

CS 550 – Database Systems

Project Component 1: Conceptual Database design using Entity-Relationship (ER) Diagrams

Project Supporting Document

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Project Topic: A database system for a customer loyalty program

In the ER diagram, the symbols are represented as :

- (1,1) relation is shown as =====>
- (1, n) relation is shown as =====
- (0, n) relation is shown as -----
- (0,1) relation is shown as ----->
- Entity is shown as



- Attribute is shown as



Attributes and Entities:

1. Customer (Entity): Attributes are
 - Full Name
 - SSN
 - Family Data
 - Address (Multiple Attributes are Street, city, state, and zip code)

- Age
- Sex
- Marital Status
- Occupation
- Membership

2. Card (Entity): Attributes are

- Card_id
- Exp_date

3. Login (Entity): Attributes are

- Username
- Password

4. Product (Entity): Attributes are

- P_name
- Product_id
- Price
- Point

5. Transaction (Entity): Attributes are

- t_id
- Bill_amount
- t_point
- t_date
- total_prod

6. Prizes (Entity): Attributes are

- prize_name
- points
- prize_id

7. Exchange Center (Entity): Attributes are

- e_id
- e_name
- Address

8. Redemption History (Entity): Attributes are

- R_id
- Available_points
- Redeemed_data

9. Family (Entity): Attributes are

- F_id
- Group_member

10. Special Promotion (Entity): Attributes are

- P_id
- Point_multiplier
- P_data

11. Branches (Entity): Attributes are

- B_id
- B_name
- B_address

Assumption:

1. If a customer logs into an account he/she will hold a card which will be used to redeem the points from their redemption history.
2. For every purchase (transaction) we assume that a certain number of points will be added to the customer's redemption history
3. When a customer applies for a card we assume that he/she includes their family members' details too.

4. We assume that every purchase from any family member will accumulate the points in redemption history.
5. We assume that when certain points accumulate in the redemption history the customer gets a prize.
6. If a customer wants to exchange the prize he/she can exchange it at any exchange center.
7. Customer gets a special promotion on some occasions in different branches.

Experience gained towards the final ER design:

- **Draft-1:** Firstly, we started by identifying the entities in the given scenario and also we identified the attributes of the entity.
- **Draft-2:** Moving forward, we have assigned relations to the entities.
- **Draft-3:** We made the first design for the entities and relations in the ER diagram.
- **Draft-4:** Here, we identified the aggregation and added extra entities.
- **Draft-5:** Finally, we added attributes to the ER diagram and identified the primary key.

These are relations which is shown by ER Diagram:

1. Customer can have only one login with their details
2. According to the customer entity, the customer can hold 0 or more loyalty cards but loyalty cards can held by only one customer name.
3. The customer registers for a new loyalty card when he loses his existing loyalty card.
4. One customer can have multiple transactions and each transaction can be associated with one customer.
5. Each transaction includes one or more products, but each product belongs to only one transaction.
6. Customer can collect 0 or more points when he/she does more transactions. The total points are stored in redemption history.

7. Each customer can be a part of a family group which is a (0,1) relation. Not all customers need to be in a family group and can have multiple members which is (1, n) relation
8. Family can have multiple Redemption histories with card (1, n) relation but Redemption history was gathered by one family which is (0,1) relation. This is used for sharing points with a family.
9. Customer may or may not accumulate redemption history but redemption history should accumulate by one customer.
10. Customer may redeem their point for one or more prizes which allows the customer to redeem points for different items
11. Every time we get the prize, a point will be removed from the redemption history which states (1,1) relation.
12. When points increase after the purchase of a product by the customer in redemption history may lead to n number of rewards.
13. A customer can redeem an item in n number of exchange centers.
14. A customer will get 0 to n number of special promotion points for their purchased products.
15. Every product is associated with a special promotion to the customer.
16. Special promotions can apply to one or more branches.

