1. Construct an E-R diagram for a car-insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of recorded accidents.

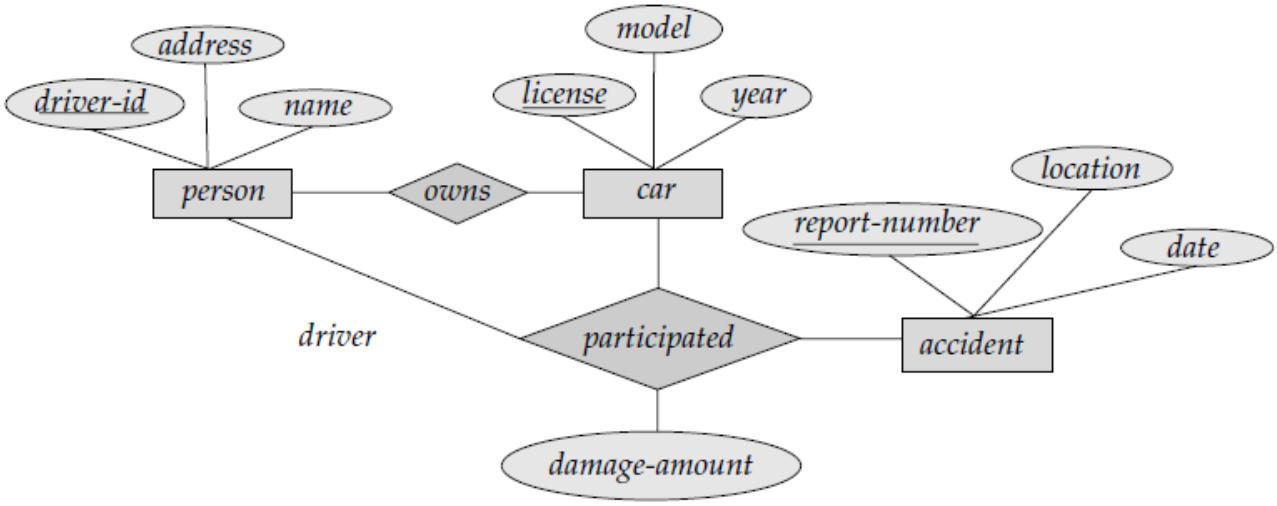


Figure 2.1 E-R diagram for a Car-insurance company.

2. Construct an E-R diagram for a hospital with a set of patients and a set of medical doctors. Associate with each patient a log of the various tests and examinations conducted.

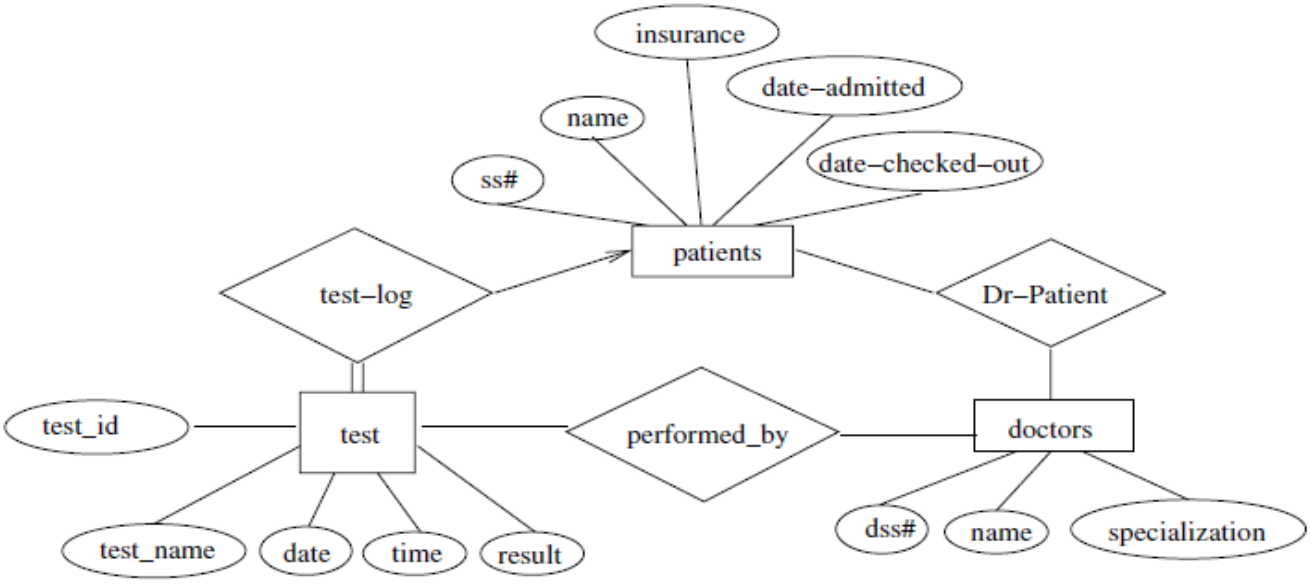


Figure 2.2 E-R diagram for a hospital.

3. A university registrar's office maintains data about the following entities: (a) courses, including number, title, credits, syllabus, and prerequisites; (b) course offerings, including course number, year, semester, section number, instructor(s), timings, and classroom; (c) students, including student-id, name, and program; and (d) instructors, including identification number, name, department, and title. Further, the enrollment of students in courses and grades awarded to students in each course they are enrolled for must be appropriately modeled.

   Construct an E-R diagram for the registrar's office. Document all assumptions that you make about the mapping constraints.

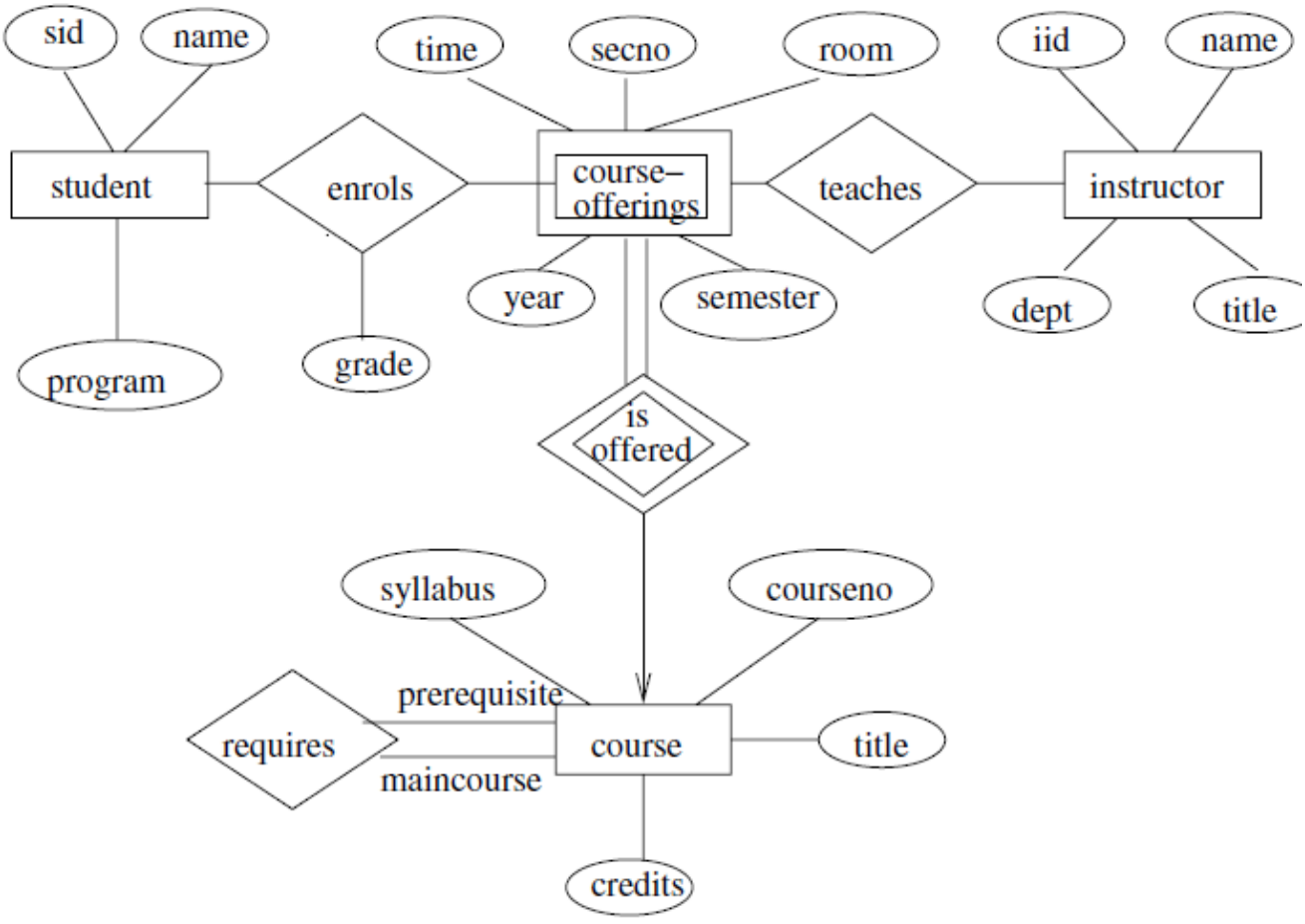


Figure 2.3 E-R diagram for a university.

In the answer given here, the main entity sets are *student, course, course-offering,* and *instructor*. The entity set *course-offering* is a weak entity set dependent on *course*. The assumptions made are:

a. a class meets only at one particular place and time. This E-R diagram cannot model a class meeting at different places at different times.

b. There is no guarantee that the database does not have two classes meeting at the same place and time.

4. Consider a database used to record the marks that students get in different exams of different course offerings.

   a. Construct an E-R diagram that models exams as entities, and uses a ternary relationship, for the above database.

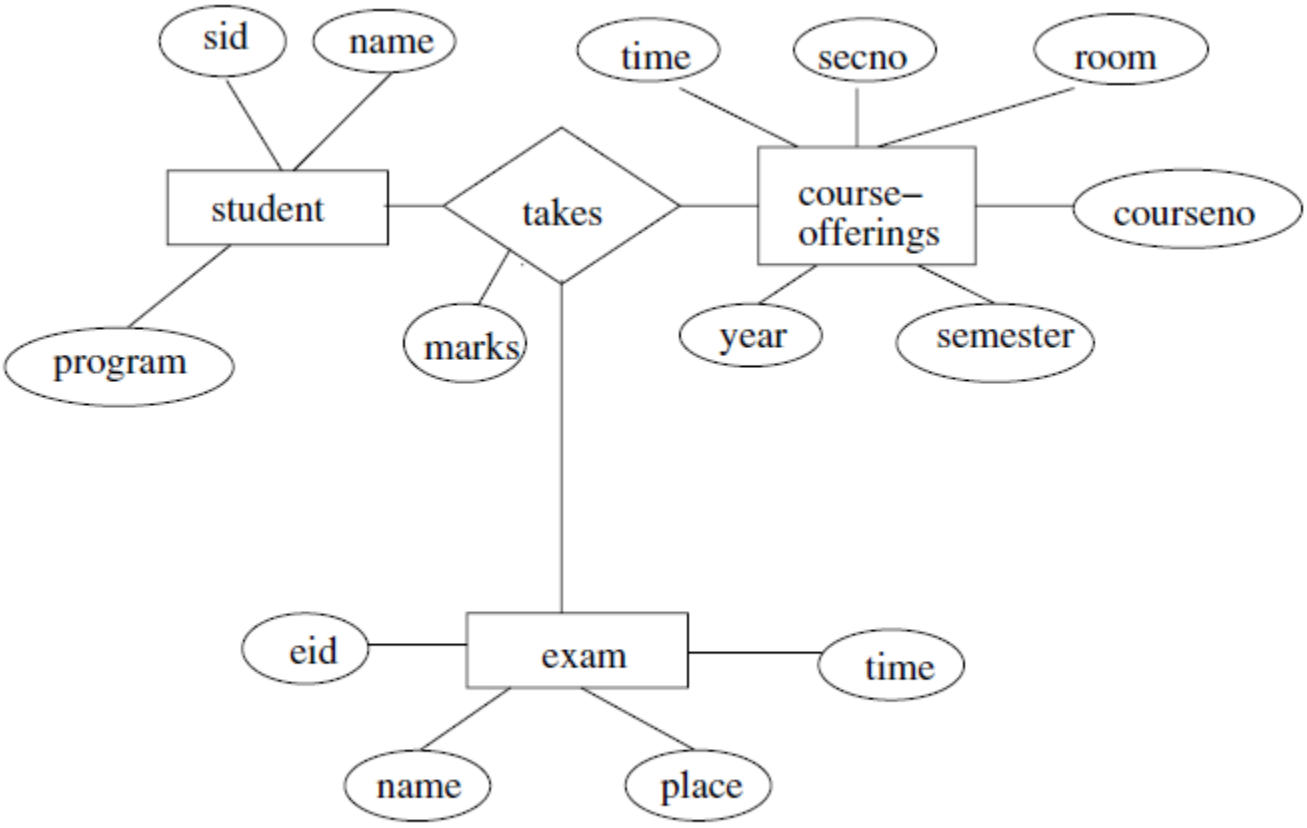


Figure 2.4 E-R diagram for marks database.

   b. Construct an alternative E-R diagram that uses only a binary relationship between *students* and *course-offerings*. Make sure that only one relationship exists between a particular student and course-offering pair, yet you can represent the marks that a student gets in different exams of a course offering.

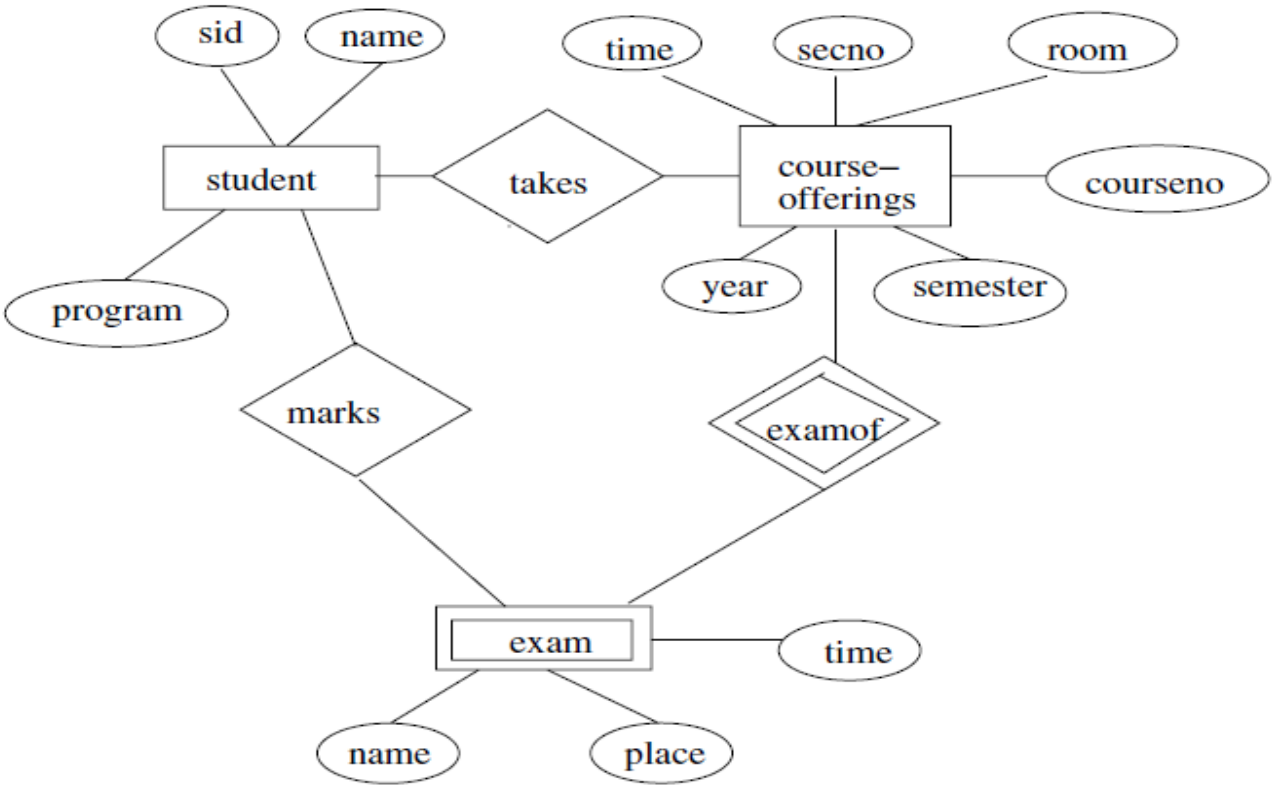


Figure 2.5 Another E-R diagram for marks database.

5. Design an E-R diagram for keeping track of the exploits of your favorite sports team. You should store the matches played, the scores in each match, the players in each match and individual player statistics for each match. Summary statistics should be modeled as derived attributes.

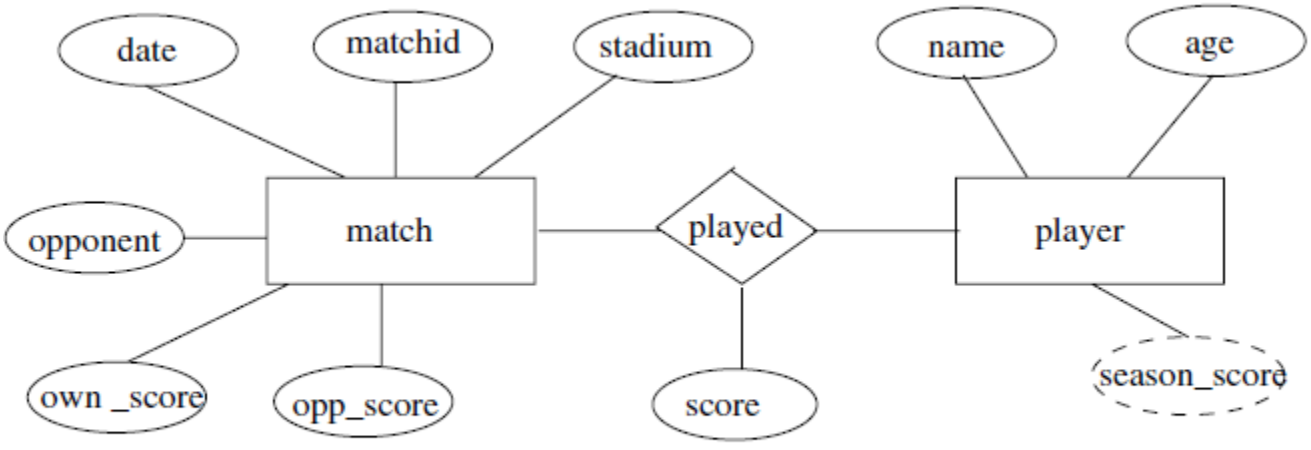


Figure 2.6 E-R diagram for favourite team statistics.

6. Consider a university database for the scheduling of classrooms for final exams. This database could be modeled as the single entity set *exam*, with attributes *course-name*, *section-number*, *room-number*, and *time*. Alternatively, one or more additional entity sets could be defined, along with relationship sets to replace some of the attributes of the *exam* entity set, as

   - *course* with attributes *name*, *department*, and *c-number*
   - *section* with attributes *s-number* and *enrollment*, and dependent as a weak entity set on *course*
   - *room* with attributes *r-number*, *capacity*, and *building*

   a. Show an E-R diagram illustrating the use of all three additional entity sets listed.

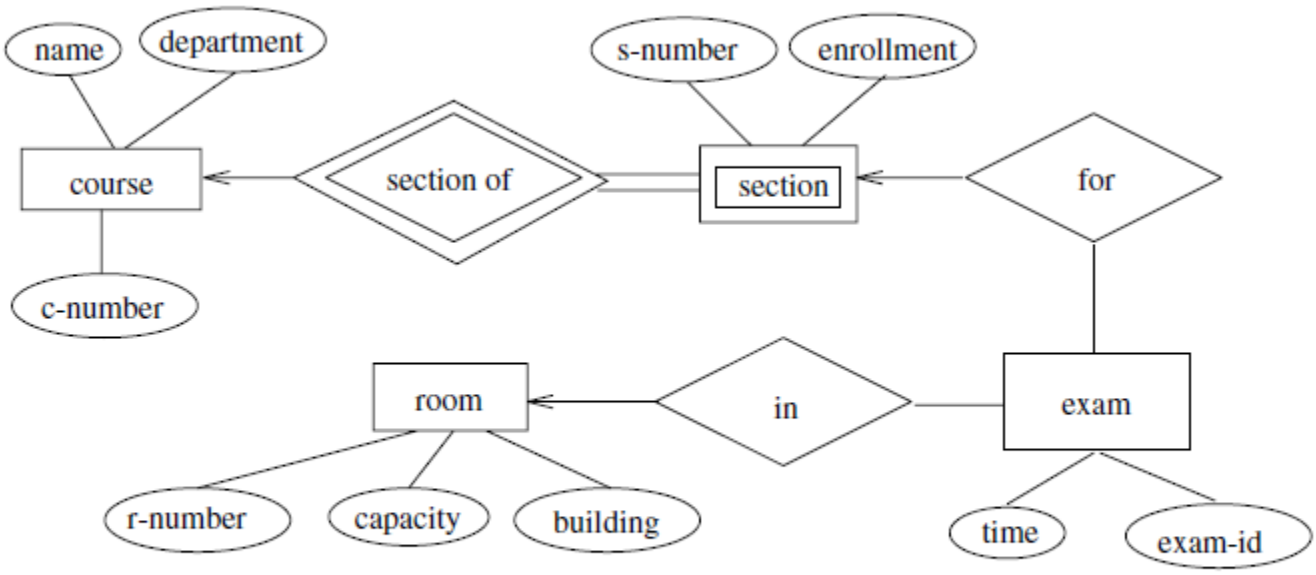


Figure 2.12 E-R diagram for exam scheduling.

b. Explain what application characteristics would influence a decision to include or not to include each of the additional entity sets.

The additional entity sets are useful if we wish to store their attributes as part of the database. For the *course* entity set, we have chosen to include three attributes. If only the primary key (*c-number*) were included, and if courses have only one section, then

it would be appropriate to replace the *course* (and *section*) entity sets by an attribute (*c-number*) of *exam*. The reason it is undesirable to have multiple attributes of *course* as attributes of *exam* is that it would then be difficult to maintain data on the courses, particularly if a course has no exam or several exams. Similar remarks apply to the *room* entity set.

7. Solution:

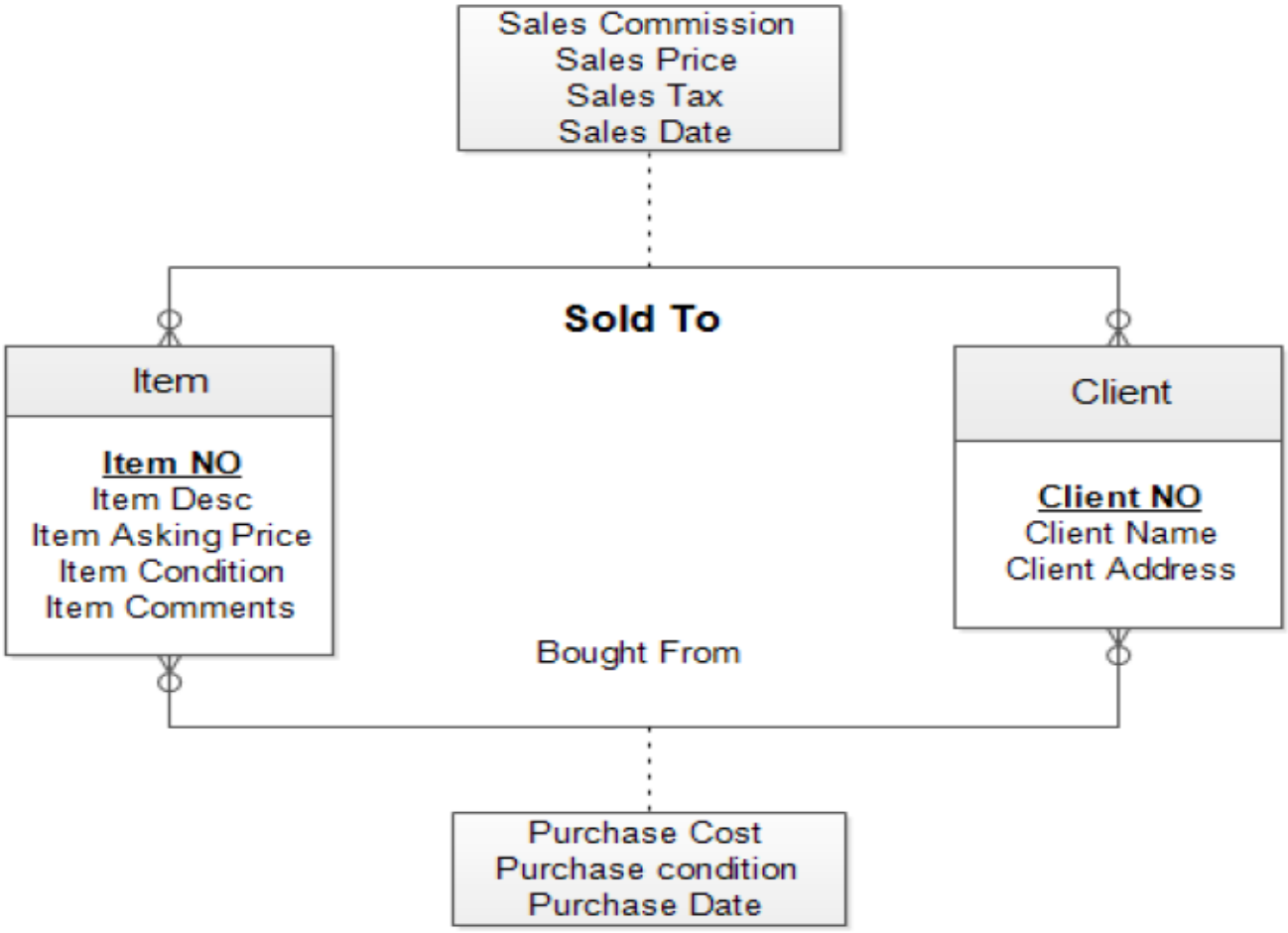
   Entity relationship diagram for Stillwater Antiques:

   • There are two entities ITEM and CLIENT in this Stillwater Antiques.

   • The Stillwater keeps the records when selling the items to client.

   • The Stillwater keeps the records when buying the items to client.

   The diagrammatic representation of ER diagram for Stillwater Antiques is shown below:



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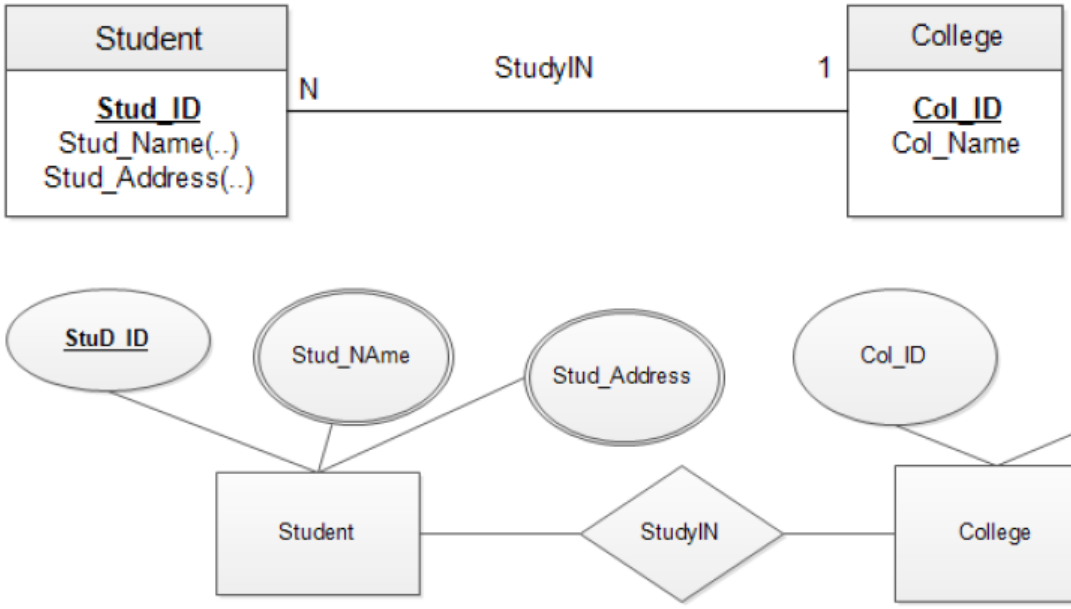

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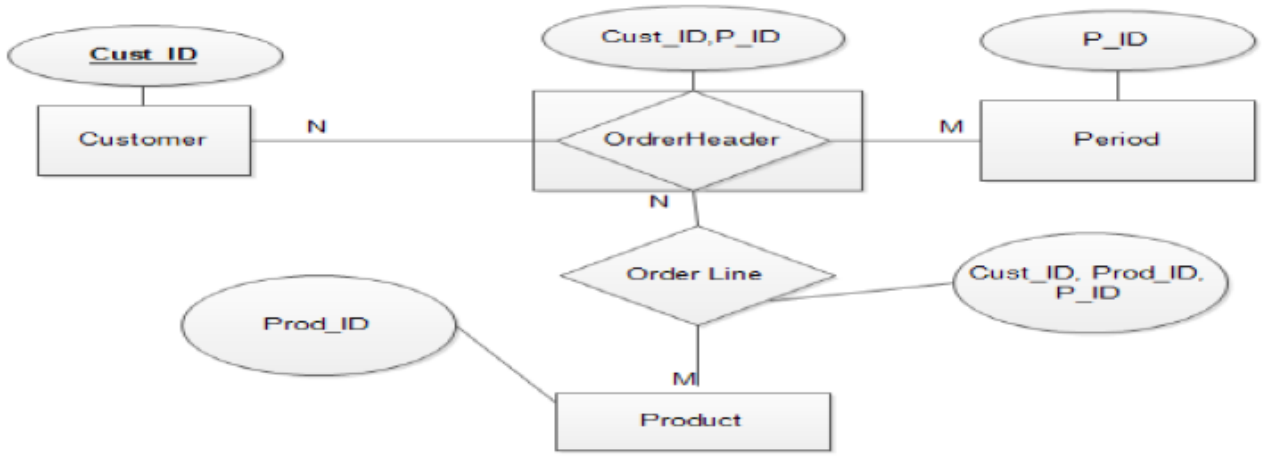


Customer

Cust-#	..

Period

P-ID	..

Order Header

Cust-#	P-ID

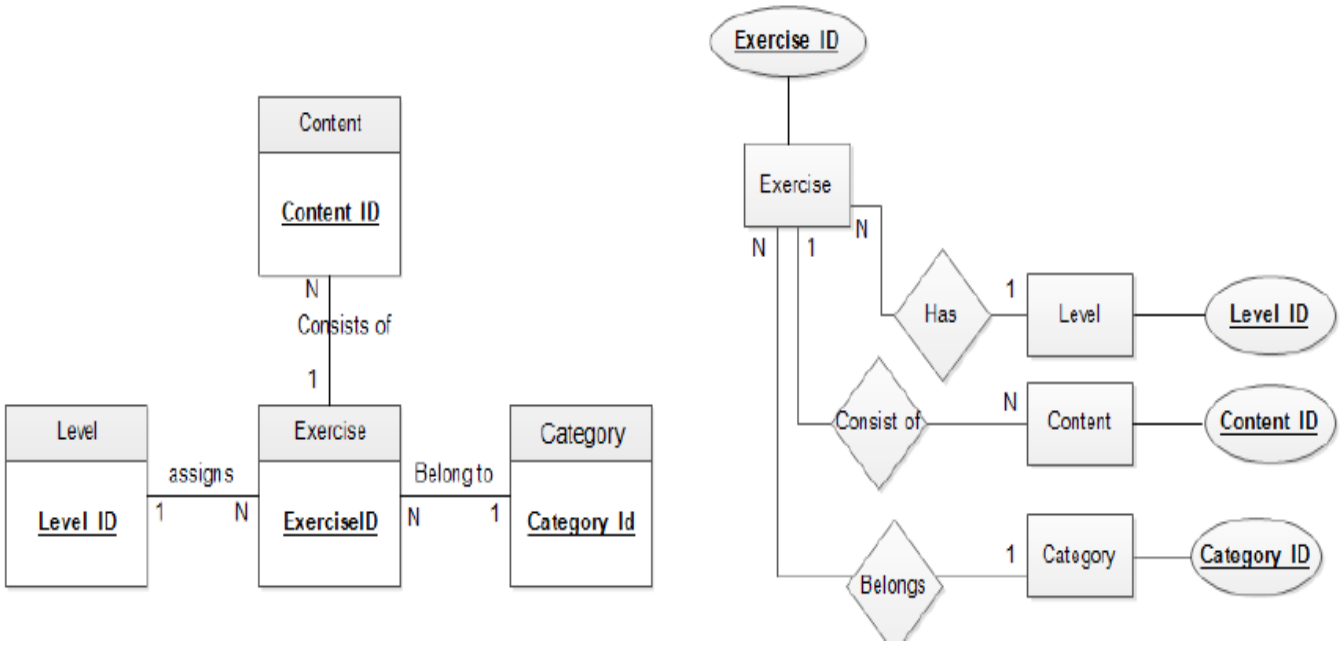
Product

Prod-#	..

Line Items

Prod-#	Cust-#	P-ID

10-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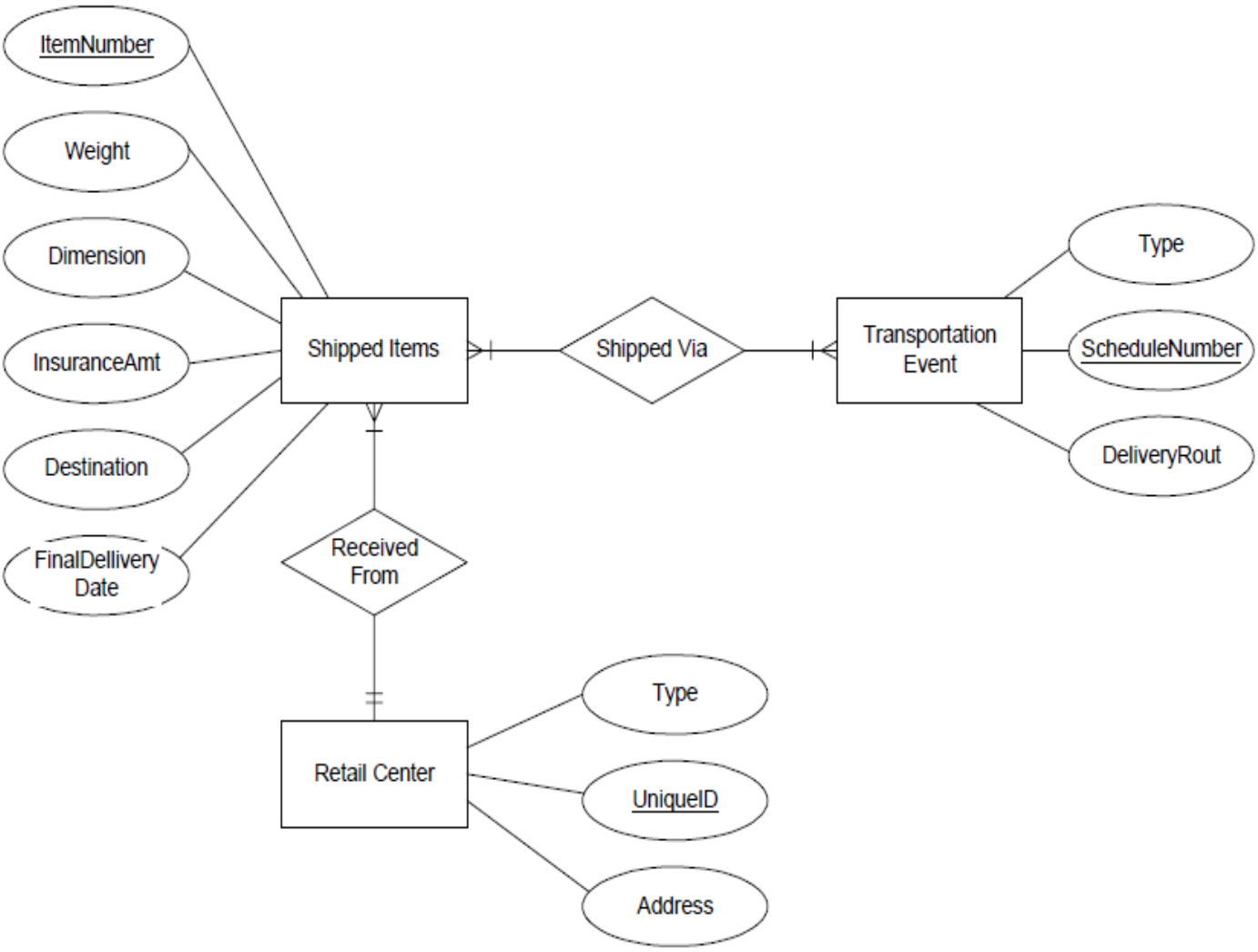
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Shipped Items
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Transportation Event
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Type
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