**CS3431-A22 Wong**

**Assignment 4: Entity-Relationship Diagram**

Submission:

1. Create Entity Relationship Diagrams using draw.io
2. Place resulting images in a single Word or PDF file
3. Uploaded your Word or PDF file using the Assignment 4 link. No hand-drawn diagrams will be accepted.

**General Instructions**

* The homework is to be done in teams of 2!
* After determining who your partner is, go to Canvas and do the following:
  1. Click on “People” on the course’s left menu bar
  2. Click on the “Groups” tab
  3. Add yourself to an empty Team Project number if you are the first one on your team to sign up. If you are the second or third person to sign up, join the Team Project number given to you by your teammate. Team members who do not contribute will receive a zero fo rthe assignment.
* In your ERD design, clearly indicate the keys and the cardinalities of the relationships. Include discriminators, if they exist. Do not use multi-way relationships. Replace them with a new entity that has multiple binary relationships instead.
* Any assumptions you make, which are not stated in the problem definition, need to written explicitly. The assumptions you add must be “in addition” to the specified requirements in the problem definition without deleting any of these requirements.

**(50 points) Problem 1a – Healthcare Database**

In the United States, organ transplants involve doctors who are responsible for organs ready for transplanting (Organ Procurement Organization Doctors – OPO Doctors), doctors who treat patients (Primary Care Physicians - PCPs), and surgeons who perform the transplantation of the organ into a patient.

The database includes the following:

* Each patient has a unique health care ID, a full name (consisting of a first name, middle initial and last name), city, state, blood type, and birthDate properties.
* Doctors have a physician number (unique ID), a full name (consisting of a first name, middle initial and last name), and the name of their associated hospital.
* PCPs have a specialty. PCPs can treat many patients but a patient has at most one PCP.
* OPO doctors have the name of an associated organ bank and the type of organ they work with. For example, livers or kidneys. OPO doctors may care for many organs available for transplants, but each organ must have a single OPO doctor assigned to it.
* Surgeons are a third type of doctor and can be board-certified or not.
* For the purposes of this database application, doctors must be only one of the following types of doctor – PCP, surgeon, or OPO. There are no other types of doctors in our system.
* Organs have a unique ID, a blood type, and the date it was removed from a person.
* A transplant operation consists of a single Patient, and a single Organ and one or more Surgeons. Transplant operations include the date it was performed, the cost, whether it was successful, and a unique invoice number.
* A patient may have many operations, and a surgeon can perform many operations. However, an organ will be transplanted at most once.

Design a conceptual ERD that captures the above requirements. Follow the notations given in the course slides, and also follow the given guidelines for Good Design. State any assumptions that you make in addition to the above requirements.

**(10 points) Problem 1b – Healthcare Database**

Create the ERD for the same information in Problem 1a, except patients are uniquely identified by the combination of their health care ID and their PCP.

**(40 points) Problem 2 – Company Department**

* The database system is created for a single company with multiple departments.
* Each employee has a unique employee ID, a name, and at least one phone number.
* Each department has a unique name and the floor it is on in a building.
* Each building has a unique name and an address (consisting of the street, city, state and zipcode).
* An employee must work for exactly one department. Departments can have many employees and even be empty if it is a newly created department.
* There are employees who mentor other employees.
* A department is led by at most one employee. An employee may be the leader of many departments although many employees do not lead any departments.
* The employees have not been given the formal positions of mentor and leader. Therefore, do not use inheritance.
* Vendors have a unique ID, a company name, and are assigned to the one department that deals with them. Vendors cannot be unassigned because some department has to take responsibility for them. Departments can have many vendors.