Florida International University
COP 4710 – Database Management
Final Project
Value: 100 points (25% weight of the grading of the course)
Due Date: July 19, 2020
Instructor: Lenis Hernandez

In this project, **you are required** to design and implement a database for a real miniworld environment based on the given database requirements. The deliverable for this assignment must include:

1. The ER diagram, relational schemas and the corresponding relation instance for the database.
2. The SQL scripts for the database creation and data population.
3. Your deliverable for this assignment should include the SQL scripts for each query question and corresponding answer (you can include the query results as plain text files in a readable format).

This is an individual project.

You are given a set of requirements for a hospital system database. Based on the set of requirements for the hospital system database, you are asked to do the following:

1. **Design** the conceptual schema for the hospital system database by using an ER diagram in UML format. Your conceptual design of the database should include the followings but not limit to:
a. Entities
b. Relationships
c. Keys
d. Structural constraints (Cardinality ratio and participation constraints) (20 points)

2. **Transform the ER schema** of database you get from step 1 into the corresponding relational database schema. Example Fig. 5.8 page 172 of the textbook. (10 points)
a. Specify all the key attributes of relations and any referential integrity constraints.
b. Specify the data item format for each attribute in each relation schema.
c. Specify all the functional dependencies you could infer from the requirements.

3. **Normalize** relation schema in the database design that you get from step 4 into either 3NF or BCNF if it is necessary. (10 points)

4. **Implement the relational database** you get in step 5, via PostgreSQL, this includes creating the database, creating the corresponding relation schemas, data preparation and loading data into the database. (30 points)

5. **Implement the given queries** using PostgreSQL. Provide the SQL script for each query (30 points)

The requirements for a hospital system database:

In a hospital we represent data about patients, patient treatments, medicine, doctors, nurses and other employees. These are the requirements:

1. The database keeps track of each patient's name, last name, SSN, Date of birth, age, address (house/apt number, street, city, state, zip code), phone, sex (gender), date admitted, date discharged. Each patient has a unique identifier.
2. Each patient is assigned to a room.
3. The database will keep track if a patient was admitted through the Emergency Room (ER) for history record purposes.
4. Each room is described by room number, and room type (single bed, two bed) and period.
5. The patient is billed a treatment and the treatment is formed by the list of medicines used in the treatment including the quantity of each medicine.
6. Each medicine is described by code, description and price.
7. The database keeps track of three types of employees: doctors, nurses and receptionists. Each employee can only belong to one of these types. Each employee has a name, last name, SSN, sex (gender), address (house/apt number, street, city, state, zip code), phone number, salary, birth date and employee number.
8. Every doctor has a specialty that can be internist, cardiologist, pulmonologist, nephrologist, ENT, neurologist, neurologist or endocrinologist.
9. A doctor attends a patient.
10. A nurse governs a room.
11. The receptionist maintains a record of the patient and this record contains the record number, the patient id, the appointment date and observations about the patient.

Hint:

1. For any unspecified requirements, add the appropriate assumptions to make the specification complete.
2. You may want to identify multi-value attributes, composite attribute, and multi-valued composite attributes.

Queries (2 points each one):

1. List the last name, name, employee number, type of employee of all employees ordered by last name.
2. List the last name, name, employee number, type of employee of all employees ordered by last name grouped by employee type.
3. List the name, last name, employee number, Specialty of doctors. Group by specialty and order by last name.
4. List the count of doctors per specialty order the list by specialty name.
5. List the name, last name, employee number of all the nurses.
6. List the employees name, last name, employee type, salary with salaries greater than 85K.
7. List the name, last name, sex, patient id and room number of all the patients not discharged yet and who are older than 65 years old.
8. List the patient name, last name, patient id of patients discharged in one specific month (specified the month based on the data you used to populate the database).
9. List the name and last name and room number of patients admitted through the ER and already discharged

10. List the name and last name, assigned room, room type and assigned nurse name and last name of patients not discharged yet.
11. List the nurse name, nurse last name and average patient they took care per month.
12. List the doctor name and last name and average patient attended per month for all the doctors.
13. List the specialty and number of doctors for the specialty that has more than 3 doctors that make more than 100K a year.
14. List the room number of any empty room.
15. List the average cost of a treatment.