

CSC 370 - Database Systems

Practice Midterm: 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.

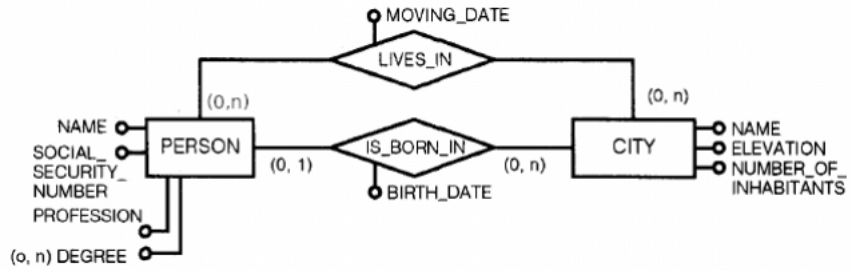


Figure 1: Figure 2.20 (Batini et al.), modified.

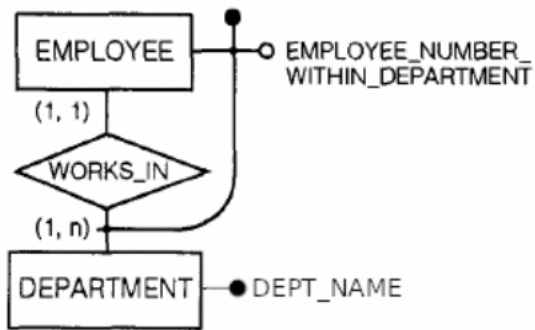


Figure 2: Figure 2.27(c) (Batini et al.), modified

1. (1 point) Which type of abstraction mechanism is used for WORKS_IN in Figure 2.27(c)'s schema above?
 - A. Aggregation
 - B. Classification
 - C. Generalisation
 - D. None of the above

2. (1 point) What is the identifier for the EMPLOYEE entity set in Figure 2.27(c)'s schema above?
 - A. undefined
 - B. {EMPLOYEE_NUMBER_WITHIN_DEPARTMENT}
 - C. {DEPT_NAME}
 - D. {EMPLOYEE_NUMBER_WITHIN_DEPARTMENT, DEPARTMENT}
 - E. {EMPLOYEE_NUMBER_WITHIN_DEPARTMENT, DEPT_NAME}

3. (1 point) What is the output of conceptual design?
 - A. A conceptual schema
 - B. A set of requirements
 - C. A conceptual data model

4. (1 point) Considering the schema in Figure 2.20 above, which of the following is an appropriate identifier for CITY? An example instance would be ('London', 251, 404699).
 - A. {CITY}
 - B. {ELEVATION}
 - C. {NUMBER_OF_INHABITANTS}
 - D. None of the above

5. (1 point) Assume that SOCIAL_SECURITY_NUMBER is an identifier in Figure 2.20 above. What are the minimum and maximum number of times that each unique PROFESSION can be paired with each unique BIRTH_DATE?
- A. min = 0, max = 1
 - B. min = 0, max = n
 - C. min = 1, max = 1
 - D. min = 1, max = n
 - E. None of the above
6. (1 point) Assume that you have total, overlapping generalisation entity set, Room, which is specialised by entity sets, Classroom and Lab. Which of the following statements is clearly then false?
- A. My lab takes place in the classroom
 - B. My lab and class are in different rooms
 - C. Each classroom has an identifier that is different from the room identifier
 - D. None of the above
7. (1 point) Consider the schema in Figure 2.20 above. Which of the following would be an information-preserving transformation that would improve this design?
- A. Make DEGREE a separate entity set and connect it to PERSON with a relationship
 - B. Merge LIVES_IN and IS_BORN_IN into one relationship with an attribute TYPE and merge MOVING_DATE and BIRTH_DATE into a single attribute called DATE
 - 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, and birthdate), movies (name, year published, and whether it is a cartoon or a mystery or both) and which people liked which movies. Which of the following is a good way to represent the movie entity set?
- A. As an entity set with an attribute called GENRE
 - B. As an entity set with two boolean attributes called IS_CARTOON and IS_MYSTERY
 - C. As an entity set with partial, overlapping specialisations called Cartoon and Mystery
 - D. As a multi-valued attribute of PERSON called MOVIES_LIKED
9. (1 point) In a syntactically correct Entity-Relationship Diagram, which of the following is not possible?
- A. An entity set without attributes
 - B. A generalisation hierarchy with only one specialisation
 - C. An attribute that is an aggregation of other attributes
 - D. A relationship that is not connected to any entity sets
10. (1 point) Assume that you were using a mixed methodology to construct a schema and that you had the two components shown by Figure 2.20 and Figure 2.27(c) above, respectively. You join them by making EMPLOYEE a specialisation of PERSON. Moreover, you added a relationship LOCATED_TO to relate DEPARTMENT to CITY with cardinalities of (1,1) and (0,n), respectively. What other modifications would you need to make to complete the design?
- A. Migrate some attributes from PERSON to EMPLOYEE
 - B. Migrate some attributes from EMPLOYEE to PERSON
 - C. Eliminate the identifier from EMPLOYEE because it is redundant
 - D. Create a relationship between PERSON and DEPARTMENT
 - E. None of the above

Answer Key

Question 1

Aggregation

Question 2

{EMPLOYEE_NUMBER_WITHIN_DEPARTMENT, DEPT_NAME}

Question 3

A conceptual schema

Question 4

None of the above

Question 5

min = 0, max = n

Question 6

None of the above

Question 7

Make DEGREE a separate entity set and connect it to PERSON with a relationship

Question 8

As an entity set with two boolean attributes called IS_CARTOON and IS_MYSTERY

Question 9

A relationship that is not connected to any entity sets

Question 10

None of the above