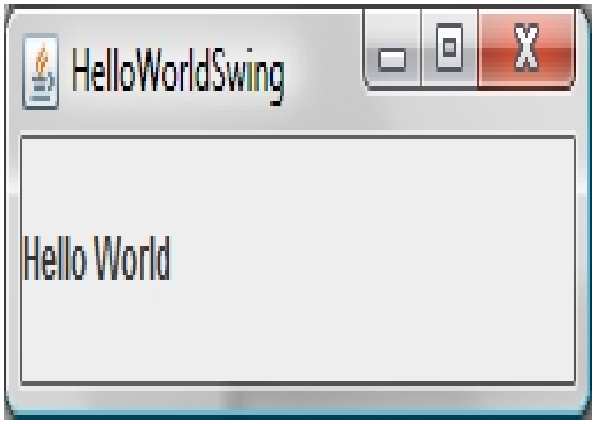
What features are available?

- GUI components like button, checkbox, and so on…
- Java 2D API: images, figures, animation
- Pluggable look and feel: use samples or create your own
- Data Transfer: cut, copy, paste, drag & drop
- Internationalization: supports different input language, right to left reading
- Accessibility API: for people with disabilities
- Undo Framework API: supports unlimited numbers of actions to undo and redo
- Flexible Deployment: run within a browser as an applet or Java Web Start

How does HelloWorld look like?

```
import javax.swing.*;

public class HelloWorldSwing {
    private static void createAndShowGUI() {
        //Create and set up the window.
        JFrame frame = new JFrame("HelloWorldSwing");

     frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);

        //Add the ubiquitous "Hello World" label.
        JLabel label = new JLabel("Hello World");
        frame.getContentPane().add(label);

        //Display the window.
        frame.pack();
        frame.setVisible(true);
    }
```

```
public static void
  main(String[] args) {
    //Schedule a job for the
  event-dispatching thread:
    //creating and showing
  this application's GUI.

  javax.swing.SwingUtilities.i
  nvokeLater(new
  Runnable() {
        public void run() {

  createAndShowGUI();
        }
    });
  }
}
```

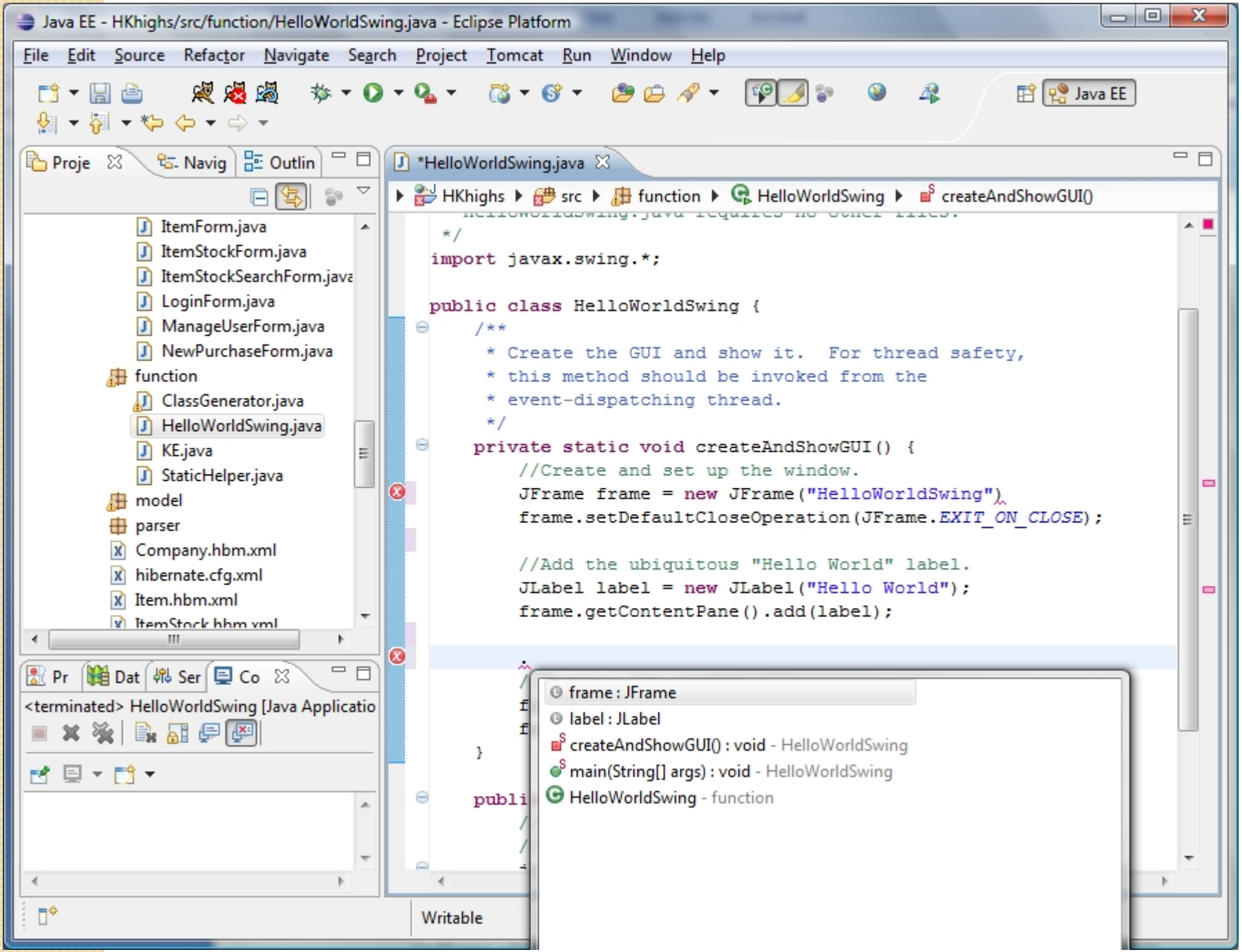


Who are users?

- Since we are evaluating user interface toolkit itself, in this case Java Swing, users will be software developers, not software users
- I believe that most Java developers use Eclipse as their developing platform so we will evaluate Java Swing with Eclipse based on ten usability heuristics by Jakob Nielson

1. **Visibility of system status**

- This may be a strong advantage of Java Swing over other UI toolkits, not because of Java Swing itself is great, but because Eclipse provides such sophisticated checking on what is going on now
- Constantly checks for syntax errors
- Lists available methods or variables when press '.' (dot)
- However, you don't have synchronous result view
- You will have to run it in order to see the status of your program

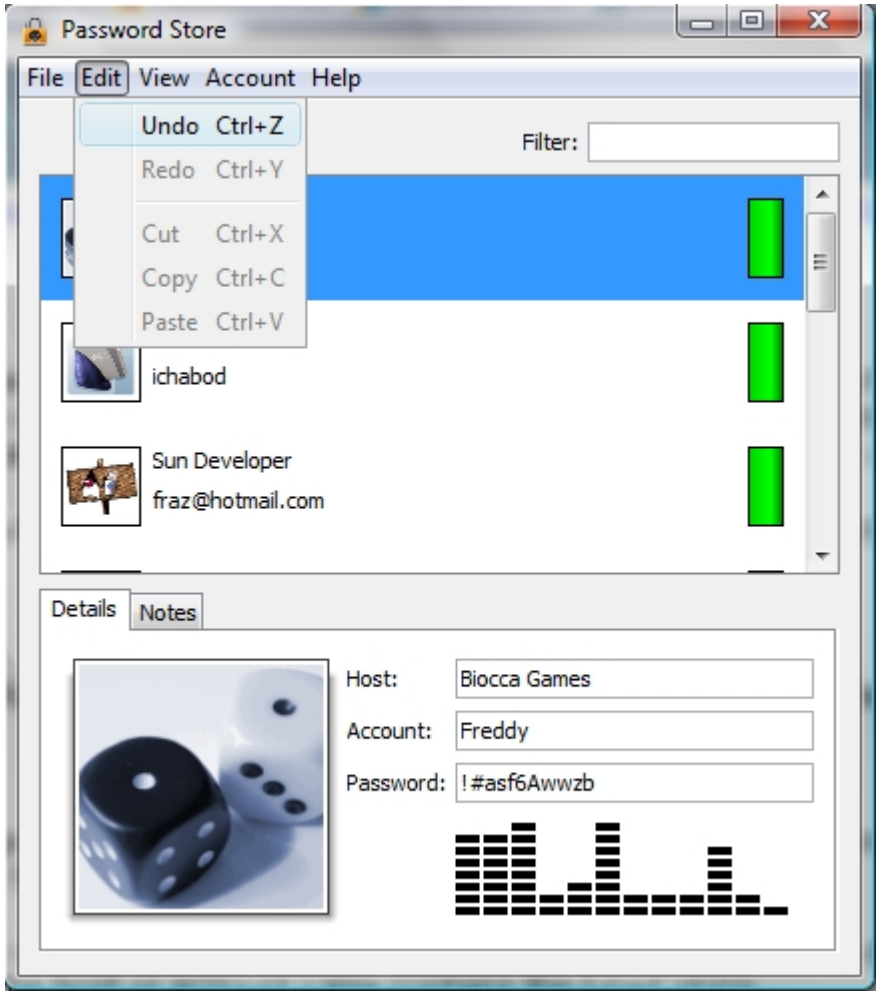

Java EE - HKhighs/src/function/HelloWorldSwing.java - Eclipse Platform
File Edit Source Refactor Navigate Search Project Tomcat Run Window Help
Java EE
*HelloWorldSwing.java
HKhighs ▸ src ▸ function ▸ HelloWorldSwing ▸ createAndShowGUI()
ItemForm.java
ItemStockForm.java
ItemStockSearchForm.java
LoginForm.java
ManageUserForm.java
NewPurchaseForm.java
function
ClassGenerator.java
HelloWorldSwing.java
KE.java
StaticHelper.java
model
parser
Company.hbm.xml
hibernate.cfg.xml
Item.hbm.xml
<terminated> HelloWorldSwing [Java Applicatio
import javax.swing.*;
public class HelloWorldSwing {
/**
* Create the GUI and show it. For thread safety,
* this method should be invoked from the
* event-dispatching thread.
*/
private static void createAndShowGUI() {
//Create and set up the window.
JFrame frame = new JFrame("HelloWorldSwing");
frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
//Add the ubiquitous "Hello World" label.
JLabel label = new JLabel("Hello World");
frame.getContentPane().add(label);
frame : JFrame
label : JLabel
createAndShowGUI() : void - HelloWorldSwing
main(String[] args) : void - HelloWorldSwing
HelloWorldSwing - function
Writable

2. Match between system and the real world

- First of all, it is Java
- It follows Java convention
- It consists of 18 public packages of Java classes
- Its classes and methods are reasonably named
- Unless you are the first time programmer, you don’t have to worry about its syntax or convention
- JLabel developerNameLabel = new javax.swing.JLabel(); developerNameLabel.setFont(new java.awt.Font("Arial", 0, 14)); developerNameLabel.setForeground(new java.awt.Color(255, 255, 255));

3. User control and freedom

- Eclipse supports strong undo and redo features
- You can’t possibly go wrong and have to rewrite every code
- You can always fix it even though it may take you some effort and time
- Java Swing also provides undo and redo package
- javax.swing.event.UndoableEditEvent; javax.swing.event.UndoableEditListener; javax.swing.undo.UndoableEdit;


Password Store
File
Edit
View
Account
Help
Undo Ctrl+Z
Redo Ctrl+Y
Cut Ctrl+X
Copy Ctrl+C
Paste Ctrl+V
Filter:
ichabod
Sun Developer
fraz@hotmail.com
Details
Notes
Host:
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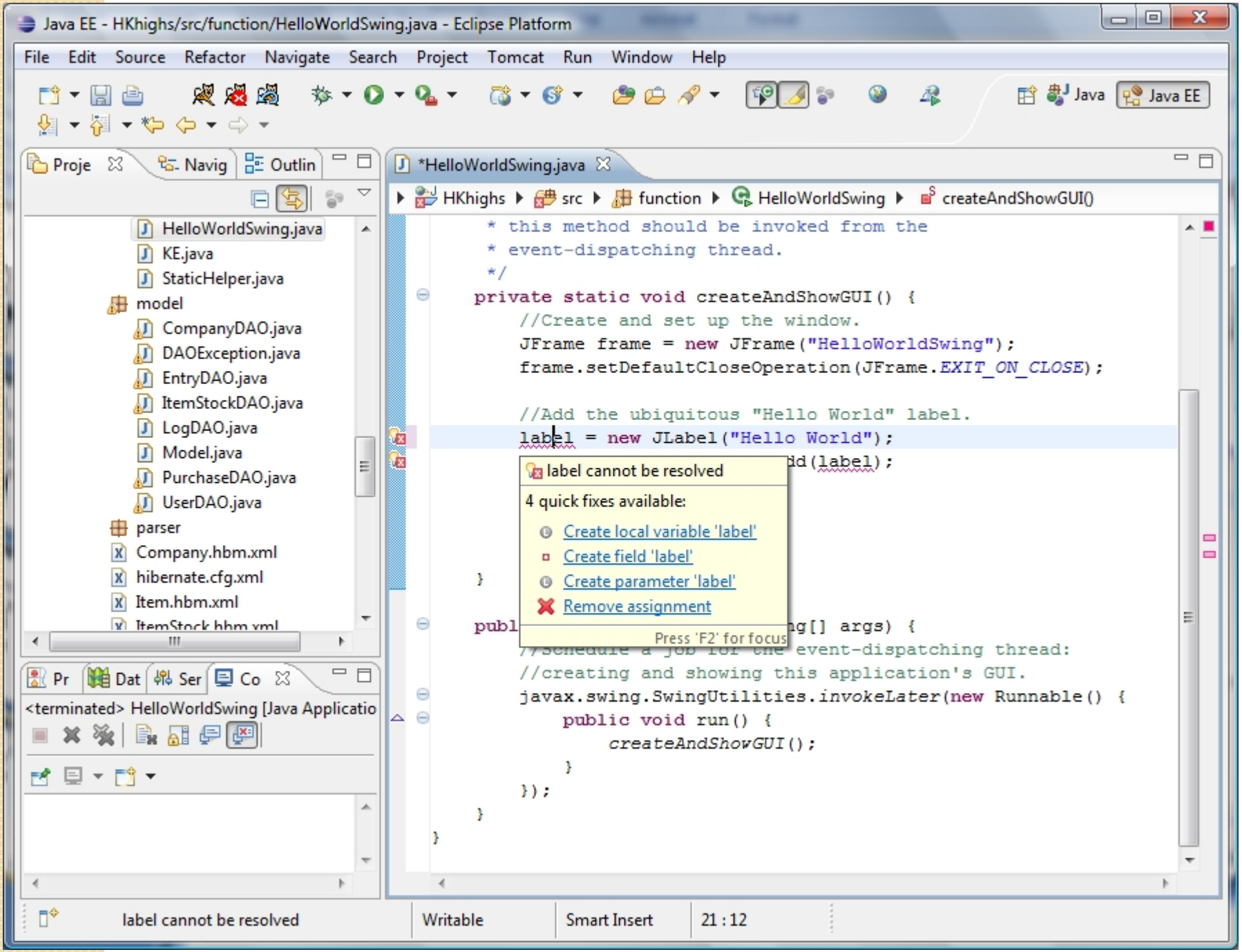
Account:
Freddy
Password:
!#asf6Awwzb

4. Consistency and standards

- Similar to #2
- Java Swing follows Java convention
- Packages, classes, methods, parameters, variables
- Mainly constructor, getter, setter

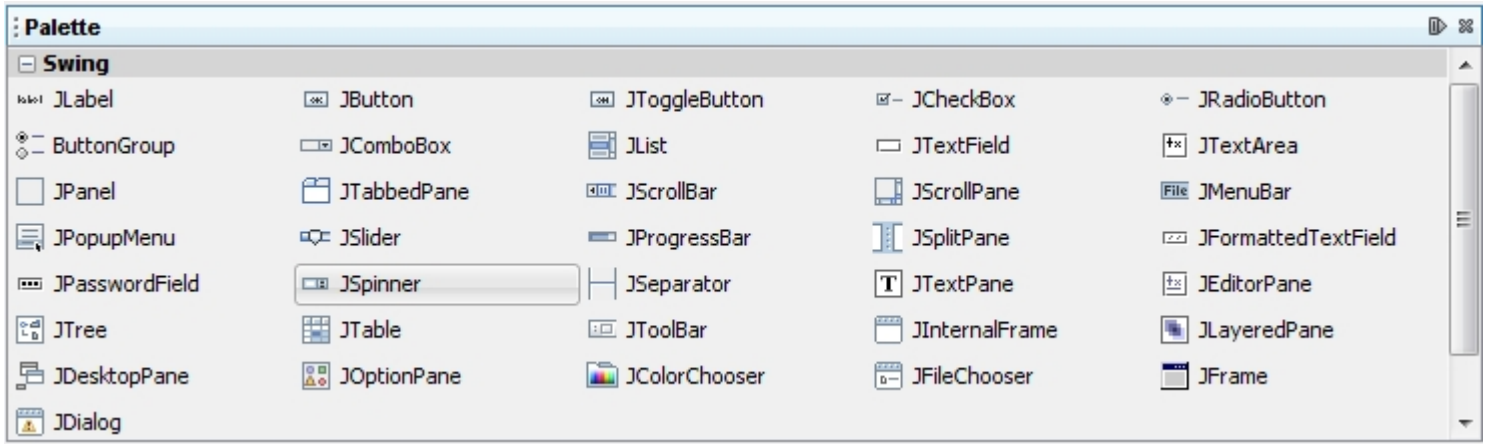
5. Error prevention

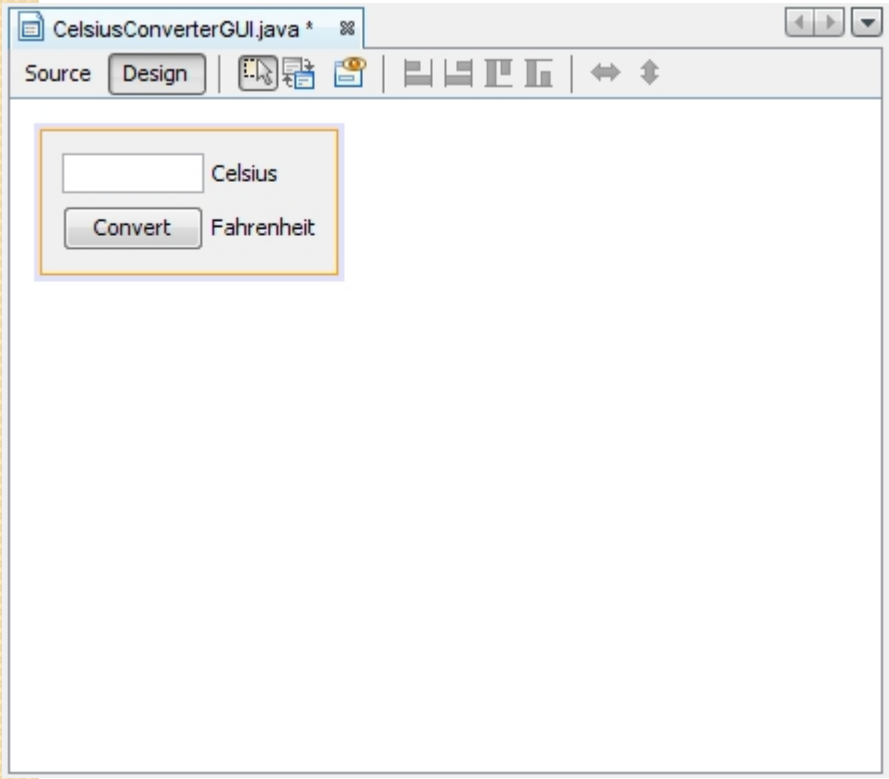
- First of all, Java is a strongly typed language: primitives and objects
- Eclipse checks for syntax and type errors continuously
- It gives red underline to errors and small red box to let you know which line in document it is located
- If you move your mouse over the error, then it suggests possible solutions to the error
- If you think one of the suggestions is a solution, then simply click on it to apply it
- Of course, it won't compile and run until you fix all the syntax errors
- However, you don't have any idea about runtime errors except that you will have to run it and find

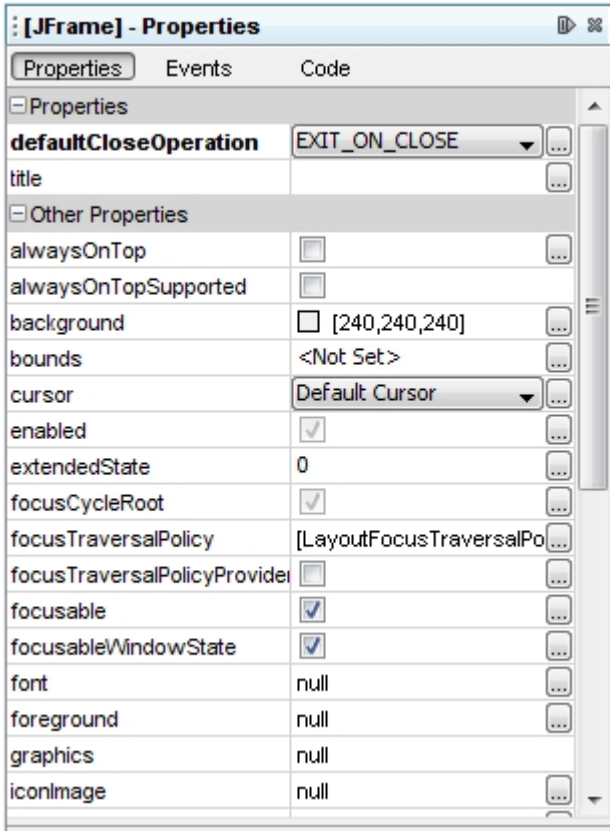

Java EE - HKhighs/src/function/HelloWorldSwing.java - Eclipse Platform
File Edit Source Refactor Navigate Search Project Tomcat Run Window Help
Java
Java EE
HelloWorldSwing.java
KE.java
StaticHelper.java
model
CompanyDAO.java
DAOException.java
EntryDAO.java
ItemStockDAO.java
LogDAO.java
Model.java
PurchaseDAO.java
UserDAO.java
parser
Company.hbm.xml
hibernate.cfg.xml
Item.hbm.xml
*HelloWorldSwing.java
HKhighs ▸ src ▸ function ▸ HelloWorldSwing ▸ createAndShowGUI()
* this method should be invoked from the
* event-dispatching thread.
*/
private static void createAndShowGUI() {
//Create and set up the window.
JFrame frame = new JFrame("HelloWorldSwing");
frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
//Add the ubiquitous "Hello World" label.
label = new JLabel("Hello World");
label cannot be resolved
4 quick fixes available:
Create local variable 'label'
Create field 'label'
Create parameter 'label'
Remove assignment
Press 'F2' for focus
//creating and showing this application's GUI.
javax.swing.SwingUtilities.invokeLater(new Runnable() {
public void run() {
createAndShowGUI();
}
});
}
}
<terminated> HelloWorldSwing [Java Applicatio
label cannot be resolved
Writable
Smart Insert
21 : 12

6. Recognition rather than recall

- It’s a programming language, so it’s better and faster for you if you memorize names and their functions of classes or methods
- However, whenever you press ‘dot’ after name of package, class, or object, then eclipse provides you a list of all possible subclasses, functions and variables
- If you move your mouse over almost anything, then eclipse provides you with a text document associated with it, usually javadoc, or you can click on it and it directs you to online javadoc page
- You don’t have a help of graphical interface to develop a graphical interface, so it maybe a disadvantage of Java Swing with eclipse.
- By the way, you can have a graphical interface if you use NetBeans IDE instead of eclipse


Palette
Swing
JLabel
JButton
JToggleButton
JCheckBox
JRadioButton
ButtonGroup
JComboBox
JList
JTextField
JTextArea
JPanel
JTabbedPane
JScrollBar
JScrollPane
JMenuBar
JPopupMenu
JSlider
JProgressBar
JSplitPane
JFormattedTextField
JPasswordField
JSpinner
JSeparator
JTextPane
JEditorPane
JTree
JTable
JToolBar
JInternalFrame
JLayeredPane
JDesktopPane
JOptionPane
JColorChooser
JFileChooser
JFrame
JDialog


CelsiusConverterGUI.java *
Source
Design
Celsius
Convert
Fahrenheit


[JFrame] - Properties
Properties
Events
Code
Properties
defaultCloseOperation
EXIT_ON_CLOSE
title
Other Properties
alwaysOnTop
alwaysOnTopSupported
background
[240,240,240]
bounds
<Not Set>
cursor
Default Cursor
enabled
extendedState
0
focusCycleRoot
focusTraversalPolicy
focusTraversalPolicyProvider
focusable
focusableWindowState
font
null
foreground
null
graphics
null
iconImage
null

7. Flexibility and efficiency of use

- Swing includes many basic components as a package, so it is efficient to use them
- At the same time, you can create almost anything you want as combination of those components and some pure coding in Java
- Java have had a reputation for being slower and requiring more memory than those written in natively compiled languages such as C or C++
- However, the performance heavily depends on how you optimize your codes and which components of UI you use the most frequently
- It may be subsequently slower or faster

8. Aesthetic and minimalist design

- Swing is designed in a way that it provides a set of "lightweight" (all-Java language) components that, to the maximum degree possible, work the same on all platforms
- It includes almost only and all components we could find around any software with user interface
- Yet, it gives developers varieties to customize those components

9. **Help users recognize, diagnose, and recover from errors**

- Syntax and type checking errors are already covered previously
- Java shows where in the code runtime errors (exceptions) are caused, specifying line numbers and brief reason for error on the console of eclipse
- It’s not always right, but most of the times it is right
- It’s relatively easy to find the cause of the error and debug it comparing to other languages I have experienced with

10. **Help and documentation**

- Javadoc
- Eclipse’s support for javadoc (already covered)

Conclusion

- Java Swing is easier to learn than others because it’s Java
- You can use any helpful tools out there that are for Java development like eclipse IDE, NetBeans IDE
- Lacks live graphical and interactive help while developing
- Has unlimited possibilities depending on how you implement your software