

Homework 05 - ER Modeling

Early Submission EC Deadline: Monday, Nov 10 @ 11:59 pm to GradeScope
Regular Submission Deadline: Wednesday, Nov 12¹ @ 11:59 pm to GradeScope

Directions:

Complete each of the questions. Partial credit is available.

Don't forget to properly associate your solutions with the questions on GradeScope.

All ER Diagrams should be drawn in the style covered in lecture. ER Diagrams should be drawn professionally using an appropriate software tool such as Lucidchart, Miro, or Google Draw.

Academic Collaboration Reminder:

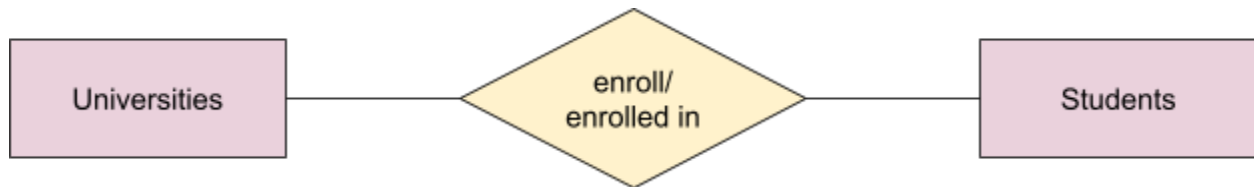
Remember that you may not look at, copy, capture, screenshot, or otherwise take possession of any other students' solutions to any of these questions. Further, you may not provide your solutions in part or in whole to any other student. Doing any of the above constitutes a violation of academic honesty which could result in an F in this class and a referral to OSCCR. What is permissible? You are free and encouraged to talk to your peers about the conceptual material from the lectures or the conceptual material that is part of this assignment. You can get around a whiteboard and talk through the Sakila data model. You and your colleagues can work through sample SQL queries done in class or others that you dream up on the fly. I'm very confident that each of you knows where the line between collaborative learning and cheating sits. Please don't cross that line.

¹ Note that the due date is a day later than usual due to Nov 11 being a no-class day.

Question 1: ER Modelling

For the following questions, indicate the correct participation and cardinality by completing the entity-only ER Diagrams using the information provided. You may not change the entities or the relationships provided. If the provided prompt does not include enough information to determine cardinality or participation, use a question mark (?) to indicate such. [10 points each]

1.1 A university can accept several (but possibly 0) students. A student must be enrolled in exactly one university.



1.2 In any given semester, all courses at a university must be associated with a single academic department. Even though most departments offer multiple courses, some may not offer any in the given semester.



1.3 A startup can receive investments from multiple investors, and an investor can invest in multiple startups. However, some startups may not have any investors yet (e.g., if they are in the early stages). Likewise, some investors may not have invested in any startups (e.g., an investor is waiting for the right opportunity).



Question 2:

Below is a scenario for an automotive service shop specializing in quick maintenance tasks, such as oil changes, windshield wiper replacements, etc.

... as told by the manager of the maintenance facility...

- 1) *Customer intake happens in the drive bays. If a new customer arrives, we need to gather their first name, last name, phone number, and email address. We use email addresses to uniquely identify each customer. Each customer must put one credit card on file for payment. In our system, we securely store the credit card number and expiration date. If a customer wants to update to a new card, is still saved in the system for auditing purposes. When a returning customer arrives, we simply ask for their email address to access their account. **Color:** _____*
- 2) *For our clients' cars, we track the make, model, year of production, color, and VIN (vehicle identification number), which is unique to each car. Of course, a single client can have several cars on their account. We also have relationships with some car dealerships around the area that share their client list with us so we can market to them, but we don't get any information about what car they bought. We still treat these as customers in our system, though. Every maintenance visit is associated with one specific car. We keep track of the visitID (a unique value we assign to the maintenance visit), the date the car was dropped off for maintenance, the odometer reading at the time of drop off, the date we promised to return the car to the customer (which could initially be empty), and the date we actually returned the car to the customer (which will initially be empty). **Color** _____*
- 3) *Each maintenance visit has a technician assigned to it who performs all required maintenance on a specific car during that visit. Only one technician is assigned to a maintenance visit. On our side of the system, we only see the technician's first name, last name, and employee ID (unique to each technician). HR handles all the other employee info (you do not need to model the HR context). **Color** _____*
- 4) *We stock a range of parts regularly used during maintenance visits. In the parts catalog, we store the catalog number (unique to each part type) of the part, the name of the part, the names of the suppliers we get the part from, and any sometimes some memo notes. While we obviously get every part from at least one supplier, we don't maintain a separate set of data on each supplier... we just store the names of all the suppliers with the part. When a technician uses a part during a maintenance visit, they enter the catalog number, which reduces the inventory for that part by 1. We also store the date and time that the technician claimed a part for use. It is important to note that during a single maintenance visit, a technician may need multiple parts from the warehouse, or none at all. If a tech uses two of the same part, that shows up as two different entries in our system. **Color** _____*

Note: do NOT apply your own extensions to the specific description listed above. Simply model what has been communicated.

2.1 Provide a list of entities that will be needed in this data model. Identify each entity as a strong or weak entity. [10 points]

2.2 List all relationships in the form *Entity_A {Relationship} Entity_B*, along with what clues from the description led you to believe this relationship should be part of the data model. Use quotes from the scenario above [10 points]

2.3 Using a tool of your choice (see first page for limitations), produce an ER Diagram for this scenario. Things to note:

- Color-code your diagram such that all elements from one of the bullets are shaded the same color. Put the color name in the blanks after each bullet.
- Use the notation style covered in lecture. Use of any other ER Diagram notation will receive no credit.
- Include as much detail as possible from the scenario, including multiplicities for each entity involved in a relationship. You may use a ? in place of a particular participation or cardinality value if there is not enough information to determine the correct value.
- Proper interpretation and diagramming of each bullet point is worth 12.5 points.