# Report OOP – Lab03

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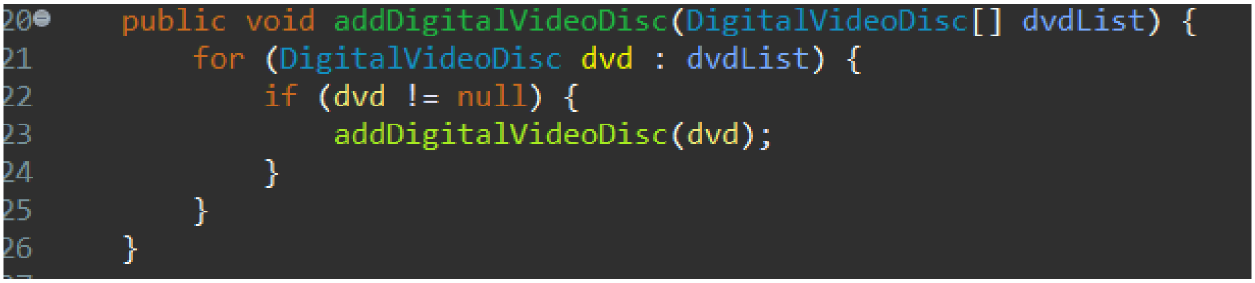
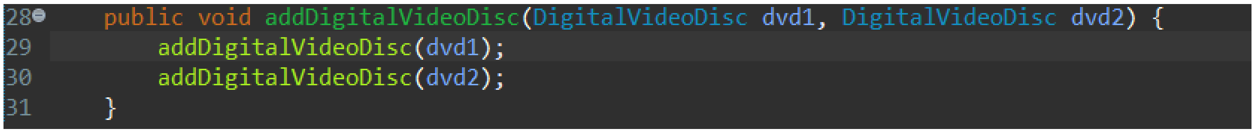
## 1. Working with method overloading

- Overloading by differing types of parameter



```
    public void addDigitalVideoDisc(DigitalVideoDisc[] dvdList) {
        for (DigitalVideoDisc dvd : dvdList) {
            if (dvd != null) {
                addDigitalVideoDisc(dvd);
            }
        }
    }
```

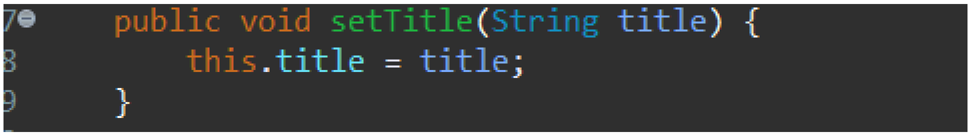
- Overloading by differing the number of parameters



```
    public void addDigitalVideoDisc(DigitalVideoDisc dvd1, DigitalVideoDisc dvd2) {
        addDigitalVideoDisc(dvd1);
        addDigitalVideoDisc(dvd2);
    }
```

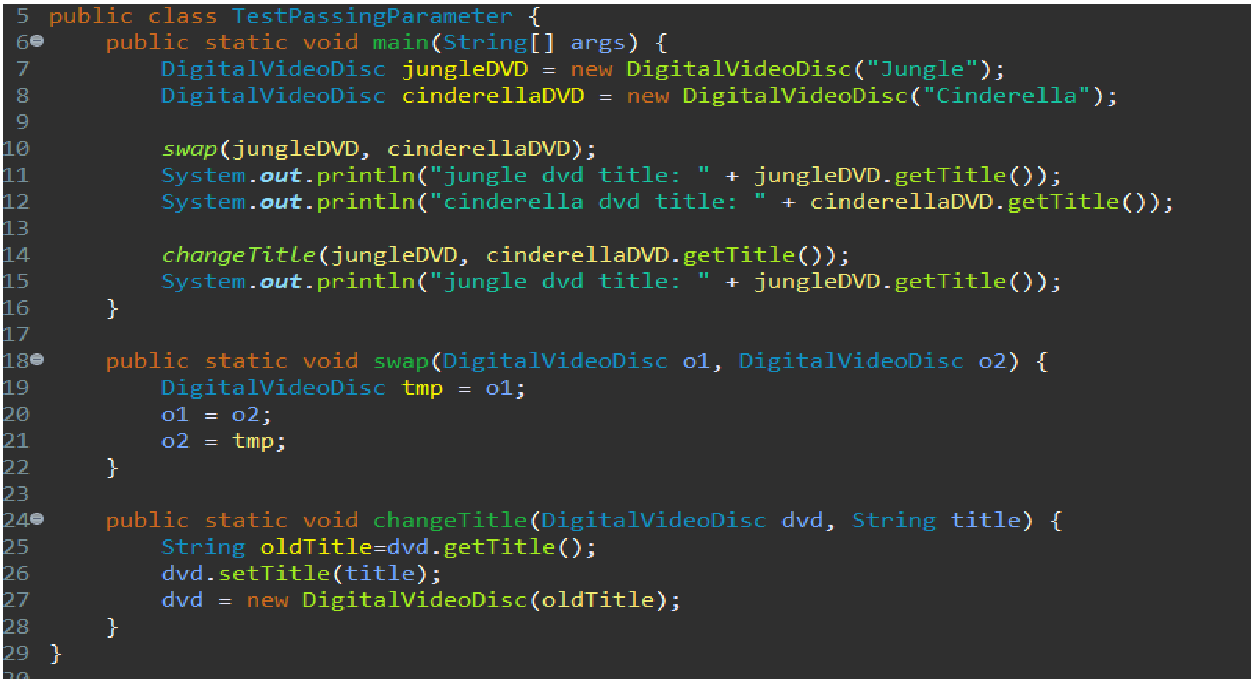
## 2. Passing parameter

- Thêm setter cho title của lớp DigitalVideoDisc



```
    public void setTitle(String title) {
        this.title = title;
    }
```

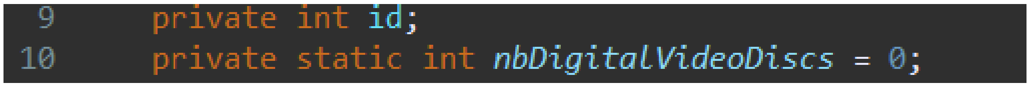
- Class TestPassingParameter



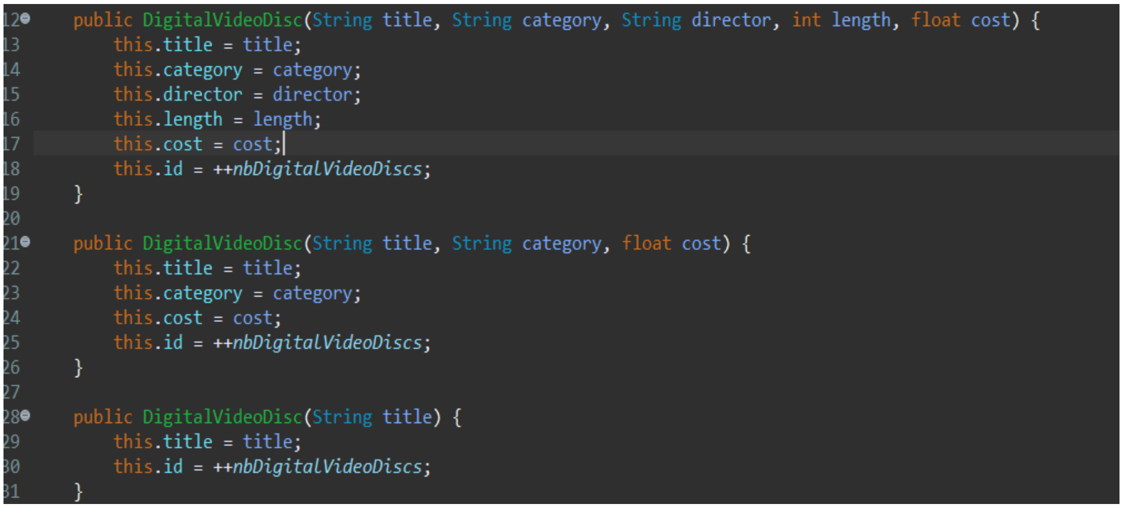
```java
public class TestPassingParameter {
    public static void main(String[] args) {
        DigitalVideoDisc jungleDVD = new DigitalVideoDisc("Jungle");
        DigitalVideoDisc cinderellaDVD = new DigitalVideoDisc("Cinderella");

        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(DigitalVideoDisc o1, DigitalVideoDisc o2) {
        DigitalVideoDisc 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. Classifier Member and Instance Member

- Tại class DigitalVideoDisc thêm instance như sau



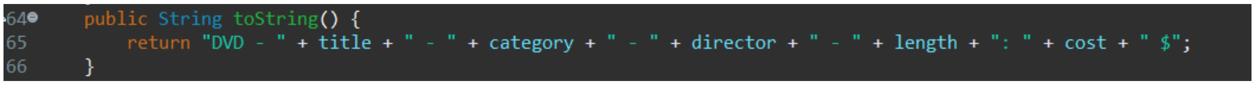
```java
    private int id;
    private static int nbDigitalVideoDiscs = 0;
```



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

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

    public DigitalVideoDisc(String title) {
        this.title = title;
        this.id = ++nbDigitalVideoDiscs;
    }
```

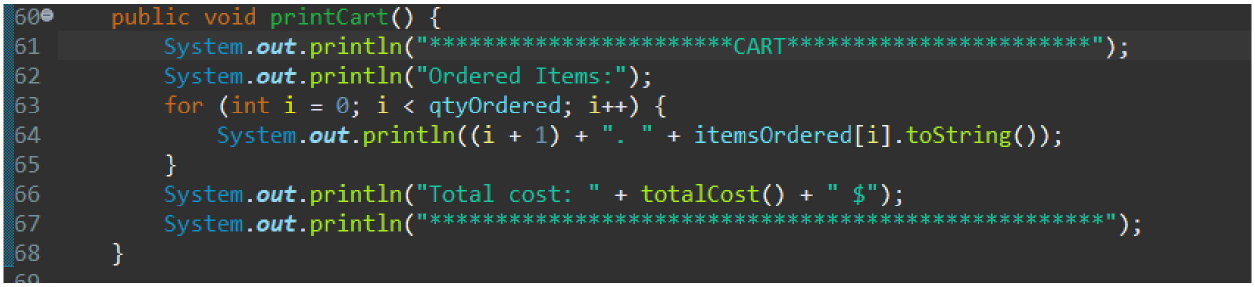
## 4. Print  Cart

- VIết hàm tótring trong DigitalVideoDisc



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

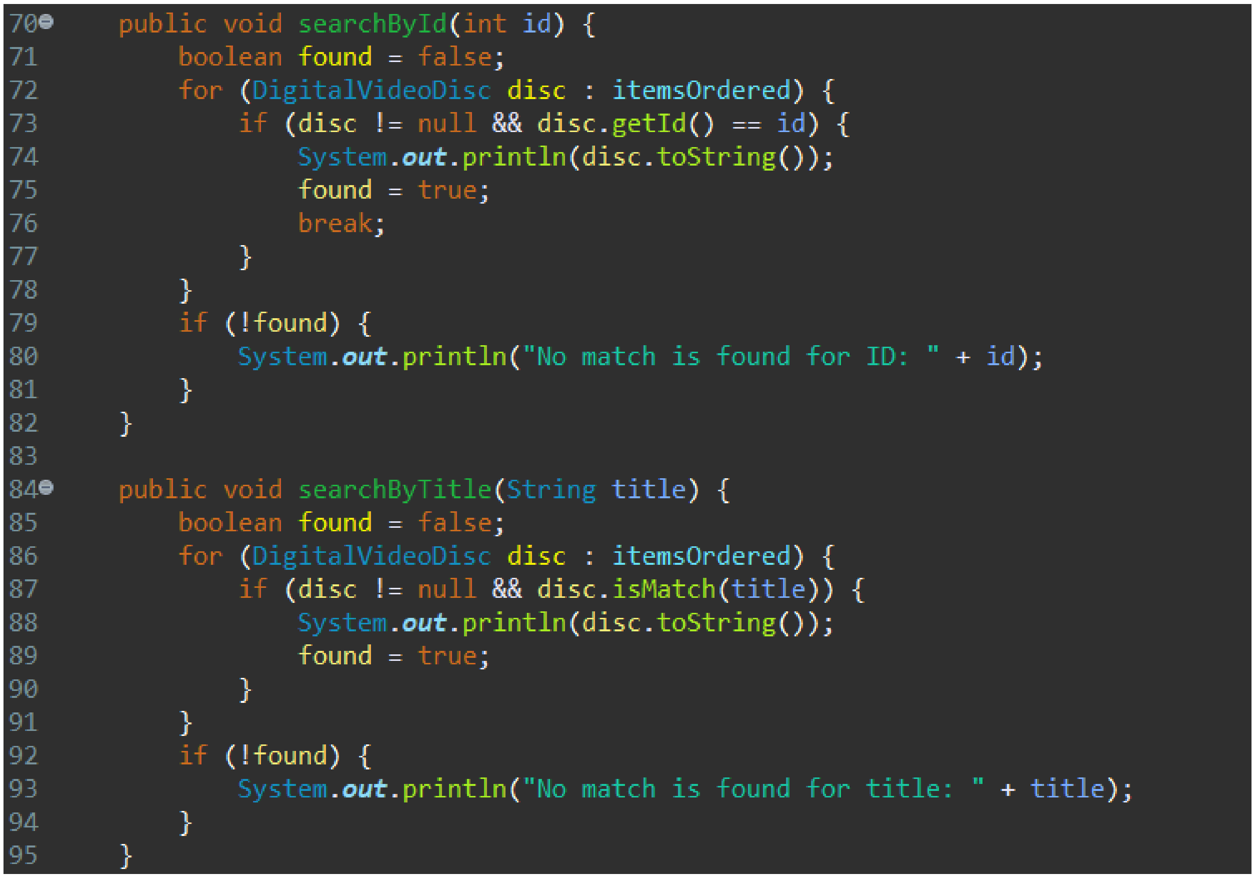
- Tạo phương thức printCart() in danh sách các mặt hàng trong class Cart



```java
    public void printCart() {
        System.out.println("***********************CART***********************");
        System.out.println("Ordered Items:");
        for (int i = 0; i < qtyOrdered; i++) {
            System.out.println((i + 1) + ". " + itemsOrdered[i].toString());
        }
        System.out.println("Total cost: " + totalCost() + " $");
        System.out.println("***************************************************");
    }
```

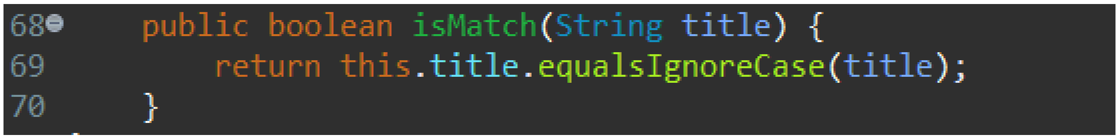
## 5. Search Cart

- Tìm kiếm theo ID và tìm kiếm theo Title ở trong class Cart



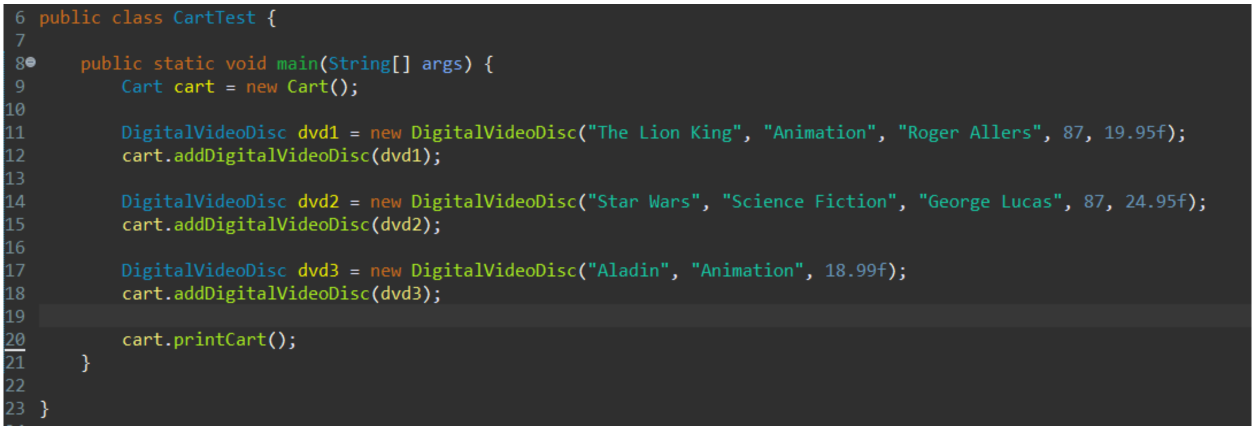
```java
    public void searchById(int id) {
        boolean found = false;
        for (DigitalVideoDisc disc : itemsOrdered) {
            if (disc != null && disc.getId() == id) {
                System.out.println(disc.toString());
                found = true;
                break;
            }
        }
        if (!found) {
            System.out.println("No match is found for ID: " + id);
        }
    }

    public void searchByTitle(String title) {
        boolean found = false;
        for (DigitalVideoDisc disc : itemsOrdered) {
            if (disc != null && disc.isMatch(title)) {
                System.out.println(disc.toString());
                found = true;
            }
        }
        if (!found) {
            System.out.println("No match is found for title: " + title);
        }
    }
```

- boolean isMatch(String title) trong DigitalVideoDisc để kiểm tra xem đĩa có khớp với tiêu đề đã cho hay không



```java
    public boolean isMatch(String title) {
        return this.title.equalsIgnoreCase(title);
    }
```

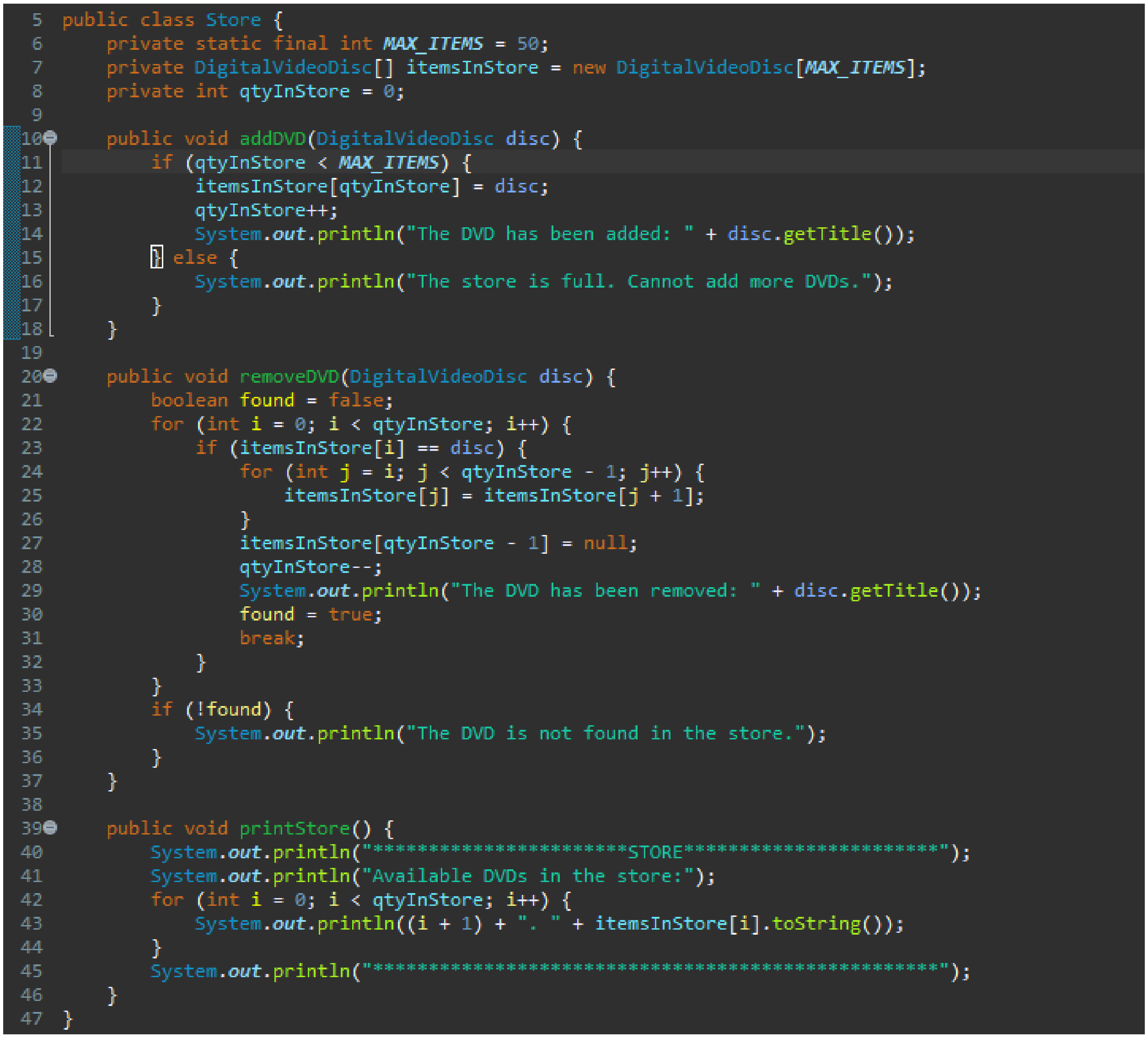
- Tạo class CartTest để kiểm tra các hàm trên



```java
public class CartTest {

    public static void main(String[] args) {
        Cart cart = new 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);

        cart.printCart();
    }

}
```

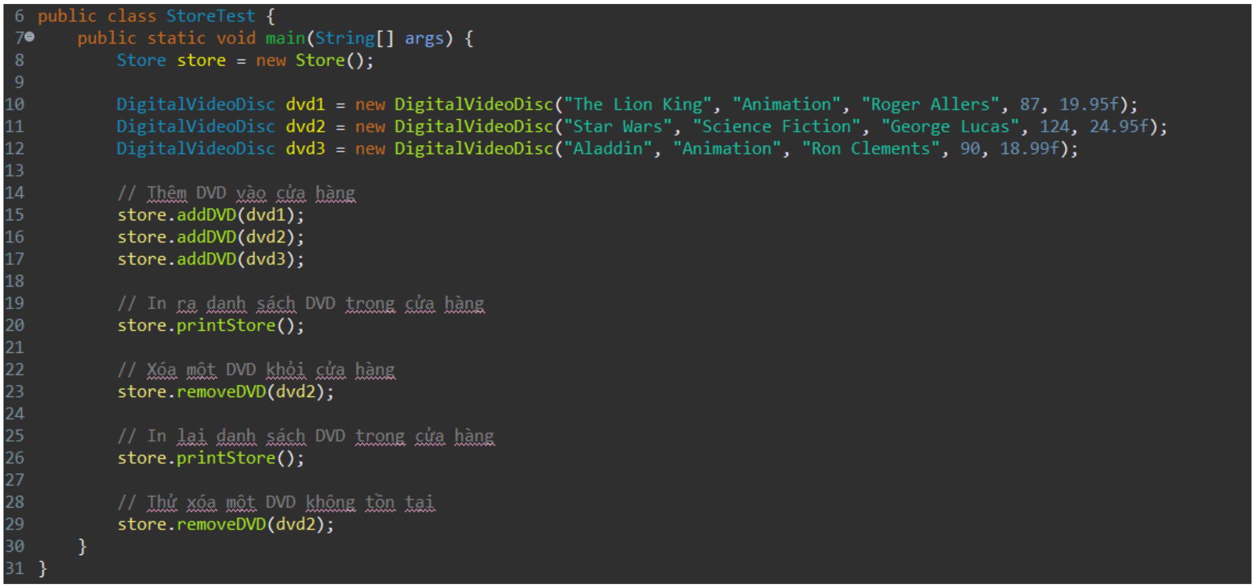
## 6. Implement the Store class

- Class Store



```java
public class Store {
    private static final int MAX_ITEMS = 50;
    private DigitalVideoDisc[] itemsInStore = new DigitalVideoDisc[MAX_ITEMS];
    private int qtyInStore = 0;

    public void addDVD(DigitalVideoDisc disc) {
        if (qtyInStore < MAX_ITEMS) {
            itemsInStore[qtyInStore] = disc;
            qtyInStore++;
            System.out.println("The DVD has been added: " + disc.getTitle());
        } else {
            System.out.println("The store is full. Cannot add more DVDs.");
        }
    }

    public void removeDVD(DigitalVideoDisc disc) {
        boolean found = false;
        for (int i = 0; i < qtyInStore; i++) {
            if (itemsInStore[i] == disc) {
                for (int j = i; j < qtyInStore - 1; j++) {
                    itemsInStore[j] = itemsInStore[j + 1];
                }
                itemsInStore[qtyInStore - 1] = null;
                qtyInStore--;
                System.out.println("The DVD has been removed: " + disc.getTitle());
                found = true;
                break;
            }
        }
        if (!found) {
            System.out.println("The DVD is not found in the store.");
        }
    }

    public void printStore() {
        System.out.println("***********************STORE***********************");
        System.out.println("Available DVDs in the store:");
        for (int i = 0; i < qtyInStore; i++) {
            System.out.println((i + 1) + ". " + itemsInStore[i].toString());
        }
        System.out.println("***************************************************");
    }
}
```

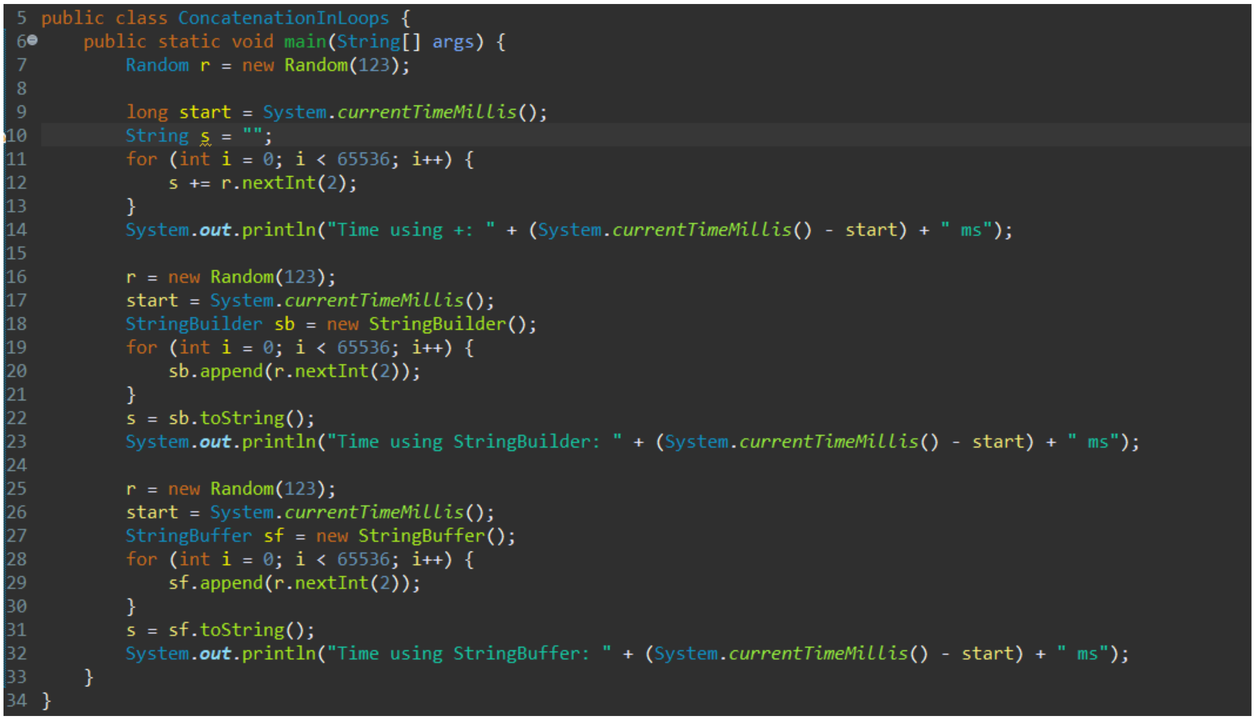
- Class StoreTest



```java
public class StoreTest {
    public static void main(String[] args) {
        Store store = new Store();

        DigitalVideoDisc dvd1 = new DigitalVideoDisc("The Lion King", "Animation", "Roger Allers", 87, 19.95f);
        DigitalVideoDisc dvd2 = new DigitalVideoDisc("Star Wars", "Science Fiction", "George Lucas", 124, 24.95f);
        DigitalVideoDisc dvd3 = new DigitalVideoDisc("Aladdin", "Animation", "Ron Clements", 90, 18.99f);

        // Thêm DVD vào cửa hàng
        store.addDVD(dvd1);
        store.addDVD(dvd2);
        store.addDVD(dvd3);

        // In ra danh sách DVD trong cửa hàng
        store.printStore();

        // Xóa một DVD khỏi cửa hàng
        store.removeDVD(dvd2);

        // In lại danh sách DVD trong cửa hàng
        store.printStore();

        // Thử xóa một DVD không tồn tại
        store.removeDVD(dvd2);
    }
}
```

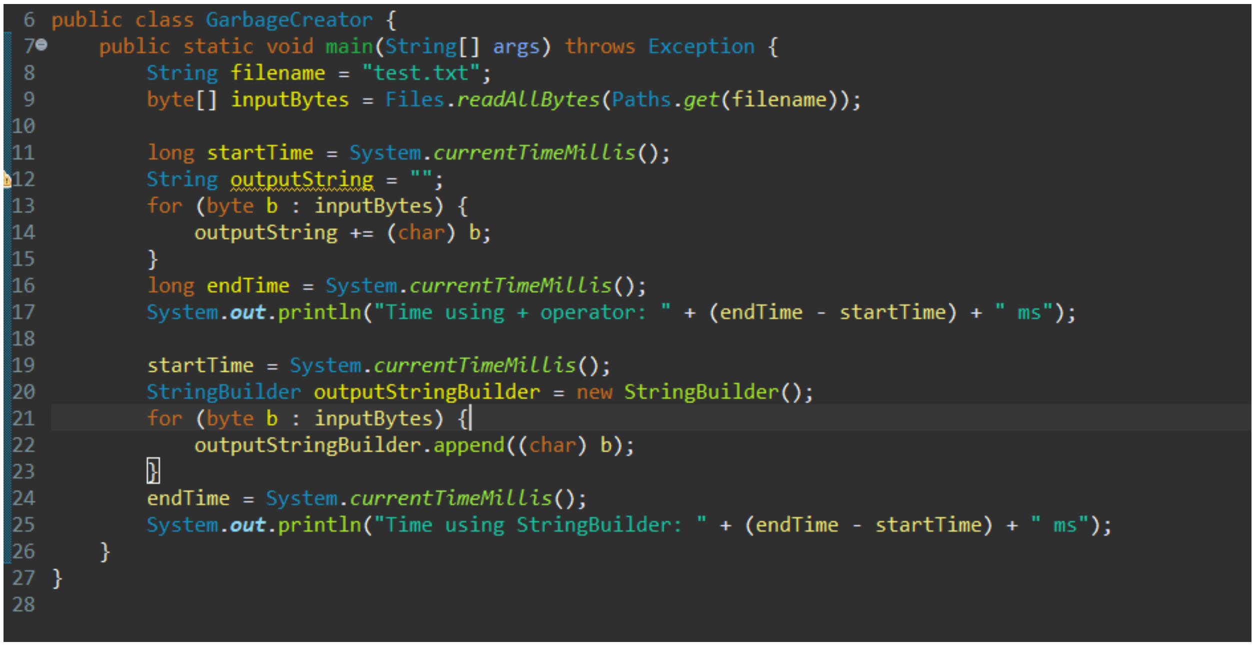
## 7. String, StringBuilder and StringBuffer

- Class ConcatenationInLoops để kiểm tra thời gian xử lý khi xây dựng chuỗi String bằng toán tử +, StringBuilder và StringBuffer



```java
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("Time using +: " + (System.currentTimeMillis() - start) + " ms");

        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("Time using StringBuilder: " + (System.currentTimeMillis() - start) + " ms");

        r = new Random(123);
        start = System.currentTimeMillis();
        StringBuffer sf = new StringBuffer();
        for (int i = 0; i < 65536; i++) {
            sf.append(r.nextInt(2));
        }
        s = sf.toString();
        System.out.println("Time using StringBuffer: " + (System.currentTimeMillis() - start) + " ms");
    }
}
```

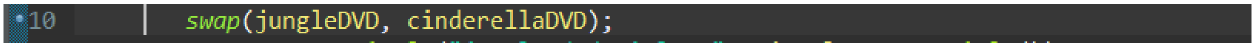
- Tạo một class mới là GarbageCreator đọc tệp văn bản vào 1 chuỗi dùng +



```java
public class GarbageCreator {
    public static void main(String[] args) throws Exception {
        String filename = "test.txt";
        byte[] inputBytes = Files.readAllBytes(Paths.get(filename));

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

        startTime = System.currentTimeMillis();
        StringBuilder outputStringBuilder = new StringBuilder();
        for (byte b : inputBytes) {
            outputStringBuilder.append((char) b);
        }
        endTime = System.currentTimeMillis();
        System.out.println("Time using StringBuilder: " + (endTime - startTime) + " ms");
    }
}
```

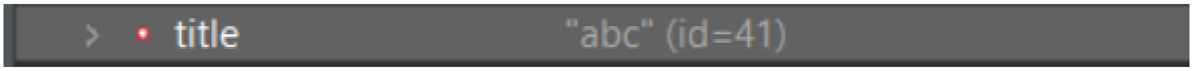
## 8. Debug

- Debug tại class TestPassingParameter. Đặt breakpoint tại swap(jungleDVD, cinderellaDVD)



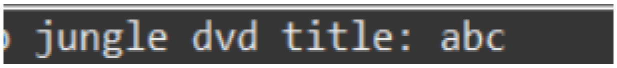
```java
        swap(jungleDVD, cinderellaDVD);
```

- Thay đổi giá trị của biến



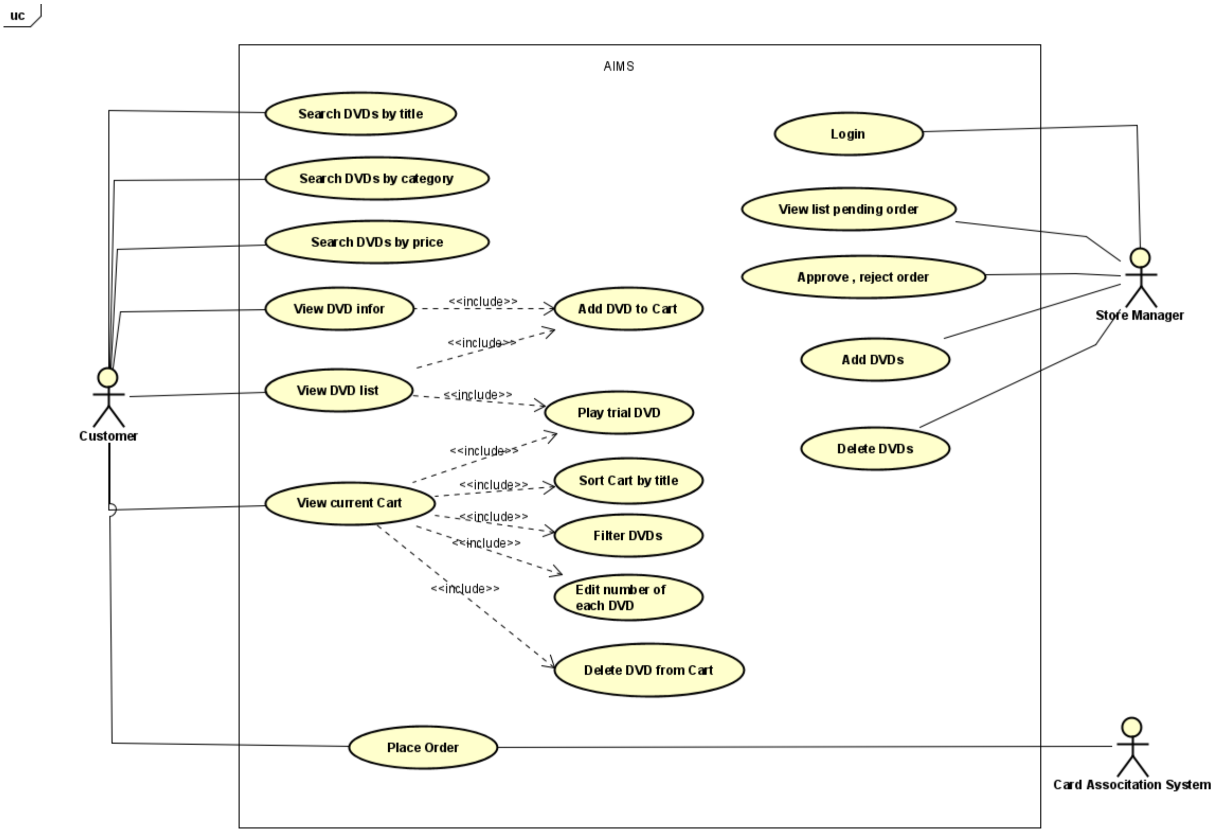
title    "abc" (id=41)

- Kết quả

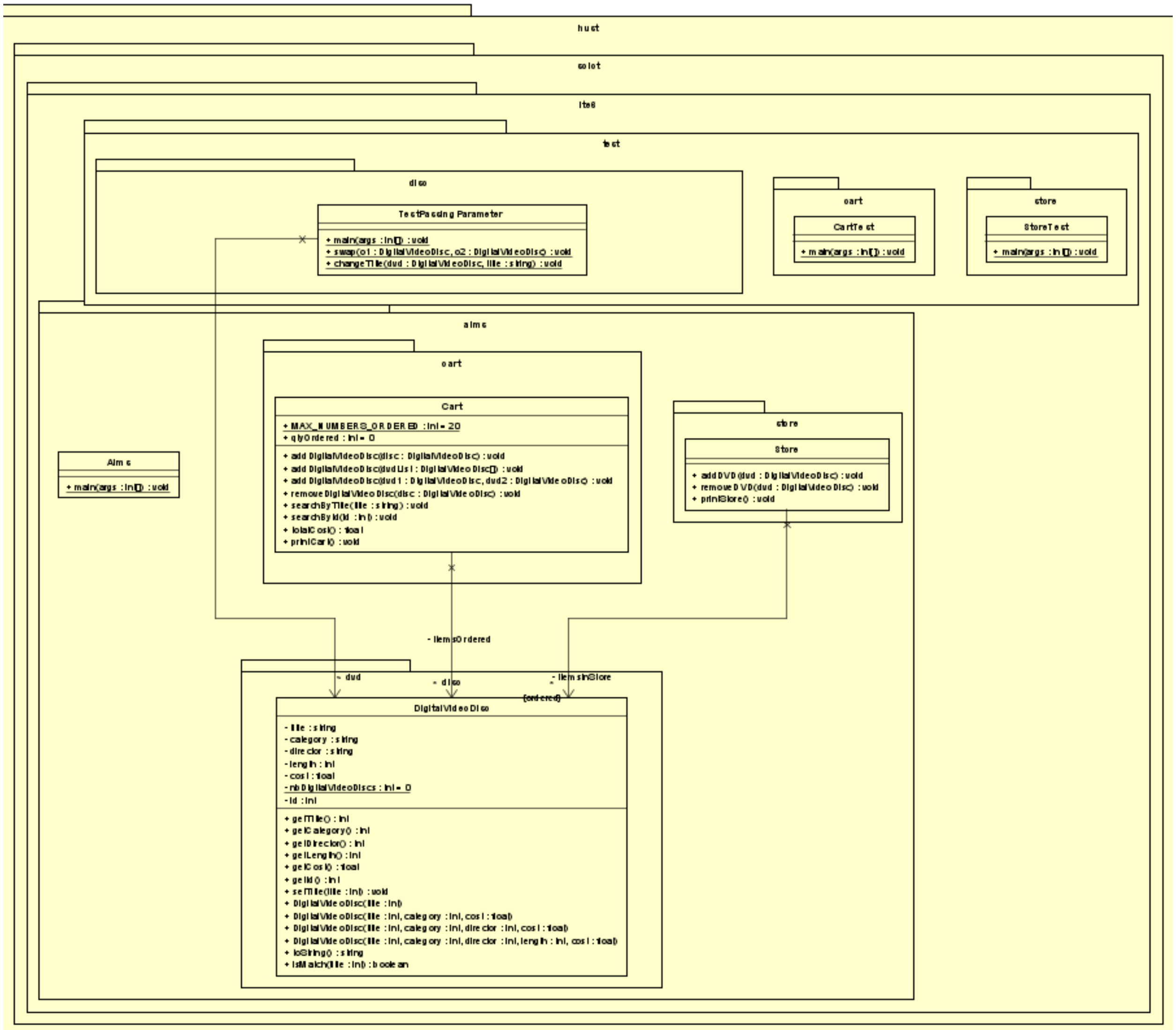


```
jungle dvd title: abc
```

## 9. Use-case Diagram



## 10. Class Diagram


hust
soict
ite6
test
disc
TestPassingParameter
+ main(args : int[]) : void
+ swap(o1 : DigitalVideoDisc, o2 : DigitalVideoDisc) : void
+ changeTitle(dvd : DigitalVideoDisc, title : string) : void
cart
CartTest
+ main(args : int[]) : void
store
StoreTest
+ main(args : int[]) : void
aims
Aims
+ main(args : int[]) : void
cart
Cart
+ MAX_NUMBERS_ORDERED : int = 20
+ qtyOrdered : int = 0
+ addDigitalVideoDisc(disc : DigitalVideoDisc) : void
+ addDigitalVideoDisc(dvdList : DigitalVideoDisc[]) : void
+ addDigitalVideoDisc(dvd1 : DigitalVideoDisc, dvd2 : DigitalVideoDisc) : void
+ removeDigitalVideoDisc(disc : DigitalVideoDisc) : void
+ searchByTitle(title : string) : void
+ searchById(id : int) : void
+ totalCost() : float
+ printCart() : void
store
Store
+ addDVD(dvd : DigitalVideoDisc) : void
+ removeDVD(dvd : DigitalVideoDisc) : void
+ printStore() : void
- itemsOrdered
~ dvd
~ disc
- itemsInStore
*
{ordered}
DigitalVideoDisc
- title : string
- category : string
- director : string
- length : int
- cost : float
- nbDigitalVideoDiscs : int = 0
- id : int
+ getTitle() : int
+ getCategory() : int
+ getDirector() : int
+ getLength() : int
+ getCost() : float
+ getId() : int
+ setTitle(title : int) : void
+ DigitalVideoDisc(title : int)
+ DigitalVideoDisc(title : int, category : int, cost : float)
+ DigitalVideoDisc(title : int, category : int, director : int, cost : float)
+ DigitalVideoDisc(title : int, category : int, director : int, length : int, cost : float)
+ toString() : string
+ isMatch(title : int) : boolean

## 11. Answer Question

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

Java is a programming language that uses pass-by-value.

- **After the call of swap(jungleDVD, cinderellaDVD), why do the titles of these two objects remain unchanged?**

This is because the swap() method only swaps the values of the title fields between the two objects temporarily within the method. It does not modify the original object references. As a result, the references jungleDVD and cinderellaDVD continue to point to their original objects in memory after the method execution.

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

The title of jungleDVD changes because the changeTitle() method directly updates the title field of the jungleDVD object by calling its setter method.

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

The return type of the toString() method for the DigitalVideoDisc class should be String.