Họ và tên: Lê Việt Anh

Mã số sinh viên: 20225689

IT3103 – LAB 03: Basic Object-Oriented Techniques

Questions:

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

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

Tiêu đề của hai đối tượng không thay đổi vì Java sử dụng cơ chế truyền tham trị (pass-by-value) khi gọi hàm. Khi bạn truyền một tham chiếu đối tượng (như jungleDVD hoặc cinderellaDVD) vào phương thức, Java chỉ truyền bản sao của tham chiếu chứ không phải bản thân đối tượng.

Tiêu đề của jungleDVD thay đổi vì phương thức changeTitle trực tiếp thay đổi trạng thái của đối tượng mà tham chiếu dvd trỏ tới.

- **TestPassingParameter với swap cũ:**

```java
package aims;

public class TestPassingParameter {
    Run | Debug
    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;
    }

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

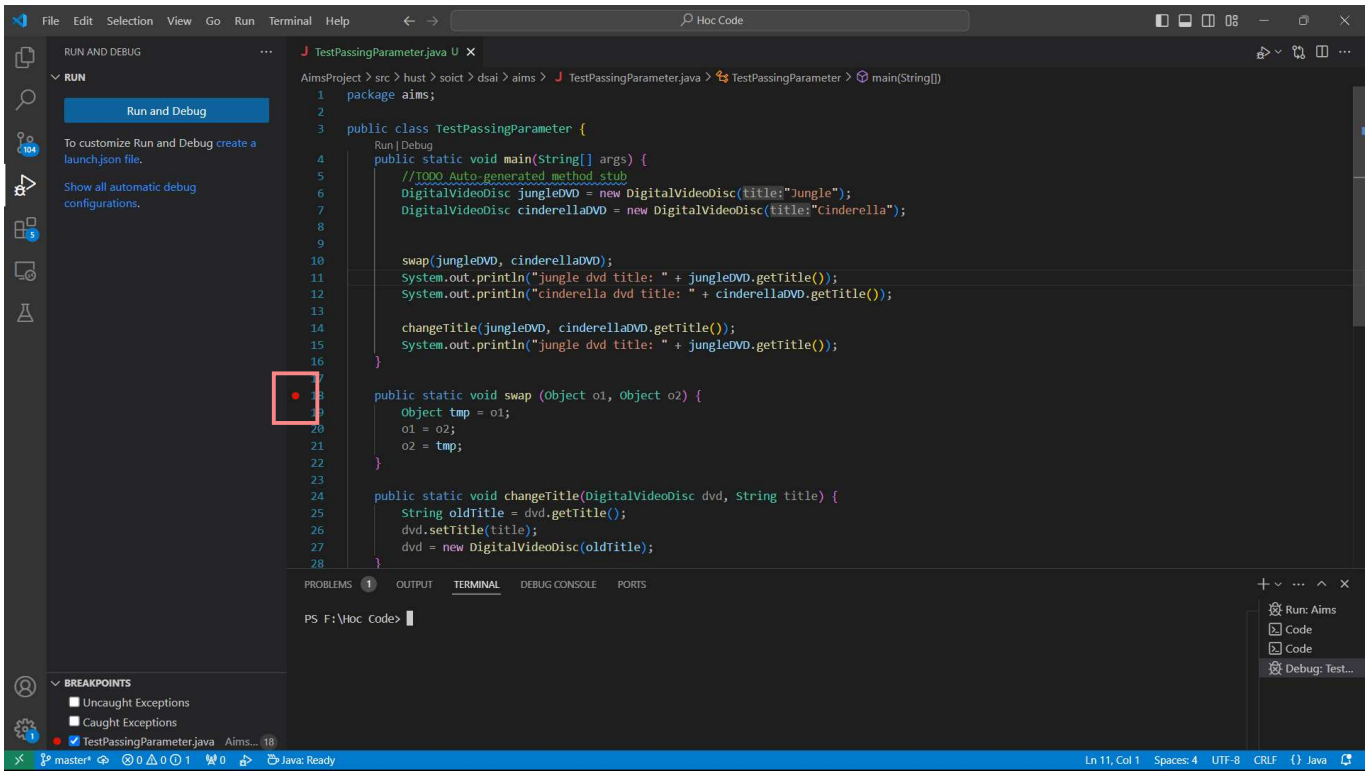
- **TestPassingParameter với swap mới:**

```java
package aims;

public class TestPassingParameter {
    Run | Debug
    public static void main(String[] args) {
        //TODO Auto-generated method stub
        DigitalVideoDisc jungleDVD = new DigitalVideoDisc(title:"Jungle");
        DigitalVideoDisc cinderellaDVD = new DigitalVideoDisc(title:"Cinderella");

        Wrapper<DigitalVideoDisc> jungleWrapper = new Wrapper<>(jungleDVD);
        Wrapper<DigitalVideoDisc> cinderellaWrapper = new Wrapper<>(cinderellaDVD);

        swap(jungleWrapper, cinderellaWrapper);

        jungleDVD = jungleWrapper.value;
        cinderellaDVD = cinderellaWrapper.value;

        System.out.println(x:"After swap:");
        System.out.println("jungle dvd title: " + jungleDVD.getTitle());
        System.out.println("cinderella dvd title: " + cinderellaDVD.getTitle());

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

    //Old swap
    /*
    public static void swap (Object o1, Object o2) {
        Object tmp = o1;
        o1 = o2;
        o2 = tmp;
    }
    */
```

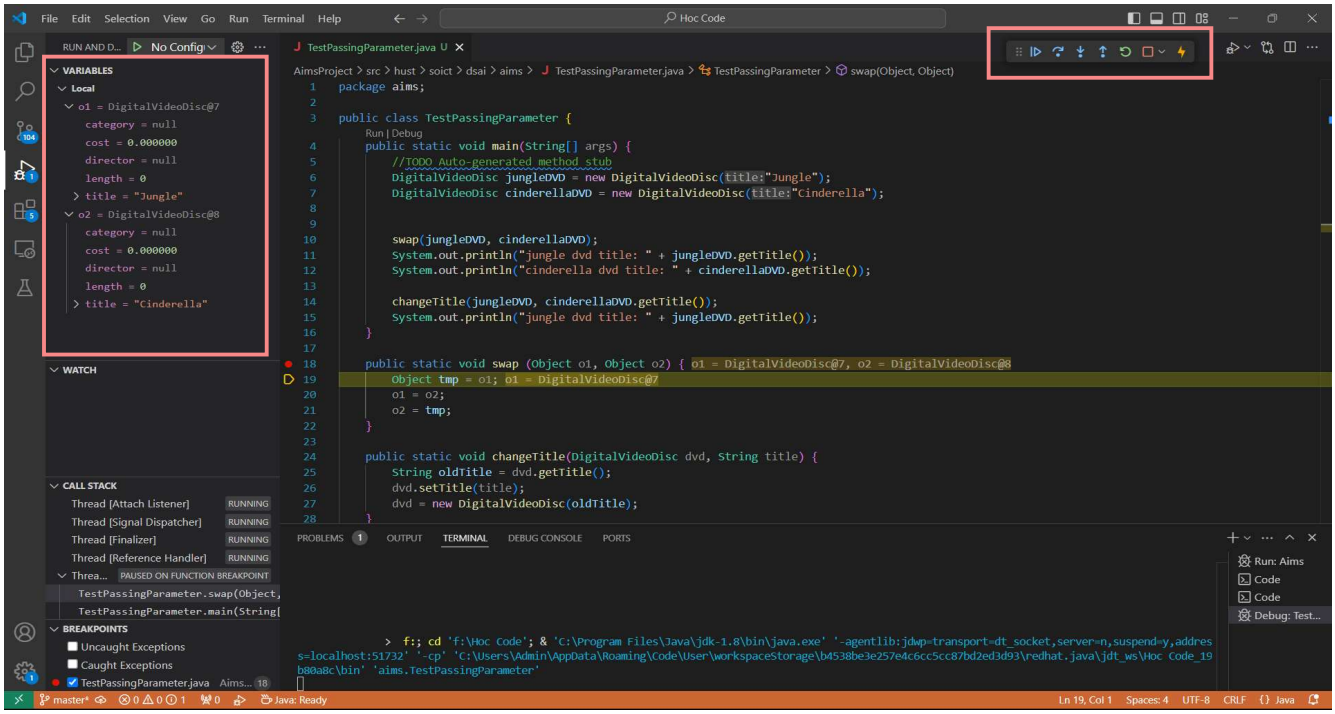
String aims.DigitalVideoDisc.getTitle()

```java
    //New swap
    public static class Wrapper<T> {
        public T value;

        public Wrapper(T value) {
            this.value = value;
        }
    }

    public static <T> void swap(Wrapper<T> o1, Wrapper<T> o2) {
        T temp = o1.value;
        o1.value = o2.value;
        o2.value = temp;
    }


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

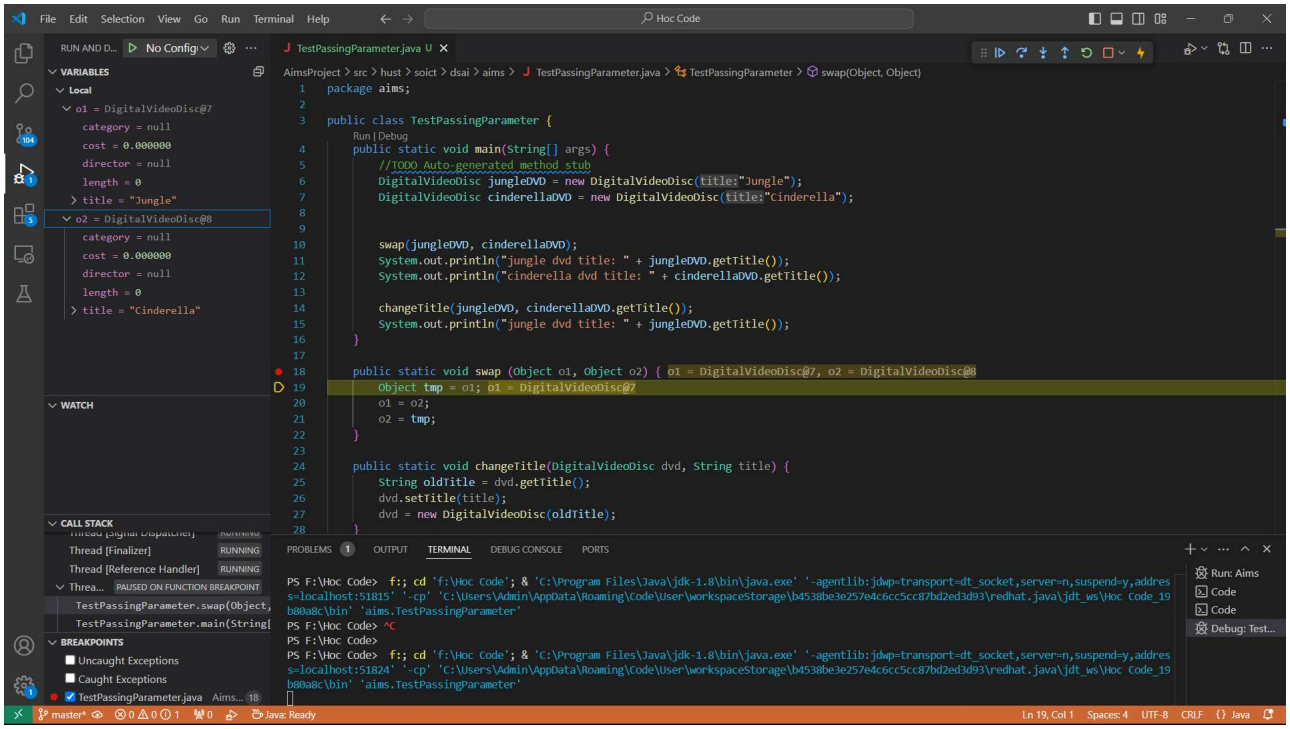
- **Set up break point:**



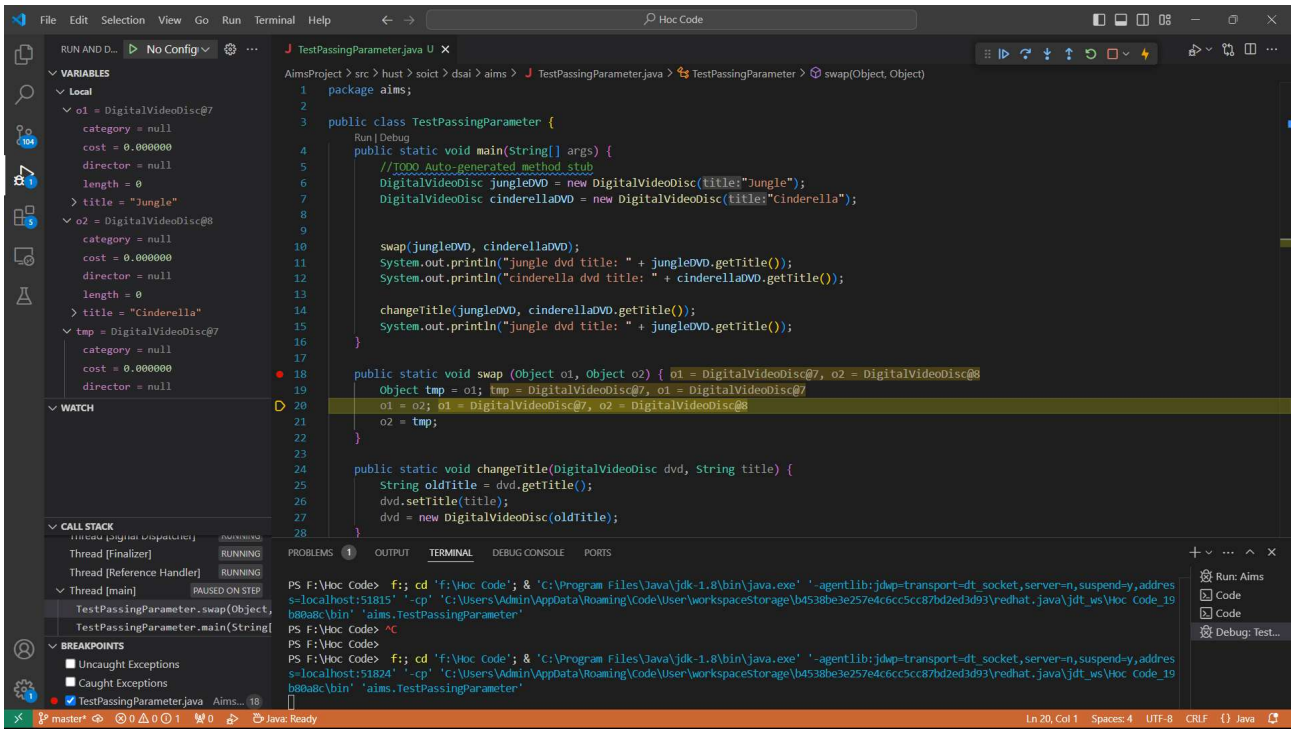
- **Run in debug mode:** (Step Into, Step Over, Step Return, value of variables)



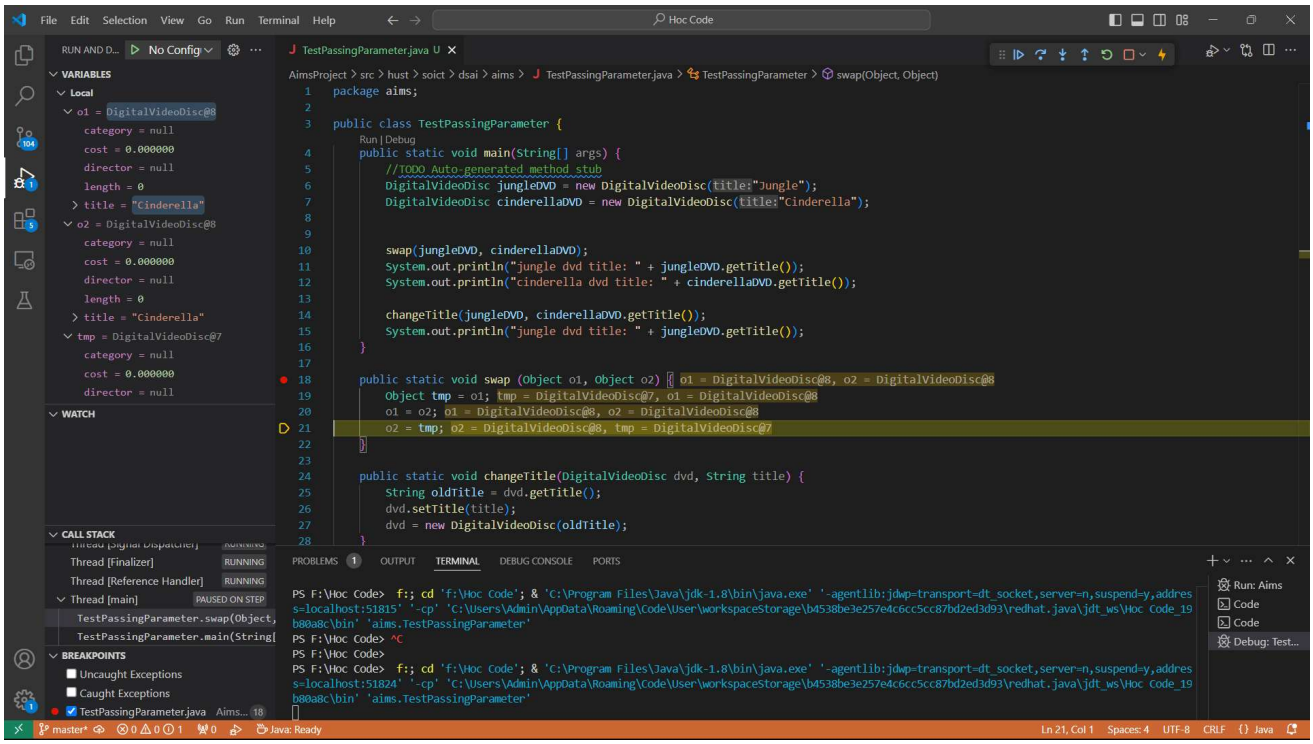
- **Investigate value of variables:**



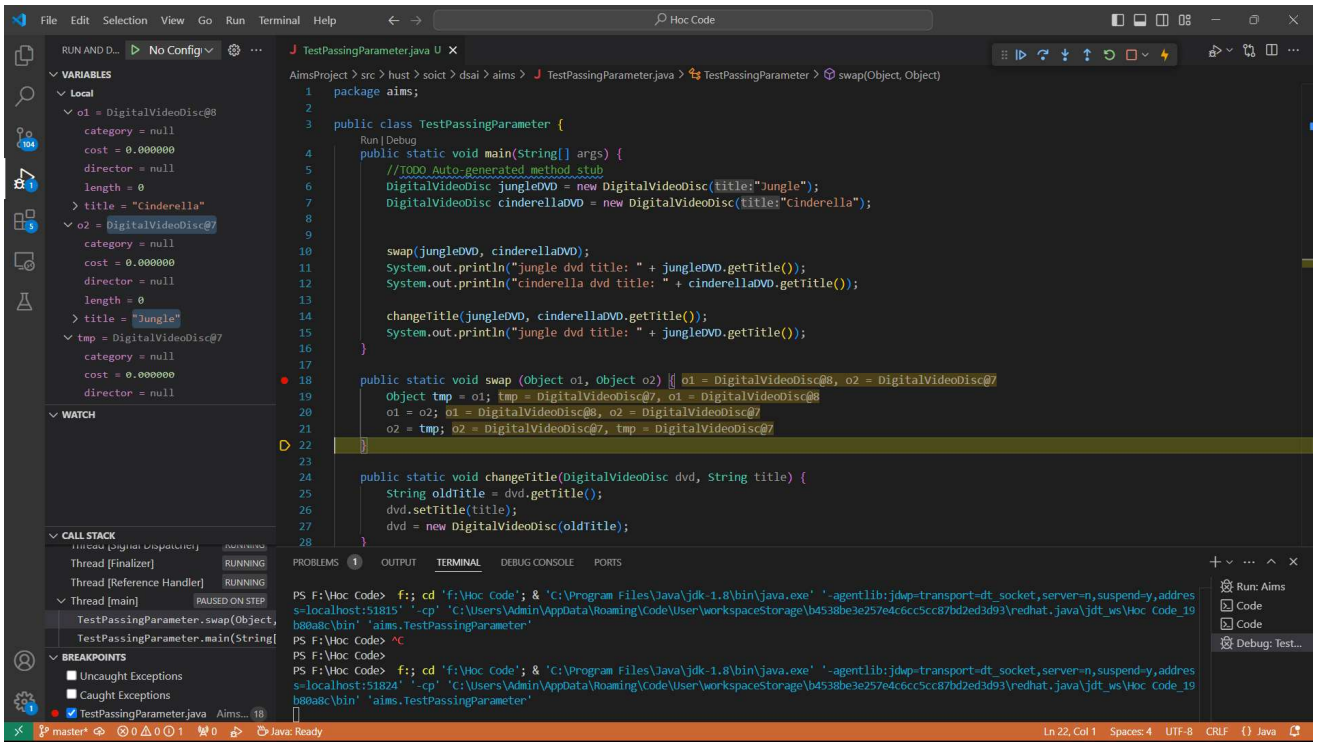
+ Khởi tạo tmp = o1:



+ o1 = o2 (Title o1 thay đổi)

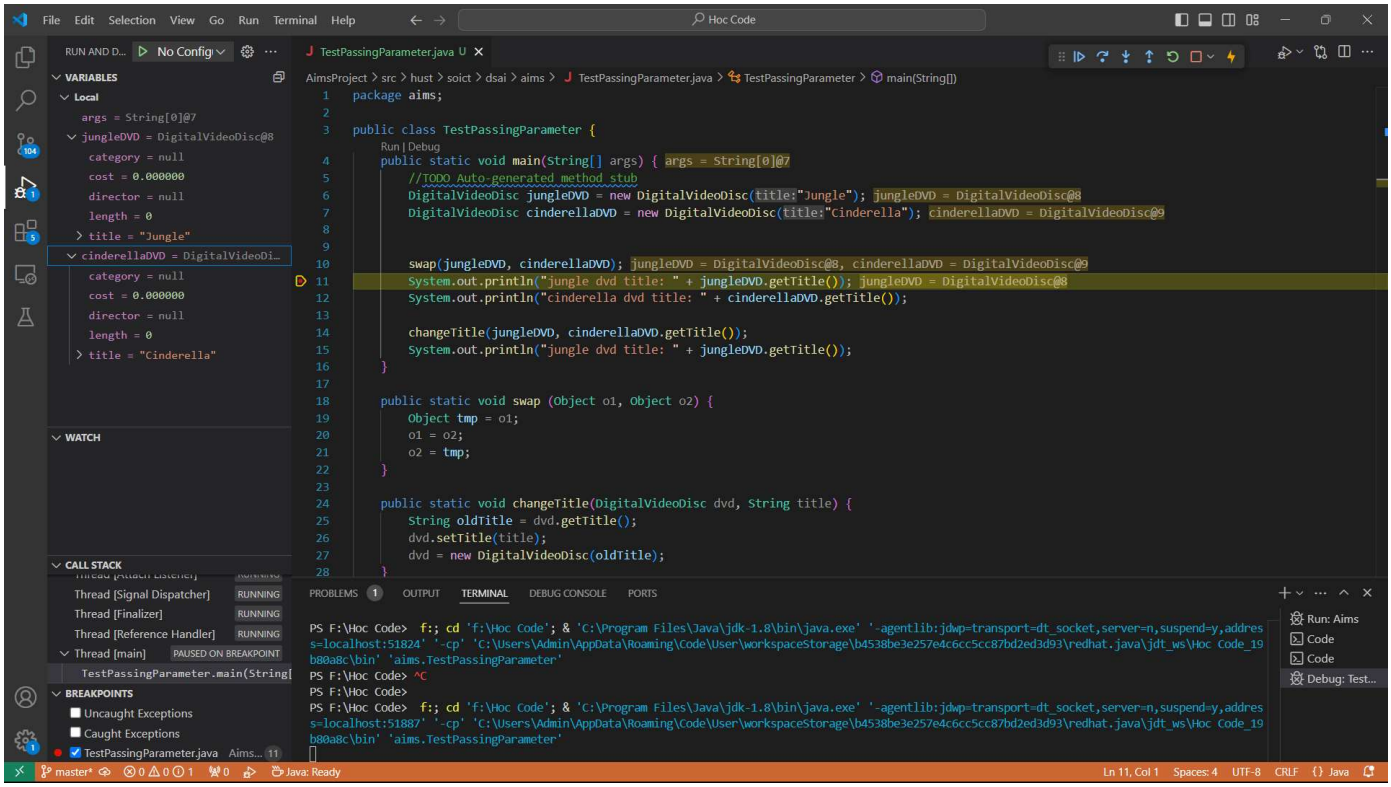


+ o2 = tmp (Tiêu đề o2 thay đổi)

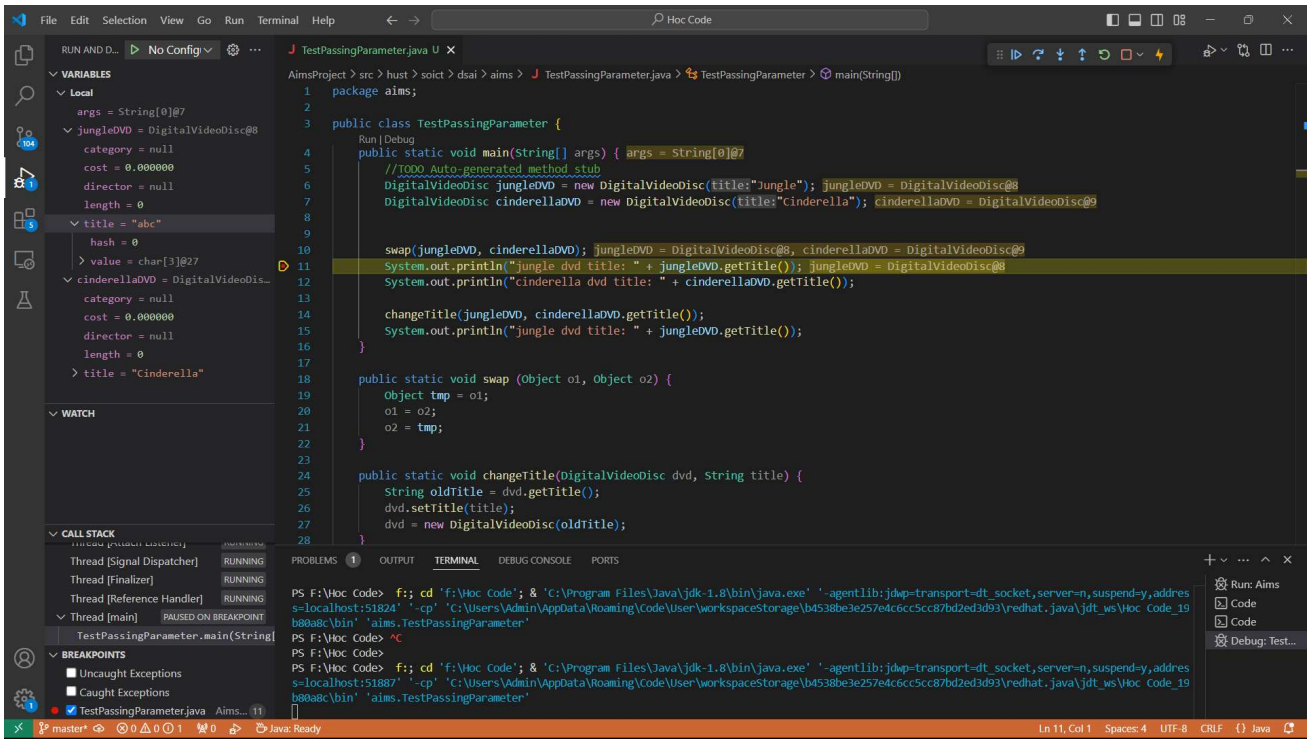


- **Change value of variables:**

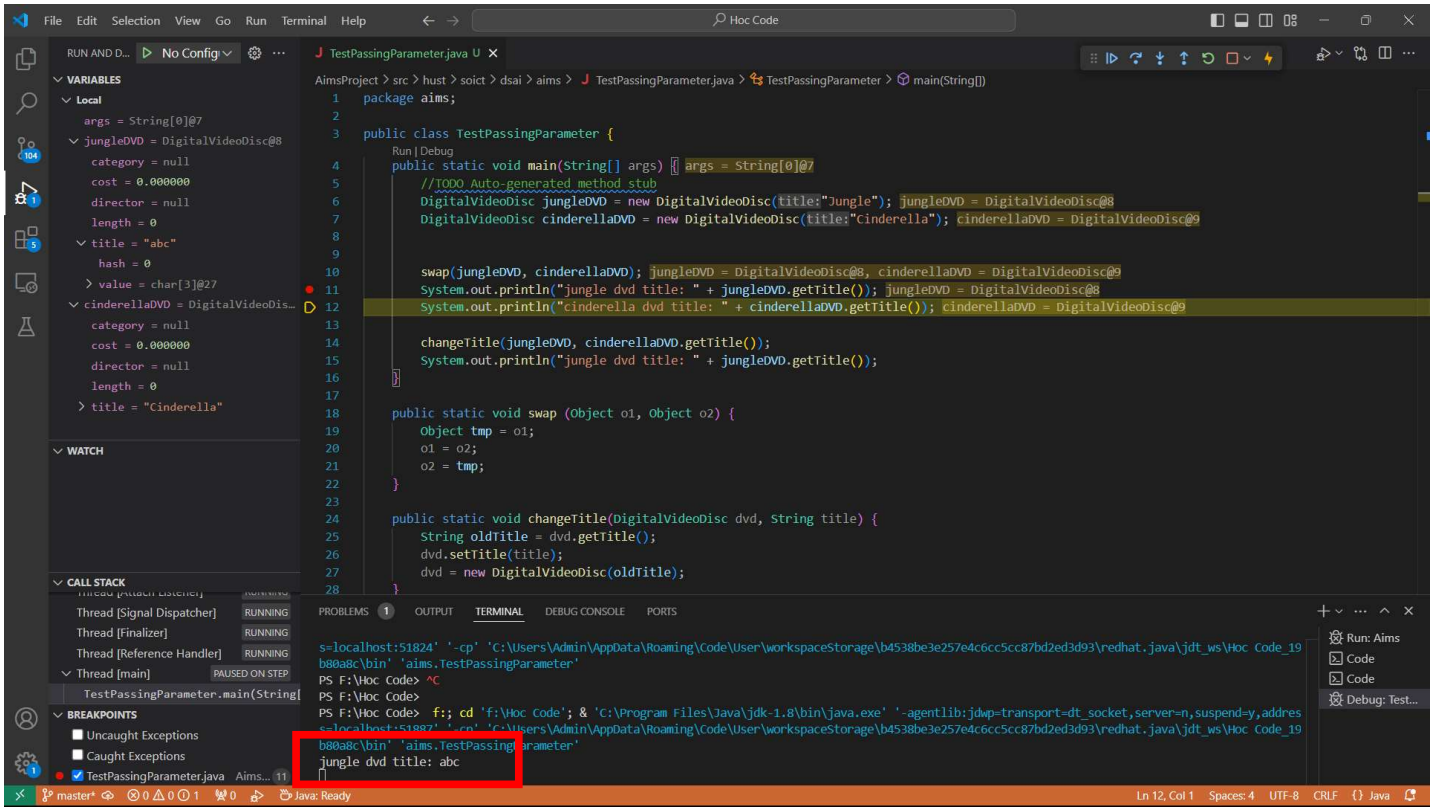
+ The Title of jungleDVD vẫn là “Jungle”:



+ Đổi title jungleDVD thành “abc”:



+ Kết quả in:


File Edit Selection View Go Run Terminal Help
Hoc Code
RUN AND D... No Config
TestPassingParameter.java U
AimsProject > src > hust > soict > dsai > aims > TestPassingParameter.java > TestPassingParameter > main(String[])
VARIABLES
Local
args = String[0]@7
jungleDVD = DigitalVideoDisc@8
category = null
cost = 0.000000
director = null
length = 0
title = "abc"
hash = 0
value = char[3]@27
cinderellaDVD = DigitalVideoDis...
category = null
cost = 0.000000
director = null
length = 0
title = "Cinderella"
WATCH
CALL STACK
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... 11
1 package aims;
3 public class TestPassingParameter {
Run | Debug
4 public static void main(String[] args) { args = String[0]@7
5 //TODO Auto-generated method stub
6 DigitalVideoDisc jungleDVD = new DigitalVideoDisc(title:"Jungle"); jungleDVD = DigitalVideoDisc@8
7 DigitalVideoDisc cinderellaDVD = new DigitalVideoDisc(title:"Cinderella"); cinderellaDVD = DigitalVideoDisc@9
10 swap(jungleDVD, cinderellaDVD); jungleDVD = DigitalVideoDisc@8, cinderellaDVD = DigitalVideoDisc@9
11 System.out.println("jungle dvd title: " + jungleDVD.getTitle()); jungleDVD = DigitalVideoDisc@8
12 System.out.println("cinderella dvd title: " + cinderellaDVD.getTitle()); cinderellaDVD = DigitalVideoDisc@9
14 changeTitle(jungleDVD, cinderellaDVD.getTitle());
15 System.out.println("jungle dvd title: " + jungleDVD.getTitle());
16 }
18 public static void swap (Object o1, Object o2) {
19 Object tmp = o1;
20 o1 = o2;
21 o2 = tmp;
22 }
24 public static void changeTitle(DigitalVideoDisc dvd, String title) {
25 String oldTitle = dvd.getTitle();
26 dvd.setTitle(title);
27 dvd = new DigitalVideoDisc(oldTitle);
28 }
PROBLEMS 1 OUTPUT TERMINAL DEBUG CONSOLE PORTS
s=localhost:51824' '-cp' 'C:\Users\Admin\AppData\Roaming\Code\User\workspaceStorage\b4538be3e257e4c6cc5cc87bd2ed3d93\redhat.java\jdt_ws\Hoc Code_19b80a8c\bin' 'aims.TestPassingParameter'
PS F:\Hoc Code> ^C
PS F:\Hoc Code>
PS F:\Hoc Code> f:; cd 'f:\Hoc Code'; & 'C:\Program Files\Java\jdk-1.8\bin\java.exe' '-agentlib:jdwp=transport=dt_socket,server=n,suspend=y,address=localhost:51887' '-cp' 'C:\Users\Admin\AppData\Roaming\Code\User\workspaceStorage\b4538be3e257e4c6cc5cc87bd2ed3d93\redhat.java\jdt_ws\Hoc Code_19b80a8c\bin' 'aims.TestPassingParameter'
jungle dvd title: abc
Run: Aims
Code
Code
Debug: Test...
master* 0 0 0 1 0 Java: Ready
Ln 12, Col 1 Spaces: 4 UTF-8 CRLF {} Java

- **Chỉnh sửa trong class DigitalVideoDisc**

+ Thêm id và nbDigitalVideoDisc

```
3   public class DigitalVideoDisc {
4       private int id;
5       private String title;
6       private String category;
7       private String director;
8       private int length;
9       private float cost;
10      //Đếm số lượng DVD hiện có
11      private static int nbDigitalVideoDisc = 0;
```

+ Thêm setter setTtile

```
38      //Setter
39      public void setTitle(String newTitle) {
40          this.title = newTitle;
41      }
```

+ Thêm tự cập nhập id của DVD vào các constructor

```
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;

    //Gán ID và cập nhập biến đếm nbDigitalVideoDisc
    this.id = ++nbDigitalVideoDisc;
}
```

+ Method kiểm tra Title

```
//Kiểm tra xem có đúng Title không
public boolean isMatch(String title){
    return this.title.equalsIgnoreCase(title);
}
```

+ Chỉnh sửa lại method hiển thị cho phù hợp với format yêu cầu

```
//Hiển thị thông tin DVD
public void displayInfo() {
    System.out.print(s:"DVD -");
    System.out.print(" " + title);
    if (category != null) {
        System.out.print(" - " + category);
    } else System.out.print(s:" - Not Found" );
    if (director != null) {
        System.out.print(" - " + director);
    } else System.out.print(s:" - Not Found" );
    if (length !=  0) {
        System.out.print(" - " + length + " mins");
    } else System.out.print(s:" - Not Found" );
    System.out.print(": " + cost + "$");
    System.out.println();
}
```

- **Chỉnh sửa trong class Cart:**

+ Overload thêm các method addDigitalVideoDisc:

```
public void addDigitalVideoDisc (DigitalVideoDisc[] discList) {
    for (DigitalVideoDisc disc : discList) {
        if (qtyOrdered < MAX_NUMBERS_ORDERED) {
            addDigitalVideoDisc(disc);
        } else System.out.println(x:"The cart is full. Cannot add more items!");
    }
}
```

```
public void addDigitalVideoDisc (DigitalVideoDisc disc1, DigitalVideoDisc disc2) {
    if ((qtyOrdered + 1) < MAX_NUMBERS_ORDERED) {
        addDigitalVideoDisc(disc1);
        addDigitalVideoDisc(disc2);
    } else System.out.print(s:"The cart is full. Cannot add two more items!");
}
```

+ Thêm tìm kiếm bằng id:

```
//Tìm kiếm bằng ID
public void searchById(int id) {
    boolean found = false;
    for (int i = 0; i < qtyOrdered; i++) {
        if (itemsOrdered[i].getId() == id) {
            found = true;
            System.out.println("Found the DVD with ID " + id + ": \n");
            itemsOrdered[i].displayInfo();
            break;
        }
    }
    if (!found) System.out.println("No DVD found with ID " + id + "!");
}
```

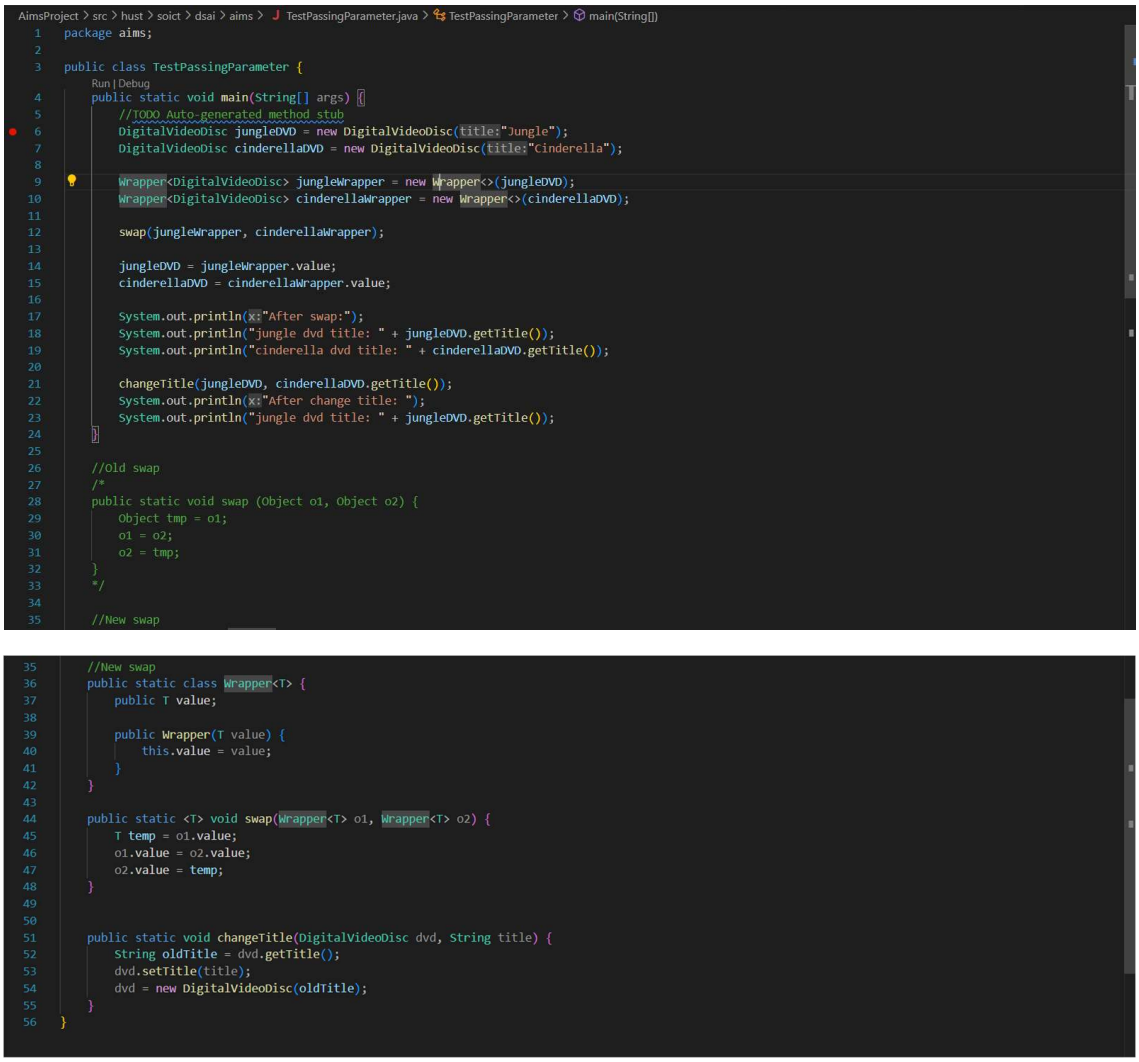
+ Thêm tìm kiếm bằng title:

```
//Tìm kiếm bằng Title
public void searchByTitle(String title) {
    boolean found = false;
    for (int i = 0; i < qtyOrdered; i++) {
        if (itemsOrdered[i].isMatch(title)) {
            found = true;
            System.out.println("\nFound the DVD with title \"" + title + "\": ");
            itemsOrdered[i].displayInfo();
        }
    }
    if (!found) {
        System.out.println("\nNo DVD found with title \"" + title + "\"!");
    }
}
```

+ Chỉnh sửa lại method hiển thị giỏ cho phù hợp với yêu cầu:

```java
//Hiển thị giỏ hàng
public void displayCart() {
    System.out.println();
    System.out.println("Current items in the cart: " + qtyOrdered + " item(s).");
    System.out.println(x:"**********CART**********");
    for (int i = 0; i < qtyOrdered; i++) {
        System.out.print((i+1) + ". ");
        itemsOrdered[i].displayInfo();
    }
    System.out.println(x:"--------------------------------------------------");
    System.out.println("Total cost: $" + totalCost());
    System.out.println(x:"**************************************************");
    System.out.println();
}
```

- **Thêm class TestPassingParamter:**



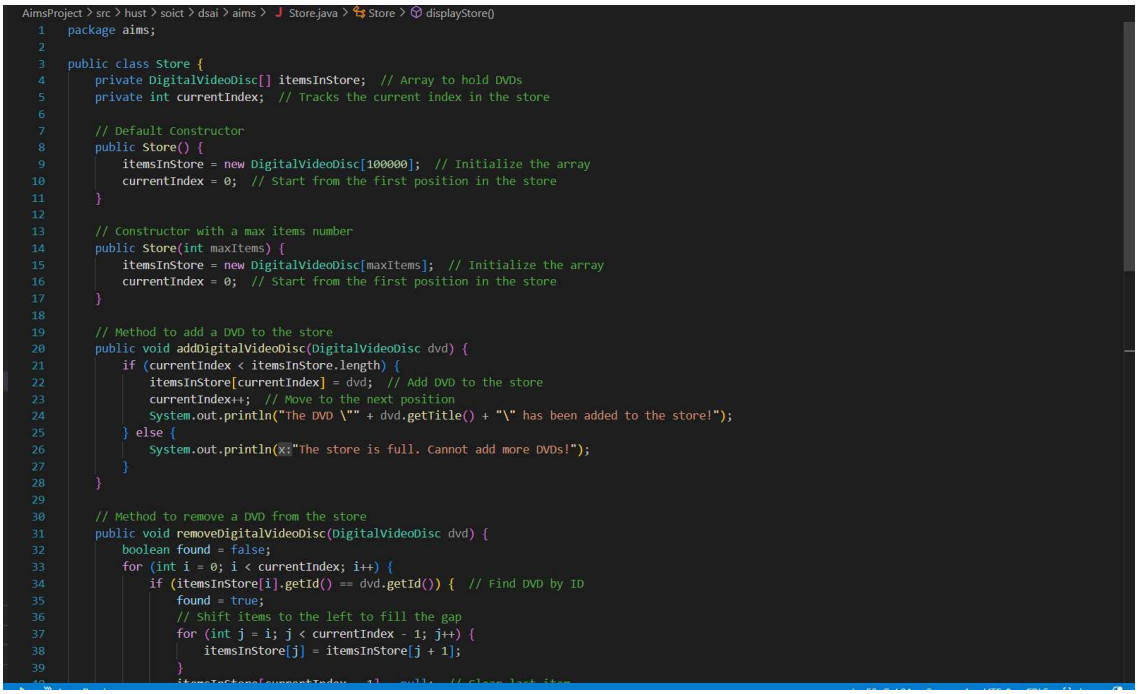
```
AimsProject > src > hust > soict > dsai > aims > TestPassingParameter.java > TestPassingParameter > main(String[])
1   package aims;
2
3   public class TestPassingParameter {
        Run | Debug
4       public static void main(String[] args) {
5           //TODO Auto-generated method stub
6           DigitalVideoDisc jungleDVD = new DigitalVideoDisc(title:"Jungle");
7           DigitalVideoDisc cinderellaDVD = new DigitalVideoDisc(title:"Cinderella");
8
9           Wrapper<DigitalVideoDisc> jungleWrapper = new Wrapper<>(jungleDVD);
10          Wrapper<DigitalVideoDisc> cinderellaWrapper = new Wrapper<>(cinderellaDVD);
11
12          swap(jungleWrapper, cinderellaWrapper);
13
14          jungleDVD = jungleWrapper.value;
15          cinderellaDVD = cinderellaWrapper.value;
16
17          System.out.println(x:"After swap:");
18          System.out.println("jungle dvd title: " + jungleDVD.getTitle());
19          System.out.println("cinderella dvd title: " + cinderellaDVD.getTitle());
20
21          changeTitle(jungleDVD, cinderellaDVD.getTitle());
22          System.out.println(x:"After change title: ");
23          System.out.println("jungle dvd title: " + jungleDVD.getTitle());
24      }
25
26      //Old swap
27      /*
28      public static void swap (Object o1, Object o2) {
29          Object tmp = o1;
30          o1 = o2;
31          o2 = tmp;
32      }
33      */
34
35      //New swap
```



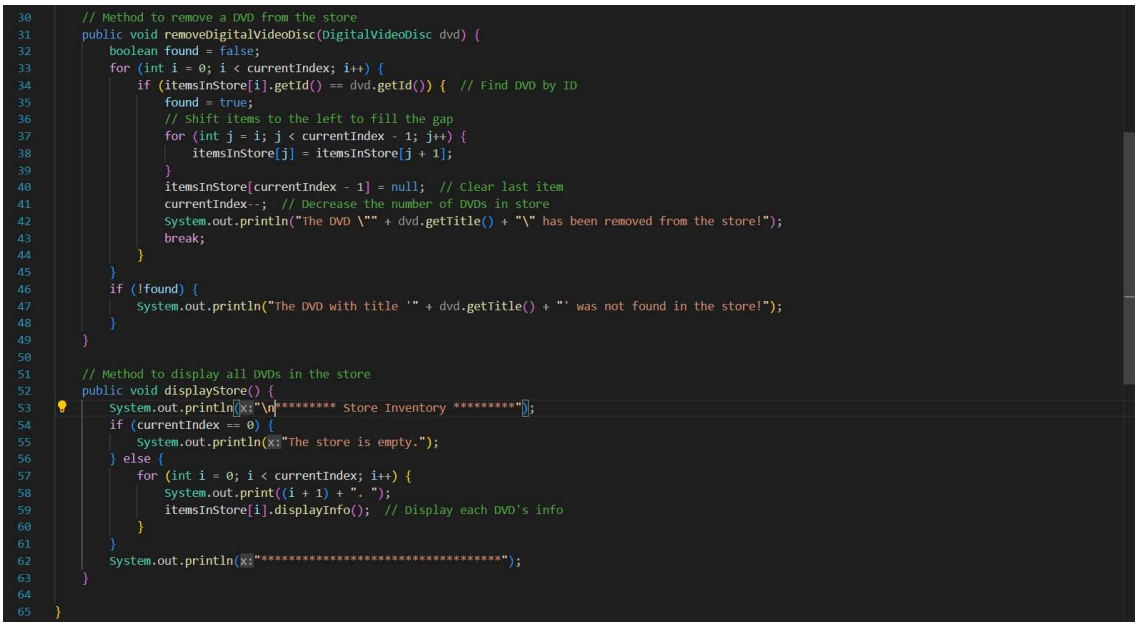
```
35      //New swap
36      public static class Wrapper<T> {
37          public T value;
38
39          public Wrapper(T value) {
40              this.value = value;
41          }
42      }
43
44      public static <T> void swap(Wrapper<T> o1, Wrapper<T> o2) {
45          T temp = o1.value;
46          o1.value = o2.value;
47          o2.value = temp;
48      }
49
50
51      public static void changeTitle(DigitalVideoDisc dvd, String title) {
52          String oldTitle = dvd.getTitle();
53          dvd.setTitle(title);
54          dvd = new DigitalVideoDisc(oldTitle);
55      }
56  }
```

- **Thêm class CartTest:**

- **Thêm class Store:**

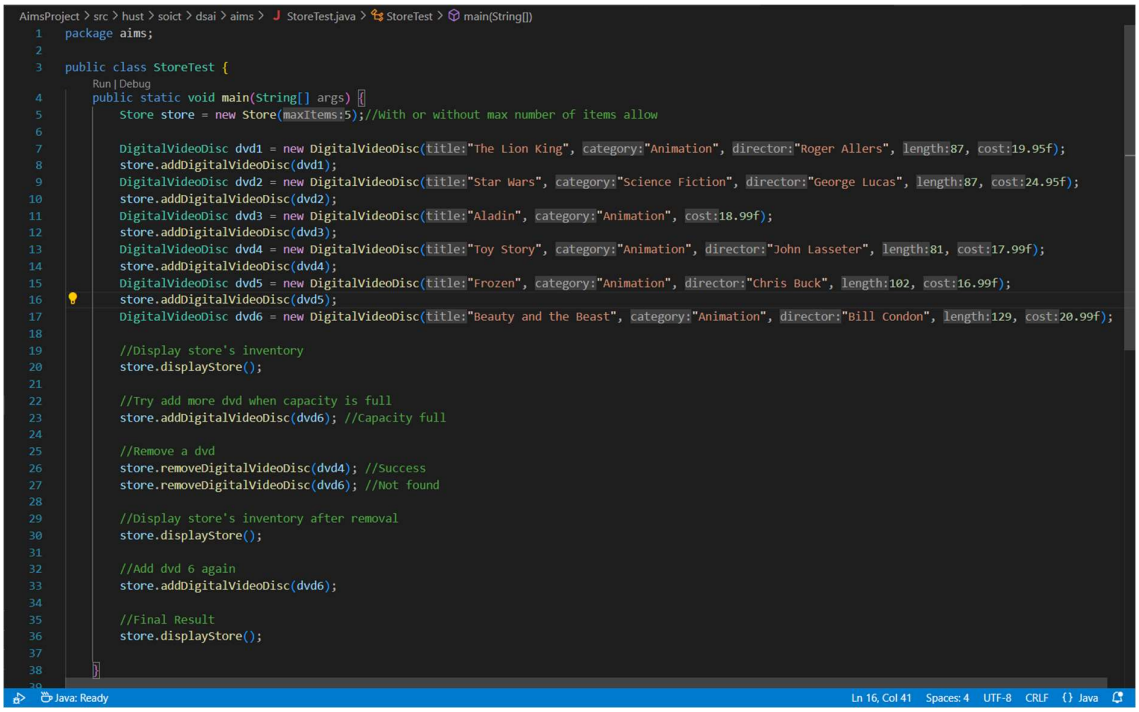
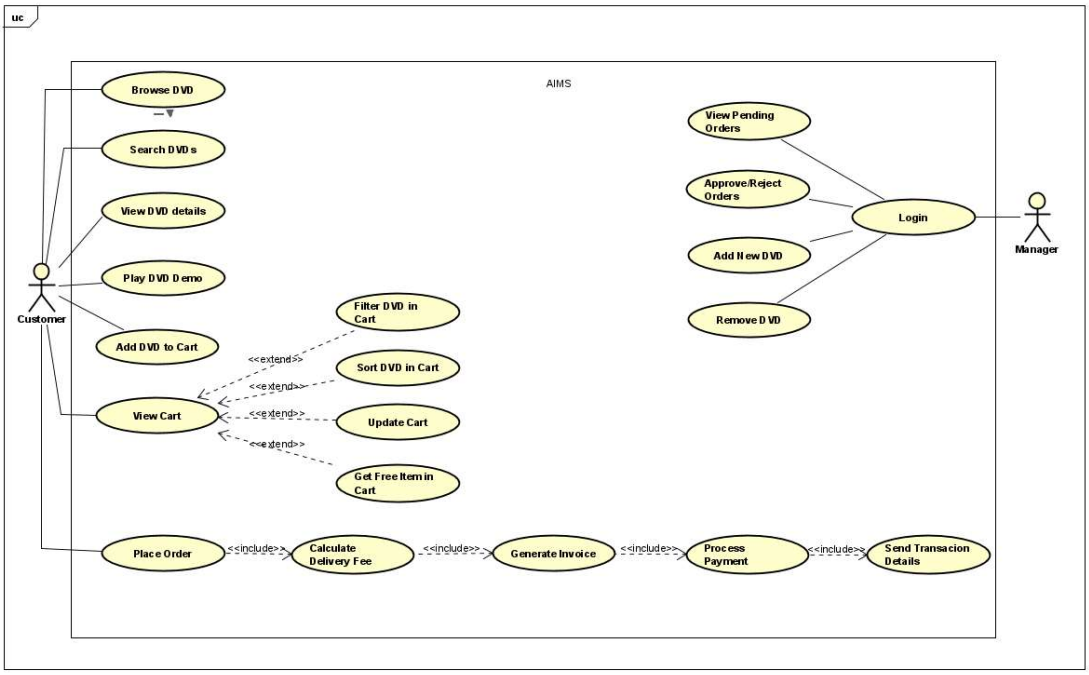
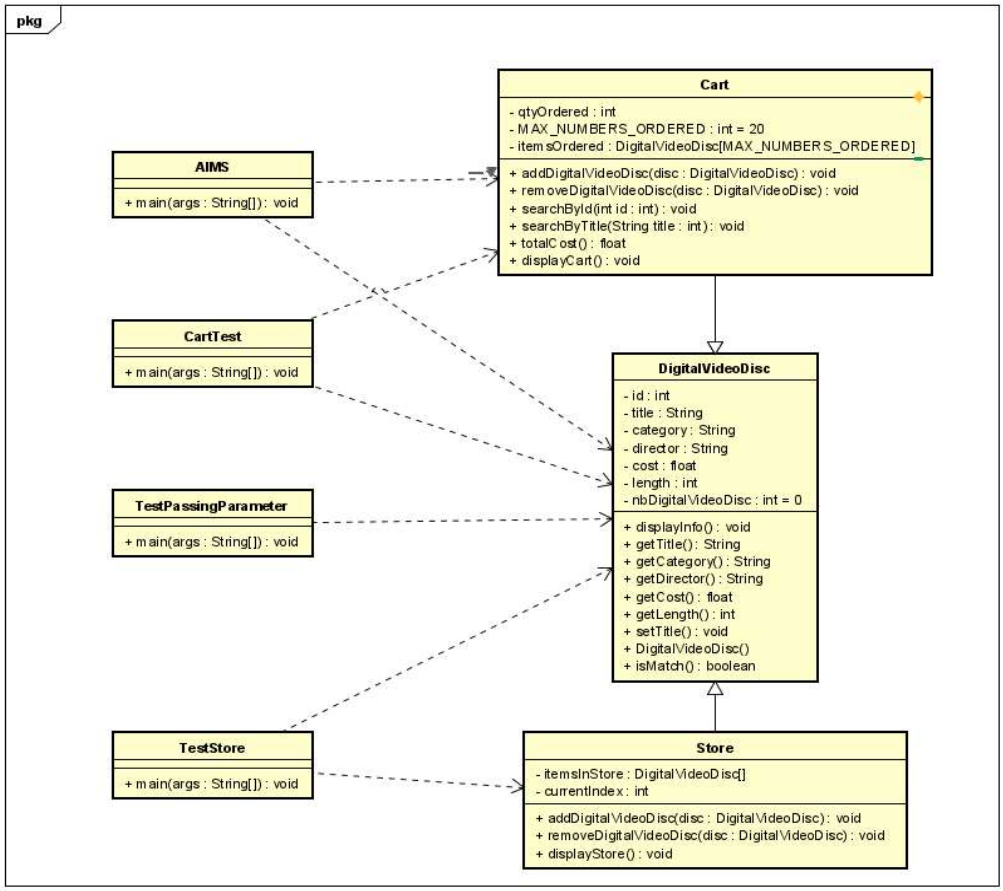


```
AimsProject > src > hust > soict > dsai > aims > Store.java > Store > displayStore()
1  package aims;
2
3  public class Store {
4      private DigitalVideoDisc[] itemsInStore;  // Array to hold DVDs
5      private int currentIndex;  // Tracks the current index in the store
6
7      // Default Constructor
8      public Store() {
9          itemsInStore = new DigitalVideoDisc[100000];  // Initialize the array
10         currentIndex = 0;  // Start from the first position in the store
11     }
12
13     // Constructor with a max items number
14     public Store(int maxItems) {
15         itemsInStore = new DigitalVideoDisc[maxItems];  // Initialize the array
16         currentIndex = 0;  // Start from the first position in the store
17     }
18
19     // Method to add a DVD to the store
20     public void addDigitalVideoDisc(DigitalVideoDisc dvd) {
21         if (currentIndex < itemsInStore.length) {
22             itemsInStore[currentIndex] = dvd;  // Add DVD to the store
23             currentIndex++;  // Move to the next position
24             System.out.println("The DVD \"" + dvd.getTitle() + "\" has been added to the store!");
25         } else {
26             System.out.println(x:"The store is full. Cannot add more DVDs!");
27         }
28     }
29
30     // Method to remove a DVD from the store
31     public void removeDigitalVideoDisc(DigitalVideoDisc dvd) {
32         boolean found = false;
33         for (int i = 0; i < currentIndex; i++) {
34             if (itemsInStore[i].getId() == dvd.getId()) {  // Find DVD by ID
35                 found = true;
36                 // Shift items to the left to fill the gap
37                 for (int j = i; j < currentIndex - 1; j++) {
38                     itemsInStore[j] = itemsInStore[j + 1];
39                 }
```



```
30     // Method to remove a DVD from the store
31     public void removeDigitalVideoDisc(DigitalVideoDisc dvd) {
32         boolean found = false;
33         for (int i = 0; i < currentIndex; i++) {
34             if (itemsInStore[i].getId() == dvd.getId()) {  // Find DVD by ID
35                 found = true;
36                 // Shift items to the left to fill the gap
37                 for (int j = i; j < currentIndex - 1; j++) {
38                     itemsInStore[j] = itemsInStore[j + 1];
39                 }
40                 itemsInStore[currentIndex - 1] = null;  // Clear last item
41                 currentIndex--;  // Decrease the number of DVDs in store
42                 System.out.println("The DVD \"" + dvd.getTitle() + "\" has been removed from the store!");
43                 break;
44             }
45         }
46         if (!found) {
47             System.out.println("The DVD with title '" + dvd.getTitle() + "' was not found in the store!");
48         }
49     }
50
51     // Method to display all DVDs in the store
52     public void displayStore() {
53         System.out.println(x:"\n******** Store Inventory ********");
54         if (currentIndex == 0) {
55             System.out.println(x:"The store is empty.");
56         } else {
57             for (int i = 0; i < currentIndex; i++) {
58                 System.out.print((i + 1) + ". ");
59                 itemsInStore[i].displayInfo();  // Display each DVD's info
60             }
61         }
62         System.out.println(x:"**********************************");
63     }
64
65 }
```

- **Thêm class StoreTest:**



- **Class và UseCase Diagram:**