**EPAM Data Analytics Engineer Final Task**

**Topic: Fuel Station Network**

**Business Description:**

Our company operates a network of fuel stations across various locations, offering a range of fuel types to both retail and commercial customers. We are committed to providing efficient and reliable services to motorists and businesses alike, ensuring they have access to quality fuels at competitive prices.  
**Key Features and Services:**

Diverse Fuel Options: Our fuel stations provide a wide selection of fuel types, including gasoline, diesel, ethanol blends, ,catering to the diverse needs of our customers.

Competitive Pricing: We strive to offer competitive fuel prices, with regular and discounted pricing options based on market conditions and customer loyalty programs.

Convenient Locations: Our stations are strategically located along major routes, in urban centers, and near key transport hubs, ensuring easy access for customers.

Efficient Sales Management: The system efficiently manages fuel sales transactions, recording the type and quantity of fuel purchased, payment methods, and timestamps for each transaction.

Inventory Replenishment: Automated fuel replenishment processes ensure that our stations are always stocked with the right fuel types, maintaining optimal inventory levels.

Employee Management: We employ dedicated staff members who oversee station operations, ensuring smooth day-to-day management and customer service.

Customer Engagement: We prioritize customer satisfaction through loyalty programs, promotional offers, and personalized service experiences.

**System Benefits:**

Data-Driven Insights: The database system captures and analyzes transactional data, providing insights into sales trends, fuel consumption patterns, and customer preferences.

Operational Efficiency: By automating inventory management and sales processes, we optimize operational efficiency and reduce administrative burdens.

Compliance and Security: The system incorporates robust security measures to safeguard customer data and ensure compliance with industry regulations.

Our goal is to deliver exceptional service and value to our customers, whether they are individual motorists, fleet operators, or businesses reliant on reliable fuel supply. Through technology-driven solutions and a customer-centric approach, we aim to enhance the overall fuel station experience and drive customer loyalty. As we continue to expand our network and adopt innovative technologies, our fuel station management system will evolve to meet the changing needs of the market. We remain committed to sustainability, efficiency, and customer satisfaction as core pillars of our business strategy.

**Conceptual Data Model**

1. **FuelStation**
   * Attributes:
     + **station\_id** (Primary Key)
     + **station\_name**
     + **location**
     + **employee\_id** (Foreign Key to Employee)
2. **FuelType**
   * Attributes:
     + **fuel\_type\_id** (Primary Key)
     + **fuel\_name**
3. **FuelPrice**
   * Attributes:
     + **price\_id** (Primary Key)
     + **fuel\_type\_id** (Foreign Key to FuelType)
     + **station\_id** (Foreign Key to FuelStation)
     + **regular\_price**
     + **discounted\_price**
4. **FuelSale**
   * Attributes:
     + **sale\_id** (Primary Key)
     + **station\_id** (Foreign Key to FuelStation)
     + **fuel\_type\_id** (Foreign Key to FuelType)
     + **sale\_datetime**
     + **quantity**
     + **payment\_method**
     + **customer\_id** (Foreign Key to Customer)
5. **FuelReplenishment**
   * Attributes:
     + **replenish\_id** (Primary Key)
     + **station\_id** (Foreign Key to FuelStation)
     + **fuel\_type\_id** (Foreign Key to FuelType)
     + **supplier\_name**
     + **delivery\_date**
     + **quantity\_received**
6. **Employee**
   * Attributes:
     + **employee\_id** (Primary Key)
     + **name**
     + **role**
     + **station\_id** (Foreign Key to FuelStation)
7. **Customer**
   * Attributes:
     + **customer\_id** (Primary Key)
     + **name**
     + **phone**
     + **email**
8. **FuelStationType**
   * Attributes:
     + **Station\_id (Foreign Key to FuelStation)**
     + **Fuel\_type\_id (Foreign Ke to FuelType)**

**Logical Data Model (3NF)**

1. **FuelStation**
   * **station\_id** INT (Primary Key)
   * **station\_name** VARCHAR(100)
   * **location** VARCHAR(255)
   * **manager\_id** INT (Foreign Key to Employee)
2. **FuelType**
   * **fuel\_type\_id** INT (Primary Key)
   * **fuel\_name** VARCHAR(100)
   * **description** TEXT
3. **FuelPrice**
   * **price\_id** INT (Primary Key)
   * **fuel\_type\_id** INT (Foreign Key to FuelType)
   * **station\_id** INT (Foreign Key to FuelStation)
   * **regular\_price** DECIMAL(10, 2)
   * **discounted\_price** DECIMAL(10, 2)
4. **FuelSale**
   * **sale\_id** INT (Primary Key)
   * **station\_id** INT (Foreign Key to FuelStation)
   * **fuel\_type\_id** INT (Foreign Key to FuelType)
   * **sale\_datetime** DATETIME
   * **quantity** DECIMAL(10, 2)
   * **payment\_method** VARCHAR(50)
   * **customer\_id** INT (Foreign Key to Customer)
5. **FuelReplenishment**
   * **replenish\_id** INT (Primary Key)
   * **station\_id** INT (Foreign Key to FuelStation)
   * **fuel\_type\_id** INT (Foreign Key to FuelType)
   * **supplier** VARCHAR(100)
   * **delivery\_date** DATE
   * **quantity\_received** DECIMAL(10, 2)
6. **Employee**
   * **employee\_id** INT (Primary Key)
   * **name** VARCHAR(100)
   * **role** VARCHAR(100)
   * **station\_id** INT (Foreign Key to FuelStation)
7. **Customer**
   * **customer\_id** INT (Primary Key)
   * **name** VARCHAR(100)
   * **phone** VARCHAR(20)
   * **email** VARCHAR(255)
8. **FuelStationType**
   * **Station\_id INT (Foreign Key to FuelStation)**
   * **Fuel\_type\_id INT (FK to FuelType)**
   * **name** VARCHAR(100)
   * **phone** VARCHAR(20)

**Relationships**

**FuelStation to Employee:** One-to-Many (A station can have many employees)

**FuelStation to FuelPrice:** One-to-Many (A station can have multiple fuel price entries)

**FuelStation to FuelSale:** One-to-Many (A station can have multiple fuel sales)

**FuelStation to FuelReplenishment**: One-to-Many (A station can have multiple fuel replenishments)

**FuelType to FuelPrice:** One-to-Many (A fuel type can have multiple price entries across different stations)

**FuelType to FuelSale**: One-to-Many (A fuel type can be sold in multiple transactions)

**FuelType to FuelReplenishment:** One-to-Many (A fuel type can be replenished multiple times)

**Customer to FuelSale:** One-to-Many (A customer can make multiple fuel purchases)

**Employee to FuelStation:** Many-to-One (An employee works at one station)

**FuelType to FuelStationType:** One-to-many (bridge table to represent a many-to-many relationship between FuelType and FuelStation)

**FuelStation to FuelStationType:** One-to-many (bridge table to represent a many-to-many relationship between FuelType and FuelStation)