Software Requirements Specifications

for

G5 – Campus Wellness Portal with Medical System and Fitness Center Integration

Version: 1.0

Date: 24.05.2025

Group: 5

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Revisions

Version	Primary Author(s)	Description of Version	Date Completed
1.0	Ng Jia Hong, Lee Ken Yu, Danish Haziq	This version contains software and hardware requirement descriptions, system functions and overview.	24.05.2025

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1.0 Introduction

1.1 Purpose

The software is aimed at making it easy for all students and staff to access to tools that support their well-being on campus. Users can book and manage health appointments, sign up for exercise classes, set personal targets for well-being, and receive customized recommendations—all on the same app and website.

In addition, the integration ensures students can easily access their timetables, resources at the Health Center, and their personal info from the SIS. It guarantees users have instant access to current information, making search and support services easier and more efficient.

It also aims to streamline the work that administrative staff do. With such tools, members of staff can deal with bookings, absence from classes, and feedback efficiently. Students evaluate their own progress, get explanations from AI, and are encouraged to pursue their health goals.

The software is designed to encourage students to make use of wellness services, simplify the work of staff, and support a thriving and healthy community on campus.

1.2 Scope

The Campus Wellness Portal addresses the need for a cohesive system that manages the fragmented wellness-related services across university departments. It offers a single digital entry point—accessible via both web and mobile—for students and staff to manage health and fitness activities.

Core Functional Modules:

- **User Registration and Authentication (R-1):** Role-based login and account management for students, medical personnel, fitness instructors, and admins.
- **Appointment Management (R-2):** Full support for booking, viewing, editing, cancelling appointments, and receiving reminders.
- **Wellness Monitoring & Suggestions (R-3):** Includes health self-assessments, setting health goals, AI-generated suggestions, and visual progress summaries.
- **Health Content Delivery & Notifications (R-4):** Access to curated articles and event notifications delivered through email, push, and in-app messaging.
- **Fitness & Physical Activity (R-5):** Enables registration for fitness classes, gym slot reservations, joining sports activities, and activity tracking.
- **Feedback Collection (R-6):** Users can submit opinions and suggestions related to portal services and wellness offerings.

System Capabilities:

- Seamless integration with university systems such as SIS and medical records
- Real-time interaction and updates with backend services
- Responsive and mobile-first UI design
- Cloud-hosted infrastructure with high availability and scalability
- Compliance with PDPA and institutional security protocols

Expected Benefits:

- Improved visibility and participation in wellness programs
- Personalized health tracking and AI-driven tips
- Time-saving automation for admin and health staff
- Real-time reporting and wellness trend monitoring

Goals of the Campus Wellness Portal:

- Increase student participation in wellness services by 25% within the first semester
- Achieve over 90% user satisfaction on ease of access and service delivery
- Automate at least 60% of manual administrative wellness processes
- Provide a scalable foundation for future expansion such as wearable device integration and virtual consultations

1.3 Product Overview

1.3.1 Product Perspective

This section gives an overview of the Campus Wellness Portal (CWP). It briefly describes how the system is built with different parts, how people interact with those parts through interfaces and how users navigate throughout the system with the help of different technologies. It provides one place to manage your appointments, keep track of your activities, check your wellness and receive health information.

All individuals (students, staff, medical staff and administrators) will use the same web or mobile platform to access the system. They interact with the backend server with safe and secure internet communication. When a user requests information, the server collects data from cloud-based databases or from the Medical System and Fitness Center System.

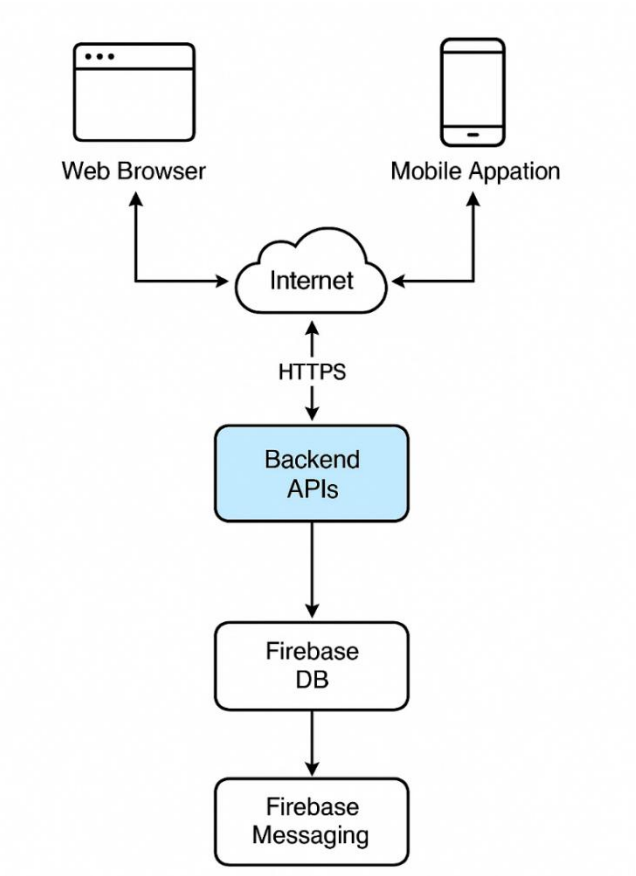

Figure 1 System Overview Diagram

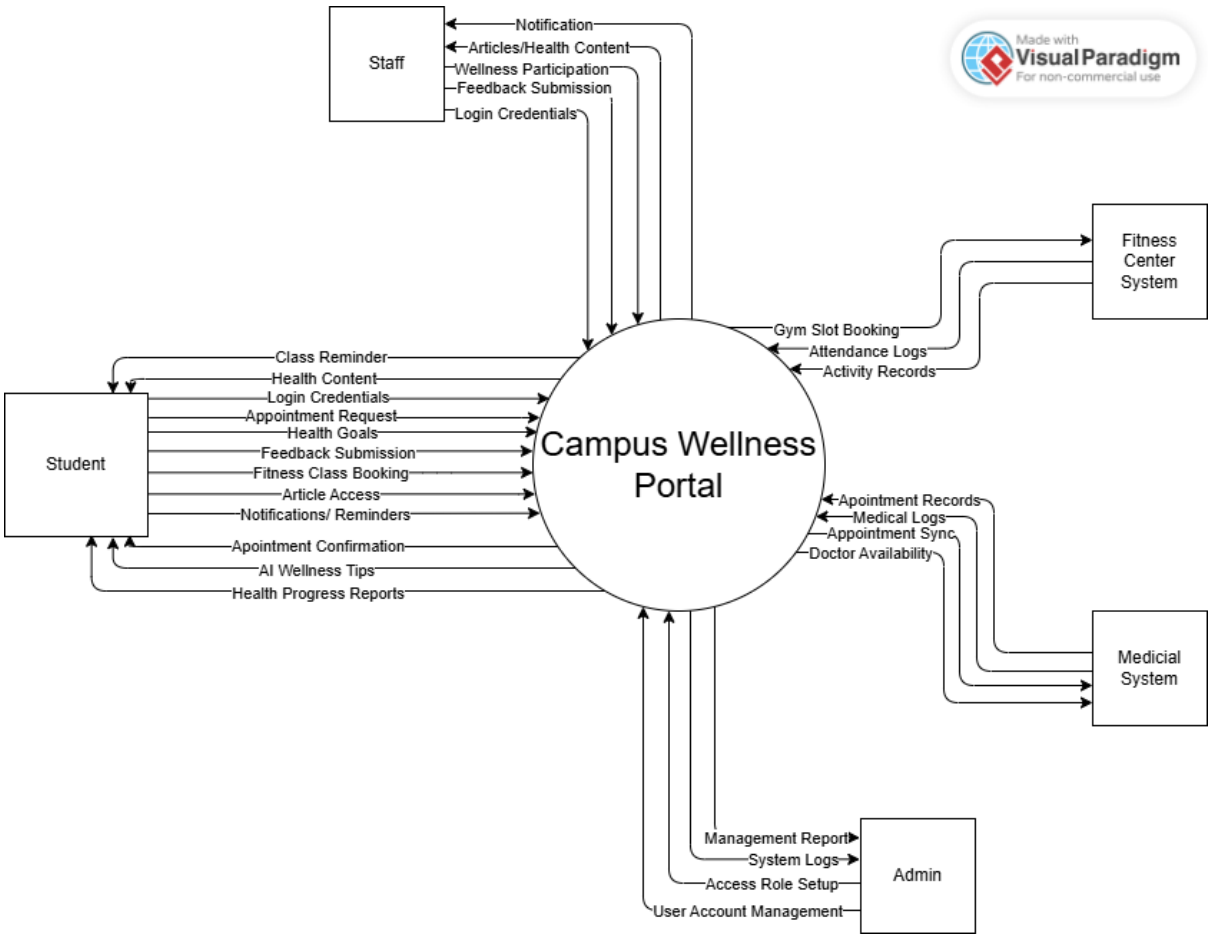

Figure 2 System Context diagram

1.3.1.1 System Interfaces

Table 1 System Interfaces

Interface ID	Interface Description	Author
REQ_SI001	Medical System Integration Connects the university's health center to CWP for syncing appointment records, visit logs, and real-time doctor availability.	Ng Jia Hong
REQ_SI002	Fitness Center System Interface Enables booking of gym slots, registration for fitness classes, and real-time updates of physical activities.	Lee Ken Yu
REQ_SI003	SIS Authentication API Allows students and staff to authenticate using university credentials pulled from the Student Information System.	Danish Haziq

REQ_SI004	Firebase Notification Service Sends reminders, appointment alerts, and wellness tips through push notifications and email.	Ng Jia Hong

1.3.1.2 User Interfaces

Table 2 User Interfaces

Requirement ID	Description	Priority	Author
REQ_UI001	The login screen will use a minimal interface with clear input fields and branding colours of the university.	High	Lee Ken Yu
REQ_UI002	Dashboards for students and staff will have clearly labelled modules (appointments, goals, classes) with segmented tabs.	High	Danish Haziq
REQ_UI003	A consistent colour palette will be used throughout the application – Blue for active, Green for success, and Red for errors.	Medium	Ng Jia Hong
REQ_UI004	Font family used: “Poppins” for headers, “Roboto” for body text. Size ranges from 14px to 24px for readability.	Medium	Lee Ken Yu
REQ_UI005	Appointment and fitness class pages will use color-coded calendar blocks – Green (Available), Orange (Pending), Red (Booked).	High	Danish Haziq

1.3.1.3 Hardware Interfaces

Server Requirements:

- Processor: Intel Xeon or equivalent
- RAM: 16 GB minimum
- Storage: 1 TB SSD with RAID backup
- Network: 1 Gbps or higher, with redundancy

Client Devices:

The system is compatible with a wide range of modern devices. However, performance may degrade on hardware below the recommended specifications.

Table 3 Hardware Interfaces

Interface ID	Description	Priority
REQ_HI001	Devices should run on minimum 64-bit architecture with at least 2 GHz processor speed.	High
REQ_HI002	A minimum of 4GB RAM is required for smooth experience using the mobile or web portal.	High
REQ_HI003	At least 500MB of free storage is required for caching user data and media assets locally.	Medium
REQ_HI004	The system must support Wi-Fi and cellular network for cloud synchronization.	High

1.3.1.4 Software Interfaces

This section outlines software dependencies and integrations for smooth system functioning.

Table 4 Software Interfaces

Category	Software Name	Version	Purpose	Reference
Database	Firebase Firestore	Latest	Handles structured data including appointments, wellness logs, and fitness tracking.	Firebase Docs
Backend	Node.js	v18.x	Powers API logic for authentication, booking, and notifications.	Node.js Docs
Frontend	React.js or Flutter	Latest Stable	UI rendering and client-side logic.	React/Flutter Docs
Browser	Chrome / Safari / Edge / Firefox	V90+	User interface access via supported web browsers.	Browser Official Sites
Notification	Firebase Cloud Messaging	v2.0	Push notifications for reminders, alerts, and tips.	FCM Docs

Auth	OAuth 2.0 (via SIS)	Standard	SSO-based university login.	OAuth 2.0 Docs

1.3.1.5 Communication Interfaces

Apart from HTTPS and WebSockets, the system shall secure data transmission by doing the following:

- The deployment must be over a protected infrastructure and should allow communication speeds of at least 1 Gbps between its frontend and backend sections.
- To communicate with their database servers, clients either use WWANs or LANs within an institution.
- Login, booking, providing feedback and accessing data all take place using HTTPS with TLS encryption.
- At every step of a client-server exchange, authentication and authorization are put into effect.

1.3.1.6 Memory Constraints

More ways to improve how well a system performs:

- It is important that the backend database can handle up to 10TB of health and fitness data, logs and feedback records.
- Up to 5GB of their own storage space is given to each student or staff member for their medical records, wellness information and workout history.
- At least 1000 users are expected to use the system at the same time during the start of the semester or when exams are being taken.
- Sessions allow caching up to 1GB of unsent events in both the message queue and notification services.

1.3.1.7 Operations

Modules and Functional Components:

Table 5 Modules and Functional Components

Module	Key Functions
User Management	Registration, login, role-based access
Appointment System	View, book, and manage health center appointments
Fitness Registration	Sign up for classes, check availability, view history
Goal Tracker	Input and visualize personal health metrics
Reminders and Alerts	Automated push/email/SMS notifications
Admin Panel	Class setup, appointment slot control, usage reports

User Roles and Access Levels:

Table 6 User Roles and Access Levels

Role	Capabilities
Student	Book appointments, join fitness classes, set goals, receive updates
Medical Staff	Manage appointment schedules, view visit logs
Fitness Instructor	Manage class attendees, log participation
Administrator	Oversee system usage, generate reports, manage content

1.3.1.8 Site Adaptation Requirements

- Cross-Platform: Supports Windows, macOS, Android, iOS.
- Mobile Compatibility: Fully responsive UI for all devices.
- Internet Dependency: Requires reliable internet for real-time features.
- Cloud-Hosted: Backend and database hosted on Firebase or Azure.
- No Special Hardware: Accessible using modern browsers; no proprietary equipment needed.

1.3.1.9 Interface with Services

Along with the previously mentioned SIS, Medical System, Fitness Center APIs and Firebase, I also used these.

- The Campus Wellness Portal relies on Firebase Hosting and Google Cloud to ensure it scales up instantly and effectively stores and broadcasts files in real time.
- All communication between services relies on RESTful APIs and OAuth 2.0 security.

1.3.2 Product Functions

1.3.2.1 Use Case Diagram

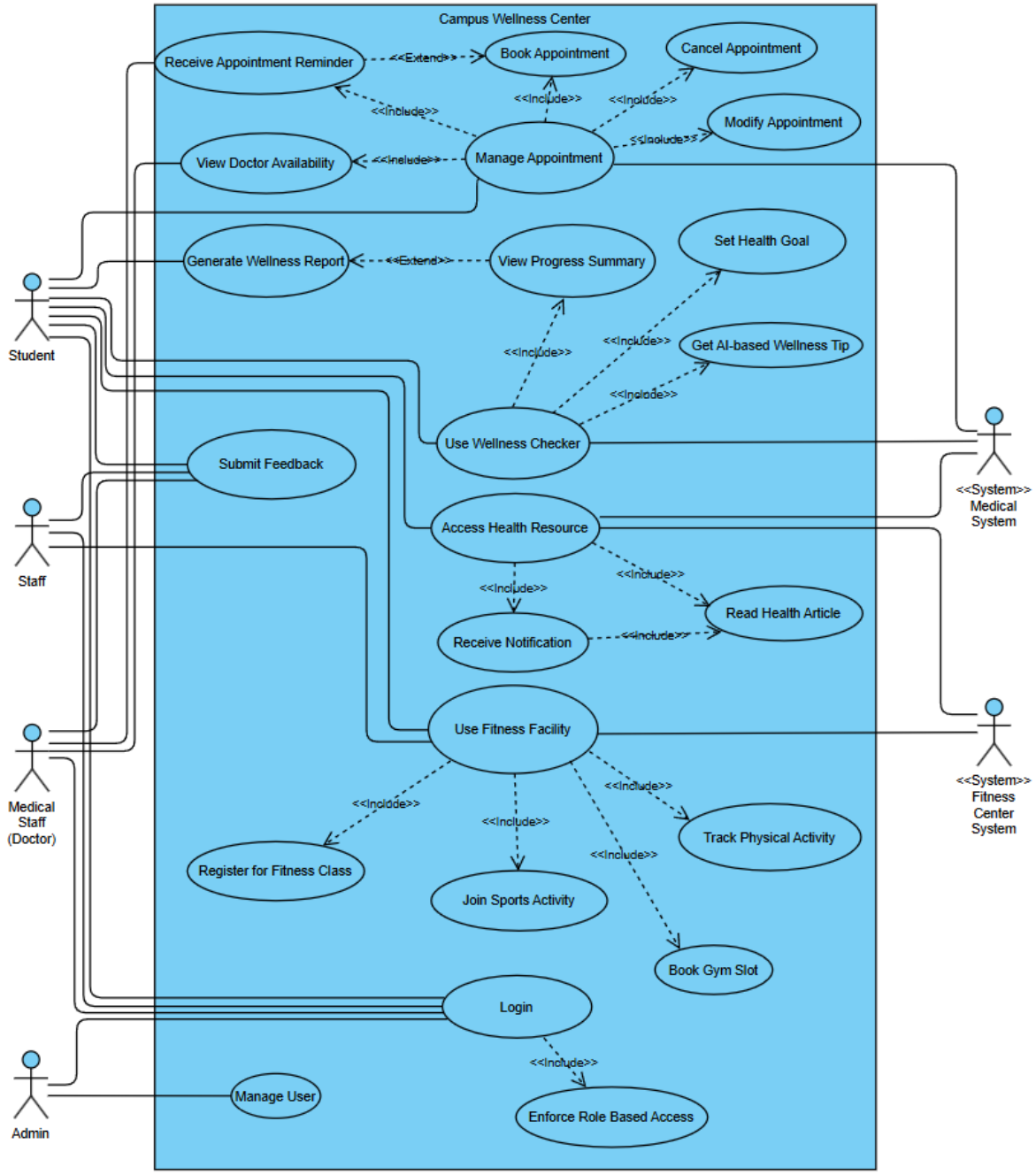

Figure 3 Use Case Diagram

1.3.2.2 R-1 User Access Management

Table 7 Use Case Specification – Login

No.	Section	Label	Explanation
ID	1.2	Name	Login
Management	2.1	Author(s)	Ng Jia Hong
Context	3.1	Source	Interview Documentation
Use Case Definition	4.2	Short Description	Allows users to securely log into the system.
	4.4	Goal(s)	To authenticate users and redirect them based on roles.
	4.5 / 4.6	Actor(s)	1. Student 2. Staff 3. Medical Staff 4. Admin
	4.7	Pre-condition(s)	User must have a valid account.
	4.8	Post-condition(s)	User is logged in and taken to their dashboard.
Relationships	5.2	Relationship to other use cases	Supports access to all user-specific features.

Table 8 Use Case Specification – Enforce Role Based Access

No.	Section	Label	Explanation
ID	1.2	Name	Enforce Role Based Access
Management	2.1	Author(s)	Ng Jia Hong
Context	3.1	Source	Interview Documentation
Use Case Definition	4.2	Short Description	Applies access permissions based on user roles.
	4.4	Goal(s)	To restrict unauthorized access to certain features.
	4.5 / 4.6	Actor(s)	1. Admin 2. System
	4.7	Pre-condition(s)	User must be authenticated.
	4.8	Post-condition(s)	Access restrictions are enforced.
Relationships	5.2	Relationship to other use cases	Included in user management functions.

Table 9 Use Case Specification – Manage User

No.	**Section**	**Label**	**Explanation**
ID	1.2	Name	Manage User
Management	2.1	Author(s)	Ng Jia Hong
Context	3.1	Source	Interview Documentation
Use Case Definition	4.2	Short Description	Admin manages user accounts.
	4.4	Goal(s)	To allow account creation, update, and deletion.
	4.5 / 4.6	Actor(s)	1. Admin
	4.7	Pre-condition(s)	Admin must be logged in with proper privileges.
	4.8	Post-condition(s)	User account information is updated.
Relationships	5.2	Relationship to other use cases	Includes role access enforcement and login management.

1.3.2.3 R-2 Appointment Management

Table 10 Use Case Specification – Manage Appointment

No.	Section	Label	Explanation
ID	1.2	Name	Manage Appointment
Management	2.1	Author(s)	Ng Jia Hong
Context	3.1	Source	Interview Documentation
Use Case Definition	4.2	Short Description	Central control for booking, cancelling, and modifying appointments.
	4.4	Goal(s)	To help users manage their appointments with the health center.
	4.5 / 4.6	Actor(s)	1. Student 2. Medical System
	4.7	Pre-condition(s)	User is logged in.
	4.8	Post-condition(s)	Appointment state is updated in the system.
Relationships	5.2	Relationship to other use cases	Includes Book, Cancel, Modify, and View Doctor Availability.

Table 11 Use Case Specification – Book Appointment

No.	Section	Label	Explanation
ID	1.2	Name	Book Appointment
Management	2.1	Author(s)	Ng Jia Hong
Context	3.1	Source	Interview Documentation
Use Case Definition	4.2	Short Description	Allows students to request an appointment with the health center.
	4.4	Goal(s)	To create a new appointment entry.
	4.5 / 4.6	Actor(s)	1. Student 2. Medical System
	4.7	Pre-condition(s)	User is logged in and can view availability.
	4.8	Post-condition(s)	Appointment is booked and confirmation is issued.
Relationships	5.2	Relationship to other use cases	Extended by Receive Appointment Reminder; included in Manage Appointment.

Table 12 Use Case Specification – Cancel Appointment

No.	Section	Label	Explanation
ID	1.2	Name	Cancel Appointment
Management	2.1	Author(s)	Ng Jia Hong
Context	3.1	Source	Interview Documentation
Use Case Definition	4.2	Short Description	Allows users to cancel a scheduled appointment.
	4.4	Goal(s)	To remove a scheduled appointment from the system.
	4.5 / 4.6	Actor(s)	1. Student 2. Medical System
	4.7	Pre-condition(s)	User has a valid appointment scheduled.
	4.8	Post-condition(s)	Appointment is cancelled and record updated.
Relationships	5.2	Relationship to other use cases	Included in Manage Appointment.

Table 13 Use Case Specification – Modify Appointment

No.	Section	Label	Explanation
ID	1.2	Name	Modify Appointment
Management	2.1	Author(s)	Ng Jia Hong
Context	3.1	Source	Interview Documentation
Use Case Definition	4.2	Short Description	Enables rescheduling or editing appointment details.
	4.4	Goal(s)	To update appointment information.
	4.5 / 4.6	Actor(s)	1. Student 2. Medical System
	4.7	Pre-condition(s)	User has an existing appointment.
	4.8	Post-condition(s)	Updated appointment details are saved.
Relationships	5.2	Relationship to other use cases	Included in Manage Appointment.

Table 14 Use Case Specification – View Doctor Availability

No.	Section	Label	Explanation
ID	1.2	Name	View Doctor Availability
Management	2.1	Author(s)	Ng Jia Hong
Context	3.1	Source	Interview Documentation
Use Case Definition	4.2	Short Description	Shows available time slots for booking appointments.
	4.4	Goal(s)	To check available time slots before booking.
	4.5 / 4.6	Actor(s)	1. Student 2. Medical System
	4.7	Pre-condition(s)	User is authenticated.
	4.8	Post-condition(s)	Available slots are displayed.
Relationships	5.2	Relationship to other use cases	Included in Manage Appointment.

Table 15 Use Case Specification – Receive Appointment Reminder

No.	Section	Label	Explanation
ID	1.2	Name	Receive Appointment Reminder
Management	2.1	Author(s)	Ng Jia Hong
Context	3.1	Source	Interview Documentation
Use Case Definition	4.2	Short Description	System sends reminders for upcoming appointments.
	4.4	Goal(s)	To help users remember their scheduled appointments.
	4.5 / 4.6	Actor(s)	1. Student 2. Medical Staff 3. Medical System
	4.7	Pre-condition(s)	User has a future appointment.
	4.8	Post-condition(s)	Reminder is sent via the preferred notification method.
Relationships	5.2	Relationship to other use cases	Extends Book Appointment.

1.3.2.4 R-3 Wellness Monitoring & Suggestion

Table 16 Use Case Specification – Use Wellness Checker

No.	Section	Label	Explanation
ID	1.2	Name	Use Wellness Checker
Management	2.1	Author(s)	Danish Haziq
Context	3.1	Source	Interview Documentation
Use Case Definition	4.2	Short Description	Allows users to evaluate their current health status.
	4.4	Goal(s)	To guide users in understanding their wellness level.
	4.5 / 4.6	Actor(s)	1. Student 2. Medical System
	4.7	Pre-condition(s)	User is logged in.
	4.8	Post-condition(s)	System provides health check summary.
Relationships	5.2	Relationship to other use cases	Includes View Progress Summary and Set Health Goal.

Table 17 Use Case Specification – View Progress Summary

No.	Section	Label	Explanation
ID	1.2	Name	View Progress Summary
Management	2.1	Author(s)	Danish Haziq
Context	3.1	Source	Interview Documentation
Use Case Definition	4.2	Short Description	Displays user's tracked wellness progress.
	4.4	Goal(s)	To inform users of trends and improvement areas.
	4.5 / 4.6	Actor(s)	1. Student 2. Medical System
	4.7	Pre-condition(s)	User has logged relevant health data.
	4.8	Post-condition(s)	Progress summary is shown.

Relationships	5.2	Relationship to other use cases	Included in Use Wellness Checker.

Table 18 Use Case Specification – Set Health Goal

No.	Section	Label	Explanation
ID	1.2	Name	Set Health Goal
Management	2.1	Author(s)	Danish Haziq
Context	3.1	Source	Interview Documentation
Use Case Definition	4.2	Short Description	Allows users to define personal wellness targets.
	4.4	Goal(s)	To encourage goal-based wellness tracking.
	4.5 / 4.6	Actor(s)	1. Student 2. Medical System
	4.7	Pre-condition(s)	User is logged in.
	4.8	Post-condition(s)	Health goals are saved to the user profile.
Relationships	5.2	Relationship to other use cases	Included in Use Wellness Checker.

Table 19 Use Case Specification – Get AI-based Wellness Tip

No.	Section	Label	Explanation
ID	1.2	Name	Get AI-based Wellness Tip
Management	2.1	Author(s)	Danish Haziq
Context	3.1	Source	Interview Documentation
Use Case Definition	4.2	Short Description	System provides personalized health recommendations.
	4.4	Goal(s)	To offer tailored advice for achieving set goals.
	4.5 / 4.6	Actor(s)	1. Student 2. Medical System
	4.7	Pre-condition(s)	Health goal is defined by user.

	4.8	Post-condition(s)	Recommendations are delivered to user.
Relationships	5.2	Relationship to other use cases	Extends Set Health Goal.

Table 20 Use Case Specification – Generate Wellness Report

No.	Section	Label	Explanation
ID	1.2	Name	Generate Wellness Report
Management	2.1	Author(s)	Danish Haziq
Context	3.1	Source	Interview Documentation
Use Case Definition	4.2	Short Description	Summarizes user's wellness data into a report.
	4.4	Goal(s)	To enable reflection and further improvement.
	4.5 / 4.6	Actor(s)	1. Student
	4.7	Pre-condition(s)	User has recorded wellness progress and goals.
	4.8	Post-condition(s)	Report is generated and presented.
Relationships	5.2	Relationship to other use cases	Extends View Progress Summary and Set Health Goal.

1.3.2.5 R-4 Health Resources & Notification

Table 21 Use Case Specification – Access Health Resource

No.	Section	Label	Explanation
ID	1.2	Name	Access Health Resource
Management	2.1	Author(s)	Danish Haziq
Context	3.1	Source	Interview Documentation
Use Case Definition	4.2	Short Description	Grants users access to health content and resources.
	4.4	Goal(s)	To educate and support users with health materials.
	4.5 / 4.6	Actor(s)	1. Student 2. Staff 3. Medical System 4. Fitness Center System
	4.7	Pre-condition(s)	User is authenticated.
	4.8	Post-condition(s)	User views selected resources.
Relationships	5.2	Relationship to other use cases	Includes Read Health Article, Extends Receive Notification.

Table 22 Use Case Specification – Read Health Article

No.	Section	Label	Explanation
ID	1.2	Name	Read Health Article
Management	2.1	Author(s)	Danish Haziq
Context	3.1	Source	Interview Documentation
Use Case Definition	4.2	Short Description	Displays curated health and wellness articles.
	4.4	Goal(s)	To improve user knowledge on wellness topics.
	4.5 / 4.6	Actor(s)	1. Student 2. Staff
	4.7	Pre-condition(s)	User is logged in.
	4.8	Post-condition(s)	Article content is displayed.

Relationships	5.2	Relationship to other use cases	Included in Access Health Resource.

Table 23 Use Case Specification – Receive Notification

No.	Section	Label	Explanation
ID	1.2	Name	Receive Notification
Management	2.1	Author(s)	Danish Haziq
Context	3.1	Source	Interview Documentation
Use Case Definition	4.2	Short Description	Delivers health reminders or updates to users.
	4.4	Goal(s)	To inform users of relevant health updates or alerts.
	4.5 / 4.6	Actor(s)	1. System
	4.7	Pre-condition(s)	User has opted in or has activity generating alerts.
	4.8	Post-condition(s)	User receives and reviews notification.
Relationships	5.2	Relationship to other use cases	Extended by Access Health Resource.

1.3.2.6 R-5 Fitness & Physical Activity

Table 24 Use Case Specification – Use Fitness Facility

No.	Section	Label	Explanation
ID	1.2	Name	Use Fitness Facility
Management	2.1	Author(s)	Lee Ken Yu
Context	3.1	Source	Interview Documentation
Use Case Definition	4.2	Short Description	Allows users to access and use campus fitness resources.
	4.4	Goal(s)	To enable structured fitness engagement through system access.
	4.5 / 4.6	Actor(s)	1. Student 2. Staff 3. Medical Staff 4. Fitness Center System
	4.7	Pre-condition(s)	User must be logged in and have appropriate access.
	4.8	Post-condition(s)	User is allowed entry or access to facility.
Relationships	5.2	Relationship to other use cases	Includes Register for Fitness Class, Join Sports Activity, Track Physical Activity, Book Gym Slot.

Table 25 Use Case Specification – Register for Fitness Class

No.	Section	Label	Explanation
ID	1.2	Name	Register for Fitness Class
Management	2.1	Author(s)	Lee Ken Yu
Context	3.1	Source	Interview Documentation
Use Case Definition	4.2	Short Description	Enables users to sign up for scheduled classes.
	4.4	Goal(s)	To let users participate in guided fitness sessions.
	4.5 / 4.6	Actor(s)	1. Student 2. Staff 3. Fitness Center System

	4.7	Pre-condition(s)	User must be logged in and class must be available.
	4.8	Post-condition(s)	User is registered for the selected class.
Relationships	5.2	Relationship to other use cases	Included in Use Fitness Facility, Extends Use Fitness Facility.

Table 26 Use Case Specification – Join Sports Activity

No.	Section	Label	Explanation
ID	1.2	Name	Join Sports Activity
Management	2.1	Author(s)	Lee Ken Yu
Context	3.1	Source	Interview Documentation
Use Case Definition	4.2	Short Description	Allows participation in group sports or wellness events.
	4.4	Goal(s)	To promote teamwork and physical health.
	4.5 / 4.6	Actor(s)	1. Student 2. Staff 3. Fitness Center System
	4.7	Pre-condition(s)	User is logged in.
	4.8	Post-condition(s)	User is enrolled in a group event.
Relationships	5.2	Relationship to other use cases	Included in Use Fitness Facility.

Table 27 Use Case Specification – Track Physical Activity

No.	Section	Label	Explanation
ID	1.2	Name	Track Physical Activity
Management	2.1	Author(s)	Lee Ken Yu
Context	3.1	Source	Interview Documentation
Use Case Definition	4.2	Short Description	Logs physical activity performed by the user.
	4.4	Goal(s)	To monitor and record user's fitness performance.

	4.5 / 4.6	Actor(s)	1. Student 2. Fitness Center System
	4.7	Pre-condition(s)	User is engaged in a fitness task.
	4.8	Post-condition(s)	Activity is logged and saved.
Relationships	5.2	Relationship to other use cases	Included in Use Fitness Facility.

Table 28 Use Case Specification – Book Gym Slot

No.	Section	Label	Explanation
ID	1.2	Name	Book Gym Slot
Management	2.1	Author(s)	Lee Ken Yu
Context	3.1	Source	Interview Documentation
Use Case Definition	4.2	Short Description	Allows users to reserve a gym session slot.
	4.4	Goal(s)	To manage capacity and ensure equipment availability.
	4.5 / 4.6	Actor(s)	1. Student 2. Staff 3. Fitness Center System
	4.7	Pre-condition(s)	User is logged in and gym slot is available.
	4.8	Post-condition(s)	Slot is reserved under the user's name.
Relationships	5.2	Relationship to other use cases	Included in Use Fitness Facility.

1.3.2.7 R-6 Feedback

Table 29 Use Case Specification – Submit Feedback

No.	Section	Label	Explanation
ID	1.2	Name	Submit Feedback
Management	2.1	Author(s)	Lee Ken Yu
Context	3.1	Source	Interview Documentation
Use Case Definition	4.2	Short Description	Enables users to provide input on services and experiences.
	4.4	Goal(s)	To gather user insights for system improvement.
	4.5 / 4.6	Actor(s)	1. Student 2. Staff
	4.7	Pre-condition(s)	User has experienced a service or class.
	4.8	Post-condition(s)	Feedback is recorded and stored.
Relationships	5.2	Relationship to other use cases	Standalone use case.

2.0 References

The references used in preparing this report are listed below:

1. **ISO/IEC/IEEE 29148:2018 Standard**: International Organization for Standardization. (2018). ISO/IEC/IEEE 29148:2018: Systems and software engineering — Life cycle processes — Requirements engineering. Retrieved from https://mmuedumy-my.sharepoint.com/personal/zarina_embi_mmu_edu_my/_layouts/15/onedrive.aspx?id=%2Fpersonal%2Fzarina%5Fembi%5Fmmu%5Fedu%5Fmy%2FDocuments%2FCSE6224%20Tutorial%20Materials%20for%20students%2FWeek%204&ga=1
2. **Sample SRS and SDS from MSTB 2013**: Multimedia University. (2013). Sample SRS and SDS from MSTB 2013 (based on older standards). Retrieved from https://mmuedumy-my.sharepoint.com/personal/zarina_embi_mmu_edu_my/_layouts/15/onedrive.aspx?id=%2Fpersonal%2Fzarina%5Fembi%5Fmmu%5Fedu%5Fmy%2FDocuments%2FCSE6224%20Tutorial%20Materials%20for%20students%2FWeek%205&ga=1
3. **Extra Guidance and Suggestions for Project Part 1 SRS**: Multimedia University. (n.d.). Extra guidance and suggestions for Project Part 1 SRS. Retrieved from https://mmuedumy-my.sharepoint.com/personal/zarina_embi_mmu_edu_my/_layouts/15/onedrive.aspx?id=%2Fpersonal%2Fzarina%5Fembi%5Fmmu%5Fedu%5Fmy%2FDocuments%2FCSE6224%20Tutorial%20Materials%20for%20students%2FWeek%205&ga=1

3.0 Requirements

3.1 Apportioning of Requirements

3.1.1 Software Elements Identification

The primary software modules identified for the G5 system include:

- User Access Management: Enforces login functionality, role-based access control, and administrative user management.
- Appointment Management: Supports booking, cancellation, and administration of appointments, including real-time availability and reminders through system integration with medical services.
- Wellness Monitoring & Recommendations: Allows students to assess their wellness, set personal health goals, track progress, receive AI-based wellness recommendations, and offer reporting.
- Health Resources & Notifications: Provides access to health articles and wellness resources, and delivers system-alert reminders and notifications.
- Fitness & Physical Activity Management: Manages sign-ups for fitness classes, gym time, sports activities, and tracks physical activity across fitness centers.
- Feedback: Tracks user satisfaction through the submittal of feedback and quality assessment logs.

3.1.1.1 Cross-Reference Table

Table 30 Cross-Reference Table

Software Elements	Requirement	Notes
User Access Management	System should authorized users with institutional credentials and provide role-based access.	Assigned user-specific access to wellness functions and confidential data.
Appointment Management	Should be able to book, cancel, and re-book doctor visits.	Should have real-time doctors' availability, waitlists, and send automated reminders.

Wellness Goal Tracker	System needs to support students in measuring wellness, goal setting, and receiving AI-powered recommendations.	Both milestone tracking and goal progress dashboard are available.
Health Resource & Notification	Users should be granted access to well-being resources and reminded of health.	Facilitates email, SMS, and portal-based reminders.
Fitness & Physical Activity	System should allow for registration for fitness class, gym booking, and activity logging.	Includes real-time class availability, booking confirmation and activity tracking features.
Feedback	System will collect feedback on wellness services, UI experience, and appointment satisfaction.	Helps in quality assurance and feature improvement.

3.1.1.2 Requirements That May Be Delayed Until Future Versions of the System

Table 31 Requirements That May Be Delayed Until Future Versions of the System

Version	Requirement	Reasons for Delay
Future Version 2.0	System will offer real-time virtual consultation. For example, video chat with doctors or trainers.	Requires integration with video conferencing APIs and secure streaming.
Future Version 3.0	System will provide predictive analytics on student health risk and suggest interventions.	Needs sophisticated data modeling, incorporation of machine learning, and additional data sets.
Future Version 4.0	Integration with wearable fitness trackers (e.g., Fitbits) to automatically sync fitness activity.	Requires API partnerships with third-party hardware and data normalization systems.

3.2 Specified Requirements

This segment states the system's functional needs for the G5 system from general to detailed for all major features.

Table 32 R-1

Requirement ID	R-1	Version	1.0
Description	System will have the capability of creating users, authentication, and allow students to customize their profile.		
Author	Ng Jia Hong		

Table 33 R-2

Requirement ID	R-2	Version	1.0
Description	System will support scheduling and arrangement of appointments between the students and university health centers.		
Author	Ng Jia Hong		

Table 34 R-3

Requirement ID	R-3	Version	1.0
Description	System will support monitoring students wellness progress such as exercise and sleeps.		
Author	Danish Haziq		

Table 35 R-4

Requirement ID	R-4	Version	1.0
Description	The system will provide users with handpicked health resources such as articles and wellness content, and offer customized notifications and reminders to make them aware and involve them in health activities.		
Author	Danish Haziq		

Table 36 R-5

Requirement ID	R-5	Version	1.0
Description	The system will help users communicate with gyms, register for classes, participate in sports, book time slots at gyms, and track their physical activities to stimulate a healthier life.		
Author	Lee Ken Yu		

Table 37 R-6

Requirement ID	R-6	Version	1.0
Description	The system will allow customers to give feedback on their fitness programs, health services, and system features overall experience to improve user satisfaction and service delivery.		
Author	Lee Ken Yu		

3.2.1 R-1 User Access Management

Table 38 R-1-01

Requirement ID	R-1-01	Version	1.0
Description	System shall allow students and staff to register and login for accounts with secure credentials.		
Author	Ng Jia Hong		

Table 39 R-1-02

Requirement ID	R-1-02	Version	1.0
Description	Make sure the role-based permission are enforced after login.		
Author	Ng Jia Hong		

Table 40 R-1-03

Requirement ID	R-1-03	Version	1.0
Description	System shall allow admin to edit the students' personal profiles, including contact information and wellness preferences.		
Author	Ng Jia Hong		

3.2.2 R-2 Appointment Management

Table 41 R-2-01

Requirement ID	R-2-01	Version	1.0
Description	System shall allow students to book appointments.		
Author	Ng Jia Hong		

Table 42 R-2-02

Requirement ID	R-2-02	Version	1.0
Description	System shall allow students to cancel and reschedule their appointment before the appointment date.		
Author	Ng Jia Hong		

Table 43 R-2-03

Requirement ID	R-2-03	Version	1.0
Description	System will allow health staff to view, approve, or update appointments.		
Author	Ng Jia Hong		

Table 44 R-2-04

Requirement ID	R-2-04	Version	1.0
Description	System shall allow students to view the doctor availability and appointment time slots.		
Author	Ng Jia Hong		

Table 45 R-2-05

Requirement ID	R-2-05	Version	1.0
Description	System will send appointment confirmation and reminders via email.		
Author	Ng Jia Hong		

3.2.3 R-3 Wellness Monitoring & Suggestions

Table 46 R-3-01

Requirement ID	R-3-01	Version	1.0
Description	System shall enable students to define personal health and wellness goals.		
Author	Danish Haziq		

Table 47 R-3-02

Requirement ID	R-3-02	Version	1.0
Description	System shall enable students to edit and track progress on their goals.		
Author	Danish Haziq		

Table 48 R-3-03

Requirement ID	R-3-03	Version	1.0
Description	System shall enable encouragement messages for achieved goals.		
Author	Danish Haziq		

Table 49 R-3-04

Requirement ID	R-3-04	Version	1.0
Description	System shall provide AI-powered personalized wellness tips to users.		
Author	Danish Haziq		

Table 50 R-3-05

Requirement ID	R-3-05	Version	1.0
Description	System shall produce graphical summaries of progress using charts or graphs.		
Author	Danish Haziq		

Table 51 R-3-06

Requirement ID	R-3-06	Version	1.0

Description	System must export well-being reports in downloadable PDF format.
Author	Danish Haziq

3.2.4 R-4 Wellness Goal Tracking

Table 52 R-4-01

Requirement ID	R-4-01	Version	1.0
Description	System shall display curated health tips and articles on the dashboard.		
Author	Danish Haziq		

Table 53 R-4-02

Requirement ID	R-4-02	Version	1.0
Description	System shall personalize content based on user profile and objectives.		
Author	Danish Haziq		

Table 54 R-4-03

Requirement ID	R-4-03	Version	1.0
Description	System shall allow users to bookmark or save articles for future use.		
Author	Danish Haziq		

Table 55 R-4-04

Requirement ID	R-4-04	Version	1.0
Description	System shall inform users with key notifications and health reminders.		
Author	Danish Haziq		

3.2.5 R-5 Health Content Delivery

Table 56 R-5-01

Requirement ID	R-5-01	Version	1.0
Description	System shall show fitness classes with date, time, and instructor.		
Author	Lee Ken Yu		

Table 57 R-5-02

Requirement ID	R-5-02	Version	1.0
Description	System shall allow students to sign up for fitness classes.		
Author	Lee Ken Yu		

Table 58 R-5-03

Requirement ID	R-5-03	Version	1.0
Description	System shall allow users to cancel fitness class sign-ups.		
Author	Lee Ken Yu		

Table 59 R-5-04

Requirement ID	R-5-04	Version	1.0
Description	System shall provide reminders for the upcoming fitness classes through email		
Author	Lee Ken Yu		

Table 60 R-5-05

Requirement ID	R-5-05	Version	1.0
Description	System shall allow users to reserve gym slots and track physical activity.		
Author	Lee Ken Yu		

3.2.6 R-6 Wellness Analytics and Insights

Table 61 R-6-01

Requirement ID	R-6-01	Version	1.0
Description	System shall allow users to give feedback on services and features		
Author	Lee Ken Yu		

3.3 External Interfaces

This section provides the definitions of all the inputs and outputs of the software system.

3.3.1 User Access Management Interface

Table 62 User Access Management Interface

Requirement ID	R-IO-01	**Version**	1.0
Item Name	User Access Management Interface		
Description	Covers login, role-based access control, and user management including account updates.		
Purpose	To securely authenticate users, manage roles, and administer user accounts.		
Source of Input	User credentials, admin panel input		
Format	Input: Username/password, Role data | Output: Token, access result	**Valid Range**	All system users (Students, Staff, Admin, Medical Staff)
Timing	On login and when user roles are assigned or modified	**Units of Measure**	Session duration, user ID
Related I/O	User account database, role matrix		
Relationships to Other Inputs/Output	Provides session token used by every user-level module		
Command Formats	POST /login, GET /user, PUT /user-role		
Author	Access Control Team		

3.3.2 Appointment Management Interface

Table 63 Appointment Management Interface

Requirement ID	R-IO-02	**Version**	1.0
Item Name	Appointment Management Interface		
Description	Handles full appointment lifecycle: booking, modifying, cancelling, viewing doctor availability, and sending reminders.		

Purpose	To manage medical appointments efficiently between students and medical staff.		
Source of Input	Student booking requests, doctor schedules, cancellation inputs		
Format	Input: Booking data, doctor ID | Output: Confirmation, notifications	**Valid Range**	Registered students with healthcare access
Timing	Real-time or scheduled	**Units of Measure**	Timestamps, appointment ID
Related I/O	Doctor availability, appointment DB, notification queue		
Relationships to Other Inputs/Output	Triggers reminders, updates calendar and dashboard		
Command Formats	POST /appointments, PUT /reschedule, DELETE /cancel		
Author	Medical Integration Team		

3.3.3 Wellness Monitoring & Suggestion Engine

Table 64 Wellness Monitoring & Suggestion Engine

Requirement ID	R-IO-03	**Version**	1.0
Item Name	Wellness Monitoring & Suggestion Engine		
Description	Manages wellness checkers, health goal setting, progress summaries, AI-based tips, and monthly reports.		
Purpose	To support students' mental and physical health using logged data and AI suggestions.		
Source of Input	Student self-reports, system logs, wearable sync		
Format	Input: Wellness logs, goals | Output: Charts, AI tips, reports	**Valid Range**	Students with goal and health monitoring enabled
Timing	On submission, daily AI run, or monthly report trigger	**Units of Measure**	Mood score, steps, goals

Related I/O	User profile, progress database
Relationships to Other Inputs/Output	Feeds reports and notification engine
Command Formats	POST /wellness-check, GET /tips, POST /generate-report
Author	AI Wellness Team

3.3.4 Health Resources & Notification Module

Table 65 Health Resources & Notification Module

Requirement ID	R-IO-04	**Version**	1.0
Item Name	Health Resources & Notification Module		
Description	Provides access to health resources and manages delivery of notifications.		
Purpose	To increase user knowledge and engagement with health updates and alerts.		
Source of Input	Admin content upload, system triggers, AI engine		
Format	Input: Article files, events | Output: Alerts, resource viewer	**Valid Range**	All authenticated users
Timing	On content upload or scheduled event	**Units of Measure**	Article reads, notifications sent
Related I/O	Health article DB, event queue		
Relationships to Other Inputs/Output	Notification engine links with AI tip system, events, and appointment reminders		
Command Formats	GET /resource, PUSH /notify		
Author	Content and Messaging Team		

3.3.5 Fitness Facility Booking & Tracking System

Table 66 Fitness Facility Booking & Tracking System

Requirement ID	R-IO-05	**Version**	1.0

Item Name	Fitness Facility Booking & Tracking System		
Description	Combines gym slot booking, facility check-in, class registration, sport joining, and physical tracking.		
Purpose	To enable and track participation in campus fitness activities.		
Source of Input	Student activity logs, bookings, wearable data		
Format	Input: Activity selection | Output: Attendance logs, visual tracker	**Valid Range**	All fitness-registered users
Timing	During and after physical activity	**Units of Measure**	Minutes, calories, class count
Related I/O	Class DB, booking logs		
Relationships to Other Inputs/Output	Feeds progress dashboard, wellness engine		
Command Formats	POST /fitness-booking, POST /log-activity		
Author	Fitness Center System Team		

3.3.6 Feedback Interface

Table 67 Feedback Interface

Requirement ID	R-IO-06	**Version**	1.0
Item Name	Feedback Interface		
Description	Captures suggestions, complaints, and experience ratings from users.		
Purpose	To support system improvement via community feedback.		
Source of Input	Student/staff feedback forms		
Format	Input: Text, ratings | Output: Stored feedback	**Valid Range**	All users' post-interaction
Timing	On-demand	**Units of Measure**	Rating scale, timestamp
Related I/O	Feedback DB, user ID		
Relationships to	Connects to analytics system		

Other Inputs/Output	
Command Formats	POST /submit-feedback
Author	UX Improvement Team

3.4 Functions

3.4.1 R-1 User Access Management

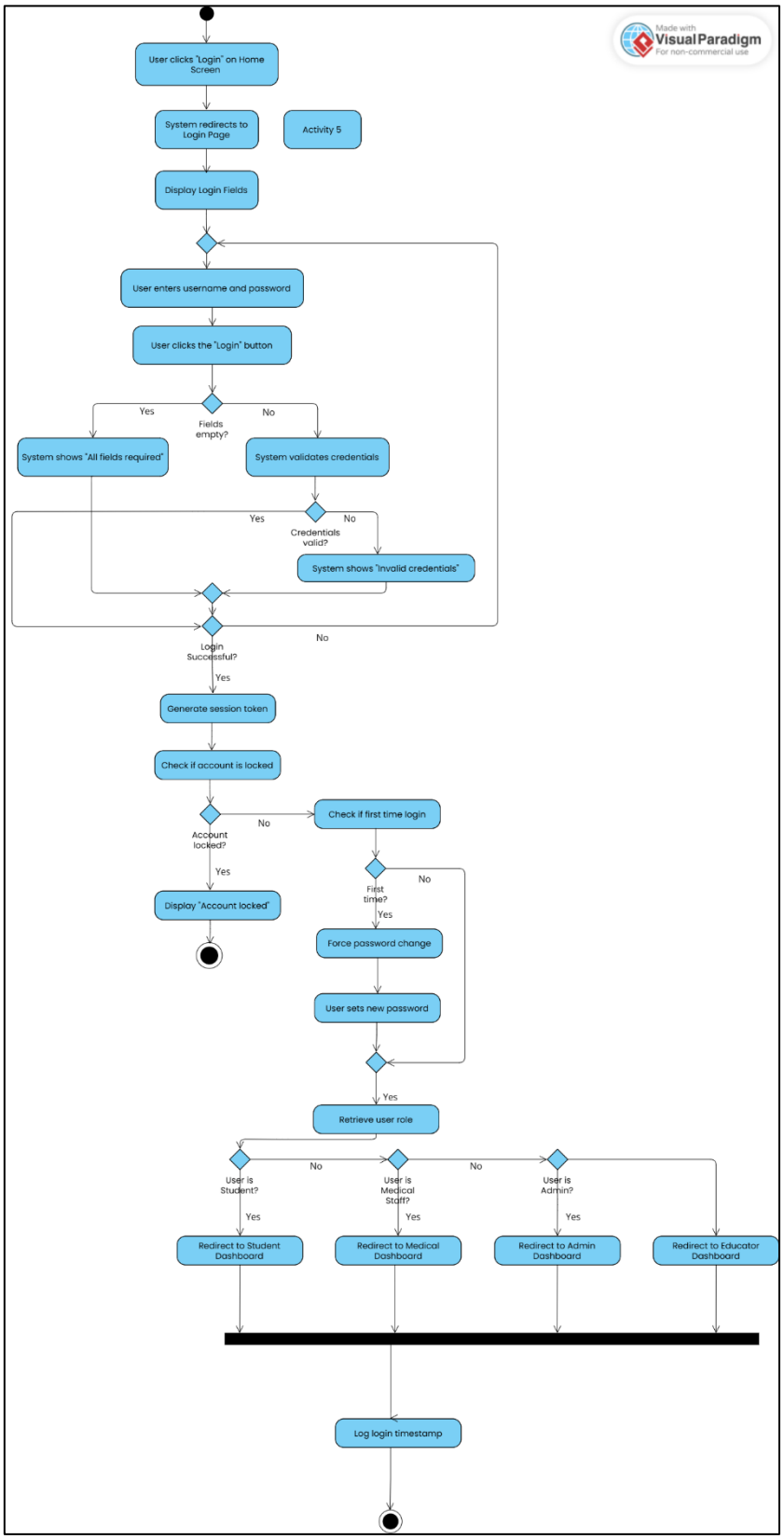

Figure 4 Activity Diagram - Login

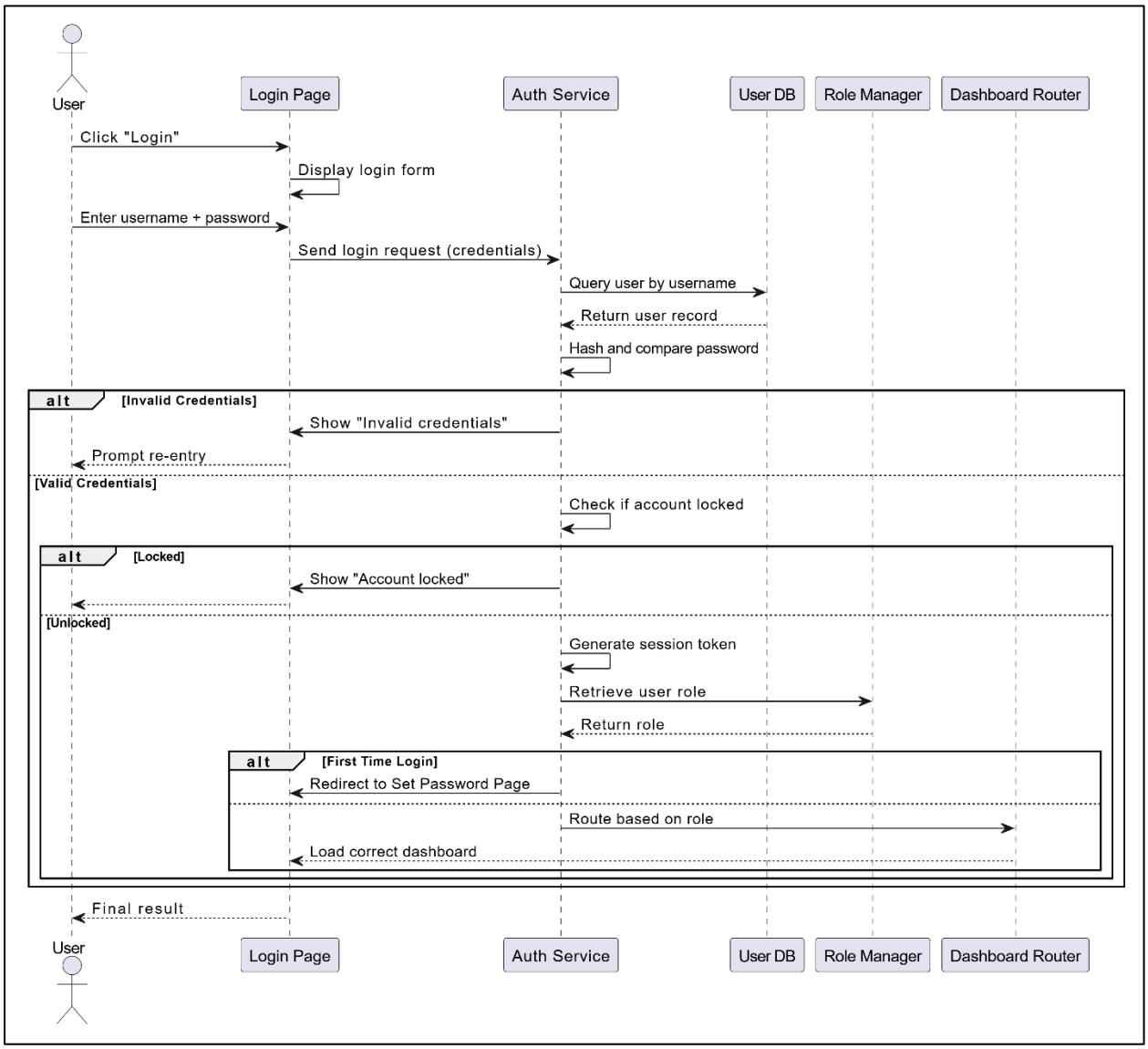

Figure 5 Sequence Diagram - Login

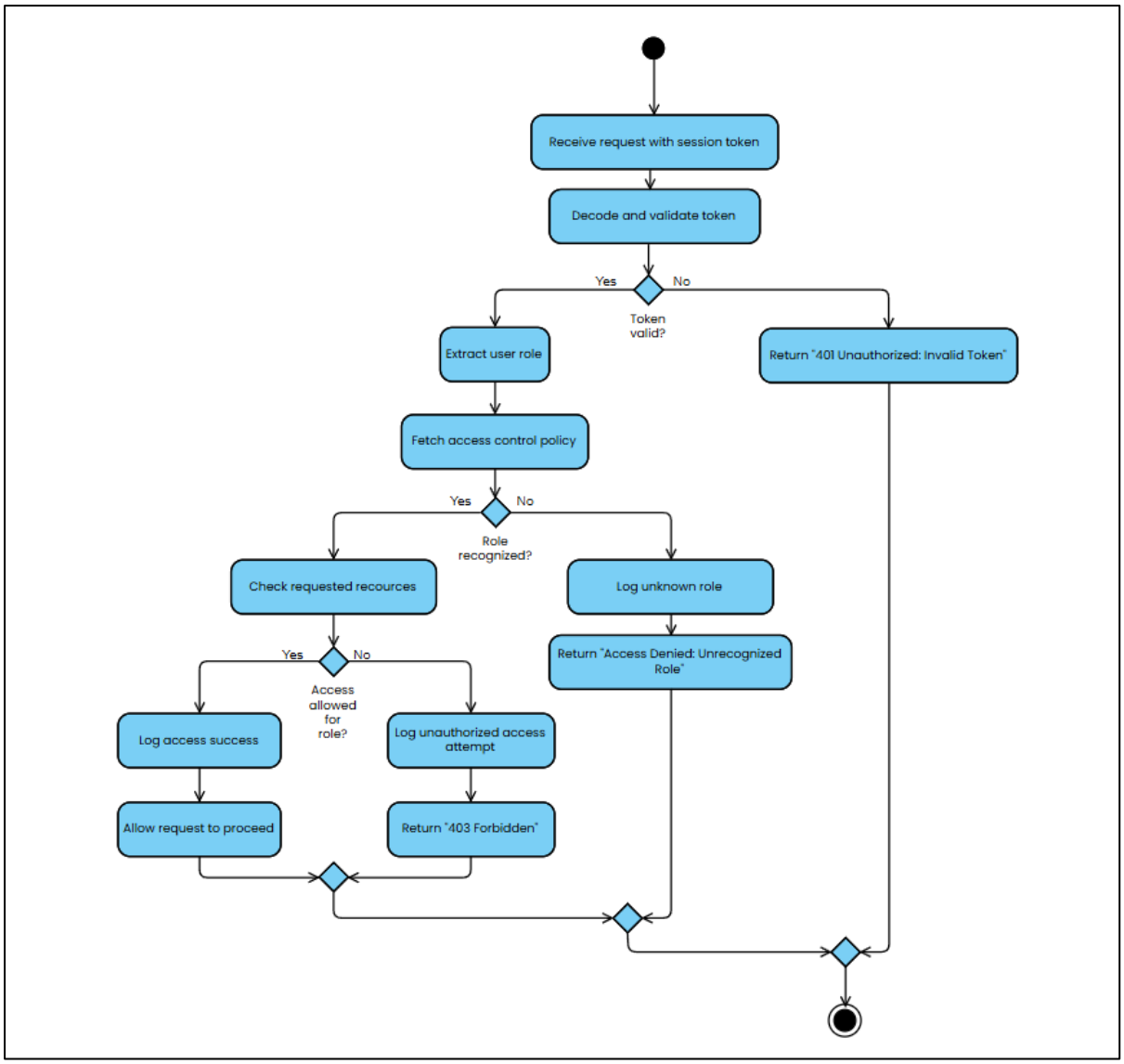

Figure 6 Activity Diagram - Enforce Role Based Access

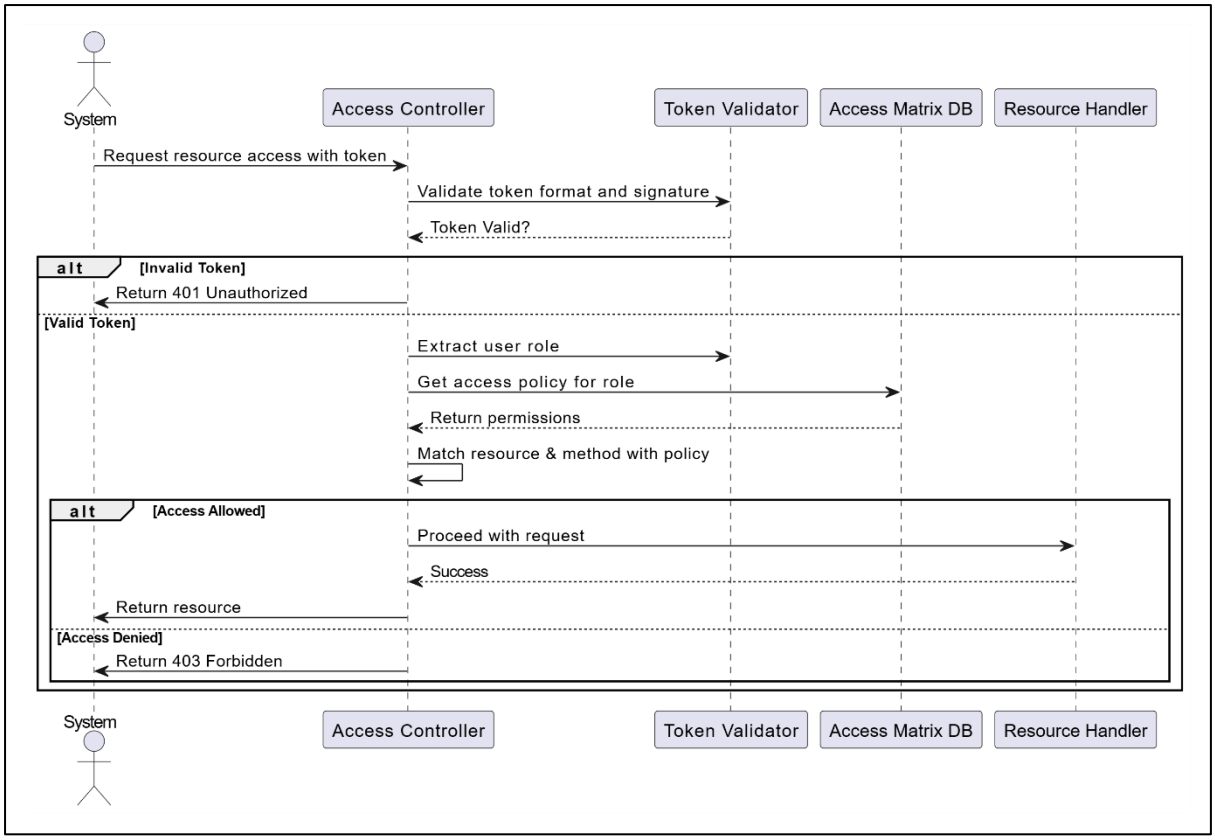

Figure 7 Sequence Diagram - Enforce Role Based Access

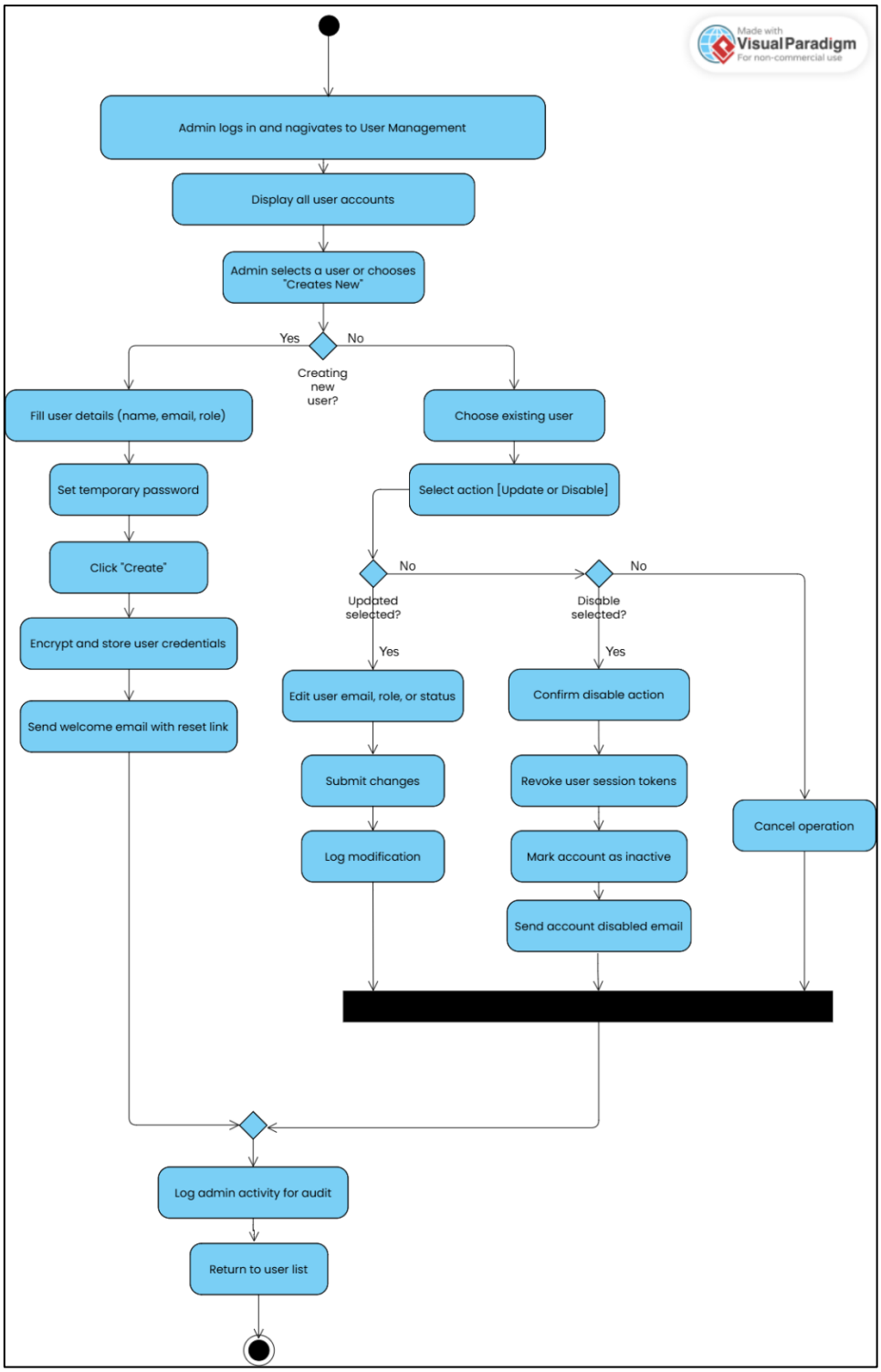

Figure 8 Activity Diagram – Manage user

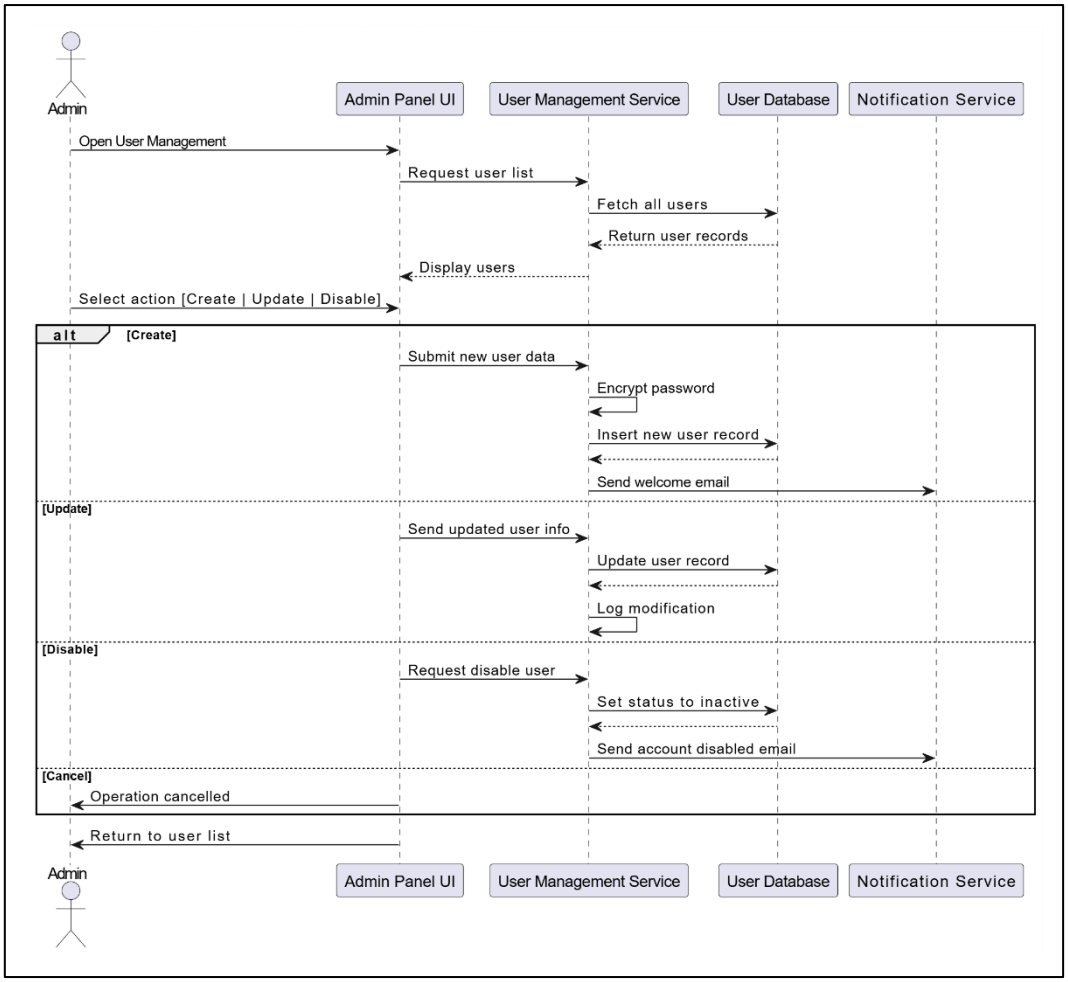

Figure 9 Sequence Diagram– Manage user

3.4.2 Appointment Management

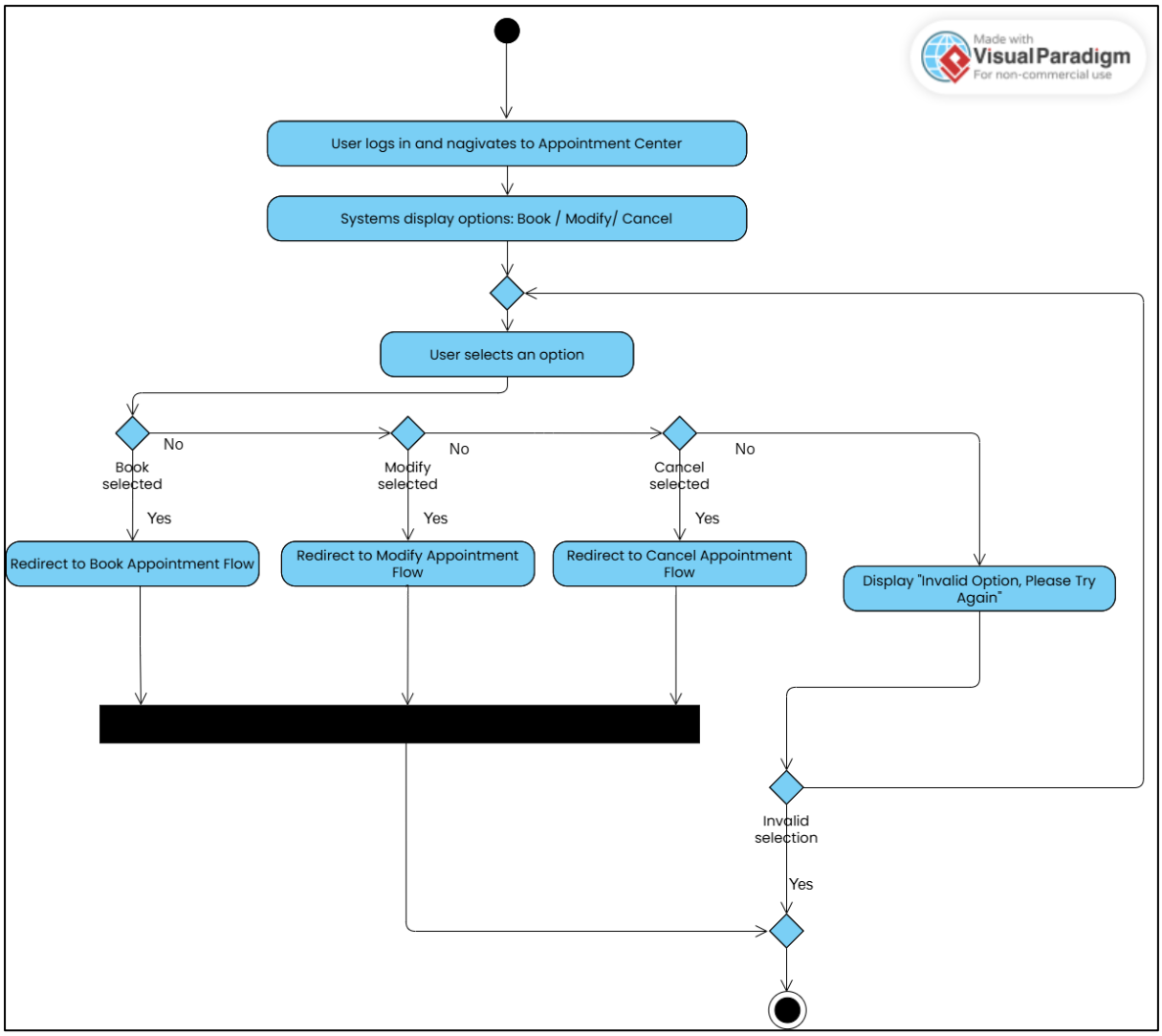

Figure 10 Activity Diagram– Manage Appointment

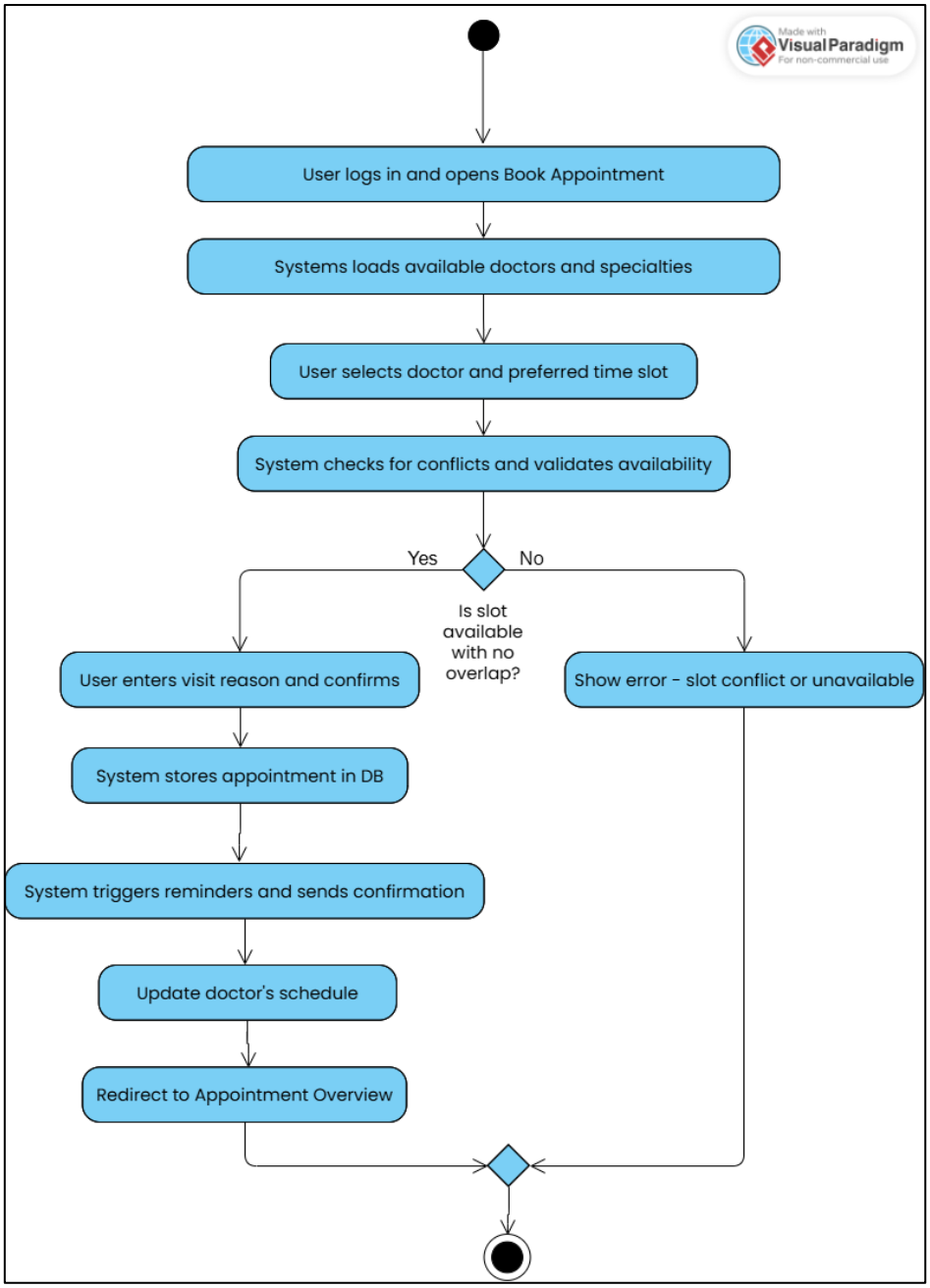

Figure 11 Activity Diagram – Book Appointment

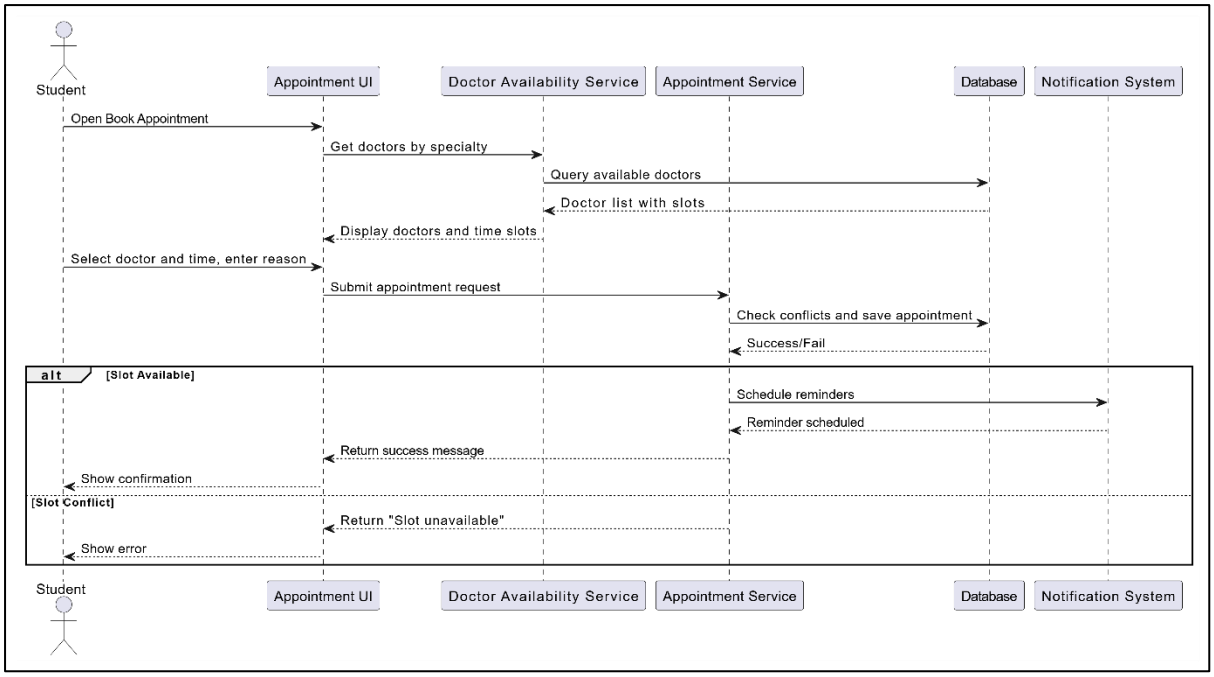

Figure 12 Sequence Diagram– Book Appointment

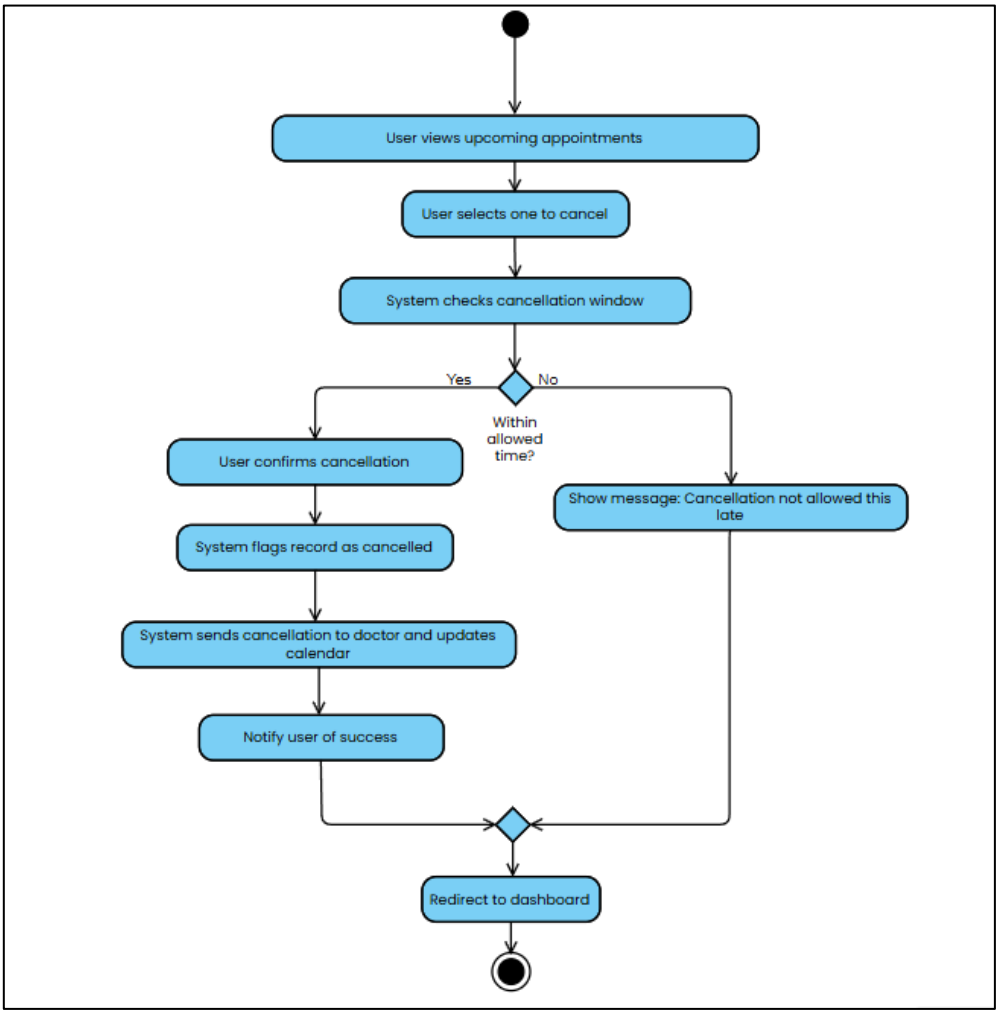

Figure 13 Activity Diagram– Cancel Appointment

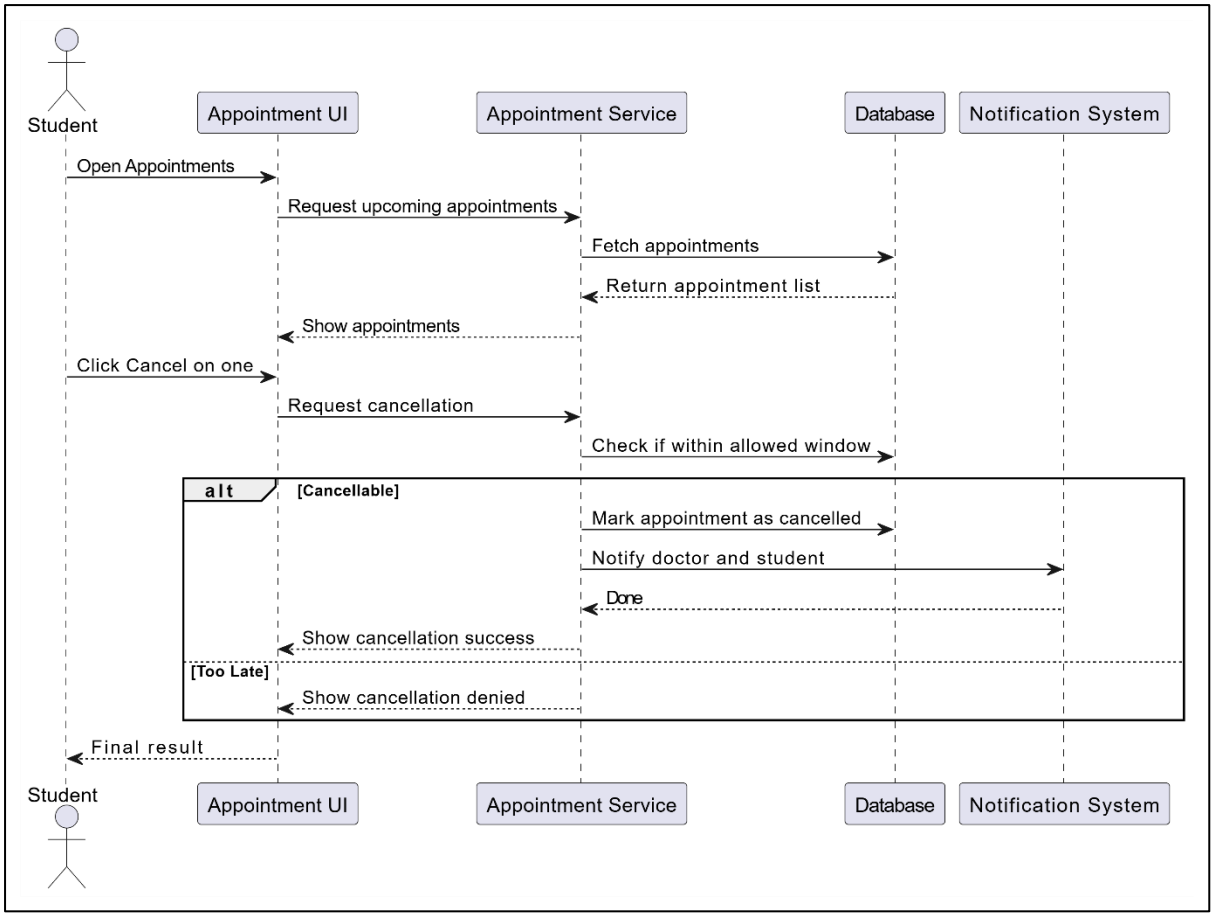

Figure 14 Sequence Diagram– Cancel Appointment

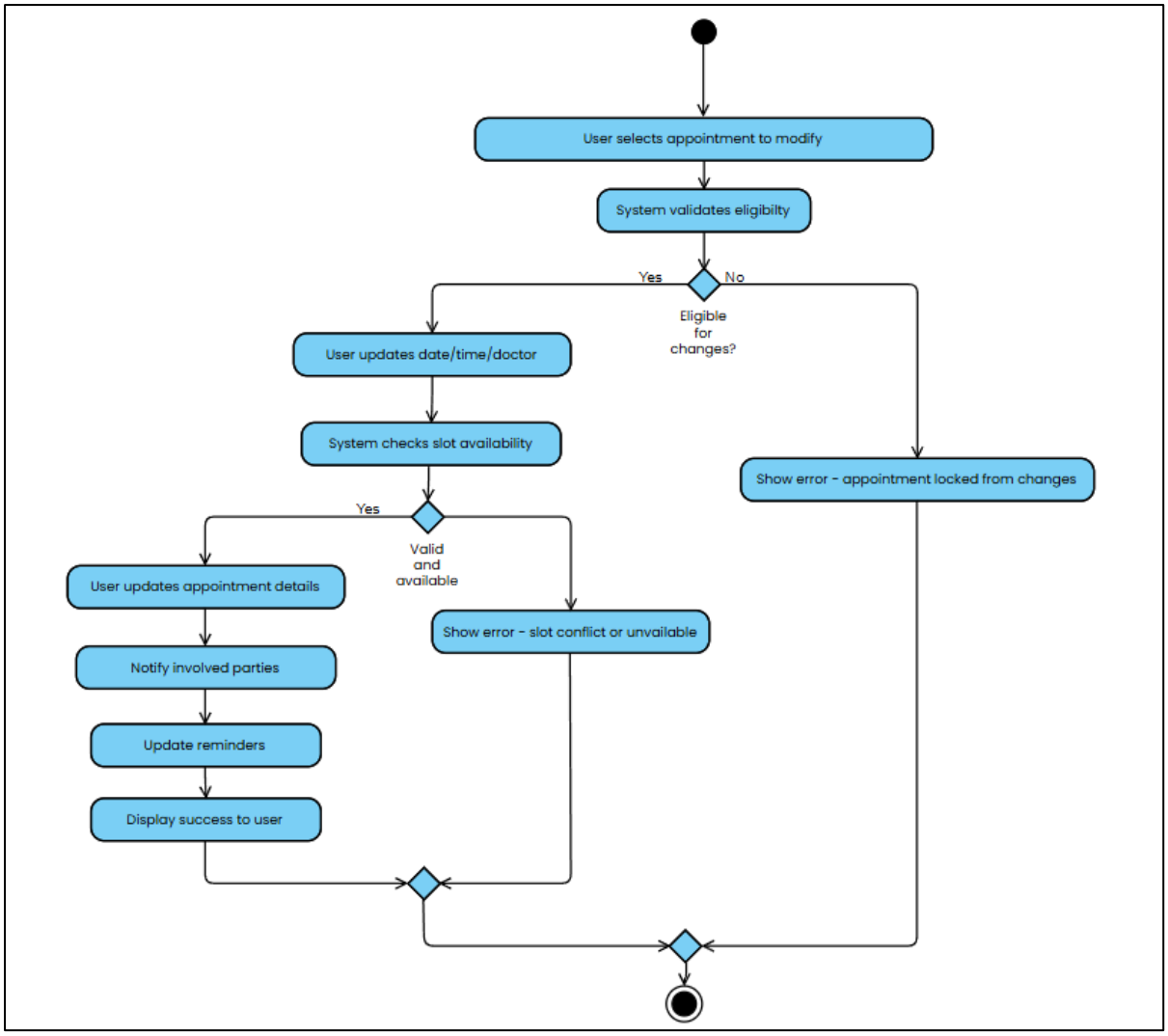

Figure 15 Activity Diagram– Modify Appointment

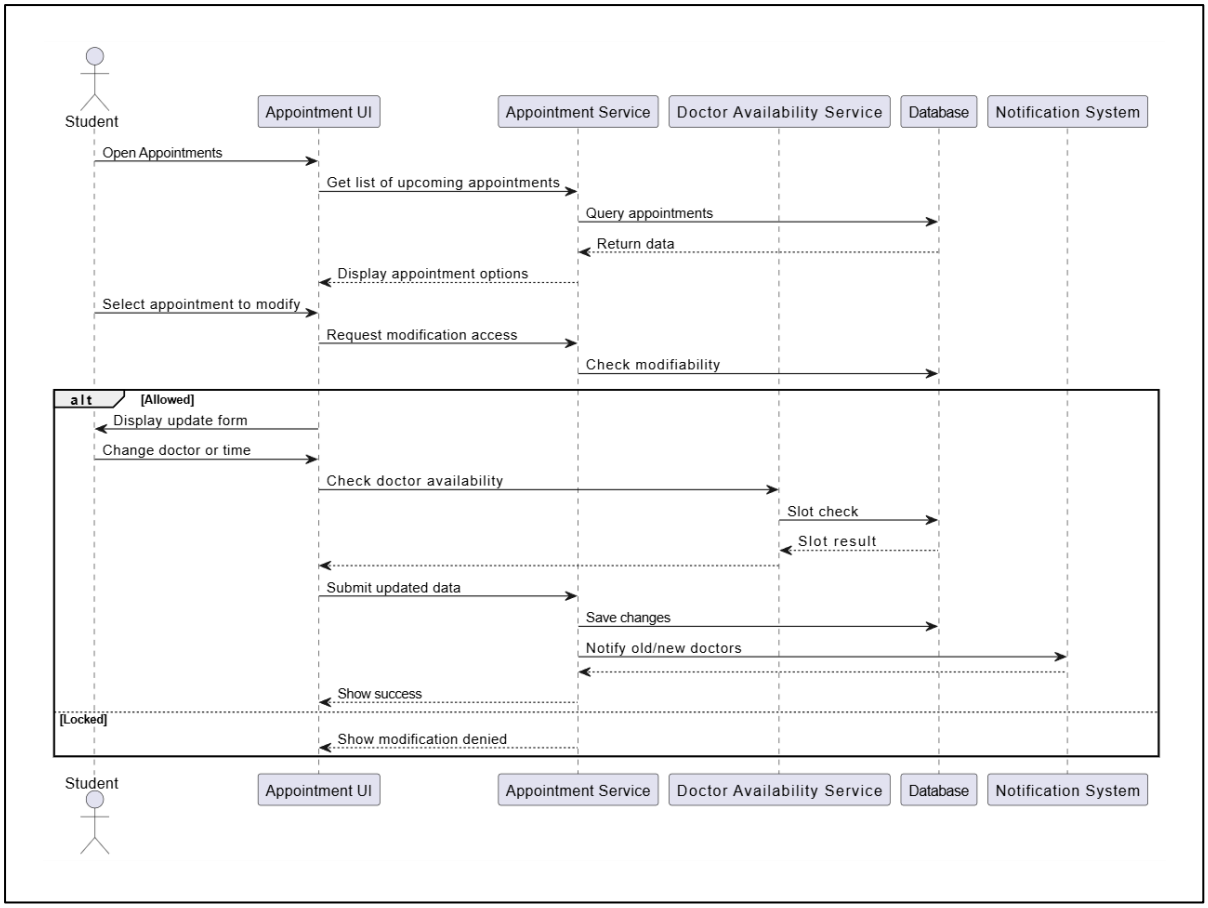

Figure 16 Sequence Diagram– Modify Appointment

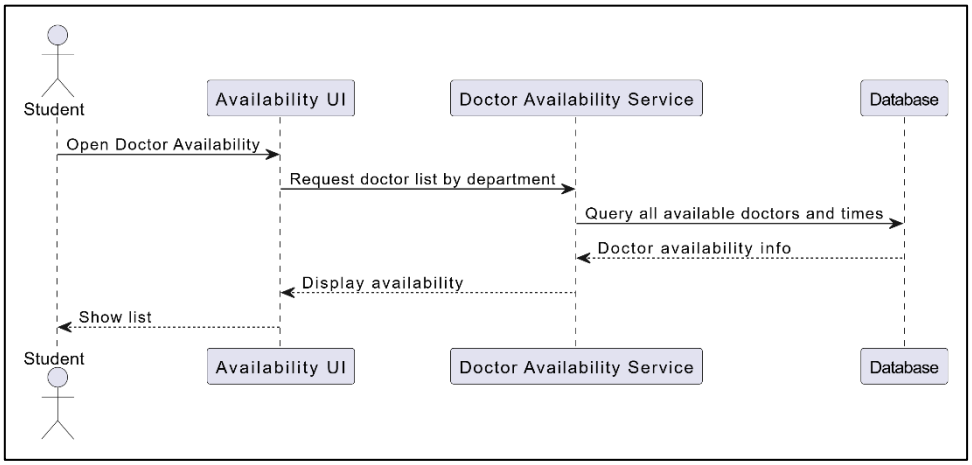

Figure 17 Sequence Diagram– View Doctor Availability

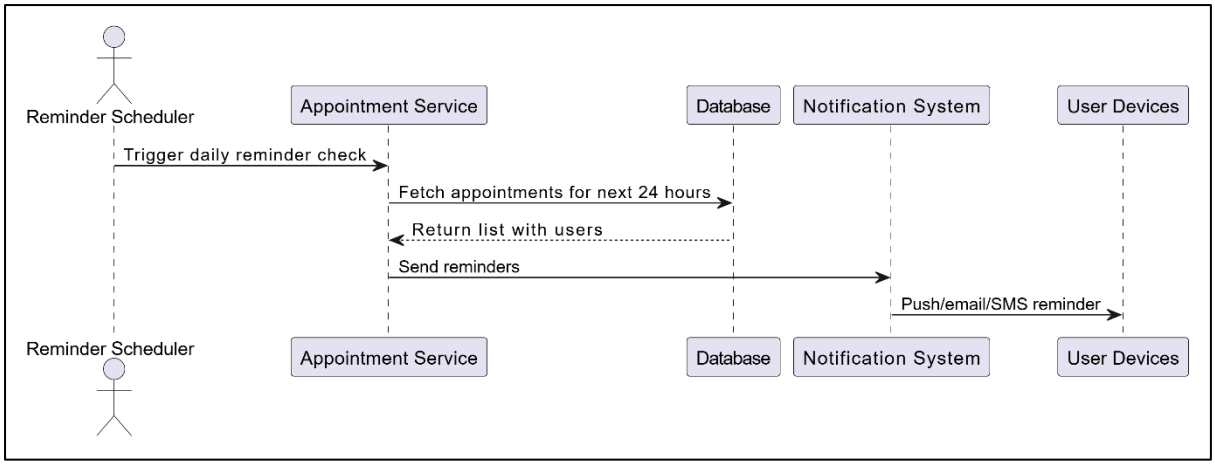

Figure 18 Sequence Diagram – Receive Appointment

3.4.3 Wellness Monitoring & Suggestions

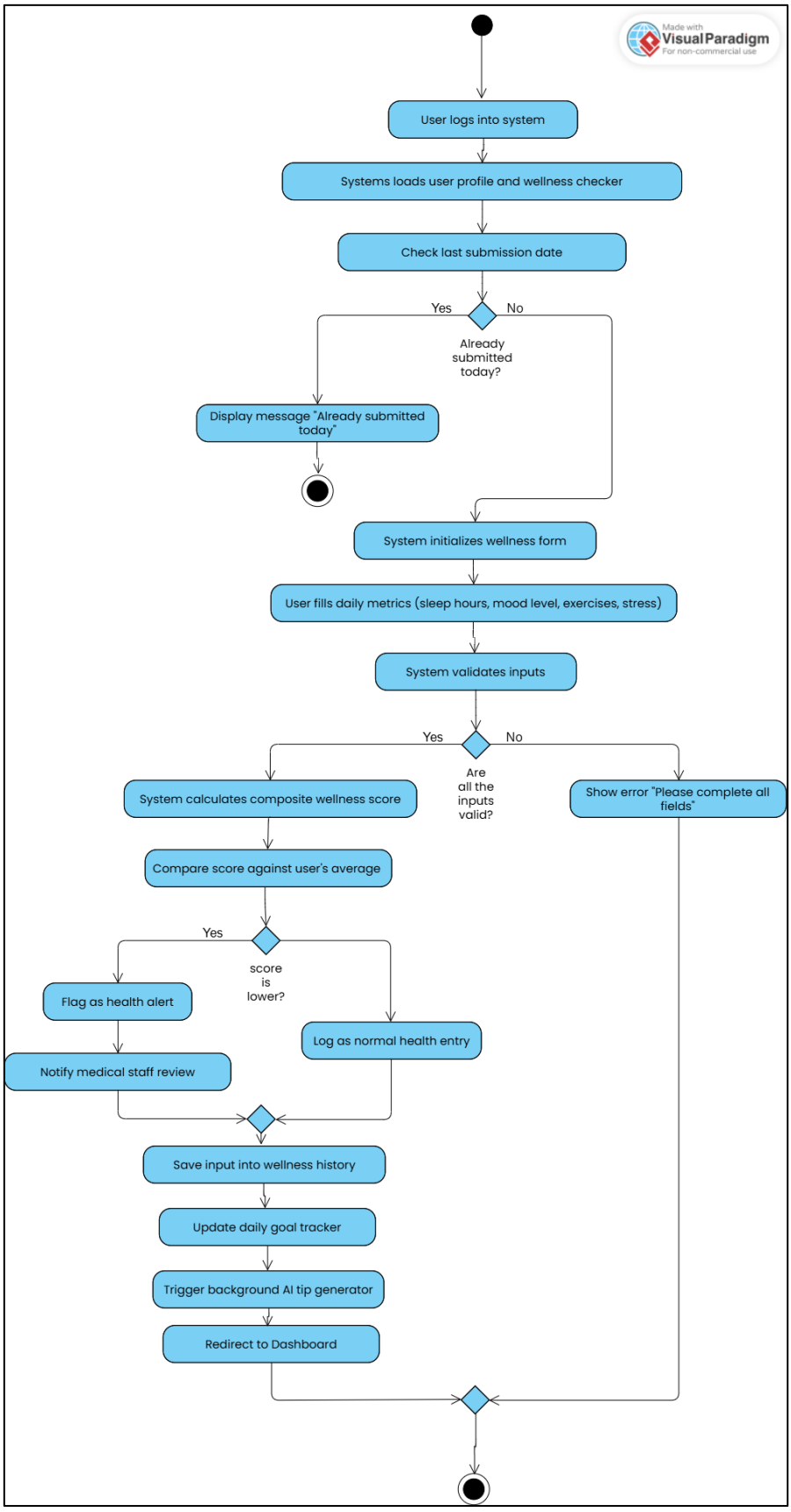

Figure 19 Activity Diagram – Use Wellness Checker

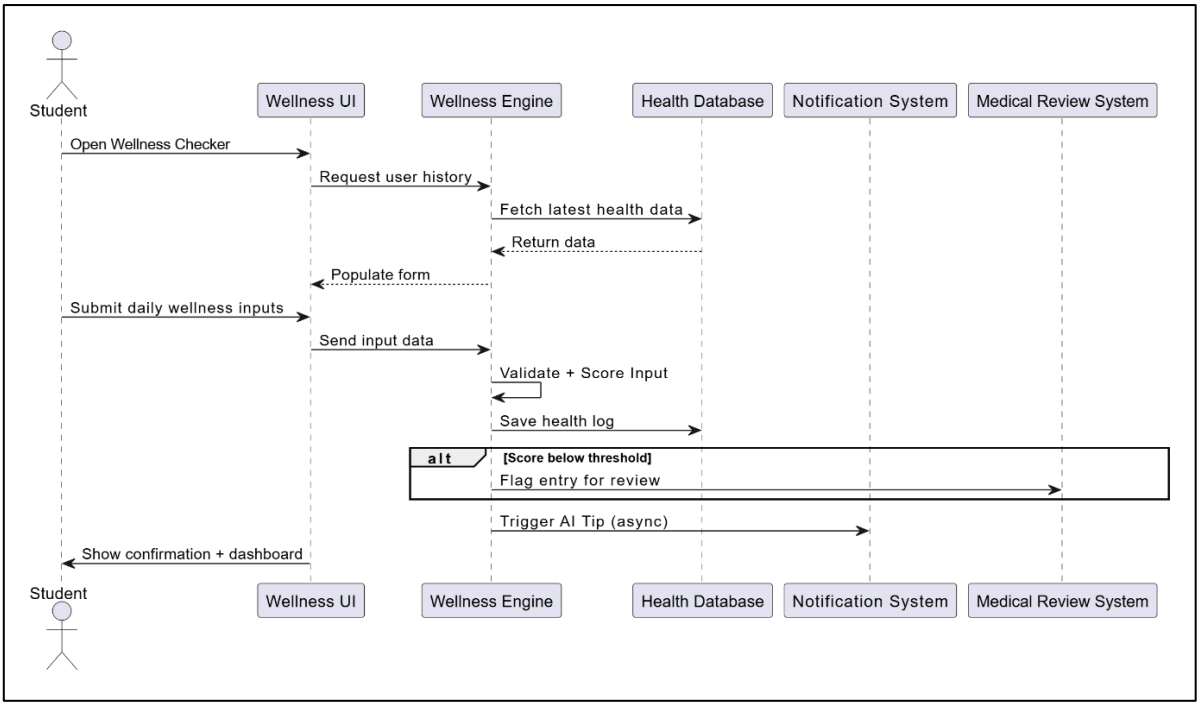

Figure 20 Sequence Diagram– Use Wellness Checker

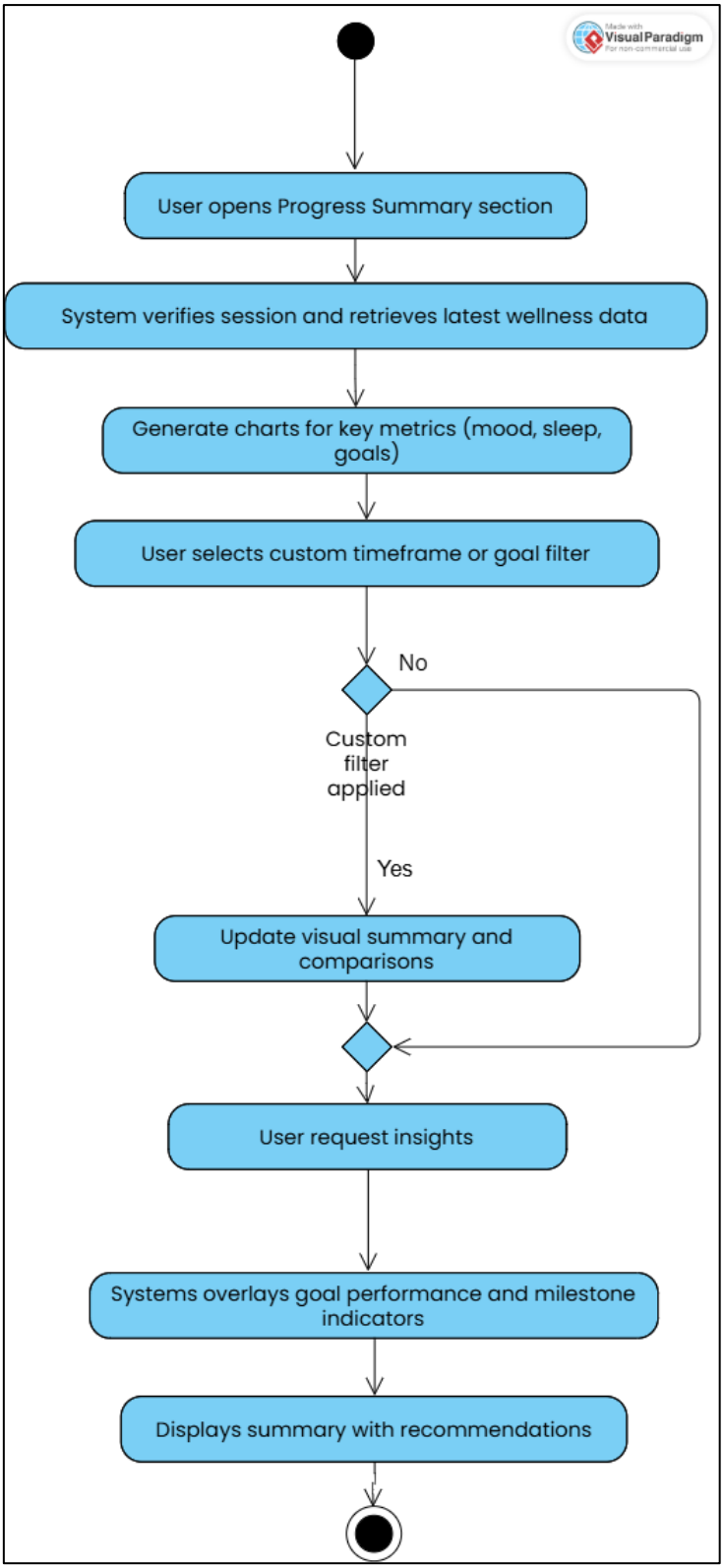

Figure 21 Activity Diagram – View Progress Summary

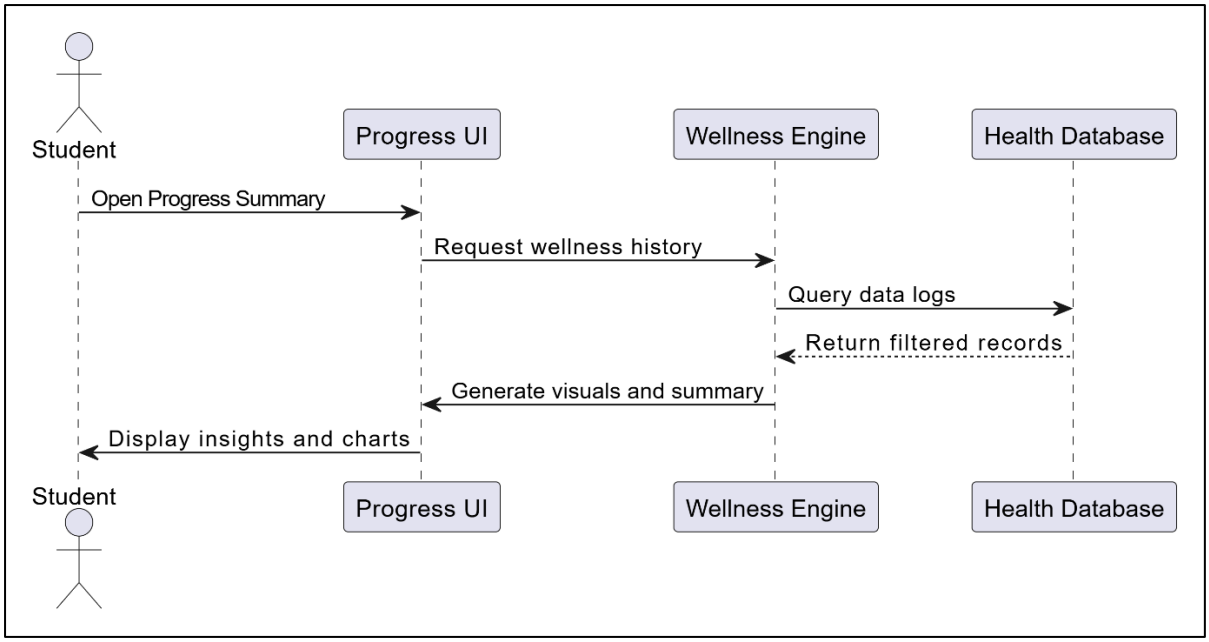

Figure 22 Sequence Diagram– View Progress Summary

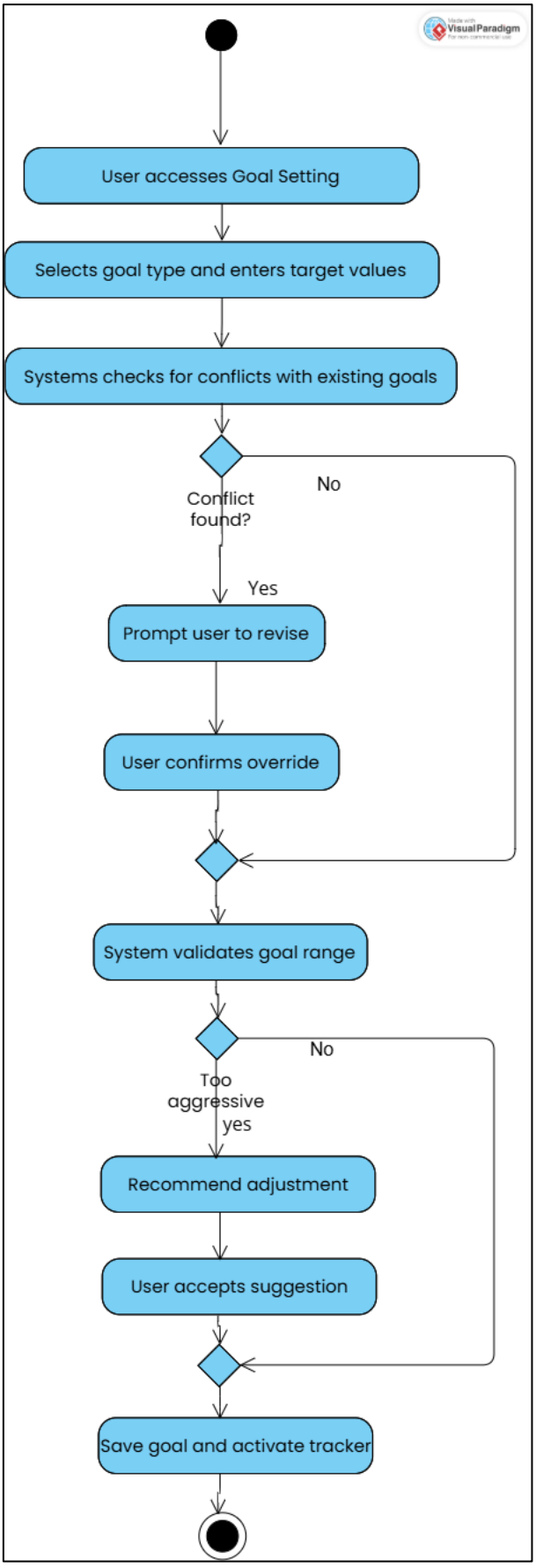

Figure 23 Activity Diagram – Set Health Goal

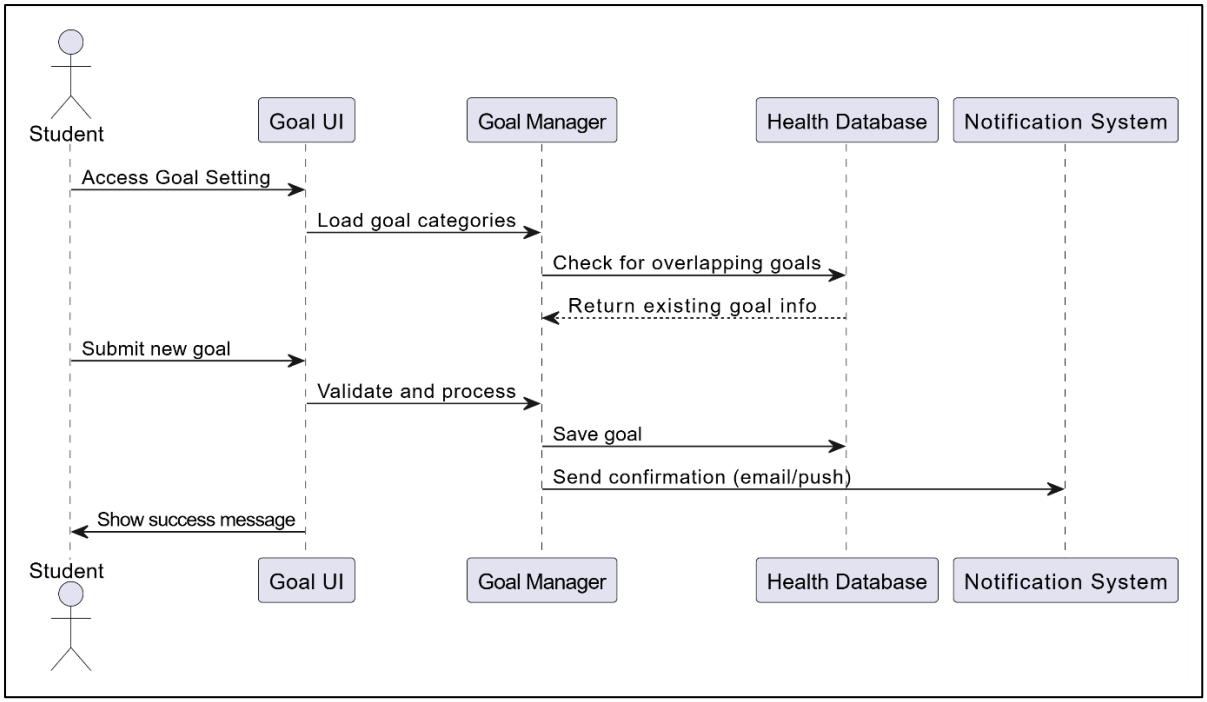

Figure 24 Sequence Diagram– Set Health Goal

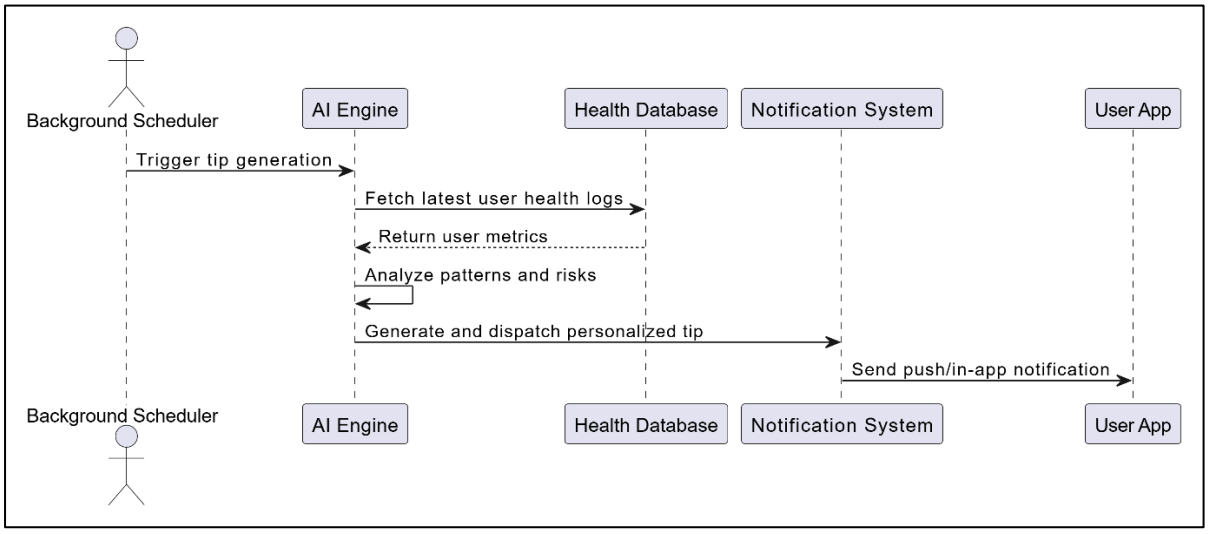

Figure 25 Sequence Diagram– Get AI-based Wellness Tip

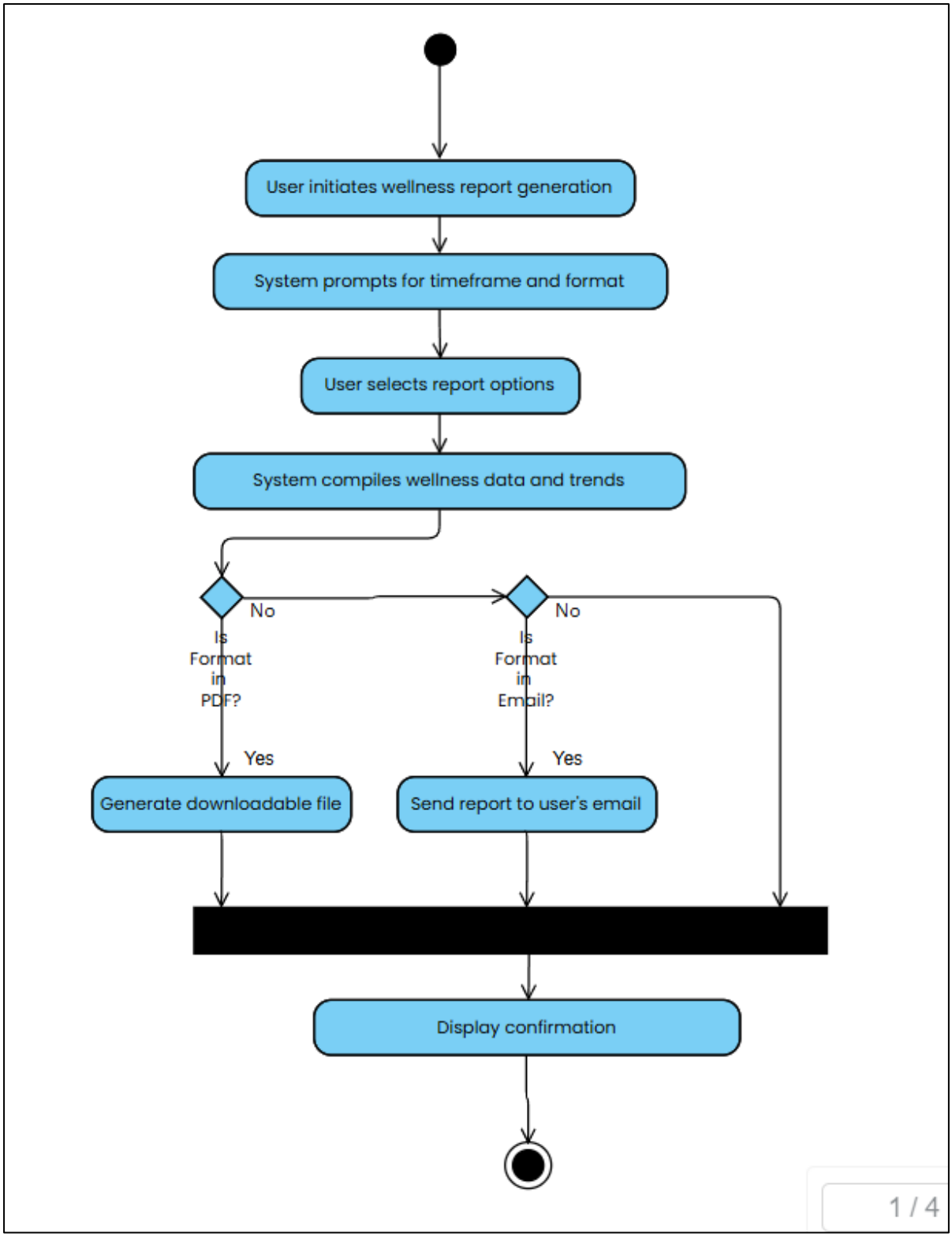

Figure 26 Activity Diagram – Generate Wellness Report

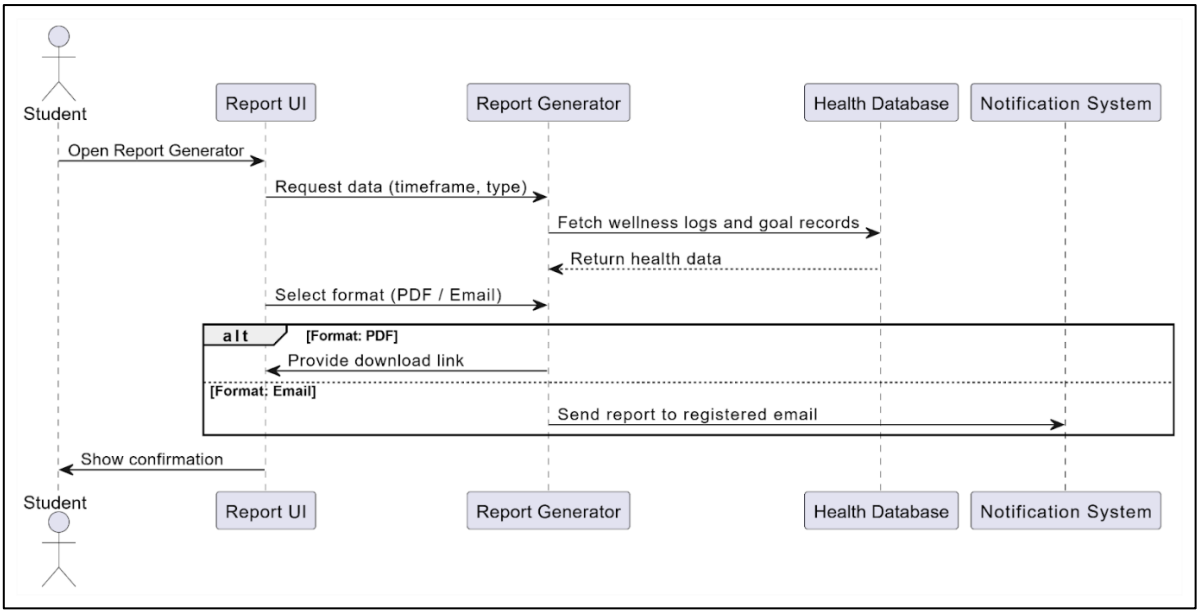

Figure 27 Sequence Diagram– Generate Wellness Report

3.4.4 Health Resources & Notification

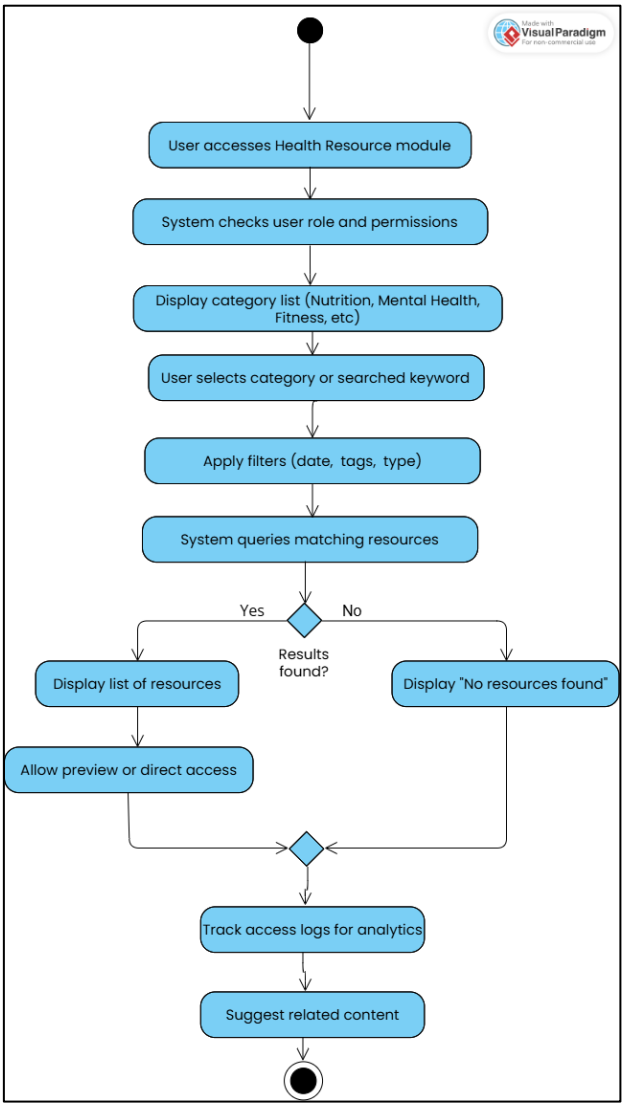

Figure 28 Activity Diagram – Access Health Resource

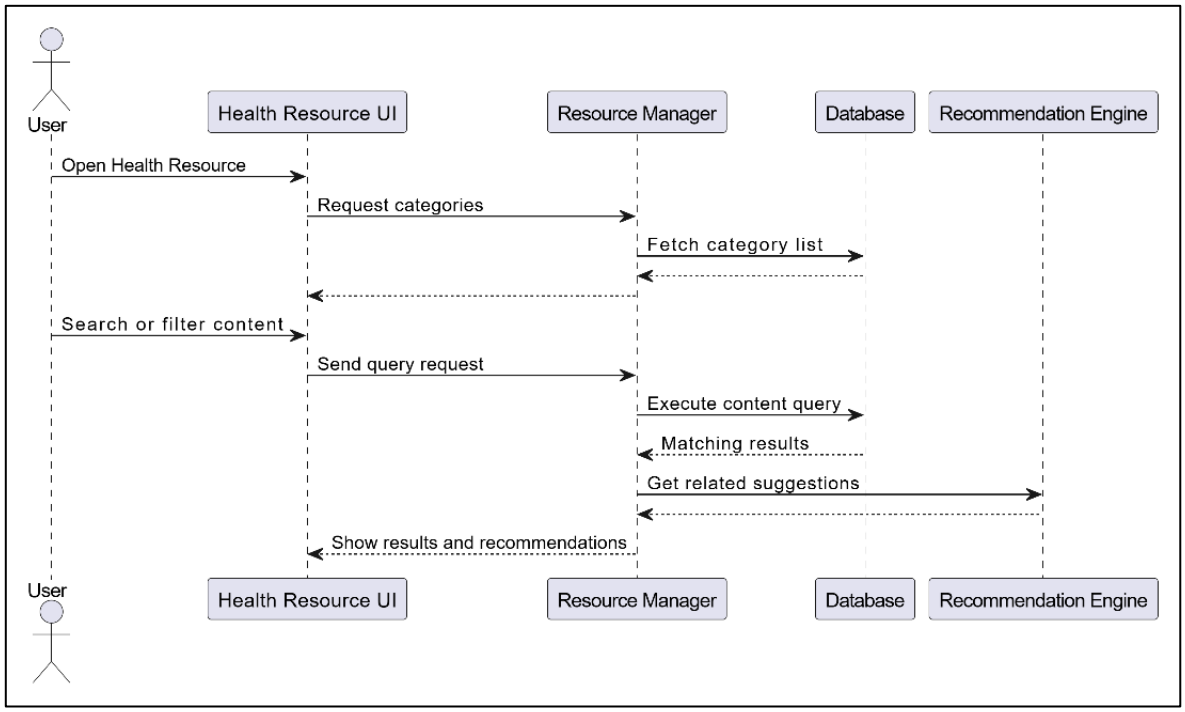

Figure 29 Sequence Diagram– Access Health Resource

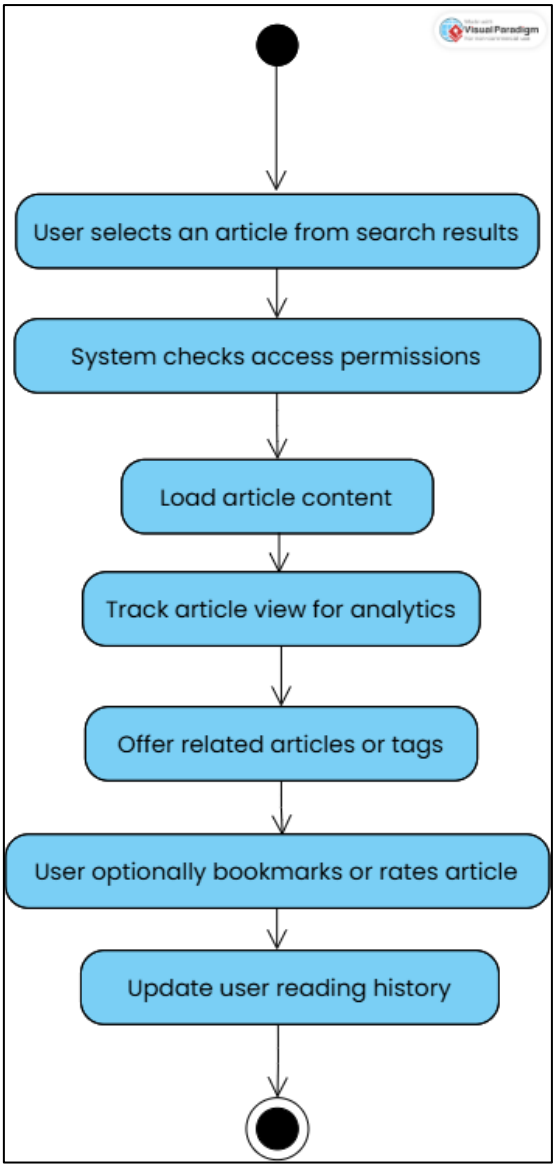

Figure 30 Activity Diagram – Read Health Article

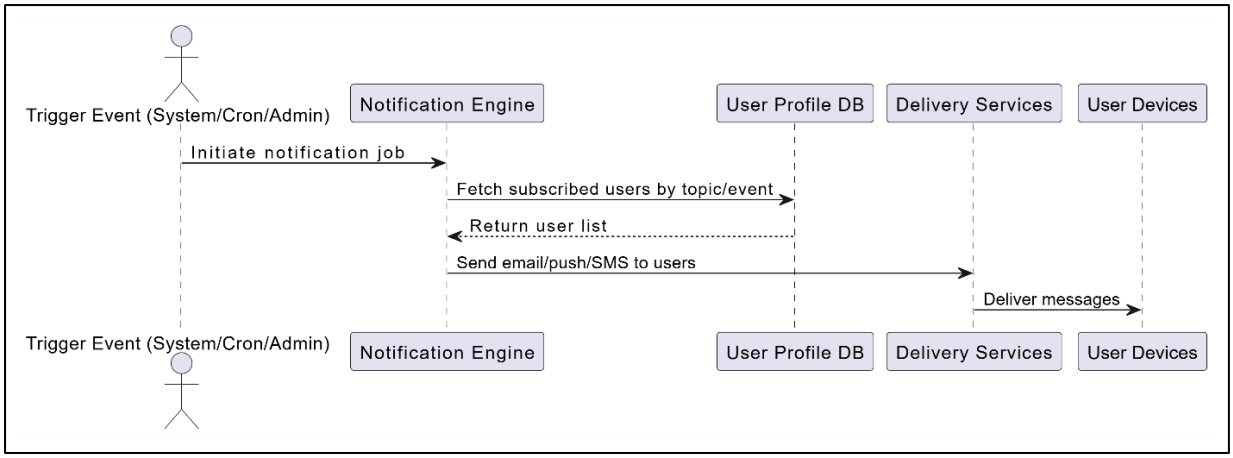

Figure 31 Sequence Diagram – Receive Notification

3.4.5 Fitness & Physical Activity

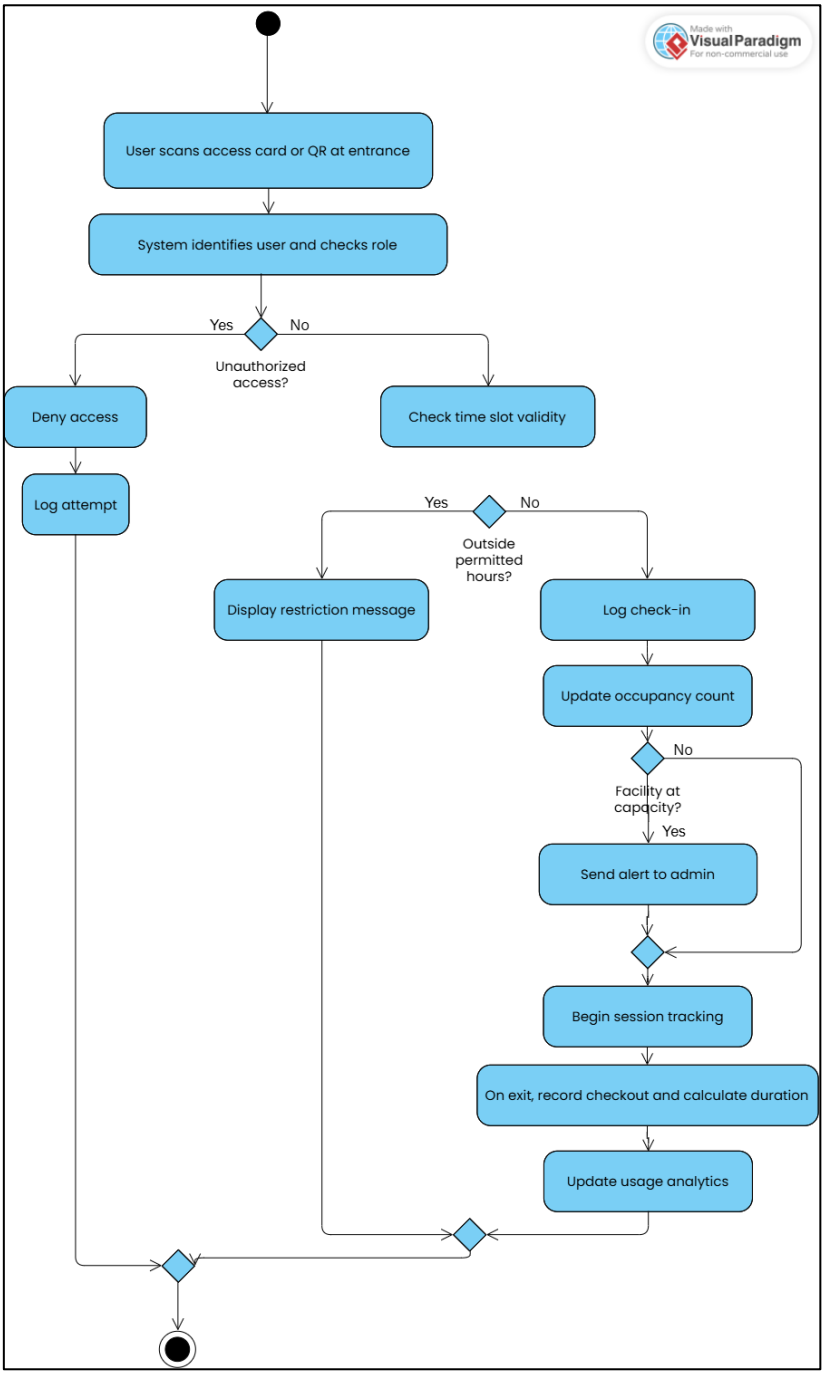

Figure 32 Activity Diagram – Use Fitness Facility

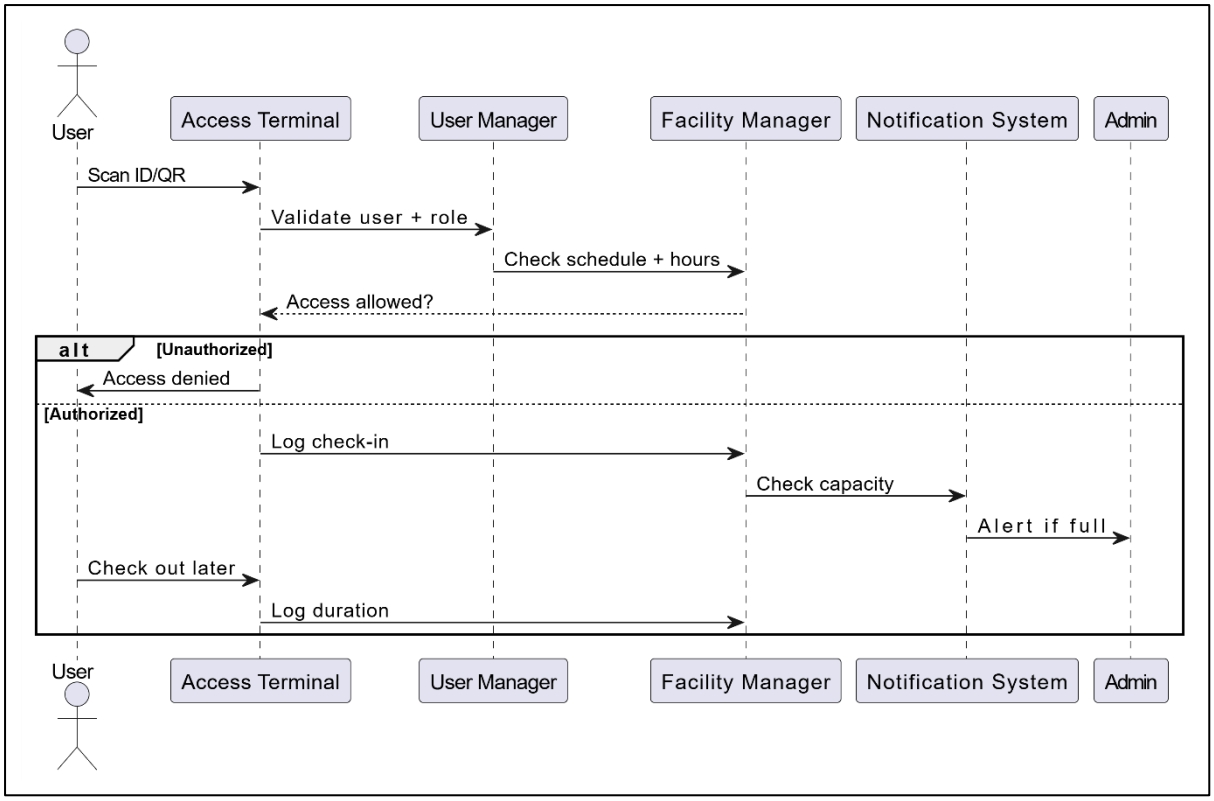

Figure 33 Sequence Diagram– Use Fitness Facility

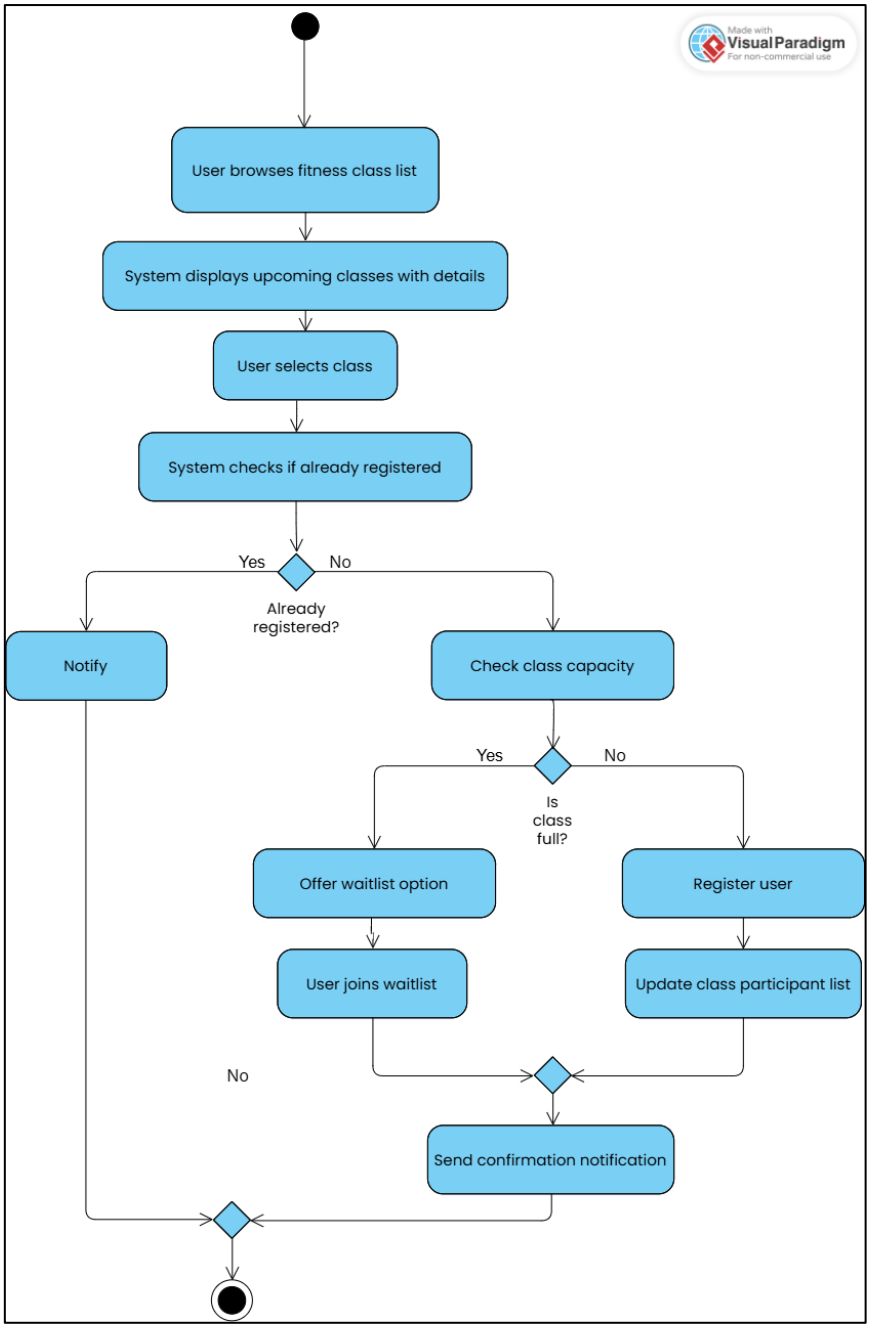

Figure 34 Activity Diagram – Register for Fitness Class

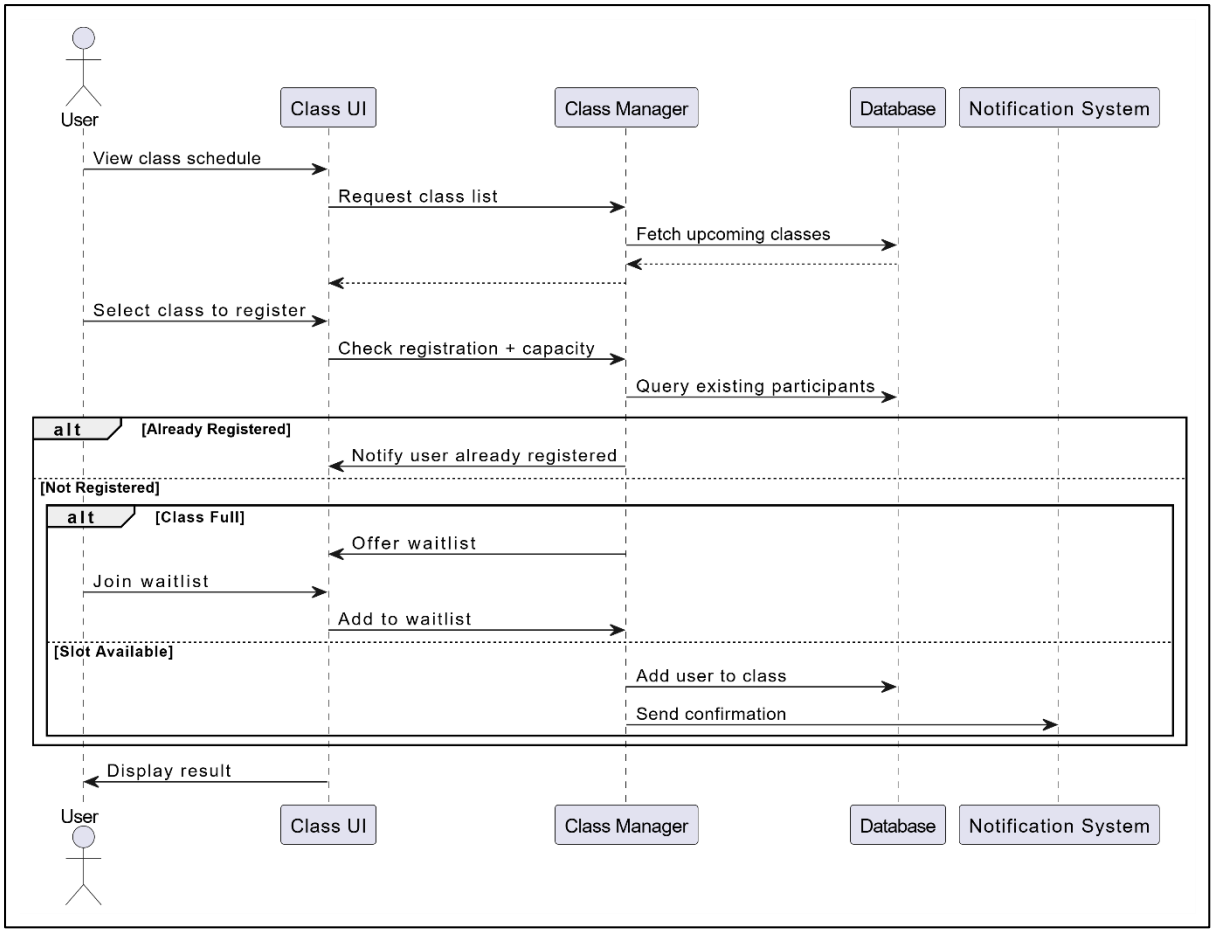

Figure 35 Sequence Diagram– Register for Fitness Class

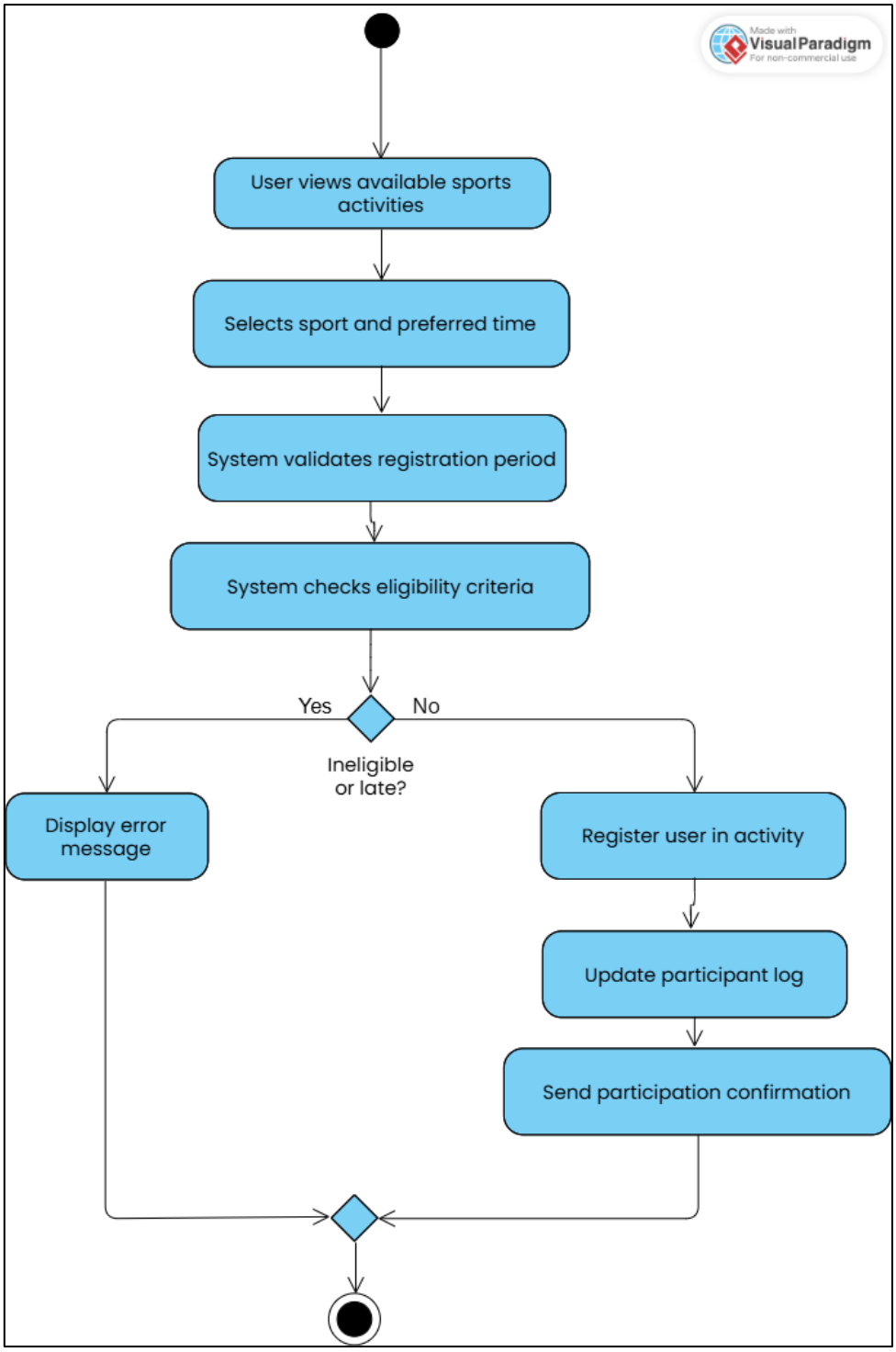

Figure 36 Activity Diagram – Join Sports Activity

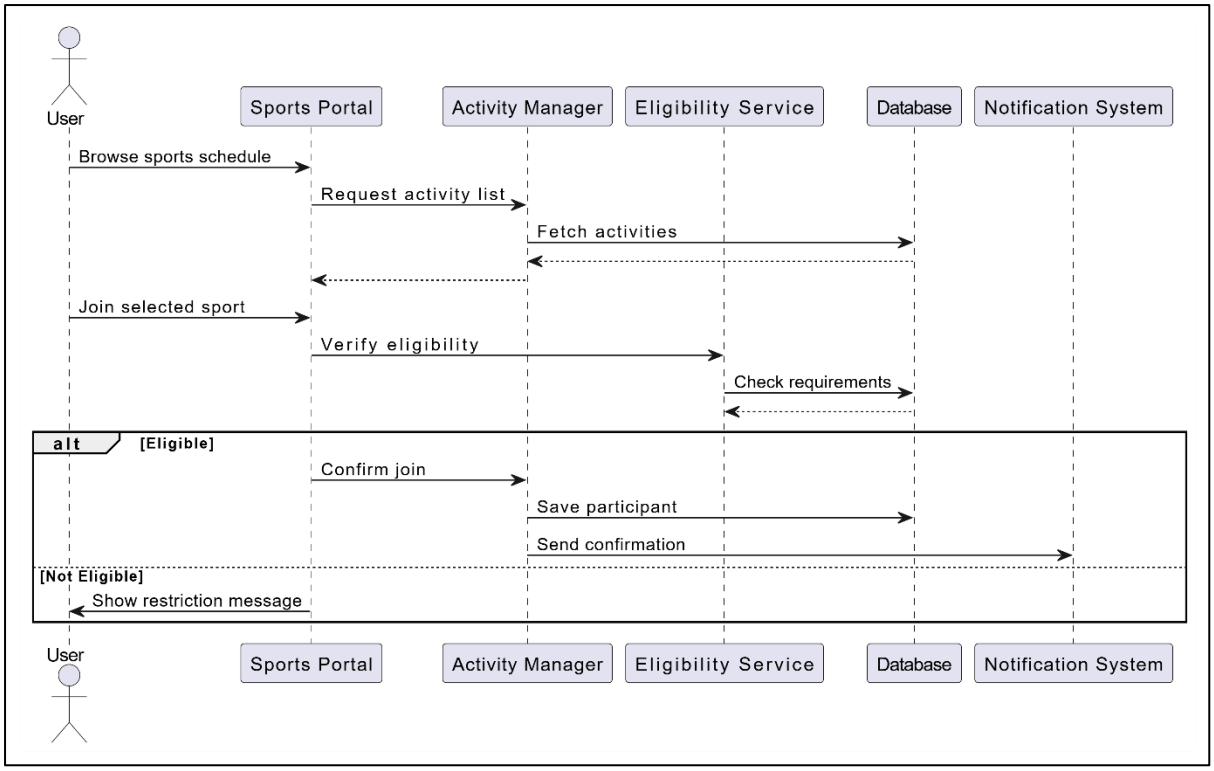

Figure 37 Sequence Diagram– Join Sports Activity

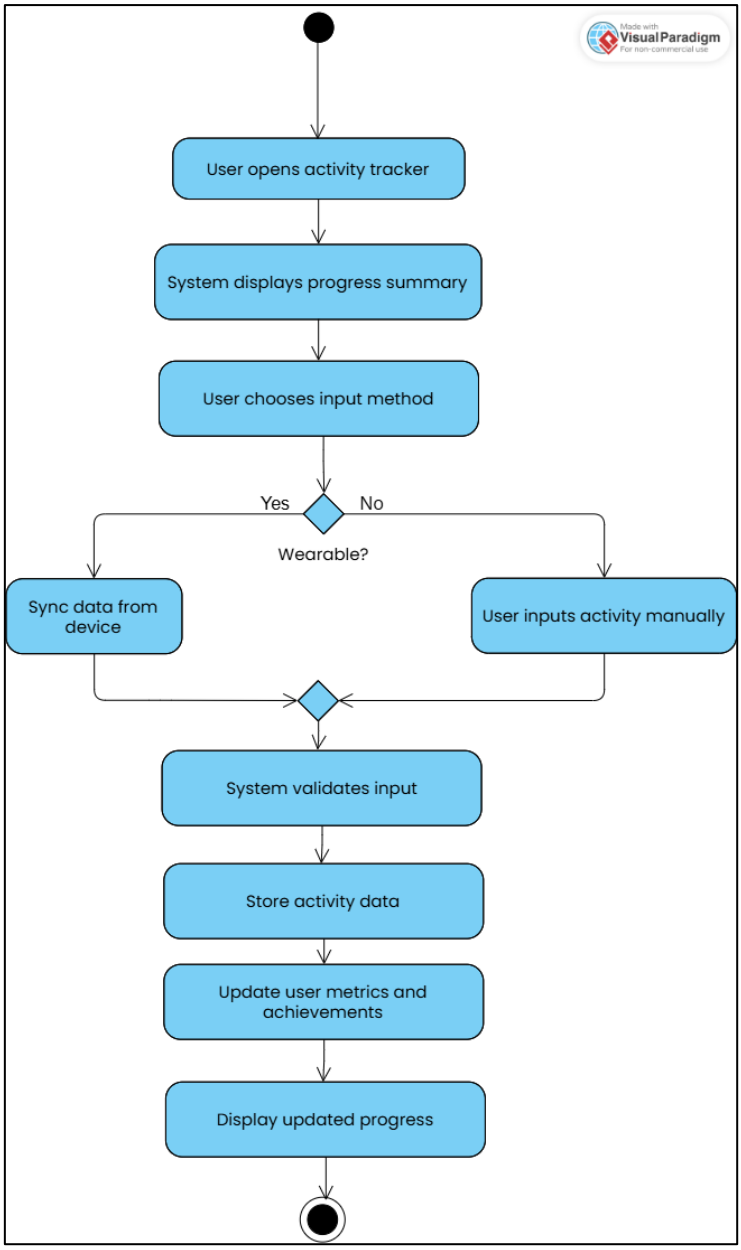

Figure 38 Activity Diagram – Track Physical Activity

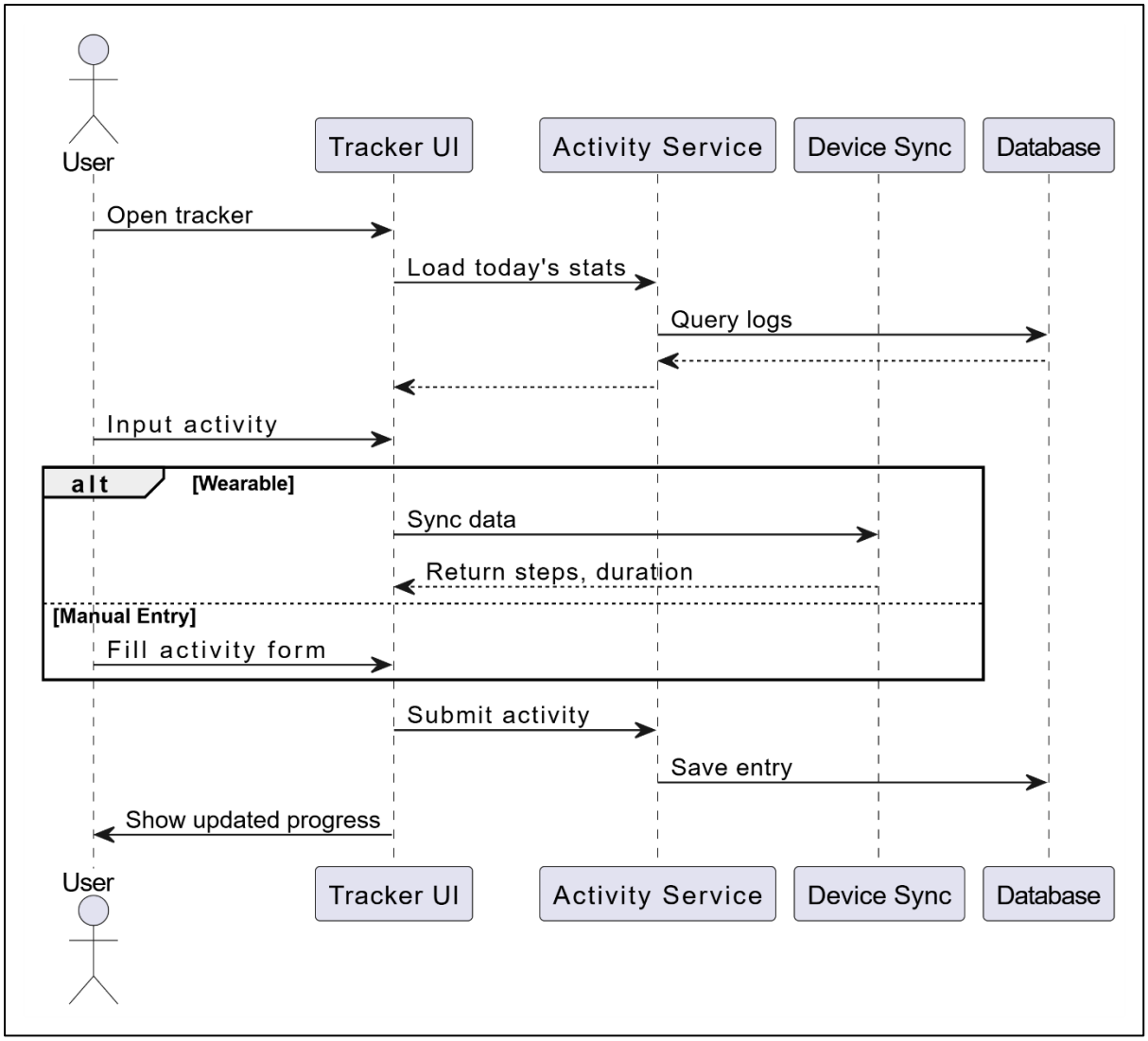

Figure 39 Sequence Diagram– Track Physical Activity

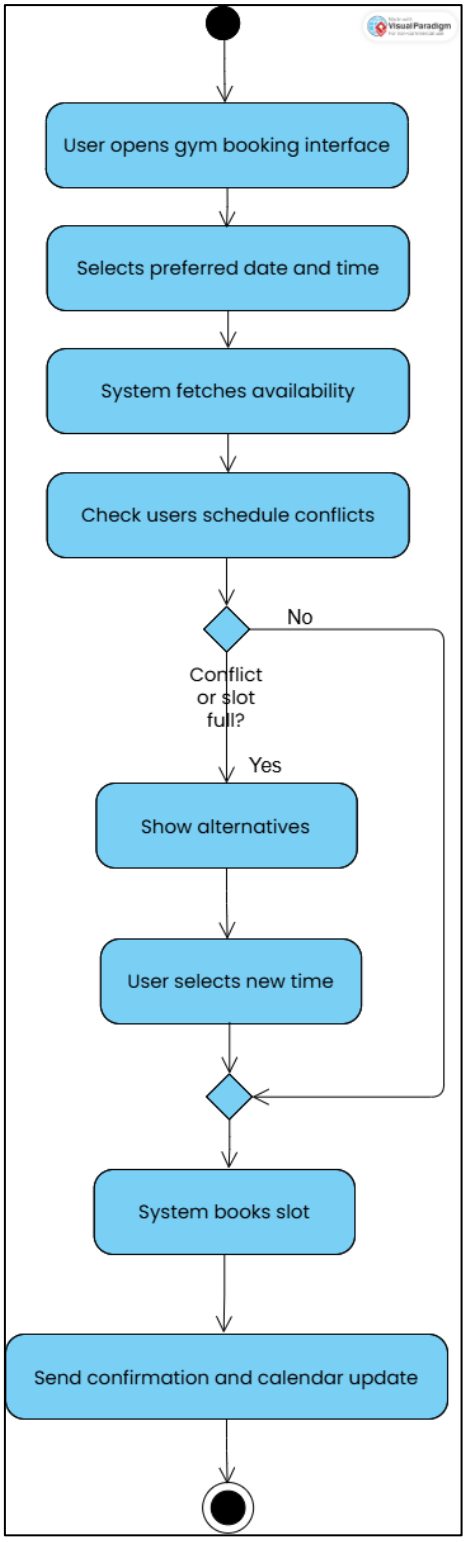

Figure 40 Activity Diagram – Book Gym Slot

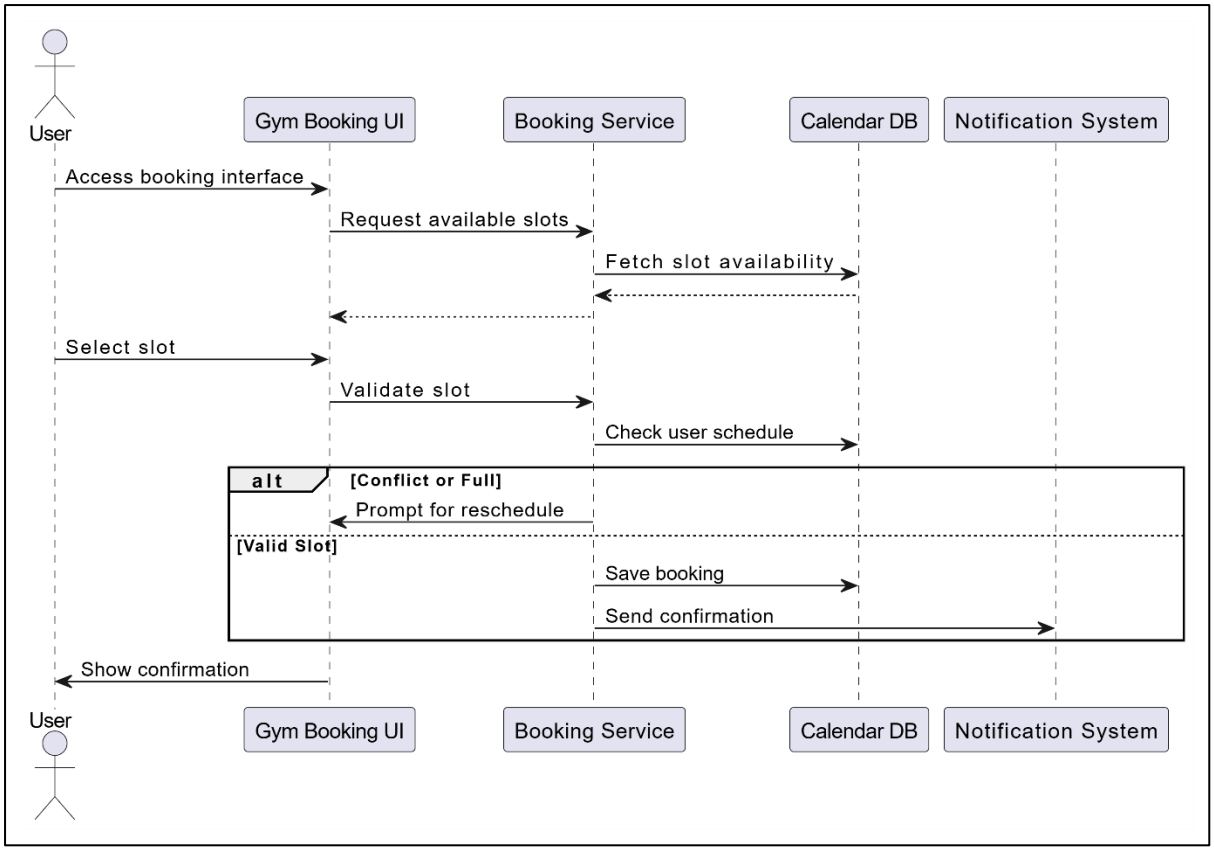

Figure 41 Sequence Diagram – Book Gym Slot

3.4.6 Feedback

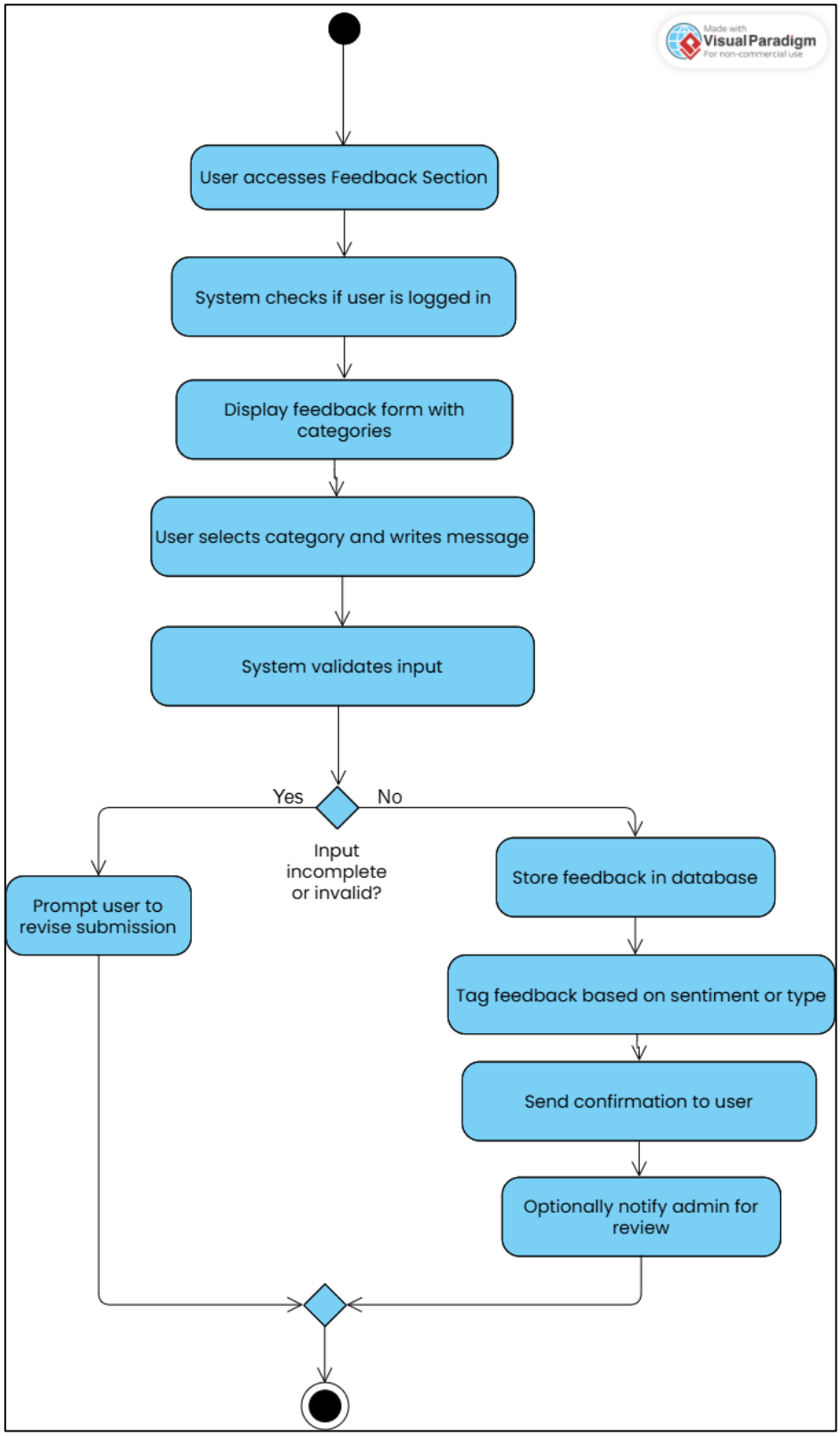

Figure 42 Activity Diagram – Submit Feedback

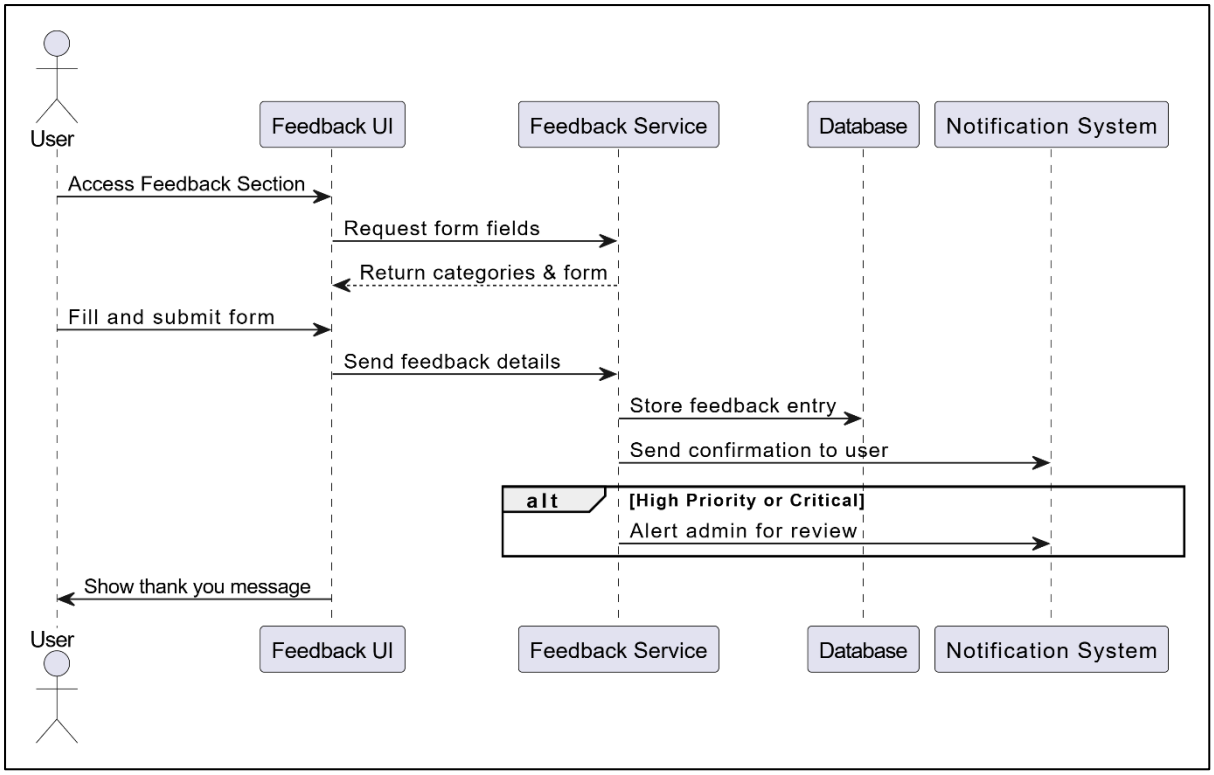

Figure 43 Sequence Diagram – Submit Feedback

3.5 Performance Requirements

Table 68 Performance Requirements

Requirement ID	Description	Priority	Author
R-P-1	The system will render the user dashboard, wellness content, and goal summaries within 3 seconds of login.	High	Lee Ken Yu
R-P-2	The system shall generate personalized health analytics reports within 5 seconds of user request.	Medium	Ng Jia Hong
R-P-3	The system will process fitness class registrations for 150 concurrent users without any delay.	High	Danish Haziq
R-P-4	The system will send real-time booking confirmation emails within 30 seconds of booking.	High	Ng Jia Hong

3.6 Usability Requirement

Table 69 Usability Requirement

Requirement ID	Usability	Description
R-U-01	Navigation	Navigation should be easy, intuitive, and role-based (Student, Staff, Admin, Medical Staff) such that facilities such as appointment booking (UC-05), tracking wellness (UC-11), fitness registration (UC-19), and viewing resources (UC-15) are accessible in a minimal number of steps.
R-U-02	Security	The system will provide secure access by login (UC-01) and role-based access control (UC-02) to permit users to view or access only those features that are pertinent to their role (e.g., Admin vs. Student).
R-U-03	Ease of use	The system will have an intuitive interface and features such as tooltips, context-sensitive help, simplified forms (e.g., in UC-05: Book Appointment, UC-23: Submit Feedback), and a uniform layout for the interface across modules to minimize the learning curve.
R-U-04	Accessibility	The system will have accessibility features such as multi-language support (for UC-05, UC-13, UC-16), screen reader support, and adequate colour contrast to enable usability by users of different abilities and orientations.

3.7 Logical Database Requirements

Class Diagram

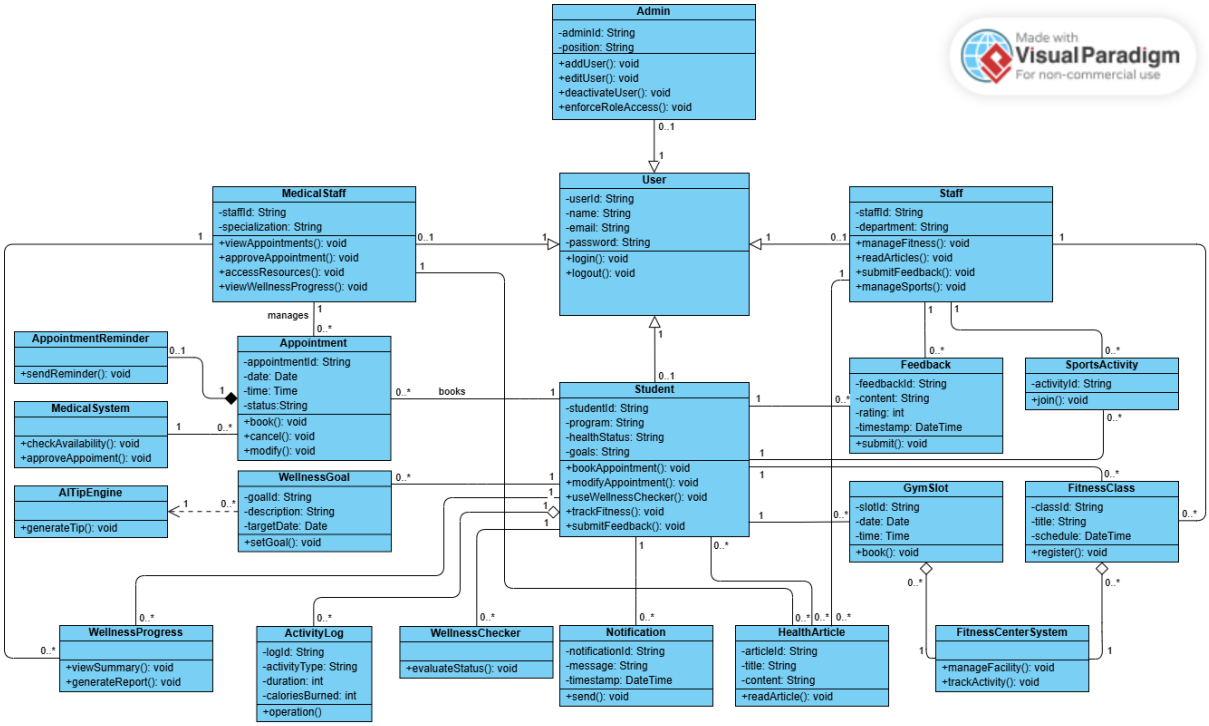

Figure 44 UML Class Diagram – Campus Wellness and Appointment Management System

Table 70 Description: Figure 40

Class	Description
User	User class represents individuals who access the system. • Stores username, password, name, and email. • User is a superclass for Student, Staff, MedicalStaff, and Admin classes. • All system actors authenticate through User credentials.
Student	Student class is a subclass of User class. • Stores studentId, program, healthStatus, and goals. • A student can book, cancel, or modify appointments. • A student can use the wellness checker and track their goals. • A student can register for fitness classes, book gym slots, and log physical activities. • A student can access health articles, receive notifications, and submit feedback. • A student interacts with the AITipEngine to get personalized wellness tips.
Staff	Staff class is a subclass of User class. • Stores staffId and department. • A staff member can manage for fitness classes and sports activities. • A staff member can read health articles and receive notifications • A staff member can submit feedback on services and portal usage.
MedicalStaff	MedicalStaff class is a subclass of User class. • Stores staffId and specialization. • A medical staff can view, approve, and manage appointments.

	• A medical staff can access student wellness progress. • A medical staff can read health articles and manage resources.
Admin	Admin class is a subclass of User class. • Stores adminId and position. • An admin can manage user accounts: add, edit, or deactivate users. • An admin enforces role-based access control throughout the system.
Appointment	Appointment class represents scheduled bookings between students and medical staff. • Stores appointmentId, date, time, and status. • Linked to students and medical staff. • Can be booked, cancelled, or modified by students. • Connected to the AppointmentReminder for sending alerts.
AppointmentReminder	AppointmentReminder class manages automated reminders. • Sends alerts to users for upcoming medical appointments. • Always associated with a specific appointment. • Delivers reminders via preferred notification methods.
MedicalSystem	MedicalSystem class represents the backend interface for managing medical services. • Provides real-time doctor availability. • Approves or updates appointments as needed. • Interacts with the Appointment module.
WellnessGoal	WellnessGoal class stores personal health objectives defined by students. • Contains goalId, description, and targetDate. • Students can set and track their own wellness goals. • Goals are evaluated by the AITipEngine and tracked in WellnessProgress.

WellnessProgress	WellnessProgress class tracks the user's improvement over time. • Linked to student goals and activities. • Generates progress summaries and downloadable wellness reports.
AITipEngine	AITipEngine class generates personalized tips using AI logic. • Dynamically provides students with wellness suggestions. • Considers input from WellnessGoal and WellnessProgress.
WellnessChecker	WellnessChecker class allows students to evaluate their current health status. • Takes input from students and provides summary feedback. • Connected to goal setting and progress tracking.
HealthArticle	HealthArticle class represents wellness-related reading materials. • Contains articleId, title, content, and tags. • Accessible to students, staff, and medical staff. • Used to educate and inform users about health topics.
Notification	Notification class represents alerts and reminders sent to users. • Stores notificationId, message content, and timestamp. • Triggered by system events like appointments or new resources. • Delivered through email or in-app messaging.
FitnessClass	FitnessClass class represents scheduled exercise sessions. • Contains classId, title, schedule, and instructor. • Students and staff can register for classes. • Managed and tracked by the FitnessCenterSystem.
GymSlot	GymSlot class represents reserved time blocks for gym usage. • Stores slotId, date, and time. • Students can book slots in advance through the system.
SportsActivity	SportsActivity class represents physical wellness events. • Includes structured team or solo sports activities.

	• Can be joined by students and staff.
ActivityLog	ActivityLog class records student physical activities. • Includes activity type, duration, and calories burned. • Aggregated under student accounts and reported in WellnessProgress.
FitnessCenterSystem	FitnessCenterSystem class manages operations of campus fitness resources. • Handles gym slot scheduling, class management, and activity tracking. • Acts as the backend for all fitness-related services.
Feedback	Feedback class collects user input about portal services and user experience. • Stores feedbackId, content, rating, and timestamp. • Submitted by students and staff. • Used for system improvement and quality assurance.

3.8 Design Constraints

1. Data Privacy and Security Standards

G5 system should be strictly compliant with data privacy standards in the protection of students' sensitive personal and health information, and employees' personnel and personal information. The highest level of compliance is the General Data Protection Regulation (GDPR) such that:

- All user data gathered must be processed lawfully and transparently.
- Person well-being files, appointment schedules, and doctors' notes authorization access is given to only identified stakeholders.
- SSL/TLS encryption is implemented on data in transit.
- High-level encryption algorithms are used on data at rest, especially on health-related data storage.

Role-Based Access Control (RBAC) and Multi-Factor Authentication (MFA) are utilized to prevent unauthorized access, misuse of data, or breaches from happening.

2. Integration with Campus Systems

Because the portal is located in an electronic campus environment, it must enable integration with a variety of in-campus systems, such as:

- Learning Management Systems such as Moodle or Canvas to synchronize with academic calendar synchronizing students' class schedules with wellness appointment schedules.
- University Authentication Systems implemented with Single Sign-On-based protocols.
- Student Information Systems (SIS) for automatic synchronization of student records.

If there is content to be learned to be shared (e.g., mental health training), the system must be SCORM compliant for tracking and reporting content.

3. Constraints on Performance

Effective student support depends on system performance. The key performance requirements are:

- Response time: Major functionality—appointment booking, viewing dashboards, access to wellness content—must take 2–3 seconds.
- Scalability: The portal must support simultaneous logins by hundreds of students during peak periods (e.g., exam periods or registration periods).
- Stability under load: Activities such as fitness class reservation or access to health records must function without crashing during peak periods.

4. Budget and Timeline Constraints

System development must be accommodated in the existing university IT budget and academic calendar. However,

- It will prioritize the feature implementations by impact and feasibility. For example, appointment scheduling and medical logging before advanced analytics or AI wellness predictions.
- It is a must to ensure that the most important modules for deployment milestones. For instance, medical appointment scheduling and fitness tracking are implemented before classes start to assign incoming students.

5. User Interface and Device Compatibility

The portal must be accessible by many students and staff across various platforms:

- Cross-device compatibility: Available on desktop, laptop, tablet, and smartphone.
- Browser support: Support for Google Chrome, Mozilla Firefox, Safari, and Microsoft Edge.
- Mobile responsiveness and simple, intuitive interface following best UI/UX practices are required to cater to varying levels of tech savviness.

Also, the design should consider accessibility guidelines (like WCAG) to accommodate users with disabilities.

3.9 Standard Compliance

The G5 system must adhere to standards and regulations governing educational, medical, and institutional compliance. The standards influence reporting formats, data structuring, record-keeping, and auditability to ensure transparency, interoperability, and accountability.

The system must generate standard reports which are compliant to institution policy and privacy and wellness regulation. The reports must be exportable into general formats such as PDF, CSV, Excel, and Word to facilitate sharing ease, data analysis, and archiving and between departments, and in the case of the need to send to outside organizations.

Some reports required include:

- Health and Wellness Reports: Student participation summaries in wellness activities, fitness tracking, and appointment visits.
- Appointment and Consultation Records: Medical appointment records, date, services rendered, and follow-up remarks available for authorized health professionals.
- Administrative Analytics: Administrator and counsellor dashboards to track participation patterns, common health issues, and utilization rates.

For interoperability across systems and consistency of data, the portal has to use standard naming conventions for all stored data. Naming conventions make data easy to read and load, aggregate and store. Examples include:

- Fields for User Data: studentID, studentName, email, program, healthPlanStatus
- Appointment Records: appointmentID, staffID, visitType, visitDate, notes
- Fitness & Wellness Tracking: activityType, duration, caloriesBurned, goalProgress

Descriptive, coded field names minimize database query errors, reports correctly, and simpler to integrate with future systems.

Accounting Procedures and Auditing

The system needs accounting-type-processes to monitor the transaction and user activities to facilitate traceable and reliable activity logging in the portal:

- Wellness Activities Logging: Each student reservation, check-in, or completion of an event (e.g., counselling session or exercise class) must be logged with a timestamp.
- Medical Form Submissions: Any uploaded or submitted feedback forms must be dated and stored as separate files.
- Interaction Traceability: All log files must record all interactions when a student opens, submits, or modifies wellness objectives or intake surveys.

The logs support the ability to meet internal as well as external audits with effective performance monitoring.

Audit Tracing Standards

The education and healthcare data governance standards issued adapted audit tracing policies which the portal needs to implement immediately:

- User Activity Logs: Documenting profile changes, logins, scheduled appointments, and services rendered are also included.
- Access Logs: Important access to areas such as health records and consultation notes should be logged.
- Modification Tracking: Ensure modification of sensitive information such as diagnosis history, appointment information, and system settings are traced.

Logs must contain a description of the action, be time-stamped, tagged with user IDs, and held in securely sealed tamper-evident containers. Accessible only during probes or audits.

3.10 Software System Attributes

Table 71 Software System Attributes

Attribute	Description
Reliability	The system must operate with high reliability as it handles critical modules such as medical appointments, fitness scheduling, and health tracking. Redundant hosting and regular backups will ensure a 99.5% uptime annually.
Availability	Accessible 24/7 with core functions such as reminders and tracking always online. Maintenance downtime is scheduled with user alerts.
Security	Implements RBAC, JWT authentication, HTTPS encryption, and compliance with PDPA. Sensitive data is logged and access tracked.
Maintainability	Modular architecture allows for isolated maintenance. Admin dashboard will include monitoring and bug tracking.
Portability	Responsive web app accessible on desktop, tablet, and mobile. Compatible with major browsers and ready for future mobile expansion.

3.11 Supporting Information

3.11.1 Interview Minutes

Identifier	**INT-01**
Date	April 5, 2025
Goal	Elicitation on Dissatisfier requirements for the Campus Wellness Portal (CWP) across wellness, medical, and fitness domains.
Interviewer	Danish Haziq
Interviewee(s)	Azmi
Minutes	Minutes 1. Medical Appointment Conflicts Stakeholder Concern: Students reported difficulties when booking medical appointments, especially around overlapping times and unavailable doctors not being shown in the system. There was no real-time update when doctors were unavailable, or rooms were occupied. Feedback: “Sometimes I book an appointment and then get told it’s not valid later. It should check availability immediately.” 2. Fitness Class Overbooking Stakeholder Concern: There were cases where students signed up for a fitness class only to find it had already reached capacity. The system did not automatically block full classes or provide alternatives. Feedback: “It’s annoying when you register and then they say the class is full. Just show the limit before confirming.” 3. Wellness Progress Invisibility Stakeholder Concern: Users expressed concerns over the wellness checker’s lack of detailed progress tracking or visualization. There was no clear way to monitor improvements or regressions over time, which defeated the purpose of regular check-ins. Feedback: “I fill in my wellness tracker every day, but I don’t see any trend or progress chart. It’s just there.”

Identifier	**INT-02**
Date	April 15, 2025
Goal	Elicitation on usability, notification handling, and security constraints for the Campus Wellness Portal (CWP) based on user roles and privacy expectations.
Interviewer	Danish Haziq
Interviewee(s)	Alif
Minutes	1. Notification Timing and Relevance Students and medical staff raised concerns about the timing and content of system notifications. Notifications that are related to appointments, fitness classes and even health events sometimes arrives too late and not actionable. There was also confusion as the same alert appeared on multiple channels without any clarification. Feedback: “I got a push notification for a fitness class I registered for five minutes before it started and that’s not helpful. It should come earlier as well as let me respond to it.” 2. User Role Overlap and Restrictions Medical staff with dual roles (e.g., also using the gym or acting as student mentors) reported restrictions while switching between functionalities. The system sometimes blocked valid actions due to tight role enforcement. Feedback: “As medical staff, I also attend fitness sessions, but the system logs me out when switching views. It should know I wear multiple hats.” 3. Privacy and Data Control Expectations Students expressed concerns about who could access their wellness logs and whether personal stress entries would be visible to educators or admin. Interviewees emphasized that while they appreciated the tracking features, visibility control and clear privacy boundaries were needed. 4. Feedback: "I want to log my wellness honestly, but I hesitate because I’m unsure who else can see my check-ins. There should be more clarity or a toggle."

3.11.2 Brainstorming Minutes

Identifier	**BRN-01**
Date	April 10, 2025
Goal	To generate innovative and valuable features that enhances engagement, usability, and wellness outcomes in the Campus Wellness Portal (CWP).
Facilitator	Ng Jia Hong
Participants	Lee Ken Yu, Danish Haziq
Ideas Collected	Minutes Collected Ideas: QR Code Check-in Participants suggested the implementation of a QR code check-in system to make attendance taking easier for fitness classes and wellness events. This idea arises to aid in reducing manual logging and provide accurate tracking of participation. Feedback: "A simple QR scan would make it so much faster to join classes and we don't have to take manual sheets anymore and make mistakes." AI-Driven Personalized Wellness Tips Analysing user data was suggested for the system from the wellness checker and generate daily or weekly tips that's personalized to the individual's trends. These tips could include exercise suggestions, mental health strategies and reminders to rest. Feedback: "Getting personalized wellness advice based on my stress or sleep pattern definitely can make me feel like the system actually care about my health." Monthly Wellness Progress Report Another idea highlighted was to auto-generate wellness progress reports summarizing a student's activities, stress levels, fitness participation, and overall wellness trends. Reports would be sent through email and are downloadable through the portal. Feedback: "A monthly report showing how I've been doing would motivate me to stay on track or improve where I'm slipping."

4.0 Verification

4.1 Function

4.1.1 R-1 User Access Management

Table 72 R-1-01

Requirement ID	R-1-01
Function	Login
Verification Method	Functional Testing
Requirement	System will only allow access to those users who have valid credentials.
Verification	• Verify successful login with valid credentials for each role (Student, Staff and Medical staff and Admin). • Double check failed login attempts with wrong credentials. • Log in redirection based on the user role.
Conducted By	Developer

Table 73 R-1-02

Requirement ID	R-1-02
Function	Enforce Role Based Access
Verification Method	Functional Testing
Requirement	System is required to restrict access based on roles assigned to a user.
Verification	• Check that Admin can access admin-only modules. • Enforce that the Students and Staff cannot access the unauthorized areas. • Ensure that any role-based limitations are applied throughout the system in uniform manner.
Conducted By	Developer

Table 74 R-1-03

Requirement ID	R-1-03

Function	Manage User
Verification Method	Functional Testing
Requirement	Admin can be able to perform user management.
Verification	• Ensure Admin is able to add, edit as well as deactivate user accounts. • Ensure that all changes are carried over to user records. • Test for error handling for the duplicate or invalid data.
Conducted By	Developer

4.1.2 R-2 Appointment Management

Table 75 R-2-01

Requirement ID	R-2-01
Function	Manage Appointment
Verification Method	Functional Testing
Requirement	System should provide users with an option of checking for the available appointments, booking, canceling, and editing their appointments.
Verification	• Ensure student can access appointment dashboard and perform any possible actions. • Medical System displays accurate records of appointment. • Ensure sync between user's actions and system updates.
Conducted By	Developer

Table 76 R-2-02

Requirement ID	R-2-02
Function	Book Appointment
Verification Method	Functional Testing

Requirement	Students should be in a position to register for appointments with available doctors.
Verification	• Validate that the booking flow is successful if the right inputs are provided. • Ensure booking slots for actual availability at real-time. • Confirm that properly messages are shown in already booked and unavailable slots.
Conducted By	Developer

Table 77 R-2-03

Requirement ID	R-2-03
Function	Cancel Appointment
Verification Method	Functional Testing
Requirement	The students should be able to cancel appointment.
Verification	• Confirm the success of cancellation of chosen appointments. • Confirm whether updates are available after cancellation of the system. • Validate messages of confirmation and error for cancellation attempts.
Conducted By	Developer

Table 78 R-2-04

Requirement ID	R-2-04
Function	Modify Appointment
Verification Method	Functional Testing
Requirement	Students should be able to re-schedule the existing appointments.
Verification	• Ensures that the appointment rescheduling update slot accordingly.

	• Confirm that the previous slot is released, and the new one is set-aside. • Authenticate conflict management and attempts at invalid modification.
Conducted By	Developer

Table 79 R-2-05

Requirement ID	R-2-05
Function	View Doctor Availability
Verification Method	Functional Testing
Requirement	Students should be in a position to see available time slots for doctors.
Verification	• Ensure correct and real-time display of availability of doctors. • Confirm the data refresh upon chosen date or department. • Does system handle unavailable days and slot conflicts.
Conducted By	Developer

Table 80 R-2-06

Requirement ID	R-2-06
Function	Receive Appointment Reminder
Verification Method	Functional Testing
Requirement	System automatically should send reminders before scheduled appointments.
Verification	• Verify reminders are sent to the student and medical staff on basis of schedule. • Ensure that format, content and method of delivery (e.g., email, SMS) are correct. • Ensure that duplicate or missing reminders are not created.
Conducted By	Developer

4.1.3 R-3 Wellness Monitoring & Suggestions

Table 81 R-3-01

Requirement ID	R-3-01
Function	Use Wellness Checker
Verification Method	Functional Testing
Requirement	System should equip with a wellness checker tool on which to check the current health status of the users.
Verification	• Verify that Students are able to fill in wellness checker form. • Ensure that the results are presented according to inputs. • Determine that data is secure, and capable of being viewed on user records.
Conducted By	Developer

Table 82 R-3-02

Requirement ID	R-3-02
Function	View Progress Summary
Verification Method	Functional Testing
Requirement	The students should be able to access wellness progress summaries.
Verification	• Verification of summaries exist that contain historical wellness data and goal tracking. • Confirm that the summaries are updated in accordance with new entry. • Ensure Medical System provides true summaries for reference.
Conducted By	Developer

Table 83 R-3-03

Requirement ID	R-3-03
Function	Set Health Goal

Verification Method	Functional Testing
Requirement	Students should be able to set personal health goals and update them.
Verification	• Confirmation of goals creation and editable by the user. • An assertion that saved goals are available on the dashboard should pass. • Validate validation and error handling for the invalid entries.
Conducted By	Developer

Table 84 R-3-04

Requirement ID	R-3-04
Function	Get AI-based Wellness Tip
Verification Method	Functional Testing
Requirement	System shall generate AI wellness tips based on the user input and progress.
Verification	• Validate tips are dynamically created with reference to wellness data. • Check relevance and accuracy of tips. • Ensure that various inputs result in context-sensitive suggestions.
Conducted By	Developer

Table 85 R-3-05

Requirement ID	R-3-05
Function	Generate Wellness Report
Verification Method	Functional Testing
Requirement	Students should be able to produce downloadable wellness reports.
Verification	• Check if report generation catches up user's whole wellness history.

	• Make sure to check the format is user-friendly (PDF, summary charts, etc.). • Confirm whether or not the reports are downloadable and securely stored.
Conducted By	Developer

4.1.4 R-4 Health Resources & Notification

Table 86 R-4-01

Requirement ID	R-4-01
Function	Access Health Resource
Verification Method	Functional Testing
Requirement	System should enable authorized users to access health resources library.
Verification	• Ensure that the Students, Staff, Medical System and Fitness Center System can gain access to correct resources. • Ensure categories, filters, and search functionality are working as expected. • Authenticate access control of sensitive resources.
Conducted By	Developer

Table 87 R-4-02

Requirement ID	R-4-02
Function	Read Health Article
Verification Method	Functional Testing
Requirement	System shall enable Students and Staff to read health related articles.
Verification	• Ensure that article contents are rendered properly with the right format. • Ensure that article listing contains titles, dates, and tags. • Validate tracking of read/unread status or recommendation.
Conducted By	Developer

Table 88 R-4-03

Requirement ID	R-4-03
Function	Receive Notification
Verification Method	Functional Testing
Requirement	System will send notifications, of updates, appointments, or health alerts.
Verification	• Ensure detailed notifications are sent as expected by system events (e.g. new article, appointment). • Confirm delivery by the appropriate channels (e.g. in-app, email). • Ensure that the duplicated or irrelevant notifications are eliminated.
Conducted By	Developer

4.1.5 R-5 Fitness & Physical Activity

Table 89 R-5-01

Requirement ID	R-5-01
Function	Use Fitness Facility
Verification Method	Functional Testing
Requirement	System must allow authorized persons to access fitness facilities.
Verification	• Test to ensure that Students, Staff, Medical Staff, and Fitness Center System is able to log and keep a record of usage. • Access rights are confirmed before being allowed into the facility. • Ensure usage data entered is correct in reports.
Conducted By	Developer

Table 90 R-5-02

Requirement ID	R-5-02
Function	Register for Fitness Class

Verification Method	Functional Testing
Requirement	System should allow users to sign up for fit classes that are available.
Verification	• Verify the success of registration with valid class choice. • Confirm that update of seat availability is real-time based. • Ensure that full classes and duplicate attempts are otherwise handled correctly.
Conducted By	Developer

Table 91 R-5-03

Requirement ID	R-5-03
Function	Join Sports Activity
Verification Method	Functional Testing
Requirement	System will enable the clients to participate in structured sporting activities.
Verification	• Confirm the success through which the user enrols in selected activities. • Check that activity schedules and participants' lists are correct. • The verify system also enforces deadlines and eligibility.
Conducted By	Developer

4.1.6 R-6 Feedback

Table 92 R-6-01

Requirement ID	R-6-01
Function	Join Sports Activity
Verification Method	Functional Testing
Requirement	System shall provide an opportunity for Students and Staff to provide feedback on services and facilities.

Verification	• Confirm that Feedback form is available to Students and staff. • Ensure submission is saved appropriately and is related with the user. - Ensure validations of proper form (ex – mandatory fields, input restrictions). • Confirmation message is displayed when submitted.
Conducted By	Developer

5.0 Appendices

5.1 Assumption and Dependencies

Assumptions

1. The Student Wellness Portal is made to be used in the setting of higher education or universities. It is thought that these features and processes are created for academic use and might not work well in different fields.
2. Users (students, staff, medical persons, and admins) should log in only with correct credentials. The system depends on the accuracy of personal information, records about health, and all booking data given by users. Incorrect or old data could cause various issues within the system and keep users from using essential services.
3. The system works thanks to access to accurate, prompt, and updated information, for example, when doctors are available and when fitness classes are still open. If the data in the system is incorrect or outdated, you might end up with incorrect advice, not attend some important meetings, or trust the system less.

Dependencies

1. A good performance from the system requires servers on campus, a solid internet connection, and good cloud services. Real-time booking, health monitoring, and notification services require the system to have the right server support and a reliable internet connection.
2. Technical problems, security loopholes, and new user needs have to be constantly dealt with in the system. Updating the system from time to time makes sure students' information is protected, maintains compatibility with various devices, and introduces features that help students.

5.2 Acronyms and Abbreviations

Acronym	Description
SRS	System Requirements Specification
SSO	Single Sign-On
SIS	Student Information System
LMS	Learning Management System
UI	User Interface
UX	User Experience
QR	Quick Response (Code)
API	Application Programming Interface
MFA	Multi-Factor Authentication
GDPR	General Data Protection Regulation
PDF	Portable Document Format
CSV	Comma-Separated Values
HTML	HyperText Markup Language
WCAG	Web Content Accessibility Guidelines
RBAC	Role-Based Access Control
AI	Artificial Intelligence