CI6205 Database Systems

Assignment 2

Assignment Objectives

The students should be able to:

- Understand the concept of functional dependencies and 3NF
- Use a database language (SQL) for manipulating and updating data
- Understand indexes

Q1 Functional dependencies and 3NF

(10 marks)

1) Check whether your tables are in 3NF. If they are not in 3NF, decompose them into 3NF tables. Write down the functional dependencies on each table. You should include all functional dependencies implied by the textual description of the database; in addition, you can also include any functional dependencies that make sense to you. Please document any assumption that you make.

2) List the set of tables that you obtain from the above two steps. State the primary key of each table. State all of the foreign keys in each table.

Note: You might find that your conceptual design in Assignment 1 is less than ideal, in the sense that some of the queries in Assignment 2 cannot be performed on the tables obtained from your conceptual design. If that is the case, please modify your tables to make ALL queries work, and please document the modifications that you need to make in the beginning of your report for Assignment 2.

Q2 Queries

(45 marks)

1) Find all users who have not written any message/comment.

2) Find each user whose wall contains more comments than message posts.

3) Show news feed for a user: List the latest 5 messages, each of which is either a status update from this user, a wall message sent from this user to a friend in the "News Feed" list, or a wall message sent from a friend in the "News Feed" list to this user.

4) Suggest friends to a given user: select top 5 users of the site who has the largest number of mutual friends with this user and yet to be a friend.

5) Suggest points of interest to a user: select top 5 points of interest that are mostly visited by the user's friends, and have not yet been visited by the user.

6) Find nearby Points of Interest of a given point of interest: Given a point of interest, find the nearest points of interest such that its description contains word "delicious" and its name contains word "pizza".

7) Find the most popular POI with the most number of check-ins. And find the POI that has been checked in by the most number of distinct users.

You need to populate your tables with suitable and meaningful data so that the given sample queries can be answered properly. For each query in Q2, please use your sample data to show the correctness of your solution (in other words, design test cases to show the correctness). Please include screenshot of your test result, and the data in your database.

Q3 Constraints & Triggers

(35 marks)

1) The two default friend lists cannot be deleted.

2) When a new friend is added, it is placed automatically in the "Friends" and "News Feed" lists; when it is removed, it is deleted automatically from these lists.

3) The database should automatically keep track of the top 5 most active users: (the degree of activity for a user is measured by the number of status updates from this user, plus the number of messages sent from this user to another user, plus the number of comments from this user)

4) The maximum number of check-in of a user make at a point of interest per day is 5

You need to populate your tables with suitable and meaningful data so that the given sample triggers can be answered properly. For each trigger in Q3, please use your sample data to show the correctness of your solution (in other words, design test cases to show the correctness). Please include screenshot of your test result, and the data in your database.

Q4 Index

Design and create one index for your database that is not created automatically by the DBMS you use, and analyse which queries in Q2 will benefit from your indexes (when database is large).

(10 marks)

Evaluation

A hardcopy of the solutions to all the questions should be submitted during the lecture in Week 12 (**April 6**, 2016). **For any plagiarized report, actions will be taken according to NTU rules**.

Please **state individual contributions** in the end of your report or the cover page (if any) of your report

Please write Group Number in the first page of your report.

Note that assignment 2 will take 10% of the final mark.

For the report, you are encouraged to print in double side (to save papers). BINDING is NOT required (to save your money).