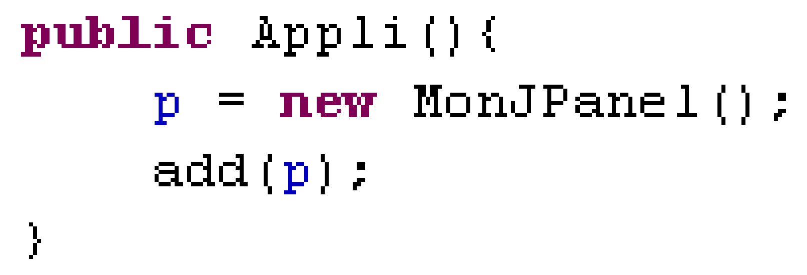
Programmation événementielle

I. Nature des événements

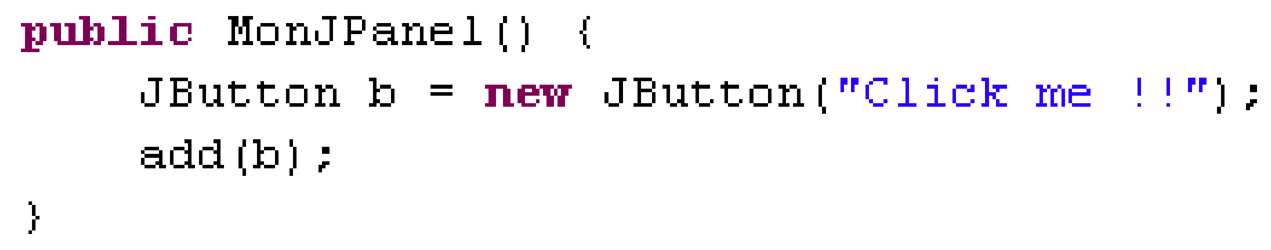
Que se passe-t-il lors d'un clic ?

JFrame

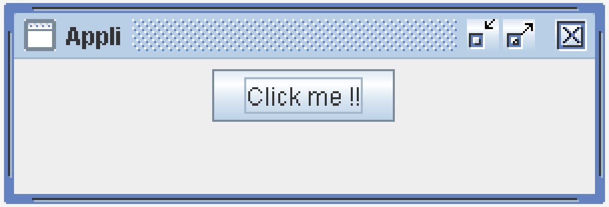


```
public Appli(){
    p = new MonJPanel();
    add(p);
}
```

MonJPanel

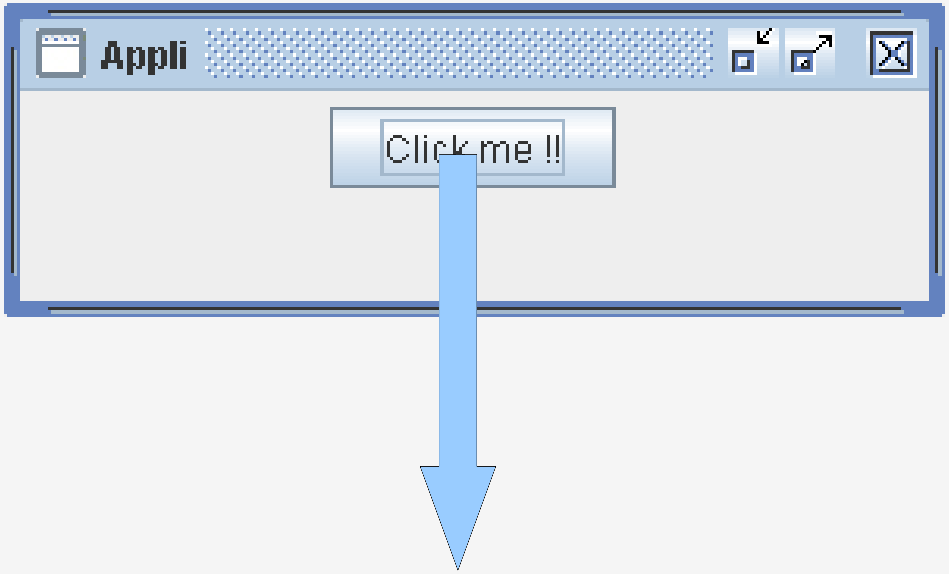


```
public MonJPanel() {
    JButton b = new JButton("Click me !!");
    add(b);
}
```



Que se passe-t-il lors d'un clic ?

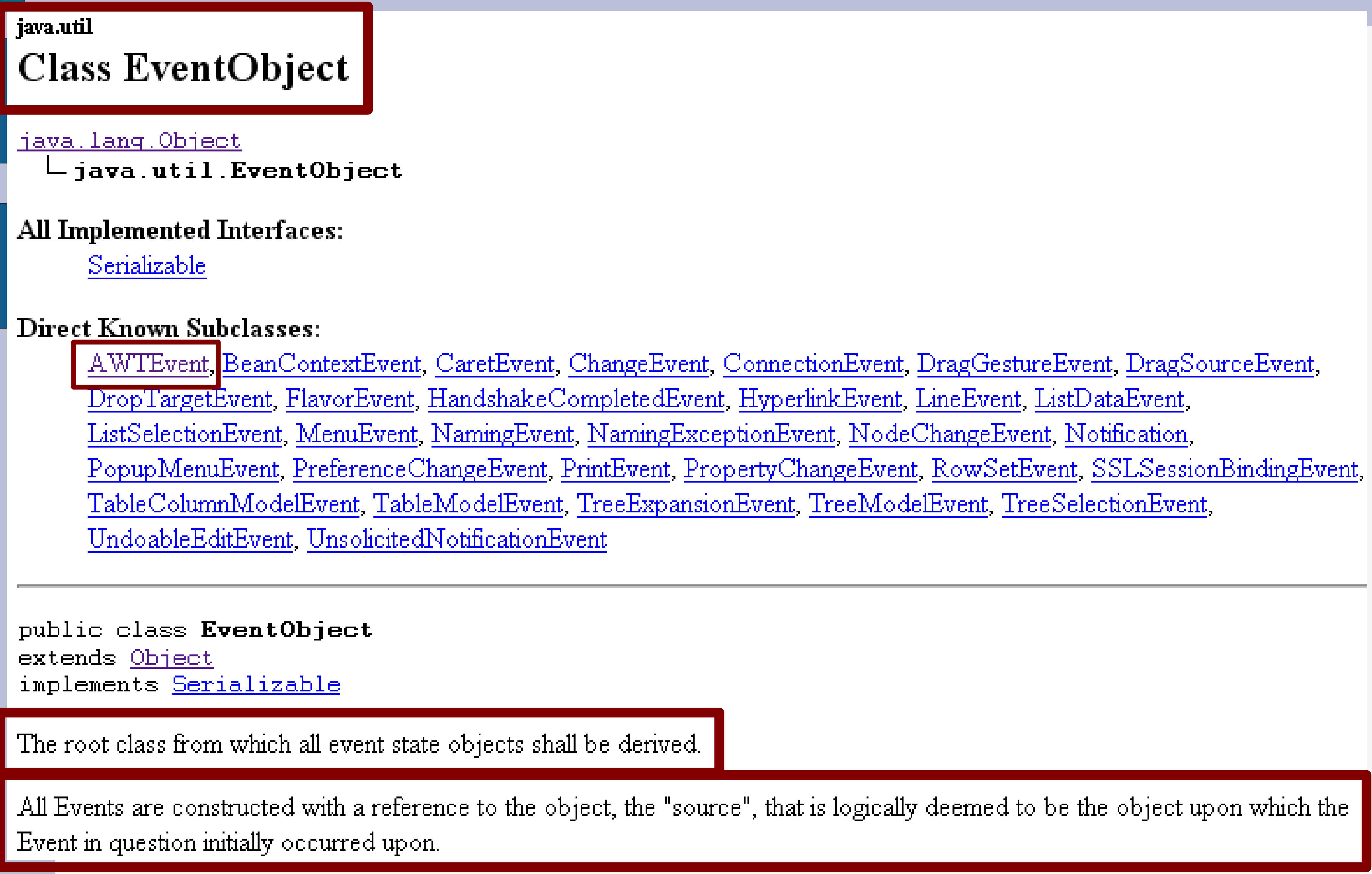
- Un clic génère ce qu'on appelle un événement


Appli
Click me !!

Événement

- Il s'agit en fait d'un **objet**

L'objet **java.util.EventObject**



java.util

Class EventObject

```
java.lang.Object
  └ java.util.EventObject
```

All Implemented Interfaces:

Serializable

Direct Known Subclasses:

AWTEvent, BeanContextEvent, CaretEvent, ChangeEvent, ConnectionEvent, DragGestureEvent, DragSourceEvent, DropTargetEvent, FlavorEvent, HandshakeCompletedEvent, HyperlinkEvent, LineEvent, ListDataEvent, ListSelectionEvent, MenuEvent, NamingEvent, NamingExceptionEvent, NodeChangeEvent, Notification, PopupMenuEvent, PreferenceChangeEvent, PrintEvent, PropertyChangeEvent, RowSetEvent, SSLSessionBindingEvent, TableColumnModelEvent, TableModelEvent, TreeExpansionEvent, TreeModelEvent, TreeSelectionEvent, UndoableEditEvent, UnsolicitedNotificationEvent

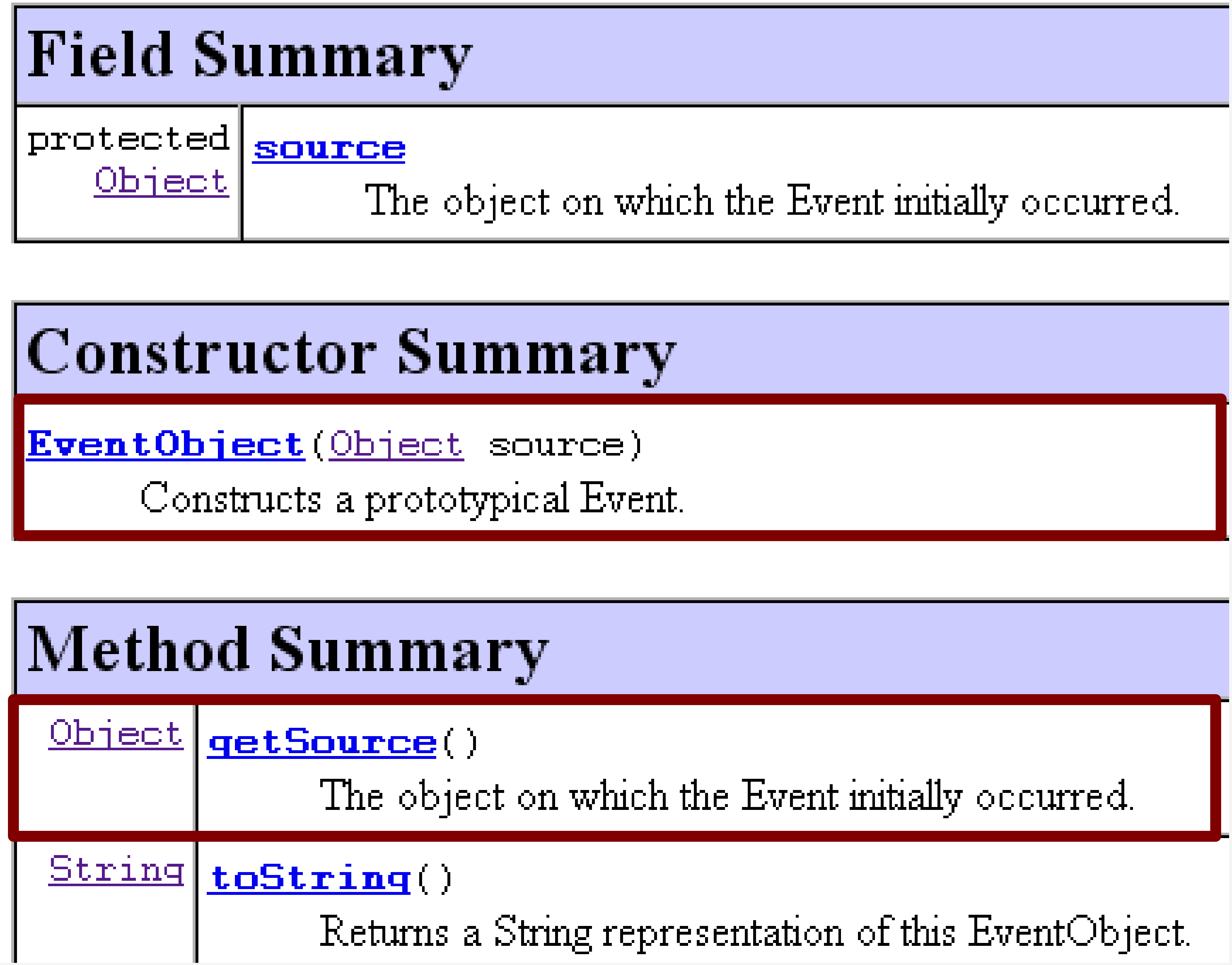
---

```
public class EventObject
extends Object
implements Serializable
```

The root class from which all event state objects shall be derived.

All Events are constructed with a reference to the object, the "source", that is logically deemed to be the object upon which the Event in question initially occurred upon.

L'objet événement de Java



Field Summary

protected Object	**source** The object on which the Event initially occurred.

Constructor Summary

EventObject(Object source) Constructs a prototypical Event.

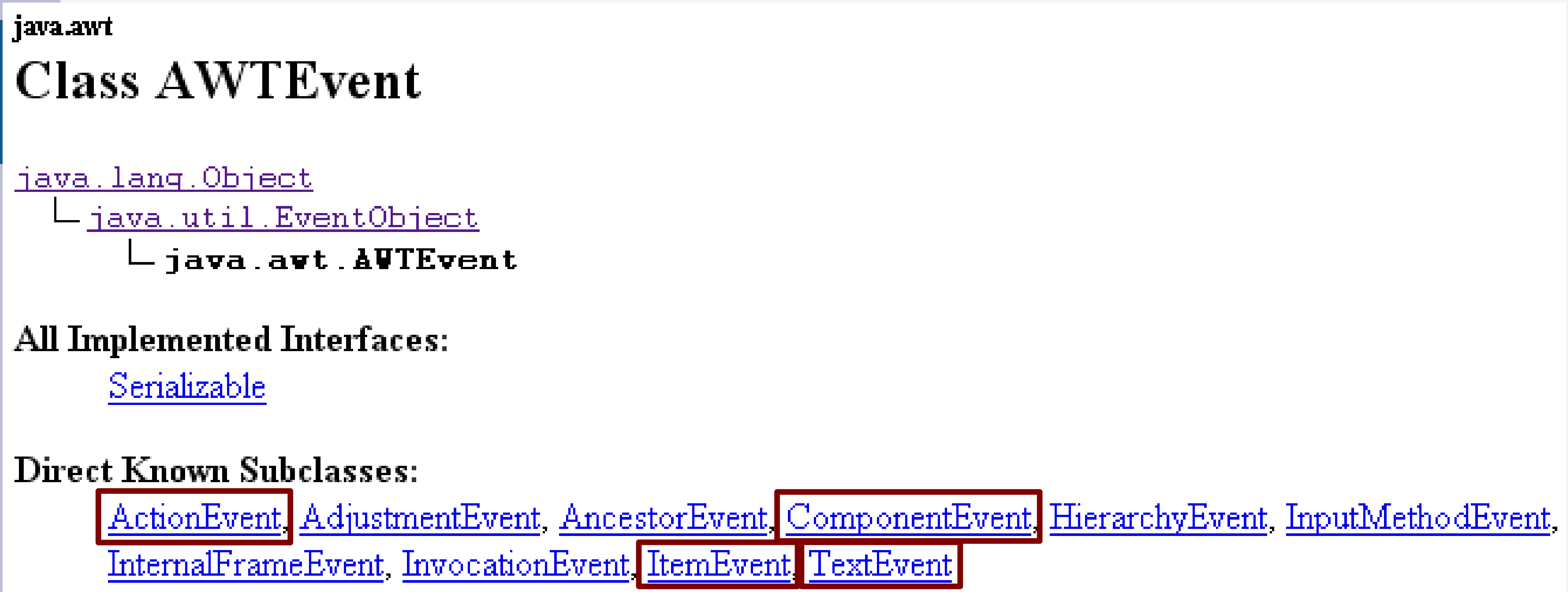
Method Summary

Object	**getSource**() The object on which the Event initially occurred.
String	**toString**() Returns a String representation of this EventObject.

Qui crée ce type d'objet ?

- Il existe un thread spécifique, chargé de récupérer les interactions utilisateurs (souris, clavier, etc.)
- Lors d’une interaction, ce thread instancie un événement du type correspondant, avec le composant concerné comme **source**.
- Conséquence : **on ne crée pas** les événements, **on ne fait que les gérer**.

GUI → java.awt.AWTEvent



java.awt

Class AWTEvent

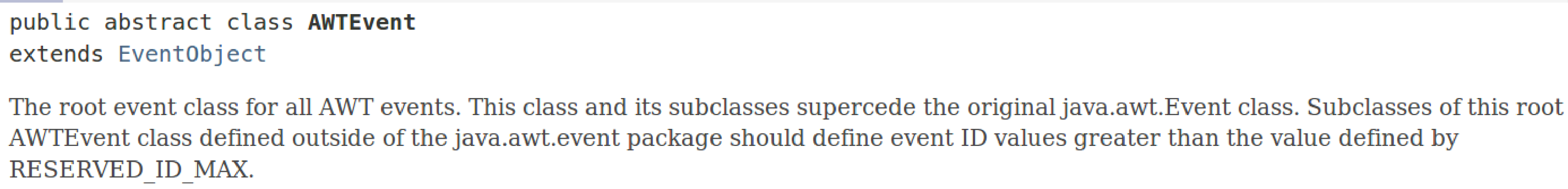
```
java.lang.Object
  └ java.util.EventObject
      └ java.awt.AWTEvent
```

All Implemented Interfaces:

Serializable

Direct Known Subclasses:

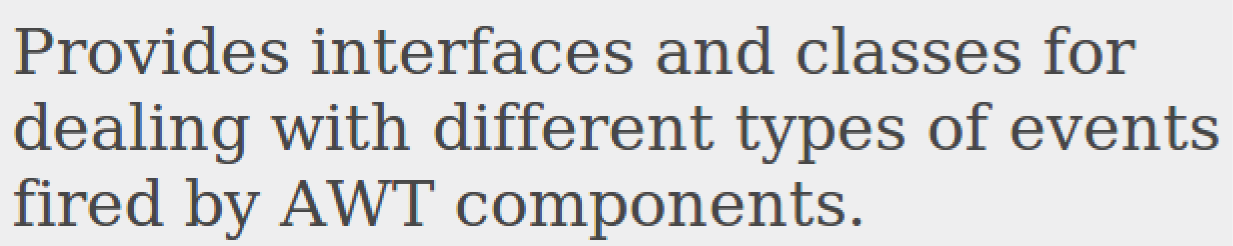
ActionEvent, AdjustmentEvent, AncestorEvent, ComponentEvent, HierarchyEvent, InputMethodEvent, InternalFrameEvent, InvocationEvent, ItemEvent, TextEvent



```
public abstract class AWTEvent
extends EventObject
```

The root event class for all AWT events. This class and its subclasses supercede the original java.awt.Event class. Subclasses of this root AWTEvent class defined outside of the java.awt.event package should define event ID values greater than the value defined by RESERVED_ID_MAX.

II. Le package **java.awt.event**



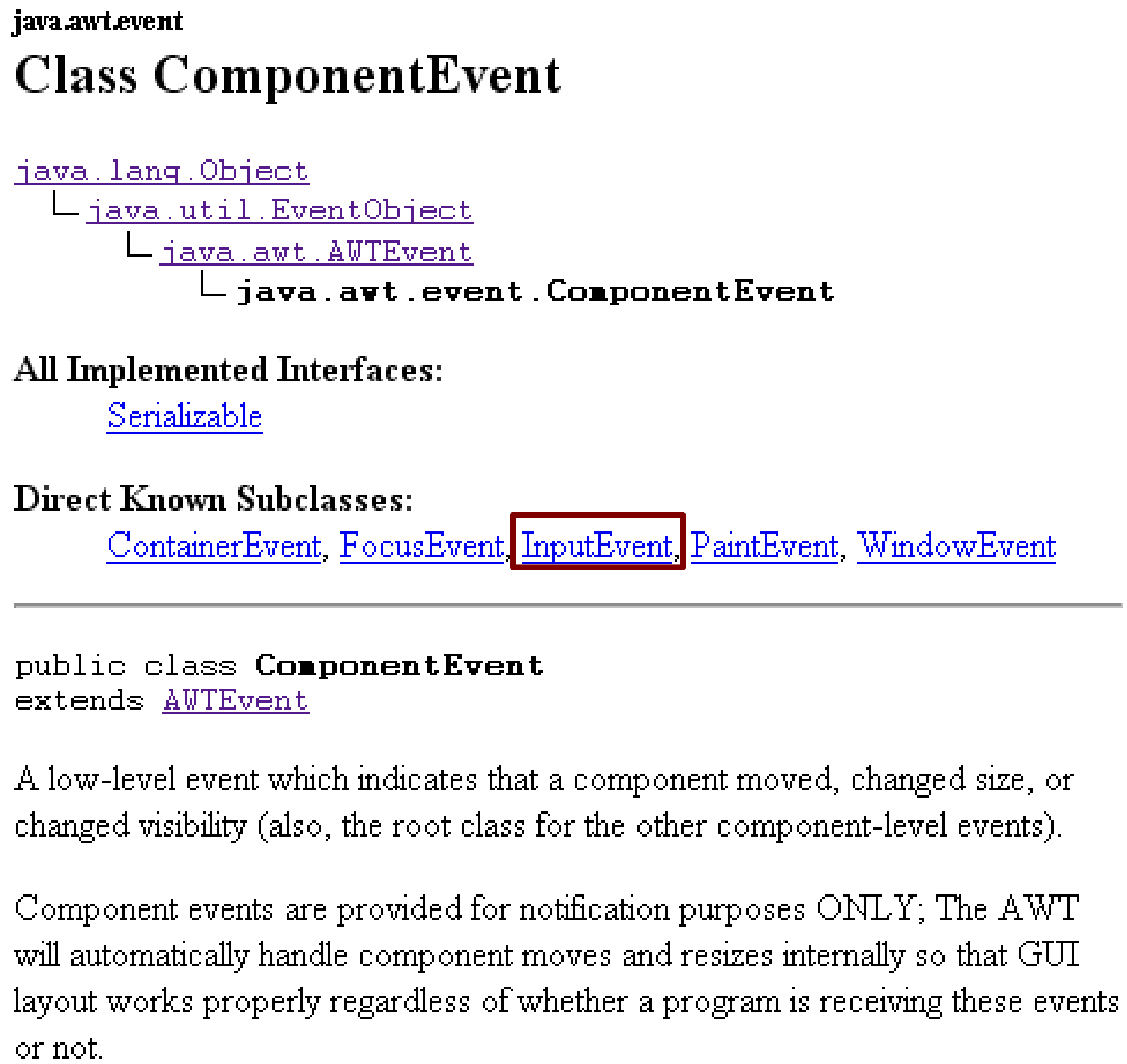
Provides interfaces and classes for dealing with different types of events fired by AWT components.

Events **bas niveau** vs. **sémantique**

- 2 types d’événements sont distingués :
  - **bas niveau** : e.g. clique de souris, clavier, etc.
  - **sémantiques** : e.g. « *le bouton X a été pressé* »

- En priorité, on traite des *events* sémantiques :
  - ils contiennent une information de plus haut niveau .
  - Ils facilitent la gestion : presser un bouton avec le clavier ou la souris revient au même.

java.awt.event.ComponentEvent



java.awt.event

Class ComponentEvent

```
java.lang.Object
  └java.util.EventObject
      └java.awt.AWTEvent
          └java.awt.event.ComponentEvent
```

All Implemented Interfaces:

Serializable

Direct Known Subclasses:

ContainerEvent, FocusEvent, InputEvent, PaintEvent, WindowEvent

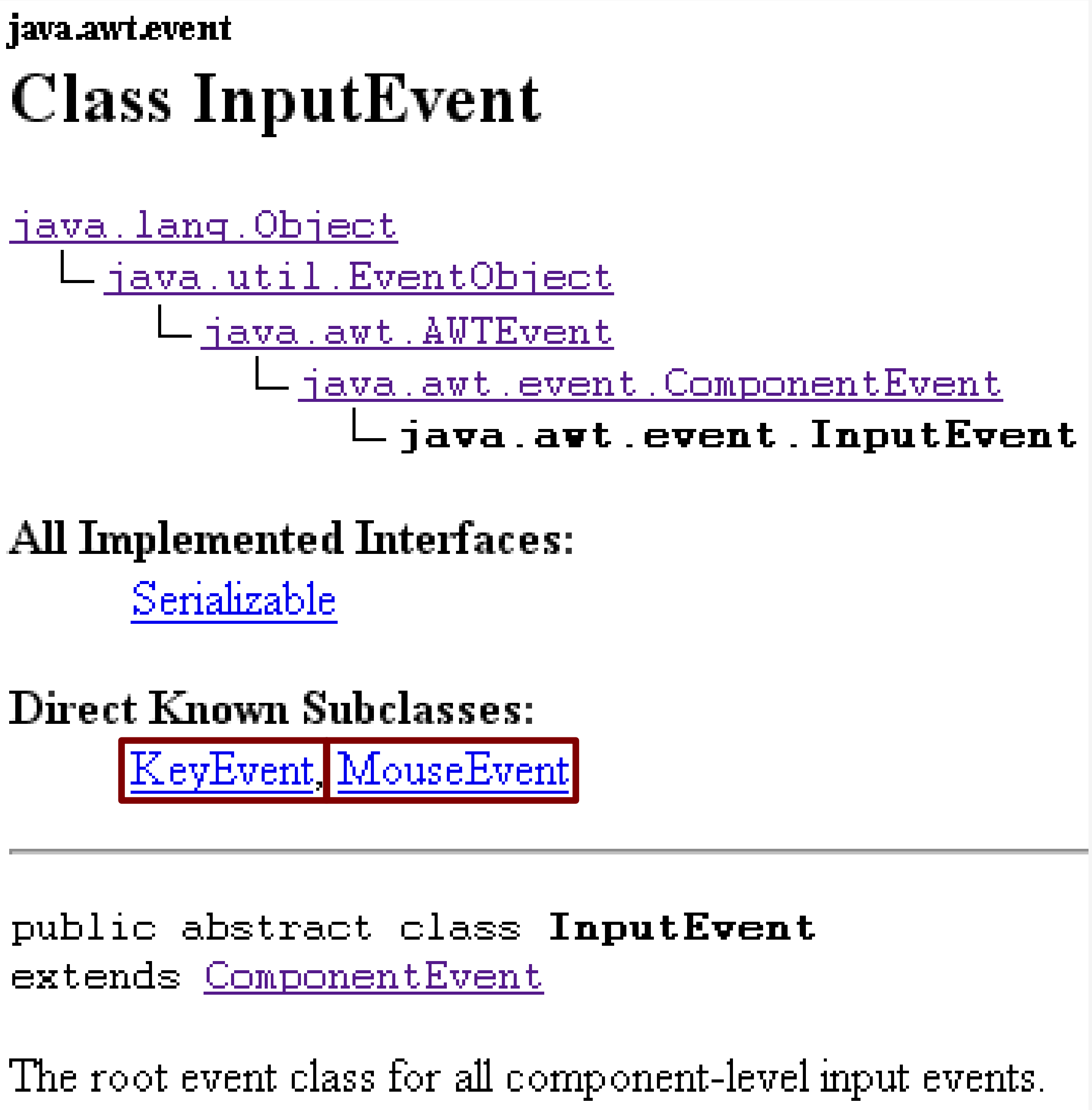
---

```
public class ComponentEvent
extends AWTEvent
```

A low-level event which indicates that a component moved, changed size, or changed visibility (also, the root class for the other component-level events).

Component events are provided for notification purposes ONLY; The AWT will automatically handle component moves and resizes internally so that GUI layout works properly regardless of whether a program is receiving these events or not.

java.awt.event.InputEvent



java.awt.event

Class InputEvent

```
java.lang.Object
  └ java.util.EventObject
      └ java.awt.AWTEvent
          └ java.awt.event.ComponentEvent
              └ java.awt.event.InputEvent
```

All Implemented Interfaces:

Serializable

Direct Known Subclasses:

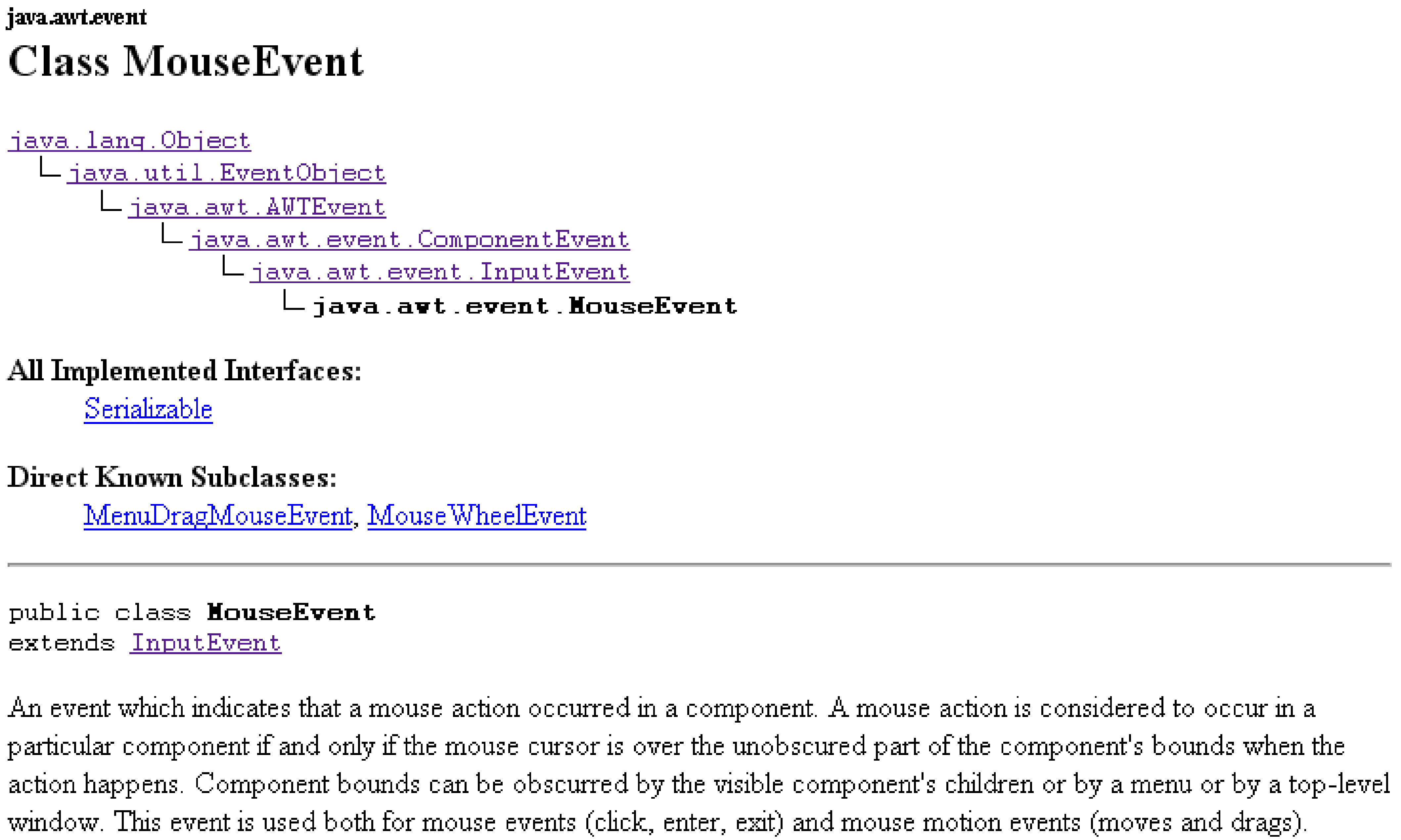
KeyEvent, MouseEvent

---

public abstract class **InputEvent**
extends ComponentEvent

The root event class for all component-level input events.

java.awt.event.MouseEvent



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

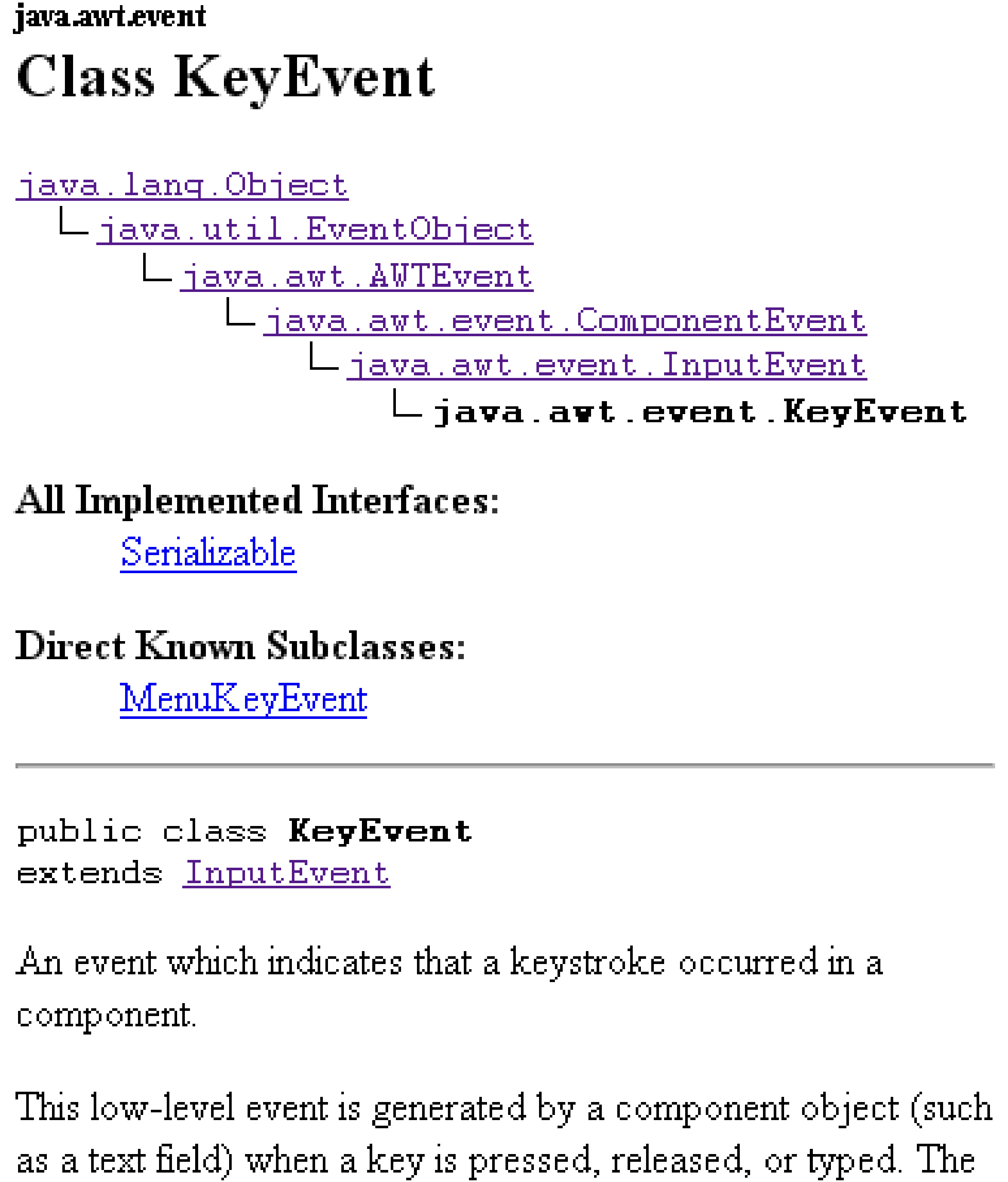
Direct Known Subclasses:

MenuDragMouseEvent, MouseWheelEvent

```
public class MouseEvent
extends InputEvent
```

An event which indicates that a mouse action occurred in a component. A mouse action is considered to occur in a particular component if and only if the mouse cursor is over the unobscured part of the component's bounds when the action happens. Component bounds can be obscured by the visible component's children or by a menu or by a top-level window. This event is used both for mouse events (click, enter, exit) and mouse motion events (moves and drags).

java.awt.event.KeyEvent



java.awt.event

Class KeyEvent

```
java.lang.Object
  └ java.util.EventObject
      └ java.awt.AWTEvent
          └ java.awt.event.ComponentEvent
              └ java.awt.event.InputEvent
                  └ java.awt.event.KeyEvent
```

All Implemented Interfaces:

Serializable

Direct Known Subclasses:

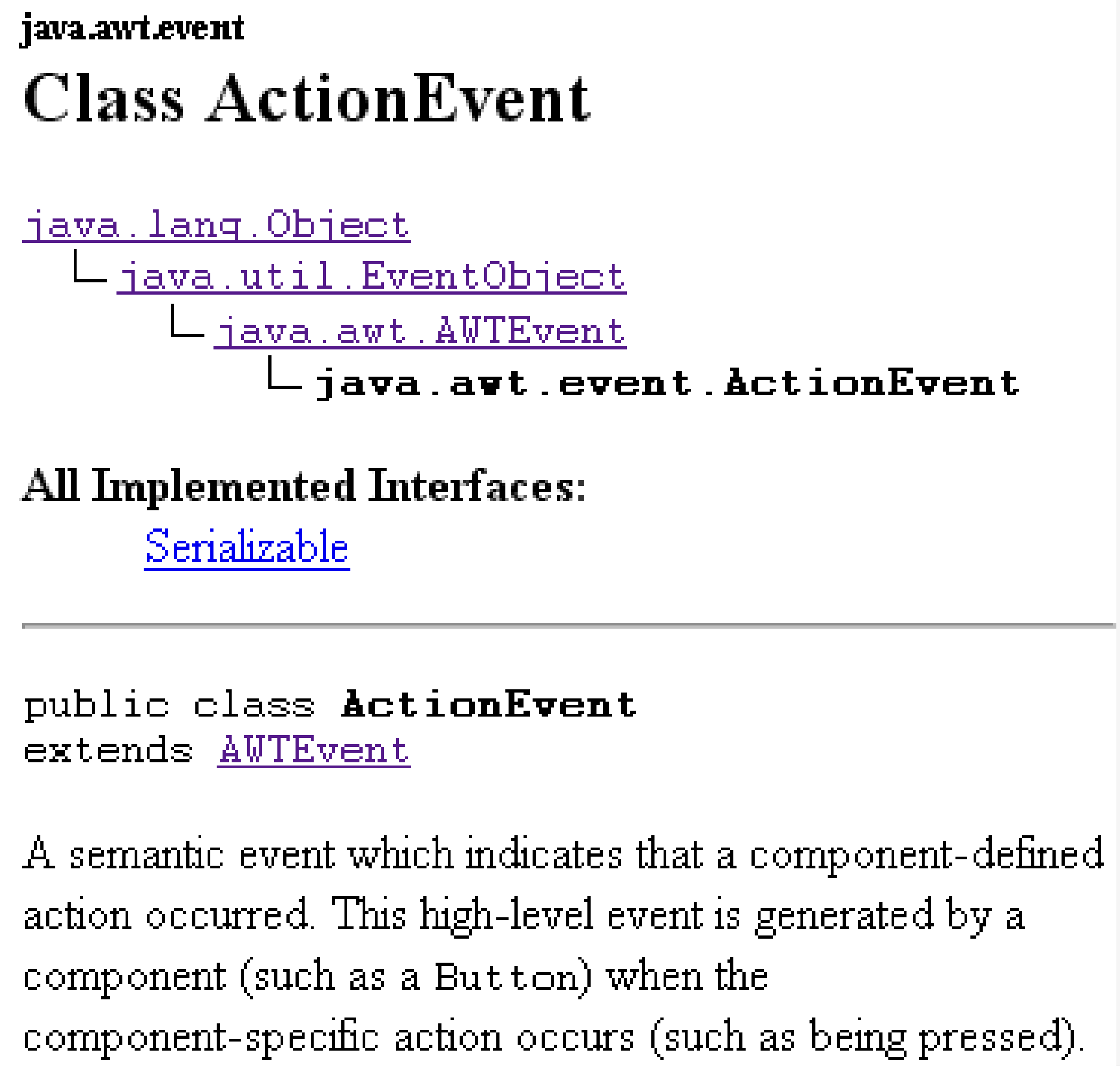
MenuKeyEvent

```
public class KeyEvent
extends InputEvent
```

An event which indicates that a keystroke occurred in a component.

This low-level event is generated by a component object (such as a text field) when a key is pressed, released, or typed. The

java.awt.event.ActionEvent



java.awt.event

Class ActionEvent

```
java.lang.Object
  └ java.util.EventObject
      └ java.awt.AWTEvent
          └ java.awt.event.ActionEvent
```

All Implemented Interfaces:

Serializable

`public class` **`ActionEvent`**
`extends AWTEvent`

A semantic event which indicates that a component-defined action occurred. This high-level event is generated by a component (such as a `Button`) when the component-specific action occurs (such as being pressed).

III. Gestion des événements

Comment gérer des événements ?

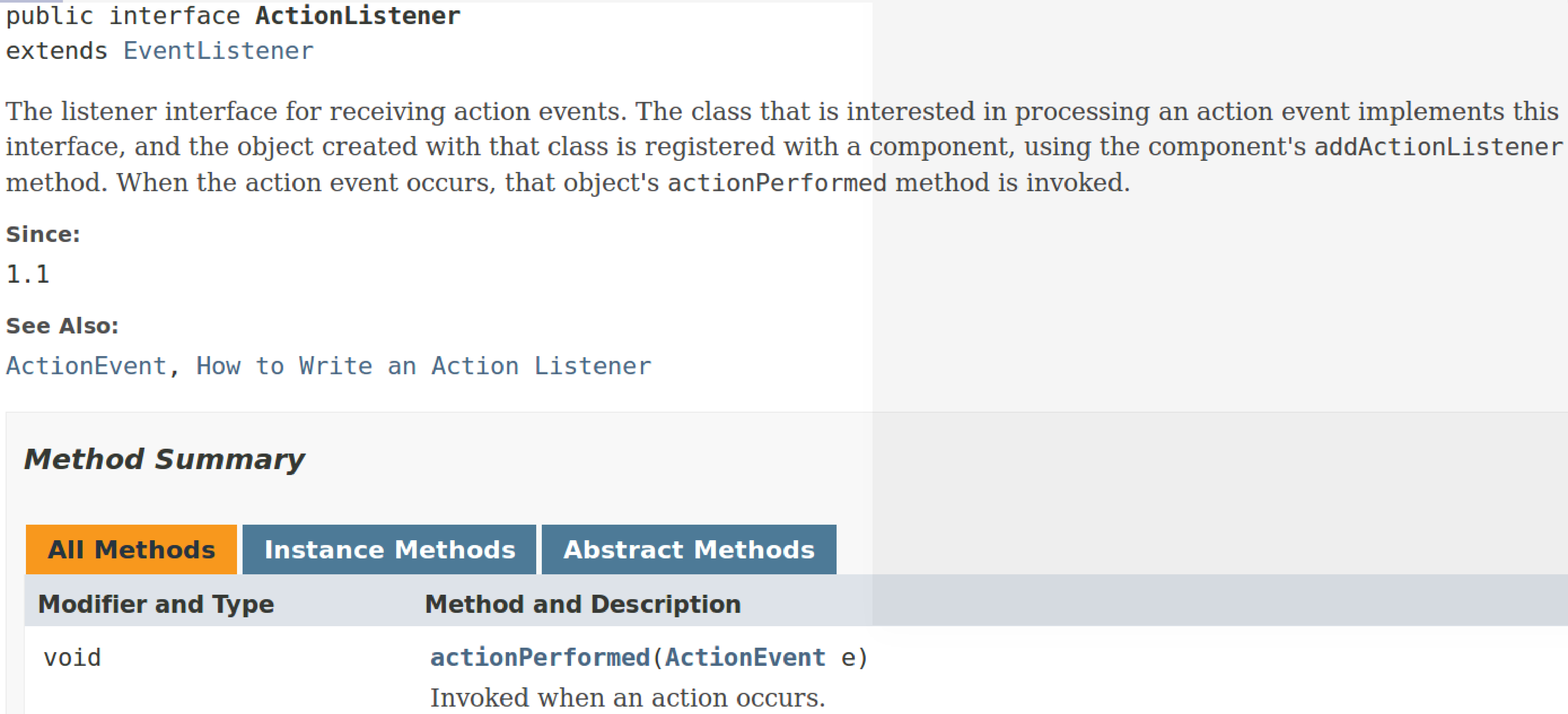
- Un très grand nombre d'événements sont générés
- Il est hors de question de tous les gérer
- Le principe consiste à **écouter** uniquement les **événements désirés** sur les **composants ciblés**.
- → on crée des **écouteurs**, pour chaque *event* désiré, et on les associent aux composants cibles

Qu'est-ce qu'un écouteur ?

- Un écouteur est un objet destiné à recevoir et à gérer les événements générés
- Les écouteurs principaux se trouvent aussi dans le **package java.awt.event**
- La plupart sont définis par une interface java : n'importe quel objet peut devenir un écouteur.
- Exemple :

java.awt.event.ActionListener

java.awt.event.ActionListener



```
public interface ActionListener
extends EventListener
```

The listener interface for receiving action events. The class that is interested in processing an action event implements this interface, and the object created with that class is registered with a component, using the component's `addActionListener` method. When the action event occurs, that object's `actionPerformed` method is invoked.

Since:

1.1

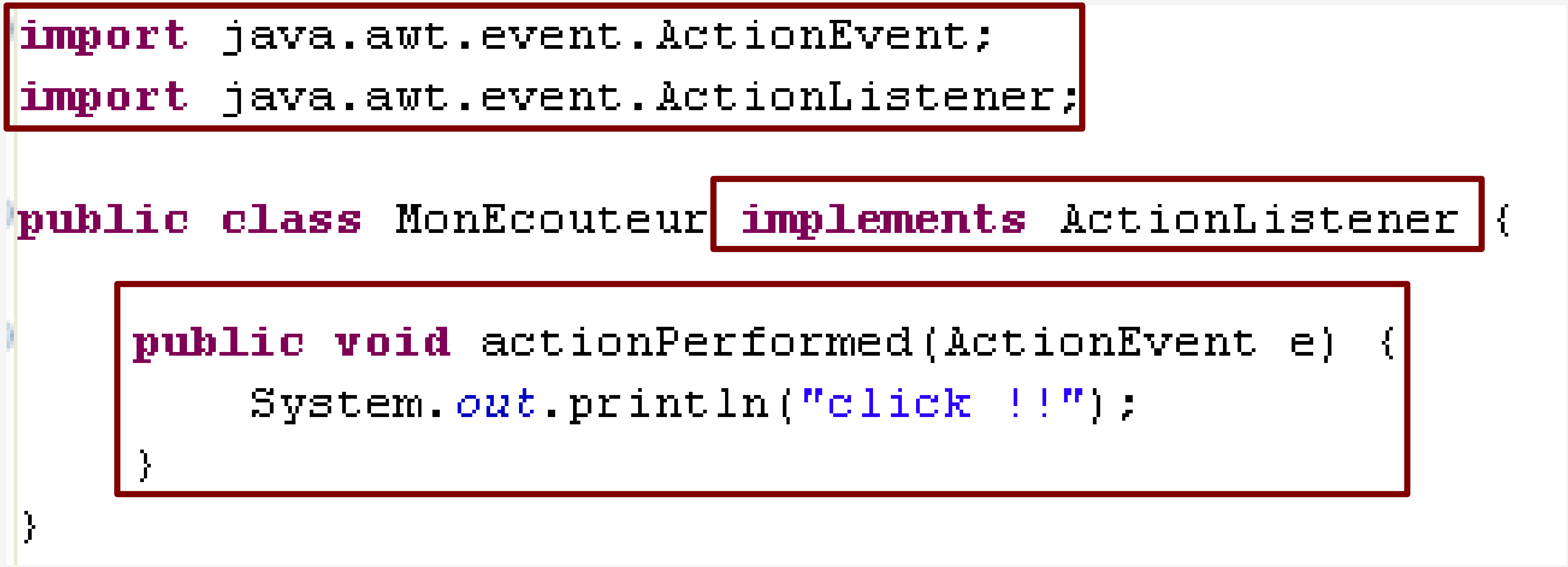
See Also:

ActionEvent, How to Write an Action Listener

Method Summary

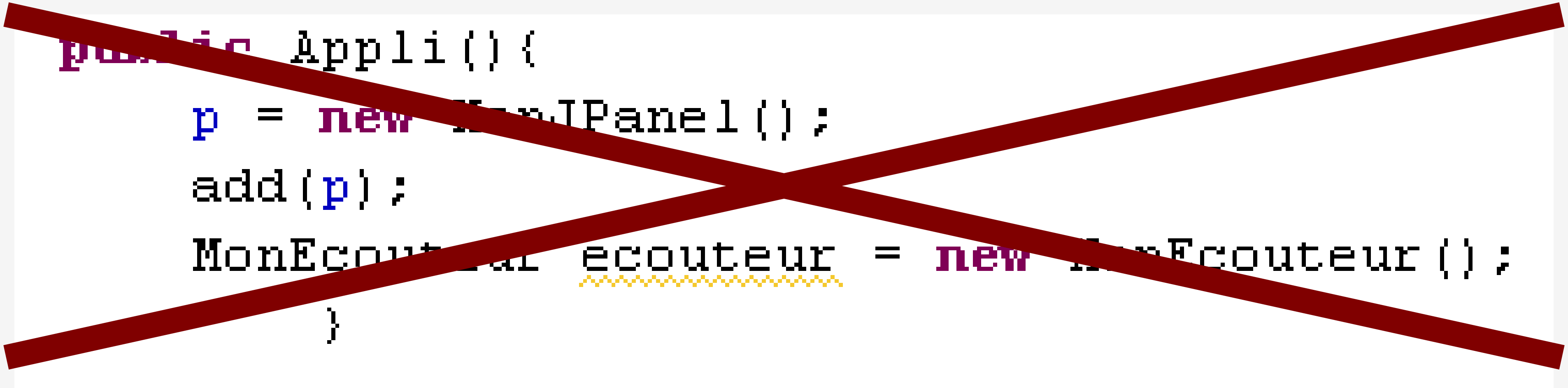
Modifier and Type	Method and Description
`void`	`actionPerformed(ActionEvent e)` Invoked when an action occurs.

Création d'un écouteur

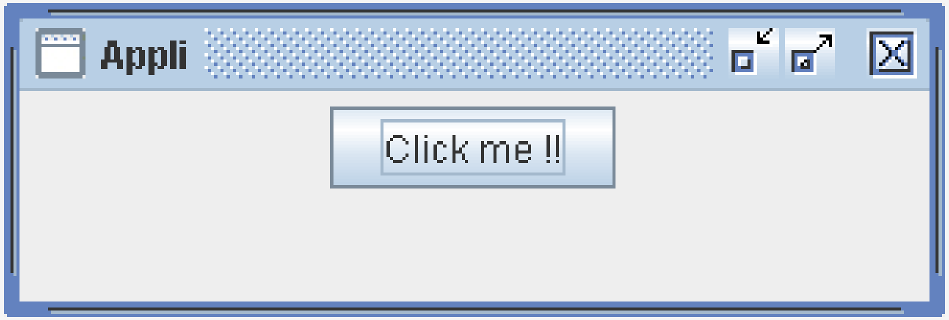


```
import java.awt.event.ActionEvent;
import java.awt.event.ActionListener;

public class MonEcouteur implements ActionListener {

    public void actionPerformed(ActionEvent e) {
        System.out.println("click !!");
    }
}
```

Utilisation de l'écouteur



```
public Appli(){
        p = new MonJPanel();
        add(p);
        MonEcouteur ecouteur = new MonEcouteur();
            }
```

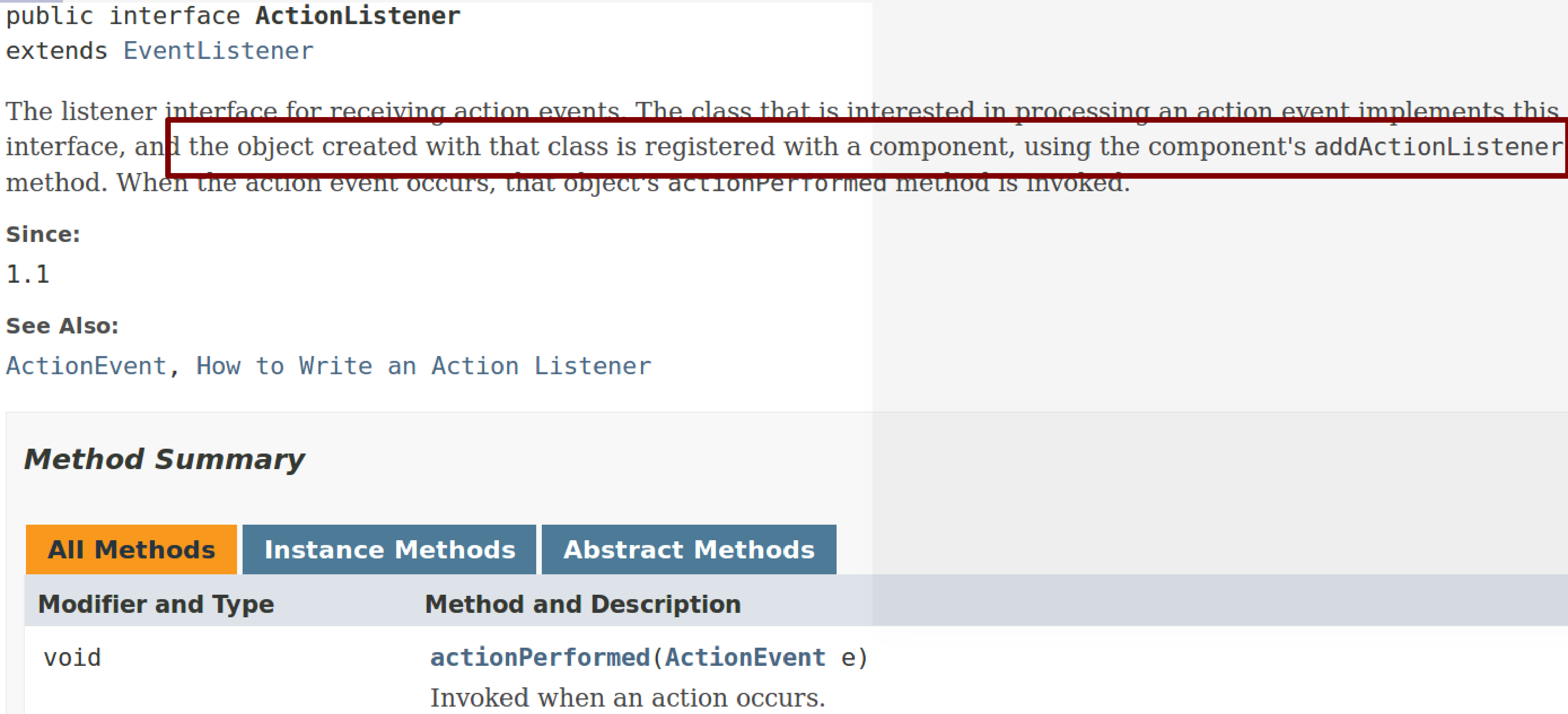

Appli
Click me !!

- Au clique, rien ne se passe...

Principe de l'écoute

- Par défaut, un écouteur ne récupère pas tous les événements produits par le système, heureusement !
- Il n'écoute **que les objets qu'on lui dit d'écouter** !
- Pour fonctionner, **il doit être associé à un objet** qui génère des événements.
- Ainsi, **les objets** qui génèrent des événements **possèdent des méthodes qui permettent de leur associer les écouteurs adéquats**

java.awt.event.ActionListener



`public interface` **`ActionListener`**
`extends EventListener`

The listener interface for receiving action events. The class that is interested in processing an action event implements this interface, and the object created with that class is registered with a component, using the component's `addActionListener` method. When the action event occurs, that object's `actionPerformed` method is invoked.

Since:

1.1

See Also:

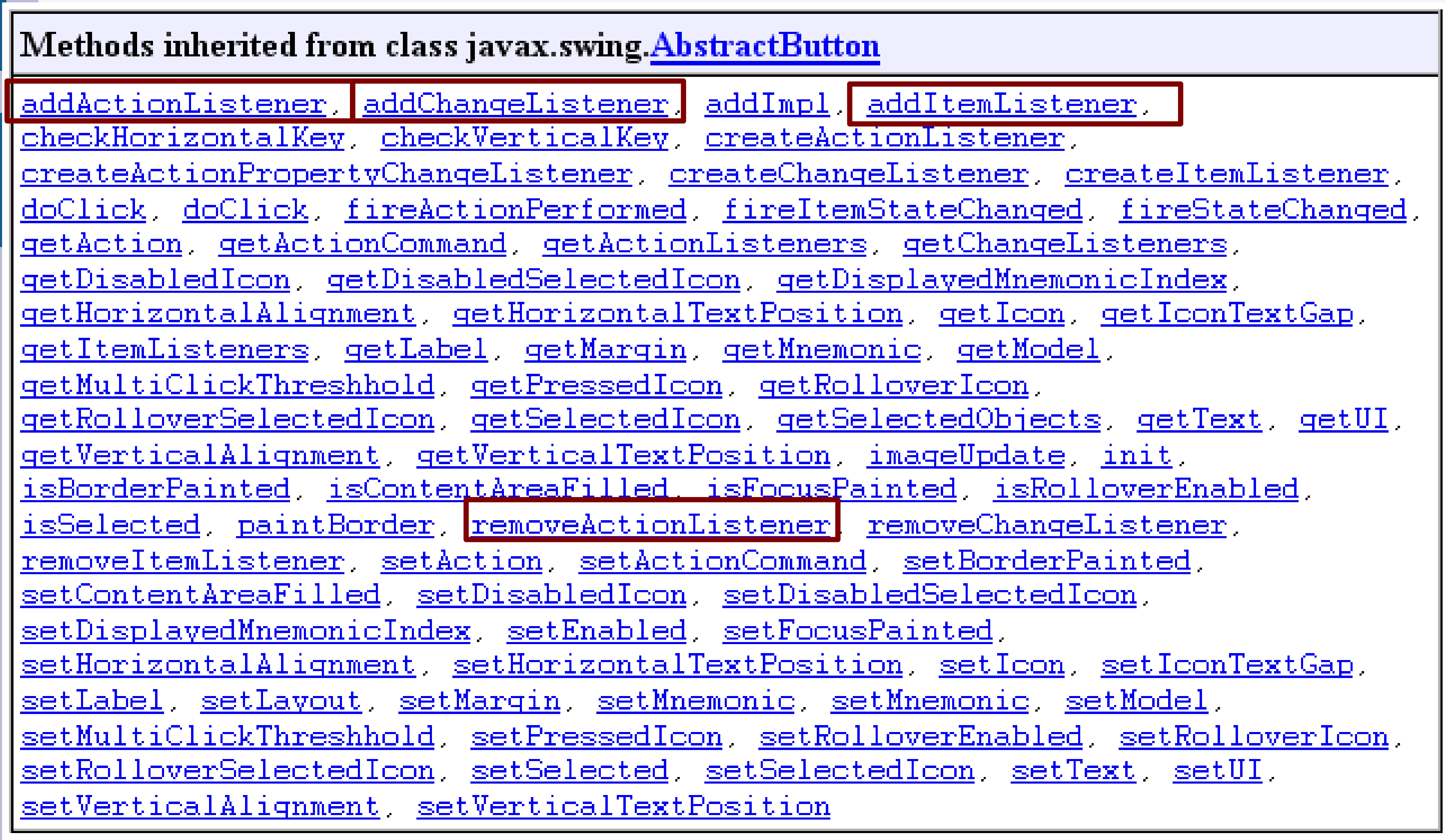
`ActionEvent`, `How to Write an Action Listener`

Method Summary

All Methods | **Instance Methods** | **Abstract Methods**

Modifier and Type	Method and Description
`void`	**`actionPerformed(ActionEvent e)`** Invoked when an action occurs.

javax.swing.JButton

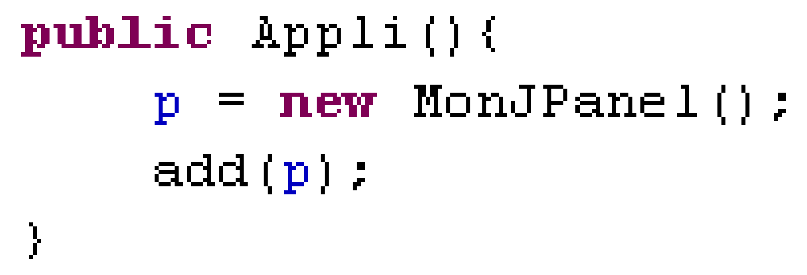


Methods inherited from class javax.swing.AbstractButton

addActionListener, addChangeListener, addImpl, addItemListener, checkHorizontalKey, checkVerticalKey, createActionListener, createActionPropertyChangeListener, createChangeListener, createItemListener, doClick, doClick, fireActionPerformed, fireItemStateChanged, fireStateChanged, getAction, getActionCommand, getActionListeners, getChangeListeners, getDisabledIcon, getDisabledSelectedIcon, getDisplayedMnemonicIndex, getHorizontalAlignment, getHorizontalTextPosition, getIcon, getIconTextGap, getItemListeners, getLabel, getMargin, getMnemonic, getModel, getMultiClickThreshhold, getPressedIcon, getRolloverIcon, getRolloverSelectedIcon, getSelectedIcon, getSelectedObjects, getText, getUI, getVerticalAlignment, getVerticalTextPosition, imageUpdate, init, isBorderPainted, isContentAreaFilled, isFocusPainted, isRolloverEnabled, isSelected, paintBorder, removeActionListener, removeChangeListener, removeItemListener, setAction, setActionCommand, setBorderPainted, setContentAreaFilled, setDisabledIcon, setDisabledSelectedIcon, setDisplayedMnemonicIndex, setEnabled, setFocusPainted, setHorizontalAlignment, setHorizontalTextPosition, setIcon, setIconTextGap, setLabel, setLayout, setMargin, setMnemonic, setMnemonic, setModel, setMultiClickThreshhold, setPressedIcon, setRolloverEnabled, setRolloverIcon, setRolloverSelectedIcon, setSelected, setSelectedIcon, setText, setUI, setVerticalAlignment, setVerticalTextPosition

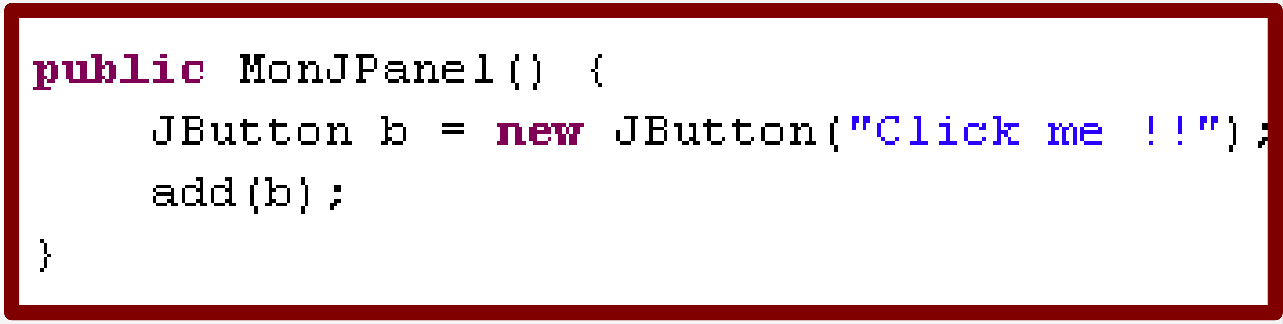
Rappel sur l'application: 3 classes

JFrame



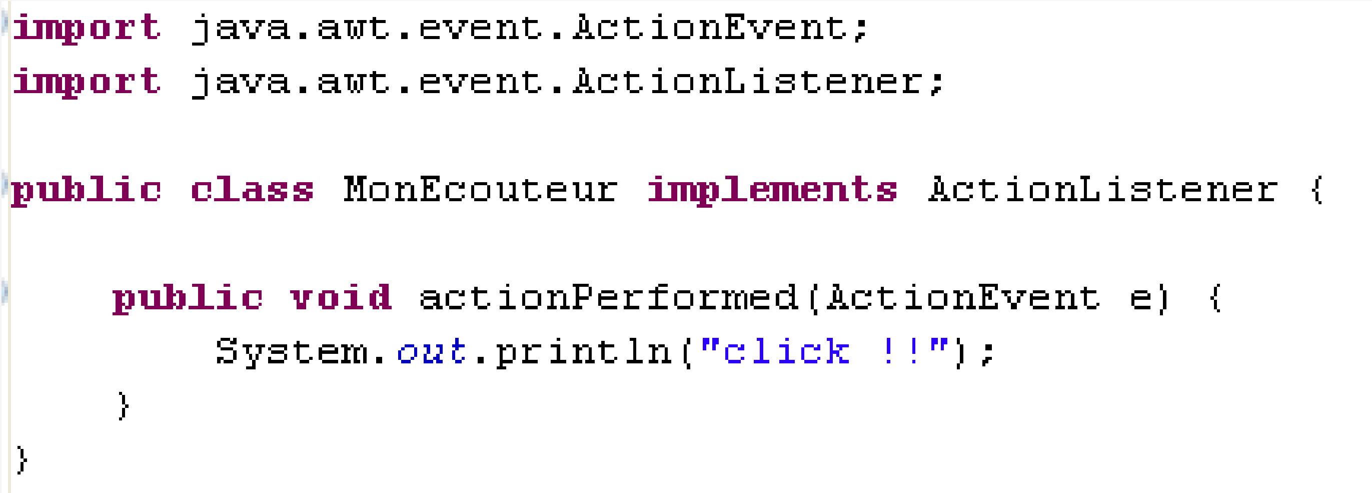
```
public Appli(){
     p = new MonJPanel();
     add(p);
}
```

MonJPanel

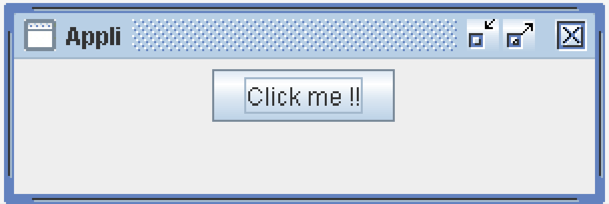


```
public MonJPanel() {
     JButton b = new JButton("Click me !!");
     add(b);
}
```

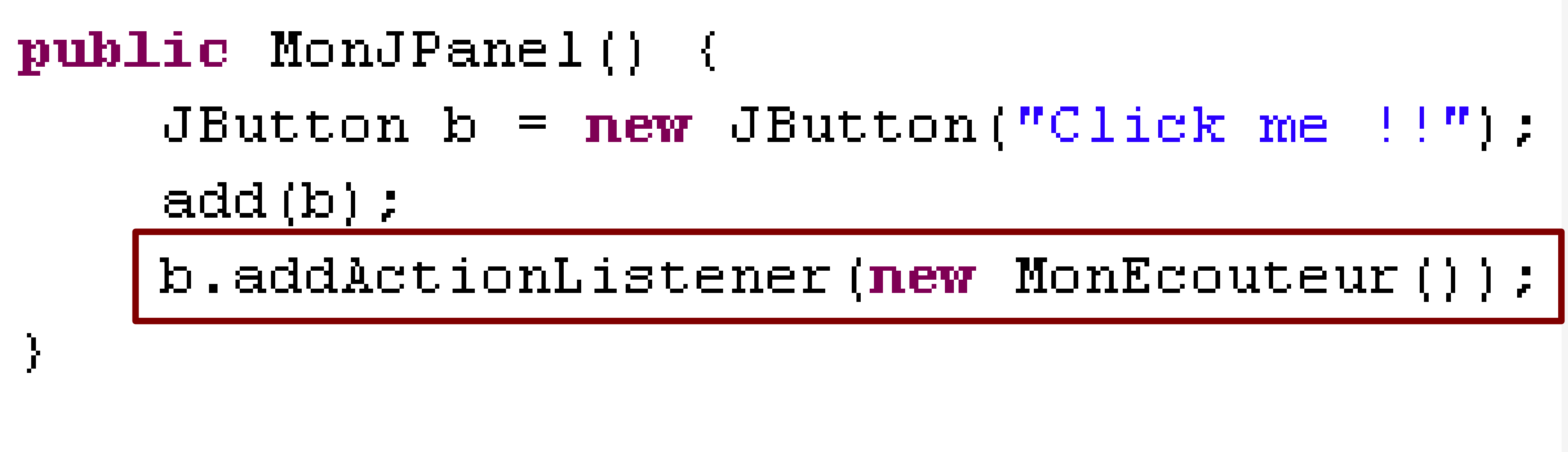
MonEcouteur



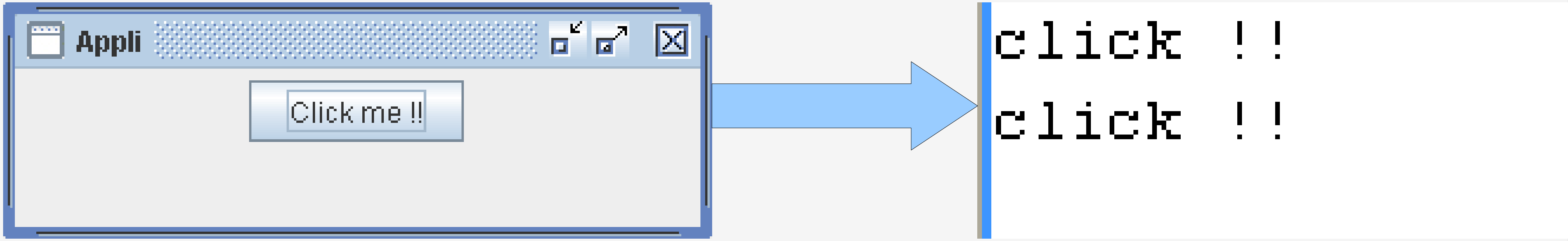
```
import java.awt.event.ActionEvent;
import java.awt.event.ActionListener;

public class MonEcouteur implements ActionListener {

    public void actionPerformed(ActionEvent e) {
        System.out.println("click !!");
    }
}
```



Utilisation d'un écouteur

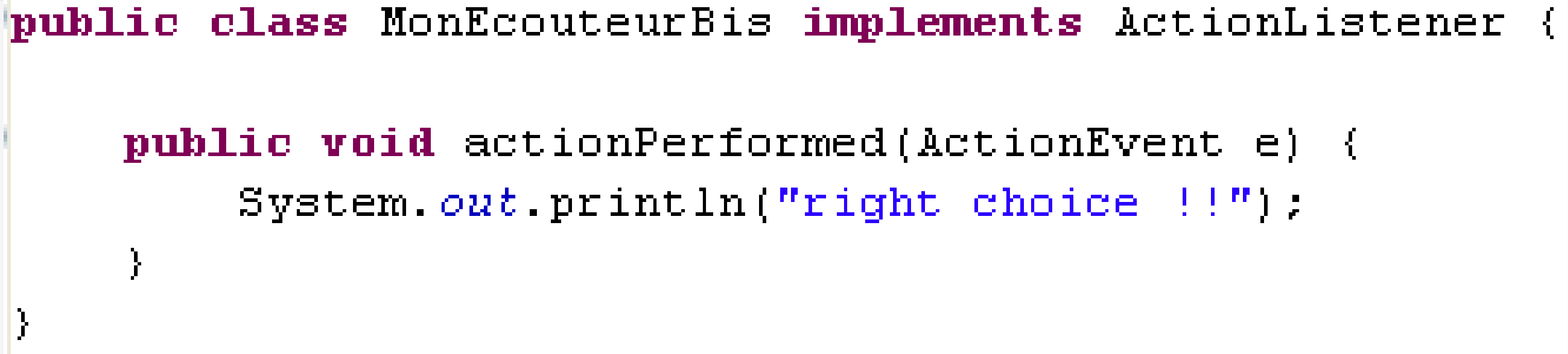


```
public MonJPanel() {
    JButton b = new JButton("Click me !!");
    add(b);
    b.addActionListener(new MonEcouteur());
}
```

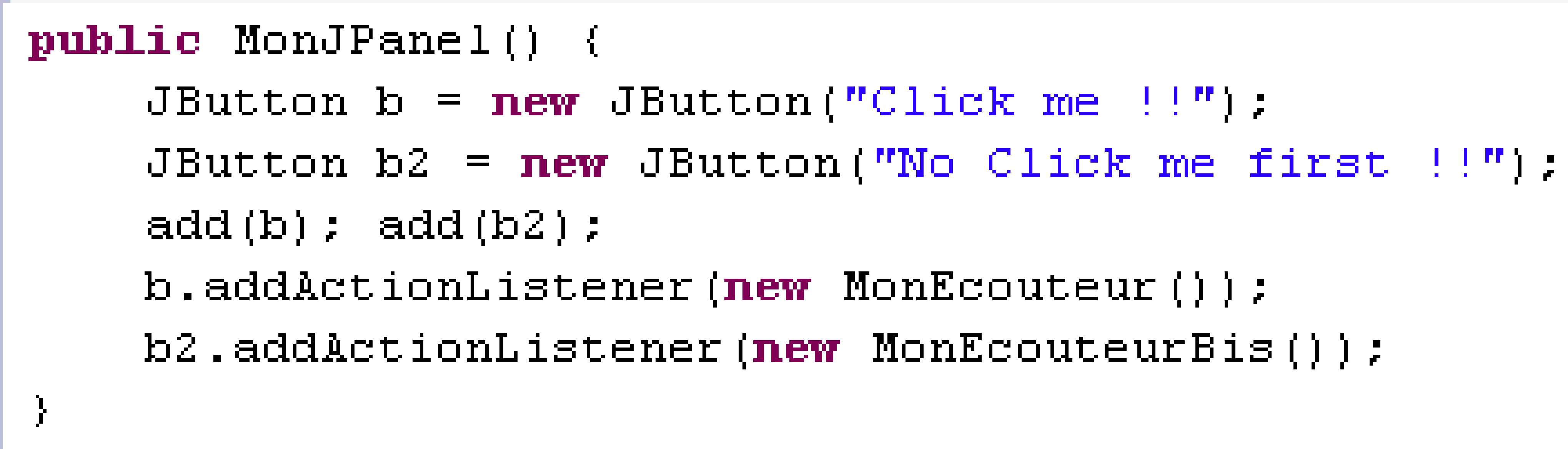

Appli
Click me !!

```
click !!
click !!
```

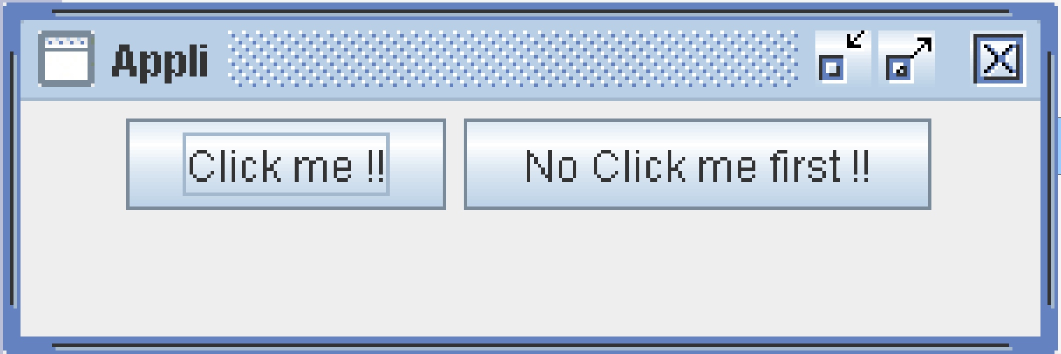
2 boutons : 1 écouteur par objet

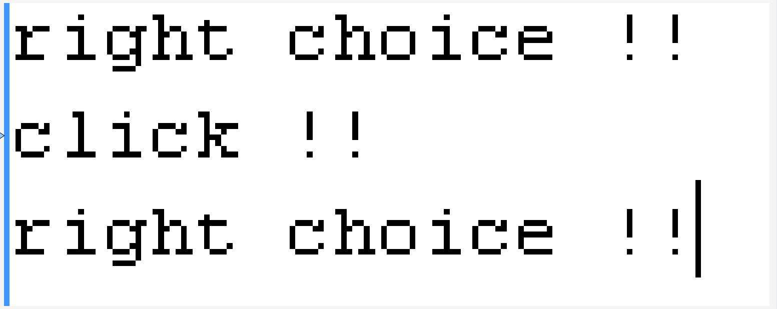


```
public class MonEcouteurBis implements ActionListener {

    public void actionPerformed(ActionEvent e) {
        System.out.println("right choice !!");
    }
}
```



```
public MonJPanel() {
    JButton b = new JButton("Click me !!");
    JButton b2 = new JButton("No Click me first !!");
    add(b); add(b2);
    b.addActionListener(new MonEcouteur());
    b2.addActionListener(new MonEcouteurBis());
}
```





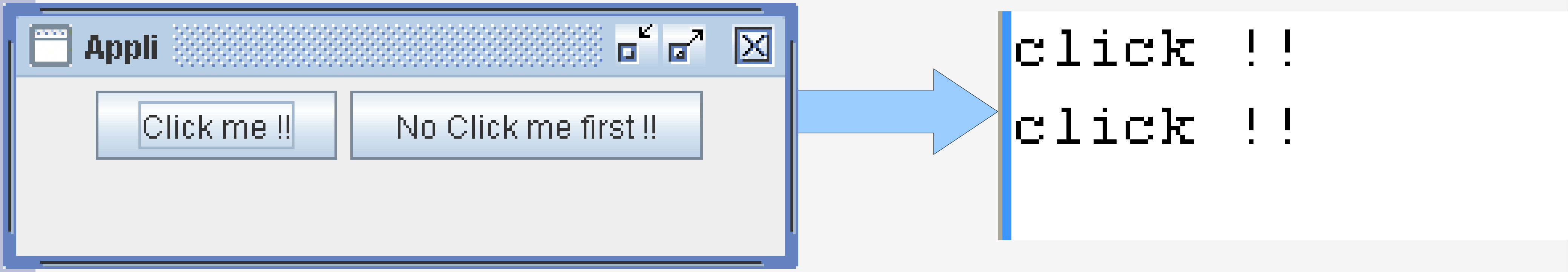
```
right choice !!
click !!
right choice !!
```

Remarques sur les écouteurs

- Il est possible d'ajouter plusieurs écouteurs à un seul objet
- Il est possible d'écouter plusieurs objets avec un seul écouteur

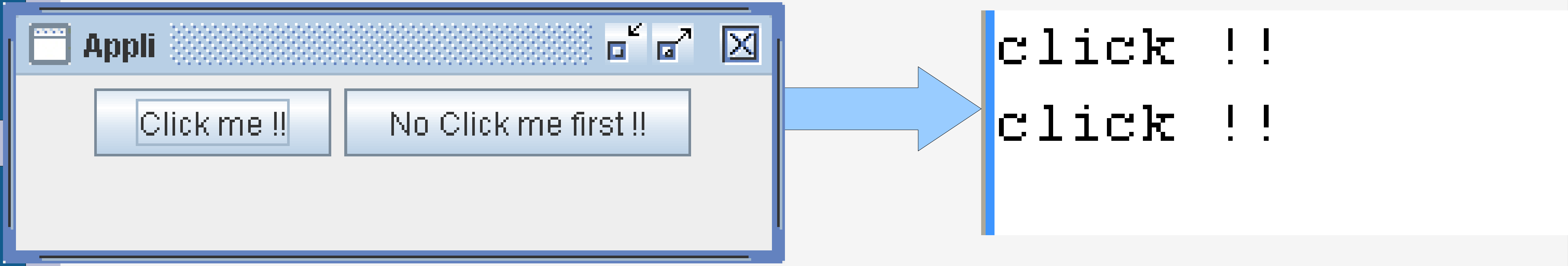
1 écouteur pour 2 objets

```
public MonJPanel() {
    JButton b = new JButton("Click me !!");
    JButton b2 = new JButton("No Click me first !!");
    add(b); add(b2);
    MonEcouteur m = new MonEcouteur();
    b.addActionListener(m);
    b2.addActionListener(m);
}
```


Appli
Click me !!
No Click me first !!

```
click !!
click !!
```

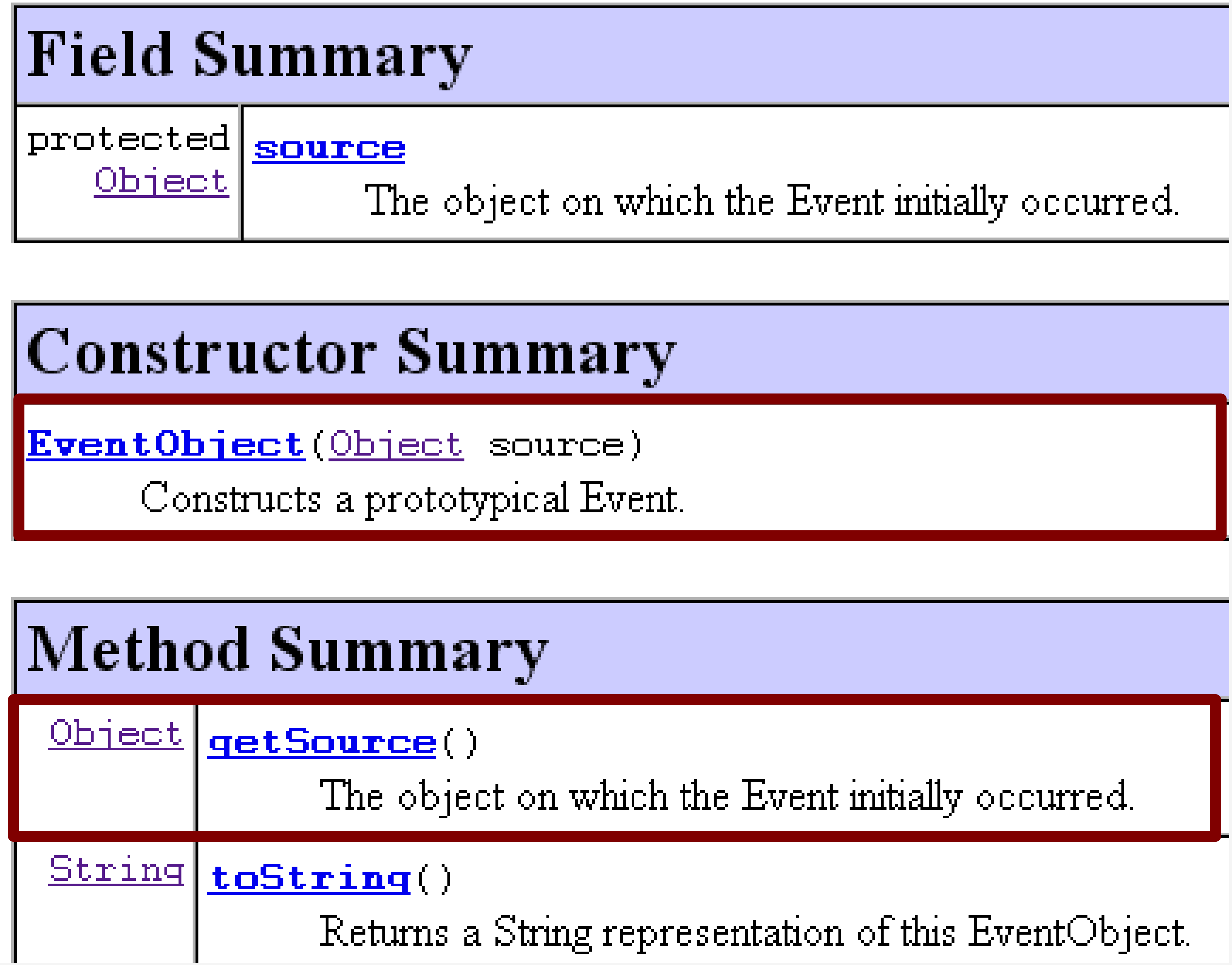
Problème : la source ?


Appli
Click me !!
No Click me first !!

```
click !!
click !!
```

- Comment faire pour distinguer les deux avec un seul écouteur ?

Rappel : java.util.EventObject



Field Summary

protected Object	**source** The object on which the Event initially occurred.

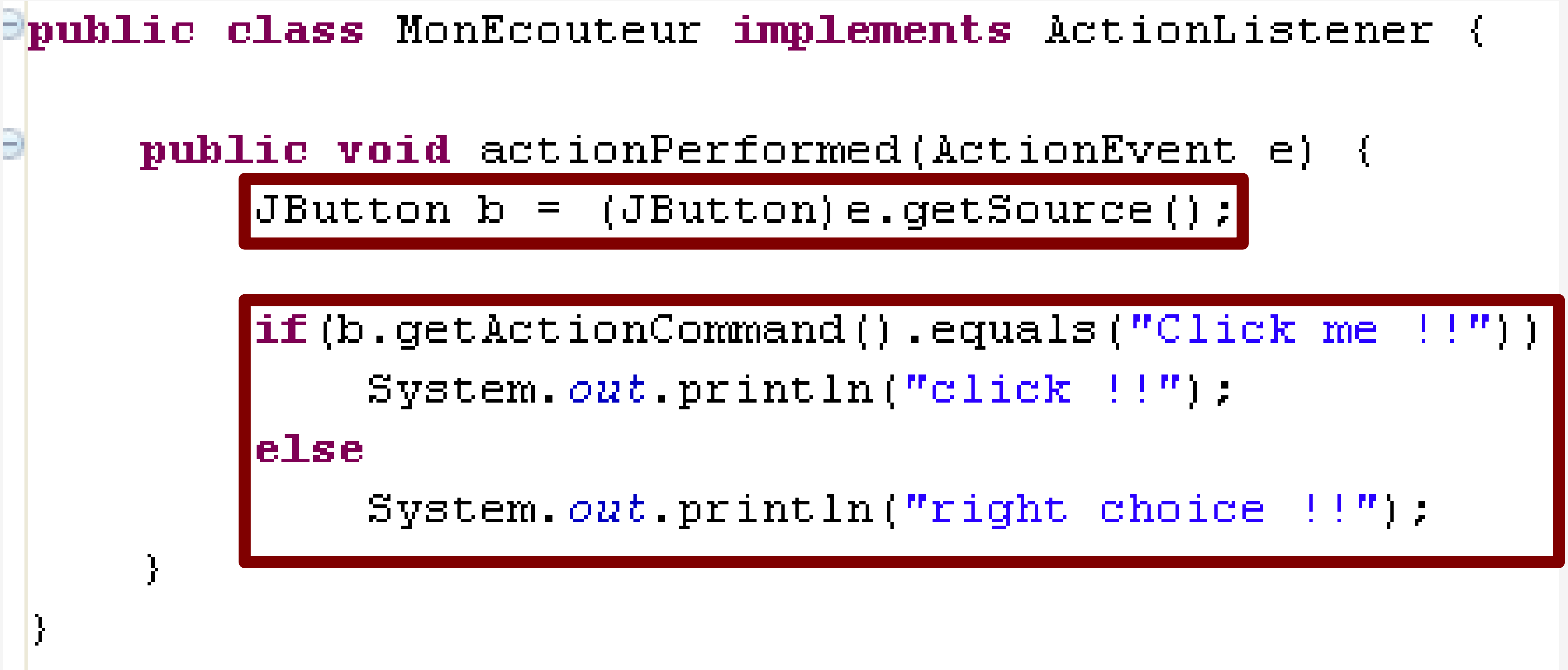
Constructor Summary

EventObject(Object source) Constructs a prototypical Event.

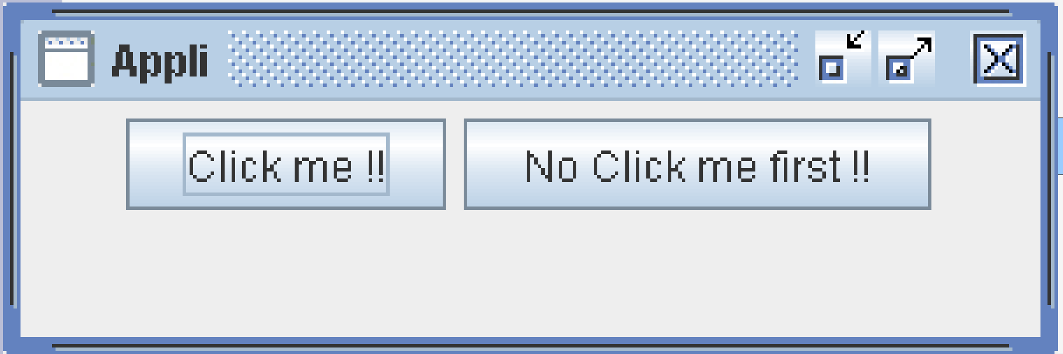
Method Summary

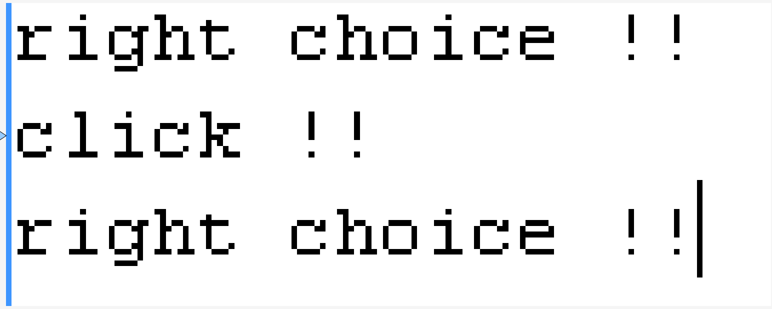
Object	**getSource**() The object on which the Event initially occurred.
String	**toString**() Returns a String representation of this EventObject.

On connaît la source !



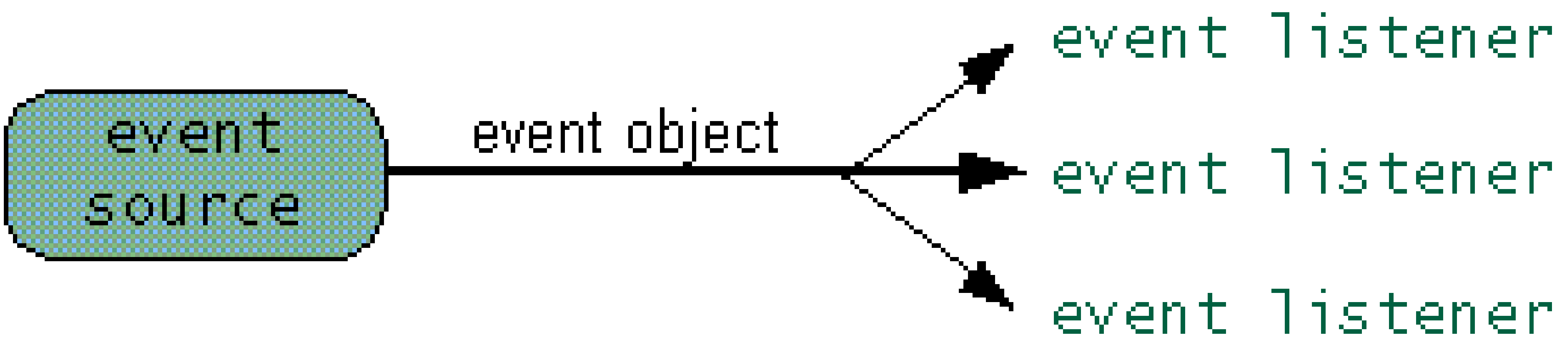
```
public class MonEcouteur implements ActionListener {

    public void actionPerformed(ActionEvent e) {
        JButton b = (JButton)e.getSource();

        if(b.getActionCommand().equals("Click me !!"))
            System.out.println("click !!");
        else
            System.out.println("right choice !!");
    }
}
```





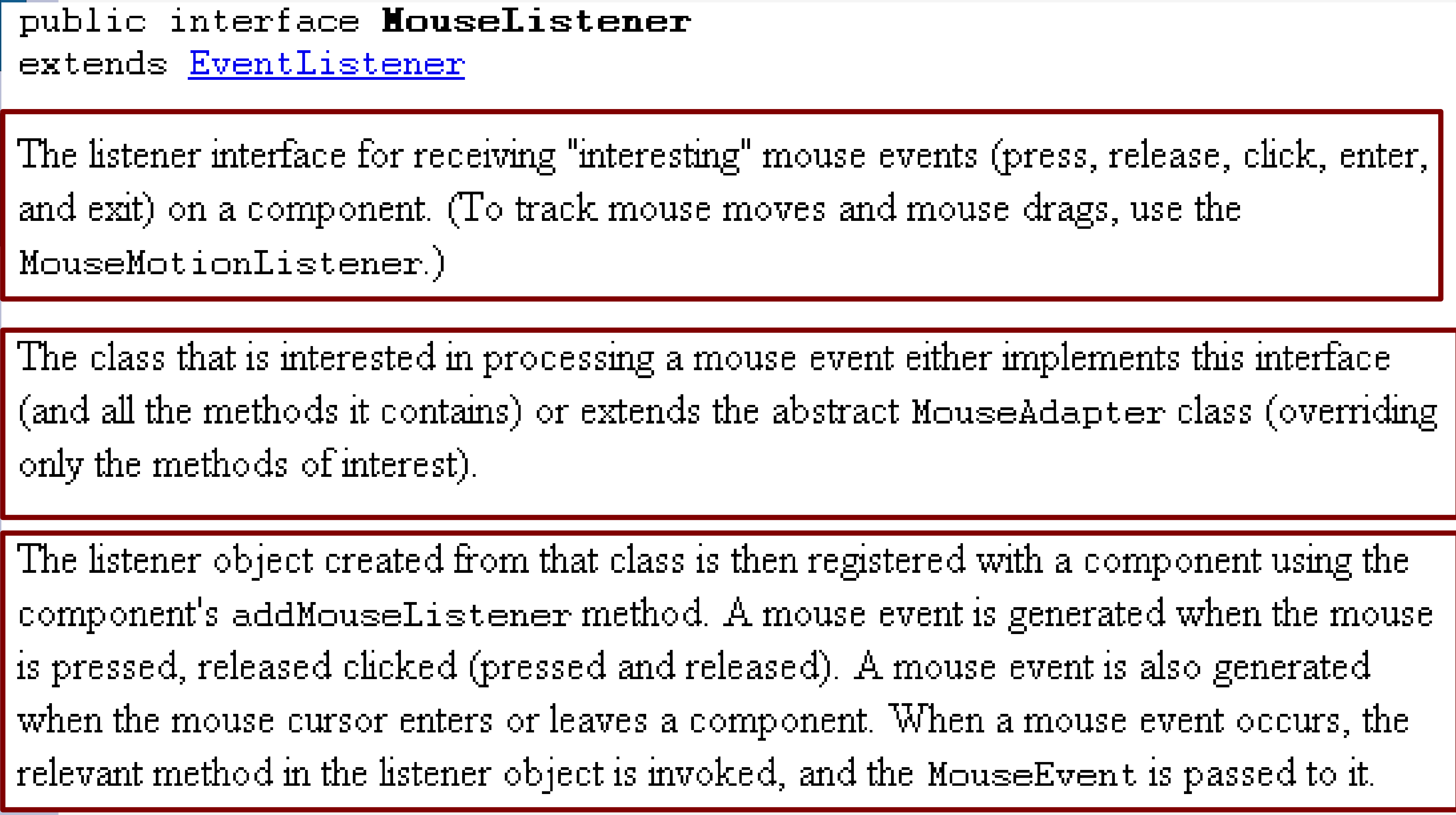
```
right choice !!
click !!
right choice !!
```

Pour résumer


event source
event object
event listener
event listener
event listener

IV. Écoute des événements souris

java.awt.event.MouseListener



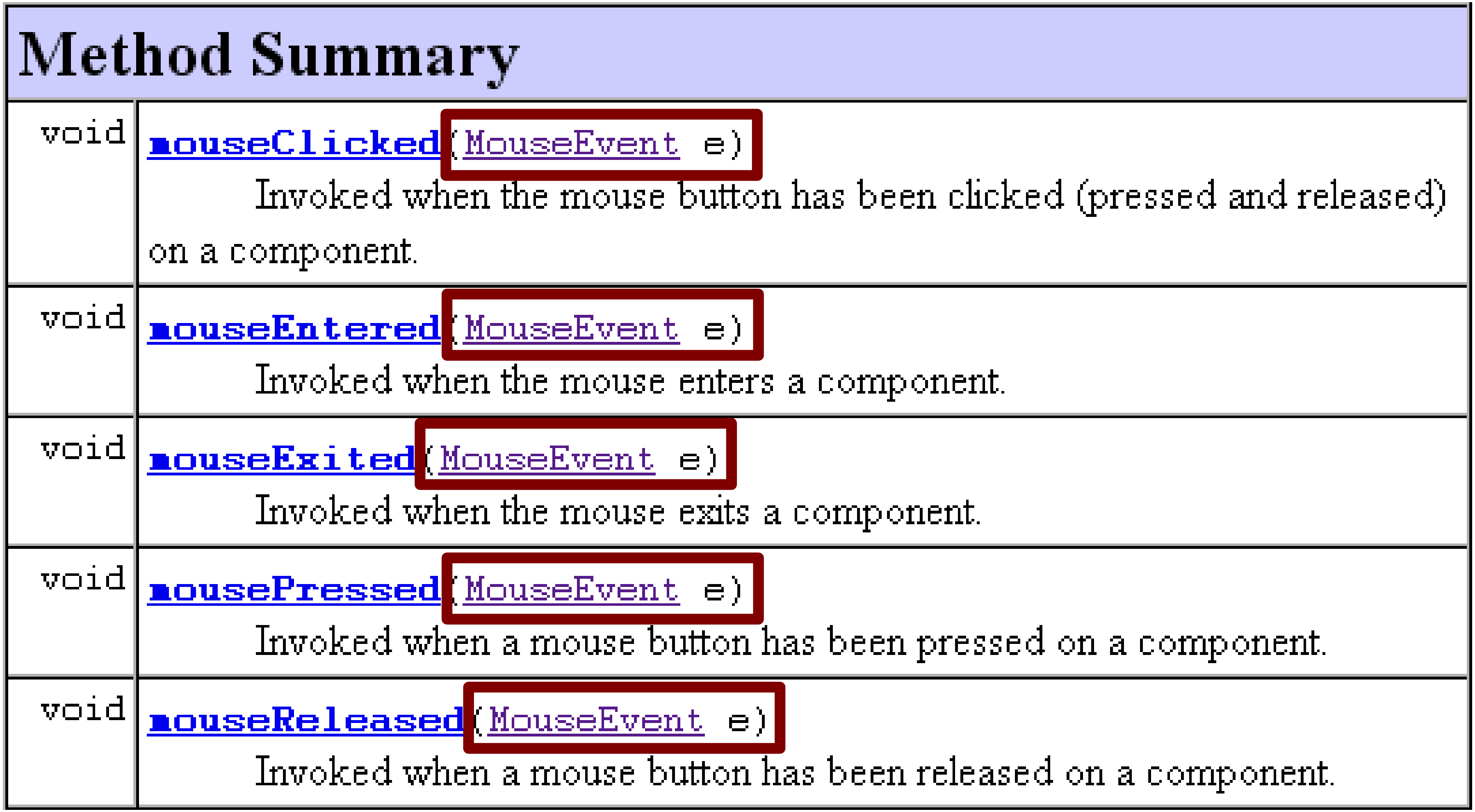
```
public interface MouseListener
extends EventListener
```

The listener interface for receiving "interesting" mouse events (press, release, click, enter, and exit) on a component. (To track mouse moves and mouse drags, use the `MouseMotionListener`.)

The class that is interested in processing a mouse event either implements this interface (and all the methods it contains) or extends the abstract `MouseAdapter` class (overriding only the methods of interest).

The listener object created from that class is then registered with a component using the component's `addMouseListener` method. A mouse event is generated when the mouse is pressed, released clicked (pressed and released). A mouse event is also generated when the mouse cursor enters or leaves a component. When a mouse event occurs, the relevant method in the listener object is invoked, and the `MouseEvent` is passed to it.

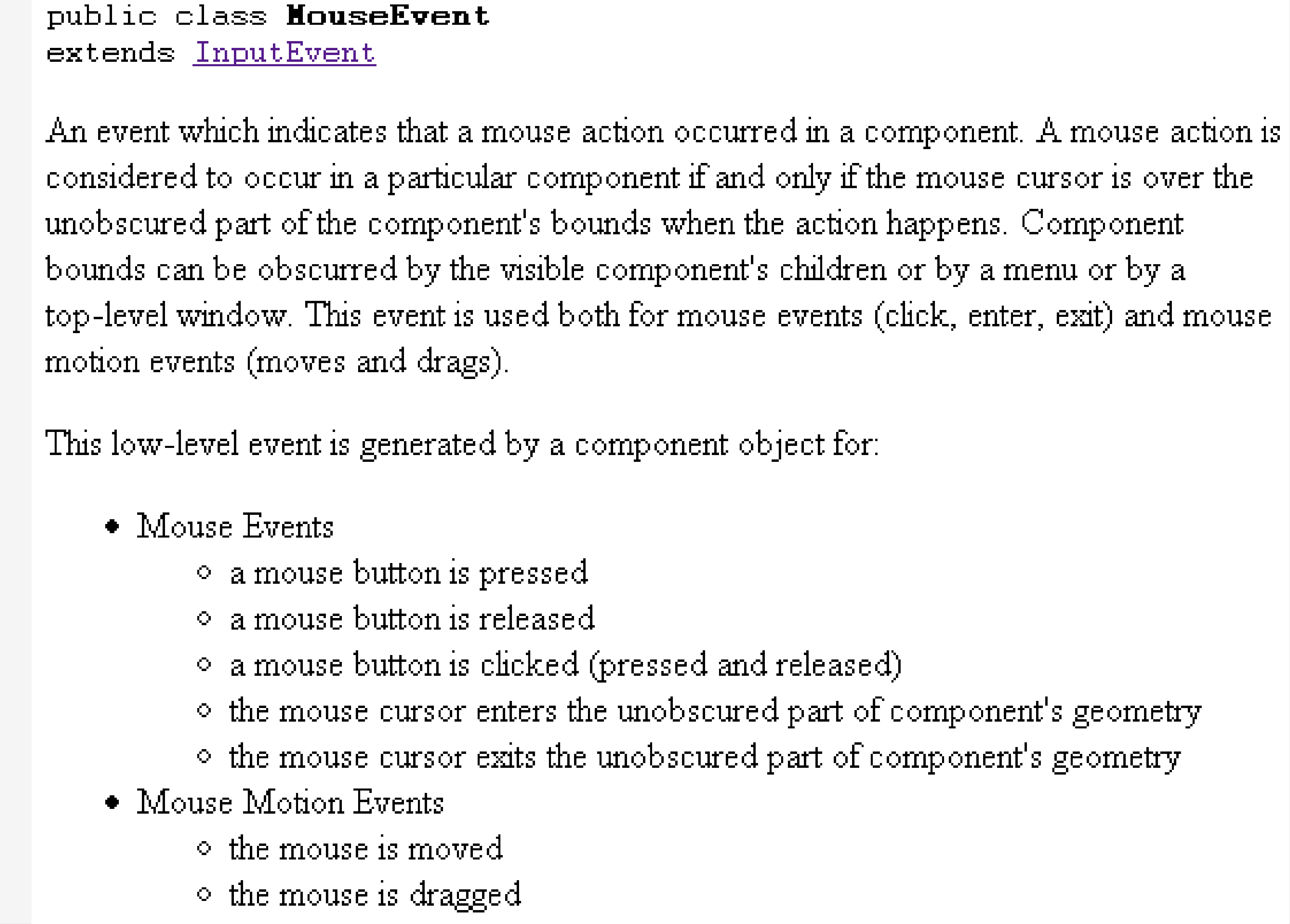
java.awt.event.MouseListener



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.

java.awt.event.MouseEvent



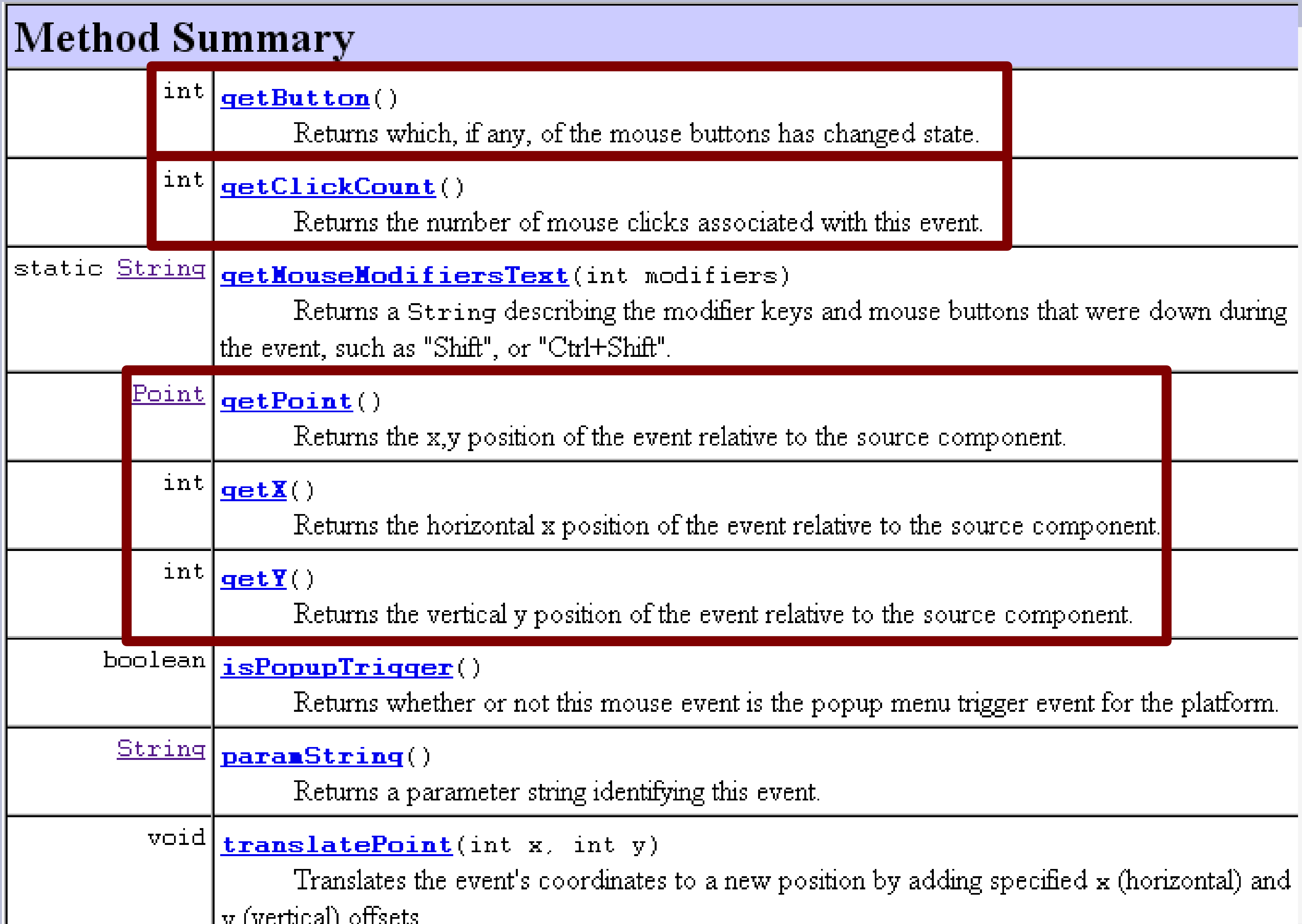
```
public class MouseEvent
extends InputEvent
```

An event which indicates that a mouse action occurred in a component. A mouse action is considered to occur in a particular component if and only if the mouse cursor is over the unobscured part of the component's bounds when the action happens. Component bounds can be obscured by the visible component's children or by a menu or by a top-level window. This event is used both for mouse events (click, enter, exit) and mouse motion events (moves and drags).

This low-level event is generated by a component object for:

- Mouse Events
  - a mouse button is pressed
  - a mouse button is released
  - a mouse button is clicked (pressed and released)
  - the mouse cursor enters the unobscured part of component's geometry
  - the mouse cursor exits the unobscured part of component's geometry
- Mouse Motion Events
  - the mouse is moved
  - the mouse is dragged

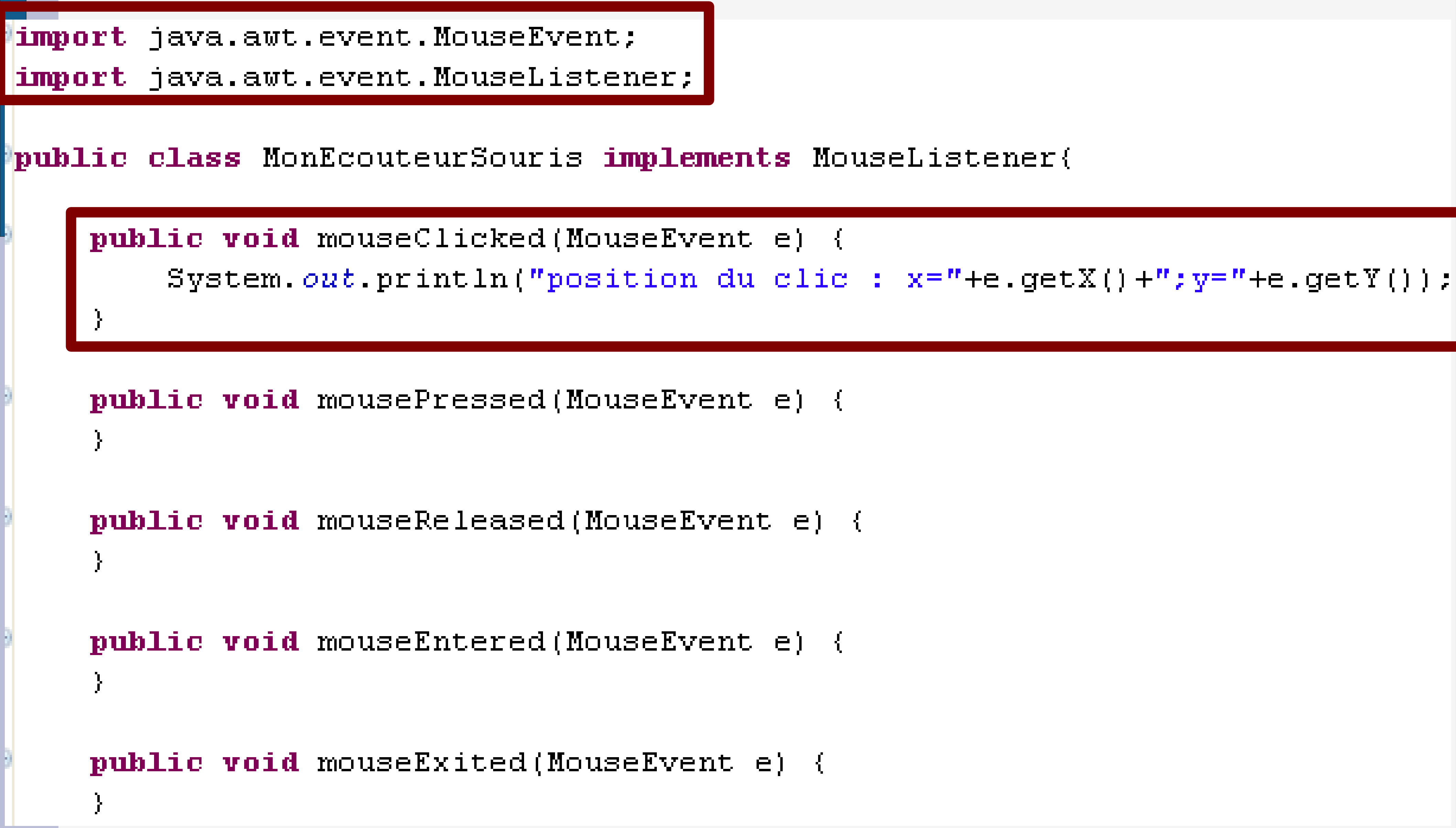
java.awt.event.MouseEvent



Method Summary

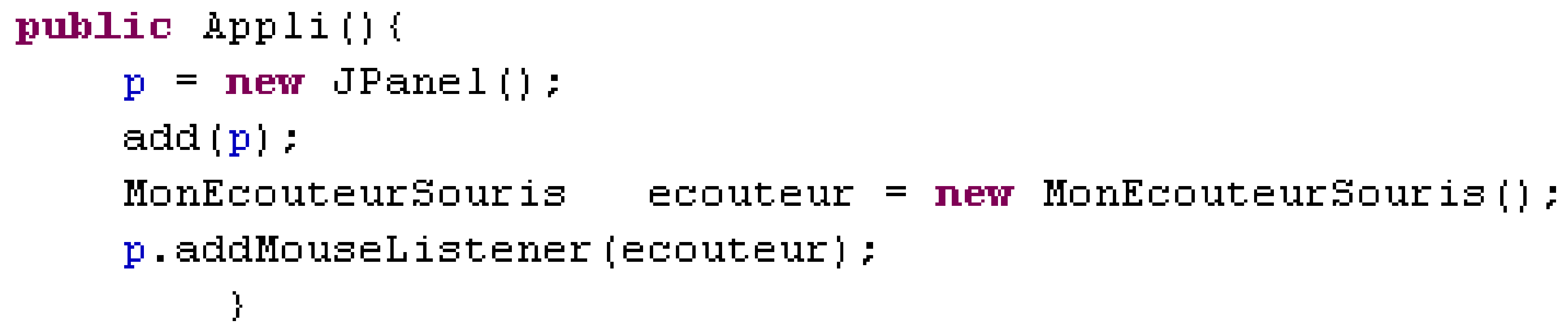
`int`	`getButton()` Returns which, if any, of the mouse buttons has changed state.
`int`	`getClickCount()` Returns the number of mouse clicks associated with this event.
`static String`	`getMouseModifiersText(int modifiers)` Returns a `String` describing the modifier keys and mouse buttons that were 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`	`getY()` Returns the vertical y position of the event relative to the source component.
`boolean`	`isPopupTrigger()` Returns whether or not this mouse event is the popup menu trigger event for the platform.
`String`	`paramString()` Returns a parameter string identifying this event.
`void`	`translatePoint(int x, int y)` Translates the event's coordinates to a new position by adding specified x (horizontal) and y (vertical) offsets

java.awt.event.MouseListener

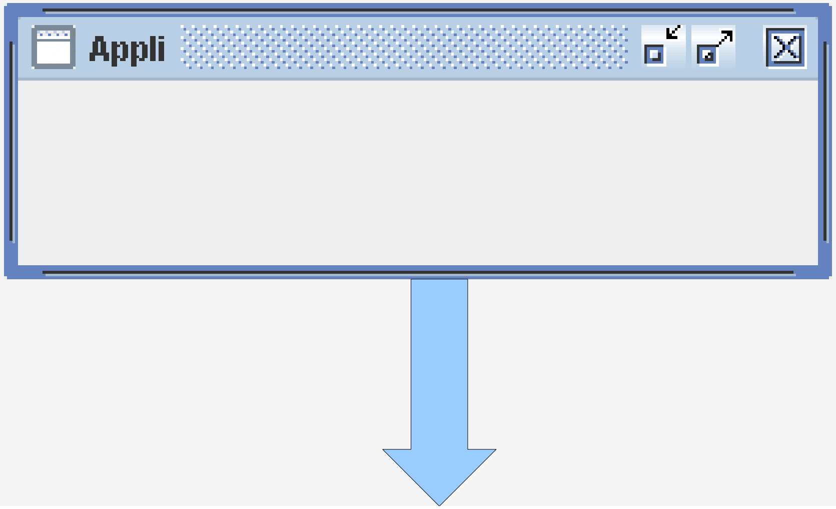


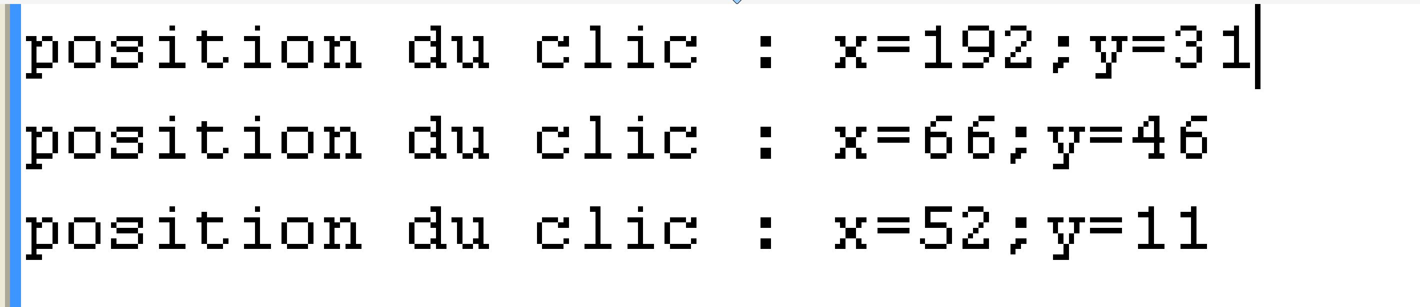
```
import java.awt.event.MouseEvent;
import java.awt.event.MouseListener;

public class MonEcouteurSouris implements MouseListener{

    public void mouseClicked(MouseEvent e) {
        System.out.println("position du clic : x="+e.getX()+";y="+e.getY());
    }

    public void mousePressed(MouseEvent e) {
    }

    public void mouseReleased(MouseEvent e) {
    }

    public void mouseEntered(MouseEvent e) {
    }

    public void mouseExited(MouseEvent e) {
    }
```

java.awt.event.MouseListener



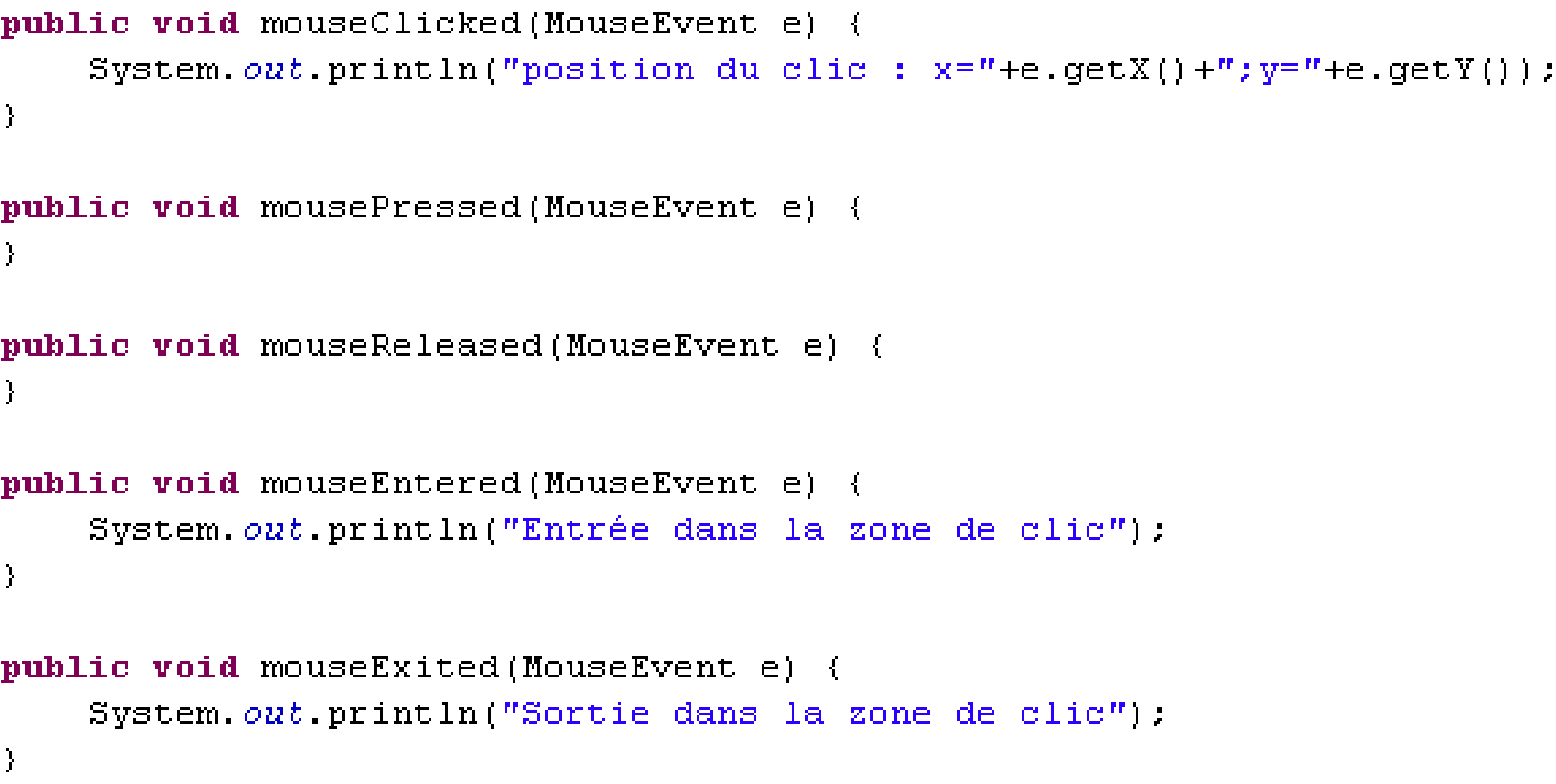
```
public Appli(){
    p = new JPanel();
    add(p);
    MonEcouteurSouris   ecouteur = new MonEcouteurSouris();
    p.addMouseListener(ecouteur);
        }
```





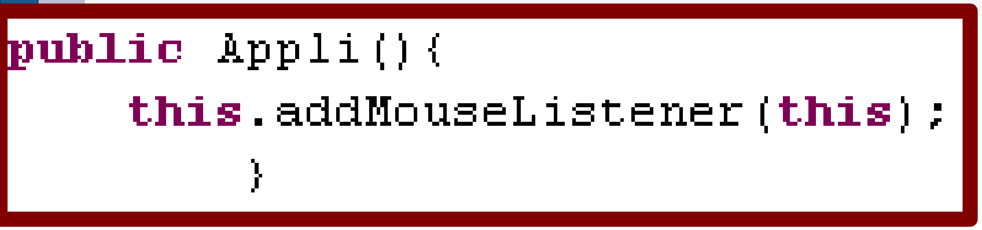
```
position du clic : x=192;y=31
position du clic : x=66;y=46
position du clic : x=52;y=11
```

Autre exemple

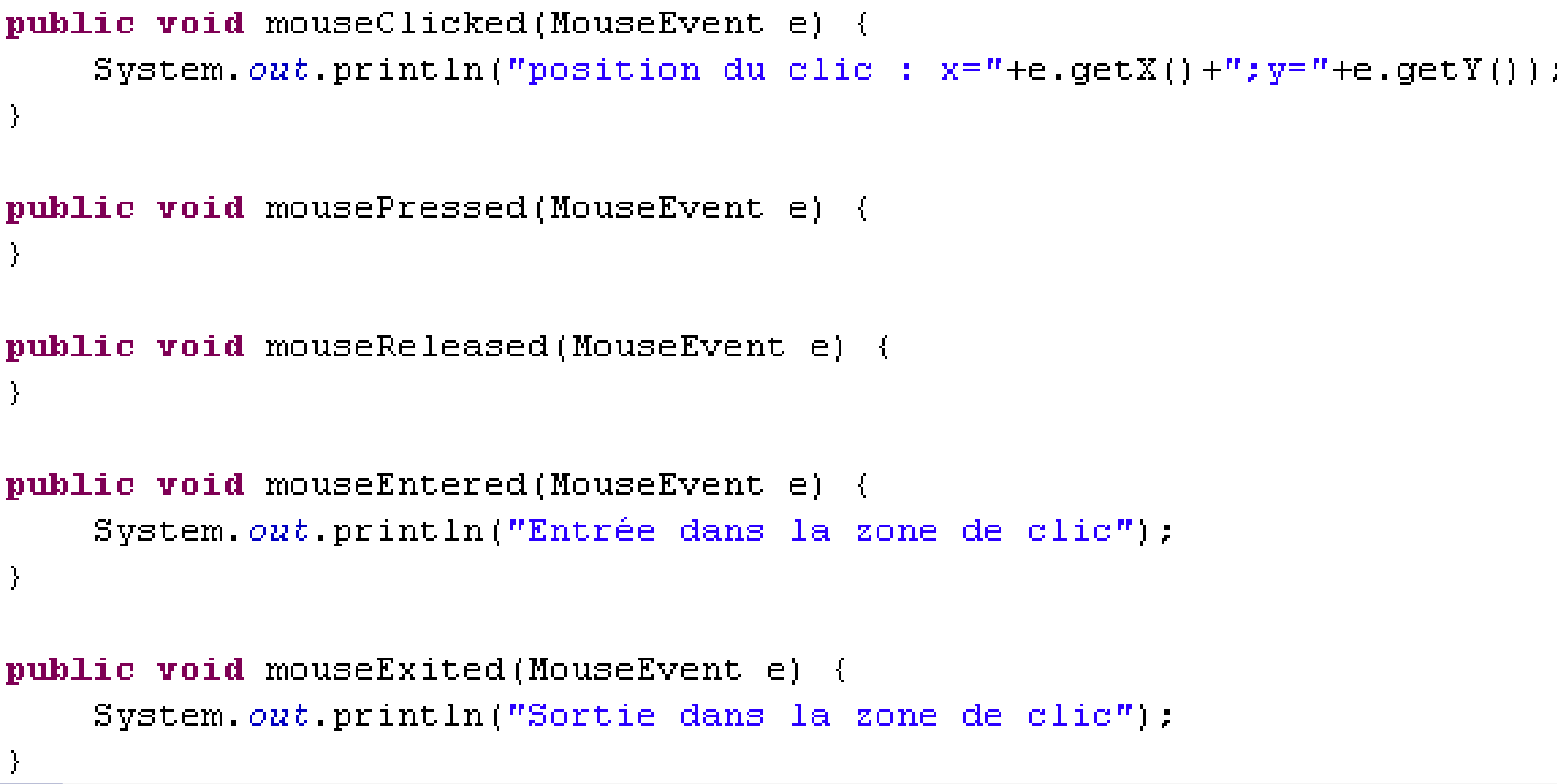


```
public void mouseClicked(MouseEvent e) {
    System.out.println("position du clic : x="+e.getX()+";y="+e.getY());
}

public void mousePressed(MouseEvent e) {
}

public void mouseReleased(MouseEvent e) {
}

public void mouseEntered(MouseEvent e) {
    System.out.println("Entrée dans la zone de clic");
}

public void mouseExited(MouseEvent e) {
    System.out.println("Sortie dans la zone de clic");
}
```

Remarque : un objet peut être son propre écouteur !



```
public Appli(){
    this.addMouseListener(this);
        }
```

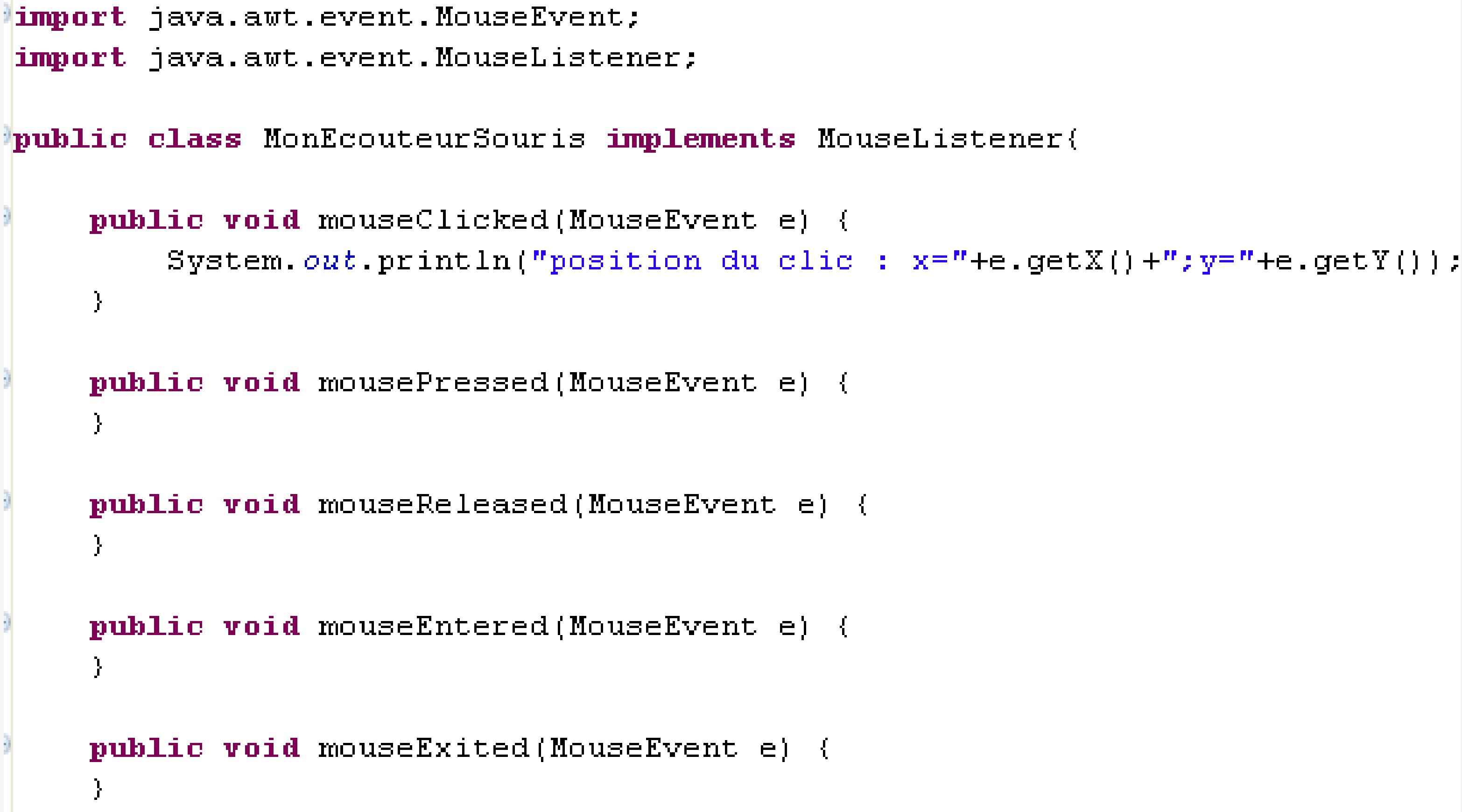


```
public void mouseClicked(MouseEvent e) {
    System.out.println("position du clic : x="+e.getX()+";y="+e.getY());
}

public void mousePressed(MouseEvent e) {
}

public void mouseReleased(MouseEvent e) {
}

public void mouseEntered(MouseEvent e) {
    System.out.println("Entrée dans la zone de clic");
}

public void mouseExited(MouseEvent e) {
    System.out.println("Sortie dans la zone de clic");
}
```

V. Sucre syntaxique

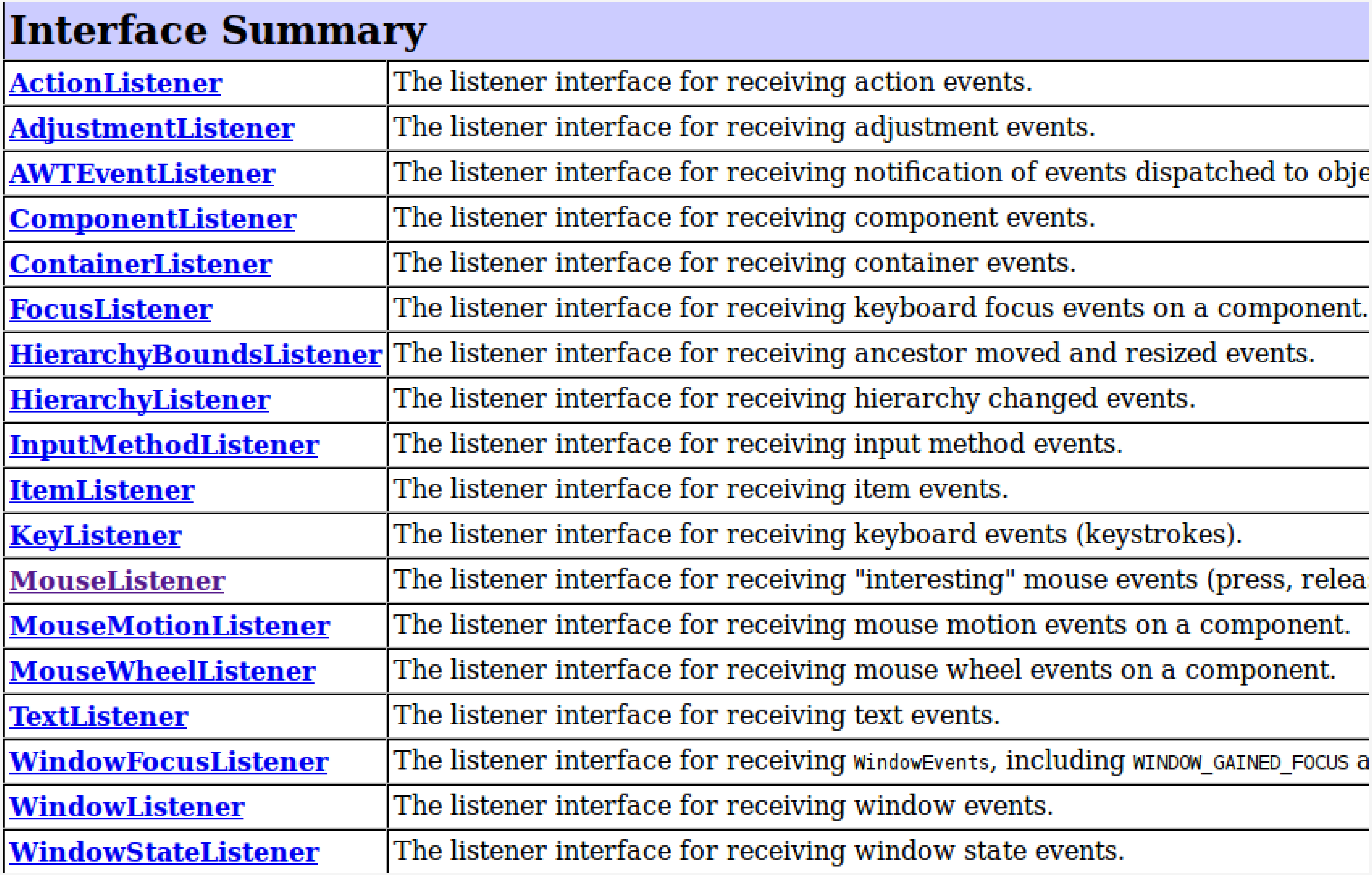
Listeners concrets dans le JDK

- Coder un ***java.awt.event.MouseListener*** peut être fastidieux car plusieurs des méthodes de l'interface sont souvent vides dans les implémentations :



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

public class MonEcouteurSouris implements MouseListener{

    public void mouseClicked(MouseEvent e) {
        System.out.println("position du clic : x="+e.getX()+";y="+e.getY());
    }

    public void mousePressed(MouseEvent e) {
    }

    public void mouseReleased(MouseEvent e) {
    }

    public void mouseEntered(MouseEvent e) {
    }

    public void mouseExited(MouseEvent e) {
    }
```

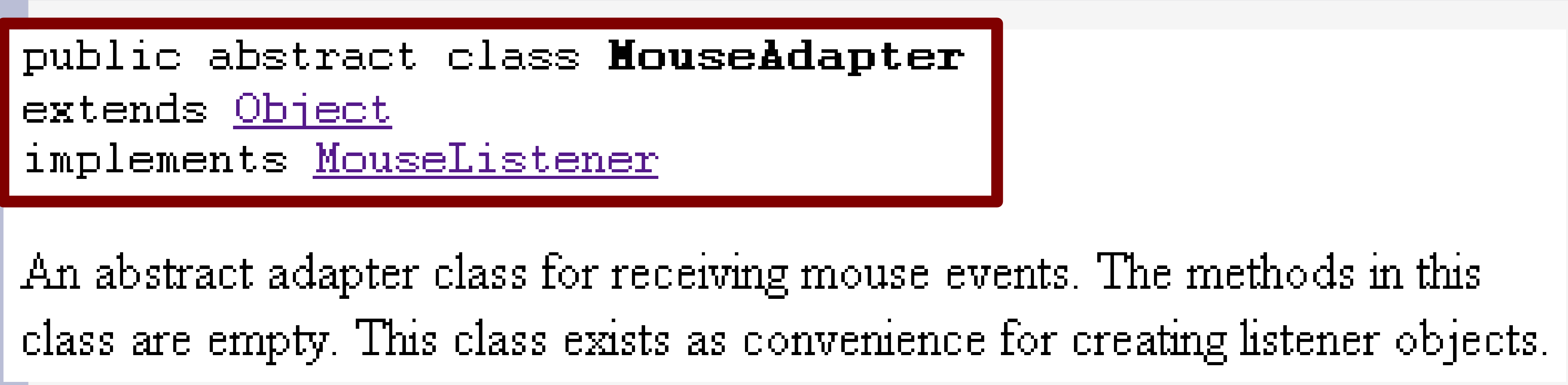
Package java.awt.event



Interface Summary

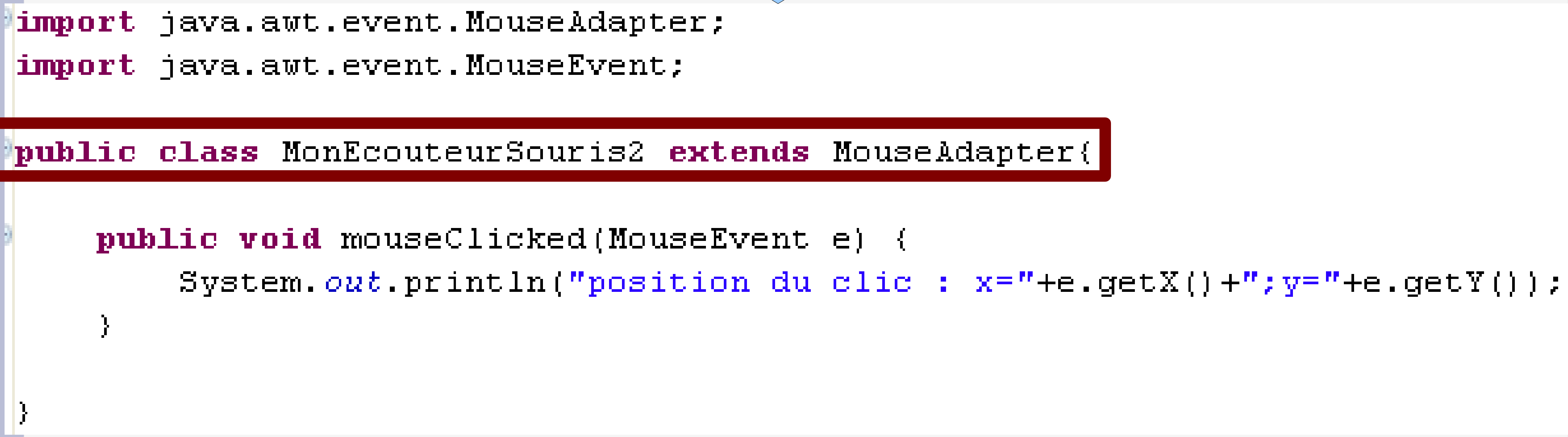
ActionListener	The listener interface for receiving action events.
AdjustmentListener	The listener interface for receiving adjustment events.
AWTEventListener	The listener interface for receiving notification of events dispatched to obje
ComponentListener	The listener interface for receiving component events.
ContainerListener	The listener interface for receiving container events.
FocusListener	The listener interface for receiving keyboard focus events on a component.
HierarchyBoundsListener	The listener interface for receiving ancestor moved and resized events.
HierarchyListener	The listener interface for receiving hierarchy changed events.
InputMethodListener	The listener interface for receiving input method events.
ItemListener	The listener interface for receiving item events.
KeyListener	The listener interface for receiving keyboard events (keystrokes).
MouseListener	The listener interface for receiving "interesting" mouse events (press, relea
MouseMotionListener	The listener interface for receiving mouse motion events on a component.
MouseWheelListener	The listener interface for receiving mouse wheel events on a component.
TextListener	The listener interface for receiving text events.
WindowFocusListener	The listener interface for receiving `WindowEvents`, including `WINDOW_GAINED_FOCUS` a
WindowListener	The listener interface for receiving window events.
WindowStateListener	The listener interface for receiving window state events.

java.awt.event.MouseAdapter



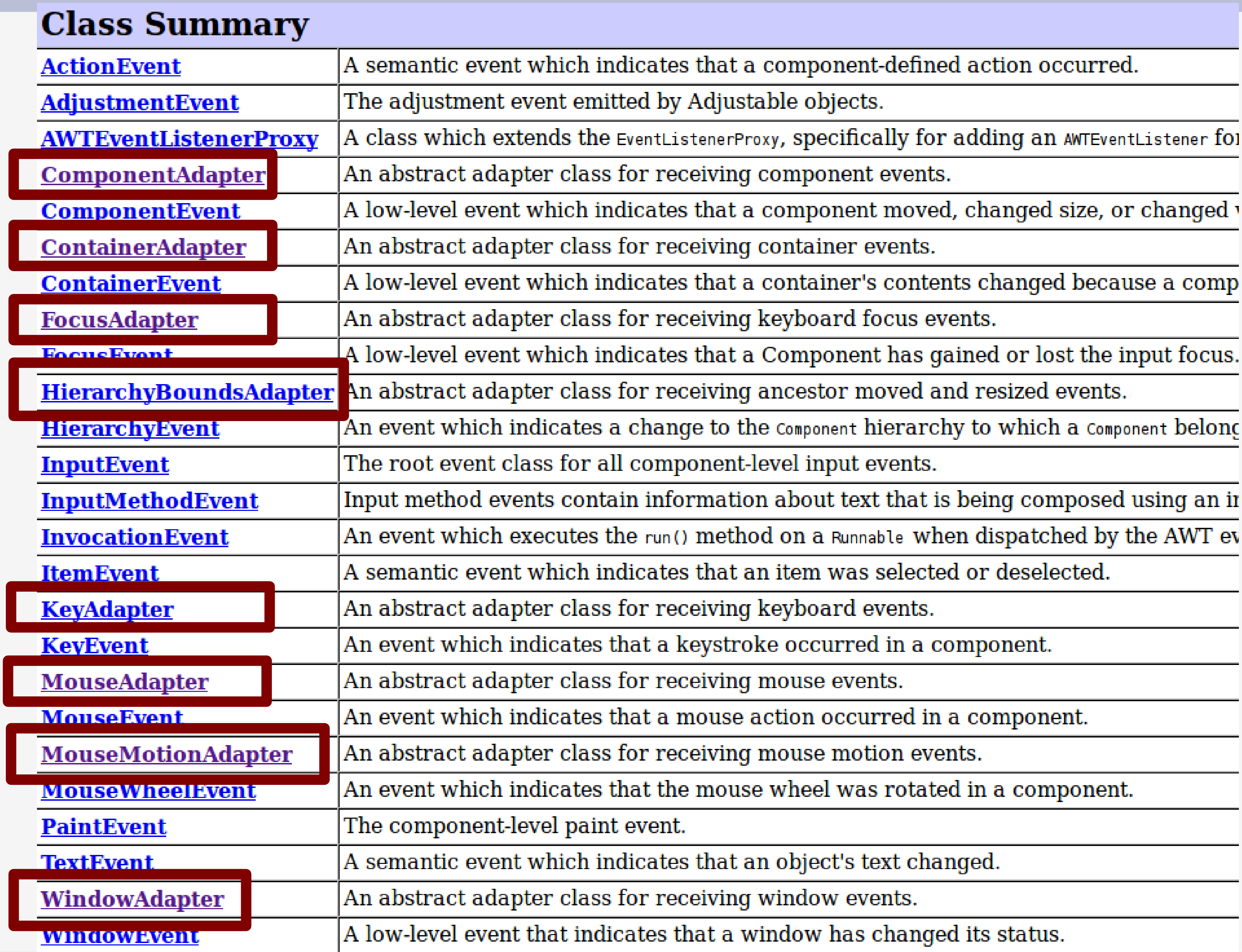
```
public abstract class MouseAdapter
extends Object
implements MouseListener
```

An abstract adapter class for receiving mouse events. The methods in this class are empty. This class exists as convenience for creating listener objects.



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

public class MonEcouteurSouris2 extends MouseAdapter{

    public void mouseClicked(MouseEvent e) {
        System.out.println("position du clic : x="+e.getX()+";y="+e.getY());
    }


}
```

Les *adapters* de java.awt.event



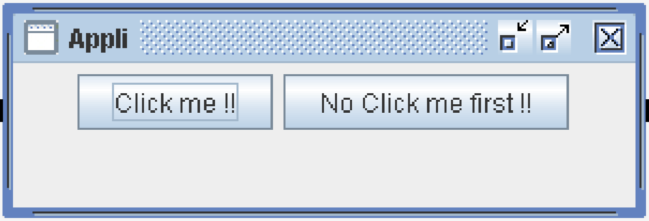
Class Summary

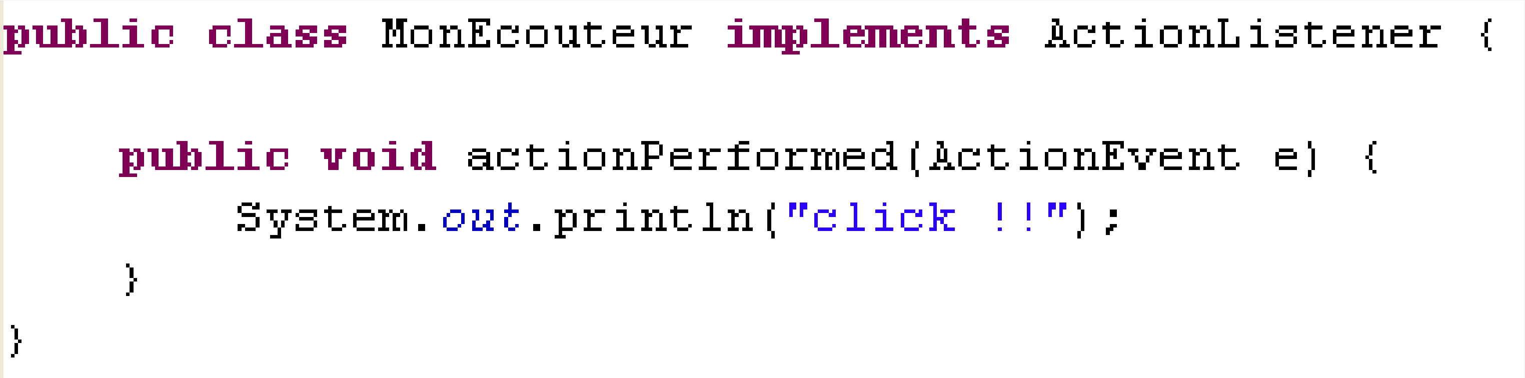
ActionEvent	A semantic event which indicates that a component-defined action occurred.
AdjustmentEvent	The adjustment event emitted by Adjustable objects.
AWTEventListenerProxy	A class which extends the `EventListenerProxy`, specifically for adding an `AWTEventListener` fo
ComponentAdapter	An abstract adapter class for receiving component events.
ComponentEvent	A low-level event which indicates that a component moved, changed size, or changed
ContainerAdapter	An abstract adapter class for receiving container events.
ContainerEvent	A low-level event which indicates that a container's contents changed because a comp
FocusAdapter	An abstract adapter class for receiving keyboard focus events.
FocusEvent	A low-level event which indicates that a Component has gained or lost the input focus.
HierarchyBoundsAdapter	An abstract adapter class for receiving ancestor moved and resized events.
HierarchyEvent	An event which indicates a change to the `Component` hierarchy to which a `Component` belong
InputEvent	The root event class for all component-level input events.
InputMethodEvent	Input method events contain information about text that is being composed using an i
InvocationEvent	An event which executes the `run()` method on a `Runnable` when dispatched by the AWT ev
ItemEvent	A semantic event which indicates that an item was selected or deselected.
KeyAdapter	An abstract adapter class for receiving keyboard events.
KeyEvent	An event which indicates that a keystroke occurred in a component.
MouseAdapter	An abstract adapter class for receiving mouse events.
MouseEvent	An event which indicates that a mouse action occurred in a component.
MouseMotionAdapter	An abstract adapter class for receiving mouse motion events.
MouseWheelEvent	An event which indicates that the mouse wheel was rotated in a component.
PaintEvent	The component-level paint event.
TextEvent	A semantic event which indicates that an object's text changed.
WindowAdapter	An abstract adapter class for receiving window events.
WindowEvent	A low-level event that indicates that a window has changed its status.

Gérer beaucoup d'écouteurs ?!

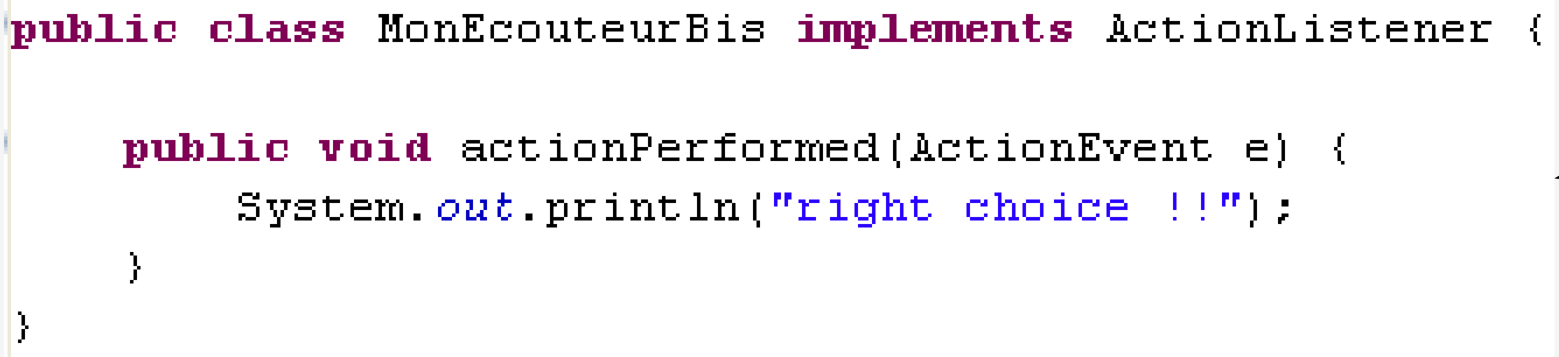
Un écouteur par composant ?

- A priori, il est fastidieux d'écrire un écouteur par composant: **une classe par composant !**





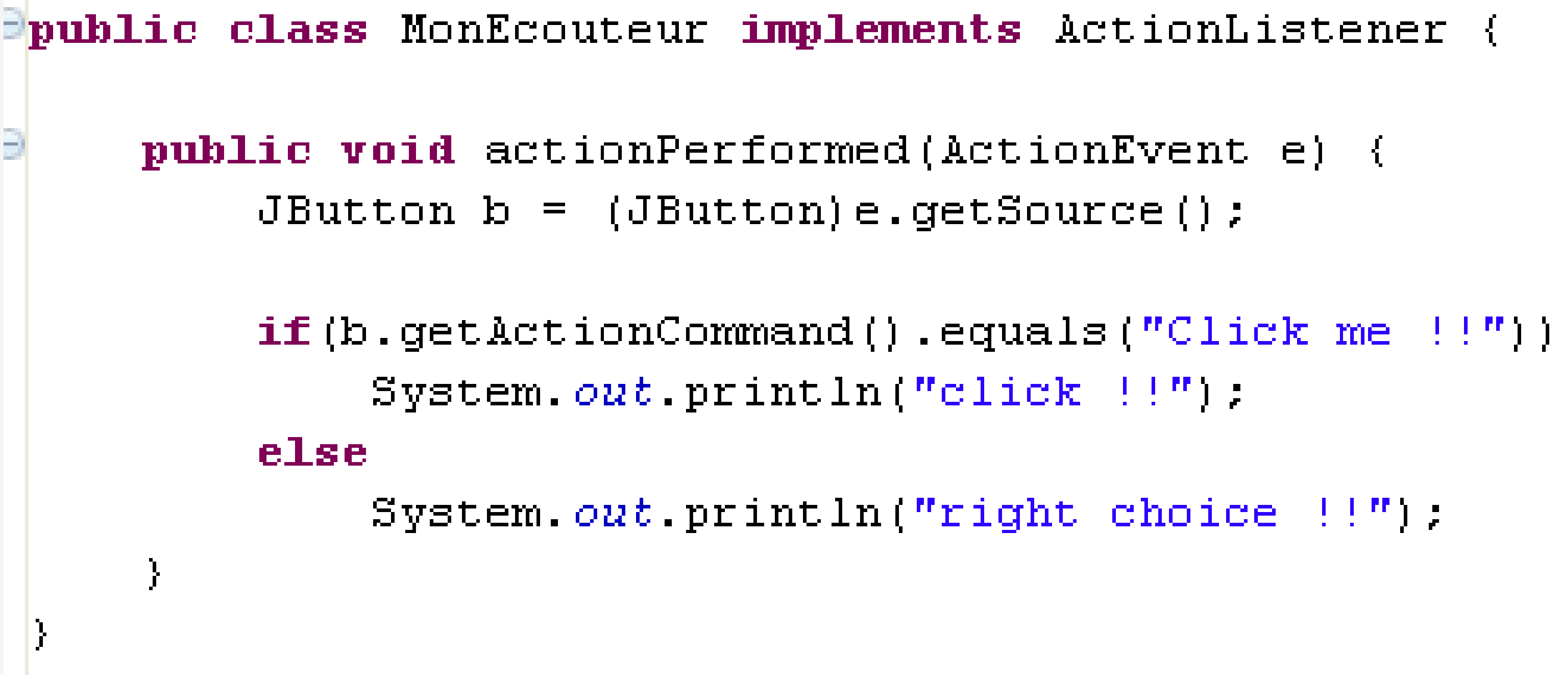
```java
public class MonEcouteur implements ActionListener {

    public void actionPerformed(ActionEvent e) {
        System.out.println("click !!");
    }
}
```



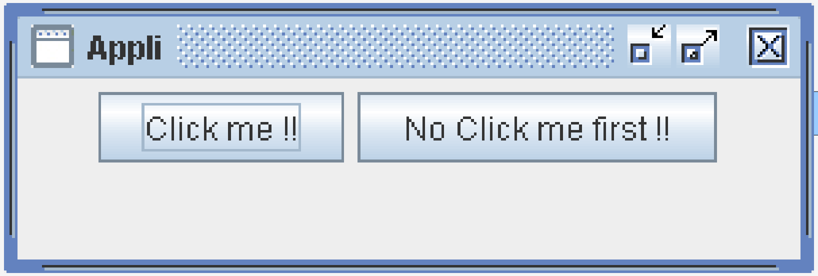
```java
public class MonEcouteurBis implements ActionListener {

    public void actionPerformed(ActionEvent e) {
        System.out.println("right choice !!");
    }
}
```

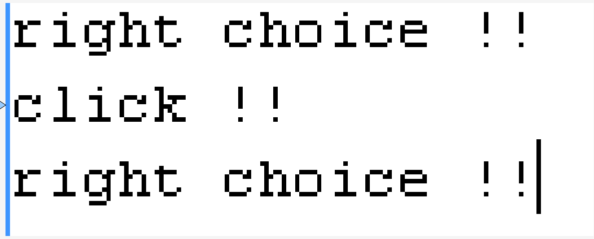
Un écouteur pour n composants ?

- L'idée est alors d'écrire un écouteur qui gère plusieurs composants :



```java
public class MonEcouteur implements ActionListener {

    public void actionPerformed(ActionEvent e) {
        JButton b = (JButton)e.getSource();

        if(b.getActionCommand().equals("Click me !!"))
            System.out.println("click !!");
        else
            System.out.println("right choice !!");
    }
}
```





```
right choice !!
click !!
right choice !!
```

Un écouteur pour n composants ?

- Inconvénients :
  - Code peu efficace : beaucoup de tests pour pas grand-chose
  - Le code va devenir rapidement complexe et difficile à maintenir
  - Conséquence : solution à éviter lorsqu'on a beaucoup de boutons

Que faire ?

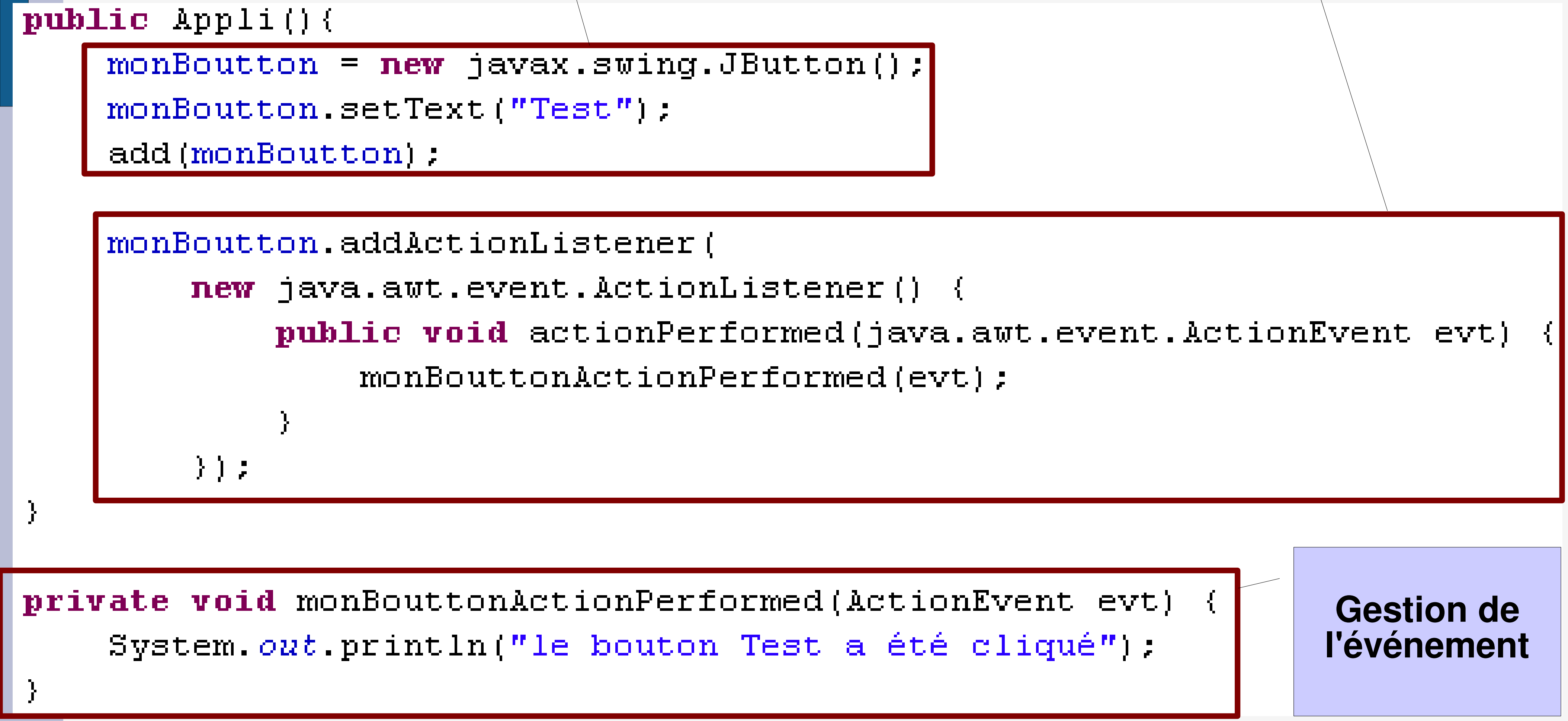
Un écouteur par composant !

- En fait, il faut créer une nouvelle classe écouteur par composant !
- Mais pas de manière classique (avec un fichier par classe)
- Il est possible de définir une classe à l'intérieur du code d'une autre classe
- Cela facilite grandement la gestion des écouteurs :
  - On va créer la classe écouteur correspondant à un composant immédiatement après son initialisation en utilisant une classe interne anonyme !

Les classes internes anonymes

Création et ajout du bouton

La classe interne anonyme pour définir l'écouteur du bouton



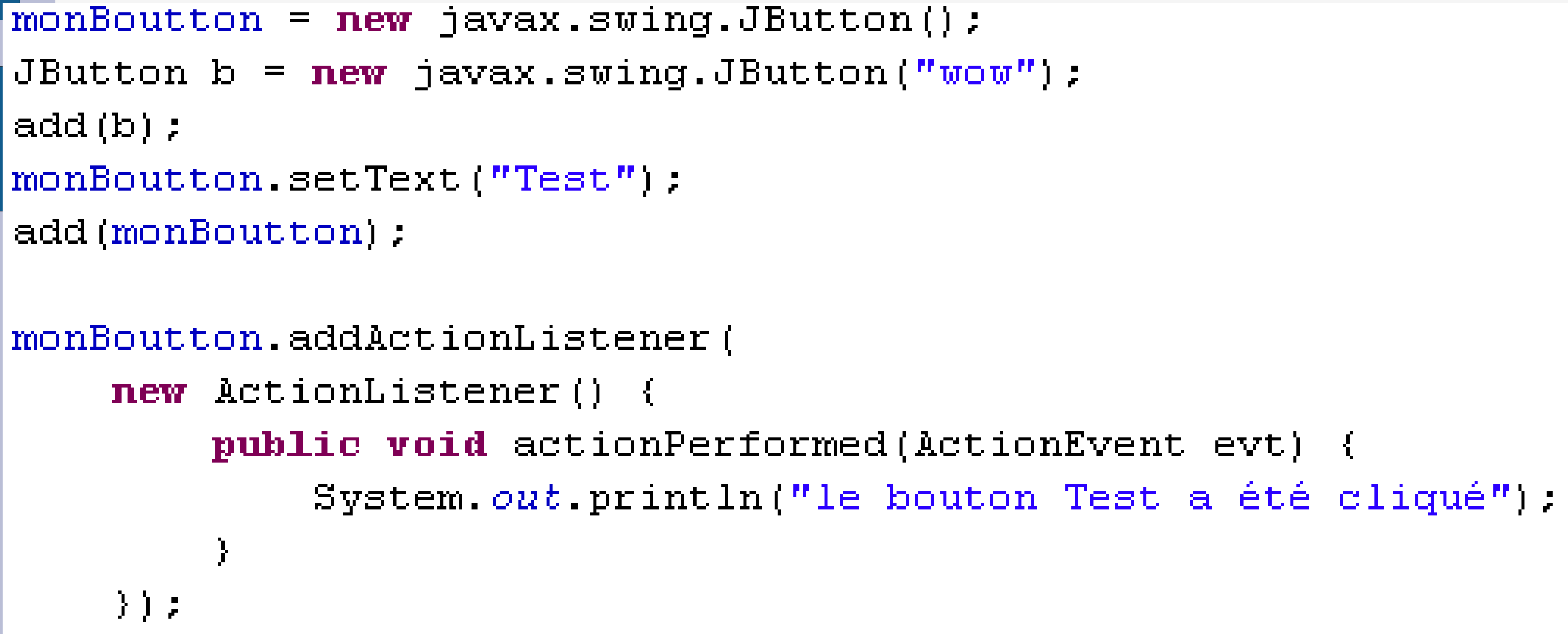
```
public Appli(){
    monBoutton = new javax.swing.JButton();
    monBoutton.setText("Test");
    add(monBoutton);

    monBoutton.addActionListener(
        new java.awt.event.ActionListener() {
            public void actionPerformed(java.awt.event.ActionEvent evt) {
                monBouttonActionPerformed(evt);
            }
        });
}

private void monBouttonActionPerformed(ActionEvent evt) {
    System.out.println("le bouton Test a été cliqué");
}
```

Gestion de l'événement

Les classes internes anonymes

- Le code précédent correspond à ce qui est obtenu automatiquement à l'aide des outils d'édition graphique d'un IDE (Eclipse, Netbeans)
  - Il y a une séparation entre :
    - Le code généré automatiquement (la classe écouteur anonyme)
    - Le code géré par le programmeur (la méthode correspondant à la gestion de l'événement) : monBouttonActionPerformed(ActionEvent evt)
- En pratique, rien n'empêche de coder directement la gestion de l'événement au moment de la création de l'écouteur

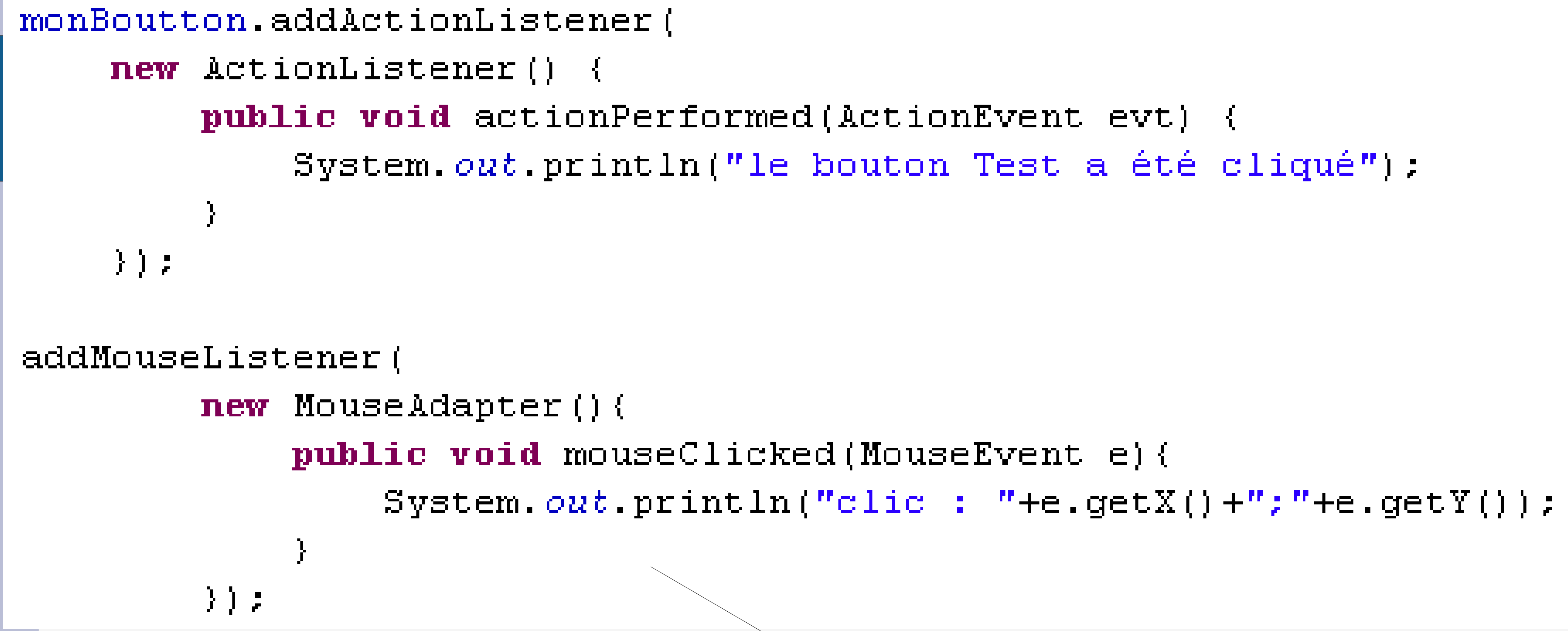
Exemple



```
monBoutton = new javax.swing.JButton();
JButton b = new javax.swing.JButton("wow");
add(b);
monBoutton.setText("Test");
add(monBoutton);

monBoutton.addActionListener(
    new ActionListener() {
        public void actionPerformed(ActionEvent evt) {
            System.out.println("le bouton Test a été cliqué");
        }
    });
```

Même chose pour la souris

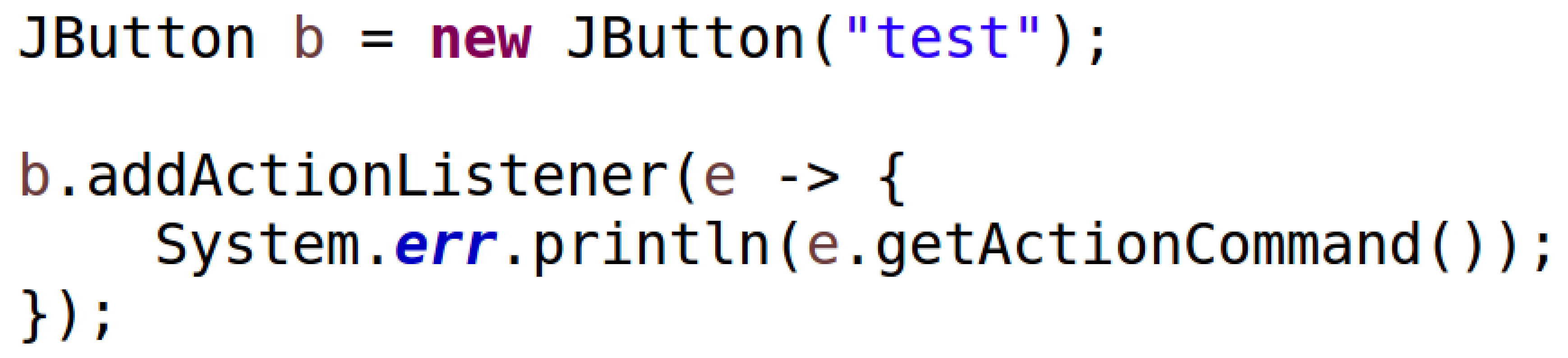
Pour un bouton



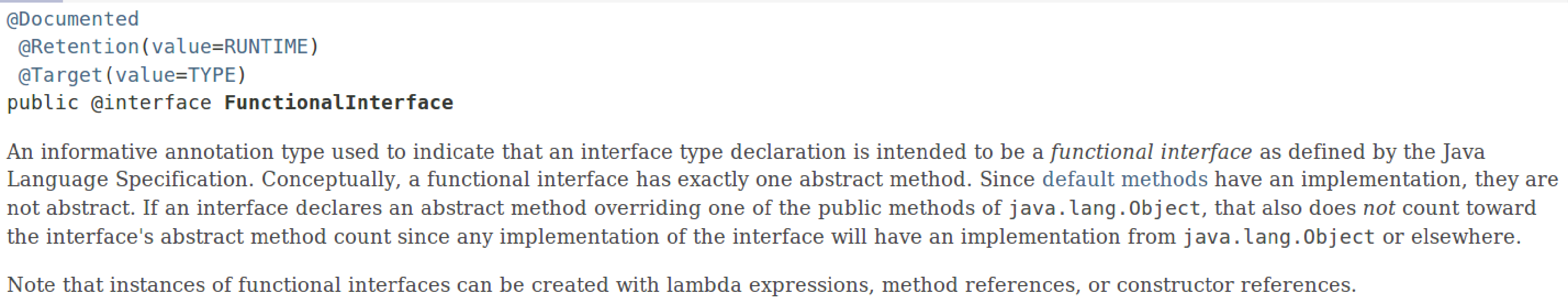
```
monBoutton.addActionListener(
    new ActionListener() {
        public void actionPerformed(ActionEvent evt) {
            System.out.println("le bouton Test a été cliqué");
        }
    });

addMouseListener(
        new MouseAdapter(){
            public void mouseClicked(MouseEvent e){
                System.out.println("clic : "+e.getX()+";"+e.getY());
            }
        });
```

Pour la souris

ActionListener en Java 8



```
JButton b = new JButton("test");

b.addActionListener(e -> {
    System.err.println(e.getActionCommand());
});
```



```
@Documented
 @Retention(value=RUNTIME)
 @Target(value=TYPE)
public @interface FunctionalInterface
```

An informative annotation type used to indicate that an interface type declaration is intended to be a *functional interface* as defined by the Java Language Specification. Conceptually, a functional interface has exactly one abstract method. Since default methods have an implementation, they are not abstract. If an interface declares an abstract method overriding one of the public methods of `java.lang.Object`, that also does *not* count toward the interface's abstract method count since any implementation of the interface will have an implementation from `java.lang.Object` or elsewhere.

Note that instances of functional interfaces can be created with lambda expressions, method references, or constructor references.