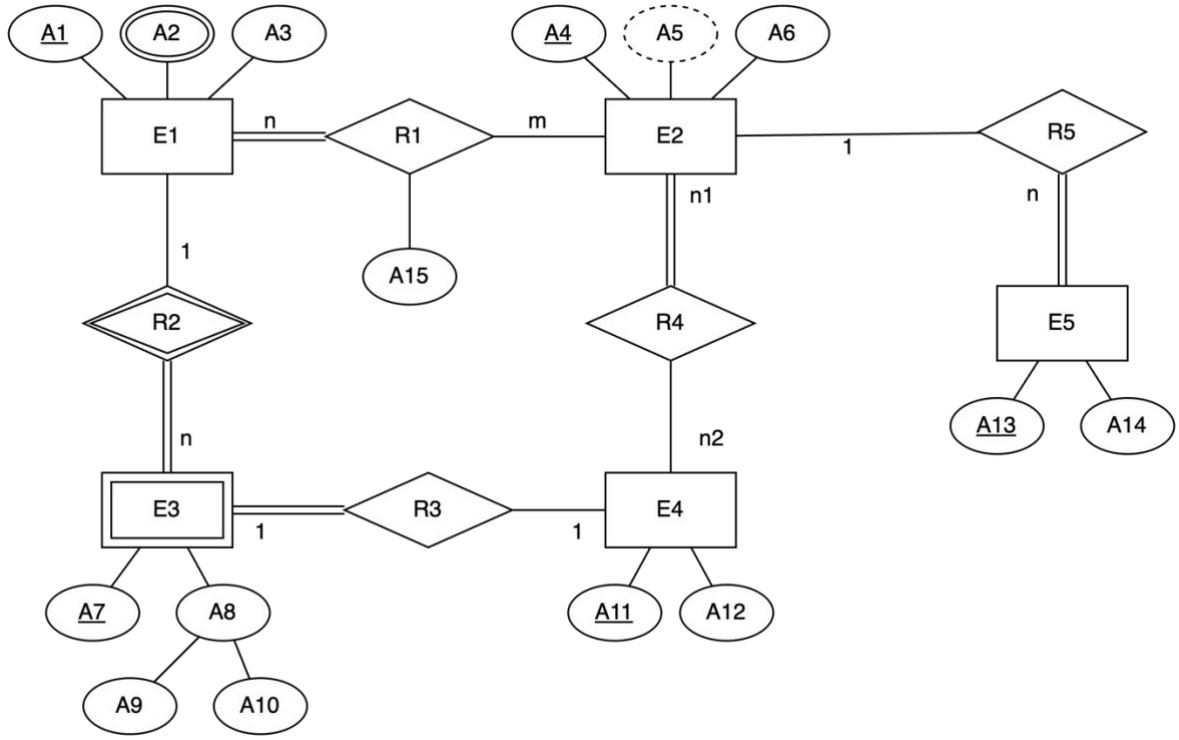
**COMP9311 24T3: Assignment 1**
**Deadline: 5pm Monday 30 September**

**Question 1. Suppose we are designing a database for a hospital. The hospital provides the following information, based on the provided information, please draw an ER diagram using the notations taught in the lecture. (8 marks)**

- Doctors: Each doctor is identified by a staff_id and has a profile with details including name, specialty, and years of experience.
- Departments: The hospital has several departments(e.g., cardiology, oncology, etc.). Each department is identified by a department_id and has information including the department name, description and location. Each doctor works in one department; a department has at least one doctor.
- Patients: Each patient is identified by the Social Security Number(SSN) and has a profile with personal details (name including first name and last name, address, phone number, age, and date of birth). Each patient may have multiple phone numbers.
- Medications: Each medication is identified by a medication_id and has information including the medication name, description and price.
- Prescriptions: Each prescription is identified by a prescription_id and has information including the date of the prescription, the patient who received the prescription, the doctor who prescribed the medication, and the medication prescribed. Each patient may have received zero or more prescriptions, and each doctor may have prescribed zero or more prescriptions. Each prescription can have one or more medications.
- Rooms: Patients may need to stay in the hospital. Each room in the hospital belongs to a department and a department can have one or more rooms. Within each department, rooms can be identified by a room_id and have information including the location and room type. Patients are assigned to rooms. The time period (start time and end time) a patient occupies a room and the number of currently available rooms in each department is also recorded.
- Equipment: Each equipment is identified by an equipment_id and has information including the equipment name, type and description. Each equipment belongs to a department and each department can have zero or multiple equipments.

**Question 2. Convert the ER-diagram below into a relational data model. Use the notations/model taught in the lecture. (6 marks)**



**Question 3. Given the following schema for the car sale database, write the relational algebra expressions for the queries with the operators/notations taught in the lecture. (10 marks)**

- Customer (cusID, cusName, phone)
- Manufacturer (manuID, makName, foundedYear, country)
- Car (carID, manuID, model, year, bodyType, status (available/sold))
- Sale (carID, cusID, salpID, saleYear, salePrice)
- Salesperson (salpID, salpName, rating)
- Service (serID, carID, sYear, sCost)

Queries:

1. (2 marks) Find the names of customers who have purchased cars from more than two different manufacturers and whose total spending on these cars is higher than the average total spending of all customers.
2. (2 marks) Find the names of manufacturers whose cars have never been serviced more than once in any given year and have only been sold by salespersons with a rating higher than 4.5.
3. (3 marks) Find the names of salespersons who have sold cars every year since they started working and have never sold a car with a sale price below the average sale price of all cars sold in that year. (You can assume the current year is 2024, and that the year the salesperson started working is the same as the year they sold their first car.)
4. (3 marks) Find the ID of cars that have been serviced exactly once in their lifetime, and that service occurred at least three years after the car was sold.

**Assignment Submission**

- You are required to submit an electronic version of your answers via **Moodle**. If your submission is handwritten, please ensure they are clear and legible.
- We only accept the **.pdf** format.
- For clarity of your submission, we strongly recommend that you use a drawing program (such as draw.io/PPT) for Questions 1 and 2 and typesetting tools (such as MS Word/Latex) to write relational algebras for question 3.

**Late Submission Penalty**

- 5% of the max mark (24 marks) will be deducted for each additional day.
- Submissions that are more than five days late will not be marked.

**Plagiarism**

The work you submit must be your own work. Submission of work partially or completely derived from any other person or jointly written with any other person is not permitted. The penalties for such an offence may include negative marks, automatic failure of the course and possibly other academic discipline.

All submissions will be checked for plagiarism. The university regards plagiarism as a form of academic misconduct and has very strict rules. Not knowing the rules will not be considered *a valid* excuse when you are caught.

- For UNSW policies, penalties, and information to help avoid plagiarism, please see: https://student.unsw.edu.au/plagiarism.
- For guidelines in the online ELISE tutorials for all new UNSW students: https://subjectguides.library.unsw.edu.au/elise/plagiarism.