Session 08

Creating Graphical User Interface

(GUI & Swing)

Java GUI and the swing package

References:
Java-Tutorials/tutorial-2015/uiswing/index.html

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- AWT vs Swing
- GUI Basics design
- Top-level container
- Layout Manager
- Common Control
- Event Listener
- Dialogbox
- Advanced Control

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- Choice component
- Menu
- Tabbed pane
- Scroll pane
- Dialog box
- Jlist
- Jtable

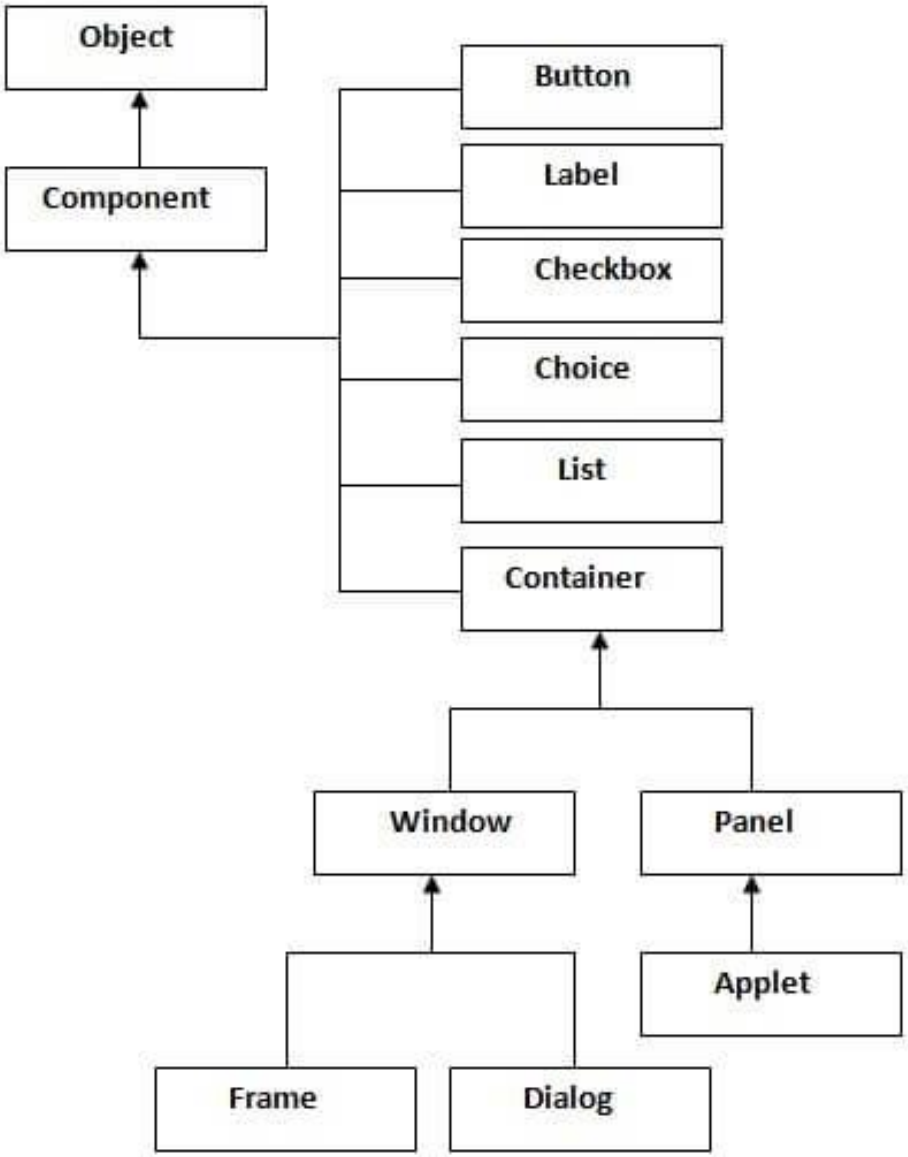
JFC (Java Foundation Classes)

- The Java Foundation Classes, or JFC, is a loose collection of standard Java APIs for client-side graphics, graphical user interfaces (GUIs), and related programming tasks.
- **AWT** (Abstract Windows Toolkit)
- **Swing**
- **Accessibility API**: Java Accessibility API is part of Java Accessibility Utilities, which is a set of utility classes that help assistive technologies provide access to GUI toolkits that implement the Java Accessibility API.
- **2D API**: ava 2D is the name for the state-of-the-art two-dimensional graphics API introduced in Java 1.2. Java 2D is built upon the AWT
- **Data transfer** (Drag and Drop): support for data transfer using the drag-and-drop metaphor.

AWT

- **Java AWT** (Abstract Window Toolkit) is *an API to develop GUI or window-based applications* in java.
- Java AWT components are platform-dependent i.e. components are displayed according to the view of operating system. AWT is **heavyweight** i.e. its components are using the resources of OS.
- The java.awt package provides classes for AWT api such as TextField, Label, Text Area, RadioButton, CheckBox, Choice, List etc.

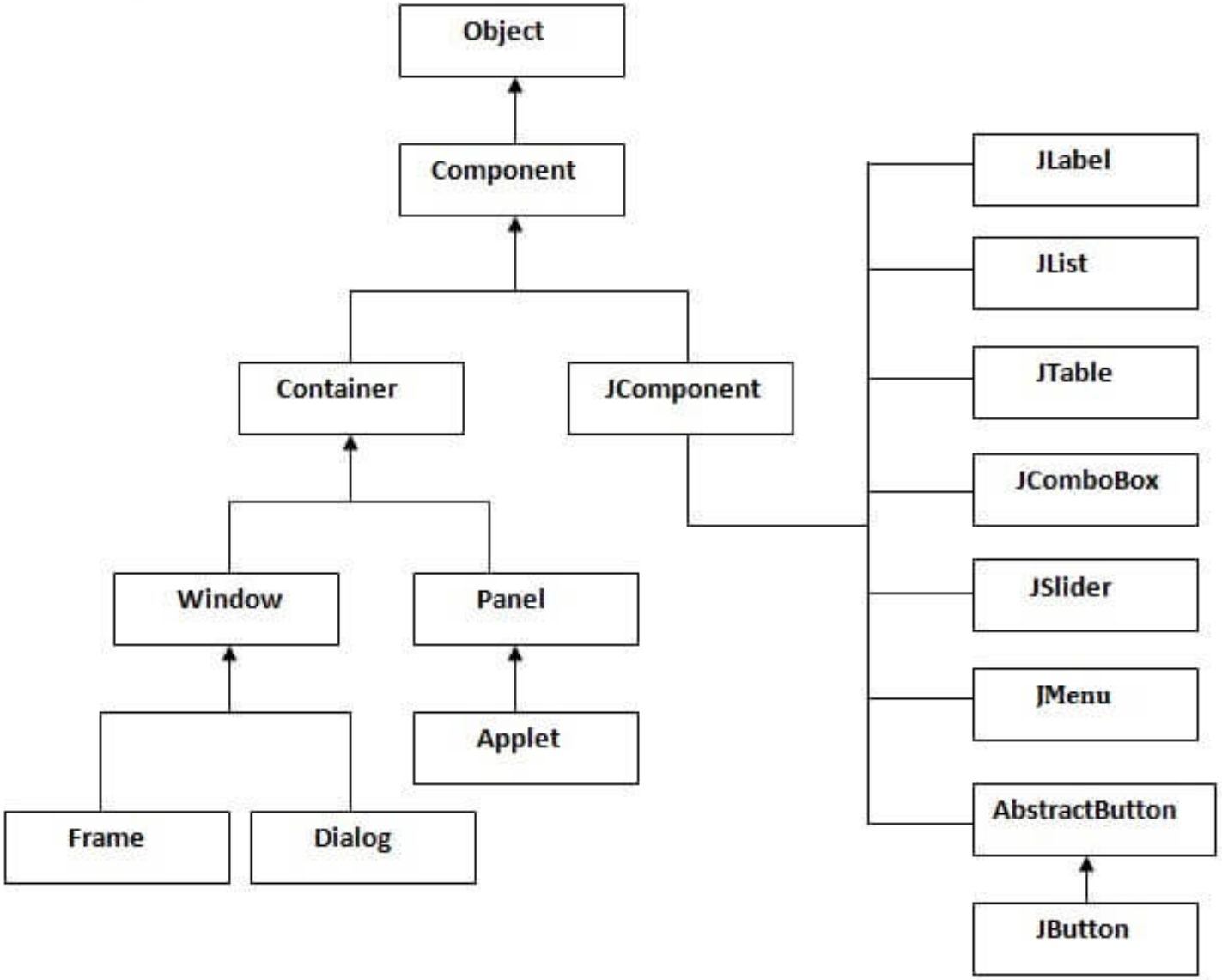
Java AWT Hierarchy



SWING

- **Java Swing tutorial** is a part of Java Foundation Classes (JFC) that is *used to create window-based applications*. It is built on the top of AWT (Abstract Windowing Toolkit) API and entirely written in java.
- Unlike AWT, Java Swing provides platform-independent and lightweight components.
- The javax.swing package provides classes for java swing API such as JButton, JTextField, JTextArea, JRadioButton, JCheckbox, JMenu, JColorChooser etc.

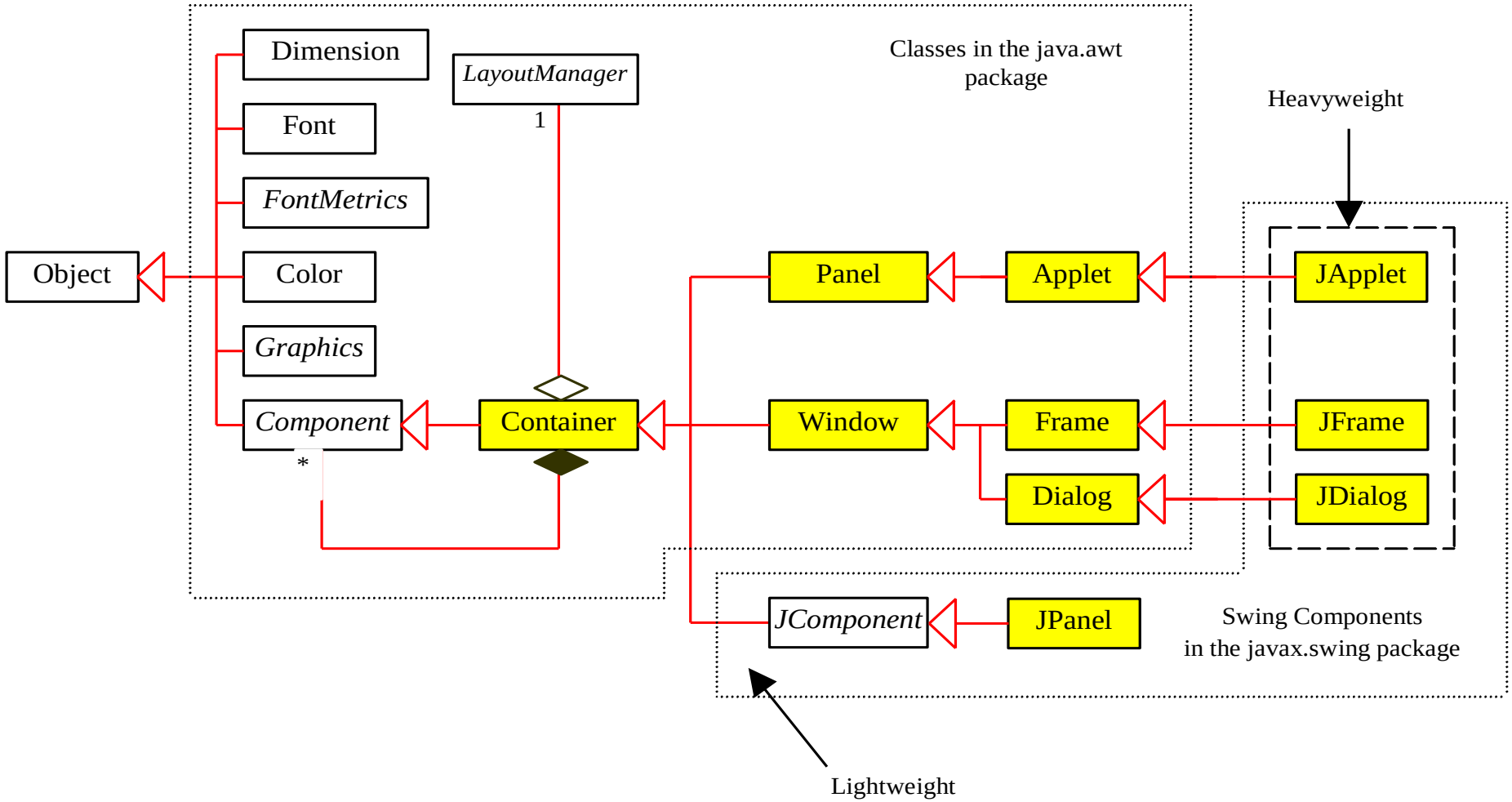
Hierarchy of Java Swing classes



Java GUI

- **Creating Graphical User Interfaces**
  - Container
  - Component
  - Layout manager
  - Graphic và drawing capabilitie
  - Font
  - Event

Container classes

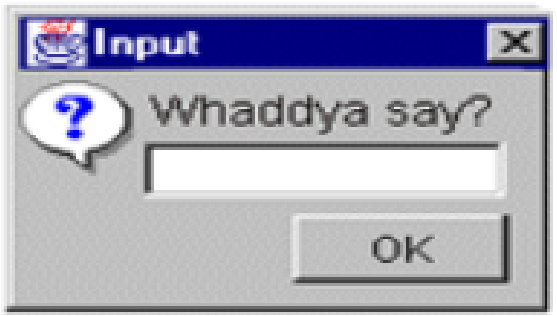


Container

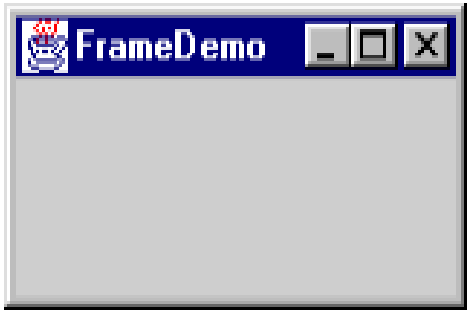
- Frame, Jframe
- Panel
- Dialogs
- ScrollPanes
- Applet: Web Applet
- JWindow

Top-level component

- Swing provides three generally useful top-level container classes: JFrame, JDialog, and JApplet.



Dialog

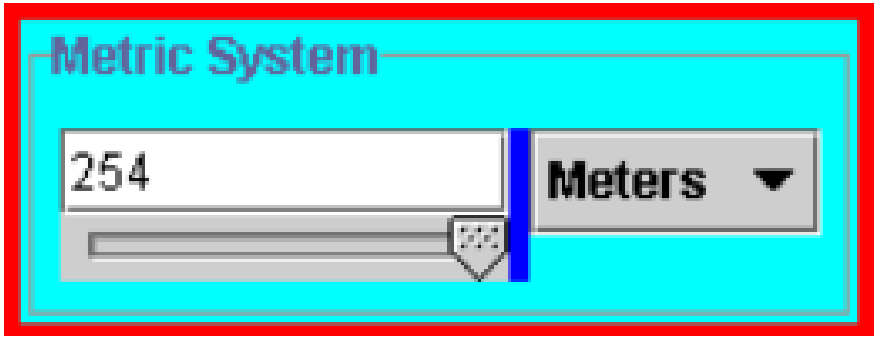


Frame

Applet

Intermediate containers

- Swing provides several general-purpose intermediate containers: scroll pane, split pane, tabbed pane….

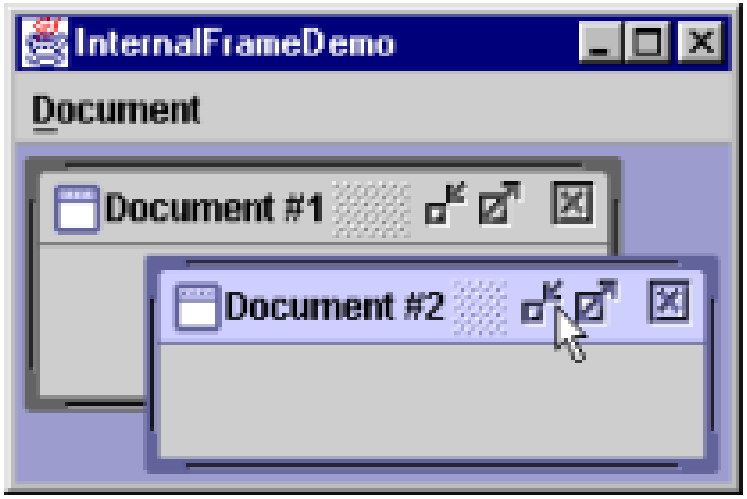


Panel

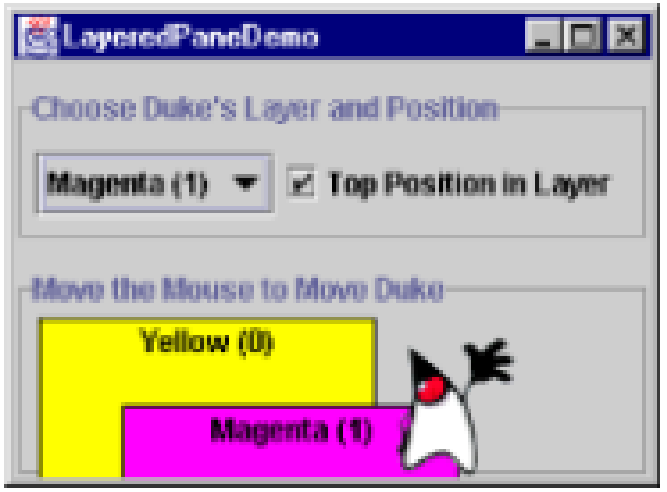
Scroll pane

Special-Purpose Containers

- The rest of the Swing intermediate containers are more specialized:



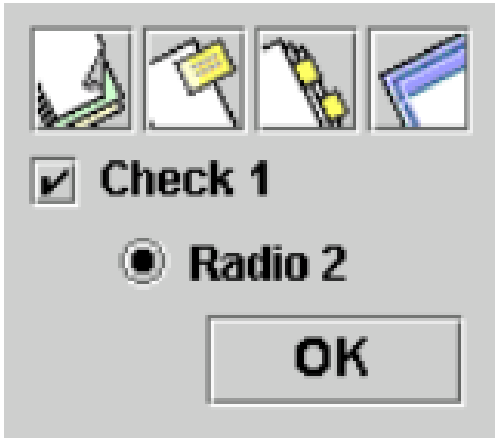
Internal Frame

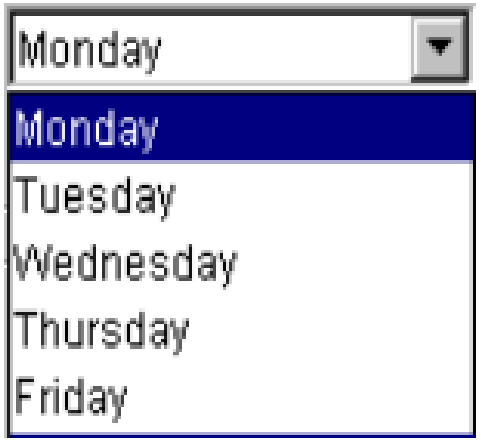


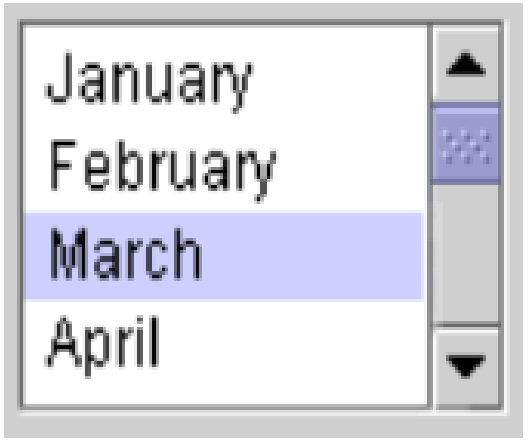
Layered pane

Basic component controls

- Receive data from the users

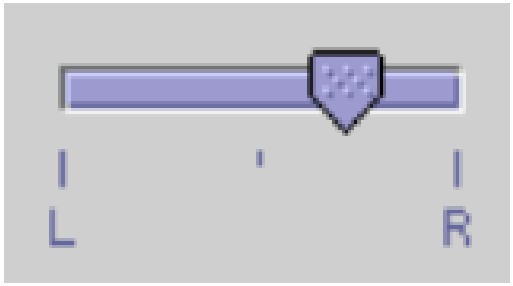






- **Buttons** **Combo Box** **List**

Basic component controls



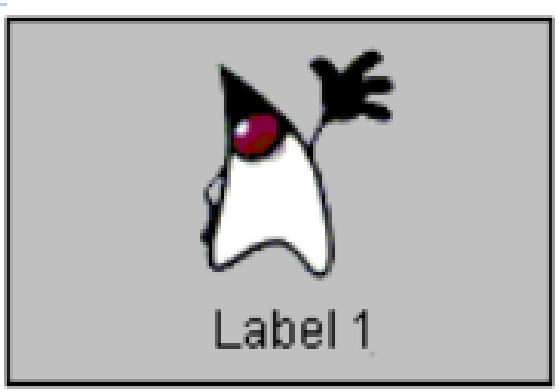
Menu

Text fields

Slide

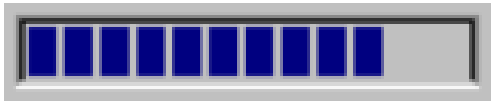
The components for display information

- Use for display information
- not allow to edit information



Label

Tool tip



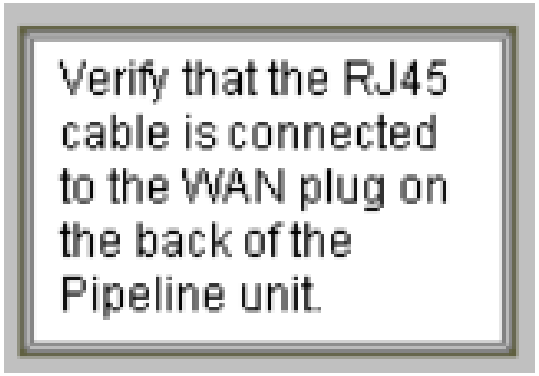
Progress Bar

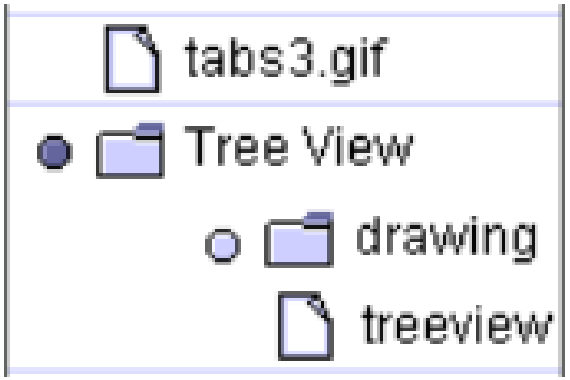
JFileChooser and JColorChooser

Color Chooser

File Chooser

Display information with format





Table

Text

Tree

Jframe

```
javax.swing.JFrame

+JFrame()

+JFrame(title: String)

+void setSize(width: int, height: int)

+void setLocation(x: int, y: int)

+void setVisible(visible: boolean)

+void setDefaultCloseOperation(mode: int)

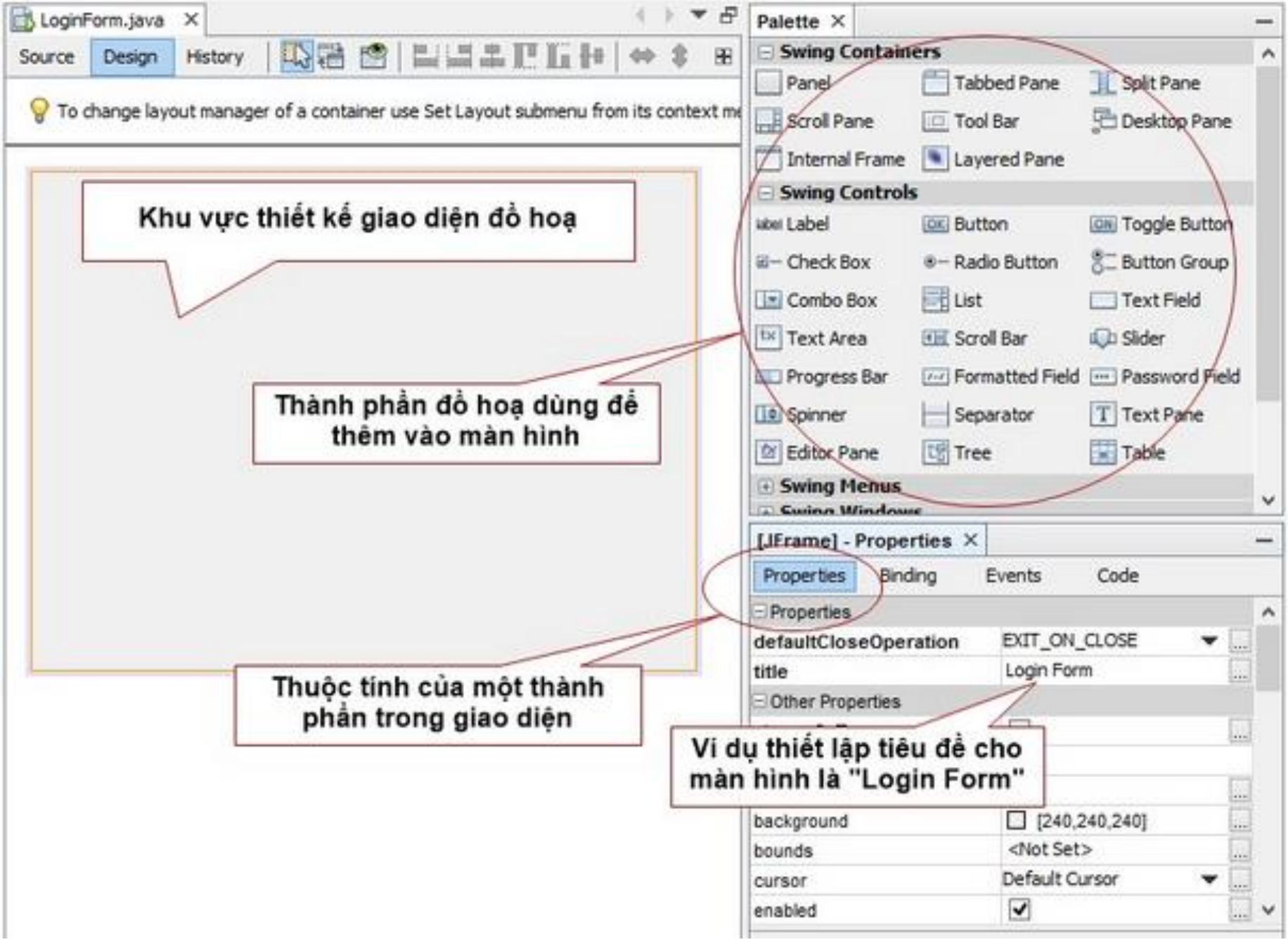
+void setLocationRelativeTo (c: Component)
```

```
1. public class HelloSwing{
2.    public static void main(String[]
   args){
3.     JFrame win = new JFrame("Demo");
4.     win.setDefaultCloseOperation(
   JFrame.EXIT_ON_CLOSE);
5.     win.setSize(300,200);
6.     win.setLocationRelativeTo(null);
7.     win.setResizable(false);
8.     win.add(new JLabel("Hello
   world!"));
9.     win.setVisible(true);
10.     }
11. }
```

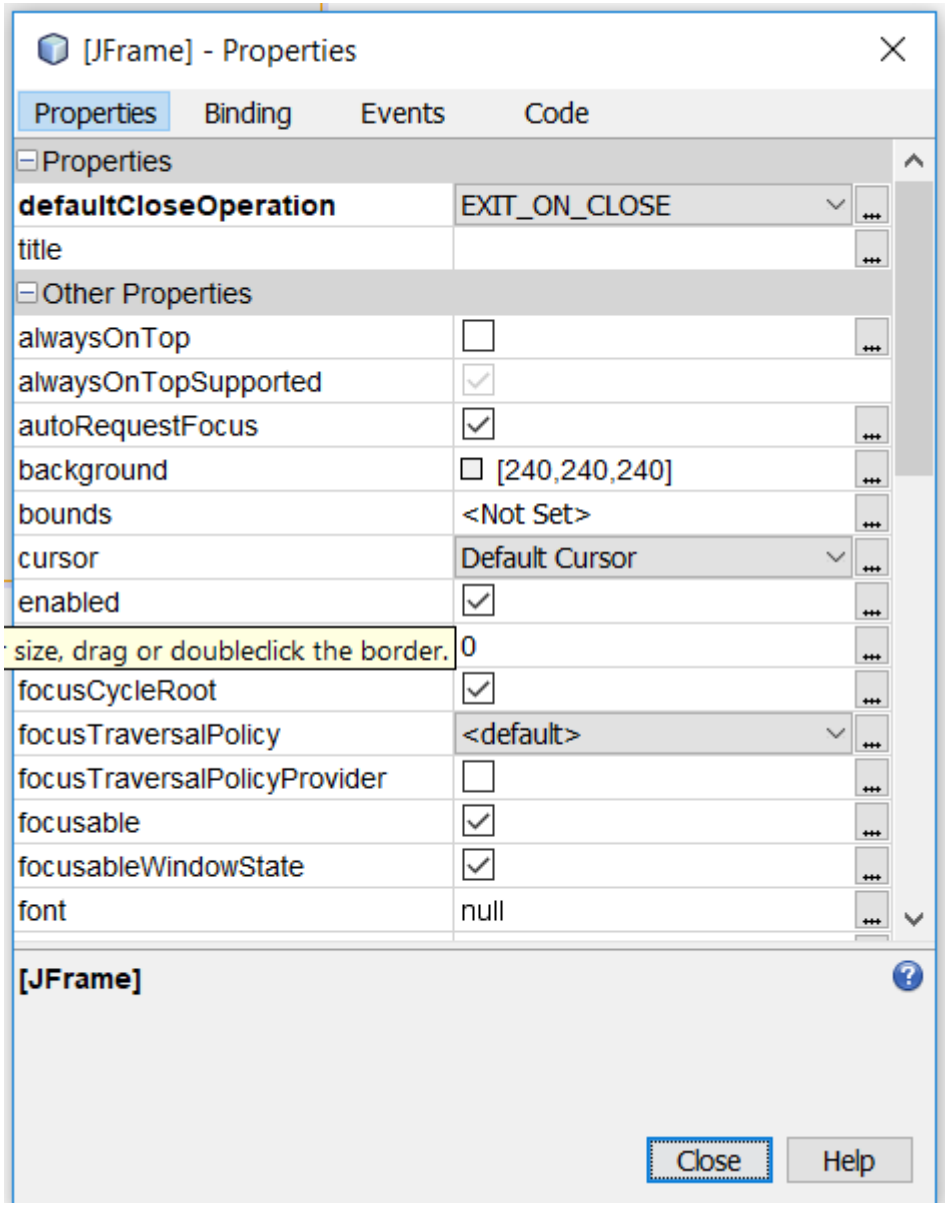
```
1. public classDemoJFrameextends JFrame{
2.   public    DemoJFrame()    {
3.     setTitle("Demo JFrame");
4.     setSize(300,200);
5.
   setDefaultCloseOperation(EXIT_ON_CLOSE);
6.     setLocationRelativeTo(null);
7.     setResizable(false);
8.   }
9.   public static void main(String[]args){
10.       new DemoJFrame().setVisible(true);
11.  }
12.}
```

JFrame with NetBeans

- click package -> click right mouse -> select **New ->** and **JFrame Form ->** enter name in **Class Name ->** select **Finish**


LoginForm.java
Source
Design
History
To change layout manager of a container use Set Layout submenu from its context me
Khu vực thiết kế giao diện đồ hoạ
Thành phần đồ hoạ dùng để thêm vào màn hình
Thuộc tính của một thành phần trong giao diện
Ví dụ thiết lập tiêu đề cho màn hình là "Login Form"
Palette
Swing Containers
Panel
Tabbed Pane
Split Pane
Scroll Pane
Tool Bar
Desktop Pane
Internal Frame
Layered Pane
Swing Controls
Label
Button
Toggle Button
Check Box
Radio Button
Button Group
Combo Box
List
Text Field
Text Area
Scroll Bar
Slider
Progress Bar
Formatted Field
Password Field
Spinner
Separator
Text Pane
Editor Pane
Tree
Table
Swing Menus
[JFrame] - Properties
Properties
Binding
Events
Code
Properties
defaultCloseOperation
EXIT_ON_CLOSE
title
Login Form
Other Properties
background
[240,240,240]
bounds
<Not Set>
cursor
Default Cursor
enabled

Jframe's properties



JDialog - demo

```
1. public  class DemoJDialog extends JDialog{
2.   public DemoJDialog(){
3.     setTitle("Demo JDialog");
4.     setDefaultCloseOperation(
   DISPOSE_ON_CLOSE);
5.     setSize(300,200);
6.     setResizable(false);
7.   }
8.   public static void main(String[] args){
9.     new DemoJDialog().setVisible(true);
10.  }
11.}
```

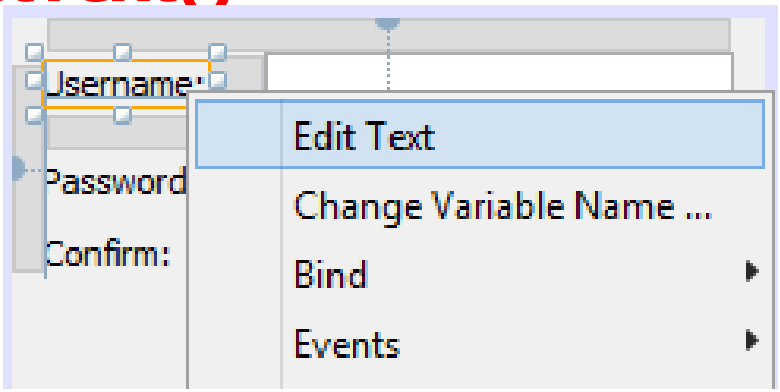
JPanel

- The JPanel is a simplest container class. It provides space in which an application can attach any other component. It inherits the JComponents class.
- It doesn't have title bar.
- Constructors:
  - JPanel()
  - JPanel(LayoutManager lm)

```
1. public class DemoJPanel extends JFrame{
2.   public DemoJPanel(){
3.     setTitle("Demo JPanel");
4.     setSize(300,400);
5.     setDefaultCloseOperation(
   JFrame.EXIT_ON_CLOSE);
6.     JPanel p=new JPanel();
7.     p.setBorder(BorderFactory.
   createTitledBorder("Book information"));
8.     p.add(new JLabel("Example!"));
9.     p.add(new JButton("for component"));
10.    this.add(p);
11.  }
12.  public static void main(String[] args) {
13.    new DemoJPanel().setVisible(true);
14.  }
15.}
```

Jlabel (1)

- The object of JLabel class is a component for placing text in a container. It is used to display a single line of read only text. The text can be changed by an application but a user cannot edit it directly. It inherits JComponent class.
- **setText(String label), getText()**
- Font getFont()
- void setFont(Font font)
- Gets or sets font



Jlabel (2)

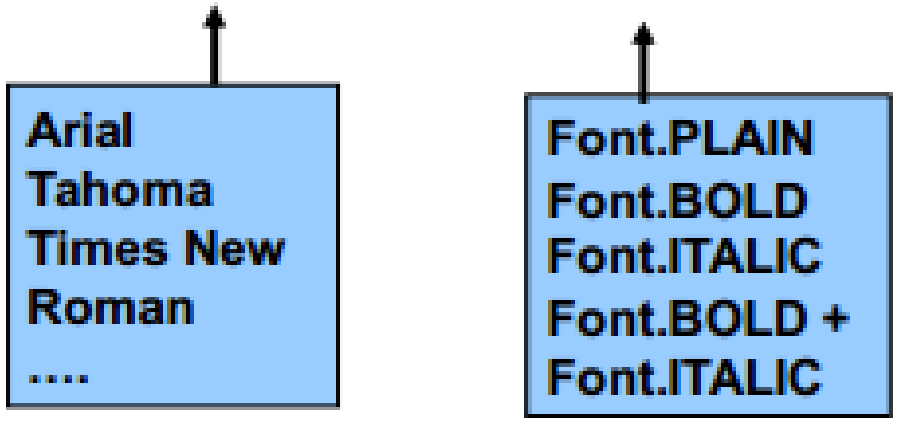
- Constructors:
- **JLabel()**: Creates an empty label
- **JLabel (String labeltext)**: Creates a label with a given text
- **JLabel (String labeltext, int alignment)**: Creates a label with given alignment where alignment can be LEFT, RIGHT, CENTER, LEADING or TRAILING.
- **JLabel (Icon img)**: Only Icon will be used for label
- **JLabel (String str, Icon img, int align)**

```
1. public class DemoJLabel extends JFrame{
2.   public DemoJLabel(){
3.     setLayout(new GridLayout(1,3,5,5));
4.     setDefaultCloseOperation(
          JFrame.EXIT_ON_CLOSE);
5.     Icon icon = new
          ImageIcon("pic_8.jpg");
6.     JLabel lb1 = new
          JLabel(“Label la text");
7.     JLabel lb2 = new JLabel(icon);
8.     JLabel lb3 = new JLabel("icon and
          text",icon, JLabel.CENTER);
9.     lb3.setVerticalTextPosition(
          JLabel.BOTTOM);
```

```
1.    lb3.setHorizontalTextPosition(
            JLabel.CENTER);
2.    add(lb1);
3.    add(lb2);
4.    add(lb3);
5.    pack();
6.    setLocationRelativeTo(null);
7.  }
8.  public static void main(String[]
    args){
9.     new
    DemoJLabel().setVisible(true);
10.  }
11.}
```

fonts for text

- To draw characters in a font, you must first create an object of the class Font
- Constructor:
- Font(String font_name, int font_style, int font_size)

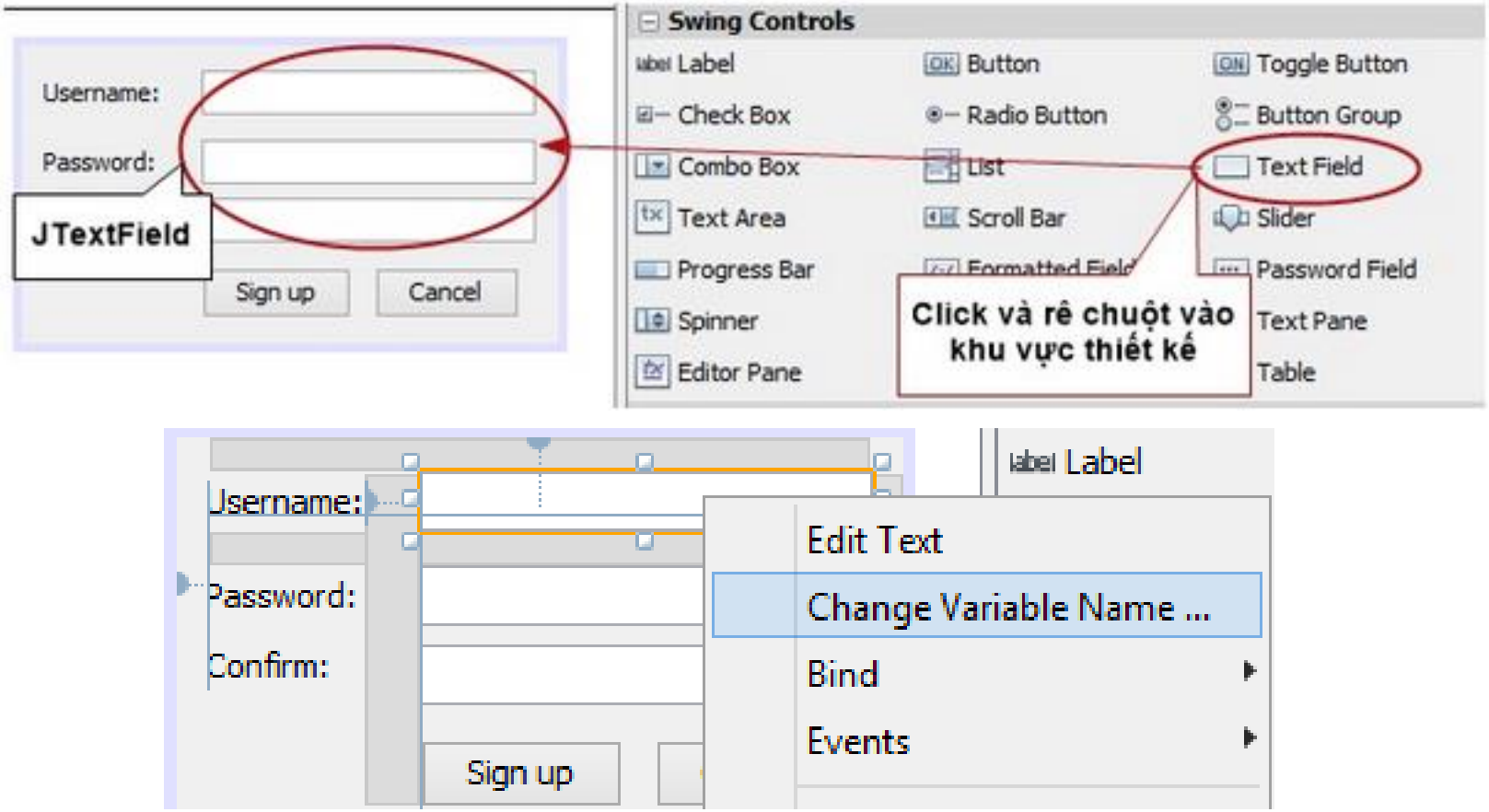


```
1. public class DemoJLabelwithColor extends JFrame{
2.     public DemoJLabelwithColor(){
3.         setLayout(new GridLayout(1, 2, 5, 5));
4.         setDefaultCloseOperation(
               JFrame.EXIT_ON_CLOSE);
5.         setSize(400, 200);
6.         JLabel lb;
7.         lb = createJLabel("Example 1", Color.red,
               Color.green);
8.         Font font=new Font("Arial",Font.BOLD,40);
9.         lb.setFont(font);
10.        add(lb);
11.        lb = createJLabel("Example 1", Color.blue,
               Color.yellow);
12.        lb.setFont(font);
13.        add(lb);
14.        setLocationRelativeTo(null);}
```

```
1. private JLabel createJLabel(String text,
   Color textColor,Color backgroundColor) {
2.     JLabel lb = new JLabel(text);
3.     lb.setHorizontalAlignment(
          JLabel.CENTER);
1.     lb.setForeground(textColor);
2.     lb.setOpaque(true);
3.     lb.setBackground(backgroundColor);
4.     return lb;
5. }
6. public static void main(String[] args) {
7.     new
   DemoJLabelwithColor().setVisible(true);
8.  }
9. }
```

JTextField

- JTextField allows the editing of a single line text.



JTextField - Constructors

- JTextField()
  - creates an empty textfield with 1 columns
- TextField(String s)
  - creates a new textfield with the given string
- JTextField(int cols)
  - creates an empty textfield with given number of columns
- JTextField(String text, int cols)
  - creates a new textfield with given string and given number of columns
- Example:
  - JTextField mmText = new JTextField(10);
  - JTextField txtName = new JTextField("To Lan", 20);

JTextField - Methods

- String getText()
- void setText(String t)
  - gets or sets the text in text field
- void setFont(Font font)
  - sets the font for this text field
- void setEditable(boolean b)
  - determines whether the user can edit the content

```
1. public class DemoJTextField extends JFrame {
2.     JTextField name;
3.     JPasswordField pass;
4.     public DemoJTextField(){
5.         super("Example for input");
6.         JPanel p =new JPanel();
7.         p.add(new JLabel("username: "));
8.         p.add(new JTextField(15));
9.         p.add(new JLabel("password:"));
10.        p.add(new JPasswordField(15));
11.        add(p);
   setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
12.            setSize(250, 100);
13.    }
14.    public static void main(String[] args) {
15.            new DemoJTextField().setVisible(true);
16.    }
17.}
```

JPasswordField

- It is a text component specialized for password entry (*).
- The default character displayed for whatever you type is '*'. If you want to change that, you can use setEchoChar(char c) method.
- JPasswordField.setEchoChar(char c)

JTextArea

- The object of a JTextArea class is a multi line region that displays text. It allows the editing of multiple line text.
- String text = getText();
- setText(String value);
- setEditable(boolean editable)

JButton

- constructor:
- **JButton()**: It creates a button with no text and icon.
- **JButton(Icon icon)**: It creates a button with the specified icon object.
- **JButton(String text)**: It creates a button with the specified text.
- **JButton(String text, Icon icon)**: It creates a button with the specified text and the specified icon object.

Methods of AbstractButton class

- **public void setText(String s)**: to set specified text on button
- **public String getText()**: to return the text of the button.
- **public void setEnabled(boolean b)**: to enable or disable the button.
- **public void setIcon(Icon b)**: to set the specified Icon on the button.
- **public Icon getIcon()**: to get the Icon of the button.
- **public void setMnemonic(int a)**: to set the mnemonic on the button.
- **public void addActionListener(ActionListener a)**: to add the action listener to this object.

```
1. public class DemoJButton extends JFrame{
2.   JButton b1,b2;
3.   public DemoJButton(){
4.      super("Example for Button");
5.      b1= new JButton("Stop", new
   ImageIcon("stop.png"));
6.      b2= new JButton("Go", new
   ImageIcon("go.png"));
7.      JPanel p = new JPanel();
8.      p.add(b1);
9.      p.add(b2);
10.     add(p);
11.     setSize(300,200);
12. }
13. public static void main(String[] args) {
14.     new DemoJButton().setVisible(true);
15.     }
16.}
```

Java Event Handling

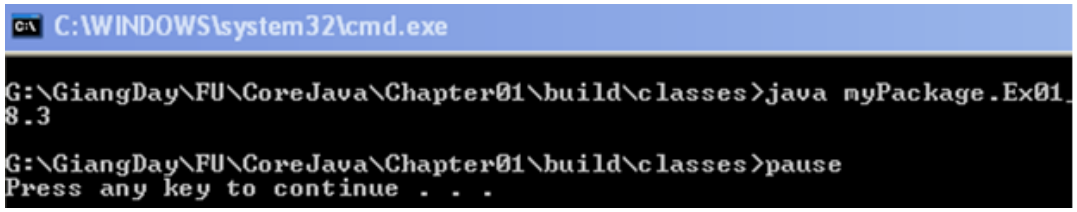
- Changing the state of an object is known as an event. For example, click on button, dragging mouse etc. The java.awt.event package provides many event classes and Listener interfaces for event handling.

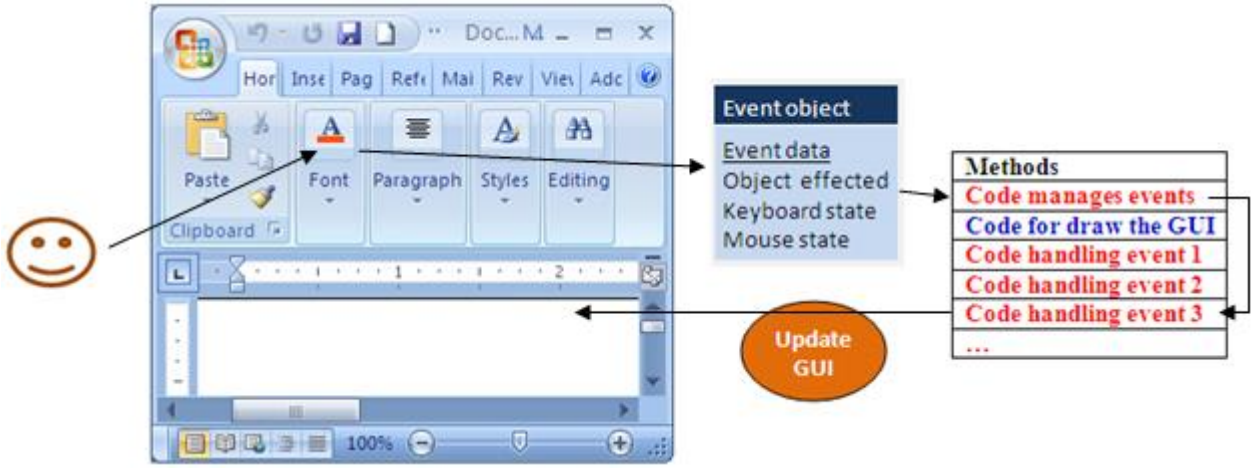
Event Classes	Listener Interfaces
ActionEvent	ActionListener
MouseEvent	MouseListener and MouseMotionListener
MouseWheelEvent	MouseWheelListener
KeyEvent	KeyListener
ItemEvent	ItemListener
TextEvent	TextListener
AdjustmentEvent	AdjustmentListener
WindowEvent	WindowListener
ComponentEvent	ComponentListener
ContainerEvent	ContainerListener
FocusEvent	FocusListener

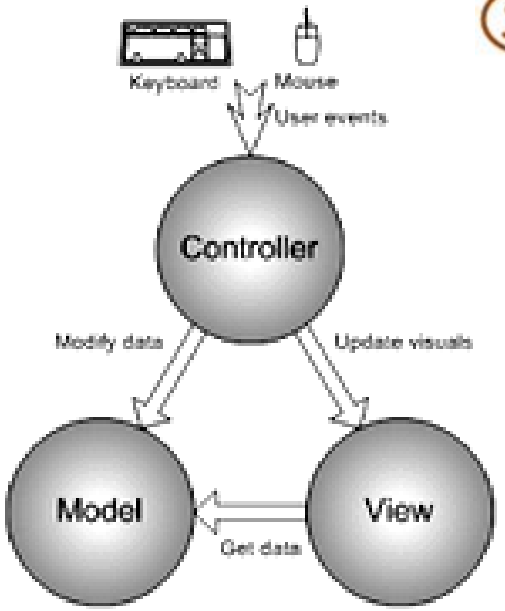
Two Kinds of Apps

Console App.
Compute-centric Apps

Event-based App.
User-centric Apps(GUI)

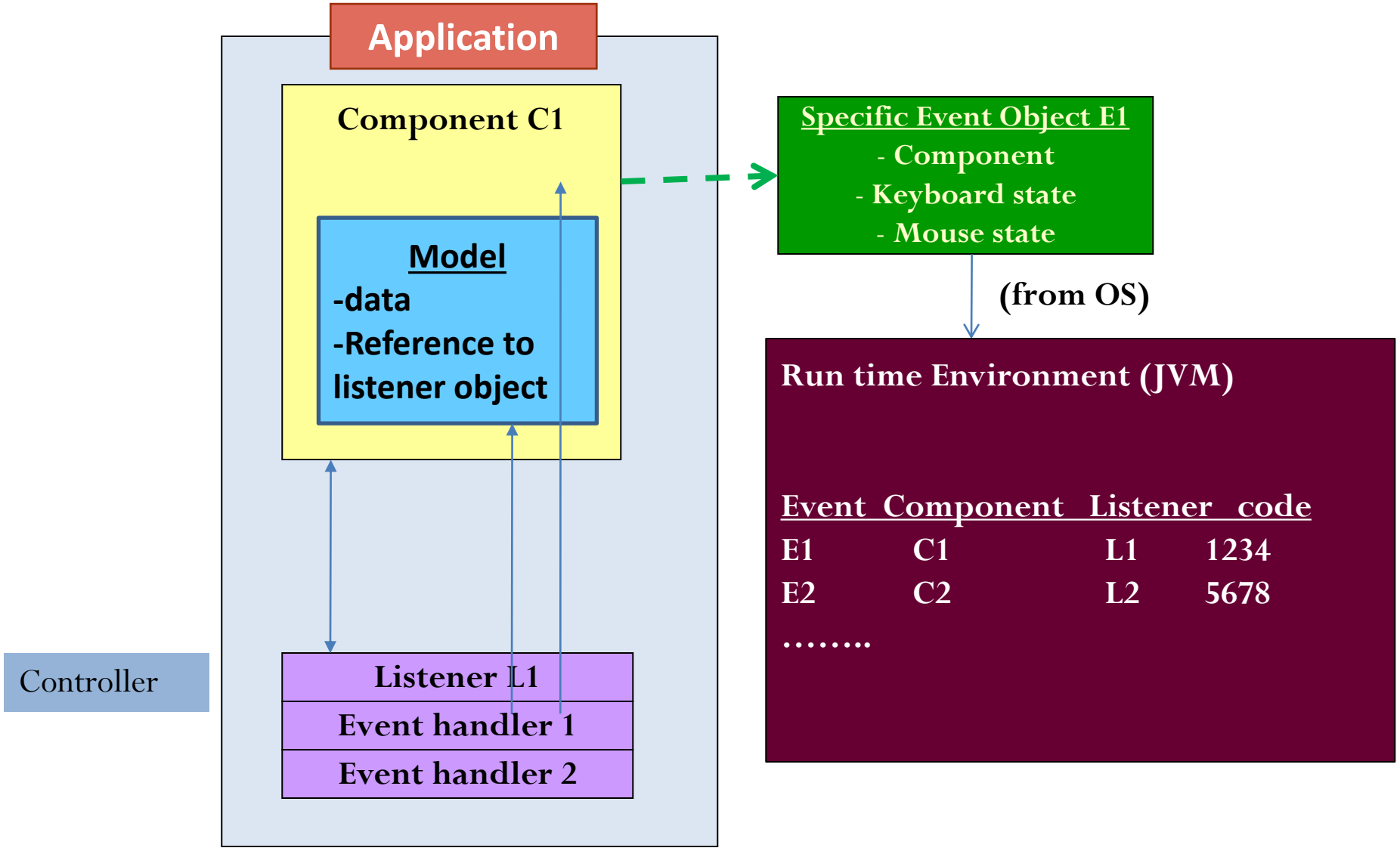






Model-**V**iew **C**ontroller Architecture for GUI component.
Model: Object contains data.
View: Object users can see it on the screen
Controller: Object manages events

Java model for event management



Steps to perform Event Handling

- Register the component with the Listener
- `public class MyApp extends Frame` **`implements ActionListener`**
- For registering the component with the Listener, many classes provide the registration methods. For example:
- **Button**
  - public void addActionListener(ActionListener a){}
- **MenuItem**
  - public void addActionListener(ActionListener a){}

- **TextField**
  - public void addActionListener(ActionListener a){}
  - public void addTextListener(TextListener a){}
- **TextArea**
  - public void addTextListener(TextListener a){}
- **Checkbox**
  - public void addItemListener(ItemListener a){}
- **Choice**
  - public void addItemListener(ItemListener a){}
- **List**
  - public void addActionListener(ActionListener a){}
  - public void addItemListener(ItemListener a){}

Java ActionListener Interface

- **public abstract void** actionPerformed(Action Event e);
- **getSource()** method returns the source of the event.

```
1. public class ButtonHandlingDemo
   implements ActionListener {
2. ….
3.  btnResult.addActionListener(this);
1. ….
2. public void
   actionPerformed(ActionEvent ae){
3. …
4.   if(ae.getSource() == btnResult)
5.     ……
6.   }
7. }
```

Example event

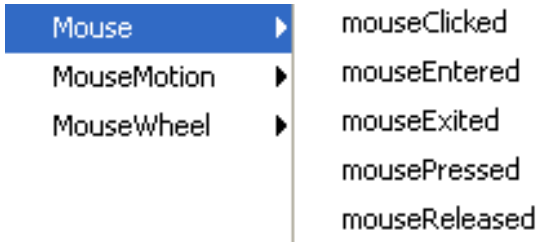
```
public class EventExp extends JFrame
        implements ActionListener {
    JLabel lbr=new JLabel("radius: ");
    JTextField tfr=new JTextField(1);
    JLabel lbrs=new JLabel("Area: ");
    JTextField tfrs=new JTextField();
 JButton btnCal=new JButton("Calculate");
    JButton btnExit=new JButton("Exit");
    public EventExp(String title){
        super(title);
        setLayout(new GridLayout(3, 2));
```

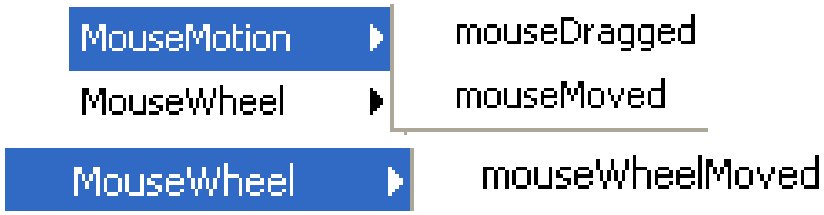
```
        add(lbr);     add(tfr);
        add(lbrs);    add(tfrs);
        btnCal.addActionListener(this);
        btnExit.addActionListener(this);
        add(btnCal); add(btnExit);
    }
public static void main(String[] args) {
    EventExp f=new EventExp("Demo for
  event");
  f.setDefaultCloseOperation(JFrame.EXIT_ON
  _CLOSE);
        f.setSize(300, 200);
        f.setVisible(true);
    }
```

```
@Override
    public void
  actionPerformed(ActionEvent ae) {
      if(ae.getSource()==btnCal){
          double
  r=Double.parseDouble(tfr.getText());
          double s=r*r*Math.PI;
          DecimalFormat f=new
  DecimalFormat("#.##");
          tfrs.setText(f.format(s));
     }else if(ae.getSource()==btnExit)
            System.exit(0);
    }     }
```

Some Common Events

Object	*Event*	*Interface*	*Method*
JButton	ActionEvent	ActionListener	actionPerformed()
JCheckBox	ActionEvent ItemEvent	ActionListener ItemListener	actionPerformed() itemStateChanged()
JRadioButton	ActionEvent ItemEvent	ActionListener ItemListener	actionPerformed() itemStateChanged()
JTextField JTextArea	ActionEvent FocusEvent	ActionListener FocusListener	actionPerformed() focusGained(), focusLost()
JPasswordField	ActionEvent	ActionListener	actionPerformed()





Layout Manager (1)

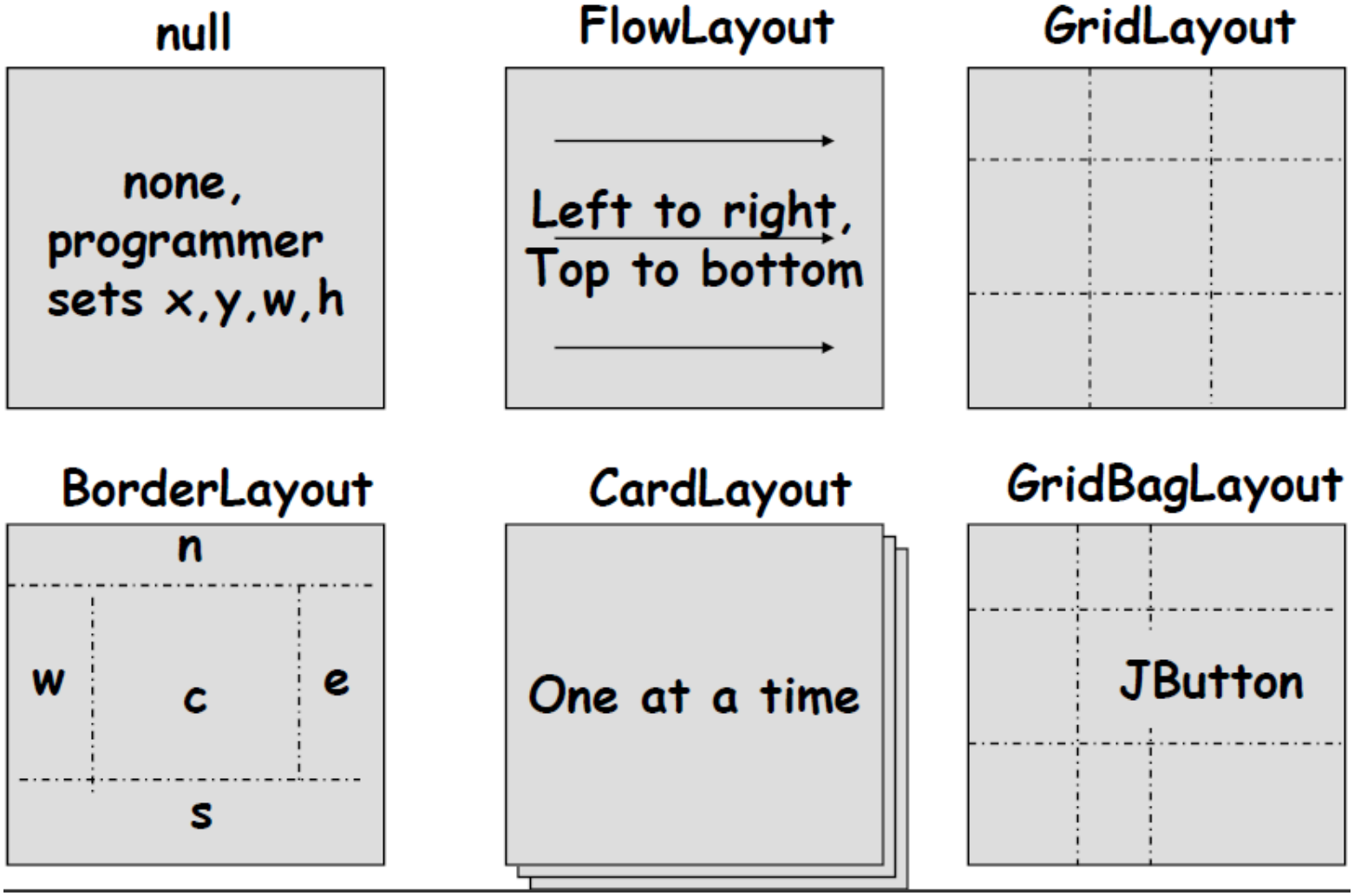
- Flow Layout
- Border Layout
- Card Layout
- Grid Layout
- GridBag Layout

Defined in the AWT

- Box Layout
- Overlay Layout

Defined in Swing

Layout Manager (2)



FlowLayout

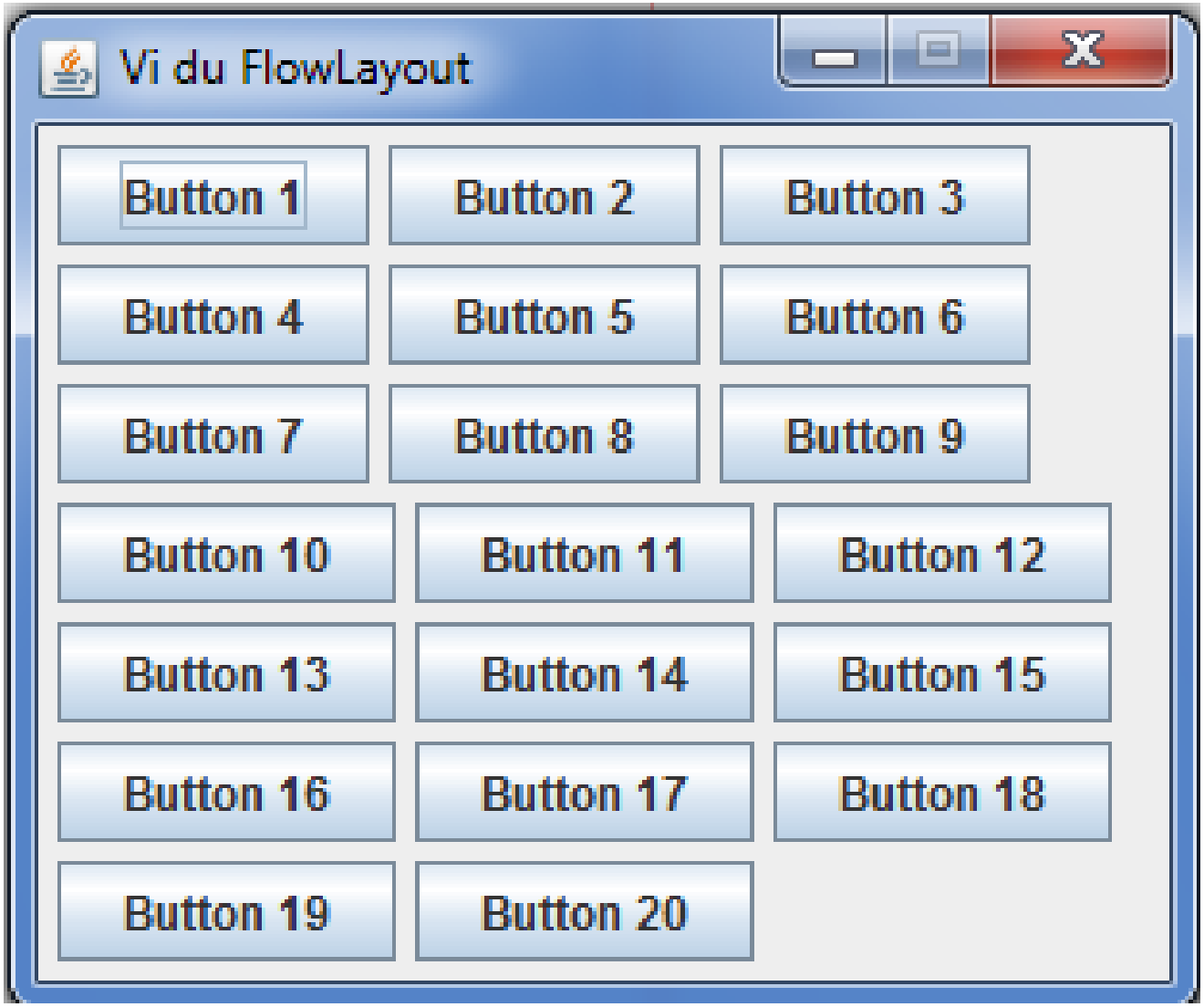
- The FlowLayout is used to arrange the components in a line, one after another (in a flow). It is the default layout of applet or panel.

FlowLayout – Constructors

- public FlowLayout()
  - Centers each row and keeps 5 pixels between entries in a row and between rows
- public FlowLayout(int align)
  - Same 5 pixels spacing, but changes the alignment of the rows to FlowLayout.LEFT, FlowLayout.RIGHT, FlowLayout.CENTER
- public FlowLayout(int align, int hgap, int vgap)
  - Specify the alignment as well as the horizontal and vertical spacing between components (in pixel)

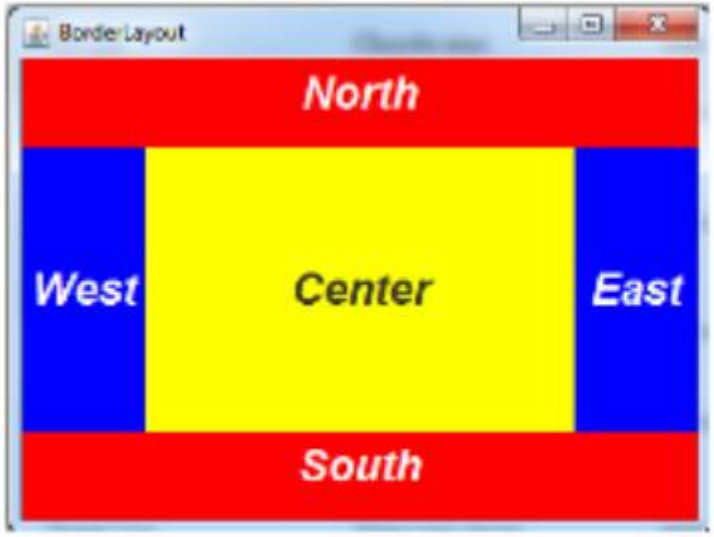
```
1. public class DemoFlowLayout extends JFrame{
2.     public    DemoFlowLayout() {
3.         setTitle("Exampe FlowLayout");
4.         setSize(300,250);
   setDefaultCloseOperation(EXIT_ON_CLOSE);
5.         setLocationRelativeTo(null);
6.         setResizable(false);
7.  setLayout(new FlowLayout(FlowLayout.LEFT));
8.         for(int     i=1;i<=20;i++){
9.             add(new JButton("Button "+i));
10.         }
11.    }
12.   public static void main(String[] args) {
13.     new DemoFlowLayout().setVisible(true);
14.    }
15.}
```

Result

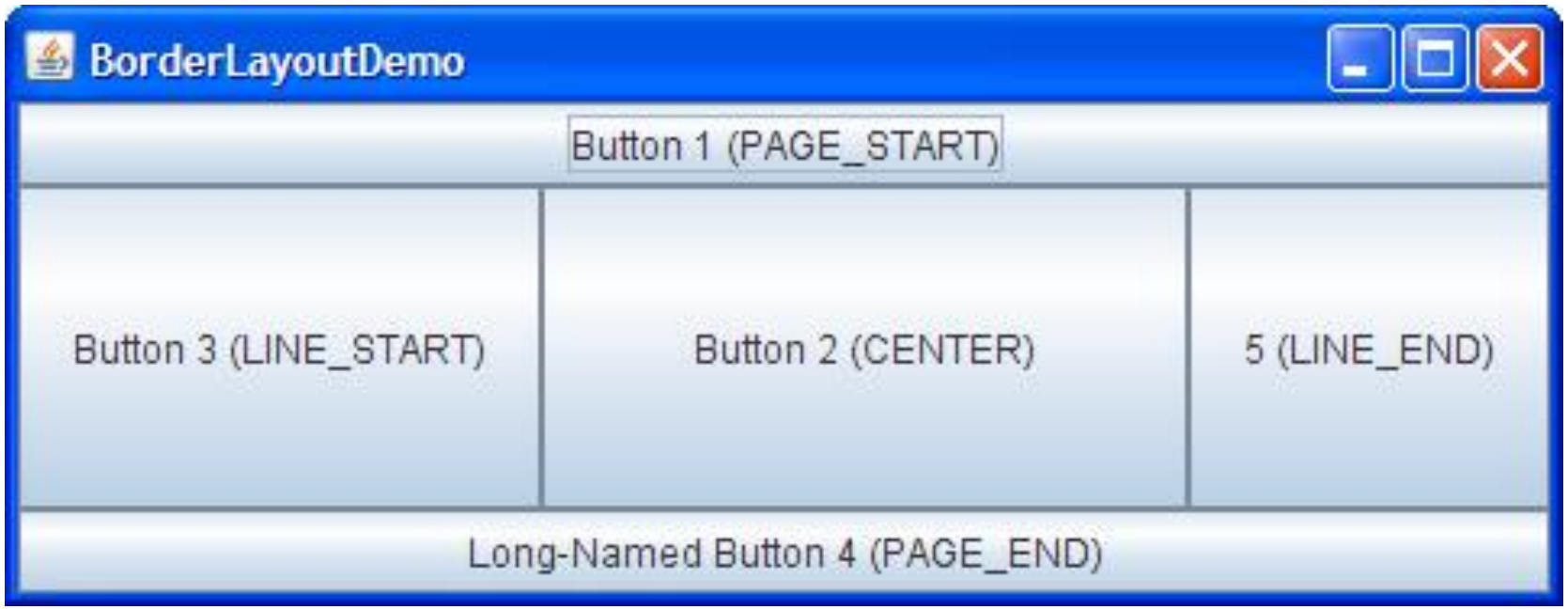

Vi du FlowLayout
Button 1
Button 2
Button 3
Button 4
Button 5
Button 6
Button 7
Button 8
Button 9
Button 10
Button 11
Button 12
Button 13
Button 14
Button 15
Button 16
Button 17
Button 18
Button 19
Button 20

Border Layout

- The BorderLayout is used to arrange the components in five regions: north, south, east, west and center. Each region (area) may contain one component only. It is the default layout of frame or window. The BorderLayout provides five constants for each region



- **public static final int NORTH**
- **public static final int SOUTH**
- **public static final int EAST**
- **public static final int WEST**
- **public static final int CENTER**
- Constructors of BorderLayout class:
- **BorderLayout():** creates a border layout but with no gaps between the components.
- **JBorderLayout(int hgap, int vgap):** creates a border layout with the given horizontal and vertical gaps between the components.

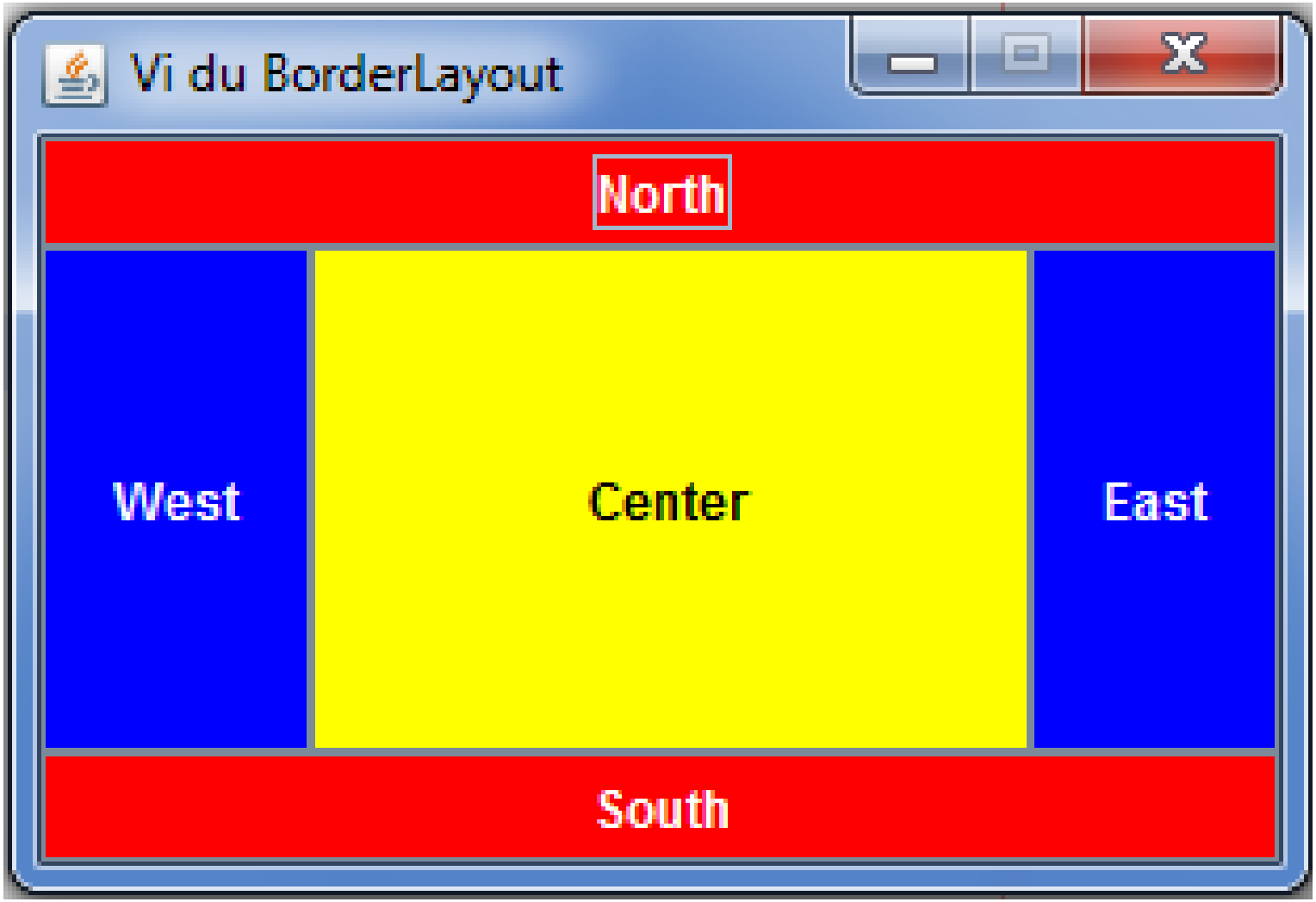

BorderLayoutDemo
Button 1 (PAGE_START)
Button 3 (LINE_START)
Button 2 (CENTER)
5 (LINE_END)
Long-Named Button 4 (PAGE_END)

```
1. public class DemoBorderLayout extends JFrame{
2.     private JButton
3.     bn=new JButton("North"),
4.     bs=new JButton("South"),
5.     be=new JButton("East"),
6.     bw=new JButton("West"),
7.     bc=new JButton("Center");
8.     public DemoBorderLayout()    {
9.         setTitle("BorderLayout");
10.         setSize(300,200);
    setDefaultCloseOperation(EXIT_ON_CLOSE);
11.         setLocationRelativeTo(null);
12.         setResizable(false);
13.         add(BorderLayout.NORTH, bn);
14.         add(BorderLayout.SOUTH, bs);
15.         add(BorderLayout.EAST, be);
16.         add(BorderLayout.WEST, bw);
17.         add(BorderLayout.CENTER, bc);
```

```
1. bn.setBackground(Color.red);
2.         bs.setBackground(Color.red);
3.         bc.setBackground(Color.YELLOW);
4.         be.setBackground(Color.BLUE);
5.         bw.setBackground(Color.BLUE);
6.         bn.setForeground(Color.WHITE);
7.         bs.setForeground(Color.WHITE);
8.         bc.setForeground(Color.black);
9.         be.setForeground(Color.WHITE);
10.         bw.setForeground(Color.WHITE);
11.     }
12.  public static void main(String[] args) {
13.  new DemoBorderLayout().setVisible(true);

14.     }
15.}
```

Result



Grid Layout

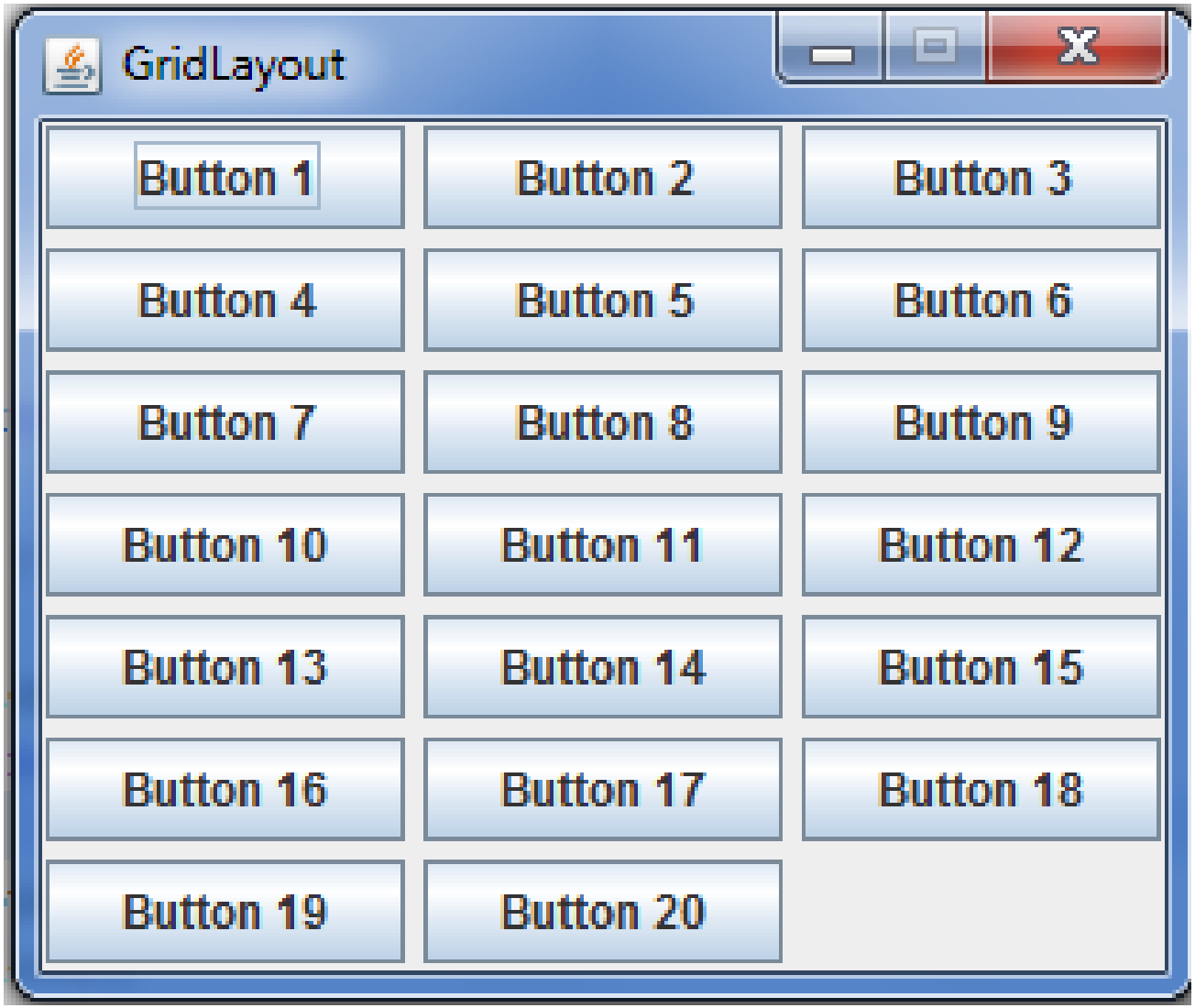
- The GridLayout is used to arrange the components in rectangular grid. One component is displayed in each rectangle.

GridLayout – Constructors

- public GridLayout()
  - Creates a single row with one column allocated per component
- public GridLayout(int rows, int cols)
  - Divides the window into the specified number of rows and columns
  - Either rows or cols (but not both) can be zero
- public GridLayout(int rows, int cols, int hgap, int vgap)
  - Uses the specified gaps between cells

```
1. public class DemoGridLayout extends
   JFrame{
2.  public DemoGridLayout(){
3.    setTitle("GridLayout");
4.    setSize(300, 250);
5.
   setDefaultCloseOperation(EXIT_ON_CLOSE);
6.    setLocationRelativeTo(null);
7.    setResizable(false);
8.    setLayout(new GridLayout(7,3,5,5));
9.    for(int i = 1;i <=20;i++){
10.     add(new JButton("Button "+i));
11.         }
12.    }
13. public static void main(String[] args) {
14.    new DemoGridLayout().setVisible(true);
15.    }
16.}
```

Result

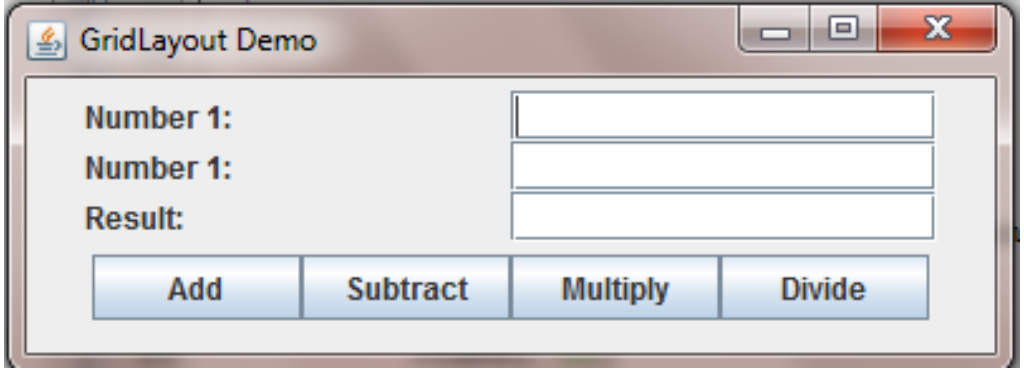

GridLayout
Button 1
Button 2
Button 3
Button 4
Button 5
Button 6
Button 7
Button 8
Button 9
Button 10
Button 11
Button 12
Button 13
Button 14
Button 15
Button 16
Button 17
Button 18
Button 19
Button 20

```
1. public class DemoGridLayout1 extends JFrame {
2.  public DemoGridLayout1() {
3.     initUI(); }
4.  public final void initUI() {
5.     JPanel panel = new JPanel();
6.
   panel.setBorder(BorderFactory.createEmptyBord
   er(5, 5, 5, 5));
7.     panel.setLayout(new GridLayout(5, 4, 5,
   5));
8.     String[] buttons = {
9.          "Cls", "Bck", "", "Close",
10.          "7", "8", "9", "/",
11.          "4", "5", "6", "*",
12.          "1", "2", "3", "-",
13.          "0", ".", "=", "+"
14.         };
```

```
1. for (int i = 0; i <
   buttons.length; i++) {
2.   if (i == 2)
3.     panel.add(new
   JLabel(buttons[i]));
4.   else
5.     panel.add(new
   JButton(buttons[i]));
6.         }
7.  add(panel);
8.  setTitle("Example GridLayout");
9.  setSize(350, 300);
```

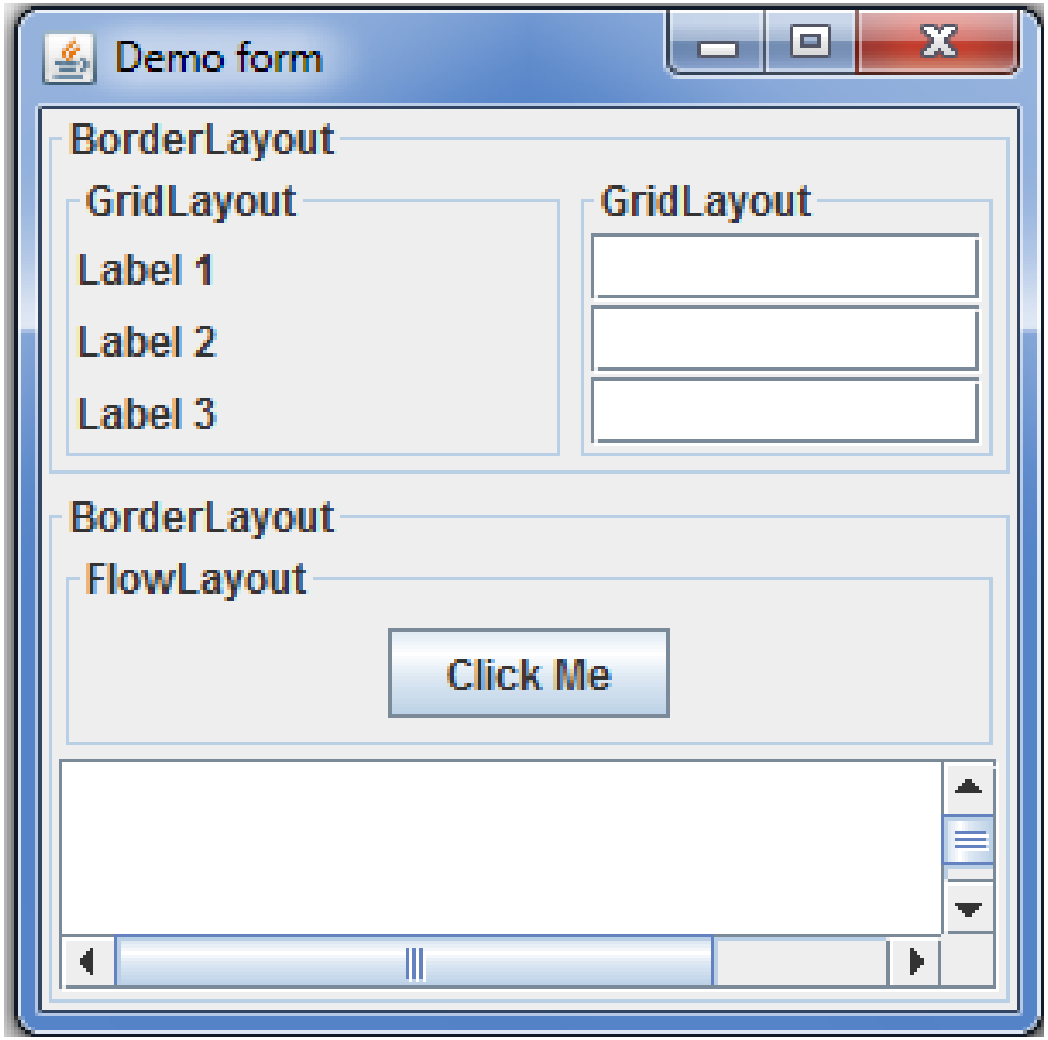
```
1.
   setDefaultCloseOperation(JFrame.EXIT_ON
   _CLOSE);
2.  setLocationRelativeTo(null);
3.  }
4.public static void main(String[] args)
   {
5.     DemoGridLayout1 ex = new
   DemoGridLayout1();
6.     ex.setVisible(true);
7.              }
8.     }
```

Combinations (Gridlayout)



- JPanel **p1**=new JPanel();
  p1.setLayout(new GridLayout(3,2));
- JPanel **p2**=new JPanel();
  p2.setLayout(new GridLayout(1,4));
- JPanel **main**=new JPanel();
  main.add(**p1**, BorderLayout.NORTH);
  main.add(**p2**, BorderLayout.SOUTH);
  this.setContentPane(main);//add(main);

DemoBorder.java

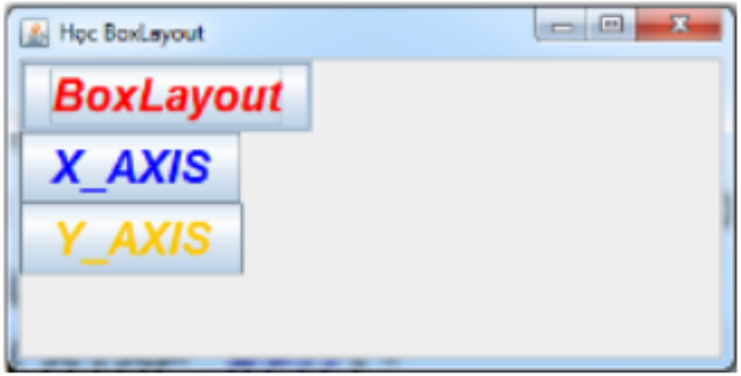


Box Layout

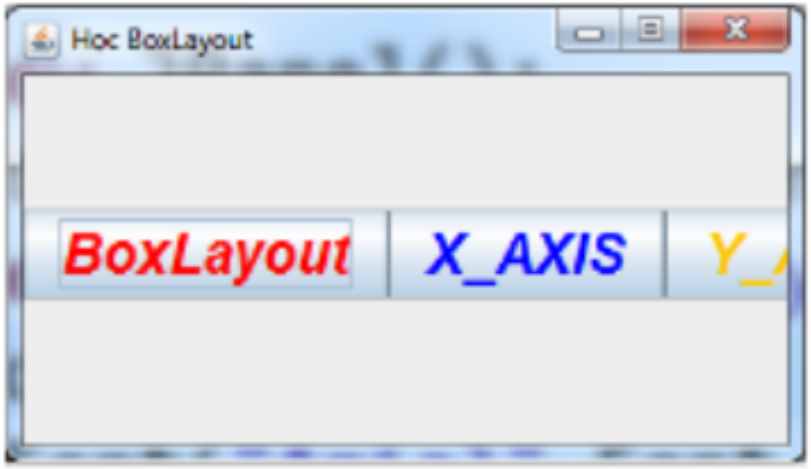
- The BoxLayout is used to arrange the components either vertically or horizontally. For this purpose, BoxLayout provides four constants.
- Fields of BoxLayout class
- **public static final int X_AXIS**
- **public static final int Y_AXIS**
- **public static final int LINE_AXIS**
- **public static final int PAGE_AXIS**
- Constructor of BoxLayout class
- **BoxLayout(Container c, int axis):** creates a box layout that arranges the components with the given axis.

Example: Box Layout

BoxLayout.X_AXIS



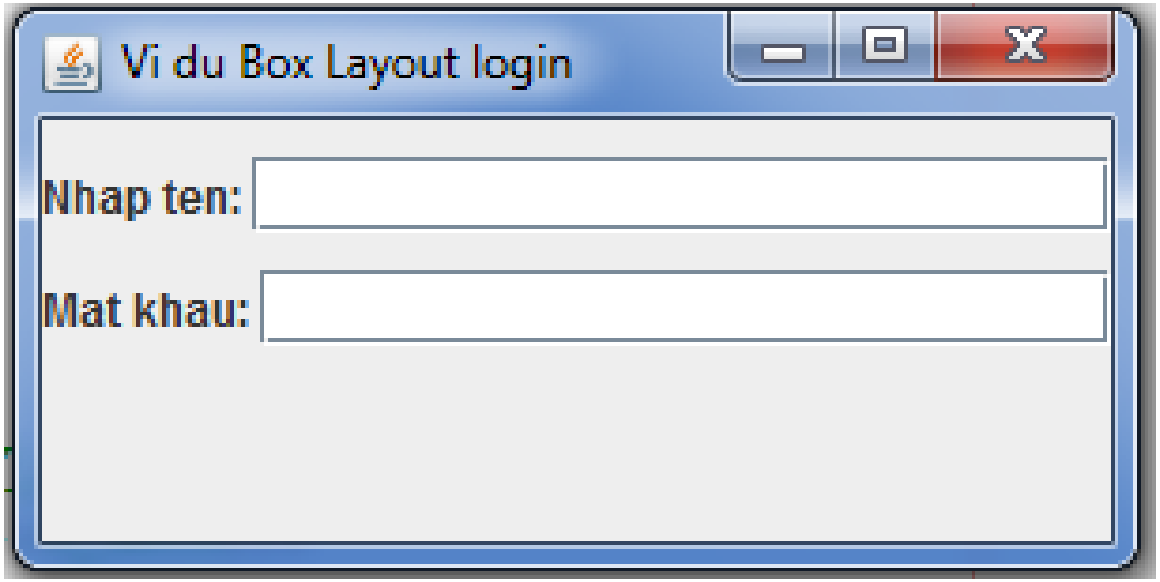
BoxLayout.Y_AXIS



No wrap row when resize dimension

```
1. public class BoxLayout1 extends JFrame{
2.  public BoxLayout1(){
3.     setTitle("Box Layout login example");
4.     setSize(300,150);
5.     setDefaultCloseOperation(EXIT_ON_CLOSE);
6.     JPanel p = new JPanel();
7.     JPanel p1 = new JPanel();
8.     JPanel p2 = new JPanel();
9.     p.setLayout(new BoxLayout(p,
   BoxLayout.Y_AXIS));
10.     p1.setLayout(new BoxLayout(p1,
   BoxLayout.X_AXIS));
11.     p2.setLayout(new BoxLayout(p2,
   BoxLayout.X_AXIS));
12.     p1.add(new JLabel("enter name: "));
13.     p1.add(new JTextField(15));
14.     p2.add(new JLabel("enter pass: "));
15.     p2.add(new JPasswordField(15));
```

```
1. p.add(Box.createRigidArea(new Dimension(10, 10)));
2. p.add(p1);
3. p.add(Box.createRigidArea(new Dimension(10, 10)));
4. p.add(p2);
5. this.add(p,BorderLayout.NORTH);
6. }
7. public static void main(String[] args) {
8.     new BoxLayout1().setVisible(true);
9. }
10.}
```



```
1. public class BoxLayout2 extends JFrame {
2.  public BoxLayout2(){
3.    setTitle("Box Layout login example");
4.    setSize(300,150);
5.
   setDefaultCloseOperation(EXIT_ON_CLOSE);
6.    Box b=Box.createVerticalBox();
7.    Box p1=Box.createHorizontalBox();
8.    Box p2=Box.createHorizontalBox();
9.    p1.add(new JLabel("enter name: "));
10.   p1.add(new JTextField(15));
11.   p2.add(new JLabel("enter pass: "));
12.   p2.add(new JPasswordField(15));
```

```
1. b.add(Box.createRigidArea(new
   Dimension(10, 10)));
2.  b.add(p1);
3.  b.add(Box.createRigidArea(new
   Dimension(10, 10)));
4.  b.add(p2);
5.  this.add(b,BorderLayout.NORTH);
6.  }
7. public static void main(String[]
   args) {
8.    new BoxLayout2().setVisible(true);
9.     }
10.}
```

Example Login

```
1. public class DemoLogin extends JFrame
   implements ActionListener{
2.   private   JButton   bLogon;
3.   private   JButton   bExit;
4.   private   JTextFieldusername;
5.   private   JPasswordField pass;
6.   public DemoLogin(){
7.      setTitle("Logon  program");
8.      setSize(500,350);
9.
   setDefaultCloseOperation(EXIT_ON_CLOSE);
10.     setLocationRelativeTo(null);
11.     buildGUI();
12.     }
```

```
1.  private void buildGUI(){
2.          JPanel   p1=new JPanel();
3.
    p1.setBorder(BorderFactory.createLineBorder(Color.red));
4.          JLabel   tieude;
5.          p1.add(tieude = new JLabel(“LOGIN"));
6.          tieude.setFont(new Font("Arial", Font.BOLD, 30));
7.          tieude.setForeground(Color.red);
8.          add(p1,BorderLayout.NORTH);
9.          JPanel   p2 = new JPanel();
10.
    p2.setBorder(BorderFactory.createLineBorder(Color.red));
11.         p2.add(bLogon=new JButton(“Login"));
12.         p2.add(bExit=new JButton("Exit"));
13.         add(p2,BorderLayout.SOUTH);
14.         JPanel   p3=new JPanel();
15.
    p3.setBorder(BorderFactory.createLineBorder(Color.red));
16.         Box      b=Box.createVerticalBox();
17.         Box      b1=Box.createHorizontalBox();
18.         Box      b2=Box.createHorizontalBox();
```

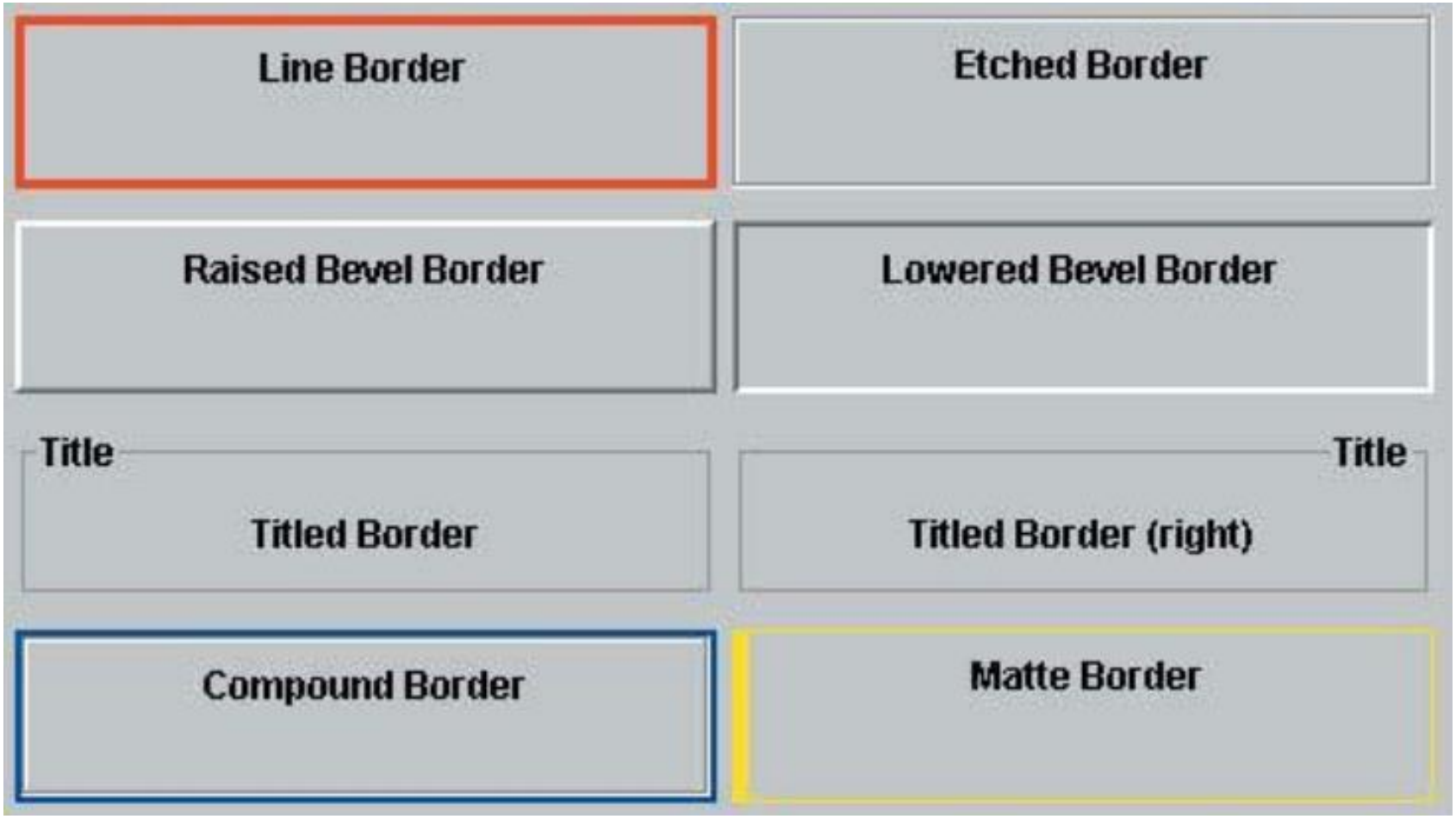
```
1.JLabel    lblUser, lblPass;
2.          b1.add(lblUser=new JLabel("Name:  "));
3.          lblUser.setFont(new Font("Arial",
Font.PLAIN, 15));
4.          b1.add(username= new JTextField(20));
5.          b2.add(lblPass=new JLabel("Password:  "));
6.          lblPass.setFont(new Font("Arial",
Font.PLAIN, 15));
7.          b2.add(pass=new JPasswordField(20));
8.
lblUser.setPreferredSize(lblPass.getPreferredSize());
9.          b.add(Box.createVerticalStrut(50));
10.          b.add(b1);
11.          b.add(Box.createVerticalStrut(10));
12.          b.add(b2);
13.          p3.add(b);
14.          add(p3,BorderLayout.CENTER);
15.          username.addActionListener(this);
16.          pass.addActionListener(this);
17.          bLogon.addActionListener(this);
18.          bExit.addActionListener(this);
19.     }
```

```
1.  @Override
2.      public void actionPerformed(ActionEvent e) {
3.          if(e.getSource()==bLogon){
4.
    if(username.getText().equalsIgnoreCase("anh") &&
    pass.getText().equalsIgnoreCase("anh")){
5.                  dispose();
6.
    JOptionPane.showMessageDialog(null,"Lgin
    success!!!");
7.              }
8.              else{
9.
    JOptionPane.showMessageDialog(null,"incorrect!!!");
10.                 username.requestFocus();
11.             }
12.         }
13.         else if(e.getSource()==bExit){
14.                 System.exit(0);
15.         }
16.     }
17. }
```

Borders

- Every JComponent can have one or more borders
- To put a border around a JComponent, you use its setBorder method. You can use the BorderFactory
  `BorderFactory.create`**`Xxx`**`Border(…)`
- ```
  JPanel pane = new JPanel();
  pane.setBorder(BorderFactory.crea
  teLineBorder(Color.black));
  ```
  ```

Example


Line Border
Etched Border
Raised Bevel Border
Lowered Bevel Border
Title
Titled Border
Title
Titled Border (right)
Compound Border
Matte Border

JTabbedPane

- The JTabbedPane class is used to switch between a group of components by clicking on a tab with a given title or icon. It inherits JComponent class.
- Constructors:
- JTabbedPane()
- JTabbedPane(int tabPlacement)
- JTabbedPane(int tabPlacement, int tabLayoutPolicy)

Example

```
public class TabbedPane {
  private static void showGUI() {
   final JFrame m = new JFrame("Tabbed Pane
  Example");
   m.setSize(400, 400);   m.setVisible(true);
  m.setDefaultCloseOperation(JFrame.EXIT_ON_CLOS
  E);
   m.setLayout(new GridLayout(1, 1));
   JTabbedPane tab = new
  JTabbedPane(JTabbedPane.TOP);
   tab.addTab("Tab1", addPanel("This is tab1"));
   tab.addTab("Tab2", addPanel("This is tab2"));
   tab.addTab("Tab3", addPanel("This is tab3"));
   tab.addTab("Tab4", addPanel("This is tab4"));
   m.add(tab);
```

```
int selectedIndex = tab.getSelectedIndex();
  System.out.println("Default Index:" +
  selectedIndex);
  tab.setSelectedIndex(tab.getTabCount()-1);
  selectedIndex = tab.getSelectedIndex();
  System.out.println("Index:" + selectedIndex);
    }
private static JPanel addPanel(String text) {
    JPanel p = new JPanel();
    p.add(new JLabel(text));
    p.setLayout(new GridLayout(1, 1));
    return p;
    }
public static void main(String[] args) {
        showGUI();
    }
}
```

JCheckBox - JRadioButton

- **JCheckBox**: The JCheckBox class is used to create a checkbox. It is used to turn an option on (true) or off (false). Clicking on a CheckBox changes its state from "on" to "off" or from "off" to "on ".
- **JRadioButton** The JRadioButton class is used to create a radio button. It is used to choose one option from multiple options. It is widely used in exam systems or quiz. It should be added in ButtonGroup to select one radio button only.

JCheckBox – Constructor

- JCheckBox()
- JCheckBox(String text)
- JCheckBox(String text, boolean selected)
- JCheckBox(Icon icon)
- JCheckBox(String text, Icon icon)
- JCheckBox(String text,Icon icon,boolean selected)

JCheckBox – Methods

- boolean isSelected()
  - returns the state of the checkbox
- void setSelected(boolean state)
  - sets the checkbox to a new state
- String getText()
- void setText(String text)
  - gets or sets the button's text
- addItemListener
  - Add an ItemListener to process ItemEvent in itemStateChanged

JCheckBox Demo

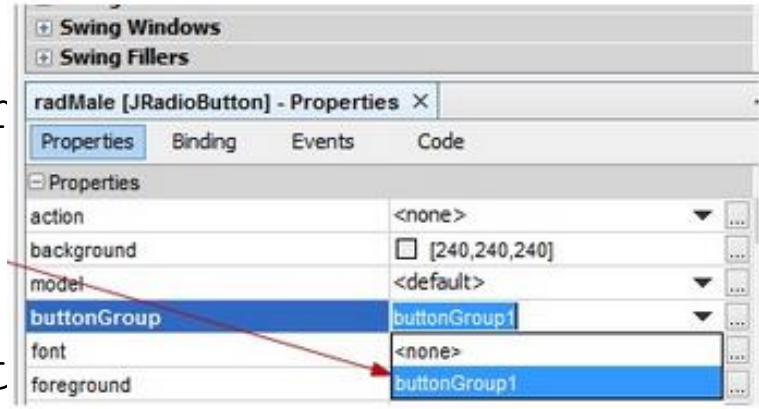
- `JCheckBox ga, bo;`
- `JPanel p2 = new JPanel();`
- `p2.add(chicken=new JCheckBox("fried chicken"));`
- `p2.add(beef = new JCheckBox("beef "));`
- `add(p2);`
- `public void itemStateChanged(ItemEvent e) {`
- `if (e.getItem() == chicken)`
- `JOptionPane.showMessageDialog(null,"You select fried chicken");`
- `if (e.getItem() == beef)`
- `JOptionPane.showMessageDialog(null,"You select beef");`

JRadioButton - Constructor

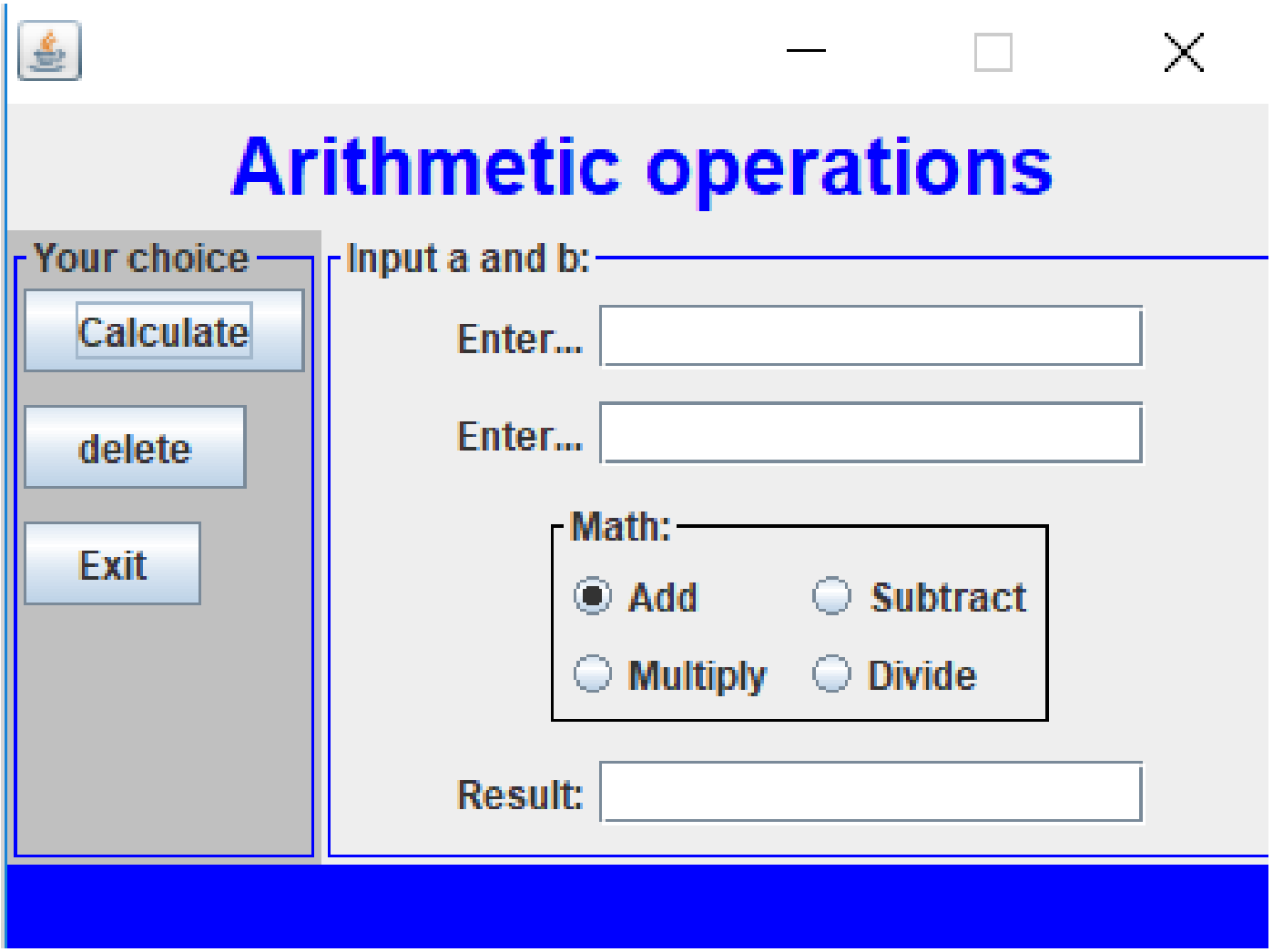
- JRadioButton()
- JRadioButton(String text)
- JRadioButton(String text, boolean selected)
- JRadioButton(Icon icon)
- JRadioButton(String text, Icon icon)
- JRadioButton(String text, Icon icon, boolean selected)

JRadioButton vs Button Group

- ButtonGroup pt=new ButtonGr
- Final JRadioButton add=new JRadioButton("Add");
- Final JRadioButton subtract JRadioButton("Subtract");
- Final JRadioButton multiply=new JRadioButton("Multiply");
- Final JRadioButton divide=new JRadioButton("Divide");
- pt.add(add);pt.add(suntract);
- pt.add(multiply);pt.add(divide);

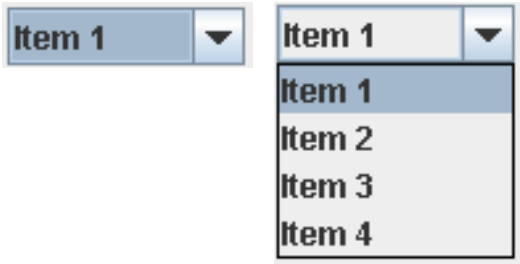


Example


Arithmetic operations
Your choice
Calculate
delete
Exit
Input a and b:
Enter...
Enter...
Math:
Add
Subtract
Multiply
Divide
Result:

JComboBox (1)

- The object of Choice class is used to show popup menu of choices



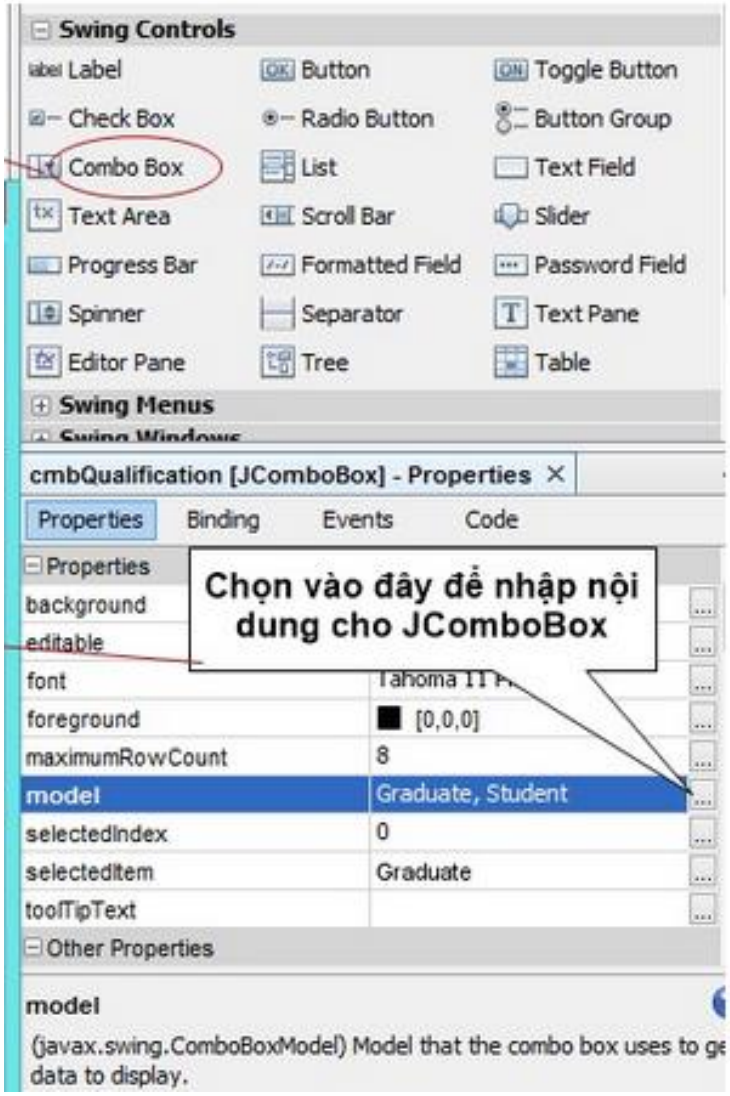
Constructors

- `public JComboBox()`
- `public JComboBox(Object[] items)`
- `public JComboBox(Vector items)`

Common used methods

- `public void addItem(Object item)`
- `public int getItemCount()`
- `public int getSelectedIndex()`
- `public Object getSelectedItem()`
- `public void setEditable(boolean editable)`
- `public void setSelectedIndex(int index)`
- `public void setSelectedItem(Object item)`

JComboBox (2)


Swing Controls
Label
Button
Toggle Button
Check Box
Radio Button
Button Group
Combo Box
List
Text Field
Text Area
Scroll Bar
Slider
Progress Bar
Formatted Field
Password Field
Spinner
Separator
Text Pane
Editor Pane
Tree
Table
Swing Menus
cmbQualification [JComboBox] - Properties
Properties
Binding
Events
Code
Properties
Chọn vào đây để nhập nội dung cho JComboBox
background
editable
font
foreground
[0,0,0]
maximumRowCount
8
model
Graduate, Student
selectedIndex
0
selectedItem
Graduate
toolTipText
Other Properties
model
(javax.swing.ComboBoxModel) Model that the combo box uses to ge
data to display.

Jlist (1)

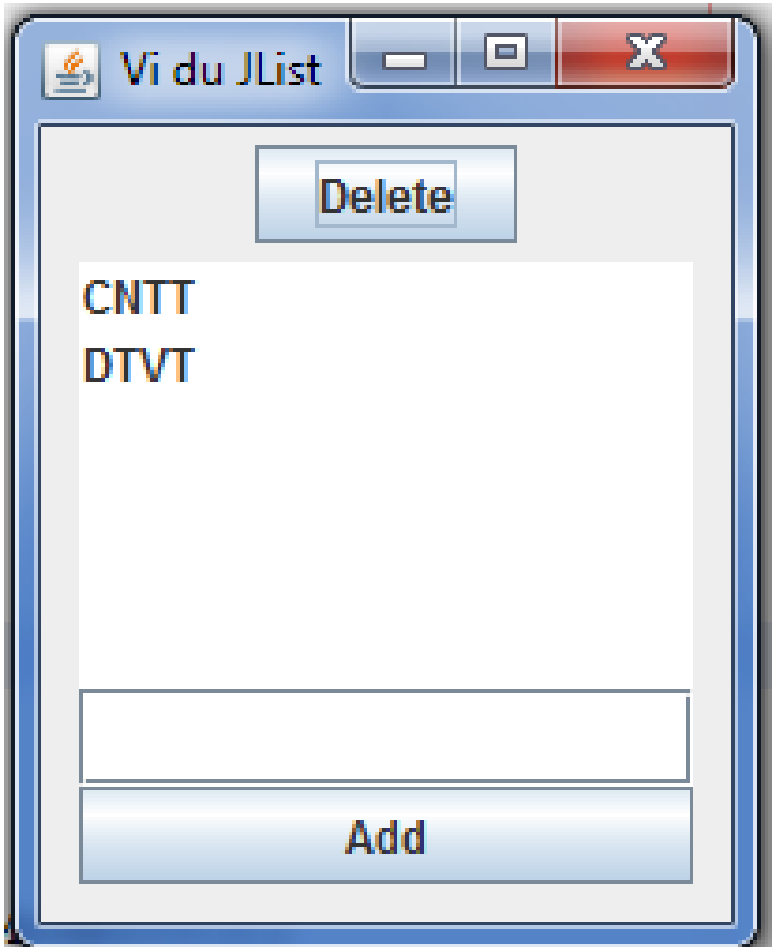
- JList The object of JList class represents a list of text items. The list of text items can be set up so that the user can choose either one item or multiple items.

Jlist (2)

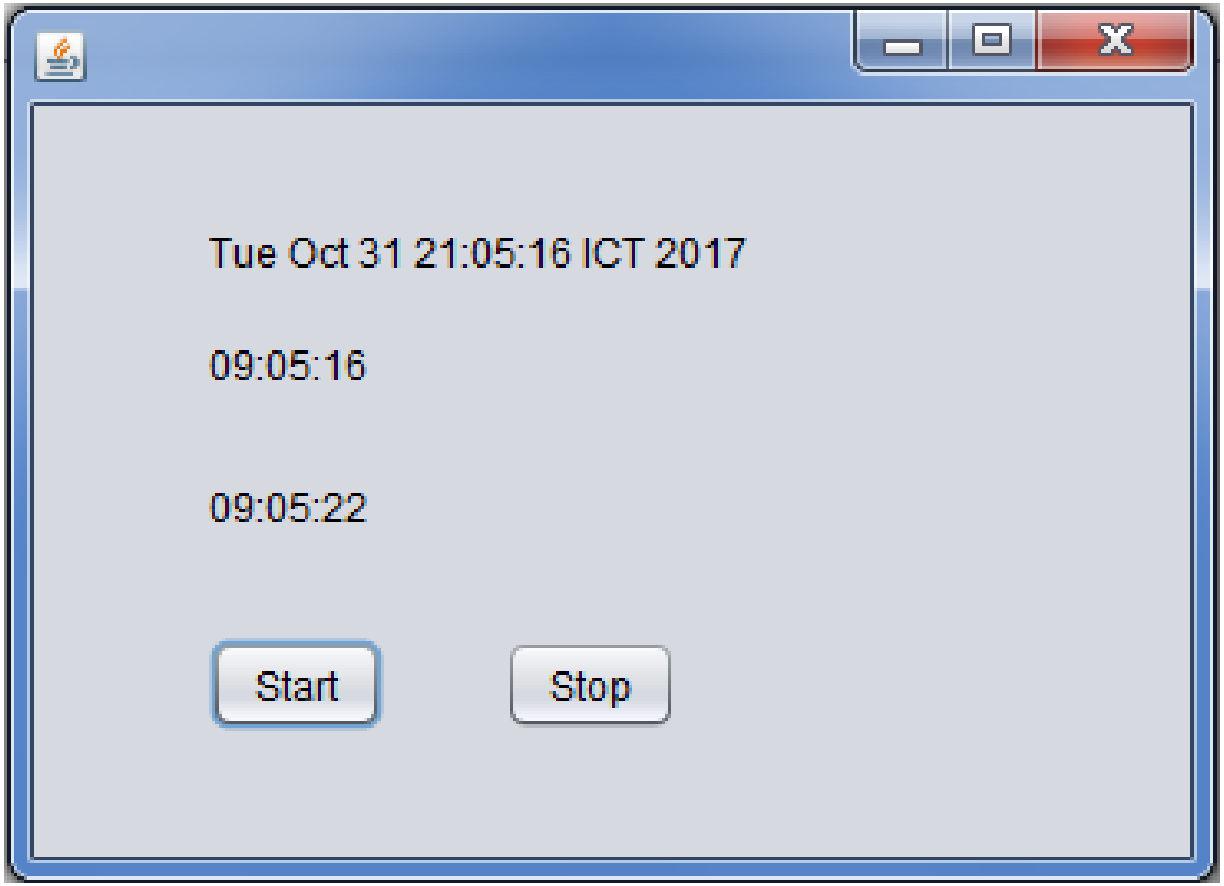
```
public void clearSelection()
public int getSelectedIndex()
public int[] getSelectedIndices()
public boolean isSelectionEmpty()
public void setListData(Object[] items)
public void setSelectedIndex(int index)
public void setSelectedIndices(int[] indices)
```

- Constructors
  - JList()
  - JList (Object[] dataItems)
  - JList (Vector vectorItems)
- Event handling:
  - ListSelectionEvent
  - ListSelectionListener
  - public void valueChanged(ListSelectionEvent e)

Example



Example



JSlider

- The Java JSlider class is used to create the slider. By using JSlider, a user can select a value from a specific range.
- **JSlider()**: creates a slider with the initial value of 50 and range of 0 to 100.
- **JSlider(int orientation)**: creates a slider with the specified orientation set by either JSlider.HORIZONTAL or JSlider.VERTICAL with the range 0 to 100 and initial value 50.

- **JSlider(int min, int max)**: creates a horizontal slider using the given min and max.
- **JSlider(int min, int max, int value)**: creates a horizontal slider using the given min, max and value.
- **JSlider(int orientation, int min, int max, int value)**: creates a slider using the given orientation, min, max and value.

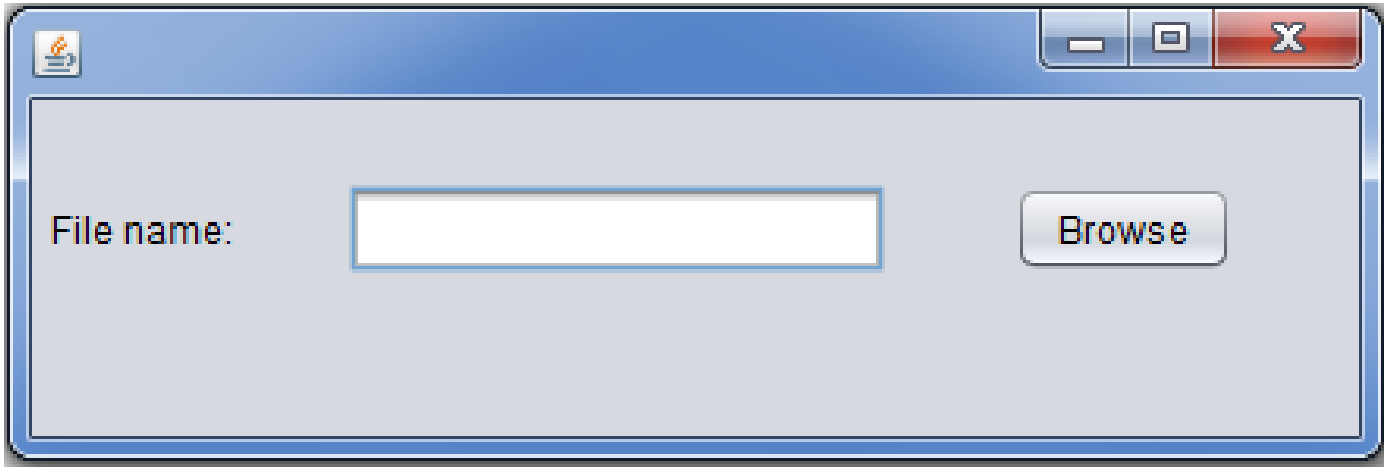
Example

```
 JLabel jLabel1;
public Main() {
 initComponents();
 setLayout(new BorderLayout());
 jLabel1=new JLabel("Java is
 cool",JLabel.CENTER);
 jLabel1.setFont(new Font("Times New Roman",
 Font.BOLD, 32));
 add(jLabel1,BorderLayout.NORTH);
 add(jSlider1,BorderLayout.CENTER);
 jSlider1.setMinimum(200);
 jSlider1.setMaximum(1000);
 jSlider1.setMinorTickSpacing(20);
 jSlider1.setMajorTickSpacing(100);
 jSlider1.setPaintLabels(true);
 jSlider1.setPaintTicks(true);
```

JFileChooser

- The object of JFileChooser class represents a dialog window from which the user can select file.
- **constructor**
- JFileChooser()
- JFileChooser(File currentDirectory)
- **int showDialog(Component parent, String approveButtonText)** Displays a file chooser with the approve button text specified by the String argument
- **int showSaveDialog(Component parent)** Displays a file chooser with a "Save" approve button
- **int showOpenDialog(Component parent)** Displays an file chooser with an "Open" approve button

Example



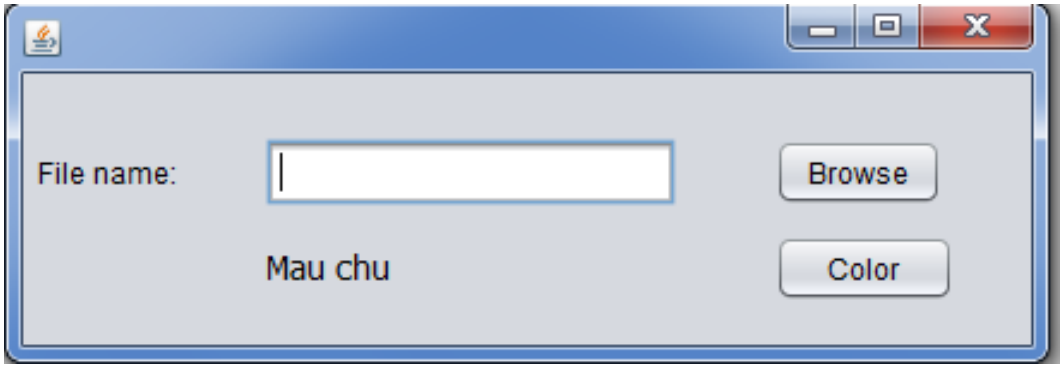

```
private void
   jButton1ActionPerformed(java.awt.
   event.ActionEvent evt) {
   txtfile.setText(""+displayChosenF
   ile());
     }
```

```
private String displayChosenFile(){
        String filestr=null;
        JFileChooser file=new JFileChooser(".");
        int select=file.showOpenDialog(null);
  if(select==JFileChooser.APPROVE_OPTION){
            File
  selectedFile=file.getSelectedFile();
  System.out.println(selectedFile.getParent());
  System.out.println(selectedFile.getName());
        try{
  filestr=selectedFile.getCanonicalPath();
            }catch(Exception e){
                e.printStackTrace();
            }
        }
        return filestr;
    }
```

JColorChooser

- The JColorChooser class is used to create a color chooser dialog box so that user can select any color.
- **JColorChooser()**: It is used to create a color chooser panel with white color initially.
- **JColorChooser(Color initialColor)**: It is used to create a color chooser panel with the specified color initially.

```
Color c =
  JColorChooser.showDialog(this,
                    "Choose foreground
  color", Color.BLACK);
        if(c != null){
  jTextArea1.setForeground(c);
  jButton1.setForeground(c);
        }
```

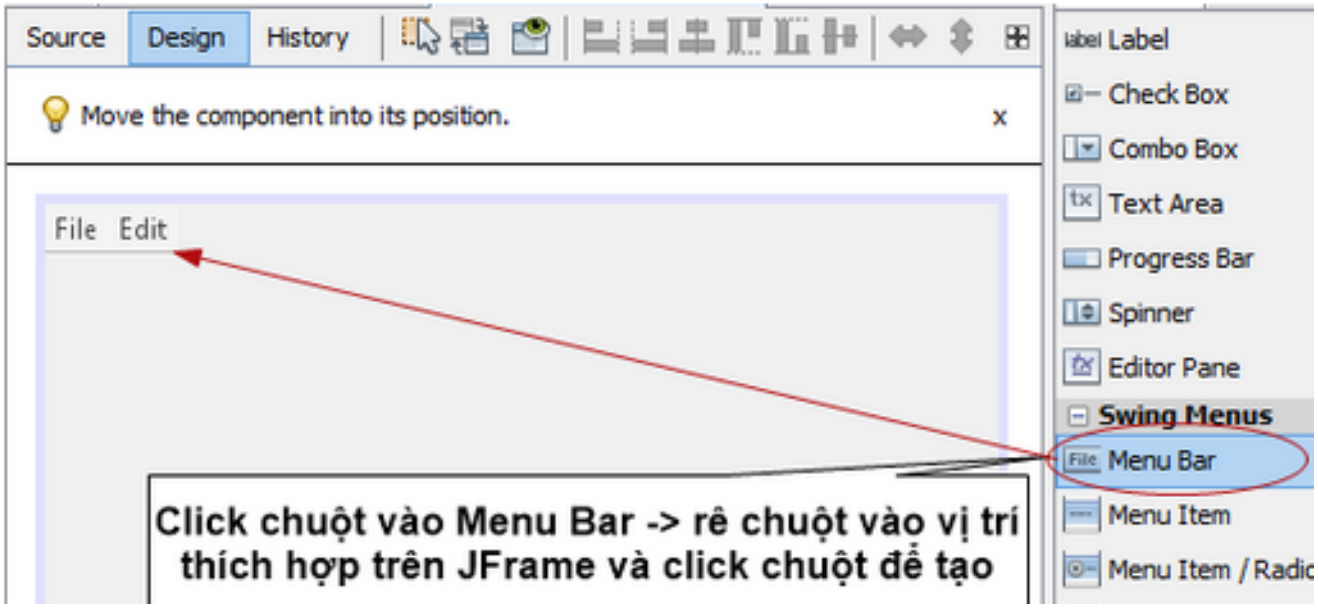


Swing Menu Components

Objectives

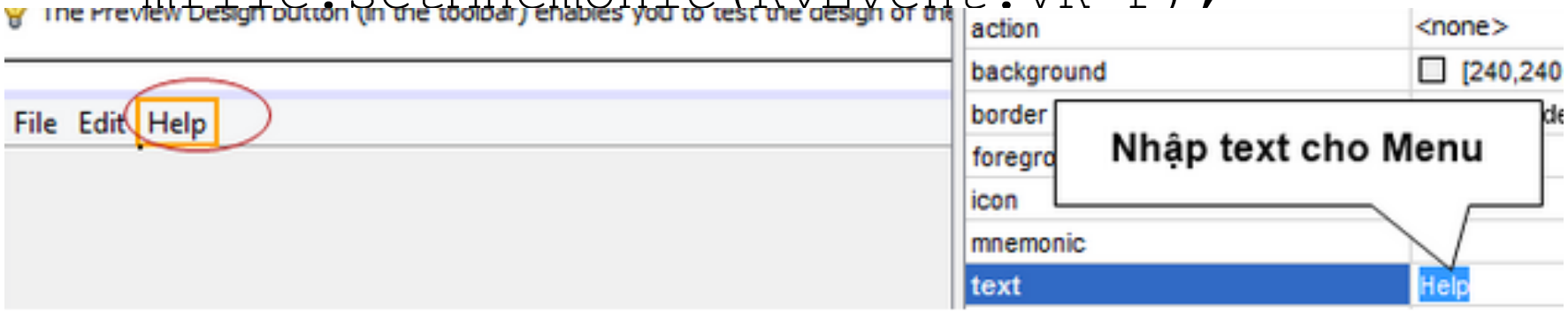
JMenuBar class

- The JMenuBar class is used to display menubar on the window or frame
- `JFrame f= new JFrame("Menu demo");`
- `JMenuBar bar = new JMenuBar();`
- `f.setJMenuBar(bar);`



JMenu class

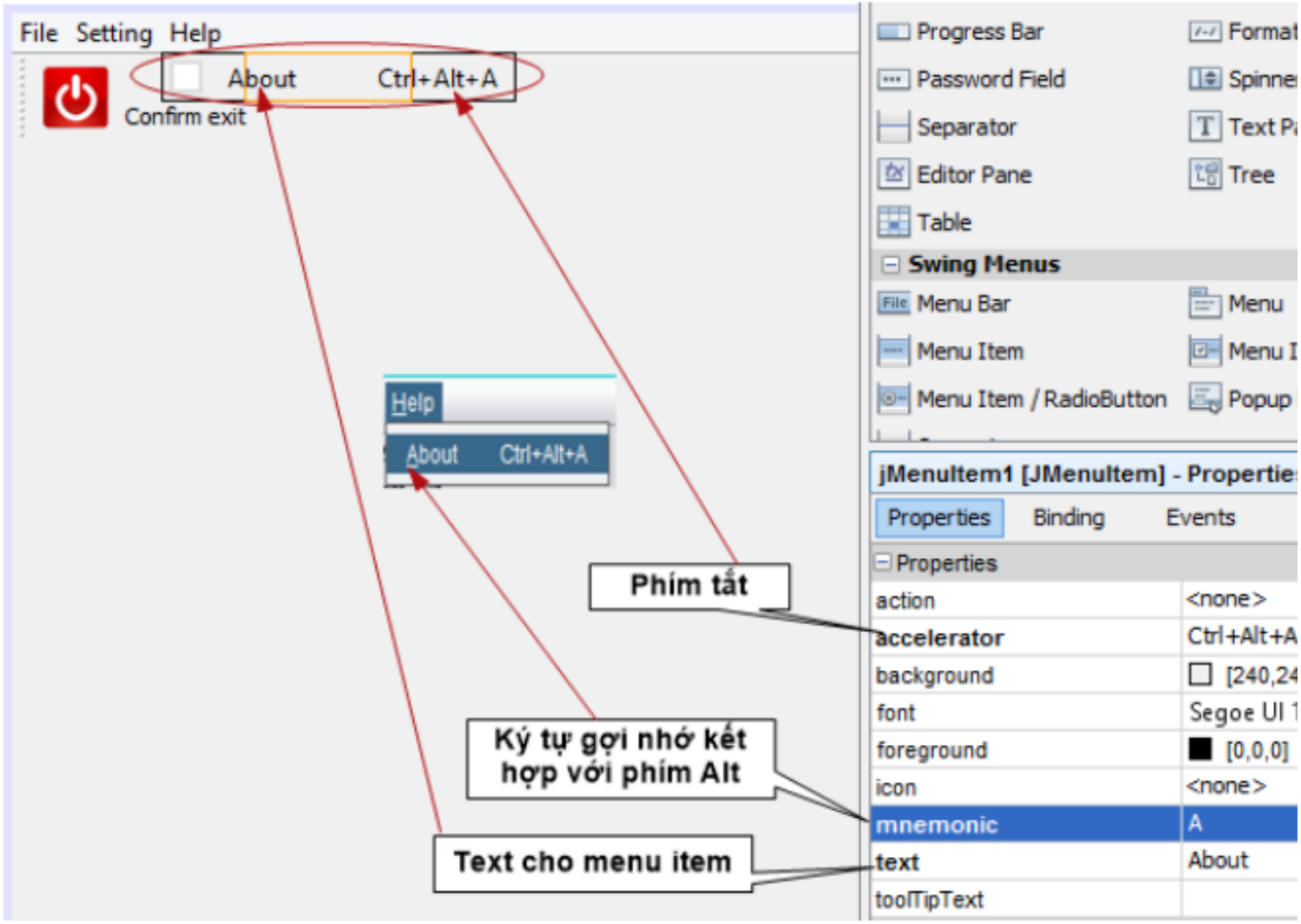
- The object of JMenu class is a pull down menu component which is displayed from the menu bar.
- Constructors:
- `JMenu()`
- `JMenu(String label)`
- `JMenu mfile= new JMenu("File");`
- `bar.add(mfile);`
- `mfile.addSeparator();`
- `mfile.setMnemonic(KyEvent.VK F);`



JMenuItem

- Constructors:
  - `JMenuItem()`
  - `JMenuItem(Action a)`
  - `JMenuItem(Icon icon)`
  - `JMenuItem(String text)`
  - `JMenuItem(String text, Icon icon)`
  - `JMenuItem(String text, int mnemonic)`
- Important methods
  - `setEnable(boolean enable)`
  - `setMnemonic(int mnemonic)`
  - `setAccelerator(KeyStroke keyStroke)`
- Add menu item to menu
  - `menuObject.add(menuItemObject)`

menu item


File Setting Help
About Ctrl+Alt+A
Confirm exit
Help
About Ctrl+Alt+A
Phím tắt
Ký tự gợi nhớ kết hợp với phím Alt
Text cho menu item
Progress Bar
Password Field
Separator
Editor Pane
Table
Swing Menus
Menu Bar
Menu Item
Menu Item / RadioButton
Menu
Popup
jMenuItem1 [JMenuItem] - Properties
Properties
Binding
Events
Properties
action <none>
accelerator Ctrl+Alt+A
background [240,24
font Segoe UI
foreground [0,0,0]
icon <none>
mnemonic A
text About
toolTipText

JCheckBoxMenuItem

- Constructors:
  - `JCheckBoxMenuItem()`
  - `JCheckBoxMenuItem(Action a)`
  - `JCheckBoxMenuItem(String text)`
  - `JCheckBoxMenuItem(Icon icon)`
  - `JCheckBoxMenuItem(String text, Icon icon)`
  - `JCheckBoxMenuItem(String text, boolean b)`
  - `JCheckBoxMenuItem(String text, Icon icon, boolean b)`
- Important methods
  - `boolean isSelected()`
  - `get/ setSelected (boolean)`
  - `get/setState(boolean)`
- Add menu item to menu

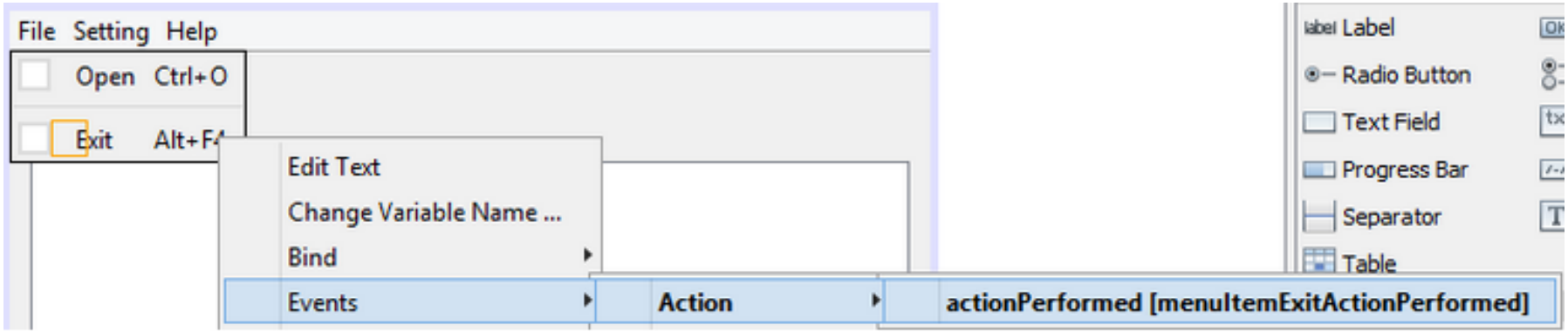
  `menuObject.add(checkBoxMenuItemObject)`

JCheckBoxMenuItem

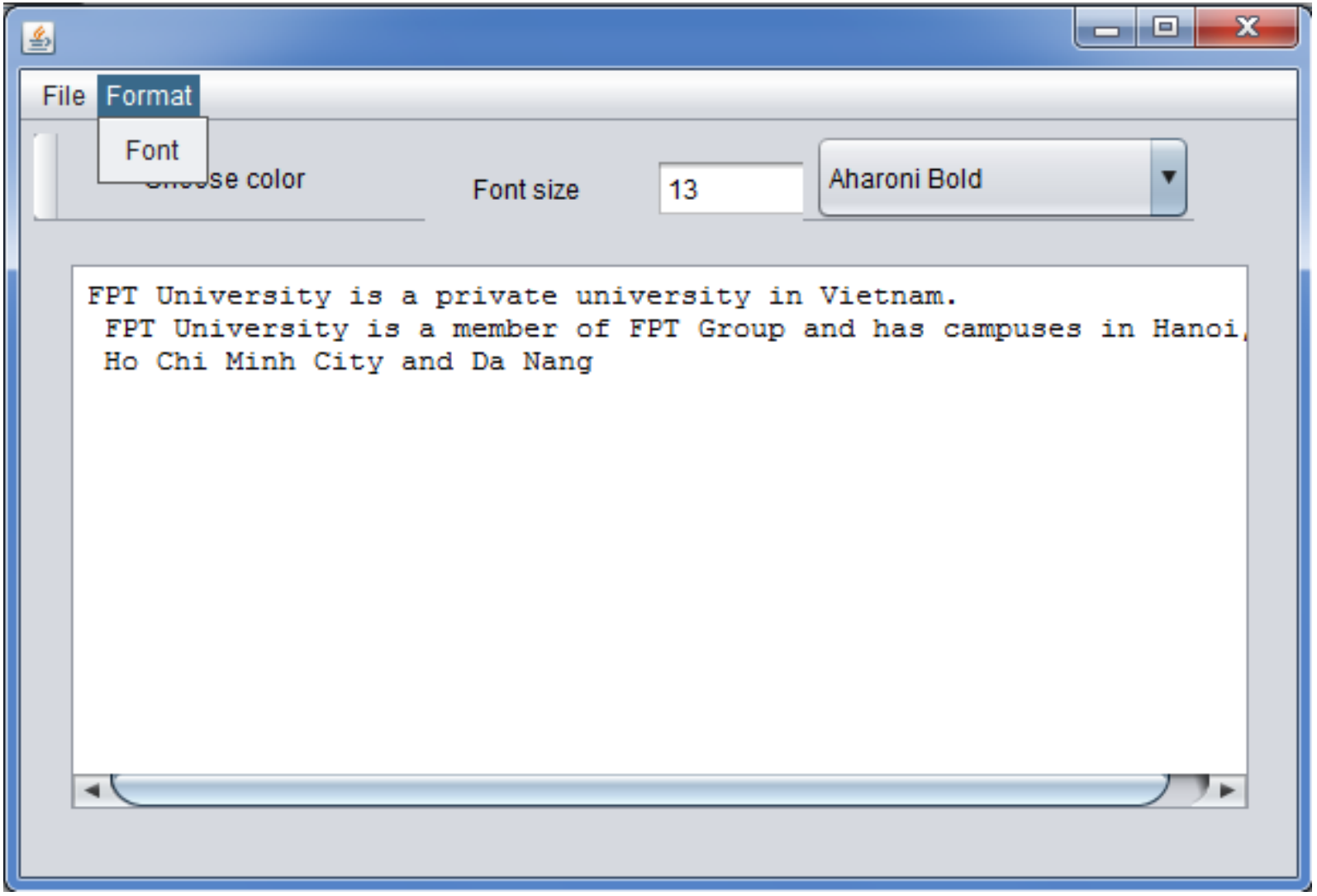
- Constructors:
  - `JCheckBoxMenuItem()`
  - `JCheckBoxMenuItem(Action a)`
  - `JCheckBoxMenuItem(String text)`
  - `JCheckBoxMenuItem(Icon icon)`
  - `JCheckBoxMenuItem(String text, Icon icon)`
  - `JCheckBoxMenuItem(String text, boolean b)`
  - `JCheckBoxMenuItem(String text, Icon icon, boolean b)`
- Important methods
  - `boolean isSelected()`
  - `get/ setSelected (boolean)`
  - `get/setState(boolean)`
- Add menu item to menu

```
menuObject.add(checkBoxMenuItemObject)
```

Event for Menu item



Example


File
Format
Font
Font size
13
Aharoni Bold
FPT University is a private university in Vietnam.
FPT University is a member of FPT Group and has campuses in Hanoi,
Ho Chi Minh City and Da Nang

JTable

- The JTable class is used to display data in tabular form. It is composed of rows and column.

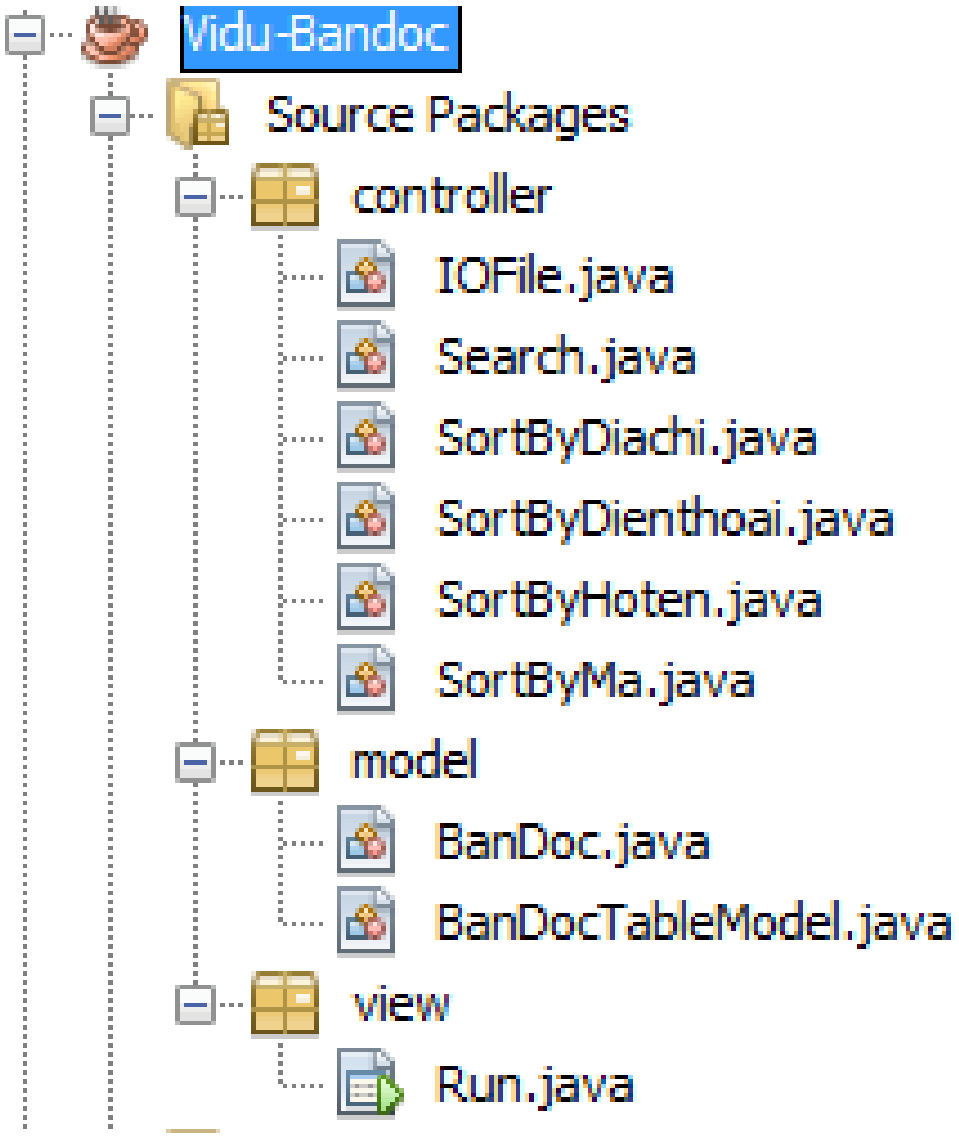
Constructors - Methods of JTable

- JTable(Object[][] entries, Object[] columnNames)
  - constructs a table with a default table model
- JTable(TableModel model)
  - displays the elements in the specified, non-null table model
- int **getSelectedRow()**
  - returns the index of the first selected row, -1 if no row is selected
- Object **getValueAt**(int row, int column)
- void setValueAt(Object value, int row, int column)
  - gets or sets the value at the given row and column
- int **getRowCount**()
  - returns the number of row in the table

JTable with changeable choices

- JTable:
- DefaultTableModel
- String[] cols= {“Code", “Name", “number of credits "};
- DefaultTableModel **model**=new DefaultTableModel(cols,0);
- JTable table = new JTable(model);
- JScrollPane pane = new JScrollPane(table);
- Add/remove elements
- Use the **model**, not the JTable directly

Example


Vidu-Bandoc
Source Packages
controller
IOFile.java
Search.java
SortByDiachi.java
SortByDienthoai.java
SortByHoten.java
SortByMa.java
model
BanDoc.java
BanDocTableModel.java
view
Run.java

Methods in DefaultTableModel

- void **addRow**(Object[] rowData)
- void **insertRow**(int row, Object[] rowData
- void **removeRow**(int row)
- void **setValueAt**(Object value, int row, int column)
- Void **fireTableDataChanged()**

BanDoc.java

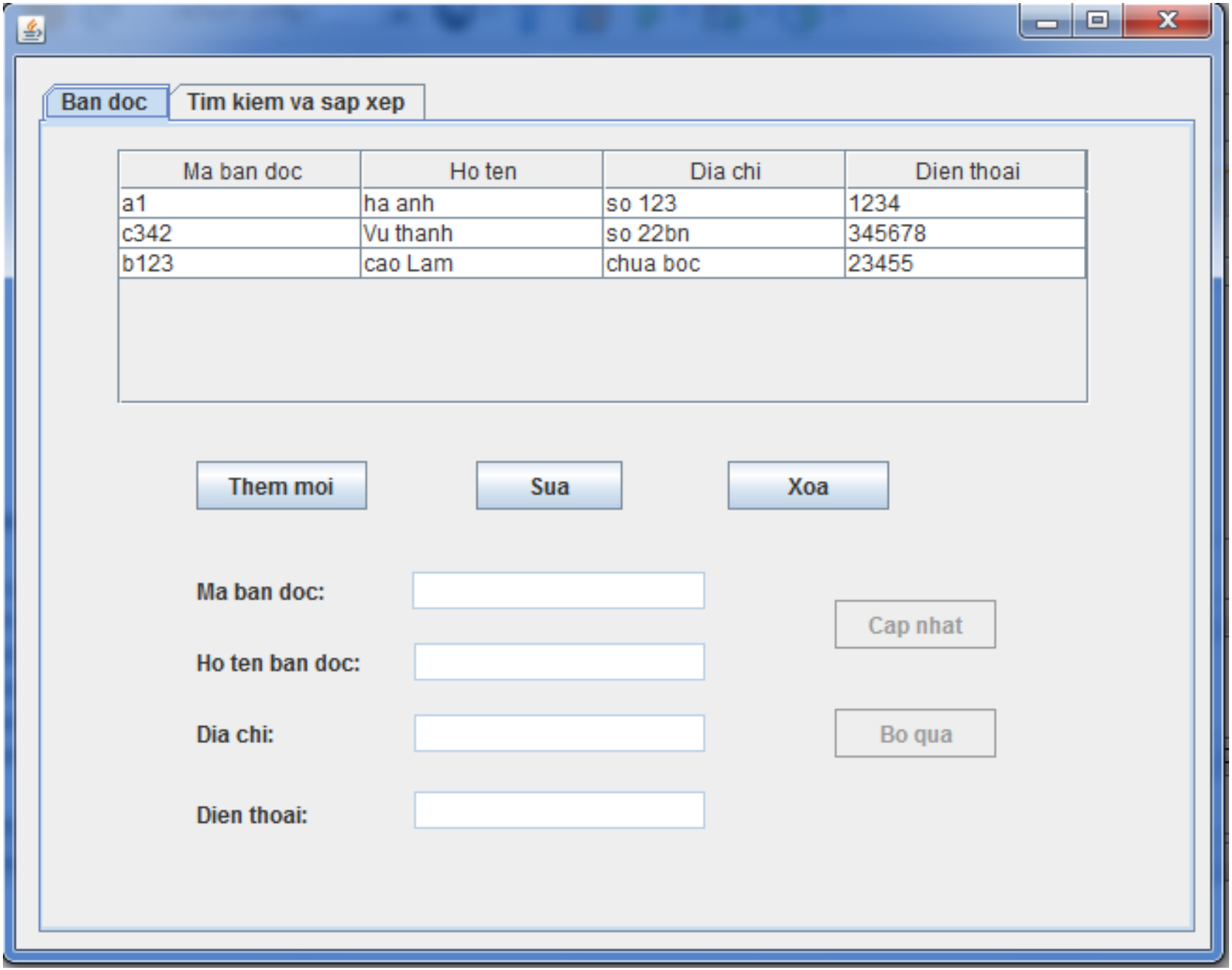
```
public class BanDoc implements
  Serializable{
     private String maBD;
     private String tenBD;
     private String diachi;
     private String dienthoai;
     public BanDoc(){
     }
//getter and setter
}
```

BanDocTableModel.java

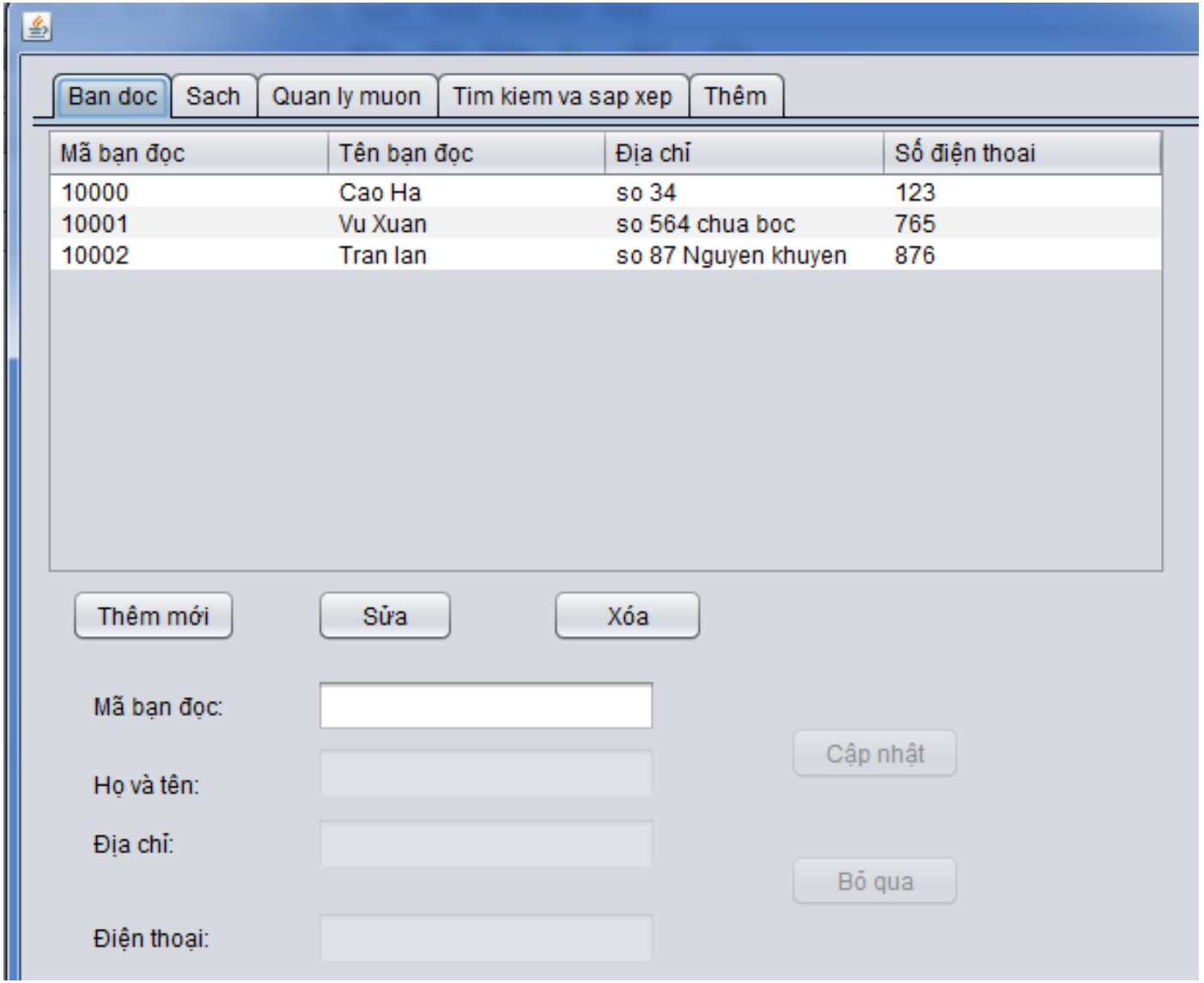
```
1. public class BanDocTableModel extends
   AbstractTableModel{
2.     private String[] columns = {"Ma ban
   doc", "Ho ten", "Dia chi","Dien thoai"};
3.     ArrayList<BanDoc> bandoc;

4.     public ArrayList<BanDoc> getBanDoc() {
5.         return bandoc;    }
6.     public void setBanDoc(ArrayList<BanDoc>
   bandoc) {
7.         this.bandoc = bandoc;    }
8.     public int getRowCount() {
9.         return bandoc.size();    }
10.     public int getColumnCount() {
11.         return columns.length;    }
```

```
1.@Override
2.  public String getColumnName(int column) {
3.        return columns[column];
4.    }
5.  public Object getValueAt(int rowIndex, int
columnIndex) {
6.     BanDoc bd = bandoc.get(rowIndex);
7.     if(columns[columnIndex].equals("Ma ban doc"))  {
8.          return bd.getMaBD();
9.     }
10.    else if(columns[columnIndex].equals("Ho ten")) {
11.        return bd.getTenBD();
12.     }
13.    else if(columns[columnIndex].equals("Dia chi")) {
14.           return bd.getDiachi();
15.        }
16. else if(columns[columnIndex].equals("Dien thoai")) {
17.            return bd.getDienthoai();
18.        }
19.        return "";
20.    }
21.}
```


Ban doc
Tim kiem va sap xep
Ma ban doc
Ho ten
Dia chi
Dien thoai
a1
ha anh
so 123
1234
c342
Vu thanh
so 22bn
345678
b123
cao Lam
chua boc
23455
Them moi
Sua
Xoa
Ma ban doc:
Ho ten ban doc:
Dia chi:
Dien thoai:
Cap nhat
Bo qua

Example


Ban doc
Sach
Quan ly muon
Tim kiem va sap xep
Thêm
Mã bạn đọc
Tên bạn đọc
Địa chỉ
Số điện thoai
10000
Cao Ha
so 34
123
10001
Vu Xuan
so 564 chua boc
765
10002
Tran lan
so 87 Nguyen khuyen
876
Thêm mới
Sửa
Xóa
Mã bạn đọc:
Họ và tên:
Địa chỉ:
Điện thoại:
Cập nhật
Bỏ qua