자바 GUI - Swing

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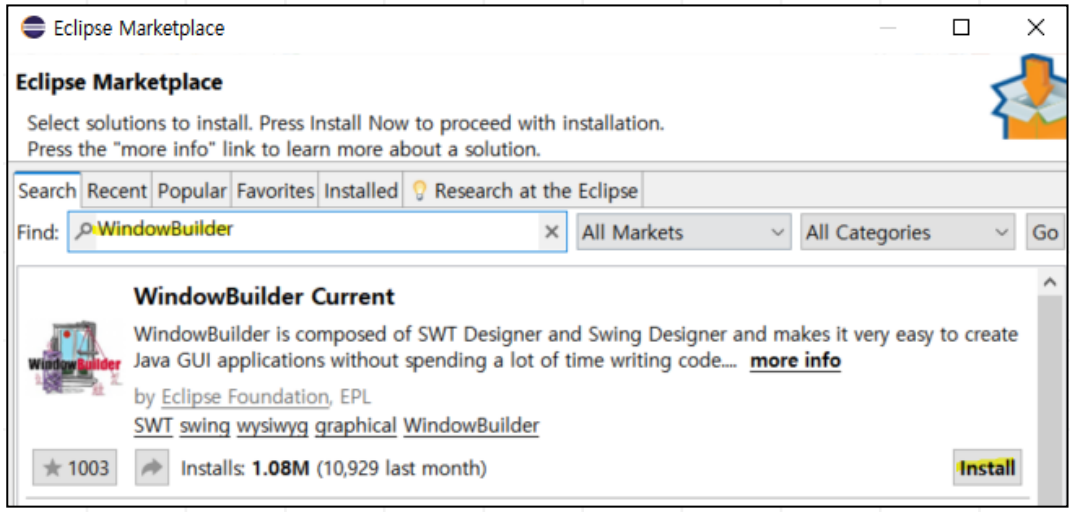
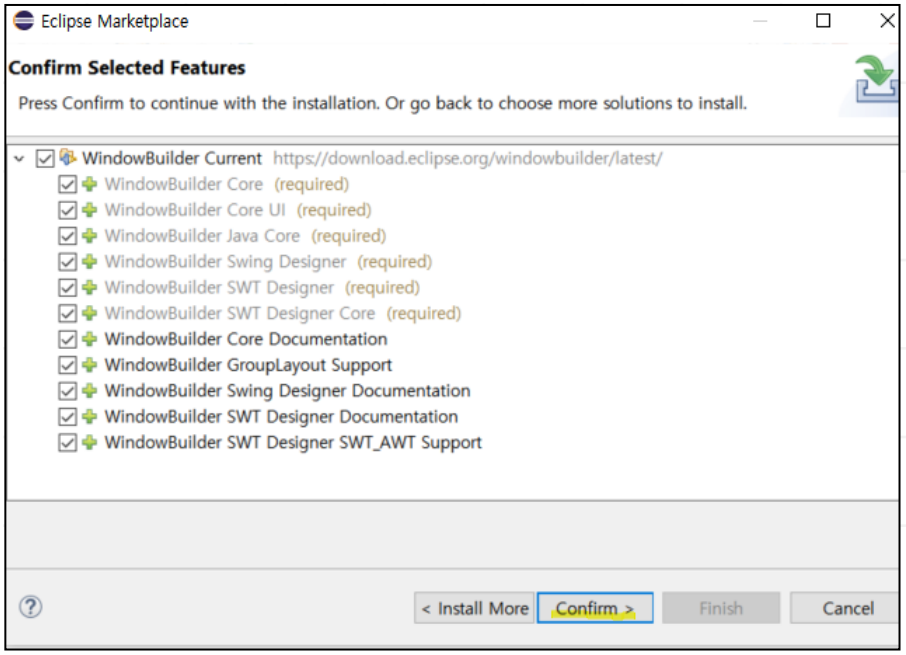
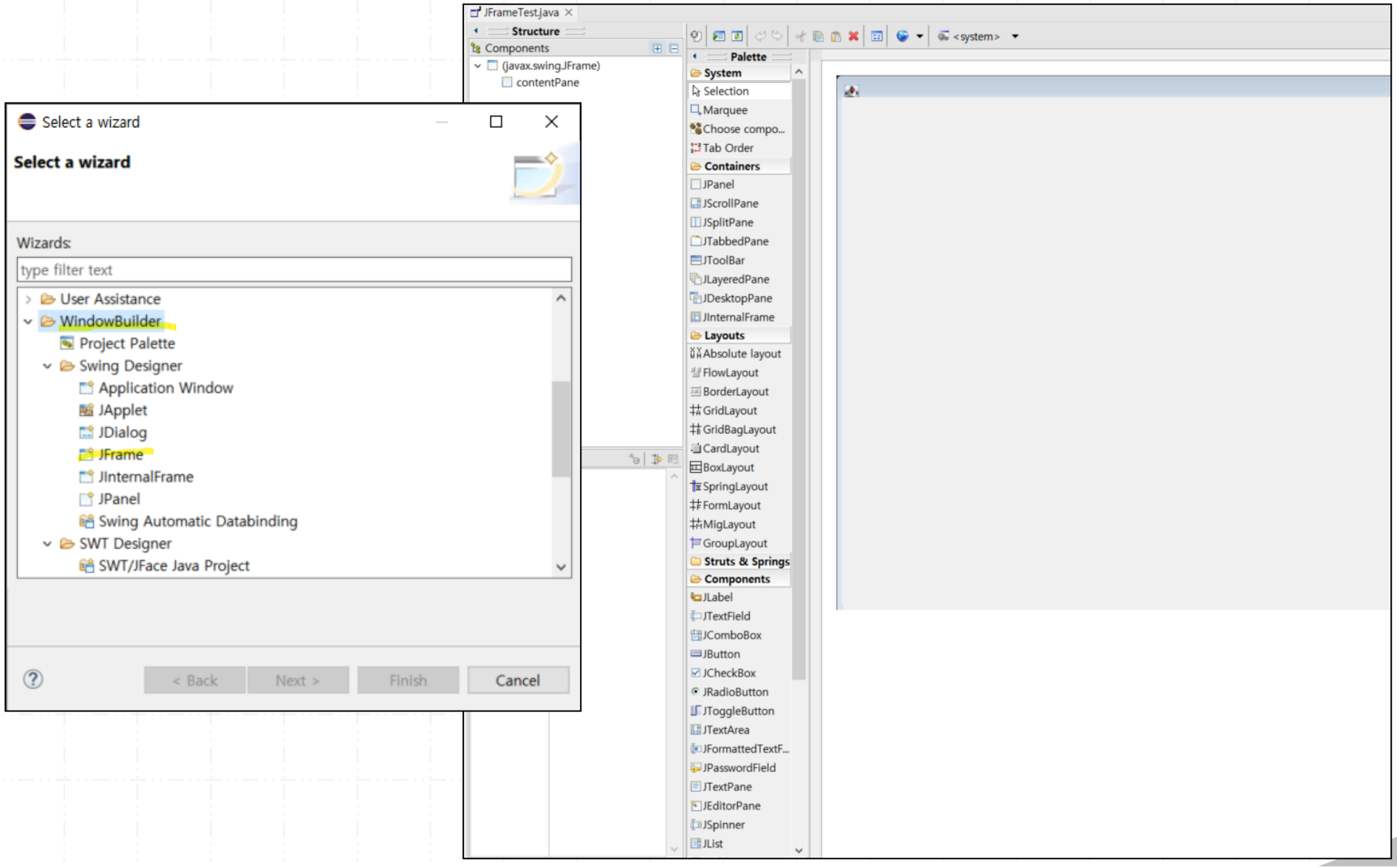
1장. Swing 개요

1. Eclipse에 WindowBuilder 플러그인 설치





1. Eclipse에 WindowBuilder 플러그인 설치



2. Swing 개요

- JFC (Java Foundation Class) 는 GUI 프로그래밍에 필요한 각종 툴킷을 모아놓은 것으로 GUI 기능들을 구현할 수 있는 Swing, 2D, 3D 등을 지원한다.
- AWT와 거의 유사하나 AWT보다 많은 컴포넌트 및 기능을 지원한다.
- AWT와 달리 자바 프로그래밍으로 자체적으로 제작된 컴포넌트이기 때문에 플랫폼에 상관없이 GUI가 항상 동일하게 보여진다.

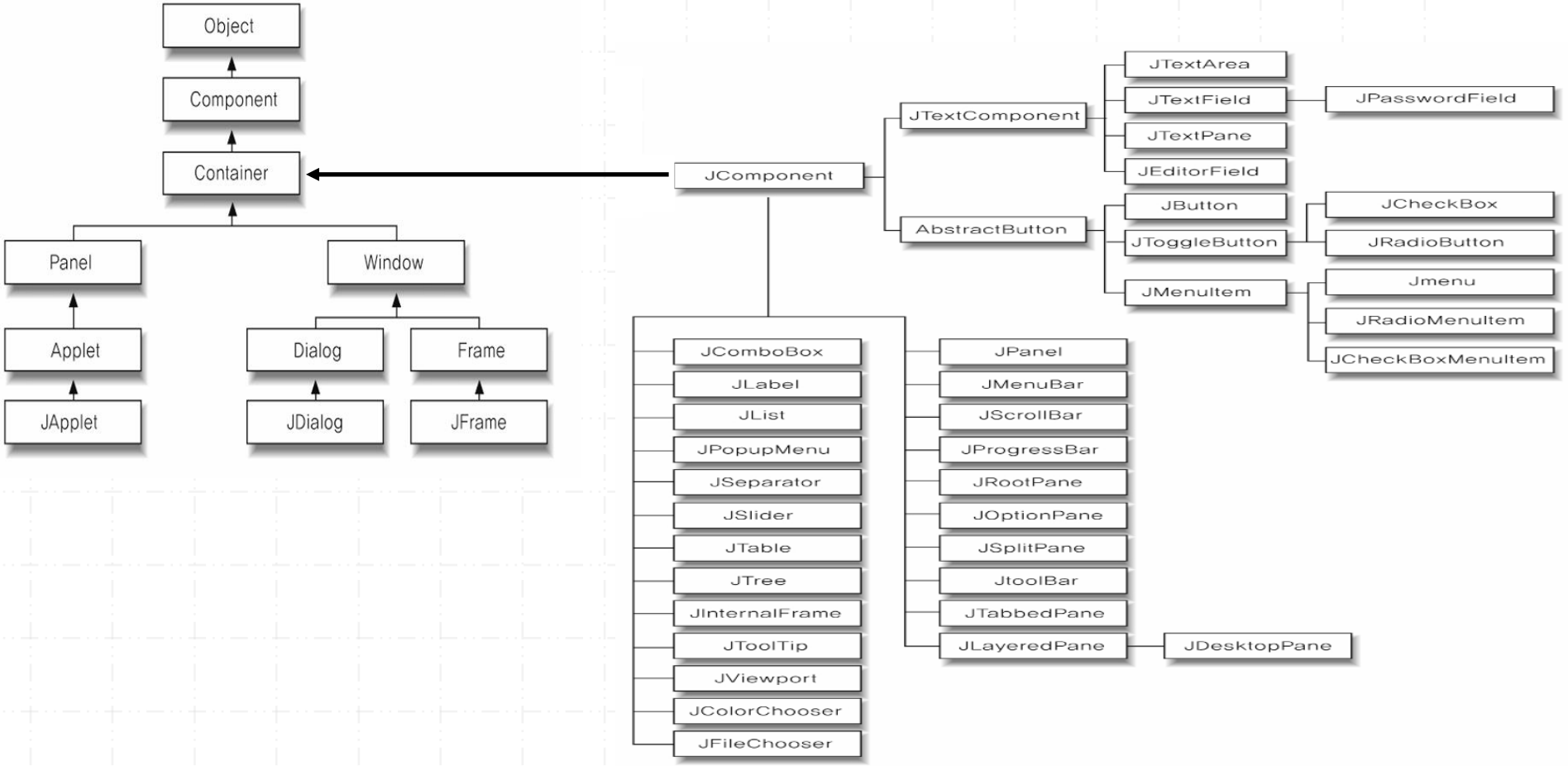
Creating Graphical User Interfaces

» Creating a GUI with Swing — A comprehensive introduction to GUI creation on the Java platform.
» Creating a JavaFX GUI — A collection of JavaFX tutorials.

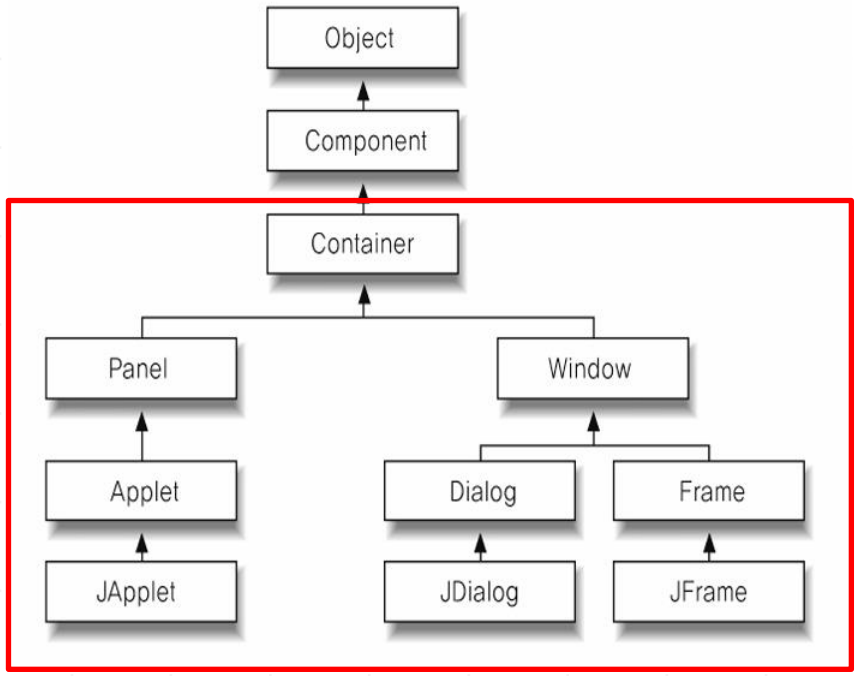
https://docs.oracle.com/en/java/javase/11/docs/api/java.desktop/javax/swing/package-summary.html

https://docs.oracle.com/javase/tutorial/uiswing/

3. Swing API 계층구조



4. Container 기능

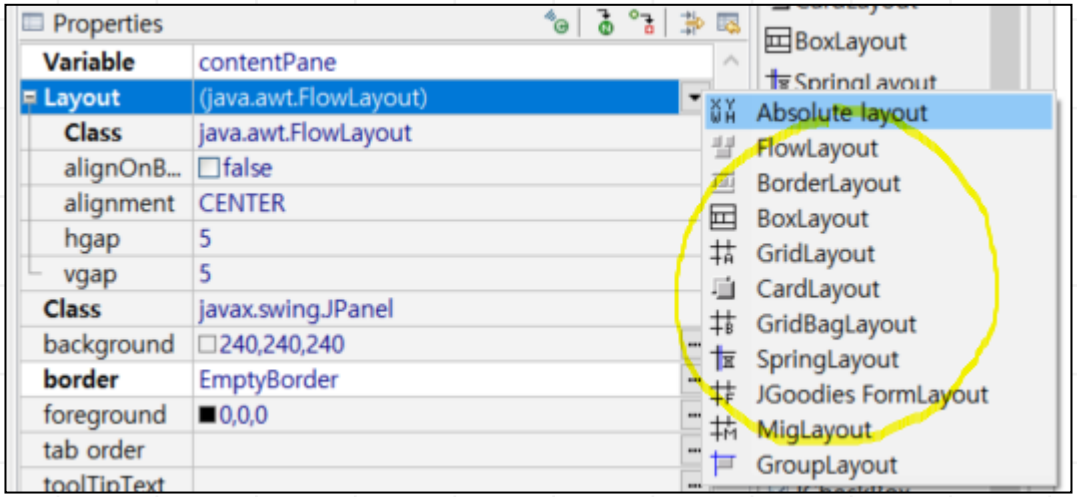


컨테이너(Container)는 다른 구성요소를 포함할 수 있는 컴포넌트이다.
Swing 프로그램은 반드시 하나의 컨테이너가 필요하다.
다음과 같이 3가지 유형이 제공된다.

가. Panel : 버튼과 같은 일반적인 컴포넌트를 포함하는 컨테이너이지만 스스로 화면 랜더링은 불가능하다.
나. Frame: 제목과 아이콘이 포함되어 있고 Panel과 동일하게 일반적인 컴포넌트를 포함할 수 있다.
Panel과 가장 큰 차이점은 독자적으로 화면 랜더링이 가능하다.
다. Dialog: 경고창과 비슷하게 동작되는 팝업창 기능.

5. Layout

컴포넌트들의 위치와 크기(x,y)를 관리하는 컴포넌트이다.



가. BorderLayout

5개의 영역에 맞게 구성요소의 크기 및 컨테이너를 배치한다.
각 위치는 NORTH, SOUTH, EAST, WEST, CENTER 5개의 상수 중 하나를 사용한다.

나. GridLayout

행과 열로 컨테이너의 구성요소를 배치한다.
설정한 행과 열에 의해 동일한 크기의 사각형으로 분할되고 하나의 구성요소는 각각의 사각형 영역에 배치된다.

다. CardLayout

카드가 겹쳐지는 형태로 각 구성요소를 배치한다.
한번에 단 하나의 카드만 볼 수 있다.

라. FlowLayout

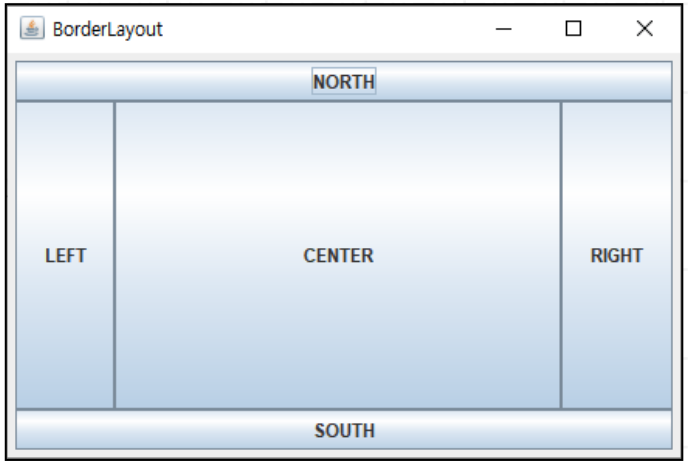
한 방향으로 컴포넌트를 배치하며 일반적으로 Panel에 버튼을 배치하는데 사용된다.
흐름 방향은 다음과 같이 상수를 이용하여 제어한다.
ComponentOrientation.LEFT_TO_RIGHT
ComponentOrientation.RIGHT_TO_LEFT

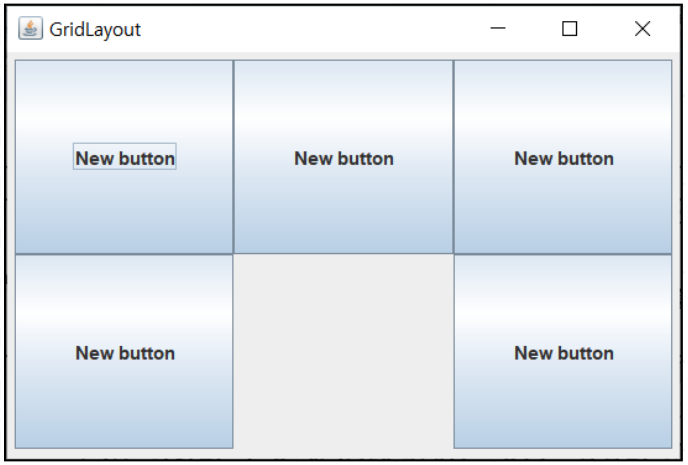
정렬 상수 (LEFT, RIGHT, CENTER, LEADING, TRAILING)

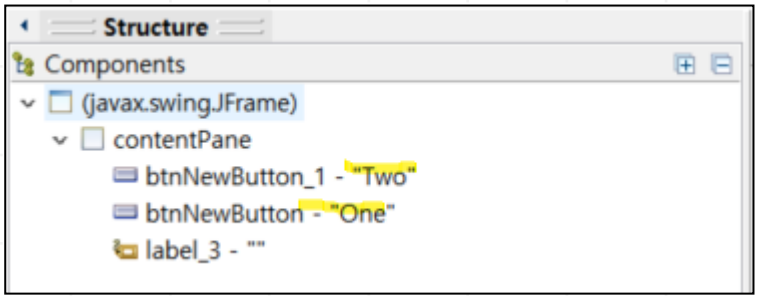
마. AbsolouteLayout

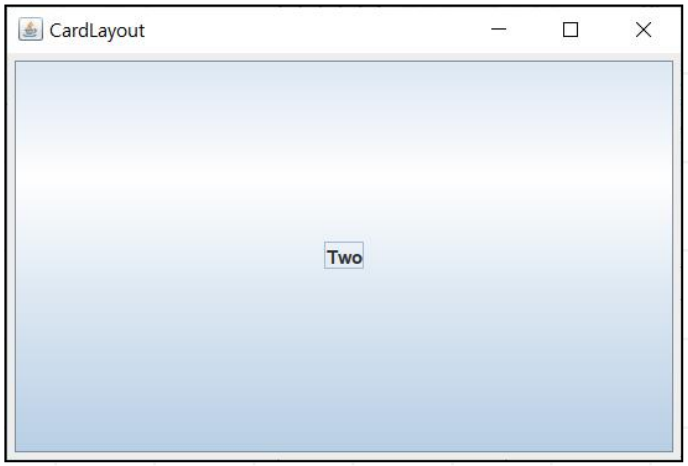
사용자가 원하는 위치에 컴포넌트를 배치한다.
setLayout(null) 방식으로 설정이 가능하다.

5. Layout

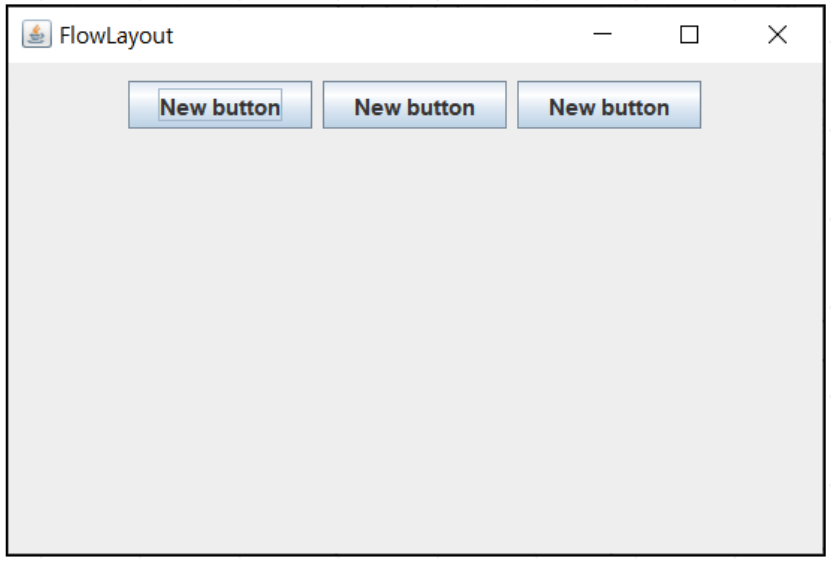

BorderLayout
NORTH
LEFT
CENTER
RIGHT
SOUTH

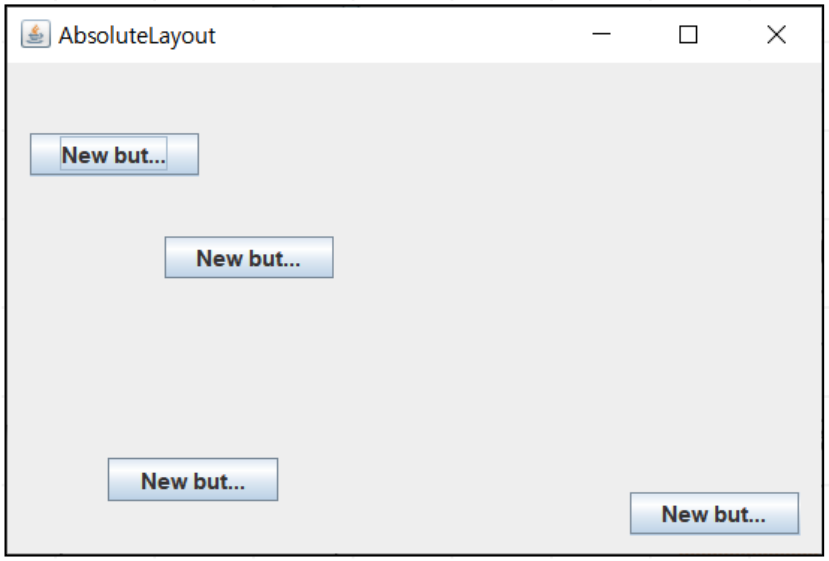

GridLayout
New button
New button
New button
New button
New button

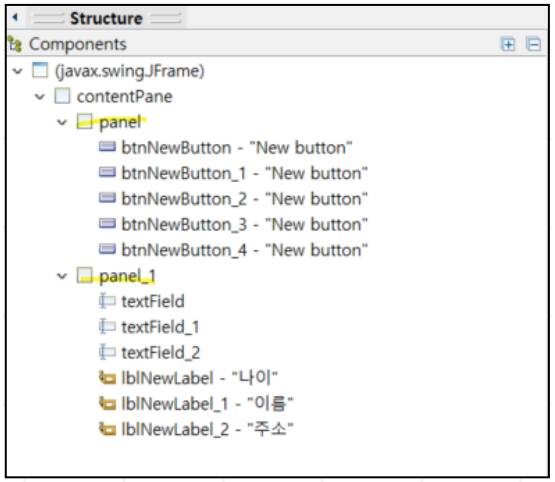

Structure
Components
(javax.swing.JFrame)
contentPane
btnNewButton_1 - "Two"
btnNewButton - "One"
label_3 - ""

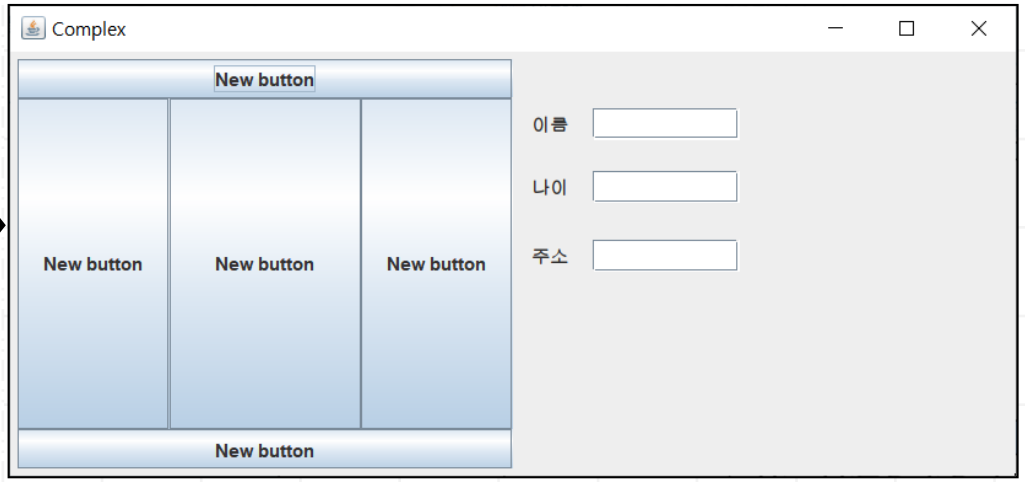

CardLayout
Two

5. Layout


FlowLayout
New button
New button
New button

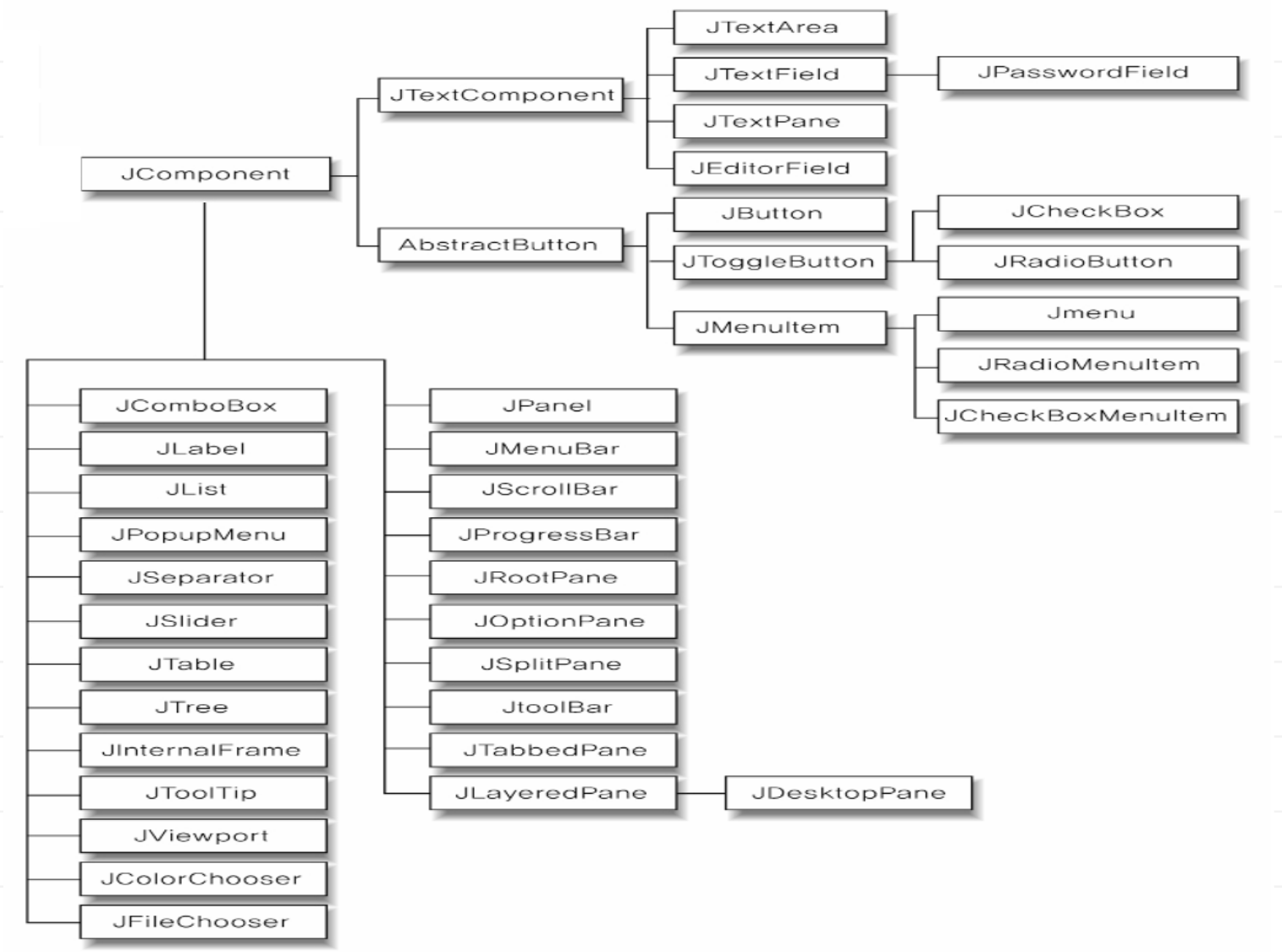

AbsoluteLayout
New but...
New but...
New but...
New but...


Structure
Components
(javax.swing.JFrame)
contentPane
panel
btnNewButton - "New button"
btnNewButton_1 - "New button"
btnNewButton_2 - "New button"
btnNewButton_3 - "New button"
btnNewButton_4 - "New button"
panel_1
textField
textField_1
textField_2
lblNewLabel - "나이"
lblNewLabel_1 - "이름"
lblNewLabel_2 - "주소"


Complex
New button
New button
New button
New button
New button
이름
나이
주소

2장. 기본 Component

1. JComponent API



2. JComponent 샘플 링크 제공

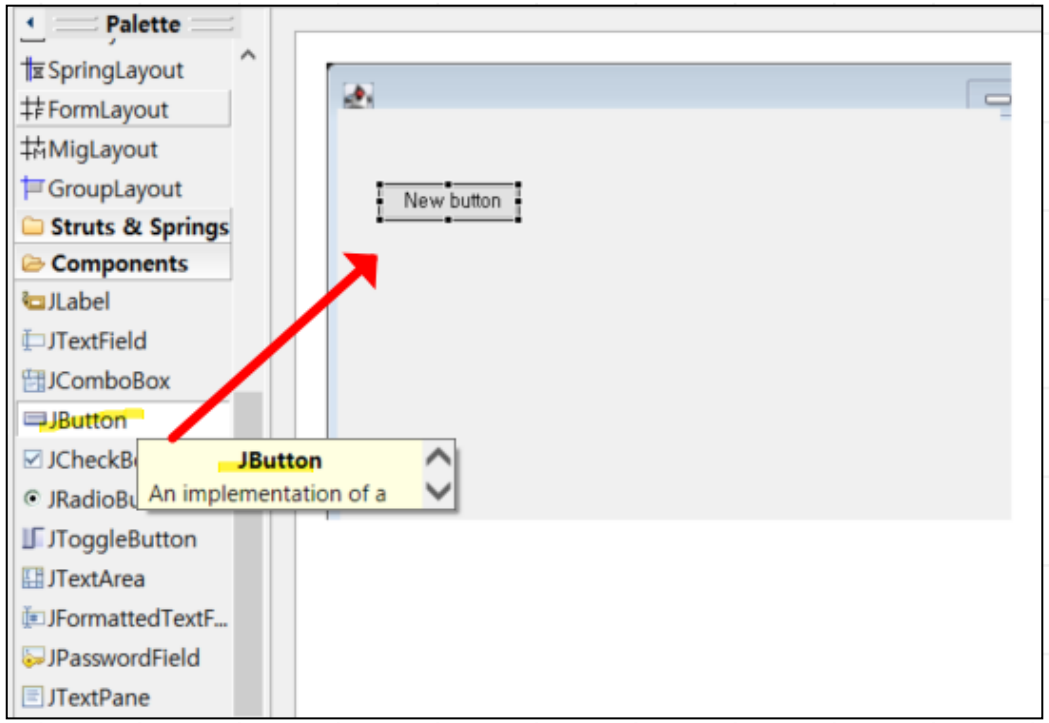
https://docs.oracle.com/javase/tutorial/uiswing/examples/components/index.html

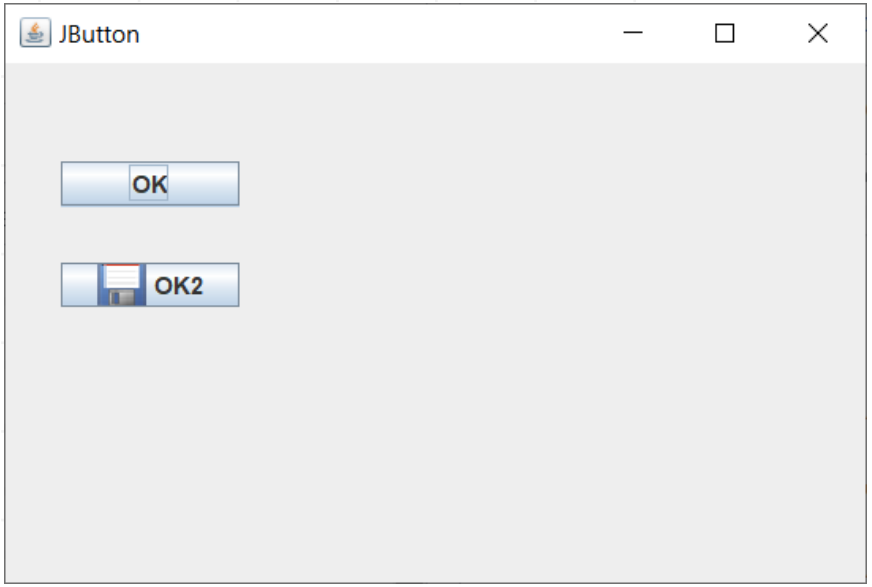
Table of Examples

Example	Zip File *(contains all files necessary for the example plus NetBeans IDE project metadata)*	Source Files *(first file has the main method, except for examples that run only as applets)*	Image and Other Files	Where Described
BorderDemo *[Launch]*	Border Demo Project	BorderDemo.java	wavy.gif	How to Use Borders
ButtonDemo *[Launch]*	Button Demo Project	ButtonDemo.java	right.gif, middle.gif, left.gif	How to Use Buttons, ...
ButtonHtmlDemo *[Launch]*	Button Html Demo Project	ButtonHtmlDemo.java	right.gif, middle.gif, left.gif	How to Use Buttons, ...
CheckBoxDemo *[Launch]*	Check Box Demo Project	CheckBoxDemo.java	All of the images in the images/geek directory.	How to Use Buttons, ...
ColorChooserDemo *[Launch]*	Color Chooser Demo Project	ColorChooserDemo.java		How to Use Color Choosers
ColorChooserDemo2 *[Launch]*	Color Chooser 2 Demo Project	ColorChooserDemo2.java CrayonPanel.java	red.gif, yellow.gif, green.gif, blue.gif	How to Use Color Choosers
ComboBoxDemo *[Launch]*	Combo Box Demo Project	ComboBoxDemo.java	Bird.gif, Cat.gif, Dog.gif, Rabbit.gif, Pig.gif	How to Use Combo Boxes
ComboBoxDemo2 *[Launch]*	Combo Box 2 Demo Project	ComboBoxDemo2.java		How to Use Combo Boxes

2. JButton

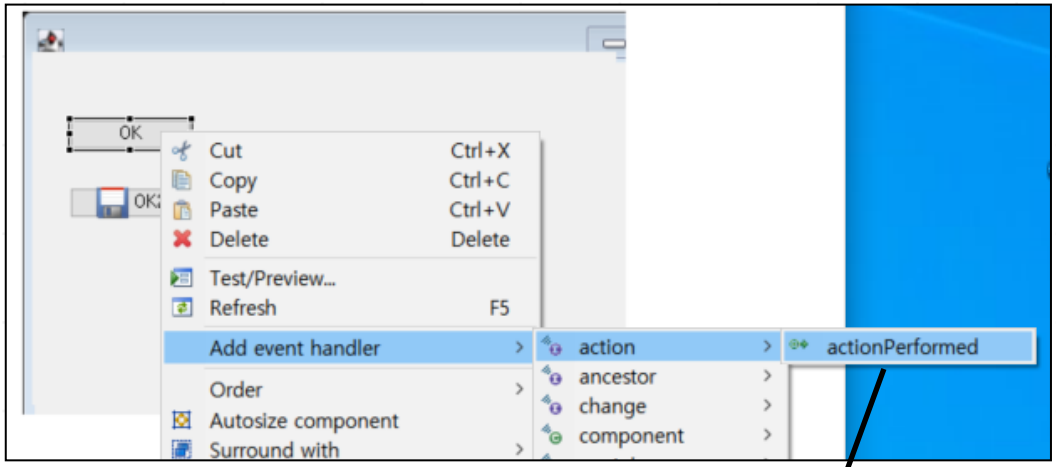
https://docs.oracle.com/javase/tutorial/uiswing/components/button.html





2. JButton 이벤트 처리

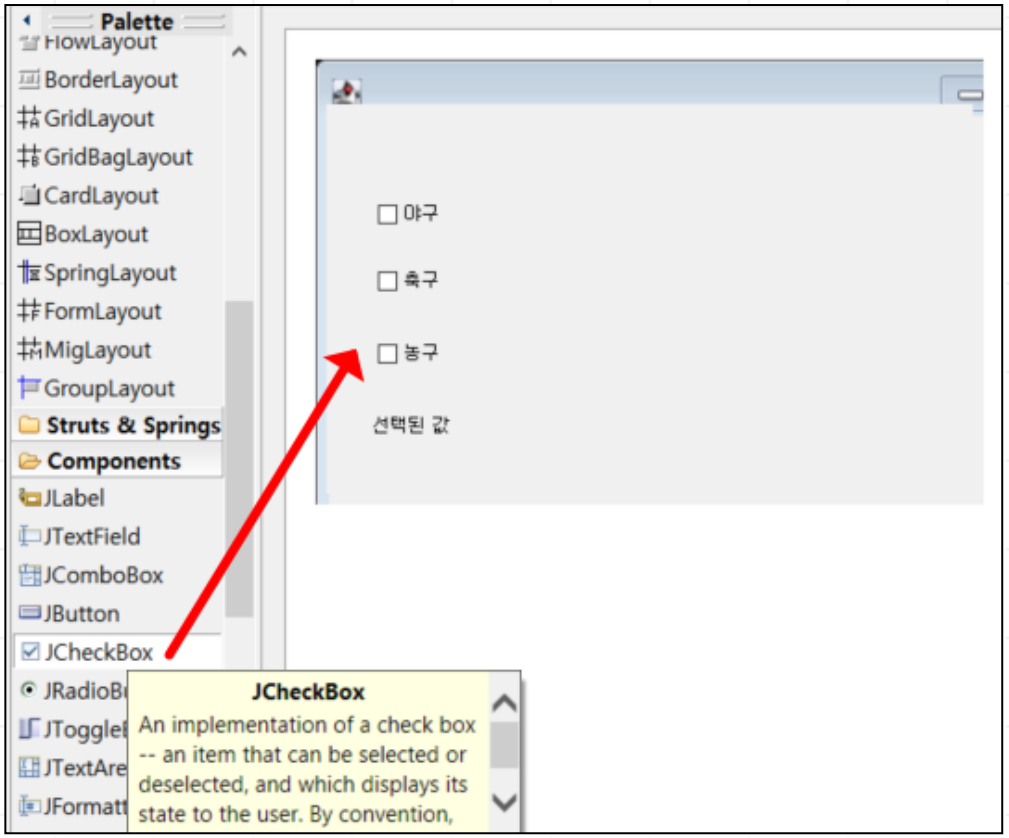
1)이벤트를 추가하고자 하는 컴포넌트를 선택하고 마우스 오른쪽 클릭.
2) Add event Handler 선택
3) action 선택 (컴포넌트 종류에 따라서 달라짐)
4) actionPerformed 선택
5) 자동으로 이벤트 처리 코드 생성.

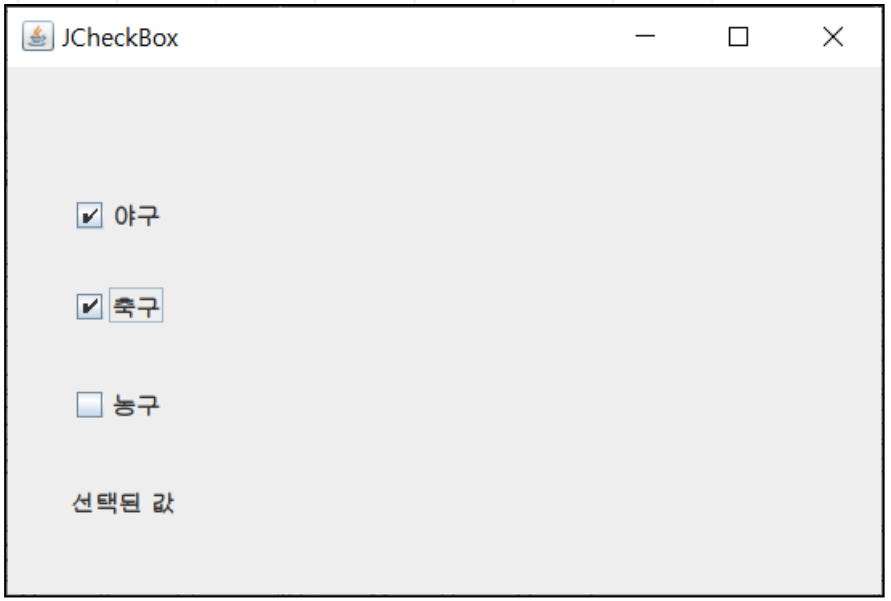



```
JButton btnNewButton = new JButton("OK");
btnNewButton.addActionListener(new ActionListener() {
    public void actionPerformed(ActionEvent e) {

    }
});
```

3. JCheckBox

https://docs.oracle.com/javase/8/docs/api/javax/swing/JCheckBox.html





3. JCheckBox이벤트 처리

JButton 과 다르게 개별적으로 이벤트 처리하지 않고 하나의 이벤트 처리 메서드를 사용한다.

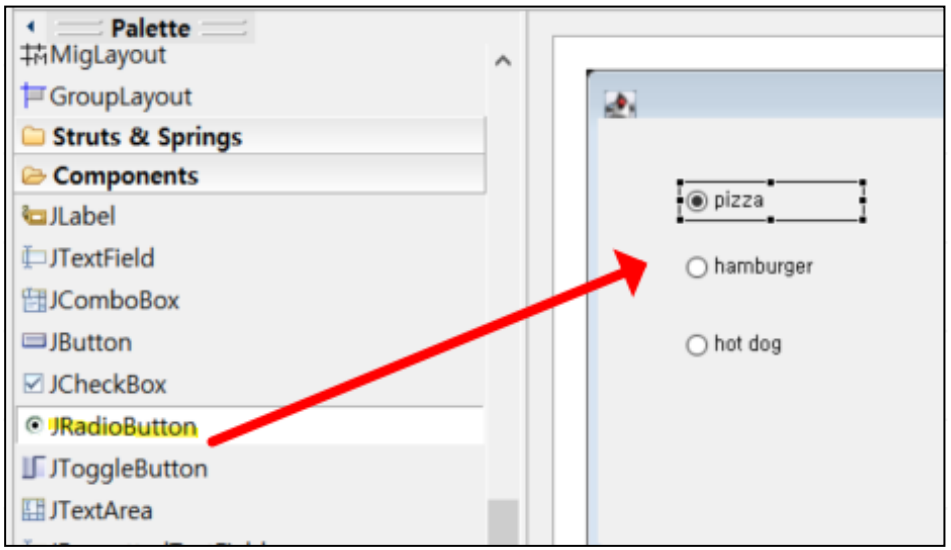
1) GUI구현 클래스에서 implements ItemListener 를 추가한다.
2) ItemListener 인터페이스의 itemStateChanged(ItemEvent) 메서드를 재정의한다.
3) 각 JCheckBox 에 addItemListener(this) 코드를 설정한다.
4) 선택된 JCheckBox 를 식별하여 이벤트 처리를 구현한다.

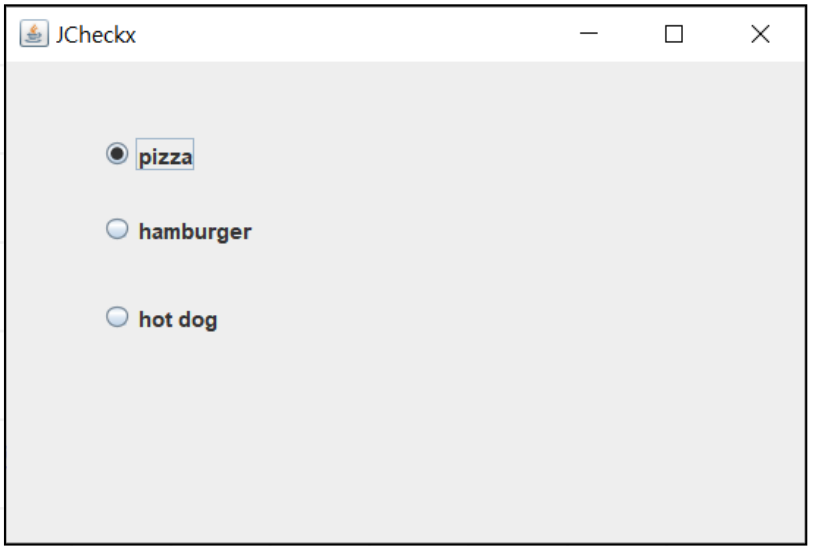
```
public class JComponent02_JCheckBox2_event
    extends JFrame implements ItemListener{

    private JPanel contentPane;

    JCheckBox ch1;
    JCheckBox ch2;
    JCheckBox ch3;
    JLabel lblNewLabel;
    Set<String> set;


    ch1 = new JCheckBox("야구");
    ch1.addItemListener(this);
    ch1.setBounds(31, 63, 107, 23);
    contentPane.add(ch1);

    ch2 = new JCheckBox("축구");
    ch2.addItemListener(this);
    ch2.setBounds(31, 108, 107, 23);
    contentPane.add(ch2);
```

```
@Override
public void itemStateChanged(ItemEvent e) {
    String key = ((JCheckBox)e.getItem()).getActionCommand();

    if(e.getStateChange() == ItemEvent.SELECTED) {
        set.add(key);
    }else {
        set.remove(key);
    }

    System.out.println(set.toString());
    lblNewLabel.setText(set.toString());
}
```

4. JRadioButton

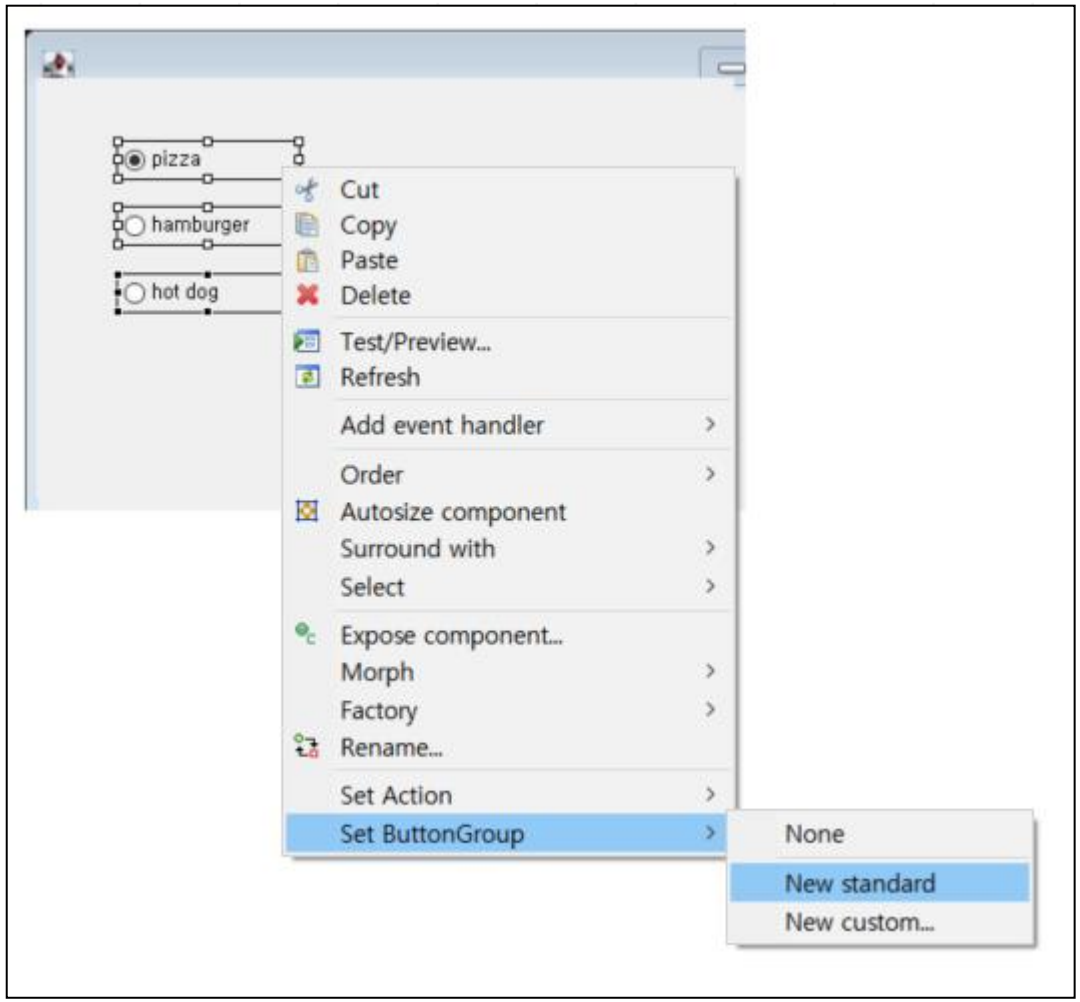
https://docs.oracle.com/javase/8/docs/api/javax/swing/JRadioButton.html





4. JRadioButton

JRadioButton 은 반드시 그룹으로 묶어서 처리해야 된다.



4. JRadioButton 이벤트 처리

JCheckBox 와 동일한 방식으로 이벤트 처리를 구현한다.

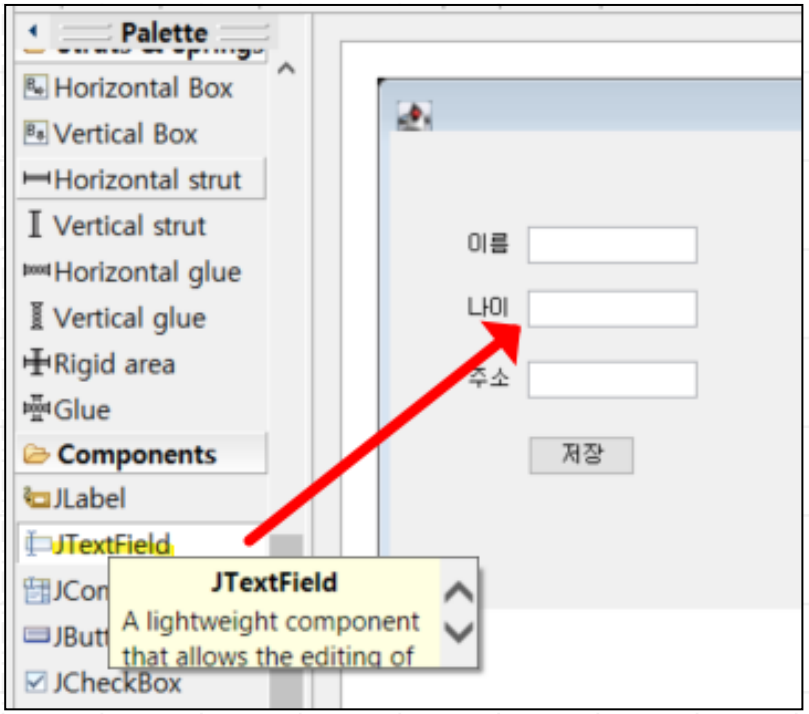
1) GUI구현 클래스에서 implements ActionListener 를 추가한다.
2) ActionListener 인터페이스의 actionPerformed(ActionEvent) 메서드를 재정의한다.
3) 각 JRadioButton 에 addActionListener(this) 코드를 설정한다.
4) 선택된 JRadioButton를 식별하여 이벤트 처리를 구현한다.

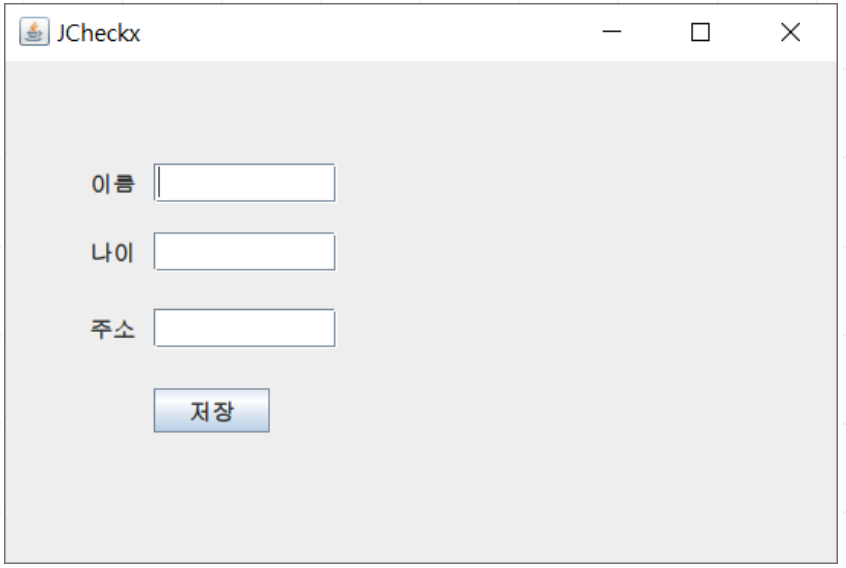
```
public class JComponent03_JRadioButton2_event
    extends JFrame implements ActionListener{

    private static final long serialVersionUID = 1L;
    private JPanel contentPane;

    JRadioButton pizzaButton;
    JRadioButton hamburgerButton;
    JRadioButton hotDogButton;
    private final ButtonGroup buttonGroup = new ButtonGroup();

    pizzaButton  = new JRadioButton("pizza");
    pizzaButton.addActionListener(this);
    buttonGroup.add(pizzaButton);
    pizzaButton.setSelected(true);
    pizzaButton.setBounds(51, 40, 113, 23);
    contentPane.add(pizzaButton);
```

```
@Override
public void actionPerformed(ActionEvent e) {
    JRadioButton btn = (JRadioButton)e.getSource();
    System.out.println(btn.getText());
}
```

5. JTextField 및 이벤트 처리

https://docs.oracle.com/javase/8/docs/api/javax/swing/JTextField.html






```
btnSave = new JButton("저장");
btnSave.addActionListener(new ActionListener() {
    public void actionPerformed(ActionEvent e) {

        String name = txtName.getText();
        String age = txtAge.getText();
        String address = txtAddress.getText();

        System.out.println(name+"\t"+age+"\t"+address);
    }
});
```

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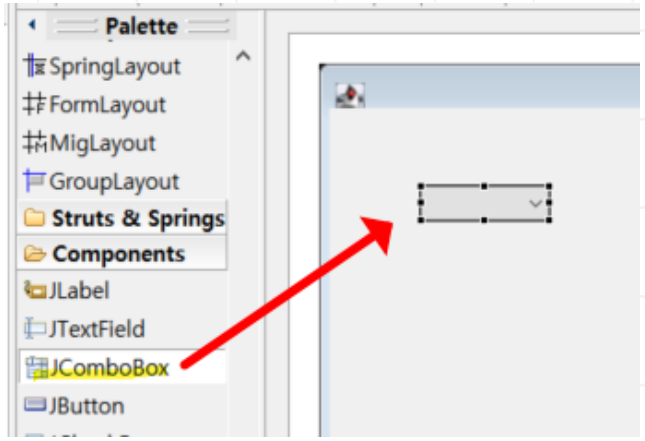
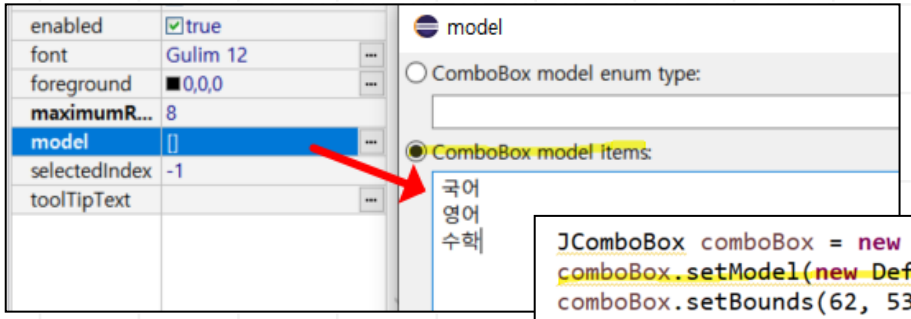
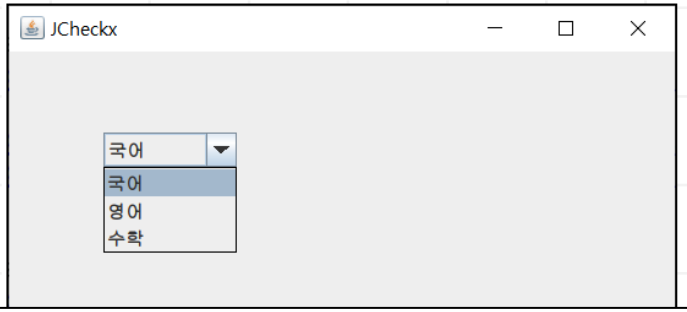
6. JComboBox

https://docs.oracle.com/javase/8/docs/api/javax/swing/JComboBox.html



콤보박스에서 보여줄 데이터 설정






```
JComboBox comboBox = new JComboBox();
comboBox.setModel(new DefaultComboBoxModel(new String[] {"국어", "영어", "수학"}));
comboBox.setBounds(62, 53, 87, 23);
contentPane.add(comboBox);

JComboBox comboBox2 = new JComboBox(new String[] {"국어", "영어", "수학"});
comboBox2.setBounds(62, 132, 87, 23);
contentPane.add(comboBox2);
```

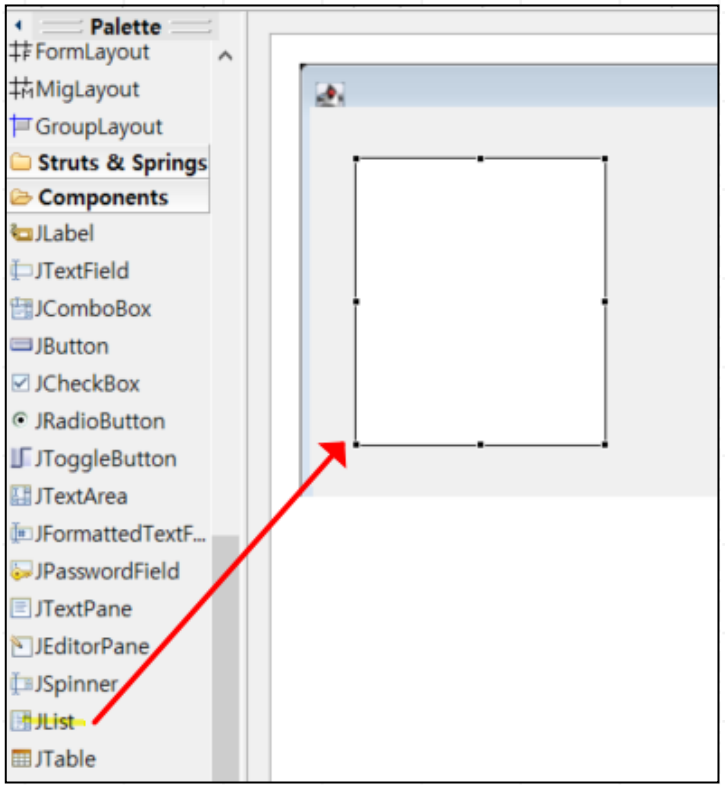
6. JComboBox 이벤트 처리

콤보박스 이벤트 처리

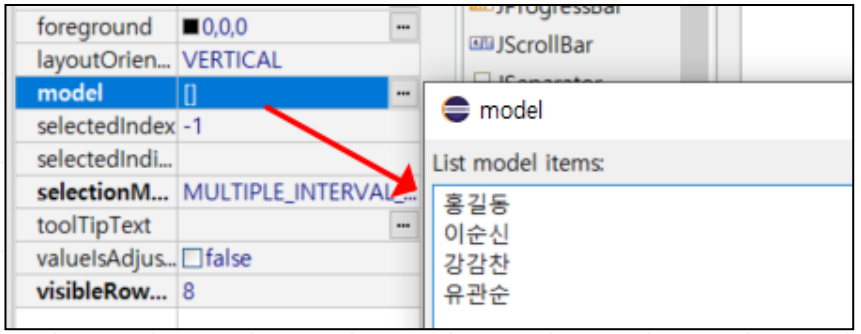
```
JComboBox comboBox2 = new JComboBox(new String[] {"국어", "영어", "수학"});
comboBox2.addActionListener(new ActionListener() {
    public void actionPerformed(ActionEvent e) {
        if(e.getSource()==comboBox2){
            System.out.println(comboBox2.getSelectedItem());
        }
    }
});
```

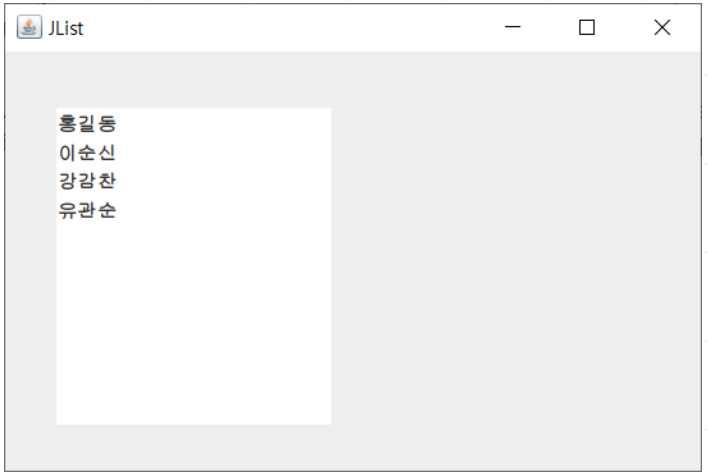
7. JList

https://docs.oracle.com/javase/8/docs/api/javax/swing/JList.html



JList에서 보여줄 데이터 설정



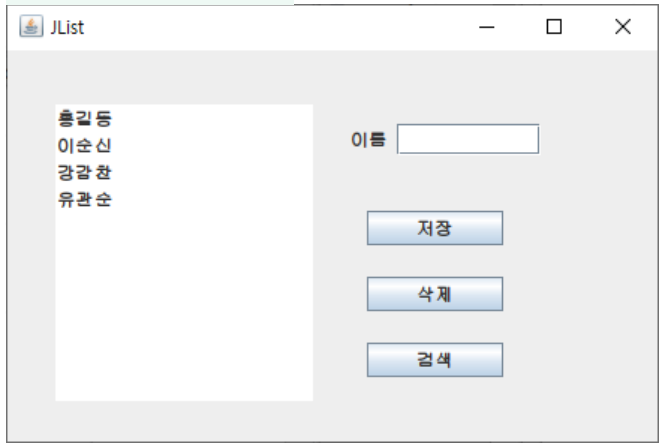


7. JList 이벤트 처리

JList 이벤트 처리

```
JList<String> list = new JList<>();
list.setModel(listModel);
list.setSelectionMode(ListSelectionModel.SINGLE_SELECTION);

//이벤트 처리
list.addListSelectionListener(new ListSelectionListener() {
    @Override
    public void valueChanged(ListSelectionEvent e) {

        JList<String> xxx = (JList<String>)e.getSource();
        tfName.setText(xxx.getSelectedValue());

    }
});

list.setBounds(32, 36, 172, 198);
contentPane.add(list);
```

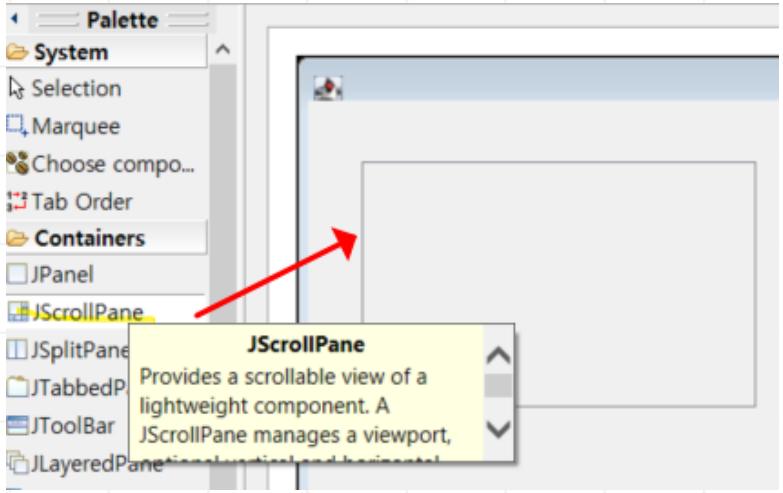
실습 문제



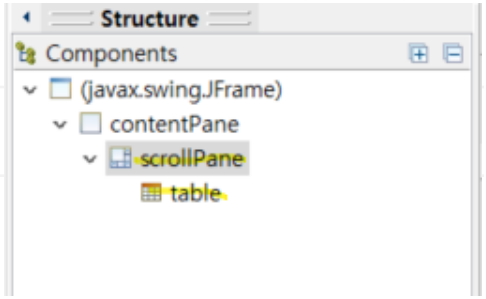
8. JTable

https://docs.oracle.com/javase/8/docs/api/javax/swing/JTable.html

JTable 생성전에 JScrollPane부터 생성한다.

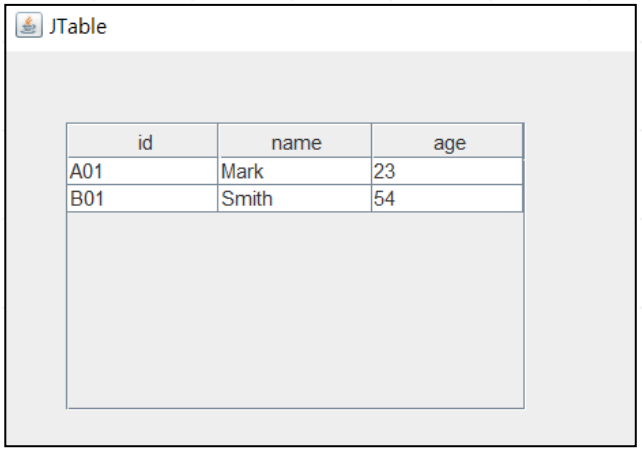


나중에 JTable 를 생성한다.



JTable에서 보여줄 데이터 설정

```
////////////////////////////////////////////////////////////////
Object [][] obj = new Object[][] {
    {"A01", "Mark", Integer.valueOf(23)},
    {"B01", "Smith", Integer.valueOf(54)},
};
String [] header = new String[] {
        "id", "name", "age"
    };

////////////////////////////////////////////////////////////////
JScrollPane scrollPane = new JScrollPane();
scrollPane.setBounds(37, 42, 271, 169);
contentPane.add(scrollPane);
table = new JTable(obj, header);
scrollPane.setViewportView(table);
```



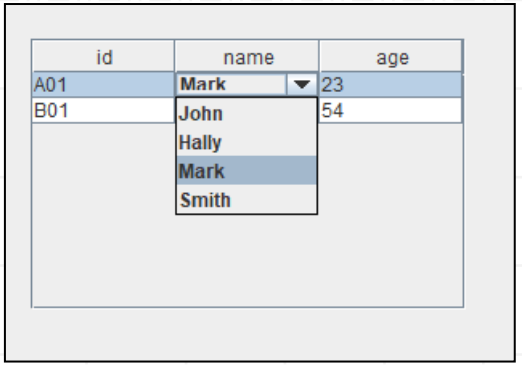
JTable 이벤트 처리

```
// 이벤트 처리
ListSelectionModel model = table2.getSelectionModel();
model.addListSelectionListener(new ListSelectionListener() {
    @Override
    public void valueChanged(ListSelectionEvent e) {
        ListSelectionModel lsm =
        (ListSelectionModel)e.getSource();
        if (lsm.isSelectionEmpty()) {
            System.out.println("isSelectionEmpty ");
        } else {
           int selectedRow = lsm.getMinSelectionIndex();
           System.out.println("selectedRow" + selectedRow +" "
             + Arrays.toString(obj[selectedRow]));
        }
    }
});
```

8. JTable 컬럼 변경

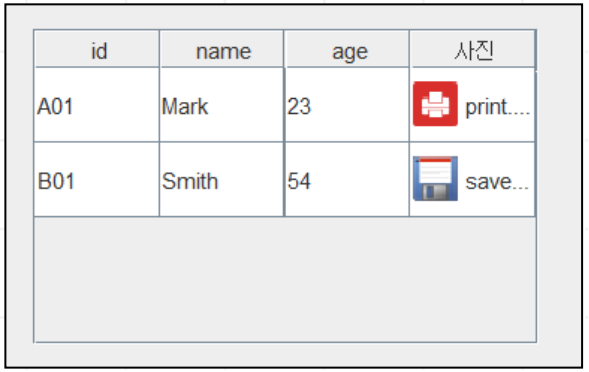
DefaultCellEditor 이용

```
// 2번째 컬럼항목을 JComboBox로 설정
TableColumn column = table2.getColumnModel().getColumn(1);

JComboBox<String> box = new JComboBox<String>();
box.addItem("John");
box.addItem("Hally");
box.addItem("Mark");
box.addItem("Smith");

column.setCellEditor( new DefaultCellEditor(box));
```



TableCellRenderer 이용

```
        // 4번째 컬럼 커스커마이징
        TableColumn column = table2.getColumnModel().getColumn(3);

        MyTableCellRenderer renderer = new MyTableCellRenderer();
        column.setCellRenderer(renderer);
    }
}
class MyTableCellRenderer implements TableCellRenderer{
     DefaultTableCellRenderer tableRenderer = new DefaultTableCellRenderer();
    @Override
    public Component getTableCellRendererComponent(JTable table, Object value,
            boolean isSelected, boolean hasFocus, int row, int column) {
        JLabel xxx = (JLabel)tableRenderer.getTableCellRendererComponent(
                  table, value, isSelected, hasFocus, row, column);

        ImageIcon icon =
                new ImageIcon(JComponent07_JTable4_TableCellRenderer.class.get
        xxx.setIcon(icon);
        return xxx;
    }
}
```



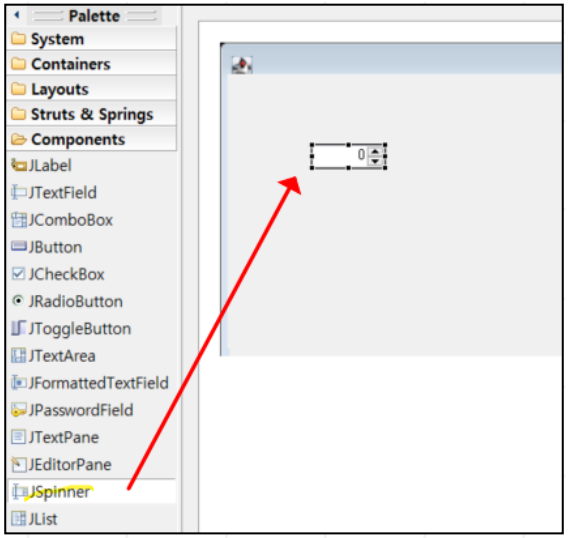
8. JTable Model 재정의

AbstractTableModel 이용

```
////////////////////////////////////////////////////////////////
//      DefaultTableModel dm = new DefaultTableModel(obj, header);
        MyTableModel mtm = new MyTableModel(obj, header);
        table.setModel(mtm);
    }
}//end class

class MyTableModel extends AbstractTableModel{

    Object [][] obj;
    String [] header;

    public MyTableModel(Object[][] obj, String[] header) {
        this.obj = obj;
        this.header = header;
    }

    @Override
    public int getRowCount() {
        return obj.length;
    }
```

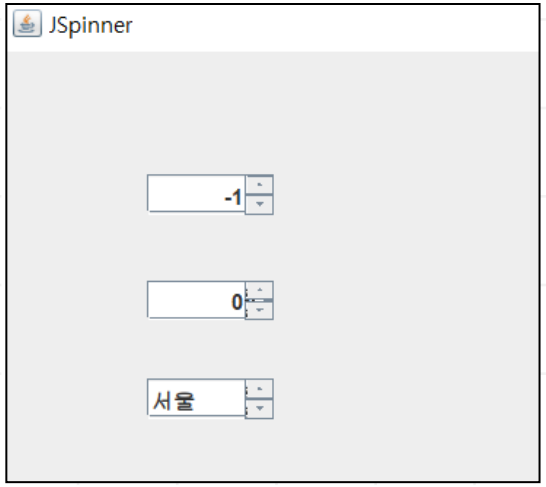
9. JSpinner

https://docs.oracle.com/javase/8/docs/api/javax/swing/JSpinner.html



JSpinner Model 설정1

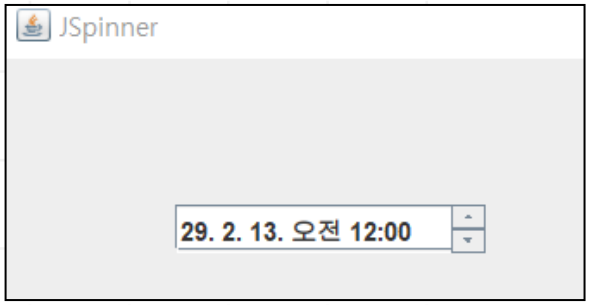
```
JSpinner spinner2 = new JSpinner();
// 속성설정
// SpinnerNumberModel(int value, int minimum, int maximum, int stepSize)
spinner2.setModel(new SpinnerNumberModel(1, 0, 100, 1));
spinner2.setBounds(81, 126, 70, 22);
contentPane.add(spinner2);

JSpinner spinner3 = new JSpinner();
spinner3.setModel(new SpinnerListModel(new String[] {"서울", "부산", "제주"}));
spinner3.setBounds(81, 180, 70, 22);
contentPane.add(spinner3);
```



9. JSpinner 이벤트 처리

JSpinner Model 설정2

```
// 날짜 모델 설정1 -
Date now = new Date();
SpinnerDateModel model =
        new SpinnerDateModel(now, null, null, Calendar.DAY_OF_WEEK);

JSpinner spinner = new JSpinner();
spinner.setModel(model);
```

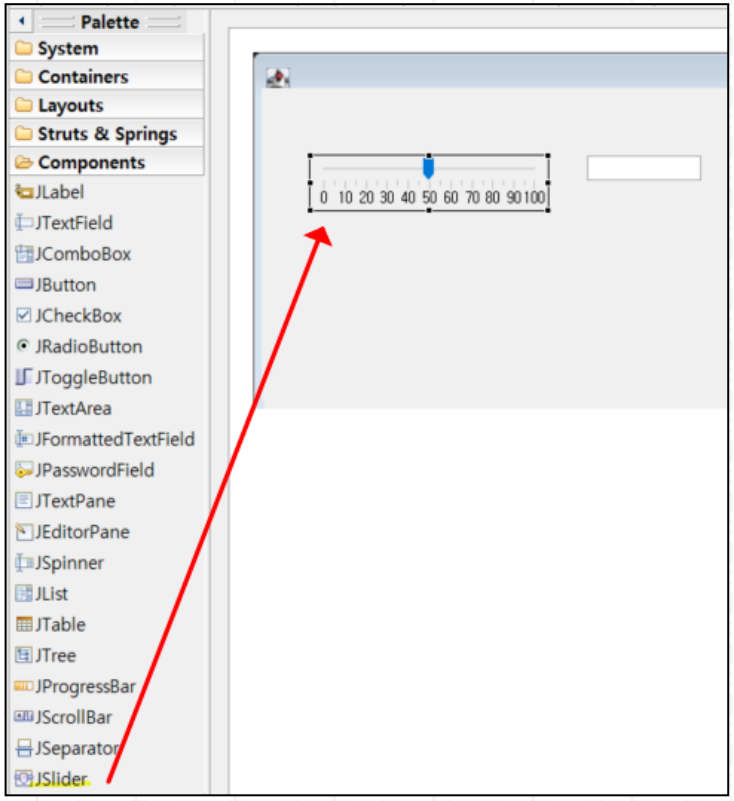


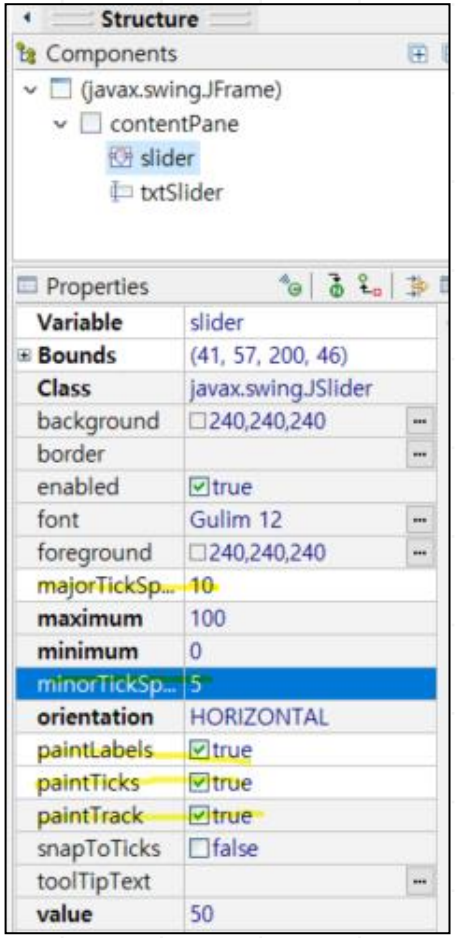
JSpinner 이벤트 처리

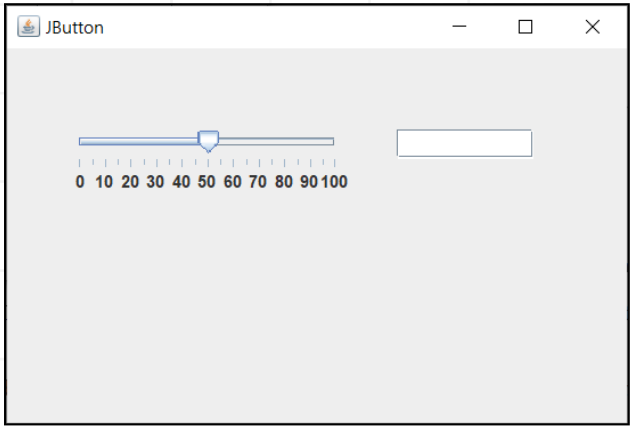
```
JSpinner spinner2 = new JSpinner();
// 속성설정
// SpinnerNumberModel(int value, int minimum, int maximum, int stepSize)
spinner2.setModel(new SpinnerNumberModel(1, 0, 100, 1));
spinner2.setBounds(81, 126, 70, 22);
contentPane.add(spinner2);

//이벤트 처리
spinner2.addChangeListener(new ChangeListener() {
    @Override
    public void stateChanged(ChangeEvent e) {
        JSpinner xxx = (JSpinner)e.getSource();
        System.out.println(xxx.getValue());
    }
} );
```

10. JSlider

https://docs.oracle.com/javase/8/docs/api/javax/swing/JSlider.html







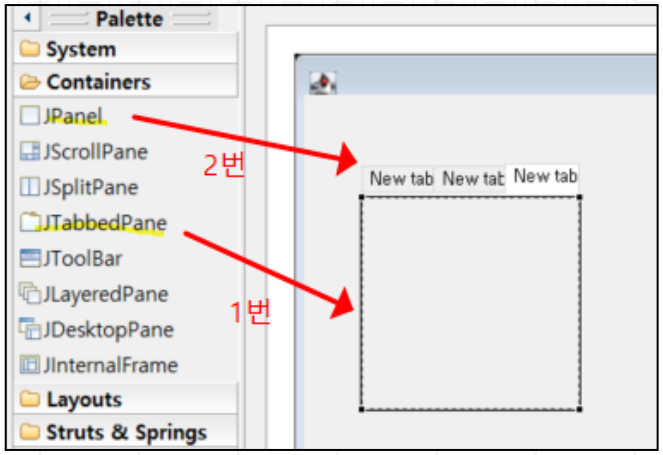
10. JSlider 이벤트 처리

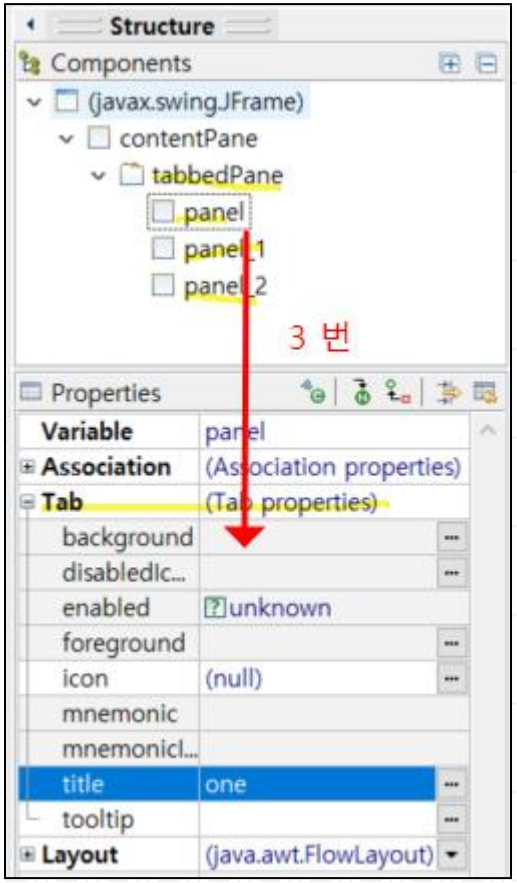
JSlider 이벤트 처리

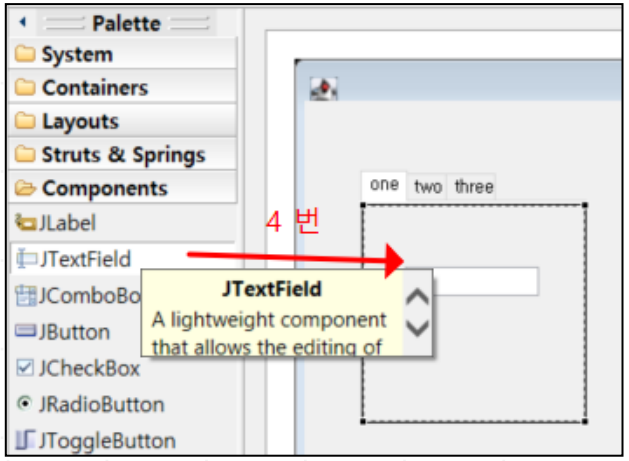
```
JSlider slider = new JSlider();
slider.addChangeListener(new ChangeListener() {
    public void stateChanged(ChangeEvent e) {

        JSlider xxx = (JSlider)e.getSource();
        int value = xxx.getValue();
        txtSlider.setText(Integer.toString(value));
    }
});
```

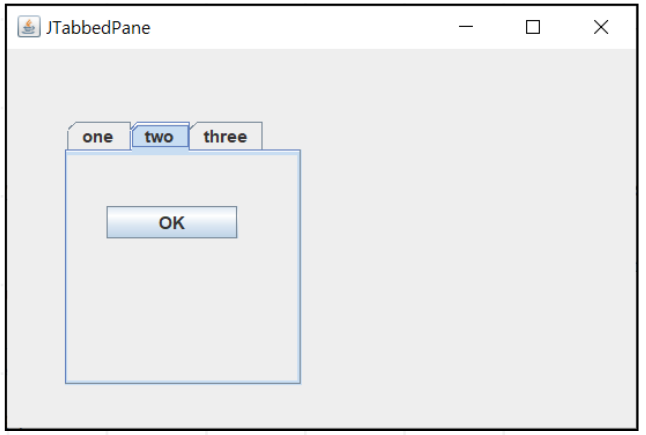
11. JTabbedPane

https://docs.oracle.com/javase/8/docs/api/javax/swing/JTabbedPane.html









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12. JOptionPane 이용한 Dialog 처리

https://docs.oracle.com/javase/8/docs/api/javax/swing/JOptionPane.html

Method Name	Description
showConfirmDialog	Asks a confirming question, like yes/no/cancel.
showInputDialog	Prompt for some input.
showMessageDialog	Tell the user about something that has happened.
showOptionDialog	The Grand Unification of the above three.

Examples:

Show an error dialog that displays the message, 'alert':

```
JOptionPane.showMessageDialog(null, "alert", "alert", JOptionPane.ERROR_MESSAGE);
```

Show an internal information dialog with the message, 'information':

```
 JOptionPane.showInternalMessageDialog(frame, "information",
             "information", JOptionPane.INFORMATION_MESSAGE);
```

Show an information panel with the options yes/no and message 'choose one':

```
JOptionPane.showConfirmDialog(null,
             "choose one", "choose one", JOptionPane.YES_NO_OPTION);
```

Show an internal information dialog with the options yes/no/cancel and message 'please choose one' and title information:

```
JOptionPane.showInternalConfirmDialog(frame,
             "please choose one", "information",
             JOptionPane.YES_NO_CANCEL_OPTION, JOptionPane.INFORMATION_MESSAGE);
```

12. JOptionPane 이용한 Dialog 처리

Show a warning dialog with the options OK, CANCEL, title 'Warning', and message 'Click OK to continue':

```
Object[] options = { "OK", "CANCEL" };
JOptionPane.showOptionDialog(null, "Click OK to continue", "Warning",
            JOptionPane.DEFAULT_OPTION, JOptionPane.WARNING_MESSAGE,
            null, options, options[0]);
```

Show a dialog asking the user to type in a String:

```
String inputValue = JOptionPane.showInputDialog("Please input a value");
```

Show a dialog asking the user to select a String:

```
Object[] possibleValues = { "First", "Second", "Third" };

Object selectedValue = JOptionPane.showInputDialog(null,
            "Choose one", "Input",
            JOptionPane.INFORMATION_MESSAGE, null,
            possibleValues, possibleValues[0]);
```

감사합니다.