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Course: Data Structure

Section: 01

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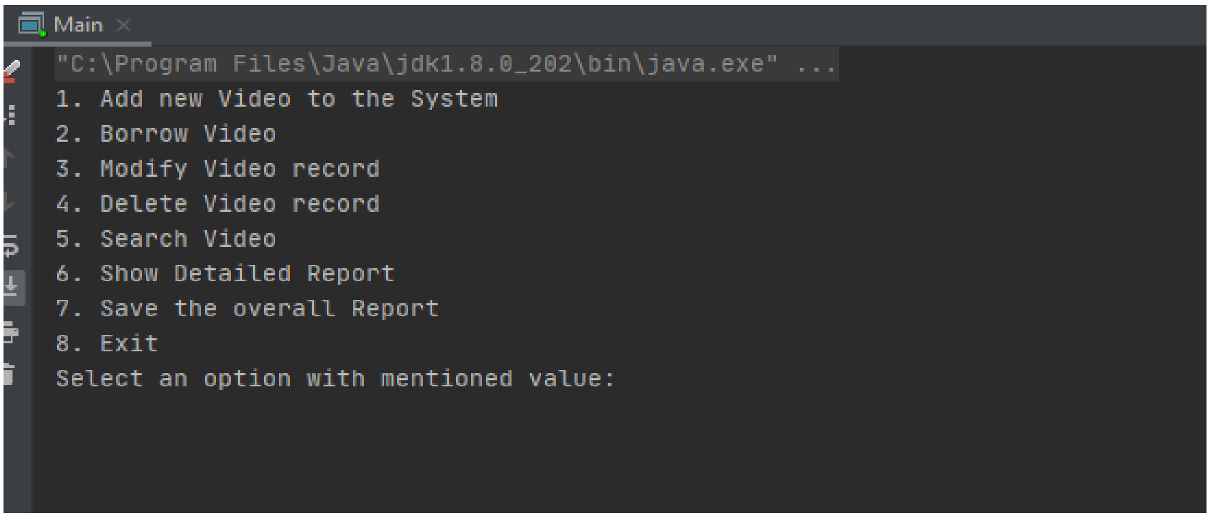
Introduction

As Object Oriented Programming is suitable for managing a large system, we developed this Video Library System to manage a huge number of videos to maintain in a library. Though it is a large system in real life, we created this beta version using file-based system to fetch and store our data.

Main Functionalities

Main Interface

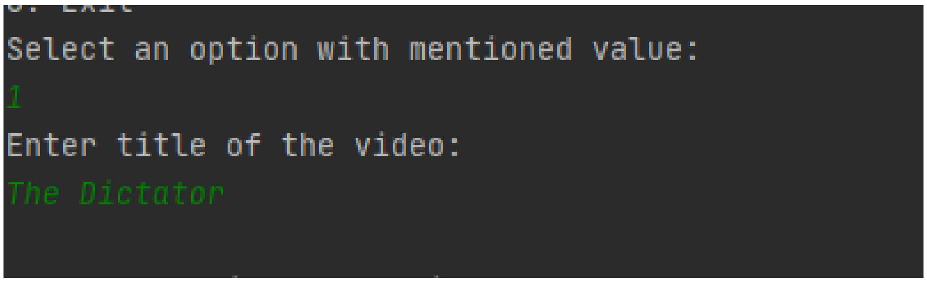


```
"C:\Program Files\Java\jdk1.8.0_202\bin\java.exe" ...
1. Add new Video to the System
2. Borrow Video
3. Modify Video record
4. Delete Video record
5. Search Video
6. Show Detailed Report
7. Save the overall Report
8. Exit
Select an option with mentioned value:
```

Pic 1: Main Interface

1. **Add New Video to the System**

Librarian can add a new video with the title. The id will be generated automatically so that it remains unique from other ids. We handled this by using a static variable which is incremented with every node of each video. Initially the borrower, borrowing date, borrower's id will be blank. We can set those later.

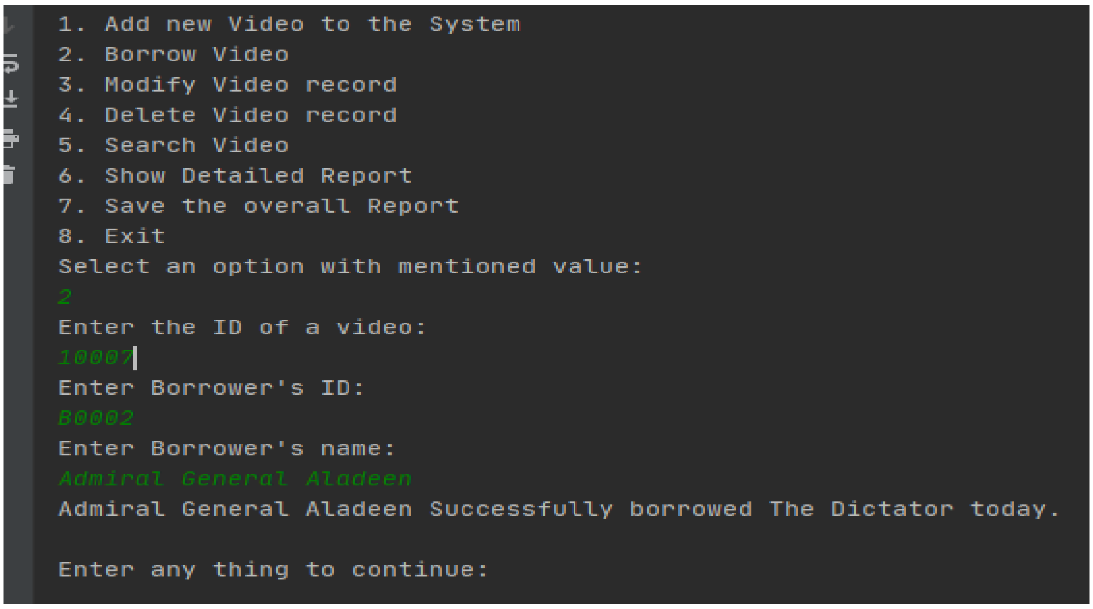


```
Select an option with mentioned value:
1
Enter title of the video:
The Dictator
```

Pic 2: Add new video

2. Borrow Video

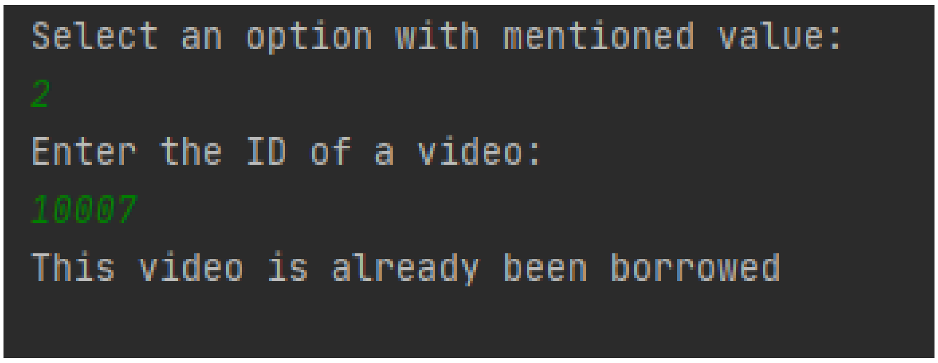
In this option we can borrow with Borrower's ID and name. But it works only which videos are available at that moment. If any video is already borrowed, we can't use the borrow option for that certain video.



```
1. Add new Video to the System
2. Borrow Video
3. Modify Video record
4. Delete Video record
5. Search Video
6. Show Detailed Report
7. Save the overall Report
8. Exit
Select an option with mentioned value:
2
Enter the ID of a video:
10007
Enter Borrower's ID:
B0002
Enter Borrower's name:
Admiral General Aladeen
Admiral General Aladeen Successfully borrowed The Dictator today.

Enter any thing to continue:
```

Pic 3: Successfully Borrow

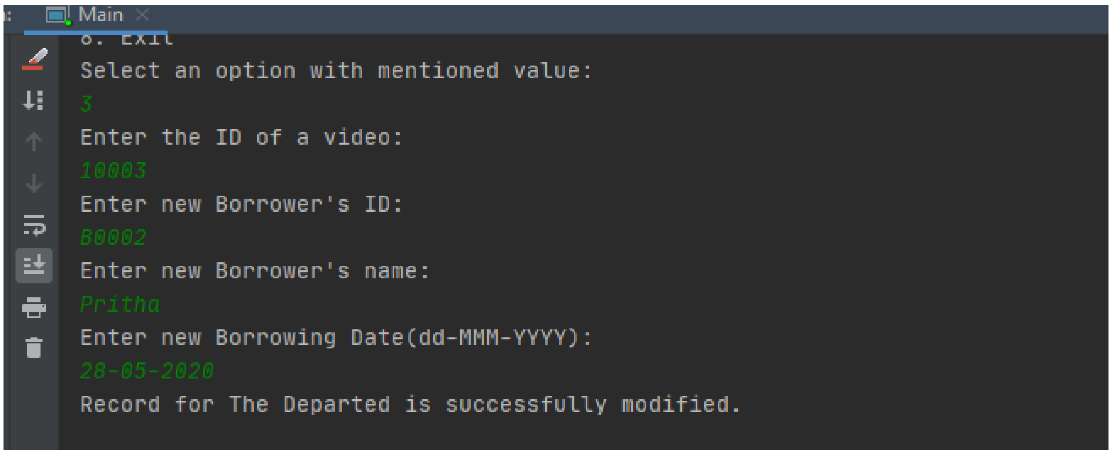


```
Select an option with mentioned value:
2
Enter the ID of a video:
10007
This video is already been borrowed
```

Pic 4: Already Borrowed

3. Modify Video record

With this option we can modify any record. Usually we can modify the Borrower's name, Borrower's ID, Borrowing date and availability. ID and name of the videos are protected from this option for security issues.

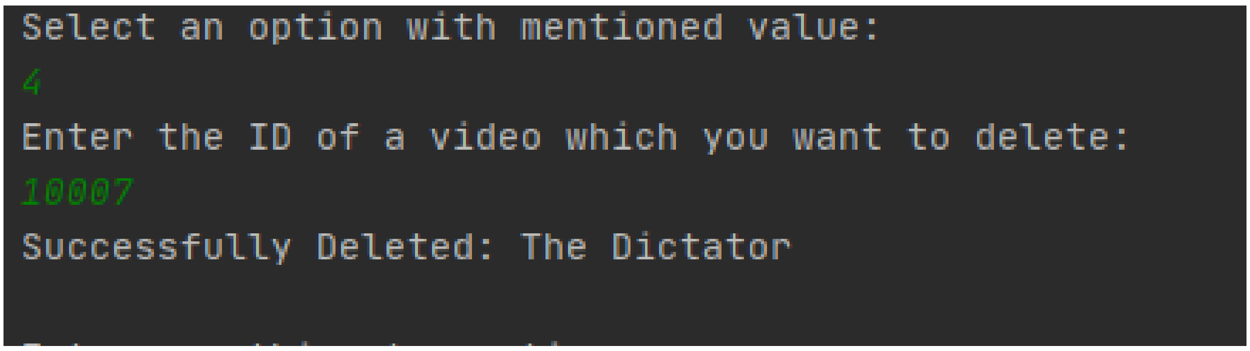


```
8. Exit
Select an option with mentioned value:
3
Enter the ID of a video:
10003
Enter new Borrower's ID:
B0002
Enter new Borrower's name:
Pritha
Enter new Borrowing Date(dd-MMM-YYYY):
28-05-2020
Record for The Departed is successfully modified.
```

Pic 5: Modifying records

4. Delete Video record

This option helps one to delete any video from the record. Initially it is removed from the ArrayList. Not from out main file.

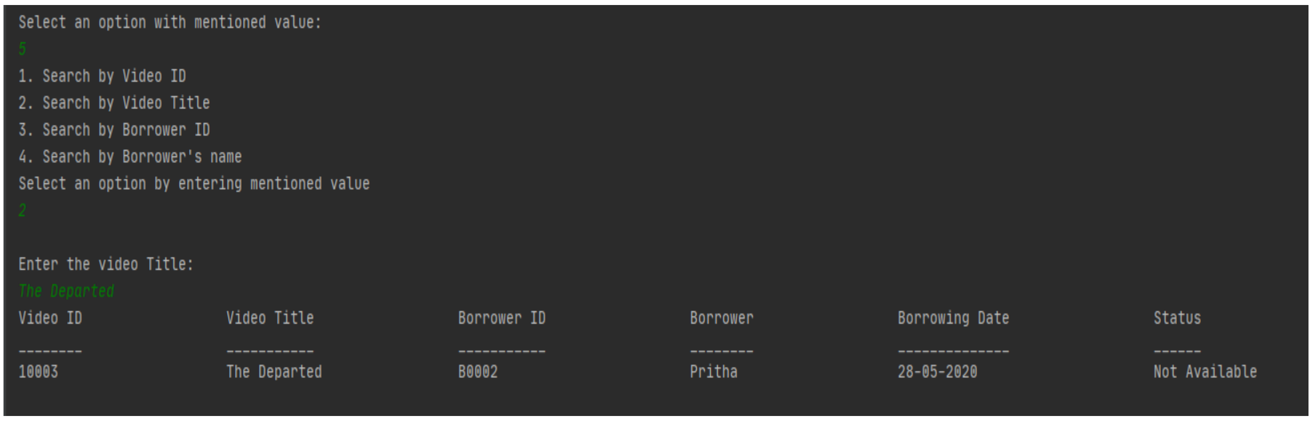


```
Select an option with mentioned value:
4
Enter the ID of a video which you want to delete:
10007
Successfully Deleted: The Dictator
```

Pic 6: Deleting records

5. Search Video

We can search any record by using Video ID, Video Title, borrower's ID, borrower's name.

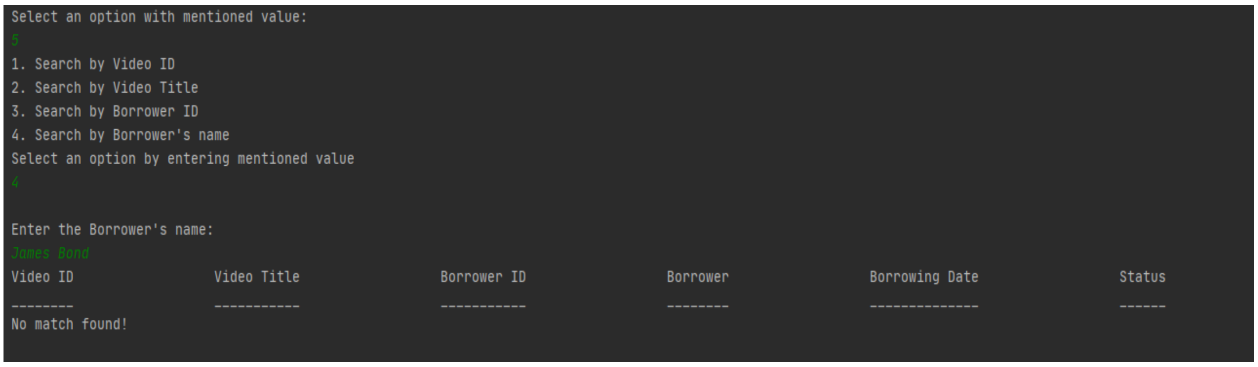


```
Select an option with mentioned value:
5
1. Search by Video ID
2. Search by Video Title
3. Search by Borrower ID
4. Search by Borrower's name
Select an option by entering mentioned value
2

Enter the video Title:
The Departed
Video ID         Video Title        Borrower ID        Borrower         Borrowing Date       Status

--------         -----------        -----------        --------         --------------       ------
10003            The Departed       B0002              Pritha           28-05-2020           Not Available
```

Pic 7: Searching Records



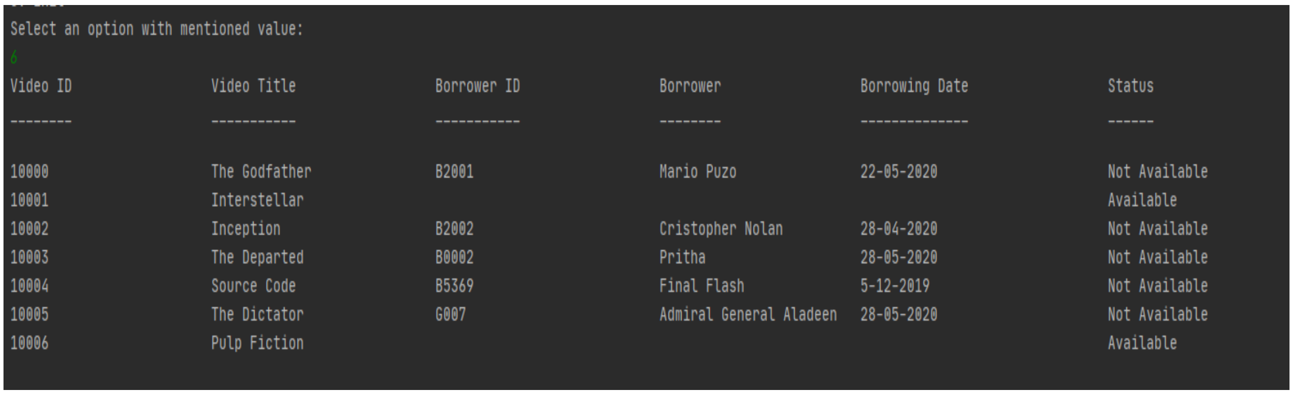
```
Select an option with mentioned value:
5
1. Search by Video ID
2. Search by Video Title
3. Search by Borrower ID
4. Search by Borrower's name
Select an option by entering mentioned value
4

Enter the Borrower's name:
James Bond
Video ID             Video Title            Borrower ID            Borrower             Borrowing Date           Status
--------             -----------            -----------            --------             --------------           ------
No match found!
```

Pic 8: Searching records

6. Show Detailed record

We can see the full records of videos with this option. It gives the total records of videos, Borrowers, borrowing date and availability.



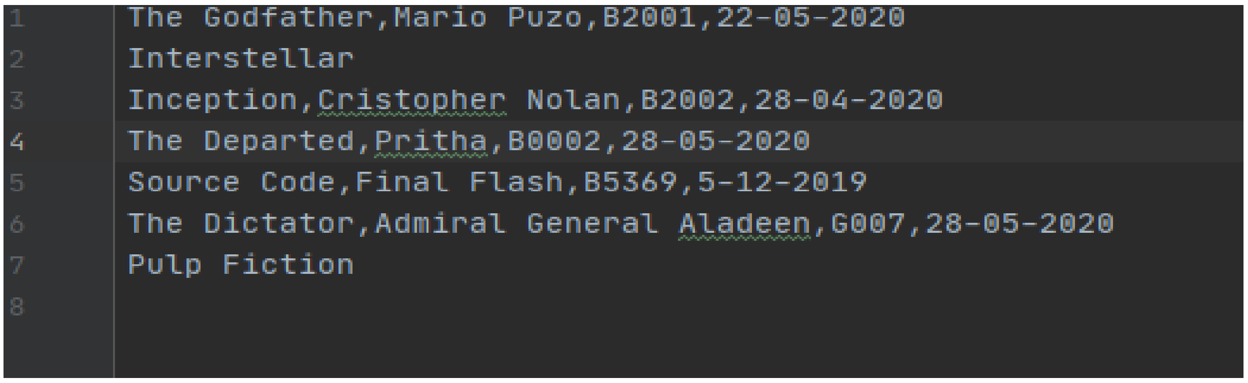
```
Select an option with mentioned value:
6
Video ID             Video Title            Borrower ID            Borrower               Borrowing Date           Status
--------             -----------            -----------            --------               --------------           ------

10000                The Godfather          B2001                  Mario Puzo             22-05-2020               Not Available
10001                Interstellar                                                                                  Available
10002                Inception              B2002                  Cristopher Nolan       28-04-2020               Not Available
10003                The Departed           B0002                  Pritha                 28-05-2020               Not Available
10004                Source Code            B5369                  Final Flash            5-12-2019                Not Available
10005                The Dictator           G007                   Admiral General Aladeen 28-05-2020              Not Available
10006                Pulp Fiction                                                                                  Available
```

Pic 9: Showing the report

7. Save the latest record

During the whole process we've modified our record many times. But all those modifications were made in our program's ArrayList. This option allows us to save these latest changes in our main file so that it can be used later.



```
The Godfather,Mario Puzo,B2001,22-05-2020
Interstellar
Inception,Cristopher Nolan,B2002,28-04-2020
The Departed,Pritha,B0002,28-05-2020
Source Code,Final Flash,B5369,5-12-2019
The Dictator,Admiral General Aladeen,G007,28-05-2020
Pulp Fiction
```

Pic 10: Text File where the records are saved

8. **Exit**

   This option is for quitting the program. It should be mentioned that using exit before saving the record will lose the latest changes made in the record.

Object Oriented Paradigms

1. **Reusability**

In this project we tried our best to make the best use of object-oriented paradigms. We tried to make the whole structure more reusable by dividing tasks in methods. First, we divided the whole process in many methods and then we organized them like pieces of puzzle. Even in main method we just used all the methods in our switch case. Making object also enables one structure to fit in another class.

2. **Interface**

Before starting the programming in full swing, we created the interface and set the abstractions. It made the project lot easier to understand. We could clearly see the whole structure and it helped to write code more efficiently. Later, we just overridden all the methods.

3. **Encapsulation**

We used Getter and Setter methods to encapsulate our protected variables. It prevents sensitive variables from any unwanted change of value.

Advanced Technical Aspects

Memory Management

In java we don’t need to use any kind of pointer. All we need to do is pass the address of any object to another variable. As a result, it gets easier in memory management side. Java Virtual Machine uses pointers implicitly, but we don’t have to use it explicitly. In Java we use the reference of an object rather than using pointers. This reference contains the pointer of the object. This extra level of abstraction makes Java more secure. In all our Objects we used references.

Garbage Collector

This is the most unique feature we liked about java. We didn’t have to handle any unreferenced object/variable. Usually these unreferenced object/variables take memory and it makes the system inefficient. But in java, the Garbage collector automatically removes these unreferenced memories so that we can use system memory more efficiently. Even we didn’t have to create any destructor for the instances.

Java Byte-Code

Another extraordinary feature of java is its byte-code compilation. Java-Byte code runs in Java Virtual Machine rather then running in physical machine. As a result, we can run our java program at any device which consists Java Runtime Environment. It enhances the mobility.

Conclusion

This was a medium project using basic java. This Video Library Management used only some few advantages of java. Still, it was one of the most instructive work. It gave a brief idea about how to use object-oriented programming in real life problem/development. It helped us to realize how large project gets easier by using object-oriented paradigm. It was a great experience about how a big project gets divided and then reassembled piece by piece both incrementally and iteratively using this Object-Oriented Technology.