Databases Tutorial 1: SQL
9 November 2018

Question 1: Basics

Based on the *Departments* table below, create a SQL table called *Employees* that stores employee number, employee name, department, and salary information. The primary key for the *Employees* table should be the employee number. Create a foreign key on the *Employees* table that references the *Departments* table based on the department_id field.

```
CREATE TABLE Departments
( department_id int NOT NULL,
  department_name char(50) NOT NULL,
  CONSTRAINT departments_pk PRIMARY KEY (department_id)
);
```

Question 2: Suppliers

Consider the following relational schema:

Suppliers(sid:integer, sname:string, city:string, street:string)
Parts(pid:integer, pname:string, color:string)
Catalog(sid:integer, pid:integer, cost:real)

Find the names of all suppliers who have supplied a non-blue part.

Question 3: Employees

Consider the table Employees(empId, name, department, salary). The columns empId and name are of type text, while department and salary are of type integer.

a) Assuming that department 5 has more than one employee, write a query to find the employees who get higher salary than anyone in the department 5?
b) SQL Query to find Max Salary from each department
c) Find all employee records containing the word "Joe", regardless of whether it was stored as JOE, Joe, or joe.

Question 4: Company

For the following relation schema:
Employees(employeeId, employeeName, street, city)
Companies(companyId, companyName, city)
Works(employee, company, salary)
Manages(manager, employee)

The information on which company an employee works for and the current salary is stored in relation *Works*. Assume that all people work for at most one company. The information on which employees have manager roles and who do they manage is stored in relation *Manages*.

Give an expression in SQL for each of the following queries:

a) Find the names, street address, and cities of residence for all employees who work for 'First Bank Corporation' and earn more than $10,000.

b) Find the names of all employees in the database who live in the same cities as the companies for which they work.

c) Find the names of all employees in the database who live in the same cities and on the same streets as do their managers.

d) Find the names of all employees in the database who earn more than every employee of 'Small Bank Corporation'.

e) Find the name of the company that has the smallest payroll (or total salaries of employees).

f) Assuming that the table employees had an email column with NULL values, write a query to update the email values.

g) How do you find all employees who are not managers?

Question 5: Hospital

A database system used by a hospital to record information about patients and wards has the following relations:

Wards(number, numBeds)
Patients(pid, name, year, gender)
PatientInWard(pid, ward)
Tests(patient, testDate, testHour, temperature, heartRate)

A ward is identified by its number. Attribute numBeds is the number of beds in that ward. Patients are identified by their personal identification number. The name, year of birth and gender (`M' or `F') of each patient is stored in the Patients relation.

The ward to which each patient is assigned is stored in relation PatientInWard.

During their stay in hospital, patients will undergo routine tests. The date and hour of each occasion when these tests are performed on a patient are recorded, and for each of these tests the patient's temperature and heart rate are measured and recorded in the database. A patient will normally undergo these routine tests several times during their stay in hospital.

a) Write an SQL query that finds the temperature and heart rate measured in each test

carried out on patients born before 1950.
b) Create a view FreeBeds(ward, numBeds) where ward is a ward number, and numBeds is the number of available beds in that ward.

Question 6: Planets

We assume that all stars have different names, and that planet names are only unique within their star-system. A star-system has exactly one star, all planets have circular orbits around their star at different distances. A planet's position indicates which order it has in the star-system, e.g. Earth is the 3rd planet around the Sun, after Mercury and Venus. If a planet has O2 or other gases, it has an atmosphere. Without an atmosphere, a planet has no gases. The surface of a planet is either all water, all land, or a combination of water and land, but nothing else.

Consider the relation
Planets(star, name, distance, mass, atmosphere, oxygen, water)

a. Write an SQL table definition with reasonable types and constraints. Store distance in millions of km (For Earth, you would store the value 149.6).
b. Write an SQL query to determine how many planets are in orbits larger than the orbit of the fictional planet “Duna" of the fictional star “Kerbol"?
c. We define a planet as "habitable" if it satisfies all these conditions:
- orbits at a distance (in millions of km) between 100 and 200 (inclusive) from its star,
- has an atmosphere and it has an oxygen percentage between 15% and 25% (inclusive),
- has water on its surface.

Write an SQL query which returns the star and name of a planet, as well as a column status with value ``habitable" if the planet is habitable, otherwise ``uninhabitable" . (This means, return 3 values per row)