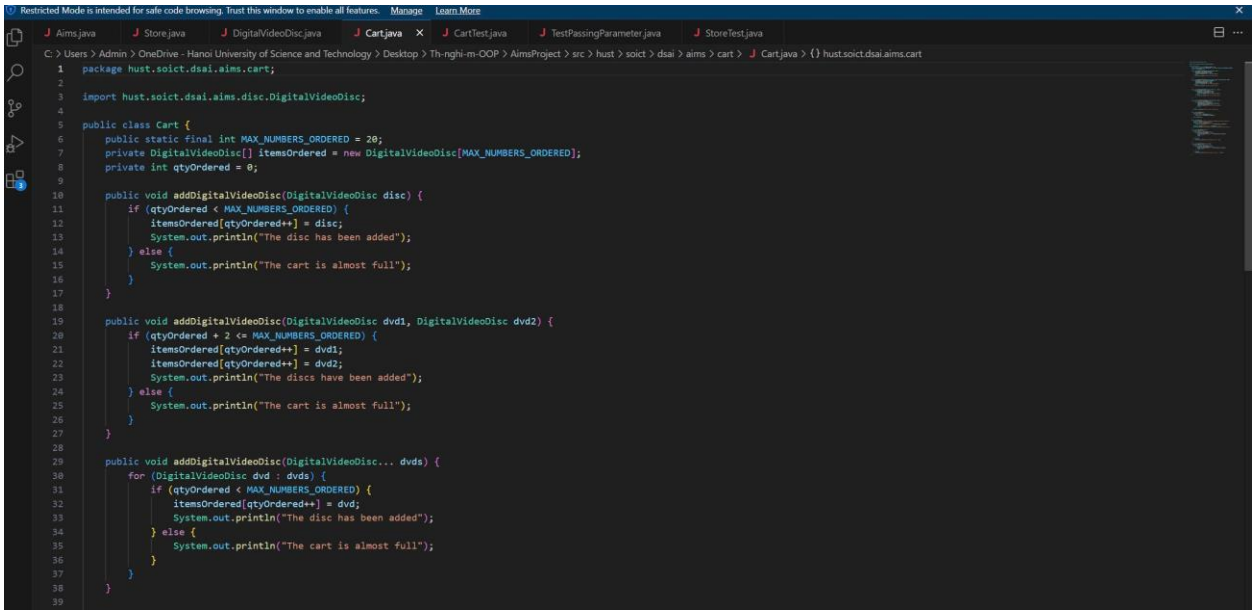
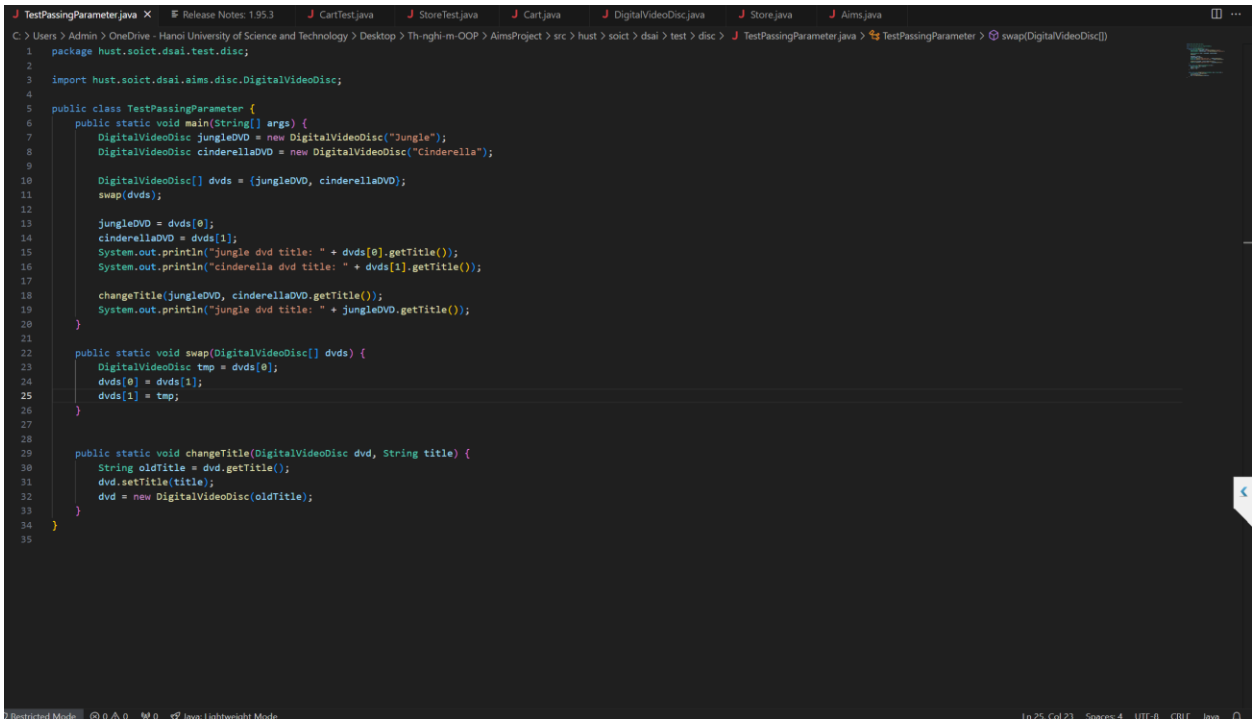
I. Screenshot new writtten code

1. Method overloading



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

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

public class Cart {
    public static final int MAX_NUMBERS_ORDERED = 20;
    private DigitalVideoDisc[] itemsOrdered = new DigitalVideoDisc[MAX_NUMBERS_ORDERED];
    private int qtyOrdered = 0;

    public void addDigitalVideoDisc(DigitalVideoDisc disc) {
        if (qtyOrdered < MAX_NUMBERS_ORDERED) {
            itemsOrdered[qtyOrdered++] = disc;
            System.out.println("The disc has been added");
        } else {
            System.out.println("The cart is almost full");
        }
    }

    public void addDigitalVideoDisc(DigitalVideoDisc dvd1, DigitalVideoDisc dvd2) {
        if (qtyOrdered + 2 <= MAX_NUMBERS_ORDERED) {
            itemsOrdered[qtyOrdered++] = dvd1;
            itemsOrdered[qtyOrdered++] = dvd2;
            System.out.println("The discs have been added");
        } else {
            System.out.println("The cart is almost full");
        }
    }

    public void addDigitalVideoDisc(DigitalVideoDisc... dvds) {
        for (DigitalVideoDisc dvd : dvds) {
            if (qtyOrdered < MAX_NUMBERS_ORDERED) {
                itemsOrdered[qtyOrdered++] = dvd;
                System.out.println("The disc has been added");
            } else {
                System.out.println("The cart is almost full");
            }
        }
    }
```

2. Passing Parameter



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

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

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

        DigitalVideoDisc[] dvds = {jungleDVD, cinderellaDVD};
        swap(dvds);

        jungleDVD = dvds[0];
        cinderellaDVD = dvds[1];
        System.out.println("jungle dvd title: " + dvds[0].getTitle());
        System.out.println("cinderella dvd title: " + dvds[1].getTitle());

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

    public static void swap(DigitalVideoDisc[] dvds) {
        DigitalVideoDisc tmp = dvds[0];
        dvds[0] = dvds[1];
        dvds[1] = tmp;
    }


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

3. toString() method, searchById(), searchByTitle()

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

```java
    public void searchById(int id) {
        boolean found = false;
        for (int i = 0; i < qtyOrdered; i++) {
            if (itemsOrdered[i].getId() == id) {
                System.out.println("Found: " + itemsOrdered[i].toString());
                found = true;
                break;
            }
        }
        if (!found) {
            System.out.println("No match found for ID: " + id);
        }
    }

    public void searchByTitle(String title) {
        boolean found = false;
        for (int i = 0; i < qtyOrdered; i++) {
            if (itemsOrdered[i].isMatch(title)) {
                System.out.println("Found: " + itemsOrdered[i].toString());
                found = true;
            }
        }
        if (!found) {
            System.out.println("No match found for title: " + title);
        }
    }
}
```

4. printCart()

```java
public void print() {
    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. CartTest

C: > Users > Admin > OneDrive - Hanoi University of Science and Technology > Desktop > Th-nghi-m-OOP > AimsProject > src > hust > soict > dsai > test > cart > J CartTest.java > {} h

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

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

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.print();

        System.out.println("Searching by ID 2:");
        cart.searchById(2);

        System.out.println("Searching by title 'Aladin':");
        cart.searchByTitle("Aladin");

        System.out.println("Searching by title 'Unknown':");
        cart.searchByTitle("Unknown");
    }
}
```

6. Store

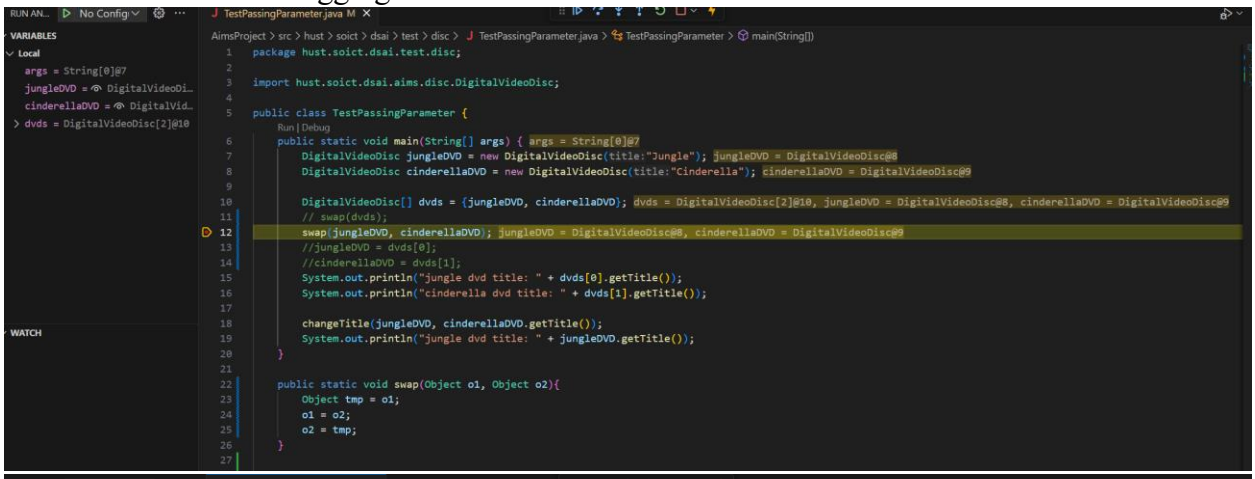
C: > Users > Admin > OneDrive - Hanoi University of Science and Technology > Desktop > Th-nghi-m-OOP > AimsProject > src > hust > soict > dsai > aims > store > J Store.java > {}

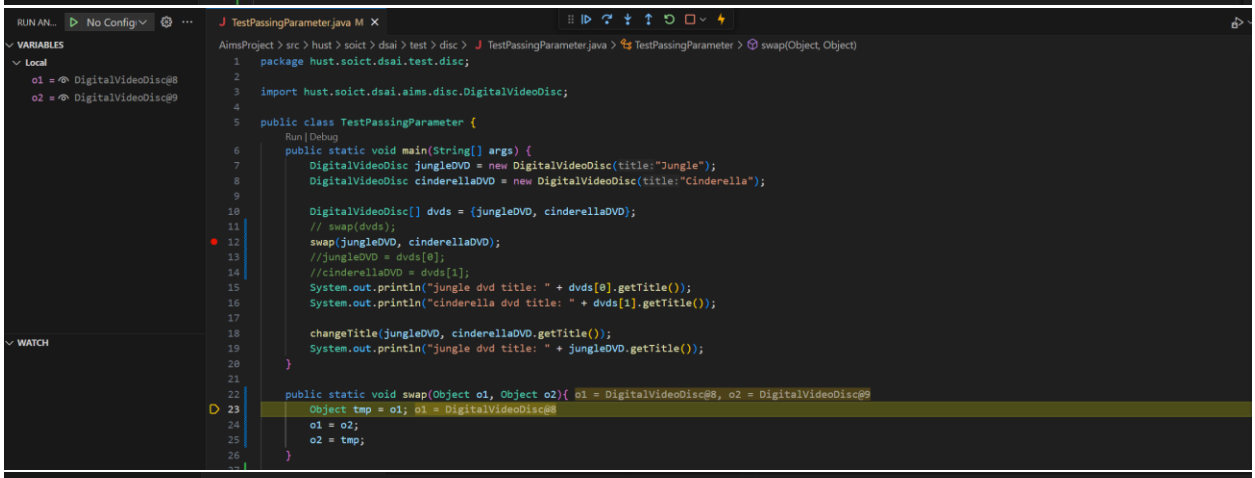
```java
package hust.soict.dsai.aims.store;

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

public class Store {
    private DigitalVideoDisc[] itemsInStore = new DigitalVideoDisc[100];
    private int qtyInStore = 0;

    public void addDVD(DigitalVideoDisc disc) {
        if (qtyInStore < itemsInStore.length) {
            itemsInStore[qtyInStore] = disc;
            qtyInStore++;
            System.out.println("Added DVD: " + disc.getTitle());
        } else {
            System.out.println("The store is full.");
        }
    }

    public void removeDVD(String title) {
        boolean found = false;
        for (int i = 0; i < qtyInStore; i++) {
            if (itemsInStore[i].isMatch(title)) {
                for (int j = i; j < qtyInStore - 1; j++) {
                    itemsInStore[j] = itemsInStore[j + 1];
                }
                itemsInStore[qtyInStore - 1] = null;
                qtyInStore--;
                System.out.println("Removed DVD: " + title);
                found = true;
                break;
            }
        }
        if (!found) {
            System.out.println("No match found for title: " + title);
        }
    }
}

```

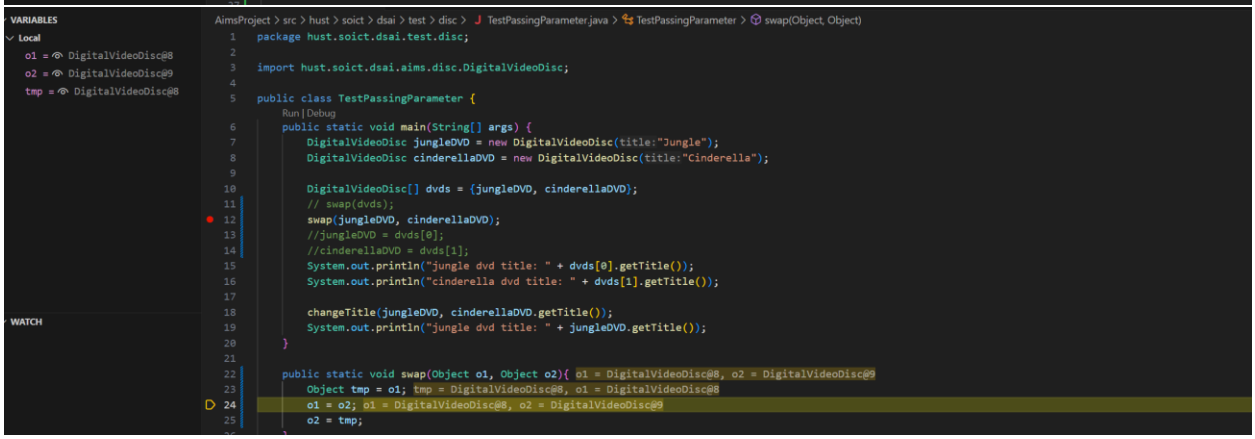
7. StoreTest

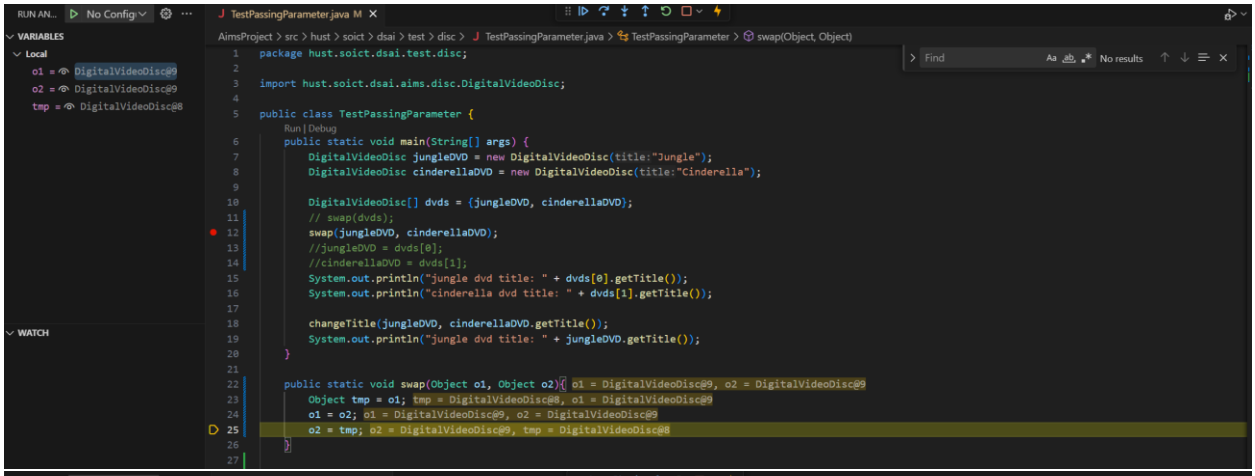
```java
package hust.soict.dsai.test.store;

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

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", 87, 24.95f);
        DigitalVideoDisc dvd3 = new DigitalVideoDisc("Aladin", "Animation", 18.99f);

        store.addDVD(dvd1);
        store.addDVD(dvd2);
        store.addDVD(dvd3);

        store.removeDVD("Star Wars");
        store.removeDVD("Unknown");
    }
}

```

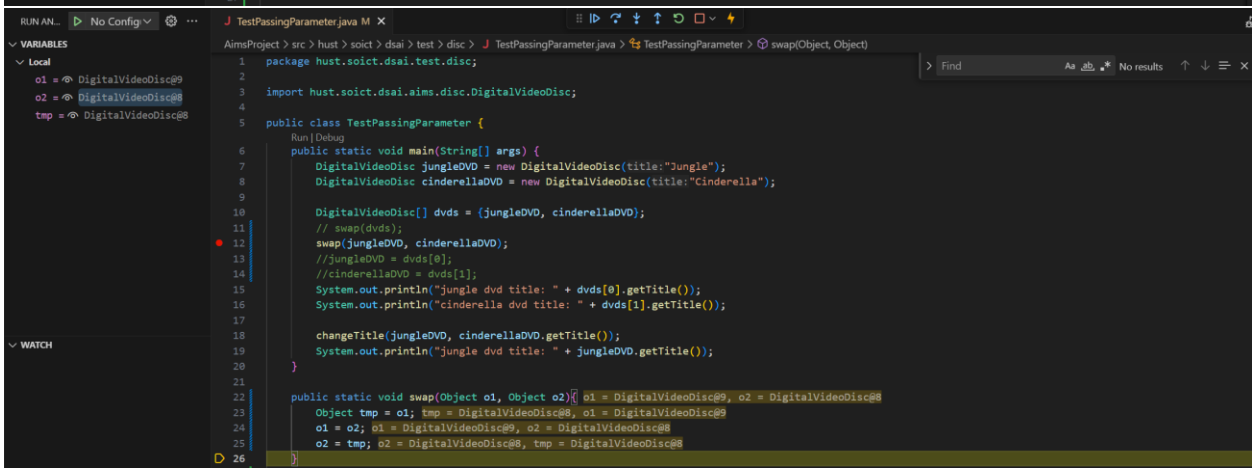
II. Screenshot of code debugging and the results

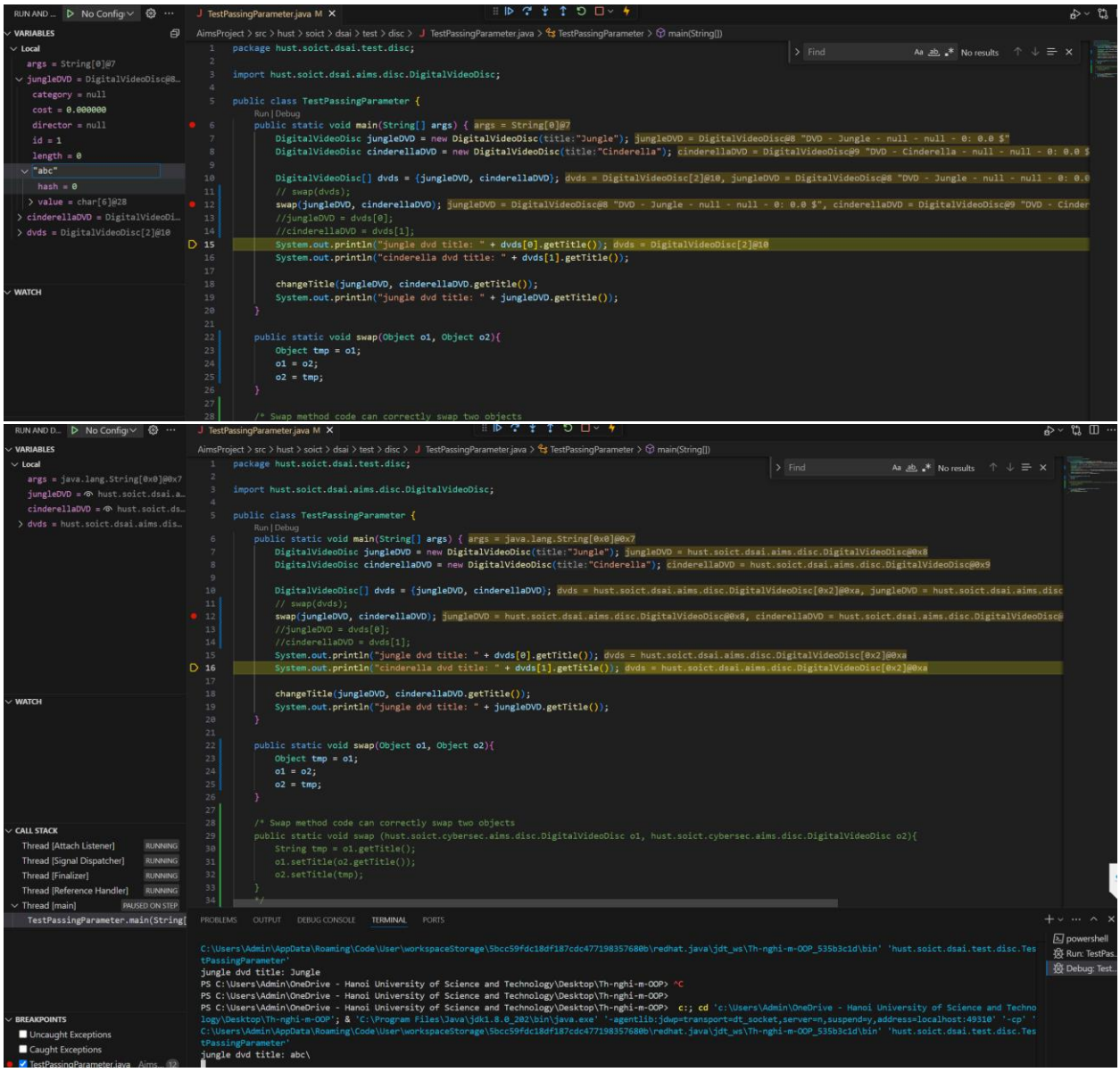




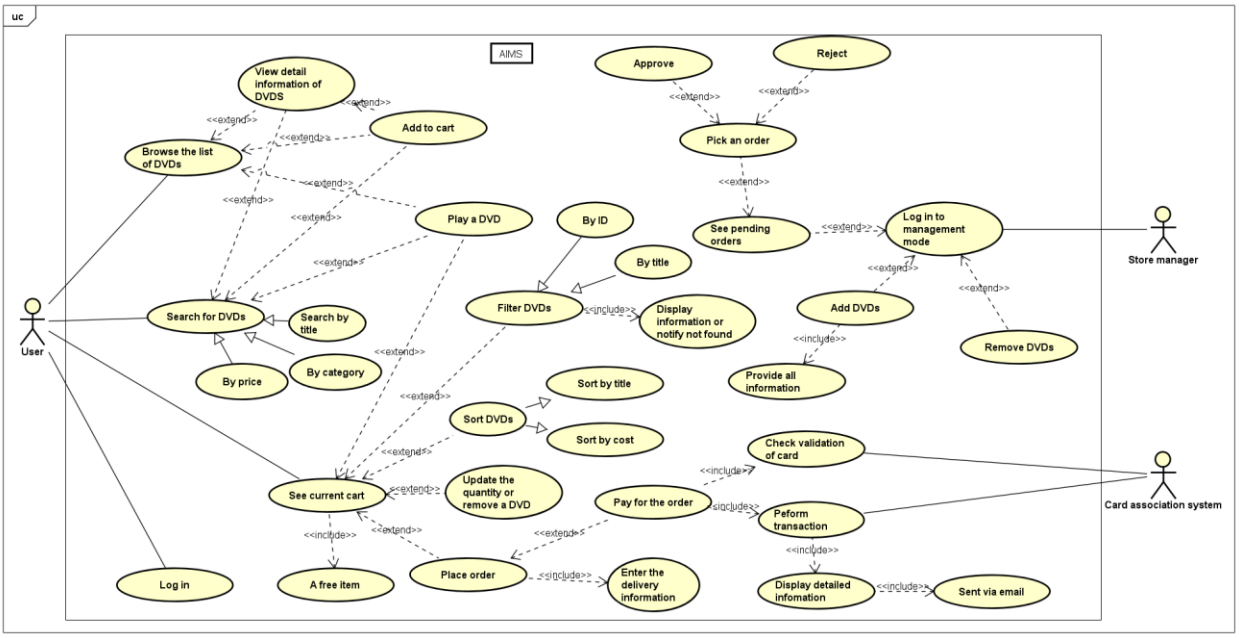


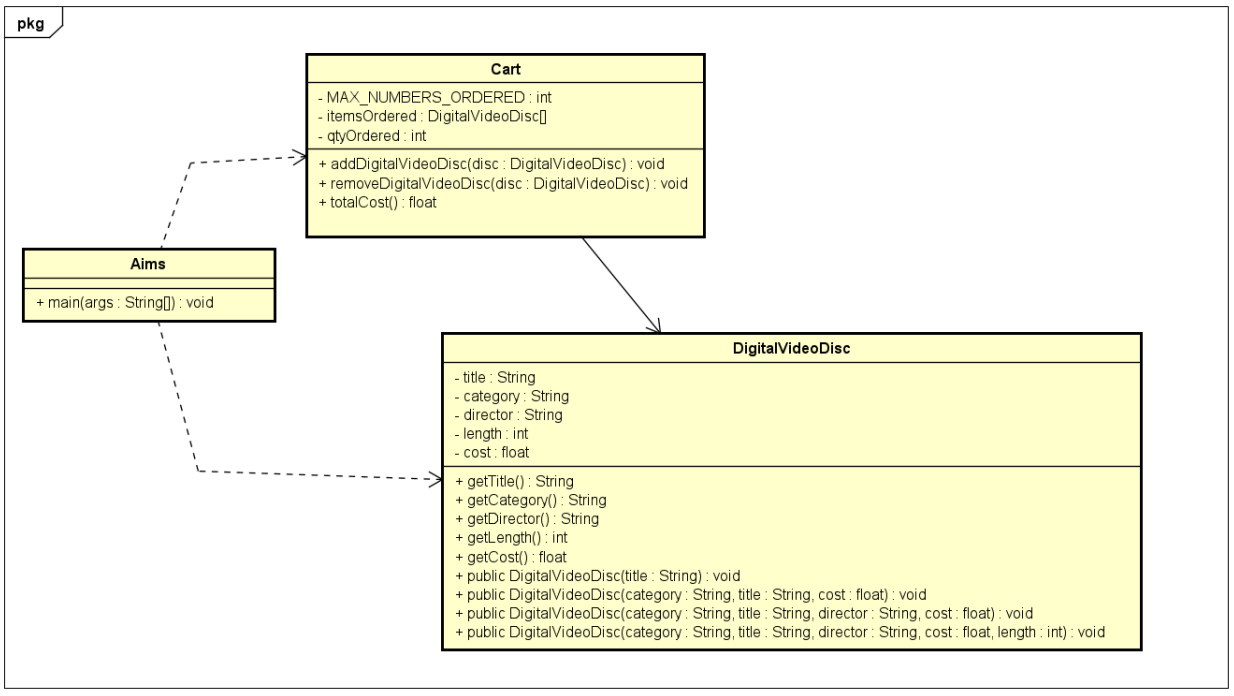

RUN AN...
No Config
VARIABLES
Local
o1 = DigitalVideoDisc@9
o2 = DigitalVideoDisc@9
tmp = DigitalVideoDisc@8
WATCH
TestPassingParameter.java M
AimsProject > src > hust > soict > dsai > test > disc > TestPassingParameter.java > TestPassingParameter > swap(Object, Object)
Find
No results
1 package hust.soict.dsai.test.disc;
3 import hust.soict.dsai.aims.disc.DigitalVideoDisc;
5 public class TestPassingParameter {
Run | Debug
6 public static void main(String[] args) {
7 DigitalVideoDisc jungleDVD = new DigitalVideoDisc(title:"Jungle");
8 DigitalVideoDisc cinderellaDVD = new DigitalVideoDisc(title:"Cinderella");
10 DigitalVideoDisc[] dvds = {jungleDVD, cinderellaDVD};
11 // swap(dvds);
12 swap(jungleDVD, cinderellaDVD);
13 //jungleDVD = dvds[0];
14 //cinderellaDVD = dvds[1];
15 System.out.println("jungle dvd title: " + dvds[0].getTitle());
16 System.out.println("cinderella dvd title: " + dvds[1].getTitle());
18 changeTitle(jungleDVD, cinderellaDVD.getTitle());
19 System.out.println("jungle dvd title: " + jungleDVD.getTitle());
20 }
22 public static void swap(Object o1, Object o2){ o1 = DigitalVideoDisc@9, o2 = DigitalVideoDisc@9
23 Object tmp = o1; tmp = DigitalVideoDisc@8, o1 = DigitalVideoDisc@9
24 o1 = o2; o1 = DigitalVideoDisc@9, o2 = DigitalVideoDisc@9
25 o2 = tmp; o2 = DigitalVideoDisc@9, tmp = DigitalVideoDisc@8
26 }


RUN AN...
No Config
VARIABLES
Local
o1 = DigitalVideoDisc@9
o2 = DigitalVideoDisc@8
tmp = DigitalVideoDisc@8
WATCH
TestPassingParameter.java M
AimsProject > src > hust > soict > dsai > test > disc > TestPassingParameter.java > TestPassingParameter > swap(Object, Object)
Find
No results
1 package hust.soict.dsai.test.disc;
3 import hust.soict.dsai.aims.disc.DigitalVideoDisc;
5 public class TestPassingParameter {
Run | Debug
6 public static void main(String[] args) {
7 DigitalVideoDisc jungleDVD = new DigitalVideoDisc(title:"Jungle");
8 DigitalVideoDisc cinderellaDVD = new DigitalVideoDisc(title:"Cinderella");
10 DigitalVideoDisc[] dvds = {jungleDVD, cinderellaDVD};
11 // swap(dvds);
12 swap(jungleDVD, cinderellaDVD);
13 //jungleDVD = dvds[0];
14 //cinderellaDVD = dvds[1];
15 System.out.println("jungle dvd title: " + dvds[0].getTitle());
16 System.out.println("cinderella dvd title: " + dvds[1].getTitle());
18 changeTitle(jungleDVD, cinderellaDVD.getTitle());
19 System.out.println("jungle dvd title: " + jungleDVD.getTitle());
20 }
22 public static void swap(Object o1, Object o2){ o1 = DigitalVideoDisc@9, o2 = DigitalVideoDisc@8
23 Object tmp = o1; tmp = DigitalVideoDisc@8, o1 = DigitalVideoDisc@9
24 o1 = o2; o1 = DigitalVideoDisc@9, o2 = DigitalVideoDisc@8
25 o2 = tmp; o2 = DigitalVideoDisc@8, tmp = DigitalVideoDisc@8
26 }


RUN AND ... No Config
VARIABLES
Local
args = String[0]@7
jungleDVD = DigitalVideoDisc@8...
category = null
cost = 0.000000
director = null
id = 1
length = 0
"abc"
hash = 0
value = char[6]@28
cinderellaDVD = DigitalVideoDi...
dvds = DigitalVideoDisc[2]@10
WATCH
TestPassingParameter.java M
AimsProject > src > hust > soict > dsai > test > disc > TestPassingParameter.java > TestPassingParameter > main(String[])
Find
No results
1 package hust.soict.dsai.test.disc;
3 import hust.soict.dsai.aims.disc.DigitalVideoDisc;
5 public class TestPassingParameter {
Run | Debug
6 public static void main(String[] args) { args = String[0]@7
7 DigitalVideoDisc jungleDVD = new DigitalVideoDisc(title:"Jungle"); jungleDVD = DigitalVideoDisc@8 "DVD - Jungle - null - null - 0: 0.0 $"
8 DigitalVideoDisc cinderellaDVD = new DigitalVideoDisc(title:"Cinderella"); cinderellaDVD = DigitalVideoDisc@9 "DVD - Cinderella - null - null - 0: 0.0 $
10 DigitalVideoDisc[] dvds = {jungleDVD, cinderellaDVD}; dvds = DigitalVideoDisc[2]@10, jungleDVD = DigitalVideoDisc@8 "DVD - Jungle - null - null - 0: 0.0
11 // swap(dvds);
12 swap(jungleDVD, cinderellaDVD); jungleDVD = DigitalVideoDisc@8 "DVD - Jungle - null - null - 0: 0.0 $", cinderellaDVD = DigitalVideoDisc@9 "DVD - Cinder
13 //jungleDVD = dvds[0];
14 //cinderellaDVD = dvds[1];
15 System.out.println("jungle dvd title: " + dvds[0].getTitle()); dvds = DigitalVideoDisc[2]@10
16 System.out.println("cinderella dvd title: " + dvds[1].getTitle());
18 changeTitle(jungleDVD, cinderellaDVD.getTitle());
19 System.out.println("jungle dvd title: " + jungleDVD.getTitle());
20 }
22 public static void swap(Object o1, Object o2){
23 Object tmp = o1;
24 o1 = o2;
25 o2 = tmp;
26 }
28 /* Swap method code can correctly swap two objects
RUN AND D... No Config
VARIABLES
Local
args = java.lang.String[0]@0x7
jungleDVD = hust.soict.dsai.a...
cinderellaDVD = hust.soict.ds...
dvds = hust.soict.dsai.aims.dis...
WATCH
CALL STACK
Thread [Attach Listener] RUNNING
Thread [Signal Dispatcher] RUNNING
Thread [Finalizer] RUNNING
Thread [Reference Handler] RUNNING
Thread [main] PAUSED ON STEP
TestPassingParameter.main(String[
BREAKPOINTS
Uncaught Exceptions
Caught Exceptions
TestPassingParameter.java Aims... 12
TestPassingParameter.java M
AimsProject > src > hust > soict > dsai > test > disc > TestPassingParameter.java > TestPassingParameter > main(String[])
Find
No results
1 package hust.soict.dsai.test.disc;
3 import hust.soict.dsai.aims.disc.DigitalVideoDisc;
5 public class TestPassingParameter {
Run | Debug
6 public static void main(String[] args) { args = java.lang.String[0]@0x7
7 DigitalVideoDisc jungleDVD = new DigitalVideoDisc(title:"Jungle"); jungleDVD = hust.soict.dsai.aims.disc.DigitalVideoDisc@0x8
8 DigitalVideoDisc cinderellaDVD = new DigitalVideoDisc(title:"Cinderella"); cinderellaDVD = hust.soict.dsai.aims.disc.DigitalVideoDisc@0x9
10 DigitalVideoDisc[] dvds = {jungleDVD, cinderellaDVD}; dvds = hust.soict.dsai.aims.disc.DigitalVideoDisc[0x2]@0xa, jungleDVD = hust.soict.dsai.aims.disc
11 // swap(dvds);
12 swap(jungleDVD, cinderellaDVD); jungleDVD = hust.soict.dsai.aims.disc.DigitalVideoDisc@0x8, cinderellaDVD = hust.soict.dsai.aims.disc.DigitalVideoDisc@
13 //jungleDVD = dvds[0];
14 //cinderellaDVD = dvds[1];
15 System.out.println("jungle dvd title: " + dvds[0].getTitle()); dvds = hust.soict.dsai.aims.disc.DigitalVideoDisc[0x2]@0xa
16 System.out.println("cinderella dvd title: " + dvds[1].getTitle()); dvds = hust.soict.dsai.aims.disc.DigitalVideoDisc[0x2]@0xa
18 changeTitle(jungleDVD, cinderellaDVD.getTitle());
19 System.out.println("jungle dvd title: " + jungleDVD.getTitle());
20 }
22 public static void swap(Object o1, Object o2){
23 Object tmp = o1;
24 o1 = o2;
25 o2 = tmp;
26 }
28 /* Swap method code can correctly swap two objects
29 public static void swap (hust.soict.cybersec.aims.disc.DigitalVideoDisc o1, hust.soict.cybersec.aims.disc.DigitalVideoDisc o2){
30 String tmp = o1.getTitle();
31 o1.setTitle(o2.getTitle());
32 o2.setTitle(tmp);
33 }
34 */
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
C:\Users\Admin\AppData\Roaming\Code\User\workspaceStorage\5bcc59fdc18df187cdc477198357680b\redhat.java\jdt_ws\Th-nghi-m-OOP_535b3c1d\bin' 'hust.soict.dsai.test.disc.TestPassingParameter'
jungle dvd title: Jungle
PS C:\Users\Admin\OneDrive - Hanoi University of Science and Technology\Desktop\Th-nghi-m-OOP> ^C
PS C:\Users\Admin\OneDrive - Hanoi University of Science and Technology\Desktop\Th-nghi-m-OOP>
PS C:\Users\Admin\OneDrive - Hanoi University of Science and Technology\Desktop\Th-nghi-m-OOP> c:; cd 'c:\Users\Admin\OneDrive - Hanoi University of Science and Technology\Desktop\Th-nghi-m-OOP'; & 'C:\Program Files\Java\jdk1.8.0_202\bin\java.exe' '-agentlib:jdwp=transport=dt_socket,server=n,suspend=y,address=localhost:49310' '-cp' 'C:\Users\Admin\AppData\Roaming\Code\User\workspaceStorage\5bcc59fdc18df187cdc477198357680b\redhat.java\jdt_ws\Th-nghi-m-OOP_535b3c1d\bin' 'hust.soict.dsai.test.disc.TestPassingParameter'
jungle dvd title: abc\
powershell
Run: TestPas...
Debug: Test...

III. Updated use-case diagram and class diagram





IV. Answer the questions

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

- JAVA is a Pass by Value programming language.

When we pass a variable to a method, we pass the value of the variable, not the reference of the variable.

So, the original variable is not changed when we change the variable in the method.

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

- In the swap method, o1 and o2 are copies of the references to jungleDVD and cinderellaDVD.

Inside the swap method, you are just swapping the references (o1 and o2), but not the actual objects that these references point to.

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

- In the changeTitle method, you are copying the reference to jungleDVD.

However, this reference copy still points to the same jungleDVD object in memory.

When you call dvd.setTitle(title), you are modifying the state of the object that dvd points to, which is the same object as jungleDVD in the main method. Therefore, the title of jungleDVD is changed.