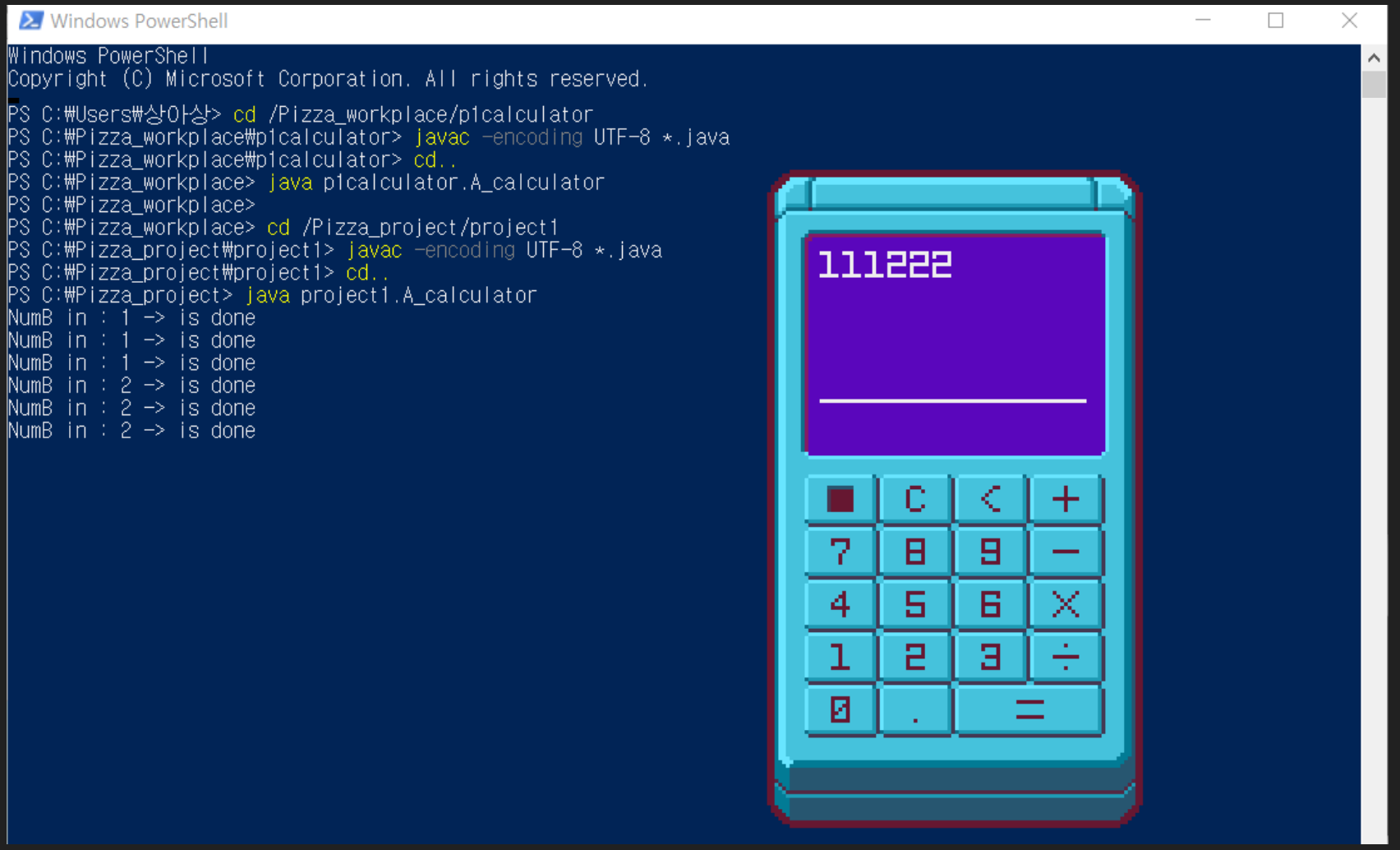
CALCULATOR

프로그래밍 실습

PROJECT1 CALCULATOR

2016314216 이상아

Problem


Windows PowerShell
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.
PS C:₩Users₩상아상> cd /Pizza_workplace/p1calculator
PS C:₩Pizza_workplace₩p1calculator> javac -encoding UTF-8 *.java
PS C:₩Pizza_workplace₩p1calculator> cd..
PS C:₩Pizza_workplace> java p1calculator.A_calculator
PS C:₩Pizza_workplace>
PS C:₩Pizza_workplace> cd /Pizza_project/project1
PS C:₩Pizza_project₩project1> javac -encoding UTF-8 *.java
PS C:₩Pizza_project₩project1> cd..
PS C:₩Pizza_project> java project1.A_calculator
NumB in : 1 -> is done
NumB in : 1 -> is done
NumB in : 1 -> is done
NumB in : 2 -> is done
NumB in : 2 -> is done
NumB in : 2 -> is done
111222
C
7
8
9
4
5
6
1
2
3
0
.

CLASS HIERARCHY

A_calculator implements ActionListen

...
main()

C_NumbButton extends JButton

char Value
ImageIcon icon
ImageIcon Label_icon
setValue(~~)

C_OperButton extends JButton

char Value
ImageIcon icon
ImageIcon Label_icon
setValue(~~)

C_SpecButton extends JButton

char Value
ImageIcon icon
setValue(~~)

D_Label extends JLabel

char Value
ImageIcon Default_icon
innitLabel()
setLabel()
deleteLabel()

B_Screen

D_Label[] ScreenValue
D_Label[] ResultValue
Int inputTail
initScreen()
getInput() ← Overload
checkInput() ← Overload
showResult()

B_GUI

Timer T
makeFrameMove()
makeFrame()
make~~Button()
setErrorScreen()

B_Function

calculValue()

CLASS HIERARCHY

A_calculator
implements
ActionListen

...
main() Button의 ActionListner

D_Label
extends
JLabel

char Value ImageIcon Default_icon
innitLabel() setLabel() deleteLabel()

C_NumbButton
extends
JButton

char Value ImageIcon icon ImageIcon Label_icon
setValue(~~)

B_Screen

D_Label[] ScreenValue D_Label[] ResultValue Int inputTail
initScreen() checkInput() ← Overload getInput() ← Overload showResult()

C_OperButton
extends
JButton

char Value ImageIcon icon ImageIcon Label_icon
setValue(~~)

B_GUI

Timer T
makeFrameMove() makeFrame() make~~Button() setErrorScreen()

C_SpecButton
extends
JButton

char Value ImageIcon icon
setValue(~~)

B_Function

calculValue()

1

Get input from Button &

display user's input on Screen

2

'=' Button :

Calculate and display result on Screen

3

Close Calculator

1

Get input from Button &

display user's input on Screen

main class

A_calculator

CLASS HIERARCHY

A_calculator
implements
ActionListen

...
main() Button의 ActionListner

D_Label
extends
JLabel

char Value ImageIcon Default_icon
innitLabel() setLabel() deleteLabel()

C_NumbButton
extends
JButton

char Value ImageIcon icon ImageIcon Label_icon
setValue(~~)

B_Screen

D_Label[] ScreenValue D_Label[] ResultValue Int inputTail
initScreen() checkInput() ← Overload getInput() ← Overload showResult()

C_OperButton
extends
JButton

char Value ImageIcon icon ImageIcon Label_icon
setValue(~~)

B_GUI

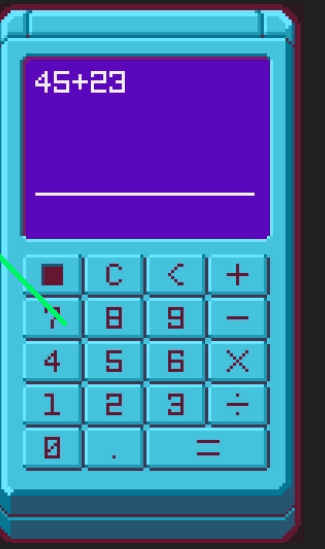
Timer T
makeFrameMove() makeFrame() make~~Button() setErrorScreen()

C_SpecButton
extends
JButton

char Value ImageIcon icon
setValue(~~)

B_Function

calculValue()



CLASS HIERARCHY

A_calculator
implements
ActionListen

...
main() Button의 ActionListner

C_NumbButton
extends
JButton

char Value ImageIcon icon ImageIcon Label_icon
setValue(~~)

C_OperButton
extends
JButton

char Value ImageIcon icon ImageIcon Label_icon
setValue(~~)

C_SpecButton
extends
JButton

char Value ImageIcon icon
setValue(~~)

D_Label
extends
JLabel

char Value ImageIcon Default_icon
innitLabel() setLabel() deleteLabel()

B_Screen

D_Label[] ScreenValue D_Label[] ResultValue Int inputTail
initScreen() checkInput() ← Overload getInput() ← Overload showResult()

B_GUI

Timer T
makeFrameMove() makeFrame() make~~Button() setErrorScreen()

B_Function

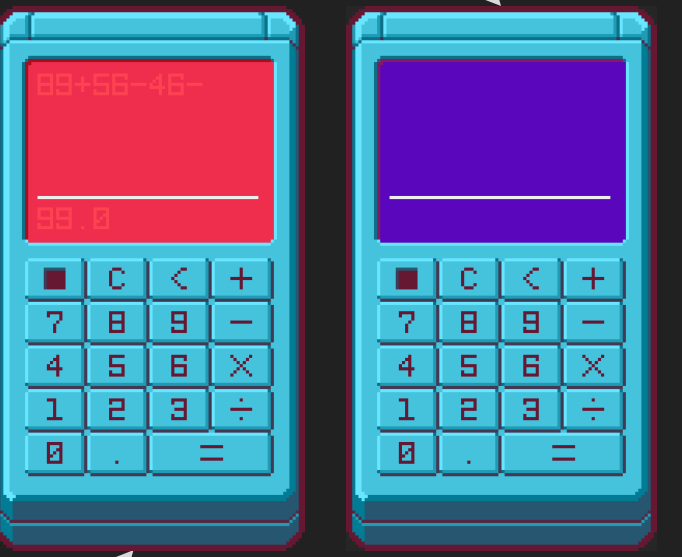
calculValue()

A_calculator

```java
package project1;

import javax.swing.*;
import java.awt.event.*;
import java.awt.*;

public class A_calculator implements ActionListener  {

    Run | Debug
    public static void main (String args[]){
        /*
        ** make (+init) static objects
        */
        JFrame F = new JFrame();          // Frame for whole GUI
        JPanel P;                         // Panel for whoel GUI

        B_GUI GUI = new B_GUI();          // GUI object
        B_Screen SCR = new B_Screen();    // Screen object

        C_NumbButton[] NumB = new C_NumbButton[10];     // Number Button objects array
        C_OperButton[] OpeB = new C_OperButton[5];      // Operator Button objects array
        C_SpecButton[] SpeB = new C_SpecButton[4];      // Special Button objects array
```

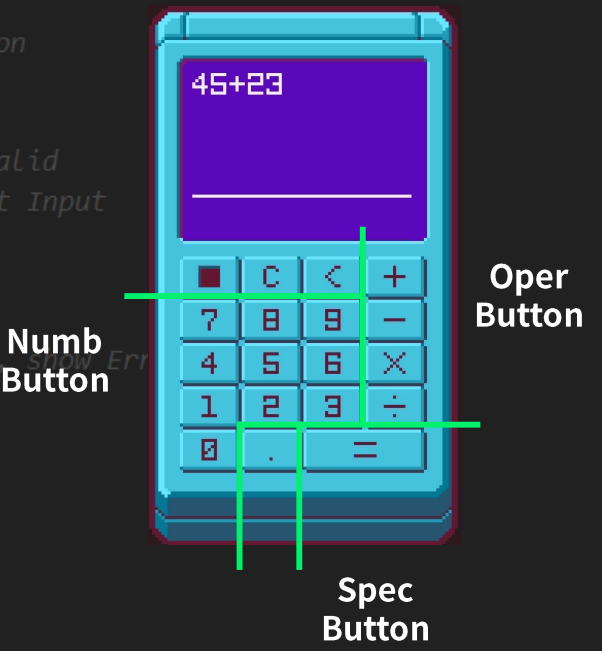
A_calculator

```java
/*
** set Panel
*/
// init panel & put bachground image on
ImageIcon icon = new ImageIcon("project1/img/Aback.png");
P = new JPanel(){
    // default serialversionUID
    private static final long serialVersionUID = 1L;

    public void paintComponent(Graphics G) {
        G.drawImage(icon.getImage(), 0, 0, null);
        setOpaque(false);
        super.paintComponent(G);
    }
};
P.setLayout(null);


/*
** set errorScreen
*/
JLabel errorScreen = new JLabel();
errorScreen.setIcon(new ImageIcon("project1/img/Aback_wrong.png"));
errorScreen.setBounds(0, 0, 300, 525);
errorScreen.setVisible(false);
P.add(errorScreen);
```



A_calculator

```java
/*
** set Buttons
*/
GUI.makeNumbButton(P, NumB);                    // set Number Buttons
for (int i=0; i<NumB.length; i++){              // add & set ActionListioner
    int ii = i;
    NumB[i].addActionListener( e -> {           // ActionListener of NumberButton
        System.out.print("NumB in : " + NumB[ii].Value);

        if (SCR.checkInput(NumB[ii])){          // check if Number Input is invalid
            SCR.getInput(NumB[ii]);             // if Number Input is valid, get Input
            System.out.println(" -> is done");      }

        else {
            GUI.setErrorScreen(errorScreen);    // else Number Input is invalid, Call Err
            System.out.println(" -> is errorwork"); }
    });
}

GUI.makeOperButton(P, OpeB);                    // set Operator Buttons
for (int i=0; i<OpeB.length; i++){              // add & set ActionListioner…

GUI.makeSpecButton(P, SpeB);                    // set Special Buttons
for (int i=0; i<SpeB.length; i++){              // add & set ActionListioner…
```



A_calculator

B_GUI

```
/*
** set Buttons
*/
GUI.makeNumbButton(P, NumB
for (int i=0; i<NumB.lengt
    int ii = i;
    NumB[i].addActionListe
        System.out.print("
        if (SCR.checkInput
            SCR.getInput(N
            System.out.pri
        else {
            GUI.setErrorSc
            System.out.pri
    });
}

GUI.makeOperButton(P, OpeB
for (int i=0; i<OpeB.lengt

GUI.makeSpecButton(P, SpeB
for (int i=0; i<SpeB.lengt
```

```
// method makeNumbButton -> make Number Buttons
void makeNumbButton(JPanel P, C_NumbButton[] NumB) {
    // init and add button0~9
    for (int i = 0; i < NumB.length; i++) {
        NumB[i] = new C_NumbButton();
        P.add(NumB[i]);
    }
    // set some values for button0~9
    // setvalue (image, value of button, positionX, positionY)
    NumB[0].setValue(new ImageIcon("project1/img/B0.png"), '0', 30, 411, new ImageIcon("project1/img/N0.png"));
    NumB[1].setValue(new ImageIcon("project1/img/B1.png"), '1', 30, 369, new ImageIcon("project1/img/N1.png"));
    NumB[2].setValue(new ImageIcon("project1/img/B2.png"), '2', 90, 369, new ImageIcon("project1/img/N2.png"));
    NumB[3].setValue(new ImageIcon("project1/img/B3.png"), '3', 150, 369, new ImageIcon("project1/img/N3.png"));
    NumB[4].setValue(new ImageIcon("project1/img/B4.png"), '4', 30, 327, new ImageIcon("project1/img/N4.png"));
    NumB[5].setValue(new ImageIcon("project1/img/B5.png"), '5', 90, 327, new ImageIcon("project1/img/N5.png"));
    NumB[6].setValue(new ImageIcon("project1/img/B6.png"), '6', 150, 327, new ImageIcon("project1/img/N6.png"));
    NumB[7].setValue(new ImageIcon("project1/img/B7.png"), '7', 30, 285, new ImageIcon("project1/img/N7.png"));
    NumB[8].setValue(new ImageIcon("project1/img/B8.png"), '8', 90, 285, new ImageIcon("project1/img/N8.png"));
    NumB[9].setValue(new ImageIcon("project1/img/B9.png"), '9', 150, 285, new ImageIcon("project1/img/N9.png"));
}

// method makeOperButton -> make Operator Buttons
void makeOperButton(JPanel P, C_OperButton[] OpeB) {···

// method makeSpecButton -> make Special Buttons
void makeSpecButton(JPanel P, C_SpecButton[] SpeB) {···
```

A_calculator

B_GUI

```
/*
** set Buttons
*/
GUI.makeNumbButton(P, NumB
for (int i=0; i<NumB.lengt
    int ii = i;
    NumB[i].addActionListe
        System.out.print("
        if (SCR.checkInput
            SCR.getInput(N
            System.out.pri
        else {
            GUI.setErrorSc
            System.out.pri
    });
}

GUI.makeOperButton(P, OpeB
for (int i=0; i<OpeB.lengt

GUI.makeSpecButton(P, SpeB
for (int i=0; i<SpeB.lengt
```

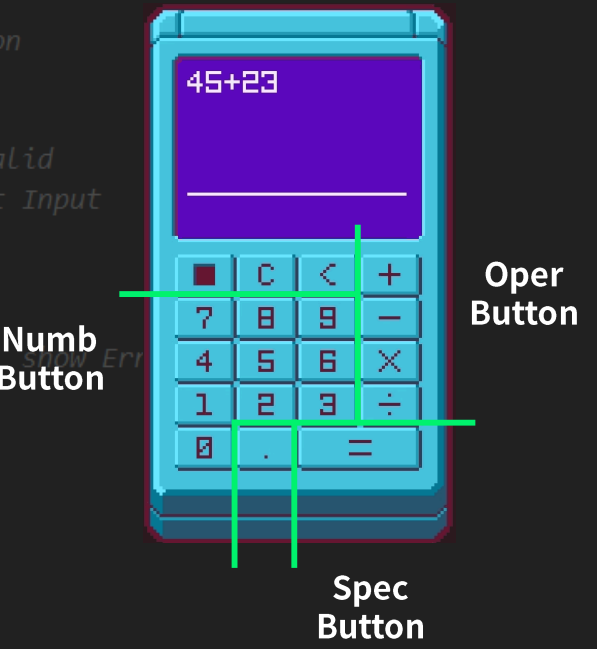
```
// method makeNumbButton -> make Number Butto
void makeNumbButton(JPanel P, C_NumbButton[]
    // init and add button0~9
    for (int i = 0; i < NumB.length; i++) {
        NumB[i] = new C_NumbButton();
        P.add(NumB[i]);
    }
    // set some values for button0~9
    // setValue (image, value of button, posi
    NumB[0].setValue(new ImageIcon("project1/
    NumB[1].setValue(new ImageIcon("project1/
    NumB[2].setValue(new ImageIcon("project1/
    NumB[3].setValue(new ImageIcon("project1/
    NumB[4].setValue(new ImageIcon("project1/
    NumB[5].setValue(new ImageIcon("project1/
    NumB[6].setValue(new ImageIcon("project1/
    NumB[7].setValue(new ImageIcon("project1/
    NumB[8].setValue(new ImageIcon("project1/
    NumB[9].setValue(new ImageIcon("project1/
}

// method makeOperButton -> make Operator But
void makeOperButton(JPanel P, C_OperButton[]

// method makeSpecButton -> make Special But
void makeSpecButton(JPanel P, C_SpecButton[]
```

C_NumbButton

```
public class C_NumbButton extends JButton{
    /*
    ** instance var
    */
    char Value;
    ImageIcon Icon;
    ImageIcon Label_Icon;
    private static final long serialVersionUID = 1L;

    public void setValue(ImageIcon icon, char V, int posX, int posY, Im
        // 파라미터를 통해 받은 정보들로 버튼 설정
        Icon = icon;                    // 아이콘을 인스턴스로 저장
        Value = V;                      // 버튼에 해당하는 값을 인스턴스로
        setIcon(null);                  // 버튼의 디폴트 이미지는 배경 이
        setBounds(posX, posY, 60, 42);  // 버튼의 위치 (posX, posY), 버튼

        Label_Icon=L_Icon;              // 해당 버튼을 눌렀을 때 스크린에


        // 버튼의 테두리가 보이지 않도록 설정
        setBackground(null);
        setBorderPainted(false);
        setFocusPainted(false);
        setContentAreaFilled(false);

        // 마우스를 눌렀을 때 눌리는 이미지로 바뀌었다가, 손을 떼면 원상복구
        addMouseListener(new MouseAdapter() {
            public void mousePressed(MouseEvent e) {    setIcon(Icon);
            public void mouseReleased(MouseEvent e) {   setIcon(null);
        });
    }
```

A_calculator

```
/*
** set Buttons
*/
GUI.makeNumbButton(P, NumB);                          // set Number Buttons
for (int i=0; i<NumB.length; i++){                    // add & set ActionListioner
    int ii = i;
    NumB[i].addActionListener( e -> {                 // ActionListener of NumberButton
        System.out.print("NumB in : " + NumB[ii].Value);

        if (SCR.checkInput(NumB[ii])){                // check if Number Input is invalid
            SCR.getInput(NumB[ii]);                   // if Number Input is valid, get Input
            System.out.println(" -> is done");      }

        else {
            GUI.setErrorScreen(errorScreen);          // else Number Input is invalid, Call Err
            System.out.println(" -> is errorwork"); }
    });
}

GUI.makeOperButton(P, OpeB);                          // set Operator Buttons
for (int i=0; i<OpeB.length; i++){                    // add & set ActionListioner…

GUI.makeSpecButton(P, SpeB);                          // set Special Buttons
for (int i=0; i<SpeB.length; i++){                    // add & set ActionListioner…
```



A_calculator

B_Screen

```
/*
** set Buttons
*/
GUI.makeNumbButton(P, NumB);
for (int i=0; i<NumB.length; i++){
    int ii = i;
    NumB[i].addActionListener( e -> {
        System.out.print("NumB in : " +

        if (SCR.checkInput(NumB[ii])){
            SCR.getInput(NumB[ii]);
            System.out.println(" -> is (

        else {
            GUI.setErrorScreen(errorScr(
            System.out.println(" -> is (
    });
}

GUI.makeOperButton(P, OpeB);
for (int i=0; i<OpeB.length; i++){

GUI.makeSpecButton(P, SpeB);
for (int i=0; i<SpeB.length; i++){
```

```
/*
** check Input
*/
// check invalid NUMBER BUTTON input
boolean checkInput(C_NumbButton NB){

    if (inputTail==0 && NB.Value=='0')  {return false;}
    if (inputTail>47)                   {return false;}
    if (inputTail>1 && ScreenValue[inputTail-1].Value=='/' && NB.Value=='0') {return f

    return true;    }

// check invalid OPERATOR BUTTON input
boolean checkInput(C_OperButton OP){
```

```
// 모든 Number Button에 대
//      -아무것도 없을 때 0
//      -48자리 이상 입력할
```

...

A_calculator

B_Screen

```
/*
** set Buttons
*/
GUI.makeNumbButton(P, NumB);
for (int i=0; i<NumB.length; i++){
    int ii = i;
    NumB[i].addActionListener( e -> {
        System.out.print("NumB in : " +

        if (SCR.checkInput(NumB[ii])){
            SCR.getInput(NumB[ii]);
            System.out.println(" -> is (

        else {
            GUI.setErrorScreen(errorScr(
            System.out.println(" -> is (
    });
}

GUI.makeOperButton(P, OpeB);
for (int i=0; i<OpeB.length; i++){

GUI.makeSpecButton(P, SpeB);
for (int i=0; i<SpeB.length; i++){
```

```
/*
** get Input
*/
// get Input from Number Button
void getInput(C_NumbButton NB){
    ScreenValue[inputTail].setLabel(NB.Value, NB.Label_Icon);
    //ScreenValue[inputTail].setIcon(NB.Label_Icon);
    //ScreenValue[inputTail].Value = NB.Value;
    inputTail++;
}

// get Input from Operator Button
void getInput(C_OperButton OB){
    ScreenValue[inputTail].setLabel(OB.Value, OB.Label_Icon);
    //ScreenValue[inputTail].setIcon(OB.Label_Icon);
    //ScreenValue[inputTail].Value = OB.Value;
    inputTail++;
}


// get Input from Special Button
void getInput(C_SpecButton SP){
    if(SP.Value == 'p'){                                    // Power Button
        System.exit(0);                                     }

    else if (SP.Value == 'c'){                              // Clear Button
        for (int i=0 ; i<ScreenValue.length ; i++){
```

A_calculator

B_Screen

```
/*
** set Buttons
*/
GUI.makeNumbButton(P, NumB);
for (int i=0; i<NumB.length; i++){
    int ii = i;
    NumB[i].addActionListener( e -> {
        System.out.print("NumB in : " +

        if (SCR.checkInput(NumB[ii])){
            SCR.getInput(NumB[ii]);
            System.out.println(" -> is (

        else {
            GUI.setErrorScreen(errorScr(
            System.out.println(" -> is (
    });
}

GUI.makeOperButton(P, OpeB);
for (int i=0; i<OpeB.length; i++){

GUI.makeSpecButton(P, SpeB);
for (int i=0; i<SpeB.length; i++){
```

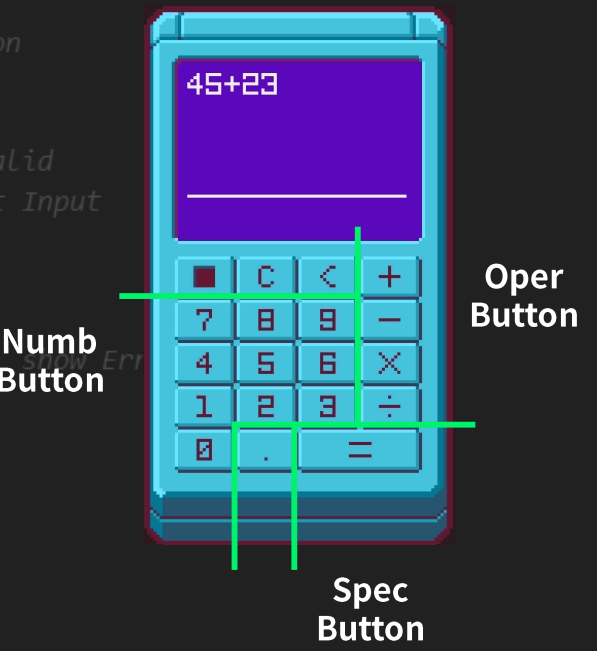
```
                    // set Number Buttons
                    // add & set ActionLis

/*
** get Input
*/
// get Input from Number Button
void getInput(C_NumbButton NB){
    ScreenValue[inputTail].setLabel(NB.
    //ScreenValue[inputTail].setIcon(NB
    //ScreenValue[inputTail].Value = NB
    inputTail++;
}

// get Input from Operator Button
void getInput(C_OperButton OB){
    ScreenValue[inputTail].setLabel(OB.
    //ScreenValue[inputTail].setIcon(OB
    //ScreenValue[inputTail].Value = OB
    inputTail++;
}

// get Input from Special Button
void getInput(C_SpecButton SP){
    if(SP.Value == 'p'){
        System.exit(0);

    else if (SP.Value == 'c'){
        for (int i=0 ; i<ScreenValue.le
```

D_Label

```
,
// 라벨의 값과 아이콘 재설정
public void setLabel(char V, ImageIcon Icon)
    this.setIcon(Icon);
    this.Value = V;
}
// 라벨의 값과 아이콘 삭제
public void deleteLabel(){
    setIcon(default_Icon);
    Value = 'n';

}
```

A_calculator

```
/*
** set Buttons
*/
GUI.makeNumbButton(P, NumB);                          // set Number Buttons
for (int i=0; i<NumB.length; i++){                    // add & set ActionListioner
    int ii = i;
    NumB[i].addActionListener( e -> {                 // ActionListener of NumberButton
        System.out.print("NumB in : " + NumB[ii].Value);

        if (SCR.checkInput(NumB[ii])){                // check if Number Input is invalid
            SCR.getInput(NumB[ii]);                   // if Number Input is valid, get Input
            System.out.println(" -> is done");      }

        else {
            GUI.setErrorScreen(errorScreen);          // else Number Input is invalid, Set Err
            System.out.println(" -> is errorwork"); }
    });
}

GUI.makeOperButton(P, OpeB);                          // set Operator Buttons
for (int i=0; i<OpeB.length; i++){                    // add & set ActionListioner…

GUI.makeSpecButton(P, SpeB);                          // set Special Buttons
for (int i=0; i<SpeB.length; i++){                    // add & set ActionListioner…
```



A_calculator

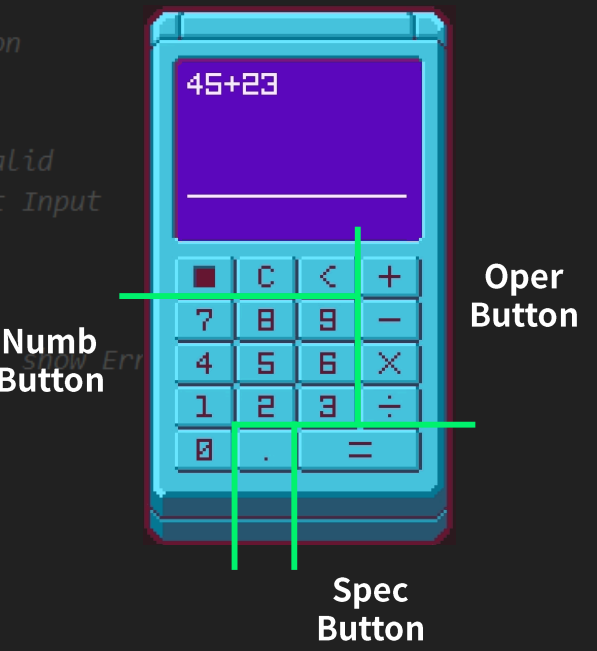
B_GUI

```
/*
** set Buttons
*/
GUI.makeNumbButton(P, NumB);
for (int i=0; i<NumB.length; i++){
    int ii = i;
    NumB[i].addActionListener( e -> {
        System.out.print("NumB in : " +

        if (SCR.checkInput(NumB[ii])){
            SCR.getInput(NumB[ii]);
            System.out.println(" -> is (

        else {
            GUI.setErrorScreen(errorScr
            System.out.println(" -> is (
    });
}

GUI.makeOperButton(P, OpeB);
for (int i=0; i<OpeB.length; i++){

GUI.makeSpecButton(P, SpeB);
for (int i=0; i<SpeB.length; i++){
```

```
// method errorScreen --> screen flickers 2 times
void setErrorScreen(JLabel eScreen) {

    T.schedule(new TimerTask(){
        @Override
        public void run() { eScreen.setVisible(true); }}

    T.schedule(new TimerTask(){
        @Override
        public void run() { eScreen.setVisible(false); }}, 200);

    T.schedule(new TimerTask(){
        @Override
        public void run() { eScreen.setVisible(true); }}, 400);

    T.schedule(new TimerTask(){
        @Override
        public void run() { eScreen.setVisible(false); }}, 600);

}
```

A_calculator

```
/*
** set Buttons
*/
GUI.makeNumbButton(P, NumB);                          // set Number Buttons
for (int i=0; i<NumB.length; i++){                    // add & set ActionListioner
    int ii = i;
    NumB[i].addActionListener( e -> {                 // ActionListener of NumberButton
        System.out.print("NumB in : " + NumB[ii].Value);

        if (SCR.checkInput(NumB[ii])){                // check if Number Input is invalid
            SCR.getInput(NumB[ii]);                   // if Number Input is valid, get Input
            System.out.println(" -> is done");      }

        else {
            GUI.setErrorScreen(errorScreen);          // else Number Input is invalid, Set Err
            System.out.println(" -> is errorwork"); }
    });
}

GUI.makeOperButton(P, OpeB);                          // set Operator Buttons
for (int i=0; i<OpeB.length; i++){                    // add & set ActionListioner…

GUI.makeSpecButton(P, SpeB);                          // set Special Buttons
for (int i=0; i<SpeB.length; i++){                    // add & set ActionListioner…
```



A_calculator

```
        /*
        ** set Screen
        */
        SCR.initScreen(P);


        /*
        ** set Frame
        */
        GUI.makeFrameMove(F);
        GUI.makeFrame(F, P);

    }

    @Override
    public void actionPerformed(ActionEvent e) {
        // empty
    }
}
```

2

'=' Button :

Calculate and display result on Screen

B_Screen.getInput(...)

B_Function.calculValue()

CLASS HIERARCHY

C_NumbButton
extends
JButton

- char Value
- ImageIcon icon
- ImageIcon Label_icon
- setValue(~~)

C_OperButton
extends
JButton

- char Value
- ImageIcon icon
- ImageIcon Label_icon
- setValue(~~)

C_SpecButton
extends
JButton

- char Value
- ImageIcon icon
- setValue(~~)

D_Label
extends
JLabel

- char Value
- ImageIcon Default_icon
- innitLabel()
- setLabel()
- deleteLabel()

A_calculator
implements
ActionListen

- ...
- main()
- Button의 ActionListner

B_Screen

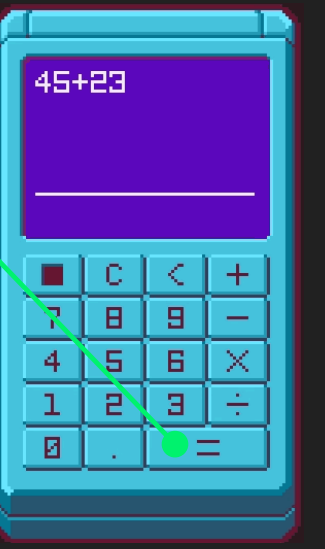
- D_Label[] ScreenValue
- D_Label[] ResultValue
- Int inputTail
- initScreen()
- checkInput() ← Overload
- getInput() ← Overload
- showResult()

B_GUI

- Timer T
- makeFrameMove()
- makeFrame()
- make~~Button()
- setErrorScreen()

B_Function

- calculValue()



CLASS HIERARCHY

A_calculator
implements
ActionListen

...
main() Button의 ActionListner

D_Label
extends
JLabel

char Value ImageIcon Default_icon
innitLabel() setLabel() deleteLabel()

C_NumbButton
extends
JButton

char Value ImageIcon icon ImageIcon Label_icon
setValue(~~)

C_OperButton
extends
JButton

char Value ImageIcon icon ImageIcon Label_icon
setValue(~~)

C_SpecButton
extends
JButton

char Value ImageIcon icon
setValue(~~)

B_Screen

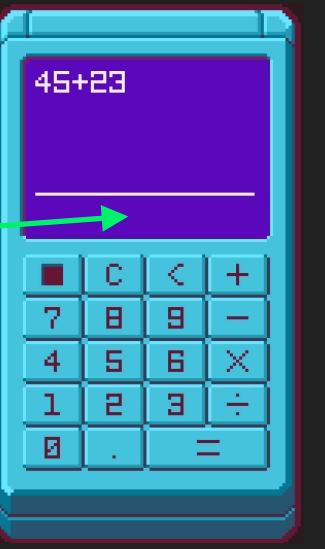
D_Label[] ScreenValue D_Label[] ResultValue Int inputTail
initScreen() checkInput() ← Overload getInput() ← Overload showResult()

B_GUI

Timer T
makeFrameMove() makeFrame() make~~Button() setErrorScreen()

B_Function

calculValue()



B_Screen

```
// get Input from Special Button
void getInput(C_SpecButton SP){
    if(SP.Value == 'p'){                                    // Power Button
        System.exit(0);                                     }

    else if (SP.Value == 'c'){                              // Clear Button
        for (int i=0 ; i<ScreenValue.length ; i++){
            ScreenValue[i].deleteLabel();   }
        for (int i=0 ; i<ResultValue.length ; i++){
            ResultValue[i].deleteLabel();   }
        inputTail=0;                                        }

    else if (SP.Value == '<'){                              // Delete Button
        if (inputTail>0){
            ScreenValue[inputTail-1].deleteLabel();
            inputTail--;                        }       }

    else if (SP.Value == '='){                              // is Button
        if (ScreenValue[inputTail-1].Value=='+' || ScreenValue[inputTail-1].Value=='-' ||
            ScreenValue[inputTail-1].Value=='*' || ScreenValue[inputTail-1].Value=='/' ){
                // ==바로 전에 부호가 입력되었을 경우 배제
            }
        else{
            char[] result = B_Function.calculValue(ScreenValue);
            showResult(result);
        }
    }
    else {
        System.out.println("nonkind SpecButton");       }
}
```

B_Screen

```
// get Input from Special Button
void getInput(C_SpecButton SP){
    if(SP.Value == 'p'){                                    // Power
        System.exit(0);                                     }

    else if (SP.Value == 'c'){                              // Clear
        for (int i=0 ; i<ScreenValue.length ; i++){
            ScreenValue[i].deleteLabel();   }
        for (int i=0 ; i<ResultValue.length ; i++){
            ResultValue[i].deleteLabel();   }
        inputTail=0;                                        }

    else if (SP.Value == '<'){                              // Delete
        if (inputTail>0){
            ScreenValue[inputTail-1].deleteLabel();
            inputTail--;                                }   }

    else if (SP.Value == '='){                              // is But
        if (ScreenValue[inputTail-1].Value=='+' || ScreenValue[in
            ScreenValue[inputTail-1].Value=='*' || ScreenValue[in
                // ==바로 전에 부호가 입력되었을 경우 배제
            }
        else{
            char[] result = B_Function.calculValue(ScreenValue);
            showResult(result);
        }
    }
    else {
        System.out.println("nonkind SpecButton");        }
}
```

B_Function.calculValue(...)

```
public class B_Function{

    static char[] calculValue(D_Label[] SV){
        // step1 : D_Label[i].value → char[] 로 받은 식 추출
        ArrayList<Character> CH = new ArrayList<Character>();

        for (int i=0 ; i<SV.length ; i++){
            // 값을 다 읽어내고 더미n값만 남은 경우 break
            if (SV[i].Value=='n'){  break;  }
            CH.add (SV[i].Value);
        }
        System.out.print("CH : ");
        System.out.println(CH);
```

step1 : D_Label[i].value → char[]

B_Screen

```
// get Input from Special Button
void getInput(C_SpecButton SP){
    if(SP.Value == 'p'){                                    // Power
        System.exit(0);                                     }

    else if (SP.Value == 'c'){                              // Clear
        for (int i=0 ; i<ScreenValue.length ; i++){
            ScreenValue[i].deleteLabel();   }
        for (int i=0 ; i<ResultValue.length ; i++){
            ResultValue[i].deleteLabel();   }
        inputTail=0;                                        }

    else if (SP.Value == '<'){                              // Delete
        if (inputTail>0){
            ScreenValue[inputTail-1].deleteLabel();
            inputTail--;                                }   }

    else if (SP.Value == '='){                              // is But
        if (ScreenValue[inputTail-1].Value=='+' || ScreenValue[in
            ScreenValue[inputTail-1].Value=='*' || ScreenValue[in
                // ==바로 전에 부호가 입력되었을 경우 배제
            }
        else{
            char[] result = B_Function.calculValue(ScreenValue);
            showResult(result);
        }
    }
    else {
        System.out.println("nonkind SpecButton");        }
}
```

B_Function.calculValue(...)

```
public class B_Function{

    static char[] calculValue(D_Label[] SV){
```

step2 : char[] → ArrayList<String>();

```
        ArrayList<String> ST = new ArrayList<String>();
        String preV="";
        for (int i=0 ; i<CH.size() ; i++){
            char now = CH.get(i); // 현재값

            if( now=='+' || now=='-' || now=='*' || now=='/' ){
                ST.add(preV);
                System.out.println("ST added : "+preV);
                preV="";
                ST.add( Character.toString(now) );
                System.out.println("ST added : "+ Character.toString(no

            }

            else if (i==CH.size()-1){
                preV = preV + Character.toString(now) ;
                ST.add(preV);
                System.out.println("ST added : "+preV);
            }

            else{
                preV = preV + Character.toString(now) ;
            }
        }
        System.out.print("ST : "+ST);
        System.out.println(ST.size());
```

B_Screen

```
// get Input from Special Button
void getInput(C_SpecButton SP){
    if(SP.Value == 'p'){                                    // Power
        System.exit(0);                                     }

    else if (SP.Value == 'c'){                              // Clear
        for (int i=0 ; i<ScreenValue.length ; i++){
            ScreenValue[i].deleteLabel();   }
        for (int i=0 ; i<ResultValue.length ; i++){
            ResultValue[i].deleteLabel();   }
        inputTail=0;                                        }

    else if (SP.Value == '<'){                              // Delete
        if (inputTail>0){
            ScreenValue[inputTail-1].deleteLabel();
            inputTail--;                                }   }

    else if (SP.Value == '='){                              // is But
        if (ScreenValue[inputTail-1].Value=='+' || ScreenValue[in
            ScreenValue[inputTail-1].Value=='*' || ScreenValue[in
                // ==바로 전에 부호가 입력되었을 경우 배제
            }
        else{
            char[] result = B_Function.calculValue(ScreenValue);
            showResult(result);
        }
    }
    else {
        System.out.println("nonkind SpecButton");           }
}
```

B_Function.calculValue(...)

```
public class B_Function{

    static char[] calculValue(D_Label[] SV){
```

step3 : ArrayList<String> → calculate !

```
        double resultV = 0;
        try{
            for (int i=0 ; i<ST.size() ; i++){
                String nowS = ST.get(i);
                char nowC = ST.get(i).charAt(0);

                if (nowC=='+' || nowC=='-' || nowC=='*' || nowC=='/' ){
                    System.out.println("it is +-*/");
                }

                else if (i==0){
                    resultV = Double.parseDouble(nowS);
                    System.out.println("first number!");
                }

                else{
                    char pre = ST.get(i-1).charAt(0);
                    // (계산해오던 resultV 값) (바로 전 연산자) (현재 값)
                    if      (pre=='+')  { resultV = resultV + Double.pa
                    else if (pre=='-')  { resultV = resultV - Double.pa
                    else if (pre=='*')  { resultV = resultV * Double.pa
                    else if (pre=='/')  { resultV = resultV / Double.pa
                    else {  System.out.println("it wasn't divided...");
                    }
                    System.out.println(i+" = "+nowS+" -> "+resultV);
                }
            }catch(Exception e){
                System.out.println("can't calculate! press Clear button and
            }
```

B_Screen

```
// get Input from Special Button
void getInput(C_SpecButton SP){
    if(SP.Value == 'p'){                                    // Power
        System.exit(0);                                     }

    else if (SP.Value == 'c'){                              // Clear
        for (int i=0 ; i<ScreenValue.length ; i++){
            ScreenValue[i].deleteLabel();   }
        for (int i=0 ; i<ResultValue.length ; i++){
            ResultValue[i].deleteLabel();   }
        inputTail=0;                                        }

    else if (SP.Value == '<'){                              // Delete
        if (inputTail>0){
            ScreenValue[inputTail-1].deleteLabel();
            inputTail--;                            }       }

    else if (SP.Value == '='){                              // is But
        if (ScreenValue[inputTail-1].Value=='+' || ScreenValue[in
            ScreenValue[inputTail-1].Value=='*' || ScreenValue[in
                // ==바로 전에 부호가 입력되었을 경우 배제
            }
        else{
            char[] result = B_Function.calculValue(ScreenValue);
            showResult(result);
        }
    }
    else {
        System.out.println("nonkind SpecButton");        }
}
```

B_Function.calculValue(...)

```
public class B_Function{

    static char[] calculValue(D_Label[] SV){
        System.out.println("success : "+resultV);
        String tmpresult = Double.toString(resultV);
        char[] result = tmpresult.toCharArray();

        // step 5        결과 리턴
        return result;
    }
}
```

step4 : int result → char[] result

step5 : return) char[] result

B_Screen

```
// get Input from Special Button
void getInput(C_SpecButton SP){
    if(SP.Value == 'p'){                                    // Power
        System.exit(0);                                     }

    else if (SP.Value == 'c'){                              // Clear
        for (int i=0 ; i<ScreenValue.length ; i++){
            ScreenValue[i].deleteLabel();   }
        for (int i=0 ; i<ResultValue.length ; i++){
            ResultValue[i].deleteLabel();   }
        inputTail=0;                                        }

    else if (SP.Value == '<'){                              // Delete
        if (inputTail>0){
            ScreenValue[inputTail-1].deleteLabel();
            inputTail--;                                }   }

    else if (SP.Value == '='){                              // is But
        if (ScreenValue[inputTail-1].Value=='+' || ScreenValue[inp
            ScreenValue[inputTail-1].Value=='*' || ScreenValue[inp
                // ==바로 전에 부호가 입력되었을 경우 배제
            }
        else{
            char[] result = B_Function.calculValue(ScreenValue);
            showResult(result);
        }
    }
    else {
        System.out.println("nonkind SpecButton");        }
}
```

B_Screen.showResult(...)

```
/*
** showResult
*/
// showResult    -> 계산한 정답을 보여준다
void showResult (char[] result){
    int strlen = result.length;
    // 답이 12자보다 큰 경우 나머지는 ...로 표시한다
    if (strlen>=12){
        for (int i=0 ; i<11 ; i++){
            ImageIcon icon = findIcon(result[i]);
            ResultValue[i].setLabel('n', icon);
        }
        ResultValue[11].setLabel('n', new ImageIcon("project1/img/N
    }
    else{
        for (int i=0 ; i<strlen ; i++){
            ImageIcon icon = findIcon(result[i]);
            ResultValue[i].setLabel('n', icon);
        }
    }
}
// findIcon      -> 계산한 정답 표시를 위한 아이콘을 찾는다
ImageIcon findIcon(char C){···
```

step6 : show result !

3

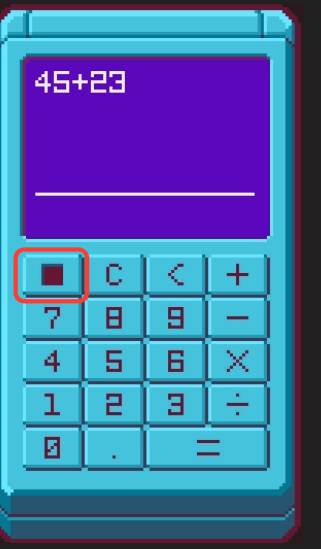
Close

Calculator

B_Screen.getInput(...)

B_Screen

```
// get Input from Special Button
void getInput(C_SpecButton SP){
    if(SP.Value == 'p'){                                    // Power Button
        System.exit(0);                                     }

    else if (SP.Value == 'c'){                              // Clear Button
        for (int i=0 ; i<ScreenValue.length ; i++){
            ScreenValue[i].deleteLabel();   }
        for (int i=0 ; i<ResultValue.length ; i++){
            ResultValue[i].deleteLabel();   }
        inputTail=0;                                        }

    else if (SP.Value == '<'){                              // Delete Button
        if (inputTail>0){
            ScreenValue[inputTail-1].deleteLabel();
            inputTail--;                        }       }

    else if (SP.Value == '='){                              // is Button
        if (ScreenValue[inputTail-1].Value=='+' || ScreenValue[inputTail-1].Value=='-' ||
            ScreenValue[inputTail-1].Value=='*' || ScreenValue[inputTail-1].Value=='/' ){
                // ==바로 전에 부호가 입력되었을 경우 배제
            }
        else{
            char[] result = B_Function.calculValue(ScreenValue);
            showResult(result);
        }
    }
    else {
        System.out.println("nonkind SpecButton");       }
}
```



QNA

프로그래밍 실습

PROJECT1 CALCULATOR

2016314216 이상아