

Introduction to Database Project

Project Title: Football Clubs Database

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1 Conceptual design

1.1 Structured requirements

General statements:

We want to realize a database for football clubs, aiming to represent data related to a team; its players and their positions, captain, coaching staff, manager, sponsor, and contracts between a team and a person. The database will also include information about the leagues in which the teams participate. Additionally, the database will track historical data for contracts, team memberships, and managerial positions over time.

Statements concerning teams:

For the teams, we are interested in the team ID that uniquely identifies them together with the name. The city they are located in, the year of foundation and kit colours are also of interest.

Statements concerning leagues:

For the leagues, we are interested in the leagueID that uniquely identifies them, along with the name, country, start date, end date, and the number of teams participating in the league.

Statements concerning persons:

For the persons, each of them is identified uniquely by an ID together with the name (some people might have the same name), we represent the date of birth and nationality. We want to keep track of the contract's date and salaries they have received over time with a team.

Statements concerning players:

For the players, who are persons in a team, we are also interested in their startingXI status, and the number of appearances they have made. We want to keep track of the team they play for and those they have played for in the past, with the start date along with their jersey numbers.

Statements concerning captains:

For the captains, who are players, we are interested in their seniority and the date since they have been captain.

Statements concerning coaching staff:

For the coaching staff, who are also persons in a team, we are interested in their special roles in a team and the teamID to identify which team they belong to.

Statements concerning managers:

For the managers, who are part of the coaching staff, we represent the years of experience, and we want to keep track of the team they have managed in the past with the start date.

Statements concerning positions:

For the positions which a player can play, we are interested in the type and the positionID that uniquely identifies it. There are at most 11 different positions.

Statements concerning sponsors:

For the sponsors, we are interested in the sponsorID that uniquely identifies them, along with their name, industry, and foundation year. There can be sponsorship, either for a team or for a player.

1.2 Glossary of terms

Term	Description	Synonyms	Connections
Team	A collection of team personnel, including players, manager, coaching staff and more.	Football team, Club	Sponsor, Player, Person, Manager, Captain, League
Person	A member of a team.	Member, Individual	Team, Player, Manager, Coaching Staff
Player	A person who plays for a team.	Footballer	Team, Sponsor, Position, Coaching Staff
Captain	A player who is the leader of a team.	Skipper, Leader	Team, Player
Coaching Staff	A person who is a non-playing team member listed on the official team list.	Trainers, Technical Staff	Player, Person, Manager, Team
Manager	A coaching staff member who manages a team.	Head Coach	Team, Person, Coaching Staff
Position	Different positions a Player can play.	Role, Spot	Player
League	A football league.	Competition	Team, Sponsor
Sponsor	A company providing funds to another entity.	Official Sponsor, Partner	Player, Team, League

1.3 Conceptual schema

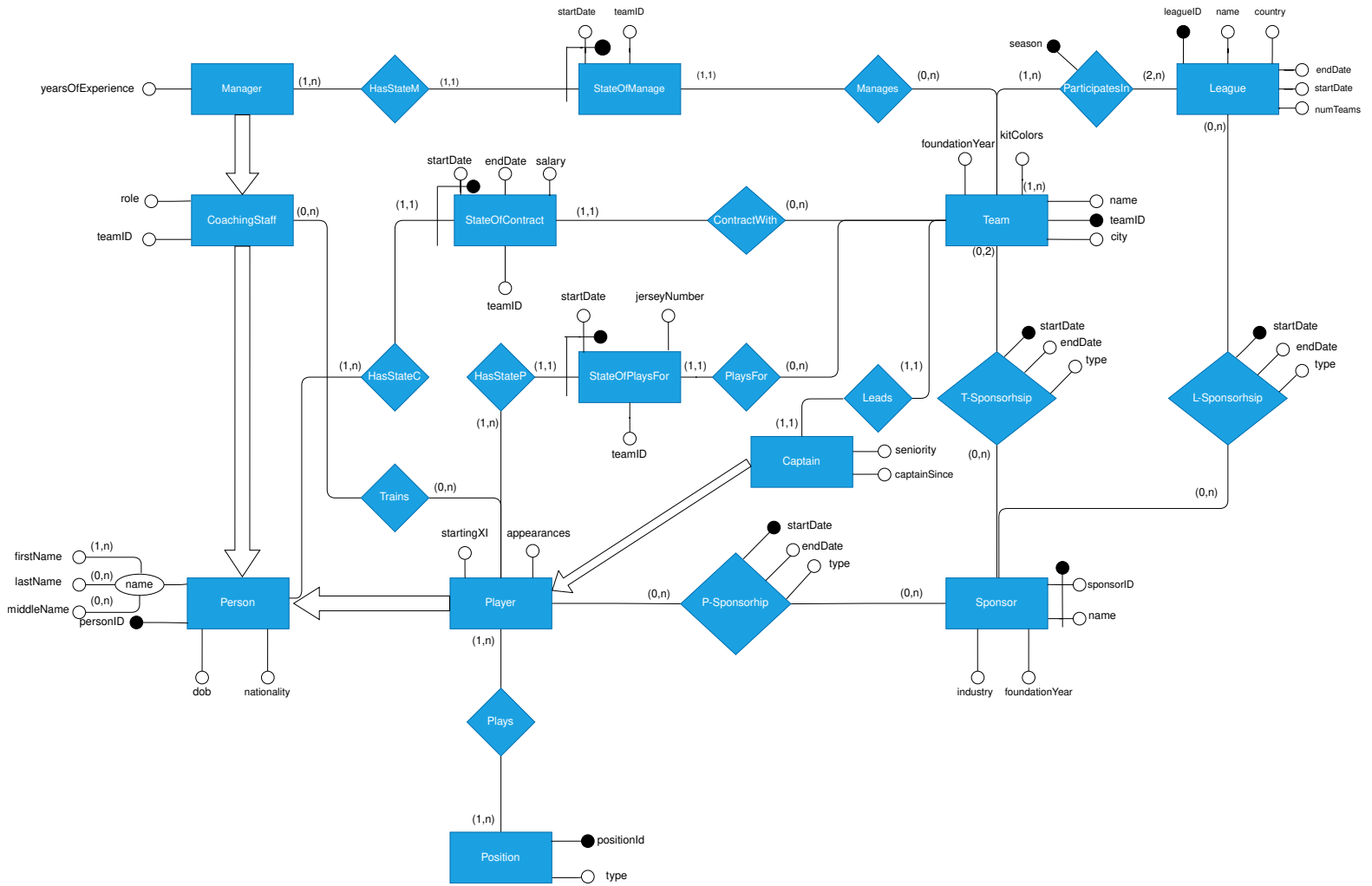


Figure 1: Conceptual schema

1.4 Data dictionaries

Data dictionary: Entities

Entity	Description	Attributes	Identifiers
Team	Represents a football team	name teamID city foundationYear kitColors	{teamID}
Person	Represents a person involved in a football club	personID dob nationality name (firstName, middleName, lastName)	{personID}
Player	Represents a player in a team.	startingXI appearances	{personID}
Captain	Represents a captain of a team.	captainSince seniority	{personID}
Position	Represents a playing position in a team	positionID type	{positionID}
CoachingStaff	Represents a coaching staff member of a team	role teamID	{personID}
Manager	Represents a manager of a team	yearsOfExperience	{personID}
Sponsor	Represents a sponsor for a team, league or player	name industry sponsorID industry foundationYear	{sponsorID}
League	Represents a football league	leagueID name country startDate endDate numTeams	{leagueID}

Data dictionary: Entities

Entity	Description	Attributes	Identifiers
StateOfPlaysFor	Represents the historical state of a player's team	startDate jerseyNumber teamID playerID	{startDate, playerID}
StateOfContract	Represents a historical state of a contract between Person and Team	startDate endDate salary teamID personID	{startDate, personID}
StateOfManage	Represents the historical state of a manager's team	startDate managerID teamID	{startDate, managerID}

Data dictionary: Relationships

Relationship	Description	Components	Attributes	Identifiers
Manages	Describes which team a manager manages.	Team, StateOfManage		
HasStateM	Connects a manager with their historicized management state	Manager, StateOfManage		
Trains	Describes the connection between player and Coaching Staff .	CoachingStaff, Player		
Plays	Describes the position a player plays in.	Player, Position		
HasStateC	Connects a person with their historicized contract state.	Person, StateOfContract		
PlaysFor	Describes which team a player plays for.	StateOfPlaysFor, Team		
ContractWith	Connects a team with a person's historicized contract state.	Team, StateOfContract		
HasStateP	Connects a player with their historicized state.	Player, StateOfPlaysFor		
Leads	Describes the relationship between a captain and the team they lead.	Captain, Team		
ParticipateIn	Describes the relationship between the team and the league they participate in.	League, Team	season	{season}
T-Sponsorship	Describes the sponsorship relationship between a sponsor and a team.	Team, Sponsor	startDate, endDate, type	{startDate}
P-Sponsorship	Sponsorship between a team and a player.	Sponsor, Player	startDate, endDate, type	{startDate}
L-Sponsorship	Sponsorship between a team and a player.	Sponsor, League	startDate, endDate, type	{startDate}

Data dictionary: External constraints

External Integrity Constraints	
1	A player cannot be a part of two different teams simultaneously.
2	A person cannot hold the roles of manager, coaching staff member, and player concurrently.
3	A person can have only one active contract with a team at any given time
4	A team can have only one manager and one captain at any given time.
5	A captain's "captainSince" date cannot be in the future or earlier than the player's contract start date with the team.
6	A player cannot play more than 11 positions
7	A player's number of appearances cannot be negative
8	A Player's jersey number should be within a predefined range (e.g., 1-99)
9	The end date of a contract in the StateOfContract table should be greater than its start date.
10	The start date in the StateOfManage should not overlap with the start dates of other entries for the same manager, ensuring that a manager cannot manage multiple teams simultaneously

1.5 Table of volumes and operations

Table of Volumes

Concept	Construct	Volume
Team	Entity	50
Person	Entity	1400
Player	Entity	1250
CoachingStaff	Entity	150
Manager	Entity	50
Captain	Entity	50
Position	Entity	11
League	Entity	5
Sponsor	Entity	100
StateOfManage	Entity	50
StateOfPlaysFor	Entity	1250
StateOfContract	Entity	1400
ContractWith	Relationship	1400
HasStateM	Relationship	50
HasStateP	Relationship	1250
HasStateC	Relationship	1400
Plays	Relationship	1250
ParticipatesIn	Relationship	250
Trains	Relationship	400
L-Sponsorship	Relationship	100
T-Sponsorship	Relationship	200
P-Sponsorship	Relationship	300

Operations of interest:

1. Insert a new player to a team.
2. Update team's coaching staff (including manager).
3. Update player's contract.
4. Assign a new captain.
5. Insert a new sponsorship.
6. Retrieve team's players.
7. Retrieve a player's contract.
8. List all sponsorships for a player.
9. List all sponsorships for a team.
10. List all sponsorships for a league.

Table of Operations

Operation	Type	Frequency
1	Interactive	10/month
2	Interactive	3/month
3	Interactive	20/month
4	Interactive	1/year
5	Interactive	5/month
6	Interactive	100/day
7	Interactive	50/day
8	Batch	10/month
9	Batch	1/week
10	Batch	1/month