CS-GY 6083-A, Principles of Database Systems, Fall 2021

Homework 1: Entity-Relationship and Relational Models

Due at 11:59pm EDT on Thursday, October 7

Description

This assignment covers the following topics

(1) Sets
(2) ER model
(3) Relational model

I do not expect you to use any special software to draw ER diagrams. The easiest way is to print out this assignment, draw the diagrams by hand, scan in and submit.

Grading

This assignment is made up of 3 problems, collectively worth 60 points, or 8% of the overall course grade. Homeworks must be submitted on time. Each student can make use of 2 additional days for late homework submission over the course of the semester. If a late day is used, it is used in full. That is, if a student submits a homework assignment 2 hours late, this counts as a full day.

This assignment is to be completed individually. Please consult the course syllabus for a description of our academic honesty policy.

Submission instructions

Submit your assignment on BrightSpace.

Part 1 (12 pts): Sets

Let us denote by S the set of all Tandon students who graduated in 2021, by D the set of domestic students, by H the set of students who received a graduation honor, by J the set of students who landed a job after graduation, and by C the set of students who are continuing to pursue another degree after their 2021 graduation. For each question below, write down an expression that represents the set being described. Write **exactly one expression** for each question.

(a) (3 points) International students who received a graduation honor and landed a job.

(b) (3 points) Students who received a graduation honor and are not continuing to pursue another degree.

(c) (3 points) Students who either did not receive a graduation honor and landed a job, or received a graduation honor and are continuing to pursue another degree.

(d) (3 points) All possible pairs of students, such that one is domestic, the other is international, and both landed a job upon graduation.

Problem 2 (30 points) Business rules to ER diagrams

For each question below, draw an ER diagram that correctly represents the business rules. Assume that the only business rules that hold are those stated, and that no additional business rules hold. *Clearly mark all key and participation constraints using the notation presented in class.*

(a) (10 points) Directors direct movies. Each director has a social security number (SSN) that uniquely identifies them, and also has a name and a home address. We record an address for each director, and some directors may share the same home address. A movie is identified by the combination of name and year of release. Each movie was directed by exactly one director.

Cinemas screen movies, although some movies are streaming-only (not screened at cinemas). No two cinemas have the same name and city. A movie may be screened at a particular cinema on multiple dates, and we are interested in recording both present and past screenings of movies. Cinemas are owned by individuals who are identified by an SSN, and also have a name and a home address. Each cinema is owned by some owner, and each owner in our database owns at least one cinema and resides at some address.

(b) (10 points) Soccer teams are identified by their name, and each is assigned to a specific home stadium. Stadiums are identified by their name and city, and also have a maximum capacity (number of spectators). A match involves a home and an away team, takes place at some stadium on a particular date, and is associated with a score: the number of goals scored by each team. We want to record all matches that took place.

(c) (10 points) Artists paint paintings. An artist is uniquely identified by their name. A painting is uniquely identified by the combination of name and year when it was painted. Each painting is painted by one artist, but for some of the paintings the artist is unknown. A museum is uniquely identified by its name. Paintings can be on show at different museums, during different start / end date ranges, and we want to record all such occurrences. Every painting in our database is exhibited at least once.

Part 3 (18 pts): Gradiance

You will use Gradiance to complete some of the homework assignments in this course. To access Gradiance, you must create a Gradiance account at http://www.gradiance.com/services, and then use this account to log on to the system. Having logged on, sign up for a new class, specifying the following class token: **C75D9C84**.

When you enter the token above, CS-GY 6083-A will appear under "Your Classes". Click on the link for CS-GY 6083-A, and then follow the link to homeworks in the menu on the left. You will see the currently assigned homework, and will be able to open it and submit solutions. Gradiance will automatically grade your submissions and record your scores. We will retrieve your scores for this part of the assignment directly from Gradiance, there is no need to submit anything through NYU Classes for this part of the assignment.