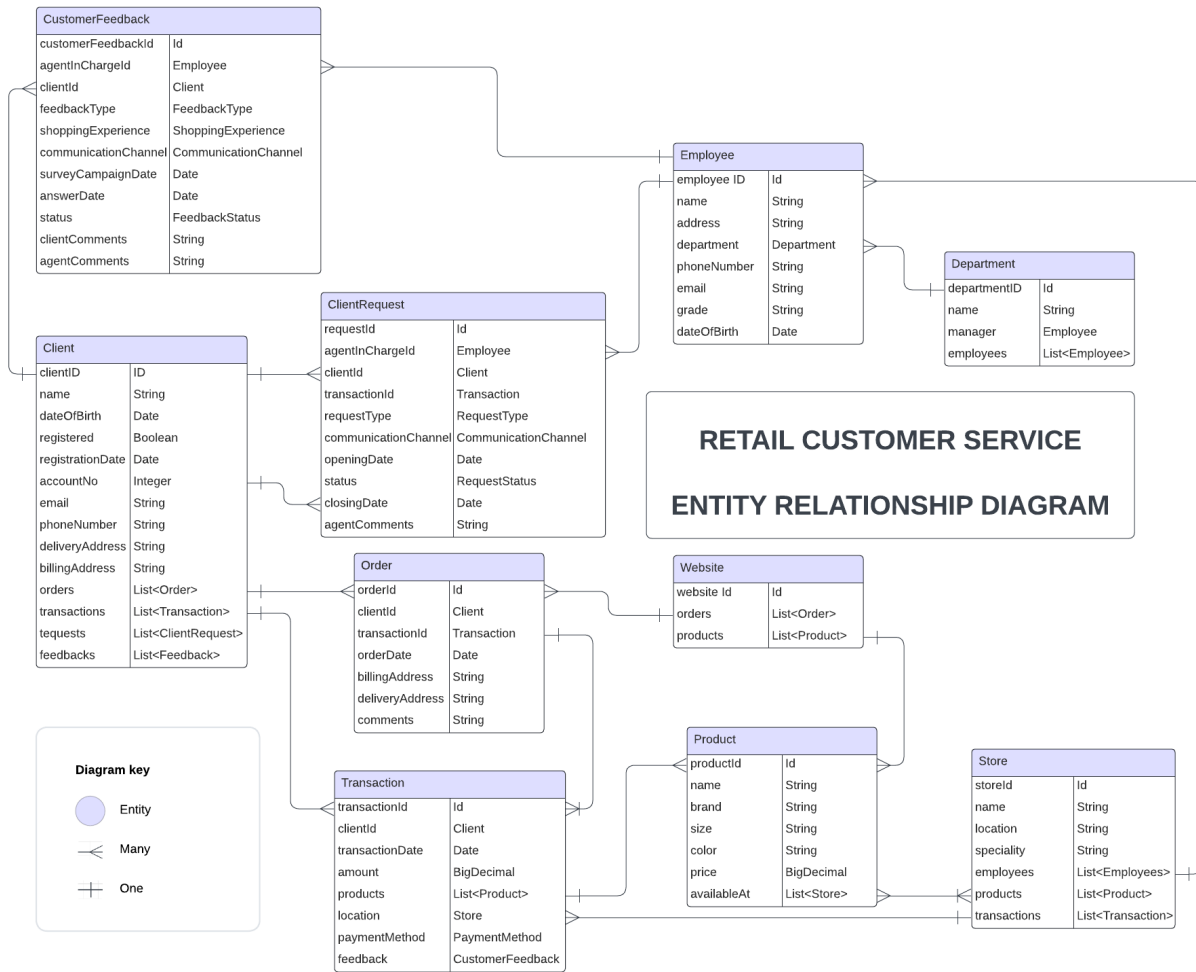# Retail Customer Service Database

By Group 1

1. Introduction

Advanced technology has led to the birth of "untact" services in the world of retailing in the United Kingdom and other areas of the world. "Untact" created from two words: no (-un) and con(tact) was first coined in South Korea. It is a form of service initiated and received by a customer without a face-to-face encounter between employee and customer that is aided by digital technology (Kim et al., 2018; Bordoloi et al., 2018; Lee and Lee, 2020). It becomes pertinent for businesses to listen to the customers' voices by making available a communication environment where the customers' needs and complaints can be harvested and responded to autonomously. The following database design aims to store clients' feedback on the services received. An analysis of this would be used to drive decisions that would lead to improved clients' satisfaction index and their loyalty in our retail industry.

2. Logical Design

2.1. Entity Relationship Diagram (ERD)

The *Retail Customer Service ERD* represents the relationships between various entities in a retail environment, focusing on customer interactions, employee involvement, and transactions. Each entity has its Primary Key, a unique identifier (entityId).

CustomerFeedback

customerFeedbackId	Id
agentInChargeId	Employee
clientId	Client
feedbackType	FeedbackType
shoppingExperience	ShoppingExperience
communicationChannel	CommunicationChannel
surveyCampaignDate	Date
answerDate	Date
status	FeedbackStatus
clientComments	String
agentComments	String

Employee

employee ID	Id
name	String
address	String
department	Department
phoneNumber	String
email	String
grade	String
dateOfBirth	Date

Department

departmentID	Id
name	String
manager	Employee
employees	List<Employee>

ClientRequest

requestId	Id
agentInChargeId	Employee
clientId	Client
transactionId	Transaction
requestType	RequestType
communicationChannel	CommunicationChannel
openingDate	Date
status	RequestStatus
closingDate	Date
agentComments	String

Client

clientID	ID
name	String
dateOfBirth	Date
registered	Boolean
registrationDate	Date
accountNo	Integer
email	String
phoneNumber	String
deliveryAddress	String
billingAddress	String
orders	List<Order>
transactions	List<Transaction>
tequests	List<ClientRequest>
feedbacks	List<Feedback>

RETAIL CUSTOMER SERVICE

ENTITY RELATIONSHIP DIAGRAM

Order

orderId	Id
clientId	Client
transactionId	Transaction
orderDate	Date
billingAddress	String
deliveryAddress	String
comments	String

Website

website Id	Id
orders	List<Order>
products	List<Product>

Product

productId	Id
name	String
brand	String
size	String
color	String
price	BigDecimal
availableAt	List<Store>

Store

storeId	Id
name	String
location	String
speciality	String
employees	List<Employees>
products	List<Product>
transactions	List<Transaction>

Transaction

transactionId	Id
clientId	Client
transactionDate	Date
amount	BigDecimal
products	List<Product>
location	Store
paymentMethod	PaymentMethod
feedback	CustomerFeedback

Diagram key

- ⬤ Entity
- ⟨ Many
- ⊢ One

2.2. Relationships and Associations

1. Client

- A client can have multiple Orders.
- A client can initiate multiple Transactions.
- A client can send multiple ClientRequests.
- A client can provide multiple CustomerFeedback entries.

2. Employee

- Each employee is associated with a department.
- Employees handle client requests and feedback.

3. Department

- A department can have many employees.

4. ClientRequest

- A request is linked to one client, handled by one employee, and may refer to one transaction.

5. CustomerFeedback

- Feedback is linked to one client and one employee.

6. Order

- An order belongs to one client and may involve one transaction.

7. Transaction

- Each transaction is linked to one client, can involve one or multiple products, and may have one associated feedback.

8. Product

- A product is linked to multiple stores and transactions.

9. Store

- A store employs multiple employees.
- A store sells multiple products and handles multiple transactions.

10. Website

- The website facilitates transactions and order management.

2.3 ERD Assumptions

General Assumptions

1. All monetary values (price, amount) are recorded in pounds (£).

2. Feedback provided by customers is in the form of close-ended and multiple-choice questions, ensuring structured and concise responses.
3. Each transaction can have at most one feedback entry.
4. *Not product-specific customer feedback is handled by the* *Remediation Department.*
5. Orders are exclusively processed through the online store.
6. The *shoppingExperience* (whether online or in-store) is tracked to understand customer behaviour.
7. A *Department* is a team responsible for specific client needs or situations. Examples: Deliveries, Client Satisfaction, After-Sales Support, Returns, and Remediation.

Client Requests

1. Each client request is assigned to one employee.
2. Client requests must be resolved within 10 working days.
3. If a client decides to change their initial request, they must create a new request with the appropriate *requestType*.

RequestType

- **Return**
    - Within a 14 days limit
- **Refund**
    - Default refund method: a voucher for the equivalent amount.
    - If the voucher is refused, a bank transfer will be issued.
- **Exchange**

Request Status

- **Opened**
- **In Progress**
- **Closed**
- **Urgent**

FeedbackType

- **Complaint**
- **Satisfaction Survey**
- **After-Sale**
- **Request Dealing**

- **Satisfaction Rating**

FeedbackStatus

- **Received**
- **Processed**
- **Reported**
- **No Action Needed**
- **Expired**

CommunicationChannel

- **Email**
- **Text Message**
- **Website** (online request forms
- **Phone**

PaymentMethod:

- **Credit Card**
- **Cash**
- **Gift Card**
- **Voucher**

3. Database Management System (DBMS)

Chosen DBMS: MySQL

- **Storage Requirements:**
  MySQL's InnoDB supports foreign keys and ensures data integrity in the stored datasets. InnoDB is scalable for medium to large datasets.

- **User Access Needs:**
  MySQL includes role-based access control which makes data accessibility more secure. MySQL allows us to implement restrictions in accessing data based on different organisational roles, as well as handle concurrent user connections making it ideal for retail environments.

- **Data Manipulation and Retrieval:**
  MySQL is highly efficient for handling data and performing CRUD (Create, Read, Update, Delete) operations.

3.1 Code for SQL queries (Sarkar and Roychowdhury, 2019)

Queries

- Start queries with BEGIN TRANSACTIONS
- End queries with COMMIT;

Tables

- CREATE TABLE client (ClientID INT PRIMARY KEY,);

Data Insertion

- INSERT into client (clientID, name) Values (1, 'John Doe');

Data update

- UPDATE client SET email =['jdoe@email.com'](mailto:jdoe@email.com) WHERE clientID = 1;

Data Deletion

- DELETE FROM client WHERE clientID = 1;

4. Data Management Pipeline

4.1. Data Capture

In the Retail Customer Service system, data is collected through:

- **User Inputs**
- **Manual Entry**
- **File Uploads**

4.2 Data Cleaning Process

Techniques Used:

- **Handling Missing Values:** missing data is either replaced with a default value or is set as missing (Davidson, 2020)
- **Normalizing Data:** Data is structured to follow 3 forms of normalization as mentioned in Davidson (2020)
    - 1NF: each row is unique and data such as first name and last name is parsed into two tables
    - 2NF: removing partial dependency by ensuring tables completely depend on primary keys and not on different variables

- ▪ 3NF removing non-key attribute to ensure there is no transitive dependency
  - **Removing Duplicates**

Stages of ETL as referenced in Cote et. Al. (2017):

- **Extraction:** Data is collected using forms that customers have filled out regarding their experience or a general questionnaire via phone.
- **Transformation:** Data is validated by cleaning and formatting it to ensure that values are aggregated and have correct formats.
- **Loading:** Processed data is loaded into the data warehouse so that analytics and reporting can be performed.

4.3. Data Storage and Security

Storage Strategies ():

- **Indexing**: Primary and foreign keys are indexed to optimize query performance.
- **Partitioning:** To achieve maximum efficiency the transactions are categorized by date to improve performance on time-based queries.

Security Measures:

- **Encryption:** Sensitive data of users are encrypted in transit to ensure that data is secure between the client application and database.
- **Access Controls:** Implementing role-based privilege principle to ensure necessary access is granted to individuals assuring that data is accessible according to its relevancy based on employee roles.
- **Backups:** full or incremental backups ensure data loss does not occur.

5. Critical Evaluation

The design supports scalability, allowing integration with APIs to collect data from diverse sources like surveys or e-commerce platforms. Future integration with machine learning (ML) and Natural Language Processing (NLP) can deepen feedback analysis, providing sentiment insights and predicting trends. Operational efficiency is ensured with automated request tracking and well-defined workflows for returns, refunds, and exchanges.

However, improvements could include optional open-ended feedback for richer insights, explicit UK GDPR compliance for sensitive data, and real-time analytics for quicker response to critical feedback. Overall, the Retail Customer Service Database design is a future-proofed and scalable design that aligns well with the business goal of enhancing customer satisfaction and loyalty.

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