How To Create Library Management System Project in Java?

In this modern era of the internet, almost all of us rely on web-based applications from small to big tasks. Well, Library management system is one of the most popular use-cases considered by the professionals while building applications in Java. In this article, I will show you how to create a library management system project in Java.

The following will be the sequence of topics for this article:

Let's get started.

What is Java?

Java is an object-oriented language similar to C++, but with advanced and simplified features. Java is **free to access** and can **run** on **all platforms**.

The features of Java are as follows:

- **Simple:** Java has made life easier by removing all the complexities such as pointers, operator overloading as you see in C++ or any other programming language.
- **Object-oriented:** Everything is considered to be an "**object**" which possess some state, behavior and all the operations are performed using these objects.
- **Secured:** All the code is converted in **bytecode** after compilation, which is not readable by a human. and java does not use an explicit pointer and run the programs inside the sandbox to prevent any activities from untrusted sources. It enables to develop virus-free, tamper-free systems/applications.

What is MySQL?

MySQL is an open-source relational database management system that works on many platforms. It provides multi-user access to support many storage engines and is backed by Oracle. So, you can buy a commercial license version from Oracle to get premium support services.

The features of MySQL are as follows:

- **Ease of Management –** The software very easily gets downloaded and also uses an event scheduler to schedule the tasks automatically.
- **Robust Transactional Support –** Holds the ACID (Atomicity, Consistency, Isolation, Durability) property, and also allows distributed multi-version support.
- **Comprehensive Application Development –** MySQL has plugin libraries to embed the database into any application. It also supports stored procedures, triggers, functions, views and many more for application development. Refer to ***RDS Tutorial*** to understand Amazon's RDBMS.

Library Management System Project in Java

Library Management System is one of the most popular projects which is created using Java. So, in this article, I will show you how to create this project using the following system requirements.

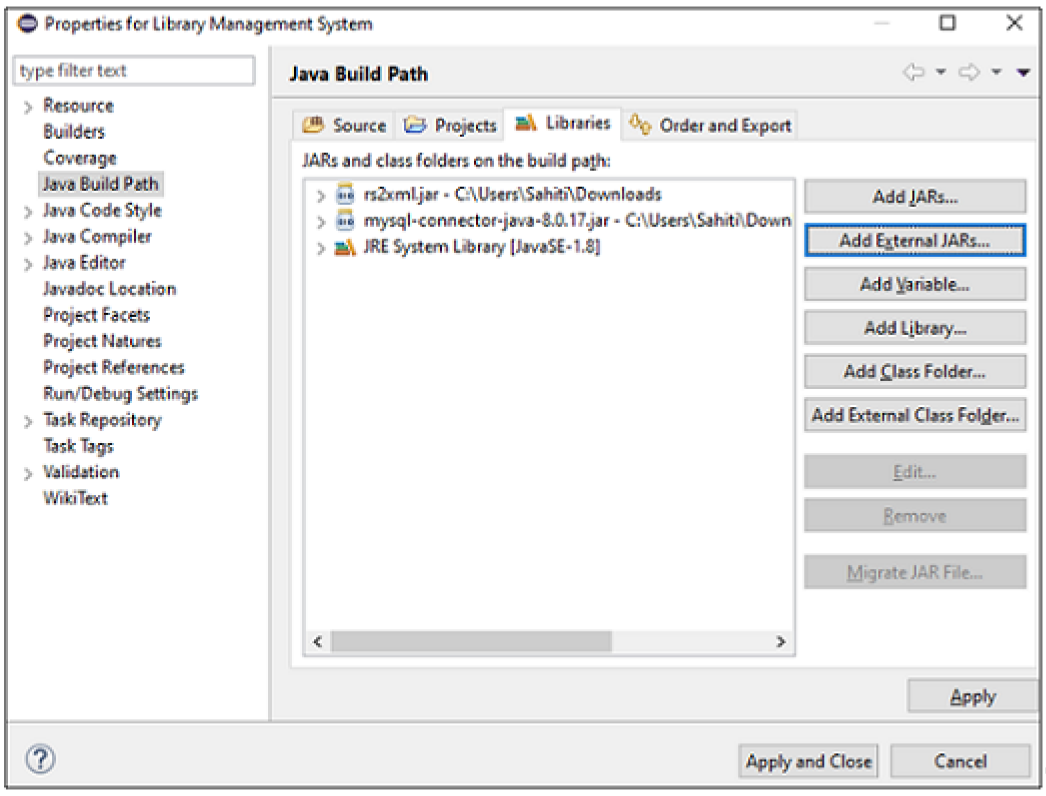
System Requirements

To execute the below project, you will need the following business requirements:

- MySQL Community Server
- MySQL JDBC Connector
- Java
- Eclipse IDE
- rs2xml.jar

The rs2xml jar is used to display the data in a table format. So, once you create a project in Eclipse IDE, you have to import the rs2xml jar and JDBC connector JAR into the project.

To do that, **right-click on the project**, choose **Build Path** -> **Configure Build Path**. In the dialog box, which opens up, choose **Add External JARs**, and add the JAR files. Once added, click on **Apply and Close**. Refer below.



JARs and class folders on the build path:

- rs2xml.jar - C:\Users\Sahiti\Downloads
- mysql-connector-java-8.0.17.jar - C:\Users\Sahiti\Down
- JRE System Library [JavaSE-1.8]

Tables Considered

Now, for this particular project, I have considered three tables, which are:

- **Users** -> This table consists of the columns {UID, Username, Password, Admin}
- **Books**-> The book's table consists of the columns {BID, Book name, Price, Genre}
- **Issue** -> This table consists of the columns {IID, UID, BID, IssueDate, Period, ReturnDate, Fine}

Alright, so now that the Initial set is done, and I have told you the schema of tables, let us get started.

Library Management System Project Code

For your better understanding, I have divided the code into the following functions and I will be explaining you function-wise:

- Login
- Connect
- Create/ Reset
- User Menu
- Admin Menu

Also, to create a GUI, I will be using Swing. Swing is a library or a set of program components used to create graphical user interface components such as scroll bars, buttons, dialog boxes, etc.

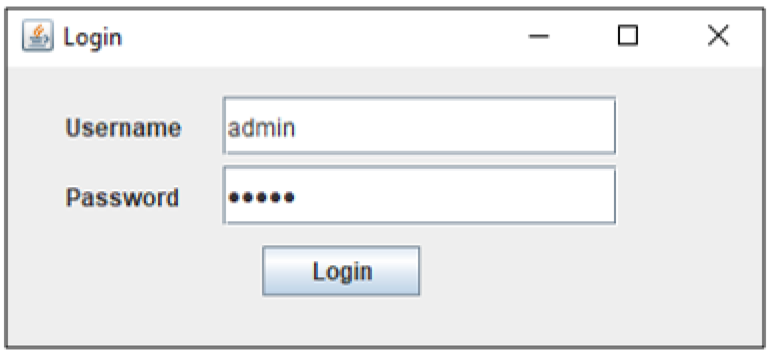
Before I discuss the code of functions with you, let me show you the code for the main class and the libraries to be imported:

```
import java.awt.event.ActionEvent;
import java.awt.event.ActionListener;
import java.sql.*;
import java.text.DateFormat;
import java.text.ParseException;
import java.text.SimpleDateFormat;
import java.util.ArrayList;
import java.util.Date;
import java.util.Locale;
import java.util.concurrent.TimeUnit;

import javax.swing.*;
import net.proteanit.sql.DbUtils;

public class main {

public static class ex{
 public static int days=0;
 }

public static void main(String[] args) {

login();
//create();
}
```

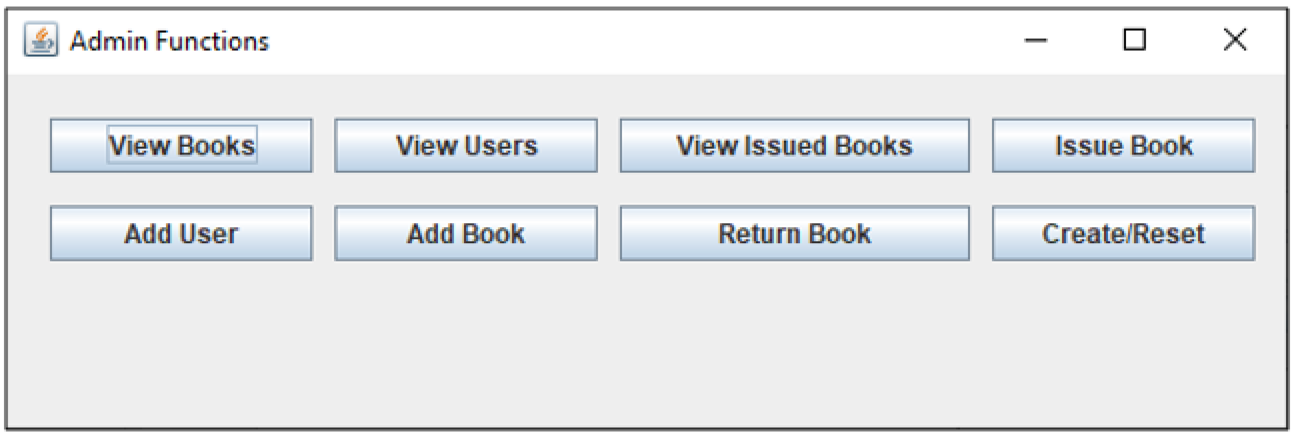
Now in this article on Library Management System in Java, let us understand the code of all the above functions.

Login

I have created this function to enable the user and the admin login. So, initially when a user logs in for the first time, that user will be an admin by default, and the username and password will be {admin, admin}. Refer below.



For this schema, I have considered only one admin. So, once a user logs in as an admin, he or she will be redirected to the admin menu as below. I will discuss the functions of the admin in the admin menu section.



Coming back to the login functions, refer to the below code:

```
public static void login() {

JFrame f=new JFrame("Login");//creating instance of JFrame
JLabel l1,l2;
l1=new JLabel("Username");  //Create label Username
l1.setBounds(30,15, 100,30); //x axis, y axis, width, height

l2=new JLabel("Password");  //Create label Password
l2.setBounds(30,50, 100,30);

JTextField F_user = new JTextField(); //Create text field for username
F_user.setBounds(110, 15, 200, 30);

JPasswordField F_pass=new JPasswordField(); //Create text field for password
F_pass.setBounds(110, 50, 200, 30);

JButton login_but=new JButton("Login");//creating instance of JButton for Login Butto
login_but.setBounds(130,90,80,25);//Dimensions for button
login_but.addActionListener(new ActionListener() {  //Perform action

public void actionPerformed(ActionEvent e){

String username = F_user.getText(); //Store username entered by the user in the variable
String password = F_pass.getText(); //Store password entered by the user in the variable

if(username.equals("")) //If username is null
{
JOptionPane.showMessageDialog(null,"Please enter username"); //Display dialog box with
}
else if(password.equals("")) //If password is null
{
JOptionPane.showMessageDialog(null,"Please enter password"); //Display dialog box with
}
else { //If both the fields are present then to login the user, check wether the user exis
//System.out.println("Login connect");
Connection connection=connect();  //Connect to the database
try
{
Statement stmt = connection.createStatement();
stmt.executeUpdate("USE LIBRARY"); //Use the database with the name "Librar
String st = ("SELECT * FROM USERS WHERE USERNAME='"+username+"' AND PASSWORD='"+password+"'"); //Ret
from users
ResultSet rs = stmt.executeQuery(st); //Execute query
if(rs.next()==false) { //Move pointer below
System.out.print("No user");
JOptionPane.showMessageDialog(null,"Wrong Username/Password!"); //Display M

}
else {
f.dispose();
rs.beforeFirst();  //Move the pointer above
while(rs.next())
{
String admin = rs.getString("ADMIN"); //user is admin
//System.out.println(admin);
String UID = rs.getString("UID"); //Get user ID of the user
if(admin.equals("1")) { //If boolean value 1
admin_menu(); //redirect to admin menu
}
else{
user_menu(UID); //redirect to user menu for that user ID
}
}
}
}
catch (Exception ex) {
ex.printStackTrace();
}
}
}
});


f.add(F_pass); //add password
f.add(login_but);//adding button in JFrame
f.add(F_user);  //add user
f.add(l1);  // add label1 i.e. for username
f.add(l2); // add label2 i.e. for password

f.setSize(400,180);//400 width and 500 height
f.setLayout(null);//using no layout managers
f.setVisible(true);//making the frame visible
f.setLocationRelativeTo(null);

}
```

Connect

The connect function is used to connect the database to the GUI. So, to do that, I have mentioned the below code:

```
public static Connection connect()
{
try {
Class.forName("com.mysql.cj.jdbc.Driver");
//System.out.println("Loaded driver");
Connection con = DriverManager.getConnection("jdbc:mysql://localhost/mysql?user=root&password=edure
//System.out.println("Connected to MySQL");
return con;
}
catch (Exception ex) {
ex.printStackTrace();
}
return null;
}
```

In the above function, we are connecting our **MySQL database** with the **username "root"** and **password "edureka"** to our application. Now, once the application is connected to the database, our next step is to create or reset the database. So, next in this article on Library Management System Project in Java, let us discuss the Create function..

Create

The create function is used to create the database, tables and add data into these tables. So, to do that, SQL statements will be used as below.

```
public static void create() {
try {
```

```
Connection connection=connect();
ResultSet resultSet = connection.getMetaData().getCatalogs();
//iterate each catalog in the ResultSet
while (resultSet.next()) {
// Get the database name, which is at position 1
String databaseName = resultSet.getString(1);
if(databaseName.equals("library")) {
//System.out.print("yes");
Statement stmt = connection.createStatement();
//Drop database if it pre-exists to reset the complete database
String sql = "DROP DATABASE library";
stmt.executeUpdate(sql);
}
}
Statement stmt = connection.createStatement();

String sql = "CREATE DATABASE LIBRARY"; //Create Database
stmt.executeUpdate(sql);
stmt.executeUpdate("USE LIBRARY"); //Use Database
//Create Users Table
String sql1 = "CREATE TABLE USERS(UID INT NOT NULL AUTO_INCREMENT PRIMARY KEY, USERNAME VARCHAR(30), P
BOOLEAN)";
stmt.executeUpdate(sql1);
//Insert into users table
stmt.executeUpdate("INSERT INTO USERS(USERNAME, PASSWORD, ADMIN) VALUES('admin','admin
//Create Books table
stmt.executeUpdate("CREATE TABLE BOOKS(BID INT NOT NULL AUTO_INCREMENT PRIMARY KEY, BNAME VARCHAR(50),
INT)");
//Create Issued Table
stmt.executeUpdate("CREATE TABLE ISSUED(IID INT NOT NULL AUTO_INCREMENT PRIMARY KEY, UID INT, BID INT,
RETURN_DATE VARCHAR(20), PERIOD INT, FINE INT)");
//Insert into books table
stmt.executeUpdate("INSERT INTO BOOKS(BNAME, GENRE, PRICE) VALUES ('War and Peace', 'Mystery', 200),  ('
300), ('The Perfect Murder','Mystery', 150), ('Accidental Presidents', 'Biography', 250), ('The Wicked King

resultSet.close();
}
catch (Exception ex) {
  ex.printStackTrace();
}
}
```

Now, that we have created the database, connected with GUI and enables the login function, next in this article on Library Management System Project in Java, let us now discuss the functions of the User Menu.

User Menu

The User Menu is designed to show details of all the books present in the library and the books issued by the user.

```
public static void user_menu(String UID) {


JFrame f=new JFrame("User Functions"); //Give dialog box name as User functions
//f.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE); //Exit user menu on closing the dial
JButton view_but=new JButton("View Books");//creating instance of JButton
view_but.setBounds(20,20,120,25);//x axis, y axis, width, height
view_but.addActionListener(new ActionListener() {
public void actionPerformed(ActionEvent e){

JFrame f = new JFrame("Books Available"); //View books stored in database
//f.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);


Connection connection = connect();
String sql="select * from BOOKS"; //Retreive data from database
try {
Statement stmt = connection.createStatement(); //connect to database
stmt.executeUpdate("USE LIBRARY"); // use librabry
stmt=connection.createStatement();
ResultSet rs=stmt.executeQuery(sql);
JTable book_list= new JTable(); //show data in table format
book_list.setModel(DbUtils.resultSetToTableModel(rs));

JScrollPane scrollPane = new JScrollPane(book_list); //enable scroll ba

f.add(scrollPane); //add scroll bar
f.setSize(800, 400); //set dimensions of view books frame
f.setVisible(true);
f.setLocationRelativeTo(null);
} catch (SQLException e1) {
// TODO Auto-generated catch block
JOptionPane.showMessageDialog(null, e1);
}

}
}
```

```
                );

        JButton my_book=new JButton("My Books");//creating instance of JButton
            my_book.setBounds(150,20,120,25);//x axis, y axis, width, height
            my_book.addActionListener(new ActionListener() { //Perform action
                public void actionPerformed(ActionEvent e){


                    JFrame f = new JFrame("My Books"); //View books issued by user
                    //f.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
                    int UID_int = Integer.parseInt(UID); //Pass user ID

                    //.iid,issued.uid,issued.bid,issued.issued_date,issued.return_date,issued,
                    Connection connection = connect(); //connect to database
                    //retrieve data
                    String sql="select distinct issued.*,books.bname,books.genre,books.price from issued,books " + "where (
                    and (books.bid in (select bid from issued where issued.uid="+UID_int+"))) group by iid"
                    String sql1 = "select bid from issued where uid="+UID_int;
                    try {
                        Statement stmt = connection.createStatement();
                        //use database
                        stmt.executeUpdate("USE LIBRARY");
                        stmt=connection.createStatement();
                        //store in array
                        ArrayList books_list = new ArrayList();



                        ResultSet rs=stmt.executeQuery(sql);
                        JTable book_list= new JTable(); //store data in table format
                        book_list.setModel(DbUtils.resultSetToTableModel(rs));
                        //enable scroll bar
                        JScrollPane scrollPane = new JScrollPane(book_list);

                        f.add(scrollPane); //add scroll bar
                        f.setSize(800, 400); //set dimensions of my books frame
                        f.setVisible(true);
                        f.setLocationRelativeTo(null);
                    } catch (SQLException e1) {
                        // TODO Auto-generated catch block
                        JOptionPane.showMessageDialog(null, e1);
                    }

                }
            }
        );



        f.add(my_book); //add my books
        f.add(view_but); // add view books
        f.setSize(300,100);//400 width and 500 height
        f.setLayout(null);//using no layout managers
        f.setVisible(true);//making the frame visible
        f.setLocationRelativeTo(null);
    }
```

Next, in this article on Library Management System Project in Java, let us discuss the code for Admin Menu function.

Admin Menu

The Admin Menu is designed to show details of users, books, issued books, add books, return books, add user, and create or reset the database.

```
public static void admin_menu() {


    JFrame f=new JFrame("Admin Functions"); //Give dialog box name as admin functions
    //f.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE); //


    JButton create_but=new JButton("Create/Reset");//creating instance of JButton to create or re
        create_but.setBounds(450,60,120,25);//x axis, y axis, width, height
        create_but.addActionListener(new ActionListener() { //Perform action
            public void actionPerformed(ActionEvent e){
```

```
                                         create(); //Call create function
    JOptionPane.showMessageDialog(null,"Database Created/Reset!"); //Open a dialog box and di

                                                       }
                                                    });


          JButton view_but=new JButton("View Books");//creating instance of JButton to view bo
                     view_but.setBounds(20,20,120,25);//x axis, y axis, width, height
                             view_but.addActionListener(new ActionListener() {
                                  public void actionPerformed(ActionEvent e){

                                     JFrame f = new JFrame("Books Available");
                                //f.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);


                             Connection connection = connect(); //connect to database
                               String sql="select * from BOOKS"; //select all books
                                                       try {
                                    Statement stmt = connection.createStatement();
                                   stmt.executeUpdate("USE LIBRARY"); //use database
                                          stmt=connection.createStatement();
                                         ResultSet rs=stmt.executeQuery(sql);
                              JTable book_list= new JTable(); //view data in table format
                                book_list.setModel(DbUtils.resultSetToTableModel(rs));
                                                 //mention scroll bar
                                  JScrollPane scrollPane = new JScrollPane(book_list);

                                          f.add(scrollPane); //add scrollpane
                                       f.setSize(800, 400); //set size for frame
                                                  f.setVisible(true);
                                            f.setLocationRelativeTo(null);
                                            } catch (SQLException e1) {
                                          // TODO Auto-generated catch block
                                        JOptionPane.showMessageDialog(null, e1);
                                                  }

                                                     }
                                                     }
                                                    );

          JButton users_but=new JButton("View Users");//creating instance of JButton to view u
                    users_but.setBounds(150,20,120,25);//x axis, y axis, width, height
            users_but.addActionListener(new ActionListener() { //Perform action on click butto
                                  public void actionPerformed(ActionEvent e){

                                          JFrame f = new JFrame("Users List");
                                  //f.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);


                                          Connection connection = connect();
                                String sql="select * from users"; //retrieve all users
                                                         try {
                                      Statement stmt = connection.createStatement();
                                     stmt.executeUpdate("USE LIBRARY"); //use database
                                            stmt=connection.createStatement();
                                           ResultSet rs=stmt.executeQuery(sql);
                                              JTable book_list= new JTable();
                                  book_list.setModel(DbUtils.resultSetToTableModel(rs));
                                                   //mention scroll bar
                                    JScrollPane scrollPane = new JScrollPane(book_list);

                                            f.add(scrollPane); //add scrollpane
                                         f.setSize(800, 400); //set size for frame
                                                    f.setVisible(true);
                                              f.setLocationRelativeTo(null);
                                              } catch (SQLException e1) {
                                            // TODO Auto-generated catch block
                                          JOptionPane.showMessageDialog(null, e1);
                                                        }


                                                     }
                                                       }
                                                    );

JButton issued_but=new JButton("View Issued Books");//creating instance of JButton to view the
                    issued_but.setBounds(280,20,160,25);//x axis, y axis, width, height
                            issued_but.addActionListener(new ActionListener() {
                                  public void actionPerformed(ActionEvent e){

                                          JFrame f = new JFrame("Users List");
                                  //f.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);


                                          Connection connection = connect();
                                          String sql="select * from issued";
                                                         try {
                                      Statement stmt = connection.createStatement();
```

```
stmt.executeUpdate("USE LIBRARY");
stmt=connection.createStatement();
ResultSet rs=stmt.executeQuery(sql);
JTable book_list= new JTable();
book_list.setModel(DbUtils.resultSetToTableModel(rs));

JScrollPane scrollPane = new JScrollPane(book_list);

f.add(scrollPane);
f.setSize(800, 400);
f.setVisible(true);
f.setLocationRelativeTo(null);
} catch (SQLException e1) {
// TODO Auto-generated catch block
JOptionPane.showMessageDialog(null, e1);
}

}
}
);


JButton add_user=new JButton("Add User"); //creating instance of JButton to add use
add_user.setBounds(20,60,120,25); //set dimensions for button

add_user.addActionListener(new ActionListener() {
public void actionPerformed(ActionEvent e){

JFrame g = new JFrame("Enter User Details"); //Frame to enter user detai
//g.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
//Create label
JLabel l1,l2;
l1=new JLabel("Username");  //label 1 for username
l1.setBounds(30,15, 100,30);


l2=new JLabel("Password");  //label 2 for password
l2.setBounds(30,50, 100,30);

//set text field for username
JTextField F_user = new JTextField();
F_user.setBounds(110, 15, 200, 30);

//set text field for password
JPasswordField F_pass=new JPasswordField();
F_pass.setBounds(110, 50, 200, 30);
//set radio button for admin
JRadioButton a1 = new JRadioButton("Admin");
a1.setBounds(55, 80, 200,30);
//set radio button for user
JRadioButton a2 = new JRadioButton("User");
a2.setBounds(130, 80, 200,30);
//add radio buttons
ButtonGroup bg=new ButtonGroup();
bg.add(a1);bg.add(a2);


JButton create_but=new JButton("Create");//creating instance of JButton for
create_but.setBounds(130,130,80,25);//x axis, y axis, width, height
create_but.addActionListener(new ActionListener() {

public void actionPerformed(ActionEvent e){

String username = F_user.getText();
String password = F_pass.getText();
Boolean admin = false;

if(a1.isSelected()) {
admin=true;
}

Connection connection = connect();

try {
Statement stmt = connection.createStatement();
stmt.executeUpdate("USE LIBRARY");
stmt.executeUpdate("INSERT INTO USERS(USERNAME,PASSWORD,ADMIN) VALUES ('"+username+"','"+
JOptionPane.showMessageDialog(null,"User added!");
g.dispose();

}

catch (SQLException e1) {
// TODO Auto-generated catch block
JOptionPane.showMessageDialog(null, e1);
}

}

```

```
                                        });


                                  g.add(create_but);
                                      g.add(a2);
                                      g.add(a1);
                                      g.add(l1);
                                      g.add(l2);
                                    g.add(F_user);
                                    g.add(F_pass);
                   g.setSize(350,200);//400 width and 500 height
                   g.setLayout(null);//using no layout managers
                   g.setVisible(true);//making the frame visible
                          g.setLocationRelativeTo(null);


                                  }
                                  });


JButton add_book=new JButton("Add Book"); //creating instance of JButton for adding b
                          add_book.setBounds(150,60,120,25);

                  add_book.addActionListener(new ActionListener() {
                        public void actionPerformed(ActionEvent e){
                                //set frame wot enter book details
                           JFrame g = new JFrame("Enter Book Details");
                  //g.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
                                         // set labels
                                       JLabel l1,l2,l3;
                  l1=new JLabel("Book Name");  //lebel 1 for book name
                               l1.setBounds(30,15, 100,30);


                      l2=new JLabel("Genre");  //label 2 for genre
                               l2.setBounds(30,53, 100,30);

                      l3=new JLabel("Price");  //label 2 for price
                               l3.setBounds(30,90, 100,30);

                              //set text field for book name
                          JTextField F_bname = new JTextField();
                          F_bname.setBounds(110, 15, 200, 30);

                                //set text field for genre
                           JTextField F_genre=new JTextField();
                          F_genre.setBounds(110, 53, 200, 30);
                                //set text field for price
                           JTextField F_price=new JTextField();
                          F_price.setBounds(110, 90, 200, 30);


   JButton create_but=new JButton("Submit");//creating instance of JButton to submi
             create_but.setBounds(130,130,80,25);//x axis, y axis, width, height
                   create_but.addActionListener(new ActionListener() {

                          public void actionPerformed(ActionEvent e){
                            // assign the book name, genre, price
                              String bname = F_bname.getText();
                              String genre = F_genre.getText();
                              String price = F_price.getText();
                              //convert price of integer to int
                          int price_int = Integer.parseInt(price);

                             Connection connection = connect();

                                            try{
                     Statement stmt = connection.createStatement();
                               stmt.executeUpdate("USE LIBRARY");
stmt.executeUpdate("INSERT INTO BOOKS(BNAME,GENRE,PRICE) VALUES ('"+bname+"','"+genre
                        JOptionPane.showMessageDialog(null,"Book added!");
                                         g.dispose();

                                             }

                                 catch (SQLException e1) {
                                // TODO Auto-generated catch block
                             JOptionPane.showMessageDialog(null, e1);
                                             }

                                             }

                                        });

                                      g.add(l3);
                                  g.add(create_but);
                                      g.add(l1);
                                      g.add(l2);
                                    g.add(F_bname);
```

```
                                              g.add(F_genre);
                                              g.add(F_price);
                              g.setSize(350,200);//400 width and 500 height
                               g.setLayout(null);//using no layout managers
                               g.setVisible(true);//making the frame visible
                                      g.setLocationRelativeTo(null);

                                             }
                                            });


JButton issue_book=new JButton("Issue Book"); //creating instance of JButton to issue
                           issue_book.setBounds(450,20,120,25);

                    issue_book.addActionListener(new ActionListener() {
                          public void actionPerformed(ActionEvent e){
                                            //enter details
                                JFrame g = new JFrame("Enter Details");
                          //g.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
                                            //create labels
                                         JLabel l1,l2,l3,l4;
                        l1=new JLabel("Book ID(BID)");  // Label 1 for Book ID
                                     l1.setBounds(30,15, 100,30);


                         l2=new JLabel("User ID(UID)");  //Label 2 for user ID
                                     l2.setBounds(30,53, 100,30);

                         l3=new JLabel("Period(days)");  //Label 3 for period
                                     l3.setBounds(30,90, 100,30);

                  l4=new JLabel("Issued Date(DD-MM-YYYY)");  //Label 4 for issue date
                                     l4.setBounds(30,127, 150,30);

                                 JTextField F_bid = new JTextField();
                                  F_bid.setBounds(110, 15, 200, 30);


                                  JTextField F_uid=new JTextField();
                                  F_uid.setBounds(110, 53, 200, 30);

                                 JTextField F_period=new JTextField();
                                 F_period.setBounds(110, 90, 200, 30);

                                 JTextField F_issue=new JTextField();
                                F_issue.setBounds(180, 130, 130, 30);


               JButton create_but=new JButton("Submit");//creating instance of JButtor
                  create_but.setBounds(130,170,80,25);//x axis, y axis, width, height
                          create_but.addActionListener(new ActionListener() {

                                public void actionPerformed(ActionEvent e){

                                       String uid = F_uid.getText();
                                       String bid = F_bid.getText();
                                    String period = F_period.getText();
                                  String issued_date = F_issue.getText();

                                int period_int = Integer.parseInt(period);

                                    Connection connection = connect();

                                                   try{
                              Statement stmt = connection.createStatement();
                                     stmt.executeUpdate("USE LIBRARY");
                 stmt.executeUpdate("INSERT INTO ISSUED(UID,BID,ISSUED_DATE,PERIOD) V
               ('"+uid+"','"+bid+"','"+issued_date+"',"+period_int+")");
                            JOptionPane.showMessageDialog(null,"Book Issued!");
                                                g.dispose();

                                                     }

                                          catch (SQLException e1) {
                                       // TODO Auto-generated catch block
                                    JOptionPane.showMessageDialog(null, e1);
                                                    }

                                                     }

                                                  });


                                                g.add(l3);
                                                g.add(l4);
                                            g.add(create_but);
                                                g.add(l1);
                                                g.add(l2);
```

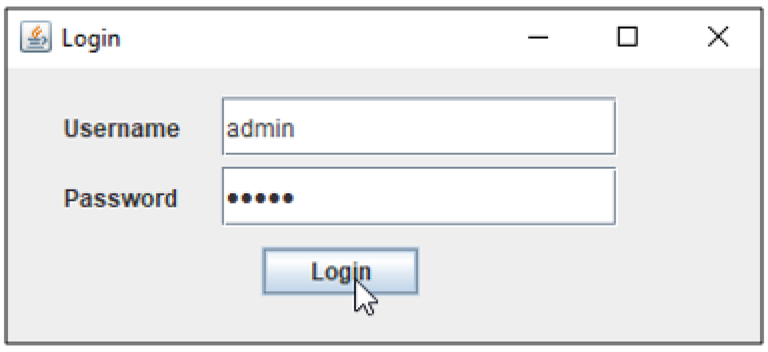
```
                                                    g.add(F_uid);
                                                    g.add(F_bid);
                                                   g.add(F_period);
                                                   g.add(F_issue);
                                    g.setSize(350,250);//400 width and 500 height
                                    g.setLayout(null);//using no layout managers
                                    g.setVisible(true);//making the frame visible
                                            g.setLocationRelativeTo(null);


                                                   }
                                                  });


    JButton return_book=new JButton("Return Book"); //creating instance of JButton to return
                                return_book.setBounds(280,60,160,25);

                         return_book.addActionListener(new ActionListener() {
                                public void actionPerformed(ActionEvent e){

                                      JFrame g = new JFrame("Enter Details");
                               //g.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
                                                   //set labels
                                               JLabel l1,l2,l3,l4;
                              l1=new JLabel("Issue ID(IID)");  //Label 1 for Issue ID
                                           l1.setBounds(30,15, 100,30);


                                    l4=new JLabel("Return Date(DD-MM-YYYY)");
                                           l4.setBounds(30,50, 150,30);

                                       JTextField F_iid = new JTextField();
                                        F_iid.setBounds(110, 15, 200, 30);


                                       JTextField F_return=new JTextField();
                                      F_return.setBounds(180, 50, 130, 30);


JButton create_but=new JButton("Return");//creating instance of JButton to mention return da
                       create_but.setBounds(130,170,80,25);//x axis, y axis, width, height
                                create_but.addActionListener(new ActionListener() {

                              public void actionPerformed(ActionEvent e){

                                             String iid = F_iid.getText();
                                       String return_date = F_return.getText();

                                          Connection connection = connect();

                                                         try {
                                    Statement stmt = connection.createStatement();
                                          stmt.executeUpdate("USE LIBRARY");
                                           //Intialize date1 with NULL value
                                                   String date1=null;
                              String date2=return_date; //Intialize date2 with return date

                                                  //select issue date
                  ResultSet rs = stmt.executeQuery("SELECT ISSUED_DATE FROM ISSUED WHERE II
                                                  while (rs.next()) {
                                                 date1 = rs.getString(1);

                                                             }

                                                          try {
                                 Date date_1=new SimpleDateFormat("dd-MM-yyyy").parse(date1)
                                 Date date_2=new SimpleDateFormat("dd-MM-yyyy").parse(date2)
                                            //subtract the dates and store in diff
                                       long diff = date_2.getTime() - date_1.getTime();
                                           //Convert diff from milliseconds to days
                              ex.days=(int)(TimeUnit.DAYS.convert(diff, TimeUnit.MILLISECON


                                               } catch (ParseException e1) {
                                              // TODO Auto-generated catch block
                                                    e1.printStackTrace();
                                                             }


                                                 //update return date
                 stmt.executeUpdate("UPDATE ISSUED SET RETURN_DATE='"+return_date+"' WHERE
                                                     g.dispose();


                                          Connection connection1 = connect();
                                   Statement stmt1 = connection1.createStatement();
                                  stmt1.executeUpdate("USE LIBRARY");
             ResultSet rs1 = stmt1.executeQuery("SELECT PERIOD FROM ISSUED WHERE IID="+iid)
```

```
                                        String diff=null;
                                       while (rs1.next()) {
                                       diff = rs1.getString(1);

                                                 }
                                  int diff_int = Integer.parseInt(diff);
         if(ex.days&amp;amp;amp;amp;amp;amp;amp;amp;amp;amp;amp;gt;diff_int) { //If number of days ar
                                   calculcate fine

                                     //System.out.println(ex.days);
                    int fine = (ex.days-diff_int)*10; //fine for every day after the period
                                      //update fine in the system
                      stmt1.executeUpdate("UPDATE ISSUED SET FINE="+fine+" WHERE IID="+i
                                   String fine_str = ("Fine: Rs. "+fine);
                                JOptionPane.showMessageDialog(null,fine_str);

                                                }

                          JOptionPane.showMessageDialog(null,"Book Returned!");

                                                }


                                      catch (SQLException e1) {
                                    // TODO Auto-generated catch block
                                   JOptionPane.showMessageDialog(null, e1);
                                                }

                                                }

                                              });
                                             g.add(l4);
                                         g.add(create_but);
                                             g.add(l1);
                                           g.add(F_iid);
                                          g.add(F_return);
                            g.setSize(350,250);//400 width and 500 height
                            g.setLayout(null);//using no layout managers
                            g.setVisible(true);//making the frame visible
                             g.setLocationRelativeTo(null);
                                          }
                                         });

                                    f.add(create_but);
                                   f.add(return_book);
                                    f.add(issue_book);
                                     f.add(add_book);
                                    f.add(issued_but);
                                     f.add(users_but);
                                      f.add(view_but);
                                      f.add(add_user);
                        f.setSize(600,200);//400 width and 500 height
                        f.setLayout(null);//using no layout managers
                        f.setVisible(true);//making the frame visible
                            f.setLocationRelativeTo(null);

                                          }
                                         }
```

Now that you have understood all the functions, let us execute our library management system project in Java and see the outputs.

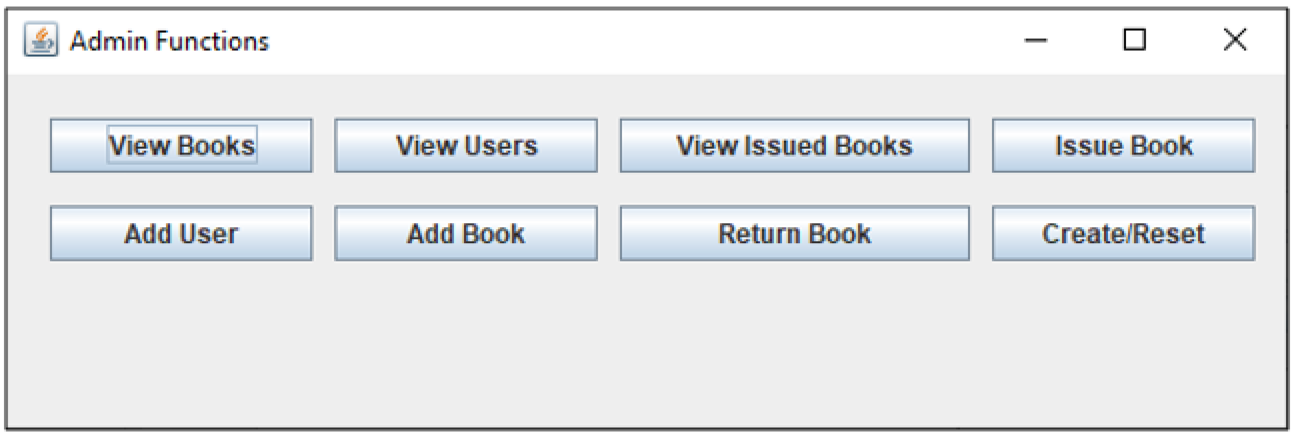
Output:

Execute the application by clicking on the run button. Once, you execute you will see the below dialog box. In the below dialog box, mention username and password as {admin, admin}. Then click on the Login button.


Username: admin

Password: •••••

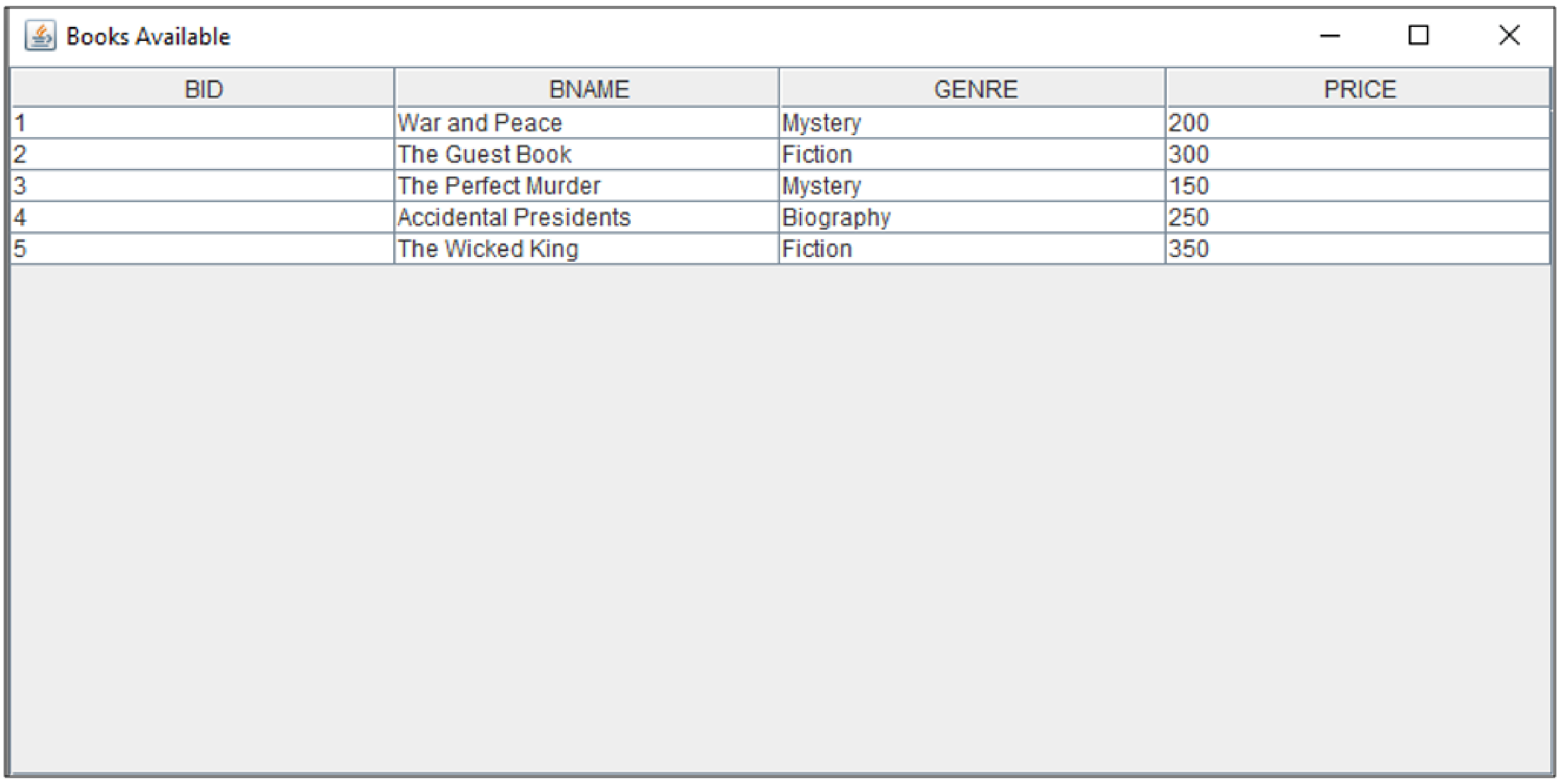
Once you click on the **Login button**, you will see the below dialog box opening up.



Here you have various options which you can explore. So, let us start with the first one:

View Books

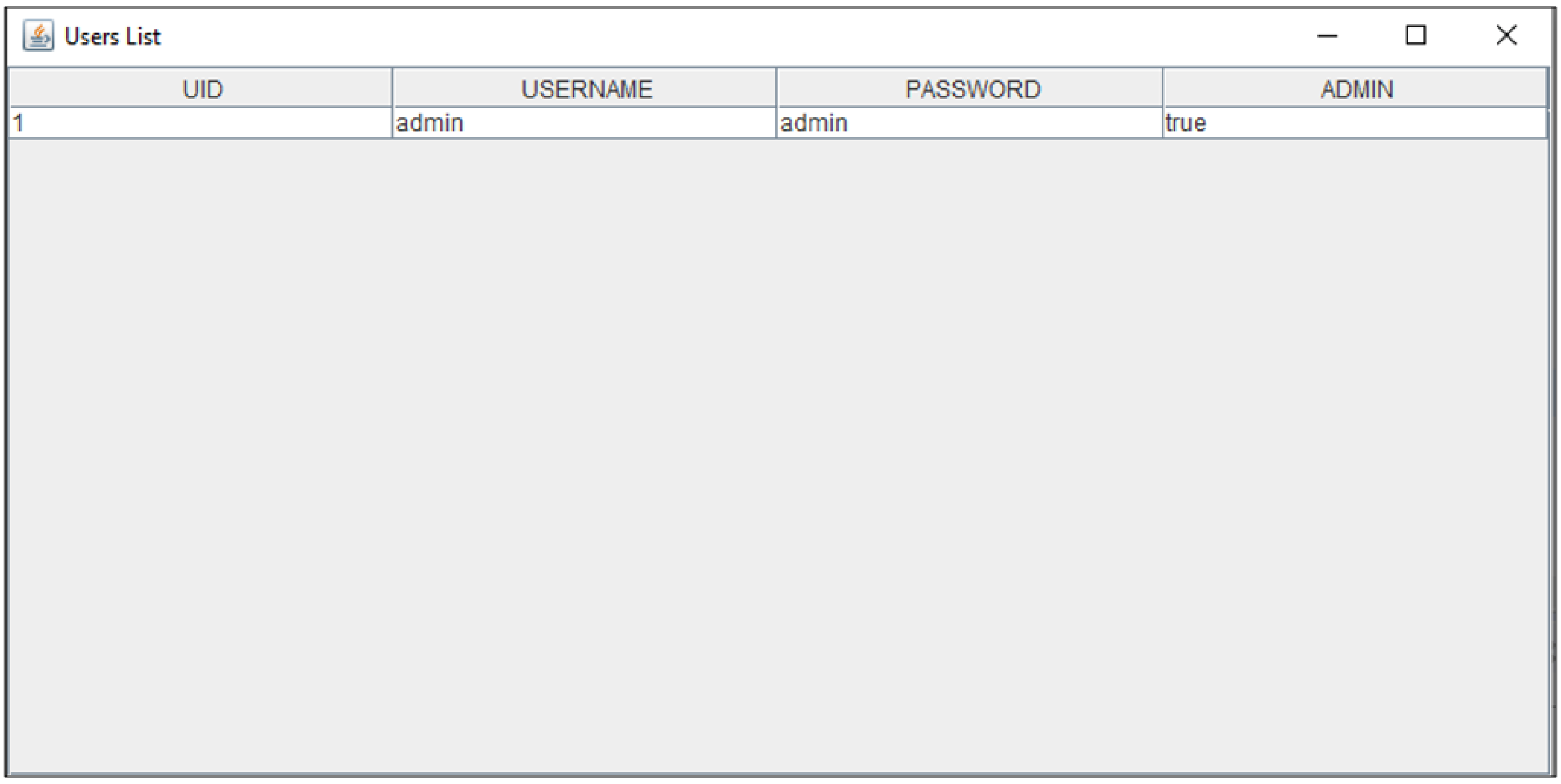
Once, you click on View Books button, you will see the below frame displaying all the books present in the database, with their details.



BID	BNAME	GENRE	PRICE
1	War and Peace	Mystery	200
2	The Guest Book	Fiction	300
3	The Perfect Murder	Mystery	150
4	Accidental Presidents	Biography	250
5	The Wicked King	Fiction	350

View Users

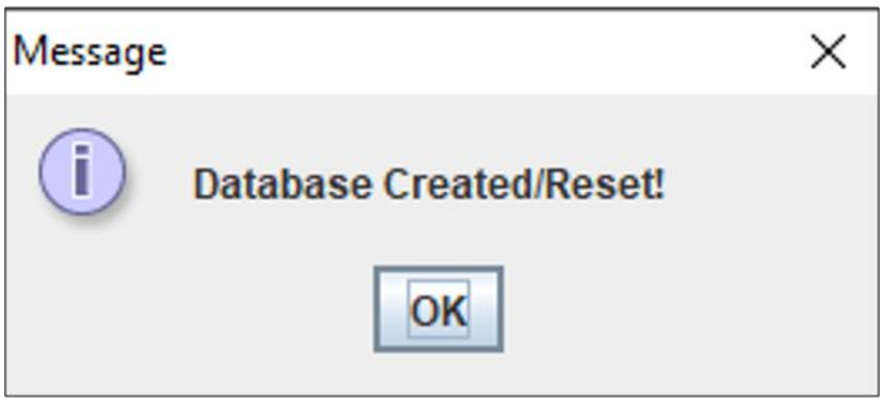
The View Users button is used to view the current users on the system. Since we just have only one user present i.e the admin, it will show you output as below:



UID	USERNAME	PASSWORD	ADMIN
1	admin	admin	true

Create/Reset

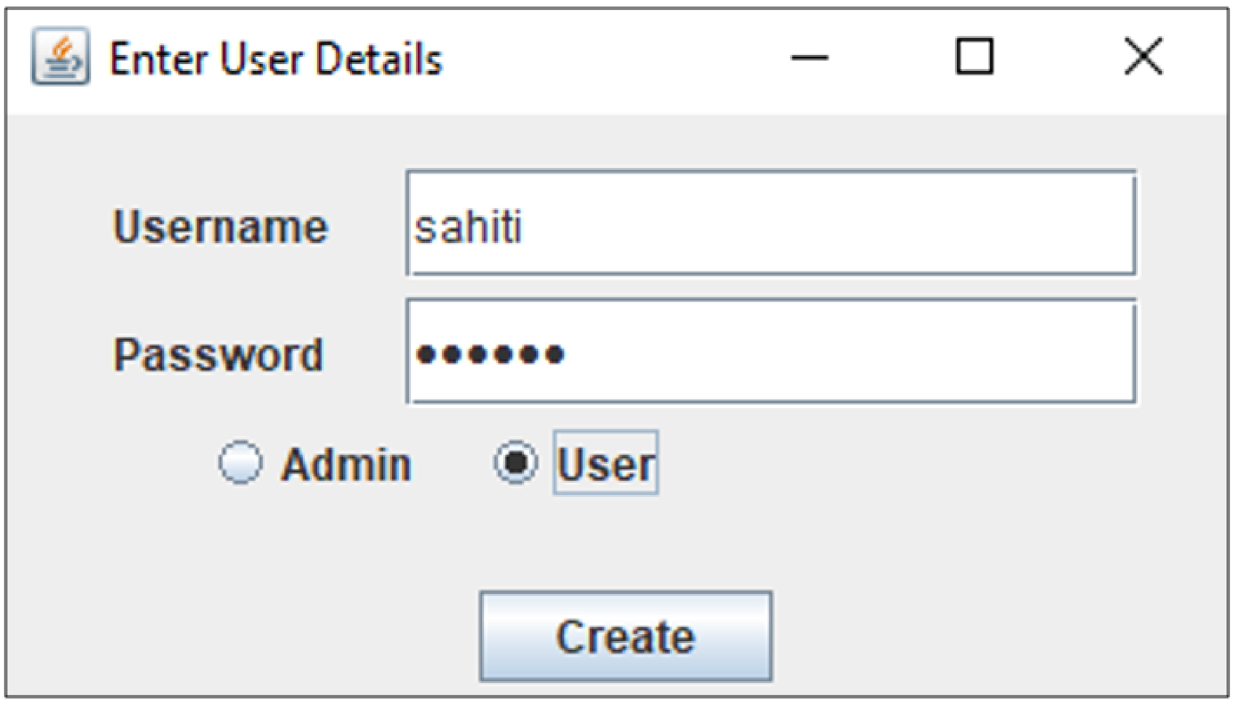
This functionality is used to create or reset a database. So, once you click on the button Create/Rest, you will see the below output:



Database Created/Reset!

Add User

To add a user, click on the option “**Add User**” and mention details such as **username, password and choose the radio button user or admin**. By default, it will be the user. Then, click on **Create**.



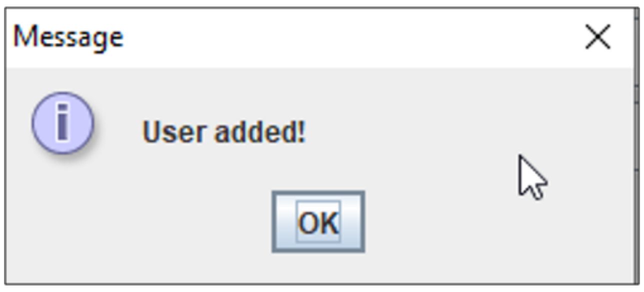
Enter User Details

Username: sahiti

Password: ●●●●●●

○ Admin ● User

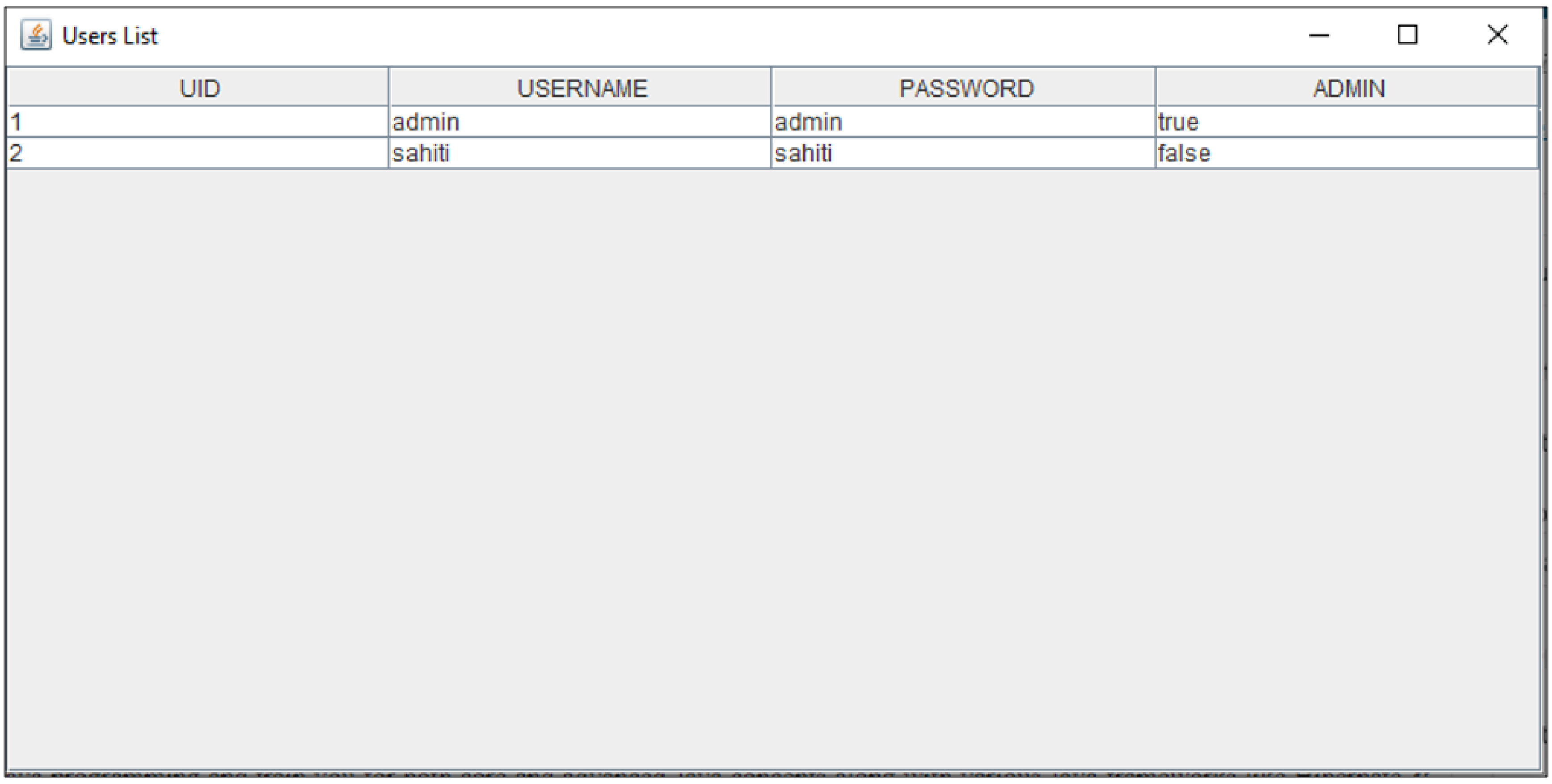
Once the user is created, you will see an output as below:



Message

User added!

Now, again if you click on **View Users button**, you will see the below output:



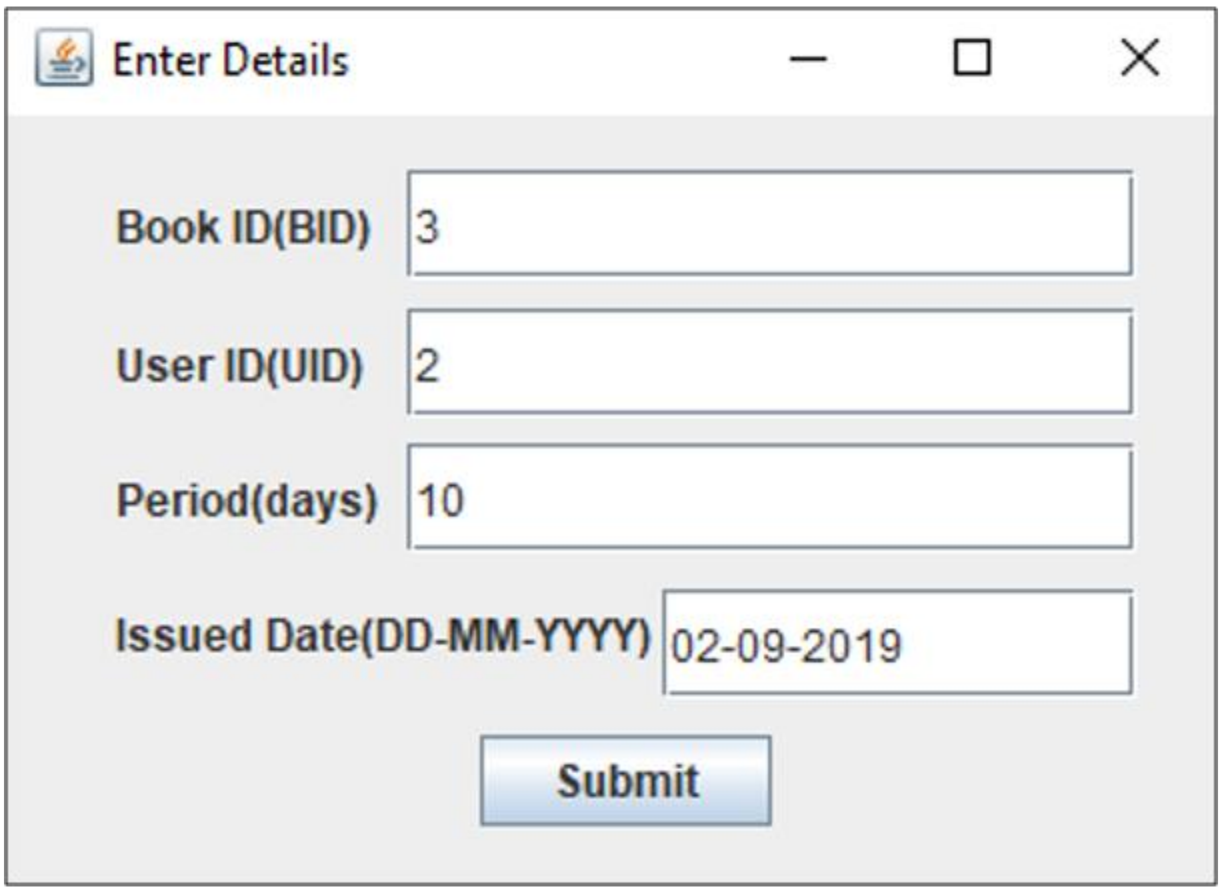
Users List

UID	USERNAME	PASSWORD	ADMIN
1	admin	admin	true
2	sahiti	sahiti	false

Alright, so now that we have added a user. Let us say, that particular user wants to issue books. To do that, the user has to choose the option of Issue Book.

Issue Book

Suppose, if you are the user, once you click on the **Issue Book button**, you have to mention the **Book ID, User ID, Period(Number of days for issuing the book)**, and the **Issue Date** as follows:



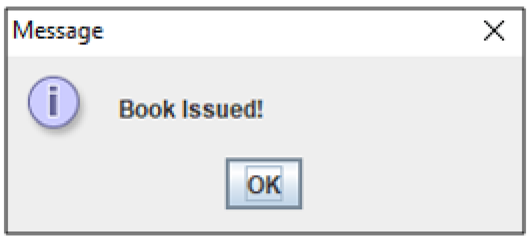
Book ID(BID) 3

User ID(UID) 2

Period(days) 10

Issued Date(DD-MM-YYYY) 02-09-2019

Then click on **Submit**. Once, you click on **Submit**, you will see the below dialog box:

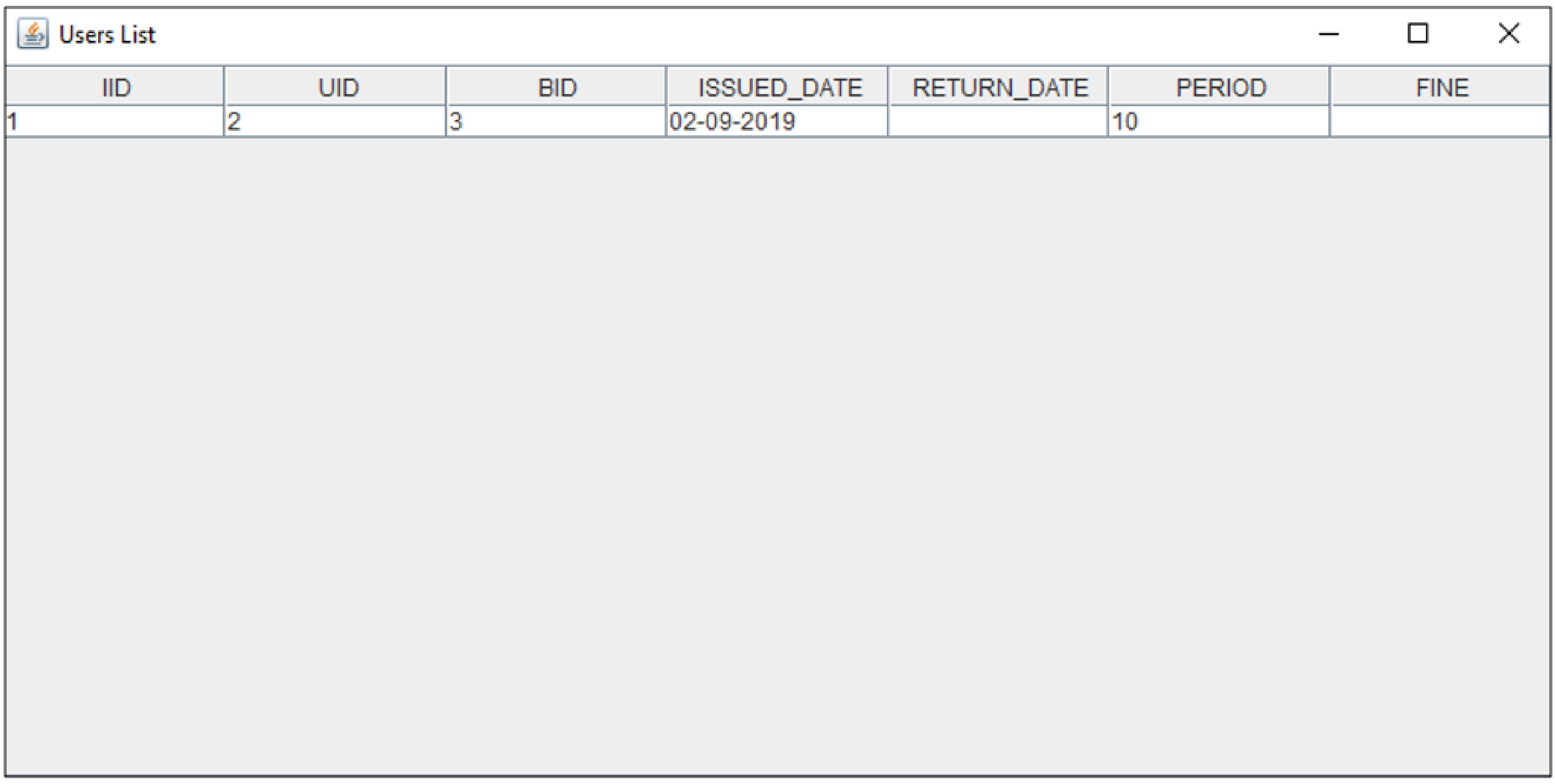


Book Issued!

Now, if you want to see the issued books details, you can use the View Issued Books functionality.

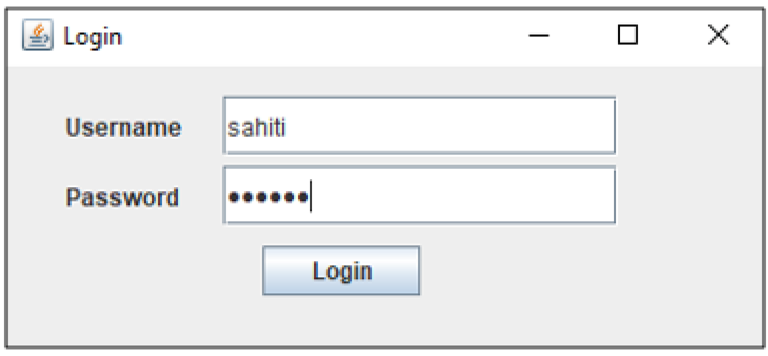
View Issued Books

Once you click on this button, you will see the following output:



IID	UID	BID	ISSUED_DATE	RETURN_DATE	PERIOD	FINE
1	2	3	02-09-2019		10	

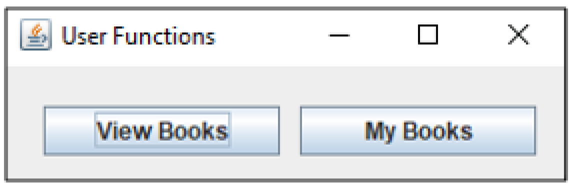
Alright, so, now **if the user logs in to the system**, using the login function, as below:



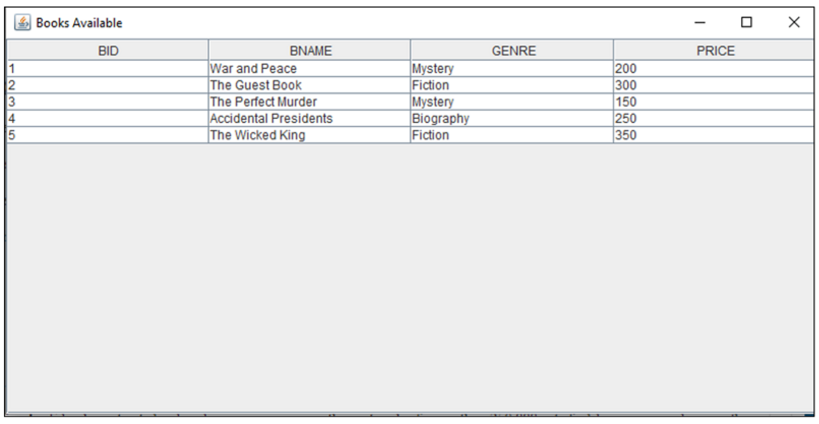
Username sahiti

Password ••••••

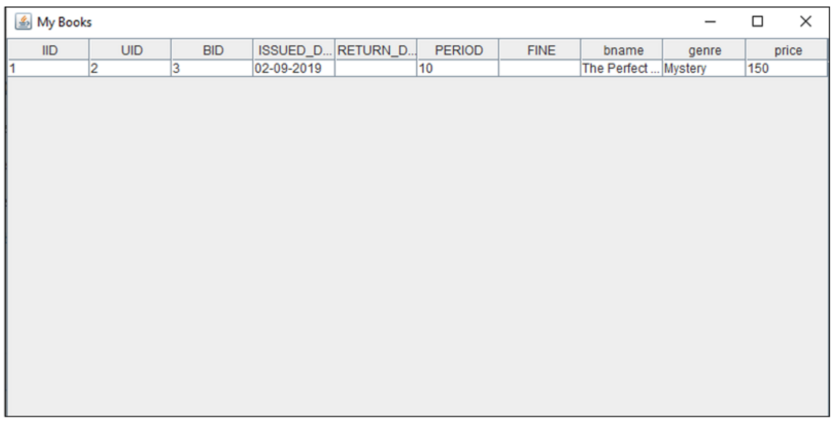
Then the user will see the below User Menu.



Here, the user can **view all the books** in the database by **using the View Books option** and the **books issued by the user** in the **My Books section** as below:



BID	BNAME	GENRE	PRICE
1	War and Peace	Mystery	200
2	The Guest Book	Fiction	300
3	The Perfect Murder	Mystery	150
4	Accidental Presidents	Biography	250
5	The Wicked King	Fiction	350

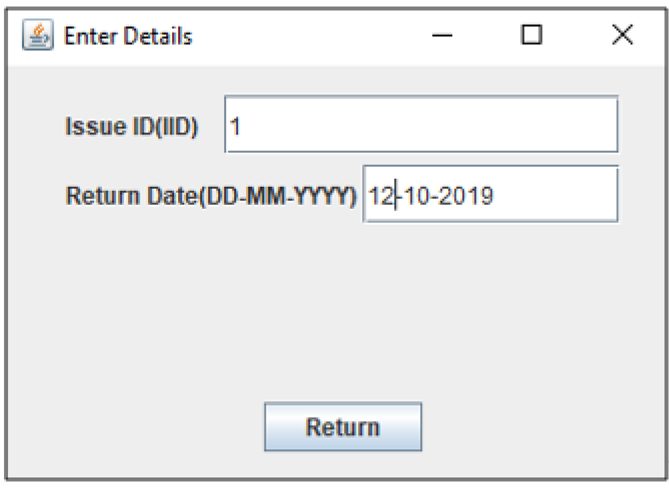


IID	UID	BID	ISSUED_D...	RETURN_D...	PERIOD	FINE	bname	genre	price
1	2	3	02-09-2019		10		The Perfect ...	Mystery	150

Now, if you wish to return the book, then you have to choose the option of Return Book.

Return Book

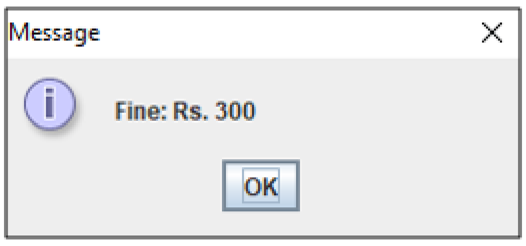
Once, you click on the Return Book, mention the **Issue ID and the return date** as below. Then click on **Return**.



Issue ID(IID) 1

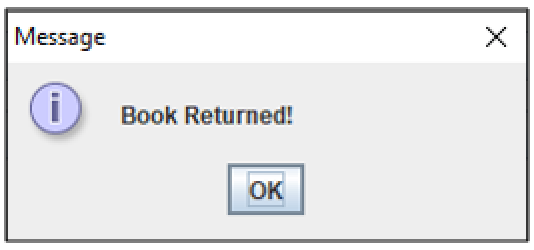
Return Date(DD-MM-YYYY) 12-10-2019

Then, you see a message box displaying the fine.



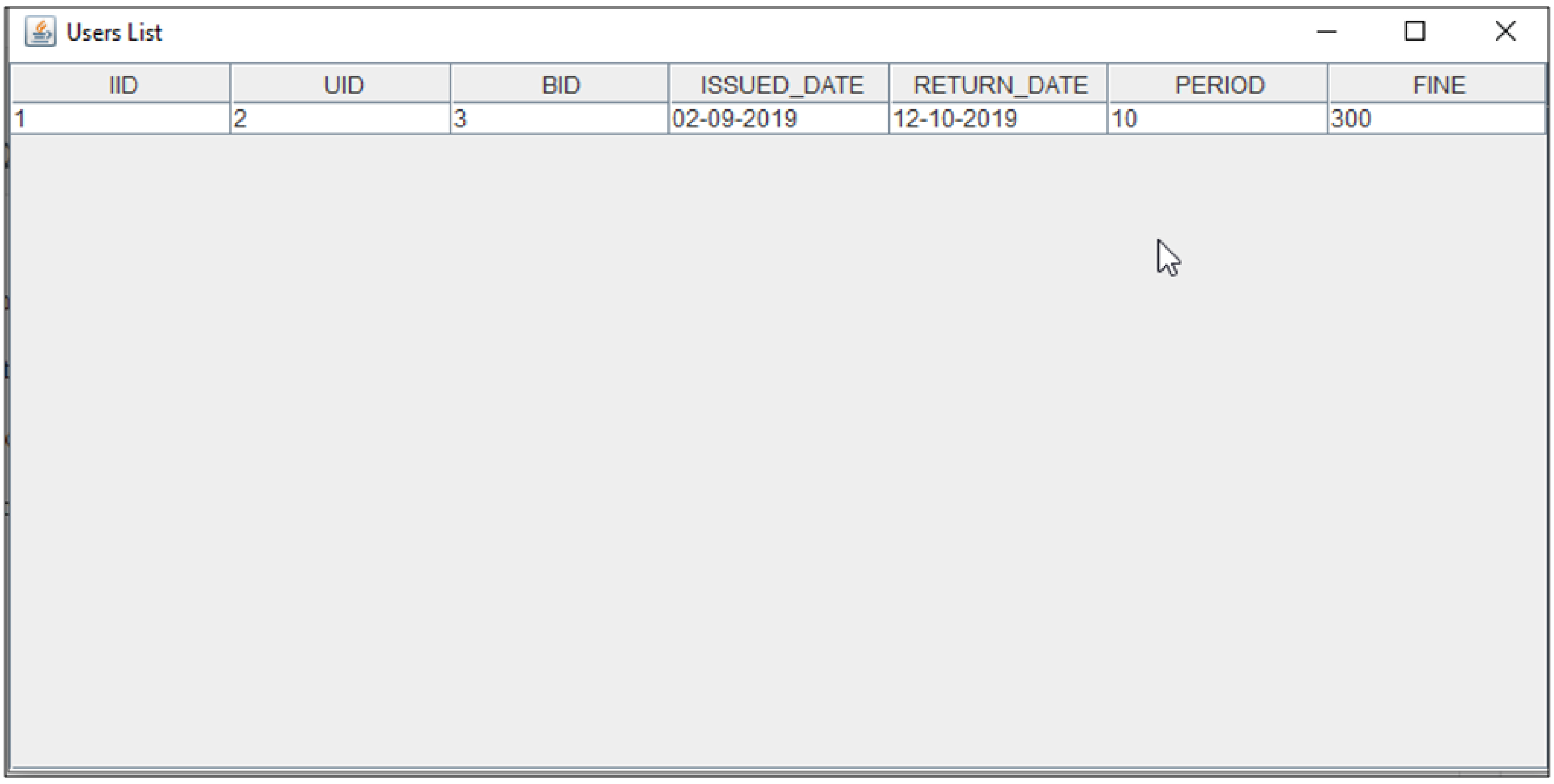
Fine: Rs. 300

After that, you again see a dialog box, showing the message “**Book Returned**“. Refer below.



Book Returned!

Now, if you click on the **View Issued Books**, you will see the below output:

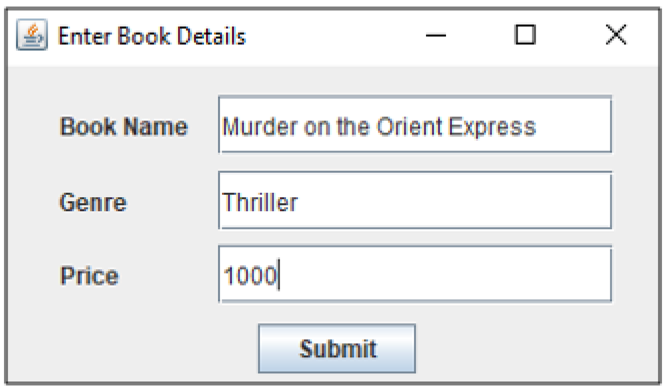

Users List

IID	UID	BID	ISSUED_DATE	RETURN_DATE	PERIOD	FINE
1	2	3	02-09-2019	12-10-2019	10	300

Lastly, if you wish to add a book, you can use the option of Add Book.

Add Book

Click on the **Add Book button**, and mention the **book name, genre and price**. Then, click on the **Submit button**. Refer below.

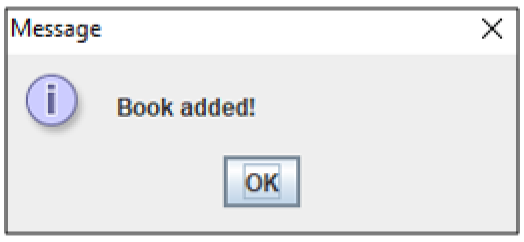

Enter Book Details

Book Name: Murder on the Orient Express

Genre: Thriller

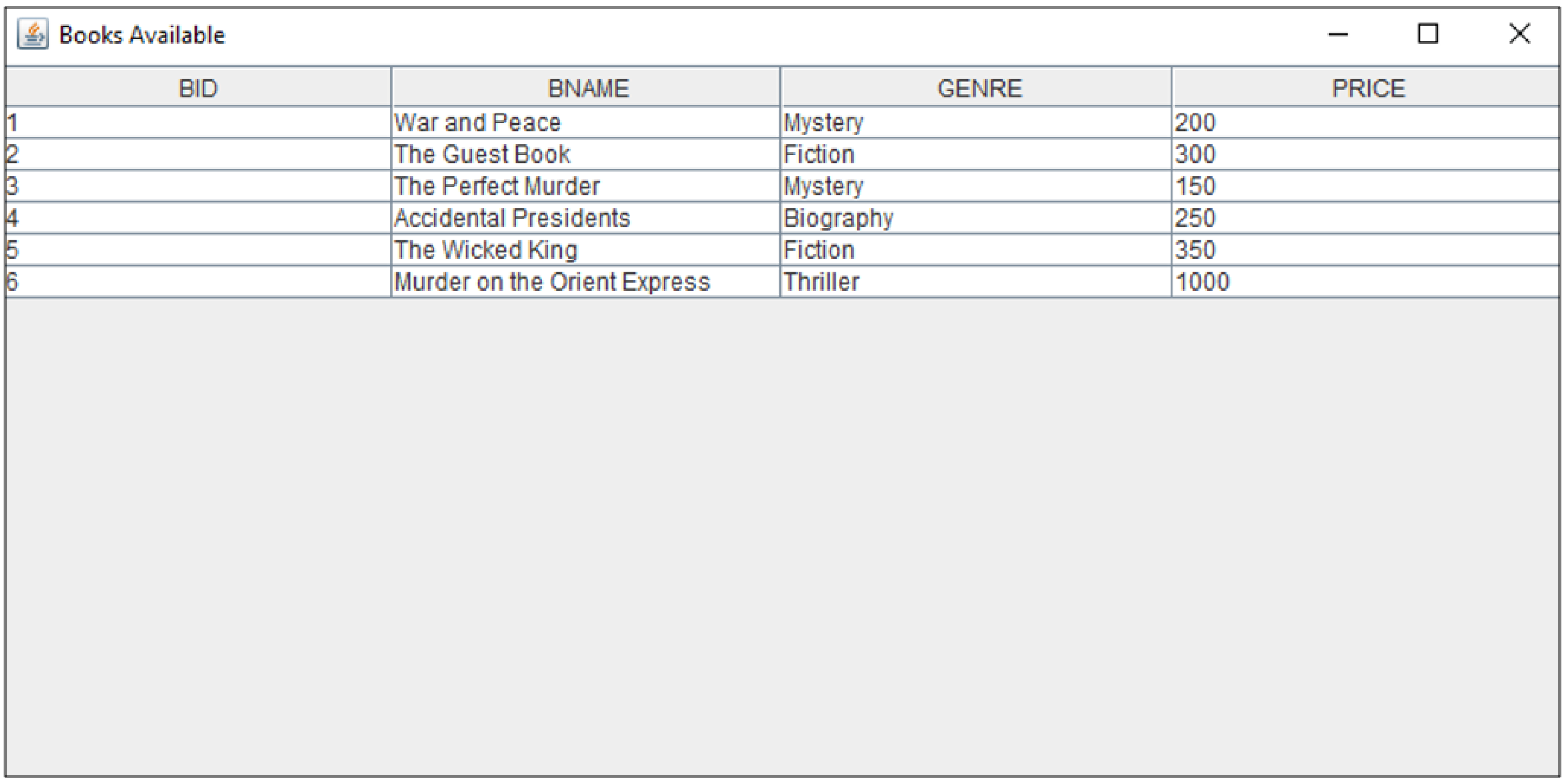
Price: 1000

You will see a dialog box displaying the below message:


Message

Book added!

Apart from this, you can also, see the added books in the **View Books** section as below:



BID	BNAME	GENRE	PRICE
1	War and Peace	Mystery	200
2	The Guest Book	Fiction	300
3	The Perfect Murder	Mystery	150
4	Accidental Presidents	Biography	250
5	The Wicked King	Fiction	350
6	Murder on the Orient Express	Thriller	1000

This brings us to the end of our article on Library Management System Project in Java. I hope you found this article informative and added value to your knowledge.