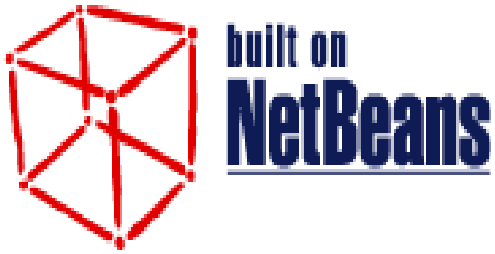
Pemrograman Berbasis Komponen

Java Beans + Swing di Netbeans



Java Beans

- Merupakan **component** pada Java
- Merupakan komponen perangkat lunak yang **reusable** dapat dimanipulasi secara visual menggunakan **builder tool**
- The JavaBeans API provides a *framework for defining reusable, embeddable, modular software components.*
- Memungkinkan pengguna untuk membangun aplikasi secara mudah

Java Beans

- **Visual bean**

  (mis. button, text-box)
- **Non-visual bean**

  (mis. FTP, SMTP, ZipCode validator)

A JavaBean is a "**Plain Old Java Object**" (POJO) that is serializable, has a no-argument constructor, and allows access to properties using getter and setter methods

Chilkat

Chilkat Class Libraries for Java

* Note: If the JDK is not specified, it is JDK6.

Windows Downloads

32-bit (win32) • v9.3.0 • 21-Jan-2012 • chilkatJava.zip (Windows Install Instructions)

64-bit (x64) • v9.3.0 • 21-Jan-2012 • chilkatJava64.zip (Windows Install Instructions)

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MAC OS X Downloads

Standard (32/64-bit Universal, v10.6 Base SDK) • 21-Jan-2012
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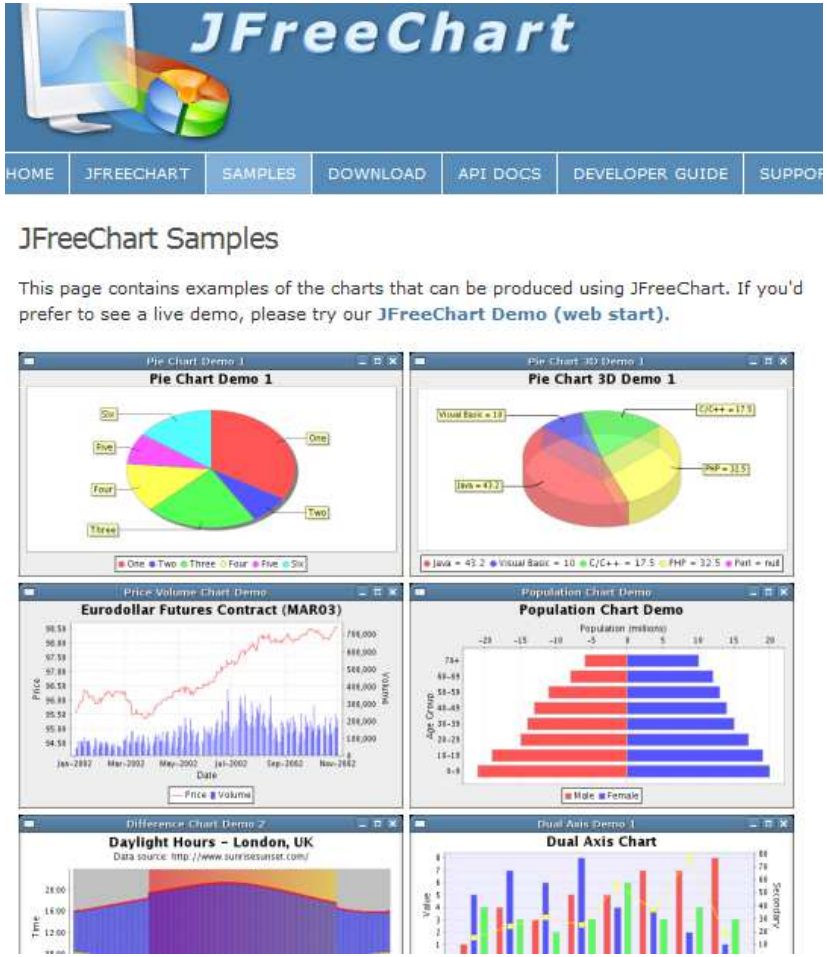
JFreeChart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This page contains examples of the charts that can be produced using JFreeChart. If you'd prefer to see a live demo, please try our JFreeChart Demo (web start).
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Pie Chart 3D Demo 1
Price Volume Chart Demo
Eurodollar Futures Contract (MAR03)
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JustFormsPDF

JustFormsPDF
PDF Forms on the fly

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Examples

Here are some examples, of using JustFormsPDF library in various situations, which can serve as kick starters.

Java Program

Source Code
Input/Template PDF
Output PDF

Servlet

Source Code
Input/Template PDF
Output PDF

Multiline Text

Source Code
Input/Template PDF
Output PDF

JavaBean Component Model

- Stateful
- Visual oriented
- Introspection
- Event driven
- Method naming
- Event naming
- BeanInfo class

JavaBeans

Lima fungsionalitas penting yang didukung oleh JavaBeans

- Event
- Property
- Persistence
  - Enable a bean to save and restore its state.
- Introspection: sifat-sifat suatu class
- Customization
  - Exposed properties could be modified at design time by a property editor or bean customizers.

Event

Apa itu **event**?

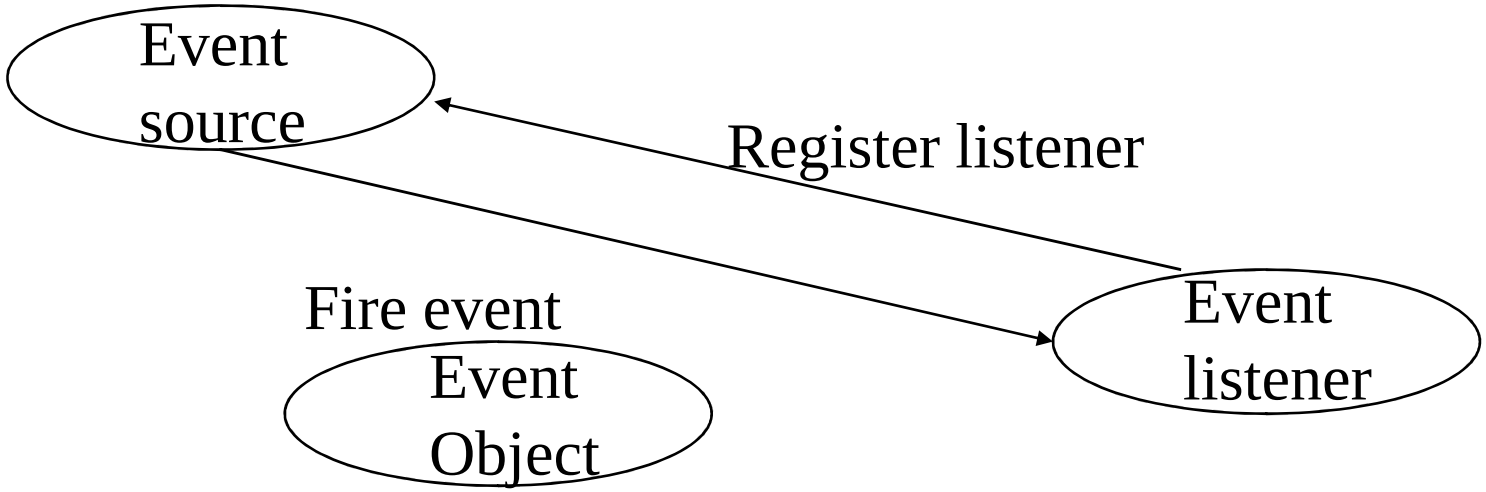
*A **source bean fires** an event, while a **listener bean receives** the event and responds to the event.*

- suatu message yang dikirim dari satu objek ke objek yang lain
- Pemberitahuan kepada penerima (recipient) bahwa telah terjadi ‘sesuatu’

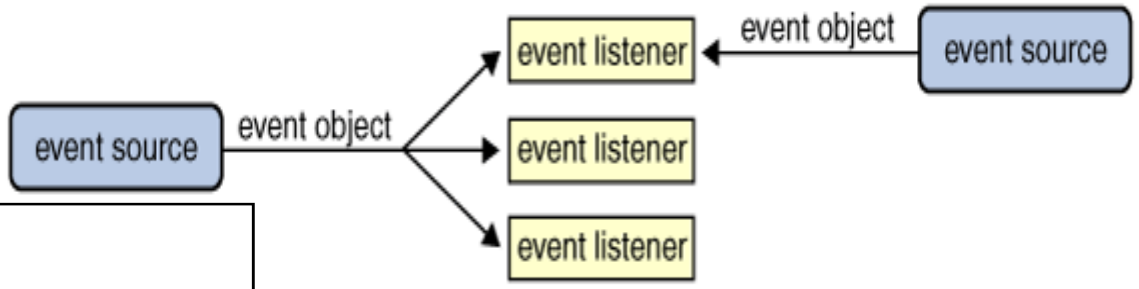
- Ada dua tipe event:
  - “Source” objects.
  - “Listener” objects.
- Berdasarkan **registrasi** -> observer

Event

- **Message** sent from one object to another.
- Sender *fires* event, recipient (listener) *handles* the event
- *There may be many listeners.*

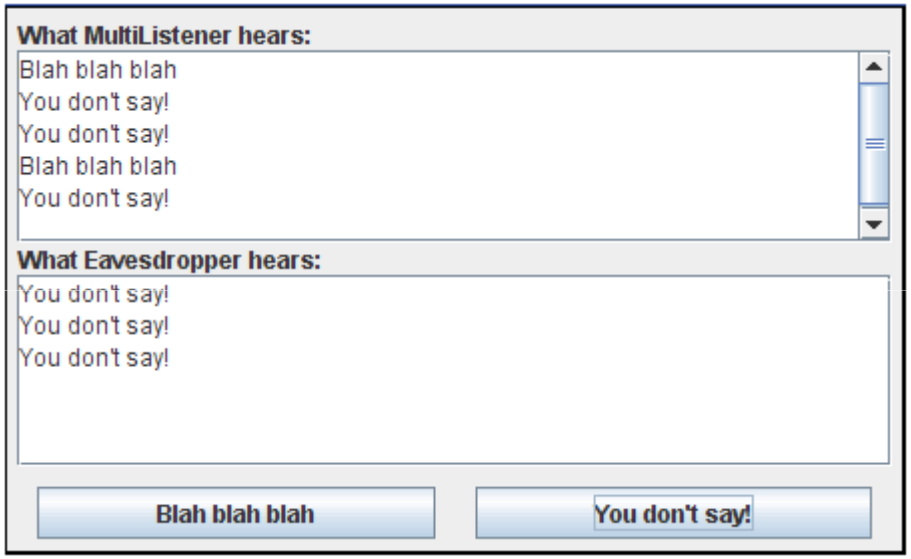


Multiple Listener




```
button1.addActionListener(this);
button2.addActionListener(this);

button2.addActionListener(new Eavesdropper(bottomTextArea));
```

```
class Eavesdropper implements ActionListener {
    JTextArea myTextArea;
    public Eavesdropper(JTextArea ta) {
        myTextArea = ta;
    }

    public void actionPerformed(ActionEvent e) {
        myTextArea.append(e.getActionCommand()
                          + MultiListener.newline);
        myTextArea.setCaretPosition(myTextArea.getDocument().getLength());
    }
}
```



Contoh Kode Listener

```
this.addKeyListener(new java.awt.event.KeyAdapter() {
    @Override
    public void keyTyped(java.awt.event.KeyEvent evt) {
        keyPress(evt);
    }
});
this.addFocusListener(new java.awt.event.FocusAdapter() {
    @Override
    public void focusLost(java.awt.event.FocusEvent evt) {
        lost(evt);
    }
});
```

Property

Apa itu **property** ?

Public attributes of a bean that affects its appearance or behavior

– Mendefinisikan karakteristik dari suatu bean

Contoh: bean NumericTextBox

- possible properties : maxValue, minValue, text

– dapat di : read/write, read-only atau write-only

Property

- Empat jenis property
  - **Simple Property**
    - Yang paling sederhana (tipe data **single** value)
  - **Indexed Property**
    - Suatu property tunggal dapat menyimpan **array** of values
  - **Bound property**
    - Memberi tahu *listeners* jika salah satu properti dari properti mengalami perubahan
  - **Constrained property**
    - Memungkinkan *listeners* untuk memilih constrain jika akan mengubah property

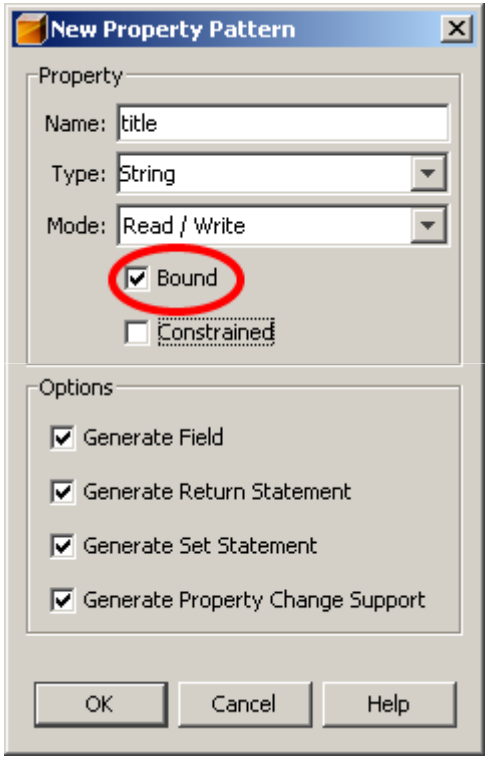
Contoh property

Constructors	A bean has a no argument constructor
Simple Properties	`public T getN()` `public void setN ( T value)`

Boolean Properties	`public boolean isN()`
	`public boolean getN()`
	`public void setN(boolean value)`

Indexed Properties	`public T getN(int index)`
	`public T[] getN()`
	`public void setN(int index, T value)`
	`public void setN(T[] values)`

Bound Property




```
private final PropertyChangeSupport pcs = new PropertyChangeSupport( this );

public String getTitle()
{
    return this.title;
}

public void setTitle( String title )
{
    String old = this.title;
    this.title = title;
    this.pcs.firePropertyChange( "title", old, title );
}
```

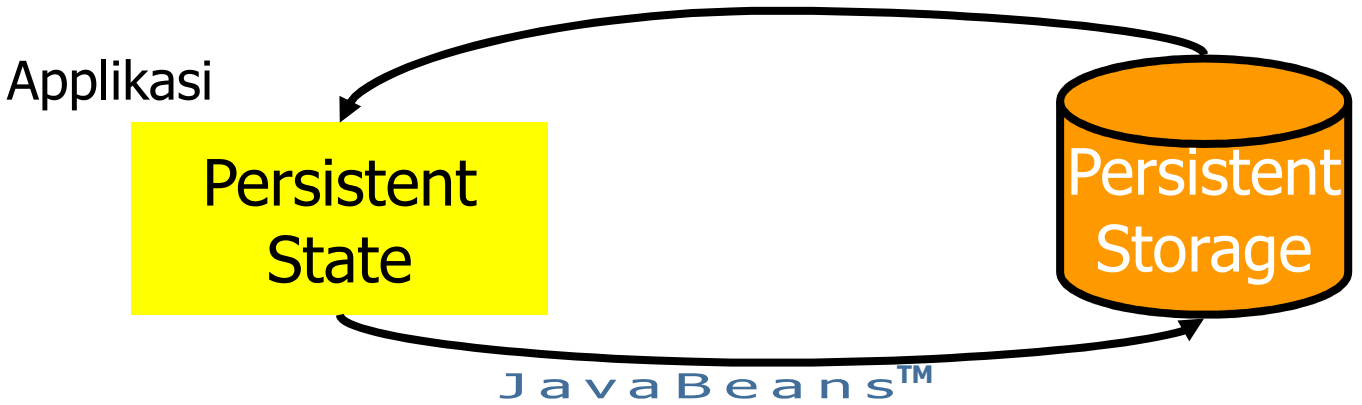
Persistence

Apa itu **persistence** ?

*Enable a bean to **save** and restore its state*

– development tool menyimpan JavaBean di dalam hard disk, dan dapat di-load suatu waktu

– memelihara nilai property tanpa tergantung apakah JavaBeans terdapat di memory atau hard disk



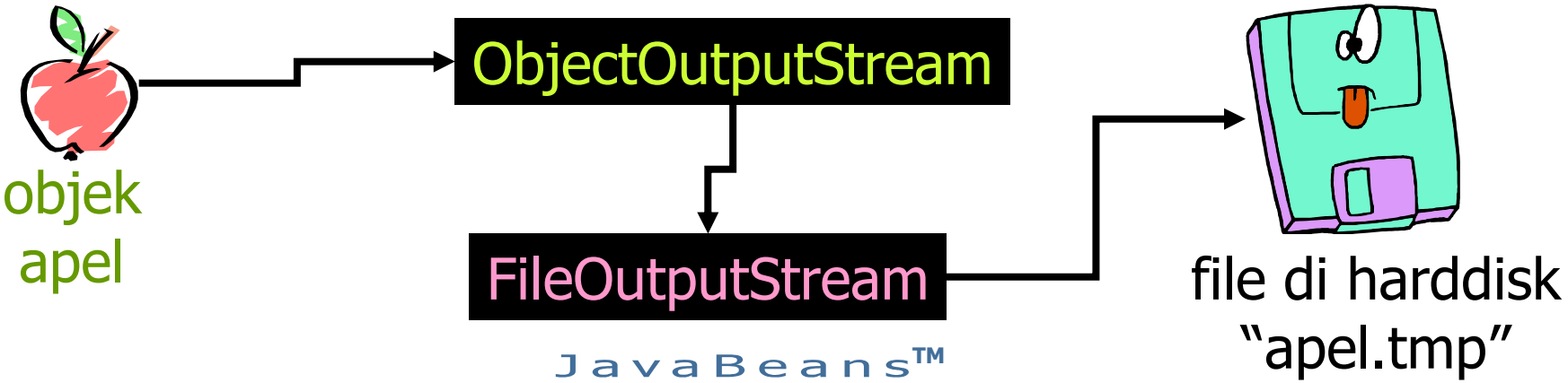
Object serialization

- Persistence dapat diperoleh dengan ***object serialization (***implements serializable***)***
  - Save semua content dari suatu object pada data stream
  - Generate kembali objek ketika membaca data dari data stream
- Selected property fields can bypass the serialization using keywords ***transient***

Object serialization

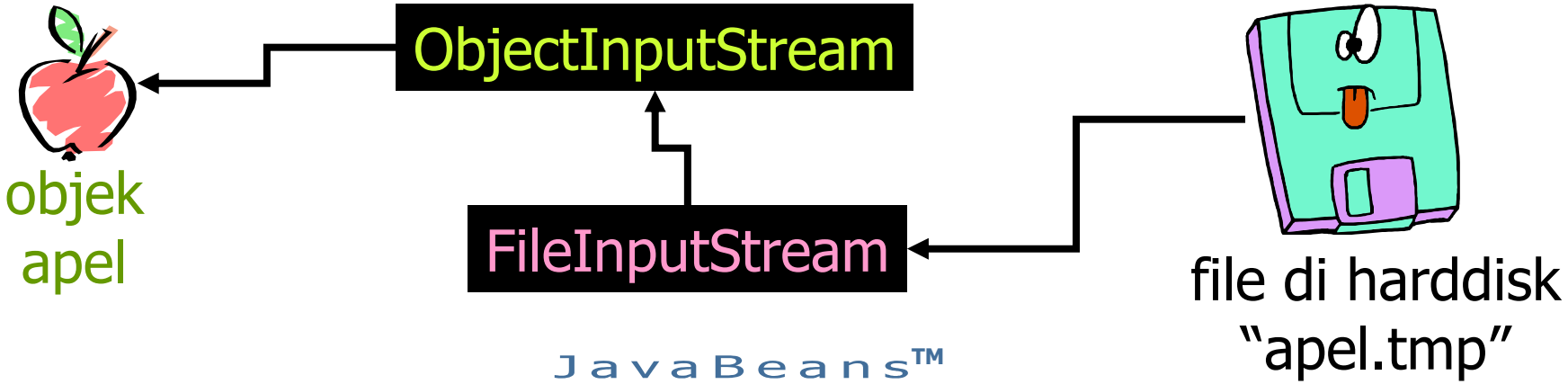
Contoh

```
Apel apel = new Apel(Color.green);
FileOutputStream f = new FileOutputStream("apel.tmp");
ObjectOutputStream s = new ObjectOutputStream(f);
s.writeObject(apel);
s.flush();
f.close();
```



Object serialization

```
FileInputStream f = new FileInputputStream("apel.tmp");
ObjectInputStream s = new ObjectInputStream(f);
Apel apel = (Apel)s.readObject();

f.close();
```



Contoh Lain: Pegawai

```
import java.io.*;

public class Pegawai implements Serializable {
	private String nama;
	private int umur;
	private int gaji;

	public Pegawai(String nama, int umur, int gaji) {
		this.nama = nama;
		this.umur = umur;
		this.gaji = gaji;
	}

	public void print() {
		System.out.println("Data untuk " + this.nama);
		System.out.println("nama " + this.nama);
		System.out.println("umur " + this.umur);
		System.out.println("gaji " + this.gaji);
	}
}
```

Contoh SimpanPegawai

```
import java.io.*;

public class SimpanPegawai {
  public static void main(String[] args) {
    Pegawai aaa = new Pegawai("aaa", 28, 100);
    Pegawai bbb = new Pegawai("bbb", 30, 150);

    try {
      FileOutputStream fos = new FileOutputStream("db");
      ObjectOutputStream oos = new ObjectOutputStream(fos);
      oos.writeObject(aaa);
      oos.writeObject(bbb);
      oos.flush();
    }
    catch (IOException e) {
      System.out.print("error " + e);
      System.exit(1);
    }
  }
}
```

Contoh: BacaPegawai

```
import java.io.*;

public class BacaPegawai {
   public static void main(String[] args) {
      try {
        FileInputStream fis = new FileInputStream("db");
        ObjectInputStream ois = new ObjectInputStream(fis);

        Pegawai aaa = (Pegawai) ois.readObject();
        Pegawai bbb = (Pegawai) ois.readObject();

        aaa.print();
        bbb.print();
      }
      catch (IOException e) {
        System.exit(1);
      }
      catch (Exception e) {
        System.exit(1);
      }
   }
}
```

```
Data untuk aaa
nama aaa
umur 28
gaji 100
Data untuk bbb
nama bbb
umur 30
gaji 150
```

Introspection

- Bagaimana development tools mengetahui method/event/property yang terdapat pada suatu beans?
  - **Introspection**
  - Java Reflection API (*java.lang.reflect*)
- Java Reflection API digunakan jika bean tidak mendukung introspection

Introspection

Apa itu **introspection**?

Information about the properties, events, and methods supported by a target Java Bean.

- Buat class XXXBeanInfo khusus untuk menjelaskan class XXX secara detil
- BeanInfo mendefinisikan informasi bean berikut:
  - Icon (displayed in development tool)
  - Property
  - Method
  - Other information

Java Reflection API

Apa itu **Java Reflection API** ?

A Java API for finding out the methods, fields, constructors, superclasses at ***RUNTIME***

- API ini juga digunakan untuk menulis development tools yang lain:
  - debuggers
  - class browsers
  - GUI builders

Java Reflection API

Contoh:

– Bagaimana mencari nama class suatu objek?

```
Button b        = new Button();
Class c         = b.getClass();
String s        = c.getName();
System.out.println(s);
```

– Bagaimana mencari superclass suatu class?

```
Button b        = new Button();
Class c         = b.getClass();
Class sc        = c.getSuperclass();
String s        = sc.getName();
System.out.println(s);
```

Java Reflection API

Contoh :

– Bagaimana mengetahui fields suatu objek?

```
Button b      = new Button();
Class c       = b.getClass();
Field[] f     = c.getFields();
System.out.println(f[0].getName() + f[0].getType());
```

– Bagaimana mengetahui method suatu objek?

```
Button b      = new Button();
Class c       = b.getClass();
Method[] m = c.getMethods();
System.out.println(m[0].getName() + m[0].getReturnType());
```

Java API yang dipakai pada JavaBean

- **The Java event model**: java.util.EventObject, java.awt.event
- **Object serialization**: java.io.Serializable, java.io.Object
- **Reflection**: java.lang.reflect

Contoh PersonBean

```java
public class PersonBean implements java.io.Serializable {

    private String name;

    private boolean deceased;

    /** No-arg constructor (takes no arguments). */
    public PersonBean() {
    }

    /**
     * Property <code>name</code> (note capitalization) readable/writable.
     */
    public String getName() {
        return this.name;
    }

    /**
     * Setter for property <code>name</code>.
     * @param name
     */
    public void setName(final String name) {
        this.name = name;
    }

    /**
     * Getter for property "deceased"
     * Different syntax for a boolean field (is vs. get)
     */
    public boolean isDeceased() {
        return this.deceased;
    }

    /**
     * Setter for property <code>deceased</code>.
     * @param deceased
     */
    public void setDeceased(final boolean deceased) {
        this.deceased = deceased;
    }
}
```

TestPersonBean

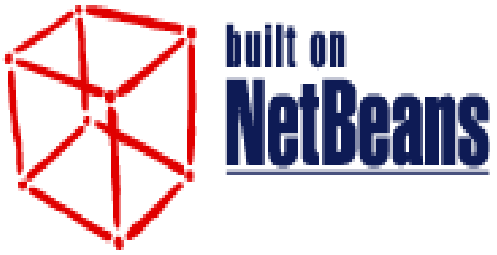
```java
/**
 * Class <code>TestPersonBean</code>.
 */
public class TestPersonBean {
    /**
     * Tester method <code>main</code> for class <code>PersonBean</code>.
     * @param args
     */
    public static void main(String[] args) {
        PersonBean person = new PersonBean();
        person.setName("Bob");
        person.setDeceased(false);

        // Output: "Bob [alive]"
        System.out.print(person.getName());
        System.out.println(person.isDeceased() ? " [deceased]" : " [alive]");
    }
}
```

Beberapa Hal yang diperhatikan

- All beans should **implement** the **Serializable** interface so that their state can be **saved** and later restored.
- Methods that are to be **exposed** to the builder tool and to other beans must bemade **public**.
- All exposed methods should be made **thread-safe** (possibly **synchronized**) to prevent more than one thread from calling a method at any given time.
- Properties are exposed through the use of public “set”and“get” methods.
  - Properties with no “set” method are **read-only**.
  - Properties with no “get” method are **write-only**.
- The “get” side of a boolean property may be exposed either through the use of a public “is” method or an ordinary “get” method.
- Events that the bean can multicast are exposed through public “add”and“remove” methods.

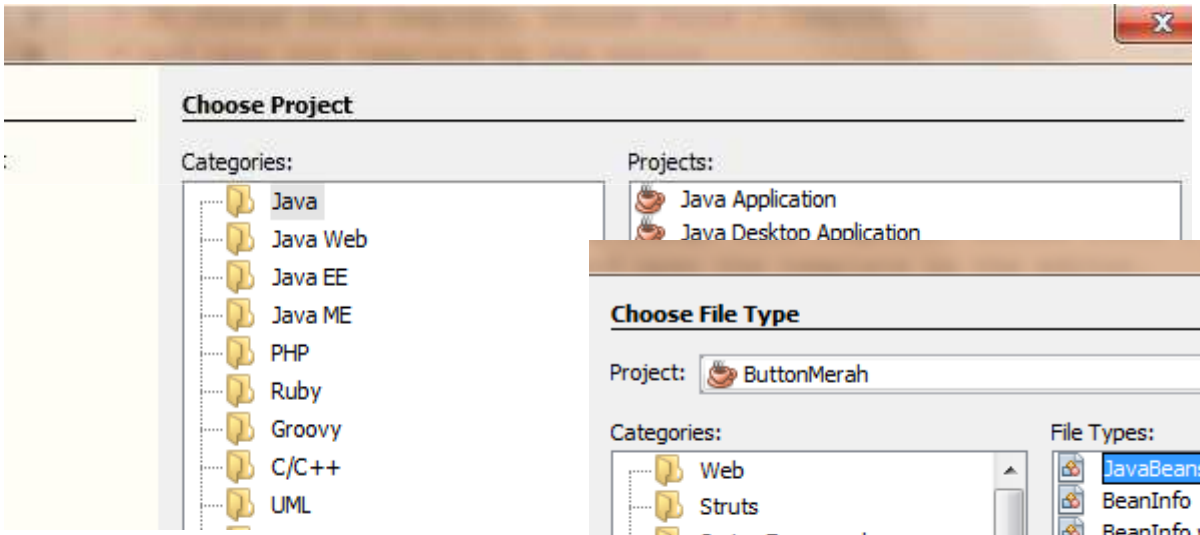
Komponen Bean pada Netbeans

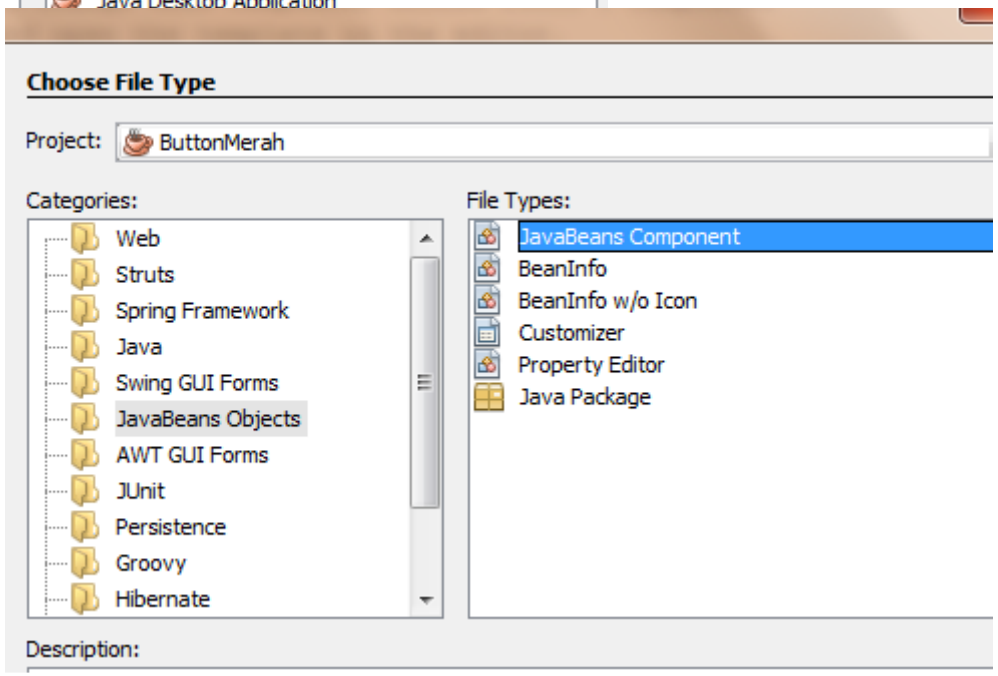
- Contoh kasus: TombolMerah
- Contoh kasus: NumericTextBox
- Contoh kasus: AdvancedEdit



TombolMerah

- Create New Project from Netbeans
  - Java Class Library
  - Beri nama ButtonMerah





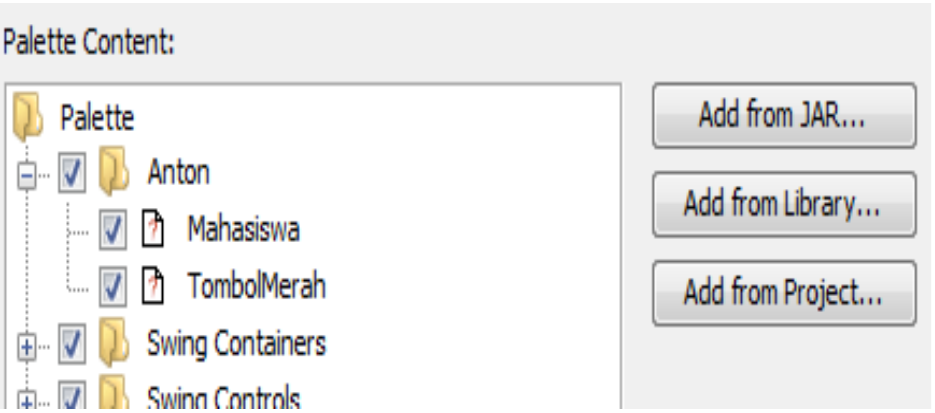
  - Tambahkan JavaBean

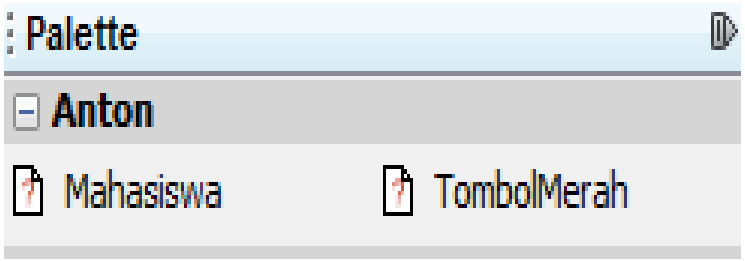
Source Code

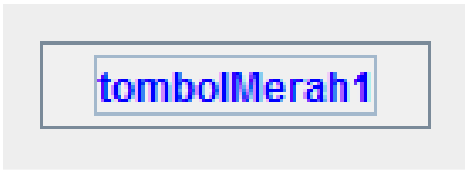
```
import java.awt.event.MouseEvent;
import java.io.Serializable;
import javax.swing.JButton;

public class TombolMerah extends JButton implements Serializable {
    public TombolMerah() {
        this.setForeground(Color.BLUE);
        this.addMouseListener(new java.awt.event.MouseAdapter() {
            @Override
            public void mouseClicked(java.awt.event.MouseEvent evt) {
                MouseClicked(evt);
            }
        });
    }
    public void MouseClicked(MouseEvent evt){
        if(this.getForeground() == Color.BLUE){
            this.setForeground(Color.WHITE);
            this.setBackground(Color.RED);
        } else {
            this.setForeground(Color.BLUE);
            this.setBackground(new Color(240,240,240));
        }
    }
}
```

Tambahkan ke Pallete

- Dari Pallete > klik kanan, pilih Pallete Manager
- Buat New Category > misal Anton
  - From JAR, pilih JAR TombolMerah dari folder dist
  - Pilih komponen
  - Pilih kategori Anton



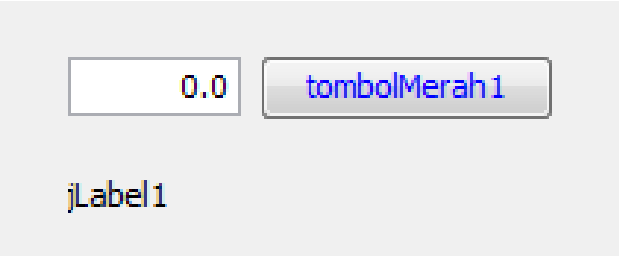




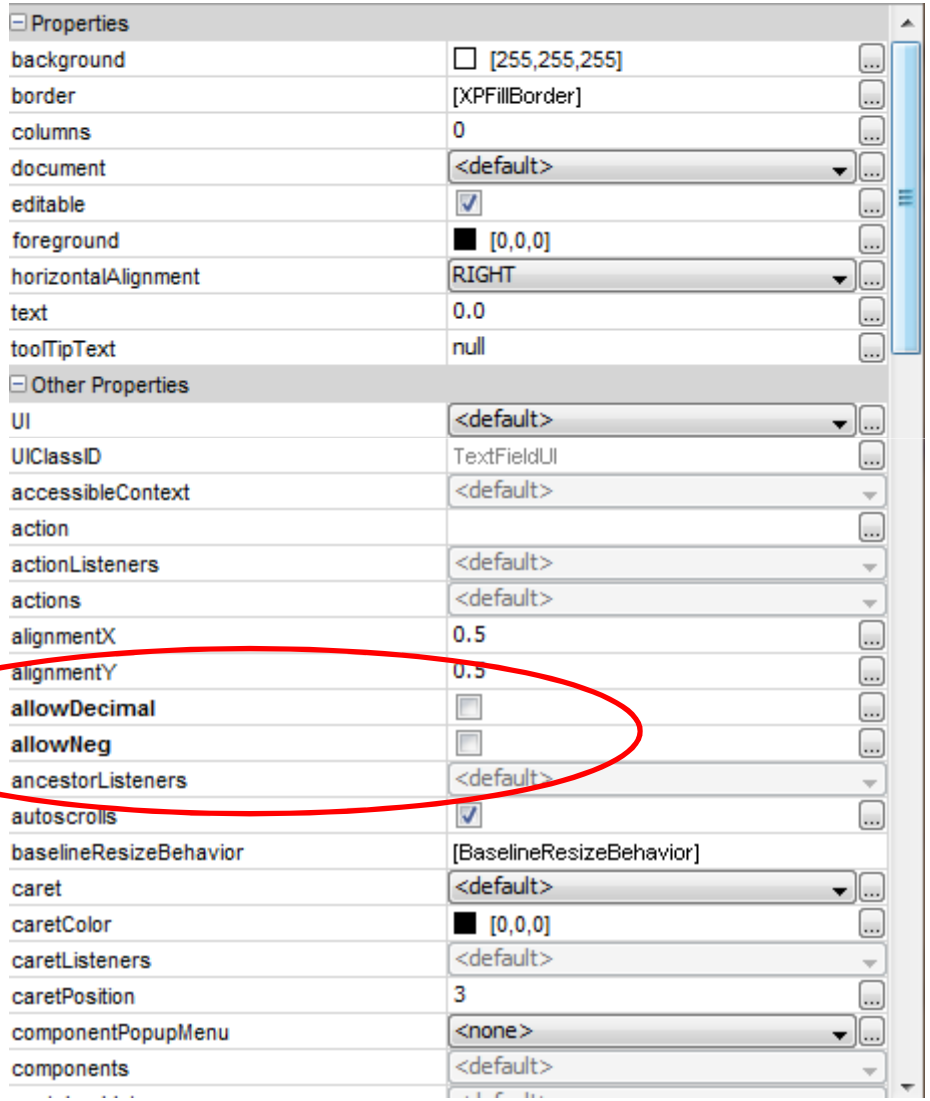
Numeric TextBox

- Extends dari **JTextField**
- Mampu menerima input berupa data angka (numeric) saja, plus minus, dan decimal

Numeric TextBox




```
import java.awt.Dimension;
import java.awt.event.KeyEvent;
import java.io.Serializable;
import javax.swing.JTextField;
```



Konstruktor

```
private boolean _AllowNeg = true;
private boolean _AllowDecimal = true;
private double _MaxValue;
private double _MinValue;
private int _intnilai = 0;
private double _dnilai = 0.0;

public NumericTextBox(){
    this.setText("0");
    setMinValue(Double.MIN_VALUE);
    setMaxValue(Double.MAX_VALUE);
    setIntnilai(0);
    setDnilai(0);
    this.setHorizontalAlignment(JTextField.RIGHT);
    this.addKeyListener(new java.awt.event.KeyAdapter() {
        @Override
        public void keyTyped(java.awt.event.KeyEvent evt) {
            XkeyTyped(evt);
        }
    });
    this.addFocusListener(new java.awt.event.FocusAdapter() {
        @Override
        public void focusLost(java.awt.event.FocusEvent evt) {
            lost(evt);
        }
    });
    this.setPreferredSize(new Dimension(59,20));
}
```

Event Keypress

```
private void XkeyTyped(KeyEvent evt) {
    if(Character.isDigit(evt.getKeyChar())){

    } else
    if(evt.getKeyChar() == '.' || evt.getKeyChar() == ','){
        if(isAllowDecimal() == true && this.getText().indexOf(DecimalSeparator()) == -1){
            evt.setKeyChar(DecimalSeparator());
        } else {
            evt.setKeyChar('\u0000');
        }
    } else {
        switch(evt.getKeyChar()){
            case '-':
                int p;
                if(isAllowNeg()==true){
                    p = this.getSelectionStart();
                    System.out.println(p);
                    setDnilai(-1*getDnilai());
                    if(getDnilai() > 0)
                        this.setSelectionStart(p-1);
                    else
                        this.setSelectionStart(p+1);
                    evt.setKeyChar('\u0000');
                } else {
                    evt.setKeyChar('\u0000');
                }
                break;
            case '\u0008':
                break;
            default: evt.setKeyChar('\u0000');
        }
    }
}
```

AdvancedEdit

- Sama dengan VB.NET, sudah memiliki fitur aligment, yaitu diset dari property **horizontalAligment = left, right, center**
- Extends dari JTextField
- Variable
  - private Color FOldBackColor;
  - private Color FColorOnEnter;
  - private boolean FTabOnEnter;
- Imports:
  - import java.awt.Color;
  - import java.awt.Dimension;
  - import java.awt.event.KeyEvent;
  - import javax.swing.*;

Class AdvancedEdit

```
import java.awt.Color;
import java.awt.Dimension;
import java.awt.event.KeyEvent;
import javax.swing.*;

public class AdvancedEdit extends JTextField {
    private Color FOldBackColor;
    private Color FColorOnEnter;
    private boolean FTabOnEnter;

    public AdvancedEdit(){
        this.setFColorOnEnter(this.getBackground());
        this.setPreferredSize(new Dimension(59,20));
        this.addKeyListener(new java.awt.event.KeyAdapter() {
            @Override
            public void keyPressed(java.awt.event.KeyEvent evt) {
                OnKeyPress(evt);
            }
        });
        this.addFocusListener(new java.awt.event.FocusAdapter() {
            @Override
            public void focusLost(java.awt.event.FocusEvent evt) {
                OnLostFocus(evt);
            }
            @Override
            public void focusGained(java.awt.event.FocusEvent evt){
                OnFocus(evt);
            }
        });
    }
```

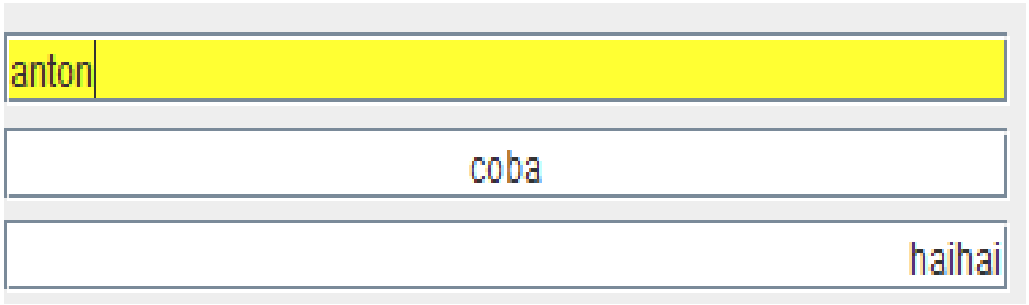
Setter dan getter

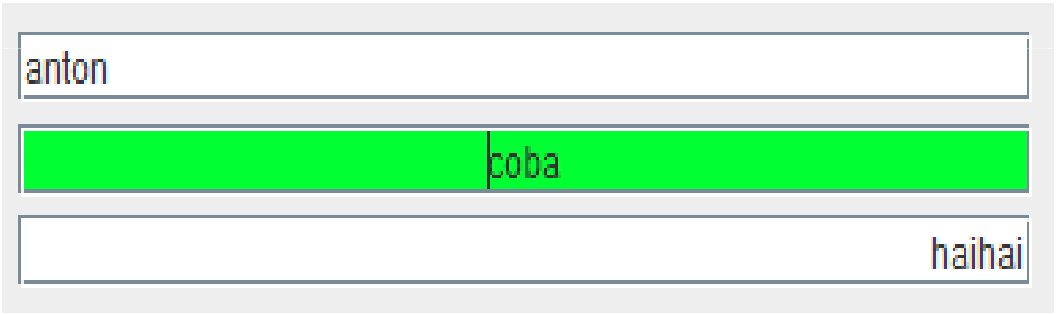
```
public Color getFOldBackColor() {
    return FOldBackColor;
}

public void setFOldBackColor(Color FOldBackColor) {
    this.FOldBackColor = FOldBackColor;
}

public Color getFColorOnEnter() {
    return FColorOnEnter;
}

public void setFColorOnEnter(Color FColorOnEnter) {
    this.FColorOnEnter = FColorOnEnter;
}

public boolean isFTabOnEnter() {
    return FTabOnEnter;
}

public void setFTabOnEnter(boolean FTabOnEnter) {
    this.FTabOnEnter = FTabOnEnter;
}
```

Method inti

```
public void OnFocus(java.awt.event.FocusEvent evt){
    this.setFOldBackColor(this.getBackground());
    this.setBackground(this.getFColorOnEnter());
}

public void OnLostFocus(java.awt.event.FocusEvent evt){
    this.setBackground(this.getFOldBackColor());
}

public void OnKeyPress(KeyEvent evt){
    int key = evt.getKeyCode();
    if (key == KeyEvent.VK_ENTER)
        if(this.isFTabOnEnter())
            transferFocus();
}
```

Hasil


anton
coba
haihai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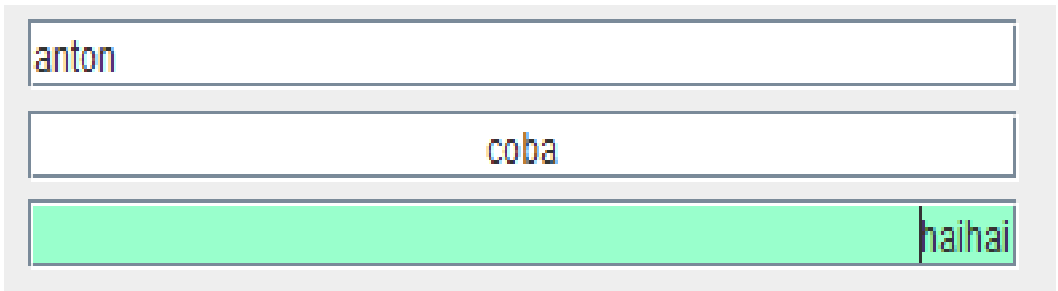
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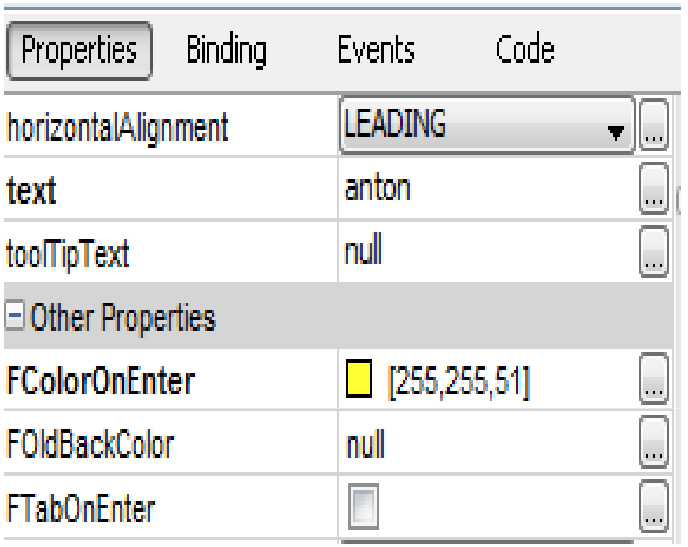
Properties
Binding
Events
Code
horizontalAlignment
LEADING
text
anton
toolTipText
null
Other Properties
FColorOnEnter
[255,255,51]
FOldBackColor
null
FTabOnEnter

Next

- TTS
- Web Component