



EAST WEST UNIVERSITY
Department of Computer Science and Engineering
B.Sc. in Computer Science and Engineering Program
Mid Term II Assessment (Online), Fall 2020 Semester

Course: CSE 302 Database Systems
Instructor: Mohammad Rezwanul Huq, PhD, Associate Professor, CSE Department
Full Marks: 40 (15 will be counted for final grading)
Time: 1 Hour and 30 Minutes (including answer uploading time)

Note: There are 6 (SIX) questions, answer ALL of them. Course Outcome (CO), Cognitive Level and Mark of each question are mentioned at the right margin.

1. **Write SQL Statements** for the following queries based on the 'Pizza' database schema, as given in the Appendix. [CO2, C3, Mark: 10]
 - a) Find the average price of each pizza type throughout all the stores. Do not include a pizza type in the result when the average price of that pizza is less than 9 dollars. The result must be sorted in the alphabetical order of pizza type.
 - b) Rewrite the same query as mentioned in question 1.(a) using the concept of the nested subquery.
 - c) Find the persons who have tasted all pizza types, which are in the menu list of 'Chicago Pizza'. You must use NOT EXISTS keyword to solve this query.
 - d) Find the name of the pizzeria and pizza that has the second lowest price.
 - e) Find pizzerias (pizza shops), of which the highest-priced pizza that they serve is less than the average price of pizzas of the same type considering all the pizzeria. You must use a WITH clause to solve the query.
2. **Create a view named MushroomLovers** that contains the name of persons who had mushroom pizza. [CO1, C4, Mark: 4]

Now, assume that appropriate foreign key constraints are in place. Considering that if the following SQL statement is executed, **discuss** and **explain** the outcome.

insert into MushroomLovers values ('Alice');

3. Consider the following authorization graph showing the users having SELECT privilege on the previously created MushroomLovers view. [CO2, C4, Mark: 6]

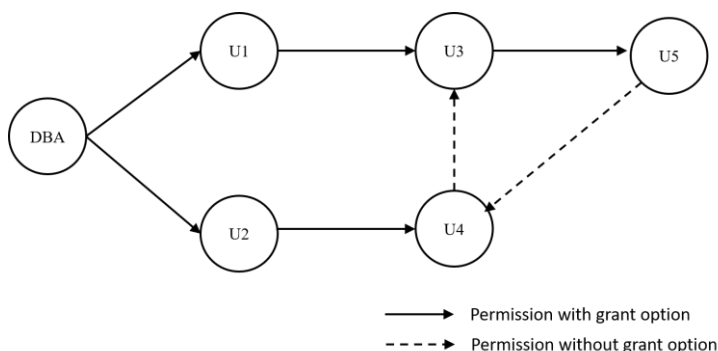


Figure 1: Authorization Graph for Question 3

- a) If the user U3 executes the following SQL statement, what will be the output?
- ```
SELECT grantor, grantee, grantable
from user_tab_privs
where table_name = 'MushroomLovers' ;
```
- b) If U1 revokes privilege from U3, does U5 still have access to the view? Draw the changed authorization graph in support of your answer.
4. Consider a **MOVIE** database in which data is recorded about the movie industry. [CO3, C6, Mark: 10]  
The data requirements are summarized as follows:
- Each movie is identified by title and year of release. Each movie has a length in minutes and a plot outline.
  - Each movie has a production company, and one or more directors and one or more actors appear in it. A movie may have a number of roles. Roles are existentially dependent on Movies. Finally, each movie has zero or more quotable quotes, each of which is spoken by a particular actor appearing in the movie.
  - Actors are identified by name and date of birth and appear in one or more movies. Each actor has a role in the movie.
  - Directors are also identified by name and date of birth and direct one or more movies. It is possible for a director to act in a movie (including one that he or she may also direct).
  - Production companies are identified by name and each has an address. A production company produces one or more movies.

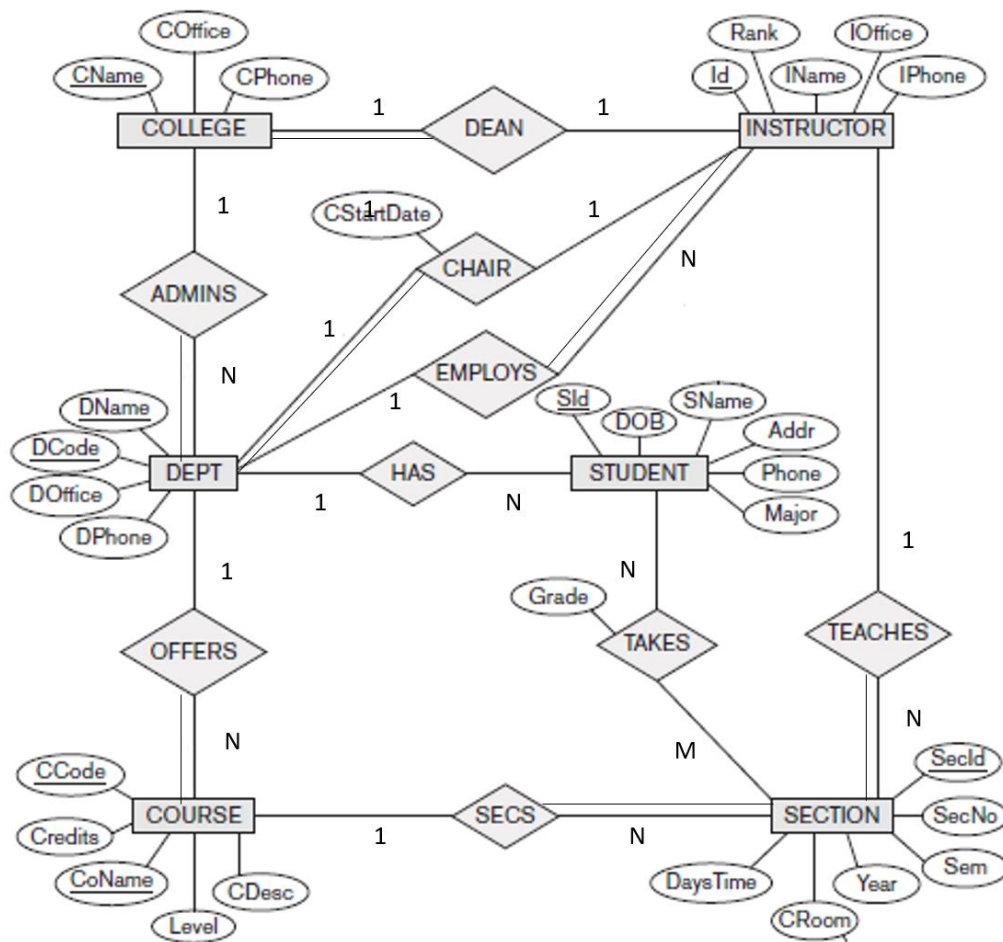
**Design** an entity-relationship model (ER diagram) for the MOVIE database. Please note that the information is not complete and you are free to make reasonable assumptions. Write down your assumptions if you have made any with your design. Your design must be legible and clear.

5. Assume that there are 3 entity sets: Faculty, Department, and Instructor. A single faculty has one or more departments and has one or more instructors. A department is associated under one faculty, and a department may have many instructors. [CO3, C4, Mark: 4]

**Draw** the partial ER diagram in such a way so that the resulting database schema can answer the query - “which instructor work under which faculty”.

You do not need to consider any attributes but must show mapping cardinalities of a relationship set.

6. **Reduce** the following ER model into a set of relational schemas. Justify your answer briefly. [CO3, C3, Mark: 6]



Please note that, in the diagram, ellipses represent simple attributes, dashed ellipse represents derived attributes and double ellipse represents multi-valued attributes. 1 indicates 'one' side and N indicates 'many' side in a relationship set.

## Appendix: Pizza Database

The following database schema keeps information on several pizza-lovers, pizza shops known as a pizzeria and different types of pizzas.

- **Person** ( name, age, gender )
- **Frequents** ( name, pizzeria )
- **Eats** ( name, pizza )
- **Serves** ( pizzeria, pizza, price )

*Person* relation stores information related to a person. The *Frequents* relation keeps the information about the membership of a person to a particular pizzeria (pizza shop). The *Eats* relation holds information about the consumption of different types of pizza by all persons. The *Serves* relation contains information about the menu of a particular pizzeria (pizza shop).

| Person |     |        | Frequents |                | Eats |           | Serves         |           |       |
|--------|-----|--------|-----------|----------------|------|-----------|----------------|-----------|-------|
| name   | age | gender | name      | pizzeria       | name | pizza     | pizzeria       | pizza     | price |
| Amy    | 16  | female | Amy       | Pizza Hut      | Amy  | mushroom  | Chicago Pizza  | cheese    | 7.75  |
| Ben    | 21  | male   | Ben       | Chicago Pizza  | Amy  | pepperoni | Chicago Pizza  | supreme   | 8.5   |
| Cal    | 33  | male   | Ben       | Pizza Hut      | Ben  | cheese    | Dominos        | cheese    | 9.75  |
| Dan    | 13  | male   | Cal       | New York Pizza | Ben  | pepperoni | Dominos        | mushroom  | 11    |
| Eli    | 45  | male   | Cal       | Straw Hat      | Cal  | supreme   | Little Caesars | cheese    | 7     |
| Fay    | 21  | female | Dan       | New York Pizza | Dan  | cheese    | Little Caesars | mushroom  | 9.25  |
| Gus    | 24  | male   | Dan       | Straw Hat      | Dan  | mushroom  | Little Caesars | pepperoni | 9.75  |
| Hil    | 30  | female | Eli       | Chicago Pizza  | Dan  | pepperoni | Little Caesars | sausage   | 9.5   |
| Ian    | 18  | male   | Eli       | Straw Hat      | Dan  | sausage   | New York Pizza | cheese    | 7     |
|        |     |        | Fay       | Dominos        | Dan  | supreme   | New York Pizza | pepperoni | 8     |
|        |     |        | Fay       | Little Caesars | Eli  | cheese    | New York Pizza | supreme   | 8.5   |
|        |     |        | Gus       | Chicago Pizza  | Fay  | mushroom  | Pizza Hut      | cheese    | 9     |
|        |     |        | Gus       | Pizza Hut      | Gus  | cheese    | Pizza Hut      | pepperoni | 12    |
|        |     |        | Hil       | Dominos        | Gus  | mushroom  | Pizza Hut      | sausage   | 12    |
|        |     |        | Hil       | Pizza Hut      | Hil  | supreme   | Pizza Hut      | supreme   | 12    |
|        |     |        | Hil       | Straw Hat      | Ian  | pepperoni | Straw Hat      | cheese    | 9.25  |
|        |     |        | Ian       | Dominos        | Ian  | supreme   | Straw Hat      | pepperoni | 8     |
|        |     |        | Ian       | New York Pizza |      |           | Straw Hat      | sausage   | 9.75  |
|        |     |        | Ian       | Straw Hat      |      |           |                |           |       |