
Software Requirements and Design Document

for

HealthPal

Prepared by Saad Aamir, Taha Khahro, Ahmed Raza

Code Crafts

27th-November-2024

Table of Contents

Table of Contents	ii
1. Introduction.....	3
1.1 Purpose.....	3
1.2 Product Scope	3
1.3 Title	3
1.4 Objectives.....	3
1.5 Problem Statement.....	4
2. Overall Description.....	4
2.1 Product Perspective	4
2.2 Product Functions	6
2.3 List of Use Cases	7
2.4 Extended Use Cases.....	8
2.5 Use Case Diagram.....	33
3. Other Nonfunctional Requirements	34
3.1 Performance Requirements.....	34
3.2 Safety Requirements	34
3.3 Security Requirements	34
3.4 Software Quality Attributes.....	35
3.5 Business Rules	35
3.6 Operating Environment	35
3.7 User Interfaces.....	36
4. Domain Model	377
5. System Sequence Diagram.....	388
6. Sequence Diagram.....	64
7. Class Diagram	89
8. Component Diagram.....	90
9. Package Diagram	91
10. Deployment Diagram	92

1. Introduction

1.1 Purpose

This document specifies the software requirements for the **Health and Fitness Tracker (HFT)**, Revision 1.0. The purpose of the product is to assist individuals in managing their health and fitness journeys through goal-setting, meal and workout planning, and progress tracking. This SRS covers the core functionalities of the system, including user profile management, goal tracking, meal customization, and workout planning. It does not include advanced features like real-time notifications, API integrations, or personalized trainer sessions, which may be developed in future versions.

1.2 Product Scope

The **Health and Fitness Tracker** is a software application designed to help users plan and monitor their fitness activities and dietary habits. Its purpose is to promote healthier lifestyles by providing tools for personalized goal-setting, meal planning, and exercise scheduling.

- **Relevant Benefits, Objectives, and Goals:**
- **Benefits:**
 - Simplifies the management of fitness routines.
 - Encourages accountability through progress tracking.
 - Offers flexibility with customizable meal and workout plans.
- **Objectives:**
 - To improve users' adherence to fitness goals.
 - To reduce the complexity of managing fitness and dietary habits.
 - To provide a scalable foundation for adding advanced features like trainer support and API integrations.

The software aligns with corporate goals of promoting well-being and improving user satisfaction in the fitness and health domain.

1.3 Title

Health and Fitness Tracker (HFT): A Comprehensive Solution for Fitness Management

The **Health and Fitness Tracker** aims to provide an all-in-one platform for users to set, manage, and achieve their fitness goals. The immediate solution offered is a system for organizing meals, workouts, and goal progress, eliminating the need for manual tracking methods.

1.4 Objectives

The primary objectives of the **Health and Fitness Tracker** include:

1. **Fitness Goal Management:** Allow users to set measurable fitness goals (e.g., weight loss or maintenance).
2. **Meal and Nutrition Planning:** Provide tools for creating and customizing meal plans tailored to user preferences.
3. **Workout Scheduling:** Offer predefined workout plans and post-workout guidance.
4. **User Engagement:** Ensure ease of use and regular engagement through an intuitive interface.

5. **Scalability:** Create a modular system that can integrate advanced features like trainer support and AI-driven meal recommendations in the future.

1.5 Problem Statement

In today's busy world, maintaining a healthy lifestyle is challenging. Many individuals struggle to balance their dietary habits and fitness routines due to:

- Lack of personalized planning tools.
- The complexity of manually tracking progress.
- Limited access to affordable fitness guidance.

The **Health and Fitness Tracker** addresses these challenges by providing an integrated platform to plan meals, schedule workouts, and track fitness progress. By automating routine tasks like calorie tracking and workout planning, the system eliminates manual effort and reduces the likelihood of errors.

Feasibility:

The project is technically feasible with its current reliance on JavaFX for the interface and scalable architecture for future expansions. Economically, it is viable due to the increasing demand for fitness solutions, making it an attractive product for end-users and organizations focused on wellness.

2. Overall Description

2.1 Product Perspective

The **Health and Fitness Tracker (HFT)** is a **new, self-contained product** designed to provide users with an intuitive platform for managing their fitness and dietary goals. It is not part of an existing product family, but it is inspired by the growing demand for digital health solutions and the limitations of current tools in the market.

Context:

- The product is designed to cater to individuals seeking a more efficient way to organize their fitness routines, meal plans, and overall health objectives.
- While existing solutions often focus on either fitness tracking or meal planning, the HFT combines both into a single cohesive system for enhanced user convenience.

Origin:

- This product emerged from extensive market research and user feedback, highlighting the need for a comprehensive tool that bridges the gap between fitness and dietary management.
- It leverages advancements in user interface design (via JavaFX) and modular architecture, ensuring scalability and adaptability for future enhancements.

If this SRS defines a component of a larger ecosystem, the **Health and Fitness Tracker** could potentially integrate with other health and fitness systems, such as wearable devices (e.g., fitness trackers, smartwatches), healthcare monitoring apps, or corporate wellness platforms.

System Components and Interfaces:

The major components of the overall system include:

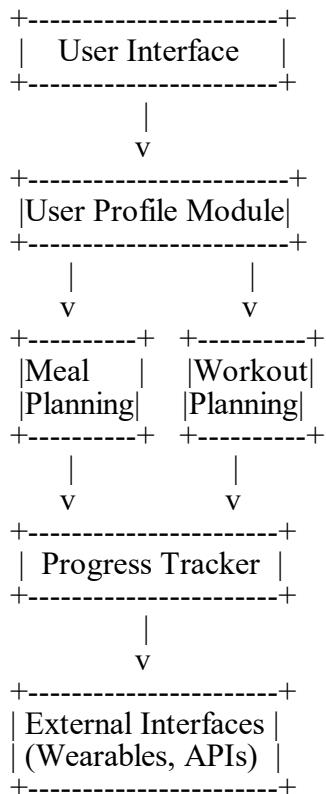
1. **User Profile Management:** Handles user registration, preferences, and goal settings.
2. **Meal Planning Module:** Allows users to create and customize daily or weekly meal plans.

3. **Workout Planning Module:** Offers workout schedules, exercise recommendations, and progress tracking.
4. **Progress Tracker:** Tracks metrics such as calorie intake, weight, and workout performance over time.

Subsystem Interconnections and External Interfaces:

- **Subsystem Interconnections:**
 - The user profile module interacts with the meal planning and workout planning modules to ensure a personalized experience.
 - The progress tracker aggregates data from meal and workout plans to generate performance insights.
- **External Interfaces:**
 - Integration with wearable devices (e.g., Fitbit, Apple Watch) for automatic tracking of physical activity.
 - API endpoints for importing/exporting user data to third-party platforms.
- **System Diagram**

Here's a simple diagram representing the major components, their interactions, and external interfaces:



This architecture ensures a seamless flow of data across modules and external systems, providing users with a unified experience while remaining scalable for future development.

2.2 Product Functions

Key Features

1. User Management

- **Login and Signup:**
 - Users can log in using logincontroller, which verifies credentials via the dbconnect layer.
 - New account creation redirects to the signupcontroller, where users can create a profile.
 - Once logged in, the user session is managed using the blayer.session class.
- **Profile Editing:**
 - The editprofilecontroller allows users to update personal details like name, age, weight, dietary preferences, and activity level.
 - Validations are in place to ensure data integrity (e.g., preventing invalid inputs).

2. Goal Tracking

- **Add Goals:**
 - Users can set weight-related goals (addgoalcontroller) with attributes like startWeight, goalWeight, and currentWeight.
 - Progress is automatically calculated and stored in the goal class.
- The progress calculation ensures accurate tracking between the current, start, and goal weights while capping the progress between -100% and 100%.

3. Workout Plans

- The WorkoutPlanController provides users with predefined workout plans based on the time of day (Morning, Evening, Night).
- Users can view detailed instructions and post-workout recommendations for each plan.
- The controller also allows navigation back to the home screen for seamless UX.

4. Meal Plans

- The blayer.MealPlan class handles meal customization:
 - Users can add meals to different categories (Breakfast, Lunch, Dinner, Snacks).
 - Features include swapping meals, adjusting portion sizes, and searching for alternative recipes.
- While meal plan search alternatives are mocked (searchAlternativeRecipes), this could integrate with an API for real-time recipe suggestions.

5. Trainer and User Data Management

- The blayer.User class handles attributes like dietary preferences, allergies, activity level, and booked time slots. This serves as a central object for user-related operations.
- The integration of trainers (blayer.Trainer) suggests potential for additional functionalities, such as assigning personalized trainers or workout plans.

Architecture

1. Frontend (JavaFX):

- GUI is designed using .fxml files.
- Controllers (addgoalcontroller, editprofilecontroller, etc.) connect the UI to the backend, handling user interactions and data processing.

2. Business Logic Layer (BLayer):

- Contains core logic, such as user data (User), goal tracking (goal), and meal planning (MealPlan).
- Encapsulates methods for calculations (e.g., progress in goal) and abstractions for various functionalities.

3. Database Layer (DBLayer):

- Presumably, dbconnect acts as the data access object (DAO), facilitating interaction with the database.
- Example functionalities:
 - Add user goals (addGoalForUser).
 - Validate login credentials (loginUser).
 - Update user details (updateUser).

4. Session Management:

- The session class ensures user session persistence, enabling logged-in users to access personalized data.

Possible Enhancements

1. Error Handling:

- Enhance input validation to prevent crashes (e.g., invalid weight or age values).
- Implement proper database exception handling.

2. Scalability:

- Integrate APIs for advanced meal and workout recommendations.
- Add a notification system for reminders (e.g., workout schedules or meal prep).

3. UI/UX Improvements:

- Use CSS for consistent styling.
- Add animations for better user experience.

4. Testing:

- Implement unit tests for controllers and data processing methods to ensure robustness.

5. Database Enhancements:

- Clearly define schemas for storing user, goal, meal plan, and workout plan data.

2.3 List of Use Cases

- Explore Fitness Library
- Manage Client Progress
- Manage Goals
- Progress Tracking

- Track Nutrition
- Connect with Wearables
- Track Sleep Patterns
- Participate in Fitness Challenges
- Set Up Personalized Meal Plan (Advanced)
- Mindfulness & Meditation Practices
- Community Fitness Events
- Track Hydration Levels
- Pre-and Post-Workout Routines
- Schedule Virtual Training Session
- Analyze Sleep Stages and Improve Sleep Quality

2.4 Extended Use Cases

Use Case ID	HP-001
Use Case Name	Explore Fitness Library
Scope	HealthPal system
Level	User-goal level
Primary Actor	Fitness enthusiast(FE)
Stakeholders and Interests	Fitness Enthusiast: Interested in viewing tutorial videos and articles related to health and fitness
Preconditions	Fitness enthusiast has installed HealthPal and logged in FE has an internet connection
Success Guarantee (Post Conditions)	FE successfully accesses the fitness library and can view articles and videos on health and fitness according to preference.
Main Success Scenario	FE navigates to Fitness Library FE navigates to a desired category through a list or uses search bar FE consumes the desired resources.
Extensions	a) if FE doesn't have an internet connection ,system displays a message indicating a need for internet connection b) If the desired category is not present system displays a message and suggests available categories

Special Requirements	Performance-time to retrieve resources should be minimal
Technology and Data Variations List	None
Frequency of Occurrence	Multiple times a day- depends on FE
Open Issues	None

Use Case ID	HP-002
Use Case Name	Manage Client Progress
Scope	HealthPal system
Level	User-goal level
Primary Actor	Personal Trainer
Stakeholders and Interests	Personal Trainer: interested in efficiently managing client needs. Client: interested in receiving guidelines according to individual requirements.
Preconditions	Trainer has access to Client profiles and workout history

Success Guarantee (Post Conditions)	Personal Trainer successfully manages the clients requests providing them valuable support resulting in client satisfaction.
Main Success Scenario	<p>Personal trainer navigates to the "Client Management" section and then to a client profile.</p> <p>Personal trainer designs a personalized workout plan based on client's data and preference.</p> <p>Personal trainer assigns the workout plan to the client.</p> <p>System tracks client's progress through workout logs, performance metrics, and feedback.</p> <p>Personal trainer monitors client's progress and provides guidance and support as needed.</p>
Extensions	Immediate Assistance: If a client requires immediate assistance personal trainer offers support through messaging or video calls.
Special Requirements	Additional features such as performance analytics and scheduling tools.
Technology and Data Variations List	None
Frequency of Occurrence	2-3 days a week
Open Issues	Client consent in sharing data

Use Case ID	HP-003
Use Case Name	Manage Goals
Scope	HealthPal system
Level	User-goal level
Primary Actor	Fitness enthusiast(FE)
Stakeholders and Interests	Fitness Enthusiast: Interested in setting & updating personalized health and fitness goals to achieve desired outcomes.
Preconditions	Fitness enthusiast has installed HealthPal
Success Guarantee (Post Conditions)	FE successfully manages their health and fitness goals within the HealthPal application, ensuring that goal data is aligned with their current objectives.
Main Success Scenario	FE navigates to the "Goals" section. FE navigates to a specific goal from a list ie Creates a goal that aligns with objectives
	a.2)FE receives recommendations to aid in achieving created goal. b)FE updates an existing goal b.2)System gives an acknowledgement c)FE navigates to "view completed goals".
Extensions	a) No Existing goals: System prompts user to create a new goal first. b) No completed goal: System gives an appropriate message to FE
Special Requirements	Goal management features should be accessible across multiple devices..
Technology and Data Variations List	Integration with cloud services to safeguard goal data.
Frequency of Occurrence	Low-only when user is reassessing objectives
Open Issues	None

Use Case ID	HP-004
Use Case Name	Progress Tracking
Scope	HealthPal system
Level	User-goal level
Primary Actor	Fitness enthusiast(FE)
Stakeholders and Interests	Fitness Enthusiast: Interested in monitoring and tracking progress towards health and fitness goals
Preconditions	FE has installed HealthPal FE has previously set goals
Success Guarantee (Post Conditions)	FE successfully tracks their progress towards health and fitness goals within the HealthPal application, gaining insights and motivation to continue their wellness journey.
Main Success Scenario	FE profile section and navigates to "Progress Tracking." 1)System shows summary of active goals , PRs , weight over time, relevant metrics and goal status. 1.a)System calculates progress using user inputs(DEXA scan, weight) and wearable data.

	FE reviews progress trends.
Extensions	a) No Existing goals: System prompts user to create a new goal first. b) No wearables: System recommends FE to connect to a wearable c) Unexpected progress trends: system offers suggestion based on FE data
Special Requirements	None
Technology and Data Variations List	Integration with wearables for more accurate health data. Integration with DEXA for progress tracking
Frequency of Occurrence	daily
Open Issues	None

Use Case ID	HP-005
Use Case Name	Track Nutrition
Scope	HealthPal system
Level	User-goal level
Primary Actor	Fitness enthusiast(FE)
Stakeholders and Interests	<ul style="list-style-type: none"> • Fitness Enthusiast: Interested in monitoring and recording food intake for informed dietary decisions and goal achievement.
Preconditions	<ul style="list-style-type: none"> • FE has installed HealthPal and logged in. • FE has an internet connection (optional).
Success Guarantee (Post Conditions)	<ul style="list-style-type: none"> • FE successfully tracks their food intake within HealthPal, allowing for analysis and adjustments to support their health and fitness goals.
Main Success Scenario	<ol style="list-style-type: none"> 1. FE navigates to the "Nutrition" section. 2. FE chooses between:

	<ul style="list-style-type: none"> o Manual entry: FE adds food items by searching a database or manually entering details (quantity, calories, macros). o Barcode scan (if internet available): FE scans a food item's barcode for automatic data entry. 3. FE can adjust serving sizes and review nutritional information. 4. System calculates daily calorie intake and macro breakdowns.
Extensions	<p>FE can set daily calorie goals.</p> <ul style="list-style-type: none"> • System can suggest meal plans based on goals and preferences. • FE can connect with food delivery services for easier logging (if internet available).
Special Requirements	<ul style="list-style-type: none"> • Extensive food database for accurate calorie and macronutrient information.
Technology and Data Variations List	<ul style="list-style-type: none"> • Barcode scanner (optional).
Frequency of Occurrence	<ul style="list-style-type: none"> • Multiple times a day, depending on FE's eating habits.
Open Issues	<ul style="list-style-type: none"> • Accuracy of user-entered data.

Use Case ID	HP-006
Use Case Name	Connect with Wearables
Scope	HealthPal system
Level	User-goal level
Primary Actor	Fitness enthusiast(FE)
Stakeholders and Interests	<ul style="list-style-type: none"> • Fitness Enthusiast: Interested in seamless data transfer from wearables for comprehensive health tracking.

Preconditions	<ul style="list-style-type: none"> FE has installed HealthPal and logged in. FE possesses a compatible wearable device.
Success Guarantee (Post Conditions)	<ul style="list-style-type: none"> FE successfully connects their wearable device to HealthPal, enabling automatic data synchronization for a more holistic view of their health.
Main Success Scenario	<ol style="list-style-type: none"> FE navigates to the "Settings" section. FE selects "Device Integration." FE chooses their wearable brand from a list or follows on-screen instructions for manual setup. FE authorizes data sharing between HealthPal and the wearable device. System confirms successful connection and displays synced data (e.g., steps, heart rate, sleep patterns).
Extensions	<ul style="list-style-type: none"> System provides troubleshooting steps for connection issues. FE can choose specific data points to sync from the wearable.
Special Requirements	<ul style="list-style-type: none"> Compatibility with various wearable brands and models. Secure data transfer protocols.
Technology and Data Variations List	<ul style="list-style-type: none"> Bluetooth or Wi-Fi connectivity (depending on wearable).
Frequency of Occurrence	<ul style="list-style-type: none"> One-time setup, with occasional reconnection if needed.
Open Issues	<ul style="list-style-type: none"> Maintaining compatibility with evolving wearable technology.

Use Case ID	HP-007
Use Case Name	Track Sleep Patterns
Scope	HealthPal system
Level	User-goal level
Primary Actor	Fitness enthusiast(FE)
Stakeholders and Interests	<ul style="list-style-type: none"> • Fitness Enthusiast: Interested in monitoring sleep quality to optimize recovery and improve overall health.
Preconditions	<ul style="list-style-type: none"> • FE has installed HealthPal and logged in. • FE has a wearable device with sleep tracking capabilities (optional).
Success Guarantee (Post Conditions)	<ul style="list-style-type: none"> • FE successfully tracks their sleep patterns within HealthPal, gaining insights into sleep duration, quality, and sleep stages, allowing for adjustments to improve their sleep hygiene.
Main Success Scenario	<ol style="list-style-type: none"> 1. FE navigates to the "Sleep" section. 2. System displays sleep data (if wearable connected): total sleep duration, sleep stages (light, deep, REM), sleep efficiency. 3. FE can manually enter sleep and wake times (if no wearable). 4. System calculates sleep metrics and compares them to recommended sleep goals. 5. FE can review sleep trends over time.
Extensions	<ul style="list-style-type: none"> • System provides educational content on sleep hygiene practices. • FE can set sleep goals and receive reminders to maintain a regular

	<p>sleep schedule.</p> <ul style="list-style-type: none"> Integration with smart home devices to adjust bedroom
--	--

	environment for better sleep (e.g., temperature, lighting).
Special Requirements	<ul style="list-style-type: none"> Compatibility with various sleep tracking wearables.
Technology and Data Variations List	<ul style="list-style-type: none"> Sleep data from wearables (optional). Manual sleep data entry.
Frequency of Occurrence	<ul style="list-style-type: none"> Daily (automatic) or upon manual entry.
Open Issues	<ul style="list-style-type: none"> Accuracy of sleep data from wearables may vary.

Use Case ID	HP-008
Use Case Name	Participate in Fitness Challenges
Scope	HealthPal system
Level	User-goal level
Primary Actor	Fitness enthusiast(FE)
Stakeholders and Interests	<ul style="list-style-type: none"> Fitness Enthusiast: Interested in staying motivated and engaged in their fitness journey through friendly competition and community support.
Preconditions	<ul style="list-style-type: none"> FE has installed HealthPal and logged in. FE has an internet connection.
Success Guarantee (Post Conditions)	<ul style="list-style-type: none"> FE successfully participates in a fitness challenge within HealthPal, boosting motivation and fostering a

	sense of community through shared goals.
--	--

Main Success Scenario	<ol style="list-style-type: none"> 1. FE navigates to the "Challenges" section. 2. System displays a list of ongoing fitness challenges with descriptions and participation requirements (e.g., steps walked in a week, workout consistency). 3. FE chooses a challenge that aligns with their goals and interests. 4. FE joins the challenge and competes against other users on a leaderboard. 5. System tracks FE's progress towards the challenge goal. 6. FE receives motivational messages and badges for achieving milestones.
Extensions	<ul style="list-style-type: none"> • FE can create or host their own challenges and invite friends to participate. • System facilitates communication and interaction among challenge participants. • FE can earn rewards for completing challenges (e.g., discounts on fitness gear, virtual badges).
Special Requirements	<ul style="list-style-type: none"> • Engaging and diverse challenge formats to cater to different fitness levels and interests.
Technology and Data Variations List	<ul style="list-style-type: none"> • Leaderboard functionality. • Communication features (optional).
Frequency of Occurrence	<ul style="list-style-type: none"> • FE can participate in multiple challenges simultaneously, depending on their preferences.

Open Issues	<ul style="list-style-type: none">• Maintaining a fair and balanced playing field for participants with varying fitness levels.
--------------------	---

Use Case ID	HP-009
Use Case Name	Set Up Personalized Meal Plan (Advanced)
Scope	HealthPal system
Level	User-goal level
Primary Actor	Fitness enthusiast(FE)
Stakeholders and Interests	<ul style="list-style-type: none"> • Fitness Enthusiast: Tailor a meal plan that aligns with specific dietary needs, preferences, and allergies.
Preconditions	<ul style="list-style-type: none"> • FE has installed HealthPal and logged in. • FE has completed a detailed profile including dietary restrictions, allergies, and food preferences. • FE has connected with a registered dietitian (RD) on the platform (optional).
Success Guarantee (Post Conditions)	<ul style="list-style-type: none"> • FE successfully creates a personalized meal plan within HealthPal that caters to their individual needs and goals, promoting healthy eating habits.
Main Success Scenario	<ol style="list-style-type: none"> 1. FE navigates to the "Nutrition" section and selects "Meal Plans." 2. System prompts FE to answer questions about dietary goals (weight loss, muscle gain), preferences (vegetarian, low-carb), and allergies/restrictions. 3. Based on the answers, HealthPal generates a sample meal plan with options for breakfast, lunch, dinner, and snacks. 4. FE can customize the plan by swapping meals, adjusting portion sizes.

	sizes, or searching for alternative recipes within the app.
Extensions	<ul style="list-style-type: none"> Integration with grocery delivery services for seamless purchasing of meal plan ingredients. Ability to track adherence to the meal plan and receive feedback. Educational content on healthy eating habits and portion control.
Special Requirements	<ul style="list-style-type: none"> Secure platform for communication between FE and RD. Extensive recipe database with customizable options for dietary needs.
Technology and Data Variations List	<ul style="list-style-type: none"> Integration with grocery delivery services (optional).
Frequency of Occurrence	<ul style="list-style-type: none"> FE can create or modify their meal plan as needed, with ongoing support from the RD (if applicable).
Open Issues	<ul style="list-style-type: none"> Ensuring the accuracy and effectiveness of RD consultations conducted virtually.

Use Case ID	HP-010
Use Case Name	Mindfulness & Meditation Practices
Scope	HealthPal system
Level	User-goal level
Primary Actor	Fitness enthusiast(FE)
Stakeholders and Interests	<ul style="list-style-type: none"> Fitness Enthusiast: Reduce stress, improve focus, and promote overall well-being through

	mindfulness and meditation practices.
Preconditions	<ul style="list-style-type: none"> • FE has installed HealthPal and logged in. • FE has an internet connection (optional).
Success Guarantee (Post Conditions)	<ul style="list-style-type: none"> • FE successfully utilizes HealthPal's mindfulness and meditation features, integrating these practices into their routine for improved mental well-being.
Main Success Scenario	<ol style="list-style-type: none"> 1. FE navigates to the "Wellbeing" section and selects "Mindfulness & Meditation." 2. System displays a library of guided meditations categorized by duration, purpose (stress reduction, sleep improvement), and difficulty level. 3. FE chooses a meditation session and follows the audio instructions. 4. System offers additional features like breathwork exercises and calming soundscapes.
Extensions	<ul style="list-style-type: none"> • Integration with wearable devices to track physiological responses during meditation (optional). • Ability to set daily or weekly meditation reminders. • Educational content on the benefits of mindfulness and different meditation techniques. • Progress tracking to monitor consistency and user experience.
Special Requirements	<ul style="list-style-type: none"> • High-quality audio recordings for guided meditations. • Collaboration with meditation experts for content creation.
Technology and Data Variations List	<ul style="list-style-type: none"> • Audio playback functionality.

	<ul style="list-style-type: none"> • Wearable data integration (optional).
--	---

Frequency of Occurrence	<ul style="list-style-type: none"> • Daily or as frequently as desired by FE.
Open Issues	<ul style="list-style-type: none"> • Encouraging long-term adherence to mindfulness practices.

Use Case ID	HP-011
Use Case Name	Community Fitness Events
Scope	HealthPal system
Level	User-goal level
Primary Actor	Fitness enthusiast(FE)
Stakeholders and Interests	<ul style="list-style-type: none"> • Fitness Enthusiast: Discover and participate in local fitness events to stay motivated, connect with others, and explore new activities. • Event Organizers: Promote their events to a wider audience within the HealthPal user base.
Preconditions	<ul style="list-style-type: none"> • FE has installed HealthPal and logged in. • FE has enabled location services (optional).
Success Guarantee (Post Conditions)	<ul style="list-style-type: none"> • FE successfully discovers and registers for local fitness events (runs, group fitness classes) through HealthPal, fostering a sense of community and promoting participation in physical activities. • Event organizers effectively reach their target audience within the HealthPal platform.
Main Success Scenario	<ol style="list-style-type: none"> 1. FE navigates to the "Events"

	<p>section.</p> <p>2. System displays a list of upcoming fitness events in the FE's area (based on location services or zip code).</p>
--	--

	<p>3. FE can filter events by category (running, yoga, HIIT), date, and difficulty level.</p> <p>4. FE selects an event and views details like description, location, registration fee, and organizer information.</p> <p>5. FE can register for the event directly within the app (if applicable).</p>
Extensions	<ul style="list-style-type: none"> Ability for FEs to create and share their own fitness events. Integration with social media platforms to share event participation and connect with friends. Event reviews and ratings from other FEs.
Special Requirements	<ul style="list-style-type: none"> Secure payment gateway for event registration fees (if applicable). Location-based services for accurate event discovery.
Technology and Data Variations List	<ul style="list-style-type: none"> Maps integration for event locations. Social media integration (optional).
Frequency of Occurrence	<ul style="list-style-type: none"> FEs can discover and register for multiple events throughout the year.
Open Issues	<ul style="list-style-type: none"> Maintaining data accuracy and verification for user-created events.

Use Case ID	HP-012
Use Case Name	Track Hydration Levels
Scope	HealthPal system

Level	User-goal level
Primary Actor	Fitness enthusiast(FE)
Stakeholders and Interests	<ul style="list-style-type: none"> • Fitness Enthusiast: Monitor and maintain optimal hydration levels for improved performance, health, and well-being.
Preconditions	<ul style="list-style-type: none"> • FE has installed HealthPal and logged in. • FE can enter data manually or connect a wearable with hydration tracking capabilities (optional).
Success Guarantee (Post Conditions)	<ul style="list-style-type: none"> • FE successfully tracks their daily water intake within HealthPal, receiving personalized reminders and insights to ensure proper hydration.
Main Success Scenario	<ol style="list-style-type: none"> 1. FE navigates to the "Hydration" section. 2. FE sets a daily water intake goal based on their weight, activity level, and climate. 3. FE manually logs the amount of water consumed throughout the day. 4. System tracks progress towards the daily goal and displays remaining water intake needed. 5. FE receives motivational prompts

	to drink water at regular intervals.
Extensions	<ul style="list-style-type: none"> Integration with smart water bottles that track and sync water intake data. Personalized recommendations for water intake based on weather conditions and planned activities. Educational content on the importance of hydration and its impact on health.
Special Requirements	<ul style="list-style-type: none"> Compatibility with various wearable hydration tracking features.

Technology and Data Variations List	<ul style="list-style-type: none"> Manual water intake entry. Wearable data integration (optional).
Frequency of Occurrence	<ul style="list-style-type: none"> Daily, with ongoing monitoring and adjustments based on user data.
Open Issues	<ul style="list-style-type: none"> Accuracy of hydration data may vary depending on user input or wearable limitations.

Use Case ID	HP-013
Use Case Name	Pre- and Post-Workout Routines
Scope	HealthPal system
Level	User-goal level
Primary Actor	Fitness enthusiast(FE)
Stakeholders and Interests	<ul style="list-style-type: none"> Fitness Enthusiast: Perform effective warm-up and cool-down routines to minimize injury risk and optimize workout performance.

Preconditions	<ul style="list-style-type: none">• FE has installed HealthPal and logged in.
Success Guarantee (Post Conditions)	<ul style="list-style-type: none">• FE successfully utilizes HealthPal's pre- and post-workout routines, reducing injury risk and enhancing workout effectiveness.
Main Success Scenario	<ol style="list-style-type: none">1. FE selects a workout plan from the HealthPal library.2. System displays a video or instructional guide for the pre-workout routine, including dynamic stretches and muscle activation exercises.

	<ol style="list-style-type: none"> 3. After completing the workout, FE can access a post-workout routine focused on static stretches and mobility exercises. 4. System offers variations of these routines based on the chosen workout and user preferences.
Extensions	<ul style="list-style-type: none"> • Integration with wearable data to personalize warm-up intensity based on heart rate or muscle activity. • Ability for FEs to create and save their own custom pre- and post-workout routines. • Timer functionality to guide users through each exercise in the routines.
Special Requirements	<ul style="list-style-type: none"> • High-quality instructional videos for various pre- and post-workout exercises. • Collaboration with fitness professionals for routine development.
Technology and Data Variations List	<ul style="list-style-type: none"> • Video playback functionality. • Wearable data integration (optional). • Timer functionality (optional).
Frequency of Occurrence	<ul style="list-style-type: none"> • Before and after each workout session.
Open Issues	<ul style="list-style-type: none"> • Ensuring users perform the exercises correctly to maximize benefits and minimize risk.

Use Case ID	HP-014
Use Case Name	Schedule Virtual Training Session

Scope	HealthPal system
Level	User-goal level
Primary Actor	Fitness enthusiast(FE)
Stakeholders and Interests	<ul style="list-style-type: none"> • Fitness Enthusiast: Wants to conveniently schedule virtual training sessions with coaches or fitness professionals within HealthPal. • Trainer/Coach: Benefits by having a streamlined system for managing client bookings. • HealthPal: Encourages user engagement by facilitating access to professional guidance.
Preconditions	<ul style="list-style-type: none"> • FE has a HealthPal account. • FE has browsed available trainers/coaches and identified a desired session.
Success Guarantee (Post Conditions)	<ul style="list-style-type: none"> • FE successfully schedules a virtual training session with their chosen trainer/coach at a desired date and time within HealthPal. Both FE and trainer receive a confirmation with details.
Main Success Scenario	<ol style="list-style-type: none"> 1. FE navigates to the "Training" section of the app. 2. FE browses available trainers/coaches by specialty, ratings, or availability. 3. FE selects a specific training session offered by a chosen trainer. 4. The session details page displays available dates and time slots. 5. FE chooses a preferred date and time slot. (Optional) FE can review trainer's profile and bio before booking. 6. FE confirms the booking.

	<ul style="list-style-type: none"> o System verifies trainer availability and confirms booking.
	<p>7. Both FE and Trainer receive confirmation notifications with details (date, time, trainer information, meeting link).</p>
Extensions	<ul style="list-style-type: none"> • Implement video conferencing integration within HealthPal for seamless session execution. • Allow secure in-app payment processing for booking sessions. • Enable pre-session chat functionality for FE and trainer communication.
Special Requirements	<ul style="list-style-type: none"> • Integration with appointment scheduling tools or calendars. • Secure communication channels for video conferencing and in-app chat.
Technology and Data Variations List	<ul style="list-style-type: none"> • Trainer/coach profiles and availability data. • Session details (type, duration, cost). • User calendar integration (optional).
Frequency of Occurrence	<ul style="list-style-type: none"> • Varies depending on FE's training needs.
Open Issues	<ul style="list-style-type: none"> • Trainer/coach availability needs to be accurately reflected in real-time. • Integration with various video conferencing platforms might be needed. pen_spark •

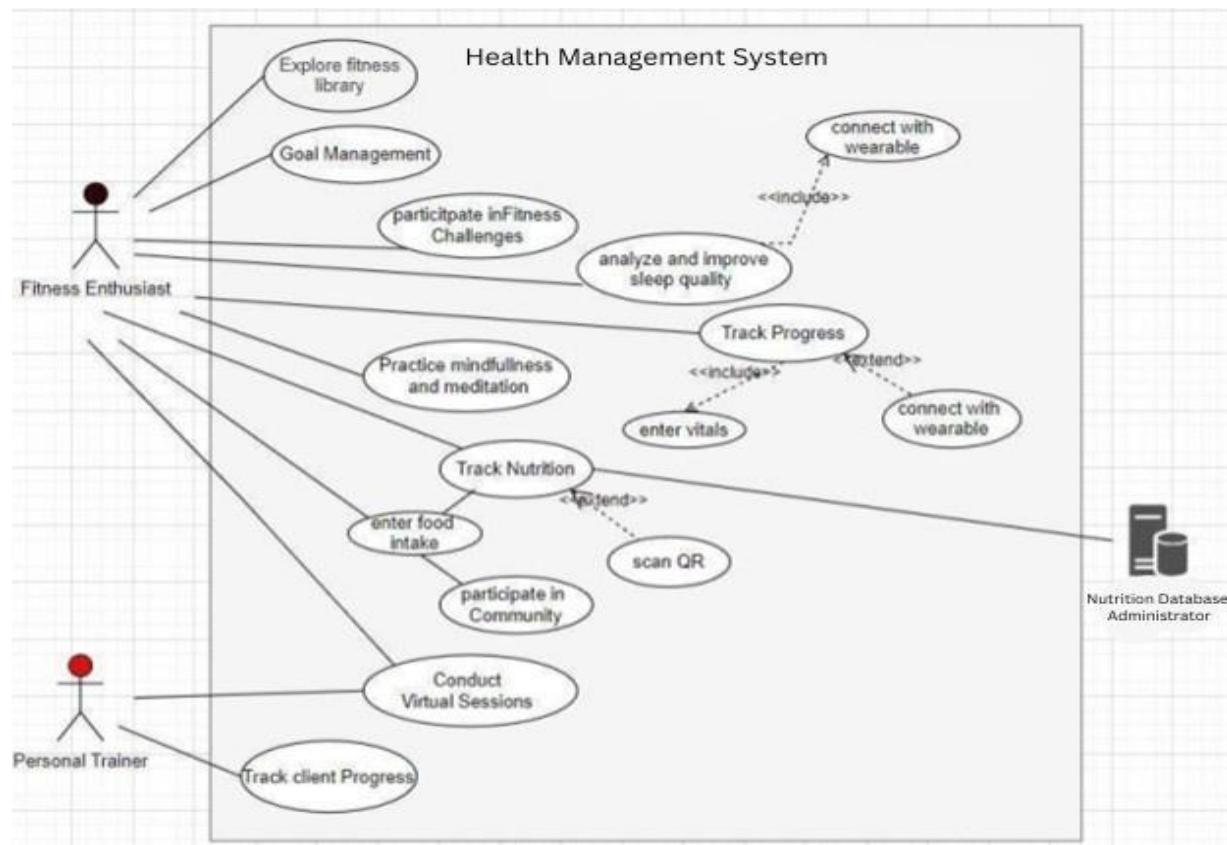
Use Case ID	HP-015
Use Case Name	Analyze Sleep Stages and Improve Sleep Quality
Scope	HealthPal system
Level	User-goal level

Primary Actor	Fitness enthusiast(FE)
Stakeholders and Interests	<ul style="list-style-type: none"> • Fitness Enthusiast: Gain deeper insights into sleep architecture (deep sleep, REM sleep, light sleep) to optimize sleep quality and improve overall health.
Preconditions	<ul style="list-style-type: none"> • FE has installed HealthPal and logged in. • FE has a wearable device with advanced sleep tracking capabilities (e.g., sleep stage monitoring).
Success Guarantee (Post Conditions)	<ul style="list-style-type: none"> • FE successfully utilizes HealthPal's sleep stage analysis features, identifying sleep quality issues and receiving personalized recommendations for improvement.

Main Success Scenario	<ol style="list-style-type: none"> 1. FE awakens and views their sleep data within HealthPal. 2. System displays a detailed breakdown of sleep stages (deep sleep, REM sleep, light sleep) throughout the night. 3. FE can compare sleep data to recommended sleep quality benchmarks and identify potential sleep disturbances. 4. HealthPal offers personalized recommendations based on sleep data, such as relaxation techniques, adjustments to sleep hygiene habits, or consulting a healthcare professional for chronic sleep issues.
Extensions	<ul style="list-style-type: none"> • Integration with smart bedroom devices to automatically adjust sleep environment (e.g., temperature, light) based on sleep stages.
	<ul style="list-style-type: none"> • Educational content on the importance of deep sleep for cognitive function and physical recovery. • Collaboration with sleep specialists for advanced sleep analysis and personalized coaching (optional - paid service).
Special Requirements	<ul style="list-style-type: none"> • Compatibility with advanced sleep tracking wearables. • Secure data storage and anonymization for sleep research purposes (with user consent).
Technology and Data Variations List	<ul style="list-style-type: none"> • Wearable data integration with sleep stage monitoring capabilities. • Smart home device integration (optional).

Frequency of Occurrence	<ul style="list-style-type: none"> Daily analysis of sleep data with adjustments to sleep habits based on ongoing trends.
Open Issues	<ul style="list-style-type: none"> Accuracy of sleep stage data from wearables may vary and require further research and development. Balancing user privacy with the potential benefits of sleep data analysis for research and development.

2.5 Use Case Diagram



3. Other Nonfunctional Requirements

3.1 Performance Requirements

The **Health and Fitness Tracker** must meet the following performance benchmarks to ensure smooth operation under various conditions:

1. Response Time:

- User actions (e.g., updating meal plans or workout schedules) should be processed and displayed within **2 seconds** under normal network conditions.
- Synchronization with external devices (e.g., wearables) should complete within **5 seconds** after initiation.

2. Data Handling:

- The system must efficiently manage up to **10,000 active users simultaneously** without noticeable performance degradation.
- The progress tracker module should process and display graphs or statistics within **3 seconds** for datasets of up to 1 year.

3. Concurrent Users:

- Support at least **5,000 concurrent users** on a single instance without failure or slowdown.

Rationale: These performance requirements ensure a seamless and efficient user experience, especially in scenarios where quick access to fitness and health data is critical.

3.2 Safety Requirements

1. Data Integrity:

- The software must implement mechanisms to prevent data corruption during sudden power loss or system crashes. Automatic backups should occur every **10 minutes**.

2. User Safeguards:

- Features like calorie recommendations and workout suggestions must include disclaimers indicating they are guidelines and not medical advice.

3. Error Handling:

- In case of a system error, the software must log the issue and revert to the last stable state. It should display clear error messages without exposing sensitive system information.

4. Regulatory Compliance:

- The product must adhere to applicable health and fitness regulations, such as **HIPAA** (if used in healthcare settings).

3.3 Security Requirements

User Authentication:

- Require **multi-factor authentication (MFA)** for user login to prevent unauthorized access.

Data Encryption:

- All sensitive user data must be encrypted using **AES-256** encryption standards.
- Data in transit must be secured with **TLS 1.3**.

Privacy:

- Follow **GDPR** or equivalent standards to ensure user data privacy. Allow users to delete their accounts and associated data upon request.

Role-Based Access Control (RBAC):

- Define specific user roles (e.g., admin, regular user) to limit access to certain system functions.

 Vulnerability Management:

- Perform regular security audits and patch vulnerabilities within **48 hours** of identification.

3.4 Software Quality Attributes

1. **Adaptability:**

- The software should adapt to various screen sizes, including desktop, tablet, and mobile.

2. **Reliability:**

- Achieve **99.9% uptime** to ensure the system remains accessible to users.

3. **Interoperability:**

- Seamlessly integrate with at least **5 popular wearable devices** (e.g., Fitbit, Apple Watch).

4. **Maintainability:**

- The modular codebase should allow developers to add new features with minimal disruption to existing functionality.

5. **Usability:**

- Ensure an intuitive UI with clear navigation, consistent labeling, and accessible design (WCAG 2.1 compliance).

6. **Testability:**

- Implement automated test cases covering **90% of the codebase** to ensure reliability during updates.

3.5 Business Rules

 User Permissions:

- Admin users can manage user accounts and system configurations.
- Regular users can only access their profile, workout plans, and meal plans.

 Data Management:

- Only users can view or modify their personal data. Admins cannot access individual user data without explicit permission.

 Access Restrictions:

- User accounts will be locked after **5 failed login attempts**, with unlocking only possible via a secure email reset link.

 Usage Limits:

- Users can create up to **3 meal plans** and **3 workout schedules** for free accounts, with premium users having unlimited access.

3.6 Operating Environment

 Hardware Platform:

- Minimum: Dual-core processor, 4 GB RAM, 20 GB available storage.
- Recommended: Quad-core processor, 8 GB RAM, 50 GB available storage.

 Operating Systems:

- Windows 10 or later, macOS 10.15 or later, and Ubuntu 20.04 or later.

 Dependencies:

- Java Runtime Environment (JRE) version 11 or higher.
- Relational database (e.g., PostgreSQL 13).
- Web browser compatibility: Chrome, Firefox, Safari, Edge (latest versions).

3.7 User Interfaces

General Layout:

- **Navigation Bar:** Available at the top for quick access to modules (Dashboard, Meal Plans, Workouts, Progress).
- **Dashboard:** Displays an overview of user statistics (calories burned, meals logged, etc.).

Standards:

- Follow Material Design guidelines for UI components.
- Ensure consistency in color schemes and typography.

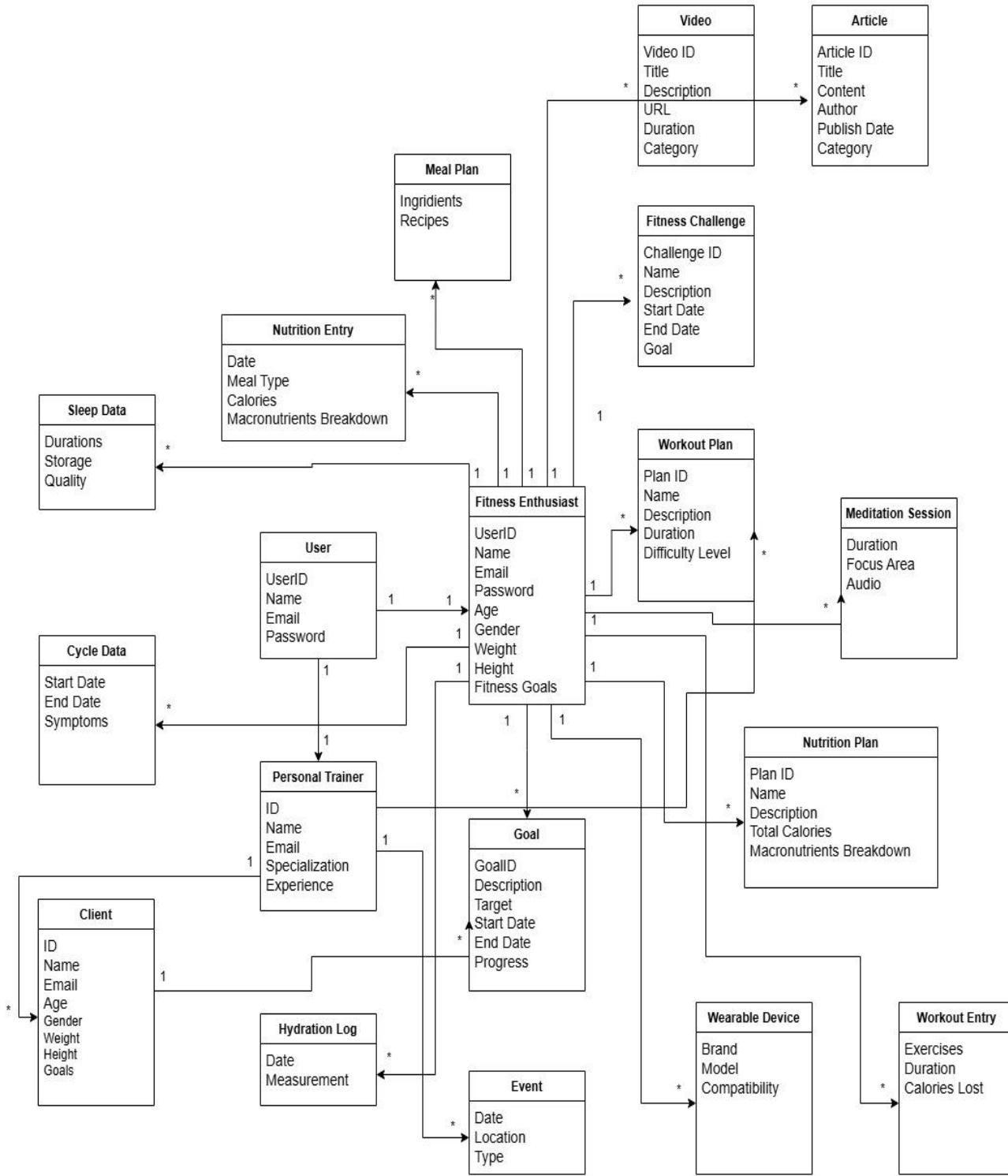
Key Features:

- **Help Button:** Accessible on every screen for user assistance.
- **Error Messages:** Display user-friendly, actionable messages (e.g., "Invalid input. Please try again.").
- **Keyboard Shortcuts:** Include shortcuts for common actions like saving progress (e.g., Ctrl+S).

Accessibility:

- Use high-contrast themes for visually impaired users.
- Enable text-to-speech for key sections.

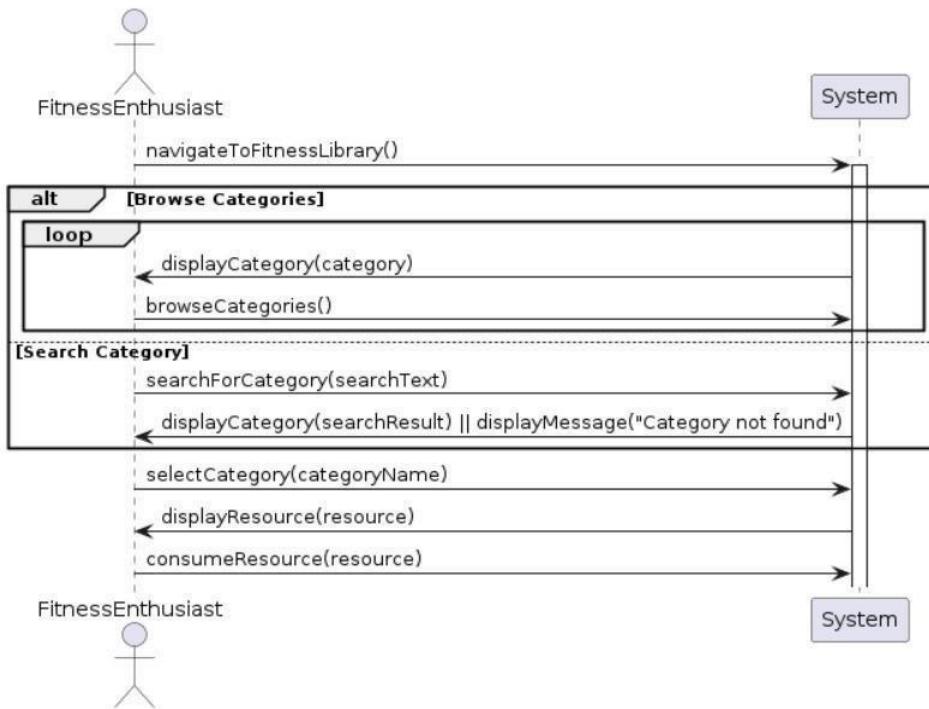
4. Domain Model



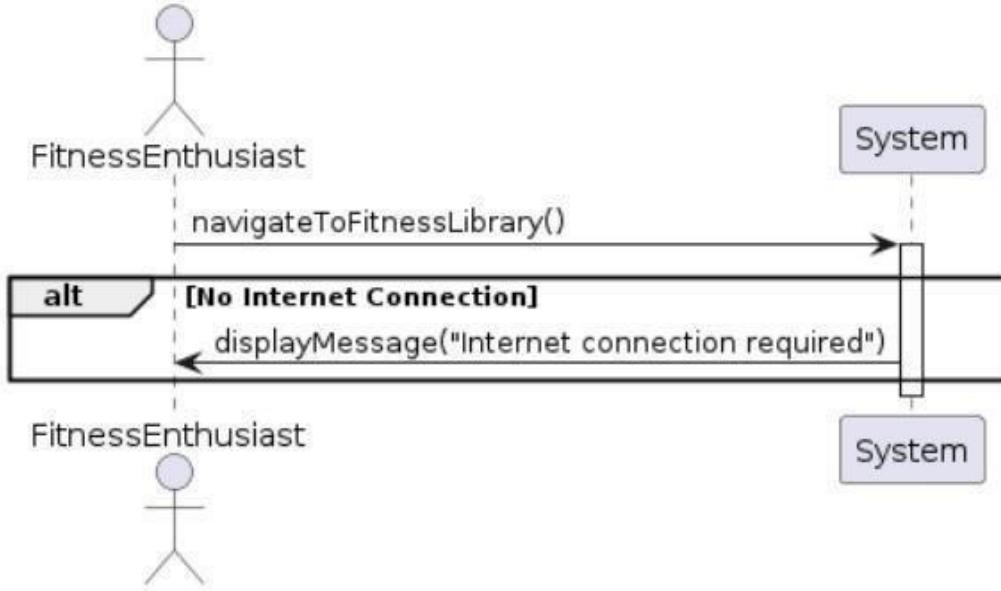
5. System Sequence Diagram

1. USE CASE 001:

- Main Scenario(Explore Fitness Library)
- SSD

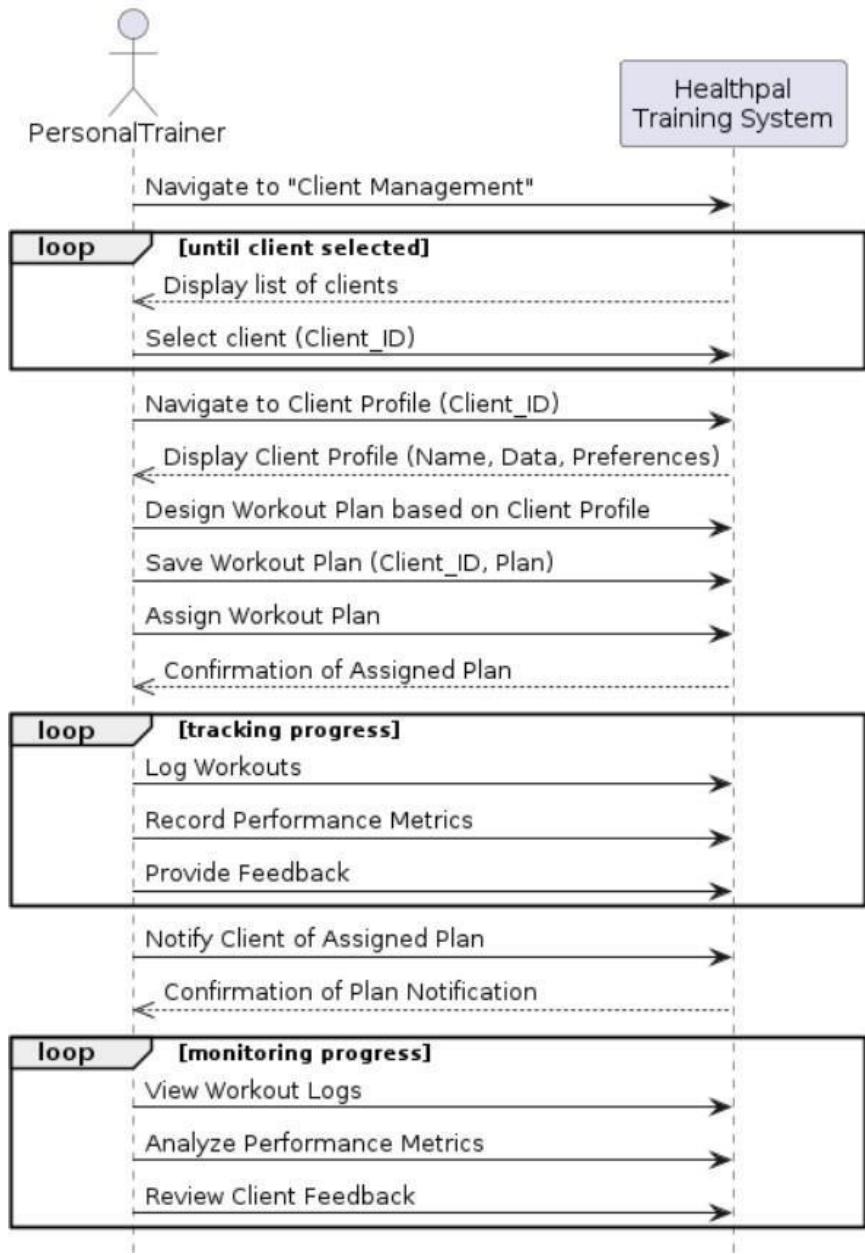


- Alternate Scenario(No internet connection):
- SSD

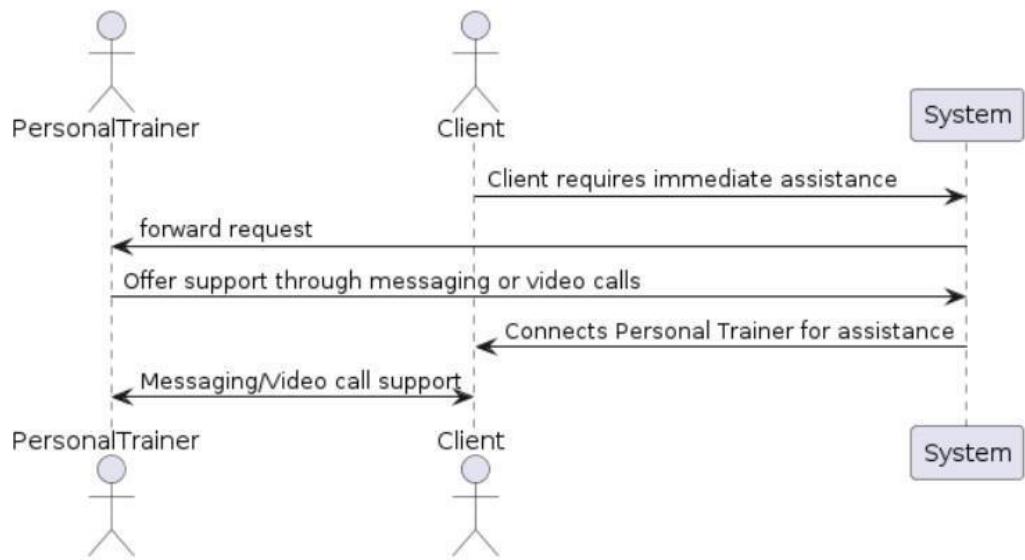


2. USE CASE 002:

- Main Scenario (Manage Client Progress)
- SSD

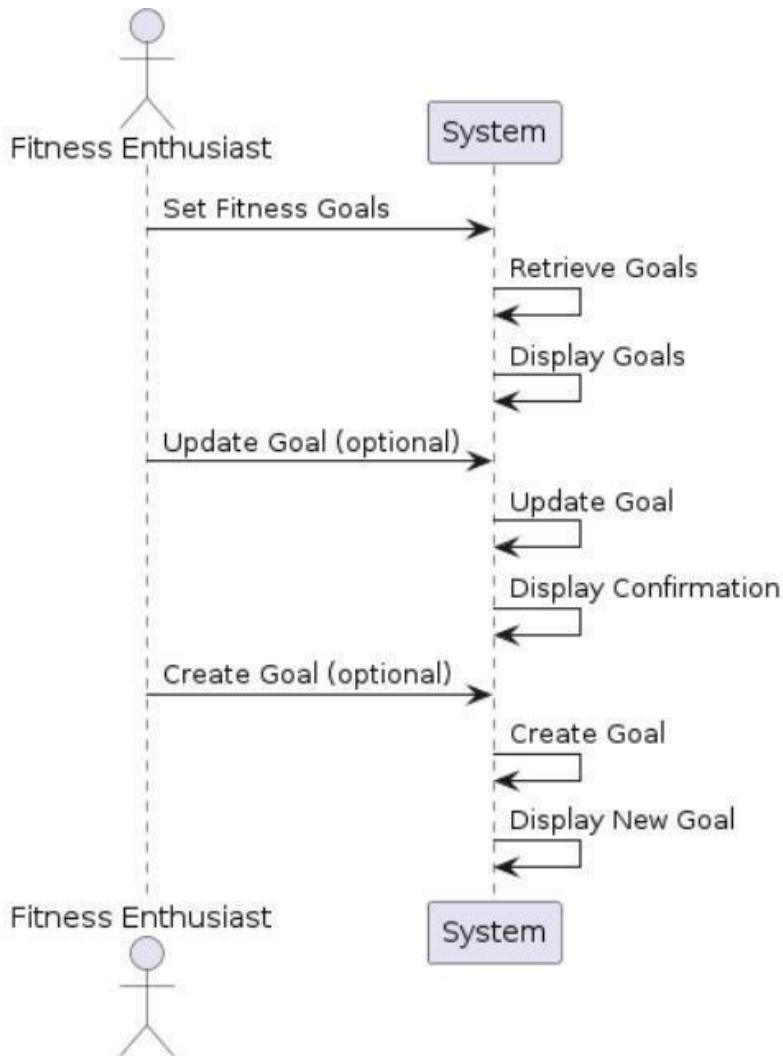


- Alternate Scenario:
- SSD

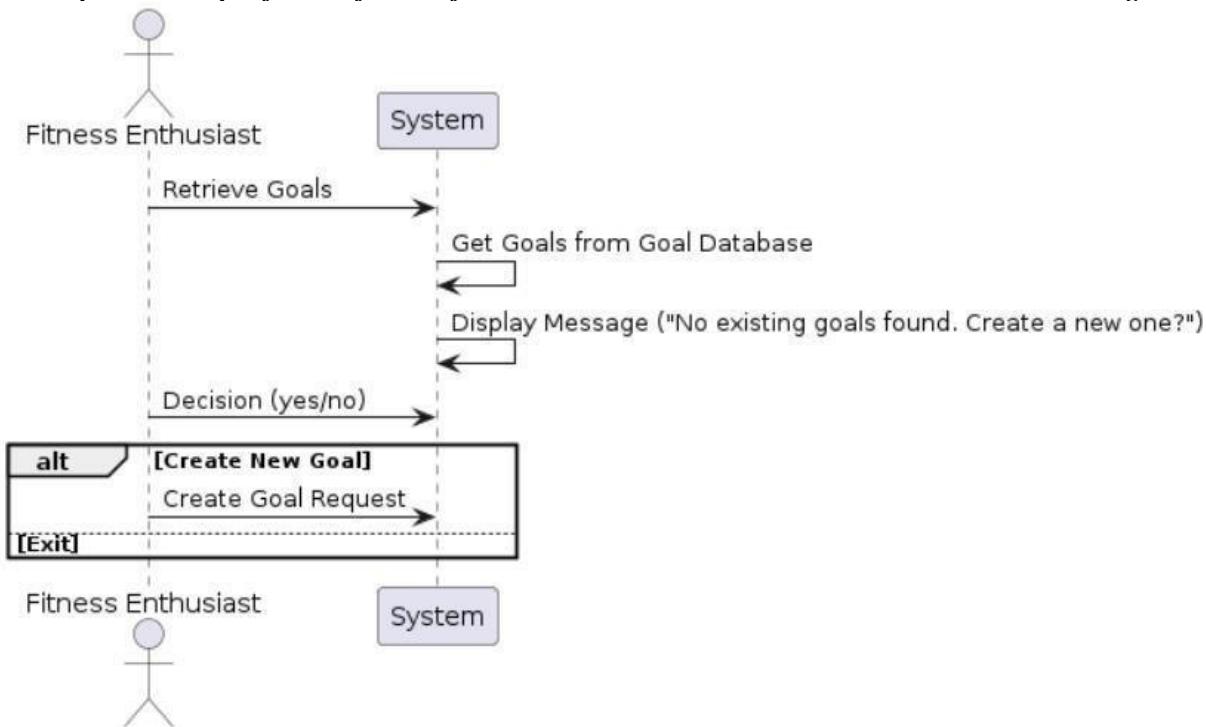


3. USE CASE 003:

- Main Scenario (Manage goals)
- SSD

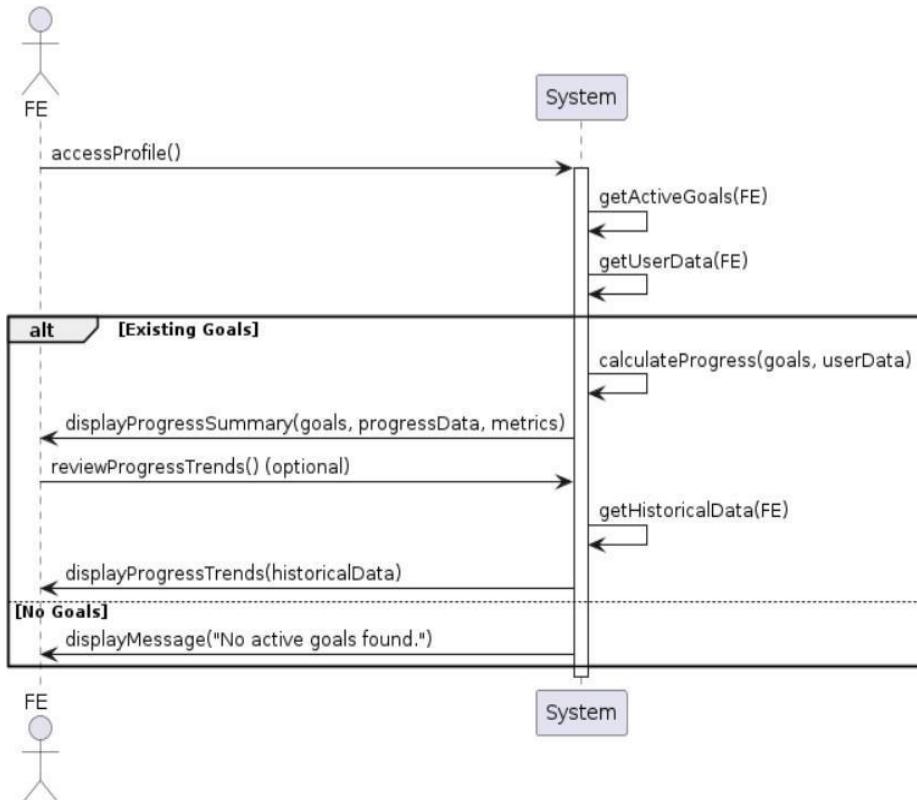


- Alternate Scenario (No Goals Found Originally):
- SSD

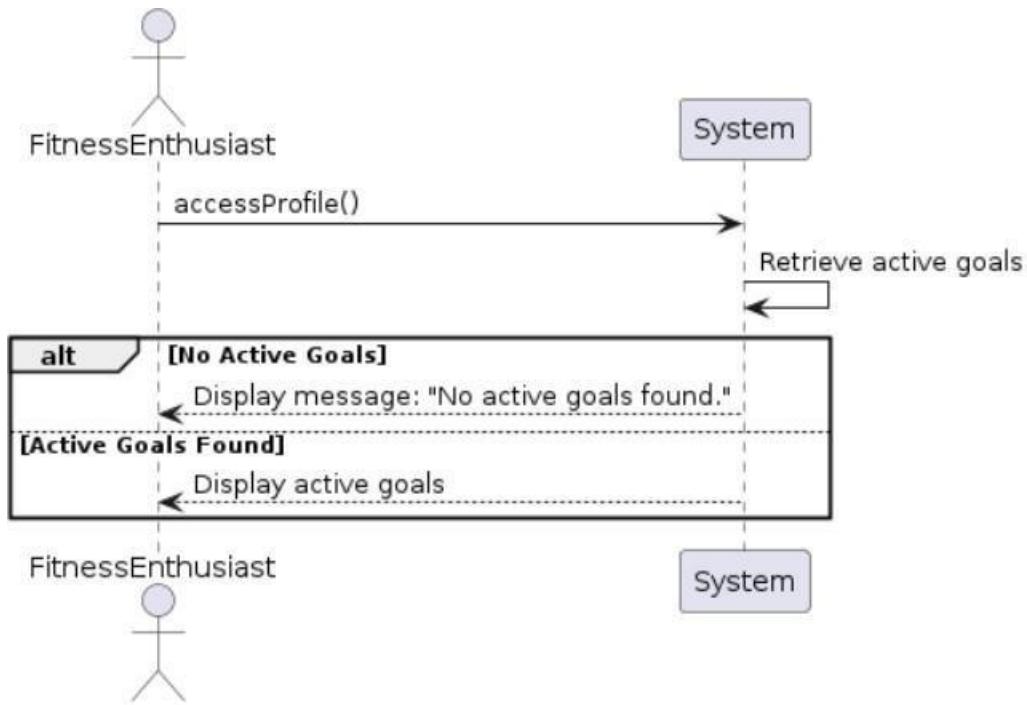


4. USE CASE 004:

- Main Scenario (Progress Tracking)
- SSD

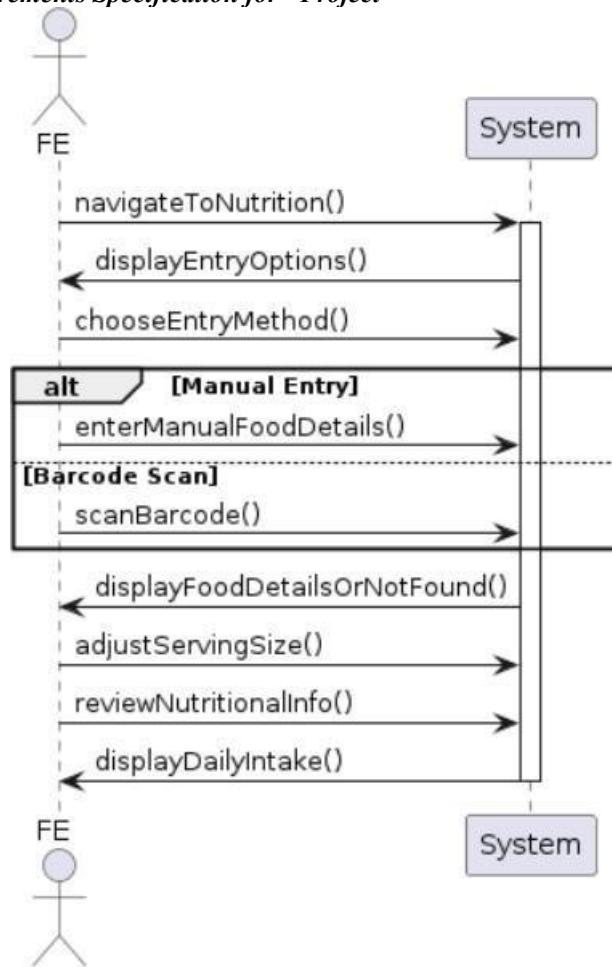


- Alternate Scenario (No Active Goals):
- SSD

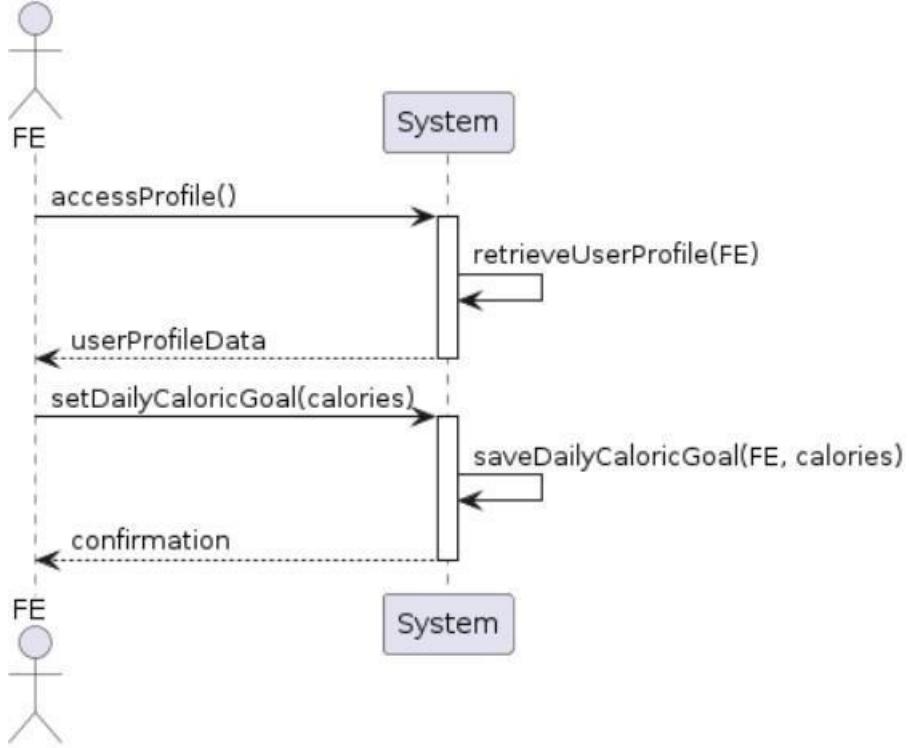


5. USE CASE 005:

- Main Scenario (Food Entry)
- SSD



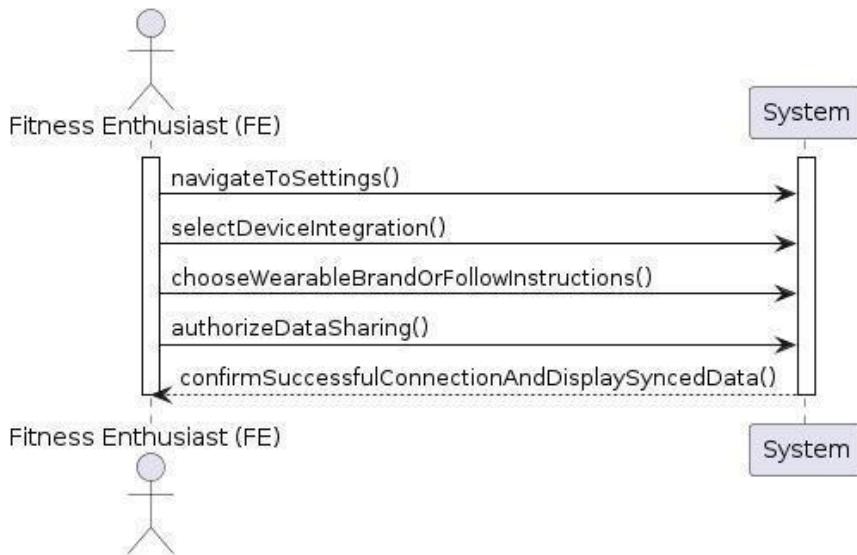
- **Alternate Scenario (No Active Goals):**
- **SSD**



6. USE CASE 006:

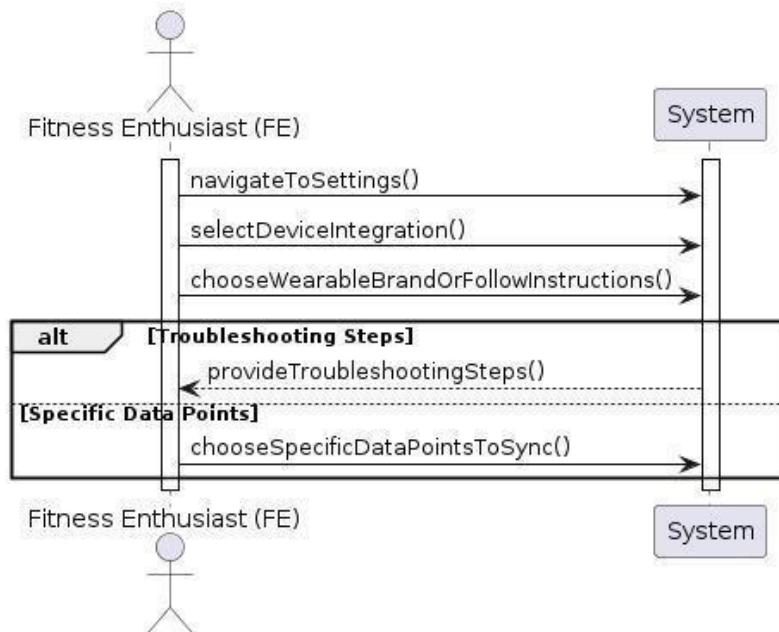
- Main Scenario
- SSD

Connect with Wearables - Main Success Scenario



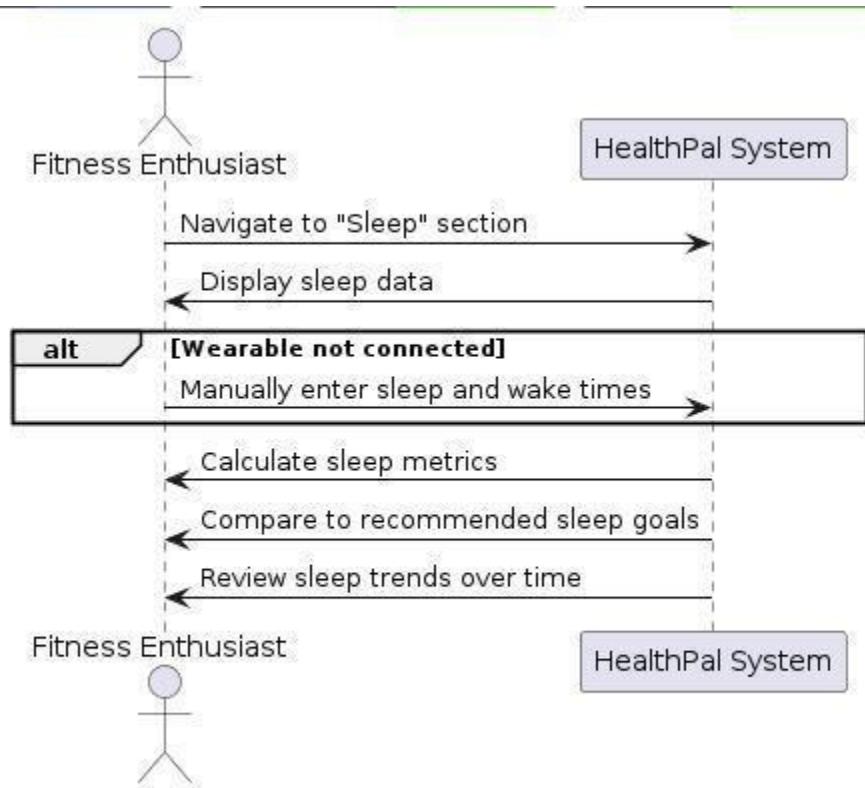
- Alternative Scenario:
- SSD

Connect with Wearables - Alternative Scenario

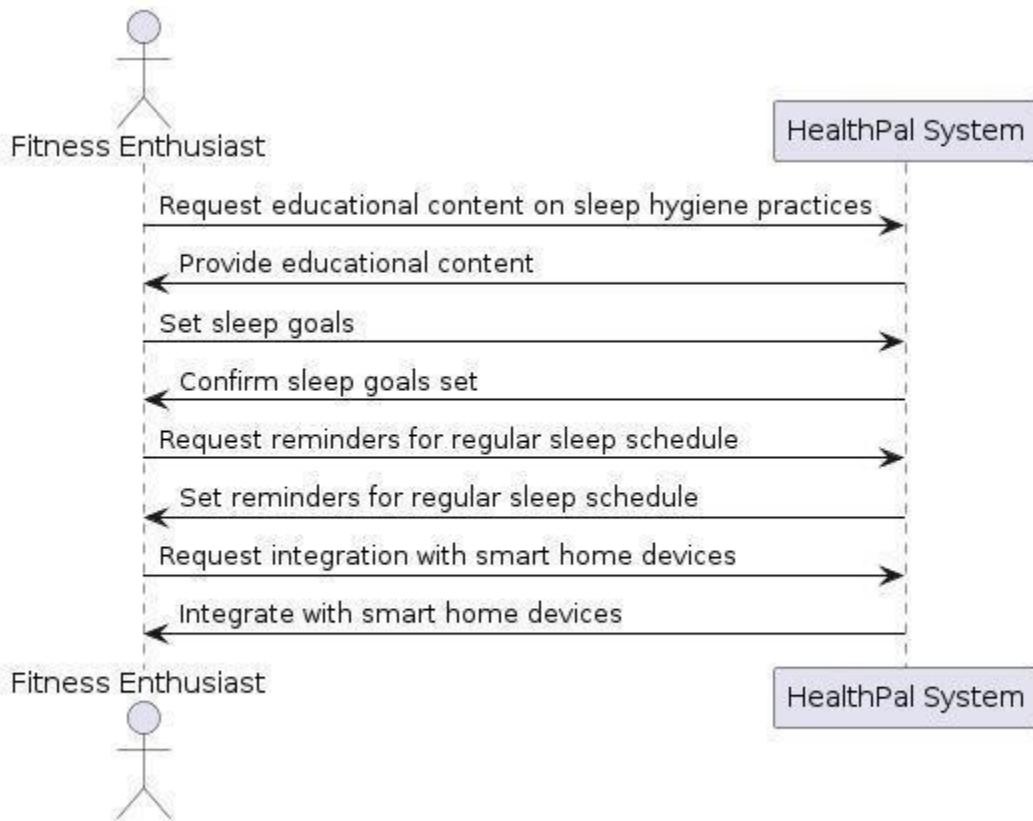


7. USE CASE 007:

- Main Scenario
- SSD



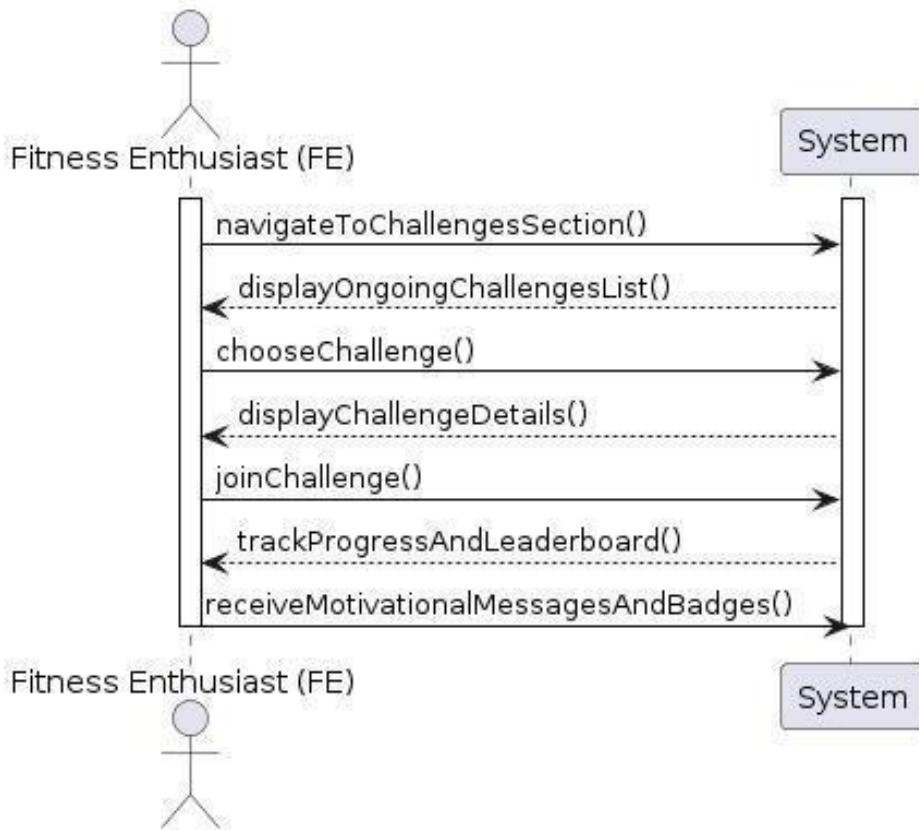
- Alternative Scenario:
- SSD



8. USE CASE 008:

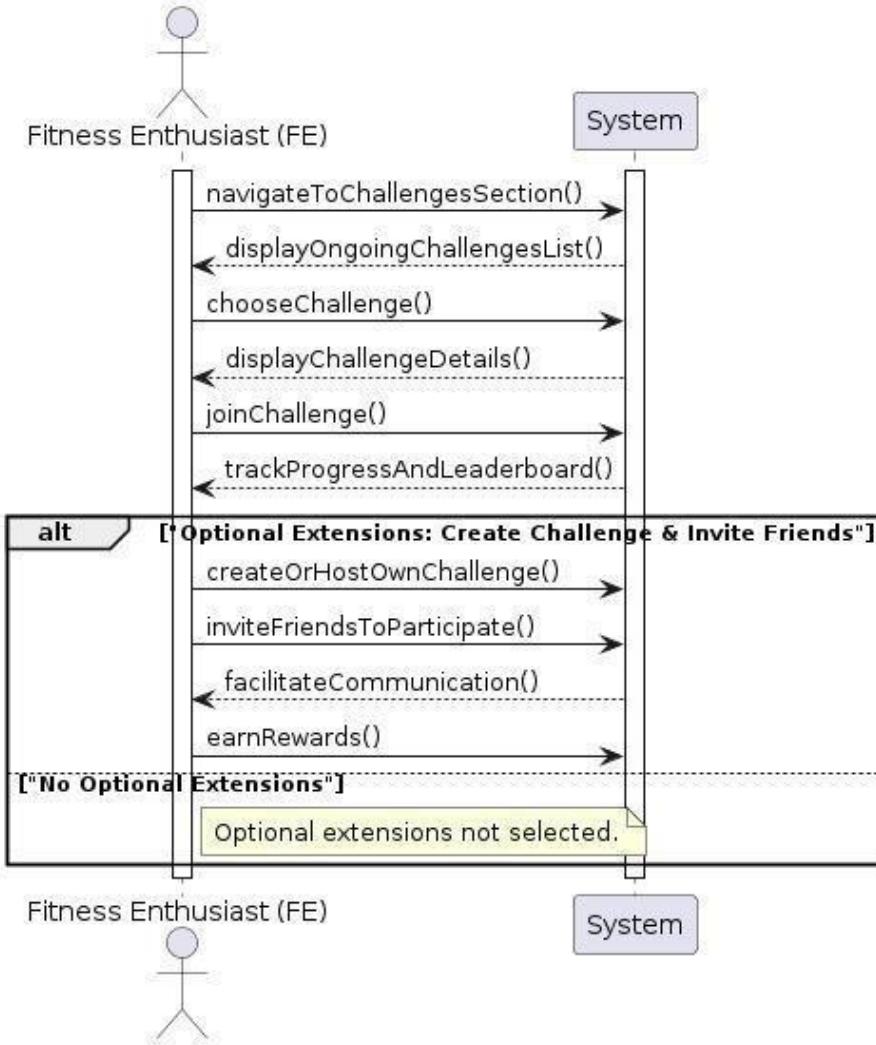
- Main Scenario
- SSD

Participate in Fitness Challenges - Main Success Scenario



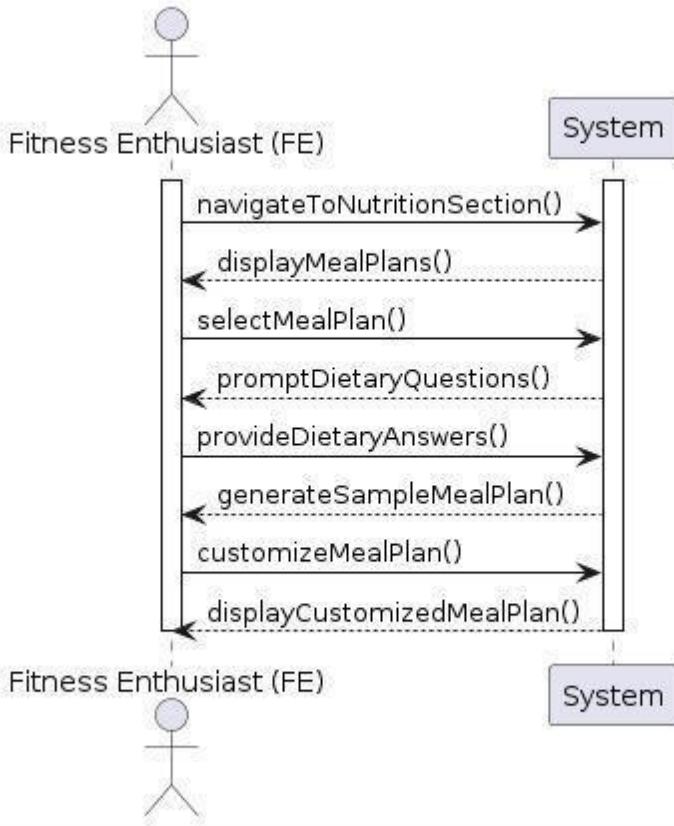
- Alternative Scenario:
- SSD

Participate in Fitness Challenges - Alternative Scenario with Optional Extensions



9. USE CASE 009:

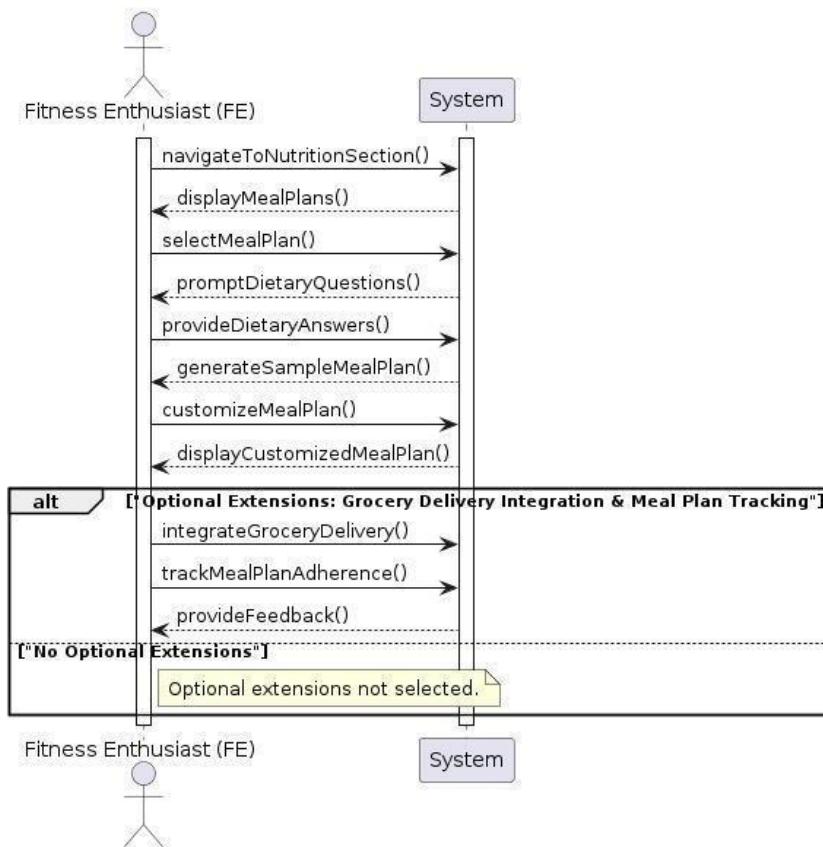
- Main Scenario
- SSD

Set Up Personalized Meal Plan (Advanced) - Main Success Scenario

- Alternative Scenario:

- SSD

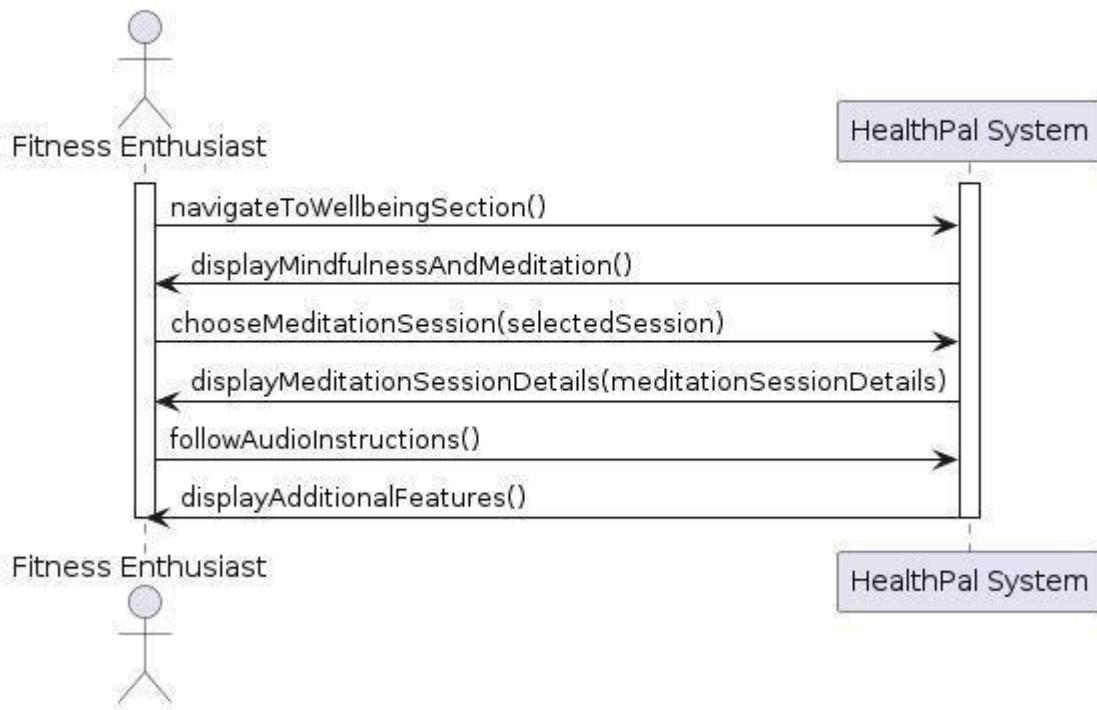
Set Up Personalized Meal Plan (Advanced) - Alternative Scenario with Optional Extensions



10. USE CASE 010:

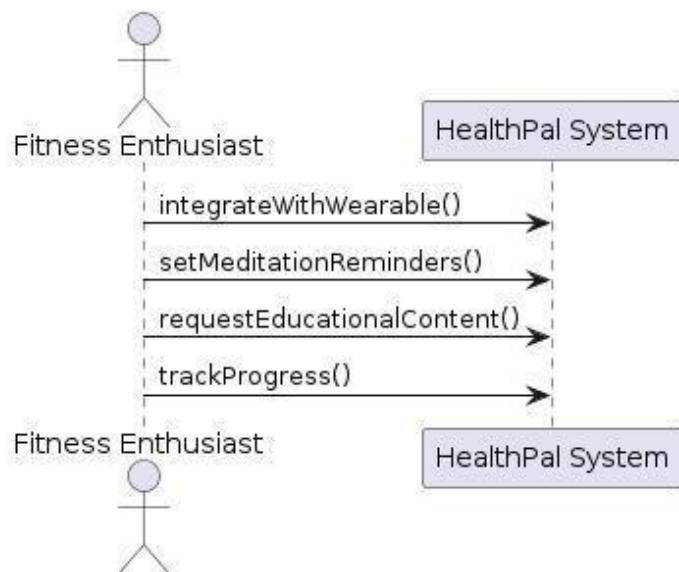
- Main Scenario
- SSD

Mindfulness & Meditation Practices - Main Success Scenario (SSD)



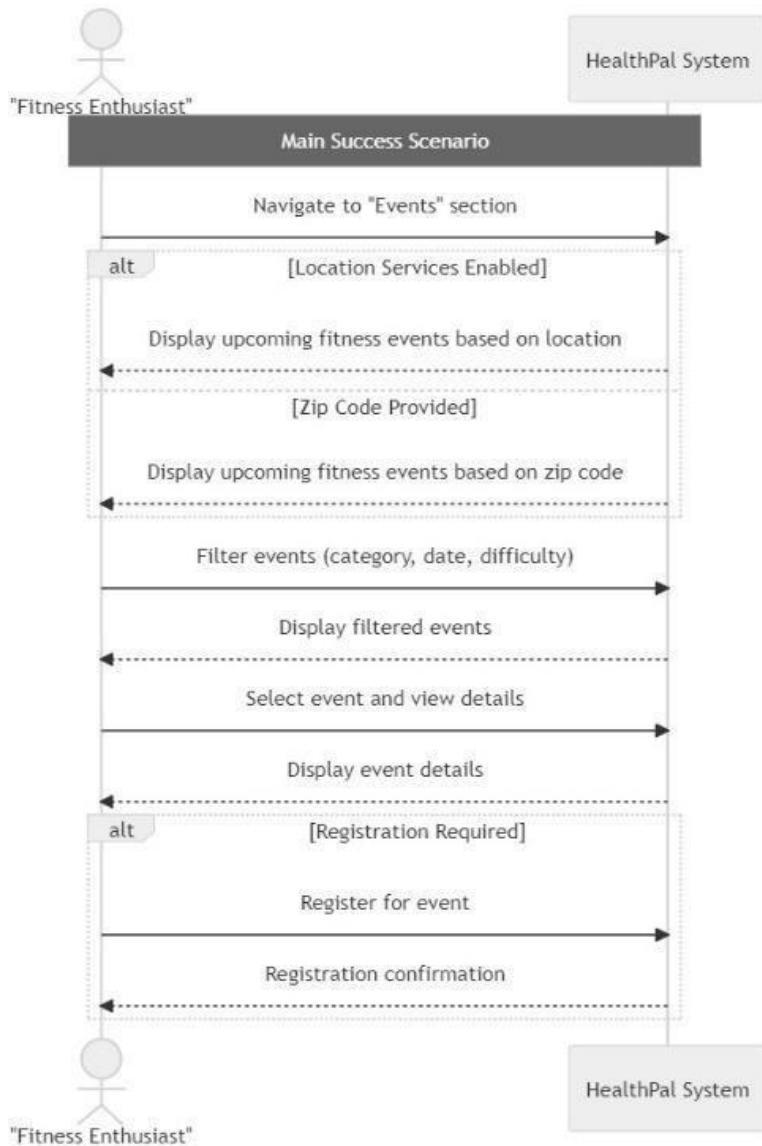
- Alternative Scenario:
- SSD

Mindfulness & Meditation Practices - Alternative Case Scenario

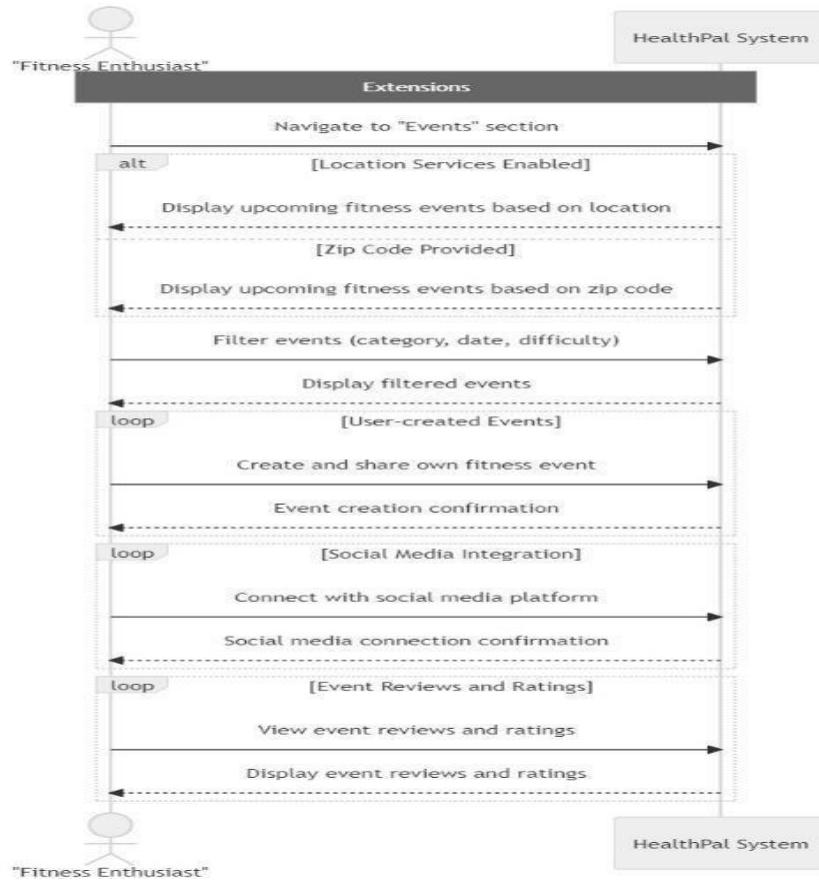


11. Use case 011:

- Main Scenario(Community Fitness Events)
- SSD

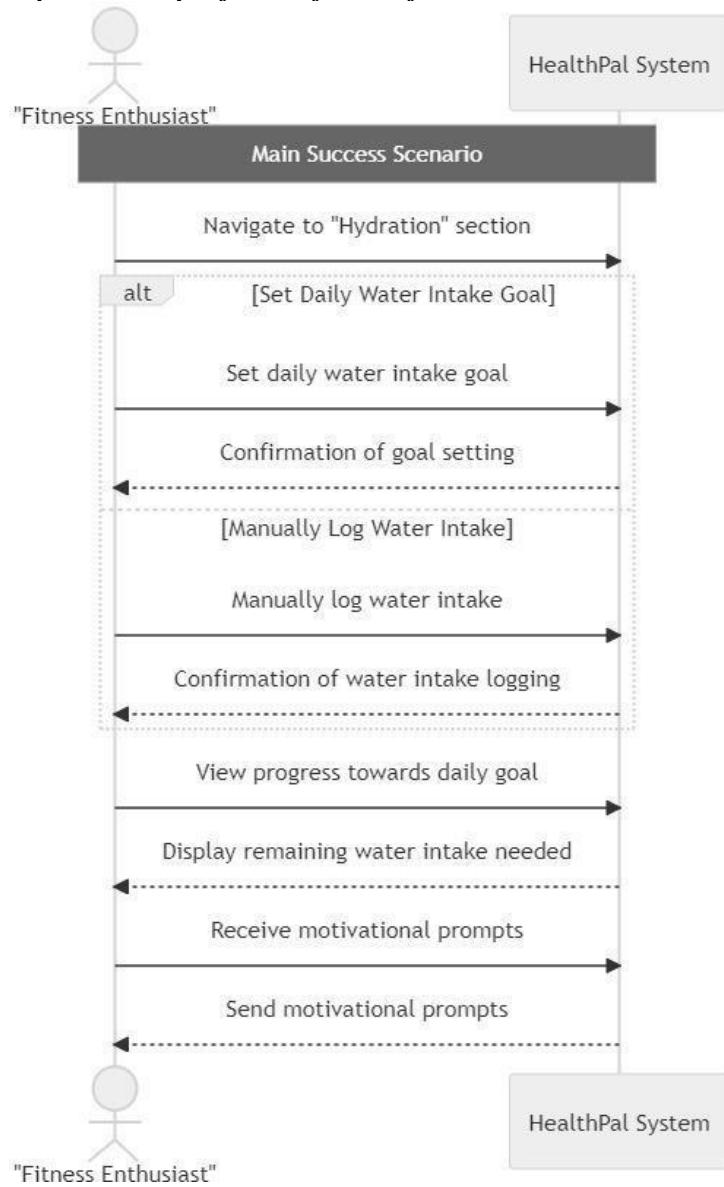


- Alternative Scenario:
- SSD

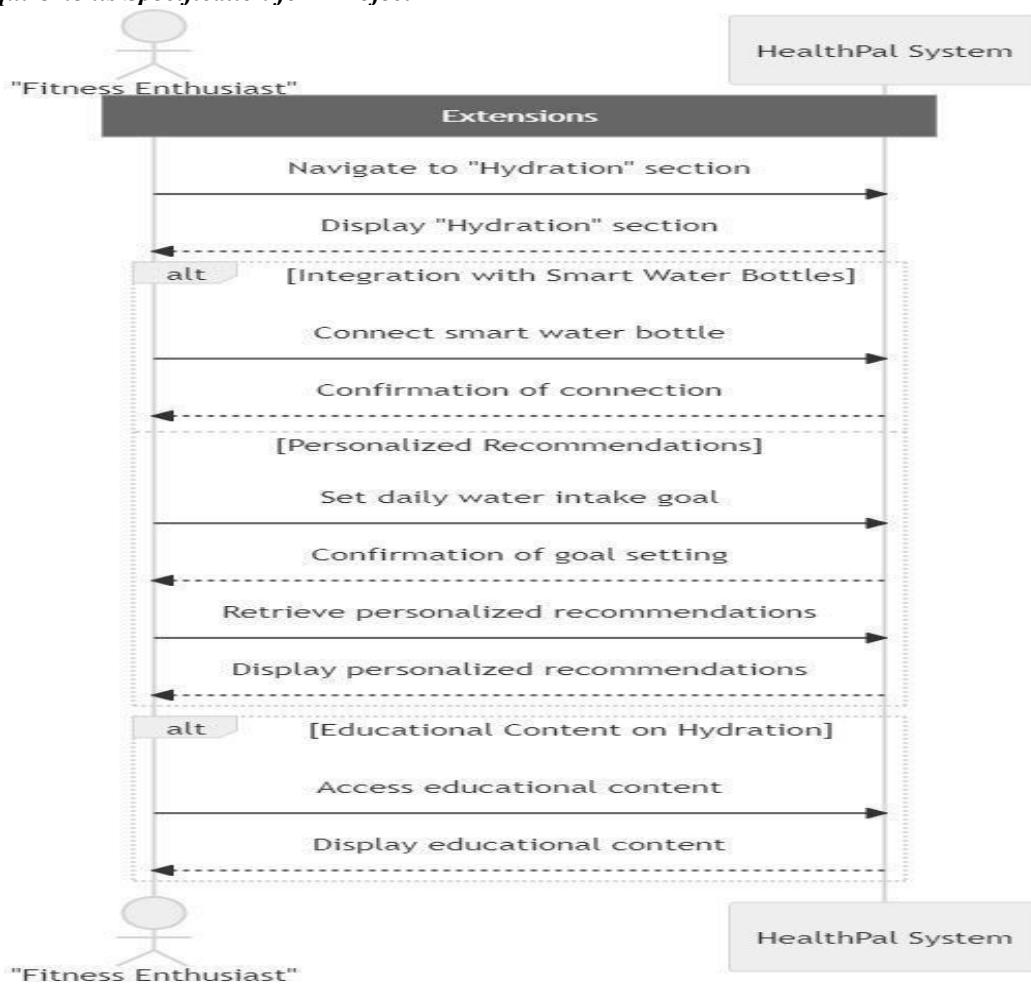


12. Use case 012:

- Main Scenario (Track Hydration Levels):
 - SSD

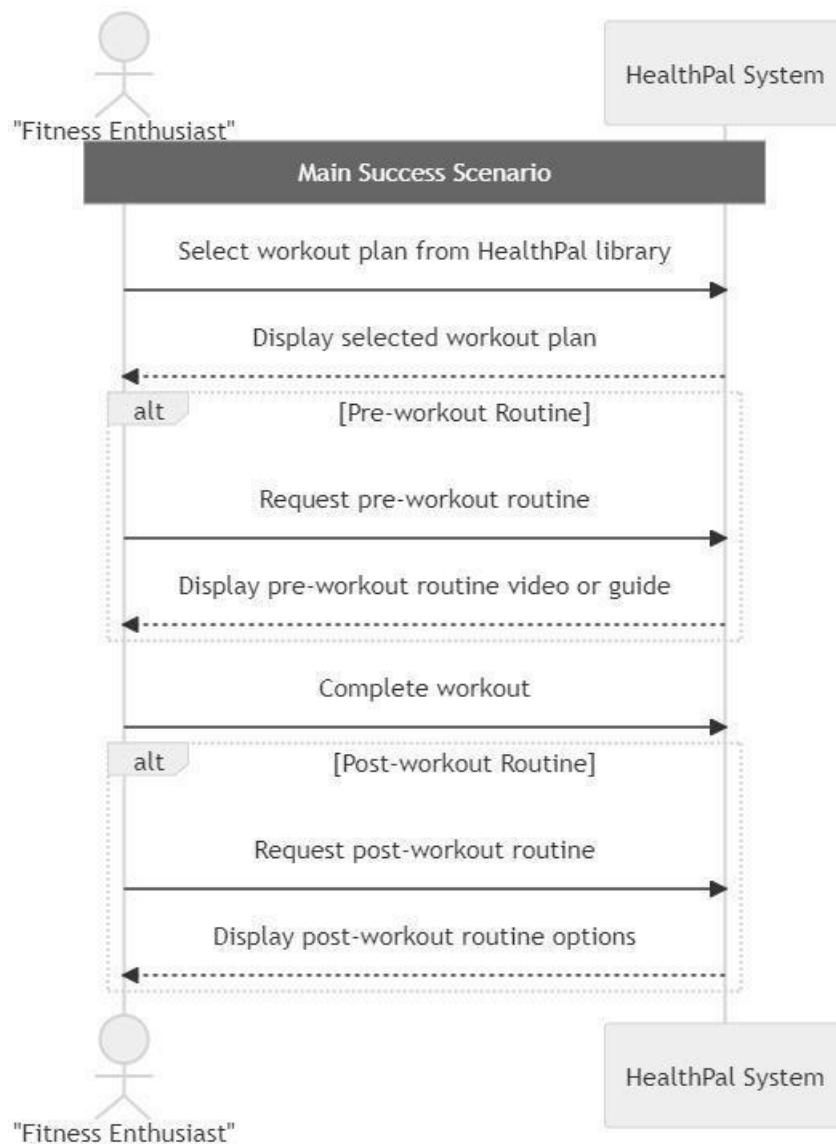


- **Alternative Scenario:**
- **SSD**

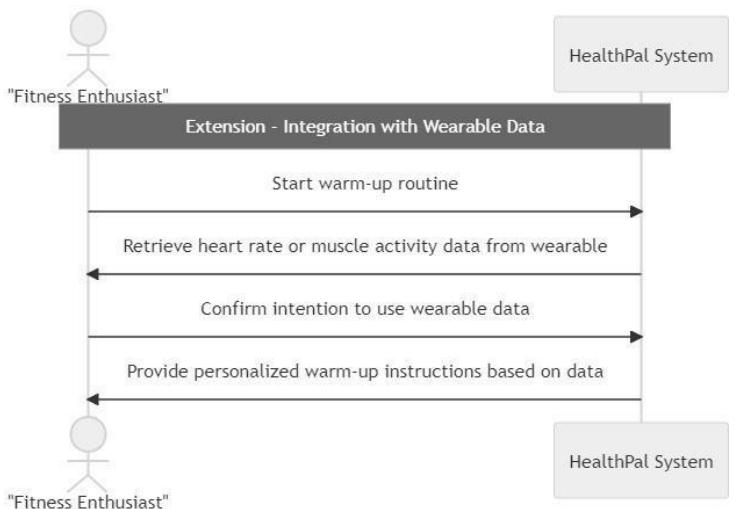


13. Use case 013:

- Main Scenario (Pre- and Post-Workout Routines)
- SSD

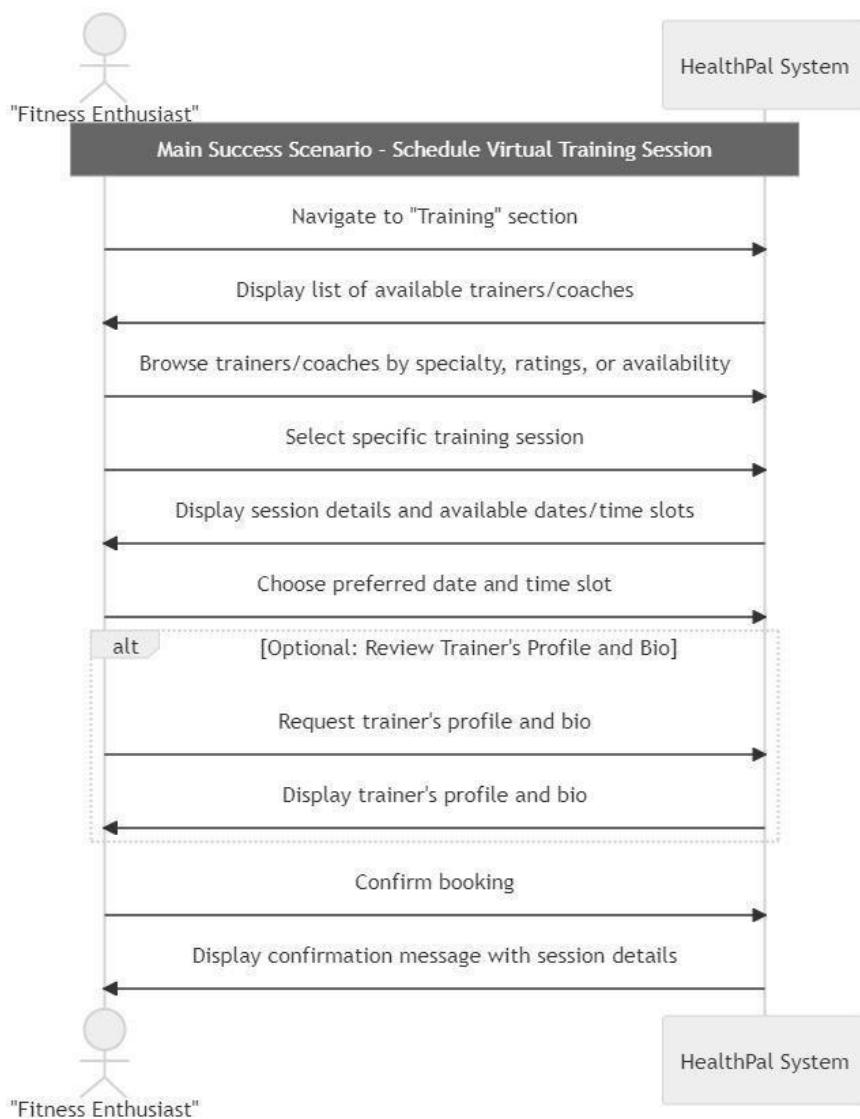


- Alternative Scenario:
- SSD

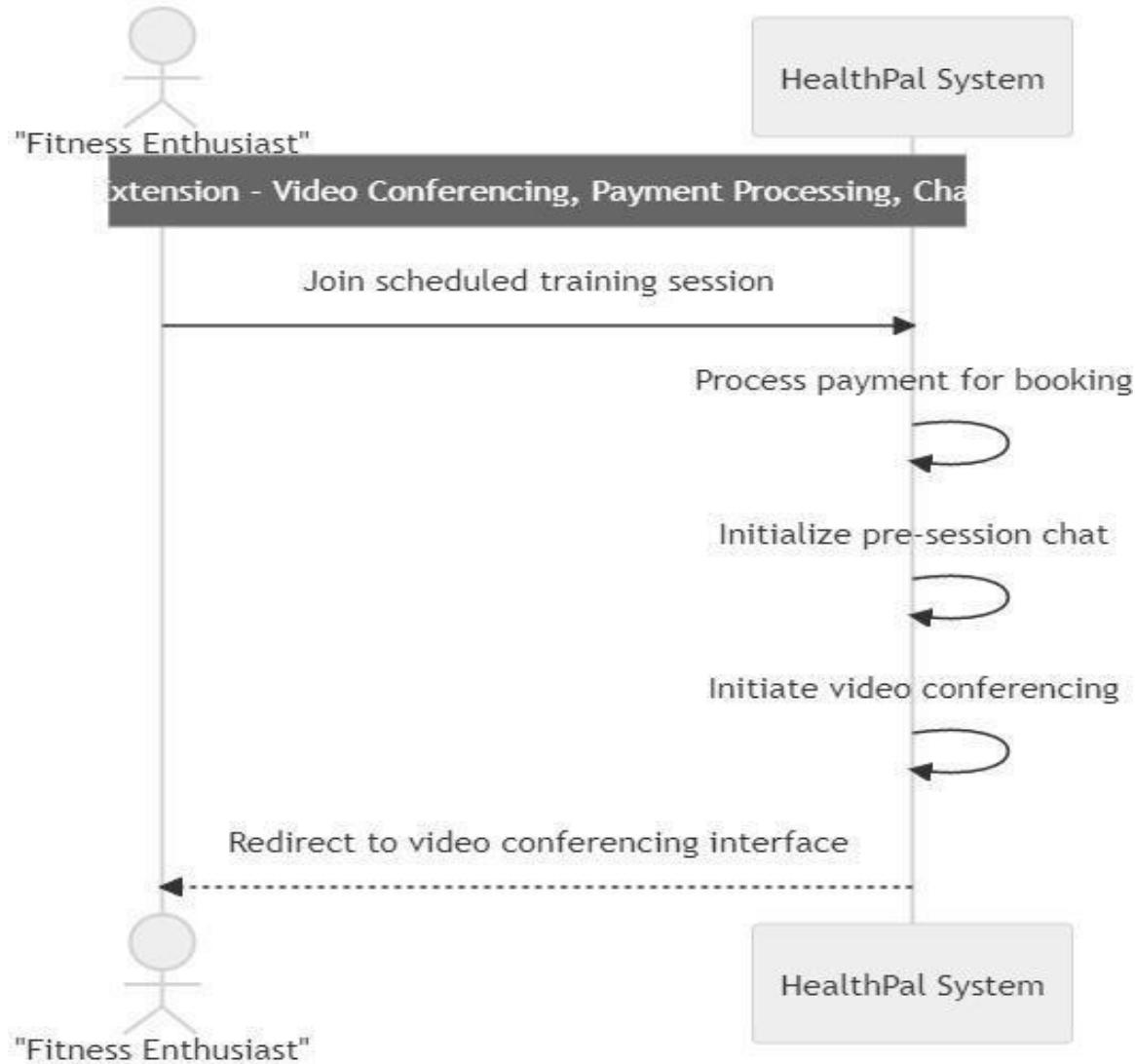


14. Use case 014:

- Main Scenario (Schedule Virtual Training Session)
- SSD

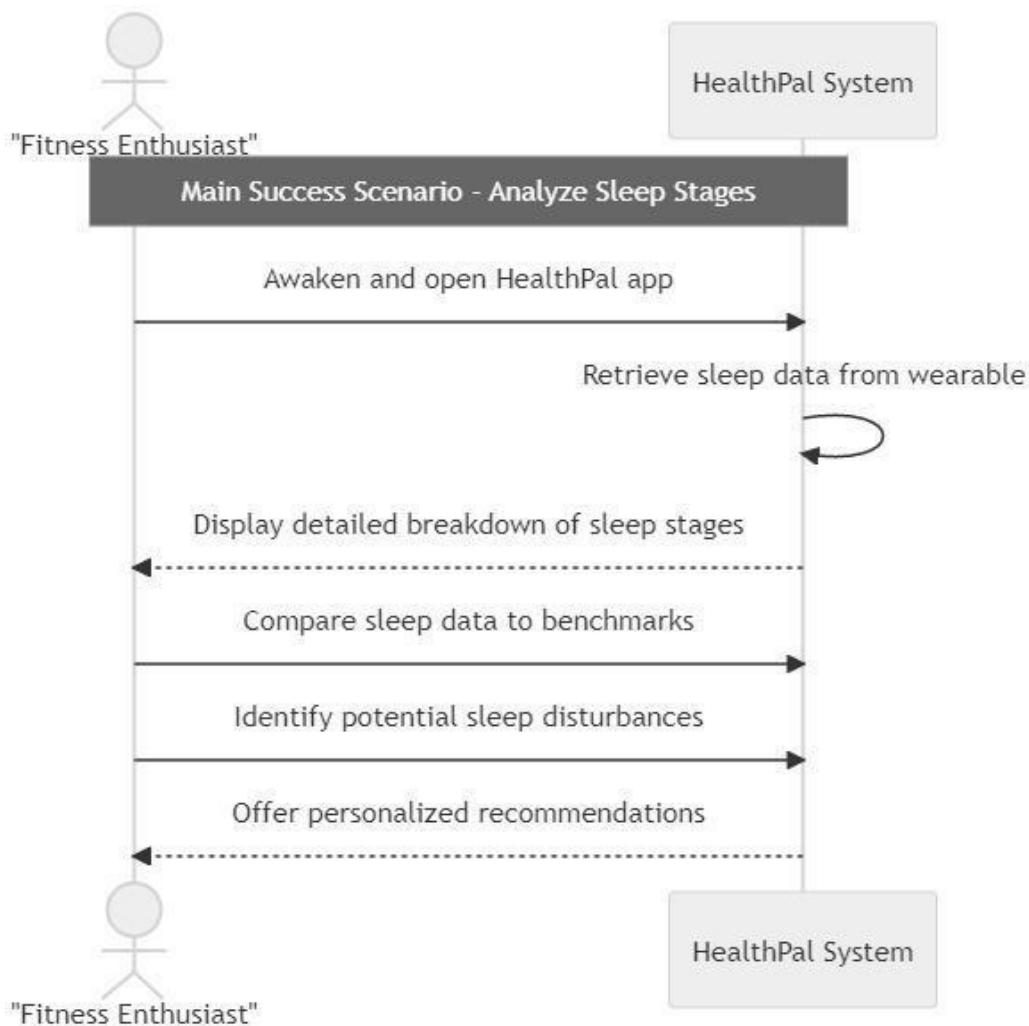


- Alternative Scenario:
- SSD

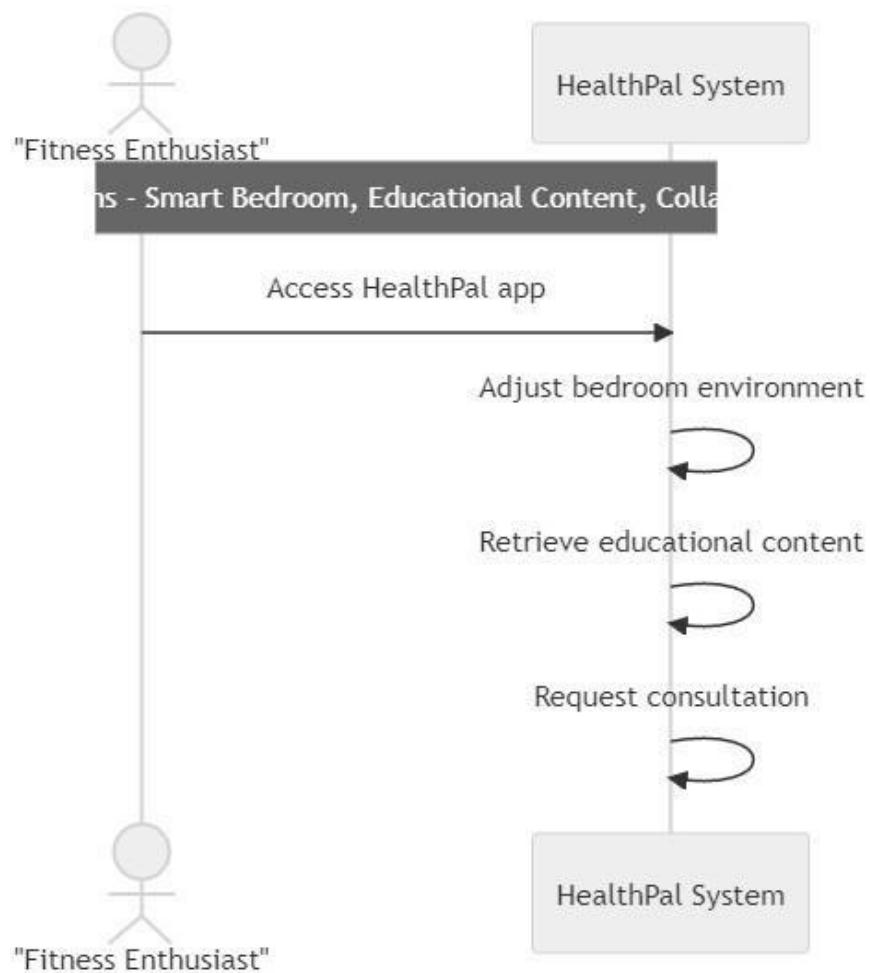


15. Use case 015:

- Main Scenario (Analyze Sleep Stages and Improve Sleep Quality)
- SSD



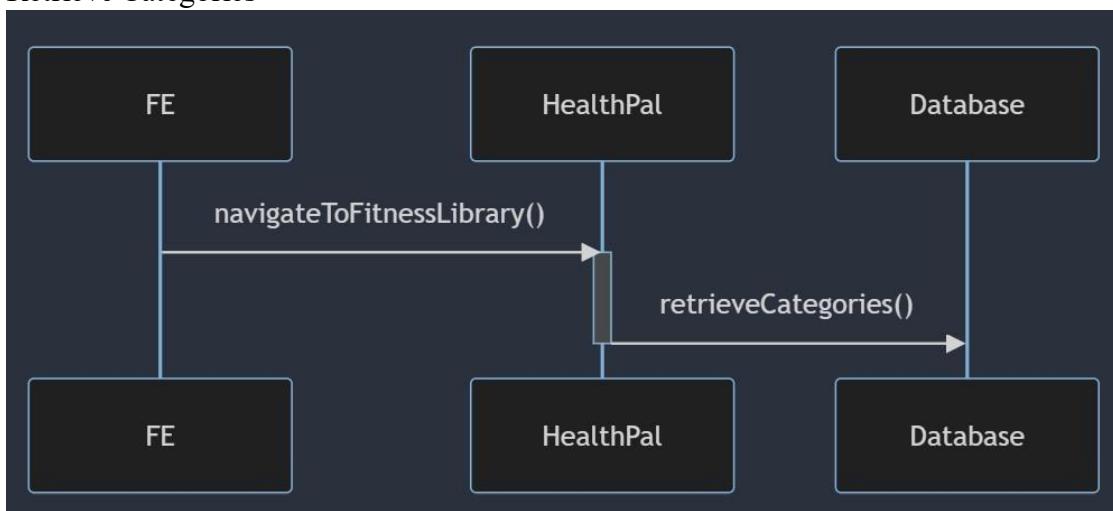
- Alternative Scenario:
- SSD



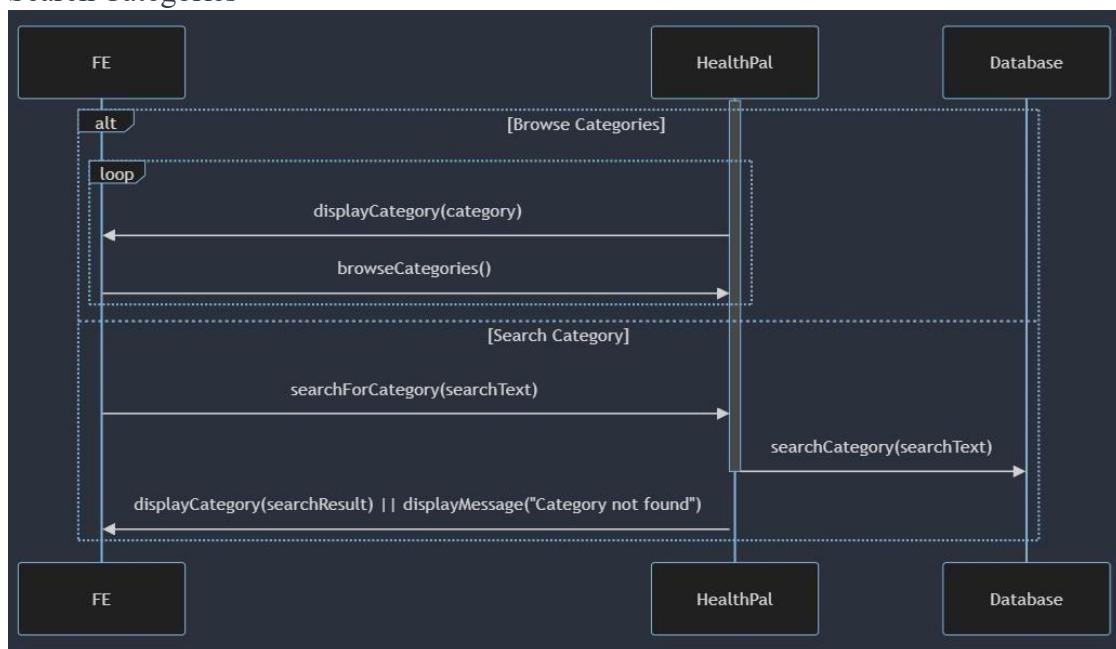
6. Sequence Diagram

1) Use case1

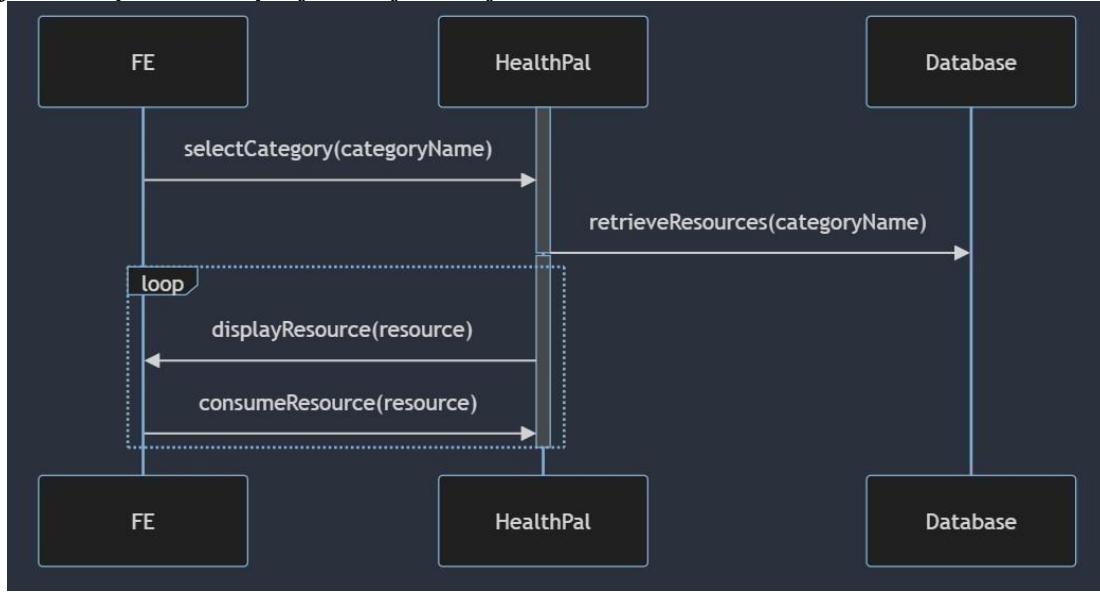
Retrieve Categories



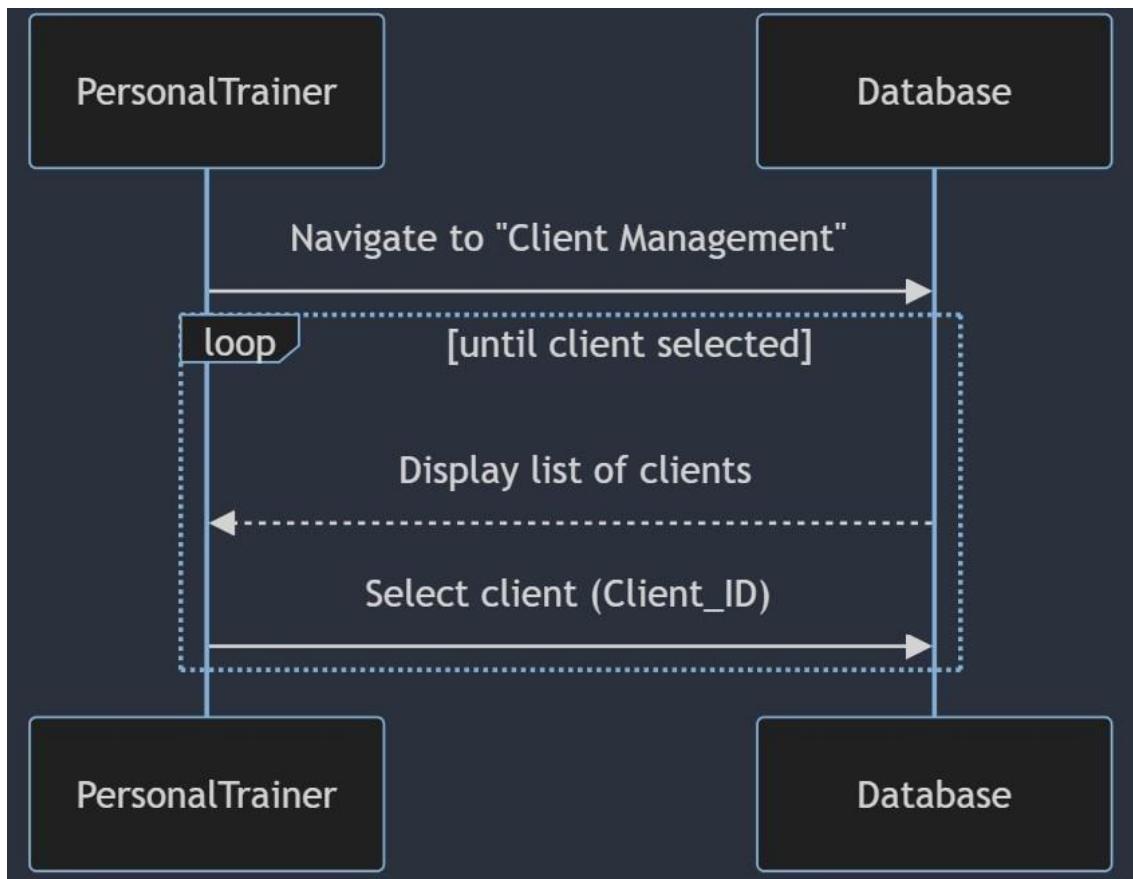
Search Categories



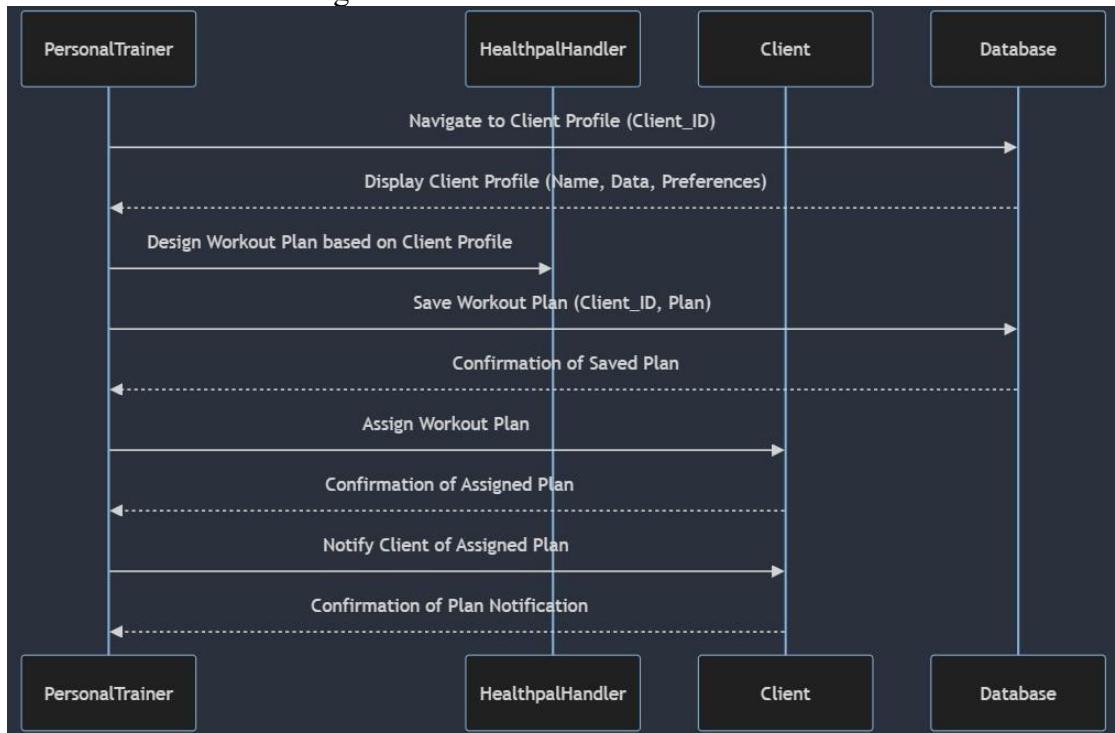
View Resources



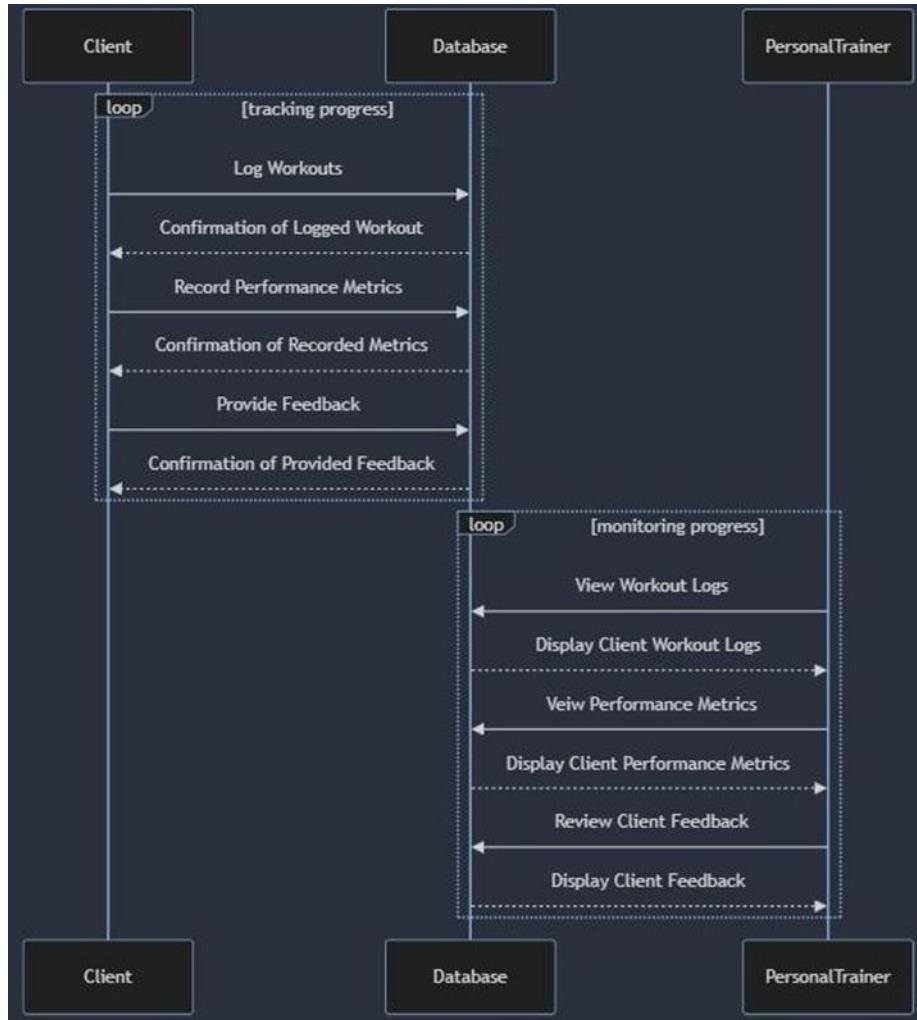
2) Use case2
Display & Select
Client



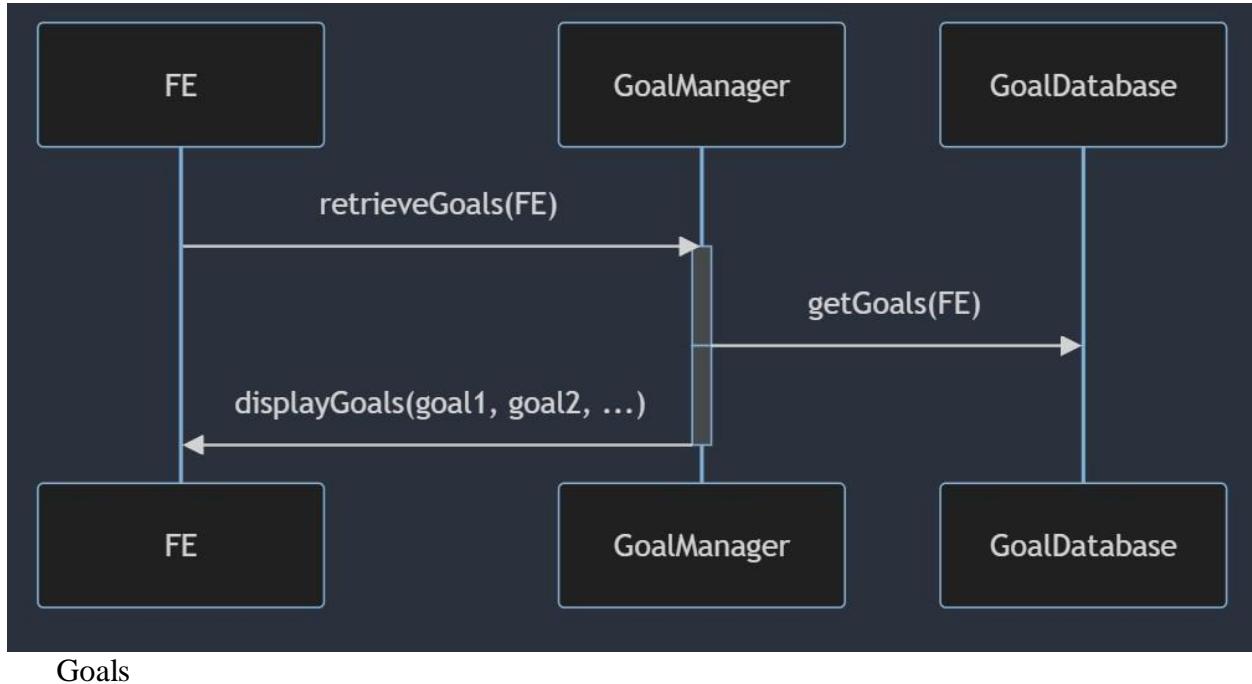
Workout Creation & Assignment



Track & Monitor Progress

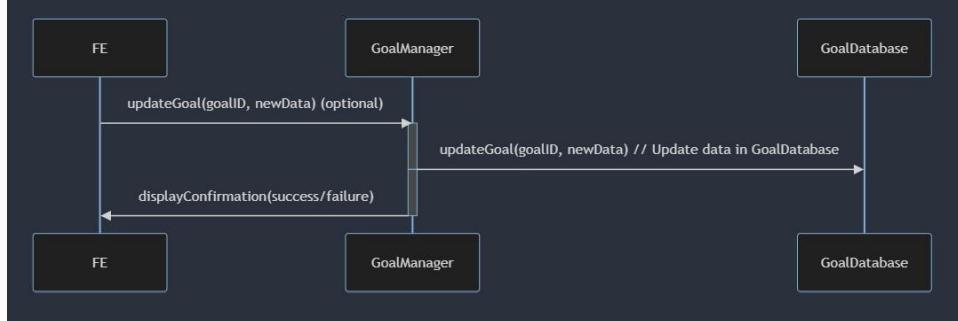


3) Use
case3View



Goals

Update Goals



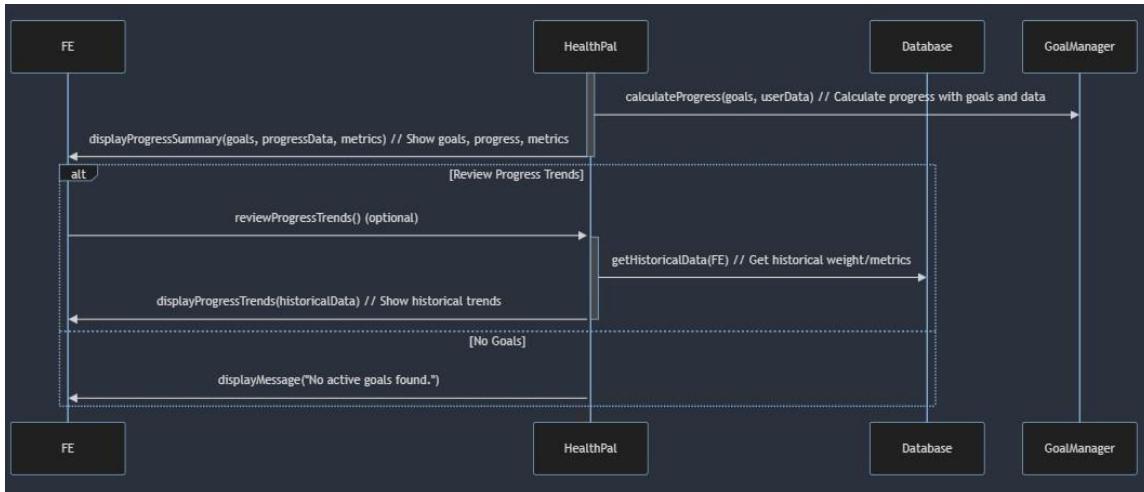
Create New Goals



4) Use
case4View
Profile

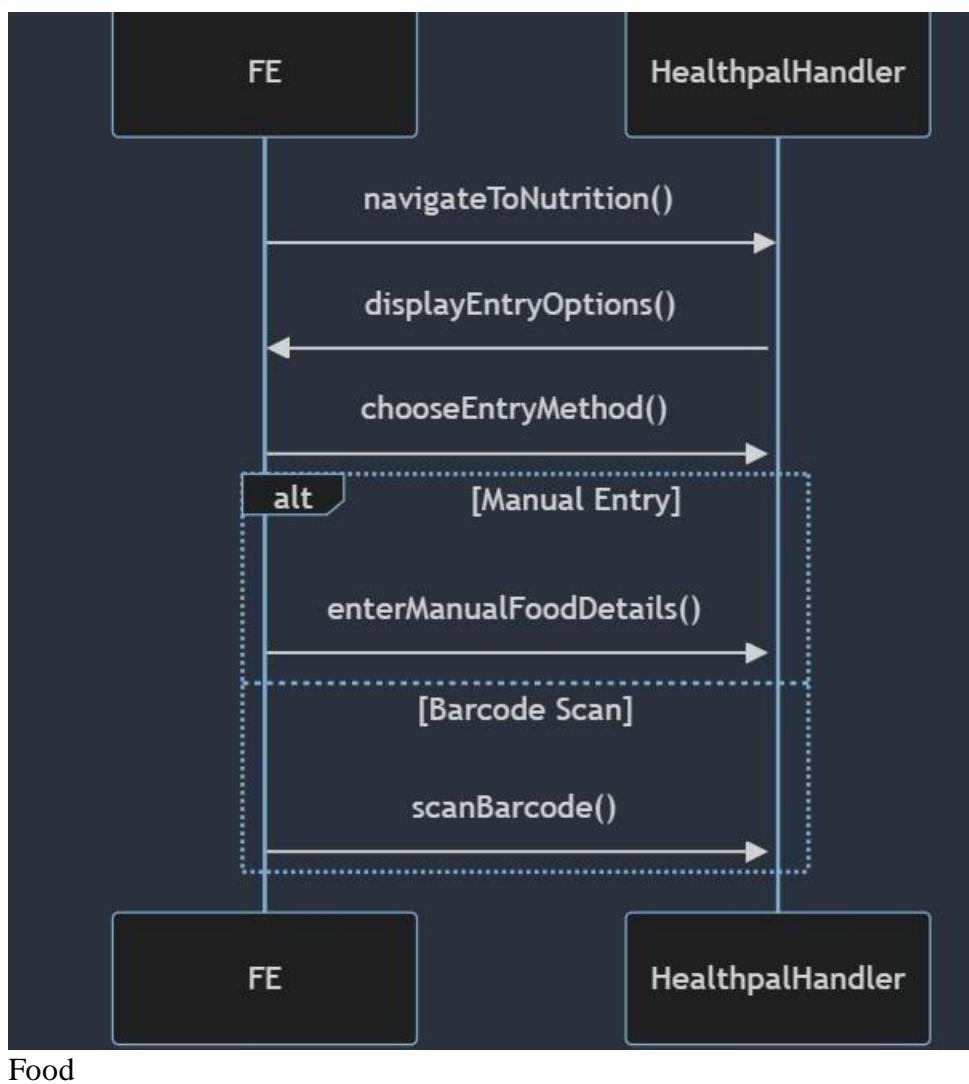


View Progress and History



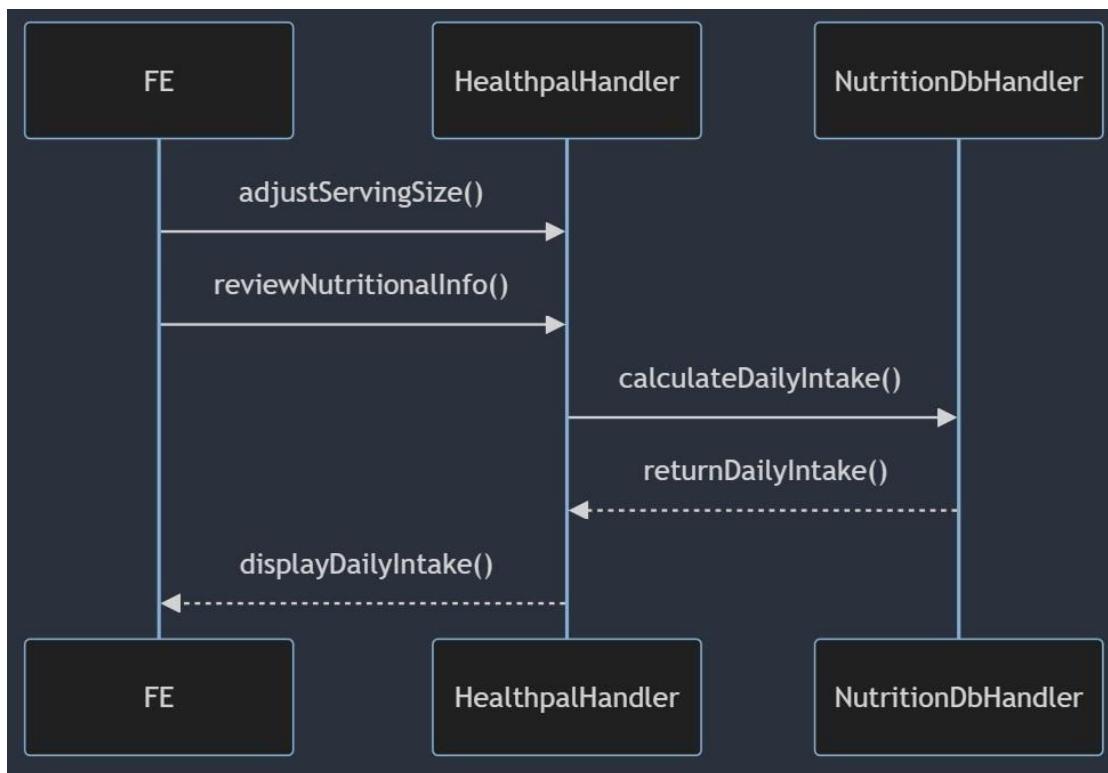
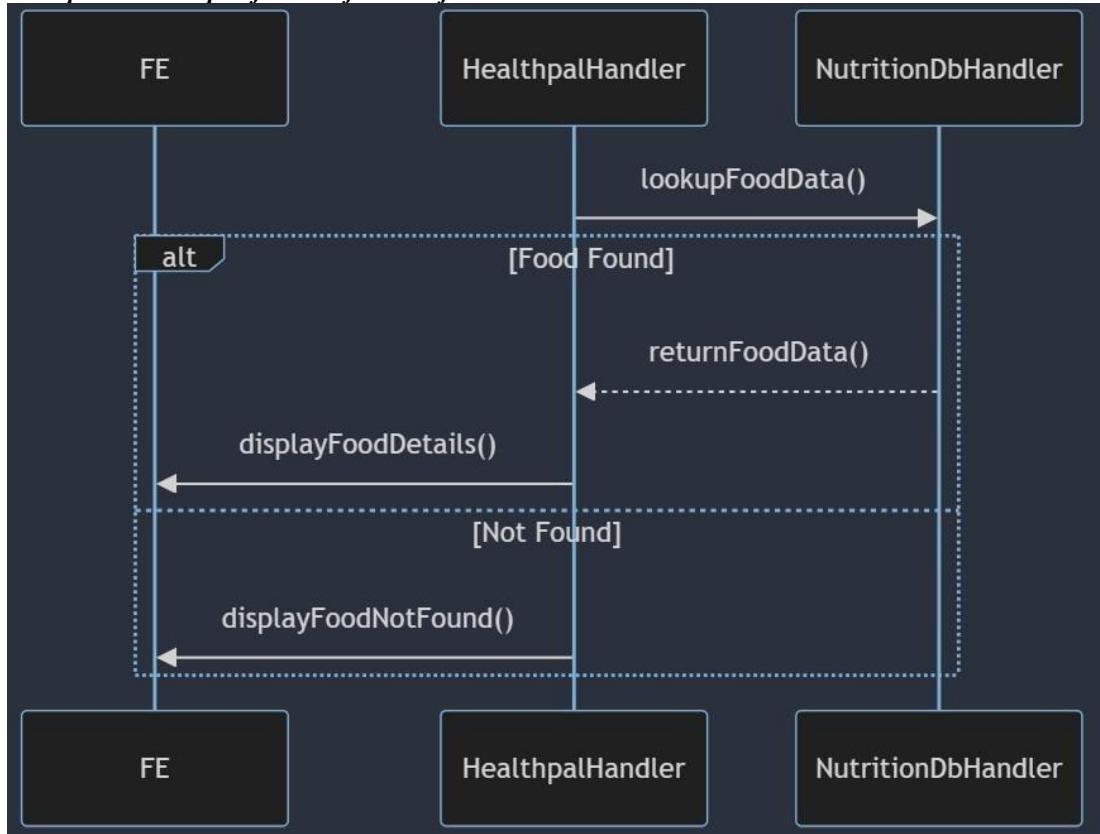
5) Use

case5Enter



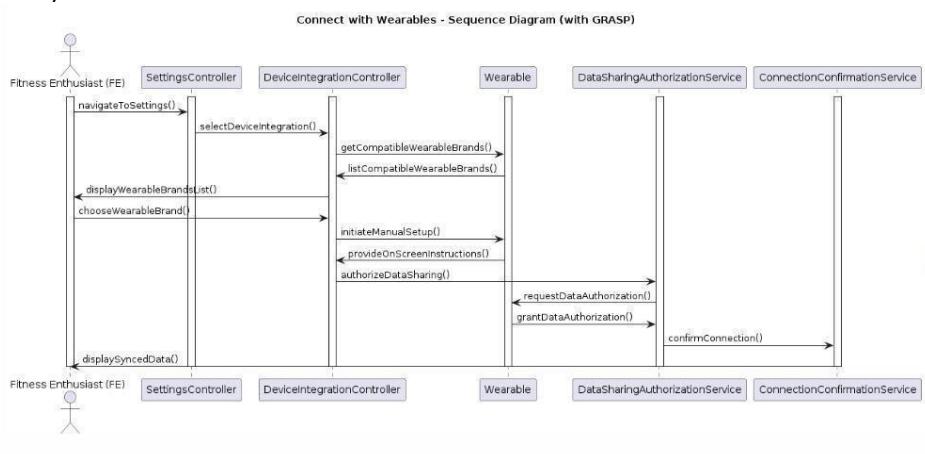
Food

View Food Details

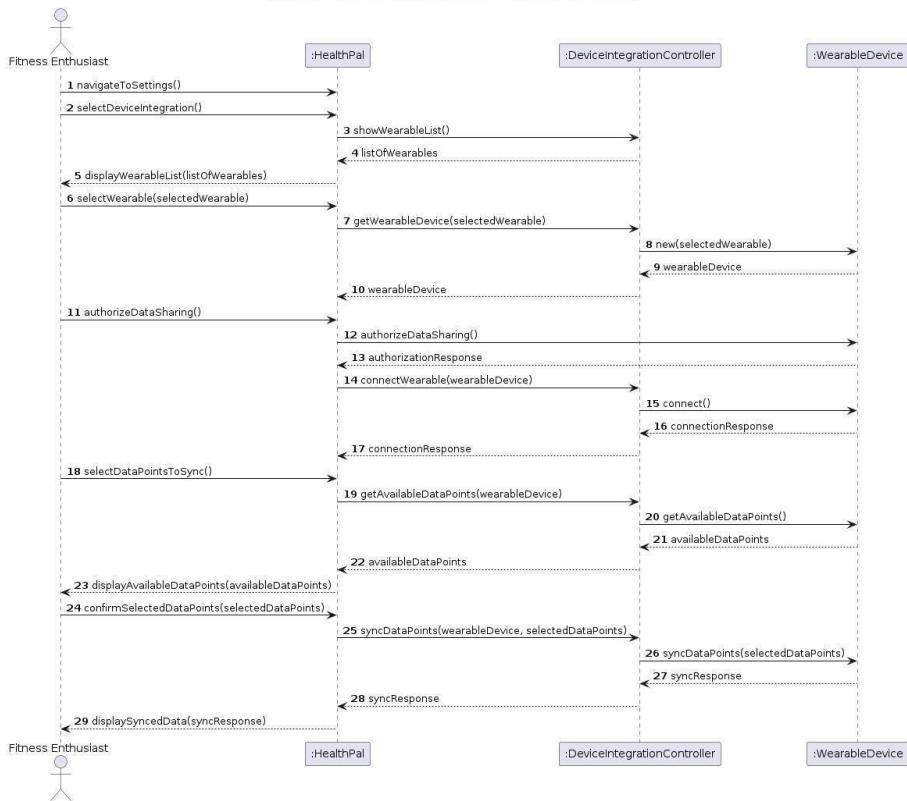


6) Use case6

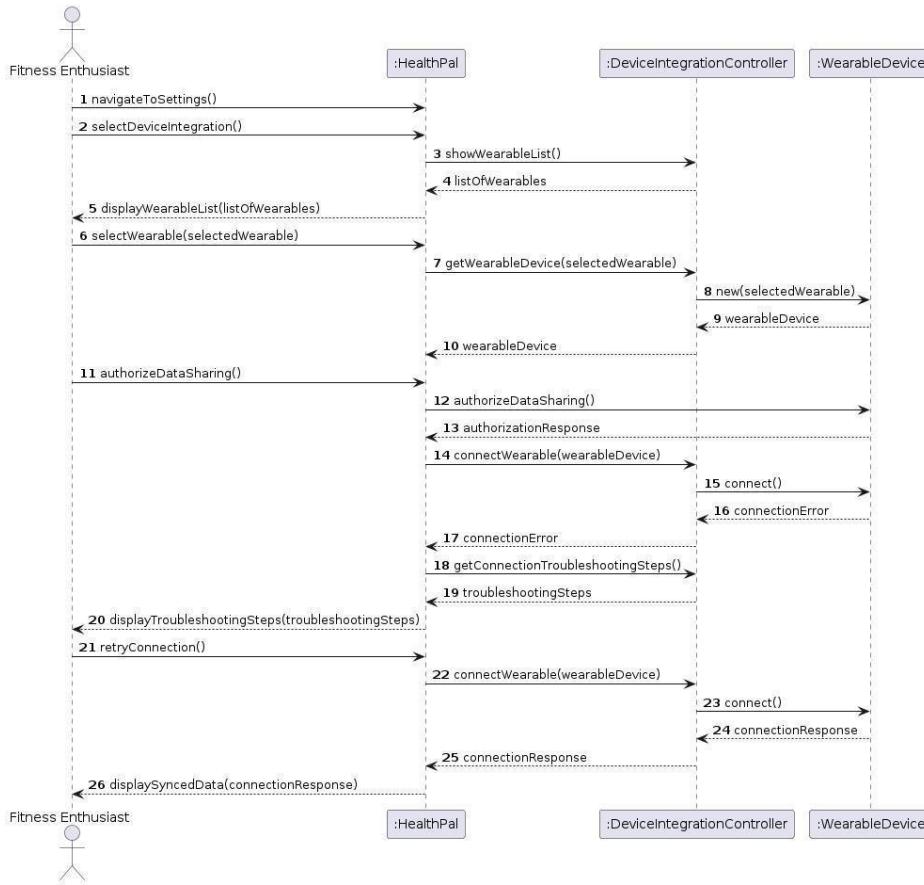
Connect with Wearables - Sequence Diagram (with GRASP)



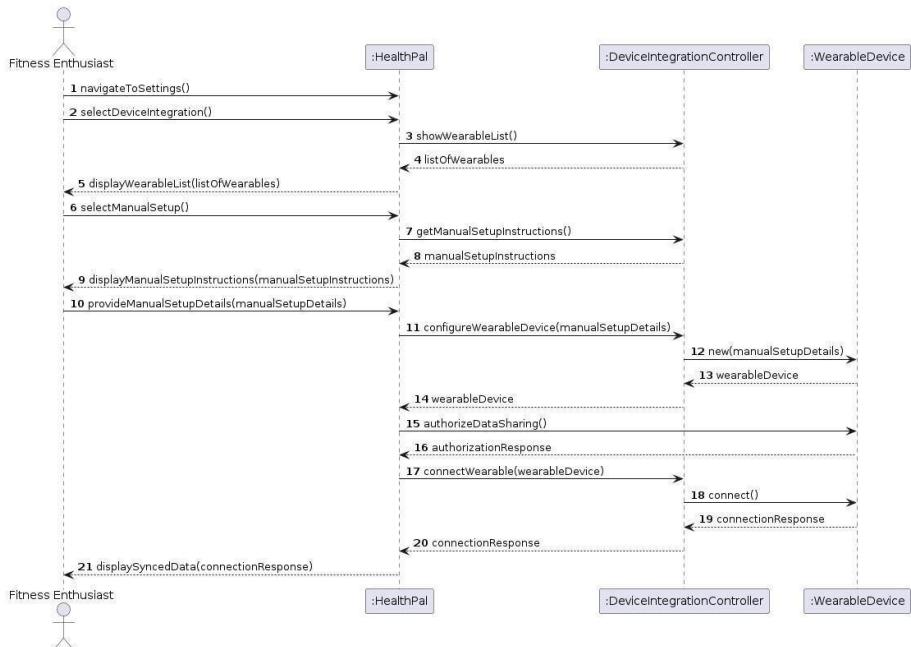
Sequence Diagram: Select Data Points to Sync from Wearable



Sequence Diagram: Handle Connection Issue with Wearable Device

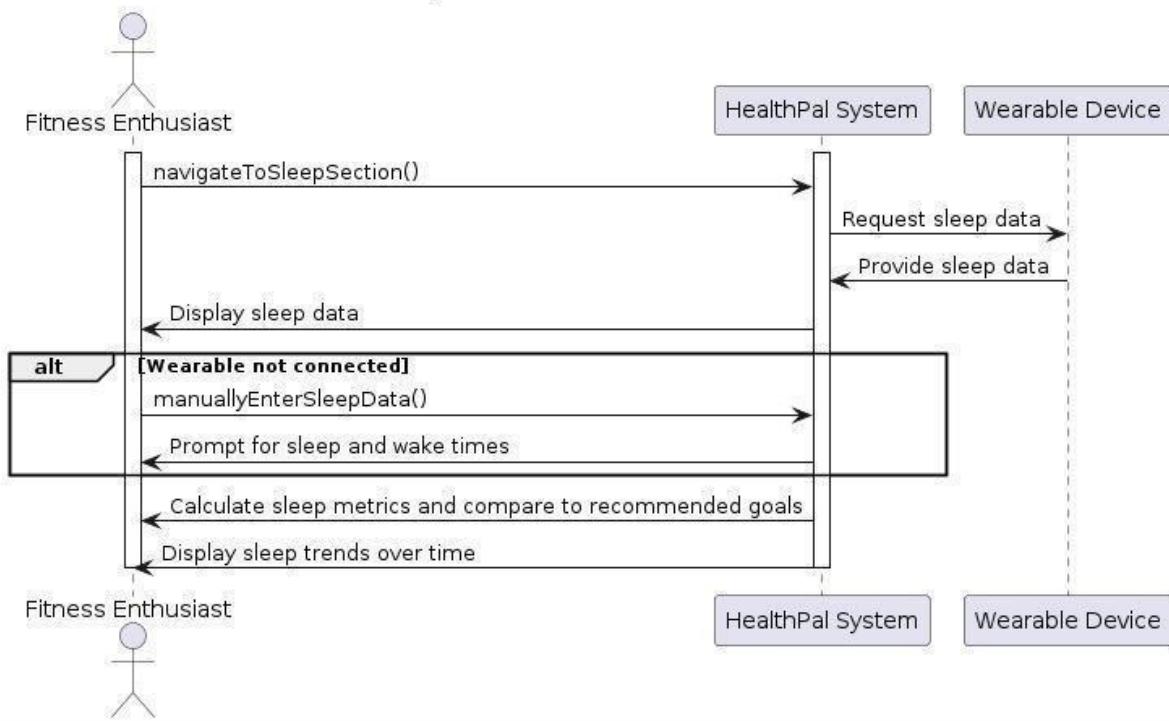


Sequence Diagram: Manually Configure Wearable Device

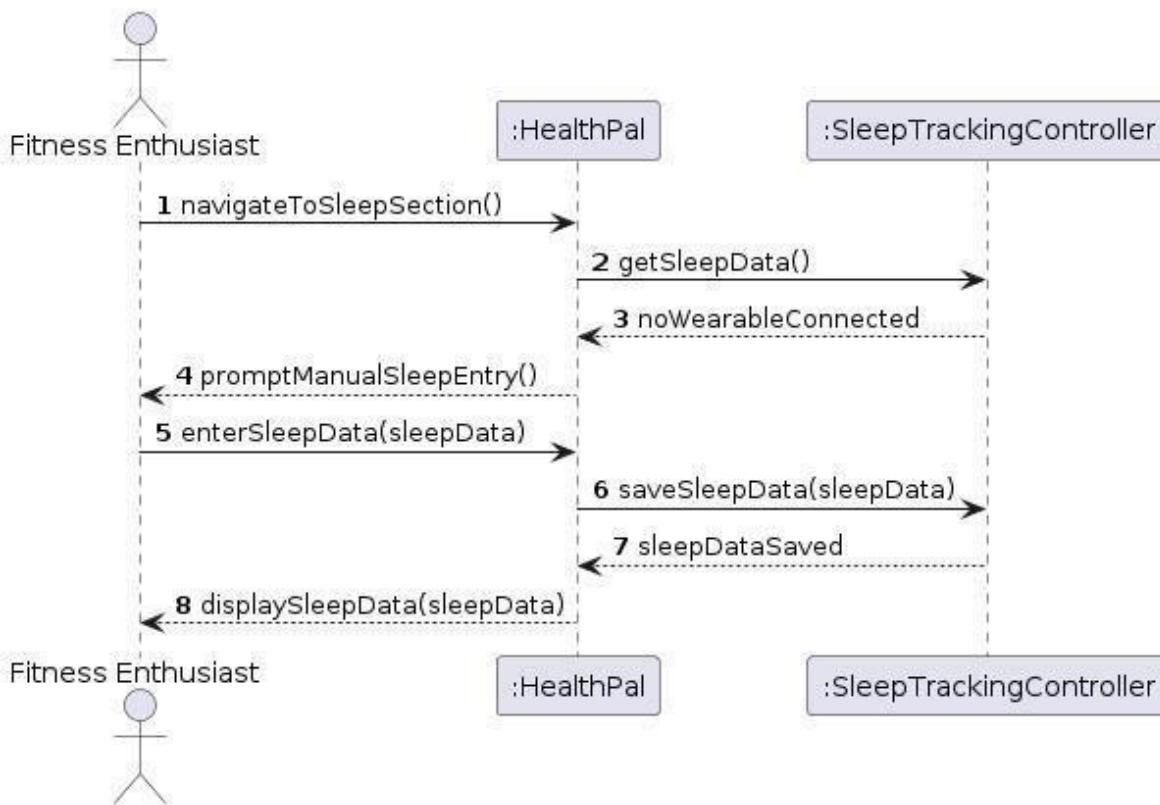


7) Use case 7

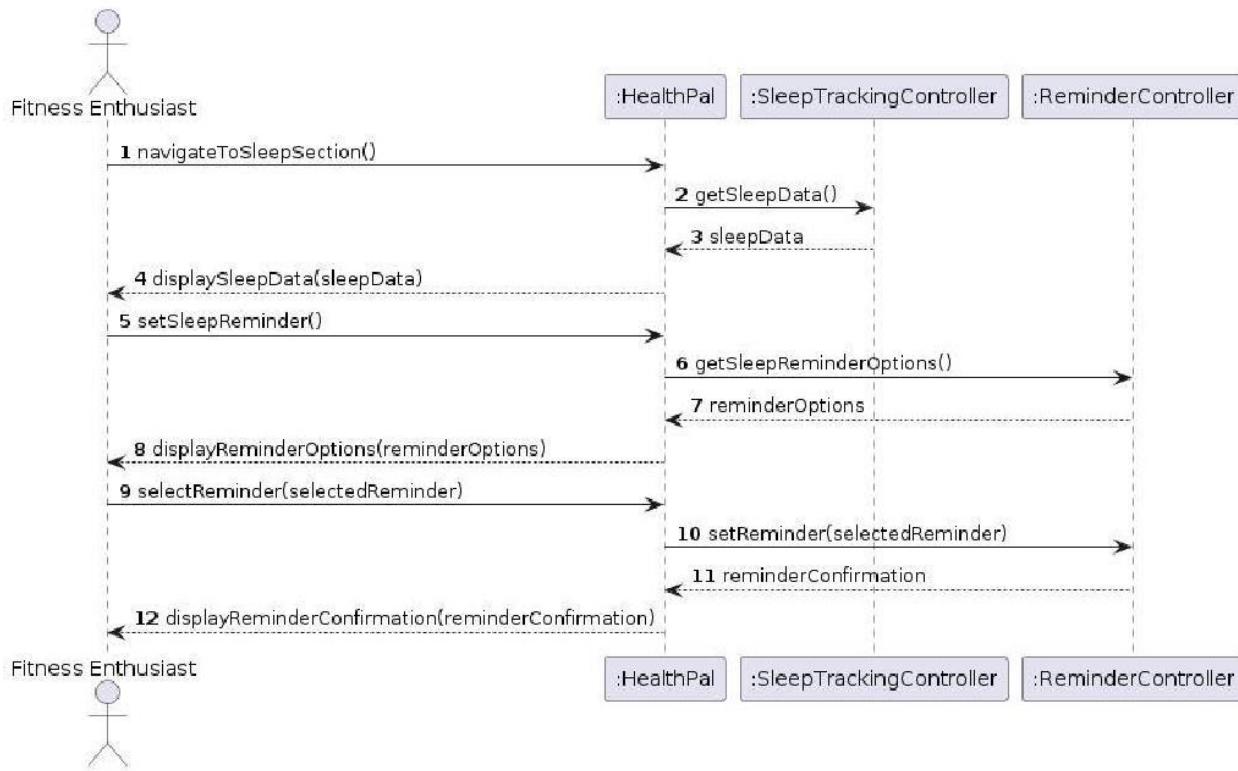
Track Sleep Patterns - Main Success Scenario



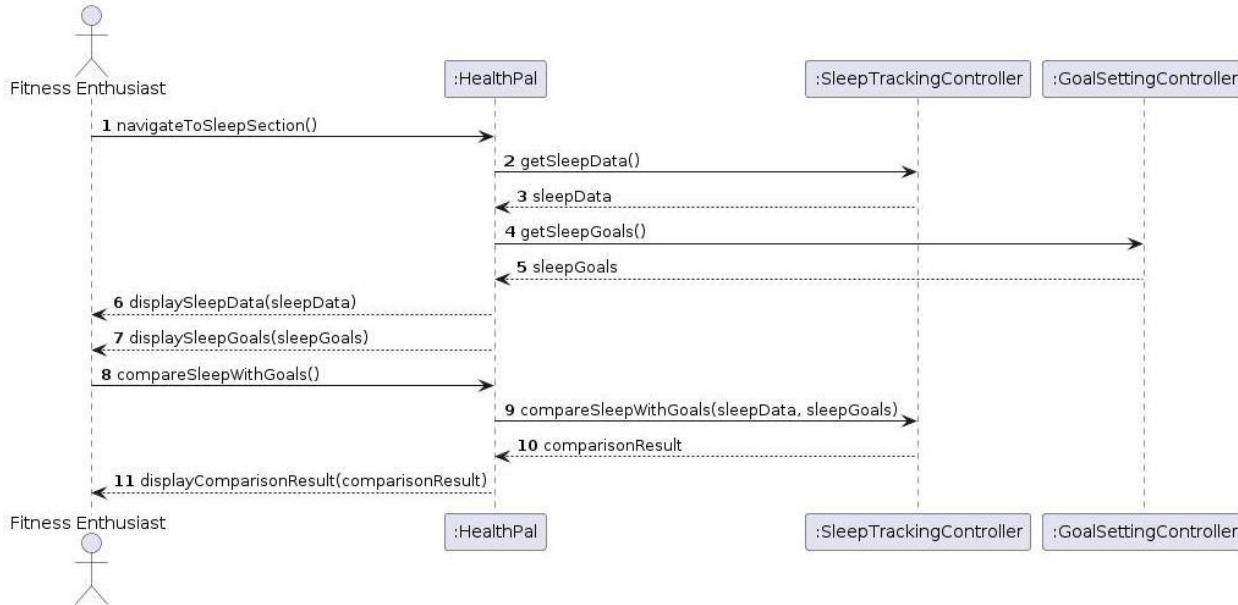
Sequence Diagram: Manual Sleep Data Entry



Sequence Diagram: Set Sleep Reminder

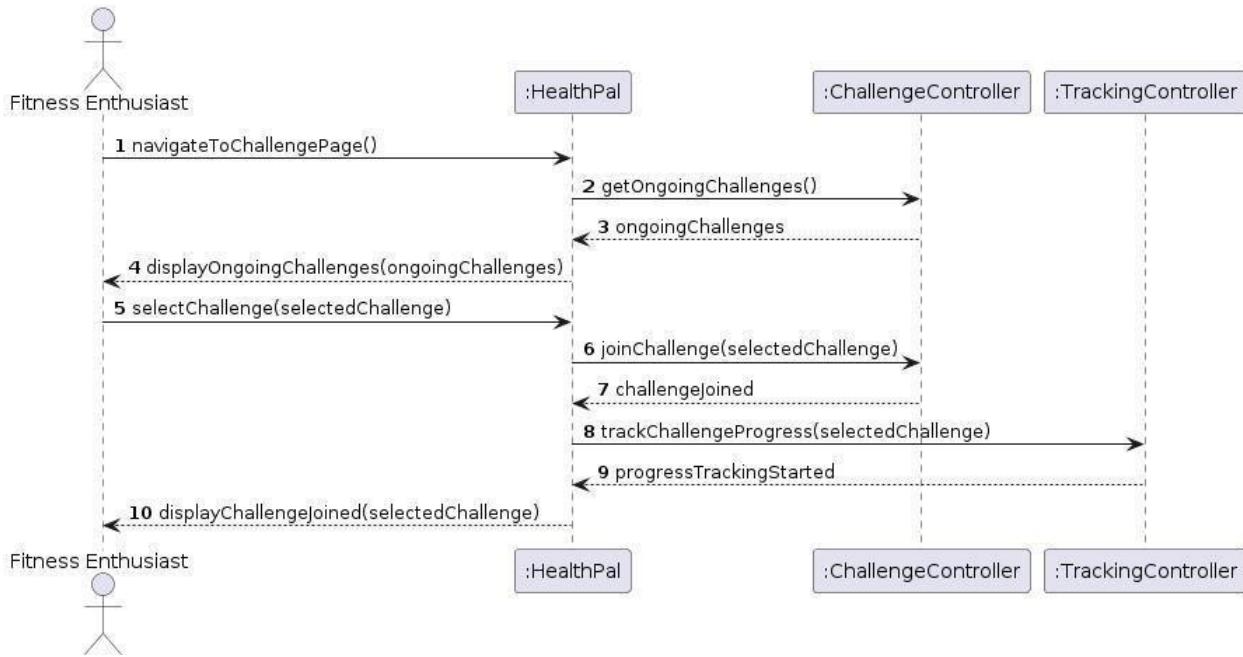


Sequence Diagram: Compare Sleep Data with Goals

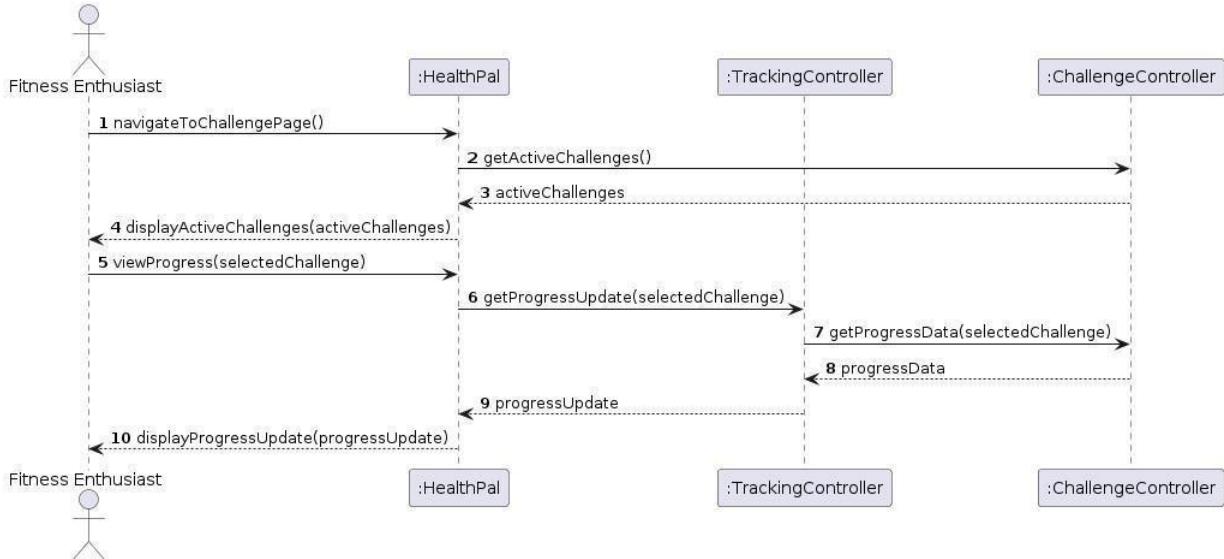


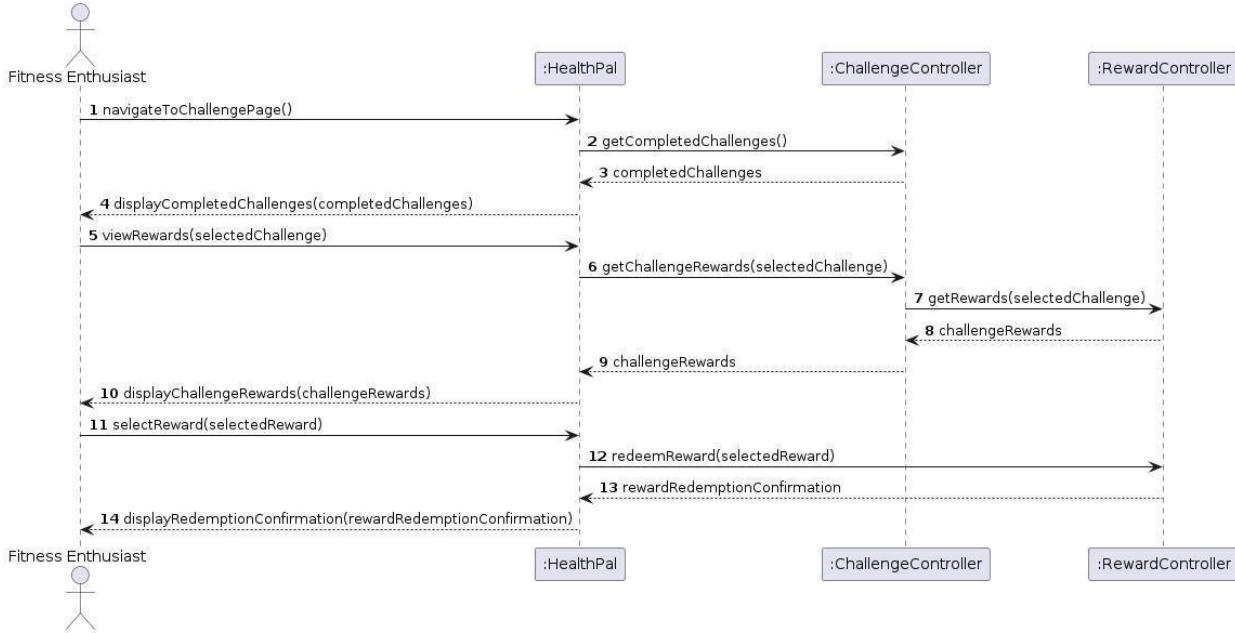
8) Use case8

Sequence Diagram: Join Fitness Challenge



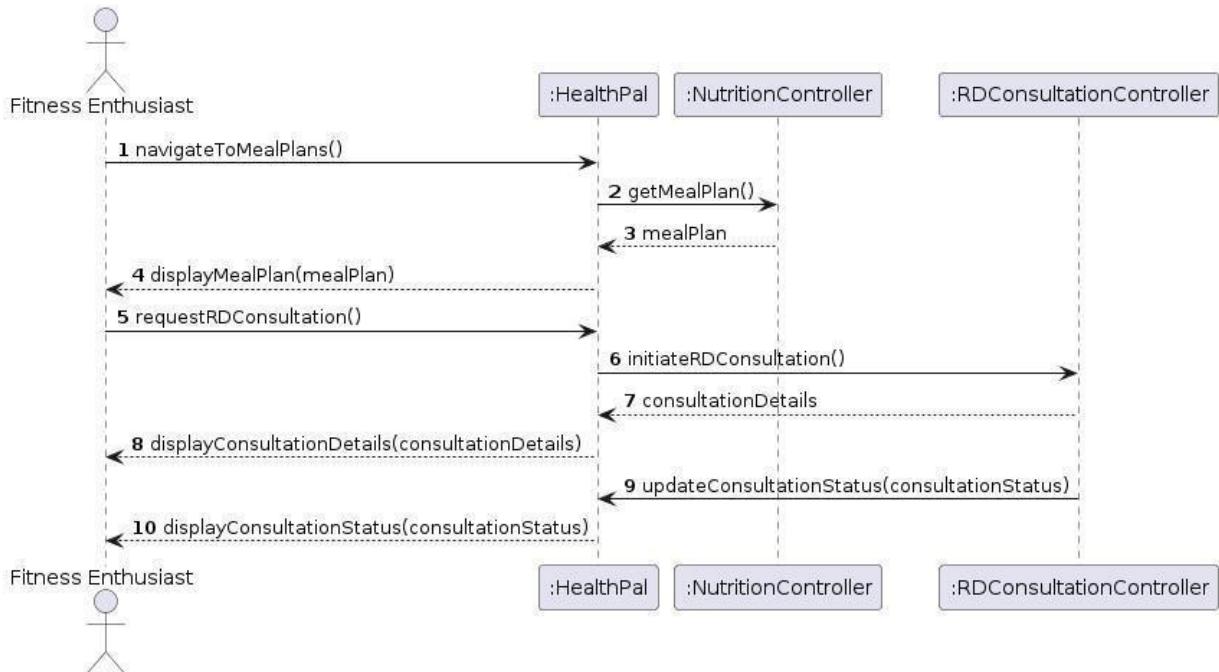
Sequence Diagram: Track Challenge Progress



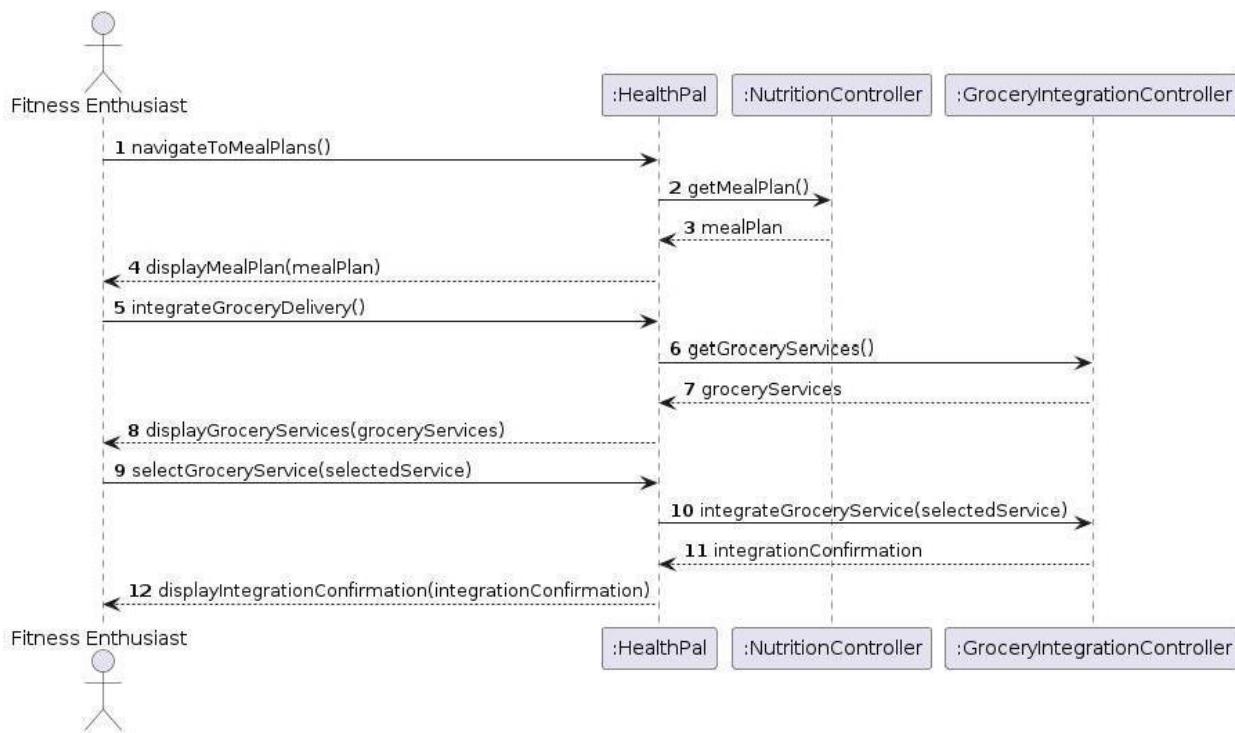


9) Use case9

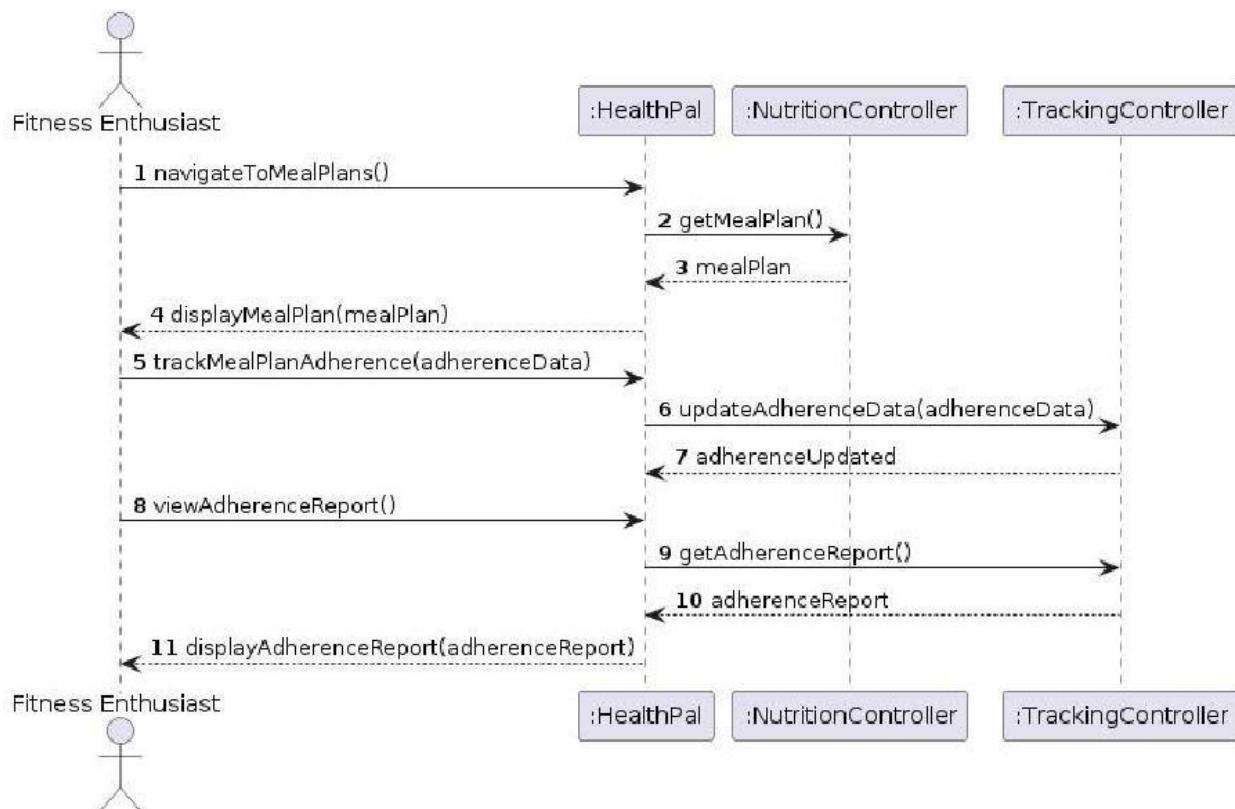
Sequence Diagram: Request RD Consultation



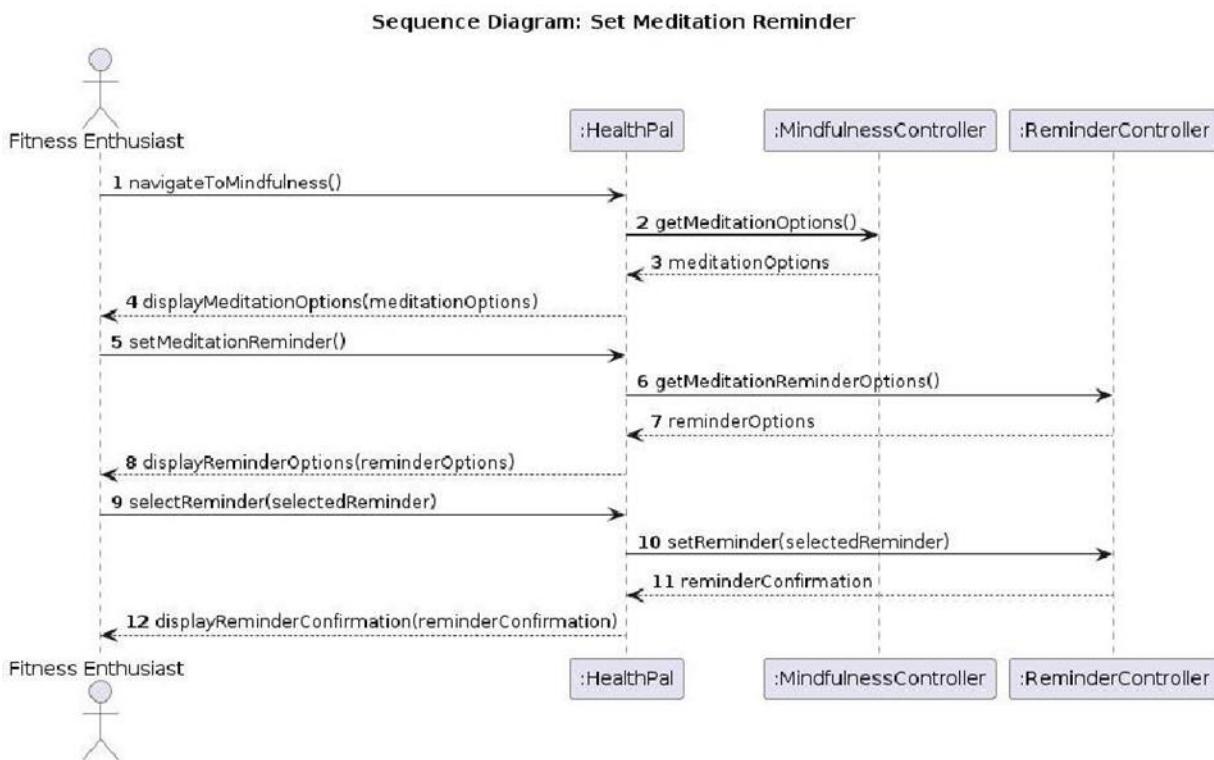
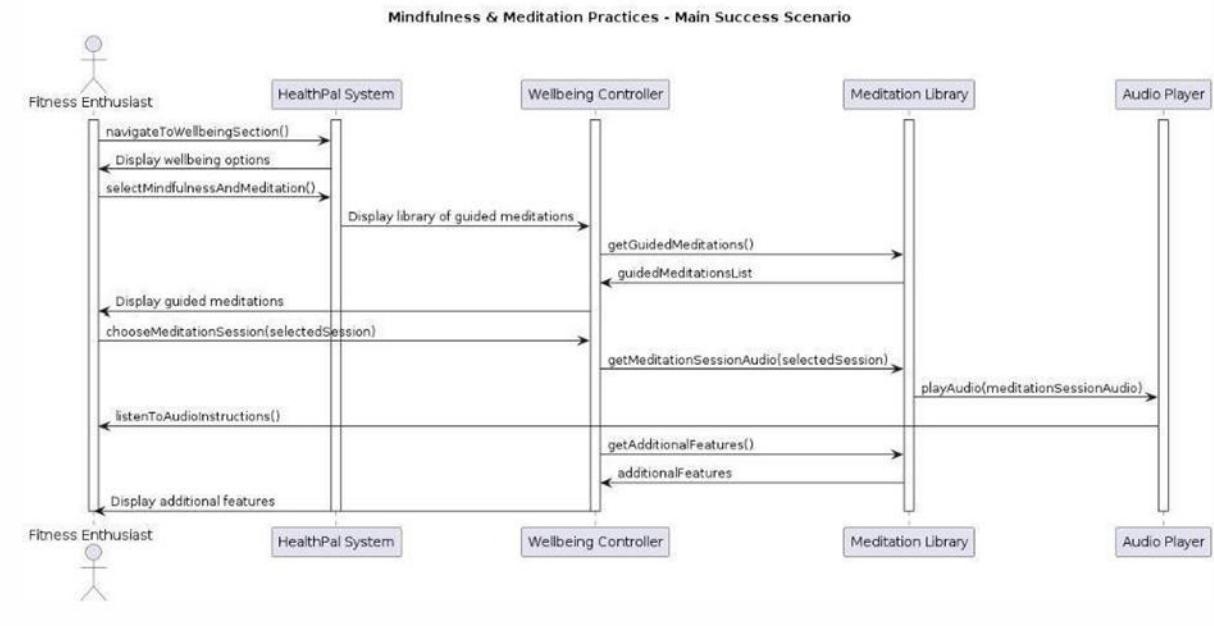
Sequence Diagram: Integrate Grocery Delivery Service



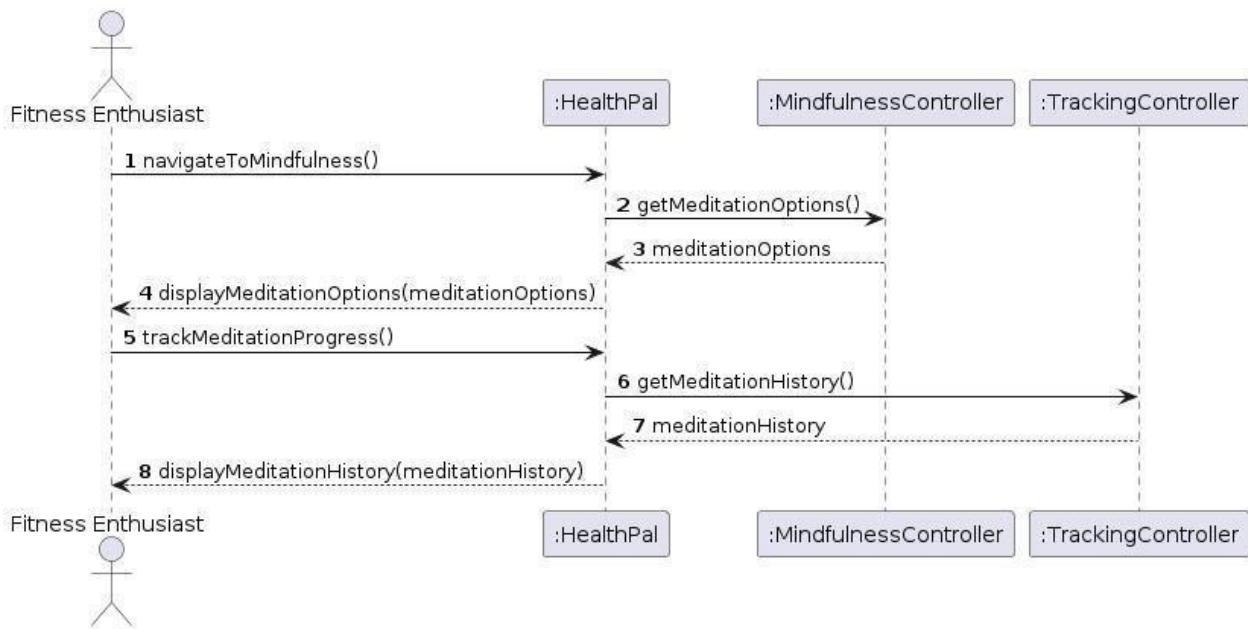
Sequence Diagram: Track Meal Plan Adherence



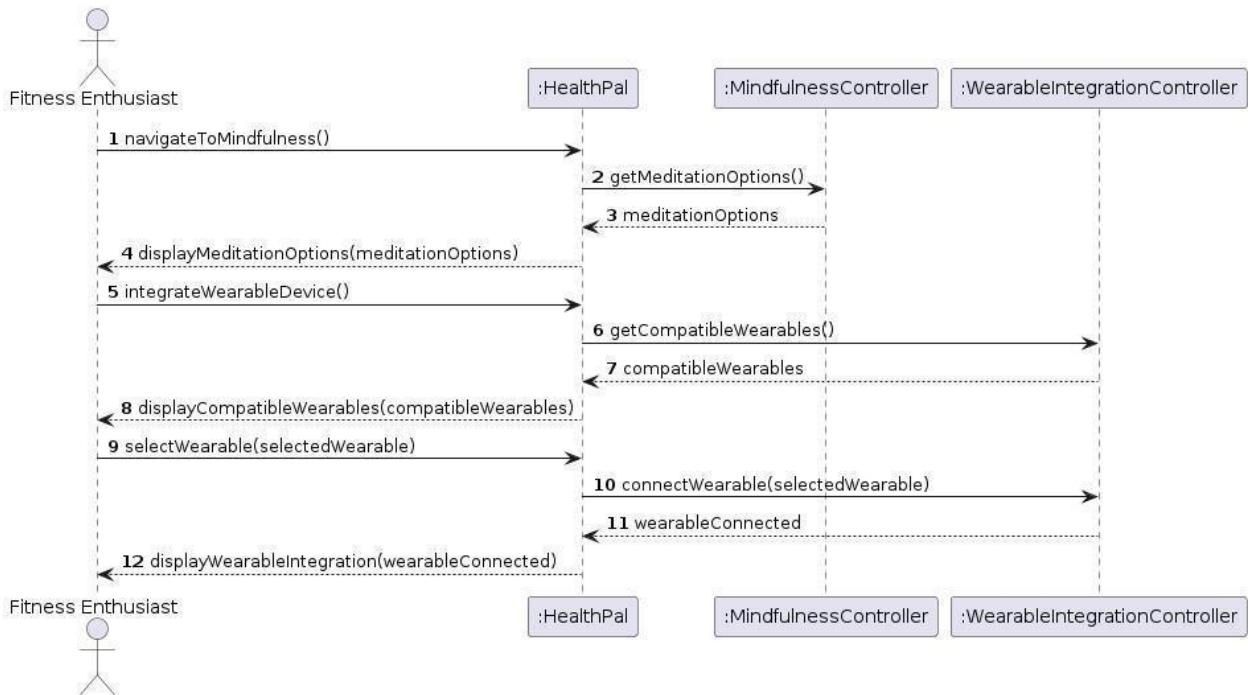
10) Use case10



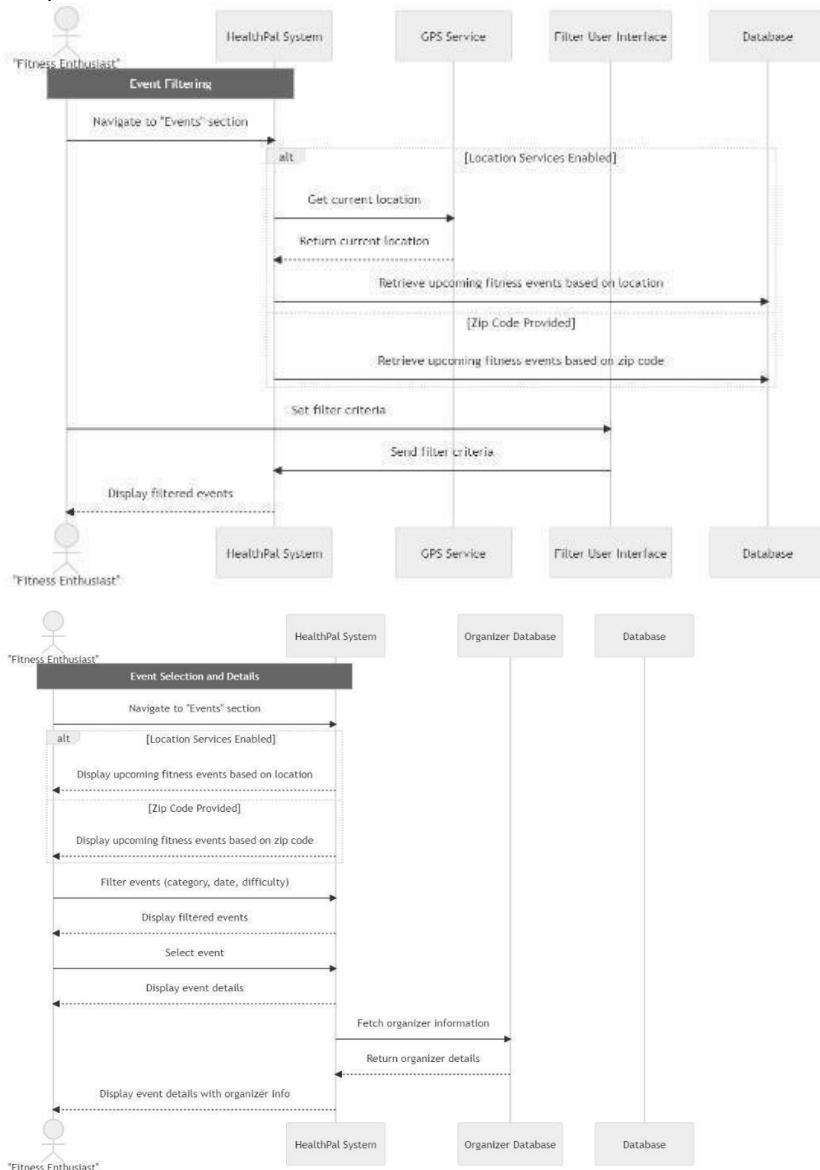
Sequence Diagram: Track Meditation Progress

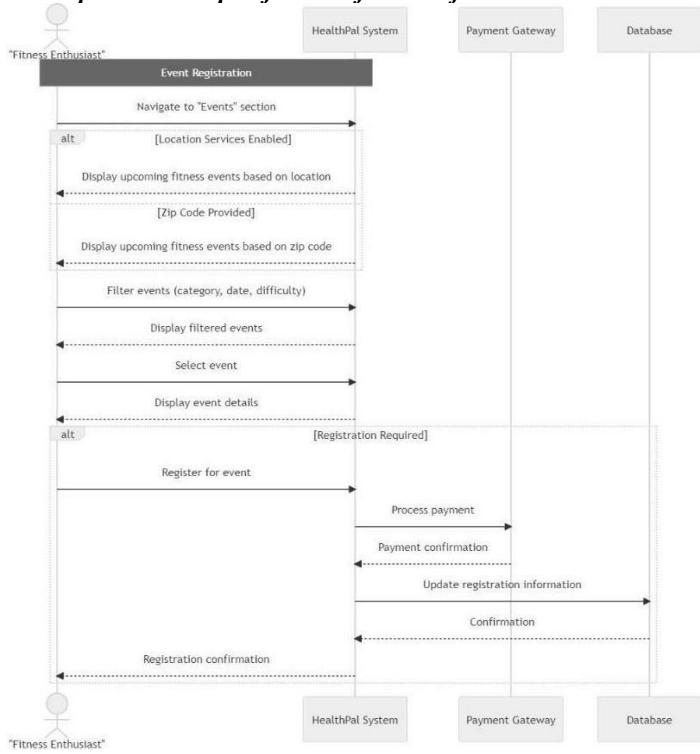


Sequence Diagram: Integrate Wearable Device

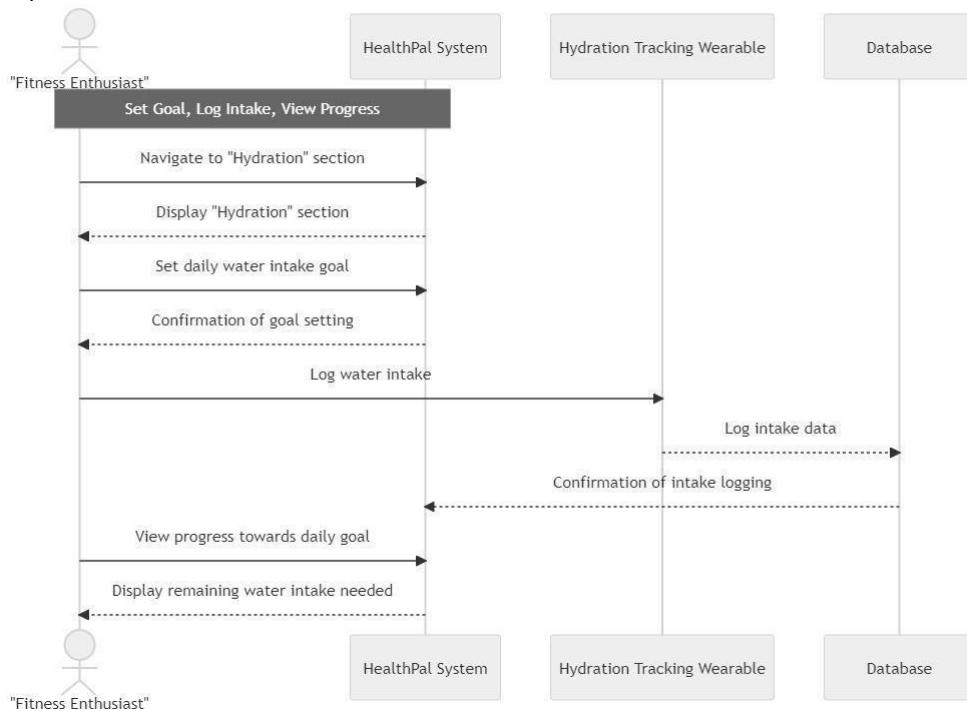


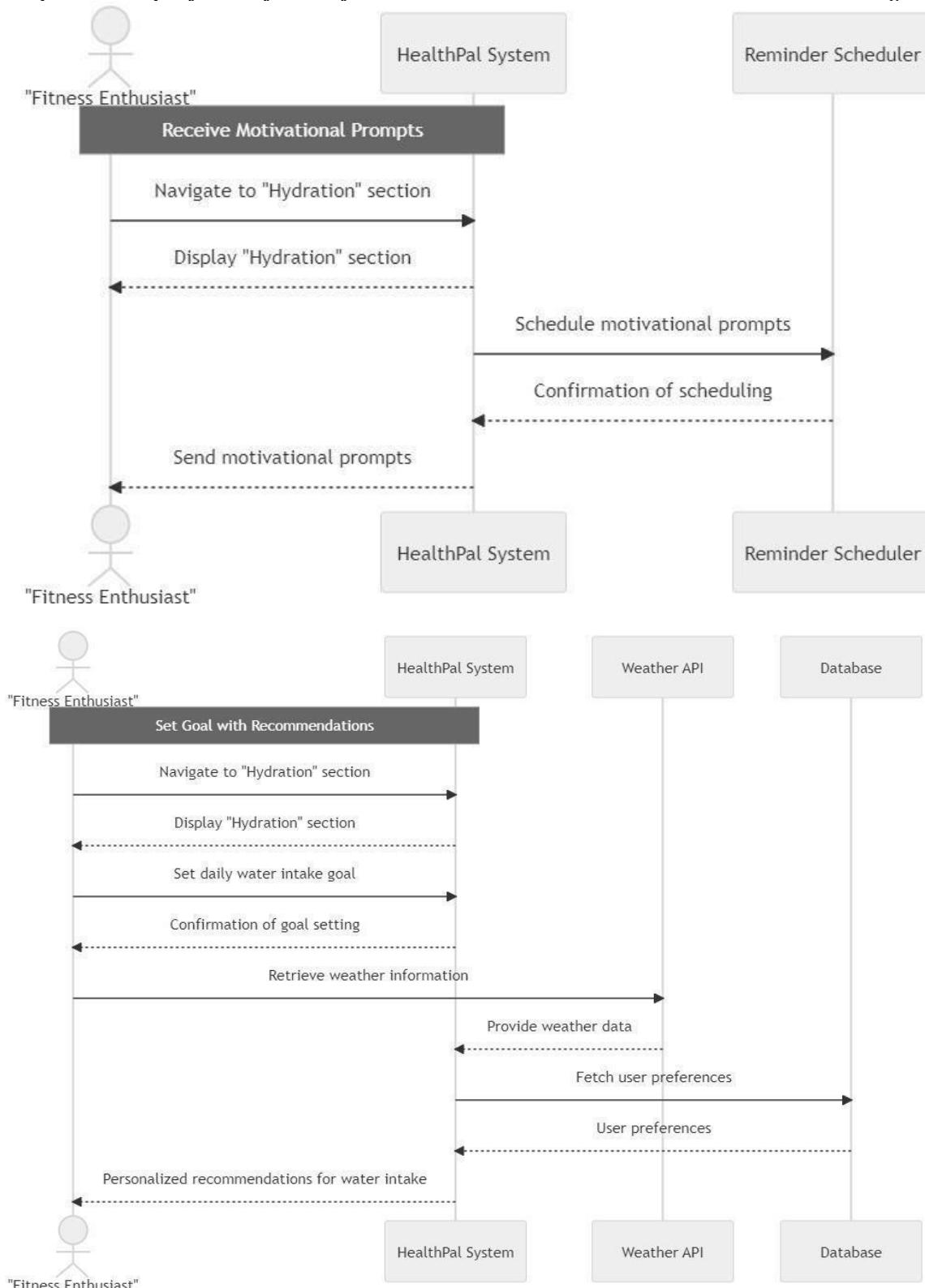
11) Use case 11



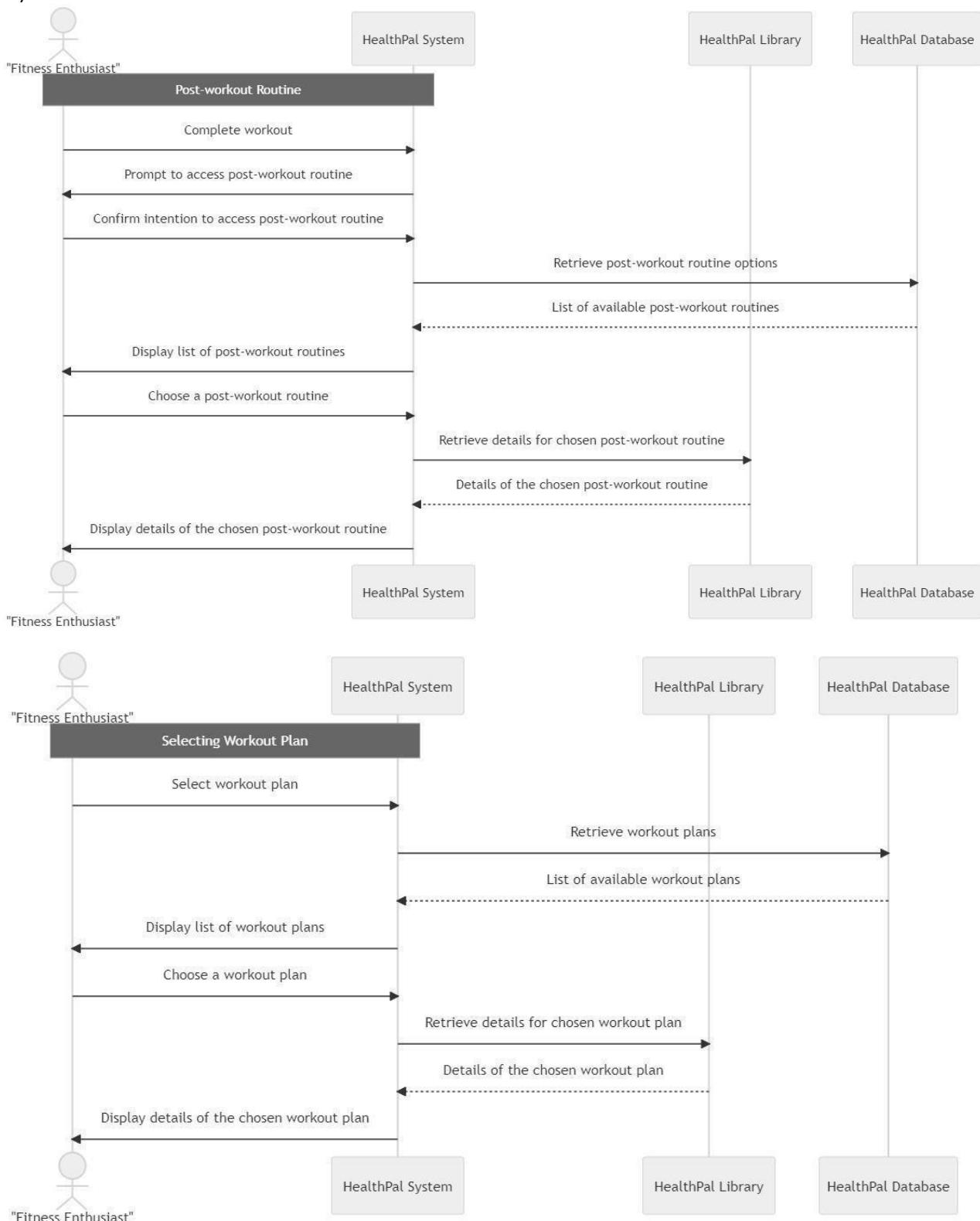


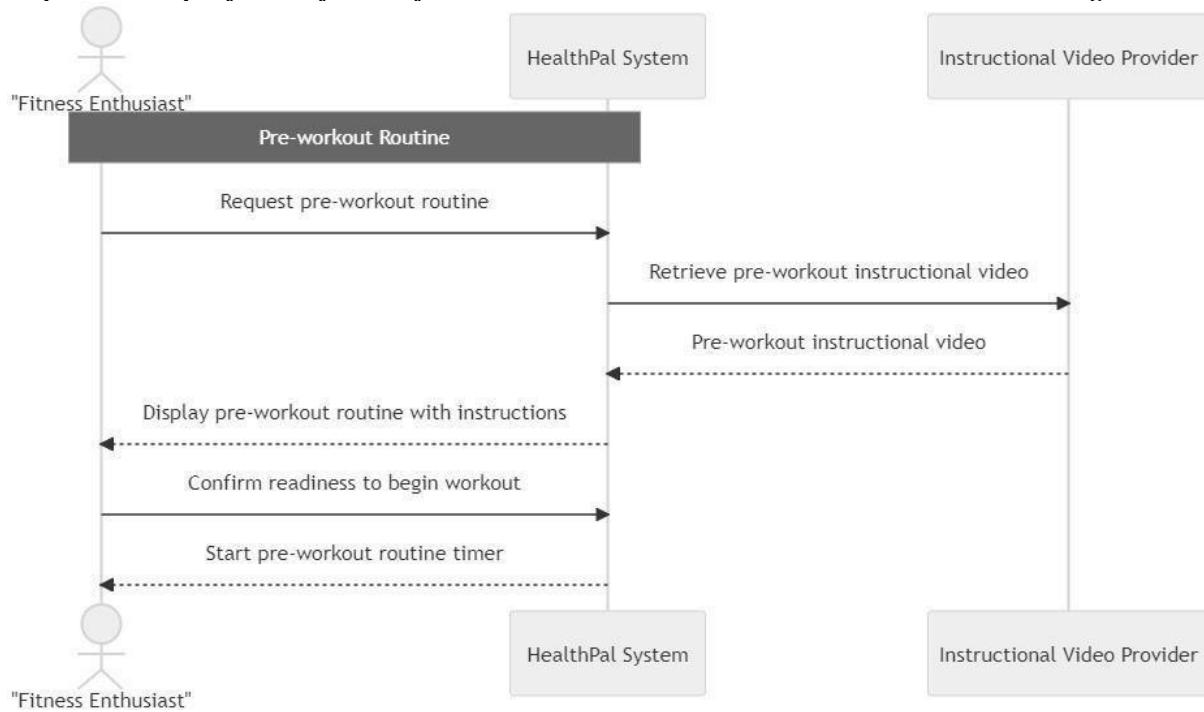
12) Use casse12



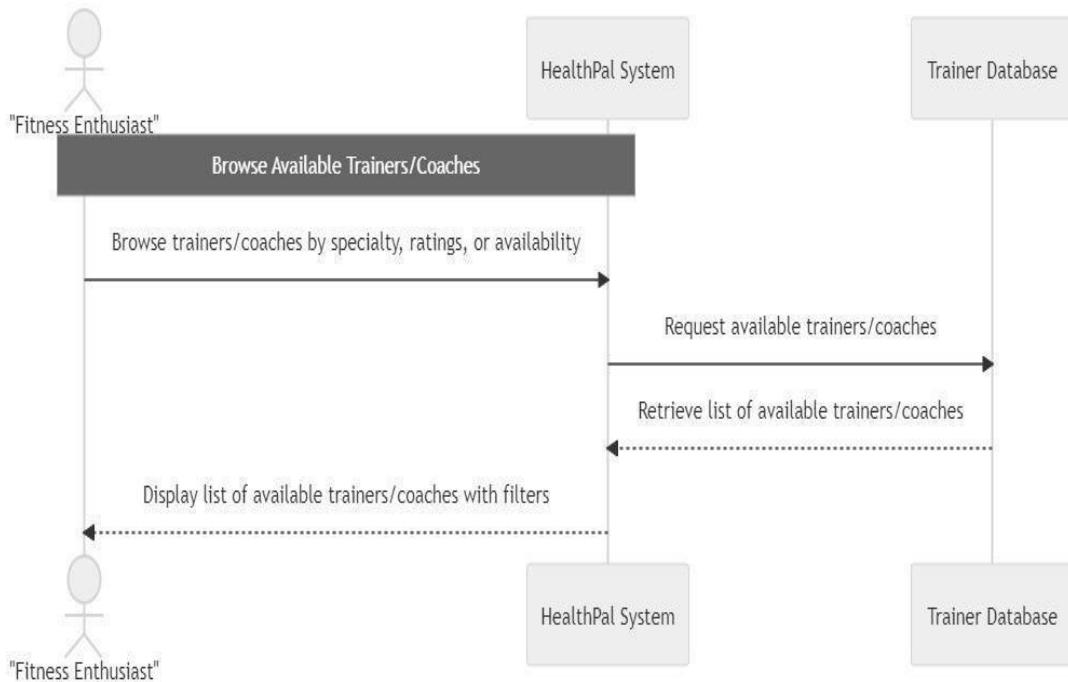


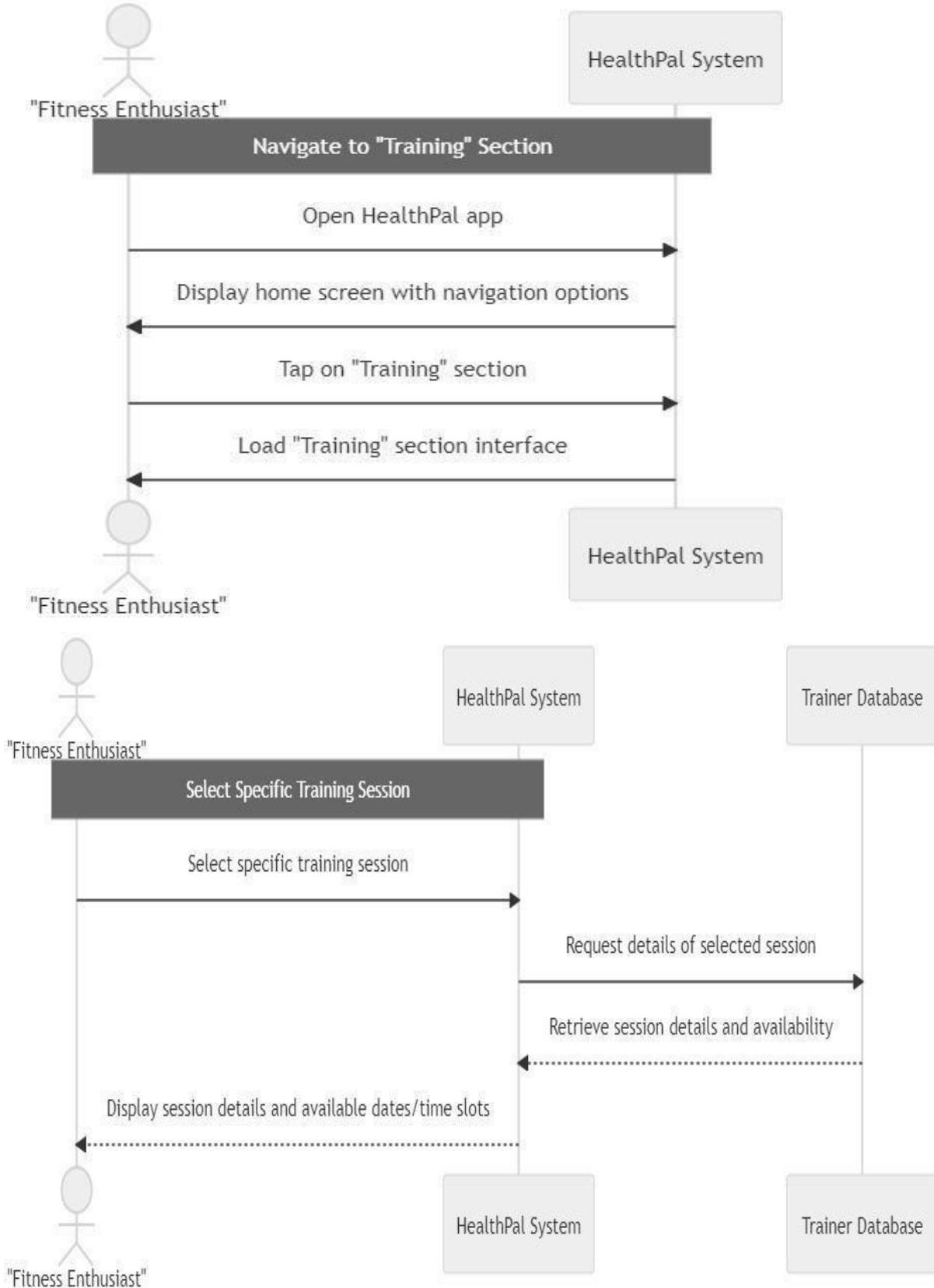
13) Use case13

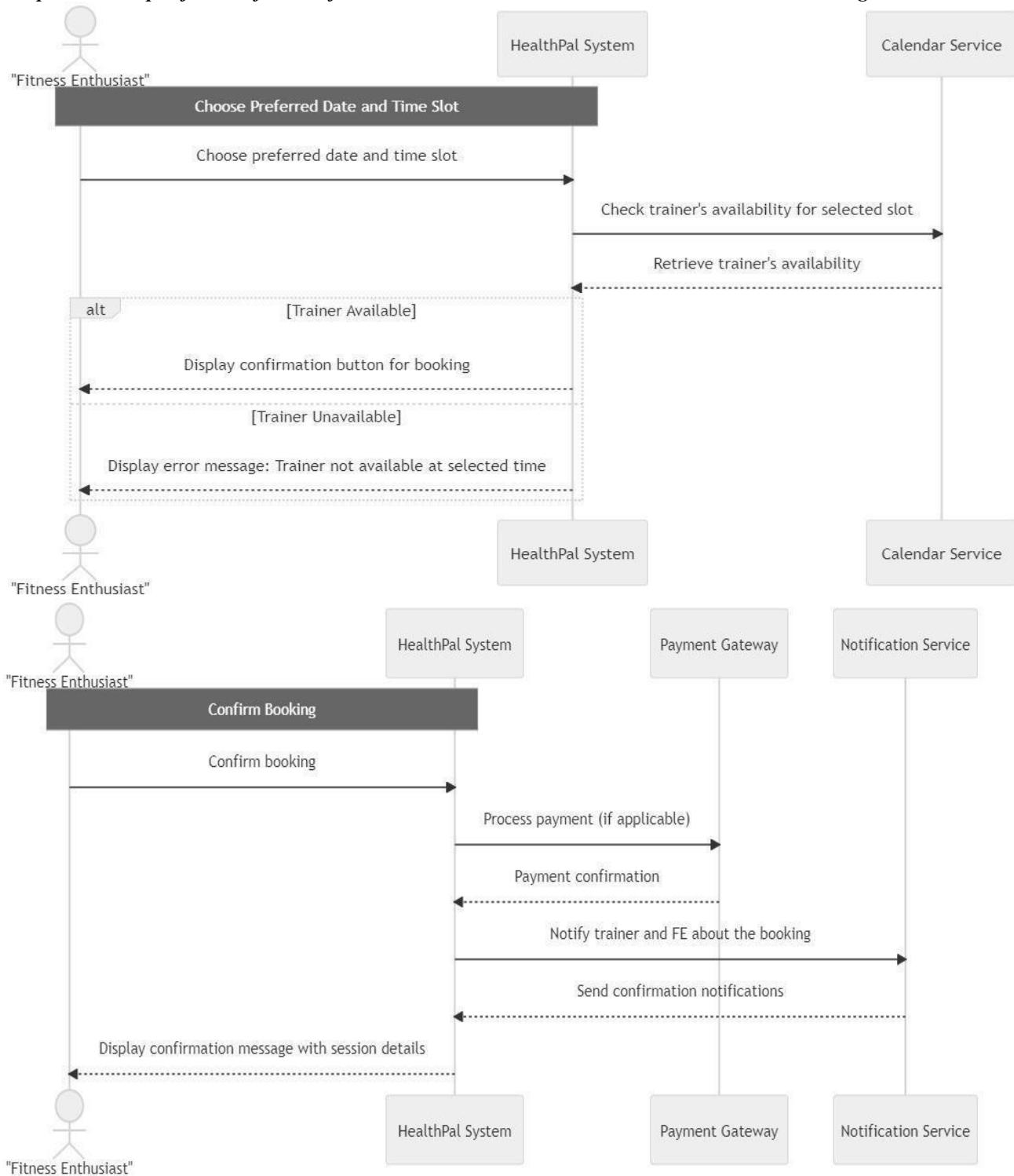




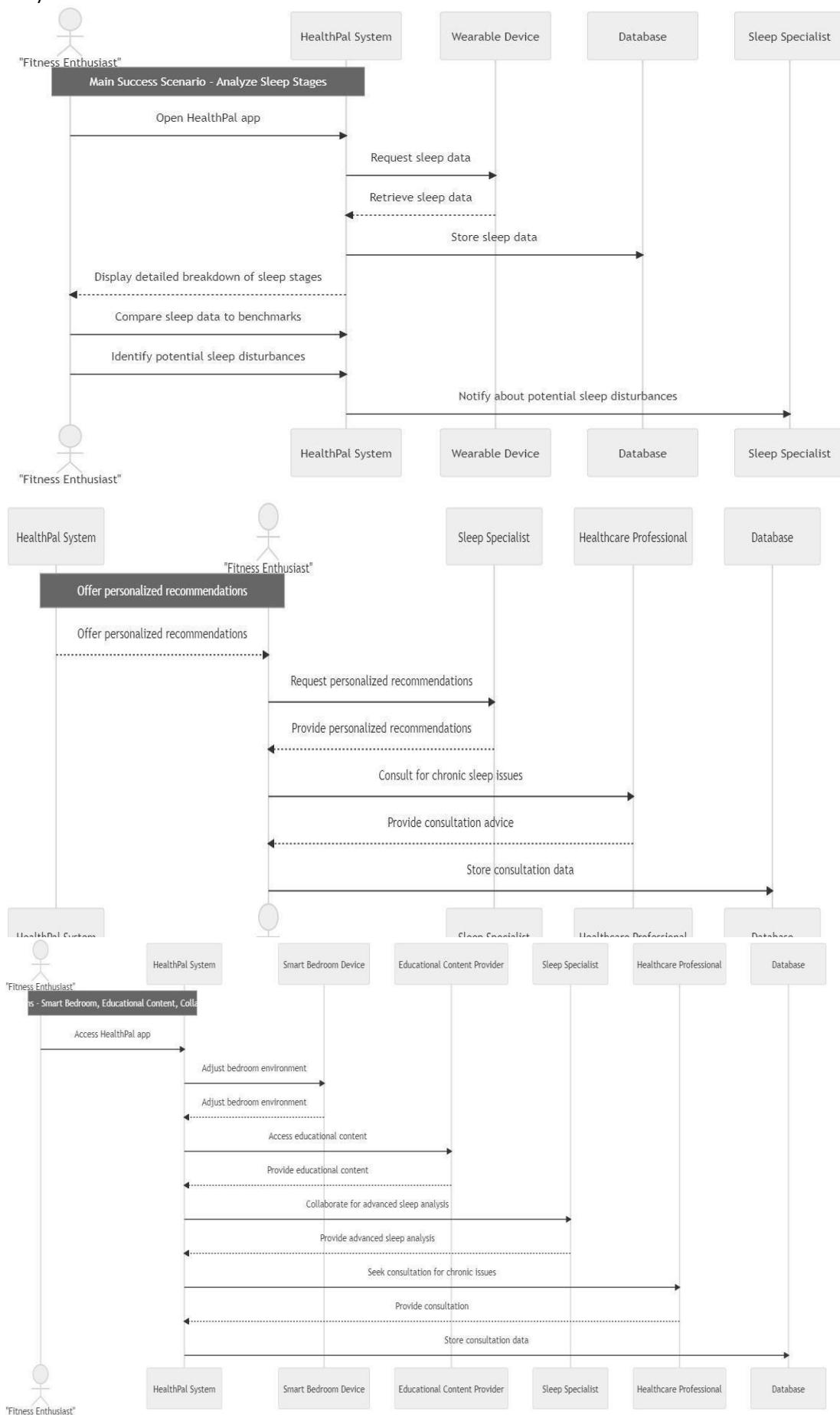
14) Use case14



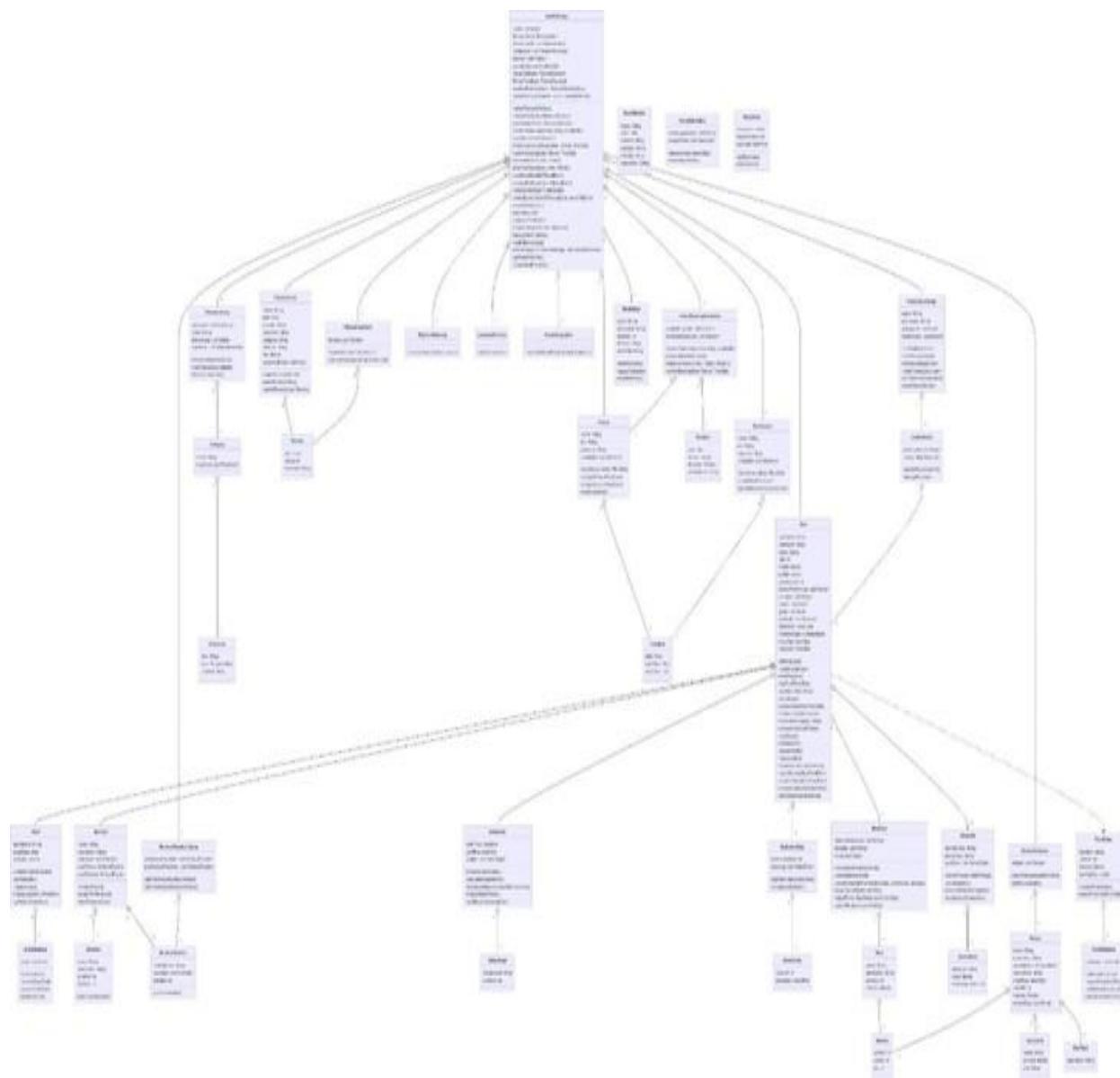




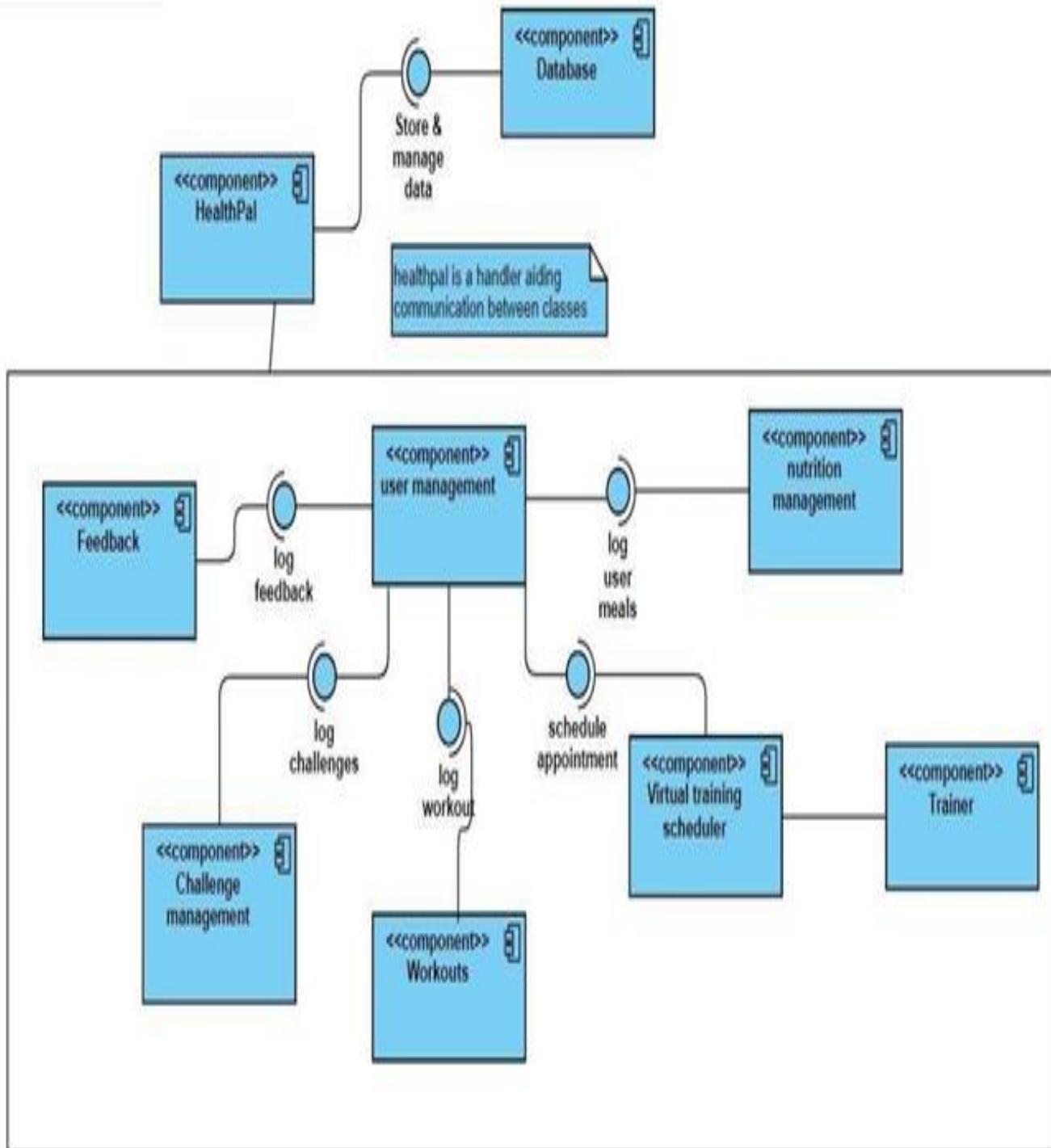
15) Use case 15



7. Class Diagram



8. Component Diagram



9. Package Diagram

1. User:

User, UserProfile, Goal, Workout, SleepData, HydrationData, MealPlan, Wearable

2. Workout:

Workout, Exercise, WorkoutRoutine

3. FitnessEvent:

FitnessEvent, Review

4. FitnessChallenge:

FitnessChallenge, Leaderboard

5. Trainer:

Trainer, TimeSlot

6. Nutritionist:

Nutritionist, TimeSlot

7. RecipeDatabase:

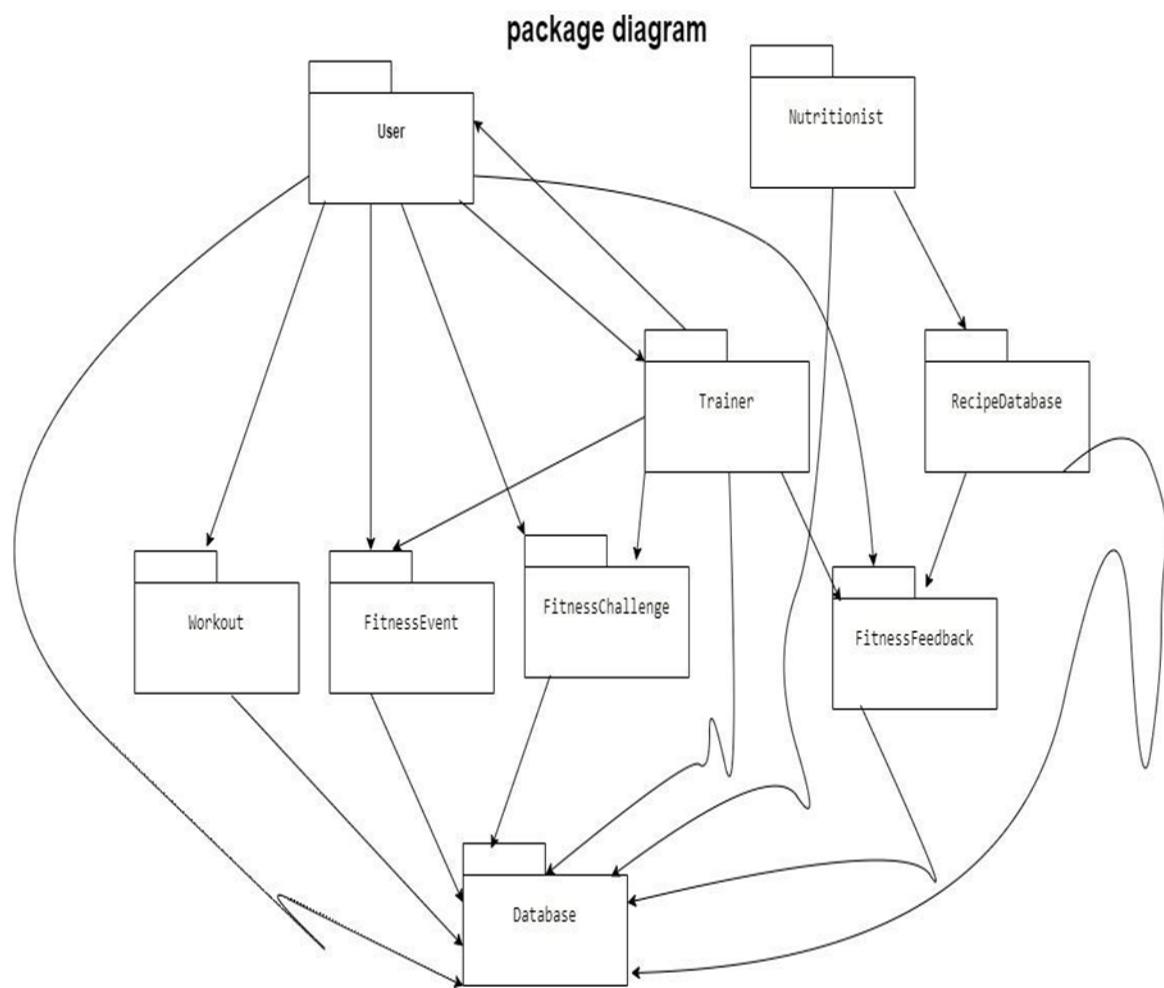
RecipeDatabase, Recipe, Ingredient

8. FitnessFeedback:

FitnessFeedback, Review

9. Database:

GoalDatabase, FoodDatabase



10. Deployment Diagram

