

# BÁO CÁO THỰC HÀNH LAB 3

## LẬP TRÌNH HƯỚNG ĐỐI TƯỢNG

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<https://github.com/VuThuongDat/IT3103.732871.2023.1.20215031.VuThuongDat/tree/release/lab03/OtherProjects/src/hust/soict/globalict/garbage>

## 1. Branch your repository

- Tạo 9 branch theo yêu cầu:

```

MINGW64:/c/Users/user/Documents/OOLT_lab/IT3103.732871.2023.1.20215031...
user@DESKTOP-JR2C9Q6 MINGW64 ~/Documents/OOLT_lab/IT3103.732871.2023.1.20215031.
VuThuongDat (test)
$ git branch
  feature/print-cart
  feature/search-cart
  main
  refactor/apply-release-flow
  refactor/packages
* test
  topic/class-members
  topic/memory-management-string
  topic/method-overloading
  topic/passing-parameter
  topic/store
user@DESKTOP-JR2C9Q6 MINGW64 ~/Documents/OOLT_lab/IT3103.732871.2023.1.20215031.
VuThuongDat (test)
$ |

```

- Sau khi tạo 1 branch và checkout sang branch đó thì ta sẽ tiến hành làm bài rồi push branch đó lên github
- Cuối cùng là merge các branch vào nhánh chính

## 2. Working with method overloading

### 2.1. Overloading by differing types of parameter

Code:

```

public void addDigitalVideoDisc(DigitalVideoDisc... dvdList) {
    for (DigitalVideoDisc disc : dvdList) {
        addDigitalVideoDisc(disc);
    }
}

```

### 2.2. Overloading by differing the number of parameters

Code:

```

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

```

-addDigitalVideoDisc(DigitalVideoDisc disc)

```

public void addDigitalVideoDisc(DigitalVideoDisc disc) {
    if (disc == null)
        return;
    if (qtyOrdered == MAX_NUMBERS_ORDERED) {
        System.out.println("Gio hang da day");
        return;
    }
    for (int i = 0; i < qtyOrdered; i++) {
        if (itemsOrdered[i].equals(disc)) {
            System.out.println("Khong the them vi " + disc.getTitle() + " da co trong gio hang!!");
            return;
        }
    }
    itemsOrdered[qtyOrdered] = disc;
    qtyOrdered++;
    System.out.println("Them thanh cong " + disc.getTitle());
}

```

Chạy chương trình:

```

4      DigitalVideoDisc[] dvdList = new DigitalVideoDisc[19];
5      var dvd1 = new DigitalVideoDisc(
6          "The Lion King",
7          "Animation",
8          "Roger Allers",
9          87,
10         19.95f
11     );
12     var dvd2 = new DigitalVideoDisc(
13         "Star Wars",
14         "Science Fiction",
15         "George Lucas",
16         87,
17         24.95f
18     );
19     var dvd3 = new DigitalVideoDisc(
20         "Aladdin",
21         "Animation",
22         "Piaka",
23         92,
24         18.99f
25     );

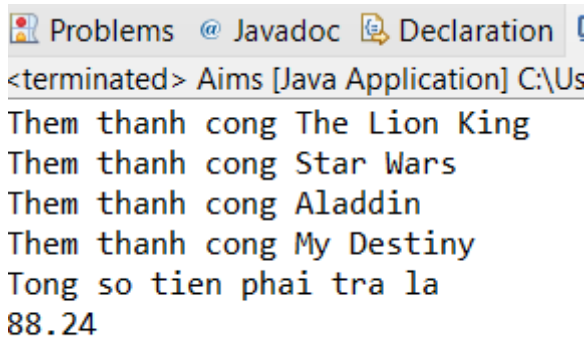
```

```

26         var dvd4 = new DigitalVideoDisc(
27             "My Destiny",
28             "Love",
29             "Home Seckia",
30             97,
31             24.35f
32         );
33
34         dvdList[0] = dvd1;
35         dvdList[1] = dvd2;
36
37         anOrder.addDigitalVideoDisc(dvdList);
38         anOrder.addDigitalVideoDisc(dvd3, dvd4);
39         System.out.println("Tong so tien phai tra la ");
40         System.out.println(anOrder.totalCost());
41     }
42 }

```

Kết quả:



```

<terminated> Aims [Java Application] C:\Us
Them thanh cong The Lion King
Them thanh cong Star Wars
Them thanh cong Aladdin
Them thanh cong My Destiny
Tong so tien phai tra la
88.24

```

### 3. Passing Parameter

Code:

```

//Vu Thuong Dat 20215031
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(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);
    }
}

```

Kết quả:

```

Jungle dvd title: Jungle
Cinderella dvd title: Cinderella
Jungle dvd title: Cinderella

```

\*\*\*\*Sửa lại hàm swap():

Code:

```

//Vu Thuong Dat 20215031
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());
    }
    public static void swap(DigitalVideoDisc dvd1, DigitalVideoDisc dvd2) {
        String tmp = dvd1.getTitle();
        dvd1.setTitle(dvd2.getTitle());
        dvd2.setTitle(tmp);
    }
}

```

Kết quả:

```

<terminated> TestPassingParameter [Java Applic
Jungle dvd title: Cinderella
Cinderella dvd title: Jungle

```

#### 4. Use debug run

##### 4.1. Debugging Java in Eclipse

##### 4.2. Example of debug run for the swap method of

##### 4.2.1. Setting, deleting & deactivate breakpoints

###### Set breakpoint

```

1 //Vu Thuong Dat 20215031
2 public class TestPassingParameter {
3
4     public static void main(String[] args) {
5         DigitalVideoDisc jungleDVD = new DigitalVideoDisc("Jungle");
6         DigitalVideoDisc cinderellaDVD = new DigitalVideoDisc("Cinderella");
7
8         swap(jungleDVD, cinderellaDVD);
9         System.out.println("Jungle dvd title: " + jungleDVD.getTitle() );
10        System.out.println("Cinderella dvd title: " + cinderellaDVD.getTitle());
11    }

```

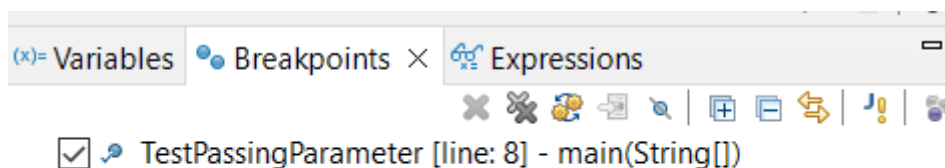
###### Delete

```

3
4     public static void main(String[] args) {
5         DigitalVideoDisc jungleDVD = new DigitalVideoDisc("Jungle");
6         DigitalVideoDisc cinderellaDVD = new DigitalVideoDisc("Cinderella");
7
8         swap(jungleDVD, cinderellaDVD);
9         System.out.println("Jungle dvd title: " + jungleDVD.getTitle() );
10        System.out.println("Cinderella dvd title: " + cinderellaDVD.getTitle());
11    }

```

###### Deactive



##### 4.2.2. Run in debug mode

Chọn menu Run -> Debug As -> Java Application.

#### 4.2.3. Step Into, Step Over, Step Return, Resume Chọn Step Into

```

6      DigitalVideoDisc cinderellaDVD = new DigitalVideoDisc("Cinderella");
7
8      swap(jungleDVD, cinderellaDVD);
9      System.out.println("Jungle dvd title: " + jungleDVD.getTitle() );
10     System.out.println("Cinderella dvd title: " + cinderellaDVD.getTitle());
11
12     changeTitle(jungleDVD, cinderellaDVD.getTitle());
13     System.out.println("Jungle dvd title: " + jungleDVD.getTitle());
14 }
15 public static void swap(Object o1, Object o2) {
16     Object tmp = o1;
17     o1 = o2;
18     o2 = tmp;
19 }
20 public static void changeTitle(DigitalVideoDisc dvd, String title) {
21     String oldTitle = dvd.getTitle();

```

#### 4.2.4. Investigate value of variables

##### Variables shown in Variable View

(x)= Variables × Breakpoints Expressions		
Name	Value	
no method return value		
o1	DigitalVideoDisc (id=22)	
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)	

## Step over line 16 of swap function

(x)= Variables × Breakpoints Expressions		
Name	Value	
no method return value		
o1	DigitalVideoDisc (id=22)	
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)	
tmp	DigitalVideoDisc (id=22)	
category	null	
cost	0.0	
director	null	
length	0	
title	"Jungle" (id=26)	

## Step over line 17 of swap function

(x)= Variables × Breakpoints Expressions		
Name	Value	
no method return value		
o1	DigitalVideoDisc (id=25)	
category	null	
cost	0.0	
director	null	
length	0	
title	"Cinderella" (id=32)	
o2	DigitalVideoDisc (id=25)	
category	null	
cost	0.0	
director	null	
length	0	
title	"Cinderella" (id=32)	
tmp	DigitalVideoDisc (id=22)	
category	null	
cost	0.0	
director	null	
length	0	
title	"Jungle" (id=26)	



## Step over line 18 of swap function

(x)= Variables × Breakpoints Expressions		
Name	Value	
no method return value		
o1	DigitalVideoDisc (id=25)	
category	null	
cost	0.0	
director	null	
length	0	
title	"Cinderella" (id=32)	
o2	DigitalVideoDisc (id=22)	
category	null	
cost	0.0	
director	null	
length	0	
title	"Jungle" (id=26)	
tmp	DigitalVideoDisc (id=22)	
category	null	
cost	0.0	
director	null	
length	0	
title	"Jungle" (id=26)	

## 4.2.5. Change value of variables

Change Change title of jungleDVD

(x)= Variables × Breakpoints Expressions		
Name	Value	
swap() returned	(No explicit return value)	
args	String[0] (id=20)	
jungleDVD	DigitalVideoDisc (id=22)	
category	null	
cost	0.0	
director	null	
length	0	
title	"xyz" (id=37)	
coder	0	
hash	0	
hashIsZero	false	
value	(id=38)	
cinderellaDVD	DigitalVideoDisc (id=25)	

Out put:

```
TestPassingParameter [Java Application] [pid: 4352]
Jungle dvd title: xyz
```

## 5. Classifier Member and Instance Member

Khai báo biến nextId = 1

```
1 public class Cart {
2     public static final int MAX_NUMBERS_ORDERED
3     public DigitalVideoDisc itemsOrdered[] = new
4     public int qtyOrdered;
5
6     private static int nextId = 1;
7 }
```

Khai báo thuộc tính id của DVD dùng setter cập nhật ID

```
1 //Vu Thuong Dat 20215031
2 public class DigitalVideoDisc {
3     private int id;
4     private String title;
```

```
2
3     public void setId(int id) {
4         this.id = id;
5     }
6     public String getTitle() {
7         return title;
8     }
```

Dùng setter cập nhật ID

```
24     disc.setId(nextId++);
25     itemsOrdered[qtyOrdered] = disc;
26     qtyOrdered++;
27     System.out.println("Them thanh cong " + disc.getTitle() + " (ID: " + disc.getId() + ")");
28 }
```

Kết quả:

Problems @ Javadoc Declaration Console  
 <terminated> Aims [Java Application] C:\Users\user\p  
 Them thanh cong The Lion King (ID: 1)  
 Them thanh cong Star Wars (ID: 2)  
 Them thanh cong Aladdin (ID: 3)  
 Them thanh cong My Destiny (ID: 4)  
 Tong so tien phai tra la  
 88.24

## 6. Open the cart class

Print cart

toString()

```
49 public String toString() {
50     return String.format("%s - %s - %s - %d: %.2f $", getTitle(), getCategory(), getDirector(), getLength(), getCost());
51 }
```

printCart()

```
public void printCart() {
    System.out.println("*****CART*****");
    System.out.println("Ordered Items:");
    if (qtyOrdered != 0) {
        for (int i = 0; i < qtyOrdered; ++i) {
            System.out.println((i + 1) + ". DVD " + itemsOrdered[i].toString());
        }
    } else {
        System.out.println("");
    }

    System.out.println("Total cost: " + totalCost());
    System.out.println("*****");
}
```

Search cart

isMatch()

```

    public boolean equals(DigitalVideoDisc disc) {
        return this.getTitle().equals(disc.getTitle());
    }
    public boolean isMatch(int id) {
        return this.id == id;
    }
    public boolean isMatch(String title) {
        String[] tmp = title.split(" ", 0);
        for (String x : tmp) {
            if (getTitle().toLowerCase().contains(x.toLowerCase()))
                return true;
        }
        return false;
    }
}

```

searchCart()

```

    public void searchCart(int id){
        int check = 0;
        for(int i = 0; i < qtyOrdered; i++) {
            if(itemsOrdered[i].isMatch(id)) {
                check = 1;
                System.out.println(itemsOrdered[i].toString());
                break;
            }
        }
        if(check == 0) {
            System.out.println("Khong tim thay '"+ id +"'");
        }
    }
    public void searchCart(String title){
        int check = 0;
        for(int i = 0; i < qtyOrdered; i++) {
            if(itemsOrdered[i].isMatch(title)) {
                check = 1;
                System.out.println(itemsOrdered[i].toString());
                break;
            }
        }
        if(check == 0) {
            System.out.println("Khong tim thay '"+title+"'");
        }
    }
}

```

Chạy Thử:

```
anOrder.addDigitalVideoDisc(dvdList);
anOrder.addDigitalVideoDisc(dvd3, dvd4);
anOrder.printCart();
anOrder.searchCart(1);
anOrder.searchCart("A");
anOrder.searchCart(5);
```

Kết quả:

```
*****CART*****
Ordered Items:
1. DVD The Lion King - Animation - Roger Allers - 87: 19,95 $
2. DVD Star Wars - Science Fiction - George Lucas - 87: 24,95 $
3. DVD Aladdin - Animation - Piaka - 92: 18,99 $
4. DVD My Destiny - Love - Home Seckia - 97: 24,35 $
Total cost: 88.24
*****
The Lion King - Animation - Roger Allers - 87: 19,95 $
Star Wars - Science Fiction - George Lucas - 87: 24,95 $
Khong tim thay '5'
```

## 7. Implement the Store class

Code:

```
1 //Vu Thuong Dat 20215031
2 public class Store {
3     private DigitalVideoDisc itemStore[];
4     private int qtyItem;
5
6     public Store(int MAX_NUMBER_ITEM) {
7         itemStore = new DigitalVideoDisc[MAX_NUMBER_ITEM];
8         qtyItem = 0;
9     }
10
11     public void addDVD(DigitalVideoDisc dvd) {
12         if (qtyItem < itemStore.length) {
13             itemStore[qtyItem] = dvd;
14             qtyItem++;
15             System.out.println("Them thanh cong " + dvd.getTitle());
16         } else {
17             System.out.println("Khong the them " + dvd.getTitle() + "vi cua hang da day!!");
18         }
19     }
20 }
```

```

21 public void removeDVD(DigitalVideoDisc dvd) {
22     boolean check = false;
23     for (int i = 0; i < qtyItem; i++) {
24         if (itemStore[i].equals(dvd)) {
25             check = true;
26             for (int j = i; j < qtyItem - 1; j++) {
27                 itemStore[j] = itemStore[j + 1];
28             }
29             qtyItem--;
30             System.out.println("Đã xóa " + dvd.getTitle());
31             break;
32         }
33     }
34
35     if (!check) {
36         System.out.println("Không tìm thấy " + dvd.getTitle());
37     }
38 }
39
40 public void displayStore() {
41     System.out.println("***** STORE *****");
42     for (int i = 0; i < qtyItem; i++) {
43         System.out.println((i + 1) + ". " + itemStore[i].toString());
44     }
45     System.out.println("*****");
46 }
47 }

```

Chạy thử

```

1 //Vu Thuong Dat 20215031
2 public class StoreTest {
3     public static void main(String[] args) {
4         Store store = new Store(10);
5         var dvd1 = new DigitalVideoDisc(
6             "The Lion King",
7             "Animation",
8             "Roger Allers",
9             87,
10            19.95f
11        );
12         var dvd2 = new DigitalVideoDisc(
13             "Star Wars",
14             "Science Fiction",
15             "George Lucas",
16             87,
17             24.95f
18        );

```

```

19         var dvd3 = new DigitalVideoDisc(
20             "Aladdin",
21             "Animation",
22             "Piaka",
23             92,
24             18.99f
25         );
26         var dvd4 = new DigitalVideoDisc(
27             "My Destiny",
28             "Love",
29             "Home Seckia",
30             97,
31             24.35f
32         );
33
34         store.addDVD(dvd1);
35         store.addDVD(dvd2);
36         store.addDVD(dvd3);
37
38         store.displayStore();
39         store.removeDVD(dvd2);
40         store.displayStore();
41     }
42 }
43

```

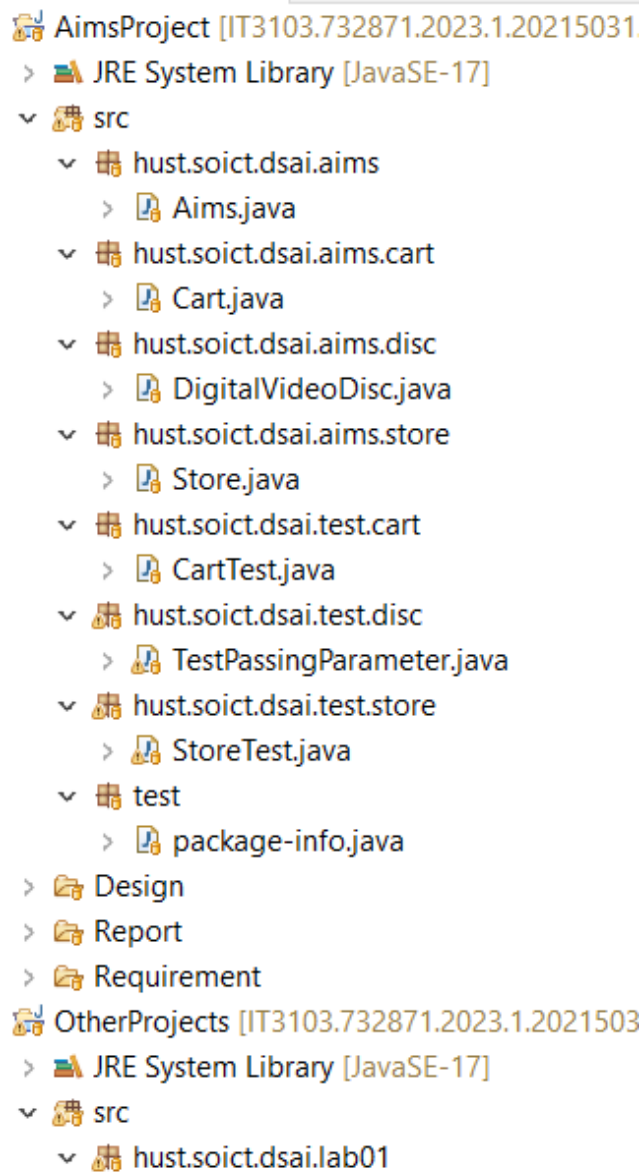
Kết quả:

```

<terminated> StoreTest [Java Application] C:\Users\user\.p2\pool\plugins\org.ecli
Them thanh cong The Lion King
Them thanh cong Star Wars
Them thanh cong Aladdin
***** STORE *****
1. The Lion King - Animation - Roger Allers - 87: 19,95 $
2. Star Wars - Science Fiction - George Lucas - 87: 24,95 $
3. Aladdin - Animation - Piaka - 92: 18,99 $
*****
Da xoa Star Wars
***** STORE *****
1. The Lion King - Animation - Roger Allers - 87: 19,95 $
2. Aladdin - Animation - Piaka - 92: 18,99 $
*****

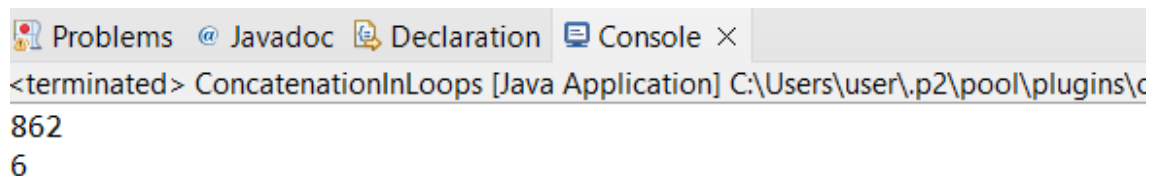
```

## 8. Re-organize your projects



## 9. String, StringBuilder and StringBuffer

Chạy ConcatenationInLoops ta thu được kết quả





Trong vòng lặp đầu tiên, chuỗi s được nối (+=) trong mỗi vòng lặp. Điều này tạo ra một chuỗi mới mỗi lần nối, vì vậy nó sẽ tạo ra nhiều đối tượng chuỗi trung gian, ảnh hưởng đến hiệu suất và tăng chi phí bộ nhớ.

Trong vòng lặp thứ hai, StringBuilder được sử dụng để thực hiện phép nối (append). StringBuilder được thiết kế để thực hiện các phép nối chuỗi mà không tạo ra nhiều đối tượng trung gian, do đó giảm áp lực lên bộ nhớ và có hiệu suất tốt hơn.

Kết quả của đoạn code là thời gian thực thi của mỗi phương thức. Thời gian thực thi của StringBuilder sẽ thường ít hơn so với String bởi vì StringBuilder không tạo ra nhiều đối tượng trung gian và thực hiện phép nối hiệu quả hơn.

Ví dụ đọc file text sử dụng String sử dụng String

Đầu tiên ta tạo file simple.txt

```
1 package hust.soict.globalict.garbage;
2 import java.io.BufferedWriter;
3 import java.io.FileWriter;
4 import java.io.IOException;
5 public class CreateTextFile {
6     public static void main(String[] args) {
7         String fileName = "sample.txt";
8         int fileSizeKB = 100;
9
10        try (BufferedWriter writer = new BufferedWriter(new FileWriter(fileName))) {
11            // Tao noi dung voi kich thước xấp xỉ 10 KB
12            StringBuilder content = new StringBuilder();
13            while (content.length() < fileSizeKB * 1024) {
14                content.append("hello world ");
15            }
16            // Ghi noi dung vào tệp tin
17            writer.write(content.toString());
18
19            System.out.println("Tạo file thành công: " + fileName);
20        } catch (IOException e) {
21            e.printStackTrace();
22        }
23    }
24 }
25
```

Sau đó chạy GarbageCreator ta thu được kết quả

```
<terminated> GarbageCreator [Java Application] C:\Users\user\...
1280
```

Còn nếu sử dụng stringBuilder chạy chương trình NoGarbage:

```
<terminated> NoGarbage [Java Application] C:\Users\user\...
27
```

So sánh 2 trường hợp ta nhận thấy stringBuilder chạy nhanh hơn đáng kể

## 10. Q&A

Question 1 : working with method overloading

This method will add a list of DVDs to the current cart.

Try to add a method addDigitalVideoDisc which allows to pass an arbitrary number of arguments for dvd. Compare to an array parameter. What do you prefer in this case?

Trả lời :

Việc truyền tham số là 1 mảng sẽ giúp tối ưu hơn , thuận tiện hơn , nếu số phần tử của mảng thay đổi thì cũng có thể dễ dàng thay đổi theo .

Question 2 : Question: Is JAVA a Pass by Value or a Pass by Reference programming language?

Trả lời : JAVA is Pass by value programming language .

Question 3 : After the call of swap(jungleDVD, cinderellaDVD) why does the title of these two objects still remain?

Trả lời : Vì Java không cho phép truyền dữ liệu kiểu tham chiếu nên khi swap o1 và o2 không có thay đổi gì

Question 4 : After the call of changeTitle(jungleDVD, cinderellaDVD.getTitle()) why is the title of the JungleDVD changed?

Trả lời :

Việc dùng setter cho phép thay đổi tên của DVD bằng cách lấy getter của DV khác chuyển thành một chuỗi .

Question 5 : Write a toString() method for the DigitalVideoDisc class. What should be the return type of this method?

Trả lời : Phương thức toString() trả về một chuỗi String biểu diễn đối tượng