MALAYSIA-JAPAN INTERNATIONAL INSTITUTE OF TECHNOLOGY (MJIIT)

SEMESTER 1-2024/25

SOFTWARE ENGINEERING

COURSE CODE: SECJ 2203; SECTION – 16

LECTURER: DR ROZANA ISMAIL

A2: SPECIFIC REQUIREMENTS (SR)

Group - 6

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Contents

1. Introduction

1.1 Purpose

This section delineates the purpose of the SD and specifies its intended audience.
Purpose: This SD describes the development and implementation of a staff management system aimed at efficiently managing personnel-related activities.
Audience: The intended audience includes project stakeholders such as software developers, testers, project managers, and end-users, including administrative staff.

1.2 Scope

The staff management system is designed to:
- Streamline staff record management, attendance tracking, and performance monitoring.
- Enhance communication and task allocation efficiency.
- Facilitate compliance with organizational policies.

The software product includes:
1. Staff Database Management: For storing and accessing employee details securely.
2. Attendance Monitoring: Real-time tracking of staff attendance with reporting features.
3. Task Assignment & Tracking: Assign and track the progress of tasks for individuals or teams.
4. Reporting & Analytics: Generate reports for performance and compliance metrics.

Exclusions: The system will not include modules related to financial payroll management or third-party application integrations.
Application:
- The system will provide benefits such as improved record accuracy, reduced administrative workload, and enhanced performance tracking. It aligns with organizational goals of operational efficiency and staff engagement.

1.3 Definitions, Acronyms, and Abbreviations

Definitions:
- Staff: Refers to employees under the organization's purview.
- Task Assignment: Allocation of specific responsibilities to individuals or teams.

Acronyms:
- SRS: Software Requirements Specification
- SDD: Software Design Document
- STD: Software Test Documentation

1.4 References

The documents and resources referenced in this SD include:
1. Sommerville, I. (2016). *Software Engineering* (10th Edition). Pearson Education.
2. Organization Policy Manual (2023).
3. Agile Alliance Guidelines (2024). Agile Alliance

1.5 Overview

This SD is organized as follows:
- Section 1: Introduction to the SD, including its purpose, scope, and organizational overview.
- Section 2: Detailed requirements and specifications (SRS).
- Section 3: Design documentation (SDD).
- Section 4: Testing procedures and documentation (STD).

The document ensures comprehensive coverage of the staff management system development process.

2. Specific Requirements

The Sustainability Tracking and Rewards System helps staff monitor and reduce their environmental impact by tracking daily activities like transportation and energy use. It offers feedback, rewards eco-friendly actions, and provides educational content on sustainability. Users can earn points for green initiatives, access sustainability courses, and share their achievements on social media. The system motivates staff to adopt environmentally conscious practices and promotes a sustainable workplace culture. Available on web and mobile, it integrates with existing user management systems.

2.1 Persona

The MyGreen UTM app has three main actors:

1. **Staff Member (End User):** The primary users who log activities, propose green initiatives, and track their participation and impact.

2. **Admin (Staff Manager):** The administrators responsible for organizing programs, monitoring engagement, and generating reports to evaluate sustainability efforts.

3. **System:** The app itself, which automates processes such as carbon footprint calculations, data storage, notifications, and report generation.

These actors ensure the app is user-focused and supports sustainability effectively.

2.1.1 Persona 1 (User/End User)

A staff member actively participating in campus sustainability efforts

Track their carbon footprint, suggest eco-friendly initiatives, and measure their participation in green activities.

Staff members can log their activities (e.g., recycling, using public transport) to monitor their carbon footprint.

They can submit proposals for green initiatives through a structured form and collaborate with others.

The app tracks their participation metrics, displays progress on dashboards, and offers rewards for consistent efforts.

2.1.2 Persona 2 (Admin)

A staff manager overseeing the organization and progress of sustainability initiatives

Manage and organize programs, monitor participation, and generate reports to measure sustainability impact.

Admins have access to program management tools for creating, scheduling, and editing initiatives.

They can track staff participation levels using visual dashboards and generate detailed reports on program outcomes, including insights into the collective carbon footprint reduction and activity trends. Notifications can also be sent to remind staff about upcoming events or incomplete tasks.

2.1.3 Persona 3 (System)

The app/system itself automating processes for staff and admins

Process staff inputs, store data securely, and provide automated notifications and reports. The system calculates carbon footprints based on logged data, securely stores user inputs, and generates real-time visualizations for staff and admins.

It sends automated reminders for event deadlines or milestones and provides staff with tailored insights into their environmental contributions.

2.2 System Features

The "MyGreen UTM" app is part of Universiti Teknologi Malaysia's (UTM) digital ecosystem and sustainability initiatives. It functions as a mobile application designed to promote eco-friendly practices, engage users in environmental awareness, and support UTM's green campus goals. It Supports UTM's environmental monitoring and reporting frameworks. Primary users include students, faculty, and staff at UTM.

The system features of "MyGreen UTM" from a Staff's perspective have been demonstrated and analyzed below with Use Case Diagram:
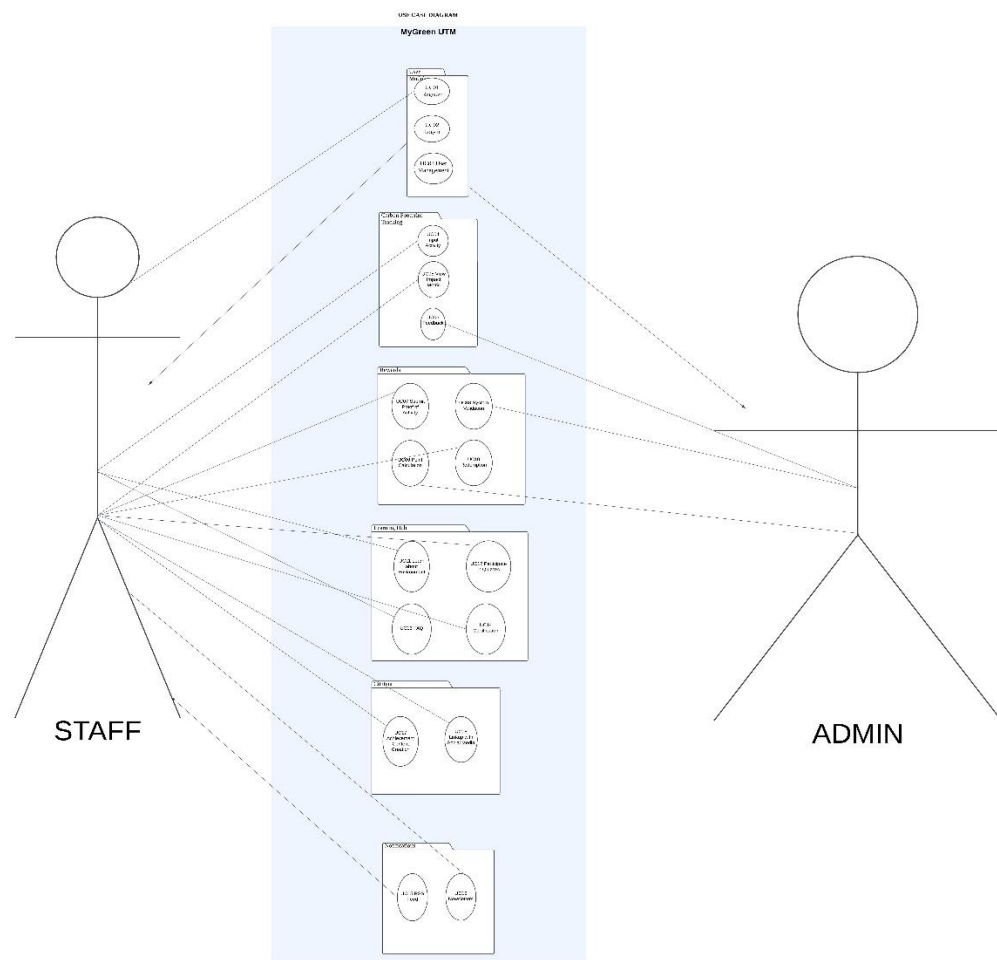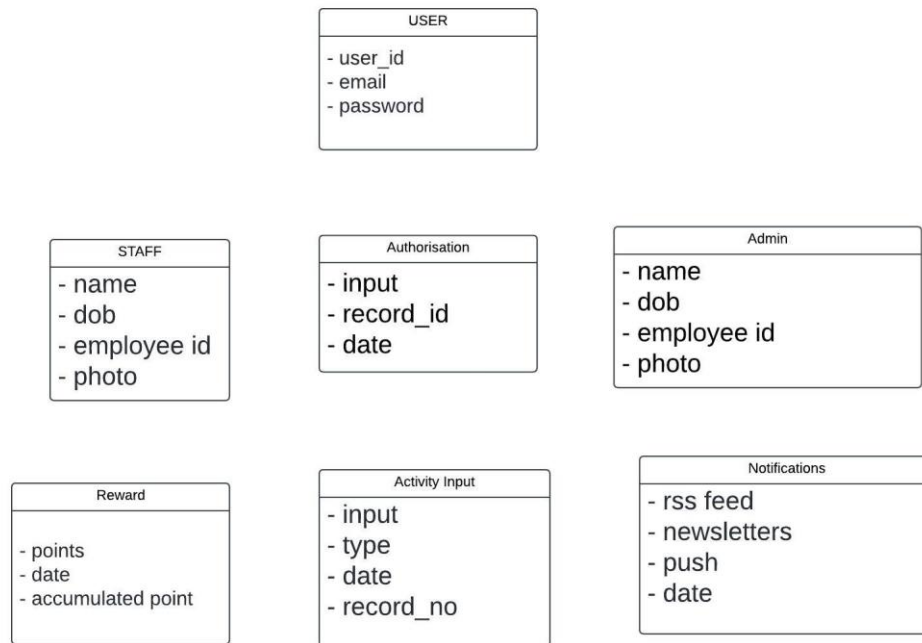

Figure 1: Use Case Diagram for "MYGreen UTM"

Table 1: Description of Module & Functions for "MYGreen UTM"

USE_CASE	MODULE	FUNCTIONS	DESCRIPTION
UC01	User Management	Registration	Registration of the user by Staff
UC02		Login	Login to the system with credentials
UC03		Profile Management	Admin manages every profile
UC04	Carbon Footprint Tracking	Input Activity	Staff makes input on any environment related activity
UC05		View Impact Metric	Admin authorizes the input
UC06		Feedback	Feedback from both Admin & Staff
UC07	Rewards	Submit Proof of Activity	Input with photos or QR
UC08		System Validation	System validates the metric
UC09		Point Calculation	Calculation of points accumalted
UC10		Redemption	Staff can make redemption of the points
UC11	Learning Hub	Learn about Environment	Staff can learn about environment & initiatives
UC12		Participate in Quizzes	Staff takes part in Quizzes
UC13		FAQ	Staff can hover into FAQ about the System
UC14		Certification	Staff can get Certification for completing Quiz or Course
UC15	Notification Board	RSS Feed	RSS Feeds will give various related news
UC16		Newsletters	Newsletters can be used to notify on various events
UC17	Content Creation	Achievement Content Creation	After a meaningful impact, Staff can share content with Text or Visual representation
UC18		Linkup with Social-Media	The content can be shared on various Socials

Below is a relational domain model (class diagram). The relation is just being demonstrated with its operations.

```
                              ┌──────────────────────┐
                              │         USER         │
                              ├──────────────────────┤
                              │  - user_id           │
                              │  - email             │
                              │  - password          │
                              │                      │
                              └──────────────────────┘


  ┌──────────────────┐   ┌──────────────────────┐   ┌──────────────────────────┐
  │      STAFF       │   │     Authorisation    │   │          Admin           │
  ├──────────────────┤   ├──────────────────────┤   ├──────────────────────────┤
  │  - name          │   │  - input             │   │  - name                  │
  │  - dob           │   │  - record_id         │   │  - dob                   │
  │  - employee id   │   │  - date              │   │  - employee id           │
  │  - photo         │   │                      │   │  - photo                 │
  └──────────────────┘   └──────────────────────┘   └──────────────────────────┘


  ┌──────────────────┐   ┌──────────────────────┐   ┌──────────────────────────┐
  │      Reward      │   │     Activity Input   │   │       Notifications      │
  ├──────────────────┤   ├──────────────────────┤   ├──────────────────────────┤
  │  - points        │   │  - input             │   │  - rss feed              │
  │  - date          │   │  - type              │   │  - newsletters           │
  │  - accumulated   │   │  - date              │   │  - push                  │
  │    point         │   │  - record_no         │   │  - date                  │
  └──────────────────┘   └──────────────────────┘   └──────────────────────────┘
```

2.3 Launch Phase

The launch phase for the MyGreen UTM app would involve several carefully planned steps to ensure a smooth rollout and successful adoption by its intended users (UTM students, faculty, and staff). Here's how the launch phase might look:

In pre-launch activity, the main parts are System Testing, User Acceptance Testing (UAT), Performance and Load Testing, Security Testing and content preparation. Also, we need to take consideration of the deployment - Production Environment Setup, Data Initialization. We can also need to engage marketing & communication engagements - Announcement and Promotion, User Engagement Campaigns.

For the launch phase, 3 or 4 metrics need to be considered for long successful lifecycle of the software - User Adoption Rate, App Performance, User Feedback, Engagement Levels.

Sprint	Team members assigned
Sprint #1 Carbon Footprint Tracking	Tahiya, Pashmia, Saumik
Sprint #2 Sustainability Rewards System	Saumik, Pashmia
Sprint #3 Access to Educational Content	Zabir, Pashmia
Sprint #4 Sustainability Rewards System	Tahiya, Zabir

Table 2: Launch Phase with Product Backlog Scenarios

Launch phase success of the app will be depended on its development cycle and delivery process have been followed with due diligence.
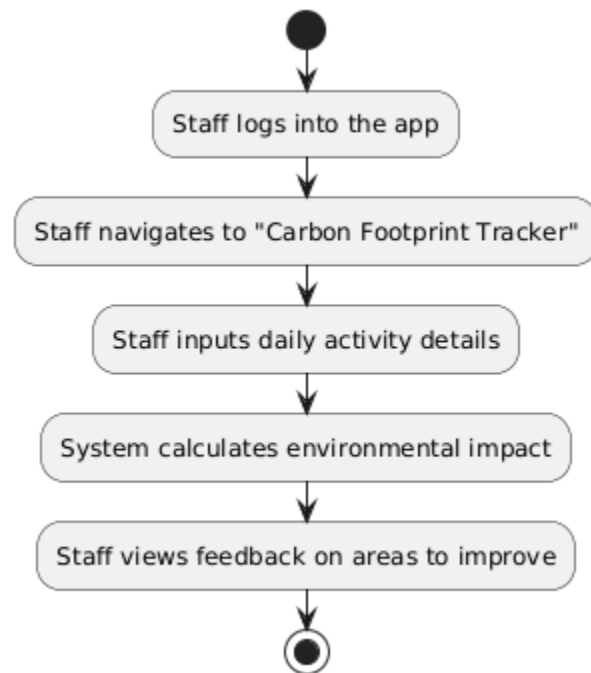
2.4 User Story Details

The project includes 5 user story, focusing on essential functionalities tailored to staff. The mandatory use cases include Carbon Footprint Tracking, allowing staff to monitor their environmental impact; Green Initiative Proposals, enabling staff to suggest and collaborate on eco-friendly projects; Program Management, for organizing and managing sustainability initiatives; Participation Tracking, to measure staff involvement in green activities; and Report Generation, providing detailed insights into progress and achievements. These use cases define the project's focus on equipping staff with tools to lead sustainability efforts, ensuring meaningful contributions to environmental conservation on campus.
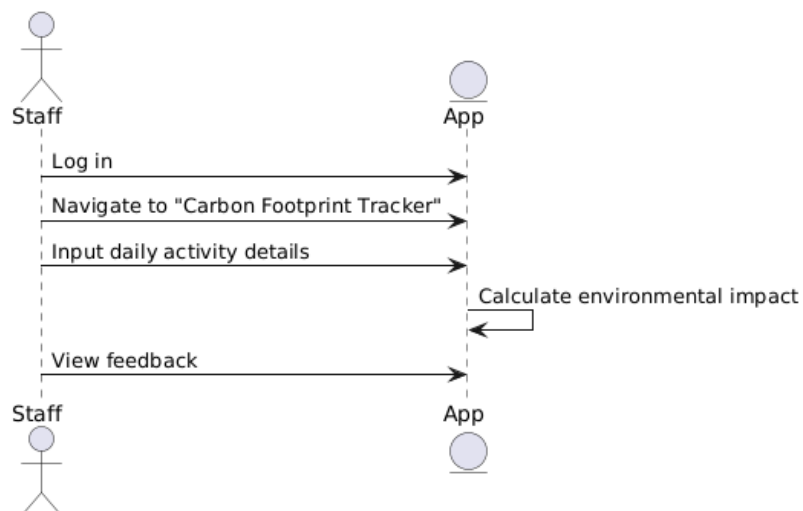
2.4.1 US001: User Story1 <Carbon Footprint Tracking>

| User Story1: Carbon Footprint Tracking |
| --- |
| **ID: US001** |
| **Actor: Staff** |
| **User Story Description:**
As a staff member,
I want to input daily activities and receive feedback on my
environmental impact,
So that I can track and reduce my carbon footprint. |
| **Flow of Events**:
1. Staff logs into the app.
2. Staff navigates to the "Carbon Footprint Tracker" section.
3. Staff inputs details of daily activities (e.g., transportation, energy usage).
4. The system calculates and displays the staff's environmental impact.
5. Staff views feedback on areas to improve. |
| **Alternative Flow:**

• If the staff skips some inputs, default averages are used. |
| **Acceptance Criteria:**
• **Precondition:** Staff is logged into the app.
• **Postcondition:** The calculated footprint is displayed and saved.
• **Other Conditions:** Accuracy of calculations based on scientific formulas. |
| **Exception Flow:**
• Invalid inputs trigger an error prompt with corrections. |

Carbon Footprint Tracking (Activity Diagram)

Staff logs into the app

Staff navigates to "Carbon Footprint Tracker"

Staff inputs daily activity details

System calculates environmental impact

Staff views feedback on areas to improve

Carbon Footprint Tracking (Sequence diagram)

Staff — App

Log in

Navigate to "Carbon Footprint Tracker"

Input daily activity details

Calculate environmental impact

View feedback

Staff — App

2.4.2 US002: User Story2 < Event Notification Management>

User Story2: Event Notification Management
ID: US002
Actor: Staff
User Story Description: **As a staff member,** **I want to receive notifications about upcoming sustainability events,** **So that I can participate in green initiatives.**

Flow of Events:
   1. Staff enables notifications for events in the app settings.
   2. System identifies a relevant upcoming event.
   3. Staff receives a notification with event details.
   4. Staff clicks the notification to view more information in the app.

Alternative Flow: • If notifications are disabled, staff can manually check the "Events" section in the app.

Acceptance Criteria:
   • **Precondition**: Staff has enabled notifications.
   • **Postcondition**: Staff is notified about upcoming events.

Exception Flow: • If there is a system error, staff receives a fallback email notification.

Event Notification Management (Activity Diagram)
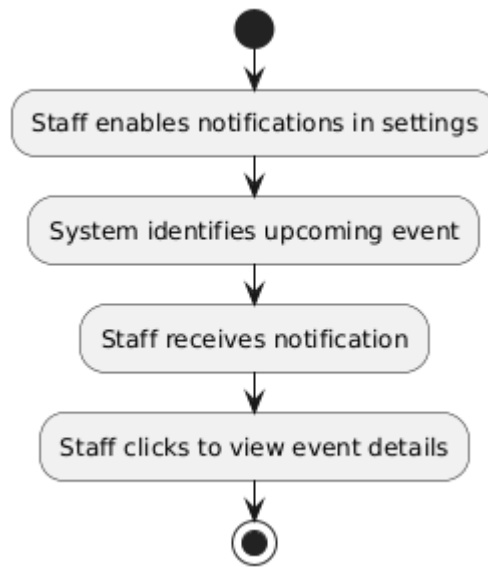
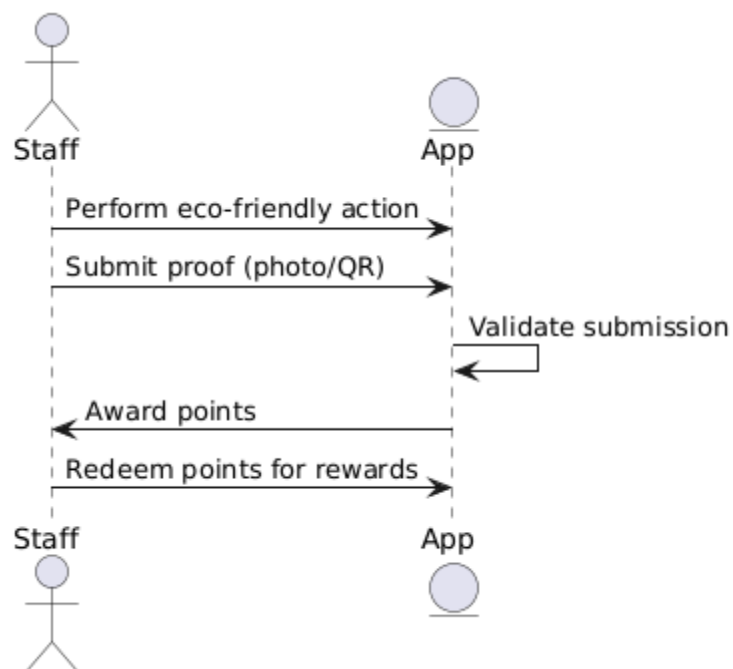**Event Notification Management (Sequence diagram)**
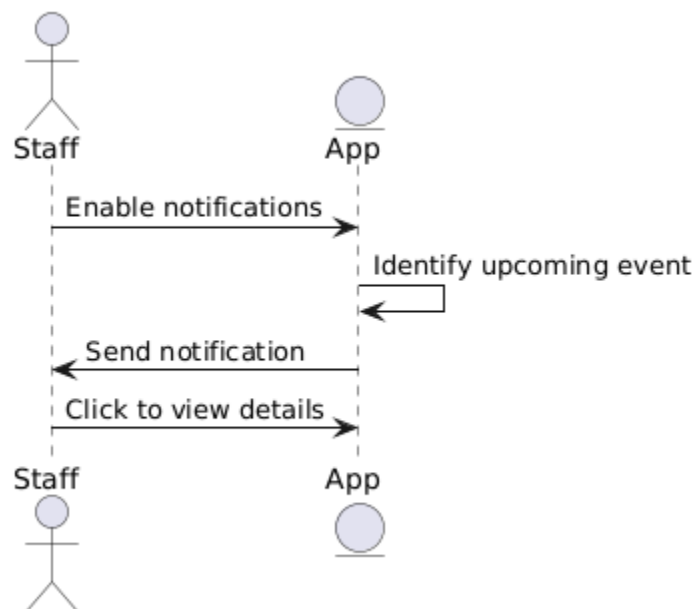
2.4.3 US003: User Story3 < Sustainability Rewards System >

User Story3: Sustainability Rewards System
ID: US003
Actor: Staff
User Story Description: **As a staff member,** **I want to earn rewards for participating in eco-friendly activities,** **So that I feel motivated to continue making a positive impact.**

Flow of Events:
    1. Staff performs an eco-friendly action (e.g., recycling, attending workshops).
    2. Staff submits proof of action via the app (e.g., photo upload or QR scan).
    3. System validates the submission.
    4. Points are awarded and displayed in the staff's profile.
    5. Staff redeems accumulated points for rewards.

Alternative Flow: • If proof submission fails, staff can manually report their action to the admin for verification.

Acceptance Criteria:
    • **Precondition:** Staff action is logged in the system.
    • **Postcondition:** Points are credited to the staff's account.

Exception Flow: • Invalid or duplicate submissions are flagged and rejected.

Sustainability Rewards System (Activity Diagram)

**Sustainability Rewards System (Sequence diagram)**
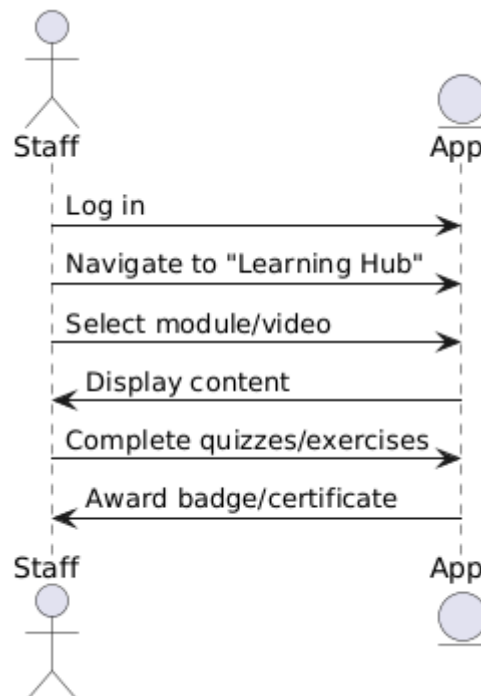
2.4.4 US004: User Story4<Access to Educational Content>

User Story4: Access to Educational Content
ID: US004
Actor: Staff
User Story Description: **As a staff member,** **I want to access educational content about sustainability practices,** **So that I can enhance my knowledge and apply it in my role.**

Flow of Events:
    1. Staff logs into the app.
    2. Staff navigates to the "Learning Hub."
    3. Staff selects a module or video on a sustainability topic.
    4. Staff completes quizzes or interactive exercises within the module.
    5. Staff earns a badge or certificate for completion.

Alternative Flow: • If a module is incomplete, progress is saved for future sessions.

Acceptance Criteria:
   • **Precondition:** Staff has access to the app and the Learning Hub**.**
   • **Postcondition:** Module completion is recorded, and rewards are issued.

Exception Flow: • Network issues interrupting module access trigger an offline mode for previously downloaded content.

Access to Educational Content (Activity Diagram)
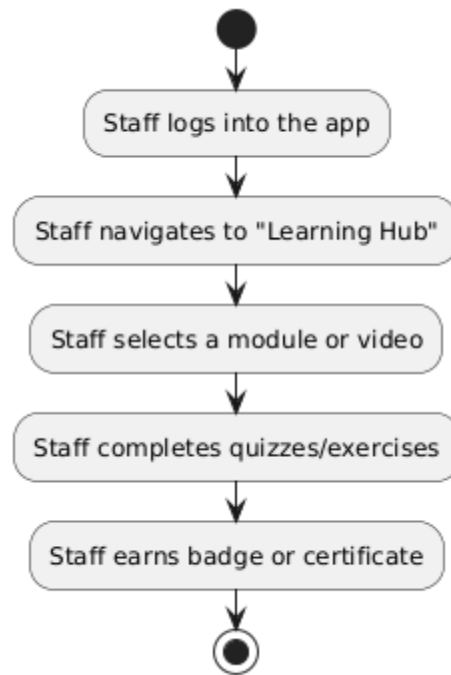
**Access to Educational Content (Sequence diagram)**

2.4.5 US005: User Story5<Sharing Achievements>

User Story5: Sharing Achievements
ID: US005
Actor: Staff
User Story Description: **As a staff member,** **I want to share my sustainability achievements on** **social media,** **So that I can inspire others to take similar actions.**
Flow of Events: 1. Staff logs into the app. 2. Staff navigates to the "Achievements" section. 3. Staff selects an achievement to share. 4. System generates a shareable post with text and visuals. 5. Staff posts directly to their social media account.
Alternative Flow: • If staff opts not to share directly, they can save the post for later.
Acceptance Criteria: • **Precondition:** Staff has at least one achievement recorded in the app. • **Postcondition:** Achievement is successfully shared on social media.
Exception Flow: • If sharing fails, the system provides an option to copy the post content manually.

Sharing Achievements (Activity Diagram)

Sharing Achievements (Sequence diagram)
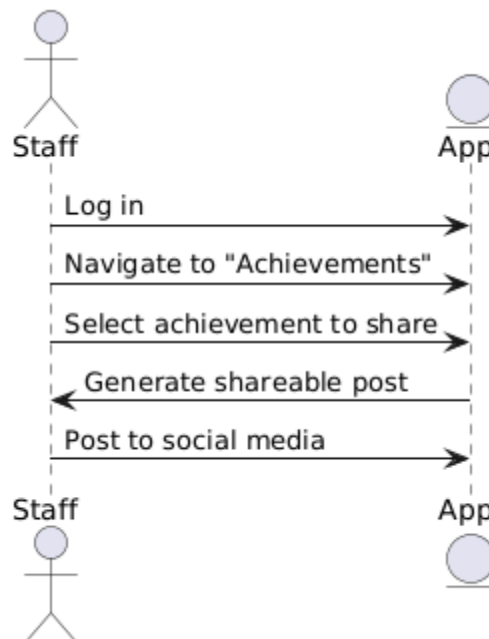
2.5 PERFORMANCE AND OTHER REQUIREMENTS

Performance requirements define the system's capability to respond to user requests and handle data in a timely manner. These requirements include the following:

▪ **Response Time**: The time it takes for the system to respond to a user request. This defines the user experience and ensures the system delivers prompt feedback to interactions.

▪ **Throughput**: The number of requests the system can handle in a given period of time. This metric determines how efficiently the system can process high volumes of operations.

▪ **Capacity**: The maximum number of users or amount of data that the system can handle. Ensuring adequate capacity prevents bottlenecks during peak usage.

▪ **Availability**: The percentage of time the system is operational and accessible to users. High availability ensures minimal downtime and continuous operation.

Software system attributes define the overall qualities or characteristics of the software. These attributes are the foundation on which the software is built, and they include the following:

▪ **Reliability**: The ability of the system to perform its functions correctly and consistently. It ensures dependable performance over time.

▪ **Maintainability**: The ease with which the system can be modified, repaired, and enhanced. This attribute supports long-term adaptability and reduced costs for updates and fixes.

▪ **Portability**: The ability of the system to run on different hardware and software platforms. This ensures flexibility and broader applicability across environments.

▪ **Compatibility**: The ability of the system to work with other systems and components. Seamless integration ensures enhanced functionality and user experience.

▪ **Security**: The protection of the system and its data from unauthorized access and malicious attacks. Security measures safeguard user privacy and system integrity.

▪ **Safety**: The ability of the system to operate safely without causing harm to users or the environment. This is critical in systems where failures can lead to physical harm or environmental damage.

▪ **Legal and Regulatory**: Compliance with laws, regulations, and standards. Adherence to these ensures the system meets necessary operational and ethical guidelines.

▪ **Environmental**: The impact of the system on the environment. Systems should aim for sustainability and reduced ecological footprints.

2.6 DESIGN CONSTRAINTS

Environmental Constraints: These constraints relate to the physical environment in which the system will operate, such as temperature, humidity, and lighting conditions. Properly accounting for environmental factors ensures the system remains operational and efficient under various conditions. For instance, in industrial settings, systems may need to withstand extreme temperatures or high humidity levels, while office environments may prioritize ergonomic and energy-efficient designs.

Hardware Constraints: These constraints relate to the specific hardware components that will be used in the system, such as processors, memory, and storage. Hardware constraints also consider future scalability, ensuring that the system can be upgraded to accommodate evolving requirements. For example, selecting hardware with modular components allows for easier replacement and expansion.

Security Constraints: These constraints relate to the security requirements for the system, such as data encryption, authentication, and access control. Security constraints also encompass resilience against emerging threats, including regular updates to counter vulnerabilities. Implementing multi-layered security protocols ensures that sensitive data is protected across all levels of the system.

Compatibility Constraints: These constraints relate to the compatibility requirements for the system, such as compatibility with specific software or hardware components. This includes considerations for backward compatibility to support legacy systems, as well as forward compatibility to integrate with future technologies. Ensuring comprehensive compatibility reduces integration challenges and enhances system longevity.