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Assignment 7: A review of chapters 1 to 5
CIS 310 FALL 2019

Please do your best to answer the following six questions, using Visio or Lucid Chart.

1. Typically, a patient staying in a hospital receives medications that have been ordered by a particular doctor. Because the patient often receives several medications per day, there is a 1:M relationship between PATIENT and ORDER. Similarly, each order can include several medications, creating a 1:M relationship between ORDER and MEDICATION.

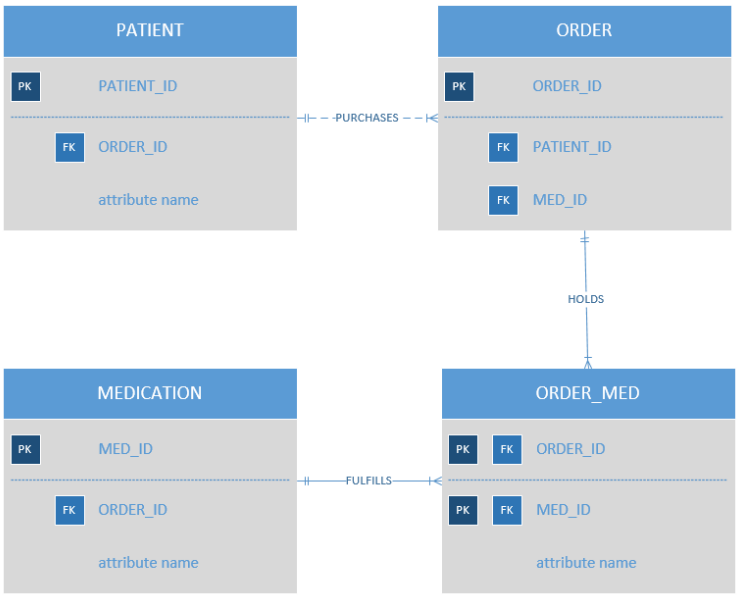
a. Identify the business rules for PATIENT, ORDER, and MEDICATION.

The Business Rules for PATIENT, ORDER, and MEDICATION are as follows:

- One patient can make many orders, and many orders can have one patient
- One medical order contains many medications, and many medications can be made by one order

ENTITY	RELATIONSHIP	CONNECTIVITY	ENTITY
PATIENT	PURCHASES	1:M	ORDER
ORDER	CONTAINS	M:N	MEDICATION

b. Create a Crow's Foot ERD that depicts a relational database model to capture these business rules.



2. **United Broke Artists (UBA) is a broker for not-so-famous painters. UBA maintains a small network database to track painters, paintings, and galleries. A painting is painted by a particular artist, and that painting is exhibited in a particular gallery. A gallery can exhibit many paintings, but each painting can be exhibited in only one gallery. Similarly, a painting is painted by a single painter, but each painter can paint many paintings. Using PAINTER, PAINTING, and GALLERY, in terms of a relational database:**

   a. **What tables would you create, and what would the table components be? Identify each table with attributes**

- The **PAINTER** table that would be created needs to include the following attributes: PAINTER_ID, PAINTER_FNAME, PAINTER_LNAME, PAINTER_DOB, PAINTER_ADDRESS, and PAINTER_PHONE
- The **PAINTING** table that would be created needs to include the following attributes: PAINTING_ID, PAINTING_NAME, PAINTING_DATE, PAINTING_PRICE, PAINTING_CATEGORY, PAINTER_ID (foreign key), and GALLERY_ID (foreign key
- The **GALLERY** table that would be created needs to include the following attributes: GALLERY_ID, GALLERY_NAME, GALLERY_LOCATION, GALLERY_CONTACT, and PAINTING_ID (a foreign key)

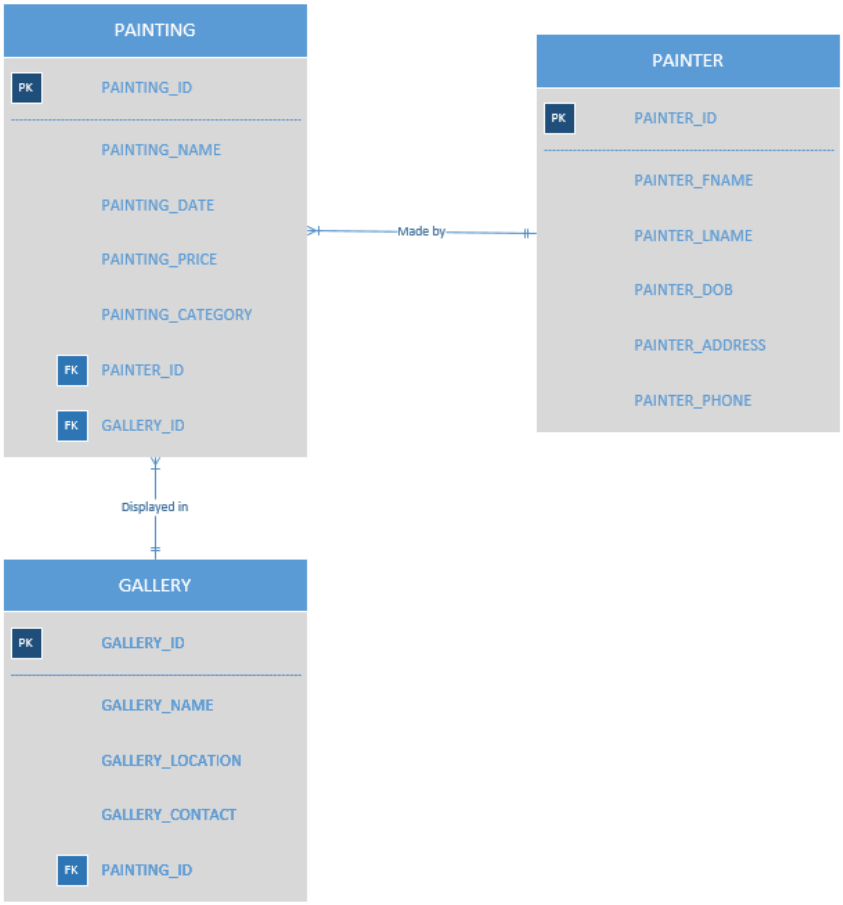
   b. **Identify applicable business rules for each entities (tables)**

Business rules for each of the tables are as follows:

- Paintings are created by a single painter, but one painter can make many paintings.
- Many paintings can be exhibited in only one gallery, but a gallery can include many paintings.

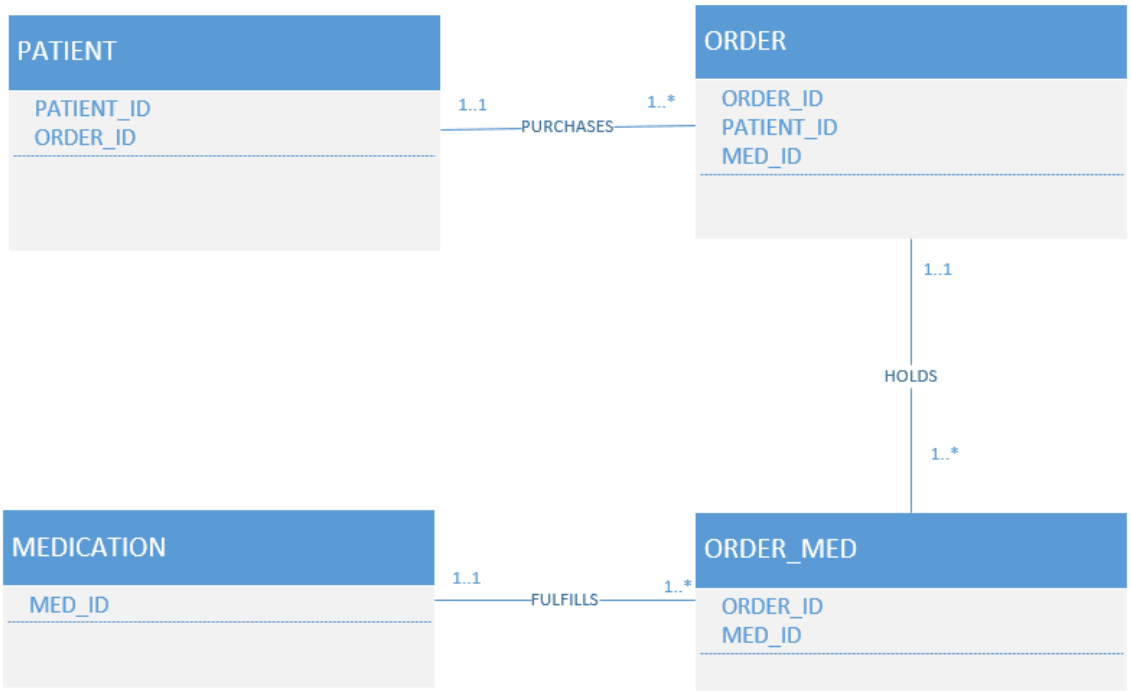
ENTITY	RELATIONSHIP	CONNECTIVITY	ENTITY
PAINTER	CREATES	1:M	PAINTING
GALLERY	EXHIBITS	1:M	PAINTING

   c. **Show the relationships in a Crow's Foot diagram**



3. Using the ERD you created from Problem 2, create the relational diagram. (Create an appropriate collection of attributes for each of the entities. Make sure you use the appropriate naming conventions to name the attributes.)

4. Convert the ERD from Problem 1 into the corresponding UML class diagram.



5. Identify the business rules from the depicted relationships in the Crow's Foot ERD shown in Figure 5.1

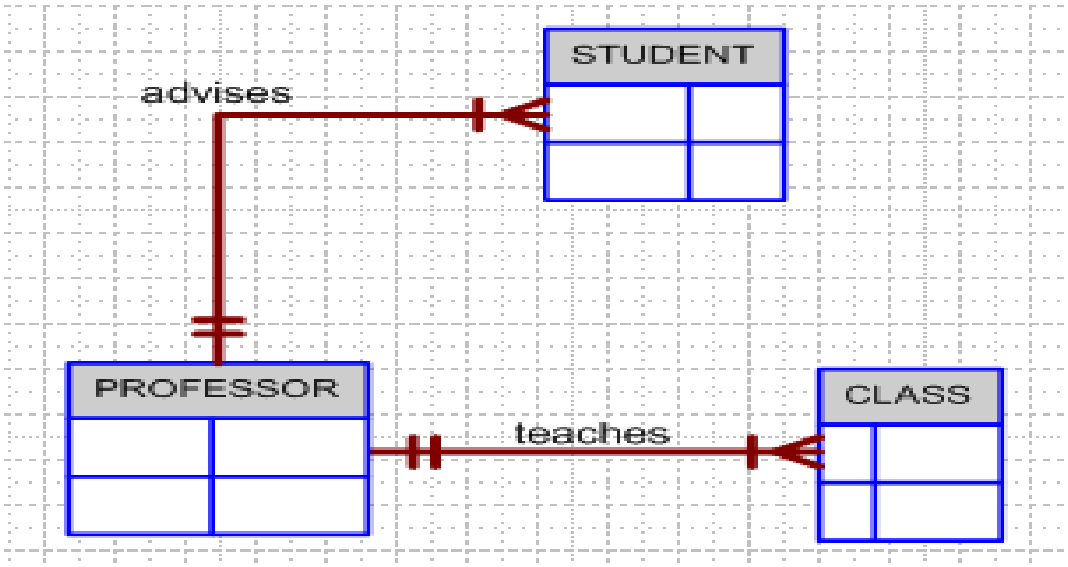


Figure 5.1 The Crow's Foot ERD for Problem 5

The Business Rules for figure 5.1 are as follows:

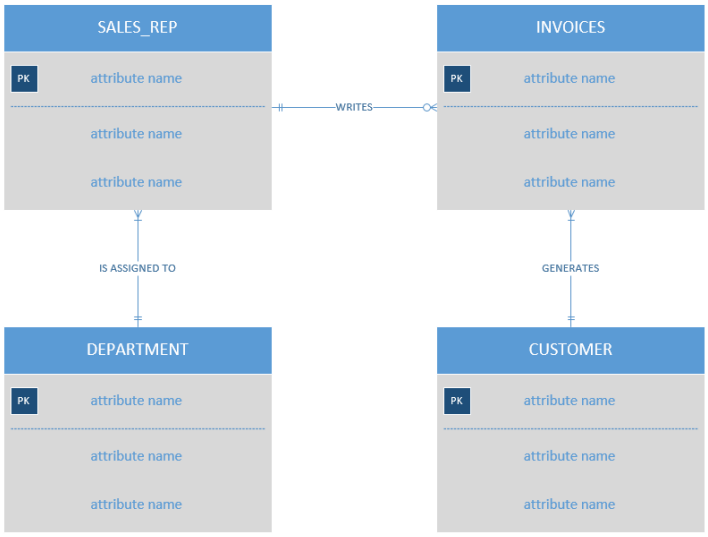
- Many students can be advised by one professor, but each professor can advise one or many students.
- Many classes can only be taught by only one professor, but each professor can teach one or many classes.

ENTITY	RELATIONSHIP	CONNECTIVITY	ENTITY
PROFESSOR	ADVISES	1:M	STUDENT
PROFESSOR	TEACHES	1:M	CLASS

6. Create a Crow's Foot ERD to include the following business rules for the ProdCo company:

a. **Each sales representative writes many invoices.**
b. **Each invoice is written by one sales representative.**
c. **Each sales representative is assigned to one department.**
d. **Each department has many sales representatives.**
e. **Each customer can generate many invoices.**
f. **Each invoice is generated by one customer.**

ENTITY	RELATIONSHIP	CONNECTIVITY	ENTITY
SALES_REP	WRITES	1:M	INVOICES
DEPARTMENT	INCLUDES	1:M	SALES_REP
CUSTOMER	RECEIVES	1:M	INVOICES



7. What is normalization and why it's important?

a. describe the three forms

- Normalization is the process of evaluating and correcting table structures to try and reduce/minimize the data redundancy in a database. Redundancy can cause inconsistencies (insertion, update, and deletion anomalies), and normalization resolves these issues. There are three forms of normalization: first normal form (1NF), second normal form (2NF), and third normal form (3NF). 1NF eliminates repeating groups and null values, it helps identify a primary key, and identify all of the dependencies that use a diagram in tabular format (all attributes are dependent on the primary key). 2NF eliminates partial dependencies and reassigns corresponding dependent attributes (and therefore eiminating most anomalies). 3NF makes new tables that eliminate transitive dependencies and reassigns any further corresponding dependent attributes. 3NF normalization is being used for most of the business database designs that help maintain a high data integrity as much as possible. However, 3NF is seen as being desirable all the time, as there is increased performance (but higher redundancy) in the lower levels.

b. describe the data modeling checklist

- The data modeling checklist ensures that data-modeling tasks are being performed successfully. The checklist includes representing real-world data, users, processes, and interactions into the data model. The business rules need to be properly documented and verified with end users, as each source of the rules needs to be justified, dated, and approved in order to identify entities, attributes, relationships, and constraints. Data

modeling incorporates naming conventions that are limited in length and are also unique to each of the entities. Each entity should represent a single subject and has to be clearly defined as an instance. The attribute names need to be unique to each entity and use suffixes that describe the characteristic. Relationship names are verbs that clearly show what is the nature, cardinalities and participants of the relationship. The last part of the checklist is the entity relationship models, the relationship models have to conform to the minimal data rule and also be validated against insertion, update, and deletion processes in order to minimize and potential redundancies.