CSCI-4380 Database Systems

Homework 1

Relational Model and SQL DDL

This homework will focus on the concepts of the relational model, as well as the use of relational algebra to query a relational schema.

It is due on Friday January 24 at 11:59PM and should be submitted electronically on the class Submitty site. You should upload two files: one for the first question (a scan, or electronic copy of your completed solution), and a `homework-1.sql` file for the second question.

1. You're building the database for a tech company that wants to keep track of the conferences it offers, and the people who register to attend.

   You need to store information about each conference: its name, location, start date, end date, and cost to attend. You also need to keep track of the names, birthday, email addresses, current job title, and current employer of each attendee, as well as a record of which conferences they register to attend. Finally, each of the conferences has an arbitrary number of corporate sponsors, and you will need to keep track of the company name, which conferences they sponsor, and the amount they paid to sponsor them.

   (a) (12 points) Create the schemas for four relations to store data about the conferences (*conference*), attendees (*people*), conference registration (*registration*), and corporate sponsors (*sponsors*). Make sure to define keys for each relation (if appropriate), but do *not* create any artificial keys.

   Solution: $conference(\underline{name}, \underline{location}, \underline{start\_date}, end\_date, cost)$
   $people(name, birthday, \underline{email}, job\_title, employer)$
   $registration(\underline{conference}, \underline{city}, \underline{start\_date}, \underline{attendee\_email})$
   $sponsors(\underline{name}, \underline{conference}, \underline{city}, \underline{start\_date}, amount\_paid)$

   (b) (2 points) Give two example tuples for the *Conference* relation:

   Solution: (AWS Summit, NYC, July 7, 2019, July 8, 2019, $0)
   (Scala Days, Berlin, June 6, 2019, June 9, 2019, $500)

   (c) (6 points) Give three example tuples for the *Sponsor* relation, representing that one company sponsored two different conferences and one conference had two different sponsors:

   Solution: (Microsoft, AWS Summit, NYC, July 12, 2018, $25,000)
   (Microsoft, Window World, Chicago, March 3, 2003, $250,000)
   (MongoDB, AWS Summit, NYC, July 12, 2018, $10,000)

2. (15 points) For each of the relations you created in part (a) above, write a `CREATE TABLE` statement in SQL to create the table, including appropriate keys. Assume that no two people share the same email, and that no two people have both the same name and birthday. Upload your solutions in a separate `homework-1.sql` file.

   Solution:

```
CREATE TABLE conferences(
name VARCHAR(255),
location VARCHAR(255),
start_date DATE,
```

```
end_date DATE,
cost NUMERIC(6, 2),
PRIMARY KEY (name, location, start_date)
);

CREATE TABLE people(
name VARCHAR(255),
birthday DATE,
email VARCHAR(255),
current_job_title VARCHAR(255),
current_employer VARCHAR(127),
PRIMARY KEY (email),
UNIQUE (name, birthday)
);

CREATE TABLE registration(
conference_name VARCHAR(255),
location VARCHAR(255),
start_date DATE,
attendee_email VARCHAR(255)
);

CREATE TABLE sponsors(
conference_name VARCHAR(255),
location VARCHAR(255),
start_date DATE,
amount NUMERIC(9, 2),
PRIMARY KEY (conference_name, location, start_date)
);
```