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.
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.