Java AWT Tutorial

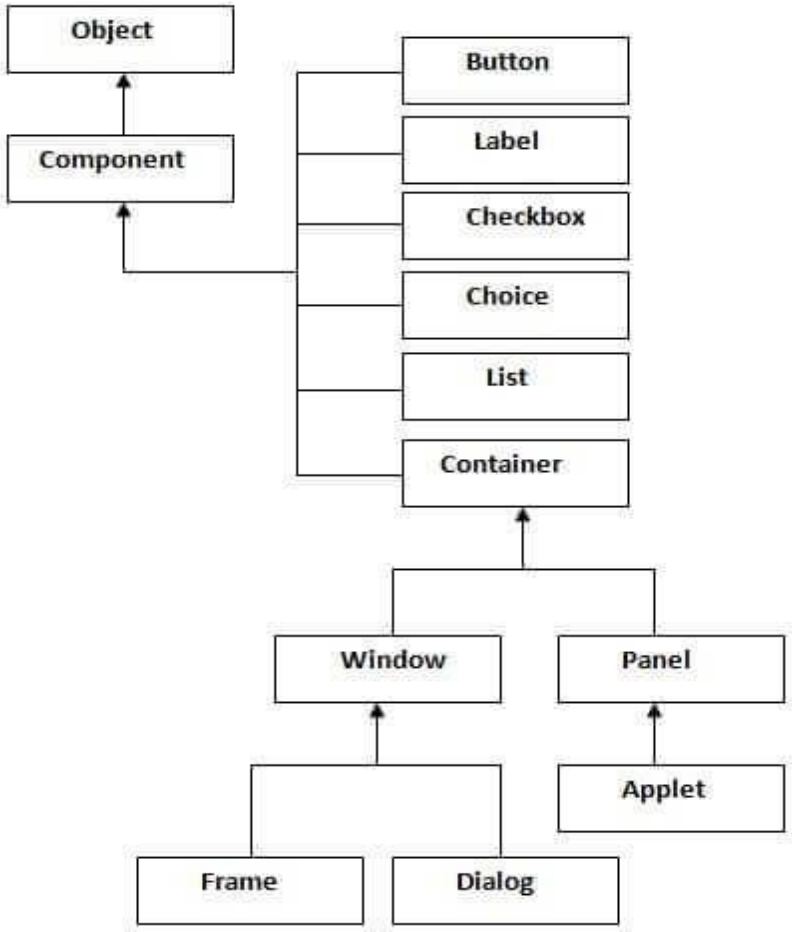
Java AWT (Abstract Window Toolkit) is *an API to develop GUI or window-based applications* in java.

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, TextArea, RadioButton, CheckBox, Choice, List etc.

Java AWT Hierarchy

The hierarchy of Java AWT classes are given below.



Container

The Container is a component in AWT that can contain another components like buttons, textfields, labels etc. The classes that extends Container class are known as container such as Frame, Dialog and Panel.

Window

The window is the container that have no borders and menu bars. You must use frame, dialog or another window for creating a window.

Panel

The Panel is the container that doesn't contain title bar and menu bars. It can have other components like button, textfield etc.

Frame

The Frame is the container that contain title bar and can have menu bars. It can have other components like button, textfield etc.

Useful Methods of Component class

Method	Description
public void add(Component c)	inserts a component on this component.
public void setSize(int width,int height)	sets the size (width and height) of the component.
public void setLayout(LayoutManager m)	defines the layout manager for the component.
public void setVisible(boolean status)	changes the visibility of the component, by default false.

Java AWT Example

To create simple awt example, you need a frame. There are two ways to create a frame in AWT.

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

AWT Example by Inheritance

Let's see a simple example of AWT where we are inheriting Frame class. Here, we are showing Button component on the Frame.

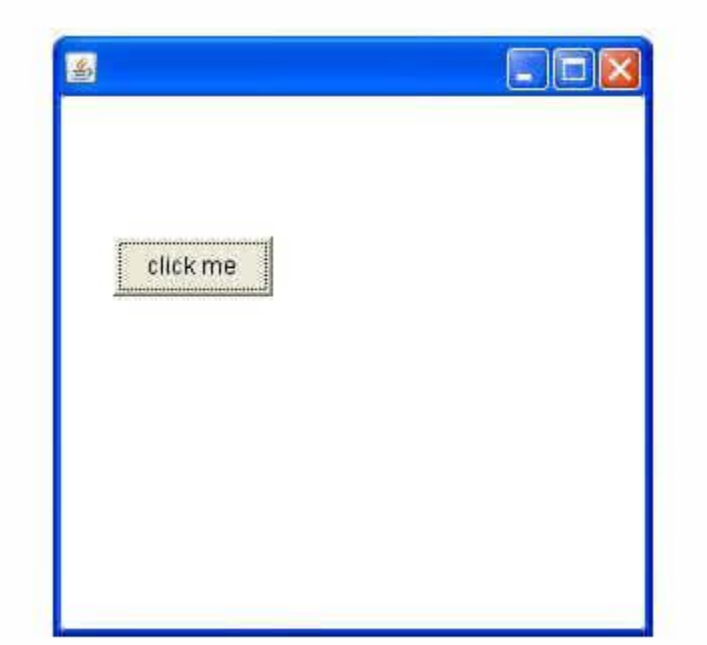
```
1. import java.awt.*;
2. class First extends Frame{
3. First(){
4. Button b=new Button("click me");
5. b.setBounds(30,100,80,30);// setting button position
6. add(b);//adding button into frame
7. setSize(300,300);//frame size 300 width and 300 height
8. setLayout(null);//no layout manager
9. setVisible(true);//now frame will be visible, by default not visible
10. }
11. public static void main(String args[]){
12. First f=new First();
13. }
14. }
```

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

AWT Example by Association

Let's see a simple example of AWT where we are creating instance of Frame class. Here, we are showing Button component on the Frame.

```
1. import java.awt.*;
2. class First2{
3. First2(){
4. Frame f=new Frame();
5. Button b=new Button("click me");
6. b.setBounds(30,50,80,30);
7. f.add(b);
8. f.setSize(300,300);
9. f.setLayout(null);
10. f.setVisible(true);
11. }
12. public static void main(String args[]){
13. First2 f=new First2();
14. }}
```



Event and Listener (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.

Java Event classes and Listener interfaces

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

Steps to perform Event Handling

Following steps are required to perform event handling:

1. Register the component with the Listener

Registration Methods

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 Event Handling Code

We can put the event handling code into one of the following places:

1. Within class
2. Other class
3. Anonymous class

Java event handling by implementing ActionListener

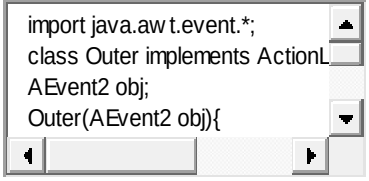
```
1. import java.awt.*;
2. import java.awt.event.*;
3. class AEvent extends Frame implements ActionListener{
4. TextField tf;
5. AEvent(){
6.
7. //create components
8. tf=new TextField();
9. tf.setBounds(60,50,170,20);
10. Button b=new Button("click me");
11. b.setBounds(100,120,80,30);
12.
13. //register listener
14. b.addActionListener(this);//passing current instance
15.
16. //add components and set size, layout and visibility
17. add(b);add(tf);
18. setSize(300,300);
19. setLayout(null);
20. setVisible(true);
21. }
22. public void actionPerformed(ActionEvent e){
23. tf.setText("Welcome");
24. }
25. public static void main(String args[]){
26. new AEvent();
27. }
28. }
```

public void setBounds(int xaxis, int yaxis, int width, int height); have been used in the above example that sets the position of the component it may be button, textfield etc.

2) Java event handling by outer class

```
1.  import java.awt.*;
2.  import java.awt.event.*;
3.  class AEvent2 extends Frame{
4.  TextField tf;
5.  AEvent2(){
6.  //create components
7.  tf=new TextField();
8.  tf.setBounds(60,50,170,20);
9.  Button b=new Button("click me");
10. b.setBounds(100,120,80,30);
11. //register listener
12. Outer o=new Outer(this);
13. b.addActionListener(o);//passing outer class instance
14. //add components and set size, layout and visibility
15. add(b);add(tf);
16. setSize(300,300);
17. setLayout(null);
18. setVisible(true);
19. }
20. public static void main(String args[]){
21. new AEvent2();
22. }
23. }
```

```
    import java.awt.event.*;
1.  class Outer implements ActionListener{
2.  AEvent2 obj;
3.  Outer(AEvent2 obj){
4.  this.obj=obj;
5.  }
6.  public void actionPerformed(ActionEvent e){
7.  obj.tf.setText("welcome");
8.  }
9.  }
```



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3) Java event handling by anonymous class

```
1. import java.awt.*;
2. import java.awt.event.*;
3. class AEvent3 extends Frame{
4. TextField tf;
5. AEvent3(){
6. tf=new TextField();
7. tf.setBounds(60,50,170,20);
8. Button b=new Button("click me");
9. b.setBounds(50,120,80,30);
10. b.addActionListener(new ActionListener(){
11. public void actionPerformed(){
12. tf.setText("hello");
13. }
14. });
15. add(b);add(tf);
16. setSize(300,300);
17. setLayout(null);
18. setVisible(true);
19. }
20. public static void main(String args[]){
21. new AEvent3();
22. }
23.}
```