LẬP TRÌNH HƯỚNG ĐỐI TƯỢNG

LAB 03

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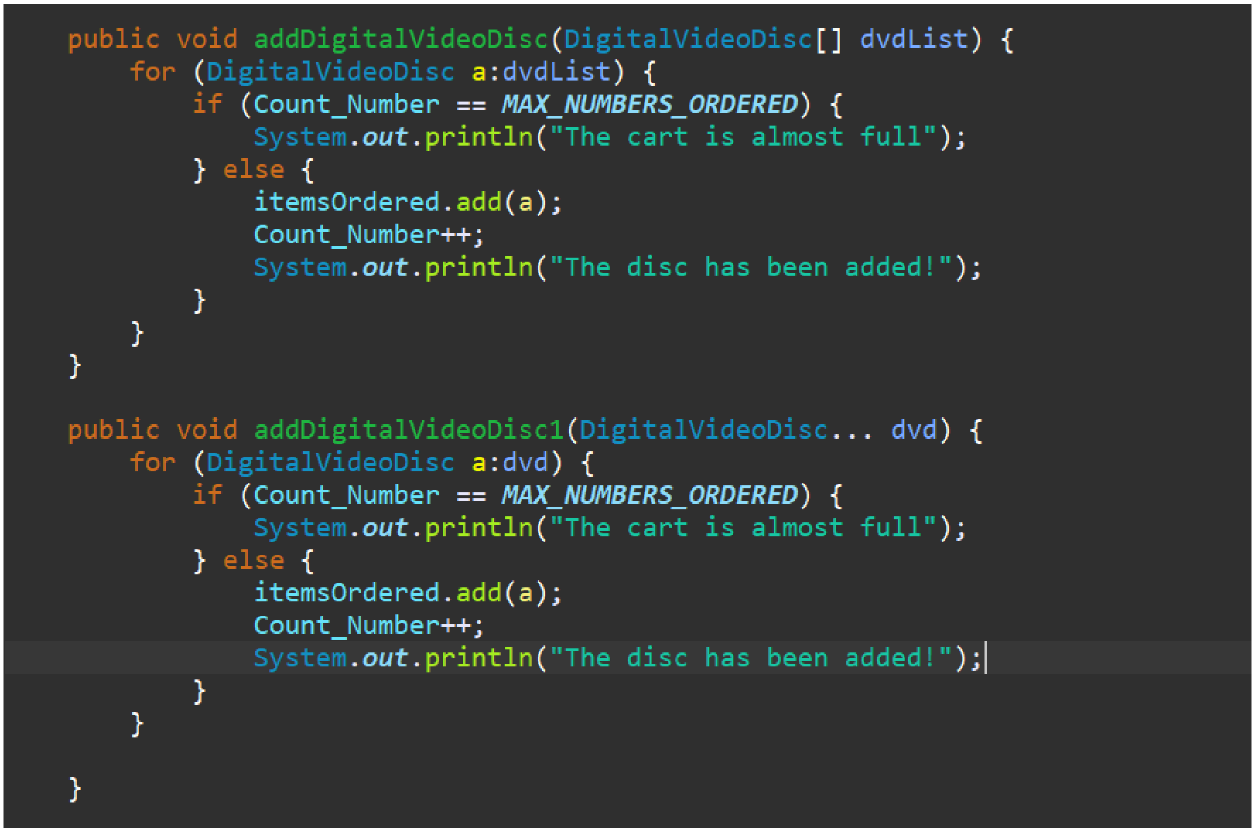
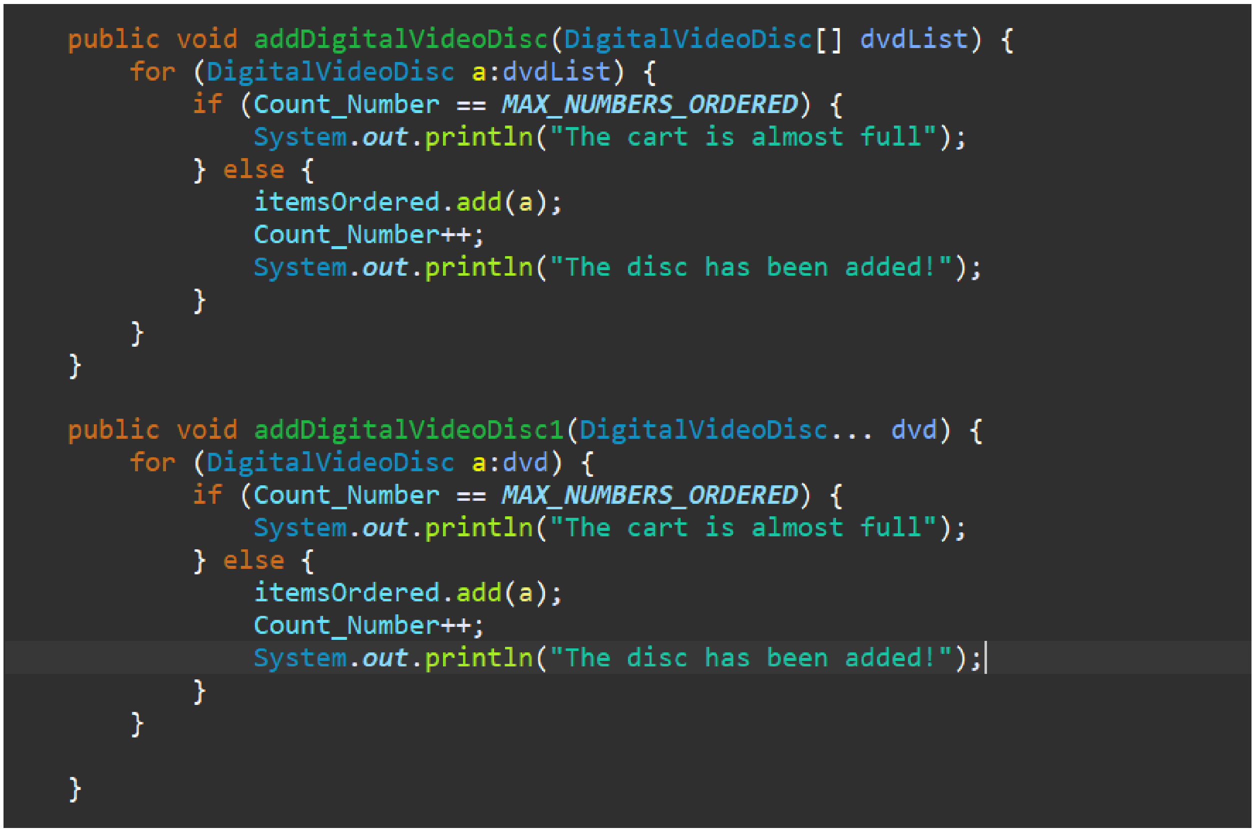
1. Working with method overloading

- Tạo method addDigitalVideoDisc(DigitalVideoDisc [] dvdList) và addDigitalVideoDisc(DigitalVideoDisc dvd1,DigitalVideoDisc dvd2)

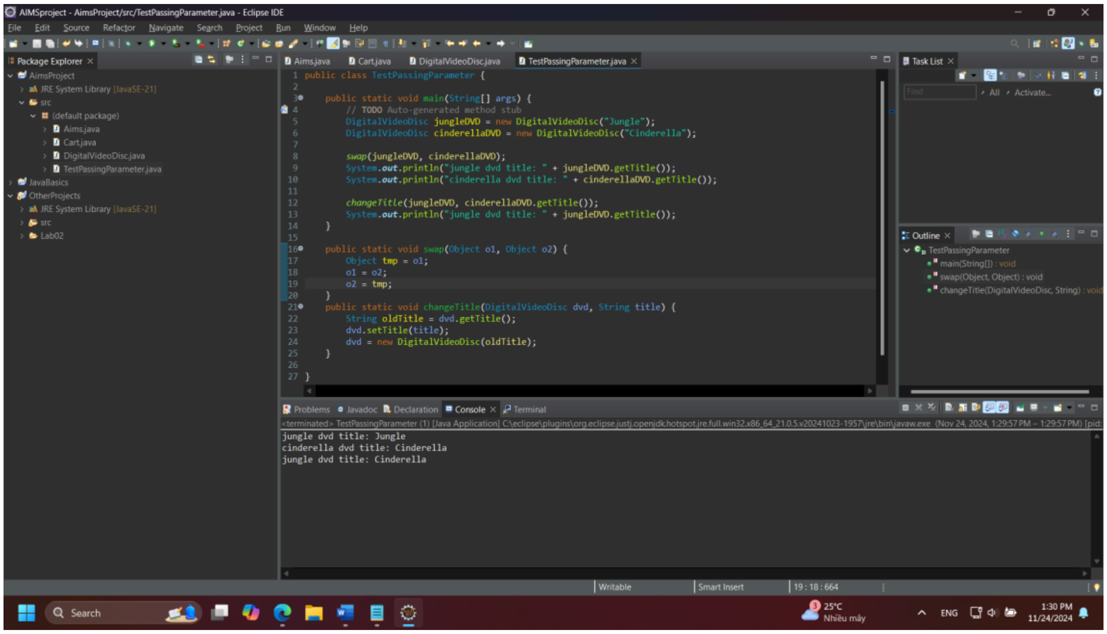


```
public void addDigitalVideoDisc(DigitalVideoDisc[] dvdList) {
    for (DigitalVideoDisc a:dvdList) {
        if (Count_Number == MAX_NUMBERS_ORDERED) {
            System.out.println("The cart is almost full");
        } else {
            itemsOrdered.add(a);
            Count_Number++;
            System.out.println("The disc has been added!");
        }
    }
}

public void addDigitalVideoDisc1(DigitalVideoDisc... dvd) {
    for (DigitalVideoDisc a:dvd) {
        if (Count_Number == MAX_NUMBERS_ORDERED) {
            System.out.println("The cart is almost full");
        } else {
            itemsOrdered.add(a);
            Count_Number++;
            System.out.println("The disc has been added!");
        }
    }

}
```



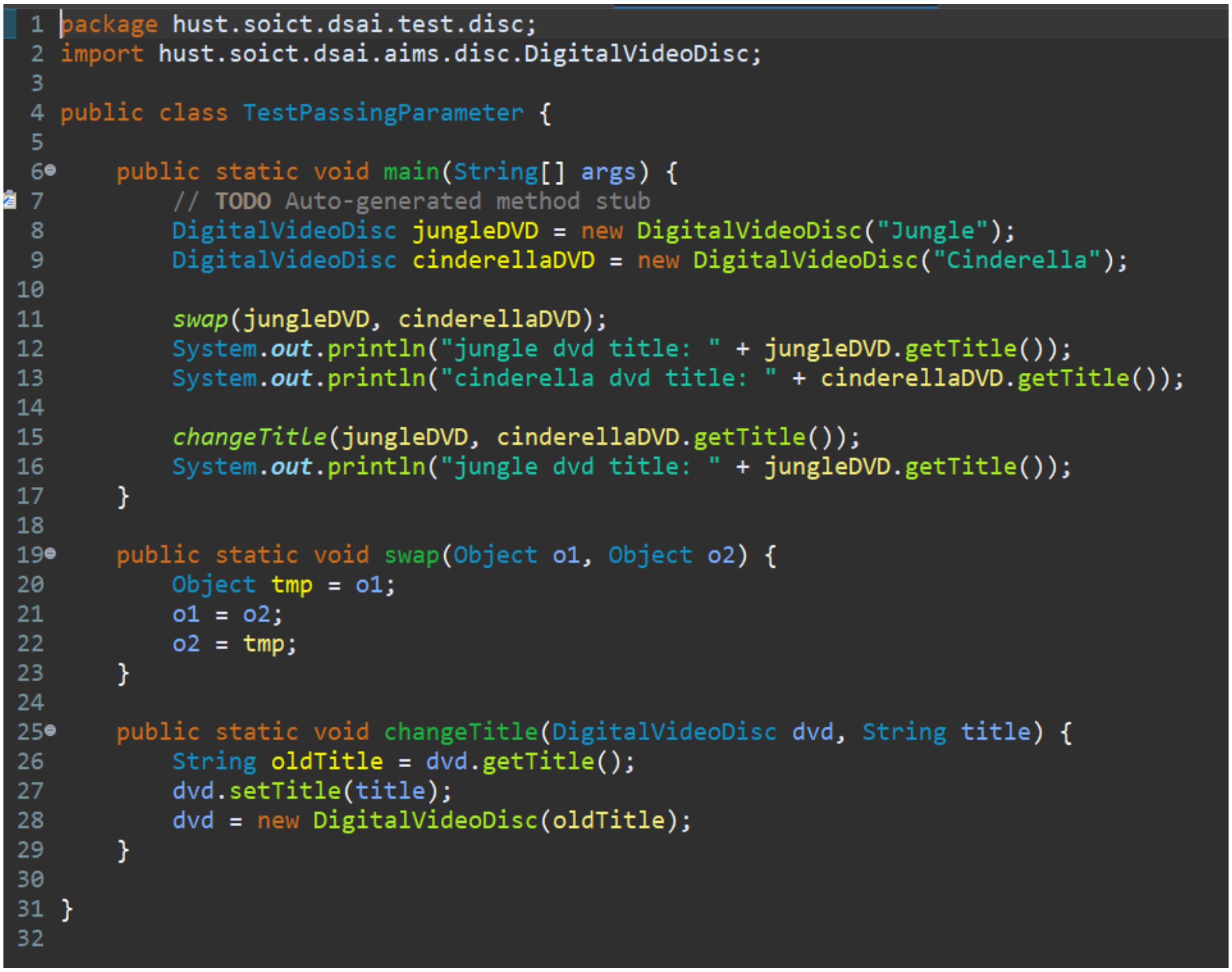
```java
public void addDigitalVideoDisc(DigitalVideoDisc[] dvdList) {
    for (DigitalVideoDisc a:dvdList) {
        if (Count_Number == MAX_NUMBERS_ORDERED) {
            System.out.println("The cart is almost full");
        } else {
            itemsOrdered.add(a);
            Count_Number++;
            System.out.println("The disc has been added!");
        }
    }
}

public void addDigitalVideoDisc1(DigitalVideoDisc... dvd) {
    for (DigitalVideoDisc a:dvd) {
        if (Count_Number == MAX_NUMBERS_ORDERED) {
            System.out.println("The cart is almost full");
        } else {
            itemsOrdered.add(a);
            Count_Number++;
            System.out.println("The disc has been added!");
        }
    }

}
```

2. Passing parameter



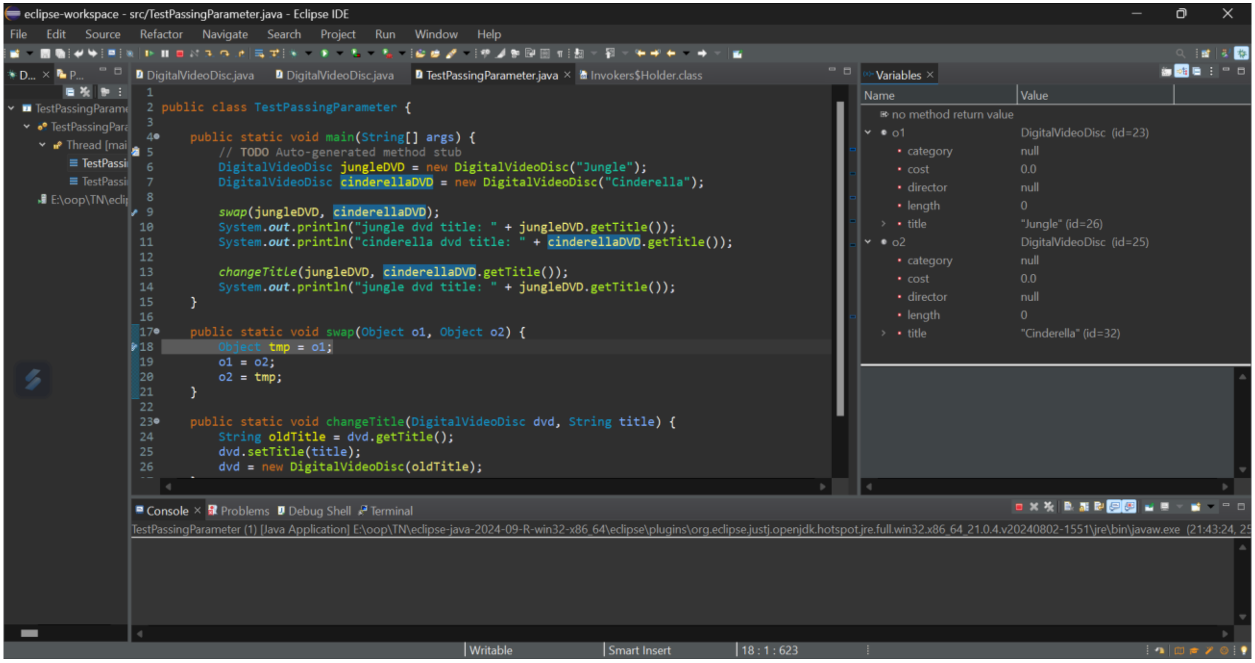
```java
public class TestPassingParameter {

    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);
    }

}
```

```
<terminated> TestPassingParameter (1) [Java Application] C:\eclipse\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_21.0.5.v20241023-1957\jre\bin\javaw.exe (Nov 24, 2024, 1:29:57 PM – 1:29:57 PM) [pid:
jungle dvd title: Jungle
cinderella dvd title: Cinderella
jungle dvd title: Cinderella
```



```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);
    }

}
```

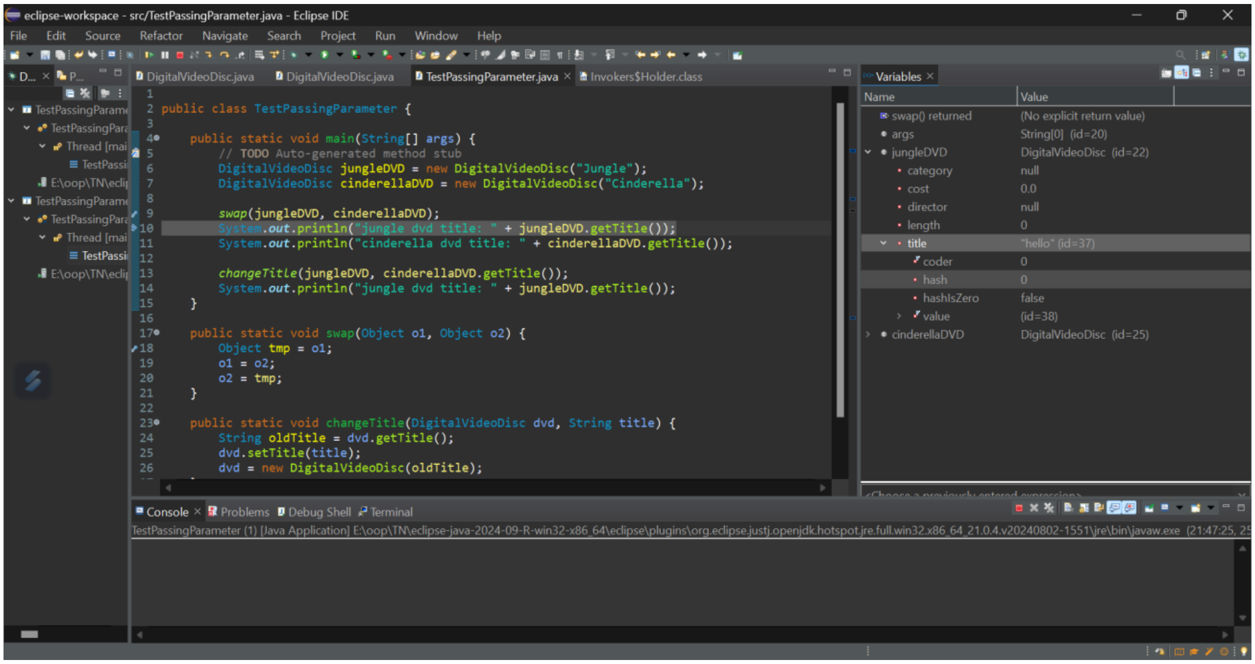
3. Use debug run



```java

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);
```

```
Name                      Value
  no method return value
v o1                      DigitalVideoDisc  (id=23)
    category              null
    cost                  0.0
    director              null
    length                0
  > title                 "Jungle" (id=26)
v o2                      DigitalVideoDisc  (id=25)
    category              null
    cost                  0.0
    director              null
    length                0
  > title                 "Cinderella" (id=32)
```

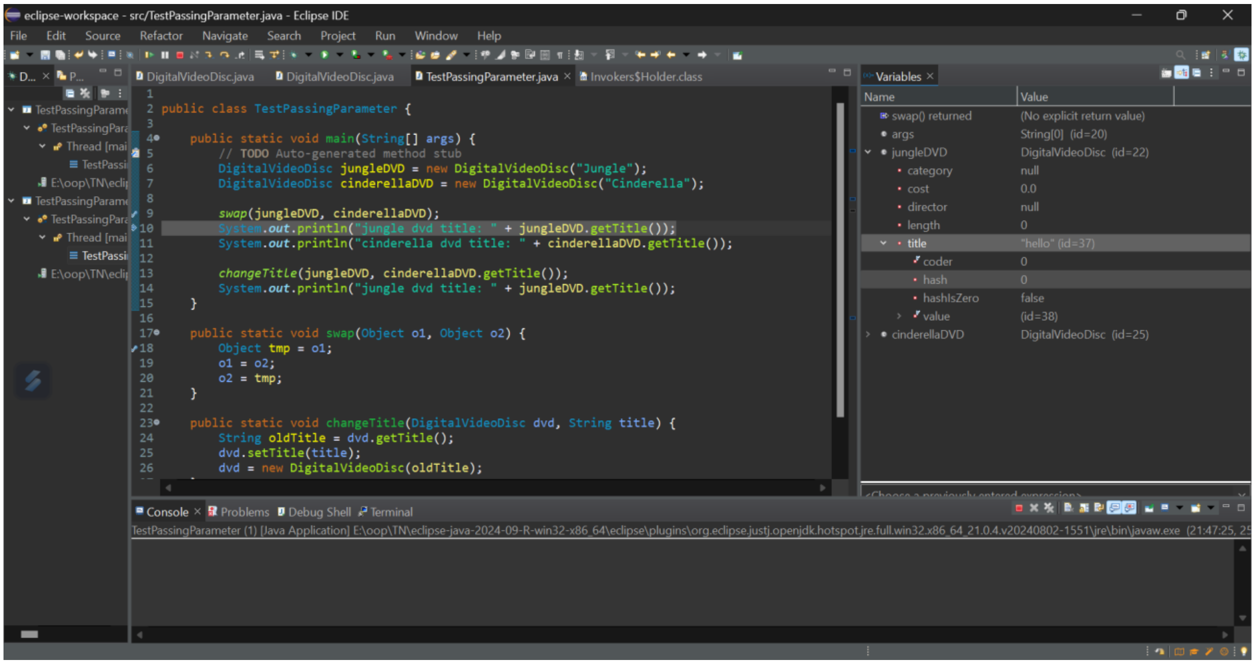
```
TestPassingParameter (1) [Java Application] E:\oop\TN\eclipse-java-2024-09-R-win32-x86_64\eclipse\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_21.0.4.v20240802-1551\jre\bin\javaw.exe  (21:43:24, 25
```



```java
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);
```

Name	Value
swap() returned	(No explicit return value)
args	String[0] (id=20)
jungleDVD	DigitalVideoDisc (id=22)
category	null
cost	0.0
director	null
length	0
title	"hello" (id=37)
coder	0
hash	0
hashIsZero	false
value	(id=38)
cinderellaDVD	DigitalVideoDisc (id=25)

```
TestPassingParameter (1) [Java Application] E:\oop\TN\eclipse-java-2024-09-R-win32-x86_64\eclipse\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_21.0.4.v20240802-1551\jre\bin\javaw.exe (21:47:25, 2
```

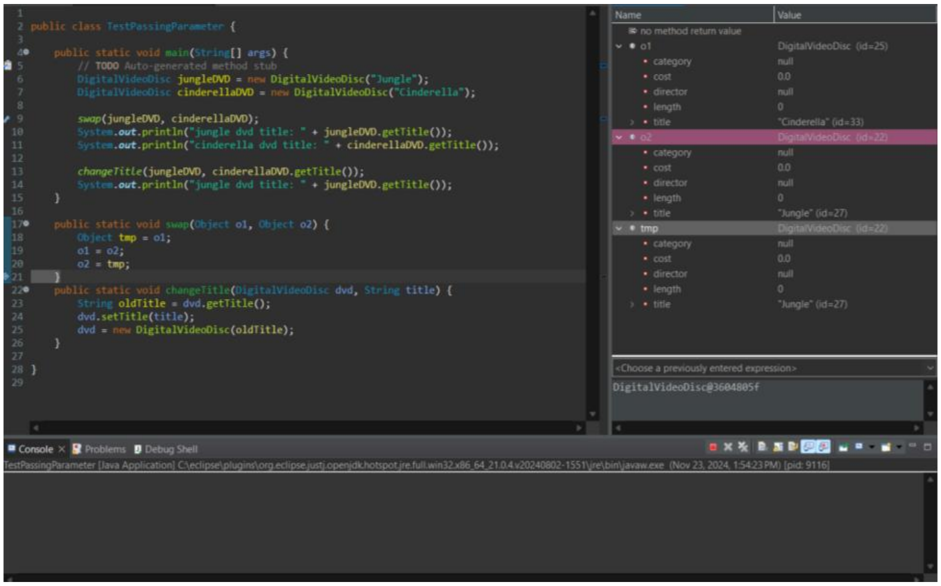


eclipse-workspace - src/TestPassingParameter.java - Eclipse IDE

```java
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);
```

Name	Value
swap() returned	(No explicit return value)
args	String[0] (id=20)
jungleDVD	DigitalVideoDisc (id=22)
category	null
cost	0.0
director	null
length	0
title	"hello" (id=37)
coder	0
hash	0
hashIsZero	false
value	(id=38)
cinderellaDVD	DigitalVideoDisc (id=25)

```
TestPassingParameter (1) [Java Application] E:\oop\TN\eclipse-java-2024-09-R-win32-x86_64\eclipse\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_21.0.4.v20240802-1551\jre\bin\javaw.exe (21:47:25, 2
```



```java

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);
    }

}

```

```
Name                          Value
   no method return value
 ˅ o1                         DigitalVideoDisc (id=25)
     category                 null
     cost                     0.0
     director                 null
     length                   0
   › title                    "Cinderella" (id=33)
 ˅ o2                         DigitalVideoDisc (id=22)
     category                 null
     cost                     0.0
     director                 null
     length                   0
   › title                    "Jungle" (id=27)
 ˅ tmp                        DigitalVideoDisc (id=22)
     category                 null
     cost                     0.0
     director                 null
     length                   0
   › title                    "Jungle" (id=27)
```

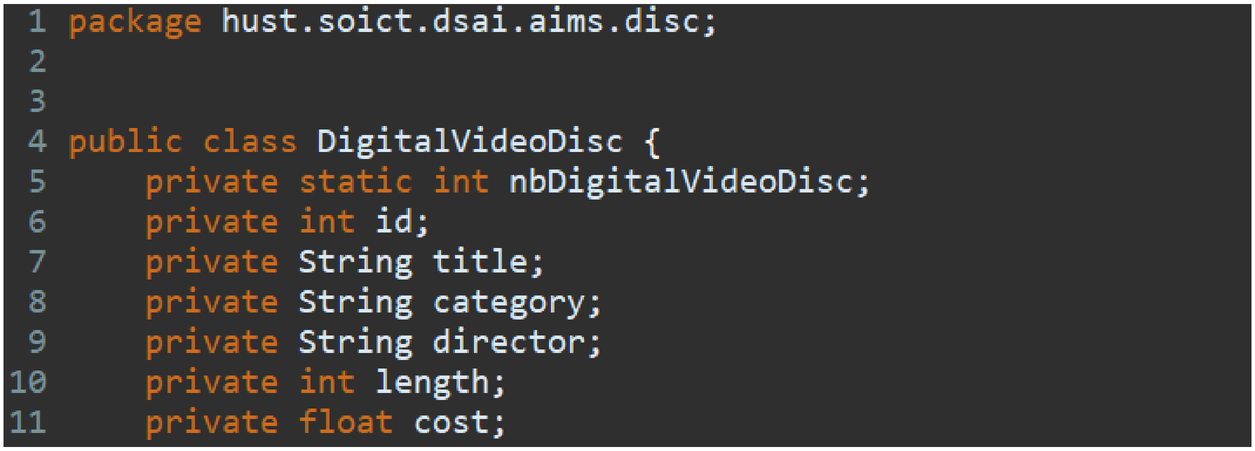
<Choose a previously entered expression>

```
DigitalVideoDisc@3604805f
```

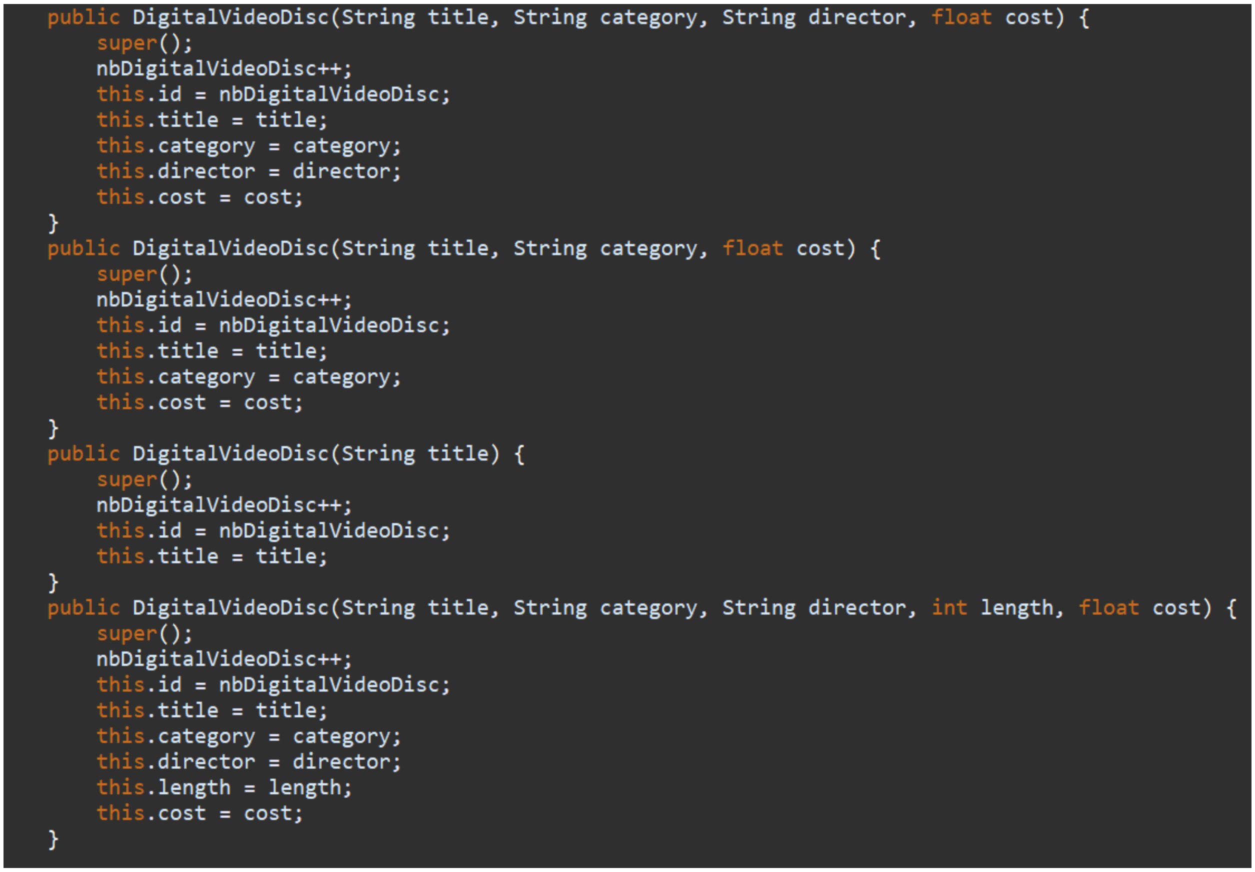
```
TestPassingParameter [Java Application] C:\eclipse\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_21.0.4.v20240802-1551\jre\bin\javaw.exe (Nov 23, 2024, 1:54:23 PM) [pid: 9116]
```

4. Classifier Member and Instance Member

- Create a class attribute named "nbDigitalVideoDiscs" in the class DigitalVideoDisc
- Create an instance attribute named "id" in the class DigitalVideoDisc



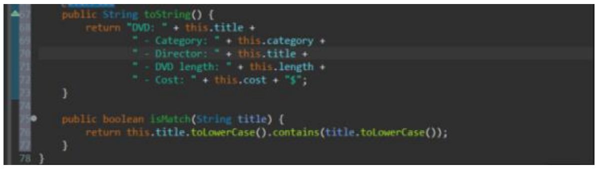
```java
package hust.soict.dsai.aims.disc;


public class DigitalVideoDisc {
    private static int nbDigitalVideoDisc;
    private int id;
    private String title;
    private String category;
    private String director;
    private int length;
    private float cost;
```



```
public DigitalVideoDisc(String title, String category, String director, float cost) {
    super();
    nbDigitalVideoDisc++;
    this.id = nbDigitalVideoDisc;
    this.title = title;
    this.category = category;
    this.director = director;
    this.cost = cost;
}
public DigitalVideoDisc(String title, String category, float cost) {
    super();
    nbDigitalVideoDisc++;
    this.id = nbDigitalVideoDisc;
    this.title = title;
    this.category = category;
    this.cost = cost;
}
public DigitalVideoDisc(String title) {
    super();
    nbDigitalVideoDisc++;
    this.id = nbDigitalVideoDisc;
    this.title = title;
}
public DigitalVideoDisc(String title, String category, String director, int length, float cost) {
    super();
    nbDigitalVideoDisc++;
    this.id = nbDigitalVideoDisc;
    this.title = title;
    this.category = category;
    this.director = director;
    this.length = length;
    this.cost = cost;
}
```

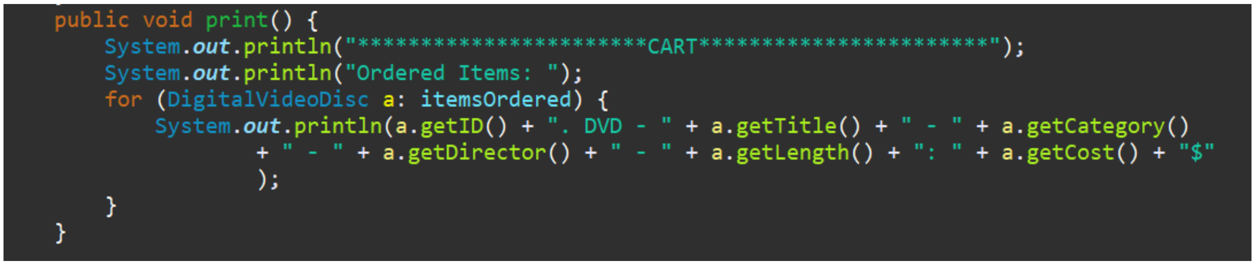
5. Open the Cart class

- toString() và isMatch()



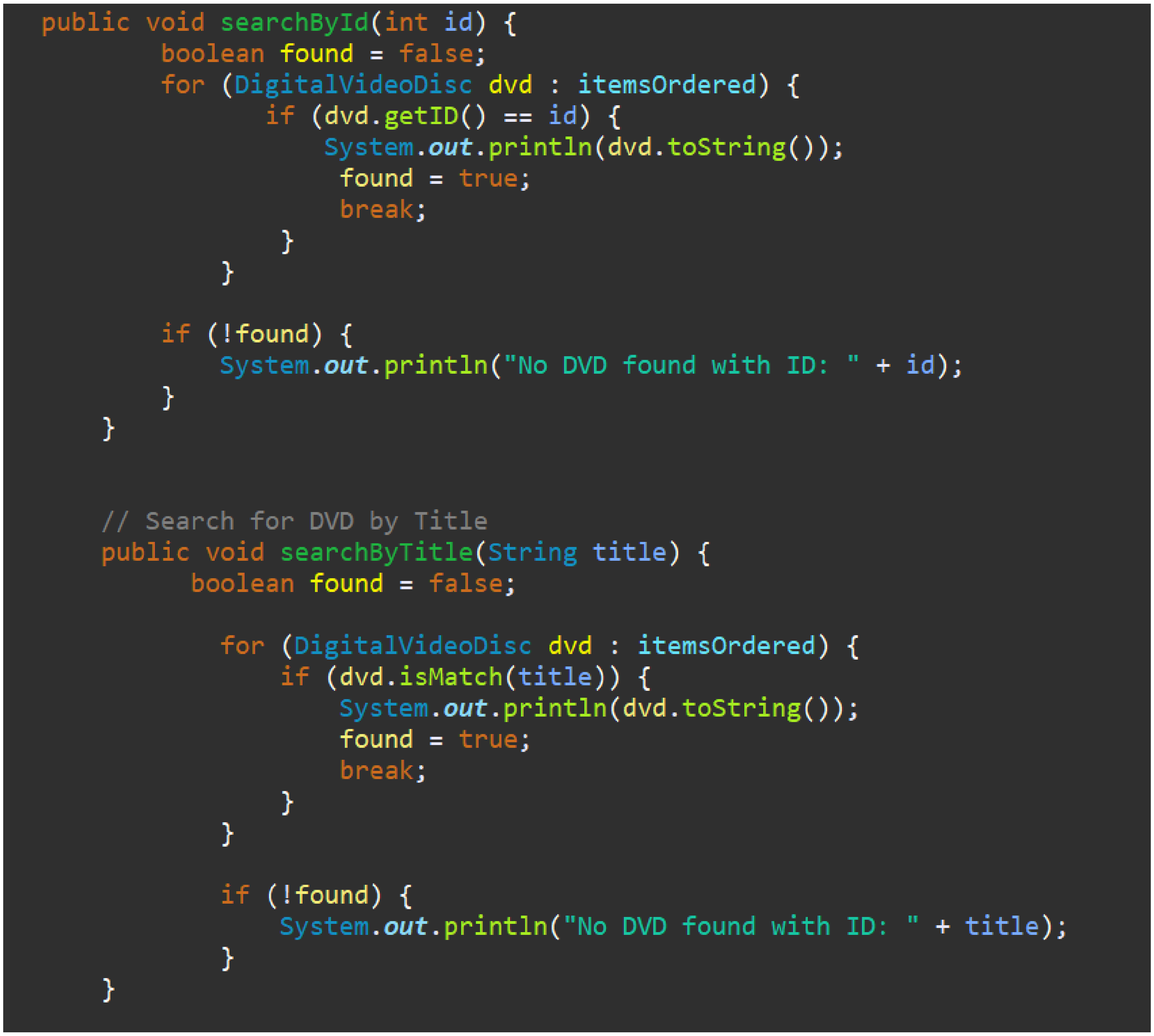
```
    public String toString() {
        return "DVD: " + this.title +
                " - Category: " + this.category +
                " - Director: " + this.title +
                " - DVD length: " + this.length +
                " - Cost: " + this.cost + "$";
    }

    public boolean isMatch(String title) {
        return this.title.toLowerCase().contains(title.toLowerCase());
    }
}
```

- Update Cart;



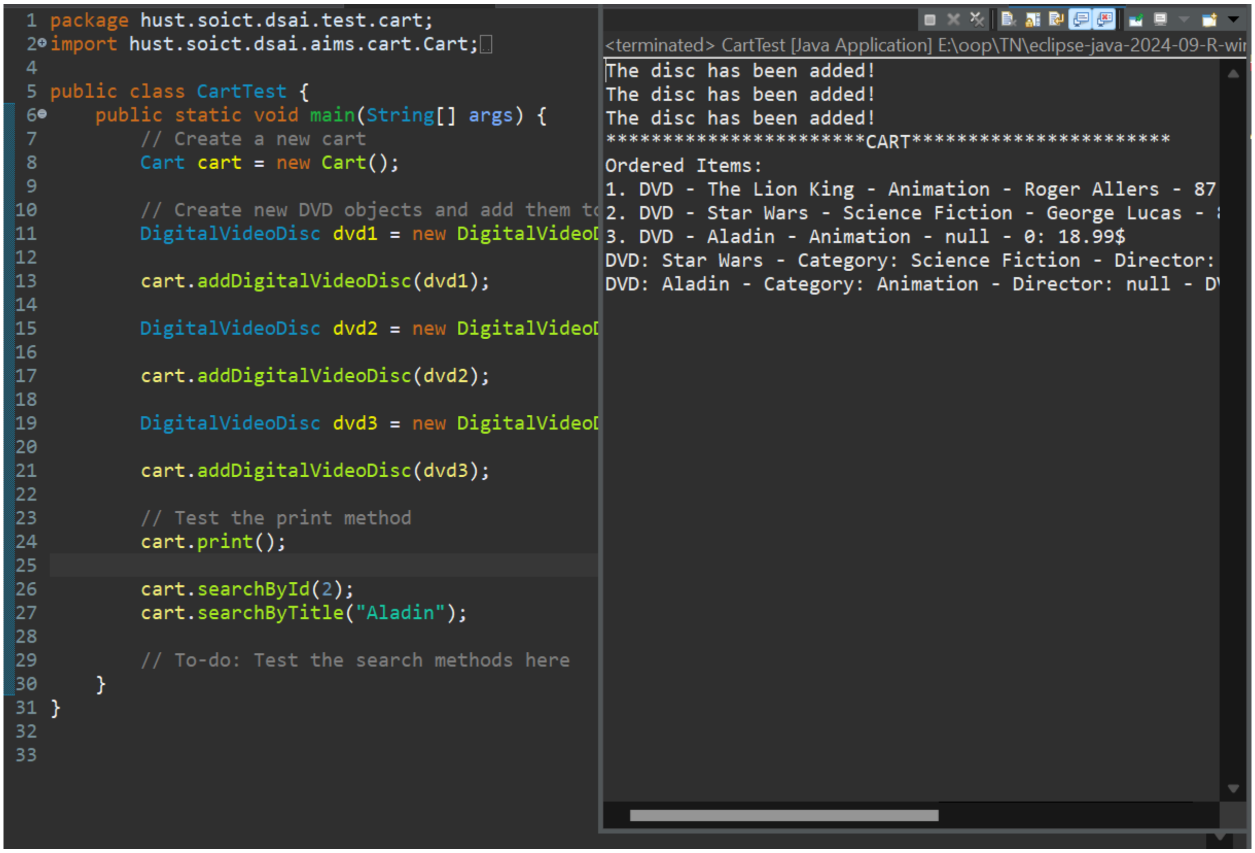
```
public void print() {
    System.out.println("***********************CART***********************");
    System.out.println("Ordered Items: ");
    for (DigitalVideoDisc a: itemsOrdered) {
        System.out.println(a.getID() + ". DVD - " + a.getTitle() + " - " + a.getCategory()
                + " - " + a.getDirector() + " - " + a.getLength() + ": " + a.getCost() + "$"
                );
    }
}
```

- SearchbyID() và SearchbyTitle:



```
public void searchById(int id) {
        boolean found = false;
        for (DigitalVideoDisc dvd : itemsOrdered) {
               if (dvd.getID() == id) {
                   System.out.println(dvd.toString());
                    found = true;
                    break;
                }
            }

        if (!found) {
            System.out.println("No DVD found with ID: " + id);
        }
    }


    // Search for DVD by Title
    public void searchByTitle(String title) {
          boolean found = false;

            for (DigitalVideoDisc dvd : itemsOrdered) {
                if (dvd.isMatch(title)) {
                    System.out.println(dvd.toString());
                    found = true;
                    break;
                }
            }

            if (!found) {
                System.out.println("No DVD found with ID: " + title);
            }
    }
```

- Chạy CartTest:



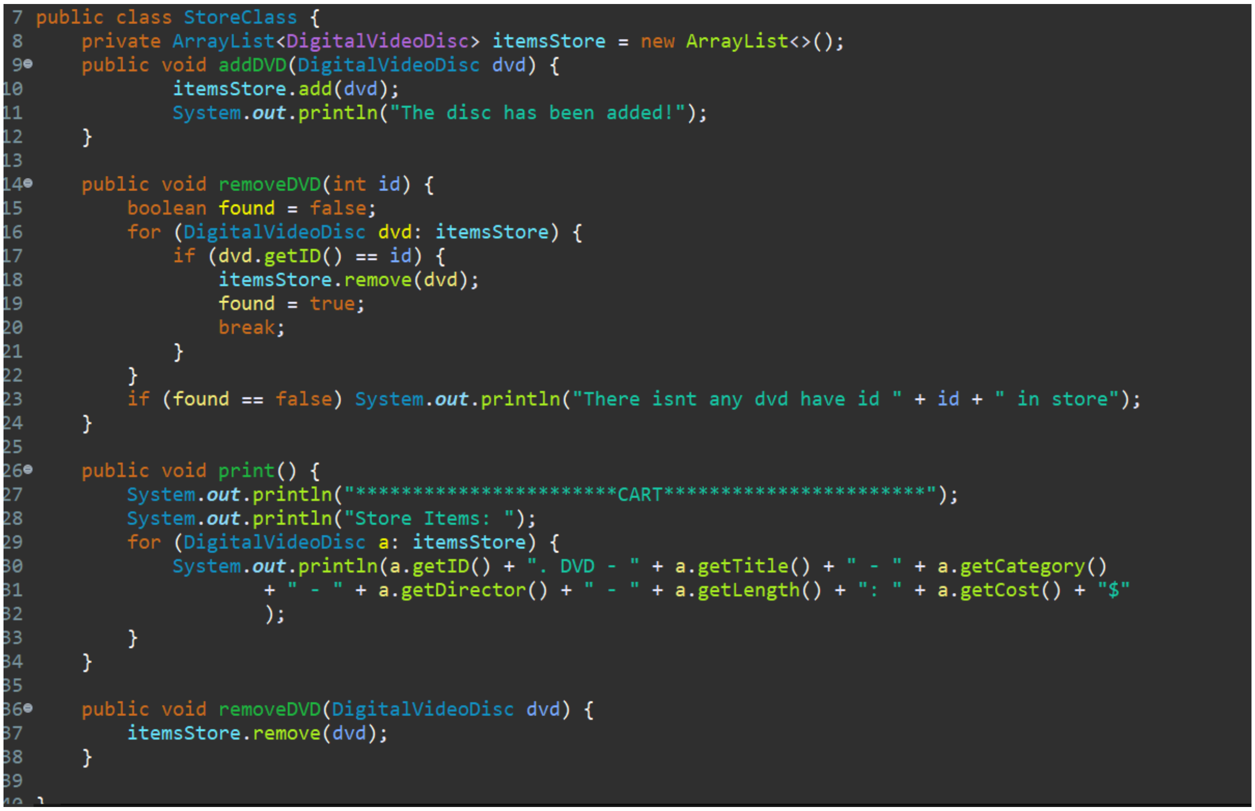
```java
package hust.soict.dsai.test.cart;
import hust.soict.dsai.aims.cart.Cart;

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
        DigitalVideoDisc dvd1 = new DigitalVideoD

        cart.addDigitalVideoDisc(dvd1);

        DigitalVideoDisc dvd2 = new DigitalVideoD

        cart.addDigitalVideoDisc(dvd2);

        DigitalVideoDisc dvd3 = new DigitalVideoD

        cart.addDigitalVideoDisc(dvd3);

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

        cart.searchById(2);
        cart.searchByTitle("Aladin");

        // To-do: Test the search methods here
    }
}
```

<terminated> CartTest [Java Application] E:\oop\TN\eclipse-java-2024-09-R-wi

```
The disc has been added!
The disc has been added!
The disc has been added!
***********************CART***********************
Ordered Items:
1. DVD - The Lion King - Animation - Roger Allers - 87
2. DVD - Star Wars - Science Fiction - George Lucas -
3. DVD - Aladin - Animation - null - 0: 18.99$
DVD: Star Wars - Category: Science Fiction - Director:
DVD: Aladin - Category: Animation - Director: null - D
```

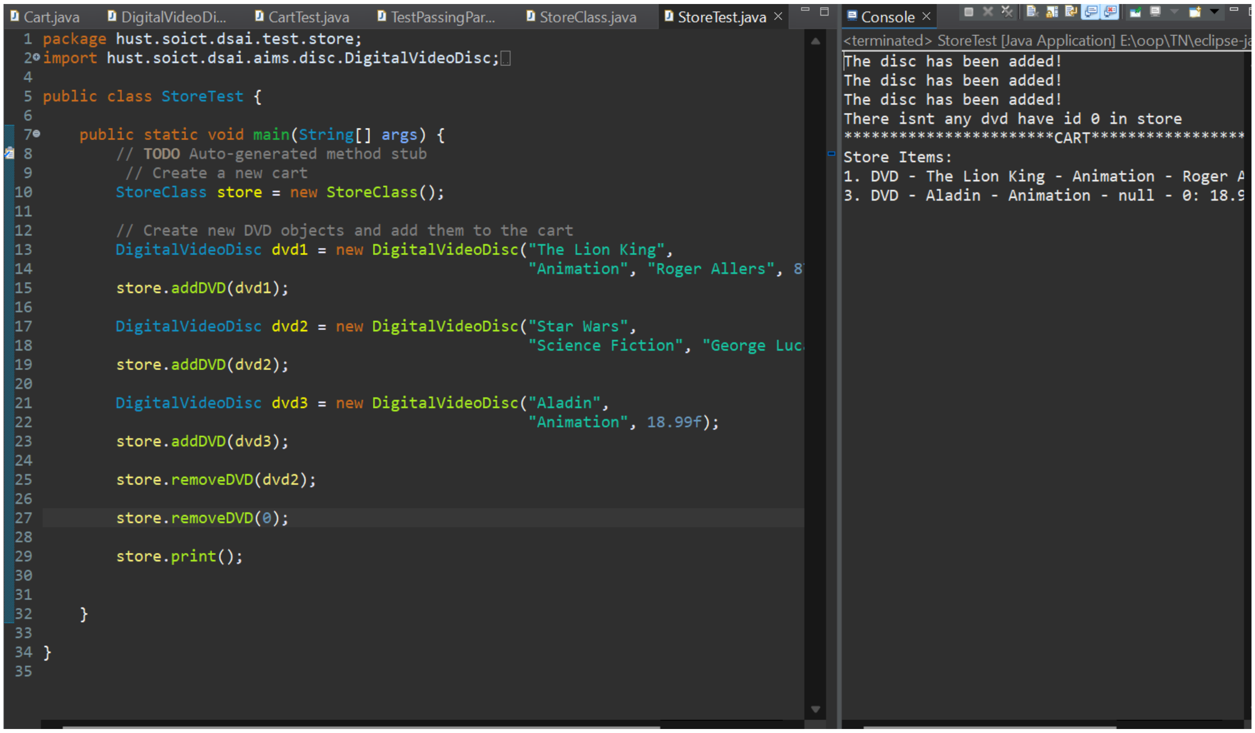
6. Implement the Store class

- Store



```java
public class StoreClass {
    private ArrayList<DigitalVideoDisc> itemsStore = new ArrayList<>();
    public void addDVD(DigitalVideoDisc dvd) {
            itemsStore.add(dvd);
            System.out.println("The disc has been added!");
    }

    public void removeDVD(int id) {
        boolean found = false;
        for (DigitalVideoDisc dvd: itemsStore) {
            if (dvd.getID() == id) {
                itemsStore.remove(dvd);
                found = true;
                break;
            }
        }
        if (found == false) System.out.println("There isnt any dvd have id " + id + " in store");
    }

    public void print() {
        System.out.println("***********************CART***********************");
        System.out.println("Store Items: ");
        for (DigitalVideoDisc a: itemsStore) {
            System.out.println(a.getID() + ". DVD - " + a.getTitle() + " - " + a.getCategory()
                    + " - " + a.getDirector() + " - " + a.getLength() + ": " + a.getCost() + "$"
                    );
        }
    }

    public void removeDVD(DigitalVideoDisc dvd) {
        itemsStore.remove(dvd);
    }

}
```

- Chạy StoreRun:

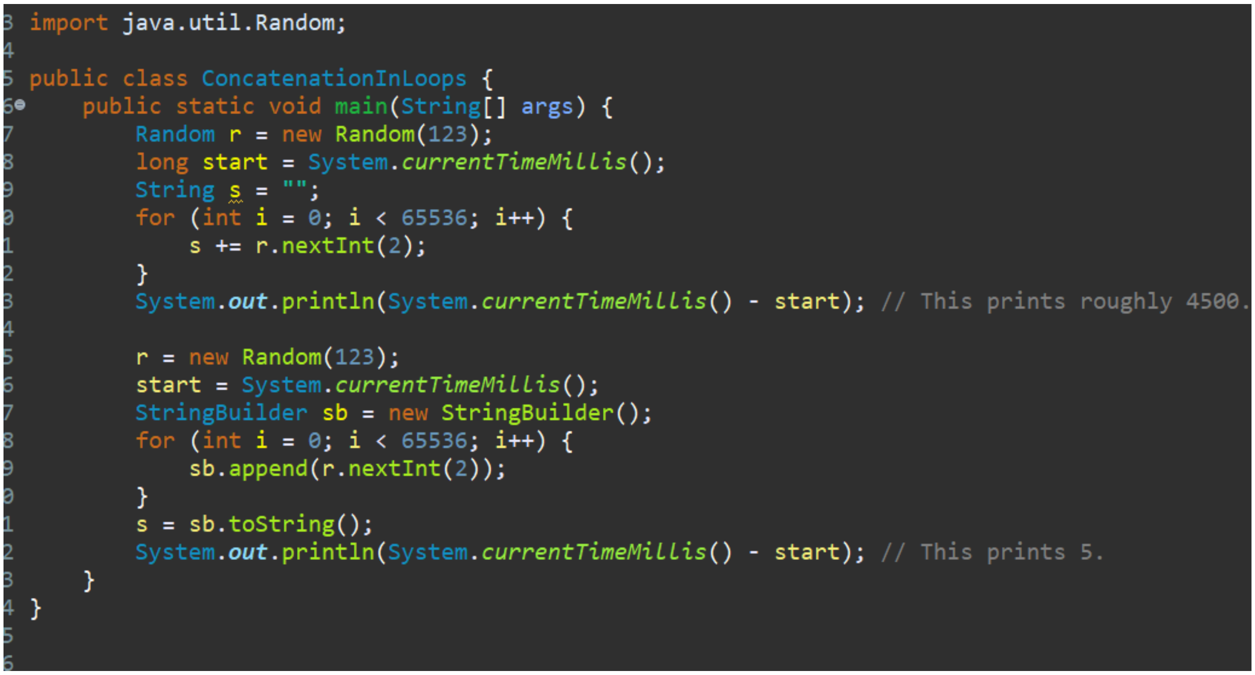


```java
package hust.soict.dsai.test.store;
import hust.soict.dsai.aims.disc.DigitalVideoDisc;

public class StoreTest {

    public static void main(String[] args) {
        // TODO Auto-generated method stub
         // Create a new cart
        StoreClass store = new StoreClass();

        // Create new DVD objects and add them to the cart
        DigitalVideoDisc dvd1 = new DigitalVideoDisc("The Lion King",
                                                     "Animation", "Roger Allers", 8
        store.addDVD(dvd1);

        DigitalVideoDisc dvd2 = new DigitalVideoDisc("Star Wars",
                                                     "Science Fiction", "George Luc
        store.addDVD(dvd2);

        DigitalVideoDisc dvd3 = new DigitalVideoDisc("Aladin",
                                                     "Animation", 18.99f);
        store.addDVD(dvd3);

        store.removeDVD(dvd2);

        store.removeDVD(0);

        store.print();


    }

}
```

```
<terminated> StoreTest [Java Application] E:\oop\TN\eclipse-ja
The disc has been added!
The disc has been added!
The disc has been added!
There isnt any dvd have id 0 in store
***********************CART*****************
Store Items:
1. DVD - The Lion King - Animation - Roger A
3. DVD - Aladin - Animation - null - 0: 18.9
```

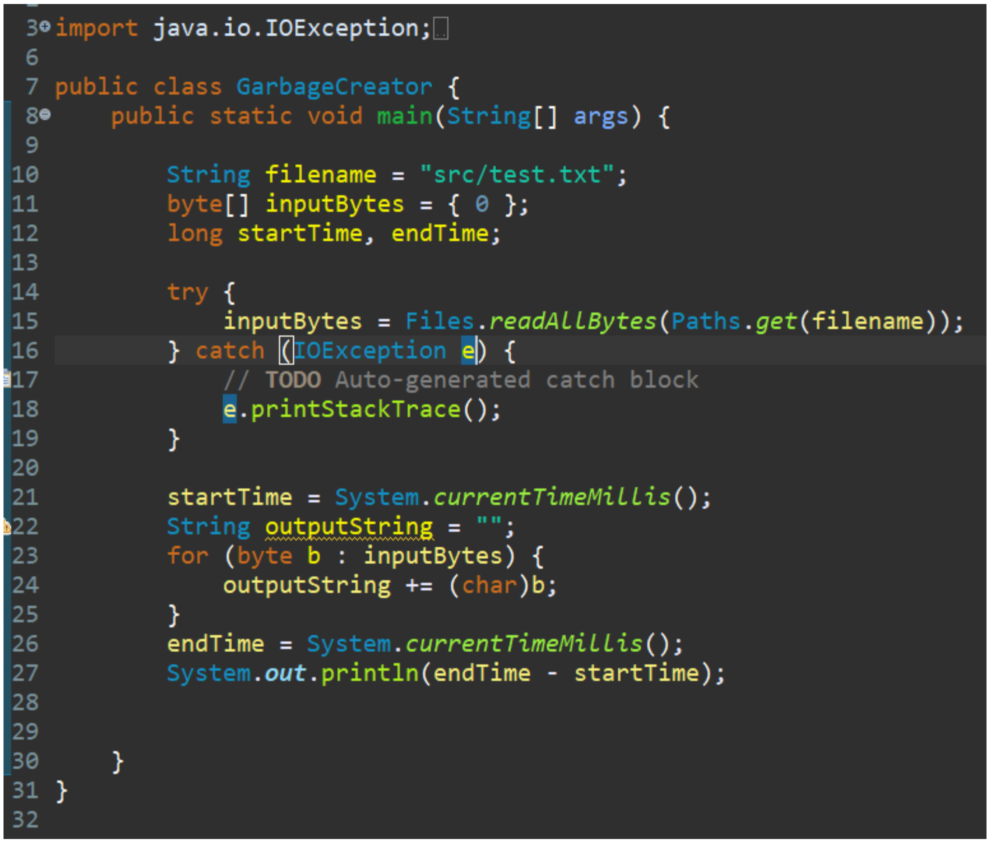
7. String, StringBuilder and StringBuffer

- Class ConcatenationInLoops:



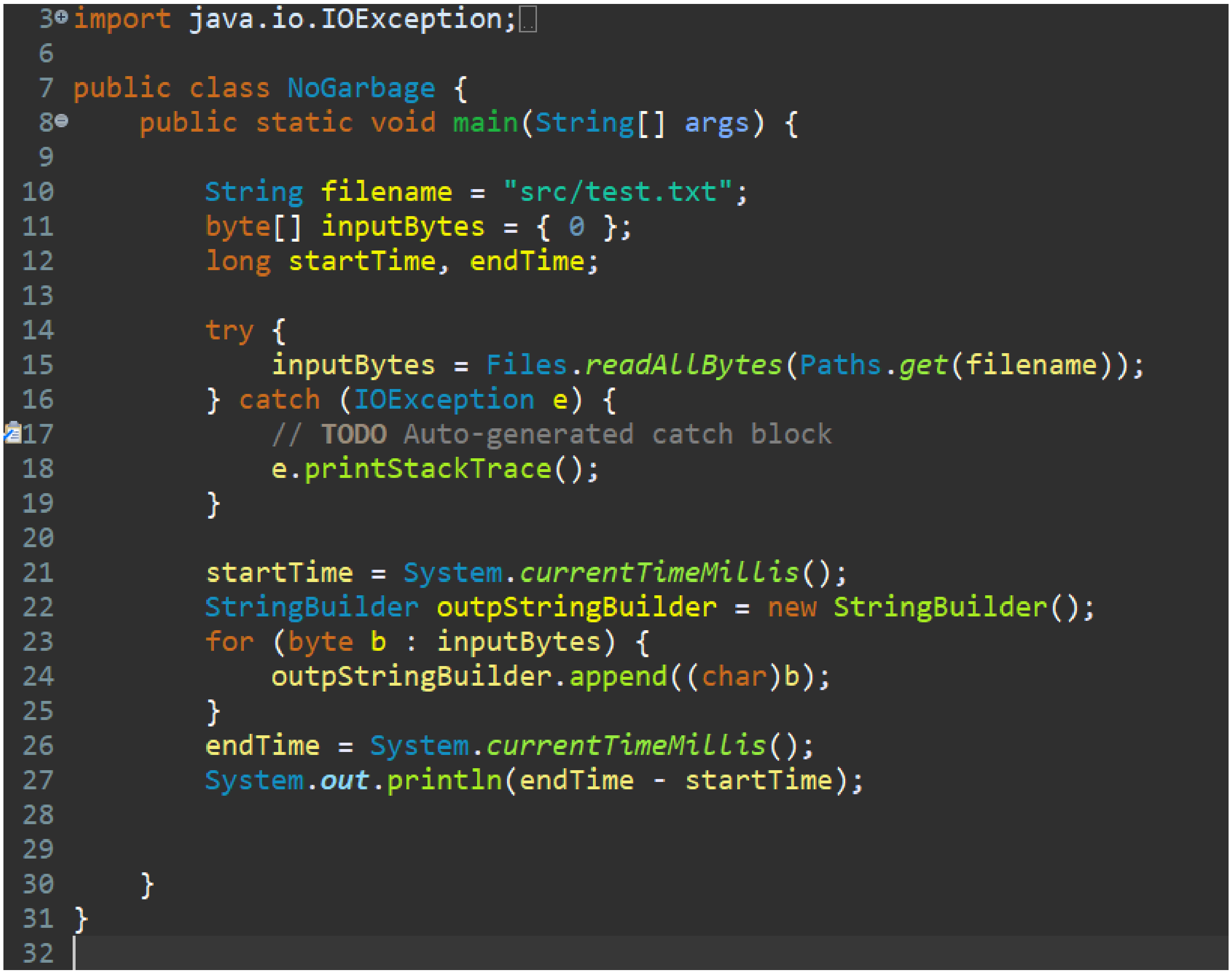
```java
import java.util.Random;

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 5.
    }
}
```

- Class GarbageCreator:



```java
import java.io.IOException;

public class GarbageCreator {
    public static void main(String[] args) {

        String filename = "src/test.txt";
        byte[] inputBytes = { 0 };
        long startTime, endTime;

        try {
            inputBytes = Files.readAllBytes(Paths.get(filename));
        } catch (IOException e) {
            // TODO Auto-generated catch block
            e.printStackTrace();
        }

        startTime = System.currentTimeMillis();
        String outputString = "";
        for (byte b : inputBytes) {
            outputString += (char)b;
        }
        endTime = System.currentTimeMillis();
        System.out.println(endTime - startTime);


    }
}
```

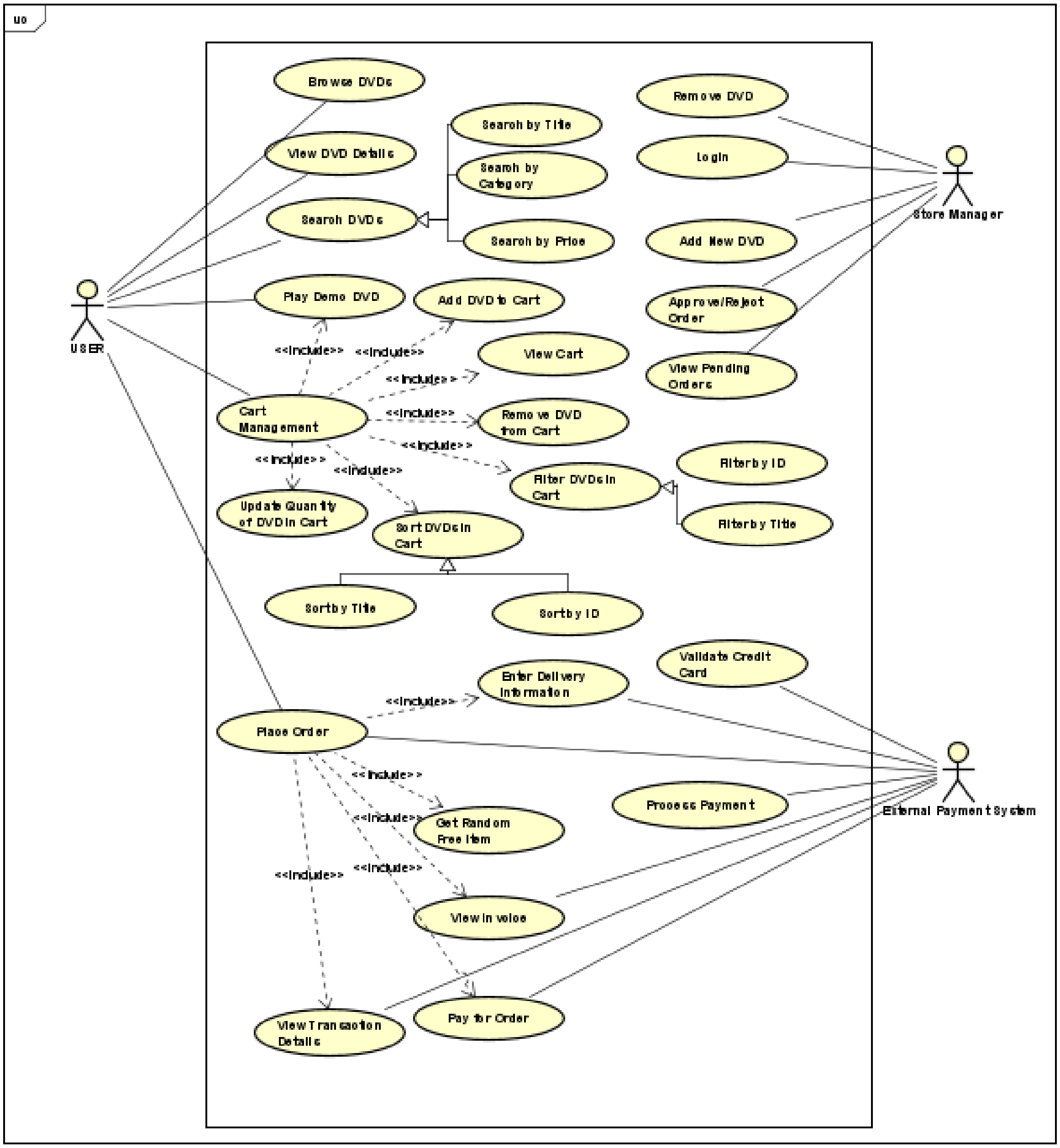
- Class NoGarbage:



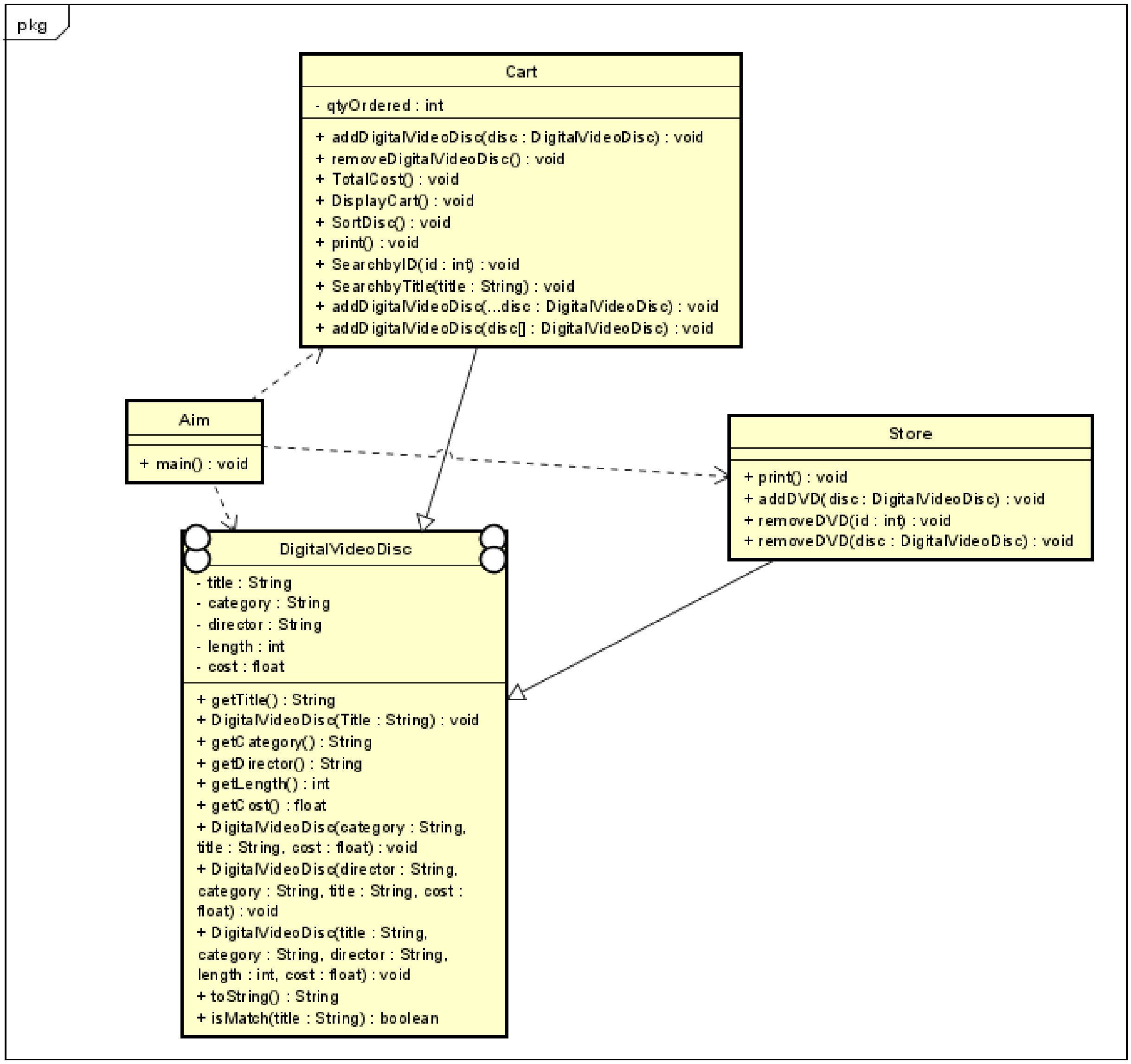
```
import java.io.IOException;

public class NoGarbage {
    public static void main(String[] args) {

        String filename = "src/test.txt";
        byte[] inputBytes = { 0 };
        long startTime, endTime;

        try {
            inputBytes = Files.readAllBytes(Paths.get(filename));
        } catch (IOException e) {
            // TODO Auto-generated catch block
            e.printStackTrace();
        }

        startTime = System.currentTimeMillis();
        StringBuilder outpStringBuilder = new StringBuilder();
        for (byte b : inputBytes) {
            outpStringBuilder.append((char)b);
        }
        endTime = System.currentTimeMillis();
        System.out.println(endTime - startTime);


    }
}

```

8. Update Astah file

- Update Use Diagram



- Update Class Diagram:


pkg
Cart
- qtyOrdered : int
+ addDigitalVideoDisc(disc : DigitalVideoDisc) : void
+ removeDigitalVideoDisc() : void
+ TotalCost() : void
+ DisplayCart() : void
+ SortDisc() : void
+ print() : void
+ SearchbyID(id : int) : void
+ SearchbyTitle(title : String) : void
+ addDigitalVideoDisc(...disc : DigitalVideoDisc) : void
+ addDigitalVideoDisc(disc[] : DigitalVideoDisc) : void
Aim
+ main() : void
Store
+ print() : void
+ addDVD(disc : DigitalVideoDisc) : void
+ removeDVD(id : int) : void
+ removeDVD(disc : DigitalVideoDisc) : void
DigitalVideoDisc
- title : String
- category : String
- director : String
- length : int
- cost : float
+ getTitle() : String
+ DigitalVideoDisc(Title : String) : void
+ getCategory() : String
+ getDirector() : String
+ getLength() : int
+ getCost() : float
+ DigitalVideoDisc(category : String, title : String, cost : float) : void
+ DigitalVideoDisc(director : String, category : String, title : String, cost : float) : void
+ DigitalVideoDisc(title : String, category : String, director : String, length : int, cost : float) : void
+ toString() : String
+ isMatch(title : String) : boolean

9. Answer Question:

- Is JAVA a Pass by Value or a Pass by Reference programming language?

Java is a passed by value programming language.

- After the call of swap(jungleDVD, cinderellaDVD) why does the title of these two objects still remain?

Because the swap() method is exchanging the values of the title fields between the two objects, but it's not changing the object references themselves. So the jungleDVD and cinderellaDVD object references still point to the same objects in memory as before the swap() method call.

- After the call of changeTitle(jungleDVD, cinderellaDVD.getTitle()) why is the title of the JungleDVD changed?

Because the changeTitle() method is modifying the title field of the jungleDVD object directly using the setter method.

- Write a toString() method for the DigitalVideoDisc class. What should be the return type of this method?

The return type should be String