CS 1555 – Database Management Systems (Fall 2020)
Dept. of Computer Science, University of Pittsburgh

Assignment #4: SQL DML and Views

Release: Sept. 28, 2020 Due: 8:00 PM, Oct 8, 2020

Goal

Gain familiarity with SQL and some advanced SQL features. We will continue with the *ticket system* database schema of Assignment #3. You will create and manipulate the database using SQL in the PostgreSQL server.

Description:

Consider the following relational database schema that supports the technical support ticketing system, *CS_Tech*. *CS_Tech* keeps track of the tickets, their status, who is working on them, and who submitted them. The full specification of the tables and their constraints are given in `hw4-cstech-db.sql` (which is the same as `hw3-cstech-db.txt`).

- TECH_PERSONNEL (pplSoft, fname, lname, pittID, expertise, office_phone, years_of_experience, supervisor)
  Where fname is first name, and lname is last name.
- USERS (pplSoft, fname, lname, pittID, office_phone)
- CATEGORIES (category_id, category, description).
  Where this table lists all possible categories of submitted tickets. Examples of categories are *Display_problem*, *HD_problem*, *OS_update*, *Virus_infected*, etc.
- INVENTORY (machine_name, ip_address, network_port, mac_address, location_id)
- LOCATIONS (location_id, location, building, notes)
- TICKETS (ticket_number, owner_pplSoft, date_submitted, date_closed, days_worked_on, category_id, machine_name, description)
- ASSIGNMENT (ticket_number, tech_pplSoft, date_assigned, status, outcome)
  Where status field is an enumeration, could be: *assigned*, *in_progress*, *delegated*, *closed_successful*, or *closed_unsuccessful*.

Ticket Lifetime (see Figure 1):

- When a ticket is submitted by the owner, a record (tuple) is inserted in TICKETS with the ***date_submitted*** value set to reflect the date that ticket was created. The ticket remains in the submitted queue until it is assigned to a tech staff. The attribute ***days_worked_on*** reflects the number of days from the date the ticket was first assigned to a tech staff until it is closed, *closed_successful* or *closed_unsuccessful*.
- When a ticket is first assigned to a tech staff, a record is inserted in the ASSIGNMENT table with the status *assigned*, reflecting that the ticket is in that tech staff task queue. When the tech staff starts working on the ticket, it changes its status from *assigned* to *in_progress*. Subsequently, the tech staff can either close the ticket or pass it to another tech staff to

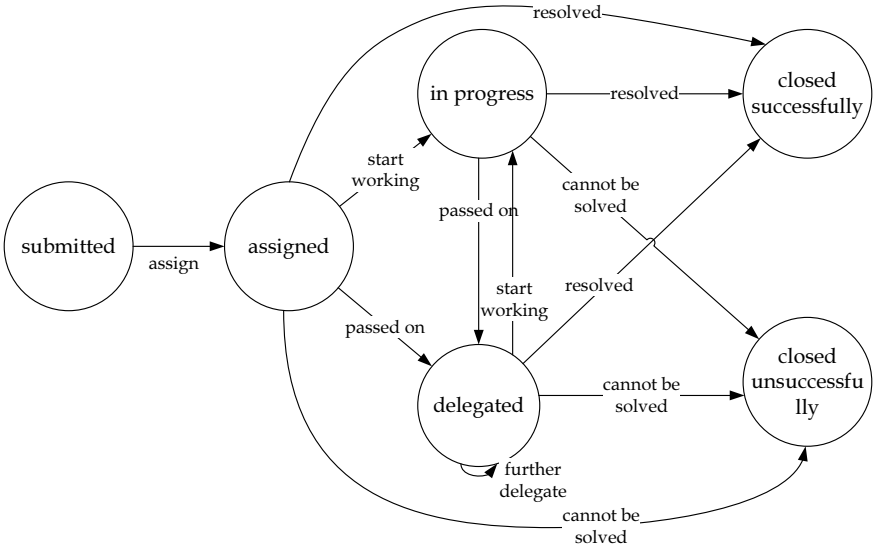

Figure 1: Ticket Lifetime: Status Settings

continue working on it. In the case the work is completed successfully or unsuccessfully, the tech staff sets the status *closed_successful* or *closed_unsuccessful*, accordingly and updates the ***date_closed*** in TICKETS. In the case that the ticket is passed on to another tech staff, the status is changed to *delegated*, and a new record is inserted in ASSIGNMENT with that ticket number and the new tech staff ***tech_pplSoft***. A ticket can be passed on multiple times until it is closed, but never delegated back to a tech staff who has previously worked on it.

Questions

1. Execute the statements in hw4-cstech-db.sql to create the tables and insert the rows by executing hw4-cstech-insert.sql to populate the *CS_Tech* database schema.

2. Express the following queries in SQL and answer them using the database you have created above [for a total of 80 points]:

   (a) [8 points] List in ascending order of their full names, as "UserNames" (i.e., a single attribute), users whose office phone number is 412-624-8443.

   (b) [8 points] List only once (no duplicates) the first and last name of users who have at least one ticket with status '*in_progress*' since January 2020.

   (c) [8 points] List the full names as "Staff" (i.e., a single attribute) of Tech Staff along with the full name as "Supervisor" of their supervisor. Note that a Tech Staff who does not have a supervisor, such as a supervisor, has NULL in supervisor attribute.

   (d) [8 points] List the pplSoft number of users who submitted more than 5 tickets during the month of January 2020.

   (e) [8 points] Display the average number of days each ticket is being worked on as AVERAGE_DAYS_WORKED_ON, for tickets submitted during the month of January 2020. Note that a newly submitted ticket without days worked on (NULL) should be listed as 0.

   (f) [10 points] Display the full name and number of tickets of the user who submitted the least number of tickets.

   (g) [10 points] List the 3 machines located on the fifth floor of Sennott with the most problems (i.e., Top 3 number of tickets) along with the number of problems.

(h) [10 points] List the days ranked third and fifth with the most number of submitted tickets in December 2019. Hint: This is based on ranking.

(i) [10 points] For tickets submitted during the month of January 2020, calculate the top two categories that tickets were submitted under. That is, list the two categories with the most tickets along with the number of tickets submitted Lunder the category, in descending order.

3. Express the following queries in SQL using one or more views [for a total of 15 points]:

(a) [4 points] For tickets submitted during the month of January 2020, calculate the top two categories that tickets were submitted under. That is, list the two categories with the most tickets along with the number of tickets submitted under the category, in descending order.

(b) [11 points] For each tech personnel, calculate the total number of days spent on resolving tickets during the month of January 2020. List them in an ascending order.

What to submit [5 points]

You are required to electronically submit **exactly two** files, all under your **pitt_user_name** (e.g., pitt01).

- **<pitt_user_name>-query.sql (e.g., pitt01-query.sql)**
  In this file, please submit the answers to Questions 1 and 2. In addition to providing the answers, you are expected to:
  - **include your name and pitt user name at the top of the SQL script as an SQL comment**, and
  - identify the question number before each SQL comments.
  - At the beginning of this file, you must write simple queries to list the content of the five tables.

  The entire SQL script file should be composed of **valid SQL statements**.
- **<pitt_username-output.txt> (e.g., pitt01-output.txt)**
  In this file, please submit the output of your query SQL script (i.e., the one that is named <pitt_user_name>-query.sql). To do that in PSQL you can use the command "\o" as seen in the recitation video.
  In addition to providing the answers, you are expected to:
  - **include your name and pitt username at the top of the text file**

How to submit it:

1. After preparing your solution, submit two files (i.e., one SQL script file and a text output file) that contain your solution through the Web-based submission interface you have used for previous Assignments. **It is your responsibility to make sure the assignment was submitted properly.**
2. Submit your files by the due date **(8:00pm Oct. 8, 2020). There is no late submission.**

Academic Honesty

The work in this assignment is to be done *independently.* Discussions with other students on the assignment should be limited to understanding the statement of the problem. Cheating in any way, including giving your work to someone else will result in an F for the course and a report to the appropriate University authority.