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كلية الرياضيات والإعلام الآلي
Faculty of Mathematics and Computer Science

قسم الإعلام الآلي
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THEME

Mobile App for sports clubs

Academic Year 2024/2025

Dedications:

Je dédie ce travail à mes parents, pour leurs soutiens, leurs encouragements et leurs sacrifices tout au long de mes études.

À ma famille, pour leur présence et leur aide précieuse.

À mes enseignants à l'Université de M'sila, pour leurs efforts et leur accompagnement.

Et à toutes les personnes qui m'ont soutenu de près ou de loin durant ce parcours.

FAROUK LOUNIS.

إلى أبي وأمي، اللذين كانا أعظم سند وداعم لي طوال مسيرتي الدراسية، كل الشكر والامتنان على حبكما وتضحياتكما التي لا تُقدّر بثمن.

وإلى كل أستاذ تتلمذت على يديه، أشكركم على ما بذلتموه من جهد وما قدمتموه من علم، فلكم الفضل في وصولي إلى هذه المرحلة.

وإلى أصدقائي الأعزاء، شكراً لرفقتكم الصادقة، ودعمكم المتواصل، ولأنكم كنتم جزءاً جميلاً من هذه الرحلة.

عثمان بن حليمة.

بسم الله الرحمن الرحيم،
حمداً لله جل وعلا على توفيقه ونِعمه التي لا تُحصى.

أُهدي هذا العمل:
إلى والديّ العزيزين، على دعمهما اللامحدود وتضحياتهما العظيمة.
إلى عائلتي الكريمة، سندي ومصدر قوتي.
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وإلى أصدقائي الأعزاء، على رفقتهم الصادقة وتشجيعهم الدائم.

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ايمن محمودي.

Acknowledgement

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فنود أن نعرب عن خالص شكرنا وتقديرنا للدكتور علي دبّة على دعمه القيّم وإرشاده المتواصل طوال فترة هذا المشروع. لقد كان لخبرته وإشرافه دورٌ أساسي في مساعدتنا على تجاوز التحديات وإتمام هذا العمل بنجاح .نحن ممتنون حقًا للوقت والجهد الذي بذله، ونتمنى له دوام التوفيق والصحة في مسيرته الأكاديمية والمهني

Table of Contents:

General Introduction

In light of rapid technological advancement and the growing role of mobile applications across various sectors, private sports clubs increasingly require integrated information systems to enhance service quality and streamline both administrative and technical workflows. This project aims to design and develop a comprehensive mobile application for the management of private sports clubs, establishing a real-time digital link among all stakeholders—administrators, coaches, technical and medical staff, and athletes—to facilitate information exchange, simplify registration processes, monitor activities, and generate reports.

The proposed application follows a software engineering methodology beginning with a preliminary study of the club's organizational structure and current operations. It then proceeds to architectural design using Unified Modeling Language (UML) to define system components and their relationships. A carefully structured relational database reflects key entities—members, teams, training sessions, and medical and performance reports. For implementation, Flutter and Dart are chosen for the front-end to deliver high performance and a seamless cross-platform user experience, while Supabase provides a secure, real-time backend and database solution.

This project addresses common inefficiencies in traditional sports club management, including burdensome manual procedures, delays in notifications and reporting, and limited departmental integration. Through role-based access control, real-time notifications, and verification mechanisms, each user can perform their tasks accurately and efficiently while maintaining high levels of oversight. Ultimately, this work represents a significant step toward the full digital transformation of private sports clubs and lays the groundwork for future enhancements, such as data analytics and integration with biometric monitoring devices to further optimize athletic performance.

Chapter One: Preliminary Study of the Private Sports Club

1. Introduction:

This chapter provides a comprehensive preliminary analysis of the current operational system of a private sports club. The objective is to establish a clear understanding of the club's structure, functionality, and organizational environment. The chapter begins by defining the concept of a sports club and describing its core components, human resources, and key stakeholders. It then outlines the club's essential features, identifies the main deficiencies within the existing system, and concludes by proposing a range of technological and administrative solutions to enhance operational efficiency and service quality.

2. Definition of the Sports Club:

A sports club is a structured institution that offers a variety of athletic services aimed at fostering physical development, technical skills, and sportsmanship among individuals of different age groups and skill levels. It serves as an organized environment for training, competition, and personal growth, supported by both sports and administrative infrastructure. The club operates through various specialized departments that oversee activities, manage athletes, and ensure the overall development of sporting programs [6].

Figure 1

3. Core Components of the Sports Club

3.1. Sports Branches

The club encompasses several branches, each dedicated to a specific sport, including but not limited to:

- Football.
- Handball.
- Basketball.
- Karate.
- Volleyball.

3.2. Sports Teams

Athletes are organized into teams based on their age and discipline. Examples include:

- Youth team.
- Senior team.
- Women's athletics team.
- Other age-specific teams.

3.3. Players

Players represent the fundamental unit of the club. They are classified by category and follow structured training programs under both technical and medical supervision.

3.4. Coaching Staff

Coaches are responsible for designing training plans, conducting sessions, monitoring player progress, and ensuring the athletic development of teams and individuals.

3.5. Medical Staff

This unit monitors the health of athletes, prepares regular medical reports, and responds to injuries and medical concerns during training or competition.

3.6. Technical and Support Staff

Includes assistant coaches, technicians, maintenance personnel, and logistics specialists who provide technical and operational support to the teams and facilities.

3.7. Training and Development Programs:

The club implements continuous development initiatives, such as specialized workshops and training modules, to enhance the competencies of both athletes and staff.

3.8. Administrative System:

The administrative structure consists of management departments, secretarial units, branch coordinators, and a centralized database for managing records related to athletes, staff, and operations.

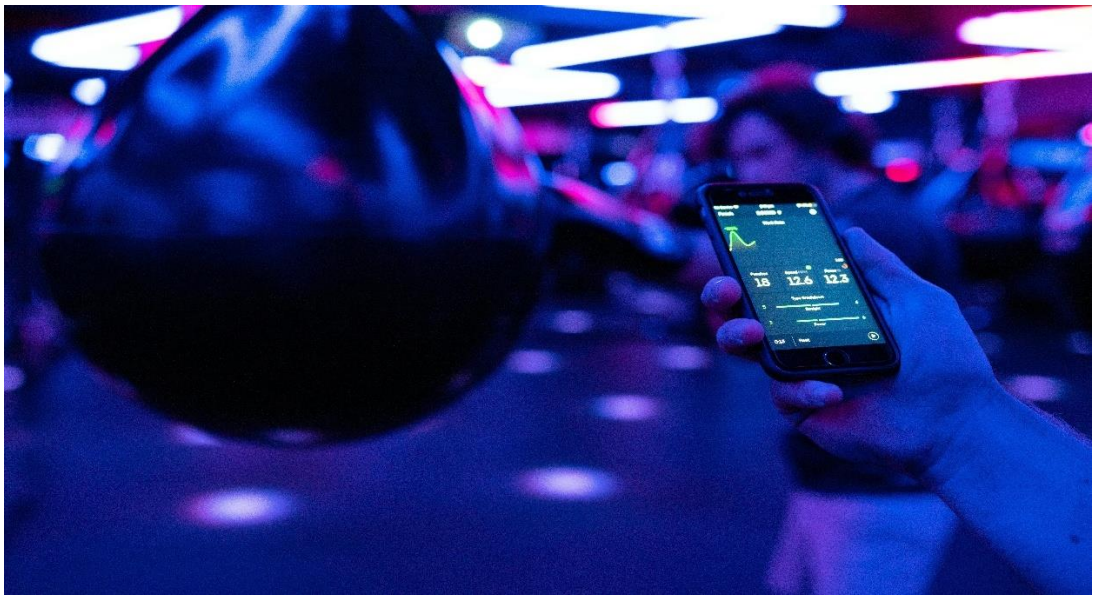


Figure 2

4. Human Resources of the Club:

The effective operation of the club depends on a diverse range of human resources, including:

General Manager

Sports branch directors

Professional coaches

Registration and front desk staff

Sports doctors and nursing staff

Technical support personnel

Equipment and logistics coordinators

Maintenance and custodial staff

5. Stakeholders Associated with the Sports Club:

5.1. Athletes

The primary beneficiaries of the club's services, representing various age groups and performance levels.

5.2. Parents and Guardians

Especially for underage athletes, parents play a crucial role in administrative coordination, health supervision, and educational support.

5.3. Suppliers

Entities responsible for providing sports equipment, apparel, medical supplies, and technical tools necessary for club operations.

5.4. Regulatory and Official Bodies

Includes sports federations, local authorities, and governing institutions that oversee compliance, licensing, and development programs.

5.5. Sponsors and Partners

The club collaborates with commercial and institutional partners for funding, material support, and strategic development.

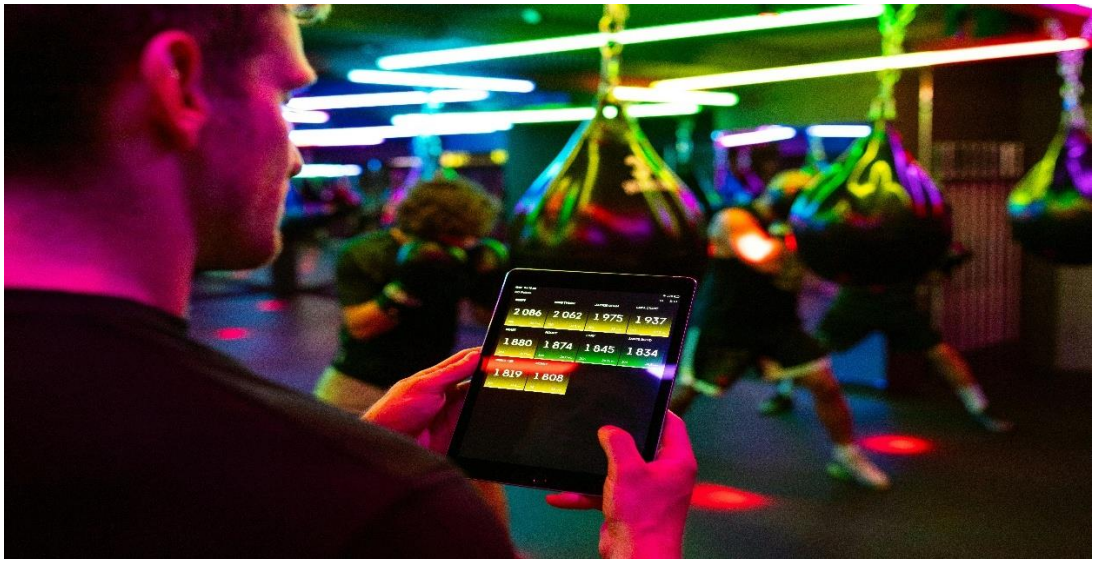


Figure 3

6. Key Features of the Sports Club:

6.1. Multidisciplinary Activities

Offers a broad spectrum of sports to accommodate diverse interests and talents.

6.2. Qualified Staff

Employs experienced professionals in coaching, health care, and technical management.

6.3. Comprehensive Facilities

Equipped with modern infrastructure for training, competition, and recovery.

6.4. Monitoring and Evaluation Systems

Implements structured systems to track athletes' physical and technical development.

6.5. Training and Capacity Building

Provides ongoing training programs for both athletes and staff to ensure continuous improvement.

6.6. Structured Organizational Hierarchy

A clear and functional organizational framework that supports efficient decision-making and task execution.

7. Limitations of the Current Operational System:

Despite its strengths, the current system suffers from several operational inefficiencies that affect overall performance. These include:

7.1. Dependence on manual administrative procedures
7.2. Delays in task processing (e.g., registration, evaluations)
7.3. Inability to monitor athlete progress across seasons
7.4. Lack of digital integration among departments
7.5. Ineffective data storage and retrieval mechanisms
7.6. Insufficient collaboration between medical and technical staff
7.7. Susceptibility to human error in documentation and reporting
7.8. Absence of an internal communication platform.
7.9. Limited use of data analytics for performance evaluation.

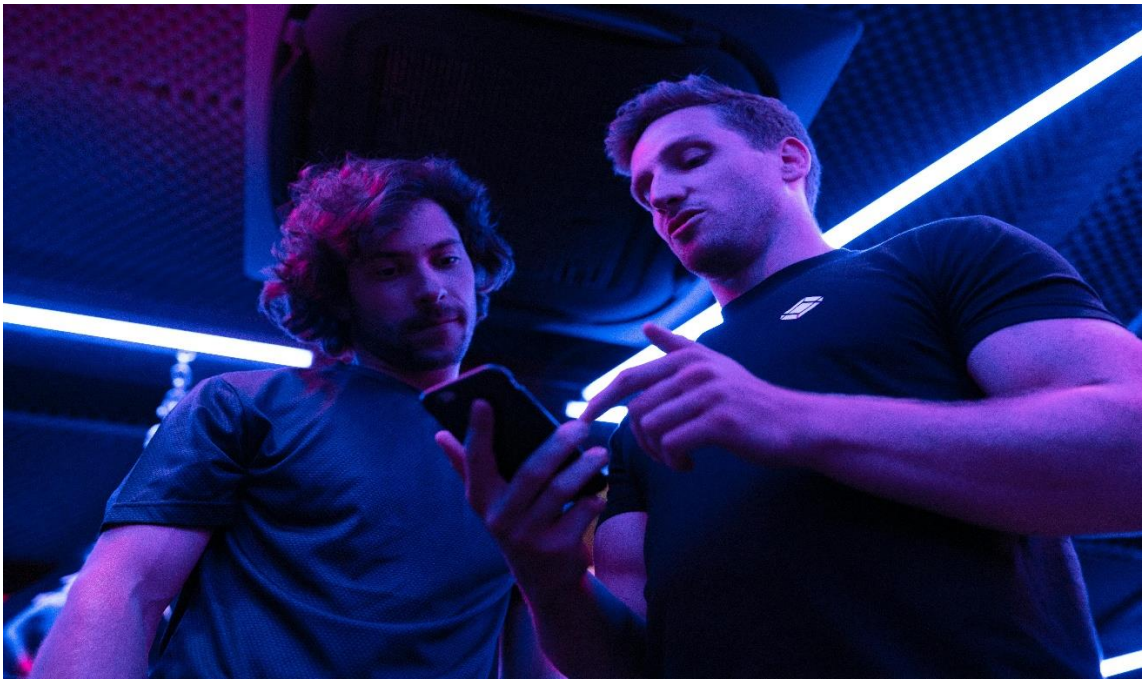


Figure 4

8. Proposed Solutions for System Improvement:

To address the above challenges, the following solutions are recommended:

8.1. Digital Information System
Develop an integrated digital platform for managing player profiles, training schedules, and performance and medical records.
8.2. Smart Card Implementation
Introduce smart identification cards for athletes and coaches to track attendance, participation, and health metrics.
8.3. Interdepartmental Digital Network
Establish a centralized network that links the administrative, technical, and medical units for seamless information sharing.
8.4. Real-Time Notification System
Enable instant notifications for training sessions, medical appointments, and meetings via the digital system.
8.5. Barcode Inventory System
Apply barcode technology for the efficient management of equipment and inventory.
8.6. Digital Reporting and Archiving
Automate the generation and storage of medical and performance reports in digital format.
8.7. Internal Communication Application
Create a secure platform for messaging and coordination between players, coaches, and medical staff.
8.8. Capacity-Building Workshops
Organize training workshops to develop staff proficiency in using modern information and management systems.

9. Conclusion:

This chapter provided a detailed examination of the private sports club's structure, stakeholders, and core operational components. It identified key limitations in the current system and offered a comprehensive set of solutions to improve its administrative and technical efficiency. These proposals serve as a foundation for the system design and implementation phases in the subsequent chapters.

Chapter two: System Design

1. Introduction

After completing the preliminary study of the sports club, this chapter transitions into the design phase, which aims to define how the Sports Club Application will be implemented and managed effectively. In this context, the Unified Modeling Language (UML) is adopted as a tool to analyze and document the system's components and behaviors, contributing to a comprehensive and accurate vision of the application. The chapter focuses on presenting the system's core elements and illustrating how they interact with each other, in addition to identifying the main processes that occur within the application. This design serves as the technical foundation upon which the implementation phase will be based, ensuring that the project's objectives are achieved efficiently and professionally.

2. UML (Unified Modeling Language)

The UML standard provides a methodology for creating diagrams that communicate the various aspects of a system's design. Project teams can use UML to share and discuss concepts, collaborate on the modeling process and design the final software [1].

2.1Use Case Diagram

Use case diagrams address the system's functionality and how actors interact with the system, based on specific use cases. The following use case diagram was prepared to improve the application design, as it contains five actors:

Admin: The central user responsible for managing system entities.

- Register Users: Allows the admin to register different types of users, including:

Players.
Trainers.
Medical Staff.
Technical Staff.

- Manage Users & Data:

Modify.
Add.
Delete.

- Search, with filters:

By Name.
By Email.
By Phone Numbers.

- Authentication & System Interaction:

Login.
Logout.

- creates ads.

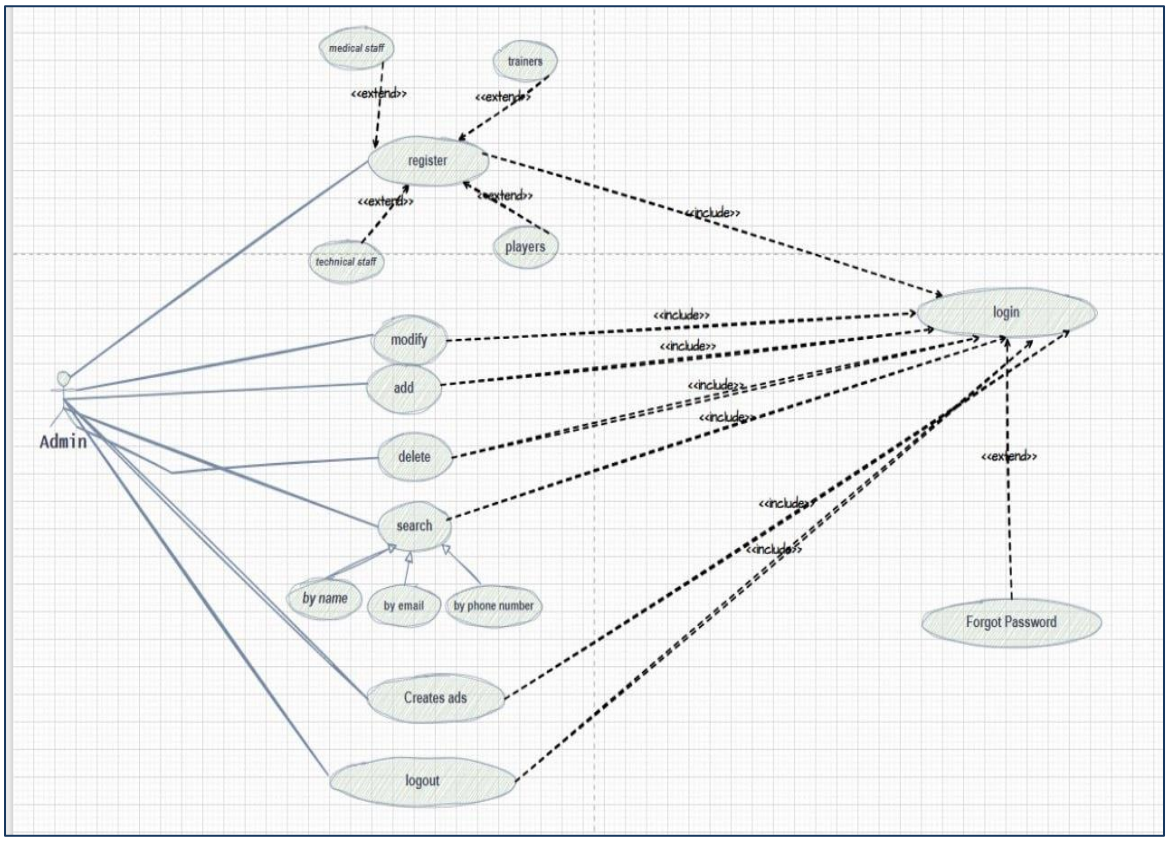


Figure 5: Use Case Diagram of Admin Actor

Player: Interacts with the system through various functionalities.

- Login.
- Modify Information.
- View Training Schedule.
- View Competitions.
- Verify Participation in Competitions, with possible outcomes:
- Accept (Approve participation).
- Refuse (Decline participation).
- Receive Notifications.
- Logout.

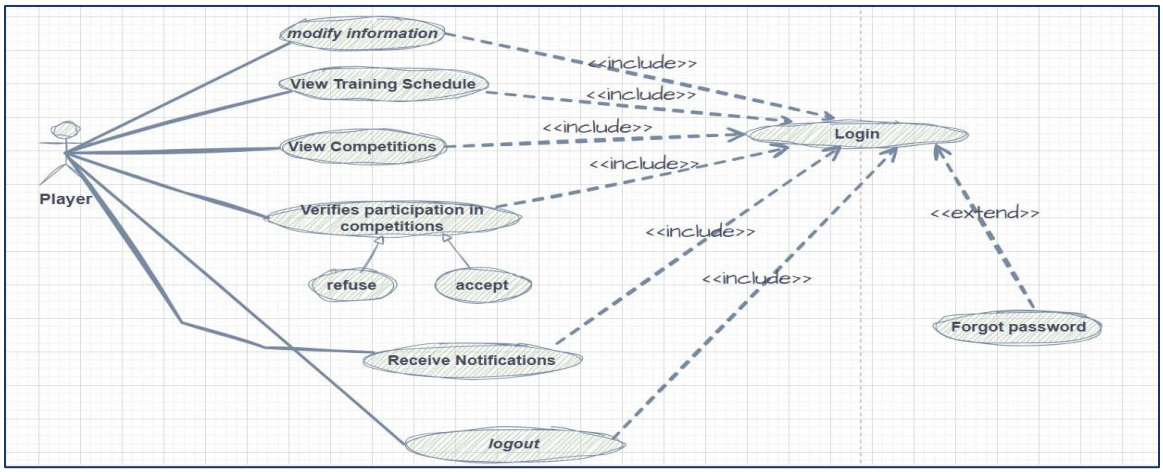


Figure 6: Use Case Diagram of Player Actor.

Technical Staff:

- Login
- Modify Information.
- View Players' Performance Reports.
- View Training Schedule.
- Provide Technical Feedback.
- Receive Notifications.
- Logout.

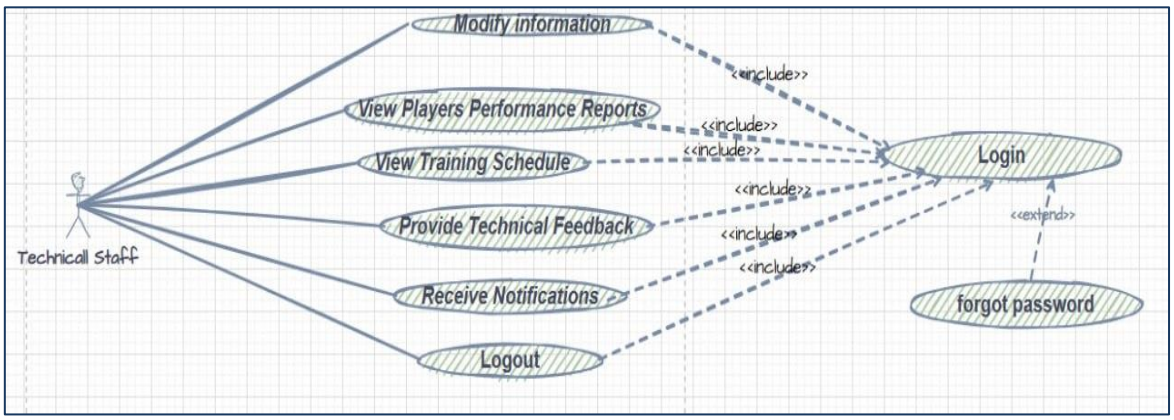


Figure 7: Use Case Diagram of Technical staff Actor.

Coach: Interacts with the system through the following functionalities:

- Login.
- Prepare the training schedule, including:

Add.
Modify.
Delete

- Identify players participants.
- View Players Status with possible conditions:

Suspended.
Infected.
Ready.

- Logout.
- Collaborates closely with the Technical Staff, who provide technical feedback, assess players' performance, and contribute to planning the training sessions.

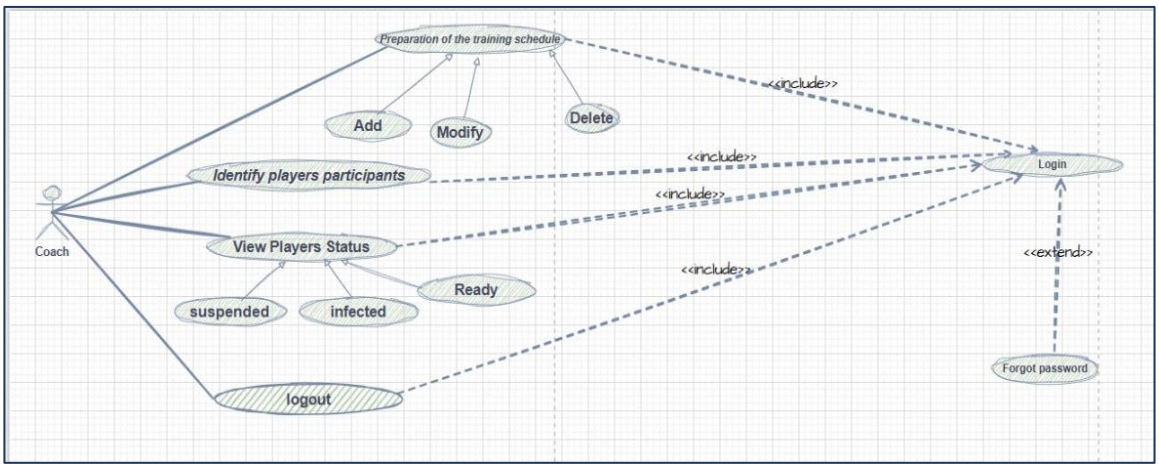


Figure 8: Use Case Diagram of Coach staff Actor.

Medical Staff: Interacts with the system through health-related functionalities:

- Login.
- Modify Information.
- View Players' Health Status, which includes:
  - View Injured Players.
  - View Recovered Players.
  - Provide Medical Reports.
- Logout.

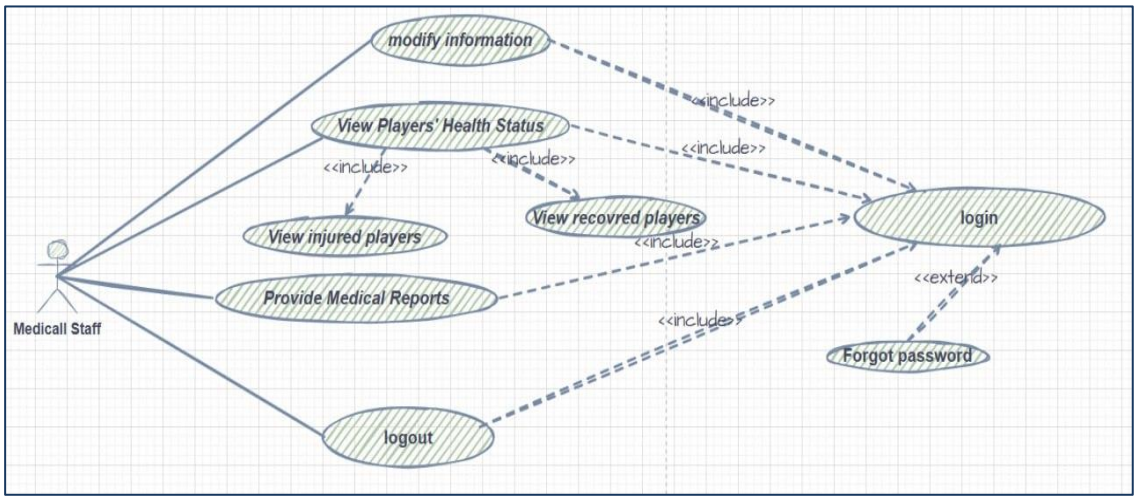


Figure 9: Use Case Diagram of Medical Staff Actor.

2.2Sequence Diagram

A Sequence Diagram is a key component of UML used to visualize the interaction between objects in a sequential order. It focuses on how objects communicate with each other over time, making it an essential tool for modeling dynamic behavior in a system. Sequence diagrams illustrate object interactions, message flows, and the sequence of operations, making them valuable for understanding use cases, designing system architecture, and documenting complex processes [2].
To better understand this flow, we created sequence diagrams for the following operations:

Login
The Login operation enables users (Player, Coach, Medical Staff...) to access the system using their email and password.
Upon submission, credentials are validated via the Supabase(database) authentication service.
If the information is correct, the system grants access.
If the password is incorrect, an error message is displayed on the interface, and the user must try again.

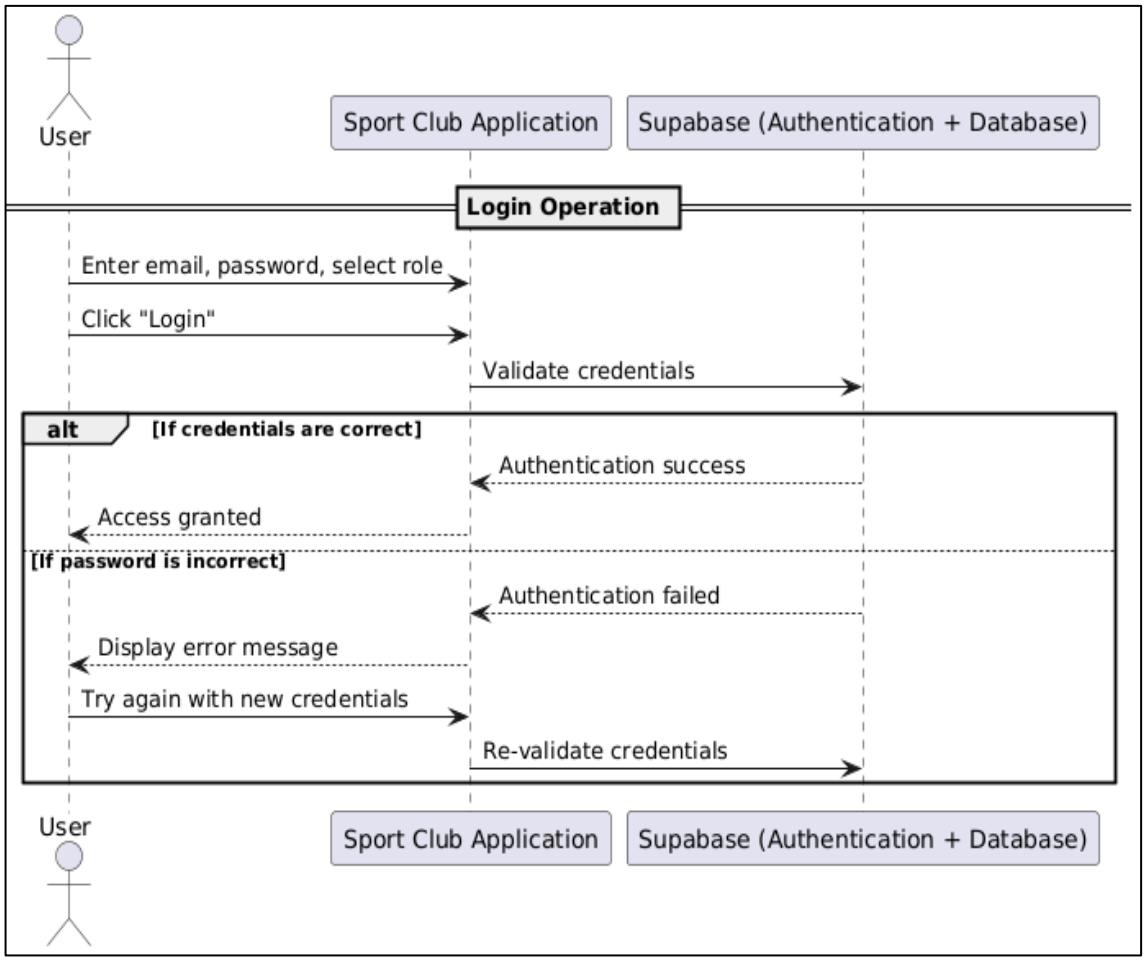


Figure 10: Sequence Diagram of Login operation

Personal Profile Management

Users, especially players, can view and update their personal information such as phone number, email address, or profile photo. This keeps the data accurate and up to date.

Training Schedule Consultation

The system displays a training calendar with details such as dates, times, location, and assigned coach. This feature helps organize sports activities efficiently.

Competition Participation

Players can view the list of upcoming competitions and indicate their availability. This operation helps manage team selection for each event.

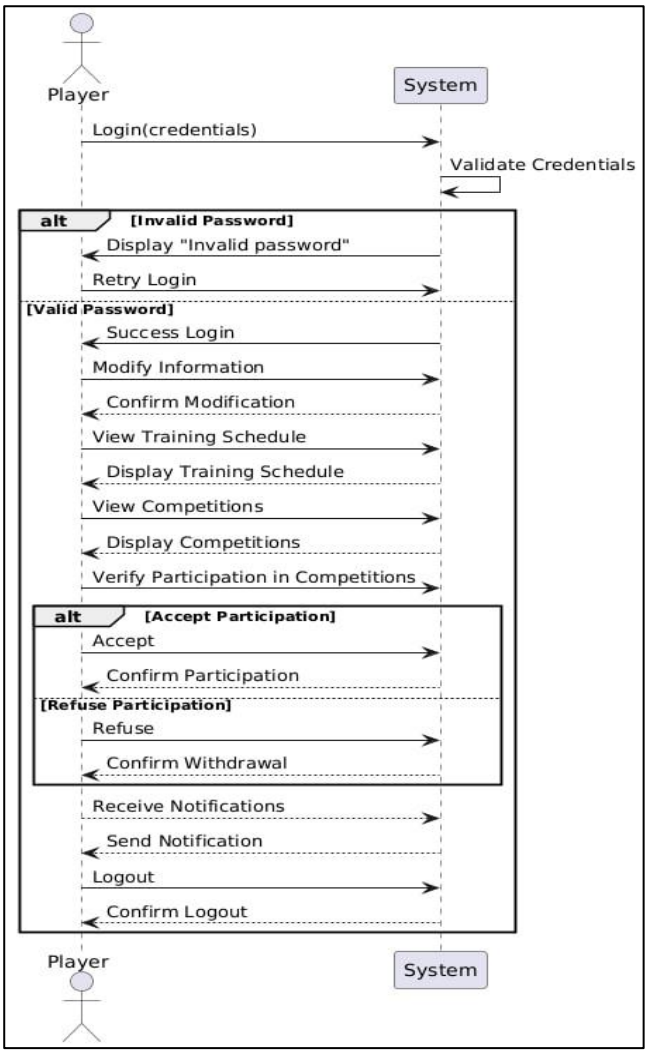


Figure 11: Sequence Diagram of Player actor operation.

Notification System

The system sends notifications to users about important updates: schedule changes, admin messages, convocations, etc.

Medical Record Management

Medical staff can create, update, or view players' medical records (injuries, treatments, rest periods). This ensures accurate health tracking of athletes.

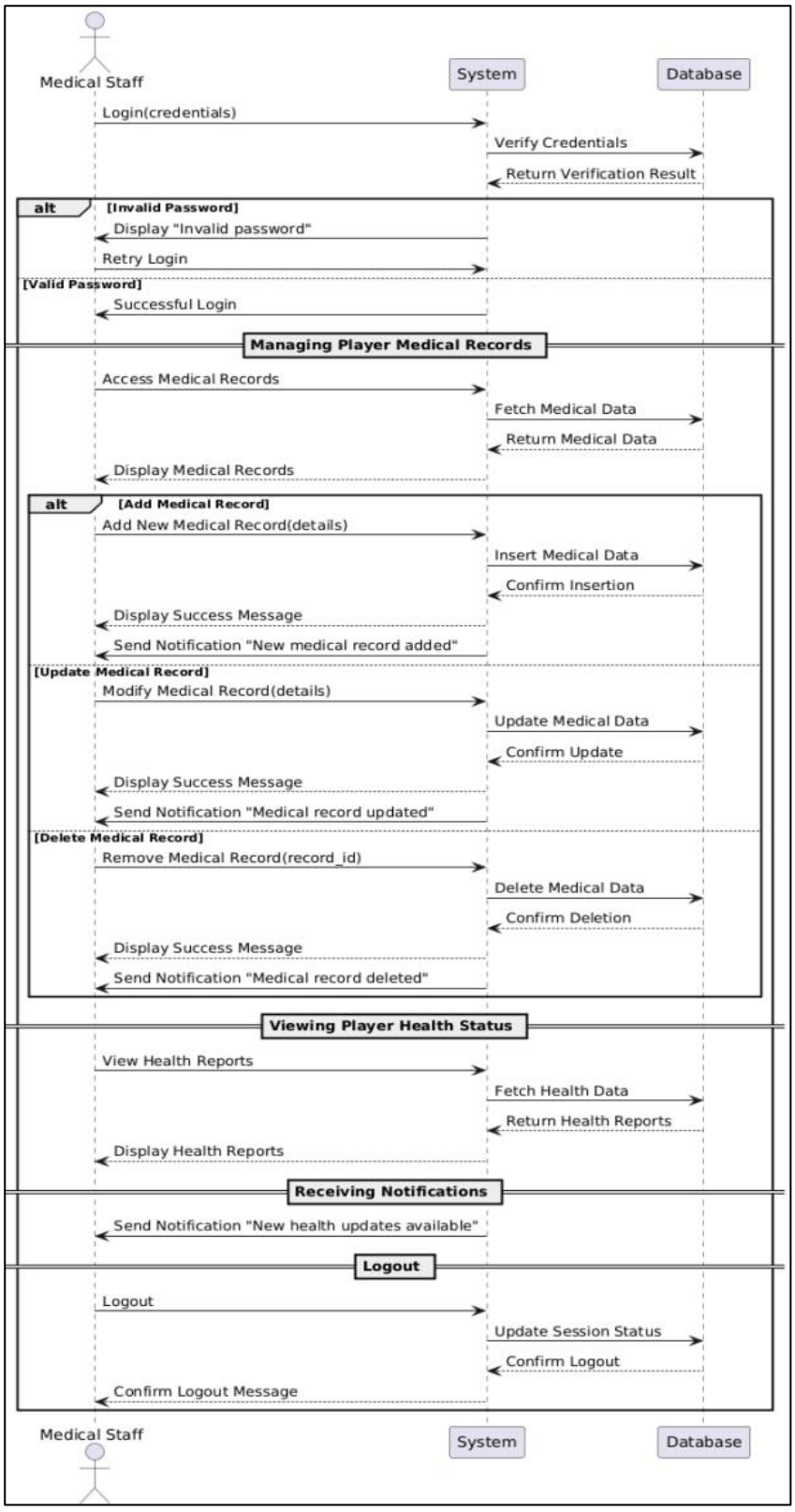


Figure 12: Sequence Diagram of Medical staff actor.

Performance Report Consultation

Coaches and technical staff can generate reports on players' performance based on data collected during training sessions. This helps tailor training programs effectively.

Training Session Management

Coaches can schedule sessions, define their content (exercises, duration, objectives), and modify them as needed for the team.

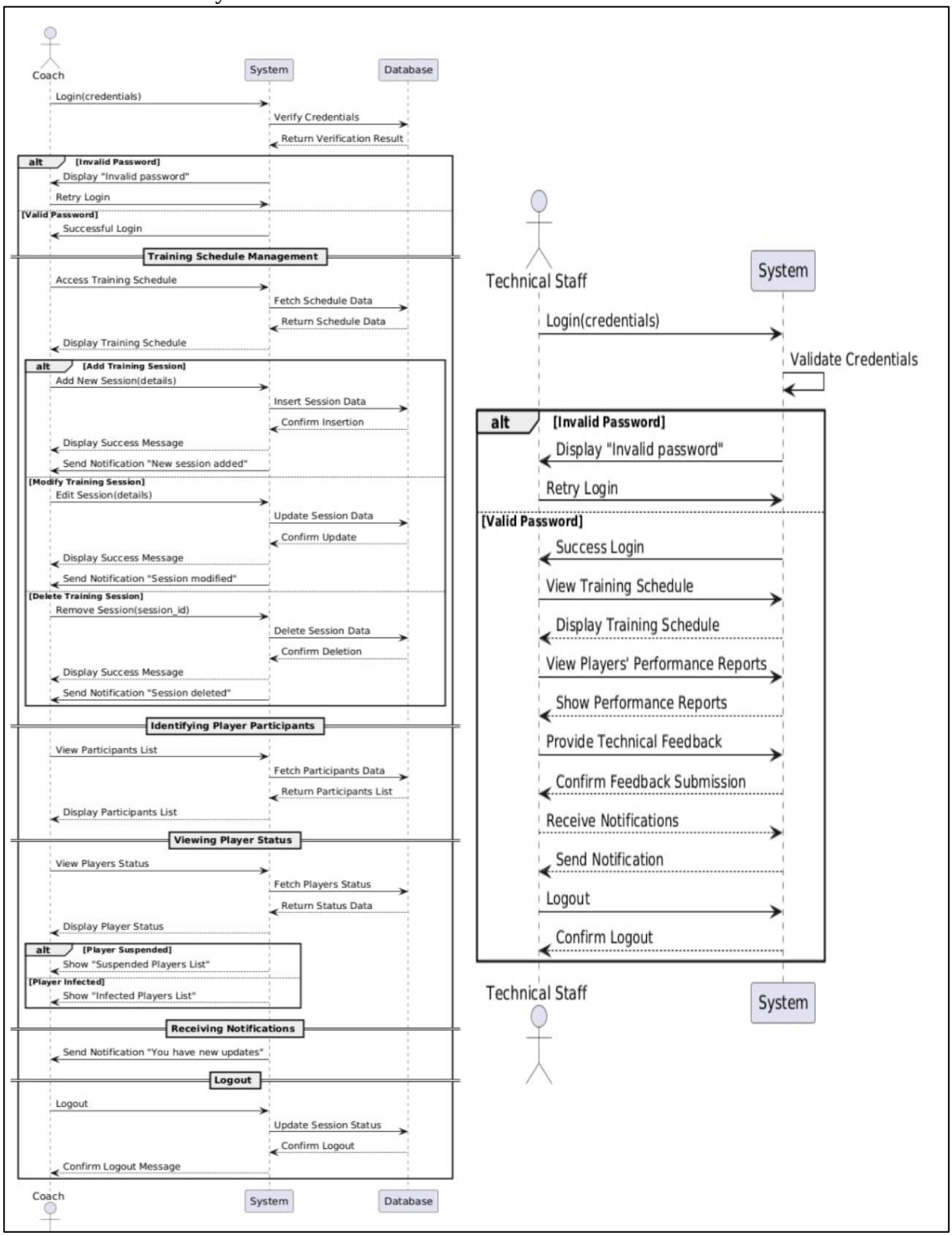


Figure 13: Sequence Diagram of coach and technical staff actors.

Announcement Posting
The administrator can post announcements visible to all system users. This improves official communication within the club.

User Management
This operation, reserved for the administrator, allows the creation, editing, searching, or deletion of user accounts based on their roles (player, coach, doctor, etc.).

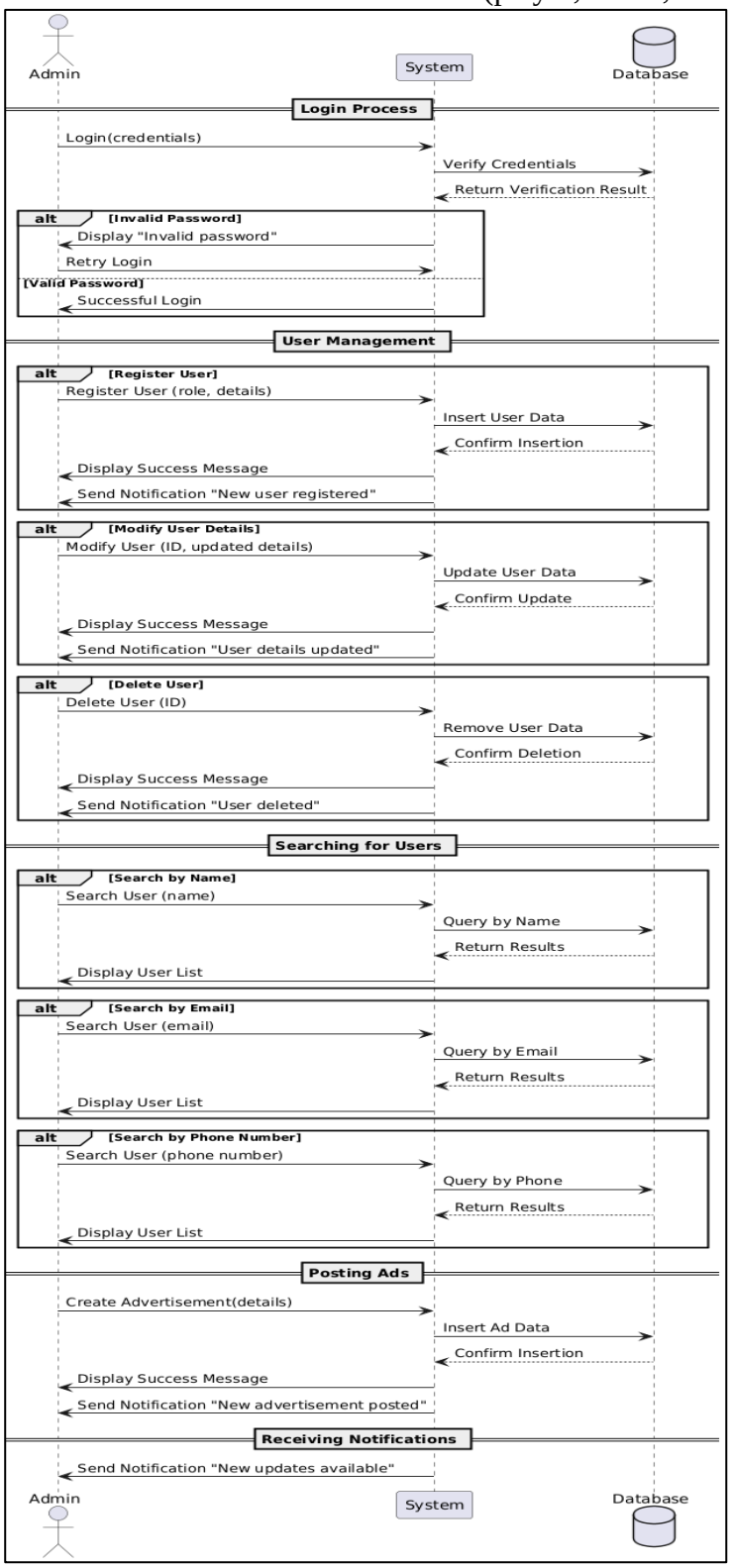


Figure 14: Sequence Diagram of Administrator (Admin) actors.

Finaly**, Logout**
Each user can securely end their session to protect personal data.

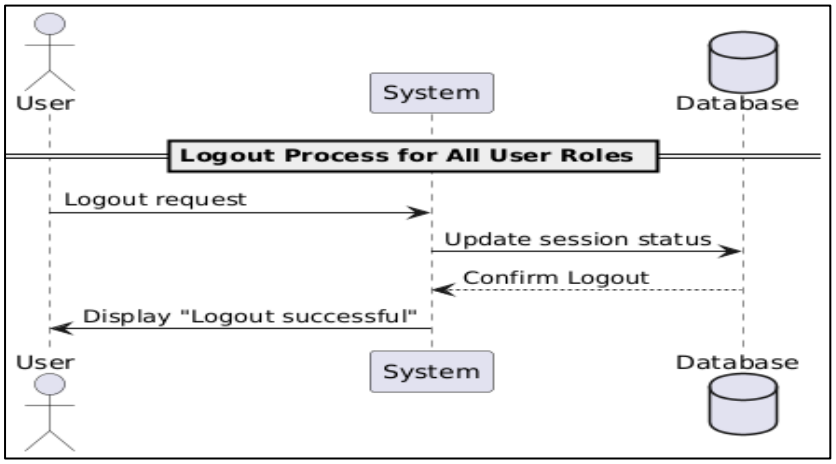


Figure 15: Sequence Diagram of Logout operation.

2.3Class Diagram

The most widely use UML diagram is the class diagram. It is the building block of all object-oriented software systems. We use class diagrams to depict the static structure of a system by showing system's classes, their methods and attributes. Class diagrams also help us identify relationship between different classes or objects [3].

We have designed a diagram that highlights the overall structure of the sports club information system. This diagram includes the following classes:

1. Sports Club (ClubSports)

At the heart of the system, the sports club holds essential details such as its ID, name, address, phone number, and date of establishment. It is composed of several branches, each representing a specific sport, and it is classified under various categories. The club is overseen by a general manager responsible for its administration.

2. Sports Branch (Branch)

Each branch corresponds to a particular sport (e.g., football, handball) and includes attributes such as name, description, number of players, and branch type. It encompasses players, coaches, technical staff, and medical staff, and also manages training sessions led by coaches.

3. Team

A team consists of a group of players who belong to a specific category and participate in competitions during a defined season. Each team has a unique name and identifier, is linked to a branch, and is managed by a coach.

4. Category

Categories are used to group teams based on common criteria such as age group or sport type. This classification facilitates better organization of matches and events.

5. Sports Season (Season)

The sports season defines a time frame during which competitions take place. It brings together several teams and competitions held throughout the year.

6. Competition

A competition is an event in which teams face off during a season. It includes information such as the date, location, and type of competition.

7. Player

Players are at the core of team composition. Each player is described by personal details including full name, date of birth, playing position, and status. Players are associated with both a team and a branch. Their performance is monitored through performance reports and, if needed, medical reports are issued.

8. Coach

The coach is responsible for managing a team and supervising a branch. With specific expertise and experience, the coach organizes training sessions and evaluates player performance.

9. Training Session

This component includes information such as the session's date, type, duration, and location. It is scheduled within a branch and conducted under the supervision of a coach.

10. Medical Staff (StaffMedical)

Medical staff members are assigned to branches to monitor player health. They generate medical reports that detail diagnoses, treatments, and consultation dates.

11. Technical Staff (StaffTech)

Technical staff assist branches by providing logistical and technical support. Each member has a clearly defined role and responsibilities.

12. User Profile (Profile)

Each user has a dedicated profile containing login credentials and a defined role (Admin, Player, Coach, Medical Staff, or Technical Staff). Profiles allow access to functionalities such as creating announcements and receiving notifications.

13. Announcement

Announcements serve to share information within the system. They include a title, content, date of creation, and are linked to the user who created them.

14. Notification

Notifications are messages sent to users to inform them about relevant updates or actions. Each one includes a title, message content, creation date, and read status.

15. Performance Report

This report is used to assess a player's performance based on measurable indicators. It includes evaluator comments and the evaluation date, aiding coaches in performance tracking.

16. Medical Report

Used for medical follow-ups, the report contains information such as diagnosis, prescribed treatment, and medical consultation dates for the player.

17. Football (Football)

As a specialized branch, football includes specific attributes such as the type of field used, whether a goalkeeper is required, and the duration of each half.

18. Handball (Handball)

This branch defines attributes particular to handball, such as hall type, whether it is an indoor sport, and total match duration.

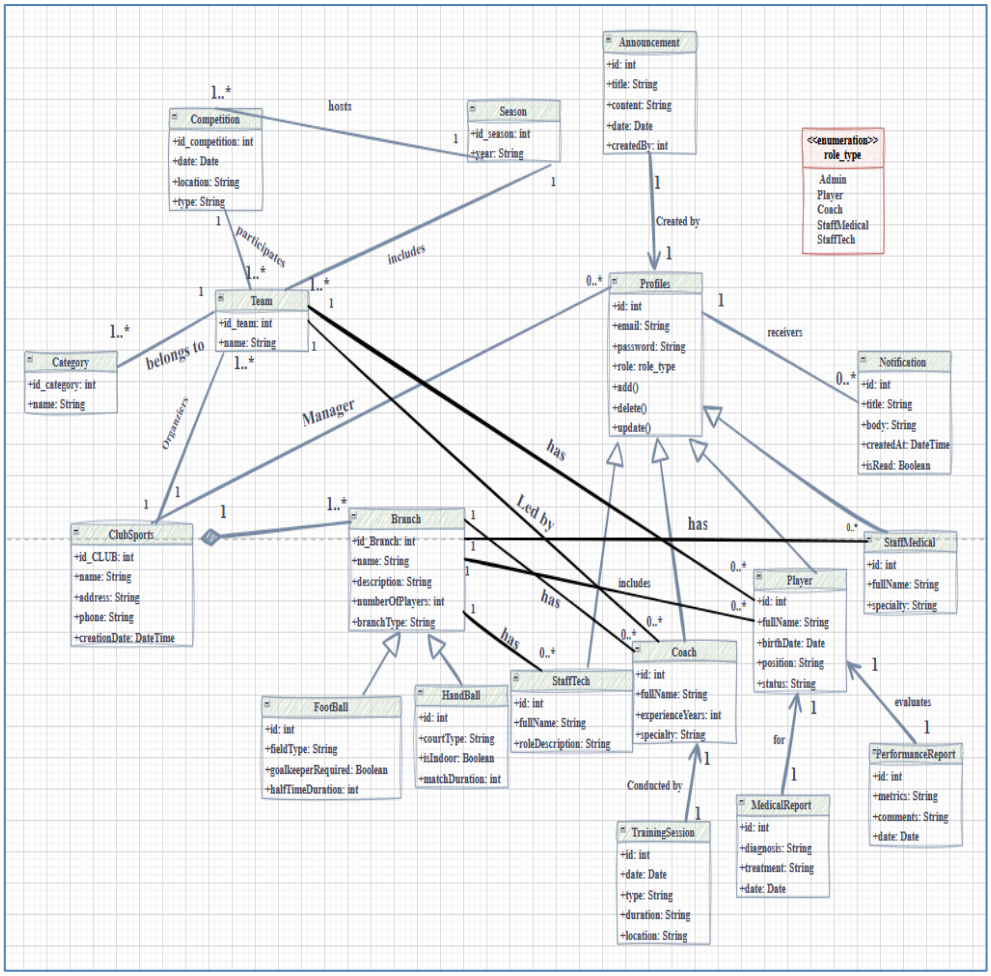


Figure 16: Class Diagram of SportClub App.

3 Conclusion

In this chapter, we addressed the design phase, which enabled us to define the approach for implementing and managing the sports club system. We used UML diagrams, such as "Use Case" and "Sequence" diagrams, to analyze the key operations within the system. Additionally, we developed a "Class Diagram" that provided a clear representation of the system's main components and their interactions.

In the following chapter, we will present the implemented application, which is based on this design and aims to meet the needs of the sports club system.

Chapter three: implementation

1. Introduction

In this chapter, we transition from the previous phase, where we addressed the general aspects of the project, to a new phase that involves the practical embodiment of the "Sports Club" application. This chapter aims to highlight the various requirements imposed by the practical reality of the university club, which we strive to meet through the design of this application. We also delve into the programming environment used to accomplish the project, in addition to the database prepared to store and process information related to users and sports activities. We will also provide an overview of the application's main interfaces, focusing on its distinctive features and opening up prospects for its future development in line with the club's evolving needs.

2. Work environment

2.1 Material means

The application was developed using an HP ENVY laptop 13 manufactured by HP, relying on a suitable development environment for Android systems such as phones and an Android emulator on the computer, which has the following specifications:

Processor: Intel® Core i7 -8550U CPU @ 1.80GHz.
Operating system: Windows 11 pro.
RAM: 8GB.
Hard disk: TOSHIBA 512GB SSD.
Screen resolution: 1920 x 1080 Full hd.

2.2 Software tools

Database SQL language and the supabase platform were used due to their distinction in being:

Figure 17: supabase Logo.

- Full PostgreSQL Support:

Supabase is built entirely on PostgreSQL, meaning you're using a robust and reliable database supported by all standard SQL features.

- Full Control via SQL Editor:

You can execute any SQL command directly through the SQL Editor in the control panel, providing flexibility and speed in database management.

- Realtime Updates:

Thanks to SQL integration with the Realtime Service, your application can receive updates as they occur in the database.

- Row-Level Security (RLS):

Using SQL, you can define fine-grained access policies to control who can read or modify each row of data.

- Easy Integration with Applications:

Supabase automatically generates an API based on your SQL Tables, making it easy for developers to use the data in their applications [4].

Program interface: The Dart language and Flutter framework were used for the following reasons:

- Designed Together for UI:

Dart was chosen by Google as the language for Flutter because it is optimized for UI development.

Flutter uses a declarative style of UI programming, and Dart supports this perfectly.

- Hot Reload Support :

Dart enables fast development cycles through hot reload, allowing developers to see UI changes instantly without restarting the app.

- High Performance (Native Compilation):

Dart compiles to native machine code (AOT – Ahead-of-Time), resulting in high-performance apps.

Flutter renders directly using Skai (a fast graphics engine), and Dart ensures low latency.

- Consistent Development Across Platforms:

Flutter + Dart allows writing a single codebase for Android, iOS, Web, and Desktop.

This unifies the development process and reduces time and cost.

- Easy to Learn for Developers:

Dart has a clear and modern syntax, especially familiar for developers with experience in Java, JavaScript, or C#.

- Rich Ecosystem and Tooling :

Dart provides built-in tools like package manager (pub), testing tools, and good integration with VS Code and Android Studio [5].

3. Developed The application

3.1 Data base: After defining the system's functional requirements and the data that should be included in the database, and after designing the table structure in the database, defining the relationships between them, and specifying the primary and foreign keys, we have completed the database according to the diagram shown below:

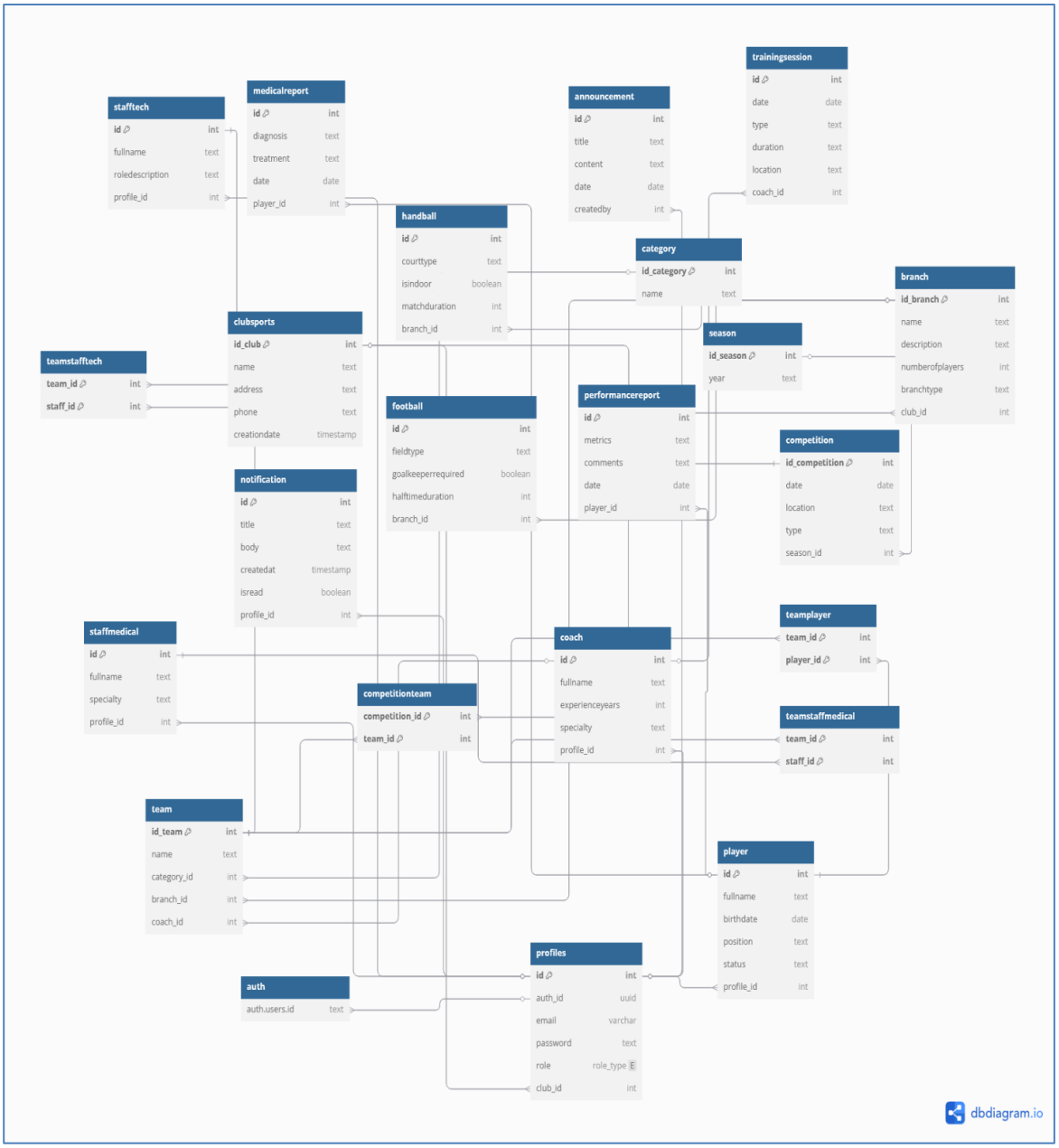


Figure18: schema of Database of club sport

The relational model implemented for our application is based on a well-structured organization of entities and their interconnections. The ClubSports entity represents a sports club, which can consist of multiple branches (*Branch*) and encompass several profiles (*Profiles*) of affiliated individuals, establishing two *one-to-many* relationships. Each profile may be associated with a single specific role within the club: either a coach (*Coach*), a player (*Player*), a technical staff

member (*StaffTech*), or a medical staff member (*StaffMedical*), thus forming *one-to-one* relationships.

Each branch can be dedicated to a unique sports discipline such as football or handball, through *one-to-one* relationships with the *Football* and *Handball* entities. Furthermore, a branch may contain multiple teams (*Team*), establishing a *one-to-many* relationship. Each team belongs to a specific category (*Category*) and is managed by a coach, both representing additional *one-to-many* relationships.

The team entity is central to the sports system: it is associated with multiple players, technical staff, and medical staff through associative tables (*TeamPlayer*, *TeamStaffTech*, *TeamStaffMedical*), reflecting *many-to-many* relationships. Additionally, each team conducts multiple training sessions (*TrainingSession*), in a *one-to-many* relationship.

Competitions are organized within sport seasons (*Season*), in a *one-to-many* relationship, and each competition may include multiple teams through a *many-to-many* relationship represented by the *CompetitionTeam* table. Each player is also subject to both medical and performance monitoring, represented by the *MedicalReport* and *PerformanceReport* entities, both linked to the player via *one-to-many* relationships. Finally, the system allows for sending notifications (*Notification*) to users, where each notification is linked to a single profile, but each profile may receive multiple notifications, forming a *one-to-many* relationship.

3.2Graphical User Interfaces (GUIs):

Splash screen:

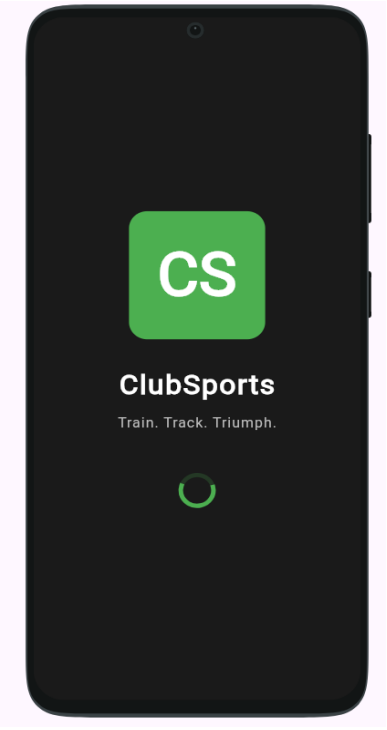


Figure 19: splash screen

Login screen:

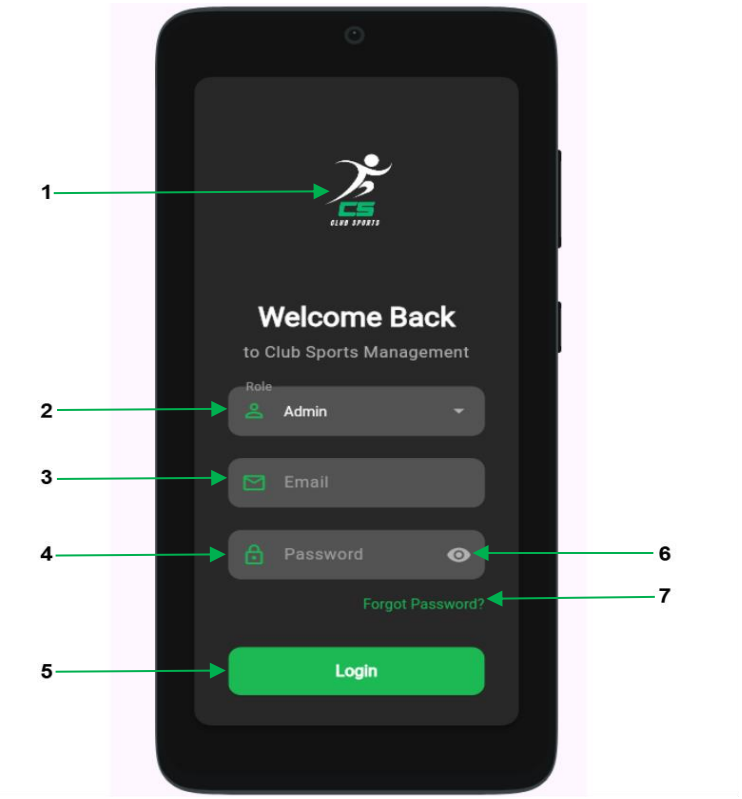
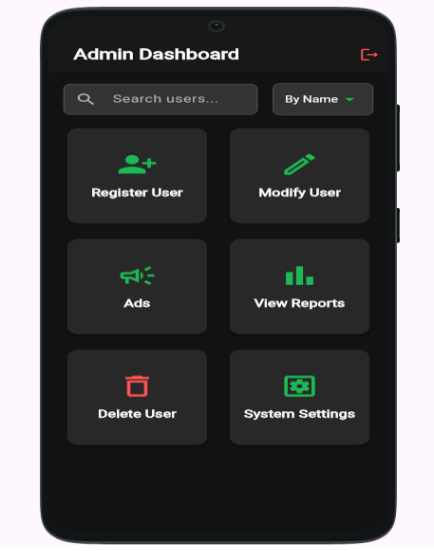


Figure 20: Login screen.

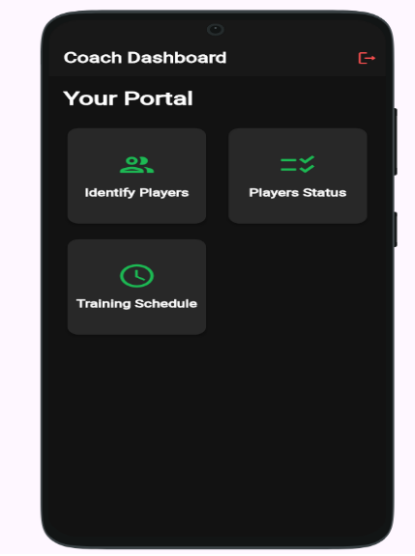
1: Sports club logo.
2: Account type Selection Menu.
3: Email Address Input Field.
4: A password Input field.
5: Login Button.
6: Show/Hide password Toggle.
7: Forget password Link.

After choosing a role, Email and Password and clicking on "Login", we are redirected to the dashboard of:

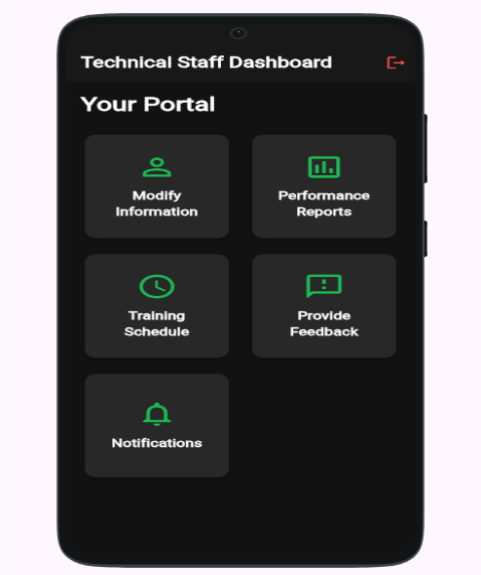
Admin:



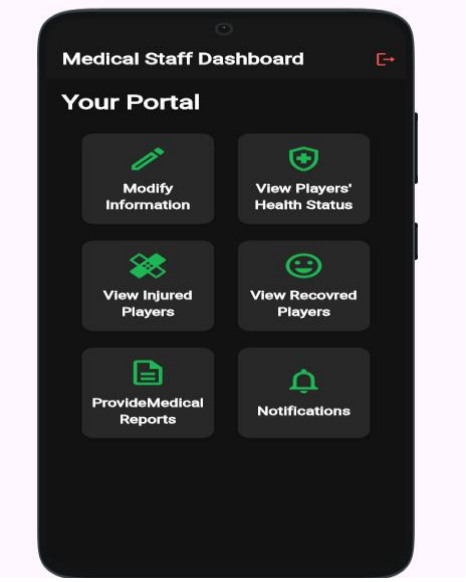
Coach:



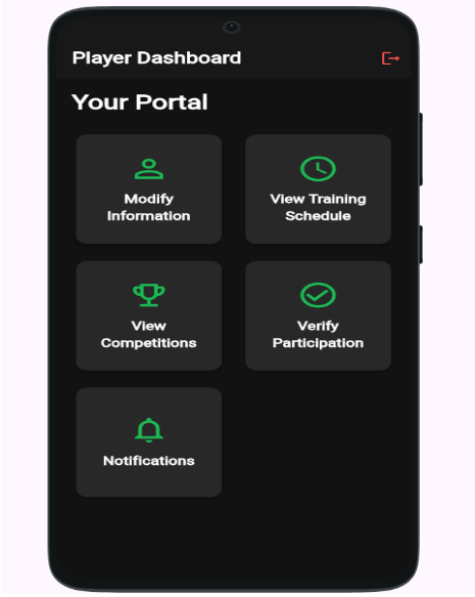
StaffTech:



StaffMedical:



Player:



Admin dashboard:

The interface is designed for system administrators. It provides a simple and intuitive way to manage users and access key functionalities through a dashboard. Available actions include user registration, modification, and deletion, as well as viewing reports, managing advertisements, and configuring system settings. The interface features a clear layout, representative icons, and a color scheme that enhances usability (green for positive actions, red for deletions). It aims to deliver a smooth and efficient user experience within an administrative context.

Player dashboard:

The Player Dashboard interface serves as a user portal for athletes. It enables players to manage and track their personal activities within the system. Core functionalities include modifying personal information, viewing training schedules, checking upcoming competitions, verifying participation, and receiving notifications. The interface is designed with a clean layout and intuitive icons to ensure ease of use. Its main objective is to provide a streamlined and accessible experience tailored to the needs of individual players.

StaffTech dashboard:

The Medical Staff Dashboard interface is designed to support healthcare professionals in monitoring and managing players' health. It provides functionalities such as updating medical information, viewing the health status of players, identifying injured and recovered players, and submitting medical reports. Notifications are also integrated to keep staff updated on critical health events. The interface uses clear icons and a structured layout to facilitate efficient medical follow-up and decision-making within a sports environment.

StaffMedical dashboard:

The interface titled Medical Staff Dashboard is designed for the medical staff of the sports club. It centralizes all functions related to monitoring players' health, thereby facilitating medical management within the team.

The screen features six functional buttons clearly organized, each accompanied by an intuitive icon:

- Modify Information: Allows the modification of a player's medical information.
- View Players' Health Status: Displays the overall health status of all players.
- View Injured Players: Shows only the players who are currently injured.
- View Recovered Players: Lists players who have recovered and are fit to resume activities.
- Provide Medical Reports: Enables the creation and submission of official medical reports.

- Notifications: Manages medical alerts and reminders (check-ups, treatments, etc.).

Coach dashboard:

The Coach Dashboard interface is designed for the team's coaches. It provides quick access to essential information regarding players and training schedules.

This screen consists of three functional buttons:

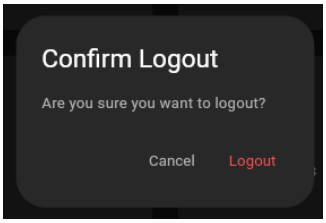
- Identify Players: Allows the coach to view and recognize registered players.
- Players Status: Displays the overall status or availability of players (active, injured, recovering).
- Training Schedule: Gives access to the team's training session calendar.

Logout operation: When the user clicks the "Logout" button, a dialog box appears with the message:
"Are you sure you want to logout?"

The dialog provides two options:

"Logout": Confirms the action and logs the user out of the application.

"Cancel": Closes the dialog and keeps the user logged in.



We obtain this result through the following code**:**

```
Future<void> signOut() async {
  try {
    await Supabase.instance.client.auth.signOut();
  } catch (error) {
    _logger.e('Sign-out error: $error', error: error);
    rethrow;
  }
}
```

Figure 21: Code source of Logout operation.

General Features of the Application:

The user interfaces of the mobile application—developed for players, coaches, technical staff, medical staff, and administrators—were evaluated based on the eight ergonomic criteria proposed by Bastien and Scapin. The evaluation highlights several strengths in the overall design. First, the interfaces demonstrate effective guidance, offering clear labels and intuitive icons that help users navigate easily. The workload is minimized through a limited number of actions per screen and the use of consistent layouts, reducing both memory load and cognitive effort. Regarding explicit control, actions are clearly defined; however, some improvements are needed in terms of user feedback and confirmation messages for sensitive operations. The adaptability of the system is evident, as each interface is specifically tailored to the user's role, ensuring that each individual has access to the most relevant functionalities. The application also maintains strong consistency, with a uniform dark theme and cohesive visual language across all modules. In terms of meaning of codes, the icons used are semantically appropriate, helping users quickly associate visuals with their intended functions. Additionally, the design ensures good compatibility with standard mobile UX conventions and user expectations, making it accessible even to non-technical users. However, the error management aspect remains underdeveloped, lacking visible input validation or recovery mechanisms. In conclusion, the interface design is largely aligned with human-computer interaction principles, and while some improvements are recommended—particularly regarding feedback and error handling—the system remains user-centered, efficient, and appropriate for a professional sports club environment**.**

Future works:

In light of the current circumstances and the time constraints encountered during the development phase, it was deemed necessary to postpone the implementation of certain optional interfaces, namely *Forgot Password*, *Advertisements*, and *View Reports*. This strategic decision was taken in order to prioritize the development of the core functionalities of the application and to ensure that the main objectives are met effectively. These optional features are planned to be integrated in a subsequent version of the application, as part of future improvements.

Conclusion

This project presents the development of a mobile application designed to meet the digital transformation needs of private sports clubs. It begins with a thorough analysis of the club's structure, followed by UML-based system design and a relational database implementation. Technologies such as Flutter and Dart were chosen for their cross-platform performance, while Supabase ensures secure, real-time backend services. The application addresses major challenges in traditional sports management, including manual procedures, communication delays, and fragmented workflows. By integrating role-based access, real-time notifications, and unified data handling, it significantly improves operational efficiency and collaboration among club members—administrators, coaches, medical and technical staff, and players. Furthermore, the intuitive user interface offers a smooth experience tailored to each role. Future improvements may include features like data analytics dashboards, performance prediction tools, and integration with biometric devices. These additions will elevate the app's capabilities, contributing to more informed decision-making and enhanced athlete management.

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Abstract:
This end-of-cycle project centers on the design and development of a cross-platform mobile application for the digital management of private sports clubs. It aims to resolve the inefficiencies of traditional systems—such as manual processes, fragmented communication, and lack of centralized data—by offering a modern, integrated digital solution. A detailed preliminary study helped define functional requirements, followed by UML-based system modeling and the creation of a relational database schema. Flutter and Dart were selected for front-end development due to their performance and cross-platform capabilities, while Supabase was integrated to provide secure, real-time backend services. The application includes role-based access control, real-time notifications, and intuitive interfaces tailored for different user roles: administrators, coaches, medical staff, and athletes. Beyond streamlining daily operations, this solution lays the foundation for future enhancements such as advanced analytics, biometric integration, and predictive performance tools, contributing to digital innovation in the sports sector.
Keywords: Mobile application, Sports club, Flutter.

Résumé :
Ce projet de fin d'études consiste en la création d'une application mobile multiplateforme pour la gestion numérique des clubs sportifs privés. Il répond aux limites des systèmes traditionnels en proposant une solution moderne, centralisée et interactive. Une étude préliminaire a permis de définir les besoins fonctionnels, suivie d'une modélisation UML et de la conception d'une base de données relationnelle. Le développement a été réalisé avec Flutter et Dart pour leur efficacité multiplateforme, et Supabase a été intégré pour un backend sécurisé en temps réel. L'application propose un accès basé sur les rôles, des notifications instantanées et des interfaces adaptées aux différents utilisateurs : administrateurs, coachs, personnel médical et athlètes. Elle améliore la gestion quotidienne et prépare le terrain pour des extensions futures comme l'analyse de données, l'intégration biométrique et les outils prédictifs de performance.

Mots-clés
Application mobile, Club sportif, Flutter.

الملخص
يركز هذا المشروع النهائي على تصميم وتطوير تطبيق جوّال متعدد المنصات مخصّص للإدارة الرقمية للأندية الرياضية الخاصة. يهدف إلى معالجة أوجه القصور في الأنظمة التقليدية مثل الإجراءات اليدوية، وتشتّت وسائل الاتصال، وانعدام مركزية البيانات، من خلال تقديم حل رقمي حديث ومتكامل. تم إجراء دراسة تمهيدية شاملة لتحديد المتطلبات الوظيفية، تلتها نمذجة للنظام باستخدامUML ، وإنشاء مخطط قاعدة بيانات علائقية. تم اختيار Flutter و Dartلتطوير الواجهة الأمامية نظرًا لأدائهما العالي ودعمهما للتشغيل عبر مختلف المنصات، في حين تم دمج Supabase لتوفير خدمات خلفية آمنة وآنية. يشمل التطبيق نظام وصول مبني على الأدوار، إشعارات فورية، وواجهات مبسطة تتناسب مع مختلف المستخدمين: الإداريين، المدربين، الطاقم الطبي، والرياضيين. لا يقتصر هذا الحل على تحسين سير العمل اليومي، بل يضع أيضًا الأساس لتطويرات مستقبلية مثل التحليلات المتقدمة، الدمج الحيوي، وأدوات التنبؤ بالأداء، مما يعزز التحول الرقمي في المجال الرياضي.
الكلمات المفتاحية
تطبيق جوال، نادٍ رياضي، Flutter.