Football Club Management System

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I. Introduction:

A software management system is an essential tool for organizations to manage their operations and streamline their processes. The football industry is no exception to this, as football clubs need to manage their teams, players, matches, and other aspects of their operations efficiently. Football clubs are constantly seeking ways to improve their performance and stay ahead of their competitors. Therefore, a software management system that caters to the unique needs of a football club can help them achieve their goals.

The goal of this project is to create a controllable football club system that incorporates all of the many concepts necessary for the system to improve client services. This will be a web project that aims to streamline the day-to-day operations of the football club.

Problem Definition:

Football clubs have a lot of information to manage, from player information to match schedules to team performance analysis. The existing systems that football clubs use to manage this information are often outdated, fragmented, and difficult to use. There is a need for a software management system that can centralize all this information, making it easier for football clubs to access and analyze. The software management system should be easy to use, efficient, and customizable to meet the specific needs of each football club

Motivation:

The motivation behind this project is to provide football clubs with a software management system that can help them manage their operations effectively. The software management system will help football clubs save time and resources, enabling them to focus on improving their performance on the field. The system will also provide football clubs with valuable insights into their player and team performance, helping them identify areas for improvement and make data-driven decisions.

Objectives:

The software focuses on a variety of objectives for different users:

1. The players' module gives the football club's players a simple and well-designed interface to manage their personal data, practice plans, and game statistics. To assist athletes to
2. perform better on the field, this module also has capabilities like injury tracking and performance metrics. Some objectives such as the number of clearances, goals, and assists in a season will also be listed for every player depending on his position and style of playing.
3. The managers' module gives the resources they need to run practices, schedule games, and monitor the development of specific players. The system has performance analytics that let managers assess players' development and make informed choices. The coaches will also be able to display videos and texts with their players to assess other teams' styles of styles and develop plans accordingly. This section will also be offered tools for organizing matches and practices, handling club funds, and getting in touch with players and managers. The system has elements for managing employees and other club resources as well as tools for managing player contracts and tracking payments.
4. The fans' module gives each fan a profile and provides the schedule of matches for the team as well as the live score during an ongoing game. The fans can give their predictions and expectations of the team. They will also be able to see the price of merchandise in case they want to purchase it.
5. The system is to be created such that the design of the software should be user-friendly and easy to use, and it should manage all aspects of the football club's operations.
6. To provide football clubs with a customizable system that can be tailored to meet their specific needs.
7. The physical and health staff module allows them to monitor the well-being of athletes. They will be able to check the players' physical condition regularly including body composition, strength, and cardiovascular fitness. They will also be able to post and monitor sleep and nutrition programs for the players as well as track their injuries and provide the recovery programs they see fit.

II. Glossary:

a. Acronyms:

- FR: functional requirement
- NFR: non-functional requirement
- DR: Domain requirement
- FCMS: football club management system

b. Definitions:

- User Requirements: Statements defining the set of functionalities and constraints the system will ensure.
- System Requirements: More detailed statements that describe how the system will operate.
- Domain Requirements: Requirements related to the domain of the software. In this case, requirements related to education and learning.
- Functional Requirements: Requirements related to the functionalities of the system. They state generally what the system should or should not do.
- Non-functional Requirements: Requirements that are not related to a specific behavior or functionality but rather describe the system as a whole. They usually relate to system performance, security, accessibility, interactions with other software, etc…
- Football Club: A team that plays soccer or football.
- Management System: A system that is used to manage and organize various operations and activities of the football club.
- Admin: An individual who has the authority to manage and control the system.
- Player: An individual who plays on the football club team.
- Fixture: A scheduled game between two teams.
- Ticket: A document that grants entry to a match.

- Training Schedule: A plan that outlines the training sessions for the team.
- Squad: The group of players that make up the team.
- Formation: The tactical setup of the players on the field.
- Injury Report: A record of the injuries sustained by the players.
- Performance Analysis: The process of reviewing the team's performance and identifying areas for improvement.
- Fans: The supporters of the football club.
- Contract: A legal agreement between a player and a club that outlines the terms and conditions of their employment.
- Physical Team: A group of healthcare professionals who provide physical and medical support to the players.
- Analytics: The use of data and statistical methods to analyze and improve the performance of the team.
- Merchandise: Products that are sold by the club to fans, such as jerseys, scarves, and hats.
- Broadcast Rights: The rights to broadcast matches and other content related to the football club.
- Travel Arrangements: The process of arranging transport and accommodation for the team during away matches.
- Risk Management: The process of identifying and mitigating potential risks and hazards associated with the club's operations.
- Data Privacy: The protection of the personal information of players, staff, and fans in compliance with data privacy regulations.

III. Background:

The world of football is becoming increasingly competitive, and teams are under immense pressure to perform at their best. One key aspect of success for any football team is effective management. Over the years, various football club management software systems have been

developed to help teams manage their operations more efficiently. However, there is still room for improvement, and that's where our software engineering project comes in.

Research:

In our research on existing football club management software, we found that most of the software available in the market offers similar features such as team and player management, scheduling, and match analysis. However, most of this software lacks customization options and flexibility, which makes it difficult for teams to tailor them to their specific needs.

In addition, some software systems lack user-friendly interfaces, making them difficult to navigate, and others have security vulnerabilities that put the team's data at risk. Moreover, they lack some useful functionalities that could add value to the club. These issues can make it challenging for teams to adopt the software and benefit fully from its features.

Our Solution:

Our software engineering project aims to address these issues and provide a comprehensive FCMS that is flexible, user-friendly, and secure. Our software will offer a range of features such as team and player management, scheduling, match analysis, and customizable reporting tools.

Our system will be designed with a modern and intuitive interface, making it easy to navigate and use. We will also implement robust security measures to protect the team's data and ensure the confidentiality of sensitive information.

Furthermore, our software will be highly customizable, allowing teams to tailor it to their specific needs. This will enable teams to get the most out of the software and improve their overall performance.

Conclusion:

In conclusion, our software engineering project will offer a unique FCMS that is flexible, user-friendly, and secure. Also, we have added some useful functionalities such as fan-based services that can increase the popularity of the club. We believe that our software will help teams manage their operations more efficiently and improve their overall performance.

IV. User Requirements:

Player requirements:

1. The player shall be able to view the objectives of a given season that he/she is required to achieve. These objectives include: (FR)

- Red cards/yellow cards
- Fouls committed
- % of successful tackles
- Average distance covered
- Chances created
- Assists
- Goals
- Minutes played
- Heat map
- Clean sheets

2. the player shall be able to track their progress toward achieving these objectives anytime they want. (FR)

3. the system shall alert the player when falling behind the objectives. (FR)

4. the player shall be able to view his statistics for a given game. The statistics include: (FR)

- Red cards/yellow cards
- Fouls committed
- % of successful tackles

- Average distance covered
- Chances created
- Assists
- Goals
- Minutes played
- Heat map
- Clean sheets

5. the player shall be able to view his overall statistics for the current season. (FR)

6. the player shall be able to watch several videos that can be posted by the manager or the physical staff e.g. (tactical videos, previous matches, and opponents' matches…). (FR)

7. the players shall be able to view training exercises that might be assigned to them by the manager or by the physical staff. (FR)

8. the player shall have access to a schedule that shows the date, time, and location of all club-related activities. (FR)

9. the player shall be able to view his food schedule for every day that is assigned to him by the physical staff. (FR)

10. the player shall be able to view his sleeping schedule for every day that is assigned to him by the physical staff. (FR)

11. the player shall be able to submit daily reports of his sleeping hours, food consumed, supplement intake, and exercises performed. (FR)

12. the injured players shall be able to follow up with the physical staff to follow up on their rehabilitation schedule and medications. (FR)

13. the players shall be able to book appointments with the physical staff. (FR)

14. the player shall be able to see the feedback sent by the fans, teammates, manager, and physical staff. (FR)

Manager requirements:

1. The manager should be able to view the players' information: (FR)
    - Name
    - Age
    - Position(s)
    - Physical fitness (strength, endurance, speed, and agility)
    - Technical Skills (passing, dribbling, shooting, tackling, and positioning)
    - Injury History (past and current injuries, chronic conditions, physical limitations)
    - Communication skills
2. The manager shall be able to set plans for the upcoming games (strategies, tactics, roles to players, analyzing opponents…) (FR)
3. The manager shall be able to track the performance of every player: analyzing his games and identifying his weaknesses. (FR)
4. The manager shall be able to watch videos of previous games and share insights with players. (FR)
5. The manager shall schedule training times, places, traveling times … (FR)
6. The manager shall be able to share announcements. (FR)
7. The manager shall view his objectives (similar to that of the player) (FR)
8. The manager should be able to send some punishments to the players when necessary. (FR)

Physical and health staff functional requirements:

1. The physical and health staff shall monitor the players' physical condition (body composition, strength, cardiovascular fitness, …) (FR)
2. The physical and health staff shall be able to assign training programs. (FR)
3. The physical and health staff shall monitor the nutrition of the players. (FR)
4. The physical and health staff should post the food schedule of each player, the amount of water they should take, and the supplements they have to use. (FR)
5. The physical and health staff shall keep track of the hours slept by every player and use this data to assign sleeping hours daily. (FR)
6. The physical and health staff shall be able to track every player's injury and stage of recovery. (FR)
7. The physical and health staff shall design rehabilitation programs (recovery goals). (FR)
8. The physical and health staff should be able to coordinate with the manager and the players. (FR)

Fans' functional requirements:

1. Each fan shall have a unique profile. (FR)
2. The fans shall be able to view the team and players' information (schedule of games, statistics of the team and of players, news). (FR)
3. The fans shall be able to watch live games and scores. (FR)
4. Fans should be able to provide feedback about the team and players. (FR)
5. Fans shall buy tickets for the matches. (FR)
6. Fans shall be able to buy the merchandise and products of the teams. (FR)
7. Fans shall have a points award system according to their purchases. (FR)
8. Fans shall see the weekly competitions. (FR)
9. Fans should be able to provide their expectations of a certain game. (FR)
10. Fans shall be able to carpool together. (FR)

V. System Requirements:

Player requirements:

1. Player Tracking achieving objectives:

   a. The system shall allow the player to mark each objective as completed once achieved. (FR)
   b. The system shall provide progress reports on the player's performance towards achieving their objectives. (FR)
   c. The system shall send automated notifications to the player to remind them of their objectives and update them on their progress(FR)
   d. The system shall allow the player to update their objectives in case of changes agreed upon with the manager and physical staff. (FR)
   e. The system shall allow the player to save or export the chart or graph in different formats, such as PDF or PNG, for further analysis or sharing with others. (FR)
   f. The system shall allow the player to view their progress towards achieving their objectives in different formats such as graphs, charts, or tables. (FR)
   g. The system shall ask the player to set new objectives for the season when he/she suffers from long-term injury. (FR)
   h. The system shall ensure that the charts and graphs are customizable and configurable so that players can tailor their display to their individual preferences and needs. (NFR)
   i. The system should ensure that the charts and graphs are responsive and load within 10s, even when dealing with large amounts of data. (NFR)
   j. The system should ensure that the graphs use the labeling, colors, and font conventions used by FIFA. (NFR)

k. The software shall ensure that the objective data is easily searchable and filterable so that players can quickly find the information they need. (NFR)
l. The software shall ensure that the objective data is updated in real-time or near-real-time, so players can access the most up-to-date information. (NFR)

2. System alerting player if falling behind objective:

a. The system shall compare the player's progress towards their objectives against their expected progress and identify when the player is falling behind.[The system will compare the expected average yield per game *number of games versus the realized yield per game to identify if a player is not doing well] (FR)
b. The system shall provide the player with suggestions or recommendations on how to catch up with their objectives(FR)
c. The system shall provide the manager with an alert or notification when a player is consistently falling behind their objectives. (FR)
d. The system shall send three reminders a day as soon as it detects that the player is falling behind
e. The system shall ask the player to schedule an urgent appointment for the player with the manager and the physical staff. (FR)
f. The system shall ensure the day-to-day checking of the progress of the player. (NFR)

3. Player View Statistics:

a. The system shall allow the player to filter and sort their statistics by various criteria, such as game type, opponent, or date. (FR)
b. The system shall allow the player to compare their performance across different games they played during the season. (FR)
c. The system shall provide visual representations, such as graphs or charts, to help the player understand their performance trends over time. (FR)

d. The system shall provide a detailed breakdown of the player's performance in different areas, such as goals scored, passes made, and time played. (FR)
e. The system shall display the player's statistics in a user-friendly and easily understandable format. (FR)
f. The system shall accumulate the player statistics game after game to provide overall statistics for a given season.
g. The system should be able to handle at least 1,000 records per match with no data loss. (NFR)
h. The system should be able to collect player performance data from a variety of sources with at least 95% accuracy. (NFR)

4. Player viewing previous matches:

a. The system shall have a video player feature that can play multiple video formats (e.g. MP4, AVI, MOV, etc.)(FR)
b. The player shall be able to access the videos uploaded by the manager or physical staff.
c. The player must have access to the video section of the system and be able to browse and search for videos. (FR)
d. The player should be able to filter the videos by categories (e.g. tactical videos, previous matches, opponents' matches). (FR)
e. The player shall be able to play, pause, rewind, fast forward, and control the volume of the videos. (FR)
f. The system shall notify the players whenever there is new content that is posted. (FR)
g. The video player shall be interoperable with other software used by the football club management system to enable seamless integration with other functionalities, such as training schedules, match analysis, and player performance tracking(NFR)
h. The system shall be able to load and play videos within 15 s. (NFR)
i. The system shall provide each video with qualities between 720 p and 1280p(NFR)

5. Player getting Training exercises:

a. The system shall have a training exercise library that can store various types of exercises in different formats (e.g., text, images, videos, etc.). (FR)
b. The player shall have access to the training exercise section of the system and be able to browse and search for exercises. (FR)
c. The player should be able to filter the exercises by categories (e.g. strength training, agility training, ball control training, etc.). (FR)
d. The player shall be able to view detailed instructions for each exercise and understand how to perform them correctly. (FR)
e. The player should be able to mark an exercise as completed, and the system should keep track of the player's progress. (FR)
f. The system must provide an option for the player to provide feedback on the training exercises and suggest improvements if needed. (FR)
g. The system shall automatically notify the player whenever new content is posted(FR)
h. The system shall ask the player to view the posted content within 3 days(NFR)
i. The system must be secure, ensuring that only authorized users have access to the training exercises. (NFR)

8. Player getting Feedback:
    a. The system shall allow fans, teammates, managers, and physical staff to submit feedback on the player's performance. (FR)
    b. The system shall display the feedback received from fans, teammates, managers, and physical staff to the player. (FR)
    c. The system shall allow the player to sort and filter the feedback received by date and time or by the category of the user received from. (FR)
    d. The system shall allow the player to respond to the feedback received from fans, teammates, managers, and physical staff. (FR)
    e. The system shall notify the player of new feedback received. (FR)
    f. The system shall not tolerate any kind of abusive or offensive speech. (FR)
    g. The feedback should only be received as a text message. (NFR)
    h. The number of letters should not exceed 1000 letters. (NFR)
    i. The feedback received should disappear after 90 days. (NFR)

j. The system shall make sure only the player and the sender of the feedback shall be able to view it. (NFR)
k. The system shall abide by the country's law that regulates the freedom of expression. (NFR)

9. Player schedule of all activities:
    a. The system shall provide a schedule of all club-related activities for a day, month, and season. (FR)
    b. The player shall be able to view the date, time, and location of each activity. (FR)
    c. The player shall be able to filter the activities by types, such as training sessions, games, meetings, and events. (FR)
    d. The system shall notify the player of any upcoming events 2 hours earlier. (FR)
    e. The player shall be able to add or remove removable activities from their schedule. (FR)
    f. The player shall request changes to his/her schedule(FR)
    g. The system shall ask the player to check the schedule every week (FR)
    h. The schedule for the day shall be divided based on the hours of work(NFR)
    i. The schedule for the month should have a calendar form(NFR)
    j. The schedule of the year should be calendar forms for all of the months(NFR).

10. Player food schedule:
    a. The system should remind the players to check their food schedule(FR)
    b. The system shall provide a food schedule for each player. (FR)
    c. The player shall be able to view their food schedule for each day, which shows the types of food and the time of consumption. (FR)
    d. The food schedule shall contain the meals for a given day, snacks, and the required portions of nutrients. (DR)
    e. The player should be able to request changes to their food schedule, such as changing the types of food or the time of consumption. (FR)

11. Player sleep schedule:

a. The system should remind the player to check their sleeping schedule(FR)
b. The system should provide a sleeping schedule for each player. (FR)
c. The sleeping schedule shall contain the sleeping hours for a given day, the recommended naps, and the recommended sleeping time based on sleeping cycles. (DR)
d. The player should be able to view their sleeping schedule for each day(FR)
e. The player should be able to request changes to their sleeping schedule, such as changing the recommended hours of sleep or the time to wake up. (FR)

12. Player reporting:

a. The system should allow the player to submit daily reports to their coach or physical staff. (FR)
b. The system should validate the data entered by the player and prompt the player to correct any errors. (FR)
c. The system should store the daily reports submitted by the player. (FR)
d. The system shall allow the player to enter data for daily reports, including sleeping hours, food consumed, supplement intake, and exercises performed. (FR)
e. The system shall validate the data entered by the player and prompt the player to correct any errors. (FR)
f. The system shall store the daily reports submitted by the player. (FR)
g. The system should alert the player about submitting the report. (FR)
h. The report must be a questionnaire that the player should fill out. (NFR)
i. The report must accept images that are used to validate the reported information. (FR)

13. Appointment Booking:

a. The system shall allow players to book appointments with the physical staff. (FR)
b. The system shall allow the player to check the availability times of the physical staff. (FR)
c. The system shall send reminders to players about their upcoming appointments. (FR)

d. The system shall allow players to cancel or reschedule appointments with the physical staff. (FR)
e. The system should allow players to view their past and upcoming appointments with the physical staff. (FR)
f. The system shall schedule routine appointments for the players automatically. (FR)

14. Rehabilitation Schedule:
    a. The system shall allow the players to access their rehabilitation schedule. (FR)
    b. The system should allow physical staff to track the medication prescribed to injured players and schedule medication reminders. (FR)
    c. The system should allow injured players to communicate with physical staff to follow up on their rehabilitation schedule and medications. (FR)
    d. The system should allow physical staff to schedule appointments with injured players for follow-up assessments. (FR)
    e. The system shall ask the players to report their rehabilitation improvement daily. (FR)
    f. The system shall send reminders to the players to make sure they are reminded of the schedule. (FR)

Manager requirements:

1. Manager view player info:
    a. The system shall allow the manager to view players' information. (FR)
    b. The system shall display the following information for each player: name, age, position(s), physical fitness (strength, endurance, speed, and agility), technical skills (passing, dribbling, shooting, tackling, and positioning), injury history (past and current injuries, chronic conditions, physical limitations), and communication skills. (FR)

2. Set upcoming plans:
    a. The system shall allow the manager to set plans for upcoming games. (FR)
    b. The system shall provide the manager with tools to develop game strategies, and tactics, and assign player roles. (FR)
    c. The system shall provide the manager with the ability to analyze the opponent's strengths and weaknesses. (FR)

3. Track the performance player: the
    a. The system shall allow the manager to track the performance of every player. (FR)
    b. The system shall provide the manager with tools to analyze the player's game performance. (FR)
    c. The system shall allow the manager to identify the player's weaknesses. (FR)

4. Watch previous games:
    a. The system shall allow the manager to watch videos of previous games. (FR)
    b. The system shall allow the manager to share insights with players based on the videos. (FR)

5. Schedule training:
    a. The system shall allow the manager to schedule training times. (FR)
    b. The system shall allow the manager to schedule training places. (FR)
    c. The system shall allow the manager to schedule traveling times. (FR)

6. Share announcements:
    a. The system shall allow the manager to create announcements. (FR)
    b. The system shall allow the manager to share announcements with players and other staff members. (FR)
    c. The system shall be interoperable, and able to integrate with other software systems and third-party services, as required by the football club's operations. (NFR)

7. View objectives:

a. The system shall allow the manager to view his objectives. (FR)
b. The system shall provide a list of objectives to the manager. (FR)
c. The system shall ensure the security and privacy of manager objectives. (NFR)
d. The system shall provide quick and responsive access to manager objectives. (NFR)

8. Send punishments:
    a. The system shall allow the manager to assign punishments to players when necessary. (FR)
    b. The system shall provide a list of punishments that the manager can choose from. (FR)
    c. The system shall allow the manager to specify the duration and severity of the punishment. (FR)
    d. The system shall notify the player of the assigned punishment. (FR)
    e. The system shall be scalable to accommodate additional punishment options. (NFR)
    f. The system shall provide an audit trail of punishment assignments for accountability purposes. (NFR)

Physical and Health Staff Requirements:

1. Monitor the player's physical condition:
    a. The system shall provide a way for physical and health staff to record and monitor players' physical condition. (FR)
    b. The system shall include fields to record body composition, strength, cardiovascular fitness, and other relevant physical metrics. (FR)
    c. The system shall allow physical and health staff to enter data manually or import it from external sources such as wearable devices. (FR)

2. Assign Training Programs:
    a. The system should provide the physical and health staff with the ability to create training programs. (FR)

b. The system should allow staff to assign specific training programs to individual users or groups of users. (FR)
c. The system should be able to track the progress of each user's training program. (FR)
d. The system should allow staff to modify or update training programs, as necessary. (FR)

3. Monitoring player's nutrition:
    a. The system should provide the physical and health staff with the ability to record and track the nutrition data of each player, including their dietary intake and nutritional requirements. (FR)
    b. The system should allow staff to monitor the players' progress towards meeting their nutritional goals. (FR)
    c. The system should provide alerts and notifications to the staff when a player's nutritional intake falls below or exceeds certain thresholds. (FR)
    d. The system should generate reports on the nutritional status of individual players or the entire team. (FR)

4. Posting food schedule:
    a. The system should provide the physical and health staff with the ability to create and post food schedules for each player. (FR)
    b. The system should allow staff to specify the amount of water that each player should take. (FR)
    c. The system should allow staff to specify the supplements that each player should use, including the dosage and frequency. (FR)
    d. The system should provide players with the ability to view their food schedules, water intake requirements, and supplement usage instructions. (FR)

5. Track sleeping:
    a. The system should provide the physical and health staff with the ability to record the hours slept by every player. (FR)

b. The system should be able to generate reports on sleeping patterns for individual players or the entire team. (FR)
c. The system should use the recorded sleeping data to assign recommended sleeping hours for each player daily. (FR)
d. The system should allow staff to modify or adjust the recommended sleeping hours, as necessary. (FR)

6. Tracking Injuries:
    a. The system should provide the physical and health staff with the ability to record and track every player's injury, including the type of injury, date of occurrence, and severity. (FR)
    b. The system should allow staff to record the stage of recovery for each player's injury, including progress updates and expected return-to-play dates. (FR)
    c. The system should provide alerts and notifications to the staff when a player's injury is not progressing as expected or when they are cleared to return to play. (FR)
    d. The system should generate reports on injury and recovery data for individual players or the entire team. (FR)

7. Designing Rehabilitation Programs:
    a. The system should provide the physical and health staff with the ability to design and create rehabilitation programs for each player, including specific recovery goals. (FR)
    b. The system should allow staff to track each player's progress toward their recovery goals and modify the rehabilitation program as necessary. (FR)
    c. The system should provide players with access to their rehabilitation program and recovery goals. (FR)
    d. The system should provide alerts and notifications to the staff when a player is not making progress toward their recovery goals or when the rehabilitation program needs to be modified. (FR)

8. Coordinate with Manager and Players:
    a. The system should provide the physical and health staff with the ability to communicate and coordinate with the team manager and players. (FR)
    b. The system should allow staff to schedule and manage appointments and meetings with the manager and players. (FR)
    c. The system should provide staff with the ability to send messages, alerts, and notifications to the manager and players. (FR)

Fans Requirements:

1. Unique Profile:
    a. The system should allow users to create a unique profile that includes their name, email, and password. (FR)
    b. The system should allow users to edit their profiles, including adding or changing their profile picture, bio, and other personal details. (FR)

2. Viewing team and players' information:
    a. The system should display the schedule of games for the team, including dates, times, and locations. (FR)
    b. The system should provide up-to-date statistics on the team's and players' performances, such as win-loss records, points, rebounds, and assists. (FR)
    c. The system should provide a news feed that includes the latest news and updates related to the team and players. (FR)

3. Live games and scores:
    a. The system should allow fans to watch live games in real time, including access to live scores and commentary. (FR)
    b. The system should provide up-to-date scores and statistics during live games. (FR)

4. Fans' feedback and comments:
    a. The system should allow fans to submit feedback about the team and players, including comments, ratings, and reviews. (FR)

b. The system should allow administrators to moderate the feedback submitted by fans to ensure it is appropriate and respectful. (FR)

5. Tickets for the matches:
   a. The system should allow fans to purchase tickets for matches online using a credit card or other payment method. (FR)
   b. The system should display the availability of tickets for upcoming matches, including seat locations and pricing. (FR)
   c. The system should allow fans to choose how they want to receive their tickets, such as via email or physical mail. (FR)

6. Merchandise and team products:
   a. The system should provide an online store where fans can browse and purchase team merchandise and products. (FR)
   b. The system should allow fans to add merchandise and products to a shopping cart and checkout using a credit card or other payment method. (FR)

7. Points award system:
   a. The system should allow fans to earn points for their purchases of team merchandise and products. (FR)
   b. The system should allow fans to redeem their points for rewards or discounts on future purchases. (FR)
   c. The system should allow administrators to manage the points system, including setting point values for purchases and rewards. (FR)

8. Weekly Competitions:
   a. The system should display a schedule of weekly competitions, including dates, times, and opponent teams. (FR)
   b. The system should provide information about each competition, such as location, game type, and broadcast information. (FR)
   c. The system should display the results of each competition, including scores and player statistics. (FR)

9. Expectations of a game:

a. The system should allow fans to submit their expectations for a specific game, such as the final score, player performance, or game outcomes. (FR)

10. Carpooling:
    a. The system should allow fans to submit requests for carpooling to a specific game or event. (FR)
    b. The system should match fans with compatible carpool partners based on their location, preferred departure time, and other relevant information. (FR)

Other System Requirements:

1. The system should not allow unauthorized access to sensitive information, such as player contracts, medical records, and financial data. (FR)
2. The system should not allow users to modify game results or other important data without proper authorization. (FR)
3. The system should not allow users to delete important data, such as player information or game schedules, without proper authorization. (FR)
4. The system should not allow users to manipulate or alter player statistics or other important data in a way that would compromise the integrity of the information. (FR)
5. The system should be secure and protect sensitive data from unauthorized access or theft. (NFR)
6. The system should be always reliable and available to ensure that the football club management can access important information and perform necessary tasks. (NFR)
7. The system should be scalable and able to handle increased usage or data volume as the football club grows and expands. (NFR)
8. The system should be able to handle a large volume of data, including player and match statistics, without any significant delays or system crashes. (NFR)
9. The system should have adequate measures in place to protect against unauthorized access, hacking, and data breaches, as well as ensure the privacy and confidentiality of sensitive information. (NFR)
10. The system should be stable and dependable, with minimal downtime or system failures, as it is critical to the operation of the football club. (NFR)

11. The system should be easy to maintain, update, and modify over time, with clear documentation and support resources available to ensure the system remains functional and up to date. (NFR)
12. The system should be user-friendly and intuitive, with a clear and consistent interface that minimizes user errors, as it will be used by a variety of people with different levels of technical proficiency. (NFR)
13. The system should be able to accommodate growth and changes in usage patterns over time, as the football club may expand or change in size. (NFR)
14. The system should be accessible to users with disabilities, such as visual impairments or mobility limitations, to ensure that all club staff and stakeholders can use the system effectively. (NFR)
15. The system should be able to integrate with other systems and platforms as needed, such as through APIs or data exchange protocols, to enable seamless data exchange with other systems used by the football club. (NFR)
16. The system should comply with relevant laws, regulations, and industry standards, such as data privacy laws or security certifications, to ensure that the club is not subject to legal or regulatory penalties. (NFR)

VI. Conclusion

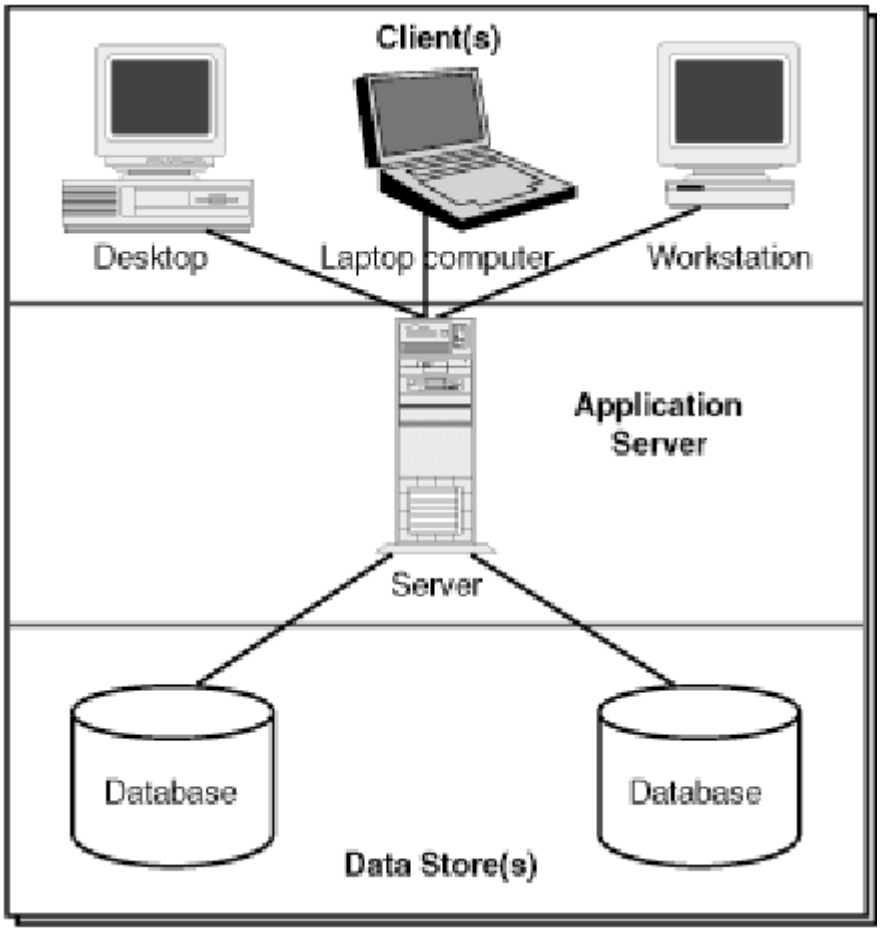
In conclusion, the Football Club Management System is a comprehensive software solution designed to meet the needs of a modern football club. The system provides robust features for managing teams, game schedules, monitoring players, and other important information.

Throughout the development process, we followed the guidelines of software engineering to ensure that the system is functional, reliable, and secure. We have also considered non-functional requirements such as scalability, user-friendliness, and availability to ensure that the system is usable and accessible by the football club management and staff.

Overall, the Football Club Management System represents a significant improvement over the manual management of football clubs, providing a more efficient and effective way to manage the day-to-day operations of the club. The system can be customized to meet the specific needs of any football club and is ready to help take the club to the next level of success.

VII. Software Architecture Design

Software architecture refers to the high-level design and organization of a software system. It involves making important decisions about the system's structure, components, interfaces, and interactions, as well as the patterns and principles that guide the design. Due to the fact that our platform is a web-based application, the software architecture is as follows:



The frontend part of the software represents the design, animations, and visuals of the program. These will be done using HTML, CSS, and JavaScript.

The backend part of the software represents the servers and the database which provide the functionality for the system and store information. For the backend part ,we will be using PHP and SQL.

Our software will be web-based thus the clients will communicate from their devices through the frontend part. The requests will be sent to the server which helps them communicate with the database.

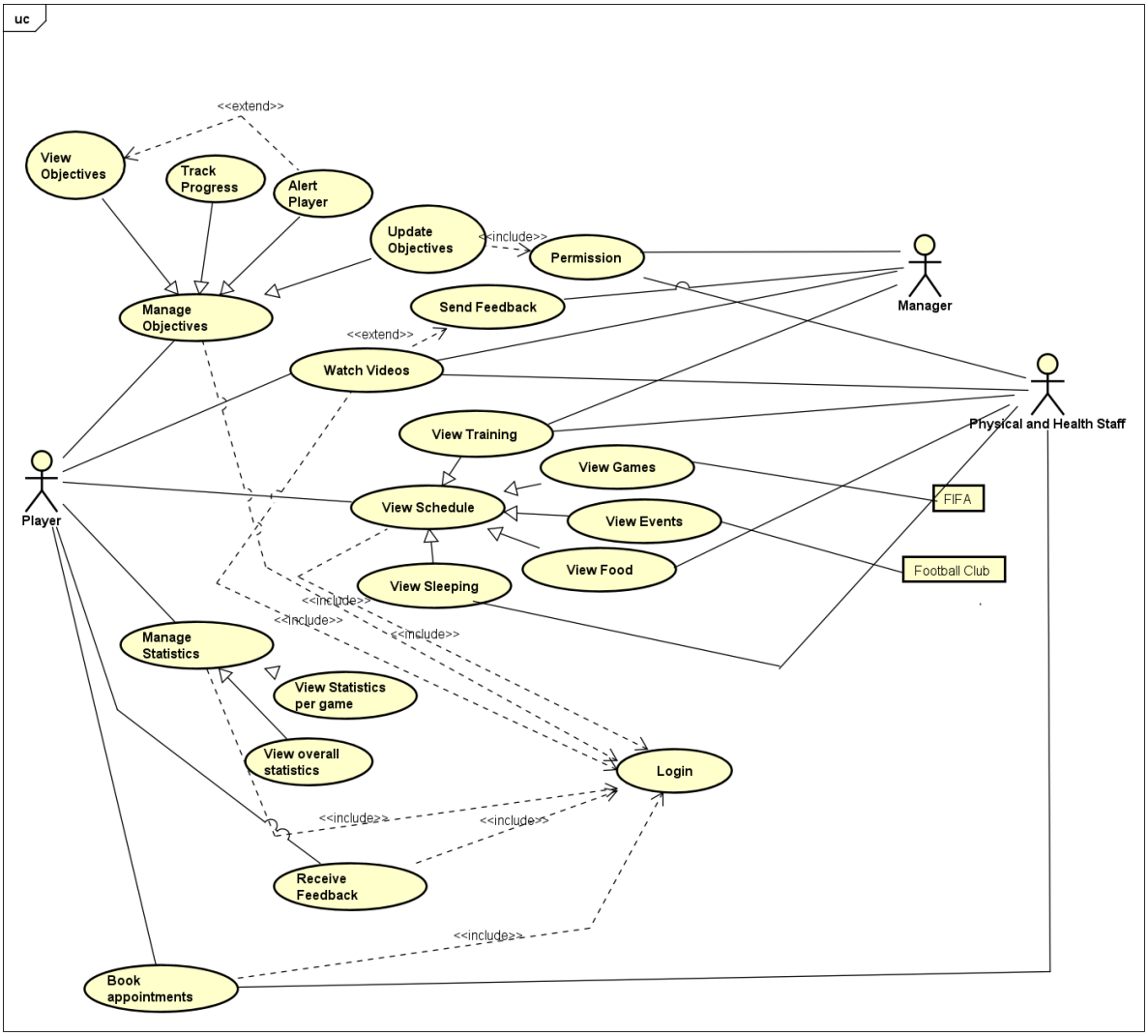
VIII. Software Engineering Tools and Diagrams

This section will discuss the different diagrams that the team used to produce the software. Each diagram was designed for a specific purpose, which will be mentioned in the document.

A) Use Case Diagram

The first diagram to be presented is the use case diagram, which shows the user's possible interactions (called use cases) with a system. The figure below shows the use case diagram for the waterfall booking system.

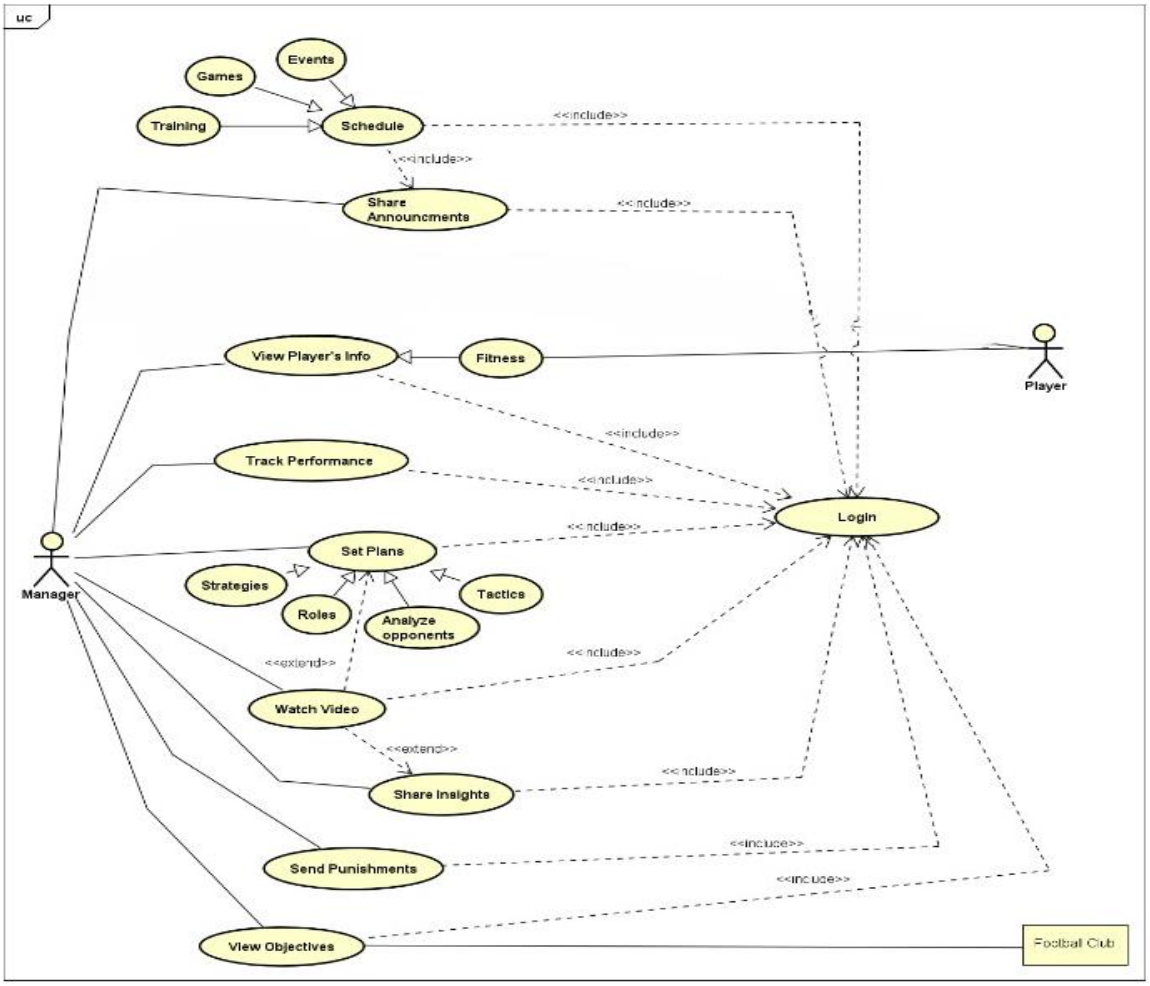
1) Player Use Case Diagram:



This use case has the player as a primary actor and the manager, physical and health staff, FIFA, and the football club as secondary actors. The player has a variety of options which are managing his objectives which is an abstract generalized relationship that includes viewing objectives, tracking progress, being sent an alert in a case falling behind the objectives, and updating the objectives in case of getting permission from the manager. The player shall be able to watch videos sent to him by the manager. He will be able to view his schedule which includes schedules of his food (given to him by the physical and health staff), games (managed and organized by FIFA), events (organized by the football club), sleep (sent by the physical and health staff), and training (overseen and sent by the manager with the help of the physical and health staff). The player has the functionality to manage his statistics which is an abstract generalized relationship that allows him to view his statistics per game and his overall statistics.

Moreover, the player shall be able to see the feedback provided to him by the fans. Finally, the player shall be able to book appointments with the physical and health staff when needed. The player cannot manage his objectives, watch videos, view his schedule, manage his statistics, see feedback, and book appointments unless he is logged in to the system for security reasons.

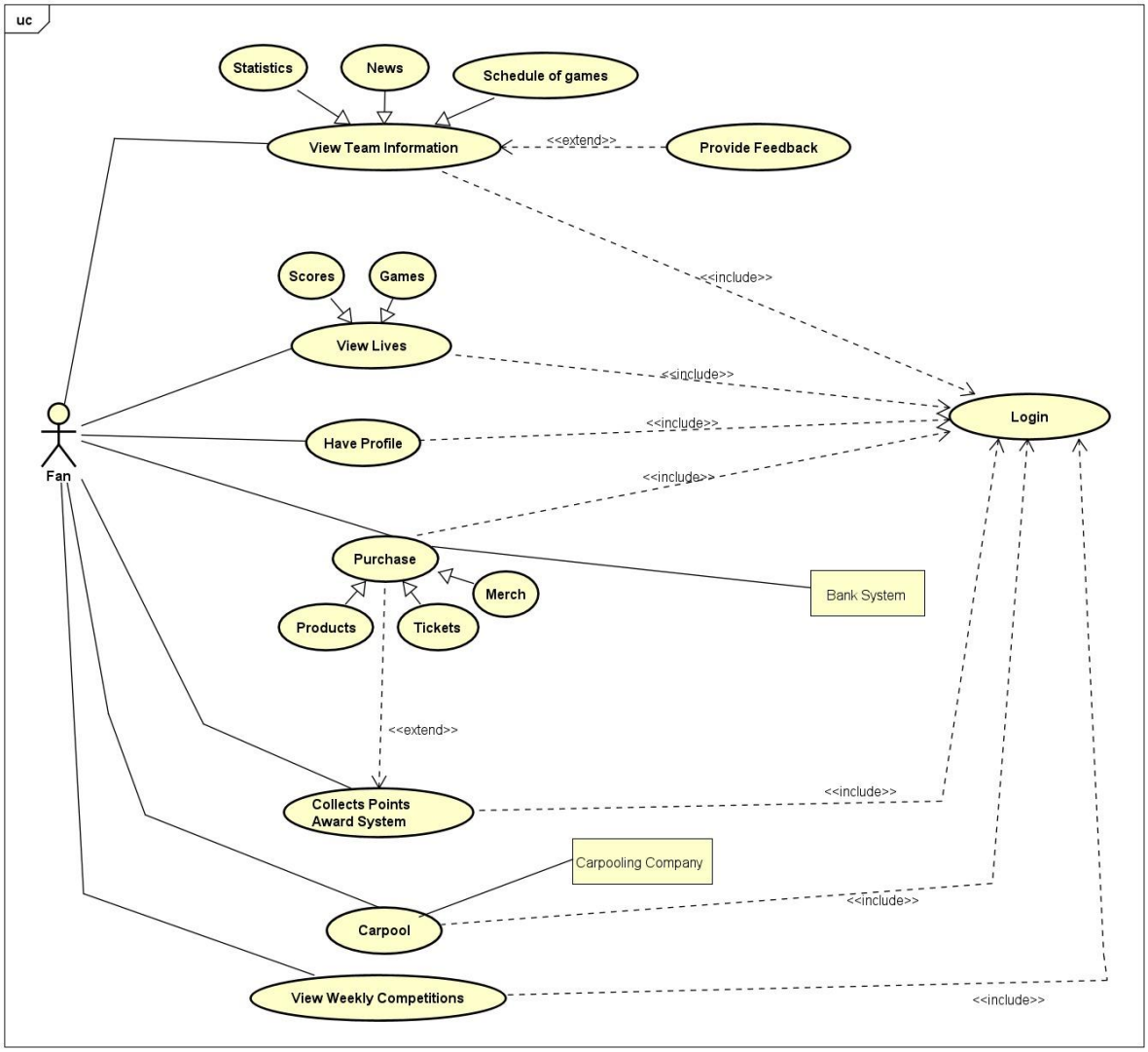
2) Manager Use Case Diagram:



This use case has the manager as a primary actor and the player and the football club as secondary actors. The manager has a variety of options such as tracking performance, sending punishments and viewing, his objectives which will be given to him by the football club which buys the software. The manager can view the player's info which is an abstract that includes the

player's injury history, position, age, name, as well as his technical skills and fitness (given to him by the player). The manager can watch videos and then if found necessary (extend) he can set plans like strategies and tactics, or share his insights about the video. The manager has to share announcements to inform the players of their roles before assigning their training, games and events schedules (this is an abstract generalized relationship). The manager cannot view the players' info, track their performance, share announcements, watch videos, send punishments, and view objectives unless he is logged in for security reasons.

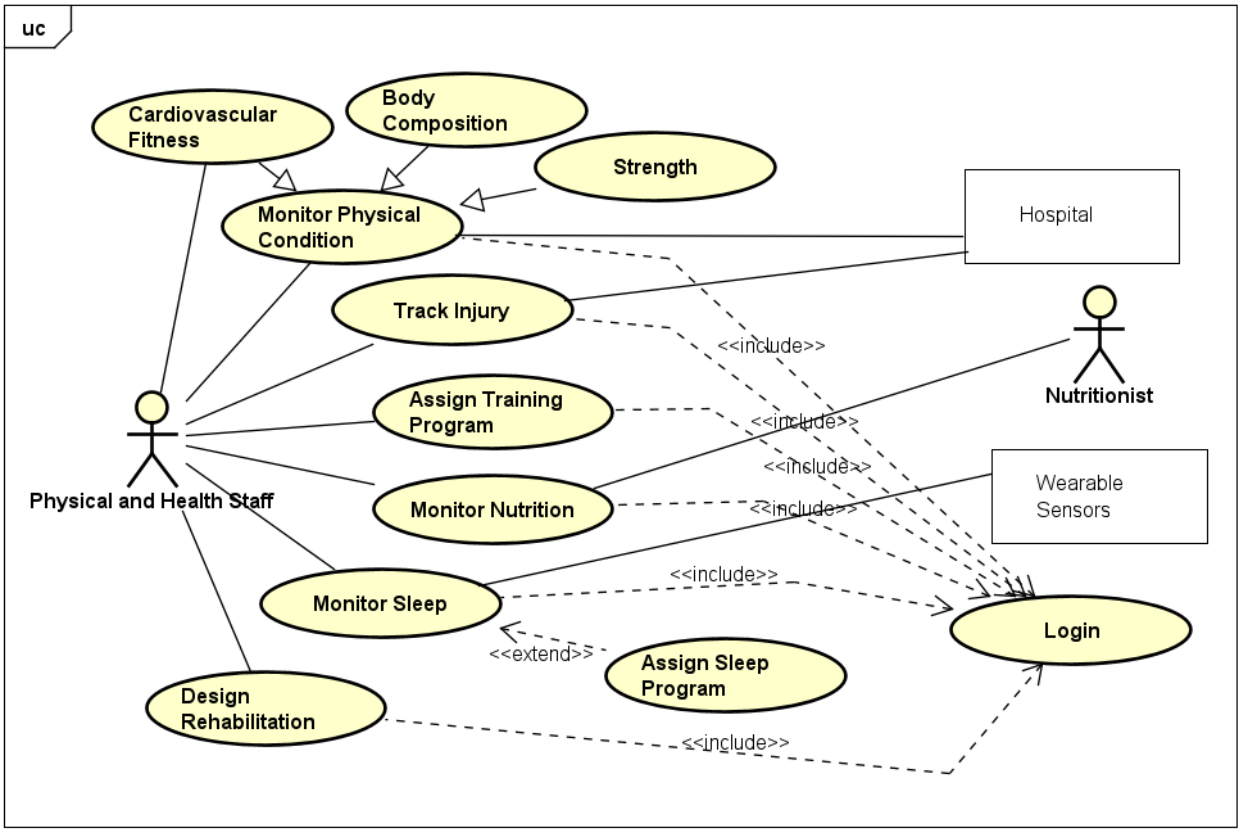
3) Fan Use Case Diagram:



In the use-case diagram previously shown, we include 1 primary actor which is the Fan User. As a secondary actor, we have the Bank System and the Carpooling Company which are actors that will be discussed later.

The Fan has one of seven options to do in our system, which all should be proceeded by a login. First, this user can View the team's information(like viewing statistics, news, or the schedule of the games) and then after this they have the option to provide feedback for the team. Second, the Fan actor can View lives like live scores and live games. Third, this actor can have a profile for them. Fourth, the actor can Purchase products, or Purchase merch or even Purchase Tickets. Now for purchasing the fan can get Points of loyalty in their account, but also this purchase can be done with the help of the secondary actor which is the Bank System so that it helps in the payment process. Fifth, this user has a balance of loyalty Points in their account, which they collect by for example purchasing products from the site. Sixth, the Fan can participate in carpooling, which is a service that we provide as an interface to manage the carpooling processes of the fans with the help from the secondary actor of a Carpooling Company which will provide us with this service. Finally, the Fan can View and Participate in Weekly Competitions.

4)Physical and Health Staff Use Case Diagram:



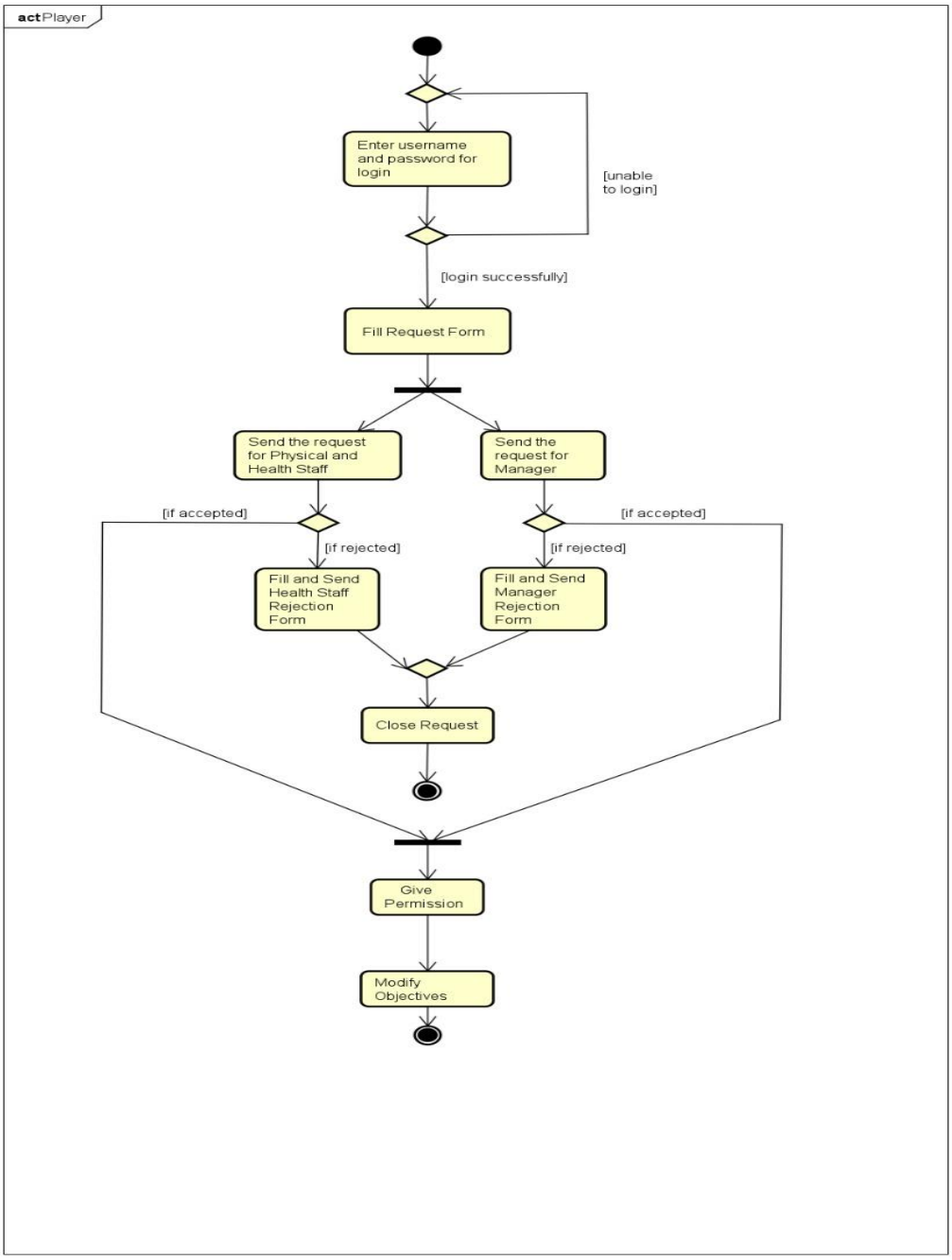
In the use-case diagram previously shown, we include 1 primary actor which is the Physical and Health Staff User. As a secondary actors, we have the Hospital, the Nutritionist, and the Wearable sensors which are actors that will be discussed later.

The Physical and Health Staff has one of six options to do in our system, which all should be proceeded by a login. First, this user can Monitor the Physical Condition of the player whether information can be provided in detail by the secondary actor "Hospital". Second, the Physical and Health Staff actor can Track the injury of the player which information is also provided by the secondary actor "Hospital". Third, this actor can Assign Training Programs for players. Fourth, the actor can Monitor the Nutrition of the player with the help of a secondary actor which is a Nutritionist. Fifth, this use can monitor the player's sleep, and to monitor the sleep of the player, the staff should get the amount of sleep each player is getting, which can be provided by the secondary actor which is the Wearable Sensor (for example a smart band), and after monitoring the sleep, the staff have the option to Assign a Sleep program for the player accordingly. Finally, the Physical and Health Staff can Design a Rehabilitation Program for the player for example a recovery program after an injury.

B) Activity Diagrams

The next diagram to be discussed is the activity diagram, that shows the flow of activities and actions within our system. The figure below shows the activity diagram for the waterfall booking system.

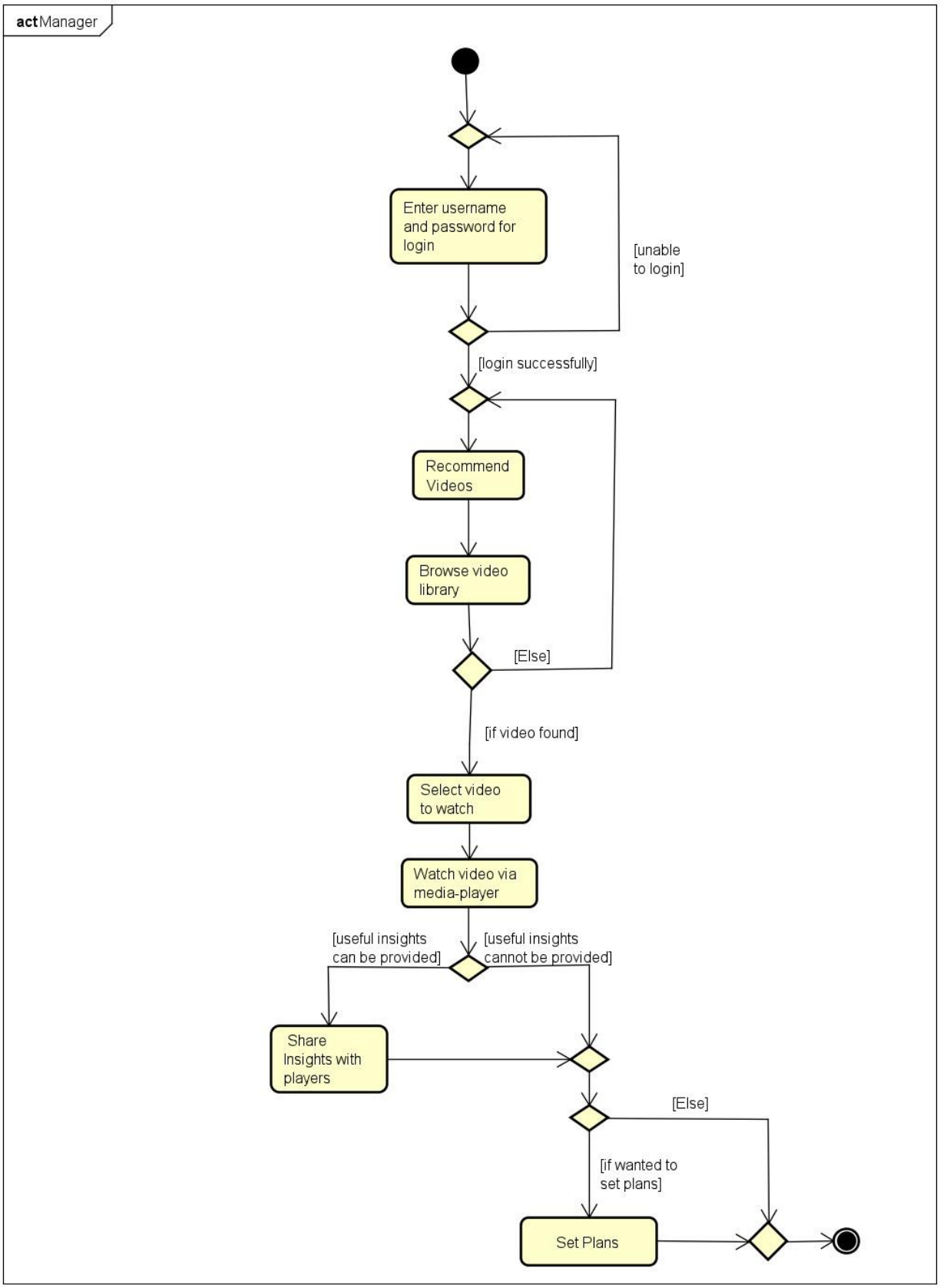
1) Player Activity Diagram:



Now this activity diagrams represent the use case of updating the objectives by the Player actor. At first, the Player logs-in to the system by entering the username and password, if it was unable to login for reasons such as incorrect credentials, it will re-prompts the player to re-enter the

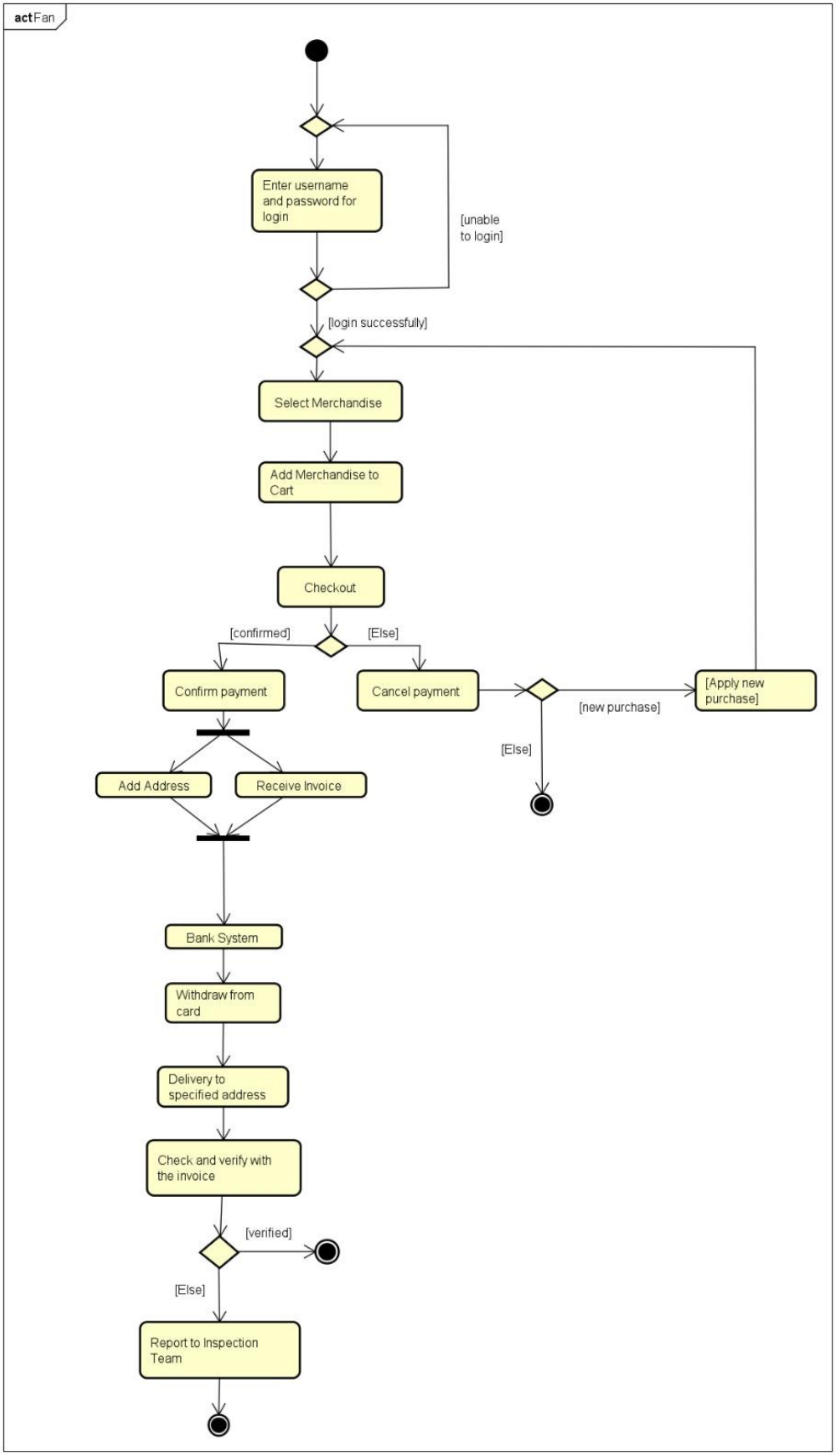
login credentials. Now if login was successful, the player will fill the request form which will have all the details about the update request. Next, this form request will be sent to two actors in parallel, one for the Physical and Health Staff to approve, and the other for the Manager to approve. Now if both actors have accepted the request, the permission for updating will be provided to the player, and then the player can modify the objective and then the process will end. While in the other case, if one or both of the actors have rejected the request, the one who rejected will fill and send a detailed rejection form to the player providing the reason for the rejection, and then request will be close and the process will end.

2) Manager Activity Diagram:


actManager
Enter username and password for login
[unable to login]
[login successfully]
Recommend Videos
Browse video library
[Else]
[if video found]
Select video to watch
Watch video via media-player
[useful insights can be provided]
[useful insights cannot be provided]
Share Insights with players
[Else]
[if wanted to set plans]
Set Plans

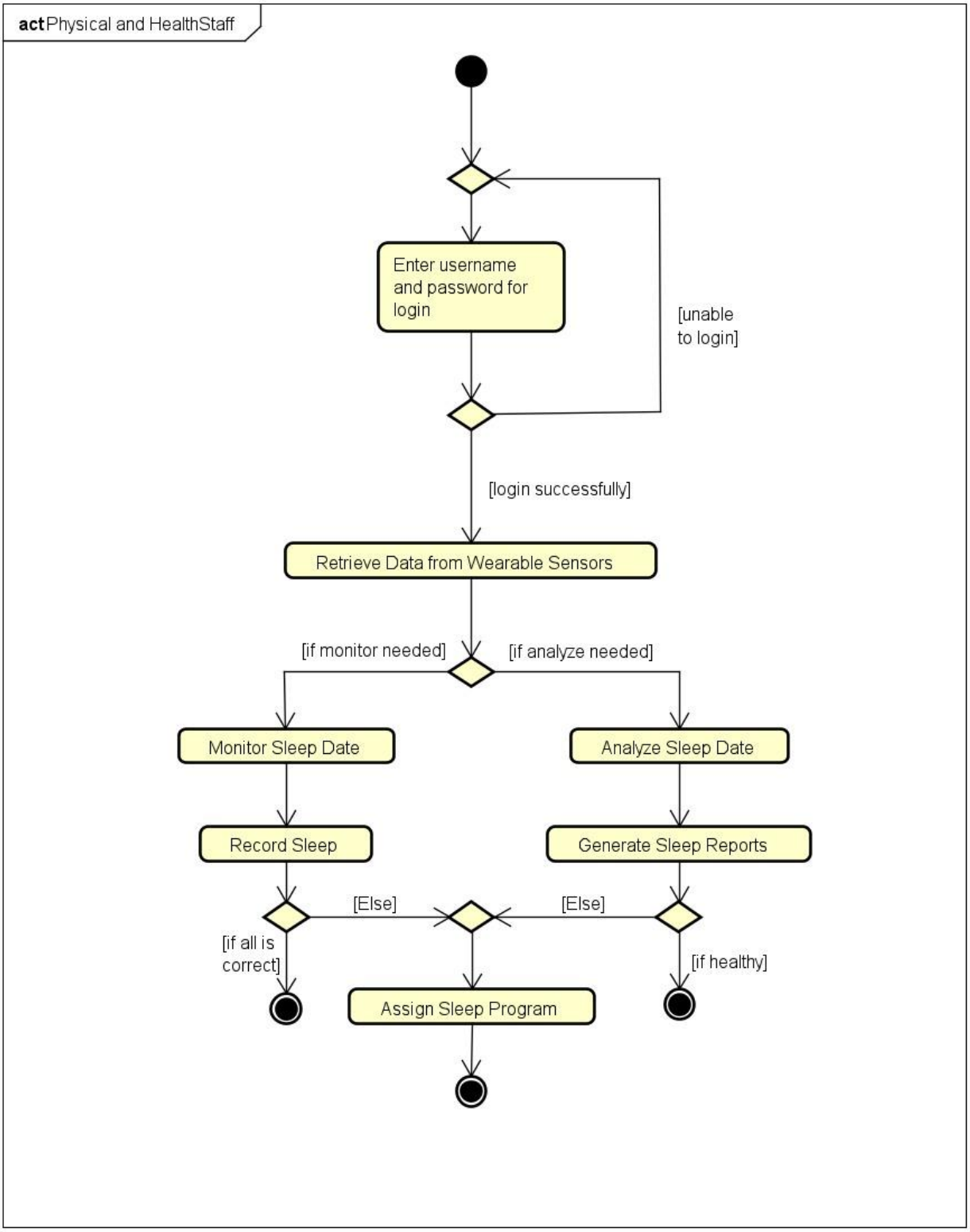
Now this activity diagrams represent the use case of watching videos by the Manager actor. At first, the Manger logs-in to the system by entering the username and password, if it was unable to login for reasons such as incorrect credentials, it will re-prompts the manger to re-enter the login credentials. Now if login was successful, the system will provide the manager with some recommended videos, and then the Manager will browse in the video library. Now, if the Manager didn't find a video that he is interested in watching, it will Reloop again for the system to re-provide another recommended videos and so on. While in the case the manger did find a video that interested him/her, the manager should select the video, and then the video will be played on a media player in the system so that the manager can watch it. After that, the system will ask the manager if there was a useful insight to share. If the manager found useful insights, he/she will share it with the player, and then the system will ask the manager if he/she wants to set plans, otherwise if the manager didn't found useful insights to share, the system will directly ask about setting plans. Now regarding setting plans, if the manager wants to set plans, he/she will set the plans in the system and then leave, so that the process will end. Now if the manager don't want to set plans, it will directly end the process.

3) Fan Activity Diagram:


actFan
Enter username and password for login
[unable to login]
[login successfully]
Select Merchandise
Add Merchandise to Cart
Checkout
[confirmed]
[Else]
Confirm payment
Cancel payment
[new purchase]
[Apply new purchase]
[Else]
Add Address
Receive Invoice
Bank System
Withdraw from card
Delivery to specified address
Check and verify with the invoice
[verified]
[Else]
Report to Inspection Team

Now this activity diagram represent the use case of Purchasing Merchandise by the Fan actor. At first, the Fan logs-in to the system by entering the username and password, if it was unable to login for reasons such as incorrect credentials, it will reprompts the Fan to re-enter the login credentials. Now if login was successful, the Fan will select one of the available Merchandise, then this merch will be added to the cart. Now the Fan will proceed to Checkout, if the fan don't want to pay, the system will prompt him to cancel the payment and then will ask him/her if he/she want to make other purchase. If the fan wants to do another purchase the system will take him/her to select a Merchandise again and it will enter in this loop. Incase he/she don't want to make another purchase the process will end. Otherwise, if the fan want to pay, the system will prompt the user to Confirm the payment. Then the user will receive an invoice of the payment from the system, and he/she will be re-prompted to fill and add his/her address. After the invoice was received and the address was added, the payment will be done with the help of the bank system. Then, money will be withdrawn from the card the fan gave, and the merch will be delivered to the specified address. After delivering to the specified address, the invoice will be checked if it is right and everything will be verified, then the process will end. Otherwise, if it was not verified and there was a problem, a report will be sent to the inspection team to inspect and solve the problem, then the process will end.

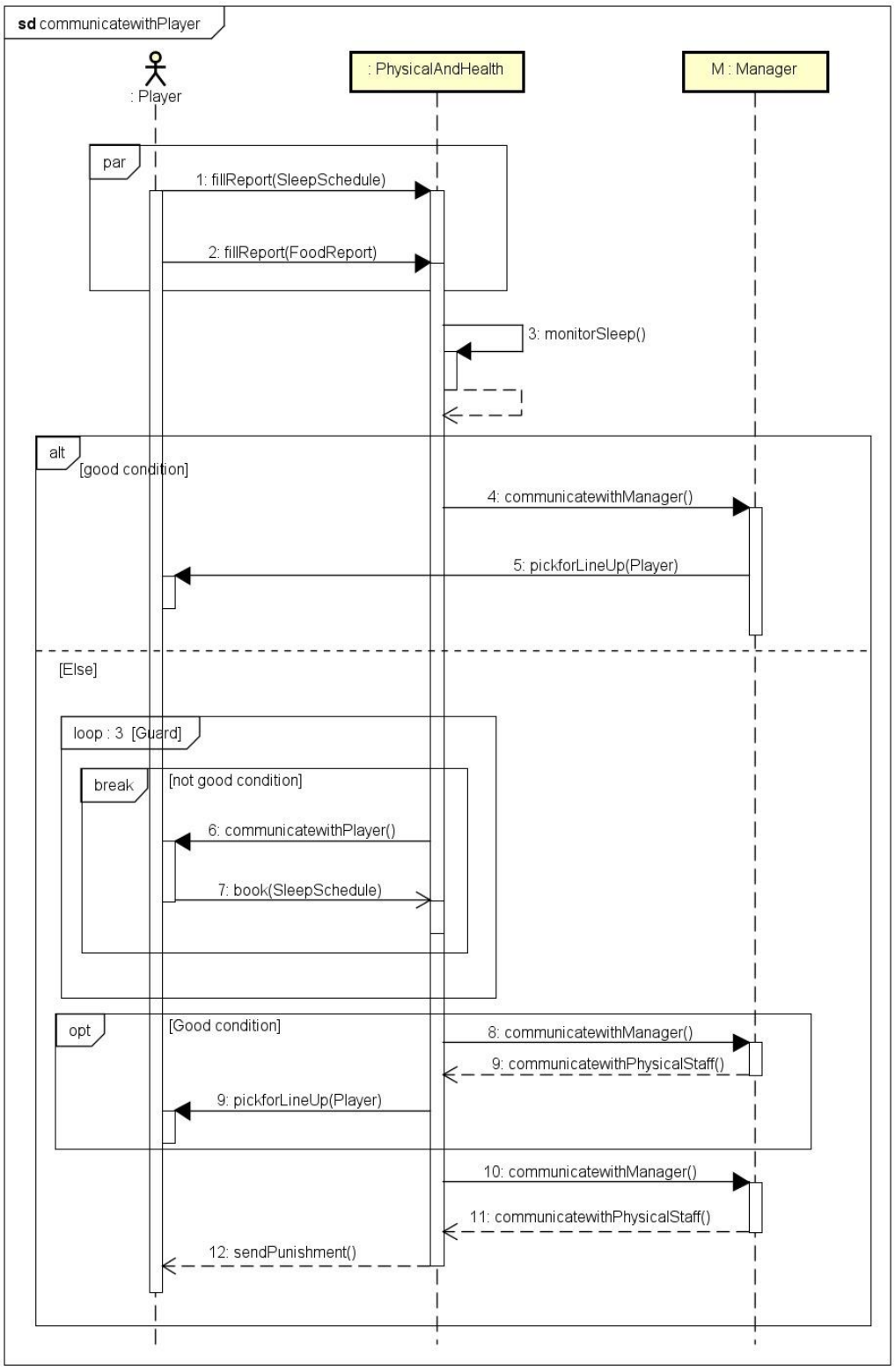
4) Physical and Health Staff Activity Diagram:


act Physical and HealthStaff
Enter username and password for login
[unable to login]
[login successfully]
Retrieve Data from Wearable Sensors
[if monitor needed]
[if analyze needed]
Monitor Sleep Date
Analyze Sleep Date
Record Sleep
Generate Sleep Reports
[Else]
[Else]
[if all is correct]
[if healthy]
Assign Sleep Program

B) Sequence Diagrams

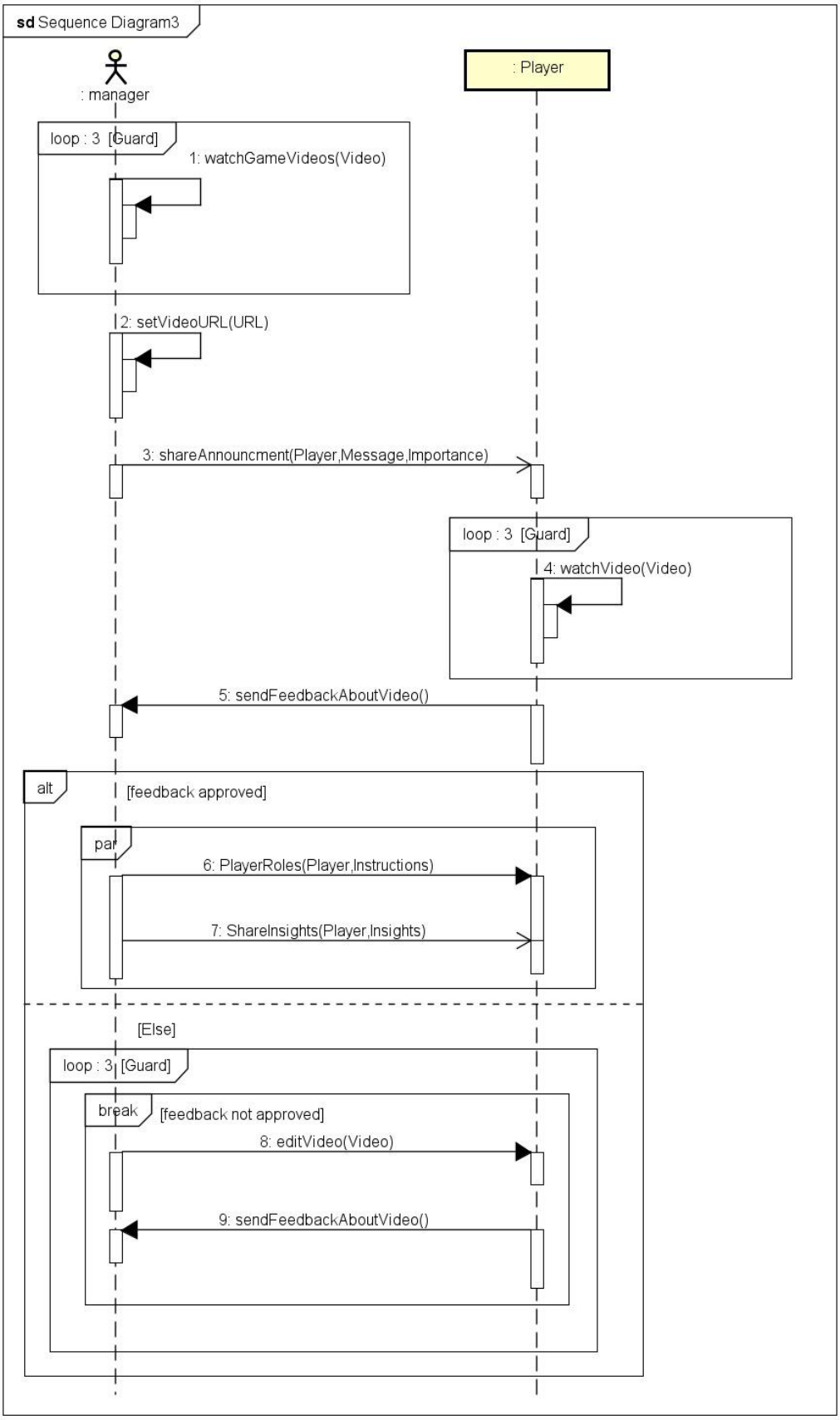
The following shows the sequence diagram for our system (for the teller user). The sequence diagram shows the exact sequence of events and messages, in chronological order.

1) First Sequence Diagram:


sd communicatewithPlayer
: Player
: PhysicalAndHealth
M : Manager
par
1: fillReport(SleepSchedule)
2: fillReport(FoodReport)
3: monitorSleep()
alt
[good condition]
4: communicatewithManager()
5: pickforLineUp(Player)
[Else]
loop : 3 [Guard]
break
[not good condition]
6: communicatewithPlayer()
7: book(SleepSchedule)
opt
[Good condition]
8: communicatewithManager()
9: communicatewithPhysicalStaff()
9: pickforLineUp(Player)
10: communicatewithManager()
11: communicatewithPhysicalStaff()
12: sendPunishment()

In this diagram, the player reports his sleep and food schedules to the physical and health staff in parallel using the par operator. The physical and health staff will monitor the sleep of the player. The alt method will be used to check whether the player is in good condition. If the player is in good condition the physical and health staff will communicate with the manager who will in return pick the player for the line-up of the team. Else, the staff will communicate with the player 3 times to ensure that he meets the requirements for his schedule using the loop operator. After looping 3 times, if the condition of the player is changed to good, the physical and health staff will communicate with the manager who will reply to them and in return choose the player for line-up (for this we used the opt operator to check for a Boolean condition). In case the condition is still not good, the manager will receive a message from the physical and health staff to which he will reply for them to send punishment for the player for not abiding by his contract and responsibilities.

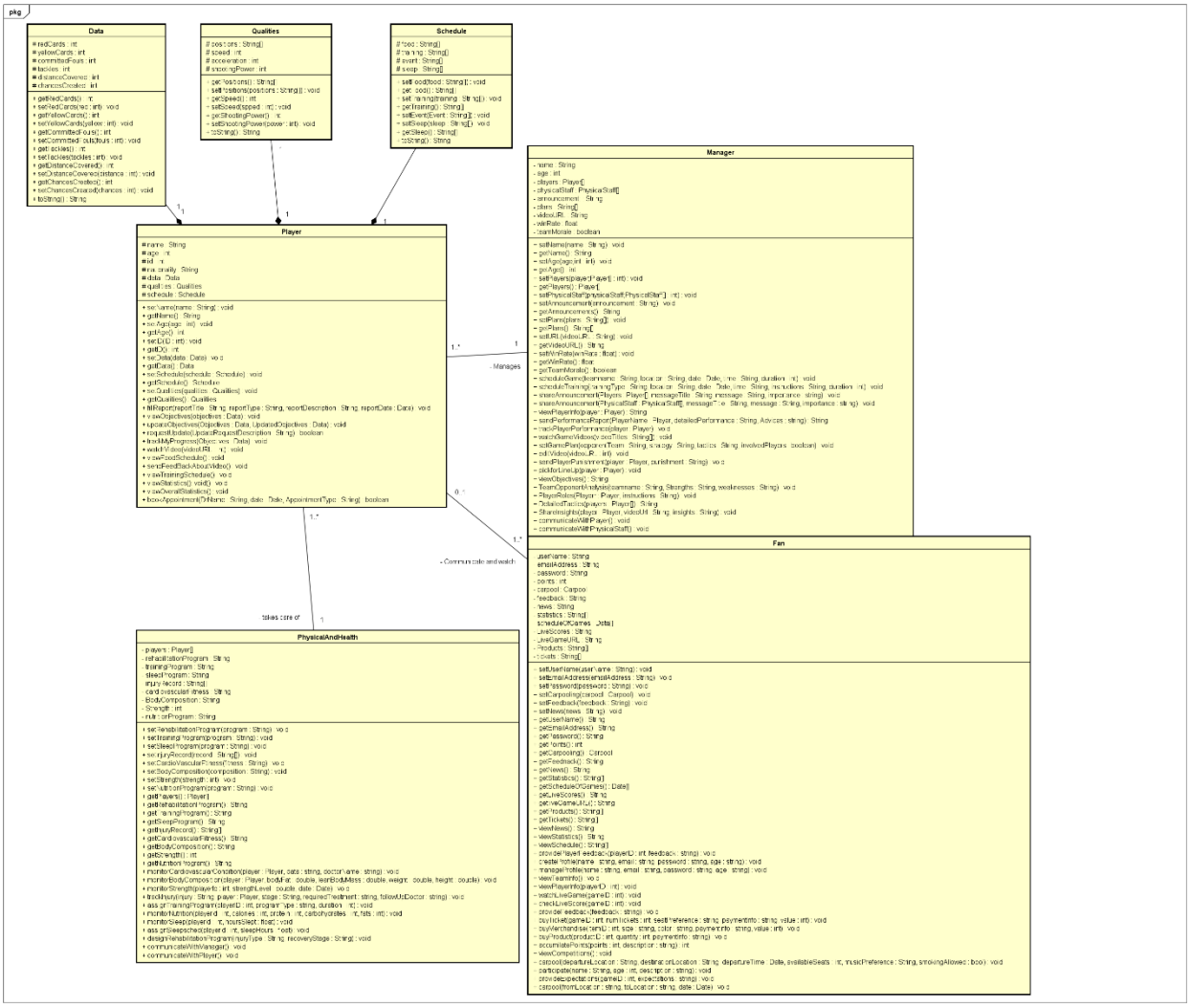
2) Second Sequence Diagram:


sd Sequence Diagram3
: manager
: Player
loop : 3 [Guard]
1: watchGameVideos(Video)
2: setVideoURL(URL)
3: shareAnnouncment(Player,Message,Importance)
loop : 3 [Guard]
4: watchVideo(Video)
5: sendFeedbackAboutVideo()
alt
[feedback approved]
par
6: PlayerRoles(Player,Instructions)
7: ShareInsights(Player,Insights)
[Else]
loop : 3 [Guard]
break
[feedback not approved]
8: editVideo(Video)
9: sendFeedbackAboutVideo()

In this sequence diagram, the manager will watch a certain video three times and then he/she will use the setVideoURL function to upload this video to the player side. Then the manager will notify the player about this video using the shareAnnouncement function. On the other hand, the player will watch the video three times and will send feedback to the manager about this video. If the manager approves this feedback, he/she will assign roles for the player and share with them useful insights. However, if the manager disapproves of the feedback received from the player, he/she will edit this video for the player and wait for new feedback. The manager will be able to handle tolerate wrong feedback received from the player up to three times maximally.

D) Class Diagram

A class diagram shows the different classes and objects used in a system that is implemented by an Object-Oriented Programming Language. The diagram below shows the class diagram for our system.



In our project, there are 4 main classes each representing a certain user (player, fan, manager, and physical and health staff). As for the player module, each player will have a name, age, nationality, unique ID, and objects of data types we made. The object of type Data is to keep track of his stats and objectives like red cards taken, committed fouls, tackles and chances created. The object of type Qualities is to keep track of the player's benefit on the field such as his positions, speed, acceleration, and shooting power. The schedule is used to remind the player of his obligations to his training, nutrition, sleep time, and events. The player class is then able to view his schedule, and qualities, track his objectives, request to update his objectives, fill reports, track his progress through the Data class, and view statistics.

The player class interacts with other classes which are the physical and health staff, manager, and fans. He can request to book an appointment with the physical and health staff. The physical

and health staff can take care of many players, one manager can manage 1 or more players, and many fans can communicate and watch 0 or one players at a time. The Physical and Health staff will have an array of players to keep their data. This class will save the injury records of the players as well as prepare rehabilitation programs, training programs, and nutrition programs and assign them to the players. This class will also be able to monitor the players' cardiovascular system, body composition, and strength.

The Manager class will have a name and age attributes to identify the manager. The manager will take an array of players as well as an array of physical staff to keep track of them and make sure everything is going correctly. He will have announcements to send, video URLs, win rate, and team morale (a Boolean to make sure that the players are in a good environment where they can function well). The manager can schedule games, schedule training, and their dates, view the player information, send performance reports, set game plans, analyze opponents, as well as send detailed tactics and insights.

The fan class will have a username and an email to identify them as well as a password to log in to the system. The fan will have an integer representing the points collected, a carpool object to arrive at games with minimum costs, feedback to provide about the players and their games, news, statistics of the players, schedule of games, live scores, live game URLs and products and tickets to buy. The fans will have the functionality to accumulate points, view competitions and participate in them, and provide their expectations.

VIII. Conclusion

In conclusion, the creation of the four UML diagrams—sequence, use case, class, and activity—marks the successful completion of the second phase of our software engineering project for the football team.

The Sequence diagram will ensure smooth interactions between system objects, the use case diagram will highlight user needs, ensuring the system meets their needs, and the Class diagram will give an overview of the underlying classes in the system and their relationships which will help us to identify potential optimization areas and ensures that the system is built on a strong foundation, and the Activity diagram - provides a clear picture of the system's workflow, allowing identification of potential bottlenecks and streamlining processes.
These diagrams are essential tools for comprehending the requirements and design of the system and help ensure that the system we are building is correctly created to meet the needs of its users. With the aid of these diagrams, we should now be able to understand the system's behavior, its users and their interactions, the underlying classes and their relationships, and the overall flow of operations inside the system.

Finally, the system's behavior, user interactions, classes and their relationships, and the overall flow of activities have all been thoroughly explained by these diagrams. As we continue to create and enhance our system, we can consult these diagrams as needed. These will help us stay focused on the project's goals and make sure we're creating a system that meets the needs of the football club and its users.