2a. Relational Model Exercises
E-R Diagram for a Banking Enterprise
Tables for ER diagram

- 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)
Tables for ER diagram

• Weak Entity
  – Payment (loan-number, payment-number, payment-date, payment-amount)

• Multi-valued attribute
  – Dependent (employee-id, dependent-name)
Tables for ER diagram

- **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)
ER to Tables

Convert the ER diagram into tables.
Tables for ER diagram

- 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 ER 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.
Employee (EmpNo, Name)
Course (CourseNo, Name)
Offering (CourseNo, OfferingNo, Day, Time, EmpNo)
Enrolled (CourseNo, OfferingNo, EmpNo, Grade)
Example

Let the following relational schema: 
B(X,W),
C(P,Q,X) where X is defined as NOT NULL,
D(P,X,R)

Give an ER diagram for the above relational schema.
Solution