

Khoi Duong

Prof. VB

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HW 2B

Exercise 3.16:

- a. During a particular semester and year, only one section can use a particular classroom at a particular DaysTime value.

The combination of attributes to be unique: *Sem, Year, SecId, CRoom, DaysTime*

- b. During a particular semester and year, an instructor can teach only one section at a particular DaysTime value.

The combination of attributes to be unique: *Sem, Year, Id, SecId, DaysTime*

- c. During a particular semester and year, the section numbers for sections offered for the same course must all be different.

The combination of attributes to be unique: *Sem, Year, SecNo, CoName, CCode*

Another similar constraint we can think about is that during a particular semester and year, a student can only take one course in a particular section and in a particular classroom.

Exercise 3.19:

AIRPORT

- The *Airport_code* has to be unique

- The composite key consists of *City*, *State*, and *Name* \Leftrightarrow For a particular state and city, two airports with the same name cannot exist.
- The AIRPORT section represents the information about each airport and each AIRPORT object is identified by a unique *Airport_code*

FLIGHT

- Every flight has a unique *Number*
- The FLIGHT section contains information about which airline operates the flight and the days on which the flight is scheduled
- The combination of constraints consists of *Airline* and *Weekdays* \Leftrightarrow Two flights cannot be scheduled on the same weekdays by the same airline

FARE

- The FARE section represents the price and ticket of a particular flight
- The *Code* value has a non-identifying relationship to the FARE section
- The FARE section also contains *Restrictions* and *Amount*, and it is a weak entity from the FLIGHT entity, which means the foreign key of FLIGHT (*Number*) will determine the primary key of the FARE object.

FLIGHT_LEG

- Each FLIGHT will contain one or more FLIGHT_LEGs with *Leg_no*
- The FARE is kept for each FLIGHT_LEG and the FARE has some restrictions set
- Each FLIGHT_LEG is characterized by the DEPARTURE_AIRPORT and ARRIVAL_AIRPORT which have *Scheduled_dep_time* and *Scheduled_arr_time*

LEG_INSTANCE

- Each FLIGHT_LEG has one or more LEG_INSTANCES with the *Date* value

- A LEG_INSTANCE is an instance of a FLIGHT_LEG for a date on which a flight travels
- The information on AIRPLANE used, FLIGHT_LEG, and the number of available seats are kept in the LEG_INSTANCE

RESERVATION

- It is a weak entity from its parent LEG_INSTANCE
- RESERVATION includes *Customer_name* and *Cphone* values, and the two attributes together have to be a unique combination set.

SEAT

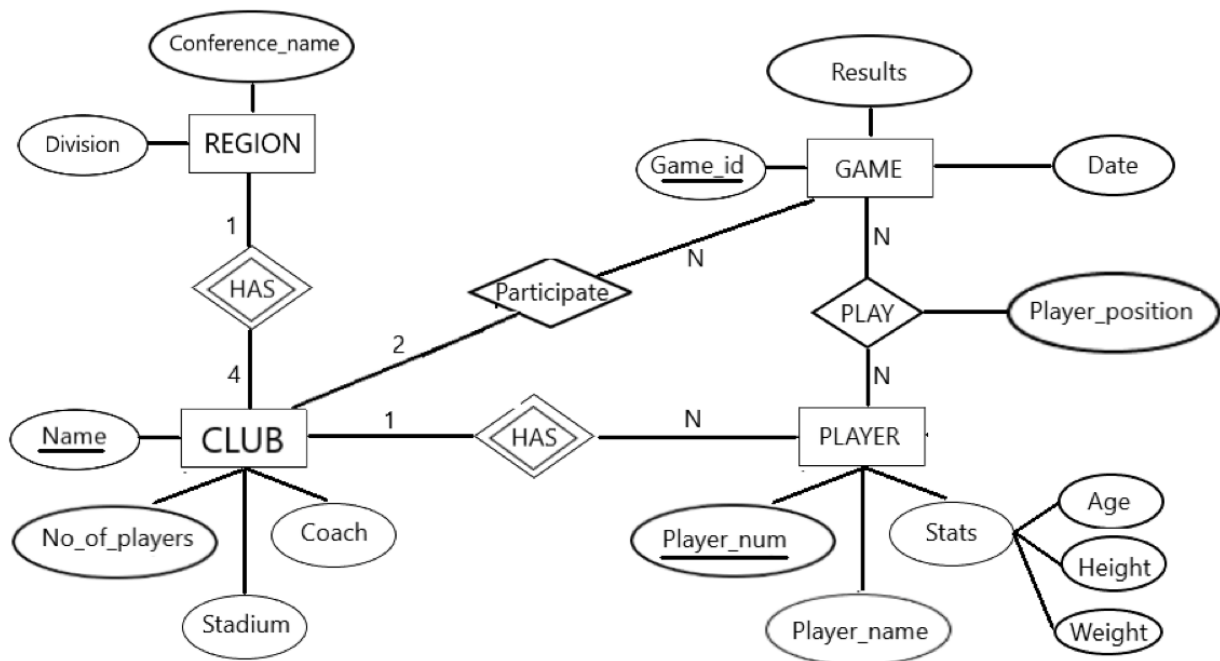
- Contains *Seat_no*
- A weak entity of RESERVATION

AIRPLANE, AIRPLANE_TYPE

- Characterized by a unique *Airplane_id* and a particular type of *Type_name*
- Contains other information about the airplane such as *Total_no_of_seats*, *Max_seats*, *Company*
- The AIRPLANE has the manufacturing company name and a fixed number of seats
- CAN_LAND relates the AIRPLANE_TYPE to which AIRPORT an AIRPLANE can land at a time

Exercise 3.22:

We try the Football League with the ER diagram:

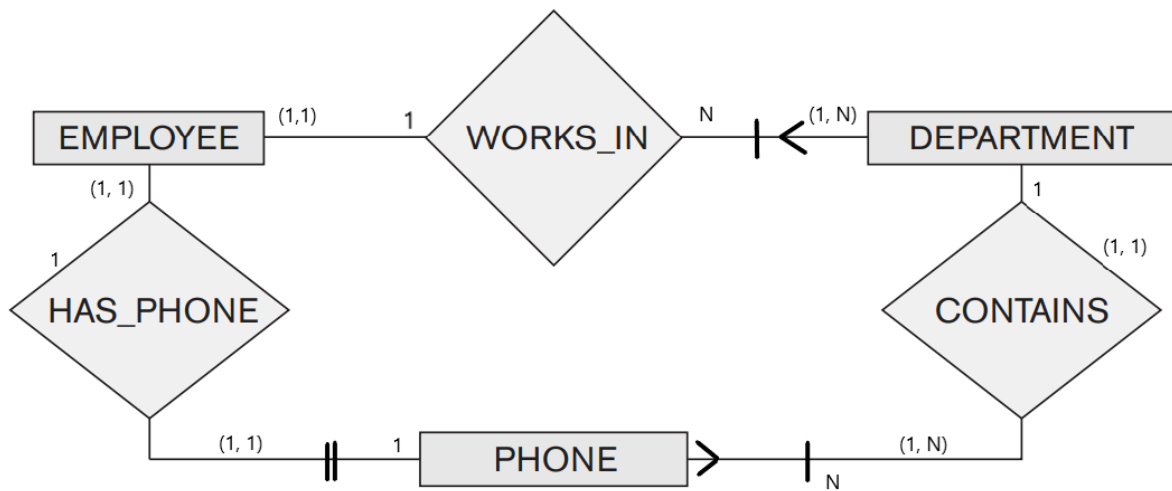


Based on the ER diagram, we have assumptions:

- A REGION is characterized by the *Division* name and which conference the region in.
- One REGION can have maximum 4 CLUBs.
- Each club has a unique *Name*, with a fixed number of players, a home stadium, and a coach
- A CLUB can has many PLAYERS
- Each PLAYER has a unique *Player_num*, PLAYER also has name and stats such as *Age*, *Height*, and *Weight*
- 2 clubs can participate in many games of the league and many players will play many games
- The GAME is characterized by the *Game_id*, with the context on the *Date* and *Result*

Exercise 3.24:

a.



In this the employee and the department have the cardinality of 1:N which is one to many as more than one must represent as many relationship and the min max constraints as 1,1 between employee and worksin relationship and 1,N as one employee can work for many departments between works for and department.

In the same way department can have more than one phone so 1:N and the employee can have only one phone in department so 1:1.

b.

In this department has phone numbers which will be assigned to the employees only. In the same case employee has been assigned to phone in department here these both refer to the same department phone. So, in this case the relationship has phone will be redundant as without this relationship also we can know the phone assigned to the employee.

Exercise 3.27:

Entity 1	Cardinality Ratio	Entity 2
1. STUDENT	<u>1 to many:</u> A student may have more than one social security card. However, every social security card must belongs to only one student.	SOCIAL_SECURITY_CARD
2. STUDENT	<u>Many to many:</u> Many students are taught by many teachers and vice versa	TEACHER
3. CLASSROOM	<u>Many to many:</u> Many classrooms has many walls and a wall can belong to more than one classroom (if there is adjacent rooms)	WALL
4. COUNTRY	<u>1 to 1:</u> 1 country can have only 1 president and 1 president can lead only 1 county	CURRENT_PRESIDENT
5. COURSE	<u>Many to many:</u> A course may have many textbooks and a textbook may be assigned for different courses.	TEXTBOOK
6. ITEM (that can be found in an order)	<u>1 to many:</u> An item can appear in different orders. However, 1 order can only contain 1 item.	ORDER
7. STUDENT	<u>Many to many:</u> One student may take several classes and every class will have many students.	CLASS
8. CLASS	<u>Many to 1:</u> Assumed that a class can only be taught by one instructor and 1 instructor can teach many classes.	INSTRUCTOR
9. INSTRUCTOR	<u>1 to 1:</u> Assumed that every instructor has his/her office and thus each office belongs to only one instructor.	OFFICE
10. EBAY_AUCTION_ITEM	<u>1 to many:</u> 1 item can have more than one bid, but a bid is unique to only 1 item (assuming a regular Ebay auction format)	EBAY_BID