CSC 370 - Database Systems

Midterm 01 Version 02
Conceptual Design

45 MINUTES

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Notes

This examination consists of ten equally-weighted multiple choice questions. You should record your solutions in the provided bubble sheet. Each question has a single best solution; if you record more than one solution for the same question, you will receive a score of zero on that question. If you answer x questions correctly, then your grade on the exam will be x/10, i.e., you must answer at least five questions correctly to pass. This exam is closed-book: you are welcome to bring with you empty pages and a single-sided A4/US letter note sheet, but you cannot bring other notes nor electronic devices to your desk. Please confirm immediately after the exam starts that you have all four pages and ten questions.

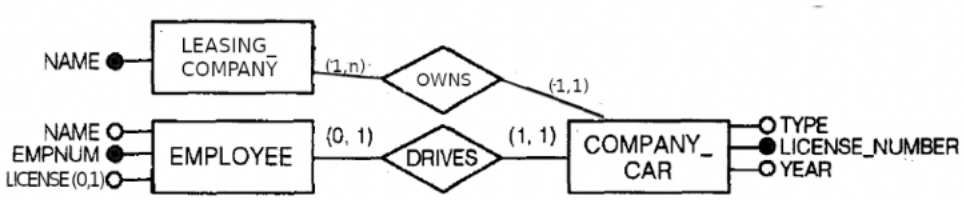

Figure 6.11 (Batini et al.), cropped & modified. No two employees can have the same driver license number.

Figure 1: Figure 6.11 (Batini et al.), cropped and modified. No two employees can have the same driver license number..

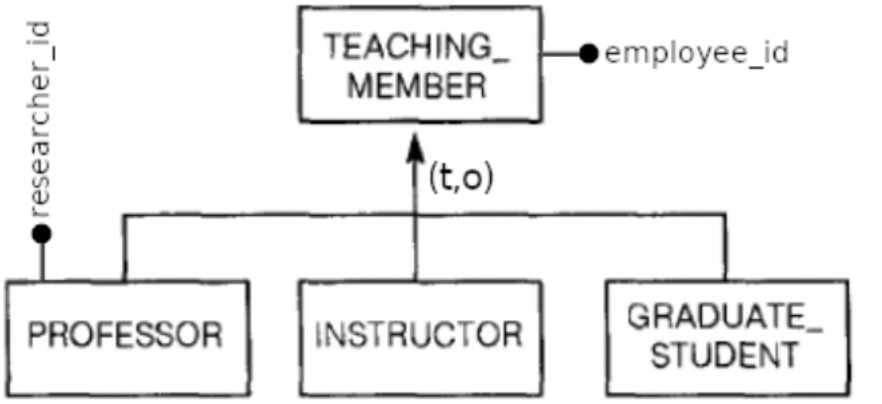

Figure 6.9 (Batini et al.), cropped & modified

Figure 2: Figure 6.9 (Batini et al.), cropped and modified.

1. (1 point) Which of the following abstraction mechanisms is not used in Figure 6.9's schema above?

    A. Aggregation

    B. Classification

    C. Generalisation

    D. None of the above

2. (1 point) Which of the following statements is not true given the schema in Figure 6.9? (This question accidentally has two correct answers).

    A. Some professors are not instructors

    B. Some professors are also instructors

    C. Some teaching members could be undergraduate students

    D. Some professors are not teaching members

3. (1 point) Where does conceptual design usually fit within the process of database design?

    A. After logical design, but prior to requirements analysis

    B. After requirements analysis, but prior to logical design

    C. After logical design, but prior to physical design

    D. After physical design, but prior to logical design

4. (1 point) Considering the schema in Figure 6.9 above, which of the following is an identifier of professor?

    A. {employee_id}

    B. {researcher_id}

    C. {employee_id} and {researcher_id}

    D. {employee_id, researcher_id}

5. (1 point) Considering the schema in Figure 6.11 above, what is the range of different leasing company names that each employee driver license number can be related to?

   A. min = 0, max = 0

   B. min = 0, max = 1

   C. min = 0, max = n

   D. min = 1, max = n

   E. None of the above

6. (1 point) Assume that you have a weak entity set, SportsTeam, which is supported by a strong entity set, City. Which of the following best describes the identifier for SportsTeam?

   A. It is the same as the identifier for City

   B. It includes all the attributes for City and some attributes from SportsTeam

   C. It is the union of the identifier for City and some attributes from SportsTeam

   D. It includes at least one attribute from City and all attributes from SportsTeam

7. (1 point) Consider the schema in Figure 6.9 above. Which of the following would be an information-preserving transformation that would improve this design? (This question also accidentally has two correct answers).

   A. Remove specialisations Instructor and Graduate_Student and replace them with two boolean attributes, is_instructor and is_graduate_student, on TEACHING_MEMBER

   B. Remove all specialisations and replace them with an optional attribute, researcher_id (0,1), and a mandatory attribute role on TEACHING_MEMBER

   C. Neither of the above, because they are not information-preserving

   D. Neither of the above, because the design is already good

8. (1 point) Assume that you are to design a schema for a system that tracks information about people (name, identifiers, birthdate, and current address), political parties (just their name), and for which parties each person votes. Which of the following is a good reason to represent PoliticalParty as a separate entity set?

    A. You will make a relationship VotesFor that is many-many from Person to PoliticalParty

    B. You want to have an extensible design

    C. There is a small, finite number of possible values for the name of a PoliticalParty

    D. There is no good reason to make PoliticalParty a separate entity set.

9. (1 point) In a valid Entity-Relationship Diagram, where can relationships be found?

    A. Only connected to entity sets

    B. Connected to entity sets and attributes

    C. Connected to entity sets, attributes, and other relationships

    D. Relationships are not part of the Entity-Relationship Diagram model

10. (1 point) Assume that you wanted to modify the schema top-down in Figure 6.11 to improve self-explanation. Which of the following top-down transformations best improves self-explanation with a minimal design?

    A. Move the optional driver's license attribute to the DRIVES relationship and make it mandatory

    B. Add a subset hierarchy to EMPLOYEE with a specialisation DRIVER that has LICENSE as an identifier; change DRIVES to relate to DRIVER instead of EMPLOYEE

    C. Make a new entity set DRIVER with LICENSE as an identifier and connect it to DRIVES as a ternary relationship

    D. Create a new relationship called IS_DRIVER between EMPLOYEE and itself

    E. Make LICENSE a mandatory attribute

Answer Key

Question 1

None of the above

Question 2

Some teaching members could be undergraduate students Some professors are not teaching members

Question 3

After requirements analysis, but prior to logical design

Question 4

{employee_id} and {researcher_id}

Question 5

min = 0, max = 1

Question 6

It is the union of the identifier for City and some attributes from SportsTeam

Question 7

Neither of the above, because they are not information-preserving Neither of the above, because the design is already good

Question 8

You will make a relationship VotesFor that is many-many from Person to PoliticalParty There is no good reason to make PoliticalParty a separate entity set. (0.5 marks because it could be multivalued attribute that is not normalised)

Question 9

Connected to entity sets and attributes

Question 10

Add a subset hierarchy to EMPLOYEE with a specialisation DRIVER that has LICENSE as an identifier; change DRIVES to relate to DRIVER instead of EMPLOYEE