

Modeling Exercises

In 3rd Normal Form, describe the entities and their attributes as tables and columns, as well as their relationships and cardinalities.

The model must efficiently answer the questions derived from the above requirements

Exercise 1

Modeling for a social networking application where users can post messages, reply to previous posts, and favorite posts. The model must meet the following requirements:

- Each user creates many posts, replies, and favorites.
- Each post belongs to a single user.
- Each post has many replies and many favorites.
- Each reply belongs to both a user and a post.
- Each favorite belongs to both a user and a post.

Exercise 2

A gym wants to create an application that allows members to register for classes. The studio offers a variety of class types and has several different instructors. The model must meet the following requirements:

- Each gym member can make multiple class reservations (yoga, pilates, GAP, cycling, spinning, crossfit, etc.)
- Each reservation belongs to a single member and a single scheduled class (e.g., member #1 is registered for scheduled class #211, "Spinning (60 minutes) with instructor Raúl Servet on Wednesday, August 25, 2021, from 2 to 3 p.m.")
- The scheduled classes represent the gym's overall schedule. It includes unique combinations of class, instructor, and date/time.
- Each scheduled class may appear in the class schedule multiple times (e.g., "Advanced Yoga (40 minutes)" is scheduled on Mondays, Wednesdays, and Fridays at 8 a.m. and 6 p.m.)
- Each class also belongs to a single type (e.g., "Advanced Yoga (40 minutes)" belongs to "Yoga", just like "Beginner Yoga (20 minutes)")
- Each type (e.g., yoga, pilates, spinning) has many classes.
- Each instructor teaches many scheduled classes.

Exercise 3

Helping the sports journalist from my building block work more efficiently. The following data model is designed to store information about teams, players, and basic statistics for all teams affiliated with the Andalusian Football Federation. This database will be used by our neighbor from apartment 4A, who works as a sports journalist. Since it's impossible for him to attend all matches, he needs to log the minimum necessary information for his reports or to provide updates to the Sevilla FC and Real Betis Balompié youth academies (which have

been covering his vacation expenses in Matalascañas since August 1984). Specifications include:

- A team consists of many players.
- A player can play in many matches.
- Each match involves players from two teams: one home team and one away team.
- Matches belong to a specific competition (regular league, playoff, summer tournament, tribute match, friendly).
- At any given time during the season, a player can only belong to one team.
- For players participating in a match, only goal-scoring and competition info is recorded. More data is not useful to the journalist.
- The journalist needs to know which players participated in a match on a particular date and what the result was.
- It is also necessary to know when the players joined the team, their field position (forward, midfielder, winger, etc.), even though these change frequently and are not recorded in detail.
- The jersey number is critical to identifying the players if he visits matches, although his wife Dorotea is annoyed by the many games yet the 15 days in Matalascañas make up for it.

Exercise 4

The Deportivo Vedruna Football Club wants to manage its players, coaches, and all accessories/equipment needed for football matches and training (boots, socks, shin guards, gloves, shirts, bibs, cones, etc.) for all its categories (benjamin, children, alevines, cadets, youth, and senior). The data model must store all information related to teams, players, and equipment for matches and training. The following requirements are specified:

- A team can have many players and only one coach.
- A coach can manage teams in different categories.
- A player can play many matches but in only one category.
- An accessory can be used by many players.
- The club has many players in all categories, but a player can only play in one specific category at a given time. The evolution of a player through the categories must be trackable.
- Players share accessories due to budget constraints.
- A player may or may not play in matches during the league, and for each match, there is a call-up list that must be viewable (some categories have more players than the allowed match roster).
- It is necessary to register which accessories a player used during a match to determine their usage/wear based on minutes played.
- The Dietetics and Sports Education departments at Vedruna are collaborating on a project funded by the European Union titled "Obesity and Sport: Unnecessary Antagonists".
- Four times a year (configurable and defined by Brussels), physical data must be recorded: height, weight, arm span, abdominal fat percentage, and lung capacity.