

[URL Link](#)

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CS 340 Portfolio Project  
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## Summary

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Throughout our journey completing this project, we had several iterations and versions of our submissions. We received many commendations for our progress as well as constructive criticism and feedback that brought any mistakes to light and sparked new ideas and improvements which helped achieve the final result of our project.

During the beginning stages of the project, there was confusion about the difference between ERD & Schema. We had to edit the ER Diagram to omit some details to provide more of a logical view of a database, and later add that information in the Schema diagram. There were also minor errors with comprehension and consistency. To enhance comprehension, we added specific numerical values and more detailed information in the overview. Consistency in naming conventions (PascalCase) across entities and attributes was established, with entity names adjusted to be plural. Proper commenting in the SQL file was ensured to avoid import issues. There was some confusion with if NULL-able relationships existed for some reviewers, so we added a note in the report to indicate that not all relationships are mandatory, clarifying the allowance for nullable relationships.

For the structure, at times there were decisions made to simplify our ideas in order to produce a desired result more efficiently; in other instances we chose to challenge ourselves and work through some roadblocks we encountered. Initially, when developing our database, we formed our many-to-many relationship intersection table as just that. Later, we decided to add its own primary key and relevant attributes to enhance data modeling and improve query efficiency. Another example was in the Books entity, it was brought to our attention that removing the stock attribute could help with simplification during CRUD operations. Instead, we decided to take the challenge and keep the stock attribute and ensure it updates correctly, even though it required a little more effort.

During the website creation process, we meticulously checked and updated labels to maintain consistency when copying formats from previous pages. For better usability, foreign keys in forms were changed from number or text entries to drop-down menus, and corresponding information was included with ID numbers to make forms more user-friendly.

In conclusion, our project's evolution through numerous iterations and feedback cycles significantly improved its overall quality and functionality. Receiving peer reviews allowed us to see mistakes that we did not catch, provided insight on ideas we didn't think of, and provided a different vantage point of our project as a whole. It also provided motivation to ensure we were submitting something we felt was worthy of, not only our own efforts, but to those who spent the time reviewing and giving feedback. We did our best to balance simplicity and complexity in our design to produce a project that effectively implemented database-related skills and achieved all the deliverables.

## Overview

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“The technology that threatens to kill off books as we know them - the ‘physical book,’ a new phrase in our language - is also making the physical book capable of being more beautiful than books have been since the middle ages.”

- Art Spiegelman

At The Book Club, the primary goal is to optimize inventory management and enhance the customer experience with our site. The bookstore currently faces challenges in efficiently managing its 50,000+ different titles as well as the inventory of 1m+ books due to the lack of a centralized system. Not only is inventory management a problem, but also the record of 50,000 customers and 30,000 monthly orders. As a result, employees spend significant time manually updating inventory records, leading to errors and inconsistencies in stock levels causing delays to their \$800,000 monthly business transactions. Additionally, customers may experience delays or frustration due to inaccuracies in online availability and fulfillment process.

By implementing the online bookstore management system through MySQL, the bookstore aims to streamline its inventory management processes. Not only will the system provide real-time visibility into available book inventory, but also modernize online order fulfillment. In general, this project aims to provide a database of authors, publishers, orders, books, and customers for The Book Club.

## Database Outline

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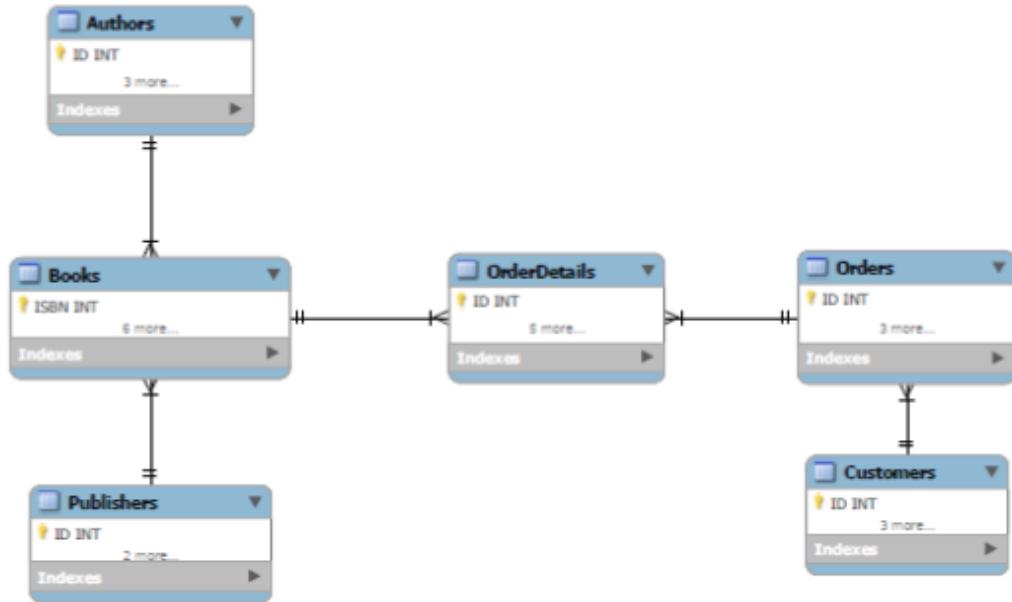
- Books: Records information on the individual book in our system
  - **ISBN: int(13), auto-increment, unique, not NULL, PK**
  - **Title: varchar(50), unique, not NULL**
  - **Genre: varchar(45), not NULL**
  - **Stock: int(3), not NULL**
  - **Price: decimal(5.2), not NULL**
  - **AID (FK), not NULL**
  - **PID (FK), not NULL**
  - Relationship: a 1:M relationship between Author and Book is implemented with Book containing author\_ID as a FK. Book has the same relationship with Publisher
  - Book can have only one author and one publisher
  - Delete CASCADE on AID, No Action UPDATE on AID
  - Delete CASCADE on PID, No Action UPDATE on PID
  - **Mandatory** with Authors and Publishers
- Authors: Records information on an Author for each book
  - **ID: int, auto-increment, unique, not NULL, PK**
  - **FirstName: varchar(45), not NULL**
  - **LastName: varchar(45), not NULL**
  - **Gender: varchar(45)**
  - Relationship: a 1:M relationship between Author and Book is implemented, with author\_ID as a FK inside of Book
  - Author may have written multiple books
  - **Mandatory** with Books
- Publishers: Records information about the Publisher for each book
  - **ID: int, auto-increment, unique, not NULL, PK**
  - **Company: varchar(45), unique, not NULL**
  - **Year: int(4)**
  - Relationship: a 1:M relationship between Publisher and Book is implemented with publisher\_ID as a FK inside of Book
  - Publisher may have published multiple books
  - **Mandatory** with Books
- Customers: Records the details of Customers we do business with
  - **ID: int, auto-increment, unique, not NULL, PK**
  - **FirstName: varchar(45), not NULL**

- **Last Name: varchar(45), not NULL**
  - **Email: varchar(45), unique, not NULL**
  - Relationship: 1:M relationship with Orders which contains customer\_ID as a foreign key.
  - Customer may have placed zero or many orders
  - **Optional** with Orders
- Orders: Records the details of an order placed by a customer
  - **ID: int, auto-increment, unique, not NULL, PK**
  - **Date: date, not NULL**
  - **FK: CID**
  - Relationship: Order and Book have a M:M relationship that is facilitated by an intersection “OrderDetail” which contains order\_ID and ISBN as foreign Keys. Order also has a 1:M relationship with Customer, it contains customer\_ID as a foreign key.
  - An Order can have only one customer but Customer can place many orders
  - Delete SET NULL on CID, Update NO ACTION on CID
  - **Optional** with Customers and OrderDetails
- OrderDetails: (NOT AN ENTITY)
  - **ID: int, auto-increment, unique, not NULL, PK**
  - **FK: OID Int**
  - **FK: BookISBN Int**
  - **OrderQty: Int**
  - **UnitPrice: decimal(7,2)**
  - **LineTotal: decimal(7,2)**
  - Relationship: Intersection table that facilitates the M:M relationship between books and orders.
  - Delete SET NULL on ISBN, Update NO ACTION on ISBN
  - Delete CASCADE on OID, Update NO ACTION on OID
  - **Mandatory** with Books
  - **Optional** with Orders

\*NOTE: ERD and SCHEMA use solid lines to discern and exemplify the relationships, but does not necessarily equate to a mandatory relationship

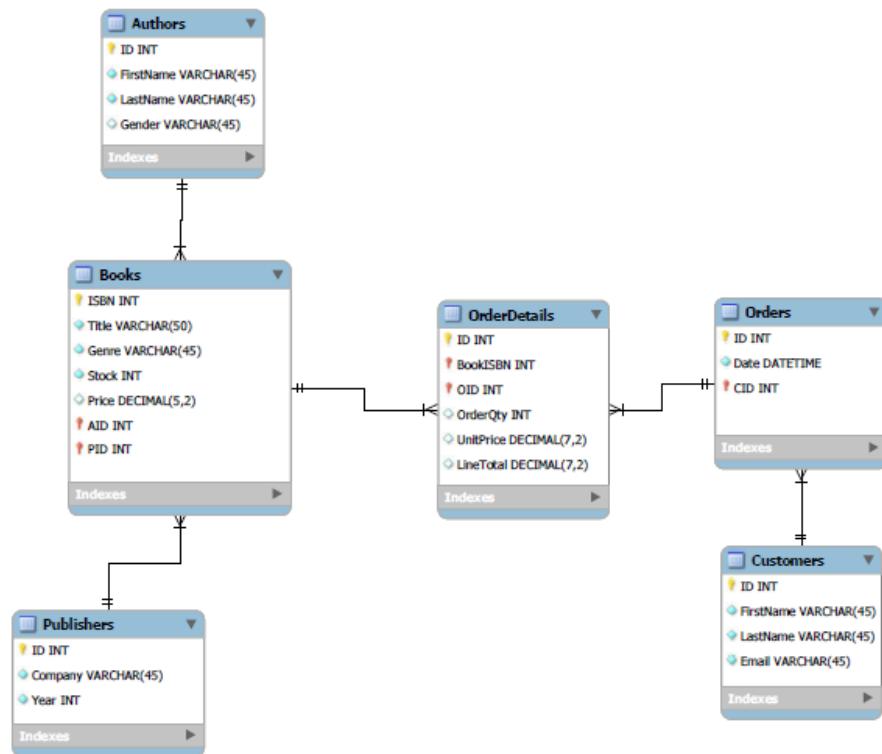
## ERD

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Schema

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## Example Data

```
[MariaDB [cs340_kimpatr]]> select * from Authors;
```

ID	FirstName	LastName	Gender
1	Joanne	Rowling	Female
2	Alex	MichaelIDes	Male
3	Ray	Bradbury	Male
4	Liu	Cixin	Male

```
[MariaDB [cs340_kimpatr]]> select * from Publishers;
```

ID	Company	Year
1	Scholastic Corporation	1920
2	Macmillian Publishers	1843
3	Ballantine Books	1952

```
[MariaDB [cs340_kimpatr]]> select * from Books;
```

ISBN	Title	Genre	Stock	Price	AID	PID
1	Harry Potter and the Sorcerer's Stone	Fantasy	50	7.00	1	1
2	The Silent Patient	Thriller	123	10.53	2	2
3	Fahrenheit 451	Sci-Fi	451	8.36	3	3
4	The Three-Body Problem	Sci-Fi	333	10.59	4	2
5	The Fury	Thriller	72	16.19	2	2

```
[MariaDB [cs340_kimpatr]]> select * from Customers;
```

ID	FirstName	LastName	Email
1	Patrick	Kim	kimpatr@oregonstate.edu
2	William	Chen	chewill@oregonstate.edu
3	Jane	Smith	jsmith@mail.com

```
[MariaDB [cs340_kimpatr]]> select * from Orders;
```

ID	Date	CID
1	2024-03-23 00:00:00	1
2	2024-03-31 00:00:00	2
3	2024-04-02 00:00:00	1
4	2024-04-20 00:00:00	3

```
[MariaDB [cs340_kimpatr]]> select * from OrderDetails;
```

ID	BookISBN	OID	OrderQty	UnitPrice	LineTotal
1	4	1	1	10.59	10.59
2	5	1	1	16.19	16.19
3	2	2	1	10.53	10.53
4	3	2	1	8.36	8.36
5	2	3	1	10.53	10.53
6	3	4	10	8.36	83.60

## Screen Captures

**CREATE** and **READ** are for all entities. **UPDATE** and **DELETE** are for **Customers**, **Orders**, and **OrderDetails**.

### Books: CREATE and READ

This screenshot shows the Books Page of a web application. At the top, there is a navigation bar with links: Home Page, Books, Publishers, Authors, Customers, Orders, and Orders Details. The main content area is titled "Books Page" and contains a table of books. The table has columns for ISBN, Title, Genre, Stock, Price, Author, and Publisher. Below the table is a form titled "Add New Book" with fields for Title, Genre, Stock, Price, Author Full Name, and Publishing Company. An "Add Book" button is at the bottom of the form.

ISBN	Title	Genre	Stock	Price	Author	Publisher
1	Harry Potter and th...	Fantasy	47	7.00	Joanne Rowling	Scholastic Corporat...
2	The Silent Patient	Thriller	123	10.53	Alex Michaelides	Macmillian Publish...
3	Fahrenheit 451	Sci-Fi	449	8.36	Ray Bradbury	Ballantine Books
4	The Three-Body Pr...	Sci-Fi	332	10.59	Liu Cixin	Macmillian Publish...
5	The Fury	Thriller	72	16.19	Alex Michaelides	Macmillian Publish...
13	Girl with the Drago...	Mystery Thriller	1	12.95	Dr. Suess	Houghton Mifflin H...

### Publishers: CREATE and READ

This screenshot shows the Publisher Page of a web application. At the top, there is a navigation bar with links: Homepage, Books, Publishers, Authors, Customers, Orders, and Orders Details. The main content area is titled "Publisher Page" and contains a table of publishers. The table has columns for Publisher ID, Company, and Year founded. Below the table is a form titled "Add New Publisher" with fields for Company and Year Founded. An "Add Publisher" button is at the bottom of the form.

Publisher ID	Company	Year
1	Scholastic Corporation	1920
2	Macmillian Publishers	1843
3	Ballantine Books	1952
7	Houghton Mifflin Harcourt	1880
9	Furry Tree	2001

## Authors: CREATE and READ

This screenshot shows the Authors Page of a web application. The page has a header with navigation links: Home Page, Books, Publishers, Authors, Customers, Orders, and Orders Details. The main content area is titled "Authors Page" and contains a table of authors:

ID	First Name	Last Name	Gender
1	Joanne	Rowling	Female
2	Alex	MichaelDes	Male
3	Ray	Bradbury	Male
4	Liu	Cixin	Male
8	Dr.	Suess	NULL
10	Lois	Lowry	Female

Below the table is a form titled "Add New Author" with fields for First Name, Last Name, and Gender, followed by a "Add Author" button. The footer of the page includes a copyright notice: "© William Chen and Patrick Kim 2024".

## Customers: CREATE, READ, UPDATE, and DELETE

This screenshot shows the Customers Page of a web application. The page has a header with navigation links: Homepage, Books, Publishers, Authors, Customers, Orders, and Orders Details. The main content area is titled "Customers Page" and contains a table of customers:

Customer ID	First Name	Last Name	Email	Edit	Delete
1	Patrick	Kim	kimpatr@oregonstate.e...	Edit	Delete
2	William	Chen	chewill@oregonstate.e...	Edit	Delete
3	Jane	Smith	jsmith@mail.com	Edit	Delete
8	Bruce	Wayne	NotBatman@wayneent...	Edit	Delete

Below the table is a form titled "Add Customer" with fields for First Name, Last Name, and E-mail Address, followed by a "Add Customer" button. The footer of the page includes a copyright notice: "© William Chen and Patrick Kim 2024".

## Customers: READ and UPDATE

The screenshot shows a web browser window titled "Edit Customer". The URL is <http://classwork.engr.oregonstate.edu:5819/edit-customer/1>. The page has a header with links: Homepage, Books, Publishers, Authors, Customers, Orders, and Orders Details. The main content area is titled "Customer" and contains a table with four columns: Customer ID, First Name, Last Name, and Email. The table row shows values: 1, Patrick, Kim, and kmpatr@oregonstate.edu. Below the table is an "Edit Customer" form with fields for First Name (Patrick), Last Name (Kim), and Email (kmpatr@oregonstate.edu). There are "Edit Customer" and "Cancel" buttons. The background of the page features a stack of colorful books.

## Orders: CREATE and READ (Customers is a UPDATE NULL-able relationship)

The screenshot shows a web browser window titled "Orders". The URL is <http://classwork.engr.oregonstate.edu:5819/orders>. The page has a header with links: Home Page, Books, Publishers, Authors, Customers, Orders, and Orders Details. The main content area is titled "Orders Page" and contains a table with columns: Order ID, Date, Customer ID, Customer Name, Edit, and Delete. The table rows show four orders: 1 (2024-03-23, Customer ID 1, Patrick Kim), 2 (2024-03-31, Customer ID 2, William Chen), 3 (2024-04-01, Customer ID None, None), and 4 (2024-04-20, Customer ID 3, Jane Smith). Below the table is an "Add Order" form with fields for Date (mm/dd/yyyy) and Customer Name (dropdown menu). There is also an "Add Order" button. The background of the page features a stack of colorful books.

## Orders: READ and UPDATE (Customers is a UPDATE NULL-able relationship)

The screenshot shows a web browser window titled "Orders". The URL is <http://classwork.engr.oregonstate.edu:5819/edit-order/4>. The page has a header with links: Home Page, Books, Publishers, Authors, Customers, Orders, and Orders Details. Below the header is a section titled "Orders Page" with a sub-section "Edit Order". The main content area displays a table with one row:

Order ID	Date	Customer ID	Customer Name
4	2024-04-20	3	Jane Smith

Below the table is a form with fields: Date (set to 04/20/2024), Customer Name (set to Jane Smith), Edit Orders button, and Cancel button. At the bottom of the page is a copyright notice: © William Chen and Patrick Kim 2024.

## Orderdetails: CREATE, READ, and DELETE (M:N DELETE)

The screenshot shows a web browser window titled "Order Details". The URL is <http://classwork.engr.oregonstate.edu:5819/orderdetails>. The page has a header with links: Homepage, Books, Publishers, Authors, Customers, Orders, and Orders Details. Below the header is a section titled "Order Details Page" with a sub-section "Add New Order Details". The main content area displays a table with five rows of data:

ID	ISBN	Title	OID	Order Quant...	Unit Price	LineTotal	Edit	Delete
19	3	Fahrenheit 451	3	2	8.36	16.72	Edit	Delete
18	5	The Fury	3	1	16.19	16.19	Edit	Delete
23	1	Harry Potter a...	4	7	7.00	49.00	Edit	Delete
50	1	Harry Potter a...	4	1	7.00	7.00	Edit	Delete

Below the table is a form with fields: Book ISBN (dropdown menu), Order ID and Date (dropdown menu), and Order Qty (input field). A "Add Order Details" button is also present. At the bottom of the page is a copyright notice: © William Chen and Patrick Kim 2024.

## Orderdetails: READ and UPDATE (M:N UPDATE)

The screenshot shows a web application window titled "Edit Order Details". The URL in the address bar is "http://classwork.engr.oregonstate.edu:5819/edit-orderdetails/19". The page has a navigation menu at the top with links: Homepage, Books, Publishers, Authors, Customers, Orders, and Orders Details. Below the menu, there is a section titled "Order Details" containing a table with the following data:

ID	BookISBN	OID	OrderQty	UnitPrice	LineTotal
19	3	3	2	8.36	16.72

Below the table is a form titled "Edit Order Details" with the following fields:

Title:  Order ID:  Order Qty:

Buttons:

A small copyright notice at the bottom left of the page reads: "© William Chen and Patrick Kim 2024".