CSIT5300: Advanced Database Systems

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
Exercise #1 – Solution

Participation constraint

Cardinality constraint

account-number balance branch-name branch-city

account account-branch branch

depositor

customer

customer-name customer-city customer-street

borrower

loan

loan-number amount

Exercise #1 – Solution

participation constraint

cardinality constraint

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borrower

loan

loan-number amount
• 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
• **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