Technical University of Denmark

Department of Applied Mathematics and Computer Science

TEST exam based on the exam in 2021.

02170 Database Systems – Written Examination Part 1

Aids allowed: All
Weighting: Part 1: 50 %, Part 2: 50 %.
The weighting is only indicative and will ultimately be decided during the evaluation

This document constitutes Part 1 of the written examination.
Part 2 is a digital multiple choice assignment which should be accessed separately.
The two parts can be solved in any order.

Your answers to the questions in this document should be inserted at the right place in the ***answers.sql*** file also provided at this part of the exam. Remember to write your name and study number at the top of the file. Output of SQL commands must be shown as SQL comments. For your convenience, the file *createHospitalDB-withoutconstraints.sql* has also been provided.

Feel free to write comments to your answers in English, Danish or both. Comments must be placed in SQL comments, i.e. just after two hyphens (--) without line breaks.

When you have completed the *answers.sql* file, you should submit it digitally

A *Hospital* Database:

In both parts of this examination a database named *Hospital* is considered. The database contains information about diseases in general, doctors employed at the hospital, patients being treated at the hospital, rooms at the hospital, and the relationships between these. Below you find the relation schemas of the database and a relation instance of each of these.

Each *disease* has a unique *diseaseName* and a *diseaseType* (which is *'infectious'* or *'non-infectious'*). Each *doctor* has a unique *doctorId*, a *doctorName,* and a *specialty* which should be one of the registered diseases. Each *room* has a unique *roomNo* and a *capacity* stating the maximal number of patients that can be allocated to (a bed in) that room. Each *patient* has a unique *patientId* and a *patientName*. A *patient* may (or may in a very rare case not) have been allocated to a specific *roomNo* among the registered rooms (to get a bed in that room). The *suffers* relation contains info about diseases diagnosed for patients. The *treats* relation contains info about which doctors treat which patients.

disease(<u>diseaseName</u>, diseaseType)

diseaseName	diseaseType
cancer	non-infectious
Covid19	infectious
influenza	infectious
stroke	non-infectious

doctor(<u>doctorId</u>, doctorName, specialty)

doctorId	doctorName	specialty
d1	Anne Pedersen	Covid19
d2	Van Andersen	Covid19
d3	Per Schmidt	stroke
d4	Flemming Taylor	cancer

room(<u>roomNo</u>, capacity)

roomNo	capacity
11	2
12	2
13	3

patient(<u>patientId</u>, patientName, roomNo)

patientId	patientName	roomNo
p1	Peter Lund	11
p2	Helen Brown	12
p3	Mary Jones	12
p4	Simon Johnson	NULL

suffers(<u>patientId</u>, <u>diseaseName</u>)

patientId	diseaseName
p1	cancer
p1	Covid19
p2	stroke
p3	cancer
p3	Covid19

treats(<u>doctorId</u>, <u>patientId</u>)

doctorId	patientId
d1	p1
d1	p3
d4	p3

Question 1 State an SQL query, which returns a table containing the *diseaseName* of each infectious disease.
Show also the result of the query for the database instance shown on page 2.

Question 2 State an SQL query, which returns a table that for each registered disease has a row giving its *diseaseName* and the number of doctors who have that disease as their specialty.
Show also the result of the query for the database instance shown on page 2.

Question 3 Define an SQL **function** named *NumberOfPatientsInRoom,* that with a room number (of type SMALLINT) as argument, will return the number of patients allocated to that room number. The return type should be INT.

Question 4 State an SQL query, which uses the function to return a table that for each room in the hospital has a row giving its *roomNo* and the number of patients allocated to that room number.
Show also the result of the query for the database instance shown on page 2.

Question 5 State an SQL query, which returns a table that has all rows consisting of a *patientId* of a patient and a *diseaseName* of a disease for which the following holds: (1) the patient suffers from the disease, but (2) the patient is not treated by any doctor having that disease as their specialty.
Show also the result of the query for the database instance shown on page 2.