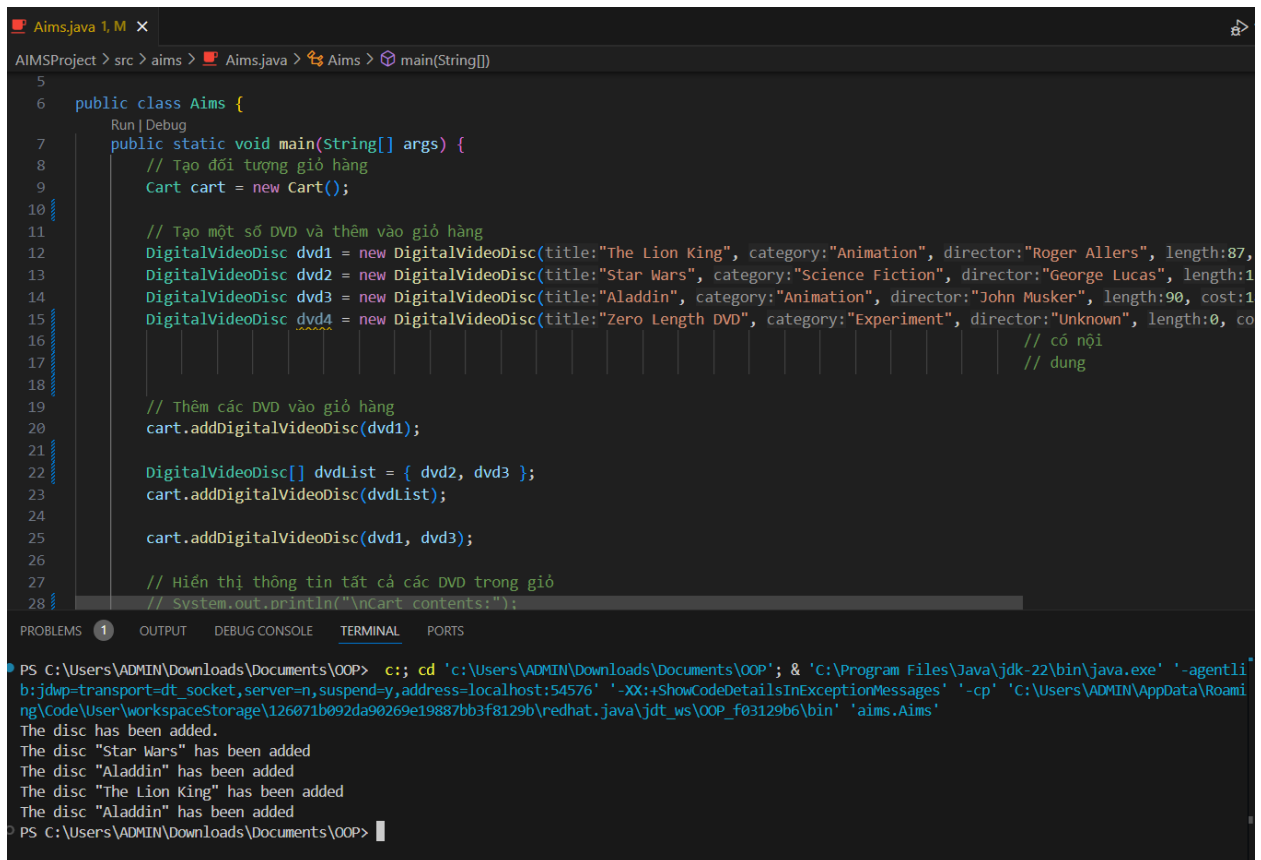


1. Method-overloading

```
// Add a list of DVDs using an array
public void addDigitalVideoDisc(DigitalVideoDisc[] dvdList) {
    for (DigitalVideoDisc disc : dvdList){
        itemsOrdered.add(disc);
        System.out.println("The disc \""+disc.getTitle() + "\" has been added");
    }
}

// Add two DVDs at once
public void addDigitalVideoDisc(DigitalVideoDisc dvd1, DigitalVideoDisc dvd2){
    itemsOrdered.add(dvd1);
    System.out.println("The disc \"" + dvd1.getTitle() + "\" has been added");
    itemsOrdered.add(dvd2);
    System.out.println("The disc \"" + dvd2.getTitle() + "\" has been added");
}
```



The screenshot shows an IDE window titled "Aims.java 1, M" with the following code:

```
5
6 public class Aims {
7     Run | Debug
8     public static void main(String[] args) {
9         // Tạo đối tượng giỏ hàng
10        Cart cart = new Cart();
11
12        // Tạo một số DVD và thêm vào giỏ hàng
13        DigitalVideoDisc dvd1 = new DigitalVideoDisc(title:"The Lion King", category:"Animation", director:"Roger Allers", length:87,
14        DigitalVideoDisc dvd2 = new DigitalVideoDisc(title:"Star Wars", category:"Science Fiction", director:"George Lucas", length:1
15        DigitalVideoDisc dvd3 = new DigitalVideoDisc(title:"Aladdin", category:"Animation", director:"John Musker", length:90, cost:1
16        DigitalVideoDisc dvd4 = new DigitalVideoDisc(title:"Zero Length DVD", category:"Experiment", director:"Unknown", length:0, co
17        // có nội
18        // dung
19
20        // Thêm các DVD vào giỏ hàng
21        cart.addDigitalVideoDisc(dvd1);
22
23        DigitalVideoDisc[] dvdList = { dvd2, dvd3 };
24        cart.addDigitalVideoDisc(dvdList);
25
26        cart.addDigitalVideoDisc(dvd1, dvd3);
27
28        // Hiển thị thông tin tất cả các DVD trong giỏ
29        // System.out.println("\nCart contents:");
30    }
31}
```

The terminal output shows the execution of the program:

```
PS C:\Users\ADMIN\Downloads\Documents\OOP> c:: cd 'c:\Users\ADMIN\Downloads\Documents\OOP'; & 'C:\Program Files\Java\jdk-22\bin\java.exe' '-agentli
b:jdpw=transport=dt_socket,server=n,suspend=y,address=localhost:54576' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\ADMIN\AppData\Roami
ng\Code\User\workspaceStorage\126071b092da90269e19887bb3f8129b\redhat.java\jdt_ws\OOP_f03129b6\bin' 'aims.Aims'
The disc "Star Wars" has been added
The disc "Aladdin" has been added
The disc "The Lion King" has been added
The disc "Aladdin" has been added
PS C:\Users\ADMIN\Downloads\Documents\OOP>
```

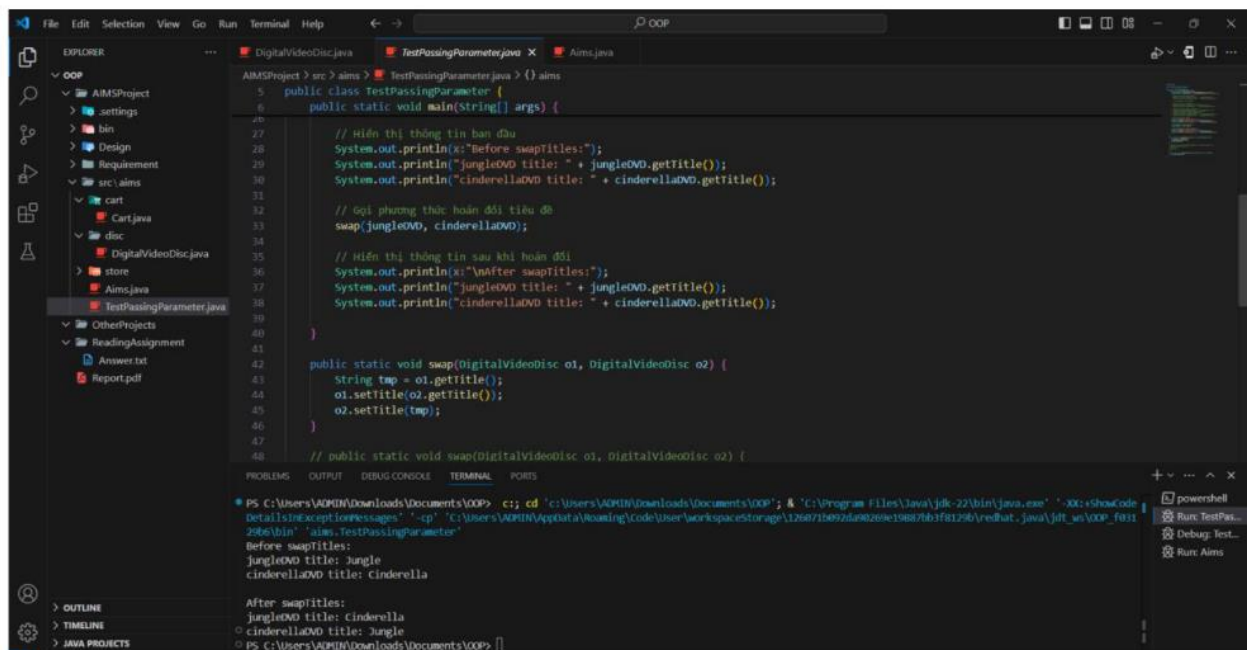
2. TestingParameter

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

```
import aims.disc.DigitalVideoDisc;  
  
public class TestPassingParameter {  
    Run | Debug  
    public static void main(String[] args) {  
        DigitalVideoDisc jungleDVD = new DigitalVideoDisc(title:"Jungle");  
        DigitalVideoDisc cinderellaDVD = new DigitalVideoDisc(title:"Cinderella");  
  
        System.out.println(x:"Before Swap:");  
        System.out.println("jungleDVD title: " + jungleDVD.getTitle());  
        System.out.println("cinderella title: " + cinderellaDVD.getTitle());  
  
        swap(jungleDVD, cinderellaDVD);  
  
        System.out.println(x:"\nAfter Swap: ");  
        System.out.println("jungleDVD: " + jungleDVD.getTitle());  
        System.out.println("cinderellaDVD: " + cinderellaDVD.getTitle());  
    }  
  
    public static void swap(DigitalVideoDisc o1, DigitalVideoDisc o2) {  
        DigitalVideoDisc tmp = o1;  
        o1 = o2;  
        o2 = tmp;  
    }  
}
```

```
After Swap:
jungleDVD: Jungle
cinderellaDVD: Cinderella
```

}



3. ClassMember

```
// Constructor
public DigitalVideoDisc(String title, String category, String director, int length, double cost) {
    this.title = title;
    this.category = category;
    this.director = director;
    this.length = length;
    this.cost = cost;

    nbDigitalVideoDiscs++;
    this.id = nbDigitalVideoDiscs;
}

public DigitalVideoDisc(String title) {
    this.title = title;

    nbDigitalVideoDiscs++;
    this.id = nbDigitalVideoDiscs;
}
```

```
// Display all DVDs in the cart
public void displayCart() {
    for (DigitalVideoDisc disc : itemsOrdered) {
        disc.displayInfo();
    }
}
```

```
// Display information of the DVD
public void displayInfo() {
    System.out.println("ID:" + id + ", Title: " + title + ", Category: " + category + ", Director: " + director +
        ", Length: " + length + " minutes, Cost: $" + cost);
}
```

Report.pdfAims.java X

AIMSProject > src > aims > Aims.java > Aims > main(String[])

```
6 public class Aims {
7     public static void main(String[] args) {
8         // Tạo một giỏ hàng
9         // Cart cart = new Cart();
10
11         // Tạo một số DVD và thêm vào giỏ hàng
12         DigitalVideoDisc dvd1 = new DigitalVideoDisc(title:"The Lion King", category:"Animation",
13             director:"Roger Allers", length:87, cost:19.95);
14         DigitalVideoDisc dvd2 = new DigitalVideoDisc(title:"Star Wars", category:"Science Fiction",
15             director:"George Lucas", length:124, cost:24.95);
16         DigitalVideoDisc dvd3 = new DigitalVideoDisc(title:"Aladdin", category:"Animation", director:"John Musker", length:90, cost:18.99);
17         DigitalVideoDisc dvd4 = new DigitalVideoDisc(title:"Zero Length DVD", category:"Experiment",
18             director:"Unknown", length:0, cost:5.99); // DVD không có nội dung
19         DigitalVideoDisc dvd5 = new DigitalVideoDisc(title:"Aladdin");
20
21         dvd1.displayInfo();
22         dvd2.displayInfo();
23         dvd3.displayInfo();
24         dvd4.displayInfo();
25         dvd5.displayInfo();
26
27         // // Thêm các DVD vào giỏ hàng
28         // cart.addDigitalVideoDisc(dvd1);
29
30         // DigitalVideoDisc[] dvdList = { dvd2, dvd3 };
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

- PS C:\Users\ADMIN\Downloads\Documents\OOP> & 'C:\Program Files\Java\jdk-22\bin\java.exe' '-agentlib:jdwp=transport=dt_socket,server=n,suspend=y,address=localhost:55638' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\ADMIN\AppData\Roaming\Code\User\workspaceStorage\126071b092da90269e19887bb3f8129b\redhat.java\jdt_ws\OOP_f03129b6\bin' 'aims.Aims'

ID:1,	Title: The Lion King,	Category: Animation,	Director: Roger Allers,	Length: 87 minutes,	Cost: \$19.95
ID:2,	Title: Star Wars,	Category: Science Fiction,	Director: George Lucas,	Length: 124 minutes,	Cost: \$24.95
ID:3,	Title: Aladdin,	Category: Animation,	Director: John Musker,	Length: 90 minutes,	Cost: \$18.99
ID:4,	Title: Zero Length DVD,	Category: Experiment,	Director: Unknown,	Length: 0 minutes,	Cost: \$5.99
ID:5,	Title: Aladdin,	Category: null,	Director: null,	Length: 0 minutes,	Cost: \$0.0

- PS C:\Users\ADMIN\Downloads\Documents\OOP>

4. Cart

```
public double totalCost() {
    double total = 0;
    for (DigitalVideoDisc disc : itemsOrdered) {
        total += disc.getCost();
    }
    return total;
}
```

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

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

public boolean isMatch(String title) {
    return this.title.toLowerCase().contains(title.toLowerCase());
}
```

```
// Search DVDs by title
public void searchByTitle(String title) {
    boolean found = false;
    System.out.println("Search results for title: " + title);
    for (DigitalVideoDisc disc : itemsOrdered) {
        if (disc.isMatch(title)) {
            System.out.println(disc.toString());
            found = true;
        }
    }
    if (!found) {
        System.out.println("No DVD found with title containing: " + title);
    }
}
```

```
*****CART*****
Ordered Items:
1. DVD - The Lion King - Animation - Roger Allers - 87 mins: $19.95
2. DVD - Star Wars - Science Fiction - George Lucas - 124 mins: $24.95
3. DVD - Aladdin - Animation - John Musker - 90 mins: $18.99
Total cost: $63.89
*****

Search by ID:
Found: DVD - Star Wars - Science Fiction - George Lucas - 124 mins: $24.95
```

Search by ID:
Found: DVD - Star Wars - Science Fiction - George Lucas - 124 mins: \$24.95

Search by Title:
Search results for title: Star
DVD - Star Wars - Science Fiction - George Lucas - 124 mins: \$24.95
Search results for title: Unknown
No DVD found with title containing: Unknown

5. Stores

```
// Phương thức thêm DVD vào cửa hàng
public void addDVD(DigitalVideoDisc dvd) {
    itemsInStore.add(dvd);
    System.out.println("DVD \"" + dvd.getTitle() + "\" đã được thêm vào cửa hàng.");
}

// Phương thức xóa DVD khỏi cửa hàng
public void removeDVD(DigitalVideoDisc dvd) {
    if (itemsInStore.remove(dvd)) {
        System.out.println("DVD \"" + dvd.getTitle() + "\" đã được xóa khỏi cửa hàng.");
    } else {
        System.out.println("Không tìm thấy DVD \"" + dvd.getTitle() + "\" trong cửa hàng.");
    }
}

// Phương thức hiển thị danh sách DVD trong cửa hàng
public void displayStoreItems() {
    System.out.println(x: "\n***** CỬA HÀNG *****");
    if (itemsInStore.isEmpty()) {
        System.out.println(x: "Không có DVD nào trong cửa hàng.");
    } else {
        for (int i = 0; i < itemsInStore.size(); i++) {
            DigitalVideoDisc dvd = itemsInStore.get(i);
            System.out.println((i + 1) + ". " + dvd.getTitle() + " - " + dvd.getCategory() +
                " - " + dvd.getDirector() + " - " + dvd.getLength() + " phút - $" + dvd.getCost());
        }
    }
    System.out.println(x: "*****");
}
}
```

```
StoreTest.java X
AIMSProject > src > hust > soict > dsai > test > store > StoreTest.java > StoreTest > main(String[])
1 package hust.soict.dsai.test.store;
2
3 import hust.soict.dsai.aims.store.Store;
4 import hust.soict.dsai.aims.disc.DigitalVideoDisc;
5
6 public class StoreTest {
7     Run | Debug
8     public static void main(String[] args) {
9         // Tạo một đối tượng cửa hàng
10         Store store = new Store();
11
12         // Tạo một số DVD mẫu
13         DigitalVideoDisc dvd1 = new DigitalVideoDisc(title:"The Lion King", category:"Animation", director:"Roger Allers", length:87, cost:18.99);
14         DigitalVideoDisc dvd2 = new DigitalVideoDisc(title:"Star Wars", category:"Science Fiction", director:"George Lucas", length:124, cost:19.99);
15         DigitalVideoDisc dvd3 = new DigitalVideoDisc(title:"Aladdin", category:"Animation", director:"John Musker", length:90, cost:18.99);
16
17         // Thêm DVD vào cửa hàng
18         store.addDVD(dvd1);
19         store.addDVD(dvd2);
20         store.addDVD(dvd3);
21
22         // Hiển thị danh sách DVD trong cửa hàng
23         store.displayStoreItems();
24
25         // Xóa DVD khỏi cửa hàng
26         store.removeDVD(dvd2);
27
28         // Hiển thị lại danh sách DVD
29         store.displayStoreItems();
30
31         // Thử xóa một DVD không có trong cửa hàng
32         store.removeDVD(dvd2);
33     }
34 }
```


DVD "The Lion King" đã được thêm vào của hàng.
DVD "Star Wars" đã được thêm vào của hàng.
DVD "Aladdin" đã được thêm vào của hàng.

***** C?A H?NG *****

1. The Lion King - Animation - Roger Allers - 87 phút - \$19.95
2. Star Wars - Science Fiction - George Lucas - 124 phút - \$24.95
3. Aladdin - Animation - John Musker - 90 phút - \$18.99

3. Aladdin - Animation - John Musker - 90 phút - \$18.99

1. The Lion King - Animation - Roger Allers - 87 phút - \$19.95
2. Star Wars - Science Fiction - George Lucas - 124 phút - \$24.95
3. Aladdin - Animation - John Musker - 90 phút - \$18.99

3. Aladdin - Animation - John Musker - 90 phút - \$18.99

DVD "Star Wars" ?? ???c xóa khỏi cửa hàng.

***** C?A H?NG *****

1. The Lion King - Animation - Roger Allers - 87 phút - \$19.95
2. Aladdin - Animation - John Musker - 90 phút - \$18.99

DVD "Star Wars" ?? ???c xóa khỏi cửa hàng.

***** C?A H?NG *****

1. The Lion King - Animation - Roger Allers - 87 phút - \$19.95

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

DVD "Star Wars" ?? ???c xóa khỏi cửa hàng.

***** C?A H?NG *****

1. The Lion King - Animation - Roger Allers - 87 phút - \$19.95
2. Aladdin - Animation - John Musker - 90 phút - \$18.99

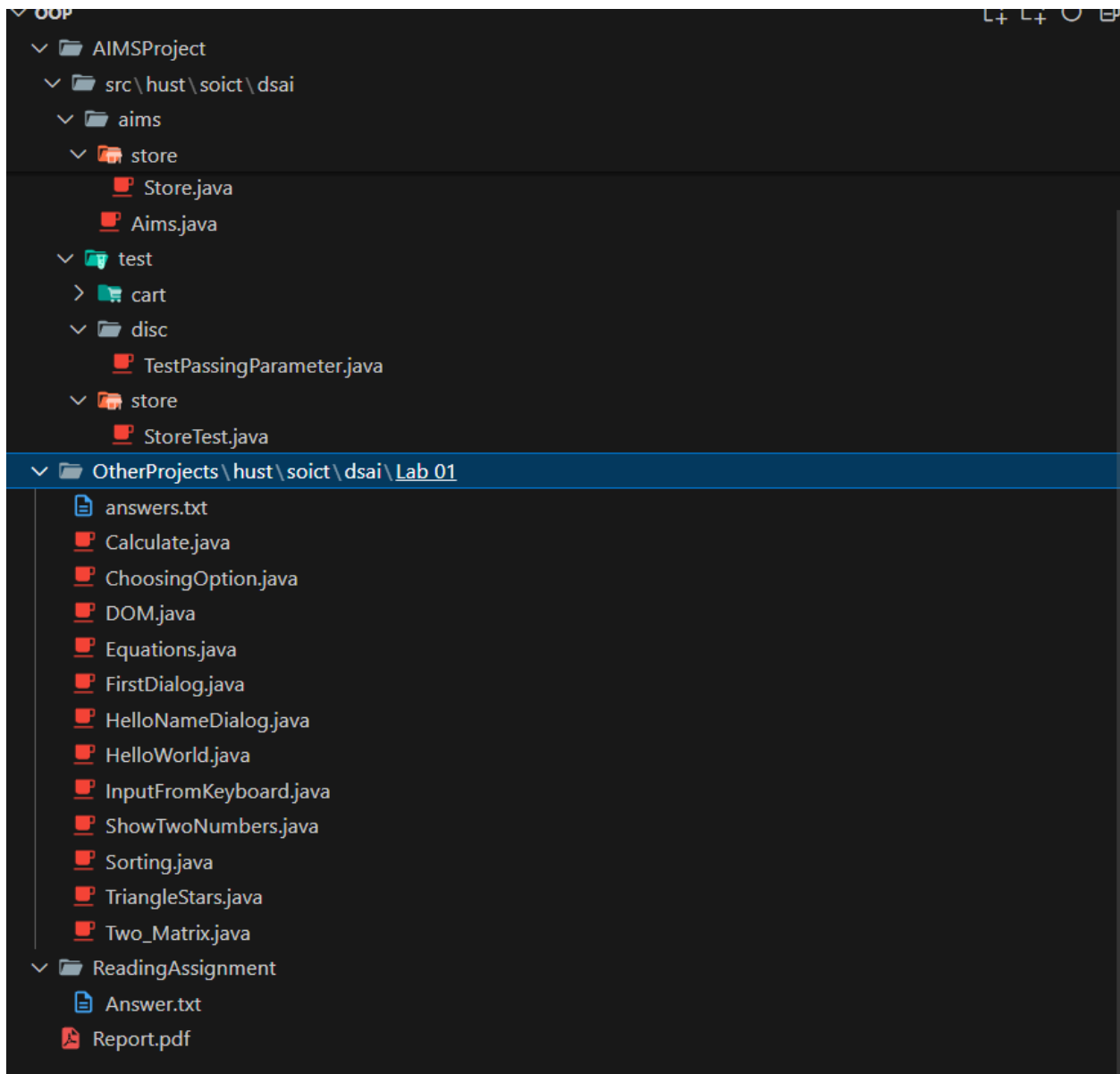
***** C?A H?NG *****

1. The Lion King - Animation - Roger Allers - 87 phút - \$19.95
2. Aladdin - Animation - John Musker - 90 phút - \$18.99

Không tìm thấy DVD "Star Wars" trong cửa hàng.

PS C:\Users\ADMIN\Downloads\Documents\OOP> █

6. Refactor/Packages



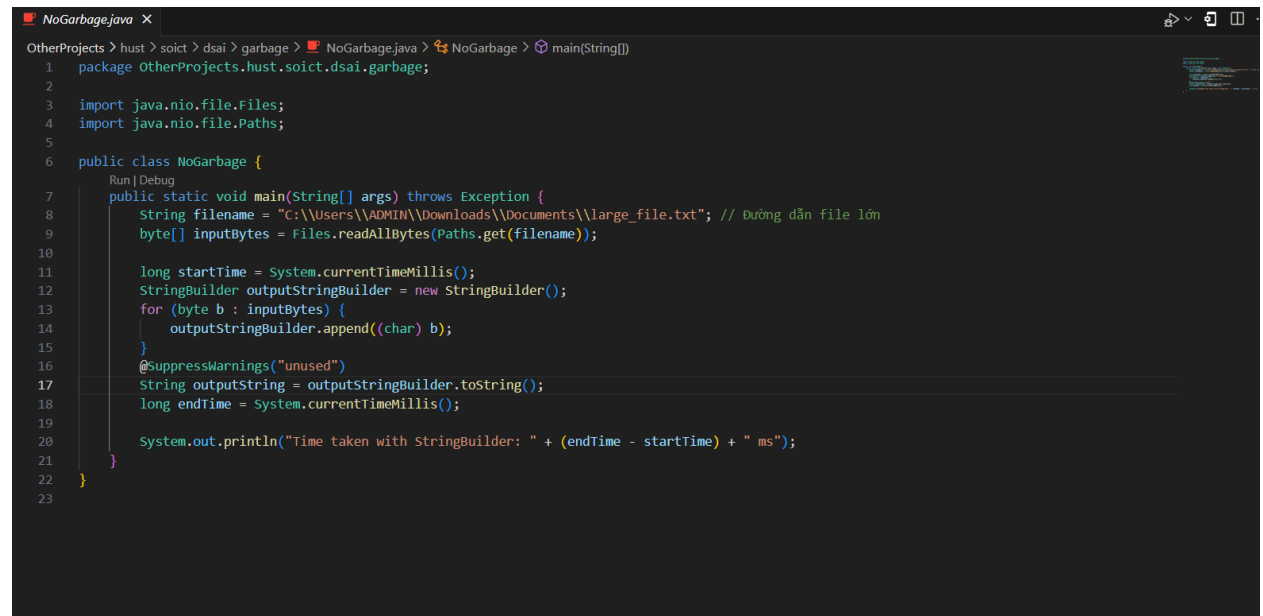
7. Memory-Management-String

```
ConcatenationInLoops.java X
OtherProjects > hust > soict > dsai > garbage > ConcatenationInLoops.java > ConcatenationInLoops > main(String[])
1 package OtherProjects.hust.soict.dsai.garbage;
2
3 import java.util.Random;
4
5 public class ConcatenationInLoops {
6     public static void main(String[] args) {
7         Random r = new Random(seed:123);
8
9         // Sử dụng String + toán tử
10        long start = System.currentTimeMillis();
11        @SuppressWarnings("unused")
12        String s = "";
13        for (int i = 0; i < 65536; i++) {
14            s += r.nextInt(bound:2);
15        }
16        System.out.println("String concatenation: " + (System.currentTimeMillis() - start) + " ms");
17
18        // Sử dụng StringBuilder
19        r = new Random(seed:123);
20        start = System.currentTimeMillis();
21        StringBuilder sb = new StringBuilder();
22        for (int i = 0; i < 65536; i++) {
23            sb.append(r.nextInt(bound:2));
24        }
25        System.out.println("StringBuilder concatenation: " + (System.currentTimeMillis() - start) + " ms");
26    }
27 }
28 }
```

```
PS C:\Users\ADMIN\Downloads\Documents\OOP> & 'C:\Program Files\Java\jdk-22\bin\java.exe' '-agentlib:jdwp=transport=dt_socket,server=n,suspend=y,address=localhost:57002' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\ADMIN\AppData\Roaming\Code\User\workspaceStorage\126071b092da90269e19887bb3f8129b\redhat.java\jdt_ws\OOP_f03129b6\bin' 'OtherProjects.hust.soict.dsai.garbage.ConcatenationInLoops'
String concatenation: 502 ms
StringBuilder concatenation: 2 ms
```

```
GarbageCreator.java X
OtherProjects > hust > soict > dsai > garbage > GarbageCreator.java > GarbageCreator > main(String[])
1 package OtherProjects.hust.soict.dsai.garbage;
2
3 import java.nio.file.Files;
4 import java.nio.file.Paths;
5
6 public class GarbageCreator {
7     public static void main(String[] args) throws Exception {
8         String filename = "C:\\Users\\ADMIN\\Downloads\\Documents\\large_file.txt"; // Đường dẫn file lớn
9         byte[] inputBytes = Files.readAllBytes(Paths.get(filename));
10
11        long startTime = System.currentTimeMillis();
12        @SuppressWarnings("unused")
13        String outputString = "";
14        for (byte b : inputBytes) {
15            outputString += (char) b;
16        }
17        long endTime = System.currentTimeMillis();
18
19        System.out.println("Time taken with String concatenation: " + (endTime - startTime) + " ms");
20    }
21 }
22 }
```

```
PS C:\Users\ADMIN\Downloads\Documents\OOP> & 'C:\Program Files\Java\jdk-22\bin\java.exe' '-agentlib:jdwp=transport=dt_socket,server=n,suspend=y,address=localhost:57039' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\ADMIN\AppData\Roaming\Code\User\workspaceStorage\126071b092da90269e19887bb3f8129b\redhat.java\jdt_ws\OOP_f03129b6\bin' 'OtherProjects.hust.soict.dsai.garbage.GarbageCreator'
```



```
NoGarbage.java x
OtherProjects > hust > soict > dsai > garbage > NoGarbage.java NoGarbage > main(String[])
1 package OtherProjects.hust.soict.dsai.garbage;
2
3 import java.nio.file.Files;
4 import java.nio.file.Paths;
5
6 public class NoGarbage {
7     public static void main(String[] args) throws Exception {
8         String filename = "C:\\Users\\ADMIN\\Downloads\\Documents\\large_file.txt"; // Đường dẫn file lớn
9         byte[] inputBytes = Files.readAllBytes(Paths.get(filename));
10
11         long startTime = System.currentTimeMillis();
12         StringBuilder outputStringBuilder = new StringBuilder();
13         for (byte b : inputBytes) {
14             outputStringBuilder.append((char) b);
15         }
16         @SuppressWarnings("unused")
17         String outputString = outputStringBuilder.toString();
18         long endTime = System.currentTimeMillis();
19
20         System.out.println("Time taken with StringBuilder: " + (endTime - startTime) + " ms");
21     }
22 }
23
```

```
PS C:\Users\ADMIN\Downloads\Documents\OOP> & 'C:\Program Files\Java\jdk-22\bin\java.exe' '-agentlib:jdwp=transport=dt_socket,server=n,suspend=y,address=localhost:57055' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\ADMIN\AppData\Roaming\Code\User\workspaceStorage\126071b092da90269e19887bb3f8129b\redhat.java\jdt_ws\OOP_f03129b6\bin' 'OtherProjects.hust.soict.dsai.garbage.NoGarbage'
Time taken with StringBuilder: 468 ms
PS C:\Users\ADMIN\Downloads\Documents\OOP>
```