67-262: Phase 2
Team ID: S5-2
Lauren Smith and Sen Feng

User Stories

Users (3)

1. Buyer - A user who purchases an item from a seller.
2. Bidder - A user who makes a bid on an item in an auction listing.
3. Seller - A user who sells an item on eBay.

User Stories (10)

ID	Type	As an <role>	I want to <goal>	So that <reason>
US1	Simple	Buyer	Add an item to my cart	I can save the item and find it again later
US2	Simple	Bidder	Place a bid on an item	I have a chance to win the auction and purchase the item I want
US3	Analytical	Seller	See most popular items within a certain item category	I can find items that other people have bought most in the category I am searching
US4	Analytical-Complex	Buyer	See the seller with the best reviews	I can shop from the most credible seller
US5	Analytical-Complex	Bidder	See how many people have bidded on a certain item	I can determine how popular an item I want is and how I should strategize my bidding
US6	Complex	Seller	See my most frequent buyers	I can inform my decisions about which buyers to target
US7	Complex	Seller	See the demographic makeup of my customers	I can understand my customer better and make sensible decisions.
US8	Complex	Buyer	My cart to update the number of items when I add something to my cart	I can know how many items are in my cart before checkout
US9	Complex	Seller	Show sales	I can look back at certain transactions
US10	Simple (New)	Buyer	Share my cart with someone	We can sync our purchases and avoid miscommunication.

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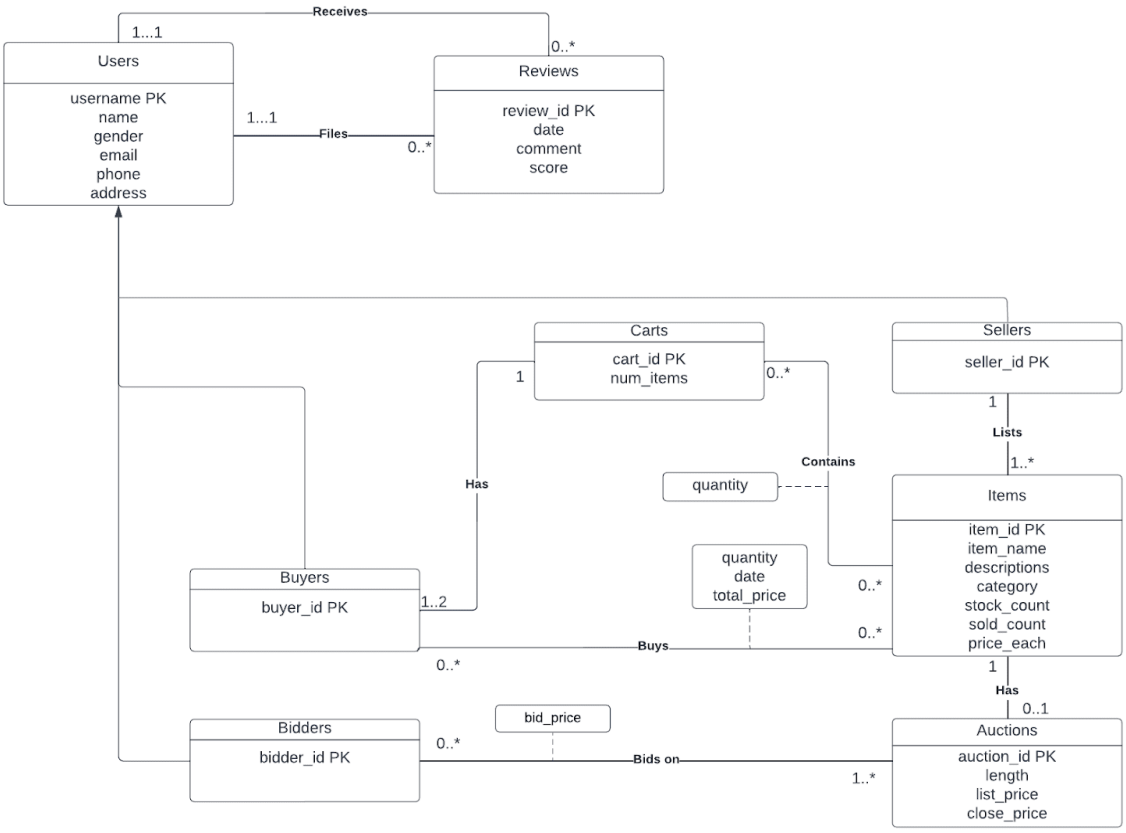
Conceptual Model



All assumptions for each entity are listed under the functional dependency section.

Relational Model

Users(**username**, name, gender, email, phone, address)
Reviews(**review_id**, from_username, to_username, date, comment, score)
Sellers(**seller_id,** username)
Buyers(**buyer_id,** username)
Bidders(**bidder_id,** username)
Cart(**cart_id**, buyer_id_1, buyer_id_2, num_items)
Contains(**cart_id, item_id**, quantity)
Items(**item_id**, item_name, details, category, seller_id, stock_count, sold_count, price_each)
Bids(**bid_id**, bidder_id, auction_id, bid_price)
Auctions(**auction_id**, length, item_id, list_price, close_price, higgest_bidder)
Sales(**sale_id,** buyer_id, item_id , quantity, price_each_at_sold, total_price, date)

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Functional Dependencies

Users:
Username -> name, email, phone, address
A -> B, C, D, E which is BCNF
Assumptions: Every user has a unique username. A can uniquely identify B, C, D, and E.

Reviews:
Review_id -> date, score, comment, from_username, to_username
Review: A -> B, C, D, E, F which is BCNF
Assumptions: A review can only be written by one user about one other user. A user cannot leave a review on themself (from_username and to_username are not the same). Users can leave multiple reviews on the same user and users can receive multiple reviews from the same user. There is no limit to how many reviews a user can give or receive on any given day. A can uniquely identify B, C, D, E and F.

Sellers:
Seller_id -> username
A -> B which is BCNF
Assumptions: A seller is considered a seller once they list one item. A user can only be associated with one seller_id. A can uniquely identify B.

Buyers:
Buyer_id -> username
A -> B which is BCNF
Assumptions: A user is only associated with one buyer_id. A can uniquely identify B.

Bidders:
Bidder_id -> username
A -> B which is BCNF
Assumptions: A user is only associated with one bidder_id. A can uniquely identify B.

Carts:
Cart_id -> buyer_id_1, buyer_id_2, num_items
A -> B, C, D which is BCNF
Assumptions: A buyer can only have one cart overall. Two buyers can share one cart. A cart can contain an unlimited number of items, but a unique item can only occur once in a buyer's cart. By default a cart's buyer_id_2 is null and num_items is 0.

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Contains:
Cart_id, item_id -> quantity
A, B -> C which is BCNF
Assumptions: An item cannot be added to a cart more than once.

Items:
Item_id -> item_name, details, category, stock_count, sold_count, price_each
A -> B, C, D, E, F, G which is BCNF
Assumptions: A seller can list multiple items with the same item_name, details, and category.

Bids:
Bid_id -> bidder_id, auction_id, bid_price
A -> B, C, D
Assumptions: A bidder can make many bids on the same auction. A bidder cannot make multiple bids of the same bid_price on the same auction.

Sales:
Sale_id -> buyer_id, item_id, quantity, price_each_at_sold, total_price, date
A -> B, C, D, E, F, G which is BCNF
Assumptions: A buyer can buy the same item more than once on the same day. Total_price is not the result of solely price_each_at_sold and total_price, it also includes taxes or discounts which are specific to the sale itself.

Normalization

Username -> name, email, phone, address is in BCNF as all of its attributes are given by the primary key, username. Name, email, phone, address can all be found from username.

Review_id -> date, score, comment, from_username, to_username is in BCNF as all of its attributes are given by the primary key, review_id. Date, score, comment, from_username, to_username can all be found from review_id. No combination of other attributes uniquely identify a review.

Seller_id -> username is in BCNF as all of its attributes are given by the primary key, seller_id. Username can be found from seller_id.
Buyer_id -> username is in BCNF as all of its attributes are given by the primary key, buyer_id. Username can be found from buyer_id.

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Bidder_id -> username is in BCNF as all of its attributes are given by the primary key, bidder_id. Username can be found from bidder_id.

Cart_id -> buyer_id_1, buyer_id_2, num_items is in BCNF as all of its attributes are given by the primary key, cart_id. Buyer_id_1, buyer_id_2, num_items can all be found from cart_id.

Cart_id, item_id -> quantity is in BCNF as all of its attributes are given by the primary keys, cart_id and item_id. This relationship does not have repeating groups, and it does not have partial or transitive dependencies.

Item_id -> item_name, details, category, stock_count, sold_count, price_each is in BCNF as all of its attributes are given by the primary key, item_id. Item_name, details, category, stock_count, sold_count, and price_each can be found from item_id.

Bid_id -> bidder_id, auction_id, bid_price is in BCNF as all of its attributes are given by the primary key, bid_id. Bidder_id, auction_id, bid_price can be found from bid_id.

Sale_id -> buyer_id, item_id, quantity, price_each_at_sold, total_price, date is in BCNF as all of its attributes are given by the primary key, sale_id. Buyer_id, item_id, quantity, price_each_at_sold, total_price, date can all be found from sale_id.

Each of the relationships in this model do not have repeating groups, partial dependencies, or transitive dependencies. This causes the model to already be in BCNF and not require further normalization. Because none of the normal forms are violated, there are not any relations to decompose.

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Physical Model