Java Swing Tutorial

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.

Difference between AWT and Swing

There are many differences between java awt and swing that are given below.

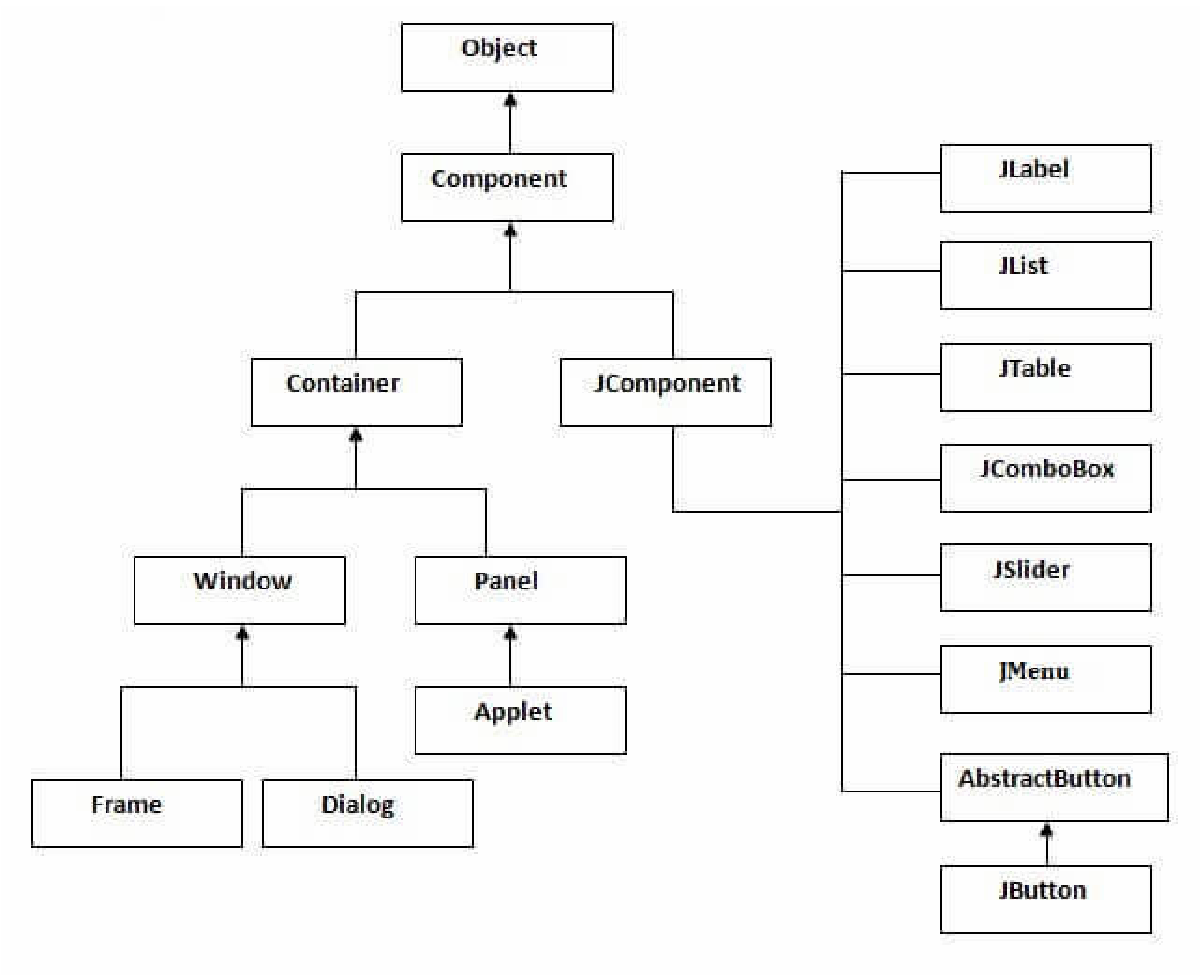
No.	Java AWT	Java Swing
1)	AWT components are **platform-dependent**.	Java swing components are **platform-independent**.
2)	AWT components are **heavyweight**.	Swing components are **lightweight**.
3)	AWT **doesn't support pluggable look and feel**.	Swing **supports pluggable look and feel**.
4)	AWT provides **less components** than Swing.	Swing provides **more powerful components** such as tables, lists, scrollpanes, colorchooser, tabbedpane etc.
5)	AWT **doesn't follows MVC**(Model View Controller) where model represents data, view represents presentation and controller acts as an interface between model and view.	Swing **follows MVC**.

What is JFC

The Java Foundation Classes (JFC) are a set of GUI components which simplify the development of desktop applications.

Hierarchy of Java Swing classes

The hierarchy of java swing API is given below.



Commonly used Methods of Component class

The methods of Component class are widely used in java swing that are given below.

Method	Description
public void add(Component c)	add a component on another component.
public void setSize(int width,int height)	sets size of the component.
public void setLayout(LayoutManager m)	sets the layout manager for the component.

public void setVisible(boolean b)	sets the visibility of the component. It is by default false.

Java Swing Examples

There are two ways to create a frame:

- By creating the object of Frame class (association)
- By extending Frame class (inheritance)

We can write the code of swing inside the main(), constructor or any other method.

Simple Java Swing Example

Let's see a simple swing example where we are creating one button and adding it on the JFrame object inside the main() method.

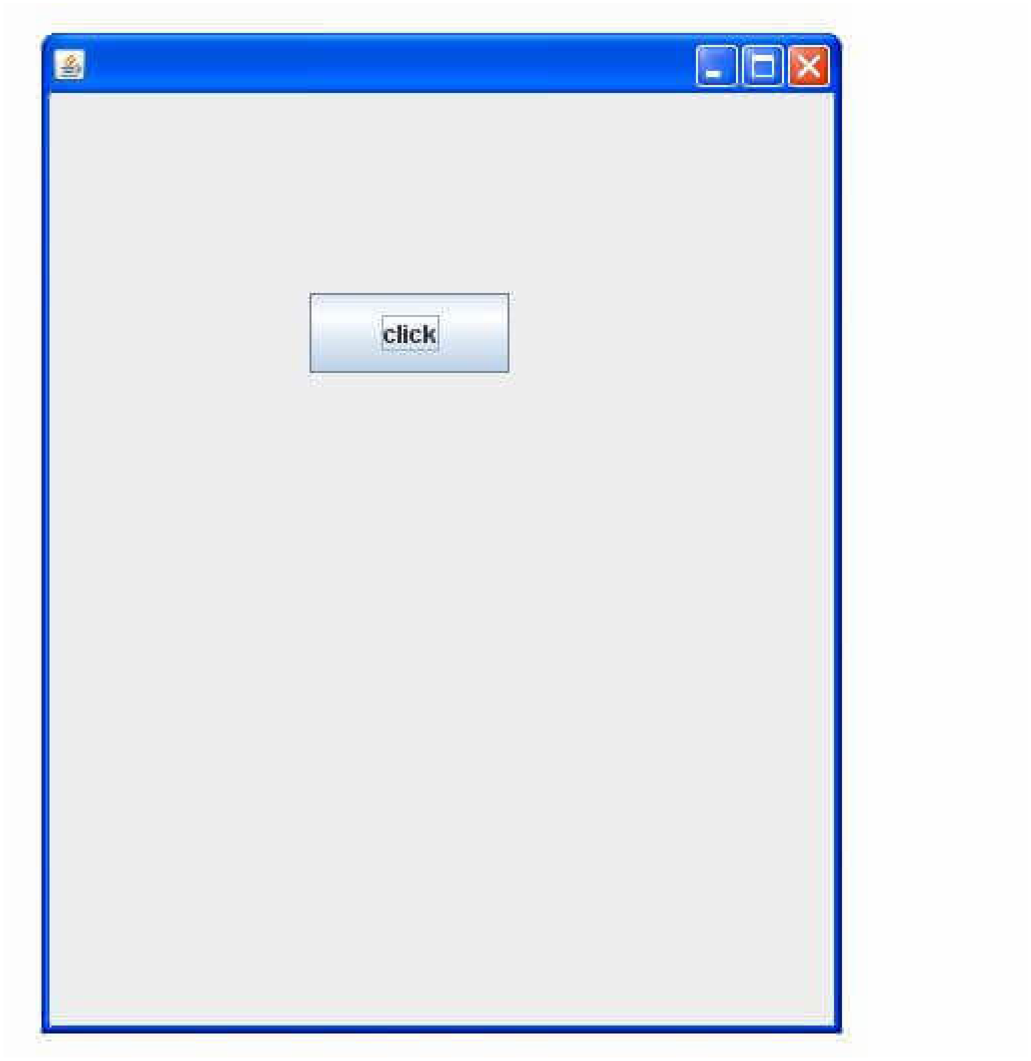
File: FirstSwingExample.java

```java
import javax.swing.*;
public class FirstSwingExample {
public static void main(String[] args) {
JFrame f=new JFrame();//creating instance of JFrame

JButton b=new JButton("click");//creating instance of JButton
b.setBounds(130,100,100, 40);//x axis, y axis, width, height

f.add(b);//adding button in JFrame

f.setSize(400,500);//400 width and 500 height
f.setLayout(null);//using no layout managers
f.setVisible(true);//making the frame visible
}
}
```



Example of Swing by Association inside constructor

We can also write all the codes of creating JFrame, JButton and method call inside the java constructor.

File: Simple.java

```
import javax.swing.*;
public class Simple {
JFrame f;
Simple(){
f=new JFrame();//creating instance of JFrame

JButton b=new JButton("click");//creating instance of JButton
b.setBounds(130,100,100, 40);

f.add(b);//adding button in JFrame

f.setSize(400,500);//400 width and 500 height
f.setLayout(null);//using no layout managers
f.setVisible(true);//making the frame visible
}

public static void main(String[] args) {
new Simple();
}
}
```

The setBounds(int xaxis, int yaxis, int width, int height)is used in the above example that sets the position of the button.

Java JButton

The JButton class is used to create a labeled button that has platform independent implementation. The application result in some action when the button is pushed. It inherits AbstractButton class.

JButton class declaration

Let's see the declaration for javax.swing.JButton class.

```
public class JButton extends AbstractButton implements Accessible
```

Commonly used Constructors:

Constructor	Description
JButton()	It creates a button with no text and icon.
JButton(String s)	It creates a button with the specified text.
JButton(Icon i)	It creates a button with the specified icon object.

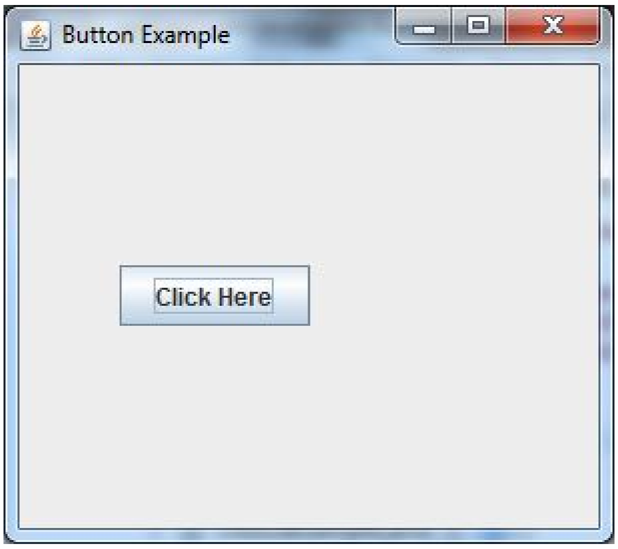
Commonly used Methods of AbstractButton class:

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

Java JButton Example

```
import javax.swing.*;
public class ButtonExample {
public static void main(String[] args) {
    JFrame f=new JFrame("Button Example");
    JButton b=new JButton("Click Here");
    b.setBounds(50,100,95,30);
    f.add(b);
    f.setSize(400,400);
    f.setLayout(null);
    f.setVisible(true);
}
}
```

Output:

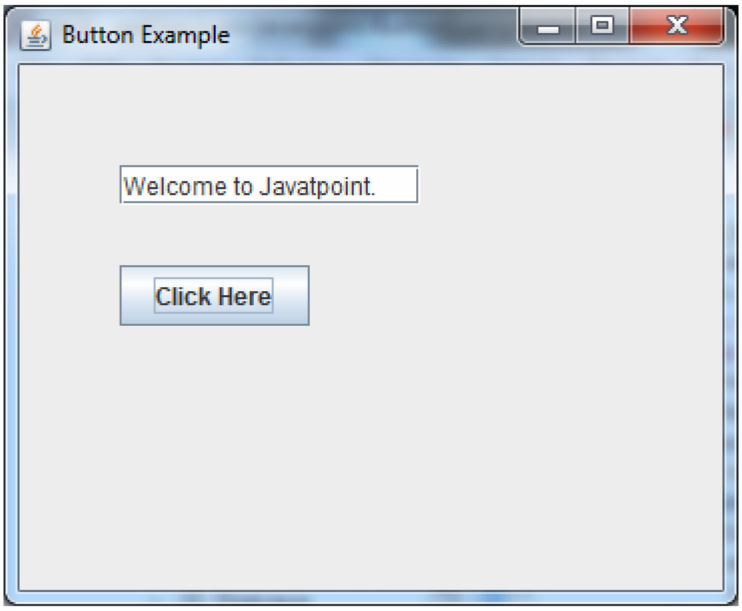


Java JButton Example with ActionListener

```
import java.awt.event.*;
import javax.swing.*;
public class ButtonExample {
public static void main(String[] args) {
    JFrame f=new JFrame("Button Example");
    final JTextField tf=new JTextField();
    tf.setBounds(50,50, 150,20);
    JButton b=new JButton("Click Here");
    b.setBounds(50,100,95,30);
    b.addActionListener(new ActionListener(){
public void actionPerformed(ActionEvent e){
            tf.setText("Welcome to Javatpoint.");
        }
    });
    f.add(b);f.add(tf);
    f.setSize(400,400);
    f.setLayout(null);
    f.setVisible(true);
}
}
```

Output:

ADVERTISEMENT



ava JLabel

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.

JLabel class declaration

Let's see the declaration for javax.swing.JLabel class.

1.

```
public class JLabel extends JComponent implements SwingConstants, Accessibl
e
```

Commonly used Constructors:

Constructor	Description
JLabel()	Creates a JLabel instance with no image and with an emp string for the title.
JLabel(String s)	Creates a JLabel instance with the specified text.
JLabel(Icon i)	Creates a JLabel instance with the specified image.
JLabel(String s, Icon i, int horizontalAlignment)	Creates a JLabel instance with the specified text, image, a horizontal alignment.

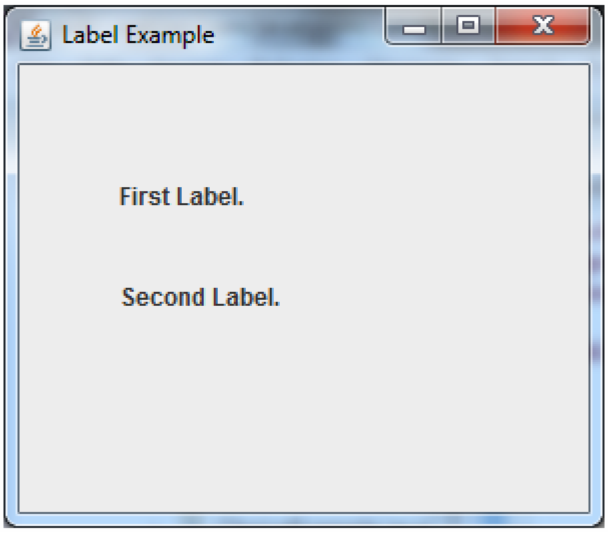
Commonly used Methods:

Methods	Description
String getText()	t returns the text string that a label displays.
void setText(String text)	It defines the single line of text this component v display.
void setHorizontalAlignment(int alignment)	It sets the alignment of the label's contents along the axis.
Icon getIcon()	It returns the graphic image that the label displays.
int getHorizontalAlignment()	It returns the alignment of the label's contents along the axis.

Java JLabel Example

```
import javax.swing.*;
class LabelExample
{
public static void main(String args[])
    {
    JFrame f= new JFrame("Label Example");
    JLabel l1,l2;
    l1=new JLabel("First Label.");
    l1.setBounds(50,50, 100,30);
    l2=new JLabel("Second Label.");
    l2.setBounds(50,100, 100,30);
    f.add(l1); f.add(l2);
    f.setSize(300,300);
    f.setLayout(null);
    f.setVisible(true);
    }
    }
```

Output:



```
First Label.

Second Label.
```

Java JTextField

The object of a JTextField class is a text component that allows the editing of a single line text. It inherits JTextComponent class.

JTextField class declaration

Let's see the declaration for javax.swing.JTextField class.

```java
public class JTextField extends JTextComponent implements SwingConstants
```

Commonly used Constructors:

Constructor	Description
JTextField()	Creates a new TextField
JTextField(String text)	Creates a new TextField initialized with the specified text.
JTextField(String text, int columns)	Creates a new TextField initialized with the specified text a columns.
JTextField(int columns)	Creates a new empty TextField with the specified number columns.

Commonly used Methods:

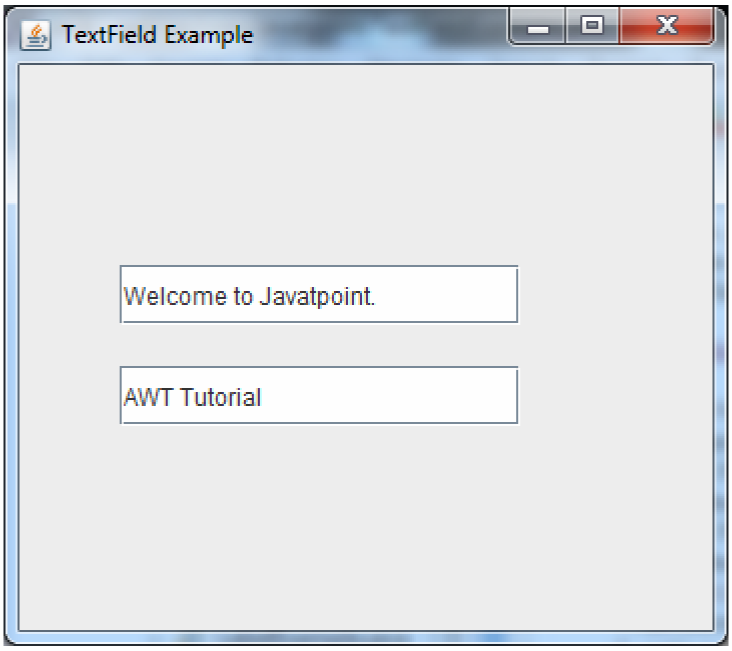
Methods	Description

void addActionListener(ActionListener l)	It is used to add the specified action listener to rece action events from this textfield.
Action getAction()	It returns the currently set Action for this ActionEve source, or null if no Action is set.
void setFont(Font f)	It is used to set the current font.
void removeActionListener(ActionListener l)	It is used to remove the specified action listener so tha no longer receives action events from this textfield.

Java JTextField Example

```
import javax.swing.*;
class TextFieldExample
{
public static void main(String args[])
    {
    JFrame f= new JFrame("TextField Example");
    JTextField t1,t2;
    t1=new JTextField("Welcome to Javatpoint.");
    t1.setBounds(50,100, 200,30);
    t2=new JTextField("AWT Tutorial");
    t2.setBounds(50,150, 200,30);
    f.add(t1); f.add(t2);
    f.setSize(400,400);
    f.setLayout(null);
    f.setVisible(true);
    }
    }
```

Output:



Java JPasswordField

The object of a JPasswordField class is a text component specialized for password entry. It allows the editing of a single line of text. It inherits JTextField class.

JPasswordField class declaration

Let's see the declaration for javax.swing.JPasswordField class.

```
1. public class JPasswordField extends JTextField
```

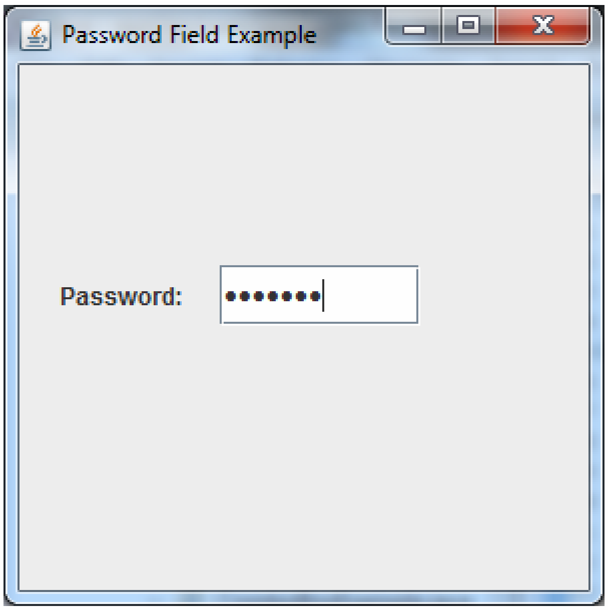
Commonly used Constructors:

Constructor	Description
JPasswordField()	Constructs a new JPasswordField, with a default document, r starting text string, and 0 column width.
JPasswordField(int columns)	Constructs a new empty JPasswordField with the specified numb of columns.
JPasswordField(String text)	Constructs a new JPasswordField initialized with the specified te
JPasswordField(String text, int columns)	Construct a new JPasswordField initialized with the specified t and columns.

Java JPasswordField Example

```
import javax.swing.*;
public class PasswordFieldExample {
   public static void main(String[] args) {
   JFrame f=new JFrame("Password Field Example");
    JPasswordField value = new JPasswordField();
    JLabel l1=new JLabel("Password:");
       l1.setBounds(20,100, 80,30);
        value.setBounds(100,100,100,30);
          f.add(value);  f.add(l1);
          f.setSize(300,300);
          f.setLayout(null);
          f.setVisible(true);
}
}
```

Output:



Java 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.

JRadioButton class declaration

Let's see the declaration for javax.swing.JRadioButton class.

```
public class JRadioButton extends JToggleButton implements Accessible
```

Commonly used Constructors:

Constructor	Description
JRadioButton()	Creates an unselected radio button with no text.
JRadioButton(String s)	Creates an unselected radio button with specified text.
JRadioButton(String s, boolean selected)	Creates a radio button with the specified text and select status.

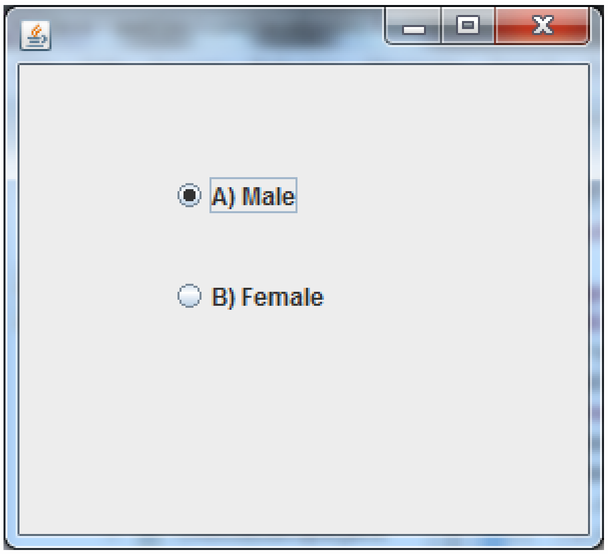
Commonly used Methods:

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

Java JRadioButton Example

```
import javax.swing.*;
public class RadioButtonExample {
JFrame f;
RadioButtonExample(){
f=new JFrame();
JRadioButton r1=new JRadioButton("A) Male");
JRadioButton r2=new JRadioButton("B) Female");
r1.setBounds(75,50,100,30);
r2.setBounds(75,100,100,30);
ButtonGroup bg=new ButtonGroup();
bg.add(r1);bg.add(r2);
f.add(r1);f.add(r2);
f.setSize(300,300);
f.setLayout(null);
f.setVisible(true);
}
public static void main(String[] args) {
    new RadioButtonExample();
}
}
```

Output:

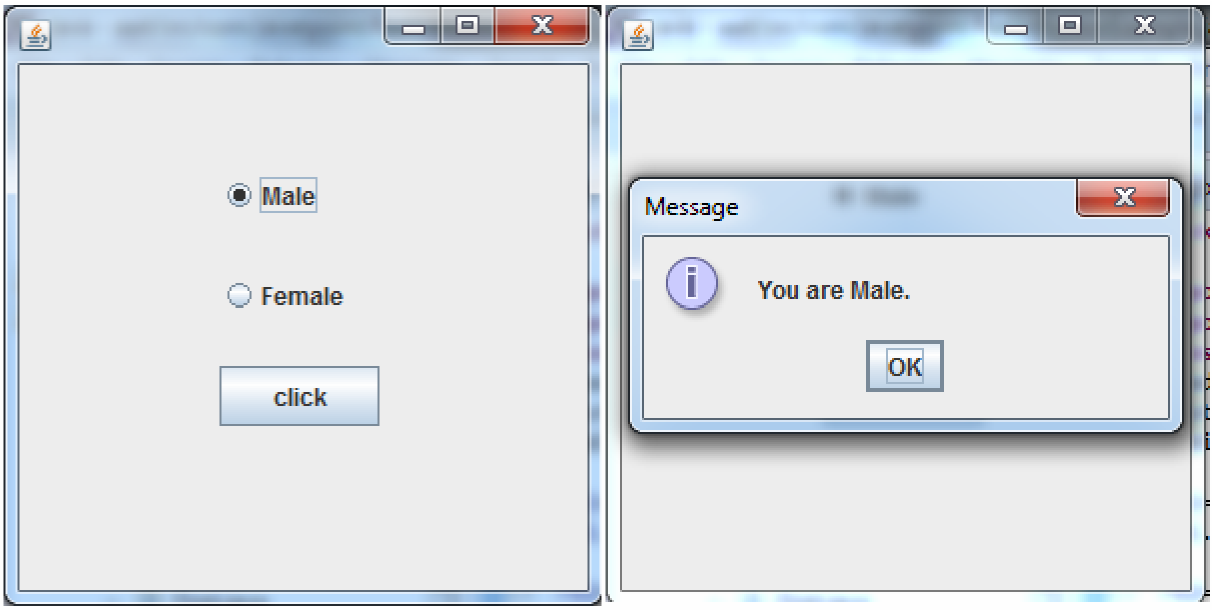


ava JRadioButton Example with ActionListener

```
import javax.swing.*;
import java.awt.event.*;
class RadioButtonExample extends JFrame implements ActionListener{
JRadioButton rb1,rb2;
JButton b;
```

```java
RadioButtonExample(){
rb1=new JRadioButton("Male");
rb1.setBounds(100,50,100,30);
rb2=new JRadioButton("Female");
rb2.setBounds(100,100,100,30);
ButtonGroup bg=new ButtonGroup();
bg.add(rb1);bg.add(rb2);
b=new JButton("click");
b.setBounds(100,150,80,30);
b.addActionListener(this);
add(rb1);add(rb2);add(b);
setSize(300,300);
setLayout(null);
setVisible(true);
}
public void actionPerformed(ActionEvent e){
if(rb1.isSelected()){
JOptionPane.showMessageDialog(this,"You are Male.");
}
if(rb2.isSelected()){
JOptionPane.showMessageDialog(this,"You are Female.");
}
}
public static void main(String args[]){
new RadioButtonExample();
}}
```

Output:



You are Male.

Java JMenuBar, JMenu and JMenuItem

The JMenuBar class is used to display menubar on the window or frame. It may have several menus.

The object of JMenu class is a pull down menu component which is displayed from the menu bar. It inherits the JMenuItem class.

The object of JMenuItem class adds a simple labeled menu item. The items used in a menu must belong to the JMenuItem or any of its subclass.

JMenuBar class declaration

1.

public class JMenuBar **extends** JComponent **implements** MenuElement, Accessib
le

JMenu class declaration

1. **public class** JMenu **extends** JMenuItem **implements** MenuElement, Accessible

JMenuItem class declaration

1.

```
public class JMenuItem extends AbstractButton implements Accessible, MenuElement
```

Java JMenuItem and JMenu Example

```
import javax.swing.*;
class MenuExample
{
          JMenu menu, submenu;
          JMenuItem i1, i2, i3, i4, i5;
          MenuExample(){
          JFrame f= new JFrame("Menu and MenuItem Example");
          JMenuBar mb=new JMenuBar();
          menu=new JMenu("Menu");
          submenu=new JMenu("Sub Menu");
          i1=new JMenuItem("Item 1");
          i2=new JMenuItem("Item 2");
          i3=new JMenuItem("Item 3");
          i4=new JMenuItem("Item 4");
          i5=new JMenuItem("Item 5");
          menu.add(i1); menu.add(i2); menu.add(i3);
          submenu.add(i4); submenu.add(i5);
          menu.add(submenu);
          mb.add(menu);
          f.setJMenuBar(mb);
          f.setSize(400,400);
          f.setLayout(null);
          f.setVisible(true);
}
public static void main(String args[])
{
new MenuExample();
}}
```

Output:

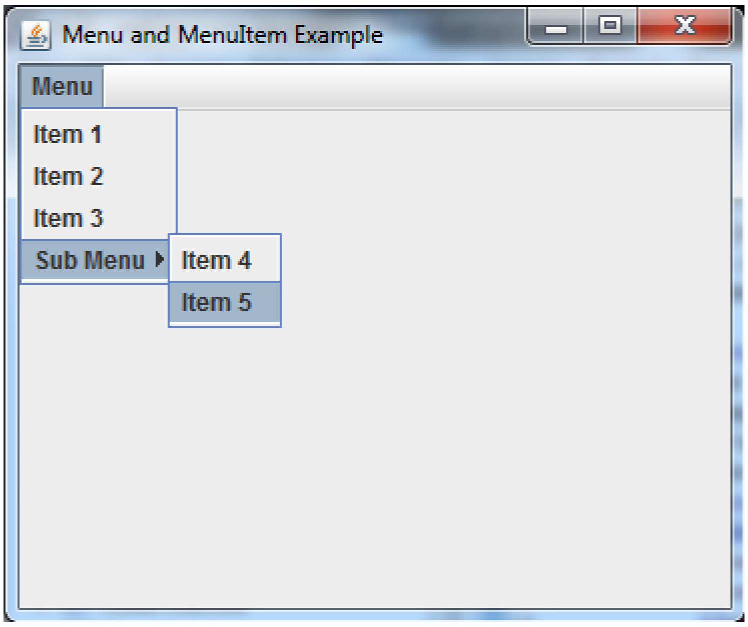
PauseNext

Mute

Current TimeÂ 0:00

/

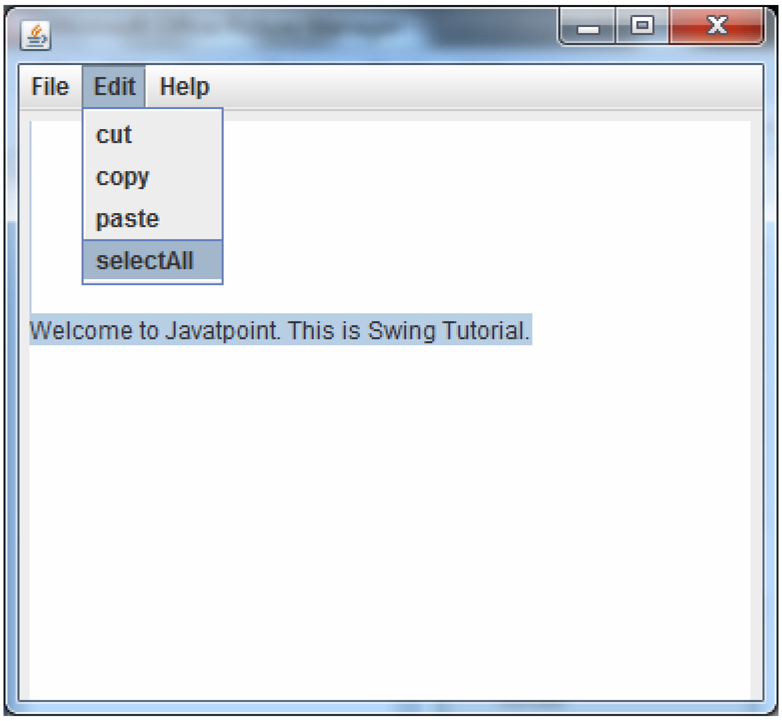
DurationÂ 18:10
Loaded: 3.30%
Â
Fullscreen



Example of creating Edit menu for Notepad:

```java
import javax.swing.*;
import java.awt.event.*;
public class MenuExample implements ActionListener{
JFrame f;
JMenuBar mb;
JMenu file,edit,help;
JMenuItem cut,copy,paste,selectAll;
JTextArea ta;
MenuExample(){
f=new JFrame();
cut=new JMenuItem("cut");
copy=new JMenuItem("copy");
paste=new JMenuItem("paste");
selectAll=new JMenuItem("selectAll");
cut.addActionListener(this);
copy.addActionListener(this);
paste.addActionListener(this);
selectAll.addActionListener(this);
mb=new JMenuBar();
file=new JMenu("File");
edit=new JMenu("Edit");
help=new JMenu("Help");
edit.add(cut);edit.add(copy);edit.add(paste);edit.add(selectAll);
mb.add(file);mb.add(edit);mb.add(help);
ta=new JTextArea();
ta.setBounds(5,5,360,320);
f.add(mb);f.add(ta);
f.setJMenuBar(mb);
f.setLayout(null);
f.setSize(400,400);
f.setVisible(true);
}
public void actionPerformed(ActionEvent e) {
if(e.getSource()==cut)
ta.cut();
if(e.getSource()==paste)
ta.paste();
if(e.getSource()==copy)
ta.copy();
if(e.getSource()==selectAll)
ta.selectAll();
}
public static void main(String[] args) {
    new MenuExample();
}
}
```

Output:



Welcome to Javatpoint. This is Swing Tutorial.

SWING - Layouts

Layout refers to the arrangement of components within the container. In another way, it could be said that layout is placing the components at a particular position within the container. The task of laying out the controls is done automatically by the Layout Manager.

Layout Manager

The layout manager automatically positions all the components within the container. Even if you do not use the layout manager, the components are still positioned by the default layout manager. It is possible to lay out the controls by hand, however, it becomes very difficult because of the following two reasons.

- It is very tedious to handle a large number of controls within the container.
- Usually, the width and height information of a component is not given when we need to arrange them.

Java provides various layout managers to position the controls. Properties like size, shape, and arrangement varies from one layout manager to the other. When the size of the applet or the application window changes, the size, shape, and arrangement of the components also changes in response, i.e. the layout managers adapt to the dimensions of the appletviewer or the application window.

The layout manager is associated with every Container object. Each layout manager is an object of the class that implements the LayoutManager interface.

Following are the interfaces defining the functionalities of Layout Managers.

Sr.No.	Interface & Description
1	**LayoutManager** The LayoutManager interface declares those methods which need to be implemented by the class, whose object will act as a layout manager.
2	**LayoutManager2** The LayoutManager2 is the sub-interface of the LayoutManager. This interface is for those classes that know how to layout containers based on layout constraint object.

AWT Layout Manager Classes

Following is the list of commonly used controls while designing GUI using AWT.

Sr.No.	LayoutManager & Description
1	**BorderLayout** The borderlayout arranges the components to fit in the five regions: east, west, north, south, and center.
2	**CardLayout** The CardLayout object treats each component in the container as a card. Only one card is visible at a time.
3	**FlowLayout** The FlowLayout is the default layout. It layout the components in a directional flow.
4	**GridLayout** The GridLayout manages the components in the form of a rectangular grid.
5	**GridBagLayout** This is the most flexible layout manager class. The object of

GridBagLayout aligns the component vertically, horizontally, or along their baseline without requiring the components of the same size.

GroupLayout

6 The GroupLayout hierarchically groups the components in order to position them in a Container.

SpringLayout

7 A SpringLayout positions the children of its associated container according to a set of constraints.