



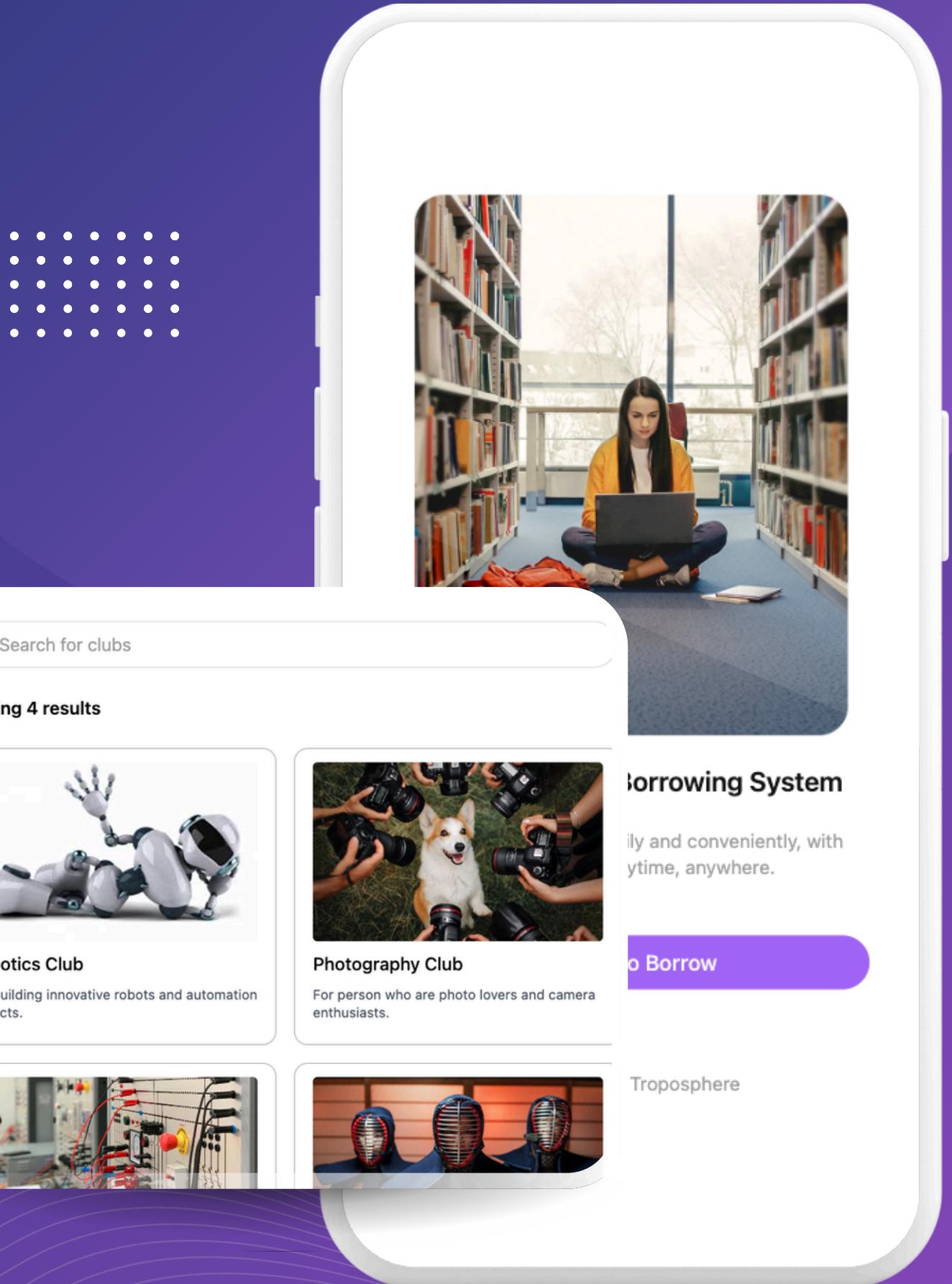
# Lab Equipment Reservation & Borrowing System

An Equipment Management Solution

DES424 | Dr. Apichon Witayangkurn

Presented By

Group 8 Troposphere



The smartphone screen displays a mobile application interface. At the top, there is a search bar with the placeholder "Search for clubs". Below the search bar, a message says "Showing 4 results". There are four cards, each representing a club:

- Robotics Club**: An image of a white and grey humanoid robot. Description: "For building innovative robots and automation projects."
- Photography Club**: An image of a corgi surrounded by several professional cameras. Description: "For person who are photo lovers and camera enthusiasts."
- Troposphere**: An image of three people wearing traditional kendo masks. Description: "Troposphere"

To the right of the cards, the text "Borrowing System" is displayed, followed by the description "Easily and conveniently, with anytime, anywhere." Below this is a purple button labeled "To Borrow".



# Our Team Members



**Nattawin Yamprasert**

ID: 6522781333



**Kaweewat Noisuwan**

ID: 6522781259



**Haseeb Ali**

ID: 6522790136



**Nipun Kharuehapaisarn**

ID: 6522771896



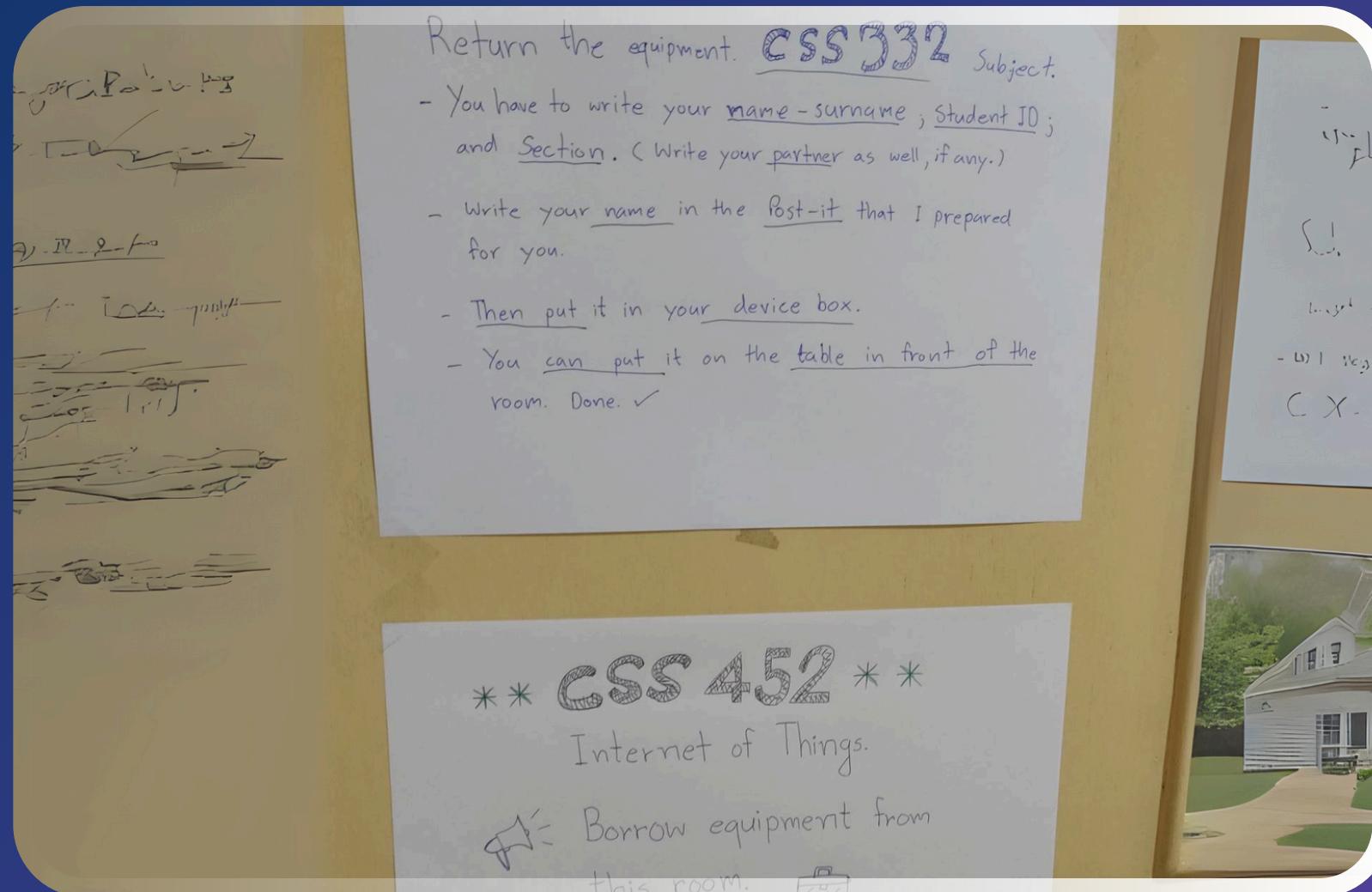
**Phonchana Matta**

ID: 6522770419



**Nawasawan Yenrompho**

ID: 6522780863



# The Problem: Operational Inefficiency

**Current State:** Assets tracked via disjointed spreadsheets, paper forms, and chat messages.

## Pain Points:

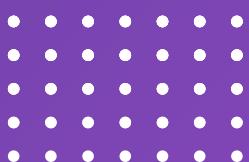
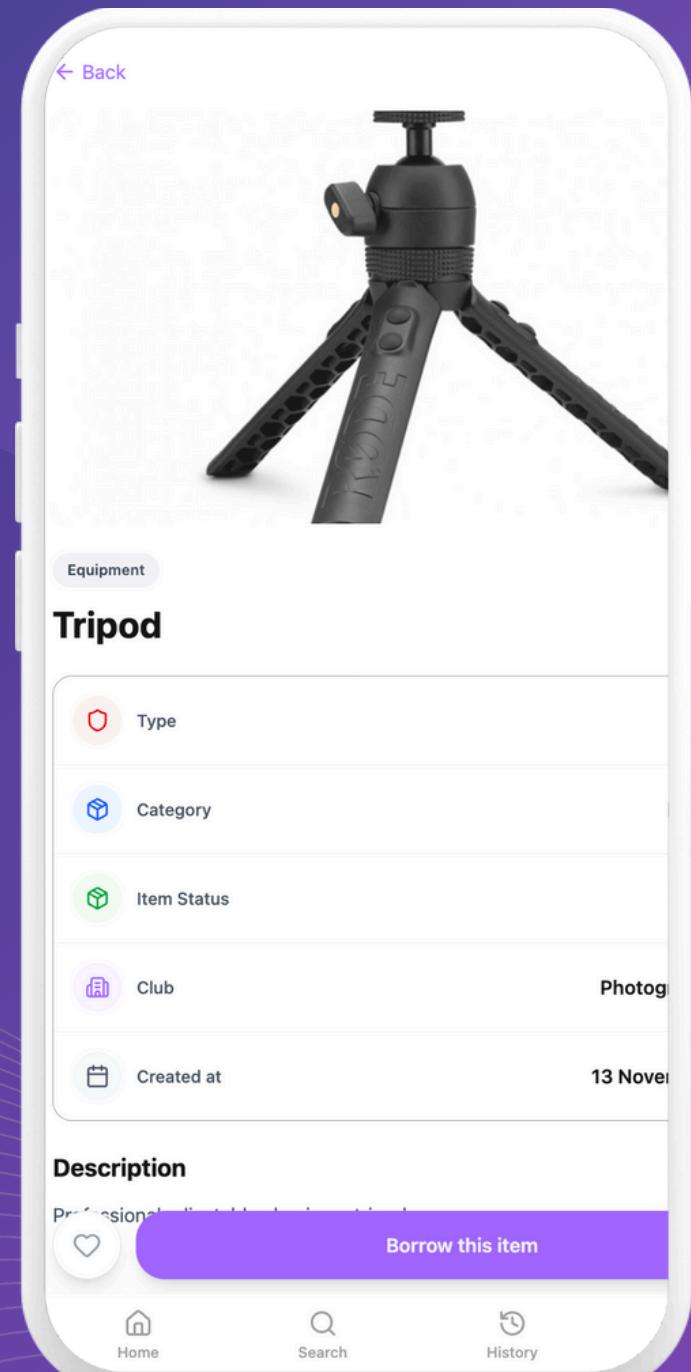
- **Double Bookings:** No single source of truth leads to conflicts.
- **Low Accountability:** Hard to track damaged/lost items.
- **Poor Visibility:** No data on utilization trends.
- **Compliance Gaps:** PDPA and audit log issues.

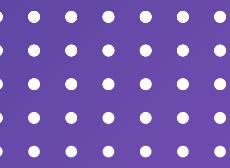
# The Solution: A Centralized Cloud Platform

- **Core Value:** Campus-wide reservation & borrowing platform.

## Key Features:

- Real-time availability calendars.
- QR Code-based checkout/return.
- Automated Notifications (Reminders & Overdue notices).
- Condition Logging (Good/Damaged).





# Key Users



## Borrowers

- View real-time availability of lab equipment.
- Reserve items and manage borrowing schedules.
- Scan QR codes to initiate pickup and return.
- Receive automated reminders for due dates.



## Moderator

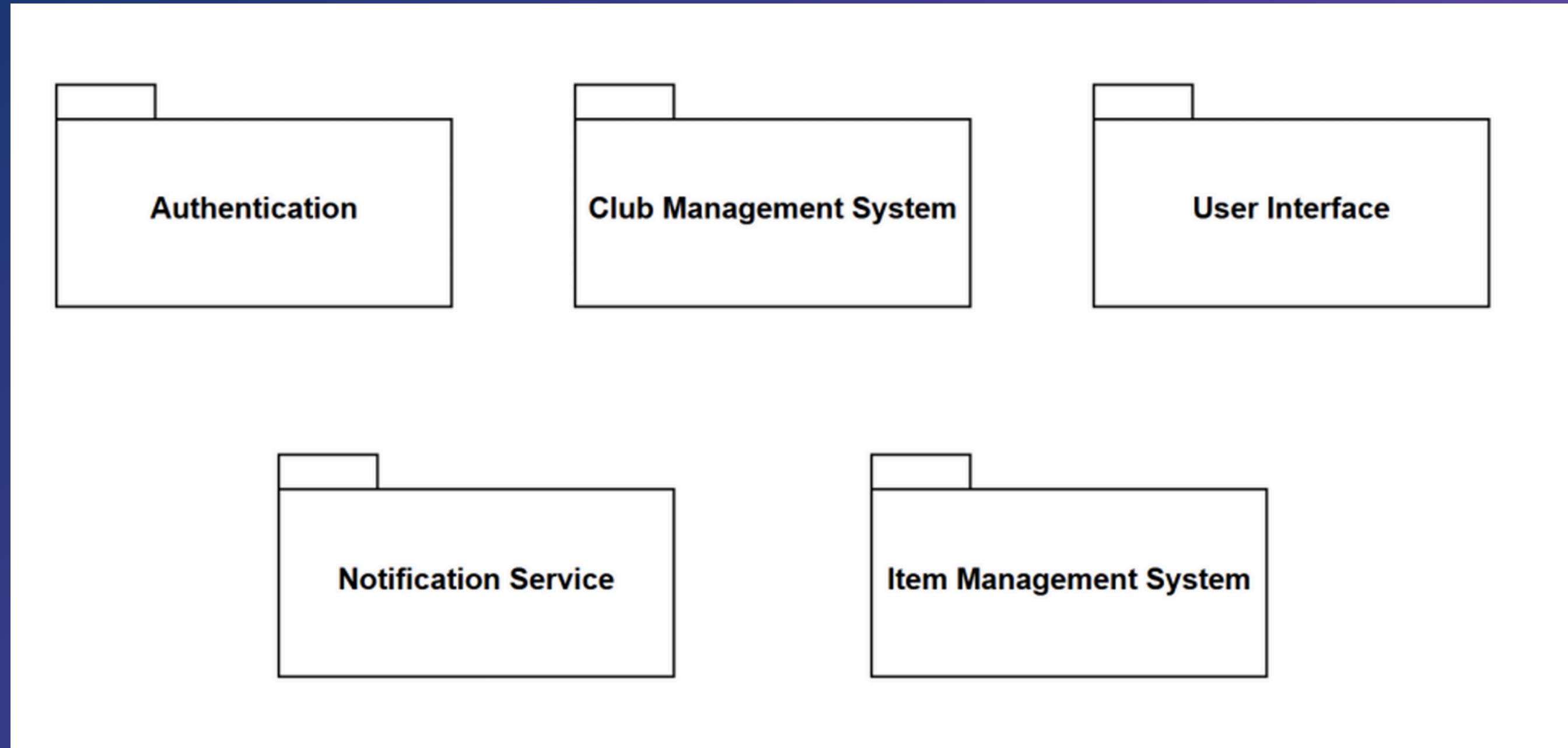
- Manage item inventories
- Approve or reject borrowing requests (for high-risk items).
- Verify item condition upon return (Good, Damaged, Lost).
- Manage member permissions within their specific club.

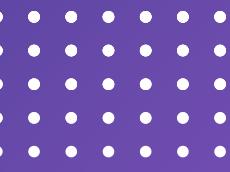


## Administrators

- Oversee the creation and deletion of club organizations.
- Manage high-level permissions and moderators.
- Access system-wide audit logs and compliance data.

# Subsystem Decomposition





# Technology Stack

## Frontend

- Vite.js (React) + TailwindCSS (Hosted on AWS Amplify).

## Backend

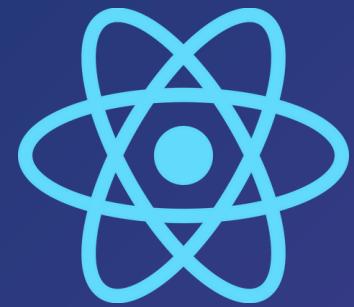
- FastAPI (Python) (High performance async).

## Database

- PostgreSQL (Relational integrity).

## Cloud Services

- AWS Fargate
- S3
- RDS.
- AWS SES



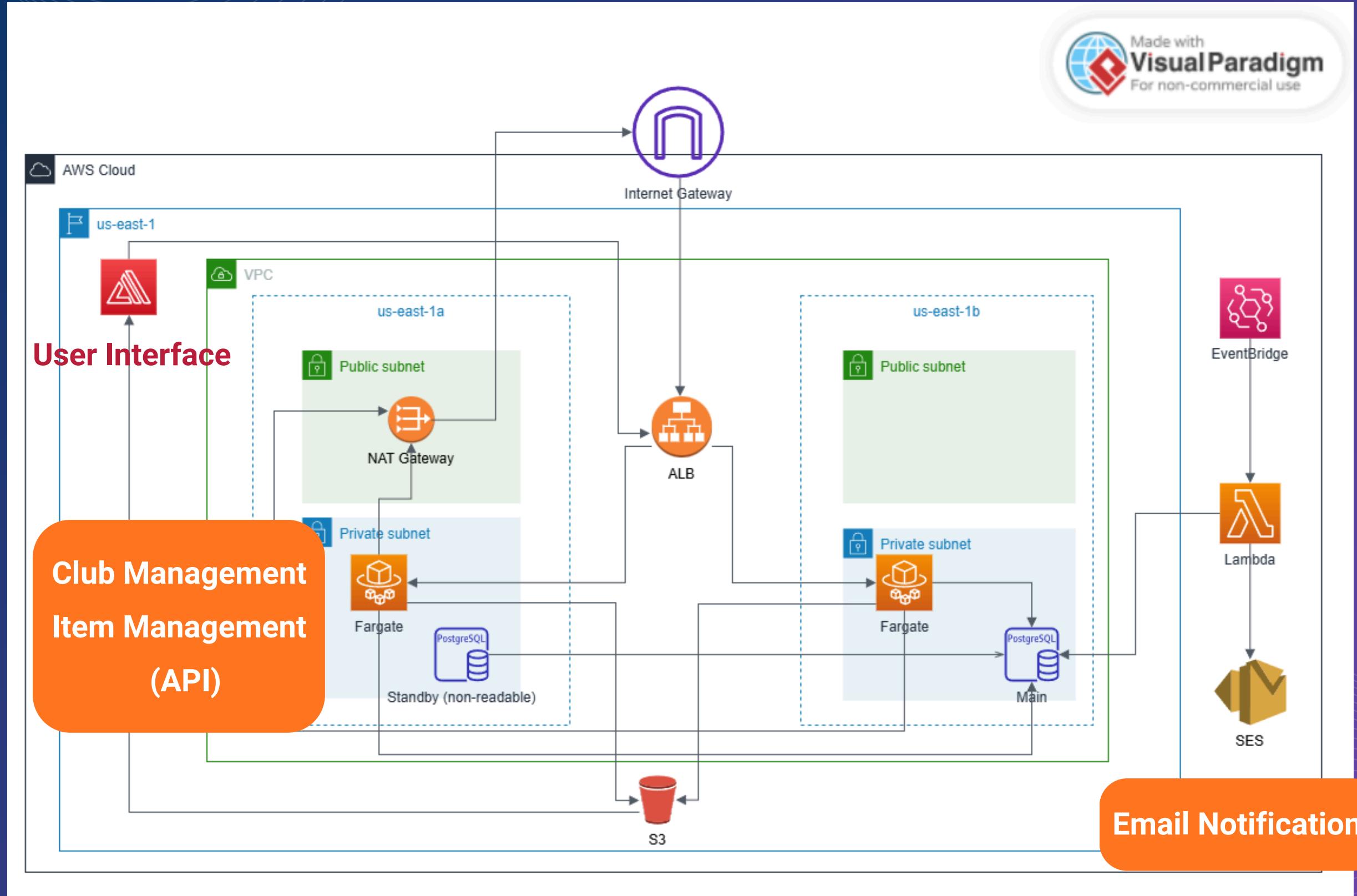
FastAPI



PostgreSQL



# System Architecture



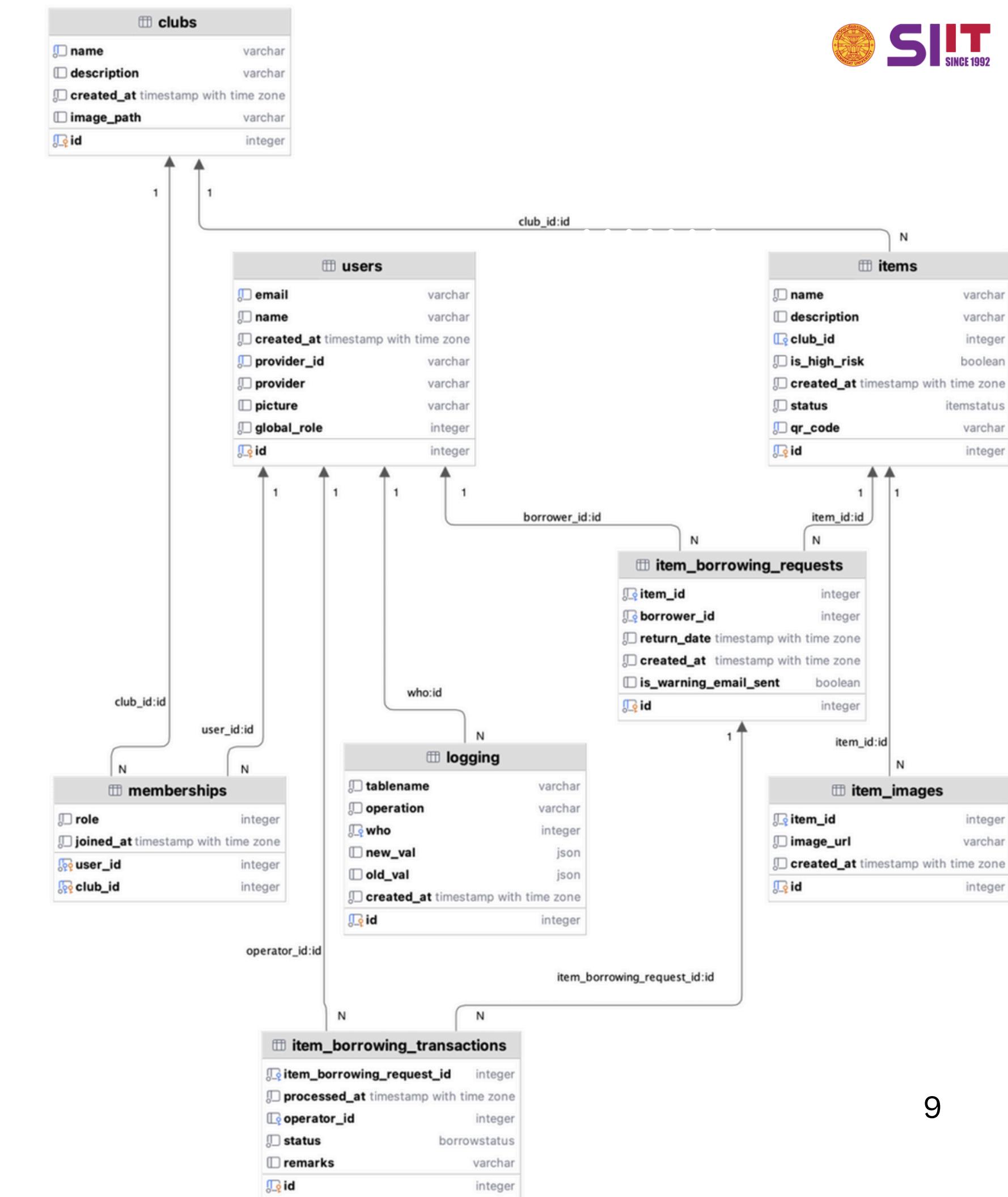
- **Compute:** AWS Fargate (Serverless container management).
- **Database:** Amazon RDS (Multi-AZ for reliability) in Private Subnet.
- **Storage:** Amazon S3 for static assets (images).
- **Network:** VPC with Public/Private subnets + Application Load Balancer (ALB).



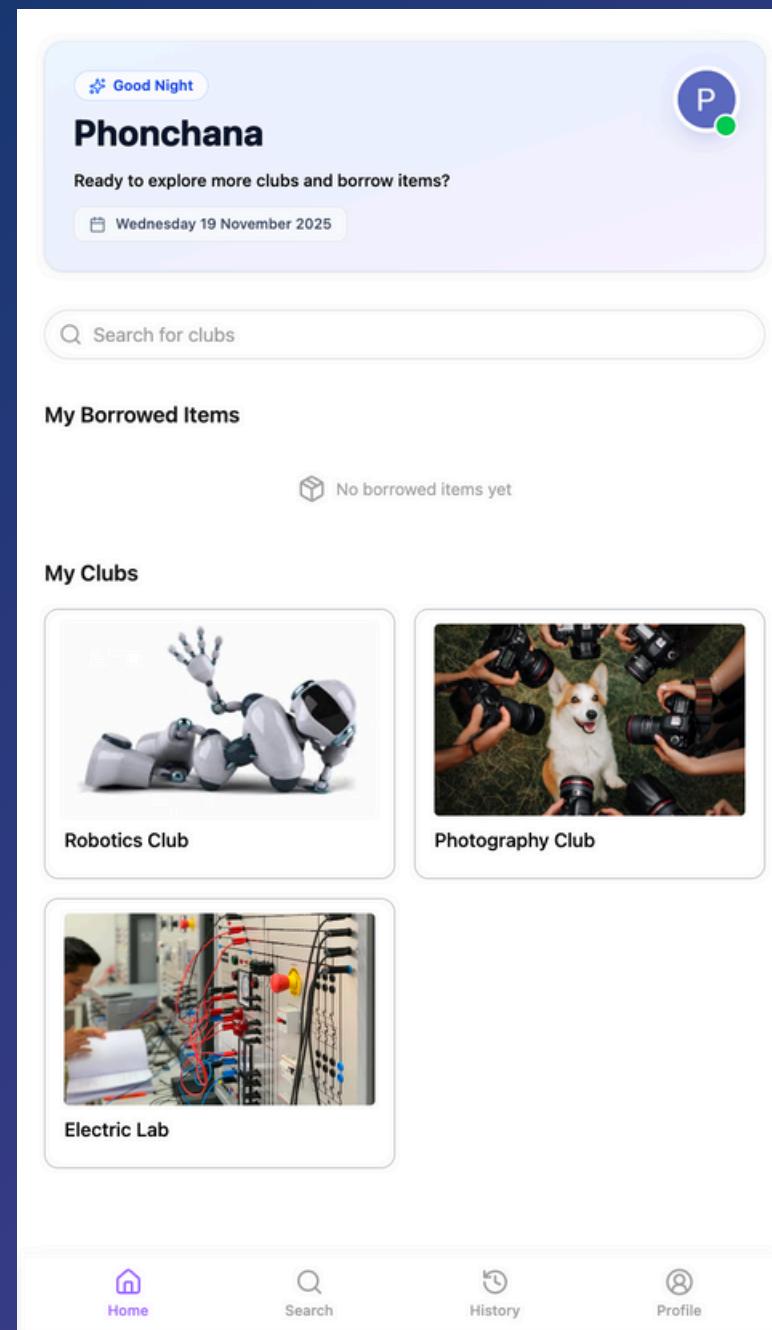
# Group 8

# Data Management

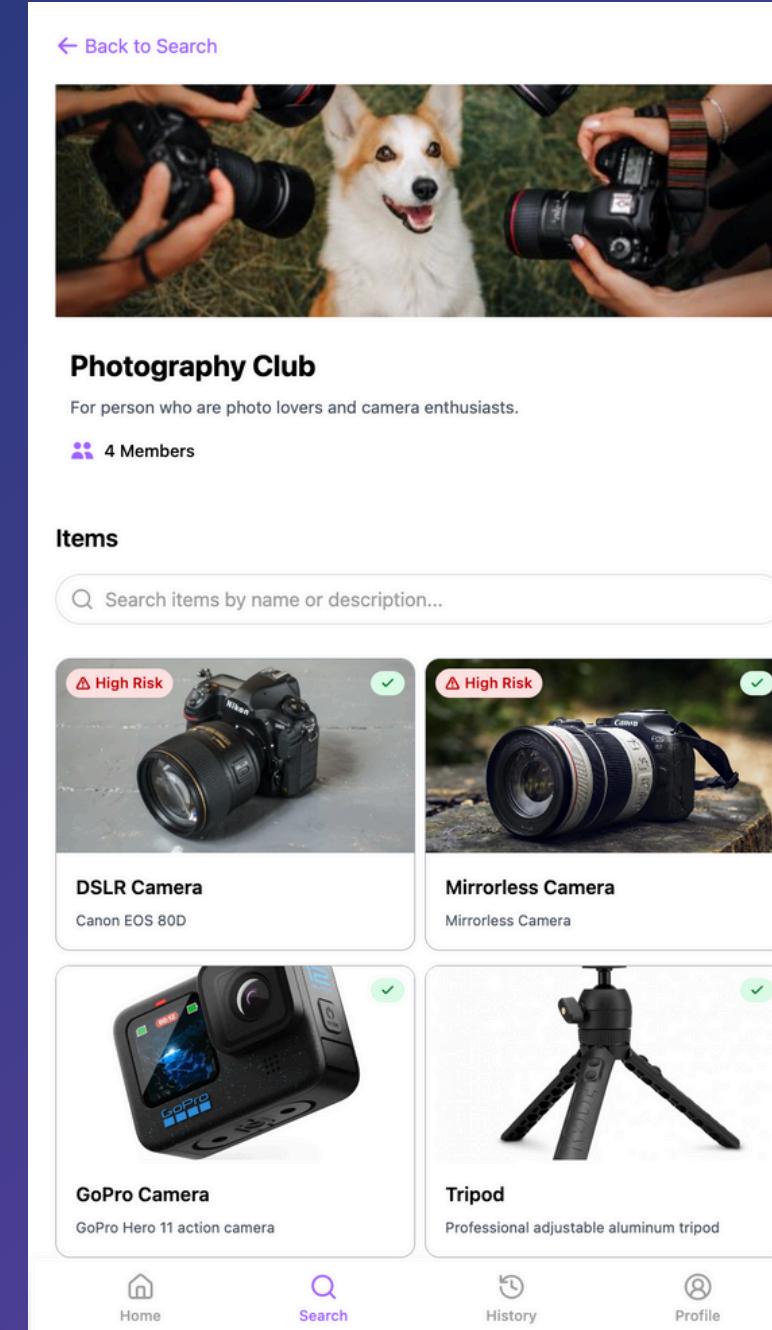
- RDS to persist transactional and multi-access data in the infrastructure
  - S3 for binary media object storage



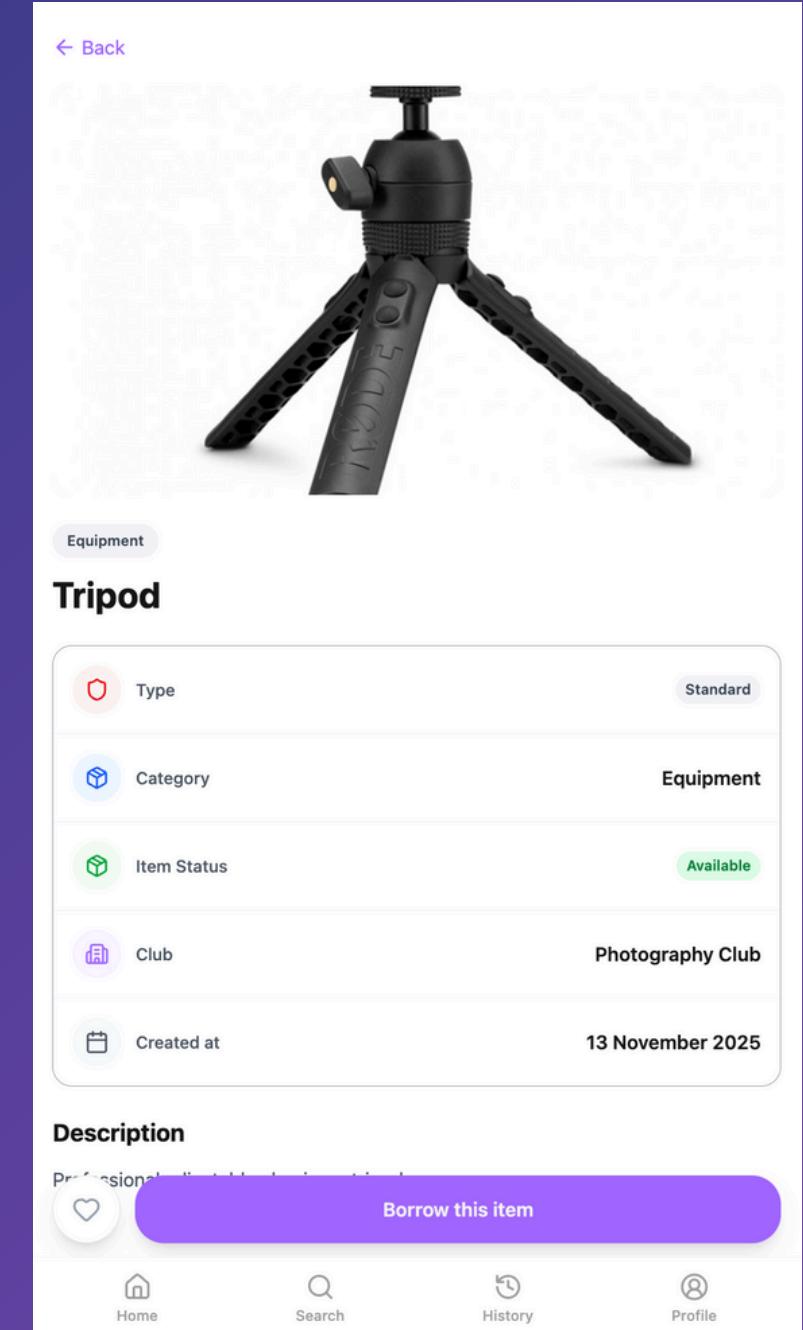
# User



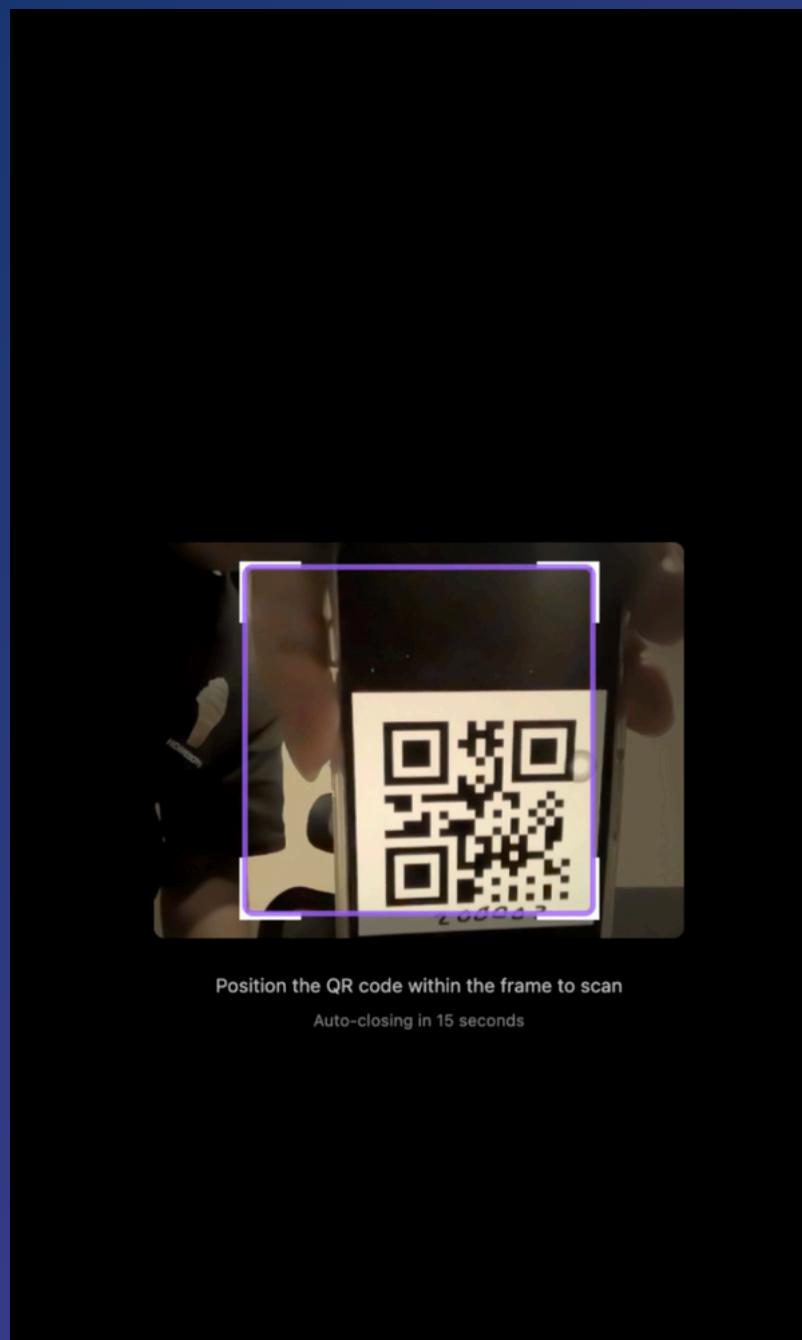
User Home Screen



Club Items List



Item Detail



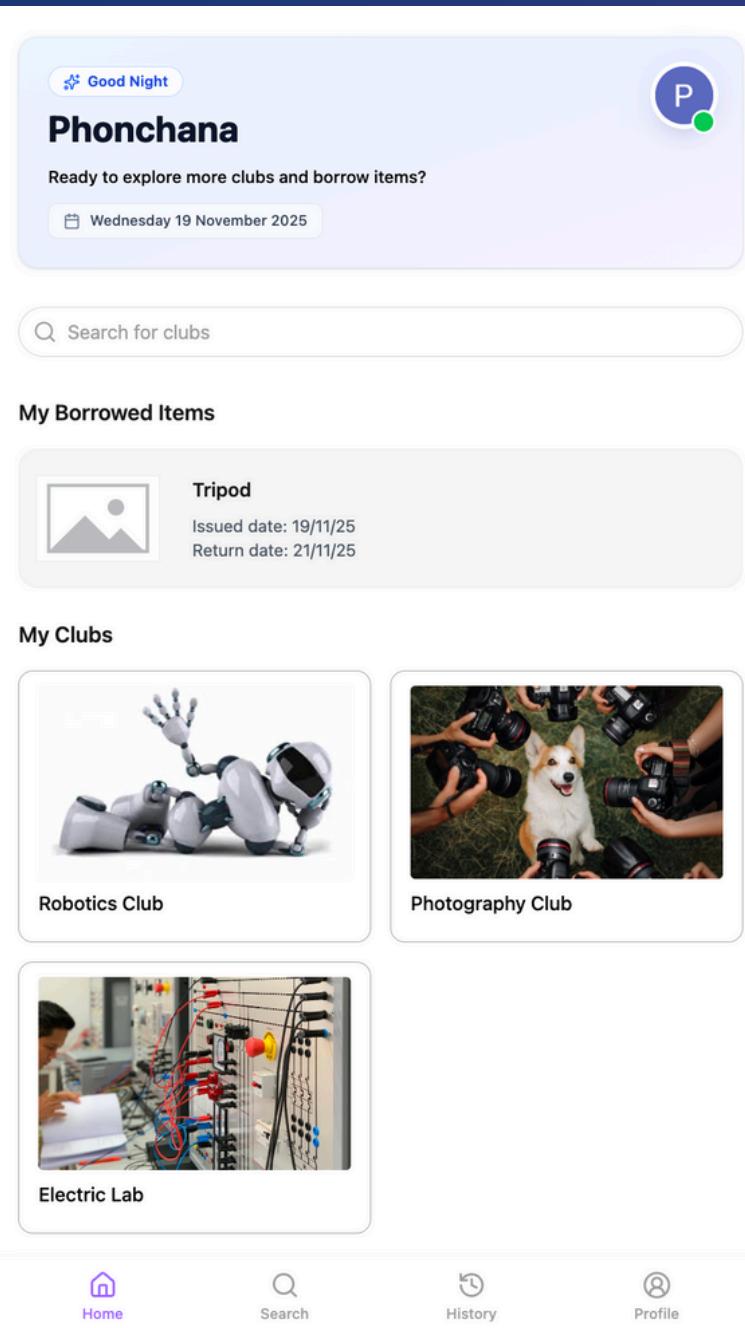
**QR Scan the Item to Borrow**

A screenshot of a mobile application interface titled "Confirmation". It shows a photograph of a black tripod. Below the photo, the text "Tripod" and "Club: Photography Club" is displayed. The "Borrowing Details" section shows "Borrowed by Phonchana Matta", "Borrow Date Wednesday, November 19, 2025", and "Return Due Date Friday, November 21, 2025 (2-days)". A calendar for November 2025 is shown, with the 19th and 20th highlighted in purple. The "Responsibility Agreement" section contains a checkbox and a note about responsibility. At the bottom is a large purple button labeled "Borrow this item".

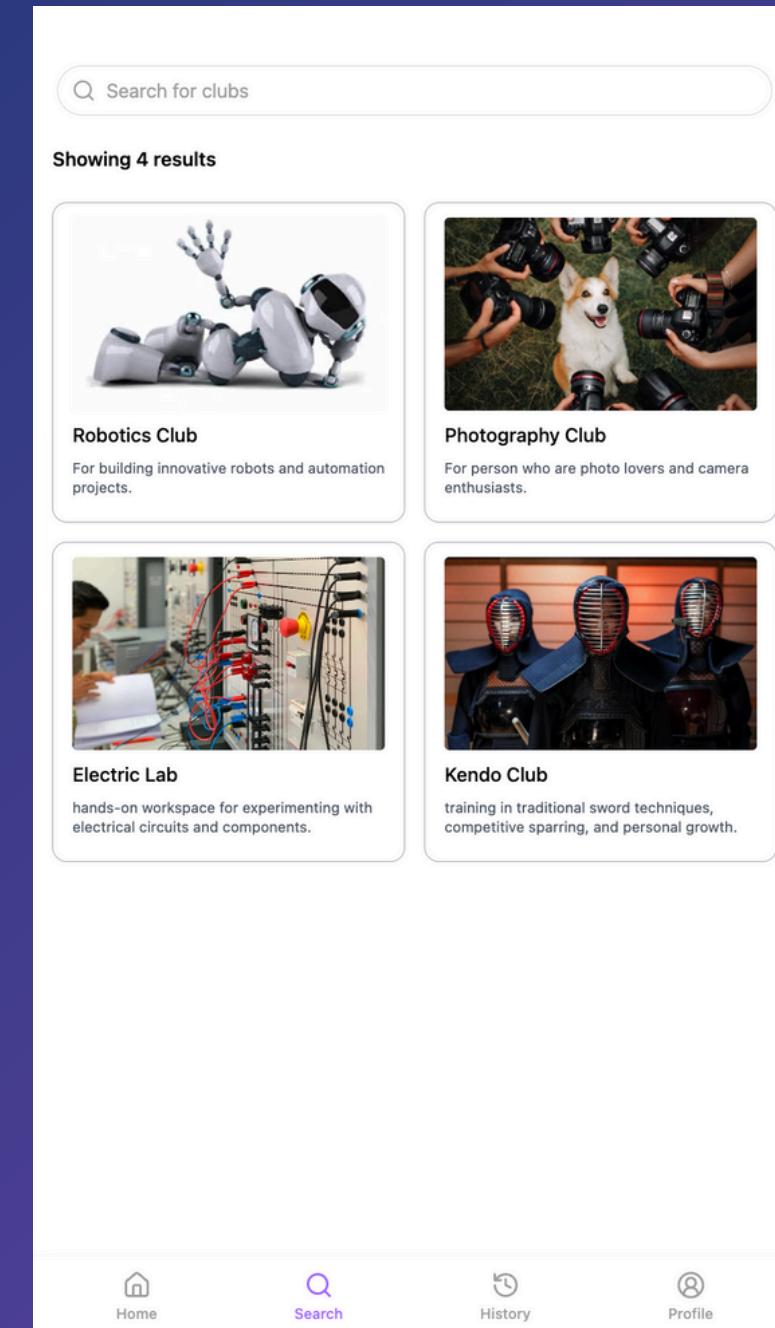
**Date Choose**

A screenshot of a mobile application interface titled "My Borrowing History". It has two sections: "Pending Approval" and "Currently Borrowed". The "Pending Approval" section shows a yellow icon for "Jetbot", a note that it is "Waiting for moderator to approve your borrow request", and borrowing details for "Borrowed: 27/11/68" and "Due Date: 14/11/68". The "Currently Borrowed" section shows a blue icon for "Tripod", a note that it is "Active", and borrowing details for "Borrowed: 19/11/25" and "Due Date: 21/11/25". It includes a "Return Item" button. Both sections have a "Home", "Search", "History", and "Profile" navigation bar at the bottom.

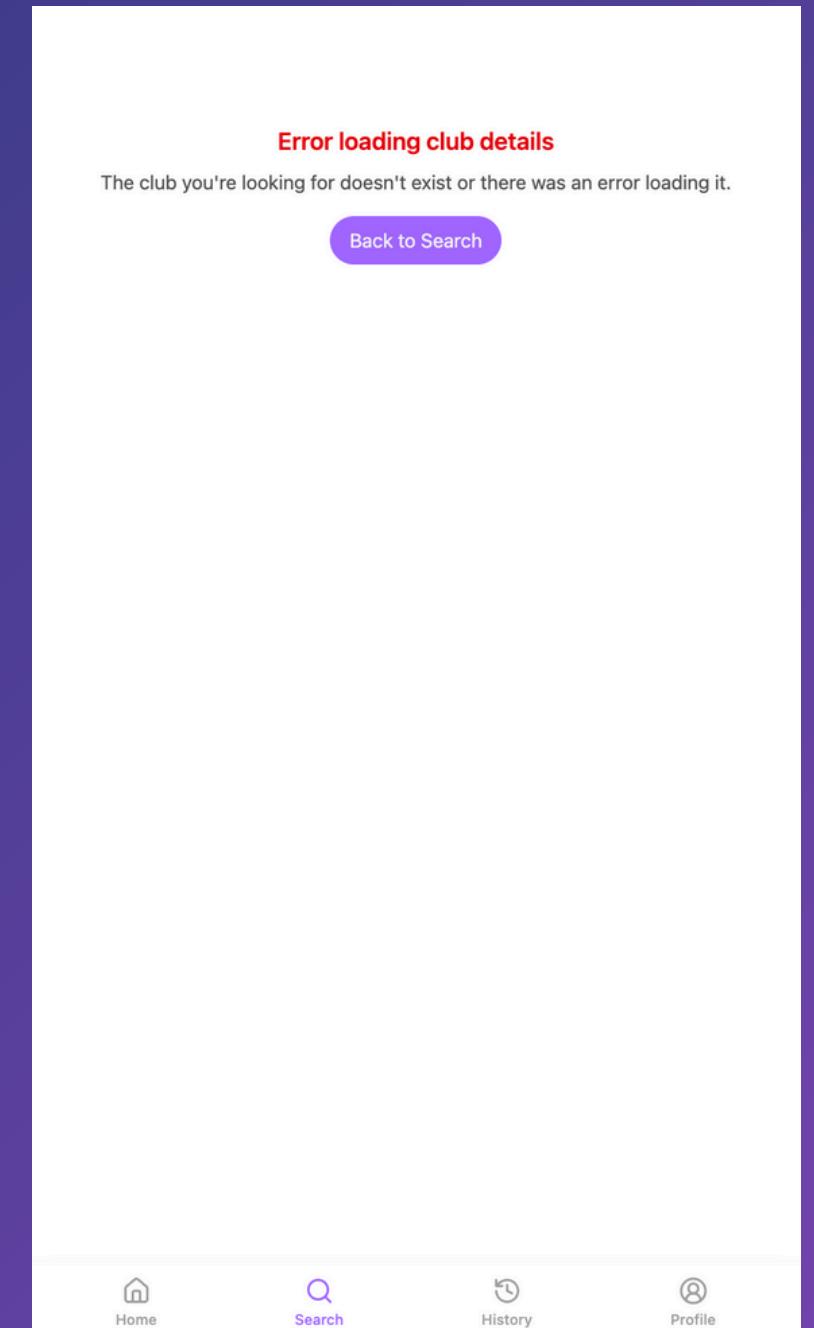
**Borrowing History**



Home Screen with History

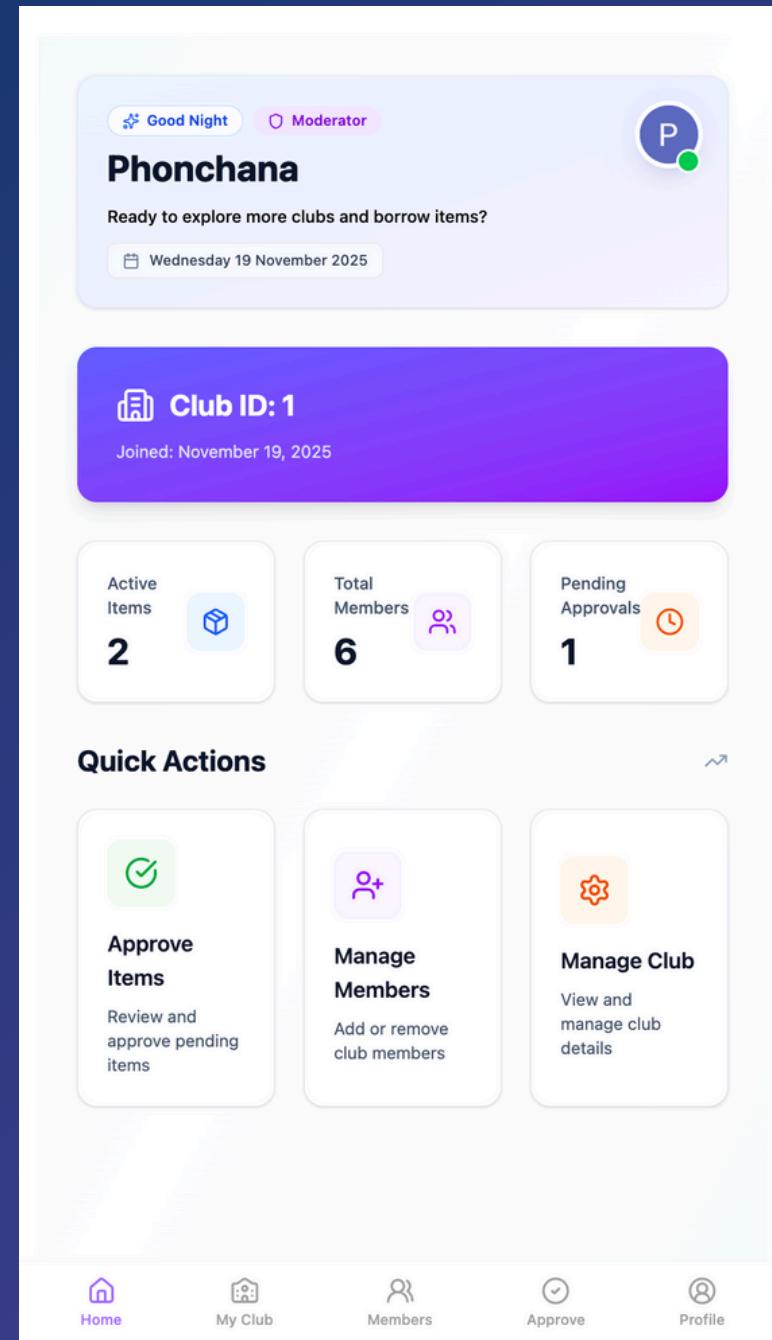


Searching Clubs

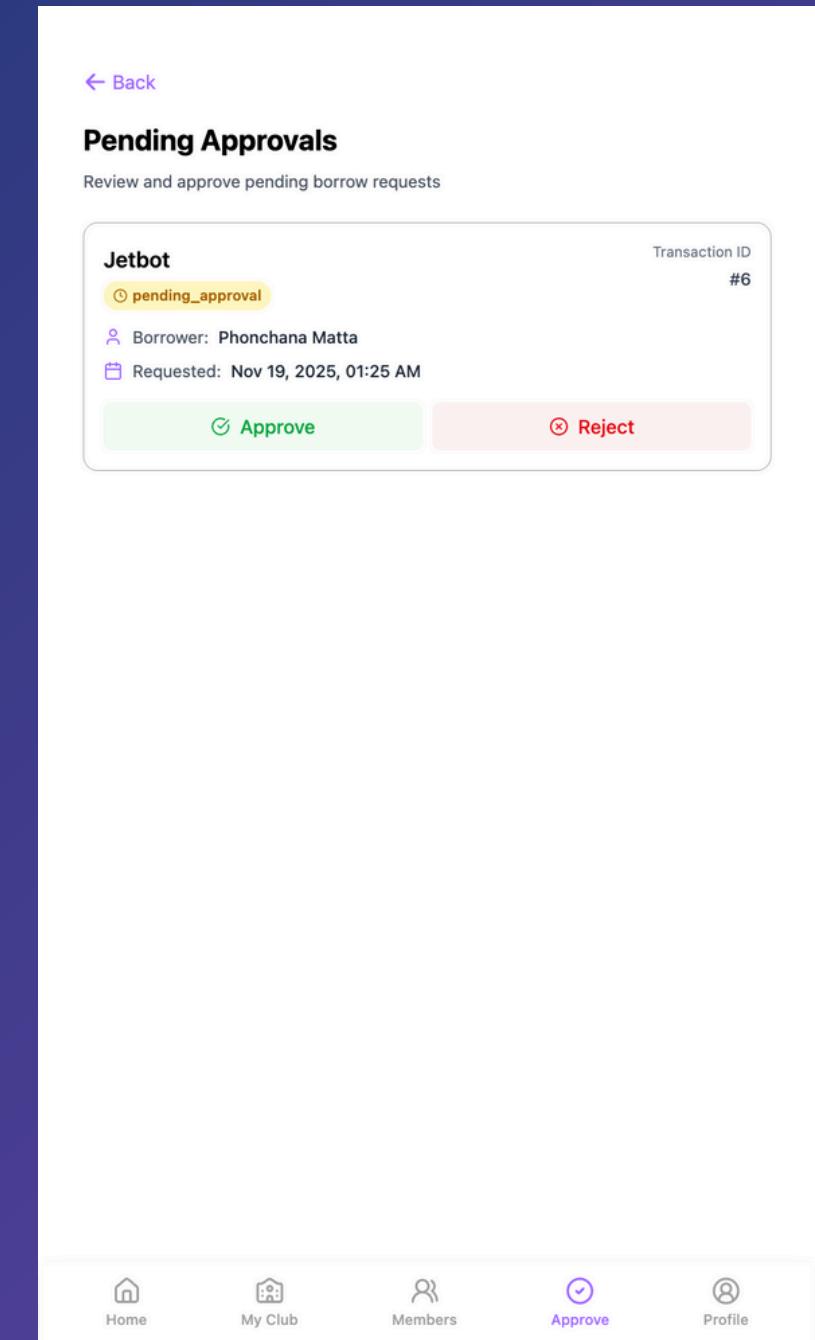


User Not Belong to Club

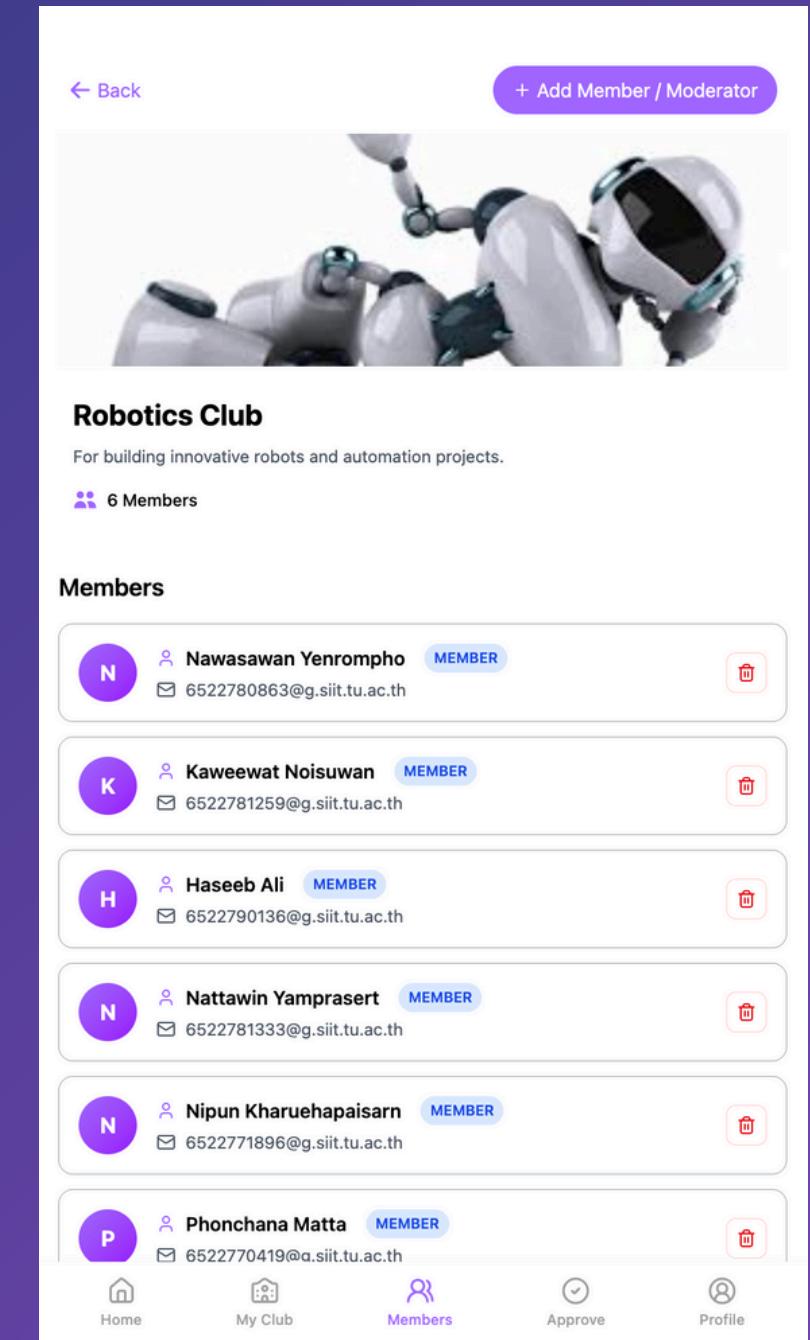
# Moderator



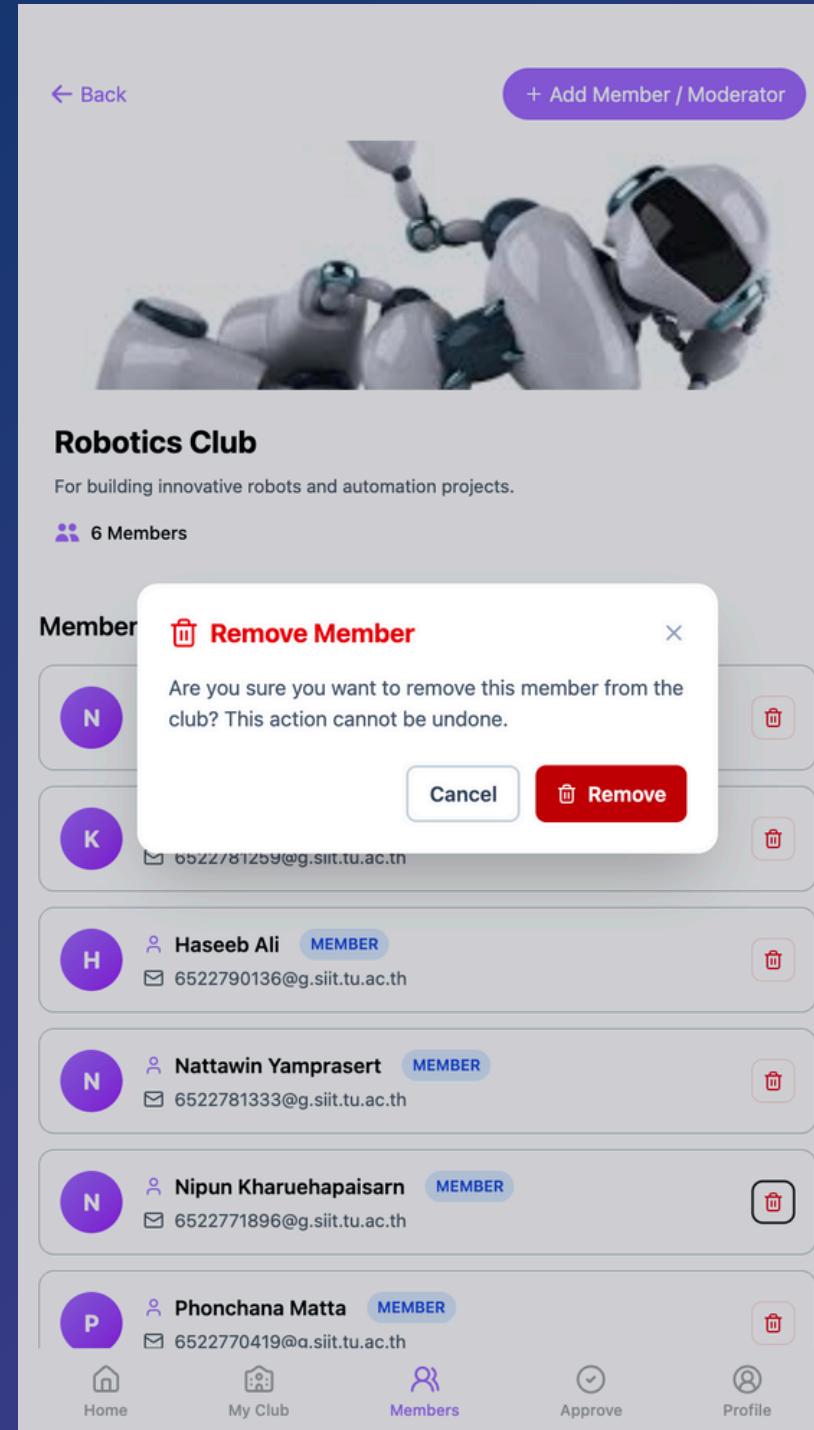
Moderator Home Screen



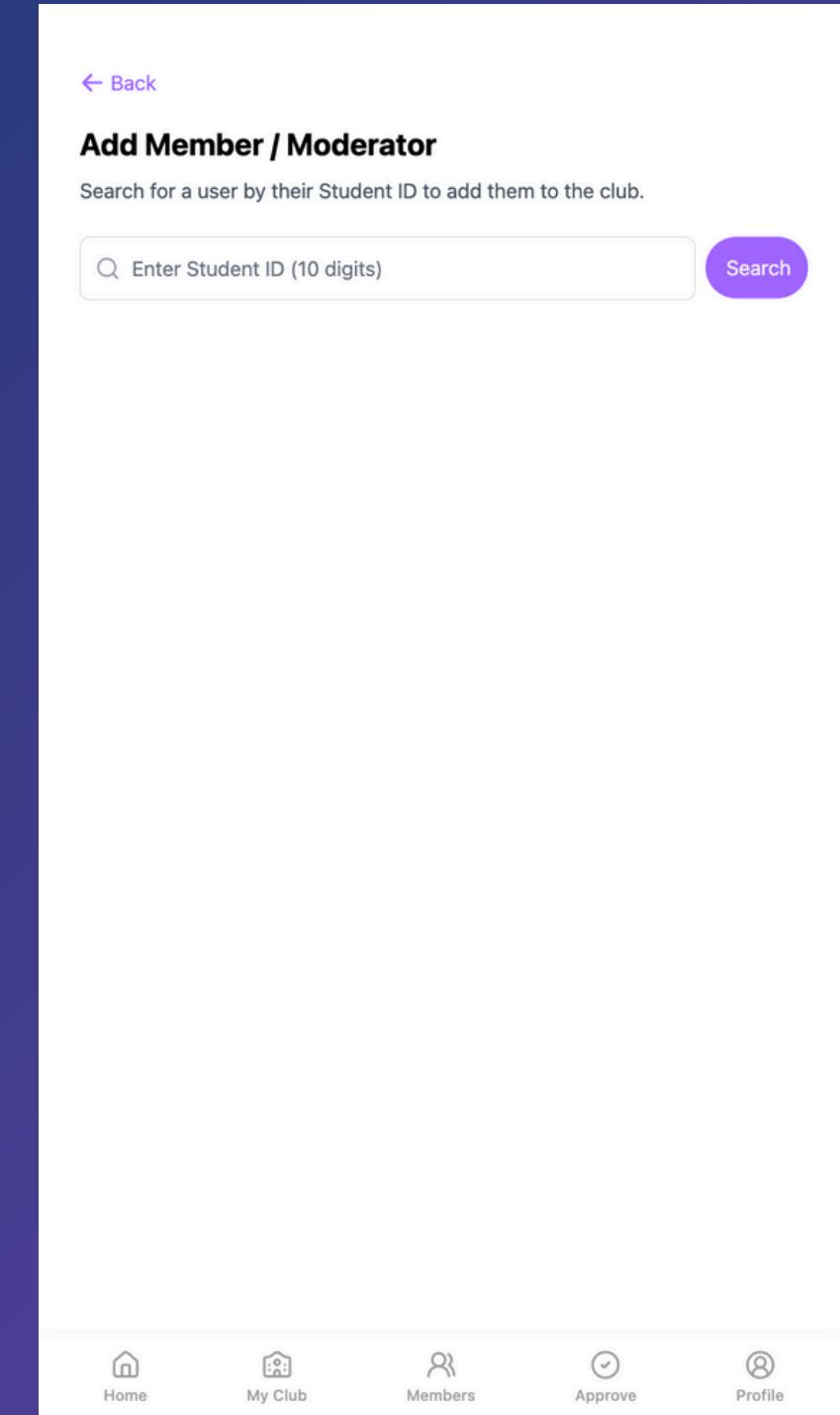
Waiting for Approval



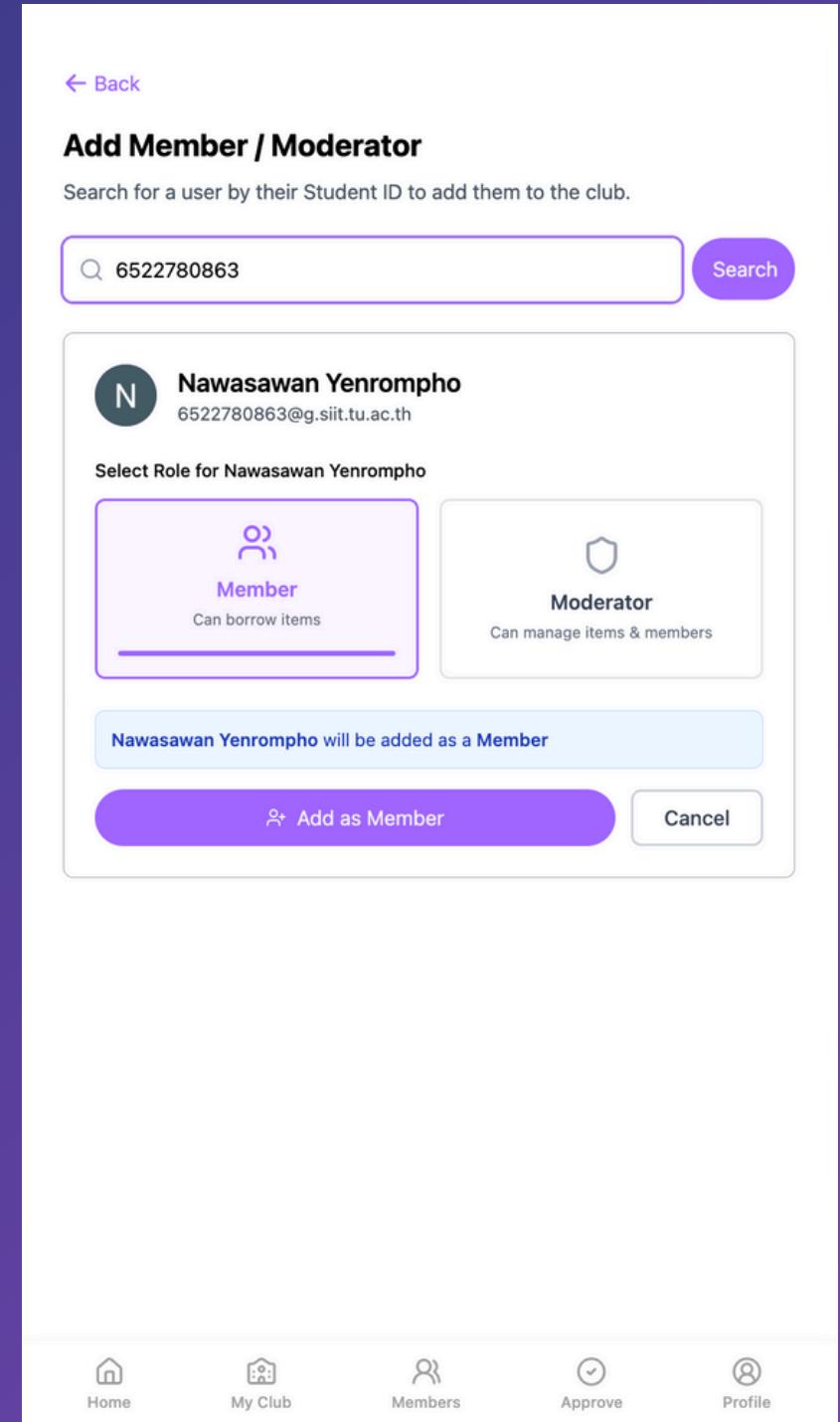
Club Management



Delete Member

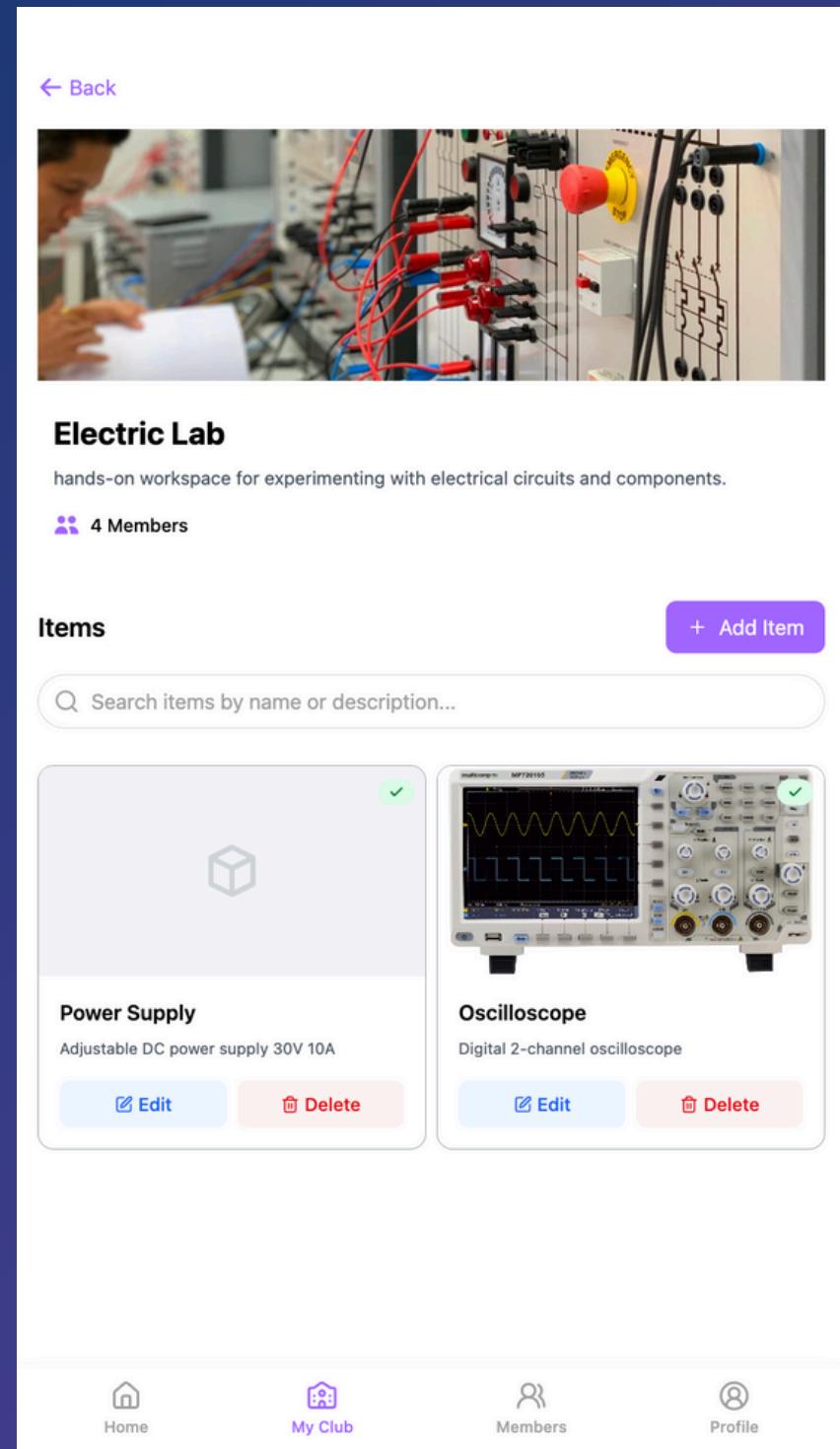


Adding Member

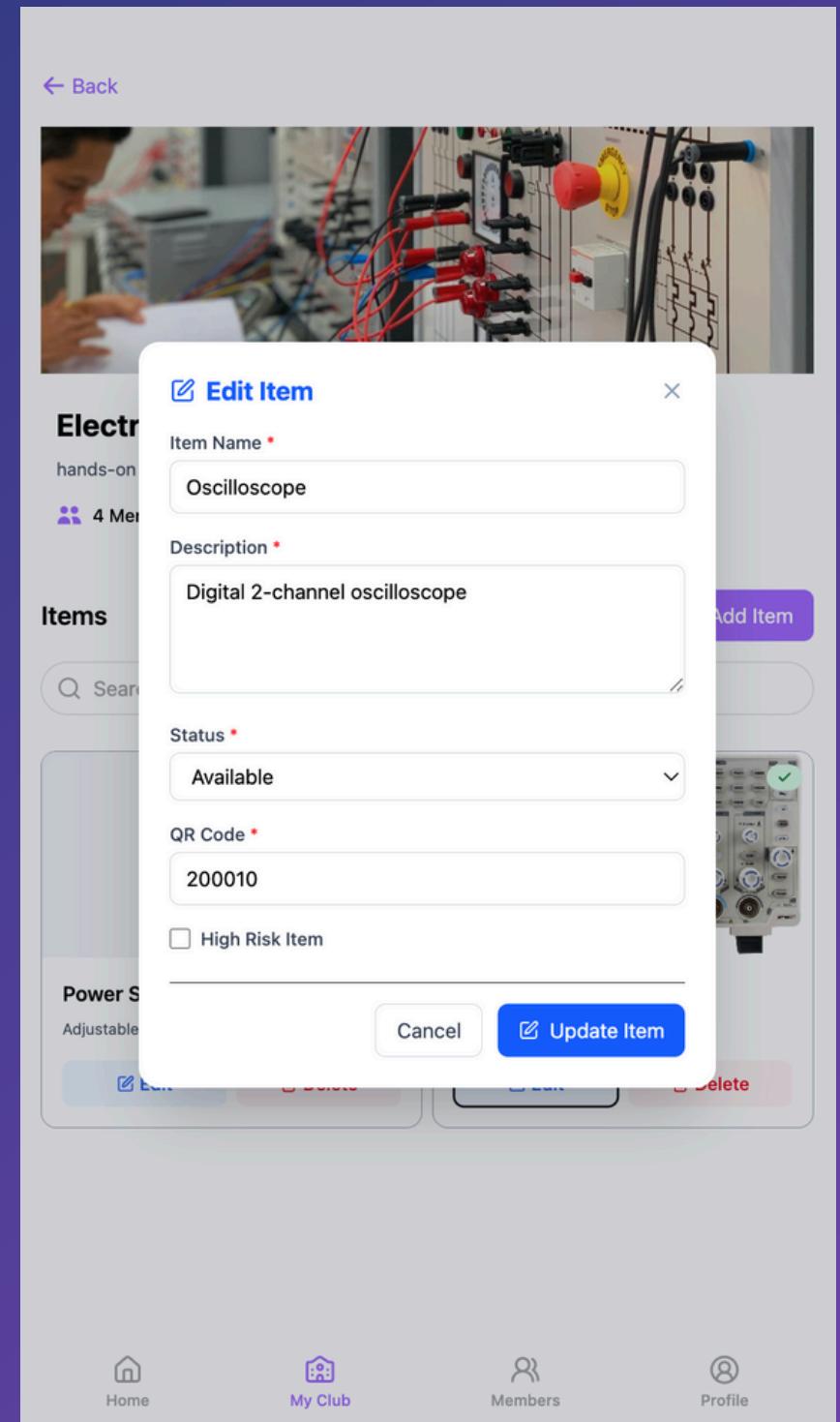


Search Member to Add

# Admin



**Admin Home Screen**



**Adding Item to Club**

# Robot Testing

Overall Result: PASSED (All tests completed successfully).

## 10.2.2. Execution Details

Test Step	Action / Verification	Result
OAuth Login	<ul style="list-style-type: none"><li>Opened: <a href="https://main.d5mmkwfmc2b85.amplifyapp.com">https://main.d5mmkwfmc2b85.amplifyapp.com</a></li><li>Clicked: "Sign In to Borrow"</li><li>Handled Security Warning: Advanced → Proceed to unsafe host</li><li>Redirected to Google login, entered credentials</li><li>Manual Step: Paused for 2FA, then resumed</li><li>Redirected back to main site</li></ul>	SUCCESS
Test 1: Navigation	<ul style="list-style-type: none"><li>Verified back, forward, and refresh actions</li><li>Verified Page Title: Troposphere-frontend</li></ul>	PASSED
Test 2: Elements	<ul style="list-style-type: none"><li>Verified presence of dynamic content:</li><li>Links: 7 → 5 (dynamic change)</li><li>Buttons: 0 → 1</li><li>Input fields: 1</li><li>Div elements: 43</li></ul>	PASSED
Test 3: Interaction	<ul style="list-style-type: none"><li>Entered text: "Selenium Test"</li><li>Submitted form</li><li>Verified page scroll functionality</li></ul>	PASSED
Test 4: Analysis	<ul style="list-style-type: none"><li>Verified Final URL: /search-clubs?query=Robotics+Club</li><li>Verified Page Size: 2560x1237 px</li><li>Scrolled to top, middle, bottom</li></ul>	PASSED



Group 8

# Thank You For Your Attention