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EEE102 C++ Group Project

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Content

1. Specifications

1.1 Overall specifications

Our team is employed by a theatre for the implementation of a movie ticket booking system(Project B). The object of the program is to design a movie ticket booking system which is able to the information about movies and customers. The customers use their ID to book the tickets and if they do not have, they must logon. Besides, the administrator and manager have higher authority to edit the information of customer and movie, while he/she can not modify customers' booking information. There are two types of rooms with rectangular arrangements of seats: 5 small rooms with 15× 20 seats and 3 large rooms with 25× 30 seats each. For different movie, time and type of room, the ticket price is varying.

1.2 Customer specification

Customer user can browse the movie information, select room and at most 5 seats and pay.

1.3 System specification

- The specific movie, room and customer and seat information should be displayed as the requirements while the user is searching;
- While adding a new movie or login a new customer, the user ID and movie ID can not be repeated;
- The administrator and manager can browse, add, modify and delete the information of movie, room and customer;
- Allow the manager to retrieve the cinema operation statistics such as the number of total customer and total income for each movie.

2. Analysis and Design

2.1 User class

The protected type of variables for user:

```
protected:
    string user_name;
    string user_password;
    int user_id;
```

Including user's name, password and ID number.

Declaration of the normal constructor:

```
user(string User_name, string User_password, int User_id);     //normal constructor
```

Definition of the constructor:

```
user::user(string User_name, string User_password, int User_id)
{
    user_name = User_name;
    user_password = User_password;
    user_id = User_id;
}
```

The getter and setter methods contain the attributes of user's name, password and ID number. Here is the definition of the getter and setter methods:

```
//getter and setter
string get_user_name();
string get_user_password();
int get_user_id();
void set_user_name(string u_name);
void set_user_password(string u_password);
void set_user_id(int u_id);
```

Getter methods mainly for returning the user's information while setter methods for changing respectively.

There are also friend methods in the user class. Here is the definition:

```
friend vector<user> read_user();     //read the data from user_data.txt
friend void save_user(vector<user> v_user);     //save the data as a file(user_data.txt)
friend vector<user> delete_user(vector<user> v_user);     //delete a user
```

The read_user method is to read data from the file of user_data.txt and the method named save_user is for save the user's data as a file in reverse. In addition, the method of delete_user is to delete a user.

To read the user, firstly, an instance object is created:

```
user theuser = user("Not Given", "Not Given", 0);
```

Besides, a vector v_user is created to store the user objects.

```
vector<user> v_user;
```

Ifstream is user for read user's information from the file named 'user_data.txt'.

```
ifstream if_read1("user_data.txt");
```

The user has four lines to record in file, the first three lines correspond to the user's name, password and ID number and the forth line 'OOOOOO' is used for marking. As a result, the for loop is used for record how many users are recorded in file.

```
for (int i = 0; i < 40000; i++){
    if_read1.getline(read, 50);
    strread = read;
    if (strread == "OOOOOO"){
        counter++;
    }
}
if_read1.close();
```

Here is the definition of read information from 'user_data.txt'.

```
for (int i = 0; i < (4 * counter); i = i + 4)
    if_read2.getline(read, 50);
    strread = read;
    theuser.set_user_name(strread);

    if_read2.getline(read, 50);
    strread = read;
    theuser.set_user_password(strread);

    if_read2.getline(read, 50);
    strread = read;
    stringstream ss(strread);
    ss >> id;
    theuser.set_user_id(id);

    if_read2.getline(read, 50);

    v_user.push_back(theuser);
}
if_read2.close();
return v_user;
```

For i is less than the number of users, read each line's information of each user and after finishing reading, close read_2.

The definition of save users' information is shown below:

```
void save_user(vector<user> v_user){
    //save the data as a file
    ofstream of_save("user_data.txt");
    for (int i = 0; i < v_user.size(); i++){
        of_save << v_user[i].get_user_name() << endl;
        of_save << v_user[i].get_user_password() << endl;
        of_save << v_user[i].get_user_id() << endl;
        of_save << "OOOOOO" << endl;
    }
    of_save.close();
}
```

If want to delete a user, if the user's vector is equal to 0, it indicates that no user has been added. In this case, the manipulation of deleting a user can not be implemented. Else the list number and information of the customers will be listed and can be chosen to erase.

There are some other declarations of methods for the user:

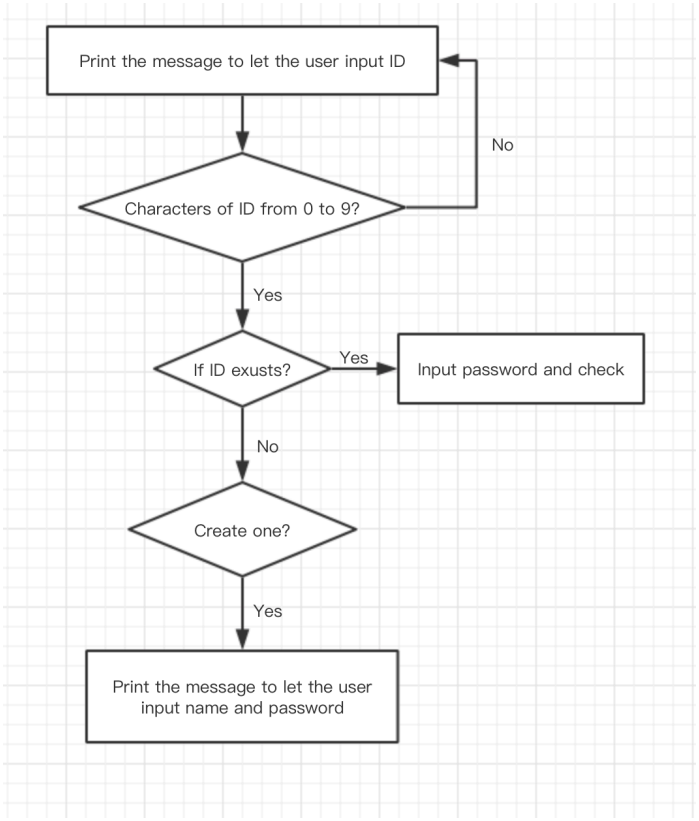
```
void operate_user();
void showUsers();
void searchUser(string Sname);
int userLogin();
int userIDsearch(int uID,bool &exist);
```

The operating part is divided into four parts:

1. Add a user
2. Delete a user
3. View user list
4. Exit

These manipulations are for the administrate to change and view the information of customers.

The userLogin method is for letting the user login their own accounts. Figure1 shows the flow chart of the userLogin method.



2.2 Movie class

The definition of movie class is similar with the user class which including the public methods of normal constructor and getter and setter. Here is the declaration of the public methods of the movie class:

```
public:
    movie(string Movie_name, int Movie_duration, int Movie_id);     //normal constructor
    //getter and setter
    string get_movie_name();
    double get_movie_duration();
    int get_movie_id();
    void set_movie_name(string m_name);
    void set_movie_duration(double m_duration);
    void set_movie_id(int m_id);
```

The attributes of movie contain movies' name, duration and id number:

```
protected:
    string movie_name;
    int movie_duration;
    int movie_id;
```

The definition of constructor of movie class:

```
movie::movie(string Movie_name, int Movie_duration, int Movie_id)
{
    movie_name = Movie_name;
    movie_duration = Movie_duration;
    movie_id = Movie_id;
}
```

The getter and setter methods of the movie class is shown in below. The getter methods is for acquiring movies' name, duration and id beyond beyond the movie class and the setter method is for the administrator to change the chosen movie's information.

```
string movie::get_movie_name()
{
    return movie_name;
}

double movie::get_movie_duration()
{
    return movie_duration;
}

int movie::get_movie_id()
{
    return movie_id;
}

void movie::set_movie_name(string m_name)
{
    movie_name = m_name;
}

void movie::set_movie_duration(double m_duration)
{
    movie_duration = m_duration;
}

void movie::set_movie_id(int m_id)
{
    movie_id = m_id;
}
```

There are also friend methods for the movie class to read, save and delete movies.

```
friend vector<movie> read_movie();     //read the data from movie_data.txt
friend void save_movie(vector<movie> v_movie);     //save the data as a file(movie_data.txt)
friend vector<movie> delete_movie(vector<movie> v_movie);     //delete a movie
```

To read movie from the file 'movie_data.txt', the instance object the movie is created. Each movie's information takes up 4 lines corresponding to the movie's name, tine and film id. The forth line is 'OOOOOO' to separate and the number of 'OOOOOO' equals to the number of movies. Here we can use a for loop to realise and in this situation, we can record 100 movies.

```
for (int i = 0; i < 400; i++){
    if_read1.getline(read, 200);
    strread = read;
    if (strread == "OOOOOO"){
        counter++;
    }
}
if_read1.close();
```

The first line records movie's name, the second line records movie's duration and the third line record movie id.

```
for (int i = 0; i < (4 * counter); i = i + 4){
    if_read2.getline(read, 200);
    strread = read;
    themovie.set_movie_name(strread);

    if_read2.getline(read, 200);
    strread = read;
    stringstream ss1(strread);
    ss1 >> duration;
    themovie.set_movie_duration(duration);

    if_read2.getline(read, 200);
    strread = read;
    stringstream ss2(strread);
    ss2 >> id;
    themovie.set_movie_id(id);

    if_read2.getline(read, 200);

    v_movie.push_back(themovie);
}
if_read2.close();
```

Here is the definition of the method of save_movie:

```
void save_movie(vector<movie> v_movie)
{
    //save the data as a file
    ofstream of_save("movie_data.txt");
    for (int i = 0; i < v_movie.size(); i++){
        of_save << v_movie[i].get_movie_name() << endl;
        of_save << v_movie[i].get_movie_duration() << endl;
        of_save << v_movie[i].get_movie_id() << endl;
        of_save << "OOOOOO" << endl;
    }
    of_save.close();
}
```

We use the ofstream to save.

The operate_movie method includes four parts:

-Add a movie

-Delete a movie

-View movie list

-Return

The definition of searchMovie method is shown in below. The search is according to the movie's name. Once the input name is same as the one in the list, the information of the corresponding movie will be printed.

```
void searchMovie(string Sname) {
    vector<movie> v_movie;
    v_movie = read_movie();     //read data from movie_data.txt
    bool searchFlag = false;
    for (unsigned int i = 0; i < v_movie.size(); i++) {
        if (v_movie[i].get_movie_name() == Sname) {
            cout << "The movie have id " << v_movie[i].get_movie_id() << " with duration " << v_movie[i].get_movie_duration() << endl;
            searchFlag = true;
        }
    }
    if (!searchFlag) cout << "No movie found in this name" << endl;
}
```

2.3 Room class

The struct is a data set which consists a series of data with same or different data types. Here is the declaration of the room class's struct:

```
struct movieTime {
    int moviePrice;
    int movieID;
    string movieName;
    int movieStartTime;

    int seat[25][30] = {};
};
```

This struct contains the movie's attributes of moviePrice, movieID, movieName, movieStartTime and the ownership of the seats in the movie theatre which represents through two-dimensional array.

The type of room is divided into two types: small room and big room. We use enum to represent.

```
enum roomType
{
    smallroom,
    bigRoom
};
```

The declaration of the methods in the movie class is shown in below:

```
public:
    Room(int RoomType, int RoomNumber, vector <movieTime> MovieTimeVec);
    ~Room();

    //Room type Setter and Getter
    int RoomTypeGetter();
    void RoomTypeSetter(int);

    //Print room's timeTable ofa movie
    void RoomTimeTableShown();

    //Set room's timeTable
    movieTime roomTimeTableSetter(int moviePrice, int movieId, string movieName, int movieStartTime, int seat[25][30]);//Single timetable setter for one room

    //Put the movieTime(struct) into the vector which stores the movieTime
    void roomTimeTableSetterVec(movieTime);

    //Return the vector which stores the movieTime
    vector <movieTime> roomTimeTableGetterVec();

    //One step to arrange or delete room's venue
    void arrange_the_venue();// Arrange the venue
    void delete_the_venue();//motify the venue

    //Set the seat to the room(user.buy may use it)
    bool write_seat_info(int number, int x, int y, int user_id);

    //Print one venue of all the seats(0 for nobody brought, id for someone has bought)
    void print_the_seat(int);

    //Save and Read
    void save_room_info(int room_num);
    void read_room_info(int room_num);

    //Consider whether user has brought 5 ticket
    bool ticket_limation(int venue,  int user_id);
```

Here is the definition of the constructor part:

```
Room::Room(int RoomType, int RoomNumber, vector <movieTime> MovieTimeVec)
{
    roomType = RoomType;
    roomNumber = RoomNumber;
    movieTimeVec = MovieTimeVec;
}
```

In addition, the getter and setter method for getting and setting room's type is shown in below:

```
int Room::RoomTypeGetter() {
    return roomType;
}

void Room::RoomTypeSetter(int type) {
    roomType = type;
}
```

There is also the normal constructor part to set the information in the movie's struct.

```
movieTime Room::roomTimeTableSetter(int moviePrice, int movieId, string movieName, int movieStartTime, int seat[25][30]) {
    movieTime roomTimeTable;
    roomTimeTable.movieID = movieId;
    roomTimeTable.movieName = movieName;
    roomTimeTable.movieStartTime = movieStartTime;//Full time 0-24
    roomTimeTable.moviePrice = moviePrice;
    return roomTimeTable;
}
```

The roomTimeTableSetterVec method uses push_back to add a new movie time at the end of the vector movieTimeVec.

```
void Room::roomTimeTableSetterVec(movieTime MovieTime) {
    movieTimeVec.push_back(MovieTime);
}
```

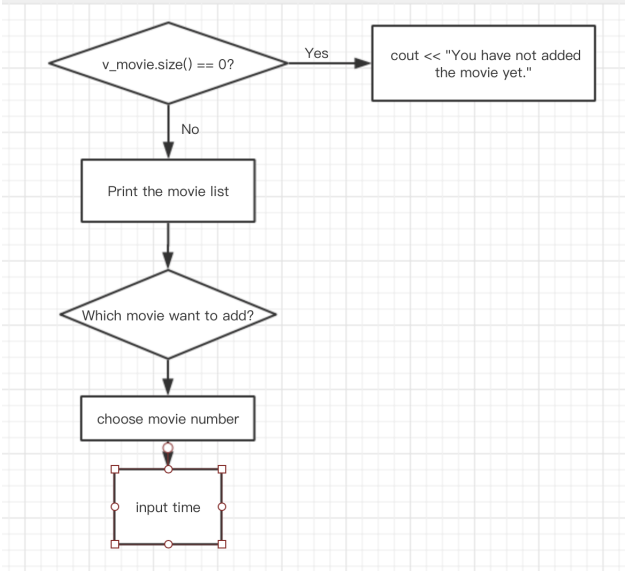
To show each room's information, if there are movies are arranged in a room, then the movies' information will be printed out. Else If there is no movie is arranged, a message will be printed out to inform.

```
void Room::RoomTimeTableShown() {
    cout << setfill('=') << setw(70) << "=" << endl << setfill(' ');
    if (movieTimeVec.size()) {
        cout << "Number " << roomNumber << "'s room TimeTable" << endl;
        cout << setfill('-') << setw(70) << "-" << endl << setfill(' ');
    }
    else {
        cout << "Number " << roomNumber << "'s room has no movie arranged." << endl;
    }

    for (int i = 0; i < movieTimeVec.size(); i++)
    {
        cout << i + 1 << ". Movie Id  " << movieTimeVec[i].movieID << "  " << "  Movie Name  " << movieTimeVec[i].movieName << "  Movie Start  " << movieTimeVec[i].movieStartTime << ":00 " << "Price " << movieTimeVec[i].moviePrice << endl;
    }
    cout << endl ;
}
```

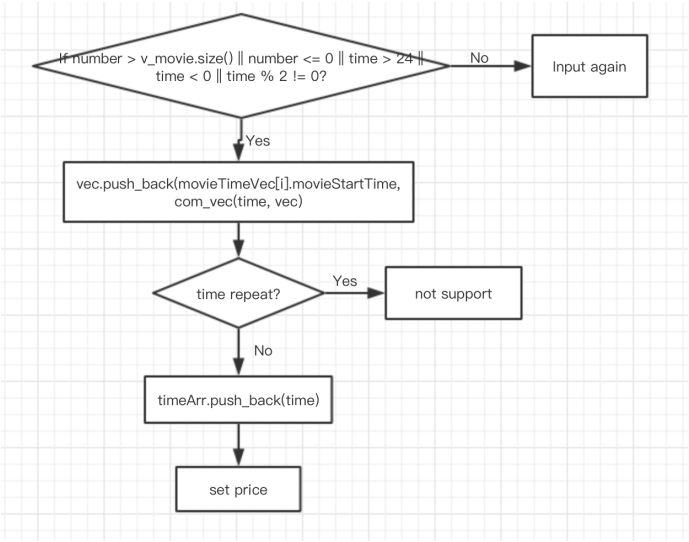
The definition of the method to print the information of movies:

```
void Room::arrange_the_venue() {
    movie themovie = movie("Not Given", 0, 0);
    vector<movie> v_movie;
    vector <int>timeArr;//Collect the Time
    v_movie = read_movie();
    if (v_movie.size() == 0) {
        cout << "You have not added the movie yet." << endl;
    }
    else {
        cout << "The movie list:" << endl;
        for (int i = 0; i < v_movie.size(); i++) {
            cout << (i + 1) << " Movie name: " << v_movie[i].get_movie_name() << endl;
            cout << "  Movie duration: " << v_movie[i].get_movie_duration() << " minutes" << endl;
            cout << "  Movie ID: " << v_movie[i].get_movie_id() << endl;
        }

    }
```

Here is the flow chart of arranging the movie venue:



The limitations of time:



The definition of delete the venue:

```
void Room::delete_the_venue() {

    cout << "Number " << roomNumber << "'s TimeTable" << endl;
    for (int i = 0; i < movieTimeVec.size(); i++)
    {
        cout << i + 1 << "Movie Id  " << movieTimeVec[i].movieID << "  " << "  Movie Name  " << movieTimeVec[i].movieName << "  Movie Start  " << movieTimeVec[i].movieStartTime << ":00 " << endl;
    }
    cout << "Which number do you want to delete" << endl;

    int selection;
    cin >> selection;

    //  movieTimeVec
    if (movieTimeVec.size()>selection)
    {
        movieTimeVec.erase(movieTimeVec.begin() + selection - 1);
    }
    else
    {
        cout << "CHECK VLUE" << endl;
    }


}
```

The definition of save room as a file:

```
void Room::save_room_info(int room_num) {

    //save the data as a file
    string name = "Room_data.txt";

    char str[1];
    stringstream ss;
    ss << room_num;
    string s1 = ss.str();



    name = s1 + name;
    ofstream of_save(name);

    of_save << roomType << endl;
    of_save << 0 << endl;

    for (int i = 0; i < movieTimeVec.size(); i++) {
        of_save << movieTimeVec[i].movieID << endl;
        of_save << movieTimeVec[i].movieName << endl;
        of_save << movieTimeVec[i].movieStartTime << endl;
        of_save << movieTimeVec[i].moviePrice << endl;
        for (int j = 0; j < 25; j++)
        {
            for (int k = 0; k < 30; k++)
            {
                of_save << movieTimeVec[i].seat[j][k] << endl;
            }
        }

    }


    of_save.close();
}
```

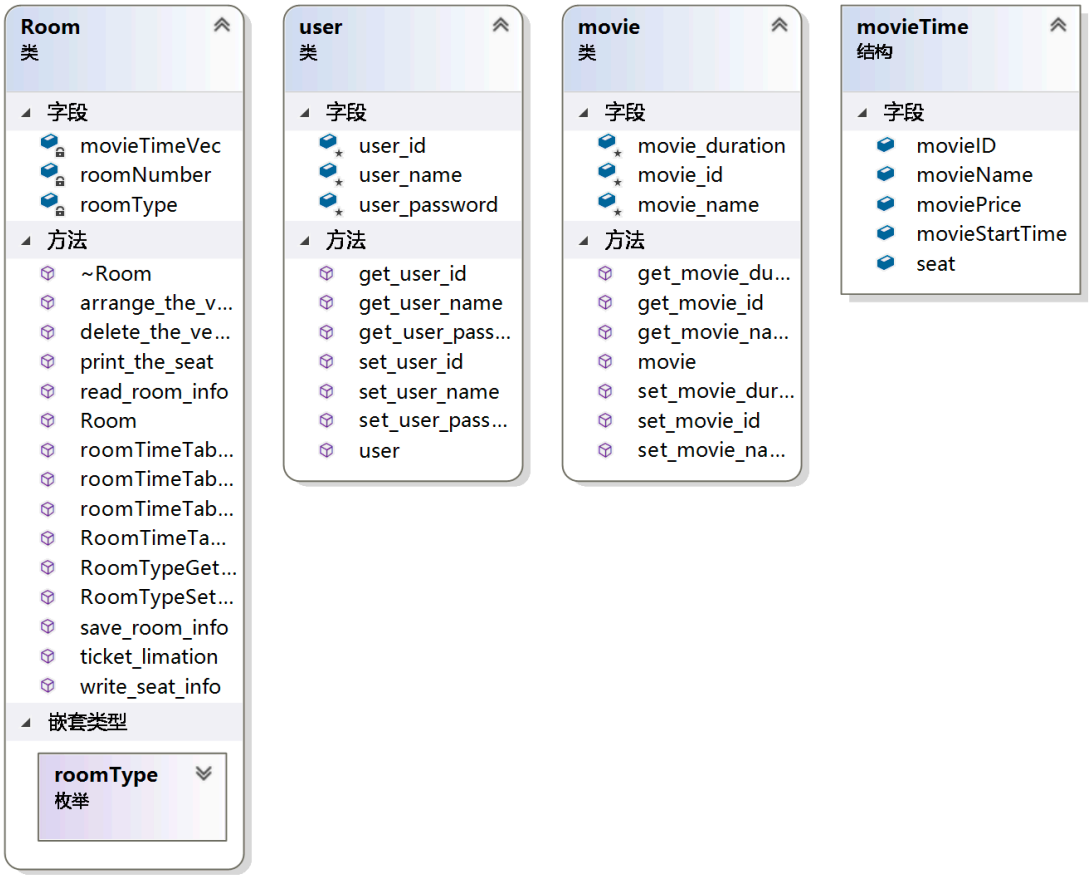
The movie's id, name, start time, price and the ownership of each seat will be saved to the vector. Here is the definition of read the data from the room:

```
void Room::read_room_info(int room_num) {
    ifstream text;
    string name = "Room_data.txt";

    char str[1];
    stringstream ss;
    ss << room_num;
    string s1 = ss.str();


    name = s1 + name;
    text.open(name, ios::in);
    vector<string> strVec;
    while (!text.eof()) {
        string inbuf;
        getline(text, inbuf, '\n');
        strVec.push_back(inbuf);
    }

    int movieTime_value = strVec.size();


    movieTime_value = (movieTime_value - 3) / 754;


    for (int i = 0; i < movieTime_value; i++)
    {
        movieTime mV;
        int seat[25][30] = {};
        mV.movieID = strToInt(strVec[2 + i * 754]);
        mV.movieName = strVec[3 + i * 754];
        mV.movieStartTime = strToInt(strVec[4 + i * 754]);
        mV.moviePrice = strToInt(strVec[5 + i * 754]);
        int counter = 0;

        for (int j = 0; j < 25; j++)
        {

            for (int k = 0; k < 30; k++)
            {
                seat[j][k] = strToInt(strVec[6 + counter + i * 754]);
                counter++;
            }

        }

        for (int i = 0; i < 25; i++)
        {

            for (int j = 0; j < 30; j++)
            {
                mV.seat[i][j] = seat[i][j];
            }
        }


        movieTimeVec.push_back(mV);

    }



}
```

Each room's data takes place 754 rows. In addition, we can read data from thee specified rows. For the small room, if the user input the row number is larger than 15 or the column number is lager than 20, then the input is invalid. For the large room, the limitation is 25 and 30. Besides, if the attribute of the seat is not equal to 0, it states that the seat has been occupied. As a consequence, the customer can not buy it any more. Here is the definition:

```cpp
bool Room::write_seat_info(int number, int x, int y, int user_id) {

    if (roomType == 0)
    {

        if (x > 15 || y > 20)
        {
            cout << "Invaild Value" << endl;
            return false;
        }
        else if (movieTimeVec[number].seat[x][y] != 0)
        {
            cout << "Invaild Value, this seat has been bought" << endl;
            return false;
        }
        else
        {
            movieTimeVec[number].seat[x][y] = user_id;
            return true;
        }



    }
    else
    {
        if (x > 25 || y > 30)
        {
            cout << "Invaild Value" << endl;
            return false;
        }
        else if (movieTimeVec[number].seat[x][y] != 0)
        {
            cout << "Invaild Value, this seat has been bought" << endl;
            return false;
        }
        else
        {
            movieTimeVec[number].seat[x][y] = user_id;
            return true;
        }
    }


}
```

(UML Diagram for all classes)

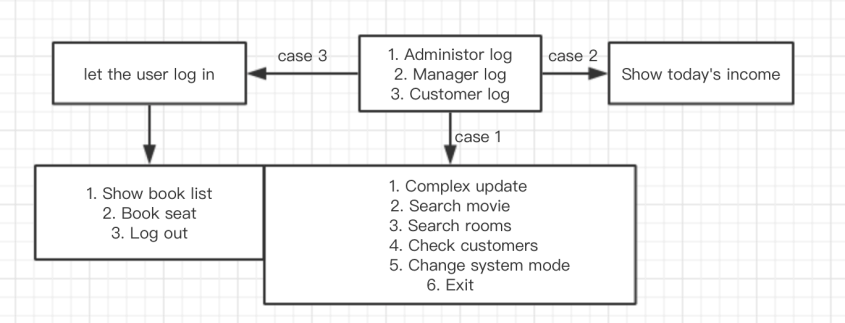


2.4 Main function

Firstly, the message will be printed out to let the user choose module.

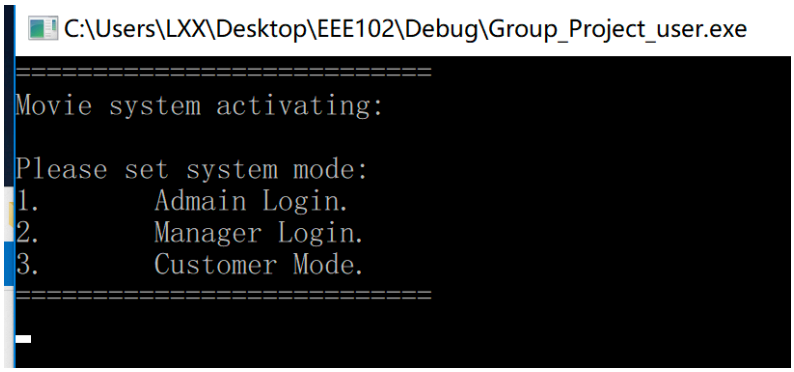
```
cout << "1.\t Admain Login." << endl;
cout << "2.\t Manager Login." << endl;
cout << "3.\t Customer Mode." << endl;
cout << "============================" << endl;
```

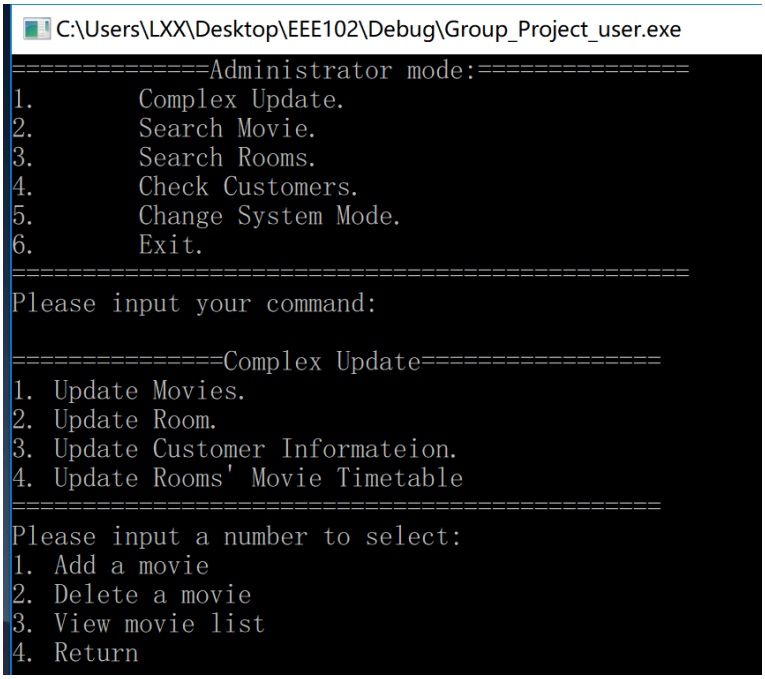
This is the structure of main function:



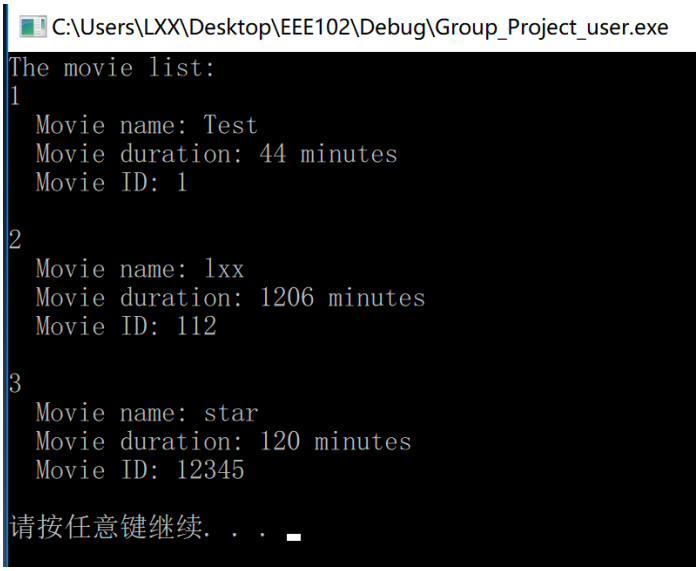
3. Testing

Firstly, the message will be printed out to let the user choose the identity.

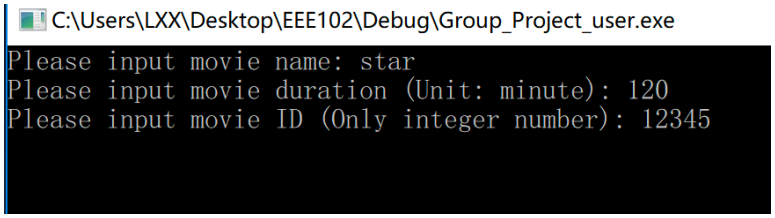




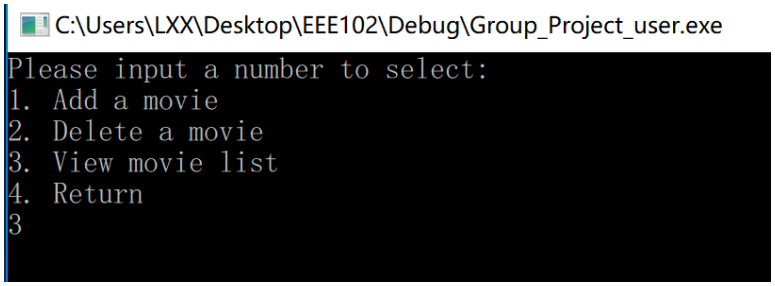
At first, we choose 1. Then six choice of manipulation is printed out and we choose Complex Update. The movie is hoped to be updated firstly, so we choose 1 and add a movie.



Then we input the movie's name, duration and ID:

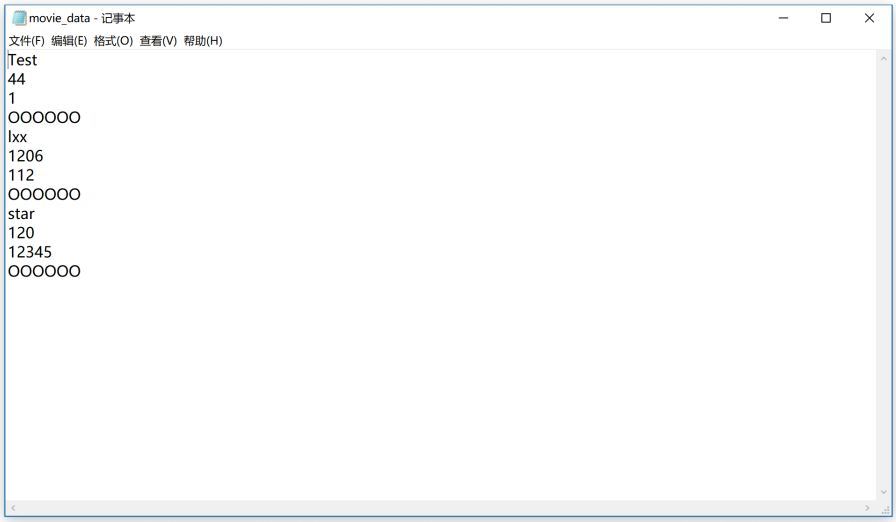


Then we choose 3 to view the movie list.

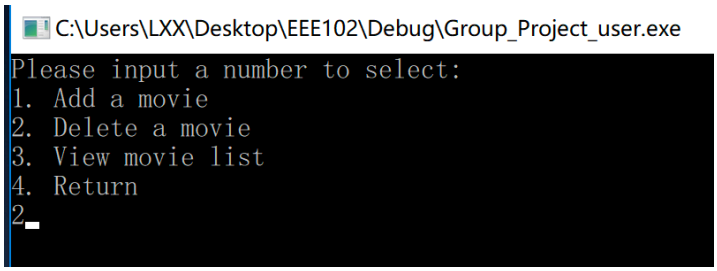


As shown on the screen, the movie named 'star' has already been added.

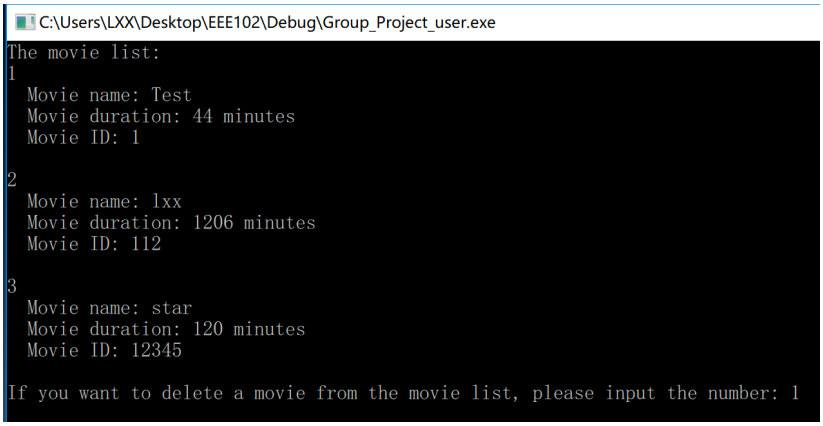
Besides, the information of the movie star has been saved in the file 'movie_data.txt' as shown in below.



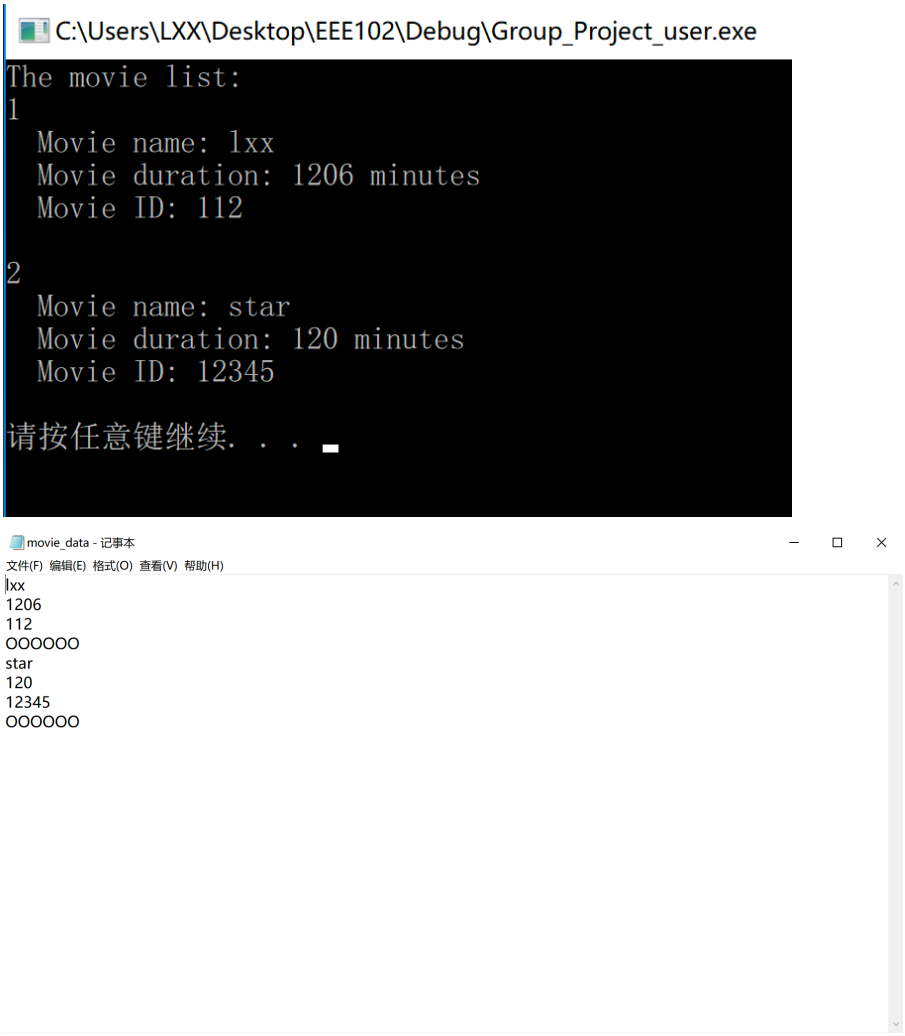
Then we choose 2 to delete a movie.



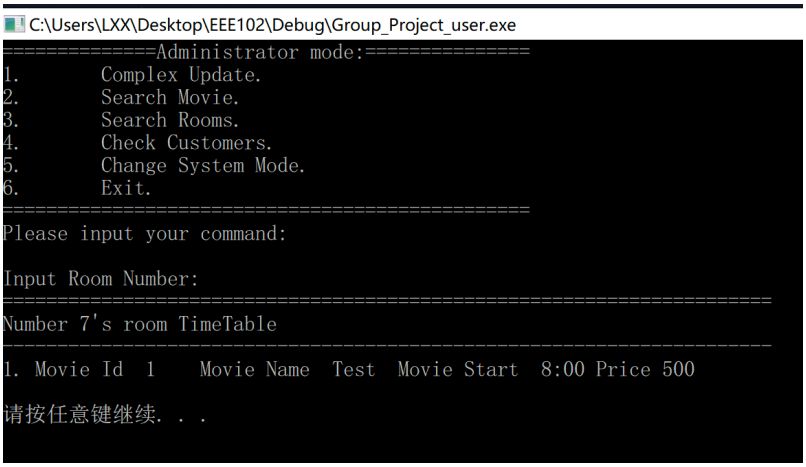
Then we choose the No.1 movie to delete it.



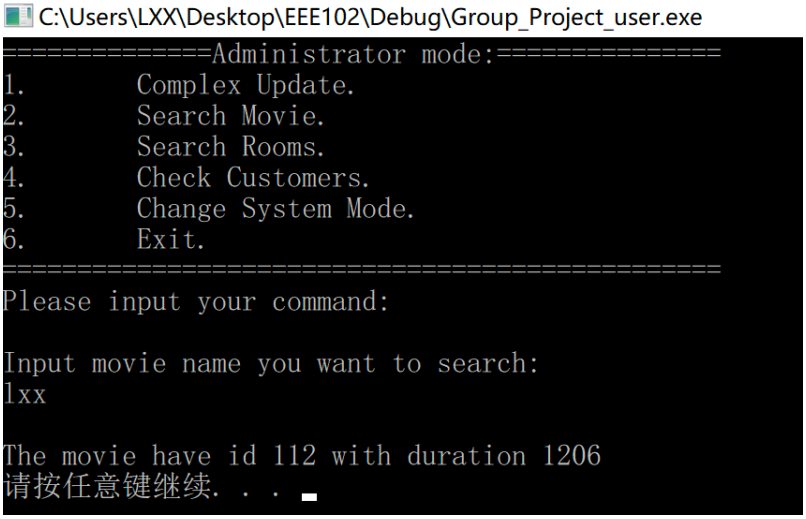
Then we view the movie list and the the file 'movie_data.txt' again. The results are shown in below:



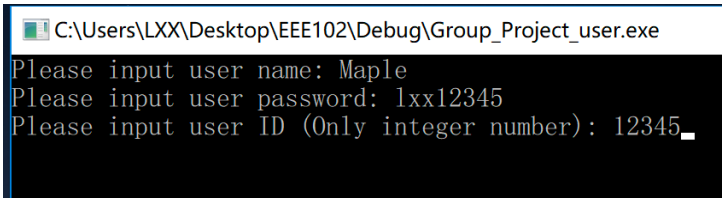
We can also choose 3 to search the corresponding movies in the room:



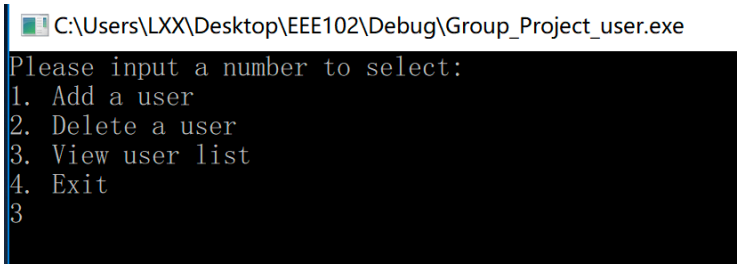
Choose 2 to search movie by name:

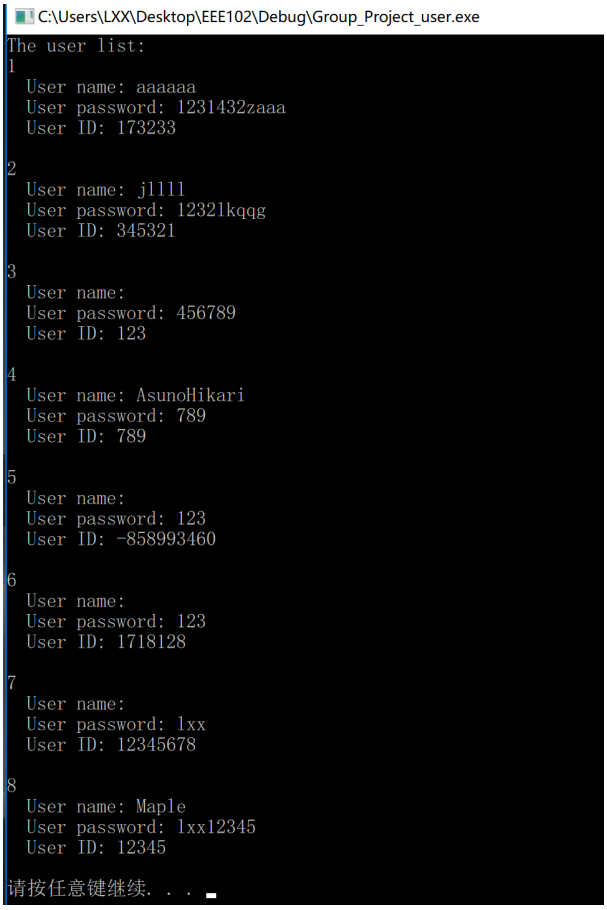


After return, we choose 3 to update the customer's information and choose 1 to add a user.

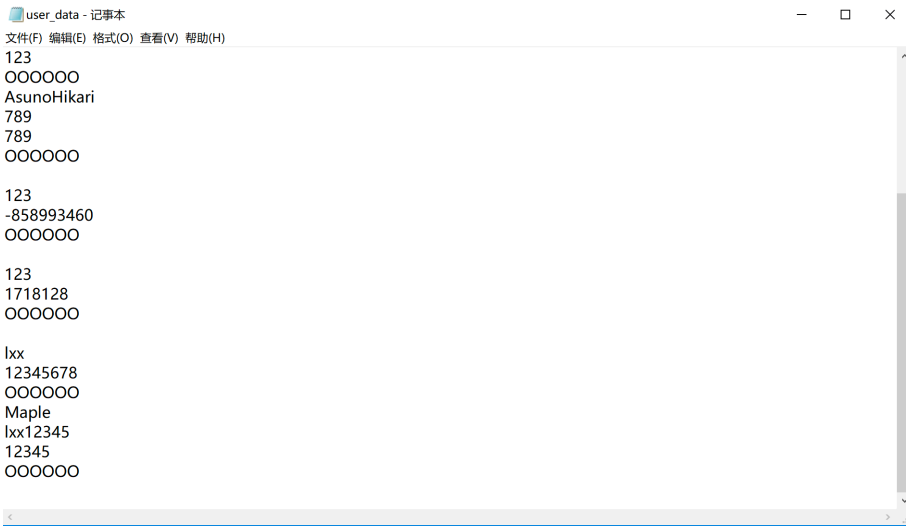


Then choose 3 to view the user list, it can been seen that the user Maple has already been added.

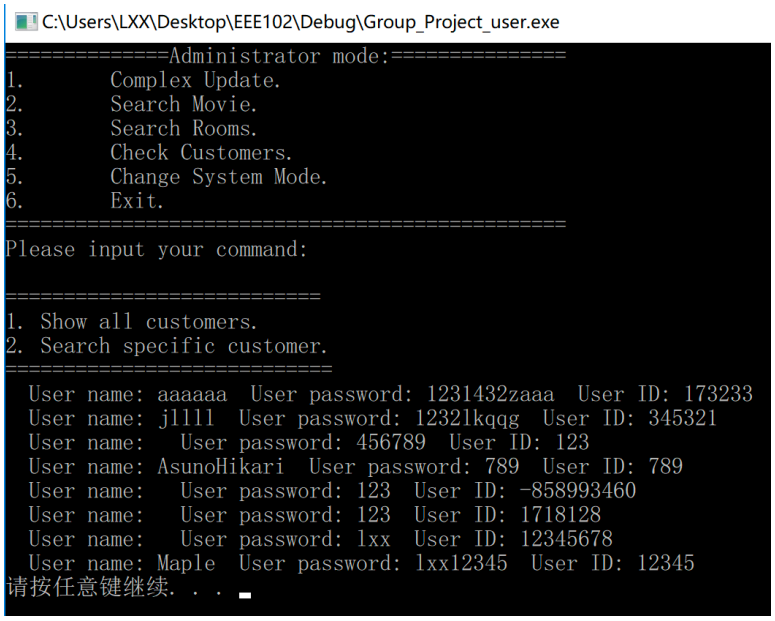




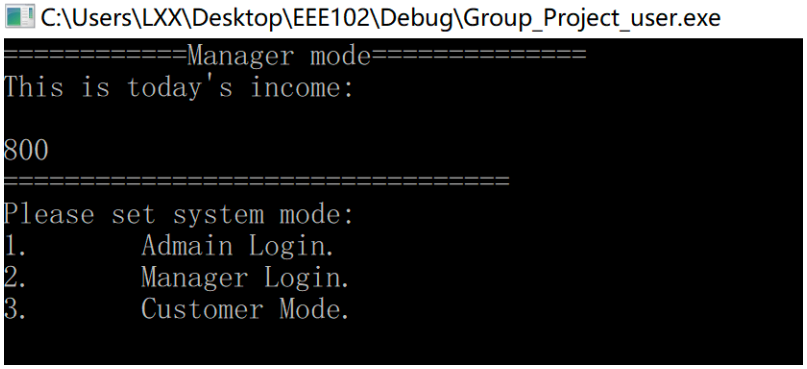
Then we view the file 'user_data.txt', the user Maple has already been added into the file.



We can choose 4 to check customers which can show all the customers or or search specific customer. Firstly, we choose 1 to show all the customers. The result is shown in below:

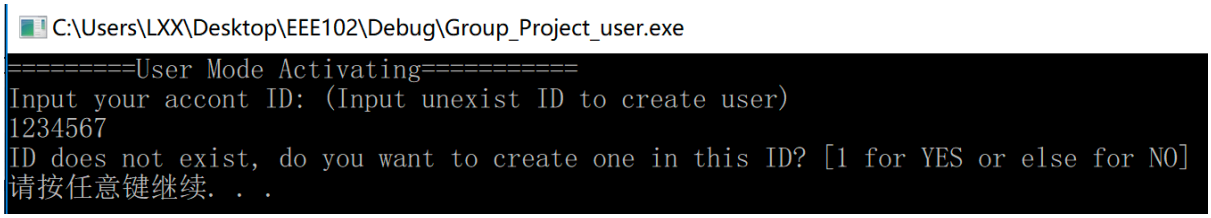


For the manager model, if the manager logs in, he/she can check today's total income as shown below:

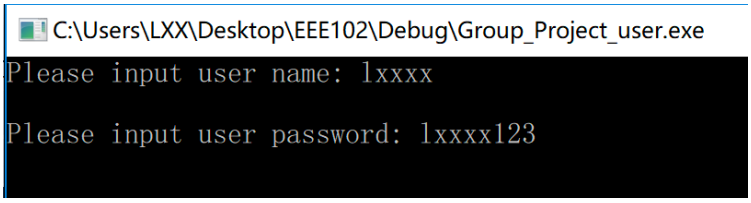


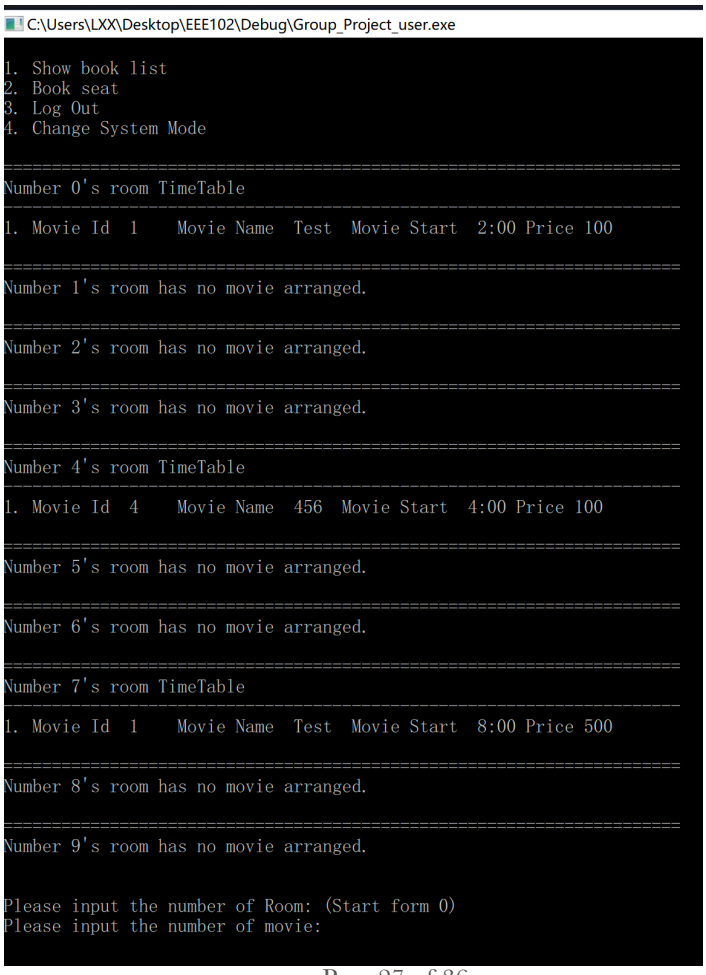
Next, we change to the customer model.

We input a ID that not exists so that create a new one. After inputting the name and password, a new user is created successfully.

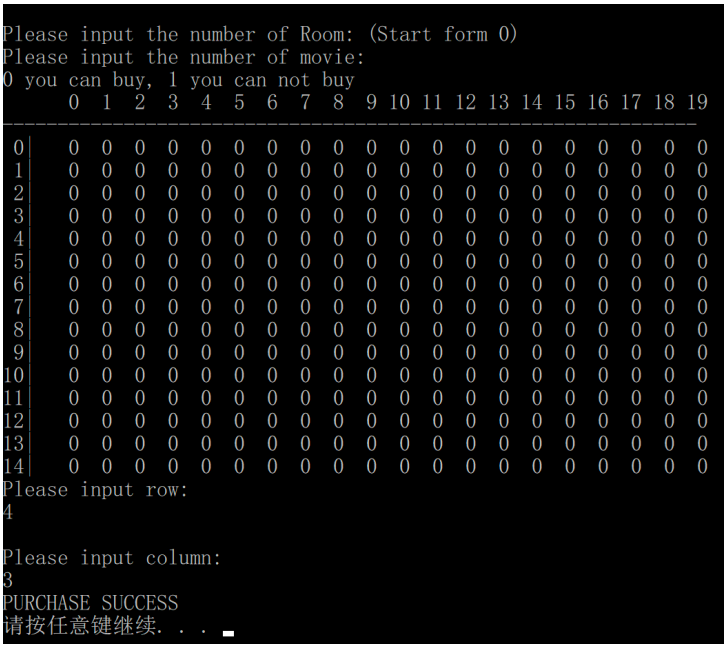


The manipulations that the user can select are showing the book list and booking a seat. Firstly, we choose 2 to book a ticket. Then all the information of rooms and movies are shown.





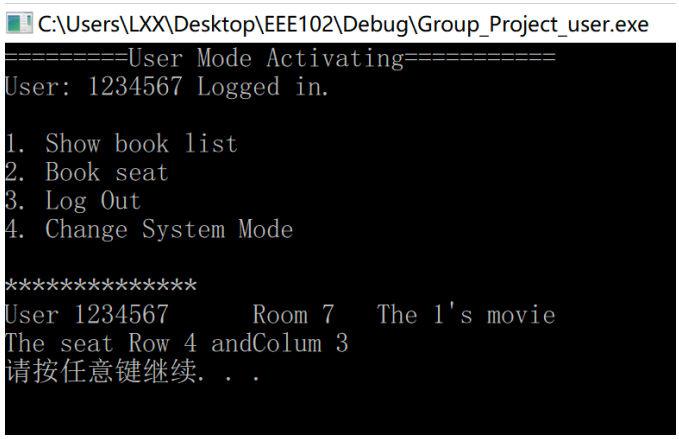
We choose 7th room and No.1 movie.



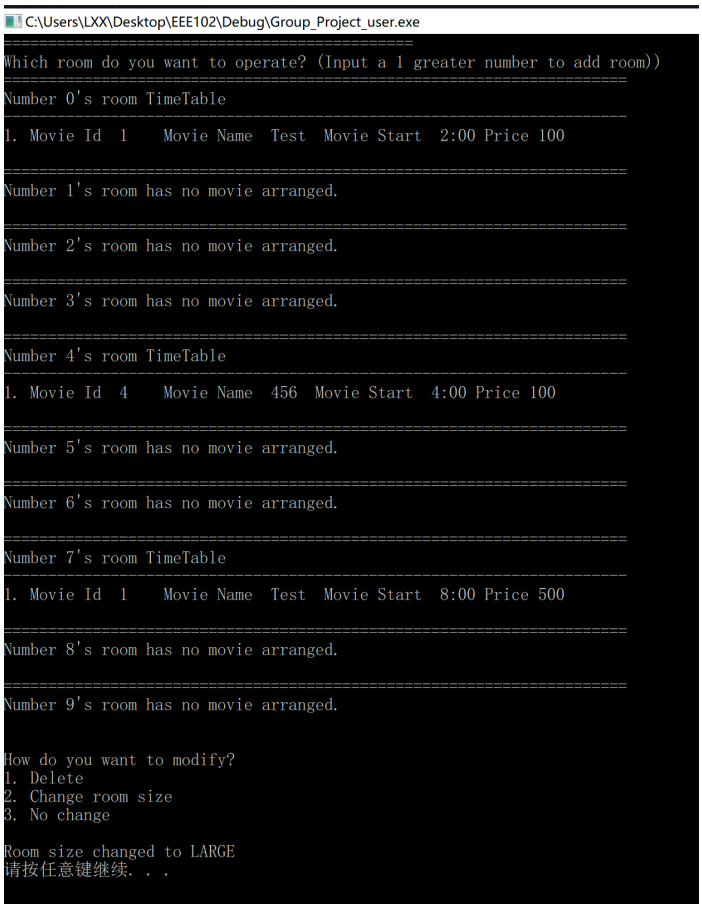
After selecting the row and column, the ticket has been bought successfully.

The data in the file updates:

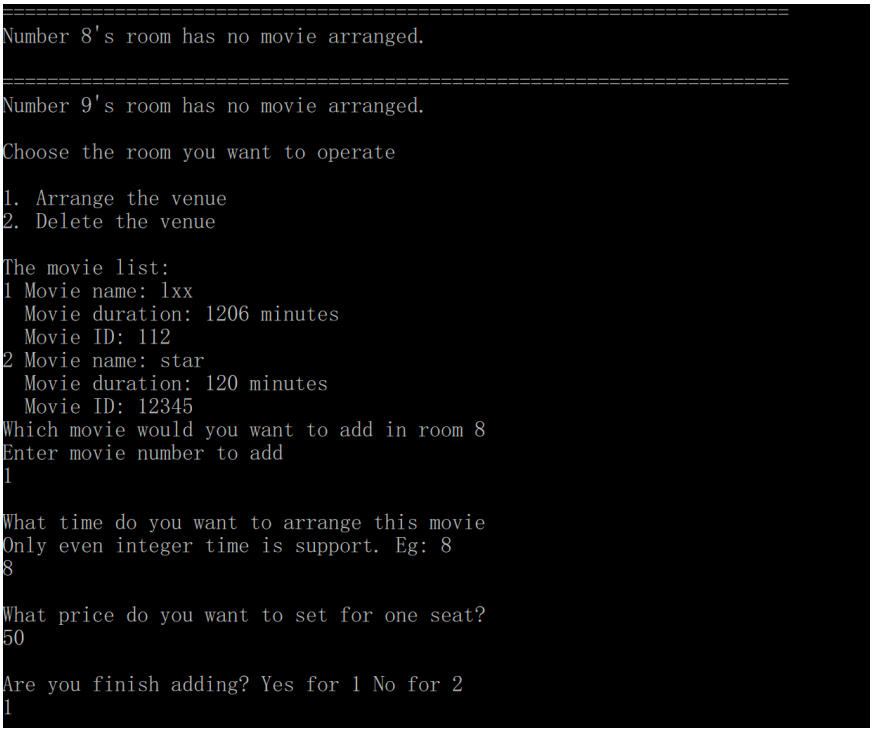
Then we choose 1 to show the user 1234567's book list.



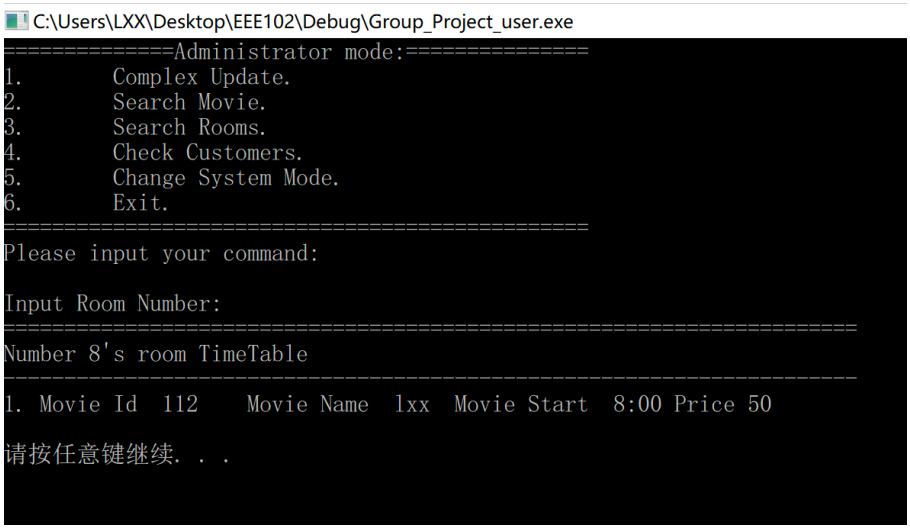
To the update room function in the complex update, we choose Room 8 to change the size to large:



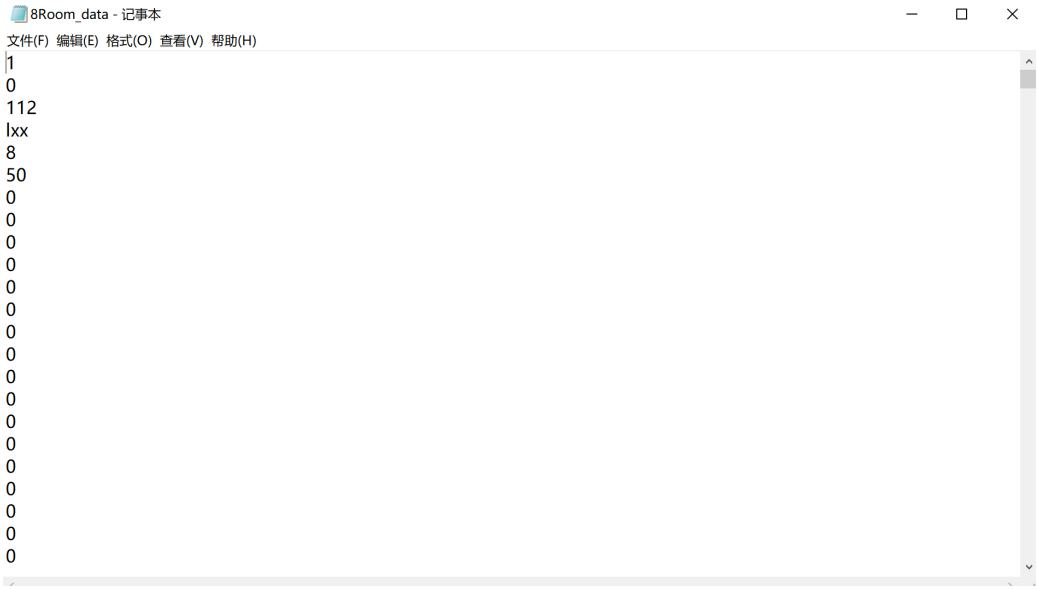
For the function that update room's movie timetable , we choose No.8 room which has not been arranged movies yet. We choose the movie named lxx to add and the time is 8, price is 50.



Then we search the No.8 Room, it can been seen that the movie lxx has been added successfully.

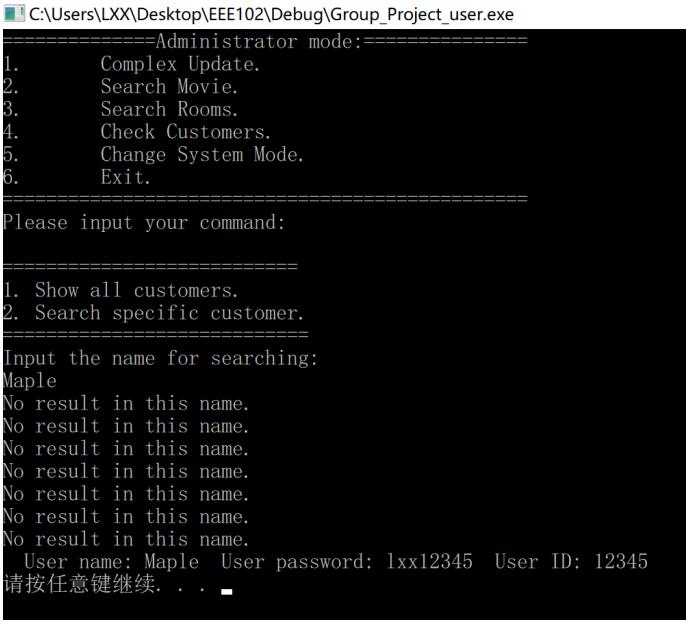


The data in '8Room_data.txt' has also been updated.



4. Bugs report

When testing the administer mode's check customers mode, when we want to check the specific customer. After inputting the name, there is a display error:



In the room change part, the statement messages are not clear enough, it is suggested that the previous room sizes are printed out to let the administer makes sure that the room size has been change successfully.

User manual

Content

1. Administer mode

The manipulations that you can select:

1.Complex Update;

2.Search Movie;

3.Search Rooms;

4.Check Customers;

5.Change system mode;

6.Exit.

1. Complex Update:

-Update movies: You should choose a specific movie that you want to modify, then you can

1. Add a movie;
2. Delete a movie;
3. View movie list.

-Update rooms: You can delete a room or change room size to small or to large.

-Update customers' information: You can show all the customers or search the specific customer by name.

- Update room's movie timetable: Firstly, you should choose a specific room, then you can

1. Arrange the venue: You can choose some movies to be added into the room and set their time and seat price.
2. Delete the movies in the venue.

2. Manager mode

The manager can only view today’s income.

3. Customer mode

Firstly, you should log in by inputting your Id and password. If your Id not exists in the system, the system will create a new one for you if you want.

After log in, you can:

1. View book list;
2. Book seat;
3. Log out.

You should select the room and choose a movie.

The ownership of seats represents as 0 means that the seats have not been occupied yet and you can choose through inputting the column and row's number.

Hint: you can buy maximum 5 tickets in total.