Department Store

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The mini world will consist of a department store's billing system. This is a commonly used system in all local supermarkets. The users of the software will be the employees of the establishment using the software. The purpose of the database is to bring more clarity and uniformity in the billing system of a store by creating a solid digital backup which can be checked for inconsistencies.

Database Requirements:

Entity Types:
- **Admin : strong entity**
  - *Attributes:*
    - Admin_id : key attribute
    - Shift_time
    - Date
    - Shift number in that month - Attribute derived from Date
- **Customer : strong entity**
  - *Attributes:*
    - <Mobile_no,Email_id> : as a composite key attribute
    - Name
    - Admin Assistance Feedback-Domain:{A scale of 1-5, where 1 is very disappointed and 5 is satisfied}
    - Date_of_birth
    - SubClass- {Disjoint, Total Participation}
    - Members:
    - Special Attributes:
      - ❖ Membership_id
      - ❖ Membership_points
      - ❖ Membership_points_redeemed
    - Non-Members:
    - Special Attributes:
      - ❖ Points_active
      - ❖ Points_redeemed

- **Product : strong entity**
    - *Attributes:*
    - Product_id : key attribute
    - Price_per_unit
    - Unit: Domain {litres, kilograms, dozens, units}
- **Sale : weak entity**
    - Dependent on Customer
    - *Attributes:*
    - Sale_id : partial key, composite attribute ; format : <admin_id><date><time>
    - Amount
    - Product: Multi valued attribute-Binary Relationship as an attribute
- **Payment : weak entity**
    - Dependent on Customer
    - *Attributes:*
    - Mode_of_payment - Domain:{ Cash, Debit/Credit Card, UPI}
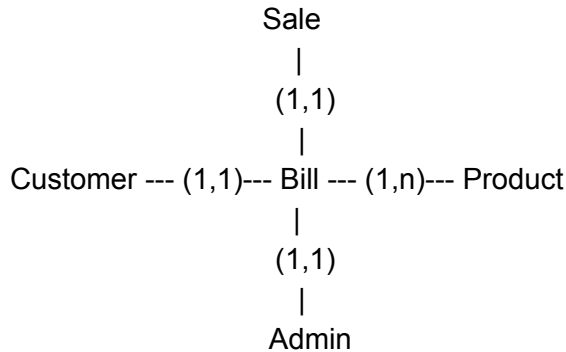   - Sale_id : partial key
    - Amount paid
    - Balance

Relationship Types:
- **Self Relation:** Every Admin should report to exactly one other Admin, an Admin can be reported to by none or many other Admins. Total Participation on side E1 and Partial Participation on side E2.
  Admin(E1) ---(1,1)--- Reports to ---(0,n)--- Admin(E2)
  The relation has an attribute : Time of Reporting
  The two roles of an Admin in this Self-Relationship Type are Reporter and Reportee.

- Every Admin has to assist at least one Customer and every Customer is assisted by exactly one Admin. Total Participation from both E1 and E2.
  Admin(E1) ---(1,n)--- Assists ---(1,1)--- a Customer

- Every Admin enters details of at least one product and every product details are entered by exactly one Admin. Both E1 and E2 have total participation.
  Admin(E1) ---(1,n)--- enters details ---(1,1)--- of Products

- Every sale initiates exactly one payment and every payment is initiated by exactly one Sale.
  Sale ---(1,1)--- initiates ---(1,1)--- Payment

- Every Customer corresponds to exactly one (Sale,Payments) pair, Every Sale has exactly one (Customer,Payments) pair and every Payment corresponds only to one (Sale,Customer) pair. Where all three entities exhibit total participation.

```
Customer ---(1,1)--- Pays ---(1,1)--- Sale
                       |
                     (1,1)
                       |
                   Payments
```
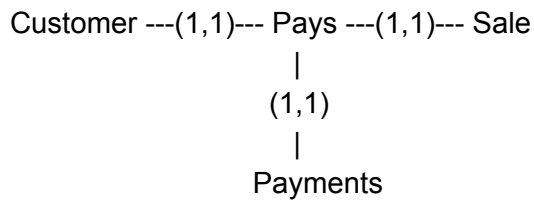
- **N>3 Relationship Type:**
  The below is an illustration of it, with all four entity types exhibiting total participation. Every Entity type has a cardinality ratio of (1,1), except Product entity type, each bill can be related to many Products.

```
                   Sale
                    |
                  (1,1)
                    |
Customer --- (1,1)--- Bill --- (1,n)--- Product
                    |
                  (1,1)
                    |
                  Admin
```

Functional Requirements:

1. **Retrieval:**
   a. **Projection:**Details of all the entities of Customer entity type, either members or on-Members, with Feedback lesser than or equal to 3.

   b. **Search :**Searching the database to find an entity of Admin entity type, with the maximum number of shifts in a month to award "Employee of the Month ".

   c. **Aggregate:** Finding the sum of all the Sales of all the Customers, Total Sales, at the end of the day.

   d. **Selection :** Retrieving data about the number of shifts worked by each entity of Admin entity type in a month.

2. **Modification:**
    a. **Update**: Updating the number of points of both Member,Non-members of Customer entity type, after every sale by them.

    b. **Insertion**: Inserting new product details including product id, price, unit into the Product entity type while the entered unit belongs to the domain of Units attribute.

    c. **Delete**: Deletion of Sale details of a particular item purchased by a particular Customer that has been returned.

3. **Analysis:**
    a. Analysing the Sale records of all the Product entity types, to prevent overstocking of unnecessary items which might affect the profit of the store and can discontinue such items.
    b. Analysis of the preferred Mode of Payment of customers, both members and non-members separately, to regularly revamp the mode-based-point allocation system to maximize the advantage of the Customers.