Basics of database systems

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Project – Database design

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1   DEFINITION

This database is developed for Bundesliga stats in 2018/2019. Database for football leagues' data is generally required, because there is so much data to be collected. I tried to gather all the most used data and made a database.

Firstly, I wanted to make sure that I put the most important stats: player stats and team stats. Team stats are very much like a league table. Then I wanted to specify player stats to also have goalkeeper stats if the player is a goalkeeper. Adding match data allowed N:M relation to the team table. I also wanted to add all the nations and how many players and minutes each nation has in the league. Lastly I wanted to add teams' wages to the database.

First query shows the user all the matches where one team was winning at the end of the first half and then lost the game in the second half. The second query shows the N:M relationship table with some added data (This was the mandatory query). Third query shows the user all the players that have played in multiple teams that season. The last query shows all team wages data, player amount, league position and attendance to see how each team has done in the league compared to their wages. Also the user can see the attendance of each team and compare that to the league position or wages. I also have two views first one shows the user the top 10 goal scorers which is searched a lot usually in football. The second view shows the user all the Finnish players and their stats.

2   MODELING

2.1   Concept model

In Figure 1

There is the made ER-Model based on the database concept. There are six entities and between them seven relationships. There are many one-to-one and one-to-many relationships and one many-to-many relationship. Goalkeeper and Wages entities are weak entities and in the Player entity, there is one multivalued attribute Posititon.

Figure 1: ER model

2.2   Relational model

Figure 2 shows the relational model based on the ER model. Due to the N:M relationship between the Team table and the Matches table there is an added TeamsInMatches table created. All the foreign keys have FK in the start of the name and all primary keys are underlined. All the references are shown by an arrow going to the table.
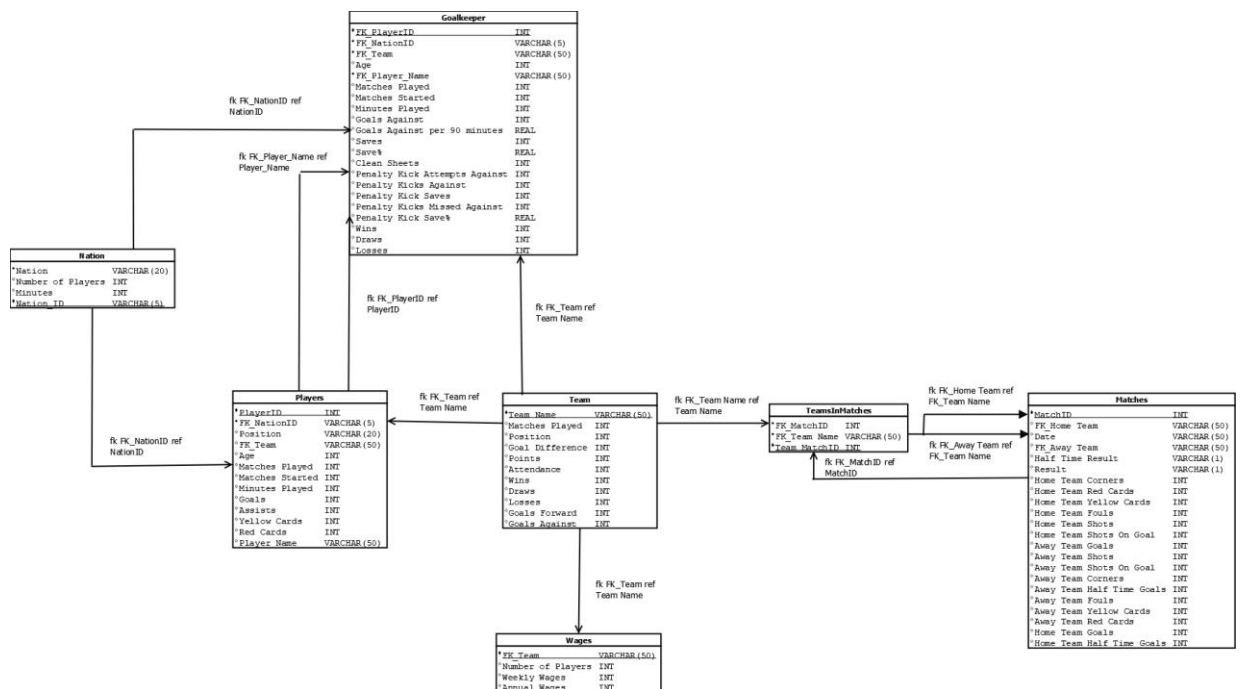
Figure 2: Relational model from the ER model

## 3	DATABASE IMPLEMENTATION

During implementation, the following constraints are created for the relations:

- **Team**:
    - Pos and Team Name cannot be null (NOT NULL)
    - ATT must be a positive integer (CHECK ATT>=0)
    - Pos is a unique integer so every team has a different position in the league table (UNIQUE)
- **Matches**:
    - Two foreign keys references to Team(Team_Name)
    - MatchID cannot be null (NOT NULL)
    - ON DELETE CASCADE
- **TeamsInMatches**:
    - Foreign keys references to Matches(MatchID) and Team(Team_Name)
    - Team_MatchID canoot be null
    - ON DELETE CASCADE
- **Nation**:
    - NationID and Nation not null
    - Min DEFAULT 0 so if nation has players but they haven't played any minutes in the league the default is 0.
- **Wages**:
    - Foreign key reference to Team(Team_Name)
    - ON DELETE CASCADE

- **Players**:
    - Foreign keys references to Nation(NationID) and Team(Team_Name)
    - PlayerID and Player_Name not null (NOT NULL)
    - ON DELETE SET NULL
- **Goalkeeper**:
    - Foreign keys references to Players(PlayerID), Players(Player_Name), Nation(NationID) and Team(Team_Name)
    - ON DELETE CASCADE

In addition to the integrity constraints listed above, the database will also implement three indexes: FK_TeamIndex on Players(FK_Team) so we can find the teams in players table quickly, FK_HomeTeamIndex on Matches(FK_HomeTeam) so we can find home team quickly in macthes table and FK_AwayTeamIndex on Matches(FK_AwayTeam) so we can find away team quickly in macthes table.

4   DISCUSSION

Here are the sources which I used for the real data in this project. This project isn't made to compete with these sites and is only used for educational purposes and learning to build databases.

Data source
Data explanation
Table source
Player source