

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!");
        }
    }
}
```

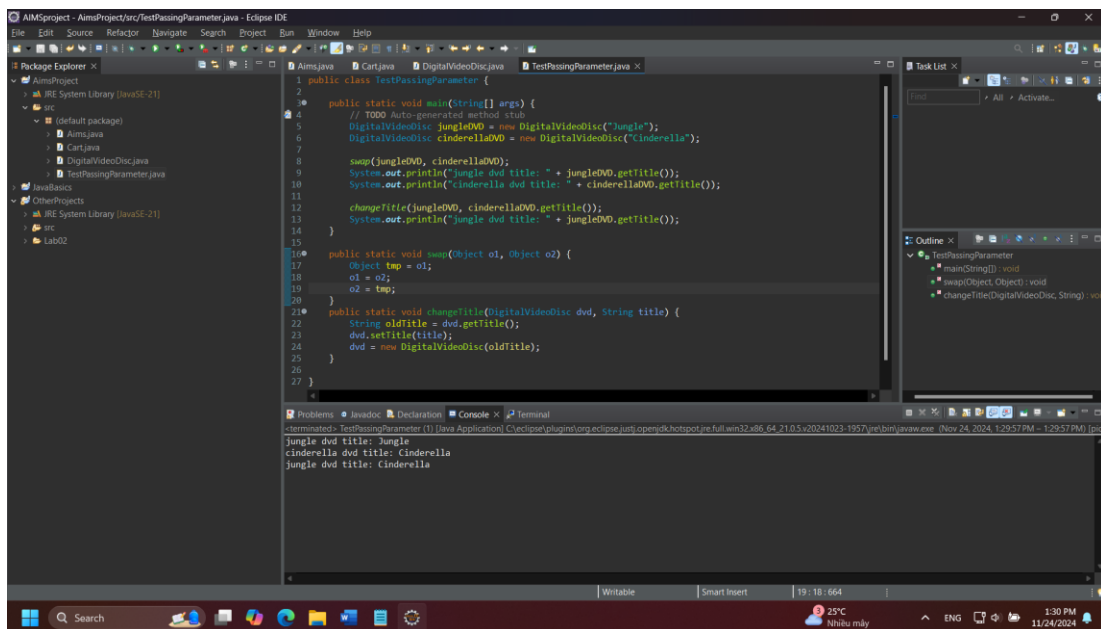
```

    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

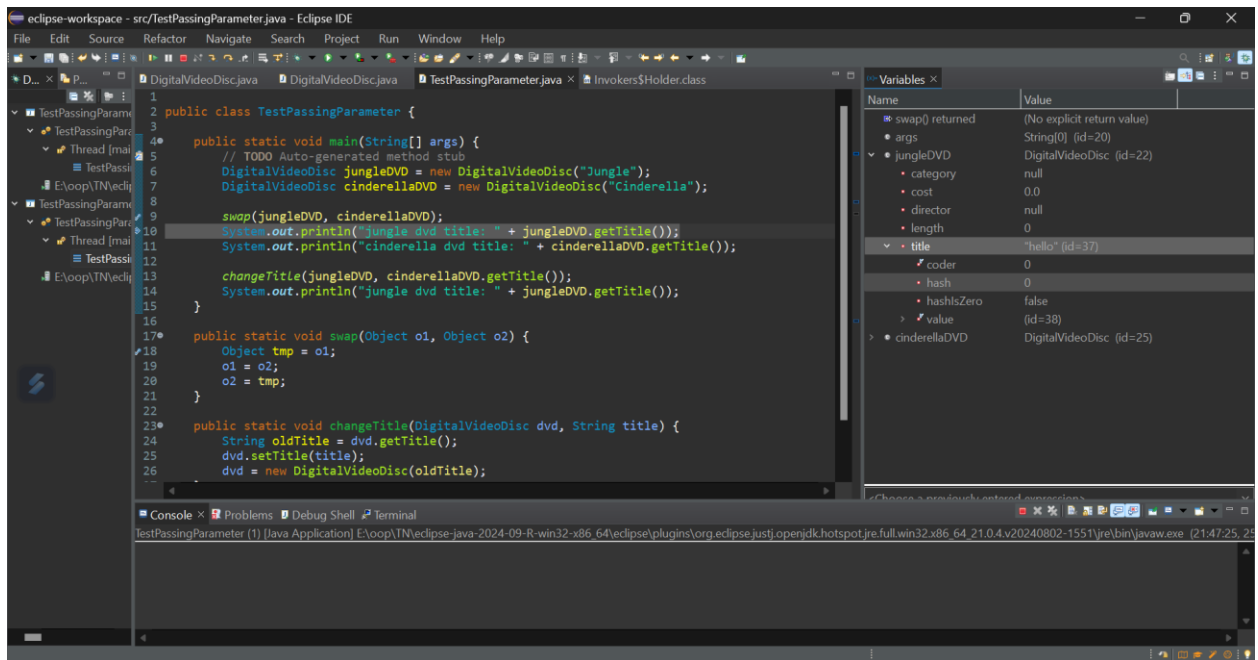
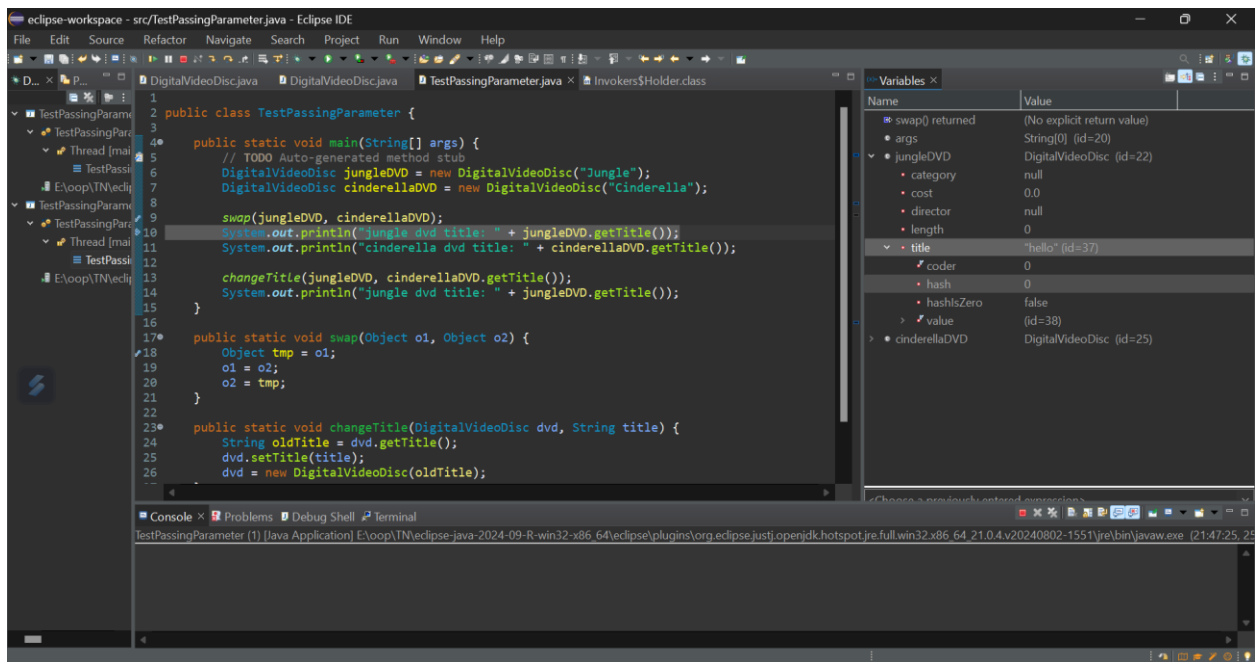
The screenshot shows the Eclipse IDE with the following components:

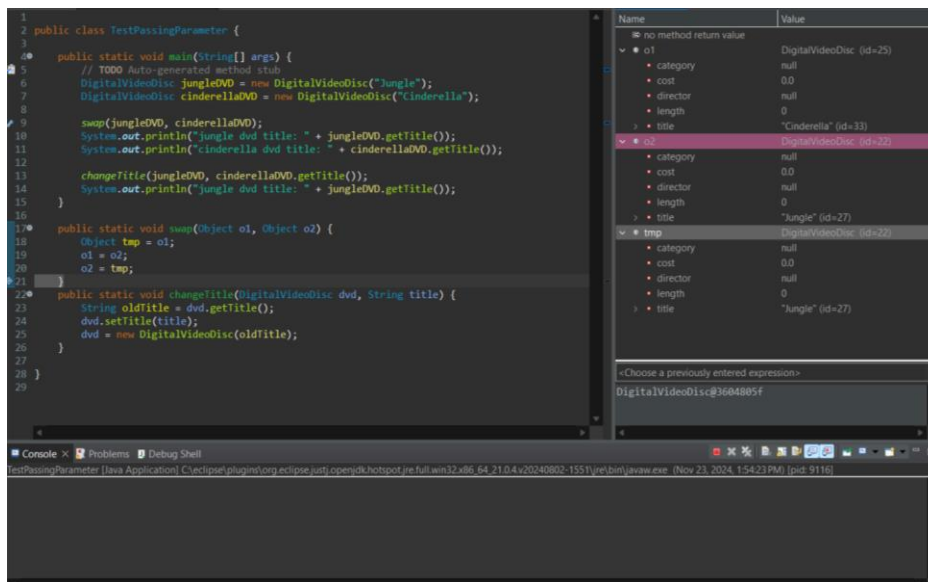
- Editor:** Displays the Java code for `TestPassingParameter.java`. The cursor is at line 18, column 18.
- Variables Window:** Shows the state of variables:

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)
- Console Window:** 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]
jungle dvd title: Jungle
cinderella dvd title: Cinderella
jungle dvd title: Jungle
      
```





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, "DVD");
12
13        cart.addDigitalVideoDisc(dvd1);
14
15        DigitalVideoDisc dvd2 = new DigitalVideoDisc("Star Wars", "Science Fiction", "George Lucas", 124, "DVD");
16
17        cart.addDigitalVideoDisc(dvd2);
18
19        DigitalVideoDisc dvd3 = new DigitalVideoDisc("Aladin", "Animation", null, 0, "DVD");
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
2. DVD - Star Wars - Science Fiction - George Lucas - 124
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


```

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 tabs: `StoreTest.java` and `Console`. The `StoreTest.java` tab contains the following code:

```

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", 85);
15        store.addDVD(dvd1);
16
17        DigitalVideoDisc dvd2 = new DigitalVideoDisc("Star Wars",
18            "Science Fiction", "George Lucas", 87);
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

```

The `Console` tab shows the output of the program:

```

<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 }
```

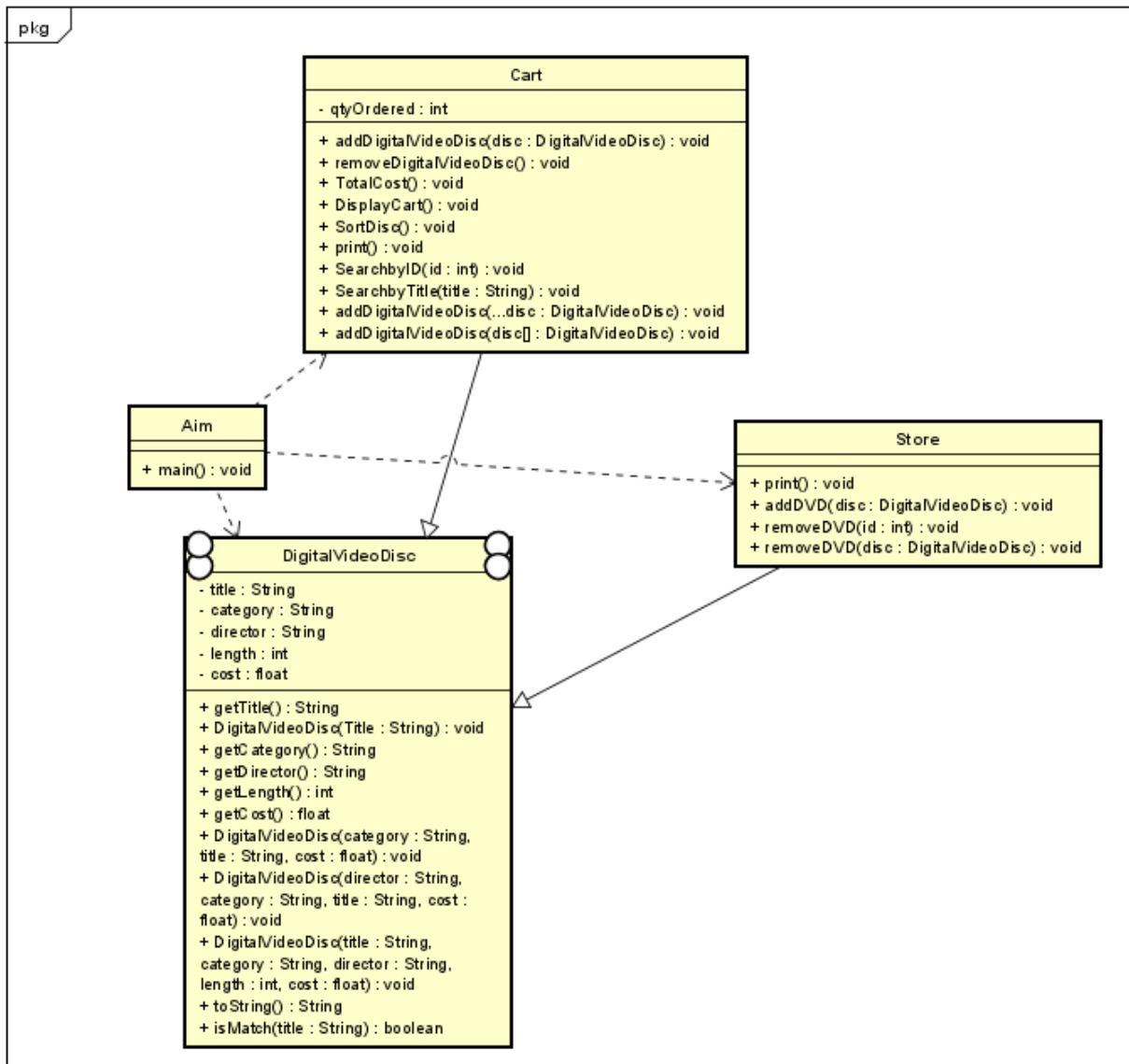
- Class GarbageCreator:

```
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`