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# Assignment 1 (worth 10%)

Last updated: **Sunday 30th July 2017**
Most recent changes will be shown in red.

[Please read this entire document. There are important notes at the end.]

## Aims

The aims of this assignment are, to:

- analyse/refine problem requirements;
- design ER data models based on requirements; and
- map ER data models to SQL schema definitions.

The ultimate goal is to build an SQL schema for a database called OzCars, which will be used by a car dealer whose business is mainly engaged in car repairing, new car selling and used car trading.

## Assignment Structure

This assignment will run in two stages: (1) conceptual modeling, (2) implementation.

**Stage 1** is carried out during the lab and is non-assessable. However, preparation of your ER model beforehand and participation in the lab discussion are highly recommended. By the end of Week 3, we will have discussed the data requirements and the conceptual model of OzCars. We will then release a sample ER design at the end of Week 3. This ER model will be provided to you for Stage 2. You may discuss with your Lab Tutor during Week 4 regarding the discrepancies between your design and the provided sample ER model.

**Stage 2** is an individual implementation exercise. You will *individually* develop a PostgreSQL schema to accurately implement the provided ER model. The PostgreSQL schema is the only thing that needs to be formally submitted (details on how to do this will be provided later).

## Timeline

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| **Wednesdays 2 and 9 August 2017 (Weeks 2 and 3)** | Discussion of the requirements/design during the lecture |
| **Week 3** | Discussion of your design during the lab |
| **Monday 14 August 2017 (Week 4)** | Sample Stage 1 ER model released and assignment submission instructions provided |
| **Friday 25 August 2017 @ 23.59 (Week 5)** | Deadline for submission of PostgreSQL schema |

## Assessment

This assignment is worth a total of **10 marks**.

The submitted schema (in a file called `a1.sql`) will be auto-marked and manually checked to determine:

- whether it is syntactically correct; and
- how accurately it captures the sample ER model.

More details on what you need to submit and how the marking is done will be provided when the sample ER model is released.

## The Problem Domain

OzCars is a car dealer that sells new cars and trades used cars. For new cars, it obtains the new cars from the manufacturers at cost price (and every new car also attracts delivery charges). It then sells them to buyers at a price that is higher than the cost plus delivery charges. For used cars, OzCars buys used cars with a price less than the market value (valued based on its own proprietary formula). It then sells them to new owners at a higher price. OzCars also offers car repair services.

Here are the details that need to be modeled and stored in the database:

## Employee

- There are three types of employees in OzCars. An employee is either a salesman, mechanic, or administrator.
- Each employee is identified by its employee ID.
- The database should store at least the name (that consists of first name and last name in separate fields), tax file number and annual salary of an employee.
- Mechanics will have their practising license numbers on record.
- Each salesman will have a negotiated commission rate (which will be reviewed and adjusted when they get promoted) ranging from 5% to max 20% (with no decimals). The commission of each car trade (sell of buy) is then calculated by the commission rate multiplied by the profit of that trade.

## Client

- For each car trade (sell or buy), the client details which include name, address, phone number and an optional email address, are recorded.
- If the client is a company, its ABN and an optional Web URL are recorded.
- Each client is identified by a unique client ID.
- OzCars also stores client details for car repairs.

## Car

- Each car is identified by a 17-character VIN, which does not include the letters I, O , or Q (to avoid confusion with digits 1 and 0).
- The car details, including manufacturer, model, year made, need to be stored.
- A list of options (if any) such as sun-roof and built-in GPS will be stored.
- For used cars, the license plate (maximum 6 characters) will be stored.
- For new cars, the manufacturer cost and delivery charges will be stored.

## RepairJob

- Each repair job is identified by the number of times that a car has been repaired by OzCars.
- A repair job may be carried out on a car that has not been traded by OzCars before.
- Each repair job can be carried out by more than one mechanic.
- A repair job will have its date, the car details, client contact phone number, description, and cost associated with it.
- The cost of a repair job has two components: parts and work.

## BuyingCar

- For each acquisition of a used car, the client (original owner) details, the car details, date of transaction, market value of the car, and actual transaction price should be recorded.
- There will only be one salesman involved. This salesman will receive a commission for the car.
- The car can be owned by joint owners.
- The actual buying price must be lower than the market value of the car.
- The commission is calculated by the commission rate times the profit (i.e., commission = commission rate x (market value - buying price)), and it should be stored in case the salesman changes his commission rate.

## SellingCar

- For each sale of a used car, the client (new owner) details, the car details, date of transaction, market value of the car, and actual transaction price should be recorded.
- For each sale of a new car, the client (new owner) details, the car details, new license plate (max 6 characters), date of transaction, and actual transaction price should be recorded.
- There will only be one salesman involved (and can be a different salesman than the one who acquired the car, in the case of selling a used car). This salesman will receive a commission for

the car.

$$Value = max (low, pre\_sale\_price (1 - (now() - pre\_sale\_date) * 70\%))$$

- The car can be owned by joint owners.
- The market value of a used car is determined by the number of years following the acquisition date of the car, with every year depreciating 10% from the previous year's market value, with the minimum capped at $1000.
- The actual selling price must be higher than the market value of the used car.
- The actual selling price must be higher than the manufacturer cost plus delivery charges of the new car.
- The commission is calculated by the commission rate times the profit (i.e., for used cars, commission = commission rate x (selling price - market value); for new cars, commission = commission rate x (selling price - (cost + delivery charges))), and it should be stored in case the salesman changes his commission rate.

$$value = Price - Commission/commRate$$

The above should be sufficient to get started on designing your data model. It is essential that the data model you produce is rich enough to support all of the functionality mentioned above. If you need to make any assumptions, please write them down as well. They will become part of the design document.