INFSCI 2710 Database Management, Fall 2022

Homework 1: Relational Algebra, SQL

100 pts

Due Date: 9/28 at the end of the day. Please submit a pdf to the Canvas assignment.

Preparations: We are using the same dataset we used in the lab, please download two files ("create db.sql" and "insert table.sql") from the lab. Run SQL queries from both files (make sure you run "create db" first).

Consider the relational database that provided in the lab material (Underlines attributes in bold are the primary keys.) **For each question in this section, you need to provide the SQL query and the screen shot of the output of that query from either MySQL Workbench or from the terminal** (make sure it is formatted properly).

classroom (**building, room_number**, capacity)
department (**dept_name**, building, type, budget)
instructor (**ID**, name, dept_name, salary)
course (**course_id**, title, dept_name, credits)
section (**course_id, sec_id,semester,year**, building, room_number, time_slot_id)
teaches (**ID, course_id,sec_id,semester,year**)
student (**ID**, name, dept_name, tot_cred)
takes (**ID, course_id,sec_id,semester,year**,grade)
advisor (**s_ID**,i_ID)
time_slot (**time_slot_id, day.start_hr, start_min**, end_hr, end_min)
prereq(**course_id, prereq_id**)

Q1 [10 pt] Specify a relational algebra expression and an SQL query to find the names of all the instructors from Biology department

Q2 [10 pt] Specify a relational algebra expression and an SQL query to find the names of courses in Computer science department which have 3 credits

Q3 [5 pt] Specify a SQL query to find all course_id and title of all courses taken by the student with ID 12345

Q4 [5 pt] Specify a SQL query to find names of all the courses taught by computer science department in 2009 Fall.

Consider another relational database that describe NBA player stats (Underlines attributes in bold are the primary keys.)

Player (**ID**, name, position, height, weight, teamID)
Team (**ID**, name, city)
Game (**gameID**, homeTeamID, awayTeamID, homeScore, awayScore)
GameStats (**playerID, gameID**, points, assists, rebounds)

Hints:
(1) Two teams may play each other multiple times each season
(2) GameStats records the performance statistics of a player within a game. A player may not play in every game, in which case it will not have its statistics recorded for that game.

Q5[20 pt] Write SQL DDL statements to create the above tables. Make sure that you capture the primary and foreign key constraints (if applicable), choose appropriate domain (data) type and constraints for each attribute.

Q6 [10 pt] Specify a SQL query to find the gameID, scores of both team of the games that are played at the Philadelphia home court

Q7 [10 pt] Specify a SQL query to find points, assist and rebounds of the player whose name is "James" in all the home game he played for his team

Q8[10 pt] Specify a SQL query to find the gameID of games that Warriors won (including both home and away games).

Q9[20 pt] Consider the following relational algebra expression

$$\pi_{GameStats.playerID}(\sigma_{(GameStats.points>10) \cap (GameStats.assist>10) \cap (GameStats.rebound>10)} GameStats)$$

1) How many attributes will the result have?

2) Write in English what question the expression is trying to answer (e.g. describe what would be the result of the expression).

3) Translate the expressions in 3) into SQL.