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ĐẠI HỌC BÁCH KHOA HÀ NỘI
TRƯỜNG CÔNG NGHỆ THÔNG TIN VÀ TRUYỀN THÔNG

BÁO CÁO THỰC HÀNH
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BÀI THỰC HÀNH 4

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Hà Nội 12/2024

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BÁO CÁO THỰC HÀNH LAB 4 LẬP TRÌNH HƯỚNG ĐỐI TƯỢNG

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1 Create the Book class

```java
package hust.soict.ite6.aims.media;

import java.util.ArrayList;
import java.util.List;

public class Book extends Media {

    private List<String> authors = new ArrayList<String>();

    //Constructor
    public Book(String title, String category, float cost) {
        super(title, category, cost);
    }

    // addAuthor method
    public void addAuthor(String authorName) {
        if(authors.contains(authorName)) {
            System.out.println("The author is already in the list");
            return;
        }
        else {
            authors.add(authorName);
            System.out.println("The author " + authorName + " has been added to the list");
        }
    }

    //removeAuthor method
    public void removeAuthor(String authorName) {
        if(authors.contains(authorName)) {
            authors.remove(authorName);
            System.out.println("The author has been removed");
            return;
        }
        System.out.println("Not found the author in the list");
    }
}
```

Figure 1: Book Class

2   Creating the abstract Media class

Đây sẽ là lớp cha để các lớp DigitalVideoDisc, Book kế thừa.

```java
AimsProject > src > hust > soict > ite6 > aims > media > ⚓ Media.java > ⬡ Media > ⬡ toString()
     You, yesterday | 1 author (You)
 1   package hust.soict.ite6.aims.media;
 2
 3   import java.util.Comparator;
     You, yesterday | 1 author (You)
 4   public abstract class Media {
 5       protected int id;
 6       protected String title;
 7       protected String category;
 8       protected float cost;
 9       private static int nbDigitalVideoDiscs = 1; // Class attribute
10       public static final Comparator<Media> COMPARE_BY_TITLE_COST = new MediaComparatorByTitleCost();
11       public static final Comparator<Media> COMPARE_BY_COST_TITLE = new MediaComparatorByCostTitle();
12       public int getId() {
13           return id;
14       }
15       public String getTitle() {
16           return title;
17       }
18       public String getCategory() {
19           return category;
20       }
21       public float getCost() {
22           return cost;
23       }
24       public static int getNbDigitalVideoDiscs() {
25           return nbDigitalVideoDiscs;
26       }
27       public void setTitle(String title) {
28           this.title = title;
29       }
30       public void setCategory(String category) {
31           this.category = category;
32       }
33       public void setCost(float cost) {
34           this.cost = cost;
35       }
36       public Media(String title, String category, float cost) {
37           this.id = nbDigitalVideoDiscs++;
38           this.title = title;
```
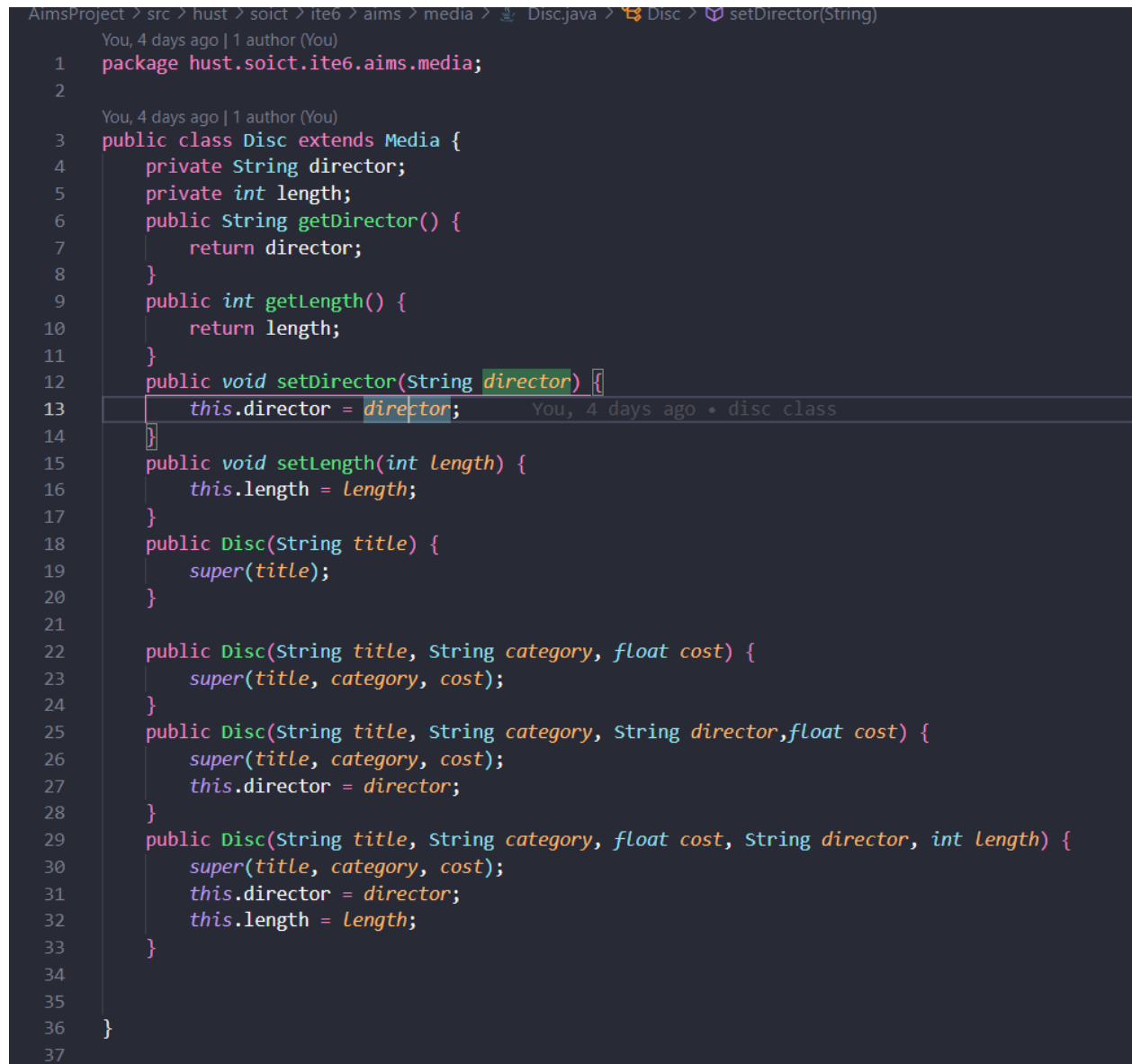
Figure 2.1: Media Class 1

```java
36          public Media(String title, String category, float cost) {
37              this.id = nbDigitalVideoDiscs++;
38              this.title = title;
39              this.category = category;
40              this.cost = cost;
41          }
42          public Media(String title) {
43              this.id = nbDigitalVideoDiscs++;
44              this.title = title;
45          }
46
47          @Override
48          public boolean equals(Object o) {
49              Media media = (Media) o;           You, 2 days ago • override equal method
50              try {
51                  String title = media.getTitle();
52                  return title.equals(this.getTitle());
53              } catch (NullPointerException e) {
54                  return false;
55              }
56          }
57          @Override
58          public String toString() {
59              return "Media {" + id + ". " + title + " - " + category + " - " + cost + "$}";
60          }
61      }
```

Figure 2.2: Media Class 2

3   Creating the CompactDisc class

3.1   Create the Disc class extending the Media class

```java
AimsProject > src > hust > soict > ite6 > aims > media > Disc.java > Disc > setDirector(String)
You, 4 days ago | 1 author (You)
1    package hust.soict.ite6.aims.media;
2
     You, 4 days ago | 1 author (You)
3    public class Disc extends Media {
4        private String director;
5        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;        You, 4 days ago • disc class
14       }
15       public void setLength(int length) {
16           this.length = length;
17       }
18       public Disc(String title) {
19           super(title);
20       }
21
22       public Disc(String title, String category, float cost) {
23           super(title, category, cost);
24       }
25       public Disc(String title, String category, String director,float cost) {
26           super(title, category, cost);
27           this.director = director;
28       }
29       public Disc(String title, String category, float cost, String director, int length) {
30           super(title, category, cost);
31           this.director = director;
32           this.length = length;
33       }
34
35
36   }
37
```

Figure 3.1: Disc Class

```java
AimsProject > src > hust > soict > ite6 > aims > media > 🔧 DigitalVideoDisc.java > ...
        You, 4 days ago | 1 author (You)
  1     package hust.soict.ite6.aims.media;
  2
        You, 4 days ago | 1 author (You)
  3     public class DigitalVideoDisc extends Disc implements Playable{
  4         private String director;
  5         private int length;
  6         public String getDirector() {
  7             return director;
  8         }
  9         public int getLength() {
 10             return length;
 11         }
 12         public DigitalVideoDisc(String title) {
 13             super(title);
 14         }
 15
 16         public DigitalVideoDisc(String title, String category, float cost) {
 17             super(title, category, cost);
 18         }
 19
 20         public DigitalVideoDisc(String title, String category, String director, float cost) {
 21             super(title, category, director, cost);
 22         }
 23
 24         public DigitalVideoDisc(String title, String category, String director, int length, float cost) {
 25             super(title, category, cost, director, length);
 26         }
 27         public void play() {
 28             System.out.println("Playing DVD: " + this.getTitle());
 29             System.out.println("DVD length: " + this.getLength());
 30         }
 31     }
 32
```

Figure 3.2: DigitalVideoDisc Class

AimsProject > src > hust > soict > ite6 > aims > media > CompactDisc.java > CompactDisc > CompactDisc(String, String)

```java
     You, 4 days ago | 1 author (You)
1    package hust.soict.ite6.aims.media;
2
3    import java.util.ArrayList;
4    import java.util.List;
5
     You, 4 days ago | 1 author (You)
6    public class CompactDisc extends Disc implements Playable {
7        private String artist;
8        private List<Track> tracks = new ArrayList<Track>();
9        public String getArtist() {
10           return artist;
11       }
12   💡  public CompactDisc(String title, String artist) {        You, 4 days ago • compact disc
13           super(title);
14           this.artist = artist;
15       }
16       public CompactDisc(String title, String category, float cost, String artist) {
17           super(title, category, cost);
18           this.artist = artist;
19       }
20       public CompactDisc(String title, String category, String director, float cost, String artist) {
21           super(title, category, director, cost);
22           this.artist = artist;
23       }
24       public CompactDisc(String title, String category, float cost, String director, int length, String artist) {
25           super(title, category, cost, director, length);
26           this.artist = artist;
27       }
28       public void addTrack(Track track) {
29           if(tracks.indexOf(track)==-1) {
30               System.out.println("Track is already in list");
31               return;
32           }
33           tracks.add(track);
34           System.out.println("Add track successfully");
35       }
```

Figure 3.3.1: CompactDisc Class 1

```java
36      public void removeTrack(Track track) {
37          if(tracks.indexOf(track) == -1) {
38              System.out.println("Track is not in list");
39              return;
40          }
41          tracks.remove(tracks.indexOf(track));
42          System.out.println("Remove track successfully");
43      }
44      public int getLength() {
45          int length = 0;
46          for(Track track : tracks) {
47              length += track.getLength();
48          }
49          setLength(length);
50          return length;
51      }
52      public void play() {
53          System.out.println("Playing CD: " + this.getTitle());
54          System.out.println("CD artist: " + this.getArtist());
55          System.out.println("CD length:" + this.getLength());
56          for(Track track : tracks) {
57              track.play();
58          }
59      }
60  }
61
```

Figure 3.3.2: CompactDisc Class 2

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

```
AimsProject > src > hust > soict > ite6 > aims > media > 🍵 Track.java > ...
       You, 2 days ago | 1 author (You)
 1     package hust.soict.ite6.aims.media;
 2
       You, 2 days ago | 1 author (You)
 3     public class Track implements Playable {
 4         private String title;
 5         private int length;
 6         public String getTitle() {
 7             return title;
 8         }
 9         public int getLength() {
10             return length;
11         }
12         public Track(String title, int length) {
13             this.title = title;
14             this.length = length;
15         }
16         public Track(String title) {
17             this.title = title;
18         }
19         public Track(int length) {
20             this.length = length;
21         }
22         public void play() {
23             System.out.println("Playing track: " + this.getTitle());
24             System.out.println("Track length: " + this.getLength());
25         }
26
27         @Override
28         public boolean equals(Object o) {
29             Track track = (Track) o;
30             String title = track.getTitle();
31             int length = track.getLength();
32             return title.equals(this.getTitle()) && length == this.getLength();
33         }
34     }
35
```

Figure 3.4: Track Class

3.3   Open the CompactDisc class

```
AimsProject > src > hust > soict > ite6 > aims > media >  CompactDisc.java >  CompactDisc >  CompactDisc(String, String)
        You, 4 days ago | 1 author (You)
  1     package hust.soict.ite6.aims.media;
  2
  3     import java.util.ArrayList;
  4     import java.util.List;
  5
        You, 4 days ago | 1 author (You)
  6     public class CompactDisc extends Disc implements Playable {
  7         private String artist;
  8         private List<Track> tracks = new ArrayList<Track>();
  9         public String getArtist() {
 10             return artist;
 11         }
 12     💡  public CompactDisc(String title, String artist) {        You, 4 days ago • compact disc
 13             super(title);
 14             this.artist = artist;
 15         }
 16         public CompactDisc(String title, String category, float cost, String artist) {
 17             super(title, category, cost);
 18             this.artist = artist;
 19         }
 20         public CompactDisc(String title, String category, String director, float cost, String artist) {
 21             super(title, category, director, cost);
 22             this.artist = artist;
 23         }
 24         public CompactDisc(String title, String category, float cost, String director, int length, String artist) {
 25             super(title, category, cost, director, length);
 26             this.artist = artist;
 27         }
 28         public void addTrack(Track track) {
 29             if(tracks.indexOf(track)==-1) {
 30                 System.out.println("Track is already in list");
 31                 return;
 32             }
 33             tracks.add(track);
 34             System.out.println("Add track successfully");
 35         }
```

Figure 3.5: CompactDisc Class 1

```
36          public void removeTrack(Track track) {
37              if(tracks.indexOf(track) == -1) {
38                  System.out.println("Track is not in list");
39                  return;
40              }
41              tracks.remove(tracks.indexOf(track));
42              System.out.println("Remove track successfully");
43          }
44          public int getLength() {
45              int length = 0;
46              for(Track track : tracks) {
47                  length += track.getLength();
48              }
49              setLength(length);
50              return length;
51          }
52          public void play() {
53              System.out.println("Playing CD: " + this.getTitle());
54              System.out.println("CD artist: " + this.getArtist());
55              System.out.println("CD length:" + this.getLength());
56              for(Track track : tracks) {
57                  track.play();
58              }
59          }
60      }
61
```

Figure 3.6: CompactDisc Class 2

4   Create the Playable interface

Figure 4.1: Playable interface

Implement play() cho các class DigitalVideoDisc, Track, CompactDisc

Figure 4.2: Method play() của DigitalVideoDisc

Figure 4.3: Method play() của Track

Figure 4.4: Method play() của CompactDisc

5 Update the Cart class to work with Media

Lớp Cart bây giờ cần có khả năng tương tác với các đối tượng DVD, CD và Book. Vì các lớp DVD, CD và Book đều kế thừa từ lớp Media, nên thay vì làm việc trực tiếp với từng lớp con, lớp cart chỉ cần giao tiếp với lớp Media là có thể hoạt động được với tất cả.

```
AimsProject > src > hust > soict > ite6 > aims > cart > Cart > Cart.java > Cart > totalCost()
        You, 2 hours ago | 1 author (You)
1       package hust.soict.ite6.aims.cart.Cart;
2
3       import java.util.ArrayList;
4       import java.util.Comparator;
5
6       import hust.soict.ite6.aims.media.Media;
7       import hust.soict.ite6.aims.media.MediaComparatorByCostTitle;
8       import hust.soict.ite6.aims.media.MediaComparatorByTitleCost;
9
        You, 2 hours ago | 1 author (You)
10      public class Cart {
11          public static final Comparator<Media> COMPARE_BY_TITLE_COST = new MediaComparatorByTitleCost();
12          public static final Comparator<Media> COMPARE_BY_COST_TITLE = new MediaComparatorByCostTitle();
13          public static final int MAX_NUMBERS_ORDERED = 20;
14          private ArrayList<Media> itemsOrdered = new ArrayList<Media>();
15
16          public void addMedia(Media media) {
17              if(itemsOrdered.size() < MAX_NUMBERS_ORDERED) {
18                  itemsOrdered.add(media);
19                  System.out.println("LeDongCanhPhu-20225755-Added Successfully.");
20              } else {
21                  System.out.println("LeDongCanhPhu-20225755-The cart is almost full.");
22              }
23          }
24
25          public void removeMedia(Media media) {
26              if(itemsOrdered.size() == 0) {
27                  System.out.println("LeDongCanhPhu-20225755-The cart is empty.");
28                  return;
29              } if(itemsOrdered.contains(media)) {
30                  itemsOrdered.remove(media);
31                  System.out.println("LeDongCanhPhu-20225755-Removed Successfully.");
32              } else {
33                  System.out.println("LeDongCanhPhu-20225755-The disc is not in the cart.");
34              }
35          }
```

Figure 5.1: Cart Class 1

```java
36      public float totalCost() {
37          float total = 0;
38          for(Media media : itemsOrdered) {
39              total += media.getCost();
40          }
41          return total;        You, last month • create Cart.java
42      }
43
44      public void printCart() {
45          System.out.println("************LeDongCanhPhu-20225755's CART************");
46          System.out.println("Ordered Items:");
47          for(Media media : itemsOrdered) {
48              System.out.println(media.toString());
49          }
50          System.out.println("*********************************************************");
51      }
52      public Media SearchbyID(int id) {
53          for(Media media : itemsOrdered) {
54              if(media.getId() == id) {
55                  return media;
56              }
57          }
58          return null;
59      }
60
61      public boolean isMatch(String title) {
62          for(Media media : itemsOrdered) {
63              if(media.getTitle().equals(title)) {
64                  return true;
65              }
66          }
67          return false;
68      }
69
```

Figure 5.2: Cart Class 2

```
70        public Media SearchbyTitle(String title) {
71            for(Media media : itemsOrdered) {
72                if(isMatch(title)) {
73                    return media;
74                }
75            }
76            return null;
77        }
78
79        public ArrayList<Media> getItemsOrdered() {
80            return itemsOrdered;
81        }
82        public void clearCart() {
83            itemsOrdered.clear();
84        }
85        public void sortByTitle() {
86            itemsOrdered.sort(COMPARE_BY_TITLE_COST);
87        }
88        public void sortByCost(){
89            itemsOrdered.sort(COMPARE_BY_COST_TITLE);
90        }
91    }
```

Figure 5.3: Cart Class 3

6   Update the Store class to work with Media

```
AimsProject > src > hust > soict > ite6 > aims > store > Store > Store.java > Store > printStore()
     You, 1 hour ago | 1 author (You)
  1  package hust.soict.ite6.aims.store.Store;
  2
  3  import java.util.ArrayList;
  4
  5  import hust.soict.ite6.aims.media.Media;
  6
     You, 1 hour ago | 1 author (You)
  7  public class Store {
  8      private ArrayList<Media> itemsInStore = new ArrayList<Media>();
  9
 10      public void addMedia(Media media) {
 11          itemsInStore.add(media);
 12          System.out.println("LeDongCanhPhu-20225755-Added Successfully.");
 13      }
 14
 15      public void removeMedia(Media media) {
 16          if(itemsInStore.contains(media)) {
 17              itemsInStore.remove(media);
 18              System.out.println("LeDongCanhPhu-20225755-Removed Successfully.");
 19          } else {
 20              System.out.println("LeDongCanhPhu-20225755-Can't found.");
 21          }
 22      }
 23      //Getter and setter
 24      public ArrayList<Media> getItemsInStore() {
 25          return itemsInStore;
 26      }
 27
 28      public void printStore() {
 29          System.out.println("************LeDongCanhPhu-20225755's STORE***********");
 30          for(Media media : itemsInStore) {
 31              System.out.println(media.toString());
 32          }
 33          System.out.println("**************************************************");
 34      }
 35
```

Figure 6.1: Store Class 1

```java
//Find media by ID
public Media findMediabyID(int id) {
    for(Media media : itemsInStore) {
        if(media.getId() == id) {
            return media;
        }
    }
    return null;
}

//Find media by title
public Media findMediabyTitle(String title) {
    for(Media media : itemsInStore) {
        if(media.getTitle().equalsIgnoreCase(title)) {
            return media;
        }
    }
    return null;
}
}
```

Figure 6.2: Store Class 2

7   Constructors of whole classes and parent classes

```
12    public Track(String title, int length) {
13        this.title = title;
14        this.length = length;
15    }
```

Figure 7.1: Constructor Track Class

```
24    public CompactDisc(String title, String category, float cost, String director, int length, String artist) {
25        super(title, category, cost, director, length);
26        this.artist = artist;
27    }
```

Figure 7.2: Constructor CompactDisc Class

Lớp Disc kế thừa lớp Media, khi đó lớp Media là lớp cha, lớp Disc là lớp con.

```
36    public Media(String title, String category, float cost) {
37        this.id = nbDigitalVideoDiscs++;
38        this.title = title;
39        this.category = category;
40        this.cost = cost;
41    }
42    public Media(String title) {
43        this.id = nbDigitalVideoDiscs++;
44        this.title = title;
45    }
```

Figure 7.3: Constructor Media Class

```java
public Disc(String title, String category, float cost, String director, int length) {
    super(title, category, cost);
    this.director = director;
    this.length = length;
}
```

Figure 7.4: Constructor Disc Class

8   Unique item in a list

Để tránh trùng lặp các phần tử media trong giỏ hàng hoặc các track trong một đĩa CD, chúng ta có thể ghi đè lại phương thức equals() mặc định kế thừa từ lớp Object. Việc này cho phép so sánh bản chất thay vì so sánh vị trí ô nhớ của các đối tượng, qua đó ngăn chặn thêm các phần tử bị trùng lắp vào danh sách.

```java
47      @Override
48      public boolean equals(Object o) {
49          Media media = (Media) o;
50          try {
51              String title = media.getTitle();
52              return title.equals(this.getTitle());
53          } catch (NullPointerException e) {
54              return false;
55          }
56      }
```

Figure 8.1: Override equals in Media Class

```java
27      @Override
28      public boolean equals(Object o) {
29          Track track = (Track) o;
30          String title = track.getTitle();
31          int length = track.getLength();
32          return title.equals(this.getTitle()) && length == this.getLength();
33      }
```

Figure 8.2: Override equals in Track Class

9   Polymorphism with toString() method

```java
package hust.soict.ite6.test.disc;            You, yesterday • override toString method

import java.util.ArrayList;
import java.util.List;

import hust.soict.ite6.aims.media.Book;
import hust.soict.ite6.aims.media.CompactDisc;
import hust.soict.ite6.aims.media.DigitalVideoDisc;
import hust.soict.ite6.aims.media.Media;

You, yesterday | 1 author (You)
public class TestPolymorphism {
    Run | Debug
    public static void main(String[] args) {
        List<Media> mediae = new ArrayList<Media>();

        //create some media here
        //for example: cd, dvd, book
        CompactDisc cd = new CompactDisc(title:"PhuLDC-20225755", category:"Music", cost:10, artist:"John");
        DigitalVideoDisc dvd = new DigitalVideoDisc(title:"DVD", category:"Movie", cost:20);
        Book book = new Book(title:"Book", category:"Literature", cost:30);

        mediae.add(cd);
        mediae.add(dvd);
        mediae.add(book);

        for(Media m : mediae) {
            System.out.println(m.toString());
        }
    }
}
```

Figure 9.1: Code mô phỏng Polymorphism

```java
        @Override
        public String toString() {
            return "Media {" + id + ". " + title + " - " + category + " - " + cost + "$}";
        }
    }
```

Figure 9.2: Override toString() in Media Class

Kết quả

```
.soict.ite6.test.disc.TestPolymorphism
● Media {1. PhuLDC-20225755 - Music - 10.0$}
  Media {2. DVD - Movie - 20.0$}
  Media {3. Book - Literature - 30.0$}
```

Figure 9.3: Result demo Polymorphism

Lớp Media là lớp cơ sở được kế thừa bởi các lớp cụ thể hơn là CompactDisc, DigitalVideoDisc và Book. Khi khởi tạo các đối tượng cd, dvd, book thuộc lớp con rồi gán chúng cho biến kiểu Media, ta áp dụng kỹ thuật gọi là upcasting.

Việc thêm chúng vào danh sách media và duyệt danh sách để in ra thông tin mỗi phần tử bằng phương thức toString() là ví dụ điển hình cho tính đa hình động. Mỗi lớp con có thể cài đặt riêng toString() nên

kết quả sẽ khác nhau dựa theo loại đối tượng, mà không cần quan tâm đến kiểu cụ thể của từng phần tử.

10 Sort media in the car

Sắp xếp các media trong giỏ hàng theo hai tiêu chí:

- Bảng title: Hiển thị tất cả các media theo thứ tự bảng chữ cái. Trong trường hợp cùng title, media có cost cao hơn sẽ được hiển thị trước.
- Bảng cost: Hiển thị theo thứ tự cost giảm dần. Trong trường hợp cost như nhau, sắp xếp media theo thứ tự bảng chữ cái

```java
public static final Comparator<Media> COMPARE_BY_TITLE_COST = new MediaComparatorByTitleCost();
public static final Comparator<Media> COMPARE_BY_COST_TITLE = new MediaComparatorByCostTitle();
```

Figure 10.1: Add the comparators as attributes of the Media class

```java
AimsProject > src > hust > soict > ite6 > aims > media >  MediaComparatorByCostTitle.java > ...
You, yesterday | 1 author (You)
1   package hust.soict.ite6.aims.media;
2
3   import java.util.Comparator;
You, yesterday | 1 author (You)
4   public class MediaComparatorByCostTitle implements Comparator<Media> {
5       public int compare(Media m1, Media m2) {
6           int costComparison = Float.compare(m2.getCost(), m1.getCost());
7           if(costComparison != 0) {
8               return costComparison;
9           }
10          return m1.getTitle().compareTo(m2.getTitle());
11      }
12  }
13
```

Figure 10.2: MediaComparatorByCostTitle Class

```
AimsProject > src > hust > soict > ite6 > aims > media >  MediaComparatorByTitleCost.java > ...
       You, yesterday | 1 author (You)
   1   package hust.soict.ite6.aims.media;
   2
   3   import java.util.Comparator;
   4
       You, yesterday | 1 author (You)
   5   public class MediaComparatorByTitleCost implements Comparator<Media> {
   6       public int compare(Media m1, Media m2) {
   7           int titleComparison = m1.getTitle().compareTo(m2.getTitle());
   8
   9           if(titleComparison != 0) {
  10               return titleComparison;
  11           }
  12           return Float.compare(m2.getCost(), m1.getCost());
  13       }
  14   }
  15
```

Figure 10.3: MediaComparatorByTitleCost Class

11 Create a complete console application in the Aims class

```
AIMS:
--------------------------------
1. View store
2. Update store
3. See current cart
0. Exit
--------------------------------
Please choose a number: 0-1-2-3
```

Figure 11.1: Màn hình chính

11.1 Người dùng chọn 1: View store

```
AIMS:
-------------------------------
1. View store
2. Update store
3. See current cart
0. Exit
-------------------------------
Please choose a number: 0-1-2-3
1
************LeDongCanhPhu-20225755's STORE*************
Media {1. Phu.LDC-20225755 - Pop - 15.99$}
Media {2. Back in Black - Rock - 12.99$}
Media {3. The Dark Side of the Moon - Progressive Rock - 14.99$}
Media {4. The Bodyguard - Soundtrack - 11.99$}
Media {5. Rumours - Rock - 13.99$}
Media {6. The Lion King - Animation - 19.95$}
Media {7. Star Wars - Science Fiction - 24.95$}
Media {8. Aladdin - Animation - 18.99$}
Media {9. Phu.LDC-20225755 - Crime - 29.99$}
Media {10. Pulp Fiction - Crime - 22.99$}
Media {11. To Kill a Mockingbird - Fiction - 10.99$}
Media {12. 1984 - Dystopian - 8.99$}
Media {13. The Great Gatsby - Classic - 12.99$}
Media {14. Moby Dick - Adventure - 15.99$}
Media {15. War and Peace - Historical - 20.99$}
*********************************************************
Options:
-------------------------------
1. See a media's details
2. Add a media to cart
3. Play a media
4. See current cart
0. Back
-------------------------------
Please choose a number: 0-1-2-3-4
```

Figure 11.2: Vào Trang View Store

11.1.1 Người dùng tiếp tục chọn 1. See a media's details

```
Options:
-------------------------------
1. See a media's details
2. Add a media to cart
3. Play a media
4. See current cart
0. Back
-------------------------------
Please choose a number: 0-1-2-3-4
1
Enter the title: 1984
Media {12. 1984 - Dystopian - 8.99$}
Options:
-------------------------------
1. Add to cart
2. Play
0. Back
-------------------------------
Please choose a number: 0-1-2
```

Figure 11.3: See a media's details

```
Options:
--------------------------------
1. See a media's details
2. Add a media to cart
3. Play a media
4. See current cart
0. Back
--------------------------------
Please choose a number: 0-1-2-3-4
1
Enter the title: 1984
Media {12. 1984 - Dystopian - 8.99$}
Options:
--------------------------------
1. Add to cart
2. Play
0. Back
--------------------------------
Please choose a number: 0-1-2
1
LeDongCanhPhu-20225755-Added Successfully.
```

Figure 11.4: Thêm vào Cart

11.1.2 Người dùng chọn 2: Add a media to the cart

```
Options:
-------------------------------
1. See a media's details
2. Add a media to cart
3. Play a media
4. See current cart
0. Back
-------------------------------
Please choose a number: 0-1-2-3-4
2
*************LeDongCanhPhu-20225755's STORE*************
Media {1. Phu.LDC-20225755 - Pop - 15.99$}
Media {2. Back in Black - Rock - 12.99$}
Media {3. The Dark Side of the Moon - Progressive Rock - 14.99$}
Media {4. The Bodyguard - Soundtrack - 11.99$}
Media {5. Rumours - Rock - 13.99$}
Media {6. The Lion King - Animation - 19.95$}
Media {7. Star Wars - Science Fiction - 24.95$}
Media {8. Aladdin - Animation - 18.99$}
Media {9. Phu.LDC-20225755 - Crime - 29.99$}
Media {10. Pulp Fiction - Crime - 22.99$}
Media {11. To Kill a Mockingbird - Fiction - 10.99$}
Media {12. 1984 - Dystopian - 8.99$}
Media {13. The Great Gatsby - Classic - 12.99$}
Media {14. Moby Dick - Adventure - 15.99$}
Media {15. War and Peace - Historical - 20.99$}
*****************************************************
Choose the media you want to add: Moby Dick
LeDongCanhPhu-20225755-Added Successfully.
The number of DVD in the cart is: 0
```

Figure 11.5: Thêm media vào Cart

11.1.3 Người dùng chọn 3: Play a media

```
Options:
-------------------------------
1. See a media's details
2. Add a media to cart
3. Play a media
4. See current cart
0. Back
-------------------------------
Please choose a number: 0-1-2-3-4
3
*************LeDongCanhPhu-20225755's STORE*************
Media {1. Phu.LDC-20225755 - Pop - 15.99$}
Media {2. Back in Black - Rock - 12.99$}
Media {3. The Dark Side of the Moon - Progressive Rock - 14.99$}
Media {4. The Bodyguard - Soundtrack - 11.99$}
Media {5. Rumours - Rock - 13.99$}
Media {6. The Lion King - Animation - 19.95$}
Media {7. Star Wars - Science Fiction - 24.95$}
Media {8. Aladdin - Animation - 18.99$}
Media {9. Phu.LDC-20225755 - Crime - 29.99$}
Media {10. Pulp Fiction - Crime - 22.99$}
Media {11. To Kill a Mockingbird - Fiction - 10.99$}
Media {12. 1984 - Dystopian - 8.99$}
Media {13. The Great Gatsby - Classic - 12.99$}
Media {14. Moby Dick - Adventure - 15.99$}
Media {15. War and Peace - Historical - 20.99$}
*********************************************************
Choose the media you want to play: Star Wars
Playing DVD: Star Wars
DVD length: 0
```

Figure 11.6: Play a media

11.1.4 Người dùng chọn 4: See current cart

```
Options:
------------------------------
1. See a media's details
2. Add a media to cart
3. Play a media
4. See current cart
0. Back
------------------------------
Please choose a number: 0-1-2-3-4
4
*************LeDongCanhPhu-20225755's CART*************
Ordered Items:
Media {1. Phu.LDC-20225755 - Pop - 15.99$}
Media {2. Back in Black - Rock - 12.99$}
Media {3. The Dark Side of the Moon - Progressive Rock - 14.99$}
Media {6. The Lion King - Animation - 19.95$}
Media {7. Star Wars - Science Fiction - 24.95$}
Media {12. 1984 - Dystopian - 8.99$}
Media {14. Moby Dick - Adventure - 15.99$}
******************************************************
Press any key to go back: █
```

Figure 11.7: See current cart

11.2 Người dùng chọn 2: Update store

```
AIMS:
--------------------------------
1. View store
2. Update store
3. See current cart
0. Exit
--------------------------------
Please choose a number: 0-1-2-3
2
************LeDongCanhPhu-20225755's STORE*************
Media {1. Phu.LDC-20225755 - Pop - 15.99$}
Media {2. Back in Black - Rock - 12.99$}
Media {3. The Dark Side of the Moon - Progressive Rock - 14.99$}
Media {4. The Bodyguard - Soundtrack - 11.99$}
Media {5. Rumours - Rock - 13.99$}
Media {6. The Lion King - Animation - 19.95$}
Media {7. Star Wars - Science Fiction - 24.95$}
Media {8. Aladdin - Animation - 18.99$}
Media {9. Phu.LDC-20225755 - Crime - 29.99$}
Media {10. Pulp Fiction - Crime - 22.99$}
Media {11. To Kill a Mockingbird - Fiction - 10.99$}
Media {12. 1984 - Dystopian - 8.99$}
Media {13. The Great Gatsby - Classic - 12.99$}
Media {14. Moby Dick - Adventure - 15.99$}
Media {15. War and Peace - Historical - 20.99$}
*********************************************************
What do you want to do?
0-Remove
1-Add: 
```

Figure 11.8: Vào Trang Update Store

11.2.1 Người dùng chọn 1: Add a media to the store

```
What do you want to do?
0-Remove
1-Add: 1
Choose the type of media you want to add:
0-Book
1-DVD
2-CD
2
Enter the title: LeDongCanhPhu-20225755
Enter the category: Classic
Enter the cost: 1000
Enter the artist: CanhPhu
LeDongCanhPhu-20225755-Added Successfully.
*************LeDongCanhPhu-20225755's STORE*************
Media {1. Phu.LDC-20225755 - Pop - 15.99$}
Media {2. Back in Black - Rock - 12.99$}
Media {3. The Dark Side of the Moon - Progressive Rock - 14.99$}
Media {4. The Bodyguard - Soundtrack - 11.99$}
Media {5. Rumours - Rock - 13.99$}
Media {6. The Lion King - Animation - 19.95$}
Media {7. Star Wars - Science Fiction - 24.95$}
Media {8. Aladdin - Animation - 18.99$}
Media {9. Phu.LDC-20225755 - Crime - 29.99$}
Media {10. Pulp Fiction - Crime - 22.99$}
Media {11. To Kill a Mockingbird - Fiction - 10.99$}
Media {12. 1984 - Dystopian - 8.99$}
Media {13. The Great Gatsby - Classic - 12.99$}
Media {14. Moby Dick - Adventure - 15.99$}
Media {15. War and Peace - Historical - 20.99$}
Media {16. LeDongCanhPhu-20225755 - Classic - 1000.0$}
********************************************************
Press any key to go back: █
```

Figure 11.9: Add a media to store and result

11.2.2 Người dùng chọn 2: Remove a media from the store

```
What do you want to do?
0-Remove
1-Add: 0
Enter the title: Phu.LDC-20225755
LeDongCanhPhu-20225755-Removed Successfully.
*************LeDongCanhPhu-20225755's STORE*************
Media {2. Back in Black - Rock - 12.99$}
Media {3. The Dark Side of the Moon - Progressive Rock - 14.99$}
Media {4. The Bodyguard - Soundtrack - 11.99$}
Media {5. Rumours - Rock - 13.99$}
Media {6. The Lion King - Animation - 19.95$}
Media {7. Star Wars - Science Fiction - 24.95$}
Media {8. Aladdin - Animation - 18.99$}
Media {9. Phu.LDC-20225755 - Crime - 29.99$}
Media {10. Pulp Fiction - Crime - 22.99$}
Media {11. To Kill a Mockingbird - Fiction - 10.99$}
Media {12. 1984 - Dystopian - 8.99$}
Media {13. The Great Gatsby - Classic - 12.99$}
Media {14. Moby Dick - Adventure - 15.99$}
Media {15. War and Peace - Historical - 20.99$}
*********************************************************

Press any key to go back:
```

Figure 11.10: Remove a media from the store and result

11.3 Người dùng chọn 3: See current cart

```
AIMS:
------------------------------
1. View store
2. Update store
3. See current cart
0. Exit
------------------------------
Please choose a number: 0-1-2-3
3
************LeDongCanhPhu-20225755's CART*************
Ordered Items:
Media {1. Phu.LDC-20225755 - Pop - 15.99$}
Media {2. Back in Black - Rock - 12.99$}
Media {3. The Dark Side of the Moon - Progressive Rock - 14.99$}
Media {6. The Lion King - Animation - 19.95$}
Media {7. Star Wars - Science Fiction - 24.95$}
****************************************************
Options:
------------------------------
1. Filter medias in cart
2. Sort medias in cart
3. Remove media from cart
4. Play a media
5. Place order
0. Back
------------------------------
Please choose a number: 0-1-2-3-4-5
```

Figure 11.11: Vào trang See current cart

11.3.1 Người dùng chọn 1: Filter medias in cart


```
Options:
--------------------------------
1. Filter medias in cart
2. Sort medias in cart
3. Remove media from cart
4. Play a media
5. Place order
0. Back
--------------------------------
Please choose a number: 0-1-2-3-4-5
1
Choose an option the filer:
0-ID
1-Title
0
Enter the ID: 6
Media {6. The Lion King - Animation - 19.95$}
```

Figure 11.12: Filter Cart By id

```
Options:
-------------------------------
1. Filter medias in cart
2. Sort medias in cart
3. Remove media from cart
4. Play a media
5. Place order
0. Back
-------------------------------
Please choose a number: 0-1-2-3-4-5
1
Choose an option the filer:
0-ID
1-Title
1
Enter the title:
Phu.LDC-20225755
Media {1. Phu.LDC-20225755 - Pop - 15.99$}
```

Figure 11.13: Filter Cart By Title

11.3.2 Người dùng chọn 2: Sort medias in cart

```
Options:
--------------------------------
1. Filter medias in cart
2. Sort medias in cart
3. Remove media from cart
4. Play a media
5. Place order
0. Back
--------------------------------
Please choose a number: 0-1-2-3-4-5
2
Choose an option to sort:
 0-Cost
1-Title
1
************LeDongCanhPhu-20225755's CART************
Ordered Items:
Media {2. Back in Black - Rock - 12.99$}
Media {1. Phu.LDC-20225755 - Pop - 15.99$}
Media {7. Star Wars - Science Fiction - 24.95$}
Media {3. The Dark Side of the Moon - Progressive Rock - 14.99$}
Media {6. The Lion King - Animation - 19.95$}
****************************************************
```

Figure 11.14: Sort Cart By Title

```
Options:
-------------------------------
1. Filter medias in cart
2. Sort medias in cart
3. Remove media from cart
4. Play a media
5. Place order
0. Back
-------------------------------
Please choose a number: 0-1-2-3-4-5
2
Choose an option to sort:
 0-Cost
1-Title
0
*************LeDongCanhPhu-20225755's CART*************
Ordered Items:
Media {7. Star Wars - Science Fiction - 24.95$}
Media {6. The Lion King - Animation - 19.95$}
Media {1. Phu.LDC-20225755 - Pop - 15.99$}
Media {3. The Dark Side of the Moon - Progressive Rock - 14.99$}
Media {2. Back in Black - Rock - 12.99$}
*********************************************************
```

Figure 11.15: Sort Cart By Cost

11.3.3 Người dùng chọn 3: Remove media from cart

```
Options:
--------------------------------
1. Filter medias in cart
2. Sort medias in cart
3. Remove media from cart
4. Play a media
5. Place order
0. Back
--------------------------------
Please choose a number: 0-1-2-3-4-5
3
*************LeDongCanhPhu-20225755's CART*************
Ordered Items:
Media {1. Phu.LDC-20225755 - Pop - 15.99$}
Media {2. Back in Black - Rock - 12.99$}
Media {3. The Dark Side of the Moon - Progressive Rock - 14.99$}
Media {6. The Lion King - Animation - 19.95$}
Media {7. Star Wars - Science Fiction - 24.95$}
********************************************************
Enter the title: Star Wars
LeDongCanhPhu-20225755-Removed Successfully.
*************LeDongCanhPhu-20225755's CART*************
Ordered Items:
Media {2. Back in Black - Rock - 12.99$}
Media {3. The Dark Side of the Moon - Progressive Rock - 14.99$}
Media {6. The Lion King - Animation - 19.95$}
Media {7. Star Wars - Science Fiction - 24.95$}
********************************************************
```

Figure 11.16: Remove media by title and result

11.3.4 Người dùng chọn 4: Play a media

```
Options:
------------------------------
1. Filter medias in cart
2. Sort medias in cart
3. Remove media from cart
4. Play a media
5. Place order
0. Back
------------------------------
Please choose a number: 0-1-2-3-4-5
4
************LeDongCanhPhu-20225755's CART*************
Ordered Items:
Media {2. Back in Black - Rock - 12.99$}
Media {3. The Dark Side of the Moon - Progressive Rock - 14.99$}
Media {6. The Lion King - Animation - 19.95$}
Media {7. Star Wars - Science Fiction - 24.95$}
*********************************************************
Choose the CD/DVD you want to play: Back in Black
Playing CD: Back in Black
CD artist: AC/DC
CD length:0
```

Figure 11.17: Play a media in cart

11.3.5 Người dùng chọn 5: Place order

```
Options:
------------------------------
1. Filter medias in cart
2. Sort medias in cart
3. Remove media from cart
4. Play a media
5. Place order
0. Back
------------------------------
Please choose a number: 0-1-2-3-4-5
5
Order Successfully.
************LeDongCanhPhu-20225755's CART*************
Ordered Items:
*********************************************************
```

Figure 11.18: Order and result

12 Class Diagram

Figure 12.1: Class Diagram
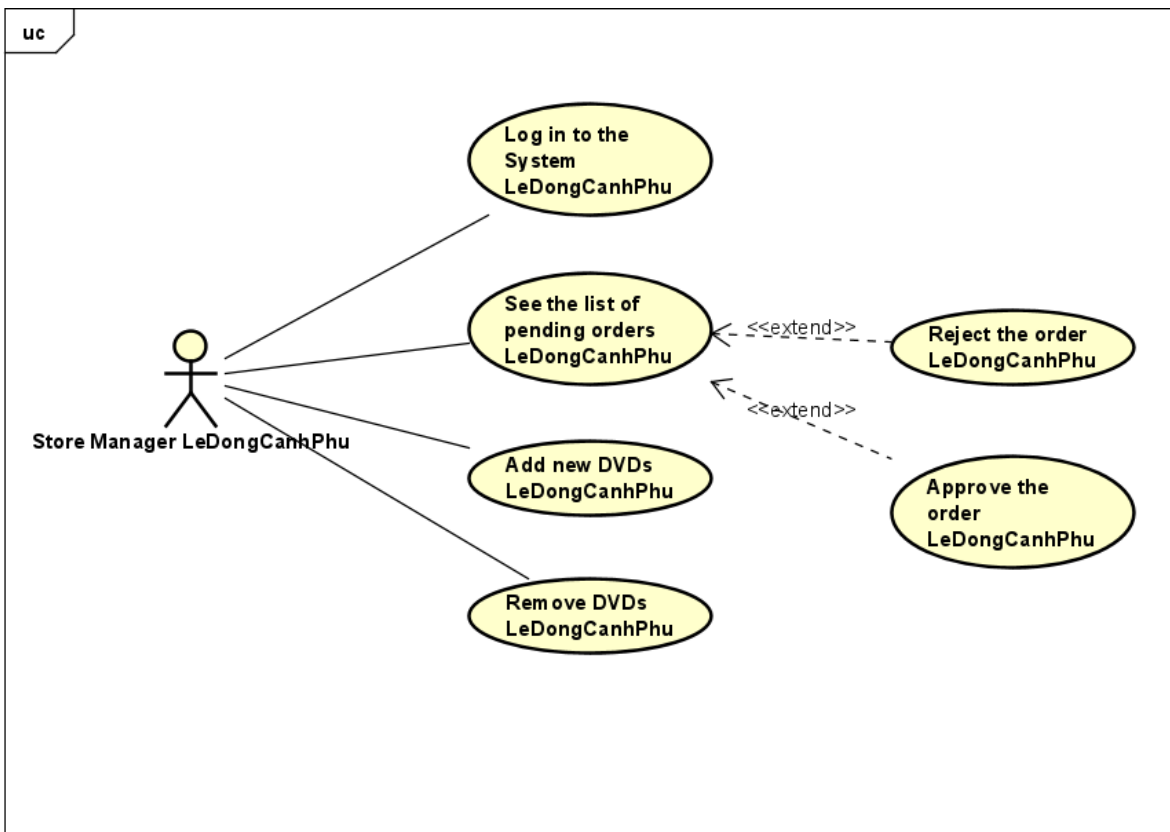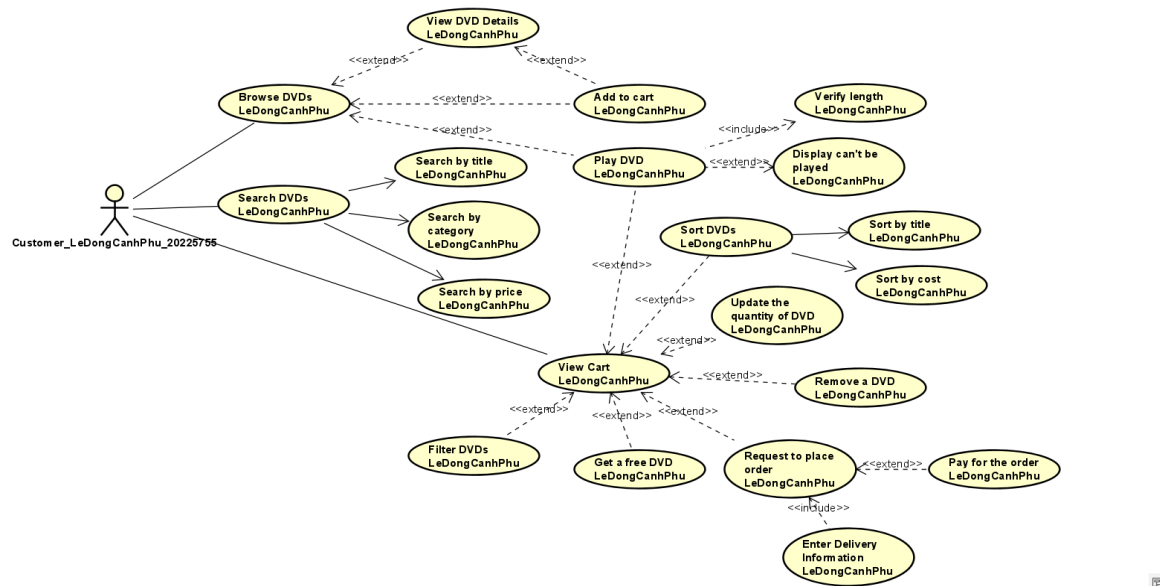
13 UseCase Diagram

Figure 13.1: UseCase Diagram

14 Answer Questions

Trong trường hợp muốn so sánh các đối tượng Media với nhau bằng cách sử dụng Comparable thay vì Comparator, thì thay vì tạo ra các lớp riêng cho từng Comparator, chúng ta cần để lớp Media triển khai interface Comparable.

```java
@Override
public int compareTo(Media otherMedia) {
    // Compare by title
    return this.getTitle().compareTo(otherMedia.getTitle());
}
```

Figure 14.1: Triển khai Comparable trong lớp trừu tượng Media

```java
@Override
public int compareTo(Media otherMedia) {
    //Compare by title first
    int titleComparison = this.getTitle().compareTo(otherMedia.getTitle());
    return (titleComparison != 0) ? titleComparison : Float.compare(this.getCost(), otherMedia.getCost());
}
```

Figure 14.2: Mở rộng để so sánh nhiều thuộc tính hơn

```java
@Override
public int compareTo(Media otherMedia) {
    if(otherMedia instanceof DigitalVideoDisc) {
        DigitalVideoDisc dvd = (DigitalVideoDisc) otherMedia;
        // Compare by title, then by length, then by cost
        int titleComparison = this.getTitle().compareTo(dvd.getTitle());
        if(titleComparison == 0) {
            int lengthComparison = Integer.compare(this.getLength(), dvd.getLength());
            return (lengthComparison == 0) ? Float.compare(this.getCost(), dvd.getCost()) : lengthComparison;
        }
        return titleComparison;
    }
    return super.compareTo(otherMedia);
}
```

Figure 14.3: Triển khai tại lớp con

Cách triển khai này giúp chúng ta linh hoạt hơn khi so sánh các đối tượng Media và cung cấp khả năng mở rộng cho các lớp con khác nếu cần thiết.