Week 3 ICT_104

Name : Drishti Durgesh Telgu

Student Id : SM20240093

Unit : ICT_104

Professor : Md Muhammad Rafiqul Islam

Tutorial :

Question 1. Write the business rule(s) that govern the relationship between Agent and Customers .

Answer :

1) In this, the relationship between AGENT and CUSTOMER is defined by certain business rules governing their interaction. Salient features are:

   - One-to-Many Relationship: One agent can handle many customers.
   - Dedicated Service:Every customer is assigned to precisely one agent.
   - These regulations are essentially depicting how one agent can correspond to multiple clients for deriving an extension of reach and the facility of customized service. The organization ties up a single agent with each customer so that a certain level of responsibility will be there and hence a way through which betterment in the satisfaction of the customer can be conveyed better.

2) Each customer will be assigned to only one serving agent, who shall be responsible and have the means to service that one customer. Consequently, this means there is somebody responsible whom

customers can get in touch with to understand their needs, develop better communication, and improve relations.

Question 2. Given the business rule(s) you wrote in Problem 1, create the basic Crow's Foot ERD.

Answer :

1) This notation shows that one agent can take up to several customers, and one customer is assigned to only one agent. Such diagramming reinforces a hierarchical relationship in order to keep the service delivery lean and effective.

2) This would be represented in a Crow's Foot ERD by drawing a single line to the customers entity from the agent that is annotated with a crow's foot. It would represent that one agent manages many customers, but each customer is managed by only one agent.
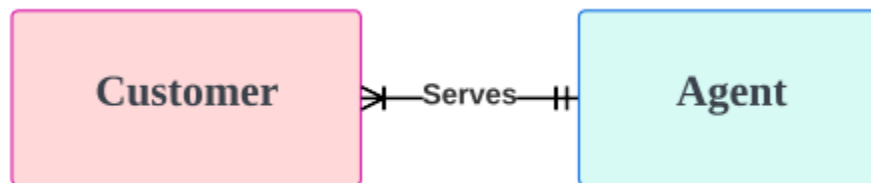

3) This would be represented in the Crow's Foot ERD by drawing a single line to the customers entity from the AGENT, annotated at the latter with a crow's foot. It would represent that one agent manages many customers, but each customer is managed by only one agent.

Lucidchart. (n.d.). *Entity Relationship Diagram (ERD) Examples.* Available at: https://www.lucidchart.com/pages/er-diagram/erd-examples (Accessed: 15 October 2024).

3. Using Figure P2.6 as your guide, work on Problems 4–5. The Tiny College relational diagram shows the initial entities and attributes for the college.

Figure P2.6 The Tiny College relational diagram
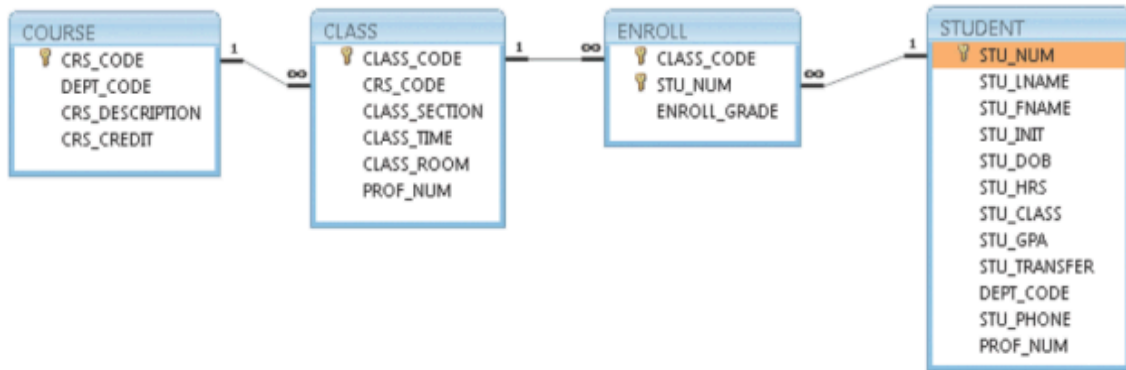
Question 4. Identify each relationship type and write all of the business rules.

Answer :

A number of relationships were specified in the relational model that demonstrated the interaction of the key entities in Tiny College's academic setup. Students and Courses relationship: M→n. Course to Instructor Relationship: Many courses to one instructor. It will be a Many-to-One relationship because every course will be assigned to one instructor, while one instructor can teach many courses; this would reflect different teaching expertise and time availability among the faculty. Last but not least, Department and Instructor will be One-to-Many (1:N) related in that for every instructor there will be one department; for every department there can be multiple instructors-an appropriate organizational structure among academic departments at this college.

- M

(Student to Course): A student can be enrolled into several courses and a course can have lots of students.

- M : 1 (Course to Instructor): Every course is assigned with only one instructor, but an instructor can assign several courses.
- 1 (Department to Instructor): One department can be associated with many instructors, but one instructor is associated with only one department.

The result of these relationships and rules is a neat, workable academic structure that guarantees the data model precisely represents the operational dynamics at Tiny College.

Question 5. Create the basic Crow's Foot ERD for Tiny College.

Answer :
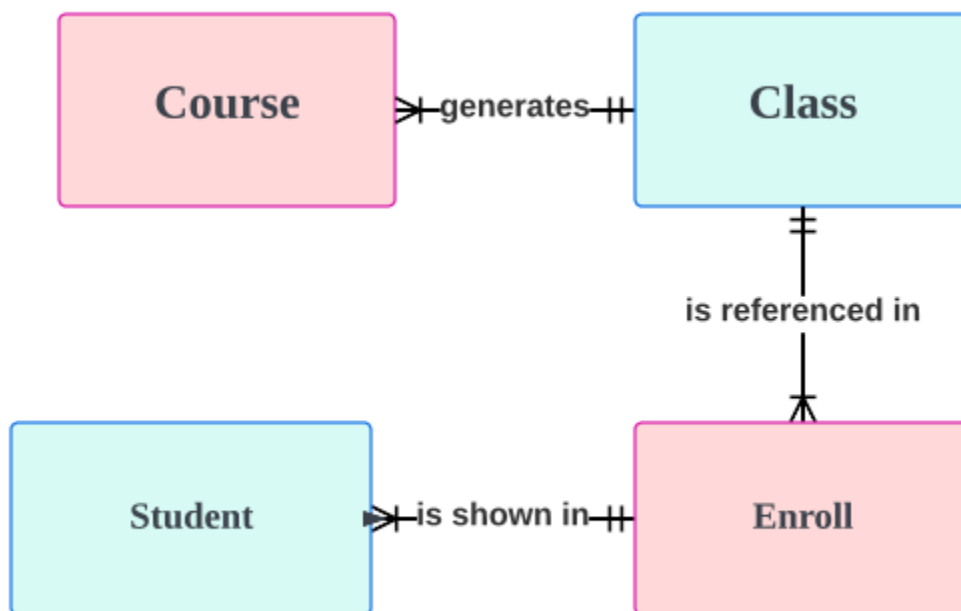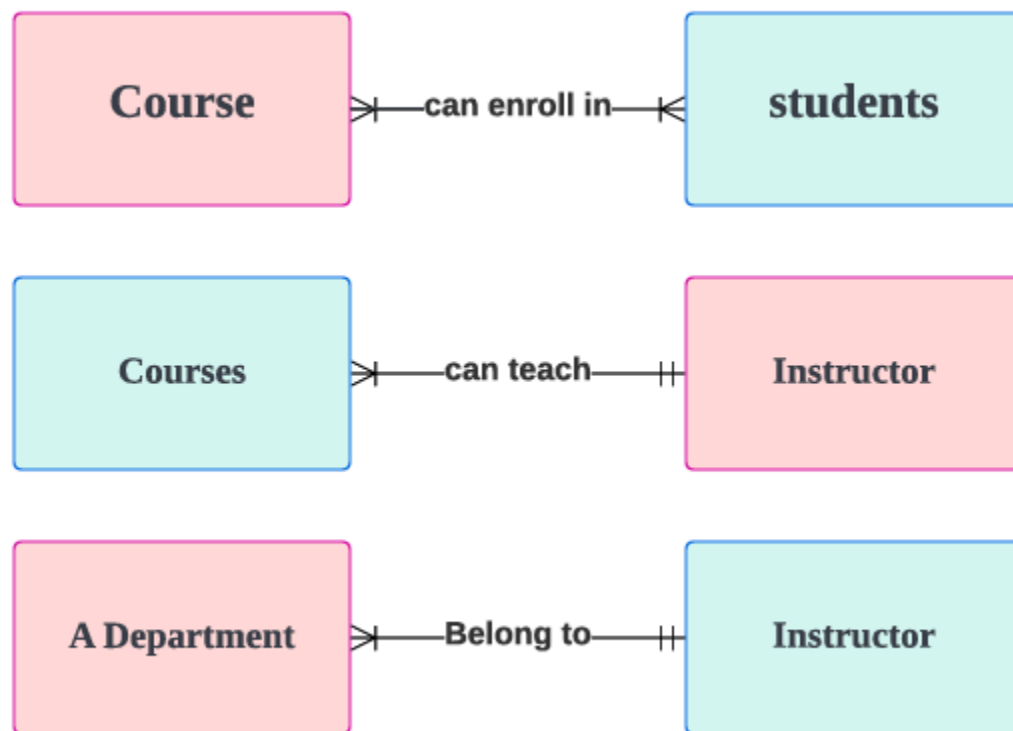
Question 6 : Typically, a hospital patient receives medications that have been ordered by a particular doctor. Because the patient often receives several medications per day, there is a 1:M relationship between PATIENT and ORDER. Similarly, each order can include several medications, creating a 1:M relationship between ORDER and MEDICATION.

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

Answer :

Business rules, from the perspective of the medication administration system of the hospital, can be said as follows:

One patient can receive more than one order. Every order will carry one unique Patient ID. Each order can contain more than one medication for one patient, uniquely identified by an Order ID. PATIENT: A patient can receive multiple orders. Each patient has a unique identifier called a Patient ID. ORDER: One order can have multiple medications.

Each order is associated with one and only one patient.

Each order has a unique identifier called the Order ID.

MEDICATION:

Each medication can be part of many orders and vice-versa

Each medication has a unique identifier called a Medication ID.

b. Draw a Crow's Foot ERD that represents a relational database model which captures the above business rules.

Answer :
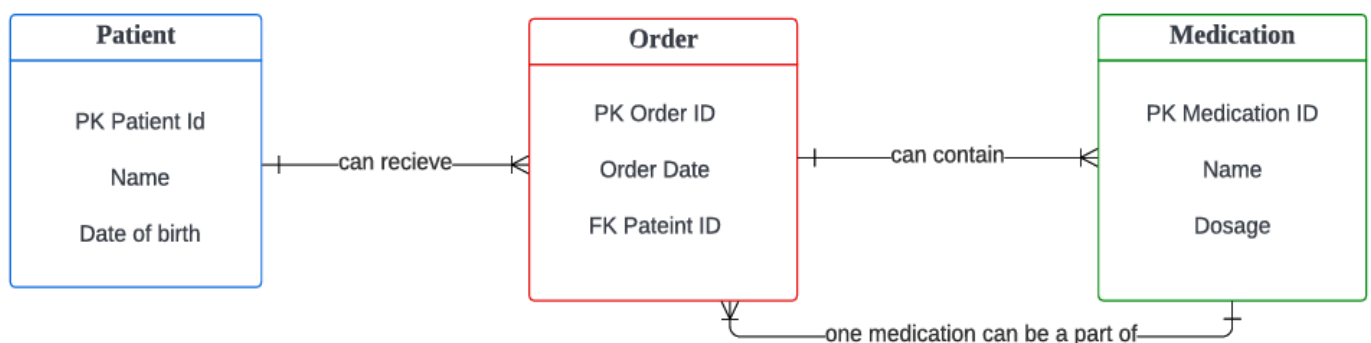
 Lucidchart. (n.d.). *Lucidchart: Diagramming application for all your flowcharts, diagrams, and more*. Available at: https://www.lucidchart.com (Accessed: 21/10/2024, 1:37pm).

7. United Broke Artists (UBA) is a broker for not-so-famous artists. UBA maintains a small database to track painters, paintings, and galleries. A

painting is created by a particular artist and then 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 created by a single painter, but each painter can create 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?

Answer :

Tables and Components

- **PAINTER**
  - **Painter ID**: Unique identifier for each painter (Primary Key).
  - **Painter Name**: Name of the painter.
  - **Bio**: Brief biography of the painter.
  - **Contact Information**: Details like email and phone number for communication.
- **PAINTING**
  - **Painting ID**: Unique identifier for each painting (Primary Key).
  - **Title**: Name of the painting.
  - **Year Created**: The year the painting was created.
  - **Medium**: The materials or techniques used (e.g., oil, watercolor).
  - **Painter ID**: References the painter who created the painting (Foreign Key).
  - **Gallery ID**: References the gallery where the painting is exhibited (Foreign Key).
- **GALLERY**
  - **Gallery ID**: Unique identifier for each gallery (Primary Key).

- **Gallery Name**: Name of the gallery.
- **Location**: Physical address or area of the gallery.
- **Contact Information**: Details like email and phone number for inquiries.

Table :
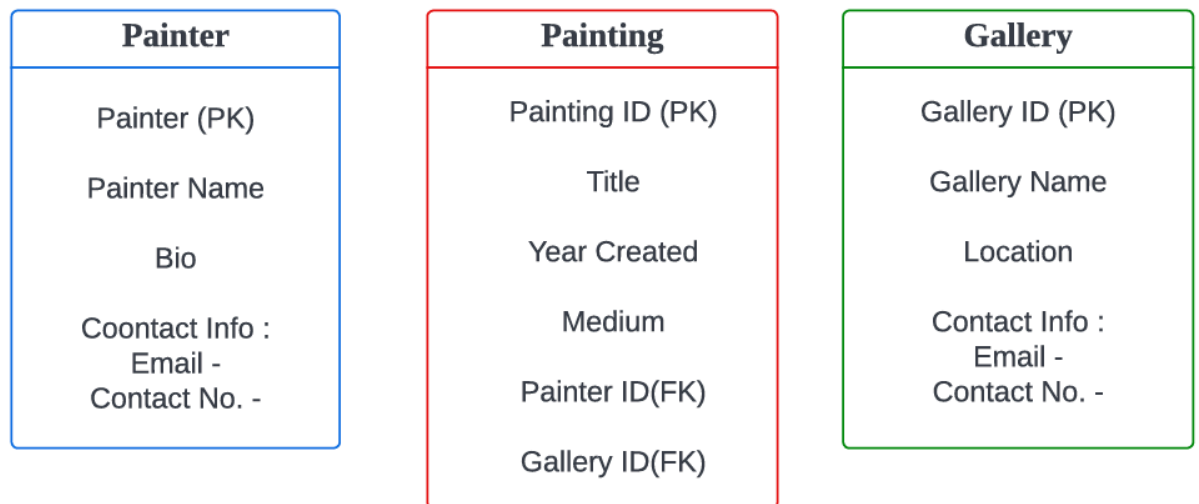
Lucidchart. (n.d.). *Lucidchart: Diagramming application for all your flowcharts, diagrams, and more*. Available at: https://www.lucidchart.com (Accessed: 21/10/2024, 1:37pm).

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

Answer :

Relationships Between Tables

1. **PAINTER to PAINTING**:
- **Relationship**: One painter can create multiple paintings (1 relationship).

- **Description**: Each painting is linked to exactly one painter, establishing a clear creator relationship.
2. **GALLERY to PAINTING**:
- **Relationship**: One gallery can exhibit multiple paintings (1 relationship).
- **Description**: Each painting is associated with one specific gallery, indicating where it is displayed.

Purpose of Keys

- **Primary Key (PK)**:
- **Definition**: A unique identifier for each record in a table.
- **Purpose**: Ensures that each entry is distinct, enabling efficient data retrieval and integrity.
- **Example**: In the PAINTER table, the **Painter ID** uniquely identifies each painter.
- **Foreign Key (FK)**:
- **Definition**: A field in one table that links to the primary key of another table.
- **Purpose**: Establishes and enforces a relationship between two tables, ensuring referential integrity.
- **Example**: In the PAINTING table, **Painter ID** and **Gallery ID** are foreign keys that reference the PAINTER and GALLERY tables, respectively.

Crow's foot ERD :
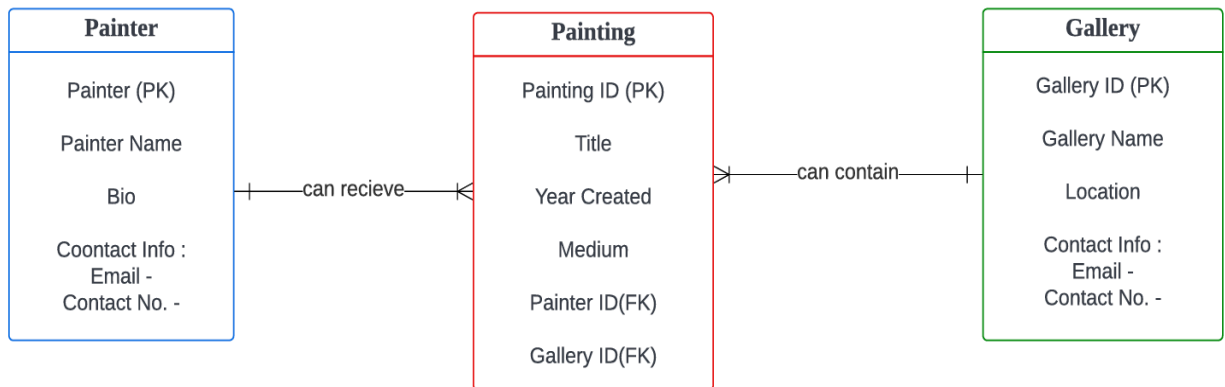
Lucidchart. (n.d.). *Lucidchart: Diagramming application for all your flowcharts, diagrams, and more*. Available at: https://www.lucidchart.com (Accessed: 21/10/2024, 1:37pm).

8. Using the ERD from Problem 7, create the relational schema. (Create an appropriate collection of attributes for each of the entities. Make sure you use the appropriate naming conventions to name the attributes.)

Answer :

A relational schema organizes how we store information in tables in a database. Each table has specific attributes which means the pieces of information that describe what we want to track.

Let's breakdown some Important terms to set up a relational schema in a database :

- **INT**: Used for whole numbers like IDs.
- **VARCHAR(n)**: Used for text that can vary in length which is up to n characters.
- **TEXT**: Used for longer pieces of text like bios.

- **NOT NULL**: Indicates that this field must have a value it cannot be left empty.
- **REFERENCES**: Creates a connection between tables, ensuring that related data stays consistent like linking paintings to their painters.
- **Tables and Attributes**

Let's set up the table accordingly

1. PAINTER Table

This table stores information about the artists.

- **PainterID** (INT, NOT NULL, Primary Key): A unique number for each painter. It can't be empty.
- **PainterName** (VARCHAR(100), NOT NULL): The name of the painter, which must be provided and can be up to 100 characters long.
- **Bio** (TEXT): A longer description about the painter. This can be left empty.
- **ContactEmail** (VARCHAR(100)): The email address of the painter. This can also be left empty.
- **ContactPhone** (VARCHAR(15)): The phone number of the painter, which can be up to 15 characters long. This can be left empty too.

2. PAINTING Table
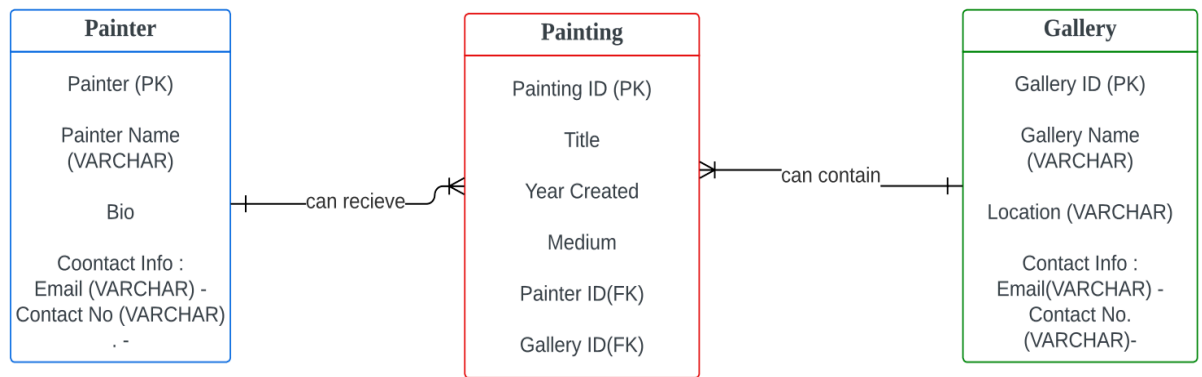
This table contains details about the paintings.

- **PaintingID** (INT, NOT NULL, Primary Key): A unique number for each painting. It can't be empty.

- **Title** (VARCHAR(200), NOT NULL): The name of the painting, which must be provided and can be up to 200 characters long.
- **YearCreated** (YEAR, NOT NULL): The year the painting was made. This must be filled in.
- **Medium** (VARCHAR(100)): What materials were used to create the painting (like oil, watercolor, etc.). This can be left empty.
- **PainterID** (INT, NOT NULL, REFERENCES PAINTER(PainterID)): This links to the PainterID in the PAINTER table, indicating who created the painting. It can't be empty.
- **GalleryID** (INT, NOT NULL, REFERENCES GALLERY(GalleryID)): This links to the GalleryID in the GALLERY table, showing where the painting is displayed. This also can't be empty.

3. GALLERY Table

This table has information about the galleries.

- **GalleryID** (INT, NOT NULL, Primary Key): A unique number for each gallery. It can't be empty.
- **GalleryName** (VARCHAR(100), NOT NULL): The name of the gallery, which must be provided and can be up to 100 characters long.
- **Location** (VARCHAR(200)): The address or location of the gallery. This can be left empty.
- **ContactEmail** (VARCHAR(100)): The email address for the gallery. This can be left empty.
- **ContactPhone** (VARCHAR(15)): The phone number for the gallery, which can be up to 15 characters long. This can also be left empty.

Painter	Painting	Gallery
Painter (PK)	Painting ID (PK)	Gallery ID (PK)
Painter Name (VARCHAR)	Title	Gallery Name (VARCHAR)
Bio	Year Created	Location (VARCHAR)
Coontact Info : Email (VARCHAR) - Contact No (VARCHAR) . -	Medium	Contact Info : Email(VARCHAR) - Contact No. (VARCHAR)-
	Painter ID(FK)	
	Gallery ID(FK)	

Painter —can recieve— Painting —can contain— Gallery

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

 a. Each sale 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.

Answer :
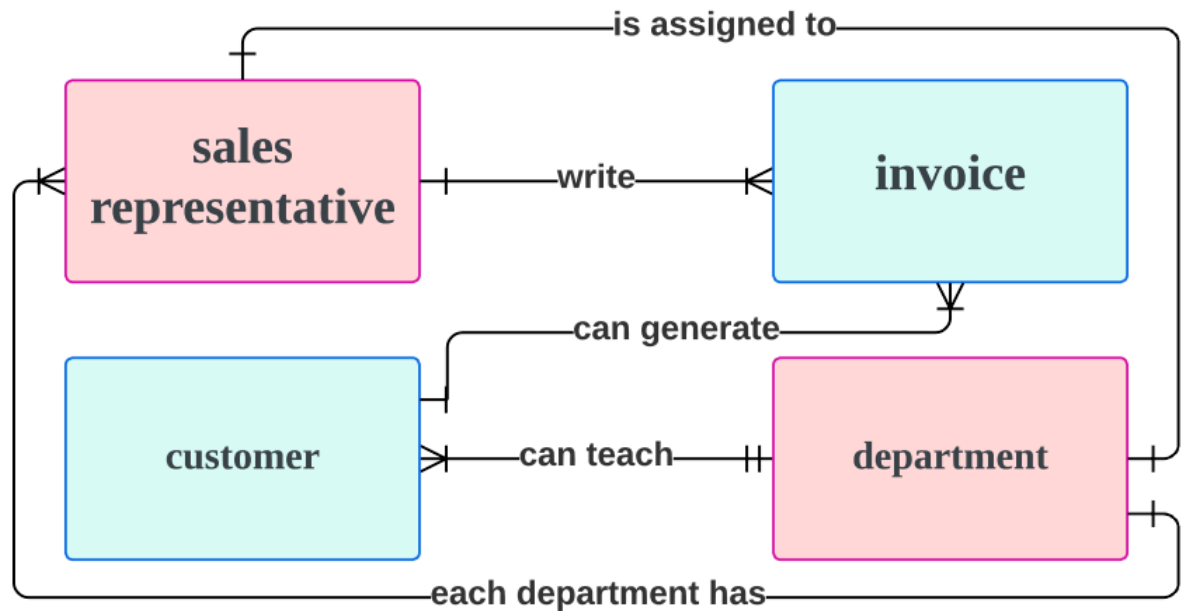
```
                        ──────────is assigned to──────────
  ┌──┤                                                                          │
  │ ┌─────────────────────┐                    ┌─────────────────────┐          │
  │ │        sales        ├──write──<│         │       invoice       │          │
  ├─<┤   representative    ├─┤                  │                     │          │
  │ └─────────────────────┘                    └──────────┬──────────┘          │
  │                         ──can generate──               ×                     │
  │ ┌─────────────────────┐           │        ┌─────────────────────┐          │
  │ │                     ├>──can teach──┤┤──   │     department      ├─┤        │
  └─┤      customer       │              │      │                     ├─┤        │
    └─────────────────────┘             ┤      └─────────────────────┘          │
                         ──each department has──                                 │
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10. Write the business rules that are reflected in the ERD shown in Figure P2.15. (Note that the ERD reflects some simplifying assumptions. For example, each book is written by only one author. Also, remember that the ERD is always read from the "1" to the "M" side, regardless of the orientation of the ERD components).

Answer :

1) Book-Author Relationship: One book is written by one author; hence, every book has only one creator. However, one author may have several books; hence, an author can also have more than one book.

2) Book and Publisher Relationship: There is one book and one publisher. The book has its own ownership to the publication;

conversely, a publisher can publish under one banner several books that reflect the diversity of its catalog.

3) Relationship of Customer to Book: The fact that each customer can borrow more than one book acts as evidence for how flexible the borrowings can get. On the other hand, many customers can borrow the same book over time, thus ensuring many customers can gain access to literature.

4) Borrowing Records: The borrowing records are a link between customers and the books they borrow. Each record contains information about one customer and one book plus information relevant to the transaction such as the date the borrowing took place and the status of the book, whether it has been returned.

Reference:

 Lucidchart. (n.d.). *Lucidchart: Diagramming application for all your flowcharts, diagrams, and more*. Available at: https://www.lucidchart.com (Accessed: 21/10/2024, 1:37pm).