**CS3431-22: Project Description**

**Building a Database Application**

**Phase 1: Initial Design and Implementation**

**Due: Saturday, 9/24 at 11:59pm. No late submissions because I need to release solutions so students can start Project Part 2.**

**Teams:** The project is done in teams of three.

**Submission:** Make sure to include all of your names on the project submission. The ERD and relational schemas are to be entered in either a Word or PDF file. Write your SQL code in a p1.sql file. Zip both files, name it Project1.zip and upload a single submission to the Project 1 link. Make sure to coordinate who is uploading the file and have other team members confirm it has been uploaded BEFORE the deadline.

**Description:**

In this phase you will be designing the ERD, the relational schema, and writing the SQL using either Oracle SQL Developer or JetBrains DataGrip to create a prototype backend database for a real-life hospital application that will be implemented in Spring 2022 by the CS3733 Software Engineering classes.

Brigham and Women’s Hospital, now part of Mass General Brigham, is interested in the creation of an application to track medical equipment and service requests. In the creation of the tables use named constraints for primary keys and foreign keys. The naming scheme (important for grading purposes) for the primary key constraints is

Tablename\_attributename(s)\_PK

The naming scheme for the foreign key constraints is

Tablename\_attributename(s)\_FK

If fields are unspecified variable length characters, use varchar2(40) as the SQL data type. For unspecified ID fields or number fields, use number(5).

Do not use the ALTER TABLE statement to create the primary and foreign key constraints.

The database includes the following:

1. Locations which include the following information: a unique locationID (9 characters), xcoord, ycoord, floor (L2, L1, 1, 2, 3, 4, or 5), building name, longName, shortName. The x- and y-coordinates refer to the pixel locations on the map images.
2. Location types which consists the unique locationTypeID (4 characters) and location type description. Each location is associated with one location type but there may be many locations that are the same location type.
3. Employees who have a unique employeeID, a username (also unique), password, and whose full name consists of a first name and last name. Employees can be staff, administrators and/or doctors in our system. There can be other employee types besides those specified above in our system.
   1. Staff employees have a salary grade level from 10 to 45
   2. Administrators have a security clearance level – A1, B1, B2, C1, C2, or C3
   3. Doctors have a unique NPI (a US National Provider Identifier Standard) that is 10 digits long.
4. Medical equipment have a unique itemID (up to 10 characters), the equipment type – whether it is a bed, recliner, wheelchair, x-ray machine, or infusion pumps (up to 15 characters), and the status of cleanliness (clean, dirty, or in use).
5. Patients have a unique patientID, a fullname consisting of a first name and last name, a primary phone number (10 digits), a city, and a state (2 character abbreviation).
6. The current locations of employees, patients, and medical equipment are tracked in our system. A single location may house multiple employees, patients, and medical equipment.
7. All service requests have a unique requestID, a status (whether it is unassigned, assigned, being processed, done, or canceled), the employee making the request, possibly an employee assigned to handle and fulfill the request, and the target destination for the request. There are exactly three types of service requests – medical equipment request, patient labs, and internal patient transportation. Requests cannot be more than one type. Employees can make many requests and handle many requests.
   1. Medical equipment requests may service many medical equipment items. A single medical equipment item may be in many medical equipment service requests.
   2. Patient lab requests also include the type of lab request (blood, urine, stool, XRay, and MRI), and who the patient is to be tested. Patients may have many tests.
   3. Internal patient transport requests (transport within the hospital) are made to transport a patient. The mode of transportation is a single medical equipment item such as a wheel chair or recliner. Patients may be transported many times and a medical equipment item may be used in many such transportations.

**Requirements:**

1. 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.
2. Create the relational schema for the above application. You need to follow the rules that convert the conceptual ERD to a relational schema. To implement inheritance for the service request systems, use ISA solution A2 – a relation for each entity set with a serviceType (role) field. To implement inheritance for the employees, use ISA solution B1 – a single relation. Use PK, FK, and UQ for primary, foreign, and candidate keys. If an attribute is more than one type of key indicate all of the types sequentially, for example, customerID PK UQ or bookISBN PK FK. You do not have to include references for the relational schema.
3. Create the following SQL code in a file named p1.sql:
   1. create tables along with their constraints using Oracle SQL Developer or JetBrains DataGrip. Make sure to read the requirements carefully (even word-by-word!). For those of you who know how, you may want to use Git to keep track of your code on your team. Otherwise, your team can use a shared text document on Google for your code.
   2. The data to be loaded into the Location, LocationType, and MedicalEquipment tables are provided for you in Brigham and Womens.xlsx Excel spreadsheet.
4. Also create the following data to enter into the remaining tables
   * 1. At least ten employees, of which 1 is an administrator, 2 are doctors, 6 are staff, and 1 employee who is not an administrator, doctor, or staff.
     2. At least ten patients
     3. Five medical equipment requests (some delivery, some cleaning). One request should include more than one item. Also have one item appear in more than one medical equipment request.
     4. Five patient lab requests of different types of lab tests
     5. Five patient internal transport requests
     6. At least a couple of the service requests will NOT have someone assigned to handle the request yet.