

# 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!");
        }
    }
}
```

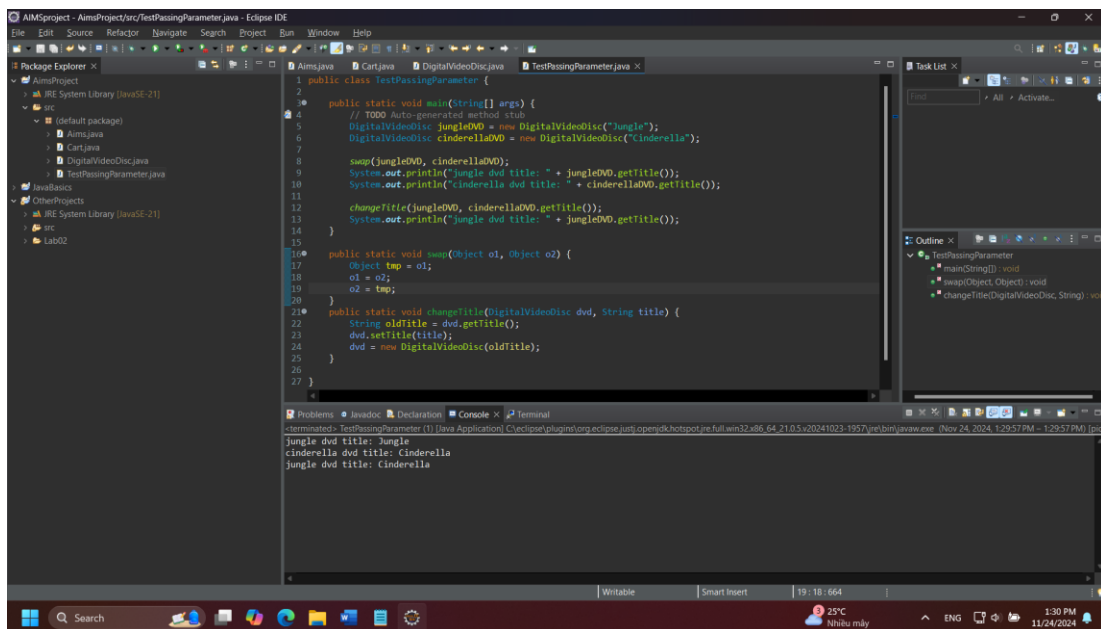
```

    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



```

1 package hust.soict.dsai.test.disc;
2 import hust.soict.dsai.aims.disc.DigitalVideoDisc;
3
4 public class TestPassingParameter {
5
6     public static void main(String[] args) {
7         // TODO Auto-generated method stub
8         DigitalVideoDisc jungleDVD = new DigitalVideoDisc("Jungle");
9         DigitalVideoDisc cinderellaDVD = new DigitalVideoDisc("Cinderella");
10
11         swap(jungleDVD, cinderellaDVD);
12         System.out.println("jungle dvd title: " + jungleDVD.getTitle());
13         System.out.println("cinderella dvd title: " + cinderellaDVD.getTitle());
14
15         changeTitle(jungleDVD, cinderellaDVD.getTitle());
16         System.out.println("jungle dvd title: " + jungleDVD.getTitle());
17     }
18
19     public static void swap(Object o1, Object o2) {
20         Object tmp = o1;
21         o1 = o2;
22         o2 = tmp;
23     }
24
25     public static void changeTitle(DigitalVideoDisc dvd, String title) {
26         String oldTitle = dvd.getTitle();
27         dvd.setTitle(title);
28         dvd = new DigitalVideoDisc(oldTitle);
29     }
30
31 }
32

```

### 3. Use debug run

The screenshot shows the Eclipse IDE with the `TestPassingParameter.java` file open. The code is the same as shown in the previous block. The `main` method is currently selected, and the `swap` method is being debugged. The `Variables` window on the right shows the state of the program:

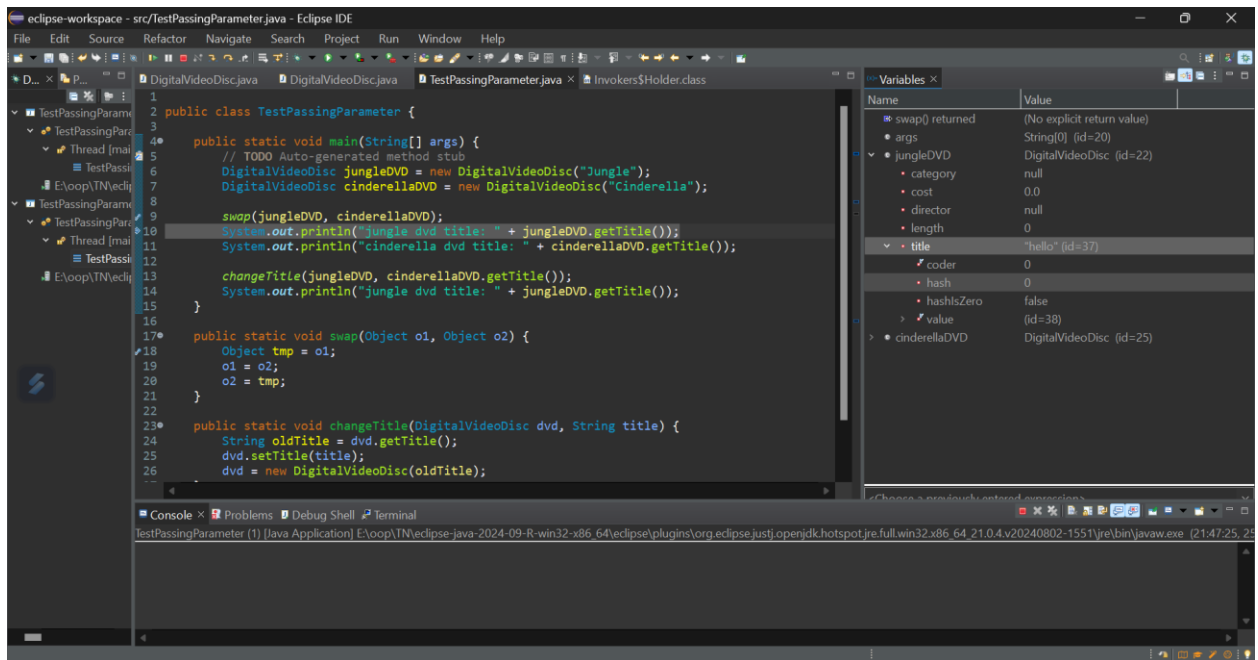
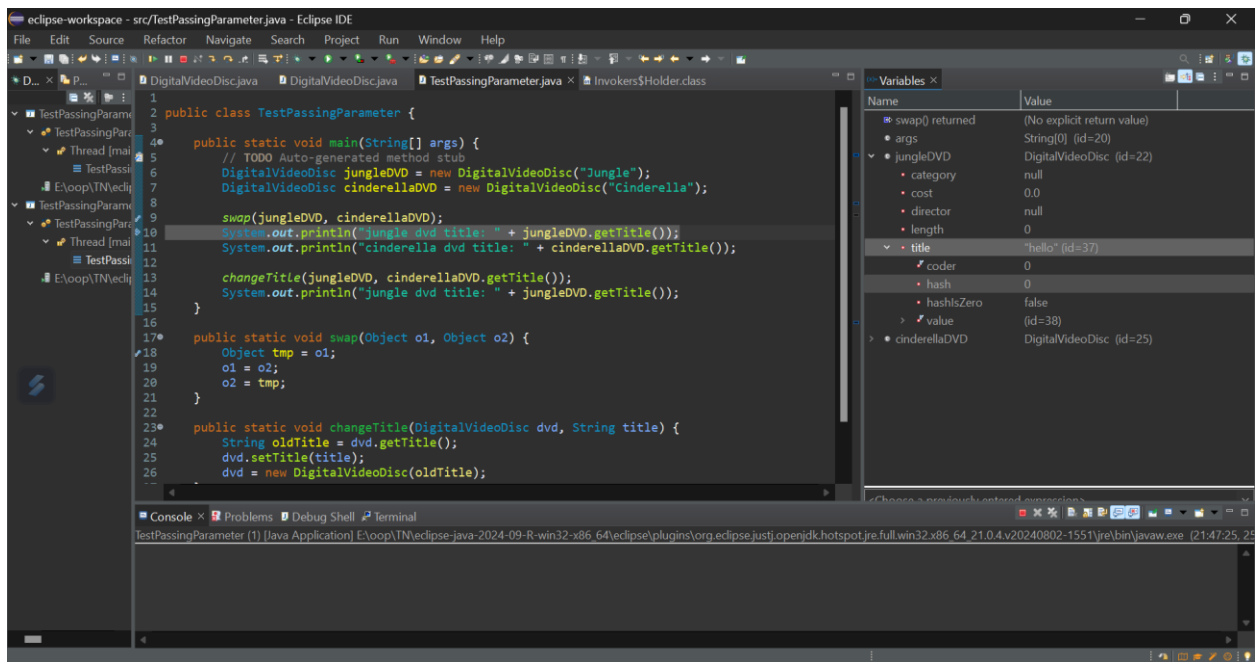
Name	Value
no method return value	
o1	DigitalVideoDisc (id=23)
category	null
cost	0.0
director	null
length	0
title	"Jungle" (id=26)
o2	DigitalVideoDisc (id=25)
category	null
cost	0.0
director	null
length	0
title	"Cinderella" (id=32)

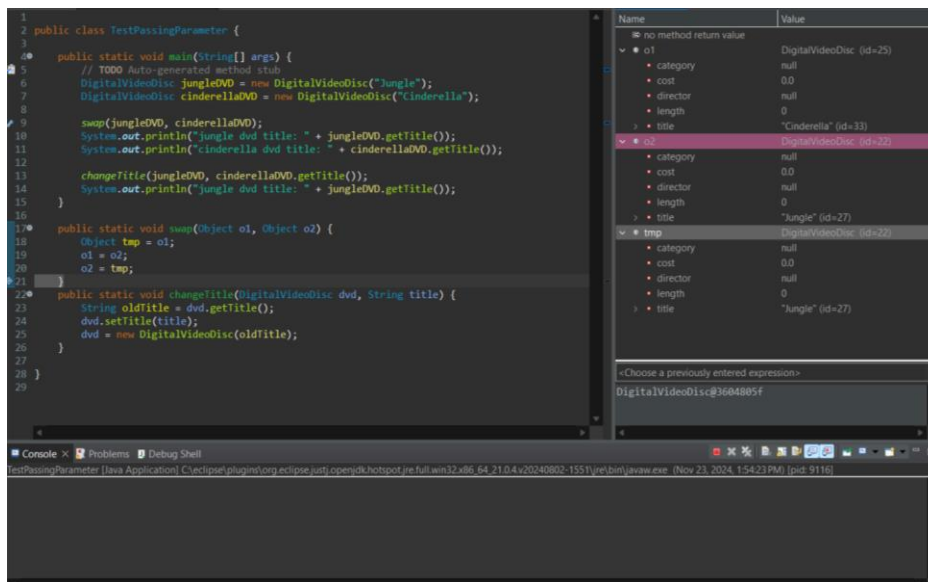
The `Console` window at the bottom shows the output of the program:

```

TestPassingParameter (1) [Java Application] E:\oop\IN\ eclipse-java-2024-09-R-win32-x86_64\ eclipse\plugins\org.eclipse.justi.openjdk.hotspot.jre.full.win32.x86_64.21.0.4.v20240802-1551\jre\bin\javaw.exe [21:43:24.25]

```





#### 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

```

1 package hust.soict.dsai.aims.disc;
2
3
4 public class DigitalVideoDisc {
5     private static int nbDigitalVideoDisc;
6     private int id;
7     private String title;
8     private String category;
9     private String director;
10    private int length;
11    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:

```
1 package hust.soict.dsai.test.cart;
2 import hust.soict.dsai.aims.cart.Cart;
3
4
5 public class CartTest {
6     public static void main(String[] args) {
7         // Create a new cart
8         Cart cart = new Cart();
9
10        // Create new DVD objects and add them to the cart
11        DigitalVideoDisc dvd1 = new DigitalVideoDisc("The Lion King", "Animation", "Roger Allers", 87, 18.99);
12
13        cart.addDigitalVideoDisc(dvd1);
14
15        DigitalVideoDisc dvd2 = new DigitalVideoDisc("Star Wars", "Science Fiction", "George Lucas", 87, 18.99);
16
17        cart.addDigitalVideoDisc(dvd2);
18
19        DigitalVideoDisc dvd3 = new DigitalVideoDisc("Aladin", "Animation", null, 0, 18.99);
20
21        cart.addDigitalVideoDisc(dvd3);
22
23        // Test the print method
24        cart.print();
25
26        cart.searchById(2);
27        cart.searchByTitle("Aladin");
28
29        // To-do: Test the search methods here
30    }
31 }
32
33
```

```
<terminated> CartTest [Java Application] E:\oop\TN\eclipse-java-2024-09-R-win
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 - 18.99$
2. DVD - Star Wars - Science Fiction - George Lucas - 87 - 18.99$
3. DVD - Aladin - Animation - null - 0: 18.99$
DVD: Star Wars - Category: Science Fiction - Director: null - Price: 18.99$
DVD: Aladin - Category: Animation - Director: null - Price: 18.99$
```

## 6. Implement the Store class

- Store



```

7 public class StoreClass {
8     private ArrayList<DigitalVideoDisc> itemsStore = new ArrayList<>();
9     public void addDVD(DigitalVideoDisc dvd) {
10         itemsStore.add(dvd);
11         System.out.println("The disc has been added!");
12     }
13
14     public void removeDVD(int id) {
15         boolean found = false;
16         for (DigitalVideoDisc dvd: itemsStore) {
17             if (dvd.getID() == id) {
18                 itemsStore.remove(dvd);
19                 found = true;
20                 break;
21             }
22         }
23         if (found == false) System.out.println("There isnt any dvd have id " + id + " in store");
24     }
25
26     public void print() {
27         System.out.println("*****CART*****");
28         System.out.println("Store Items: ");
29         for (DigitalVideoDisc a: itemsStore) {
30             System.out.println(a.getID() + ". DVD - " + a.getTitle() + " - " + a.getCategory()
31                 + " - " + a.getDirector() + " - " + a.getLength() + ": " + a.getCost() + "$");
32         }
33     }
34 }
35
36     public void removeDVD(DigitalVideoDisc dvd) {
37         itemsStore.remove(dvd);
38     }
39
40 }

```

- Chạy StoreRun:

The screenshot shows an IDE with two main windows: a code editor on the left and a console on the right.

**Code Editor (StoreTest.java):**

```

1 package hust.soict.dsai.test.store;
2 import hust.soict.dsai.aims.disc.DigitalVideoDisc;
3
4
5 public class StoreTest {
6
7     public static void main(String[] args) {
8         // TODO Auto-generated method stub
9         // Create a new cart
10        StoreClass store = new StoreClass();
11
12        // Create new DVD objects and add them to the cart
13        DigitalVideoDisc dvd1 = new DigitalVideoDisc("The Lion King",
14            "Animation", "Roger Allers", 85400);
15        store.addDVD(dvd1);
16
17        DigitalVideoDisc dvd2 = new DigitalVideoDisc("Star Wars",
18            "Science Fiction", "George Lucas", 7999);
19        store.addDVD(dvd2);
20
21        DigitalVideoDisc dvd3 = new DigitalVideoDisc("Aladin",
22            "Animation", 18.99f);
23        store.addDVD(dvd3);
24
25        store.removeDVD(dvd2);
26
27        store.removeDVD(0);
28
29        store.print();
30
31    }
32 }
33
34 }
35

```

**Console Output:**

```

<terminated> StoreTest [Java Application] E:\oop\TN\ eclipse-j
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:

```
3 import java.util.Random;
4
5 public class ConcatenationInLoops {
6     public static void main(String[] args) {
7         Random r = new Random(123);
8         long start = System.currentTimeMillis();
9         String s = "";
10        for (int i = 0; i < 65536; i++) {
11            s += r.nextInt(2);
12        }
13        System.out.println(System.currentTimeMillis() - start); // This prints roughly 4500.
14
15        r = new Random(123);
16        start = System.currentTimeMillis();
17        StringBuilder sb = new StringBuilder();
18        for (int i = 0; i < 65536; i++) {
19            sb.append(r.nextInt(2));
20        }
21        s = sb.toString();
22        System.out.println(System.currentTimeMillis() - start); // This prints 5.
23    }
24 }
```

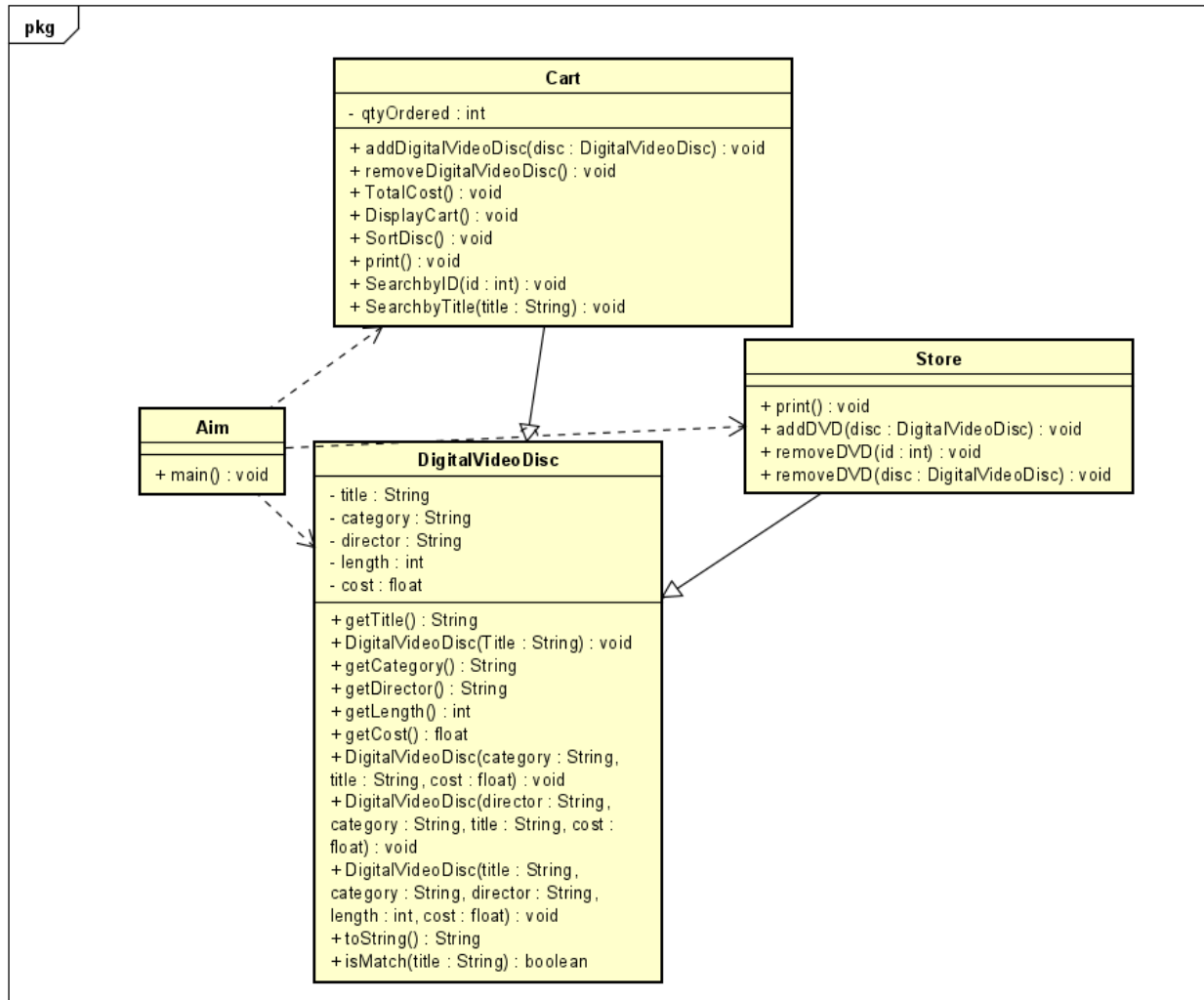
### - Class GarbageCreator:

```
3 import java.io.IOException;
4
5 public class GarbageCreator {
6     public static void main(String[] args) {
7
8         String filename = "src/test.txt";
9         byte[] inputBytes = { 0 };
10        long startTime, endTime;
11
12        try {
13            inputBytes = Files.readAllBytes(Paths.get(filename));
14        } catch (IOException e) {
15            // TODO Auto-generated catch block
16            e.printStackTrace();
17        }
18
19        startTime = System.currentTimeMillis();
20        String outputString = "";
21        for (byte b : inputBytes) {
22            outputString += (char)b;
23        }
24        endTime = System.currentTimeMillis();
25        System.out.println(endTime - startTime);
26    }
27 }
```

- Class NoGarbage:

```
3 import java.io.IOException;
6
7 public class NoGarbage {
8     public static void main(String[] args) {
9
10         String filename = "src/test.txt";
11         byte[] inputBytes = { 0 };
12         long startTime, endTime;
13
14         try {
15             inputBytes = Files.readAllBytes(Paths.get(filename));
16         } catch (IOException e) {
17             // TODO Auto-generated catch block
18             e.printStackTrace();
19         }
20
21         startTime = System.currentTimeMillis();
22         StringBuilder outStringBuilder = new StringBuilder();
23         for (byte b : inputBytes) {
24             outStringBuilder.append((char)b);
25         }
26         endTime = System.currentTimeMillis();
27         System.out.println(endTime - startTime);
28
29
30     }
31 }
32
```

8. Update Astah file
- Update Class Diagram:



## 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