Requirements Analysis Documentation

Cashier Module:

The Cashier Module is for people who want to purchase books.
The user enters the ISBN of the book they want to purchase.

The user input is checked in inventory to see if it is valid. If not, I addressed this situation with a try/catch exception in a do/while inside a larger do/while. The inside do/while is for when the user will be prompted with another question asking them if they want to try another isbn and making sure their input is valid. The outer do/while is used to check for a valid isbn.

Once valid, the user will be asked for the quantity of the book they want to purchase.
With the user's quantity input, I addressed the situation the same way. I had to do a try/catch inside a do/while.

If a user wants to check out, I addressed this situation by giving the user the option to buy another book or check out. A user can get back to the main function by checking out, even if they do not have any books in their cart.

In addition, books are removed from the Inventory Database when a user purchases them.
A checkout screen with the book(s) quantity, isbn, title, price and total will appear. Also, the user is shown their subtotal, tax, and final total.

Inventory Database Module:

The Inventory Database module must allow the user to look up information on any book in an inventory database file, add new books to the file, delete books, and change any information in the database.

Our Inventory Database module all these requirements by presenting a menu where the user can select one of 5 options, "Look Up a Book", "Add a Book", "Edit a Book's Record", "Delete a Book", or "Return to the Main Menu". Each option is assigned a number, and the user must enter in the number corresponding to the option to select it. Validation checking is done using exception handling to ensure that the input is a number within the range, and if invalid, the user is notified and reprompted.

When looking up a book, the user can search by ISBN, title, author, or publisher. After selecting a value to search by, the user is prompted for a search term. All books for which the search term is contained within the specified value are listed in a table. Some values may be truncated to ensure that the table maintains a consistent format.

When adding a book, the user is first prompted to confirm that they would like to add a new book. Then, the users is prompted to enter each value of the new book, with validation checking done for each value.

When editing a book's record, the user is prompted for the ISBN of the book to edit. If the user enters an invalid ISBN or the ISBN is not found in the inventory, the user is given a choice to cancel the operation or to try entering another ISBN. When the record is found, the user must select the value they would like the edit, and then the current value is displayed before the user is prompted for a new value to replace it with. Validation checking is done on the new value. After modifying one value of the book's record, the user can also choose to also edit a different value of the same book.

When deleting a book, the user is prompted for the ISBN of the book to delete. If the user enters an invalid ISBN or the ISBN is not found in the inventory, the user is given a choice to continue the operation or try another ISBN.

Our inventory database is stored as a tab-separated value file named books.tsv, which must be located in the same directory as the executable. The file is read when the Inventory Database module is constructed, and written when the module is destroyed. When reading the database, the module automatically sorts the inventory by ISBN, so an unsorted inventory database file will be automatically sorted by the program once the program exits.

We created the Book class to represent a book's record within our program.
It contains public members to hold the different properties of the book as well as some convenience methods like getDateStr(), getCostStr(), and getPriceStr() to get formatted versions of certain values for user output. We store dates internally in the time_t type, which allows for easy comparison of dates. However, this type is not portable, so we use the mm/dd/yyyy format to store dates in the database and use our setDate(string date_str) convenience method to set the time_t value given the mm/dd/yyyy format. We have also overloaded the << and >> stream operators to read and write Books using the tab-separated format used in our database.

Our Inventory Database module maintains a vector of Book objects read in from the database file or newly added by the user. The module provides the public getBooks() and getBook(string isbn) methods for other modules either access the entire inventory and select certain a book by it's ISBN, abstracting all database reading, writing, and searching within the module. These methods return const Book pointers, preventing any modification of the book data. getBook(string isbn) is implemented with binary search, taking advantage of the already ISBN-sorted vector. The module also provides the remove(const Book *book, int qty) method, allowing the Cashier module to remove a given quantity of a Book from the inventory and automatically deleting a book from the inventory if it's quantity reaches 0.

Reports Module:

We addressed the specifications for the reports module for:

Inventory List- of printing “a list of information on all books in the inventory” by printing out the list of books and it’s corresponding information (ISBN, Author, Price, etc) in order of increasing ISBN using the inventory module’s getBooks() function.

Inventory Wholesale Value- we printed a list of books and their individual wholesale costs, as well as the total wholesale value of the inventory

Inventory Retail Value- we printed a list of books and their individual retail price, as well as the total retail value of the inventory

List by Quantity- we printed a list of books by descending quantity by using selection sort on the getBooks() array in respect to quantity so instead of being sorted by ISBN, they are sorted by quantity and then the books are printed on the screen in that sorted order.

List by Cost- we printed a list of books by ascending cost by using selection sort on the getBooks() array in respect to cost so instead of being sorted by ISBN, they are sorted by cost and then the books are printed on the screen in that sorted order.

List by Age- we printed a list of books by ascending age by using selection sort on the getBooks() array in respect to age so instead of being sorted by ISBN, they are sorted by age and then the books are printed on the screen in that sorted order.

Pseudocode

Reports Module:

```
print options that reports module will do
get option number from user
        if number is not within range tell user to re-enter value

case 1(inventory list)
        use getBooks() to get the books array by ISBN
        display book information (with title truncated to 35 chars)
        return to Reports Menu

case 2(wholesale value)
        use getBooks() to get the books array by ISBN
        display book information (with title, and wholesale value)
```

Calculate total wholesale value and display the value

case 3(retail value)
Use getBooks() to get the books array by ISBN
display book information (with title, and retail value)
Calculate total retail value and display the value

case 4(list by quantity)
use getBooks() to get the books array by ISBN
selection sort books array in order of quantity (descending order)
display book information in order of quantity (with title truncated to 35 chars)
return to Reports Menu

case 5(list by cost)
use getBooks() to get the books array by ISBN
selection sort books array in order of cost (ascending order)
display book information in order of cost (with title truncated to 35 chars)
return to Reports Menu

case 6(list by age)
use getBooks() to get the books array by ISBN
selection sort books array in order of age (ascending order)
display book information in order of age (with title truncated to 35 chars)
return to Reports Menu

case 7(return to main menu)
return to Main Menu

Cashier Module:

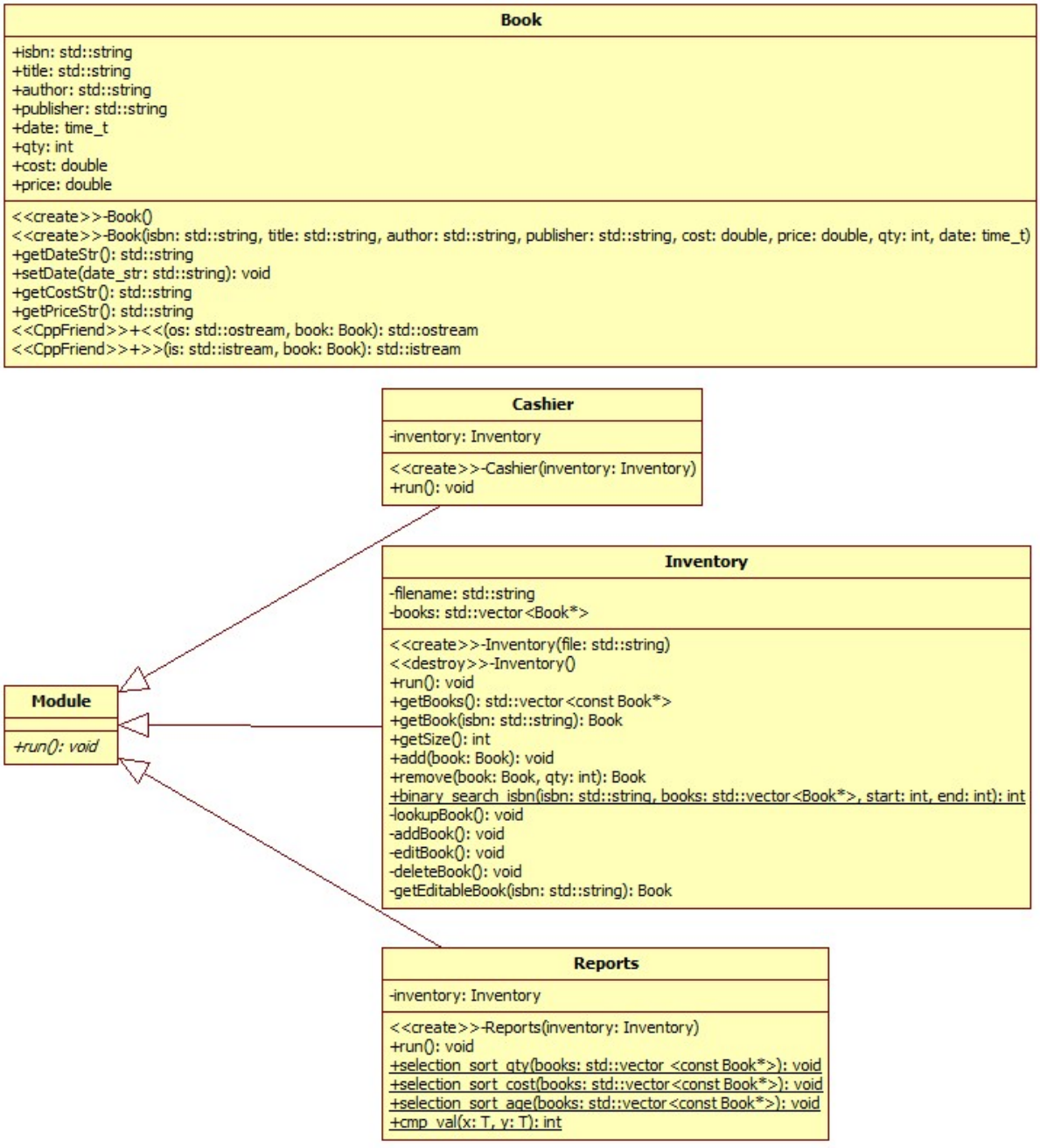
Print out Store Name statement
Ask User to enter ISBN number of book they want to purchase
do/while loop to ask user the quantity of books they want to purchase
Use try catch to make sure they enter valid number
Else keep asking for a valid ISBN.
Ask User the quantity they want to buy.
Check to see if the quantity the user wants is in the inventory.
Try and catch to make sure they are inputting a valid character.
If not, ask user to input a new isbn and then a new quantity.
Ask User if they would like to purchase another book or Check out.
Receive input and make sure it is a valid character.
If User wants to purchase another book, go back to beginning and ask the user to enter an ISBN.

If User wants to check out, print out Check out screen.
For loop print out all the books they want to buy with the quantity, isbn, title, price and total.
Calculate total, subtotal, tax, and final total.
Print out calculations.
Return to main menu.

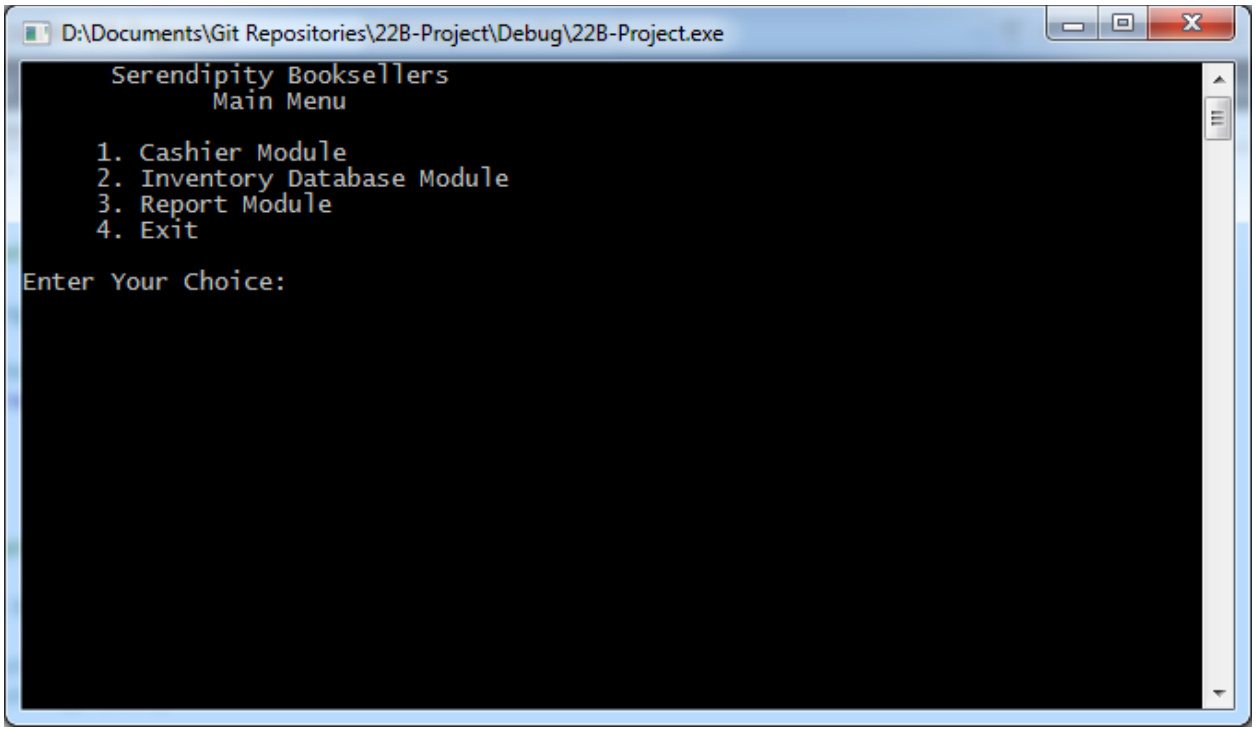
Inventory Database Module:

```
while "Return to the Main Menu" not selected
        show inventory module menu
        prompt for user selection

        if "Look Up a Book" selected
                show available values to search by
                prompt for value to search by
                prompt for search term
                list books in inventory for which selected value contains search term

        else if "Add a Book" selected
                confirm user wants to add a book
                prompt for and validate each value of the new book
                add book into inventory

        else if "Edit a Book's Record" selected
                prompt for isbn of book to edit
                find book by isbn in inventory
                show available values to edit
                prompt for value to edit
                show current value
                prompt for new value
                ask if user would like to edit another value

        else if "Delete a Book" selected
                prompt for isbn of book to delete
                delete book from inventory
```

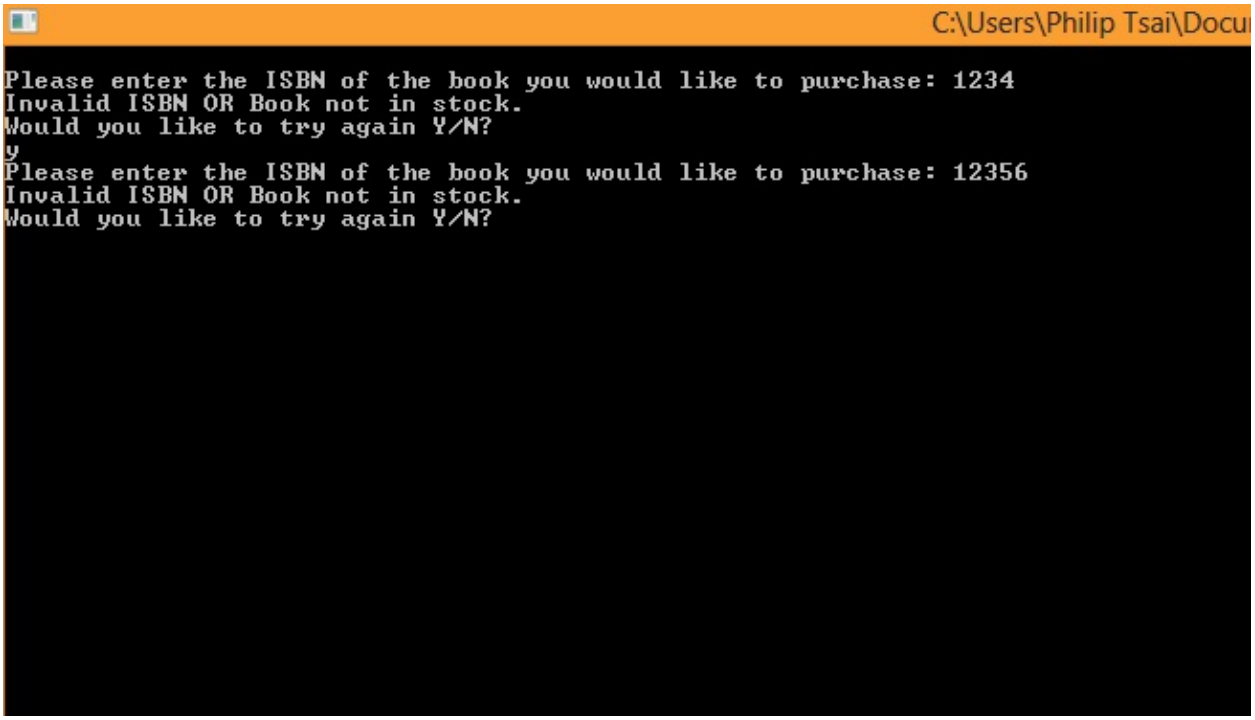
UML

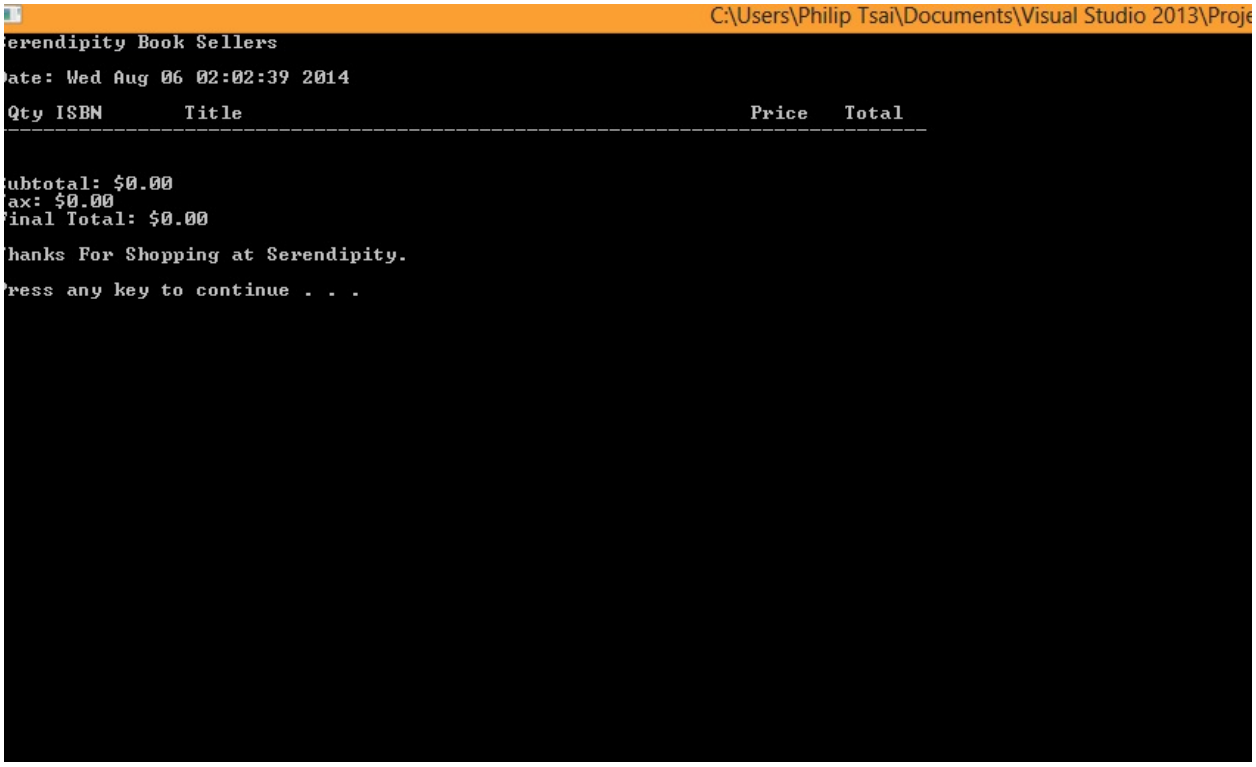

Book
+isbn: std::string
+title: std::string
+author: std::string
+publisher: std::string
+date: time_t
+qty: int
+cost: double
+price: double
<<create>>-Book()
<<create>>-Book(isbn: std::string, title: std::string, author: std::string, publisher: std::string, cost: double, price: double, qty: int, date: time_t)
+getDateStr(): std::string
+setDate(date_str: std::string): void
+getCostStr(): std::string
+getPriceStr(): std::string
<<CppFriend>>+<<(os: std::ostream, book: Book): std::ostream
<<CppFriend>>+>>(is: std::istream, book: Book): std::istream
Cashier
-inventory: Inventory
<<create>>-Cashier(inventory: Inventory)
+run(): void
Inventory
-filename: std::string
-books: std::vector<Book*>
<<create>>-Inventory(file: std::string)
<<destroy>>-Inventory()
+run(): void
+getBooks(): std::vector<const Book*>
+getBook(isbn: std::string): Book
+getSize(): int
+add(book: Book): void
+remove(book: Book, qty: int): Book
+binary_search_isbn(isbn: std::string, books: std::vector<Book*>, start: int, end: int): int
-lookupBook(): void
-addBook(): void
-editBook(): void
-deleteBook(): void
-getEditableBook(isbn: std::string): Book
Module
+run(): void
Reports
-inventory: Inventory
<<create>>-Reports(inventory: Inventory)
+run(): void
+selection_sort_qty(books: std::vector <const Book*>): void
+selection_sort_cost(books: std::vector<const Book*>): void
+selection_sort_age(books: std::vector<const Book*>): void
+cmp_val(x: T, y: T): int

Screenshots

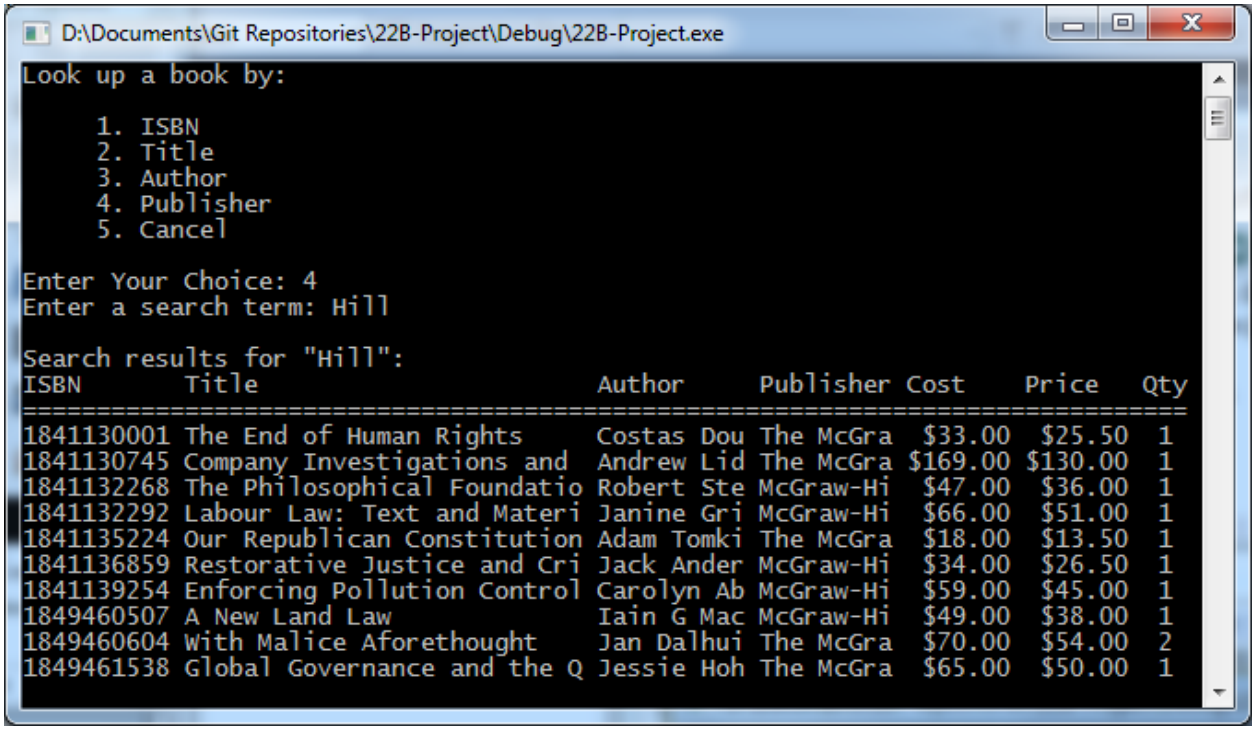


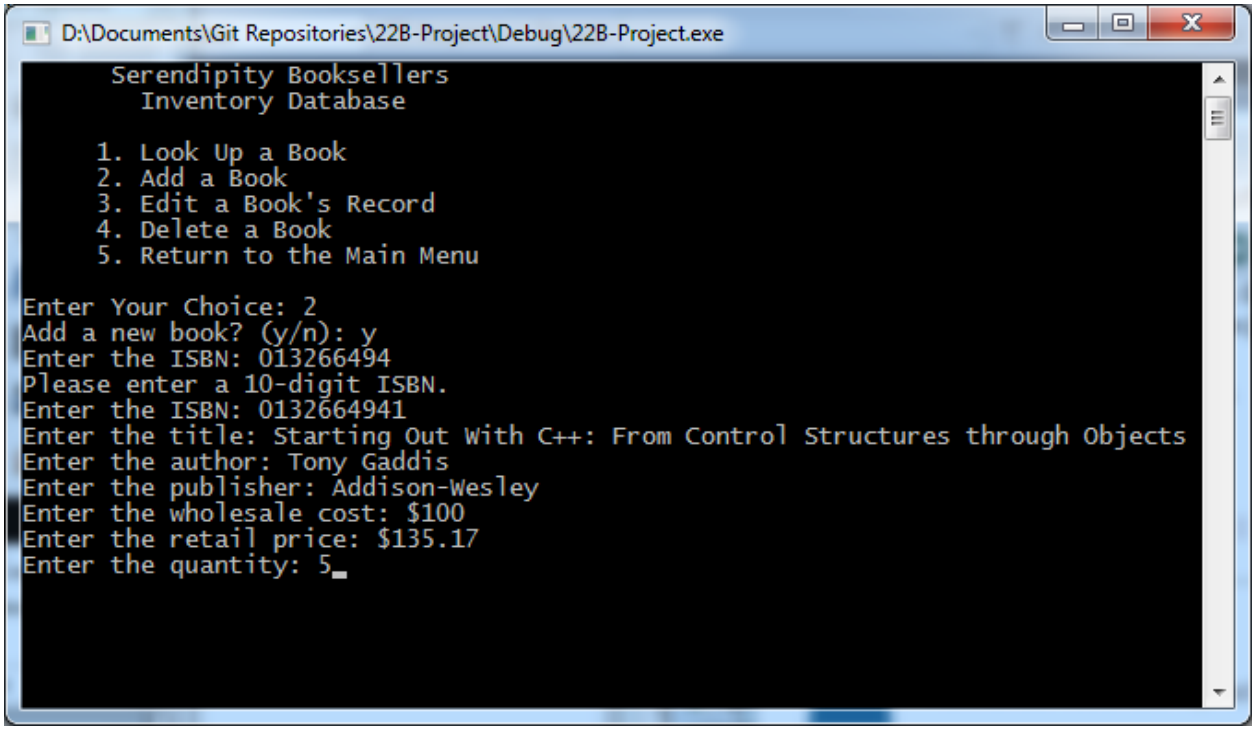
Cashier Module:

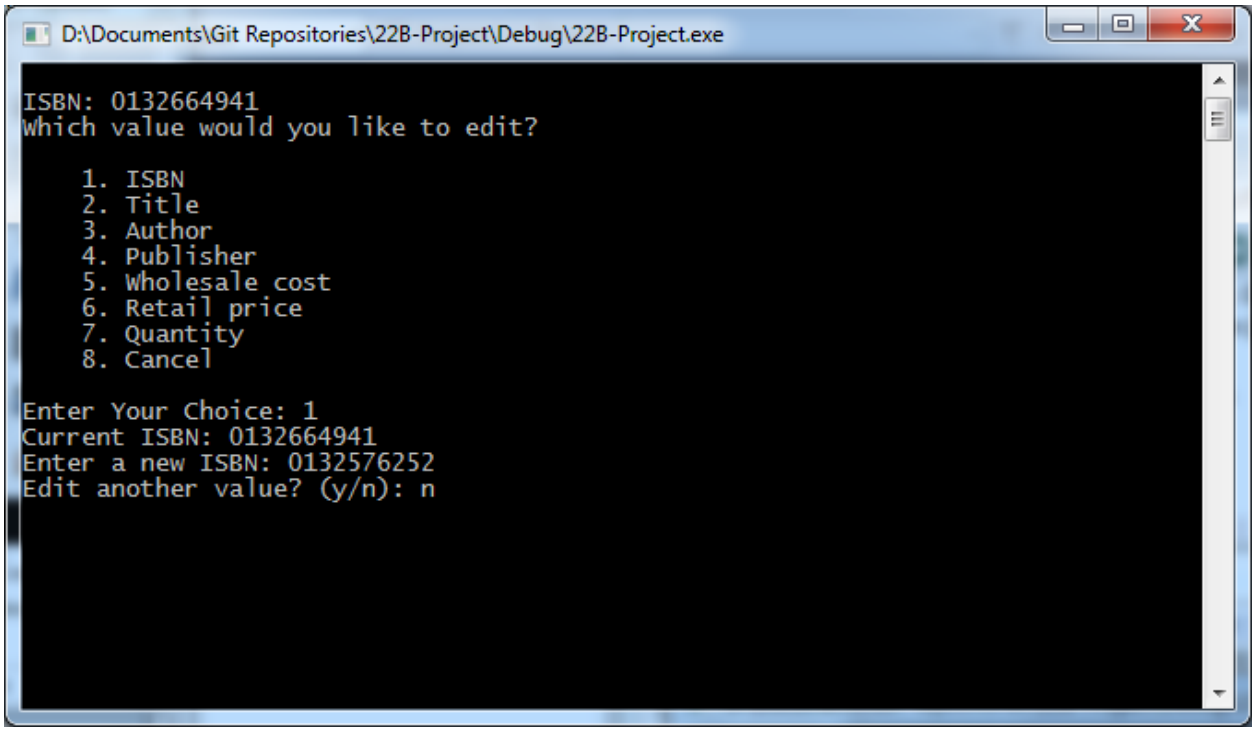




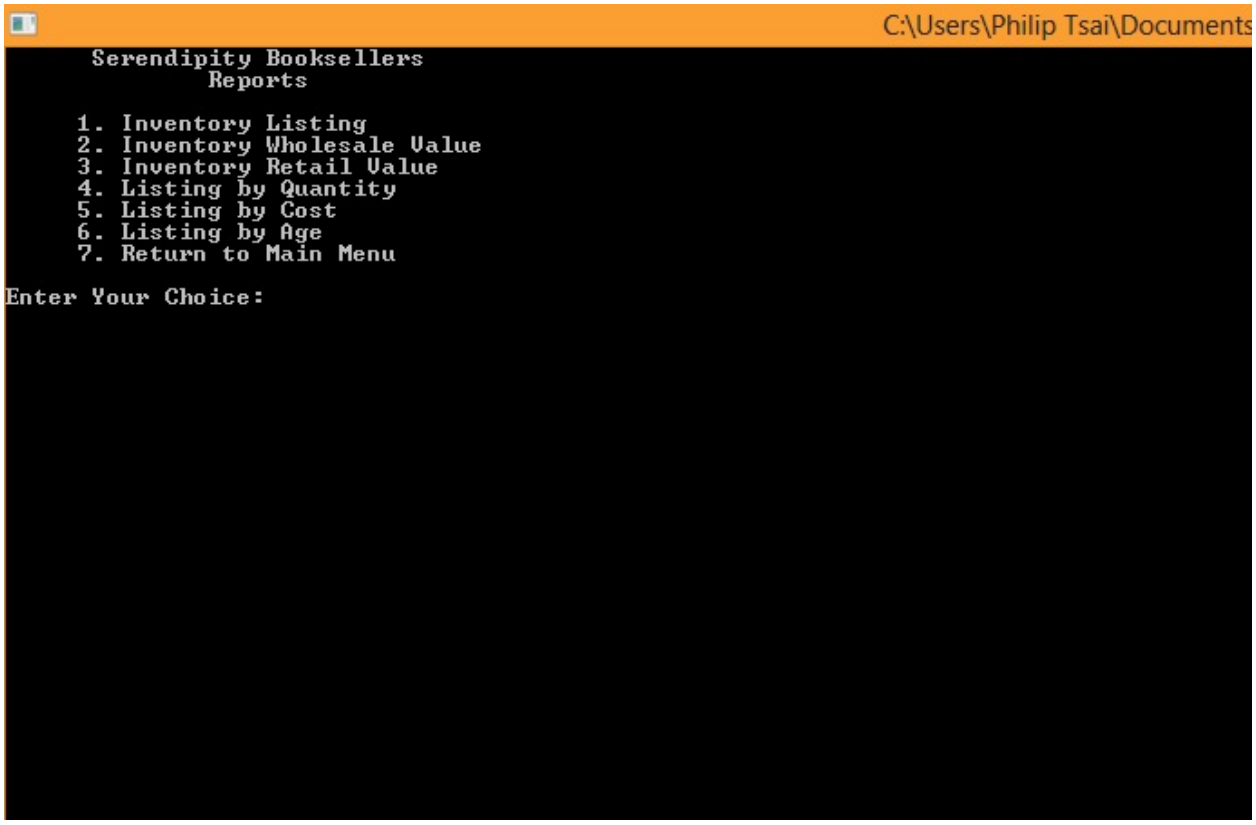
Inventory Database Module:

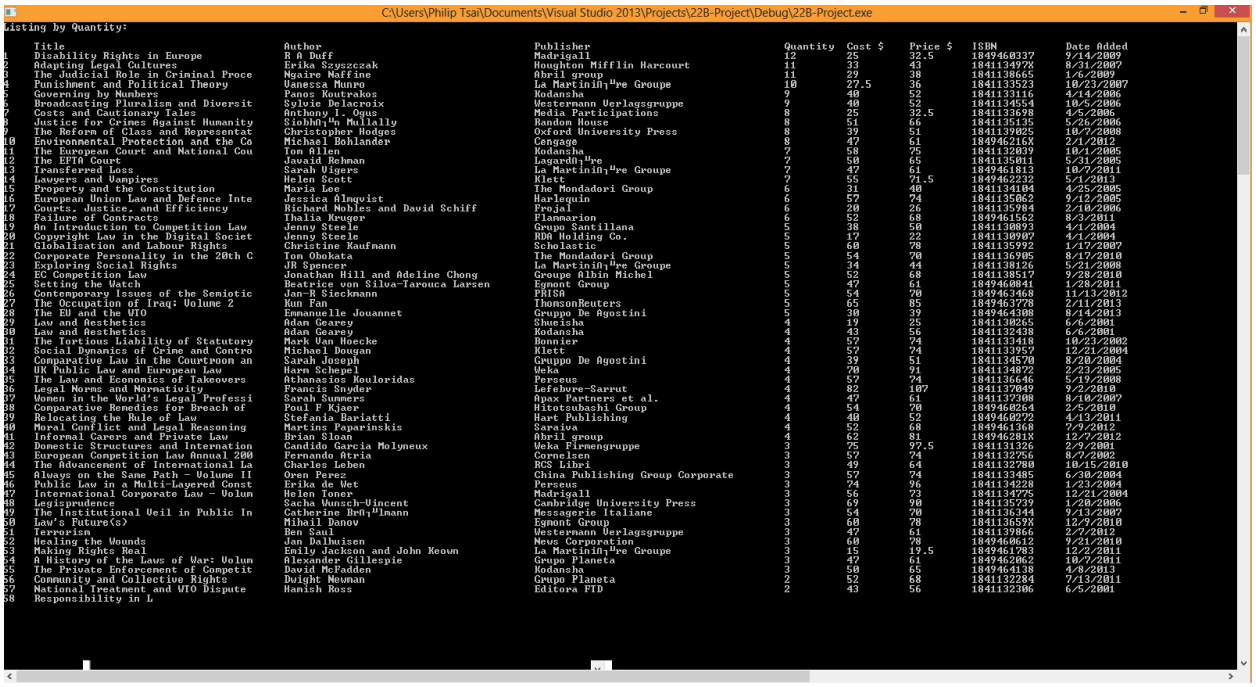



D:\Documents\Git Repositories\22B-Project\Debug\22B-Project.exe
Serendipity Booksellers
Inventory Database
1. Look Up a Book
2. Add a Book
3. Edit a Book's Record
4. Delete a Book
5. Return to the Main Menu
Enter Your Choice: 2
Add a new book? (y/n): y
Enter the ISBN: 013266494
Please enter a 10-digit ISBN.
Enter the ISBN: 0132664941
Enter the title: Starting Out With C++: From Control Structures through Objects
Enter the author: Tony Gaddis
Enter the publisher: Addison-Wesley
Enter the wholesale cost: $100
Enter the retail price: $135.17
Enter the quantity: 5


D:\Documents\Git Repositories\22B-Project\Debug\22B-Project.exe
ISBN: 0132664941
Which value would you like to edit?
1. ISBN
2. Title
3. Author
4. Publisher
5. Wholesale cost
6. Retail price
7. Quantity
8. Cancel
Enter Your Choice: 1
Current ISBN: 0132664941
Enter a new ISBN: 0132576252
Edit another value? (y/n): n

Reports Module:





	Title	Author	Publisher	Quantity	Cost $	Price $	ISBN	Date Added
1	Disability Rights in Europe	R A Duf	Madrigall	12	25	32.5	1849460337	9/14/2009
2	Adapting Legal Cultures	Erika Szyszczak	Houghton Mifflin Harcourt	11	33	43	184113497X	8/31/2007
3	The Judicial Role in Criminal Proce	Ngaire Naffine	Abril group	11	29	38	1841138665	1/6/2009
4	Punishment and Political Theory	Vanessa Munro	La Martiniï¬ªre Groupe	10	27.5	36	1841133523	10/23/2007
5	Governing by Numbers	Panos Koutrakos	Kodansha	9	40	52	1841133116	4/14/2006
6	Broadcasting Pluralism and Diversit	Sylvie Delacroix	Westermann Verlagsgruppe	9	40	52	1841134554	10/5/2006
7	Costs and Cautionary Tales	Anthony I. Ogus	Media Participations	8	25	32.5	1841133698	4/5/2006
8	Justice for Crimes Against Humanity	Siobhï¬ªn Mullally	Random House	8	51	66	1841135135	5/26/2006
9	The Reform of Class and Representat	Christopher Hodges	Oxford University Press	8	39	51	1841139025	10/7/2008
10	Environmental Protection and the Co	Michael Bohlander	Cengage	8	47	61	184946216X	2/1/2012
11	The European Court and National Cou	Tom Allen	Kodansha	7	58	75	1841132079	10/1/2005
12	The EFTA Court	Javaid Rehman	Lagardï¬ªre	7	50	65	1841135011	5/31/2005
13	Transferred Loss	Sarah Vigers	La Martiniï¬ªre Groupe	7	47	61	1849461813	10/7/2011
14	Lawyers and Vampires	Helen Scott	Klett	7	55	71.5	1849462232	5/1/2013
15	Property and the Constitution	Maria Lee	The Mondadori Group	6	31	40	1841134104	4/25/2005
16	European Union Law and Defence Inte	Jessica Almqvist	Harlequin	6	57	74	1841135062	9/12/2005
17	Courts, Justice, and Efficiency	Richard Nobles and David Schiff	Projal	6	20	26	1841135904	2/10/2006
18	Failure of Contracts	Thalia Kruger	Flammarion	6	52	68	1849461562	8/3/2011
19	An Introduction to Competition Law	Jenny Steele	Grupo Santillana	5	38	50	1841138893	4/1/2004
20	Copyright Law in the Digital Societ	Jenny Steele	RDA Holding Co.	5	17	22	1841138997	4/1/2004
21	Globalisation and Labour Rights	Christine Kaufmann	Scholastic	5	60	78	1841135992	1/17/2007
22	Corporate Personality in the 20th C	Tom Obokata	The Mondadori Group	5	54	70	1841136905	8/17/2010
23	Exploring Social Rights	JB Spencer	La Martiniï¬ªre Groupe	5	34	44	1841138126	5/21/2008
24	EC Competition Law	Jonathan Hill and Adeline Chong	Groupe Albin Michel	5	52	68	1841138517	9/28/2010
25	Setting the Watch	Beatrice von Silva-Tarouca Larsen	Egmont Group	5	47	61	1849460841	1/28/2011
26	Contemporary Issues of the Semiotic	Jan-R Sieckmann	PRISA	5	54	70	1849463468	11/13/2012
27	The Occupation of Iraq: Volume 2	Kun Fan	ThomsonReuters	5	65	85	1849463778	2/11/2013
28	The EU and the WTO	Emmanuelle Jouannet	Gruppo De Agostini	5	30	39	1849464308	8/14/2013
29	Law and Aesthetics	Adam Gearey	Shueisha	4	19	25	1841138265	6/6/2001
30	Law and Aesthetics	Adam Gearey	Kodansha	4	43	56	1841132438	6/6/2001
31	The Tortious Liability of Statutory	Mark Van Hoecke	Bonnier	4	57	74	1841133418	10/23/2002
32	Social Dynamics of Crime and Contro	Michael Dougan	Klett	4	57	74	1841133957	12/21/2004
33	Comparative Law in the Courtroom an	Sarah Joseph	Gruppo De Agostini	4	39	51	1841134570	8/28/2004
34	UK Public Law and European Law	Harm Schepel	Weka	4	70	91	1841134872	2/23/2005
35	The Law and Economics of Takeovers	Athanasios Kouloridas	Perseus	4	57	74	1841136646	5/19/2008
36	Legal Norms and Normativity	Francis Snyder	Lefebvre-Sarrut	4	82	107	1841137049	9/2/2010
37	Women in the World's Legal Professi	Sarah Summers	Apax Partners et al.	4	47	61	1841137308	8/10/2007
38	Comparative Remedies for Breach of	Poul F Kjaer	Hitotsubashi Group	4	54	70	1849460264	2/5/2010
39	Relocating the Rule of Law	Stefania Bariatti	Hart Publishing	4	40	52	1849460272	4/13/2011
40	Moral Conflict and Legal Reasoning	Martins Paparinskis	Saraiva	4	52	68	1849461368	7/9/2012
41	Informal Careers and Private Law	Brian Sloan	Abril group	4	62	81	184946281X	12/7/2012
42	Domestic Structures and Internation	Candido Garcia Molyneux	Weka Firmengruppe	3	75	97.5	1841131326	2/3/2001
43	European Competition Law Annual 200	Fernando Atria	Cornelsen	3	57	74	1841132756	8/7/2002
44	The Advancement of International La	Charles Leben	RCS Libri	3	49	64	1841132780	10/15/2010
45	Always on the Same Path - Volume II	Oren Perez	China Publishing Group Corporate	3	57	74	1841133485	6/30/2004
46	Public Law in a Multi-Layered Const	Erika de Wet	Perseus	3	74	96	1841134228	1/23/2004
47	International Corporate Law - Volum	Helen Toner	Madrigall	3	56	73	1841134775	12/21/2004
48	Legisprudence	Sacha Wunsch-Vincent	Cambridge University Press	3	69	90	1841135799	1/20/2006
49	The Institutional Veil in Public In	Catherine Beï¬ªmann	Messagerie Italiane	3	54	70	1841136344	9/13/2007
50	Law's Future(s)	Mihail Danov	Egmont Group	3	60	78	184113659X	12/9/2010
51	Terrorism	Ben Saul	Westermann Verlagsgruppe	3	47	61	1841139866	2/7/2012
52	Healing the Wounds	Jan Dalhuisen	News Corporation	3	60	78	1849460612	9/21/2010
53	Making Rights Real	Emily Jackson and John Keown	La Martiniï¬ªre Groupe	3	15	19.5	1849461783	12/2/2011
54	A History of the Laws of War: Volum	Alexander Gillespie	Grupo Planeta	3	47	61	1849462062	10/7/2011
55	The Private Enforcement of Competit	David McFadden	Kodansha	3	50	65	1849461138	4/8/2013
56	Community and Collective Rights	Dwight Newman	Grupo Planeta	2	52	68	1841132284	7/13/2011
57	National Treatment and WTO Dispute	Hamish Ross	Editora FTD	2	43	56	1841132306	6/5/2001
58	Responsibility in L							