Exam 1 Part 2 Solutions

Name: ____________________________
UFID: ____________________________
Email Address: ____________________

Pledge (Must be signed according to UF Honor Code)

On my honor, I have neither given nor received unauthorized aid in doing this assignment.

_______________________________________________
Signature

For scoring use only:

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Question 3 (ER Model)  [25 points]

1. Transform the following ER model into a corresponding database schema. Identify the primary keys and foreign keys. You need not include data types in the schema. [20 points]

Solution:
Employee (ssn, name, gender, birthday, email, salary, employedBy) employedBy -> Division.did
Project (pid, pname, madeBy) madeBy -> Division.did
Skill (sid, name)
Division (did, dname, dlocation, eid) eid -> Employee.ssn
Dependent(deid, eid, name, birthday, relationship) eid -> Employee.ssn
Master (sid, eid) sid -> Skill.sid, eid -> Employee.ssn

2. Using SQL, create the table Employee. Your answer should be recognized by Oracle [5 points].
Solution:
CREATE TABLE Employee (  ssn VARCHAR(11) PRIMARY KEY,  name VARCHAR(255),  gender VARCHAR(1),  birthday DATE,  email VARCHAR(255),  salary DECIMAL(19, 4));
Question 4 (Relational Algebra) [25 points]

Consider a database of a simplified, Twitter-like social network website. Primary key attributes are underlined.

- Person (pname, city, street) - Assume the pname is unique
- Follow (pname1, pname2) - Person pname1 follows person pname2
- Tweet (tid, ttitle, ttext) - Tweet with tid has title ttitle and text ttext
- PersonTweet (pname, tid, ts) - Person pname posted tweet tid at timestamp ts
- TweetTag (tid, tagname) - Tweet tid had tagname in its list of tags

Express the following queries in relational algebra. Feel free to use views if you need. For example,

\[
PITT\_PEOPLE = \sigma_{\text{city} = \text{"Pittsburgh"}}(\text{Person})
\]

defines a view PITT\_PEOPLE containing everyone in Person from Pittsburgh.

1. List the name of people (pname) who posted a tweet with tag “Obama.” [5 points]

\[
\pi_{\text{pname}}(\text{PersonTweet} \bowtie (\sigma_{\text{tagname} = \text{"Obama"}}(\text{TweetTag})))
\]

2. Find all people (pname) from “Pittsburgh” who used the tag “G20.” [5 points]

\[
\pi_{\text{pname}}(\sigma_{\text{city} = \text{"Pittsburgh"}}(\text{Person}) \bowtie \text{PersonTweet} \bowtie \sigma_{\text{tagname} = \text{"G20"}}(\text{TweetTag}))
\]

3. List the name and city of people following people who follow “Ashton Kutcher” (i.e., second-level followers). [5 points]

\[
\text{AshtonFollowers} = \pi_{\text{pname1}}(\sigma_{\text{pname2} = \text{"Ashton Kutcher"}}(\text{Follow})
\]

\[
\pi_{\text{pname}, \text{city}}(\text{Person} \bowtie \text{pname} = \text{pname1}) (\text{AshtonFollowers} \bowtie \text{AshtonFollowers.pname1} = \text{pname2} \text{Follow}))
\]

4. Find all pairs of people (pname) who have at least one follower in common. [5 points]

\[
\pi_{\text{Follow.pname2}, \text{F1.pname2}}(\sigma_{\text{Follow.pname1} = \text{F1.pname1}}(\text{Follow} \times \rho_{\text{F1}}(\text{Follow})))
\]

5. List the name and city of people following at least everyone that “Bob Smith” follows. [5 points]

\[
\pi_{\text{pname}, \text{city}}(\text{Person} \bowtie \text{pname} = \text{pname1}) (\text{Follow} \div \pi_{\text{pname2}}(\sigma_{\text{pname1} = \text{“Bob Smith”}}(\text{Follow})))
\]