



Software requirement specification document for Football League Managementproject

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1 Introduction

1.1 Purpose of this document

The purpose of this Software Requirements Specification (SRS) document is to provide a detailed description of the requirements for the development of a Football League Management App using ASP.net. This document will serve as a guide for the developers and stakeholders involved in the project, outlining the functional and non-functional requirements of the app.

The SRS document will help to ensure that everyone involved in the project is on the same page, and that the app meets the expectations of all stakeholders. It will also help to minimize misunderstandings and errors that could arise during the development process by providing a clear, concise description of the app's features, functionality, and constraints.

The SRS document will be used throughout the development process as a reference for the developers and stakeholders, and will be used to validate that the completed app meets the requirements outlined in the document.

Overall, the purpose of this document is to provide a comprehensive description of the Football League Management App, including its features, functionality, and requirements, to ensure a successful development process and a high-quality, user-friendly final product.

1.2 Scope of this document

The scope of this document includes the functional and non-functional requirements of the app, as well as any constraints, assumptions, and dependencies that must be taken into account during the development process. The document is intended for use by the development team, stakeholders, and other interested parties, and is meant to provide a clear and detailed description of the app's features and functionality.

The scope of this document does not include detailed design specifications or implementation details, but rather provides a high-level overview of the app's requirements. It is intended to be used as a reference throughout the development process, to ensure that the app meets the needs of all stakeholders and functions as expected.

Overall, the scope of this document is to provide a clear and detailed description of the requirements for the development of the Football League Management App, to guide the development team and stakeholders throughout the project, and to ensure a successful and high-quality final product.

1.3 Overview

The Football League Management App is a web-based application developed using ASP.net, designed to provide a comprehensive solution for managing a football league. The app will allow users to manage clubs, fixtures, results, rankings, notifications, and finances, and will provide clubs with the ability to manage their own information.

The app will be designed with a user-friendly interface, allowing for easy navigation and use. The app will be accessible through a web browser and will be compatible with desktop and mobile devices.

The main features of the app will include:

- User registration and login
- Ability to manage clubs, including creating, updating, promoting, demoting, and deleting clubs
- Ability to manage fixtures, including scheduling, updating, and cancelling fixtures
- Ability to manage results and rankings, including updating and displaying league tables
- Ability to send notifications and documentation to all clubs
- Ability to manage finances of the league, including tracking income and expenses and generating financial reports
- Ability to penalize clubs for infringements
- Ability to manage a prize pool for high achieving clubs and outstanding players
- Ability for clubs to manage their own information, including updating their profiles and managing their players

The app will be developed with a focus on performance, scalability, security, and usability. It will be designed to handle a large volume of data and users, and will be secured with appropriate measures to protect sensitive information.

Overall, the Football League Management App will provide a comprehensive and user-friendly solution for managing a football league, streamlining administrative tasks and improving communication between clubs and league administrators.

1.4 Business Context

The development of the Football League Management App is a university project aimed at providing a comprehensive and efficient solution for managing football leagues.

The project recognizes the importance of technology in achieving these goals and aims to leverage the latest technological advancements to develop a state-of-the-art solution for managing football leagues. The Football League Management App is a key component of the project's strategy for achieving its goals, and the development of the app is a top priority for the project.

2 General Description

2.1 Product Functions

The Football League Management App is a web-based application that aims to provide a comprehensive solution for managing football leagues. The app will allow league administrators to manage all aspects of the league, including clubs, fixtures, results, and rankings. It will also provide clubs with a platform to manage their own information and track their progress.

The key functions of the Football League Management App are as follows:

- Sign up: The app will allow league administrators and clubs to create their own accounts and sign up for the league.
- Login: Once signed up, users will be able to log in to the app and access their respective accounts.
- Change password: Users will be able to change their passwords at any time, for security purposes.
- Manage all clubs: League administrators will be able to manage all clubs participating in the league, including adding, editing, and deleting clubs.
- Result and ranking management: The app will allow league administrators to manage results and rankings for each fixture, as well as for the overall league standings.
- Promote, demote, delete clubs: League administrators will be able to promote or demote clubs to different leagues based on their performance, or remove them from the league altogether.
- Notification and documentation to all clubs: The app will provide a platform for league administrators to communicate with all clubs, as well as share important documents and information.
- Schedule fixture: League administrators will be able to schedule fixtures for each round of the league, including specifying the date, time, and location of the fixture.
- Penalize for infringement: The app will provide a mechanism for league administrators to penalize clubs for infringements, such as misconduct or breach of rules.
- Manage finance of the league: The app will allow league administrators to manage the financial aspects of the league, including setting and collecting fees, managing expenses, and distributing prizes.
- Prize pool for high achievement clubs and outstanding players: The app will provide a platform for league administrators to manage a prize pool for high-achieving clubs and outstanding players, based on performance metrics and other criteria.

- **Manage own club:** Clubs will be able to manage their own information, including player rosters, game schedules, and performance metrics.

Overall, the Football League Management App will provide a comprehensive solution for managing football leagues, with features designed to streamline administrative tasks, improve communication, and promote fair play and transparency.

2.2 Similar System Information

There are several other football league management systems available in the market, including both commercial and open-source solutions. However, most of these systems are either too complex and difficult to use, or lack key features that are essential for effective league management.

The Football League Management App is intended to be a stand-alone product, designed to provide a comprehensive solution for managing football leagues. It is not intended to be used as a component of a larger product. However, the app will be compatible with other systems and software, allowing users to import and export data as needed.

2.3 User Characteristics

The Football League Management App is designed to be used by two primary user groups:

- **League Administrators:** These users are expected to have a high level of expertise in football league management and should be familiar with software systems commonly used for managing leagues. They will be responsible for setting up and configuring the app, managing league settings, and monitoring league activity.
- **Clubs:** These users may have varying levels of expertise with software systems, but should have a basic understanding of how to use computers and mobile devices. They will use the app to manage their club, including adding and editing player and staff profiles, submitting results and fixtures, and tracking their finances.

Both user groups are expected to have a basic understanding of the football league domain, including rules and regulations, and common terminology used in league management.

The app will be designed with a user-friendly interface and will include help documentation and tutorials to assist users with common tasks. In addition, support will be available to help users with any questions or issues they may encounter while using the app.

Overall, the Football League Management App is designed to be accessible and easy to use for users of varying levels of expertise, with features and functionality tailored to the specific needs of league administrators and clubs.

2.4 User Problem Statement

The user community for the Football League Management App faces several key challenges when managing football leagues:

- **Lack of comprehensive solutions:** Many existing football league management systems are either too complex or lack key features required for effective league management. This often leads to frustration and inefficiencies for league administrators and clubs.
- **Inefficient manual processes:** Without a comprehensive software solution, many league administrators and clubs resort to using manual processes to manage their leagues. This can be time-consuming and error-prone, leading to inaccuracies in results and rankings.
- **Poor communication and collaboration:** With manual processes, it can be difficult for league administrators and clubs to effectively communicate and collaborate with each other. This can lead to misunderstandings, missed deadlines, and a lack of transparency in league activities.
- **Limited access:** Without mobile-friendly solutions, league administrators and clubs may be limited in their ability to manage leagues on-the-go. This can be particularly challenging for clubs, who may need to submit results and fixtures while on the road for away games.

The Football League Management App aims to address these challenges by providing a comprehensive, user-friendly solution for managing football leagues. With a range of features and functionality designed specifically for league management, the app is expected to improve efficiency, communication, and collaboration between league administrators and clubs, while providing greater accessibility and flexibility for users.

2.5 User Objectives

The user community for the Football League Management App has several key objectives for the system:

- **Comprehensive league management:** The app should provide a comprehensive solution for managing all aspects of a football league, including setting up league rules and settings, managing club and player profiles, submitting results and fixtures, and managing league finances.
- **User-friendly interface:** The app should have a user-friendly interface that is easy to navigate and use, with clear and concise instructions for common tasks.
- **Mobile accessibility:** The app should be accessible on mobile devices, allowing users to manage their leagues on-the-go.
- **Efficient and accurate processes:** The app should streamline league management processes, reducing the need for manual processes and minimizing the risk of errors and inaccuracies.
- **Effective communication and collaboration:** The app should facilitate effective communication and collaboration between league administrators and clubs, with features such as notifications, messaging, and shared documents.

- Customizable settings: The app should allow league administrators to customize league settings and rules to fit their specific needs.
- Security and privacy: The app should ensure the security and privacy of user data, with features such as password protection and data encryption.
- Affordable pricing: The app should be priced at an affordable level for both small and large leagues, with transparent pricing and no hidden fees.

Overall, the Football League Management App aims to meet these user objectives by providing a comprehensive, user-friendly solution for managing football leagues, with a range of features and functionality designed to improve efficiency, communication, and collaboration between league administrators and clubs.

2.6 General Constraints

The design and development of the Football League Management App is subject to the following general constraints:

- Hardware and software platforms: The app must be designed to run on common hardware and software platforms, including desktop and mobile devices running Windows, MacOS, iOS, and Android operating systems.
- Speed and performance: The app must be designed to provide fast and efficient performance, with minimal lag time or delays when loading or processing data.
- Security and privacy: The app must be designed to ensure the security and privacy of user data, with features such as password protection, data encryption, and secure data storage.
- Industry protocols and standards: The app must comply with relevant industry protocols and standards, including those related to data privacy, security, and accessibility.
- User interface and experience: The app must be designed to provide a user-friendly interface and experience, with clear and concise instructions for common tasks, and intuitive navigation.
- Budget constraints: The design and development of the app must be completed within a specific budget, with careful consideration given to the cost of development tools, hardware and software platforms, and ongoing maintenance and support.

Overall, the Football League Management App must be designed and developed within these general constraints to ensure its success as a comprehensive and user-friendly solution for managing football leagues.

3 Functional Requirements

Table 1: Functional Requirement Sign Up

Function Name	Sign up
Description	Users must be able to create an account by entering their basic personal information such as name, email address, and password.
Critically	Must have
Technical issues	Implementing a secure password encryption algorithm to ensure the security of user data.
Cost and schedule	Low cost and minimal time are required to implement this function.
Risks	The risk of creating a weak password, which could result in the user's account being compromised. This risk can be minimized by enforcing a password complexity policy.
Pre-Condition	The user must be on the registration page of the platform.
Post-Condition	The user's account is created, and they are automatically logged in to the platform.

Table 2: Functional Requirement Login

Function Name	Login
Description	Users must be able to log in to the platform by entering their email and password.
Critically	Must have
Technical issues	Ensuring the authentication process is secure and that the user's login information is not vulnerable to unauthorized access.
Cost and schedule	Low cost and minimal time are required to implement this function.
Risks	The risk of unauthorized access to the user's account. This risk can be minimized by enforcing strict security policies and implementing multi-factor authentication.
Pre-Condition	The user must have an existing account on the platform.
Post-Condition	The user is logged in to their account and can access the platform's functionalities.

Table 3: Functional Requirement Change password

Function Name	Change password
Description	Users must be able to change their password for security purposes.
Critically	Important.
Technical issues	Ensuring the password change process is secure and that the user's new password is not vulnerable to unauthorized access.
Cost and schedule	Low cost and minimal time are required to implement this function.
Risks	The risk of forgetting the new password or creating a weak password. This risk can be minimized by providing password complexity requirements and implementing password reset functionality.
Pre-Condition	The user must be logged in to their account.
Post-Condition	The user's password is changed, and they are required to log in again using their new password.

Table 4: Functional Requirement Manage all clubs

Function Name	Manage all clubs
Description	Allow authorized users to manage all the clubs in the football league by adding new clubs, updating existing ones, and deleting inactive clubs.
Critically	Essential
Technical issues	Proper access control mechanisms should be implemented to ensure that only authorized users can manage clubs.
Cost and schedule	Medium
Risks	The risk of unauthorized access to club management functions can be mitigated by implementing proper access control measures.
Pre-Condition	The user is authorized to manage clubs in the system.
Post-Condition	The club information is updated or a new club is added or inactive clubs are deleted.

Table 5: Functional Requirement Promote, demote, delete clubs

Function Name	Promote, demote, delete clubs
Description	Allow authorized users to promote, demote, or delete clubs based on their performance in the league.
Critically	Essential
Technical issues	Proper access control mechanisms should be implemented to ensure that only authorized users can promote, demote, or delete clubs.
Cost and schedule	Medium
Risks	The risk of incorrect promotions or demotions can be mitigated by implementing proper validation mechanisms.
Pre-Condition	The user is authorized to promote, demote, or delete clubs in the system.
Post-Condition	Clubs are promoted, demoted, or deleted according to the user's actions.

Table 6: Functional Requirement Manage Results and Rankings

Function Name	Manage Results and Rankings
Description	This function allows the league manager to input the results of matches played by the various clubs and automatically generates an up-to-date ranking table based on the results.
Critically	Must have
Technical issues	The technical issues involved in implementing this requirement include designing a user-friendly interface for inputting match results, implementing an algorithm that accurately calculates the ranking of each club based on the results of their matches, and ensuring that the ranking table is displayed correctly.
Cost and schedule	The cost and schedule of implementing this requirement depend on the complexity of the algorithm used for ranking clubs and the amount of time required to design and test the user interface.
Risks	The main risk associated with this requirement is the potential for inaccuracies in the ranking system due to incorrect data input by the league manager.
Pre-Condition	The league manager has logged into the system and has access to the match results.
Post-Condition	The system generates an updated ranking table based on the inputted match results.

Table 7: Functional Requirement Send notification and documentation to all clubs

Function Name	Send notification and documentation to all clubs.
Description	The system should allow the league administrator to send notifications and documentation (such as rule changes, meeting minutes, etc.) to all registered clubs.
Critically	Important.
Technical issues	The system will need to implement a messaging system that allows for the creation and sending of messages to all registered clubs.
Cost and schedule	The cost and schedule of implementing this function will depend on the complexity of the messaging system and the desired features.
Risks	There is a risk that messages may not be delivered or may be overlooked by clubs.
Pre-Condition	The league administrator must be logged into the system and have authorization to send messages to all clubs.
Post-Condition	All registered clubs should receive the message and be able to access it in their message inbox or notification center.

Table 8: Functional Requirement Schedule fixture

Function Name	Schedule fixture
Description	Allows the league administrator to schedule fixtures between clubs and update the schedule as needed.
Critically	crucial
Technical issues	The system must be able to handle conflicting schedules and ensure that no club is scheduled to play two matches at the same time or on the same day.
Cost and schedule	The cost and schedule of this function will depend on the complexity of the scheduling algorithm used and the frequency of updates required.
Risks	The risk of this function not being able to be satisfied is low, as there are existing scheduling algorithms that can be used.
Pre-Condition	The league administrator must have access to all necessary information regarding club availability, stadium availability, and any other relevant scheduling constraints.
Post-Condition	A schedule is generated that assigns each club to a specific time and place for each match, and all clubs are notified of their scheduled matches.

Table 9: Functional Requirement Penalize for infringement

Function Name	Penalize for infringement.
Description	The system should allow the league administrators to impose penalties on clubs or players who violate the league rules.
Critically	Medium
Technical issues	The system needs to have a mechanism to track violations and penalties and display them publicly to ensure transparency.
Cost and schedule	The cost of implementing this requirement may depend on the complexity of the penalty system and the level of automation required.
Risks	There is a risk of incorrectly imposing penalties or not imposing penalties when necessary.
Pre-Condition	The league rules and regulations should be clearly defined and communicated to all clubs and players.
Post-Condition	The penalties imposed should be recorded and reflected in the standings and rankings.

Table 10: Functional Requirement Manage finance of the league

Function Name	Manage finance of the league
Description	The system should allow the league administrators to manage the financial aspects of the league, including revenue generation, expenses, and budgeting.
Critically	Medium.
Technical issues	The system needs to have a mechanism to track revenue and expenses and generate financial reports.
Cost and schedule	The cost of implementing this requirement will depend on the complexity of the financial management system.
Risks	There is a risk of financial mismanagement or fraud. To reduce this risk, the system should have appropriate controls and audit trails in place.
Pre-Condition	The league administrators should have a clear understanding of the league's financial goals and objectives.
Post-Condition	The financial records should be accurate and up-to-date, and the league should be able to operate within its budget.

Table 11: Functional Requirement Prize pool for high achievement clubs and outstanding players

Function Name	Prize pool for high achievement clubs and outstanding players
Description	The system should allow the league administrators to create a prize pool for high-achieving clubs and outstanding players.
Critically	Important
Technical issues	The system needs to have a mechanism to track performance and calculate rewards based on predefined criteria.
Cost and schedule	The cost of implementing this requirement will depend on the size and complexity of the prize pool.
Risks	There is a risk of unfairness or bias in the selection of winners. To reduce this risk, the criteria for selecting winners should be transparent and objective.
Pre-Condition	The criteria for selecting winners should be clearly defined and communicated to all clubs and players.
Post-Condition	The rewards should be distributed fairly among eligible clubs and players.

Table 12: Functional Requirement Manage own club

Function Name	Manage own club
Description	Allows club owners to manage their club information, including club name, logo, players, coach, and staff. Club owners can add, edit, or remove players, coaches, and staff from their club.
Critically	essential
Technical issues	The system needs to ensure that club owners only have access to their club's information and cannot view or edit information about other clubs.
Cost and schedule	The cost and schedule for implementing this function will depend on the complexity of the system and the number of features included.
Risks	The risk involved with this function is that club owners may accidentally delete important information or make changes that negatively impact their club's performance.
Pre-Condition	The club owner is logged in to the system and has access to their club's information.
Post-Condition	The club owner has successfully managed their club's information and can view the changes made in the system.

4 Interface Requirements

4.1 User Interfaces

The system will have a user interface that allows the league management and club management staff to perform various operations such as scheduling fixtures, managing finances, managing results and rankings, and managing players' data. The user interface will be developed using modern web technologies such as HTML, CSS, and JavaScript.

4.1.1 GUI

The Graphical User Interface (GUI) of the system is designed to provide an intuitive and user-friendly way for the user to interact with the system. The GUI provides a set of screens that allow the user to perform various functions such as managing clubs, players, fixtures, and results, as well as viewing league tables and player statistics. The GUI is designed with the following features:

- **Navigation Menu:** The navigation menu provides access to all the different functionalities of the system. It includes options such as "Manage Club", "Manage Players", "Schedule Fixture", "View Results", "View League Table", "View Player Statistics", and so on.
- **Input Forms:** The system provides input forms to collect user inputs for various functionalities. The input forms are designed with input validation and error messages to ensure data integrity.
- **Tables:** The system displays data in tabular format for easy viewing and analysis. The tables are designed with sorting and filtering capabilities to allow the user to easily find and manipulate data.
- **Charts:** The system provides charts and graphs to display league tables and player statistics in a visually appealing and easy-to-understand format.

4.1.2 Diagnostics or ROM

The system shall have a built-in diagnostic feature that will help in the detection and correction of any errors in the software. When an error is encountered, the system will generate an error message that will be displayed on the user interface. The message will include the error code, a brief description of the error, and recommendations for resolving the issue.

The system will also maintain a log file that records all system events, including errors, warnings, and informational messages. This log file will be stored on the server and can be accessed by the system administrator for debugging and diagnostic purposes.

In addition, the system will provide a remote access feature that will allow the system administrator to remotely access the server for debugging and diagnostic purposes. The remote access feature will require authentication and authorization to ensure the security of the system.

The system will also include a ROM that contains the system software, data, and configuration files. This ROM will be used as a backup in case of system failure, and can be used to restore the system to its previous state. The ROM will be stored in a secure location and will be regularly updated to ensure the system is always backed up.

4.2 Hardware Interfaces

The Football League Management system does not have any direct interfaces to hardware devices. However, the system requires a computer or mobile device with internet connectivity to access and utilize the software. The system is compatible with a wide range of hardware devices, including desktop computers, laptops,

tablets, and smartphones. Additionally, the system may utilize hardware devices such as printers to generate physical copies of reports or other data outputs. The system does not require any specific hardware configuration, but it is recommended that users utilize devices with modern hardware specifications to ensure optimal performance.

4.3 Communications Interfaces

The Football League Management system will require communication interfaces to various external systems and networks. These interfaces will include:

- **Internet Connectivity:** The system will need to be connected to the Internet in order to access external data and information, such as real-time match scores, news updates, and other relevant data. This interface will need to support standard networking protocols such as TCP/IP, HTTP, and FTP.
- **Email Notifications:** The system will be capable of sending automated email notifications to club officials, referees, and other relevant parties, such as match schedules, results, and other updates. This interface will use standard email protocols such as SMTP and POP3.
- **SMS Notifications:** In addition to email, the system will also be capable of sending automated SMS notifications to club officials and other relevant parties. This interface will use standard SMS protocols such as SMPP.

Overall, the communication interfaces of the Football League Management system will need to be reliable, secure, and scalable to ensure that all relevant parties can access and interact with the system effectively.

5 Performance Requirements

The performance of the system is critical for efficient management of the football league. The system must meet the following requirements:

- **Response Time:** The system must have a response time of less than 2 seconds for all user interactions.
- **Scalability:** The system must be able to handle a large number of users and data without any performance degradation.
- **Memory usage:** The system must be optimized to use the minimum amount of memory possible.
- **Reliability:** The system must be reliable and have an uptime of at least 99.9
- **Security:** The system must be secured from any external threats and must have a proper authentication mechanism to ensure the safety of data.

6 Design Constraints

- **Technology:** The system will be developed using ASP.NET, and the design team must ensure that all modules and components are compatible with this technology.
- **Platform:** The system must be compatible with the Windows operating system and run on the .NET framework. The design team must ensure that all modules and components are compatible with the specified platform.
- **Security:** The system must provide secure access to the database and other critical resources. The design team must implement security measures such as authentication, authorization, and encryption to ensure data confidentiality and integrity.
- **Performance:** The system must perform efficiently and handle a large number of concurrent users. The design team must optimize the system performance by minimizing response time, network latency, and resource usage.
- **Scalability:** The system must be scalable and able to handle an increase in the number of users and data volume. The design team must ensure that the system architecture and database design can support future expansion.
- **Usability:** The system must be user-friendly and easy to navigate. The design team must ensure that the user interface is intuitive and conforms to established usability standards.
- **Accessibility:** The system must comply with accessibility guidelines to ensure that users with disabilities can access and use the system. The design team must ensure that the user interface is compatible with assistive technologies and that all content is accessible to users with disabilities.
- **Documentation:** The design team must provide comprehensive documentation that includes technical specifications, design documents, user manuals, and installation guides. The documentation must be complete, accurate, and up-to-date.

7 Other non-functional attributes

The following non-functional attributes are also important for the system:

- **Security:** The system must be designed with appropriate security measures to prevent unauthorized access, data breaches, and malicious attacks. User authentication and access control must be implemented to ensure that only authorized users can access sensitive data.
- **Scalability:** The system must be designed to handle a large number of users and a growing amount of data. It should be scalable and able to handle increasing demands without any significant performance degradation.

- **Availability:** The system must be highly available and accessible at all times. It should have a robust disaster recovery plan in place to ensure business continuity in the event of any system failures or disruptions.
- **Reliability:** The system must be reliable and consistent in its performance. It should minimize the occurrence of errors and ensure that data is accurately and consistently stored and retrieved.
- **Usability:** The system must be easy to use and navigate for all types of users, regardless of their technical expertise. It should have a user-friendly interface and clear documentation to support users in using the system.
- **Maintainability:** The system must be easy to maintain and update over time. It should be designed with modularity in mind, using standard coding practices and programming languages to facilitate maintenance and updates.

8 Operational Scenarios

Scenario 1: User Registration John, a football enthusiast, wants to join the football league management system to register his team. John navigates to the registration page and enters his personal details and team information. The system verifies his information and creates a new user account. John logs in to the system and accesses his team dashboard.

Scenario 2: Fixture Schedule As the league administrator, Maria wants to schedule fixtures for the upcoming season. Maria logs into the system and navigates to the fixture scheduling page. She selects the teams that will participate in each fixture and assigns the dates and times. The system validates the scheduling conflicts and confirms the fixtures.

Scenario 3: Penalty Issuance As the referee of a football match, Tom notices a player from one of the teams violating a league rule. Tom records the incident in the system, and the system issues a penalty against the player and notifies the team management.

Scenario 4: Payment Processing As the owner of a football team, Mark wants to pay the league fees for his team. Mark logs into the system and navigates to the payment processing page. He selects the payment method, enters the payment details, and confirms the payment. The system verifies the payment and updates Mark's team's account balance.

Scenario 5: Player Statistics As the coach of a football team, Sarah wants to view the performance statistics of her team's players. Sarah logs into the system and navigates to the player statistics page. She selects the players whose statistics she wants to view and accesses their performance history. The system presents the statistics in an easy-to-understand format.

These scenarios provide a practical view of how the system will work in real-world scenarios. By using these scenarios, we can test the system's functionality and ensure that it meets the requirements of the stakeholders.

9 Preliminary Object-Oriented Domain Analysis

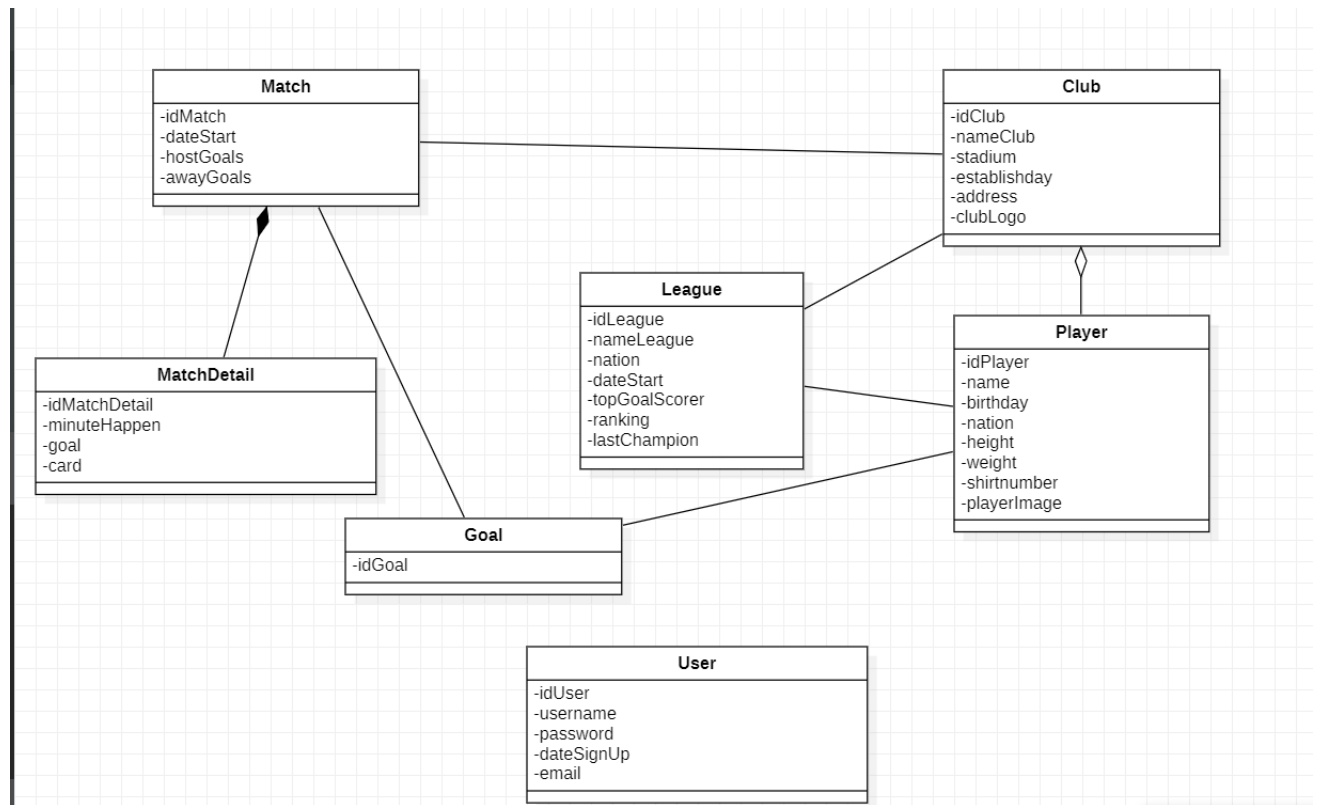


Figure 1: Class diagram

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