CS/DSA 4513 – Section 001 - Fall 2019 - Dr. Le Gruenwald

GRADED HOMEWORK 1

Assigned: 9/9/2018

Group Portion Due: 9/16/2018 at 01:30 PM on Canvas

Individual Portion Due: 9/17/2018 at 11:59 PM on Canvas

No late submission of either the group portion or the individual portion will be accepted.

See the submission instructions at the end of the document. Read the "Group Graded Homework Grading Policy" posted on the class website

PROBLEM 1

A travel company connects people offering lodgings and people looking for lodgings in the US (think of Airbnb analog) wants to create a database to store the data related to its operation. This company expects people to visit its website, register for a user account, and either browse and book one of the available lodgings or offer lodging of their own ready for booking by other users. An initial analysis of the requirements produced the below facts.

a. When a person creates a user account through the website, the person will be asked to provide his/her name consisting of the first name and last name, date of birth, email address, and one or more phone numbers. The database is also expected to store the age of the user corresponding to the date of birth provided and the timestamp when the user account was created. A user can be identified by his/her email address.
b. A user can take on the following roles: a host offering lodgings for booking and/or a guest booking the available lodgings. A host user is required to provide his/her social security number to the company as well as an insurance policy ID purchased through a third-party partner company.
c. A host user can offer lodging for booking by the guests. The database will store the following information about the lodging provided by the host: type (such as private room, hotel room, house, etc.), maximum occupancy, number of bedrooms, number of beds, number of bathrooms, price per night, and the address consisting of street name, street number, apartment number, city, state and zip code. A unique ID will be generated by the website when the lodging is first offered and will be stored in the database as well.
d. A host can offer more than one lodging. A lodging, however, must be offered by exactly one host.
e. When a guest user decides to book a lodging, the database will record the check-in date, check-out date, number of people staying, and booking cost. A guest user can book the same lodging more than once (for different check-in/check-out dates), or even more than one lodging concurrently.
f. Some bookings may be canceled before guests check-in. When this happens, the database will record the cancelation information consisting of the cancelation date, cancelation reason, and refund amount. More than one booking can be canceled on the same date, for the same reason, and with the same amount of the refund issued. Furthermore, there might be multiple concurrent

cancelations for the same booking (due to payment refused, invalid host's insurance, booking withdrawn by the host, etc.), but their reasons will be all different.

g. A booking which was not canceled and was not free of charge will have payment information associated with it. This information consists of the guest user's credit card number, expiration date, transaction amount, and a timestamp when the transaction occurred. A credit card transaction is associated with a single booking and vice versa.
h. The travel company or the host user can offer discounts for a particular lodging. The database will store the information about the minimal number of staying nights to qualify for the discount, maximum numbers of nights before check-in when the discount can be offered, and the discount percentage. Each discount is uniquely identified in the database by the combination of those three values. The same discount can be offered for many lodgings, and one lodging can have many types of discounts offered for it.
i. A user can refer other people to create a user account on the company's website. A new user can only be referred by one existing user. When the new user makes his/her first booking, the referrer will be granted a certain credit amount which the database records.

Group Questions:

1.1 Draw an ER diagram capturing the above database design requirements (a-i). Make sure to draw and properly annotate the entity sets, their attributes, primary keys, relationship sets, cardinality constraints, etc. **Do not draw anything in excess of what's needed to satisfy the database design requirements.**

1.2 Assume that the following information is added to the above Problem 1 description: *"A host can review a guest if the guest has ever stayed in the host's lodging. The database will record the timestamp when the review is made, the number of stars given (1-5), and a review comment"*. How would you express this requirement in the ER diagram? If you cannot express it or do not believe it changes your earlier design, provide detailed explanations.

Individual Questions:

Each group member will be assigned one of the following questions randomly after the group portion of the homework is due (see the submission instructions at the end of the document). You must be ready to answer any of these questions on your own to submit the individual portion of the homework:

1. Assume that the following information is added to the above Problem 1 description: *"Each guest user has one membership based on the number of bookings he/she has made. Each membership has a unique type (such as bronze, silver, gold, etc.), a minimum number of bookings qualifying a guest user for the membership, and the discount percentage applied for every future booking"*. How would you express this requirement in the ER diagram? If you cannot express it or do not believe it changes your earlier design, provide detailed explanations.
2. Assume that the following information is added to the above Problem 1 description: *"A guest user can write a review about a lodging (even if he/she has never booked it). The database will record the timestamp of the review submission, the number of given stars (1-5), and the user comment. Many guests can submit reviews for lodging, and guests can submit many reviews"*. How would you express this requirement in the ER diagram? If you cannot express it or do not believe it changes your earlier design, provide detailed explanations.

3. Assume that the following information is added to the above Problem 1 description: *"Each host user has to provide one or more records of his/her bank account information. The database stores the bank account number, bank routing number, type of account, name of account's holder, and bank's name. The combination of the bank routing number and the account number is unique and can only be used by one host user."* How would you express this requirement in the ER diagram? If you cannot express it or do not believe it changes your earlier design, provide detailed explanations.
4. Assume that the following information is added to the above Problem 1 description: *"A lodging may be unavailable for booking for any periods of time for reasons unrelated to bookings by other guest users (such as renovations, use by the host, etc.) The database stores the start date and end date of each of the lodging's unavailability periods. An availability period is not uniquely determined by its start date and end date."* How would you express this requirement in the ER diagram? If you cannot express it or do not believe it changes your earlier design, provide detailed explanations.

PROBLEM 2 (Group Question, No Individual Questions):

Provide a detailed description (using the same format as that of Problem 1) and an ER diagram for a database application of your choice that is different from the one given in Problem 1 (a database application that is a modification of the one given in Problem 1 will not be accepted). The design must include at least five entity sets and cover all features: strong entity sets, weak entity sets, different kinds of relationship sets, total participation and partial participation, aggregation, role indicators, and generalization and/or specialization. The database application must not come from the textbooks/lecture notes/homework assignments/class projects/exams/examples used for CS/DSA-4513 at the University of Oklahoma. If you have obtained the application from some other sources, you must provide the sources' complete reference information in your answer. Turn in BOTH your detailed description and ER diagram as a group submission. If either of them is missing, you will get a zero credit for this problem.

SUBMISSION INSTRUCTIONS

Group portion:

- All parts of your solutions must be typed (including your ER diagram) (i.e., no hand-written solutions will be accepted). Make sure that your submitted answers are readable; otherwise, they will not be graded, and you will get a zero credit for this assignment. An example of a free tool that you can use to generate ER diagrams is: http://www.draw.io
- Attach to your group solutions of Problems 1 and 2 a cover page that contains the following information:

  COURSE: CS/DSA-4513 - DATABASE MANAGEMENT
  SECTION: 001
  SEMESTER: FALL 2019
  INSTRUCTOR:
  GROUP NUMBER: <write your group number here>
  GROUP MEMBERS: <list the names of all members here>
  SCORE:
- Submit the cover page and your solutions for the group portion of Problems 1 and Problem 2 in ONE SINGLE PDF FILE to Canvas (**file name convention**: "*Group*" **followed by your group number followed by** "*-Graded Homework 1*"; **Example:** "*Group10-Graded Homework 1*")

Individual portion:

- After the submission deadline of the group portion of this graded homework, and before the submission deadline of the individual portion of this graded homework, you will have to take a quiz on Canvas. The quiz will be open from 1:31 PM, Monday, September 16, 2019 to 11:59 PM, Tuesday, September 17, 2019. The quiz will contain one of the Individual Questions for Problem 1. You will have to upload one PDF document as your answer. The quiz will also ask you for your feedback on your group members (i.e. the scores you give to each of your group members on the group portion of this graded homework) as outlined in the "Group Graded Homework Grading Policy" document available on Canvas.