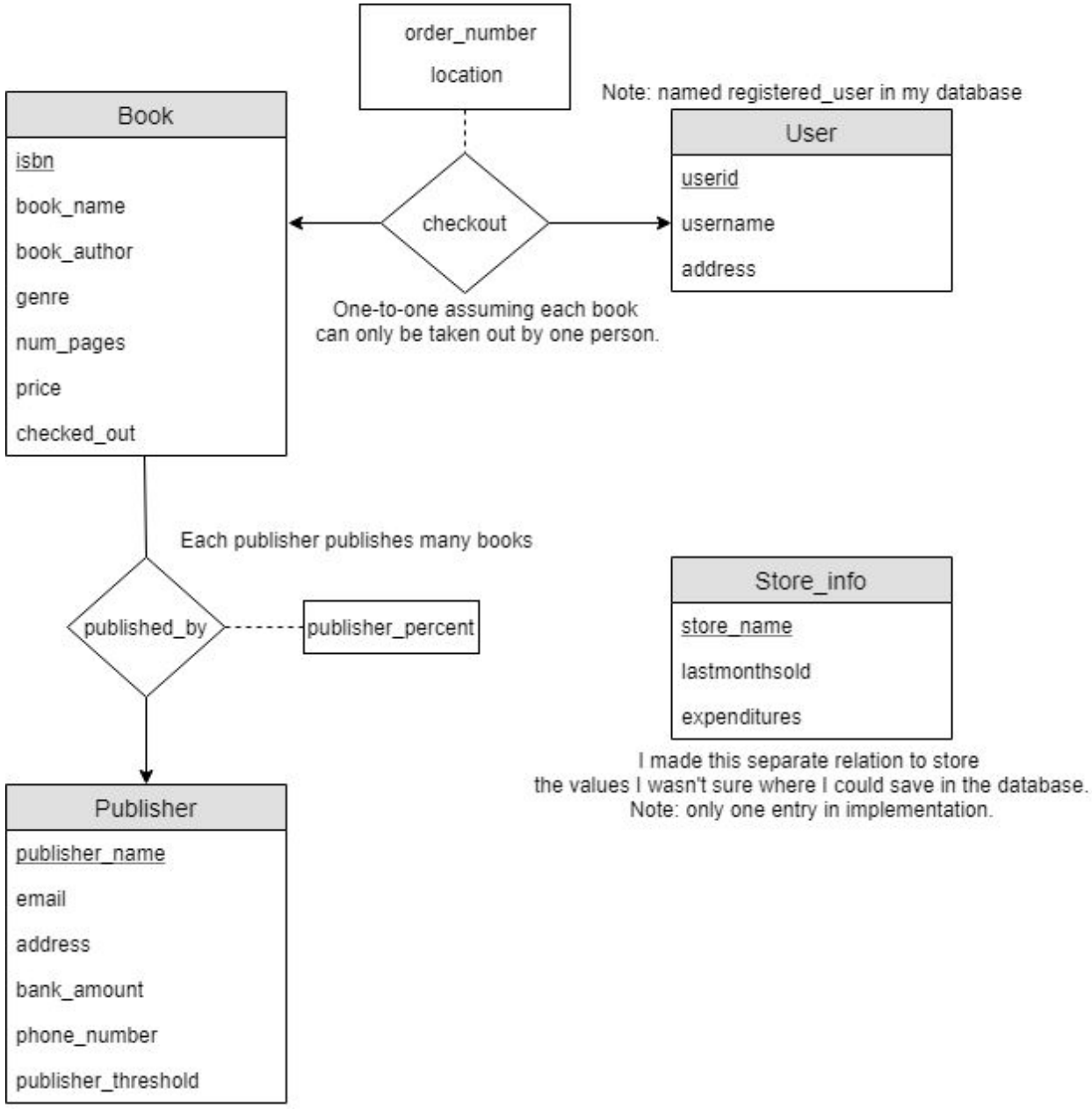
Conceptual Design (ER-Diagram)



Reduction to Relation Schemas

book(isbn, book_name, book_author, genre, num_pages, price, checked_out, publisher_percent, publisher_name)

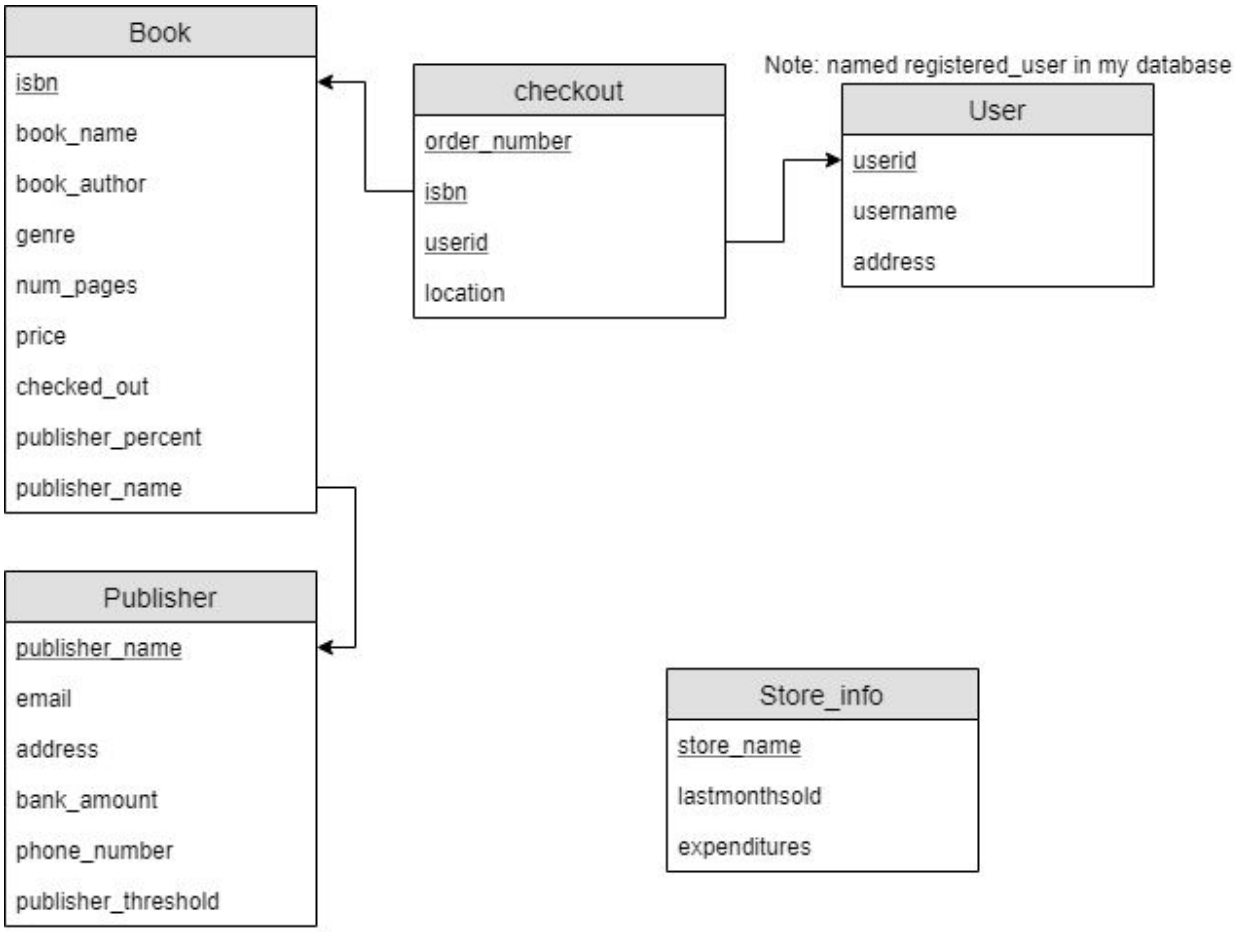
publisher(publisher_name, email, address, bank_amount, phone_number, publisher_threshold)

registered_user(userid, username, address)

checkout(order_number, isbn, userid, location)

store_info(store_name, lastmonthsold, expenditures)

Schema Diagram



Normalization of Relation Schemas

To prove my relation schemas are in good normal form, I'll show the tests of each relation schema and how it is in Third Normal Form (with appropriate assumptions for functional dependencies).

Store_info Relation

Functional dependencies

1. *store_name → lastmonthsold, expenditures* (Assuming given the store name we can determine the info about the store)

The store_info relation is in third normal form because the only functional dependency has a superkey on the left hand side.

Publisher Relation

Functional dependencies

1. *publisher_name → email, address, bank_amount, phone_number, publisher_threshold* (Given the name can determine all info about the publisher)
2. *email → publisher_name* (assuming you can determine name if you know the email - can google it and find results)
3. *phone_number → publisher_name* (assuming you can determine name if you know the phone number)
4. *address → publisher_name* (assuming you can determine name if you know the address)

The publisher relation is in third normal form because each of the functional dependencies has a superkey on the left-hand side (can determine all other attributes). This is because knowing the publisher_name allows you to determine every other attribute, and the other functional dependencies allow you to determine the publisher_name.

Book relation

Functional dependencies

1. *isbn → book_name, book_author, genre, num_pages, price, checked_out, publisher_name, publisher_percent* (assuming all info about the book can be searched up with the ISBN)
2. *book_name → author, genre, num_pages, publisher*
3. *author, genre, num_pages, publisher → isbn* (Assuming with the help of the publisher, can find the ISBN of the book with the other info on the book)

Dependency 1 is a superkey because isbn determines all attributes for books.
Dependency 2 is a superkey because…
$(book\_name)^+ = author, genre, num\_pages, publisher$
$author, genre, num\_pages, publisher -> isbn : (book\_name)^+ = book\_name, book\_author, genre, num\_pages, price, checked\_out, publisher\_name, publisher\_percent$
It determines isbn through dependency 3 which determines all attributes for books.
Dependency 3 is a superkey because it determines isbn which determines all attributes for books.
Therefore the book relation is in third normal form.

Registered_user relation

Functional dependencies

1. *userid → username, address*

Note: *username → userid* is not a functional dependency because you can't figure out your ID using your username, as the ids are stored internally.

The registered_user relation is in third normal form because the only functional dependency has a superkey on the left hand side.

Checkout relation

Functional dependencies

1. *order_number → isbn, userid, location*

Note: *userid → order_number* is not a functional dependency because you're only shown your order number once when completing your order.

The checkout relation is in third normal form because the only functional dependency has a superkey on the left hand side.

Additional Info

Github - https://github.com/MNCmascot/aidan_gowsell_3005Project (Will be made public on April 7th)

If there is classes on April 7th, I'll be available anytime after 10am (assuming no 3005 class on this day).