

# Assignment 1

**Please make sure that you always use notations consistent with lecture notes. Different notations will not be accepted. The deadline for assignment 1 is:**

**Fri 12 Mar, 5:00 pm**

## Question 1 (6 marks)

A car dealership organization hires you to design a small database, and gives you the following requirements:

- A dealership is uniquely identified by its ID. For each dealership, we also record its name, contact number, email, and address. The address is composed of a suburb and a street. Each dealership must have one or more employees.
- An employee is uniquely identified by his/her ID. For each employee, we also record his/her name, phone number and email. An employee works in one or more dealerships. In addition, an employee can have multiple working time periods available.
- A vehicle is uniquely identified by its ID. For each vehicle, the make, model, build date, and description will be recorded. In this organization, each vehicle will be sold by exactly one employee.
- An employee can sell zero or more vehicles.
- A dealership owns zero or more vehicles. Each vehicle must be owned by exactly one dealership.
- There are some showrooms. A showroom is uniquely identified by its ID. For each showroom, the name, the contact person, and the contact number will be recorded. Each showroom has one or more vehicles, and a vehicle is parked in zero or one showrooms.
- A customer is uniquely identified by his/her ID. For each customer, we also record his/her name, phone number and email. A customer may not buy any vehicle but can also buy multiple vehicles. A vehicle may not be sold yet. If sold, a vehicle must be bought by exactly one customer.
- When a customer purchases a vehicle, we also record the date and sales price.

Draw an ER diagram to represent the scenario, clearly state the assumptions you make if any.

## Question 2 (6 marks)

Convert your ER-diagram from Question 1 into a relational data model.

### Question 3 (8 marks)

Consider the following relational schemas:

Department (dID, dName, location)

Employee (eID, eName, dID, gender)

Project (pID, pName, cost, startTime, endTime)

WorkOn (eID, pID)

Host (dID, pID)

Write relational algebra expression to answer the following questions:

- 1) Find the *names* of the employees who work for the *sales* department. (2 marks)
- 2) Find the *names* of the projects which has no employee from the *human resource* department and involves at least one employee from each of the rest of the departments. (2 marks)
- 3) Find the *names* of the projects which only have *male* employees or only have *female* employees. (2 marks)
- 4) Find the *names* of the departments which have hosted some high-cost projects ( $\geq 1$  million), but their employees do not participate in the projects hosted by any other departments. (2 marks)

Note that, only the following operators can be used in your answer: *Select*, *Project*, *Union*, *Intersection*, *Difference*, *Cartesian Product*, *Join*, and *Divide*. Any name may not be unique, different departments, projects or employees can have a same name. For duplicate entity names in two different relations, you may use relation.entity to specify the entity, e.g.,  $R_1 \bowtie_{R_1.eID=R_2.eID} R_2$

## Assignment Submission

- Students must submit an electronic copy of their answers to the above questions to the course website in Moodle.
- Only **.doc** or **.pdf** file is accepted. The file name should be **ass1\_studentID.doc** or **ass1\_studentID.pdf** (e.g., **ass1\_z5100000.doc** or **ass1\_z5100000.pdf**).

Note:

1. For any problems in submissions, please email to [comp9311unsw@gmail.com](mailto:comp9311unsw@gmail.com)
2. All submissions will be checked for plagiarism.
3. We do not accept e-mail submissions.

Warning: Before submission, please keep a copy in your university account or other reliable cloud servers (such as dropbox or google drive). If you are not sure how, please have a look at [taggi](#). Usually, the submission should be successful. In case it fails, we do **not** accept backups from your own computers as the modification time can be edited.

The university regards plagiarism as a form of academic misconduct and has very strict rules regarding plagiarism. For UNSW policies, penalties, and information to help avoid plagiarism, please see: <https://student.unsw.edu.au/plagiarism> as well as the guidelines in the online ELISE tutorials for all new UNSW students:  
<https://subjectguides.library.unsw.edu.au/elise>

## Late Submission Penalty

0 mark.