INTRODUCTION TO DATABASES

GROUP PROJECT

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The Problem:

Car Hire Management System

"JYA Car Hire" is a car-rental company headquartered in Dublin with a number of branches across the country that operates a fleet of 500+ cars from its premises that combine the front office and a garage. Its operations are managed by a number of managers who are responsible for customer's interaction, everyday operations, suppliers and contractors relations, staff management and basic accounting. Assistant managers are junior staff and receive a lower salary. Advanced accounting and tax reports are outsourced.

The fleet consists of several categories of light passenger vehicles with the capacity from 5 to 7 seats of predominantly German and Japanese makes. Every category has its own rate of rental. It is the company's policy not to keep the cars that are older than 10 years.

The cars are rented out to both regular and casual clients. A deposit (according to car rental class) is required for each rental in addition to their rental rate. Customers must be strictly over 18 years old and hold a valid driving licence. Cars are provided from and returned to the company's premises.

Payment is accepted by credit or debit card or in cash. Payment can be done in advance by card or by cash on commencement of the rental.

Major and complicated repairs, break-downs and services are outsourced to external garages some of which have a long-time agreement in place and provide the credit facility of 30 days to JYA. Other require an immediate payment on services.

Payments from the car-rentals and cost of car repairs are recorded on the books. Insurance policy applies on a strictly one-to-one basis and is brought along with the car for the period of its use.

As an IT Manager, you are tasked to provide a system to cater for the above details.

The JYA management requires you to tell them what information your Database System can provide for them and how much would it cost?

- Detail the queries on the current and past orders for rental cars with their booking dates, responsible managers, customers and money inflows;
- Detail the queries on the state of the fleet including year of production, registration numbers, and any others;
- Detail the queries on income and expenditure;
- Detail the queries on services and repairs over a specified period of time and their total costs
- Detail the queries on the purchases of the cars for the initial year and from certain suppliers.

List of entities and attributes:

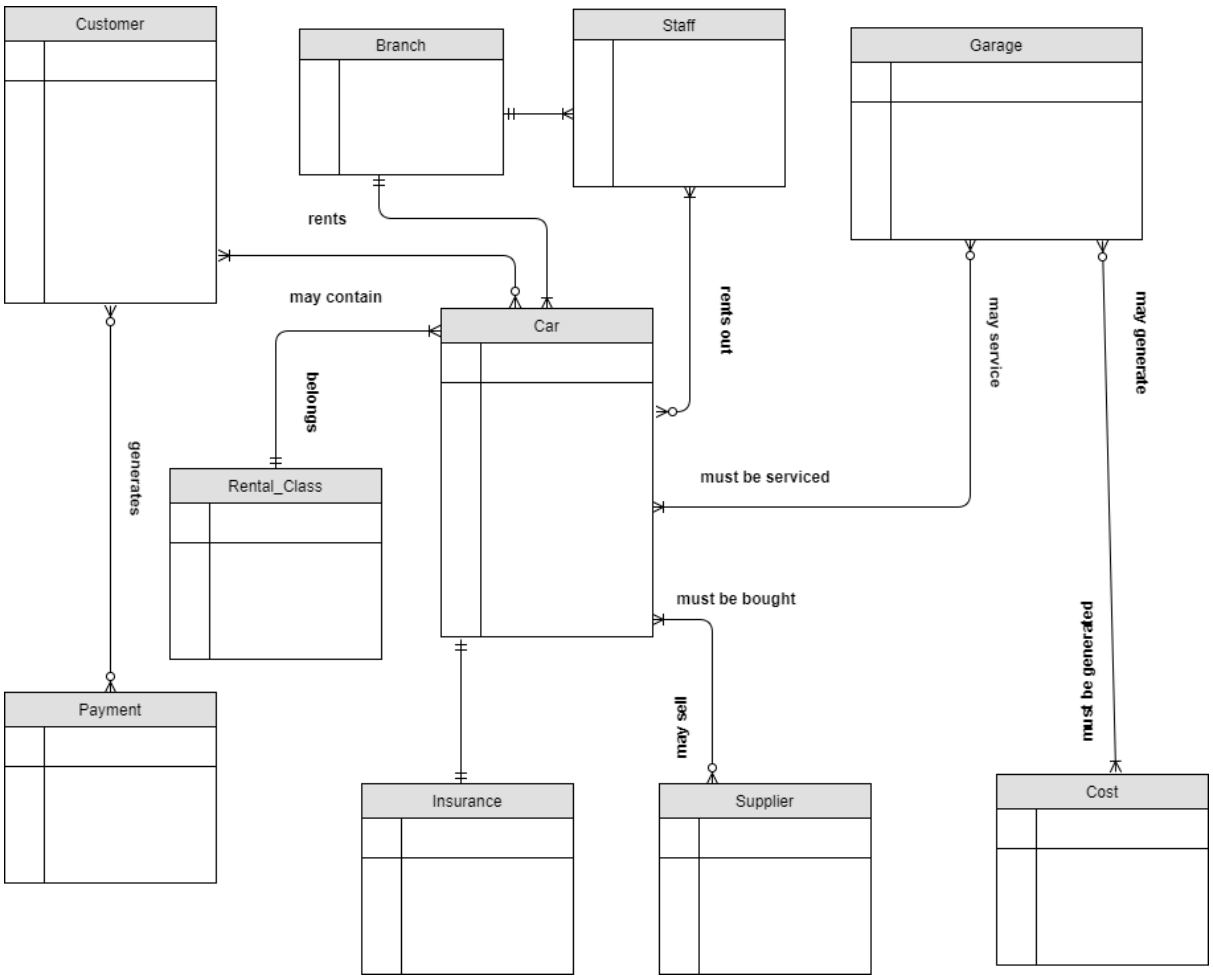
Entities:

- **Car** (CarID, RegNum, Year of production)
- **Customer** (Name, Address, DOB, email, telephone, passport number, driving licence)
- **Staff** (ID, Name, DOB, position, address, telephone, email, salary)
- **Insurance** (expiry date, insurance cost)
- **Garage** (ID, Garage Name, garage address, telephone, email, contact person, credit term).
- **Payment** (payment ID, payment date, paid by, amount)
- **Cost** (cost ID, cost date, cost_type, payable to)
- **Rental Class** (Rental Class ID, Class Name, Class Price)
- **Supplier** (SupplierID, Supplier Name, Supplier Address, email, telephone, contact person etc)
- **Branch** (Branch ID, Branch Name, Address, Email, Telephone)
- **Car Model** (ModelID, Model Name, Fuel_Type, Number of Seats)

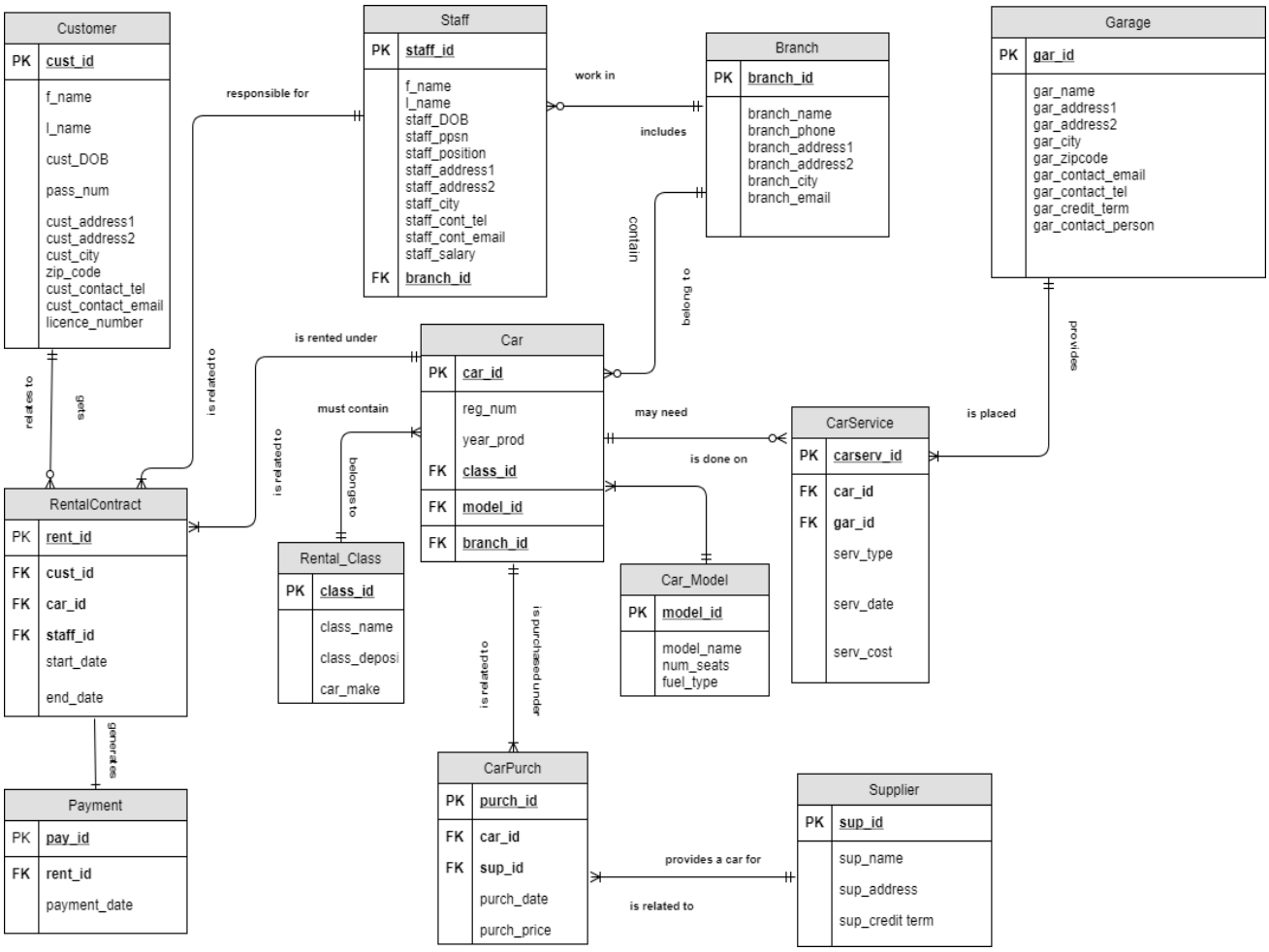
Important business rules:

- Staff and cars are allocated to their respective branches on a permanent basis.
- Customers can rent a car for the duration of no more than 30 days; additional drivers are not allowed.
- The cars are rented to the customers by the managers and assistant managers. Each manager can manage several rentals for several customers. Common responsibility for contracts is not allowed.
- Cars are assigned to 4 rental classes A, B, C, D that have different rent prices according to the make of the vehicle, its model and number of seats.
- Payment is collected from the customer according to the rental contract. Rental contract must be paid in full. To extend the rental over 30 days a new contract is signed. In case of the amendment, the previous contract is canceled and a new one is formed.
- Customer accounts (rentals) for every car can be created and maintained by only one manager.
- The rentals are calculated according to the rental duration and are based on the rental's class rate.
- All members of staff are receiving a salary.
- Complicated repairs and services are outsourced to external garages. Costs for repairs on every car are recorded on the books.
- Cars are kept for the periods not exceeding 10 years.
- Customers must be at least 18 years of age and hold valid driving licence.
- Cars are purchased from the suppliers with the insurance cover for 10 years (every vehicle has the cover matching the holding period for all cars in the company). Suppliers details are kept on the record. Some suppliers provide credit facilities.

Conceptual Database Model



ERD Logic Model



Physical Design Stage – DDL and DML

According to the conceptual and logic database models, the physical design was implemented using MySQL Workbench. The SQL script files can be found in the zipped folder for the report.

Pseudo-random data to suit enterprise constraints was generated using Python Programming language. The working script is attached to the project and is located in the file databases.py. The data was written into CSV files and then imported into the database using the internal LOAD DATA LOCAL INFILE command.

File names:

- ProjectFinalDDLDML – DDL and DML with loading data.
- Data3.zip – CSV files used to load the data (!!!N.B. Please make sure that the path in LOAD DATA LOCAL INFILE for every table is stated correctly when executing).
- QueriesTask – queries according to brief demonstrating the functioning of the joins.