CEBU INSTITUTE OF TECHNOLOGY
UNIVERSITY

IT342-G4
SYSTEMS INTEGRATION AND ARCHITECTURE 1

FUNCTIONAL REQUIREMENTS SPECIFICATION (FRS)

Project Title: Quantix

Prepared By: Shinely Marie R. Embalsado

Date of Submission: 02/11/2026

Version: 1

Table of Contents

1. Introduction 3
   1.1. Purpose 3
   1.2. Scope 3
   1.3. Definitions, Acronyms, and Abbreviations 3
2. Overall Description 3
   2.1. System Perspective 3
   2.2. User Classes and Characteristics 3
   2.3. Operating Environment 3
   2.4. Assumptions and Dependencies 3
3. System Features and Functional Requirements 3
   3.1. Feature 1: 3
   3.2. Feature 2: 3
   3.3. Feature 3: 3
   3.4. Feature 4: 3
4. Non-Functional Requirements 3
5. System Models (Diagrams) 4
   5.1. ERD 4
   5.2. Use Case Diagram 4
   5.3. Activity Diagram 4
   5.4. Class Diagram 4
   5.5. Sequence Diagram 4
6. Appendices 4

1. Introduction

1.1. Purpose

This document serves as the functional and design specification for the Quantix system. It outlines the system's architecture, functional requirements, and non-functional constraints to guide development and ensure alignment with CIT-U laboratory operations.

1.2. Scope

In Scope:

- Microsoft OAuth login and register using institutional email
- Allow users to view and update their personal profile information
- Role-based access control for NAS and laboratory coordinators
- Allow users to view their transaction history
- Enable Non-Academic Scholars (NAS) to process inventory transactions
- Asset categorization, condition, and status tracking
- Allow laboratory coordinators to add, update, and manage laboratory equipment records
- Maintain records of equipment, users, and transaction history

Out of Scope:

- Handle procurement or purchasing of equipment
- Email or SMS notifications
- Perform physical inspection or maintenance of equipment
- Financial tracking or accounting features

1.3. Definitions, Acronyms, and Abbreviations

- **Quantix** – The laboratory equipment inventory management system
- **CIT-U** – Cebu Institute of Technology – University
- **User** – Any individual who interacts with the system
- **NAS** – Non-Academic Scholars assigned to laboratory offices
- **Laboratory Coordinator** – Faculty or staff responsible for overseeing laboratory operations
- **API** – Application Programming Interface
- **OAuth** – Open standard for access delegation used for authentication

2. Overall Description

2.1. System Perspective

Quantix is a centralized inventory management system that operates within CIT-U. It integrates with Microsoft OAuth for authentication and uses a three-tier architecture consisting of:

- Backend services (business logic and data management)
- Web application for coordinators
- Mobile application for NAS

The system communicates through RESTful APIs and is accessible via secure internet connections within the university environment.

2.2. User Classes and Characteristics

- **Non-Academic Scholars (NAS)**
  - Handle inventory transactions
  - Update equipment availability status
  - View user transaction records
  - Moderate system proficiency
- **Laboratory Coordinators**
  - Add, update, and manage laboratory equipment records
  - Monitor transactions
  - View system-wide transaction reports and logs
  - Monitoring and supervisory role

2.3. Operating Environment

Backend: Spring Boot (Java)
Web Application: React (JS)
Mobile Application: Android
Database: Relational databaseAuthentication: Microsoft OAuth
Client Devices: Desktop, laptop, and Android mobile devices
Network: Stable internet connection within CIT-U

2.4. Assumptions and Dependencies

- Users possess valid CIT-U institutional Microsoft accounts
- Microsoft OAuth services are available and operational
- NAS personnel are officially assigned by the university
- Laboratory coordinators have monitoring authority only
- Stable internet connectivity is available within CIT-U
- Equipment data is properly maintained and updated

3. System Features and Functional Requirements

3.1. Feature 1: Authentication and Account Access

Description: Allows users to securely access the system using institutional credentials.
Functional Requirements:

- Users shall be able to log in using Microsoft OAuth
- The system shall validate institutional email accounts
- Access restrictions shall be applied based on user roles

3.2. Feature 2: User Profile Management

Description: Allows users to manage their personal account information and view activity.
Functional Requirements:

- View their profile information
- Update allowed profile details
- View their transaction history
- Users shall not modify role or authentication credentials

3.3. Feature 3: Equipment Management

Description: Allows laboratory coordinators to manage laboratory equipment records.
Functional Requirements:

- Coordinators shall add new equipment records
- Coordinators shall update equipment details
- The system shall store equipment information

3.4. Feature 4: Transaction Processing and Monitoring

Description: Allows NAS to process transactions and coordinators to monitor them.
Functional Requirements:

- The system shall log all transactions with timestamps and user details
- NAS and coordinators shall view transaction logs and reports

4. Non-Functional Requirements

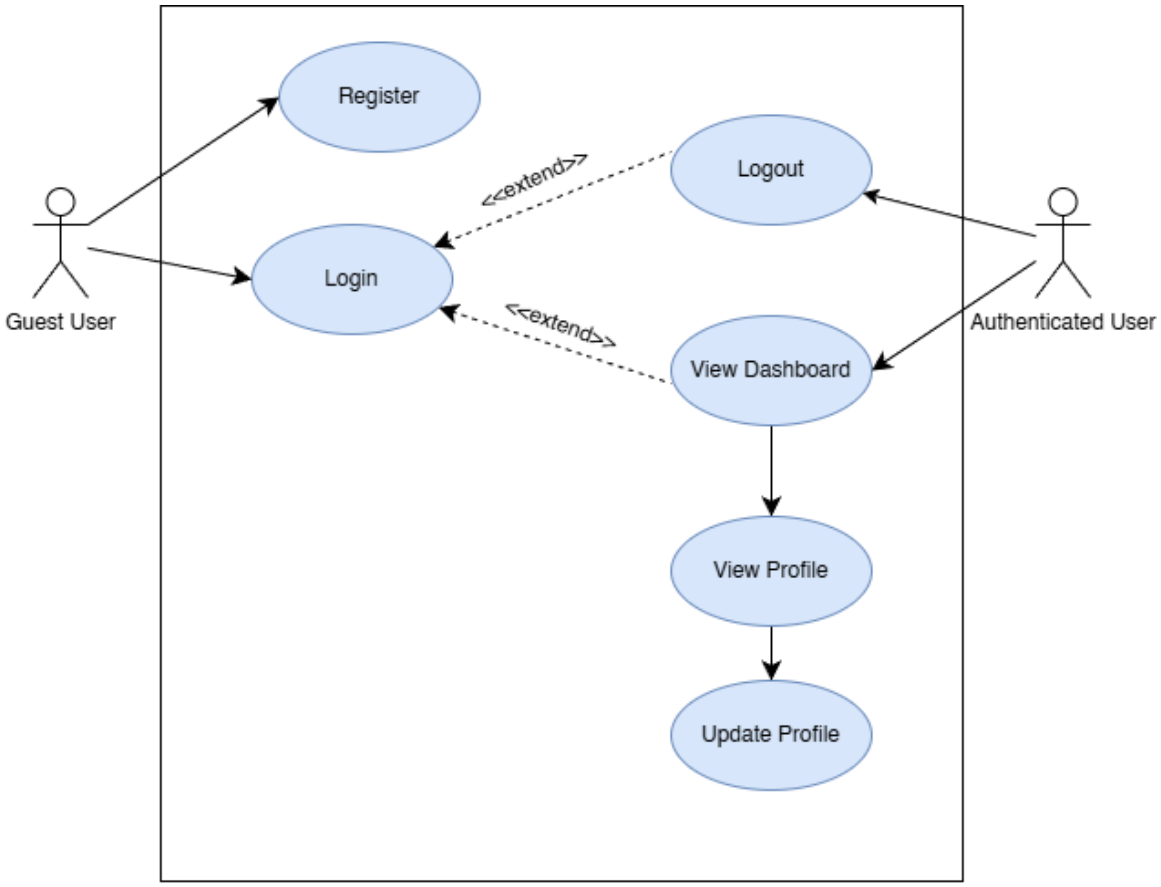
4.1. **Performance:** The system shall respond to user actions within acceptable time limits.
4.2. **Security:** The system shall use Microsoft OAuth, enforce role-based access control, and protect user and transaction data.
4.3. **Usability:** The system shall provide a clear and user-friendly interface across platforms.
4.4. **Reliability:** The system shall maintain accurate and consistent records.
4.5. **Availability:** The system shall be accessible during laboratory operating hours.

5. System Models (Diagrams)

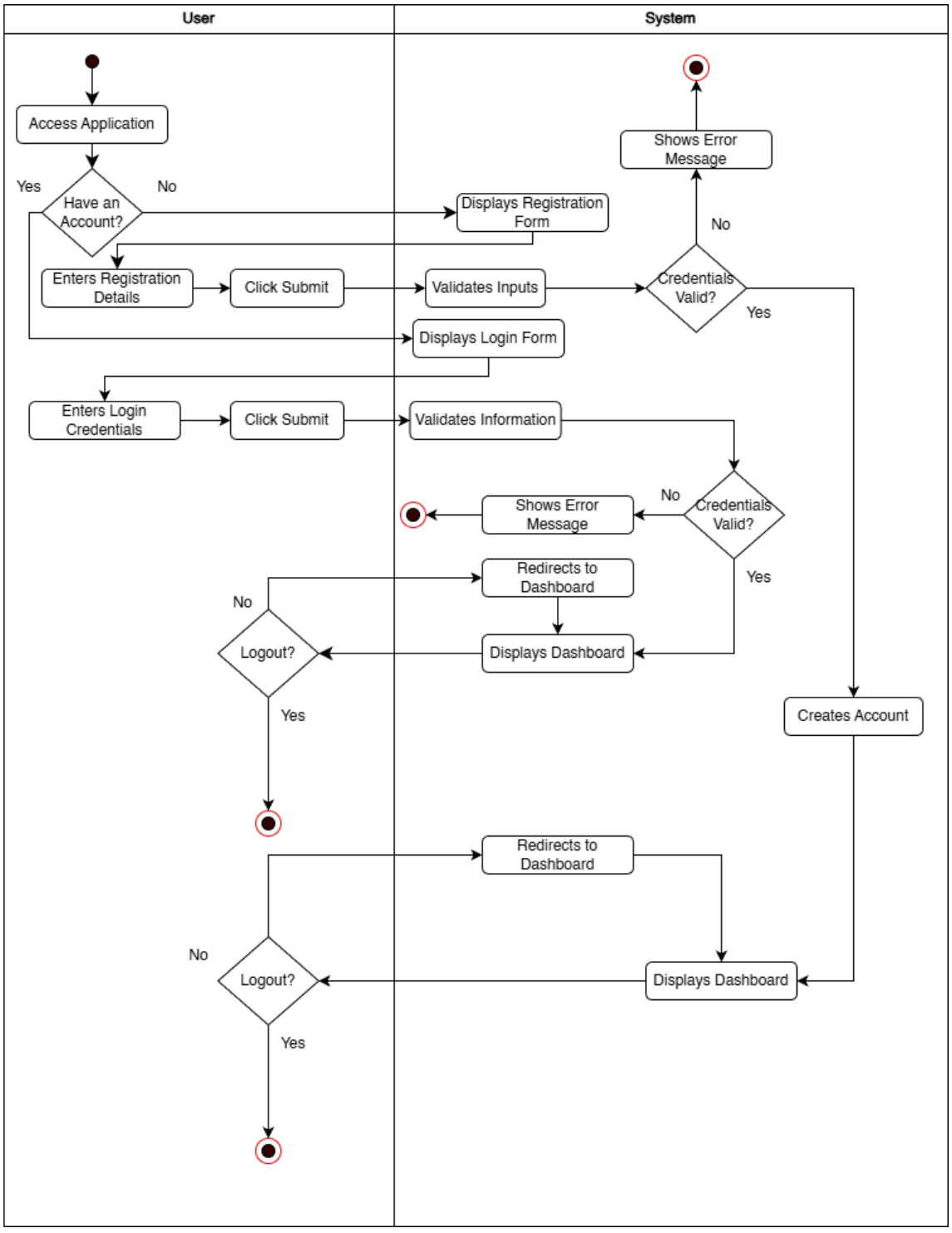
5.1. ERD

User
(PK) id: BIGINT
email: VARCHAR(255) UNIQUE NOT NULL
username: VARCHAR(100) UNIQUE NOT NULL
password: VARCHAR(255) NOT NULL
first_name: VARCHAR(70)
last_name: VARCHAR(70)
avatar: VARCHAR(255)
role_id: BIGINT FOREIGN KEY REFERENCES user_roles(id)
is_active: BOOLEAN DEFAULT TRUE
created_at: TIMESTAMP NOT NULL DEFAULT CURRENT_TIMESTAMP
updated_at: TIMESTAMP NOT NULL DEFAULT CURRENT_TIMESTAMP

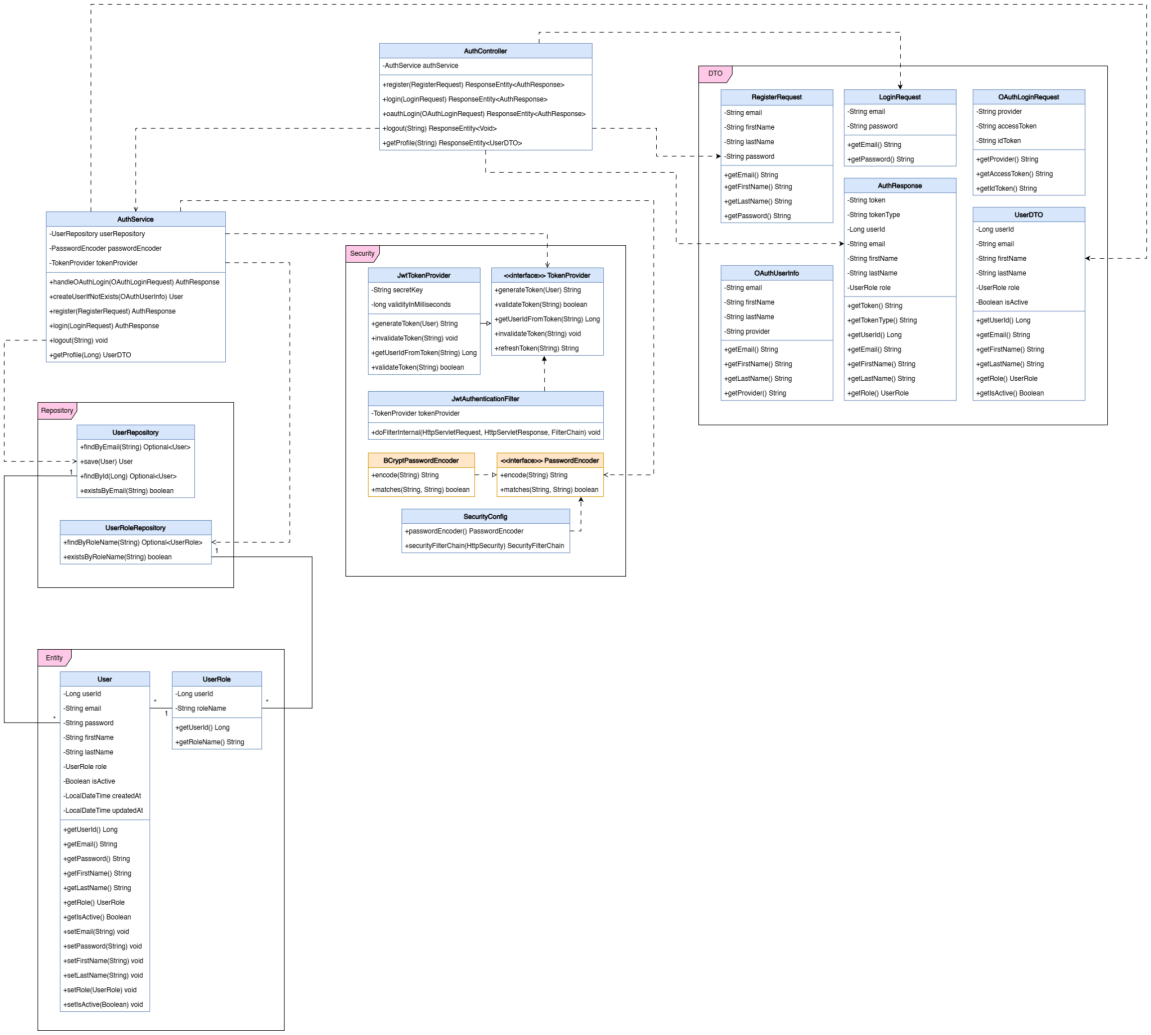
5.2. **Use Case Diagram**



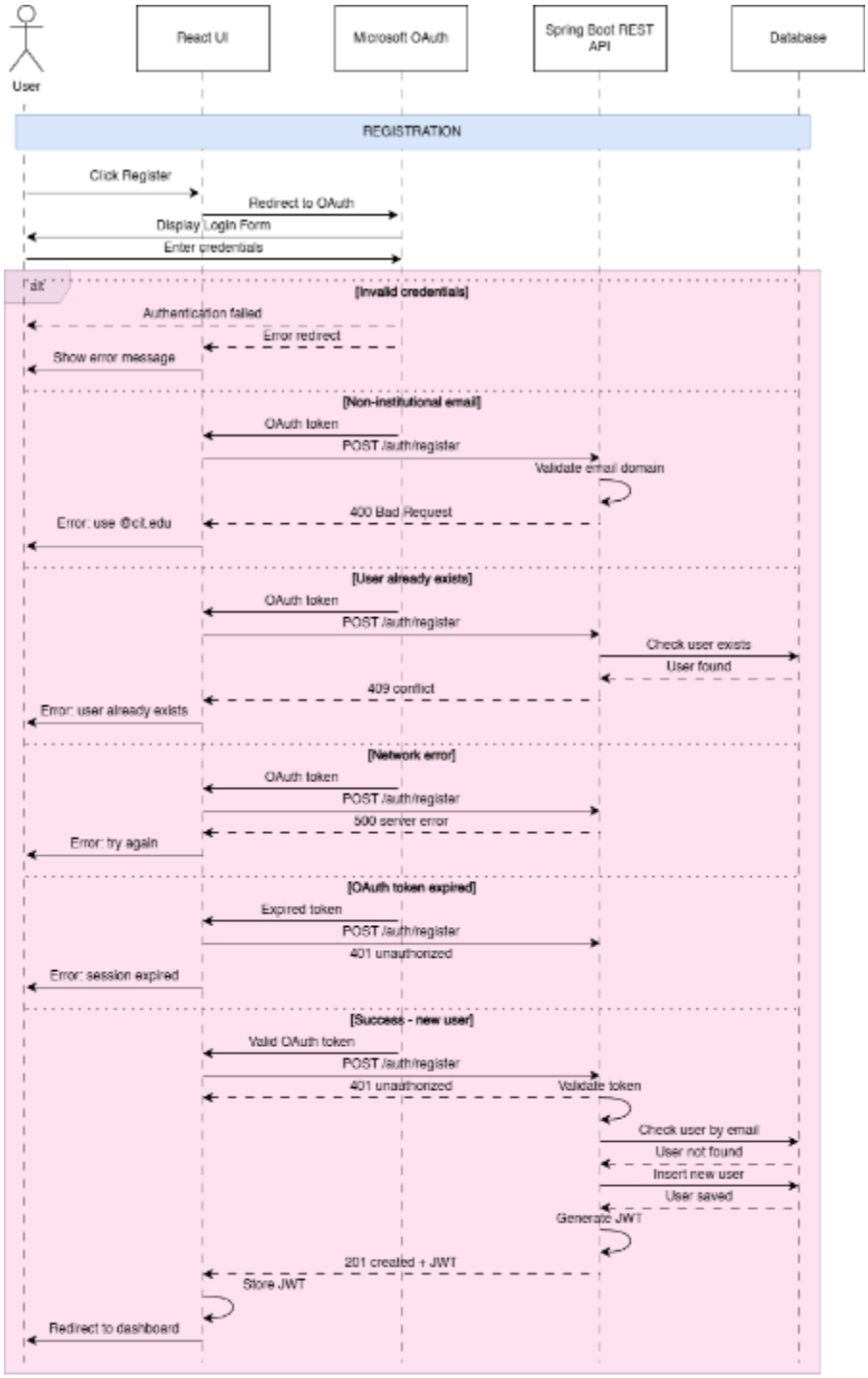
5.3. Activity Diagram

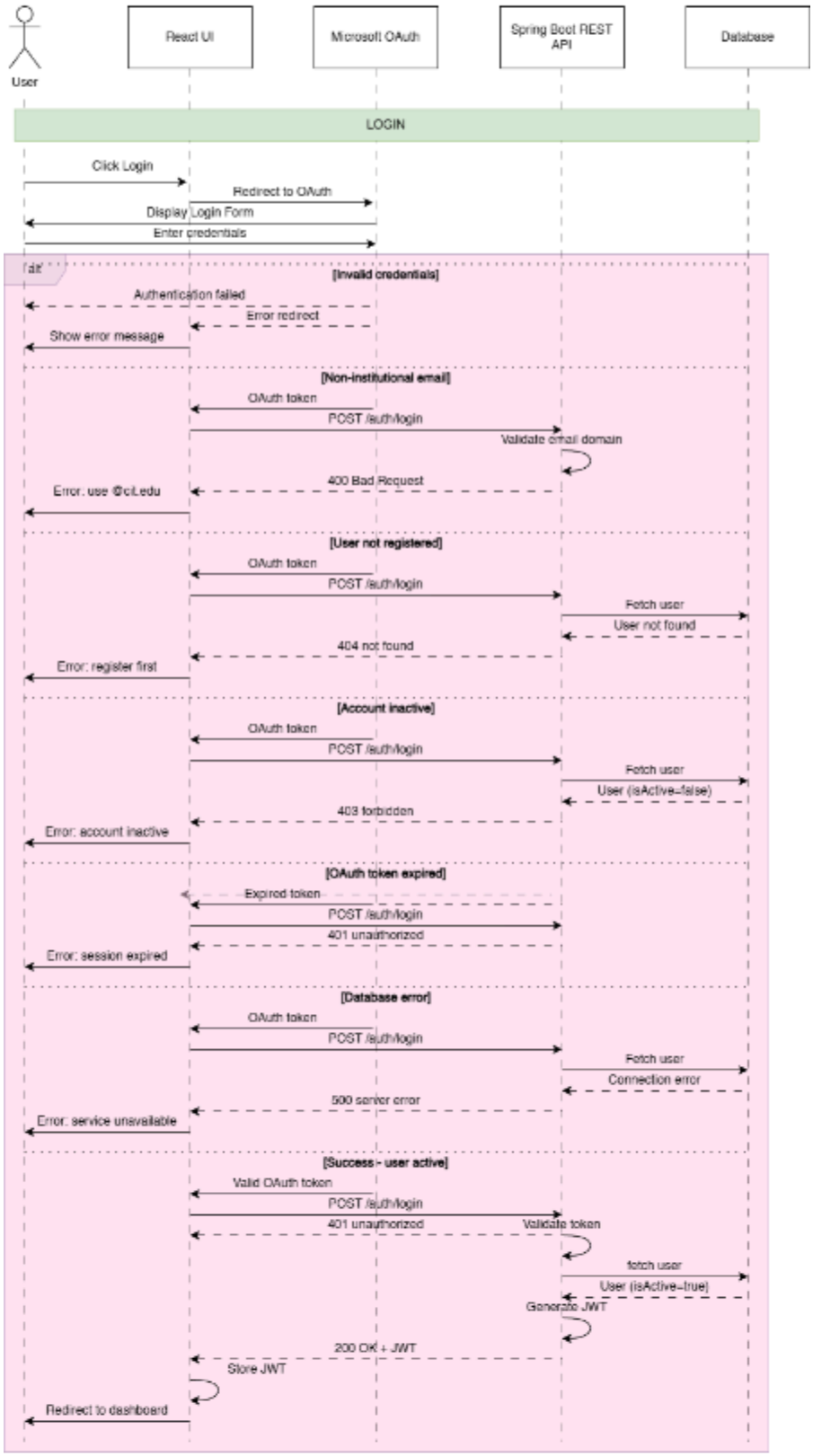


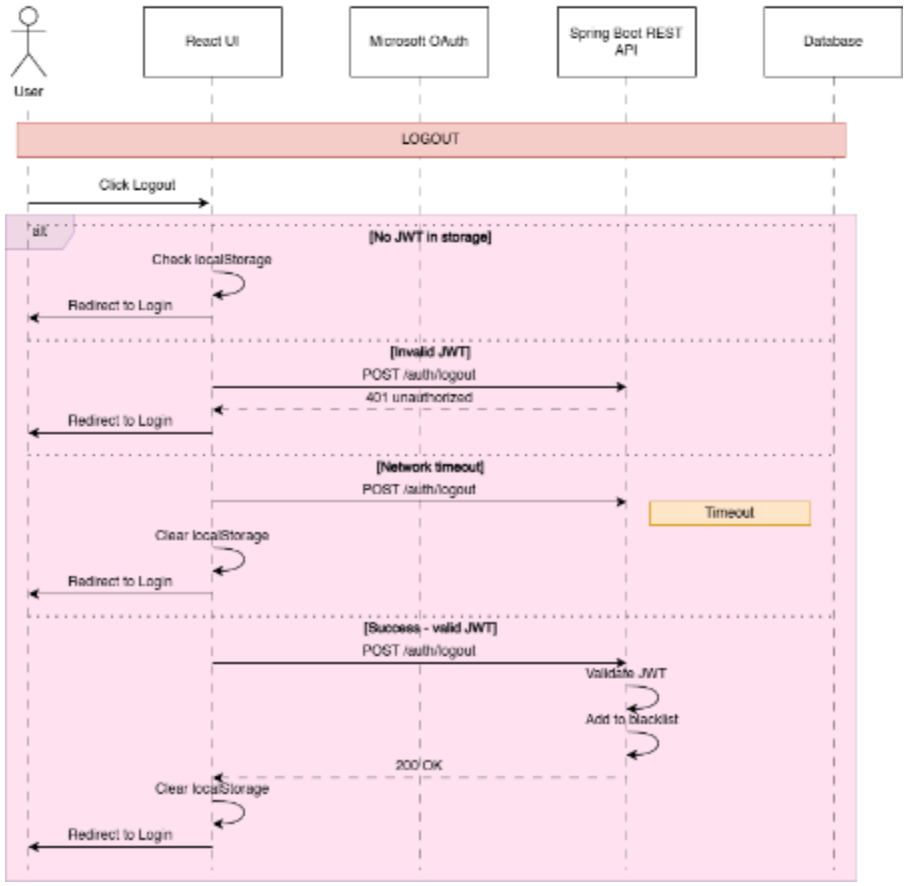
5.4. Class Diagram



5.5. Sequence Diagram



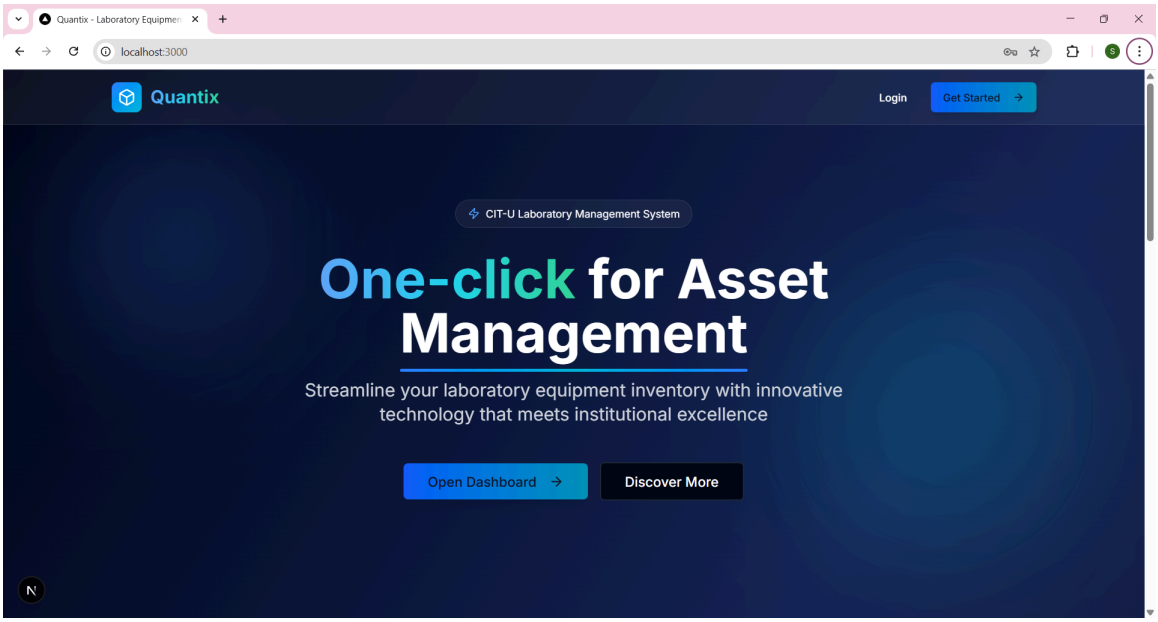

User
React UI
Microsoft OAuth
Spring Boot REST API
Database
LOGIN
Click Login
Redirect to OAuth
Display Login Form
Enter credentials
alt
[Invalid credentials]
Authentication failed
Error redirect
Show error message
[Non-institutional email]
OAuth token
POST /auth/login
Validate email domain
400 Bad Request
Error: use @ci.edu
[User not registered]
OAuth token
POST /auth/login
Fetch user
User not found
404 not found
Error: register first
[Account inactive]
OAuth token
POST /auth/login
Fetch user
User (isActive=false)
403 forbidden
Error: account inactive
[OAuth token expired]
Expired token
POST /auth/login
401 unauthorized
Error: session expired
[Database error]
OAuth token
POST /auth/login
Fetch user
Connection error
500 server error
Error: service unavailable
[Success - user active]
Valid OAuth token
POST /auth/login
401 unauthorized
Validate token
fetch user
User (isActive=true)
Generate JWT
200 OK + JWT
Store JWT
Redirect to dashboard

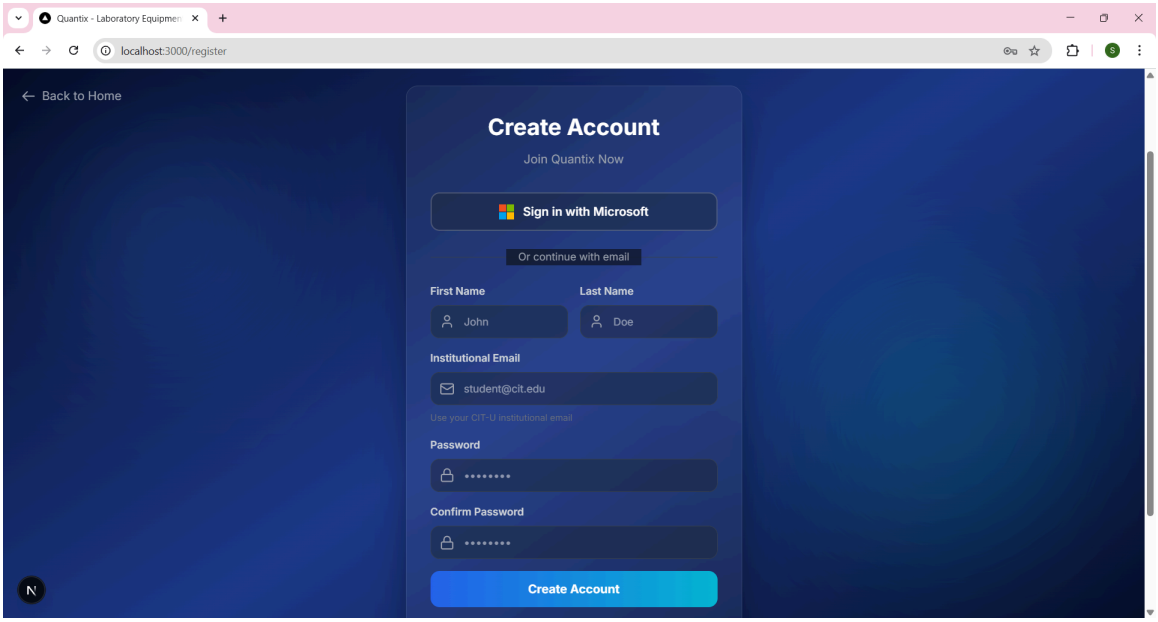


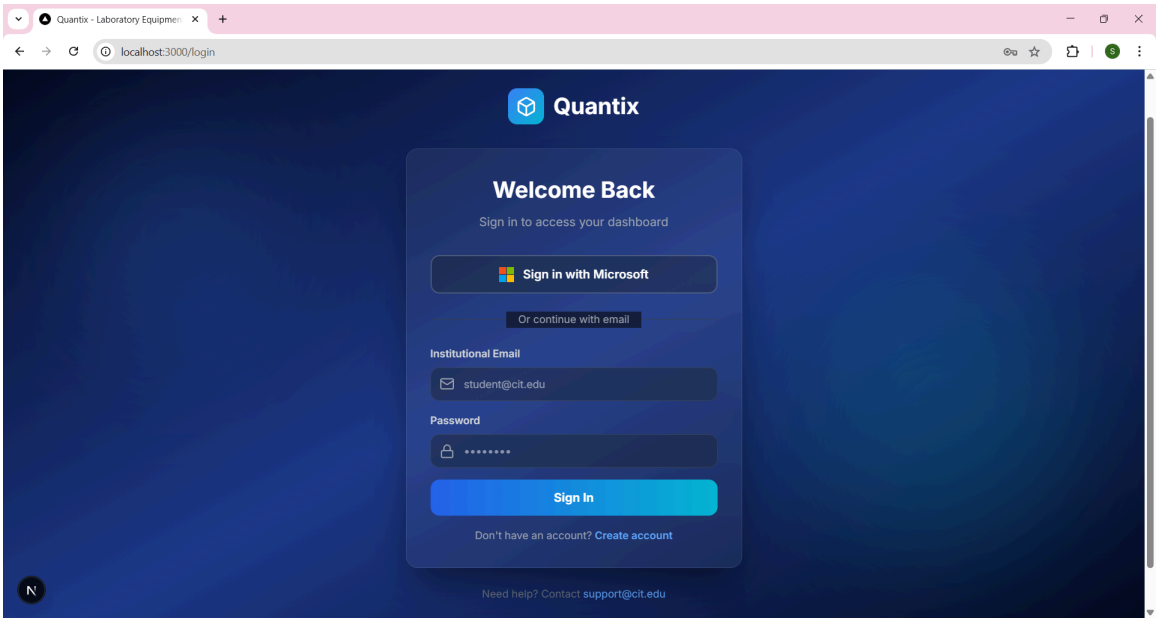
6. Appendices

Final UI Screenshots

Web


Quantix - Laboratory Equipmen
localhost:3000
Quantix
Login
Get Started
CIT-U Laboratory Management System
One-click for Asset Management
Streamline your laboratory equipment inventory with innovative technology that meets institutional excellence
Open Dashboard
Discover More


Quantix - Laboratory Equipmen
localhost:3000/register
Back to Home
Create Account
Join Quantix Now
Sign in with Microsoft
Or continue with email
First Name
John
Last Name
Doe
Institutional Email
student@cit.edu
Use your CIT-U institutional email
Password
Confirm Password
Create Account


Quantix - Laboratory Equipmen
localhost:3000/login
Quantix
Welcome Back
Sign in to access your dashboard
Sign in with Microsoft
Or continue with email
Institutional Email
student@cit.edu
Password
••••••••
Sign In
Don't have an account? Create account
Need help? Contact support@cit.edu