

# CSC 370 - Database Systems

## Midterm 01 Version 01 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.

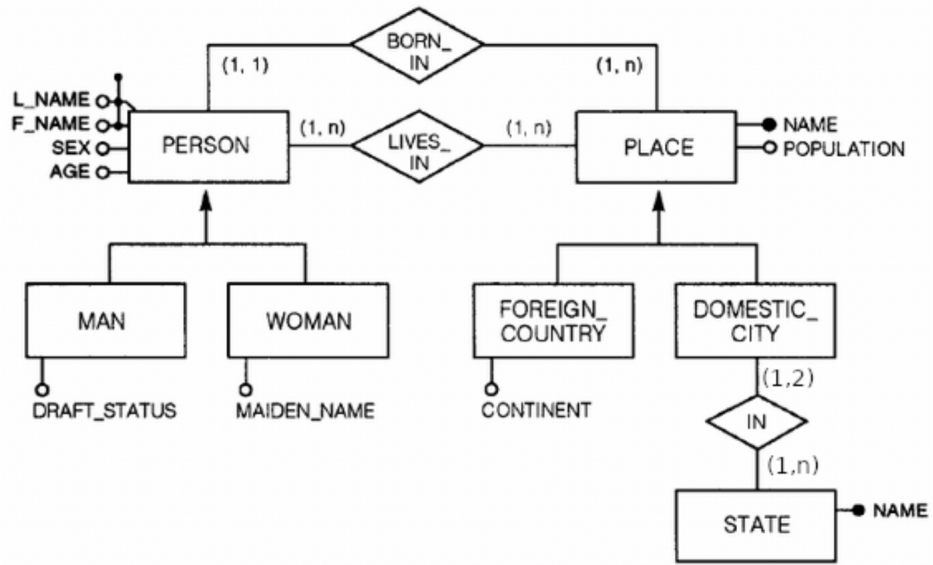


Figure 3.17(d) (Batini et al.), modified.

Figure 1: Figure 3.17(d) (Batini et al.), modified.

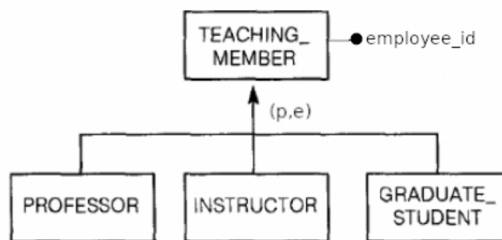


Figure 6.9 (Batini et al.), cropped & modified

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 3.17(d)'s schema above?
  - A. Aggregation
  - B. Classification
  - C. Generalisation
  - D. None of the above
  
2. (1 point) Which generalisation abstractions imposes no requirements on the general class?
  - A. total, exclusive
  - B. total, overlapping
  - C. partial, exclusive
  - D. partial, overlapping
  
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 3.17(d) above, which of the following is an identifier?
  - A. L\_NAME of PERSON
  - B. MAIDEN\_NAME of WOMAN
  - C. MAIDEN\_NAME of PERSON
  - D. NAME of DOMESTIC\_CITY

5. (1 point) Considering the schema in Figure 3.17(d) above, what are the minimum number of place names and state names that each WOMAN can be related to?
- A. place = 0, state = 0
  - B. place = 1, state = 0
  - C. place = 1, state = 1
  - D. place = 2, state = 0
  - E. None of the above
6. (1 point) Assume that you have a weak entity set, Room, which is supported by a strong entity set, Building. Which of the following best describes the identifier for Room?
- A. It is the same as the identifier for Building
  - B. It includes all the attributes for Building and some attributes from Room
  - C. It is the union of the identifier for Building and some attributes from Room
  - D. It includes at least one attribute from Building and all attributes from Room
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?
- A. Remove all specialisations and replace them with an attribute, Rank (0,1), on TEACHING\_MEMBER
  - B. Remove all specialisations and replace them with an attribute, Rank, 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 attributes be found?
- A. Only on entity sets
  - B. On entity sets and relationships
  - C. On entity sets, relationships, or other attributes
  - D. Attributes are not part of the Entity-Relationship Diagram model
10. (1 point) Assume that you wanted to modify the schema top-down in Figure 3.17(d) so that it was clear which domestic cities were capitols of which states with the constraint that each state has exactly one capitol. Which of the following top-down transformations captures the new requirement with a minimal design?
- A. Add a boolean attribute is\_capitol to DOMESTIC\_CITY
  - B. Add a subset hierarchy to DOMESTIC\_CITY with a specialisation CAPITOL\_CITY
  - C. Add a boolean attribute is\_capitol to relationship IN
  - D. Add a parallel relationship to IN, called CAPITOL\_OF with (0,1) and (1,1) cardinalities for DOMESTIC\_CITY and STATE, respectively
  - E. Add an attribute capitol\_city to STATE

## **Answer Key**

### **Question 1**

None of the above

### **Question 2**

partial, overlapping

### **Question 3**

After requirements analysis, but prior to logical design

### **Question 4**

NAME of DOMESTIC\_CITY

### **Question 5**

place = 1, state = 0 place = 2, state = 0 (0.75 marks: this is close to the correct solution)

### **Question 6**

It is the union of the identifier for Building and some attributes from Room

### **Question 7**

Remove all specialisations and replace them with an attribute, Rank (0,1), on TEACHING\_MEMBER

### **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 a multivalued attribute, which is not normalised)

### **Question 9**

On entity sets, relationships, or other attributes

### **Question 10**

Add a parallel relationship to IN, called CAPITOL\_OF with (0,1) and (1,1) cardinalities for DOMESTIC\_CITY and STATE, respectively