

The Motor Vehicle Branch administers driving tests and issues driver's licenses. Any person who wants a driver's license must take a learner's exam at any Motor Vehicle Branch in the province. If he/she fails the exam, he can take the exam again any time after a week of the failed exam date, at any branch. If he passes the exam, he is issued a license (type = learner's) with a unique license number. A learner's license may contain a single restriction on it. The person may take his driver's exam at any branch any time before the learner's license expiry date (which is usually set at six months after the license issue date). If he passes the exam, the branch issues him a driver's license. A driver's license must also record if the driver has completed driver's education, for insurance purposes.

Create a E-R diagram following these steps.

1. Find out the entities in the spec.
2. Find out the relationships among the entities.
3. Figure out attributes of the entities and (if any) of the relationships.
4. Figure out constraints between entities and relationships.

The entities in the specification are:

Branch

Driver

License

Learner License

Driver License

Constraints:

1. a [driver] must <own> (at least one) [license].
2. a [driver] must <take> at least one exam.
3. a [license] must be <owned> by one and only one [driver].
4. a [license] must be <issued> by one and only one [branch].
5. a [branch] must <issue> at least one license

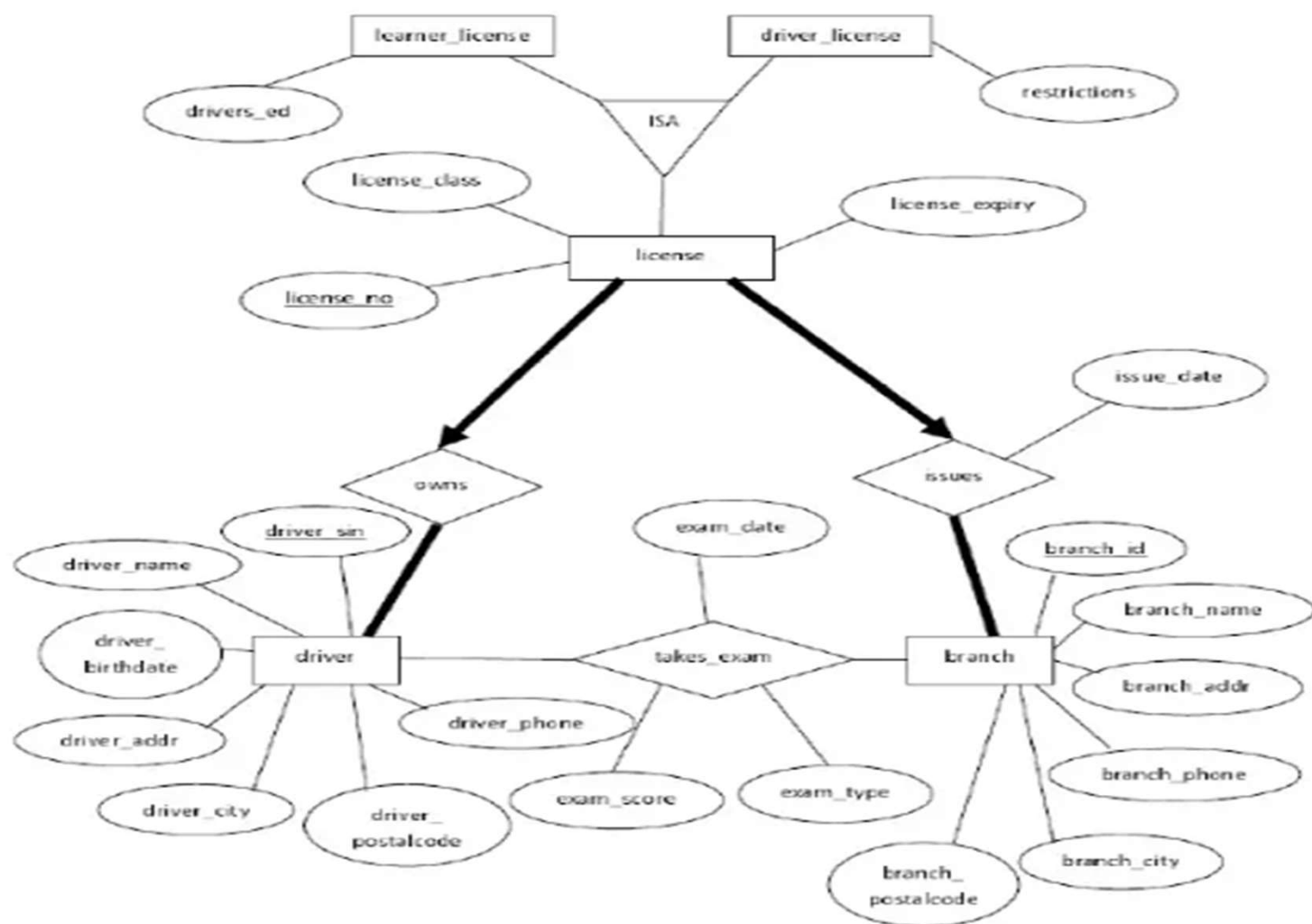
Relationships:

takes exam(driver,branch):exam date, exam score, exam type

owns(license, driver)

issues(license, branch): issue data

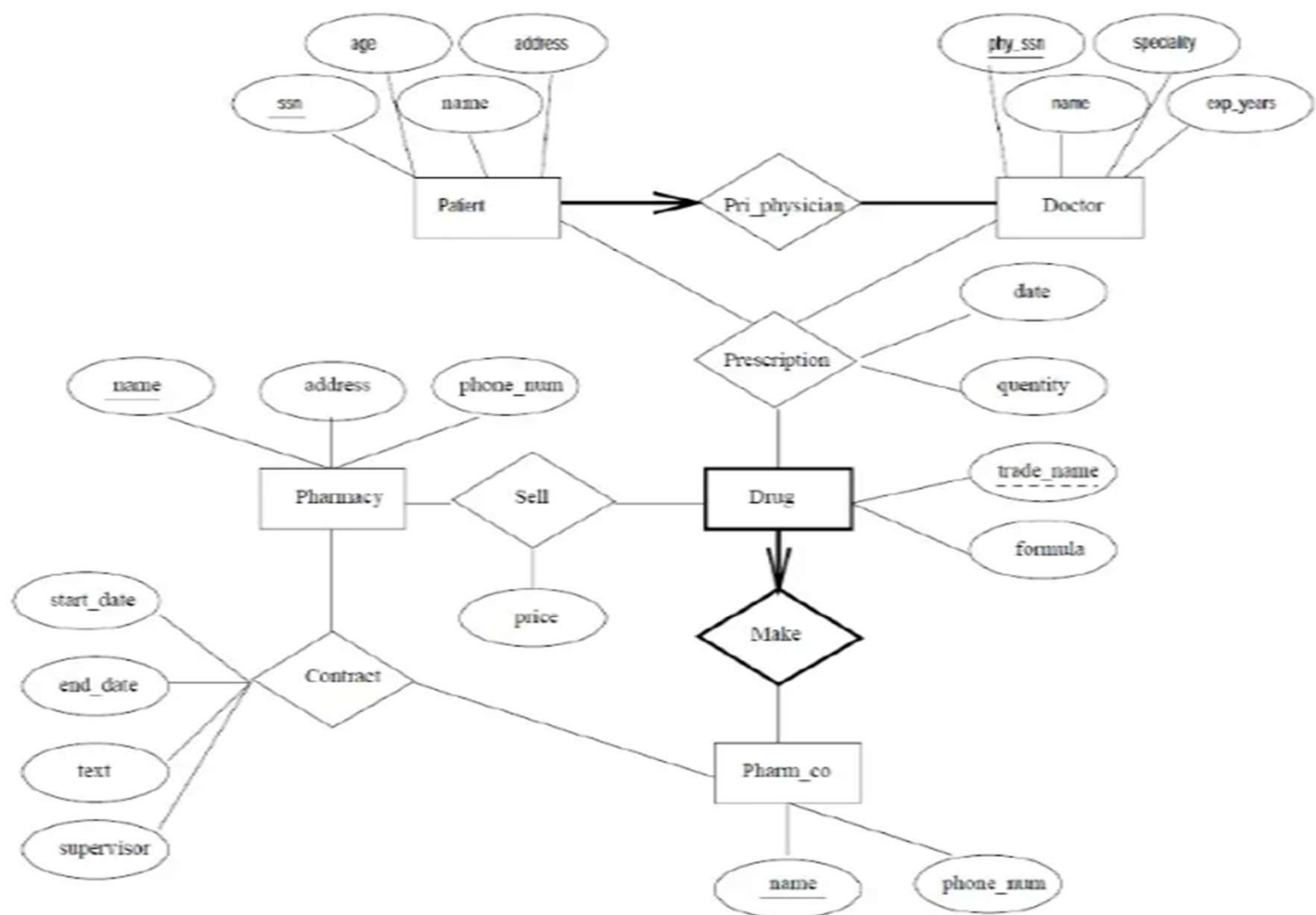
"ISA" relationship : Learner license, Driver license "is a" license



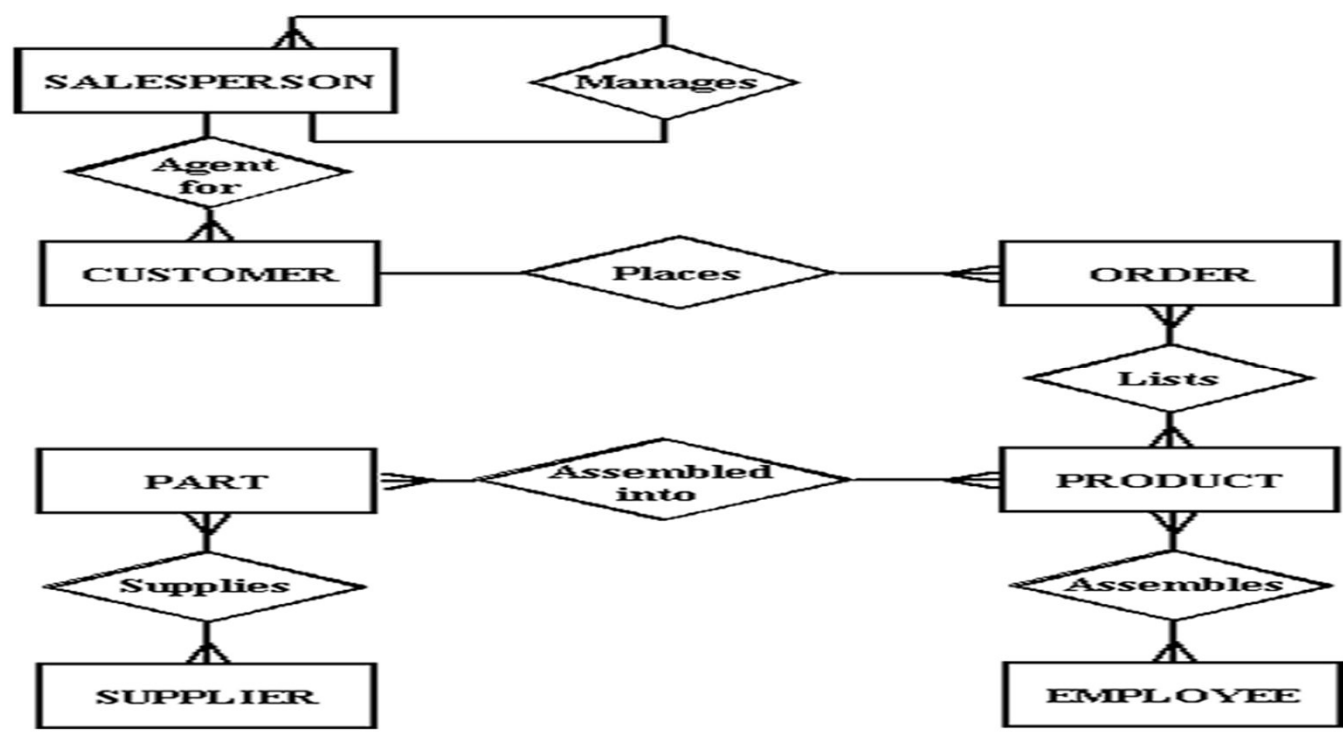
The Prescriptions-R-X chain of pharmacies has offered to give you a free life-time supply of medicines if you design its database. Given the rising cost of health care, you agree. Here is the information that you gather.

1. Patients are identified by SSN, and their names, addresses, and also ages.
2. Doctors are identified by an SSN, for each doctor, the name, specialty and years of experience must be recorded.
3. Each pharmaceutical company is identified by name and has a phone number.
4. For each drug, the trade name and formula must be recorded. Each drug is sold by a given pharmaceutical company, and the trade name identifies a drug uniquely from among the products of that company. If a pharmaceutical company is deleted, you need not keep track of its products any longer.
5. Each pharmacy has a name, address, and phone number.
6. Every patient has a primary physician. Every doctor has at least one patient.
7. Each pharmacy sells several drugs and has a price for each. A drug could be sold at several pharmacies, and the price could vary from one pharmacy to another.
8. Doctors prescribe drugs for patients. A doctor could prescribe one or more drugs for several patients, and a patient could obtain prescriptions from several doctors. Each prescription has a date and a quantity associated with it. You can assume that if a doctor prescribes the same drug for the same patient more than once, only the last such prescription needs to be stored.
9. Pharmaceutical company have long-term contracts with pharmacies. A pharmaceutical company can contract with several pharmaceutical companies. For each contract, you have to store a start date, and end date, and the text of the contract.
10. Pharmacies appoint a supervisor for each contract. There must always a supervisor for each contract.

Draw a ER diagram that captures the above information. Identify and constraints that are not captured by your ER-diagram.



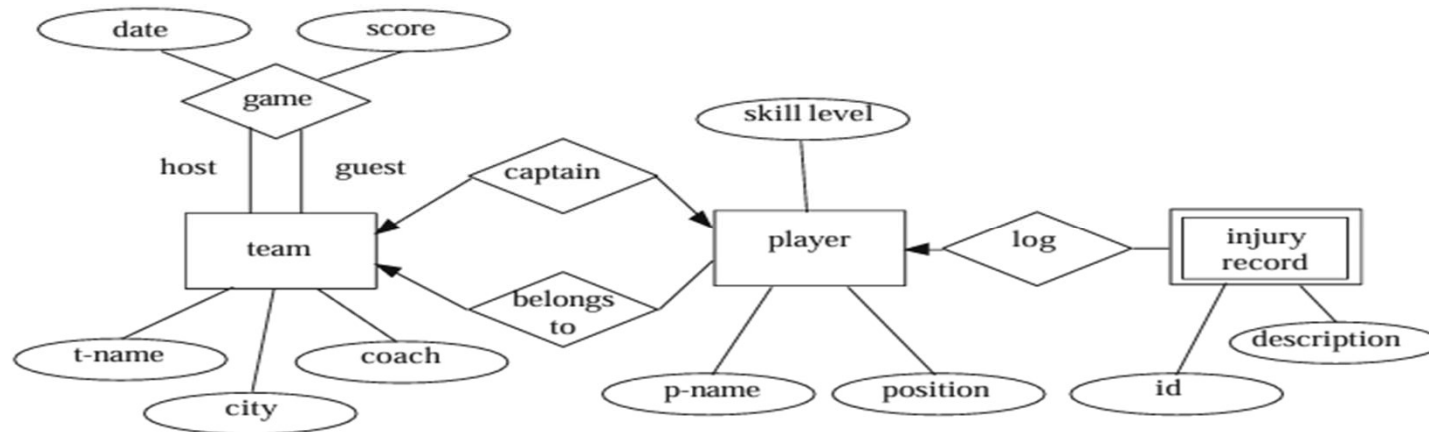
A salesperson may manage many other salespeople. A salesperson is managed by only one salespeople. A salesperson can be an agent for many customers. A customer is managed by one salespeople. A customer can place many orders. An order can be placed by one customer. An order lists many inventory items. An inventory item may be listed on many orders. An inventory item is assembled from many parts. A part may be assembled into many inventory items. Many employees assemble an inventory item from many parts. A supplier supplies many parts. A part may be supplied by many suppliers.



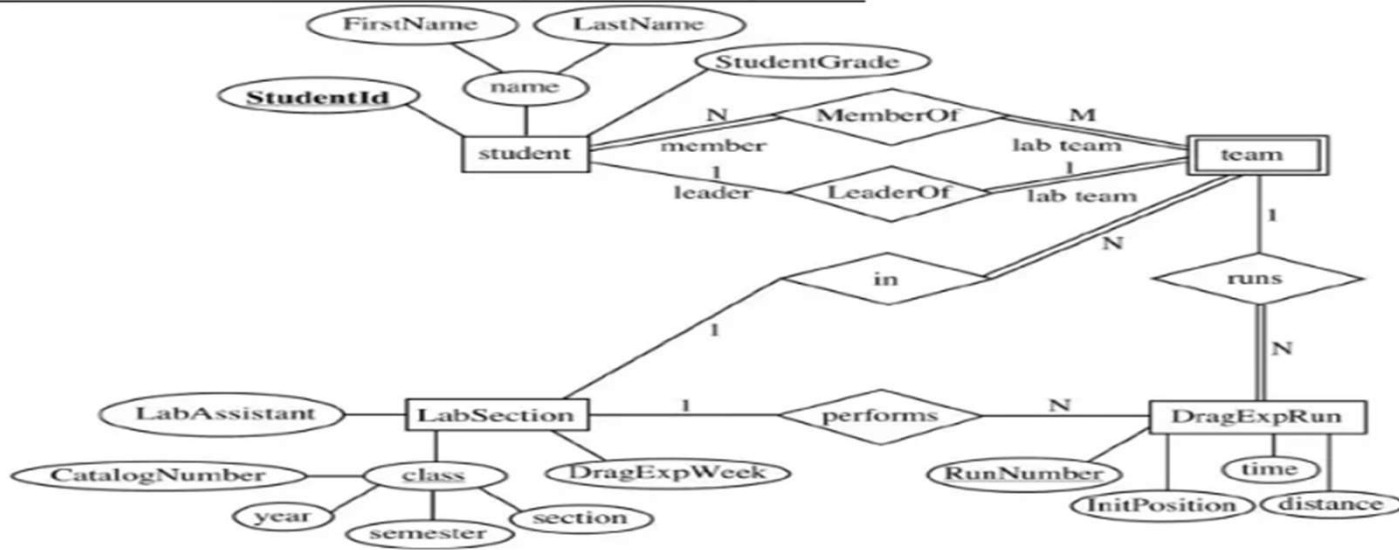
Suppose you are given the following requirements for a simple database for the National Hockey League (NHL):

- the NHL has many teams,
- each team has a name, a city, a coach, a captain, and a set of players,
- each player belongs to only one team,
- each player has a name, a position (such as left wing or goalie), a skill level, and a set of injury records,
- a team captain is also a player,
- a game is played between two teams (referred to as host_team and guest_team) and has a date (such as May 11th, 1999) and a score (such as 4 to 2).

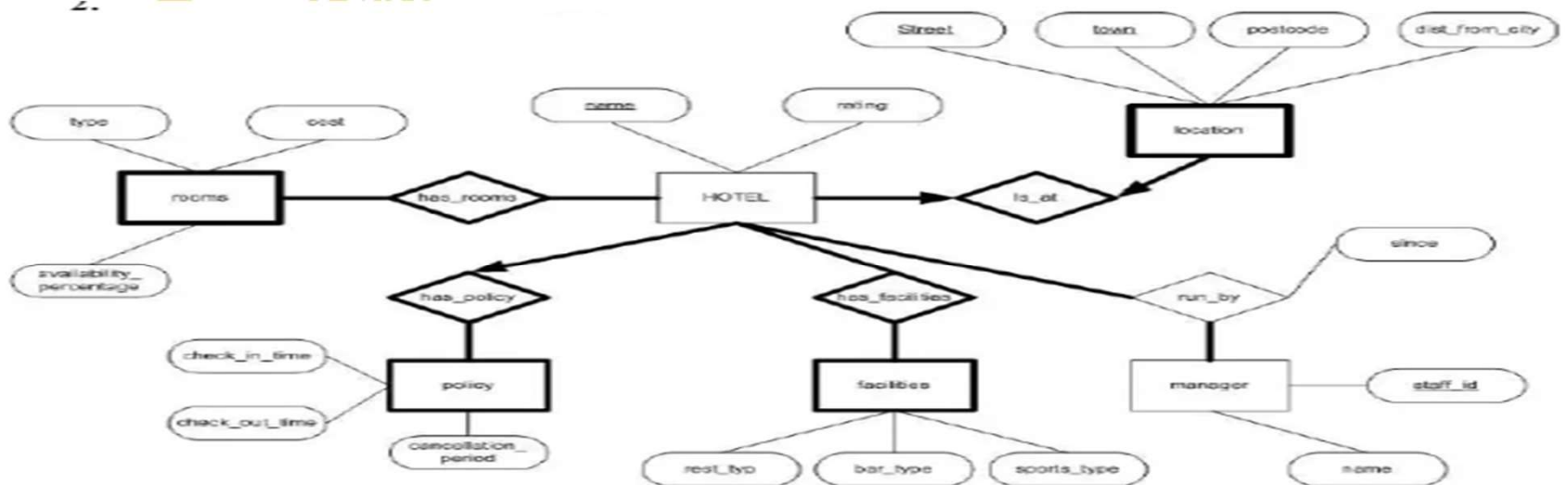
Construct a clean and concise ER diagram for the NHL database using the Chen notation as in your textbook. List your assumptions and clearly indicate the cardinality mappings as well as any role indicators in your ER diagram.



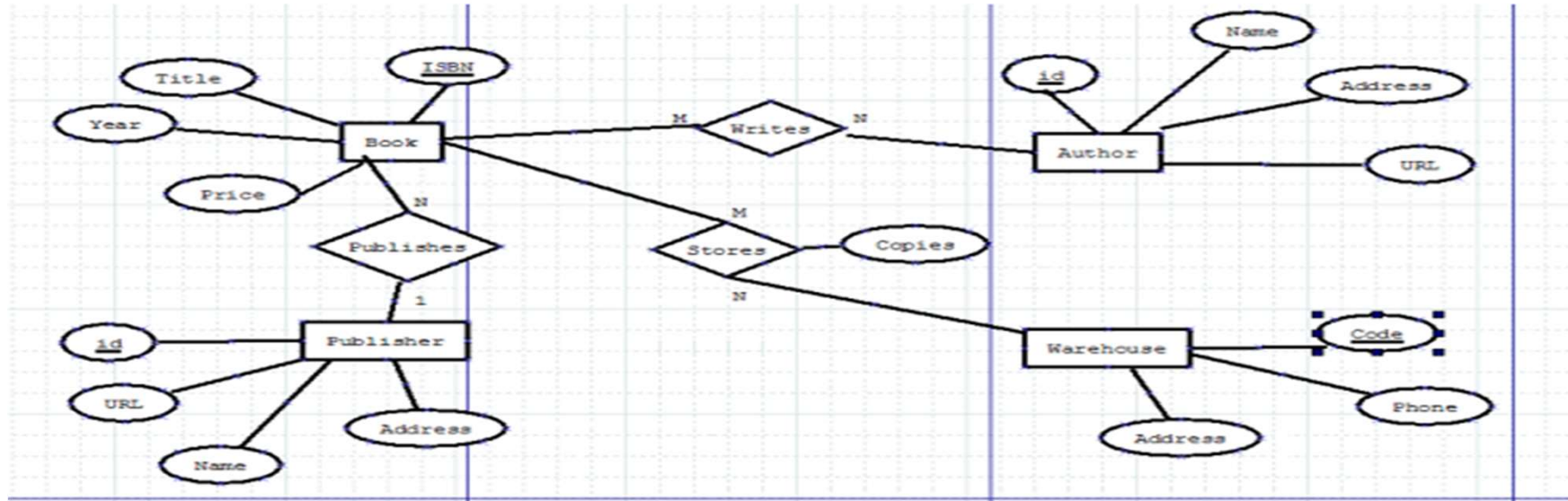
1.



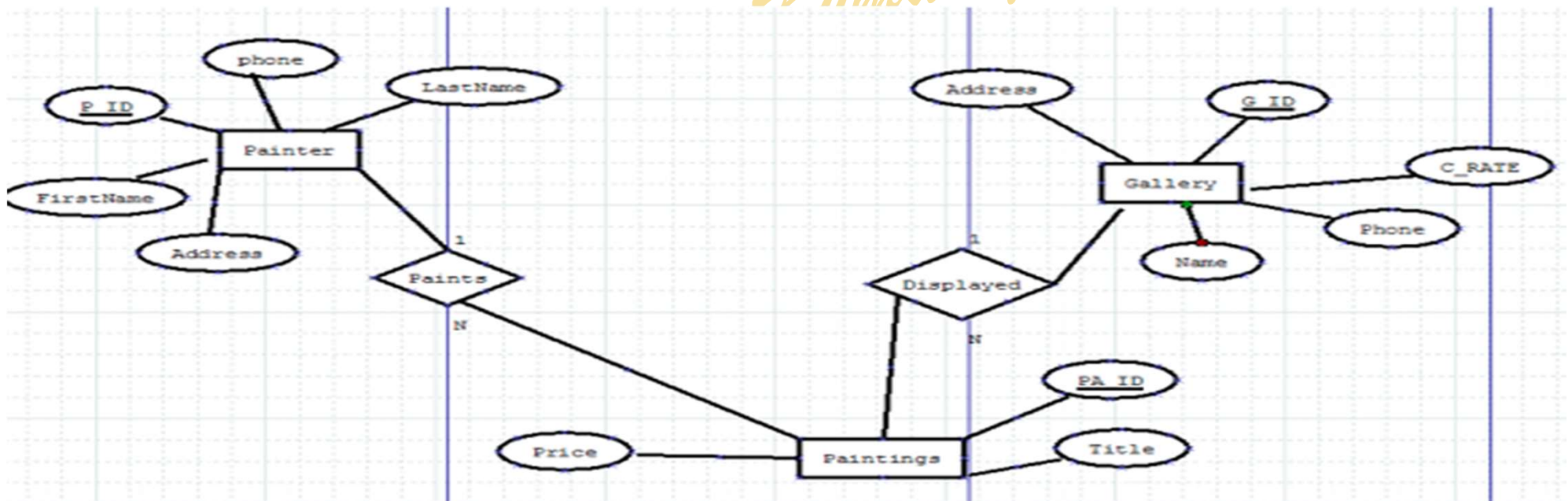
2.



- The database must store book, author, publisher and warehouse information.
 - For every book you must capture the title, isbn, year and price information. The isbn value is unique for a book.
 - For every author you must store an id, name, address and the URL of their homepage. Each author can write many books, and each book can have many authors, for example.
 - For every publisher you must store an id, name, address, phone number and an URL of their website.
 - Books are stored at several warehouses, each of which has a code, address and phone number.
 - A book has only one publisher.
 - The warehouse stocks many different books. A book may be stocked at multiple warehouses.
 - The database records the number of copies of a book stocked at various warehouses.
 - Design an ER diagram for such a bookstore.
- Your ER diagram must show entities, attributes and the relationships between entities.



- United Direct Artists (UDA) is an insurance broker that specialise in insuring paintings for galleries. You are required to design a database for this company.
- The database must store painters, paintings, and galleries information.
- Painters have a unique number, Name, and phone number
- Paintings have unique number, title and price
- Galleries have unique number, owner, phone number, commission rate and address
- 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.



Developing ER model – Guided activity

Identify the entities

Find the relationships and cardinality

Identify the key attributes

Identify other relevant attributes

Draw the ER diagram

Kumar Gupta

Easy Shop : A snapshot

- 9,000 outlets across the world
- Approximately 40,000 employees working in various outlets
- More than 90,000 items
- More than 3,000 suppliers
- Around 2.5 million customers
- More than a million transactions each day across all outlets

Step 1: Identify the entities

- Supplier
- Quotation
- Item
- RetailOutlet
- Employee
- Customer
- Dependent

Step 3: Identify key attributes

- **Supplier:** supplierid
- **Quotation:** quotationid
- **Item:** itemcode
- **RetailOutlet:** retailoutletid
- **Employee:** empid
- **Customer:** customerid

Step 2: Find relationship and cardinality

- One supplier can provide many quotations



- Many items can be outward to several retail outlets



- Many customers can purchase items from several retail outlets



Step 4: Identify other relevant attributes

- **Supplier:** suppliername
- **Quotation:** quotedprice, quotationdate, quotationstatus
- **Item:** Itemcode, description, price, category, qtyonhand, reorderlevel
- **RetailOutlet:** retailoutletlocation
- **Employee:** empname, designation, emailid, contactno, salary, password
- **Customer:** customertype, customername, emailid, contactno, address

By: Praveen Kumar Gupta

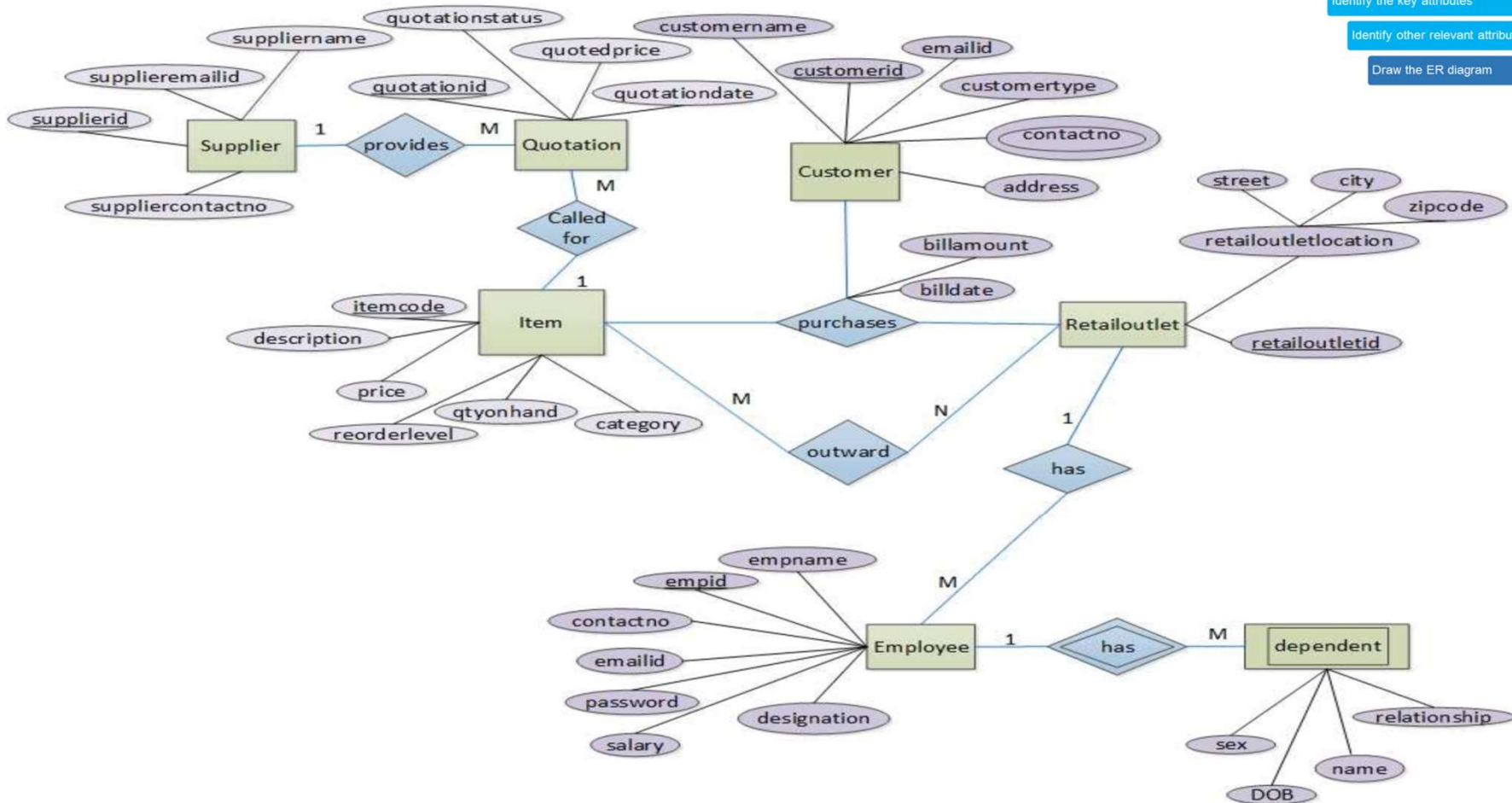
Identify the entities

Find the relationships and cardinality

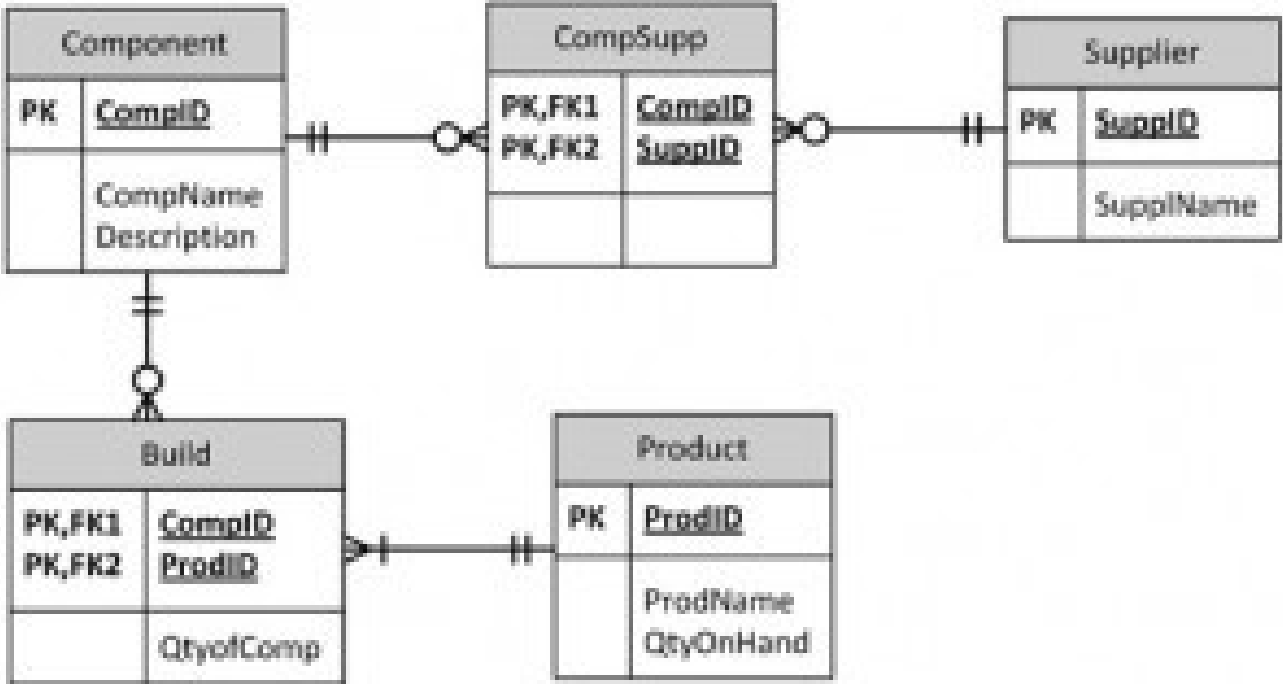
Identify the key attributes

Identify other relevant attributes

Draw the ER diagram



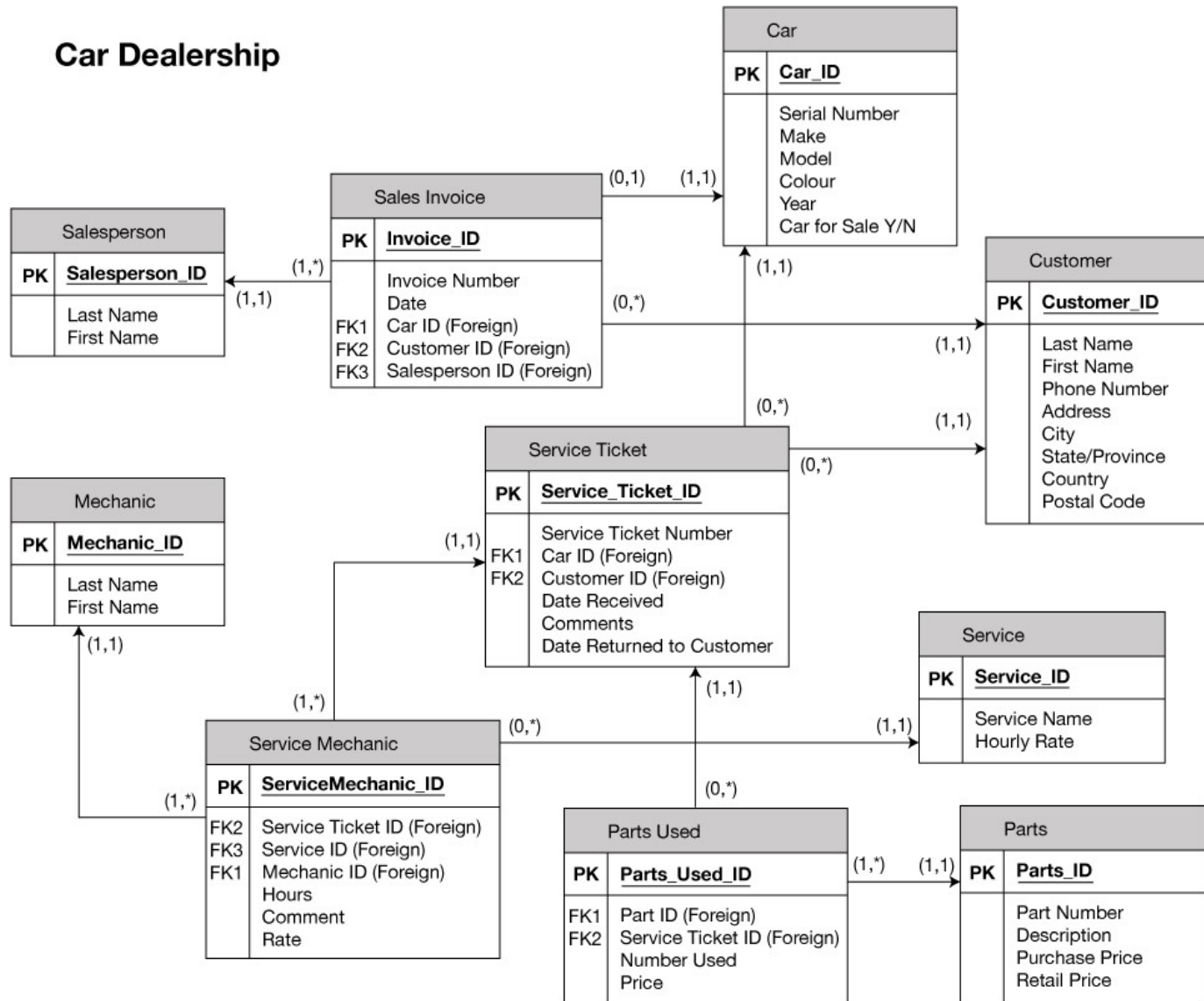
A manufacturing company produces products. The following product information is stored: product name, product ID and quantity on hand. These products are made up of many components. Each component can be supplied by one or more suppliers. The following component information is kept: component ID, name, description, suppliers who supply them, and products in which they are used.



Create an ERD for a car dealership. The dealership sells both new and used cars, and it operates a service facility (see Figure B.2). Base your design on the following business rules:

- A salesperson may sell many cars, but each car is sold by only one salesperson.
- A customer may buy many cars, but each car is bought by only one customer.
- A salesperson writes a single invoice for each car he or she sells.
- A customer gets an invoice for each car he or she buys.
- A customer may come in just to have his or her car serviced; that is, a customer need not buy a car to be classified as a customer.
- When a customer takes one or more cars in for repair or service, one service ticket is written for each car.
- The car dealership maintains a service history for each of the cars serviced. The service records are referenced by the car's serial number.
- A car brought in for service can be worked on by many mechanics, and each mechanic may work on many cars.
- A car that is serviced may or may not need parts (e.g., adjusting a carburetor or cleaning a fuel injector nozzle does not require providing new parts).

Car Dealership



Problem #1 The following is a description of some data requirements for a chain of pharmacies. Draw the appropriate entity-relationship (E-R) diagram. Clearly show all cardinality constraints, cardinality limits, and existence dependencies.

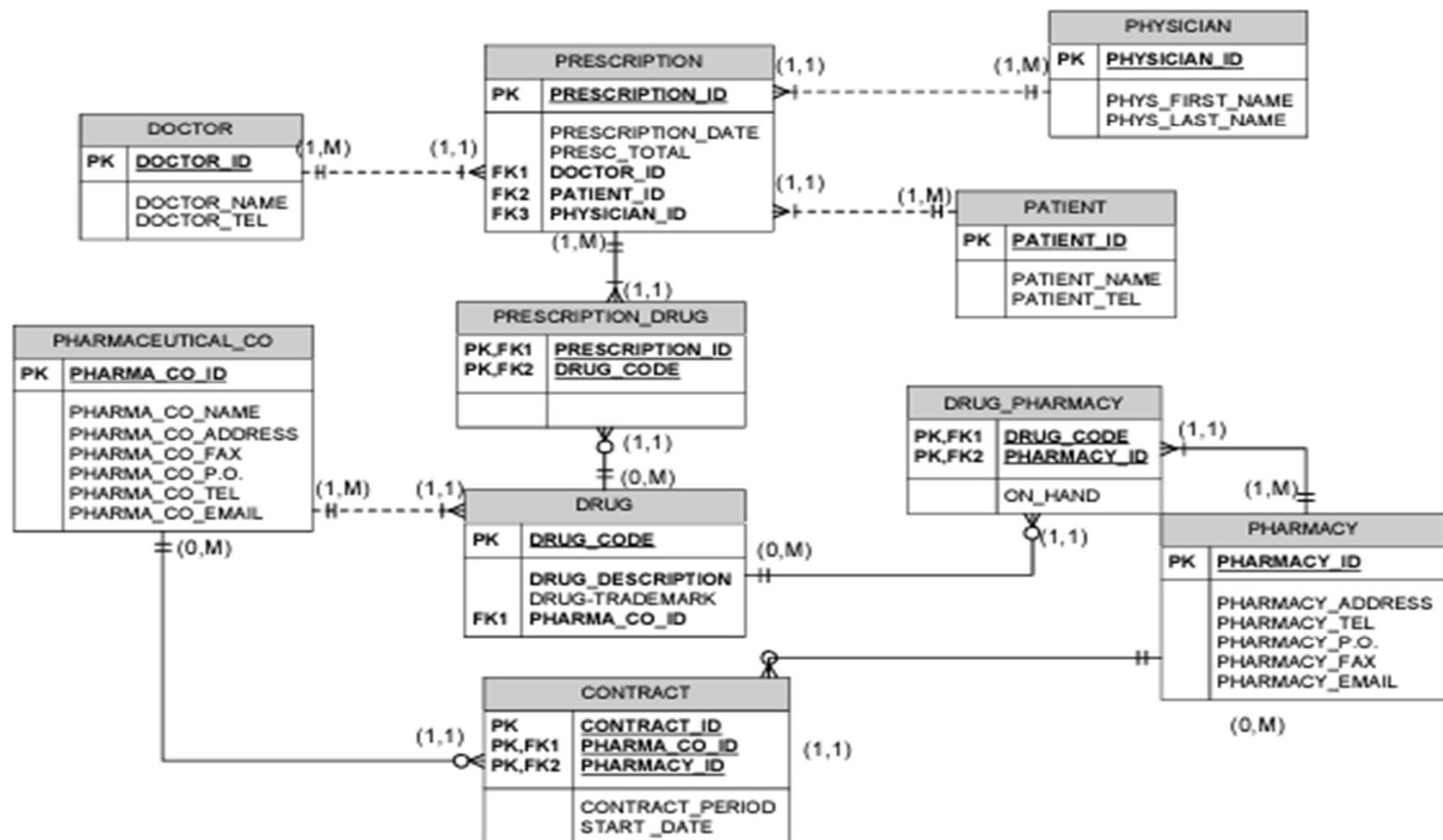
(a) A pharmaceutical company manufactures one or more drugs, and each drug is manufactured and marketed by exactly one pharmaceutical company.

(b) Drugs are sold in pharmacies. Each pharmacy has a unique identification. Every pharmacy sells one or more drugs, but some pharmacies do not sell every drug.

(c) Drug sales must be recorded by prescription, which are kept as a record by the pharmacy. A prescription clearly identifies the drug, physician, and patient, as well as the date it is filled.

(d) Doctors prescribe drugs for patients. A doctor can prescribe one or more drugs for a patient and a patient can get one or more prescriptions, but a prescription is written by only one doctor.

(e) Pharmaceutical companies may have long-term contracts with pharmacies and a pharmacy can contract with zero, one, or more pharmaceutical companies. Each contract is uniquely identified by a contract number.



- The company is organized into departments. Each department has a unique name, a unique number, and a particular employee who manages the department. We keep track of the start date when that employee began managing the department. A department may have several locations.
- A department controls a number of projects, each of which has a unique name, a unique number, and a single location.
- We store each employee's name, Social Security number,² address, salary, sex (gender), and birth date. An employee is assigned to one department, but may work on several projects, which are not necessarily controlled by the same department. We keep track of the current number of hours per week that an employee works on each project. We also keep track of the direct supervisor of each employee (who is another employee).
- We want to keep track of the dependents of each employee for insurance purposes. We keep each dependent's first name, sex, birth date, and relationship to the employee.

