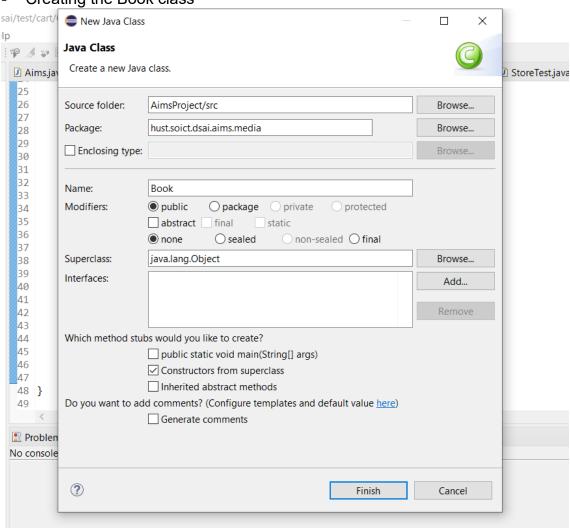
# BÁO CÁO THỰC HÀNH LAB 4 LẬP TRÌNH HƯỚNG ĐỐI TƯỢNG

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- 1. Import the existing project into the workspace of Eclipse
- 2. Additional requirements of AIMS
- 3. Creating the Book class

- Creating the Book class



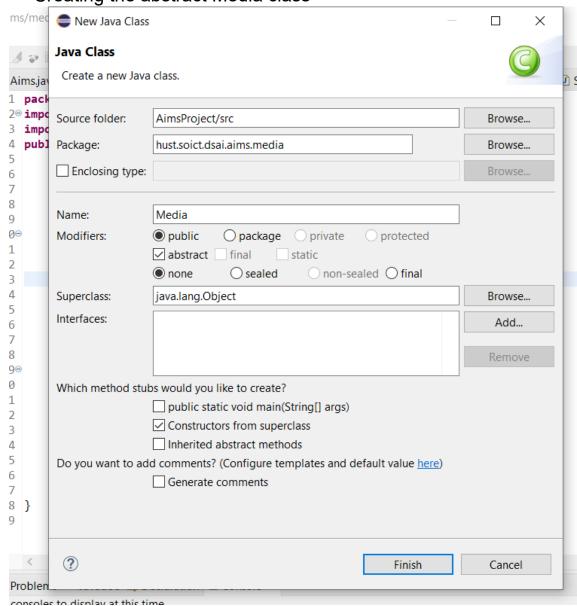
- Add fields to the Book class

```
public class Book {
    private int id;
    private String title;
    private String category;
    private float cost;
    private List<String> authors = new ArrayList<String>();
```

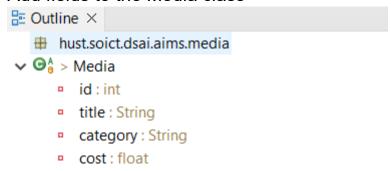
```
11⊝
       public void addAuthor(String authorname) {
           if(authors.contains(authorname)){
    System.out.println("Author " + authorname +" is already in the list!");
12
13
14
15
            else {
                authors.add(authorname);
16
                System.out.println("Successfully added " + authorname+ " to list!");
17
18
19
20⊝
        public void removeAuthor(String authorname) {
21
                if(authors.contains(authorname)) {
                    authors.remove(authorname);
22
23
                    System.out.println("Successfully removed " + authorname+" from the list!" );
24
25
26
                    System.out.println("Author " + authorname +" does not exist in the list!");
27
28
```

4. Creating the abstract Media class

Creating the abstract Media class



- Add fields to the Media class



```
getId(): int
            setId(int): void
        getTitle(): String
        setTitle(String): void
          getCategory() : String
          setCategory(String): void
        getCost(): float
        setCost(float) : void
        C Media()
        C Media(String)

    <sup>c</sup> Media(String, String, float)

        isMatch(int): boolean
        isMatch(String): boolean
        a toString() : String
      public Media(String title){
37
          super();
38
          this.title = title;
39
40⊝
      public Media(String title, String category, float cost) {
41
42
          this.title = title;
43
          this.category = category;
44
          this.cost = cost;
45
46⊖
      public boolean isMatch(int id) {
47
          return this.id == id;
48
49⊜
      public boolean isMatch(String title) {
          String[] tmp = title.split(" ", 0);
50
          for (String x : tmp) {
51
              if (getTitle().toLowerCase().contains(x.toLowerCase()))
52
53
54
55
          return false;
56
57⊝
      public String toString() {
          return String.format("ID: %d - %s - %s - %f $\n",this.id, this.title, this.category, this.cost);
60 }
```

Remove fields and methods from Book and DigitalVideoDisc classes

```
□ Outline ×
□ hust.soict.dsai.aims.media
∨ O<sub>a</sub> > Book
□ authors: List < String >
□ addAuthor(String): void
□ removeAuthor(String): void
```

- Do similarly for the DigitalVideoDisc class and move it to the package hust.soict.dsai.aims.media. Remove the package hust.soict.dsai.aims.disc.

```
Dutline ×

hust.soict.dsai.aims.media

• O

• DigitalVideoDisc

• director: String

• length: int

• getDirector(): String

• getLength(): int

• DigitalVideoDisc(String)

• DigitalVideoDisc(String, String, float)

• DigitalVideoDisc(String, String, String, float)

• DigitalVideoDisc(String, String, String, float)

• DigitalVideoDisc(String, String, String, int, float)

• LoString(): String
```

```
1 //Vu Thuong Dat 20215031
 2 package hust.soict.dsai.aims.media;
 3 public class DigitalVideoDisc extends Media {
 4
      private String director;
     private int length;
public String getDirector() {
 69
           return director;
 8
 90
     public int getLength() {
10
          return length;
11
12⊝
     public DigitalVideoDisc(String title) {
           super(title);
14
     public DigitalVideoDisc(String title, String category, float cost) {
15⊝
16
           super(title, category, cost);
17
18⊝
       public DigitalVideoDisc(String title, String category, String director, float cost) {
19
           super(title, category, cost);
20
           this.director = director;
21
      public DigitalVideoDisc(String title, String category, String director, int length, float c
22⊝
23
           this(title, category, director, cost);
24
           this.length = length;
25
.26⊜
      public String toString() {
27
           return String.format("%s - %s - %s - %d: %.2f $", getTitle(), getCategory(), getDirector
28
29 }
30
```

- 5. Creating the CompactDisc class
  - 5.1. Create the Disc class extending the Media class

### # hust.soict.dsai.aims.media

### ✓ O₂ Disc

- director : String
- length: int
- getDirector() : String
- getLength(): int
- setDirector(String): void
- setLength(int) : void
- <sup>c</sup> Disc(String)
- <sup>c</sup> Disc(String, String, float)
- <sup>c</sup> Disc(String, String, String, float)
- C Disc(String, String, String, int, float)

```
1 //Vu Thuong Dat 20215031
package hust.soict.dsai.aims.media;
 3 public class Disc extends Media {
       private String director;
       private int length;
 6⊜
       public String getDirector() {
 7
           return director;
 8
 9⊝
       public int getLength() {
10
           return length;
11
12⊝
       public void setDirector(String director) {
13
           this.director = director;
14
15⊜
       public void setLength(int length) {
16
           this.length = length;
17
18⊖
       public Disc(String title) {
19
           super(title);
20
219
       public Disc(String title, String category, float cost) {
22
           super(title, category, cost);
23
       public Disc(String title, String category, String director, float cost) {
24⊖
25
           super(title, category, cost);
           this.director = director;
26
27
       public Disc(String title, String category, String director, int length, float cost) {
289
29
           this(title, category, director, cost);
30
           this.length = length;
31
       }
32 }
```

Make the DigitalVideoDisc extending the Disc class.

Create the CompactDisc extending the Disc class.

```
//Vu Thuong Dat 20215031
package hust.soict.dsai.aims.media;
public class CompactDisc extends Disc{

}
```

5.2. Create the Track class which models a track on a compact disc and will store information incuding the title and length of the track

```
1 //Vu Thuong Dat 20215031
 2 package hust.soict.dsai.aims.media;
 3 public class Track {
       private String title;
 4
 5
       private int length;
 6⊖
       public String getTitle() {
 7
            return title;
 8
9⊝
       public void setTitle(String title) {
10
           this.title = title;
11
12⊖
       public int getLength() {
           return length;
13
14
15⊝
       public void setLength(int length) {
16
           this.length = length;
17
       }
18
   }
10
```

## 5.3. Open the CompactDisc class

```
P □ Iª N N O N O O O O

    □ Outline ×

    hust.soict.dsai.aims.media

✓ O<sub>B</sub> > CompactDisc

        artist : String
        tracks : List < Track >
        getArtist() : String
        CompactDisc(String, List<Track>)

    <sup>c</sup> CompactDisc(String, String, String, List<Track>, float)

            addTrack(Track): void
        removeTrack(Track): void
        getLength(): int
1 //Vu Thuong Dat 20215031
 2 package hust.soict.dsai.aims.media;
 3 mport java.util.ArrayList; ...
 5 public class CompactDisc extends Disc implements Playable{
       private String artist;
       private List<Track> tracks = new ArrayList<Track>();
80
      public String getArtist() {
9
          return artist;
10
11⊖
      public CompactDisc(String artist, List<Track> tracks) {
12
          super();
13
          this.artist = artist;
          this.tracks = tracks;
15
16⊜
      public CompactDisc(String title,String category,String artist, List<Track> tracks,float cost) {
          super(title,category,cost);
          this.artist = artist;
18
19
          this.tracks = tracks;
20
21
22⊖
       public void addTrack(Track track) {
23
          if(tracks.contains(track)) {
              System.out.println("Track " + this.getTitle() + " is already in the list!");
25
26
          else {
27
               tracks.add(track);
               System.out.println("Successfully added " + this.getTitle() + " to list!");
28
29
30
32⊝
       public void removeTrack(Track track) {
          if(tracks.contains(track)) {
34
               tracks.remove(track);
               System.out.println("Successfully removed " + this.getTitle()+ " from the list!");
35
           else {
              System.out.println("Track "+ this.getTitle() +" does not exist in the list");
38
39
40
419
       public int getLength() {
42
           int length = 0;
43
           for (Track track: tracks)
               length += track.getLength();
45
           return length;
46
```

6. Create the Playable interface

```
//Vu Thuong Dat 20215031
package hust.soict.dsai.aims.media;
public interface Playable {
   public void play();
}
```

- Implement the Playable with CompactDisc, DigitalVideoDisc and Track
- Add the method play()
   DigitalVideoDisc class:

```
public void play() {
    System.out.println("Playing DVD: " + this.getTitle());
    System.out.println("DVD length: " + this.getLength());
}
```

### Track class:

```
public void play() {|
    System.out.println("Playing Track: " + this.getTitle());
    System.out.println("Track length: " + this.getLength());
}
```

# CompactDisc class:

7. Update the Cart class to work with Media

```
🖆 🗏 ↓ª 😿 🔊 ⊖

    □ Outline ×

   hust.soict.dsai.aims.cart

∨ O<sub>n</sub> > Cart

      MAX_NUMBERS_ORDERED : int
      nextld:int
      getNextId(): int
         itemsOrdered : ArrayList < Media >
      addMedia(Media) : void
        addMedia(Media...): void
      addMedia(Media, Media): void
      removeMedia(Media): void
      totalCost(): float
        printCart(): void
      searchMedia(int) : Media
        searchMedia(String) : Media
```

### Code:

```
1 //Vu Thuong Dat 20215031
 2 package hust.soict.dsai.aims.cart;
3⊖ import hust.soict.dsai.aims.media.Media;
4 import java.util.ArrayList;
5 import java.util.Collections;
6 import hust.soict.dsai.aims.media.MediaComparatorByCostTitle;
 7 import hust.soict.dsai.aims.media.MediaComparatorByTitleCost;
8 public class Cart {
       public static final int MAX_NUMBERS_ORDERED = 20;
10
      private static int nextId = 1;
11⊖
     public static int getNextId() {
12
           return nextId;
13
15
       private ArrayList<Media> itemsOrdered = new ArrayList<Media>();
16
17⊜
       public void addMedia(Media media) {
18
          if (itemsOrdered.size() >= MAX_NUMBERS_ORDERED) {
               System.out.println("Cart is full");
19
20
21
22
           if (itemsOrdered.contains(media)) {
23
               System.out.println("Can't add because " + media.getTitle() + " is already in the cart!"
24
25
               return;
26
           }
27
           media.setId(nextId++);
29
           itemsOrdered.add(media);
           System.out.println("Successfully added " + media.getTitle() + " (ID: " + media.getId() + ")
30
31
```

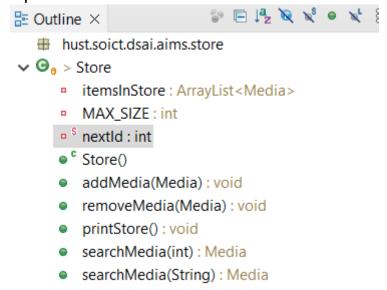
```
33⊝
      public void addMedia(Media... mediaList) {
34
          for (Media media: mediaList) {
35
              addMedia(media);
36
37
38⊝
       public void addMedia (Media media1, Media media2) {
39
          addMedia(media1);
40
          addMedia(media2);
41
429
       public void removeMedia(Media media) {
43
          if (itemsOrdered.isEmpty()) {
44
              System.out.println("Cart is empty");
45
              return;
46
          }
47
48
          if (itemsOrdered.contains(media)) {
49
              itemsOrdered.remove(media);
              System.out.println("Successfully removed " + media.getTitle() + " (ID: " + media.getIc
50
51
          } else {
52
              System.out.println("Cannot remove because " + media.getTitle() + " does not exist in t
53
54
      }
55
      public float totalCost() {
56⊜
57
          float totalCost = 0f;
58
          for (Media media : itemsOrdered) {
              totalCost += media.getCost();
60
61
          return totalCost;
62
      }
63
649
       public void printCart() {
          65
66
          if (!itemsOrdered.isEmpty()) {
67
              for (Media media : itemsOrdered) {
                 System.out.println(media.printMedia());
69
              }
          } else {
70
71
              System.out.println("Cart is empty!");
72
          73
74
75
      }
76
77⊝
      public Media searchMedia(int id) {
78
          for (Media media : itemsOrdered) {
79
              if (media.isMatch(id)) return media;
80
81
          return null;
82
      }
83
      public Media searchMedia(String title) {
84⊖
85
          for (Media media : itemsOrdered) {
86
              if (media.isMatch(title)) return media;
87
88
          return null;
89
```

## Chạy thử:

```
//Vu Thuong Dat 20215031
 2 package hust.soict.dsai.test.cart;
 3⊕ import java.util.ArrayList;
11
12 public class CartTest {
       private static List<Track> tracks;
13
14
       private static List<String> authors;
       public static void main(String[] args) {
15⊜
16
           Cart anOrder = new Cart();
17
           Media[] mediaList = new Media[3];
18
           Media media1 = new DigitalVideoDisc("The Lion King", "Animation", "John Director", 87, 19
19
20
           authors= new ArrayList<>();
21
           authors.add("Antoine de Saint-Exupéry");
           Media media2 = new Book("The little prince", "Animation", authors, 18.15f);
22
23
           tracks = new ArrayList<>();
24
           tracks.add(new Track("I do", 5));
           tracks.add(new Track("The night", 3));
Media media3 = new CompactDisc("Music", "US-UK", "Artist X", tracks , 20.81f);
25
26
27
28
           mediaList[0] = media1;
29
           mediaList[1] = media2;
30
           mediaList[2] = media3;
31
           anOrder.addMedia(mediaList);
32
33
34
           for (Media media : mediaList) {
35
                System.out.println(media.toString());
36
37
           anOrder.printCart();
38
```

# Kết quả

8. Update the Store class to work with Media



#### Code:

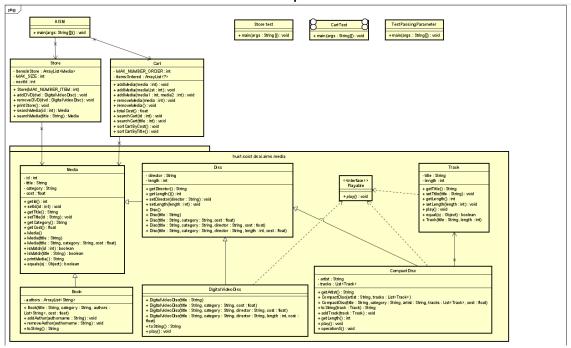
```
1 //Vu Thuong Dat 20215031
2 package hust.soict.dsai.aims.store;
 3⊕ import hust.soict.dsai.aims.media.Media;
5 public class Store {
       private ArrayList<Media> itemsInStore;
       private int MAX_SIZE = 20 ;
8
       private static int nextId = 1;
90
       public Store() {
10
           itemsInStore = new ArrayList<>(MAX_SIZE);
11
       public void addMedia(Media media) {
12⊝
13
           if (itemsInStore.size() >= MAX_SIZE) {
               System.out.println("Store is full");
14
15
               return;
16
           }
17
18
           if (itemsInStore.contains(media)) {
               System.out.println("Can't add because " + media.getTitle() + " is already in the store
19
20
               return:
21
           }
22
23
           media.setId(nextId++);
24
           itemsInStore.add(media);
           System.out.println("Successfully added " + media.getTitle() + " (ID: " + media.getId() +
25
26
           return;
27
28⊝
       public void removeMedia(Media media) {
29
           if (itemsInStore.isEmpty()) {
               System.out.println("Store is empty");
30
31
               return;
32
           }
33
34
           if (itemsInStore.contains(media)) {
35
               itemsInStore.remove(media);
               System.out.println("Successfully removed " + media.getTitle() + " (ID: " + media.getIc
36
37
           } else {
38
               System.out.println("Cannot remove because " + media.getTitle() + " does not exist in t
39
40
       public void printStore() {
    System.out.println("******** STORE ********");
419
42
43
           if(!itemsInStore.isEmpty()) {
44
               for(Media media: itemsInStore) {
45
                    System.out.println(media.printMedia());
46
47
           }
48
               else {
49
                    System.out.println("Store is empty!");
50
           System.out.println("********************************);
51
52
53⊜
       public Media searchMedia(int id) {
54
           for (Media media : itemsInStore) {
55
               if (media.isMatch(id)) System.out.println(media.printMedia());
56
57
           return null;
58
       }
59
609
       public Media searchMedia(String title) {
61
           for (Media media : itemsInStore) {
               if (media.isMatch(title)) return media;
62
63
64
           return null;
65
66 }
```

# Chạy thử:

```
1 //Vu Thuong Dat 20215031
 2 package hust.soict.dsai.test.store;
3⊕ import java.util.ArrayList; ...
11 public class StoreTest {
12
       private static List<Track> tracks;
       private static List<String> authors;
14⊝
       public static void main(String[] args) {
15
           Store anOrder = new Store();
16
17
           Media[] mediaList = new Media[3];
18
19
           Media media1 = new DigitalVideoDisc("The Lion King", "Animation", "John Director", 87, 19
20
           authors= new ArrayList<>();
21
           authors.add("Antoine de Saint-Exupéry");
           Media media2 = new Book("The little prince", "Animation", authors, 18.15f);
22
           tracks = new ArrayList<>();
23
24
           tracks.add(new Track("I do", 5));
tracks.add(new Track("The night", 3));
25
26
           Media media3 = new CompactDisc("Music", "US-UK", "Artist X", tracks , 20.81f);
27
28
           mediaList[0] = media1;
           mediaList[1] = media2;
29
30
           mediaList[2] = media3;
31
32
           anOrder.addMedia(media1);
33
           anOrder.addMedia(media2);
34
           anOrder.addMedia(media3);
35
36
           anOrder.printStore();
37
           anOrder.removeMedia(media2);
38
           anOrder.printStore();
39
       }
```

# Kết quả:

# 9. Constructors of whole classes and parent classes



### 10. Unique item in a list

### Media class:

```
public boolean equals(Object obj) {
    if (!(obj instanceof Media))
    return false;
    return this.id == ((Media) obj).id;
}
```

### Track class:

```
public boolean equals(Object obj) {
    if (!(obj instanceof Track))
        return false;
    return this.title.equalsIgnoreCase(((Track) obj).title) && this.length == ((Track) obj).length;
}
```

11. Polymorphism with toString() method

# toString()

```
CompactDisc:
       public String toString() {
48
          StringBuilder result = new StringBuilder();
49
          result.append(String.format("ID: %d - %s - %s - ", getId(), getTitle(),getCategory()));
          for (Track track : tracks) {
51
               result.append(track.getTitle()).append(". ");
52
53
          result.append(String.format("- %s - %d - %.2f $", getArtist(), getLength(),getCost()));
54
           return result.toString();
       }
55
DigitalVideoDisc
       public String toString() {
            return String.format("ID: %d - %s - %s - %s - %d - %.2f $", getId(), getTitle(), getCatego
17
18
Book
.29⊝
        public String toString() {
30
               StringBuilder result = new StringBuilder();
31
               result.append(String.format("ID: %d - %s - %s - ", getId(), getTitle(), getCategory()))
32
               for (String author : authors) {
33
                   result.append(author).append(". ");
35
               result.append(String.format("- %.2f $", getCost()));
               return result.toString();
```

Sau khi chạy thử với CartTest ở trên nhận thấy với mỗi loại media khác nhau sẽ cho cách in khác nhau.

Bởi vì với mỗi loại media ta đã triển khai phương thức toString() để in ra thông tin của đối tượng, khi gọi phương thức này, tùy thuộc vào loại đối tượng mà toString() tương ứng sẽ được thực hiện.

### 12. Sort media in the cart

## Create comparators

```
1 //Vu Thuong Dat 20215031
2 package hust.soict.dsai.aims.media;
3 import java.util.Comparator;
4 public class MediaComparatorByTitleCost implements Comparator<Media> {
      public int compare(Media media1, Media media2) {
6
         return Comparator.comparing(Media::getTitle)
               .thenComparing(Media::getCost)
8
                .compare(media1, media2);
9
10 }
1 //Vu Thuong Dat 20215031
2 package hust.soict.dsai.aims.media;
3 import java.util.Comparator;
4 public class MediaComparatorByCostTitle implements Comparator<Media> {
      public int compare(Media media1, Media media2) {
         return Comparator.comparing(Media::getCost)
                .thenComparing(Media::getTitle)
8
                .compare(media1, media2);
      }
10 }
Media Class
      public static final Comparator<Media> COMPARE_BY_TITLE_COST = new MediaComparatorByTitleCost();
     public static final Comparator<Media> COMPARE_BY_COST_TITLE = new MediaComparatorByCostTitle();
CartTest
 38
                 anOrder.printCart();
 39
                 anOrder.sortCartByCost();
                 System.out.println("Sorted cart by cost");
 40
                 anOrder.printCart();
 41
 42
                 anOrder.removeMedia(media2);
Kết quả
■ Console ×  Problems  Debug Shell
ID: 1 - The Lion King - Animation - 19,95 $
ID: 2 - The little prince - Animation - 18,15 $
ID: 3 - Music - US-UK - 20,81 $
Total cost: 58,91 $
Sorted cart by cost
  ID: 2 - The little prince - Animation - 18,15 $
ID: 1 - The Lion King - Animation - 19,95 $
ID: 3 - Music - US-UK - 20,81 $
Total cost: 58,91 $
```

### Trả lời câu hỏi:

Lóp nên implement Comparable interface là Media

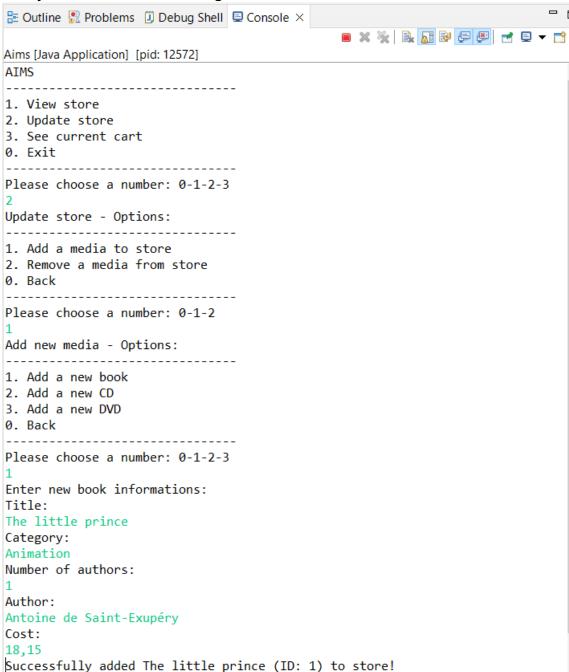
- -

13. Create a complete console application in the Aims class Code:

```
1 //Vu Thuong Dat 20215031
  2 package hust.soict.dsai.aims;
 3⊕ import hust.soict.dsai.aims.cart.Cart;
 14 public class Aims {
      private static final Scanner scanner = new Scanner(System.in);
     private static Store store = new Store();
       private static Cart cart = new Cart();
      static class ConsoleMenu {
 18⊜
 19⊕
            public static void showMenu() {[...]
 29⊕
            public static void storeMenu() {
 40⊕
           public static void mediaDetailsMenu() {[
 49⊕
          public static void updateStoreMenu() {[]
        public static void cartMenu() {[]
 58⊕
70⊕
            public static void filterCartMenu() {[]
79⊕ public static void sortCartMenu() {[
 88⊕
            public static void addMediaMenu() {[]
 98
 QQ<sub>⊕</sub>
            public static void start() {[]
121
            private static void viewStore() {[]
122⊕
174⊕
          private static void mediaDetails(Media media) {[]
            private static void updateStore() {[]
196⊕
217⊕
            private static void addMedia() {
288⊕
            private static void viewCart(){[
335⊕
            private static void filterCart(){[...]
351⊕
            private static void sortCart(){[
371
373⊜
      public static void main(String[] args) {
374
            ConsoleMenu.start();
375
376 }
```

Chi tiết ở link github

# Chạy thử một số tính năng:



# Tương tự add thêm 1 DVD và 1 CD:

```
Enter new CD informations:
Title:
Music
Category:
US-UK
Artist:
Artist X
Number of tracks:
Track: 1
I do
Track: 2
The night
Cost:
20,81
Successfully added Music (ID: 2) to store!
Add new media - Options:
-----
1. Add a new book
2. Add a new CD
3. Add a new DVD
0. Back
Please choose a number: 0-1-2-3
Enter new DVD informations:
Title:
The Lion King
Category:
Animation
Director:
John Director
Length:
87
Cost:
19,95
Successfully added The Lion King (ID: 3) to store!
```

```
View Store
```

```
1. View store
2. Update store
3. See current cart
Exit
_____
Please choose a number: 0-1-2-3
******* STORE *******
ID: 1 - The little prince - Animation - 18,15 $
ID: 2 - Music - US-UK - 20,81 $
ID: 3 - The Lion King - Animation - 19,95 $
*********
Options:
_____

    See a media's details

2. Add a media to cart
3. Play a media
4. See current cart
Back
Please choose a number: 0-1-2-3-4
```

```
-----
1. See a media's details
2. Add a media to cart
3. Play a media
4. See current cart
Back
-----
Please choose a number: 0-1-2-3-4
Enter the title of media you want to see details:
ID: 2 - Music - US-UK - I do. The night. - Artist X - 8 - 20,81 $
Options:
1. Add to cart
2. Play
Back
Please choose a number: 0-1-2
Successfully added Music (ID: 1) to cart!
Options:
_____
1. Add to cart
2. Play
Back
Please choose a number: 0-1-2
Playing CD: Music
CD length: 8
Playing Track: I do
Track length: 5
Playing Track: The night
Track length: 3
1. See a media's details
2. Add a media to cart
3. Play a media
4. See current cart
Back
-----
Please choose a number: 0-1-2-3-4
Enter the title of media you want to see details:
Music
ID: 2 - Music - US-UK - I do. The night. - Artist X - 8 - 20,81 $
```

```
Options:
1. Add to cart
2. Play
Back
Please choose a number: 0-1-2
Successfully added Music (ID: 1) to cart!
Options:
-----

    Add to cart

2. Play
Back
Please choose a number: 0-1-2
Playing CD: Music
CD length: 8
Playing Track: I do
Track length: 5
Playing Track: The night
Track length: 3
. . .
```