Graphical User Interface (GUI)

Pendahuluan

Bahasa pemrograman java telah mendukung adanya pemrograman berbasis GUI (Graphical User Interface). Class yang merepresentasikan GUI ini berada pada paket Javax.swing,

Sebelum swing, fitur GUI didukung oleh API Java yang disebut dengan Abstract Window Toolkit (AWT). AWT ini merupakan library yang pertamakali diperkenalkan oleh java, namun Sun tidak merekomendasikan penggunaan komponen GUI dari AWT.

Komponen Swing

- **Top Level Container** : merupakan kontainer dasar dimana komponen lainya diletakkan.
  - JFrame, JDialog, dan Applet.
- **Intermediate Container** : kontainer pertama dimana komponen lain diletakkan
  - JPanel, JScrollPane, JTabbedPane, JToolBar, JSplitPane.

Komponen Swing (Lanjutan)

- **Atomic Component** : Komponen yang memiliki fungsi spesifik dan menerima interaksi langsung dari pengguna.
  - JButton, JTextField, JLabel, JTextArea, dsb.
- **Layout Manager** : digunakan untuk mengatur tataletak dan posisi komponen dalam kontainer.
  - BorderLayout, GridBagLayout, FlowLayout, dsb.

java.awt.Container
JComponent
Text
JTextComponent
JTextArea
JEditorPane
JTextPane
JTextField
JPasswordField
Menus
AbstractButton
JMenuBar
JMenuItem
JPopupMenu
JMenu
JCheckBoxMenuItem
JRadioButtonMenuItem
JSeparator
Widgets
JButton
JToggleButton
JCheckBox
JRadioButton
JSlider
JToolTip
JComboBox
JLabel
JList
JTree
JToolBar
JTable
JScrollBar
JProgressBar
Sub-windows
java.awt.Panel
java.awt.Applet
JApplet
JInternalFrame
JPanel
JViewPort
JScrollPane
JPane
JRootPane
JSplitPane
JTabbedPane
JLayeredPane
JOptionPane
Lightweight
Heavyweight
Top-Level Windows
JWindow
java.awt.Window
java.awt.Frame
JFrame
java.awt.Dialog
JDialog
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Top Level Container

Komponen GUI akan ditampilkan dalam hirarki container dan menjadikan top level container sebagai container root nya.

Setiap komponen GUI hanya dapat dimuat pada satu top-level container. Dan setiap top-level container memiliki satu content pane yang berisi komponenkomponen GUI

Top Level Container (Lanjutan)

Container Hierarky

- Setiap komponen GUI berbasis swing paling tidak memiliki satu container hierarky dengan JFrame sebagai rootnya.
- Jika sebuah aplikasi memiliki satu window utama dan dua dialog artinya aplikasi tersebut memiliki tiga container hierarchy dan juga tiga top-level container
- Satu container hierarchy memiliki Jframe sebagai root, dan dua yang lain memiliki JDialog sebagai root

Kelas JFrame

- JFrame merupakan top level container yang digunakan untuk menampung komponen pada aplikasi berbasis gui, java memiliki class yang mendukung pembuatan dan pengaturan frame, class frame berada pada paket javax.swing.JFrame.
- Class JFrame merupakan subclass dari java.awt.frame yang juga masih merupakan subclass dari java.awt.windows,

JFrame (Lanjutan)

```
└ java.awt.Component
    └ java.awt.Container
        └ java.awt.Window
            └ java.awt.Frame
                └ javax.swing.JFrame
```

Properties yang sering digunakan

Method	Fungsi
Background	Mengganti warna background
DefaultCloseOperation	Menentukan event yang terjadi ketika tombol close di tekan.
resizable	Mengaktifkan dan mematikan mode resize frame.
bounds	Mengatur tata letak dan ukuran frame
font	Menentukan jenis tulisan

LESSON - NetBeans IDE 6.5
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<default config>
Pr... Files Services
Start Page
KULIAH
LATIHAN
LESSON
Source Packages
DMI.AKHIR
New
Find... Ctrl+F
Cut Ctrl+X
Copy Ctrl+C
Paste Ctrl+V
Delete Delete
Refactor
Compile Package F9
Local History
Tools
JFrame Form...
Java Class...
Java Package...
Empty report...
Java Interface...
JPanel Form...
Entity Class...
Entity Classes from Database...
Other...
Navigator
Outline not available
connect to internet.
ALL DEMOS >>
New JFrame Form
Steps
1. Choose File Type
2. Name and Location
Name and Location
Class Name: Frame
Project: LESSON
Location: Source Packages
Package: DMI.AKHIR
Created File: 'ASI OBJEK\GANJIL 2009 - 2010\MATERI PROGRAM\LESSON\src\DMI\AKHIR\Frame.java
< Back
Next >
Finish
Cancel
Help

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<default config>
Empty datasource
Search (Ctrl+I)
Pr... Files Services
KULIAH
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DMI.AKHIR
Frame.java
eksepsi.java
formatting.java
operasiString.java
DMI.MID
DMI.MID.ENKAPSULASI
DMI.MID.INHERITANCE
DMI.MID.INTERFACE
DMI.MID.POLIMORFISME
DMI.MID.UJIANMID
SSI
Navigator Report I... In...
Form Frame
Other Components
[JFrame]
Start Page
Frame.java
Source Design
Palette
JasperReportViewer
Swing Containers
Panel
Tabbed Pane
Split Pane
Frame.java - Properties
Properties
Name Frame
All Files D:\BAHAN M...
File Size 2772
Modification Time Nov 10, 2009 9:...
Classpaths
Compile Classpath C:\Program Fi...
Runtime Classpath C:\Program Fi...
Boot Classpath C:\Program Fi...
Output

Intermediate Container

Merupakan container perantara antara Top Level Container dengan Atomic Component. Contoh intermediate container yang sering digunakan :

- JPanel
- JTabbedPane
- JToolbar, dsb

JPanel

MERUPAKAN INTERMEDIATE CONTAINER YANG BERFUNGSI UNTUK MENEMPATKAN KOMPONEN-KOMPONEN LAIN, SECARA HIERARCHY BERADA DIBAWAH TOP LEVEL CONTAINER.

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DMI.MID.INTERFACE
DMI.MID.POLIMORFISME
DMI.MID.UJIANMID
SSI
Navigator Report I... In...
Form Frame
Other Components
[JFrame]
jPanel1 [JPanel]
Start Page
Frame.java *
Source Design
Palette
JasperReportViewer
Swing Containers
Panel
Tabbed Pane
Split Pane
jPanel1 [JPanel] - Prope...
Properties Binding
Properties
background [240,240,
border (No Border)
foreground [0,0,0]
toolTipText null
Other Properties
UIClassID PanelUI
alignmentX 0.5
alignmentY 0.5
autoscrolls
baselineResizeB [BaselineResizeB
componentPopup <none>
debugGraphicsO NO_C...
doubleBuffered
Output

Properties yang sering digunakan

Method	Fungsi
Background	Mengganti warna background
Border	Mengatur jenis border atau batas
Opaque	Memberikan warna transparant

jPanel1 [JPanel] - Prope...
Properties
Binding
Events
Code
Properties
background
Control
border
[BevelBorder]
foreground
toolTipText
null
Other Properties
jPanel1 [JPanel] - background
Set jPanel1's background property using:
Color chooser
Swatches
HSB
RGB
AWT Palette
Swing Palette
System Palette
Recent:
Preview
Sample Text Sample Text
Sample Text Sample Text
Sample Text Sample Text
OK
Cancel
File Edit Format Preview View Navigate Source Refactor Run Debug Profile Versioning Tools Window Help
Start Page
Frame.java
Source
Design
Output - LESSON (run)
run:
BUILD SUCCESSFUL (total time: 5 seconds)

jPanel1 [JPanel] - Prope...
Properties
Binding
Events
Code
Properties
background
[153,153,
border
[BevelBorder]
jPanel1 [JPanel] - border
Set jPanel1's border property using:
Border customizer
Available Borders
(No Border)
Bevel Border
Compound Border
javax.swing.border.BevelBorder
A simple two-line bevel border.
Line Border
Matte Border
Soft Bevel Border
Titled Border
Properties
Type
Raised
Highlight Inner Color
null
Highlight Outer Color
null
Shadow Inner Color
null
Shadow Outer Color
null
OK
Reset to default
Cancel
File Edit Format Preview View Navigate Source Refactor Run Debug Profile Versioning Tools Window Help
Start Page
Frame.java
Source
Design
Palette
Output - LESSON (run)
run:
BUILD SUCCESSFUL (total time: 5 seconds)

Atomic Component

- Merupakan komponen-komponen yang memiliki fungsi spesifik dan menerima interaksi langsung dari user. Contoh yang sering digunakan :
  - JLabel
  - JTextField
  - JButton
  - JTextArea
  - JSpinner, dsb

JLabel

label digunakan untuk menampilkan informasi, informasi yang ditampilkan berupa teks string.

```
java.lang.Object
  └ java.awt.Component
      └ java.awt.Container
          └ javax.swing.JComponent
              └ javax.swing.JLabel
```

LESSON - NetBeans IDE 6.5
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DMI.MID.INHERITANCE
DMI.MID.INTERFACE
DMI.MID.POLIMORFISME
DMI.MID.UJIANMID
SSI
Navigator Report I... In...
Form Frame
Other Components
[JFrame]
jToolBar1 [JToolBar]
jPanel1 [JPanel]
jLabel1 [JLabel]
Start Page
Frame.java *
Source Design
jLabel1
Palette
Tool Bar
Desktop Pane
Internal Frame
Layered Pane
Swing Controls
Label
Button
Toggle Button
Check Box
Radio Button
Button Group
Combo Box
List
jLabel1 [JLabel] - Prope...
Properties Binding
Events Code
Properties
background [240,240,
Output - LESSON (run)
run:
BUILD SUCCESSFUL (total time: 15 seconds)

Properties
Binding
Events
Code
displayedMnemoı
font
Tahoma 11 Pl
foreground
[0,0,0]
horizontalAlignme
LEADING
icon
labelFor
<none>
text
jLabel1
toolTipText
null
verticalAlignment
CENTER
jLabel1
jLabel1 [JLabel] - text
Set jLabel1's text property using:
Plain text
Kode Barang
OK
Reset to default
Cancel
Start Page
Frame.java *
Source
Design
Kode Barang

k

jLabel1 [JLabel] - Prope...
Properties
Binding
Events
Code
Properties
background
[240,240,
displayedMnemo
font
Tahoma 11 Pl
foreground
[0,0,0]
horizontalAlignme
LEADING
icon
Kode Barang
jLabel1 [JLabel] - font
Set jLabel1's font property using:
Default editor
Derive the font from the default font
Font:
Font Style:
Size:
Tahoma
Plain
14
Aharoni
Andalus
Angsana New
AngsanaUPC
Arabic Typesetting
Plain
Bold
Italic
Bold Italic
8
10
12
14
18
Preview
Tahoma 14 Plain
OK
Cancel
Source
Design
Output - LESSON (run)
run:
BUILD SUCCESSFUL
Kode Barang

JTextField

- JTextField berfungsi untuk menampilkan maupun sebagai inputan, berbeda dengan JLabel yang berfungsi hanya sebagai output atau menampilkan sebuah nilai / teks string, JTextField selain dapat digunakan sebagai output dapat juga digunakan sebagai inputan. Nilai yang dimasukkan pada JTextField akan direpresentasikan sebagai teks String

```
java.lang.Object
  └ java.awt.Component
      └ java.awt.Container
          └ javax.swing.JComponent
              └ javax.swing.text.JTextComponent
                  └ javax.swing.JTextField
```

Source
Design
Kode Barang
jTextField1

font
Tahoma 11 Pl
foreground
[0,0,0]
horizontalAlignme
LEADING
text
jTextField1
toolTipText
null
Other Properties
UI
<defa...
jTextField1 [JTextField] - text
Set jTextField1's text property using:
Plain text
Di Hapus
OK
Reset to default
Cancel
Source
Design
Kode Barang

Mengganti Nama Komponen

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Empty datasource
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DMI.MID
DMI.MID.ENKAPSULASI
DMI.MID.INHERITANCE
DMI.MID.INTERFACE
DMI.MID.POLIMORFISME
DMI.MID.UJIANMID
jToolBar... Report I... In...
Form Frame
Other Components
[JFrame]
jToolBar1 [JToolBar]
jPanel1 [JPanel]
jLabel1 [JLabel]
txtKodeBarang [JTextField]
jLabel2 [JLabel]
txtNama [JTextField]
jLabel3 [JLabel]
Start Page
Frame.java *
FrameHitung.java
Source Design
Kode Barang
Nama
Satuan
Palette
List
Text Field
Text Area
Scroll Bar
Slider
Progress Bar
Formatted Field
Frame.java - Properties
Properties
Name Frame
All Files D:\BAHAN M...
File Size 5589
Modification Time Nov 10, 2009 12...
Classpaths
Compile Classpath C:\Program Fi...
Runtime Classpath C:\Program Fi...
Boot Classpath C:\Program Fi...
Output - LESSON (run)
run:
BUILD SUCCESSFUL (total time: 6 seconds)

JComboBox

- JComboBox digunakan untuk pemilihan suatu nilai dalam bentuk drop down list, nilai yang dimasukkan diurutkan berdasarkan item index (array

```
java.lang.Object
  └ java.awt.Component
      └ java.awt.Container
          └ javax.swing.JComponent
              └ javax.swing.JComboBox
```

Source
Design
Kode Barang
Nama
Satuan
Item 1

jComboBox1 [JComboB...
Properties
Binding
Events
Code
editable
font
Tahoma 12
foreground
[0,0,0]
maximumRowCou
8
model
Item 1, Ite...
selectedIndex
0
selectedItem
Item 1
toolTipText
null
Other Properties

jComboBox1 [JComboBox] - model
Set jComboBox1's model property using:
Combo Box Model Editor
Enter the textual representation of combo box model content. Each row corresponds
combo box item.
Pcs
Kg
Unit
Liter
Lusin
OK
Reset to default
Cancel

Top Level Container - JFrame
Kode Barang
Nama
Satuan
Pcs
Pcs
Kg
Unit
Liter
Lusin

LESSON - NetBeans IDE 6.5
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<default config>
Empty datasource
Search (Ctrl+I)
Pr... Files Services
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LATIHAN
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FrameHitung.java
eksepsi.java
formatting.java
operasiString.java
DMI.MID
DMI.MID.ENKAPSULASI
DMI.MID.INHERITANCE
DMI.MID.INTERFACE
DMI.MID.POLIMORFISME
DMI.MID.UJIANMID
<init> -... Report I... In...
Form Frame
Other Components
[JFrame]
jPanel1 [JPanel]
jLabel1 [JLabel]
txtKodeBarang [JTextField]
jLabel2 [JLabel]
txtNama [JTextField]
jLabel3 [JLabel]
Start Page
Frame.java
FrameHitung.java
Source
Design
Kode Barang
Nama
Satuan
Pcs
Harga Beli
Harga Jual
Palette
JasperReportViewer
Swing Containers
Panel
Tabbed Pane
Split Pane
Scroll Pane
Tool Bar
Desktop Pane
Internal Frame
Frame.java - Properties
Properties
Name
Frame
All Files
D:\BAHAN M...
File Size
10480
Modification Time
Nov 10, 2009 12...
Classpaths
Compile Classpath
C:\Program Fi...
Runtime Classpath
C:\Program Fi...
Boot Classpath
C:\Program Fi...
Output - LESSON (run)
run:

JButton

BUTTON SERING KITA JUMPAI DALAM BERBAGAI APLIKASI BERBASIS GUI, KITA SERING MENGGUNAKANYA SEBAGAI INTERFACE UNTUK MELAKUKAN EKSEKUSI SUATU PERINTAH

```
java.lang.Object
  └ java.awt.Component
      └ java.awt.Container
          └ javax.swing.JComponent
              └ javax.swing.JComboBox
```

LESSON - NetBeans IDE 6.5
File Edit Format Preview View Navigate Source Refactor Run Debug Profile Versioning Tools Window Help
<default config>
Empty datasource
Search (Ctrl+I)
Pr... Files Services
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FrameHitung.java
eksepsi.java
formatting.java
operasiString.java
DMI.MID
DMI.MID.ENKAPSULASI
DMI.MID.INHERITANCE
DMI.MID.INTERFACE
DMI.MID.POLIMORFISME
DMI.MID.UJIANMID
<init> -... Report I... In...
Form Frame
Other Components
[JFrame]
jPanel1 [JPanel]
jLabel1 [JLabel]
txtKodeBarang [JTextField]
jLabel2 [JLabel]
txtNama [JTextField]
jLabel3 [JLabel]
jComboBox1 [JComboBox]
Start Page
Frame.java *
FrameHitung.java
Source Design
Kode Barang
Nama
Satuan
Pcs
Harga Beli
Harga Jual
jButton1
Palette
Tool Bar
Desktop Pane
Internal Frame
Layered Pane
Swing Controls
Label
Button
Toggle Button
jButton1 [JButton] - Pro...
Properties Binding
Events Code
Properties
action
background [240,240,
font Tahoma 11 Pl
foreground [0,0,0]
icon
mnemonic
text jButton1
toolTipText null
Output - LESSON (run)
run:

foreground
[0,0,0]
icon
mnemonic
text
jButton1
toolTipText
null
Source
Design
jButton1 [JButton] - text
Set jButton1's text property using:
Plain text
Tambah
To format the text using html, prefix the text with <html>
Do not internationalize this string
OK
Reset to default
Cancel
Output - LESSON
run:
Kode Barang
Nama
Satuan
Pcs
Harga Beli
Harga Jual
Tambah

Mengenal Event

Event merupakan suatu aksi yang dilakukan user saat user menggunakan perangkat I/O seperti Keyboard atau Mouse, setiap objek komponen GUI dapat merespons event sehingga komponen tersebut dapat melakukan aksi ketika terjadi suatu event

Contoh Event

Berikut ini beberapa event yang sering digunakan

Event	**Tipe Event Listener**
Menekan tombol, atau menekan enter setelah penulisan teks atau memilih menu item.	ActionListener
User menutup frame	WindowListener
User menekan tombol mouse saat mouse berada pada sebuah komponen	MouseListener
User menggarakan mouse diatas sebuah komponen	MouseMotionListener
Saat Komponen Visible ketika sebelumnya UnVisible	ComponentListener
Saat komponen mendapatkan focus keyboard	FocusListener
Saat menekan tombol keyboard pada sebuah TextField	KeyListener
Memilih row table atau list berubah	ListSelectionListener

ActionListener

Adalah sebuah interface yang merupakan sebuah sub interface EventListener, ActionListener digunakan untuk menerima suatu event seperti penekanan button, pemilihan menu atau penekanan tombol enter ketika penulisan pada textField. ActionListener memiliki satu method yaitu actionPerformed() yang merupakan kode aksi dari event yang diterima ActionListener

Method	
void	actionPerformed(ActionEvent e) Invoked when an action occurs.

Source
Design
Kode Barang
Nama
Satuan
Harga
Harga
Edit Text
Change Variable Name ...
Bind
Events
Align
Anchor
Auto Resizing
Same Size
Set Default Size
Space Around Component...
Enclose In
Design Parent
Move Up
Move Down
Cut Ctrl+X
Copy Ctrl+C
Duplicate Ctrl+D
Delete Delete
Customize Code
Action
Ancestor
Change
Component
Container
Focus
Hierarchy
HierarchyBounds
InputMethod
Item
Key
Mouse
MouseMotion
MouseWheel
PropertyChange
VetoableChange
actionPerformed

WindowListener

WindowListener adalah interface yang menerima event yang dikenakan pada window, class yang memproses window event juga mengimplementasi interface ini, misalnya JFrame.

Method	
void	windowActivated(WindowEvent e) Invoked when the Window is set to be the active Window.
void	windowClosed(WindowEvent e) Invoked when a window has been closed as the result of calling dispose on the window.
void	windowClosing(WindowEvent e) Invoked when the user attempts to close the window from the window's system menu.
void	windowDeactivated(WindowEvent e) Invoked when a Window is no longer the active Window.
void	windowDeiconified(WindowEvent e) Invoked when a window is changed from a minimized to a normal state.
void	windowIconified(WindowEvent e) Invoked when a window is changed from a normal to a minimized state.
void	windowOpened(WindowEvent e) Invoked the first time a window is made visible.

Source
Design
Kode Barang
Nama
Satuan
Pcs
Harga Beli
Harga Jual
Tambah
Ubah
Simpan
keluar
Preview Design
Bind
Events
Set Layout
Customize Layout...
Add From Palette
Design This Container
Set Default Size
Change Order...
Copy Ctrl+C
Paste Ctrl+V
Component
Container
Focus
Hierarchy
HierarchyBounds
InputMethod
Key
Mouse
MouseMotion
MouseWheel
PropertyChange
Window
WindowFocus
WindowState
windowActivated
windowClosed
windowClosing
windowDeactivated
windowDeiconified
windowIconified
windowOpened

MouseListener

- MouseListener adalah interface yang berfungsi membaca dan menerima mouse event dari komponen, MouseListener dibentuk oleh sebuah class dengan menambahkan method pada komponen yang akan menerima event dengan perintah addMouseListener() atau dapat diimplementasikan pada sebuah class

Method	
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.

Source
Design
Kode Barang
Nama
Satuan
Pcs
Harga Beli
Harga Jual
Tambah
Ubah
Simpan
Hapus
Batal
Component
Container
Focus
Hierarchy
HierarchyBounds
InputMethod
Key
Mouse
MouseMotion
MouseWheel
PropertyChange
Window
WindowFocus
WindowState
mouseClicked
mouseEntered
mouseExited
mousePressed
mouseReleased
Preview
Bind
Events
Set Layout
Customize Layout...
Add From Palette
Design This Container
Set Default Size
Change Order...
Copy Ctrl+C
Paste Ctrl+V
Customize Code
Properties

Contoh Menggunakan Event

Program akan berhenti ketika tombol keluar ditekan

Klik kanan pada tombol, pilih Action -> actionPerformed

```
Source  Design
36      Generated Code
238
239     private void formAncestorResized(java.awt.event.Hierarch
240         // TODO add your handling code here:
241     }
242
243     private void cmdExitActionPerformed(java.awt.event.Actic
244         // TODO add your handling code here:
245         this.dispose();
246 }
247
248     /**
249     * @param args the command line arguments
250     */
251     public static void main(String args[]) {
252         java.awt.EventQueue.invokeLater(new Runnable() {
            public void run() {
```

Method Auto Generate

Tulis kode didalam method