

GRADED HOMEWORK 1 (Maximum Points: 100 points)

Assigned: 9/13/2021 at 1:30 PM (CST); Due: 9/20/2021 at 11:59 PM (CST) on Canvas

(Submit your homework answers in ONE SINGLE PDF FILE using the file name convention “Graded Homework 1_your last name_your first name”, e.g., “Graded Homework 1_Smith_Joe”, to Canvas; late submissions will be accepted until 11:59 PM on the date following the due date with 5% penalty. Any late submission after this time will not be graded.)

PROBLEM DESCRIPTION

A travel company that 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 cancellation information consisting of the cancellation date, cancellation 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 cancellations 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.

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 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.
- 1.3 Assume that the following information is added to the above Problem 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.
- 1.4 Assume that the following information is added to the above Problem 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.

SUBMISSION INSTRUCTIONS

- 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.diagrams.net>.
- Submit your homework answers in ONE SINGLE PDF FILE using the file name convention "Graded Homework 1_your last name_your first name", e.g., "Graded Homework 1_Smith_Joe", to Canvas.
- Attach to your homework answers a cover page that contains the following information:

NAME: <Write your name here>
STUDENT ID: <Write your student ID here>
GRADED HOMEWORK NUMBER: 1
COURSE: CS/DSA 4513 - DATABASE MANAGEMENT
SECTION: ONLINE
SEMESTER: FALL 2021
INSTRUCTOR: DR. LE GRUENWALD
SCORE: