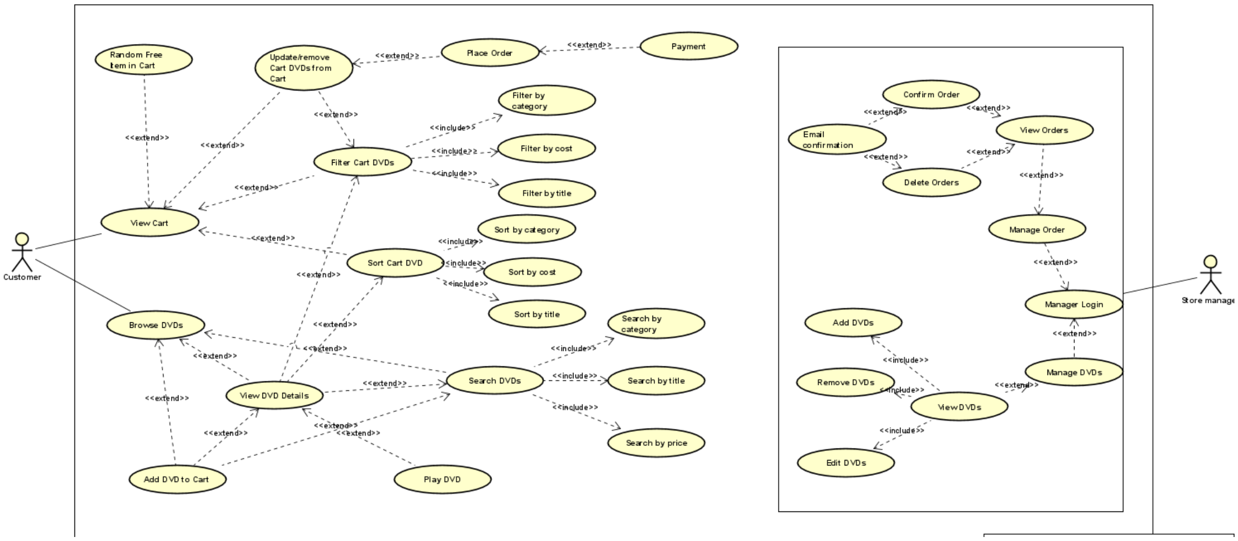
NGUYỄN KHÁNH TOÀN 235626

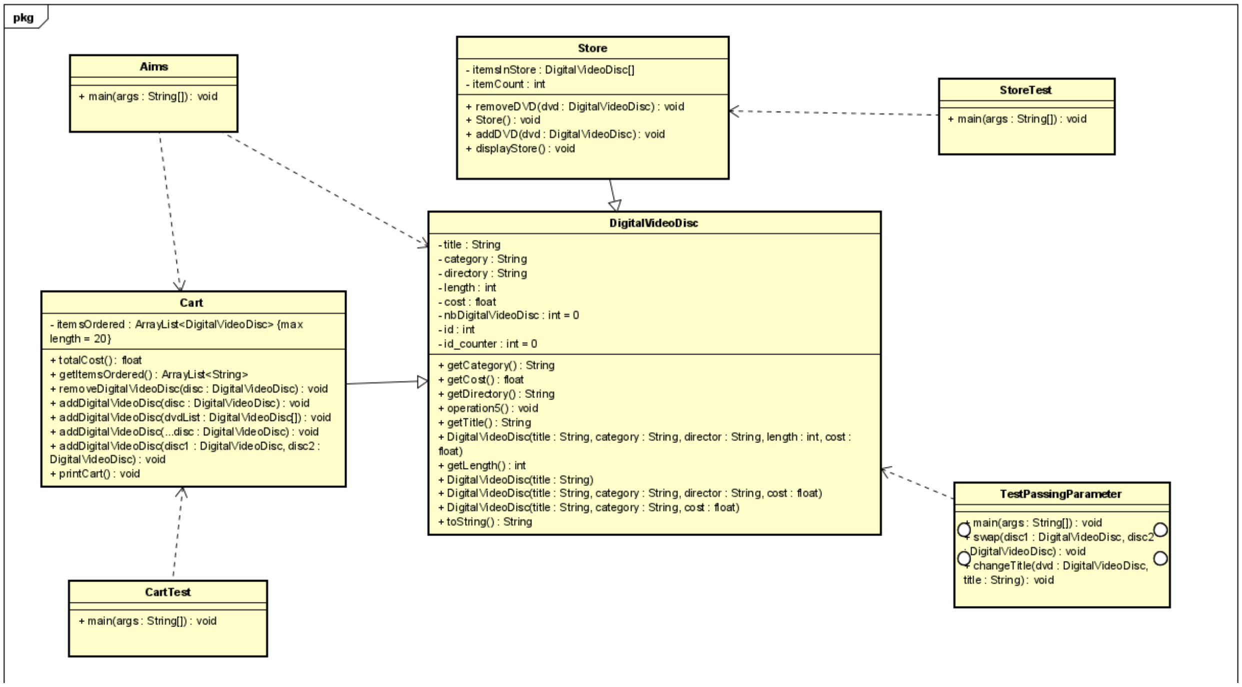
ALL the codes

UPDATE THE DIAGRAMS

USECASE:

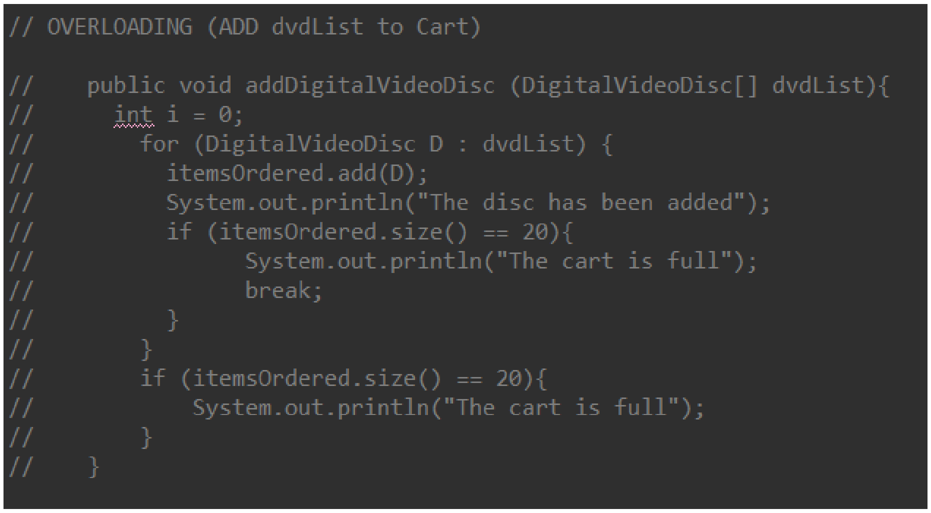


Class diagram:

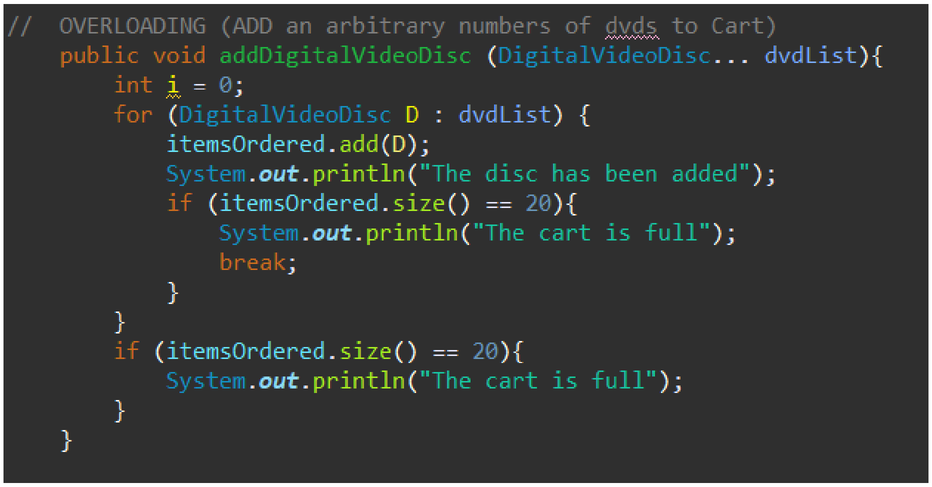

pkg
Aims
+ main(args : String[]) : void
Store
- itemsInStore : DigitalVideoDisc[]
- itemCount : int
+ removeDVD(dvd : DigitalVideoDisc) : void
+ Store() : void
+ addDVD(dvd : DigitalVideoDisc) : void
+ displayStore() : void
StoreTest
+ main(args : String[]) : void
DigitalVideoDisc
- title : String
- category : String
- directory : String
- length : int
- cost : float
- nbDigitalVideoDisc : int = 0
- id : int
- id_counter : int = 0
+ getCategory() : String
+ getCost() : float
+ getDirectory() : String
+ operation5() : void
+ getTitle() : String
+ DigitalVideoDisc(title : String, category : String, director : String, length : int, cost : float)
+ getLength() : int
+ DigitalVideoDisc(title : String)
+ DigitalVideoDisc(title : String, category : String, director : String, cost : float)
+ DigitalVideoDisc(title : String, category : String, cost : float)
+ toString() : String
Cart
- itemsOrdered : ArrayList<DigitalVideoDisc> {max length = 20}
+ totalCost() : float
+ getItemsOrdered() : ArrayList<String>
+ removeDigitalVideoDisc(disc : DigitalVideoDisc) : void
+ addDigitalVideoDisc(disc : DigitalVideoDisc) : void
+ addDigitalVideoDisc(dvdList : DigitalVideoDisc[]) : void
+ addDigitalVideoDisc(...disc : DigitalVideoDisc) : void
+ addDigitalVideoDisc(disc1 : DigitalVideoDisc, disc2 : DigitalVideoDisc) : void
+ printCart() : void
TestPassingParameter
+ main(args : String[]) : void
+ swap(disc1 : DigitalVideoDisc, disc2 : DigitalVideoDisc) : void
+ changeTitle(dvd : DigitalVideoDisc, title : String) : void
CartTest
+ main(args : String[]) : void

2. Working with overloading

2.1



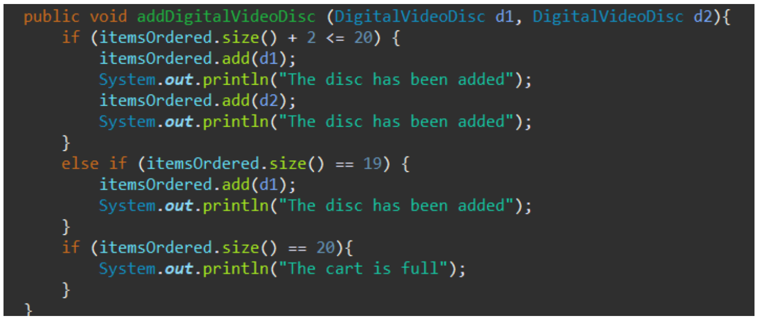
```
// OVERLOADING (ADD dvdList to Cart)

//    public void addDigitalVideoDisc (DigitalVideoDisc[] dvdList){
//      int i = 0;
//        for (DigitalVideoDisc D : dvdList) {
//          itemsOrdered.add(D);
//          System.out.println("The disc has been added");
//          if (itemsOrdered.size() == 20){
//                System.out.println("The cart is full");
//                break;
//          }
//        }
//        if (itemsOrdered.size() == 20){
//            System.out.println("The cart is full");
//        }
//    }
```



```
//  OVERLOADING (ADD an arbitrary numbers of dvds to Cart)
    public void addDigitalVideoDisc (DigitalVideoDisc... dvdList){
        int i = 0;
        for (DigitalVideoDisc D : dvdList) {
            itemsOrdered.add(D);
            System.out.println("The disc has been added");
            if (itemsOrdered.size() == 20){
                System.out.println("The cart is full");
                break;
            }
        }
        if (itemsOrdered.size() == 20){
            System.out.println("The cart is full");
        }
    }
```

- I prefer the second one as I don’t need to make a new array for the dvdList

2.2



```
    public void addDigitalVideoDisc (DigitalVideoDisc d1, DigitalVideoDisc d2){
        if (itemsOrdered.size() + 2 <= 20) {
            itemsOrdered.add(d1);
            System.out.println("The disc has been added");
            itemsOrdered.add(d2);
            System.out.println("The disc has been added");
        }
        else if (itemsOrdered.size() == 19) {
            itemsOrdered.add(d1);
            System.out.println("The disc has been added");
        }
        if (itemsOrdered.size() == 20){
            System.out.println("The cart is full");
        }
    }
```

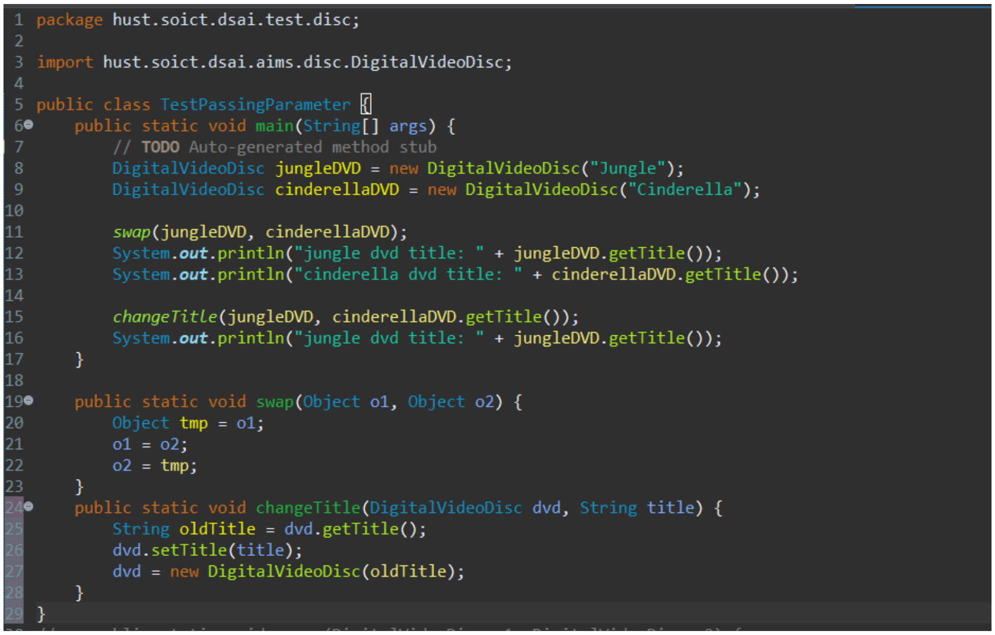
3. Passing parameter

Questions:

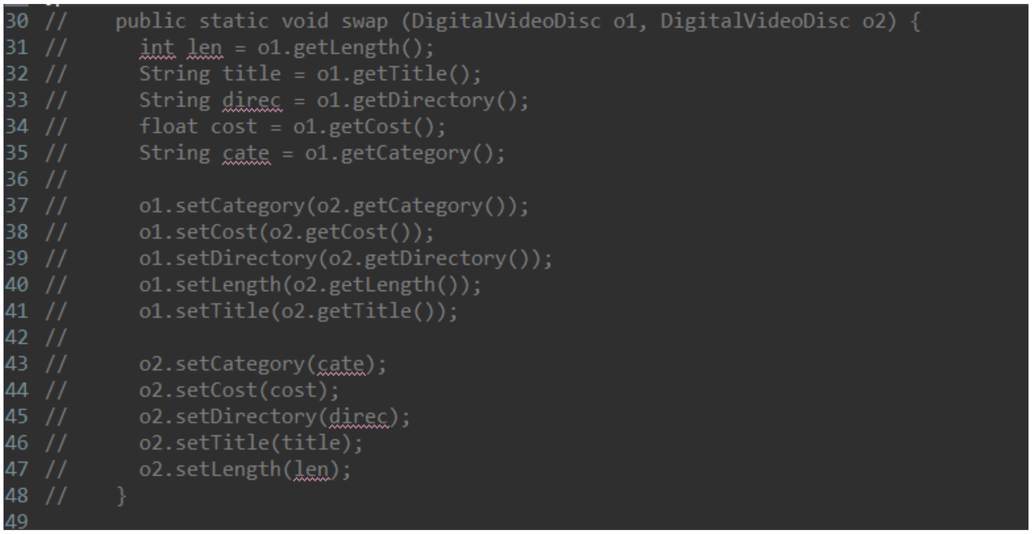
- After the call of **swap(jungleDVD, cinderellaDVD)** why does the title of these two objects still remain?
- After the call of **changeTitle(jungleDVD, cinderellaDVD.getTitle())** why is the title of the JungleDVD changed?

- BECAUSE JAVA IS A PASS BY VALUE PROGRAMMING, THEN WE DON'T CHANGE IT BY OBJECT = OBJECT

-JAVA IS A PASS BY VALUE PROGRAMMING LANGUAGE.

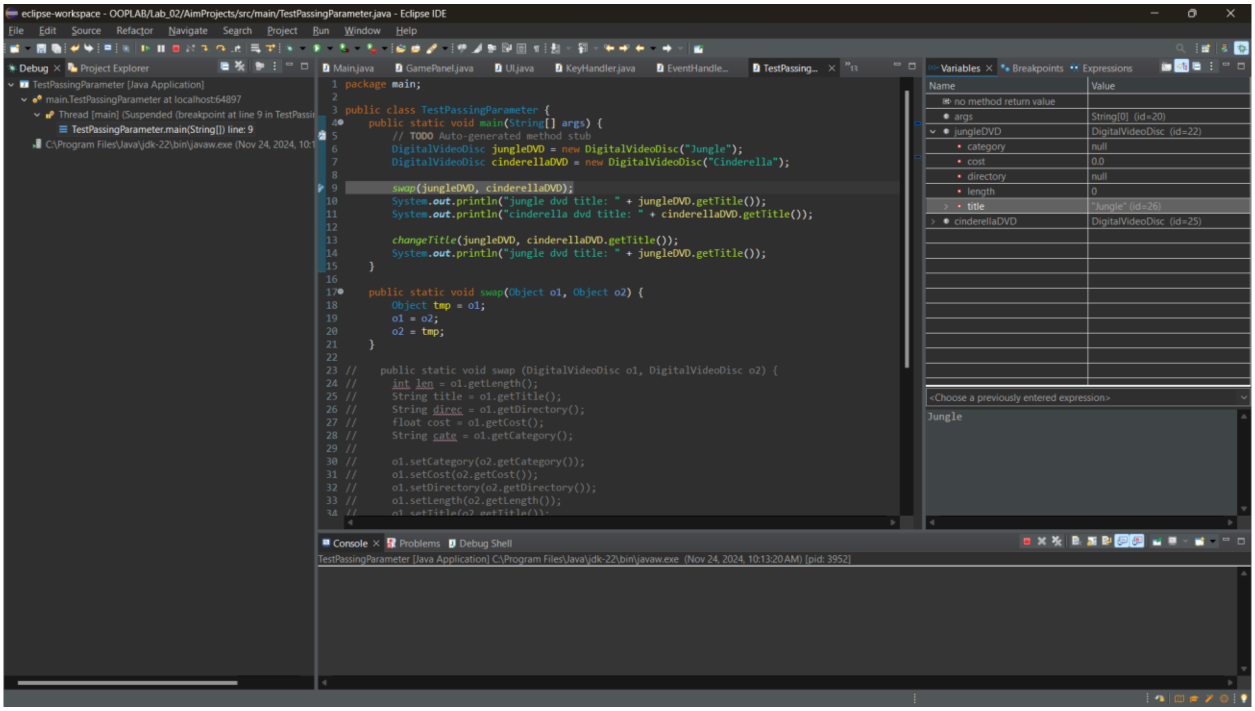


```java
package hust.soict.dsai.test.disc;

import hust.soict.dsai.aims.disc.DigitalVideoDisc;

public class TestPassingParameter {
    public static void main(String[] args) {
        // TODO Auto-generated method stub
        DigitalVideoDisc jungleDVD = new DigitalVideoDisc("Jungle");
        DigitalVideoDisc cinderellaDVD = new DigitalVideoDisc("Cinderella");

        swap(jungleDVD, cinderellaDVD);
        System.out.println("jungle dvd title: " + jungleDVD.getTitle());
        System.out.println("cinderella dvd title: " + cinderellaDVD.getTitle());

        changeTitle(jungleDVD, cinderellaDVD.getTitle());
        System.out.println("jungle dvd title: " + jungleDVD.getTitle());
    }

    public static void swap(Object o1, Object o2) {
        Object tmp = o1;
        o1 = o2;
        o2 = tmp;
    }
    public static void changeTitle(DigitalVideoDisc dvd, String title) {
        String oldTitle = dvd.getTitle();
        dvd.setTitle(title);
        dvd = new DigitalVideoDisc(oldTitle);
    }
}
```



```java
//    public static void swap (DigitalVideoDisc o1, DigitalVideoDisc o2) {
//      int len = o1.getLength();
//      String title = o1.getTitle();
//      String direc = o1.getDirectory();
//      float cost = o1.getCost();
//      String cate = o1.getCategory();
//
//      o1.setCategory(o2.getCategory());
//      o1.setCost(o2.getCost());
//      o1.setDirectory(o2.getDirectory());
//      o1.setLength(o2.getLength());
//      o1.setTitle(o2.getTitle());
//
//      o2.setCategory(cate);
//      o2.setCost(cost);
//      o2.setDirectory(direc);
//      o2.setTitle(title);
//      o2.setLength(len);
//    }
```

4. Use debug run


eclipse-workspace - OOPLAB/Lab_02/AimProjects/src/main/TestPassingParameter.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Debug
Project Explorer
Main.java
GamePanel.java
UI.java
KeyHandler.java
EventHandle...
TestPassing...
Variables
Breakpoints
Expressions
Console
Problems
Debug Shell

```
TestPassingParameter [Java Application]
  main.TestPassingParameter at localhost:64897
    Thread [main] (Suspended (breakpoint at line 9 in TestPassi
      TestPassingParameter.main(String[]) line: 9
  C:\Program Files\Java\jdk-22\bin\javaw.exe (Nov 24, 2024, 10:1
```

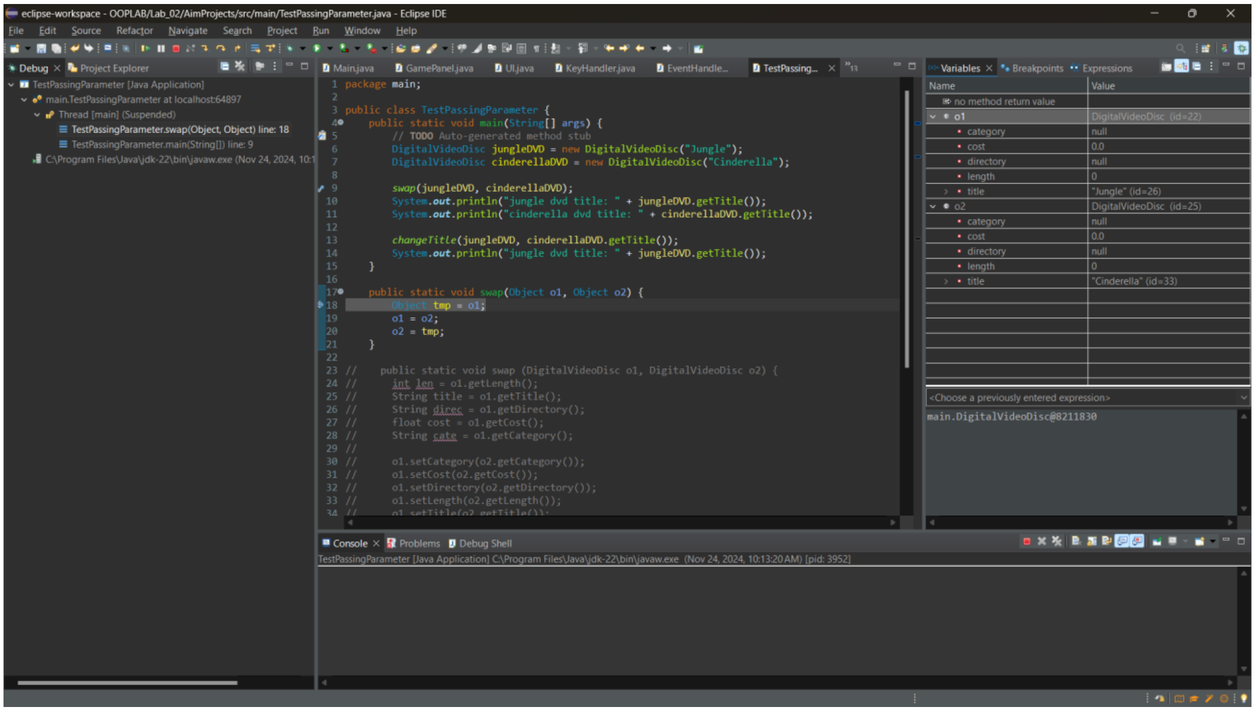
```java
package main;

public class TestPassingParameter {
    public static void main(String[] args) {
        // TODO Auto-generated method stub
        DigitalVideoDisc jungleDVD = new DigitalVideoDisc("Jungle");
        DigitalVideoDisc cinderellaDVD = new DigitalVideoDisc("Cinderella");

        swap(jungleDVD, cinderellaDVD);
        System.out.println("jungle dvd title: " + jungleDVD.getTitle());
        System.out.println("cinderella dvd title: " + cinderellaDVD.getTitle());

        changeTitle(jungleDVD, cinderellaDVD.getTitle());
        System.out.println("jungle dvd title: " + jungleDVD.getTitle());
    }

    public static void swap(Object o1, Object o2) {
        Object tmp = o1;
        o1 = o2;
        o2 = tmp;
    }

//    public static void swap (DigitalVideoDisc o1, DigitalVideoDisc o2) {
//        int len = o1.getLength();
//        String title = o1.getTitle();
//        String direc = o1.getDirectory();
//        float cost = o1.getCost();
//        String cate = o1.getCategory();
//
//        o1.setCategory(o2.getCategory());
//        o1.setCost(o2.getCost());
//        o1.setDirectory(o2.getDirectory());
//        o1.setLength(o2.getLength());
//        o1.setTitle(o2.getTitle());
```

Name	Value
no method return value	
args	String[0] (id=20)
jungleDVD	DigitalVideoDisc (id=22)
category	null
cost	0.0
directory	null
length	0
title	"Jungle" (id=26)
cinderellaDVD	DigitalVideoDisc (id=25)

<Choose a previously entered expression>

```
Jungle
```

```
TestPassingParameter [Java Application] C:\Program Files\Java\jdk-22\bin\javaw.exe  (Nov 24, 2024, 10:13:20 AM) [pid: 3952]
```


eclipse-workspace - OOPLAB/Lab_02/AimProjects/src/main/TestPassingParameter.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Debug
Project Explorer
Main.java
GamePanel.java
UI.java
KeyHandler.java
EventHandle...
TestPassing...
Variables
Breakpoints
Expressions
Console
Problems
Debug Shell

```
TestPassingParameter [Java Application]
  main.TestPassingParameter at localhost:64897
    Thread [main] (Suspended)
      TestPassingParameter.swap(Object, Object) line: 18
      TestPassingParameter.main(String[]) line: 9
  C:\Program Files\Java\jdk-22\bin\javaw.exe (Nov 24, 2024, 10:1
```

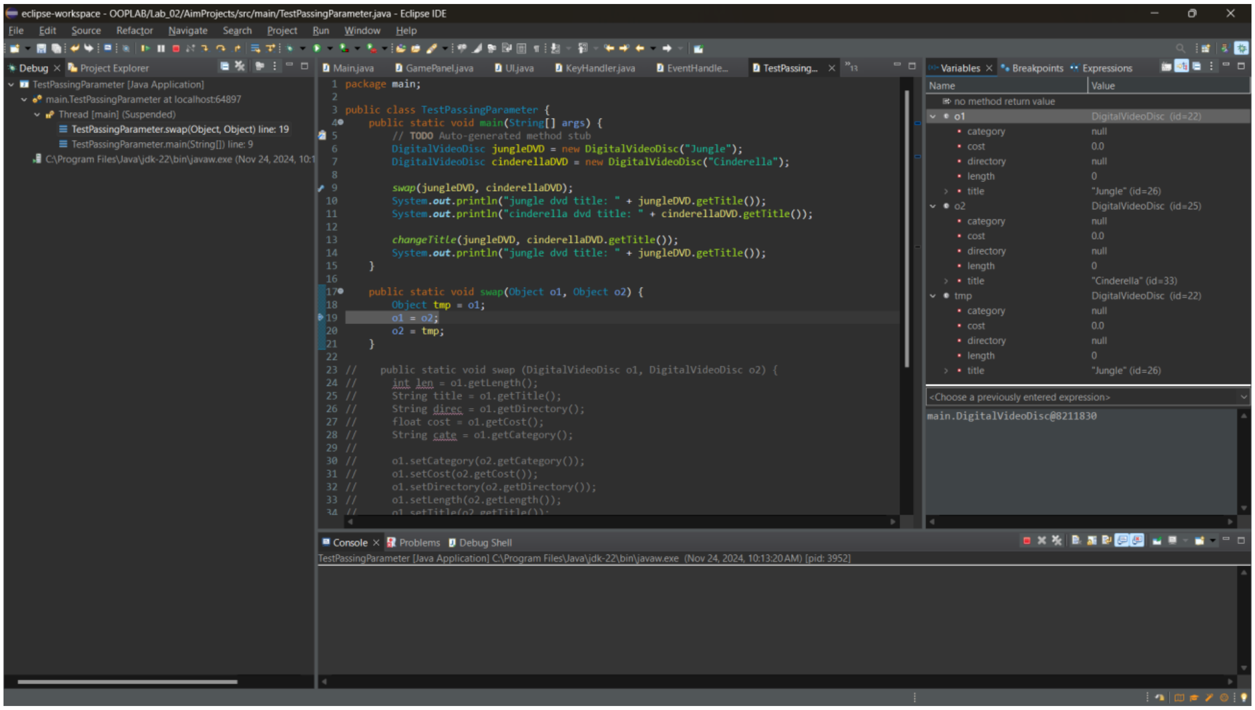
```java
package main;

public class TestPassingParameter {
    public static void main(String[] args) {
        // TODO Auto-generated method stub
        DigitalVideoDisc jungleDVD = new DigitalVideoDisc("Jungle");
        DigitalVideoDisc cinderellaDVD = new DigitalVideoDisc("Cinderella");

        swap(jungleDVD, cinderellaDVD);
        System.out.println("jungle dvd title: " + jungleDVD.getTitle());
        System.out.println("cinderella dvd title: " + cinderellaDVD.getTitle());

        changeTitle(jungleDVD, cinderellaDVD.getTitle());
        System.out.println("jungle dvd title: " + jungleDVD.getTitle());
    }

    public static void swap(Object o1, Object o2) {
        Object tmp = o1;
        o1 = o2;
        o2 = tmp;
    }

//    public static void swap (DigitalVideoDisc o1, DigitalVideoDisc o2) {
//        int len = o1.getLength();
//        String title = o1.getTitle();
//        String direc = o1.getDirectory();
//        float cost = o1.getCost();
//        String cate = o1.getCategory();
//
//        o1.setCategory(o2.getCategory());
//        o1.setCost(o2.getCost());
//        o1.setDirectory(o2.getDirectory());
//        o1.setLength(o2.getLength());
//        o1.setTitle(o2.getTitle());
```

Name	Value
no method return value	
o1	DigitalVideoDisc (id=22)
category	null
cost	0.0
directory	null
length	0
title	"Jungle" (id=26)
o2	DigitalVideoDisc (id=25)
category	null
cost	0.0
directory	null
length	0
title	"Cinderella" (id=33)

<Choose a previously entered expression>

```
main.DigitalVideoDisc@8211830
```

```
TestPassingParameter [Java Application] C:\Program Files\Java\jdk-22\bin\javaw.exe  (Nov 24, 2024, 10:13:20 AM) [pid: 3952]
```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File Edit Source Refactor Navigate Search Project Run Window Help
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```
TestPassingParameter [Java Application]
  main.TestPassingParameter at localhost:64897
    Thread [main] (Suspended)
      TestPassingParameter.swap(Object, Object) line: 19
      TestPassingParameter.main(String[]) line: 9
  C:\Program Files\Java\jdk-22\bin\javaw.exe (Nov 24, 2024, 10:1
```

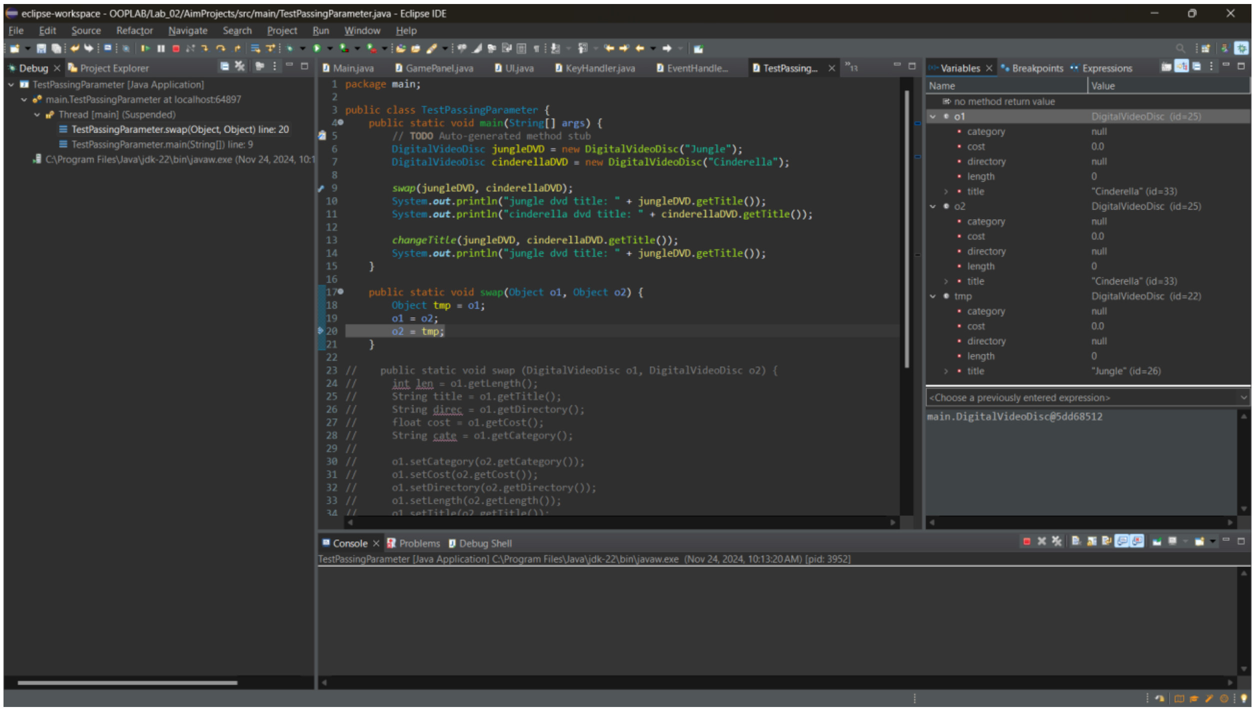
```java
package main;

public class TestPassingParameter {
    public static void main(String[] args) {
        // TODO Auto-generated method stub
        DigitalVideoDisc jungleDVD = new DigitalVideoDisc("Jungle");
        DigitalVideoDisc cinderellaDVD = new DigitalVideoDisc("Cinderella");

        swap(jungleDVD, cinderellaDVD);
        System.out.println("jungle dvd title: " + jungleDVD.getTitle());
        System.out.println("cinderella dvd title: " + cinderellaDVD.getTitle());

        changeTitle(jungleDVD, cinderellaDVD.getTitle());
        System.out.println("jungle dvd title: " + jungleDVD.getTitle());
    }

    public static void swap(Object o1, Object o2) {
        Object tmp = o1;
        o1 = o2;
        o2 = tmp;
    }

//    public static void swap (DigitalVideoDisc o1, DigitalVideoDisc o2) {
//        int len = o1.getLength();
//        String title = o1.getTitle();
//        String direc = o1.getDirectory();
//        float cost = o1.getCost();
//        String cate = o1.getCategory();
//
//        o1.setCategory(o2.getCategory());
//        o1.setCost(o2.getCost());
//        o1.setDirectory(o2.getDirectory());
//        o1.setLength(o2.getLength());
//        o1.setTitle(o2.getTitle());
```

Name	Value
no method return value	
o1	DigitalVideoDisc (id=22)
category	null
cost	0.0
directory	null
length	0
title	"Jungle" (id=26)
o2	DigitalVideoDisc (id=25)
category	null
cost	0.0
directory	null
length	0
title	"Cinderella" (id=33)
tmp	DigitalVideoDisc (id=22)
category	null
cost	0.0
directory	null
length	0
title	"Jungle" (id=26)

<Choose a previously entered expression>

```
main.DigitalVideoDisc@8211830
```

```
TestPassingParameter [Java Application] C:\Program Files\Java\jdk-22\bin\javaw.exe  (Nov 24, 2024, 10:13:20 AM) [pid: 3952]
```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```
TestPassingParameter [Java Application]
  main.TestPassingParameter at localhost:64897
    Thread [main] (Suspended)
      TestPassingParameter.swap(Object, Object) line: 20
      TestPassingParameter.main(String[]) line: 9
  C:\Program Files\Java\jdk-22\bin\javaw.exe (Nov 24, 2024, 10:1
```

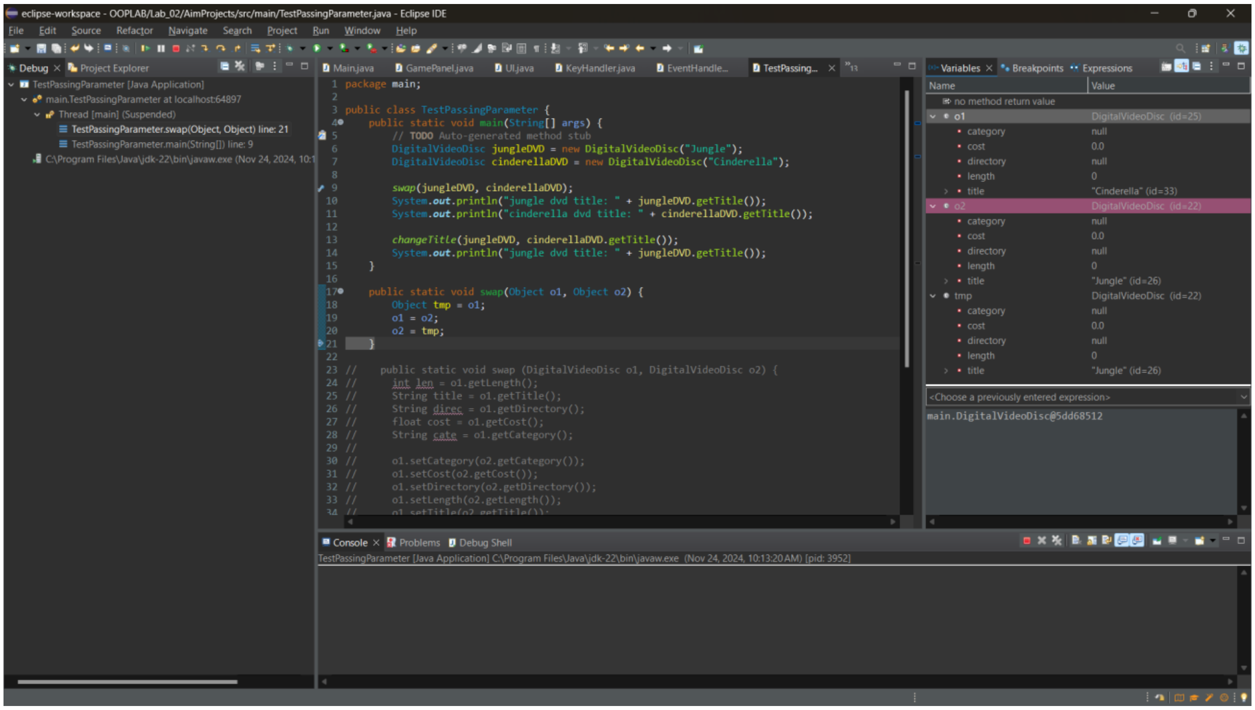
```java
package main;

public class TestPassingParameter {
    public static void main(String[] args) {
        // TODO Auto-generated method stub
        DigitalVideoDisc jungleDVD = new DigitalVideoDisc("Jungle");
        DigitalVideoDisc cinderellaDVD = new DigitalVideoDisc("Cinderella");

        swap(jungleDVD, cinderellaDVD);
        System.out.println("jungle dvd title: " + jungleDVD.getTitle());
        System.out.println("cinderella dvd title: " + cinderellaDVD.getTitle());

        changeTitle(jungleDVD, cinderellaDVD.getTitle());
        System.out.println("jungle dvd title: " + jungleDVD.getTitle());
    }

    public static void swap(Object o1, Object o2) {
        Object tmp = o1;
        o1 = o2;
        o2 = tmp;
    }

//    public static void swap (DigitalVideoDisc o1, DigitalVideoDisc o2) {
//        int len = o1.getLength();
//        String title = o1.getTitle();
//        String direc = o1.getDirectory();
//        float cost = o1.getCost();
//        String cate = o1.getCategory();
//
//        o1.setCategory(o2.getCategory());
//        o1.setCost(o2.getCost());
//        o1.setDirectory(o2.getDirectory());
//        o1.setLength(o2.getLength());
//        o1.setTitle(o2.getTitle());
```

Name	Value
no method return value	
o1	DigitalVideoDisc (id=25)
category	null
cost	0.0
directory	null
length	0
title	"Cinderella" (id=33)
o2	DigitalVideoDisc (id=25)
category	null
cost	0.0
directory	null
length	0
title	"Cinderella" (id=33)
tmp	DigitalVideoDisc (id=22)
category	null
cost	0.0
directory	null
length	0
title	"Jungle" (id=26)

<Choose a previously entered expression>

```
main.DigitalVideoDisc@5dd68512
```

```
TestPassingParameter [Java Application] C:\Program Files\Java\jdk-22\bin\javaw.exe  (Nov 24, 2024, 10:13:20 AM) [pid: 3952]
```



eclipse-workspace - OOPLAB/Lab_02/AimProjects/src/main/TestPassingParameter.java - Eclipse IDE

```
TestPassingParameter [Java Application]
  main.TestPassingParameter at localhost:64897
    Thread [main] (Suspended)
      TestPassingParameter.swap(Object, Object) line: 21
      TestPassingParameter.main(String[]) line: 9
  C:\Program Files\Java\jdk-22\bin\javaw.exe (Nov 24, 2024, 10:1
```

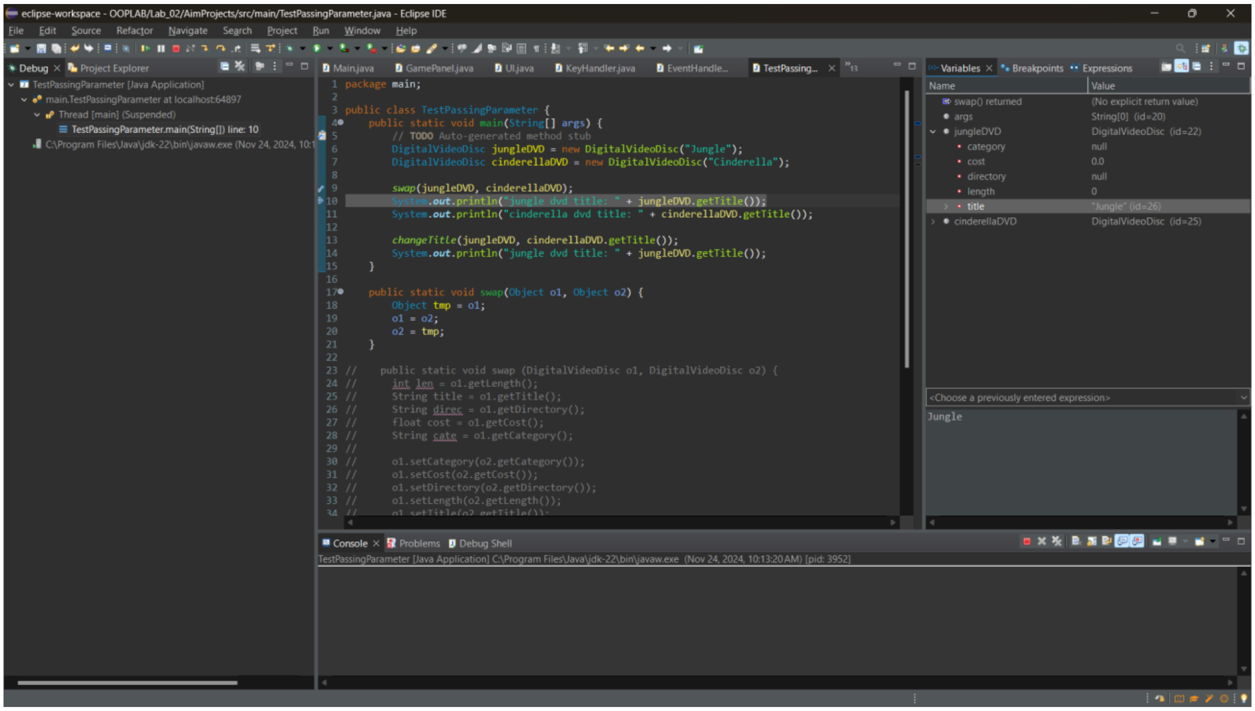
```java
package main;

public class TestPassingParameter {
    public static void main(String[] args) {
        // TODO Auto-generated method stub
        DigitalVideoDisc jungleDVD = new DigitalVideoDisc("Jungle");
        DigitalVideoDisc cinderellaDVD = new DigitalVideoDisc("Cinderella");

        swap(jungleDVD, cinderellaDVD);
        System.out.println("jungle dvd title: " + jungleDVD.getTitle());
        System.out.println("cinderella dvd title: " + cinderellaDVD.getTitle());

        changeTitle(jungleDVD, cinderellaDVD.getTitle());
        System.out.println("jungle dvd title: " + jungleDVD.getTitle());
    }

    public static void swap(Object o1, Object o2) {
        Object tmp = o1;
        o1 = o2;
        o2 = tmp;
    }

//    public static void swap (DigitalVideoDisc o1, DigitalVideoDisc o2) {
//        int len = o1.getLength();
//        String title = o1.getTitle();
//        String direc = o1.getDirectory();
//        float cost = o1.getCost();
//        String cate = o1.getCategory();
//
//        o1.setCategory(o2.getCategory());
//        o1.setCost(o2.getCost());
//        o1.setDirectory(o2.getDirectory());
//        o1.setLength(o2.getLength());
//        o1.setTitle(o2.getTitle());
```

```
Name                        Value
  no method return value
o1                          DigitalVideoDisc  (id=25)
    category                null
    cost                    0.0
    directory               null
    length                  0
    title                   "Cinderella" (id=33)
o2                          DigitalVideoDisc  (id=22)
    category                null
    cost                    0.0
    directory               null
    length                  0
    title                   "Jungle" (id=26)
tmp                         DigitalVideoDisc  (id=22)
    category                null
    cost                    0.0
    directory               null
    length                  0
    title                   "Jungle" (id=26)
```

<Choose a previously entered expression>

```
main.DigitalVideoDisc@5dd68512
```

TestPassingParameter [Java Application] C:\Program Files\Java\jdk-22\bin\javaw.exe (Nov 24, 2024, 10:13:20 AM) [pid: 3952]



eclipse-workspace - OOPLAB/Lab_02/AimProjects/src/main/TestPassingParameter.java - Eclipse IDE

```
TestPassingParameter [Java Application]
  main.TestPassingParameter at localhost:64897
    Thread [main] (Suspended)
      TestPassingParameter.main(String[]) line: 10
  C:\Program Files\Java\jdk-22\bin\javaw.exe (Nov 24, 2024, 10:1
```

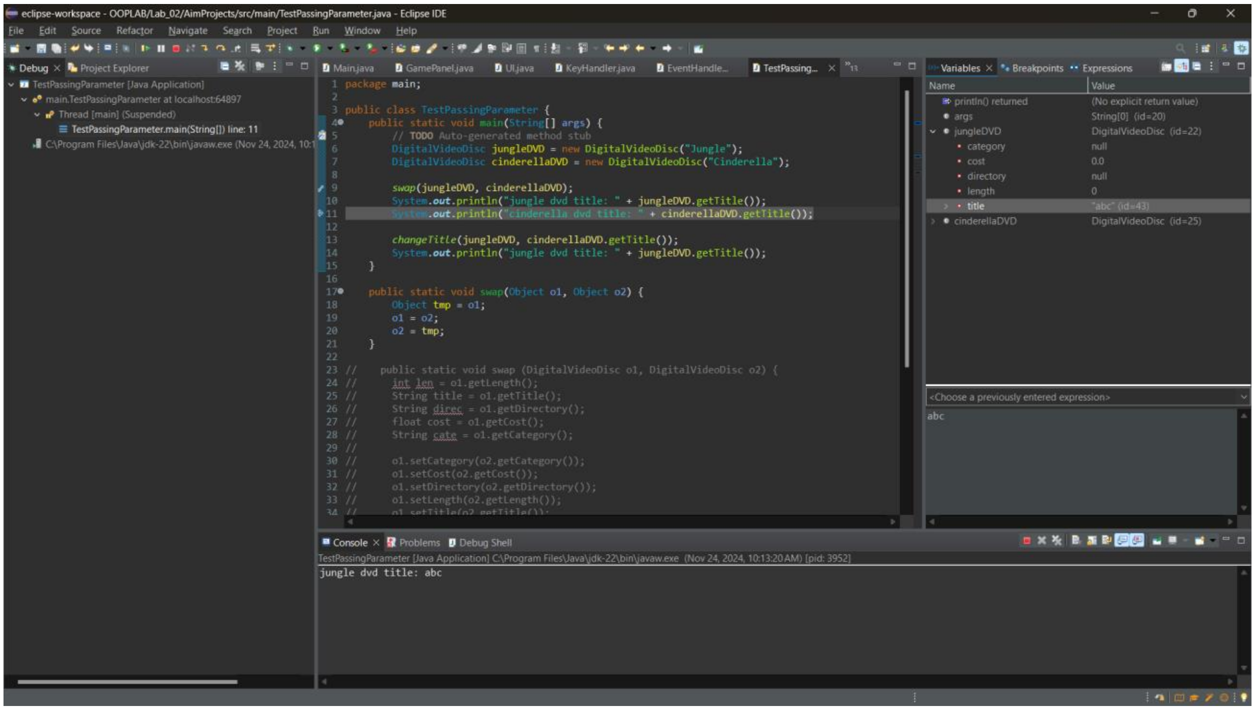
```java
package main;

public class TestPassingParameter {
    public static void main(String[] args) {
        // TODO Auto-generated method stub
        DigitalVideoDisc jungleDVD = new DigitalVideoDisc("Jungle");
        DigitalVideoDisc cinderellaDVD = new DigitalVideoDisc("Cinderella");

        swap(jungleDVD, cinderellaDVD);
        System.out.println("jungle dvd title: " + jungleDVD.getTitle());
        System.out.println("cinderella dvd title: " + cinderellaDVD.getTitle());

        changeTitle(jungleDVD, cinderellaDVD.getTitle());
        System.out.println("jungle dvd title: " + jungleDVD.getTitle());
    }

    public static void swap(Object o1, Object o2) {
        Object tmp = o1;
        o1 = o2;
        o2 = tmp;
    }

//    public static void swap (DigitalVideoDisc o1, DigitalVideoDisc o2) {
//        int len = o1.getLength();
//        String title = o1.getTitle();
//        String direc = o1.getDirectory();
//        float cost = o1.getCost();
//        String cate = o1.getCategory();
//
//        o1.setCategory(o2.getCategory());
//        o1.setCost(o2.getCost());
//        o1.setDirectory(o2.getDirectory());
//        o1.setLength(o2.getLength());
//        o1.setTitle(o2.getTitle());
```

```
Name                        Value
  swap() returned           (No explicit return value)
  args                      String[0]  (id=20)
jungleDVD                   DigitalVideoDisc  (id=22)
    category                null
    cost                    0.0
    directory               null
    length                  0
    title                   "Jungle" (id=26)
cinderellaDVD               DigitalVideoDisc  (id=25)
```

<Choose a previously entered expression>

```
Jungle
```

TestPassingParameter [Java Application] C:\Program Files\Java\jdk-22\bin\javaw.exe (Nov 24, 2024, 10:13:20 AM) [pid: 3952]



eclipse-workspace - OOPLAB/Lab_02/AimProjects/src/main/TestPassingParameter.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Debug
Project Explorer
Main.java
GamePanel.java
UI.java
KeyHandler.java
EventHandle...
TestPassing...
Variables
Breakpoints
Expressions
Console
Problems
Debug Shell

```
TestPassingParameter [Java Application]
  main.TestPassingParameter at localhost:64897
    Thread [main] (Suspended)
      TestPassingParameter.main(String[]) line: 11
  C:\Program Files\Java\jdk-22\bin\javaw.exe (Nov 24, 2024, 10:1
```

```java
package main;

public class TestPassingParameter {
    public static void main(String[] args) {
        // TODO Auto-generated method stub
        DigitalVideoDisc jungleDVD = new DigitalVideoDisc("Jungle");
        DigitalVideoDisc cinderellaDVD = new DigitalVideoDisc("Cinderella");

        swap(jungleDVD, cinderellaDVD);
        System.out.println("jungle dvd title: " + jungleDVD.getTitle());
        System.out.println("cinderella dvd title: " + cinderellaDVD.getTitle());

        changeTitle(jungleDVD, cinderellaDVD.getTitle());
        System.out.println("jungle dvd title: " + jungleDVD.getTitle());
    }

    public static void swap(Object o1, Object o2) {
        Object tmp = o1;
        o1 = o2;
        o2 = tmp;
    }

//    public static void swap (DigitalVideoDisc o1, DigitalVideoDisc o2) {
//      int len = o1.getLength();
//      String title = o1.getTitle();
//      String direc = o1.getDirectory();
//      float cost = o1.getCost();
//      String cate = o1.getCategory();
//
//      o1.setCategory(o2.getCategory());
//      o1.setCost(o2.getCost());
//      o1.setDirectory(o2.getDirectory());
//      o1.setLength(o2.getLength());
//      o1.setTitle(o2.getTitle());
```

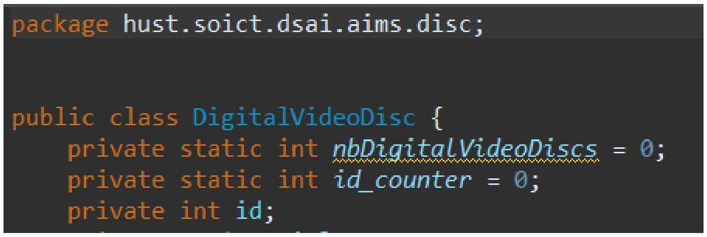
Name	Value
println() returned	(No explicit return value)
args	String[0] (id=20)
jungleDVD	DigitalVideoDisc (id=22)
category	null
cost	0.0
directory	null
length	0
title	"abc" (id=43)
cinderellaDVD	DigitalVideoDisc (id=25)

<Choose a previously entered expression>

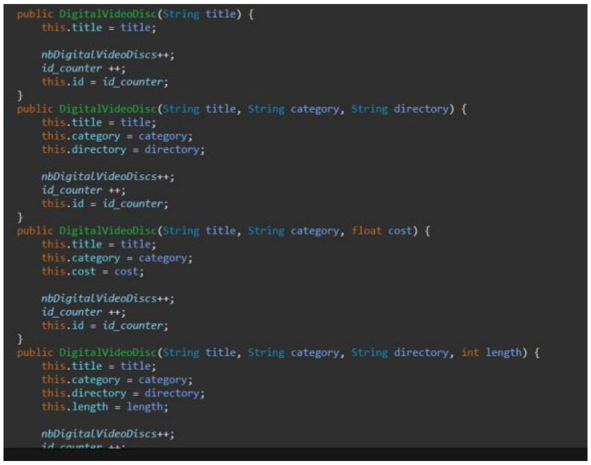
abc

```
TestPassingParameter [Java Application] C:\Program Files\Java\jdk-22\bin\javaw.exe  (Nov 24, 2024, 10:13:20 AM) [pid: 3952]
jungle dvd title: abc
```

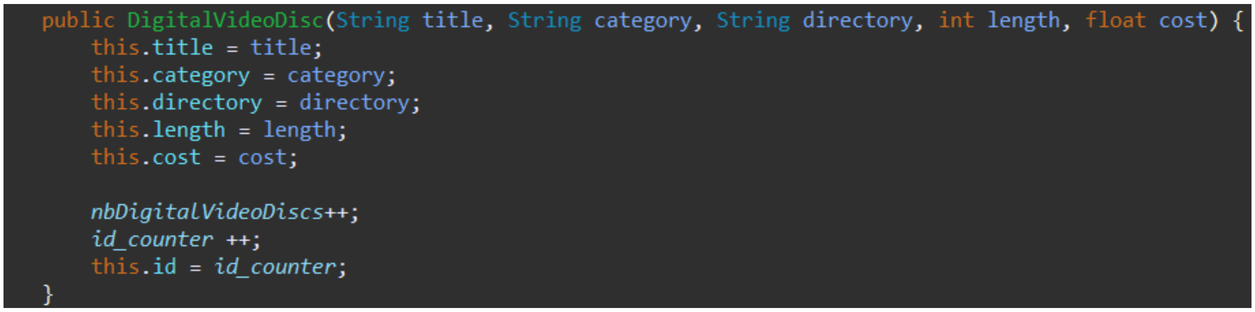
5. Classifier Member and Instance Member



```java
package hust.soict.dsai.aims.disc;


public class DigitalVideoDisc {
    private static int nbDigitalVideoDiscs = 0;
    private static int id_counter = 0;
    private int id;
```

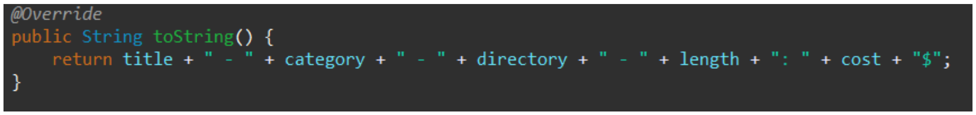


```java
public DigitalVideoDisc(String title) {
    this.title = title;

    nbDigitalVideoDiscs++;
    id_counter ++;
    this.id = id_counter;
}
public DigitalVideoDisc(String title, String category, String directory) {
    this.title = title;
    this.category = category;
    this.directory = directory;

    nbDigitalVideoDiscs++;
    id_counter ++;
    this.id = id_counter;
}
public DigitalVideoDisc(String title, String category, float cost) {
    this.title = title;
    this.category = category;
    this.cost = cost;

    nbDigitalVideoDiscs++;
    id_counter ++;
    this.id = id_counter;
}
public DigitalVideoDisc(String title, String category, String directory, int length) {
    this.title = title;
    this.category = category;
    this.directory = directory;
    this.length = length;

    nbDigitalVideoDiscs++;
    id_counter ++;
```

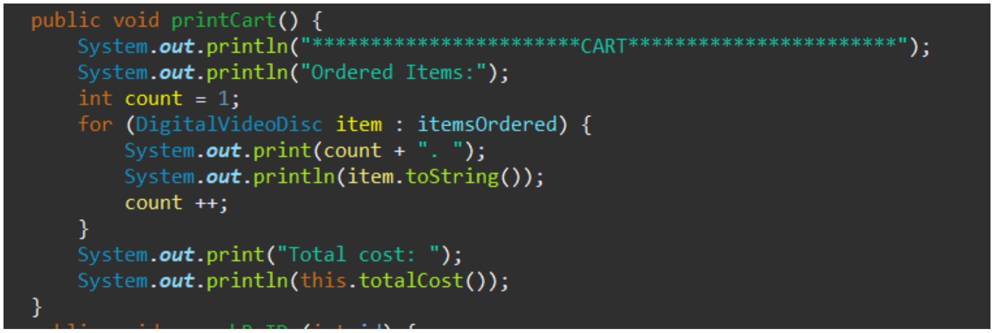


```java
public DigitalVideoDisc(String title, String category, String directory, int length, float cost) {
    this.title = title;
    this.category = category;
    this.directory = directory;
    this.length = length;
    this.cost = cost;

    nbDigitalVideoDiscs++;
    id_counter ++;
    this.id = id_counter;
}
```

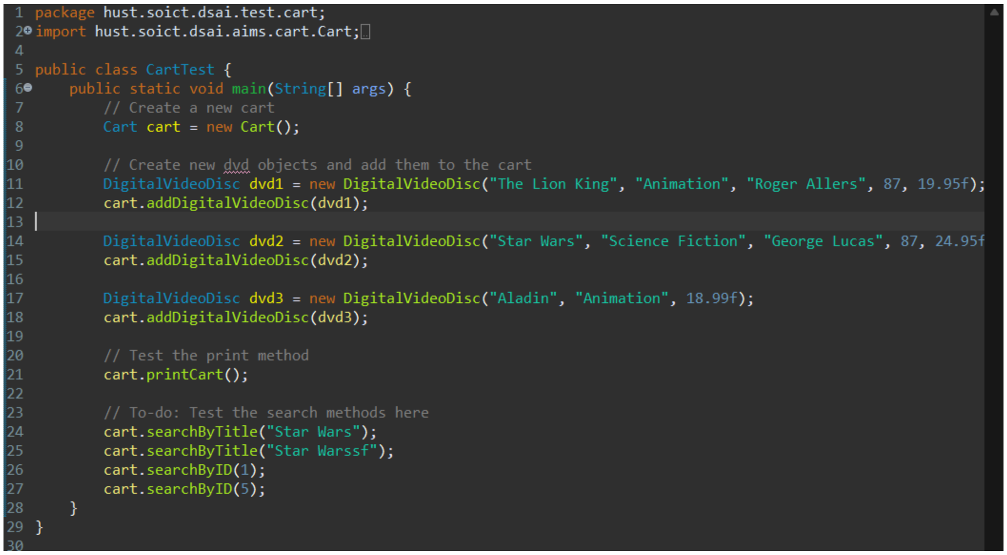
6. Open the Cart Class



```java
@Override
public String toString() {
    return title + " - " + category + " - " + directory + " - " + length + ": " + cost + "$";
}
```



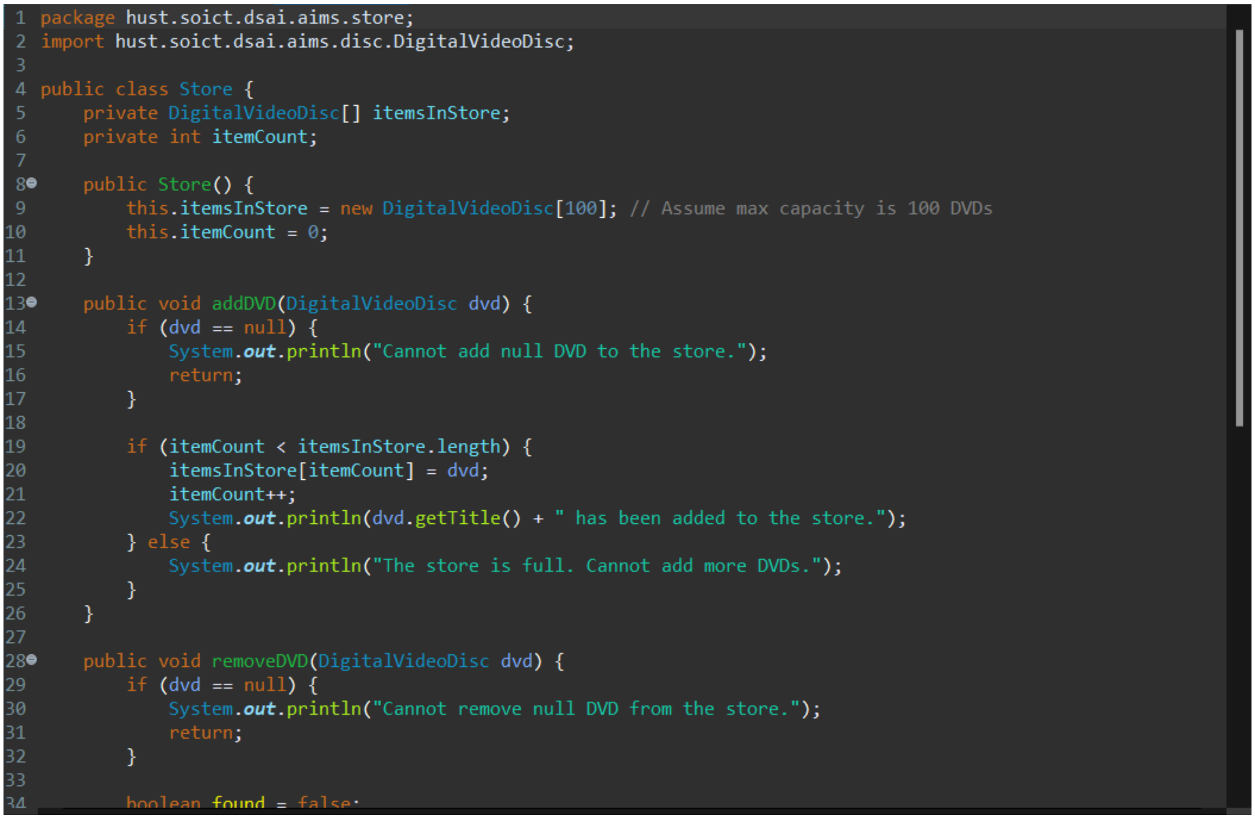
```java
public void printCart() {
    System.out.println("***********************CART***********************");
    System.out.println("Ordered Items:");
    int count = 1;
    for (DigitalVideoDisc item : itemsOrdered) {
        System.out.print(count + ". ");
        System.out.println(item.toString());
        count ++;
    }
    System.out.print("Total cost: ");
    System.out.println(this.totalCost());
}
```



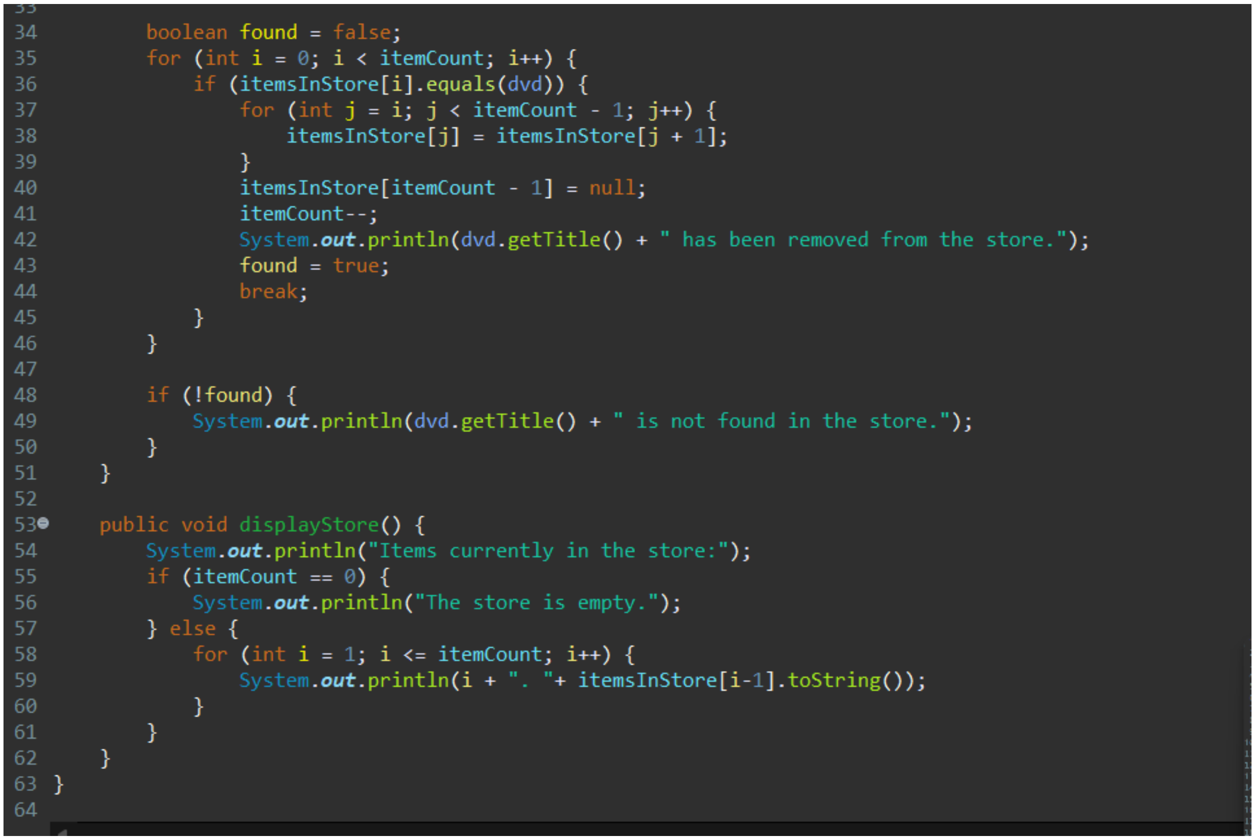
```java
package hust.soict.dsai.test.cart;
import hust.soict.dsai.aims.cart.Cart;

public class CartTest {
    public static void main(String[] args) {
        // Create a new cart
        Cart cart = new Cart();

        // Create new dvd objects and add them to the cart
        DigitalVideoDisc dvd1 = new DigitalVideoDisc("The Lion King", "Animation", "Roger Allers", 87, 19.95f);
        cart.addDigitalVideoDisc(dvd1);

        DigitalVideoDisc dvd2 = new DigitalVideoDisc("Star Wars", "Science Fiction", "George Lucas", 87, 24.95f
        cart.addDigitalVideoDisc(dvd2);

        DigitalVideoDisc dvd3 = new DigitalVideoDisc("Aladin", "Animation", 18.99f);
        cart.addDigitalVideoDisc(dvd3);

        // Test the print method
        cart.printCart();

        // To-do: Test the search methods here
        cart.searchByTitle("Star Wars");
        cart.searchByTitle("Star Warssf");
        cart.searchByID(1);
        cart.searchByID(5);
    }
}
```

- toString() returns String

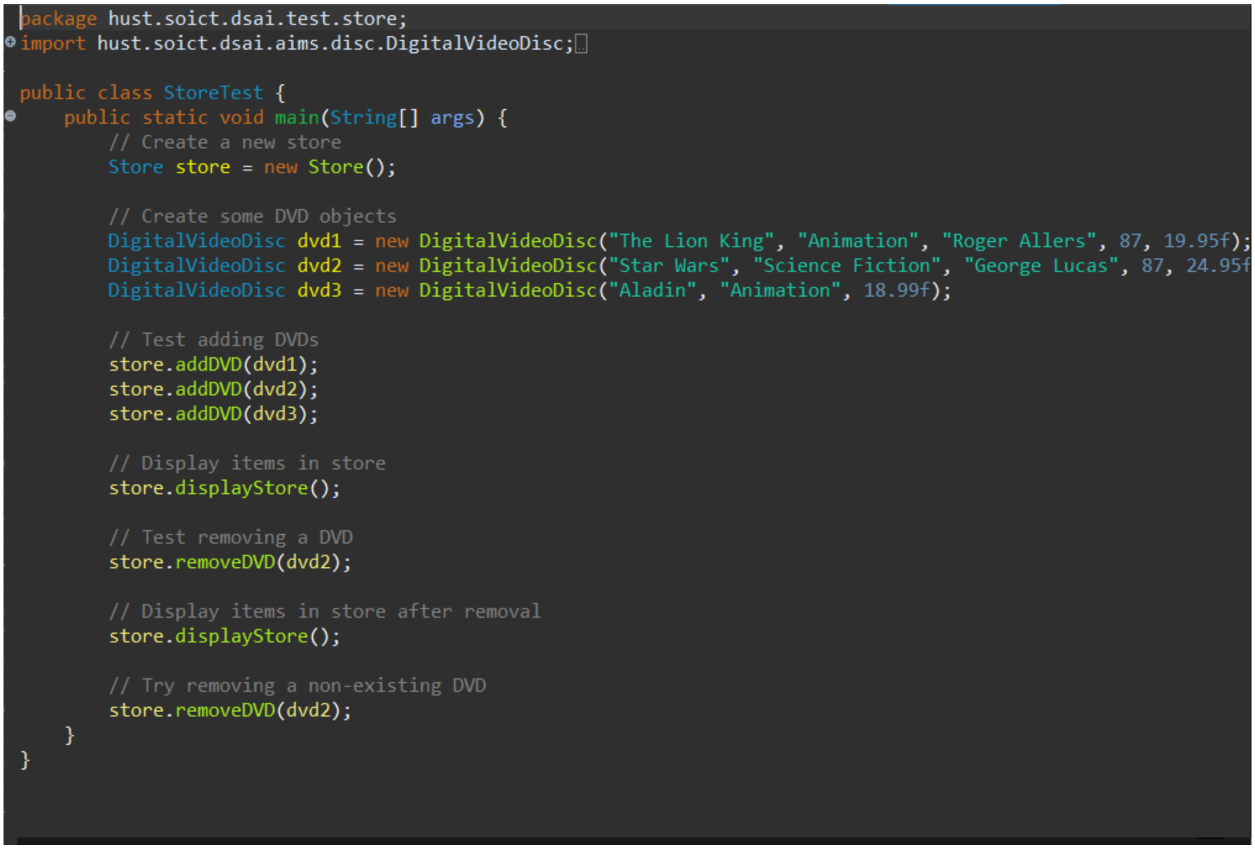
7. Implement the Store Class



```java
package hust.soict.dsai.aims.store;
import hust.soict.dsai.aims.disc.DigitalVideoDisc;

public class Store {
    private DigitalVideoDisc[] itemsInStore;
    private int itemCount;

    public Store() {
        this.itemsInStore = new DigitalVideoDisc[100]; // Assume max capacity is 100 DVDs
        this.itemCount = 0;
    }

    public void addDVD(DigitalVideoDisc dvd) {
        if (dvd == null) {
            System.out.println("Cannot add null DVD to the store.");
            return;
        }

        if (itemCount < itemsInStore.length) {
            itemsInStore[itemCount] = dvd;
            itemCount++;
            System.out.println(dvd.getTitle() + " has been added to the store.");
        } else {
            System.out.println("The store is full. Cannot add more DVDs.");
        }
    }

    public void removeDVD(DigitalVideoDisc dvd) {
        if (dvd == null) {
            System.out.println("Cannot remove null DVD from the store.");
            return;
        }

        boolean found = false;
```

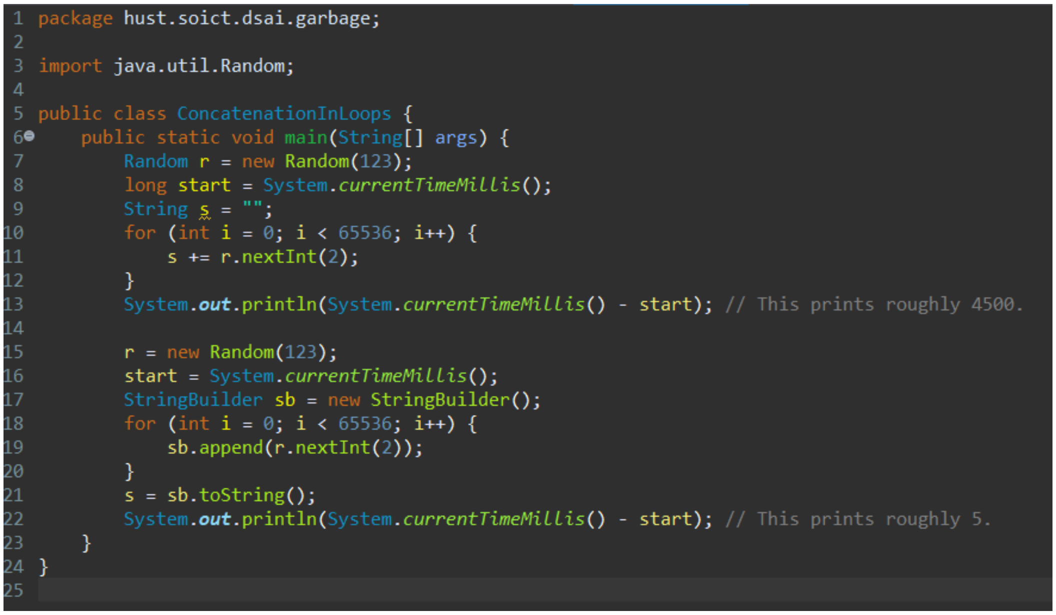


```java
        boolean found = false;
        for (int i = 0; i < itemCount; i++) {
            if (itemsInStore[i].equals(dvd)) {
                for (int j = i; j < itemCount - 1; j++) {
                    itemsInStore[j] = itemsInStore[j + 1];
                }
                itemsInStore[itemCount - 1] = null;
                itemCount--;
                System.out.println(dvd.getTitle() + " has been removed from the store.");
                found = true;
                break;
            }
        }

        if (!found) {
            System.out.println(dvd.getTitle() + " is not found in the store.");
        }
    }

    public void displayStore() {
        System.out.println("Items currently in the store:");
        if (itemCount == 0) {
            System.out.println("The store is empty.");
        } else {
            for (int i = 1; i <= itemCount; i++) {
                System.out.println(i + ". "+ itemsInStore[i-1].toString());
            }
        }
    }
}
```

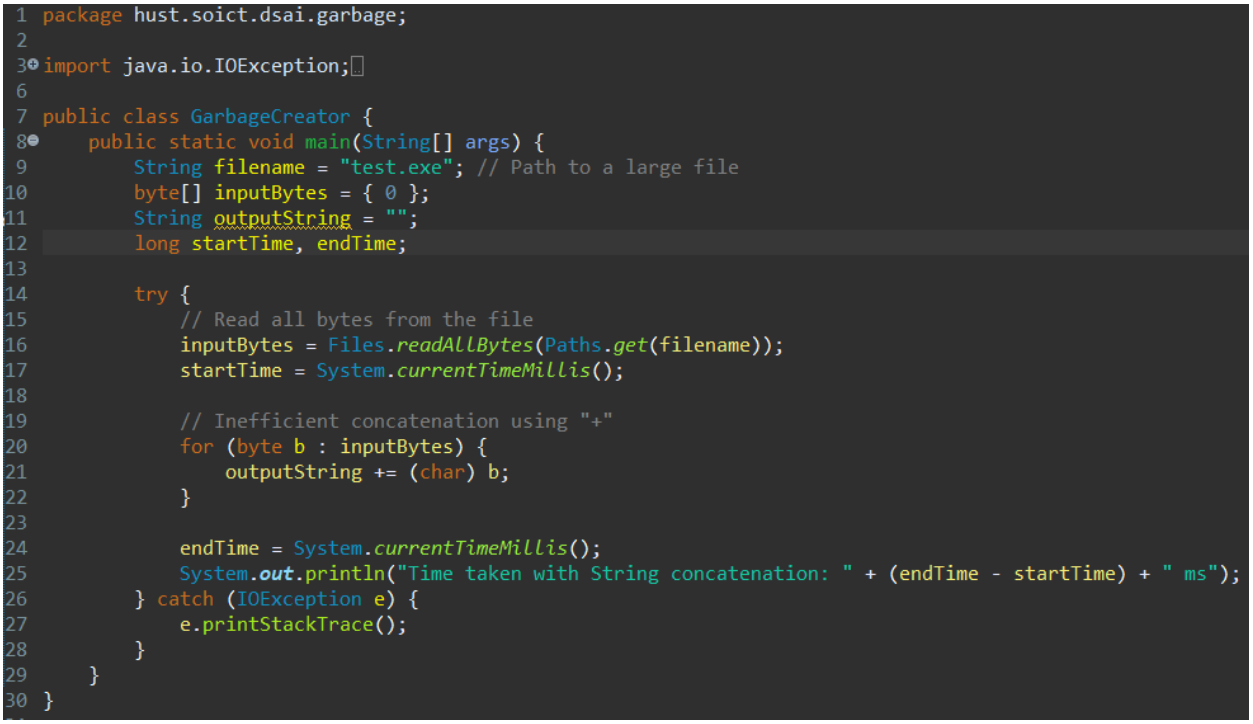


```java
package hust.soict.dsai.test.store;
import hust.soict.dsai.aims.disc.DigitalVideoDisc;

public class StoreTest {
    public static void main(String[] args) {
        // Create a new store
        Store store = new Store();

        // Create some DVD objects
        DigitalVideoDisc dvd1 = new DigitalVideoDisc("The Lion King", "Animation", "Roger Allers", 87, 19.95f);
        DigitalVideoDisc dvd2 = new DigitalVideoDisc("Star Wars", "Science Fiction", "George Lucas", 87, 24.95f
        DigitalVideoDisc dvd3 = new DigitalVideoDisc("Aladin", "Animation", 18.99f);

        // Test adding DVDs
        store.addDVD(dvd1);
        store.addDVD(dvd2);
        store.addDVD(dvd3);

        // Display items in store
        store.displayStore();

        // Test removing a DVD
        store.removeDVD(dvd2);

        // Display items in store after removal
        store.displayStore();

        // Try removing a non-existing DVD
        store.removeDVD(dvd2);
    }
}
```

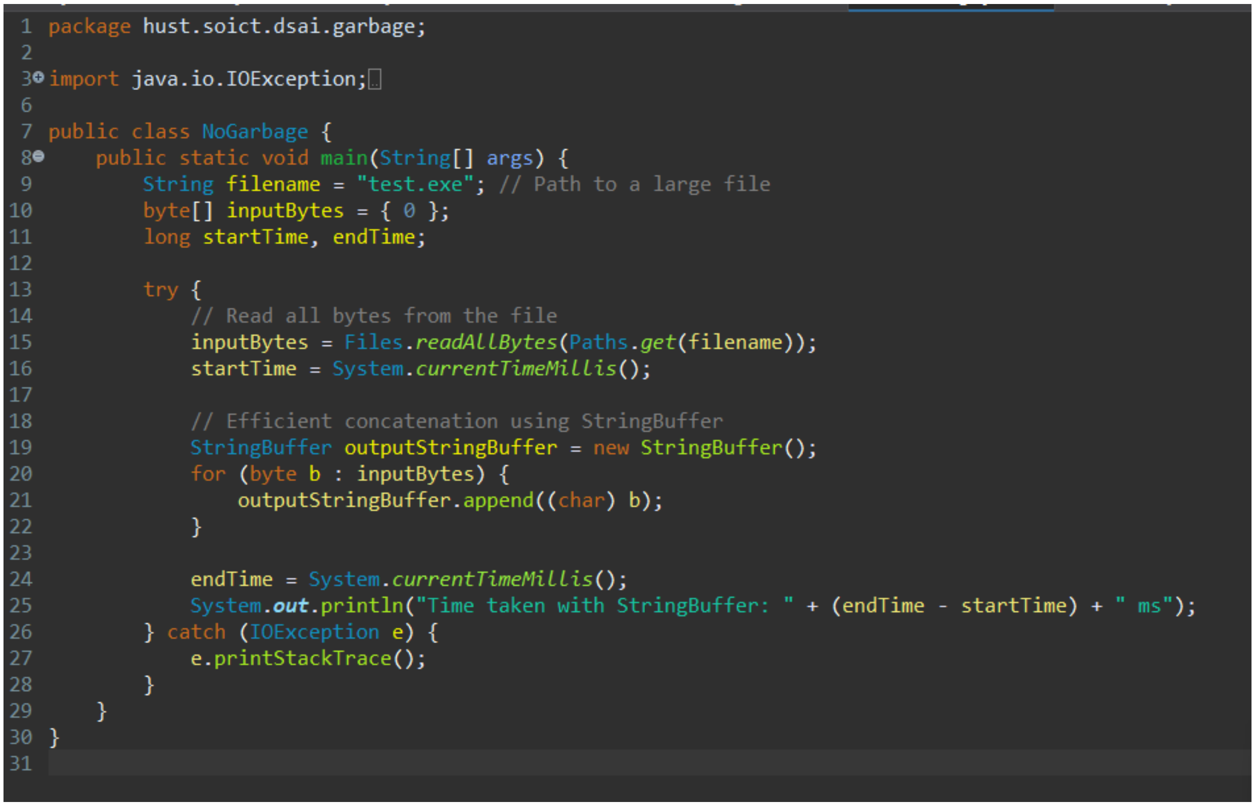
9. String concatenation



```java
package hust.soict.dsai.garbage;

import java.util.Random;

public class ConcatenationInLoops {
    public static void main(String[] args) {
        Random r = new Random(123);
        long start = System.currentTimeMillis();
        String s = "";
        for (int i = 0; i < 65536; i++) {
            s += r.nextInt(2);
        }
        System.out.println(System.currentTimeMillis() - start); // This prints roughly 4500.

        r = new Random(123);
        start = System.currentTimeMillis();
        StringBuilder sb = new StringBuilder();
        for (int i = 0; i < 65536; i++) {
            sb.append(r.nextInt(2));
        }
        s = sb.toString();
        System.out.println(System.currentTimeMillis() - start); // This prints roughly 5.
    }
}

```



```java
package hust.soict.dsai.garbage;

import java.io.IOException;

public class GarbageCreator {
    public static void main(String[] args) {
        String filename = "test.exe"; // Path to a large file
        byte[] inputBytes = { 0 };
        String outputString = "";
        long startTime, endTime;

        try {
            // Read all bytes from the file
            inputBytes = Files.readAllBytes(Paths.get(filename));
            startTime = System.currentTimeMillis();

            // Inefficient concatenation using "+"
            for (byte b : inputBytes) {
                outputString += (char) b;
            }

            endTime = System.currentTimeMillis();
            System.out.println("Time taken with String concatenation: " + (endTime - startTime) + " ms");
        } catch (IOException e) {
            e.printStackTrace();
        }
    }
}
```



```java
package hust.soict.dsai.garbage;

import java.io.IOException;

public class NoGarbage {
    public static void main(String[] args) {
        String filename = "test.exe"; // Path to a large file
        byte[] inputBytes = { 0 };
        long startTime, endTime;

        try {
            // Read all bytes from the file
            inputBytes = Files.readAllBytes(Paths.get(filename));
            startTime = System.currentTimeMillis();

            // Efficient concatenation using StringBuffer
            StringBuffer outputStringBuffer = new StringBuffer();
            for (byte b : inputBytes) {
                outputStringBuffer.append((char) b);
            }

            endTime = System.currentTimeMillis();
            System.out.println("Time taken with StringBuffer: " + (endTime - startTime) + " ms");
        } catch (IOException e) {
            e.printStackTrace();
        }
    }
}

```