



CEBU INSTITUTE OF TECHNOLOGY
UNIVERSITY

IT342-Section SYSTEMS INTEGRATION AND ARCHITECTURE 1

FUNCTIONAL REQUIREMENTS SPECIFICATION (FRS)

Project Title: Mini App - User Registration & Authentication

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1. Introduction

1.1. Purpose

This document defines the functional and non-functional requirements of a mini authentication application for user registration and login.

It is intended for:

- Students
- Developers
- Testers
- Project stakeholders
- Instructors

1.2. Scope

In scope:

- User registration with basic information
- User login with credentials
- Token-based authentication
- Access to a protected user profile
- Secure logout
- Password hashing
- Username and email uniqueness validation

Out of scope:

- Password reset / forgot password
- Email verification
- Social login
- Roles and permissions
- Multi-factor authentication
- Profile editing and account deletion

1.3. Definitions, Acronyms, and Abbreviations

Term	Definition
JWT	A token used for stateless authentication
API	Application Programming Interface
BCrypt	Secure password hashing algorithm
REST	Web service architecture using HTTP methods

CORS	Security mechanism for cross-origin requests
SPA	Single Page Application
JPA	Java Persistence API for database access

2. Overall Description

2.1. System Perspective

The system provides a basic authentication layer for a web application.

It uses a three-tier structure:

- Presentation Layer – User interface for login and registration
- Business Logic Layer – Handles authentication rules and token validation
- Data Layer – Stores user credentials and profile data

The system communicates using RESTful APIs and maintains authentication through JWT tokens.

2.2. User Classes and Characteristics

Guest Users

- Can register and login
- No access to protected pages

Authenticated Users

- Can access profile/dashboard
- Can logout
- Have a valid JWT token

2.3. Operating Environment

- Runs on modern web browsers
- Requires internet connection
- Uses a backend server and relational database
- Tokens are stored in browser local storage

2.4. Assumptions and Dependencies

Assumptions

- Users have valid emails
- Internet access is available
- Browsers support localStorage
- Database and server are reachable

Dependencies

- Authentication framework
- JWT library
- Password hashing library
- Database driver
- HTTP client

3. System Features and Functional Requirements

Describe each major feature of the system and its functional requirements.

3.1. Feature 1: User Registration

Description: Allows new users to create an account by providing their basic information. The system validates the input, securely stores the credentials, and automatically logs the user in after successful registration.

Functional Requirements:

- Accept username, email, password, first name, last name
- Validate unique username and email
- Validate email format
- Enforce password length (min. 8)
- Hash password before saving
- Store user in database
- Generate JWT token after success
- Return: 201 Created on success, 409 Conflict if username/email exists, 400 Bad Request for validation errors

3.2. Feature 2: User Login

Description: Authenticates existing users by verifying their credentials and granting them access to protected areas of the system.

Functional Requirements:

- Accept username and password
- Validate user existence

- Verify password
- Generate JWT token
- Return: 200 OK on success, 401 Unauthorized on failure
- Client stores token and redirects to dashboard

3.3 Feature 3: Profile Access (Protected)

Description: Allows logged-in users to view their profile information. Access is restricted to users with a valid authentication token.

Functional Requirements:

- Require Authorization: Bearer <token>
- Validate token signature and expiration
- Extract username from token
- Fetch user profile
- Exclude password from response
- Return 401 Unauthorized if invalid

3.4 Feature 4: User Logout

Description: Ends the user's session by invalidating the current token, preventing further access to protected resources.

Functional Requirements:

- Require valid token
- Invalidate token (blacklist)
- Return success message
- Client deletes token and redirects to login

4. Non-Functional Requirements

Performance

- API responses < 500 ms
- Token validation < 50 ms
- Security

BCrypt password hashing

- Encrypted JWT tokens
- HTTPS enforced
- Input validation
- SQL injection protection
- Token blacklist

Usability

- Clear error messages
- Responsive UI
- Real-time form validation

Reliability

- Graceful error handling
- Authentication error rate < 1%

Maintainability

- Layered architecture
- Centralized business logic
- Externalized configuration

Compatibility

- Works on modern browsers
- Supports relational databases
- REST-compliant API

5. System Models (Diagrams)

5.1. ERD

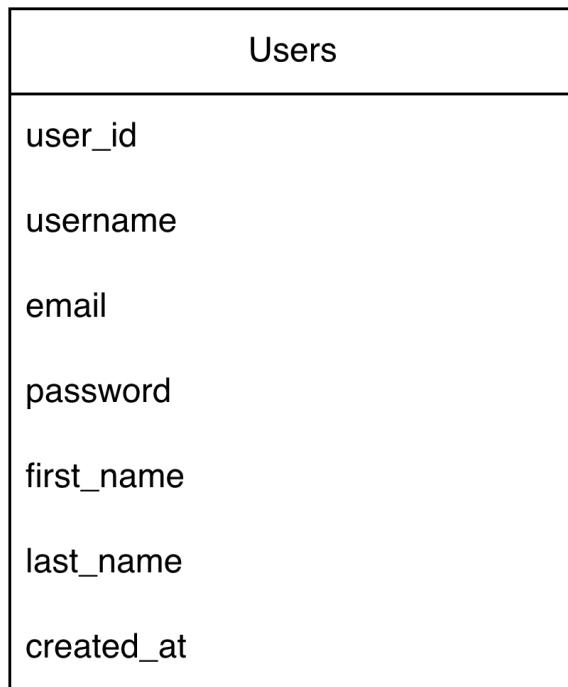


Figure 1.1 ERD

5.2. Use Case Diagram

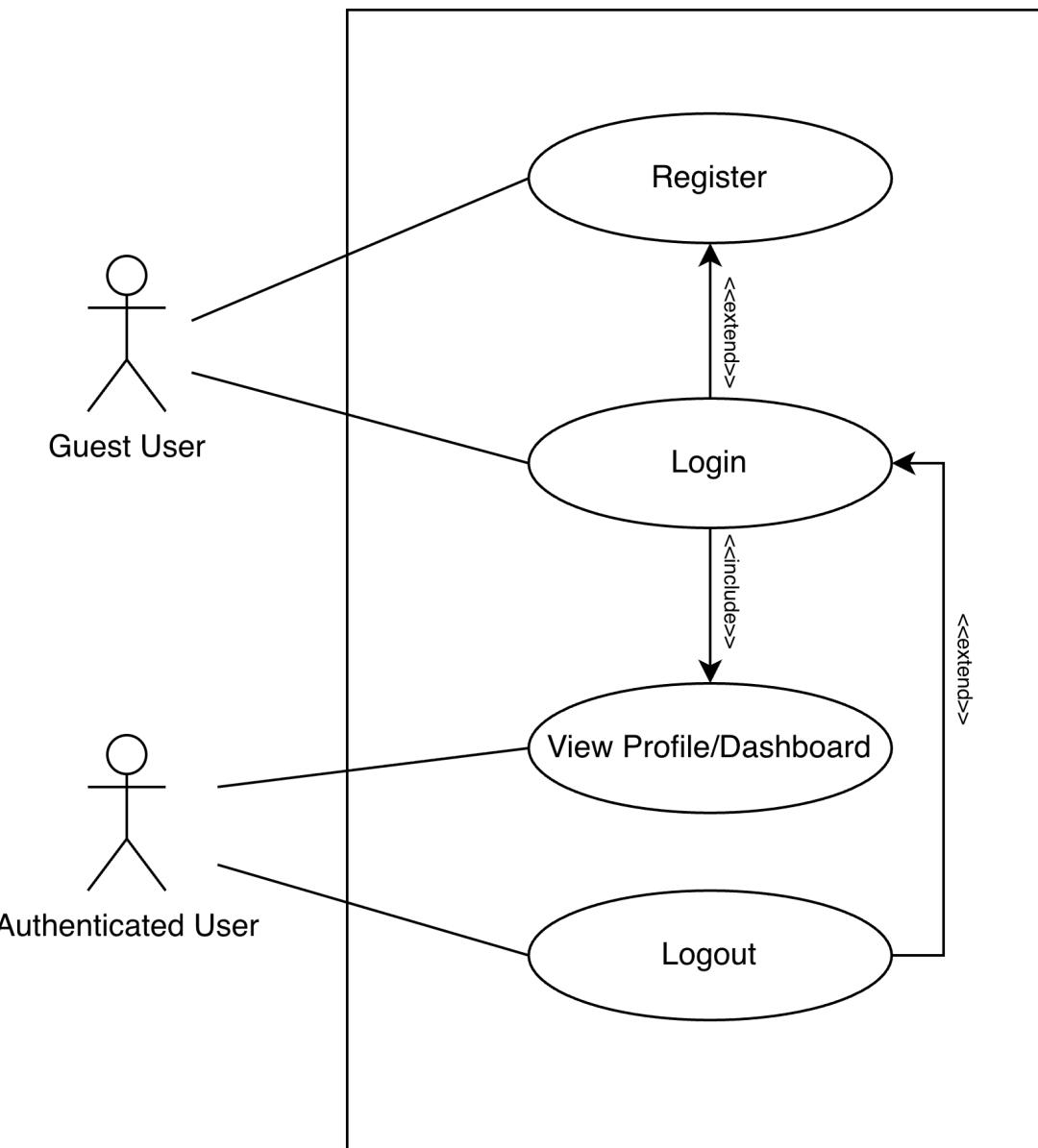


Figure 1.2 Use Case Diagram

5.3. Activity Diagram

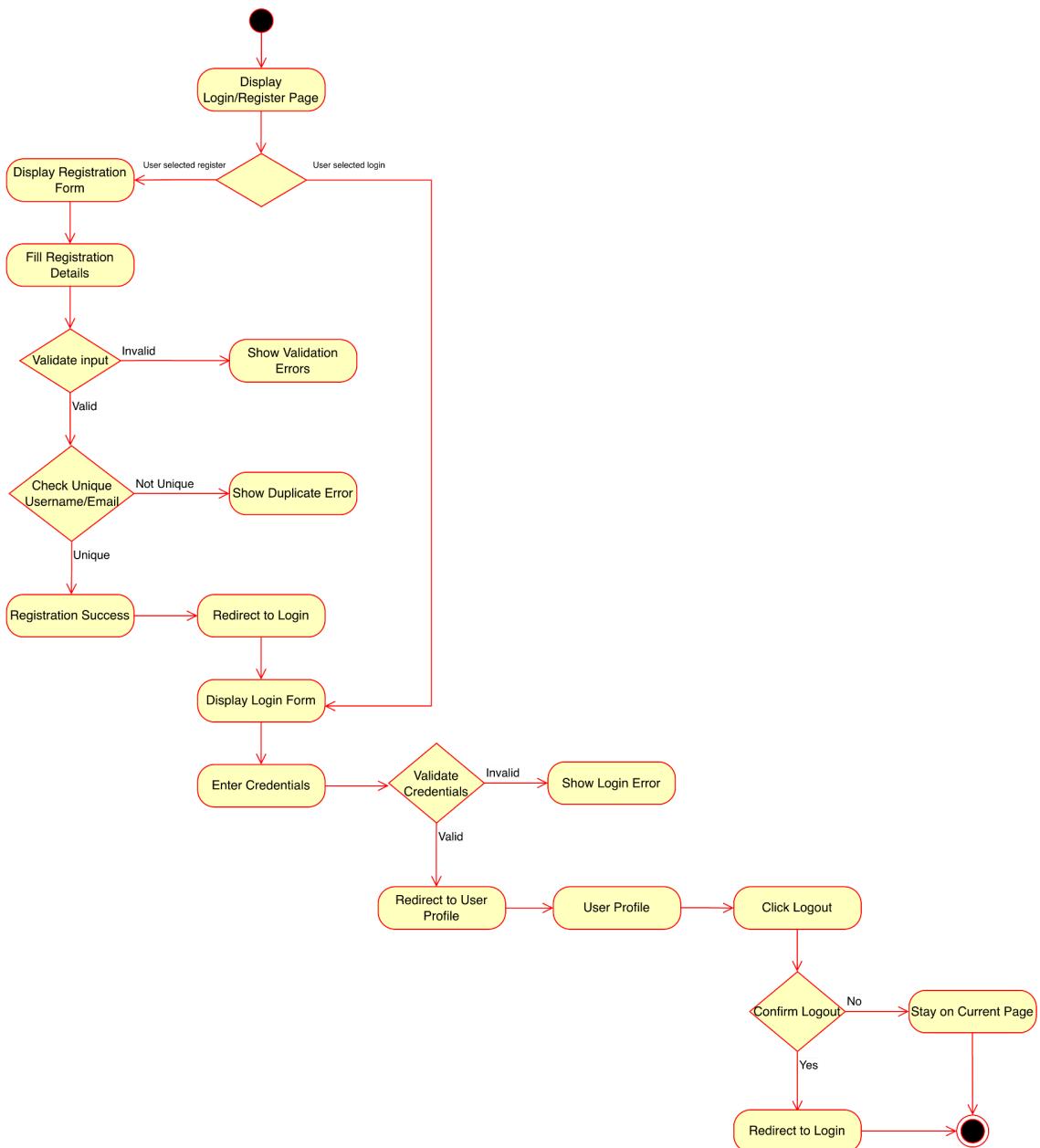


Figure 1.3 Activity Diagram

5.4. Class Diagram

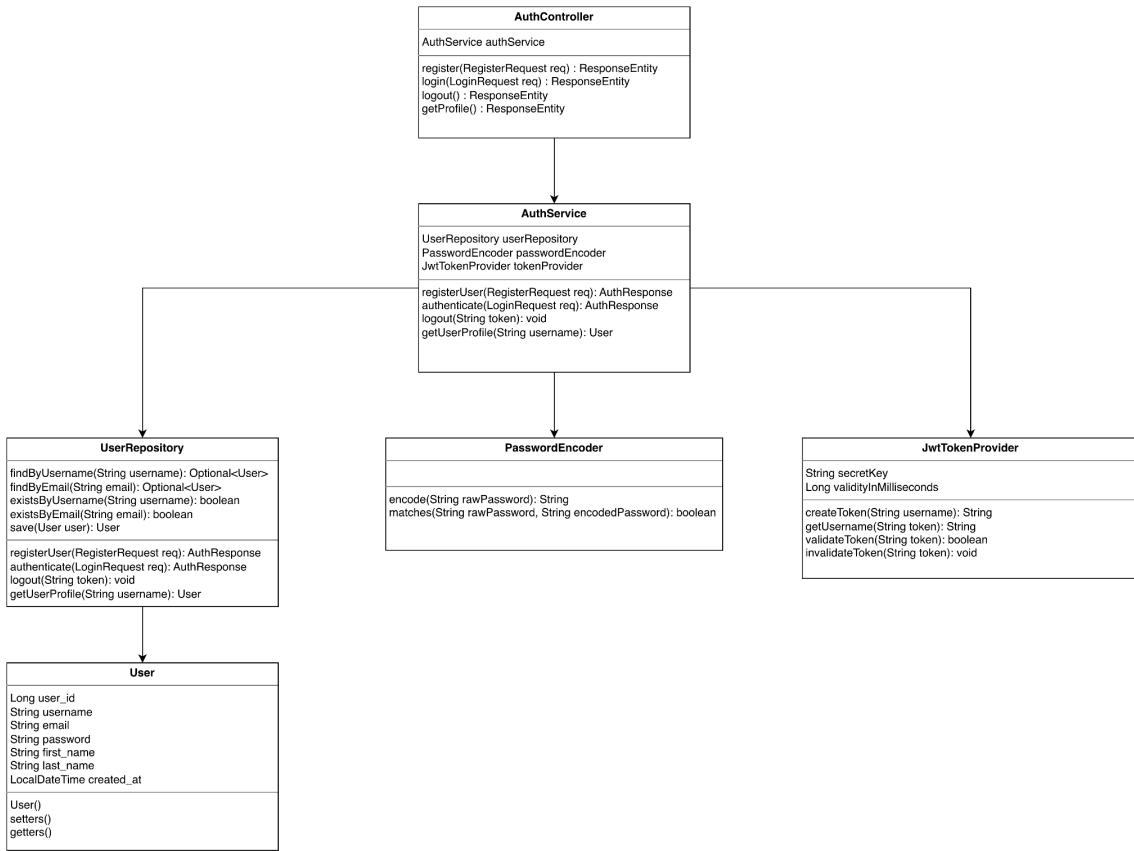


Figure 1.4 Class Diagram

5.5. Sequence Diagram

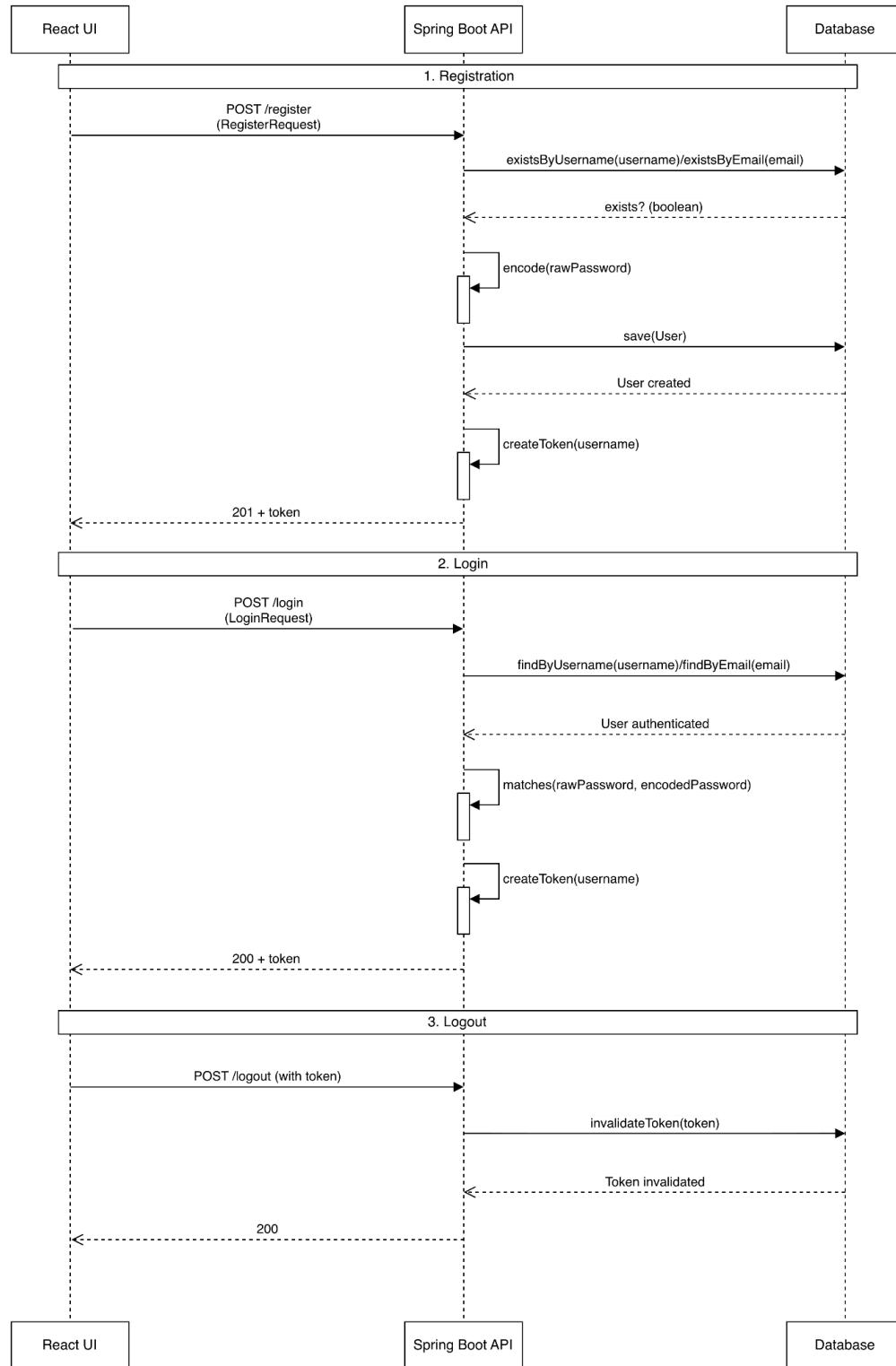


Figure 1.5 Sequence Diagram

6. Appendices

Appendix A: System Models

Figure 1.1 – Entity Relationship Diagram (ERD)

Figure 1.2 – Use Case Diagram

Figure 1.3 – Activity Diagram

Figure 1.4 – Class Diagram

Figure 1.5 – Sequence Diagram