Stat11 - Project Report

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Contribution: Backend functions for calculations and fetching, home page UI, highlights, main scorecard, Debugging, Display teams page

Problem Statement

During cricket matches, keeping track of scores is a cumbersome task. The conventional pen-paper approach consists of many issues:

1. Using a conventional approach, score management is a tiresome task for the scorer.
2. In-depth analysis remains almost impractical.
3. Communicating the complete scoreboard and analysis across the general audience isn't an option.

For the same, SportLabs wants software that will serve two primary functions.

1. It will enable the general public to view a real-time scoreboard for cricket matches. This will allow cricket fans to easily keep track of the latest scores and updates for ongoing matches.
2. The software will provide a platform for scorers in cricket matches to update the scoreboard efficiently. This feature will enable scorers to update the scoreboard quickly and accurately, ensuring that cricket fans can access the latest scores and statistics.

Our Approach: Solution

Our solution includes a web application designed to digitalize the whole scoreboard management process, making it more intuitive and easier for the scorer.

- Scorers (having admin rights) will be able to manipulate the scoreboard digitally during the match.
- An in-depth analysis of the match will be calculated and provided with the help of several graphs and charts.
- Highlights will be provided once the match is over. Additionally, all previous scoreboards will remain accessible after the match ends, making match review easier.
- Anyone (even the virtual audience crowd) can view the scoreboard and the corresponding chart analysis.

Key Features

Novelty

Stat11's key novelty is the ability to provide analytics and live scores of the cricket matches at once. Moreover, the general public don't have to go through the process of authentication and can access the information easily.

Stat11's analytics allow the user to have a better understanding of the performance of a player and also provide an interactive and interesting experience.

Scorecard

1. Scoreboard will show all statistics related to a match.
2. Stats shown for any player will depend on the player's role
    i. For batsmen
        1. Runs
        2. Balls
        3. Fours
        4. Sixes
        5. Strike rate
    ii. For bowlers
        1. Runs
        2. Overs
        3. Maidens
        4. Wickets
        5. Economy rate

*Scoreboard can only be manipulated by a user with superuser or admin rights

Chart Analysis

1. Charts and graphs showing an in-depth analysis of the match will be provided.
2. Various charts will be included. Some of them are,
    a. Pie chart denoting the percentage of runs scored by each batsman
    b. Bar graphs denoting the number of wickets taken by each bowler
3. All discussed charts will be provided for both teams simultaneously.

Highlights

Once the match ends, highlights based on the scoreboard will be provided.
Highlights include,

1. Best batters
2. Best bowlers
3. MVP (Most Valuable Player)

Applications

1. Enhanced viewing experience: With real-time statistics and analysis, Stat11 can enhance the viewing experience of cricket matches for fans. The app can provide a better understanding of player and team performance and can help fans make informed predictions about future outcomes.
2. Coaching and training: Stat11 can be used by coaches and players to analyze performance data and identify areas for improvement. The app's interactive charts and match analysis can provide insights into player strengths and weaknesses and help coaches tailor their training programs to specific needs.
3. Scouting and recruitment: Professional cricket teams can use Stat11 to scout and recruit new players. The app's real-time statistics and analysis can help teams identify potential prospects and evaluate their performance against specific criteria.

Development Methodology

To meet our client's requirements, we adopted the Agile methodology, emphasizing collaboration, flexibility, and iterative development.
Agile methodology breaks the project into smaller, manageable tasks or sprints, completed and reviewed in cycles. This allows for frequent feedback and adjustments throughout the development process, leading to better communication, faster delivery, and improved final product quality.
The Agile methodology prioritizes the client's and the end-users needs, ensuring that the web application meets their requirements and expectations.

Workflow

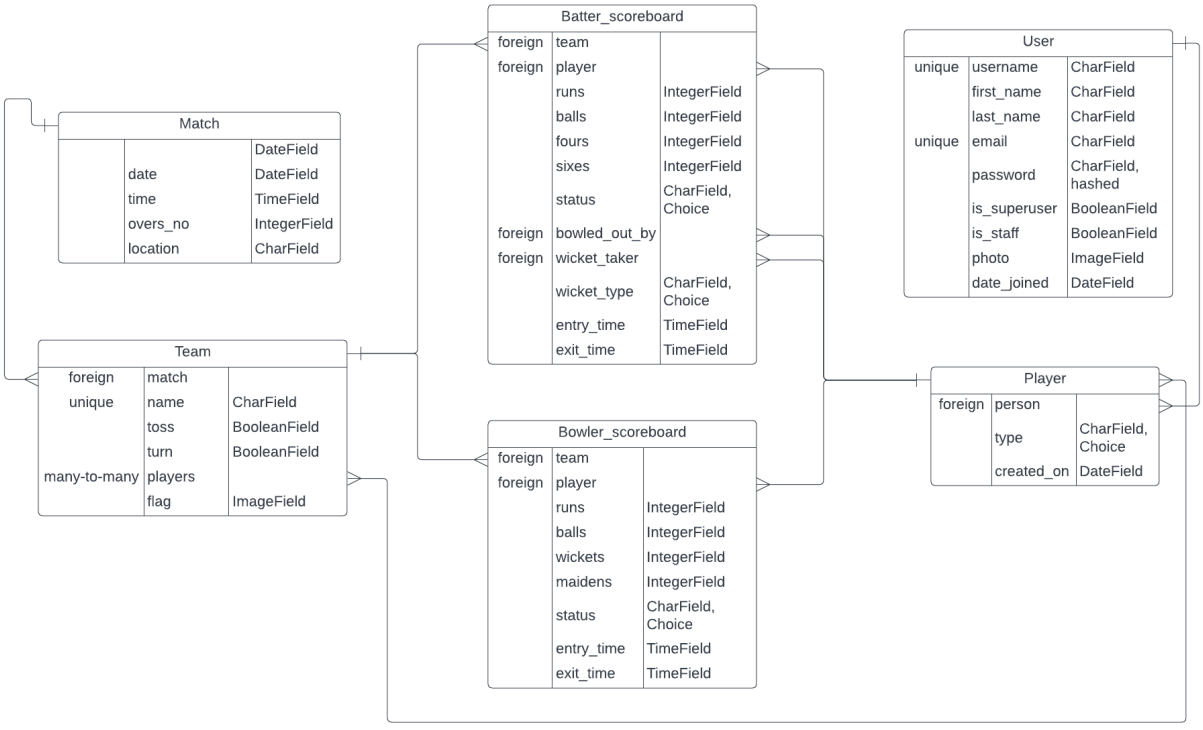
The following is a high-level workflow of the Stat11 web application:

1. Home Page: The user visits the web application's home page, where they can see the list of ongoing and upcoming cricket matches.

2. Match Selection: The user selects a match to view the live scores and other match-related information.
3. Live Scorecard: The user will be taken to the live scorecard page, where they can see the current score, player statistics, and other real-time updates related to the match.
4. Match Analysis: The user can access the match analysis page, where they can view various charts and graphs related to the match's progress, such as run rate, fall of wickets, and other important statistics.
5. Admin Panel: The administrator will have access to the admin panel, where they can manage various aspects of the application, such as creating new matches, managing players, and updating the scorecard.
6. Superuser Access: The superuser will have complete editing rights, including admin rights for other users.
7. Audience View: Anyone with network access can view the application as an audience member without authentication. Overall, the application workflow is designed to be simple and user-friendly, emphasizing real-time updates and a clean UI with intuitive UX.

Database Modeling

Entity Relationship Diagram



User

Attributes:

1. Username(String) - Unique username for each user
2. First_name(String) - First name of user
3. Last_name(String) - Last name of user
4. Email(String) - Unique email address for the user.
5. Password(String) - Password string used while authenticating users registered in the application, will be stored via SHA256 hashing.
6. Is_superuser(Boolean) - A boolean telling whether the user has superuser rights or not.
7. Is_staff(Boolean) - A boolean telling whether the user has admin rights or not.
8. Date_joined(Date) - Date when the account was created.

Player

Attributes:

1. Person(Foreign_Key) - A foreign key representing the user object the player is connected to
2. Type(String) - String containing the player's type (batter, bowler, all_rounder)
3. Created_on(Date) - Contains the date this player was created

Match

Attributes:

1. Created_on(Date) - Contains the date when the match was created.
2. Date(Date) - The date scheduled for the match.
3. Time(Time) - The time match is scheduled at
4. Overs_no(Integer) - Number of overs in the match
5. Location(String) - The location of the match.

Team

Attributes:

1. Match(Foreign_Key) - The foreign key representing the match the given team participates in.
2. Name(String) - The name of team
3. Toss(Boolean) - A boolean telling if the team won the toss
4. Turn(Boolean) - A boolean telling if it's the team's turn to bat
5. Players(Many_To_Many) - Players list which is part of team

6. Flag(Image) - Image representing the team's flag

Batter_Scoreboard

Attributes:

1. Team(Foreign_Key) - The foreign key represents the team given batter is part of
2. Player(Foreign_Key) - The foreign key represents the player object whose scores are being recorded in this table
3. Runs(Integer) - Integer represents the runs scored by the batter
4. Balls(Integer) - The balls played by the batter
5. Fours(Integer) - The Number of fours hit
6. Sixes(Integer) - The number of sixes hit
7. Status(String) - Contains the status, i.e., yet_to_bat, batting, out, idle of the batter
8. Bowled_out_by(Foreign_Key) - The foreign key to the bowler who took the wicket
9. Wicket_taker(Foreign_Key) - Foreign key to the player who took wicket
10. Wicket_type(String) - The type of wicket
11. Entry_time(Time) - The time batter entered the arena
12. Exit_time(Time) - The time batter exits the arena

Bowler_Scoreboard

Attributes:

1. Team(Foreign_Key) - The foreign key representing the team given bowler is part of
2. Player(Foreign_Key) - The foreign key represents the player object whose data is been recorded in this table
3. Runs(Integer) - The runs conceded by the bowler
4. Balls(Integer) - Number of balls bowled
5. Wickets(Integer) - Number of wickets taken
6. Maidens(Integer) - Number of overs bowled by the bowler with 0 runs scored by batter
7. Status(String) - Contains the status of the bowler, i.e., idle or bowling

Function

CRUD (Create Retrieve Update Delete) operations are performed on every database table. Users, based on his/her access rights, will be able to request the above operations on the database.

Use Case Specifications

Users

1. General User
2. Player
3. Admin
4. SuperUser

Use cases

1. General User:

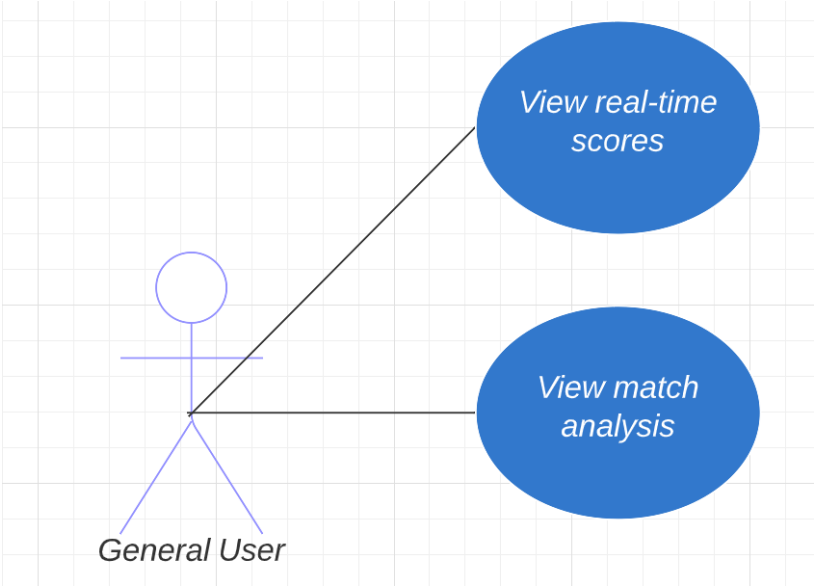
   View Real-time scores:

   Ball to Ball score updates are visible to the user

   View match analytics:

   The user can access the entire match analysis in the form of graphs and charts.

   Diagram:

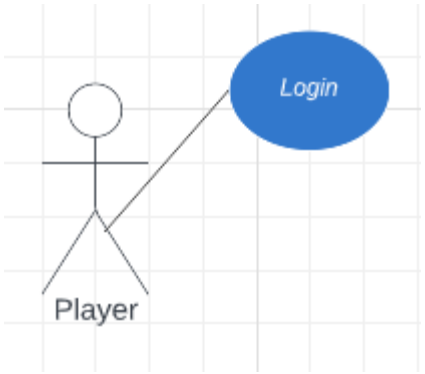


2. Player

   Login:

   A player is able to log in the app and enter his details such as playing preferences etc.

   Diagram:



3. Admin

Add a match:

Admin can start a new match and end at the desired time.

Add teams:

Admin can then add team names to the match.

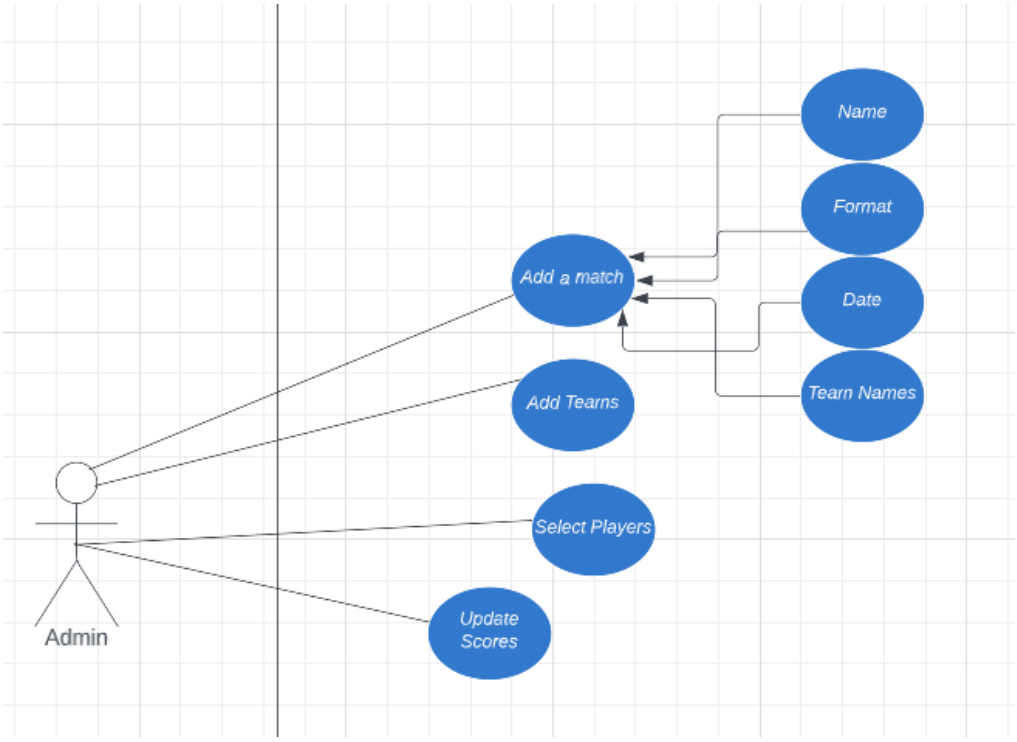
Select players:

Admin selects the players involved in the match from the player database.

Update Scores:

Once the match has started, the admin updates the scores with complete details of the particular ball of the over.

Diagram:

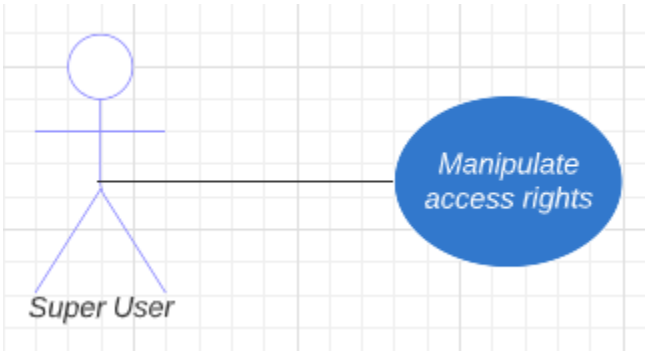


4. Superuser

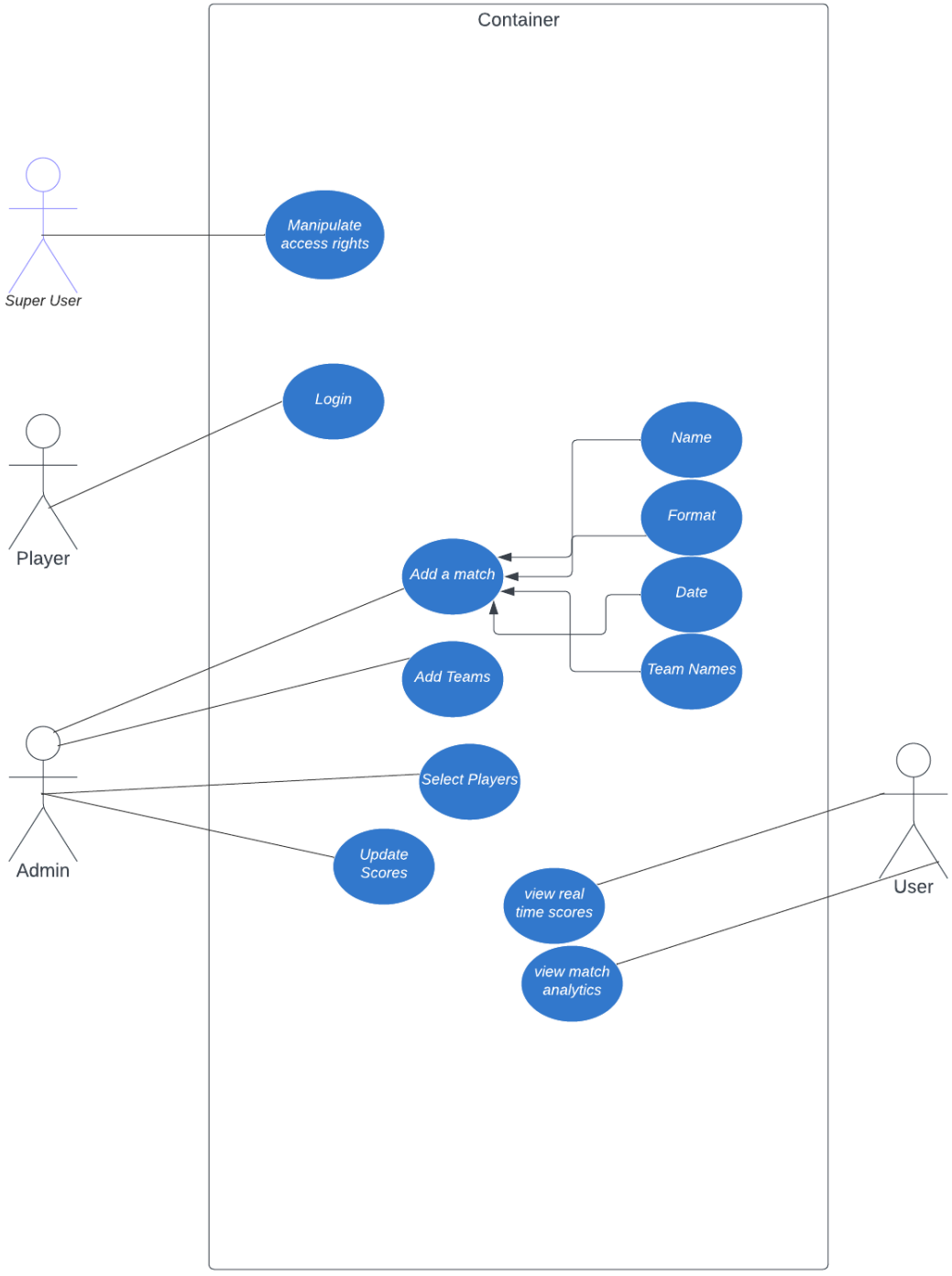
Manipulate admin rights:

Super users can manipulate the rights of any user.

Diagram:

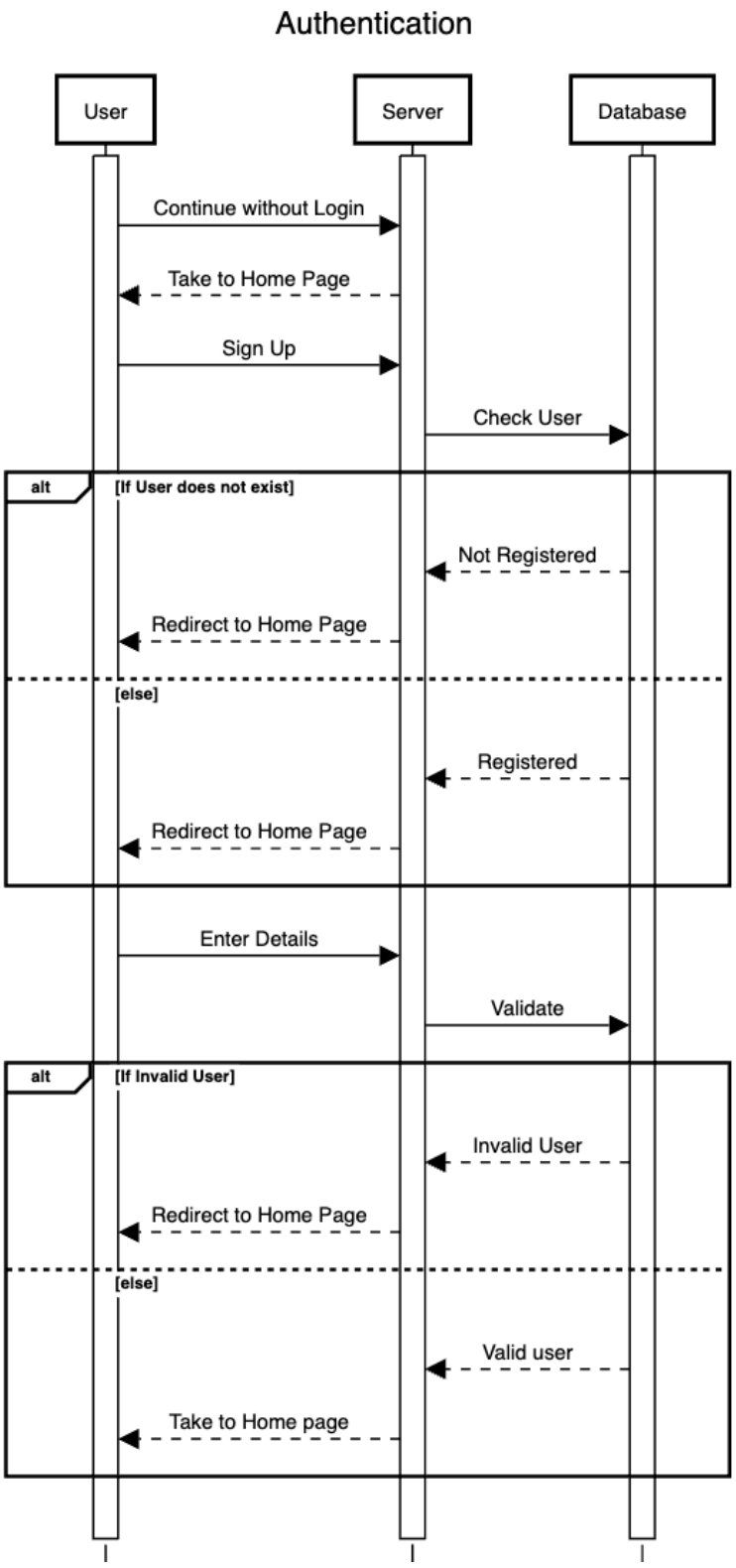


Use case Diagram

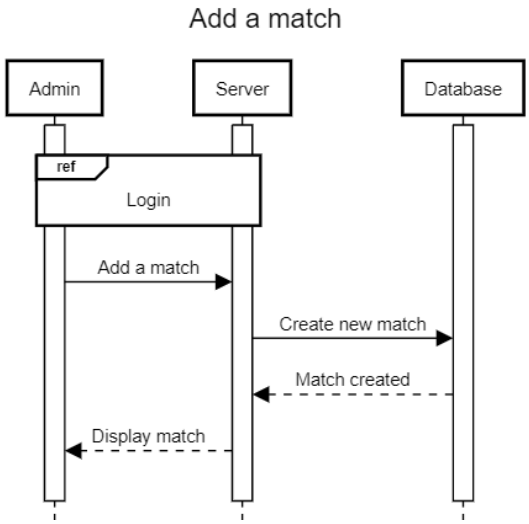


Sequence Diagrams:

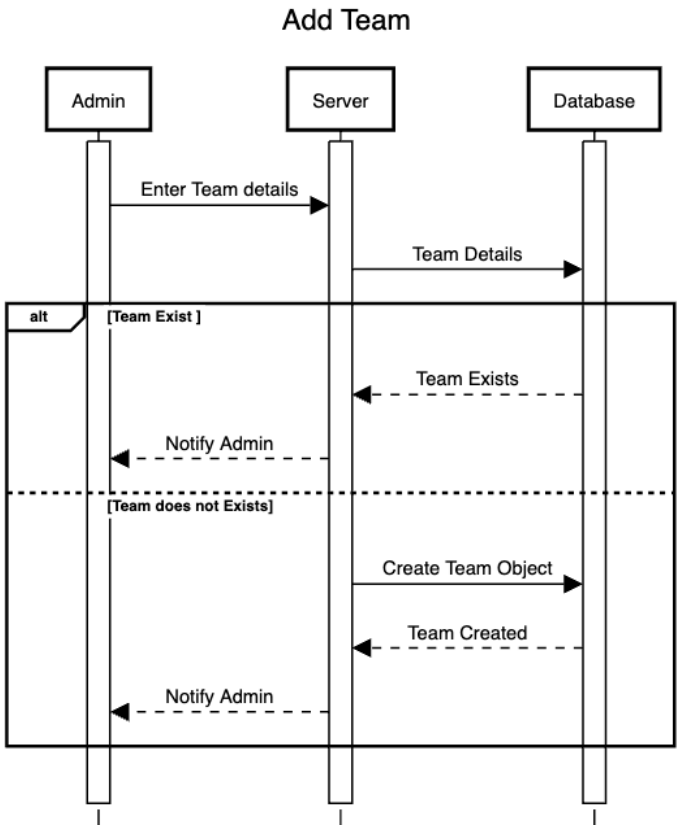
1. Authentication



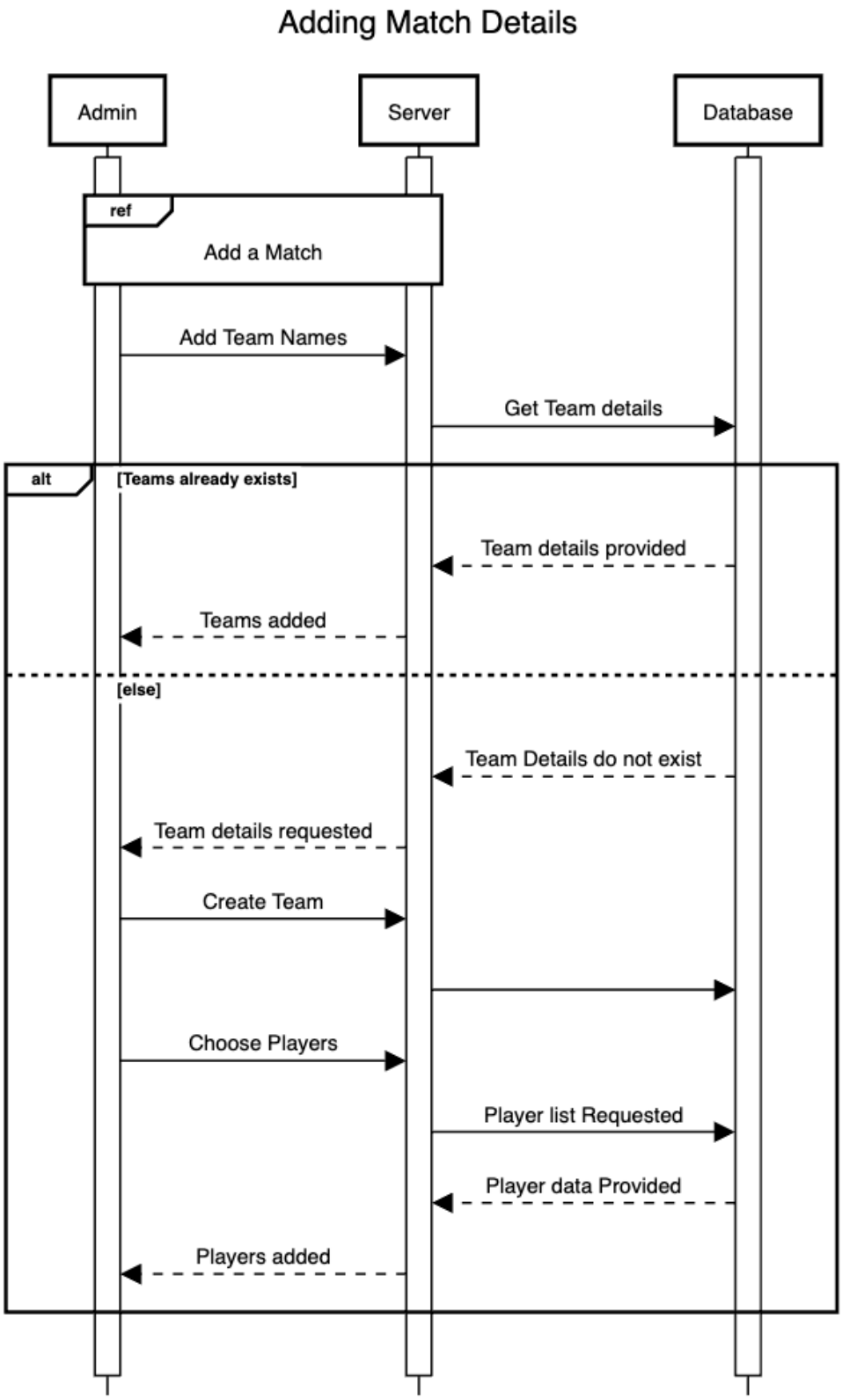
2. Add a Match



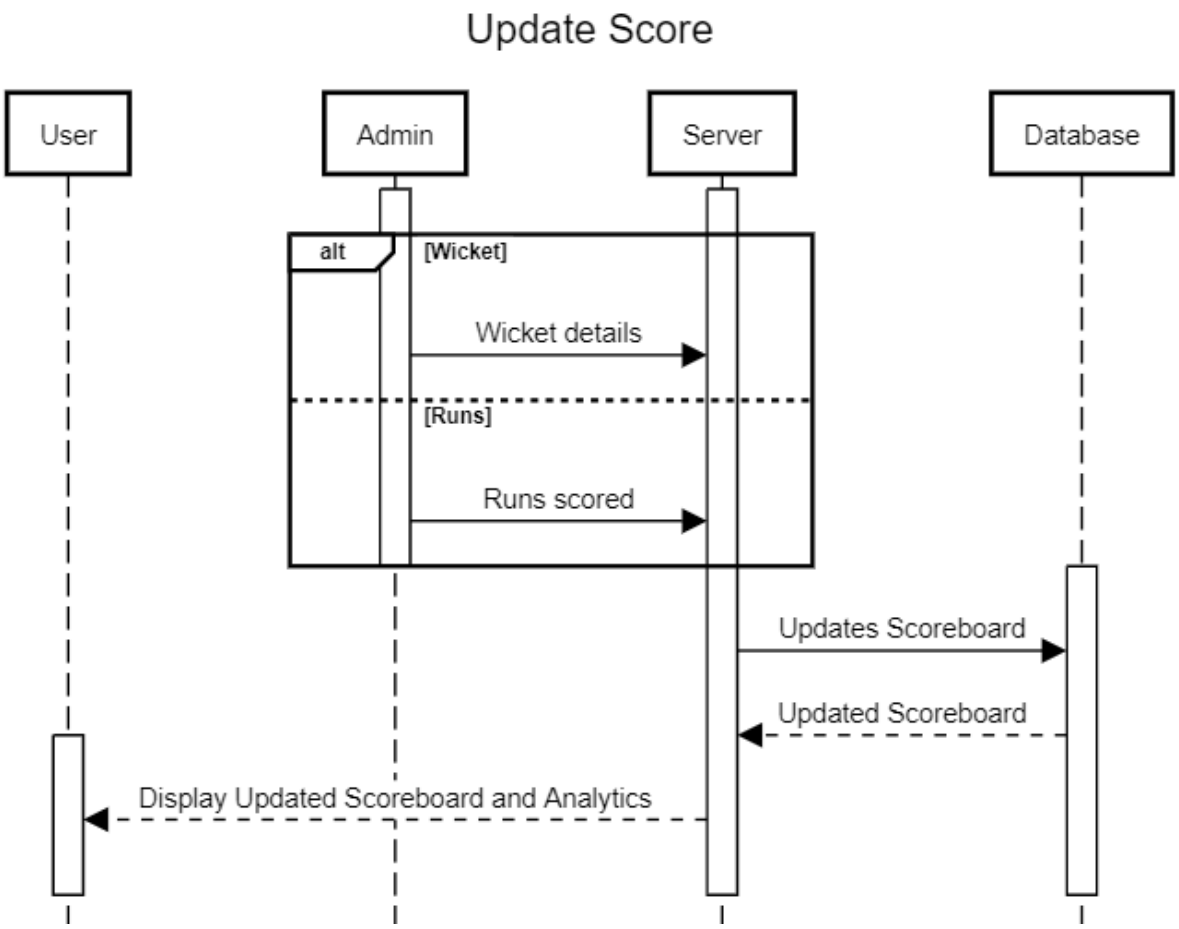
3. Add a Match



4. Adding Match Details



5. Update Score



Challenges

1. Real-time data processing: The application would need to process and analyze a significant amount of data in real-time to provide real-time statistics for cricket matches. This could be challenging and require careful optimization to ensure the application runs smoothly and doesn't slow down or crash during peak usage.
2. Developing a responsive UI: To ensure that the application is accessible and user-friendly across a wide range of devices, the UI would need to be developed with a responsive design. This could be challenging, as the application must adapt to different screen sizes and resolutions while maintaining a consistent user experience.
3. Testing and quality assurance: To ensure that the application functions as intended and provides accurate real-time statistics, rigorous testing, and quality assurance procedures need to be implemented. This could be time-consuming and require a significant amount of resources to complete.
4. Security and privacy concerns: As the application will be accessible to the general public, it will be important to implement robust security measures to protect user data and prevent unauthorized access. This could be challenging, as the application must be tested thoroughly to identify and fix potential security vulnerabilities.

TechStack Used

ReactJS

- ReactJS is a popular JavaScript library for building user interfaces with reusable UI components.
- ReactJS uses a virtual DOM, which improves performance by minimizing the number of updates to the actual DOM.
- ReactJS has a large and active community of developers, which means there are many third-party libraries and resources available.

Redux Toolkit

- Redux Toolkit will be used for state management in the application
- Redux Toolkit is a set of utilities and best practices that simplify the process of writing Redux code.
- Redux Toolkit provides a standard way to write and configure a Redux store, which reduces boilerplate code and makes the codebase more maintainable.
- Redux Toolkit includes a powerful data fetching library, which makes it easy to handle asynchronous data loading in Redux applications.

Django Rest Framework(DRF)

- Django Rest Framework is a powerful framework for building RESTful APIs in Python.

- Django Rest Framework includes built-in support for authentication, serialization, and pagination, which makes it easy to build scalable and secure APIs.
- Django Rest Framework is highly customizable and supports a wide range of HTTP methods, making it a versatile tool for building APIs.

MySQL Database

- MySQL is a popular open-source relational database management system that uses SQL.
- MySQL is fast, reliable, and scalable, making it a popular choice for web applications that require database functionality.
- MySQL has a large and active community of developers, which means there are many third-party libraries and resources available.

Scope of this project and future applications

- With cricket gaining popularity worldwide, Stat11 has tremendous scope in the future.
- Expanding it to other IITs and colleges would allow for students to explore the cricket world of other IITs as well.
- Stat11 could be enhanced with additional features, such as real-time video highlights, player statistics, and predictive analytics in the future.
- The increasing popularity of fantasy cricket leagues could be a boon for stat11 as through stat11's integration with fantasy cricket leagues we could open doors for newer audiences.