E01: Entity Relationship (ER) Model - Exercises

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• We want to create database for a bank in which we store:
  - Customers (id, name, city)
  - Accounts (number, balance)
  - Loans (number, amount)
  - Branches (name, city, assets)

• Each customer can have any number of accounts and loans
• Each account and loan is associated with one branch

• A customer must have either one account or loan in order to be in the database
• The balance in each account should be >$100

The last two constraints cannot be expressed by the ER diagram
• We want to create a simple database for HKUST in which to record information about professors, students and classes as follows
  - For each professor we need to store the HK-id, name and office number
  - For each student we need to store the student-id and name
  - For each class we need to store the id (e.g., CSE 3311) and the name

• Each class is taught by exactly one professor
• Each student must take at least one class
• For each class that a student took we need to store the grade

• Simplifying assumptions:
  - there is only one lecture for each class
  - there is only one semester in the database
Exercise #2 – Solution

- **Questions:**
  - is there any other assumption in the diagram?
  - does a professor have to teach a class?
A bus company wants to keep track of its bus routes and schedules. Design an E-R diagram for the database according to the following description:

- Each bus route has a route number, a departure station and a destination station.
- For each bus route, there is a schedule, which records the departure times of buses.
- For each departure time of each route, a driver and a bus can be assigned (however this is not necessary - information about the driver or the bus may sometimes be missing).
- A driver has an employee Id, a name and a phone number.
- A bus is identified by its license number. The database also records the seating capacity of each bus.

Identify all constraints and keys.
Exercise #3 - Solution

[Diagram of a database schema with entities ROUTE, SCHEDULE, DRIVER, and BUS, and attributes such as number#, departure station, destination station, departure time, id#, name, phone, licence#, capacity, and BUS_IN_USE.]

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