UNIVERSITY OF GHANA

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COURSE CODE AND TITLE: CPEN 211 DATABASE SYSTEM DESIGN

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DATA CONSULTANCY REPORT

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INTRODUCTION

This report presents an analysis of the database schema and data provided for a fictional company. The database consists of tables for customers, employees, vehicles, fuel types, fuel pumps, fuel sales, and payment methods. The purpose of this report is to provide an overview of the database structure, data relationships, and key insights that can be derived from the data.

DATABASE SCHEMA

The database schema consists of the following tables:

Customer: Stores information about the company's customers, including their names, IDs, and contact details.

Employee: Contains data about the company's employees, such as their IDs, names, positions, dates of hire, and shifts.

Vehicle: Stores information about the vehicles owned by customers, including the vehicle ID, customer ID, and car brand.

FuelType: Contains data about different fuel types, including the fuel ID, name, price per liter, and the customer ID associated with each fuel type.

FuelPump: Stores data about the company's fuel pumps, including the pump ID, fuel ID, and status.

FuelSales: Contains information about fuel sales transactions, including the sales ID, fuel ID, quantity sold, total price, and sale date.

PaymentMethod: Stores data about different payment methods available to customers, including the payment ID, name, type, and the customer ID associated with each payment method.

DATA ANALYSIS

Customer Analysis:

The Customer table contains 20 customer records, including their names, IDs, and contact details. Customers are uniquely identified by their Customer ID, which is set as the primary key of the table. The Customer table is related to the Vehicle, FuelType, and PaymentMethod tables through the Customer ID.

Employee Analysis:

The Employee table contains information about the company's employees, including their IDs, names, positions, dates of hire, and shifts.

Employees are uniquely identified by their Employee ID, which is set as the primary key of the table.

The Reports_to column in the Employee table indicates the employee to whom each employee reports.

Vehicle Analysis:

The Vehicle table stores information about the vehicles owned by customers, including the vehicle ID, customer ID, and car brand.

The Customer ID column in the Vehicle table references the Customer table, establishing a relationship between customers and their vehicles.

FuelType Analysis:

The FuelType table contains data about different fuel types, including their IDs, names, price per liter, and the customer ID associated with each fuel type.

The Customer ID column in the FuelType table references the Customer table, linking each fuel type to the customer who uses it.

3.5 **FuelPump Analysis:**

The FuelPump table stores data about the company's fuel pumps, including the pump ID, fuel ID, and status.

The Fuel ID column in the FuelPump table references the FuelType table, establishing a relationship between fuel pumps and the fuel types they dispense.

FuelSales Analysis:

The FuelSales table contains information about fuel sales transactions, including the sales ID, fuel ID, quantity sold, total price, and sale date.

The Fuel ID column in the FuelSales table references the FuelType table, linking each sales transaction to the fuel type sold.

A trigger function has been created to automatically calculate the total price based on the quantity and fuel price per liter.

PaymentMethod Analysis:

The PaymentMethod table stores data about different payment methods available to customers, including the payment ID, name, type, and the customer ID associated with each payment method.

The Customer ID column in the PaymentMethod table references

RELATIONSHIPS BETWEEN TABLES:

Customer table:

Primary Key: CustomerID

No foreign key relationships.

Employee table:

Primary Key: EmployeeID

No foreign key relationships.

FuelSales table:

Primary Key: SaleID

Foreign Key: CustomerID (references Customer table, indicating the customer who made the purchase)

Foreign Key: EmployeeID (references Employee table, indicating the employee who processed the sale)

PaymentMethod table:

Primary Key: PaymentID

Foreign Key: CustomerID (references Customer table, indicating the customer who used the payment method in question)

The relationships can be summarized as follows:

The customer table has a one- to- many relationship with the vehicle table, as one customer can have many vehicles and one vehicle can be owned by one customer.

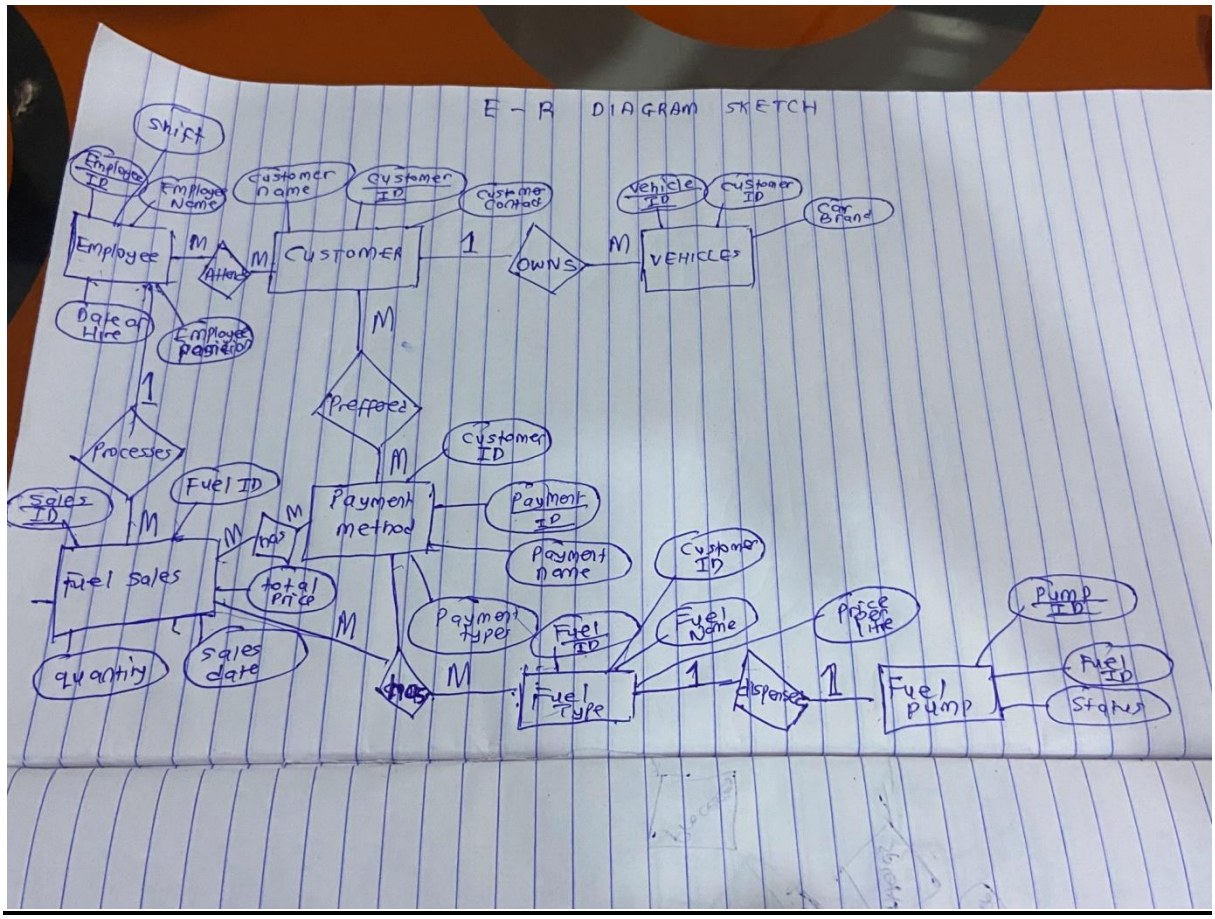
The FuelSales table has a one-to-many relationship with the Customer table, as one customer can have multiple fuel sales, but each fuel sale is associated with only one customer.

The FuelSales table also has a one-to-many relationship with the Employee table, as one employee can process multiple fuel sales, but each fuel sale is associated with only one employee.

The PaymentMethod table has a one-to-many relationship with the Customer table, as one customer can have multiple payment methods, but each payment method is associated with only one customer.

These relationships allow for the tracking of sales made by customers, the employees involved in processing those sales, and the payment methods used by customers.

ENTITY RELATIONSHIP DIAGRAM



Key Insights

Customer Insights:

The Customer table contains valuable information about the company's customers, including their names, IDs, and contact details.

By analyzing customer data, the company can identify their most loyal and valuable customers and tailor marketing strategies accordingly.

Customer data can also be used for targeted promotions, personalized offers, and customer relationship management initiatives.

Employee Insights:

The Employee table provides important details about the company's employees, including their IDs, names, positions, dates of hire, and shifts.

Analyzing employee data can help identify staffing patterns, optimize work schedules, and evaluate employee performance.

This information can assist in making informed decisions regarding resource allocation, training programs, and overall workforce management.

Fuel Sales Insights:

The FuelSales table contains transactional data related to fuel sales, including the quantity sold, total price, and sale date.

Analyzing fuel sales data can provide insights into fuel consumption patterns, peak sale periods, and popular fuel types.

This information can be used to optimize inventory management, determine pricing strategies, and plan promotional campaigns.

Payment Method Insights:

The PaymentMethod table stores data about the payment methods used by customers, including the payment ID, name, and type.

Analyzing payment method data can help understand customer preferences and payment trends.

This information can guide decisions related to offering convenient payment options, integrating new payment technologies, and improving the overall payment experience.

Recommendations

Based on the analysis of the provided database, the following recommendations are suggested:

Enhance Customer Relationship Management:

Implement a customer relationship management (CRM) system to effectively manage and engage with customers.

Utilize customer data to develop targeted marketing campaigns, personalized promotions, and loyalty programs.

Optimize Staffing and Workforce Management:

Analyze employee data to identify staffing patterns and optimize work schedules for improved efficiency.

Consider implementing performance evaluation mechanisms to identify high-performing employees and areas for improvement.

Improve Fuel Inventory Management:

Utilize fuel sales data to optimize inventory management and ensure the availability of popular fuel types during peak periods.

Implement automated inventory tracking systems to streamline the replenishment process and avoid stockouts.

Enhance Payment Options and Experience:

Analyze payment method data to identify customer preferences and trends in payment types.

Explore options for integrating new payment technologies to offer convenience and improve the overall payment experience.

6. Conclusion:

In conclusion, this report provides an overview of the database structure, data relationships, and key insights derived from the provided data. By leveraging this information, the company can make informed decisions regarding customer relationship management, workforce optimization, fuel inventory management, and payment options. Implementing the recommended strategies can lead to improved customer satisfaction, operational efficiency, and ultimately, increased profitability.