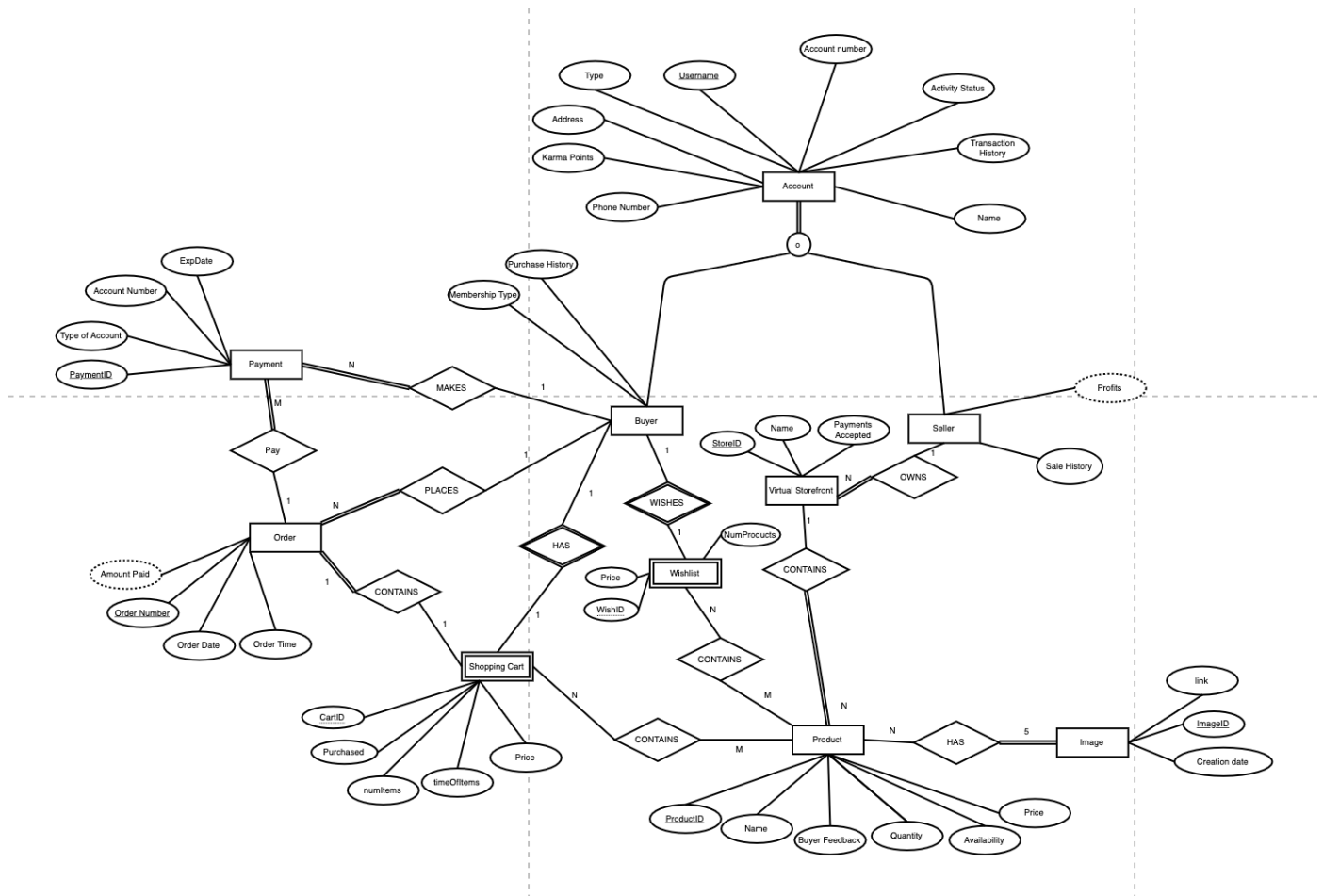


Blake Charlton, Nicki Baehre, Daniel Lim, Yi Chen

CSE 3241 Project Checkpoint 02 – Relational Model and Relational Algebra

In a NEATLY TYPED document, provide the following:

1. Provide a current version of your ER Model as per Project Checkpoint 01. If you were instructed to change the model for Project Checkpoint 01, make sure you use the revised version of your ER Model.



2. Map your ER model to a relational schema. Indicate all primary and foreign keys.

Account (Account Number, Username, Type, Address, Karma Points, Phone Number, Activity Status, Name)

Buyer(Account Number)

Seller(Account Number)

Product(ProductID, StoreID, Name, Buyer Feedback, Quantity, Availability, Price)

Image(ImageID, Creation date, link)

Virtual Storefront(StoreID, Account Number, Name)

Payment_methods(Method_name, StoreID)

Payment(PaymentID, Order Number, Account Number, Type of payment, Account Number, ExpDate)

Order(Order Number, Account Number, CartID, Order Date)

Shopping Cart(CartID, Account Number, Purchased)

Wishlist(WishID, Account Number, NumProducts)

Wish_Product(WishID, ProductID, Quantity)

Shop_Product(CartID, ProductID, Quantity)

Product_Image(ProductID, ImageID)

Underlined = Primary Key

Red = Foreign Key

3. Given your relational schema, provide the relational algebra to perform the following queries. If your schema cannot provide answers to these queries, revise your ER Model and your relational schema to contain the appropriate information for these queries:

a. Find the titles of all IP Items by a given Seller that cost less than \$10 (you choose how to designate the seller)

$$\sigma_{price < 10}(\Pi_{Name}(\sigma_{account\ number = 1}(((Seller * Virtual\ Storefront) * Product))))$$

b. Give all the titles and their dates of purchase made by given buyer (you choose how to designate the buyer)

$$\Pi_{Name, Order\ Date}(\sigma_{account\ number = 1}(((Buyer * Order) * Shopping\ Cart) * Shop_Product) * Product)$$

c. Find the seller names for all sellers with less than 5 IP Items for sale

$$\pi_{Name}(\sigma_{SUM(Quantity) < 5}(\sigma_{StoreID = F_{SUM(Quantity)}}(Virtual\ Storefront * Product)))$$

d. Give all the buyers who purchased a IP Item by a given seller and the names of the IP Items they purchased

$$\begin{aligned} & Buyer_Purchases \leftarrow \sigma_{Account\ Number, Order\ Number}(Buyer * Order) \\ & Buyer_Cart \leftarrow \sigma_{Account\ Number, Order\ Number, ProductID}((Buyer_Purchases * Shopping\ Cart) * \\ & Shop_Product) \\ & \pi_{Buyer-cart.AccountNumber}(\sigma_{Virtual\ Storefront.Account\ Number = 1}((Buyer_Cart * Product) * Virtual\ Storefront)) \end{aligned}$$

e. Find the total number of IP Items purchased by a single buyer (you choose how to designate the buyer)

$$F_{Sum(numItems)}(\sigma_{Account_number=1}((Buyer*Order)*Shopping\ Cart))$$

f. Find the buyer who has purchased the most IP Items and the total number of IP Items they have purchased

Total_purchase_per_acct(acct num, total items) <- Account Number $F_{\text{Sum}(\text{numItems})}$
 ((Buyer*Order)*Shopping Cart)
 $\pi_{\text{acct num, total items}} (F_{\text{max}(\text{total items})} (\text{Total_purchase_per_acct}))$

4. Three additional interesting queries in plain English and also relational algebra. Your queries should include at least one of these:

a. outer joins

Find the buyers who don't have a wishlist.

$\pi_{\text{Account Number}} (\sigma_{\text{WishID} = \text{null}} (\text{Buyers} \bowtie_{\text{Account Number} = \text{Account Number}} \text{Wishlist}))$

b. aggregate function

Total amount of money paid by a given buyer.

$F_{\text{Sum}(\text{Amount Paid})} (\sigma_{\text{Account_number}=1} ((\text{Buyer} * \text{Order})))$

c. "extra" entities from CP01

Find the buyer who has the most IP products in the wishlist.

Total_amount_per_acct(acct num) <- Account Number $F_{\text{Sum}(\text{NumProducts})} ((\text{Buyer} * \text{Wishlist}))$
 $\pi_{\text{acct num}} (F_{\text{max}(\text{NumProducts})} (\text{Total_amount_per_acct}))$

Account (Account Number, Username, Type, Address, Karma Points, Phone Number, Activity Status, Transaction History, Name)
Buyer(Account Number, Purchase History, Membership Type)
Seller(Account Number, Sale History)
Product(ProductID, StoreID, Name, Buyer Feedback, Quantity, Availability, Price)
Image(ImageID, Creation date, link)
Virtual Storefront(StoreID, Account Number, Name, Payments Accepted)
Payment(PaymentID, Order Number, Account Number, Type of Account, Account Number, ExpDate)
Order(Order Number, Account Number, CartID, Order Date, Order Time)
Shopping Cart(CartID, Account Number, Purchased, NumItems, timeOfItems, Price)
Wishlist(WishID, Account Number, Price, NumProducts)
Wish_Product(Account Number, WishID, ProductID)
Shop_Product(Account Number, CartID, ProductID)
Product_Image(ProductID, ImageID)