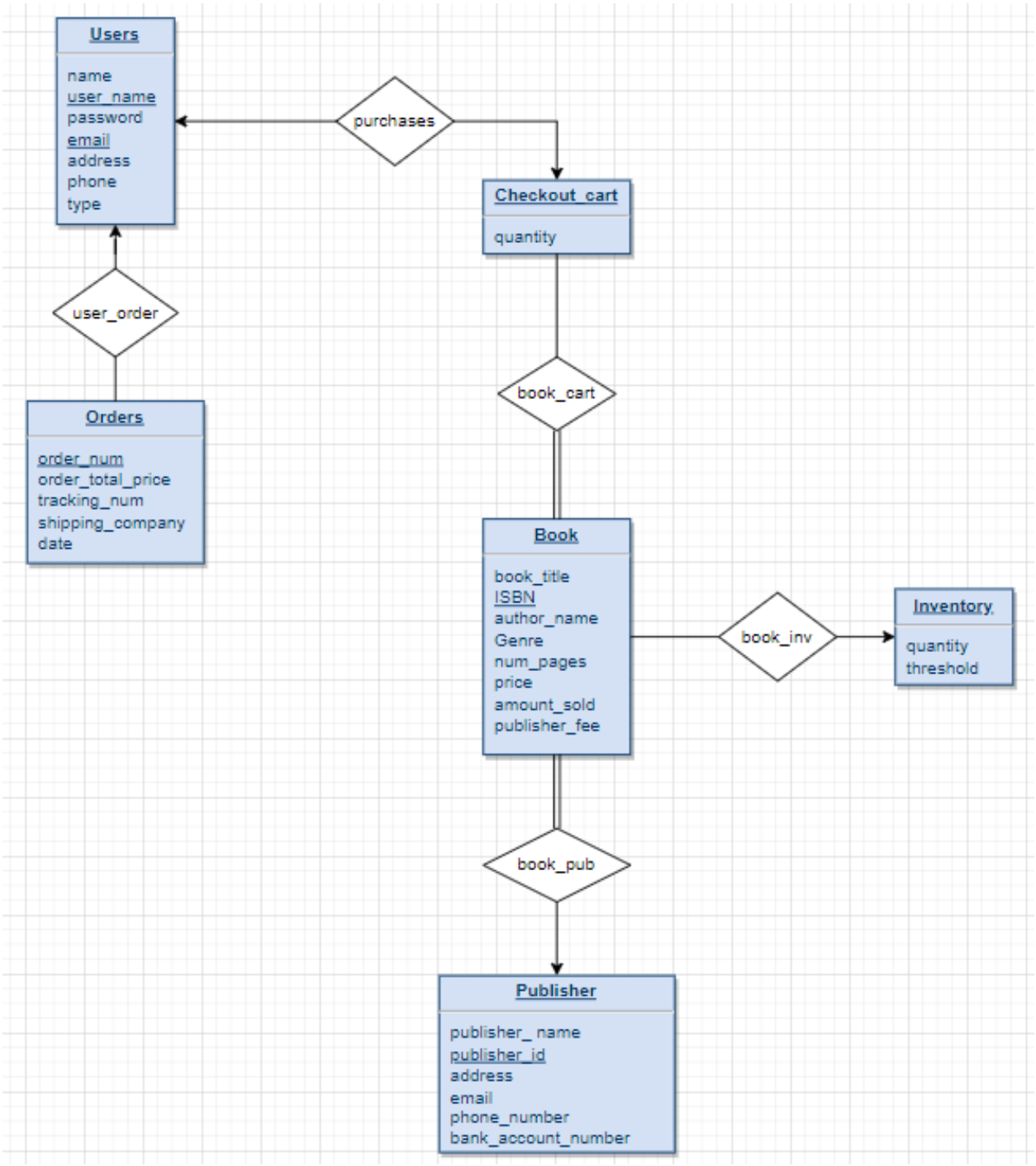
Bishoy Mickhail

101035492

COMP 3005 Project – Book Store

December 10, 2021

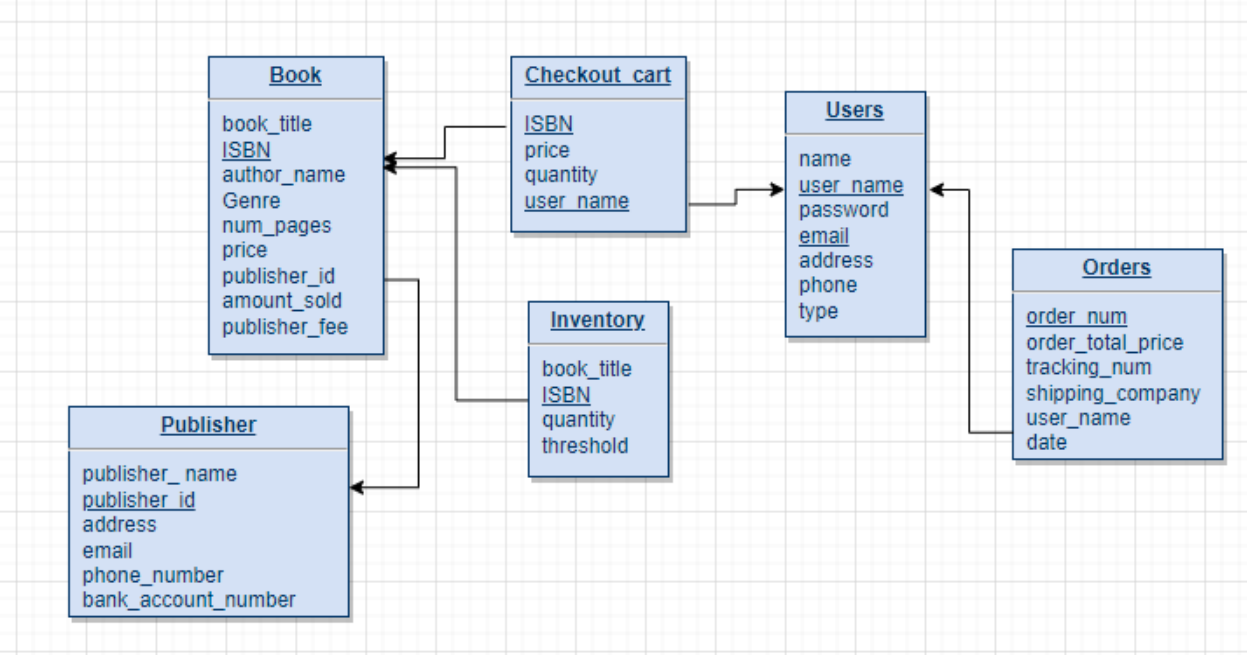
Conceptual Design



Assumptions:

- Each Book only has one publisher.
- A publisher can publish multiple books.
- The relationship between book to publisher is total participation since you cannot have a book without a publisher.
- A user can only have one checkout cart and that one checkout cart is associated with only one user.
- We assume the bookstore only has one inventory (one location).
- Total participation between the book and the checkout cart
- Both the email and user_name in the *users* tables are unique to every person. (No two people can have the same email address or user_name)

Reduction to Relation Schemas



R_{Book} (book_title, ISBN, author_name, genre, num_pages, price, publisher_id, amount_sold, publisher_fee)

$R_{Publisher}$ (publisher_name, publisher_id, address, email, phone_number, bank_account_number)

$R_{Inventory}$ (ISBN, quantity, threshold, book_title)

$R_{chechout\_cart}$ (ISBN, total_price, quantity, user_name)

R_{orders} (order_num, order_total_price, tracking_num, shipping_company, user_name, date)

Normalization of Relation Schema

R_{Book} (ISBN, book_title, author_name, genre, num_pages, price, amount sold, publisher_fee)

F = {

ISBN -> book_title, num_pages, price, amount_sold, publisher_fee, publisher_id

book_title -> author_name, genre

}

$\{ISBN\}^+$ = ?

- Through transitivity:
  - ISBN -> book_title, num_pages, price, amount_sold, publisher_fee, author_name, genre, publisher_id

$\{ISBN\}^+$ = {ISBN, book_title, num_pages, price, amount_sold, publisher_fee, author_name, genre, publisher_id}

ISBN is a candidate key (and super key)

$\{book\_title\}^+$ = ?

- Only the second FD applies

$\{book\_title\}^+$ = {book_title, author_name, genre}

- The second FD violates BCNF since *book_title* is not a super key.

R_{Book_info} (book_title, author_name, genre)

R_{Book} (ISBN, book_title, num_pages, price, amount_sold, publisher_fee, publisher_id)

$R_{Publisher}$ (publisher_id, publisher_name, address, email, phone_number, bank_account_number)

F = {

publisher_id -> bank_account_number, email

bank_account_number -> address,email phone_number, publisher_name, publisher_id

email -> address, phone_number, publisher_name, publisher_id, bank_account_number

}

{publisher_id}$^+$ = {bank_account_number, email, address, phone_number, publisher_name, publisher_id}

{bank_account_number}$^+$ = {bank_account_number, email, address, phone_number, publisher_name, publisher_id}

{email }$^+$ = {bank_account_number, email, address, phone_number, publisher_name, publisher_id}

- It satisfies BCNF

$R_{Inventory}$ (<u>ISBN,</u> quantity, threshold, book_title)

F = {

ISBN -> quantity, threshold, book_title

}

{ISBN }$^+$ = {ISBN, threshold, book_title}

- It satisfies BCNF

$R_{chechout\_cart}$ (ISBN, price, quantity, <u>user_name</u>, book_title)

F = {

user_name, ISBN -> price, quantity, book_title

}

{user_name, ISBN}$^+$ = {ISBN, price, quantity, book_title}

- It satisfies BCNF

R_{orders} (order_num, order_total_price, tracking_num, shipping_company, user_name)

F = {

user_name ->order_num

order_num -> order_total_price, tracking_num, shipping_company, date

}

{user_name}$^+$ = {user_name, order_num, order_total_price, tracking_num, shipping_company, date}

- user_name is a candidate key (and super key)

{order_total_price}$^+$ = {order_total_price}

{tracking_num}$^+$ = {tracking_num}

{shipping_company }$^+$ = {shipping_company}

{date}$^+$ = {date}

{order_num }$^+$ = {order_num, order_total_price, tracking_num, shipping_company}

- The second FD violates BCNF

R_{Orders} (user_name, order_num)

R_{orders_info} (order_num, order_total_price, tracking_num, shipping_company, date)

R_{Users} (name, user_name, password, email, address, phone, type)

F = {

user_name -> password, address, phone, type, name, email

email -> password, address, phone, type, name, user_name

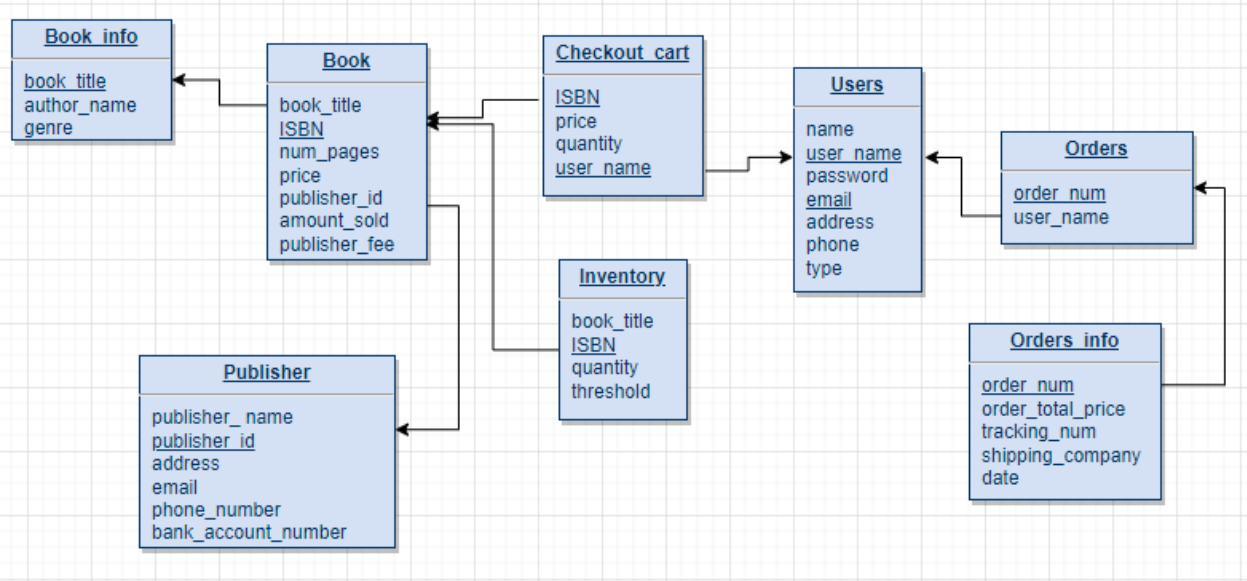
}

{user_name}$^+$ = {user _name, password, address, phone, type, name, email}

{email}$^+$ = {email, password, user_name, address, phone, type, name}

- It satisfies BCNF

Database Schema Diagram



Implementation

See Github Repository

Bonus Features

- I did add a feature that when the book is being searched by title, author, or genre, that a partial search can result in all the books with those characters will be displayed.

GitHub Repository

My profile name is ***bishoymickhail*** and the project is under the **COOMP3005_Project_Bishoy_Mickhail** repository. It should be public and visible.

https://github.com/bishoymickhail/COOMP3005_Project_Bishoy_Mickhail

Appendix I

Availability on December 20:

- 4 PM – 5 PM