Concordia University
Dept. of Computer Science & Software Engineering

Comp 353- Databases
Winter 2023

Warm-up Project

Title: A Simple database for the health facilities
Due: February 22, 2023 at 23:55
Maximum Mark: 6%

In this project, you and your group are required to develop a miniature database application system, described below, and evaluate a number of queries and transactions against the database. For this, you should use the faculty MySQL DBMS through the ID assigned to your group, which is a string of the form "xyc353_4 for some letters x and y. The Lab Instructors during the lab sessions will help you resolve possible problems you may have, for instance, connecting or interacting with the DB server.

Project Description

The application is to develop a database system to help health care facilities to keep track of their employees' health status during the COVID-19 pandemic. The system should maintain all the information about the employees of the facilities that are related to the pandemic. Information includes infection(s) of every employee, date of infection and nature of infection. Also, information about the vaccination of every employee including for every vaccination, the vaccination date, the type of vaccination, and the dose number of the vaccination. The information maintained by the system is used to help the facilities to keep track of their employees' health status to reduce the risk of contamination between the employees of the facilities. The system is called Health Facility Employee Status Tracking System HFESTS.

A facility could be a hospital, a CLSC, a clinic, a pharmacy, or a special installment. Each facility could include name, address, city, province, postal-code, phone number, web address, type (Hospital, CLSC, clinic, pharmacy, or special installment), capacity (Maximum number of employees that the facility needs to operate). At any moment in time, a facility can have one general manager and many other employees working for the facility.

The application must maintain information about every employee working in each facility. The information includes first-name, last-name, date of birth, Medicare card number, telephone-number, address, city, province, postal-code, citizenship, and email address.
Every employee must be registered with the public health care system which means that the Medicare card number cannot have null value. No two employees can have the same Medicare card number. The role of every employee must be maintained by the system. The role could be either a nurse, a doctor, a cashier, a pharmacist, a receptionist, an administrative personnel, a security personnel, or a regular employee (include all other tasks). A general manager is considered to be an administrative personnel.

An employee can work at only one facility at the same time. An employee can work at different facilities at different times. For every employee, the start date and end date working at each facility must be maintained. If the end date is null, it indicates that the employee is still working at the facility. An employee can work at the same facility at different interval of times. For example, Roger Smith who is a doctor could have worked at CLSC cote des neiges from Jan 15th, 2022, to June 30th 2022, then worked at Hospital Maisonneuve Rosemont from July 5th 2022 to Dec 15th 2022 and then worked at CLSC cote des neiges from Dec 20th 2022 till now. The application must maintain information whether the employee has been vaccinated or not. For each vaccination the employee had, the system must maintain information about the type of Vaccination is given and the dose number as well with the date and the facility location of each dose given. The type of vaccinations could be Pfizer, Moderna, AstraZeneca, Johnson & Johnson, etc. Also, the dose number could be 1, 2, or more. For example: Alfred McDonald could have taken the first vaccination dose Pfizer on the 20th of January 2021 at CLSC Montréal South, and the second vaccination dose Moderna on the 25th of April 2022 at Olympic Stadium Montréal.

Also, the application must maintain information whether the employee has been infected or not. The employee could be infected more than once. Every time the employee is infected, the application needs to store the date of the infection, and the type of infection. The infection type could be COVID-19, SARS-Cov-2 Variant, or could be other type of infection.

These are the minimum requirements for the application. More details could be added through more research and investigations from your part.

1. Express the Health Facility Employee Status Tracking System HFESTS in the E/R model. Use arrows to indicate the constraints on the relationships. Underline the key attributes for the entity and relationship sets.

2. Convert the E/R diagram into at least four relations: Facilities, Employees, Vaccines, and Infections. Other relations might be needed to capture all the requirements.

3. Write SQL scripts to create the Health Facility Employee Status Tracking System database and populate the tables with appropriate data. Also write SQL scripts of the queries and transactions given below. Include at least ten representative tuples in each table so that the result of each query includes at least two tuples. Note that the Graphical User-Interface (GUI) is not required in this project but encouraged.

    i. For every facility in the system, get the province name where the facility is located, the facility name, the maximum number of employees that the facility needs to operate, and the total number of employees currently working for the facility.

    ii. For every province, give the total number of facilities for each type of facility. Results should include province name, facility type, and total number of facilities for that type. Results should be displayed in ascending order by province name, then by total number of each type of facility.

iii. For the facility "Hospital Maisonneuve Rosemont", give the details of all the nurses and doctors who are currently working and got infected at least once with COVID-19. Details include employee's first-name, last-name, role (nurse or doctor), Medicare card number, telephone-number, email address, and date of infection. Results should be displayed sorted in descending order by date of infection, then ascending order by first name, then ascending order by last name.

iv. For the facility "Hospital Maisonneuve Rosemont", give the details of all the employees who are currently working and have never been vaccinated and have never been infected by COVID-19. Details include employee's first-name, last-name, role (nurse, doctor, etc.), Medicare card number, telephone-number, and email address. Results should be displayed sorted in ascending order by role, then by first name, then by last name.

v. Give details of employees who worked in at least two different facilities. Details include employee's first-name, last-name, start date, end date, facility name, role (nurse, doctor, etc.), Medicare card number, telephone-number, and email address. Results should be displayed sorted in ascending order by first name, then by last name, then by start date.

vi. For every vaccine type, give the total number of doses taken by employees in the system. Results should be displayed sorted in descending order by total number of doses.

vii. For every infection type in the system, give the total number of employees infected by that type in each province. Results should be displayed sorted in ascending order by infection type, then in descending order by total number of infections.

viii. For every employee in the system who is currently working and got infected at least 3 times, give the employee's first-name, last-name, start date, facility name, role (nurse, doctor, etc.), Medicare card number, telephone-number, email address, and the total number of infections. Results should be displayed sorted in descending order by total number of infections, then by first name, then by last name.

Note: You can use multiple queries to answer any of the eight transaction queries above if necessary.

Project Report: Structure and Contents

Each group should submit their project report through Moodle before the deadline, one report per group. Please check the course Moodle for more information and download the "expectation of originality". The report should include the following parts:

(1) DESIGN: The E/R diagram of the design of the database given in the project description (or a revised version, if deemed necessary).

(2) The SQL statements formulated and used to create the database. Pick appropriate data types for the attributes, the identifying key attribute(s), the relationship among the tables and include them in your report.
(3) The SQL statements formulated to express the required queries and transactions mentioned.
(4) Populate each table in the database with at least ten representative and appropriate tuples.
(5) For each relation **R** created in your database, report the result of the following SQL statement:

SELECT COUNT(*) FROM R;

A Final Note: Your report should also include the originality FORM as the cover page that is signed by EVERY member of the group. The cover page should also include the name and ID of every member of the group members together with the "Group Account" assigned by Stan's email confirmation of your group registration.