DATABASE SYSTEMS SS2021
ASSIGNMENT 1

NOTES

- *Students should read everything presented below carefully.*
- *Your team will be randomly assigned with one topic in the "business description" section.*
- *This assignment 1 is worth 15% of the overall grade.*
- *This assignment is on relational data modelling.*
- *Appropriate softwares can be used to support your design.*
- *Plagiarism must be avoided. Otherwise, zero mark is given.*

I. BUSINESS DESCRIPTION

1.1 HOSPITAL DATABASE

A hospital X needs to build a management information system to manage the information of their patients, doctors, and nurses.

The database of hospital X needs to store the information of employees (doctors and nurses) including: a unique code, full name consisting of first name and last name, date of birth, gender, address, start date (first day of work), phone number(s), and speciality with its related name degree's year. The hospital has many departments. Each department has a unique code, a title, and a dean who is a doctor. The employees have to belong to a specific department. A department has at least one or many employees. The dean must hold a specific speciality and has had more than 5 years of experience since the date he or she was awarded the speciality degree.

The patients have to provide with the hospital their information such as: full name (first name and last name), date of birth, gender, address, and phone number. After receiving their information, the system will store them into the database, and generate a unique code to identify each patient simultaneously. Patients are divided into two types: outpatients and inpatients. The hospital also wishes to use the first two characters to determine the patient type by the unique code. If one is an outpatient, the unique code for him or her starts with "OP," which is then followed by 5 digits such as "OP00001." If one is an inpatient, the unique code for him or her starts with "IP," which is then followed by 5 digits such as "IP00001."

- For outpatients, the information of the examining doctor needs to be stored. The outpatients can have many examinations with their examining doctor. The hospital needs to store the details of each examination such as: examination date, diagnosis, second examination date, medications, and fee.
- For inpatients, some information is added such as: date of admission, treating doctors, caring nurse, diagnosis, sickroom, date of discharge, and fee. After admitting to the hospital, a patient can receive treatment from at least one doctor. A doctor can treat many patients at the same time, or sometimes, he has no patients to treat. The hospital needs the details of each treatment such as: treatment period (start date and end date), result, and medications. Each inpatient is taken care of by a nurse; a nurse can take care of many inpatients at the same time.

The information of a medication is also stored in the database. This information consists of a unique code, name of the medication, effects, price, and expiration date. In case one medication is out-of-date, it will be automatically marked so in the database.

1.2 FABRIC AGENCY DATABASE

The agency supplies the wholesale fabric by bolts for their customers. Each bolt belongs to a specific category such as: silk, khaki, crewel, jacquard, faux silk, and damask … A bolt has a code that is unique within a category, and a length. Each category of fabric has a unique code, name, color, current price(s) (including the price, and the date when that price was made), and quantity (the number of bolts of this category in the warehouse).

The company takes fabric sources from many suppliers. Each supplier provides many different category of fabric for the company. However, each category is stemmed from only one supplier. The database needs to store some information about suppliers such as: a unique code, name, address, bank account, tax code, phone number(s). Whenever fabric sources are imported into the warehouse, the quantity of each category, the date, the purchase price must be stored in the database.

A customer has a unique code, name (first and last), address, phone number(s), arrearage (unpaid debt), and partial payments (including the date and amount of

money). For example, a customer has 1000$ in arrears, he or she can pay partially (he pays 200$ at the first time, and then 300$ for the next, and so on till he gets out of debt). A customer makes order. Each order contains one or more bolts, and processed by an employee at a specific date and time. An order has a unique code, and a total price. Information about employee consists of a unique code, name (first and last), gender, address, and phone.

Note: **'Bolt'** is a unit of measurement used as an industry standard for a variety of materials from wood to canvas, typically materials stored in a roll.

1.3 BANK DATABASE

ABC Bank has many branches. Each branch has a unique name, an address (including No., Street, District, City, and Region), phone numbers, fax numbers, email, and total number of employees working there. Each branch has many employees and an employee must work at a branch. There is always one employee assigned to manage that branch. The employee can only manage the office to which he or she is assigned. For each employee, we need to store a unique code, first name, last name, date of birth, phone numbers, email, and home address (including No., Street, District, and City).

The bank issues three different types of bank accounts for their customers. For Savings Accounts, the bank must keep track of the account's balance, interest rate, and the date the account was opened. Checking Accounts pay no interest, so the bank keeps track of just the balance and date opened. The third type of account, Loans, requires tracking the date the loan was taken, the balance due, and the interest rate of the loan. Each customer may have any number of bank accounts, and all accounts have a unique account number. The bank save the following information of each customer: a unique code, first name, last name, home address, office address, phone numbers, email. Each customer is attended by an employee and an employee can serve many customers.

II. REQUIREMENTS

1. Design a fully labelled (E)ERD according to your business description. The diagram has to show appropriate entities (with key attributes underlined), relationships, cardinality ratios, and optional & mandatory membership classes.
2. Mapping your (E)ER diagram above to a relational database schema.

3. Identify all constraints not shown in your (E)ER diagram.

III. SUBMISSION DEADLINE

11pm, November 8th, 2020

IV. HOW TO SUBMIT

The group leader submits your team work to BKeL with only one single zip file. The zip file may contain resources as follows:

- Team member list
- A single word file containing your (E)ER diagram, relational database schema, and constraints
- Other supporting files (if any)

V. EVALUATION

Assignment 1 (10%)
Mark: 8-10 ❑ Correctly identify all entities and their relationships ❑ Identify all appropriate attributes including primary keys of each entity ❑ Correctly state the membership class of each entity ❑ (E)ER diagram is correctly drawn with appropriate labels ❑ Mapping (E)ER diagram to a relational database schema correctly ❑ All constraints are correctly identified
Mark: 6-7.5 ❑ Correctly identify all entities and their relationships ❑ Identify all appropriate attributes including primary keys of each entity ❑ Correctly state the membership class of each entity ❑ (E)ER diagram is clearly drawn (may contain small mistakes) ❑ Mapping (E)ER diagram to a relational database schema may have a few mistakes ❑ All constraints are identified but slightly incorrect
Mark: 5-5.5 ❑ Correctly identify most of the entities and their relationships ❑ Identify most of the appropriate attributes including primary keys of each entity ❑ State most of the membership class correctly ❑ (E)ER diagram is drawn (may contain mistakes) ❑ Mapping (E)ER diagram to a relational database schema may have several mistakes ❑ All constraints are identified but incorrect
Mark: 4-4.5 ❑ Correctly identify most of the entities and their relationships ❑ Identify most of the appropriate attributes including primary keys of each entity ❑ State most of the membership class correctly ❑ (E)ER diagram contains mistakes

❑ Mapping (E)ER diagram to a relational database schema may have significant mistakes ❑ All constraints are slightly neglected
Mark: 0-3.5 ❑ Entities and their relationships are not identified correctly ❑ Attributes or primary keys of each entity are not identified ❑ Membership class are not correctly stated ❑ (E)ER diagram is not completed ❑ Mapping (E)ER diagram to a relational database schema is not done ❑ All constraints are totally neglected

---------- GOOD LUCK! ----------