

# CSCI 4370: Assignment 2: Fall 2023

Provide answers to the following questions. You have to use your own ideas, words and examples when providing answers.

The work should be done in the groups you created on Piazza. Only the **group representative** should submit the assignment on **eLC**. Please include your team member names and group name in the report and submit a PDF file. Please do not submit other file formats.

**Due date: Thu, Sep 14, 2023 @ 11:59 PM**

1. Write five distinct points describing how the ER model is useful for the database design process.
2. Describe briefly what is an entity set with examples?
3. Describe briefly what is a relationship set with examples?
4. Provide three examples where attributes must be associated with the relationship set.
5. Provide three examples where the same entity set plays different roles in a relationship.
6. Provide three examples of ternary relationships. Explain why each one of them can not be broken down into binary relationships.
7. Write down the steps to convert the following ER model concepts to a corresponding relational schema.
  - Include what relations (tables) should be created and what attributes go in them.
  - Mention what are the primary and foreign keys in the resulting relations.
  - Specify where the attributes of the relationship set goes in the resulting schema.
  - Use the notation  $pk(E)$  to refer to the attributes of the primary key of an entity set  $E$  when needed.
  - Use the notation  $attr(X)$  to refer to the attributes of a relationship or entity set  $X$ .
  - Note:  $attr(X)$  includes primary key attributes.
  - a. Strong entity  $E$
  - b. Weak entity  $W$  in an identifying relationship with strong entity  $E$
  - c. One to one binary relationship  $R$  between entity sets  $A$  and  $B$ 
    - i. Consider the cases,
      1. no side is total
      2. one side is total
      3. both sides are total
  - d. 'One to many' or 'many to one' binary relationship  $R$  between entity sets  $A$  and  $B$
  - e. Many to many binary relationship  $R$  between entity sets  $A$  and  $B$
  - f. Entity set  $E$  that has a multivalued attribute  $M$

- g. Specialization of entity set E into entity sets S1, S2 and S3:
    - i. Method 1: minimize the number of relations to access when accessing the attributes of S1, S2 or S3.
    - ii. Method 2: minimize possible redundancy.
    - iii. What method is better suited if the generalization is disjoint and total?
    - iv. What can we do if we need to create a relationship between the parent relation and some other relation when using method 1?
  - h. Aggregation of relationship R relating entity sets E1, E2 and E3 is related to an entity set D with a relationship set A.
8. Provide an ER model to capture the following information about a medical clinic. You must use the notation we discussed in the class.
- Make sure to include the following entity sets in the model. You can decide the business policy of the clinic as long as it resembles a usual clinic.
- Employee, Doctor, Pharmacist, Lab Technician, Patient, Lab Test, Prescription, Medication.
- Capture the relationships between these entity sets using appropriate relationships and cardinalities. Use the concepts discussed in the class whenever they are applicable. Provide suitable attributes to the entity sets and relationship sets. Use composite, and multivalued attributes in suitable places. Mark the primary keys.
9. Convert the ER model to a relationship schema using the steps you listed above. You don't have to include anything in the submission for this.
10. Provide SQL statements to create the converted schema with appropriate constraints.

Note: If you have any questions, please post on Piazza.