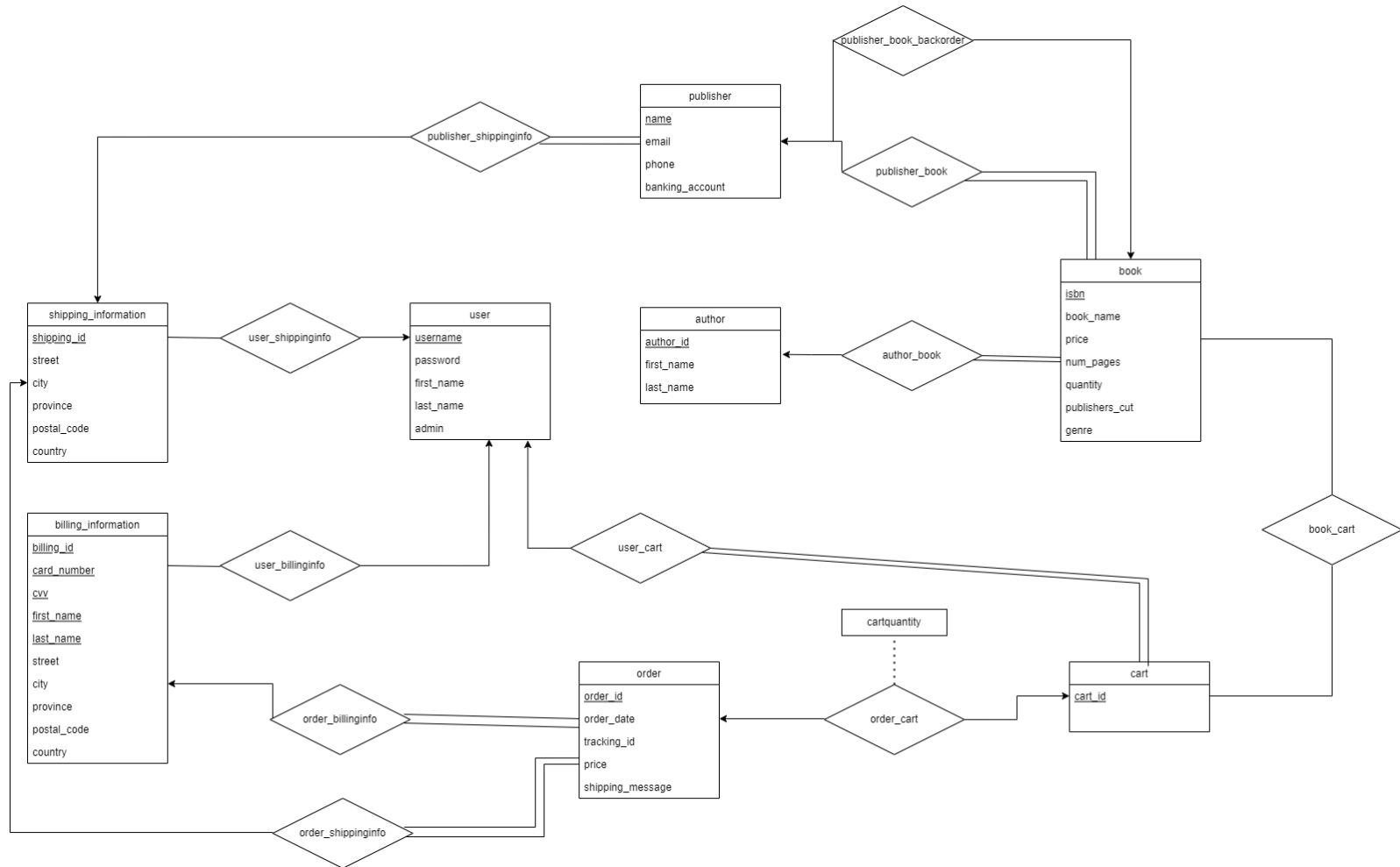


ER Diagram



Reduction to relations

author(author_id, first_name, last_name)
book(isbn, book_name, price, num_pages, quantity, publishers_cut, genre, publisher_name, author_id)
user(username, password, first_name, last_name, admin)
publisher(name, email, phone, banking_account, shipping_id)
shipping_information(shipping_id, street, city, province, postal_code, country)
billing_information(billing_id, card_number, cvv, first_name, last_name, street, city, province, postal_code, country)
cart(cart_id, username)
order(order_id, order_date, tracking_id, price, shipping_message, billing_id, shipping_id)
book_cart(cart_id, isbn, cartquantity)
order_cart(cart_id, order_id)
publisher_book_backorder(isbn, email)
user_shippinginfo(shipping_id, username)
user_billinginfo(billing_id, username)

Normalization checks

author(author_id, first_name, last_name)
 $F = \{\text{author_id} \rightarrow \text{first_name}, \text{last_name}\}$
 $\text{Author_id}^+ = \{\text{author_id}, \text{first_name}, \text{last_name}\}$ therefore author is in bcnf

book(isbn, book_name, price, num_pages, quantity, publishers_cut, publisher_name, author_id, genre)
 $F = \{\text{isbn} \rightarrow \text{book_name}, \text{price}, \text{num_pages}, \text{quantity}, \text{publishers_cut}, \text{publisher_name}, \text{author_id}, \text{genre}\}$
 $\text{isbn}^+ = \{\text{isbn}, \text{book_name}, \text{price}, \text{num_pages}, \text{quantity}, \text{publishers_cut}, \text{publisher_name}, \text{author_id}, \text{genre}\}$ therefore book is in bcnf

user(username, password, first_name, last_name, admin)
 $F = \{\text{username} \rightarrow \text{password}, \text{first_name}, \text{last_name}, \text{admin}\}$
 $\text{Username}^+ = \{\text{username}, \text{password}, \text{first_name}, \text{last_name}, \text{admin}\}$ therefore user is in bcnf

publisher(name, email, phone, banking_account, shipping_id)
 $F = \{\text{name} \rightarrow \text{email}, \text{phone}, \text{banking_account}, \text{shipping_id}\}$
 $\text{banking_account} \rightarrow \text{pub_name}$
 $\text{name}^+ = \{\text{name}, \text{email}, \text{phone}, \text{banking_account}, \text{shipping_id}\}$ therefore publisher is in bcnf

shipping_information(shipping_id, street, city, province, postal_code, country)
 $F = \{\text{shipping_id} \rightarrow \text{street}, \text{city}, \text{province}, \text{postal_code}, \text{country}\}$
 $\text{shipping_id}^+ = \{\text{shipping_id}, \text{street}, \text{city}, \text{province}, \text{postal_code}, \text{country}\}$ therefore shipping_information is in bcnf

billing_information(billing_id, street, city, province, postal_code, country)

$F = \{\text{billing_id} \rightarrow \text{street, city, province, postal_code, country}\}$

$\text{billing_id}^+ = \{\text{billing_id, street, city, province, postal_code, country}\}$ therefore billing_information is in bcnf

cart(cart_id, username)

$F = \{\text{cart_id} \rightarrow \text{username}\}$

$\text{cart_id}^+ = \{\text{cart_id, username}\}$ therefore cart is in bcnf

order(order_id, order_date, tracking_id, price, shipping_message, shipping_id, billing_id)

$F = \{\text{order_id} \rightarrow \text{order_date, tracking_id, price, shipping_message, shipping_id, billing_id}\}$

$\text{order_id}^+ = \{\text{order_date, tracking_id, price, shipping_message, shipping_id, billing_id}\}$

therefore order is in bcnf

book_cart(cart_id, isbn, cartquantity)

$F = \{\text{cart_id, isbn} \rightarrow \text{cartquantity}\}$

$(\text{cart_id, isbn})^+ = \{\text{cart_id, isbn, cartquantity}\}$ therefore book_cart is in bcnf

order_cart(cart_id, order_id)

$F = \{\text{cart_id} \rightarrow \text{order_id}$

$\text{Order_id} \rightarrow \text{cart_id}\}$

$(\text{cart_id})^+ = \{\text{cart_id, order_id}\}$

$(\text{order_id})^+ = \{\text{cart_id, order_id}\}$

therefore order_cart is in bcnf

publisher_book_backorder(isbn, email)

$F = \{\text{isbn} \rightarrow \text{email}\}$

$\text{isbn}^+ = \{\text{isbn, email}\}$ therefore publisher_book_backorder is in bcnf

user_shippinginfo(shipping_id, username)

$F = \{\text{shipping_id} \rightarrow \text{username}\}$

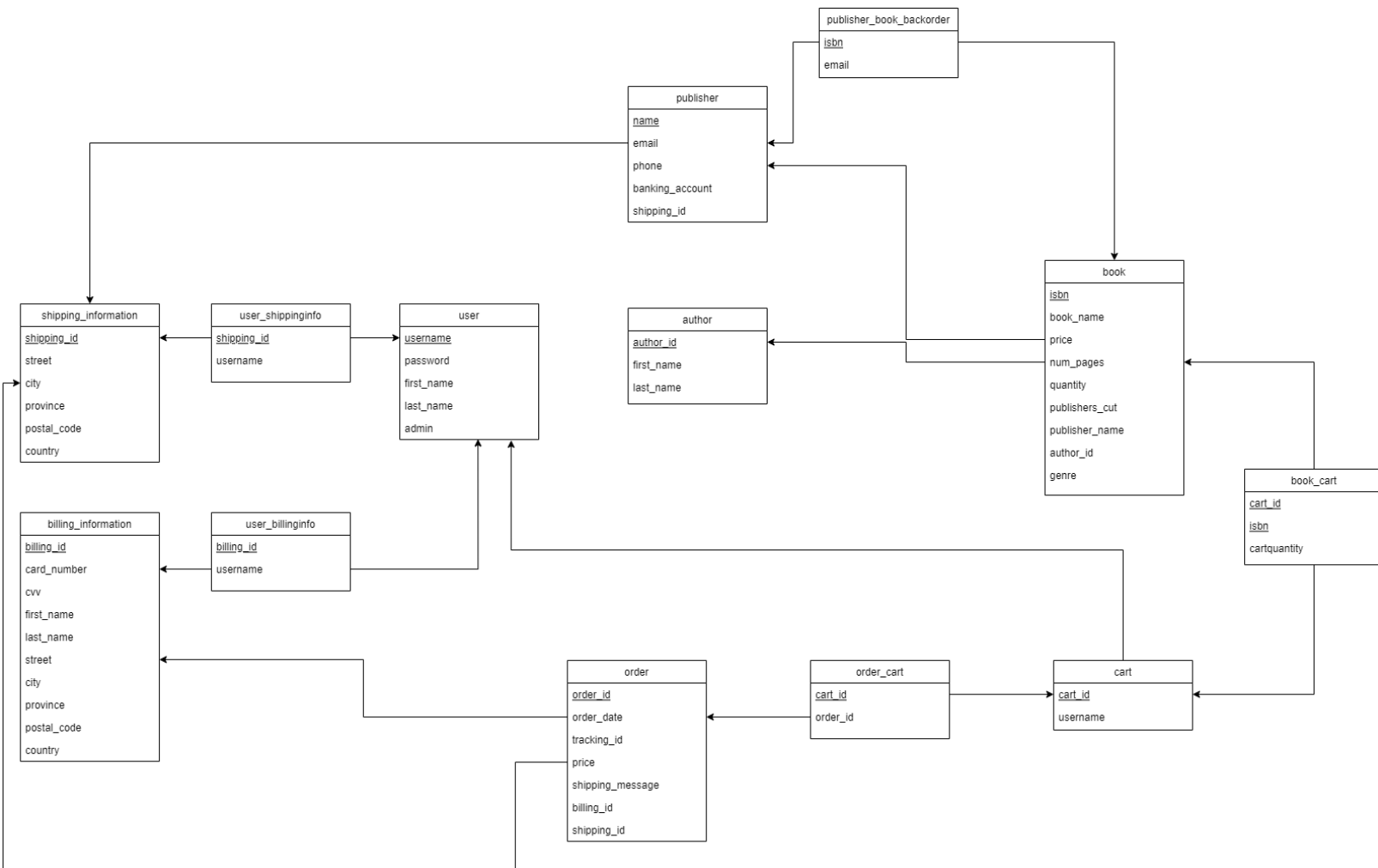
$\text{shipping_id}^+ = \{\text{shipping_id, username}\}$ therefore user_shippinginfo is in bcnf

user_billinginfo(billing_id, username)

$F = \{\text{billing_id} \rightarrow \text{username}\}$

$\text{billing_id}^+ = \{\text{billing_id, username}\}$ therefore user_billinginfo is in bcnf

Schema Diagram



Implementation

See code + user interface and admin interface demo videos on the github repo

Github Repo

<https://github.com/Joshdowning/bookstore>

Appendix

December 20th Availability: 1:00-1:20, 1:20-1:40, 1:40-2:00