Mobile Fitness Software Application

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Group 4

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CS3332: Software Engineering I

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August 14th, 2023

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List of Abbreviations

iOS	iPhone Operating System
GPS	Global Positioning System
API	Application Programming Interface
HTML	The HyperText Markup Language
CSS	Cascading Style Sheets
GDPR	General Data Protection Regulation
HIPAA	The Health Insurance Portability and Accountability Act
HIIT	High-Intensity Interval Training
MTTF	Mean Time To Failure

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Introduction

As society embraces the digital era and people actively pursue healthier lifestyles, the significance of fitness apps has skyrocketed. This report embarks on an exciting journey, delving into the conception and evolution of an innovative fitness app meticulously crafted to empower users in accomplishing their fitness aspirations with utmost success and ease.

1. Why did we choose this topic

The decision to select this captivating topic stems from a profound realization of the surging demand for fitness apps and their remarkable ability to foster a vibrant and well-balanced lifestyle. With the rapid advancement of technology and the widespread adoption of smartphones, fitness apps have attained unprecedented popularity among people of all ages, offering personalized workout plans, seamless progress tracking, and an array of health-focused features. By comprehending the driving forces behind this surge in popularity and skillfully crafting a fitness app that caters precisely to these needs, we aim to make a significant impact in empowering individuals to embrace and maintain a thriving and wholesome way of life

2. Purpose & Meaning of this topic

The focal purpose of this comprehensive report is to delineate the intricacies of developing our groundbreaking fitness app and to explore the profound impact it can have on individuals embarking on their fitness journeys. Through a meticulous examination of the app's cutting-edge features and seamless functionality, we strive to offer valuable insights into how it can revolutionize users' efforts in attaining their fitness aspirations. By delving into the app's transformative capabilities, which span beyond mere progress tracking and health monitoring, we shed light on its potential to serve as an unwavering source of motivation and inspiration. With its ability to curate personalized workout plans, dispense tailored nutritional advice, and foster a supportive community, this app is poised to empower users in crafting sustainable fitness goals and realizing them with unwavering success.

3. Subjects of this topic

The realm of this captivating topic encompasses a wide range of facets pertaining to the design of a phenomenal fitness app. In this all-encompassing report, we embark on a journey to delve into crucial subjects such as user interface design (UI), seamless functionality, meticulous data tracking, goal setting mechanisms, unparalleled personalization, and fostering a thriving community. By thoroughly scrutinizing these subjects, our ultimate goal is to craft an app that not only boasts innate user-friendliness but also radiates with captivating visual appeal. We aspire to create an app that seamlessly caters to the diverse needs and preferences of our esteemed target audience, ensuring a truly transformative and customized fitness experience beyond compare.

4. Scale of this topic

The expanse of this profound topic reaches well beyond the boundaries of mere individual fitness journeys. By ingeniously crafting a fitness app that embodies accessibility and inclusivity, we hold the potential to contribute to a larger movement aimed at fostering a healthier society. This transformative app has the power to create a ripple effect, cascading its impact not only on individuals but also extending its reach to communities, workplaces, and even healthcare systems. By harnessing the capabilities of technology to facilitate healthy habits, we aspire to inspire individuals to embrace more active lifestyles, mitigate the risk of chronic diseases, and ultimately elevate overall well-being for all. As we delve into the subsequent sections of this enlightening report, we delve into the intricate layers of the app's development process, unearthing the meticulous strategies and conscientious considerations that have been poured into its creation. Our ultimate goal is to provide you with a comprehensive understanding of the app's enduring potential, positioning it as a coveted tool that empowers and sustains a vibrant and wholesome lifestyle in the digital era we call home.

Main Content

1. Definition of a mobile application & a fitness application

1.1. Definition

A mobile app, short for a mobile application, is a software program designed to run on conveniently small, wireless devices such as smartphones, tablets or mobile-specialized

operating systems such as IOS, Android. Despite being small and limited, it offers specific functionalities and features that cater to the needs and preferences of mobile device users.

These are three common types of mobile app developments:

- **Native Apps**: These apps are developed specifically for a particular mobile platform, such as iOS (for iPhones and iPads) or Android. They are built using platform-specific programming languages (Swift or Objective-C for iOS, Java or Kotlin for Android) and have access to the device's features and capabilities.
- **Web Apps**: Web apps are accessed through a web browser on a mobile device. They are developed using web technologies such as HTML, CSS, and JavaScript. Web apps can be responsive and adapt to different screen sizes, but they may have limited access to device features compared to native apps.
- **Hybrid Apps:** Hybrid apps combine elements of both native and web apps. They are built using web technologies but are wrapped in a native container that allows them to be installed and run on a mobile device. Hybrid apps can access certain device features through plugins or APIs.

A mobile fitness app, on the other hand, is a specialized mobile application that focuses on providing fitness-related services and features that can be developed as a native mobile app or as a hybrid app, depending on the specific requirements and target platform. It typically includes features like workout routines, exercise tracking, nutrition guidance, progress monitoring, and sometimes social or community aspects. In addition, a mobile fitness app is specifically designed to help users achieve their fitness goals, improve their overall health, and maintain an active lifestyle, all within the convenience of their mobile device.

1.2. The Essential Properties and Structure of a fitness app

Home Screen: The home screen serves as the main hub of the app, providing an overview of the user's fitness journey and access to various features. It may display personalized recommendations, recent activities, or a summary of workout progress.

Navigation Menu: A navigation menu, usually accessible through a hamburger icon or similar, allows users to access different sections of the app. Common options include workouts, tracking, nutrition, community, settings, and profile.

Workouts Section: This section provides access to various workout programs or routines. Users can explore different categories, such as strength training, cardio, or yoga, and select specific workouts to follow. Each workout typically includes details like duration, difficulty level, and equipment needed.

Tracking and Monitoring: This section enables users to track and monitor their fitness progress. It may include features like activity tracking, where users can record their workouts, track steps, distance, or calories burned. Users can view their workout history, set goals, and analyze their performance.

Nutrition and Diet: If the app includes nutrition and diet features, this section allows users to track their food intake, log meals, and access nutritional information. It may offer meal planning options, recipe suggestions, or calorie counting tools.

Community and Social Features: In this section, users can connect with other app users, join fitness challenges, share achievements, or participate in forums or groups. It fosters a sense of community and provides motivation and support.

Settings: The settings section allows users to customize their app experience. They can adjust preferences, set reminders, manage notifications, and update their profile information.

Profile: The profile section displays user information, such as name, profile picture, and fitness goals. It may also include badges or achievements earned based on their progress and participation in challenges.

2. Analyze and Design

2.1. General Requirements

With the recent increase in mobile applications with the desire to design practical, accessible and convenient pieces of equipment to improve one’s life, the medical service is focused on and prioritized by people and multiple industries, notably technology and healthcare.

And so, that comes with the creation of fitness applications, which can provide a platform that offers a wide range of exercise routines, personalized workout plans, and progress-tracking features. As envisioned, a fitness app allows users to exercise anytime, anywhere, and at their own pace equipped with valuable resources such as nutrition guidance, fitness challenges, and community support, fostering motivation and accountability.

Combined with the latest mobile devices implemented with sensor and tracking modules, consumers now can monitor their health without using other health-tracking devices.

Creating and marketing a fitness app is a lucrative opportunity due to the growing fitness industry, widespread mobile technology use, and potential for revenue generation through various channels such as in-app purchases, subscriptions, and partnerships. It allows for scalability, reaching a global audience and providing a convenient platform for users to support their fitness goals.

Understanding its widespread uses and needs, our group has chosen and brainstormed the possible structure and system of a fitness application in corporate with a social media system to encourage consumers into partaking in healthy lifestyles.

2.2. Goals

Our goal for this project is to develop a fitness app that is able to provide users with a comprehensive and user-friendly platform to support them in their pursuit of a healthier and more active lifestyle.

As said, empowering individuals is one of the primary objectives of this app, by offering features and tools that help them track their exercise, monitor their progress, and stay motivated. By offering exercise tracking and progress monitoring features, the system is expected to assist users in achieving their fitness targets as a result.

Utilizing the available data recorded and collected from the embedded system, the app can visualize the users' progress over time and from there, suggest possible recommendations to users. Hence, it should help users stay accountable and motivated on their fitness journey. Additionally, the app offers goal-setting and nutrition-tracking features, where users can set specific fitness targets and monitor their daily food intake, allowing them to make informed choices and maintain a balanced diet.

2.3. Functional Requirements

2.3.1. Tracking

Goal Setting and Tracking: Fitness tracking apps often allow users to set specific goals, such as daily step targets, calorie intake, or weight loss objectives. The app tracks the user's progress towards these goals and provides feedback and reminders to help them stay on track.

Data Presentation: The processed data is then presented to the user in a user-friendly interface, usually through the app itself. This can include visual representations, graphs, charts, and statistics that give users insights into their activity levels, progress, and performance over time.

Data Processing: The collected data is processed by the app using algorithms and mathematical calculations. This involves analyzing the sensor data to determine different metrics, such as steps taken, calories burned, distance covered, active minutes, heart rate zones, and more.

Data Collection: Fitness tracking apps rely on various sensors present in smartphones or wearable devices, such as accelerometers, gyroscopes, GPS, heart rate monitors, and sometimes even external devices like chest straps or smartwatches. These sensors track movements, distance, steps, heart rate, sleep patterns, and other relevant data.

2.3.2. Planning

Workout Selection: The app offers a variety of workout routines or programs for users to choose from. These can include strength training, cardio exercises, yoga, HIIT (High-Intensity Interval Training), and more. Some apps may provide pre-designed workouts, while others allow users to create custom routines.

Exercise Demonstrations: Fitness apps often include exercise libraries or video tutorials that demonstrate proper form and technique for each exercise. This ensures users perform the exercises correctly and minimizes the risk of injury.

Workout Tracking: During a workout, the app may track and record the user's progress, including sets, reps, weights, and time. This helps users keep track of their performance and progression over time.

Progress Monitoring: Fitness apps often provide tools to track progress and measure results. This can include features like tracking weight and body measurements, recording workout history, and displaying statistics and graphs to visualize progress.

2.3.3. Nutrition

Nutritional Tracking and Logging: Allow users to log their daily food intake, including meals, snacks, and beverages. Users can search for foods in a database, scan barcodes, or manually enter nutritional information. The app calculates and displays the total caloric intake, macronutrient breakdown (carbohydrates, proteins, fats), and other relevant nutritional information. This feature helps users monitor their dietary habits and make informed choices.

Meal Planning and Recipes: Provide users with personalized meal plans and recipes based on their fitness goals, dietary preferences, and restrictions. Users can select from a variety of meal options, view cooking instructions, and even generate a shopping list. The app can suggest balanced meals that align with specific calorie, macronutrient, or nutrient targets, making it easier for users to stick to their nutritional plans.

Nutrition Education and Guidance: Offer educational content about nutrition, dietary principles, portion control, and the importance of various nutrients. Users can access articles, videos, infographics, and interactive quizzes to enhance their understanding of healthy eating. Additionally, the app can provide personalized guidance by suggesting improvements to users' dietary choices based on their goals and current eating patterns.

Nutrient Analysis and Recommendations: Implement a feature that analyzes users' dietary habits and provides insights into their nutrient intake. The app can identify potential deficiencies or excesses in vitamins, minerals, and other essential nutrients. It then offers recommendations for adjusting the diet to meet specific nutritional needs. This feature encourages users to make more balanced food choices and ensures they are getting the required nutrients for optimal health and fitness.

2.3.4. Social Network

Connecting with Others: Fitness apps often provide features that allow users to connect with other app users who share similar fitness goals and interests. This can include creating user profiles, following other users, and establishing virtual social networks within the app.

Sharing Progress: Users can share their workout achievements, milestones, and progress updates with their app community. This can be done through activity feeds, status updates, or dedicated sections where users can post photos, workout summaries, or personal records. Sharing progress not only allows users to celebrate their accomplishments but also encourages accountability and inspires others.

Participating in Challenges: Fitness apps frequently host challenges and competitions that users can join. These challenges may focus on various fitness aspects, such as step count, distance covered, workout duration, or specific exercises. Users can compete with others, track their progress on leaderboards, and earn badges or rewards for meeting certain targets. Challenges foster a sense of friendly competition, provide additional motivation, and foster a sense of community.

Community Support: Fitness apps often have dedicated forums, discussion boards, or chat groups where users can interact and seek support from others. These platforms allow users to ask questions, share experiences, offer advice, and receive encouragement from a community of like-minded individuals. Users can provide support, share tips, and learn from each other's journeys.

Virtual Training Groups: Some fitness apps offer virtual training groups or classes where users can participate in live or recorded workout sessions led by fitness professionals or trainers. These group sessions simulate the experience of attending a fitness class or training session and provide an interactive and motivating environment for users.

2.3.5. About The App

Reminders and Notifications: Apps may offer reminders and notifications to help users stay consistent with their workout routines. These can include reminders for upcoming workouts, motivational messages, or alerts to encourage users to reach their goals.

Integration with Wearable Devices: Some fitness apps can integrate with wearable devices like smartwatches or fitness trackers. This allows for more accurate tracking of activities, heart rate monitoring, and seamless synchronization of data between the app and the device.

Goal Setting: Users typically start by setting their fitness goals within the app. This could include objectives like weight loss, muscle gain, improved cardiovascular endurance, or overall fitness improvement.

Personalization: Many fitness apps allow users to personalize their experience based on factors such as age, gender, current fitness level, and available equipment. This helps the app tailor workout plans to the individual's specific needs and capabilities.

2.4. Non-functional Requirements

2.4.1. Organization Requirements

Environmental requirements:

- **Environmental Impact**: The organization must have environmental policies and requirements that need to be considered during the development of the fitness app.
    - This includes:
        - minimizing energy consumption
        - utilizing sustainable resources
        - and adhering to eco-friendly practices

- **Device Compatibility**:
    - The app need to be:
        - compatible with a range of devices
        - taking into account variations in:
        - screen sizes
        - resolutions
        - and hardware capabilities

This ensures that the app functions well across different devices and provides a consistent user experience.

Operational requirements:

- **Maintenance and Support**: The organization must have requirements for ongoing maintenance and support of the fitness app
    - This includes:
        - bug fixes

        - software updates
        - and providing customer support services to address user inquiries and issues.

- **Performance Monitoring**:
    - The organization requires monitoring and logging of app performance data
        - such as server response times
        - database performance
        - and user engagement metrics

This helps in identifying performance bottlenecks, improving scalability, and meeting service level agreements.

Development Requirements:

- **Coding Standards and Practices**:
    - The organization should have specific coding standards and practices that developers need to follow.
    - This includes guidelines for:
        - code readability
        - modularity
        - code documentation
        - and adherence to best practices

- **Source Code Management**:
    - The organization requires:
        - the use of a specific version control system, such as Git
        - set rules regarding branching strategies
        - code review processes
        - and code deployment procedures
    - This ensures proper code management and collaboration within the development team.

- **Testing and Quality Assurance**:
    - The organization requires adherence to a testing and quality assurance framework.

    - This includes:
        - unit testing
        - integration testing
        - performance testing
        - and other types of testing to ensure the app's stability, functionality, and reliability.

- **Development Tools and Technologies**:
    - The organization may dictate the use of:
        - specific development tools
        - frameworks
        - libraries
        - or programming languages
    - This ensures consistency in:
        - development practices
        - simplifies collaboration
        - and promotes knowledge sharing among developers.

2.4.2. Product Requirements

Specify that the delivered product must behave in a particular way e.g. execution speed, reliability, etc…

Usability requirements: The system should be easy to use by all types of users such as athletes, health enthusiasts, gym fanatics, and any people who want to keep fit.

- There should be 4 tabs for 4 main features of the app for easier access, this requires intuitive navigation and design inside the app.
- Inside each sub-menu, there should be related data showing up in suitable orders
- After 4-5 page swipes of introduction and tutorial (that should take no longer than 5-7 minutes to comprehend), all users should be able to discover where to find the features that they wanted to perform inside the app.

Efficiency requirements:

- **Performance requirements**: The app should take into consideration the number of processed transactions/second, user/event response time, screen refresh time to ensure

faster performance compared to existing systems. This should improve loading times, slower the delays between interactions within the system.

- **Space requirements**: With the combination of all the features of a health, tracking and social app, this app should require at least 400MB of base storage when an user attempts to download the app. The system should also be able to handle a growing scale of user data as the app provides social features and the number of users should be expected to increase.

Dependability requirements:

- **Mean time to failure (MTTF)**: The app should be available as long as possible, until features of the app such as tracking, planning and socializing are outdated and have to be replaced with new forms of gathering and presenting data.
- **Availability**: The system should be available all the time and perform real-time updates to fix bugs, improve features to keep the app up-to-date with the latest technology.

Security requirements:

- Data privacy and transmission should be available and connected across different platforms – based on where and what the user is using to access the system. This also requires good consistency (no difference) when transferring and syncing data across platforms.
- The system should provide a secure authentication mechanism to reassure whether the user is legitimate when they are signing in the app with different devices and servers.
- Data collection should be different depending on the type of device/platform that the user used to track their health's performance, this might affect the user's sense of security. The system should then provide a comprehensive privacy policy to address this problem and reassure user's about the consistency of the data.

2.4.3. External Requirements

Freedom of customization: Allows users to customize their experience or allow them to adjust accordingly to their physique. Users should be able to set personal goals, create personalized workout plans, schedules, and track specific metrics that are relevant to their fitness objectives.

- For the socializing side, the app should give users the freedom to personalize their personal news walls, news, avatar, profiles, groups, and clubs that they want to follow.

Accessibility: It should be accessible to users with disabilities, provide features and options that accommodate different abilities, and ensure equal access to fitness resources and information.

- It should adhere to accessibility guidelines, such as providing alternative text for images, supporting screen readers, and offering adjustable font sizes.
- In addition, it is recommended (if possible) to give professional suggestions about possible workout plans to disabled users

Privacy and Data Security: Prioritize user privacy and ensure the security of their personal data.

- Ensure data protection measures are in place to prevent unauthorized access, use, or disclosure of user information as well as strong encryption methods to protect sensitive user data, such as login credentials and health data.
- Compliance with relevant data protection regulations, such as GDPR or HIPAA, should be ensured if applicable.

Informed Consent & User Consent Revocation: Should have users' consent before collecting or using their personal data. In advance, users should be provided with clear, detailed, transparent statements (for example terms of service) about what data will be collected, how it will be used, and any external parties involved.

- Along with users' acknowledgment of their data usage, it should give users the ability to revoke their consent for data collection and usage at any time. And so, an option to delete their data from the app's servers must be available if users choose to discontinue using the app.

User Empowerment & Avoidance of Harmful Practices: Empower users to make informed decisions about their fitness goals and activities. Moreover, encourage users to participate in activities, and suggest groups or clubs where assistance from fellow users can be effectively provided.

- However, it should be aware of human limitations or avoid providing misleading, exaggerated information as it should not promote or encourage harmful practices, such as extreme dieting, excessive exercise, or unsafe supplements.
- Hence, it should prioritize user health and well-being, promoting balanced and sustainable fitness practices for every type of user.

Transparent Pricing and Advertising:

- If the fitness app includes paid features or displays advertisements, it should be transparent about pricing and clearly distinguish between paid and free content.
- Users should be able to easily understand the costs associated with the app and any additional charges for premium features or subscriptions.

2.5. Analyze and Design

2.5.1. Use Case Diagrams

a) Actors of the System

Index	Actor name	Description
1	User	A user who hasn't sign in yet can sign in. Logged in user can access their own profile, health data, diet and exercises list, etc…
2	Admin	An admin can manage the system, from managing users's profiles to managing built-in lists (diet/exercises), system's configuration, social media, etc…

Table 1. Description Table for Actors of the System

b) Use Case Diagram of User Overview

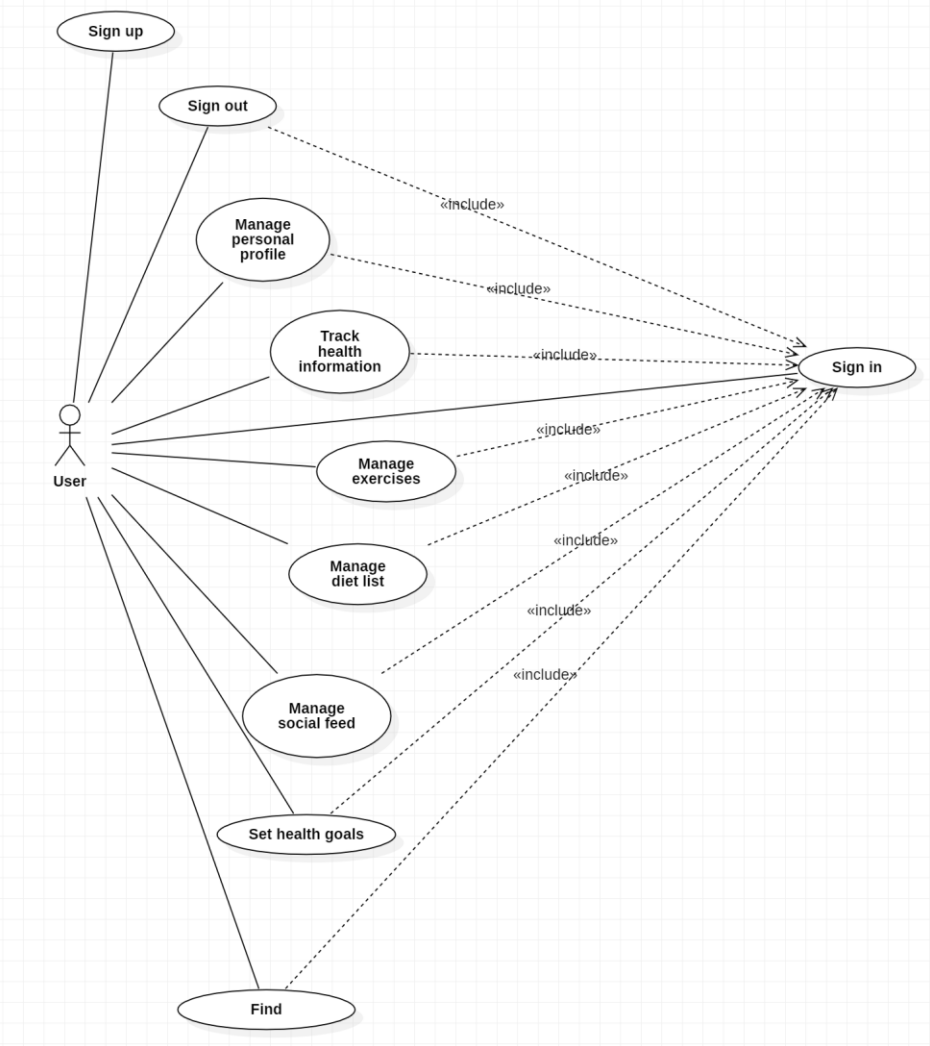

Figure 1. Use Case Diagram of User Overview

Use Case	Description
Actor	The User
Purpose	Describe all possible interactions between a user with the system

Table 2. Description Table of the Use Case Diagram for User Overview

c) Use Case Diagram of Overview of the Admin

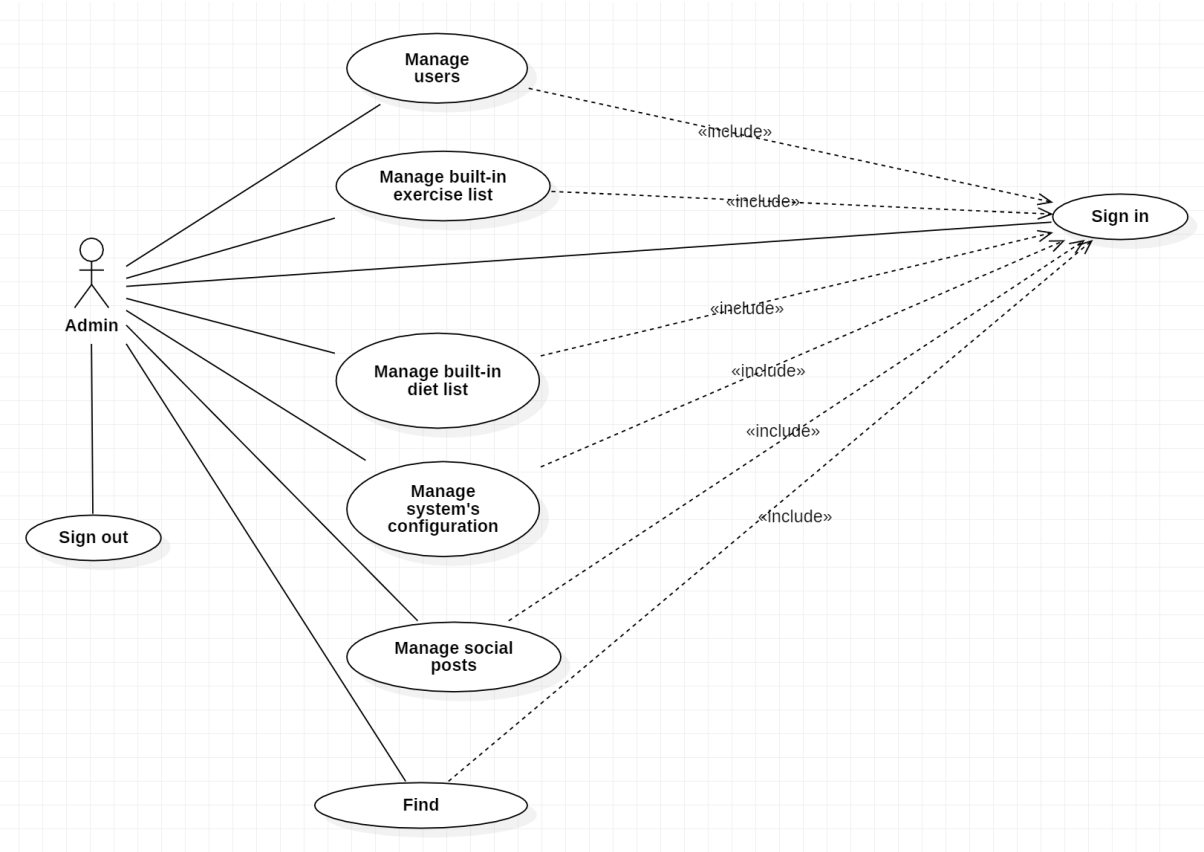

Figure 2. Use Case Diagram of Admin Overview

Use Case	**Description**
Actor	The Admin
Purpose	Describe all possible interactions between an admin with the system

Table 3. Description Table of the Use Case Diagram for Admin Overview

d) Use Case Diagram for Admin Find/Search

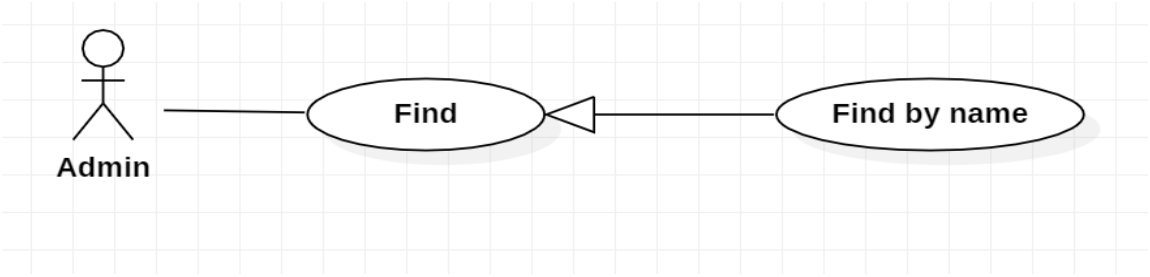

Figure 3. Use Case Diagram for Admin Find/Search

Properties	**Description**
Name	Admin Find/Search
Actor	The Admin
Description	An admin has the ability to search for any items in the system (from searching for user's name to built-in diet/ exercises lists)
Preconditions	The admin has to login as administration into the system first

Table 4. Description Table of the Use Case Diagram for Admin Find/Search

e) Use Case Diagram for Admin's User Management

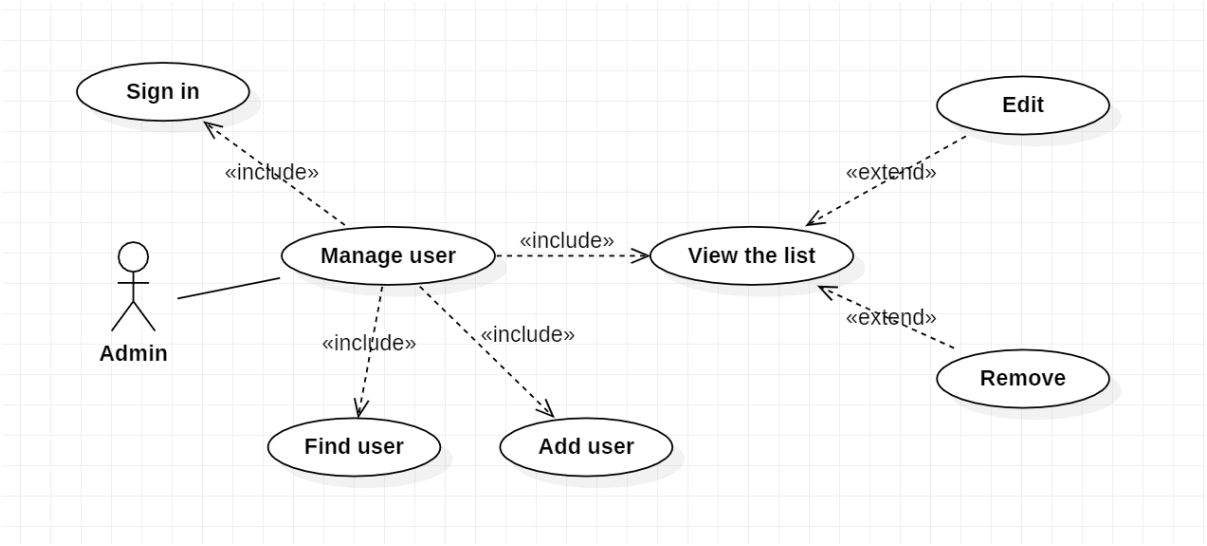

Figure 4. Use Case Diagram for Admin's User Management

Properties	Description
Name	Admin's User Management
Actor	The Admin
Description	An admin can add a new user into the database or delete, edit, view a selected user
Preconditions	The admin has to login as administration into the system first

Table 5. Description Table of the Use Case Diagram for Admin's User Management

f) Use Case Diagram for Admin's Built-in Exercises List Management

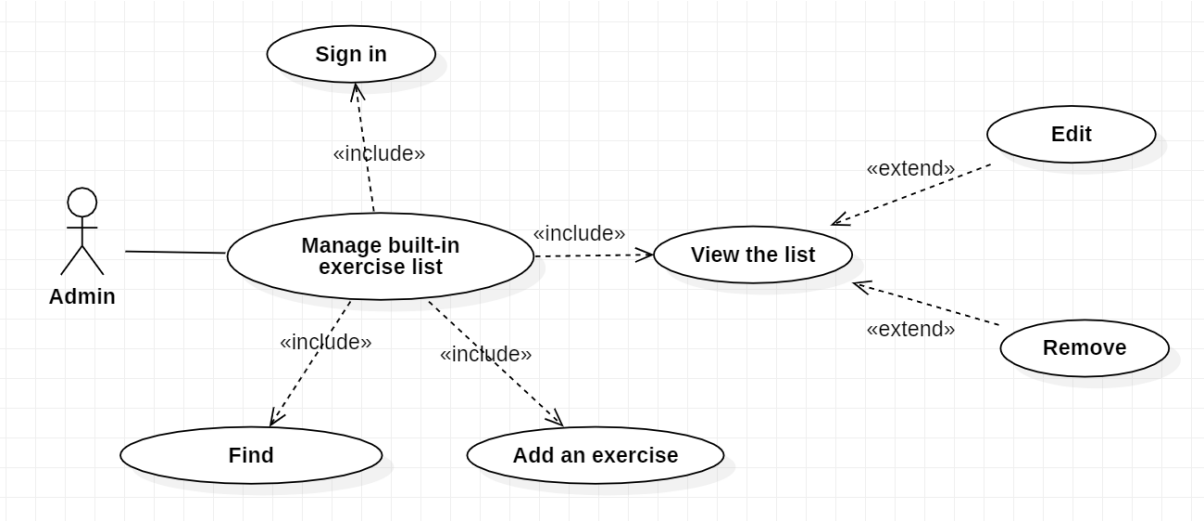

Figure 5. Use Case Diagram for Admin's Built-In Exercises List Management

Properties	Description
Name	Admin's Built-in In Exercises List Management
Actor	The Admin
Description	An admin can add a new exercise list into the database or delete, edit, view the selected list
Preconditions	The admin has to login as administration into the system first

Table 6. Description Table for the Use Case Diagram for Admin's Built-in Exercises List Management

g) Use Case Diagram for Admin's System's Configuration Management

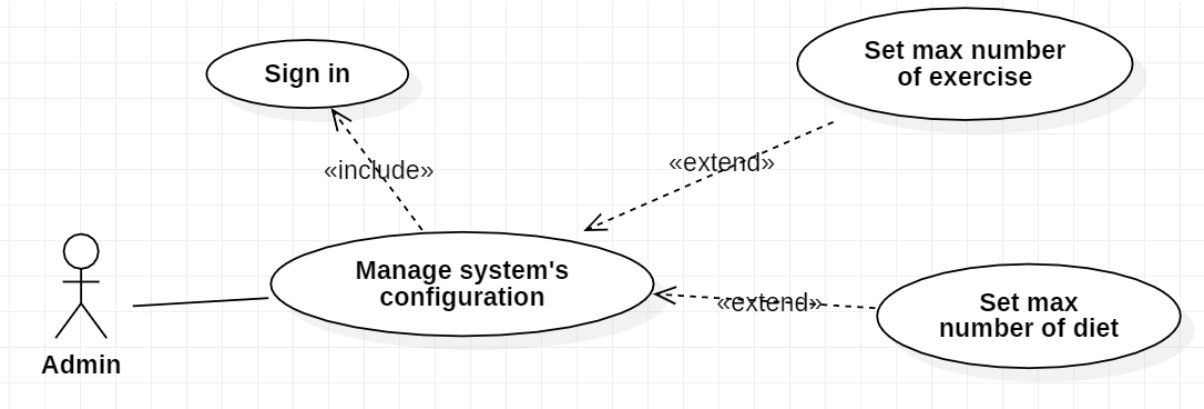

Figure 6. Use Case Diagram for Admin's System's Configuration Management

Properties	**Description**
Name	Admin's System's Configuration Management
Actor	The Admin
Description	An admin manages the system's configuration (For example: change the maximum number for a diet/ exercise list)
Preconditions	The admin has to login as administration into the system first

Table 7. Description Table for the Use Case Diagram for Admin's System's Configuration Management

h) Use Case Diagram for Admin's Social Posts Management

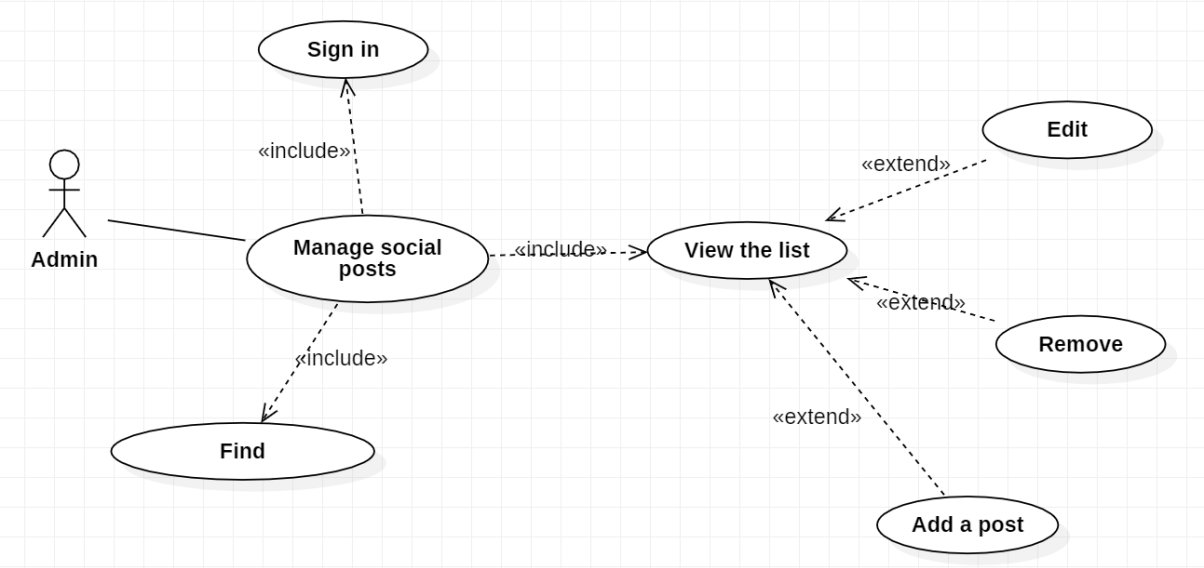

Figure 7. Use Case Diagram for Admin's Social Posts Management

Properties	**Description**
Name	Admin's Social Posts Management
Actor	The Admin
Description	An admin manages the social media (For example: can find and view the list of posts; Can add, edit or remove a social media post)
Preconditions	The admin has to login as administration into the system first

Table 8. Description Table for the Use Case Diagram for Admin's Social Posts Management

i) Use Case Diagram for User's Profile Management

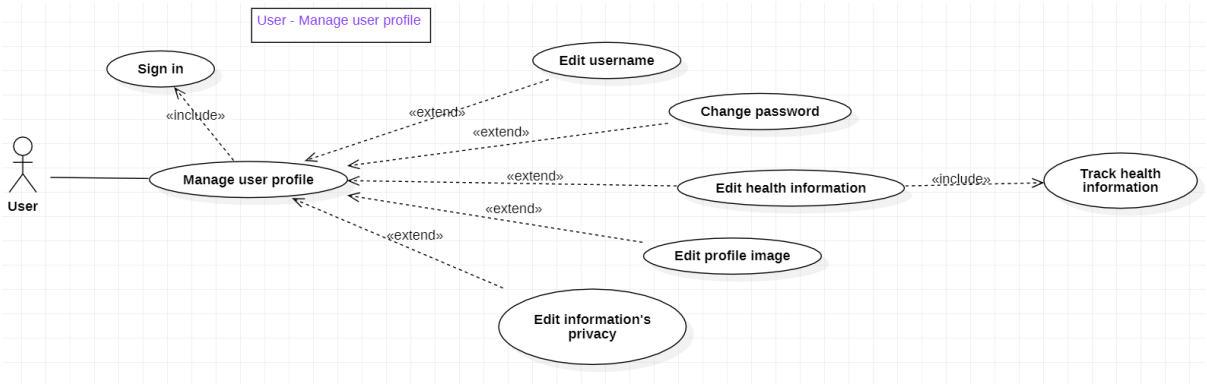

Figure 8. Use Case Diagram for User's Profile Management

Properties	**Description**
Name	User's Profile Management
Actor	The User
Description	A user can manage their own personal profile such as edit username, change password, edit health profile, profile image or privacy
Preconditions	The user has to login into the system first

Table 9. Description Table for the Use Case Diagram for User's Profile Management

j) Use Case Diagram for User's Diet List Management

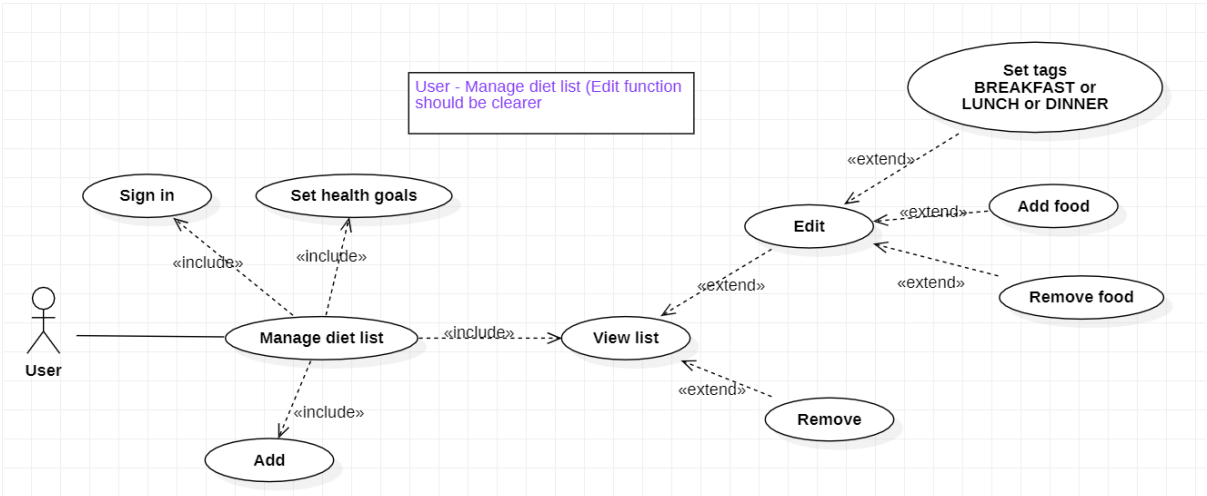

Figure 9. Use Case Diagram for User's Diet List Management

Properties	Description
Name	User's Diet List Management
Actor	The User
Description	A user can view and manage (add or remove) their own diet list such as edit tags, add or remove food from the list
Preconditions	The user has to login into the system first

Table 10. Description Table for the Use Case Diagram for User's Diet List Management

k) Use Case Diagram for User's Exercises List Management

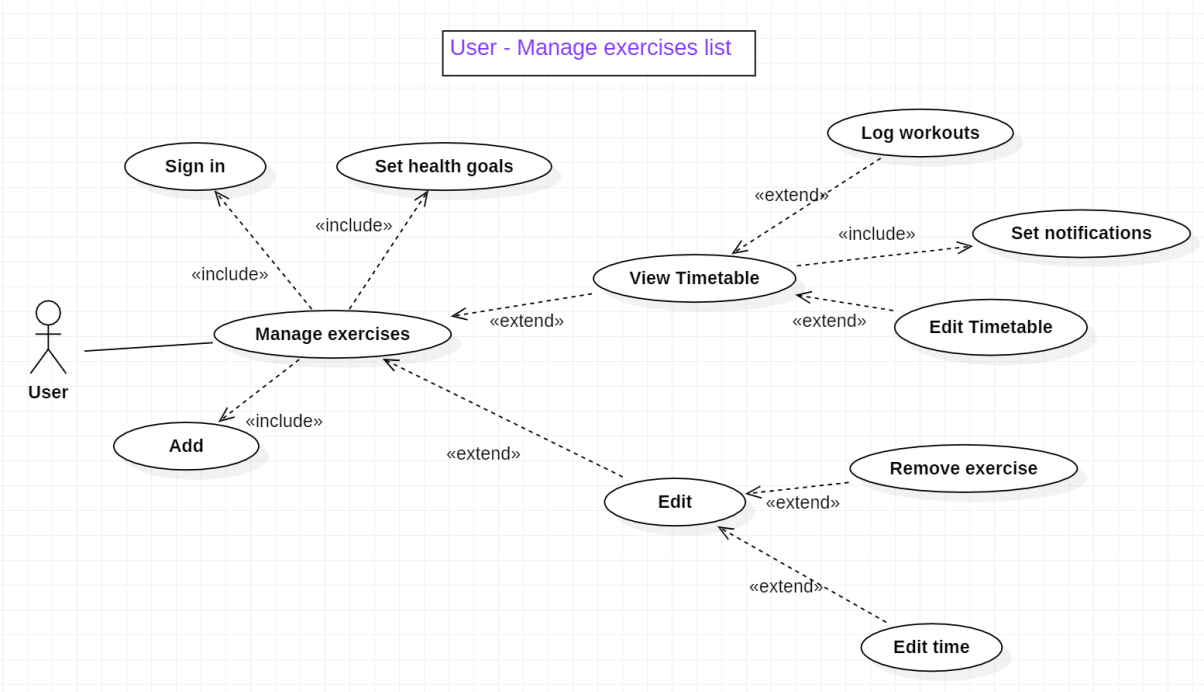

Figure 10. Use Case Diagram for User's Exercises List Management

Properties	Description
Name	User's Exercises List Management
Actor	The User
Description	A user can set health goals, view and manage (add or remove) their

	own exercises list such as edit time, workouts, add or remove exercises from the list
Preconditions	The user has to login into the system first

Table 11. Description Table for the Use Case Diagram for User's Exercises List Management

l) Use Case Diagram for User Sets Health Goals

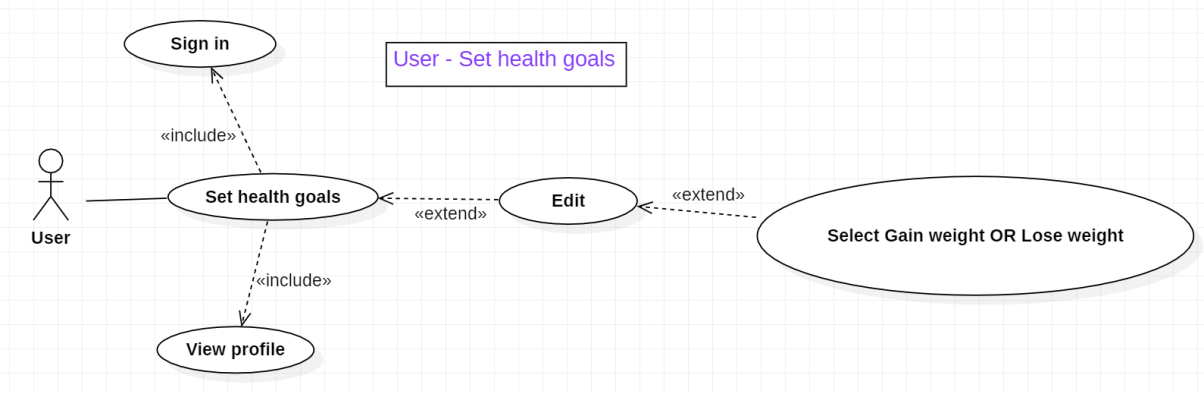

Figure 11. Use Case Diagram for User Sets Health Goals

Properties	**Description**
Name	User Sets Health Goals
Actor	The User
Description	A user can view and manage (add or remove) health goals such as make a choice between gaining or losing weights exercises/diet
Preconditions	The user has to login into the system first

Table 12. Description Table for the Use Case Diagram for User Sets Health Goals

2.5.2. Sequence Diagrams

a) Sequence Diagram of User Signing up

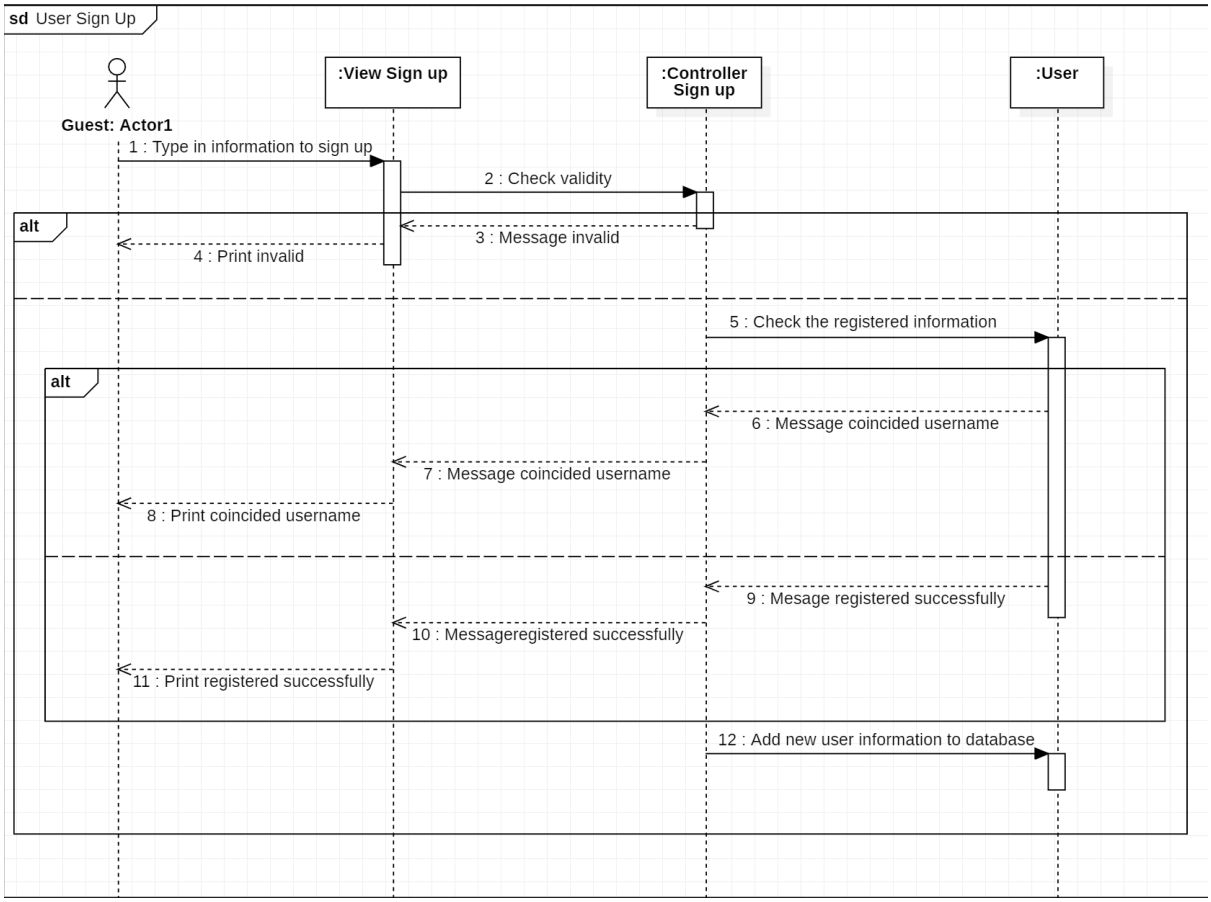

Figure 12. Sequence Diagram of User Signing up

b) Sequence Diagram of User Signing in

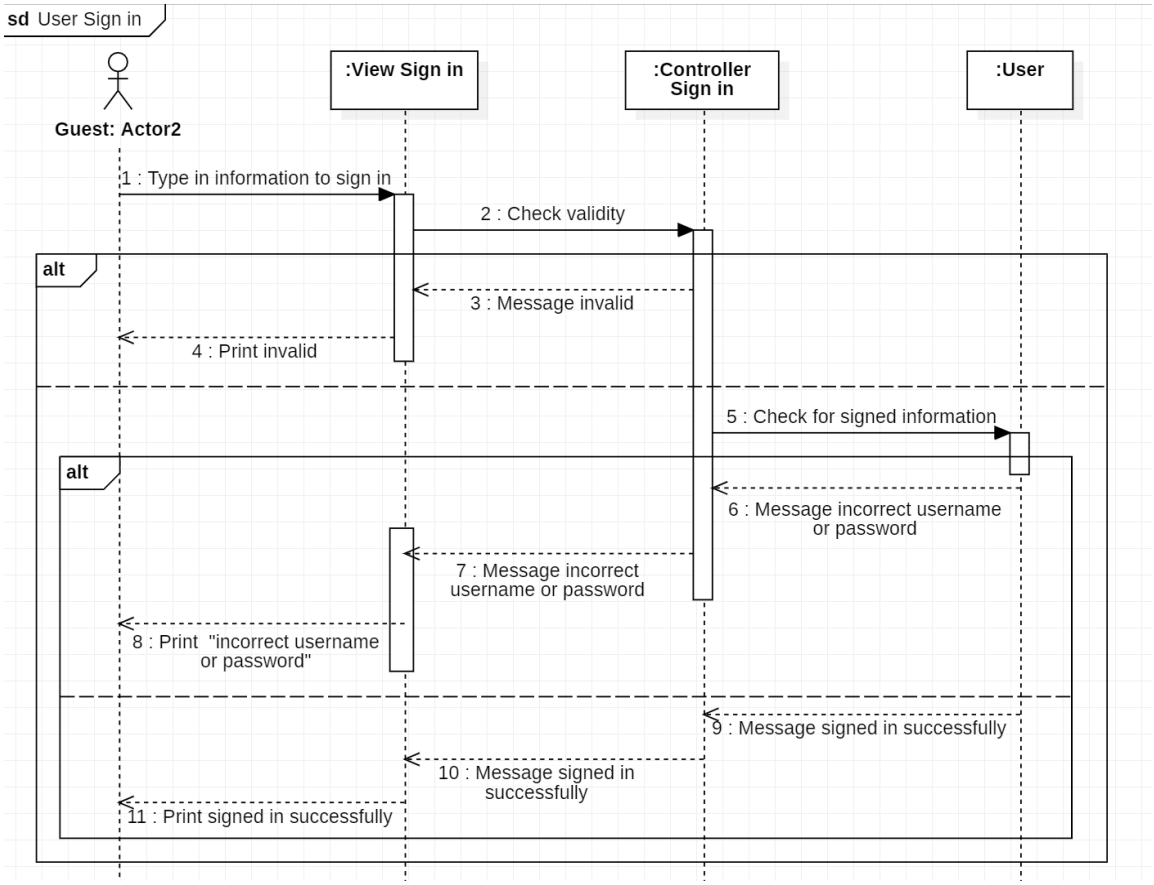

Figure 13. Sequence Diagram of User Signing in

c) Sequence Diagram of User Edit Personal Profile

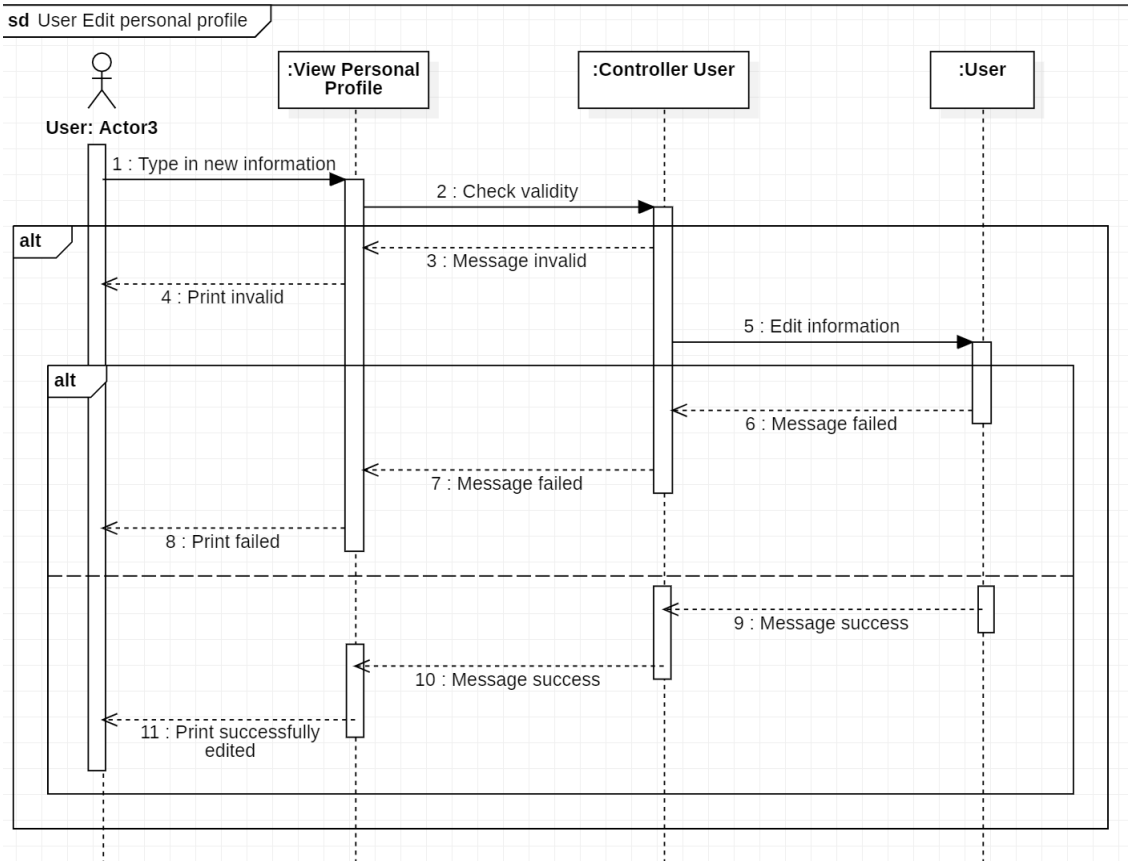

Figure 14. Sequence Diagram of User Edit Personal Profile

d) Sequence Diagram of User Find

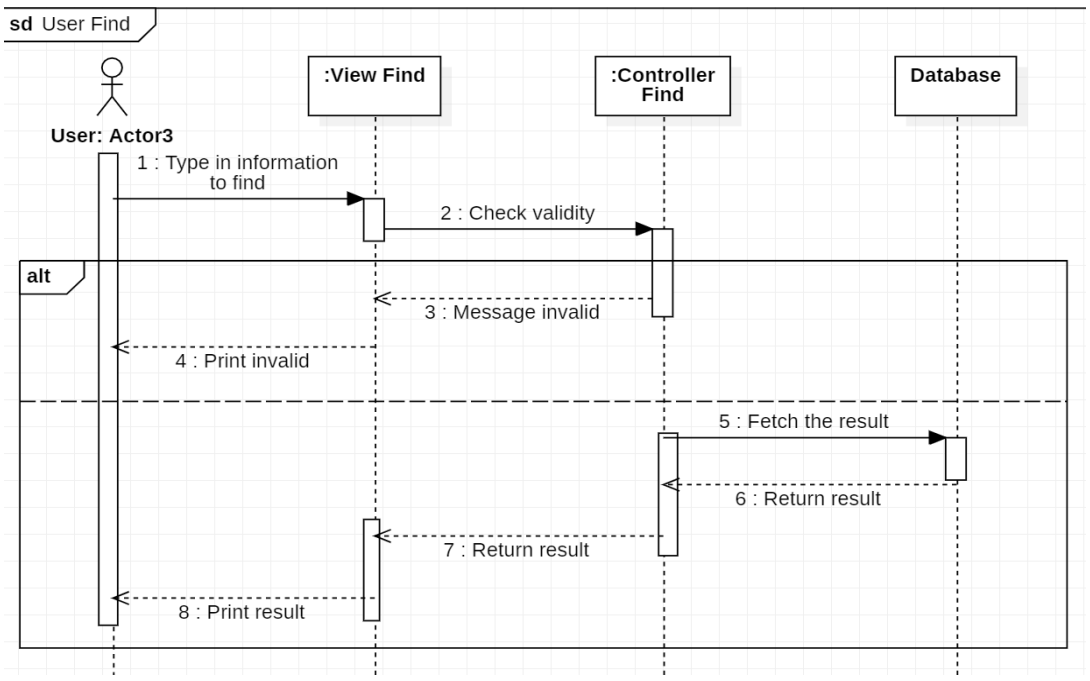

Figure 15. Sequence Diagram of User Find

e) Sequence Diagram of User Health Tracking

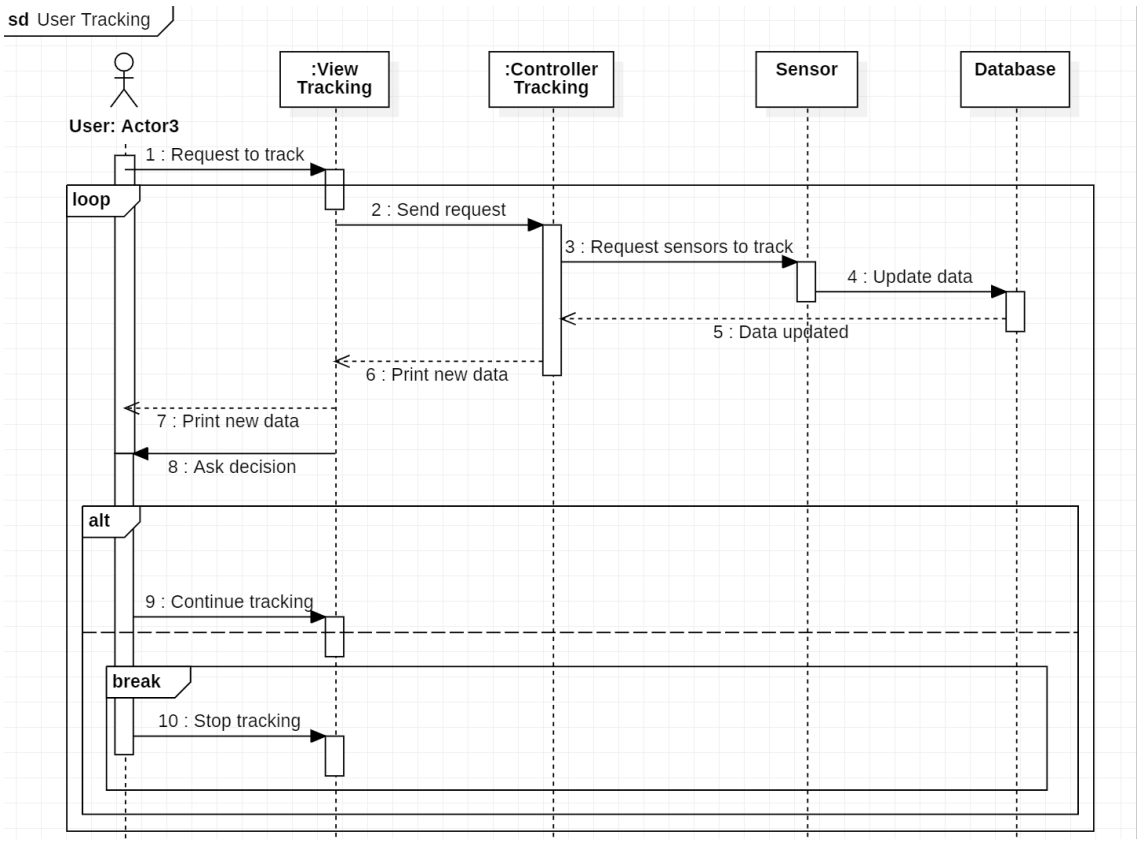

Figure 16. Sequence Diagram of User Health Tracking

f) Sequence Diagram of User Setting Goals

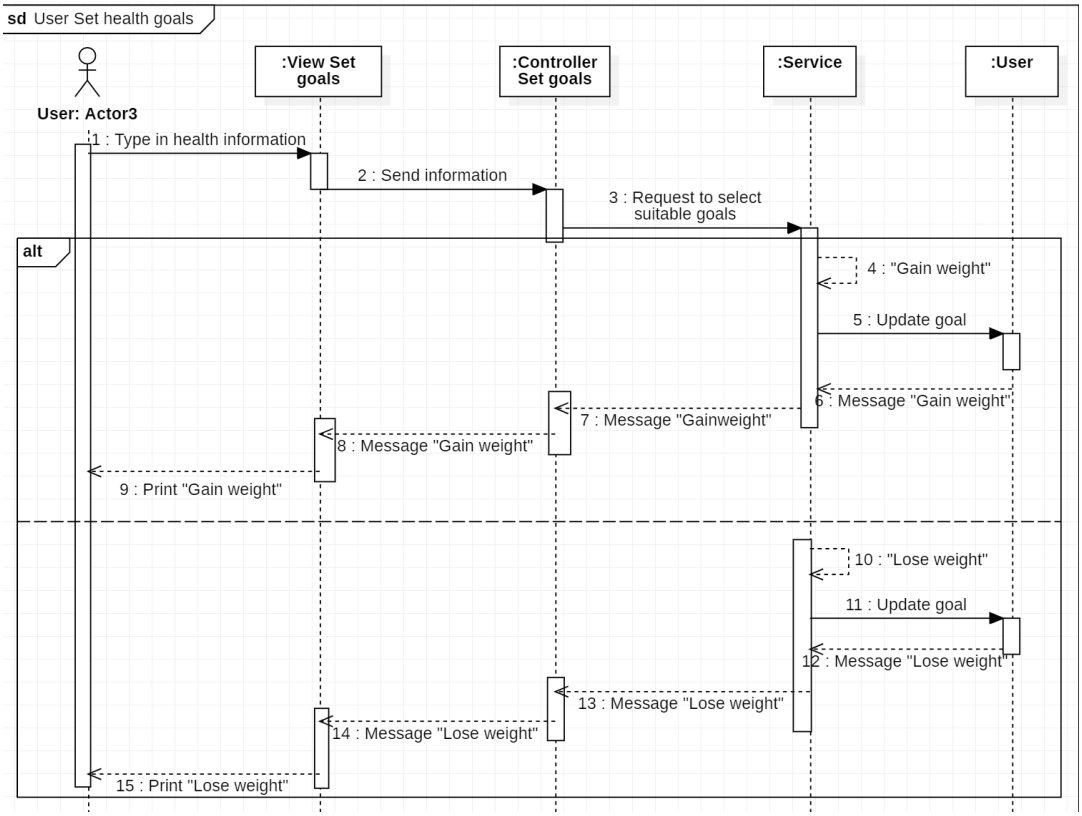

Figure 17. Sequence Diagram of User Setting Goals

g) Sequence Diagram of User's Exercises Management

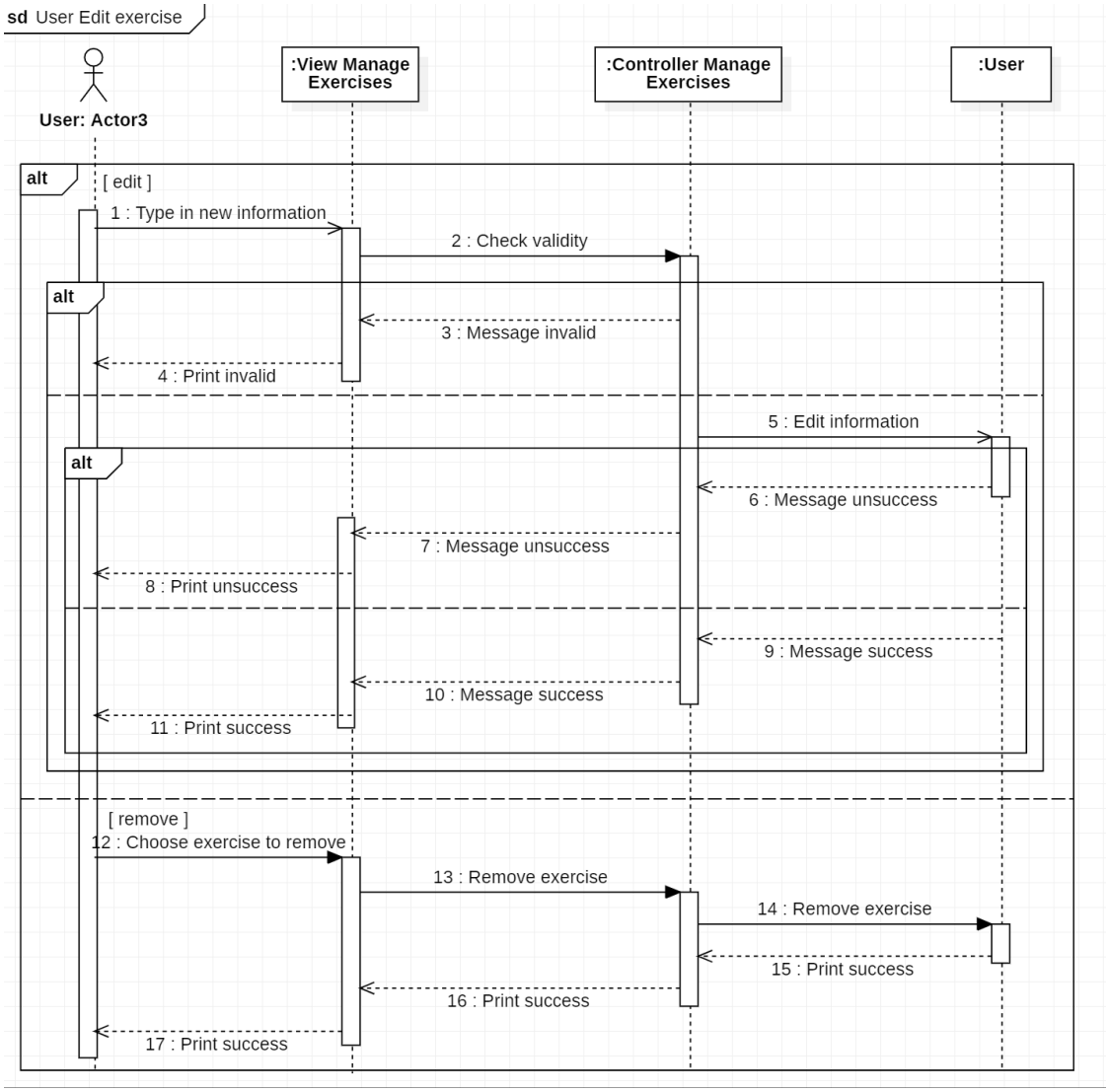

Figure 18. Sequence Diagram of User's Exercises Management

h) Sequence Diagram of User Notification Management

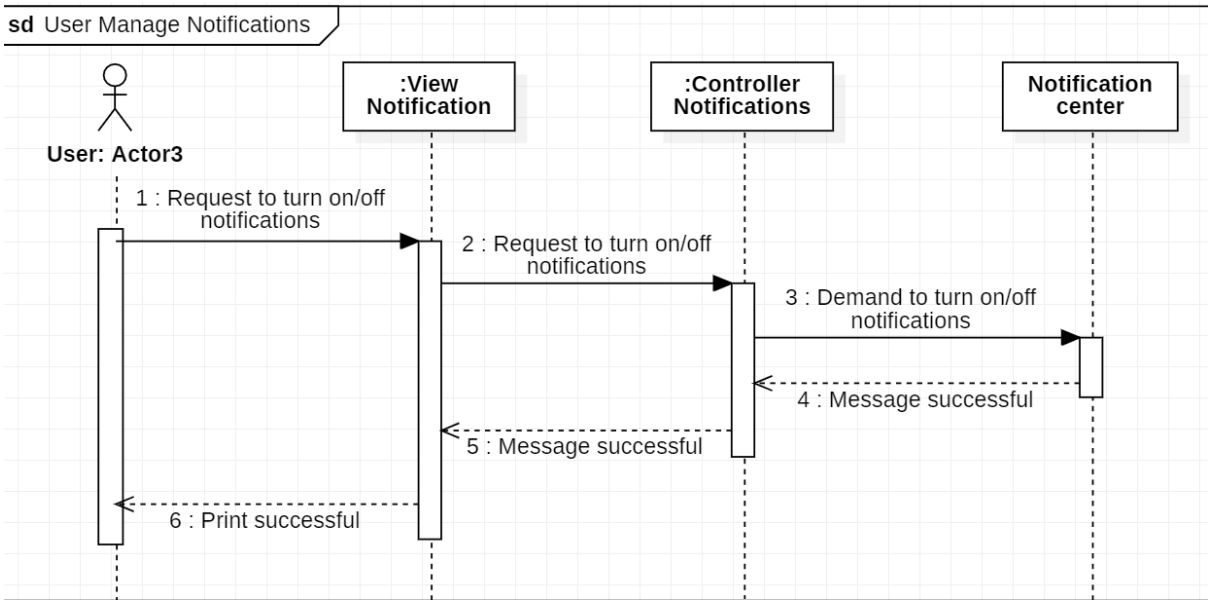

Figure 19. Sequence Diagram of User Notification Management

i) Sequence Diagram of User Posts New Status

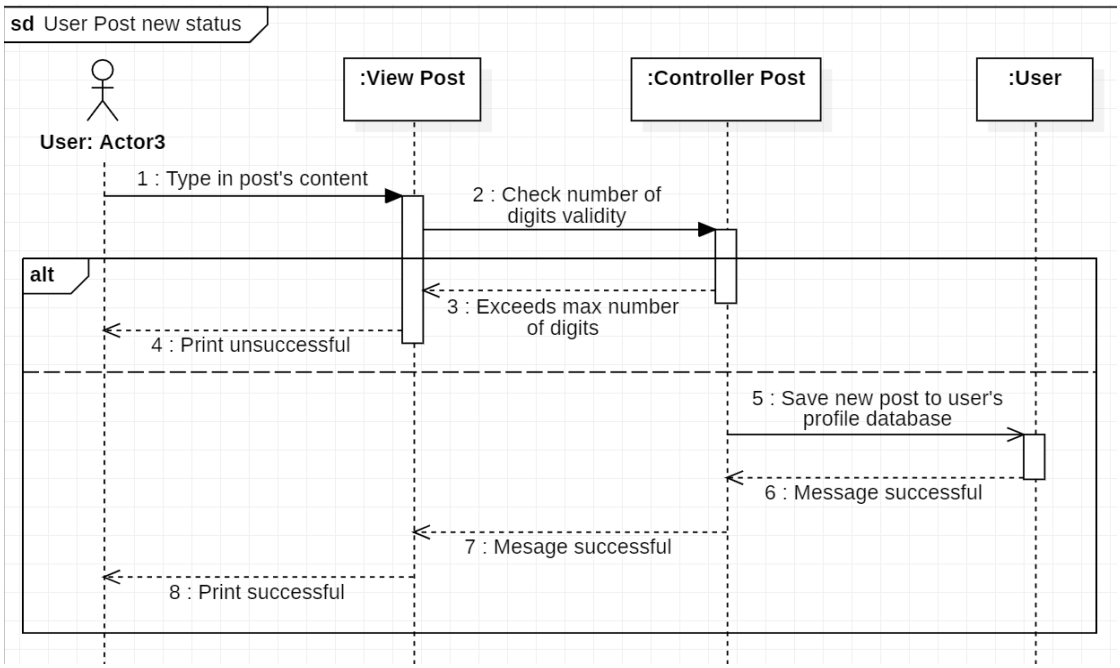

Figure 20. Sequence Diagram of User Posts New Status

j) Sequence Diagram of Admin Edits User Information

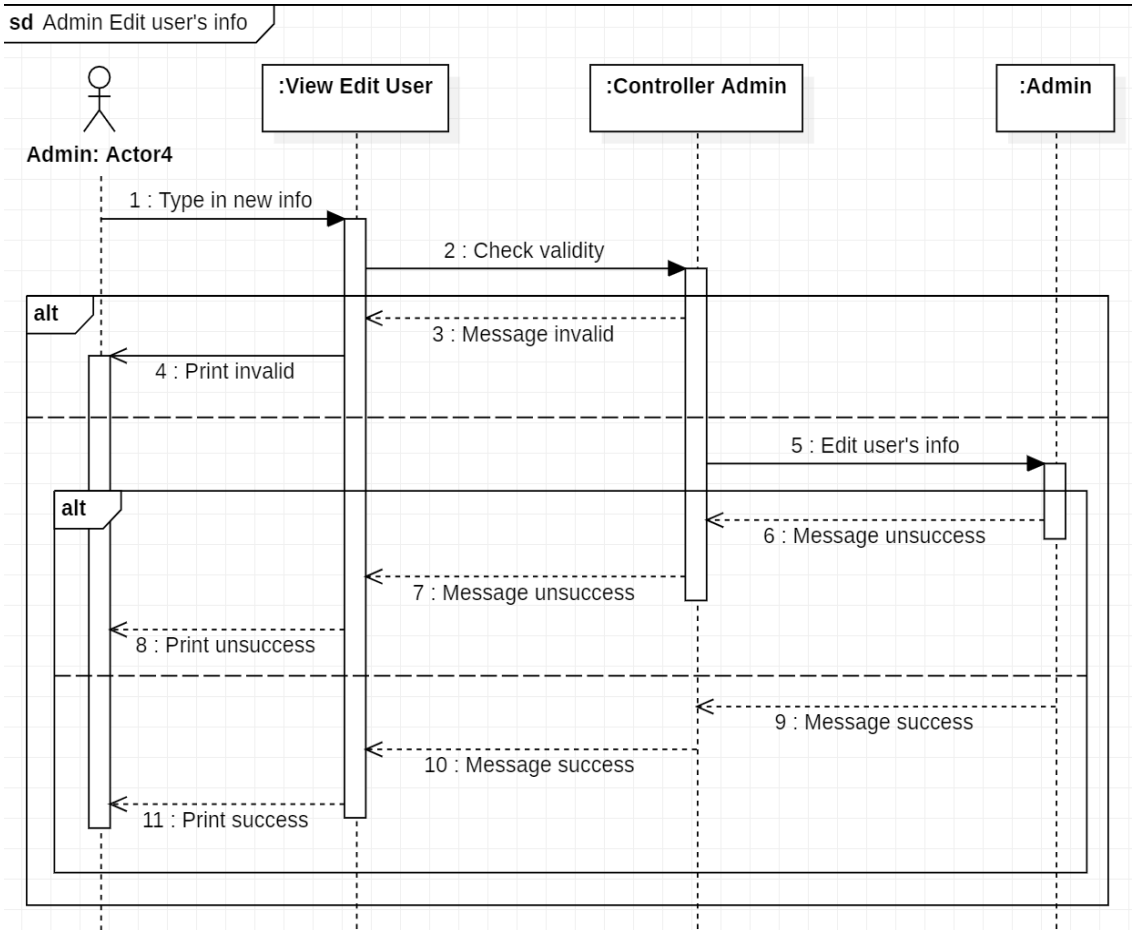

Figure 21. Sequence Diagram of Admin Edits User Information

k) Sequence Diagram of Admin Adds Exercises

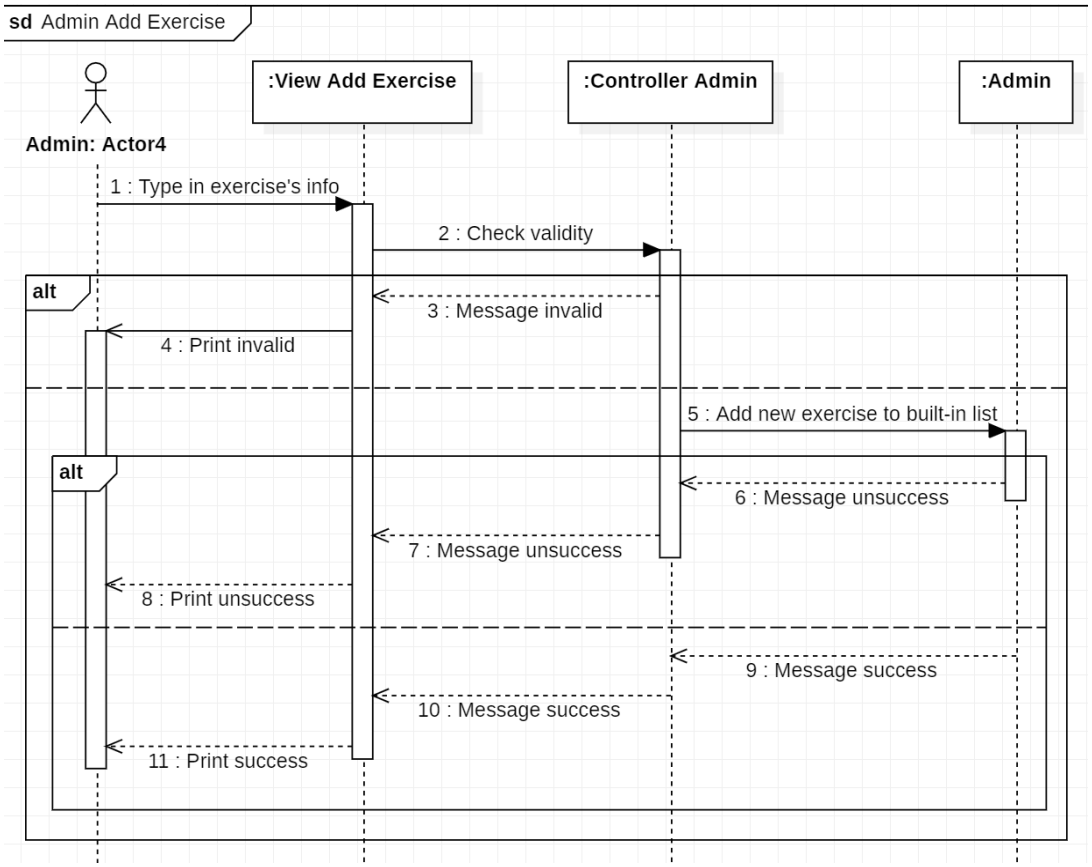

Figure 22. Sequence Diagram of Admin Adds Exercises

l) Sequence Diagram of Admin System's Configuration Management

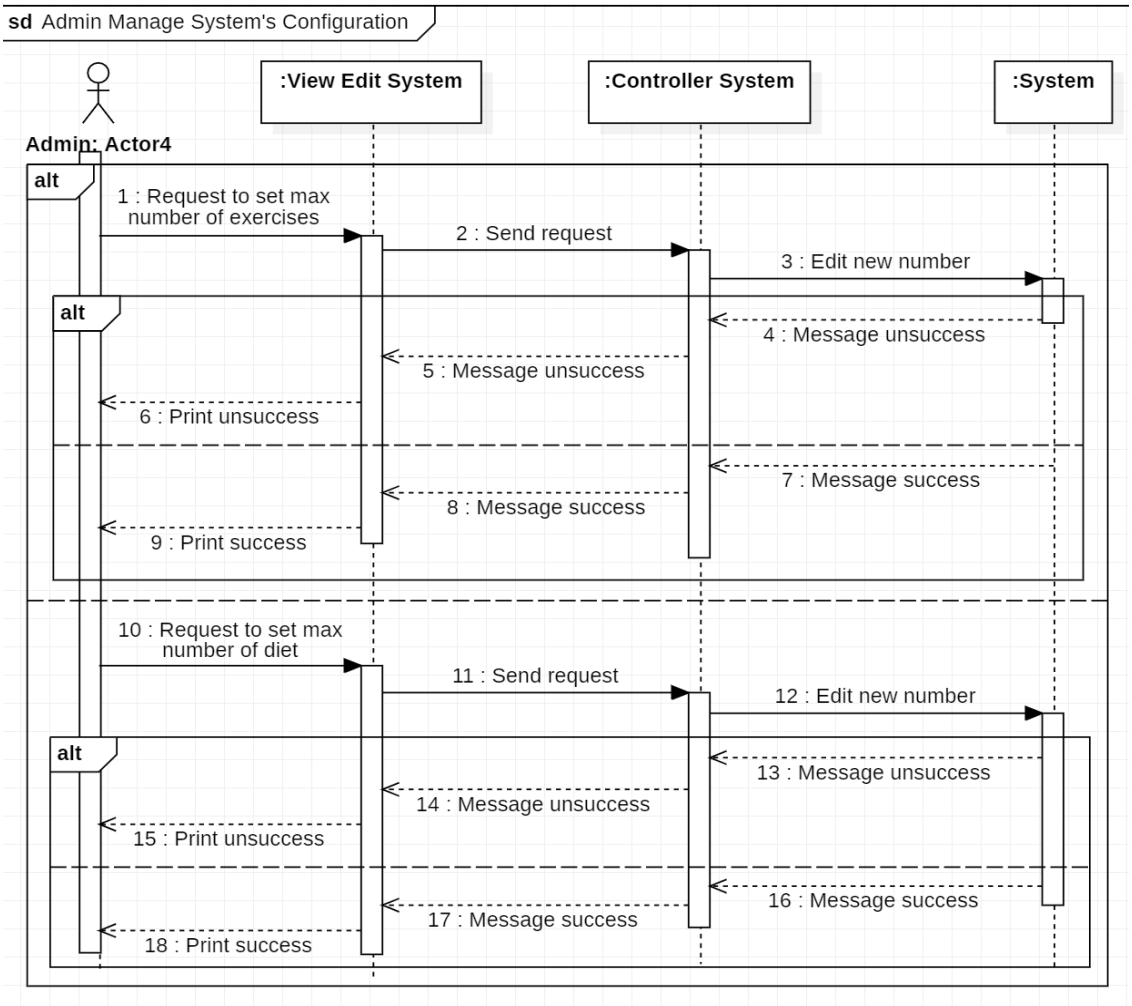

Figure 23. Sequence Diagram of Admin System's Configuration Management

2.5.3. Activity Diagrams

a) Activity Diagram of User Log In

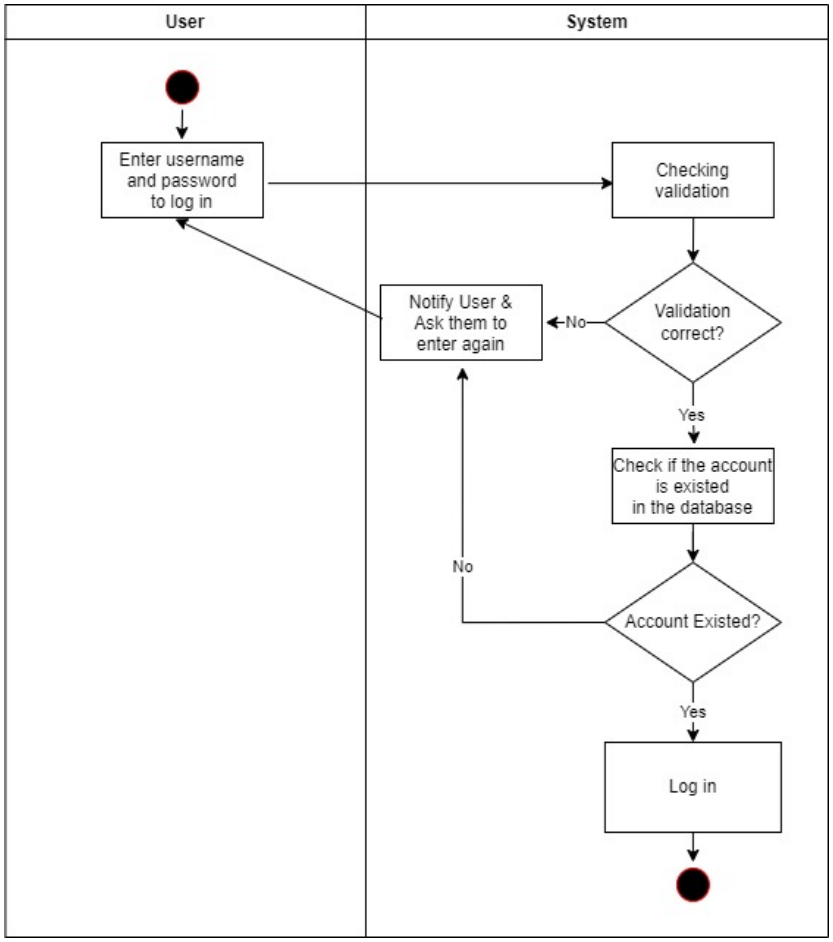

Figure 24. Activity Diagram of User Log In

b) Activity Diagram of User Sign In

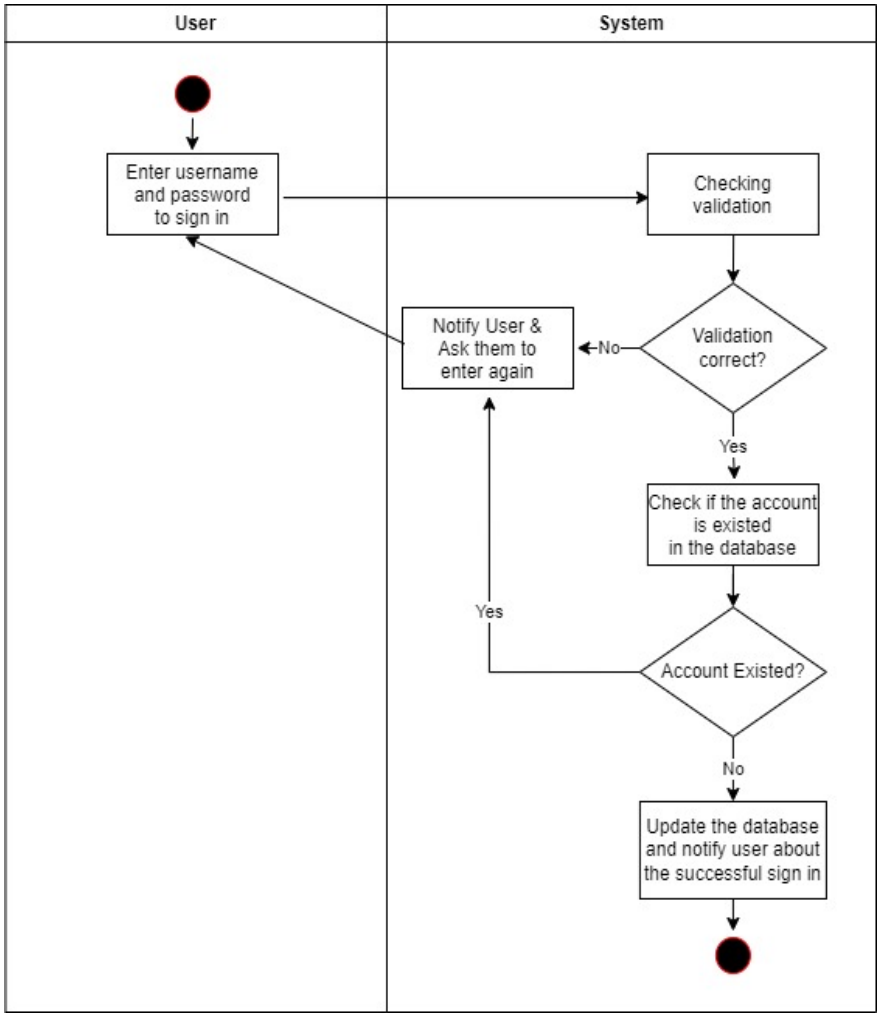

Figure 25. Activity Diagram of User Sign In

c) Activity Diagram of User Change Passwords

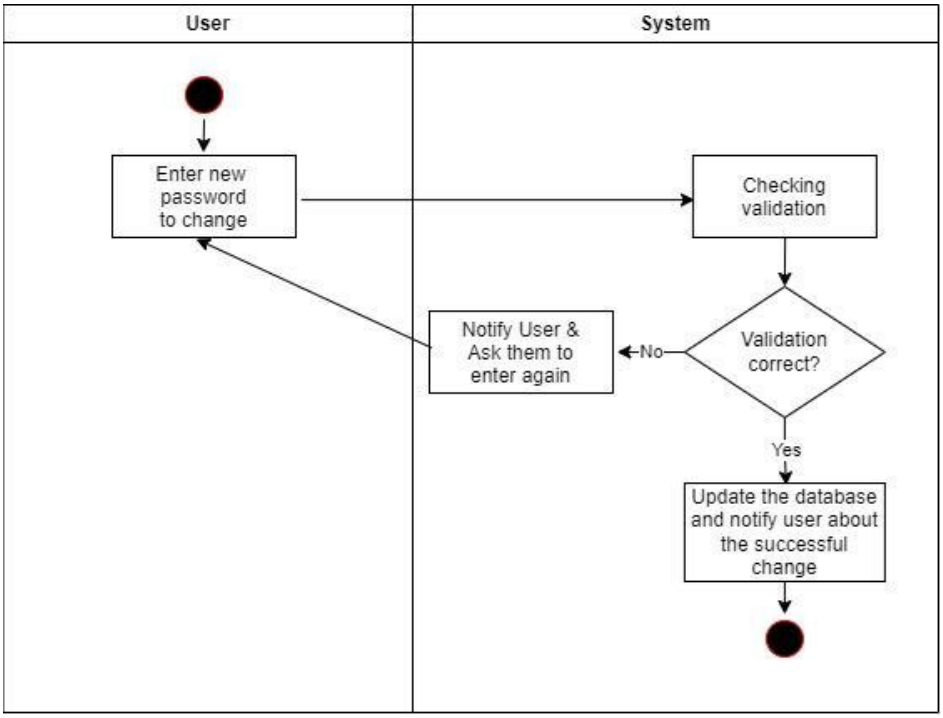

Figure 26. Activity Diagram of User Change Passwords

d) Activity Diagram of User Change Health Profile

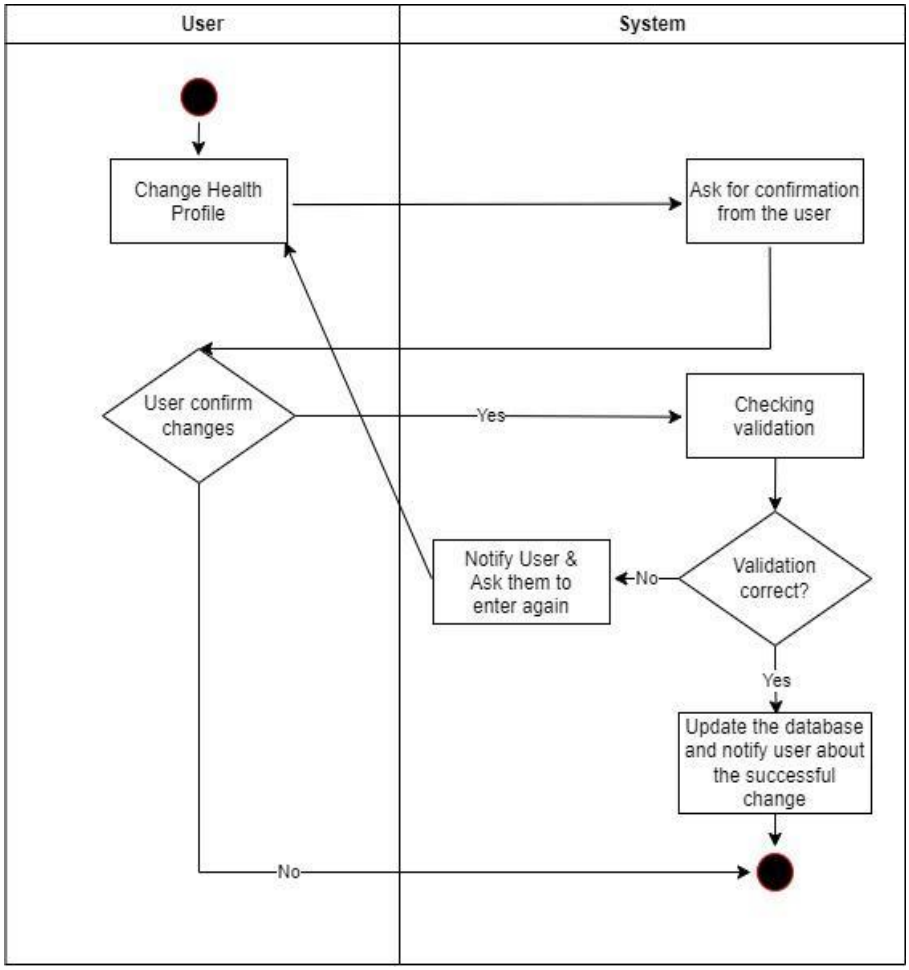

Figure 27. Activity Diagram Of User Change Health Profile

e) Activity Diagram of User Edit Diet/ Exercises Lists

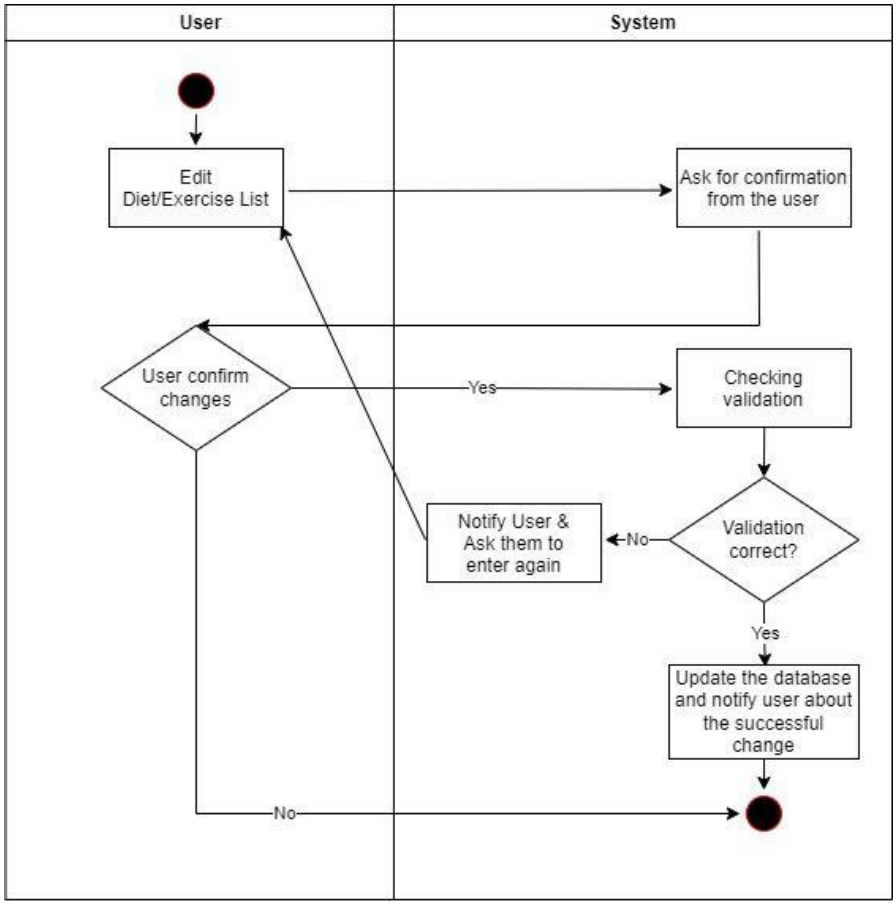

Figure 28. Activity Diagram of User Edit Diet/ Exercises Lists

f) Activity Diagram of Admin Edit Built-in Diet/ Exercises Lists

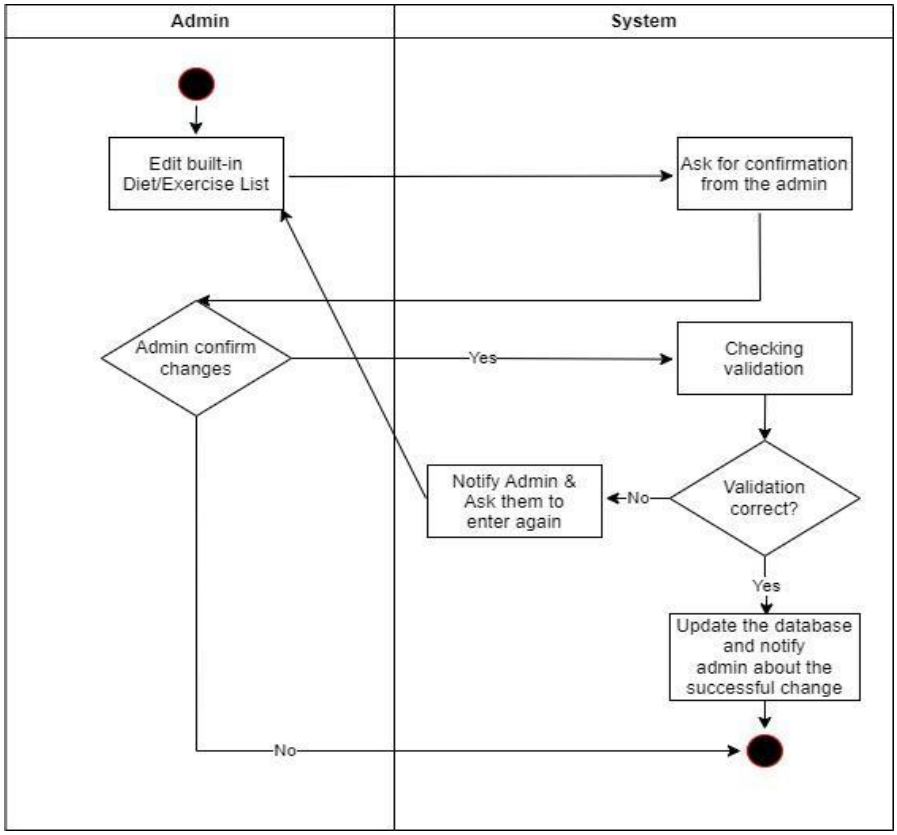

Figure 29. Activity Diagram of Admin Edit Built-in Diet/ Exercises Lists

2.5.4. Flowcharts

a) Tracking User Health Flowchart

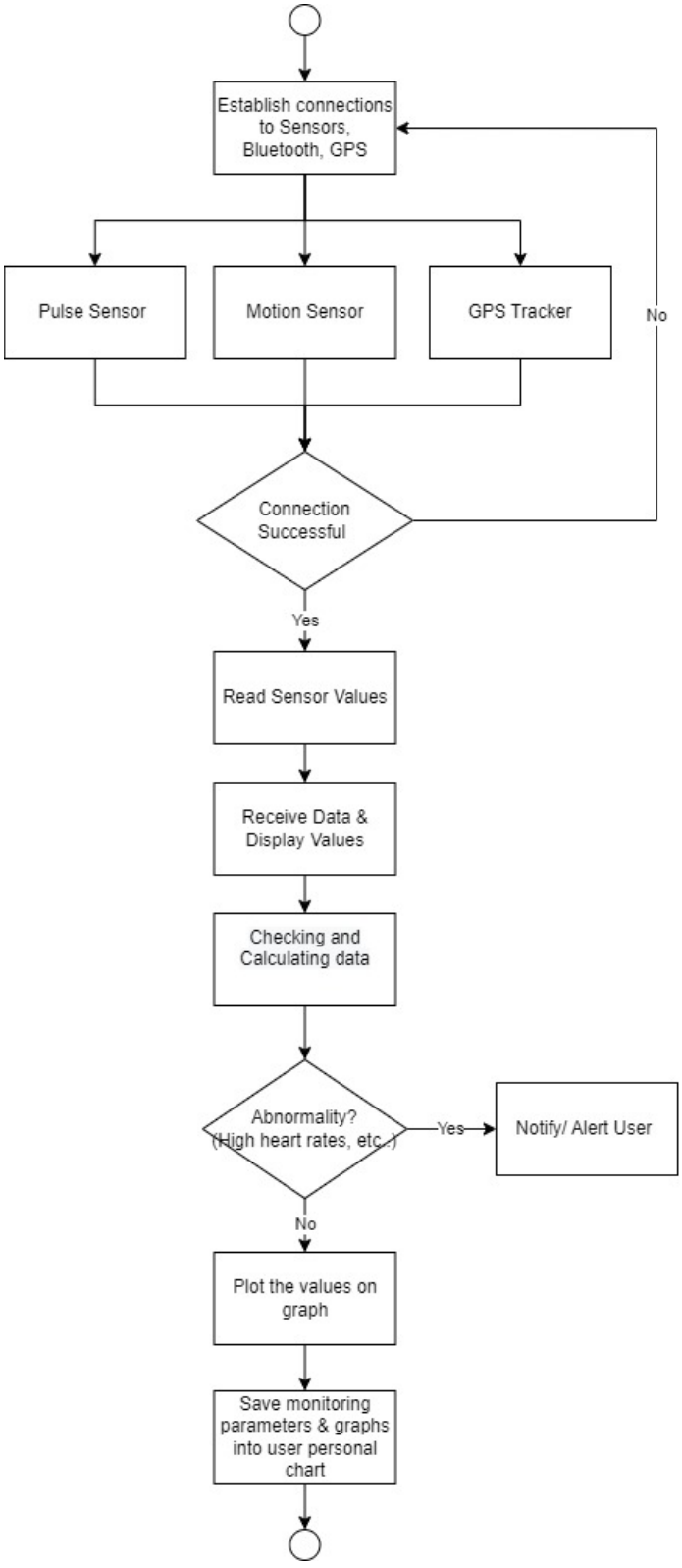

Figure 30. Tracking User Health Flowchart

b) Recommending User Flowchart

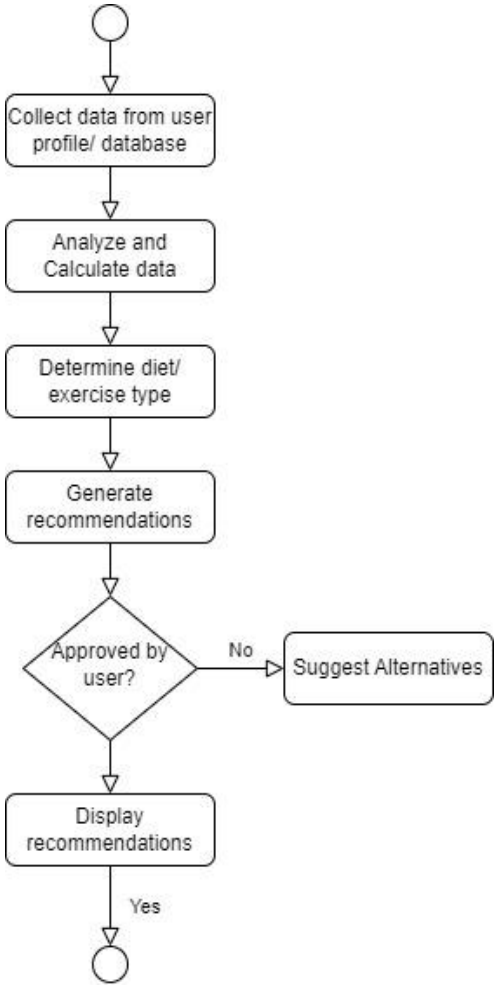

Figure 31. Recommending User Flowchart

3. Final Product

3.1. UML Class Diagram

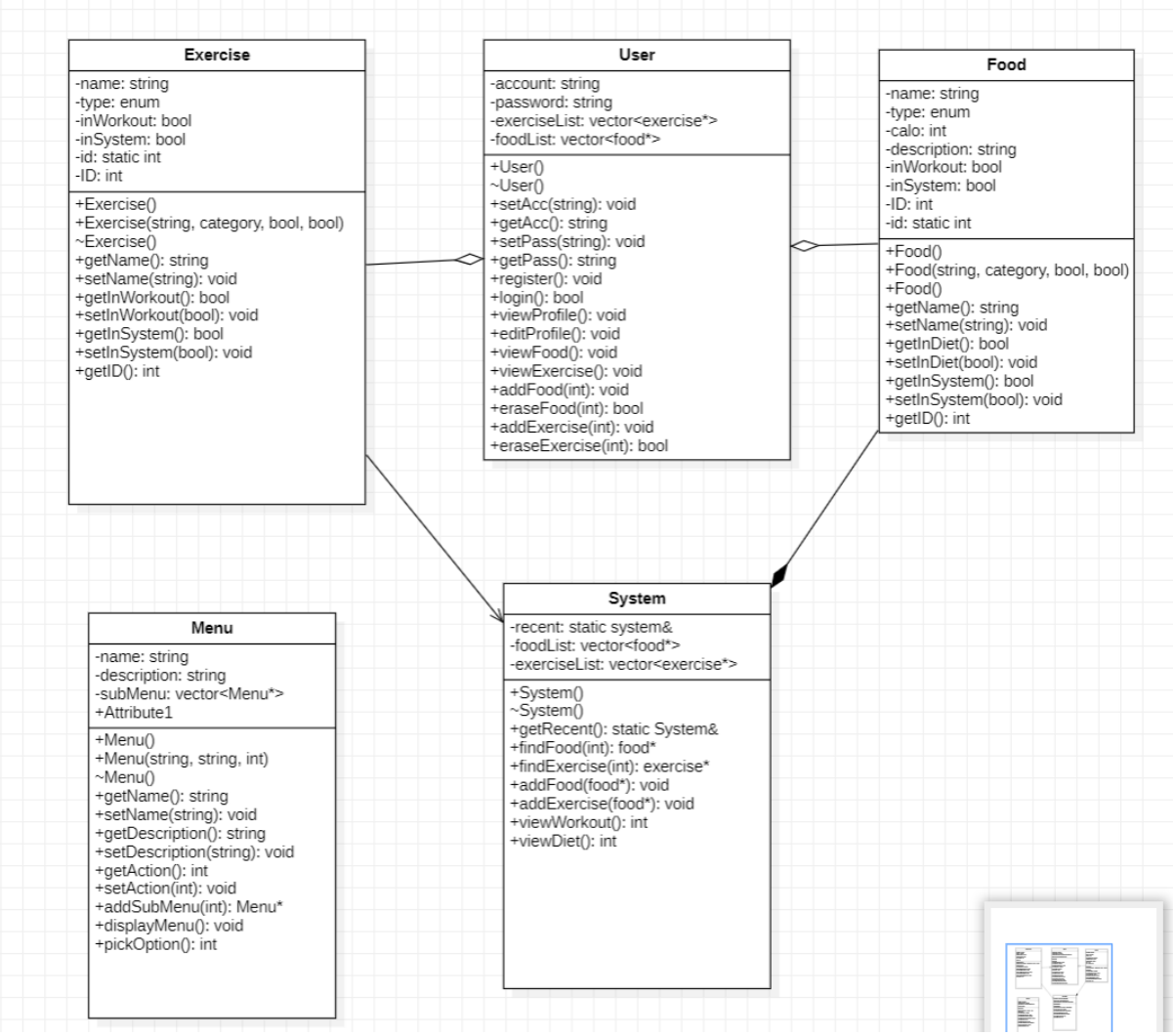

Figure 32. UML Class Diagram of the Fitness App

3.2. Data Table

Class User:

Name	Data type	Description
account	string	User's account (username)
password	string	User's password
exerciseList	vector<Exercise*>	List of Exercise objects associated with the user
foodList	vector<Food*>	List of Food objects associated with the user

Table 13. Class User Table

Class Exercise:

Name	Data type	Description
name	string	Name of the exercise
type	enum	Category of the exercise
inWorkout	bool	Indicates if in the user workout
inSystem	bool	Indicates if in the system
id (static)	int	Next available ID for the exercises
ID	int	Identifier for the exercise

Table 14. Class Exercise Table

Class Food:

Name	Data type	Description
name	string	Name of the food
type	enum	Category of the food
inDiet	bool	Indicates if in the user diet
inSystem	bool	Indicates if in the system
id (static)	int	Next available ID for the food
ID	int	Identifier for the food
calo	int	Calories of the food
description	string	Description about the food

Table 15. Class Food Table

Class System:

Name	Data type	Description
recent (static)	System*	Pointer to the most recent System instance
foodList	vector<Food*>	List of Food objects stored in the system
exerciseList	vector<Exercise*>	List of Exercise objects stored in the system

Table 16. Class System Table

Class Menu:

Name	Data type	Description
name	string	Name of the menu
description	string	Description or label for the menu
subMenu	vector<Menu*>	List of sub-menu objects associated with this menu
action	int	Action identifier associated with the menu (default: -1)

Table 17. Class Menu Table

3.3. The Final Product

3.3.1. Tracking GPS and Calories & Goal Setup

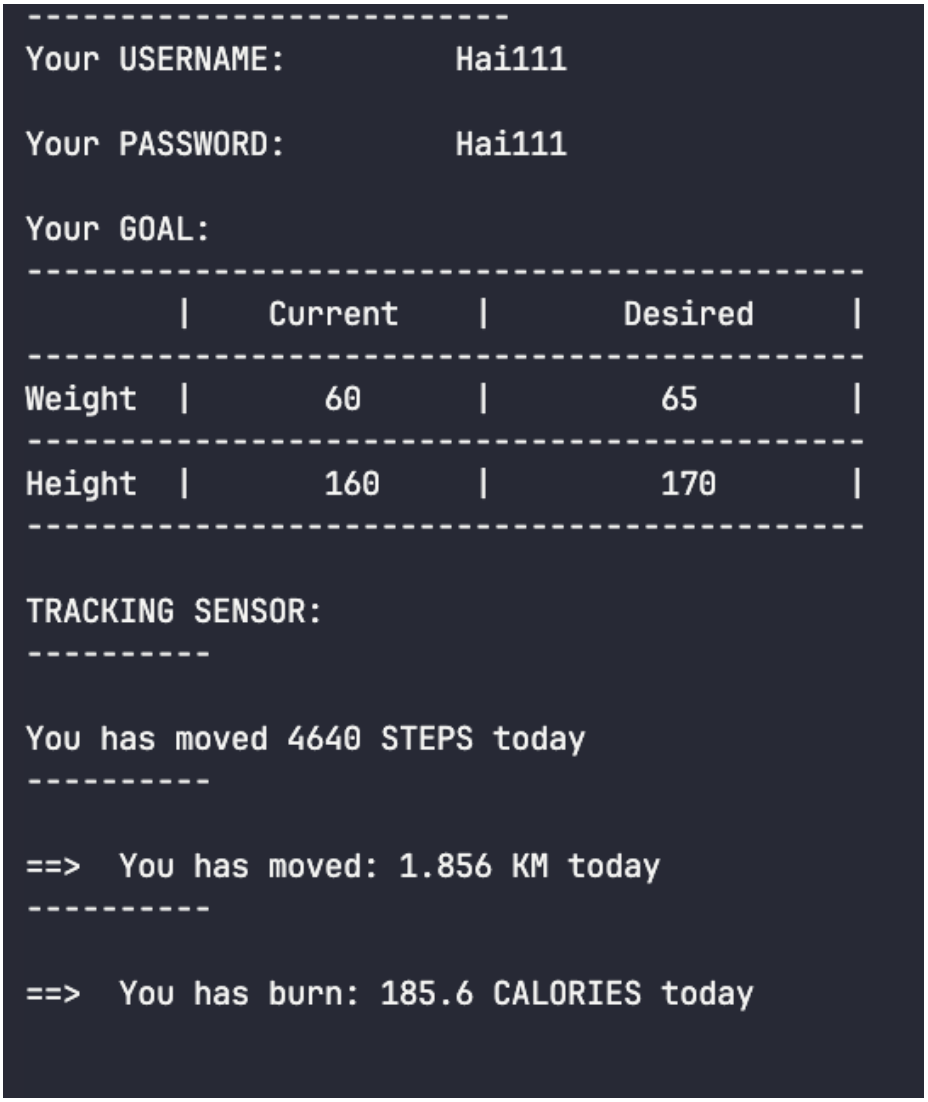

Figure 33. A screenshot of the Tracking GPS and Calories & Goal Setup

3.3.2. Exercise Routines

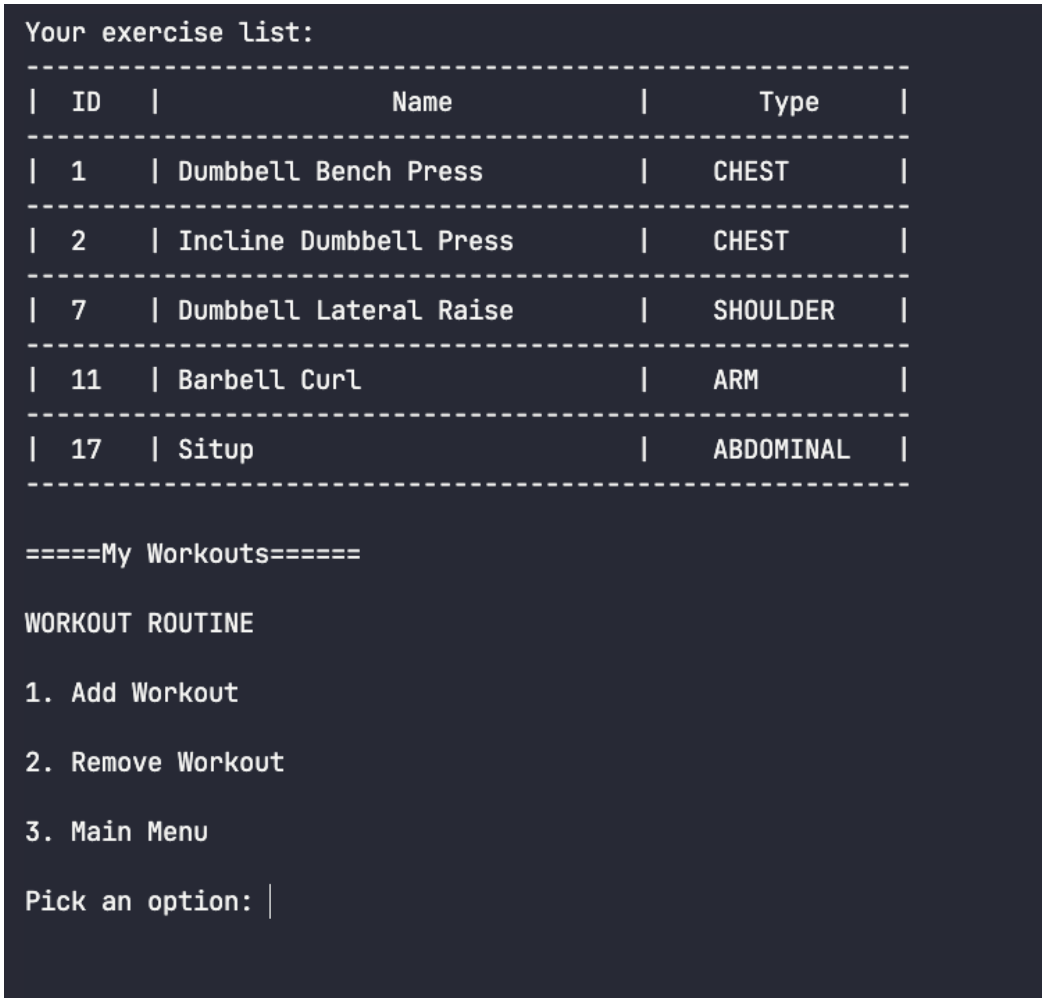

Figure 34. A screenshot of the Exercise Routines

- **Exercises List**

```
|  17   | Situp                          |    ABDOMINAL   |
-----------------------------------------------------------
|  18   | Dumbbell Russian Twist         |    ABDOMINAL   |
-----------------------------------------------------------
|  19   | Hand Side Plank                |    ABDOMINAL   |
-----------------------------------------------------------
|  20   | Pull Ups                       |    BACK        |
-----------------------------------------------------------
|  21   | Dumbbell Row                   |    BACK        |
-----------------------------------------------------------
|  22   | Lat Pulldown                   |    BACK        |
-----------------------------------------------------------
|  23   | Cable Pullover                 |    BACK        |
-----------------------------------------------------------
|  24   | Hyperextension                 |    BACK        |
-----------------------------------------------------------
|  25   | Deadlift                       |    LEG         |
-----------------------------------------------------------
|  26   | Machine Leg Extension          |    LEG         |
-----------------------------------------------------------
|  27   | Squat                          |    LEG         |
-----------------------------------------------------------
|  28   | Glute Ham Raise                |    LEG         |
-----------------------------------------------------------
|  29   | Machine Hamstring Curl         |    LEG         |
-----------------------------------------------------------
Choose the exercise ID you want to add: 100
Error adding exercise
```

Figure 35. A screenshot when user interacts with the Exercises List

3.3.3. Diet List with Food

```
Your food list:
-------------------------------------------------------
|  ID   |              Name             |       Type     |
-------------------------------------------------------
|  1    | Strawberries                  |    FRUIT       |
-------------------------------------------------------
|  2    | Banana                        |    FRUIT       |
-------------------------------------------------------
|  3    | Blueberries                   |    FRUIT       |
-------------------------------------------------------
|  4    | Grapes                        |    FRUIT       |
-------------------------------------------------------
|  5    | Milk                          |    DAIRY       |
-------------------------------------------------------

=====My Diet======
```

Figure 36. A screenshot of the Diet List with Food

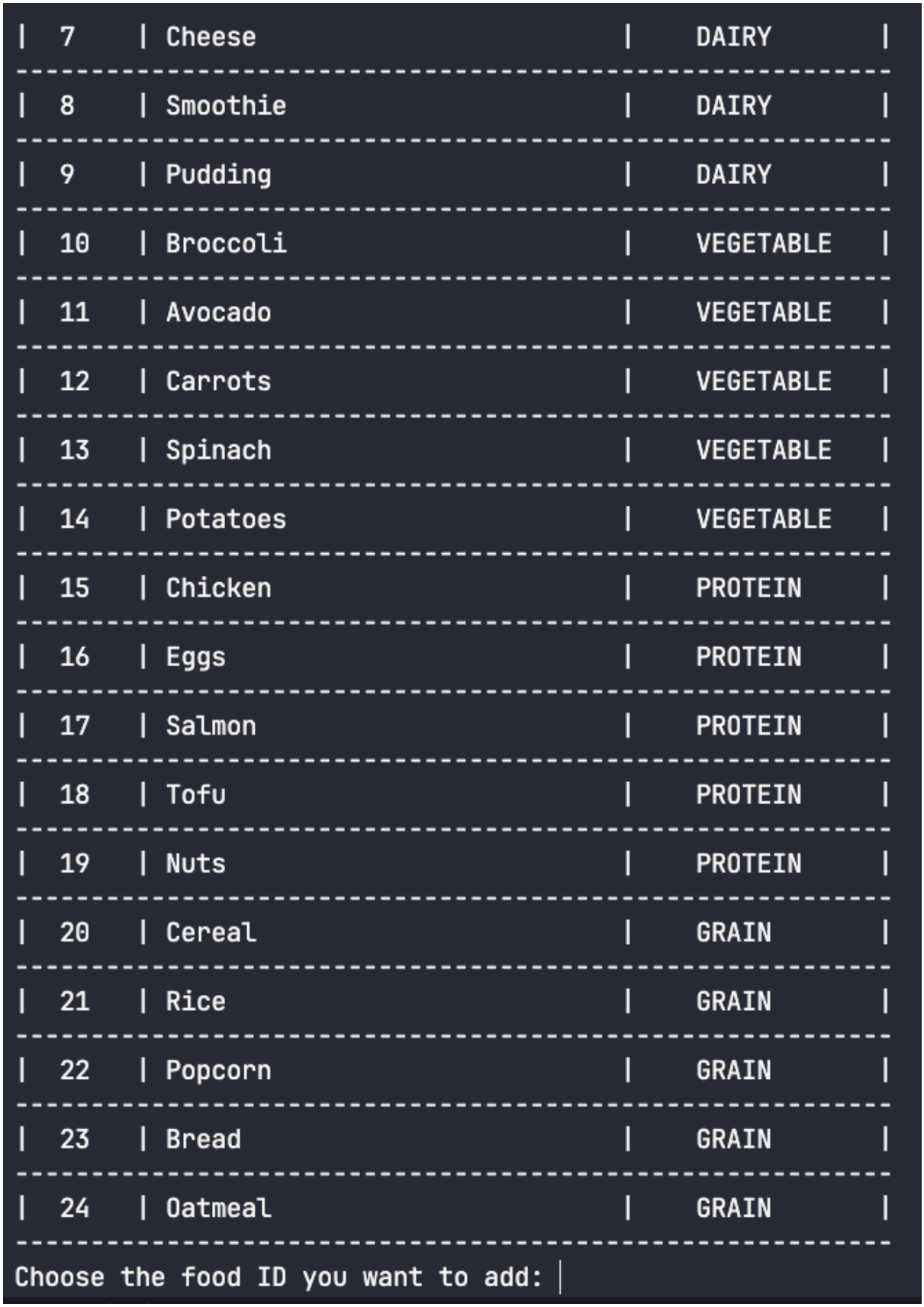

Figure 37. A screenshot of the user interacts with the Diet List

4. Validation

4.1. Test Validation for Register Function

- **Test 1**: 6 char include letter, number, NO uppercase: **INVALID**
- **Test 2**: 7 char include anything: **INVALID**
- **Test 3**: 6 char include ONLY number: **INVALID**
- **Test 4**: 6 char include letter, number, uppercase but EXIST=> **INVALID**
- **Test 5**: 6 char include letter, number, uppercase, available : **VALID**

```
USERNAME:
Input your account (6 characters include letter(s), uppercase letter(s) and number(s)): loc123

Invalid input

USERNAME:
Input your account (6 characters include letter(s), uppercase letter(s) and number(s)): minhloc

The account must have 6 characters
USERNAME:
Input your account (6 characters include letter(s), uppercase letter(s) and number(s)): 123456

Invalid input

USERNAME:
Input your account (6 characters include letter(s), uppercase letter(s) and number(s)): Hai123

Already exist account
USERNAME:
Input your account (6 characters include letter(s), uppercase letter(s) and number(s)): Loc123

Already exist account
USERNAME:
Input your account (6 characters include letter(s), uppercase letter(s) and number(s)): Hai111

PASSWORD:
Input your password (6 characters include letter(s), uppercase letter(s) and number(s)): Hai111
```

Figure 38. A screenshot of Test Cases for Register Function

4.2. Test Validation for SETTING GOAL Function

- **Test 1**: input Weight or Height smaller than 0: **INVALID**
- **Test 2**: input weight or height bigger than 0: **VALID**

```
Your current WEIGHT (kg): -10
Invalid input
Input again: 60

Your current HEIGHT (cm): -10
Invalid input
Input again: 160
------------------
Now set your GOAL

The WEIGHT you WANT (kg): -10
Invalid input
Input again: 65

The HEIGHT you WANT (cm): -5
Invalid input
Input again: 170
```

Figure 39. A screenshot of Test Cases for SETTING GOAL Function

4.3. Test Validation for EDIT WORKOUT/DIET Function

Test: input ID out of range in system => **INVALID**

```
|  17   | Situp                        |    ABDOMINAL   |
-----------------------------------------------------------
|  18   | Dumbbell Russian Twist       |    ABDOMINAL   |
-----------------------------------------------------------
|  19   | Hand Side Plank              |    ABDOMINAL   |
-----------------------------------------------------------
|  20   | Pull Ups                     |    BACK        |
-----------------------------------------------------------
|  21   | Dumbbell Row                 |    BACK        |
-----------------------------------------------------------
|  22   | Lat Pulldown                 |    BACK        |
-----------------------------------------------------------
|  23   | Cable Pullover               |    BACK        |
-----------------------------------------------------------
|  24   | Hyperextension               |    BACK        |
-----------------------------------------------------------
|  25   | Deadlift                     |    LEG         |
-----------------------------------------------------------
|  26   | Machine Leg Extension        |    LEG         |
-----------------------------------------------------------
|  27   | Squat                        |    LEG         |
-----------------------------------------------------------
|  28   | Glute Ham Raise              |    LEG         |
-----------------------------------------------------------
|  29   | Machine Hamstring Curl       |    LEG         |
-----------------------------------------------------------
Choose the exercise ID you want to add: 100
Error adding exercise
```

Figure 40. A screenshot of Test Cases for EDIT WORKOUT/DIET Function

Conclusion & Future Development

To sum up the whole, this mobile fitness app prototype report has provided a comprehensive overview of our app's requirements, development process, prototype creation, and future development plans. The prototype serves as a tangible representation of our app's core features and functionalities, demonstrating its potential and setting the stage for its future development.

The app's requirements were carefully analyzed and defined, focusing on essential aspects such as workout tracking, exercise library, nutrition management, and user progress monitoring. These requirements formed the foundation for the development process, ensuring that the prototype accurately reflected the envisioned app functionality. During the development phase, our team meticulously translated the requirements into code, implementing the core features and creating an initial version of the app. The prototype development allowed us to evaluate the feasibility and effectiveness of the app's features, providing valuable insights and opportunities for iterative improvements. The prototype successfully transformed the app's specifications into a visual and interactive interface, showcasing key screens, navigation flows, and interaction design. This enabled us to gather feedback from users and stakeholders, validating the concept and identifying areas for enhancement and refinement.

However, at the moment, our team still lacks essential knowledge needed to build and design a mobile software application, in particular the fitness/health app that requires embedded modules to function to the fullest. Therefore, with future studies and courses, we are expecting to gain new insights and techniques for embedded programming, database management, etc… in order to enhance and complete our project.

Overall, this mobile fitness app prototype/ project has served as a valuable stepping stone in our app's development journey. Through careful analysis of requirements, meticulous development efforts, and user feedback gathered during the prototype testing phase, we have gained valuable insights that will shape the future development of the app. By focusing on feature expansion, user interface refinement, performance optimization, data security, and integration with third-party services, we are committed to delivering a robust, user-friendly,

and feature-rich mobile fitness app that empowers individuals to achieve their fitness goals and lead healthier lives.