Title: **Electric Vehicle(EV) Fleet Management System - Final Report**

Port : 8650 (assigned to hk3427)

Streamlit : http://jedi.poly.edu:8650/

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Date of Submission :	15th December 2022	

Description :

Electric vehicles are the key technology to decarbonise road transport, a sector that accounts for 16% of global emissions. Recent years have seen exponential growth in the sale of electric vehicles together with improved range, wider model availability and increased performance. Passenger electric cars are surging in popularity and is estimated that 13% of new car sold in 2022 will be electric; if the growth experienced in the past two years is sustained, CO2 emissions from cars can be put on a path in line with the Net Zero Emissions by 2050 Scenario.

Electric Vehicle Fleet management system is designed to capture all the important data that might be useful for an automobile center for smooth day to day operation. For example, an automobile needs to keep track of records of the items that need to be traded for both buying and selling. Besides providing information about the different charging stations in a particular region, it may also assist users in selecting an electric vehicle close to the home that has plentiful charging stations.

Some of the advantages it can provide is :

1. It is much faster than a manual system.
2. Easy to generate reports for any transactions.
3. Work flexibility
4. Helps users make smart decisions on selecting electric vehicles.

Without such a system , it would be very tiresome for an automobile center to function efficiently. It will be an easy target for third parties to benefit from the manual system and the data can be

changed without being tracked. Imagine a scenario where all these buying and selling of electric vehicles are not recorded and therefore, an automobile center would have no idea of monthly sales track or whether they are achieving their target revenue goals or not ? Thus, it is important to have an electric vehicle fleet management system, to minimize such challenges.

Data : Synthetically Generated Data assisted with web scraping

User Interaction : The user can query the database for some of these information (Sample Interaction)

1. Select customers to display what vehicle item have they bought
2. Select location and count of charging stations for different EV type
3. Display the vehicles from a given company that are not yet ready for sale
4. Select number of service reservations by a customer to show customer details.
5. Display pairs of cars purchased by the selected customer.
6. Display the vehicle item and its quantity sold by a given vendor.
7. Display the data present in customer table.

Entity Sets :

1. CUSTOMER (NAME, CUSTOMER_ID, EMAIL,PHONE_NO,CITY)

2. ELECTRIC_VEHICLE (EV_NAME, EV_VEHICLE_CODE,EV_RANGE,EV_TYPE,LAUNCH_YEAR)

3. VENDOR (VENDOR_NAME, VENDOR_CODE, PHONE_NO, ADDRESS, CITY, PHONE_NO)

4. TRANSACTION (TRANSACTION_CODE,TRANSACTION_DATE,TRANSACTION_DESC)

5. SALES (SALES_CODE,SALES_DESC,SALES_DATE)

6.VEHICLE_ITEM(ITEM_CODE,ITEM_NAME,PURCHASE_PRICE,SALE_PRICE,CURR_STOCK)

7. COMPANY (COMPANY_ID,COMPANY_NAME,CITY,PHONE_NO,EMAIL,ADDRESS)

8. CHARGING STATIONS (CODE,LOCATION, STATUS, VEHICLE_TYPE)
9. SERVICE_RESERVATION (RESERVE_ID, RESERVE_DATE, PICKUP_DATE,PICKUP_LOCATION,NUM_DAYS, RETURN_DATE)
10. BOOKINGS (BOOKING_TIME)

Relationship Sets:

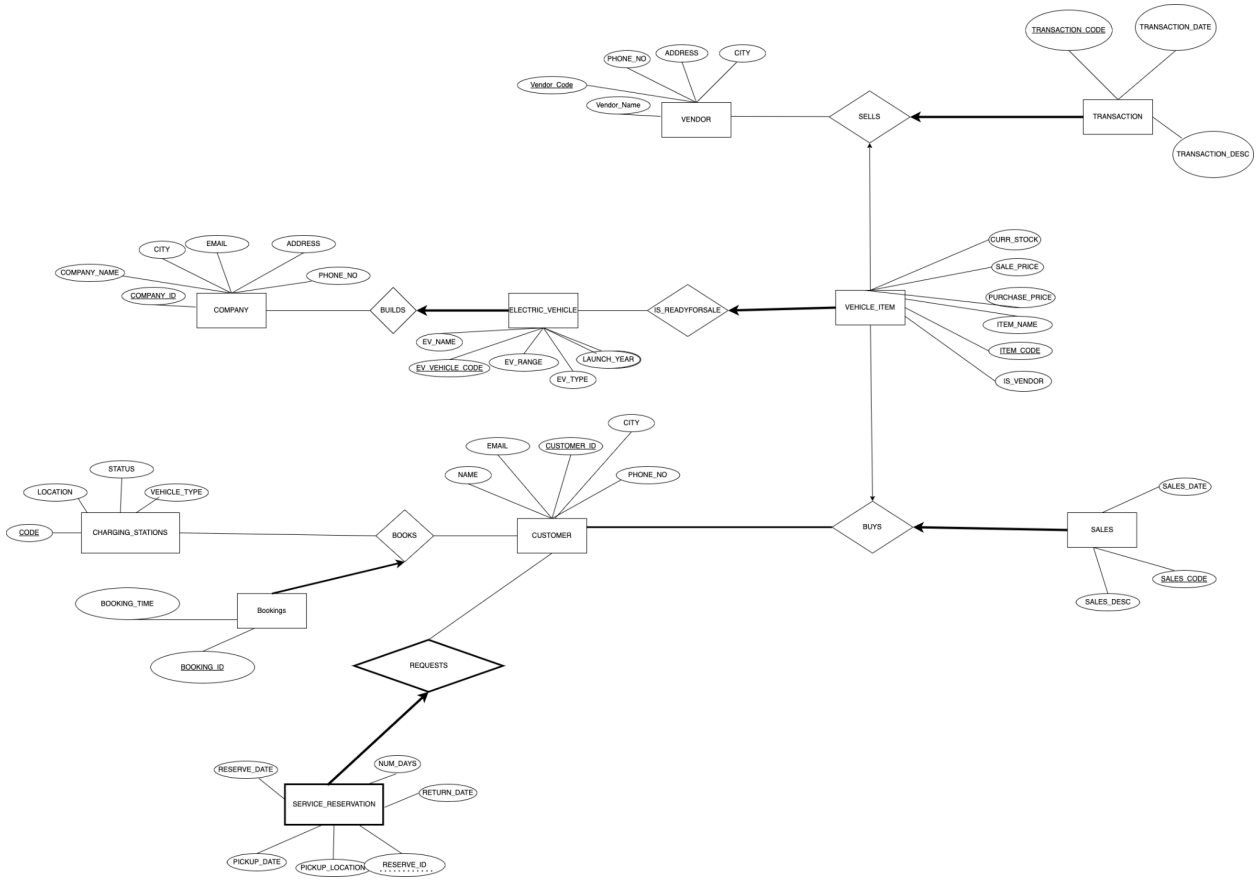
1. SELLS
2. BUILDS
3. IS_READYFORSALE
4. BUYS
5. BOOKS
6. REQUESTS

Business Rules:

1. A Company is uniquely identified by ID and described by Name, City in which they operate, email, address and phone number. Companies build Electric Vehicles. Each Electric vehicle is built by exactly one Company. Electric vehicles are uniquely identified by vehicle code and name. Electric vehicles are described by Range, type and launch year into the market.
2. Among the built Electric vehicles, there may be some vehicles that may or may not be ready to be included in the ready to sell vehicle item list.
3. Ready to sell vehicle items are uniquely identified by item code and described by name, purchase price, sale price and number of items in current stock. Each vehicle in the vehicle item belongs to exactly one electric vehicle.
4. Vendors are identified by a unique code, and also have name, phone number, address and city they work.
5. Transactions are uniquely identified by code and we also record the transaction date and description. Each Vendor may sell several vehicle items and may be associated with several transactions. However, each record in the transaction belongs to exactly one vendor and exactly one vehicle item.
6. Each record in a vehicle item can be associated to at most one vendor and at most one transaction.
7. Customers are uniquely identified by ID and also have a name, email, city and phone number. Each Customer buys one or more Vehicle items and is associated with one or more Sales.
8. Sales are identified by unique code and have a sale date and description. Each record in Sales belongs to exactly one customer and exactly one vehicle item.
9. Each record in a vehicle item can be associated to at most one customer and at most one sales.
10. Charging Stations are identified by a unique code, and also have location, status and vehicle type. A Customer can book several charging stations and charging stations can be associated with multiple customers.
11. Bookings are identified by booking ID and also have booking time. Each booking is associated with exactly one customer and exactly one charging station.

12. A Service reservation is uniquely identified by ID, and described by reservation date, return date, number of service days, pickup date and pickup location. Customers can request for several Service Reservations but each reservation belongs to exactly one Customer. A Service Reservation cannot exist independently of a Customer. If a Customer is no longer recorded in the database, then we do not track their service reservation.

ER:



SQL SCHEMA:

```
drop table if exists Service_Reservation;
drop table if exists Charging_stations_booking;
drop table if exists Charging_stations;
drop table if exists Customer_Sales;
drop table if exists Customer;
drop table if exists Vendor_Transactions;
drop table if exists Vendor;
```

```
drop table if exists Vehicle_Item;
drop table if exists Electric_Vehicle;
drop table if exists Company;


create table Company (
company_id integer primary key,
company_name varchar(64) not null,
email varchar(64) ,
phone_no bigint not null,
city varchar(64)
);

create table Electric_Vehicle (
ev_vehicle_code integer primary key,
ev_name varchar(64) not null,
ev_range integer not null,
ev_type varchar(64) not null,
launch_year integer not null,
c_id integer not null,
foreign key (c_id) references Company(company_id)
);

create table Vehicle_Item (
item_code integer primary key,
item_name varchar(64) not null,
purchase_price integer not null,
sale_price integer not null,
is_vendor boolean not null,
curr_stock integer not null,
Ev_code integer not null,
Foreign key (ev_code) references Electric_Vehicle(ev_vehicle_code)
);

Create table Vendor (
Vendor_code integer primary key,
Vendor_name varchar(64) not null,
Phone_number bigint not null,
Address varchar(64),
City varchar(32)
);

Create table Vendor_Transactions (
Transaction_code integer primary key,
```

```
Transaction_date date not null,
Transaction_desc varchar(64),
V_code integer not null,
It_code integer not null ,
Foreign key (v_code) references Vendor(vendor_code),
Foreign key (it_code) references Vehicle_item(item_code)
);

create table Customer (
customer_id integer primary key,
name varchar(64) not null,
email varchar(64) ,
phone_no bigint not null,
city varchar(64)
);

Create table Customer_Sales (
Sales_code integer primary key,
sales_date date  not null,
sales_desc varchar(64),
C_id integer not null,
It_code integer not null,
Foreign key (C_id) references Customer(customer_id),
Foreign key (it_code) references Vehicle_item(item_code)
);
```

Participation constraint of customer cannot be captured in schema.

```
create table Charging_Stations (
code integer primary key,
location varchar(64) unique not null,
Status boolean not null,
vehicle_type varchar(64) not null
);

create table Charging_Stations_Booking (
Booking_id integer primary key,
c_code integer not null,
c_id integer not null,
Booking_time timestamp not null,
Foreign key (c_code) references Charging_stations(code),
Foreign key (c_id) references Customer(customer_id)
);
```

```
Create table Service_Reservation (
Reserve_id integer,
reserve_date date not null,
Num_days integer not null,
Pickup_date date not null,
Return_date date,
Pickup_location varchar(32),
C_id integer not null,
Primary key(reserve_id, c_id),
Foreign key (c_id) references Customer(customer_id) on delete cascade
);
```
