



Functional Dependencies

User Relation:

- $User_ID \rightarrow Username$
- $User_ID \rightarrow Password$
- $User_ID \rightarrow Email$
- $User_ID \rightarrow Balance$
- $User_ID \rightarrow Profile_Picture$

Orders Relation:

- $Order_ID \rightarrow User_ID$
- $Order_ID \rightarrow IsClosed$

Listing Relation:

- $Listing_ID \rightarrow User_ID$
- $Listing_ID \rightarrow Listing_Name$
- $Listing_ID \rightarrow Listing_Description$
- $Listing_ID \rightarrow Price$
- $Listing_ID \rightarrow Product_picture$
- $Listing_ID \rightarrow onSale$
- $Listing_ID \rightarrow IsClosed$

Order_Items Relation:

- $(Order_ID, Listing_ID) \rightarrow Quantity$

Wishlist_Items Relation:

- $(User_ID, Listing_ID) \rightarrow \emptyset$ (No non-key attributes)

Relationships Represented in 3NF

User to Orders:

- A user can have multiple orders
- Each order belongs to exactly one user
- Implemented via $User_ID$ foreign key in Orders table

User to Listing:

- A user can create multiple listings
- Each listing is created by exactly one user
- Implemented via $User_ID$ foreign key in Listing table

Orders to Listings:

- An order can contain multiple listings

- A listing can be part of multiple orders
- Implemented through Order_Items junction table with composite key (Order_ID, Listing_ID)
- Additional attribute: Quantity

User to Listings (Wishlist):

- A user can wishlist multiple listings
- A listing can be wishlisted by multiple users
- Implemented through Wishlist_Items junction table with composite key (User_ID, Listing_ID)