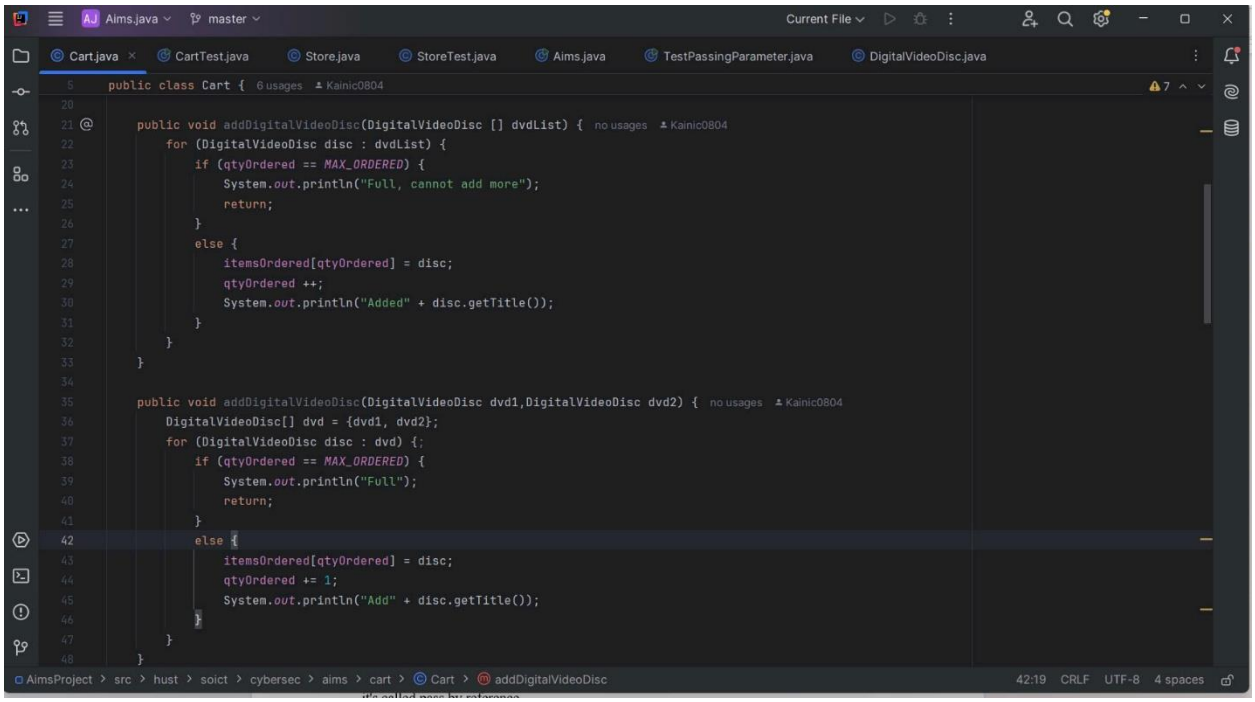
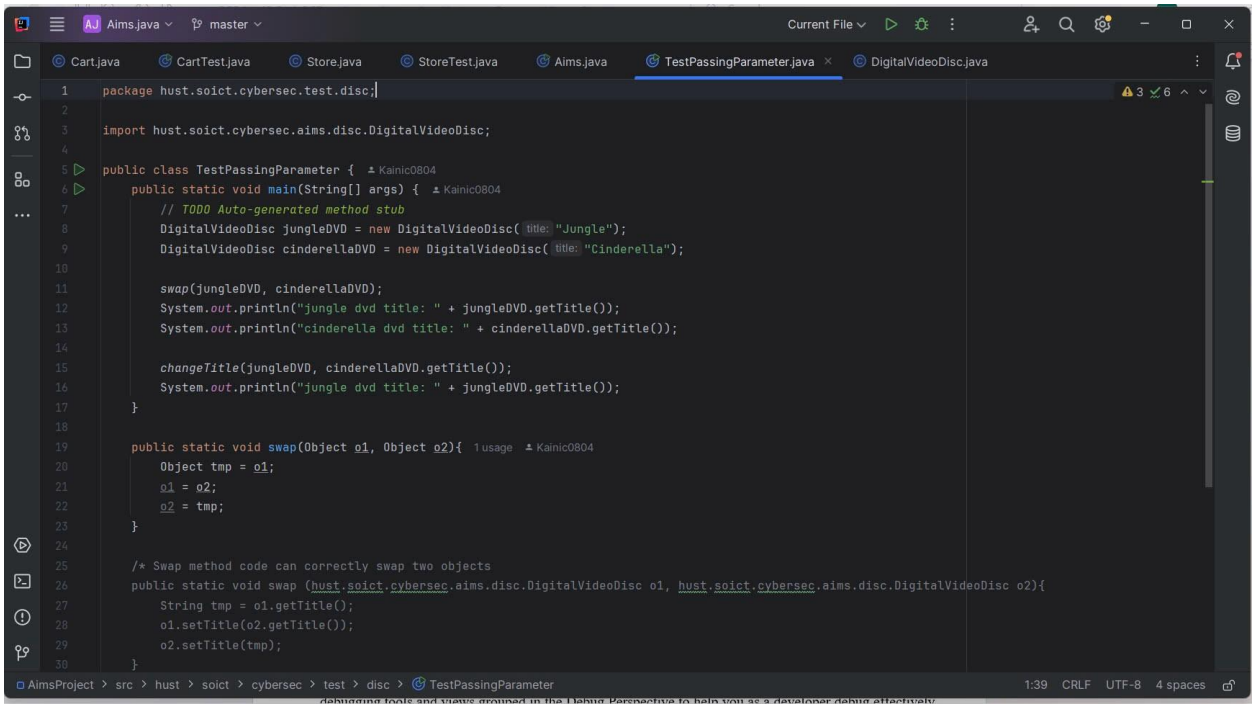
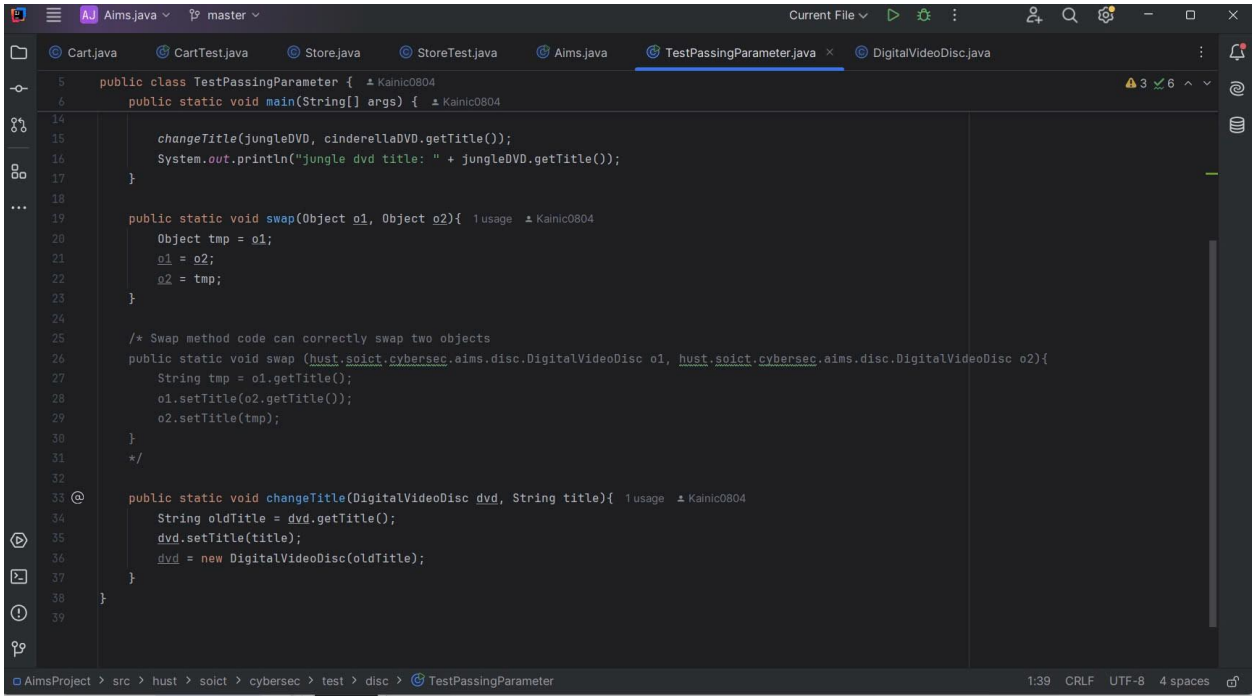
I. Screenshot of new written code

1. Method Overloading



2. Passing parameter





3. Write a toString() method, searchByID, searchByTitle, printCart

```
public String toString() {
Kainic0804
    return "DVD - " + this.getTitle() + " - " + this.getCategory() + " - " + this.getDirector() + " - " + this.getLength() + ": " + this.getCost() + " $";
}
```

```
    public void printCart() {
    1 usage
    Kainic0804
        System.out.println("**********************CART**********************");
        System.out.println("Ordered Item:");
        for (int i = 0; i < qtyOrdered; i++) {
            System.out.println((i+1) + itemsOrdered[i].toString());
        }
        System.out.println("Total Cost: $" + totalCost());
        System.out.println("************************************************");

    }
```

```java
public class Cart {  6 usages  Kainic0804

    public void searchById(int id) {  2 usages  Kainic0804
        boolean found = false;
        for (int i = 0; i < qtyOrdered; i++) {
            if (itemsOrdered[i].getId() == id) {
                found = true;
                System.out.println("DVD found");
                System.out.println(itemsOrdered[i].toString());
                break;
            }
        }
        if (found == false) {
            System.out.println("DVD not found");
        }
    }

    public void searchByTitle(String title) {  2 usages  Kainic0804
        boolean found = false;
        for (int i = 0; i < qtyOrdered; i++) {
            if (itemsOrdered[i].getTitle().equals(title)) {
                found = true;
                System.out.println("DVD found");
                System.out.println(itemsOrdered[i].toString());
                break;
            }
        }
        if (found == false) {
            System.out.println("DVD not found");
        }
    }
}
```

4. CartTest class

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

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

public class CartTest {  Kainic0804
    public static void main(String[] args) {  Kainic0804
        Cart cart = new Cart();
        DigitalVideoDisc dvd1 = new DigitalVideoDisc( title: "The lion King",
                category: "Animation",  director: "Rogger Aller",  length: 87,  cost: 19.95f);
        cart.addDigitalVideoDisc(dvd1);

        DigitalVideoDisc dvd2 = new DigitalVideoDisc( title: "Star Wars",
                category: "Science Fiction",  director: "George Lucas",  length: 87,  cost: 24.95f);
        cart.addDigitalVideoDisc(dvd2);

        DigitalVideoDisc dvd3 = new DigitalVideoDisc( title: "Aladin",
                category: "Animation",  cost: 18.99f);
        cart.addDigitalVideoDisc(dvd3);

        cart.printCart();
        cart.searchById(3);
        cart.searchById(2);
        cart.searchByTitle("Star Wars");
        cart.searchByTitle("Blackhat");
    }
}
```

5. Store class

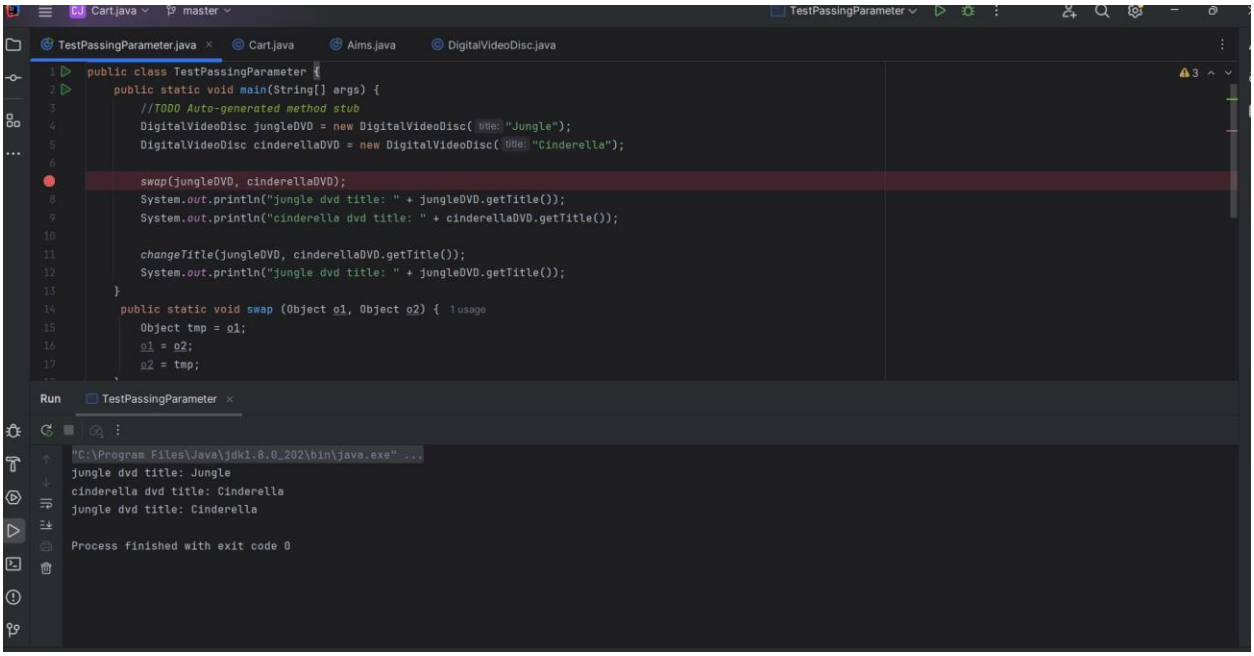
```java
package hust.soict.cybersec.aims.store;

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

public class Store {  3 usages  Kainic0804
    private DigitalVideoDisc[] itemInStore;  7 usages
    private int itemCount;  8 usages

    public Store() {  1 usage  Kainic0804
        itemInStore = new DigitalVideoDisc[1000];
        itemCount = 0;
    }

    public void addDVD(DigitalVideoDisc dvd) {  3 usages  Kainic0804
        if (itemCount < itemInStore.length) {
            itemInStore[itemCount] = dvd;
            itemCount++;
            System.out.println(dvd + " added to the store");
        }
        else {
            System.out.println("The storage is full");
        }
    }
```

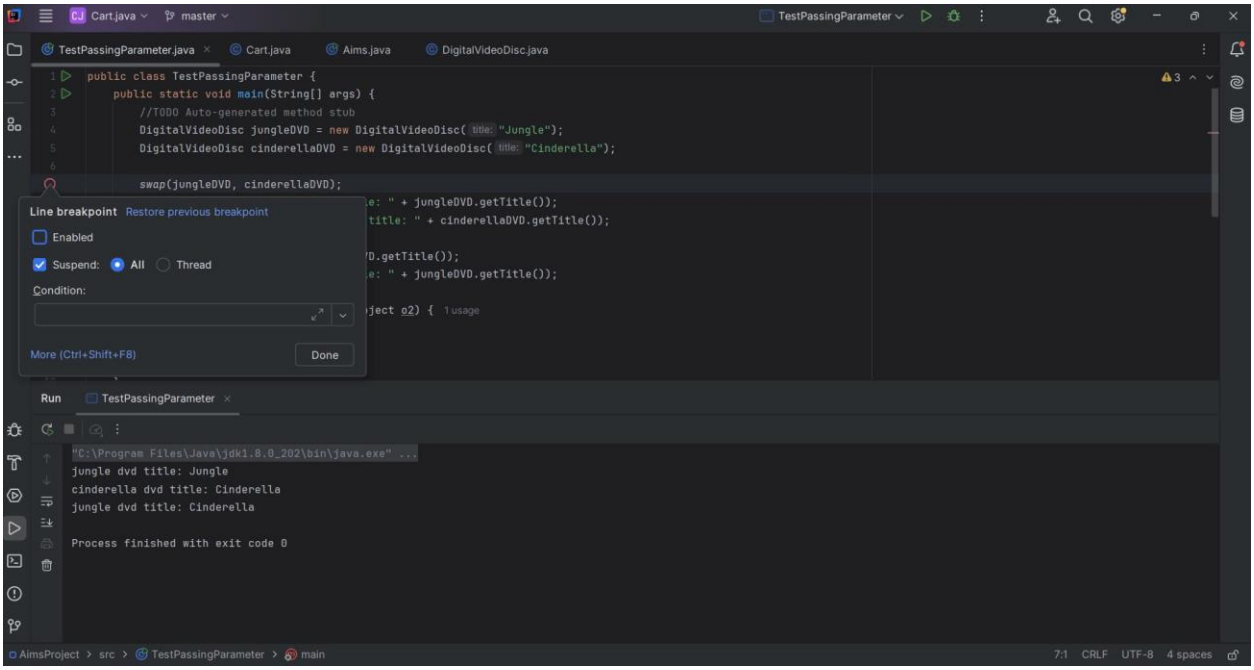
```java
    public void removeDVD(DigitalVideoDisc dvd) {  2 usages  Kainic0804
        for (int i = 0; i < itemCount; i++) {
            if (itemInStore[i] == dvd) {
                for (int j = i + 1; j < itemCount - 1; j++) {
                    itemInStore[j] = itemInStore[j + 1];
                }
                itemInStore[itemCount - 1] = null;
                itemCount--;
                System.out.println(dvd + " removed from the store");
                return;
            }

        }
        System.out.println("Cannot find the item");
    }
}
```

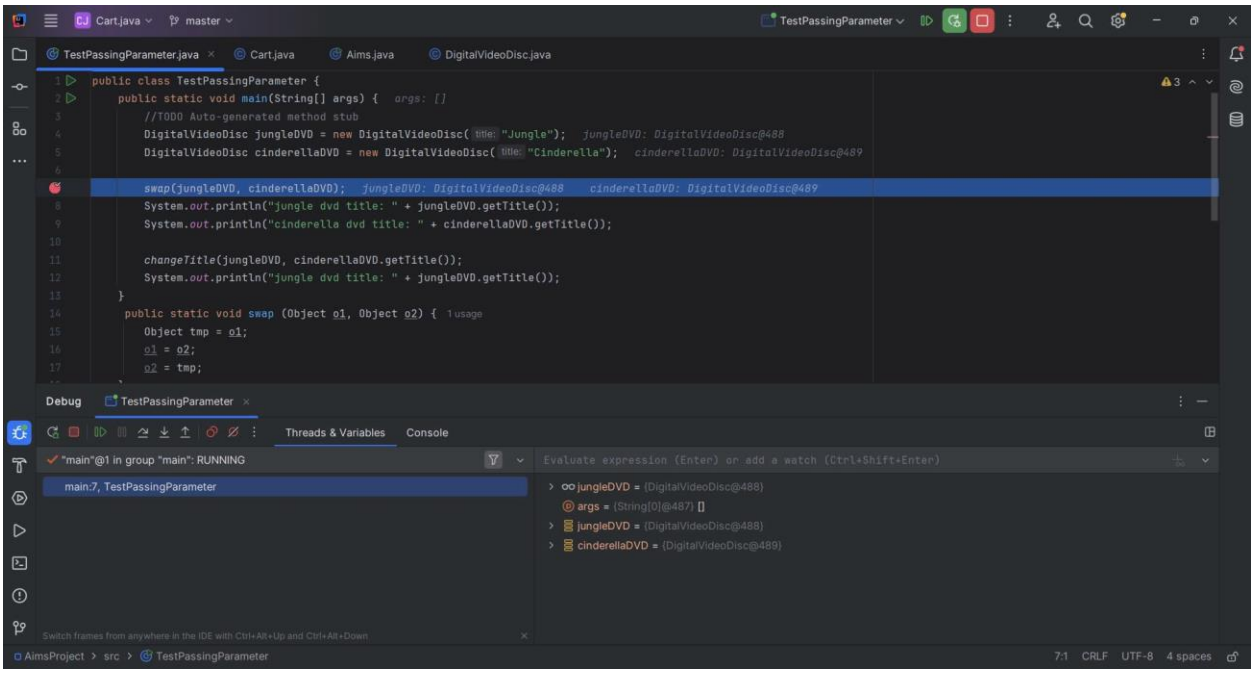
6. StoreTest class

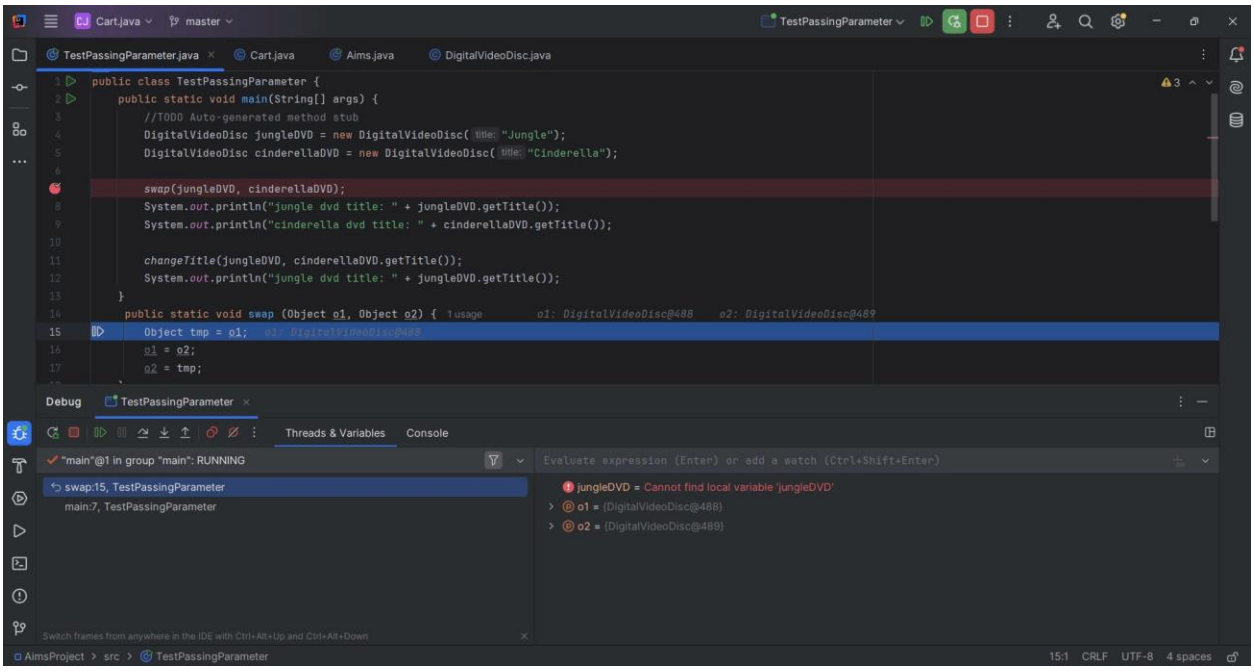
```java
package hust.soict.cybersec.test.store;

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

public class StoreTest {  Kainic0804
    public static void main(String[] args) {  Kainic0804
        Store store = new Store();
        DigitalVideoDisc dvd1 = new DigitalVideoDisc( title: "The lion King",
                category: "Animation",  director: "Rogger Aller",  length: 87,  cost: 19.95f);
        DigitalVideoDisc dvd2 = new DigitalVideoDisc( title: "Star Wars",
                category: "Science Fiction",  director: "George Lucas",  length: 87,  cost: 24.95f);
        DigitalVideoDisc dvd3 = new DigitalVideoDisc( title: "Aladin",
                category: "Animation",  cost: 18.99f);

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

        store.removeDVD(dvd1);
        store.removeDVD(dvd3);
    }
}
```

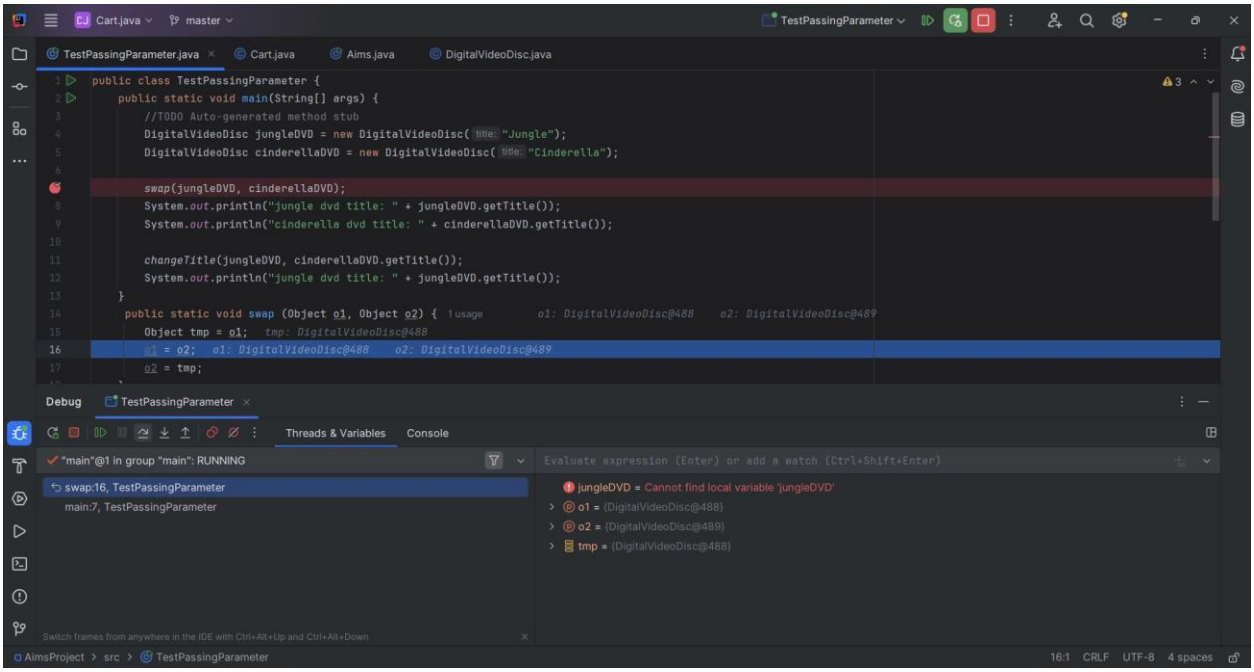
II. Screenshot of code debugging and the results

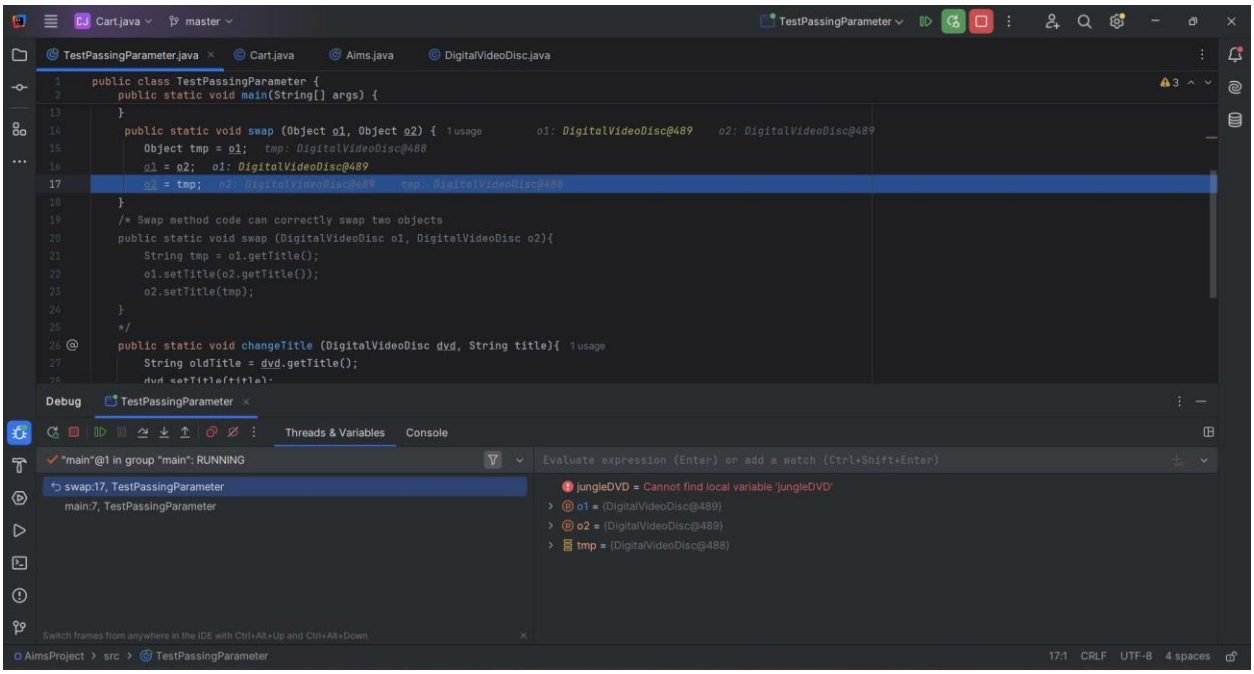

Cart.java
master
TestPassingParameter
TestPassingParameter.java
Cart.java
Aims.java
DigitalVideoDisc.java
public class TestPassingParameter {
public static void main(String[] args) {
//TODO Auto-generated method stub
DigitalVideoDisc jungleDVD = new DigitalVideoDisc(title: "Jungle");
DigitalVideoDisc cinderellaDVD = new DigitalVideoDisc(title: "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) { 1 usage
Object tmp = o1;
o1 = o2;
o2 = tmp;
Run
TestPassingParameter
"C:\Program Files\Java\jdk1.8.0_202\bin\java.exe" ...
jungle dvd title: Jungle
cinderella dvd title: Cinderella
jungle dvd title: Cinderella
Process finished with exit code 0

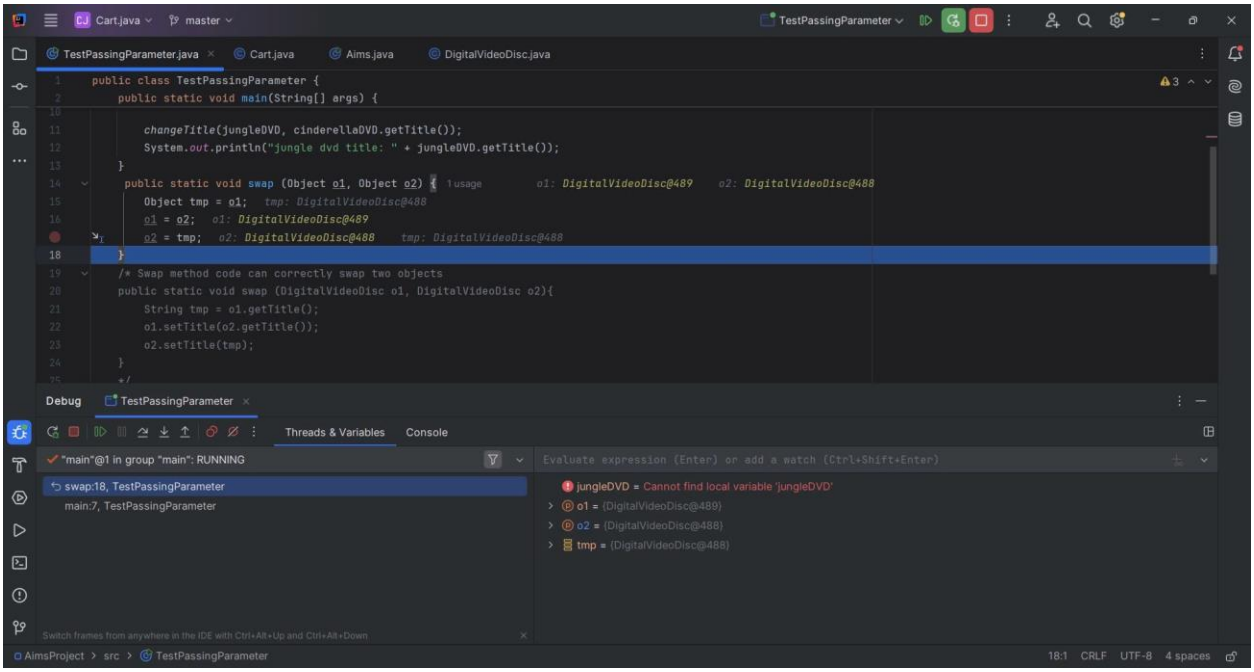

Cart.java
master
TestPassingParameter
TestPassingParameter.java
Cart.java
Aims.java
DigitalVideoDisc.java
Line breakpoint
Restore previous breakpoint
Enabled
Suspend:
All
Thread
Condition:
More (Ctrl+Shift+F8)
Done
Run
TestPassingParameter
"C:\Program Files\Java\jdk1.8.0_202\bin\java.exe" ...
jungle dvd title: Jungle
cinderella dvd title: Cinderella
jungle dvd title: Cinderella
Process finished with exit code 0
AimsProject
src
TestPassingParameter
main
7:1
CRLF
UTF-8
4 spaces

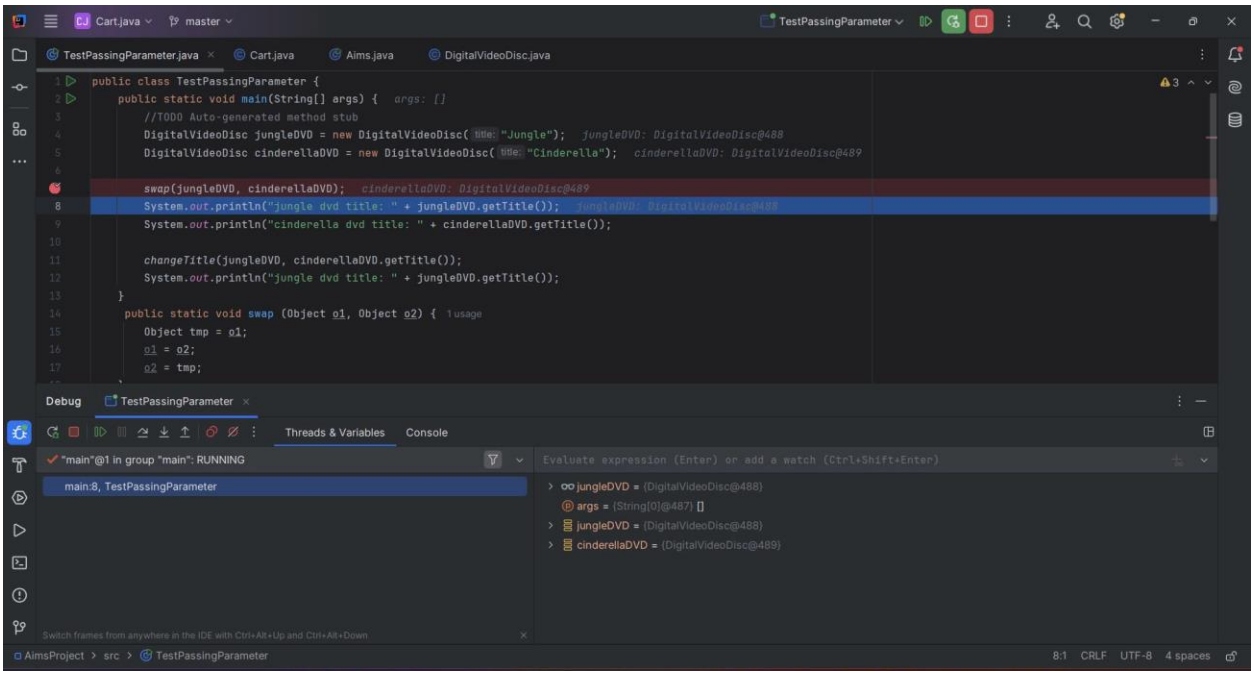

Cart.java
master
TestPassingParameter
TestPassingParameter.java
Cart.java
Aims.java
DigitalVideoDisc.java
public class TestPassingParameter {
public static void main(String[] args) {
//TODO Auto-generated method stub
DigitalVideoDisc jungleDVD = new DigitalVideoDisc(title: "Jungle");
DigitalVideoDisc cinderellaDVD = new DigitalVideoDisc(title: "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;
Debug
TestPassingParameter
Threads & Variables
Console
"main"@1 in group "main": RUNNING
main:7, TestPassingParameter
Evaluate expression (Enter) or add a watch (Ctrl+Shift+Enter)
jungleDVD = {DigitalVideoDisc@488}
args = {String[0]@487} []
jungleDVD = {DigitalVideoDisc@488}
cinderellaDVD = {DigitalVideoDisc@489}
AimsProject
src
TestPassingParameter
7:1
CRLF
UTF-8
4 spaces

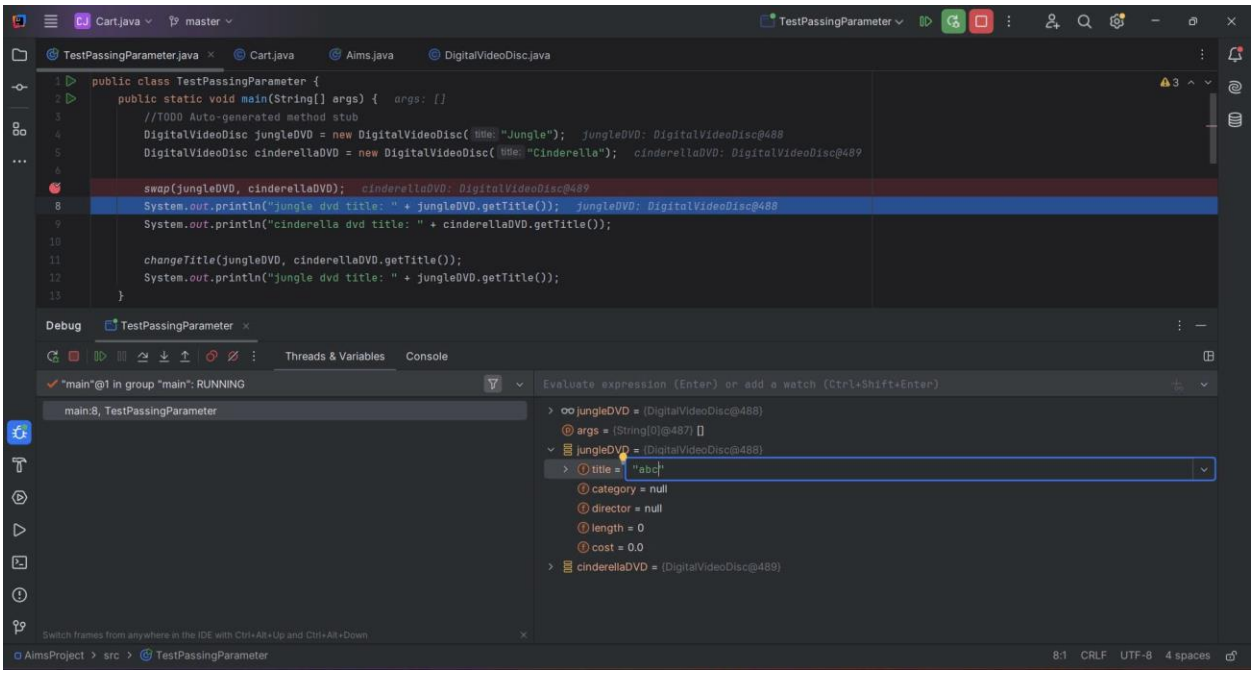

Cart.java
master
TestPassingParameter
TestPassingParameter.java
Cart.java
Aims.java
DigitalVideoDisc.java
public class TestPassingParameter {
public static void main(String[] args) {
//TODO Auto-generated method stub
DigitalVideoDisc jungleDVD = new DigitalVideoDisc(title: "Jungle");
DigitalVideoDisc cinderellaDVD = new DigitalVideoDisc(title: "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;
Debug
TestPassingParameter
Threads & Variables
Console
"main"@1 in group "main": RUNNING
swap:15, TestPassingParameter
main:7, TestPassingParameter
Evaluate expression (Enter) or add a watch (Ctrl+Shift+Enter)
jungleDVD = Cannot find local variable 'jungleDVD'
o1 = {DigitalVideoDisc@488}
o2 = {DigitalVideoDisc@489}
AimsProject
src
TestPassingParameter
15:1
CRLF
UTF-8
4 spaces

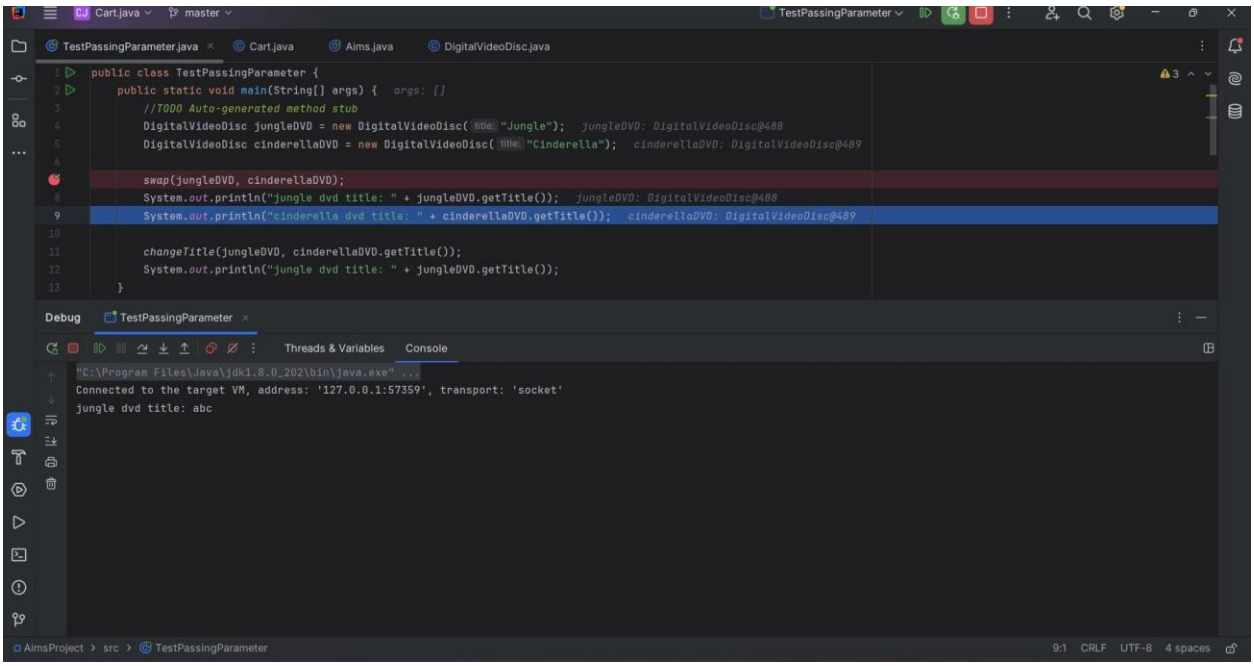

Cart.java
master
TestPassingParameter
TestPassingParameter.java
Cart.java
Aims.java
DigitalVideoDisc.java
public class TestPassingParameter {
public static void main(String[] args) {
//TODO Auto-generated method stub
DigitalVideoDisc jungleDVD = new DigitalVideoDisc(title: "Jungle");
DigitalVideoDisc cinderellaDVD = new DigitalVideoDisc(title: "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) { 1 usage o1: DigitalVideoDisc@488 o2: DigitalVideoDisc@489
Object tmp = o1; tmp: DigitalVideoDisc@488
o1 = o2; o1: DigitalVideoDisc@488 o2: DigitalVideoDisc@489
o2 = tmp;
Debug
TestPassingParameter
Threads & Variables
Console
"main"@1 in group "main": RUNNING
swap:16, TestPassingParameter
main:7, TestPassingParameter
Evaluate expression (Enter) or add a watch (Ctrl+Shift+Enter)
jungleDVD = Cannot find local variable 'jungleDVD'
o1 = {DigitalVideoDisc@488}
o2 = {DigitalVideoDisc@489}
tmp = {DigitalVideoDisc@488}
Switch frames from anywhere in the IDE with Ctrl+Alt+Up and Ctrl+Alt+Down
AimsProject
src
TestPassingParameter
16:1
CRLF
UTF-8
4 spaces


Cart.java
master
TestPassingParameter
TestPassingParameter.java
Cart.java
Aims.java
DigitalVideoDisc.java
public class TestPassingParameter {
public static void main(String[] args) {
}
public static void swap (Object o1, Object o2) { 1 usage o1: DigitalVideoDisc@489 o2: DigitalVideoDisc@489
Object tmp = o1; tmp: DigitalVideoDisc@488
o1 = o2; o1: DigitalVideoDisc@489
o2 = tmp; o2: DigitalVideoDisc@489 tmp: DigitalVideoDisc@488
}
/* Swap method code can correctly swap two objects
public static void swap (DigitalVideoDisc o1, DigitalVideoDisc o2){
String tmp = o1.getTitle();
o1.setTitle(o2.getTitle());
o2.setTitle(tmp);
}
*/
public static void changeTitle (DigitalVideoDisc dvd, String title){ 1 usage
String oldTitle = dvd.getTitle();
Debug
TestPassingParameter
Threads & Variables
Console
"main"@1 in group "main": RUNNING
swap:17, TestPassingParameter
main:7, TestPassingParameter
Evaluate expression (Enter) or add a watch (Ctrl+Shift+Enter)
jungleDVD = Cannot find local variable 'jungleDVD'
o1 = {DigitalVideoDisc@489}
o2 = {DigitalVideoDisc@489}
tmp = {DigitalVideoDisc@488}
Switch frames from anywhere in the IDE with Ctrl+Alt+Up and Ctrl+Alt+Down
AimsProject
src
TestPassingParameter
17:1
CRLF
UTF-8
4 spaces

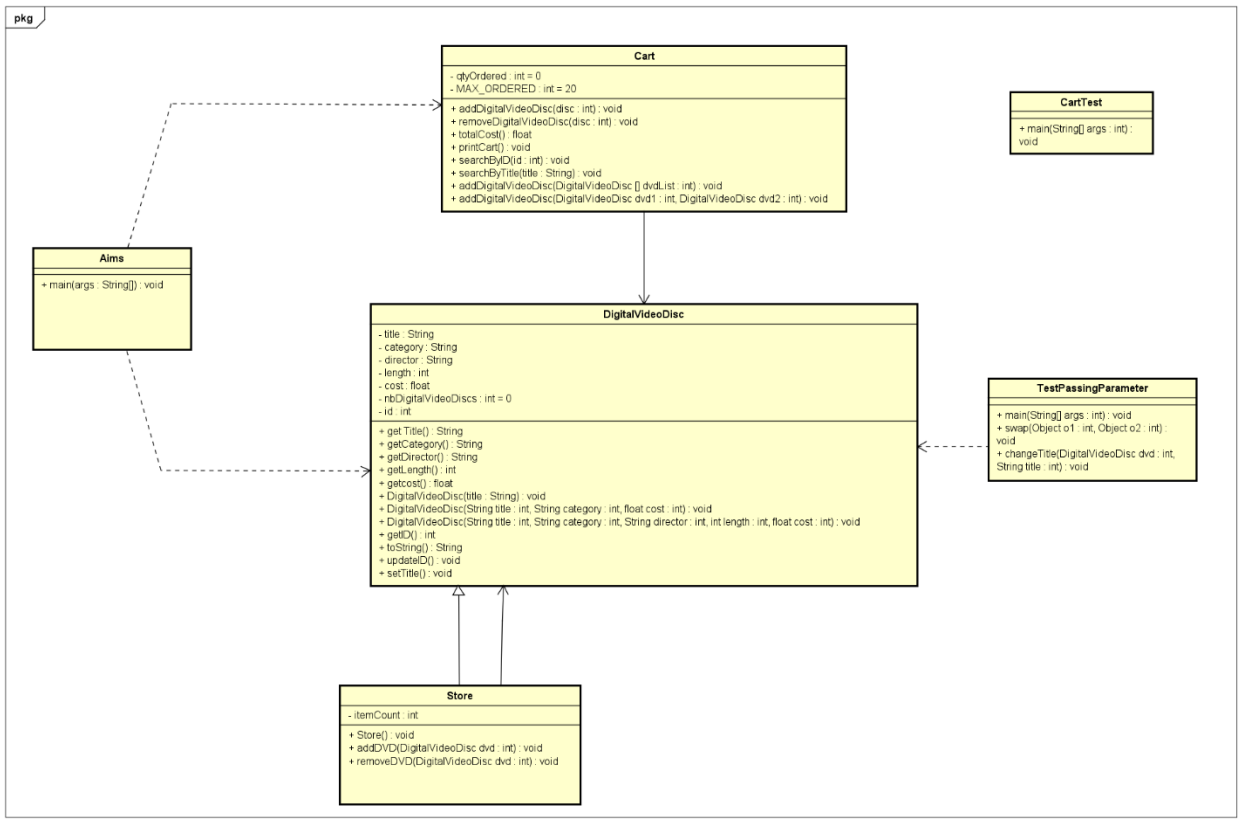

Cart.java
master
TestPassingParameter
TestPassingParameter.java
Cart.java
Aims.java
DigitalVideoDisc.java
public class TestPassingParameter {
public static void main(String[] args) {
changeTitle(jungleDVD, cinderellaDVD.getTitle());
System.out.println("jungle dvd title: " + jungleDVD.getTitle());
}
public static void swap (Object o1, Object o2) { 1 usage o1: DigitalVideoDisc@489 o2: DigitalVideoDisc@488
Object tmp = o1; tmp: DigitalVideoDisc@488
o1 = o2; o1: DigitalVideoDisc@489
o2 = tmp; o2: DigitalVideoDisc@488 tmp: DigitalVideoDisc@488
}
/* Swap method code can correctly swap two objects
public static void swap (DigitalVideoDisc o1, DigitalVideoDisc o2){
String tmp = o1.getTitle();
o1.setTitle(o2.getTitle());
o2.setTitle(tmp);
}
*/
Debug
TestPassingParameter
Threads & Variables
Console
"main"@1 in group "main": RUNNING
Evaluate expression (Enter) or add a watch (Ctrl+Shift+Enter)
swap:18, TestPassingParameter
main:7, TestPassingParameter
jungleDVD = Cannot find local variable 'jungleDVD'
o1 = {DigitalVideoDisc@489}
o2 = {DigitalVideoDisc@488}
tmp = {DigitalVideoDisc@488}
Switch frames from anywhere in the IDE with Ctrl+Alt+Up and Ctrl+Alt+Down
AimsProject
src
TestPassingParameter
18:1
CRLF
UTF-8
4 spaces

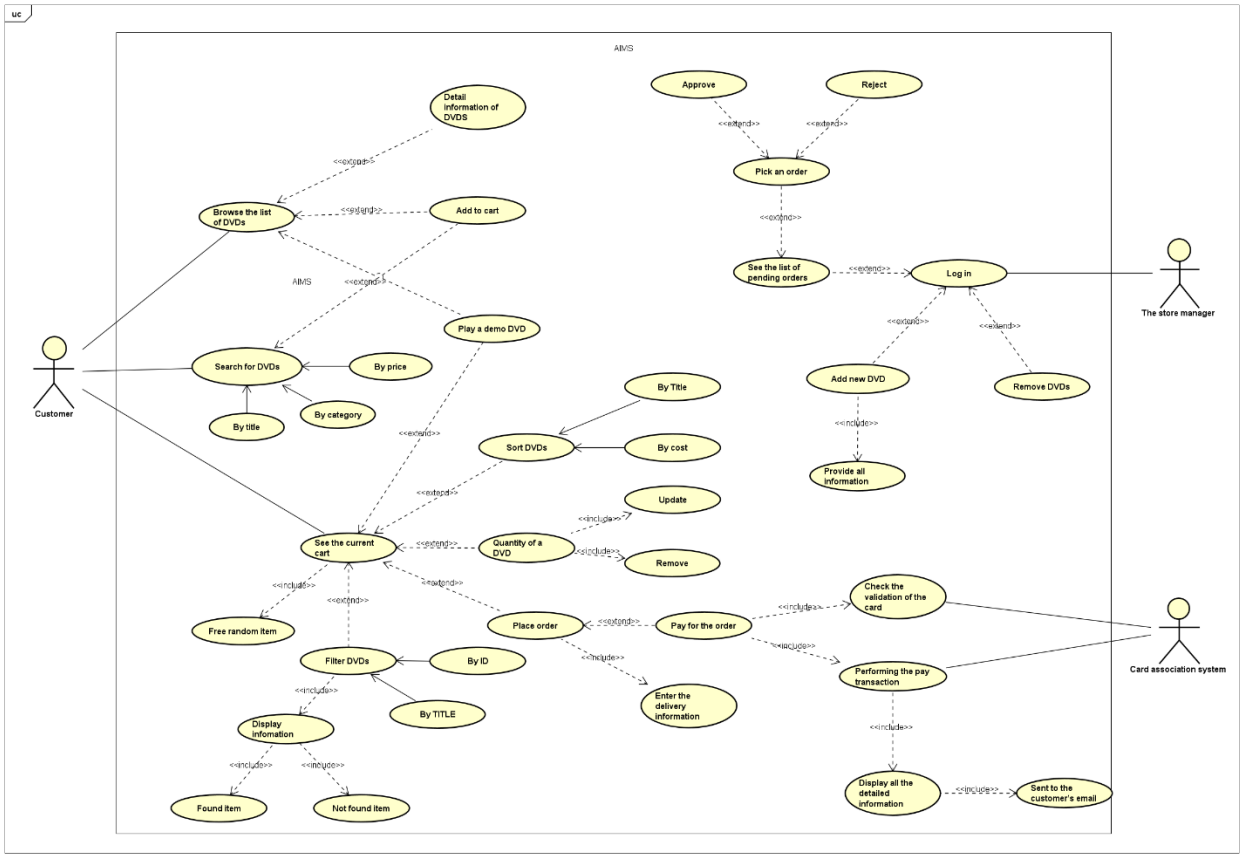

Cart.java
master
TestPassingParameter
TestPassingParameter.java
Cart.java
Aims.java
DigitalVideoDisc.java
public class TestPassingParameter {
public static void main(String[] args) { args: []
//TODO Auto-generated method stub
DigitalVideoDisc jungleDVD = new DigitalVideoDisc(title: "Jungle"); jungleDVD: DigitalVideoDisc@488
DigitalVideoDisc cinderellaDVD = new DigitalVideoDisc(title: "Cinderella"); cinderellaDVD: DigitalVideoDisc@489
swap(jungleDVD, cinderellaDVD); cinderellaDVD: DigitalVideoDisc@489
System.out.println("jungle dvd title: " + jungleDVD.getTitle()); jungleDVD: DigitalVideoDisc@488
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) { 1 usage
Object tmp = o1;
o1 = o2;
o2 = tmp;
Debug
TestPassingParameter
Threads & Variables
Console
"main"@1 in group "main": RUNNING
Evaluate expression (Enter) or add a watch (Ctrl+Shift+Enter)
main:8, TestPassingParameter
jungleDVD = {DigitalVideoDisc@488}
args = {String[0]@487} []
jungleDVD = {DigitalVideoDisc@488}
cinderellaDVD = {DigitalVideoDisc@489}
Switch frames from anywhere in the IDE with Ctrl+Alt+Up and Ctrl+Alt+Down
AimsProject
src
TestPassingParameter
8:1
CRLF
UTF-8
4 spaces





III. Use-case diagram and class diagram


pkg
Cart
- qtyOrdered : int = 0
- MAX_ORDERED : int = 20
+ addDigitalVideoDisc(disc : int) : void
+ removeDigitalVideoDisc(disc : int) : void
+ totalCost() : float
+ printCart() : void
+ searchByID(id : int) : void
+ searchByTitle(tittle : String) : void
+ addDigitalVideoDisc(DigitalVideoDisc [] dvdList : int) : void
+ addDigitalVideoDisc(DigitalVideoDisc dvd1 : int, DigitalVideoDisc dvd2 : int) : void
CartTest
+ main(String[] args : int) : void
Aims
+ main(args : String[]) : void
DigitalVideoDisc
- title : String
- category : String
- director : String
- length : int
- cost : float
- nbDigitalVideoDiscs : int = 0
- id : int
+ getTitle() : String
+ getCategory() : String
+ getDirector() : String
+ getLength() : int
+ getcost() : float
+ DigitalVideoDisc(title : String) : void
+ DigitalVideoDisc(String title : int, String category : int, float cost : int) : void
+ DigitalVideoDisc(String title : int, String category : int, String director : int, int length : int, float cost : int) : void
+ getID() : int
+ toString() : String
+ updateID() : void
+ setTitle() : void
TestPassingParameter
+ main(String[] args : int) : void
+ swap(Object o1 : int, Object o2 : int) : void
+ changeTitle(DigitalVideoDisc dvd : int, String title : int) : void
Store
- itemCount : int
+ Store() : void
+ addDVD(DigitalVideoDisc dvd : int) : void
+ removeDVD(DigitalVideoDisc dvd : int) : void


uc
AIMS
Detail information of DVDS
Approve
Reject
Pick an order
Browse the list of DVDs
Add to cart
See the list of pending orders
Log in
The store manager
Play a demo DVD
Search for DVDs
By price
By category
By title
Customer
By Title
By cost
Sort DVDs
Add new DVD
Remove DVDs
Provide all information
Update
See the current cart
Quantity of a DVD
Remove
Check the validation of the card
Free random item
Place order
Pay for the order
Card association system
Filter DVDs
By ID
By TITLE
Enter the delivery information
Performing the pay transaction
Display infomation
Found item
Not found item
Display all the detailed information
Sent to the customer's email
<<extend>>
<<include>>

IV. Answer the questions

- ***Is JAVA a Pass by Value or a Pass by Reference programming language?***
  Java is pass by Value. We can see after call of swap(jungleDVD, cinderellaDVD), the value of their references are copied into the parameters o1 and o2 respectively. Inside the swap method, the reference o1 and o2 are swapped. However, this only affects the local variables o1 and o2 within the swap method. The original references jungleDVD and cinderellaDVD in the main method are not modified, and that's why the titles remain unchanged in the main method after calling swap(jungleDVD, cinderellaDVD).

- ***After the call of swap(jungleDVD, cinderellaDVD) why does the title of these two objects still remain?***
  The value of their references are copied into the parameters o1 and o2 respectively. Inside the swap method, the reference o1 and o2 are swapped but outside the original references jungleDVD and cinderellaDVD in the main method not swapped at all, so title of these two objects still remain.
- ***After the call of changeTitle(jungleDVD, cinderellaDVD.getTitle()) why is the title of the JungleDVD changed?***
  After the call of changeTitle(jungleDVD, cinderellaDVD.getTitle()), the title of the JungleDVD changed. The reason is that Java object variables are simply references that point to real objects in the memory heap. Therefore, even though Java passes parameters to methods by value, if the variable points to an object reference, the real object will also be changed.