CSI T5300: Advanced Database Systems

E02: Relational Data Model - Exercises

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Exercise #1

- Convert the following E-R diagram into tables and identify the primary keys
• Entities
  - Branch (branch-name, branch-city, assets)
  - Customer (customer-id, customer-name, customer-street, customer-city)
  - Loan (loan-number, amount)
  - Employee (employee-id, employee-name, telephone-number, start-date)
  - Account (account-number, balance)
  - Savings-account (account-number, interest-rate)
  - Checking-account (account-number, overdraft-amount)
• Weak Entity
  – Payment (loan-number, payment-number, payment-date, payment-amount)

• Multi-valued attribute
  – Dependent (employee-id, dependent-name)
• Many-to-many relationships
  – *Borrower* (customer-id, loan-number)
  – *Depositor* (customer-id, account-number, access-date)

• One-to-many relationships
  – *Loan-branch* is represented in *Loan* (loan-number, amount, branch-name)
  – *Cust-banker* is represented in *Customer* (customer-id, customer-name, customer-street, customer-city, employee-id, type)
  – *Works-for* is represented in *Employee* (employee-id, employee-name, telephone-number, start-date, manager-id)
• Convert the following E-R diagram into tables and identify the primary keys
• Entities
  - Route (number, departure, destination)
  - Driver (id, name, phone)
  - Bus (license, capacity)

• Weak Entity
  - Schedule (number, departure-time)

• Relationships
  - Drives (number, departure-time, id)
  - Bus-in-use (license, number, departure-time)
• We want to design a relational database schema to represent
information about an internal training program of a large company.
• Design an E-R diagram based on the description given below:
  – The database keeps information about every employee in the company
    Each employee has a name and a unique employee number
  – Each course of the training program has a unique course number and a
    name
  – The courses are taught and taken by employees of the company
  – A course can be offered many times. Each offering has an offering number,
    which is unique within each course, a day and time
  – An offering is taught by exactly one employee
  – The database stores the grades of employees who took courses
• Convert the E-R diagram to tables and identify the primary keys
Exercise #3 – Solution

Employee (EmpNo, Name)
Course (CourseNo, Name)
Offering (CourseNo, OfferingNo, Day, Time, EmpNo)
Enrolled (CourseNo, OfferingNo, EmpNo, Grade)
Consider the following relational schema:

\[ B(X,W) \]
\[ C(P,Q,X) \]
\[ D(P,X,R) \]

where \( X \) is defined as NOT NULL,

Give an ER diagram for the above relational schema.