Library App (HCI/DB Project)

By Ahmed Salah – Section 1

Table of Contents

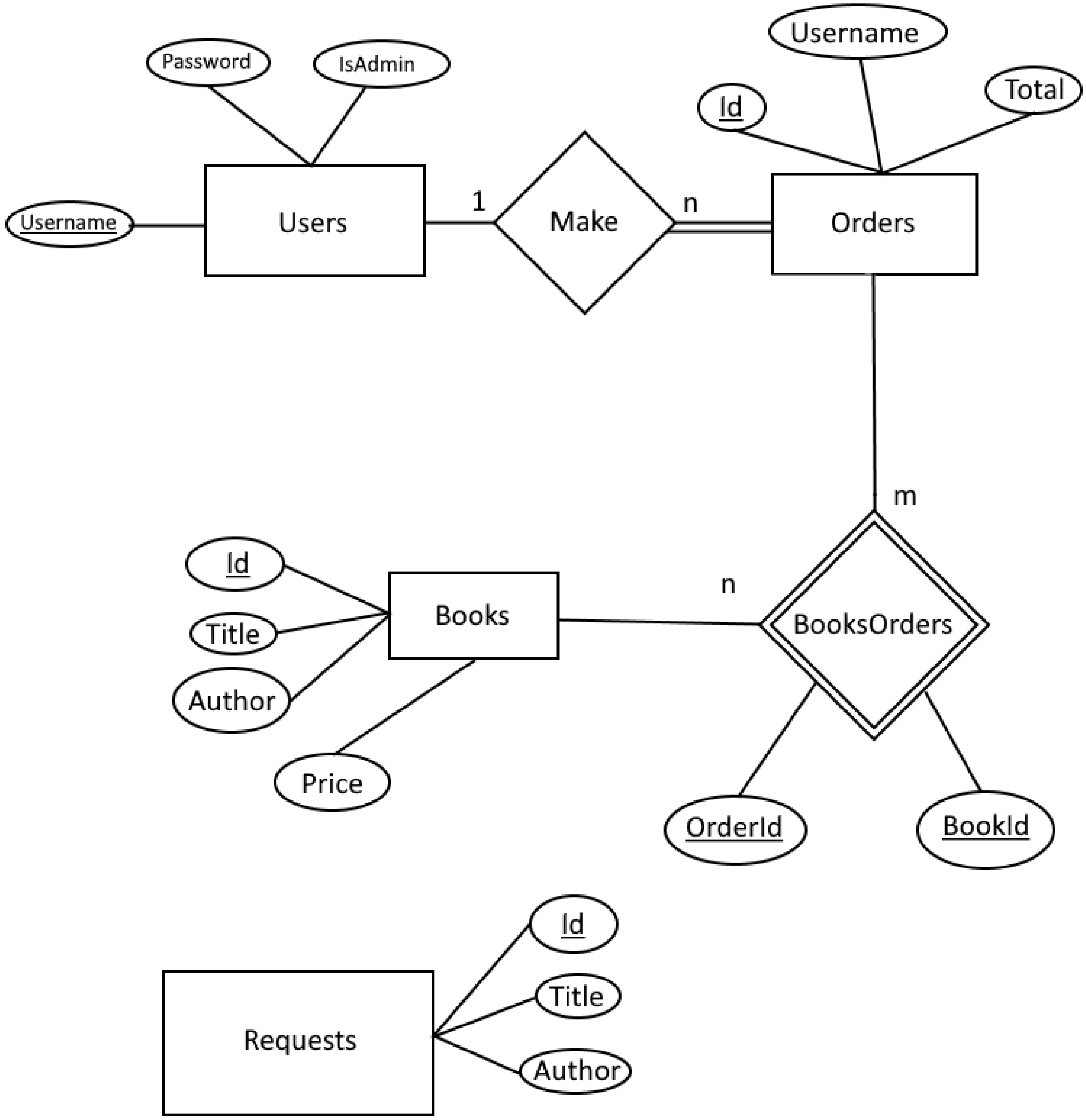
1. Application Overview (HCI/DB)

This app aims to automate some record keeping in a library. Users can register or login and see the available books in the library and order what they want from these books. If they can't find the book they want, they can use the "Requests" feature. In it they can request the book they want by entering Title and Author of the book. They can also view records of all their previous orders and in their list of orders view the orders' details.

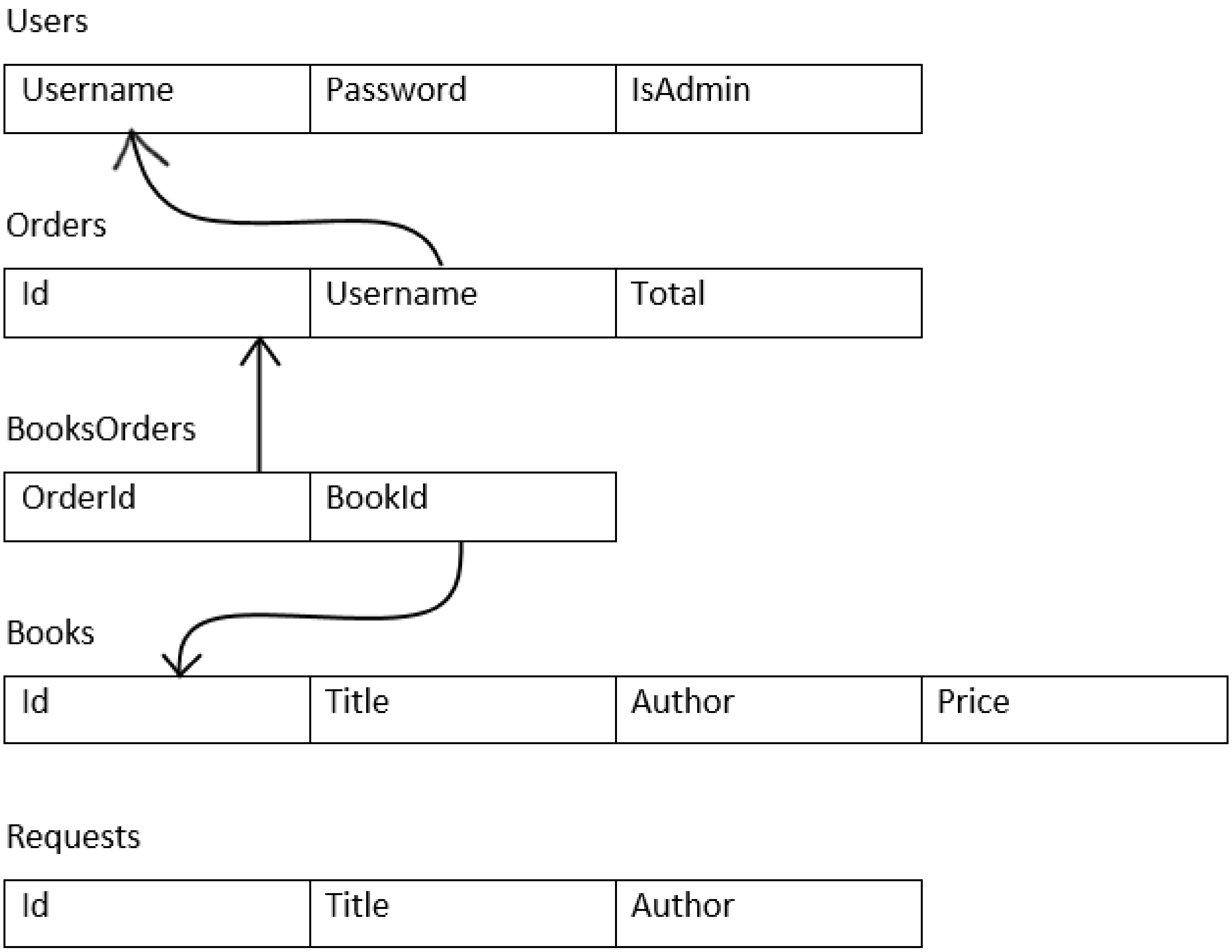
Admins can also request and order books if they want. Additionally, admins can see all orders by all users, and they are able to delete requests.

The idea is that a user inside the library can order books using the application then give the library employee their order ID or username. The employee can then give them the books they want after checking their order as admin.

2. ER Diagram (DB)



3. Relational Schema (DB)



Users

Username	Password	IsAdmin

Orders

Id	Username	Total

BooksOrders

OrderId	BookId

Books

Id	Title	Author	Price

Requests

Id	Title	Author

4. Scripts and Data for Creating the Database (DB)

This is the SQL script I used to create the Database and populate it with the required tables.

```
CREATE DATABASE LibraryApp;
USE LibraryApp;
CREATE TABLE Users (
    Username VARCHAR(30) PRIMARY KEY,
    Password VARCHAR(256) NOT NULL,
    IsAdmin BIT NOT NULL
);

CREATE TABLE Books (
    Id INTEGER IDENTITY(1,1) PRIMARY KEY,
    Title VARCHAR(MAX) NOT NULL,
    Author VARCHAR(MAX) NOT NULL,
    Price MONEY NOT NULL
);
CREATE TABLE Orders(
    Id INTEGER IDENTITY(1,1) PRIMARY KEY,
    Username VARCHAR(30) FOREIGN KEY REFERENCES Users NOT NULL,
    Total MONEY NOT NULL
);
CREATE TABLE BooksOrders(
    OrderId INTEGER FOREIGN KEY REFERENCES Orders NOT NULL,
    BookId INTEGER FOREIGN KEY REFERENCES Books NOT NULL,
);
CREATE TABLE Requests(
    Id INTEGER IDENTITY(1,1) PRIMARY KEY,
    Title VARCHAR(MAX) NOT NULL,
    Author VARCHAR(MAX) NOT NULL,
);
```

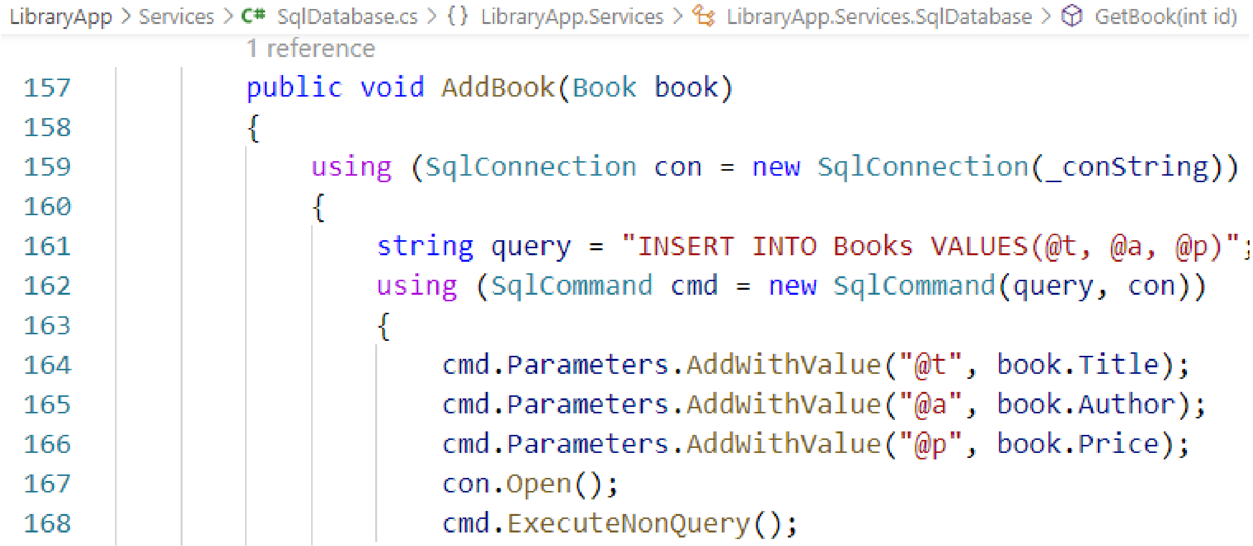
Additionally, the dummy data used to populate the database for demo purposes along with the above scripts is all available in the form of SQL scripts on the GitHub repo for this project at the following link:
https://github.com/a-sala7/LibraryApp/
The scripts can be found in the ‘sql scripts’ folder in the root directory of the repository.

5. SQL Queries and Statements (DB)

Intro:

As best practice and to protect from SQL Injection attacks, the WinForms application does not use pure SQL commands with simple string modifications. Instead it uses the SqlClient library (with methods such as SqlConnection, SqlCommand, SqlDataReader) to interface with the SQL Server backend database.

For example, if we want to add a book, it can be performed as follows:


LibraryApp > Services > C# SqlDatabase.cs > {} LibraryApp.Services > LibraryApp.Services.SqlDatabase > GetBook(int id)
1 reference

```
public void AddBook(Book book)
{
    using (SqlConnection con = new SqlConnection(_conString))
    {
        string query = "INSERT INTO Books VALUES(@t, @a, @p)";
        using (SqlCommand cmd = new SqlCommand(query, con))
        {
            cmd.Parameters.AddWithValue("@t", book.Title);
            cmd.Parameters.AddWithValue("@a", book.Author);
            cmd.Parameters.AddWithValue("@p", book.Price);
            con.Open();
            cmd.ExecuteNonQuery();
```

Pure SQL Examples:

1. Get a certain user

```
SELECT * FROM Users WHERE Username = 'Ahmed';
```

2. Add a book

```
INSERT INTO Books VALUES ('A book', 'The author', 9.99);
```

3. Make a user admin

```
UPDATE Users SET IsAdmin = 1 WHERE Username = 'Ahmed';
```

4. Delete some requests

```
DELETE FROM Requests
WHERE Id IN (1, 3, 7)
OR Title LIKE('Harry Potter and the%');
```

5. Get a single order’s details by ID

```sql
SELECT Books.Id AS 'Book Id', Books.Title, Books.Price
FROM Books, BooksOrders
WHERE BooksOrders.OrderId = 3
AND Books.Id = BooksOrders.BookId
ORDER BY Price DESC;
```

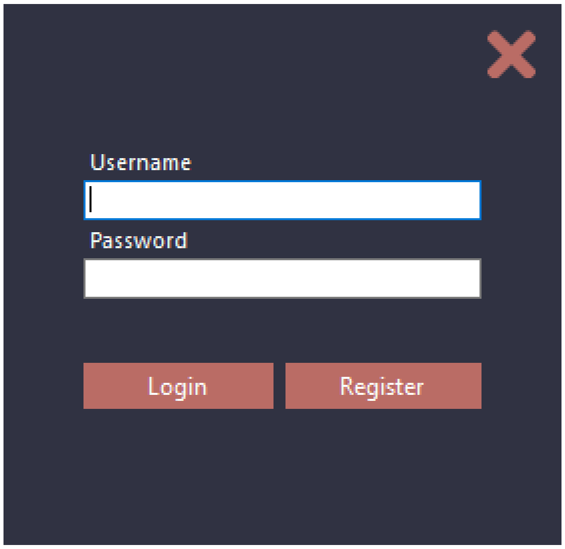
6. Make a new order. Here since we affect multiple related tables (Orders and BooksOrders) we must use SQL Transactions

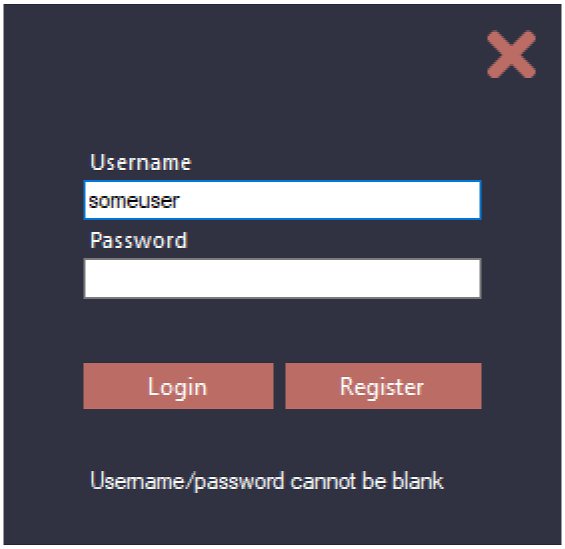
```sql
BEGIN TRAN

INSERT INTO Orders(Username, Total) VALUES ('admin',99.97);
DECLARE @orderId AS INTEGER = SCOPE_IDENTITY();
INSERT INTO BooksOrders VALUES (@orderId, 1);
INSERT INTO BooksOrders VALUES (@orderId, 2);
INSERT INTO BooksOrders VALUES (@orderId, 3);

COMMIT TRANSACTION
```

6. Application UI and Design (HCI)

1. Login Form

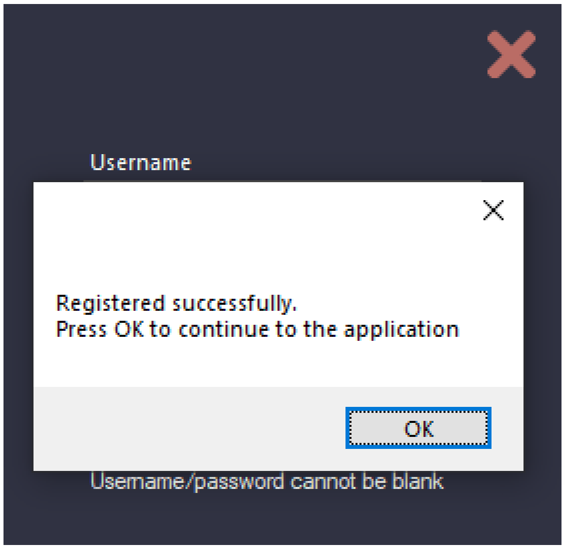
The form shows errors for incorrect passwords, nonexistent users or missing fields in a status label at the bottom.A dialog box is shown to transition between registration and opening the main form





Username: someuser

Username/password cannot be blank

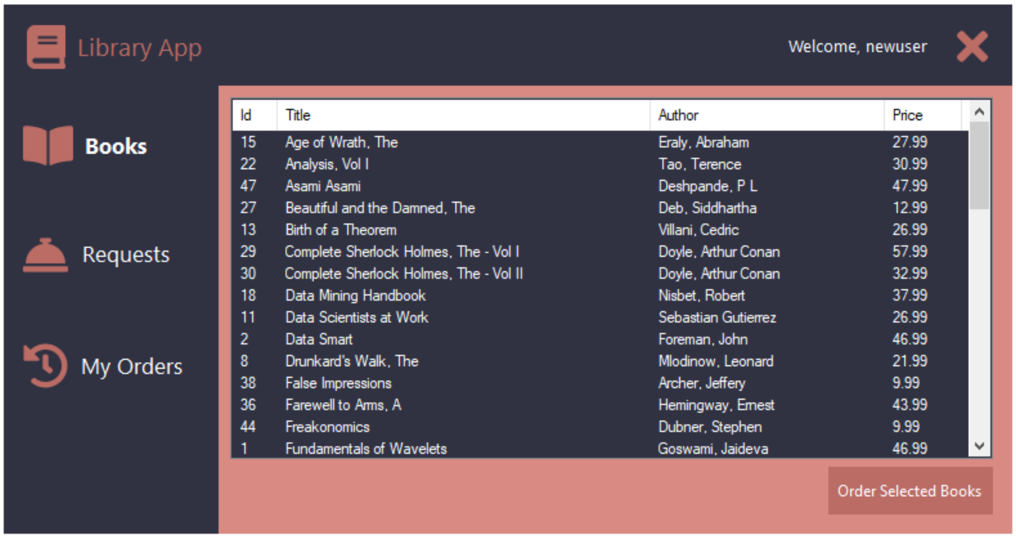


Registered successfully.
Press OK to continue to the application

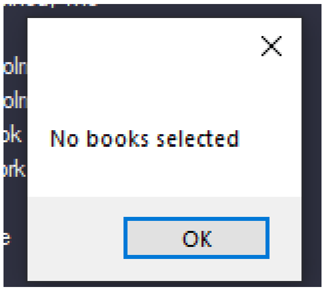
Username/password cannot be blank

2. Main Form as a Normal User

Normal users can see all available books and select one or many books to order at once. An error dialog box is shown if “Order Selected Books” is clicked without any books being selected.

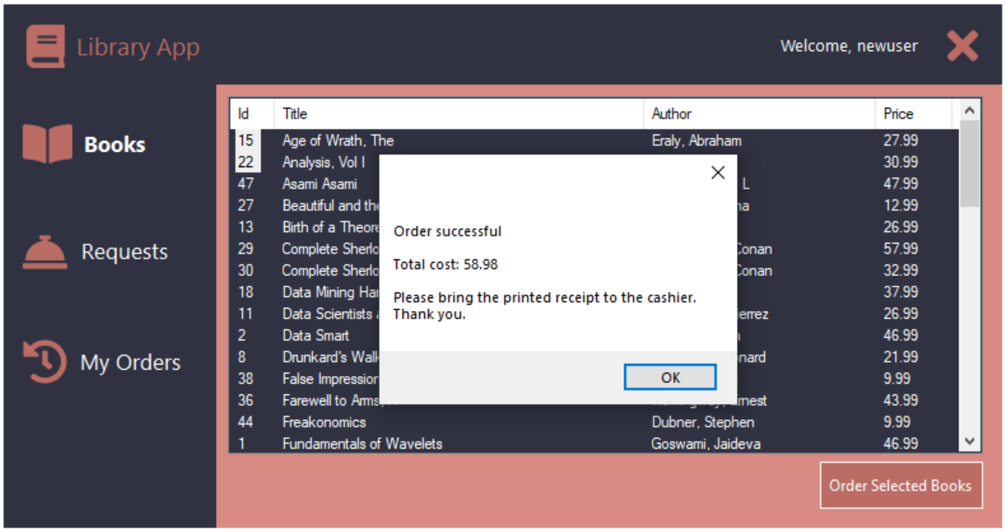


Id	Title	Author	Price
15	Age of Wrath, The	Eraly, Abraham	27.99
22	Analysis, Vol I	Tao, Terence	30.99
47	Asami Asami	Deshpande, P L	47.99
27	Beautiful and the Damned, The	Deb, Siddhartha	12.99
13	Birth of a Theorem	Villani, Cedric	26.99
29	Complete Sherlock Holmes, The - Vol I	Doyle, Arthur Conan	57.99
30	Complete Sherlock Holmes, The - Vol II	Doyle, Arthur Conan	32.99
18	Data Mining Handbook	Nisbet, Robert	37.99
11	Data Scientists at Work	Sebastian Gutierrez	26.99
2	Data Smart	Foreman, John	46.99
8	Drunkard's Walk, The	Mlodinow, Leonard	21.99
38	False Impressions	Archer, Jeffery	9.99
36	Farewell to Arms, A	Hemingway, Ernest	43.99
44	Freakonomics	Dubner, Stephen	9.99
1	Fundamentals of Wavelets	Goswami, Jaideva	46.99



No books selected

On successful orders a dialog box is shown with a short summary of the order and (theoretically) a receipt is printed for the user.



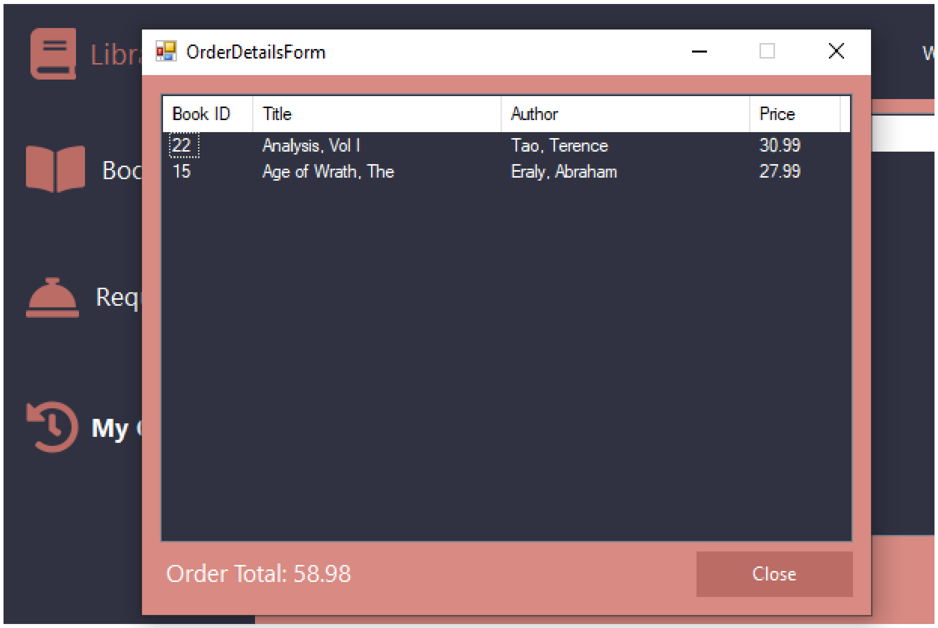
Id	Title	Author	Price
15	Age of Wrath, The	Eraly, Abraham	27.99
22	Analysis, Vol I		30.99
47	Asami Asami	L	47.99
27	Beautiful and th	a	12.99
13	Birth of a Theore		26.99
29	Complete Sherlo	onan	57.99
30	Complete Sherlo	onan	32.99
18	Data Mining Har		37.99
11	Data Scientists	errez	26.99
2	Data Smart		46.99
8	Drunkard's Wall	nard	21.99
38	False Impressior		9.99
36	Farewell to Arms,	rnest	43.99
44	Freakonomics	Dubner, Stephen	9.99
1	Fundamentals of Wavelets	Goswami, Jaideva	46.99

Order successful

Total cost: 58.98

Please bring the printed receipt to the cashier.
Thank you.

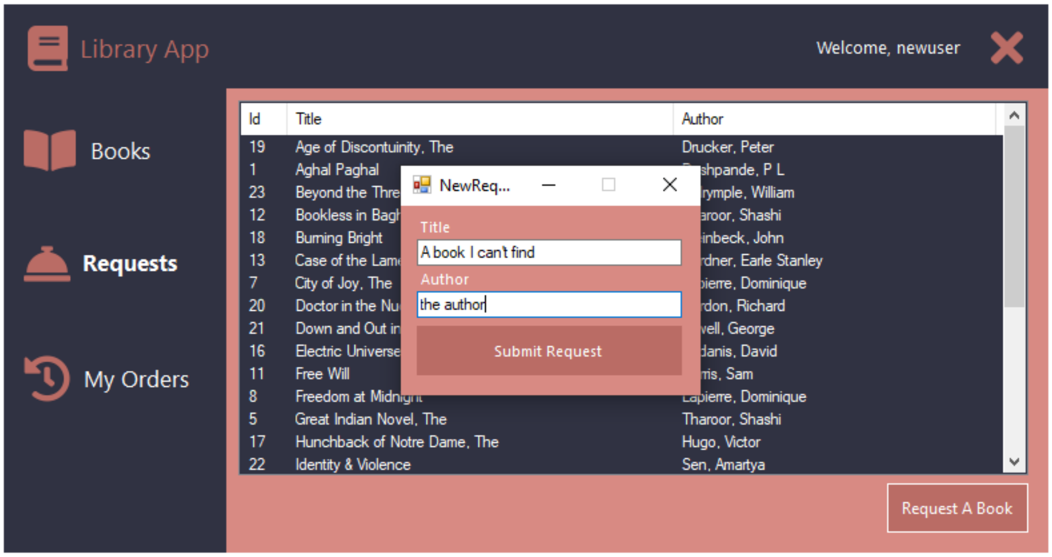
In the “My Orders” panel, users can see the orders they’ve made and pick one to see its details. Here we can see the details of the order from the previous screenshot



Book ID	Title	Author	Price
22	Analysis, Vol I	Tao, Terence	30.99
15	Age of Wrath, The	Eraly, Abraham	27.99

Order Total: 58.98

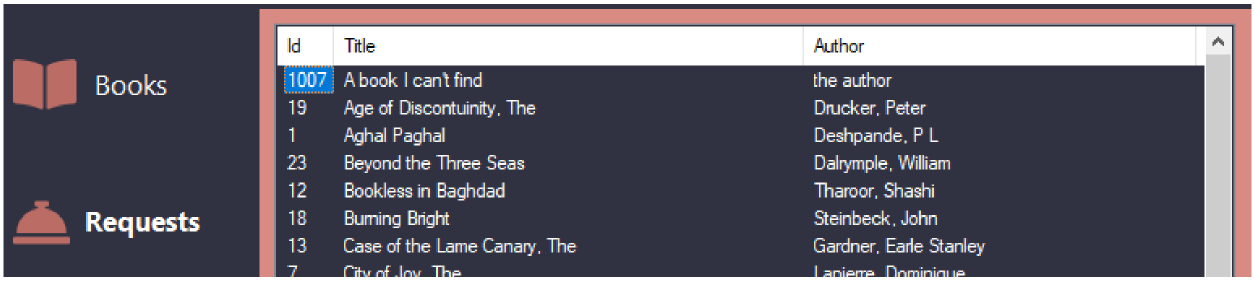
User making a request in the “Requests” panel. After submission the data is fetched from the server and updated immediately in the list inside the panel.



Id	Title	Author
19	Age of Discontinuity, The	Drucker, Peter
1	Aghal Paghal	shpande, P L
23	Beyond the Thre	rymple, William
12	Bookless in Bagh	aroor, Shashi
18	Burning Bright	inbeck, John
13	Case of the Lam	rdner, Earle Stanley
7	City of Joy, The	pierre, Dominique
20	Doctor in the Nu	rdon, Richard
21	Down and Out in	vell, George
16	Electric Universe	danis, David
11	Free Will	ris, Sam
8	Freedom at Midnight	Lapierre, Dominique
5	Great Indian Novel, The	Tharoor, Shashi
17	Hunchback of Notre Dame, The	Hugo, Victor
22	Identity & Violence	Sen, Amartya

Title: A book I can't find

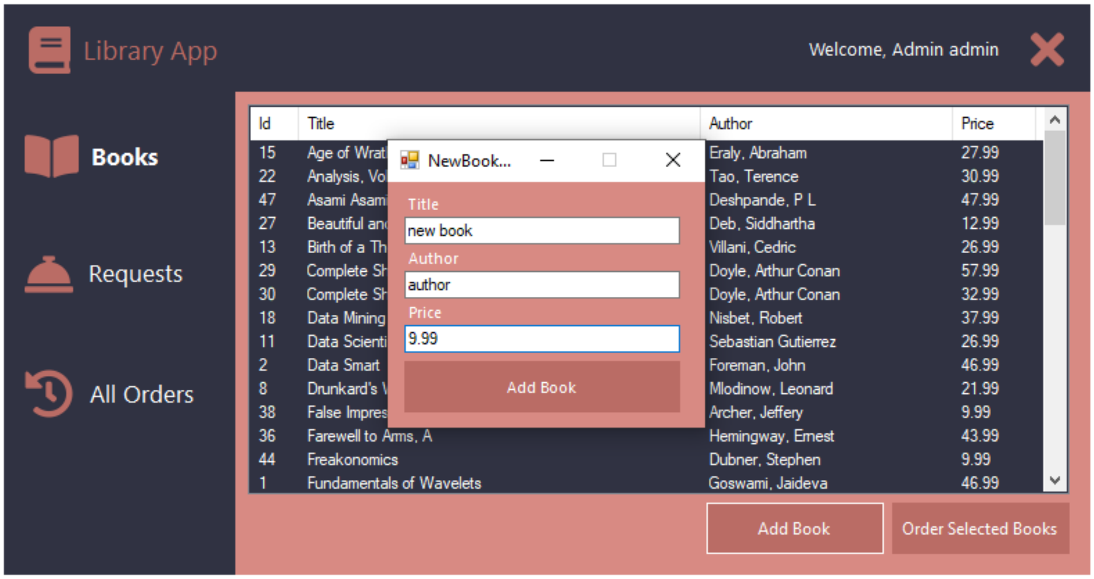
Author: the author



Id	Title	Author
1007	A book I can't find	the author
19	Age of Discontinuity, The	Drucker, Peter
1	Aghal Paghal	Deshpande, P L
23	Beyond the Three Seas	Dalrymple, William
12	Bookless in Baghdad	Tharoor, Shashi
18	Burning Bright	Steinbeck, John
13	Case of the Lame Canary, The	Gardner, Earle Stanley
7	City of Joy, The	Lapierre, Dominique

3. Main Form as an Admin

When logged in as an admin, an “Add Book” button appears in the “Books” panel which opens the following dialog box.



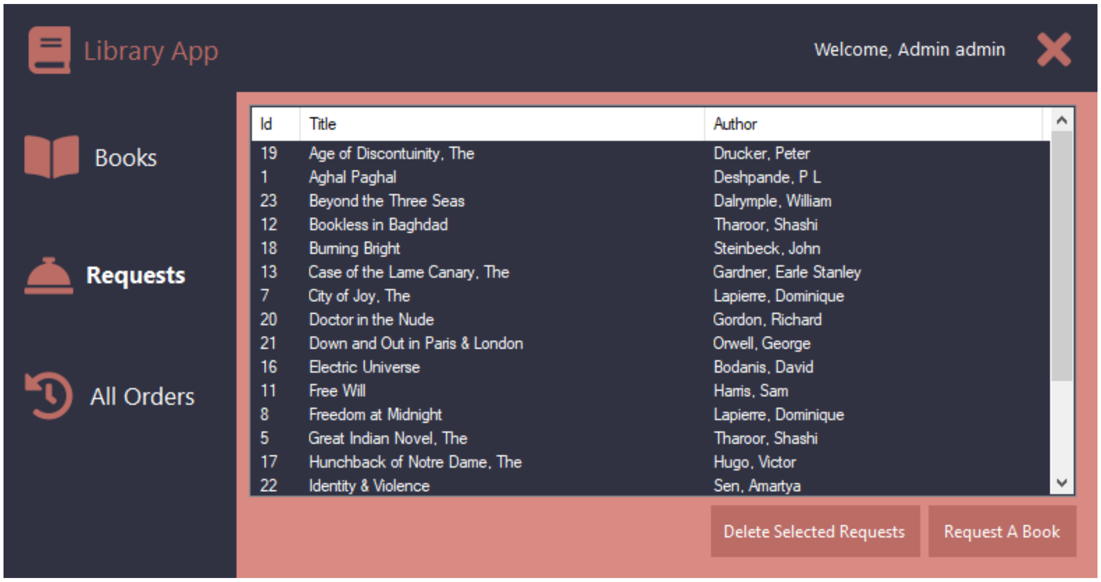
Title: new book

Author: author

Price: 9.99

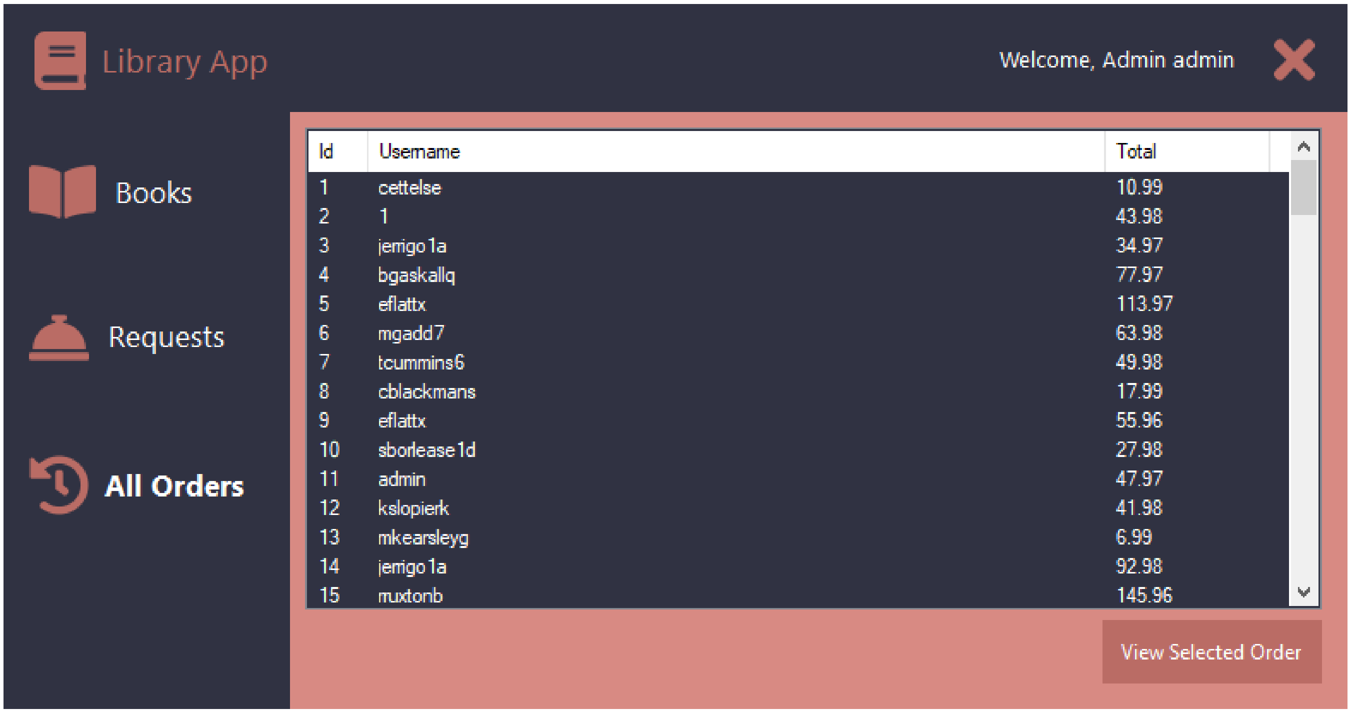
Id	Title	Author	Price
15	Age of Wrat	Eraly, Abraham	27.99
22	Analysis, Vo	Tao, Terence	30.99
47	Asami Asami	Deshpande, P L	47.99
27	Beautiful an	Deb, Siddhartha	12.99
13	Birth of a Th	Villani, Cedric	26.99
29	Complete Sh	Doyle, Arthur Conan	57.99
30	Complete Sh	Doyle, Arthur Conan	32.99
18	Data Mining	Nisbet, Robert	37.99
11	Data Scienti	Sebastian Gutierrez	26.99
2	Data Smart	Foreman, John	46.99
8	Drunkard's \	Mlodinow, Leonard	21.99
38	False Impres	Archer, Jeffery	9.99
36	Farewell to Arms, A	Hemingway, Ernest	43.99
44	Freakonomics	Dubner, Stephen	9.99
1	Fundamentals of Wavelets	Goswami, Jaideva	46.99

Admins can delete any requests by selecting them then pressing “Delete Selected Requests”



Id	Title	Author
19	Age of Discontinuity, The	Drucker, Peter
1	Aghal Paghal	Deshpande, P L
23	Beyond the Three Seas	Dalrymple, William
12	Bookless in Baghdad	Tharoor, Shashi
18	Burning Bright	Steinbeck, John
13	Case of the Lame Canary, The	Gardner, Earle Stanley
7	City of Joy, The	Lapierre, Dominique
20	Doctor in the Nude	Gordon, Richard
21	Down and Out in Paris & London	Orwell, George
16	Electric Universe	Bodanis, David
11	Free Will	Harris, Sam
8	Freedom at Midnight	Lapierre, Dominique
5	Great Indian Novel, The	Tharoor, Shashi
17	Hunchback of Notre Dame, The	Hugo, Victor
22	Identity & Violence	Sen, Amartya

Admins can see orders from all users and view their details.



Id	Username	Total
1	cettelse	10.99
2	1	43.98
3	jerrigo1a	34.97
4	bgaskallq	77.97
5	eflattx	113.97
6	mgadd7	63.98
7	tcummins6	49.98
8	cblackmans	17.99
9	eflattx	55.96
10	sborlease1d	27.98
11	admin	47.97
12	kslopierk	41.98
13	mkearsleyg	6.99
14	jerrigo1a	92.98
15	ruxtonb	145.96

7. Conclusion (HCI/DB)

The project represented a great learning experience for me, but I didn't get to implement everything I imagined at the start of it due to time constraints. There are some things I would do if I had more time, including:

1. Give the books the ability to have multiple genres by creating two new tables, Genres(Id, Name) and BooksGenres(BookId, GenreId) to enable a many-to-many relationship between Books and Genres.

2. Modify Requests to be linked to the User that made them

3. Implement a "Fulfill Request" button for admins for when a requested book is made available. Clicking it deletes the request and adds the requested book to the database after taking the price as input from the admin.

4. Implement a "Continue as Guest" button in the login form which logs into an account any new customers inside the library can make orders with.