ECE 462
Object-Oriented Programming using C++ and Java

Key Inputs in Java Games

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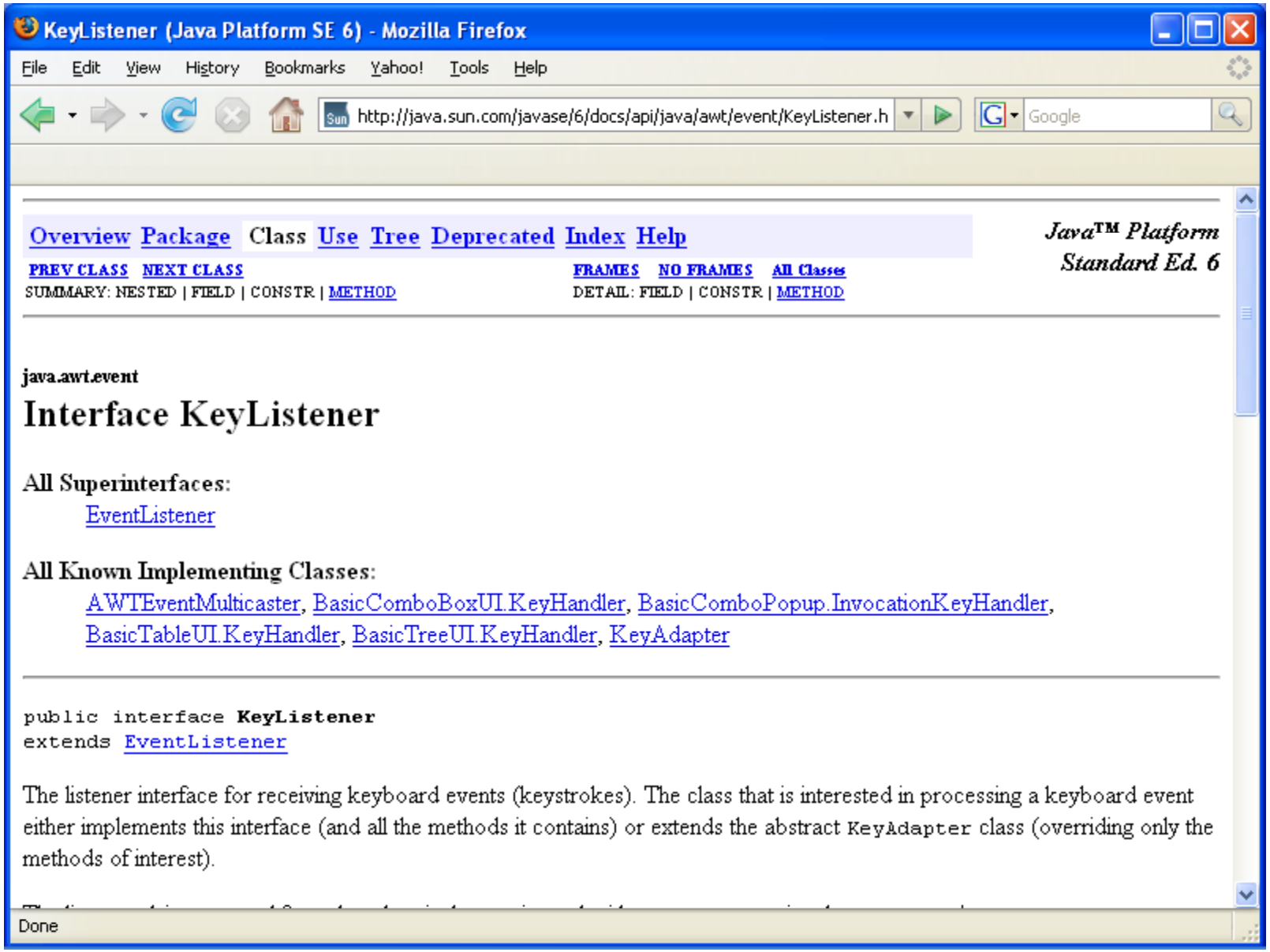
Handle Key Events

- have the focus of the keyboard inputs by calling **`setFocusable(true)`**
- two types of events:
  - pressing and releasing
  - what key (Unicode) is pressed (such as 'A' or '<')
- implement three functions
  - **`keyPressed(KeyEvent e)`**
  - **`keyReleased(KeyEvent e)`**
  - **`keyTyped(KeyEvent e)`**


KeyListener (Java Platform SE 6) - Mozilla Firefox
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http://java.sun.com/javase/6/docs/api/java/awt/event/KeyListener.h
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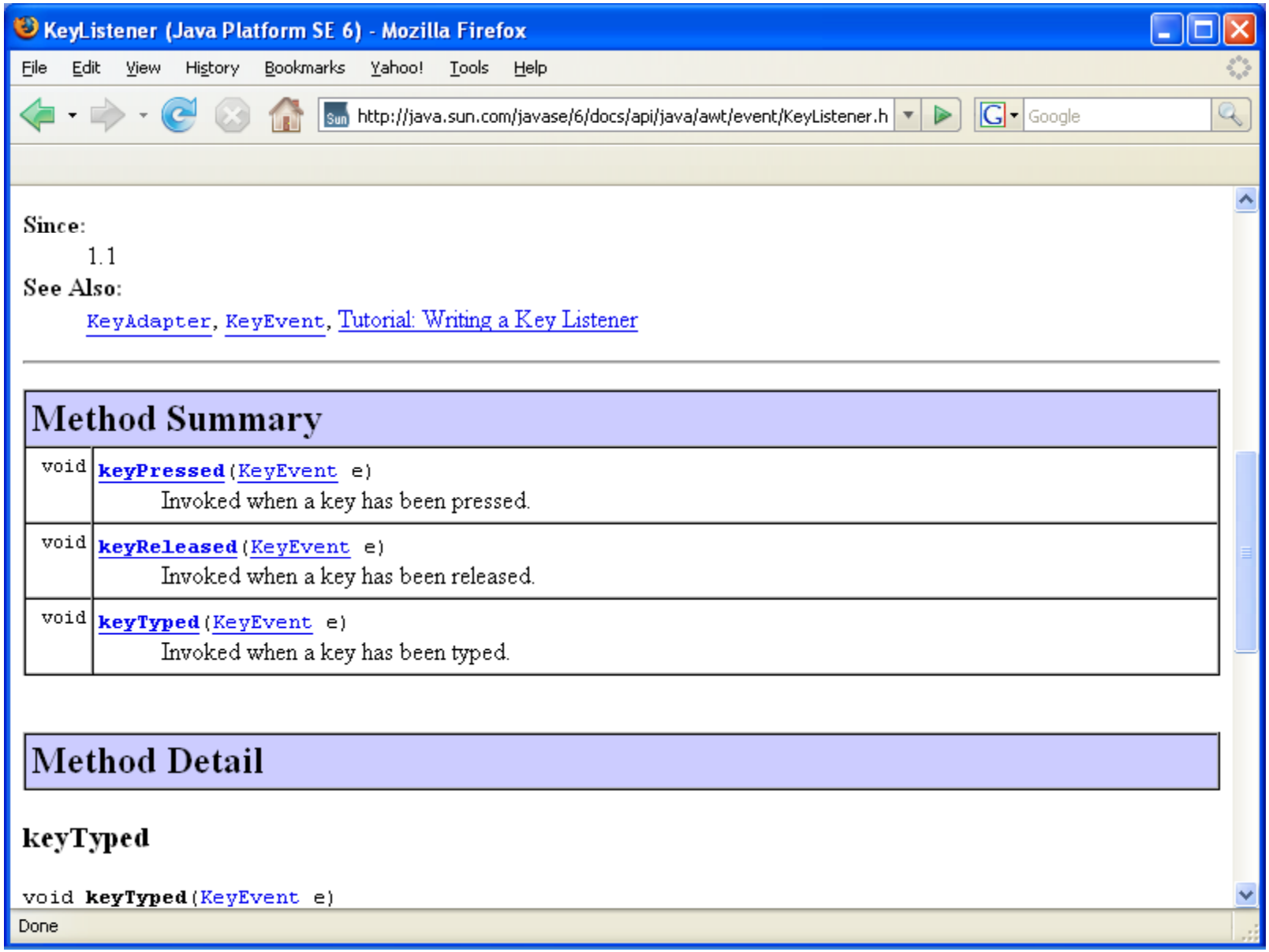
Overview Package Class Use Tree Deprecated Index Help
Java™ Platform Standard Ed. 6
PREV CLASS NEXT CLASS
FRAMES NO FRAMES All Classes
SUMMARY: NESTED | FIELD | CONSTR | METHOD
DETAIL: FIELD | CONSTR | METHOD
java.awt.event
Interface KeyListener
All Superinterfaces:
EventListener
All Known Implementing Classes:
AWTEventMulticaster, BasicComboBoxUI.KeyHandler, BasicComboPopup.InvocationKeyHandler, BasicTableUI.KeyHandler, BasicTreeUI.KeyHandler, KeyAdapter
public interface KeyListener
extends EventListener
The listener interface for receiving keyboard events (keystrokes). The class that is interested in processing a keyboard event either implements this interface (and all the methods it contains) or extends the abstract KeyAdapter class (overriding only the methods of interest).
Done


KeyListener (Java Platform SE 6) - Mozilla Firefox
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http://java.sun.com/javase/6/docs/api/java/awt/event/KeyListener.h
Google
Since:
1.1
See Also:
KeyAdapter, KeyEvent, Tutorial: Writing a Key Listener
Method Summary
void keyPressed(KeyEvent e)
Invoked when a key has been pressed.
void keyReleased(KeyEvent e)
Invoked when a key has been released.
void keyTyped(KeyEvent e)
Invoked when a key has been typed.
Method Detail
keyTyped
void keyTyped(KeyEvent e)
Done


How to Write a Key Listener (The Java™ Tutorials > Creating a GUI with JFC/Swing > Writing Event Listeners) -...
File Edit View History Bookmarks Yahoo! Tools Help
http://java.sun.com/docs/books/tutorial/uiswing/events/keylistener.h
Google
The Java™ Tutorials
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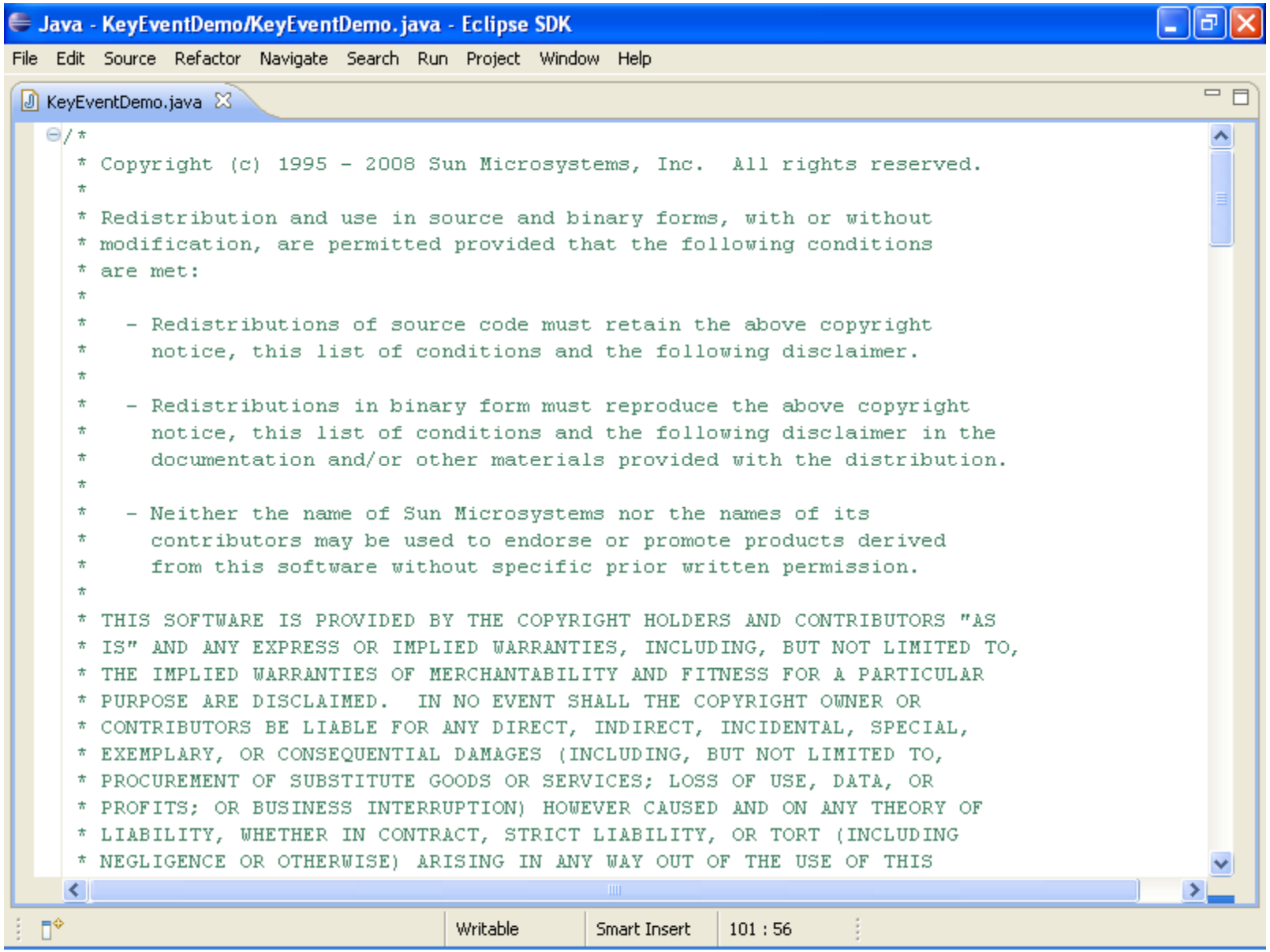
Writing Event Listeners
Introduction to Event Listeners
General Information about Writing Event Listeners
Listeners Supported by Swing Components
Implementing Listeners for Commonly Handled Events
How to Write an Action Listener
How to Write a Caret Listener
How to Write a Change Listener
How to Write a Component Listener
How to Write a Container
Home Page > Creating a GUI with JFC/Swing > Writing Event Listeners
« Previous • Trail • Next »
How to Write a Key Listener
Key events indicate when the user is typing at the keyboard. Specifically, key events are fired by the component with the keyboard focus when the user presses or releases keyboard keys. For detailed information about focus, see How to Use the Focus Subsystem.
Note: To define special reactions to particular keys, use key bindings instead of a key listener. For further information, see How to Use Key Bindings.
Notifications are sent about two basic kinds of key events:
The typing of a Unicode character
The pressing or releasing of a key on the keyboard
Done


Java - KeyEventDemo/KeyEventDemo.java - Eclipse SDK
File Edit Source Refactor Navigate Search Run Project Window Help
KeyEventDemo.java
/*
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*
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* modification, are permitted provided that the following conditions
* are met:
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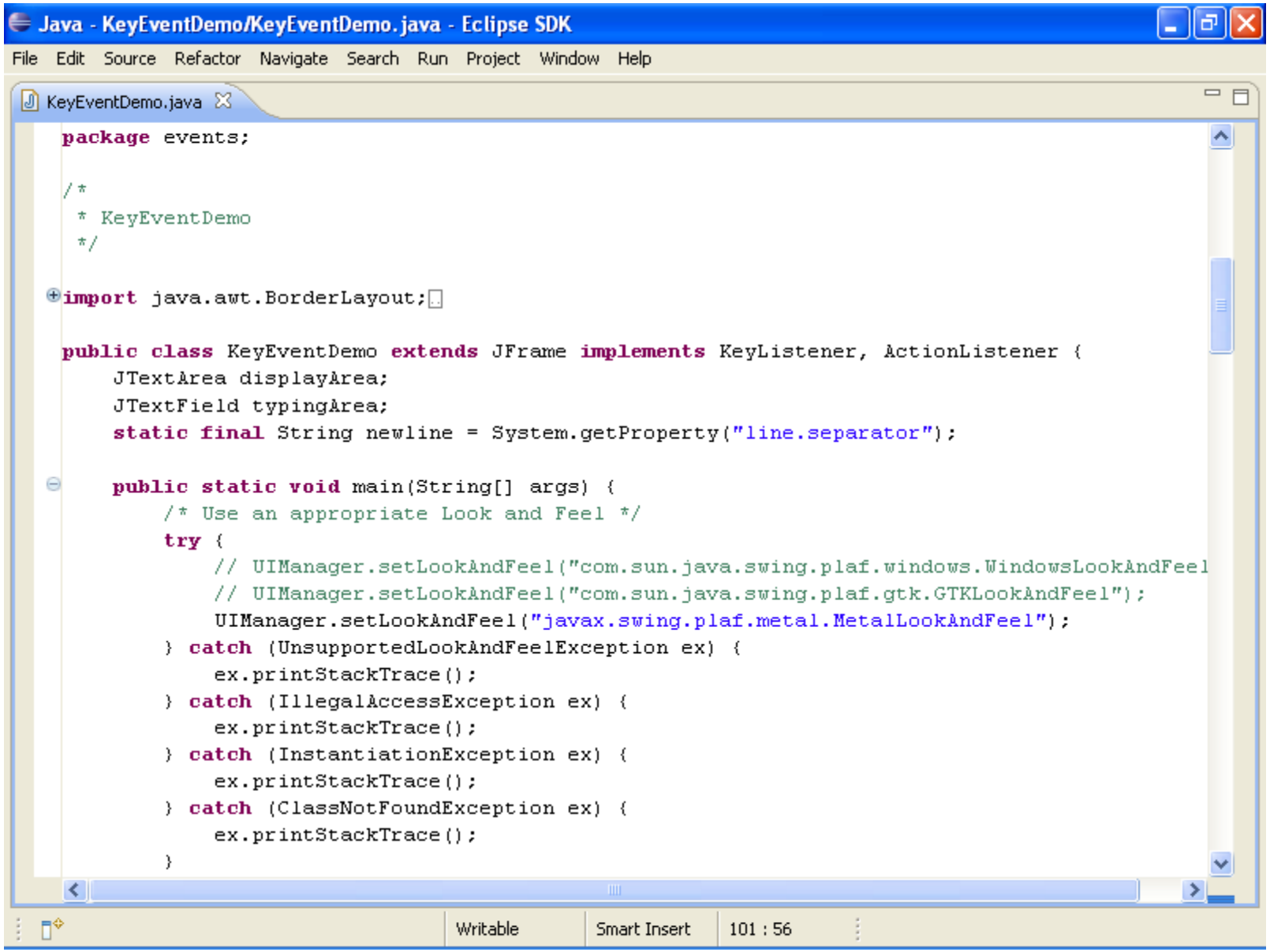
Java - KeyEventDemo/KeyEventDemo.java - Eclipse SDK
File Edit Source Refactor Navigate Search Run Project Window Help
KeyEventDemo.java
package events;
/*
* KeyEventDemo
*/
import java.awt.BorderLayout;
public class KeyEventDemo extends JFrame implements KeyListener, ActionListener {
JTextArea displayArea;
JTextField typingArea;
static final String newline = System.getProperty("line.separator");
public static void main(String[] args) {
/* Use an appropriate Look and Feel */
try {
// UIManager.setLookAndFeel("com.sun.java.swing.plaf.windows.WindowsLookAndFeel
// UIManager.setLookAndFeel("com.sun.java.swing.plaf.gtk.GTKLookAndFeel");
UIManager.setLookAndFeel("javax.swing.plaf.metal.MetalLookAndFeel");
} catch (UnsupportedLookAndFeelException ex) {
ex.printStackTrace();
} catch (IllegalAccessException ex) {
ex.printStackTrace();
} catch (InstantiationException ex) {
ex.printStackTrace();
} catch (ClassNotFoundException ex) {
ex.printStackTrace();
}
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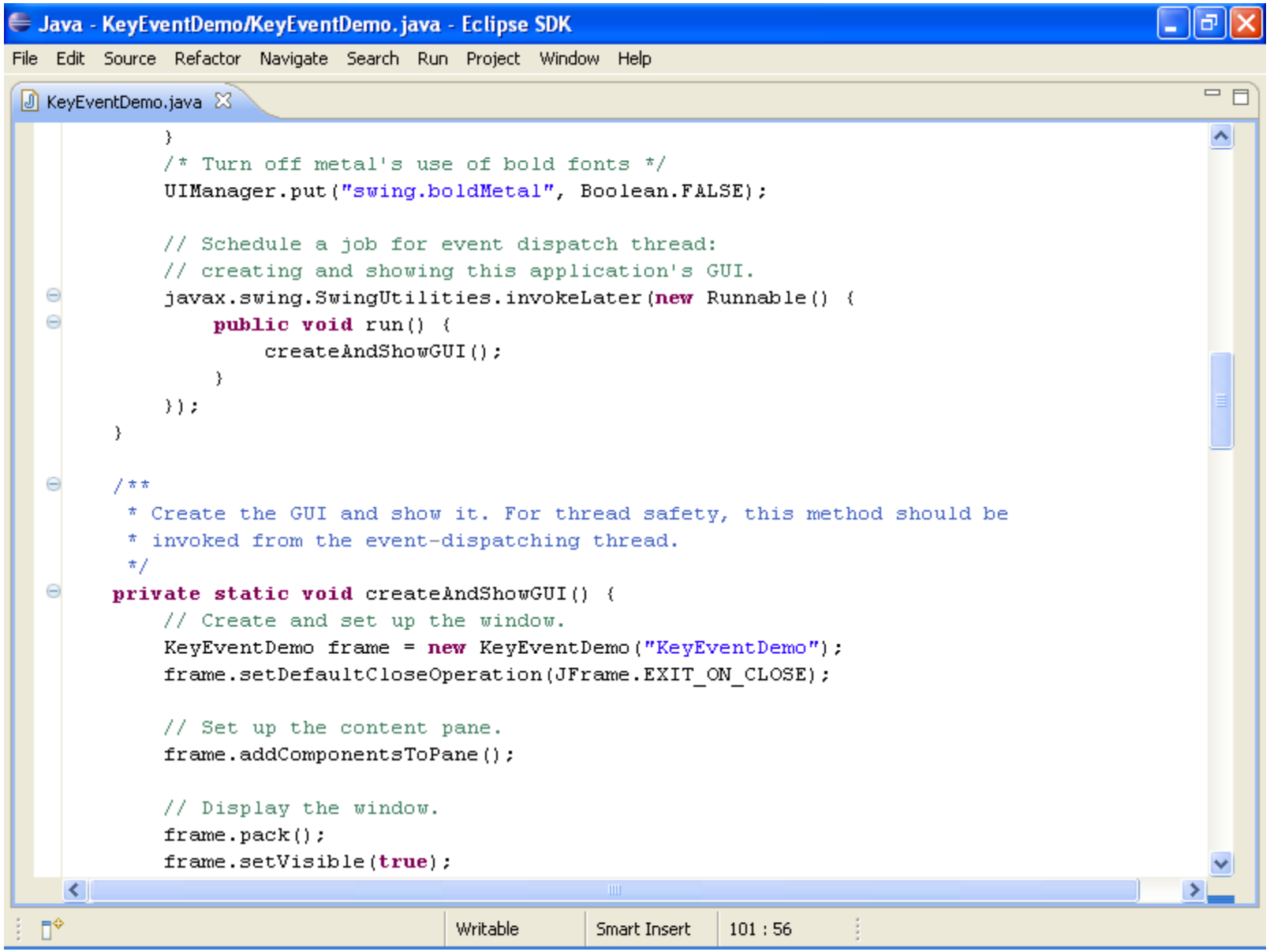
Java - KeyEventDemo/KeyEventDemo.java - Eclipse SDK
File Edit Source Refactor Navigate Search Run Project Window Help
KeyEventDemo.java
}
/* Turn off metal's use of bold fonts */
UIManager.put("swing.boldMetal", Boolean.FALSE);
// Schedule a job for event dispatch thread:
// creating and showing this application's GUI.
javax.swing.SwingUtilities.invokeLater(new Runnable() {
public void run() {
createAndShowGUI();
}
});
}
/**
* 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.
KeyEventDemo frame = new KeyEventDemo("KeyEventDemo");
frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
// Set up the content pane.
frame.addComponentsToPane();
// Display the window.
frame.pack();
frame.setVisible(true);
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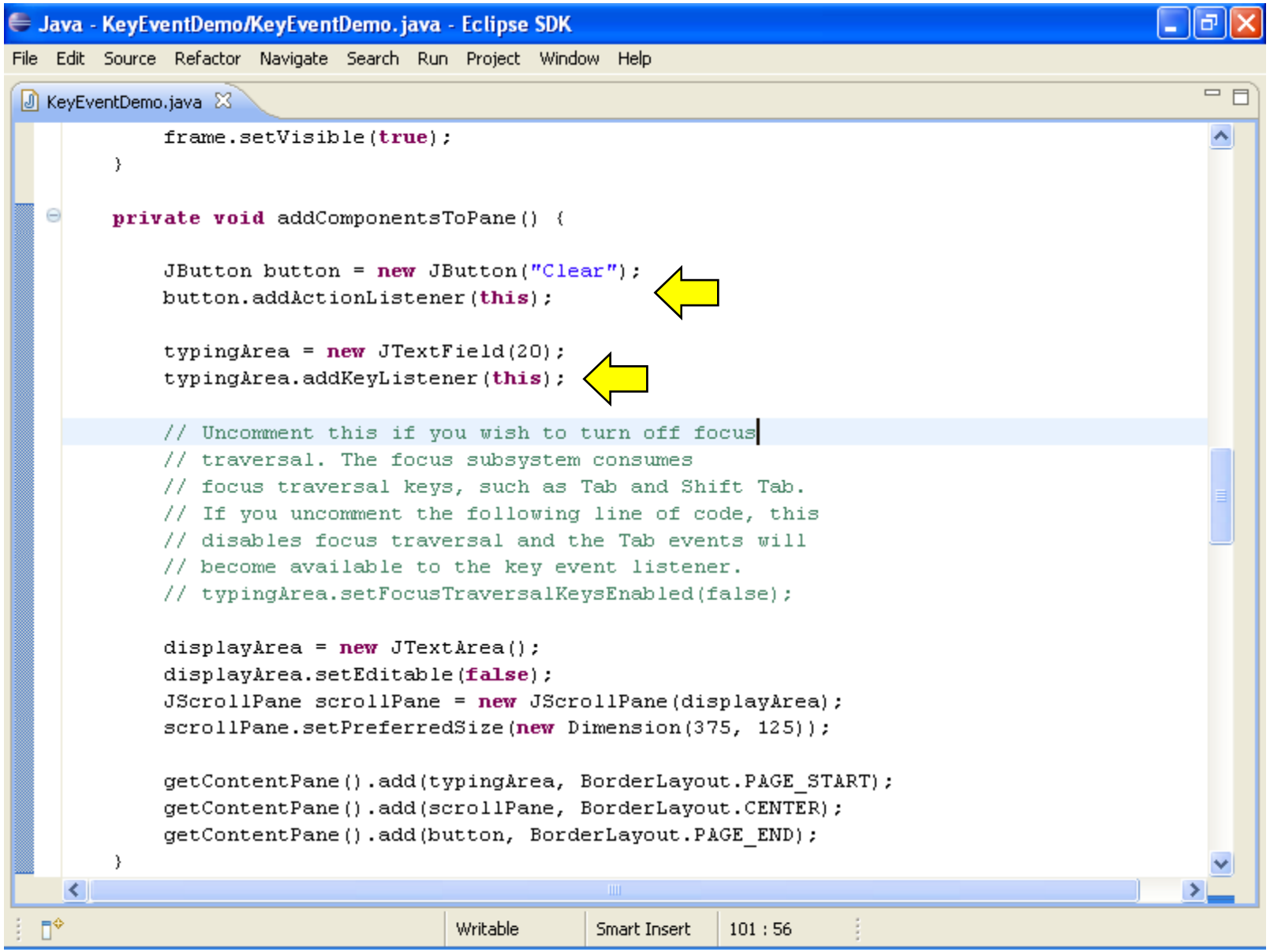
Java - KeyEventDemo/KeyEventDemo.java - Eclipse SDK
File Edit Source Refactor Navigate Search Run Project Window Help
KeyEventDemo.java
frame.setVisible(true);
}
private void addComponentsToPane() {
JButton button = new JButton("Clear");
button.addActionListener(this);
typingArea = new JTextField(20);
typingArea.addKeyListener(this);
// Uncomment this if you wish to turn off focus
// traversal. The focus subsystem consumes
// focus traversal keys, such as Tab and Shift Tab.
// If you uncomment the following line of code, this
// disables focus traversal and the Tab events will
// become available to the key event listener.
// typingArea.setFocusTraversalKeysEnabled(false);
displayArea = new JTextArea();
displayArea.setEditable(false);
JScrollPane scrollPane = new JScrollPane(displayArea);
scrollPane.setPreferredSize(new Dimension(375, 125));
getContentPane().add(typingArea, BorderLayout.PAGE_START);
getContentPane().add(scrollPane, BorderLayout.CENTER);
getContentPane().add(button, BorderLayout.PAGE_END);
}
Writable
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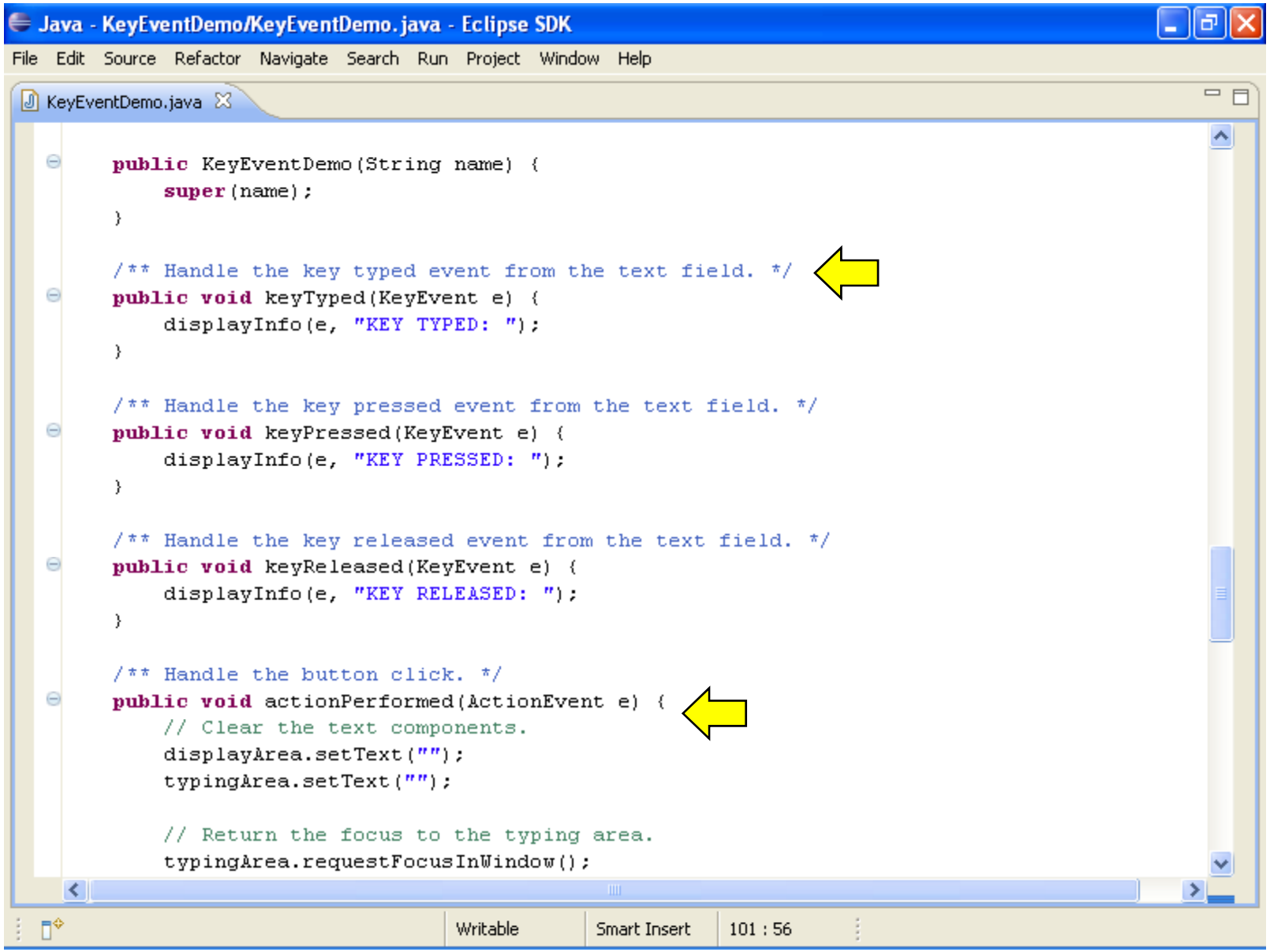
Java - KeyEventDemo/KeyEventDemo.java - Eclipse SDK
File Edit Source Refactor Navigate Search Run Project Window Help
KeyEventDemo.java
public KeyEventDemo(String name) {
super(name);
}
/** Handle the key typed event from the text field. */
public void keyTyped(KeyEvent e) {
displayInfo(e, "KEY TYPED: ");
}
/** Handle the key pressed event from the text field. */
public void keyPressed(KeyEvent e) {
displayInfo(e, "KEY PRESSED: ");
}
/** Handle the key released event from the text field. */
public void keyReleased(KeyEvent e) {
displayInfo(e, "KEY RELEASED: ");
}
/** Handle the button click. */
public void actionPerformed(ActionEvent e) {
// Clear the text components.
displayArea.setText("");
typingArea.setText("");
// Return the focus to the typing area.
typingArea.requestFocusInWindow();
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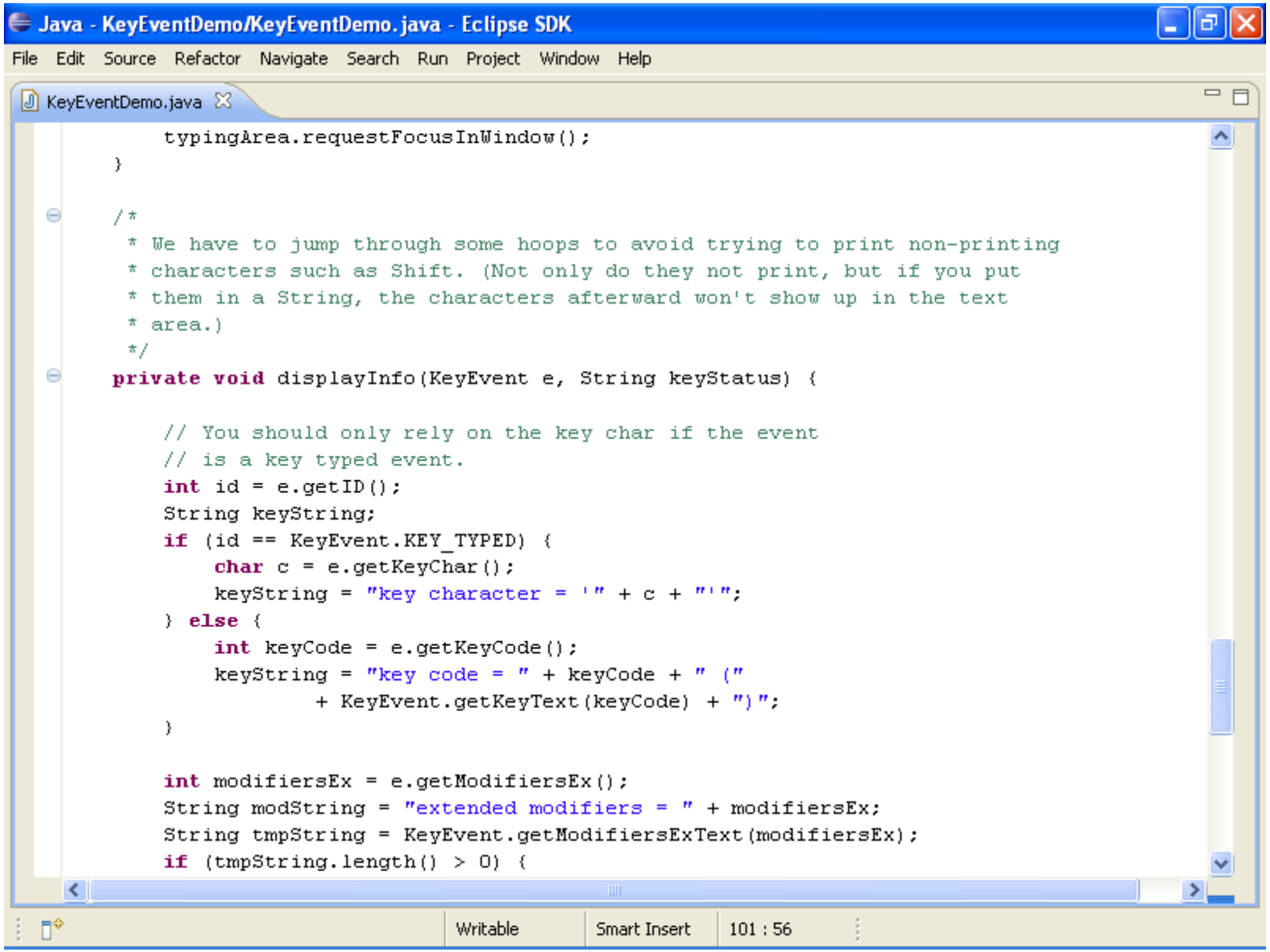
Java - KeyEventDemo/KeyEventDemo.java - Eclipse SDK
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KeyEventDemo.java
typingArea.requestFocusInWindow();
}
/*
* We have to jump through some hoops to avoid trying to print non-printing
* characters such as Shift. (Not only do they not print, but if you put
* them in a String, the characters afterward won't show up in the text
* area.)
*/
private void displayInfo(KeyEvent e, String keyStatus) {
// You should only rely on the key char if the event
// is a key typed event.
int id = e.getID();
String keyString;
if (id == KeyEvent.KEY_TYPED) {
char c = e.getKeyChar();
keyString = "key character = '" + c + "'";
} else {
int keyCode = e.getKeyCode();
keyString = "key code = " + keyCode + " ("
+ KeyEvent.getKeyText(keyCode) + ")";
}
int modifiersEx = e.getModifiersEx();
String modString = "extended modifiers = " + modifiersEx;
String tmpString = KeyEvent.getModifiersExText(modifiersEx);
if (tmpString.length() > 0) {
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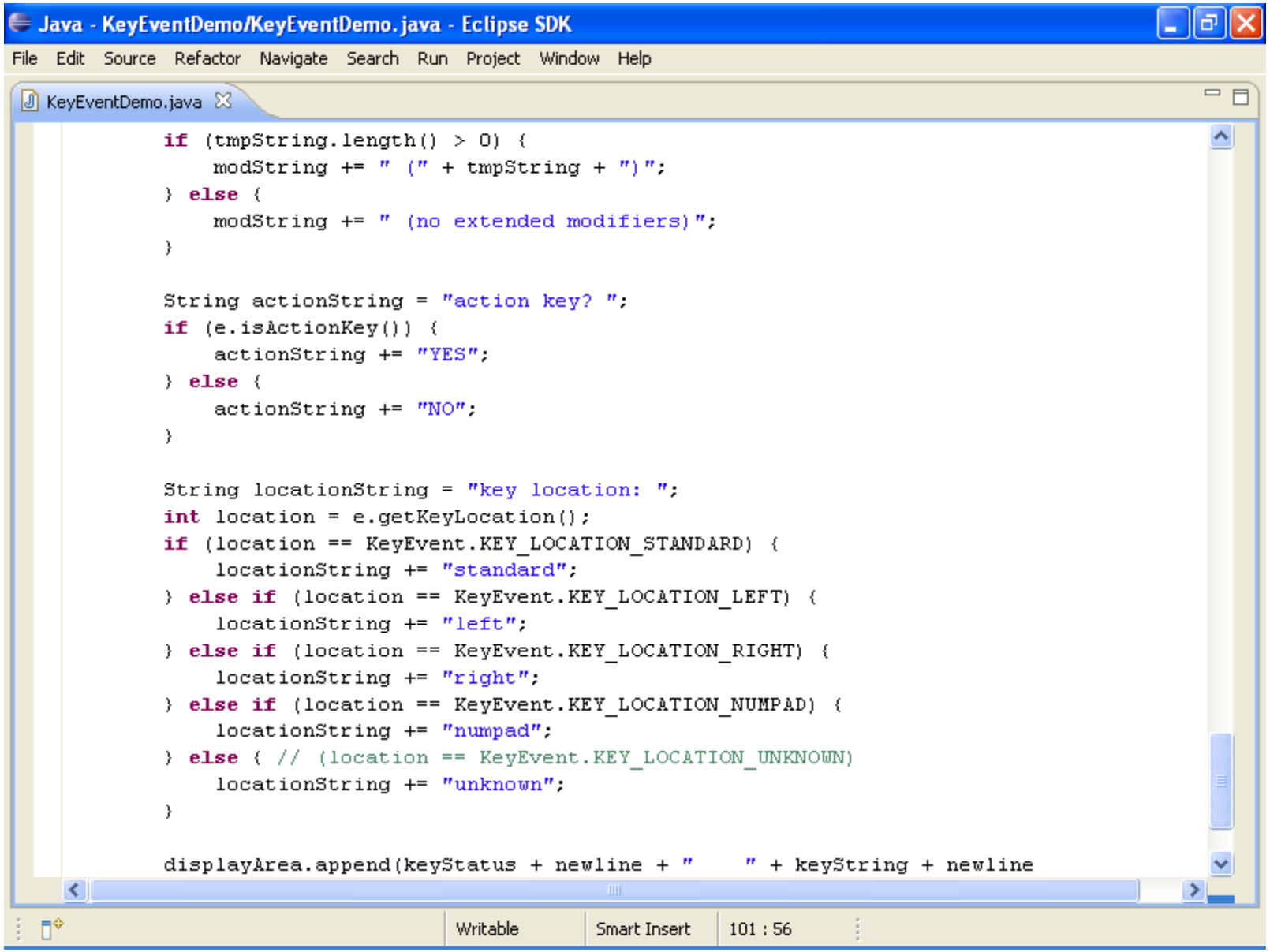
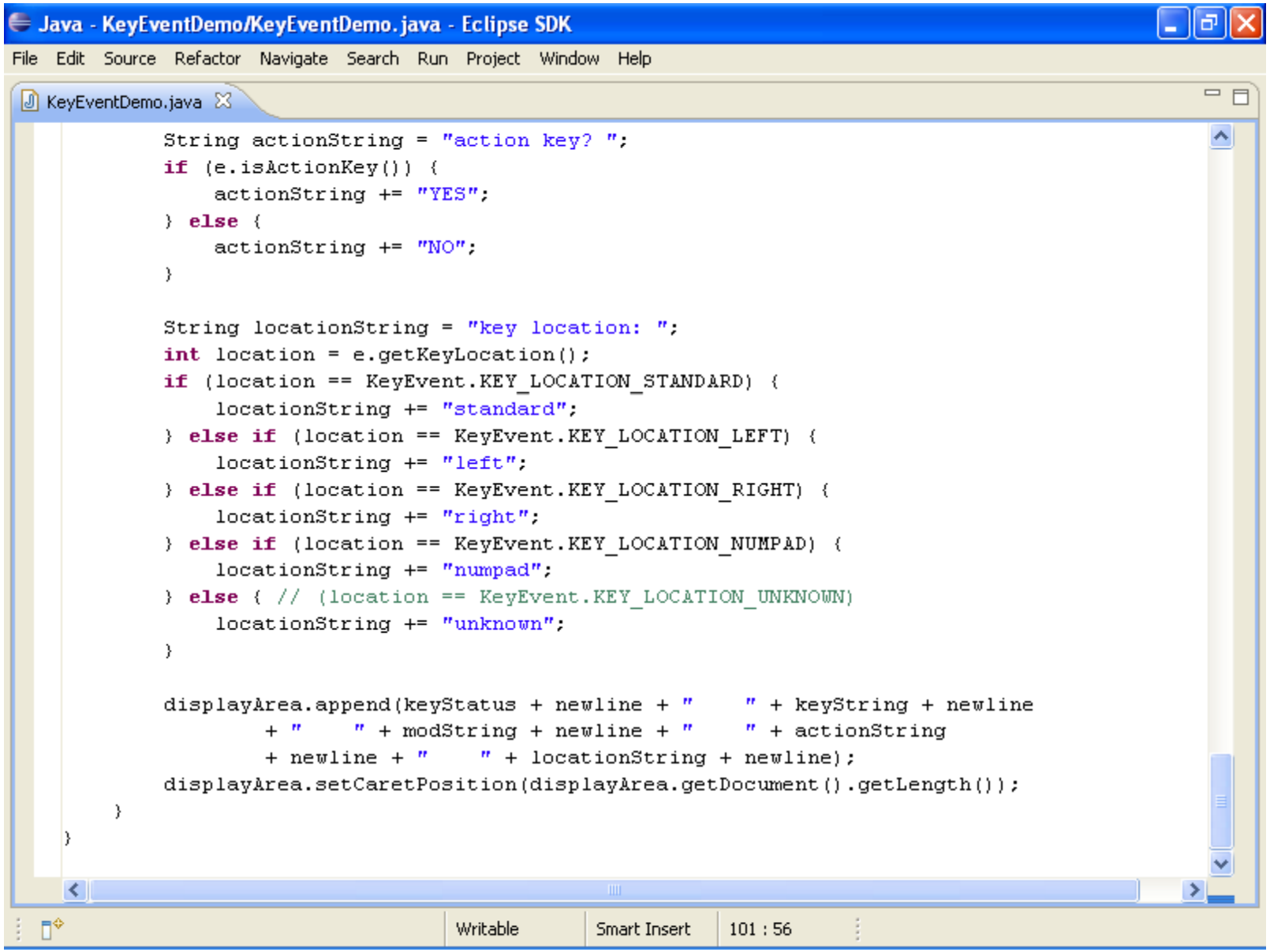
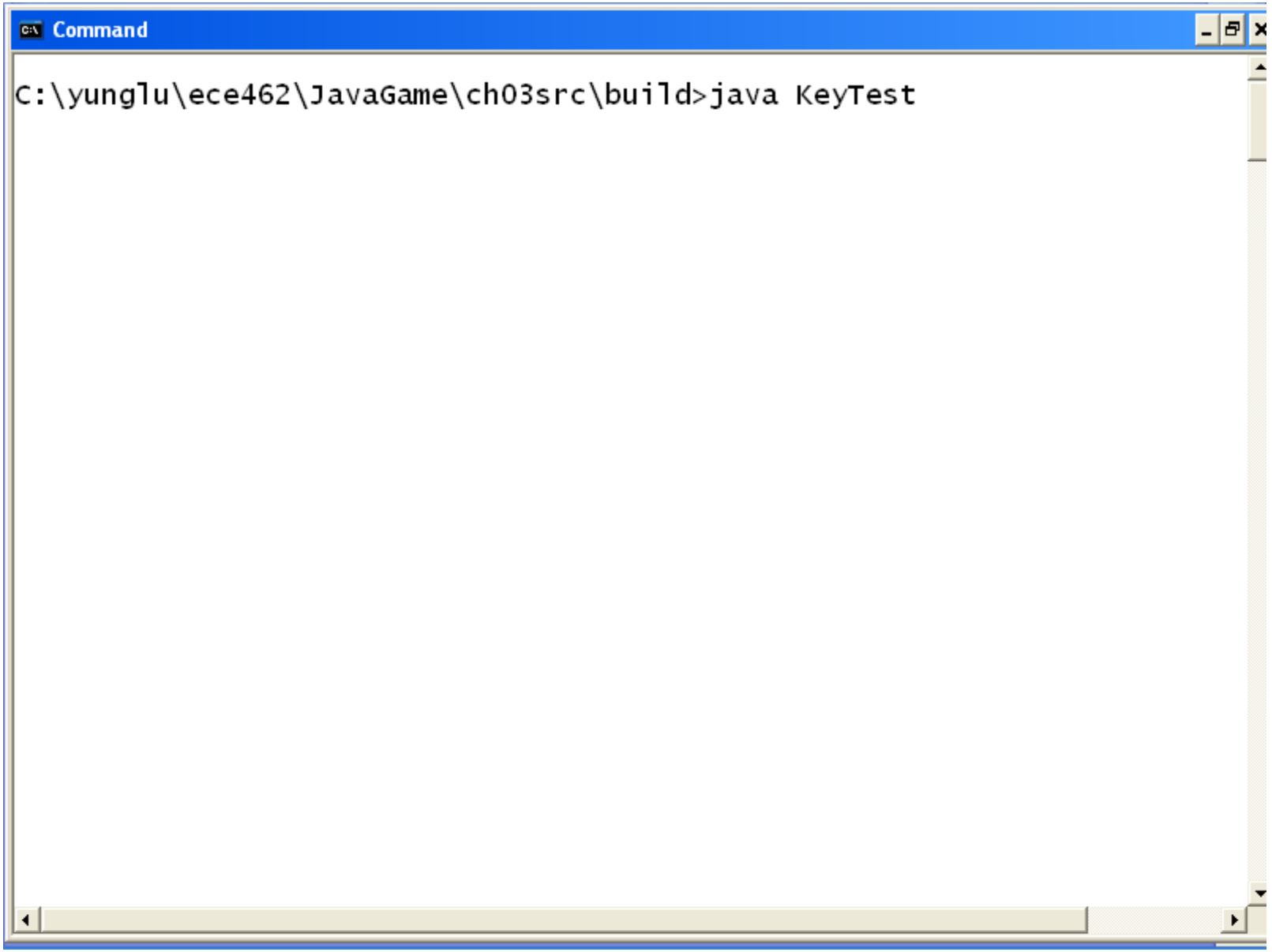
101 : 56

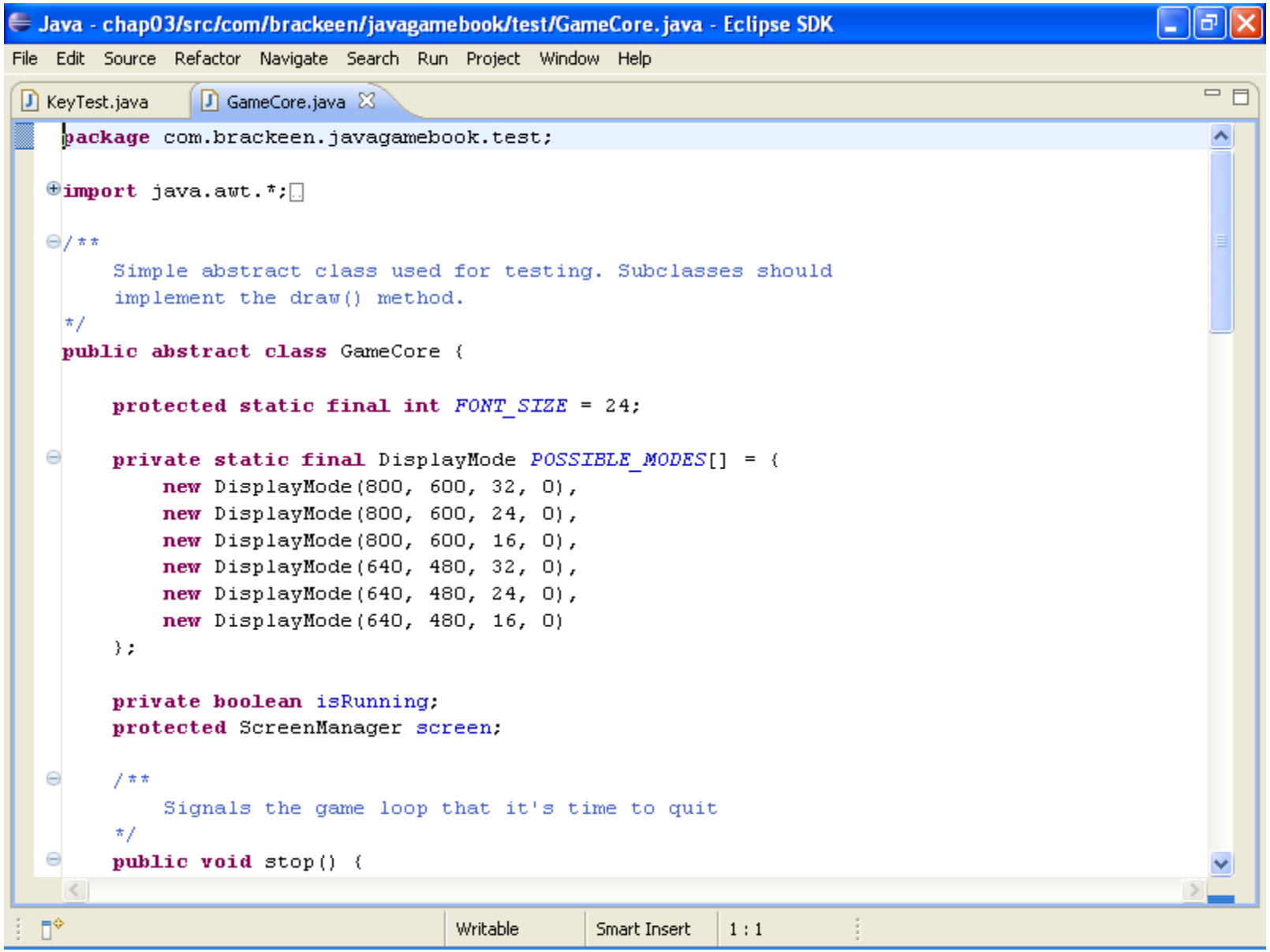

Java - KeyEventDemo/KeyEventDemo.java - Eclipse SDK
File Edit Source Refactor Navigate Search Run Project Window Help
KeyEventDemo.java
if (tmpString.length() > 0) {
modString += " (" + tmpString + ")";
} else {
modString += " (no extended modifiers)";
}
String actionString = "action key? ";
if (e.isActionKey()) {
actionString += "YES";
} else {
actionString += "NO";
}
String locationString = "key location: ";
int location = e.getKeyLocation();
if (location == KeyEvent.KEY_LOCATION_STANDARD) {
locationString += "standard";
} else if (location == KeyEvent.KEY_LOCATION_LEFT) {
locationString += "left";
} else if (location == KeyEvent.KEY_LOCATION_RIGHT) {
locationString += "right";
} else if (location == KeyEvent.KEY_LOCATION_NUMPAD) {
locationString += "numpad";
} else { // (location == KeyEvent.KEY_LOCATION_UNKNOWN)
locationString += "unknown";
}
displayArea.append(keyStatus + newline + "   " + keyString + newline
Writable
Smart Insert
101 : 56

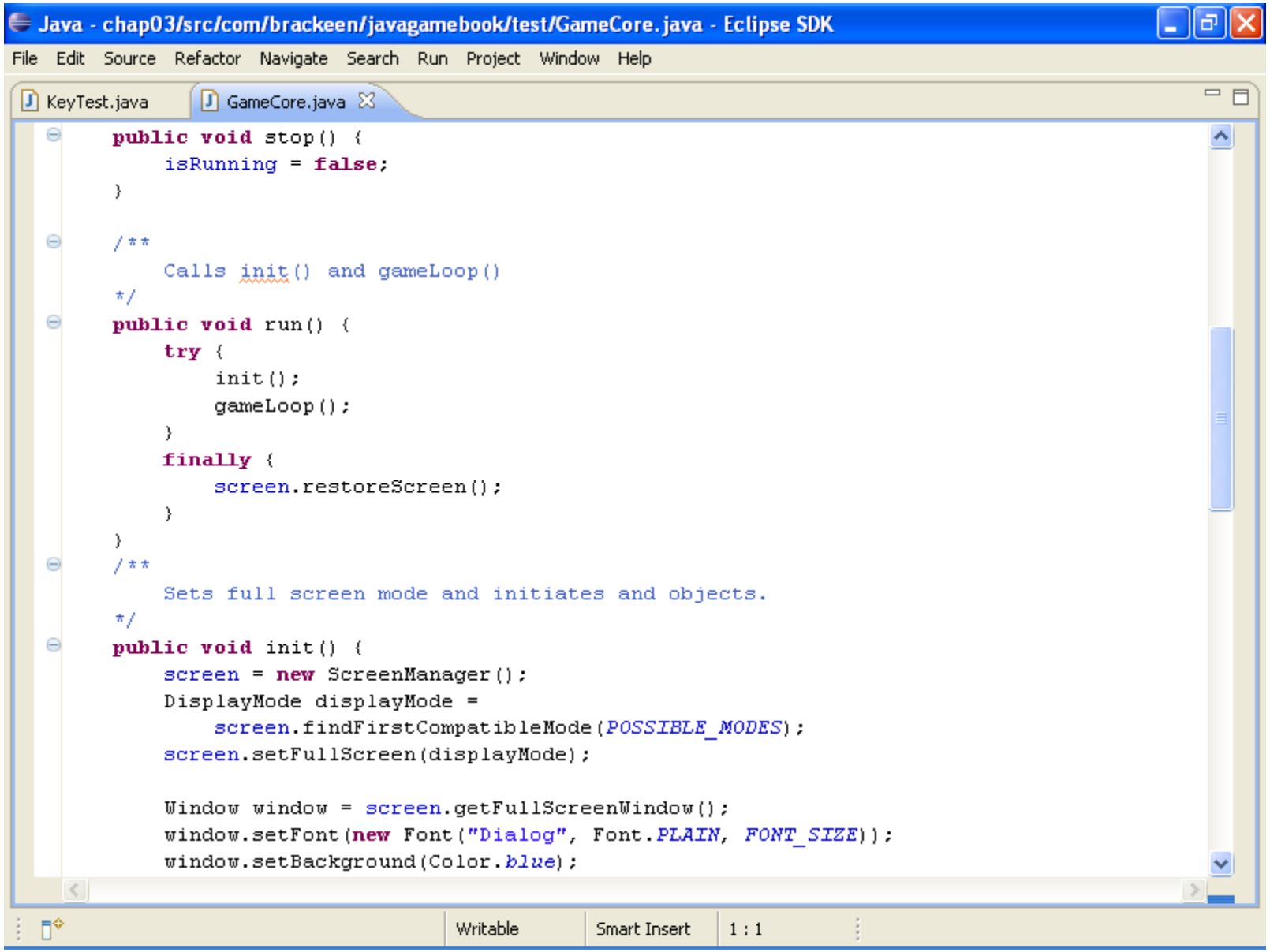

Java - KeyEventDemo/KeyEventDemo.java - Eclipse SDK
File Edit Source Refactor Navigate Search Run Project Window Help
KeyEventDemo.java
String actionString = "action key? ";
if (e.isActionKey()) {
actionString += "YES";
} else {
actionString += "NO";
}
String locationString = "key location: ";
int location = e.getKeyLocation();
if (location == KeyEvent.KEY_LOCATION_STANDARD) {
locationString += "standard";
} else if (location == KeyEvent.KEY_LOCATION_LEFT) {
locationString += "left";
} else if (location == KeyEvent.KEY_LOCATION_RIGHT) {
locationString += "right";
} else if (location == KeyEvent.KEY_LOCATION_NUMPAD) {
locationString += "numpad";
} else { // (location == KeyEvent.KEY_LOCATION_UNKNOWN)
locationString += "unknown";
}
displayArea.append(keyStatus + newline + " " + keyString + newline
+ " " + modString + newline + " " + actionString
+ newline + " " + locationString + newline);
displayArea.setCaretPosition(displayArea.getDocument().getLength());
}
}
Writable
Smart Insert
101 : 56

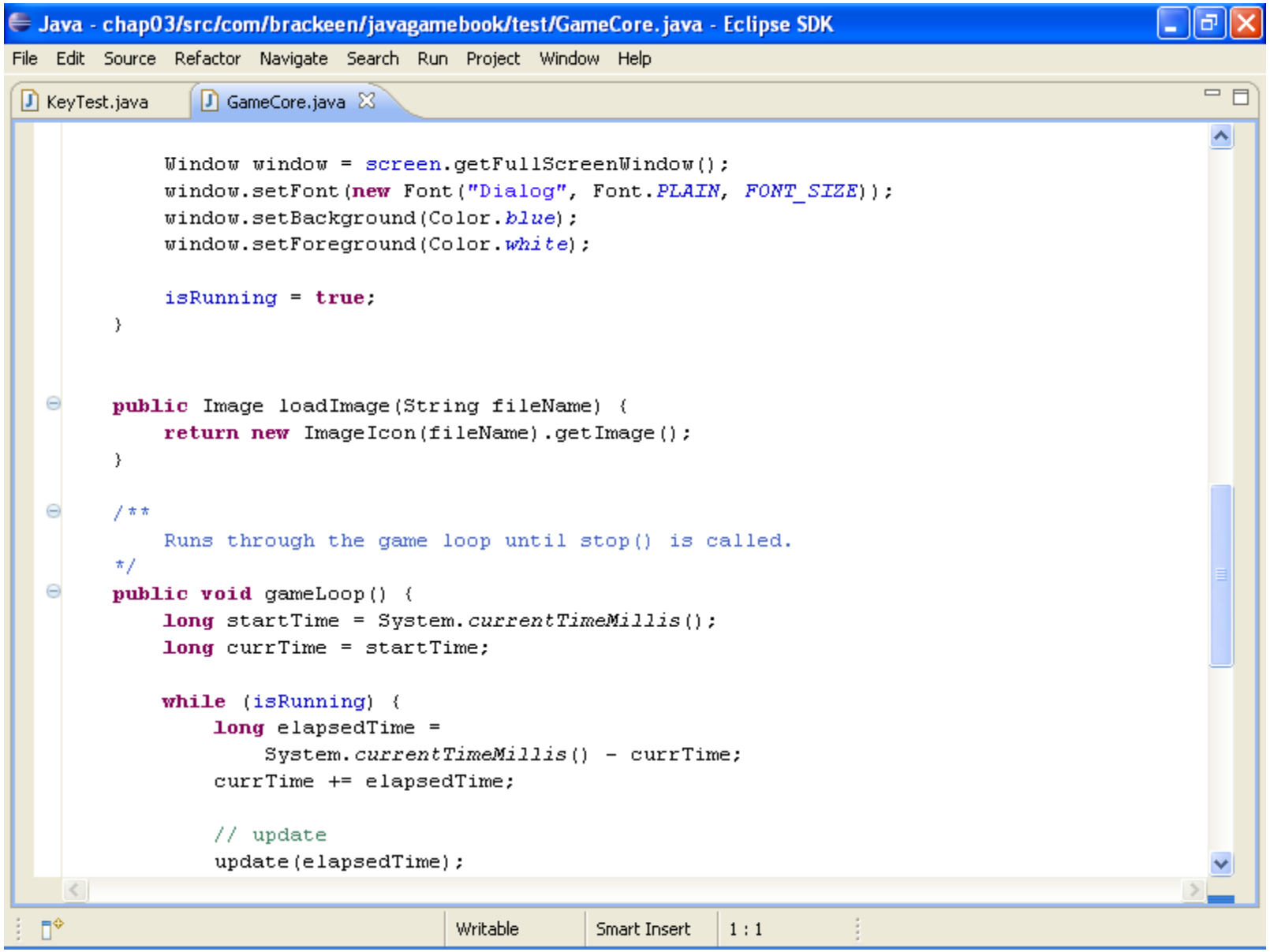
Handle Key Events in a Full Screen Game

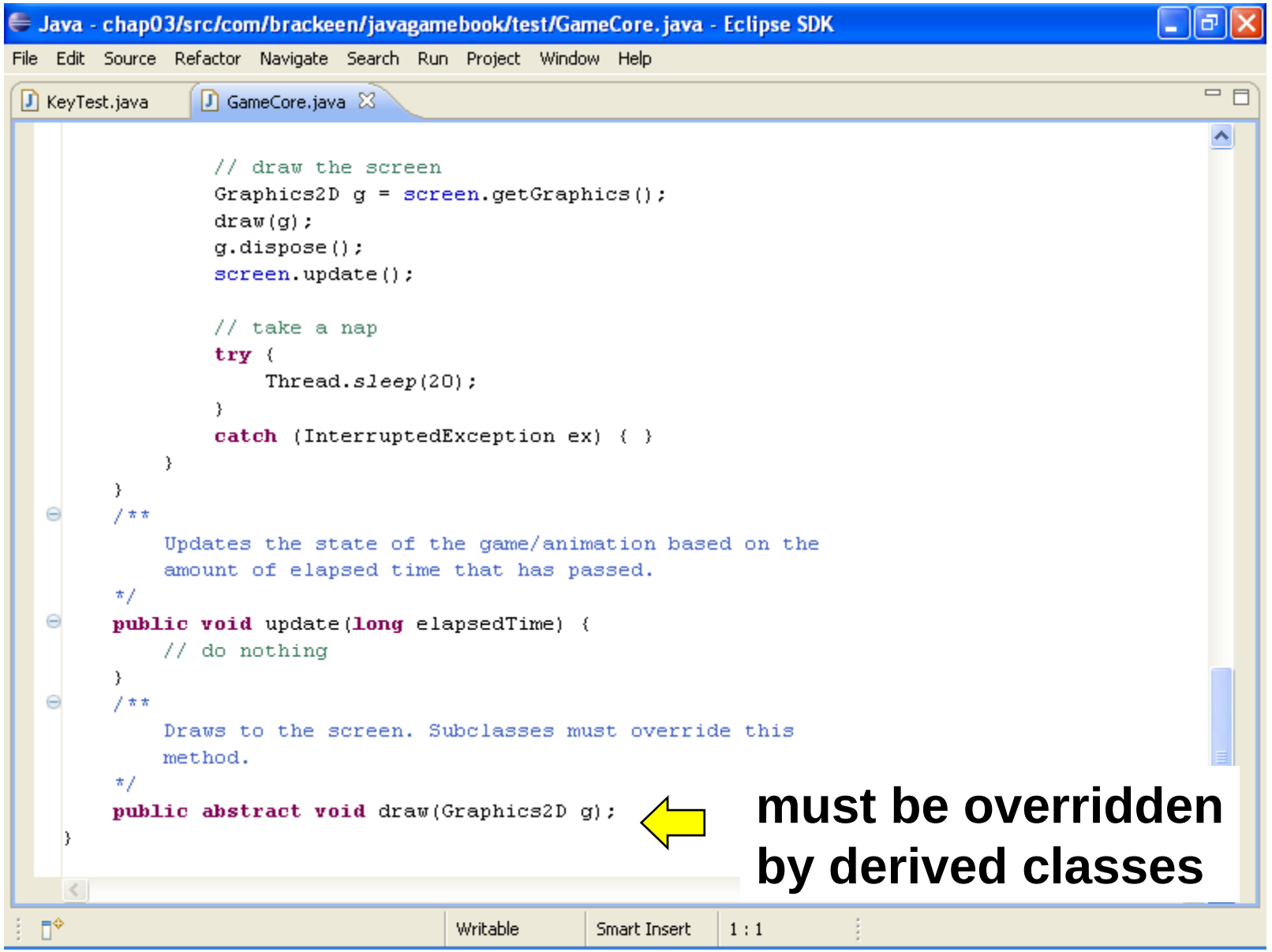

Command
C:\yunglu\ece462\JavaGame\ch03src\build>java KeyTest

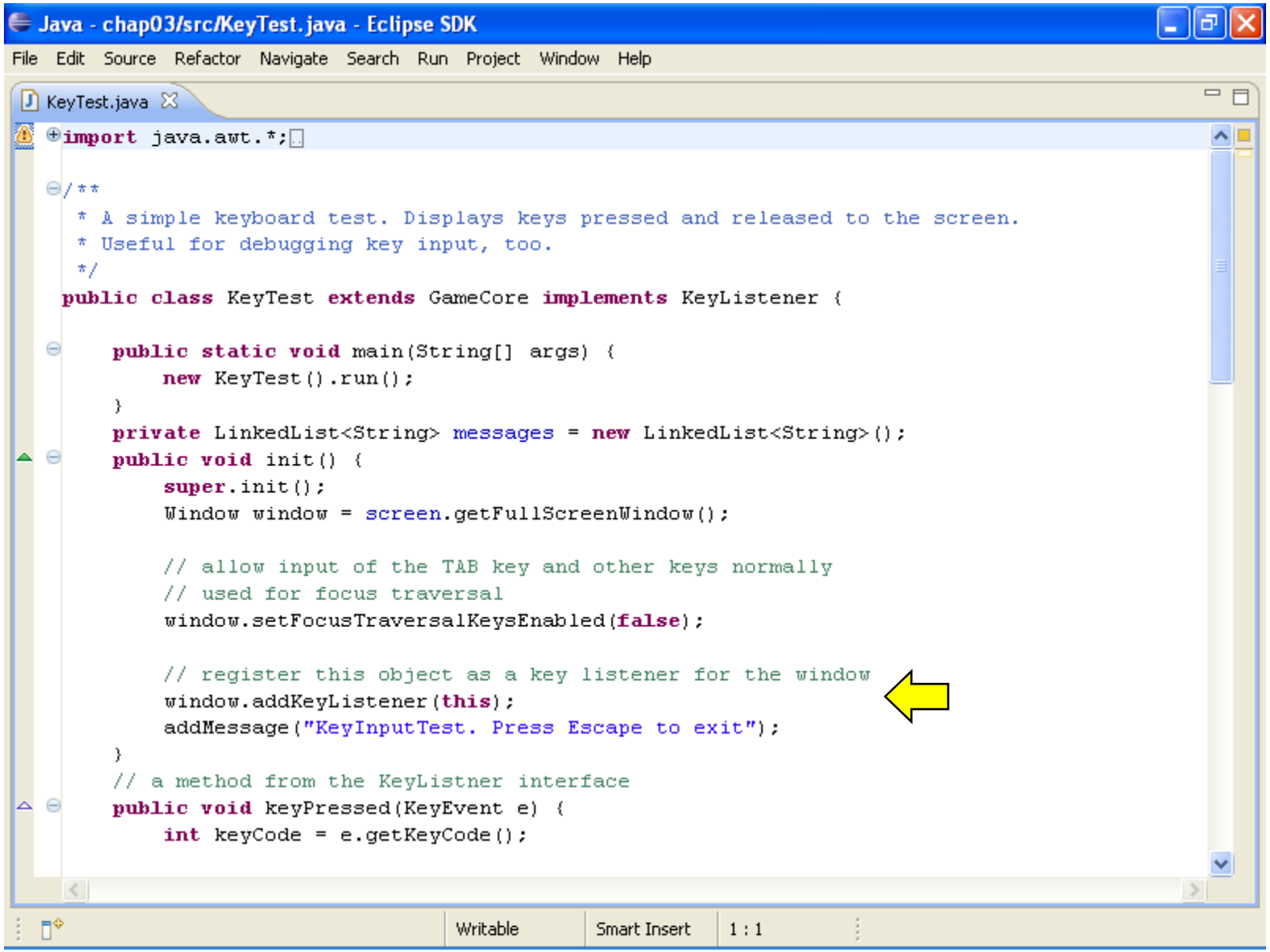

KeyInputTest. Pres


Java - chap03/src/com/brackeen/javagamebook/test/GameCore.java - Eclipse SDK
File Edit Source Refactor Navigate Search Run Project Window Help
KeyTest.java
GameCore.java
package com.brackeen.javagamebook.test;
import java.awt.*;
/**
Simple abstract class used for testing. Subclasses should
implement the draw() method.
*/
public abstract class GameCore {
protected static final int FONT_SIZE = 24;
private static final DisplayMode POSSIBLE_MODES[] = {
new DisplayMode(800, 600, 32, 0),
new DisplayMode(800, 600, 24, 0),
new DisplayMode(800, 600, 16, 0),
new DisplayMode(640, 480, 32, 0),
new DisplayMode(640, 480, 24, 0),
new DisplayMode(640, 480, 16, 0)
};
private boolean isRunning;
protected ScreenManager screen;
/**
Signals the game loop that it's time to quit
*/
public void stop() {
Writable
Smart Insert
1 : 1


Java - chap03/src/com/brackeen/javagamebook/test/GameCore.java - Eclipse SDK
File Edit Source Refactor Navigate Search Run Project Window Help
KeyTest.java
GameCore.java
public void stop() {
isRunning = false;
}
/**
Calls init() and gameLoop()
*/
public void run() {
try {
init();
gameLoop();
}
finally {
screen.restoreScreen();
}
}
/**
Sets full screen mode and initiates and objects.
*/
public void init() {
screen = new ScreenManager();
DisplayMode displayMode =
screen.findFirstCompatibleMode(POSSIBLE_MODES);
screen.setFullScreen(displayMode);
Window window = screen.getFullScreenWindow();
window.setFont(new Font("Dialog", Font.PLAIN, FONT_SIZE));
window.setBackground(Color.blue);
Writable
Smart Insert
1 : 1


Java - chap03/src/com/brackeen/javagamebook/test/GameCore.java - Eclipse SDK
File Edit Source Refactor Navigate Search Run Project Window Help
KeyTest.java
GameCore.java
Window window = screen.getFullScreenWindow();
window.setFont(new Font("Dialog", Font.PLAIN, FONT_SIZE));
window.setBackground(Color.blue);
window.setForeground(Color.white);
isRunning = true;
}
public Image loadImage(String fileName) {
return new ImageIcon(fileName).getImage();
}
/**
Runs through the game loop until stop() is called.
*/
public void gameLoop() {
long startTime = System.currentTimeMillis();
long currTime = startTime;
while (isRunning) {
long elapsedTime =
System.currentTimeMillis() - currTime;
currTime += elapsedTime;
// update
update(elapsedTime);
Writable
Smart Insert
1 : 1


Java - chap03/src/com/brackeen/javagamebook/test/GameCore.java - Eclipse SDK
File Edit Source Refactor Navigate Search Run Project Window Help
KeyTest.java
GameCore.java
// draw the screen
Graphics2D g = screen.getGraphics();
draw(g);
g.dispose();
screen.update();
// take a nap
try {
Thread.sleep(20);
}
catch (InterruptedException ex) { }
}
}
/**
Updates the state of the game/animation based on the
amount of elapsed time that has passed.
*/
public void update(long elapsedTime) {
// do nothing
}
/**
Draws to the screen. Subclasses must override this
method.
*/
public abstract void draw(Graphics2D g);
}
must be overridden by derived classes
Writable
Smart Insert
1 : 1


Java - chap03/src/KeyTest.java - Eclipse SDK
File Edit Source Refactor Navigate Search Run Project Window Help
KeyTest.java
import java.awt.*;
/**
* A simple keyboard test. Displays keys pressed and released to the screen.
* Useful for debugging key input, too.
*/
public class KeyTest extends GameCore implements KeyListener {
public static void main(String[] args) {
new KeyTest().run();
}
private LinkedList<String> messages = new LinkedList<String>();
public void init() {
super.init();
Window window = screen.getFullScreenWindow();
// allow input of the TAB key and other keys normally
// used for focus traversal
window.setFocusTraversalKeysEnabled(false);
// register this object as a key listener for the window
window.addKeyListener(this);
addMessage("KeyInputTest. Press Escape to exit");
}
// a method from the KeyListner interface
public void keyPressed(KeyEvent e) {
int keyCode = e.getKeyCode();
Writable
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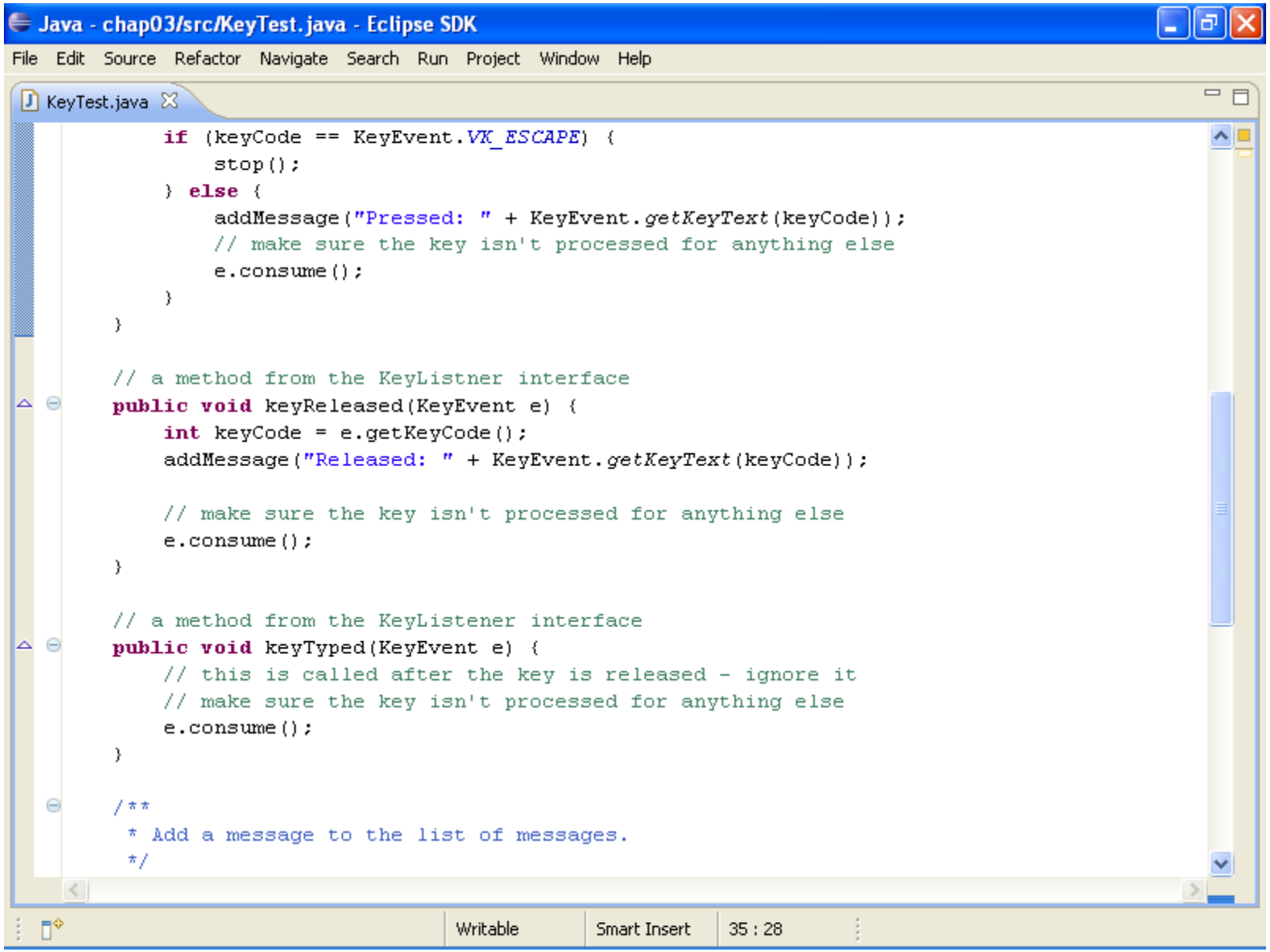
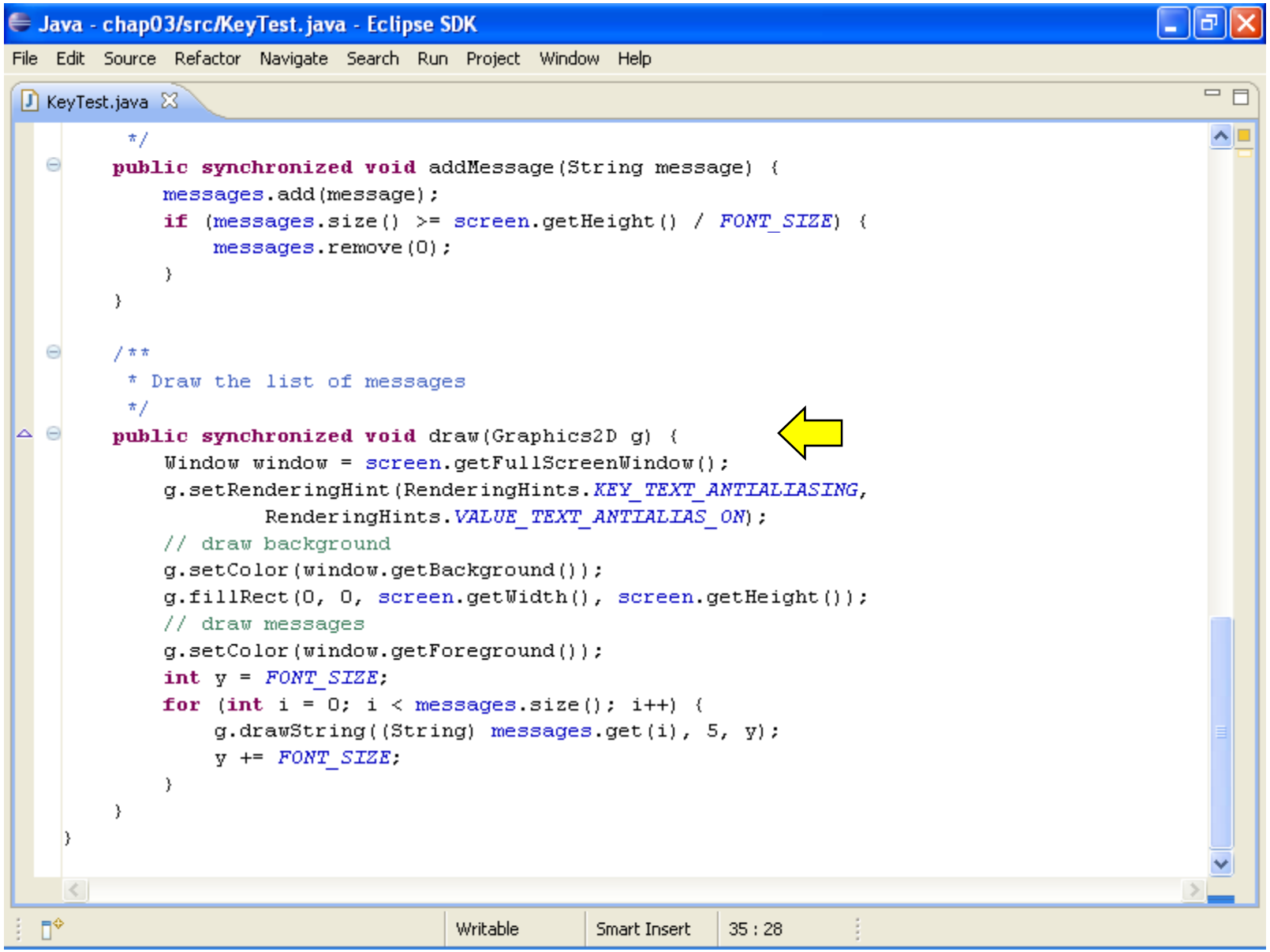
1 : 1


Java - chap03/src/KeyTest.java - Eclipse SDK
File Edit Source Refactor Navigate Search Run Project Window Help
KeyTest.java
if (keyCode == KeyEvent.VK_ESCAPE) {
stop();
} else {
addMessage("Pressed: " + KeyEvent.getKeyText(keyCode));
// make sure the key isn't processed for anything else
e.consume();
}
}
// a method from the KeyListner interface
public void keyReleased(KeyEvent e) {
int keyCode = e.getKeyCode();
addMessage("Released: " + KeyEvent.getKeyText(keyCode));
// make sure the key isn't processed for anything else
e.consume();
}
// a method from the KeyListener interface
public void keyTyped(KeyEvent e) {
// this is called after the key is released - ignore it
// make sure the key isn't processed for anything else
e.consume();
}
/**
* Add a message to the list of messages.
*/
Writable
Smart Insert
35 : 28


Java - chap03/src/KeyTest.java - Eclipse SDK
File Edit Source Refactor Navigate Search Run Project Window Help
KeyTest.java
*/
public synchronized void addMessage(String message) {
messages.add(message);
if (messages.size() >= screen.getHeight() / FONT_SIZE) {
messages.remove(0);
}
}
/**
* Draw the list of messages
*/
public synchronized void draw(Graphics2D g) {
Window window = screen.getFullScreenWindow();
g.setRenderingHint(RenderingHints.KEY_TEXT_ANTIALIASING,
RenderingHints.VALUE_TEXT_ANTIALIAS_ON);
// draw background
g.setColor(window.getBackground());
g.fillRect(0, 0, screen.getWidth(), screen.getHeight());
// draw messages
g.setColor(window.getForeground());
int y = FONT_SIZE;
for (int i = 0; i < messages.size(); i++) {
g.drawString((String) messages.get(i), 5, y);
y += FONT_SIZE;
}
}
}
Writable
Smart Insert
35 : 28

ECE 462
Object-Oriented Programming using C++ and Java

Mouse Inputs in Java Games

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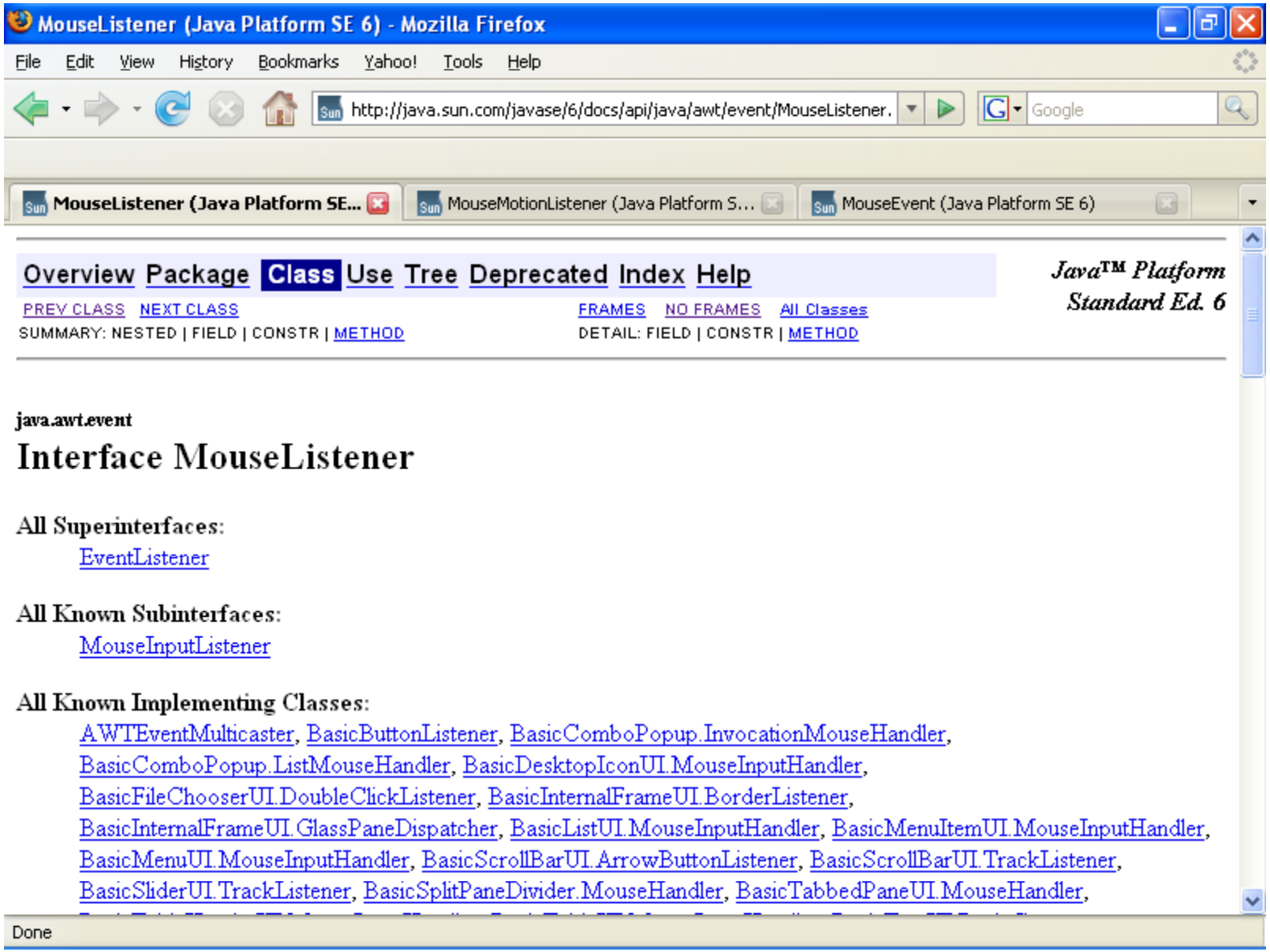
Java Mouse Listeners

- MouseListener: handle clicks
  - mouseClicked(MouseEvent e)
  - mouseEntered(MouseEvent e)
  - mouseExited(MouseEvent e)
  - mousePressed(MouseEvent e)
  - mouseReleased(MouseEvent e)
- MouseMotionListener: handle motion
  - mouseDragged(MouseEvent e)
  - mouseMoved(MouseEvent e)


MouseListener (Java Platform SE 6) - Mozilla Firefox
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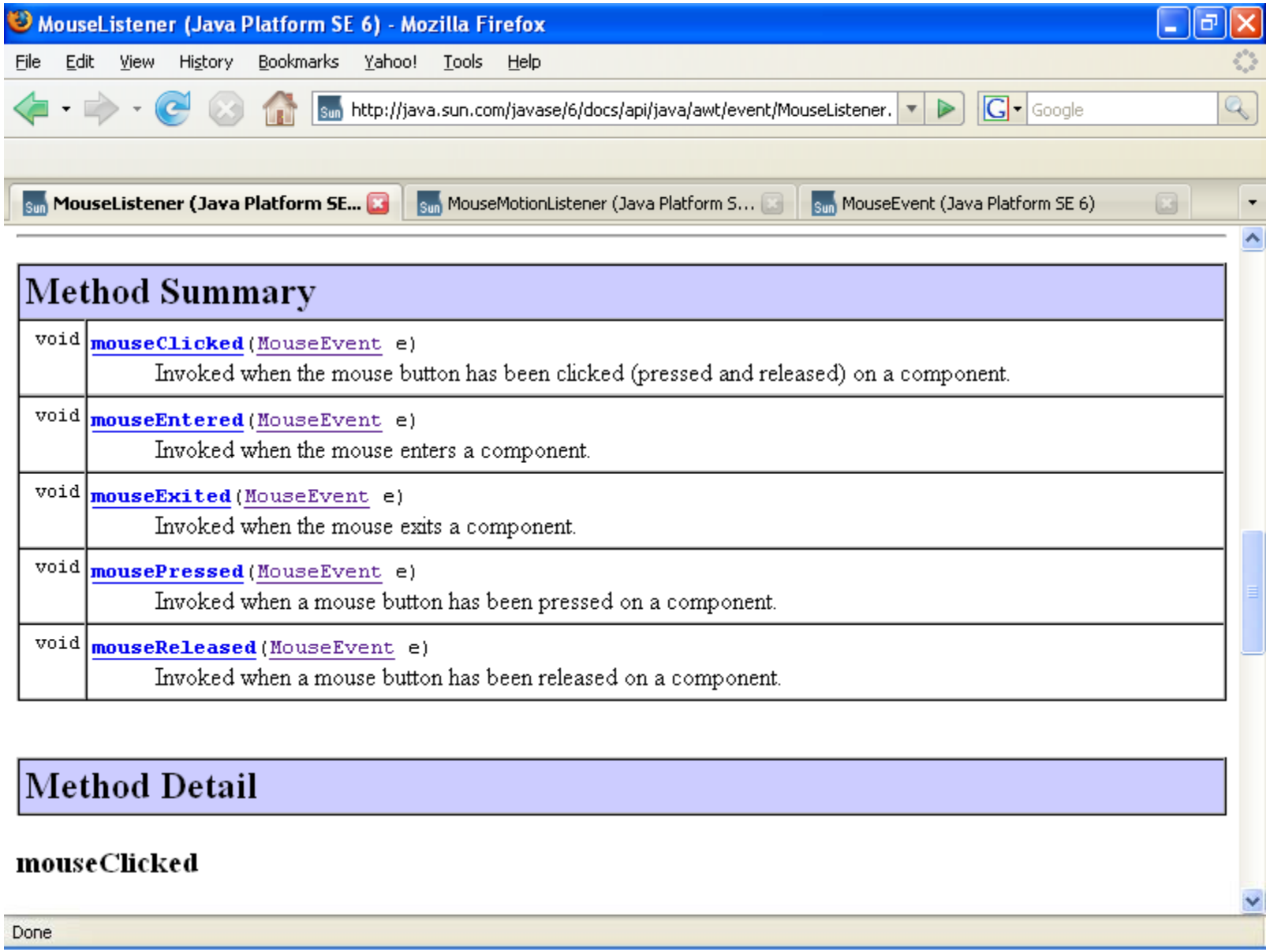
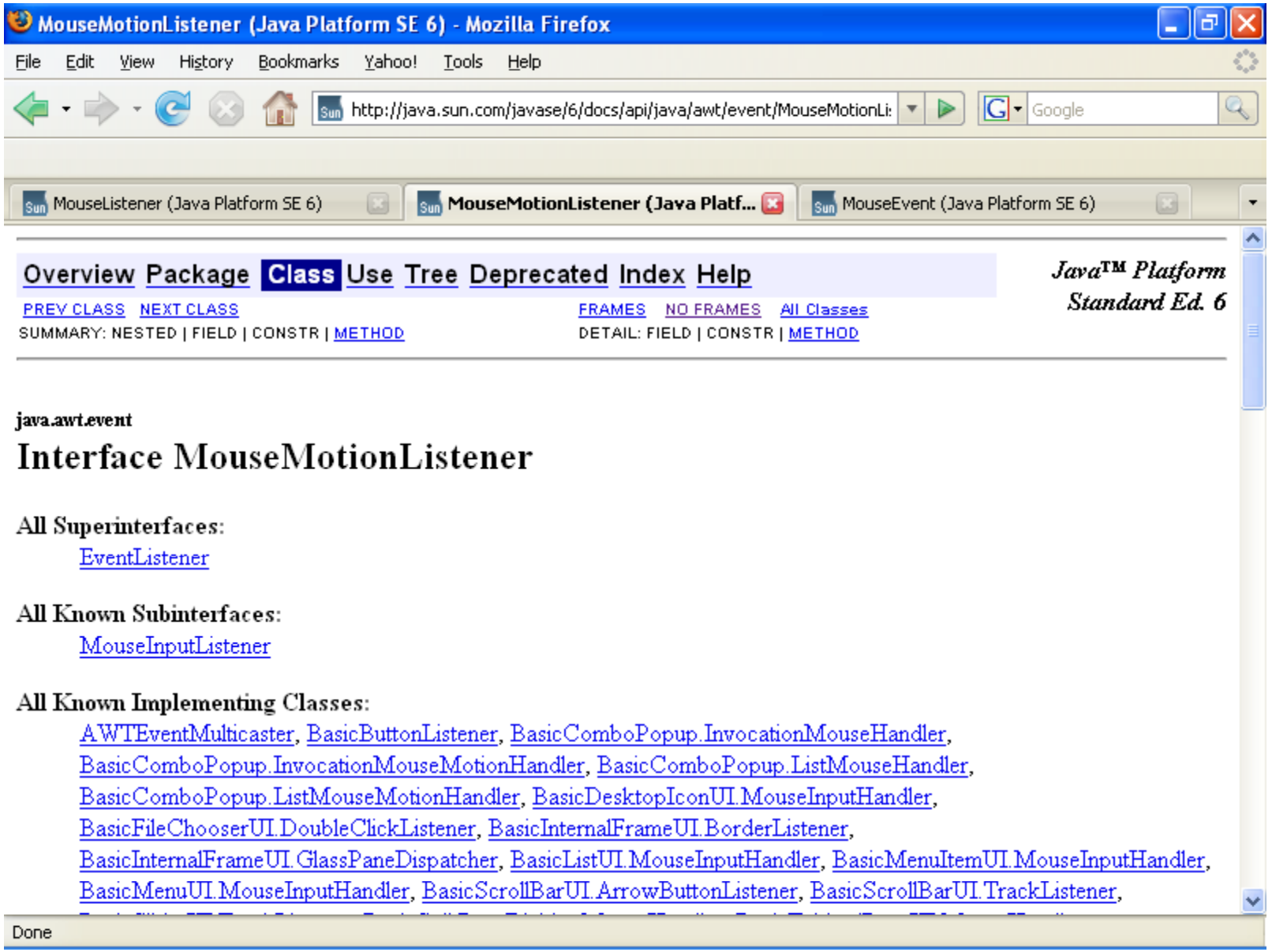
http://java.sun.com/javase/6/docs/api/java/awt/event/MouseListener.
Google
MouseListener (Java Platform SE...
MouseMotionListener (Java Platform S...
MouseEvent (Java Platform SE 6)
Overview Package Class Use Tree Deprecated Index Help
Java™ Platform Standard Ed. 6
PREV CLASS NEXT CLASS
FRAMES NO FRAMES All Classes
SUMMARY: NESTED | FIELD | CONSTR | METHOD
DETAIL: FIELD | CONSTR | METHOD
java.awt.event
Interface MouseListener
All Superinterfaces:
EventListener
All Known Subinterfaces:
MouseInputListener
All Known Implementing Classes:
AWTEventMulticaster, BasicButtonListener, BasicComboPopup.InvocationMouseHandler,
BasicComboPopup.ListMouseHandler, BasicDesktopIconUI.MouseInputHandler,
BasicFileChooserUI.DoubleClickListener, BasicInternalFrameUI.BorderListener,
BasicInternalFrameUI.GlassPaneDispatcher, BasicListUI.MouseInputHandler, BasicMenuItemUI.MouseInputHandler,
BasicMenuUI.MouseInputHandler, BasicScrollBarUI.ArrowButtonListener, BasicScrollBarUI.TrackListener,
BasicSliderUI.TrackListener, BasicSplitPaneDivider.MouseHandler, BasicTabbedPaneUI.MouseHandler,
Done


MouseListener (Java Platform SE 6) - Mozilla Firefox
File Edit View History Bookmarks Yahoo! Tools Help
http://java.sun.com/javase/6/docs/api/java/awt/event/MouseListener.
Google
MouseListener (Java Platform SE...
MouseMotionListener (Java Platform S...
MouseEvent (Java Platform SE 6)
Method Summary
void mouseClicked(MouseEvent e)
Invoked when the mouse button has been clicked (pressed and released) on a component.
void mouseEntered(MouseEvent e)
Invoked when the mouse enters a component.
void mouseExited(MouseEvent e)
Invoked when the mouse exits a component.
void mousePressed(MouseEvent e)
Invoked when a mouse button has been pressed on a component.
void mouseReleased(MouseEvent e)
Invoked when a mouse button has been released on a component.
Method Detail
mouseClicked
Done


MouseMotionListener (Java Platform SE 6) - Mozilla Firefox
File Edit View History Bookmarks Yahoo! Tools Help
http://java.sun.com/javase/6/docs/api/java/awt/event/MouseMotionLi
Google
MouseListener (Java Platform SE 6)
MouseMotionListener (Java Platf...
MouseEvent (Java Platform SE 6)
Overview Package Class Use Tree Deprecated Index Help
Java™ Platform Standard Ed. 6
PREV CLASS NEXT CLASS
FRAMES NO FRAMES All Classes
SUMMARY: NESTED | FIELD | CONSTR | METHOD
DETAIL: FIELD | CONSTR | METHOD
java.awt.event
Interface MouseMotionListener
All Superinterfaces:
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All Known Subinterfaces:
MouseInputListener
All Known Implementing Classes:
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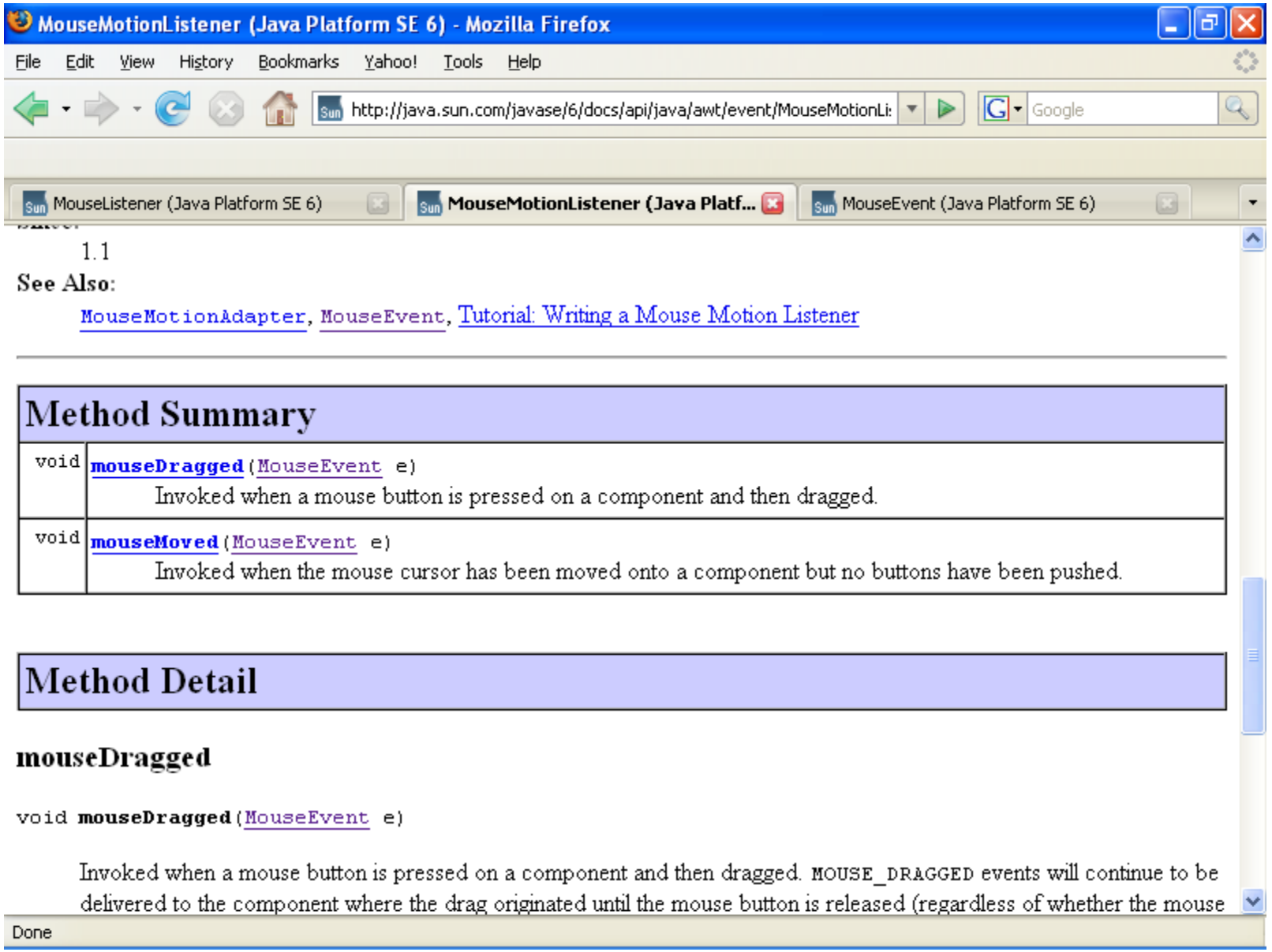
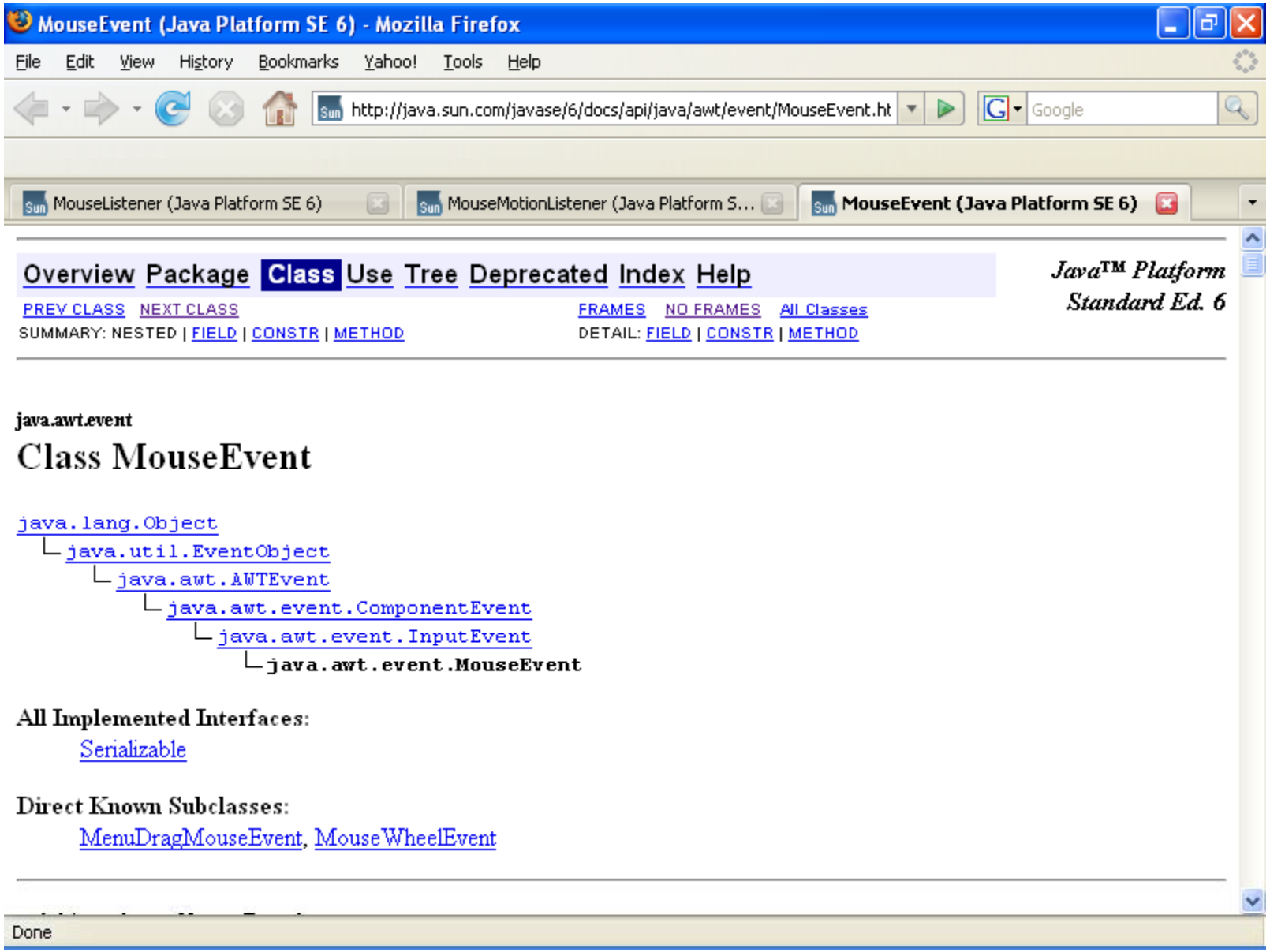
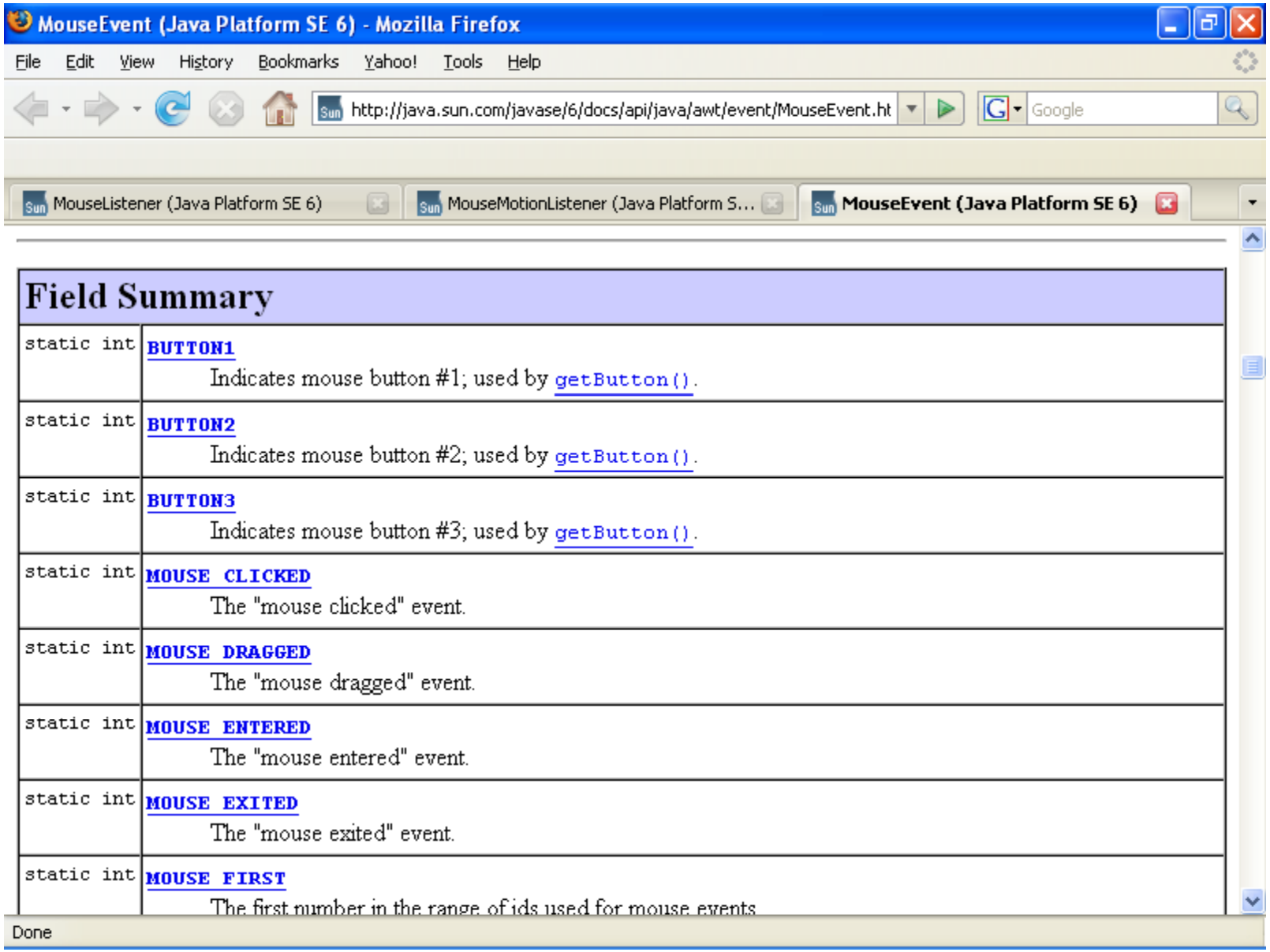
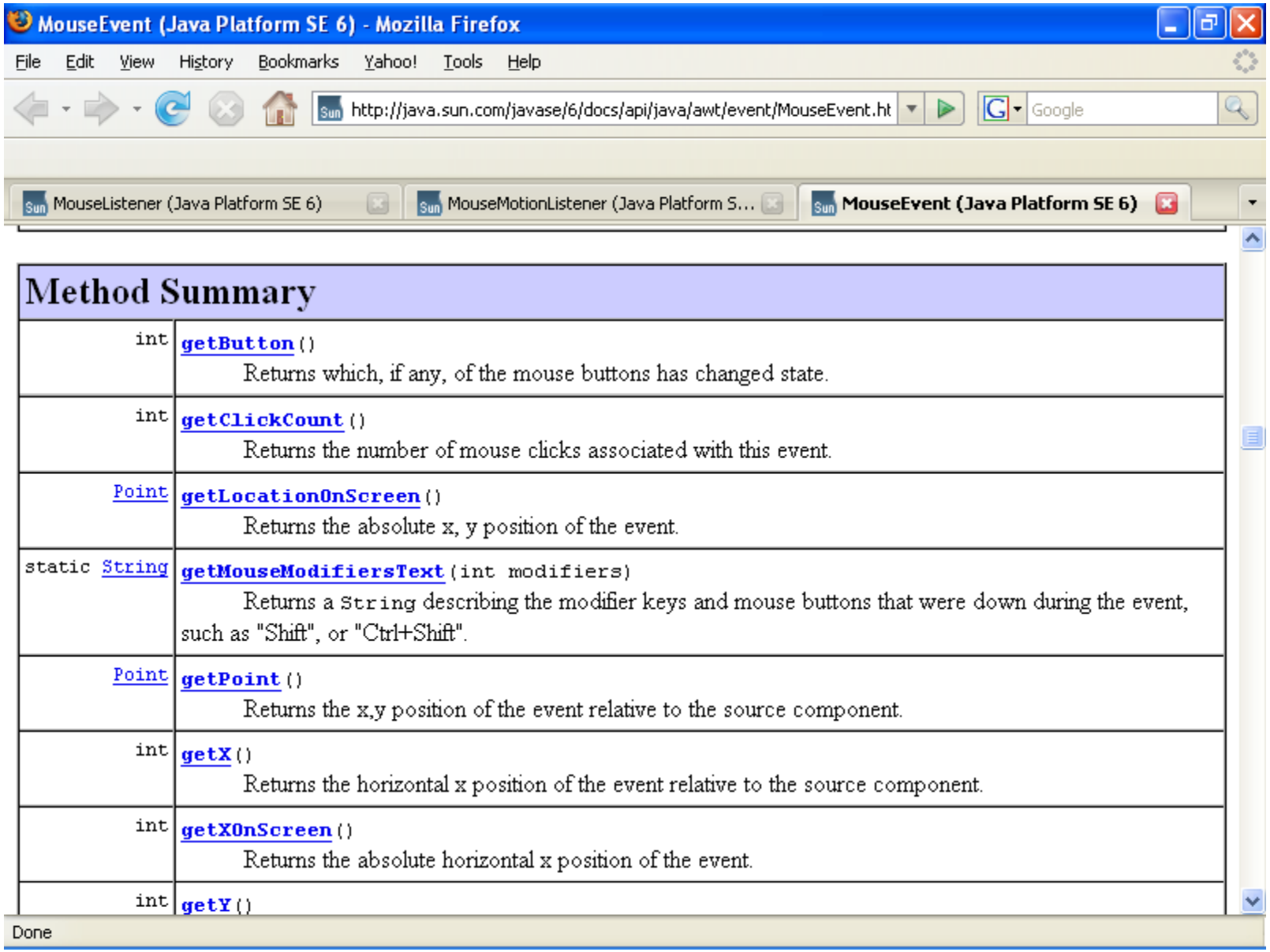
BasicComboPopup.ListMouseMotionHandler, BasicDesktopIconUI.MouseInputHandler,
BasicFileChooserUI.DoubleClickListener, BasicInternalFrameUI.BorderListener,
BasicInternalFrameUI.GlassPaneDispatcher, BasicListUI.MouseInputHandler, BasicMenuItemUI.MouseInputHandler,
BasicMenuUI.MouseInputHandler, BasicScrollBarUI.ArrowButtonListener, BasicScrollBarUI.TrackListener,
Done

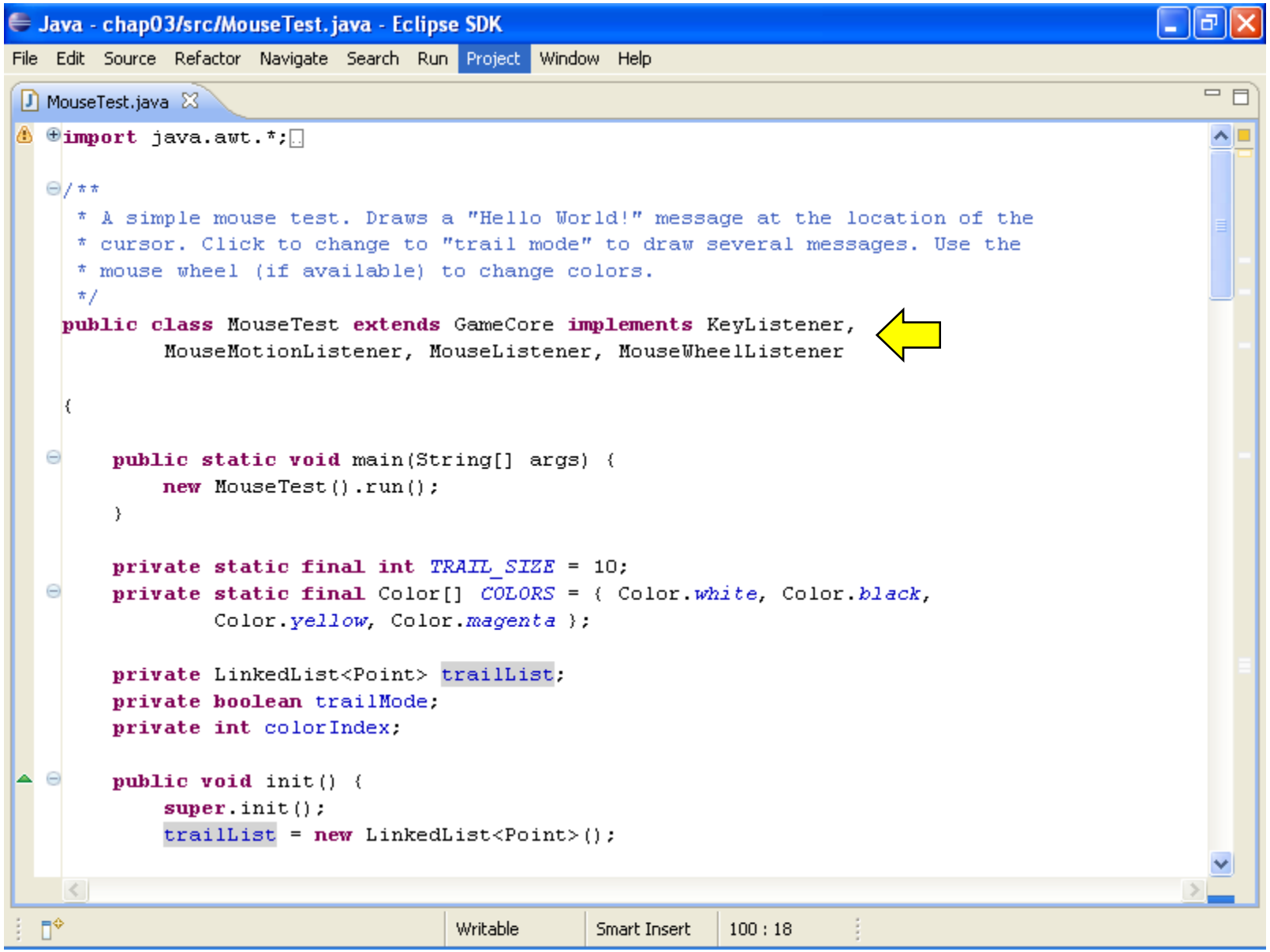

MouseMotionListener (Java Platform SE 6) - Mozilla Firefox
File Edit View History Bookmarks Yahoo! Tools Help
http://java.sun.com/javase/6/docs/api/java/awt/event/MouseMotionLi
Google
MouseListener (Java Platform SE 6)
MouseMotionListener (Java Platf...
MouseEvent (Java Platform SE 6)
1.1
See Also:
MouseMotionAdapter, MouseEvent, Tutorial: Writing a Mouse Motion Listener
Method Summary
void mouseDragged(MouseEvent e)
Invoked when a mouse button is pressed on a component and then dragged.
void mouseMoved(MouseEvent e)
Invoked when the mouse cursor has been moved onto a component but no buttons have been pushed.
Method Detail
mouseDragged
void mouseDragged(MouseEvent e)
Invoked when a mouse button is pressed on a component and then dragged. MOUSE_DRAGGED events will continue to be delivered to the component where the drag originated until the mouse button is released (regardless of whether the mouse
Done

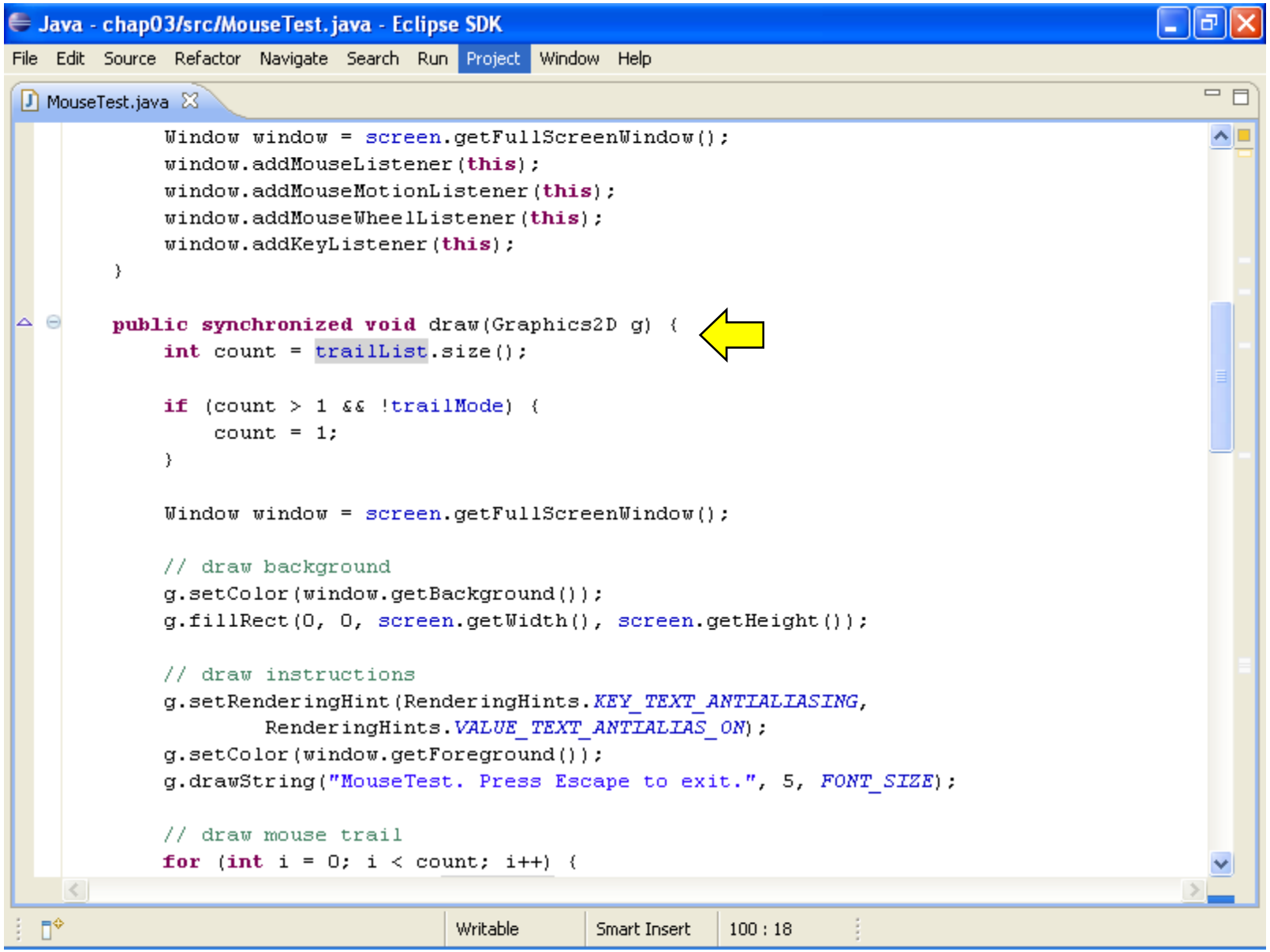

MouseEvent (Java Platform SE 6) - Mozilla Firefox
File Edit View History Bookmarks Yahoo! Tools Help
http://java.sun.com/javase/6/docs/api/java/awt/event/MouseEvent.ht
Google
MouseListener (Java Platform SE 6)
MouseMotionListener (Java Platform S...
MouseEvent (Java Platform SE 6)
Overview Package Class Use Tree Deprecated Index Help
Java™ Platform Standard Ed. 6
PREV CLASS NEXT CLASS
FRAMES NO FRAMES All Classes
SUMMARY: NESTED | FIELD | CONSTR | METHOD
DETAIL: FIELD | CONSTR | METHOD
java.awt.event
Class MouseEvent
java.lang.Object
java.util.EventObject
java.awt.AWTEvent
java.awt.event.ComponentEvent
java.awt.event.InputEvent
java.awt.event.MouseEvent
All Implemented Interfaces:
Serializable
Direct Known Subclasses:
MenuDragMouseEvent, MouseWheelEvent
Done

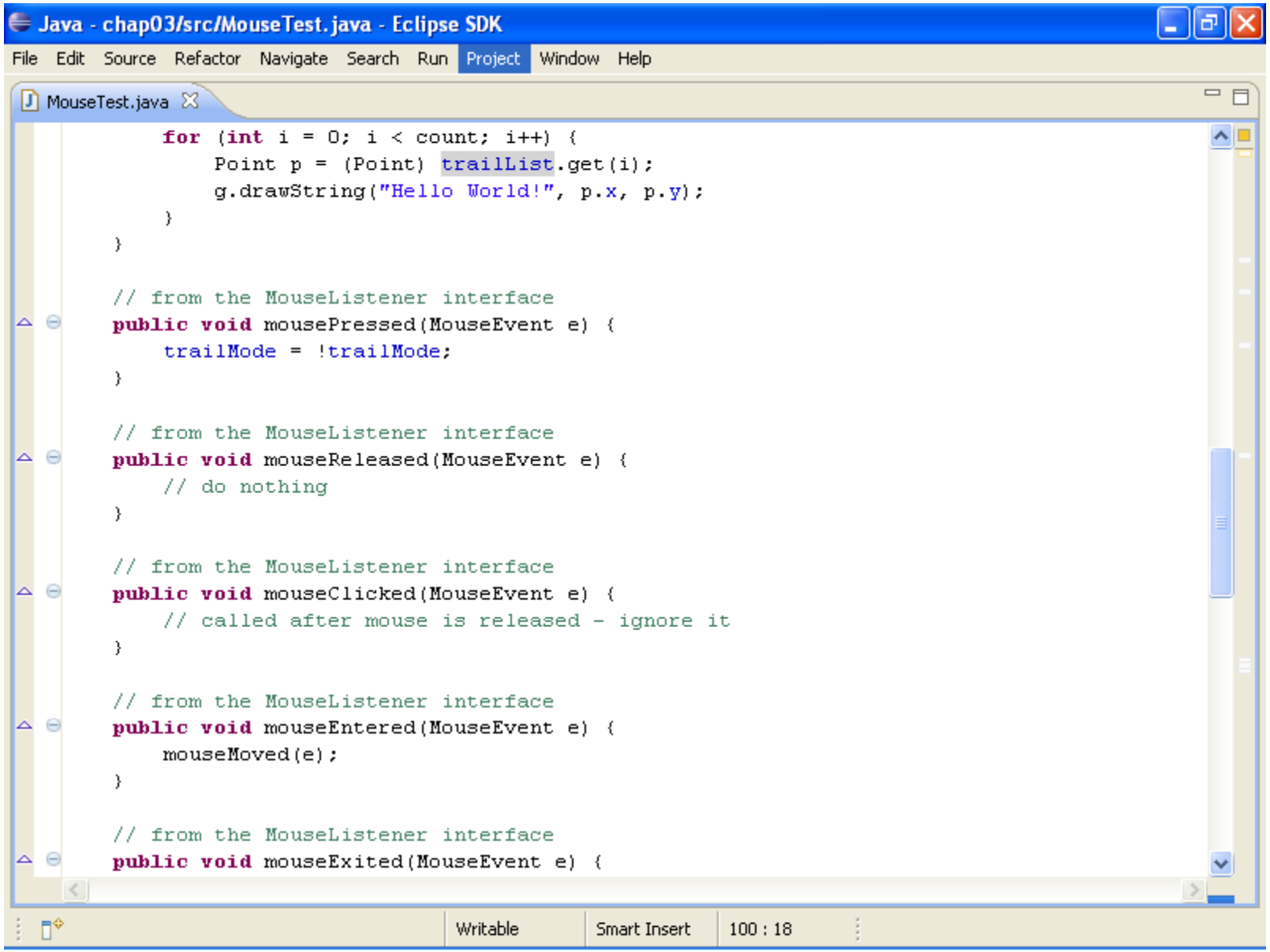

MouseEvent (Java Platform SE 6) - Mozilla Firefox
File Edit View History Bookmarks Yahoo! Tools Help
http://java.sun.com/javase/6/docs/api/java/awt/event/MouseEvent.ht
Google
MouseListener (Java Platform SE 6)
MouseMotionListener (Java Platform S...
MouseEvent (Java Platform SE 6)
Field Summary
static int BUTTON1
Indicates mouse button #1; used by getButton().
static int BUTTON2
Indicates mouse button #2; used by getButton().
static int BUTTON3
Indicates mouse button #3; used by getButton().
static int MOUSE_CLICKED
The "mouse clicked" event.
static int MOUSE_DRAGGED
The "mouse dragged" event.
static int MOUSE_ENTERED
The "mouse entered" event.
static int MOUSE_EXITED
The "mouse exited" event.
static int MOUSE_FIRST
The first number in the range of ids used for mouse events.
Done

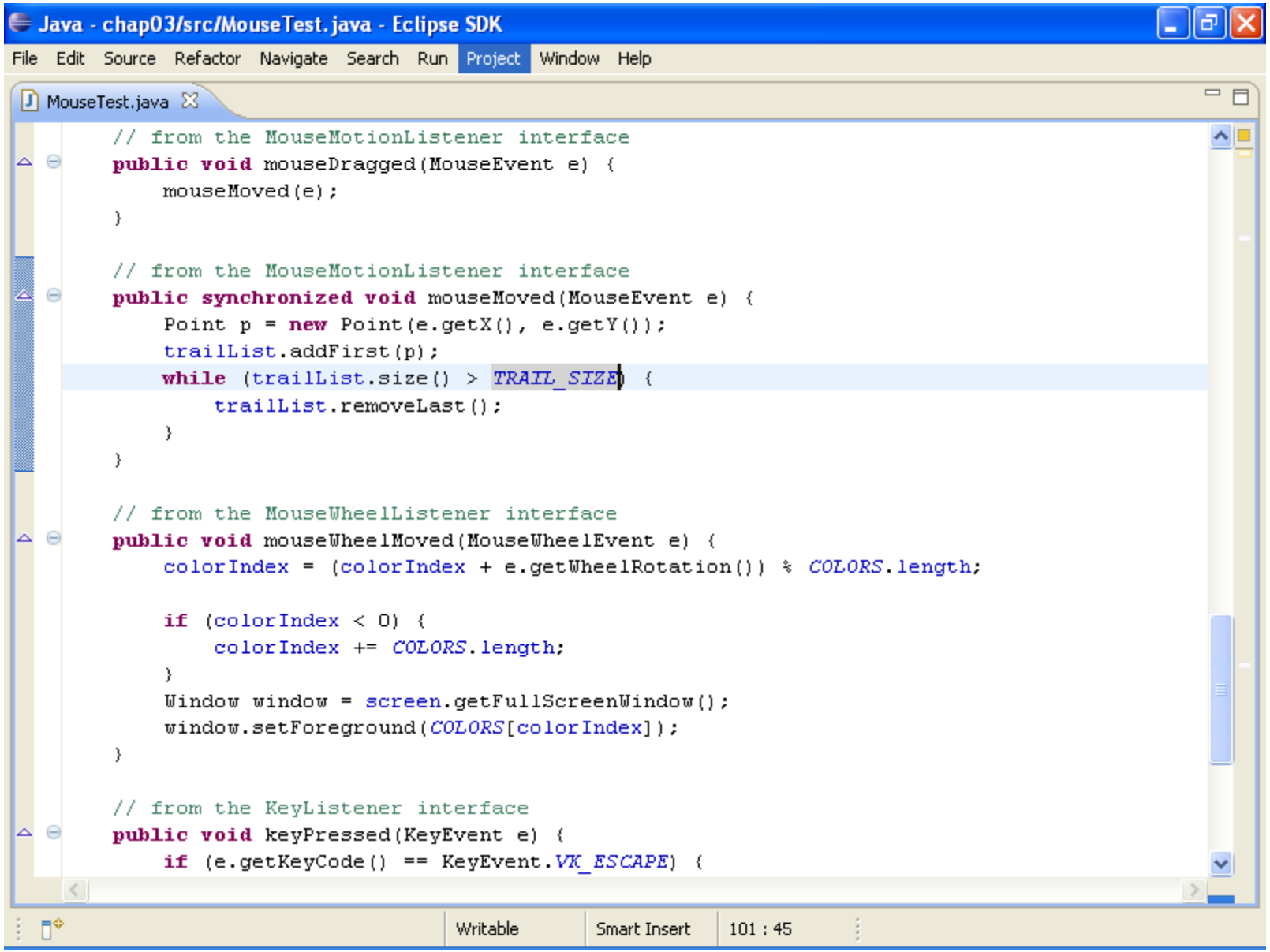

MouseEvent (Java Platform SE 6) - Mozilla Firefox
File Edit View History Bookmarks Yahoo! Tools Help
http://java.sun.com/javase/6/docs/api/java/awt/event/MouseEvent.ht
Google
MouseListener (Java Platform SE 6)
MouseMotionListener (Java Platform S...
MouseEvent (Java Platform SE 6)
Method Summary
int getButton()
Returns which, if any, of the mouse buttons has changed state.
int getClickCount()
Returns the number of mouse clicks associated with this event.
Point getLocationOnScreen()
Returns the absolute x, y position of the event.
static String getMouseModifiersText(int modifiers)
Returns a String describing the modifier keys and mouse buttons that were down during the event, such as "Shift", or "Ctrl+Shift".
Point getPoint()
Returns the x,y position of the event relative to the source component.
int getX()
Returns the horizontal x position of the event relative to the source component.
int getXOnScreen()
Returns the absolute horizontal x position of the event.
int getY()
Done

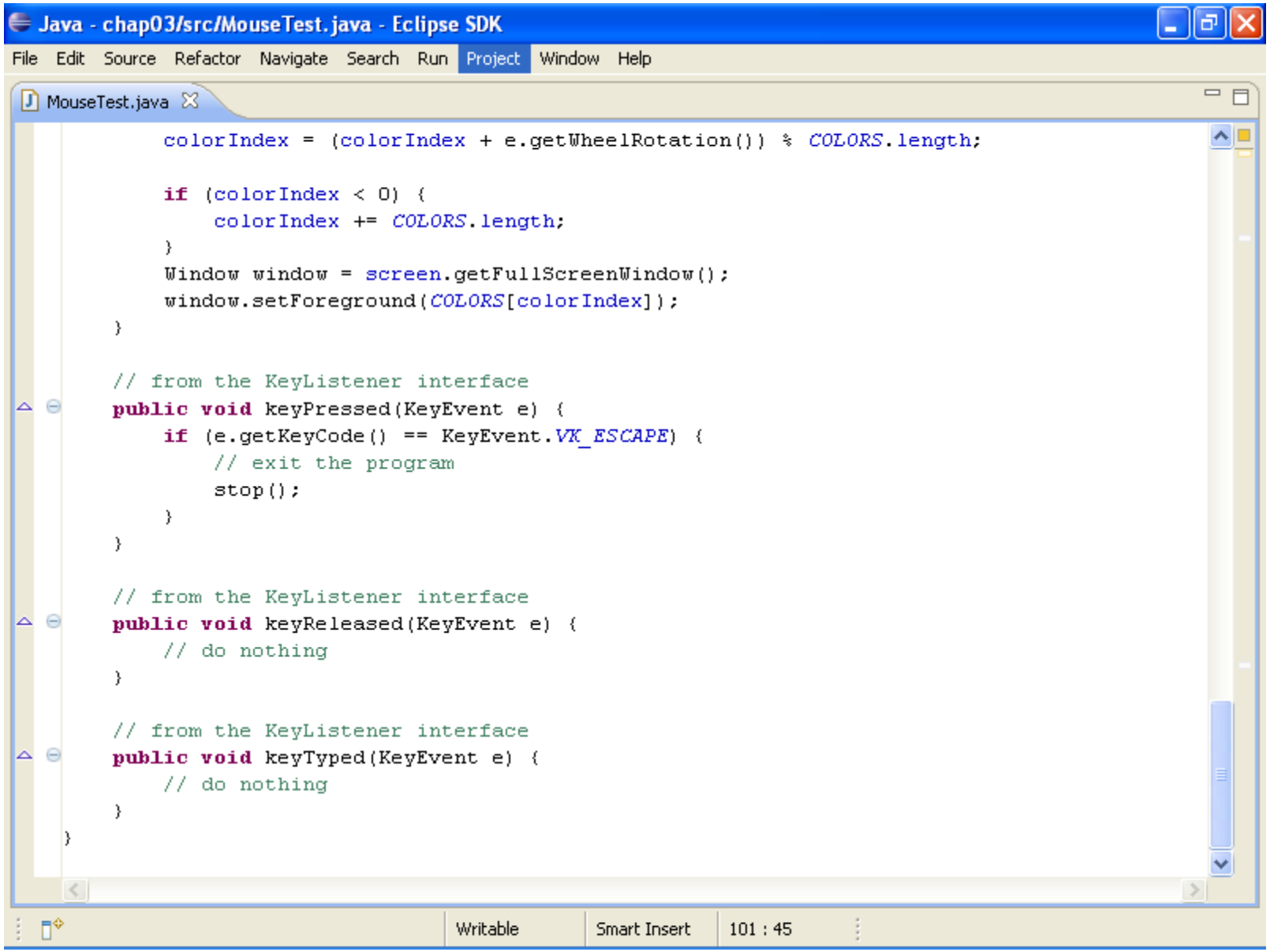

MouseTest. Press Escape to exit.
Hello World!


Java - chap03/src/MouseTest.java - Eclipse SDK
File Edit Source Refactor Navigate Search Run Project Window Help
MouseTest.java
import java.awt.*;
/**
* A simple mouse test. Draws a "Hello World!" message at the location of the
* cursor. Click to change to "trail mode" to draw several messages. Use the
* mouse wheel (if available) to change colors.
*/
public class MouseTest extends GameCore implements KeyListener,
MouseMotionListener, MouseListener, MouseWheelListener
{
public static void main(String[] args) {
new MouseTest().run();
}
private static final int TRAIL_SIZE = 10;
private static final Color[] COLORS = { Color.white, Color.black,
Color.yellow, Color.magenta };
private LinkedList<Point> trailList;
private boolean trailMode;
private int colorIndex;
public void init() {
super.init();
trailList = new LinkedList<Point>();
Writable
Smart Insert
100 : 18


Java - chap03/src/MouseTest.java - Eclipse SDK
File Edit Source Refactor Navigate Search Run Project Window Help
MouseTest.java
Window window = screen.getFullScreenWindow();
window.addMouseListener(this);
window.addMouseMotionListener(this);
window.addMouseWheelListener(this);
window.addKeyListener(this);
}
public synchronized void draw(Graphics2D g) {
int count = trailList.size();
if (count > 1 && !trailMode) {
count = 1;
}
Window window = screen.getFullScreenWindow();
// draw background
g.setColor(window.getBackground());
g.fillRect(0, 0, screen.getWidth(), screen.getHeight());
// draw instructions
g.setRenderingHint(RenderingHints.KEY_TEXT_ANTIALIASING,
RenderingHints.VALUE_TEXT_ANTIALIAS_ON);
g.setColor(window.getForeground());
g.drawString("MouseTest. Press Escape to exit.", 5, FONT_SIZE);
// draw mouse trail
for (int i = 0; i < count; i++) {
Writable
Smart Insert
100 : 18


Java - chap03/src/MouseTest.java - Eclipse SDK
File Edit Source Refactor Navigate Search Run Project Window Help
MouseTest.java
for (int i = 0; i < count; i++) {
Point p = (Point) trailList.get(i);
g.drawString("Hello World!", p.x, p.y);
}
}
// from the MouseListener interface
public void mousePressed(MouseEvent e) {
trailMode = !trailMode;
}
// from the MouseListener interface
public void mouseReleased(MouseEvent e) {
// do nothing
}
// from the MouseListener interface
public void mouseClicked(MouseEvent e) {
// called after mouse is released - ignore it
}
// from the MouseListener interface
public void mouseEntered(MouseEvent e) {
mouseMoved(e);
}
// from the MouseListener interface
public void mouseExited(MouseEvent e) {
Writable
Smart Insert
100 : 18


Java - chap03/src/MouseTest.java - Eclipse SDK
File Edit Source Refactor Navigate Search Run Project Window Help
MouseTest.java
// from the MouseMotionListener interface
public void mouseDragged(MouseEvent e) {
mouseMoved(e);
}
// from the MouseMotionListener interface
public synchronized void mouseMoved(MouseEvent e) {
Point p = new Point(e.getX(), e.getY());
trailList.addFirst(p);
while (trailList.size() > TRAIL_SIZE) {
trailList.removeLast();
}
}
// from the MouseWheelListener interface
public void mouseWheelMoved(MouseWheelEvent e) {
colorIndex = (colorIndex + e.getWheelRotation()) % COLORS.length;
if (colorIndex < 0) {
colorIndex += COLORS.length;
}
Window window = screen.getFullScreenWindow();
window.setForeground(COLORS[colorIndex]);
}
// from the KeyListener interface
public void keyPressed(KeyEvent e) {
if (e.getKeyCode() == KeyEvent.VK_ESCAPE) {
Writable
Smart Insert
101 : 45


Java - chap03/src/MouseTest.java - Eclipse SDK
File Edit Source Refactor Navigate Search Run Project Window Help
MouseTest.java
colorIndex = (colorIndex + e.getWheelRotation()) % COLORS.length;
if (colorIndex < 0) {
colorIndex += COLORS.length;
}
Window window = screen.getFullScreenWindow();
window.setForeground(COLORS[colorIndex]);
}
// from the KeyListener interface
public void keyPressed(KeyEvent e) {
if (e.getKeyCode() == KeyEvent.VK_ESCAPE) {
// exit the program
stop();
}
}
// from the KeyListener interface
public void keyReleased(KeyEvent e) {
// do nothing
}
// from the KeyListener interface
public void keyTyped(KeyEvent e) {
// do nothing
}
}
Writable
Smart Insert
101 : 45

ECE 462
Object-Oriented Programming using C++ and Java

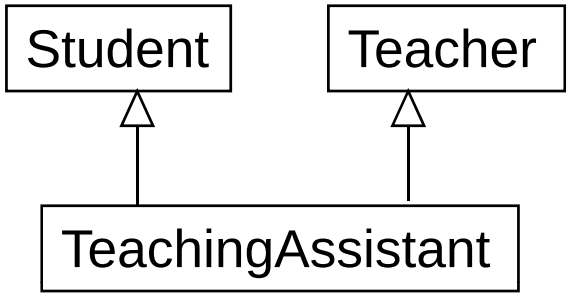
Multiple Inheritance in C++

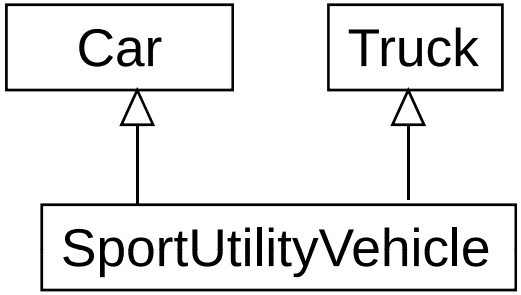
Yung-Hsiang Lu
yunglu@purdue.edu

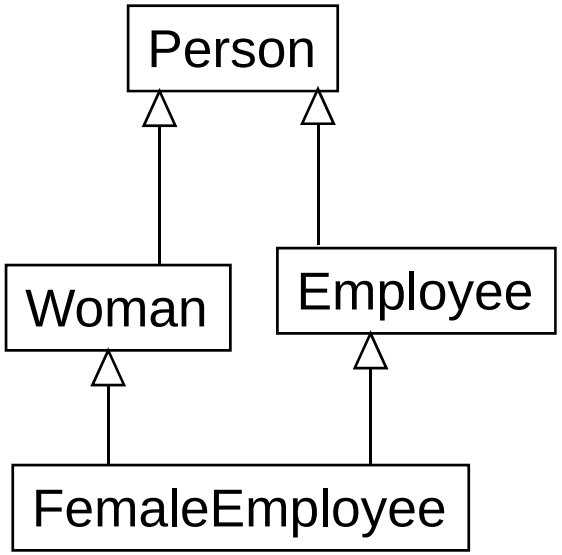
Multiple Inheritance

- One of the most (if not **the** most) controversial features in C++.
- Not supported in Java. Java uses interfaces.
- Most C++ books do not explain the concept and the problems.
- Understand the advantages and the problems and you can decide whether to use it.

Multiple Inheritance

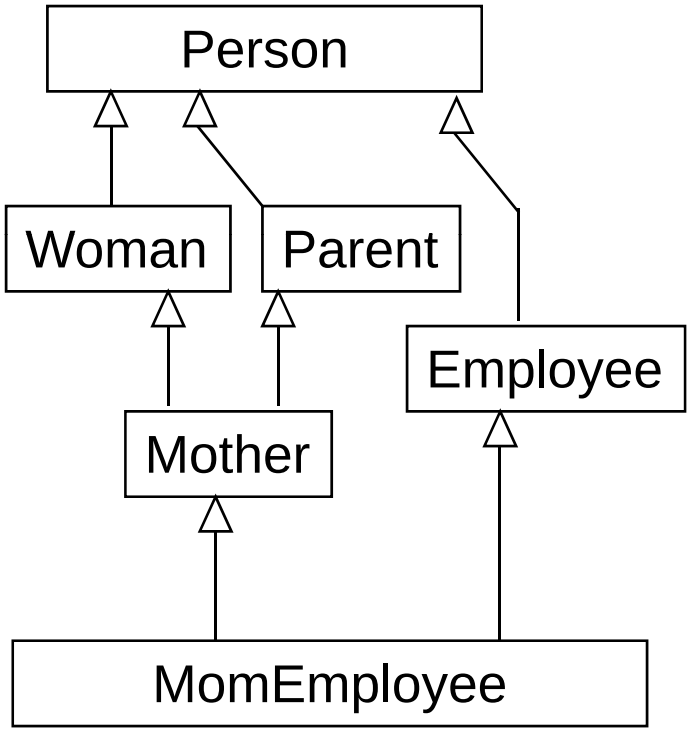






Design Issues

- A class provides interface and implementation.
- Code reuse is good but a class, once declared, is hard to change because of the code depending on this class.
- **If you have any doubt, do not create a class.**
- Avoid the proliferation of classes because they make code reuse harder.



Too Many Classes

- In many payroll systems, a person's status (for example tax withholding) depends on the person's role. If a person has children, the person's tax withholding is less.
- If an employee is also a mother, a company may send a gift to the children on their birthdays.
- Should you create one class for each possible status of employee?
- Or, use attributes to distinguish their status?

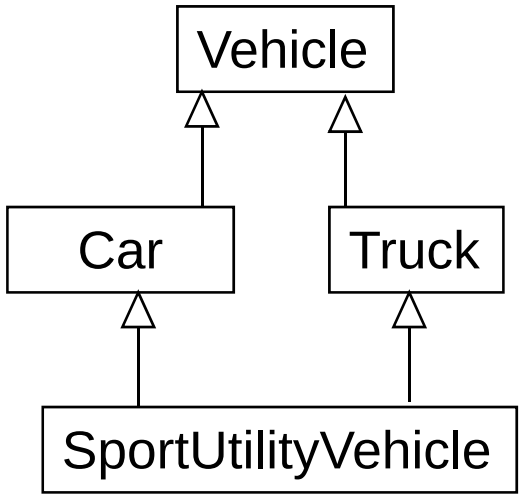
What Does a Class Give You?

- interface (public inheritance) and implementation
- polymorphism
- object creation

- If you are not using polymorphism, think twice (or more) before creating a class.
- It is usually **easier to change** the behavior of an **attribute** (encapsulation) than changing the interface (code reuse).

Repeated Inheritance

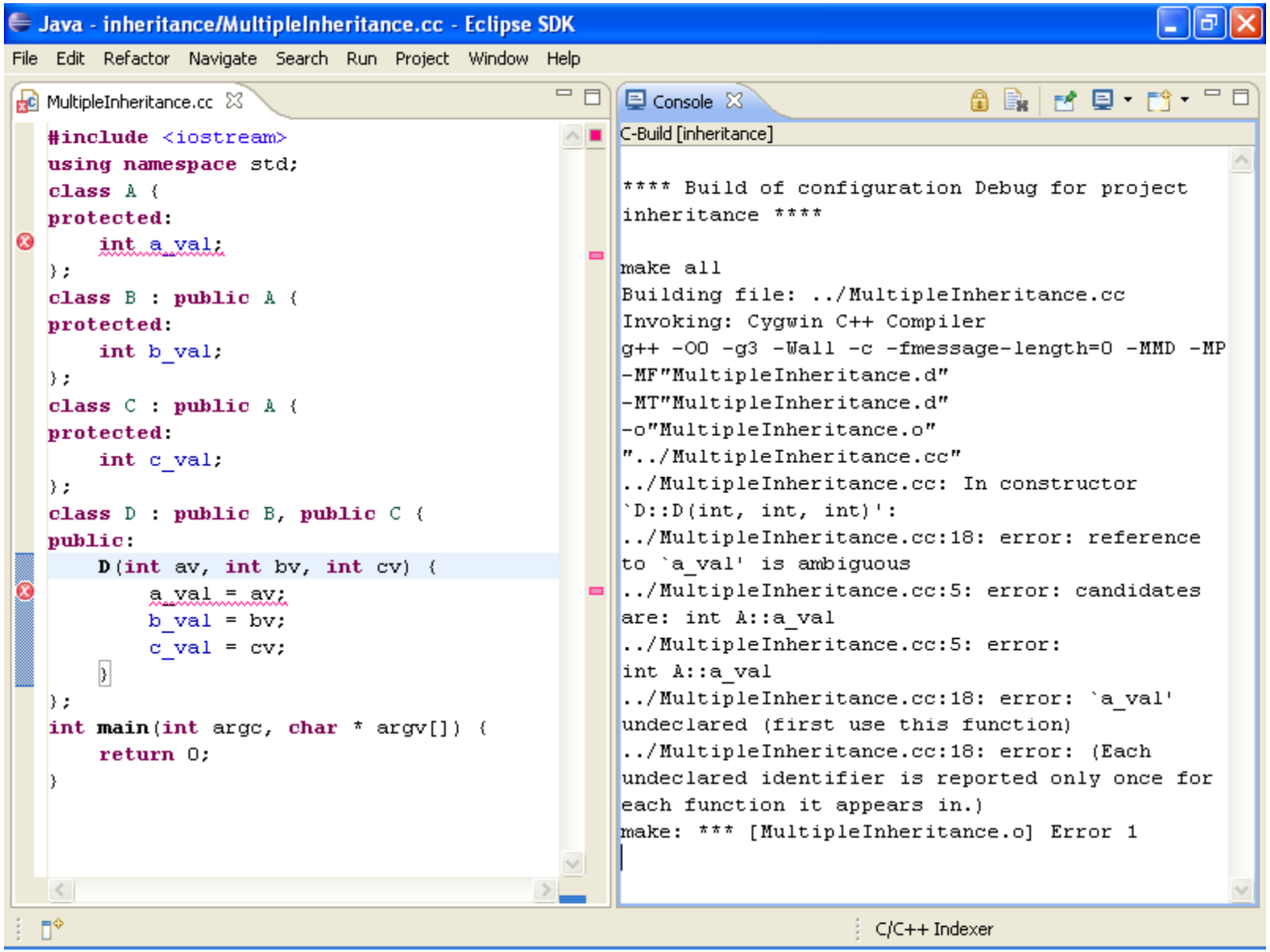
```
class Vehicle
{
    int v_engineSize;
    int v_numberWheel;
};
```

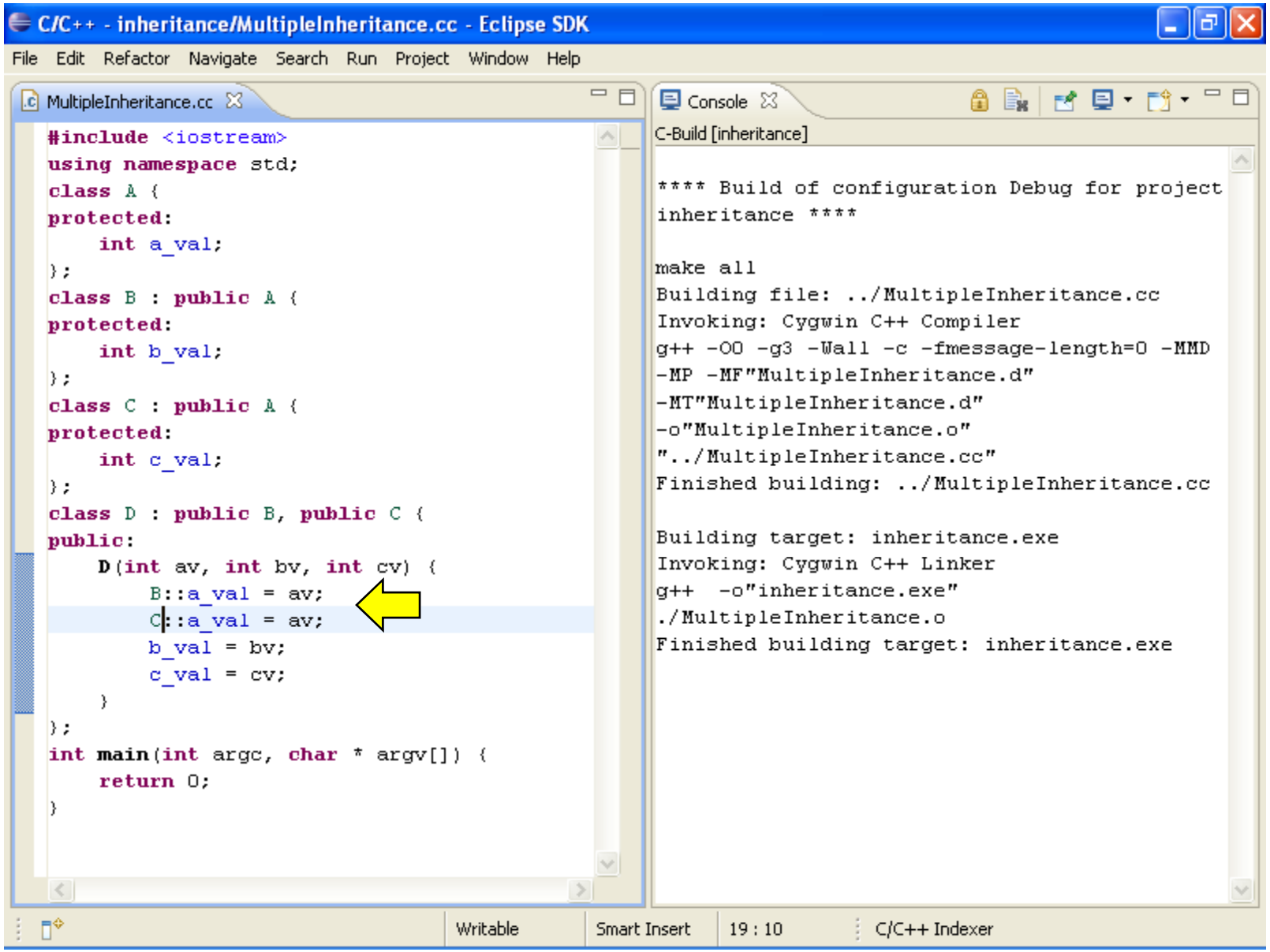


Does SportUtilityVehicle have one v_engineSize or two?

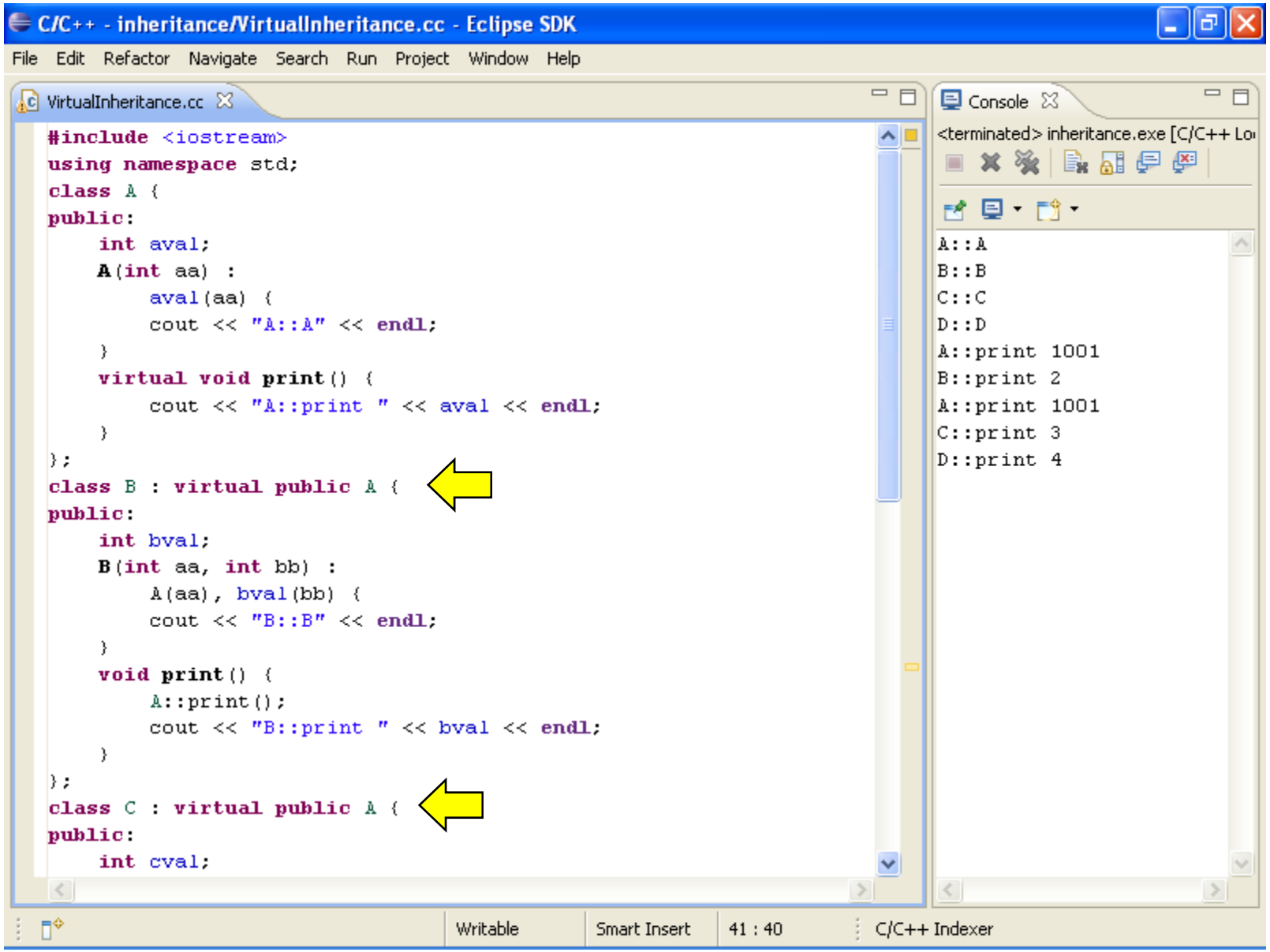
⇒ **two**, unless you use virtual inheritance

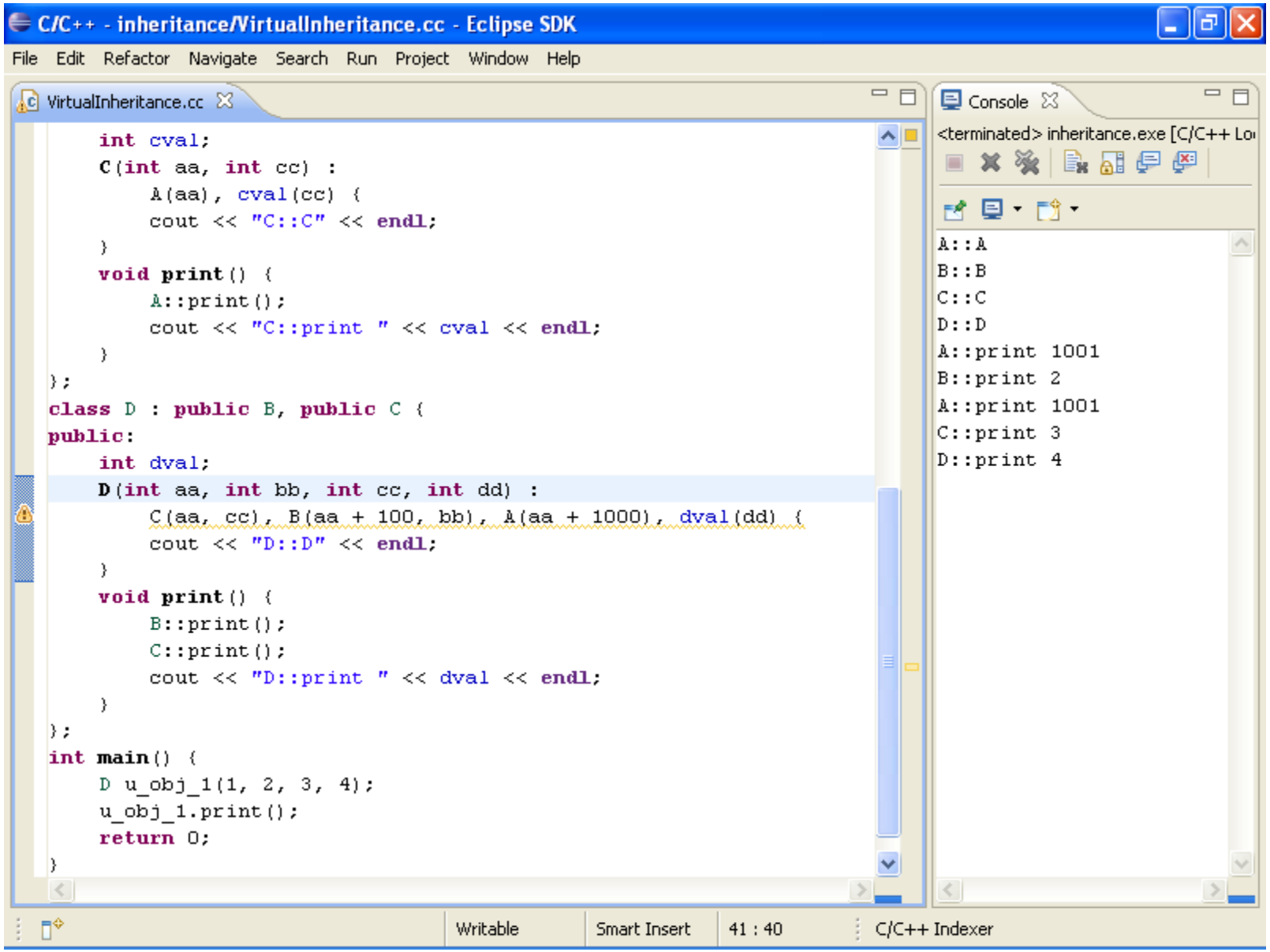
⇒ ambiguous, compilation error


Java - inheritance/MultipleInheritance.cc - Eclipse SDK
File Edit Refactor Navigate Search Run Project Window Help
MultipleInheritance.cc
#include <iostream>
using namespace std;
class A {
protected:
int a_val;
};
class B : public A {
protected:
int b_val;
};
class C : public A {
protected:
int c_val;
};
class D : public B, public C {
public:
D(int av, int bv, int cv) {
a_val = av;
b_val = bv;
c_val = cv;
}
};
int main(int argc, char * argv[]) {
return 0;
}
Console
C-Build [inheritance]
**** Build of configuration Debug for project inheritance ****
make all
Building file: ../MultipleInheritance.cc
Invoking: Cygwin C++ Compiler
g++ -O0 -g3 -Wall -c -fmessage-length=0 -MMD -MP -MF"MultipleInheritance.d" -MT"MultipleInheritance.d" -o"MultipleInheritance.o" "../MultipleInheritance.cc"
../MultipleInheritance.cc: In constructor `D::D(int, int, int)':
../MultipleInheritance.cc:18: error: reference to `a_val' is ambiguous
../MultipleInheritance.cc:5: error: candidates are: int A::a_val
../MultipleInheritance.cc:5: error: int A::a_val
../MultipleInheritance.cc:18: error: `a_val' undeclared (first use this function)
../MultipleInheritance.cc:18: error: (Each undeclared identifier is reported only once for each function it appears in.)
make: *** [MultipleInheritance.o] Error 1
C/C++ Indexer

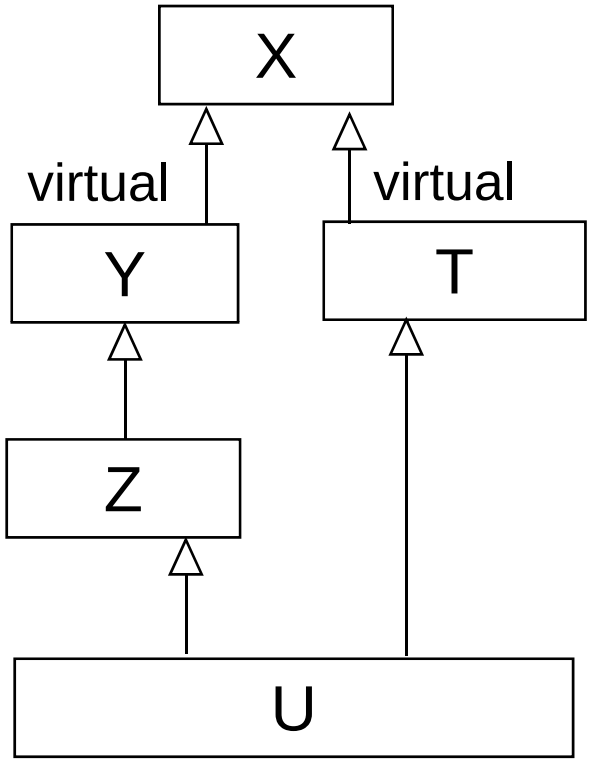

C/C++ - inheritance/MultipleInheritance.cc - Eclipse SDK
File Edit Refactor Navigate Search Run Project Window Help
MultipleInheritance.cc
#include <iostream>
using namespace std;
class A {
protected:
int a_val;
};
class B : public A {
protected:
int b_val;
};
class C : public A {
protected:
int c_val;
};
class D : public B, public C {
public:
D(int av, int bv, int cv) {
B::a_val = av;
C::a_val = av;
b_val = bv;
c_val = cv;
}
};
int main(int argc, char * argv[]) {
return 0;
}
Console
C-Build [inheritance]
**** Build of configuration Debug for project inheritance ****
make all
Building file: ../MultipleInheritance.cc
Invoking: Cygwin C++ Compiler
g++ -O0 -g3 -Wall -c -fmessage-length=0 -MMD -MP -MF"MultipleInheritance.d" -MT"MultipleInheritance.d" -o"MultipleInheritance.o" "../MultipleInheritance.cc"
Finished building: ../MultipleInheritance.cc
Building target: inheritance.exe
Invoking: Cygwin C++ Linker
g++ -o"inheritance.exe" ./MultipleInheritance.o
Finished building target: inheritance.exe
Writable
Smart Insert
19 : 10
C/C++ Indexer

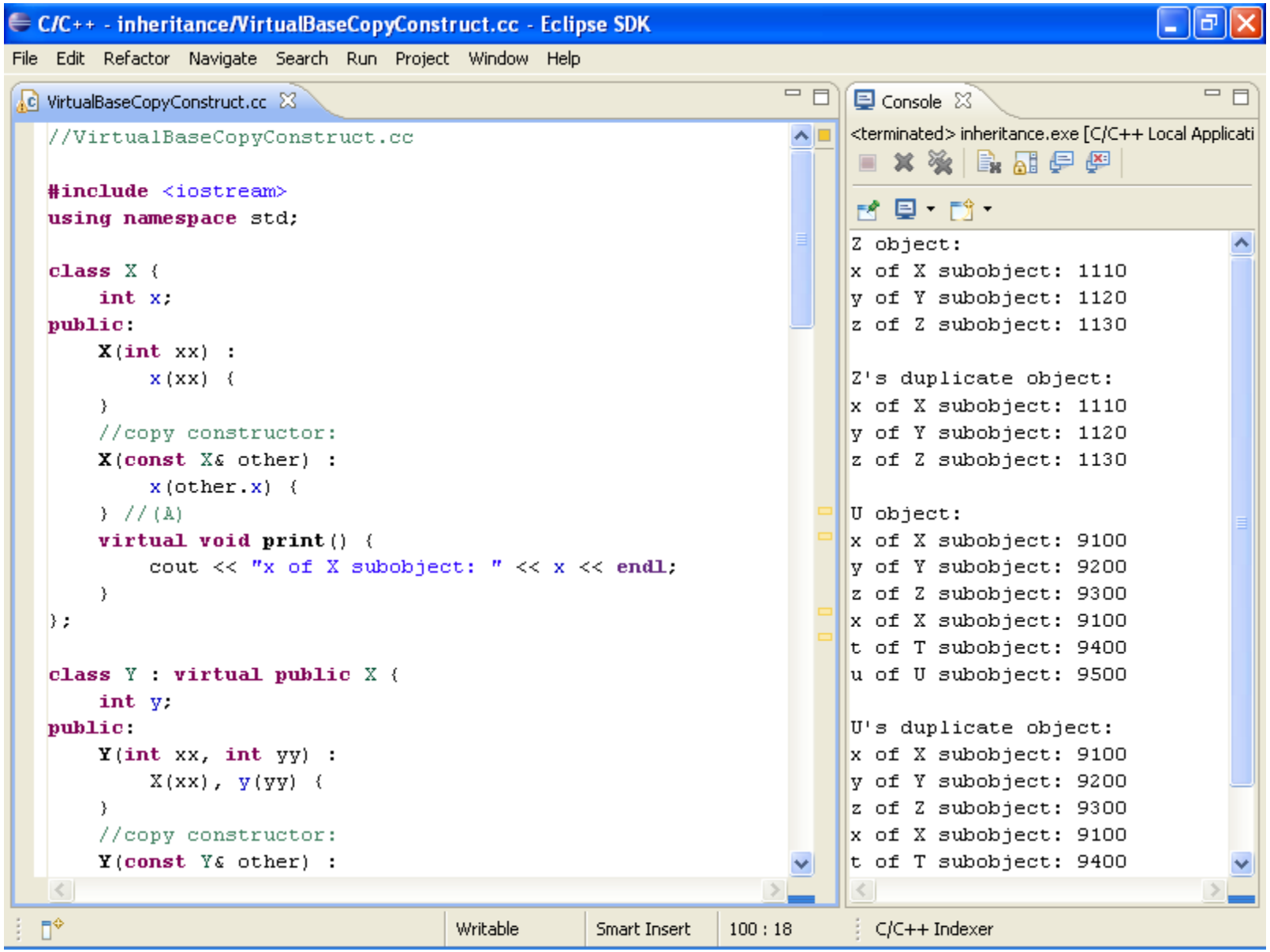
Virtual Inheritance

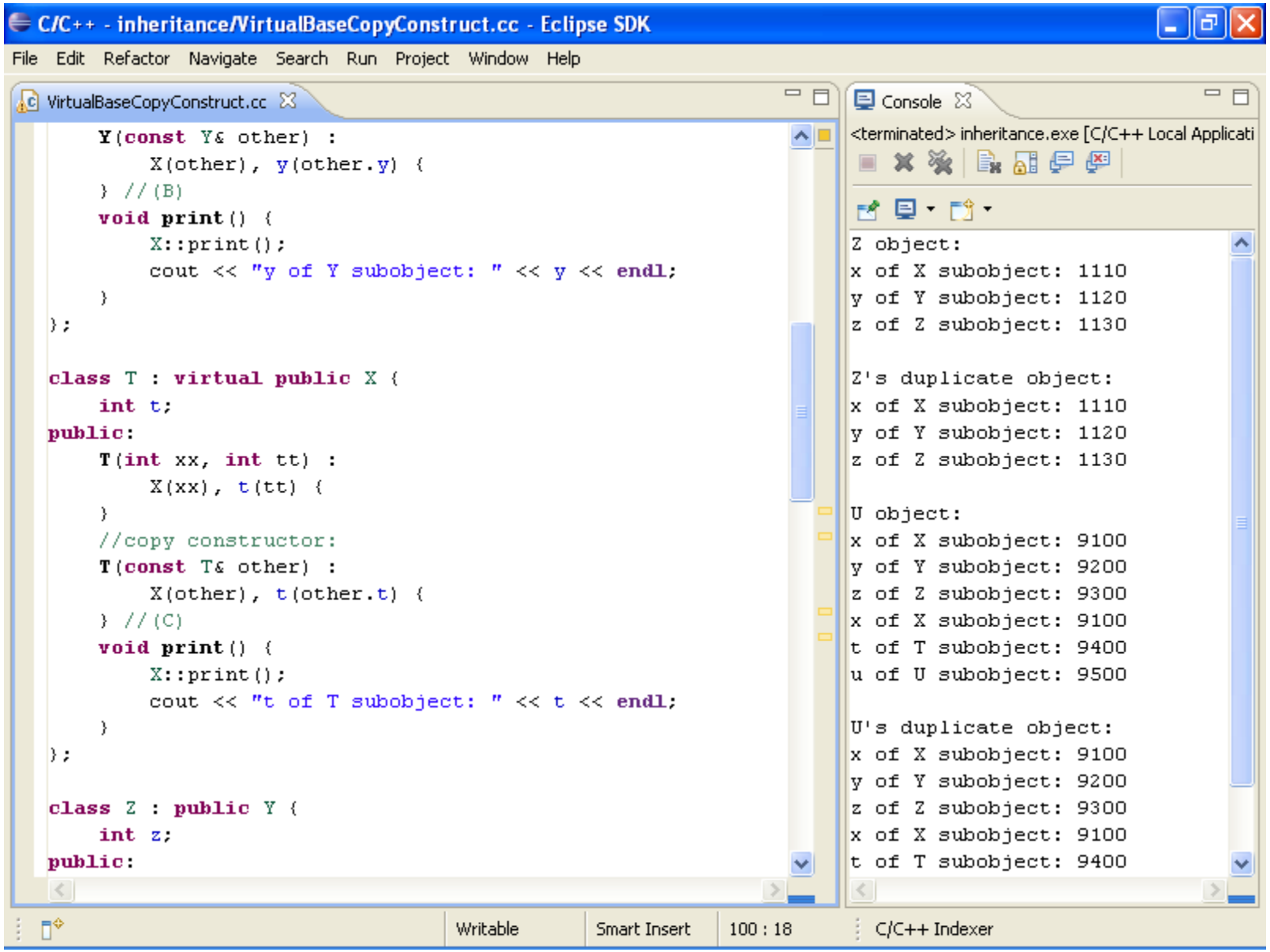

C/C++ - inheritance/VirtualInheritance.cc - Eclipse SDK
File Edit Refactor Navigate Search Run Project Window Help
VirtualInheritance.cc
#include <iostream>
using namespace std;
class A {
public:
int aval;
A(int aa) :
aval(aa) {
cout << "A::A" << endl;
}
virtual void print() {
cout << "A::print " << aval << endl;
}
};
class B : virtual public A {
public:
int bval;
B(int aa, int bb) :
A(aa), bval(bb) {
cout << "B::B" << endl;
}
void print() {
A::print();
cout << "B::print " << bval << endl;
}
};
class C : virtual public A {
public:
int cval;
Console
<terminated> inheritance.exe [C/C++ Lo
A::A
B::B
C::C
D::D
A::print 1001
B::print 2
A::print 1001
C::print 3
D::print 4
Writable
Smart Insert
41 : 40
C/C++ Indexer

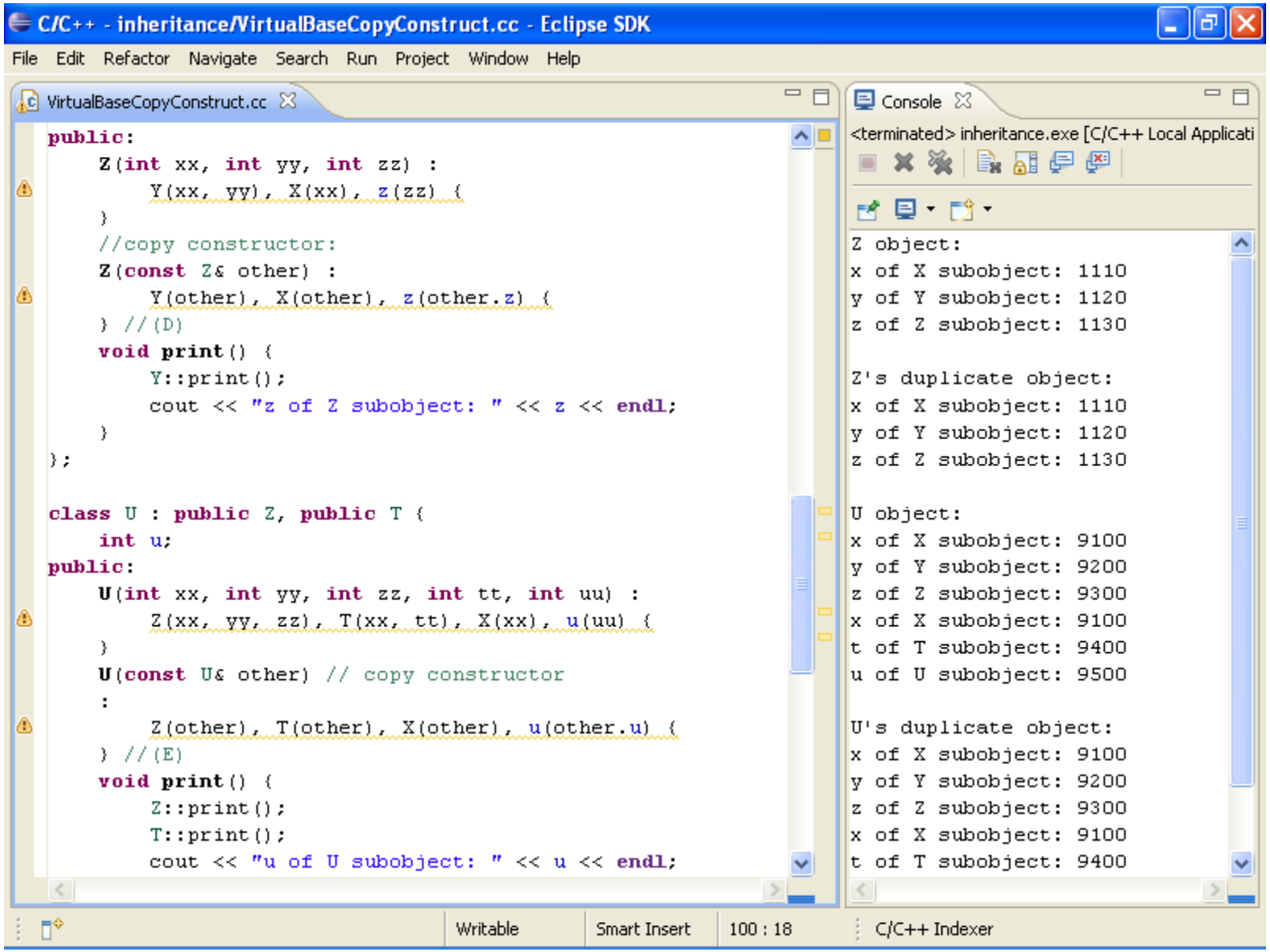

C/C++ - inheritance/VirtualInheritance.cc - Eclipse SDK
File Edit Refactor Navigate Search Run Project Window Help
VirtualInheritance.cc
int cval;
C(int aa, int cc) :
A(aa), cval(cc) {
cout << "C::C" << endl;
}
void print() {
A::print();
cout << "C::print " << cval << endl;
}
};
class D : public B, public C {
public:
int dval;
D(int aa, int bb, int cc, int dd) :
C(aa, cc), B(aa + 100, bb), A(aa + 1000), dval(dd) {
cout << "D::D" << endl;
}
void print() {
B::print();
C::print();
cout << "D::print " << dval << endl;
}
};
int main() {
D u_obj_1(1, 2, 3, 4);
u_obj_1.print();
return 0;
}
Console
<terminated> inheritance.exe [C/C++ Lo
A::A
B::B
C::C
D::D
A::print 1001
B::print 2
A::print 1001
C::print 3
D::print 4
Writable
Smart Insert
41 : 40
C/C++ Indexer

Virtual Inheritance and Copy Constructor


X
virtual
virtual
Y
T
Z
U


C/C++ - inheritance/VirtualBaseCopyConstruct.cc - Eclipse SDK
File Edit Refactor Navigate Search Run Project Window Help
VirtualBaseCopyConstruct.cc
//VirtualBaseCopyConstruct.cc
#include <iostream>
using namespace std;
class X {
int x;
public:
X(int xx) :
x(xx) {
}
//copy constructor:
X(const X& other) :
x(other.x) {
} //(A)
virtual void print() {
cout << "x of X subobject: " << x << endl;
}
};
class Y : virtual public X {
int y;
public:
Y(int xx, int yy) :
X(xx), y(yy) {
}
//copy constructor:
Y(const Y& other) :
Console
<terminated> inheritance.exe [C/C++ Local Applicati
Z object:
x of X subobject: 1110
y of Y subobject: 1120
z of Z subobject: 1130
Z's duplicate object:
x of X subobject: 1110
y of Y subobject: 1120
z of Z subobject: 1130
U object:
x of X subobject: 9100
y of Y subobject: 9200
z of Z subobject: 9300
x of X subobject: 9100
t of T subobject: 9400
u of U subobject: 9500
U's duplicate object:
x of X subobject: 9100
y of Y subobject: 9200
z of Z subobject: 9300
x of X subobject: 9100
t of T subobject: 9400
Writable
Smart Insert
100 : 18
C/C++ Indexer


C/C++ - inheritance/VirtualBaseCopyConstruct.cc - Eclipse SDK
File Edit Refactor Navigate Search Run Project Window Help
VirtualBaseCopyConstruct.cc
Y(const Y& other) :
X(other), y(other.y) {
} //(B)
void print() {
X::print();
cout << "y of Y subobject: " << y << endl;
}
};
class T : virtual public X {
int t;
public:
T(int xx, int tt) :
X(xx), t(tt) {
}
//copy constructor:
T(const T& other) :
X(other), t(other.t) {
} //(C)
void print() {
X::print();
cout << "t of T subobject: " << t << endl;
}
};
class Z : public Y {
int z;
public:
Console
<terminated> inheritance.exe [C/C++ Local Applicati
Z object:
x of X subobject: 1110
y of Y subobject: 1120
z of Z subobject: 1130
Z's duplicate object:
x of X subobject: 1110
y of Y subobject: 1120
z of Z subobject: 1130
U object:
x of X subobject: 9100
y of Y subobject: 9200
z of Z subobject: 9300
x of X subobject: 9100
t of T subobject: 9400
u of U subobject: 9500
U's duplicate object:
x of X subobject: 9100
y of Y subobject: 9200
z of Z subobject: 9300
x of X subobject: 9100
t of T subobject: 9400
Writable
Smart Insert
100 : 18
C/C++ Indexer


C/C++ - inheritance/VirtualBaseCopyConstruct.cc - Eclipse SDK
File Edit Refactor Navigate Search Run Project Window Help
VirtualBaseCopyConstruct.cc
public:
Z(int xx, int yy, int zz) :
Y(xx, yy), X(xx), z(zz) {
}
//copy constructor:
Z(const Z& other) :
Y(other), X(other), z(other.z) {
} //(D)
void print() {
Y::print();
cout << "z of Z subobject: " << z << endl;
}
};
class U : public Z, public T {
int u;
public:
U(int xx, int yy, int zz, int tt, int uu) :
Z(xx, yy, zz), T(xx, tt), X(xx), u(uu) {
}
U(const U& other) // copy constructor
:
Z(other), T(other), X(other), u(other.u) {
} //(E)
void print() {
Z::print();
T::print();
cout << "u of U subobject: " << u << endl;
Console
<terminated> inheritance.exe [C/C++ Local Applicati
Z object:
x of X subobject: 1110
y of Y subobject: 1120
z of Z subobject: 1130
Z's duplicate object:
x of X subobject: 1110
y of Y subobject: 1120
z of Z subobject: 1130
U object:
x of X subobject: 9100
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z of Z subobject: 9300
x of X subobject: 9100
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u of U subobject: 9500
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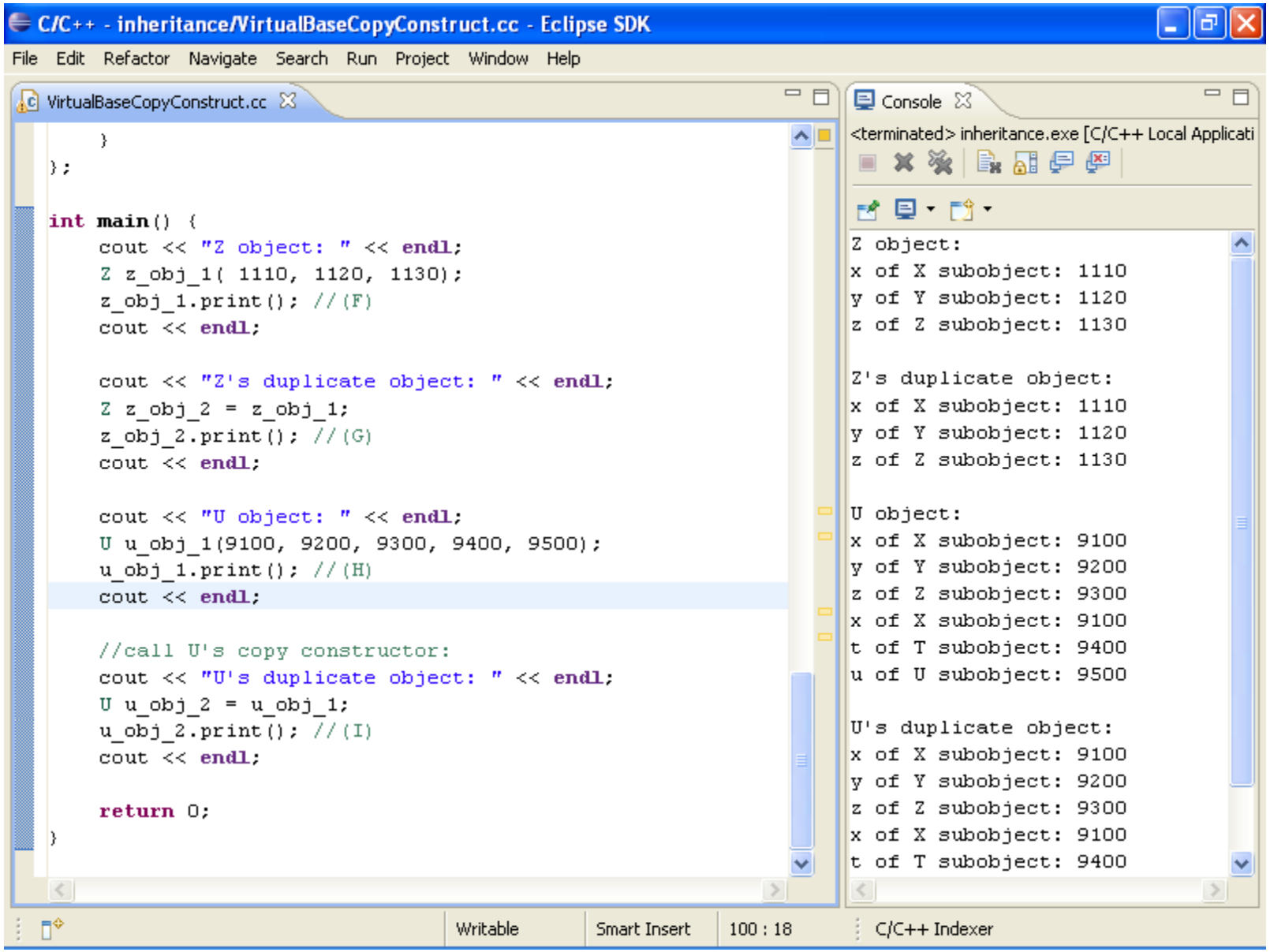
y of Y subobject: 9200
z of Z subobject: 9300
x of X subobject: 9100
t of T subobject: 9400
Writable
Smart Insert
100 : 18
C/C++ Indexer


C/C++ - inheritance/VirtualBaseCopyConstruct.cc - Eclipse SDK
File Edit Refactor Navigate Search Run Project Window Help
VirtualBaseCopyConstruct.cc
};
int main() {
cout << "Z object: " << endl;
Z z_obj_1(1110, 1120, 1130);
z_obj_1.print(); //(F)
cout << endl;
cout << "Z's duplicate object: " << endl;
Z z_obj_2 = z_obj_1;
z_obj_2.print(); //(G)
cout << endl;
cout << "U object: " << endl;
U u_obj_1(9100, 9200, 9300, 9400, 9500);
u_obj_1.print(); //(H)
cout << endl;
//call U's copy constructor:
cout << "U's duplicate object: " << endl;
U u_obj_2 = u_obj_1;
u_obj_2.print(); //(I)
cout << endl;
return 0;
}
Console
<terminated> inheritance.exe [C/C++ Local Applicati
Z object:
x of X subobject: 1110
y of Y subobject: 1120
z of Z subobject: 1130
Z's duplicate object:
x of X subobject: 1110
y of Y subobject: 1120
z of Z subobject: 1130
U object:
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x of X subobject: 9100
t of T subobject: 9400
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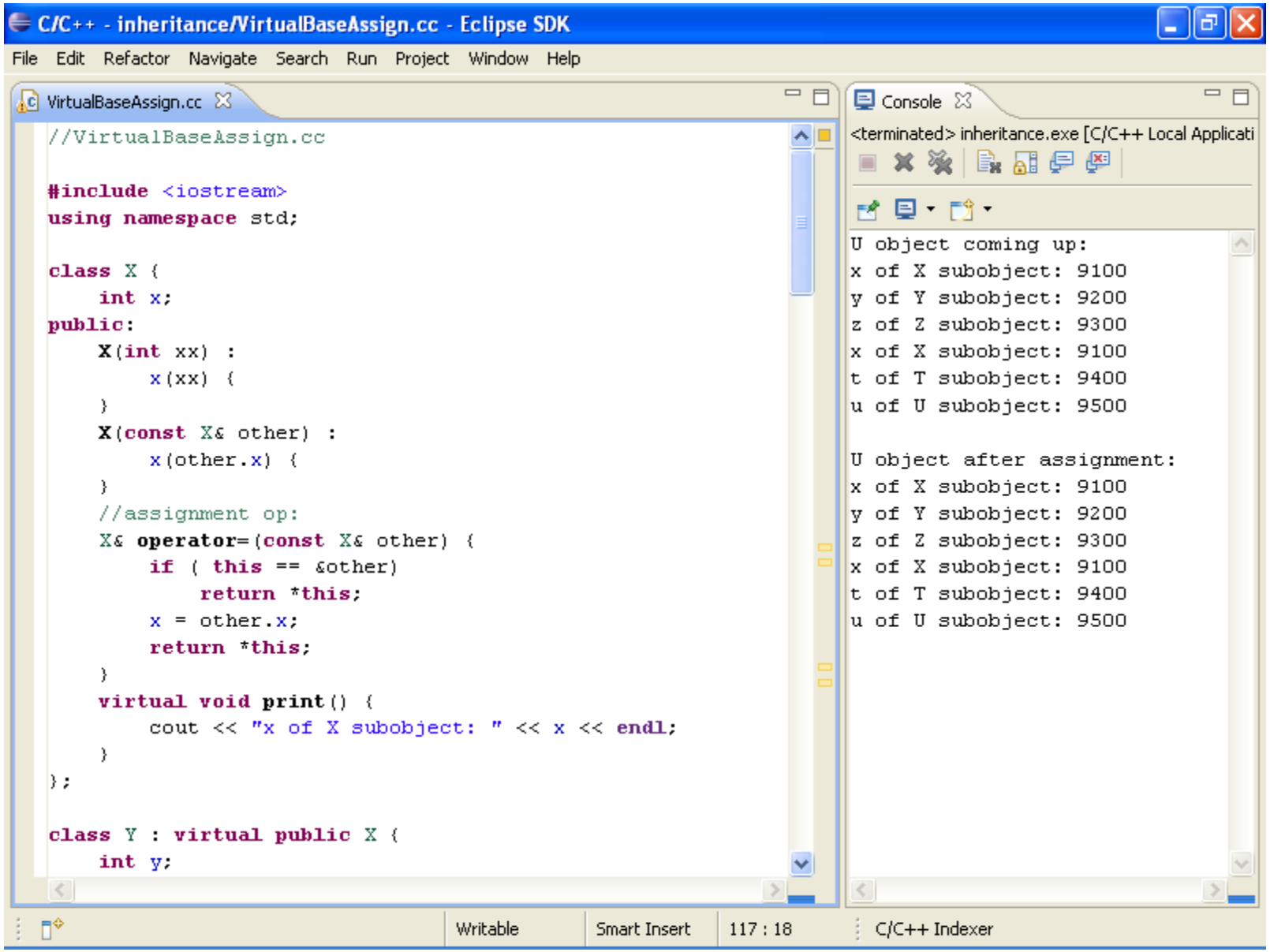
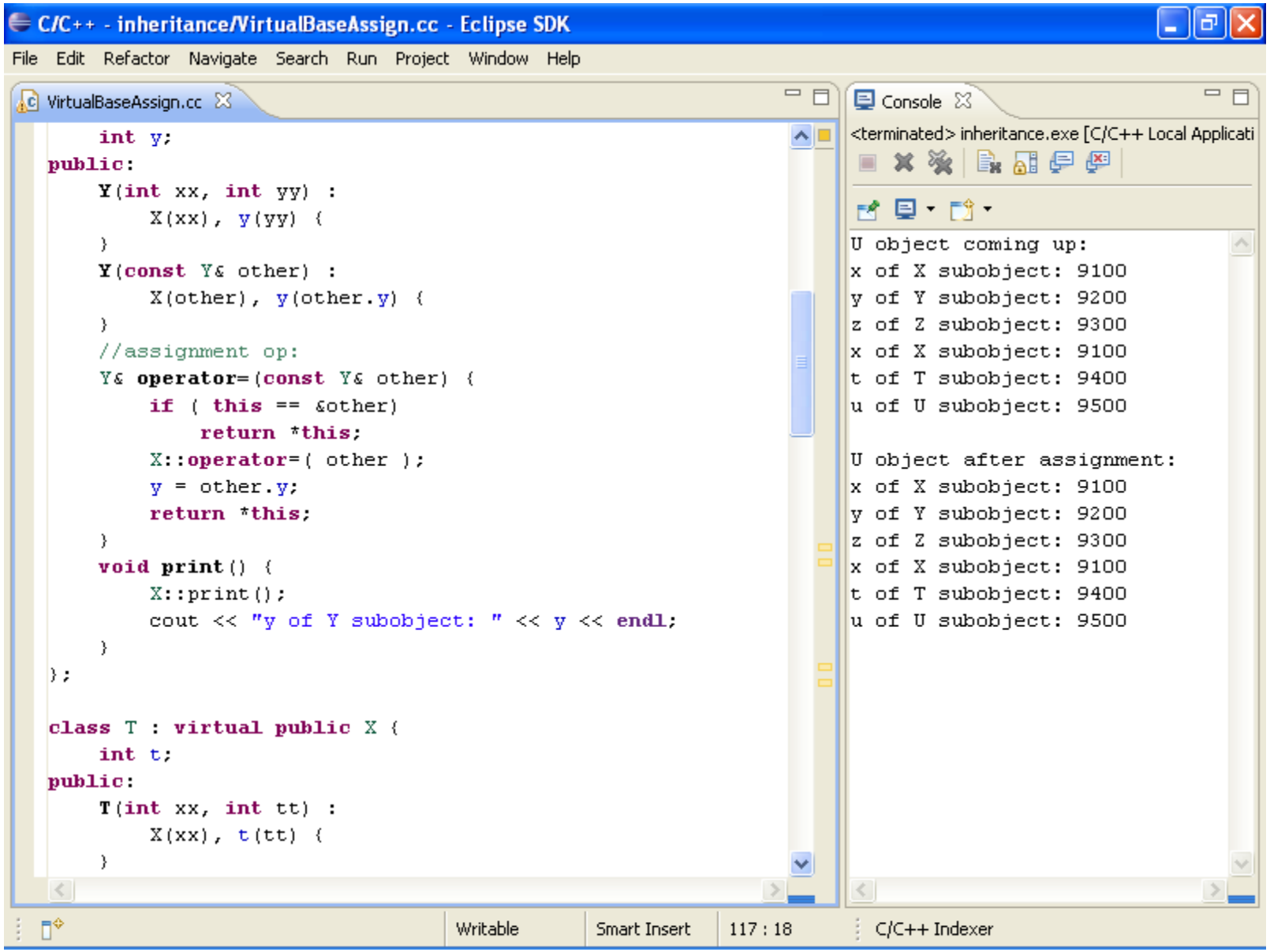
Smart Insert
100 : 18
C/C++ Indexer

Virtual Inheritance and Assignment Operator


C/C++ - inheritance/VirtualBaseAssign.cc - Eclipse SDK
File Edit Refactor Navigate Search Run Project Window Help
VirtualBaseAssign.cc
//VirtualBaseAssign.cc
#include <iostream>
using namespace std;
class X {
int x;
public:
X(int xx) :
x(xx) {
}
X(const X& other) :
x(other.x) {
}
//assignment op:
X& operator=(const X& other) {
if (this == &other)
return *this;
x = other.x;
return *this;
}
virtual void print() {
cout << "x of X subobject: " << x << endl;
}
};
class Y : virtual public X {
int y;
Console
<terminated> inheritance.exe [C/C++ Local Applicati
U object coming up:
x of X subobject: 9100
y of Y subobject: 9200
z of Z subobject: 9300
x of X subobject: 9100
t of T subobject: 9400
u of U subobject: 9500
U object after assignment:
x of X subobject: 9100
y of Y subobject: 9200
z of Z subobject: 9300
x of X subobject: 9100
t of T subobject: 9400
u of U subobject: 9500
Writable
Smart Insert
117 : 18
C/C++ Indexer


C/C++ - inheritance/VirtualBaseAssign.cc - Eclipse SDK
File Edit Refactor Navigate Search Run Project Window Help
VirtualBaseAssign.cc
int y;
public:
Y(int xx, int yy) :
X(xx), y(yy) {
}
Y(const Y& other) :
X(other), y(other.y) {
}
//assignment op:
Y& operator=(const Y& other) {
if (this == &other)
return *this;
X::operator=(other);
y = other.y;
return *this;
}
void print() {
X::print();
cout << "y of Y subobject: " << y << endl;
}
};
class T : virtual public X {
int t;
public:
T(int xx, int tt) :
X(xx), t(tt) {
}
Console
<terminated> inheritance.exe [C/C++ Local Applicati
U object coming up:
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z of Z subobject: 9300
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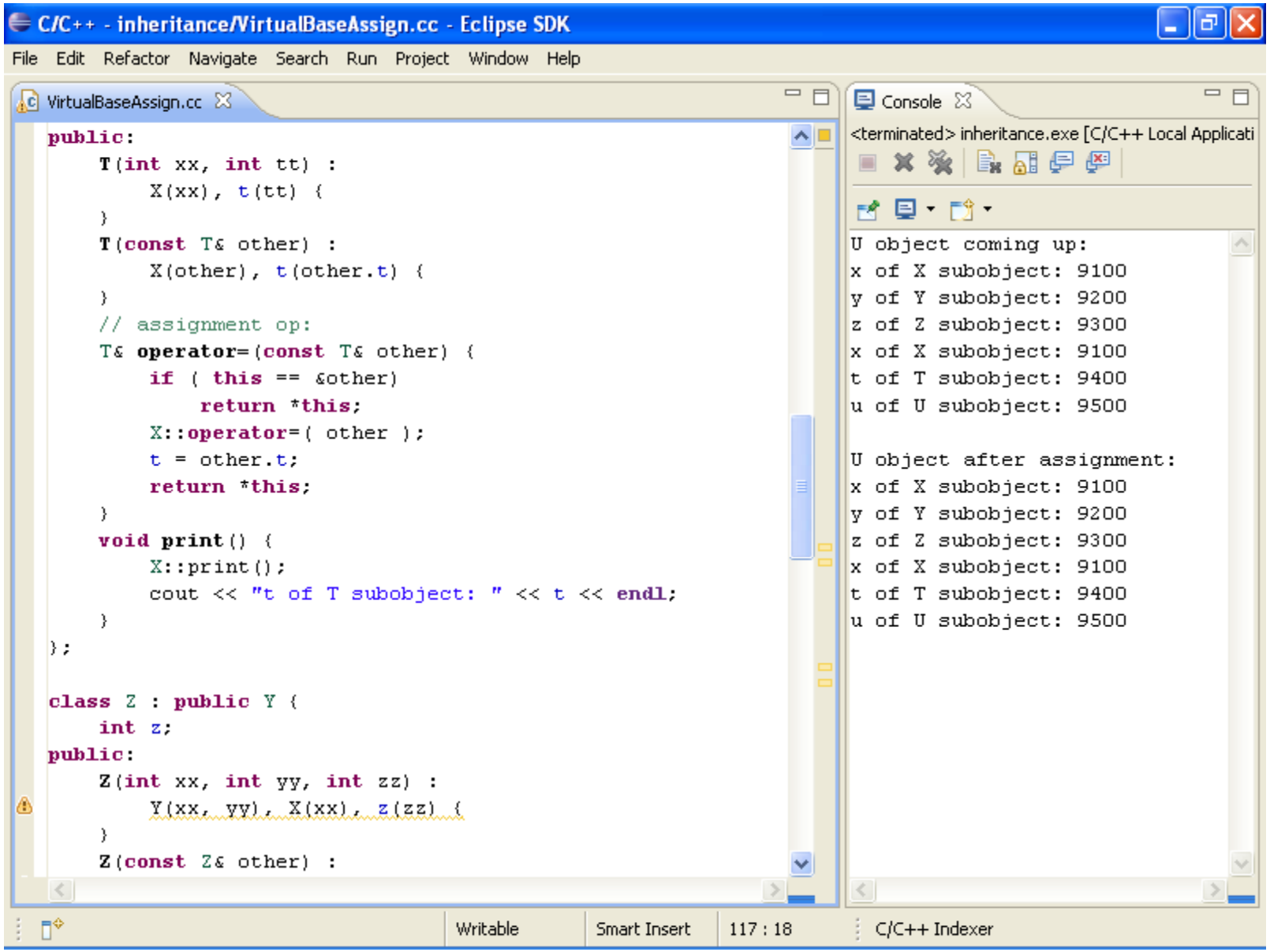
t of T subobject: 9400
u of U subobject: 9500
Writable
Smart Insert
117 : 18
C/C++ Indexer


C/C++ - inheritance/VirtualBaseAssign.cc - Eclipse SDK
File Edit Refactor Navigate Search Run Project Window Help
VirtualBaseAssign.cc
public:
T(int xx, int tt) :
X(xx), t(tt) {
}
T(const T& other) :
X(other), t(other.t) {
}
// assignment op:
T& operator=(const T& other) {
if (this == &other)
return *this;
X::operator=(other);
t = other.t;
return *this;
}
void print() {
X::print();
cout << "t of T subobject: " << t << endl;
}
};
class Z : public Y {
int z;
public:
Z(int xx, int yy, int zz) :
Y(xx, yy), X(xx), z(zz) {
}
Z(const Z& other) :
Console
<terminated> inheritance.exe [C/C++ Local Applicati
U object coming up:
x of X subobject: 9100
y of Y subobject: 9200
z of Z subobject: 9300
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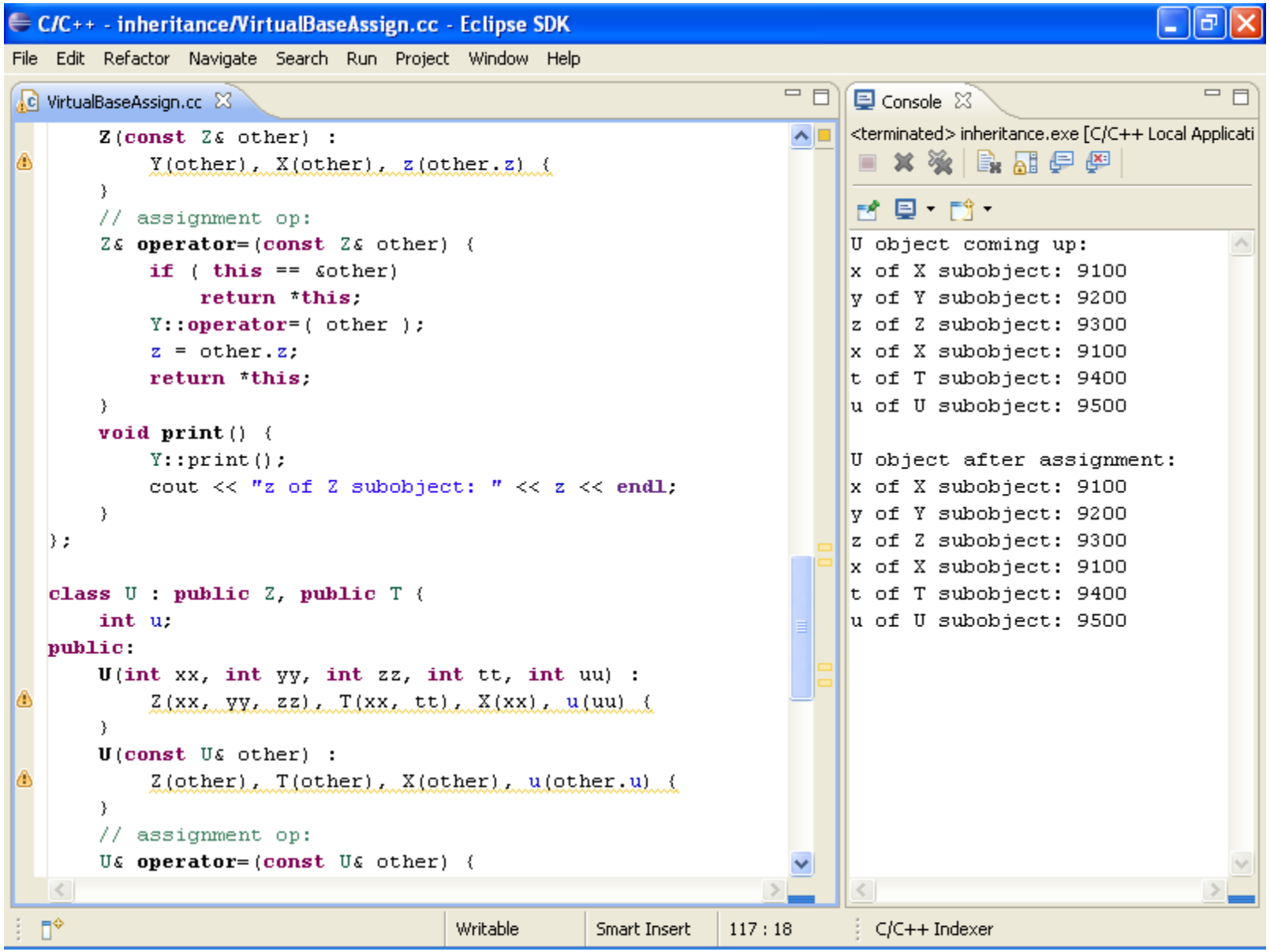
x of X subobject: 9100
t of T subobject: 9400
u of U subobject: 9500
Writable
Smart Insert
117 : 18
C/C++ Indexer


C/C++ - inheritance/VirtualBaseAssign.cc - Eclipse SDK
File Edit Refactor Navigate Search Run Project Window Help
VirtualBaseAssign.cc
Z(const Z& other) :
Y(other), X(other), z(other.z) {
}
// assignment op:
Z& operator=(const Z& other) {
if (this == &other)
return *this;
Y::operator=(other);
z = other.z;
return *this;
}
void print() {
Y::print();
cout << "z of Z subobject: " << z << endl;
}
};
class U : public Z, public T {
int u;
public:
U(int xx, int yy, int zz, int tt, int uu) :
Z(xx, yy, zz), T(xx, tt), X(xx), u(uu) {
}
U(const U& other) :
Z(other), T(other), X(other), u(other.u) {
}
// assignment op:
U& operator=(const U& other) {
Console
<terminated> inheritance.exe [C/C++ Local Applicati
U object coming up:
x of X subobject: 9100
y of Y subobject: 9200
z of Z subobject: 9300
x of X subobject: 9100
t of T subobject: 9400
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U object after assignment:
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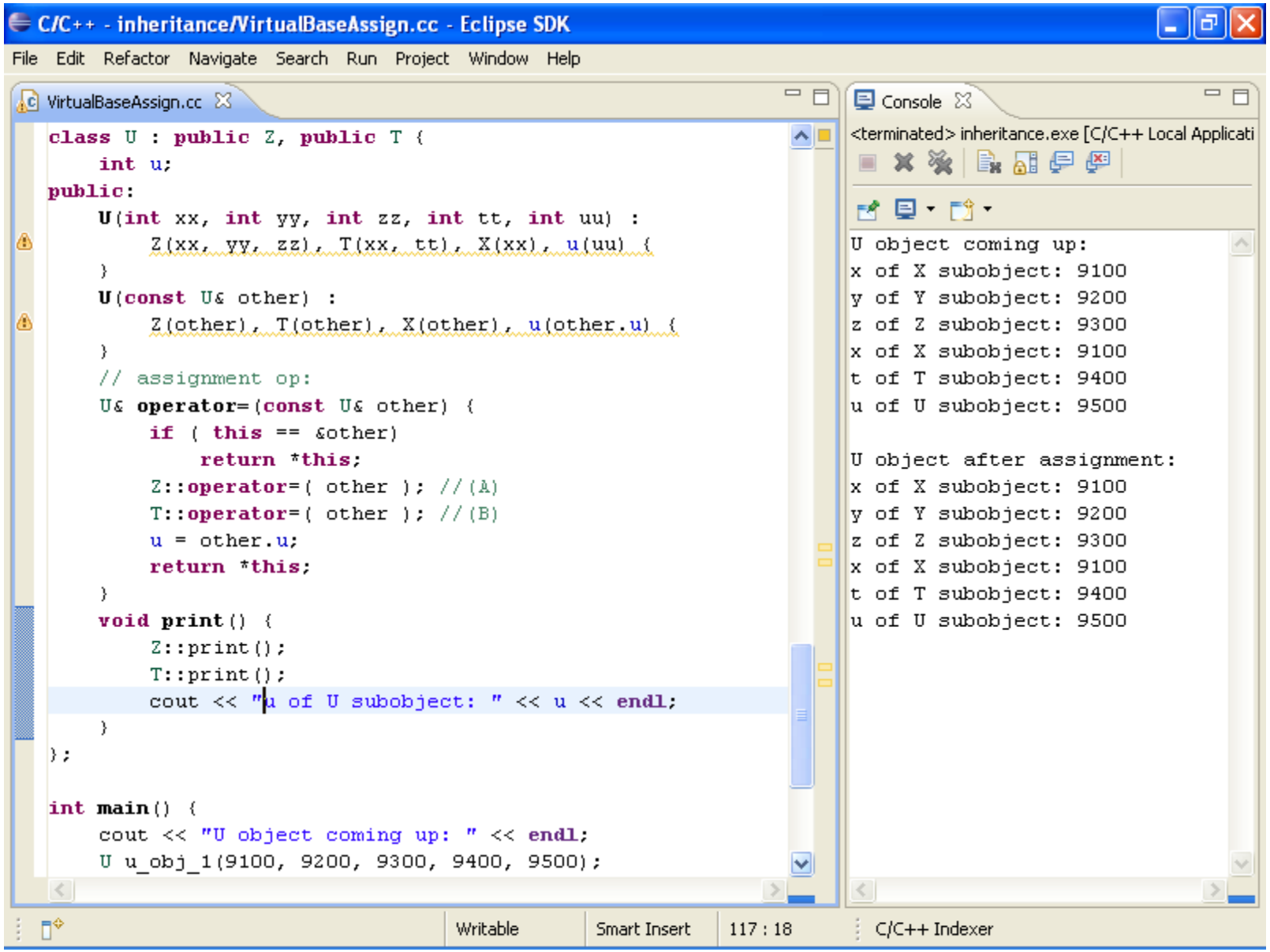
x of X subobject: 9100
t of T subobject: 9400
u of U subobject: 9500
Writable
Smart Insert
117 : 18
C/C++ Indexer


C/C++ - inheritance/VirtualBaseAssign.cc - Eclipse SDK
File Edit Refactor Navigate Search Run Project Window Help
VirtualBaseAssign.cc
class U : public Z, public T {
int u;
public:
U(int xx, int yy, int zz, int tt, int uu) :
Z(xx, yy, zz), T(xx, tt), X(xx), u(uu) {
}
U(const U& other) :
Z(other), T(other), X(other), u(other.u) {
}
// assignment op:
U& operator=(const U& other) {
if (this == &other)
return *this;
Z::operator=(other); //(A)
T::operator=(other); //(B)
u = other.u;
return *this;
}
void print() {
Z::print();
T::print();
cout << "u of U subobject: " << u << endl;
}
};
int main() {
cout << "U object coming up: " << endl;
U u_obj_1(9100, 9200, 9300, 9400, 9500);
Console
<terminated> inheritance.exe [C/C++ Local Applicati
U object coming up:
x of X subobject: 9100
y of Y subobject: 9200
z of Z subobject: 9300
x of X subobject: 9100
t of T subobject: 9400
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U object after assignment:
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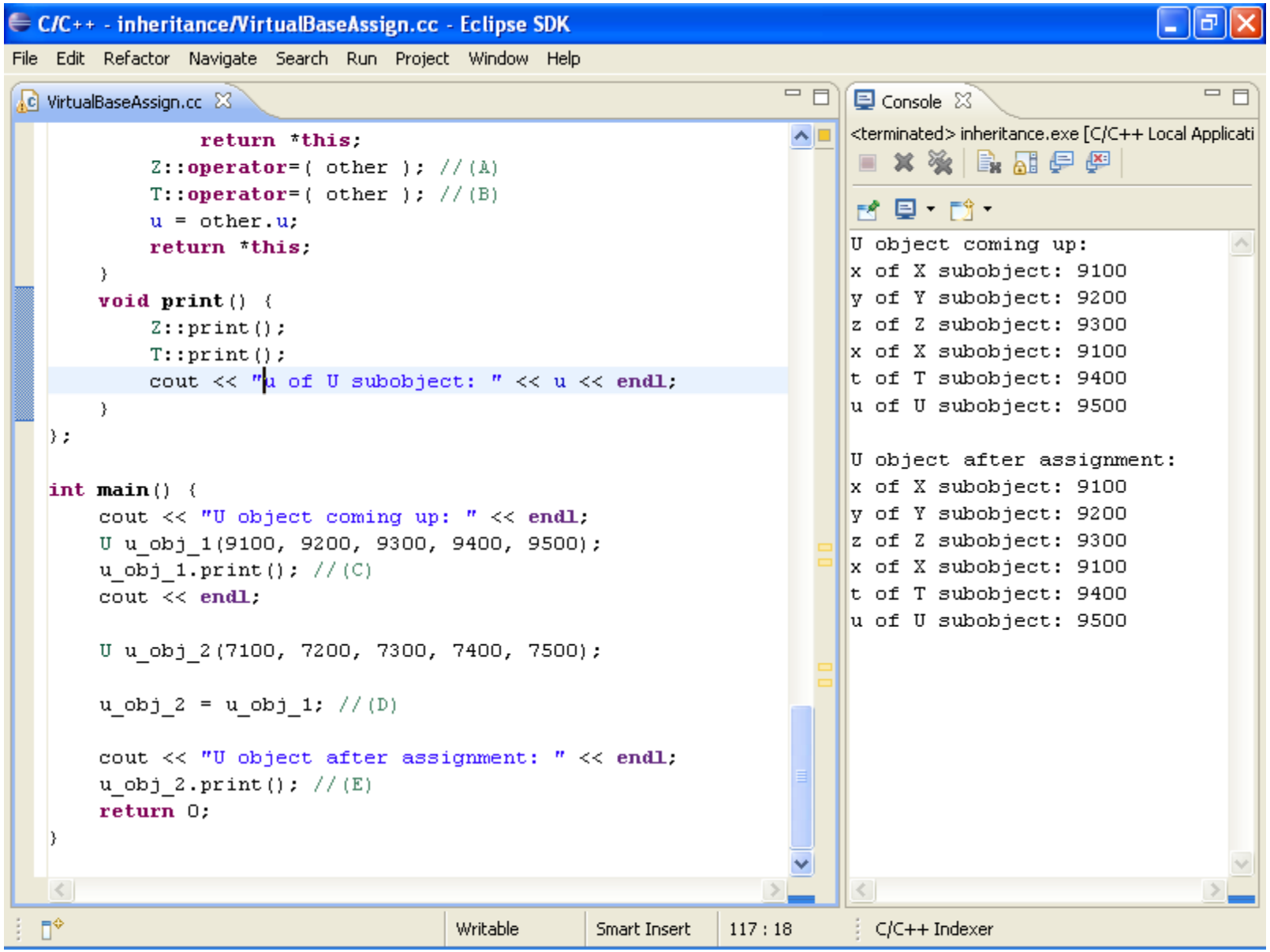
z of Z subobject: 9300
x of X subobject: 9100
t of T subobject: 9400
u of U subobject: 9500
Writable
Smart Insert
117 : 18
C/C++ Indexer


C/C++ - inheritance/VirtualBaseAssign.cc - Eclipse SDK
File Edit Refactor Navigate Search Run Project Window Help
VirtualBaseAssign.cc
return *this;
Z::operator=(other); //(A)
T::operator=(other); //(B)
u = other.u;
return *this;
}
void print() {
Z::print();
T::print();
cout << "u of U subobject: " << u << endl;
}
};
int main() {
cout << "U object coming up: " << endl;
U u_obj_1(9100, 9200, 9300, 9400, 9500);
u_obj_1.print(); //(C)
cout << endl;
U u_obj_2(7100, 7200, 7300, 7400, 7500);
u_obj_2 = u_obj_1; //(D)
cout << "U object after assignment: " << endl;
u_obj_2.print(); //(E)
return 0;
}
Console
<terminated> inheritance.exe [C/C++ Local Applicati
U object coming up:
x of X subobject: 9100
y of Y subobject: 9200
z of Z subobject: 9300
x of X subobject: 9100
t of T subobject: 9400
u of U subobject: 9500
U object after assignment:
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z of Z subobject: 9300
x of X subobject: 9100
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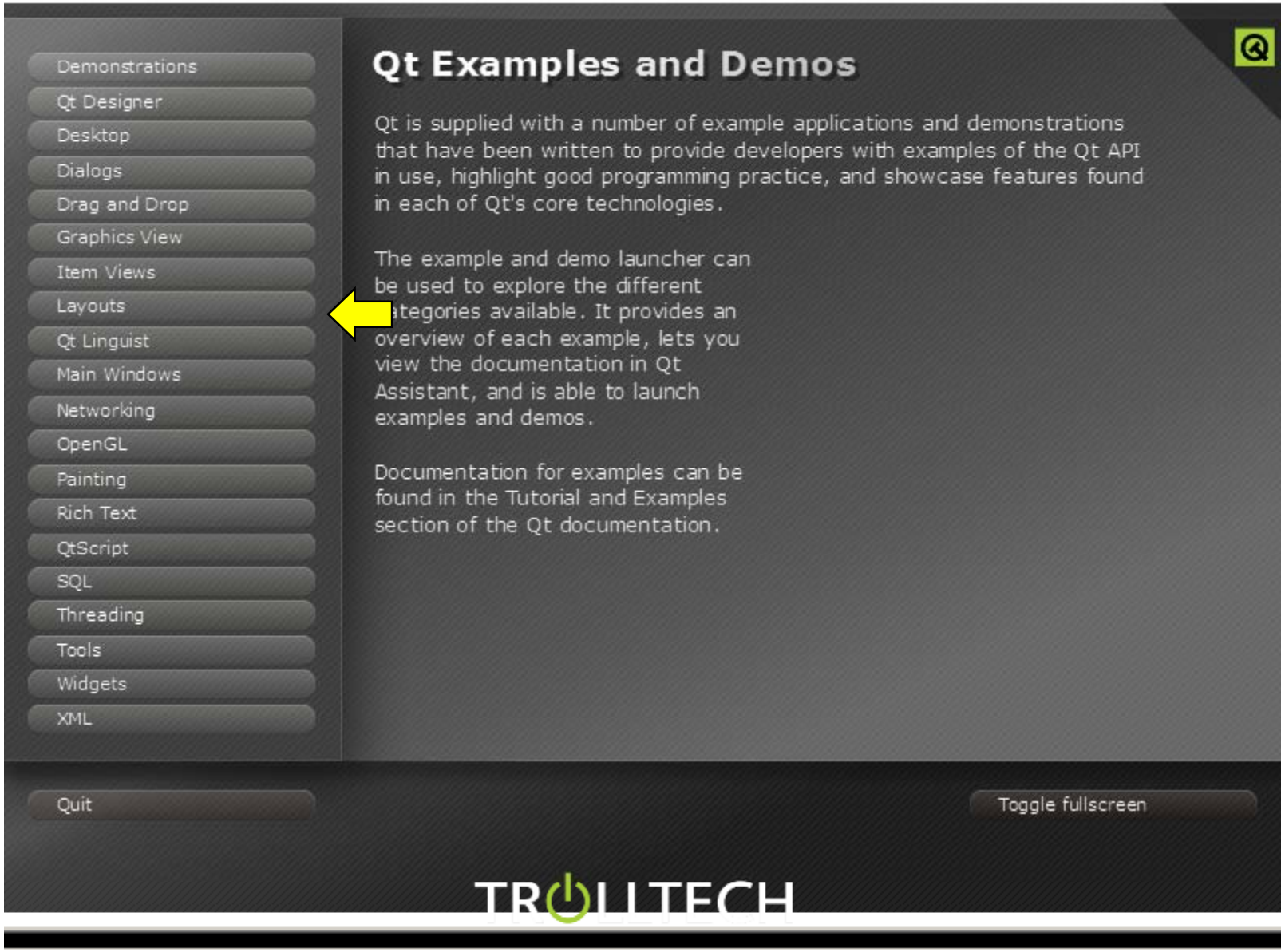
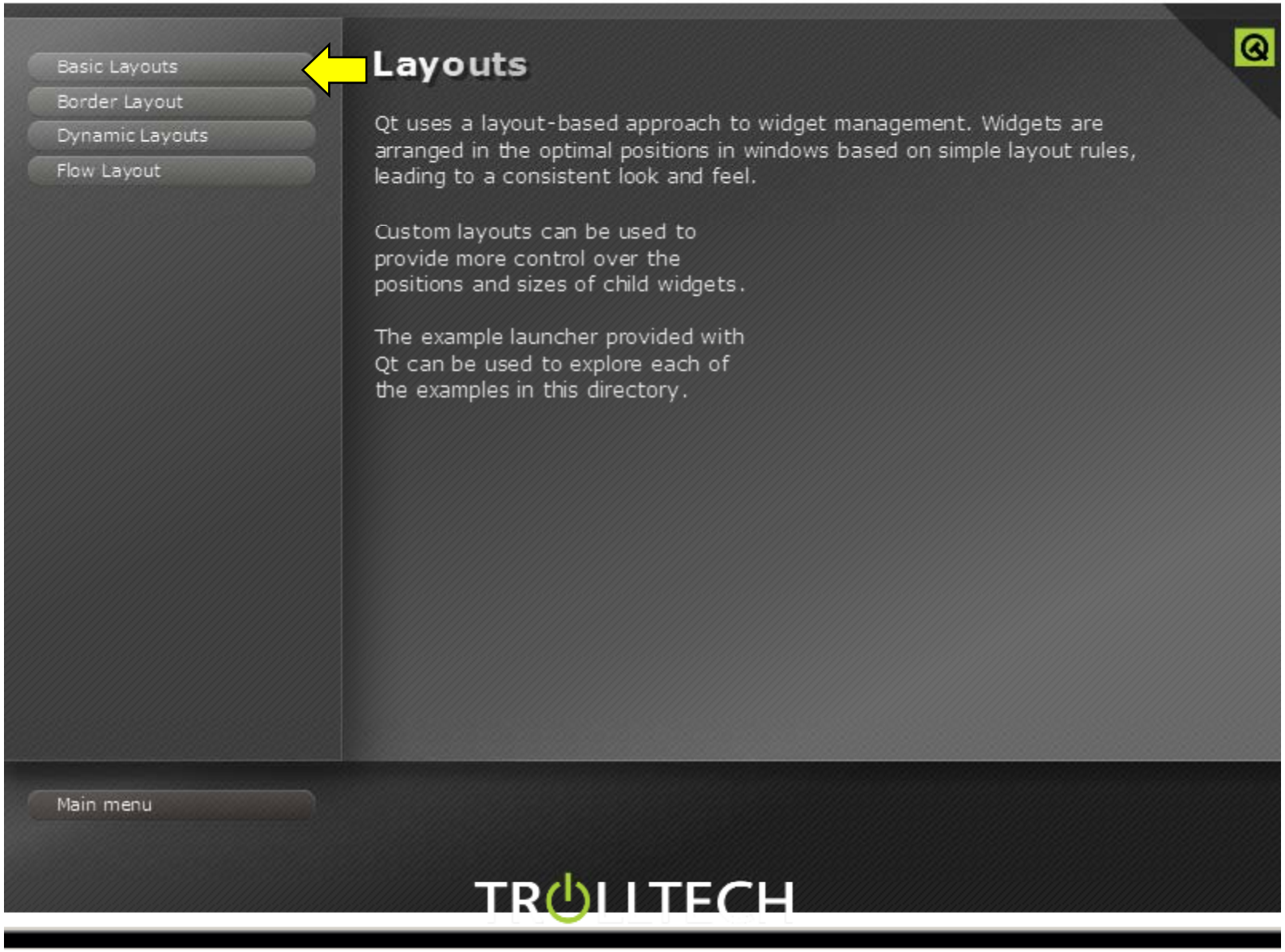
u of U subobject: 9500
Writable
Smart Insert
117 : 18
C/C++ Indexer

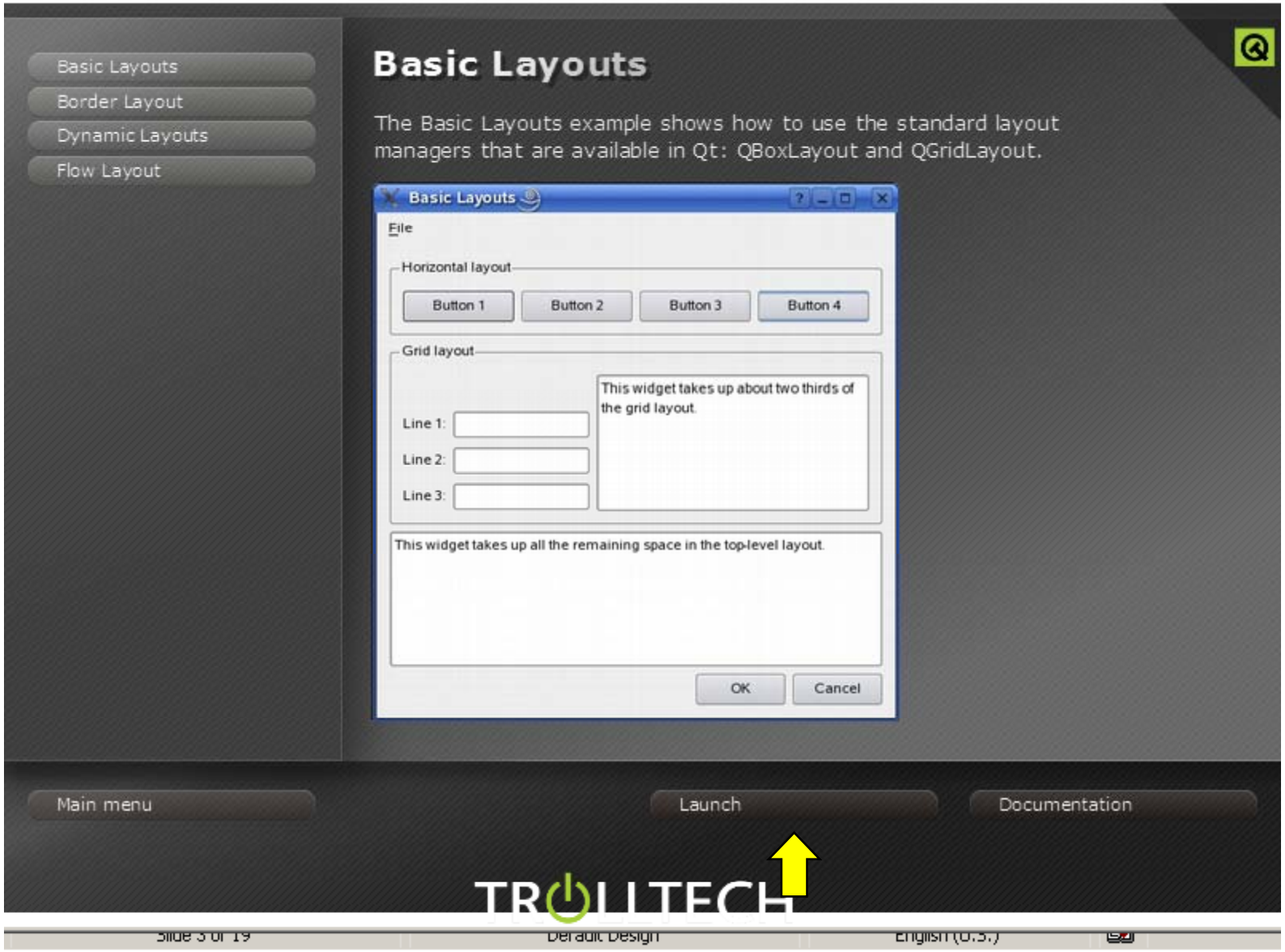
ECE 462
Object-Oriented Programming using C++ and Java

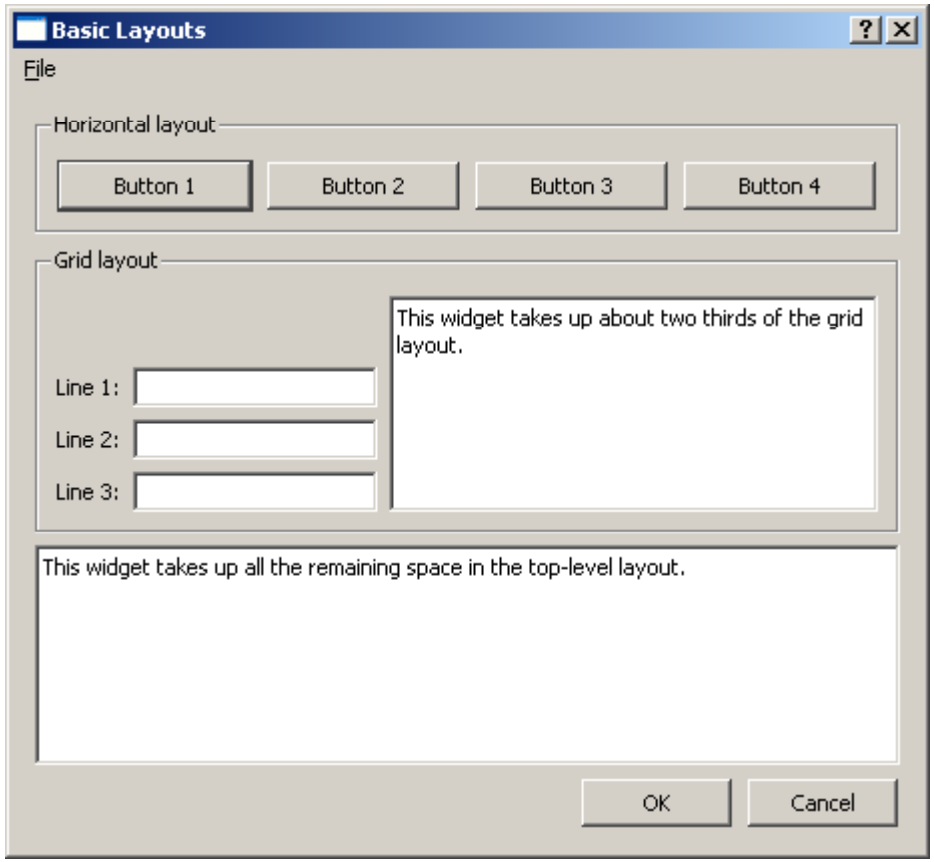
Qt Layout

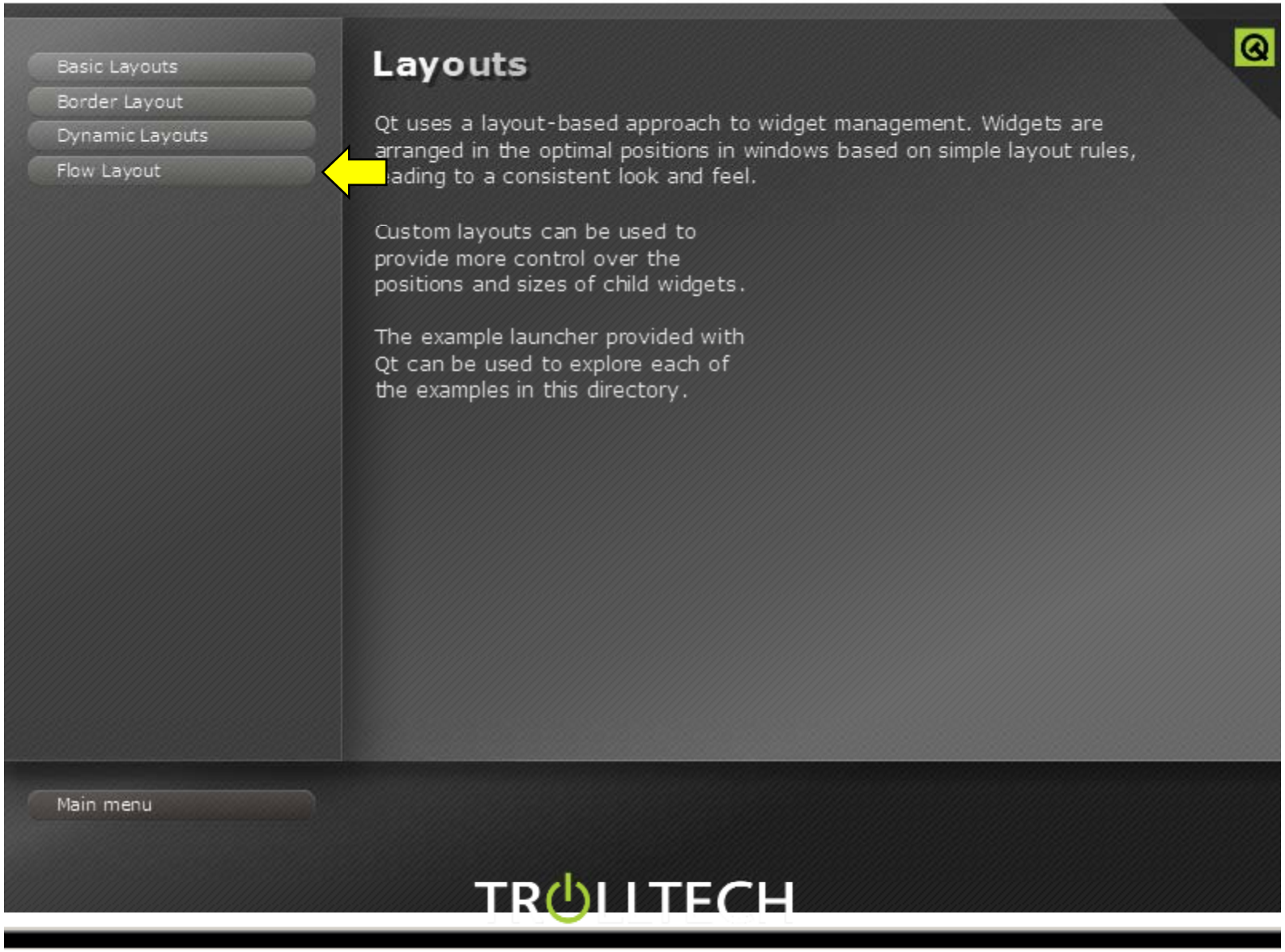
Yung-Hsiang Lu
yunglu@purdue.edu

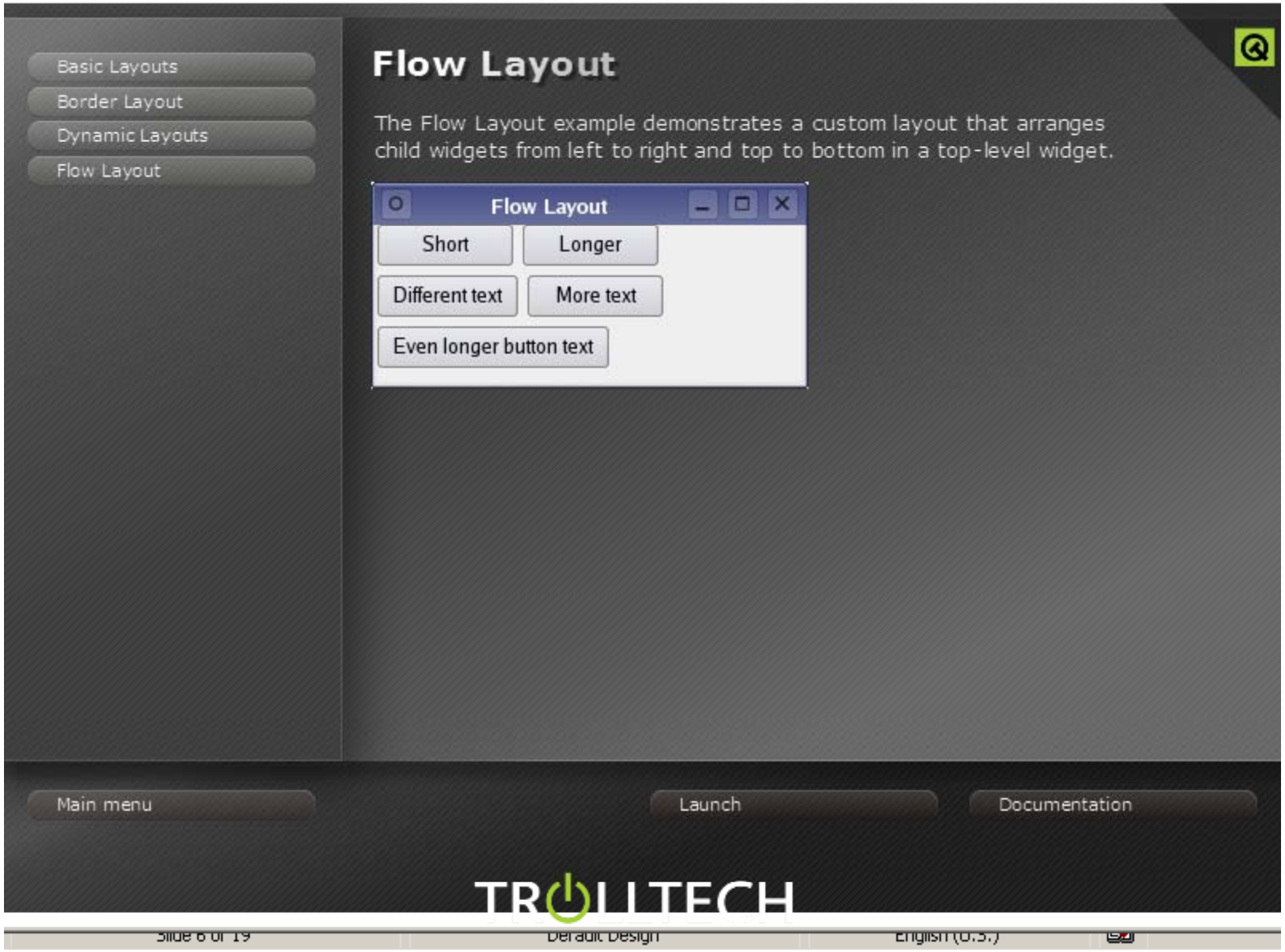

Demonstrations
Qt Designer
Desktop
Dialogs
Drag and Drop
Graphics View
Item Views
Layouts
Qt Linguist
Main Windows
Networking
OpenGL
Painting
Rich Text
QtScript
SQL
Threading
Tools
Widgets
XML
Qt Examples and Demos
Qt is supplied with a number of example applications and demonstrations that have been written to provide developers with examples of the Qt API in use, highlight good programming practice, and showcase features found in each of Qt's core technologies.
The example and demo launcher can be used to explore the different categories available. It provides an overview of each example, lets you view the documentation in Qt Assistant, and is able to launch examples and demos.
Documentation for examples can be found in the Tutorial and Examples section of the Qt documentation.
Quit
Toggle fullscreen
TROLLTECH

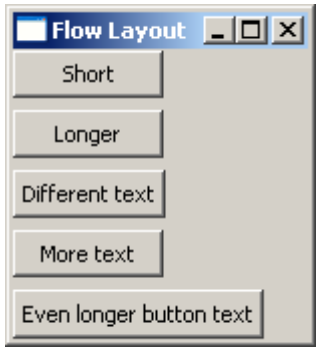

Basic Layouts
Border Layout
Dynamic Layouts
Flow Layout
Layouts
Qt uses a layout-based approach to widget management. Widgets are arranged in the optimal positions in windows based on simple layout rules, leading to a consistent look and feel.
Custom layouts can be used to provide more control over the positions and sizes of child widgets.
The example launcher provided with Qt can be used to explore each of the examples in this directory.
Main menu
TROLLTECH

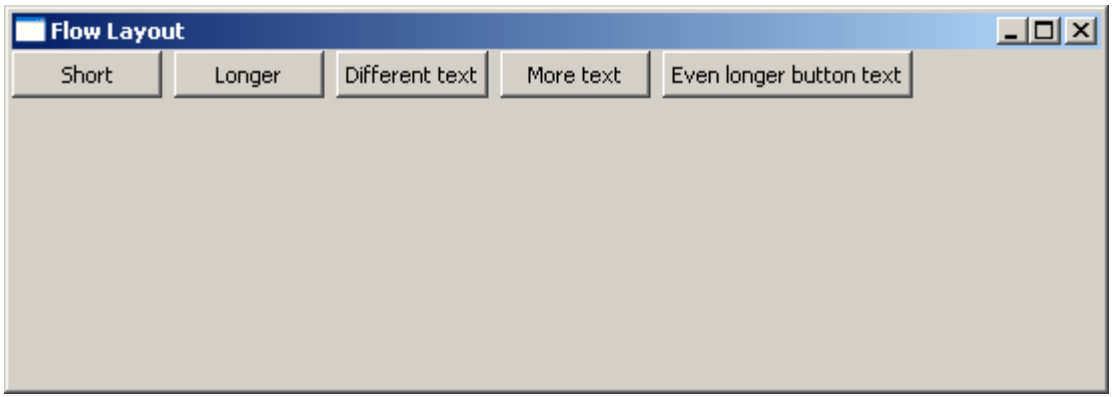

Basic Layouts
Border Layout
Dynamic Layouts
Flow Layout
Basic Layouts
The Basic Layouts example shows how to use the standard layout managers that are available in Qt: QBoxLayout and QGridLayout.
Basic Layouts
File
Horizontal layout
Button 1
Button 2
Button 3
Button 4
Grid layout
Line 1:
Line 2:
Line 3:
This widget takes up about two thirds of the grid layout.
This widget takes up all the remaining space in the top-level layout.
OK
Cancel
Main menu
Launch
Documentation
TROLLTECH
Slide 3 of 19
Default Design
English (U.S.)


Basic Layouts
File
Horizontal layout
Button 1
Button 2
Button 3
Button 4
Grid layout
This widget takes up about two thirds of the grid layout.
Line 1:
Line 2:
Line 3:
This widget takes up all the remaining space in the top-level layout.
OK
Cancel

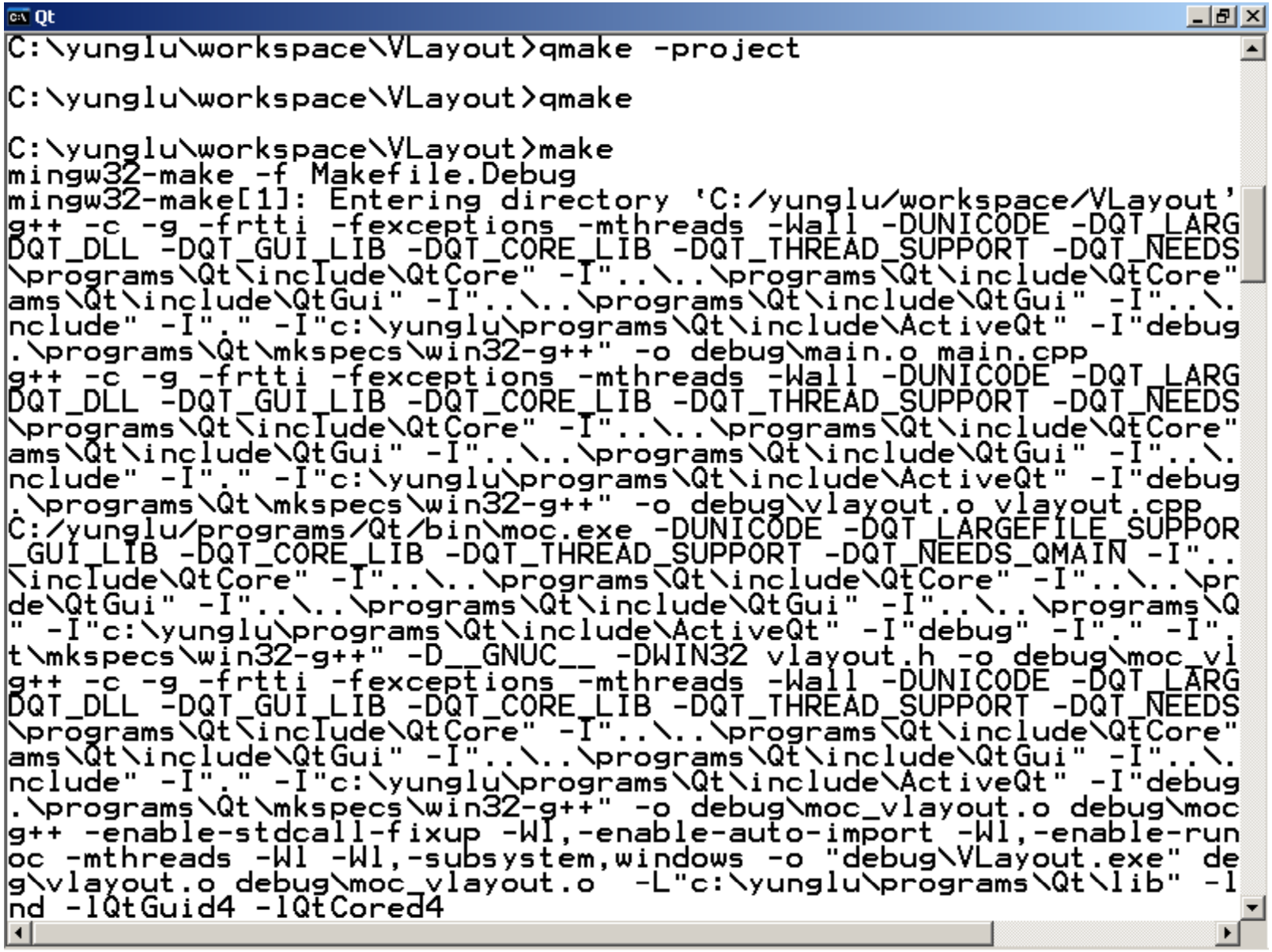

Basic Layouts
Border Layout
Dynamic Layouts
Flow Layout
Layouts
Qt uses a layout-based approach to widget management. Widgets are arranged in the optimal positions in windows based on simple layout rules, leading to a consistent look and feel.
Custom layouts can be used to provide more control over the positions and sizes of child widgets.
The example launcher provided with Qt can be used to explore each of the examples in this directory.
Main menu
TROLLTECH

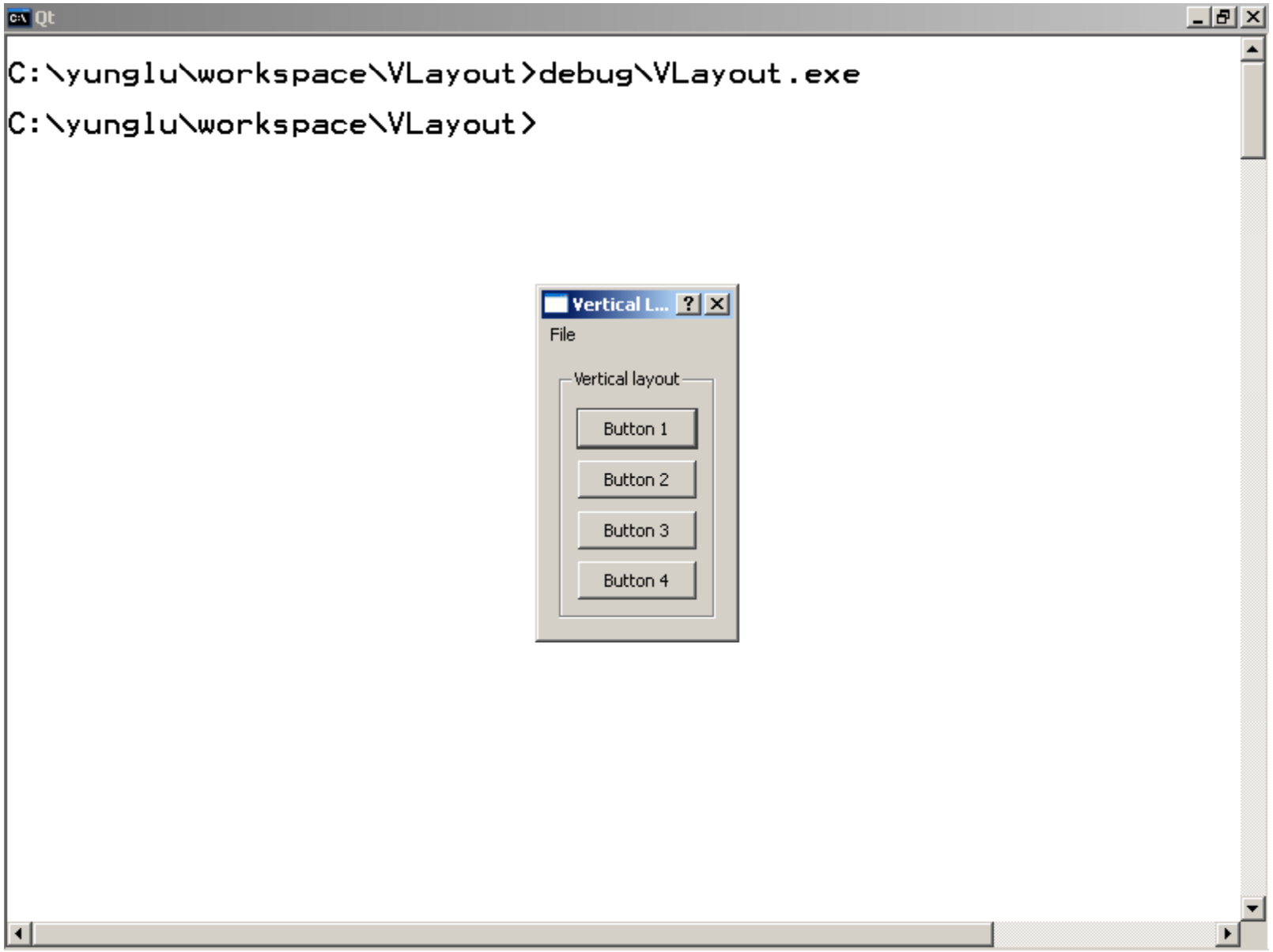

Basic Layouts
Border Layout
Dynamic Layouts
Flow Layout
Flow Layout
The Flow Layout example demonstrates a custom layout that arranges child widgets from left to right and top to bottom in a top-level widget.
Flow Layout
Short
Longer
Different text
More text
Even longer button text
Main menu
Launch
Documentation
TROLLTECH

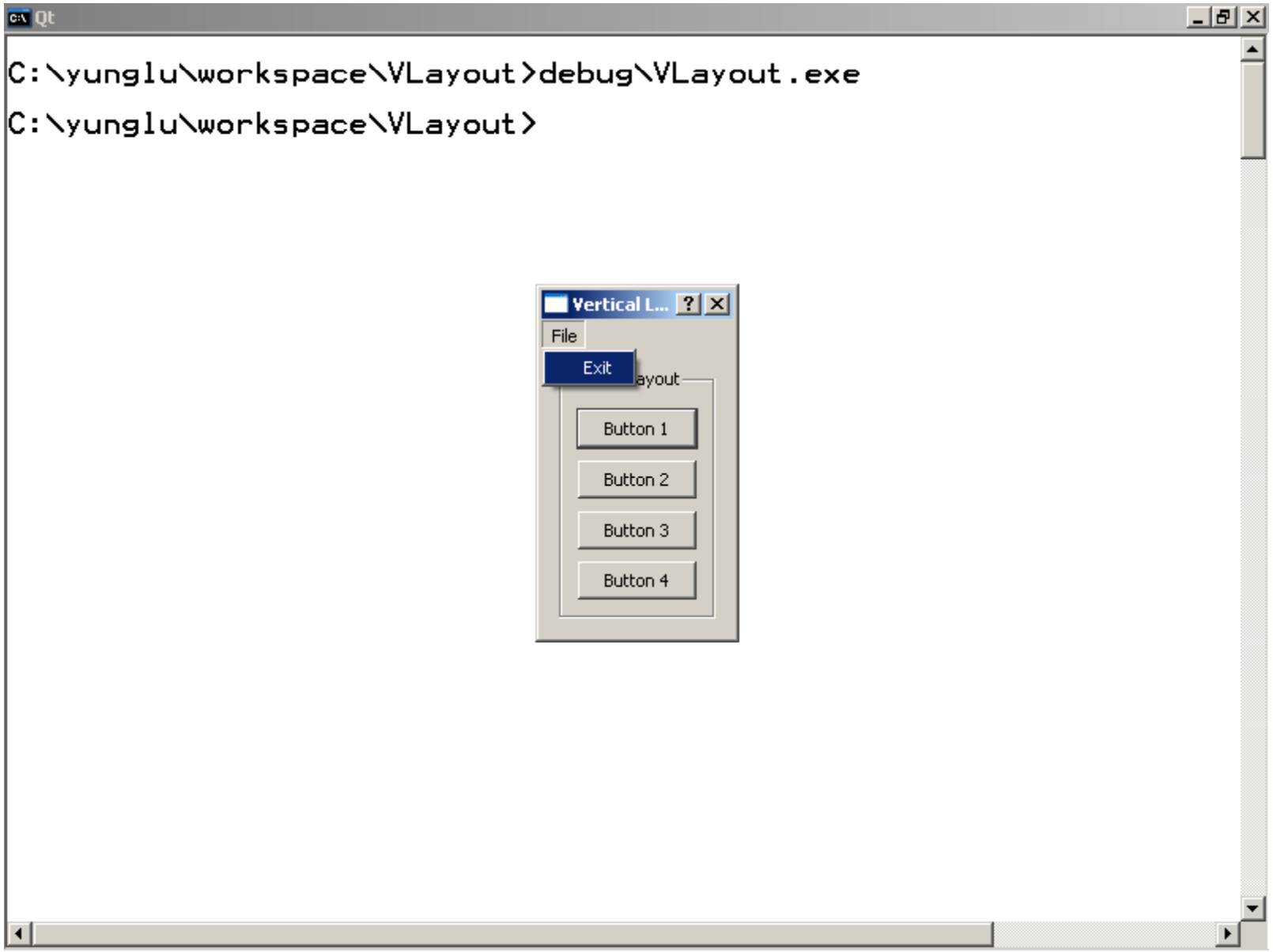

Flow Layout
Short
Longer
Different text
More text
Even longer button text

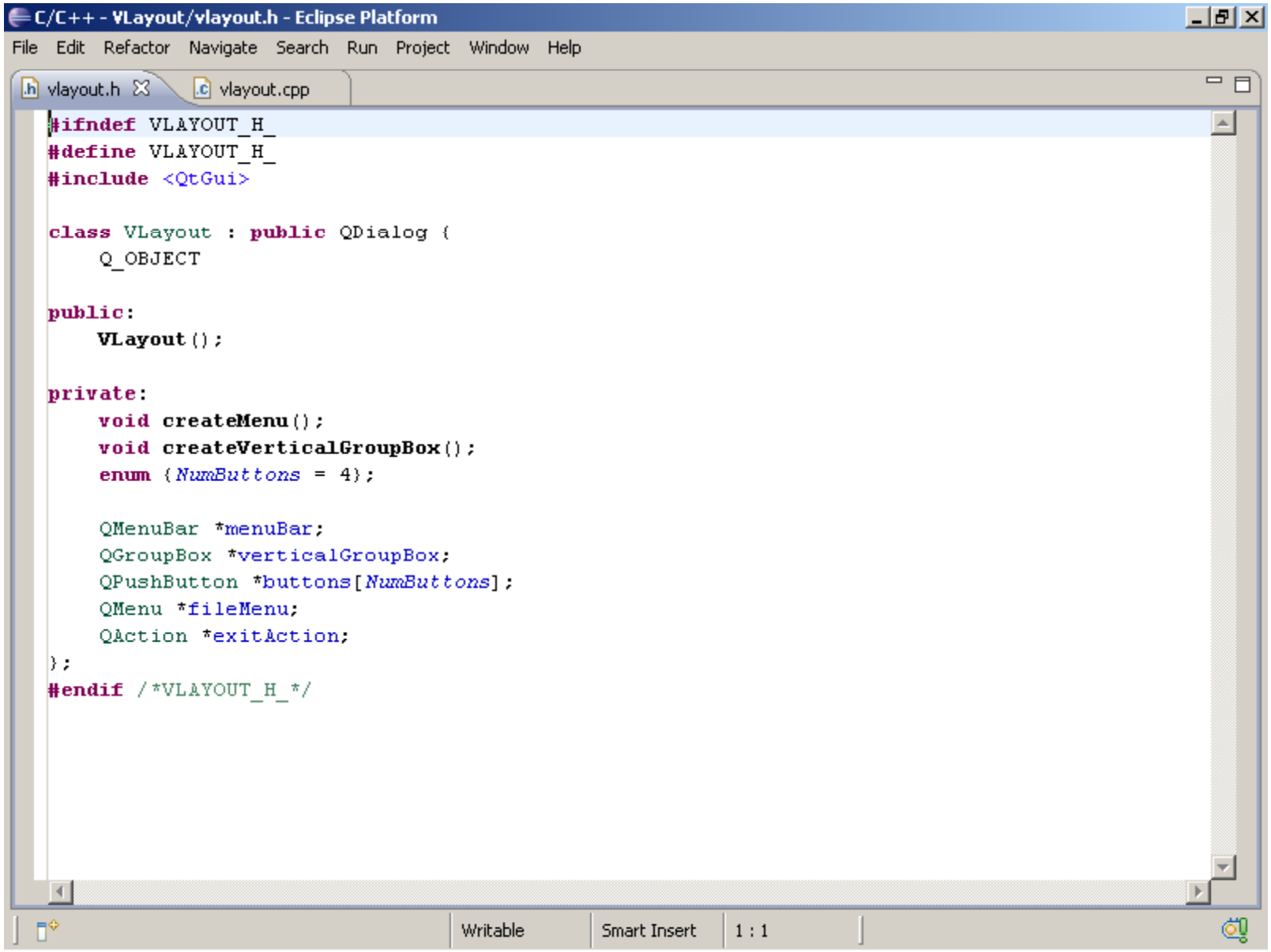

Flow Layout
Short
Longer
Different text
More text
Even longer button text

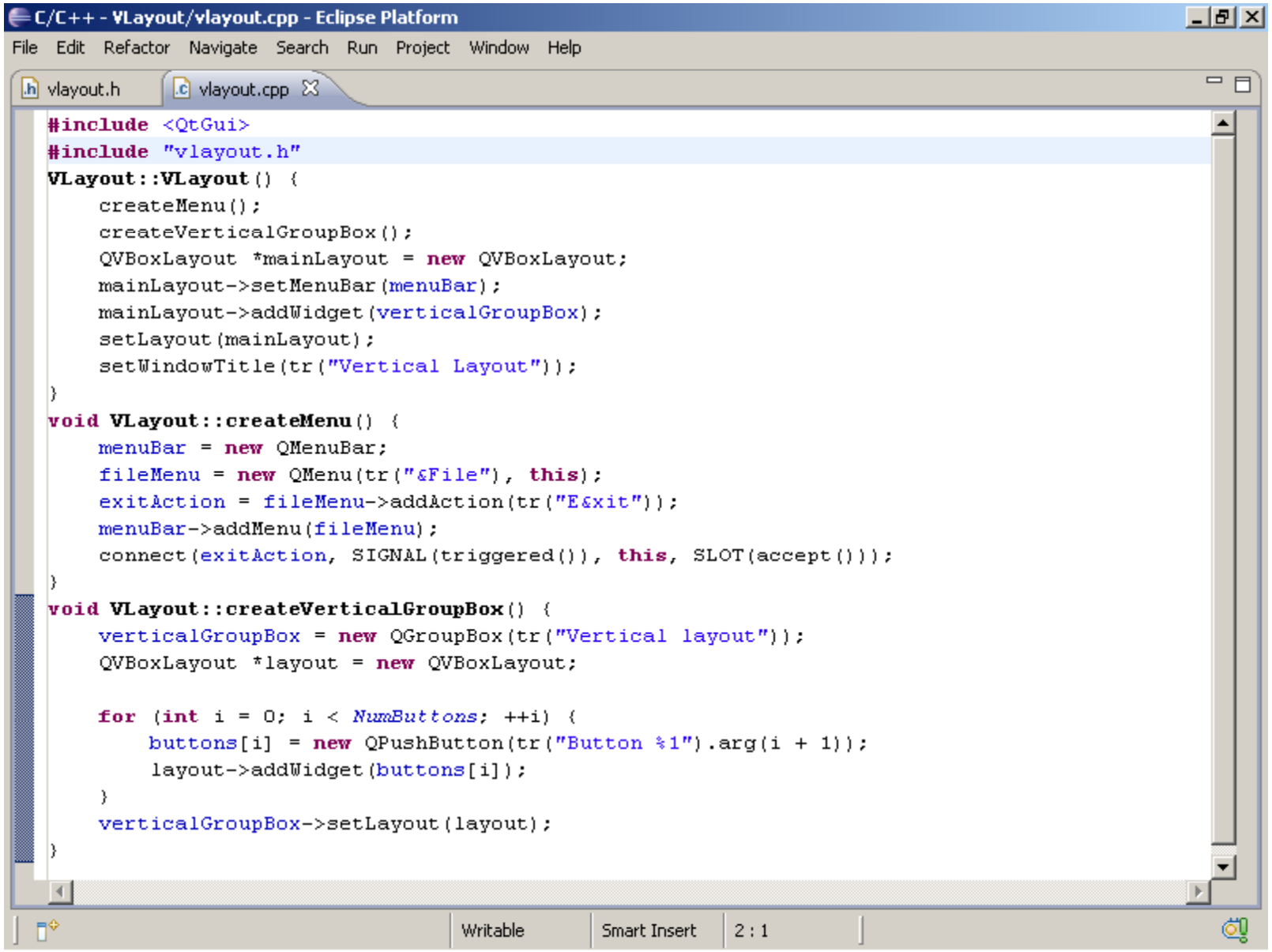
Menubar and Vertical Layout


Qt
C:\yunglu\workspace\VLayout>qmake -project
C:\yunglu\workspace\VLayout>qmake
C:\yunglu\workspace\VLayout>make
mingw32-make -f Makefile.Debug
mingw32-make[1]: Entering directory 'C:/yunglu/workspace/VLayout'
g++ -c -g -frtti -fexceptions -mthreads -Wall -DUNICODE -DQT_LARG
DQT_DLL -DQT_GUI_LIB -DQT_CORE_LIB -DQT_THREAD_SUPPORT -DQT_NEEDS
\programs\Qt\include\QtCore" -I"..\..\programs\Qt\include\QtCore"
ams\Qt\include\QtGui" -I"..\..\programs\Qt\include\QtGui" -I"..\.
nclude" -I"." -I"c:\yunglu\programs\Qt\include\ActiveQt" -I"debug
.\programs\Qt\mkspecs\win32-g++" -o debug\main.o main.cpp
g++ -c -g -frtti -fexceptions -mthreads -Wall -DUNICODE -DQT_LARG
DQT_DLL -DQT_GUI_LIB -DQT_CORE_LIB -DQT_THREAD_SUPPORT -DQT_NEEDS
\programs\Qt\include\QtCore" -I"..\..\programs\Qt\include\QtCore"
ams\Qt\include\QtGui" -I"..\..\programs\Qt\include\QtGui" -I"..\.
nclude" -I"." -I"c:\yunglu\programs\Qt\include\ActiveQt" -I"debug
.\programs\Qt\mkspecs\win32-g++" -o debug\vlayout.o vlayout.cpp
C:/yunglu/programs/Qt/bin\moc.exe -DUNICODE -DQT_LARGEFILE_SUPPOR
_GUI_LIB -DQT_CORE_LIB -DQT_THREAD_SUPPORT -DQT_NEEDS_QMAIN -I"..
\include\QtCore" -I"..\..\programs\Qt\include\QtCore" -I"..\..\pr
de\QtGui" -I"..\..\programs\Qt\include\QtGui" -I"..\..\programs\Q
" -I"c:\yunglu\programs\Qt\include\ActiveQt" -I"debug" -I"." -I".
t\mkspecs\win32-g++" -D__GNUC__ -DWIN32 vlayout.h -o debug\moc_vl
g++ -c -g -frtti -fexceptions -mthreads -Wall -DUNICODE -DQT_LARG
DQT_DLL -DQT_GUI_LIB -DQT_CORE_LIB -DQT_THREAD_SUPPORT -DQT_NEEDS
\programs\Qt\include\QtCore" -I"..\..\programs\Qt\include\QtCore"
ams\Qt\include\QtGui" -I"..\..\programs\Qt\include\QtGui" -I"..\.
nclude" -I"." -I"c:\yunglu\programs\Qt\include\ActiveQt" -I"debug
.\programs\Qt\mkspecs\win32-g++" -o debug\moc_vlayout.o debug\moc
g++ -enable-stdcall-fixup -Wl,-enable-auto-import -Wl,-enable-run
oc -mthreads -Wl -Wl,-subsystem,windows -o "debug\VLayout.exe" de
g\vlayout.o debug\moc_vlayout.o -L"c:\yunglu\programs\Qt\lib" -l
nd -lQtGuid4 -lQtCored4

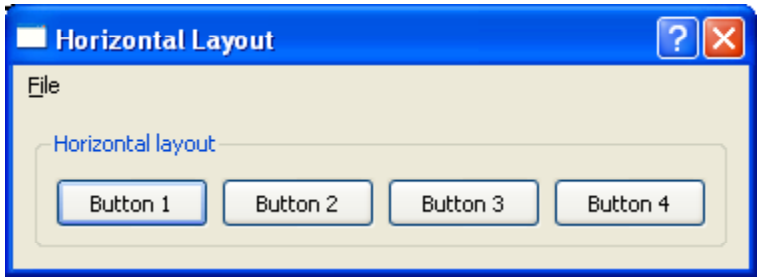

Qt
C:\yunglu\workspace\VLayout>debug\VLayout.exe
C:\yunglu\workspace\VLayout>
Vertical L...
File
Vertical layout
Button 1
Button 2
Button 3
Button 4

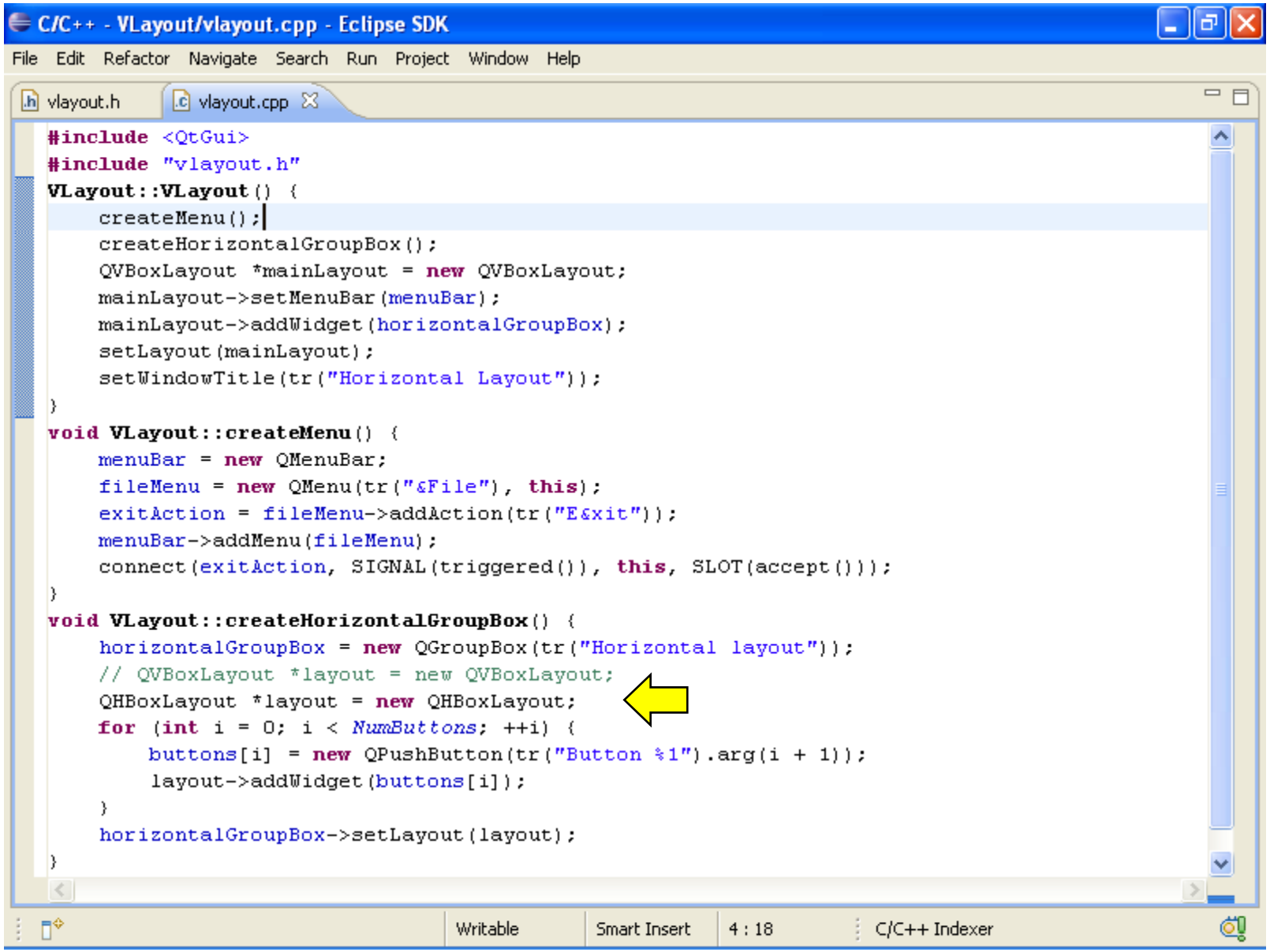

Qt
C:\yunglu\workspace\VLayout>debug\VLayout.exe
C:\yunglu\workspace\VLayout>
Vertical L...
File
Exit
Button 1
Button 2
Button 3
Button 4


C/C++ - VLayout/vlayout.h - Eclipse Platform
File Edit Refactor Navigate Search Run Project Window Help
vlayout.h
vlayout.cpp
#ifndef VLAYOUT_H_
#define VLAYOUT_H_
#include <QtGui>
class VLayout : public QDialog {
Q_OBJECT
public:
VLayout();
private:
void createMenu();
void createVerticalGroupBox();
enum {NumButtons = 4};
QMenuBar *menuBar;
QGroupBox *verticalGroupBox;
QPushButton *buttons[NumButtons];
QMenu *fileMenu;
QAction *exitAction;
};
#endif /*VLAYOUT_H_*/
Writable
Smart Insert
1 : 1

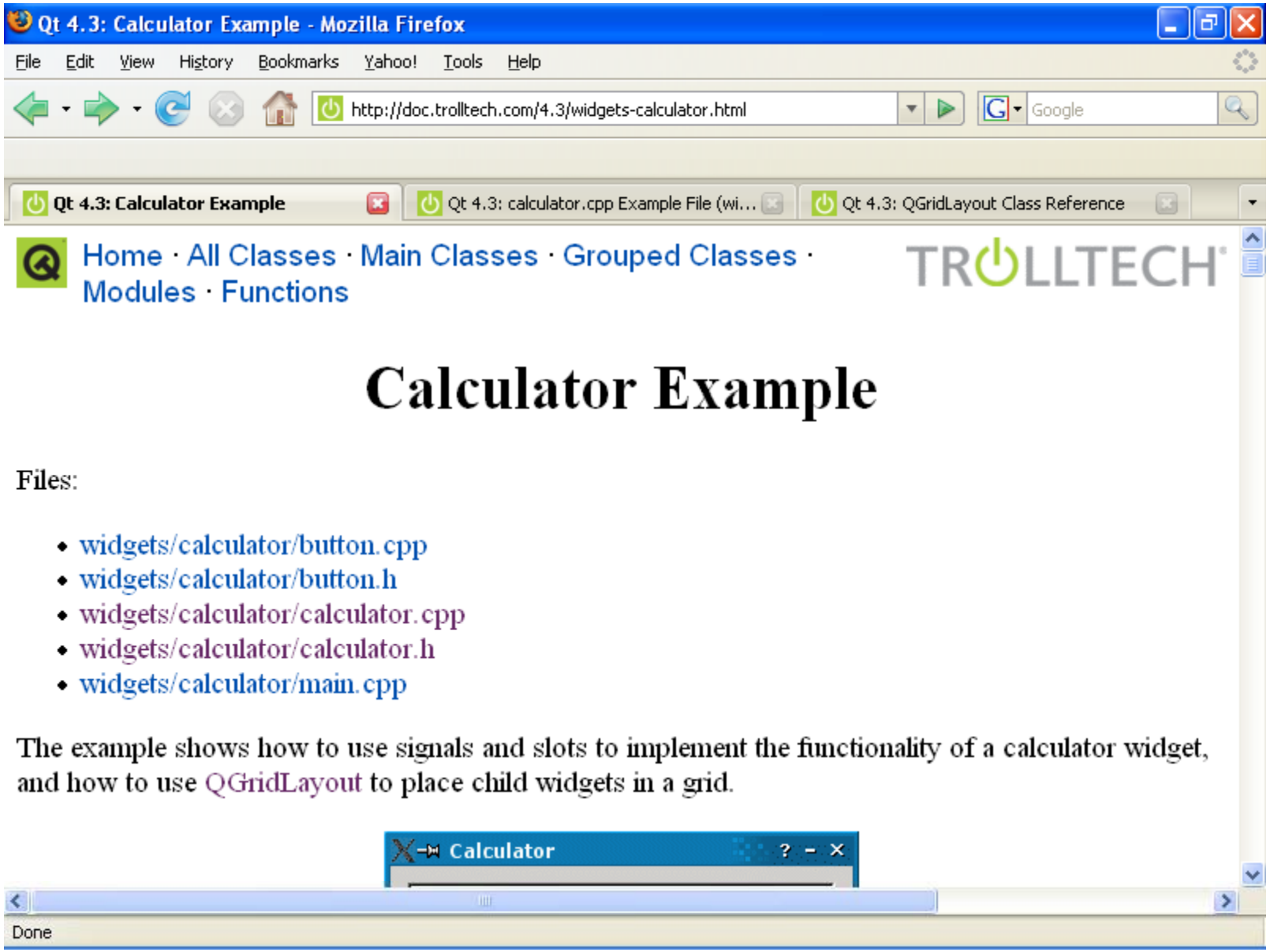

C/C++ - VLayout/vlayout.cpp - Eclipse Platform
File Edit Refactor Navigate Search Run Project Window Help
vlayout.h
vlayout.cpp
#include <QtGui>
#include "vlayout.h"
VLayout::VLayout() {
createMenu();
createVerticalGroupBox();
QVBoxLayout *mainLayout = new QVBoxLayout;
mainLayout->setMenuBar(menuBar);
mainLayout->addWidget(verticalGroupBox);
setLayout(mainLayout);
setWindowTitle(tr("Vertical Layout"));
}
void VLayout::createMenu() {
menuBar = new QMenuBar;
fileMenu = new QMenu(tr("&File"), this);
exitAction = fileMenu->addAction(tr("E&xit"));
menuBar->addMenu(fileMenu);
connect(exitAction, SIGNAL(triggered()), this, SLOT(accept()));
}
void VLayout::createVerticalGroupBox() {
verticalGroupBox = new QGroupBox(tr("Vertical layout"));
QVBoxLayout *layout = new QVBoxLayout;
for (int i = 0; i < NumButtons; ++i) {
buttons[i] = new QPushButton(tr("Button %1").arg(i + 1));
layout->addWidget(buttons[i]);
}
verticalGroupBox->setLayout(layout);
}
Writable
Smart Insert
2 : 1

Horizontal Layout


Horizontal Layout
File
Horizontal layout
Button 1
Button 2
Button 3
Button 4


C/C++ - VLayout/vlayout.cpp - Eclipse SDK
File Edit Refactor Navigate Search Run Project Window Help
vlayout.h
vlayout.cpp
#include <QtGui>
#include "vlayout.h"
VLayout::VLayout() {
createMenu();
createHorizontalGroupBox();
QVBoxLayout *mainLayout = new QVBoxLayout;
mainLayout->setMenuBar(menuBar);
mainLayout->addWidget(horizontalGroupBox);
setLayout(mainLayout);
setWindowTitle(tr("Horizontal Layout"));
}
void VLayout::createMenu() {
menuBar = new QMenuBar;
fileMenu = new QMenu(tr("&File"), this);
exitAction = fileMenu->addAction(tr("E&xit"));
menuBar->addMenu(fileMenu);
connect(exitAction, SIGNAL(triggered()), this, SLOT(accept()));
}
void VLayout::createHorizontalGroupBox() {
horizontalGroupBox = new QGroupBox(tr("Horizontal layout"));
// QVBoxLayout *layout = new QVBoxLayout;
QHBoxLayout *layout = new QHBoxLayout;
for (int i = 0; i < NumButtons; ++i) {
buttons[i] = new QPushButton(tr("Button %1").arg(i + 1));
layout->addWidget(buttons[i]);
}
horizontalGroupBox->setLayout(layout);
}
Writable
Smart Insert
4 : 18
C/C++ Indexer

Grid Layout


Qt 4.3: Calculator Example - Mozilla Firefox
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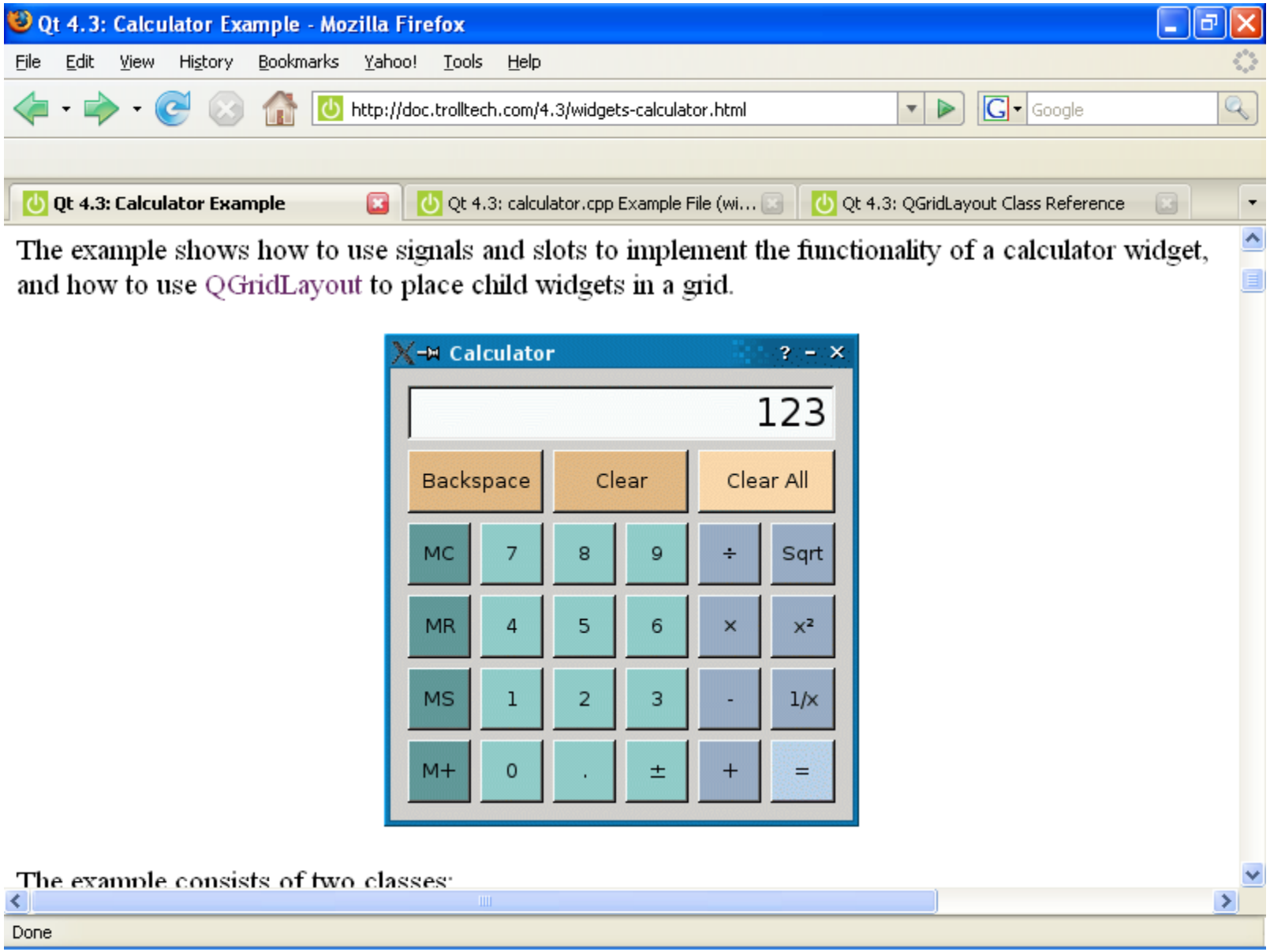
Qt 4.3: Calculator Example
Qt 4.3: calculator.cpp Example File (wi...
Qt 4.3: QGridLayout Class Reference
Home · All Classes · Main Classes · Grouped Classes · Modules · Functions
TROLLTECH
Calculator Example
Files:
widgets/calculator/button.cpp
widgets/calculator/button.h
widgets/calculator/calculator.cpp
widgets/calculator/calculator.h
widgets/calculator/main.cpp
The example shows how to use signals and slots to implement the functionality of a calculator widget, and how to use QGridLayout to place child widgets in a grid.
Calculator
Done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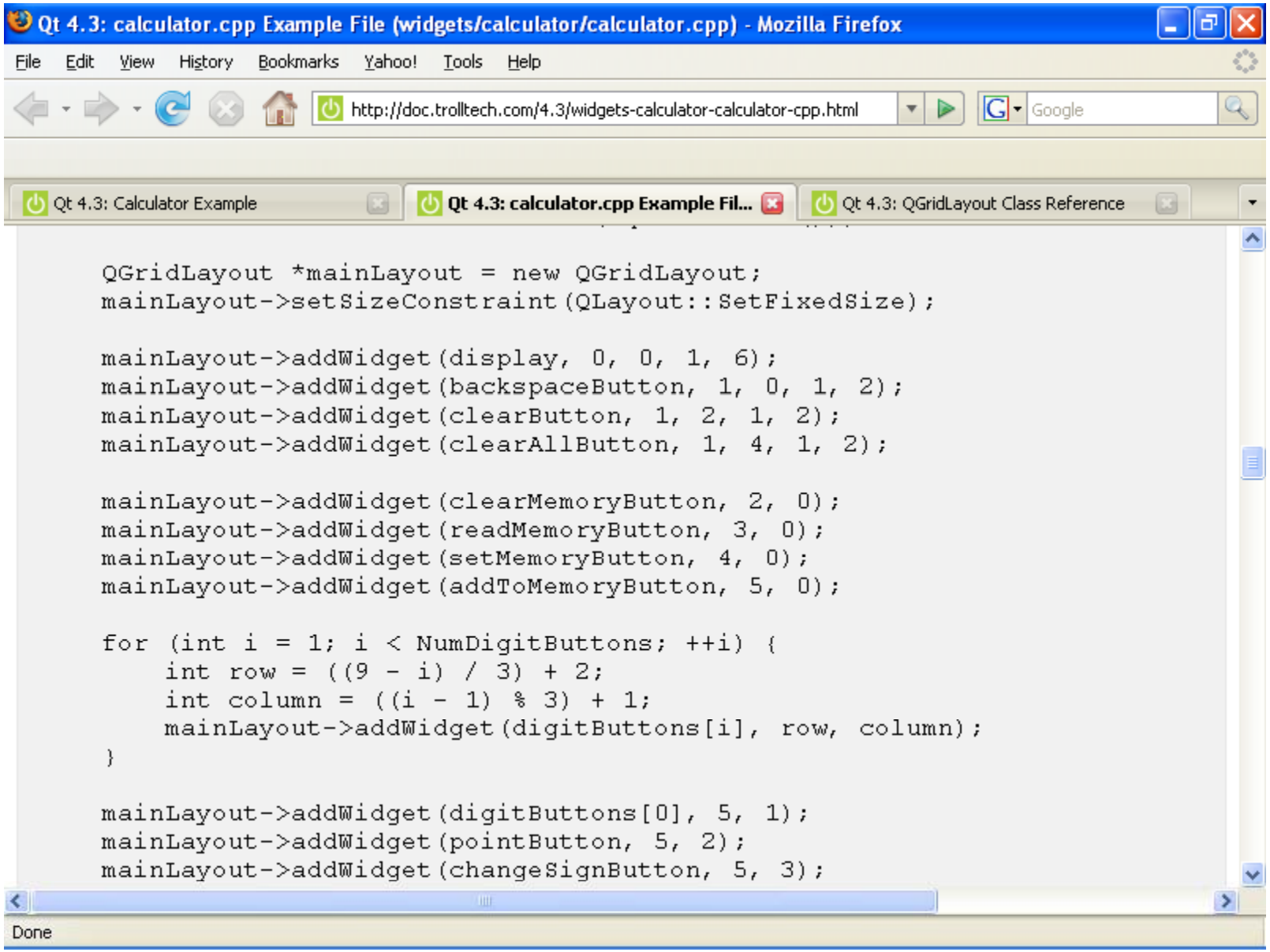
Google
Qt 4.3: Calculator Example
Qt 4.3: calculator.cpp Example File (wi...
Qt 4.3: QGridLayout Class Reference
The example shows how to use signals and slots to implement the functionality of a calculator widget, and how to use QGridLayout to place child widgets in a grid.
Calculator
123
Backspace
Clear
Clear All
MC 7 8 9 ÷ Sqrt
MR 4 5 6 × x²
MS 1 2 3 - 1/x
M+ 0 . ± + =
The example consists of two classes:
Done


Qt 4.3: calculator.cpp Example File (widgets/calculator/calculator.cpp) - Mozilla Firefox
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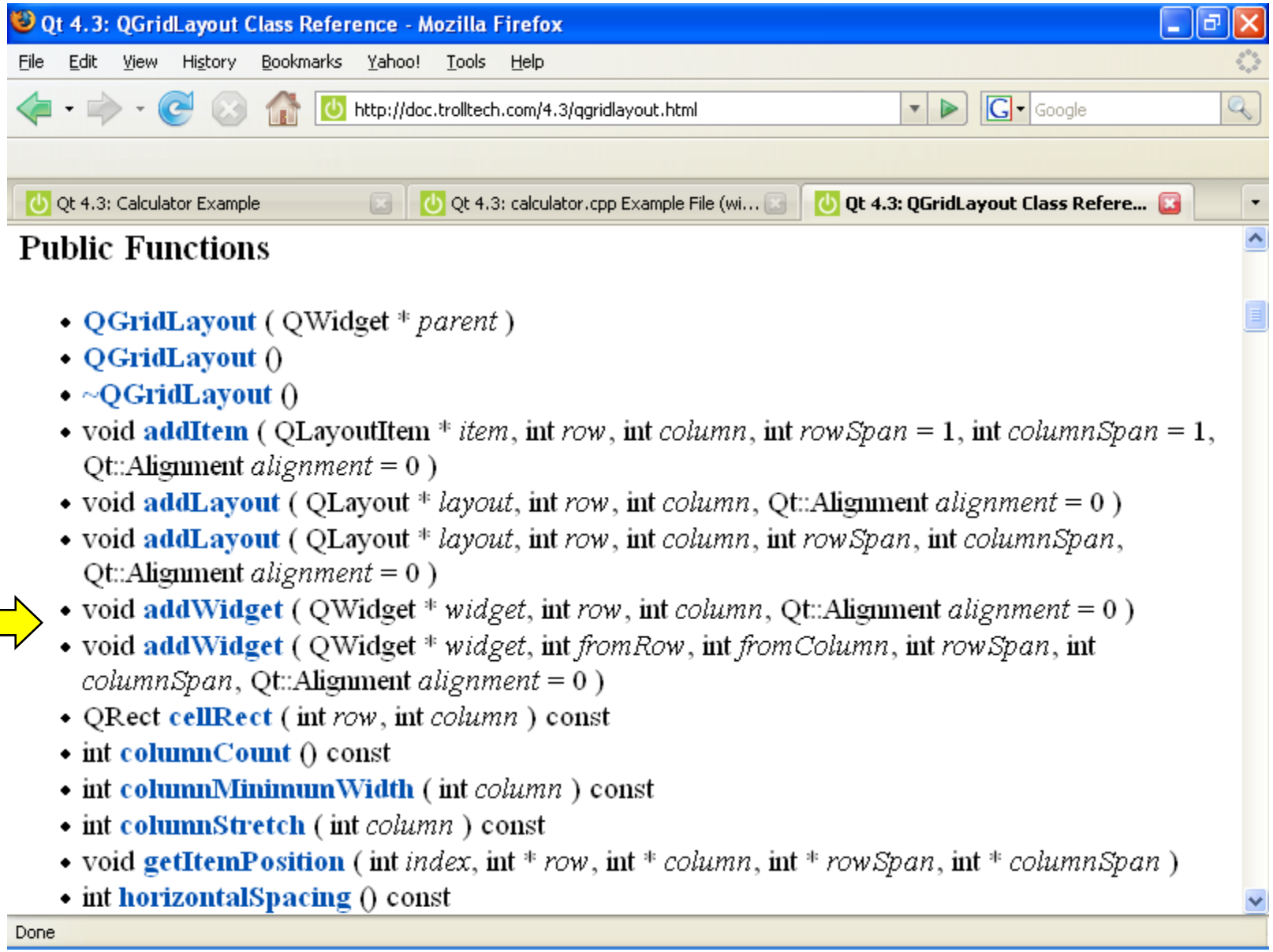
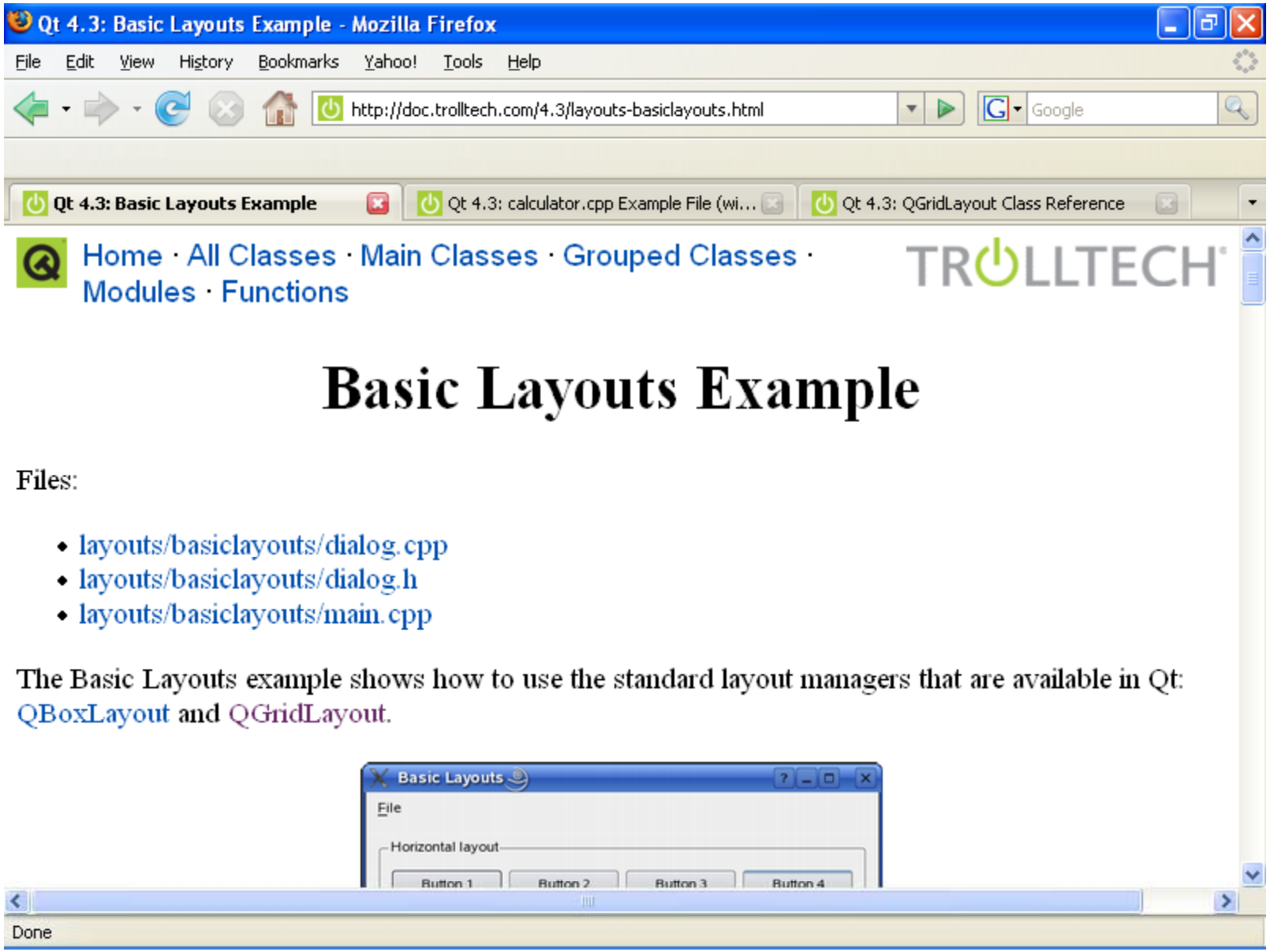
http://doc.trolltech.com/4.3/widgets-calculator-calculator-cpp.html
Google
Qt 4.3: Calculator Example
Qt 4.3: calculator.cpp Example Fil...
Qt 4.3: QGridLayout Class Reference
QGridLayout *mainLayout = new QGridLayout;
mainLayout->setSizeConstraint(QLayout::SetFixedSize);
mainLayout->addWidget(display, 0, 0, 1, 6);
mainLayout->addWidget(backspaceButton, 1, 0, 1, 2);
mainLayout->addWidget(clearButton, 1, 2, 1, 2);
mainLayout->addWidget(clearAllButton, 1, 4, 1, 2);
mainLayout->addWidget(clearMemoryButton, 2, 0);
mainLayout->addWidget(readMemoryButton, 3, 0);
mainLayout->addWidget(setMemoryButton, 4, 0);
mainLayout->addWidget(addToMemoryButton, 5, 0);
for (int i = 1; i < NumDigitButtons; ++i) {
int row = ((9 - i) / 3) + 2;
int column = ((i - 1) % 3) + 1;
mainLayout->addWidget(digitButtons[i], row, column);
}
mainLayout->addWidget(digitButtons[0], 5, 1);
mainLayout->addWidget(pointButton, 5, 2);
mainLayout->addWidget(changeSignButton, 5, 3);
Done


Qt 4.3: QGridLayout Class Reference - Mozilla Firefox
File Edit View History Bookmarks Yahoo! Tools Help
http://doc.trolltech.com/4.3/qgridlayout.html
Google
Qt 4.3: Calculator Example
Qt 4.3: calculator.cpp Example File (wi...
Qt 4.3: QGridLayout Class Refere...
Public Functions
QGridLayout (QWidget * parent)
QGridLayout ()
~QGridLayout ()
void addItem (QLayoutItem * item, int row, int column, int rowSpan = 1, int columnSpan = 1, Qt::Alignment alignment = 0)
void addLayout (QLayout * layout, int row, int column, Qt::Alignment alignment = 0)
void addLayout (QLayout * layout, int row, int column, int rowSpan, int columnSpan, Qt::Alignment alignment = 0)
void addWidget (QWidget * widget, int row, int column, Qt::Alignment alignment = 0)
void addWidget (QWidget * widget, int fromRow, int fromColumn, int rowSpan, int columnSpan, Qt::Alignment alignment = 0)
QRect cellRect (int row, int column) const
int columnCount () const
int columnMinimumWidth (int column) const
int columnStretch (int column) const
void getItemPosition (int index, int * row, int * column, int * rowSpan, int * columnSpan)
int horizontalSpacing () const
Done

Combination of Layouts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Qt 4.3: Basic Layouts Example
Qt 4.3: calculator.cpp Example File (wi...
Qt 4.3: QGridLayout Class Reference
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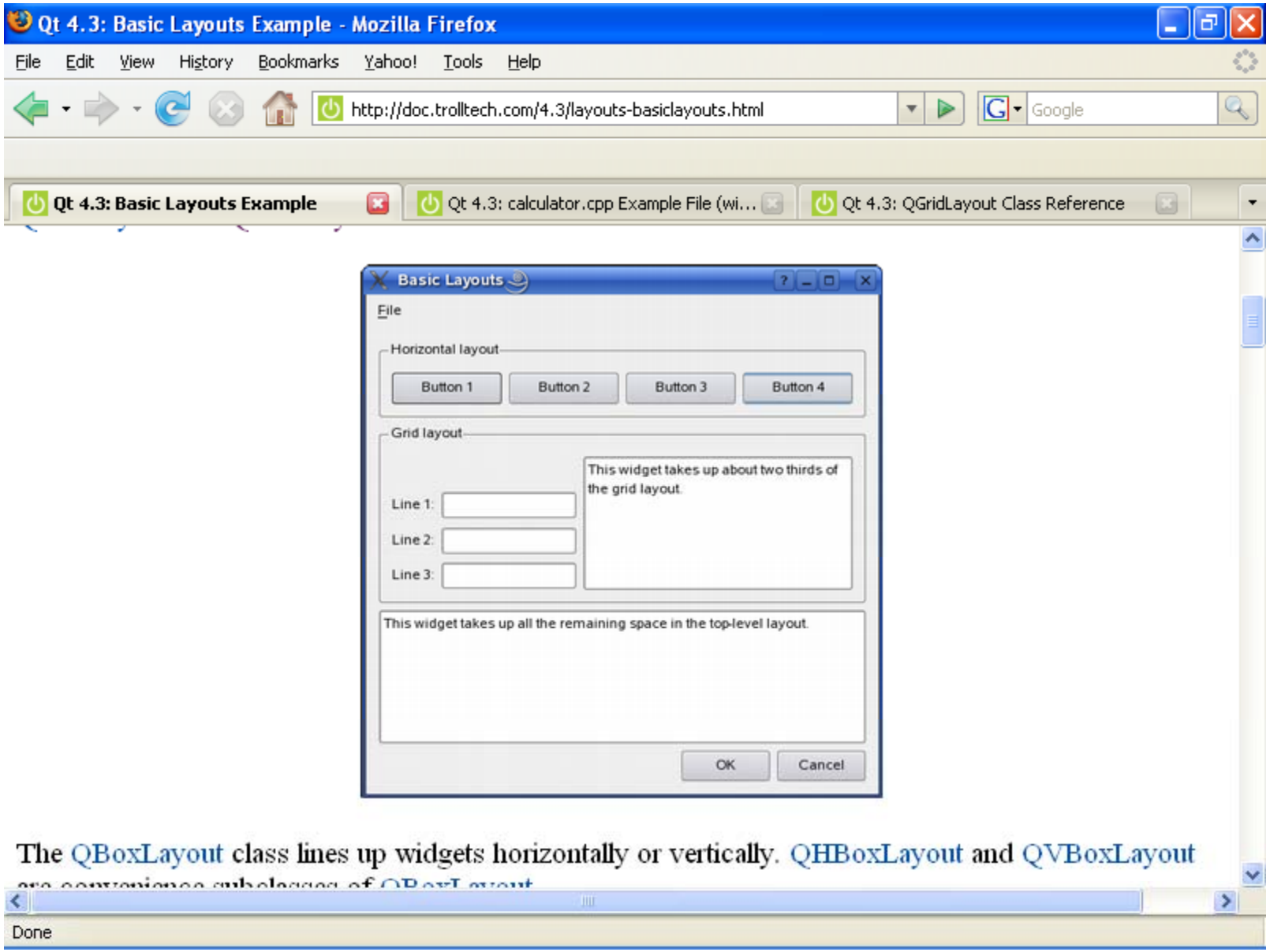
TROLLTECH
Basic Layouts Example
Files:
layouts/basiclayouts/dialog.cpp
layouts/basiclayouts/dialog.h
layouts/basiclayouts/main.cpp
The Basic Layouts example shows how to use the standard layout managers that are available in Qt: QBoxLayout and QGridLayout.
Basic Layouts
File
Horizontal layout
Button 1
Button 2
Button 3
Button 4
Done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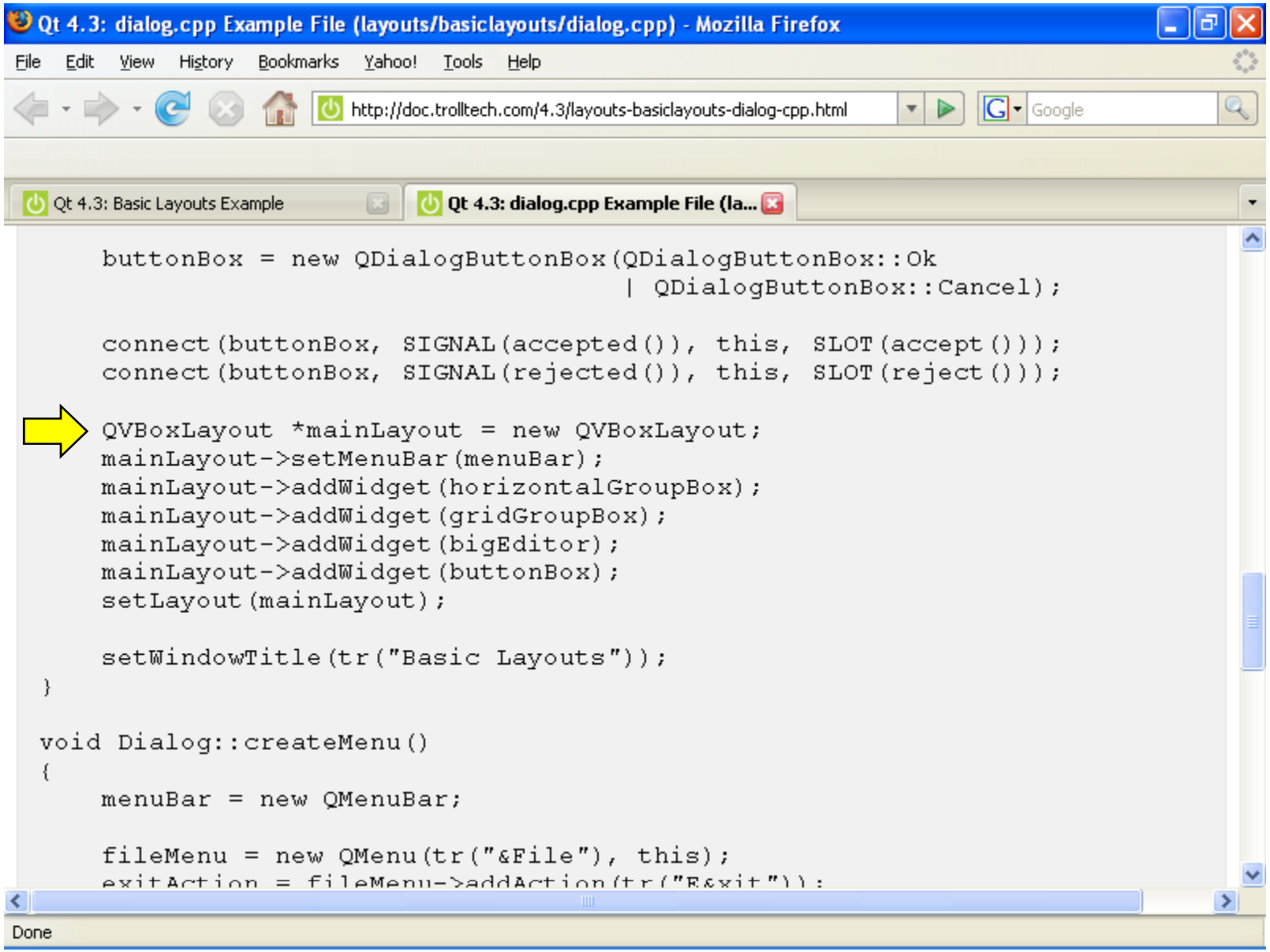
Google
Qt 4.3: Basic Layouts Example
Qt 4.3: calculator.cpp Example File (wi...
Qt 4.3: QGridLayout Class Reference
Basic Layouts
File
Horizontal layout
Button 1
Button 2
Button 3
Button 4
Grid layout
This widget takes up about two thirds of the grid layout.
Line 1:
Line 2:
Line 3:
This widget takes up all the remaining space in the top-level layout.
OK
Cancel
The QBoxLayout class lines up widgets horizontally or vertically. QHBoxLayout and QVBoxLayout
Done


Qt 4.3: dialog.cpp Example File (layouts/basiclayouts/dialog.cpp) - Mozilla Firefox
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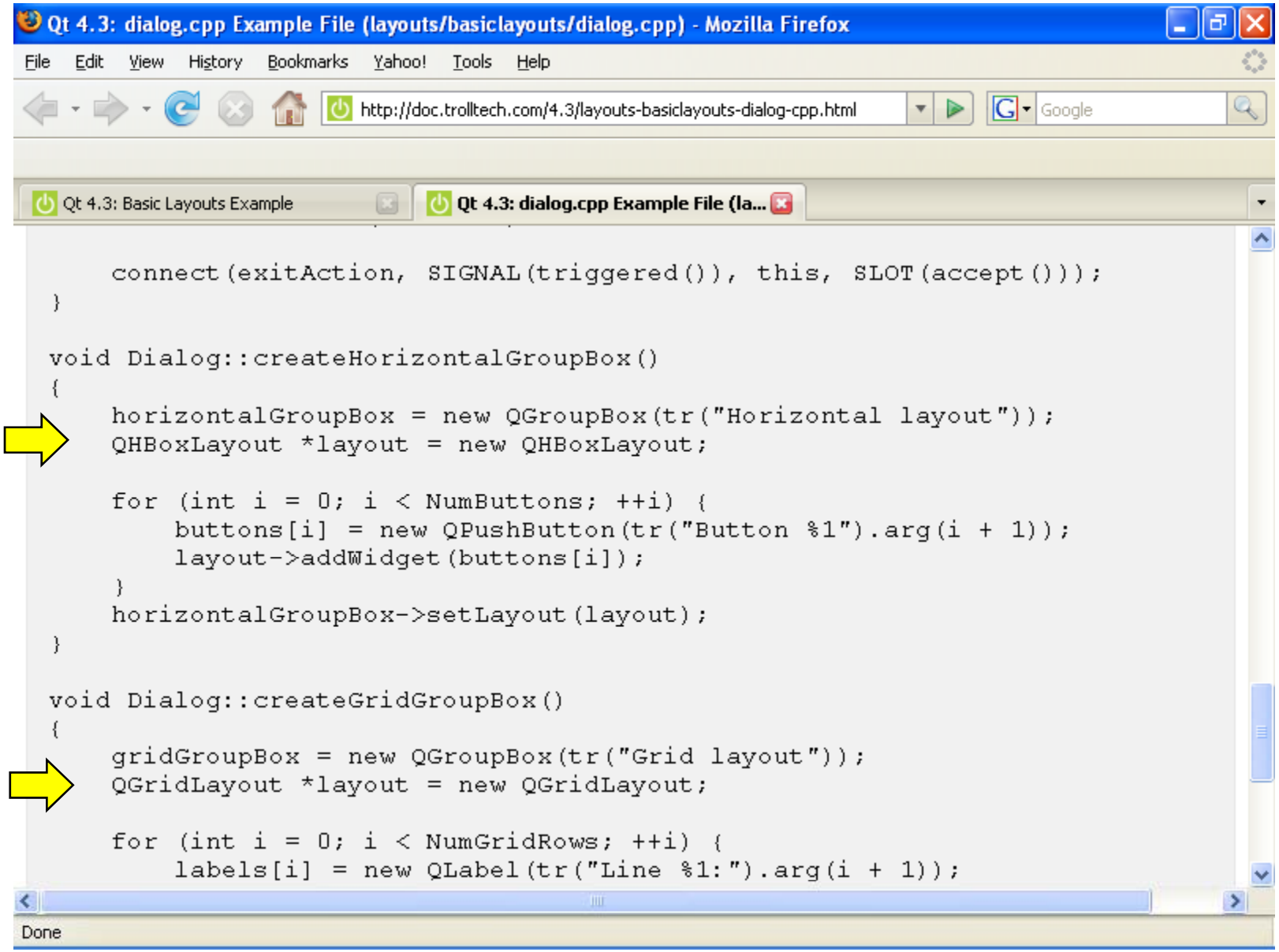
http://doc.trolltech.com/4.3/layouts-basiclayouts-dialog-cpp.html
Google
Qt 4.3: Basic Layouts Example
Qt 4.3: dialog.cpp Example File (la...
buttonBox = new QDialogButtonBox(QDialogButtonBox::Ok
| QDialogButtonBox::Cancel);
connect(buttonBox, SIGNAL(accepted()), this, SLOT(accept()));
connect(buttonBox, SIGNAL(rejected()), this, SLOT(reject()));
QVBoxLayout *mainLayout = new QVBoxLayout;
mainLayout->setMenuBar(menuBar);
mainLayout->addWidget(horizontalGroupBox);
mainLayout->addWidget(gridGroupBox);
mainLayout->addWidget(bigEditor);
mainLayout->addWidget(buttonBox);
setLayout(mainLayout);
setWindowTitle(tr("Basic Layouts"));
}
void Dialog::createMenu()
{
menuBar = new QMenuBar;
fileMenu = new QMenu(tr("&File"), this);
Done


Qt 4.3: dialog.cpp Example File (layouts/basiclayouts/dialog.cpp) - Mozilla Firefox
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http://doc.trolltech.com/4.3/layouts-basiclayouts-dialog-cpp.html
Google
Qt 4.3: Basic Layouts Example
Qt 4.3: dialog.cpp Example File (la...
connect(exitAction, SIGNAL(triggered()), this, SLOT(accept()));
}
void Dialog::createHorizontalGroupBox()
{
horizontalGroupBox = new QGroupBox(tr("Horizontal layout"));
QHBoxLayout *layout = new QHBoxLayout;
for (int i = 0; i < NumButtons; ++i) {
buttons[i] = new QPushButton(tr("Button %1").arg(i + 1));
layout->addWidget(buttons[i]);
}
horizontalGroupBox->setLayout(layout);
}
void Dialog::createGridGroupBox()
{
gridGroupBox = new QGroupBox(tr("Grid layout"));
QGridLayout *layout = new QGridLayout;
for (int i = 0; i < NumGridRows; ++i) {
labels[i] = new QLabel(tr("Line %1:").arg(i + 1));
Done