ĐẠI HỌC BÁCH KHOA HÀ NỘI
TRƯỜNG CÔNG NGHỆ THÔNG TIN VÀ TRUYỀN THÔNG

BÁO CÁO THỰC HÀNH

IT3103-744530-2024.1

BÀI THỰC HÀNH 05

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GVHD: **Lê Thị Hoa**

TA: **Bùi Trọng Dũng**

Hà Nội 12/2024

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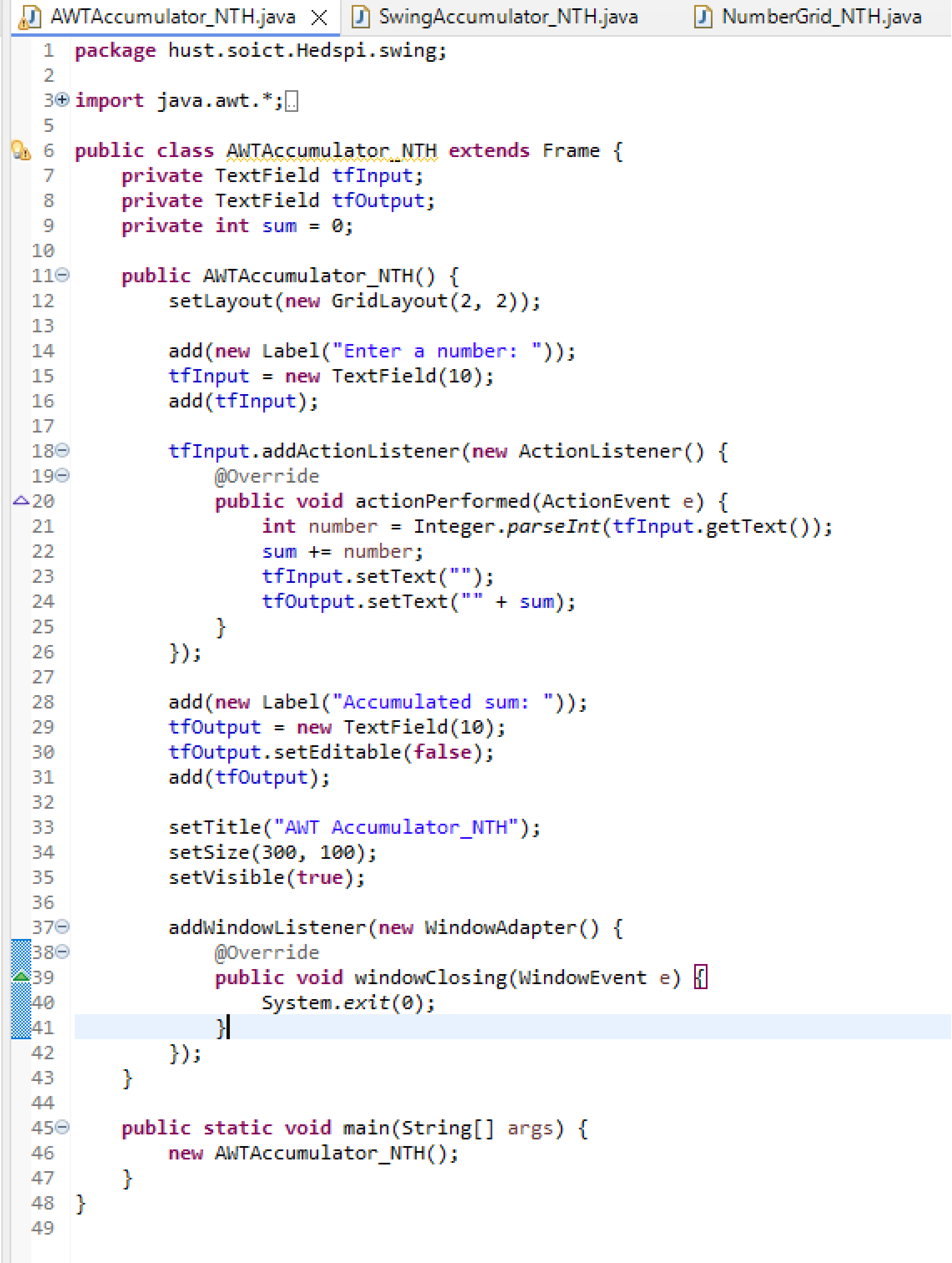
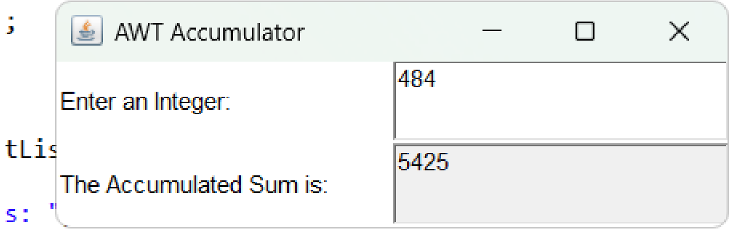


```java
package hust.soict.Hedspi.swing;

import java.awt.*;

public class AWTAccumulator_NTH extends Frame {
    private TextField tfInput;
    private TextField tfOutput;
    private int sum = 0;

    public AWTAccumulator_NTH() {
        setLayout(new GridLayout(2, 2));

        add(new Label("Enter a number: "));
        tfInput = new TextField(10);
        add(tfInput);

        tfInput.addActionListener(new ActionListener() {
            @Override
            public void actionPerformed(ActionEvent e) {
                int number = Integer.parseInt(tfInput.getText());
                sum += number;
                tfInput.setText("");
                tfOutput.setText("" + sum);
            }
        });

        add(new Label("Accumulated sum: "));
        tfOutput = new TextField(10);
        tfOutput.setEditable(false);
        add(tfOutput);

        setTitle("AWT Accumulator_NTH");
        setSize(300, 100);
        setVisible(true);

        addWindowListener(new WindowAdapter() {
            @Override
            public void windowClosing(WindowEvent e) {
                System.exit(0);
            }
        });
    }

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

Figure 1.1: Source code of AWTAccumulator

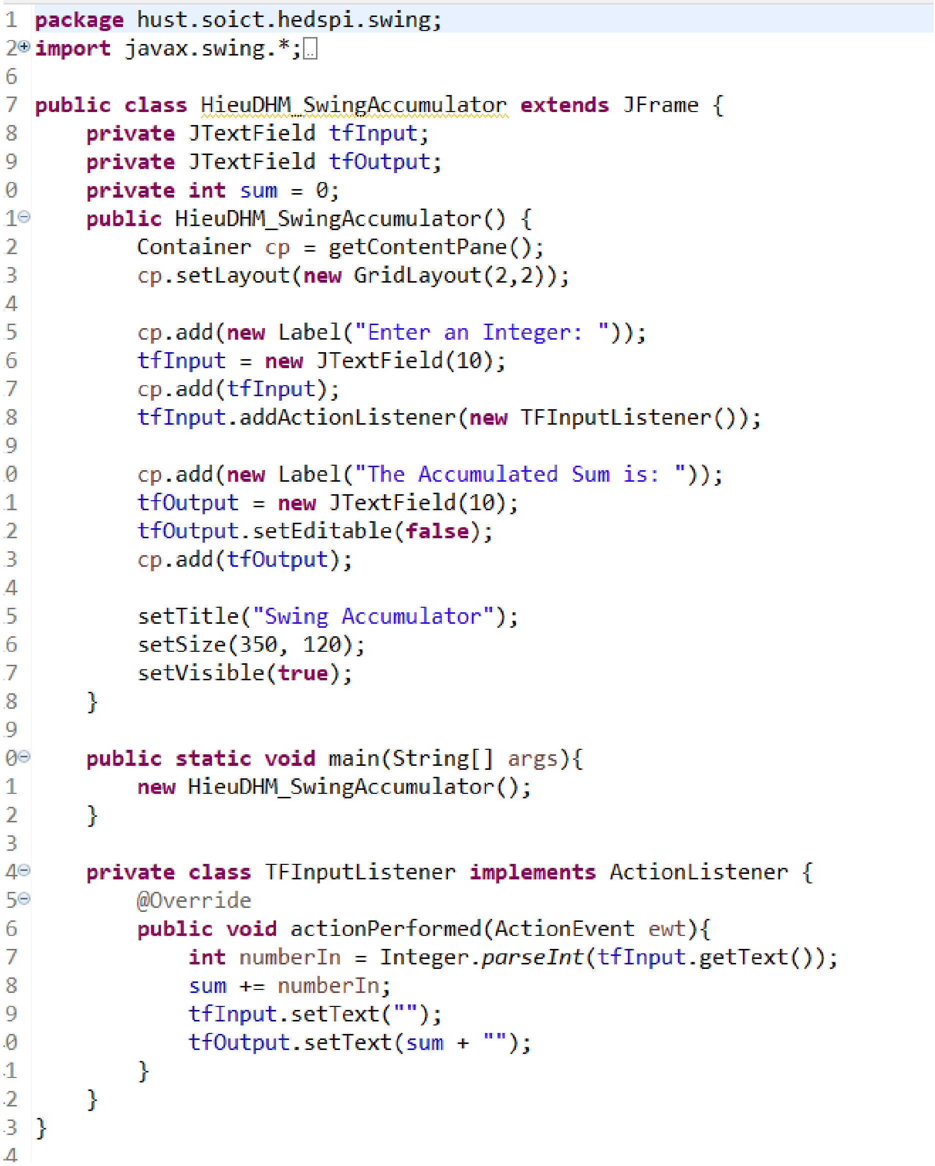


Enter an Integer: 484

The Accumulated Sum is: 5425

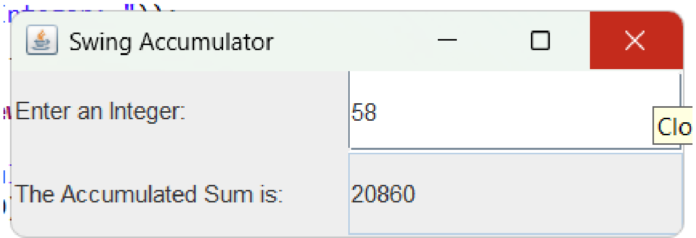
Figure 1.2: Demo of AWTAccumulator

1.2 SwingAccumulator



```
package hust.soict.hedspi.swing;
import javax.swing.*;

public class HieuDHM_SwingAccumulator extends JFrame {
    private JTextField tfInput;
    private JTextField tfOutput;
    private int sum = 0;
    public HieuDHM_SwingAccumulator() {
        Container cp = getContentPane();
        cp.setLayout(new GridLayout(2,2));

        cp.add(new Label("Enter an Integer: "));
        tfInput = new JTextField(10);
        cp.add(tfInput);
        tfInput.addActionListener(new TFInputListener());

        cp.add(new Label("The Accumulated Sum is: "));
        tfOutput = new JTextField(10);
        tfOutput.setEditable(false);
        cp.add(tfOutput);

        setTitle("Swing Accumulator");
        setSize(350, 120);
        setVisible(true);
    }

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

    private class TFInputListener implements ActionListener {
        @Override
        public void actionPerformed(ActionEvent ewt){
            int numberIn = Integer.parseInt(tfInput.getText());
            sum += numberIn;
            tfInput.setText("");
            tfOutput.setText(sum + "");
        }
    }
}
```

Figure 1.3: Source code of SwingAccumulator



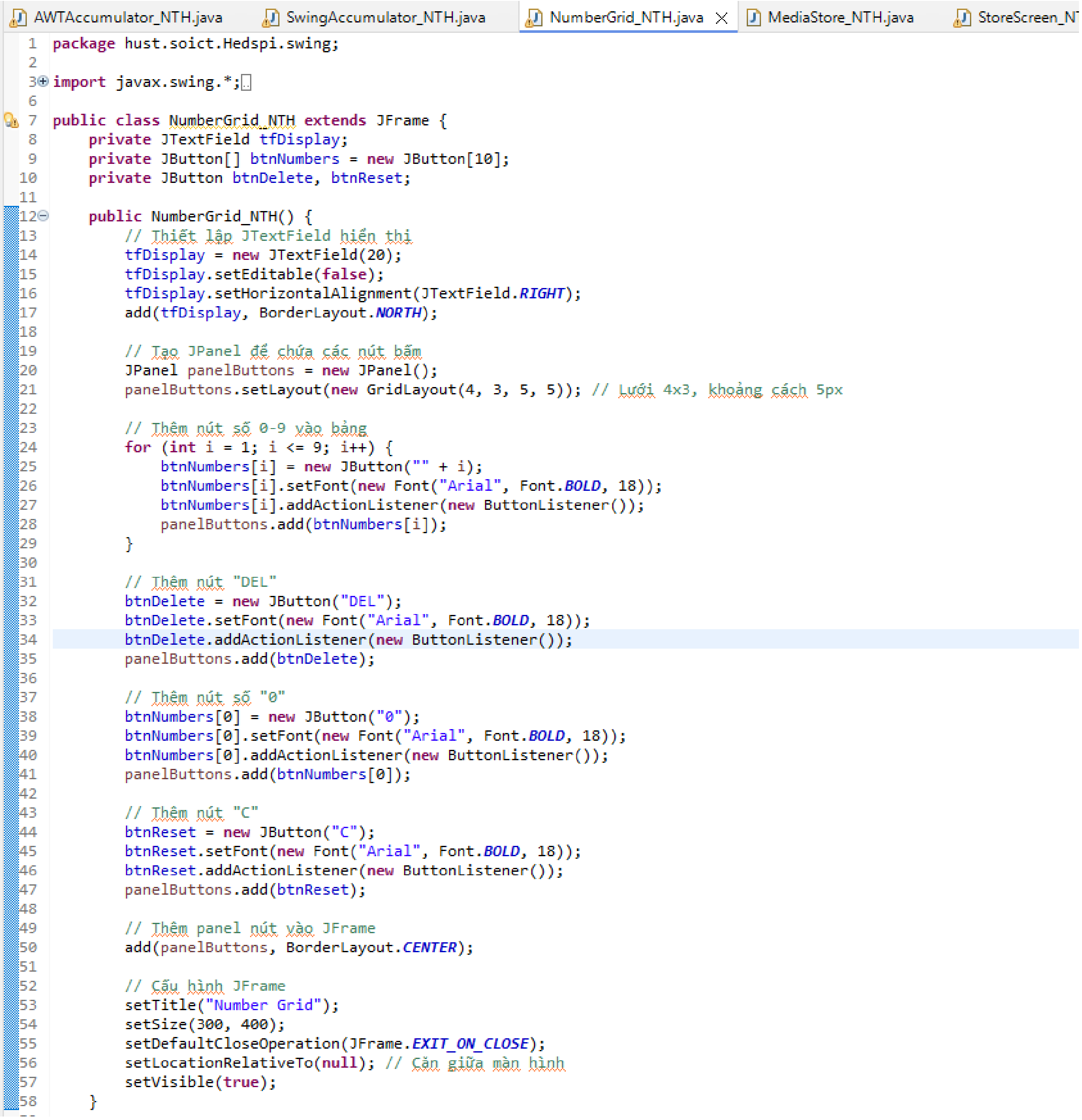
Enter an Integer: 58

The Accumulated Sum is: 20860

Figure 1.4: Demo of SwingAccumulator

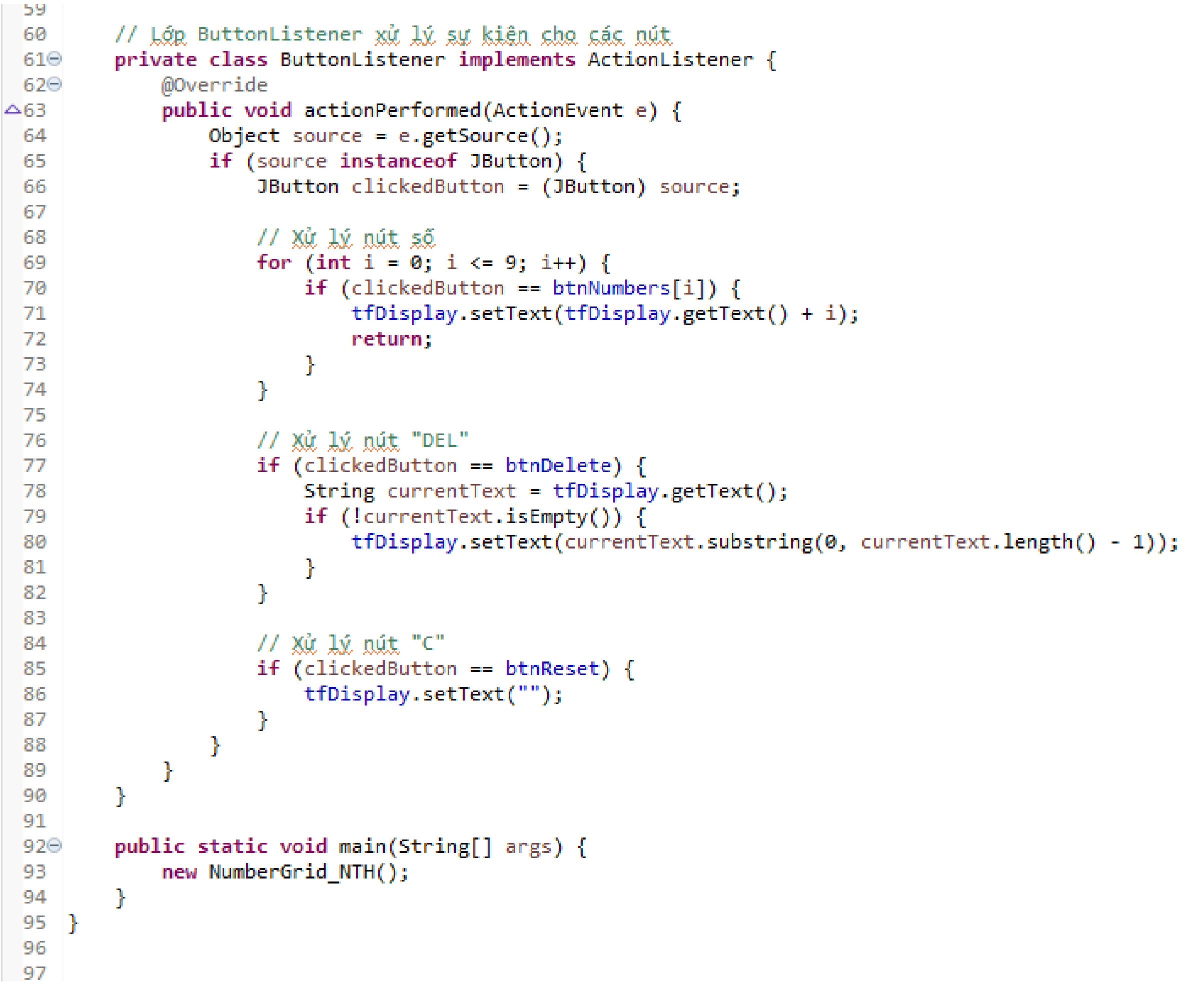
2 Organizing Swing components with Layout Managers

2.1 Code



```java
package hust.soict.Hedspi.swing;

import javax.swing.*;

public class NumberGrid_NTH extends JFrame {
    private JTextField tfDisplay;
    private JButton[] btnNumbers = new JButton[10];
    private JButton btnDelete, btnReset;

    public NumberGrid_NTH() {
        // Thiết lập JTextField hiển thị
        tfDisplay = new JTextField(20);
        tfDisplay.setEditable(false);
        tfDisplay.setHorizontalAlignment(JTextField.RIGHT);
        add(tfDisplay, BorderLayout.NORTH);

        // Tạo JPanel để chứa các nút bấm
        JPanel panelButtons = new JPanel();
        panelButtons.setLayout(new GridLayout(4, 3, 5, 5)); // Lưới 4x3, khoảng cách 5px

        // Thêm nút số 0-9 vào bảng
        for (int i = 1; i <= 9; i++) {
            btnNumbers[i] = new JButton("" + i);
            btnNumbers[i].setFont(new Font("Arial", Font.BOLD, 18));
            btnNumbers[i].addActionListener(new ButtonListener());
            panelButtons.add(btnNumbers[i]);
        }

        // Thêm nút "DEL"
        btnDelete = new JButton("DEL");
        btnDelete.setFont(new Font("Arial", Font.BOLD, 18));
        btnDelete.addActionListener(new ButtonListener());
        panelButtons.add(btnDelete);

        // Thêm nút số "0"
        btnNumbers[0] = new JButton("0");
        btnNumbers[0].setFont(new Font("Arial", Font.BOLD, 18));
        btnNumbers[0].addActionListener(new ButtonListener());
        panelButtons.add(btnNumbers[0]);

        // Thêm nút "C"
        btnReset = new JButton("C");
        btnReset.setFont(new Font("Arial", Font.BOLD, 18));
        btnReset.addActionListener(new ButtonListener());
        panelButtons.add(btnReset);

        // Thêm panel nút vào JFrame
        add(panelButtons, BorderLayout.CENTER);

        // Cấu hình JFrame
        setTitle("Number Grid");
        setSize(300, 400);
        setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        setLocationRelativeTo(null); // Căn giữa màn hình
        setVisible(true);
    }
```

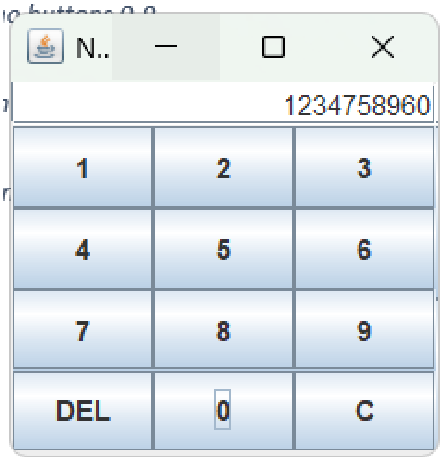
Figure 2.1: Source code of NumberGrid 1



```java

    // Lớp ButtonListener xử lý sự kiện cho các nút
    private class ButtonListener implements ActionListener {
        @Override
        public void actionPerformed(ActionEvent e) {
            Object source = e.getSource();
            if (source instanceof JButton) {
                JButton clickedButton = (JButton) source;

                // Xử lý nút số
                for (int i = 0; i <= 9; i++) {
                    if (clickedButton == btnNumbers[i]) {
                        tfDisplay.setText(tfDisplay.getText() + i);
                        return;
                    }
                }

                // Xử lý nút "DEL"
                if (clickedButton == btnDelete) {
                    String currentText = tfDisplay.getText();
                    if (!currentText.isEmpty()) {
                        tfDisplay.setText(currentText.substring(0, currentText.length() - 1));
                    }
                }

                // Xử lý nút "C"
                if (clickedButton == btnReset) {
                    tfDisplay.setText("");
                }
            }
        }
    }

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


```

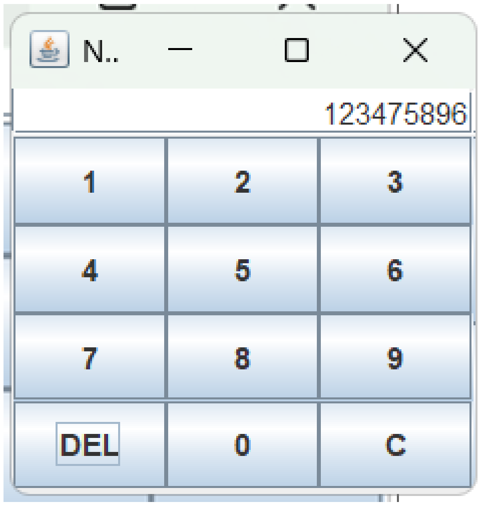
Figure 2.2: Source code of NumberGrid 2

2.2 Dem o



```
1234758960
```

Figure 2.3: Demo buttons 0-9



```
123475896
```

Figure 2.4: Demo DEL button

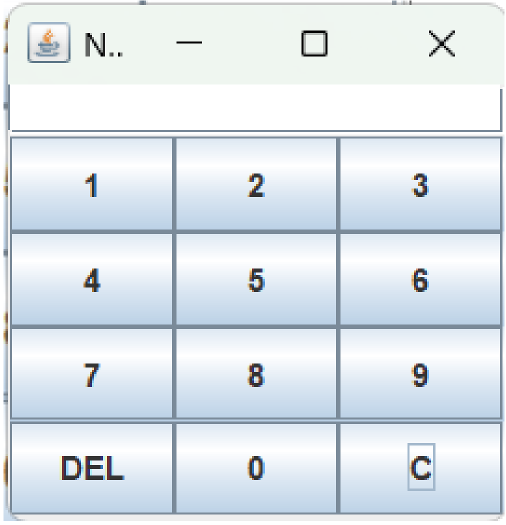
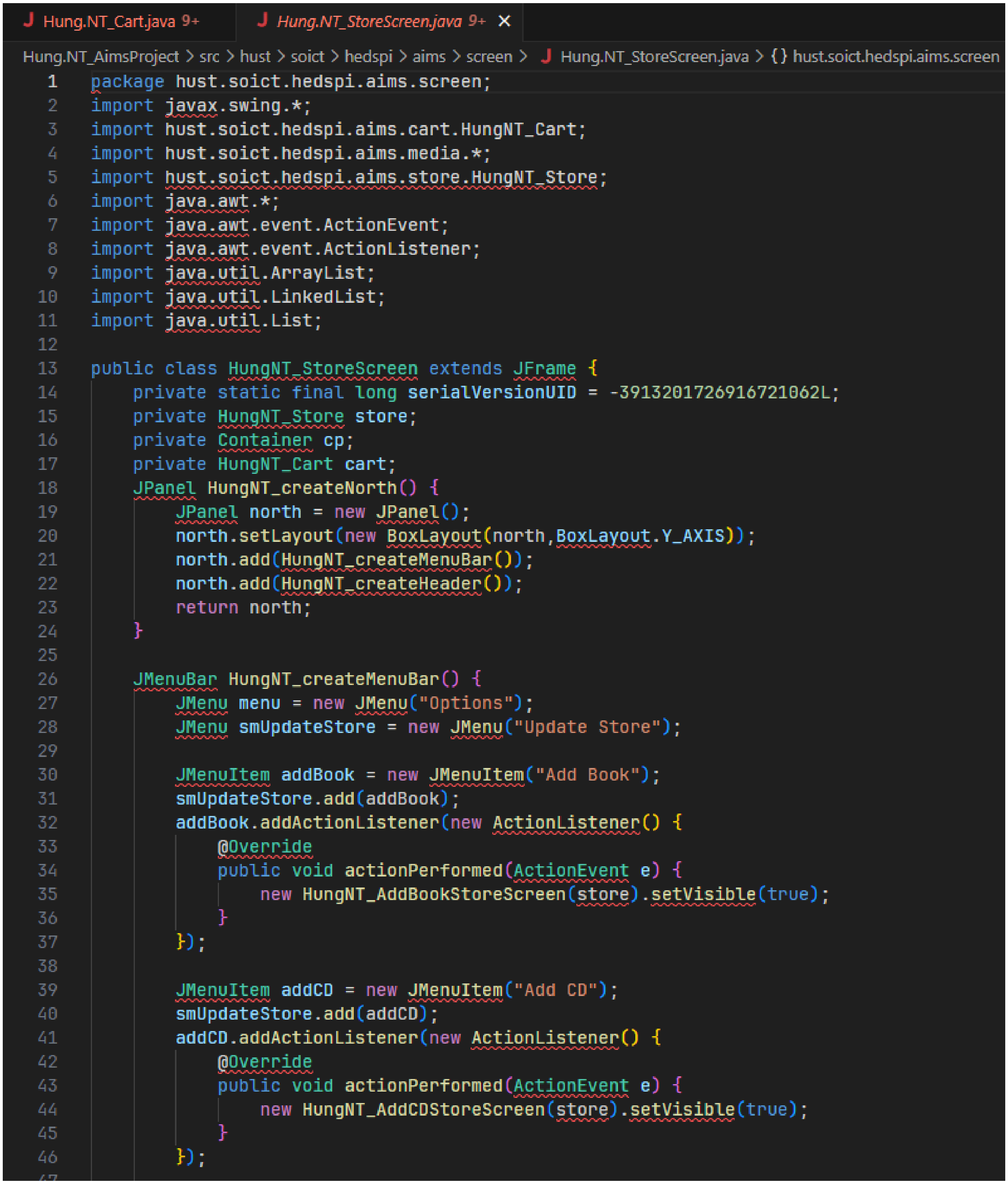


Figure 2.5: Demo C button

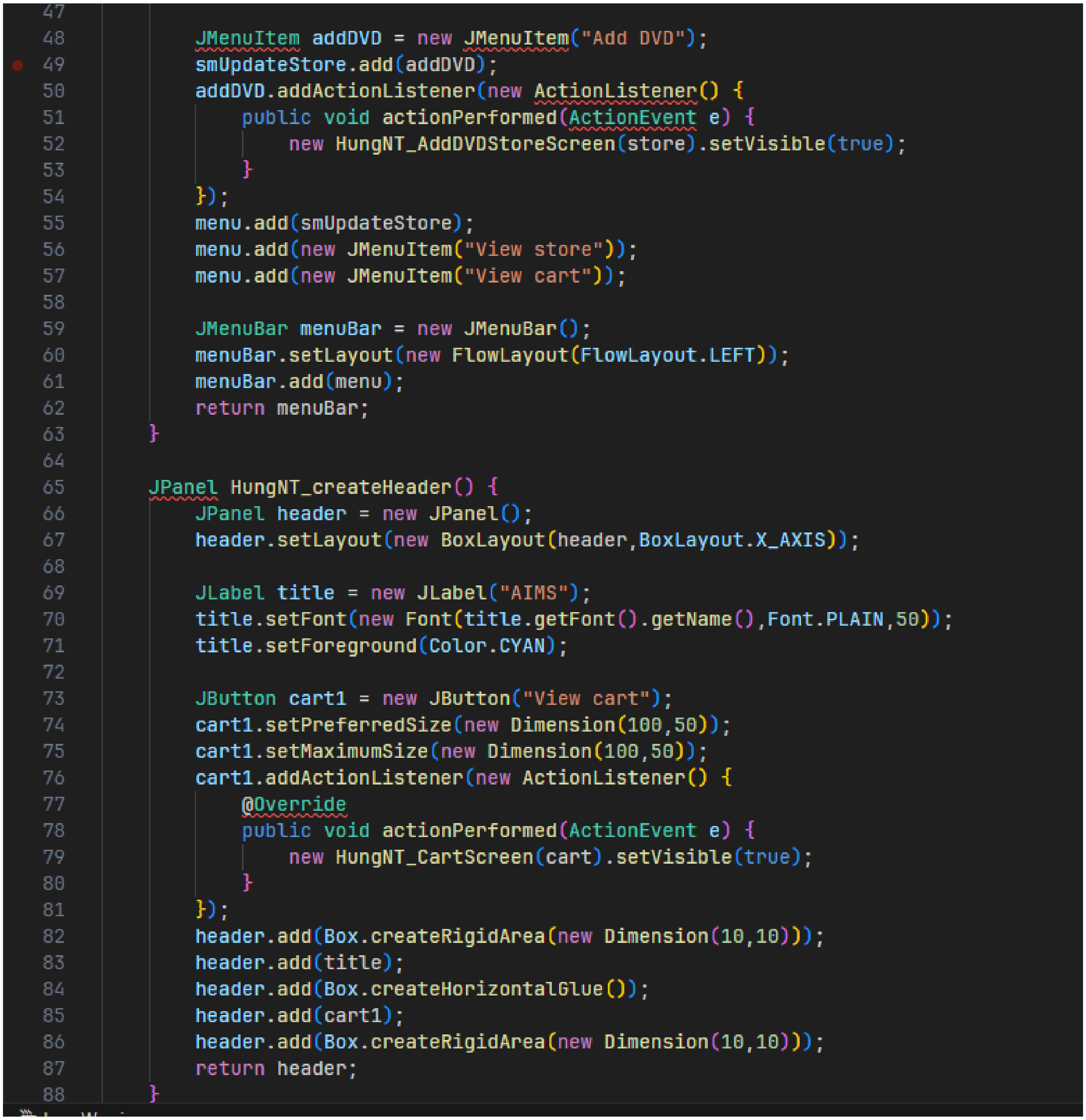
3 Create a graphical user interface for AIMS with Swing

3.1 Create class StoreScreen


Hung.NT_Cart.java 9+
Hung.NT_StoreScreen.java 9+
Hung.NT_AimsProject > src > hust > soict > hedspi > aims > screen > Hung.NT_StoreScreen.java > {} hust.soict.hedspi.aims.screen

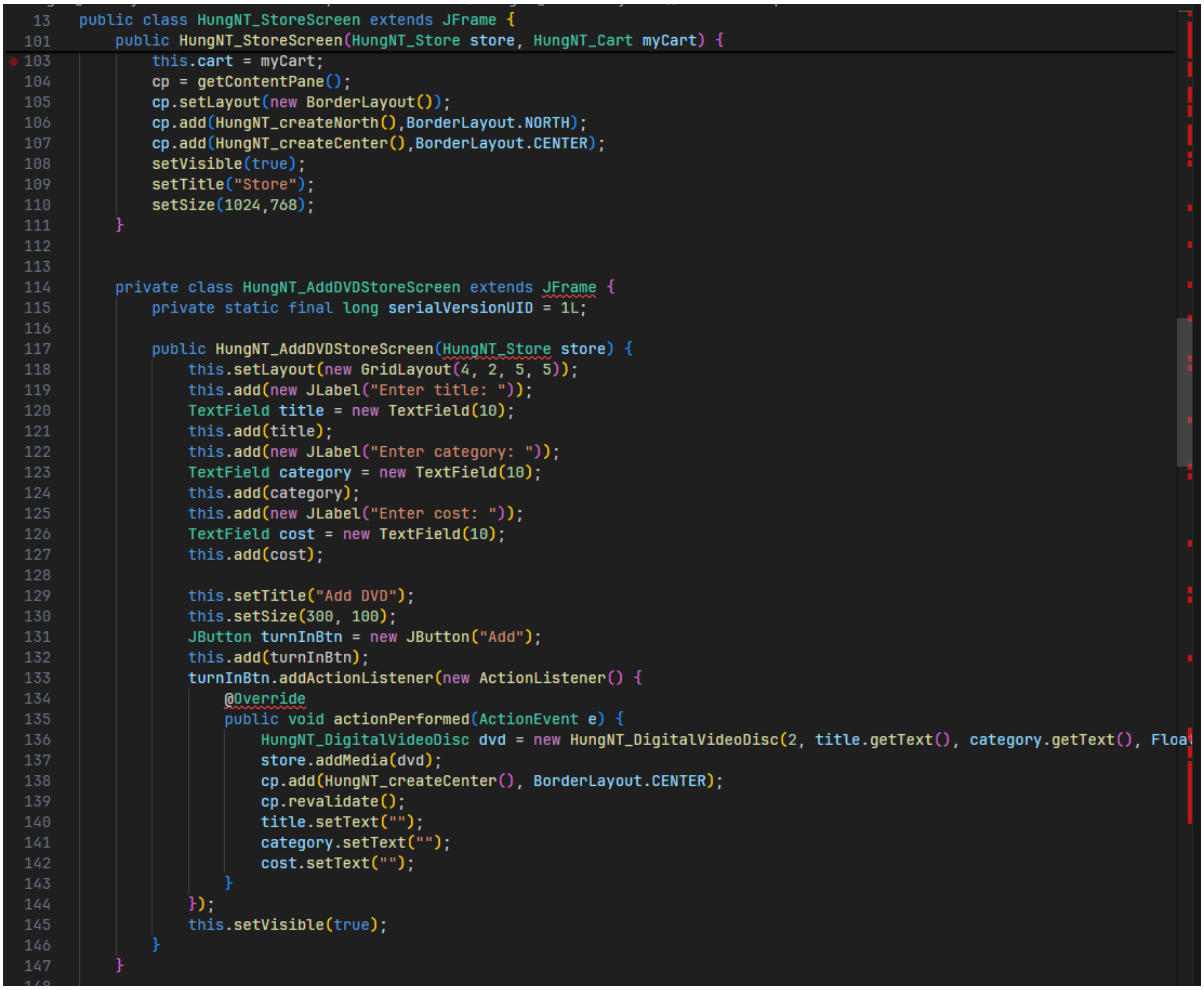
```java
package hust.soict.hedspi.aims.screen;
import javax.swing.*;
import hust.soict.hedspi.aims.cart.HungNT_Cart;
import hust.soict.hedspi.aims.media.*;
import hust.soict.hedspi.aims.store.HungNT_Store;
import java.awt.*;
import java.awt.event.ActionEvent;
import java.awt.event.ActionListener;
import java.util.ArrayList;
import java.util.LinkedList;
import java.util.List;

public class HungNT_StoreScreen extends JFrame {
    private static final long serialVersionUID = -3913201726916721062L;
    private HungNT_Store store;
    private Container cp;
    private HungNT_Cart cart;
    JPanel HungNT_createNorth() {
        JPanel north = new JPanel();
        north.setLayout(new BoxLayout(north,BoxLayout.Y_AXIS));
        north.add(HungNT_createMenuBar());
        north.add(HungNT_createHeader());
        return north;
    }

    JMenuBar HungNT_createMenuBar() {
        JMenu menu = new JMenu("Options");
        JMenu smUpdateStore = new JMenu("Update Store");

        JMenuItem addBook = new JMenuItem("Add Book");
        smUpdateStore.add(addBook);
        addBook.addActionListener(new ActionListener() {
            @Override
            public void actionPerformed(ActionEvent e) {
                new HungNT_AddBookStoreScreen(store).setVisible(true);
            }
        });

        JMenuItem addCD = new JMenuItem("Add CD");
        smUpdateStore.add(addCD);
        addCD.addActionListener(new ActionListener() {
            @Override
            public void actionPerformed(ActionEvent e) {
                new HungNT_AddCDStoreScreen(store).setVisible(true);
            }
        });
```

Figure 3.1: Class StoreScreen 1



```java

        JMenuItem addDVD = new JMenuItem("Add DVD");
        smUpdateStore.add(addDVD);
        addDVD.addActionListener(new ActionListener() {
            public void actionPerformed(ActionEvent e) {
                new HungNT_AddDVDStoreScreen(store).setVisible(true);
            }
        });
        menu.add(smUpdateStore);
        menu.add(new JMenuItem("View store"));
        menu.add(new JMenuItem("View cart"));

        JMenuBar menuBar = new JMenuBar();
        menuBar.setLayout(new FlowLayout(FlowLayout.LEFT));
        menuBar.add(menu);
        return menuBar;
    }

    JPanel HungNT_createHeader() {
        JPanel header = new JPanel();
        header.setLayout(new BoxLayout(header,BoxLayout.X_AXIS));

        JLabel title = new JLabel("AIMS");
        title.setFont(new Font(title.getFont().getName(),Font.PLAIN,50));
        title.setForeground(Color.CYAN);

        JButton cart1 = new JButton("View cart");
        cart1.setPreferredSize(new Dimension(100,50));
        cart1.setMaximumSize(new Dimension(100,50));
        cart1.addActionListener(new ActionListener() {
            @Override
            public void actionPerformed(ActionEvent e) {
                new HungNT_CartScreen(cart).setVisible(true);
            }
        });
        header.add(Box.createRigidArea(new Dimension(10,10)));
        header.add(title);
        header.add(Box.createHorizontalGlue());
        header.add(cart1);
        header.add(Box.createRigidArea(new Dimension(10,10)));
        return header;
    }
```

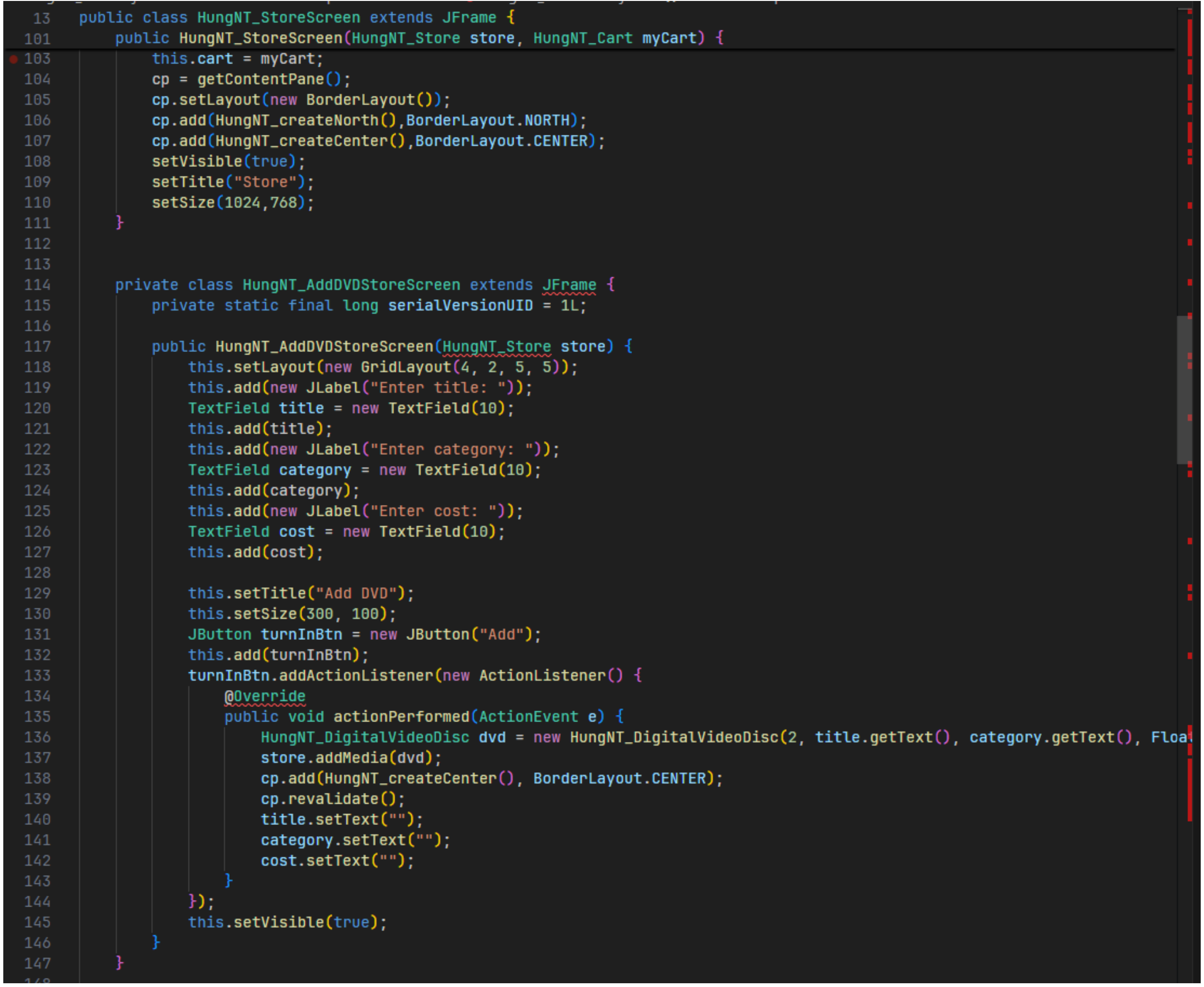
Figure 3.2: Class StoreScreen 2



```java
public class HungNT_StoreScreen extends JFrame {
    public HungNT_StoreScreen(HungNT_Store store, HungNT_Cart myCart) {
        this.cart = myCart;
        cp = getContentPane();
        cp.setLayout(new BorderLayout());
        cp.add(HungNT_createNorth(),BorderLayout.NORTH);
        cp.add(HungNT_createCenter(),BorderLayout.CENTER);
        setVisible(true);
        setTitle("Store");
        setSize(1024,768);
    }


    private class HungNT_AddDVDStoreScreen extends JFrame {
        private static final long serialVersionUID = 1L;

        public HungNT_AddDVDStoreScreen(HungNT_Store store) {
            this.setLayout(new GridLayout(4, 2, 5, 5));
            this.add(new JLabel("Enter title: "));
            TextField title = new TextField(10);
            this.add(title);
            this.add(new JLabel("Enter category: "));
            TextField category = new TextField(10);
            this.add(category);
            this.add(new JLabel("Enter cost: "));
            TextField cost = new TextField(10);
            this.add(cost);

            this.setTitle("Add DVD");
            this.setSize(300, 100);
            JButton turnInBtn = new JButton("Add");
            this.add(turnInBtn);
            turnInBtn.addActionListener(new ActionListener() {
                @Override
                public void actionPerformed(ActionEvent e) {
                    HungNT_DigitalVideoDisc dvd = new HungNT_DigitalVideoDisc(2, title.getText(), category.getText(), Floa
                    store.addMedia(dvd);
                    cp.add(HungNT_createCenter(), BorderLayout.CENTER);
                    cp.revalidate();
                    title.setText("");
                    category.setText("");
                    cost.setText("");
                }
            });
            this.setVisible(true);
        }
    }
```

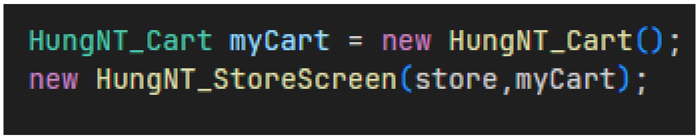
Figure 3.3: Class StoreScreen 3

Figure 3.4: Class StoreScreen 4



```java
public class HungNT_StoreScreen extends JFrame {
    public HungNT_StoreScreen(HungNT_Store store, HungNT_Cart myCart) {
        this.cart = myCart;
        cp = getContentPane();
        cp.setLayout(new BorderLayout());
        cp.add(HungNT_createNorth(),BorderLayout.NORTH);
        cp.add(HungNT_createCenter(),BorderLayout.CENTER);
        setVisible(true);
        setTitle("Store");
        setSize(1024,768);
    }


    private class HungNT_AddDVDStoreScreen extends JFrame {
        private static final long serialVersionUID = 1L;

        public HungNT_AddDVDStoreScreen(HungNT_Store store) {
            this.setLayout(new GridLayout(4, 2, 5, 5));
            this.add(new JLabel("Enter title: "));
            TextField title = new TextField(10);
            this.add(title);
            this.add(new JLabel("Enter category: "));
            TextField category = new TextField(10);
            this.add(category);
            this.add(new JLabel("Enter cost: "));
            TextField cost = new TextField(10);
            this.add(cost);

            this.setTitle("Add DVD");
            this.setSize(300, 100);
            JButton turnInBtn = new JButton("Add");
            this.add(turnInBtn);
            turnInBtn.addActionListener(new ActionListener() {
                @Override
                public void actionPerformed(ActionEvent e) {
                    HungNT_DigitalVideoDisc dvd = new HungNT_DigitalVideoDisc(2, title.getText(), category.getText(), Floa
                    store.addMedia(dvd);
                    cp.add(HungNT_createCenter(), BorderLayout.CENTER);
                    cp.revalidate();
                    title.setText("");
                    category.setText("");
                    cost.setText("");
                }
            });
            this.setVisible(true);
        }
    }
```

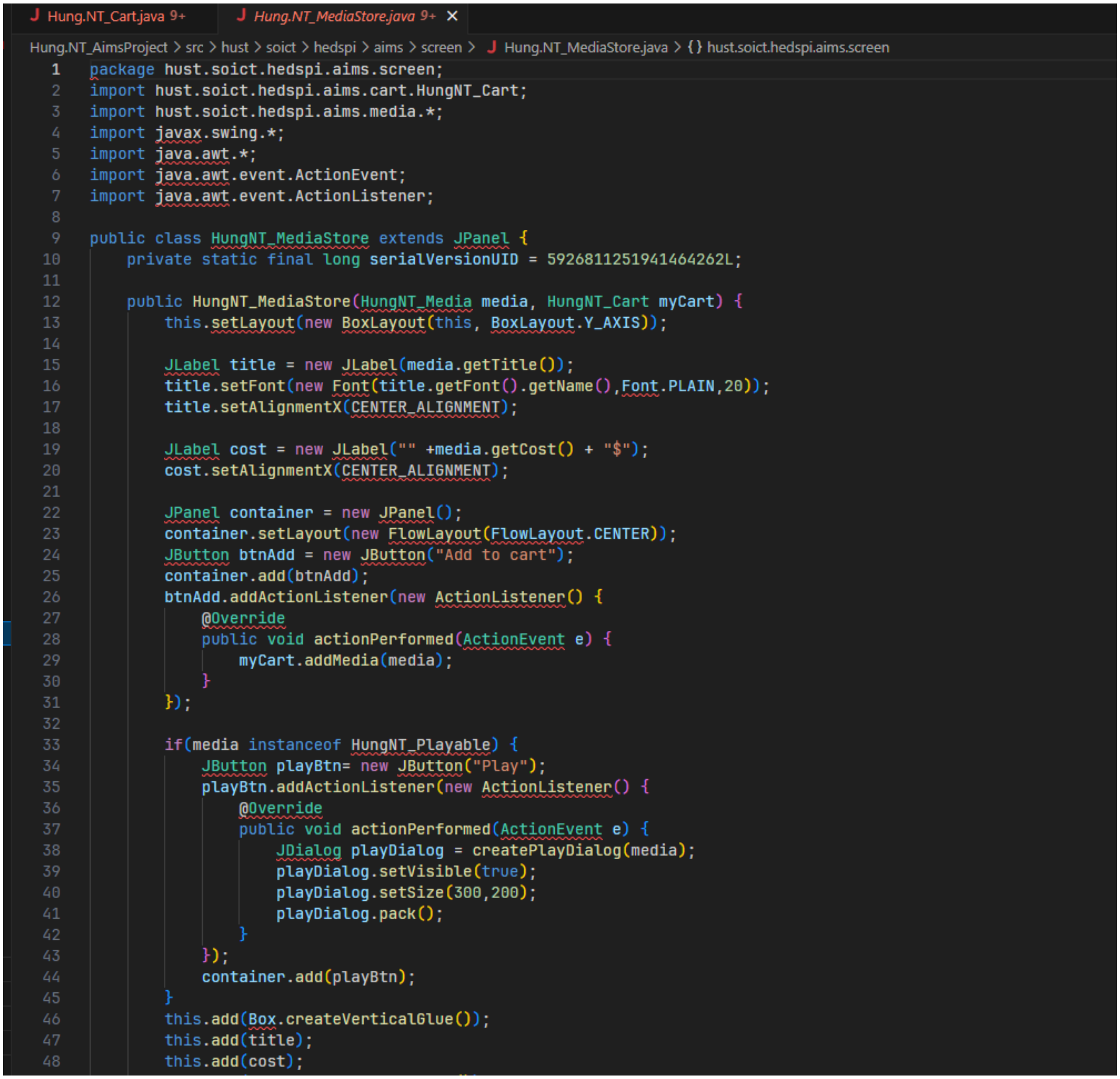
Figure 3.5: Class StoreScreen 5



```java
HungNT_Cart myCart = new HungNT_Cart();
new HungNT_StoreScreen(store,myCart);
```

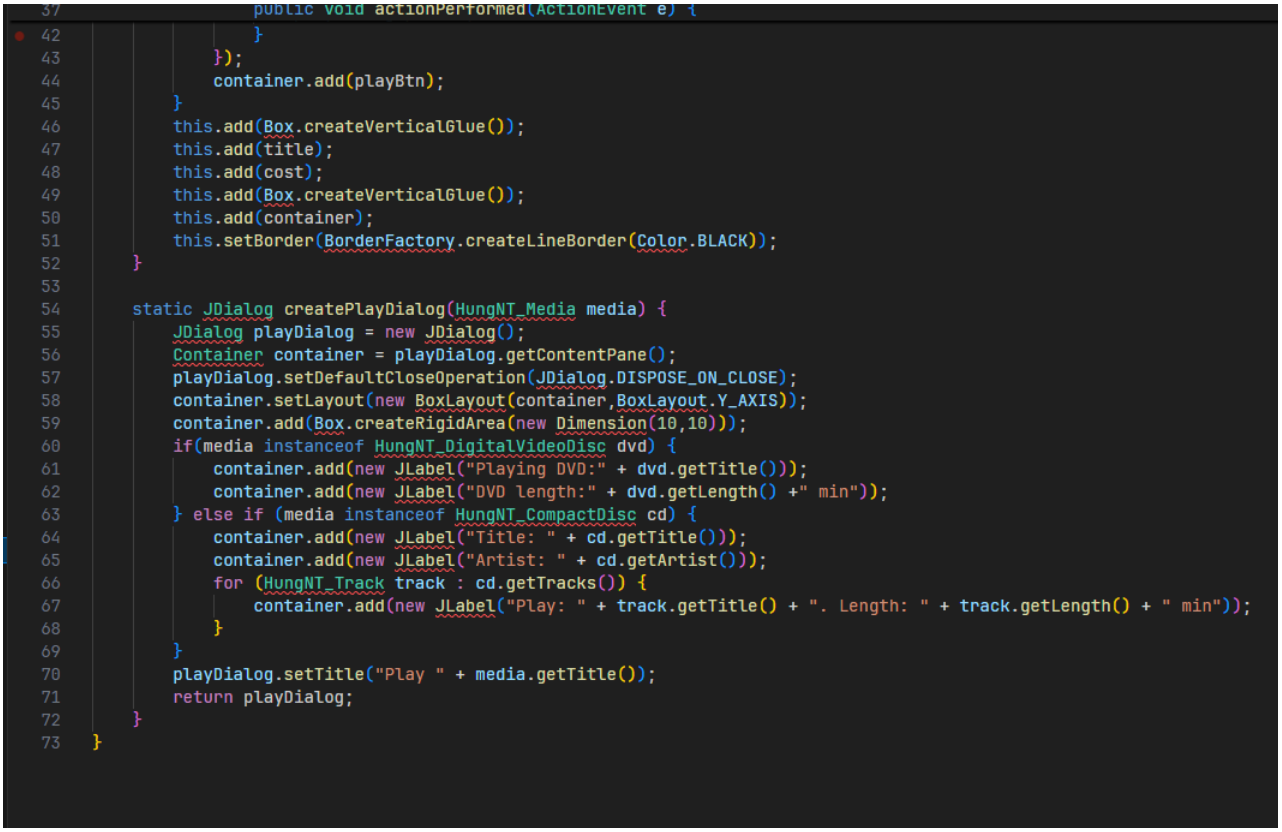
Figure 3.6: Class StoreScreen 6

3.2 Create class MediaStore


Hung.NT_Cart.java 9+
Hung.NT_MediaStore.java 9+
Hung.NT_AimsProject > src > hust > soict > hedspi > aims > screen > Hung.NT_MediaStore.java > {} hust.soict.hedspi.aims.screen

```java
package hust.soict.hedspi.aims.screen;
import hust.soict.hedspi.aims.cart.HungNT_Cart;
import hust.soict.hedspi.aims.media.*;
import javax.swing.*;
import java.awt.*;
import java.awt.event.ActionEvent;
import java.awt.event.ActionListener;

public class HungNT_MediaStore extends JPanel {
    private static final long serialVersionUID = 5926811251941464262L;

    public HungNT_MediaStore(HungNT_Media media, HungNT_Cart myCart) {
        this.setLayout(new BoxLayout(this, BoxLayout.Y_AXIS));

        JLabel title = new JLabel(media.getTitle());
        title.setFont(new Font(title.getFont().getName(),Font.PLAIN,20));
        title.setAlignmentX(CENTER_ALIGNMENT);

        JLabel cost = new JLabel("" +media.getCost() + "$");
        cost.setAlignmentX(CENTER_ALIGNMENT);

        JPanel container = new JPanel();
        container.setLayout(new FlowLayout(FlowLayout.CENTER));
        JButton btnAdd = new JButton("Add to cart");
        container.add(btnAdd);
        btnAdd.addActionListener(new ActionListener() {
            @Override
            public void actionPerformed(ActionEvent e) {
                myCart.addMedia(media);
            }
        });

        if(media instanceof HungNT_Playable) {
            JButton playBtn= new JButton("Play");
            playBtn.addActionListener(new ActionListener() {
                @Override
                public void actionPerformed(ActionEvent e) {
                    JDialog playDialog = createPlayDialog(media);
                    playDialog.setVisible(true);
                    playDialog.setSize(300,200);
                    playDialog.pack();
                }
            });
            container.add(playBtn);
        }
        this.add(Box.createVerticalGlue());
        this.add(title);
        this.add(cost);
```

Figure 3.7: Class MediaStore 1



```
                public void actionPerformed(ActionEvent e) {
                }
            });
            container.add(playBtn);
        }
        this.add(Box.createVerticalGlue());
        this.add(title);
        this.add(cost);
        this.add(Box.createVerticalGlue());
        this.add(container);
        this.setBorder(BorderFactory.createLineBorder(Color.BLACK));
    }

    static JDialog createPlayDialog(HungNT_Media media) {
        JDialog playDialog = new JDialog();
        Container container = playDialog.getContentPane();
        playDialog.setDefaultCloseOperation(JDialog.DISPOSE_ON_CLOSE);
        container.setLayout(new BoxLayout(container,BoxLayout.Y_AXIS));
        container.add(Box.createRigidArea(new Dimension(10,10)));
        if(media instanceof HungNT_DigitalVideoDisc dvd) {
            container.add(new JLabel("Playing DVD:" + dvd.getTitle()));
            container.add(new JLabel("DVD length:" + dvd.getLength() +" min"));
        } else if (media instanceof HungNT_CompactDisc cd) {
            container.add(new JLabel("Title: " + cd.getTitle()));
            container.add(new JLabel("Artist: " + cd.getArtist()));
            for (HungNT_Track track : cd.getTracks()) {
                container.add(new JLabel("Play: " + track.getTitle() + ". Length: " + track.getLength() + " min"));
            }
        }
        playDialog.setTitle("Play " + media.getTitle());
        return playDialog;
    }
}
```

Figure 3.8: Class MediaStore 2

3.3 Demo

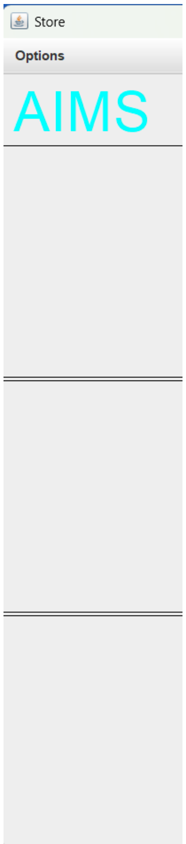
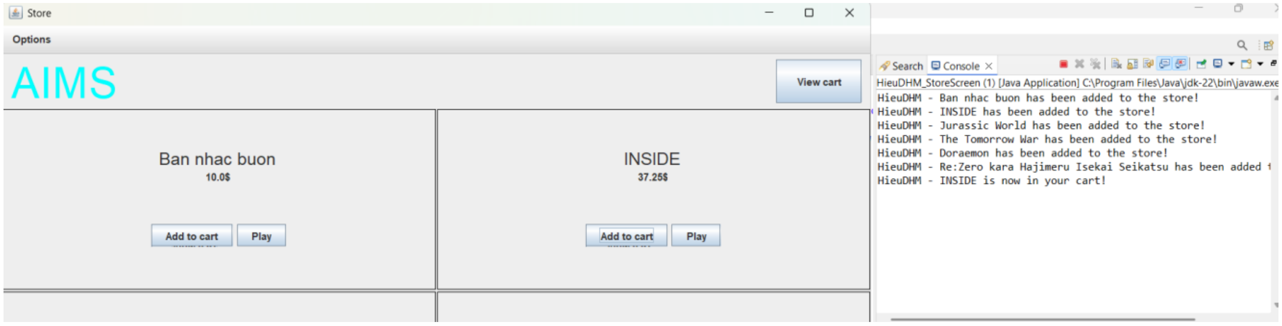
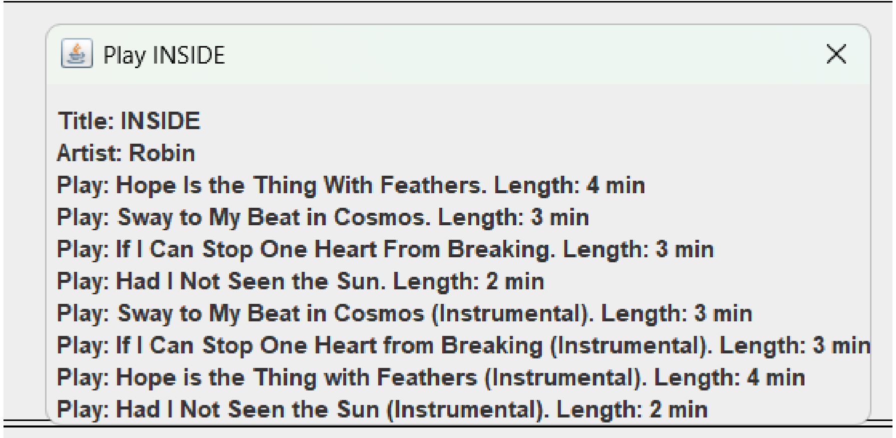


Figure 3.10 Demo Aims Store



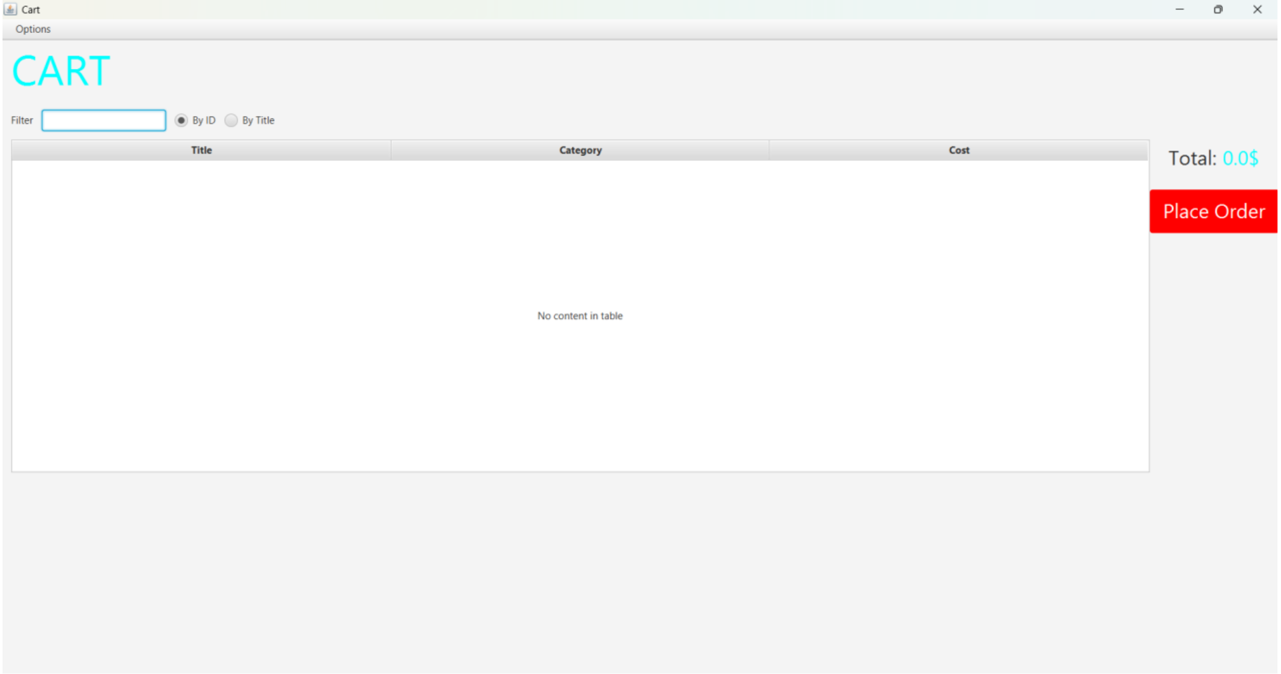
```
HieuDHM_StoreScreen (1) [Java Application] C:\Program Files\Java\jdk-22\bin\javaw.exe
HieuDHM - Ban nhac buon has been added to the store!
HieuDHM - INSIDE has been added to the store!
HieuDHM - Jurassic World has been added to the store!
HieuDHM - The Tomorrow War has been added to the store!
HieuDHM - Doraemon has been added to the store!
HieuDHM - Re:Zero kara Hajimeru Isekai Seikatsu has been added t
HieuDHM - INSIDE is now in your cart!
```

Figure 3.11 Demo Add to cart button



Title: INSIDE
Artist: Robin
Play: Hope Is the Thing With Feathers. Length: 4 min
Play: Sway to My Beat in Cosmos. Length: 3 min
Play: If I Can Stop One Heart From Breaking. Length: 3 min
Play: Had I Not Seen the Sun. Length: 2 min
Play: Sway to My Beat in Cosmos (Instrumental). Length: 3 min
Play: If I Can Stop One Heart from Breaking (Instrumental). Length: 3 min
Play: Hope is the Thing with Feathers (Instrumental). Length: 4 min
Play: Had I Not Seen the Sun (Instrumental). Length: 2 min

Figure 3.12 Demo Play button



Title	Category	Cost

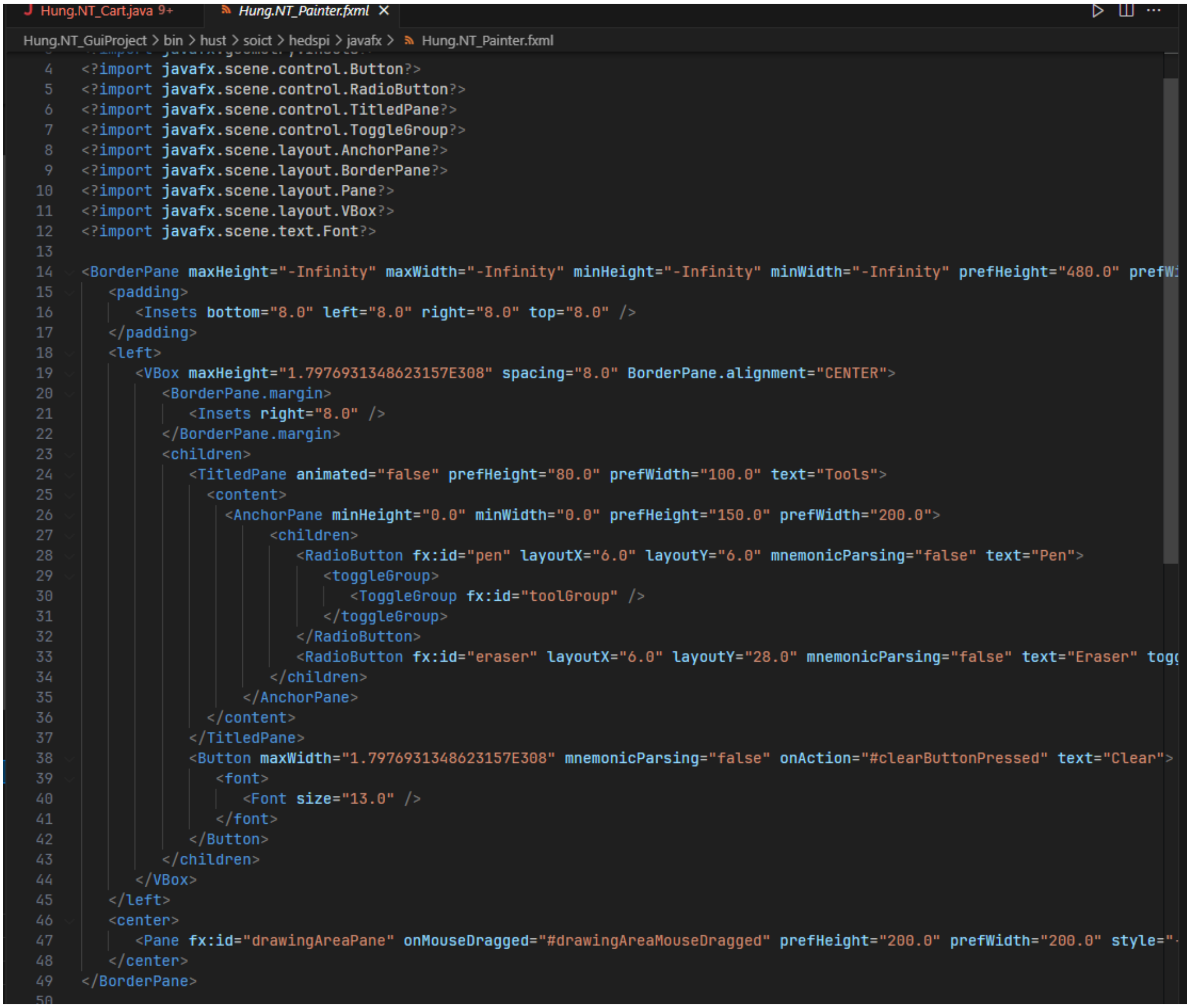
No content in table

Total: 0.0$

Figure 3.13 Demo View cart button

4 JavaFX API

4.1 Create class Painter



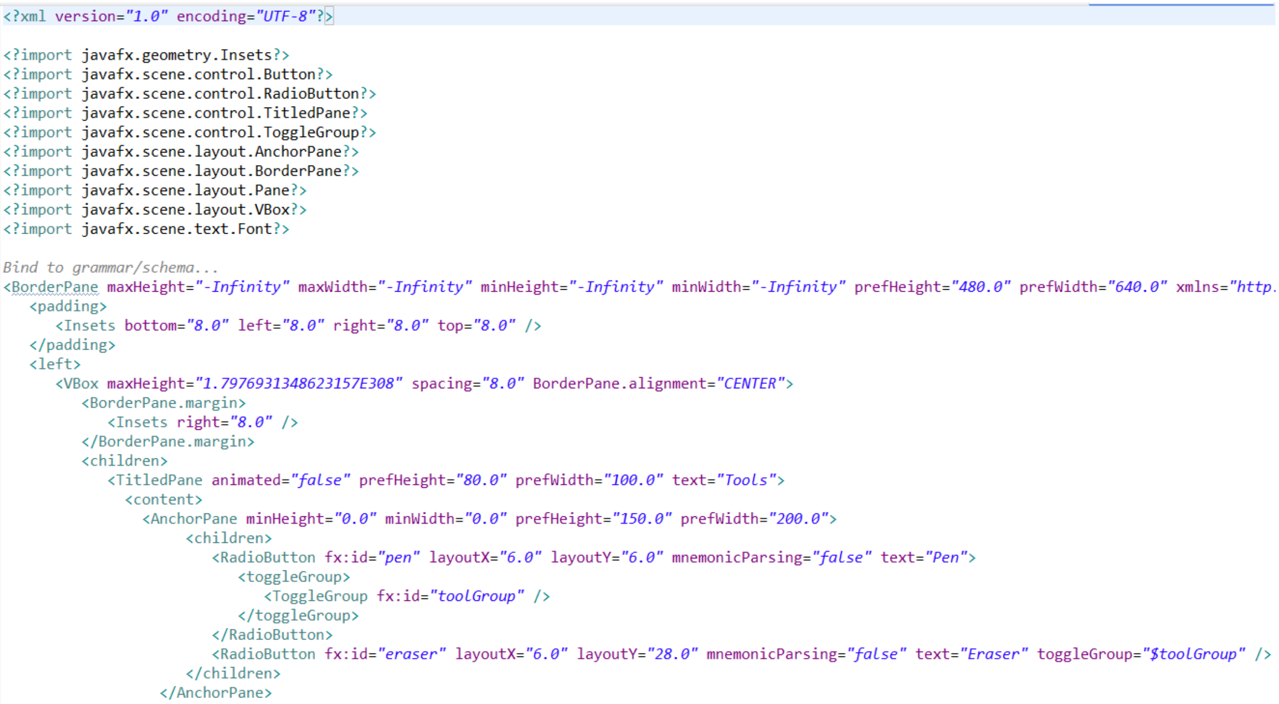
Hung.NT_Cart.java 9+
Hung.NT_Painter.fxml
Hung.NT_GuiProject > bin > hust > soict > hedspi > javafx > Hung.NT_Painter.fxml

```
<?import javafx.scene.control.Button?>
<?import javafx.scene.control.RadioButton?>
<?import javafx.scene.control.TitledPane?>
<?import javafx.scene.control.ToggleGroup?>
<?import javafx.scene.layout.AnchorPane?>
<?import javafx.scene.layout.BorderPane?>
<?import javafx.scene.layout.Pane?>
<?import javafx.scene.layout.VBox?>
<?import javafx.scene.text.Font?>

<BorderPane maxHeight="-Infinity" maxWidth="-Infinity" minHeight="-Infinity" minWidth="-Infinity" prefHeight="480.0" prefWi
   <padding>
      <Insets bottom="8.0" left="8.0" right="8.0" top="8.0" />
   </padding>
   <left>
      <VBox maxHeight="1.7976931348623157E308" spacing="8.0" BorderPane.alignment="CENTER">
         <BorderPane.margin>
            <Insets right="8.0" />
         </BorderPane.margin>
         <children>
            <TitledPane animated="false" prefHeight="80.0" prefWidth="100.0" text="Tools">
              <content>
                <AnchorPane minHeight="0.0" minWidth="0.0" prefHeight="150.0" prefWidth="200.0">
                     <children>
                        <RadioButton fx:id="pen" layoutX="6.0" layoutY="6.0" mnemonicParsing="false" text="Pen">
                           <toggleGroup>
                              <ToggleGroup fx:id="toolGroup" />
                           </toggleGroup>
                        </RadioButton>
                        <RadioButton fx:id="eraser" layoutX="6.0" layoutY="28.0" mnemonicParsing="false" text="Eraser" togg
                     </children>
                  </AnchorPane>
              </content>
            </TitledPane>
            <Button maxWidth="1.7976931348623157E308" mnemonicParsing="false" onAction="#clearButtonPressed" text="Clear">
               <font>
                  <Font size="13.0" />
               </font>
            </Button>
         </children>
      </VBox>
   </left>
   <center>
      <Pane fx:id="drawingAreaPane" onMouseDragged="#drawingAreaMouseDragged" prefHeight="200.0" prefWidth="200.0" style="-
   </center>
</BorderPane>
```

Painter.fxml

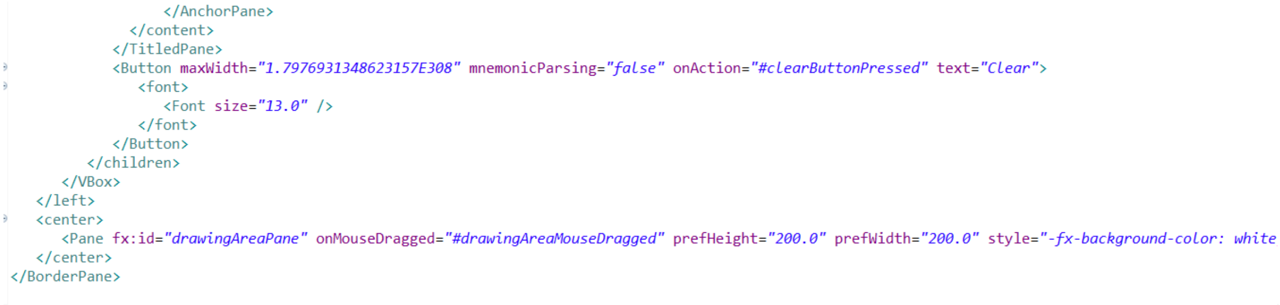
Figure 4.1: Class Painter

4.2 Create



```
<?xml version="1.0" encoding="UTF-8"?>

<?import javafx.geometry.Insets?>
<?import javafx.scene.control.Button?>
<?import javafx.scene.control.RadioButton?>
<?import javafx.scene.control.TitledPane?>
<?import javafx.scene.control.ToggleGroup?>
<?import javafx.scene.layout.AnchorPane?>
<?import javafx.scene.layout.BorderPane?>
<?import javafx.scene.layout.Pane?>
<?import javafx.scene.layout.VBox?>
<?import javafx.scene.text.Font?>

Bind to grammar/schema...
<BorderPane maxHeight="-Infinity" maxWidth="-Infinity" minHeight="-Infinity" minWidth="-Infinity" prefHeight="480.0" prefWidth="640.0" xmlns="http.
   <padding>
      <Insets bottom="8.0" left="8.0" right="8.0" top="8.0" />
   </padding>
   <left>
      <VBox maxHeight="1.7976931348623157E308" spacing="8.0" BorderPane.alignment="CENTER">
         <BorderPane.margin>
            <Insets right="8.0" />
         </BorderPane.margin>
         <children>
            <TitledPane animated="false" prefHeight="80.0" prefWidth="100.0" text="Tools">
              <content>
                <AnchorPane minHeight="0.0" minWidth="0.0" prefHeight="150.0" prefWidth="200.0">
                     <children>
                        <RadioButton fx:id="pen" layoutX="6.0" layoutY="6.0" mnemonicParsing="false" text="Pen">
                           <toggleGroup>
                              <ToggleGroup fx:id="toolGroup" />
                           </toggleGroup>
                        </RadioButton>
                        <RadioButton fx:id="eraser" layoutX="6.0" layoutY="28.0" mnemonicParsing="false" text="Eraser" toggleGroup="$toolGroup" />
                     </children>
                  </AnchorPane>
```

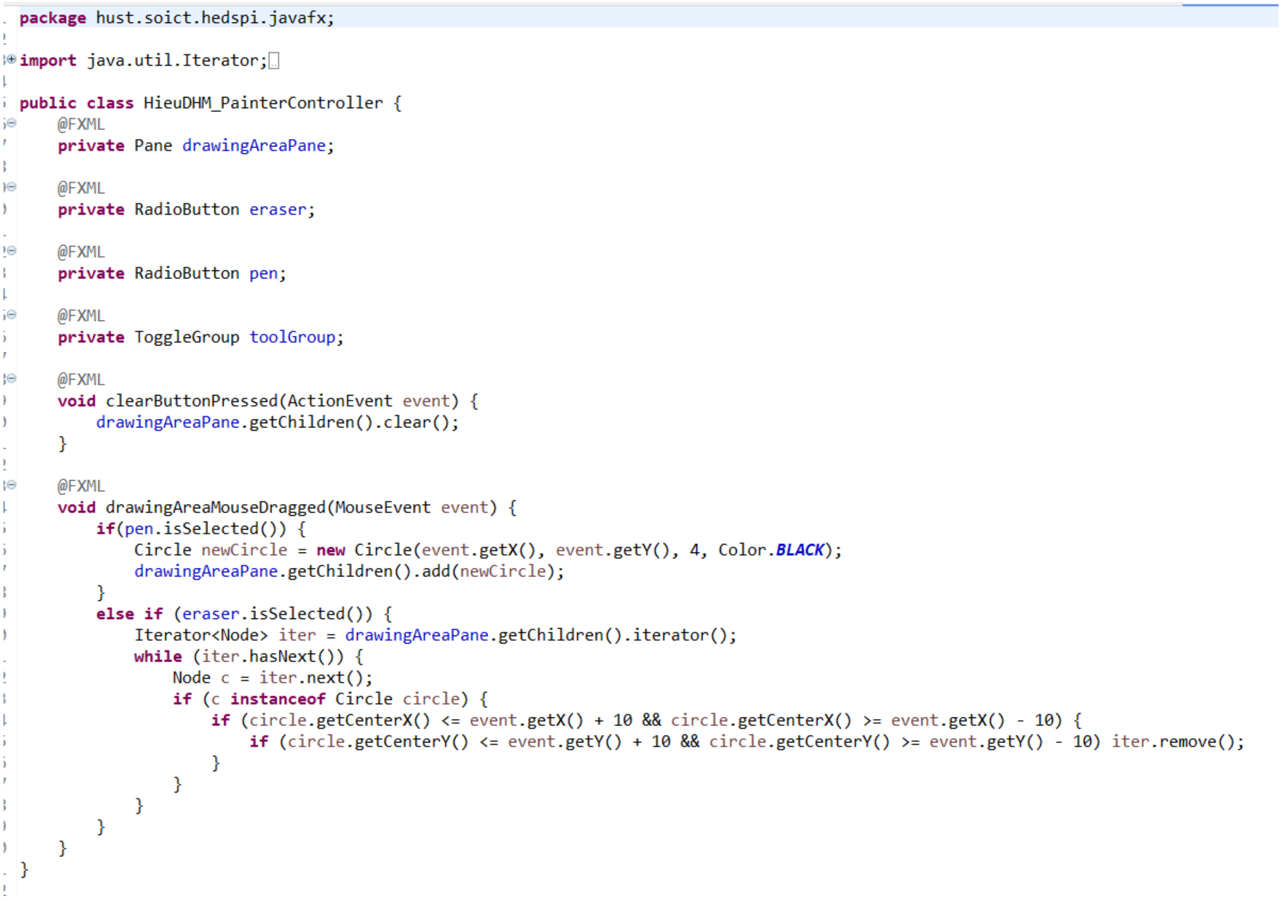
Figure 4.2: Painter.fxml 1



```
                        </AnchorPane>
                    </content>
                  </TitledPane>
                  <Button maxWidth="1.7976931348623157E308" mnemonicParsing="false" onAction="#clearButtonPressed" text="Clear">
                     <font>
                        <Font size="13.0" />
                     </font>
                  </Button>
               </children>
            </VBox>
         </left>
         <center>
            <Pane fx:id="drawingAreaPane" onMouseDragged="#drawingAreaMouseDragged" prefHeight="200.0" prefWidth="200.0" style="-fx-background-color: white
         </center>
</BorderPane>
```

Figure 4.3: Painter.fxml 2

4.3 Create class PainterController



```java
package hust.soict.hedspi.javafx;

import java.util.Iterator;

public class HieuDHM_PainterController {
    @FXML
    private Pane drawingAreaPane;

    @FXML
    private RadioButton eraser;

    @FXML
    private RadioButton pen;

    @FXML
    private ToggleGroup toolGroup;

    @FXML
    void clearButtonPressed(ActionEvent event) {
        drawingAreaPane.getChildren().clear();
    }

    @FXML
    void drawingAreaMouseDragged(MouseEvent event) {
        if(pen.isSelected()) {
            Circle newCircle = new Circle(event.getX(), event.getY(), 4, Color.BLACK);
            drawingAreaPane.getChildren().add(newCircle);
        }
        else if (eraser.isSelected()) {
            Iterator<Node> iter = drawingAreaPane.getChildren().iterator();
            while (iter.hasNext()) {
                Node c = iter.next();
                if (c instanceof Circle circle) {
                    if (circle.getCenterX() <= event.getX() + 10 && circle.getCenterX() >= event.getX() - 10) {
                        if (circle.getCenterY() <= event.getY() + 10 && circle.getCenterY() >= event.getY() - 10) iter.remove();
                    }
                }
            }
        }
    }
}
```

Figure 4.4: PainterController

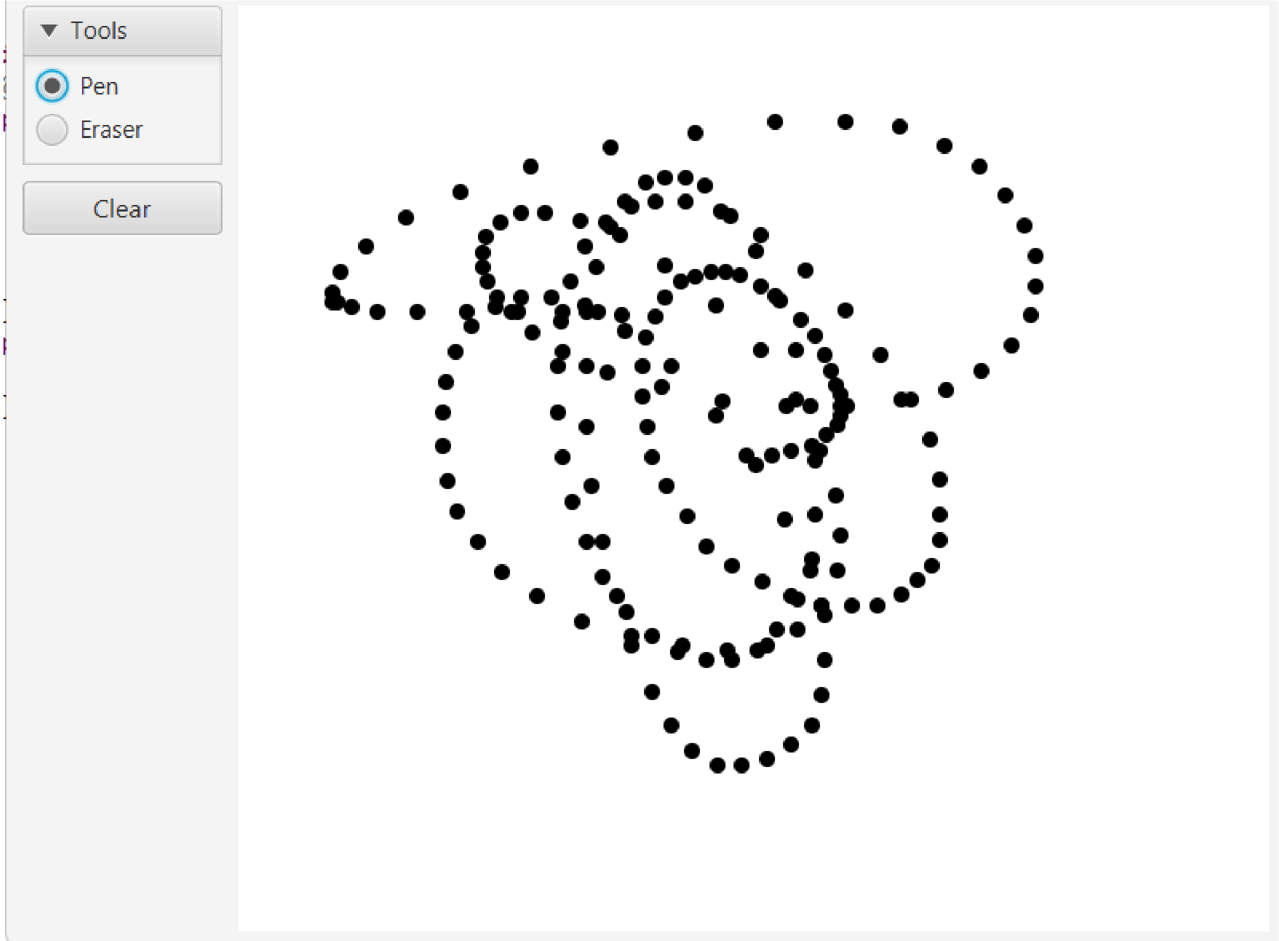


Figure 4.5: Use Pen

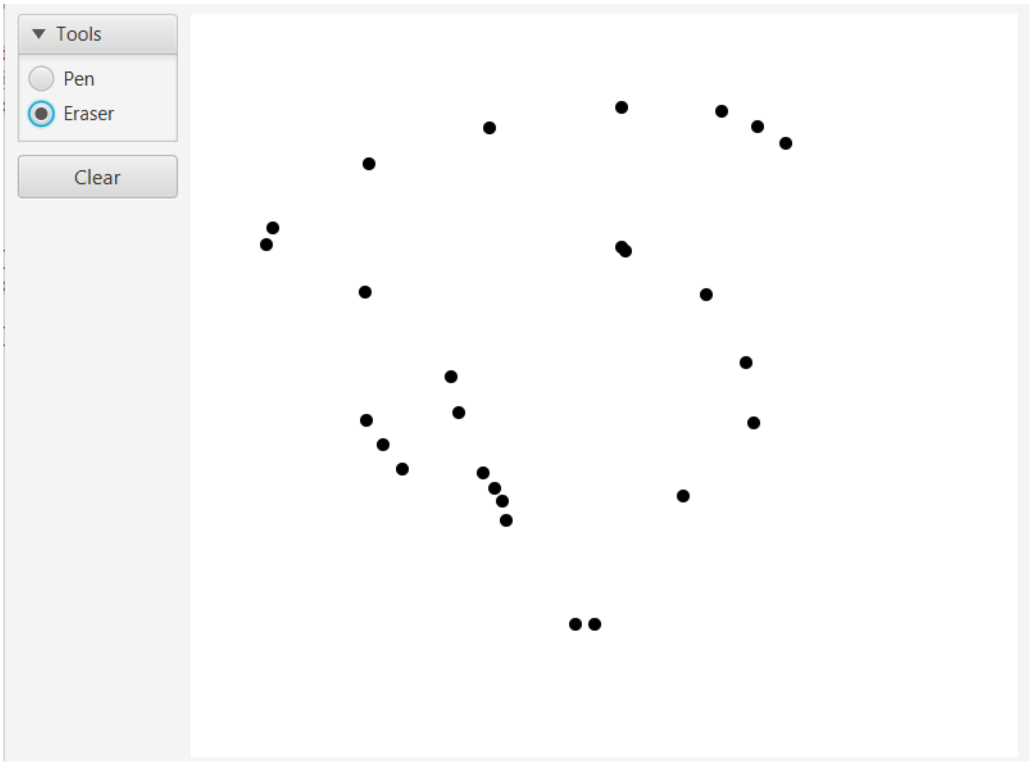


Figure 4.6: Use Eraser

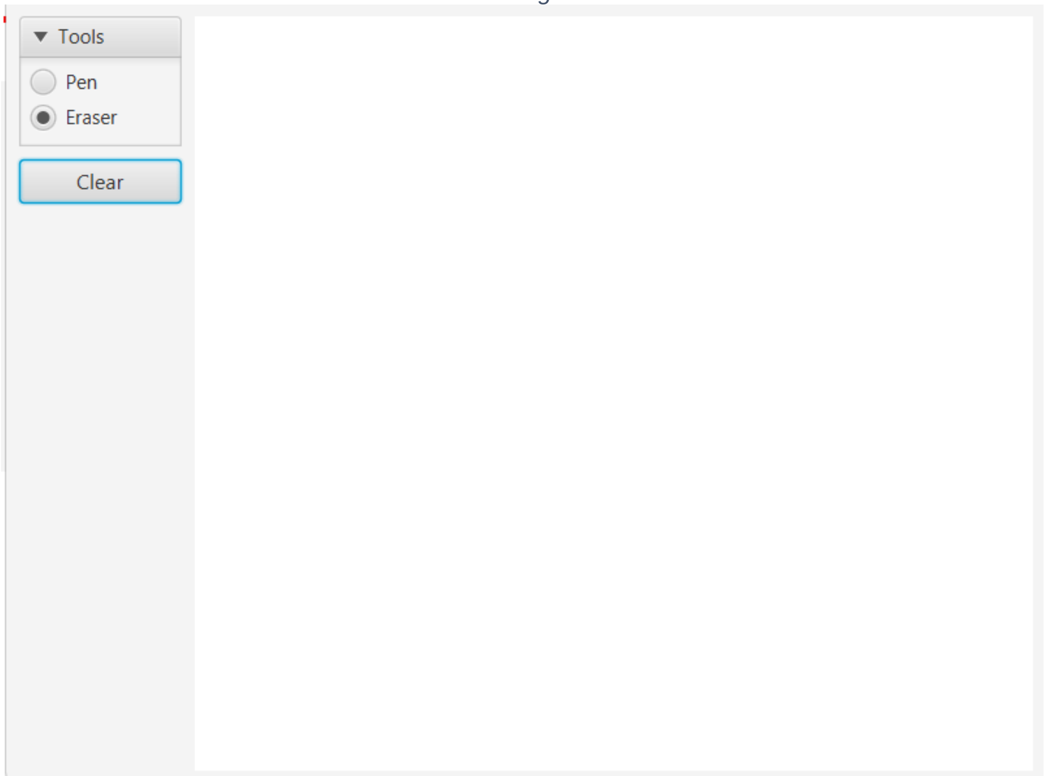
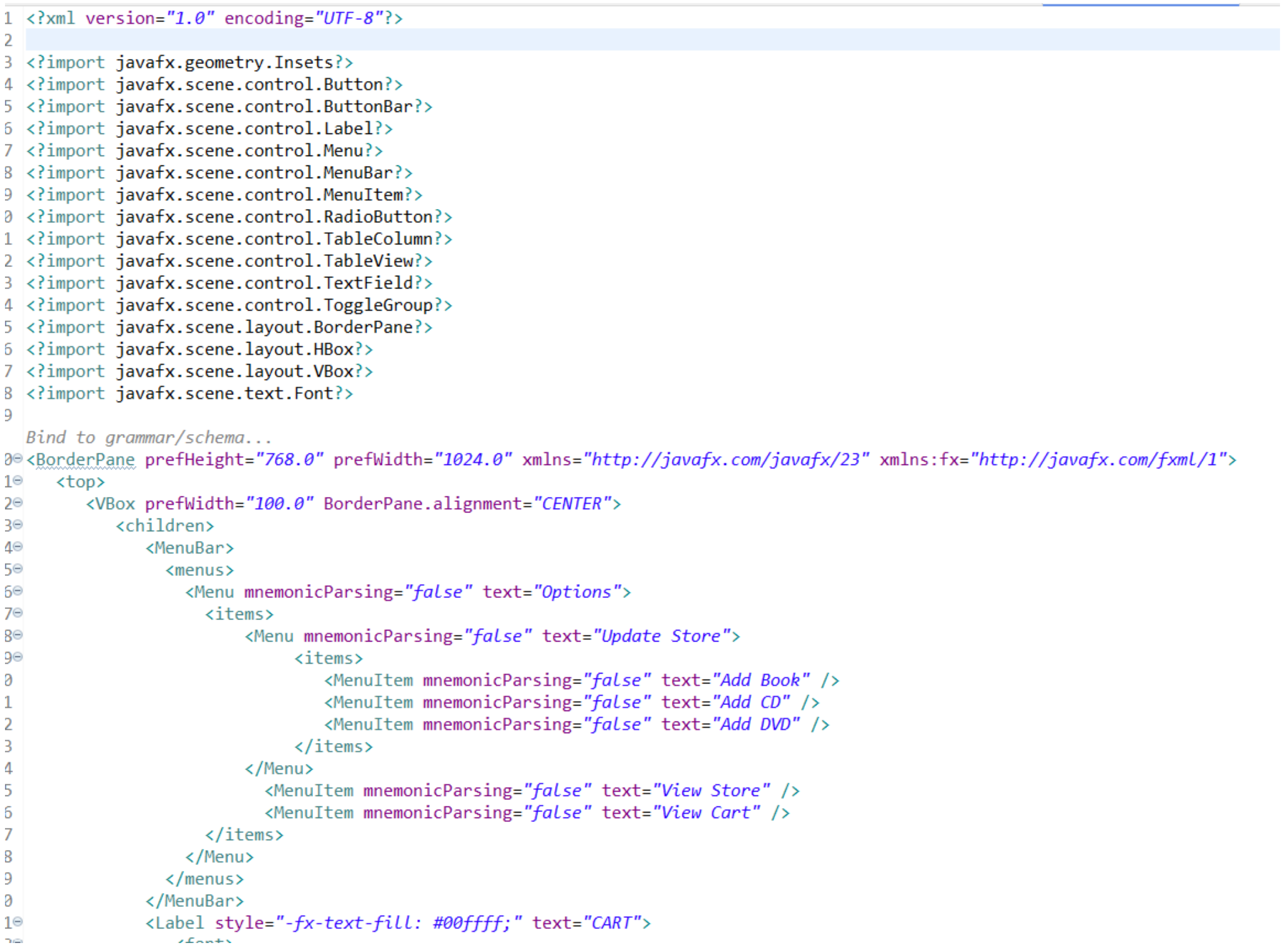


Figure 4.7: Clear button

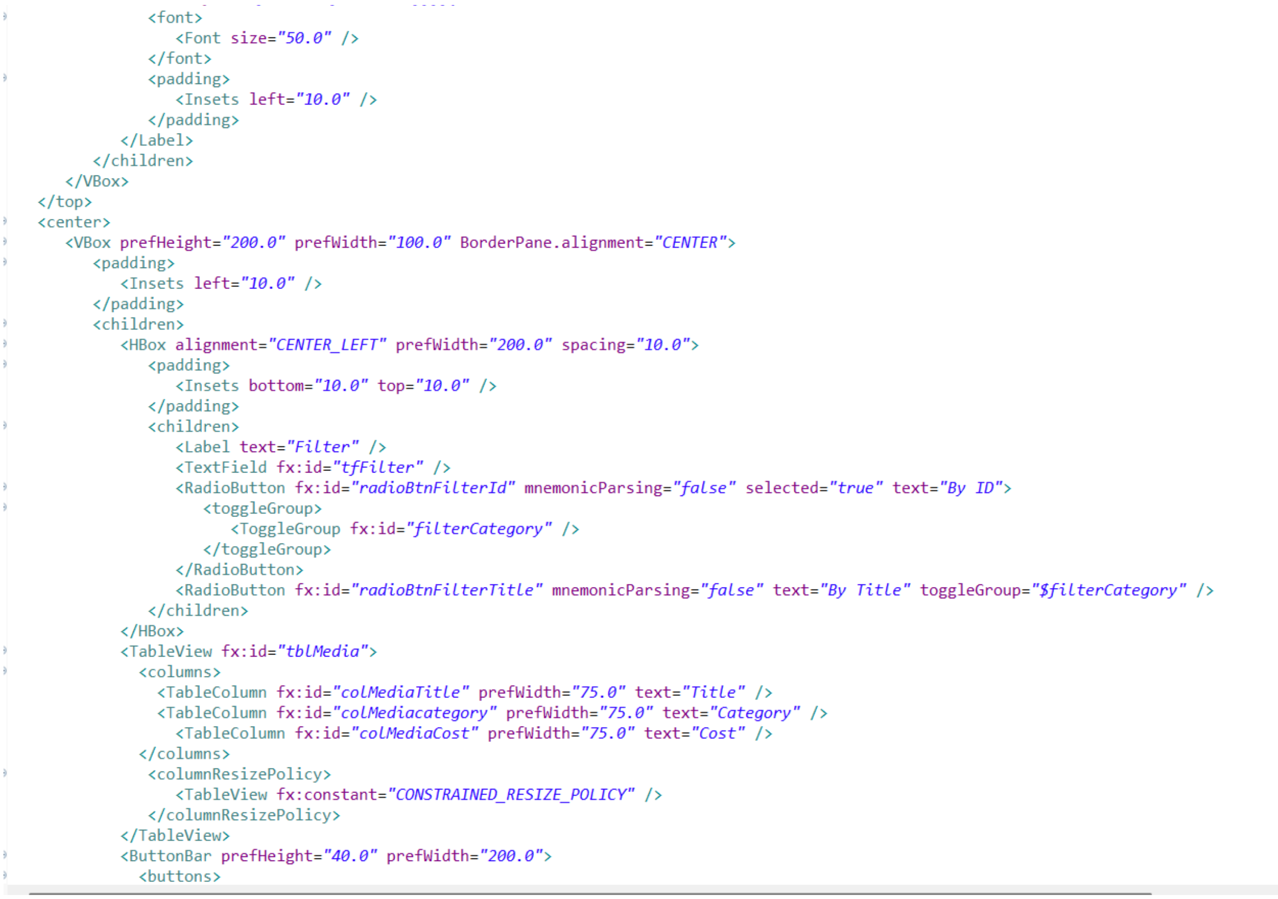
5 View Cart Screen

5.1 Create cart.fxml



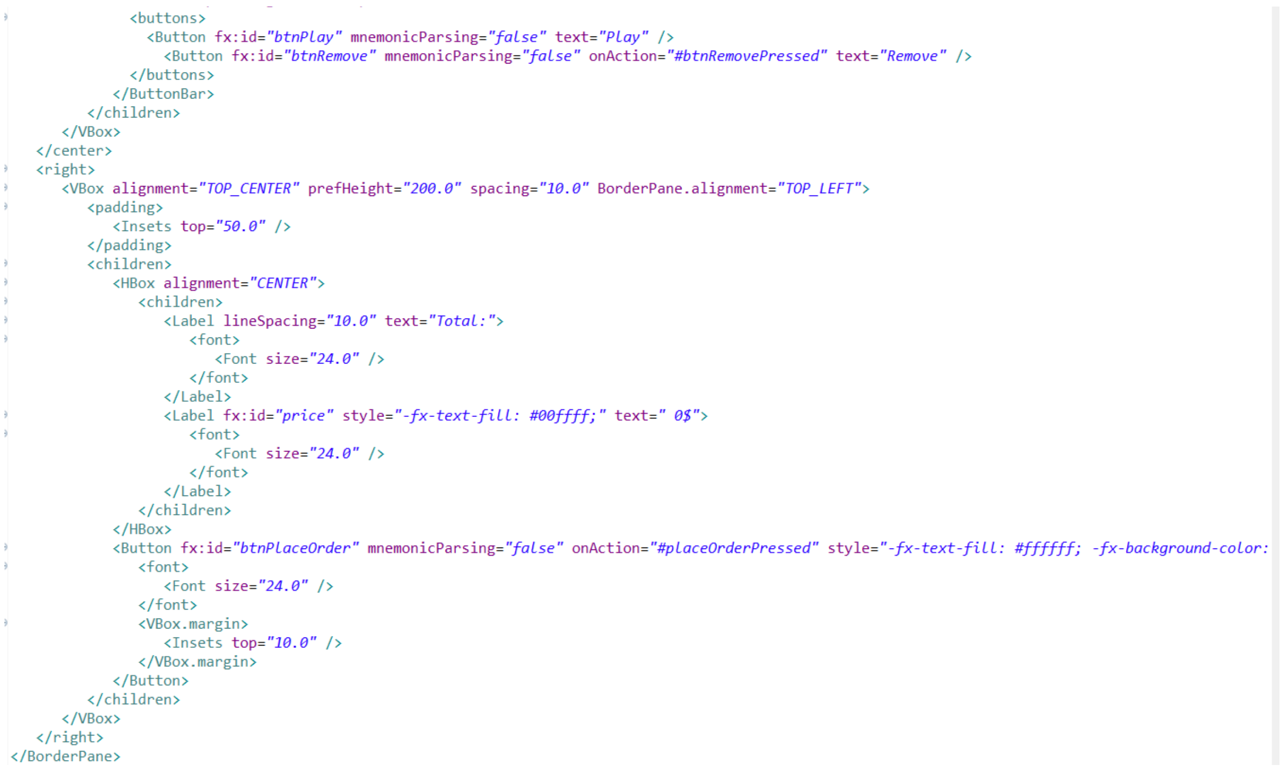
```
<?xml version="1.0" encoding="UTF-8"?>

<?import javafx.geometry.Insets?>
<?import javafx.scene.control.Button?>
<?import javafx.scene.control.ButtonBar?>
<?import javafx.scene.control.Label?>
<?import javafx.scene.control.Menu?>
<?import javafx.scene.control.MenuBar?>
<?import javafx.scene.control.MenuItem?>
<?import javafx.scene.control.RadioButton?>
<?import javafx.scene.control.TableColumn?>
<?import javafx.scene.control.TableView?>
<?import javafx.scene.control.TextField?>
<?import javafx.scene.control.ToggleGroup?>
<?import javafx.scene.layout.BorderPane?>
<?import javafx.scene.layout.HBox?>
<?import javafx.scene.layout.VBox?>
<?import javafx.scene.text.Font?>

Bind to grammar/schema...
<BorderPane prefHeight="768.0" prefWidth="1024.0" xmlns="http://javafx.com/javafx/23" xmlns:fx="http://javafx.com/fxml/1">
   <top>
      <VBox prefWidth="100.0" BorderPane.alignment="CENTER">
         <children>
            <MenuBar>
              <menus>
                <Menu mnemonicParsing="false" text="Options">
                  <items>
                      <Menu mnemonicParsing="false" text="Update Store">
                           <items>
                              <MenuItem mnemonicParsing="false" text="Add Book" />
                              <MenuItem mnemonicParsing="false" text="Add CD" />
                              <MenuItem mnemonicParsing="false" text="Add DVD" />
                           </items>
                      </Menu>
                        <MenuItem mnemonicParsing="false" text="View Store" />
                        <MenuItem mnemonicParsing="false" text="View Cart" />
                  </items>
                </Menu>
              </menus>
            </MenuBar>
            <Label style="-fx-text-fill: #00ffff;" text="CART">
               <font>
```

Figure 5.1: Cart.fxml 1



```
            <font>
               <Font size="50.0" />
            </font>
            <padding>
               <Insets left="10.0" />
            </padding>
         </Label>
      </children>
   </VBox>
</top>
<center>
   <VBox prefHeight="200.0" prefWidth="100.0" BorderPane.alignment="CENTER">
      <padding>
         <Insets left="10.0" />
      </padding>
      <children>
         <HBox alignment="CENTER_LEFT" prefWidth="200.0" spacing="10.0">
            <padding>
               <Insets bottom="10.0" top="10.0" />
            </padding>
            <children>
               <Label text="Filter" />
               <TextField fx:id="tfFilter" />
               <RadioButton fx:id="radioBtnFilterId" mnemonicParsing="false" selected="true" text="By ID">
                  <toggleGroup>
                     <ToggleGroup fx:id="filterCategory" />
                  </toggleGroup>
               </RadioButton>
               <RadioButton fx:id="radioBtnFilterTitle" mnemonicParsing="false" text="By Title" toggleGroup="$filterCategory" />
            </children>
         </HBox>
         <TableView fx:id="tblMedia">
           <columns>
             <TableColumn fx:id="colMediaTitle" prefWidth="75.0" text="Title" />
             <TableColumn fx:id="colMediacategory" prefWidth="75.0" text="Category" />
               <TableColumn fx:id="colMediaCost" prefWidth="75.0" text="Cost" />
           </columns>
            <columnResizePolicy>
               <TableView fx:constant="CONSTRAINED_RESIZE_POLICY" />
            </columnResizePolicy>
         </TableView>
         <ButtonBar prefHeight="40.0" prefWidth="200.0">
           <buttons>
```

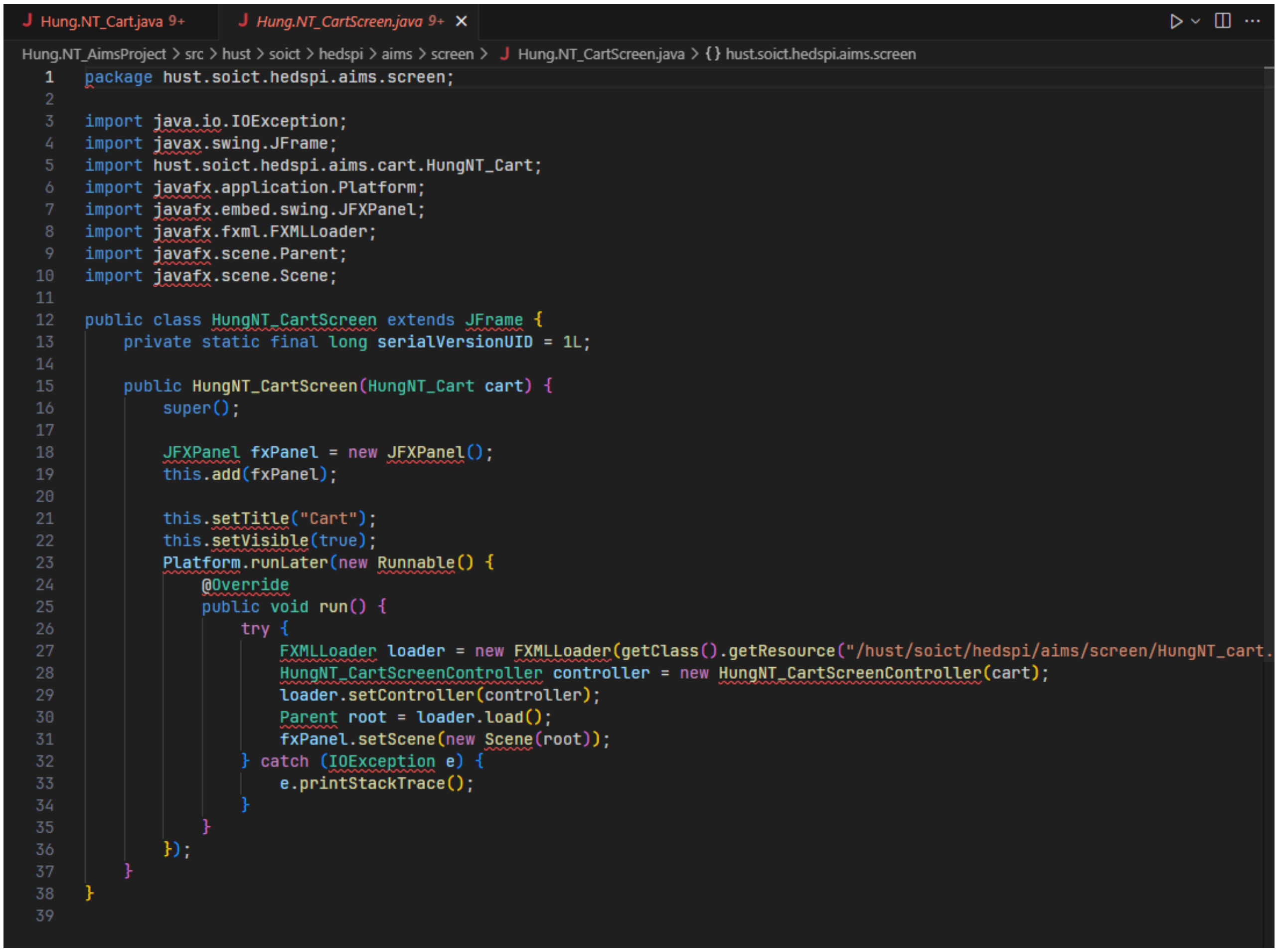
Figure 5.2: Cart.fxml 2



```
              <buttons>
                <Button fx:id="btnPlay" mnemonicParsing="false" text="Play" />
                  <Button fx:id="btnRemove" mnemonicParsing="false" onAction="#btnRemovePressed" text="Remove" />
              </buttons>
            </ButtonBar>
         </children>
      </VBox>
   </center>
   <right>
      <VBox alignment="TOP_CENTER" prefHeight="200.0" spacing="10.0" BorderPane.alignment="TOP_LEFT">
         <padding>
            <Insets top="50.0" />
         </padding>
         <children>
            <HBox alignment="CENTER">
               <children>
                  <Label lineSpacing="10.0" text="Total:">
                     <font>
                        <Font size="24.0" />
                     </font>
                  </Label>
                  <Label fx:id="price" style="-fx-text-fill: #00ffff;" text=" 0$">
                     <font>
                        <Font size="24.0" />
                     </font>
                  </Label>
               </children>
            </HBox>
            <Button fx:id="btnPlaceOrder" mnemonicParsing="false" onAction="#placeOrderPressed" style="-fx-text-fill: #ffffff; -fx-background-color:
               <font>
                  <Font size="24.0" />
               </font>
               <VBox.margin>
                  <Insets top="10.0" />
               </VBox.margin>
            </Button>
         </children>
      </VBox>
   </right>
</BorderPane>
```

Figure 5.3: Cart.fxml 3

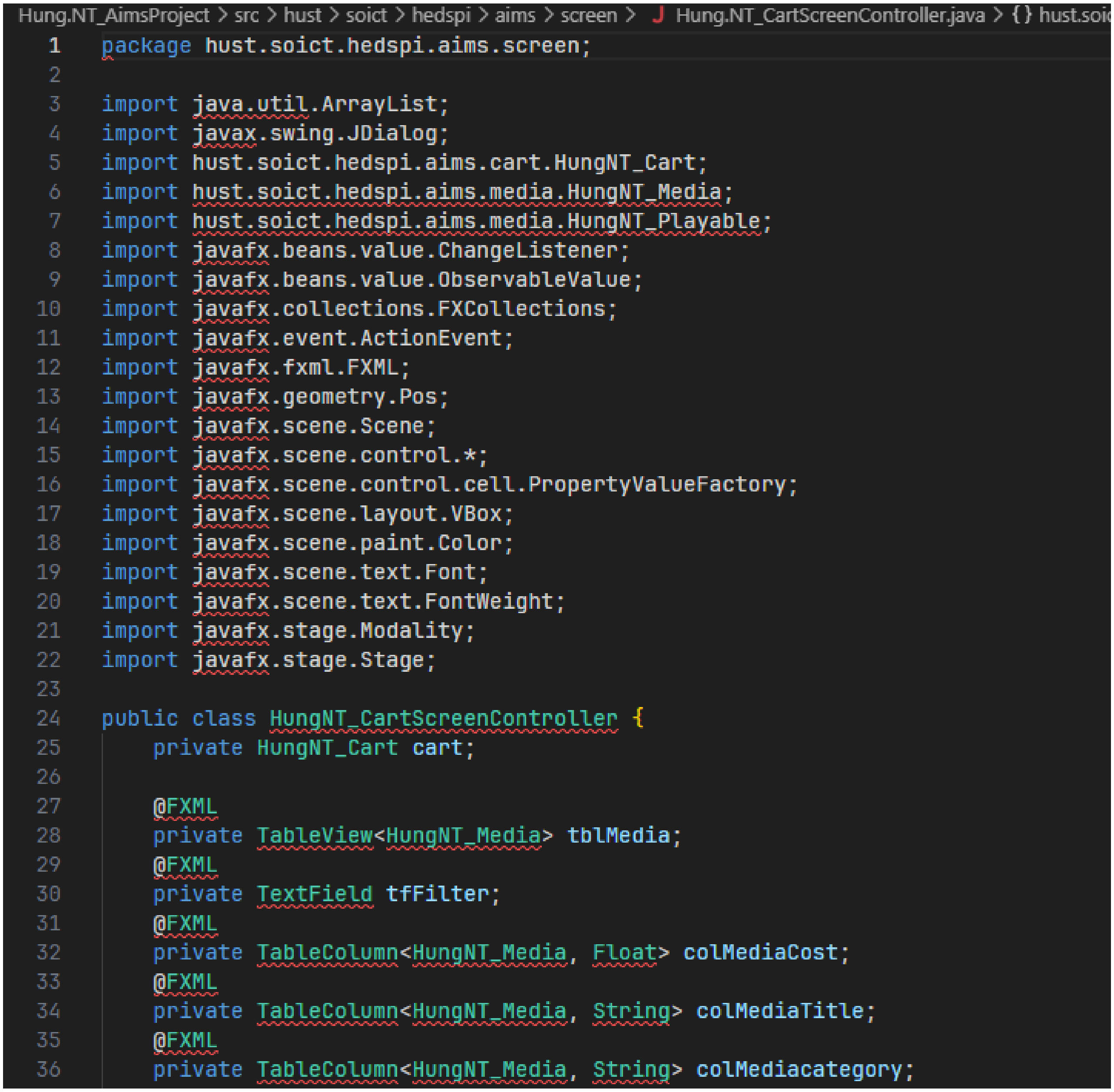
5.2 Create class CartScreen


Hung.NT_Cart.java 9+
Hung.NT_CartScreen.java 9+
Hung.NT_AimsProject > src > hust > soict > hedspi > aims > screen > Hung.NT_CartScreen.java > {} hust.soict.hedspi.aims.screen

```java
package hust.soict.hedspi.aims.screen;

import java.io.IOException;
import javax.swing.JFrame;
import hust.soict.hedspi.aims.cart.HungNT_Cart;
import javafx.application.Platform;
import javafx.embed.swing.JFXPanel;
import javafx.fxml.FXMLLoader;
import javafx.scene.Parent;
import javafx.scene.Scene;

public class HungNT_CartScreen extends JFrame {
    private static final long serialVersionUID = 1L;

    public HungNT_CartScreen(HungNT_Cart cart) {
        super();

        JFXPanel fxPanel = new JFXPanel();
        this.add(fxPanel);

        this.setTitle("Cart");
        this.setVisible(true);
        Platform.runLater(new Runnable() {
            @Override
            public void run() {
                try {
                    FXMLLoader loader = new FXMLLoader(getClass().getResource("/hust/soict/hedspi/aims/screen/HungNT_cart.
                    HungNT_CartScreenController controller = new HungNT_CartScreenController(cart);
                    loader.setController(controller);
                    Parent root = loader.load();
                    fxPanel.setScene(new Scene(root));
                } catch (IOException e) {
                    e.printStackTrace();
                }
            }
        });
    }
}

```

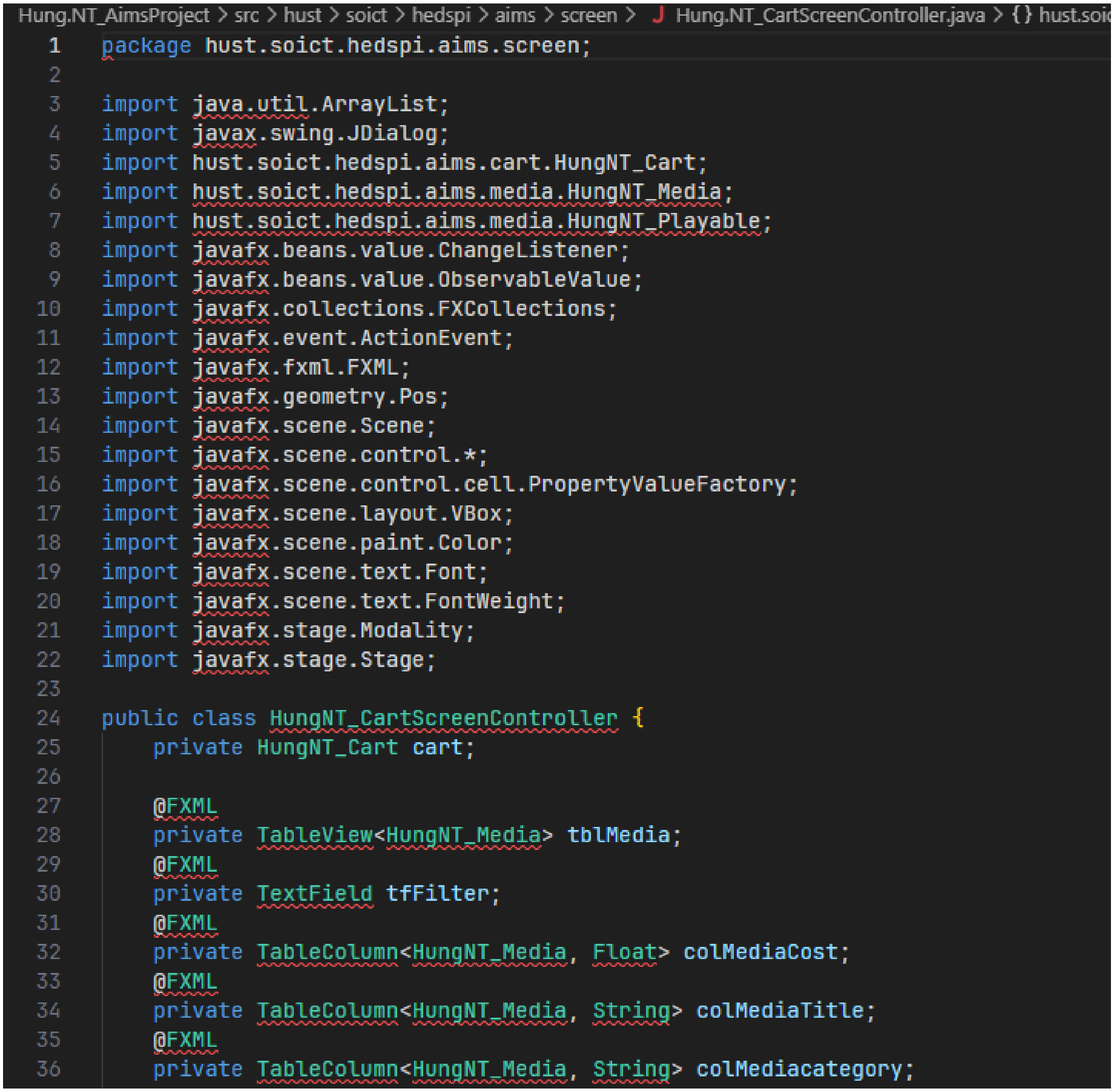
Figure 5.4: CartScreen class

5.3 Create class CartScreenController


Hung.NT_AimsProject > src > hust > soict > hedspi > aims > screen > J Hung.NT_CartScreenController.java > {} hust.soic

```java
package hust.soict.hedspi.aims.screen;

import java.util.ArrayList;
import javax.swing.JDialog;
import hust.soict.hedspi.aims.cart.HungNT_Cart;
import hust.soict.hedspi.aims.media.HungNT_Media;
import hust.soict.hedspi.aims.media.HungNT_Playable;
import javafx.beans.value.ChangeListener;
import javafx.beans.value.ObservableValue;
import javafx.collections.FXCollections;
import javafx.event.ActionEvent;
import javafx.fxml.FXML;
import javafx.geometry.Pos;
import javafx.scene.Scene;
import javafx.scene.control.*;
import javafx.scene.control.cell.PropertyValueFactory;
import javafx.scene.layout.VBox;
import javafx.scene.paint.Color;
import javafx.scene.text.Font;
import javafx.scene.text.FontWeight;
import javafx.stage.Modality;
import javafx.stage.Stage;

public class HungNT_CartScreenController {
    private HungNT_Cart cart;

    @FXML
    private TableView<HungNT_Media> tblMedia;
    @FXML
    private TextField tfFilter;
    @FXML
    private TableColumn<HungNT_Media, Float> colMediaCost;
    @FXML
    private TableColumn<HungNT_Media, String> colMediaTitle;
    @FXML
    private TableColumn<HungNT_Media, String> colMediacategory;
```

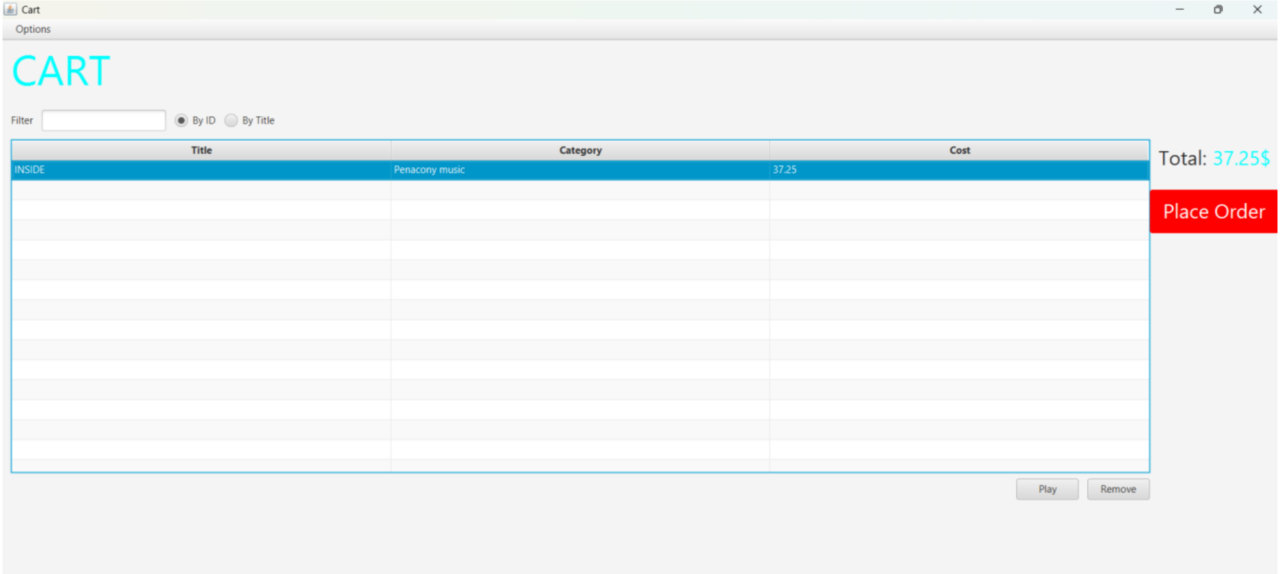
Figure 5.5: CartScreenController 1


Hung.NT_AimsProject > src > hust > soict > hedspi > aims > screen > J Hung.NT_CartScreenController.java > {} hust.soic

```java
package hust.soict.hedspi.aims.screen;

import java.util.ArrayList;
import javax.swing.JDialog;
import hust.soict.hedspi.aims.cart.HungNT_Cart;
import hust.soict.hedspi.aims.media.HungNT_Media;
import hust.soict.hedspi.aims.media.HungNT_Playable;
import javafx.beans.value.ChangeListener;
import javafx.beans.value.ObservableValue;
import javafx.collections.FXCollections;
import javafx.event.ActionEvent;
import javafx.fxml.FXML;
import javafx.geometry.Pos;
import javafx.scene.Scene;
import javafx.scene.control.*;
import javafx.scene.control.cell.PropertyValueFactory;
import javafx.scene.layout.VBox;
import javafx.scene.paint.Color;
import javafx.scene.text.Font;
import javafx.scene.text.FontWeight;
import javafx.stage.Modality;
import javafx.stage.Stage;

public class HungNT_CartScreenController {
    private HungNT_Cart cart;

    @FXML
    private TableView<HungNT_Media> tblMedia;
    @FXML
    private TextField tfFilter;
    @FXML
    private TableColumn<HungNT_Media, Float> colMediaCost;
    @FXML
    private TableColumn<HungNT_Media, String> colMediaTitle;
    @FXML
    private TableColumn<HungNT_Media, String> colMediacategory;
```

Figure 5.6: CartScreenController 2

5.4 Demo

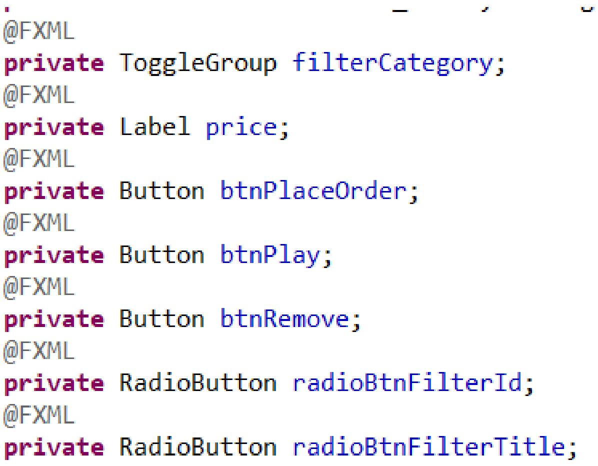


Title	Category	Cost
INSIDE	Penacony music	37.25

Figure 5.7: Demo CartScreen

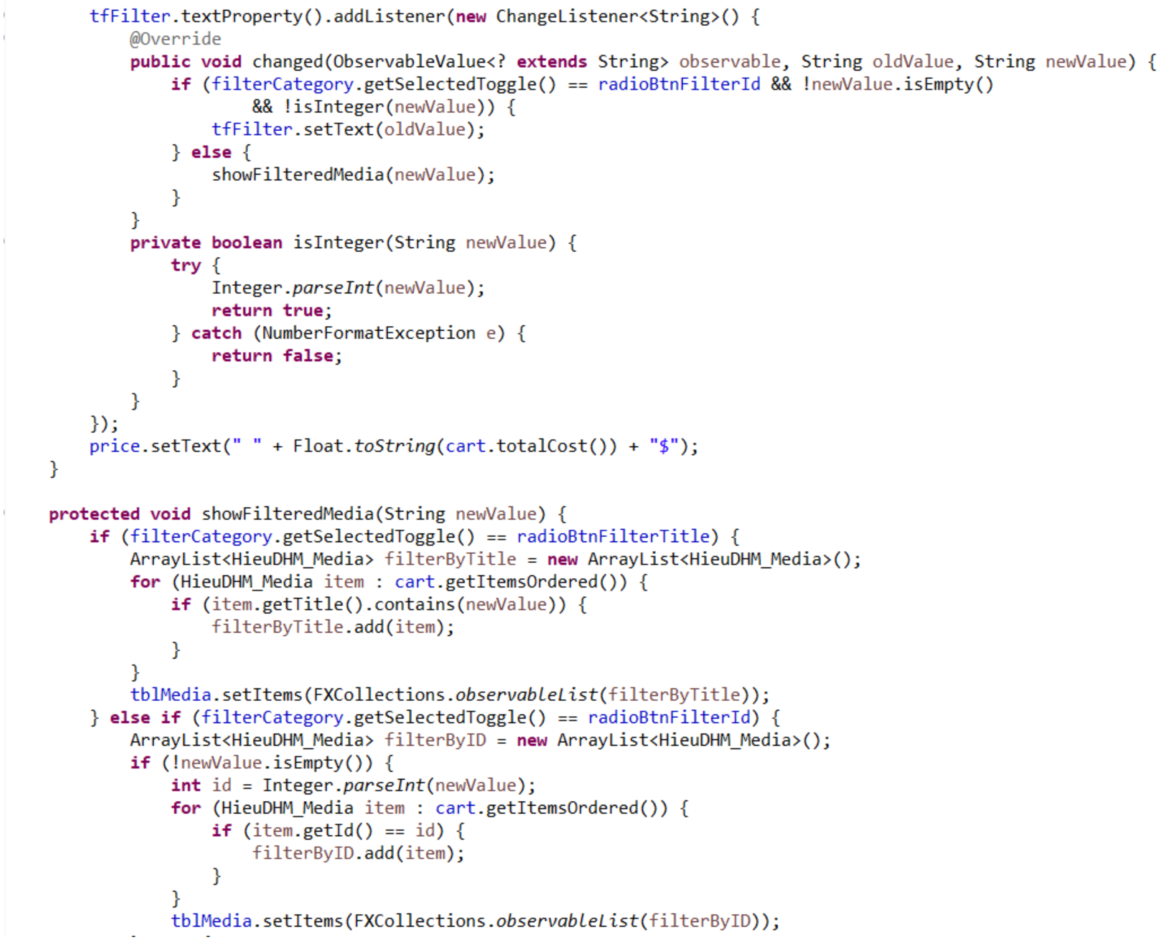
6 Updating buttons based on selected item in TableView – ChangeListener

6.1 Edit class CartScreenController



```
@FXML
private ToggleGroup filterCategory;
@FXML
private Label price;
@FXML
private Button btnPlaceOrder;
@FXML
private Button btnPlay;
@FXML
private Button btnRemove;
@FXML
private RadioButton radioBtnFilterId;
@FXML
private RadioButton radioBtnFilterTitle;
```

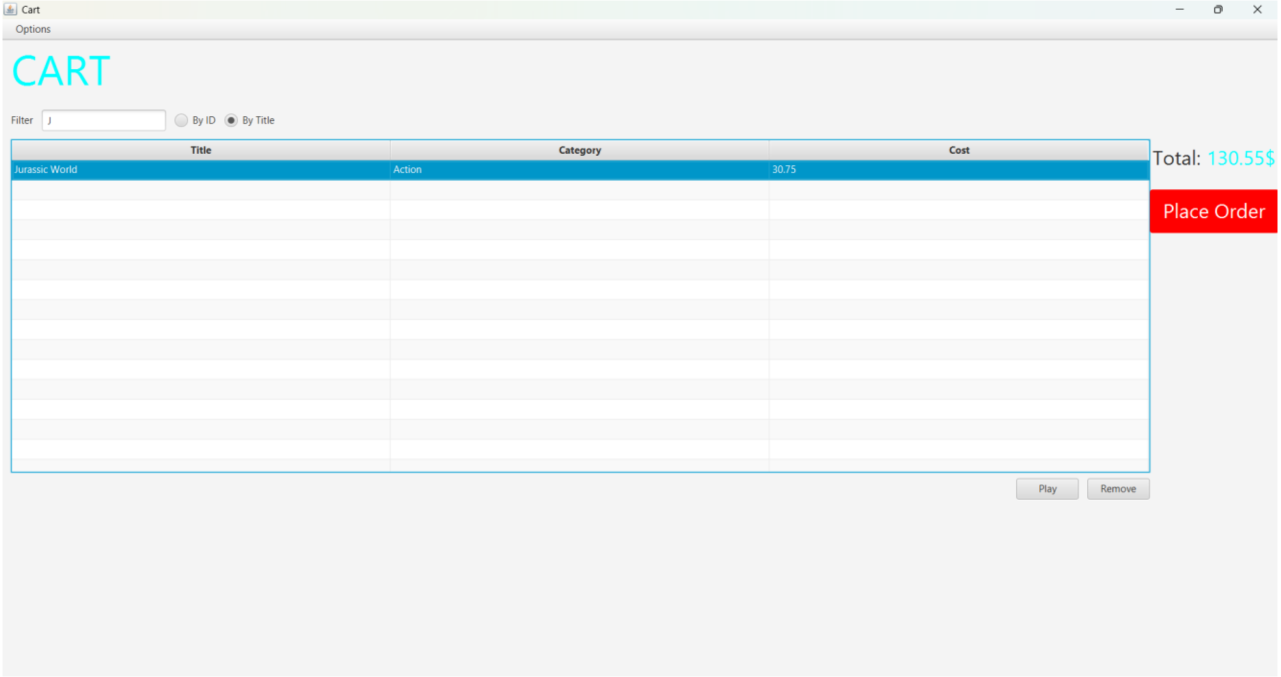
Figure 6.1: CartScreenController 1



```
        tfFilter.textProperty().addListener(new ChangeListener<String>() {
            @Override
            public void changed(ObservableValue<? extends String> observable, String oldValue, String newValue) {
                if (filterCategory.getSelectedToggle() == radioBtnFilterId && !newValue.isEmpty()
                        && !isInteger(newValue)) {
                    tfFilter.setText(oldValue);
                } else {
                    showFilteredMedia(newValue);
                }
            }
            private boolean isInteger(String newValue) {
                try {
                    Integer.parseInt(newValue);
                    return true;
                } catch (NumberFormatException e) {
                    return false;
                }
            }
        });
        price.setText(" " + Float.toString(cart.totalCost()) + "$");
    }

    protected void showFilteredMedia(String newValue) {
        if (filterCategory.getSelectedToggle() == radioBtnFilterTitle) {
            ArrayList<HieuDHM_Media> filterByTitle = new ArrayList<HieuDHM_Media>();
            for (HieuDHM_Media item : cart.getItemsOrdered()) {
                if (item.getTitle().contains(newValue)) {
                    filterByTitle.add(item);
                }
            }
            tblMedia.setItems(FXCollections.observableList(filterByTitle));
        } else if (filterCategory.getSelectedToggle() == radioBtnFilterId) {
            ArrayList<HieuDHM_Media> filterByID = new ArrayList<HieuDHM_Media>();
            if (!newValue.isEmpty()) {
                int id = Integer.parseInt(newValue);
                for (HieuDHM_Media item : cart.getItemsOrdered()) {
                    if (item.getId() == id) {
                        filterByID.add(item);
                    }
                }
                tblMedia.setItems(FXCollections.observableList(filterByID));
```

Figure 6.2: CartScreenController 2

6.2 Demo

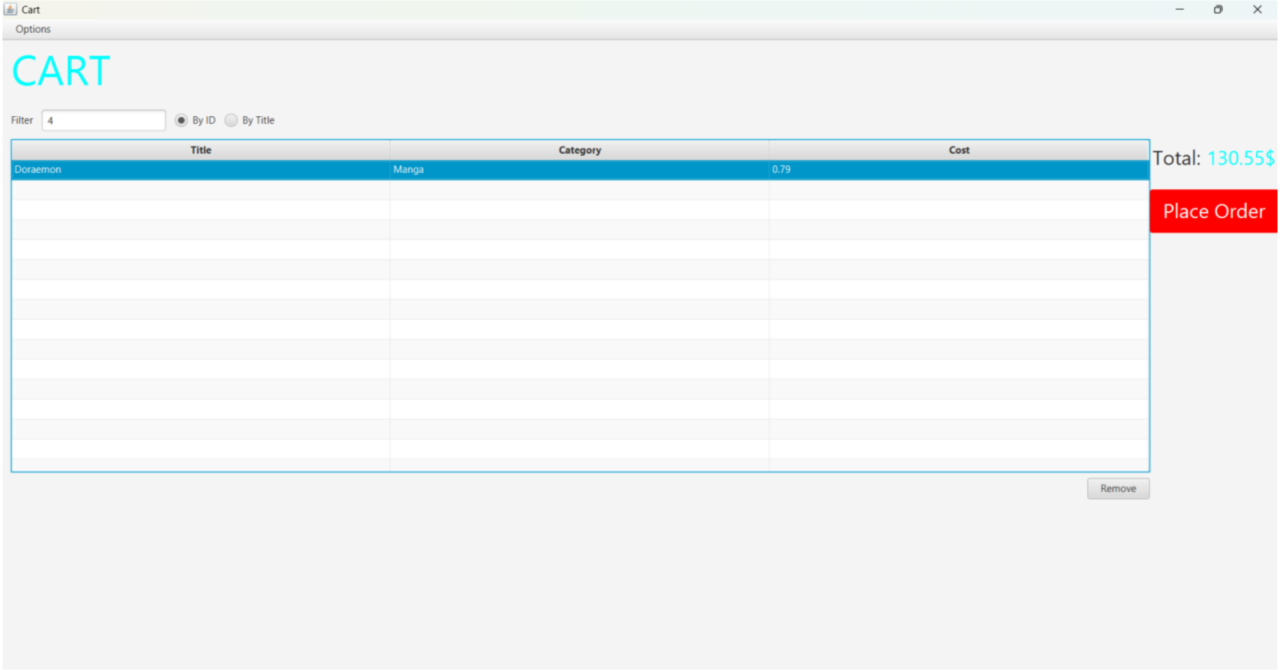


Filter J ○ By ID ● By Title

Title	Category	Cost
Jurassic World	Action	30.75

Total: 130.55$

Figure 6.3: Demo media playable



Filter 4 ● By ID ○ By Title

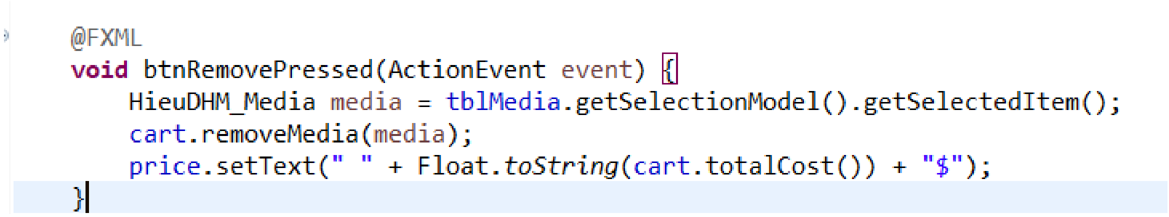
Title	Category	Cost
Doraemon	Manga	0.79

Total: 130.55$

Figure 6.4: Demo media unplayable

7 Deleting a media

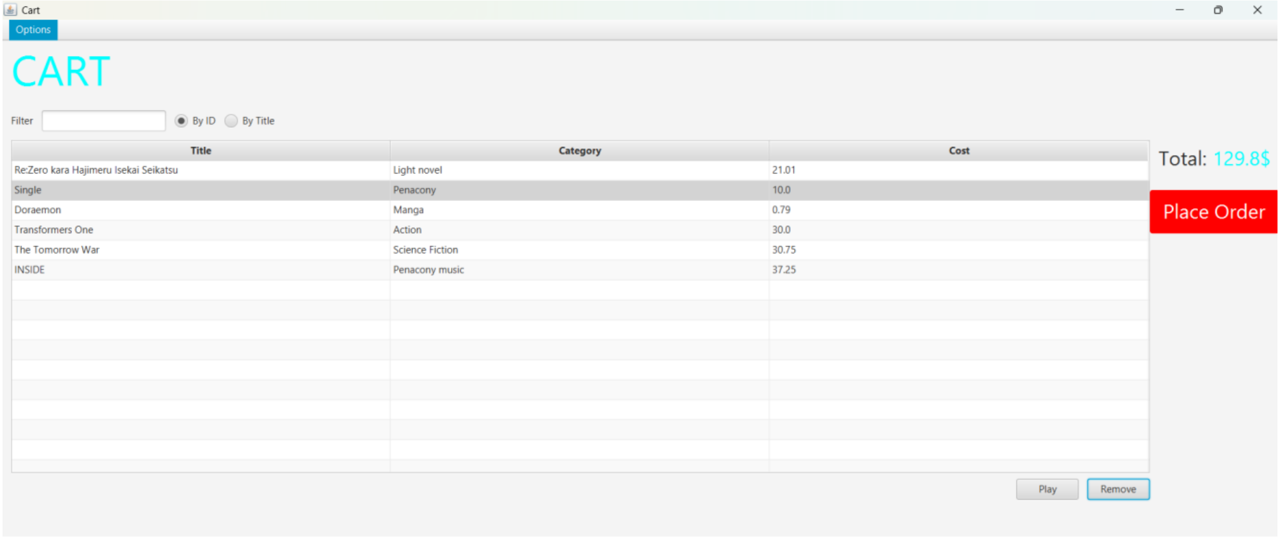
7.1 Code



```
    @FXML
    void btnRemovePressed(ActionEvent event) {
        HieuDHM_Media media = tblMedia.getSelectionModel().getSelectedItem();
        cart.removeMedia(media);
        price.setText(" " + Float.toString(cart.totalCost()) + "$");
    }
```

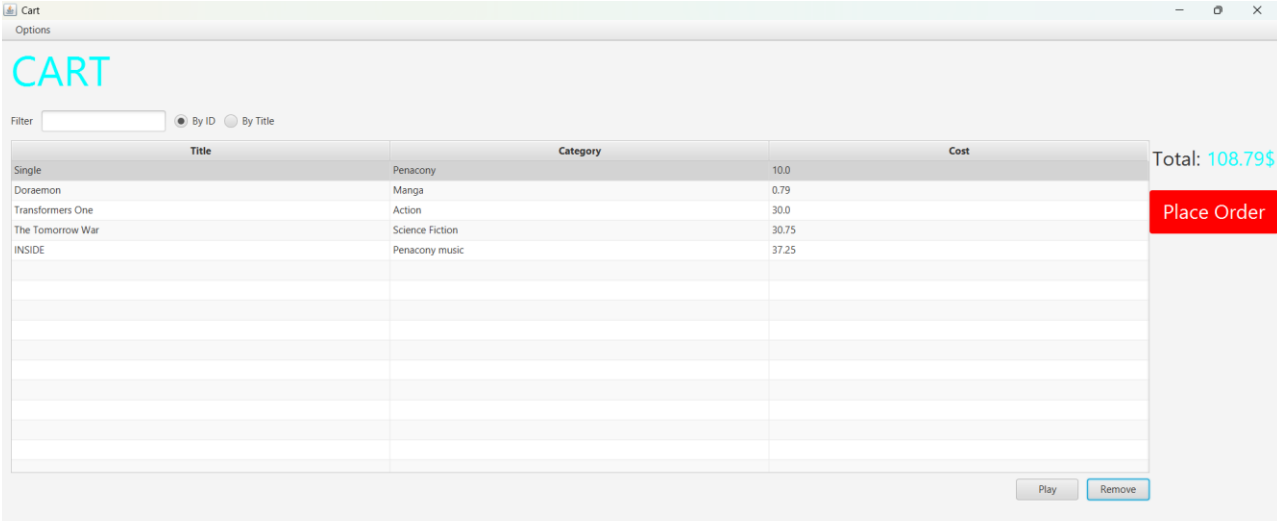
Figure 7.1: btnRemovePressed Method

7.2 Demo



Title	Category	Cost
Re:Zero kara Hajimeru Isekai Seikatsu	Light novel	21.01
Single	Penacony	10.0
Doraemon	Manga	0.79
Transformers One	Action	30.0
The Tomorrow War	Science Fiction	30.75
INSIDE	Penacony music	37.25

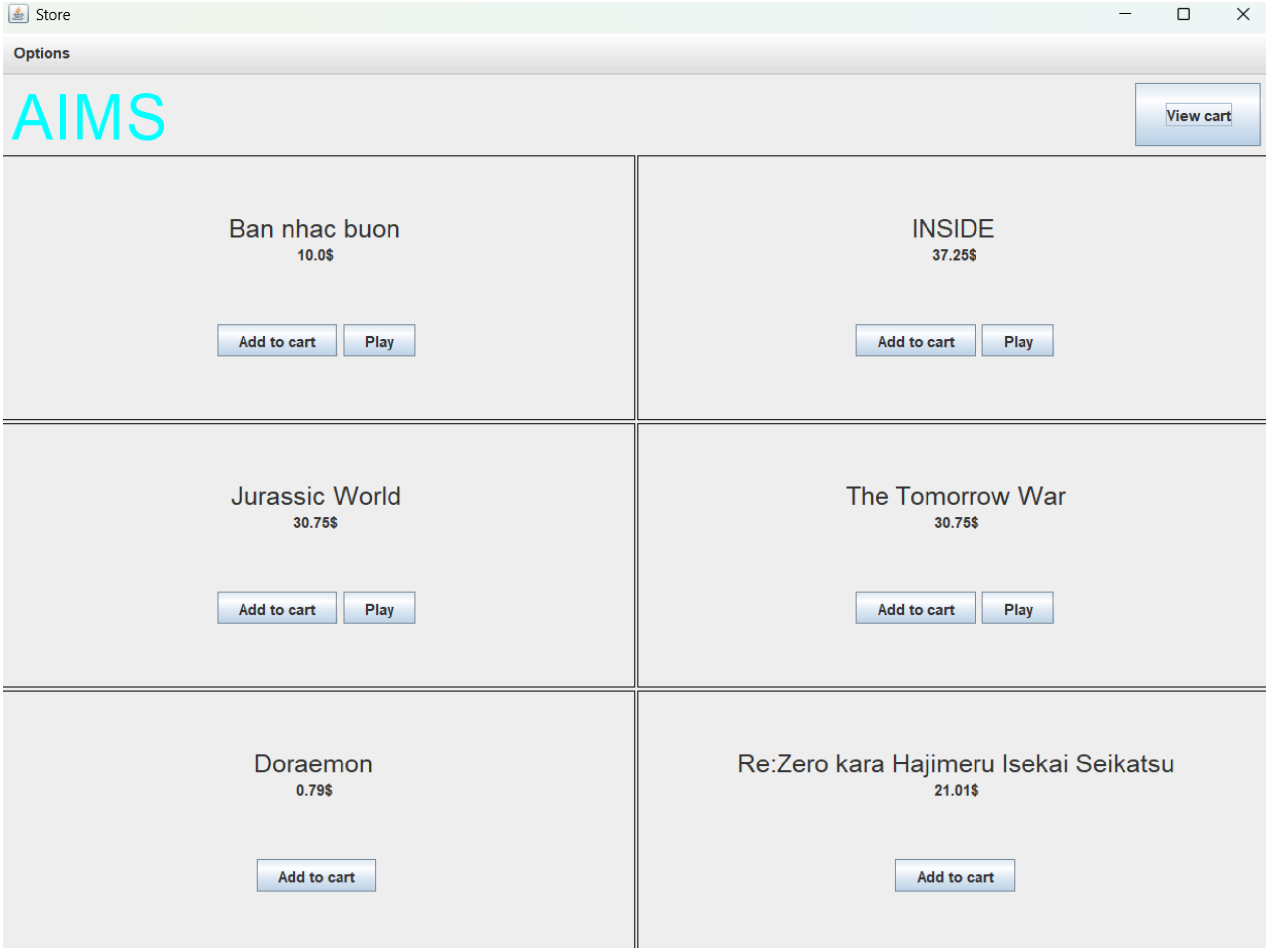
Figure 7.2: button Remove



Title	Category	Cost
Single	Penacony	10.0
Doraemon	Manga	0.79
Transformers One	Action	30.0
The Tomorrow War	Science Fiction	30.75
INSIDE	Penacony music	37.25

Figure 7.3: button Remove

8 Complete the Aims GUI application



Ban nhac buon
10.0$

INSIDE
37.25$

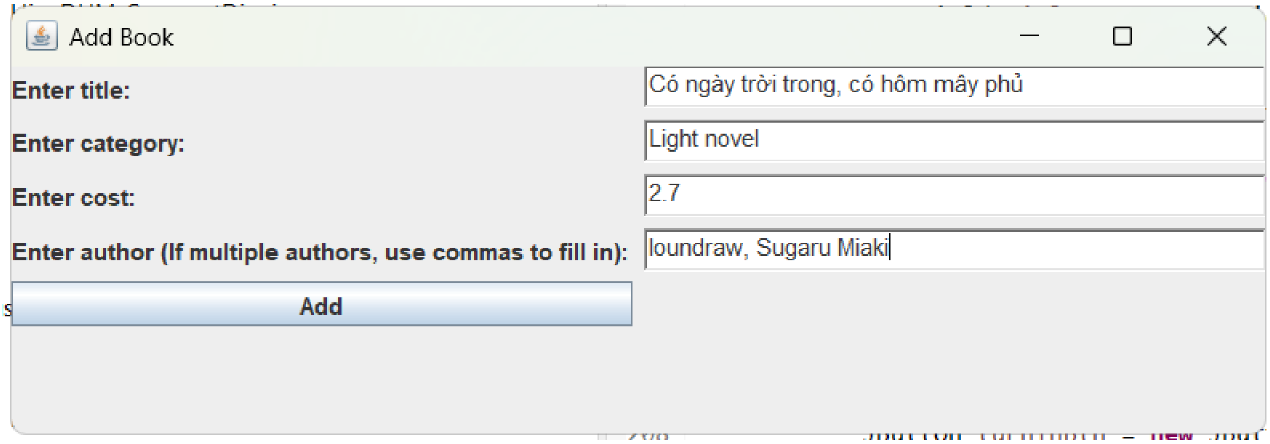
Jurassic World
30.75$

The Tomorrow War
30.75$

Doraemon
0.79$

Re:Zero kara Hajimeru Isekai Seikatsu
21.01$

Figure 8.1: Store before add book



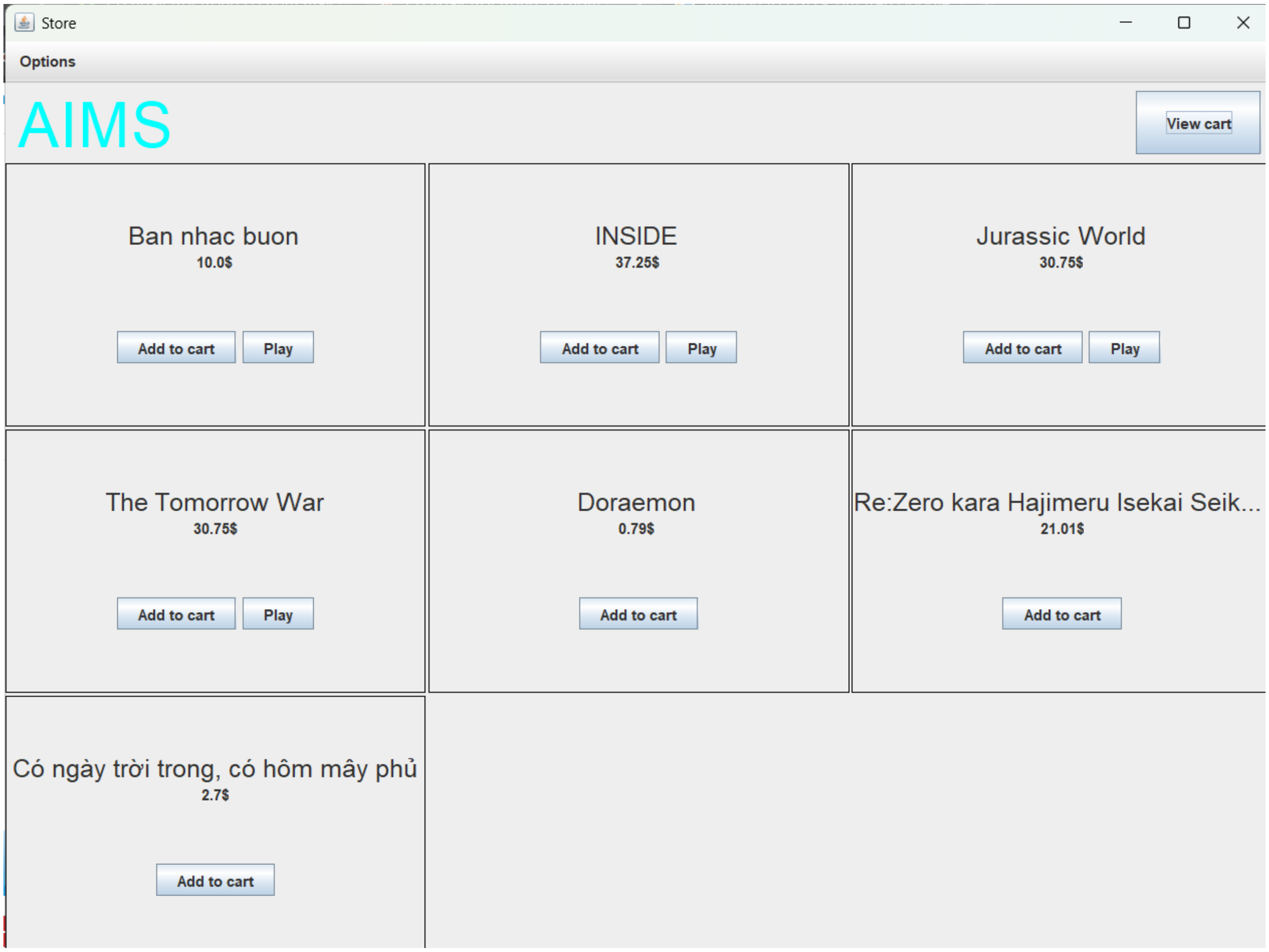
Enter title: Có ngày trời trong, có hôm mây phủ

Enter category: Light novel

Enter cost: 2.7

Enter author (If multiple authors, use commas to fill in): loundraw, Sugaru Miaki

Figure 8.2: Add book



Ban nhac buon
10.0$

INSIDE
37.25$

Jurassic World
30.75$

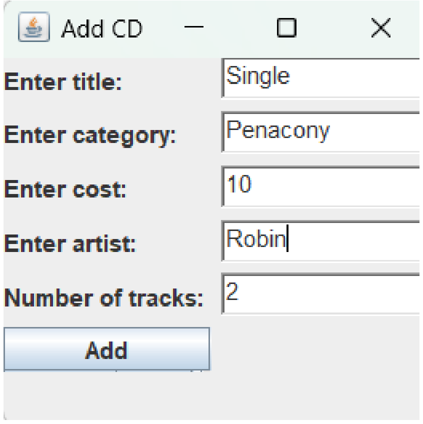
The Tomorrow War
30.75$

Doraemon
0.79$

Re:Zero kara Hajimeru Isekai Seik...
21.01$

Có ngày trời trong, có hôm mây phủ
2.7$

Figure 8.3: Store after add book



Enter title: Single
Enter category: Penacony
Enter cost: 10
Enter artist: Robin
Number of tracks: 2

Figure 8.4: Add CD

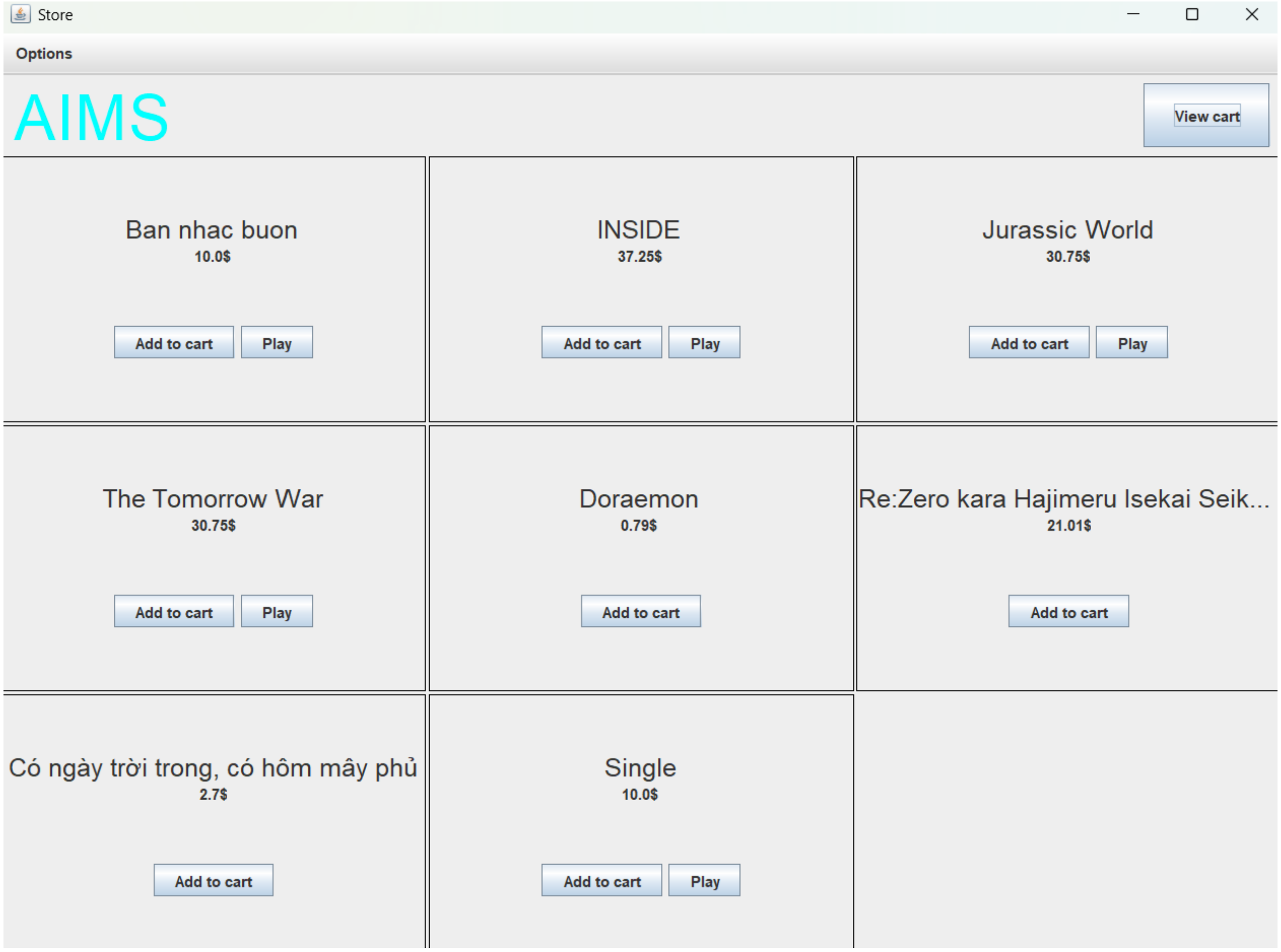
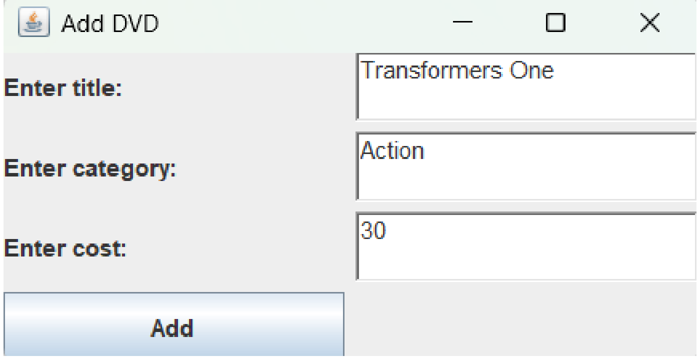
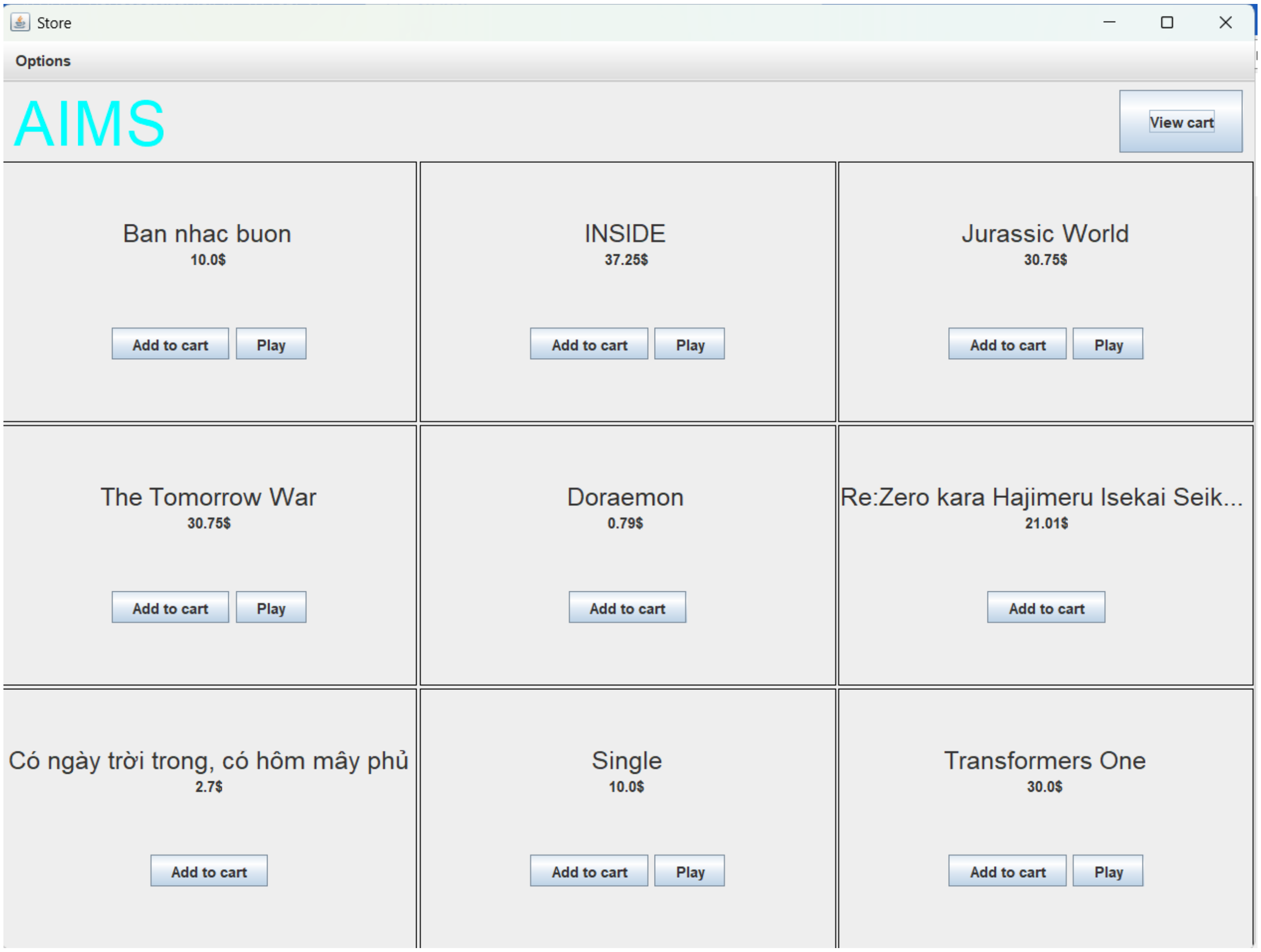


Figure 8.5: Store after add CD


Add DVD

Enter title:	Transformers One
Enter category:	Action
Enter cost:	30

Figure 8.6 Add DVD



Ban nhac buon
10.0$

INSIDE
37.25$

Jurassic World
30.75$

The Tomorrow War
30.75$

Doraemon
0.79$

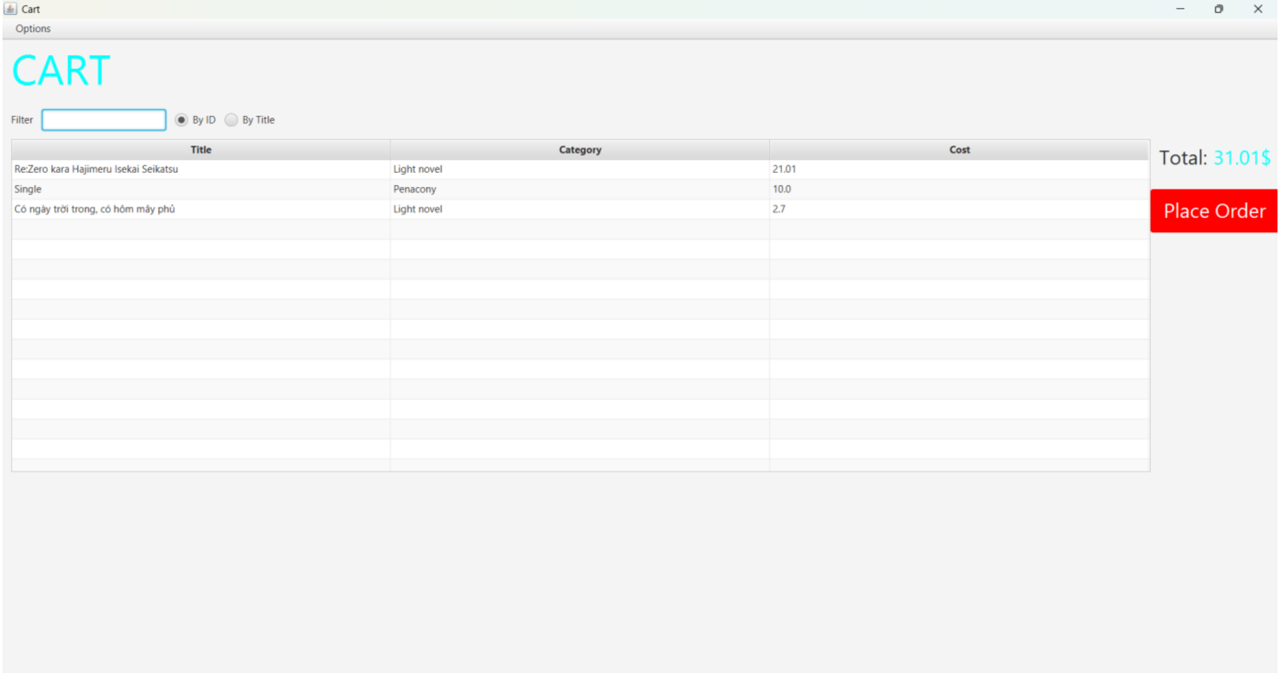
Re:Zero kara Hajimeru Isekai Seik...
21.01$

Có ngày trời trong, có hôm mây phủ
2.7$

Single
10.0$

Transformers One
30.0$

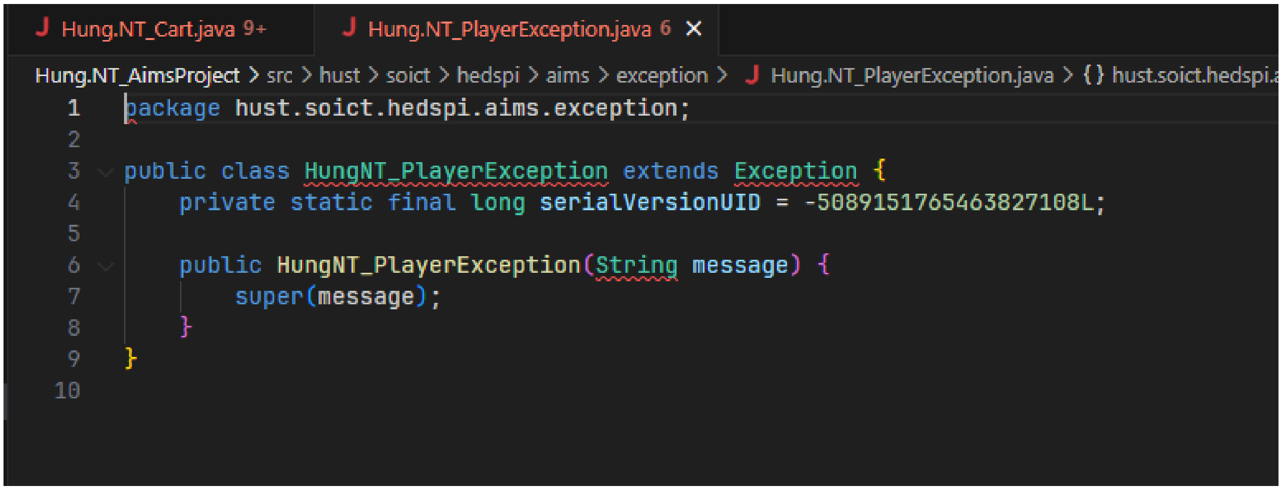
Figure 8.7: Store after add DVD



Title	Category	Cost
Re:Zero kara Hajimeru Isekai Seikatsu	Light novel	21.01
Single	Penacony	10.0
Có ngày trời trong, có hôm mây phủ	Light novel	2.7

Total: 31.01$

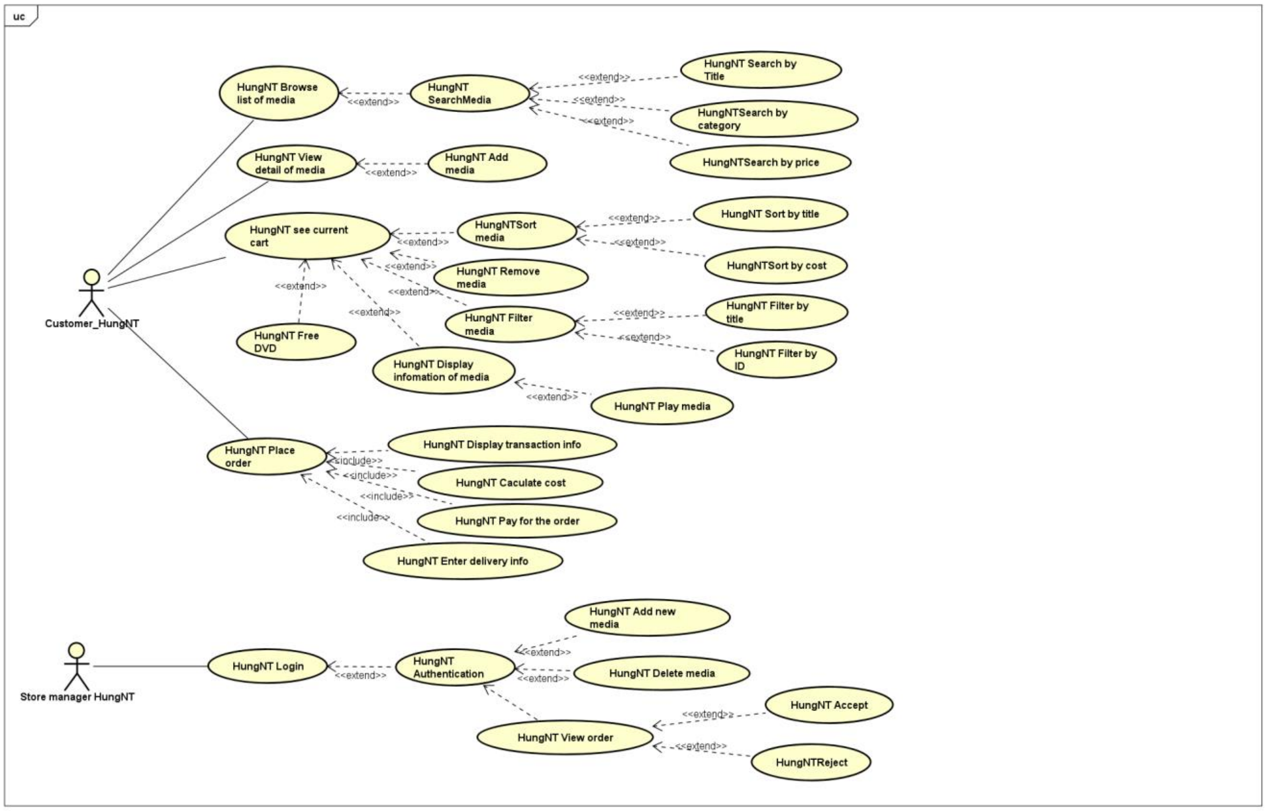
Figure 8.8: Cart


Hung.NT_Cart.java 9+
Hung.NT_PlayerException.java 6
Hung.NT_AimsProject > src > hust > soict > hedspi > aims > exception > Hung.NT_PlayerException.java > {} hust.soict.hedspi.a

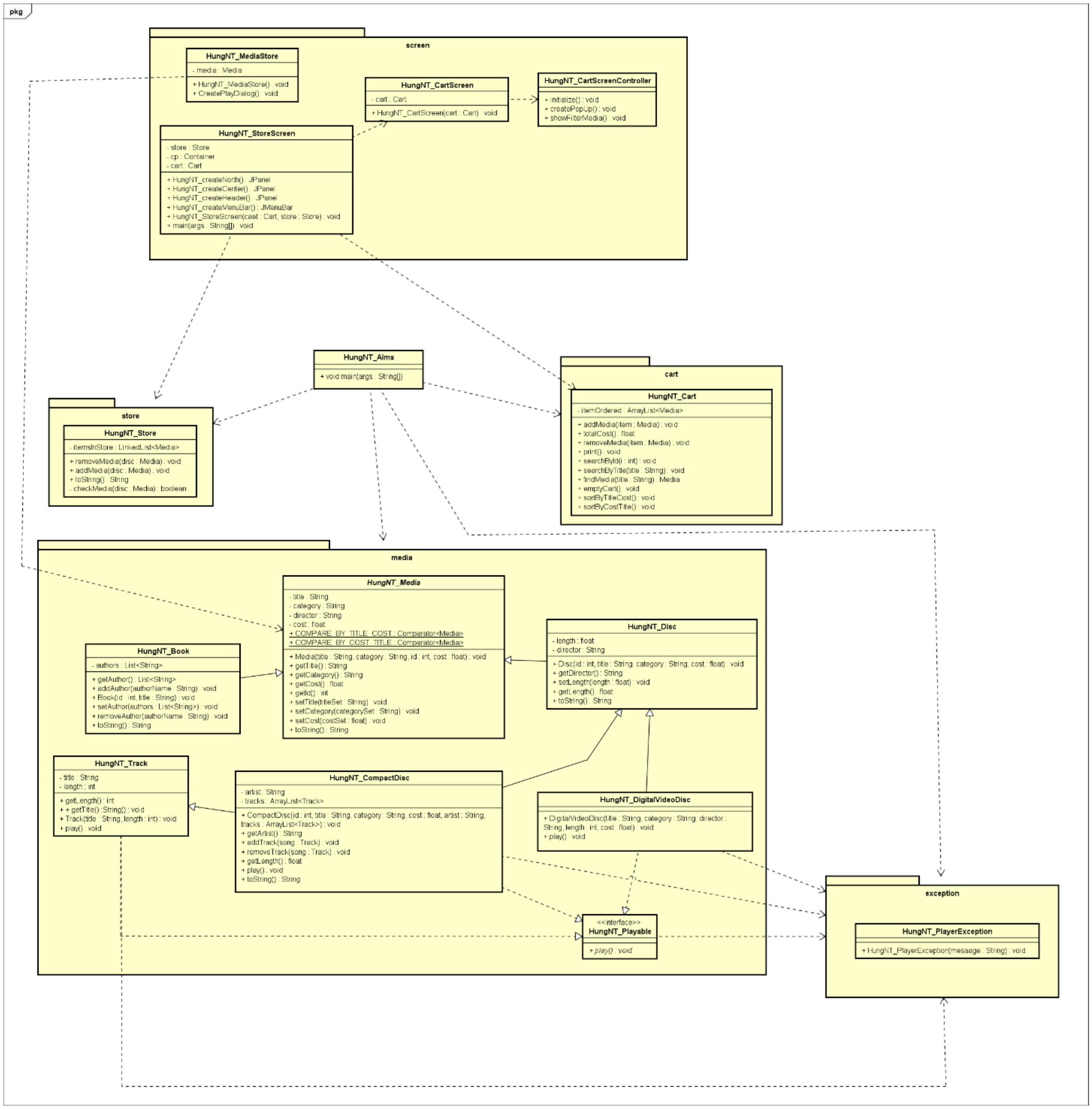
```java
package hust.soict.hedspi.aims.exception;

public class HungNT_PlayerException extends Exception {
    private static final long serialVersionUID = -5089151765463827108L;

    public HungNT_PlayerException(String message) {
        super(message);
    }
}
```

Figure 8.9: Exception

9 Use case Diagram



10 Class Diagram


pkg
screen
HungNT_MediaStore
- media : Media
+ HungNT_MediaStore() : void
+ CreatePlayDialog() : void
HungNT_CartScreen
- cart : Cart
+ HungNT_CartScreen(cart : Cart) : void
HungNT_CartScreenController
+ initialize() : void
+ createPopUp() : void
+ showFilterMedia() : void
HungNT_StoreScreen
- store : Store
- cp : Container
- cart : Cart
+ HungNT_createNorth() : JPanel
+ HungNT_createCenter() : JPanel
+ HungNT_createHeader() : JPanel
+ HungNT_createMenuBar() : JMenuBar
+ HungNT_StoreScreen(caet : Cart, store : Store) : void
+ main(args : String[]) : void
HungNT_Aims
+ void main(args : String[])
store
HungNT_Store
- itemsInStore : LinkedList<Media>
+ removeMedia(disc : Media) : void
+ addMedia(disc : Media) : void
+ toString() : String
- checkMedia(disc : Media) : boolean
cart
HungNT_Cart
- itemOrdered : ArrayList<Media>
+ addMedia(item : Media) : void
+ totalCost() : float
+ removeMedia(item : Media) : void
+ print() : void
+ searchById(i : int) : void
+ searchByTitle(title : String) : void
+ findMedia(title : String) : Media
+ emptyCart() : void
+ sortByTitleCost() : void
+ sortByCostTitle() : void
media
HungNT_Media
- title : String
- category : String
- director : String
- cost : float
+ COMPARE_BY_TITLE_COST : Comparator<Media>
+ COMPARE_BY_COST_TITLE : Comparator<Media>
+ Media(title : String, category : String, id : int, cost : float) : void
+ getTitle() : String
+ getCategory() : String
+ getCost() : float
+ getId() : int
+ setTitle(titleSet : String) : void
+ setCategory(categorySet : String) : void
+ setCost(costSet : float) : void
+ toString() : String
HungNT_Book
- authors : List<String>
+ getAuthor() : List<String>
+ addAuthor(authorName : String) : void
+ Book(id : int, title : String) : void
+ setAuthor(authors : List<String>) : void
+ removeAuthor(authorName : String) : void
+ toString() : String
HungNT_Disc
- length : float
- director : String
+ Disc(id : int, title : String, category : String, cost : float) : void
+ getDirector() : String
+ setLength(length : float) : void
+ getLength() : float
+ toString() : String
HungNT_Track
- title : String
- length : int
+ getLength() : int
+ + getTitle() :String() : void
+ Track(title : String, length : int) : void
+ play() : void
HungNT_CompactDisc
- artist : String
- tracks : ArrayList<Track>
+ CompactDisc(id : int, title : String, category : String, cost : float, artist : String, tracks : ArrayList<Track>) : void
+ getArtist() : String
+ addTrack(song : Track) : void
+ removeTrack(song : Track) : void
+ getLength() : float
+ play() : void
+ toString() : String
HungNT_DigitalVideoDisc
+ DigitalVideoDisc(title : String, category : String, director : String, length : int, cost : float) : void
+ play() : void
<<interface>>
HungNT_Playable
+ play() : void
exception
HungNT_PlayerException
+ HungNT_PlayerException(mesaage : String) : void