

Technical University of Cluj-Napoca

Software Design 2020-2021

Book Store Application

Assignment 2

Hunor Debreczeni
Group 30433

Contents

1	Requirements.....	3
1.1	Assignment specification	3
1.2	Functional requirements.....	3
1.3	Non-functional requirements	3
2	Use case model	4
3	System architectural design.....	4
4	UML Sequence diagrams	5
4.1	Modify stock in Cart.....	5
4.2	Finalize order	6
4.3	User data persistence	7
5	Class design	8
6	Data Model	9
7	System testing.....	9
8	Bibliography	26

1 REQUIREMENTS

1.1 ASSIGNMENT SPECIFICATION

Use Java/C# API to design and implement an application for the employees of a bookstore. The application should have two types of users (a regular user represented by the bookstore employee and an administrator user) which must provide a username and a password in order to use the application.

1.2 FUNCTIONAL REQUIREMENTS

There should be two types of users, the seller and the manager.

The **Seller** can perform the following operations:

- Search books by genre, title, author.
- Sell books.

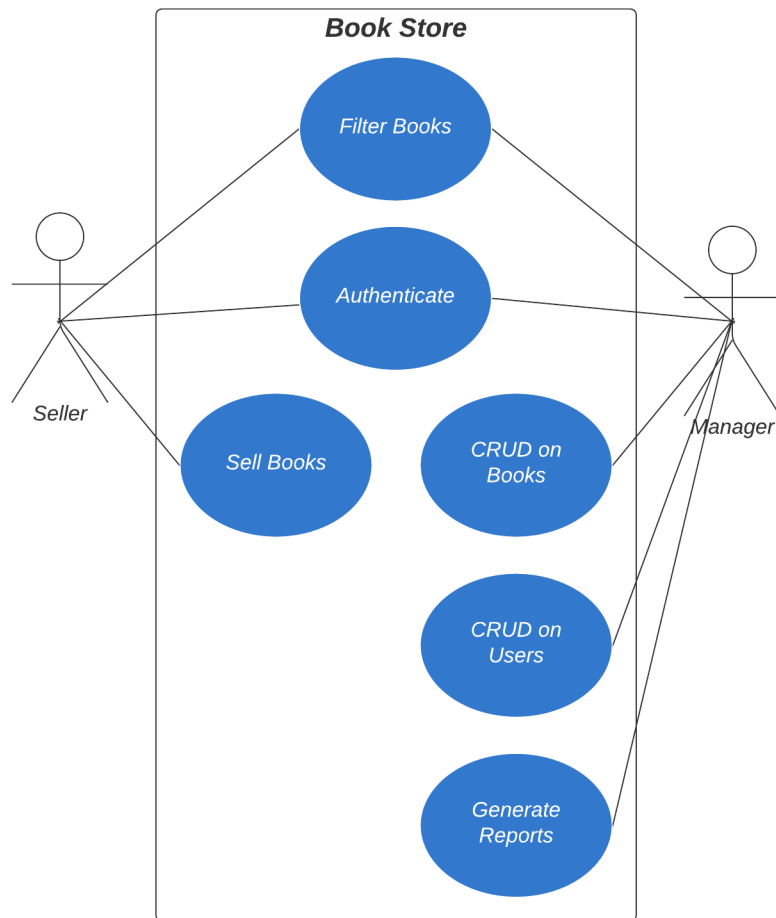
The **Manager** can perform the following operations:

- CRUD on books (book information: title, author, genre, quantity, and price).
- CRUD on regular users' information.

1.3 NON-FUNCTIONAL REQUIREMENTS

- The information about users, books and selling will be stored in multiple **XML** files. Use the Model View Controller in designing the application. Use the Factory Method design pattern for generating the reports.
- All the inputs of the application will be **validated** against invalid data before submitting the data and saving it.

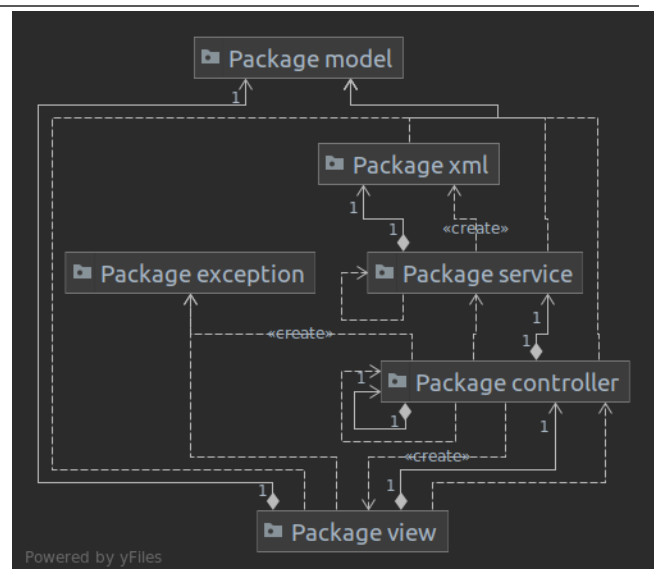
2 USE CASE MODEL



3 SYSTEM ARCHITECTURAL DESIGN

The system used the **MVC** (Model – View – Controller) layered architecture. It consists of a data model, the presentation information and some controllers for the information. There's still need for the service layer which handles the data persistence.

The **View** package contains the part of the application, which can be seen by the end-user (seller or manager in our case). Each view object uses the controller, to modify the current state of the application. This view also uses the model package, to transfer the data between the packages.



The **Controller** package handles all the logic from the application. It controls every view, and also the data persistence which may be modified by the end-user, through the view. For validation, exceptions are raised, to make the handling easier, by alerting the view that something is wrong.

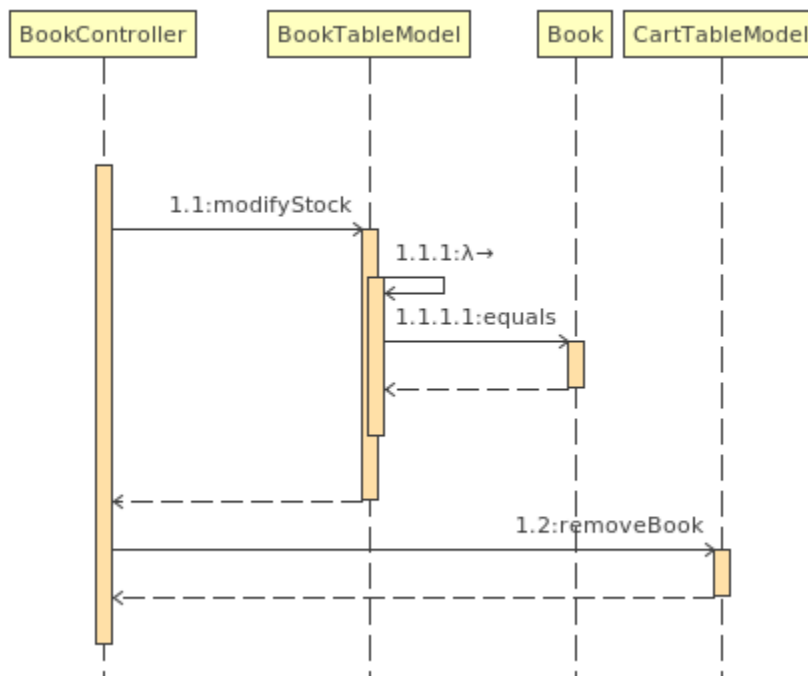
The **Service and XML** package is used for the data persistence. It handles the reading/ writing of the data to multiple xml files, which represent the database in the current application.

The **Model** package contains all the information for the objects that are needed, such as User, Book, Access Type, Reports, Lists and Tables.

4 UML SEQUENCE DIAGRAMS

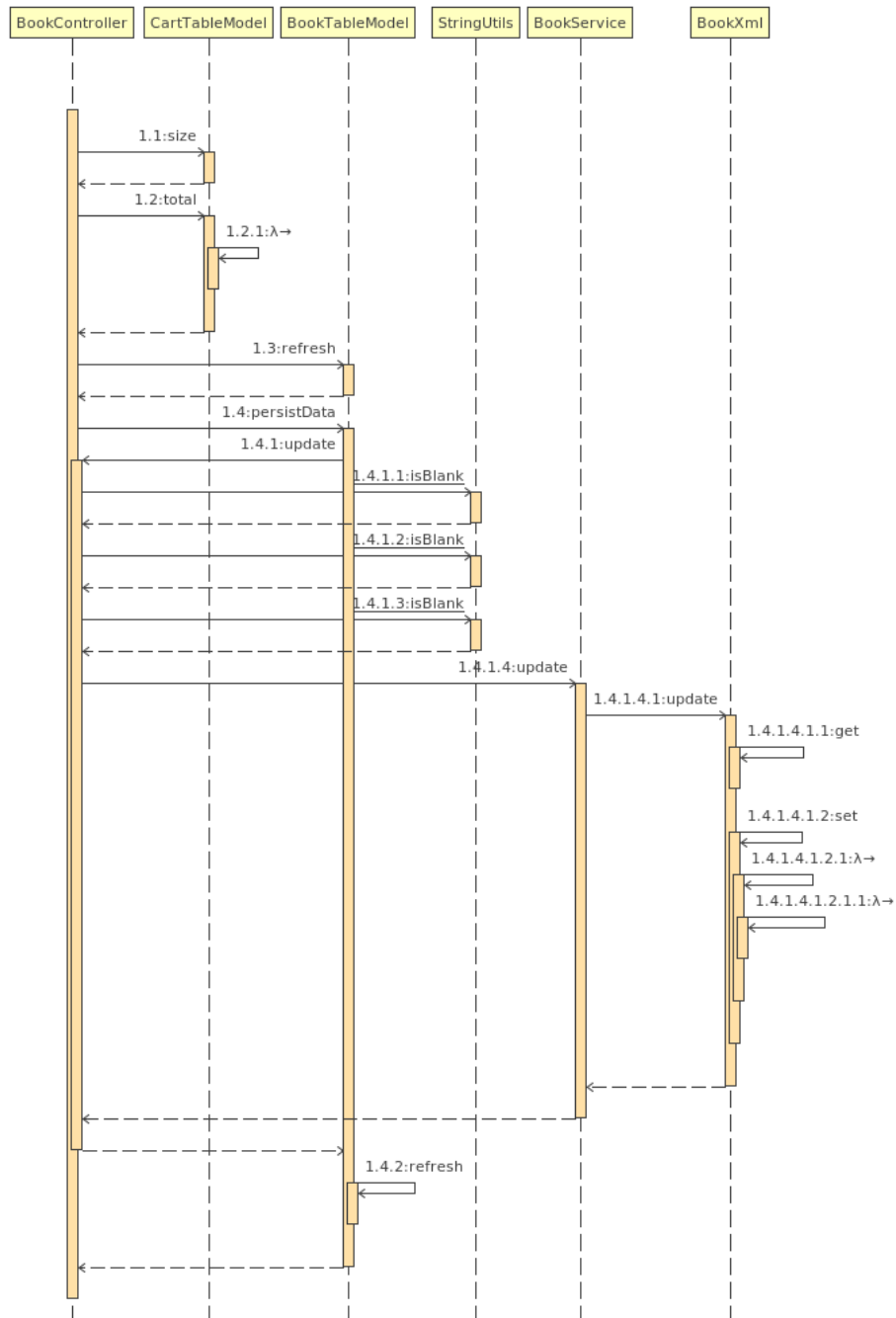
4.1 MODIFY STOCK IN CART

The following seq. diagram describes the flow on the event of modifying the quantity of a given book in the cart. It verifies first if there are enough books in stock of a given book. If there is, then the cart is modified successfully. If the new stock is negative or equal with zero, then the book is removed from the cart.



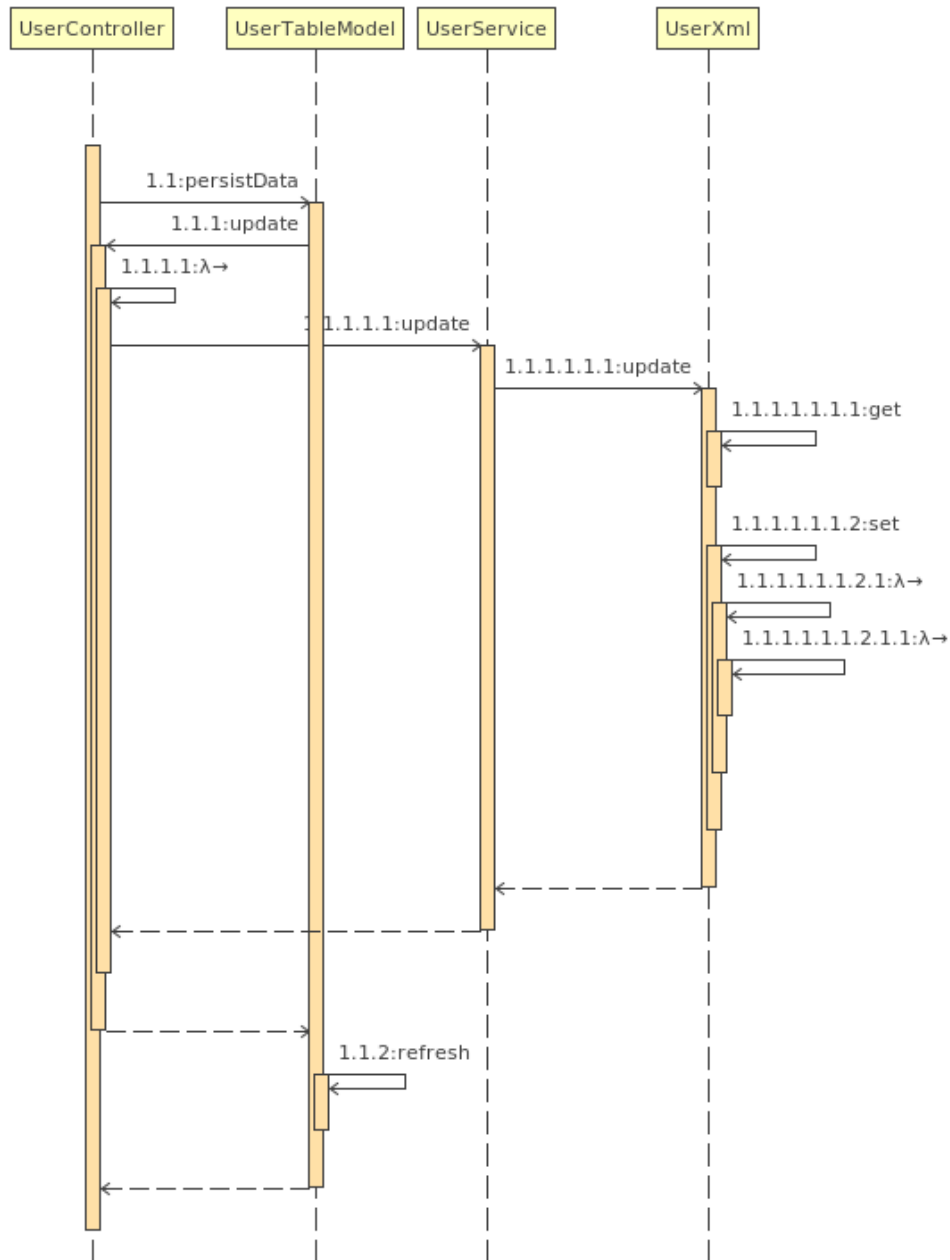
4.2 FINALIZE ORDER

This flow verifies if the cart contains books first. If it contains, then we get the total price. After that the cart is refreshed/ cleared. To save the quantity of the books/ the stock, the data from the book table must be persisted. For each book, an update action is made, which also verifies if the fields are correct. As a last step, the data from the original XML file is taken and replaced with the new one. This is done, to ensure that we don't modify data that shouldn't be modified.

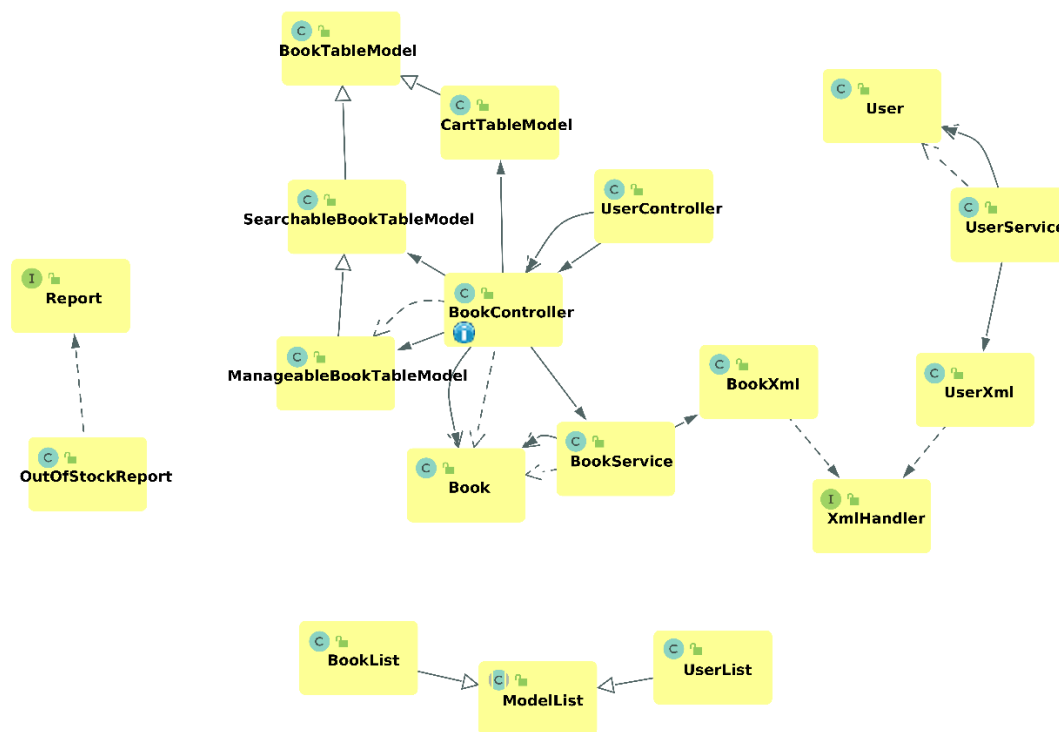


4.3 USER DATA PERSISTENCE

This flow is similar to the persistence of the books described above. The data is taken from the UserTableModel and for each User, the data is updated to ensure that no data is lost.



5 CLASS DESIGN



The brain of the application is the BookController. It handles every request, with the exception of the ones which are intended for modifying a User model. Even the UserController uses a BookController upon login, to decide the homepage of the given user (Manager Dashboard/ Seller Dashboard).

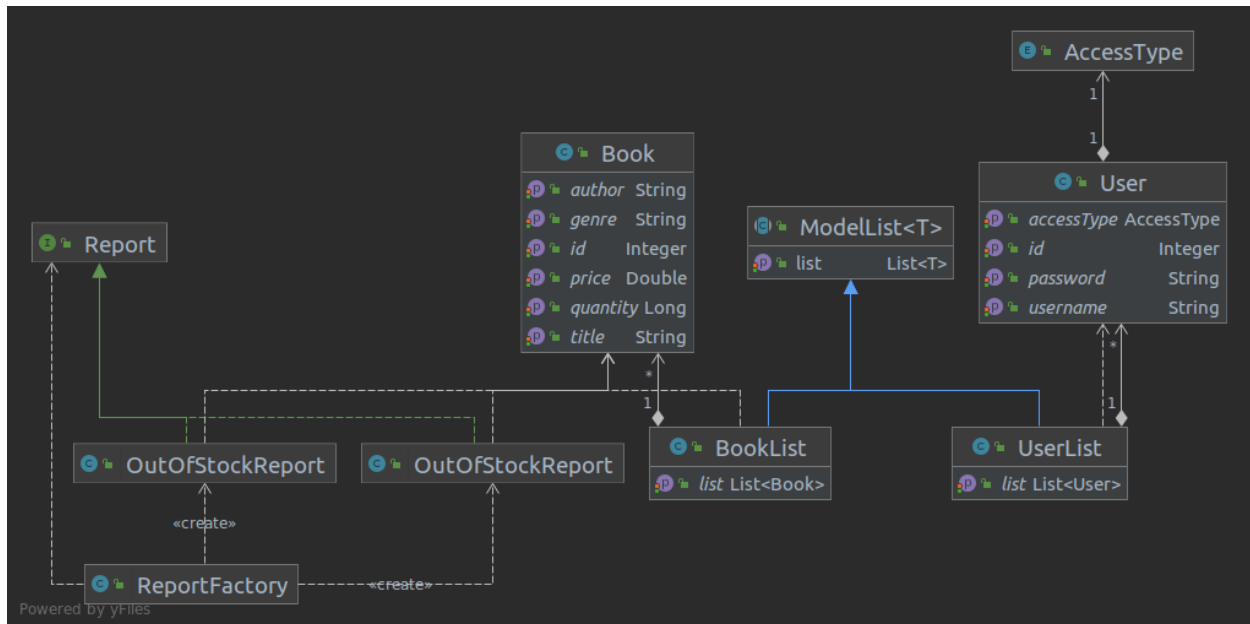
It can also be seen, that for displaying the Books, multiple Table Models were created, which add new functionality to it. The super class, BookTableModel only defines the handling of the main data (list of books). The Searchable Tabel Model adds filtering functionality, the Manageable Book Table Model adds editing functionality. The Cart Table Model adds cart functionality: editing stock, adding items, which increment the quantity of a given book if it's already in the cart.

We can also see the Report classes, where at the moment is only a single type of Report, the Out of Stock report. It comes in two different output methods (PDF/CSV), but they have the same name, but in different packages.

The service classes can also be seen which in the end, use the XmlHandler classes, which implement the main methods (CRUD) on xml files with the specified type.

The ModelList class is used, to make it easier to output the Books and the Users in an xml file.

6 DATA MODEL



The application consists of three main data models. The Book, User and Report models. The application is made for a book store, thus the most important model is the Book.

The Book model contains information about books, and every field must be populated upon creation, with the exception of the ID field, which is automatically populated by using the XmlHandlers from the back.

The User model is used for authentication and permission differentiations. This model also uses the Access Type enumeration class, which contains objects that represent different kind of users for the application. In our case, the Manager and the Seller.

The Report contains books, that have zero quantity in our case. This may also be upgraded in the future, to contain different kind of reports also.

The UserList and the BookList class is used for handling the XML files in an easier way.

7 SYSTEM TESTING

For testing the System, I went with the manual testing approach, doing the task and verifying if the result is the expected one.

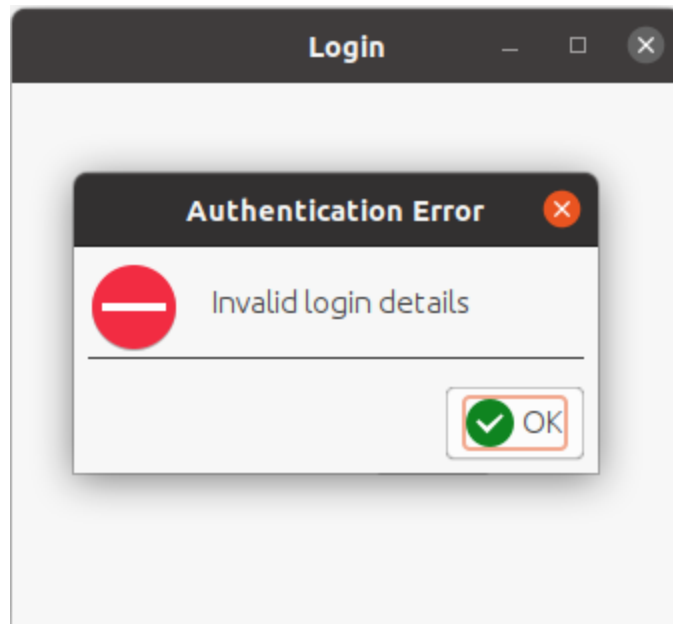


Figure 1 Authentication Verification

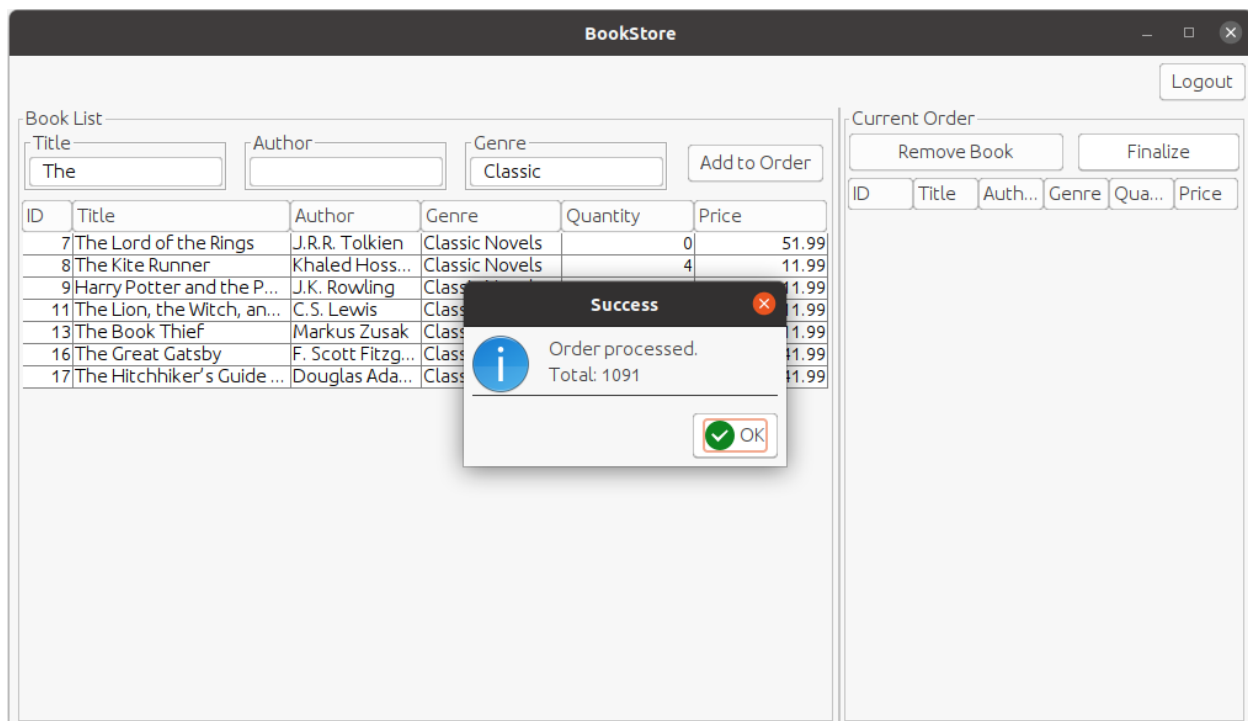


Figure 2 Cart processing upon correct cart content

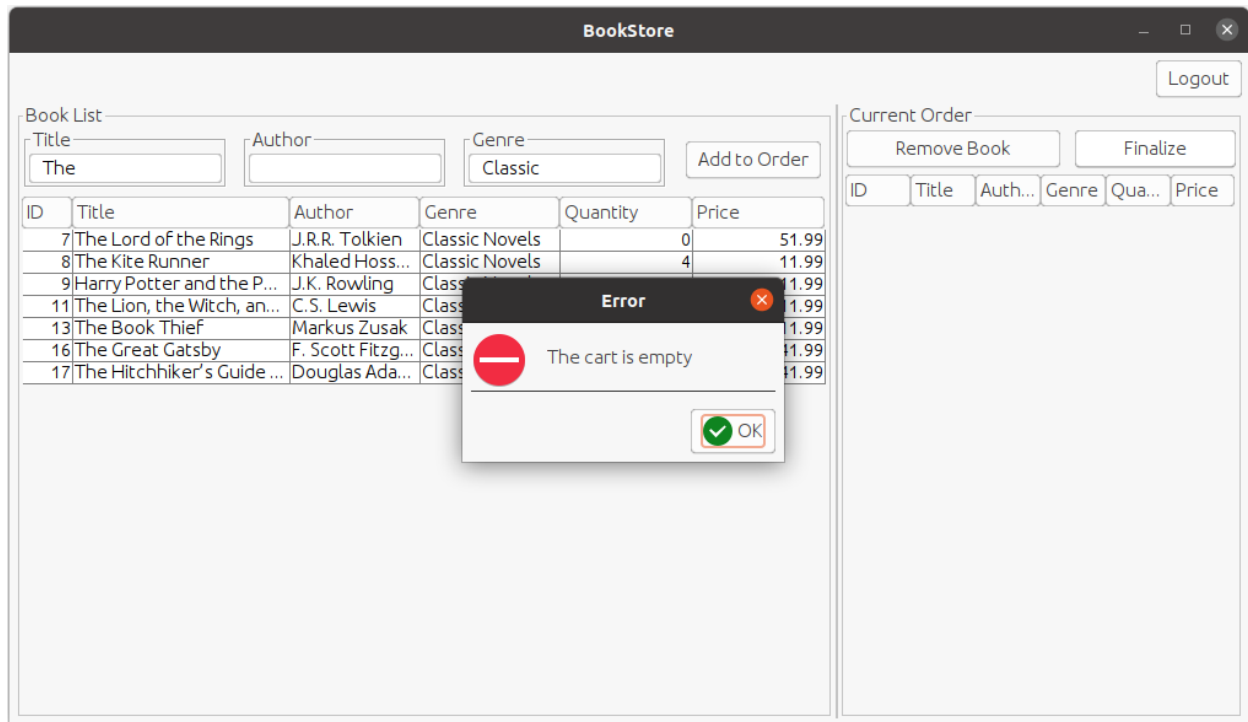


Figure 3 Finalize empty cart error

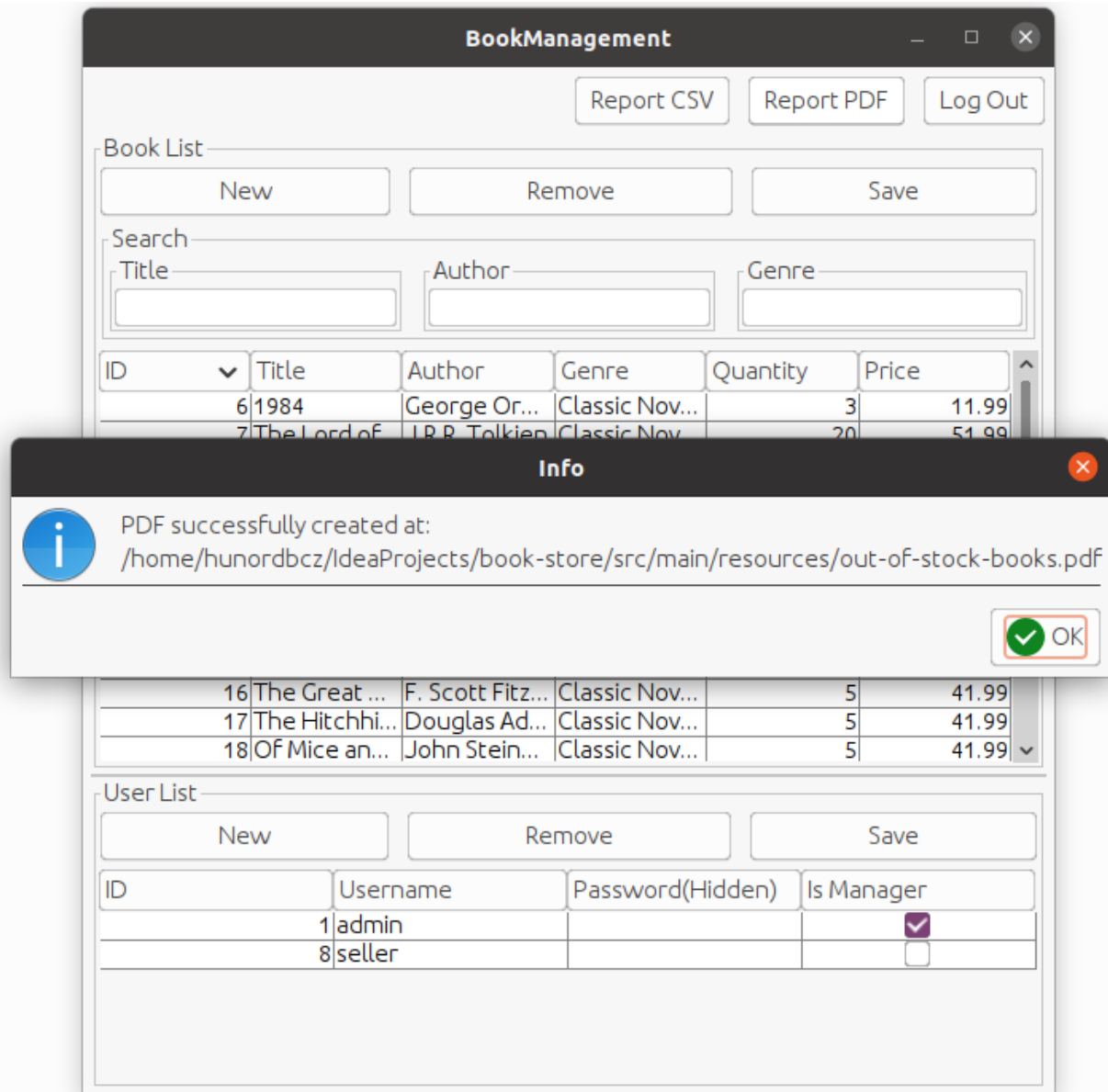


Figure 4 Generate PDF report

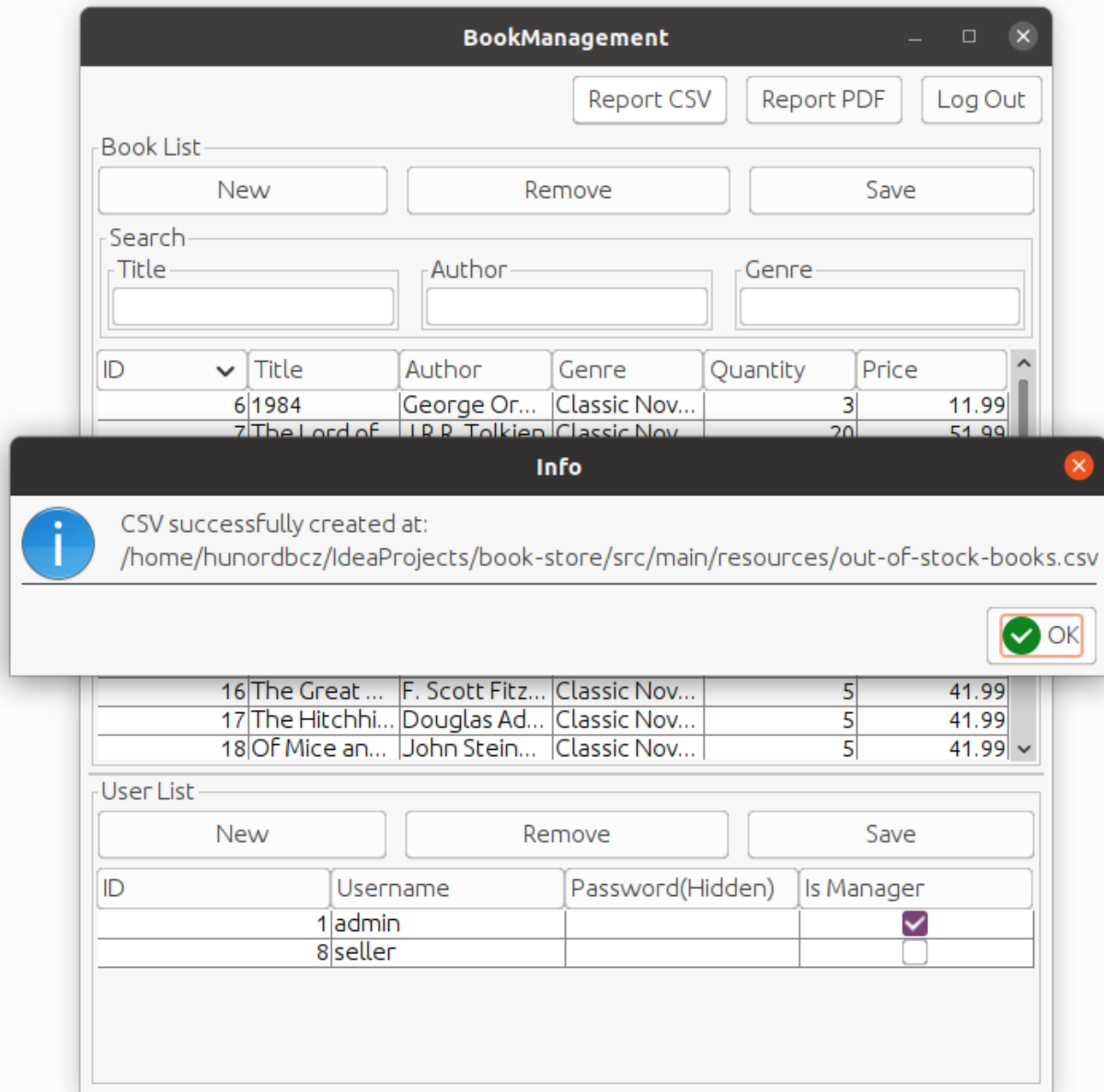


Figure 5 Generate CSV report

BookManagement

Report CSV

Report PDF

Log Out

Book List

New

Remove

Save

Search

Title

Author

Genre

ID	Title	Author	Genre	Quantity	Price
	Test	Test			
6	1984	George Or...	Classic Nov...	3	11.99
7	The Lord of...	J.R.R. Tolkien	Classic Nov...	20	51.99
8	The Kite Ru...	Khaled Hos...	Classic Nov...	4	11.99
9	Harry Potte...	J.K. Rowling	Classic Nov...	2	11.99
10	Slaughterh...	Kurt Vonne...	Classic Nov...	1	11.99
11	The Lion, t...	C.S. Lewis	Classic Nov...	3	11.99
12	To Kill a Mo...	Harper Lee	Classic Nov...	4	11.99
13	The Book T...	Markus Zus...	Classic Nov...	1	11.99
14	Rich Dad Po...	Robert T. Ki...	Business a...	4	41.99
15	Think and G...	Napoleon Hill	Classic Nov...	5	41.99
16	The Great ...	F. Scott Fitz...	Classic Nov...	5	41.99
17	The Hitchhi...	Douglas Ad...	Classic Nov...	5	41.99

User List

New

Remove

Save

ID	Username	Password(Hidden)	Is Manager
1	admin		<input checked="" type="checkbox"/>
8	seller		<input type="checkbox"/>

Figure 6 Book management opens for Manager login

BookManagement

Report CSV

Report PDF

Log Out

Book List

New

Remove

Save

Search

Title

Author

Genre

ID	Title	Author	Genre	Quantity	Price
6				3	11.99
7				20	51.99
8				4	11.99
9				2	11.99
10				1	11.99
11				3	11.99
12				4	11.99
13				1	11.99
14	Rich Dad Po...	Robert T. Ki...	Business a...	4	41.99
15	Think and G...	Napoleon Hill	Classic Nov...	5	41.99
16	The Great ...	F. Scott Fitz...	Classic Nov...	5	41.99
17	The Hitchhi...	Douglas Ad...	Classic Nov...	5	41.99

Invalid values

Invalid fields for book

OK

User List

New

Remove

Save

ID	Username	Password(Hidden)	Is Manager
1	admin		<input checked="" type="checkbox"/>
8	seller		<input type="checkbox"/>

Figure 7 Try to add book with empty fields

BookManagement

Report CSV

Report PDF

Log Out

Book List

New

Remove

Save

Search

Title

Author

Genre

ID	Title	Author	Genre	Quantity	Price
6	1			2	2
7	T			3	11.99
8	T			20	51.99
9	H			4	11.99
10	S			2	11.99
11	T			1	11.99
12	T			3	11.99
13	T			4	11.99
14	Rich Dad Po...	Robert T. Ki...	Business a...	1	11.99
15	Think and G...	Napoleon Hill	Classic Nov...	4	41.99
16	The Great ...	F. Scott Fitz...	Classic Nov...	5	41.99
17	The Hitchhi...	Douglas Ad...	Classic Nov...	5	41.99

Updated

Books successfully updated

OK

User List

New

Remove

Save

Figure 8 Add/modify book with correct fields

BookManagement

Report CSV

Report PDF

Log Out

Book List

New

Remove

Save

Search

Title

Author

Genre

ID	Title	Author	Genre	Quantity	Price
22	Principles: ...	Ray Dalio	Business a...	5	41.99
23	Influence: ...	Robert B. Ci...	Business a...	2	41.99
24	How to Win...	Dale Carne...	Personal D...	1	11.99
25	The Power ...	Charles Du...	Personal D...	1	11.99
26	A Brief Hist...	Stephen Ha...	Science an...	1	11.99
27	Freakonom...	Steven D. L...	Science an...	3	41.99
28	Uncanny Va...	Anna Wiener	Science an...	4	11.99
29	On the Road	Jack Kerouac	Travel and ...	2	41.99
30	Vagabonding	Rolf Potts	Travel and ...	3	41.99
31	Sapiens: A ...	Yuval Noah ...	Biographie...	4	41.99
32	Long Walk t...	Nelson Ma...	Biographie...	1	41.99
33	A Short Hist...	Bill Bryson	Biographie...	2	41.99
35	New	test	test	2	3

User List

New

Remove

Save

ID	Username	Password(Hidden)	Is Manager
1	admin		<input checked="" type="checkbox"/>
8	seller		<input type="checkbox"/>

Figure 9 Save new book with incremental ID

BookManagement

Report CSV

Report PDF

Log Out

Book List

New

Remove

Save

Search

Title

Author

Genre

ID	Title	Author	Genre	Quantity	Price
22	Principles: ...	Ray Dalio	Business a...	5	41.99
23	Influence: ...	Robert B. Ci...	Business a...	2	41.99
24	How to Win...	Dale Carne...	Personal D...	1	11.99
25	The Power ...	Charles Du...	Personal D...	1	11.99
26	A Brief Hist...	Stephen Ha...	Science an...	1	11.99
27	Freakonom...	Steven D. L...	Science an...	3	41.99
28	Uncanny Va...	Anna Wiener	Science an...	4	11.99
29	On the Road	Jack Kerouac	Travel and ...	2	41.99
30	Vagabonding	Rolf Potts	Travel and ...	3	41.99
31	Sapiens: A ...	Yuval Noah ...	Biographie...	4	41.99
32	Long Walk t...	Nelson Ma...	Biographie...	1	41.99
33	A Short Hist...	Bill Bryson	Biographie...	2	41.99
35	New	test	test	2	3

User List

New

Remove

Save

ID	Username	Password(Hidden)	Is Manager
1	admin		<input checked="" type="checkbox"/>
8	seller		<input type="checkbox"/>
			<input type="checkbox"/>

Figure 10 Try to add new user

BookManagement

Report CSV

Report PDF

Log Out

Book List

New

Remove

Save

Search

Title

Author

Genre

ID	Title	Author	Genre	Quantity	Price
22	Principles of Economics	David Colander	Business	5	41.99
23	Introduction to Economics	David Colander	Business	2	41.99
24	History of Economics	David Colander	Business	1	11.99
25	Theory of Economics	David Colander	Business	1	11.99
26	Advanced Economics	David Colander	Business	1	11.99
27	Financial Economics	David Colder	Business	3	41.99
28	Unemployment Economics	David Colder	Business	4	11.99
29	Classical Economics	David Colder	Business	2	41.99
30	Victorian Economics	David Colder	Business	3	41.99
31	Sapiens: A History of Humankind	Yuval Noah Harari	Biographies	4	41.99
32	Long Walk to Water	Nelson Mandela	Biographies	1	41.99
33	A Short History of Nearly Everything	Bill Bryson	Biographies	2	41.99
35	New	test	test	2	3

User List

New

Remove

Save

ID	Username	Password(Hidden)	Is Manager
1	admin		<input checked="" type="checkbox"/>
8	seller		<input type="checkbox"/>
	admin		<input checked="" type="checkbox"/>

Invalid values

Username is already taken

OK

Figure 11 Try to add user with already existing username

BookManagement

Report CSV

Report PDF

Log Out

Book List

New

Remove

Save

Search

Title

Author

Genre

ID	Title	Author	Genre	Quantity	Price
22	Principles of...	Ray Dalio	Business	5	41.99
23				2	41.99
24				1	11.99
25				1	11.99
26				1	11.99
27				3	41.99
28				4	11.99
29				2	41.99
30				3	41.99
31	Sapiens: A ...	Yuval Noah ...	Biographie...	4	41.99
32	Long Walk t...	Nelson Ma...	Biographie...	1	41.99
33	A Short Hist...	Bill Bryson	Biographie...	2	41.99
35	New	test	test	2	3

User List

New

Remove

Save

ID	Username	Password(Hidden)	Is Manager
1	admin		<input checked="" type="checkbox"/>
8	seller		<input type="checkbox"/>
			<input type="checkbox"/>

Figure 12 Try to add empty username

BookManagement

Report CSV

Report PDF

Log Out

Book List

New

Remove

Save

Search

Title

Author

Genre

ID	Title	Author	Genre	Quantity	Price
22	Principles of Economics	Paul A. David	Business	5	41.99
23	Introduction to Economics	Paul A. David	Business	2	41.99
24	History of Economics	Paul A. David	Business	1	11.99
25	Theory of Economics	Paul A. David	Business	1	11.99
26	Advanced Economics	Paul A. David	Business	1	11.99
27	Financial Economics	Paul A. David	Business	3	41.99
28	Micro Economics	Paul A. David	Business	4	11.99
29	Macro Economics	Paul A. David	Business	2	41.99
30	Value Economics	Paul A. David	Business	3	41.99
31	Sapiens: A History of Humankind	Yuval Noah Harari	Biographies	4	41.99
32	Long Walk to Water	Nelson Mandela	Biographies	1	41.99
33	A Short History of Nearly Everything	Bill Bryson	Biographies	2	41.99
35	New	test	test	2	3

User List

New

Remove

Save

ID	Username	Password(Hidden)	Is Manager
1	admin		<input checked="" type="checkbox"/>
8	seller		<input type="checkbox"/>
	user		<input type="checkbox"/>

Figure 13 Add/save user information

BookManagement

Report CSV

Report PDF

Log Out

Book List

New

Remove

Save

Search

Title

Author

Genre

ID	Title	Author	Genre	Quantity	Price
22	Principles: ...	Ray Dalio	Business a...	5	41.99
23	Influence: ...	Robert B. Ci...	Business a...	2	41.99
24	How to Win...	Dale Carne...	Personal D...	1	11.99
25	The Power ...	Charles Du...	Personal D...	1	11.99
26	A Brief Hist...	Stephen Ha...	Science an...	1	11.99
27	Freakonom...	Steven D. L...	Science an...	3	41.99
28	Uncanny Va...	Anna Wiener	Science an...	4	11.99
29	On the Road	Jack Kerouac	Travel and ...	2	41.99
30	Vagabonding	Rolf Potts	Travel and ...	3	41.99
31	Sapiens: A ...	Yuval Noah ...	Biographie...	4	41.99
32	Long Walk t...	Nelson Ma...	Biographie...	1	41.99
33	A Short Hist...	Bill Bryson	Biographie...	2	41.99
35	New	test	test	2	3

User List

New

Remove

Save

ID	Username	Password(Hidden)	Is Manager
1	admin		<input checked="" type="checkbox"/>
8	seller		<input type="checkbox"/>
9	user		<input type="checkbox"/>

Figure 14 User added with incremental ID

BookStore

Logout

Book List

Title

Author

Genre

Add to Order

ID	Title	Author	Genre	Quantity	Price
6	1984	George Orwell	Classic Novels	3	11.99
7	The Lord of t...	J.R.R. Tolkien	Classic Novels	20	51.99
8	The Kite Run...	Khaled Hoss...	Classic Novels	4	11.99
9	Harry Potter ...	J.K. Rowling	Classic Novels	2	11.99
10	Slaughterho...	Kurt Vonnegut	Classic Novels	1	11.99
11	The Lion, the...	C.S. Lewis	Classic Novels	3	11.99
12	To Kill a Moc...	Harper Lee	Classic Novels	4	11.99
13	The Book Thi...	Markus Zusak	Classic Novels	1	11.99
14	Rich Dad Poo...	Robert T. Kiy...	Business and...	4	41.99
15	Think and Gr...	Napoleon Hill	Classic Novels	5	41.99
16	The Great Ga...	F. Scott Fitzg...	Classic Novels	5	41.99
17	The Hitchhik...	Douglas Ada...	Classic Novels	5	41.99
18	Of Mice and ...	John Steinbe...	Classic Novels	5	41.99
19	Frankenstein	Mary Shelley	Classic Novels	5	41.99
20	Charlotte's ...	E.B. White	Classic Novels	3	41.99
21	The Intellige...	Benjamin Gra...	Business and...	1	41.99
22	Principles: Li...	Ray Dalio	Business and...	5	41.99
23	Influence: Th...	Robert B. Cia...	Business and...	2	41.99
24	How to Win F...	Dale Carnegie	Personal Dev...	1	11.99
25	The Power o...	Charles Duhi...	Personal Dev...	1	11.99
26	A Brief Histor...	Stephen Ha...	Science and ...	1	11.99
27	Freakonomic...	Steven D. Le...	Science and ...	3	41.99

Current Order

Remove Book

Finalize

ID	Title	Auth...	Genre	Qua...	Price
----	-------	---------	-------	--------	-------

Figure 15 Book Store dashboard opens for seller user

BookStore

Logout

Book List

Title

Author

Genre

Add to Order

ID	Title	Author	Genre	Quantity	Price
7	The Lord of t...	J.R.R. Tolkien	Classic Novels	20	51.99
8	The Kite Run...	Khaled Hosse...	Classic Novels	4	11.99
9	Harry Potter ...	J.K. Rowling	Classic Novels	2	11.99
11	The Lion, the ...	C.S. Lewis	Classic Novels	3	11.99
13	The Book Thief	Markus Zusak	Classic Novels	1	11.99
14	Rich Dad Poo...	Robert T. Kiyo...	Business and ...	4	41.99
16	The Great Ga...	F. Scott Fitzg...	Classic Novels	5	41.99
17	The Hitchhik...	Douglas Adams	Classic Novels	5	41.99
21	The Intellige...	Benjamin Gra...	Business and ...	1	41.99
23	Influence: Th...	Robert B. Cia...	Business and ...	2	41.99
25	The Power of...	Charles Duhi...	Personal Dev...	1	11.99
27	Freakonomic...	Steven D. Lev...	Science and ...	3	41.99
29	On the Road	Jack Kerouac	Travel and Ad...	2	41.99

Current Order

Remove Book

Finalize

ID	Title	Auth...	Genre	Qua...	Price
----	-------	---------	-------	--------	-------

Figure 16 Single filter works

BookStore

Logout

Book List

Title

The

Author

Genre

Classic

Add to Order

ID	Title	Author	Genre	Quantity	Price
7	The Lord of t...	J.R.R. Tolkien	Classic Novels	20	51.99
8	The Kite Run...	Khaled Hosse...	Classic Novels	4	11.99
9	Harry Potter ...	J.K. Rowling	Classic Novels	2	11.99
11	The Lion, the ...	C.S. Lewis	Classic Novels	3	11.99
13	The Book Thief	Markus Zusak	Classic Novels	1	11.99
16	The Great Ga...	F. Scott Fitzg...	Classic Novels	5	41.99
17	The Hitchhik...	Douglas Adams	Classic Novels	5	41.99

Current Order

Remove Book

Finalize

ID	Title	Auth...	Genre	Qua...	Price
----	-------	---------	-------	--------	-------

Figure 17 Multiple filter works

BookStore

Logout

Book List

Title

The

Author

Genre

Classic

Add to Order

ID	Title	Author	Genre	Quantity	Price
7	The Lord of the Rings	J.R.R. Tolkien	Classic Novels	19	51.99
8	The Kite Runner	Khaled Hoss...	Classic Novels	4	11.99
9	Harry Potter and the Ph...	J.K. Rowling	Classic Novels	1	11.99
11	The Lion, the Witch, an...	C.S. Lewis	Classic Novels	3	11.99
13	The Book Thief	Markus Zusak	Classic Novels	1	11.99
16	The Great Gatsby	F. Scott Fitzg...	Classic Novels	4	41.99
17	The Hitchhiker's Guide ...	Douglas Ada...	Classic Novels	5	41.99

Current Order

Remove Book

Finalize

ID	Title	Auth...	Genre	Qua...	Price
16	The ...	F. Sc...	Class...	1	41.99
9	Harry...	J.K. R...	Class...	1	11.99
7	The L...	J.R.R....	Class...	1	51.99

Figure 18 Add books to order works

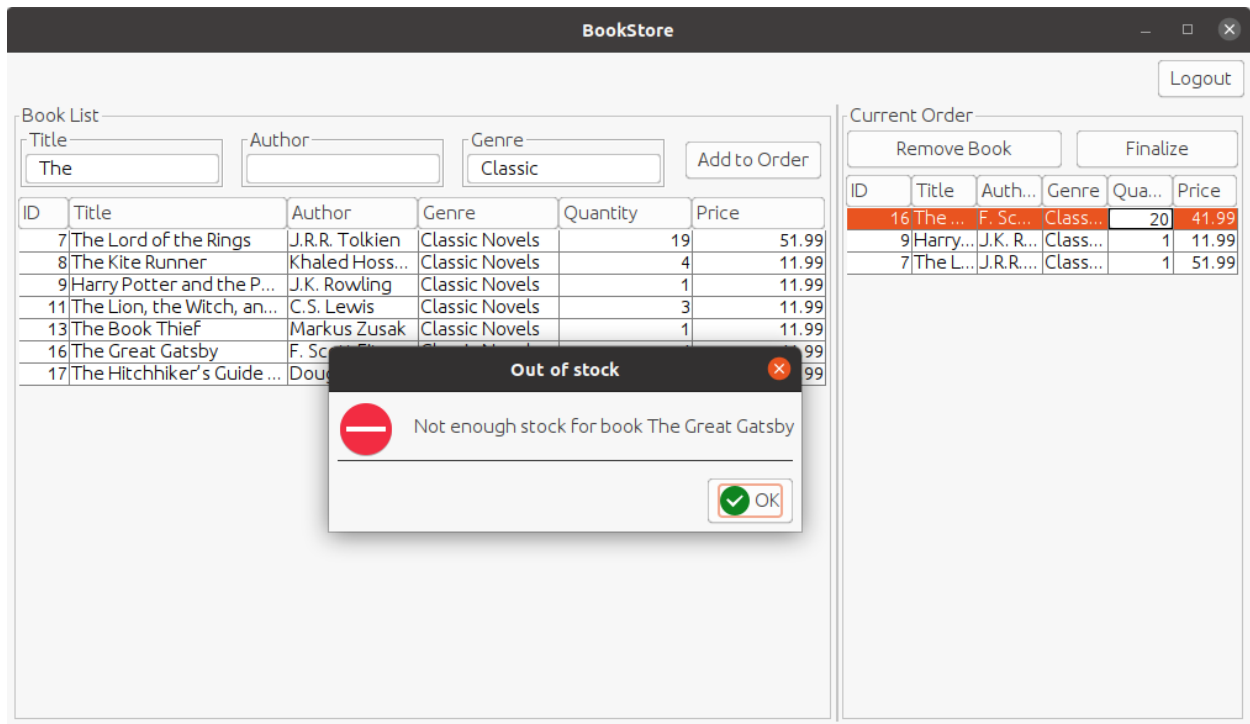


Figure 19 Try to modify stock for a book with not enough stock

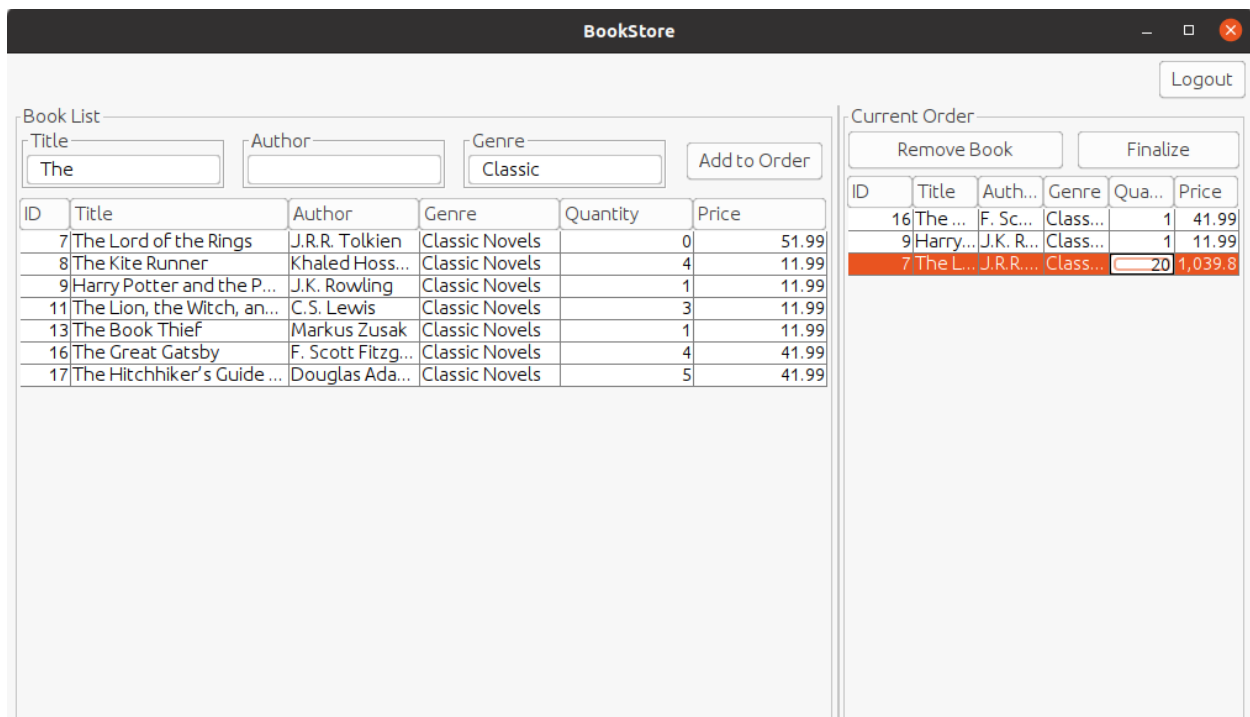


Figure 20 Try to modify stock for a book with enough stock

8 BIBLIOGRAPHY

- [MVC Design Pattern](#)