NANYANG TECHNOLOGICAL UNIVERSITY
SINGAPORE

SS4 Group 4

Assignment Report

SC/CE/CZ2002: Object-Oriented Design & Programming

Building an OO Application

Declaration of Original Work for SC/CE/CZ2002 Assignment

We hereby declare that the attached group assignment has been researched, undertaken, completed and submitted as a collective effort by the group members listed below.

We have honored the principles of academic integrity and have upheld Student Code of Academic Conduct in the completion of this work.

We understand that if plagiarism is found in the assignment, then lower marks or no marks will be awarded for the assessed work. In addition, disciplinary actions may be taken.

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Important notes:

1. Name must **EXACTLY MATCH** the one printed on your Matriculation Card.

Design Considerations

1. Approach

MOBLIMA is an application to computerize the processes of making online booking and purchase of movie tickets, listing of movies, storing and viewing of booking history as well as sales reporting. It will be used by the movie-goers and cinema staff. The application acts as a centralized ‘location’ for making bookings for all the Cinema halls in different locations managed by the vendor.

During the initial phase of designing the MOBLIMA application, we thought it would be the most optimal if it was practical, hence our application aims to closely mimic a real life movie booking platform, such as the Cathay Cineplex online platform. We begin the application from the main module ControlPanel which makes use of the CustomerApp module to handle the customer’s booking of tickets, as well as the AdminControl module to handle the staff or admin’s configuration of the entire booking system.

This report includes the detailed UML Class Diagram for MOBLIMA as well as screen captures of the testing done with test data samples provided.

2. Assumptions
    a. Our application is for single-user usage and does not consider concurrent access.
    b. The currency is in Singapore Dollar (SGD) and is inclusive of Goods and Services Tax (GST).
    c. Users can only select one type of ticket during their booking, eg. senior ticket.
    d. Once the user has confirmed to book their tickets, payment will always be successful.
    e. Child and senior discounts can be applied without validation during purchase.
    f. All public holidays have a duration of exactly one day. Holidays will have the same name in the case of a multi-day holiday.
    g. Booking history of users will be stored in their accounts.
    h. There are no interfaces provided to external systems like Payment etc.

3. Design considerations
   a. Data Storage

      Since no database application nor JSON is to be used, we store our data using Lists and ArrayLists and read and write from csv text files. Upon every time of restarting the application, the data will be read out from the csv files and stored in the respective class objects.

   b. Intuitive console user interface

      To make MOBLIMA more user friendly, users are prompted to select from a range of pre-generated options most of the time to prevent any mistakes arising from spelling or wrong data format being entered. Error catching code has also been added to ensure users are entering the correct input.

4. SOLID Principles used
   a. Single Responsibility Principle (SRP)

      This principle states that a module should have one, and only one, reason to change, meaning to say each of them should only have a single responsibility. This leads to high relations and strong focus and connection between modules or classes. Our application is split into the 3 main stereotypes of classes, Entity, Boundary and Control classes. The Boundary classes handle external input such as the admin staff adding new movies or showtimes while customers enter their booking details. The Control classes are those that are being used by other classes, such as TextToHall and TextToReview being used to convert text from csv files into the respective objects. Finally, the Entity classes are those that contain and help update information or attributes, such as the Review and Seat classes, etc.

   b. Open-Closed Principle (OCP)

This principle states that objects or entities should be open for extension but closed for modification, such that a class should be extendable without modifying the class itself. Various classes under the Boundary classification require the usage of other classes under the Entity classification. Changing the implementation of the Entity classes will not require any modification in the Boundary classes.

5. Object-Oriented Concepts
    a. Encapsulation

       Encapsulation helps to restrict access to or protect an object's private attributes, which can only be otherwise accessed by getters and setters. In our application, encapsulation is applied in every entity class, as well as certain boundary classes such as Booking and StaffLogin.

    b. Inheritance

       Inheritance is mainly used in the Control classes, namely TextToHall and TextToReview which extends from the abstract AbstractCsvConverter class to convert text from csv files into objects with ease.

6. Further enhancements
    a. We can add a reservation system. Customers will be able to reserve their tickets and deposit their payment first. The reserved seats will have their respective colour. If the customers cancel their reservation, they will be refunded their deposits and the seats will be made available once again. This will make it more convenient for customers who want to watch the movie but may not be able to confirm their availability at the moment, or for customers who suddenly cannot watch the movie after reserving the tickets.

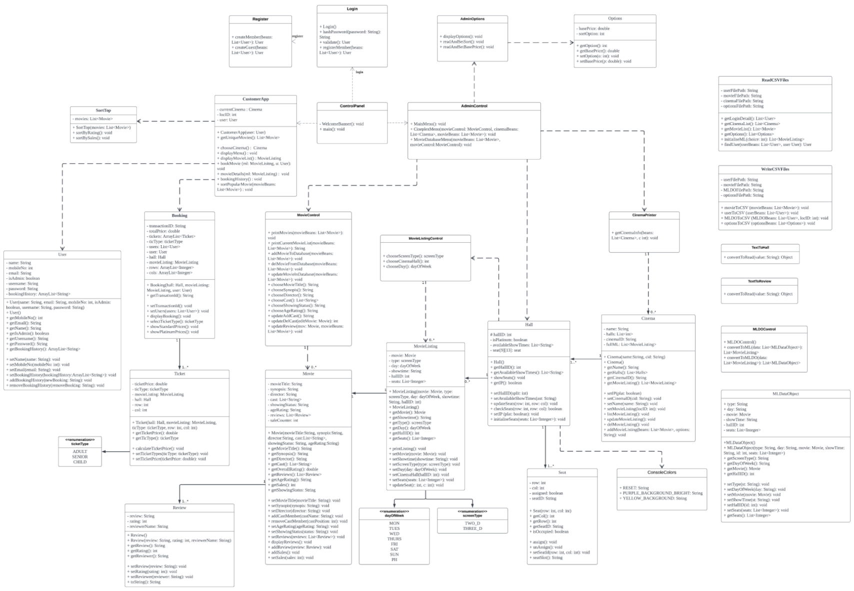
    b. We can also allow customers to be able to make a booking for multiple movies or movie timings at a time. This will make it more convenient for them if they would like to watch different movies.

7. How our current design can cater to the further enhancements
    a. Reservation: The current Booking class can be modified to request whether the customer is planning to reserve or book, with method displayBooking being made abstract. This allows the new reservation class and the actual booking class to extend and override the displayBooking method depending on whether it is to reserve or book. Polymorphism and abstraction are concepts that could be applied here, along with usage of the Dependency Injection Principle.

    b. Multiple movies: A new class could be created as a shopping cart for the customer, allowing them to add tickets for different movie listings to the cart, and then check out in a single payment. The new class would store the information for each movie listing booked, as well as preserving the ticket details to issue to the customer after they have checked out.

UML Class Diagram

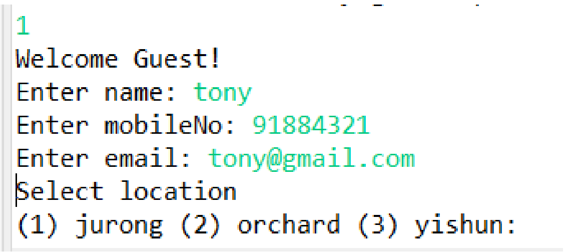
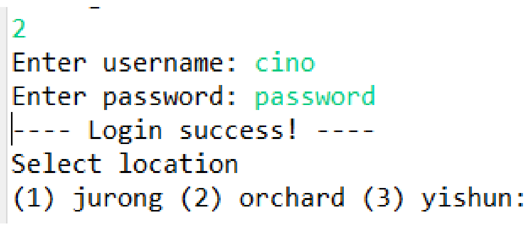
Please refer to our diagram file in Github for a clearer picture.

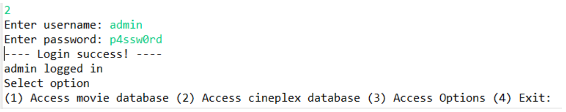
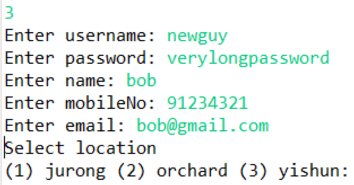


Testing

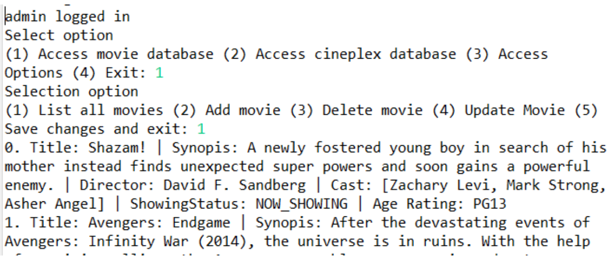
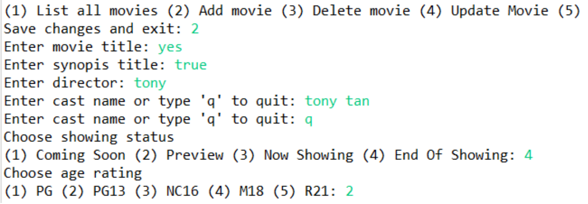
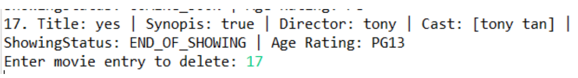
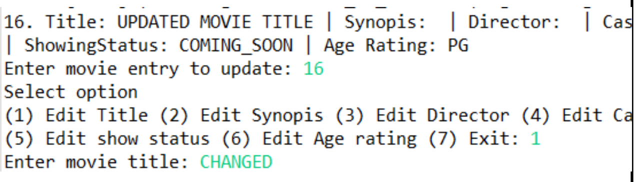
Please refer to our video for full testing. https://youtu.be/jI_e4AYnsxM

Login System

	Test Case	Expected Result	Output
1.	User selects guest login	System will ask for their name, mobile number and email before proceeding to the booking app.	 1 Welcome Guest! Enter name: tony Enter mobileNo: 91884321 Enter email: tony@gmail.com Select location (1) jurong (2) orchard (3) yishun:
2.	User selects account login and enters a member account login	System will ask for their username and password before proceeding to the booking app	 2 Enter username: cino Enter password: password ---- Login success! ---- Select location (1) jurong (2) orchard (3) yishun:

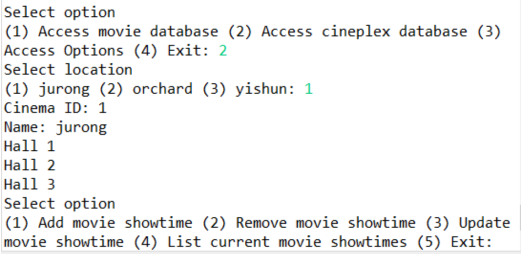
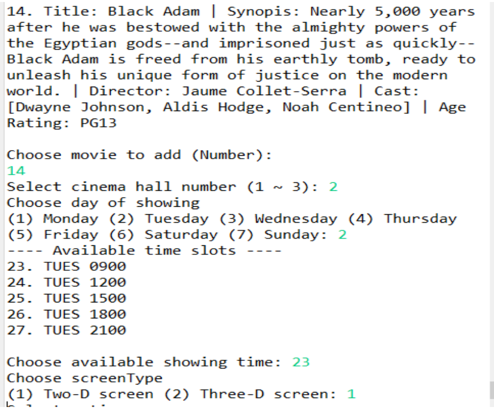
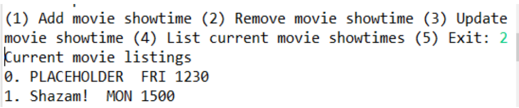
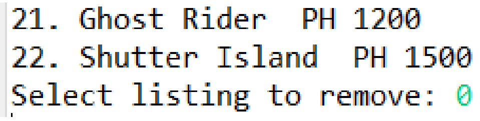
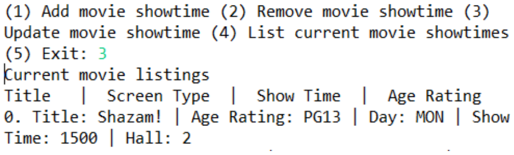
3.	User selects account login and enters an admin account login	System will ask for their username and password before proceeding to the admin interface	 2 Enter username: admin Enter password: p4ssw0rd ---- Login success! ---- admin logged in Select option (1) Access movie database (2) Access cineplex database (3) Access Options (4) Exit:
4.	User chooses to create a new user account	System will ask user for their details and log them in after registering.	 3 Enter username: newguy Enter password: verylongpassword Enter name: bob Enter mobileNo: 91234321 Enter email: bob@gmail.com Select location (1) jurong (2) orchard (3) yishun:

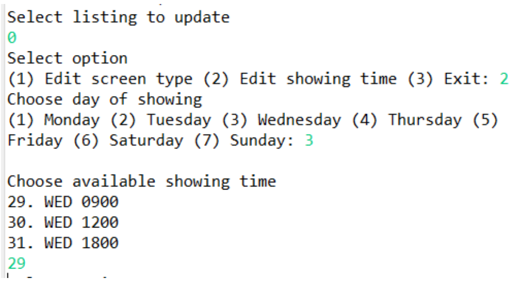
Movie System

<table>
<tr><td>1.</td><td>Admin chooses to list all movies in the database</td><td>System will print out all the movie details.</td><td>
admin logged in
Select option
(1) Access movie database (2) Access cineplex database (3) Access
Options (4) Exit: 1
Selection option
(1) List all movies (2) Add movie (3) Delete movie (4) Update Movie (5)
Save changes and exit: 1
0. Title: Shazam! | Synopis: A newly fostered young boy in search of his
mother instead finds unexpected super powers and soon gains a powerful
enemy. | Director: David F. Sandberg | Cast: [Zachary Levi, Mark Strong,
Asher Angel] | ShowingStatus: NOW_SHOWING | Age Rating: PG13
1. Title: Avengers: Endgame | Synopis: After the devastating events of
Avengers: Infinity War (2014), the universe is in ruins. With the help</td></tr>
<tr><td>2.</td><td>Admin chooses to add a new movie to the database.</td><td>System will prompt the admin for the details needed to create a movie.</td><td>
(1) List all movies (2) Add movie (3) Delete movie (4) Update Movie (5)
Save changes and exit: 2
Enter movie title: yes
Enter synopis title: true
Enter director: tony
Enter cast name or type 'q' to quit: tony tan
Enter cast name or type 'q' to quit: q
Choose showing status
(1) Coming Soon (2) Preview (3) Now Showing (4) End Of Showing: 4
Choose age rating
(1) PG (2) PG13 (3) NC16 (4) M18 (5) R21: 2</td></tr>
<tr><td>3.</td><td>Admin chooses to delete a movie from the database</td><td>System will list the current movies for admin to delete</td><td>
17. Title: yes | Synopis: true | Director: tony | Cast: [tony tan] |
ShowingStatus: END_OF_SHOWING | Age Rating: PG13
Enter movie entry to delete: 17</td></tr>
<tr><td>4.</td><td>Admin chooses to update a movie's details</td><td>System will list the current movies for admin to choose which to update, and which detail</td><td>
16. Title: UPDATED MOVIE TITLE | Synopis: | Director: | Cas
| ShowingStatus: COMING_SOON | Age Rating: PG
Enter movie entry to update: 16
Select option
(1) Edit Title (2) Edit Synopsis (3) Edit Director (4) Edit Ca
(5) Edit show status (6) Edit Age rating (7) Exit: 1
Enter movie title: CHANGED</td></tr>
</table>

		should be updated.	

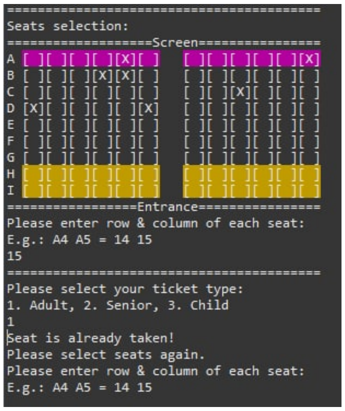
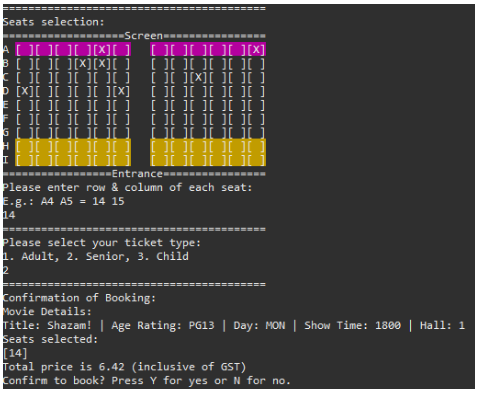
Cineplex System

	Test Case	Expected Result	Output
1.	Admin chooses cineplex to edit	System will return the cineplex information and present a menu to modify cineplex movie showtimes.	 Select option (1) Access movie database (2) Access cineplex database (3) Access Options (4) Exit: 2 Select location (1) jurong (2) orchard (3) yishun: 1 Cinema ID: 1 Name: jurong Hall 1 Hall 2 Hall 3 Select option (1) Add movie showtime (2) Remove movie showtime (3) Update movie showtime (4) List current movie showtimes (5) Exit:
2.	Admin chooses to add a new movie showtime	System will present a list of movies current that have “PREVIEW” or “NOW_SHOWING” for admin to choose. Admin can then pick the hall and showtime for the movie.	 14. Title: Black Adam | Synopis: Nearly 5,000 years after he was bestowed with the almighty powers of the Egyptian gods--and imprisoned just as quickly--Black Adam is freed from his earthly tomb, ready to unleash his unique form of justice on the modern world. | Director: Jaume Collet-Serra | Cast: [Dwayne Johnson, Aldis Hodge, Noah Centineo] | Age Rating: PG13 Choose movie to add (Number): 14 Select cinema hall number (1 ~ 3): 2 Choose day of showing (1) Monday (2) Tuesday (3) Wednesday (4) Thursday (5) Friday (6) Saturday (7) Sunday: 2 ---- Available time slots ---- 23. TUES 0900 24. TUES 1200 25. TUES 1500 26. TUES 1800 27. TUES 2100 Choose available showing time: 23 Choose screenType (1) Two-D screen (2) Three-D screen: 1
3.	Admin choose to delete a current movie showtime.	System will list the current movie showtimes for admin to choose which to remove.	 (1) Add movie showtime (2) Remove movie showtime (3) Update movie showtime (4) List current movie showtimes (5) Exit: 2 Current movie listings 0. PLACEHOLDER FRI 1230 1. Shazam! MON 1500  21. Ghost Rider PH 1200 22. Shutter Island PH 1500 Select listing to remove: 0
4.	Admin choose to update a current movie showtime.	System will list the current movie showtimes for admin to choose which to update.	 (1) Add movie showtime (2) Remove movie showtime (3) Update movie showtime (4) List current movie showtimes (5) Exit: 3 Current movie listings Title | Screen Type | Show Time | Age Rating 0. Title: Shazam! | Age Rating: PG13 | Day: MON | Show Time: 1500 | Hall: 2

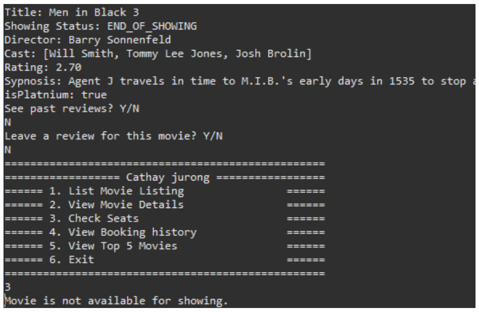
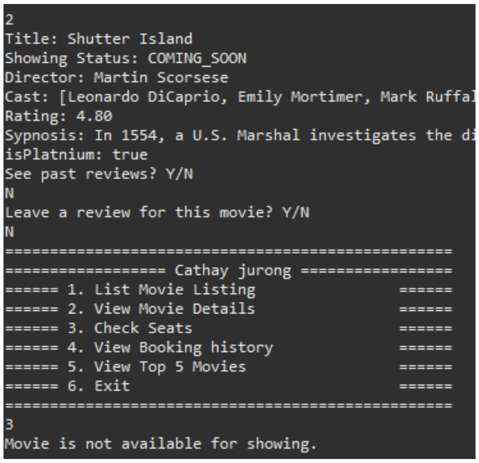
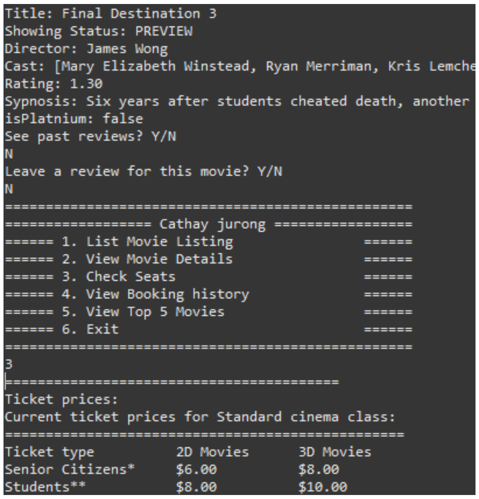
```
Select listing to update
0
Select option
(1) Edit screen type (2) Edit showing time (3) Exit: 2
Choose day of showing
(1) Monday (2) Tuesday (3) Wednesday (4) Thursday (5)
Friday (6) Saturday (7) Sunday: 3

Choose available showing time
29. WED 0900
30. WED 1200
31. WED 1800
29
```

Booking System

	Test case	Expected result	
1.	User selects an unavailable seat	System will prompt user to select seats again.	
2.	User books a movie, selecting SENIOR ticket	Able to book without credentials	

```
========================================
Seats selection:
==================Screen================
A [ ][ ][ ][ ][X][ ]   [ ][ ][ ][ ][ ][X]
B [ ][ ][ ][X][X][ ]   [ ][ ][ ][ ][ ][ ]
C [ ][ ][ ][ ][ ][ ]   [ ][ ][X][ ][ ][ ]
D [X][ ][ ][ ][ ][X]   [ ][ ][ ][ ][ ][ ]
E [ ][ ][ ][ ][ ][ ]   [ ][ ][ ][ ][ ][ ]
F [ ][ ][ ][ ][ ][ ]   [ ][ ][ ][ ][ ][ ]
G [ ][ ][ ][ ][ ][ ]   [ ][ ][ ][ ][ ][ ]
H [ ][ ][ ][ ][ ][ ]   [ ][ ][ ][ ][ ][ ]
I [ ][ ][ ][ ][ ][ ]   [ ][ ][ ][ ][ ][ ]
================Entrance================
Please enter row & column of each seat:
E.g.: A4 A5 = 14 15
15
========================================
Please select your ticket type:
1. Adult, 2. Senior, 3. Child
1
Seat is already taken!
Please select seats again.
Please enter row & column of each seat:
E.g.: A4 A5 = 14 15
```

```
========================================
Seats selection:
==================Screen================
A [ ][ ][ ][ ][X][ ]   [ ][ ][ ][ ][ ][X]
B [ ][ ][ ][X][X][ ]   [ ][ ][ ][ ][ ][ ]
C [ ][ ][ ][ ][ ][ ]   [ ][ ][X][ ][ ][ ]
D [X][ ][ ][ ][ ][X]   [ ][ ][ ][ ][ ][ ]
E [ ][ ][ ][ ][ ][ ]   [ ][ ][ ][ ][ ][ ]
F [ ][ ][ ][ ][ ][ ]   [ ][ ][ ][ ][ ][ ]
G [ ][ ][ ][ ][ ][ ]   [ ][ ][ ][ ][ ][ ]
H [ ][ ][ ][ ][ ][ ]   [ ][ ][ ][ ][ ][ ]
I [ ][ ][ ][ ][ ][ ]   [ ][ ][ ][ ][ ][ ]
================Entrance================
Please enter row & column of each seat:
E.g.: A4 A5 = 14 15
14
========================================
Please select your ticket type:
1. Adult, 2. Senior, 3. Child
2
========================================
Confirmation of Booking:
Movie Details:
Title: Shazam! | Age Rating: PG13 | Day: MON | Show Time: 1800 | Hall: 1
Seats selected:
[14]
Total price is 6.42 (inclusive of GST)
Confirm to book? Press Y for yes or N for no.
```

3.	User books movie that is END_OF_SHOWING	System will deny the booking option	 Title: Men in Black 3 Showing Status: END_OF_SHOWING Director: Barry Sonnenfeld Cast: [Will Smith, Tommy Lee Jones, Josh Brolin] Rating: 2.70 Sypnosis: Agent J travels in time to M.I.B.'s early days in 1535 to stop a isPlatnium: true See past reviews? Y/N N Leave a review for this movie? Y/N N == ================== Cathay jurong ================== ====== 1. List Movie Listing ====== ====== 2. View Movie Details ====== ====== 3. Check Seats ====== ====== 4. View Booking history ====== ====== 5. View Top 5 Movies ====== ====== 6. Exit ====== == 3 Movie is not available for showing.
4.	User books movie that is COMING_SOON	System will deny the booking option	 2 Title: Shutter Island Showing Status: COMING_SOON Director: Martin Scorsese Cast: [Leonardo DiCaprio, Emily Mortimer, Mark Ruffal Rating: 4.80 Sypnosis: In 1554, a U.S. Marshal investigates the di isPlatnium: true See past reviews? Y/N N Leave a review for this movie? Y/N N == ================== Cathay jurong ================== ====== 1. List Movie Listing ====== ====== 2. View Movie Details ====== ====== 3. Check Seats ====== ====== 4. View Booking history ====== ====== 5. View Top 5 Movies ====== ====== 6. Exit ====== == 3 Movie is not available for showing.
5.	User books movie that is PREVIEW	System will allow the booking option	 Title: Final Destination 3 Showing Status: PREVIEW Director: James Wong Cast: [Mary Elizabeth Winstead, Ryan Merriman, Kris Lemche Rating: 1.30 Sypnosis: Six years after students cheated death, another isPlatnium: false See past reviews? Y/N N Leave a review for this movie? Y/N N == ================== Cathay jurong ================== ====== 1. List Movie Listing ====== ====== 2. View Movie Details ====== ====== 3. Check Seats ====== ====== 4. View Booking history ====== ====== 5. View Top 5 Movies ====== ====== 6. Exit ====== == 3 == Ticket prices: Current ticket prices for Standard cinema class: === Ticket type 2D Movies 3D Movies Senior Citizens* $6.00 $8.00 Students** $8.00 $10.00

Reflection

1. **Spend more time reading the project requirements and planning the class diagram.**
   After drafting our initial class diagram and coding out the features, we realized there were many discrepancies from our initial design and we were constantly updating the class diagram while programming. Integrating our code together would have been easier if we had thoroughly planned out the class diagram according to good design principles.

2. **Implement more interfaces or abstract methods**
   As there are many Cinema locations and Cinema halls, we could have varied the seating format as well as the number of cinema halls within each location by extending different location classes. This would have made designing new locations and halls easier. We also could have a menu interface for our different menus to implement, such as MovieDatabaseMenu and CineplexMenu.

3. **Setting clear requirements for ourselves to accomplish**
   It was very easy to get sidetracked and implement more features to improve the app but that often caused disruptions and many conflicts to the team's code as we may inadvertently intrude on other's design. It would be best to define the features to have at the start so everyone is kept updated of the overall app design.