Homework 1

Report

The domain name: Soccer Cup

Step 1: Eliciting requirements

The Soccer Cup domain defines the organization, management, and execution of a soccer tournament where multiple teams compete for the championship. The tournament follows a structured format, dividing teams into different stages such as group rounds, knockout rounds, semi-finals, and the final match.

Each team consists of players and is led by a coach. Players have specific position (goalkeeper, defender, midfielder, forward) and are tracked based on performance metrics such as goals scored, assists, and disciplinary records (yellow/red cards). Coaches strategize and manage team performance throughout the tournament.

Matches take place at designated venues (stadiums), each with a unique location, capacity, and playing surface type. A match consists of two competing teams, a scheduled date and time, and final results. The tournament follows a predefined structure, with different stages defining the flow of competition, from the group phase to the final.

TeamMatch defines the team in a specific match

The Soccer Cup database must efficiently manage team and player statistics, match schedules and results, venue details, and stage progression, ensuring smooth tournament operations and accurate historical records for analytics, reporting, and future event planning.

Key Components of the Soccer Cup Domain

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MatchTeam

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Key Components of the Soccer Cup Domain

1. **Soccer Cup**
    - CupID – Integer, unique identifier for each soccer cup.
    - Year – Integer, the year the cup was held.
    - CupName – String, official name of the soccer cup.
    - HostCountry – String, the country that hosted the event.
    - NumberTeams – Integer, total number of participating teams.
    - Champion – String, the team that won the cup.
2. **Team**
    - TeamID – Integer, unique identifier for each team.
    - TeamName – String, name of the team.
    - HomeCountry – String, the country the team represents.
    - GoalsTotal – Integer, total number of goals scored by the team in the tournament.
    - PointsTotal – Integer, total number of points accumulated.
3. **Player**
    - PlayerID – Integer, unique identifier for each player.
    - NameFull – String, full name of the player.
    - MobileNumber – String, contact number of the player.
    - Birthday – Integer (date format), date of birth.
    - Age – Integer, player's age.
    - Nationality – String, country of origin.

- Sex – String, gender of the player.
- JerseyNumber – Integer, the player's jersey number.
- Position – String, the player's role on the field (e.g., Forward, Midfielder, Defender).
- GoalsScored – Integer, total number of goals scored in the tournament.
- CardsReceived – Integer, number of yellow and red cards received.
- TotalMinutesPlayed – Integer, total time the player has played in the tournament.

4. **Coach**
    - CoachID – Integer, unique identifier for each coach.
    - NameFull – String, full name of the coach.
    - MobileNumber – String, contact number.
    - Birthday – Date, date of birth.
    - Age – Integer, coach's age.
    - Nationality – String, country of origin.
    - Sex – String, gender of the coach.
    - Achievements – String, list of achievements and records.
    - Salary – Float, coach’s salary.
    - StartOfCoachCareer – Integer, the year the coach started their career.
    - Experience – Integer, number of years of experience.
    - TacticsStyle – String, preferred tactical approach.
5. **Match**
    - MatchID – Integer, unique identifier for each match.
    - MatchDate – Date, the date the match took place.
    - StartTime – Time, the starting time of the match.
    - MatchRes – String, final score/result of the match.
6. **MatchTeam**
    - GoalsScored – Integer, number of goals scored by the team in the match.

- IsHomeTeam – Boolean, indicating whether the team was the home team.

7. **Venue**
    - VenueID – Integer, unique identifier for each venue.
    - Name – String, name of the stadium.
    - Location – String, city and country where the stadium is located.
    - Capacity – Integer, maximum audience capacity.
    - SurfaceType – String, type of playing surface (e.g., grass, artificial turf).
    - YearOpened – Integer, year the venue was opened.
8. **Stage**
    - StageID – Integer, unique identifier for each stage of the tournament.
    - StageName – String, name of the tournament stage (e.g., Group Stage, Quarter-Final, Final).
    - StartDate – Integer in date format, the date the stage begins.
    - EndDate – Integer in date format, the date the stage ends.
    - NumberMatches – Integer, number of matches played in this stage.
    - NumberOfTeams – Integer, number of teams participating in the stage.

Relationships between entities:

- A Soccer Cup consists of multiple Stages.
- A Stage consists of multiple Matches.
- A Venue hosts a Match
- A Match involves two Teams, which are linked through MatchTeam.
- A MatchTeam records statistics for each team in a match.
- A Team has multiple Players.
- A Team is managed by one Coach.
- A Coach can manage only one Team.
- A Player belongs to only one Team.

References for the 1st step:

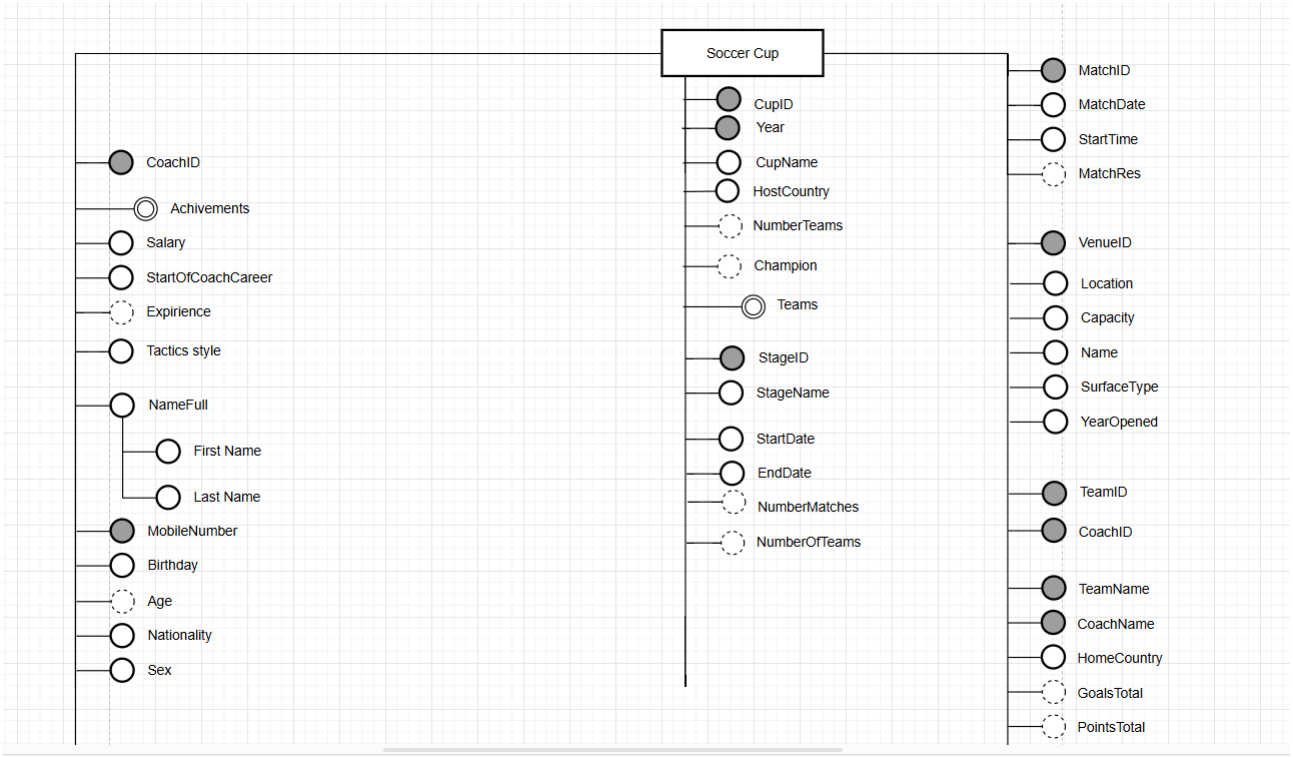
OpenAI. (2025). ChatGPT [Large language model]. https://chatgpt.com

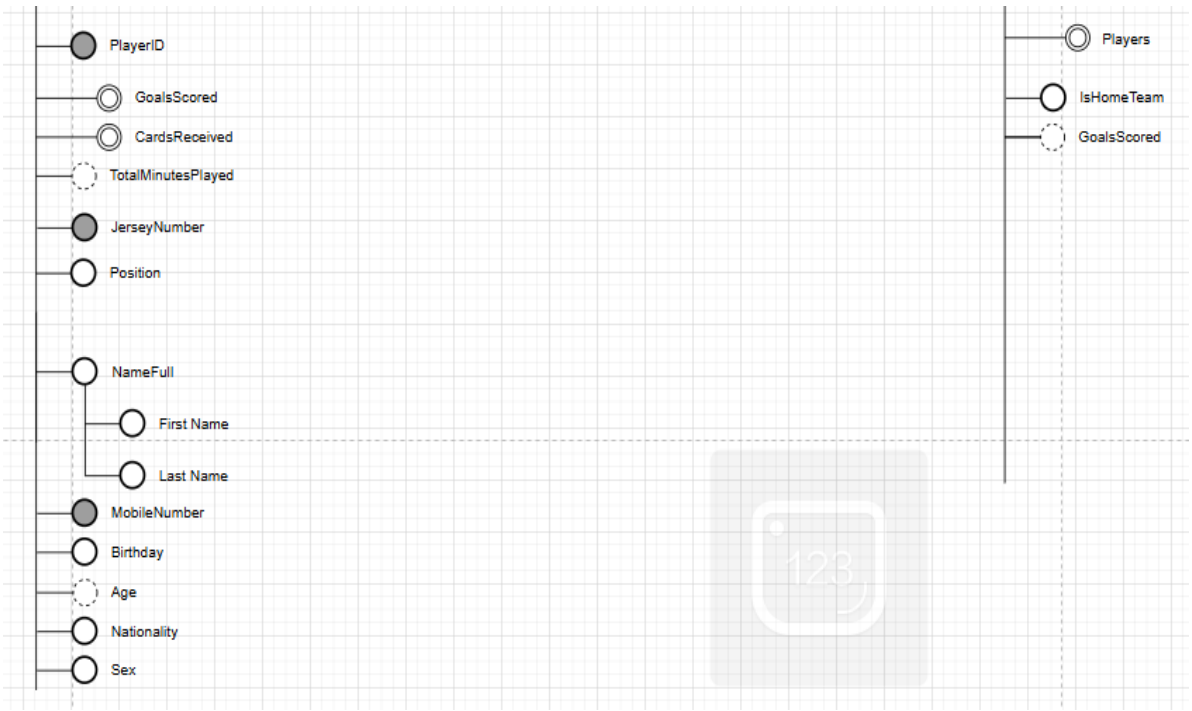
https://en.wikipedia.org/wiki/The_Soccer_Tournament

https://www.fifa.com/en/tournaments

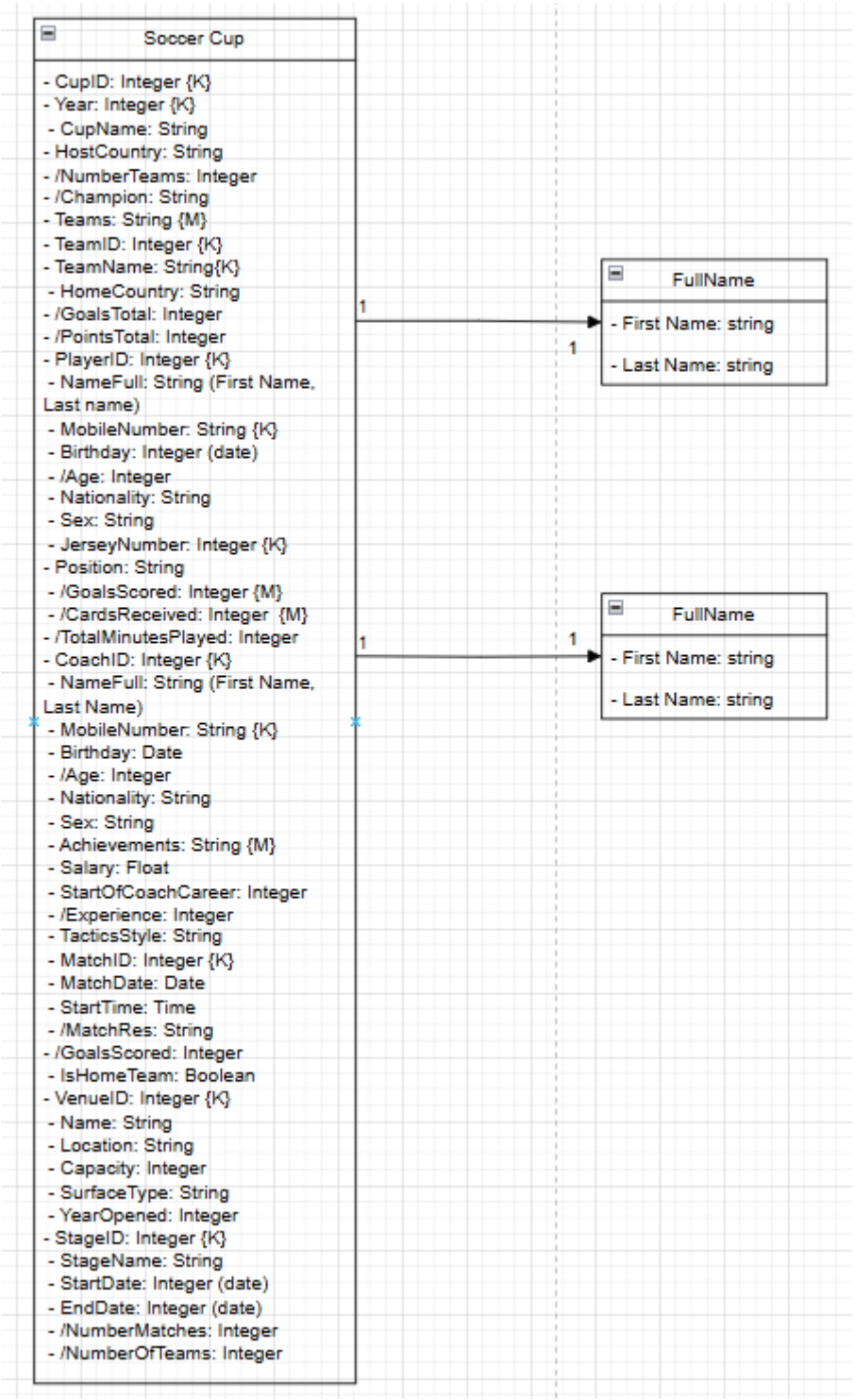
Step 2: Specified Primary Entity Type and Domain Attributes

ER-diagramm:





UML – diagramm:



In the 2nd step we I defined a primary entity type – SoccerCup and attributes for future entity types. I defined candidate keys, derived attributes, atomic attributes, composite attributes, single-multi-valued attributes:

Classification of Attributes:

Atomic: they cant be broken down further.

My list of attributes:

CupName, HostCountry, StageName, StartDate, EndDate, MatchDate, StartTime, Location, Capacity, Name, SurfaceType, YearOpened, HomeCountry, IsHomeTeam, Salary, StartOfCoachCareer, Tactics style, Birthday, Nationality, Sex, Position,

Composite: NameFull (First Name, Last Name)

Single-Valued Attributes: each attribute has only one value

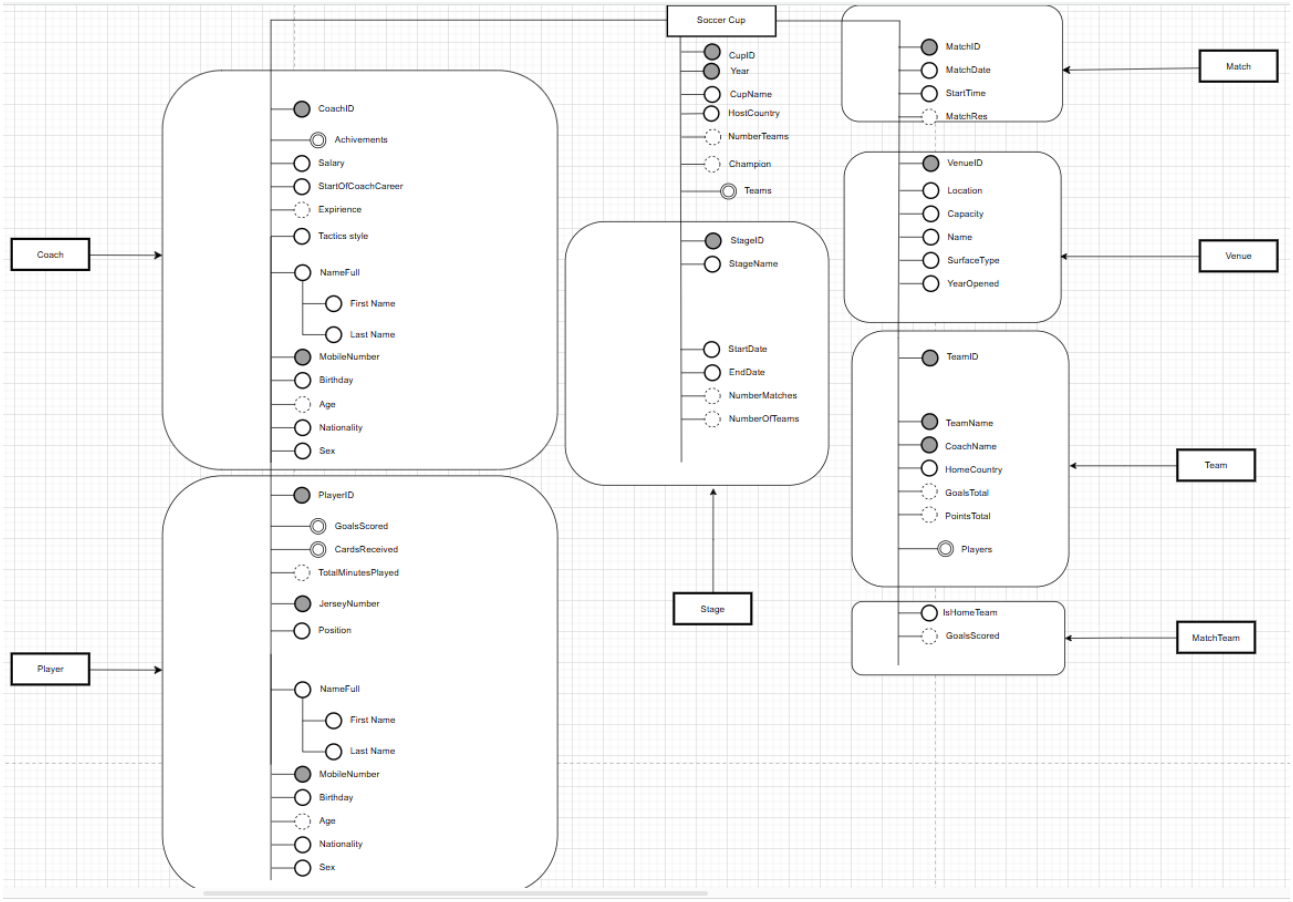
Derived Attributes: its attribute

Stored Attributes: All other attributes are stored directly.

Candidate Key Attribute: CupID is a unique identifier and serves as the candidate key for this entity.

Step 3: Identified groups of attributes for potential Entity Types

ER-diagramm:



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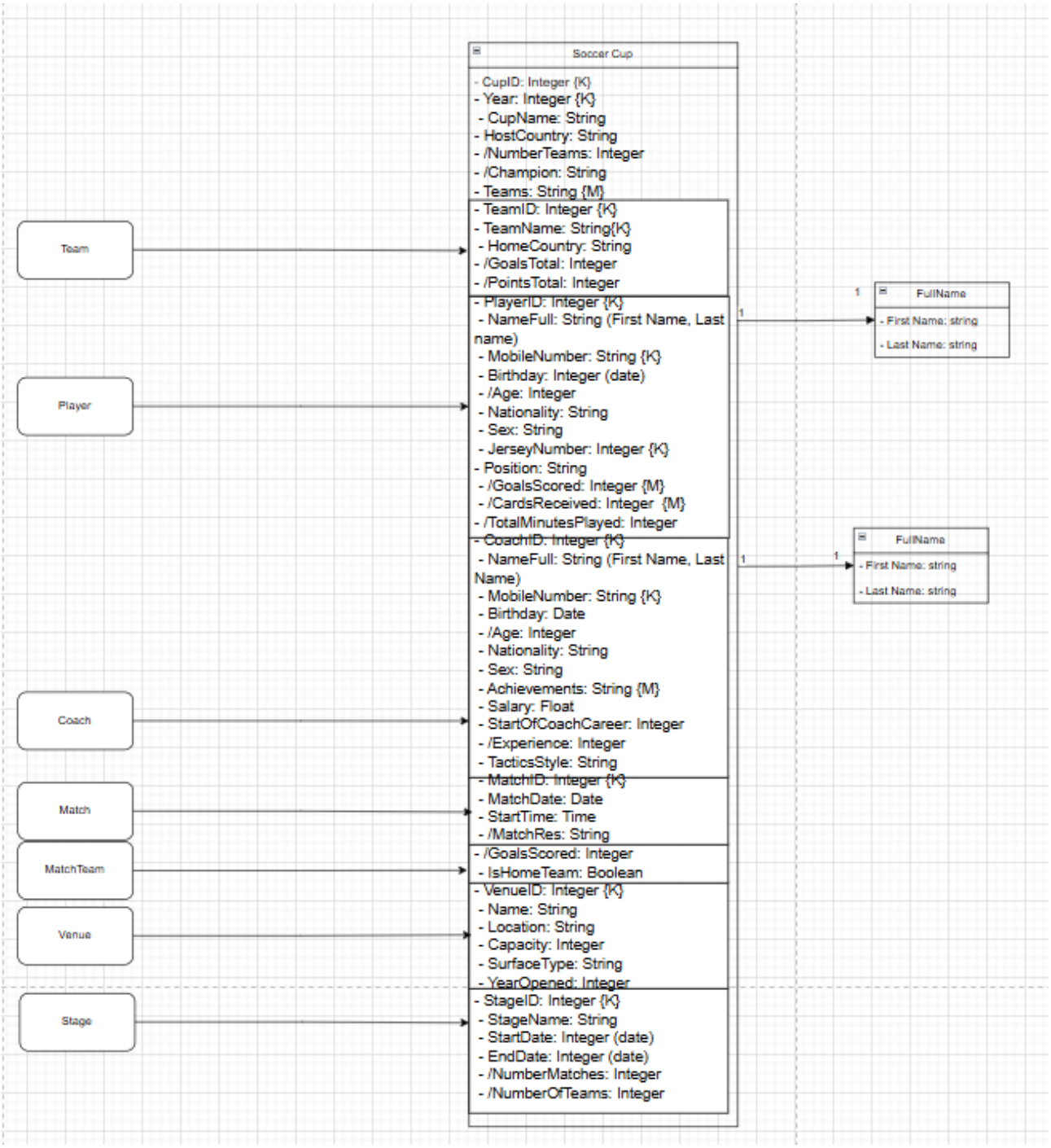
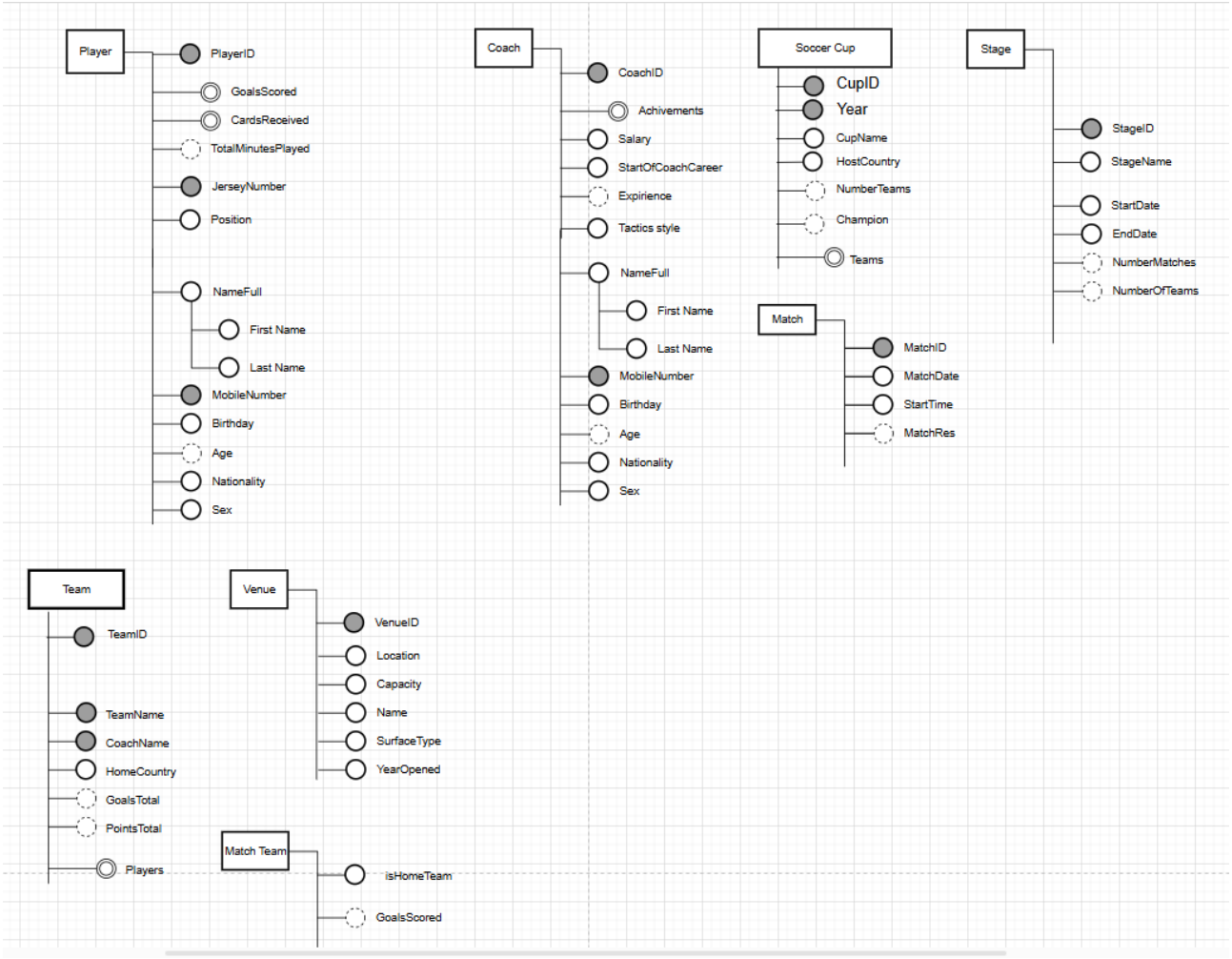
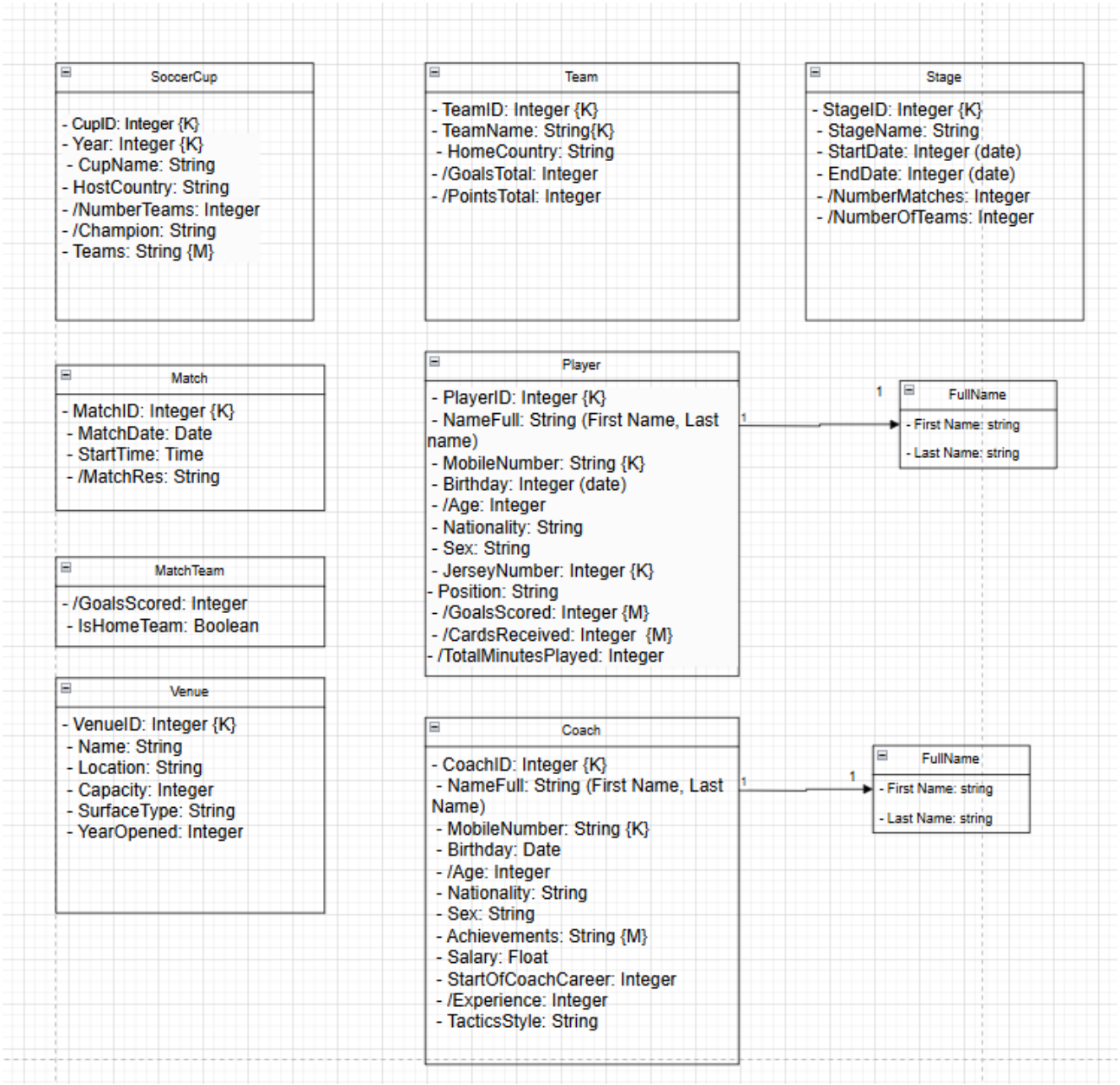


Input: After the defining the primary entity and its attributes, I can define other entities and distribute attributes among them.

Step 4: Attributes distributed among additional Entity Types, their types adjusted ER-diagramm

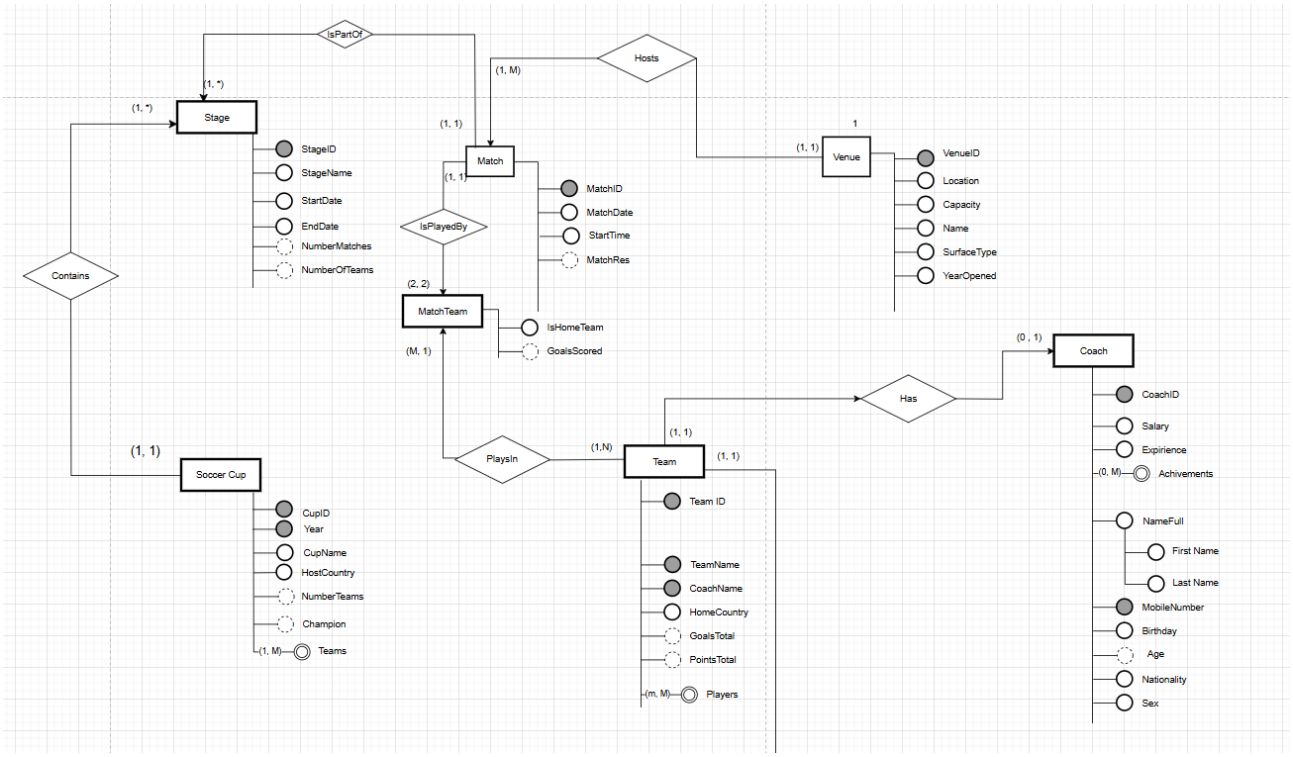


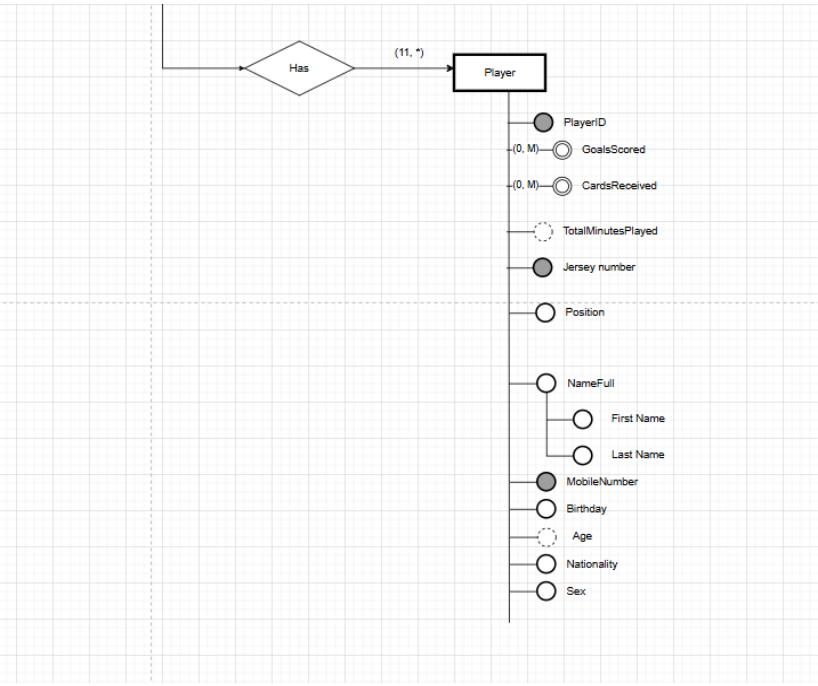
UML-diagramm:


SoccerCup
- CupID: Integer {K}
- Year: Integer {K}
- CupName: String
- HostCountry: String
- /NumberTeams: Integer
- /Champion: String
- Teams: String {M}
Team
- TeamID: Integer {K}
- TeamName: String{K}
- HomeCountry: String
- /GoalsTotal: Integer
- /PointsTotal: Integer
Stage
- StageID: Integer {K}
- StageName: String
- StartDate: Integer (date)
- EndDate: Integer (date)
- /NumberMatches: Integer
- /NumberOfTeams: Integer
Match
- MatchID: Integer {K}
- MatchDate: Date
- StartTime: Time
- /MatchRes: String
Player
- PlayerID: Integer {K}
- NameFull: String (First Name, Last name)
- MobileNumber: String {K}
- Birthday: Integer (date)
- /Age: Integer
- Nationality: String
- Sex: String
- JerseyNumber: Integer {K}
- Position: String
- /GoalsScored: Integer {M}
- /CardsReceived: Integer {M}
- /TotalMinutesPlayed: Integer
1
1
FullName
- First Name: string
- Last Name: string
MatchTeam
- /GoalsScored: Integer
- IsHomeTeam: Boolean
Venue
- VenueID: Integer {K}
- Name: String
- Location: String
- Capacity: Integer
- SurfaceType: String
- YearOpened: Integer
Coach
- CoachID: Integer {K}
- NameFull: String (First Name, Last Name)
- MobileNumber: String {K}
- Birthday: Date
- /Age: Integer
- Nationality: String
- Sex: String
- Achievements: String {M}
- Salary: Float
- StartOfCoachCareer: Integer
- /Experience: Integer
- TacticsStyle: String
1
1
FullName
- First Name: string
- Last Name: string

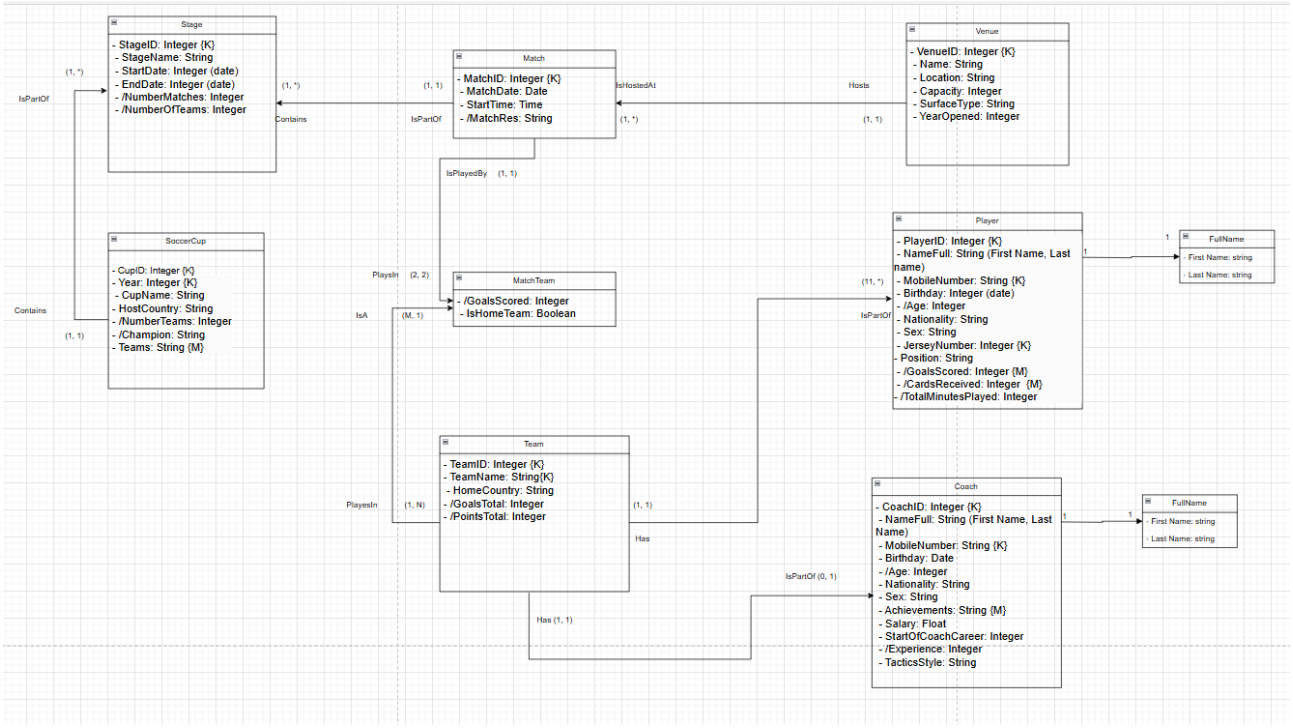
Step 5: Basic relationships specified among Entity Types, Primary Keys specified

ER-diagramm





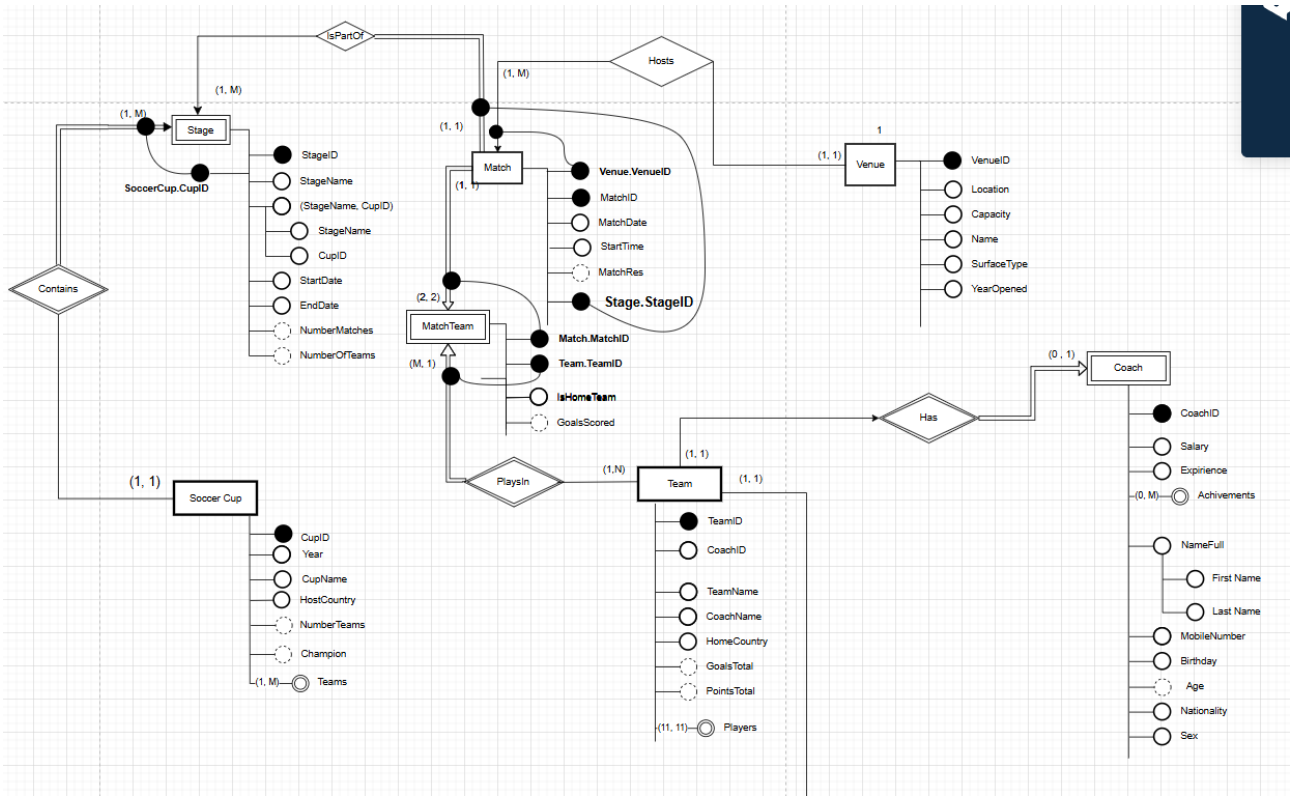
UML-diagramm

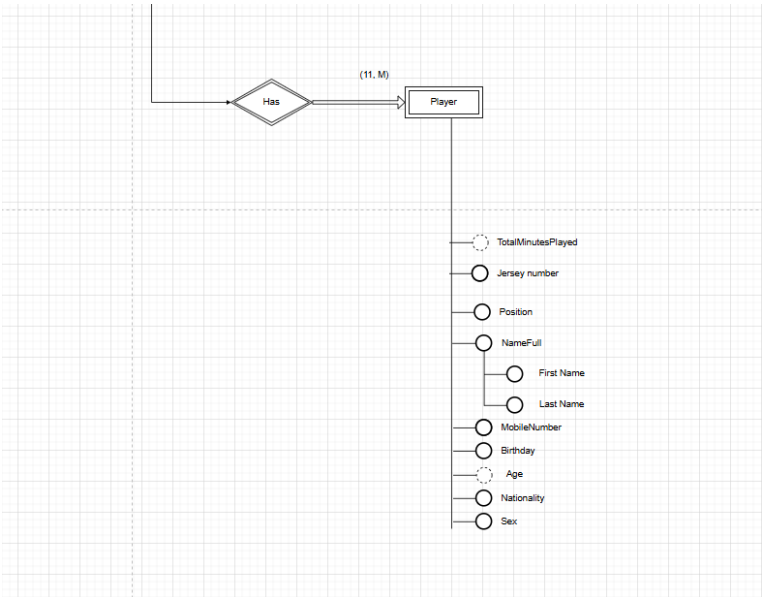


I distributed the attributes between the entities. I separated the entities from each other. Now, having established the basic relationships between my entities in the first step and understanding them, I need to connect the entities correctly with basic relationships.

Step 6: Entity memberships checked, Weak and Strong ETs specified, Foreign Keys specified

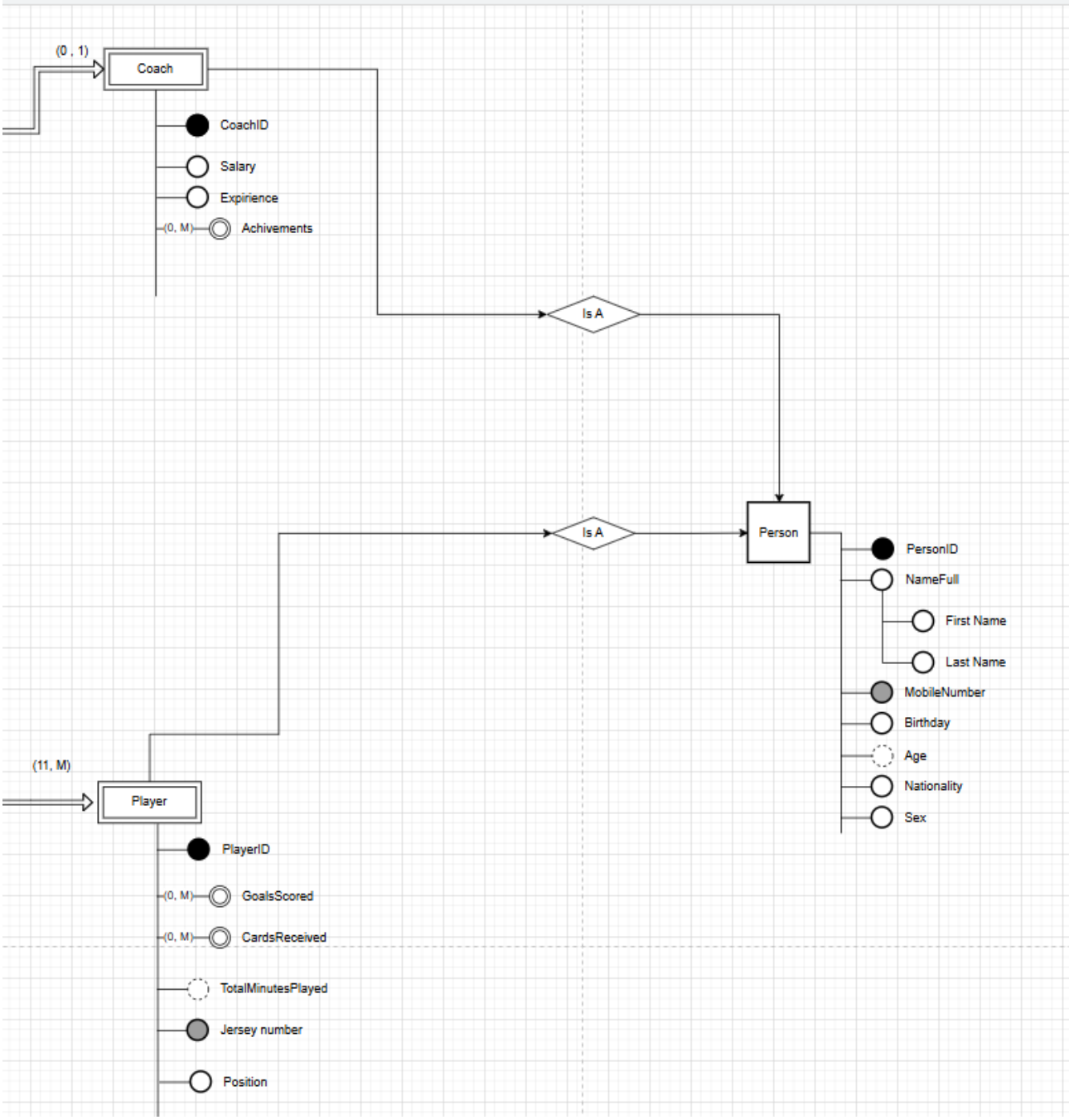
Input: Entities connected with basic relations





Step 7: Compositions and Aggregations specified

Step 8: Generalizations specified



Conclusions:

I particularly made a homework 1. Some steps are not represented. But first half of a work is done