

Assignment #7: Transactions, Triggers, and Procedures

Release: Mar. 16, 2020

Due: 8:00 PM, Mar. 25, 2020

Goal

In this homework, you will practice transactions, triggers, and procedures. You have to use transactions appropriately to guarantee the atomicity of the updates in the Oracle server.

Description

- Assume the same relational database schema of *P-Mobile* from Assignment#2 (HW2). The same assumptions also hold. You will need to further evolve the schema with new attributes, as well as adding the following two new tables:
 - **COMPANY** (comp_ID, comp_name, street, city, zip, state)
Stores a list of all tele-communication companies, and comp_ID is the primary key.
Datatype
 - comp_ID: number
 - comp_name: varchar2(20)
 - street: varchar2(40)
 - city: varchar2(20)
 - zip: number(5)
 - state: varchar2(2)
 - **COMP_BILL** comp_ID, start_date, end_date, total_minutes, amount_due)
Stores the bills for each company. The pair (comp_ID, start_date) is the primary key. Also, comp_ID is a foreign key that references the table COMPANY.
Datatype
 - comp_ID: number
 - start_date: date
 - end_date: date
 - total_minutes: number(10,2)
 - amount_due: number(10,2)

Questions

Answer the following questions [for a total of 100 points]:

1. [10 points] Edit the sample solution script of Assignment#2 (HW2), in such a way that all constraints are INITIALLY IMMEDIATE DEFERRABLE. Incorporate the modifications you were asked in Q3 in your table creations (e.g., adding the attribute free_SMS, unique integrity constraints, etc), and then use it to create the database.

2. [5 points] Create the COMPANY table and specify its primary key, alternate key(s), and foreign key(s) to be all INITIALLY DEFERRED DEFERRABLE.
3. [5 points] Create the COMP_BILL table and specify its primary key, alternate key(s), and foreign key(s) to be all INITIALLY DEFERRED DEFERRABLE.
4. [5 points] Add a new attribute called comp_ID to table DIRECTORY that references the comp_ID of the COMPANY table. Note that each phone should have a company specified, it cannot be NULL.
5. [5 points] Add a new attribute called charge_rate to table COMPANY, which is how much per minute does *P_Mobile* charges the company. Set the default value to be 20 cents. Note that each company should have a charge_rate that can not be less than 0.
6. [5 points] Add the local constraint that a start date cannot be greater or equal with an end date in all applicable tables. Now, go ahead and run the INSERT statements provided in the file 'hw7-company-inserts.sql'.
7. [10 points] A new company Q_Mobile just went into the tele-communication business. It is located at 1111 Fifth Ave, Pittsburgh, PA 15213 and has just signed with *P_Mobile* a contract to be charged 10 cents per minute of calls and unlimited free SMS. Note that without such an agreement, Q_Mobile cannot be part of P_Mobile's database. Also, it started with the following two customers:
 - Phone: 724-888-1212, Name: James Kennedy, Address: 5550 Fifth Avenue, Pittsburgh, PA 15216
 - Phone: 724-888-4545, Name: Robin Gates, Address: 6660 Sixth St, Pittsburgh, PA 15666

Write the appropriate statements in SQL to record these facts in the database in atomic fashion. After that, run the INSERT statements provided in the file 'hw7-q7-inserts.sql'.

8. [15 points total] Write the following SQL queries.
 - (a) Retrieve full name, cell phone, and the corrected total amount due for each customer, such that customers who live in Pittsburgh city get a credit of \$20, and customers who live in Philadelphia get a credit of \$15. (Refer to HW#6 Q1d for hints).
 - (b) Retrieve company name, company state, and company amount due for the period between April 1, 2019 and July 31, 2019, such that companies located in PA have a \$0.05 decrease in their charge rate, and the rest have an increase of \$0.10 increase in their charge rate. (For companies other than P_Mobile, the minimum charge rate possible is \$0.01, and no negative values are accepted). That is:
 - i. If the state is Pennsylvania and the company is not P_Mobile, decrease the rate by 0.05 (negative charge rates are not valid).
 - ii. If the state other than Pennsylvania, increase the rate by 0.10.
9. [20 points: 10 points each] Write the following triggers. You are encouraged to create views in order to help you write your triggers.
 - (a) Write a trigger called DISPLAY_LATEST_DUES that whenever the charge_rate fields in the COMPANY table is about to be changed, it displays the latest amount due for that company.

- (b) Write a trigger called BILLING that updates the statement total minutes whenever a call is done.
10. [10 points] Implement the following procedure.
- (a) Create stored procedure PROC_UPDATE_CHARGE_RATE that updates the charge_rate attribute of a specific company. The procedure has the following inputs:
- input_comp_id: the ID of the company to be updated.
 - rate_charge: the value to be used to update the charge_rate attribute.
11. [10 points: 5 points each] Verify the triggers you created above.
- (a) Test the trigger DISPLAY_LATEST_DUES in 3 steps:
- i. Display the content of COMPANY.
 - ii. Update the charge rate for a certain company through your created procedure.
 - iii. Display the content of COMPANY.
- (b) Test the trigger BILLING in 3 steps:
- i. Display the content of RECORED.
 - ii. Add a record that reflects a call.
 - iii. Display the content of STATEMETNS.

Comments and Suggestion

- The list of Oracle errors ORA-XXXX are available under doc. Also you can get them by searching them in the internet.
- Providing additional information in submission files (see **What to submit**) should be done by using the comment feature of SQL: any text after a double dash is considered a comment until the end of the line. For example, add the lines below, before the SQL trigger in your answer to Question #8:

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-- Question #8:
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You are also encouraged to leave a couple of empty lines between answers, for better clarity.

What to submit

You are required to submit **two** text files under your **pitt_user_name** (e.g, pitt01). **include your name and pitt user name at the top of the text file**, and identify the question number before each answer

- **<pitt_user_name>-db.sql**

In this file, please submit the answers to all questions (i.e., CREATE TABLE, ALTER and INSERT statements, etc). In addition to providing the answers, you are expected to:

- **include your name and pitt user name at the top of the text file**, and

- use SQL **DROP TABLE** statements at the beginning of this file so that you can make sure your database does not have pre-existed tables, which have the same name as those 7 tables in this assignment.

The entire text file should be composed of **valid SQL statements**.

- **<pitt_user_name>-output.sql**

In this file, please submit the results of your ‘db’ script. You could use the command “SPOOL log_file_name” in SQLPLUS to record your query results.

How to submit your assignment

1. Submit your assignment (the 2 files described above) through the Web-base submission interface you have used to submit the previous assignments. **It is your responsibility to make sure the assignment was properly submitted..**
2. Submit your assignment by the due date (8:00pm, Wednesday Mar. 25, 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.