CS3700

Assignment - 1.2

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Domain Description

Online Marketplace

This database is aimed at aiding the development of an e-commerce platform. Our platform connects buyers and sellers online and eases up the pressure on physical markets. In this marketplace, sellers list products for sale and a customer can order multiple products from multiple sellers. We identify our customers based on their unique CustomerID and securely collect personal information such as the customer's name, date of birth, contact numbers. Each customer can login onto our platform using an email address and a password. Given the variety of products that will be made available on our platform, we require the age of the customer to display only appropriate products for each user.

Customers can purchase items on our platform using a cart. Each cart is identified by an unique identification number and also contains details about the total price of the products contained by it. Each product in a cart is represented as a cart item identified using an ID. A cart item is related to the product added to the cart and the quantity purchased. Each customer can add as many items as they want for each product to the cart.

Sellers are also an integral part of our system. We collect, from our sellers, all the details as for a customer except for the date of birth and age. Sellers can list a product, identified by its unique ID, along with its name, a short description of the product, it's price, the quantity available and the brand of the product. We also categorize various products into different categories such as home appliances, electronics, clothing etc. Each product can also be associated with tags to enable the users to search the breath of our product repository effectively. Note that our sellers have the power to serve a product only at particular regions as per their available/ease of deliverability. An order is given to the seller when a customer pays for the seller's product. Seller then delivers the products in their correct quantities as mentioned by the customer, after verifying the payment associated with it.

Our platform supports multiple payment methods. Each payment is linked to a cart which can contain products from multiple sellers. We also record the timestamp at which the payment was made.

Entities and Attributes

1. Customer - A single user who can purchase from the marketplace.
   Attributes:
   - CustomerId (Primary Key)
   - Name
   - Account Password
   - Date of Birth
   - Contact Numbers (multi-valued)
   - Email ID (candidate key)
   - Age (derived)

2. Cart - (Weak Entity wrt Customer entity) Represents a cart which holds cart items. A user always has one and only one active cart, which can even be empty. If a cart is ordered by paying for its items, a new cart will be created for the user, and the old cart will no longer be active.
   Attributes:
   - Cart ID (Partial Key)
   - Total Amount

3. Cart Item - (Weak Entity wrt product entity) Represents a product that is added to cart. Multiple customers can add the same product to their carts.
   Attributes:
   - Item ID (Partial Key)
   - Quantity

4. Product - A product is listed by the seller. There can be multiple instances of the same product listed by the seller (indicated by the quantity). Each customer can independently add to their carts any quantity of a listed product upper bound by what is available, but the actual total number of that product purchased by all the customers is limited by it's quantity available.
   Attributes:
   - Product ID (Primary Key)
   - Name
   - Description
   - Price
   - Quantity Available
   - Brand
   - Category
   - Tags

5. Seller - Products are listed by the seller. Seller specifies Quantity of each product.

Attributes:

- Seller ID (Primary Key)
- Name
- Account Password
- Email (candidate key)
- Contact Numbers (multi-valued)

6. Region - It specifies the regions where the product is available (can be delivered). It can also be used to filter the products available in a region.

Attributes:

- Region ID (Primary Key)
- Pincode

7. Payment - It is associated with a cart. A user pays to buy all the cart items in a cart. This payment is captured as a separate entity. It's the payment for all items in a cart, and belongs to multiple sellers.

Attributes:

- Payment ID (Primary Key)
- Payment Method
- Total Amount
- Payment Timestamp

Relations

1. **creates :** Binary relation between Customer and Cart.
    - (cr,ct) ∈ creates ⇔ Customer cr added a cart ct
    - It is a one-to-many relationship from Customer to Cart because a Customer can have more than one cart. Both entities have total participation, as a customer always has at least one cart and Cart is a weak entity.
    - There is also an associated *complex attribute* : Delivery Address - the delivery address for the items added in cart

2. **doneBy :** Binary relation between Customer and Payment.
    - (cr,py) ∈ doneBy ⇔ Customer cr did payment py
    - It is a one-to-many relationship from Customer to Payment. Payment has total participation as a Payment can be made only by a customer, and hence can’t exist without a Customer

3. **listedBy :** Binary relation between Product and Seller.
    - (pr,s) ∈ listedBy ⇔ Product pr is provided by Seller s
    - It is a one-to-many relationship from Seller to Product as a single seller can list multiple products

4. **soldIn :** Binary relation between Product and Region.

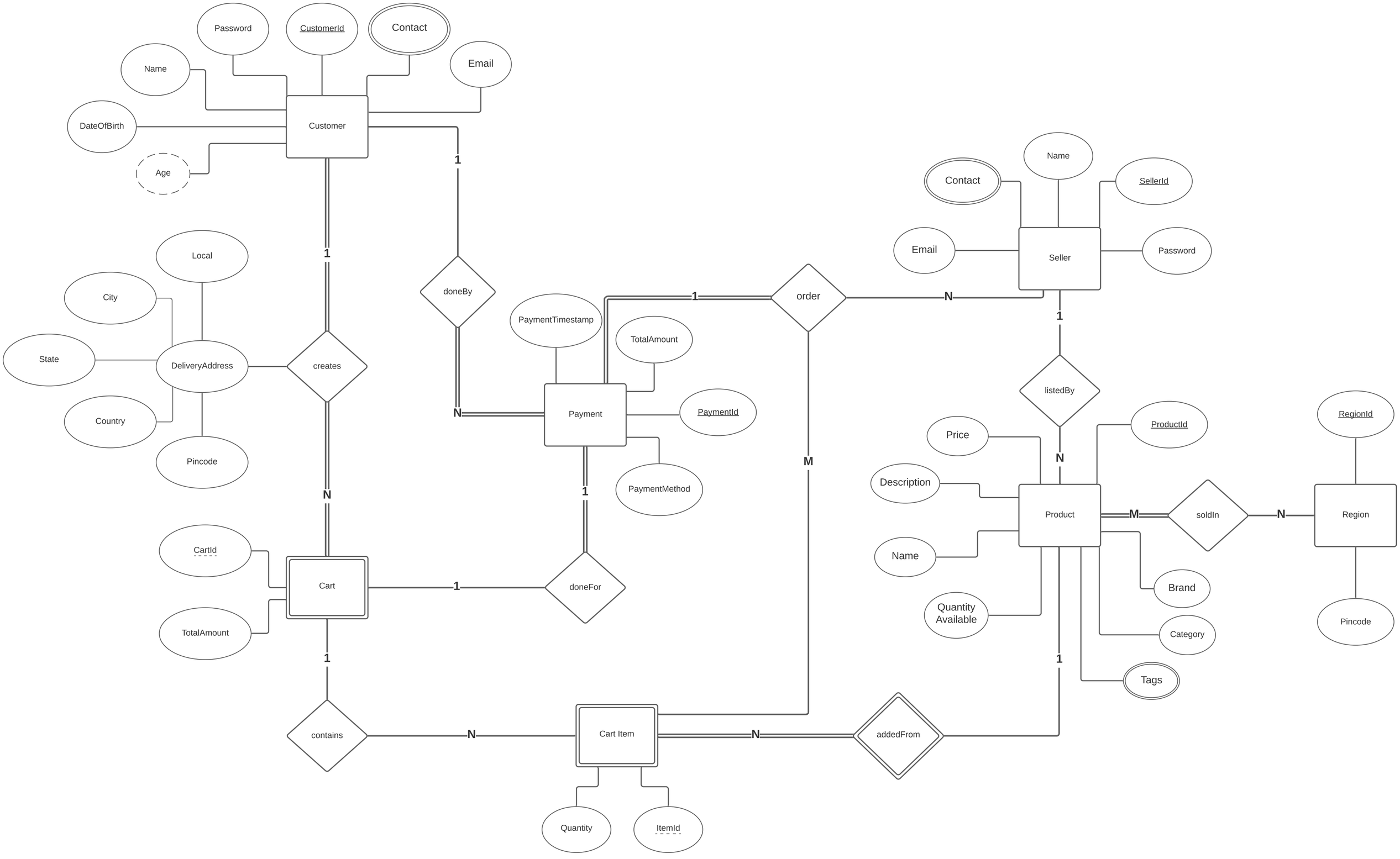
- (pr,r) ∈ soldIn ⇔ Product pr is available in Region r
- It is a many-to-many relationship from Product to Region and Product participates totally, as each product has to be sold in some place.

5. **contains :** Binary relation between Cart and Cart Item.
   - (ct,ci) ∈ contains ⇔ Cart Item ci was added to the Cart ct
   - It is a one-to-many relationship from Cart to Cart Item as a cart consists of many cart items

6. **addedFrom :** Binary relation between Product and Cart Item.
   - (pr,ci) ∈ addedFrom ⇔ Some quantity of Product pr is taken as cart item
   - It is a one-to-many relationship from Product to Cart Item, and Cart Item participates totally because it is a weak entity w.r.t. Product.

7. **doneFor :** Binary relation between Cart and Payment.
   - (ct,py) ∈ doneFor ⇔ Payment py is for Cart ct
   - It is a one-to-one relationship from Cart to Payment, and there is total participation of Payment because a payment can be made for a Cart only.

8. **order :** Ternary relation between Payment, Seller and Cart Item
   - (py,s,ci) ∈ order ⇔ Payment py was made for Cart Item ci which was listed by Seller s
   - The participation ratio is 1:M:N as a single payment can be for multiple cart items which can be from different sellers. Payment has total participation as a payment has to be associated with some cart items and sellers


Password
CustomerId
Contact
Name
Email
DateOfBirth
Customer
Age
1
1
Local
City
State
DeliveryAddress
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N
1
PaymentTimestamp
TotalAmount
Payment
PaymentId
1
PaymentMethod
order
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Name
Contact
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Email
Seller
Password
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listedBy
N
Price
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soldIn
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Region
Name
Brand
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Quantity Available
Category
Pincode
Tags
1
CartId
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TotalAmount
1
contains
N
Cart Item
N
addedFrom
Quantity
ItemId

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