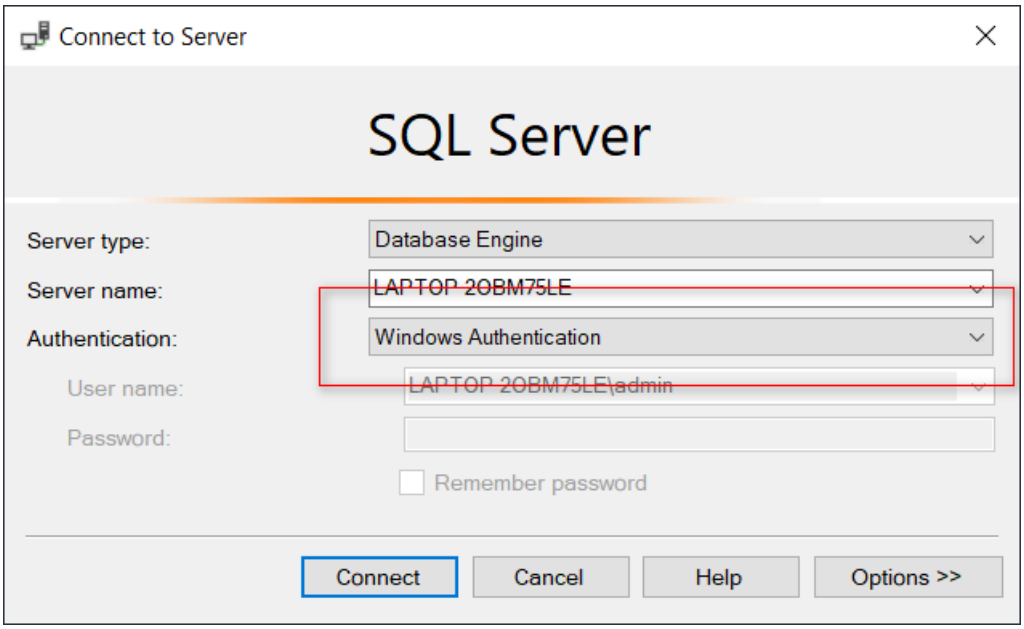
HOWTO: OPEN DATABASE CONNECTION FROM JAVA TO SQL SERVER

Contents

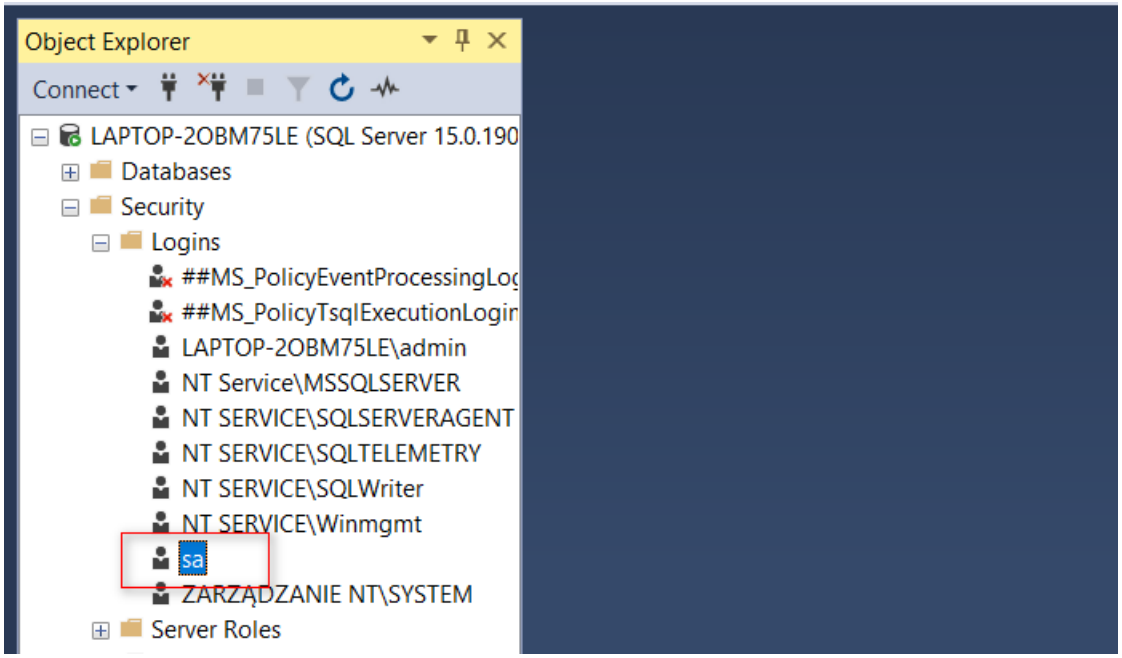
I. Database

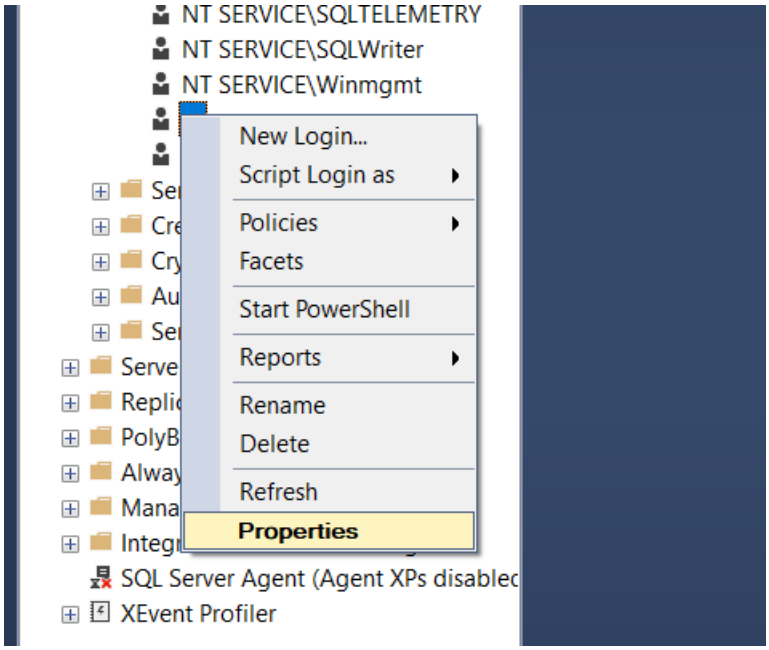
A. Create a login user

- Login to SQL Server with **Authentication** is set to **Windows Authentication.**

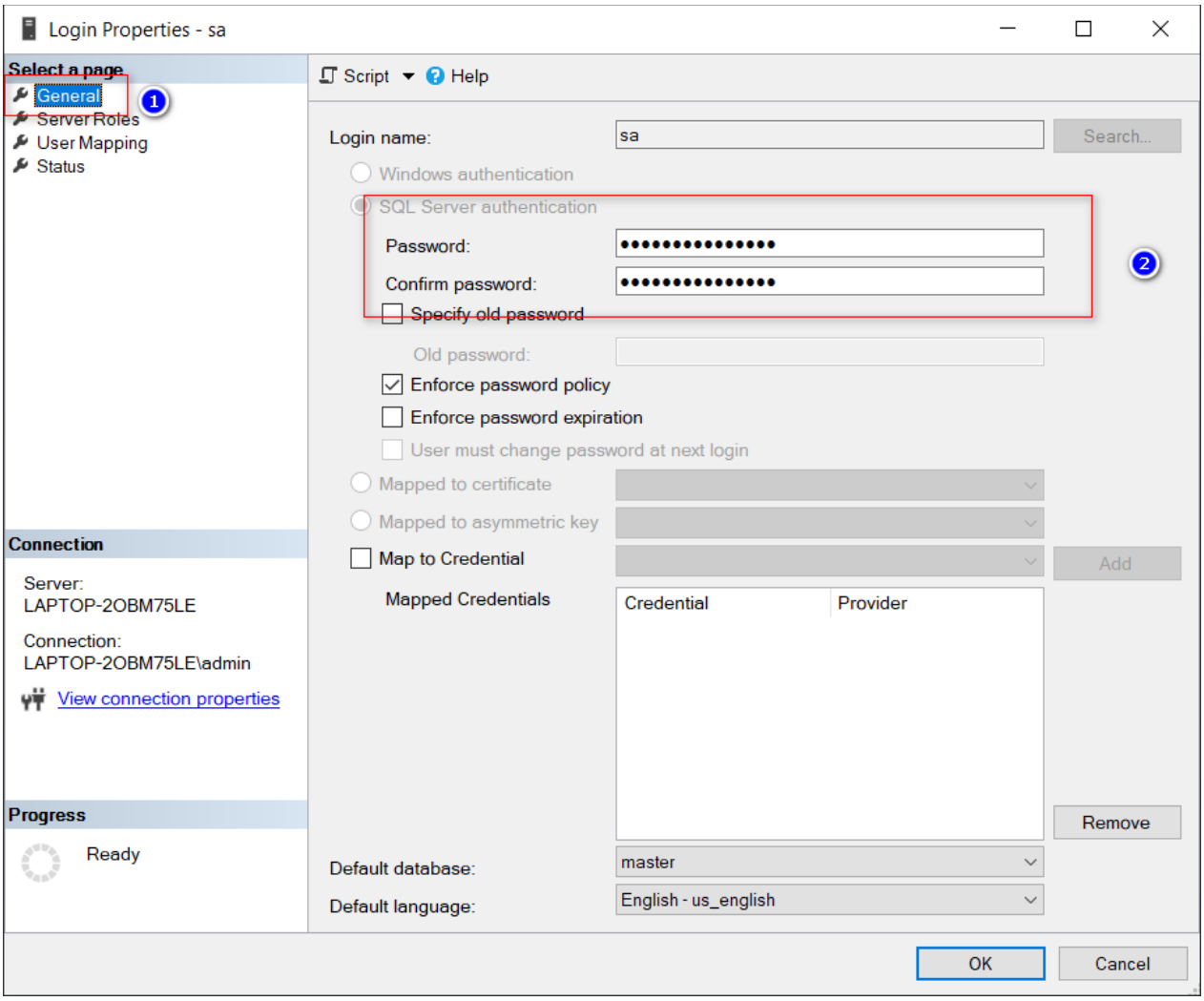


- From the Object Explorer window, select to expand **Security** and then **Logins**. Right click it on **sa** and click **Properties**.

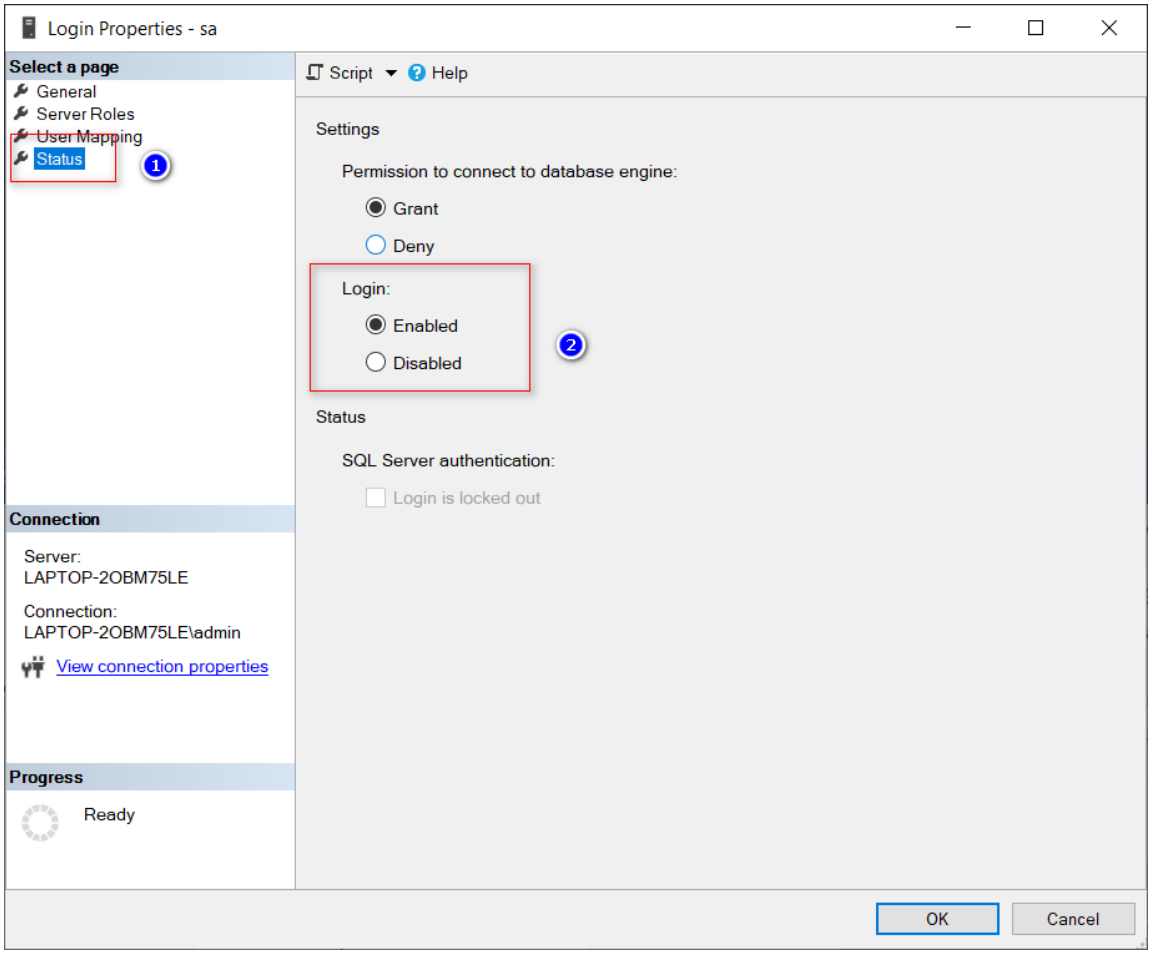




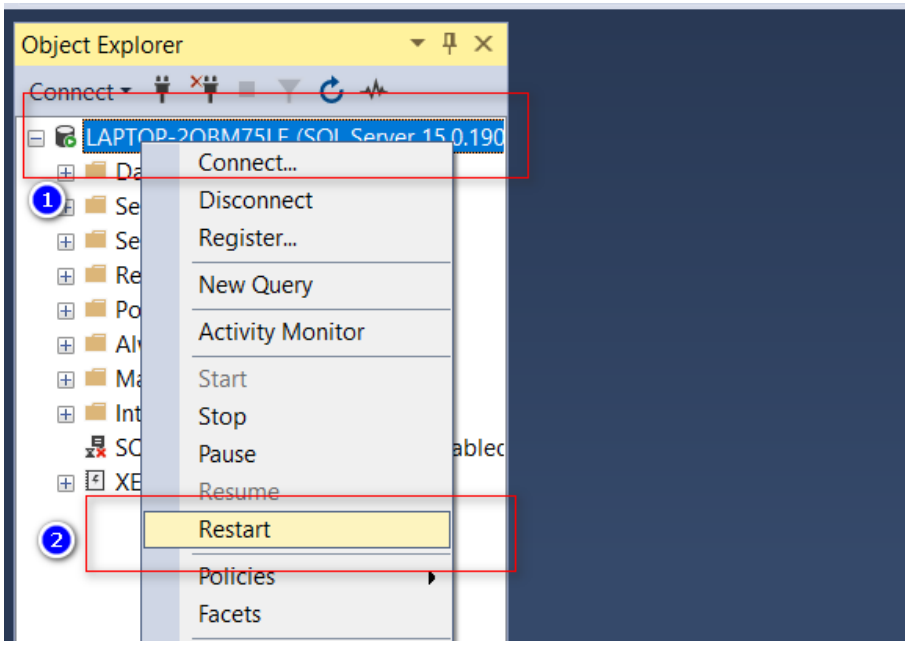
- From the General page, assign a password for user **sa**. For instance: **sa.**



- Next, switch to Status page and select **Enabled** in the **Login** section. Click **OK** to finish.



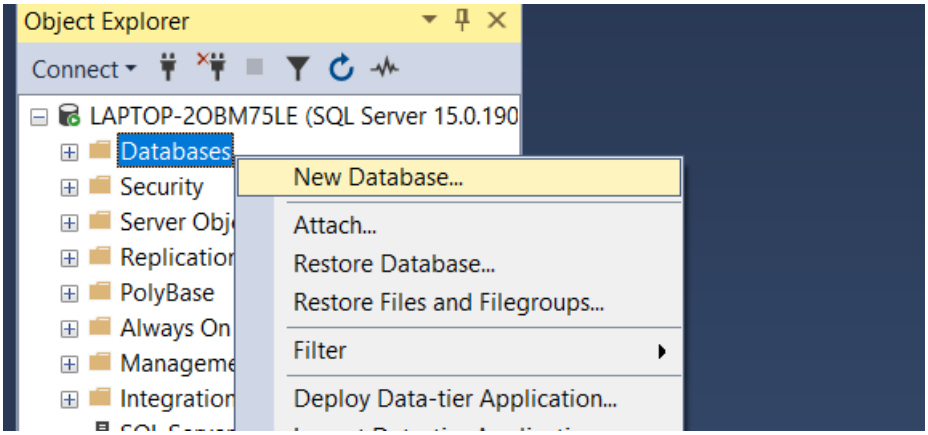
- Restart the database server by right clicking the server name in the Object Explorer window and click **Restart**.



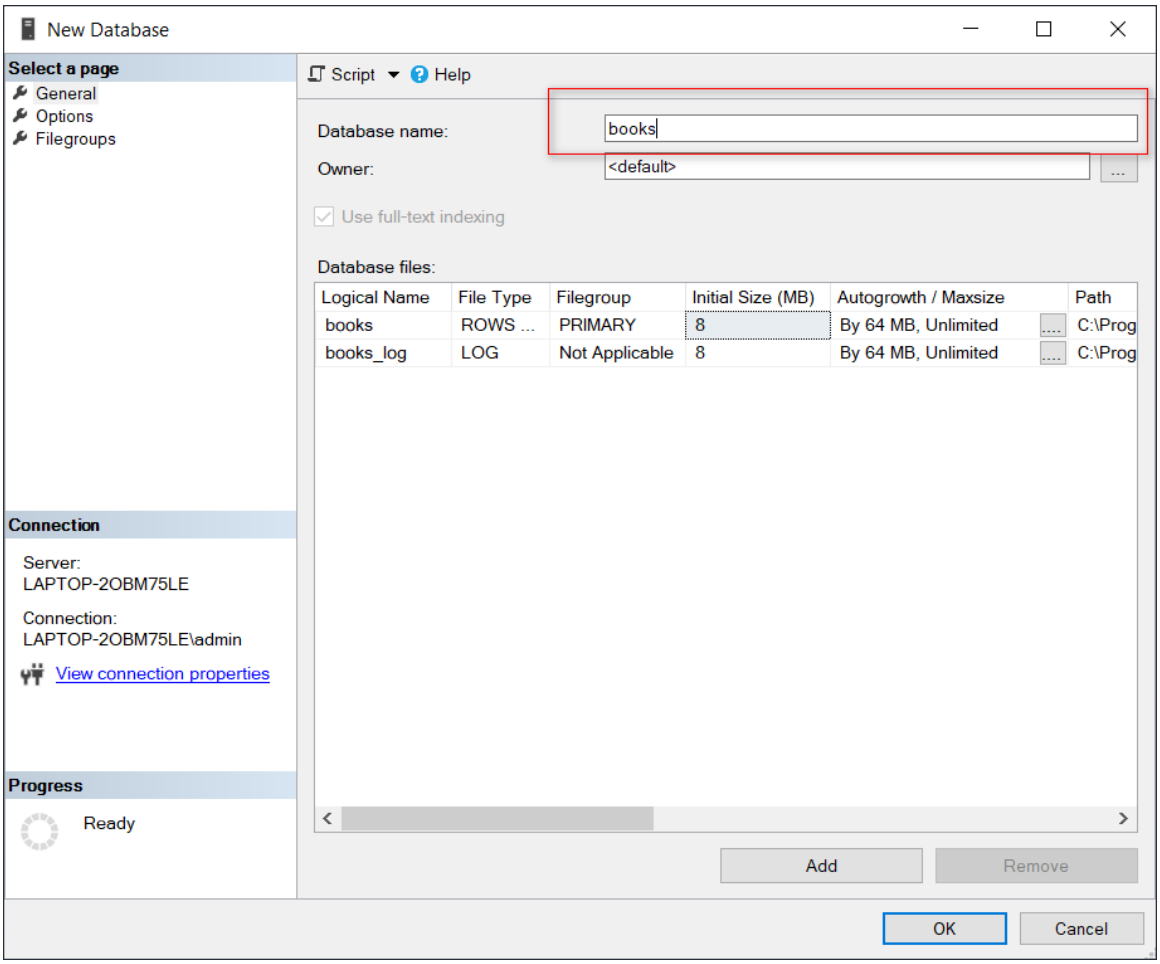
- Select **Yes** to perform the action.

B. Create a database

- Sample **books** database has Four tables: authors, publishers, authorISBN and titles
- Right click on the Databases, select **New Database.**



- Set the Database name to **books**



- Relationships among the tables

Column	Description
authorID	Author's ID number in the database. In the books database, this integer column is defined as *autoincremented*. For each row inserted in this table, the database automatically increments the authorID value to ensure that each row has a unique authorID. This column represents the table's primary key.
firstName	Author's first name (a string).
lastName	Author's last name (a string).
authors table from books.	

authorID	FirstName	LastName
1	Harvey	Deitel
2	Paul	Deitel
3	Tem	Nieto
4	Seam	Santry

Sample data from the authors table

Column	Description
publisherID	The publisher's ID number in the database. This autoincremented integer is the table's primary key.
publisherName	The name of the publisher (a string).
publishers table from books.	

PublisherID	PublisherName
1	Prentice Hall
2	Prentice Hall PTG
Data from the Publishers table	

Column	Description
isbn	ISBN of the book (a string). The table's primary key.
title	Title of the book (a string).
editionNumber	Edition number of the book (an integer).
copyright	Copyright year of the book (a string).
publisherID	Publisher's ID number (an integer). A foreign key to the publishers table.
imageFile	Name of the file containing the book's cover image (a string).
price	Suggested retail price of the book (a real number). [*Note:* The prices shown in this book are for example purposes only.]
titles table from books.	

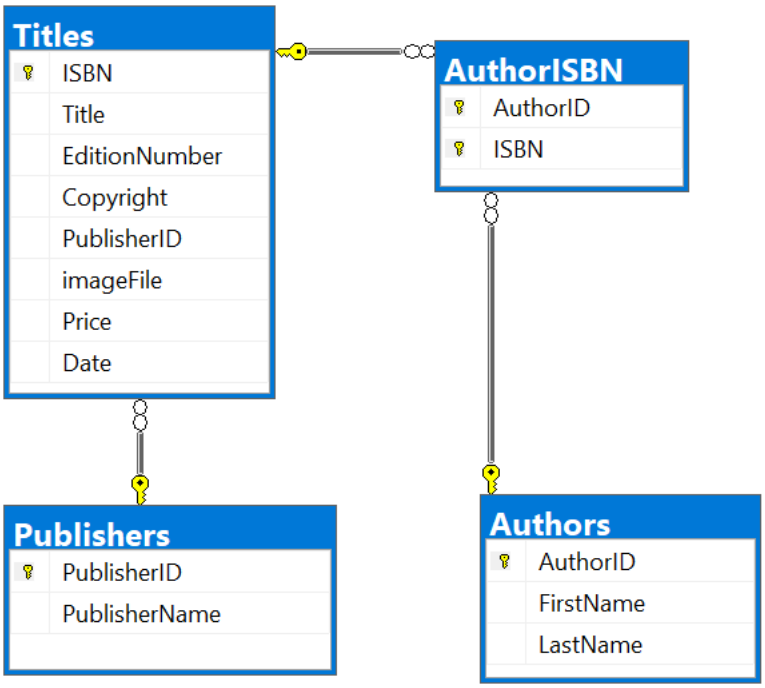
isbn	title	Edition Number	Copyright	Publisher ID	imageFile	price
0130895725	C How to Program	3	2001	1	chtp3.jpg	74.95
0130384747	C++ How to Program	4	2002	1	cpphtp4.jpg	74.95
0130461342	Java Web Services for Experienced Programmers	1	2002	1	jwsfep1.jpg	54.95
0131016210	Java How to Program	5	2003	1	jhtp5.jpg	74.95
0130852473	The Complete Java 2 Training Course	5	2002	2	javactc5.jpg	109.95
0130895601	Advanced Java 2 Platform How to Program	1	2002	1	advjhtp1.jpg	74.95
Sample data from the titles table of books.						

Column	Description
authorID	The author's ID number, a foreign key to the authors table.
isbn	The ISBN for a book, a foreign key to the titles table..
authorISBN table from books.	

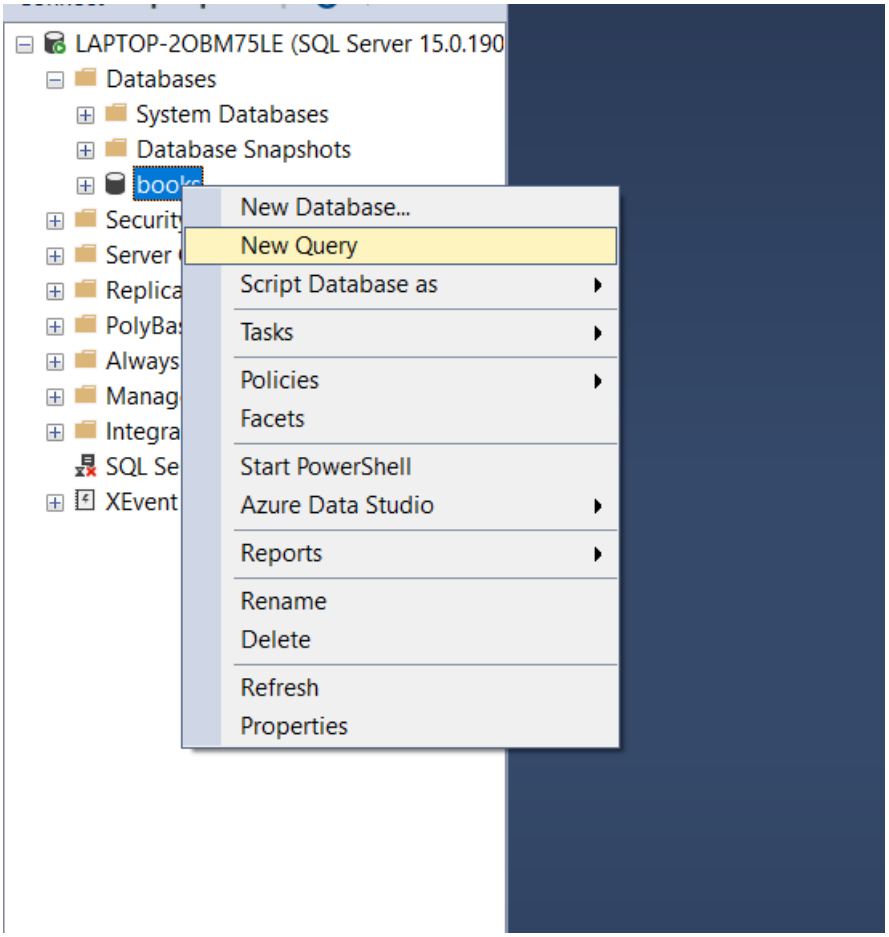
AuthorID	ISBN
1	0130461342
1	0130852473
1	0130895601
1	0130895725
1	0131016210
2	0130384747
2	0130852473
2	0130895601
2	0130895725
2	0131016210

Sample data from the AuthorISBN table of books

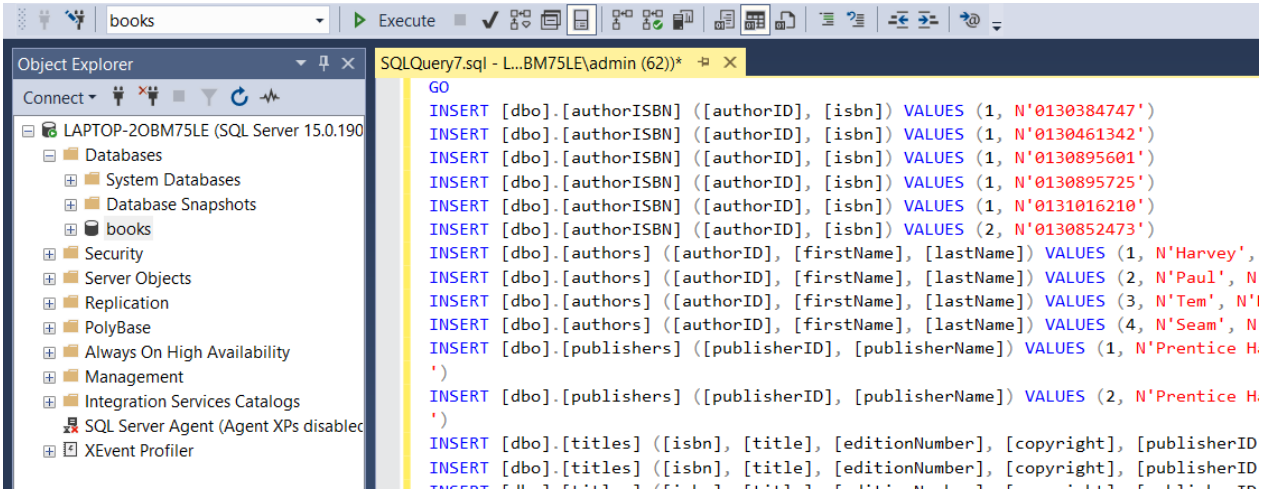
This is a diagram of Books database



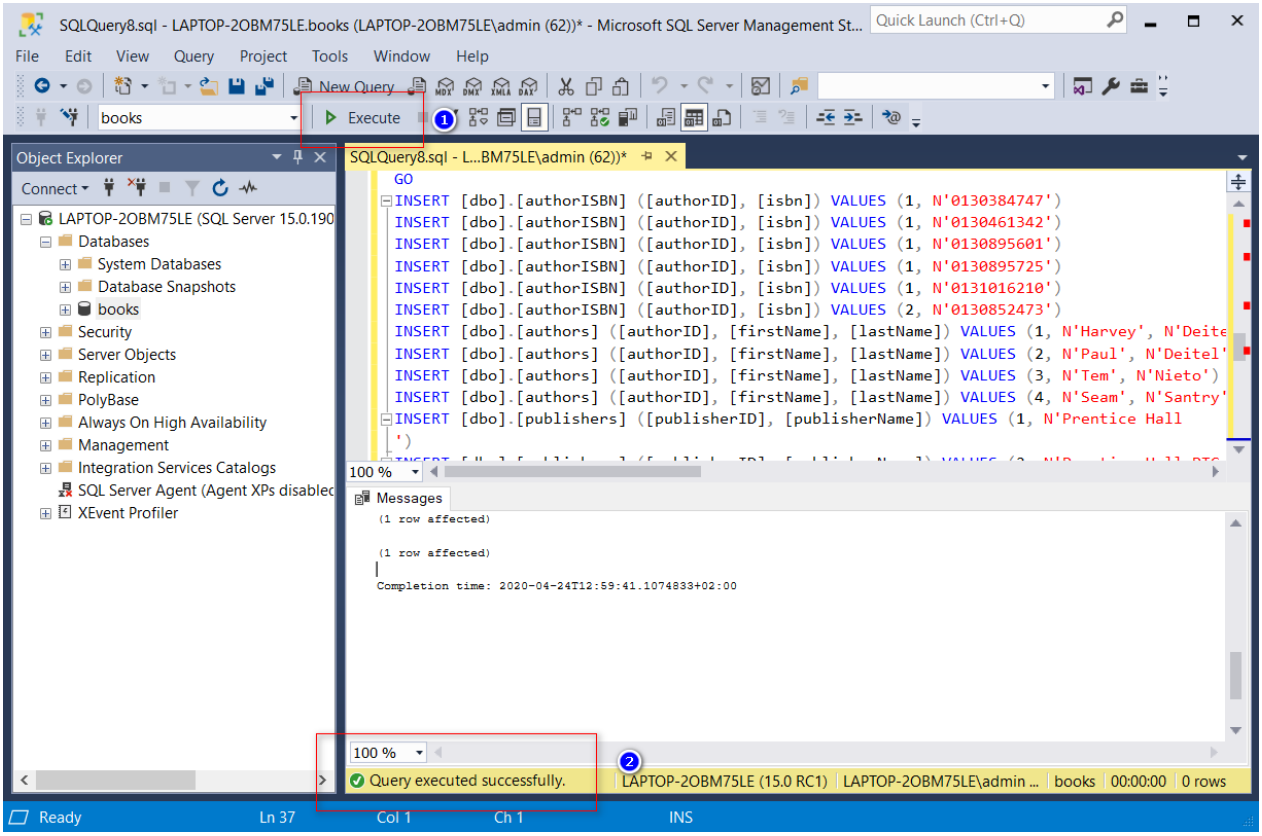
- Or maybe, you also use another way to create a Books database: Right click onto the newly created database **books**, select **New Query**.



- Copy and paste the whole content of the file **books.sql** into the editor window.



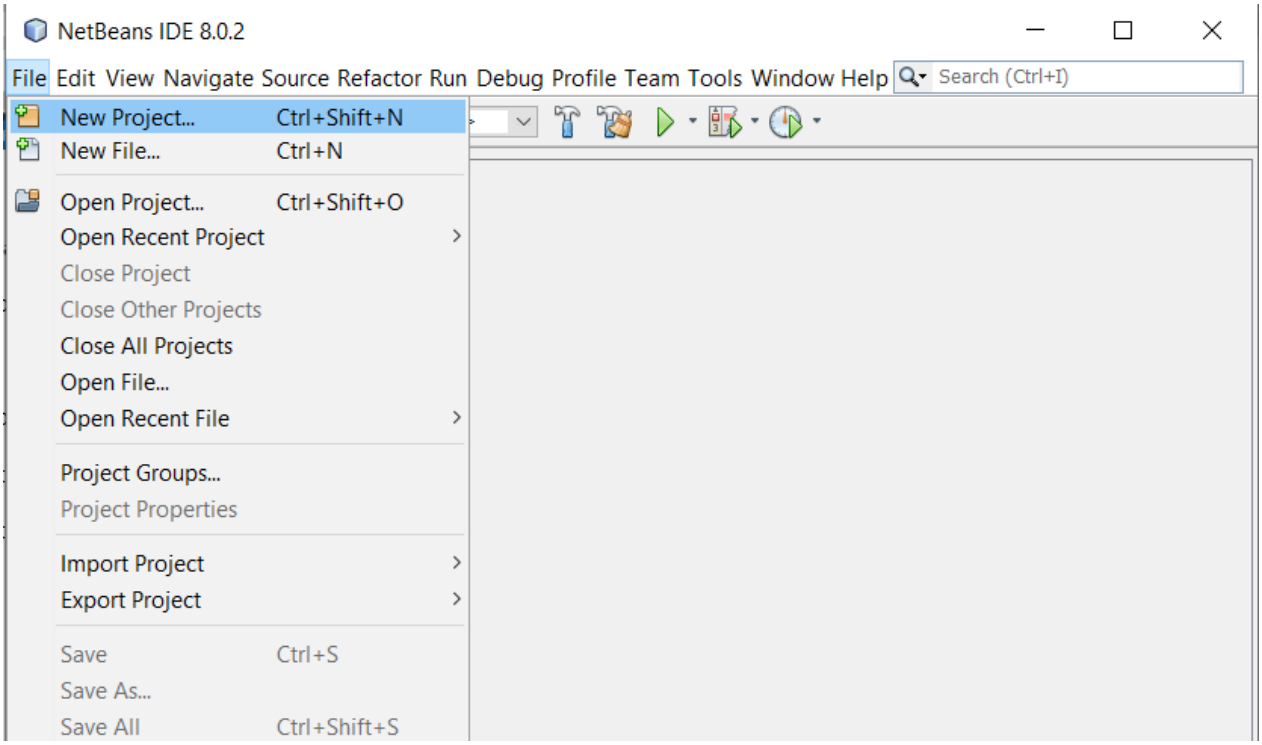
- Click **Execute** to run the script. A successful message will be displayed in the Messages window.



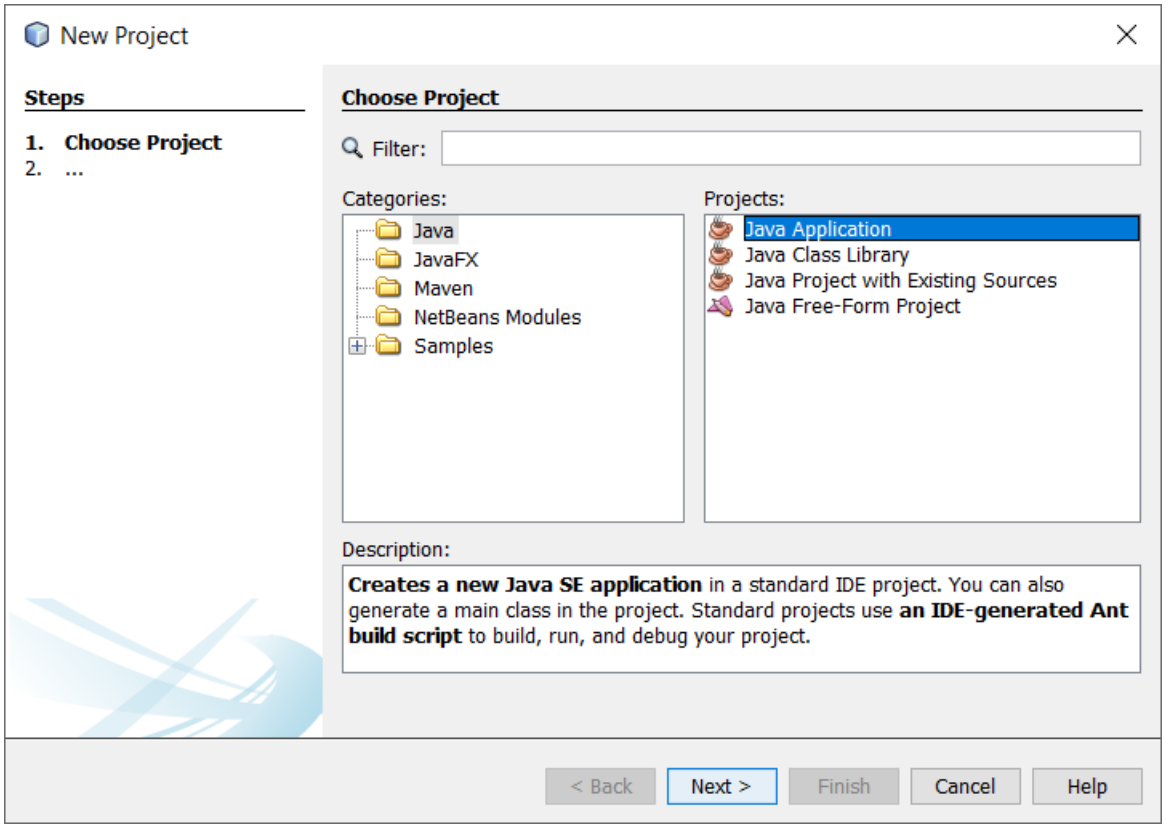
II. Java

A. Create a new project

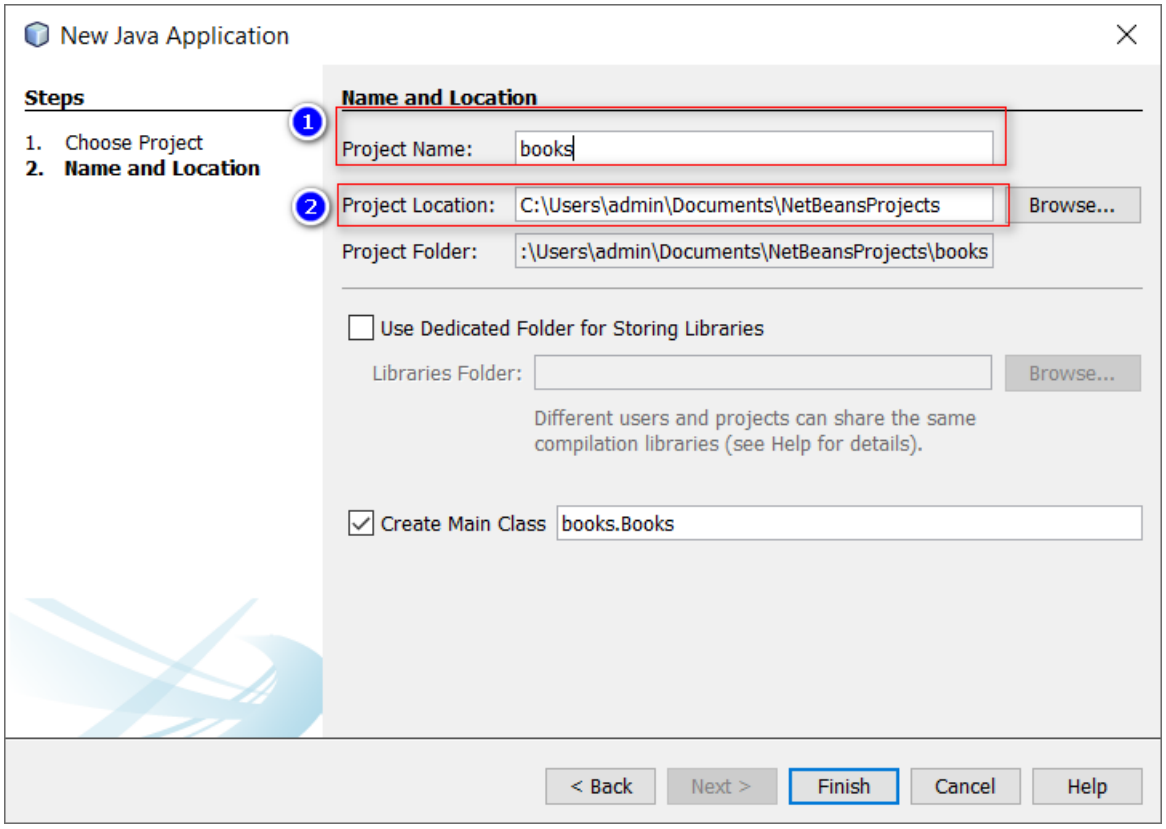
- Open Netbean, select **File** and click **New Project**



- Select **Java Application** and click **Next**

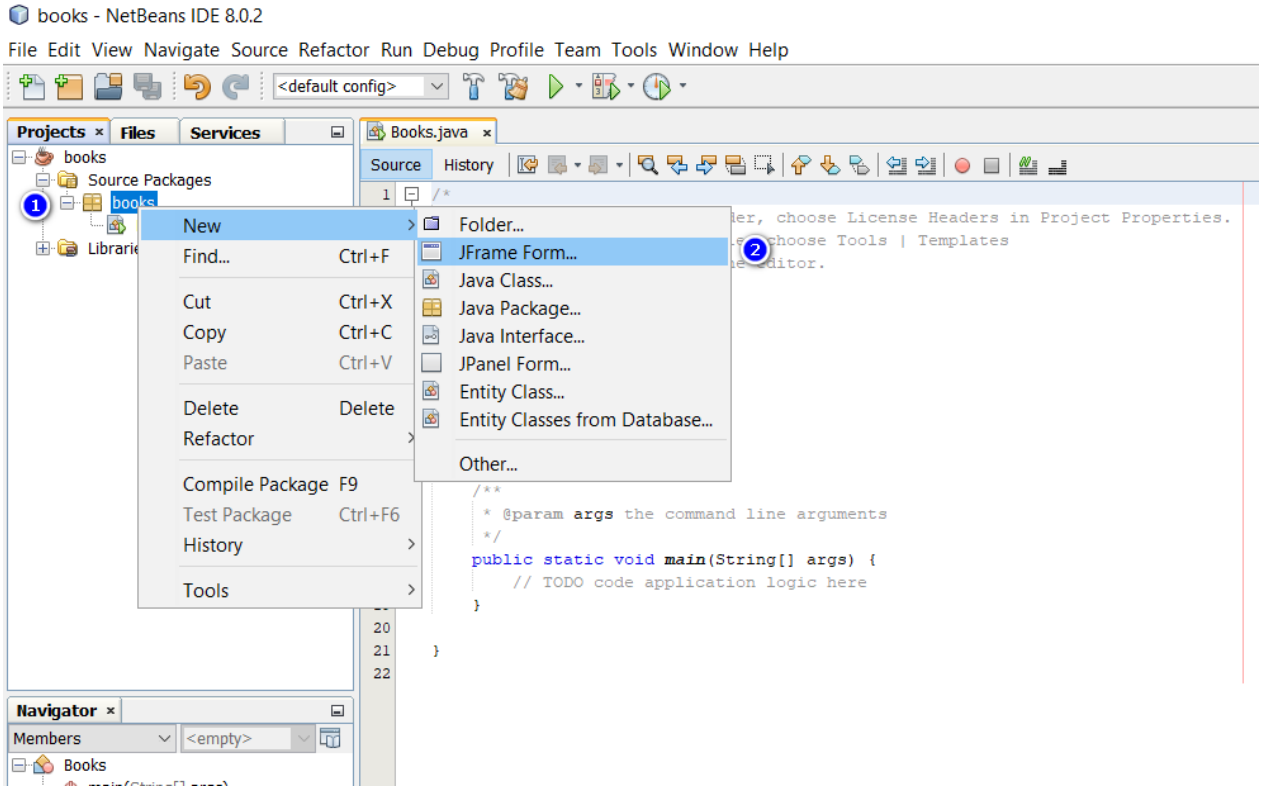


- Set the Project Name to **books**. Select a folder to store the project (optional) and then click **Finish**.

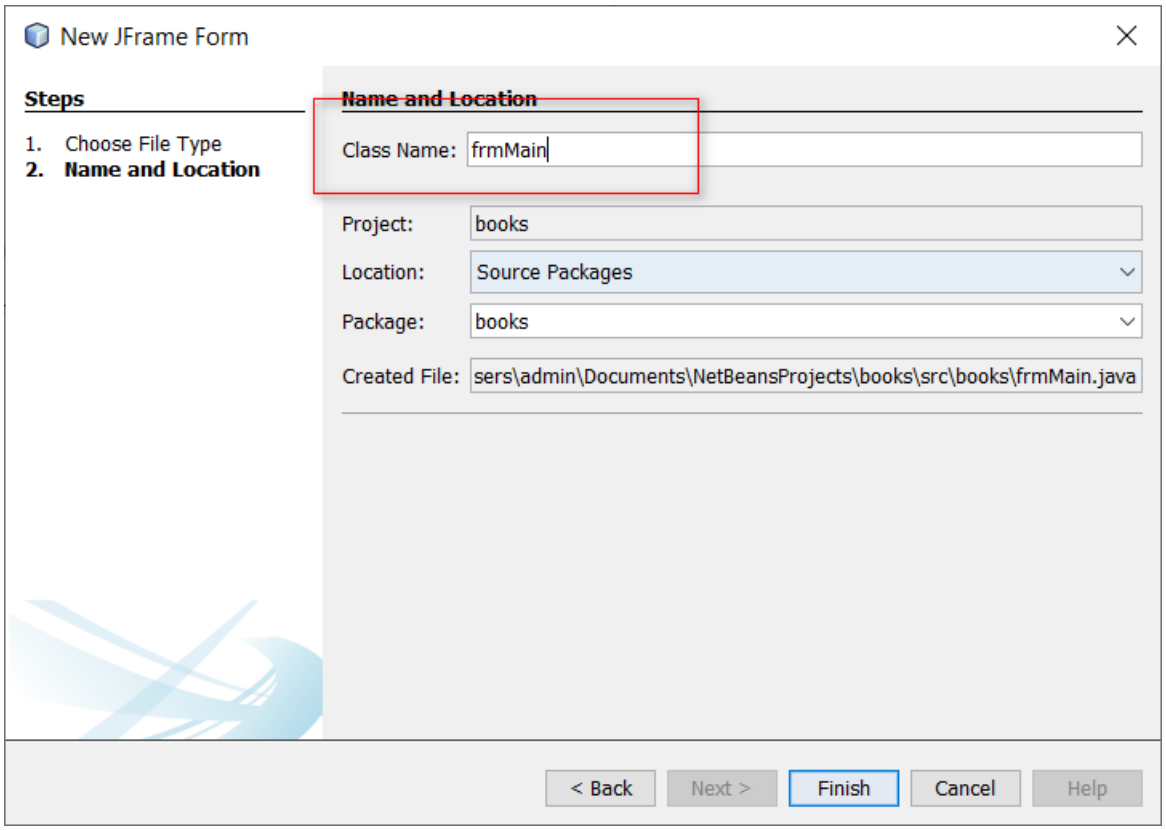


B. Create a form

- Right click on the **books** package, select **New**, and then **JFrame Form**

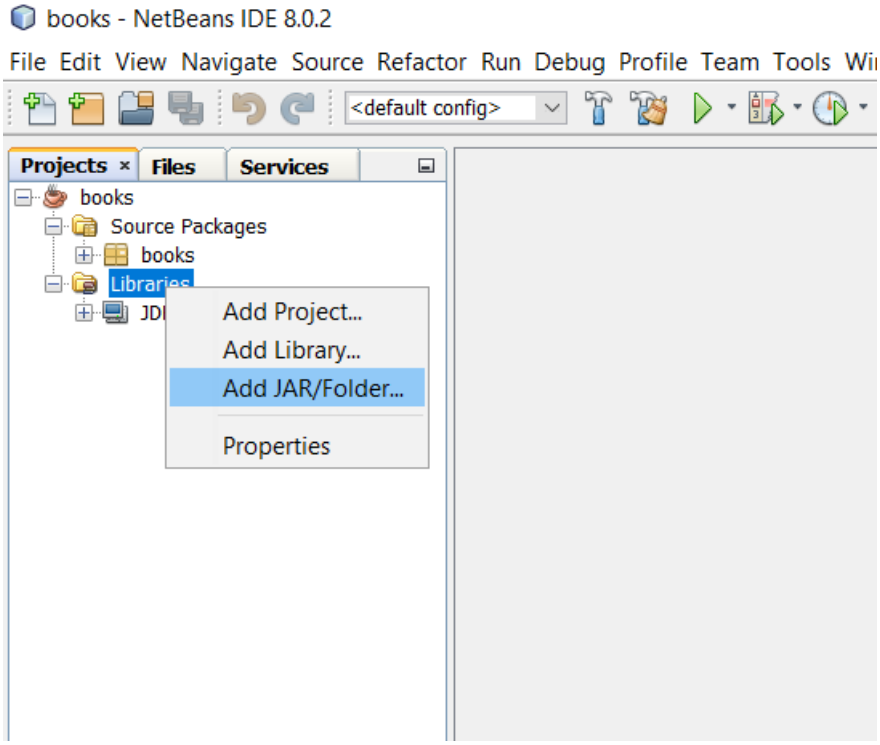


- Name the JFrame Form, i.e.: frmMain, then click **Finish**

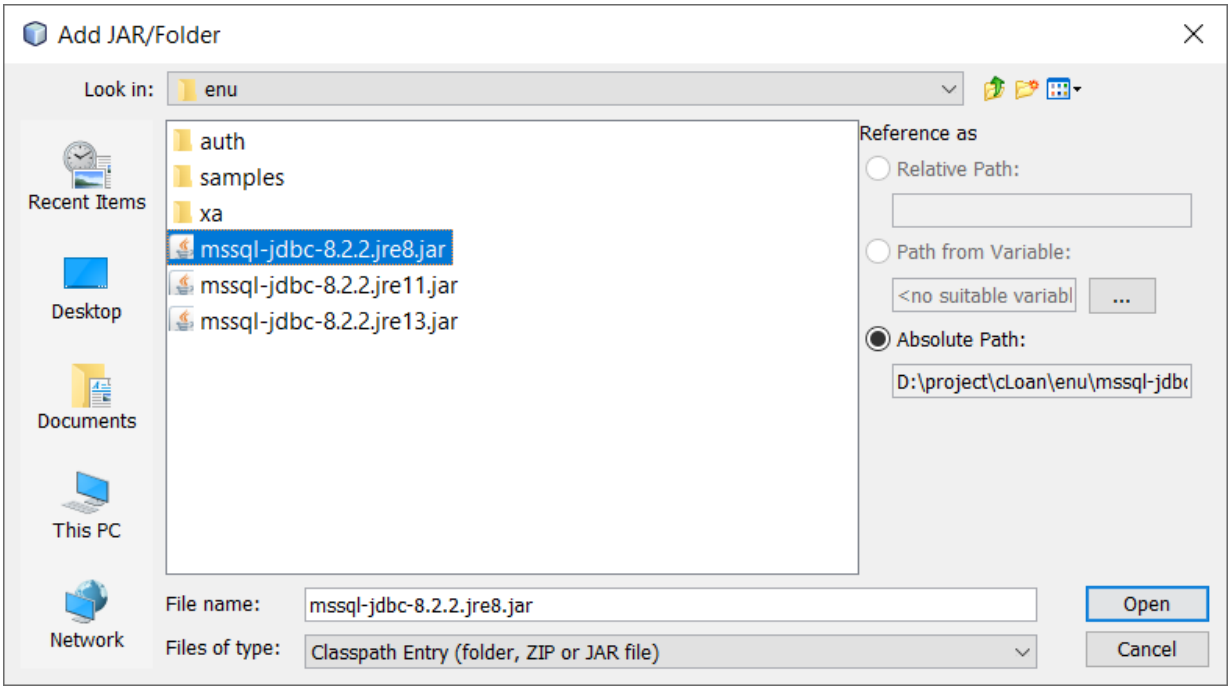


C. Adding more libraries

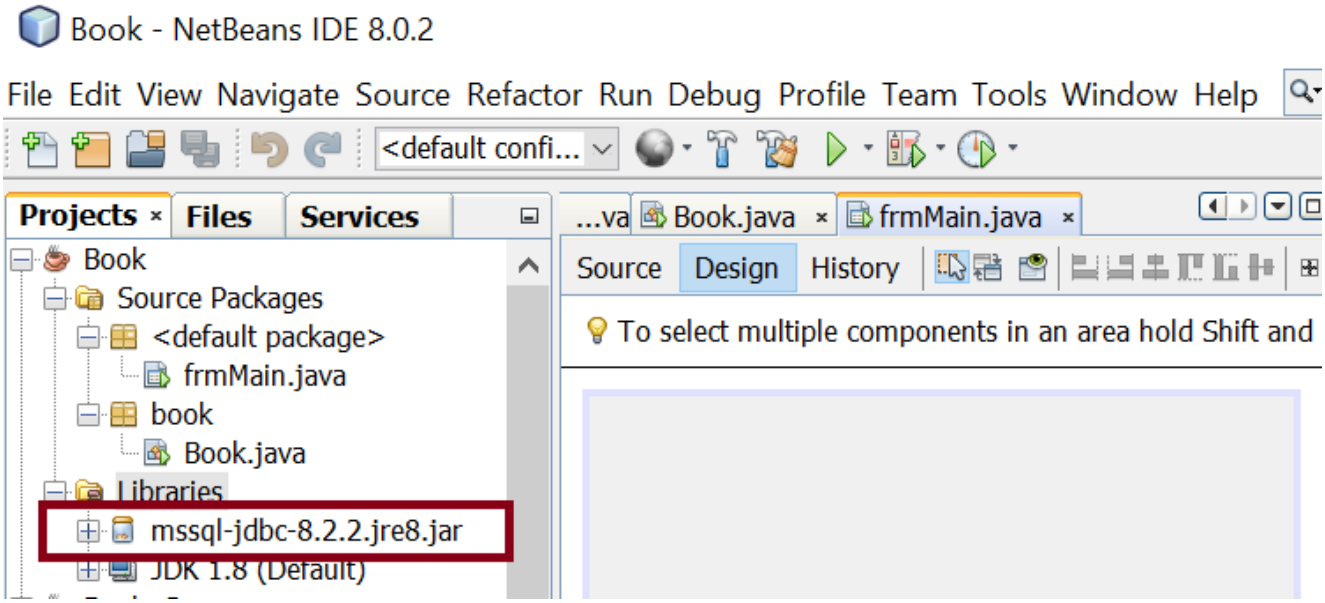
- Right click on Libraries, select **Add JAR/Folder**



- Select the file **mssql-jdbc-8.2.2.jre8.jar** and click Open.
- Link to download the library **mssql-jdbc-8.2.2.jre8.jar**: https://docs.microsoft.com/en-us/sql/connect/jdbc/download-microsoft-jdbc-driver-for-sql-server?view=sql-server-ver15



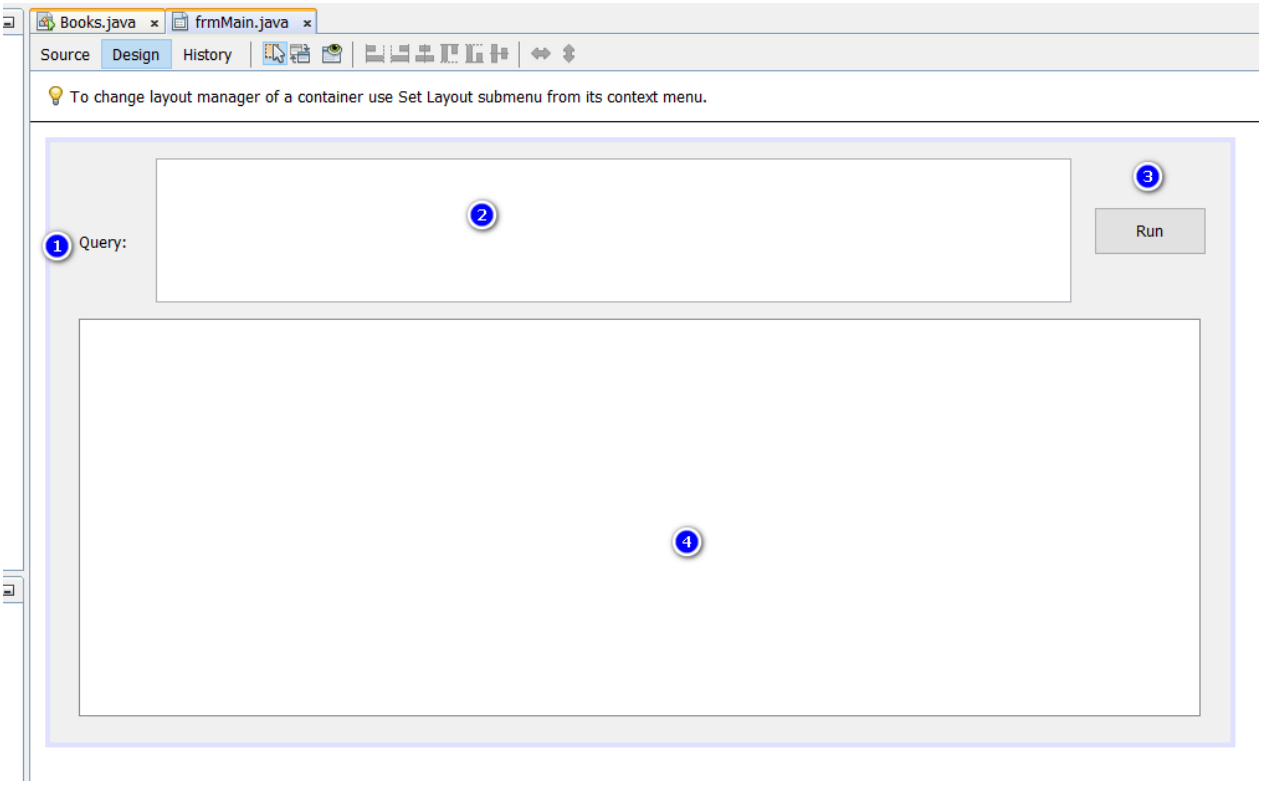
- Result:



D. User Interface Design

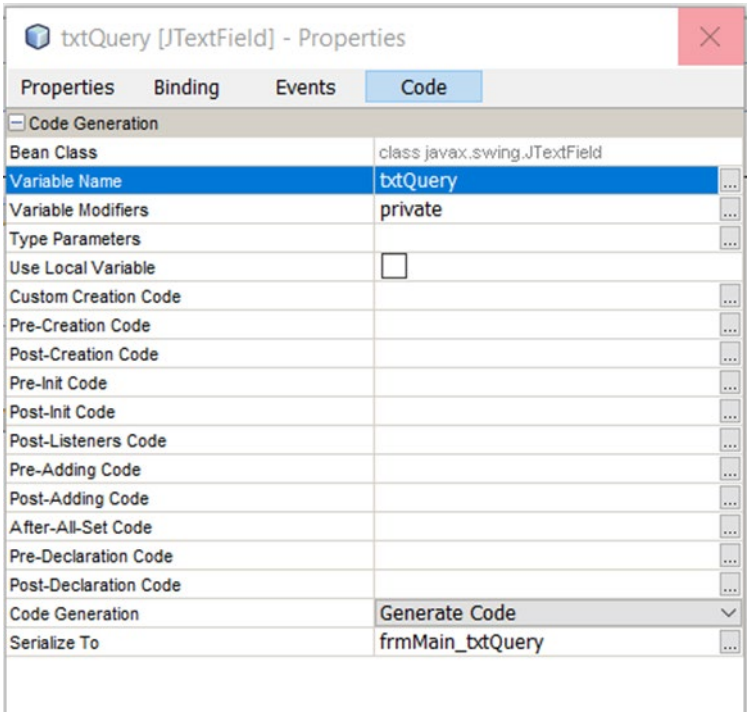
Design a user interface as follows, using Netbean common controls:

1. Label
2. Text Field
3. Button
4. Text Area



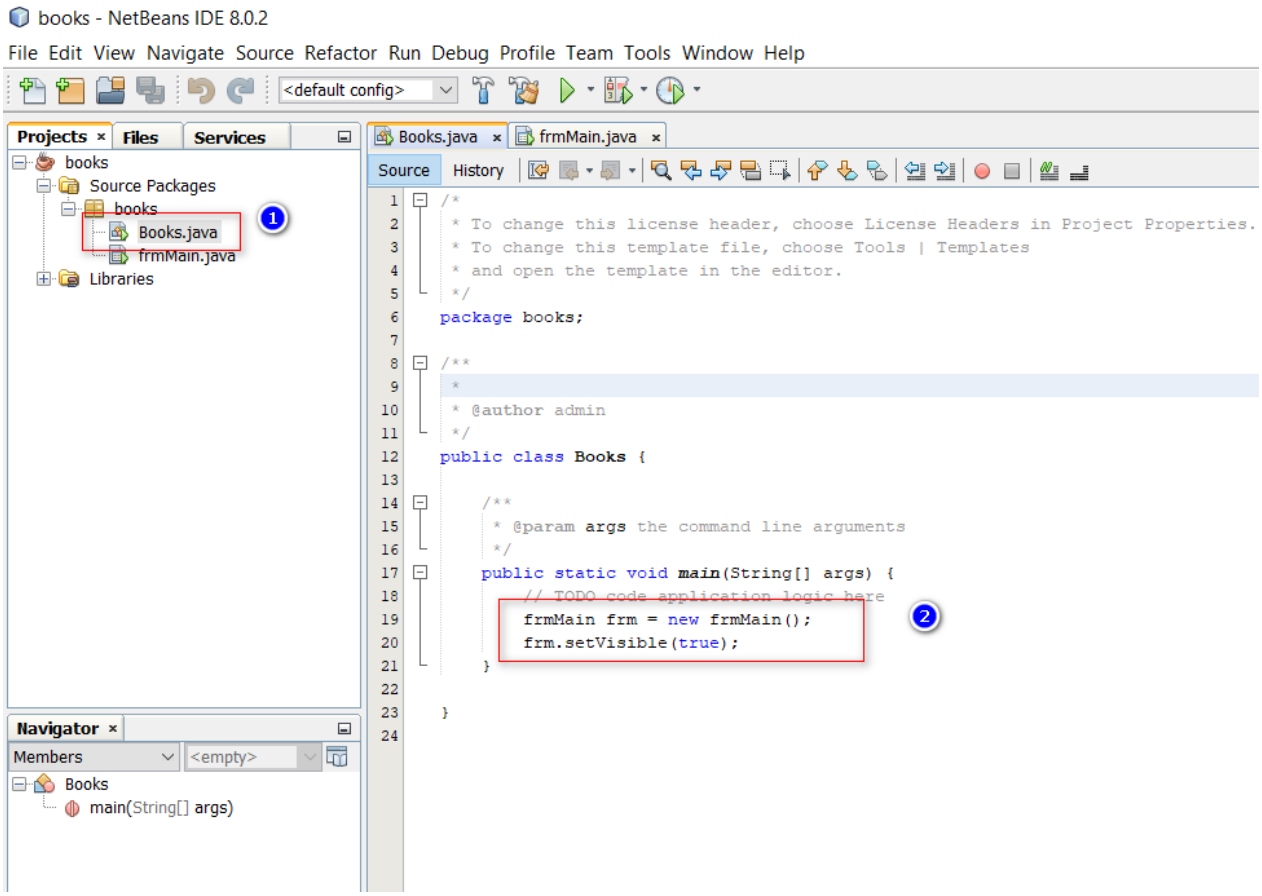
- Change control's Variable Names. Right click the control, select **Properties**. From the Code tab, modify the field **Variable Name** to the followings:

1. Text Field: **txtQuery**
2. Button: **btnRun**
3. Text Area: **txtResult**

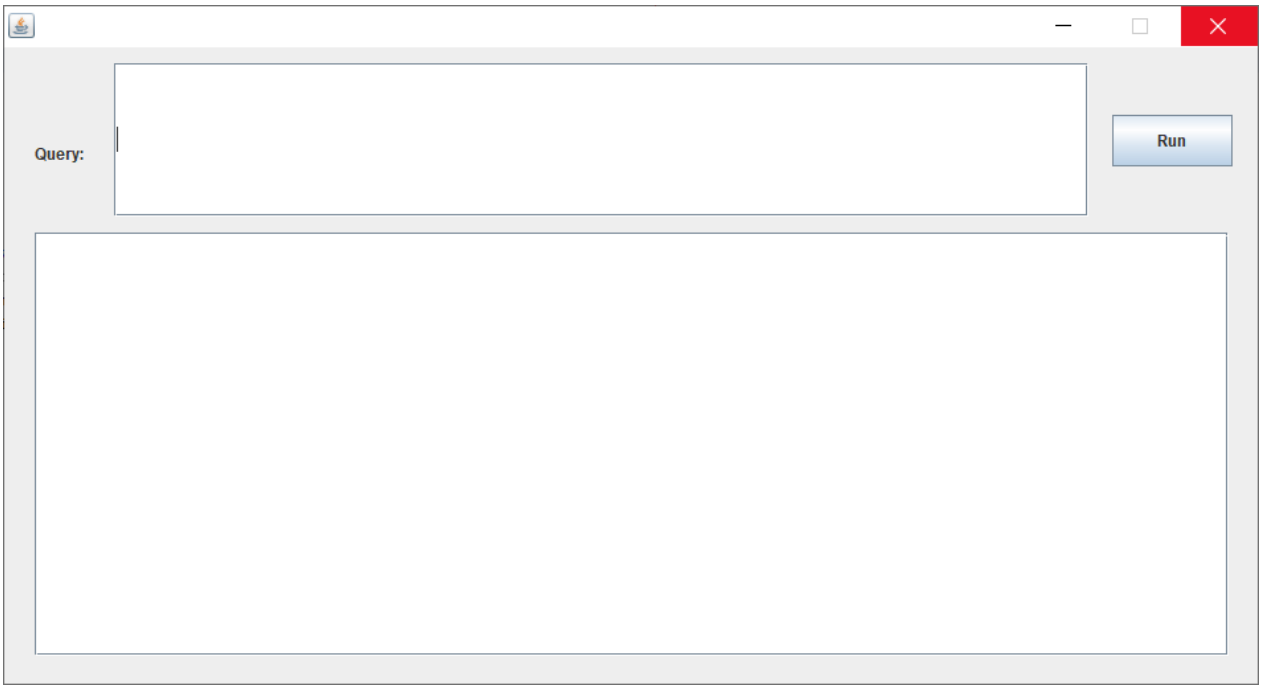


E. Display the form

- Select and open the file Books.java, from the main function, enter code to display the newly created form.



- Run Project Books and you will see the Result



F. Connecting the database

- Double click on button in the form to create an on click event for the button.

```
     * WARNING: Do NOT modify this code. The content of this method is always
     * regenerated by the Form Editor.
     */
    @SuppressWarnings("unchecked")
    Generated Code

    private void btnRunActionPerformed(java.awt.event.ActionEvent evt) {
        // TODO add your handling code here:

    }

    /**
     * @param args the command line arguments
     */
    public static void main(String args[]) {
```

- Entering the code for the on click event of the button

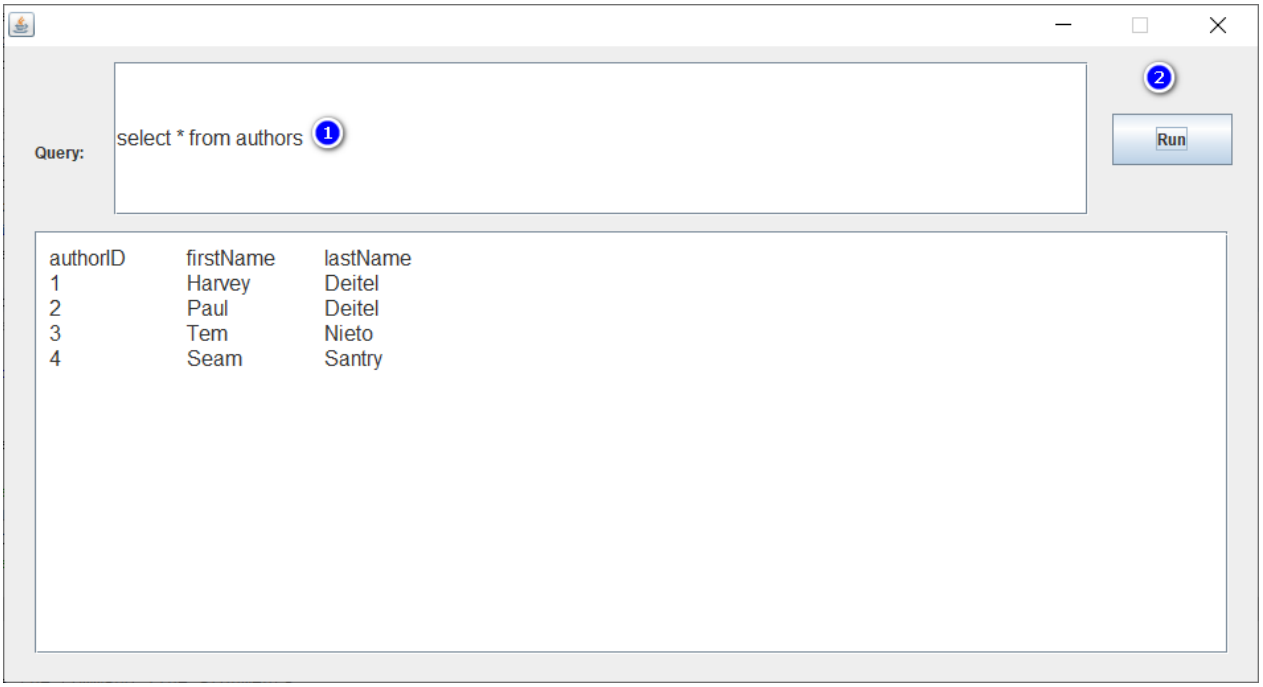
```
private void btnRunActionPerformed(java.awt.event.ActionEvent evt) {
    // TODO add your handling code here:
    if (txtQuery.getText().length() == 0) {
        JOptionPane.showMessageDialog(null, "Please input query string!", "Message", JOptionPane.WARNING_MESSAGE);
        return;
    }
    txtResult.selectAll();
    txtResult.replaceSelection("");
    String connectionUrl = "jdbc:sqlserver://localhost:1434;databaseName=books;user=sa;password=sa";

    try (Connection con = DriverManager.getConnection(connectionUrl); Statement stmt = con.createStatement();) {
        String SQL = txtQuery.getText();
        ResultSet rs = stmt.executeQuery(SQL);

        // Iterate through the data in the result set and display it.
        // process query results
        StringBuilder results = new StringBuilder();
        ResultSetMetaData metaData = rs.getMetaData();
        int numberOfColumns = metaData.getColumnCount();
        for (int i = 1; i <= numberOfColumns; i++) {
            results.append(metaData.getColumnName(i)).append("\t");
        }
        results.append("\n");

        //  Metadata
        while (rs.next()) {


            for (int i = 1; i <= numberOfColumns; i++) {
                results.append(rs.getObject(i)).append("\t");
            }
            results.append("\n");
        }
        txtResult.setText(results.toString());
    } // Handle any errors that may have occurred.
    catch (SQLException e) {
        txtResult.setText(e.getMessage());
    }
```

1. Check if the user hasn't input a query, display an error message and return control to the main form.
2. Database connection string
3. Fetch the column information for the table.
4. Obtain the results of the query.
5. Display the results onto Text Area.

- Source code: https://pastebin.com/fiza4Qee

G. Execution result

- Input a query and click Run



III. Questions

1. Finds the title, editionNumber, and copyright of all titles with copyright after 2000.
2. Finds authorID, firstName, and lastName from the authors whose last name contains I as the second letter.
3. Finds isnb, title, editionNumber, copyright, and price of titles whose titles end with “how to program” in ascending order by title.
4. Finds firstName, lastName, and isbn for the books they have written in ascending order by lastName and firstName
5. How many books were copyright in 2001.
6. Finds the name of books which have published by Prentice Hall PTG.
7. Finds the author names who’ve the books with the highest price.
8. Finds name of authors who’ve published more than 2 books.