Course Code: IS212
Course Name: Fundamentals of Database Concepts
Faculty of Computer and Information
Assiut University

Sheet 4

1. Design an ERD for an order processing system:

The data requirements for any retail store are as follows:

- The store has products where customers can buy them. The product has productID, name, unit price, units in stock, units on order, discount.
- Customers have customer ID, name, address, phone. They can buy products by making an order and any order has orderID, date, shipped date, ship address, and total price.
- Each order contains any number of products with their quantity and price for each item in the order.
- A shipment company ships order to customers. A shipper has ID, company name, phone. A shipper company ships many orders.
- An Employee has ID, name, title, address, phone. Each employee can work on many orders, but each order is worked on by one employee.
- Products may belong to one category that has ID, name, description. Each category has a number of products.
- Suppliers provide the retail with products. Each product is supplied by one supplier only. Suppliers have ID, company name, contact name, contact title, address, phone.

2. Design an ER diagram for a license issuing process of vehicles.

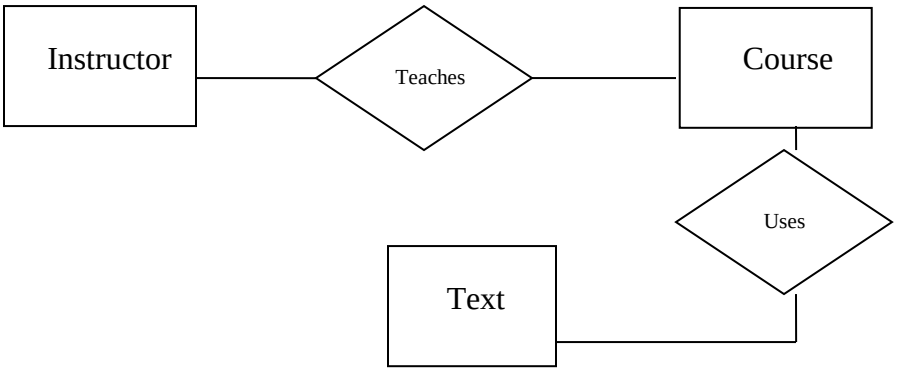
The data requirements are as follows:

- The country is divided into departments (Cairo, Giza, Alex…etc). Each department is described by a code (unique), name (unique), and several service locations (e.g., for Cairo department, there are: Heliopolis, Nasr City, etc.).
- Each vehicle is described by a vehicle no, model (ex. Hyundai accent, Hyundai matrix, fiat 128, fiat punto), type (private, limousine, taxi, etc.), color, motor capacity, number of seats, manufacturing year, license issue date, license expiry date, owner, tax rate, and a set of fins. The owner, type and tax rate information are mandatory for each vehicle. Each vehicle model is identified by a code (unique), name (unique) and tax category. Each tax category has a specific tax rate and category_id. The tax category has one or more vehicle models.

- Each vehicle fin is described by a number (unique), type, date, and vehicle no. Each fin type has a specific value and description.
- Each owner is described by id (unique), name, type (individual, organization, government, etc.), address, and set of phone numbers.

3. **Design and draw an EER diagram that captures the information about a park:**
   - The park has a number of locations throughout the city. Each location has a LocationID, and Address, a description and a maximum capacity.
   - Each location has different areas, for example, picnic areas, football fields, etc. Each area has an AreaID, a type, a description and a size.
   - Each Location is managed by one of the Areas.
   - For the picnic areas, there are sites. Within each picnic area, there are multiple sites. Each site is identified by the site number, which is unique within each picnic area.
   - Events are held at the park, and the park tracks the EventID, the event name, description, as well as the AreaID where the event is being held. One event can be held across multiple areas.
   - There are three different types of events, Sporting Events, which have the name of the team competing, Performances, which have the name of the performer, and the duration. Each performance can have multiple performers, and Conferences, which have a sponsoring organization.
   - The park rents some equipment to the visitors. There are three categories of equipment, Bikes, which have a bike ID, and colour, Boats, which have a Seats (number of people) and a boat ID, and Sports Equipment, which has an Equipment ID, and equipment type. All equipment (bikes, boats, sports) are not rental equipment, some is to be used by park employees.
   - Rentals are rented by visitors to the park. Each time the equipment is rented, the park records the date and time.
   - The park also wishes to track information about visitors to the park. They assign each visitor a visitor ID, and store their name, date of birth and registration date. They also record information about the locations visited by each visitor, and the date/time of each visit.

4. Consider the following ER diagram:



Assume that a course may or may not use a textbook, but that a text by definition is a book that is used in some course. A course may not use more than five books. Instructors teach from two to four courses. Supply(min,max) constraints on this diagram. State clearly any additional assumptions you make. If we add the relationship ADOPTS between INSTRUCTOR and TEXT what (min,max) constraints would you put on it? Why?