

# COMP 3005 Final Project

## Book Store Application

December 19, 2021

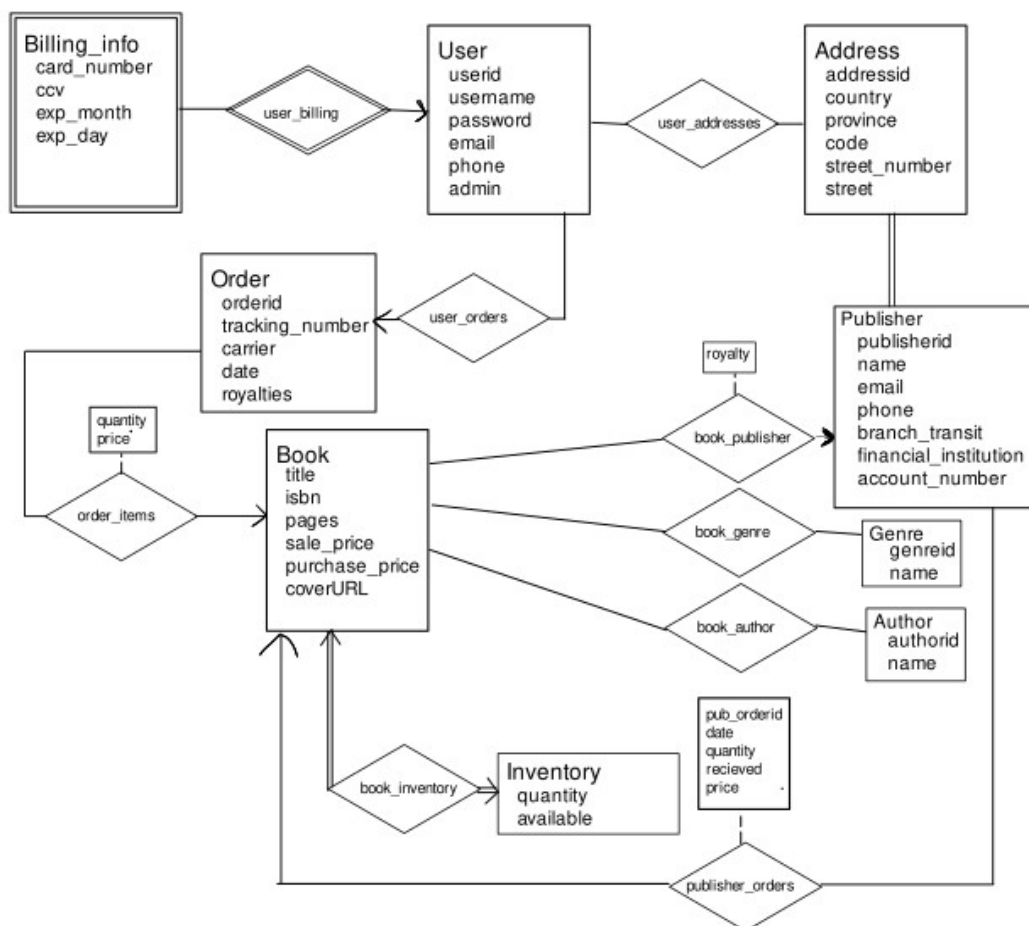
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## 2.1 – Conceptual Design

Below are some assumptions we made during the design phase, and the ER diagram we generated based off of them

- Billing
  - Billing info cannot be deleted/edited,
  - Billing info must belong to a user.
- Users
  - Users must have unique usernames, as they login with this
  - A user can have multiple addresses
  - A user can have multiple orders
  - A user can only be an admin or a user. There are no finer grained access controls
- Addresses
  - Two different copies of the same address can exist (2 users who live together)
  - Address could be shared between Publisher and Users, so if publishers are ordering books, they can be shipped to the current address of a user.
- Orders
  - A "Order" is only the kind of order that a user makes, not the store ordering more books from the Publisher
  - Order can have 1 quantity of a specific item. So maybe 4 x book1 and 3 x book2, but not 2 x book1 and 3 x book1 and 3 x book2
  - Tracking state (like location) is not stored. In the real world this would be delegated to the third part carrier, and the retailer would only keep a carrier and tracking number
- Books
  - Books always have an isbn, that is an integer
  - Books can only have one publisher
  - Books can have 0 to multiple authors (anonymously published) and genres
  - Deleted books are only ever marked as unavailable. This allows valid reports to be generated
  - Books can be repriced without retroactively changing order data
- Genres
  - Whole genres can be deleted (and all books will update) (for example, if a genre becomes no longer socially acceptable)
  - Genres do not need to have a book that includes them.
- Authors
  - Two authors with the same name can be treated the same, there is no additional information for an author

- Authors do not need to have a book that includes them. (application has search functionality for both, so imagine importing a large list, to make searching easier when adding books.)
- Publisher
  - Publisher orders can only be for one book at once.
  - Publishers can only have one bank account
  - Publisher orders are not fulfilled automatically (This is more realistic)
  - Publisher orders may not all be recieved at once (but always are in this system)
  - In addition to royalty, there is a purchase price that must be paid to the publisher every time a new order is made
- Other
  - The min inventory for a book is a static constant throughout the system, not made to be easily changed through the application itself
  - Carts do not need to be stored server-side
  - Sensitive Information (CC numbers, passwords) can be stored in plain-text



## 2.2 – Reduction to Relation Schemas

Many sets require an id to nicely identify them to the user when editing. For example, if editing a Billing\_info entry, to uniquely identify it, you need all attributes, which would typically lead to frontend urls such as /ui/billing/edit?

card\_number=XXXXXXXXXXXX&ccv=XXX&exp\_month=XX&exp\_year=XX. This is even worse for addresses, so for relations where we want to allow editing, we have to add a id. This is not done for the sole purpose of making normalization easier by almost always having a superkey.

Billing\_info(userid, card\_number, ccv, exp\_month, exp\_year)

Is a weak entity set, so it needs userid.

Users(userid, username, password, email, phone, admin)

User\_Address(userid, addressid)

Need this relation so that publishers can also use a given address

Address(addressid, country, province, code, street\_number, street)

Orders(orderid, userid, tracking\_number, carrier, date, price, royalties)

Total Participation with inventory, so it can be integrated into this relation.

OrderItems(orderid, isbn, quantity)

Books(isbn, title, pages, sale\_price, purchase\_price, coverURL, available, quantity, royalty, publisherid, royalty )

Publisher(publisherid, addressid, name, email, phone, addressid, branch\_transit, financial\_institution, account\_number)

Genres(genreid, name)

Authors(authorid, name)

Book\_genre(isbn, genreid)

Book\_author(isbn, authorid)

Publisher\_orders(pub\_orderid, isbn, publisherid, date, quantity, recieved, price)

## 2.3 – Normalization

Billing\_info(userid, card\_number, ccv, exp\_month, exp\_year)

userid, card\_number, ccv, exp\_month, exp\_year-> userid, card\_number, ccv, exp\_month, exp\_year

*All attributes form the candidate key, so this is in 3NF*

Users(userid, username, password, email, phone, admin)  
userid->username, password, email, phone, admin  
username->password, email, phone, admin  
*userid and username are both super keys, so this is in 3NF*

User\_Address(userid, addressid)  
userid, addressid -> userid, addressid  
candidate key is userid, addressid  
*In FD, X->Y, where y is userid, addressid, both elements are part of the candidate key, so this is 3NF*

Address(addressid, country, province, code, street\_number, street)  
addressid->country, province, code, street\_number, street  
code -> province, city  
candidate key is (addressid, country, province, code, street\_number, street)  
*addressid is a superkey, and province,city is in a candidate key, so this is in 3NF*

Orders(orderid, userid, tracking\_number, carrier, date, price, royalties)  
orderid->userid, tracking\_number, carrier, date, price, royalties  
*Orderid is a superkey, so this is in 3NF*

OrderItems(orderid, isbn, quantity)  
orderid, isbn -> quantity  
*Orderid, isbn form a superkey, so this is in 3NF*

Books(isbn, title, papges, sale\_price, purchase\_price, coverURL, available, quantity, royalty, publisherid )  
isbn-> title, pages, sale\_price, purchase\_price, coverURL, available, quantity, royalty, publisherid  
*Isbn is a superkey, so this is in 3NF*

Publisher(publisherid, name, email, phone, addressid, branch\_transit, financial\_institution, account\_number)  
publisherid -> name, email, phone, addressid, branch\_transit, financial\_institution, account\_number  
*publisherid is a superkey, so this is in 3NF*

Genres(genreid, name)  
genreid->name  
*genreid is a superkey, so this is in 3NF*

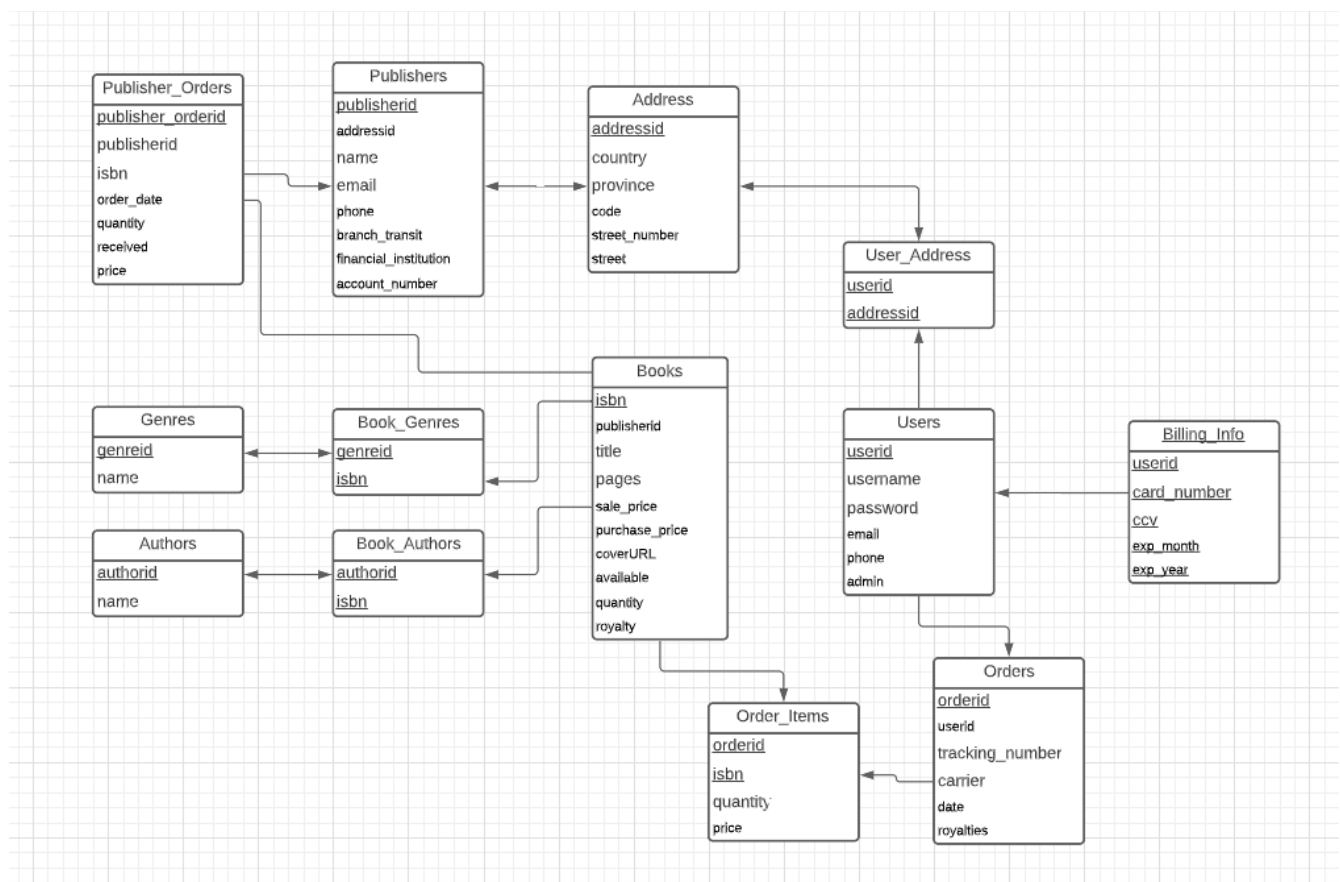
Authors(authorid, name)  
authorid->name  
*authorid is a superkey, so this is in 3NF*

Book\_genre(isbn, genreid)  
isbn, genreid-> isbn, genreid  
isbn, genreid is a candidate key, so this is in 3NF

Book\_author(isbn, authorid)  
isbn, authorid-> isbn, authorid  
isbn, authorid is a candidate key, so this is in 3NF

Publisher\_orders(publisher\_orderid, isbn, publisherid, date, quantity, recieved, price)  
publisher\_orderid-> isbn, publisherid, date, quantity, recieved, price  
*publisher\_orderid is a superkey, so this is in 3NF*

## 2.4 – Database Schema Diagram



## 2.5 – Implementation

### Backend

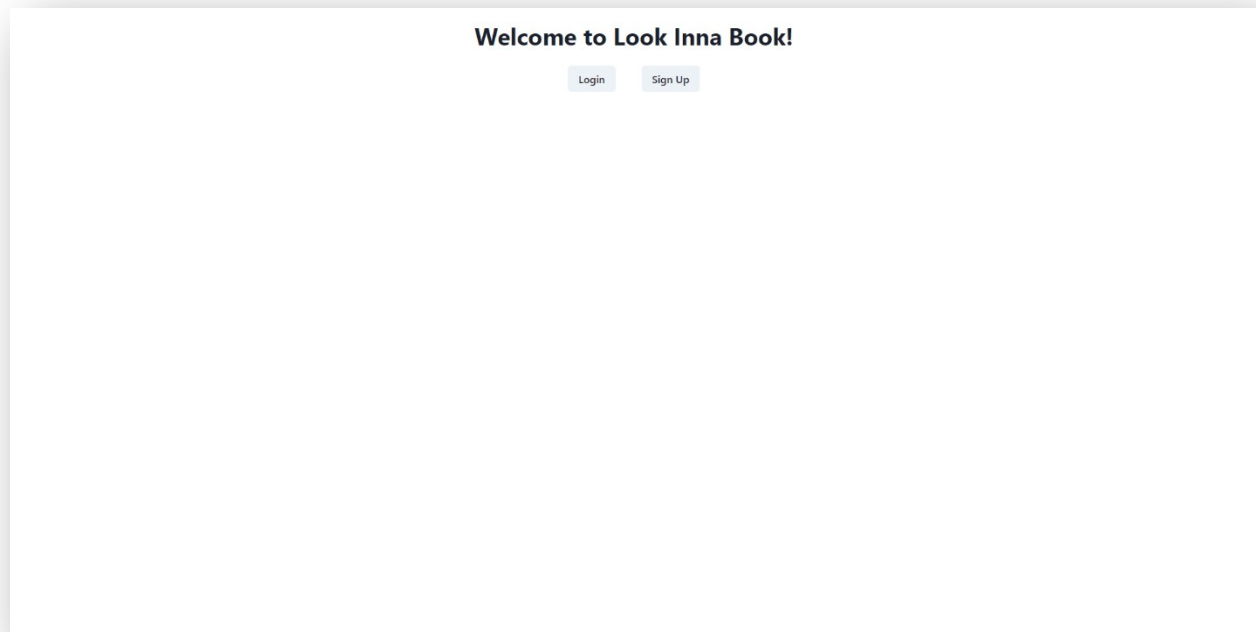
The backend is a nodejs server paired with a better-sqlite3-pool library. With the event loop architecture of nodejs, this allows for a fairly responsive application, that can process multiple requests concurrently.

It uses the callback architecture so often found in javascript projects to effectively process data, for example, the pagination, where a utility accepts two functions, `getData(limitStr)` and `getCount()`, to generate a new function, that when called with information from the http request, allows it to construct, execute and return data in the form of a paginated response easily.

As it was not the focus of the project, the backend lacks a significant amount of security. By messing with request headers, it is easily possible to emulate another user. This was done due to Cross Origin Request Sharing issues, as the project runs with the frontend on a different domain than the backend. Beyond that, it is missing anything more than basic checks on most endpoints. For example, as long as a user is signed in, they can request any billing information, which would leak credit card numbers. It additionally omits most validation, relying entirely on the database, which has little validation beyond not null and foreign key constraints.

## Frontend

### Homepage – Login – Signup



## Login

Do not have an account? [Click here to signup!](#)

## Sign Up

Already have an account? [Click here to login!](#)

The homepage of the application simply allows the user to choose whether to log in or sign up for an account if not already. The user can toggle between the login and signup pages. Once logged in or signed up, the user is redirected to the appropriate dashboard depending on whether or not they are an admin user. If they are an admin user, they are redirected to the admin dashboard, otherwise they are redirected to the user dashboard.

Admin – Add Books – Remove Books – View Reports

Order Books

Remove Books

View Reports

Add New Book

Title

ISBN

Author

Genre

Available

Sale Price

Purchase Price

# Pages

Publisher ID

Royalty

Add Book

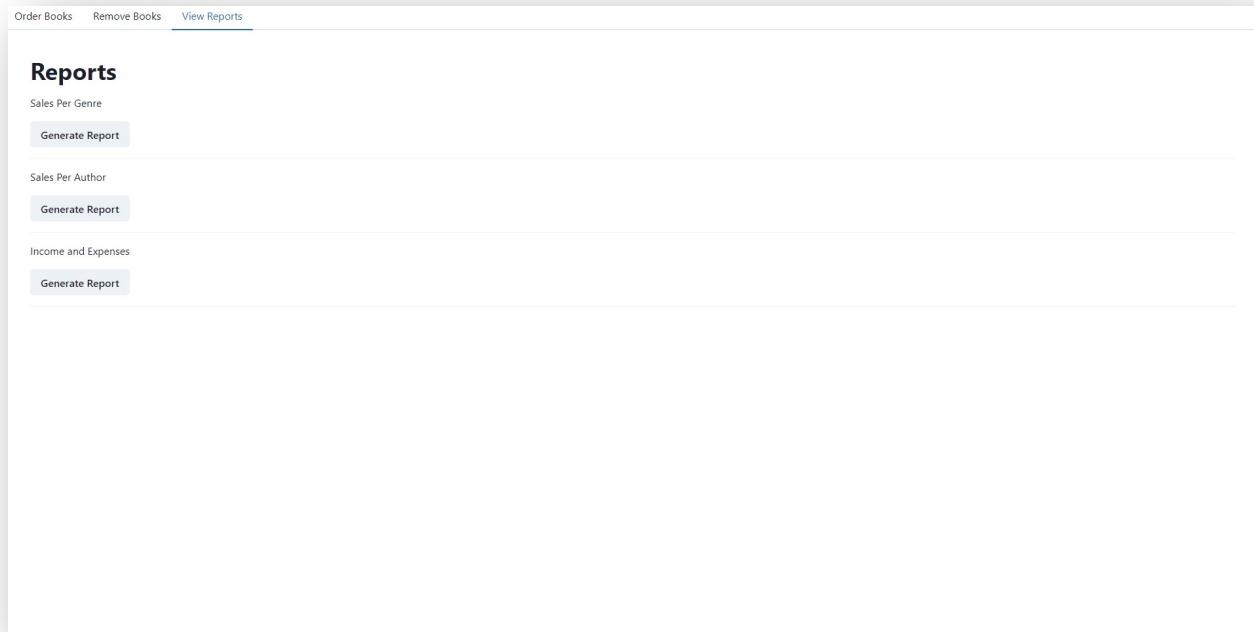
Add Books

Remove Books

View Reports

ISBN	Title	Authors	Price	Quantity Available	
11101	Title1	Emma Chadwick	\$17.05	10	Remove Book
11103	Title3	Clark Bains	\$14.45	90	Remove Book
11109	The great canadian cookbook	Canadian Author	\$30.05	15	Remove Book
11112	The great american cookbook	Dean Craig Pelton, Another name that also includes Craig	\$20.05	15	Remove Book
111145	NatGeo natural edition	Ronald Mcdonald, Canadian Author, Another name that also includes Craig, Billie	\$6	19	Remove Book





Here on the admin dashboard the user has three tabs. In the first tab, they are able to add a new book to the system. To do this they simply fill out the form and hit the “Add Book” button. In the second tab, they are able to remove books from their bookstore by hitting the “Remove Book” button in the list view. In the third tab, they are able to view the available reports that they can generate. When they hit the “Generate Report” button, the report is displayed at the bottom of the screen. Parameters can also be passed when generating these reports that allows for things like date filtering.

# User – Search Books – Cart – Track Orders

Purchase Books

Cart

Track Orders

Filter by title

Filter by ISBN

Filter by author

Select a genre

ISBN	Title	Authors	Price	Quantity Available	
11101	Title1	Emma Chadwick	\$17.05	10	Add to Cart
11103	Title3	Clark Bains	\$14.45	90	Add to Cart
11109	The great canadian cookbook	Canadian Author	\$30.05	15	Add to Cart
11112	The great american cookbook	Dean Craig Pelton, Another name that also includes Craig	\$20.05	15	Add to Cart
111145	NatGeo natural edition	Ronald Mcdonald, Canadian Author, Another name that also includes Craig, Billie	\$6	19	Add to Cart

Purchase Books

Cart

Track Orders

#	ISBN	Title	Price	Quantity	
0	11109	The great canadian cookbook	30.05	1 + -	Remove from Cart
1	11112	The great american cookbook	20.05	1 + -	Remove from Cart

Shipping Address

Street Number

Street Name

Country

Province

City

Postal Code

Billing Information

Card #

CCV #

Expiry Month

Expiry Year

Complete Order

Total: \$50.1

Purchase Books

Cart

Track Orders

Tracked Orders

Order #	Date	Total	Status
5	Mon Jan 19 1970	\$58.95	Fell off the sled
4	Mon Jan 19 1970	\$20.05	Went to the wrong city
3	Mon Jan 19 1970	\$40.1	Trapped in BC
2	Mon Jan 19 1970	\$17.05	Trapped in BC
1	Mon Jan 19 1970	\$183.4	Unknown

Here on the user dashboard, similar to the admin dashboard, the user has three tabs. In the first tab they are able to search for books in the bookstore, filtering by a variety of parameters including author, title, ISBN, etc. On this page they can also add books to their cart. In the second tab, the user is able to view their cart and their running total, increase the quantity of books they have in their cart, remove books from their cart, and enter in their shipping and billing information before finally completing their order. In the third tab, the user is able to view all of their orders and relevant tracking information such as the date, total cost, and the tracking status.

## 2.6 – Bonus Features

### Docker

This package is built as a set of 2 docker containers, one handling front end, and one handling back end. This enables easy deployment on most Linux servers, where docker is increasingly deployed in the world of containerized micro services. Also included is a docker-compose file, which contains all the configuration needed for the docker deployment, such as which data should be persisted across container restarts, and what ports should be forwarded from the container's network name space.

### Continuous Delivery

This project includes my standard Continuous Delivery script, a small nodejs server that listens on a port I forward to the outside world, and then it listens for web requests from a Github project configured to deliver on a push. This enables it to update the project, and then rebuild using docker, and redeploy, all automatically. This process happens nearly instantaneously, taking only a second or two to

deploy, if the build process can effectively leverage docker's cache. The script is also able to send Discord notifications when a commit is made, which is helpful for keeping your working tree up to date when working in a collaborative environment, such as with a partner.

## **Fuzzy Searching**

The search endpoint, allows for a CSV list of possible titles to be submitted. This is also true for the author and genre endpoints, with the name attribute. Internally, these are split into a list, and then have wildcards appended to each end of each of the split values, and then are pushed into an array, along with the appropriate clause for the query itself, for example "(name like ?)" The query clauses are all joined with either an AND or OR, depending on the situation, and are appended into the query string, which the modified split values are passed as parameter values to the query.

## **Dynamic + Pretty**

The front end is created with react, and is dynamic, which creates a far smoother user experience, as there are minimal reloads required as you navigate the site. It also uses premade CSS libraries, to provide a very visually appealing experience, compared to what could be achieved manually in the same time period.

## **2.7 – GitHub Repository**

The GitHub repository can be found here, at <https://github.com/clarkbains/3005Final>.

## **2.8 – Appendix I**

Availability of both members is 9am to 12am