Lab1

Nguyễn Phan Hoài Nam

MSSV: 2031200016

Link Github: https://github.com/kaito7love/CSE301.git

Problem1:

A hospital has a lot of doctors. Doctor's information includes doctor code (identifier), doctor's name, date of employment, and specialty. The patients are admitted to the hospital through doctors. Patient information includes patient identification (identifier) and patient name. A patient admitted to the hospital by only one doctor. One doctor can take on many patients. Once admitted to the hospital, a patient will be treated by at least one doctor. A doctor may treat no one patient or treat multiple patients. Hospitals need to save details about each time a doctor treats a patient. Treatment details include: date of treatment, duration of treatment and results.

1. Finding Entities, Key Attributes, and Related Attributes

Entities:

1. **Doctor**
   - o   Key Attribute: Doctor Code (identifier)
   - o   Related Attributes: Doctor Name, Date of Employment, Specialty
2. **Patient**
   - o   Key Attribute: Patient Identification (identifier)
   - o   Related Attributes: Patient Name
3. **Treatment**
   - o   Composite Key Attributes: Doctor Code, Patient Identification, Date of Treatment
   - o   Related Attributes: Duration of Treatment, Results

2. Finding Relationships

1. **Admitted By**
   - o   Relationship between Doctor and Patient
   - o   One doctor can admit many patients. (1-M)
   - o   One patient is admitted by only one doctor. (1-1)
2. **Treats**
   - o   Relationship between Doctor and Patient
   - o   One doctor can treat many patients. (1-M)
   - o   One patient can be treated by many doctors. . (1-M)
   - o   This relationship includes details of the treatment.

3. Finding Weak Entities and Weak Relationships

The **Treatment** entity can be considered a weak entity if we think of it as dependent on the relationship between Doctor and Patient.

4. Draw an ER Model
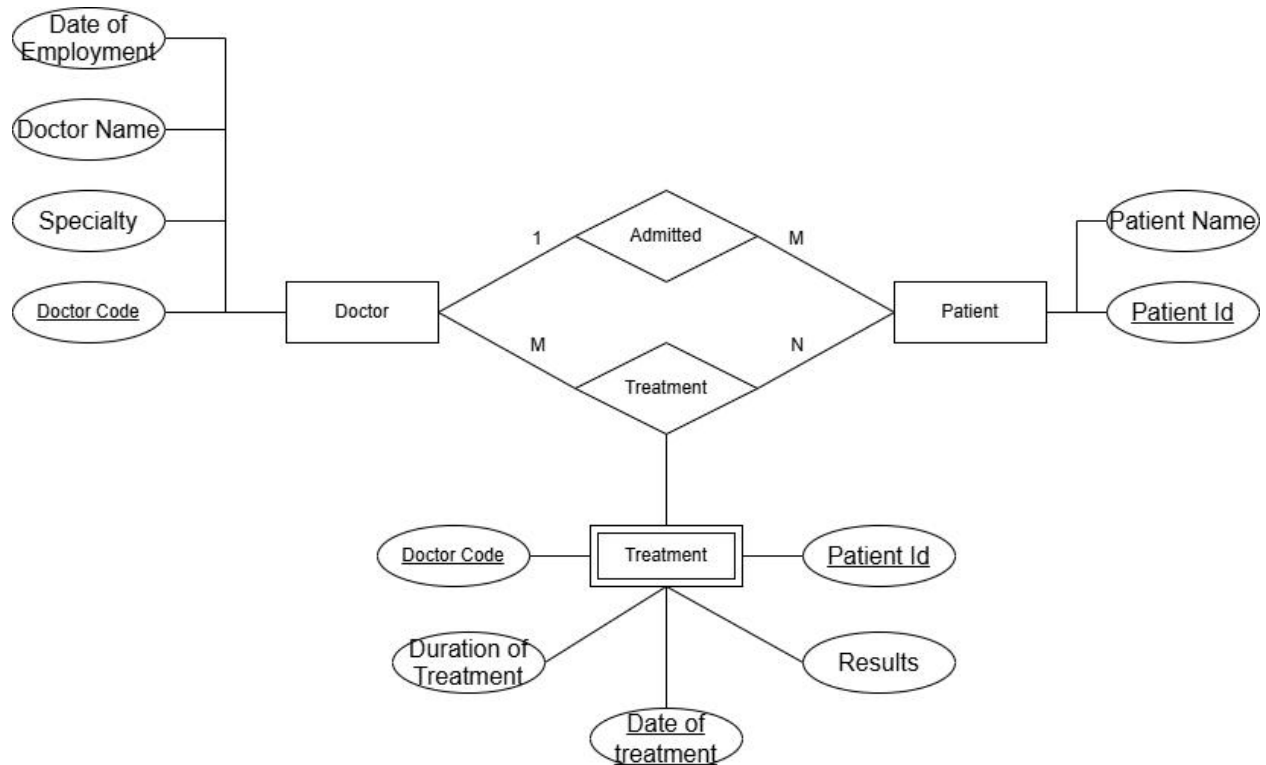
Problem2:

A university needs to computerize its management. The school has many faculties. Each faculty has information Faculty Code, Faculty Name. Each department has many classes. Class information: Class code, Class name, Wholesale number. A student upon admission is placed in a class. Student information includes: Student ID, Full name, Date of birth, gender, address. Students study a variety of subjects. At the end of each subject, students have one exam score. At the end of the course, students have a graduation point. Each subject has information: Subject code, Subject name, number of credits. Each student has a library card, and one library card belongs to only one student. Library card information: Card number, Issue date, Expiration date.

1. Finding Entities, Key Attributes, and Related Attributes

Entities:

1. **Faculty**
   - o Key Attribute: Faculty Code
   - o Related Attributes: Faculty Name
2. **Department**
   - o Key Attribute: Department Code
   - o Related Attributes: Department Name
3. **Class**
   - o Key Attribute: Class Code
   - o Related Attributes: Class Name, Wholesale Number
4. **Student**
   - o Key Attribute: Student ID
   - o Related Attributes: Full Name, Date of Birth, Gender, Address, Graduation Point
5. **Subject**
   - o Key Attribute: Subject Code
   - o Related Attributes: Subject Name, Number of Credits
6. **Exam**
   - o Composite Key Attributes: Student ID, Subject Code
   - o Related Attributes: Exam Score
7. **Library Card**
   - o Key Attribute: Card Number
   - o Related Attributes: Issue Date, Expiration Date, Student ID (Foreign Key)

# 2. Finding Relationships

1. **Belongs To (Faculty - Department)**
   - o One faculty can have many departments.
   - o One department belongs to one faculty.
2. **Belongs To (Department - Class)**
   - o One department can have many classes.
   - o One class belongs to one department.
3. **Admitted To (Class - Student)**

    o One class can have many students.
    o One student is admitted to one class.
  4. **Studies (Student - Subject)**
    o One student can study many subjects.
    o One subject can be studied by many students.
  5. **Scores (Exam)**
    o One student can have many exam scores.
    o One subject can have many exam scores.
    o Exam is a relationship entity between Student and Subject.
  6. **Has (Student - Library Card)**
    o One student has one library card.
    o One library card belongs to one student.

3. Finding Weak Entities and Weak Relationships

Exam is weak entities in this case.

4. Draw an ER Model
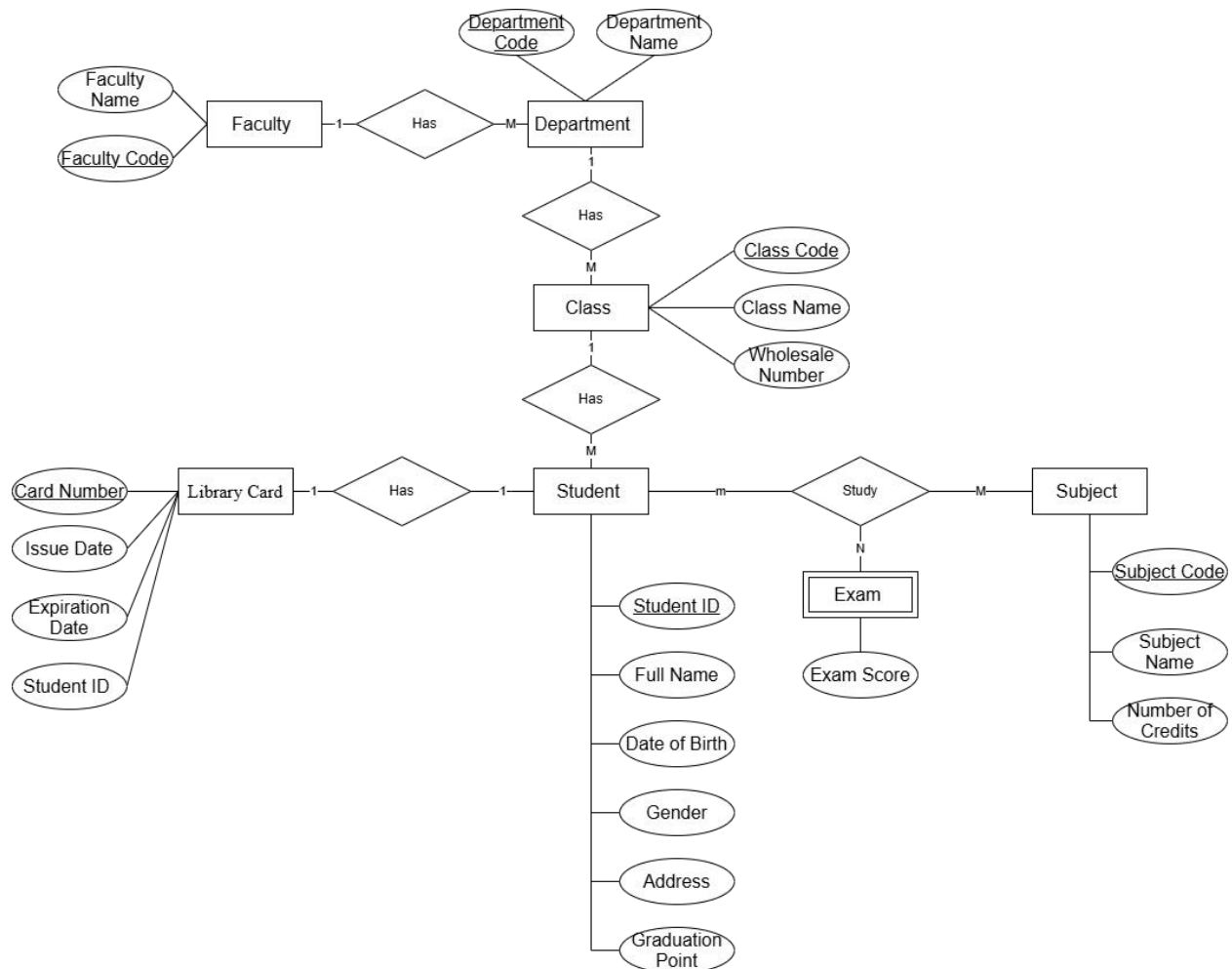
Problem3:

The hotel has many rooms, each room has room code (R101, R102, ...), room name (sunflower room, jade room, ...) Each room is located on 1 floor, floor information has floor code (F01, F02, ...), floor name (1st floor, 2nd floor, ...) Each room has a price corresponding to whether guests stay by week or by day. Each guest when arriving at the accommodation will have an identity card number, full name and corresponding phone number. There is also service information attached for each room: service code, service name and corresponding amount for each service when used 1 time. For example, service code: S01, service name is "Laundry", the amount is 50000. Room payment invoice information for customers will have information: Invoice code, identity card code, full name of the customer, number of days of stay (arrival and departure dates), in which room, total amount to pay for the room. If guests stay for 1 week and 2 days, the week will be calculated according to the weekly unit price plus 2 odd days will be calculated according to the daily unit price. The invoice also stores information: service name and total service amount. The total amount of the guest to be paid (the sum of the total room amount and service fee)

1. Finding Entities, Key Attributes, and Related Attributes

Entities:

1. **Room**
   - Key Attribute: Room Code
   - Related Attributes: Room Name, Price (Daily), Price (Weekly)
2. **Floor**
   - Key Attribute: Floor Code
   - Related Attributes: Floor Name
3. **Guest**
   - Key Attribute: Identity Card Number
   - Related Attributes: Full Name, Phone Number
4. **Service**
   - Key Attribute: Service Code
   - Related Attributes: Service Name, Amount
5. **Invoice**
   - Key Attribute: Invoice Code
   - Related Attributes: Identity Card Number (FK), Full Name, Number of Days of Stay, Arrival Date, Departure Date, Room Code (FK), Total Room Amount, Total Service Amount, Total Amount to Pay
6. **Service Usage**
   - Composite Key Attributes: Invoice Code (FK), Service Code (FK)
   - Related Attributes: Service Amount

2. Finding Relationships

1. **Located On** (Room - Floor)
   - o   One floor can have many rooms.
   - o   One room is located on one floor.
2. **Uses** (Room - Service)
   - o   One room can have many services used.
   - o   One service can be used by many rooms.
3. **Issued To** (Invoice - Guest)
   - o   One invoice is issued to one guest.
   - o   One guest can have many invoices.
4. **Includes** (Invoice - Room)
   - o   One invoice includes one room.
   - o   One room can be included in many invoices.
5. **Contains** (Invoice - Service)
   - o   One invoice can contain many services.
   - o   One service can be contained in many invoices.

3. Finding Weak Entities and Weak Relationships

There are no weak entities in this case because each entity has a primary key that can uniquely identify its instances. However, the **Service Usage** entity can be considered a dependent entity if we think of it as dependent on the relationship between Invoice and Service.

4. Draw an ER Model