Assignment 1: Testing PostgreSQL

Due Tuesday August 28, 2018 by 11:45pm

The goal of this assignment is to become familiar with PostgreSQL and to write and evaluate some SQL statements and queries in that system.

You need to upload a single .sql file to Canvas which contains the necessary SQL statements to solve the problems in this assignment. The .sql must be so that the AI's can run it in their PostgreSQL shell.

Before you can solve this assignment, you will need download PostgreSQL (version 10) and install it on your computer.

Consider the following relation schemas for a database that maintains sailors, boats, and reservations of boats by sailors.

Sailor(Sid INTEGER, Sname VARCHAR(20), Rating INTEGER, Age INTEGER)
Boat(Bid INTEGER, Bname VARCHAR(15), Color VARCHAR(15))
Reserves(Sid INTEGER, Bid INTEGER, Day VARCHAR(10))

You should assume that Sid in Reserves is a foreign key that references the primary key Sid in Sailor, and that Bid in Reserves is a foreign key that references the primary key Bid in Boat.

Note the attached text files sailor.txt, boat.txt, and reserves.txt that contain the relation instances for the Sailor, Boat, and Reserves relations, respectively.

1. Create a database in PostgreSQL that stores these relations. Make sure to specify primary and foreign keys.

2. Provide examples that illustrate how the presence or absence of primary and foreign keys affects insert and deletes in these relations. To solve this problem, you will need to experiment with the relation schemas. For example, you should consider altering primary keys and foreign key constraints and then consider various sequences of insert and delete operations. Certain inserts and deletes should succeed but other should create error conditions. (Consider the lecture notes about keys, foreign keys, and inserts and deletes.)

3. Write SQL statements for the following queries:

   (a) Find the rating of each sailor.

   (b) Find the bid and color of each boat.

   (c) Find the name of each sailor whose age is in the range $[15, 30]$

   (d) Find the name of each boat that was reserved during a weekend (i.e., Saturday or Sunday).

(e) Find the name of each sailor who reserved both a red boat and a green boat.

(f) Find the name of each sailor who reserved a red boat but neither a green nor a blue boat.

(g) Find the name of each each sailor who reserved two different boats.

(h) Find the sid of each sailor who did not reserve any boats.

(i) Find the pairs of sids (s_1, s_2) of different sailors who both reserved a boat on a Saturday.

(j) Find the bids of boats that where reserved by only one sailor. (You should write this query without using the `COUNT` aggregate function.)