SRS V1.0

Software Requirements Specification

for

KADA Cooperative System

Version 1.0 approved

Prepared by KodeLab

University of Technology Malaysia

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Table of Contents

Revision History

Name	Date	Reason For Changes	Version
KodeLab Team	29-11-2024	Initial release for the document	1.0

1. Introduction

1.1 Purpose

The paper aims to provide a concise description of the fundamental elements necessary for building the KADA Cooperative System. It outlines the objectives and boundaries of the system, in particular, its features on the digitalized membership registration and loan application processes of KADA. This paper will elaborate on the operational aspects of the system, its constraints, and its control over data, a publication for the users; it will also serve as a resource for the purpose of the initial version of the system in development by the team.

1.2 Document Conventions

This document uses the following conventions.

1.2.1 Numbering and structure

- Numbered list for sections and subsections (e.g., 1.0, 2.1).
- Nested numbering for detailed requirements (e.g., 1.2.1, 4.2.1).
- Normal numbering for list of features, specifications or steps (e.g., 1., 2.).

1.2.2 Text Formatting

- **BOLD:** Indicate as the title.

1.2.3 Tables and Point

- **Tables** to list requirements and Use Cases (e.g. hardware requirement).
- **Bullet Point** to list key features and specifications.

1.2.4 Document Style

- This document uses “Times New Roman”, font size 12 for content, 14 for subheadings and 18 for headings.
- The document using the 1.15 spacing.

1.3 Intended Audience and Reading Suggestions

This document targets various stakeholders with differing roles and interests on the KADA Cooperative System.

- Developers : Developers will apply this document to recognize the technical requirements and functionalities of the KADA Cooperative System. They shall invest more time in sections detailing the System roles, namely Applicant, Member, Administrator, and Board

of Directors; User Workflows: loan application, membership approval, and account management; and Data Interactions: updating of loan status, savings balance.

Reading Sequence: Overview, for an understanding of the system's purpose followed by Functional Requirements, System Features, and Data Requirements for a complete understanding of the KADA system architecture and processes.

- Project Manager : This overview of goals and user roles of the system coupled with its functional requirements will enable project managers to collaborate on a proper development timeline. Also, it will ensure that the deliverables align with the project objectives. How Applicants, Members, Administrators, and Board Members use the system aids in planning.

  Reading Sequence: Read first the Overview and Scope sections for general understanding, then go to the sections of Functional Requirements and Intended Use; it will be possible to determine the deliverables and trace the needs of stakeholders.

- Marketing staff : Marketing personnel need to understand who the target users are for the KADA Cooperative System and what some of the key features are. This will help them frame effective messaging for potential applicants and members. Key sections for marketing include the Overview to understand the system mission and goals; and Intended Use to clarify user benefits.

  Reading Sequence: Overview and Intended Use sections offer a quick understanding of the system's purpose, who the target users are, and what the system brings to the member community of KADA.

The end users can benefit from sections relating to the specifics of their interaction with the system External Stakeholders/End Users - Applicants, Members and Administrators :.

Applicants and Members should refer to the Overview and User Role Definitions sections for details regarding the application for membership, loan requests, and account inquiries. Functional Requirements provides detail on user activities such as loan balance inquiries and savings.

Administrators should refer to the Administrative Functions section that addresses the management of accounts, communications to users, and reporting capabilities.

- Testers: This document shall serve testers in developing test cases to ensure that KADA Cooperative System will meet functional requirements. Sections on user workflows and system roles will enable the definition of test cases for every user action that may occur, such as loan applications, viewing balances, and receiving updates in real time.

Reading Sequence: First, go through Functional Requirements and User Role Definitions to get an overview of the workflows, and then proceed with Non-Functional Requirements for the criteria on performance, security, and usability.

- Documentation Writers: These technical writers develop user manuals and guides for Applicants, Members, Administrators, and the Board of Directors. Understand the KADA Cooperative System inside out, from the sequence of steps each user follows through to perform such actions as applying for a loan, reviewing their membership status, and account information.

  Recommended Reading Sequence: The reader is advised to read the entire document starting from the Overview to the appendices to get full understanding of system features, workflows, and any technical detail that may be required for user documentation.

Organization of Document and Reading Order Suggestions
The rest of this document is organized to take readers from broad concepts to specific requirements and workflows within the KADA Cooperative System:

Overview: Gives overview of what the KADA Cooperative System is about: the purpose and goals.
Scope and Functional Requirements: System roles, workflows, core functionalities detailed for each type of user. User Role Definitions: Permissions for specific activities that shall be granted to Applicants, Members, Administrators, and the Board of Directors. Non-Functional Requirements: Performance, security, and usability criteria regarding the system. Appendices and Additional Information: Other technical details, information about data structure, and reporting specification included in testing and documentation.
The Overview should be the starting point for each stakeholder, followed by sections pertaining most directly to their individual functions as a means of most efficiently locating material and understanding the KADA Cooperative System.

1.4 Product Scope

The scope of the project is to allow the cooperative members to perform services like applying for loans, managing their accounts and participating more actively in the affairs of the cooperative. As of now, the old KADA Cooperative System is still using a hard copy system for processing applications for membership and loan requests. The website for the cooperative being developed should be accessible for viewing by any person irrespective of whether one is a KADA cooperative member or not. However, the cooperative system only allows access to the members of the cooperative who can also administer the application process and see the financial reports.

The KADA Board of Directors can access the general monetary health report as prepared for KADA cooperative and they also help process members and loans through carrying out cooperational meetings. This allows for the assessment of the effectiveness of the executives responsible for the day-to-day running and helps in building the trust of the members and active

participation by communicating on matters such as what the cooperative is doing, achievements as well as problems. An administrator also applies the use of the websites in managing the cooperation and giving the right information on the cooperation. The administrator can manage user information as well as check membership and loans status. Model operation of our system are stated as following:

1. Members subsystem
2. Admin subsystem
3. Board of Director subsystem
4. Membership and loan subsystem
5. Reporting subsystem

1.5 References

1. Lam, G. (n.d.). *Business Rules vs. Business Requirements : Features : Business Rules Community / Business Rules Journal*. Business Rules Community - BRC. https://www.brcommunity.com/articles.php?id=c141
2. "Software Requirements Specification." *Page has been moved*, https://www.cse.chalmers.se/~feldt/courses/reqeng/examples/srs_example_2010_group2.pdf [Accessed 2 November 2024]
3. Bandakkanavar, R., & Mohanty, S. (2023, May 8). *Software Requirements Specification document with example*. Krazytech. Retrieved October 31, 2024, from https://krazytech.com/projects/sample-software-requirements-specificationsrs-report-airline-database

2. Overall Description

2.1 Product Perspective

This is a web-based system that is known as KADA Cooperative System which is also a replacement for the existing KADA Cooperative System. This system is to provide the cooperative with a loan application system, which is the website for the cooperative and the users to apply for memberships and loans. This KADA Cooperative System is a main system of the modules subsystem that is stated in the product scope. There are five modules which are members, admin, board of director, membership and loan, and reporting subsystem. The details for each of the subsystem are described as following:

- Members subsystem
    1. Fill in member information
    2. Login as cooperative member
    3. Update member profile
    4. View member information
    5. Apply for loan
    6. View finance status

- Admin subsystem
    1. Manage user information
    2. Update membership and loan status
    3. Update finance information

- Board of Director subsystem
    1. Overview cooperative's finance health
    2. Approve membership and loan application
    3. View financial report

- Membership and loan subsystem
    1. Allow new member registration
    2. Members can apply for loan
    3. Membership application processing
    4. Loan application processing
    5. Report generation on membership and loan activity

- Reporting subsystem
    1. Financial report
    2. Members activity report

2.2 Product Functions

There is a few major functions that the user can perform using this system :

1. Identity Authentication

   In this system, users can verify their identity through the login feature to gain access. If a user forgets their password, they can reset it using the "Forgot Password" feature.

2. Member Registration

   KADA staff can register as cooperative members by completing an online registration form in the system. Membership is required to access member features in the system.

3. Loan Application

   KADA cooperative members can apply for loans online by filling out an application form in the system, eliminating the need to visit the KADA cooperative office in person.

4. Review Application

   This function allows the BOD of the KADA Cooperative to view, approve, or reject both member and loan applications directly in the system, streamlining the approval process during monthly meetings.

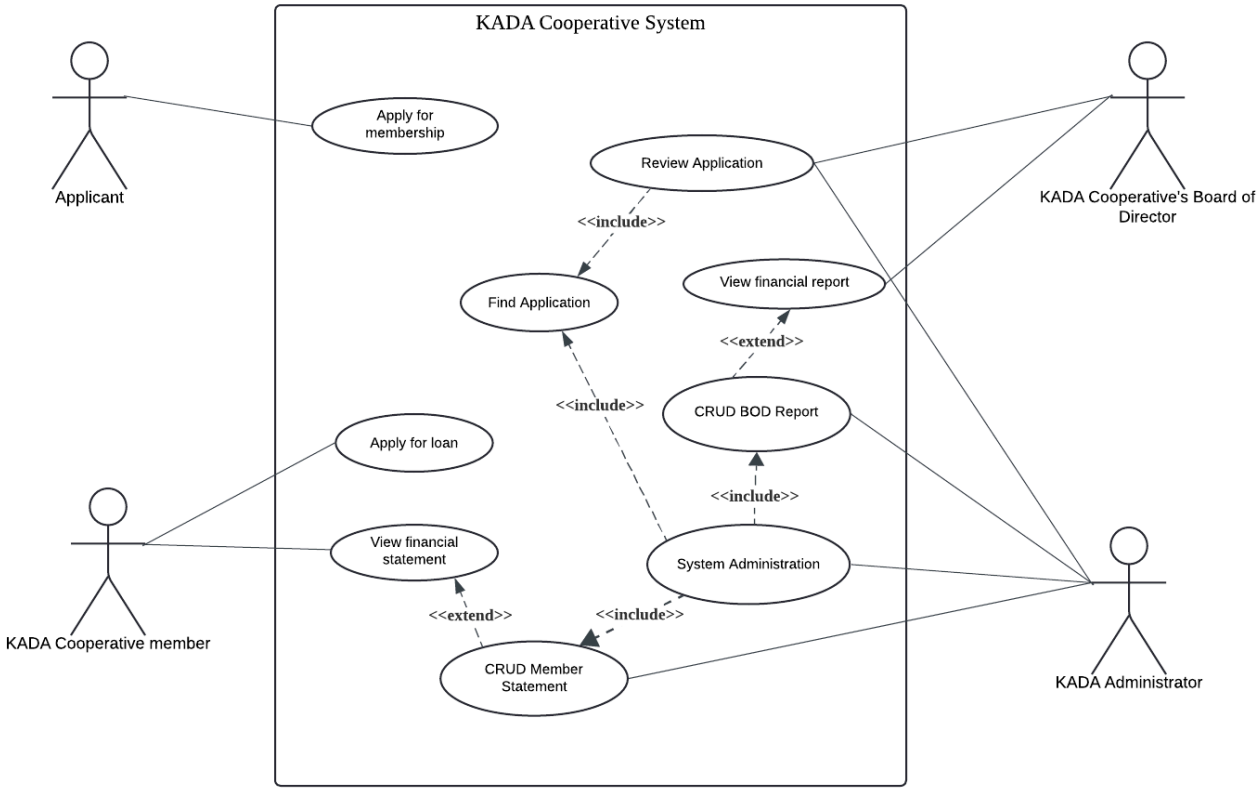

Figure 1: Use case diagram of the new KADA Cooperative System

2.3 User Classes and Characteristics

2.3.1 Applicant and member

- Applicant:
  These are the people applying for membership or seeking a loan. They can access the system through an online portal. Their major activities will be to fill in the membership eligibility forms and, upon acceptance, the loan application form. It lets an applicant keep themselves updated on the status of their applications in real time and search for details of particular membership and loan eligibility that best suit their requirements. This user class focuses on ease regarding the submission of the application and visibility into the application process of a loan.

- Member:
  Members include all those cooperative staff members who get accepted as members. They shall be given access to a secure portal on the web. The primary roles carried out by the members are managing their profiles, monitoring their membership status, and applying for loans if not done earlier. Members shall be informed of the available benefits and information on loans, such as type of loan, interest rate, and period of payback. The system should be able to keep them updated about their benefit status and/or any due outstanding action or renewals for or on any loans granted on date. This category emphasizes ease of access to membership benefits and personal updates on membership and loans.

2.3.2 Administrator

The administrators play a key role in managing and maintaining the KADA system daily. They have full access to the system functionality. They can edit or update the KADA home page, review loan application statistics and check the details of membership and loan application. Administrators are responsible for approving membership and loan applications. They are allowed to view the financial records such as member statements, loan summaries, savings statements and the annual report. All of these permissions, admins require technical expertise to handle the sensitive information securely and maintain the integrity of the KADA system.

2.3.3 Board Of Directors

The Board of Directors (BOD) constitutes one of the most important user groups within the KADA Cooperative System as they primarily interact with the system for the purposes of conducting monthly meetings as well as making decisions from time to time. They can perform certain functions such as reviewing members or loan applications, looking into the relevant financial information, and checking on some statistics on the system. Providing high-level rights, the Board is able to view more than just lockable data, but hidden information as well. This sensitive information is protected in a way that requires authentication before accessing certain files and information.

Being leaders in cooperative management, BOD members might have varying degrees of technological sophistication. In this regard, the system contains a simple interface designed for their general user operations, as well as instructional materials. Focusing on BOD preferences enables

members to run the cooperatives effectively and make timely strategic judgments.

2.4 Operating Environment

Item	Description
Hardware Platform	- 8GB RAM and above - 256GB of storage and above - Single-core processors or multi-core processors
Operating System	- Windows OS
Database	- MySQL
Browser Compatibility	- Modern web browsers like Chrome, Firefox and Microsoft Edge.
Network Requirements	Require a stable, high-speed internet connection to ensure the data transmission between client-server highly secure.

2.5 Design and Implementation Constraints

Constraints have been established for the architecture of the KADA Cooperative System. In particular, when it comes to issues like data management, financial transactions, and reporting of cooperation activities, following the laws and meeting the standards of the Malaysian Ministry of Agriculture and Food Security is very critical. Not only this, the system should also be able to work optimally on the medium range devices that KADA staff and board members use that are low in memory and processing power.

In addition, connecting to KADA's existing data storage and accounting systems is of utmost importance, which implies that the system should accommodate old data formats as well. This challenge may hinder the adoption of new innovation however it is necessary for an effective conversion to digital ways of working. With regard to accessibility from mobile and desktop devices, the system will be based on secure and centralized databases and web interface supported by logging through standard web browsers.

Given the amount of monetary value based on the information presented, security is extremely uppermost. Measures such as users logging in before access to the information and encrypting the data will be put in place to avoid unauthorized access. Lastly, the system will observe specific development processes in order to make it easy for KADA's information technology personnel to perform maintenance in the years to come and also ensure that the system is documented and programmed for future expansion intelligently.

2.6 User Documentation

There are a few document components that users can refer to help them understand more about the system.

1. User Manual
    - A comprehensive manual containing system features, navigation and troubleshooting.
    - Format : PDF

2. FAQs
    - List of frequently asked questions addressing common user concerns and issues.
    - Format : HTML

3. Tooltips (Inline Help)
    - Brief descriptions and formatting tips displayed when users hover over or click a question mark or information icon near specific fields (e.g., form fields).
    - Format : Built into the user interfaces for immediate guidance.

2.7 Assumptions and Dependencies

An assumption regarding the product is that every user has to use the cooperative website with internet access. This may lead to the situation where the website has a few issues, especially when a user has a weak internet connection jeopardizing the effectiveness of the system's user experience. Another assumption is that cooperatives are financially self-sufficient and have adequate resources to meet their financial commitments at all times.

As for the dependencies, the system may depend on the third-party banks or any financial institutes for the purposes of ensuring safe transfer of funds and disbursement of loans. Besides, the system also depends on the email for the admin to send their application approval status.

3. External Interface Requirements

3.1 User Interfaces

Prior to any logins even for the members, a dashboard page as depicted in figure 2 should be the first page viewed by a guest user who has browsed the cooperative website for the first time. If the user wishes to apply for KADA Cooperative, they can go to the '?' section and complete the sign up page as shown in figure 3. After the approval of the user membership, the user can now log in, as illustrated in figure 4.

It is only the applicant for membership that can continue to the cooperative loan. Cooperatives' members that are wishing to apply for a loan can easily direct themselves to the apply for loan page illustrated in figure 5. They can access their loan application status at the status section and other details of KADA Cooperative at the dashboard.

Next, for the admin and BOD, they have their own login page as shown in Figure 6. The admin is responsible for the operation of the cooperative information including the cooperation profile, statistics, loan application, financial statement, and report generation. In the member application section, the admin will also be responsible for facilitating the review of the members' applications and their respective details by clicking on their names and modifying the member's checklist as shown in Figure 7. The administrator can also include alterations to the cooperative members' statement and make necessary changes on the annual report for the BOD who will consider it.

As indicated in Figure 8, the BOD has access to information regarding the members' application and their share models. The BOD can also see loans applied by the individual members of the cooperative and the loans that they apply for, as illustrated in Figure 9. They can also look at the finance summary of the cooperative and there are cooperative reports for every year.

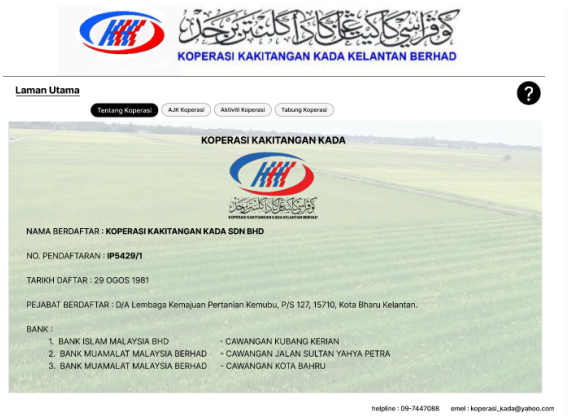

Figure 2 - Dashboard page

Figure 3 - Sign up page

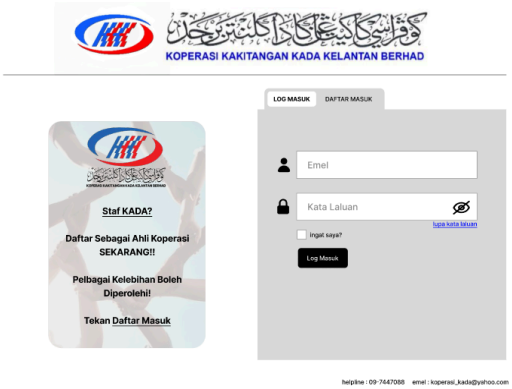

Figure 4 - Member login page

Figure 5 - Loan application

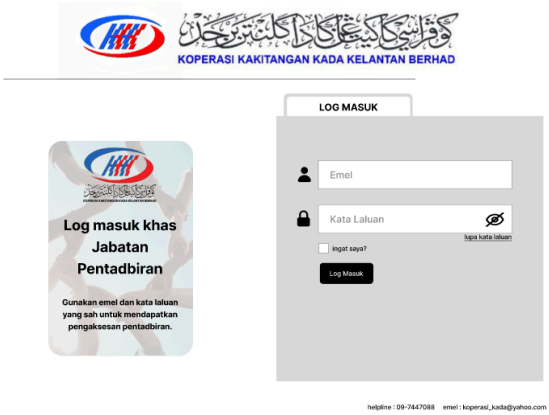

Figure 6 - Admin and BOD login page

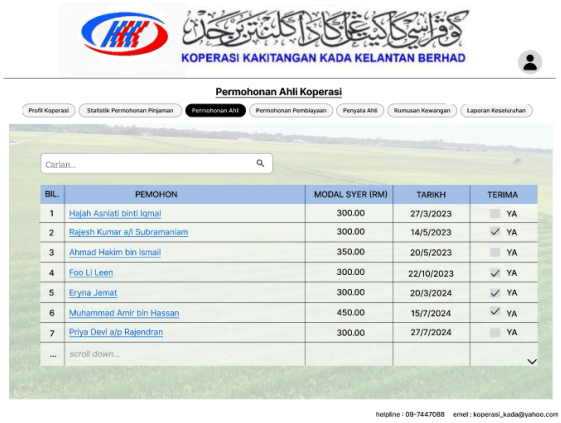

Figure 7 - Member application (admin)

Figure 8 - Member application (BOD)

Figure 9 - Loan application (BOD)

3.2 Hardware Interfaces

These are the devices that interface with the system to ensure smooth running for the employees and board members of KADA.

a. Employee Workstations

Device Type: Desktop computers or laptops.

Data Characteristics: The employee workstations interact with the centralized database in order to perform inquiries, submissions, and updates of membership and loan application data in real time. They also facilitate the interaction with automated verification and report generation features.

Control Interactions: Workstations execute client applications that allow employees to fill in membership and loan forms, submit them for review, and view reports.

Communication Protocol: Secure data interchange using TCP/IP network protocols with the server that hosts the centralized database.

Physical Connection: The workstations will connect to the organization's secure internal network via Ethernet or Wi-Fi to ensure that they are always connected to the backend server.

b. KADA Board Member Tablets

Device Type: Tablets

Data Characteristics: These tablets will provide board members with real-time reporting, analytics dashboards, and application review tools for decision-making.

Control Interactions: The tablet interfaces allow the board members to accept and discard applications, view analytics in detail, and create reports directly from the database.

Communication protocol: HTTPS for secure web access via a secure web-browser interface.

Physical Connection: Tablets connect to the system using Wi-Fi or 4G/5G networks securely, which allows mobile access and facilitates decision-making remotely.

c. Database Server

Device Type: Centralized database server, it is about MySQL Server that hosts a secure repository.

Data Characteristics: The server will store and maintain vulnerable data relating to the employees' information, loan eligibility details, payment records, and financial reports on a monthly/yearly basis.

Control Interactions: The server shall handle all read/write operations, enforce encryption of data, and ensure unauthorized persons do not have access to sensitive data.

Communication Protocol: HTTPS/TLS-secure data in transit, integrating protocols for encryption of data in transit and at rest.

Physical Connection: KADA's safe server room; connection to the organization LAN via a firewall to block unauthorized access.

d. Employee Payment Terminal Optional

Device Type: Cash payment terminal to repay loans.

Data Characteristics: This device is used to repay loans in cash by the employee in case he does not opt for deduction from his salary. The device captures the transaction information along with reflecting the loan balance in the database.

Control Interactions: Through the application interface, the terminal will update the central database in real time regarding the payment records by processing and validating the payments.

Communication Protocol: HTTPS or Proprietary protocol is used for encrypted data exchange between Terminal and Database.

Physical Connection: The physical connection is through Ethernet or a secure Wi-Fi from the terminal to the network within KADA's premises.

This hardware interface section defines the type of hardware, data characteristics, control methods, communication protocols, and physical connection the cooperative application and loan system requires. The structure provides a good basis upon which this system should be kept secure, efficient, and user-friendly for both KADA employees and board members.

3.3 Software Interfaces

Connections to other software components :

Item	Purpose	Description
Web Portal	Provides an interactive and responsive interface for system users.	Utilizes PHP as the main portal for accessing the KADA website.
Operating System	Provide the hosting environment for KADA Cooperative System.	The primary operating system for the server is expected to be Windows OS due to its stability and security features. For the client side, the access of the system will be compatible with Windows, macOS and Linux environments.
Database	Stores user data, member records, loan applications, transactions.	The system will use MySQL as the database management system for handling cooperative member data, financial transactions and the system logs.

3.4 Communications Interfaces

Communication interfaces play a crucial role in the KADA cooperative system by facilitating communication between users and the system as well as between different system components.

1. Email Interface:
    - Function: Manages sending emails to the users regarding application statuses or new application updates.
    - Example: SMTP (Simple Mail Transfer Protocol) for sending emails to users regarding notifications or loan application statuses.
    - Requirements:
        - The system must support sending emails using the SMTP protocol.
        - Emails must include standard headers (To, From, Subject) and a body.
        - The system should notify users (admin) for any email delivery failures.
        - Users must have the option to opt-in for email notifications.
2. Web Browser Interface:
    - Function: Allows users to interact with the system via a web browser.
    - Example: HTTP/HTTPS protocols for web page requests and responses, ensuring secure

communication.

- Requirements:
  - The application must be compatible with major web browsers.
  - The system must use HTTP/HTTPS protocols for secure data transmission.
  - The interface needs to be adaptable to various screen sizes.

3. Database Connection Interface:
   - Function: Facilitates communication between the application and the database.
   - Example: SQL queries executed over a TCP/IP connection to fetch or store data.
   - Requirements:
     - The system must connect to the database using secure methods, such as TCP/IP.
     - SQL queries must be optimized for performance and prevent SQL injection attacks.
     - Connection pooling should be implemented to manage database connections efficiently.

4. File Transfer Protocols:
   - Function: Allows the system to upload or download files.
   - Example: FTP or SFTP (Secure File Transfer Protocol) for securely transferring financial reports or other documents into the system.
   - Requirements:
     - The system must support secure file transfers using FTP or SFTP.
     - File uploads and downloads must be tracked and recorded for security and compliance.
     - The system should implement file size limits and type restrictions to prevent abuse.
     - Users must receive confirmation of successful uploads/downloads via in-system notifications.

5. SMS Notification Interface:
   - Function: Manages sending messages to the users regarding application statuses or new application updates.
   - Example: SMS service provider that offers API to send over message.
   - Requirements:
     - Support sending brief messages (up to 160 characters).
     - Ensure data security and user consent for SMS communications.
     - Any message delivery failures must be notified by the system to the user (admin).

4. System Features

4.1 System Feature 1 : Login

Use Case : Login
ID : **UC1**
Actors: 1. KADA Member 2. KADA Administrator 3. KADA BODs
Preconditions: 1. All users must have registered in the system.
Flow of events : 1. The users visit the main homepage of the system. 2. The users click on the profile icon. 3. The system displays “Login” and “Register” buttons. 4. The users click on the “Login” button. 5. The system displays the login page. 6. The users input their email and password and click “Login”. 7. The system validates the data. 8. If the data is not correct 8.1 The system displays a message to try again. 9. Else 9.1 The system displays the homepage for verified KADA users.
Postcondition :
Alternative flow :

4.1.1 Description and Priority

System login tools enable the user to enter the system by their roles whether they are members or admin or BOD. It is to prevent unauthorized users from easily accessing the system and to protect confidential information such as member financial data, loan information and more. The secure login reassures users that their information and financial activities are protected which also increases the confidence in the cooperative’s digital services.

- **Benefit:** 9 - Role-based access is critical.
- **Penalty:** 9 - Failing to implement the secure login system may expose the cooperative to serious risks.
- **Cost:** 5 - The costs are moderate and manageable.
- **Risk:** 7 - Require diligent management and mitigation strategies

4.1.2 Stimulus/Response Sequences

1. **Stimulus:** A user enters their email and password, then clicks the “Login” button.

System Response: The system first validates the user.

2. **Stimulus:** The system validates the email and password successfully.
   System Response: The system initiates the user sessions and redirects the user to their respective dashboards.

3. **Stimulus:** The user enters an incorrect email or password.
   System Response: The system prompts an error message.

4. **Stimulus:** The user clicks on the “Forgot Password” link.
   System Response: The system prompts the user to enter their registered email address or phone number and will send a password reset link via email or SMS.

5. **Stimulus:** The user clicks on the “Logout” button.
   System Response: The system ends the user session and redirects the user to the login page.

4.1.3 Functional Requirements

- **REQ-1:** The system must implement user authentication by user’s email id and password confirmation
- **REQ-2:** The system should allow the email ids and Passwords to be case sensitive.
- **REQ-3:** The system should not allow unauthorized access to users with invalid credentials and give an error message.
- **REQ-4:** The system should recognize different user roles when a user logs in successfully and take the user to a dashboard of his or her role.
- **REQ-5:** The system should limit users from accessing certain features based on the user role.
- **REQ-6:** The system needs to include a "Forgot Password" alternative on the login page.
- **REQ-7:** The system should provide a password reset link to the user via email or SMS.
- **REQ-8:** The system must keep the user logged in once he / she has managed to login successfully.
- **REQ-9:** The system shall enable members to log out at will by clicking the “Logout” prompt button and terminate the sessions instantly.

4.2 System Feature 2 : Member Application/Registration

Use Case : Member Application/Registration
ID : UC2
Actors: 1. Applicant 2. KADA Administrator
Preconditions: 1. The KADA Cooperative System's website can be accessed by the user. 2. The registration form had to be filled by the applicant together with all necessary notes.
Flow of events : 1. The user signs in and finds the compartment of the registration form. 2. The user fills out the form as required. 3. The user presses the submit button. 4. The system assures that their subjects are complete and true. 5. The application is assessed and the competent authority takes a decision on the acceptance or rejection of the application. 5.1 If permitted, the system creates a member id. 5.2 If not, a note containing the grounds for refusal may be recorded. 6. The system dispatches an email to the requesting user with the following content: 6.1 If Yes: contains login details. 6.2 If No: gives information on the reasons for the denial.
Alternative flow : Incomplete application: Where there is incomplete information provided, the system encourages the applicant to complete this section.
Postcondition : 1. The candidate is emailed an update regarding their application status. 2. Approved candidates get a Member ID and access to his/her account.

4.2.1 Description and Priority

The Member Application/Registration tool enables KADA personnel to submit applications for cooperative membership through an online platform. This supersedes the older way of applying for the said membership which involved filling up a lot of forms and waiting for membership approval in order to attend the monthly meetings. This is one of the features that represents a high priority feature because of its significance in hastening the registration process, reducing the administrative burden and enhancing the satisfaction of the members.

- **Benefit**: 8 – Swiftly improves process and eases user experience greatly.
- **Penalty**: 7 – Without this feature, management bottlenecks and other inefficiencies exist.
- **Cost**: 5 – Development and other related costs are moderate.
- **Risk**: 3 – Low-risk primarily involves aspects of user acceptance and systems

reliability.

4.2.2 Stimulus/Response Sequences

1. **User Action**: The user signs in to the system and goes to the page where registration is done.

   System Response: The registration page where membership details are to be filed is presented.

2. **User Action**: Staff input the required details and proceeds to the submission of the application stage.

   System Response: Checks the information and stores it within the database; otherwise, the user is verbally prompted to enter corrections if an error is detected.

3. **User Action**: Admin reviews the request and takes appropriate action by changing the application status to ‘Approved’ or to ‘Rejected’.

   System Response: An employee is updated by a status message issued as an email

4. **User Action**: Log in using the credentials provided for members who have been approved.

   System Response: Member-level functionality is made available.

4.2.3 Functional Requirements

- **REQ-1**: A registration form must be provided by the system with details for personal data.
- **REQ-2**: The system should validate the information entered by the user to check that it is complete and in the correct form.
- **REQ-3**: The system should keep all membership applications that have been verified in a protected database.
- **REQ-4**: The system shall provide functionality for administrative users to view applications and change their statuses.
- **REQ-5**: The system should be capable of sending out emails to employees when there are changes on the status of applications.
- **REQ-6**: Every candidate who has been approved will be given a distinct Member ID, which will be held in a safe manner.
- **REQ-7**: The system must issue log in details to new members to enable them access members only parts of the system.

4.3 System Feature 3 : Loan Application

Use Case : Loan Application
ID : UC3
Actors: KADA Cooperative Member
Preconditions: The user must be a registered KADA Cooperative Member.
Flow of events : 1. Members select the "Loan Application" option on the system interface. 2. System displays the loan application form with required fields. 3. Members fill in all the necessary details and submit the application form. 4. System validates the application details for completeness and accuracy. 5. System shows the successful send of the form pages. 6. System saves the application data and provides a confirmation with a unique reference number.
Alternative flow : - Incomplete information : If the user leaves the required fields with blank, the system displays an error message asking the user to complete the information before submit. - Invalid information : If data entered is invalid or does not follow the formatting, the system prompts the user to correct the data.
Postcondition : The loan application form is submitted and the user awaits the successful status.

4.3.1 Description and Priority :

The feature enables users to submit a loan application through the system by providing necessary personal information and financial details. This feature is crucial to the loan process as it was the first step for the loan request. This step also ensures either the applicant is eligible or not to apply for the loan. Priority : High

- **Benefit** : 8 - Allow members to apply for loans conveniently and efficiently through an automated system.
- **Penalty** : 9 - Missing this feature leading to dissatisfaction among members and potential financial losses.
- **Cost** : 6 - Cost is manageable given its importance and impact.
- **Risk** : 5 - Poses moderate risk including data entry errors, incomplete information and potential system failures during application process.

4.3.2 Stimulus/Response Sequences :

1. **User Actions :** Cooperative member selects "Loan Application" on the tab above the KADA System dashboard.
   System Response : The system displays the loan application form.
2. **User Actions :** Cooperative members fill in the required information.
   System Response : The system validates the entries for completeness and accuracy.

3. **User Actions :** The user submits the application form.
   System Response : System displays the successful application and saves the application data.

4.3.3 Functional Requirements :

- **REQ-1 :** The system should display the loan application form when the user clicks the "Loan Application" button.
- **REQ-2 :** The system should require users to complete all the required fields inside the form.
- **REQ-3 :** The system must validate each field to check that the data is in the correct format or not.
- **REQ-4 :** The system should provide error messages if the user incomplete or incorrectly formatted the input fields and prompt the user to correct the errors before submitting.
- **REQ-5 :** After submitting the loan application form, the system should save the application data in the database and generate a reference number.
- **REQ-6 :** The system must notify the user of successful completion and display the references number for future use.

4.4 System Feature 4 : Member Statement

Use Case : Member Statement
ID: UC4
Actors: KADA Member (cooperative members)
Preconditions: The user has been able to log into the system successfully and has provided valid credentials.
Flow of events: 1. The user accesses the system using his or her credentials and selects the "Member Statement" section. 2. The Member specifies the type of statement they wish to see (for instance, statement of savings balance or statement of loan balance). 3. The relevant statement is retrieved and displayed on the system with the latest available data. 4. If required, the Member is provided with an option to save the statement in any format as per his/her wish (for instance, in PDF format).
Alternative flow: Data Not Found: In the event that the system encounters a challenge in retrieving data, it will inform the User and suggest to him/her to try again later.
Postconditions: When requested, the financial statement of the member is submitted or made available for download.

4.4.1 Description and Priority

Member Management will provide the facility of the members managing their profiles, loan applications, and view financial statements relating to their membership. A core functionality that allows members to have a self-serving, easy-to-use interface to manage their membership tasks, hence improving their overall experience and efficiency of the system.

- **Benefit**: 9 - Improves member engagement and system effectiveness.
- **Penalty**: 8 - If it's not developed, for example, the processes stay manual and really hard for the members.
- **Cost**: 6 - Reasonable cost to develop; hence, the grade is average.
- **Risk**: 5 - Low risk if deployed in a secure way.

4.4.2 Stimulus/Response Sequences

- **User Action**: Members of the website update any profile information.

System Response: System updates this new information into the database and reflects this change immediately into the member's account.

- **User Action**: The member applies for a loan.

  System Response: The system provides the interface to apply for the loan; it should present the fields to populate the loan details along with related eligibility criteria.

- **User Action**: Members request their current financial statement.

  System Response: The system fetches and shows the current financial data of the member, including loan balances, savings, and recent transactions concerning their membership.

4.4.3 Functional Requirements

- **REQ-1**: Profile Management
  - Members should be allowed to view and make changes to their personal details, contact information.
  - The system shall confirm any changes in the profile for accuracy, for example, right format for a phone number, and the change shall be saved at once.
- **REQ-2**: Loan Application Interface
  - Members shall be provided with an interface to apply for a loan whereby they shall fill out loan details.
  - The system should highlight the relevant eligibility information. The system shall validate loan data, including loan amount and loan purpose, before form submission.
- **REQ-3**: View Financial Statement
  - The members should have a financial statement displaying their current standing as regards loans taken, savings, and recent transactions.
  - This statement should change dynamically upon new changes in members' financial activities with the cooperative.
- **REQ-4**: Notification of Loan and Financial Updates
  - Any changes in loan applications or financial status shall be informed to its members via the system.
  - The notifications shall be indicated on the member's dashboard and via email notification, if so desired, on the condition that the member has subscribed to such notifications.

4.5 System Feature 5 : BOD Reporting

Use Case : BOD Reporting
ID: UC5
Actors : KADA Board of directors (BOD)
Preconditions : The board member successfully accessed the system with the appropriate login information.
Flow of events : 1. The BOD Member signs into the system and navigates to the section with reports. 2. The BOD Member picks the type of report which they wish to look at (e.g. report on members, report on loan approvals). 3. The system generates the requested report with the latest information available and displays it. 4. The report can be filtered and sorted by the BOD Member as per his/her needs. 5. The BOD Member decides whether to save the report or to export it (for instance in PDF, excel etc).
Alternative flow : Report Filter Unavailable: In the event that certain data or filter is unavailable, the system alerts and advises the BOD Member of alternative filters or views.
Postconditions : The BOD Member presents the requested report or downloads it in the mode they have selected.

4.5.1 Description and Priority

The BOD (Board of Directors) Reporting tool provides detailed live updates about the number of memberships, loans, savings, and overall financial activities. This tool enables the board to have consolidated information in order to make informed decisions, look into loan and membership applications, and assess the financial status of the organization. It takes utmost precedence because it is essential for transparency, efficient decision-making, and supervision of the institution.

- **Benefit**: 9 - Ensures strategic resolving of issues and control execution.
- **Penalty**: 8 - Without this capability, decision-making would be based on old or absent information.
- **Cost**: 6 - With the requirement of collecting and securing data in real-time, the expense is on the higher side.
- **Risk**: 4 - Data security and integrity are at the Medium risk level.

4.5.2 Stimulus/Response Sequences

- **User Action**: The BOD Member accesses the system and chooses the

reporting segment.

System Response: A dashboard loaded with options of different types of reports is displayed.

- **User Action**: A member of the BOD chooses one of the reports, for example, Loan Approval Summary.

  System Response: The system generates the relevant report to the user's request with current data and with the possibility of filtering and sorting the results.

- **User action**: A BOD member exports or downloads the report for further consideration.

  System Response: The report can be downloaded in the following formats: pdf, excel, etc.

4.5.3 Functional Requirements

- **REQ-1**: The solution must be equipped with a visual interface where one can also see data and the different selections for report generation at the same time.
- **REQ-2**: The system should be able to compile information on such matters as membership approval, loan approval, and financial overviews among other issues.
- **REQ-3**: The system should facilitate the issuance of reports with specific parameters like dates or approval status filtered or sorted.
- **REQ-4**: The system must permit the members of the Board of Directors to save different reports in the pdf and excel formats.
- **REQ-5**: The system has to ensure that all submitted reports are accessible only by the BOD members who have any credentials designated for them.
- **REQ-6**: The system shall not take too long before the reports are updated with the latest information available.

4.6 System Feature 6 : System Administrators

Use Case : Member Application/Registration
ID : **UC6**
Actors: KADA Administrator
Preconditions: The user must be an authorized KADA Administrator with appropriate system access.
Flow of events : 1. Admin logs into KADA System with their specified email and password. 2. System grants access to the admin dashboard, providing options for monitoring the system, managing the data and user management. 3. Admin views the details of the applicant and is responsible for the approval status. 4. Admin selects a specific task such as editing the home page, managing user permissions or generating the reports. 5. System performs the requested task and confirms the successful completion.
Alternative flow : Unauthorized Access : If an unauthorized user attempts to access the administration dashboard, the system denies the access and logs the attempt.
Postcondition : Admin tasks are performed successfully to ensure the system integrity and availability.

4.6.1 Description and Priority

The System Administrator function allows the administrator to manage and sustain various elements in KADA Cooperative System including user profiles, the status of the members and their loan requests. This functionality also helps in ensuring proper maintenance of the data within the cooperative, that is accurate, current and managed in a safe environment. It is an essential component in the day to day functioning and reliability of the system as a whole.

- **Benefit**: 9 - Facilitates effective user and information handling leading to smooth functioning of the system and security.
- **Penalty**: 7- Service management is very critical to the system that low accuracy, certainty and user friendliness may be experienced.
- **Cost**: 5 - The outlays are fairly bordering on the average though there is the need to put in place measures of protecting the data employed.
- **Risk**: 4 - The risks are also fair, dealing mostly with safety and protection of the information.

4.6.2 Stimulus/Response Sequences

1. **User Action**: The user who has administrative privileges accesses the system and goes to the Admin Dashboard.
   System Response: The screen presents options for managing users and memberships as well as processing loan applications.
2. **User Action**: For the purpose of editing or removing users the administrator clicks the “Manage Users” option.
   System Response: The system lists its users and allows viewing their accounts, editing these accounts, or deleting the accounts when needed.
3. **User Action**: The administrator activates “Review Membership Applications” and operates on all the applications in the queue.
   System Response: The system allows the administrator to approve and disallow membership applications with the provision such that he or she can write comments concerning the rejection.
4. **User Action**: The Administrator selects "Loan Applications" in order to assess, accept, or change the loan status.
   System Response: The suitable screen is presented displaying details on loan application, thus providing the chance for the administrator to change the status of the loan and notify applicant.

4.6.3 Functional Requirements

- **REQ-1**: The system should incorporate an admin dashboard that is capable of supporting user management, membership management and loan management functionalities.
- **REQ-2**: It should also enable the administrator to perform the locked down functionalities of adding, editing or removing user accounts.
- **REQ-3**: The administrator should also have the ability to either approve or disapprove new membership applications with the option to add comments where necessary.
- **REQ-4**: The system should also enable users to view and approve loan requests, and also change the status of the loan.
- **REQ-5**: The system should restrict access to administrative controls and information to only those administrators that have been granted such access.
- **REQ-6**: An alert must be issued to the applicants whenever there is a change regarding their membership status or loan application status.

4.7 System Feature 7 : Review Application

Use Case : Review Application
ID: UC7
Actors: KADA Board of Director
Preconditions: 1. BODs are logged on to the system.
Flow of events: 1. BODs go to the list of application pages. 2. The system displays a list of applications. 3. include (Find Application) 4. If BODs click on applicant's name 4.1 The system displays application details in a popup size. 5. BODs approve or reject application by clicking "Approve" or "Reject" button 6. The system display message indicates the decision is successful. 7. BODs click "OK" to close the popup.
Postconditions:
Alternative flow: 1. At any point, BODs can move to different pages.
Postconditions:

4.7.1 Description and Priority

The review application feature is a function where the BODs can review, access, approve, or reject both member and loan applications. This function enables the BODs to review applications efficiently and faster since the BODs can have access to application details by clicking on the applicant's name only.

- **Benefit**: **9** - Improve BODs process or meeting to review the applications.
- **Penalty**: **6** - The review application still can be done manually without the system.
- **Cost**: **8 -** It might be costly because this process includes email/SMS connections to send application status to applicants and might be using SMS services provider API.
- **Risk**: **7 -** The risk is quite high since all the data in the application must be true and is not tampered with to make sure the decision-making process is genuine.

4.7.2 Stimulus/Response Sequences

1. **User Action**: The BODs click on "Membership Registration" or "Loan

Application” on the tabs section.

System Response: Displays the list of applications.

2. **User Action**: The BODs click on the applicant’s name.

   System Response: Displays the application details in a medium popup size.

3. **User action**: The BODs click on the “Approve” or the “Reject” button.

   System Response: Display message indicates decision is successful or not.

   System Response: Send an email/SMS to the applicant containing the application status.

4.7.3 Functional Requirements

- **REQ-1**: The system should allow the BODs to view all the application details.
- **REQ-2**: The system should allow the BODs to approve or reject an application using on-screen buttons.
- **REQ-3**: The system should allow the BODs to close the application detail by clicking “X” or outside of the popup area.
- **REQ-4**: The system should allow the BODs to move to other pages.
- **REQ-5**: The system should notify the BODs whether the decision is successfully recorded or not.

5. Other Nonfunctional Requirements

5.1 Performance Requirements

5.1.1 System Authentication

ID: QR1
TITLE: Quick authentication and data retrieval.
DESC: The system has to authenticate the user and load the corresponding role-based dashboards to the user within a 2 seconds time span. In addition, retrieval of member information and loan application should take not more than 3 seconds to give a friendly usage to the users.
RAT: Very important in keeping the user engaged and satisfied.

5.1.2 System Scalability

ID: QR2
TITLE: System scalability
DESC: The system must allow for 1,000 users to be active at the same time and process data related to 100,000 members with no serious drop in system performance.
RAT: Important in preparing for future expansion and meeting users' phenomenal needs.

5.1.3 System Availability

ID: QR3
TITLE: System availability
DESC:The system is expected to work 100% of the time with only 8 hours of the downtime allowed for a year to enable users to have uninterrupted access.
RAT: Essential in ensuring uninterrupted service and maintaining user confidence.

5.1.4 Transaction

ID: QR4
TITLE: Transaction processing capacity
DESC: The system will be required to process transactions at a rate greater than 50 TPS during busy periods without any performance degradation.
RAT: Needed for the efficient functioning of the system under peak load conditions.

5.1.5 Data Accuracy

ID: QR5
TITLE: Data accuracy and data consistency
DESC: The system will ensure that all updates are corrected in real time and will have the data locked for a maximum 1 second in case of any changes.
RAT: Needed to maintain confidence in the management of data and interactions with the users.

5.1.6 Load Handling

ID: QR6
TITLE: Load management and endurance to stress
DESC: The system shall suspend a user load increase for an additional 40% above to a typical peak load while maintaining the performance of the system.
RAT: Useful for availability during inordinate use spikes.

5.1.7 Security Efficiency

ID: QR7
TITLE: Security efficiency
DESC: System performance should not be impaired by any security features, particularly encryption, which should not add more than 10% on response times.
RAT: Important in maintaining the security level expected as well as the user experience satisfaction.

5.1.8 Optimization

ID: QR8
TITLE: Optimized resource usage
DESC: Normal operating conditions should see the system average CPU and memory usage not exceeding 75% in order to facilitate efficient operations.
RAT: Important in avoiding any performance constraints from occurring.

5.2 Safety Requirements

As it encompasses fundamental financial and membership details, the BOD Report Generation function shall be controlled through stringent control measures in order to prevent unauthorized access, data breaches or misuse of confidential information.

5.2.1 Data Encryption

All data passing over the system, including reports and login details, shall be protected against unauthorized access by encryption using AES-256.

5.2.2 Access Control

The reporting functionality will only be available for access by the authorization BOD members with the right login details. Multi-Factor Authentication (MFA) should be implemented so that even allowed users can access the confidential reports only after verification of their identity.

5.2.3 The Role of Audit Trails and Logging

The system should maintain detailed records of every access as well as actions taken using the reporting capabilities. Doing so would allow for tracking and examination of any questionable or unauthorized activity and assist in providing evidence in case of breach of data protection.

5.2.4 Standard security audits

By the industry standard security audits of the system shall be carried out on a quarterly basis to identify vulnerabilities in the reporting systems and address them. In order to preserve the integrity of the system any findings during audit will be addressed immediately.

5.2.5 Respect for Data Protection Laws.

The BOD Reporting feature must meet any data protection laws such as the Personal Data Protection Act (PDPA) of Malaysia provisions for the protection of personal data.

5.2.6 Data Backup and Recovery

In order to prevent loss of data in case of a crashed system or cyber sabotage, all the reports and critical information must be stored daily in a different safe place away from the main system. There should be provision in the system for restoration of data within the shortest time possible in case it is lost due to disastrous occurrences.

5.2.7 Safety Certifications

The system shall comply with the requirements of ISO/IEC 27001, the international standard for information management systems, which encompasses the implementation of measures to safeguard confidential information.

5.3 Security Requirements

1. Authorization

- The system should require only users with authority to have access and be able to manage the system data.
- The RBAC should be implemented to allow only administrators and BOD to view all the system data but the members can only access their own data.

2. Data Integrity

- The system should be able to make sure all the data in the system remains accurate and is not being tampered with.

3. Access Control

- The system should have restrictions on who can perform certain actions or view certain data within the system.
- Only administrators can do CRUD activities on the system data and the BOD can have access to approving the application through the system.

5.4 Software Quality Attributes

This section provides the quality attributes that are important in realizing the functionality, reliability, and usability of the KADA Cooperative Application and Loan Application system. This shall be done in line with KADA's interest in an effective, accessible, and correct application management-solution for both employees and board members.

5.4.1 Adaptability :

The system shall be such that it could be easily adapted to possible future changes in the policies of KADA on its cooperatives on the limit of loans, eligibility, and membership benefits.

Measure: The policy parameters updates, such as the interest rate on loans or the period for repayments, should be changeable by administrators through a settings interface at any time without any system downtime and within 10 minutes.

5.4.2 Availability :

The need: The variety of KADA staff and board members who might access the system at any one given time means that it has to be highly available especially during working hours that is from 8.00 AM - 6.00 PM.

Measure: System uptime during business hours shall be no less than 99.8%, given there is not more than 5 minutes of actual downtime per month outside of maintenance windows. In the event of unplanned failure, automatic failover mechanisms restore operations in under 10 minutes.

5.4.3 Correctness :

Requirement: Calculations of eligibility checks, amount of loan granted, interest accrual, and payment schedule shall be done correctly to support fairness and full transparency for the processing of employee applications.

Measure: Financial and eligibility calculations should have zero error tolerance. This shall be ensured by performing end-to-end testing on 100 loan applications. The success rate in test cases should be at least 99.9% related to financial accuracy.

5.4.4 Flexibility :

The system shall provide web access to all KADA employees and mobile access to the board members, considering that board members may need to approve or review applications remotely.

Measurement: Optimized for at least three classes of devices: desktop, tablet, and smartphone, with a consistent user interface across all supported form factors. Compatibility testing should be able to ensure 100% expected performance for the essential features on each of the platforms.

5.4.5 Interoperability

Requirement: The system will be able to integrate with payroll systems at KADA for the deduction of loan repayment for those employees who choose payroll as their means of paying loans.

Measurement: Integration with payroll system shall be performed correctly and has to finish each transaction in less than 5 seconds, as confirmed through stress testing done under peak load conditions.

5.5 Business Rules

The section of the KADA Cooperative System highlights the key roles and responsibilities in which the members of KADA Cooperative can view their own information and submit the loan applications. Admin has full access and manages users and reports. Admin also can approve loans and the financial officer handles payments and reports. Operational principles including inside the KADA Cooperative System are loan approvals managed by the admin, real-time transaction recording and admin approval membership. This can secure access controls by using unique logins, verification for sensitive actions and session timeouts.

Other Requirements

6.1 Legal Requirements

A. Electronic Signature Compliance

- The system must support electronic signatures in compliance with the Electronic Transactions Act 1999, ensuring electronic contracts are legally binding.
- If the system requires users to sign documents digitally (e.g., in loan applications), it must comply with electronic signature laws to make these agreements legally enforceable.

B. Data Protection and Privacy Laws

- The system must comply with the Personal Data Protection Act (PDPA) of Malaysia to ensure that all personal data collected, processed, and stored within the system is handled responsibly and securely.
- This law might cover user consent for data collection, data retention policies, and users' rights to access or delete their data.

Appendix A: Glossary

This document use the following terms and abbreviations:

Term	Descriptions
OS	Operating System
KADA	Kemubu Agricultural Development Authority
MFA	Multi-Factor Authentication
PDPA	Malaysia’s Personal Data Protection Act
SMS	Short Message Service
ID	Identification
QR	Quick Response
RAT	Required Action Type
CPU	Central Processing Unit
DESC	Description
TPS	Transaction Processing System
REQ	Requirement

HTTP/HTTPS	HyperText Transfer Protocol / HyperText Transfer Protocol Secure
FTP/SFTP	File Transfer Protocol / Secure File Transfer Protocol
API	Application Programming Interfaces
SMTP	Simple Mail Transfer Protocol
PHP	PHP: Hypertext Preprocessor

SRS V1.1

Software Requirements Specification

for

KADA Cooperative System

Version 1.1 approved

Prepared by KodeLab

University of Technology Malaysia

November 3, 2024

Table of Contents

Revision History

Name	Date	Reason For Changes	Version
KodeLab Team	29-10-2024	Initial release of the document	1.0
KodeLab Team	09-11-2024	Add system architecture Improve use case and use case description	1.1

1. Introduction

The KADA Cooperative System is a web-based portal designed to modernize and manage membership and loan services of a cooperative. It will replace the manual, paper-based system currently in use by the cooperative, where members can apply for loans, maintain their accounts, and also be active in cooperative affairs. The system offers multiple features to members, administrators, and Board of Directors through various subsystems for membership and loan processing administration and reporting. This will be a unitary structure that fosters efficiency, openness, and confidence amongst members to participate actively in the operations and financial undertakings of the cooperative.

1.1 Purpose

This paper aims to provide the fundamentals for building the KADA Cooperative System. It outlines the objectives and limits of the system, particularly its digital features on the membership registration and loan application processes of KADA. This paper will elaborate on the functional aspects of the system, its constraints, and its way of handling the data. This paper will also serve as a user guide as well as the foundation for the system initial version in development by the team.

1.2 Document Conventions

This document uses the following conventions.

1.2.1 Numbering and structure

- Numbered list for sections and subsections (e.g., 1.0, 2.1).
- Nested numbering for detailed requirements (e.g., 1.2.1, 4.2.1).
- Normal numbering for list of features, specifications or steps (e.g., 1., 2.).

1.2.2 Text Formatting

- **BOLD:** Indicate as the title.

1.2.3 Tables and Point

- **Tables** to list requirements and Use Cases (e.g. hardware requirement).
- **Bullet Point** to list key features and specifications.

1.2.4 Document Style

- This document uses “Times New Roman”, font size 12 for content, 14 for subheadings and 18 for headings.

- The document using the 1.15 spacing.

1.3 Intended Audience and Reading Suggestions

Project Managers: The project managers have to plan out the projects, schedule, and ensure alignment with the project objectives in consonance.
Reading suggestion: can read the Overview and Scope sections for an overview of what this project is trying to achieve, then review the Functional Requirements and Intended Use sections to verify that alignment between the goals and deliverables of the project are met.

Marketing Staff: Marketing staff focuses on how to understand system mission and benefits effectively communicate to potential users.
Reading suggestion:can read the Overview to understand the mission of the system, then check the Intended Use section to identify benefits and key features that will enable you to communicate the value of the system to users effectively

End Users :

Applicants/ Members: Interact with the system to perform operations like applying for loans and knowing the status of the account.
Reading suggestion: can read the Overview and User Role Definitions sections, which outline how the system supports membership and loan processes

Administrators: Performing tasks such as account management and maintenance of user permissions and reporting functions.
Reading suggestions: can view the Administrative Functions section for information about account management and permission control, as well as reporting functions

Testers: Testers develop test cases that will help find out whether the system meets functional and non-functional requirements of the system.
Reading Suggestion: can review the Functional Requirements and User Role Definitions to understand the workflows and create appropriate test cases, then, review the Non-Functional Requirements, which capture performance, security, and usability criteria.

Documentation Writers: User manuals and guides in respect of the system shall be prepared by the documentation writers.
Reading Suggestion: can read this entire document, beginning with the Overview section, to gain a thorough understanding of the system's feature set, workflows, and technical information essential for crafting clear and complete documentation.

1.4 Product Scope

The scope of the project is to allow the cooperative members to perform services like applying for loans, managing their accounts and participating more actively in the affairs of the cooperative. As of now, the old KADA Cooperative System is still using a hard copy system for processing applications for membership and loan requests. The website for the cooperative being developed should be accessible for viewing by any person irrespective of whether one is a KADA cooperative member or not. However, the cooperative system only allows access to the members of the cooperative who can also administer the application process and see the financial reports.

The KADA Board of Directors can access the general monetary health report as prepared for KADA cooperative and they also help process members and loans through carrying out cooperational meetings. This allows for the assessment of the effectiveness of the executives responsible for the day-to-day running and helps in building the trust of the members and active participation by communicating on matters such as what the cooperative is doing, achievements as well as problems. An administrator also applies the use of the websites in managing the cooperation and giving the right information on the cooperation. The administrator can manage user information as well as check membership and loans status. Model operation of our system are stated as following:

1. Members subsystem
2. Admin subsystem
3. Board of Director subsystem
4. Membership and loan subsystem
5. Reporting subsystem

1.5 References

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2. Overall Description

The KADA Cooperative System is an online, website-based system that proposes to computerize and streamline most of the cooperative processes that require membership registration, loan applications, and other financial management, which were previously done by hand. The modules this system would employ are member modules, administrator modules, Board of Directors' modules, and reporting for easy access in core functions. Key features to include are identity authentication, online loan application, real-time profile, and finance update. It includes considerations for compliance and security in the design to ensure safe data handling and works on stable internet access with a compatible browser. Full-featured support materials round out the system so users can easily navigate the system, thereby enhancing efficiency and accessibility of all members within the cooperative.

2.1 Product Perspective

This product is a new website system for KADA Corporation which is aimed at making a complete change from the hard copy methods of processing membership and loan applications to more automated systems. It tries to help the user eliminate all the inconveniences that are associated with applying for membership and loans, managing user details and even managing reports. In addition, the system incorporates the capabilities of calculating cooperatives' loans and interests for each member, reducing the workload on the people.

In Figure 2.1, a three-layered structure under the KADA Cooperation system architecture is illustrated. The Presentation Layer is comprised of the clients who will be the applicants, KADA Cooperative Staff, BODs and KADA administrators interacting with the system through website User Interface. Next, the Business Layer is where the system elicits actions such as user authentications, member management, loan management, managing the approval statuses and generating reports. Last, the Data Layer is the component that maintains records for loans, members, and cooperative activities and supplies data for the functions of the Business Layer.

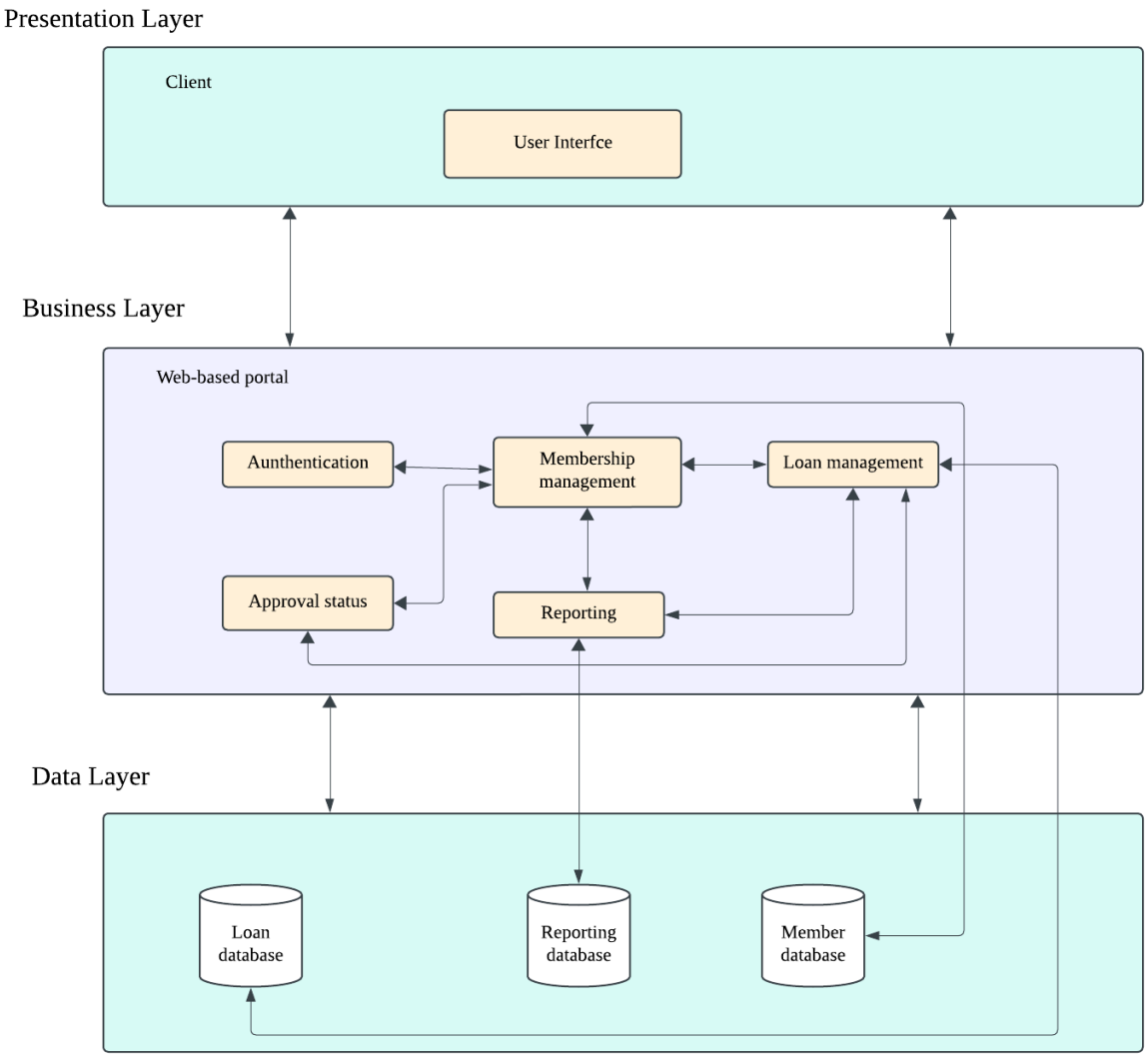


Figure 2.1 System Architecture

2.2 Product Functions

There is a few major functions that the user can perform using this system :

1. Identity Authentication

   In this system, users can verify their identity through the login feature to gain access. If a user forgets their password, they can reset it using the "Forgot Password" feature. This function also can determine their role based on the email inserted.

2. Member Registration

   KADA staff can register as cooperative members by completing an online registration form in the system. Membership is required to access member features in the system where the system will direct guests to the member registration form from “Sign Up”.

3. Loan Application

   KADA cooperative members can apply for loans online by filling out an application form in the system, eliminating the need to visit the KADA cooperative office in person by clicking on the button “Apply” on the List of Loans page.

4. Review Application

   This function allows each person in the BODs of the KADA Cooperative to view, approve, or reject both member and loan applications directly in the system, streamlining the approval process during monthly meetings.

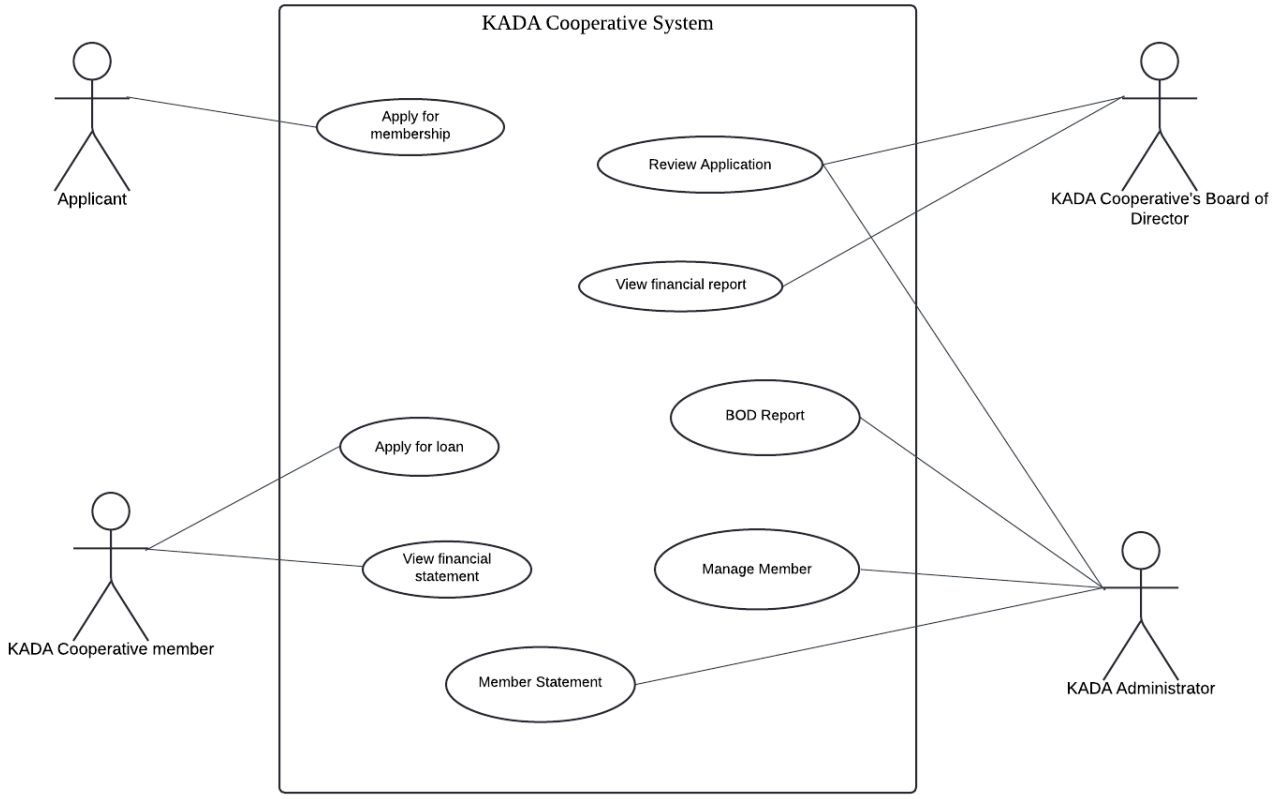


Figure 2.2: Use case diagram of the new KADA Cooperative System

2.3 User Classes and Characteristics

2.3.1 Applicant and member

- Applicant:
  These are the people applying for membership or seeking a loan. They can access the system through an online portal. Their major activities will be to fill in the membership eligibility forms and, upon acceptance, the loan application form. It lets an applicant keep themselves updated on the status of their applications in real time and search for details of particular membership and loan eligibility that best suit their requirements. This user class focuses on ease regarding the submission of the application and visibility into the application process of a loan.

- Member:
  Members include all those cooperative staff members who get accepted as members. They shall be given access to a secure portal on the web. The primary roles carried out by the members are managing their profiles, monitoring their membership status, and applying for loans if not done earlier. Members shall be informed of the available benefits and information on loans, such as type of loan, interest rate, and period of payback. The system should be able to keep them updated about their benefit status and/or any due outstanding action or renewals for or on any loans granted on date. This category emphasizes ease of

access to membership benefits and personal updates on membership and loans.

2.3.2 Administrator

The administrators play a key role in managing and maintaining the KADA system daily. They have full access to the system functionality. They can edit or update the KADA home page, review loan application statistics and check the details of membership and loan application. Administrators are responsible for approving membership and loan applications. They are allowed to view the financial records such as member statements, loan summaries, savings statements and the annual report. All of these permissions, admins require technical expertise to handle the sensitive information securely and maintain the integrity of the KADA system.

2.3.3 Board Of Directors

The Board of Directors or BOD is a significant user class of the KADA Cooperative System, with purposes of monthly meetings and decision making on a continuous basis. They may evaluate member and loan requests, retrieve the financial data, as well as check the system's metrics. The BOD member that holds high-level privileges is able to access classified content that has been passed through the verification process.

Given the wide range of technical skills possessed by members of the BOD, the system is very simple and provides helpful suggestions for them to do their duties. This model helps the cooperative run effectively, and make strategic decisions in an appropriate time frame.

2.4 Operating Environment

Table 1.0 below shows the items and description of the operating environment of the system needed.

Item	Description
Hardware Platform	- 8GB RAM and above - 256GB of storage and above - Single-core processors or multi-core processors
Operating System	- Windows OS
Database	- MySQL
Browser Compatibility	- Modern web browsers like Chrome, Firefox and Microsoft Edge.
Network Requirements	Require a stable, high-speed internet connection to ensure the data transmission between client-server highly secure.

Table 1.0 shows the operating environment of system

2.5 Design and Implementation Constraints

The KADA Cooperatives System even has its own drawbacks. The data administration, financial transactions, and reporting has to comply with the guidelines set by the Malaysian Ministry of Agriculture and Food Security. In addition, the system needs to be operational on medium range devices with low memory and processing capability, which is the case for KADA staff and board members.

In order to facilitate the smooth transition into the digital era, the new system should connect with KADA's already existing storage facilities and accounting applications, which means it has to support older data formats. The system will employ secure and centralized databases, while a web interface will be available to both mobile and desktop users accessible via standard web browsers.

Due to the significant financial value, safety is the primary factor. User authentication and data encryption will help keep unauthorized users away from the system. Furthermore, the system will follow certain development processes in order to ease the system maintenance by KADA's IT worker in the future. This includes proper documentation and programming designed to accommodate further development.

2.6 User Documentation

There are a few document components that users can refer to help them understand more about the system.

1. User Manual
    - A comprehensive manual containing system features, navigation and troubleshooting.
    - Format : PDF

2. FAQs
    - List of frequently asked questions addressing common user concerns and issues.
    - Format : HTML

3. Tooltips (Inline Help)
    - Brief descriptions and formatting tips displayed when users hover over or click a question mark or information icon near specific fields (e.g., form fields).
    - Format : Built into the user interfaces for immediate guidance.

2.7 Assumptions and Dependencies

An assumption regarding the product is that every user has to use the cooperative website with internet access. This may lead to the situation where the website has a few issues, especially when a user has a weak internet connection jeopardizing the effectiveness of the system's user experience. Another assumption is that cooperatives are financially self-sufficient and have adequate resources to meet their financial commitments at all times.

As for the dependencies, the system may depend on the third-party banks or any financial institutes for the purposes of ensuring safe transfer of funds and disbursement of loans. Besides, the system also depends on the email for the admin to send their application approval status.

3. External Interface Requirements

KADA Cooperative System is a web-based cooperative system developed to streamline the process of cooperation by providing an enabling platform where members can apply for loans, check on their application statuses, and manage their profiles online. It has key features that include modules for members, administrators, and the Board of Directors, unique in their interfaces and permissions to execute tasks in a secured and efficient manner. It shall support desktops, tablets, and payment terminals for hardware interfaces. Data storage shall be assured by MySQL. The communication interfaces through email, SMS, and secure Web access keep them updated on application improvements, among other communications, while strong security and compliance are ensured.

3.1 User Interfaces

Prior to any logins even for the members, a dashboard page as depicted in figure 2 should be the first page viewed by a guest user who has browsed the cooperative website for the first time. If the user wishes to apply for KADA Cooperative, they can go to the '?' section and complete the sign up page as shown in figure 3. After the approval of the user membership, the user can now log in, as illustrated in figure 4.

It is only the applicant for membership that can continue to the cooperative loan. Cooperatives' members that are wishing to apply for a loan can easily direct themselves to the apply for loan page illustrated in figure 5. They can access their loan application status at the status section and other details of KADA Cooperative at the dashboard.

Next, for the admin and BOD, they have their own login page as shown in Figure 6. The admin is responsible for the operation of the cooperative information including the cooperation profile, statistics, loan application, financial statement, and report generation. In the member application section, the admin will also be responsible for facilitating the review of the members' applications and their respective details by clicking on their names and modifying the member's checklist as shown in Figure 7. The administrator can also include alterations to the cooperative members' statement and make necessary changes on the annual report for the BOD who will consider it.

As indicated in Figure 8, the BOD has access to information regarding the members' application and their share models. The BOD can also see loans applied by the individual members of the cooperative and the loans that they apply for, as illustrated in Figure 9. They can also look at the finance summary of the cooperative and there are cooperative reports for every year.

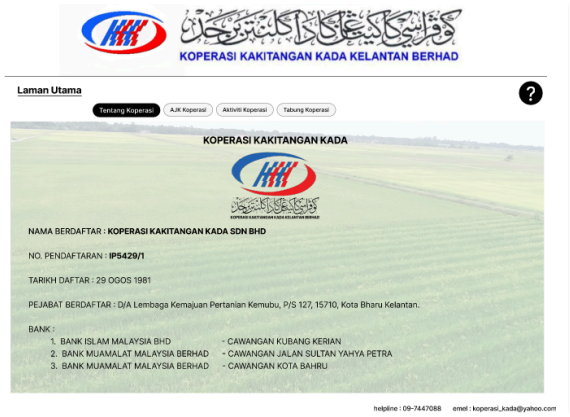


Figure 2 - Dashboard page

Figure 3 - Sign up page

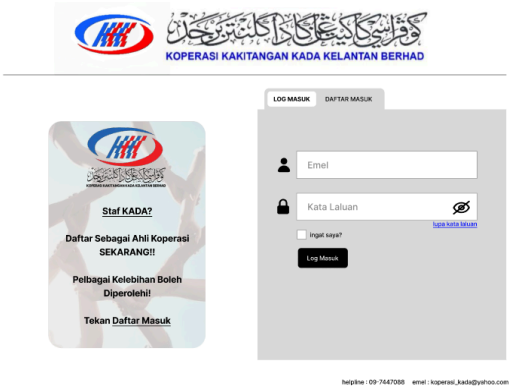
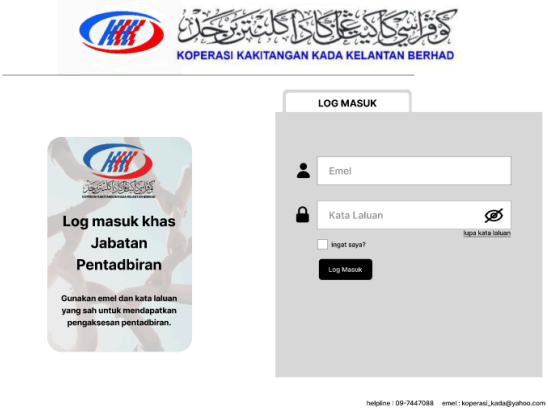


Figure 4 - Member login page

Figure 5 - Loan application



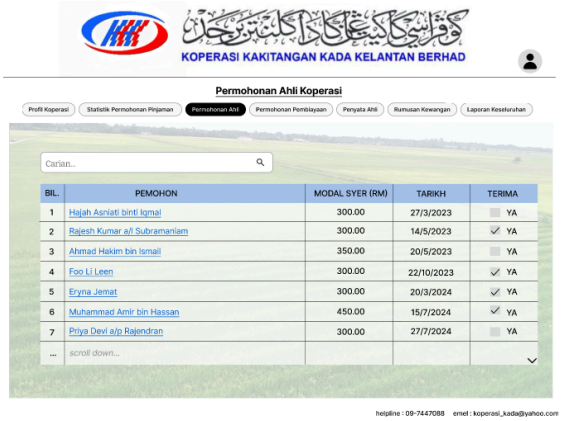


Figure 6 - Admin and BOD login page

Figure 7 - Member application (admin)

Figure 8 - Member application (BOD)

Figure 9 - Loan application (BOD)

3.2 Hardware Interfaces

These are the devices that interface with the system to ensure smooth running for the employees and board members of KADA.

a. Employee Workstations

Device Type: Desktop computers or laptops.

Data Characteristics: The employee workstations interact with the centralized database in order to perform inquiries, submissions, and updates of membership and loan application data in real time. They also facilitate the interaction with automated verification and report generation features.

Control Interactions: Workstations execute client applications that allow employees to fill in membership and loan forms, submit them for review, and view reports.

Communication Protocol: Secure data interchange using TCP/IP network protocols with the server that hosts the centralized database.

Physical Connection: The workstations will connect to the organization's secure internal network via Ethernet or Wi-Fi to ensure that they are always connected to the backend server.

b. KADA Board Member Tablets

Device Type: Tablets

Data Characteristics: These tablets will provide board members with real-time reporting, analytics dashboards, and application review tools for decision-making.

Control Interactions: The tablet interfaces allow the board members to accept and discard applications, view analytics in detail, and create reports directly from the database.

Communication protocol: HTTPS for secure web access via a secure web-browser interface.

Physical Connection: Tablets connect to the system using Wi-Fi or 4G/5G networks securely, which allows mobile access and facilitates decision-making remotely.

c. Database Server

Device Type: Centralized database server, it is about MySQL Server that hosts a secure repository.

Data Characteristics: The server will store and maintain vulnerable data relating to the employees' information, loan eligibility details, payment records, and financial reports on a monthly/yearly basis.

Control Interactions: The server shall handle all read/write operations, enforce encryption of data, and ensure unauthorized persons do not have access to sensitive data.

Communication Protocol: HTTPS/TLS-secure data in transit, integrating protocols for encryption of data in transit and at rest.

Physical Connection: KADA's safe server room; connection to the organization LAN via a firewall to block unauthorized access.

d. Employee Payment Terminal Optional

Device Type: Cash payment terminal to repay loans.

Data Characteristics: This device is used to repay loans in cash by the employee in case he does not opt for deduction from his salary. The device captures the transaction information along with reflecting the loan balance in the database.

Control Interactions: Through the application interface, the terminal will update the central database in real time regarding the payment records by processing and validating the payments.

Communication Protocol: HTTPS or Proprietary protocol is used for encrypted data exchange between Terminal and Database.

Physical Connection: The physical connection is through Ethernet or a secure Wi-Fi from the terminal to the network within KADA's premises.

This hardware interface section defines the type of hardware, data characteristics, control methods, communication protocols, and physical connection the cooperative application and loan system requires. The structure provides a good basis upon which this system should be kept secure, efficient, and user-friendly for both KADA employees and board members.

3.3 Software Interfaces

Table 1.2 shows the connections to other software components :

Item	Purpose	Description
Web Portal	Provides an interactive and responsive interface for system users.	Utilizes PHP as the main portal for accessing the KADA website.
Operating System	Provide the hosting environment for KADA Cooperative System.	The primary operating system for the server is expected to be Windows OS due to its stability and security features. For the client side, the access of the system will be compatible with Windows, macOS and Linux environments.
Database	Stores user data, member records, loan applications, transactions.	The system will use MySQL as the database management system for handling cooperative member data, financial transactions and the system logs.

Table 1.2 shows about the software interfaces

3.4 Communications Interfaces

Communication interfaces play a crucial role in the KADA cooperative system by facilitating communication between users and the system as well as between different system components.

1. Email Interface:
    - Function: Manages sending emails to the users regarding application statuses or new application updates.
    - Example: SMTP (Simple Mail Transfer Protocol) for sending emails to users regarding notifications or loan application statuses.
    - Requirements:
        - The system must support sending emails using the SMTP protocol.
        - Emails must include standard headers (To, From, Subject) and a body.
        - The system should notify users (admin) for any email delivery failures.
        - Users must have the option to opt-in for email notifications.

2. Web Browser Interface:
    - Function: Allows users to interact with the system via a web browser.
    - Example: HTTP/HTTPS protocols for web page requests and responses, ensuring secure communication.
    - Requirements:
        - The application must be compatible with major web browsers.
        - The system must use HTTP/HTTPS protocols for secure data transmission.
        - The interface needs to be adaptable to various screen sizes.

3. Database Connection Interface:
    - Function: Facilitates communication between the application and the database.
    - Example: SQL queries executed over a TCP/IP connection to fetch or store data.
    - Requirements:
        - The system must connect to the database using secure methods, such as TCP/IP.
        - SQL queries must be optimized for performance and prevent SQL injection attacks.
        - Connection pooling should be implemented to manage database connections efficiently.

4. File Transfer Protocols:
    - Function: Allows the system to upload or download files.
    - Example: FTP or SFTP (Secure File Transfer Protocol) for securely transferring financial reports or other documents into the system.
    - Requirements:
        - The system must support secure file transfers using FTP or SFTP.
        - File uploads and downloads must be tracked and recorded for security and compliance.

- The system should implement file size limits and type restrictions to prevent abuse.
- Users must receive confirmation of successful uploads/downloads via in-system notifications.

5. SMS Notification Interface:
    - Function: Manages sending messages to the users regarding application statuses or new application updates.
    - Example: SMS service provider that offers API to send over message.
    - Requirements:
        - Support sending brief messages (up to 160 characters).
        - Ensure data security and user consent for SMS communications.
        - Any message delivery failures must be notified by the system to the user (admin).

4. System Features

KADA Cooperative System is designed as the ultimate backbone of cooperative operations: the secure, role-based access for members, administrators, and board members. With a user-friendly login interface, membership registration, loan application, viewing financial statements, administrative management, review application this system enhances user experience, data security, and efficiency in daily operations. It manages members' profiles and applications online, administrators can track and update user information, and the board members review applications and generate reports. The KADA Cooperative System uses a protected, automated interface to support safe and efficient digitalization within the cooperatives.

4.1 System Feature 1 : Login

Use Case : Login
ID : **UC1**
Actors: 1. KADA Member 2. KADA Administrator 3. KADA BODs
Preconditions: 1. All users must have registered in the system.
Flow of events : 1. The users visit the main homepage of the system. 2. The users click on the profile icon. 3. The system displays “Login” and “Register” buttons. 4. The users click on the “Login” button. 5. The system displays the login page. 6. The users input their email and password and click “Login”. 7. The system validates the data. 8. If the data is not correct 8.1 The system displays a message to try again. 9. Else 9.1 The system displays the homepage for verified KADA users.
Postcondition :
Alternative flow :

4.1.1 Description and Priority

System login tools enable the user to enter the system by their roles whether they are members or admin or BOD. It is to prevent unauthorized users from easily accessing the system and to protect

confidential information such as member financial data, loan information and more. The secure login reassures users that their information and financial activities are protected which also increases the confidence in the cooperative's digital services.

- **Benefit:** 9 - Role-based access is critical.
- **Penalty:** 9 - Failing to implement the secure login system may expose the cooperative to serious risks.
- **Cost:** 5 - The costs are moderate and manageable.
- **Risk:** 7 - Require diligent management and mitigation strategies

4.1.2 Stimulus/Response Sequences

1. **Stimulus:** A user enters their email and password, then clicks the "Login" button.
   System Response: The system first validates the user.

2. **Stimulus:** The system validates the email and password successfully.
   System Response: The system initiates the user sessions and redirects the user to their respective dashboards.

3. **Stimulus:** The user enters an incorrect email or password.
   System Response: The system prompts an error message.

4. **Stimulus:** The user clicks on the "Forgot Password" link.
   System Response: The system prompts the user to enter their registered email address or phone number and will send a password reset link via email or SMS.

5. **Stimulus:** The user clicks on the "Logout" button.
   System Response: The system ends the user session and redirects the user to the login page.

4.1.3 Functional Requirements

- **REQ-1:** The system must implement user authentication by user's email id and password confirmation
- **REQ-2:** The system should allow the email ids and Passwords to be case sensitive.
- **REQ-3:** The system should not allow unauthorized access to users with invalid credentials and give an error message.
- **REQ-4:** The system should recognize different user roles when a user logs in successfully and take the user to a dashboard of his or her role.
- **REQ-5:** The system should limit users from accessing certain features based on the user role.
- **REQ-6:** The system needs to include a "Forgot Password" alternative on the login page.
- **REQ-7:** The system should provide a password reset link to the user via email or SMS.
- **REQ-8:** The system must keep the user logged in once he / she has managed to login successfully.

- **REQ-9:** The system shall enable members to log out at will by clicking the “Logout” prompt button and terminate the sessions instantly.

4.2 System Feature 2 : Member Application/Registration

Use Case : Member Application/Registration
ID : UC2
Actors: 1. Applicant 2. KADA Administrator
Preconditions: 1. The KADA Cooperative System's website can be accessed by the user. 2. The registration form had to be filled by the applicant together with all necessary notes.
Flow of events : 1. The user signs in and finds the compartment of the registration form. 2. The user fills out the form as required. 3. The user presses the submit button. 4. The system assures that their subjects are complete and true. 5. The application is assessed and the competent authority takes a decision on the acceptance or rejection of the application. 5.1 If permitted, the system creates a member id. 5.2 If not, a note containing the grounds for refusal may be recorded. 6. The system dispatches an email to the requesting user with the following content: 6.1 If Yes: contains login details. 6.2 If No: gives information on the reasons for the denial.
Alternative flow : Incomplete application: Where there is incomplete information provided, the system encourages the applicant to complete this section.
Postcondition : 1. The candidate is emailed an update regarding their application status. 2. Approved candidates get a Member ID and access to his/her account.

4.2.1 Description and Priority

Thanks to the development of the Member Application tool, KADA workers are able to send their applications for cooperative membership online instead of filling numerous forms prior to waiting for the approval. This feature is important as it quickens the registration process, reduces administrative work overload and increases member satisfaction.

- **Benefit**: 8 – Swiftly improves process and eases user experience greatly.
- **Penalty**: 7 – Without this feature, management bottlenecks and other inefficiencies exist.
- **Cost**: 5 – Development and other related costs are moderate.

- **Risk**: 3 – Low-risk primarily involves aspects of user acceptance and systems reliability.

4.2.2 Stimulus/Response Sequences

1. **User Action**: The user signs in to the system and goes to the page where registration is done.

   System Response: The registration page where membership details are to be filed is presented.

2. **User Action**: Staff input the required details and proceeds to the submission of the application stage.

   System Response: Checks the information and stores it within the database; otherwise, the user is verbally prompted to enter corrections if an error is detected.

3. **User Action**: Admin reviews the request and takes appropriate action by changing the application status to 'Approved' or to 'Rejected'.

   System Response: An employee is updated by a status message issued as an email

4. **User Action**: Log in using the credentials provided for members who have been approved.

   System Response: Member-level functionality is made available.

4.2.3 Functional Requirements

- **REQ-1**: A registration form must be provided by the system with details for personal data.
- **REQ-2**: The system should validate the information entered by the user to check that it is complete and in the correct form.
- **REQ-3**: The system should keep all membership applications that have been verified in a protected database.
- **REQ-4**: The system shall provide functionality for administrative users to view applications and change their statuses.
- **REQ-5**: The system should be capable of sending out emails to employees when there are changes on the status of applications.
- **REQ-6**: Every candidate who has been approved will be given a distinct Member ID, which will be held in a safe manner.
- **REQ-7**: The system must issue log in details to new members to enable them access members only parts of the system.

4.3 System Feature 3 : Loan Application

Use Case : Loan Application
ID : UC3
Actors: KADA Cooperative Member
Preconditions: The user must be a registered KADA Cooperative Member.
Flow of events : 1. Members select the "Loan Application" option on the system interface. 2. System displays the loan application form with required fields. 3. Members fill in all the necessary details and submit the application form. 4. System validates the application details for completeness and accuracy. 5. System shows the successful send of the form pages. 6. System saves the application data and provides a confirmation with a unique reference number.
Alternative flow : - Incomplete information : If the user leaves the required fields blank, the system displays an error message asking the user to complete the information before submit.
Postcondition :
Alternative flow : - Invalid information : If data entered is invalid or does not follow the formatting, the system prompts the user to correct the data.
Postcondition : The loan application form is submitted and the user awaits the successful status.

4.3.1 Description and Priority :

The feature enables users to submit a loan application through the system by providing necessary personal information and financial details. This feature is crucial to the loan process as it was the first step for the loan request. This step also ensures either the applicant is eligible or not to apply for the loan. Priority : High

- **Benefit** : 8 - Allow members to apply for loans conveniently and efficiently through an automated system.
- **Penalty** : 9 - Missing this feature leading to dissatisfaction among members and potential financial losses.
- **Cost** : 6 - Cost is manageable given its importance and impact.
- **Risk** : 5 - Poses moderate risk including data entry errors, incomplete information and potential system failures during application process.

4.3.2 Stimulus/Response Sequences :

1. **User Actions :** Cooperative member selects “Loan Application” on the tab above the KADA System dashboard.
   System Response : The system displays the loan application form.
2. **User Actions :** Cooperative members fill in the required information.
   System Response : The system validates the entries for completeness and accuracy.
3. **User Actions :** The user submits the application form.
   System Response : System displays the successful application and saves the application data.

4.3.3 Functional Requirements :

- **REQ-1 :** The system should display the loan application form when the user clicks the “Loan Application” button.
- **REQ-2 :** The system should require users to complete all the required fields inside the form.
- **REQ-3 :** The system must validate each field to check that the data is in the correct format or not.
- **REQ-4 :** The system should provide error messages if the user incomplete or incorrectly formatted the input fields and prompt the user to correct the errors before submitting.
- **REQ-5 :** After submitting the loan application form, the system should save the application data in the database and generate a reference number.
- **REQ-6 :** The system must notify the user of successful completion and display the references number for future use.

4.4 System Feature 4 : Member Statement

Use Case : Member Statement
ID: UC4
Actors: KADA Member (cooperative members)
Preconditions: The user has been able to log into the system successfully and has provided valid credentials.
Flow of events: 1. The user accesses the system using his or her credentials and selects the "Member Statement" section. 2. The Member specifies the type of statement they wish to see (for instance, statement of savings balance or statement of loan balance). 3. The relevant statement is retrieved and displayed on the system with the latest available data. 4. If required, the Member is provided with an option to save the statement in any format as per his/her wish (for instance, in PDF format).
Alternative flow: Data Not Found: In the event that the system encounters a challenge in retrieving data, it will inform the User and suggest to him/her to try again later.
Postconditions: When requested, the financial statement of the member is submitted or made available for download.

4.4.1 Description and Priority

Member Management will provide the facility of the members managing their profiles, loan applications, and view financial statements relating to their membership. A core functionality that allows members to have a self-serving, easy-to-use interface to manage their membership tasks, hence improving their overall experience and efficiency of the system.

- **Benefit**: 9 - Improves member engagement and system effectiveness.
- **Penalty**: 8 - If it's not developed, for example, the processes stay manual and really hard for the members.
- **Cost**: 6 - Reasonable cost to develop; hence, the grade is average.
- **Risk**: 5 - Low risk if deployed in a secure way.

4.4.2 Stimulus/Response Sequences

- **User Action**: Members of the website update any profile information.

  System Response: System updates this new information into the database and reflects this change immediately into the member's account.

- **User Action**: The member applies for a loan.

  System Response: The system provides the interface to apply for the loan; it should present the fields to populate the loan details along with related eligibility criteria.

- **User Action**: Members request their current financial statement.

  System Response: The system fetches and shows the current financial data of the member, including loan balances, savings, and recent transactions concerning their membership.

4.4.3 Functional Requirements

- **REQ-1**: Profile Management
  - Members should be allowed to view and make changes to their personal details, contact information.
  - The system shall confirm any changes in the profile for accuracy, for example, right format for a phone number, and the change shall be saved at once.
- **REQ-2**: Loan Application Interface
  - Members shall be provided with an interface to apply for a loan whereby they shall fill out loan details.
  - The system should highlight the relevant eligibility information. The system shall validate loan data, including loan amount and loan purpose, before form submission.
- **REQ-3**: View Financial Statement
  - The members should have a financial statement displaying their current standing as regards loans taken, savings, and recent transactions.
  - This statement should change dynamically upon new changes in members' financial activities with the cooperative.
- **REQ-4**: Notification of Loan and Financial Updates
  - Any changes in loan applications or financial status shall be informed to its members via the system.
  - The notifications shall be indicated on the member's dashboard and via email notification, if so desired, on the condition that the member has subscribed to such notifications.

4.5 System Feature 5 : BOD Reporting

Use Case : BOD Reporting
ID: UC5
Actors : KADA Board of directors (BOD)
Preconditions : The board member successfully accessed the system with the appropriate login information.
Flow of events : 1. The BOD Member signs into the system and navigates to the section with reports. 2. The BOD Member picks the type of report which they wish to look at (e.g. report on members, report on loan approvals). 3. The system generates the requested report with the latest information available and displays it. 4. The report can be filtered and sorted by the BOD Member as per his/her needs. 5. The BOD Member decides whether to save the report or to export it (for instance in PDF, excel etc).
Alternative flow : Report Filter Unavailable: In the event that certain data or filter is unavailable, the system alerts and advises the BOD Member of alternative filters or views.
Postconditions : The BOD Member presents the requested report or downloads it in the mode they have selected.

4.5.1 Description and Priority

The BOD Reporting tool is designed to deliver real-time information on memberships, loans, savings as well as other financial activities. It merges data to help with making informed decisions, applications inspection, and analysis of the corporation's performance. This system is essential for clarity, speed and effectiveness in making decisions, as well as observation.

- **Benefit**: 9 - Ensures strategic resolving of issues and control execution.
- **Penalty**: 8 - Without this capability, decision-making would be based on old or absent information.
- **Cost**: 6 - With the requirement of collecting and securing data in real-time, the expense is on the higher side.
- **Risk**: 4 - Data security and integrity are at the Medium risk level.

4.5.2 Stimulus/Response Sequences

- **User Action**: The BOD Member accesses the system and chooses the reporting segment.

  System Response: A dashboard loaded with options of different types of reports is displayed.

- **User Action**: A member of the BOD chooses one of the reports, for example, Loan Approval Summary.

  System Response: The system generates the relevant report to the user's request with current data and with the possibility of filtering and sorting the results.

- **User action**: A BOD member exports or downloads the report for further consideration.

  System Response: The report can be downloaded in the following formats: pdf, excel, etc.

4.5.3 Functional Requirements

- **REQ-1**: The solution must be equipped with a visual interface where one can also see data and the different selections for report generation at the same time.
- **REQ-2**: The system should be able to compile information on such matters as membership approval, loan approval, and financial overviews among other issues.
- **REQ-3**: The system should facilitate the issuance of reports with specific parameters like dates or approval status filtered or sorted.
- **REQ-4**: The system must permit the members of the Board of Directors to save different reports in the pdf and excel formats.
- **REQ-5**: The system has to ensure that all submitted reports are accessible only by the BOD members who have any credentials designated for them.
- **REQ-6**: The system shall not take too long before the reports are updated with the latest information available.

4.6 System Feature 6 : Admin Management

Use Case : Manage Member
ID : **UC6**
Actors: KADA Admin
Preconditions: The user must be an authorized KADA Administrator with appropriate system access.
Flow of events : 1. Admin logs into KADA System with their specified email and password. 2. System grants access to the admin page, providing options for editing and monitoring the system, managing the data and user management. 3. Admin views the details of the applicants of the membership and loan applications. 4. Admin selects a specific task such as editing the home page, managing the application statuses, editing the statement or updating the reports. 5. System performs the requested task and confirms the successful completion.
Alternative flow : Unauthorized Access : If an unauthorized user attempts to access the administration dashboard, the system denies the access and logs the attempt.
Postcondition : Admin tasks are performed successfully to ensure the system integrity and availability.

4.6.1 Description and Priority

The System Administrator function allows the administrator to manage and sustain various elements in KADA Cooperative System including user profiles, the status of the members and their loan requests. This functionality also helps in ensuring proper maintenance of the data within the cooperative, that is accurate, current and managed in a safe environment. It is an essential component in the day to day functioning and reliability of the system as a whole.

- **Benefit**: 9 - Facilitates effective user and information handling leading to smooth functioning of the system and security.
- **Penalty**: 7- Service management is very critical to the system that low accuracy, certainty and user friendliness may be experienced.
- **Cost**: 5 - The outlays are fairly bordering on the average though there is the need to put in place measures of protecting the data employed.
- **Risk**: 4 - The risks are also fair, dealing mostly with safety and protection of the information.

4.6.2 Stimulus/Response Sequences

1. **User Action**: The user who has administrative privileges accesses the system and goes to the Admin Dashboard.
   System Response: The screen presents options for managing users and memberships as well as processing loan applications.
2. **User Action**: For the purpose of editing or removing users the administrator clicks the “Manage Users” option.
   System Response: The system lists its users and allows viewing their accounts, editing these accounts, or deleting the accounts when needed.
3. **User Action**: The administrator activates “Review Membership Applications” and operates on all the applications in the queue.
   System Response: The system allows the administrator to approve and disallow membership applications with the provision such that he or she can write comments concerning the rejection.
4. **User Action**: The Administrator selects "Loan Applications" in order to assess, accept, or change the loan status.
   System Response: The suitable screen is presented displaying details on loan application, thus providing the chance for the administrator to change the status of the loan and notify applicant.

4.6.3 Functional Requirements

- **REQ-1**: The system should incorporate an admin dashboard that is capable of supporting user management, membership management and loan management functionalities.
- **REQ-2**: It should also enable the administrator to perform the locked down functionalities of adding, editing or removing user accounts.
- **REQ-3**: The administrator should also have the ability to either approve or disapprove new membership applications with the option to add comments where necessary.
- **REQ-4**: The system should also enable users to view and approve loan requests, and also change the status of the loan.
- **REQ-5**: The system should restrict access to administrative controls and information to only those administrators that have been granted such access.
- **REQ-6**: An alert must be issued to the applicants whenever there is a change regarding their membership status or loan application status.

4.7 System Feature 7 : Review Application

Use Case : Review Application
ID: UC7
Actors: KADA Board of Director
Preconditions: 1. BODs are logged on to the system.
Flow of events: 1. BODs go to the list of application pages. 2. The system displays a list of applications. 3. include (Find Application) 4. If BODs click on applicant's name 4.1 The system displays application details in a popup size. 5. BODs approve or reject application by clicking "Approve" or "Reject" button 6. The system display message indicates the decision is successful. 7. BODs click "OK" to close the popup.
Postconditions:
Alternative flow: 1. At any point, BODs can move to different pages.
Postconditions:
Alternative flow: 2.
Postconditions:

4.7.1 Description and Priority

The review application feature is a function where the BODs can review, access, approve, or reject both member and loan applications. This function enables the BODs to review applications efficiently and faster since the BODs can have access to application details by clicking on the applicant's name only.

- **Benefit**: **9** - Improve BODs process or meeting to review the applications.
- **Penalty**: **6** - The review application still can be done manually without the system.
- **Cost**: **8 -** It might be costly because this process includes email/SMS connections to send application status to applicants and might be using SMS services provider API.
- **Risk**: **7 -** The risk is quite high since all the data in the application must be true

and is not tampered with to make sure the decision-making process is genuine.

4.7.2 Stimulus/Response Sequences

1. **User Action**: The BODs click on “Membership Registration” or “Loan Application” on the tabs section.

   System Response: Displays the list of applications.

2. **User Action**: The BODs click on the applicant’s name.

   System Response: Displays the application details in a medium popup size.

3. **User action**: The BODs click on the “Approve” or the “Reject” button.

   System Response: Display message indicates decision is successful or not.

   System Response: Send an email/SMS to the applicant containing the application status.

4.7.3 Functional Requirements

- **REQ-1**: The system should allow the BODs to view all the application details.
- **REQ-2**: The system should allow the BODs to approve or reject an application using on-screen buttons.
- **REQ-3**: The system should allow the BODs to close the application detail by clicking “X” or outside of the popup area.
- **REQ-4**: The system should allow the BODs to move to other pages.
- **REQ-5**: The system should notify the BODs whether the decision is successfully recorded or not.

5. Other Nonfunctional Requirements

5.1 Performance Requirements

The KADA Cooperative System is designed to manage membership and loan applications efficiently, with strong performance, security, and accessibility. It allows for only role-based access in which the administrator and board members can add, approve, and view applications, while members have access to personal information and the ability to apply for a loan. It assures high availability, data accuracy, secure real-time transaction, backup, and recovery while allowing the integration of payroll systems without much hassle for loan repayments.

5.1.1 System Authentication

ID: QR1
TITLE: Quick authentication and data retrieval.
DESC: The system has to authenticate the user and load the corresponding role-based dashboards to the user within a 2 seconds time span. In addition, retrieval of member information and loan application should take not more than 3 seconds to give a friendly usage to the users.
RAT: Very important in keeping the user engaged and satisfied.

5.1.2 System Scalability

ID: QR2
TITLE: System scalability
DESC: The system must allow for 1,000 users to be active at the same time and process data related to 100,000 members with no serious drop in system performance.
RAT: Important in preparing for future expansion and meeting users' phenomenal needs.

5.1.3 System Availability

ID: QR3
TITLE: System availability
DESC:The system is expected to work 100% of the time with only 8 hours of the downtime allowed for a year to enable users to have uninterrupted access.
RAT: Essential in ensuring uninterrupted service and maintaining user confidence.

5.1.4 Transaction

ID: QR4
TITLE: Transaction processing capacity
DESC: The system will be required to process transactions at a rate greater than 50 TPS during busy periods without any performance degradation.

RAT: Needed for the efficient functioning of the system under peak load conditions.

5.1.5 Data Accuracy

ID: QR5
TITLE: Data accuracy and data consistency
DESC: The system will ensure that all updates are corrected in real time and will have the data locked for a maximum 1 second in case of any changes.
RAT: Needed to maintain confidence in the management of data and interactions with the users.

5.1.6 Load Handling

ID: QR6
TITLE: Load management and endurance to stress
DESC: The system shall suspend a user load increase for an additional 40% above to a typical peak load while maintaining the performance of the system.
RAT: Useful for availability during inordinate use spikes.

5.1.7 Security Efficiency

ID: QR7
TITLE: Security efficiency
DESC: System performance should not be impaired by any security features, particularly encryption, which should not add more than 10% on response times.
RAT: Important in maintaining the security level expected as well as the user experience satisfaction.

5.1.8 Optimization

ID: QR8
TITLE: Optimized resource usage
DESC: Normal operating conditions should see the system average CPU and memory usage not exceeding 75% in order to facilitate efficient operations.
RAT: Important in avoiding any performance constraints from occurring.

5.2 Safety Requirements

Since the BOD Report Generation function provides details that contain sensitive financial and membership data, this will be strictly controlled to prevent unauthorized access to information, data breaches and misuse of personal information.

5.2.1 Data Encryption

All data passing over the system, including reports and login details, shall be protected against unauthorized access by encryption using AES-256.

5.2.2 Access Control

The reporting functionality will only be available for the authorized BOD members to access with the right login details. Multi-Factor Authentication (MFA) should be implemented so that even allowed users can access the confidential reports only after verification of their identity.

5.2.3 The Role of Audit Trails and Logging

The system should maintain detailed records of every access as well as actions taken using the reporting capabilities. Doing so would allow for tracking and examination of any questionable or unauthorized activity and assist in providing evidence in case of breach of data protection.

5.2.4 Standard security audits

By the industry standard, security audits of the system shall be carried out on a quarterly basis to identify vulnerabilities in the reporting systems and address them. In order to preserve the integrity of the system, any findings during the audit will be addressed immediately.

5.2.5 Respect for Data Protection Laws.

The BOD Reporting feature must meet any data protection laws, such as the Personal Data Protection Act (PDPA) of Malaysia provisions for the protection of personal data.

5.2.6 Data Backup and Recovery

In order to prevent loss of data in case of a crashed system or cyber sabotage, all the reports and critical information must be stored daily in a different safe place away from the main system. There should be provision in the system for restoration of data within the shortest time possible in case it is lost due to disastrous occurrences.

5.2.7 Safety Certifications

The system shall comply with the requirements of ISO/IEC 27001, the international standard for information management systems, which encompasses the implementation of measures to safeguard confidential information.

5.3 Security Requirements

1. Authorization

- The system should require only users with authority to have access and be able to manage the system data.
- The RBAC should be implemented to allow only administrators and BOD to view all the system data but the members can only access their own data.

2. Data Integrity

- The system should be able to make sure all the data in the system remains accurate and is not being tampered with.

3. Access Control

- The system should have restrictions on who can perform certain actions or view certain data within the system.
- Only administrators can do CRUD activities on the system data and the BOD can have access to approving the application through the system.

5.4 Software Quality Attributes

This section provides the quality attributes that are important in realizing the functionality, reliability, and usability of the KADA Cooperative Application and Loan Application system. This shall be done in line with KADA's interest in an effective, accessible, and correct application management-solution for both employees and board members.

5.4.1 Adaptability :

The system shall be such that it could be easily adapted to possible future changes in the policies of KADA on its cooperatives on the limit of loans, eligibility, and membership benefits.

Measure: The policy parameters updates, such as the interest rate on loans or the period for repayments, should be changeable by administrators through a settings interface at any time without any system downtime and within 10 minutes.

5.4.2 Availability :

The need: The variety of KADA staff and board members who might access the system at any one given time means that it has to be highly available especially during working hours that is from 8.00 AM - 6.00 PM.

Measure: System uptime during business hours shall be no less than 99.8%, given there is not more than 5 minutes of actual downtime per month outside of maintenance windows. In the event of unplanned failure, automatic failover mechanisms restore operations in under 10 minutes.

5.4.3 Correctness :

Requirement: Calculations of eligibility checks, amount of loan granted, interest accrual, and payment schedule shall be done correctly to support fairness and full transparency for the processing of employee applications.

Measure: Financial and eligibility calculations should have zero error tolerance. This shall be ensured by performing end-to-end testing on 100 loan applications. The success rate in test cases should be at least 99.9% related to financial accuracy.

5.4.4 Flexibility :

The system shall provide web access to all KADA employees and mobile access to the board members, considering that board members may need to approve or review applications remotely.

Measurement: Optimized for at least three classes of devices: desktop, tablet, and smartphone, with a consistent user interface across all supported form factors. Compatibility testing should be able to ensure 100% expected performance for the essential features on each of the platforms.

5.4.5 Interoperability

Requirement: The system will be able to integrate with payroll systems at KADA for the deduction of loan repayment for those employees who choose payroll as their means of paying loans.

Measurement: Integration with payroll system shall be performed correctly and has to finish each transaction in less than 5 seconds, as confirmed through stress testing done under peak load conditions.

5.5 Business Rules

The section of the KADA Cooperative System highlights the key roles and responsibilities in which the members of KADA Cooperative can view their own information and submit the loan applications. Admin has full access and manages users and reports. Admin also can approve loans and the financial officer handles payments and reports. Operational principles including inside the KADA Cooperative System are loan approvals managed by the admin, real-time transaction recording and admin approval membership. This can secure access controls by using unique logins, verification for sensitive actions and session timeouts.

6. Other Requirements

The system complies with the Electronic Transactions Act 1999 in providing legally valid electronic signatures for digital contracts, while compliance with the Personal Data Protection Act of Malaysia secures personal data through appropriate handling, user consent, and data retention policies.

6.1 Legal Requirements

A. Electronic Signature Compliance

- The system must support electronic signatures in compliance with the Electronic Transactions Act 1999, ensuring electronic contracts are legally binding.
- If the system requires users to sign documents digitally (e.g., in loan applications), it must comply with electronic signature laws to make these agreements legally enforceable.

B. Data Protection and Privacy Laws

- The system must comply with the Personal Data Protection Act (PDPA) of Malaysia to ensure that all personal data collected, processed, and stored within the system is handled responsibly and securely.
- This law might cover user consent for data collection, data retention policies, and users' rights to access or delete their data.

Appendix A: Glossary

This document use the following terms and abbreviations:

Term	Descriptions
OS	Operating System
KADA	Kemubu Agricultural Development Authority
MFA	Multi-Factor Authentication
PDPA	Malaysia’s Personal Data Protection Act
SMS	Short Message Service
ID	Identification
QR	Quick Response

RAT	Required Action Type
CPU	Central Processing Unit
DESC	Description
TPS	Transaction Processing System
REQ	Requirement
HTTP/HTTPS	HyperText Transfer Protocol / HyperText Transfer Protocol Secure
FTP/SFTP	File Transfer Protocol / Secure File Transfer Protocol
API	Application Programming Interfaces
SMTP	Simple Mail Transfer Protocol
PHP	PHP: Hypertext Preprocessor

Appendix B: Analysis Models

Appendix C: To Be Determined List

SRS V1.0 [Agile]

SECJ2203: Software Engineering

System Documentation (SD)

KADA Cooperation System

Version 2.4

12th February 2025

Faculty of Computing

Prepared by: KodeLab

Revision Page

a. Overview

This current version of the documents outlines the requirements for the system, focusing on the earlier development of the system. It included the following sections :

1. Introduction includes the purpose, scope, definitions, acronyms and abbreviations, the references and also the overview of the system and the project.
2. Specific requirements provide the persona, system features, user story, along with the non-functional requirements and also the system's design constraint.

This version of the document reflects the state of the system during the Sprint 0 of the development and can act as the references for stakeholders of KADA Cooperative and the future developers team to understand the developed function and its functionality of the system.

b. Target Audience

1	Documentation writer
2	Project manager
3	Board of director
4	Applicant and member
5	Administrator

c. Project Team Members

Member Name	Role	Task	Status
Lubna Al Haani	Leader	1.5.0 Overview	Complete
		2.1.2 Persona 2	Complete
		2.2.3 State diagram	Complete
		2.4.7 User story 2	Complete
Nabil Aflah Boo	Member	Section introduction	Complete
		1.2.0 Scope	Complete
		2.1.4 Persona 4	Complete
		2.4.1 User story 4	Complete
Nur Firzana	Member	2.1.2 Persona 2	Complete
		2.2.2 Class diagram	Complete
		2.3.0 Launch phase	Complete
		2.4.2 User story 2	Complete

Nurul Adriana	Member	1.1.0 Purpose	Complete
		2.2.1 Use case diagram	Complete
		2.6.0 Design constraint	Complete
Pravinraj	Member	Target audience	Complete
		2.1.1 Persona 1	Complete
		2.5.0 Functional and Non-functional requirement	Complete

d. **Version Control History**

Version	Primary Author(s)	Description of Version	Date Completed
2.0	Lubna Al Haani (Team leader)	Completed Sections 1.5 and 2.1.2	29/11/2024
	Pravinraj A/L Sivabathi (Team Member)	Completed Target Audience	
2.1	Nur Firzana (Team Member)	Completed Section 2.1.3	30/11/2024
2.2	Lubna Al Haani (Team leader)	Completed Sections 2.2.3 and 2.4.2	01/12/2024
	Nur Firzana (Team Member)	Completed Section 2.4.3, Section 2.2.2 and Section 2.3	
	Pravinraj A/L Sivabathi (Team Member)	Completed section 2.1.1	
2.3	Nur Firzana (Team Member)	Updated Section 2.1.2	11/02/2025
	Pravinraj A/L Sivabathi (Team Member)	Completed section 2.5.0	
2.4	Nur Firzana (Team Member)	Updated Section 2.4.2	12/02/2025
	Lubna Al Haani (Team Leader)	Updated Section 1.1, Section 2.1.1, Section 2.2.1 and Section 2.4.1	
	Nabil Aflah Boo (Team Member)	Updated Section 2.3, 2.5 and 2.6	
	Pravinraj A/L Sivabathi (Team Member)	Updated section 2.4.4 and 2.5	

Note:
This System Documentation (SD) template is adapted from IEEE Recommended Practice for Software Requirements Specification (SRS) (IEEE Std. 830-1998), Software Design Descriptions (SDD) (IEEE Std. 10161998 1), and Software Test Documentation (IEEE Std. 829-2008) that are simplified and customized to meet the need of SECJ2203 course at School of Computing, UTM. Examples of models are from Arlow and Neustadt (2002) and other sources stated accordingly.

Table of Contents

1. Introduction

The KADA Cooperative System is a website platform designed to reduce the manual work processes of the cooperative. This system provides several functionalities such as managing members, loan applications, and financial reporting. This system helps to boost the cooperative efficiency by enabling the real-time access and automated process of applications.

1.1 Purpose

This Software Requirements Specification (SRS) document presents the KADA Cooperative System, a web-based product intended to enhance the operation of cooperatives through digitization of membership and loan applications. This document outlines the comprehensive scope of development for the system and serves as a guide for evaluating it as a reference for key stakeholder groups, including project managers, developers, testers, and consultants.

Technical Objectives

a) From this definition, derive the functional and non-functional requirements of the system consistent with those demanded by users and project goals.
b) Leave a space for iterative development and delivery of features within the Agile framework with clarifications on how this should be implemented for flexibility and continuous improvement.
c) This acts as a basis for checking how the system complies with legal, security, and quality requirements.

User Benefits

a) Replace the inefficient, manual processes with a safe, user-friendly online alternative in order to facilitate the collaboration outcome.
b) Offer an improved accessible interface and real-time updates at any time, to members, administrators, and the Board of Directors.
c) Save trees and go green by reducing paper consumption.

This SRS shall be meant for internal development teams and external system consultants, who will read and evaluate it as an iteration step in the project. This document is really important for communication between all involved parties and their successful collaboration.

Intended Audience and Reading Suggestions

1. Project Managers: Use the Overview, Scope, and Functional Requirements sections to plan timelines and align deliverables with user needs.

2. Developers & Testers: Use the Functional Requirements, System Features, and User Stories sections to guide system development, implementation, and testing.

3. Documentation Writers: Use the entire document to create user manuals and guides for different user roles, ensuring clarity and usability.

4. KADA staff: Refer to the Overview, User Role Definitions, and Functional Requirements sections for membership, loans, and account details.

5. Administrators: Refer to the Administrative Functions section for managing accounts, communications, and reports.

6. Board Members: Review the System Reports and Oversight Tools sections for insights into cooperative performance, financial reporting, and strategic decision-making.

1.2 Scope

a) The software product is called KADA Cooperative System.

b) The product should also be able to send notifications via email and SMS to the members to inform them their applications status. Some of the functions of the products are apply for membership, apply for loan, view financial statements, manage member and member statements, manage BOD report, review application, and view financial report.

c) This software product will be used by four target audiences which are applicants, cooperative members, administrators, and board of directors. Each audience will be directed to each different portal where only the specific audience can access the portal. The product helps to minimize the manual work processes and enhance user experience through the role-specific interface. It's to achieve a better understanding of the system architectures and its functions, also to serve as potential enhancement by ensuring adaptability evolves the cooperative's needs.

1.3 Definitions, Acronyms and Abbreviation

Table 1.3.1 : Definitions, Acronyms and Abbreviation

Terms	Definitions
KADA	Kemubu Agricultural Development Authority
BOD	Board of Director
SD	System Documentation
Admin	Administrator

1.4 References

[1] Dennis, A., Wixom, B. H., & Tegarden, D. (2015). *Systems Analysis and Design: An Object-Oriented Approach with UML* (A. Dennis, B. H. Wixom, & D. Tegarden, Eds.). Wiley.

1.5 Overview

Following the introduction, the SD document will delve into the specific system requirements. It begins by presenting the personas of the users and the system features, which include detailed use cases, class diagrams, and state diagrams. Additionally, the requirements also included user stories for each use case, along with the functional and non-functional requirements, and design constraints.

The SD document is organized into sections to provide a comprehensive and organized view of the system's requirements aspects. After the introduction, the specific requirements section are divided into subsections and organized as following :

1. Persona
   This subsection describes all the system's user types or actors including their user story with the system.

2. System Features
   This subsection provides graphical representation of the system: the use case diagram, class diagram and state diagram.

3. Launch Phase
   This is where the product backlog and the sprint phase for the system is provided.

4. User Story Details
   Each user story is provided with user story description along with supporting graphical representation which is the activity diagrams and sequence diagrams.

5. Performance and Other Requirements
   This subsection provided the functional and also the non-functional requirements such as system performance and attributes.

6. Design Constraints
   This subsection highlights the constraints that are imposed by the organisation for the systems to adhere such as hardware and security constraints.

2. Specific Requirements

This section of SD will show the details of all software requirements of the KADA Cooperative System. These requirements are specific to guide the designers in creating a system that satisfies users' requirements while enabling developers to implement such features. Besides, it allows the testers to validate whether the system matches its intended purpose. Each of the system requirements will include their inputs, outputs and function to the system. The users are given their specific roles and responsibilities within the system to ensure the system is streamline with their goals effectively. This section should be able to provide a better understanding of the intended audience and form the basis for the design and development of the system.

2.1 Persona

Personas are fictional representations of key users that help to understand their needs, goals and behaviors. It guides the design and development of the system to ensure it meets user expectations effectively.

2.1.1 Persona 1 (KADA Staff)

User Need

- The KADA Staff need a way to apply for membership, apply for loans, view loan application status and financial statements, and apply for membership termination.

User Stories

1. As a KADA staff, I want to apply for KADA membership to become a member of KADA Cooperative and use its loan benefits.
2. As a KADA staff, I want to apply for a loan so that I can exercise my rights as a member of the cooperative.
3. As a KADA staff, I want to view the loan application status so that I can know if my application is successful or not.
4. As a KADA staff, I want to be able to view my financial statements in the system so that I know my current financial status.
5. As a KADA staff, I want to be able to apply for a membership termination so that I can leave the cooperative when necessary.

Table 2.1.1.1 : A KADA staff user story 1

A KADA staff apply for membership
The system must be open for input.Complete the registration form. Fill in the required information and submit it. The system will check if the submitted information is

complete and accurate.Then, the application is assessed by the competent authority. If the application is approved as a member, the system generates a member ID. An email is dispatched to the applicant containing login details. If rejected, the system records the grounds for refusal. The email provides the reasons for denial.

Table 2.1.1.2 : A KADA staff user story 2

A KADA staff apply for a loan
The system must be open for input. Click on the loan application. Click on the new application. Fill the form with the details needed. If you have completed filling in all the required details on the form, click submit. The system will notify you that the application is successfully accepted into the system reviewing. If you do not fill in some of the required details, click submit. The system will alert you to fill the empty required fields. Then, click submit again after filling in all details. In all cases, the system requires you to login into the system to be able to apply for a loan.

Table 2.1.1.3 : A KADA staff user story 3

A KADA staff view the application status
Click on the loan application. Click on status. If the KADA staff has applied for a loan, the system will display the list of loan applications with its status. If the KADA staff has not yet applied for a loan, the system will not display any loan application. The system will give you a note that you have not yet applied for a loan. In all cases, the system requires you to login into the system to be able to view financial statements.

Table 2.1.1.4 : A KADA staff user story 4

A KADA staff view the financial statements
The system must be open for input. Click on the statements and choose a month.

If the chosen month's statement is available, the system will display the statement. If the chosen month's statement is not available, the system will notify you that the statement for that month is not available yet. In all cases, the system requires you to login into the system to be able to view financial statements.

Table 2.1.1.5 : A KADA staff user story 5

A member apply for membership termination
The system must be open for input. Click on the membership termination. The member should put in the termination reason. Then, click submit. The system should display a confirmation message to the member. The member should confirm or cancel the decision. In all cases, the system requires you to login into the system to be able to apply for membership termination.

2.1.2 Persona 2 (Admin)

User Need

- KADA Cooperative Admin needs a way to view the dashboard, review applications, manage applications, manage financial statements and manage the reports.

User Stories

1. As a KADA Cooperative Admin, I want to view the dashboard so that I can maintain accurate and updated information for users.
2. As a KADA Cooperative Admin, I want to review applications in detail so that I can ensure the cooperative's resources are reliable.
3. As a KADA Cooperative Admin, I want to manage the applications by notifying them via email whether their application is approved or disapproved so that they can be alerted with their status application.
4. As a KADA Cooperative Admin, I want to manage the financial statements so that the members can get the latest information with details.
5. As a KADA Cooperative Admin, I want to manage the financial reports so that the BOD can review it easily.

Table 2.1.2.1 : An admin user story 1

An Admin view the Dashboard
The system must be open for input. Click on the 'Profil Koperasi' tab. The system will give access to view the information details of KADA Cooperative. If you want to view the application's statistics, you can click the 'Laporan Koperasi' tab, then click on the 'Statistik Permohonan' dropdown to view the updated statistics based on the applications. If you want to view the financial summary, you can click the 'Laporan Koperasi' tab, then click on the 'Rumusan Kewangan' dropdown to view the updated summary. . In all cases, the system requires you to login into the system to be able to view the dashboard.

Table 2.1.2.2 : An admin user story 2

An Admin review applications
The system must be open for input. Click on the ‘Senarai Permohonan’ tab to view the list of membership and loan applications. There’s two applications that can be reviewed: the membership and loan application. You can click either on ‘Ahli’ or ‘Pembiayaan’ tab to review the applications. If you click on the name or ID at the row of the applications according to the list, the system will display the detailed information of the applicants. You can also click on the proof that has been uploaded by applicants to verify their application. In all cases, the system needs you to stay logged in to be able to view the applications.

Table 2.1.2.3 : An admin user story 3

An Admin manage applications
The system must be open for input. Click on the ‘Pengurusan Permohonan’ tab to view the list of applications. You can manage the applications only after meeting with the Board of Directors and get their confirmation of approval. If you want to approve the applications, click either on ‘Ahli’ or ‘Pembiayaan’ or ‘Berhenti’ tab, click the approve button at the desired applicant’s row, the system will send an email to applicants that their status has been approved. If you want to reject the applications, click the reject button at the desired applicant’s row, the system will send an email to the applicants that their status has been rejected. The new status of applications has been updated through their own account.

If you want to view the resignation form, you can click on the ‘Berhenti’ tab. The system will show the list of pending applications and you can view the previous year list of resignation forms that have been approved by clicking the title name. You also can download the list of previous resignation members by clicking on the ‘Download PDF’ button. In all cases, the system needs you to stay logged in to be able to manage applications.

Table 2.1.2.4 : An admin user story 4

An Admin manage financial statement
The system must be open for input. Click on the ‘Penyata Ahli’ tab. If you want to edit the latest financial statement, you can click the ‘Edit Yuran’ button. After completing the editing of the financial statement, you need to click the ‘Kemas Kini Yuran’ button to save the information. If you want to manage the financial statement by adding the new record, you can click the ‘Tambah Rekod’ button. The system will show the add record page. You can select the month and search the member through their member number. You can select either all members or specific members to add the new record of the financial statement. In all cases, the system needs you to stay logged in to be able to manage financial statements.

Table 2.1.2.5 : An admin user story 5

An Admin manage financial report
The system must be open for input. Click on the ‘Laporan Koperasi’ tab. Then click the ‘Laporan’ dropdown. The system will show the yearly financial report. If you want to view the financial report, you need to select the year and month. Then, click ‘Tunjuk Laporan’ button. The system will display the report of membership based on the selected year and month. You can download the report by clicking on the ‘Download’ button. The report of the loan also will be displayed in a table based on the type of loan. In all cases, the system needs you to stay logged in to be able to manage financial reports.

2.1.3 Persona 3 (Board of Director)

User Need

- The Board of Director needs a way to review members' applications, loan applications, and view financial summary.

User Stories

1. As a Board of Director, I want to view a list of all applicants including their profiles and details so that I can monitor all the members' activity effectively.
2. As a Board of Director, I want to review all the loan applications so that I can make a decision on the applicant's loan status during the annual meeting.
3. As a Board of Director, I want to view the details of the financial summary so that I can oversee the financial conditions and minimize financial risks.

Table 2.1.3.1: A BOD user story 1

A BOD review members' application
The system must be open for any input. Click on the 'Permohonan Ahli' section to view the members application details. If you want to search for a member's name, click on the search engine and type the particular name. The system will then display the details of the members application. If the name won't appear after the search, the system will show that the member's not available. If you don't want to search the member's name, scroll down the list of tables to see all the members' applications. If you want to view detailed information of the members application, click on the blue words 'Click Here' to see their application form details. In all cases, the system needs you to stay log in to review the members' applications.

Table 2.1.3.2: A BOD user story 2

A BOD review loan applications
The system must be open for any input. Click on the ‘Permohonan Pembiayaan’ section to view the loan application details. If you want to search for the name of the loan applicant, click on the search engine and type in the name. If the name won’t appear after the search, the system will display that the applicants is not available. If you want to view all loan applicants, scroll down the list of tables to see their loan details. If you want to view their loan application details, click on the ‘Click Here’ to be able to redirect to their forms application detail. In all cases, the system needs you to stay logged in to be able to review the members’ loan applications.

Table 2.1.3.3: A BOD user story 3

A BOD view financial summary
The system must be open for any input. Click on the ‘Rumusan Kewangan’ to view financial statistics. The system will display a profit rate for month, total dividend by year, and statistics for active loan by month for the financial summary dashboard. If you want to see the dividend history for KADA, click on the download icon or scan the qr code to review it. If you want to review the financial report, click on the download icon or scan the qr code to see the overall financial report for the current year. In all cases, the system needs you to stay logged in to be able to view the financial summary.

2.2 System Features

This product is a new website system for KADA Cooperative which is aimed at making a complete change from the hard copy methods of processing membership and loan applications to more automated systems. It tries to help the user eliminate all the inconveniences that are associated with applying for membership and loans, managing user details and even managing reports. In addition, the system incorporates the capabilities of calculating cooperatives' loans and interests for each member, reducing the workload on the people.

The system features are illustrated in Figure 2.2.1 below. The detailed description of each module and functions is tabulated in Table 2.2.1.

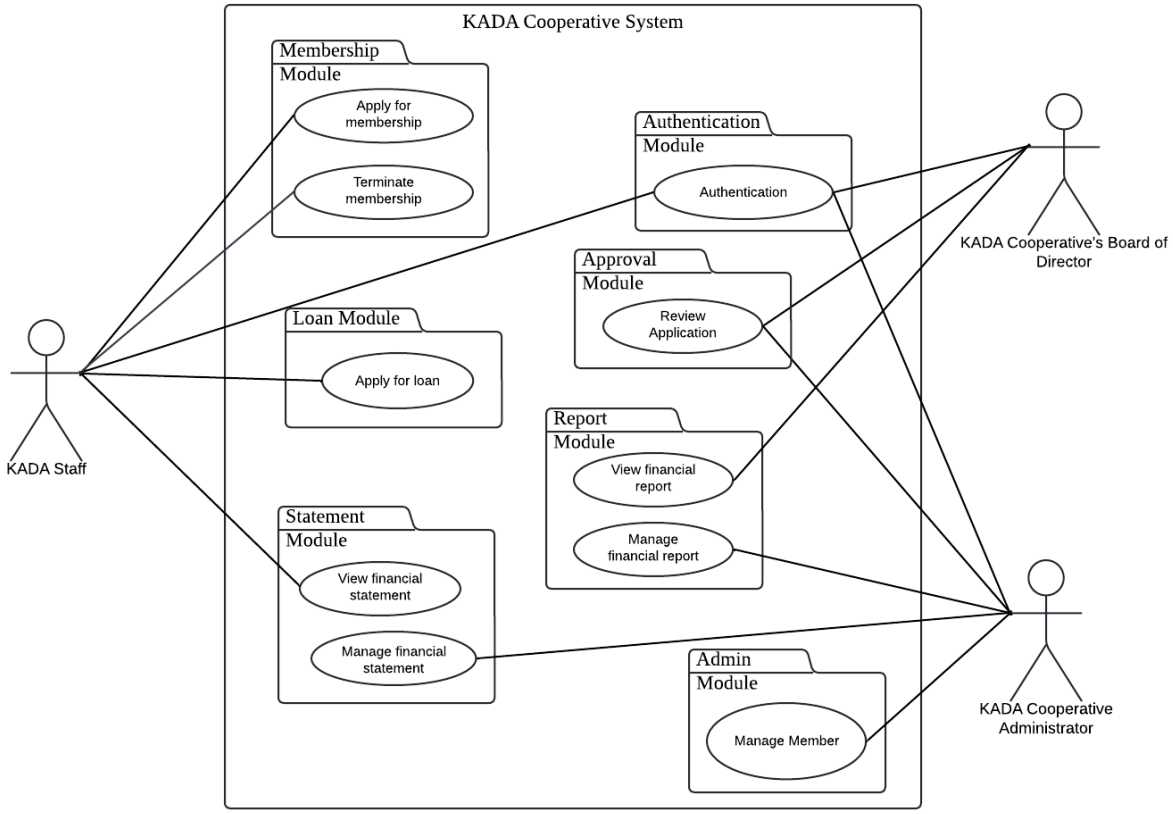


Figure 2.2.1: Use Case Diagram for KADA Cooperative System

Table 2.2.1 : Description of Module and Functions for KADA Cooperative System

Use case	Function	Description
UC001	Authentication	This use case allows the user of the system to authenticate their identity before using the system to ensure security.
UC002	Apply Membership	This use case allows individuals to apply for membership by providing required personal details.
UC003	Apply Loan	This use case allows members to submit a loan application along with necessary documents.
UC004	View Financial Statement	This use case allows the members to view financial details, including balances and transaction histories.
UC005	Manage Financial Statement	This use case allows the administrators to manage the financial statement for members.
UC006	Manage Financial Report	This use case allows the administration to manage the financial report of the cooperation for the Board of Directors (BOD).
UC007	View Financial Report	This use case allows Board of Directors (BOD) members to view comprehensive financial reports for the organization. This use case also provides detailed reports specifically designed for Board of Directors' decision-making purposes.
UC008	System Administration	This use case allows system administrators to manage user roles, permissions, and system settings.
UC009	Review Application	This use case enables administrators to review and either approve or reject membership and loan applications.
UC010	Terminate Membership	This use case allows the members to apply for membership termination as part of a fair business practice of the cooperation.

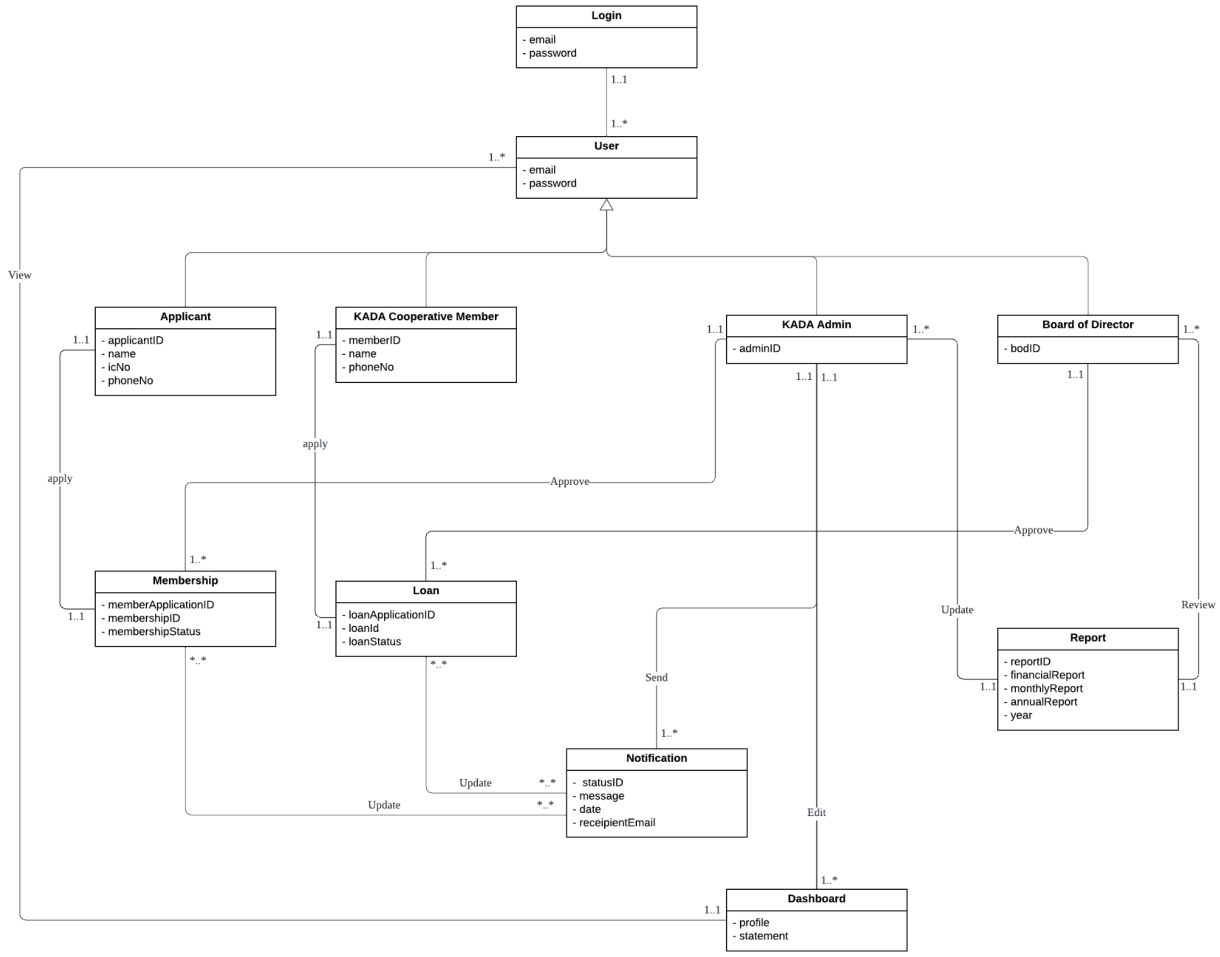


Figure 2.2.2 : Domain Model for KADA Cooperative System

Figure 2.2.3 : State Machine Diagram for Login

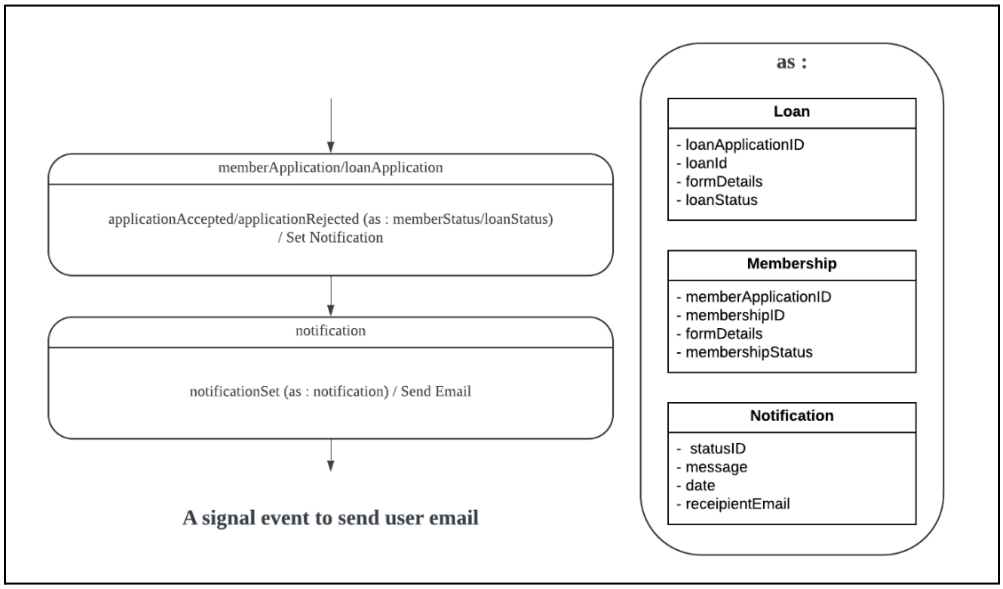


Figure 2.2.4 : State Machine Diagram for Membership, Loan and notification

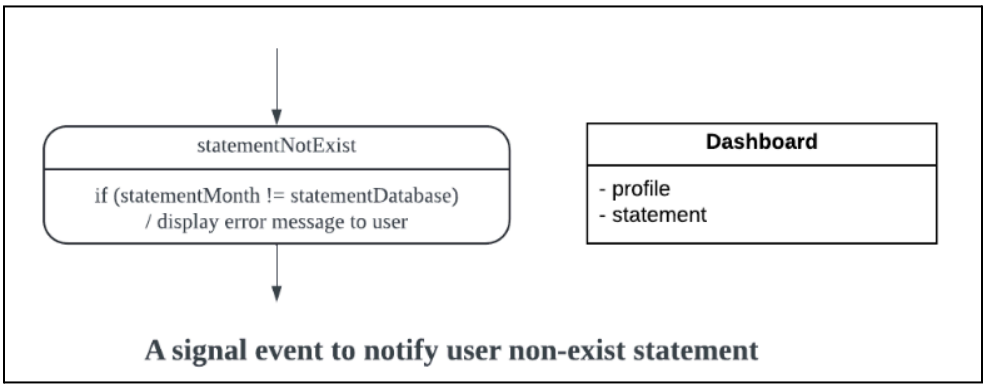


Figure 2.2.5 : State Machine Diagram for Dashboard

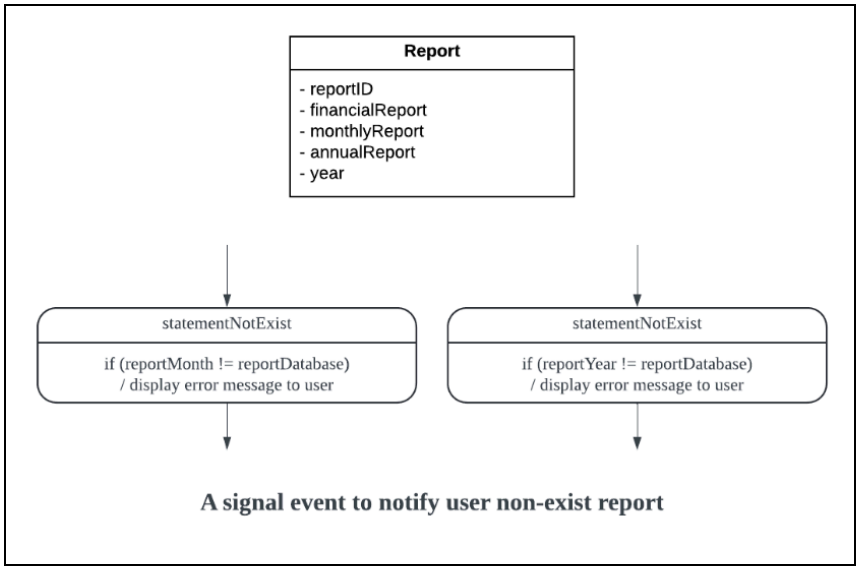


Figure 2.2.6 : State Machine Diagram for Report

2.3 Launch Phase

The product backlog includes several sprints to develop the key features of the KADA Cooperative System. Table 2.3 lists the sprints, user stories and assigned team members.

Table 2.3.1 : Launch Phase

Sprint	Team members assigned
Sprint #1 An applicant wants to apply for KADA membership to become a member in KADA and use its loan benefits.	Pravinraj
Sprint #2 A member wants to apply for a loan so that I can exercise my rights as a member of the cooperative.	Haani
Sprint #3 A KADA Cooperative Admin wants to approve or disapprove applications after they have a meeting with BODs so that only the eligible staff members can access the cooperative's services.	Firzana
Sprint #4 A Board of Director wants to review all the loan applications so that I can make a decision on the applicant's loan status during the annual meeting.	Aflah
Sprint #5 A Board of Director wants to view the details of the financial summary so that I can oversee the financial conditions and minimize financial risks.	Adriana
Sprint #6 A staff member wants to terminate the KADA membership so that I am no longer a member of KADA and can't access all of the membership opportunities.	Aflah

2.4 User Story Details

2.4.1 US001 User Story : KADA Staff

Table 2.4.1.1 : User Story Description for KADA Staff

User story: KADA Staff
ID: US001
User Story Description 1. As a KADA staff, I want to apply for KADA membership to become a member of KADA Cooperative and use its loan benefits. 2. As a KADA staff, I want to apply for a loan so that I can exercise my rights as a member of the cooperative. 3. As a KADA staff, I want to view the loan application status so that I can know if my application is successful or not. 4. As a KADA staff, I want to be able to view my financial statements in the system so that I know my current financial status. 5. As a KADA staff, I want to be able to apply for a membership termination so that I can leave the cooperative when necessary.
Flow of Events: 1. If the KADA staff is not a member 1.1. The KADA staff navigates to the registration form section. 1.2. The KADA staff clicks on "New Application." 1.3. The KADA staff fills out the registration form with the required details. 1.4. If all required details are completed, 1.4.1. The KADA staff clicks "Submit." 1.4.2. The system confirms the successful submission of the application. 1.5. Else if some required details are missing, 1.5.1. The KADA staff clicks "Submit." 1.5.2. The system alerts the applicant to fill in the missing fields. 1.5.3. The KADA staff fills in the required details and clicks "Submit" again. 2. Else if the KADA Staff is a member 2.1. If the member wants to apply for a loan. 2.1.1. The member navigates to the loan application section. 2.1.2. The system displays available loan options and eligibility criteria. 2.1.3. The member clicks on a new application. 2.1.4. The member fills out the loan application form and submits it. 2.1.5. The system confirms the application submission and provides a reference number. 2.2. If the member wants to view loan application status. 2.2.1. The member navigates to the loan application section. 2.2.2. The system will display available loan options and eligibility criteria. 2.2.3. The member navigates to the status application. 2.2.4. The system will display all of the loan applications applied by the member with its status. 2.2.5. The member can view the loan application status. 2.3. If the member wants to view the financial statements.

2.3.1. The member navigates to the financial statements section. 2.3.2. The system will display the financial statements page. 2.3.3. The member will choose a month. 2.3.4. The system will display the chosen month's financial statement. 2.3.5. The member can view, download or print the financial statements.
Alternative flow 1: If the member does not yet applied for a loan when view loan application status: 1. The system notifies the member that there is no loan application to display.
Alternative flow 2: If the monthly financial statement is not yet available when view financial statement: 1. The system notifies the member of an unavailable statement for the chosen month.
Acceptance Criteria 1: - Postcondition : The membership application's information is recorded in the system - Other condition: The applicant's information are validated during the registration process to check completeness and accuracy of data
Acceptance Criteria 2: ● Precondition: The user is an approved member of the cooperative. ● Postcondition: The loan application is recorded in the system, and a reference number is generated. ● Other conditions: The member's details are validated during the process.
Exception Flow If the system detect any issues because of invalid data or missing required fields: The applicant prompt to correct the error and resubmit the form

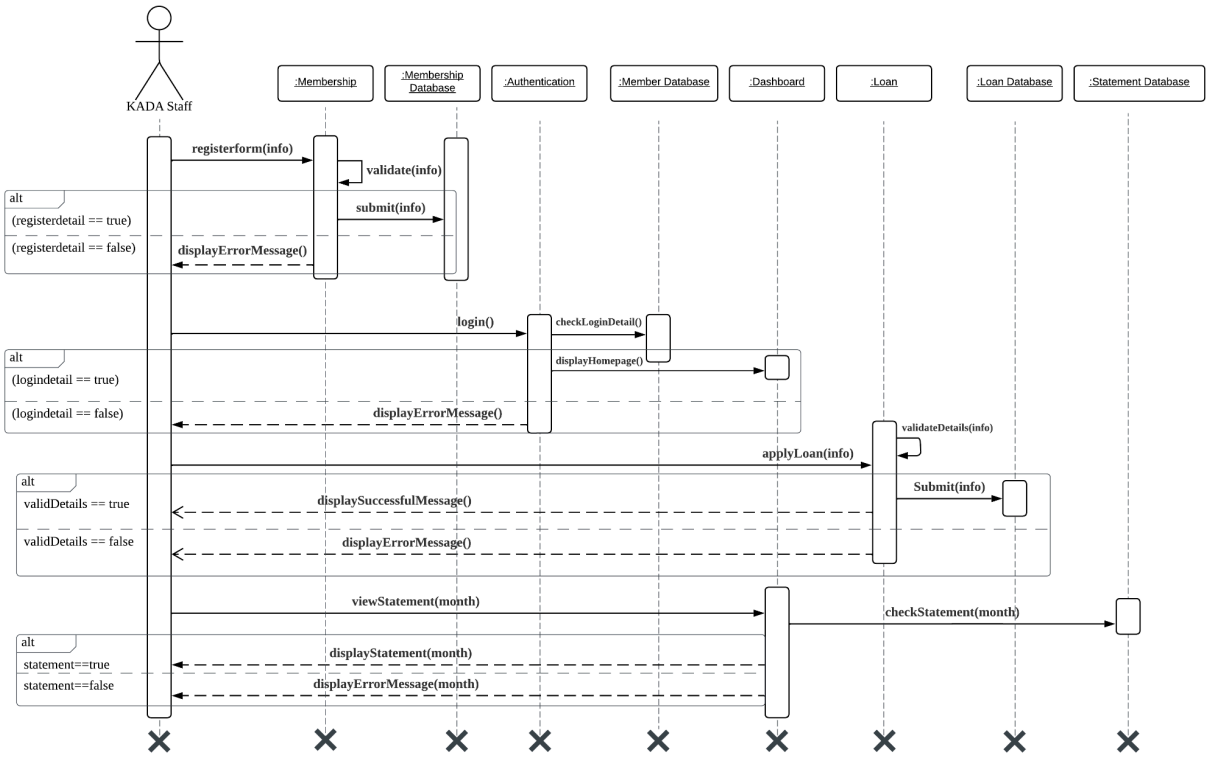


Figure 2.4.1.1 : Sequence Diagram for KADA Staff

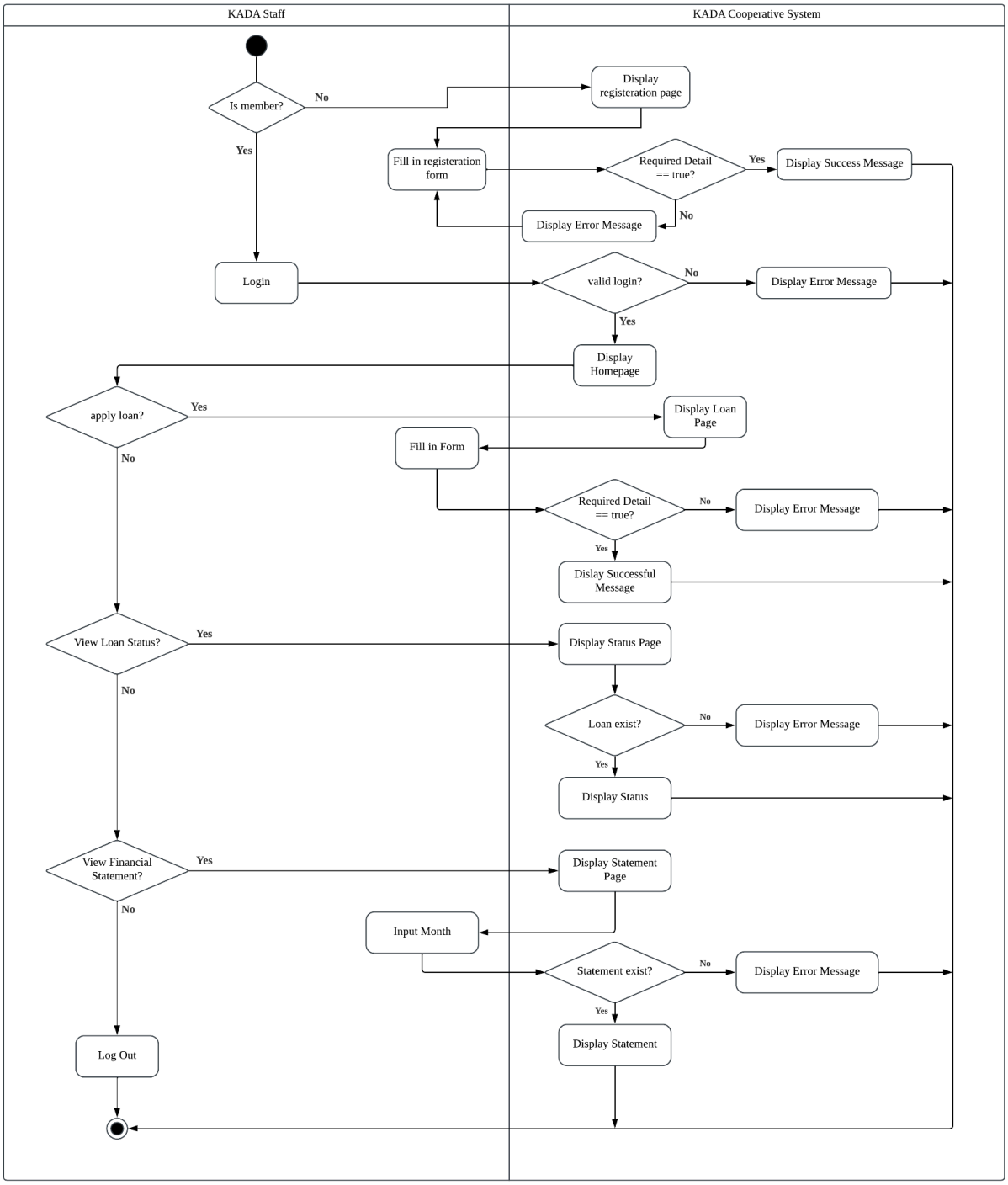


Figure 2.4.1.2: Activity Diagram for KADA Staff

2.4.2 US002 User Story : Admin

Table 2.4.2.1 : User Story Description for Admin

User story: Admin
ID: US002
User Story Description 1. As a KADA Cooperative Admin, I want to view the dashboard so that I can maintain the accurate and updated information for users. 2. As a KADA Cooperative Admin, I want to review applications in detail so that I can ensure the cooperative's resources are reliable. 3. As a KADA Cooperative Admin, I want to manage the applications by notifying them via email whether their application is approved or disapproved so that they can be alerted with their status application. 4. As a KADA Cooperative Admin, I want to manage the financial statements so that the members can get the latest information with details. 5. As a KADA Cooperative Admin, I want to manage the financial reports so that the BOD can review it easily.
Flow of events: 1. An admin logs into the system. 2. If an Admin wants to view the KADA Cooperative dashboard. 2.1. The system will display an admin dashboard with a cooperative profile. 2.2. An Admin navigates to a 'Laporan Koperasi' tab and clicks the 'Statistik Permohonan' dropdown. 2.3. The system will display the statistics of membership applications and loan applications in a graph form. 2.4. An Admin can view the number of application status by scrolling down and see the pie chart of status membership applications and status of loan applications. 3. If an Admin wants to review applications in detail. 3.1. An Admin navigates to the 'Senarai Permohonan' tab. 3.2. The system will display a list of membership applications as a default page. 3.3. If an Admin wants to review the applicants' information. 3.3.1. An Admin can click on the 'Ahli' tab to view the membership applications. 3.3.2. An Admin can click on the 'Pembiayaan' tab to view the loan applications. 3.4. An Admin can click on the name or member number of the applicants. 3.5. The system will popup the detailed information of the applicants. 4. If an Admin wants to manage applications. 4.1. An Admin navigates to the 'Senarai Permohonan' tab. 4.2. The system will display the list of membership applications. 4.3. If an Admin want to manage the applications 4.3.1. An Admin can click on the 'Ahli' tab to manage the membership applications. 4.3.2. An Admin can click on the 'Pembiayaan' tab to manage the loan applications. 4.3.3. If an Admin clicks on the 'Berhenti' tab to manage the resignation applications.

4.3.3.1. An Admin can view the previous list of resignation members by clicking the ‘Senarai Tamat Ahli Tahun 2024’ title.
4.3.3.2. The system will display the table list of the resignation members.
4.3.3.3. An Admin clicks the ‘Download PDF’ button.
4.3.3.4. The system will automatically download the list of resignation members based on the year.

4.4. An Admin can click either ‘Terima’ or ‘Tolak’ button to manage the applications for the three applications.
4.5. The system will send the email notification to the applicants to notify them that their status application has been updated.
4.6. The system will update the status of applications on applicants' accounts.

5. If an Admin wants to manage the financial statements.
5.1. An Admin navigates to the ‘Penyata Ahli’ tab.
5.2. The system will display the financial statement records.
5.3. If an Admin wants to edit the record.
5.3.1. An Admin navigates to the ‘Edit Yuran’ button.
5.3.2. The system will display the editable page of the fee information.
5.3.3. An Admin can edit the information and click ‘Kemaskini Yuran’ to save the updated information.
5.4. If an Admin wants to add a financial statement record.
5.4.1. An Admin clicks the ‘Tambah Rekod’ button.
5.4.2. The system will display the list of member financial statements.
5.4.3. An Admin can choose the month and year.
5.4.4. An Admin can search the member number that they want to add to the financial statement record.
5.4.5. The system will display the searched member.
5.4.6. An Admin clicks the checkbox for the member searched or ‘Tambah Semua’ button to add the financial statements to the members’ account.

6. If an Admin wants to manage the financial reports.
6.1. An Admin navigates to the ‘Laporan Koperasi’ tab.
6.2. An Admin clicks on the ‘Laporan’ dropdown.
6.3. The system will display the annual financial report of financial.
6.4. An Admin needs to select the year and the month. Then, click the ‘Tunjuk Laporan’ button.
6.5. The system will display the financial report based on the month and year selected.
6.6. An Admin clicks the ‘Download’ button.
6.7. The system will automatically download the report.

Alternative flow *1*:

- If the applications is not recorded:
    1. The system displays an error message “Tiada Data”.

Acceptance Criteria

- Postcondition : The system will auto-generate the graph of application statistics.
- Precondition : User logs must be an authorized KADA Cooperative Admin with appropriate system access.

Exception flow:

1. If the authorization is incorrect, the system will show an error message “Log masuk tidak sah”.
2. If the session times out, the system will redirect to the login page.

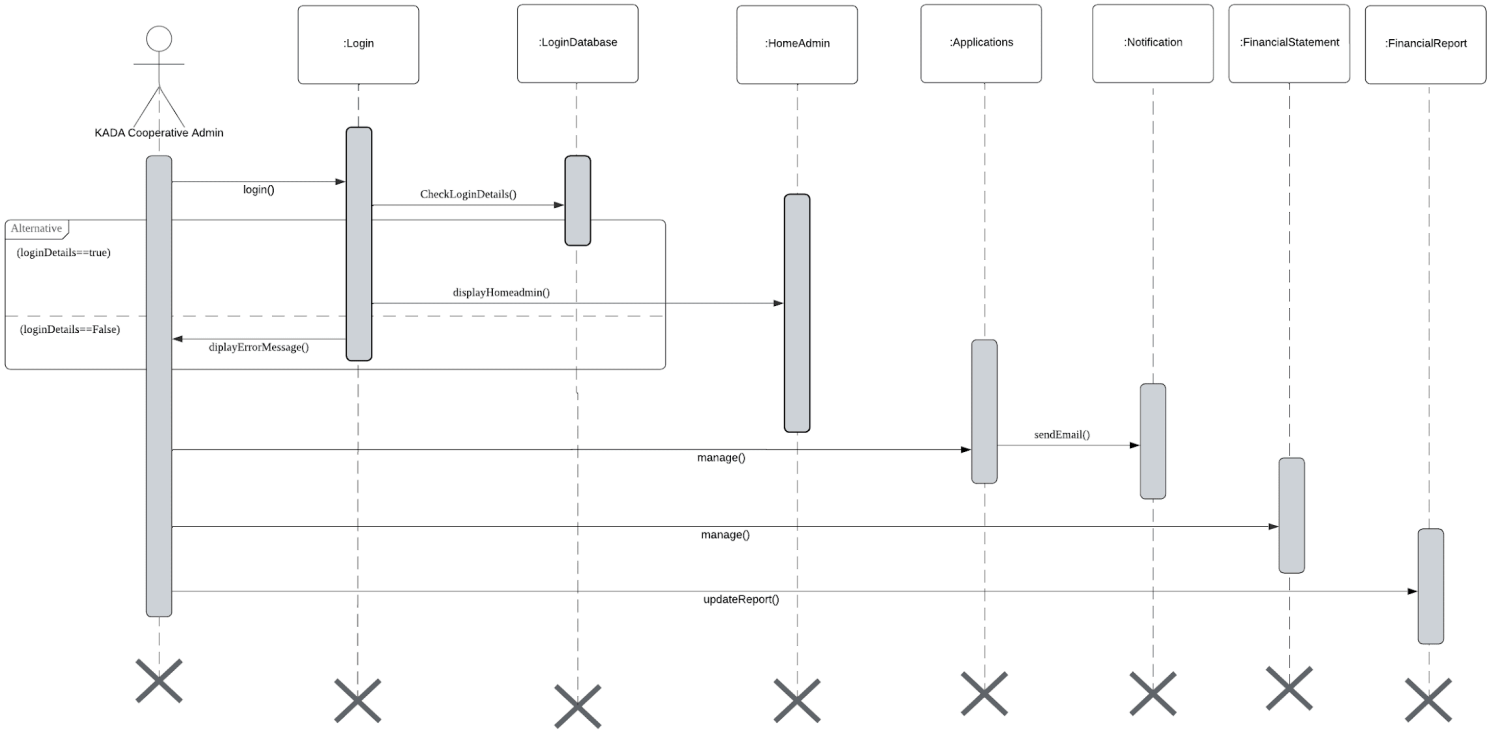


Figure 2.4.2.1 : Sequence Diagram for Admin

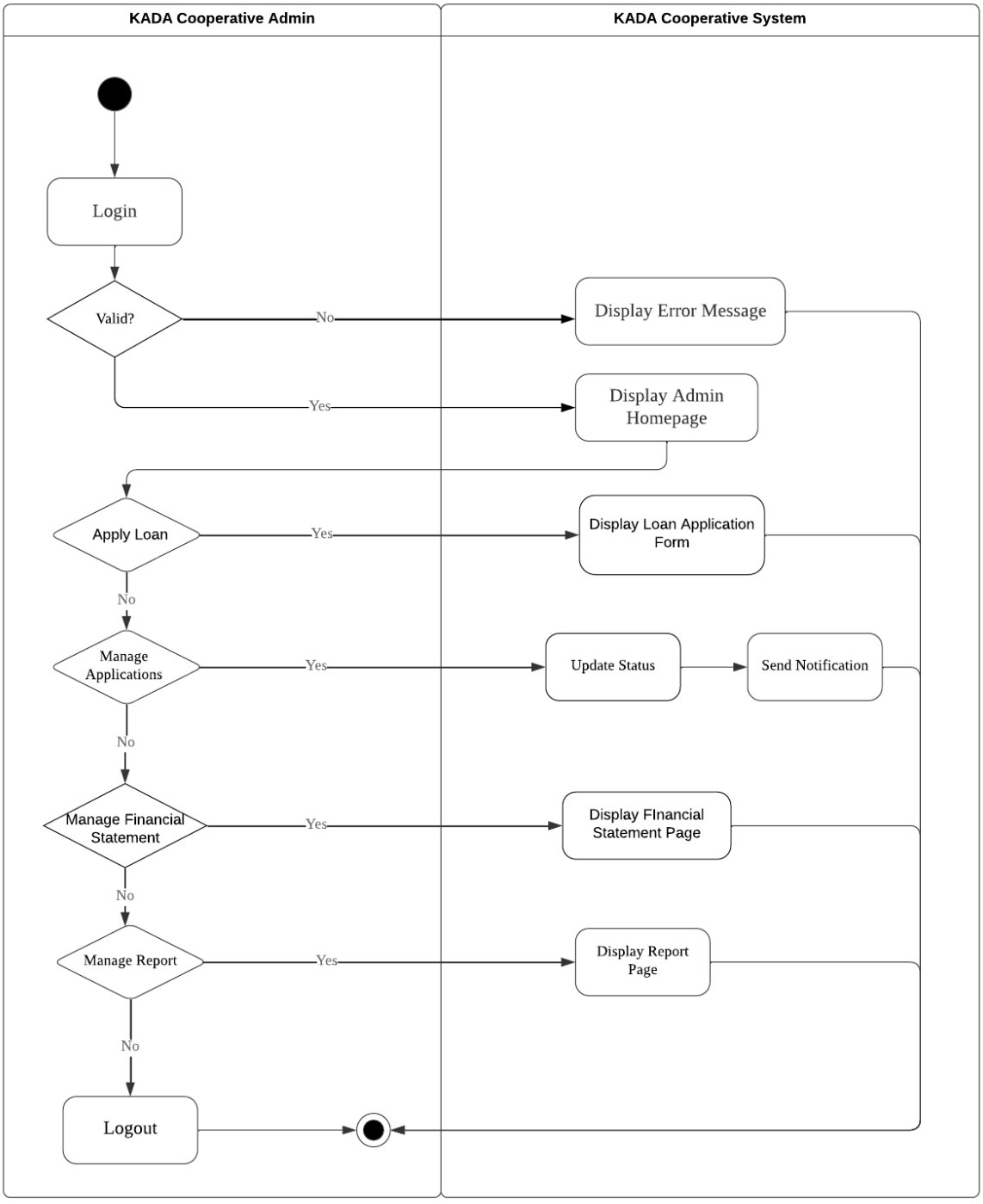


Figure 2.4.2.2 : Activity Diagram for Admin

2.4.3 US003 User Story : Board of Director

Table 2.4.3.1 : User Story Description for BOD

User story: Bod
ID: US004
User Story Description **As a** KADA Cooperative's BOD. **I want** to review loan applications and financial reports. **So that** I can manage the cooperative's applications status and reduce financial risk.
Flow of events: 1. The BOD logs into the system. 2. The system shows a dashboard with options for "loan application", and "financial summary". 3. The BOD navigates to the "loan application" section. 4. The system displays a list of members who apply for a loan including the types, amount for the loan and applicant details. 5. The BOD navigates to the "financial summary" section. 6. The system displays financial statistics and qr code for the selected year financial report. 7. The BOD scans the qr code or downloads the financial report accordingly.
Alternative flow 1: If the members is not recorded: ● The system displays an error message "No such members".
Acceptance Criteria ● Postcondition: The BOD discusses the applicant's loan status and financial condition to update to the admin during the annual meeting. ● Precondition: The applicants must be recorded into the system for BOD to review.
Exception flow: 3. If the log in credential is incorrect, the system will show an error message "Invalid email ID or Password". 4. If the session times out, the system will redirect the BOD to the login page.

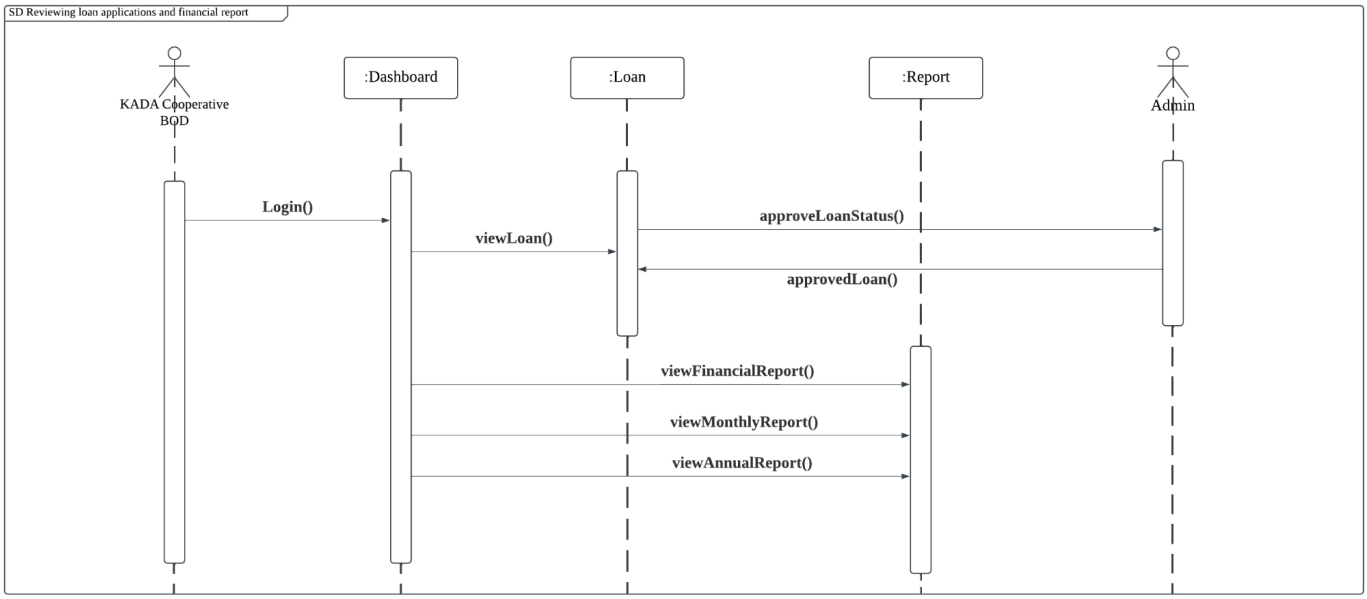


Figure 2.4.3.1 : Sequence Diagram for BOD

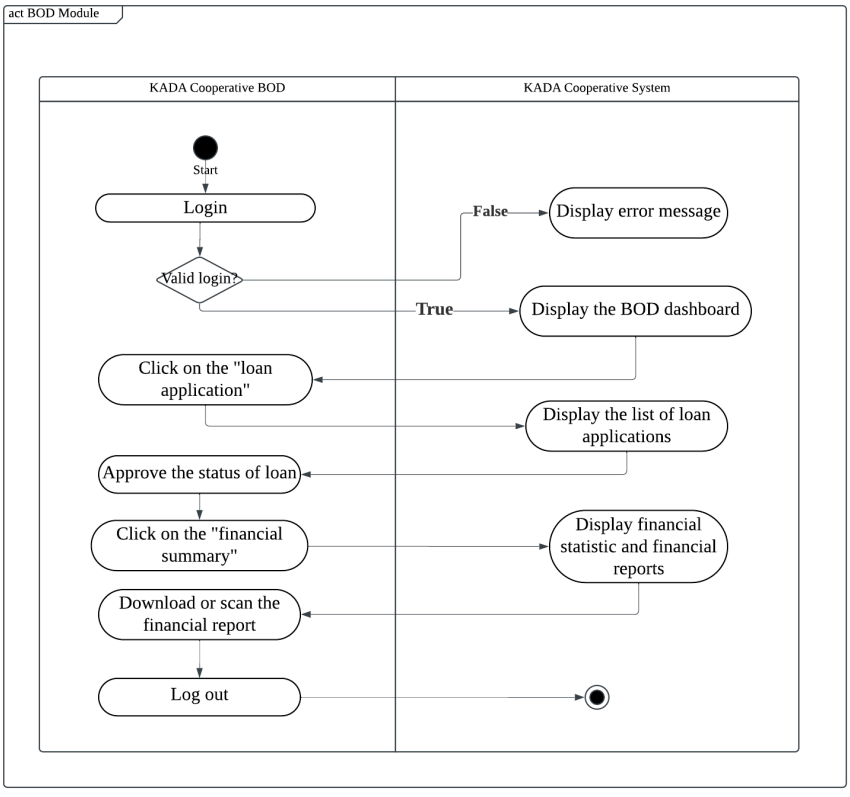


Figure 2.4.3.2 : Activity Diagram for BOD

2.5 Performance and Other Requirements

1. Software System Attributes :

Usability: The system shall provide a user-friendly interface for all user roles.

Reliability: Ensure the system features-dashboards, loan applications, and reporting-operate consistently.

Maintainability: Policy parameters such as interest rates or repayment terms shall be updated within 10 minutes without any downtime.

Portability: The system shall be compatible with desktops, tablets, and smartphones and provide a consistent interface.

Compatibility: The system should integrate well with payroll systems for efficient loan repayments.

2. Performance Requirements

Performance requirements define the responsiveness of the system and its capacity to handle data and user requests:

Response Time: User authentication and dashboard loading should not take more than 2 seconds. Member data and loan retrieval should not take more than 3 seconds.

Throughput: More than 50 transactions per second at peak load.

Capacity: 1,000 concurrent users and data of 100,000 members without any drop in performance.

Availability: 99.9% uptime, with only 8 hours of allowed annual downtime.

Other Requirements

These requirements are about compliance, safety, and environmental considerations:

3. Security: Data security through encryption should be assured via AES-256, along with multi-factor authentication for sensitive operations.

Safety: The system shall prevent unauthorized access via RBAC and shall have detailed audit trails to track all activities.

Legal and Regulatory: Ensure compliance with data protection laws such as Malaysia's PDPA and international standards like ISO/IEC 27001.

Environmental: Optimize resource usage to ensure CPU and memory do not exceed 75% during normal operations.

2.6 Design Constraints

a) *Environmental Limitations*:

- The system should operate efficiently under the common temperature range of the normal office that moves between 0^0C to 40^0C and relative humidity levels between 20% to 80%.
- Apart from this, the system fully performs in any type of network conditions to ensure the system is accessible by the users.

b) *Hardware limitations*:

The system should be deployable on hardware having the following minimal configuration:

- Processor: 2.4 GHz multi-core.
- Memory: minimum of 8GB RAM
- Storage: minimum 500GB of SSD storage.

c) *Security Regulations*:

- Sensitive user data, such as personal and financial information, should be encrypted using AES-256 when sent and stored.
- The system uses a Role-Based Access Control (RBAC) to assist users according to their roles in the system.

d) *Compatibility Constraints*:

- The systems should work well across any type of operating system such as Microsoft Windows and Linux without any modifications needed.
- It should be compatible with all newer Windows servers starting from Windows Server 2019, and with Linux-based servers as for instance, Ubuntu 20.04.

e) *Performance constraints*:

- The system has to handle a maximum concurrency of 500 users and has a maximum response time of 3 seconds to maintain user satisfaction to the system.
- The major transactions like loan process should have not more than 2 seconds of response time.

SDD

SECJ2203: Software Engineering

System Documentation (SD)

KADA Cooperative System

Version 3.5

18th February 2025

Faculty of Computing

Prepared by: KodeLab

Revision Page

a. Overview

This version 3.2 of the documents outlines how the system is designed based-on the requirements for the system. This includes the following section:

1. Introduction including purpose, scope, definition, acronym and abbreviations, references, and overview.
2. Specific requirements including user characteristics, system features, use case details, performance and other requirements, and design constraints.
3. Architectural rationale including architectural style and rationale.
4. Architectural views including use case view, implementation view, logical view, process view, and physical/ deployment view.
5. Data design including data dictionary for each entity.
6. User interface design including screen image.
7. Traceability of the system.

This version of the document acts as a blueprint for the stakeholders of the KADA Cooperative, future developer, and team members to understand and implement the system as the requirements needed.

b. Target Audience

- Stakeholder
- Development Team
- KADA Staff, Admin, and Board of Director

c. Project Team Members

The table below shows the list of the team members by stating their roles and status for each assigned task e.g. by section for this SD version (complete, partially complete, incomplete). If the assigned tasks are not done and have been assigned to other team members, state accordingly.

Member Name	Role	Task	Status
Lubna Al Haani Binti Radzuan (A23CS0107)	Team Leader	2.1 User Characteristic 2.3.3 Apply For Loan 2.3.9 Review Application 4.4 Process View 5.0 Data Design	Complete Complete Complete Complete Complete
Nabil Aflah Boo Binti Mohd Yosuf Boo Yong Chong (A23CS0252)	Team Member	2.3.1 Authentication 2.3.2 Apply For Membership 2.5 Design Constraints 7.0 Traceability	Complete Complete Complete Complete
Nur Firzana Binti Badrus Hisham (A23CS0156)	Team Member	2.2 System Feature 2.3.8 Manage Member 2.3.10 Terminate Membership	Complete Complete Complete

		4.2 Interaction View 6.0 User Interface Design	Complete Complete
Nurul Adriana Binti Kamal Jefri (A23CS0258)	Team Member	1.0 Introduction 2.3.6 View Financial Report 2.3.7 Manage Financial Report 4.3 Logical View 4.5 Physical/ Deployment View	Complete Complete Complete Complete Complete
Pravinraj A/L Sivabathi (A23CS0171)	Team Member	2.3.4 View Financial Statement 2.3.5 Member Statement 2.4 Performance and Other Requirement 3.0 Architectural Rationale 4.1 Use Case View	Complete Complete Complete Complete Complete

d. **Version Control History**

Version	Primary Author(s)	Description of Version	Date Completed
3.0	Lubna Al Haani (Team leader)	Completed Section 2.1	19/12/2024
	Nurul Adriana (Team Member)	Completed Section 1.0	
	Nabil Aflah Boo (Team Member)	Completed Section 2.5	
	Nur Firzana (Team Member)	Completed Section 6.0	
	Pravinraj A/L Sivabathi(Team Member)	Completed Section 2.4	
3.1	Nurul Adriana (Team member)	Completed Section 2.3.6, Section 2.3.7	20/12/2024
	Lubna Al Haani (Team leader)	Completed Section 2.3.3, 2.3.9 and Chapter 5.0	
	Nabil Aflah Boo (Team Member)	Completed Section 2.3.1 and Section 2.3.2	
	Nur Firzana (Team Member)	Completed Section 2.3.8	
	Pravinraj A/L Sivabathi(Team Member)	Completed Section 2.3.4 and 2.3.5	
3.2	Nurul Adriana (Team Member)	Completed Section 4.3, Section 4.5, Table of Contents	21/12/2024
	Lubna Al Haani (Team leader)	Completed Section 4.4	
	Nabil Aflah Boo (Team Member)	Completed Section 7.0 and Revision Page	
	Nur Firzana (Team Member)	Completed Section 2.2 and Section 4.2	
	Pravinraj A/L Sivabathi(Team Member)	Completed Section 3.0 and 4.1	

3.3	Nur Firzana (Team Member)	Updated Section 4.2	25/12/2024
3.4	Nur Firzana (Team Member)	Updated Section 2.2 Updated Section 2.3.8 Completed Section 2.3.10 Updated Section 4.4	12/02/2025
	Lubna Al Haani (Team Leader)	Updated Section 2.3.9 Updated Section 4.3 Updated Section 5.0	
	Pravinraj A/L Sivabathi(Team Member)	Updated Section 2.3.4 Updated Section 2.3.5	
3.5	Lubna Al Haani (Team Leader)	Updated Section 4.0, 4.4	18/2/2025
	Nur firzana (Team member)	Updated Section 4.1, 4.4	

Note:
This System Documentation (SD) template is adapted from IEEE Recommended Practice for Software Requirements Specification (SRS) (IEEE Std. 830-1998), Software Design Descriptions (SDD) (IEEE Std. 10161998 1), and Software Test Documentation (IEEE Std. 829-2008) that are simplified and customized to meet the need of SECJ2203 course at Faculty of Computing, UTM. Examples of models are from Arlow and Neustadt (2002) and other sources stated accordingly.

Table of Contents

1. Introduction

This System Documentation (SD) has detailed explanations related to the components and processes involved in designing the KADA Cooperative System that include System Requirements Specification (SRS), System Design Document (SDD), and System Testing Document. This paper, therefore, gives clarity that can be understood by the stakeholders or members of the team.

1.1 Purpose

The SD indicates a design and strategy for implementation of the KADA Cooperative System, an e-cooperative that intends to digitize the cooperative operations. It clearly specifies the technical and functional specification required for development, testing, and deployment.

The target audience includes:

- Development Team Members: To know the technology and validate the system's requirements.
- KADA Cooperative System's Administrative, Board Of Directors, and Staffs: To verify that the system goes with cooperation goals and operational requirements.

1.2 Scope

The KADA Cooperative System is aimed at enhancing the core functionalities of the cooperative by developing an automated and contemporary platform in replacement of the existing manual paper-based process. Important features include the following:

a) Online applications for membership and loans.
b) Real-time reporting and membership management.
c) Provide a secure role-based access to applicants, members, administrators and board members.

This system is meant to boost the operational efficiency, user experience and integrity of the data. It will not include irrelevant items, such as those which have a third party contact with non-cooperative financial services.

1.3 Definitions, Acronyms and Abbreviation

Term	Definition
SRS	System Requirements Specification
SDD	System Design Document
SD	System Documentation
KADA	Kemubu Agricultural Development Authority
BOD	Board Of Directors
Admin	System Administrator
SSD	Solid-State Drive

1.4 References

[1] Dennis, A., Wixom, B. H., & Tegarden, D. (2015). *Systems Analysis and Design: An Object-Oriented Approach with UML* (A. Dennis, B. H. Wixom, & D. Tegarden, Eds.). Wiley.

1.5 Overview

The SD is divided into the following sections:

- Specific Requirements: Outline the system characters, characteristics, and limitations.
- Design Components: These include use-case diagrams, class diagrams, and state diagrams.
- Launch Phase: Definition of sprints and user stories for iterative development.
- Testing and Validation: Handling of requirements from both the link in functional and non-functional attributes, performance measures, and quality standards.

This systematic arrangement assures that the document serves as an all-around reference material for all phases of the project, thus allowing for effectual collaboration and successful submitting of the whole KADA Cooperative System.

2. Specific Requirements

This section describes the requirements of the system functional and non-functional, including the user characteristics, system features, and use case details for each use case.

2.1 User characteristics

This section describes the characteristics of the users who will interact with the KADA Cooperative System. This is to provide the development team members with clear understanding and to ensure the design of this system is aligned with the user's needs, abilities and expectations.

There are three main types of users that will be using this system: KADA staff, KADA Cooperative Administrative, and KADA Board Of Director (Ahli Lembaga Koperasi).

2.1.1 KADA Staff

- The KADA staff who will use the system are expected to have access to devices for web-based systems.
- They may have varying levels of computer skills and may have difficulty understanding how to use the web-based systems.
- Training or user manual can be provided if needed.
- They will use the system to fill-in an online form to register as cooperative members and also apply for a loan if wanted.
- They also can use the system to be updated

2.1.2 KADA Cooperative Admin

- The KADA cooperative admin who will use this system is expected to have intermediate to advanced computer skills including proficiency in using web-based platforms, office productivity tools and familiarity with database systems for managing large amounts of data.

1. Manage and monitor data
    - The KADA cooperative admin will use the system to monitor all records of KADA staff that register into the system.
    - They also will update and maintain accurate financial member data in the system.

2. Financial management
    - Manage and monitor financial statements for KADA members monthly.
    - Generate and manage financial reports monthly and annually for KADA Cooperative’s board of directors.

2.1.3 KADA Cooperative Boards of directors

- KADA Cooperative board of directors who will use this system are expected to have basic to intermediate computer skills including the familiarity with viewing reports and dashboards.
- KADA Cooperative board of directors is also expected to have limited technical expertise, making simplified and user-friendly interfaces helpful for them.
- KADA Cooperative board of directors will use the system to review financial reports of KADA Cooperative.
- They also will use the system to review member registration and loan applications from KADA staff.

2.2 System Features

This product is a new website system for KADA Cooperative which is aimed at making a complete change from the paper-based methods of processing membership and loan applications to more automated systems. It tries to help the user eliminate all the inconveniences that are associated with applying for membership and loans, managing user details and even managing reports. In addition, the system incorporates the capabilities of calculating cooperatives' loans and interests for each member, reducing the workload on the people.

The system features are illustrated in Figure 2.2.1 below. The detailed description of each module and functions is tabulated in Table 2.2.1.

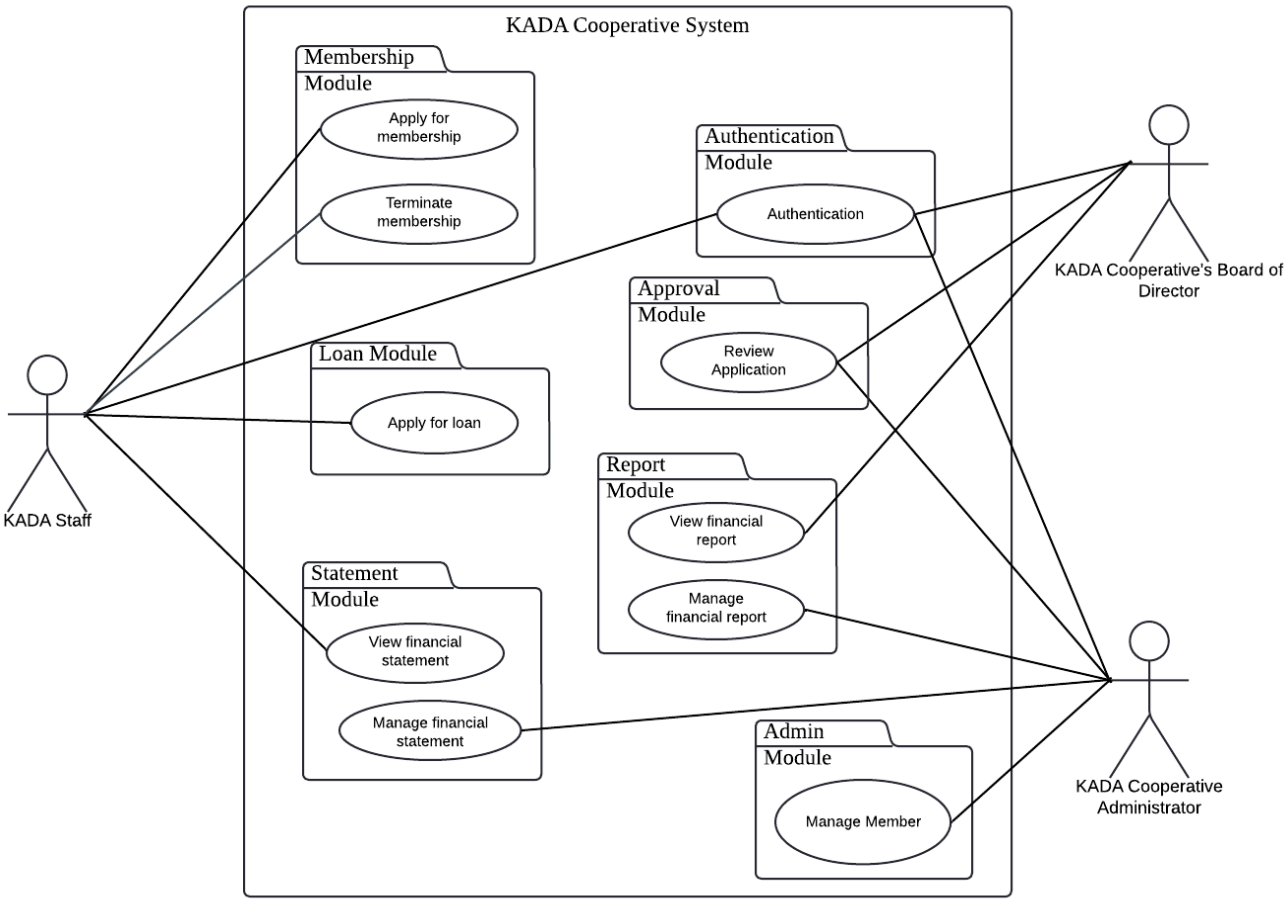


Figure 2.2.1: Use Case Diagram for KADA Cooperative System

Table 2.2.1: Description of Module and Functions for KADA Cooperative System

Module	Use case	Function	Description
Authentication	UC001	Authentication	This use case allows the user of the system to authenticate their identity before using the system to ensure security.
Membership	UC002	Apply Membership	This use case allows individuals to apply for membership by providing required personal details.
Loan	UC003	Apply Loan	This use case allows members to submit a loan application along with necessary documents.
Statement	UC004	View Financial Statement	This use case allows the members to view member-specific financial details, including balances and transaction histories.
	UC005	Manage Financial Statement	This use case allows the administrators to manage the financial statement for members.
Report	UC006	Manage Financial Report	This use case allows the administration to manage the financial report of the cooperation for the Board of Directors (BOD).
	UC007	View Financial Report	This use case allows Board of Directors (BOD) members to view comprehensive financial reports for the organization. This use case also provides detailed reports specifically designed for Board of Directors' decision-making purposes.
Admin	UC008	System Administration	This use case allows system administrators to manage user roles, permissions, and system settings.
Approval	UC009	Review Application	This use case enables administrators to review and either approve or reject membership and loan applications.
Membership	UC010	Terminate Membership	This use case allows the members to apply for membership termination as part of a fair business practice of the cooperation.

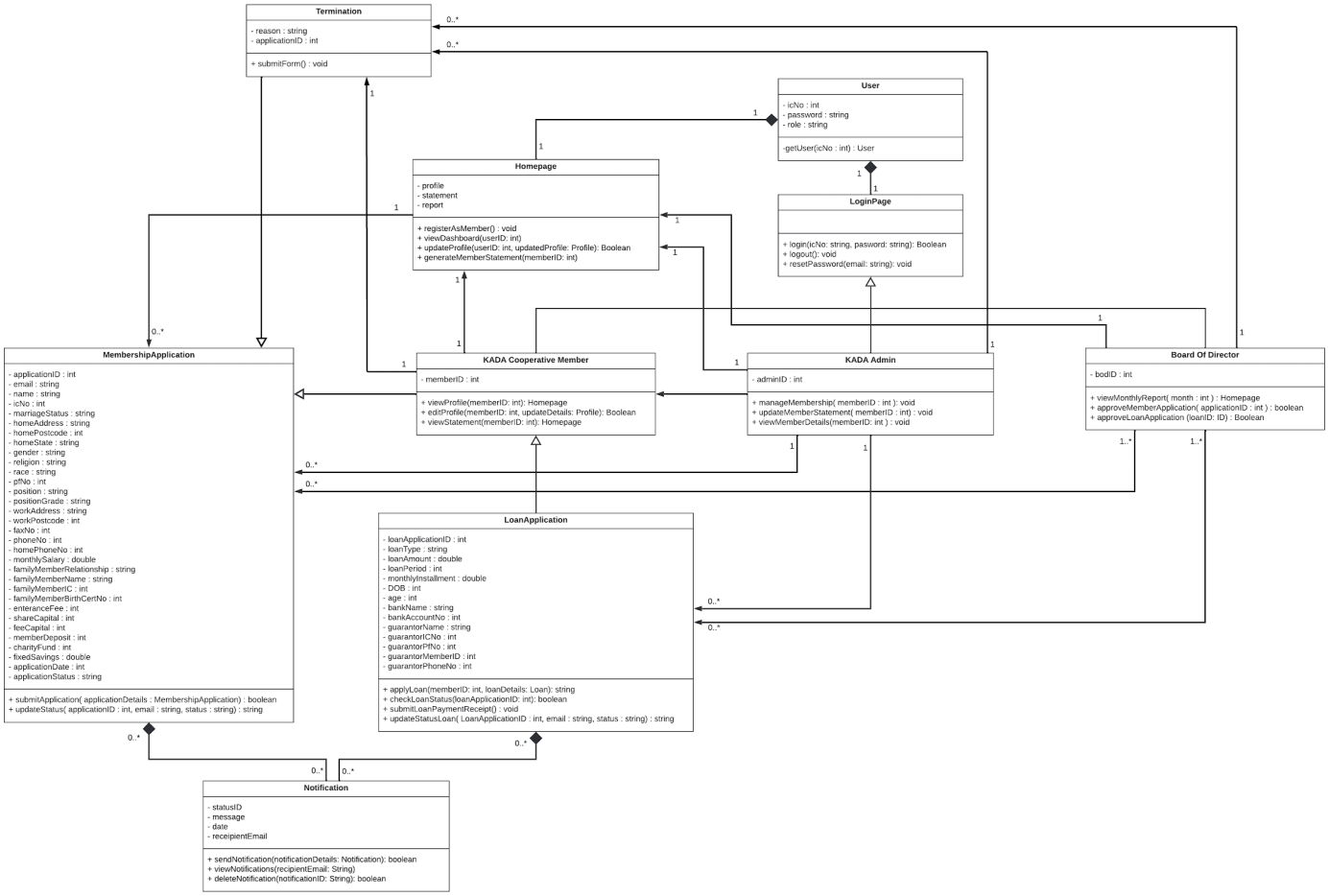


Figure 2.2.2 : Domain Model for KADA Cooperative System

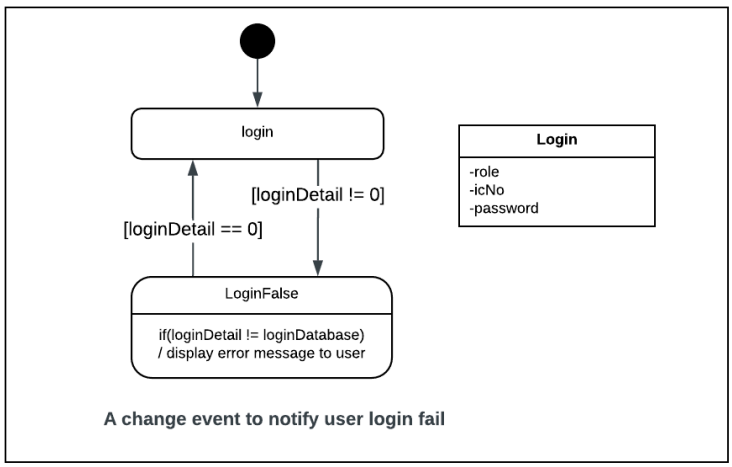


Figure 2.2.3 : State Diagram for authentication and authorization

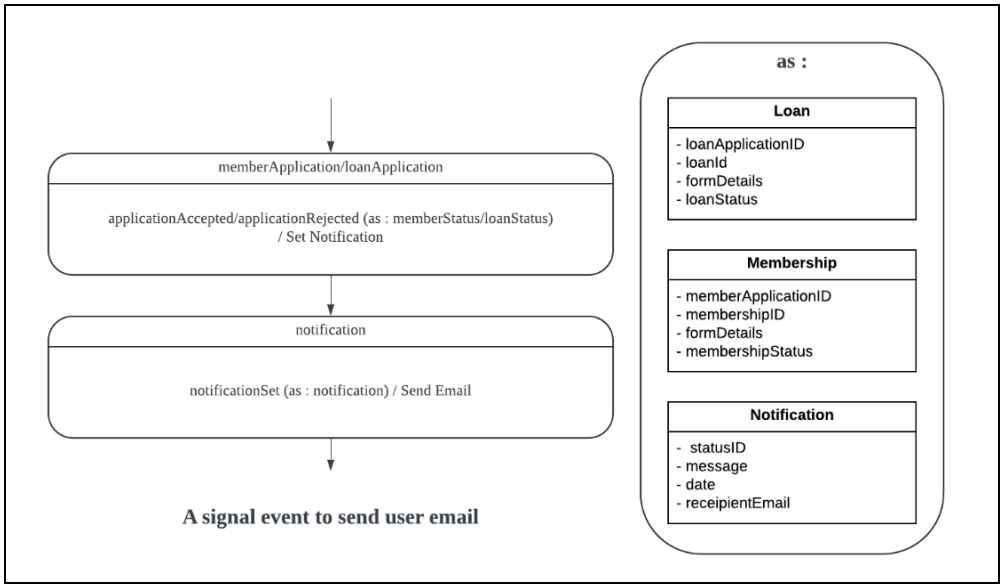


Figure 2.2.4 : State Diagram for Loan Application

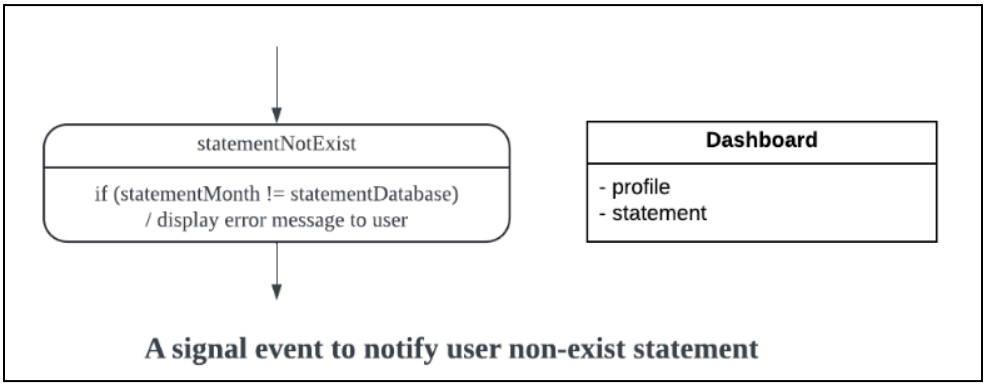


Figure 2.2.5 : State Diagram for Dashboard

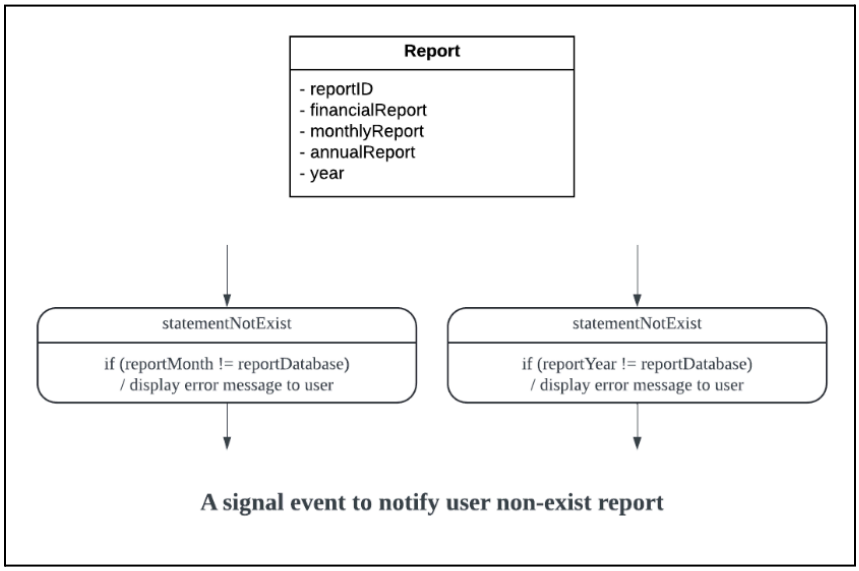


Figure 2.2.6 : State Diagram for Report

2.3 Use Case Details

This section provides detailed descriptions of each use case for the system. It outlines the interactions between the actor and the system by showing the activity diagram and sequence diagram of the system.

2.3.1 UC001 : Use Case <Authentication>

Table 2.3.1.1: Use Case Description for Authentication

Use case: Authentication
ID: UC001
Actors: KADA Staff, KADA Admin, KADA BOD
Preconditions: 1. The actors must have the valid ic number and password to login the system. 2. The actors must have a stable internet connection to be able to enter the system.
Flow of events: 1. The user clicks onto the login page of the system. 2. The system prompts the user the login form. 3. The users select their roles, enter their ic number and password through the login page. 4. The system verified the user authentication. 5. If the authentication is valid, the system grants the user access to the system based on their roles. 6. If the authentication is invalid, the system prompts the error message and denies the user access to the system.
Alternative flow 1: If the user enters an invalid role, ic number or password, the system prompts an error message and requires the user to enter the valid email and password.
Alternative flow 2: If the user has not registered to the system, they need to click on the sign up page and enter their email address and create a new password.
Postconditions: Upon the valid authentication process, the user will be redirected to the user interface according to their roles in the system.

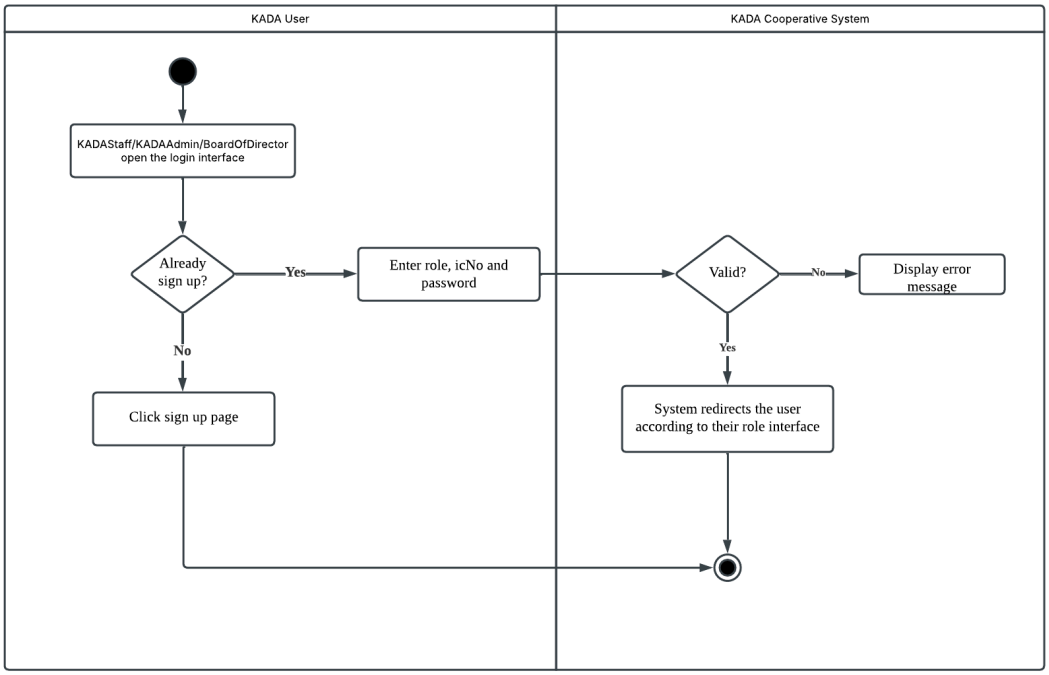


Figure 2.3.1.1: Activity Diagram for Authentication

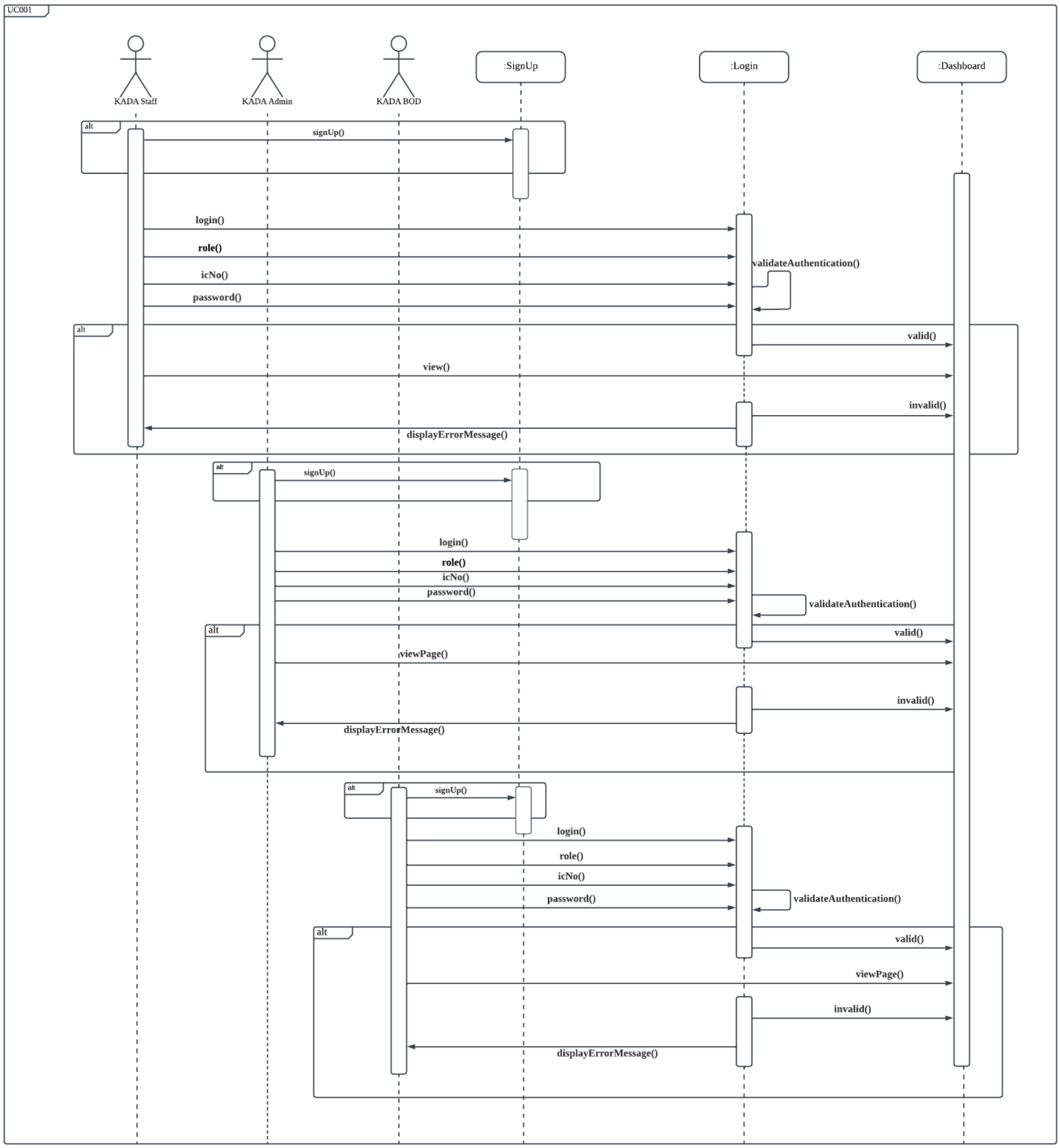


Figure 2.3.1.2: Sequence Diagram for Authentication

2.3.2 UC002: Use Case <Apply For Membership>

Table 2.3.2.1: Use Case Description for Apply For Membership

Use case: Apply For Membership
ID: UC002
Actors: KADA Staff
Preconditions: 1. The Staff must have the valid ic number and password to login the system. 2. The Staff that apply for the membership should be the one who is not a member yet.
Flow of events: 1. The Staff logs into the system. 2. The Staff navigate themselves to the “Permohonan Ahli” page. 3. The Staff required to fill all the information given and membership declaration. 4. The Staff clicks on the “hantar” button to submit the application. 5. The system prompts the successful submitted message.
Postconditions: 1. Once the application has been submitted, the Staff cannot make any changes to the application. 2. The Staff can track their membership application status after submission at the “Permohonan Ahli” page.

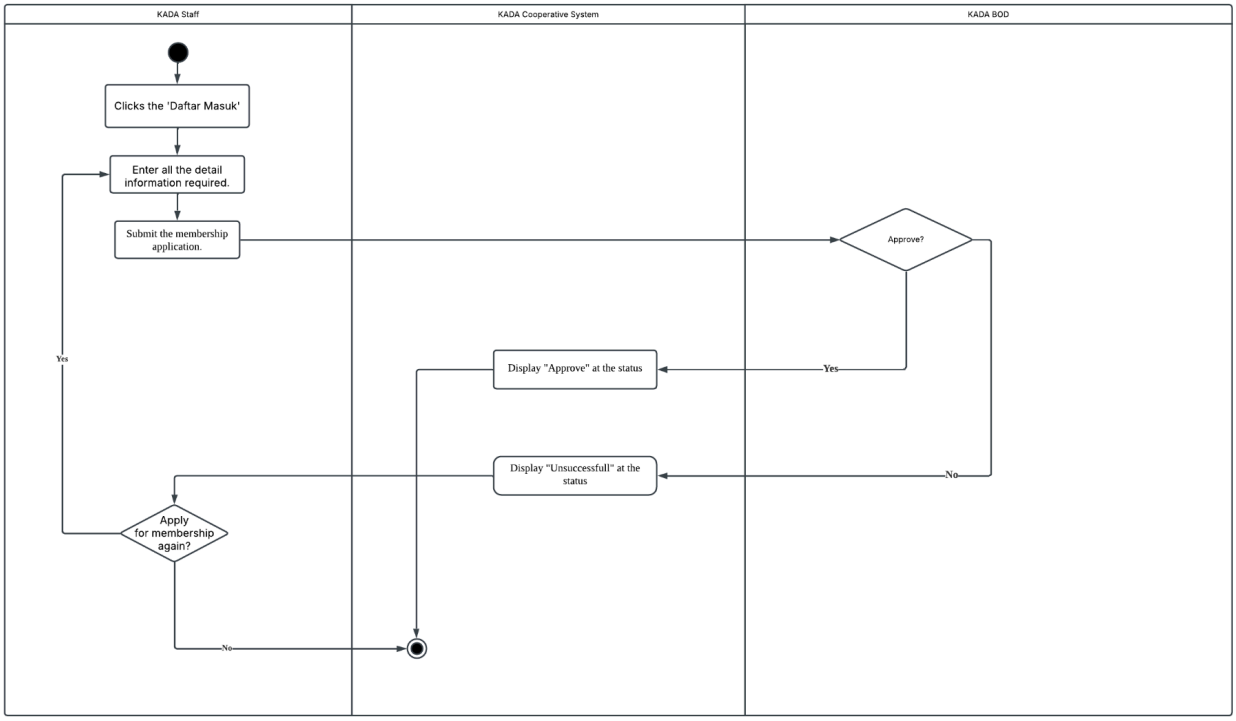


Figure 2.3.2.1: Activity Diagram for Apply For Membership

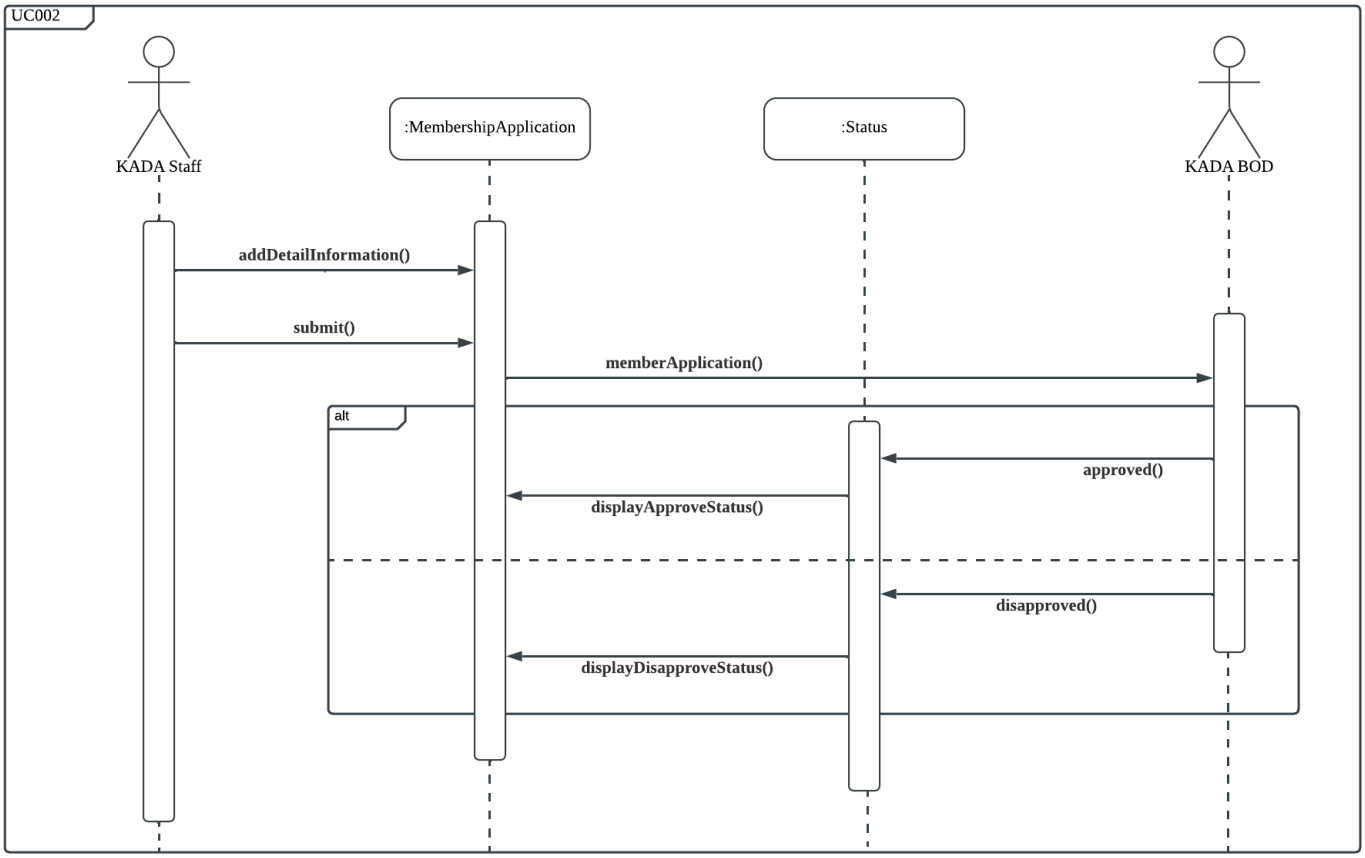


Figure 2.3.2.2: Sequence Diagram for Apply For Membership

2.3.3 UC003: Use Case <Apply for Loan>

Table 2.3.3.1: Use Case Description for Apply for Loan

Use case: Apply for Loan
ID: UC003
Actors: KADA Staff
Preconditions: 1. The staff that apply for loan should be a member and have paid completely the modal share to the cooperative.
Flow of events: 1. The KADA staff will select “Permohonan Pembiayaan” on the homepage. 1.1. System will display the loan details page. 2. KADA staff will select “Mohon Pembiayaan” button. 2.1. System will display the loan application page. 3. KADA staff will fill-in all details for the loan application. 4. KADA staff select the “Hantar” button. 4.1. System will validate all details. 4.2. If all details are valid, the system will send data into the system to be reviewed. 4.3. Else, the system will display an error message.
Postconditions: 1. After the application has been reviewed, KADA staff can view application status via application status page. 2. KADA staff select “Status Permohonan”. 2.1. If loan application exist 2.1.1. The system displays loan applications with status. 2.2. Else 2.2.1. The system will display an error message.

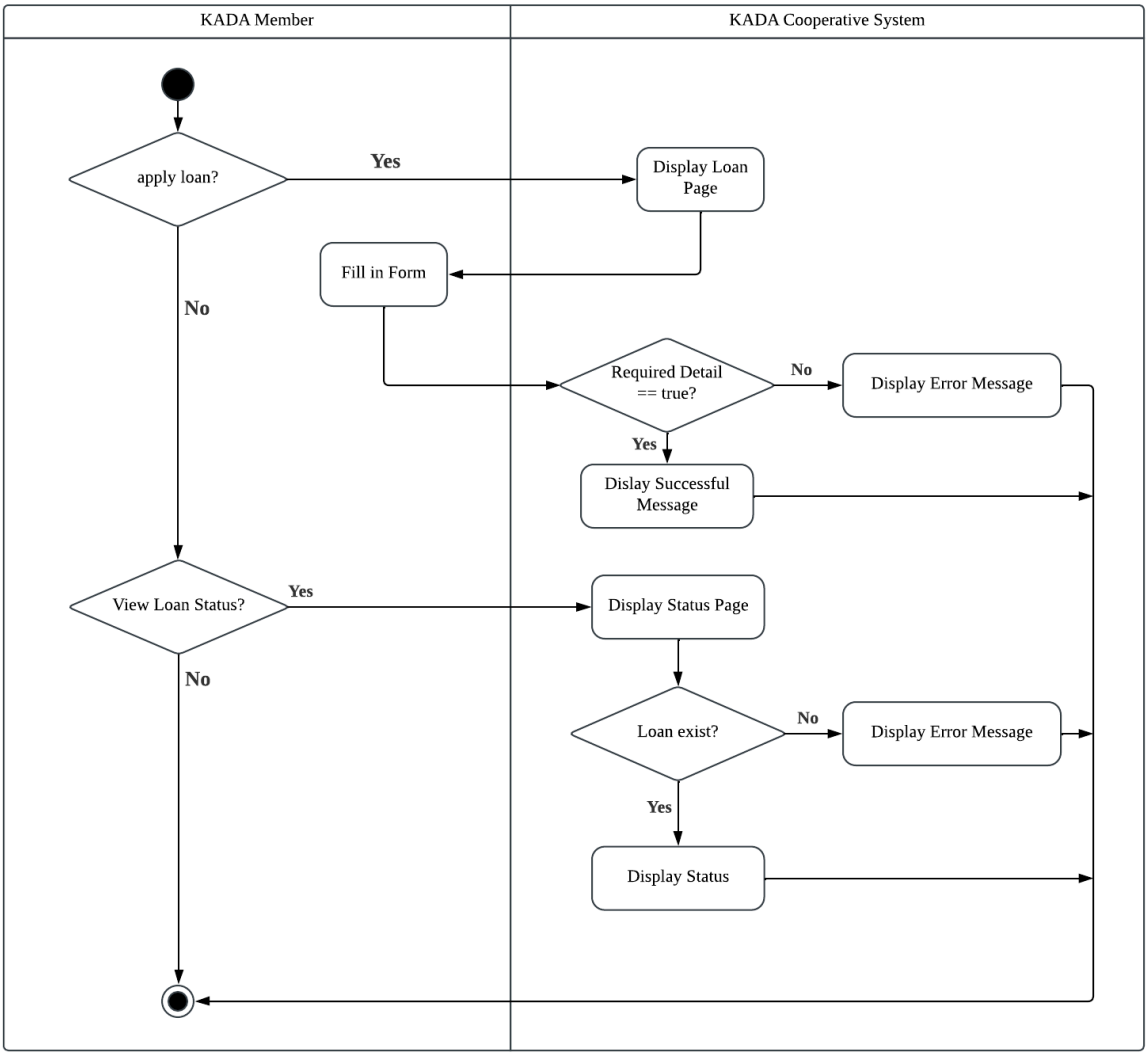


Figure 2.3.3.1: Activity diagram for Apply for Loan

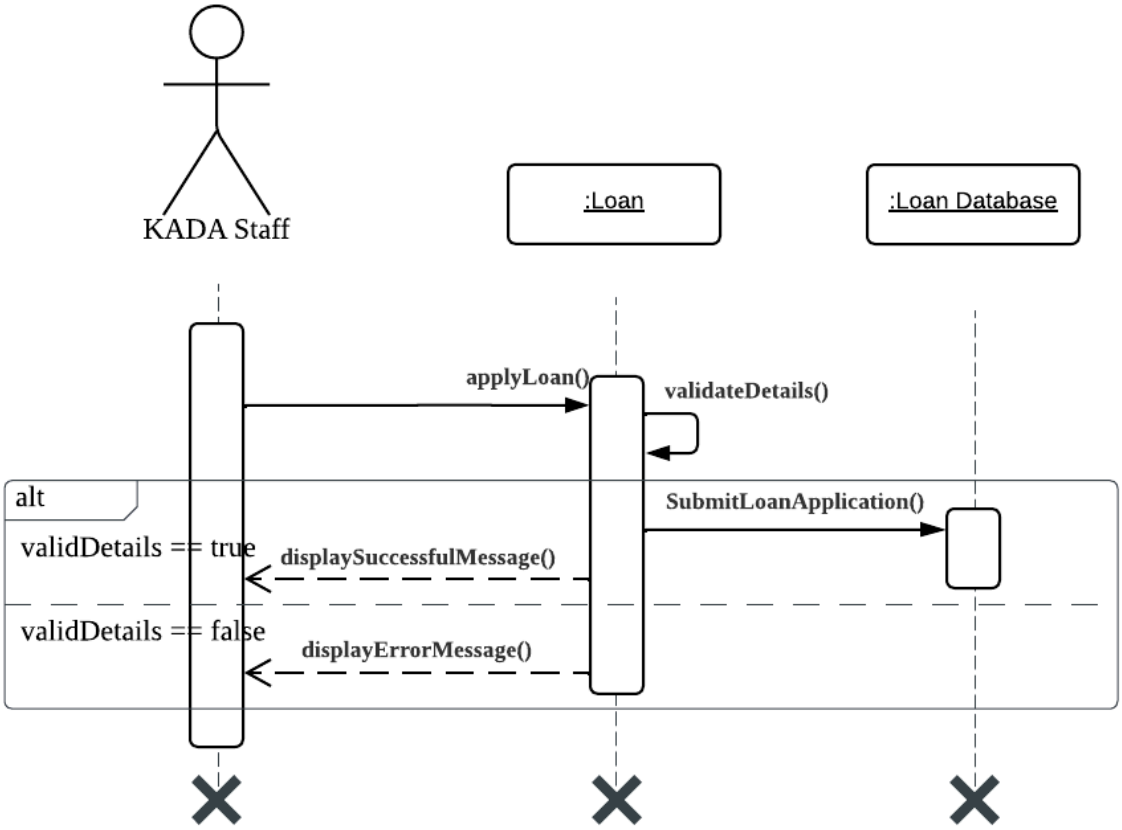


Figure 2.3.3.2: Sequence diagram for Apply for Loan

2.3.4 UC004: Use Case <View Member Statements>

Table 2.3.4.1: Use Case Description for View Member Statements

Use Case : Member Statement
ID: UC004
Actors: Kada Staff
Preconditions: 1. Kada Staff must be logged in to the KADA system to view member statements.
Flow of events: 1. Kada Staff logs into the KADA system 2. Kada Staff enters the member statement section 3. Kada Staff selects the type of statement that they want view 4. If Kada Staff selects ‘penyata bulanan’ 4.1. System retrieves and displays the staff’s monthly statements records. 5. If Kada Staff selects ‘penyata kewangan’ 5.1. System retrieves and display financial statements 6. Kada Staff can export the statement in desired format if needed
Postconditions: 1. Kada Staff views and saves or prints the financial statement

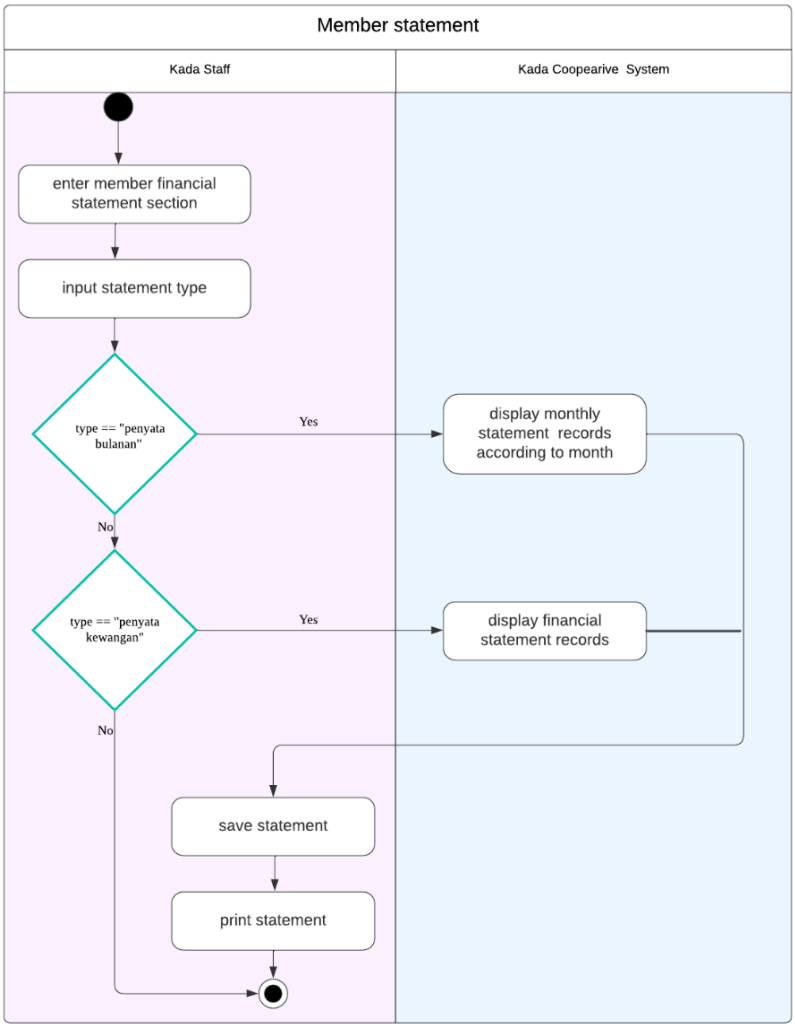


Figure 2.3.4.1: Activity diagram for View Financial Statement

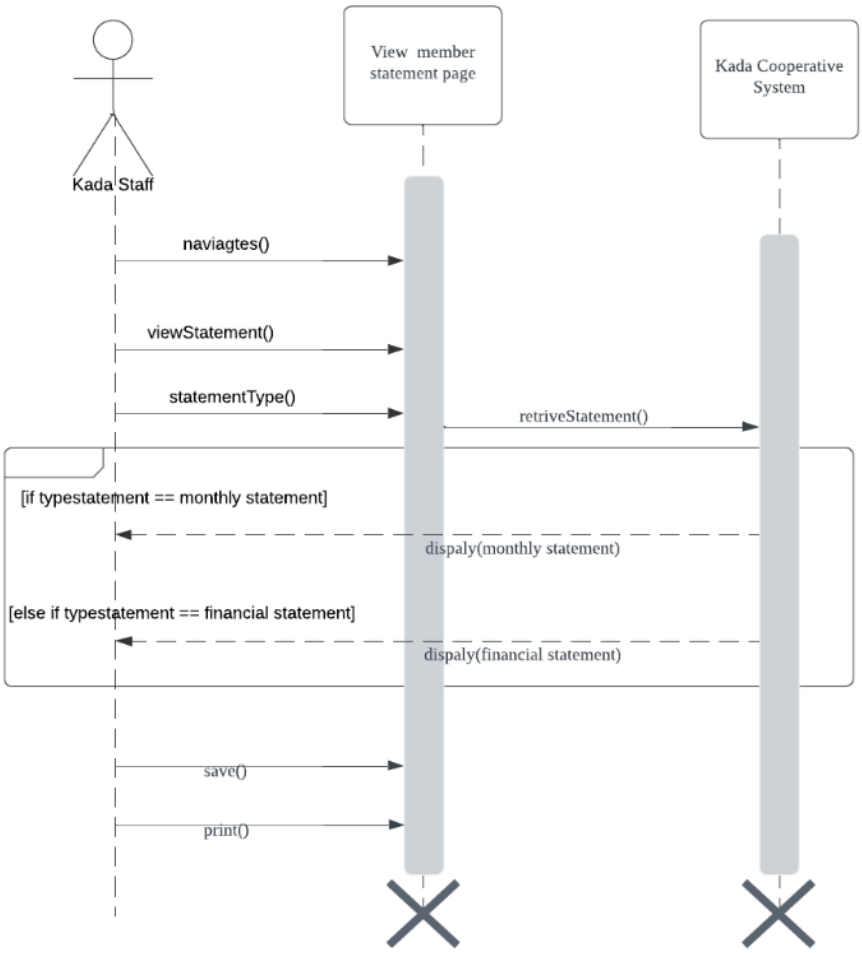


Figure 2.3.4.2: Sequence diagram for View Financial Statement

2.3.5 UC005: Use Case <Member Statement>

Table 2.3.5.1: Use Case Description for Member Statement

Use case : Member statement
ID : UC005
Actors : Kada Admin
Preconditions: 1. Kada Admin must be logged in to the KADA system to access member's financial statements.
Flow of events: 1. Kada Admin must log into the system 2. Kada Admin enter 'Member statement' section 3. Admin can edit yuran 4. If admin add record 4.1 Click 'tambah rekod' 4.2 Select month 4.3 Search member 4.4 Add record 5. View updated records 6. Save the records
Postcondition: 1. Kada Admin views and optionally saves the member statement for administrative process

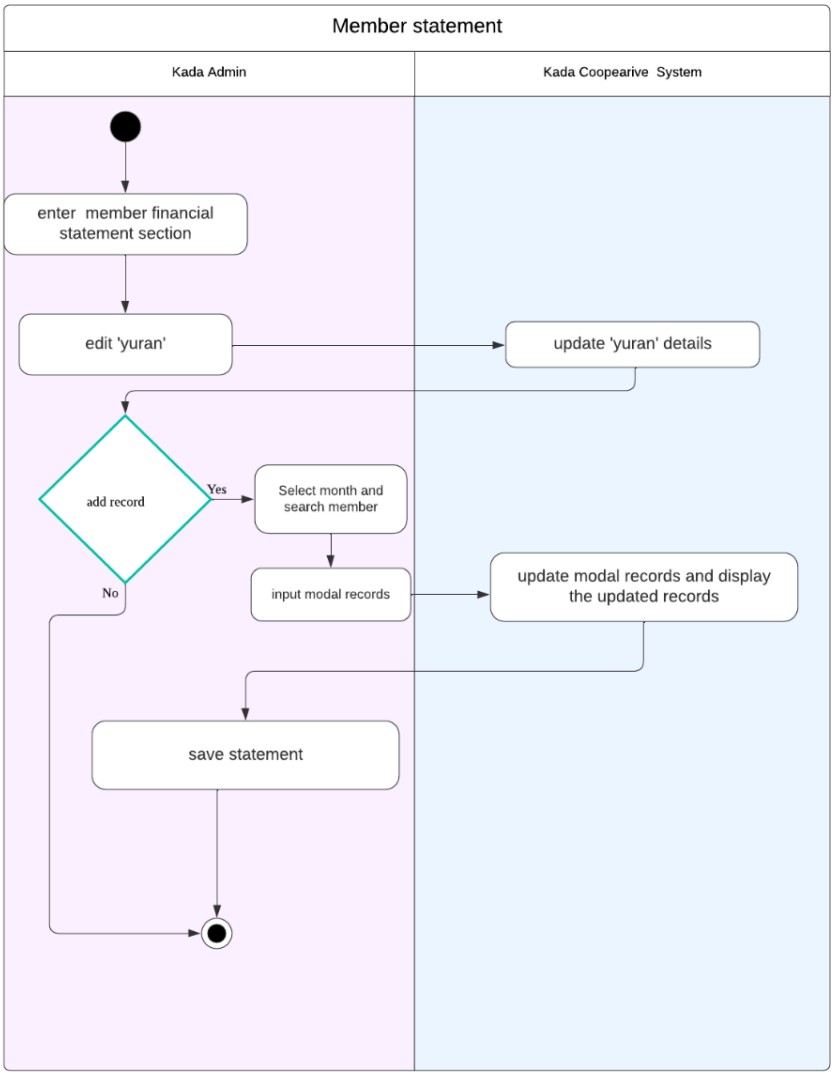


Figure 2.3.5.1: Activity diagram Description for Member Statement

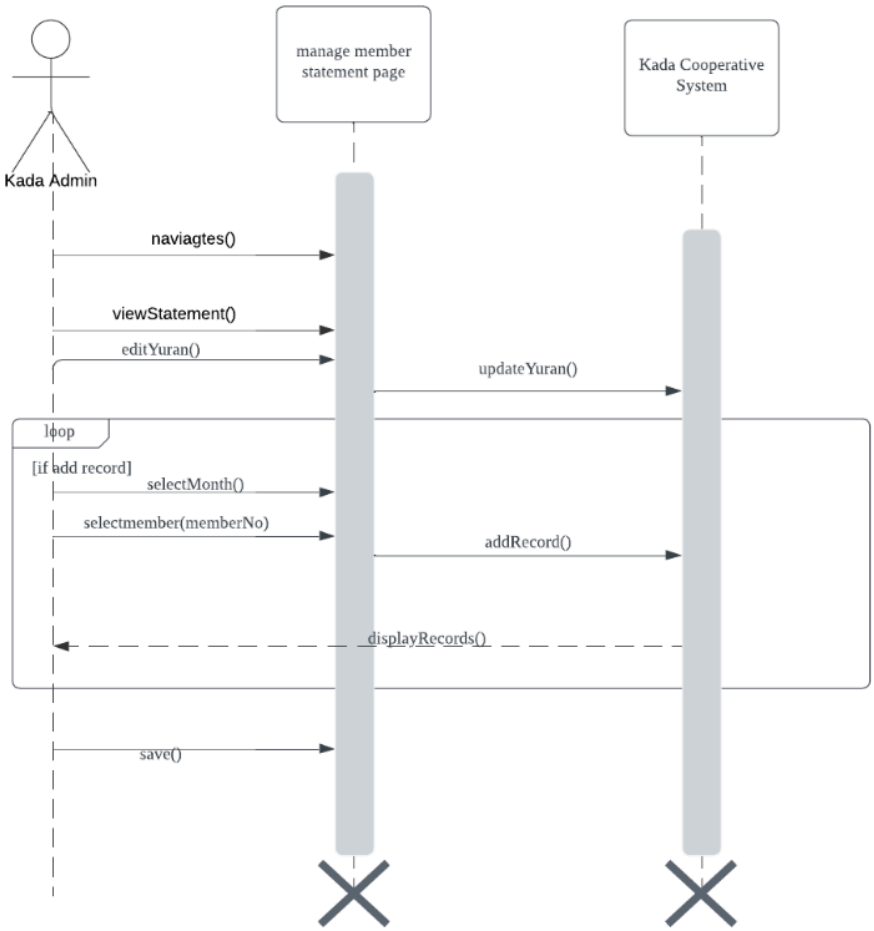


Figure 2.3.5.2: Sequence diagram Description for Member Statement

2.3.6 UC006 : Use Case <Manage Financial Report>

Table 2.3.6.1: Use Case Description for Manage Financial Report

Use Case : Manage Financial Report
ID : **UC006**
Actors: KADA Cooperative Administrative
Preconditions: 1. The Administrative has to log into the KADA Cooperative System. 2. The report must be built upon existing financial and operational inputs within the system.
Flow of events : 1. The KADA System provides access. 2. The Administrative navigates to the "Financial Report" section. 3. The KADA System presents available options for creating different types of reports (membership, loan approvals, and financial summary). 4. The Administrative generates reports by selecting the appropriate report type and filtering data (date range, loan type, etc.). 5. The KADA System retrieves such information and displays the prepared report. 6. The Administrative can sort or dynamically filter that report. 7. The report will be available as a download in PDF or Excel format to the Administrative.
Alternative flow : ● If options entered is invalid 1. The KADA system will throw an error stating "Invalid filter settings, please change your inputs”. 2. The Administrative can alter the filters and try once again. ● If data is not available 1. The KADA system displays the message that says: "No data is available based on the filters or the report type chosen." 2. The Administrative could alter the filters or exit the section.
Postcondition : 1. The Administrative gets to successfully check the request report or down it. 2. The KADA System tracks report access for audit reasons.

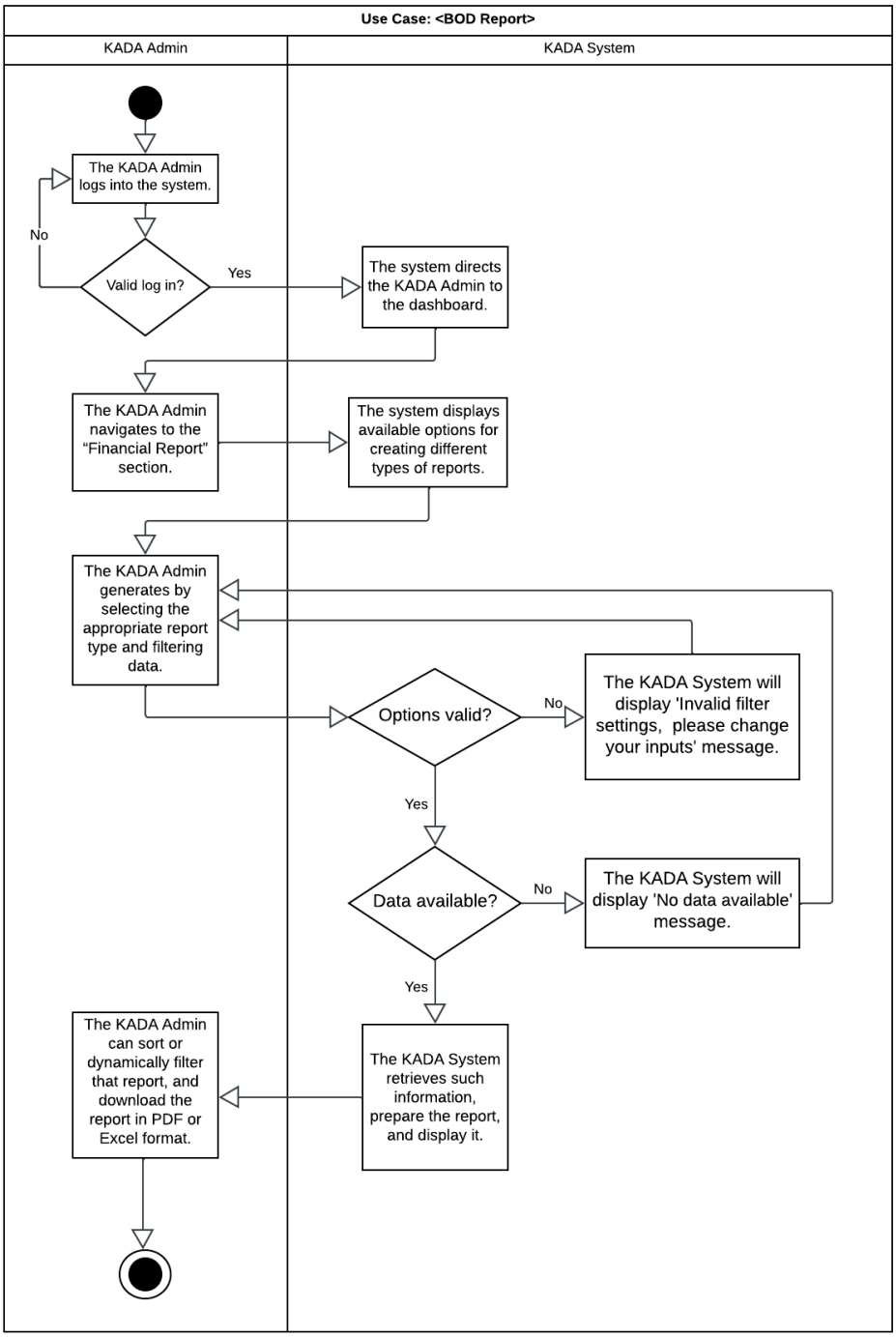


Figure 2.3.6.1: Activity Diagram for Manage Financial Report

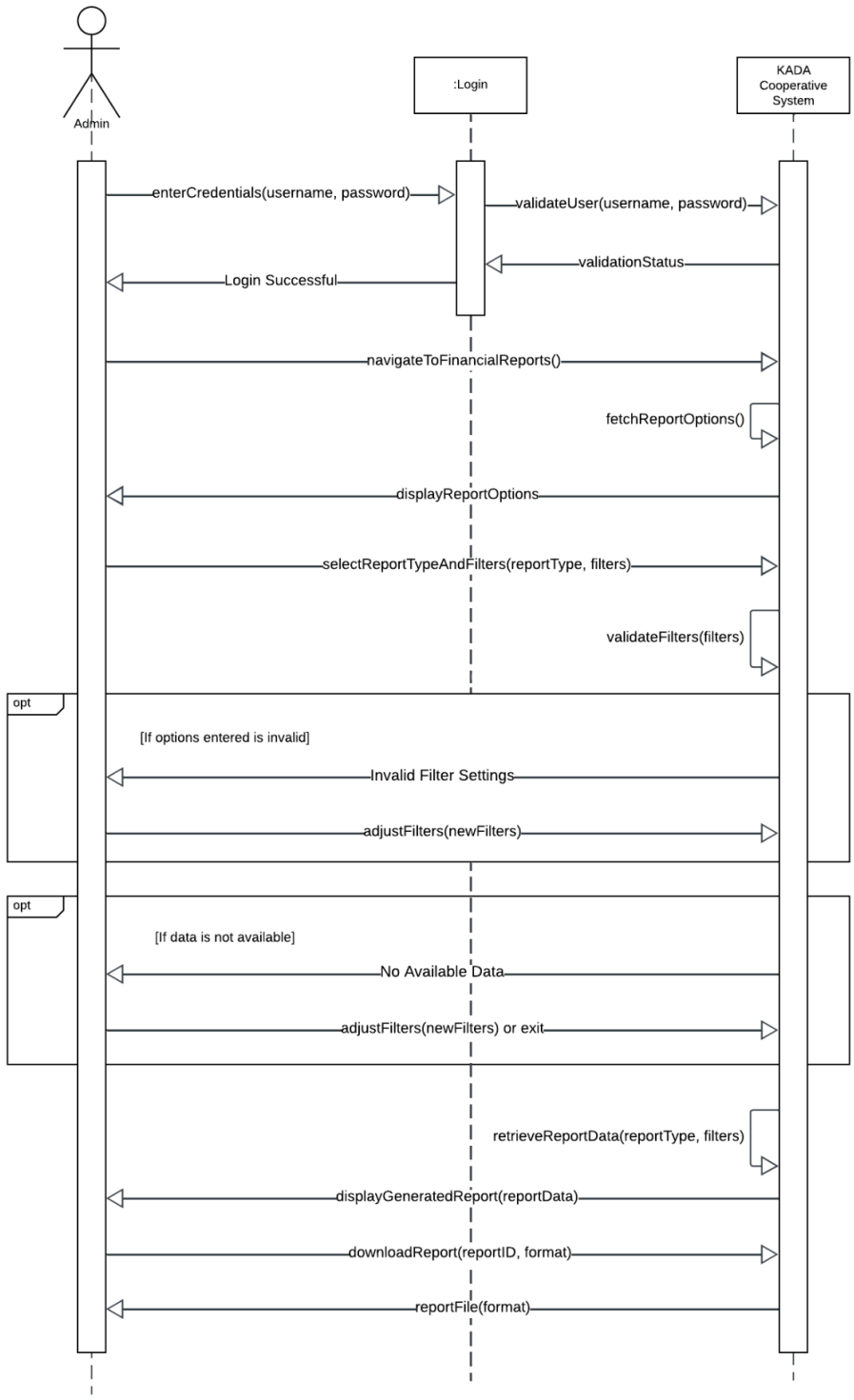


Figure 2.3.6.2: Sequence Diagram for Manage Financial Report

2.3.7 UC007: Use Case <View Financial Report>

Table 2.3.7.1: Use Case Description for View Financial Report

Use Case : View Financial Report
ID : **UC007**
Actors: KADA Cooperative Board of Directors (BOD)
Preconditions: 1. The BOD member has to log into the KADA Cooperative System. 2. Finance-related data must be recorded and are available in the database.
Flow of events : 1. The KADA System directs the BOD member to the dashboard. 2. The BOD member navigates to the “Financial Report” section. 3. The KADA System displays a list of financial reports that can be accessed. 4. The BOD member selects a certain financial report type like monthly profit report or loan distribution report. 5. The KADA System obtains the required information and prepares an appropriate report. 6. The BOD member examines the report data on screen. 7. The BOD member may download the report in PDF or Excel format.
Alternative flow : ● If financial data is not available 1. The KADA system will display a message saying "No data accessible for the chosen type of report or period". 2. The BOD member can select another kind of report or exit the "Financial Report" section. ● If there’s error in system 1. It will process it in logs and also notify the member of the BOD: "An error has occurred in generating the report. Kindly try later."
Postcondition : 1. The BOD Member is now able to access the relevant financial statement from the KADA System quite successfully. 2. If it is needed, the BOD member can download the report for use or further analysis.

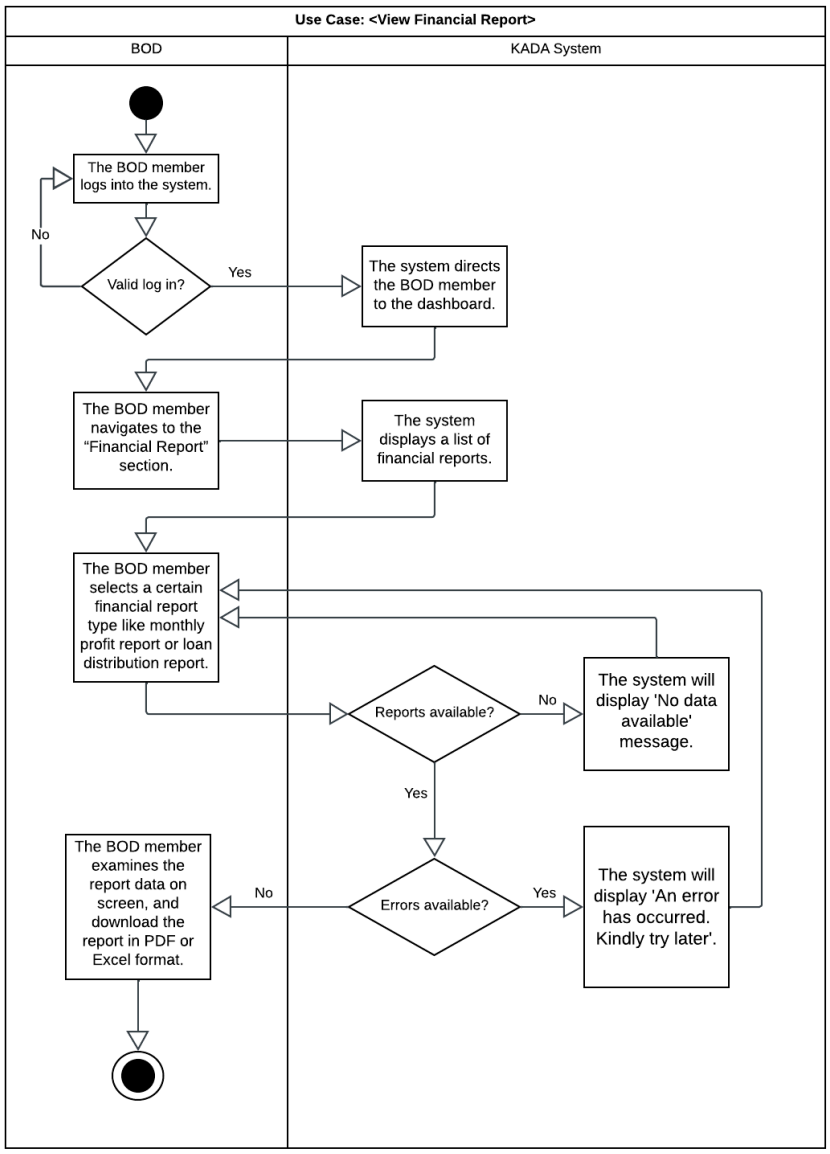


Figure 2.3.7.1: Activity Diagram for View Financial Report

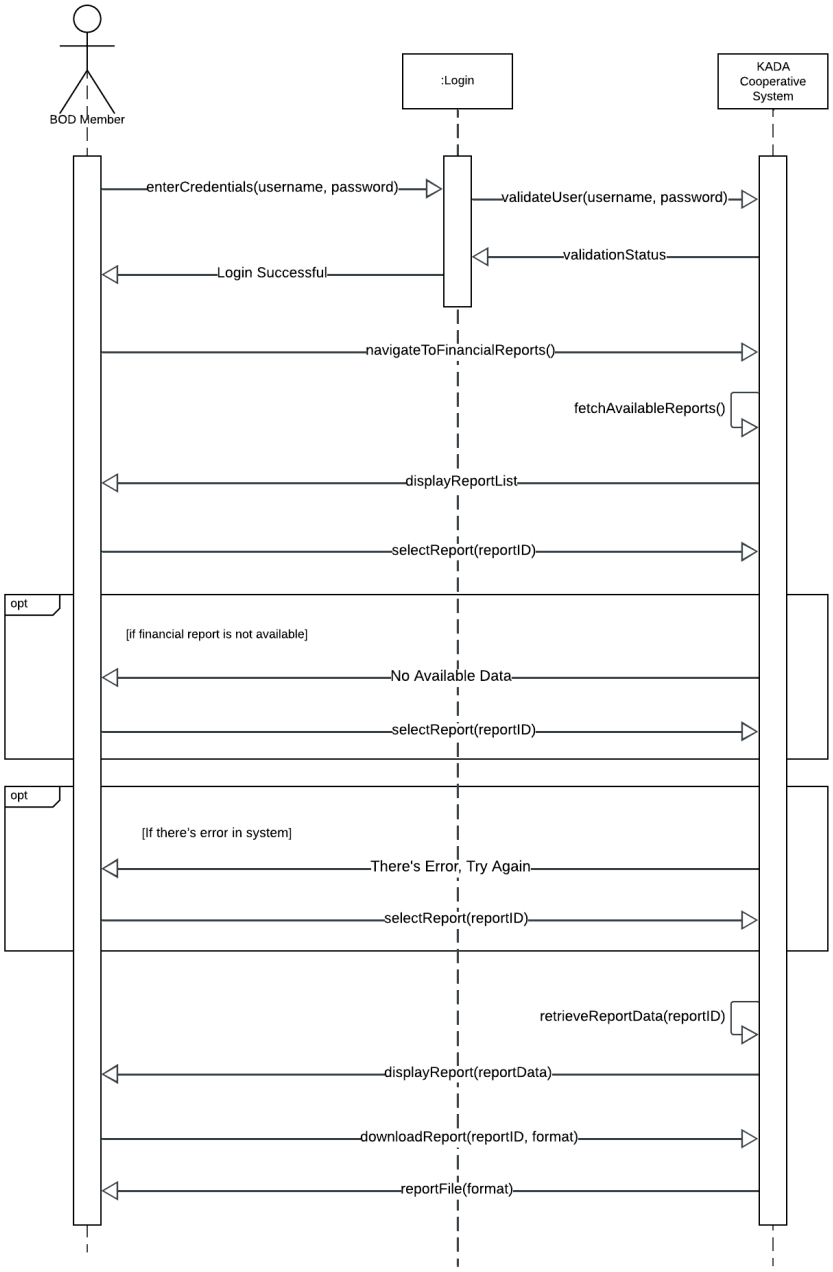


Figure 2.3.7.2: Sequence Diagram for View Financial Report

2.3.8 UC008: Use Case <Manage Member>

Table 2.3.8.1: Use Case Description for Manage Member

Use Case : Manage Member
ID : **UC009**
Actors: KADA Cooperative Admin
Preconditions: The user must be an authorized KADA Cooperative Admin with appropriate system access.
Flow of events : 1. Admin logs into KADA Cooperative System with their role, IC number and password. 2. System grants access to the admin homepage, providing options for monitoring the system, managing the applications, financial statement and financial report. 3. Admin reviews the detailed information of the applicants of the membership and loan applications. 4. Admin manages the applications like membership application, loan application and termination application. The system sends the notifications via email to the applicants. 5. Admin manages the financial statement by editing the information or add the records. 6. Admin manages the financial report by selecting the month and year. The system will display the completed financial report. 7. Admin can download the PDF of list termination members or the financial report if they want to keep it. 8. System performs the requested task and confirms the successful completion.
Alternative flow : Unauthorized Access : If an unauthorized user attempts to access the admin homepage, the system denies the access and logs the attempt.
Postcondition : Admin tasks are performed successfully to ensure the system integrity and availability.

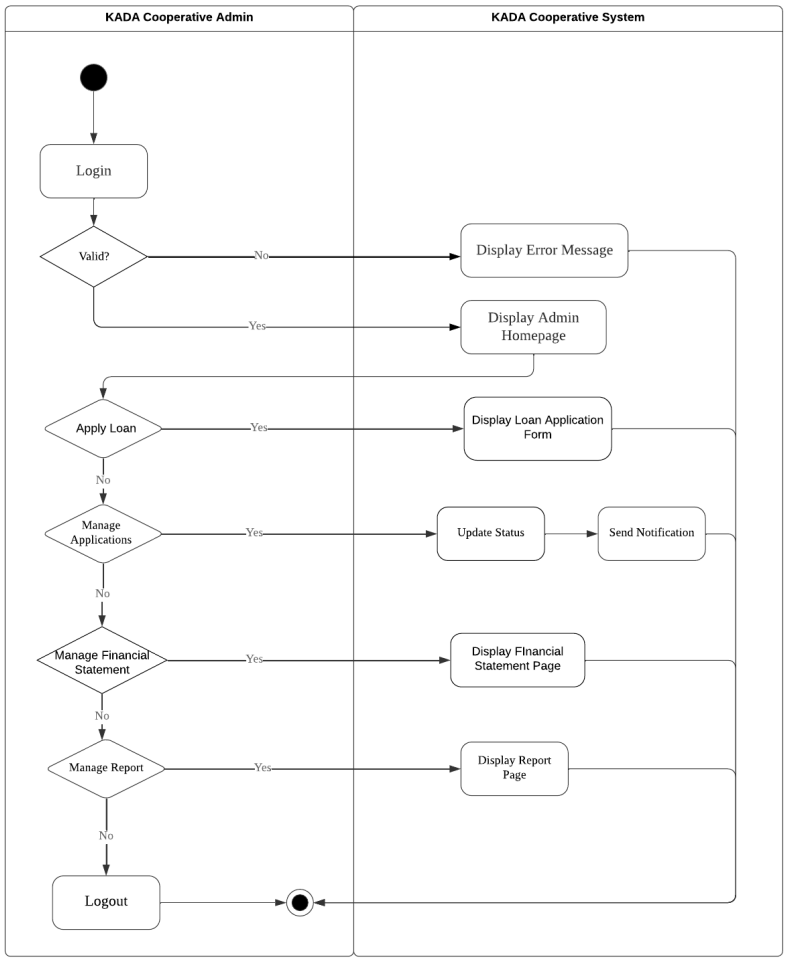


Figure 2.3.8.1: Activity Diagram for Manage Member

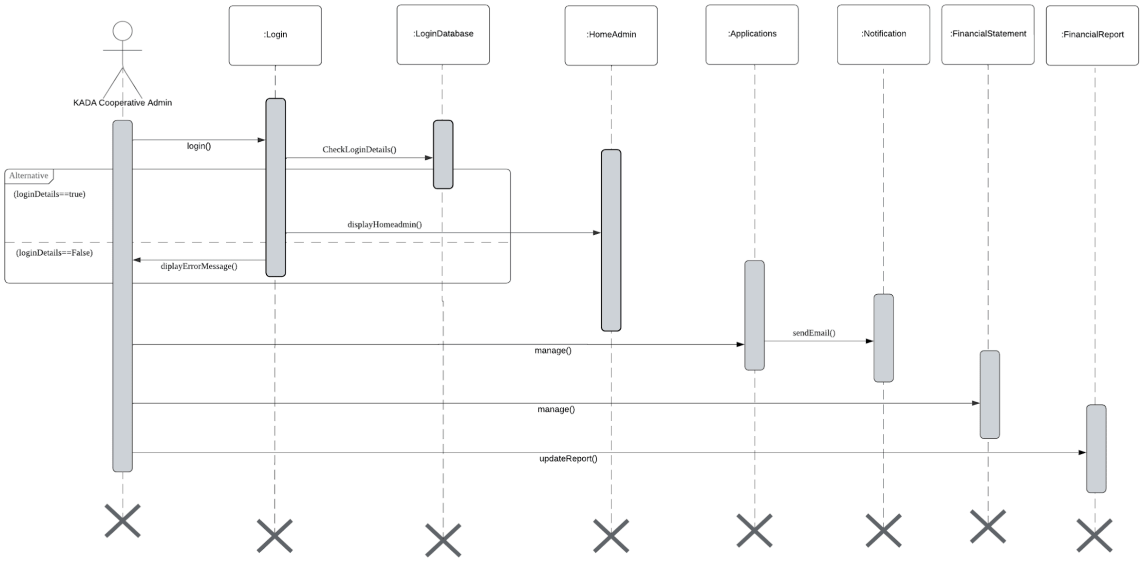


Figure 2.3.8.2: Sequence Diagram for Manage Member

2.3.9 UC009: Use Case <Review Application>

Table 2.3.9.1: Use Case Description for Review Applications

Use case: Review Applications
ID: UC009
Actors: KADA Cooperative Boards of directors KADA Cooperative Admin
Preconditions: 1. KADA cooperative BOD and admin are required to log into the system before reviewing applications.
Flow of events: 1. If BODs and admin want to review member registration applications. 1.1. BODs select the “Permohonan Ahli” button. 1.2. The system will display lists of member applications. 1.3. BODs will approve/reject applications after offline discussion. 2. Else if BODs and admin want to review loan applications. 2.1. BODs select the “Permohonan Pembiayaan” button. 2.2. The system will display lists of loan applications. 2.3. BODs will approve/reject applications after offline discussion. 3. KADA cooperative admin will monitor the reviewing process to ensure all decisions are successfully submitted into the system.
Postconditions: 1. After the application has been reviewed, the system will send an email to notify KADA staff. 2. Admin can send email manually if automatic email is not sent to the applicant.
Alternative flow 1: 1. If BODs and admin select an application, the system will display the application details.
Postconditions: 1. After the application has been reviewed, the system will send an email to notify KADA staff. 2. Admin can send email manually if automatic email is not sent to the applicant.

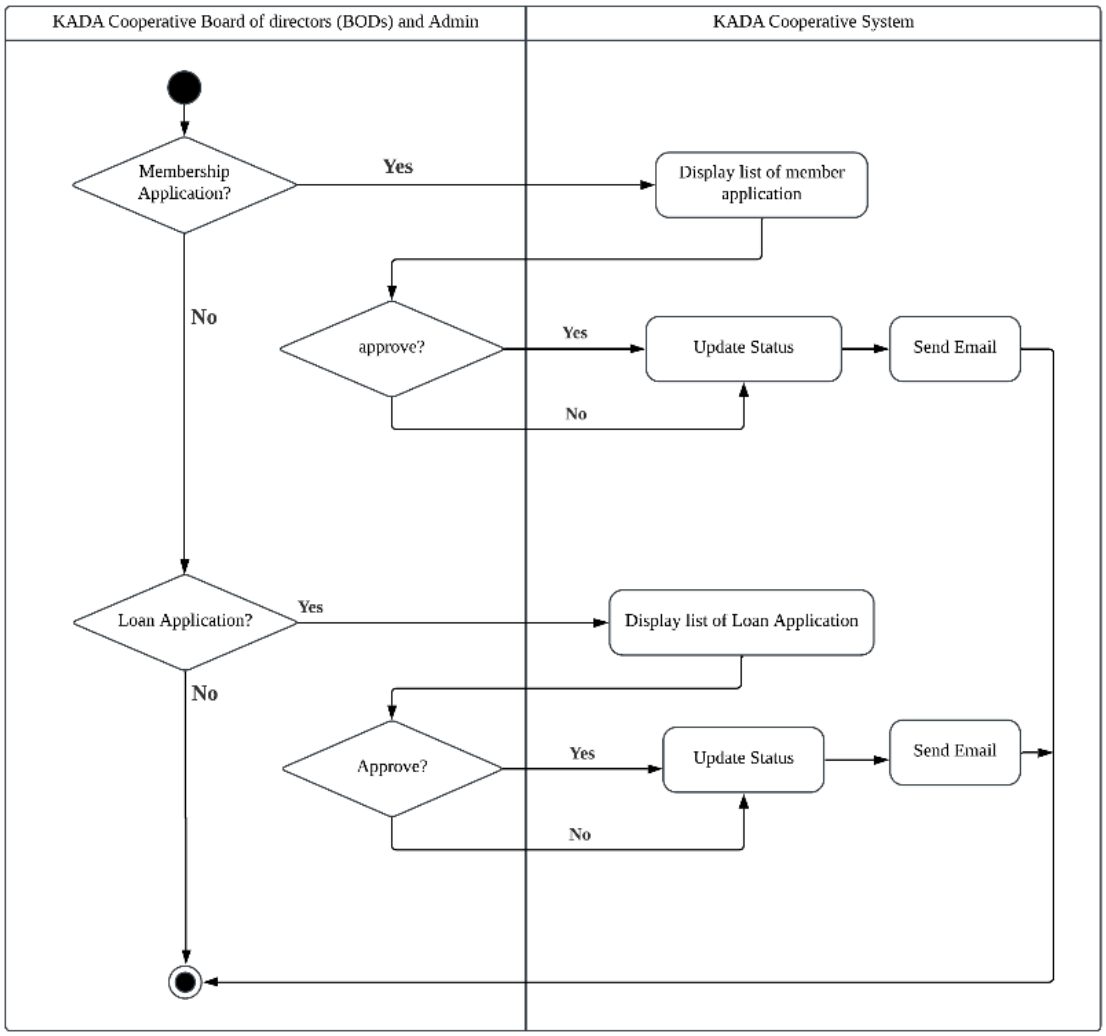


Figure 2.3.9.1: Activity Diagram for Review Applications

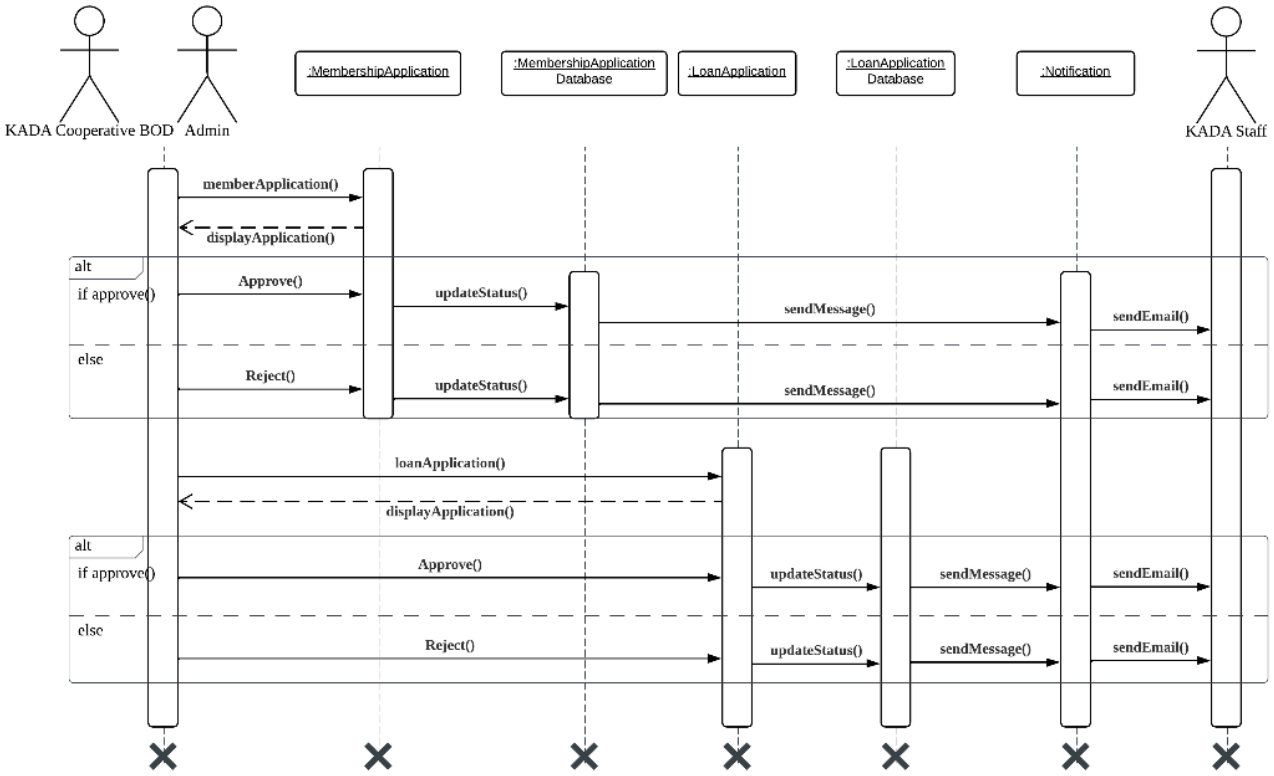


Figure 2.3.9.2: Sequence Diagram for Review Applications

2.3.10 UC010: Use Case <Terminate Membership>

Table 2.3.10.1: Use Case Description for Terminate Membership

Use case: Terminate Membership
ID: UC010
Actors: KADA Cooperative Member
Preconditions: 1. The Member must have the valid account for the system.
Flow of events: 1. The Member logs into the system. 2. The Member navigates to the 'Permohonan Berhenti Menjadi Ahli' tab. 3. The Member is required to fill the reason for terminating membership. 4. The Member clicks the 'Hantar' button to submit the form application. 5. The system prompts the successful submitted message.
Postconditions: 1. Once the termination application has been submitted, the Member cannot make any changes to the form. 2. The Member can track their application status after submission at the same tab.

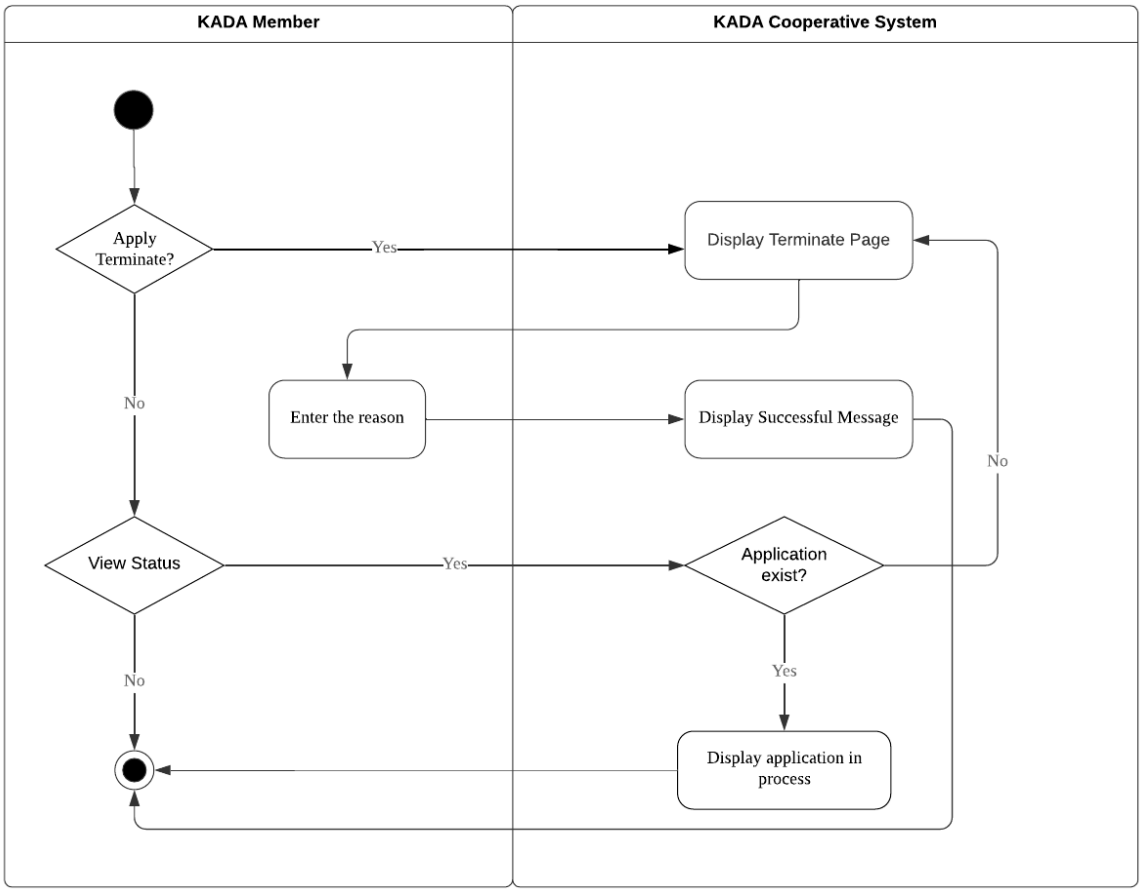


Figure 2.3.10.1: Activity Diagram for Terminate Membership

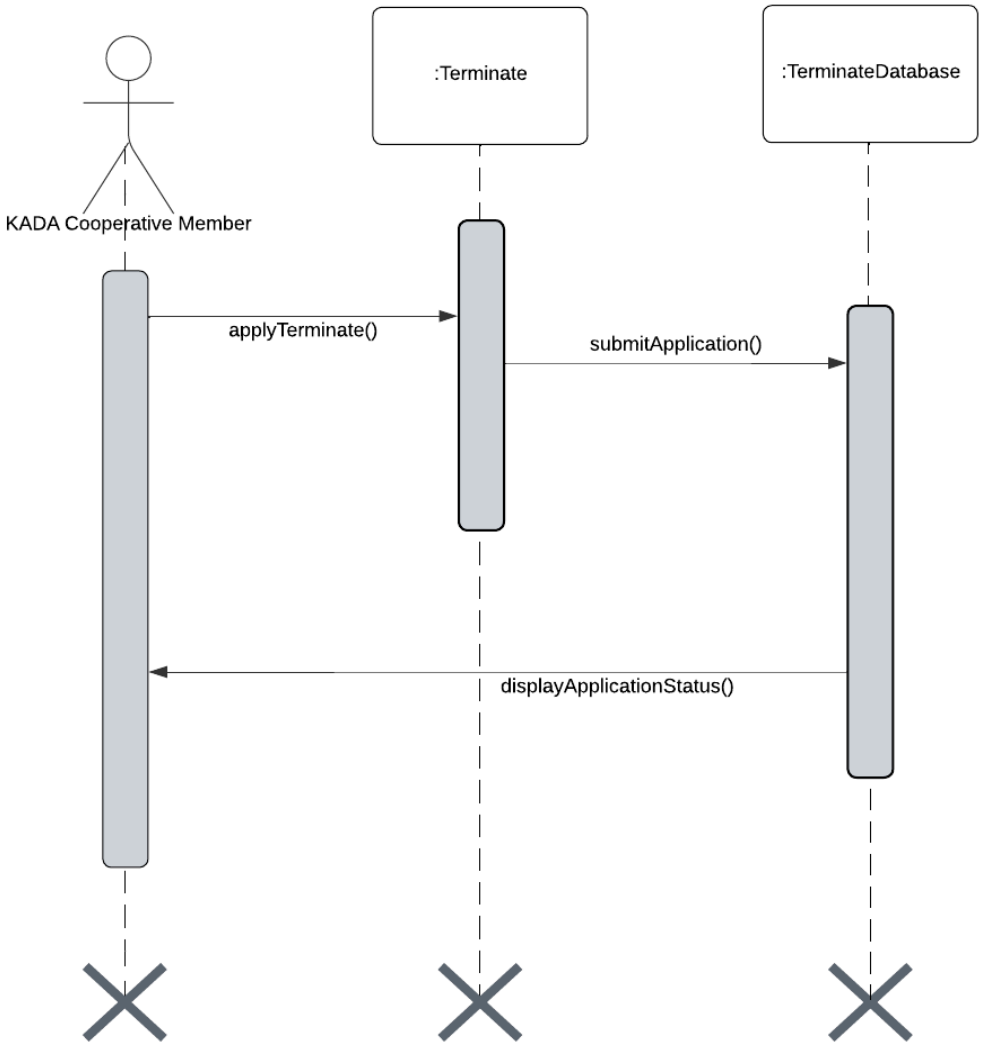


Figure 2.3.10.2: Sequence Diagram for Terminate Membership

2.4 Performance and Other Requirements

This section details the non-functional requirements, which have been categorized into Software System Attributes, Performance Requirements, and Other Requirements, adapted to the needs of the KADA Cooperative System.

1. Software System Attributes

- Usability:

➢ The system shall provide a user-friendly interface for all user roles, enabling administrators, board members, and members to interact efficiently.

➢ KADA Specific: Members can easily view personal information and submit loan applications, while administrators and board members can manage approvals and generate reports seamlessly.

- Reliability:

➢ Ensure consistent performance of key features such as dashboards, loan applications, and reporting.

➢ KADA Specific: Loan processing and real-time transactions must operate reliably, with minimal downtime, to maintain user trust and system efficiency.

- Maintainability:

➢ Policy parameters are interest rates, repayment terms, membership benefits, or others that need to be changed within 10 minutes without downtime.

➢ KADA Specific: Provide the administrators with a settings interface to quickly update the policies, so that the system could adapt to the needs of the cooperative without interruption.

- Portability:

➢ The system shall support desktops, tablets, and smartphones and provide a consistent responsive interface across devices.

➢ KADA Specific: Mobile access for board members ensures remote loan application approvals, while employees access via desktop during business hours.

- Compatibility:

- ➢ The system should integrate well with payroll systems for efficient loan repayments.
- ➢ KADA Specific: Payroll deductions for loan repayments should work seamlessly with the organization's existing systems, minimizing manual interventions.

2. Performance Requirements

- Response Time:
- ➢ Authentication and loading of the dashboard should take less than 2 seconds, while member data or loan application retrieval should take less than 3 seconds.
- ➢ KADA Specific: Ensures smooth interaction for all users, particularly during busy cooperative operations.

- Throughput:
- ➢ The system shall be able to process over 50 transactions per second at peak periods.
- ➢ KADA Specific: Allows real-time recording of loan applications and approvals during high demand.

- Capacity:
- ➢ The system will support 1,000 concurrent users and store data for 100,000 members without degradation of system performance.
- ➢ KADA Specific: Supports current volume of users and scales to grow with membership.

- Availability:
- ➢ System shall be available for use 99.9%, permitting only 8 hours of downtime annually.
- ➢ KADA Specific: Ensures cooperative services will be up during work hours to meet the needs of members and the organization.

3. Other Requirements

- Security:
- ➢ The system shall ensure data security by employing AES-256 encryption, multi-factor authentication for sensitive operations.
- ➢ KADA Specific: Protects member data, loan applications, and board-level reports from unauthorized access or breaches.

- Safety:

➢ Unauthorized access shall not be allowed via RBAC, audit trails tracking the activities for accountability.

➢ KADA Specific: Only the admin and board members will have access to sensitive data for member trust and operational security.

- Legal and Regulatory:

➢ Compliance with data protection legislation, such as PDPA in Malaysia, and the ISO/IEC 27001 standard, must be ensured.

➢ KADA Specific: Ensures that all cooperative data and transactions are legally complied with to avoid penalties and ensure member privacy.

- Environmental:

➢ Optimize CPU and memory usage; ensure they do not exceed 75% during normal operations.

➢ KADA Specific: Ensures system sustainability by avoiding overuse of computational resources to support long-term cooperative goals.

2.5 Design Constraints

a) *Environmental constraints*
- The system is designed to be able to operate under the specific temperature and humidity levels which are 0^0C to 40^0C and 20% to 80%.
- The system is able to function well in any network conditions which include bandwidth limitation situations to ensure the system remains accessible by the users.

b) *Hardware constraints*

The minimum hardware specifications that are needed to be able to run the system are describing as following:
- Memory: a minimum of 8 GB of RAM
- Processor: 2.4 GHz multi-core
- Storage: at least 500 GB of SSD storage

c) *Security Constraints*
- The system implements a Role-Based Access Control (RBAC) to restrict users access to the sensitive data based on their roles within the cooperative system.
- Sensitive members and financial data must be stored and protected through data encryption using AES-256 and secure access protocols.

d) *Compatibility constraints*
- The system can function well across multiple operating systems such as Microsoft Windows, macOS, and Linux and various types of devices without need to modify the system.

e) *Performance constraints*
- Each user has a maximum response time of 3 seconds under normal load conditions which is crucial to maintain the user satisfaction of the system.
- The system has to support up to 500 users to be able to access and interact with the system simultaneously without any performance degradation.
- The response time for major transactions such as the loan process is not more than 2 seconds.

3. Architectural Rationale

KADA Online System is based on a customized form of Model-View-Controller design pattern. Implementation utilizes tools compatible with Visual Studio Code. This methodology ensures that the system architecture is structured, maintainable, and scalable without being overly flexible or coupled to a specific framework such as Laravel.

Architecture Style and Rationale

- Authentication and Authorization

  Authentication and authorization mechanisms have been implemented with the integration of custom-built middleware and user session management. In Role-Based Access Control, this is achieved by assigning roles and permissions, which ensures that users access only those resources that their privileges will allow.

- Support for MVC Pattern

  Model-View-Controller architecture is a division of an application into three major components:

  - Model: Responsible for data and business logic, involving database operations.
  - View: It concerns the UI and presentation logic, ensuring data will be in good shape.
  - Controller: It stands between the model and view, gets input from the user, and executes on the model or view.

  Both of these are part of one concern that is separated. Such separation makes maintenance easier, allows for modular development, and enhances system scalability.

- Security and Data Protection

  The system contains the following powerful security features:

  SQL injection protection by using prepared statements and parameterized queries.

  CSRF protection implementation by using custom tokens.

  Data of the users is stored securely by using different encryption algorithms.

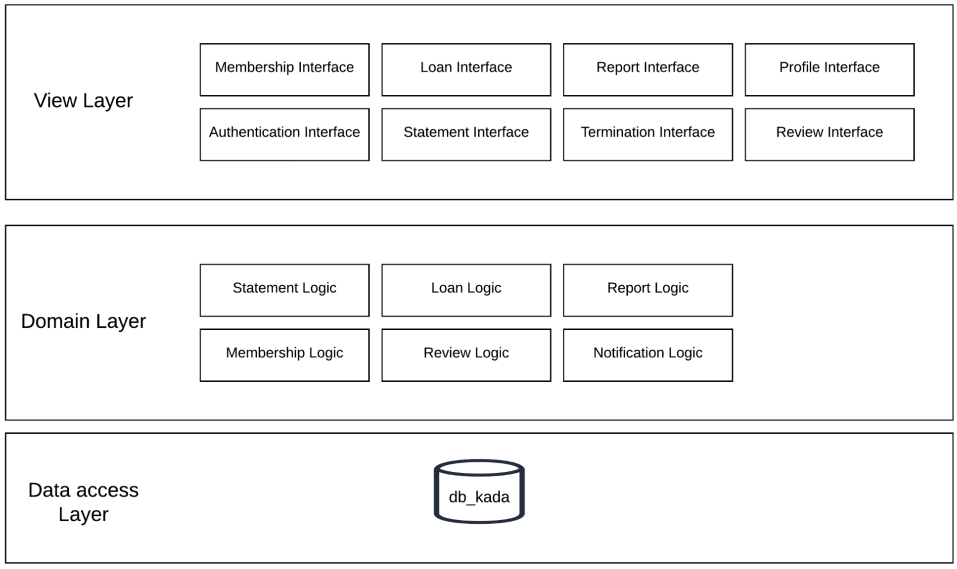
Session handling is done with secure cookies to avoid unauthorized access.

- Cross-Browser Compatibility

The various components of the system's front-end have been tested to be compatible on all major web browsers, including Google Chrome, Mozilla Firefox, and Microsoft Edge. Responsive design techniques ensure a consistent user experience on various devices and screen sizes.

- Scalability and Extensibility
  The system should be modularly built in a way that scaling is easy when more users are added by query optimization and caching. Adding features and modules can also be extended without affecting the rest of the feature areas.

- Active Development Ecosystem
  Using such a widely adopted editor as Visual Studio Code means there is an extensive ecosystem of extensions, plugins, and tools to boost productivity. Integrated debugging, version control support, and third-party libraries are some of the resources that will speed up general development and debugging.



Conclusion

The use of a custom implementation of the MVC pattern in this project means that the KADA Online System is bound to meet particular project requirements, leaving room for flexibility. This approach ensures strong security, cleanliness in code organization, and scalability; hence, the system is able to adapt to future needs efficiently.

4. Architectural Views

This chapter describes the architectural views of the system based on the Laravel framework which use the Model-Controller-View framework as the basic architecture. The views consist of Model view, View, Controller view, Interaction view and Deployment view as shown in Figure 4.1 to further explain the architectural view of MVC framework. Each view is described in detail in table 4.1.

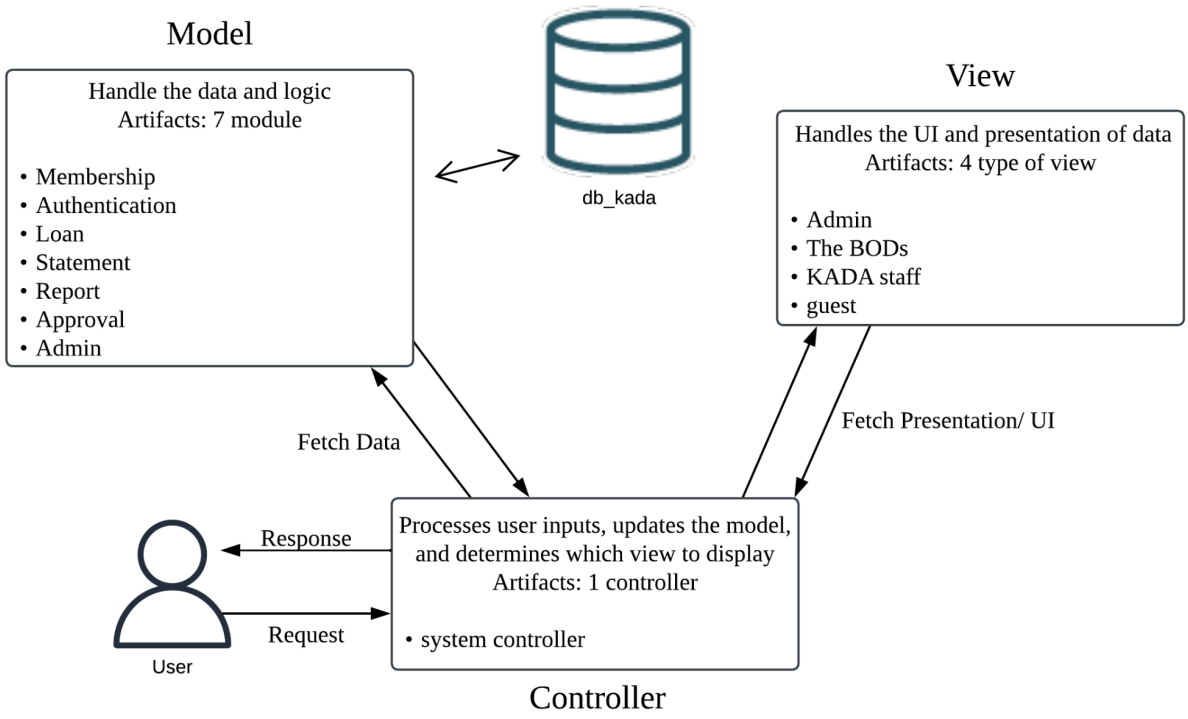


Figure 4.1: Architectural Views

Table 4.1: Views description and diagram used

Architectural Views	Description	Diagrams used
Use Case View	Defining interactions between KADA staff, admin, The BOD's and the system.	Use Case Diagram
Logical View	Represents the system's structure, focusing on the business logic such as membership and loan and interactions between them and data.	Class Diagram
Process View	Describes the system's process execution flow, interactions	Sequence Diagram

	between model, view and controller.	
Development View	Represents the organization of KADA Cooperative System components and their dependencies on model, view and controller components.	Component Diagram Package Diagram
Physical/Deployment View	Illustrates how KADA Cooperative System components are deployed on server side and storage management.	Deployment Diagram

4.1 Use Case View

The use case diagram for the KADA Cooperative System illustrates the interactions between different user roles which are KADA Staff, KADA Cooperative's Board of Directors (BOD) and KADA Cooperative Administrator. The use case also includes the various modules like membership, authentication, loan, approval, statement, report and admin module. KADA Staff members can apply for a membership, then they can access the authentication after being a cooperative member, apply for loan, view financial statements and terminate the membership. The KADA Cooperative Administrator oversees and accesses the user authentication, reviews the applications, manages members and handles the financial reports including viewing and managing the financial statements. The Board of Directors focuses on reviewing applications and also has access to authentication and view the financial reports. Each user interacts with specific system modules to ensure a clear system operation through each module. Figure 4.1 shows the detail of use case diagram that can helps to maintain the system security, efficiency and proper management of KADA Cooperative System.

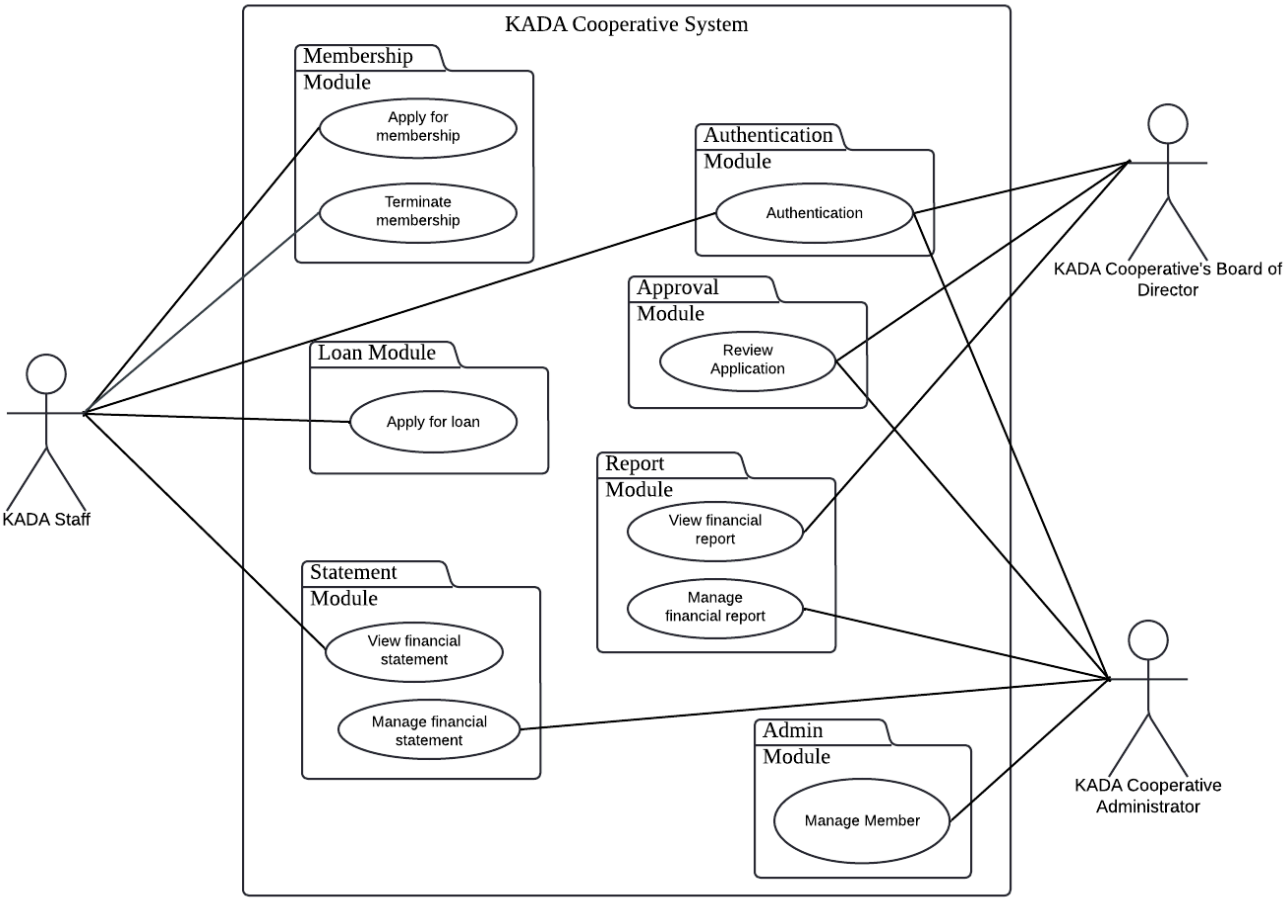


Figure 4.1: Use Case for KADA Cooperative System

4.2 Logical View

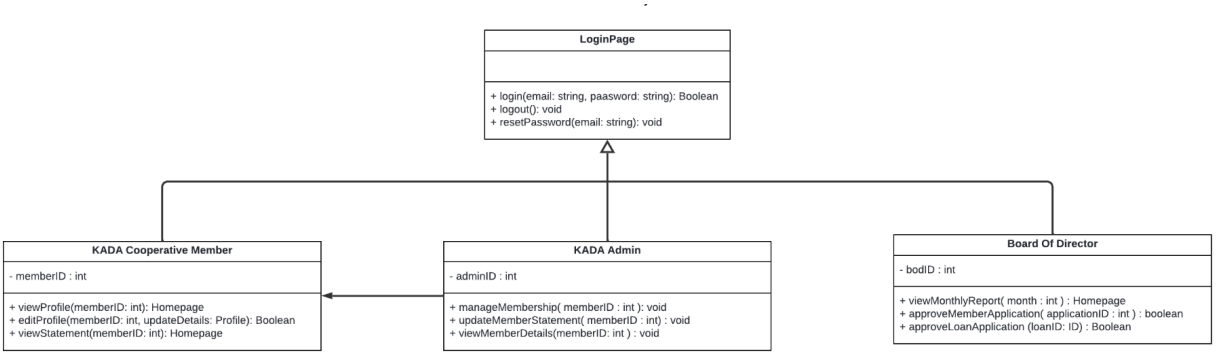


Figure 4.2.1: Class diagram for <Authentication> Subsystem

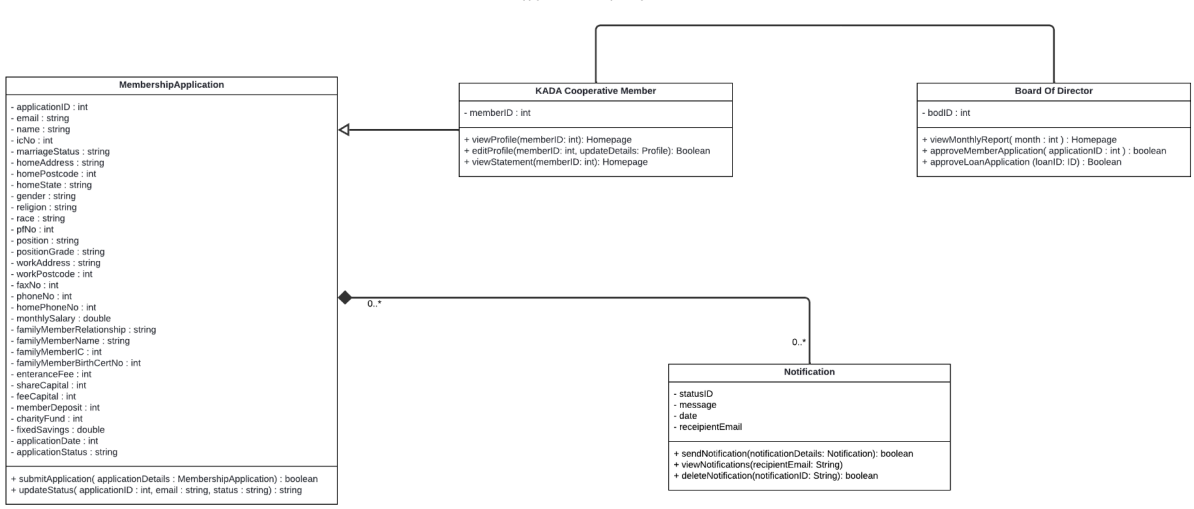


Figure 4.2.2: Class Diagram for <Apply For Membership> Subsystem

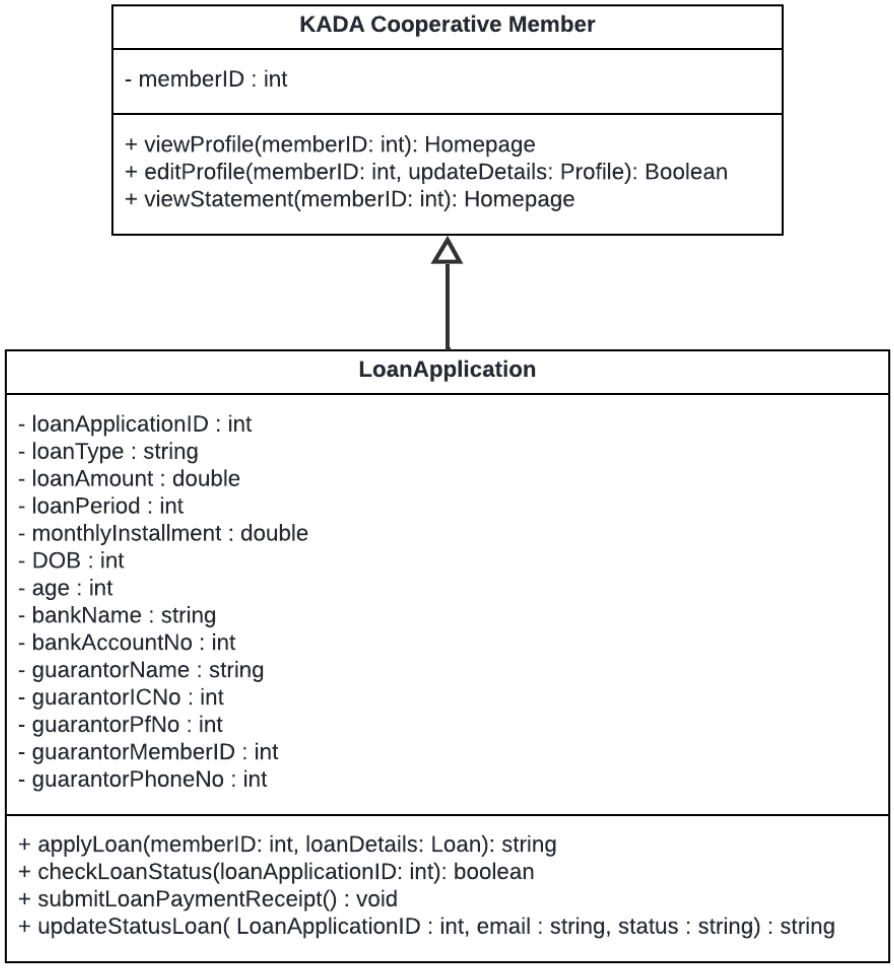


Figure 4.2.3: Class Diagram for <Apply For Loan> Subsystem

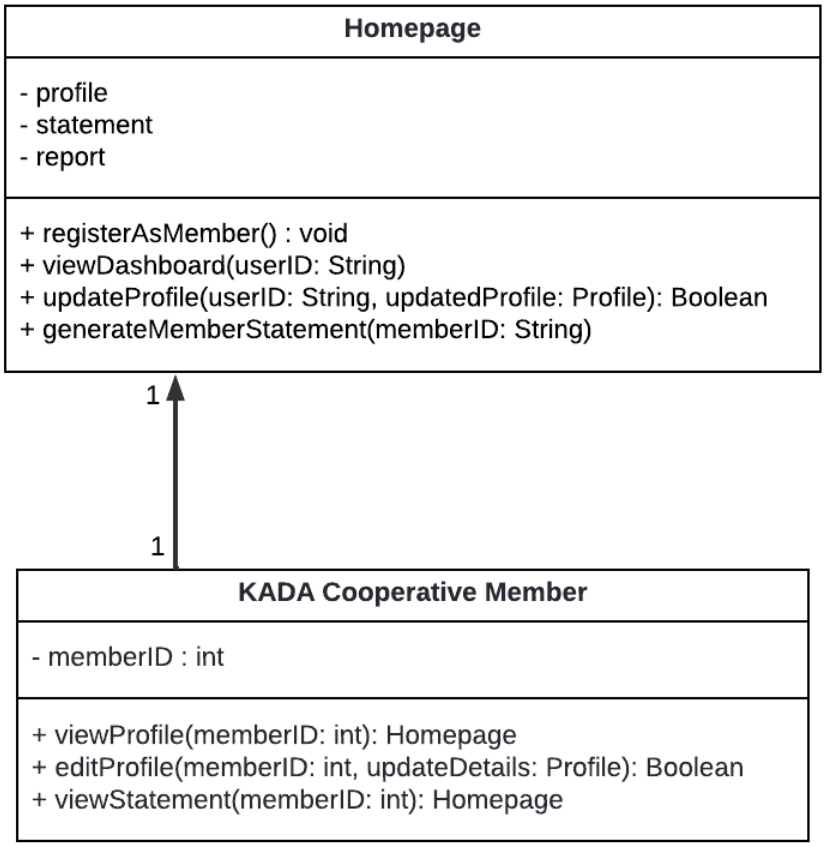


Figure 4.2.4: Class Diagram for <Manage Financial Statement> Subsystem

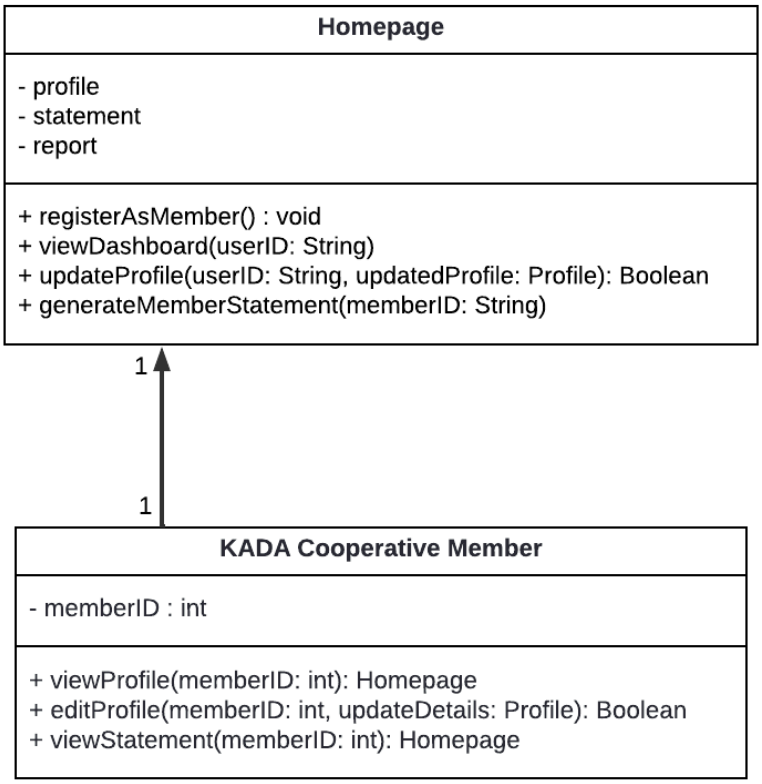


Figure 4.2.5: Class Diagram for <View Financial Statement> Subsystem

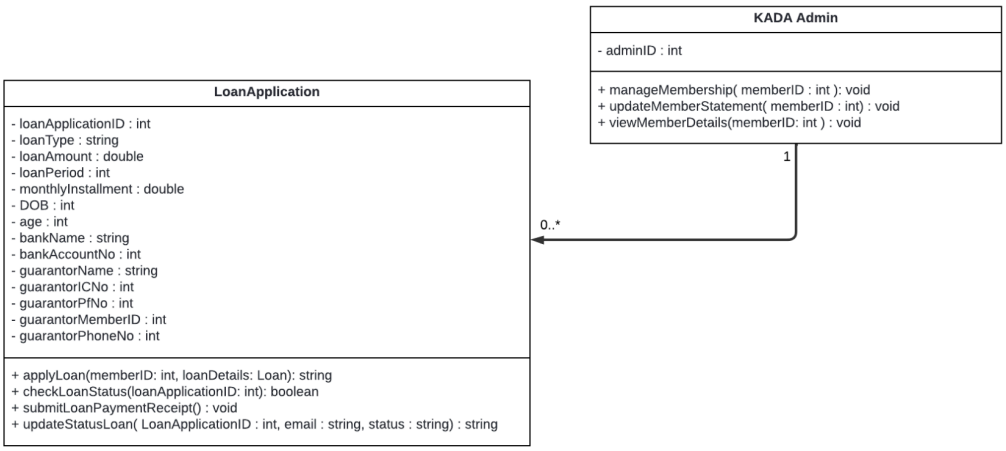


Figure 4.2.6: Class Diagram for <Manage Financial Report> Subsystem

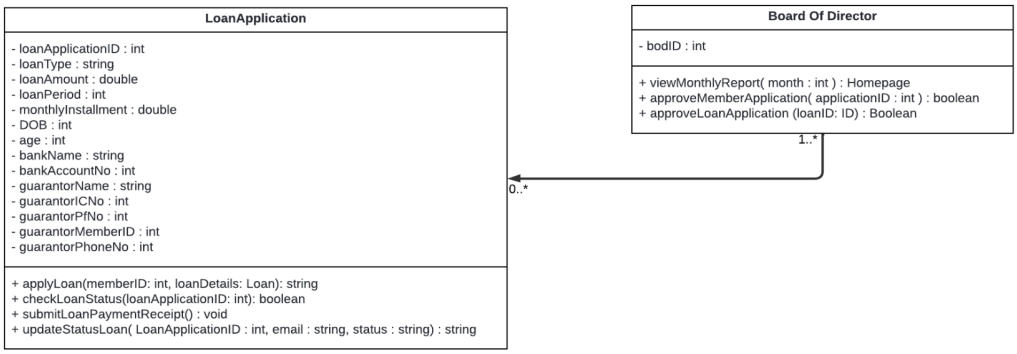


Figure 4.2.7: Class Diagram for <View Financial Report> Subsystem

Figure 4.2.8: Class Diagram for <Manage Member> Subsystem

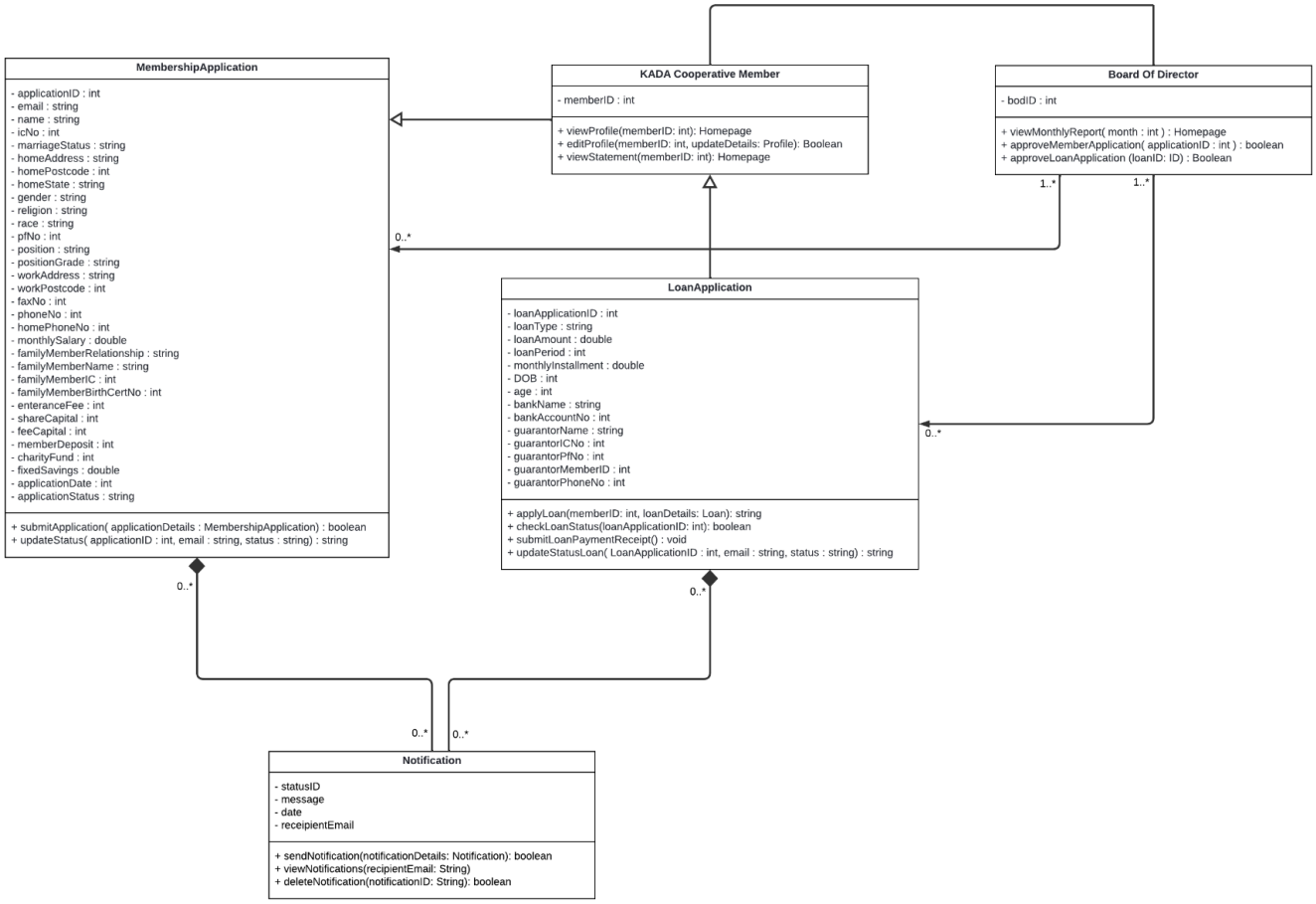


Figure 4.2.9: Class Diagram for <Review Application> Subsystem

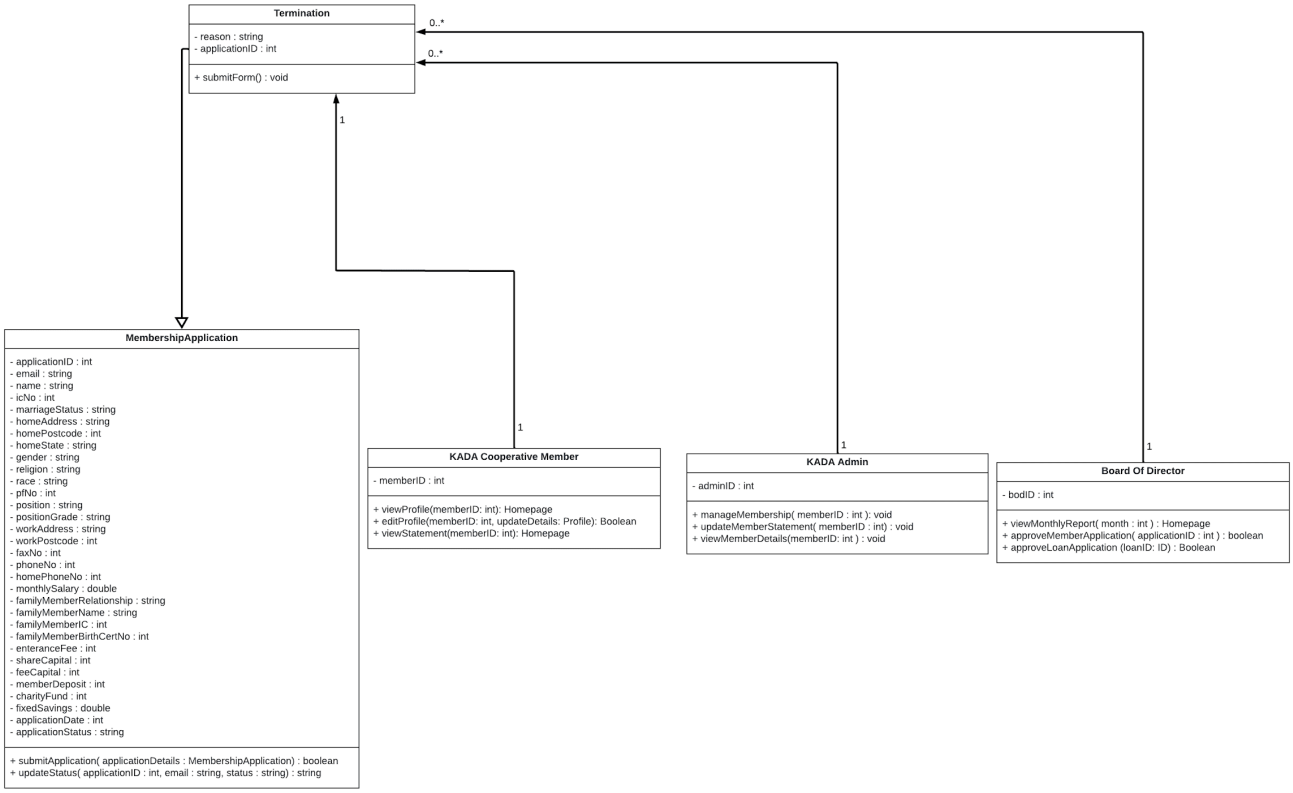


Figure 4.2.10: Class Diagram for <Terminate Membership> Subsystem

4.3 Process View

The interaction view for KADA Cooperative System can be represented effectively through a sequence diagram. This diagram visually illustrates the dynamic interaction between components within the Model-View-Controller(MVC) architecture to achieve the system's goals. Here's how the sequence diagram reflects the interaction view.

4.3.1 Authentication Process

Authentication process is to ensure the security of the system includes the login and forgot password process. The Controller will instruct the View to display the login for the user to insert information for the authentication process. While the Controller will give the Model to handle the data for the validation process with the data in the system. This data is sent to the Model for validation against the system's records. If the information is correct, the user is granted access, if not, an error message is displayed. Figure 4.3.1 represents the sequence diagram of authentication.

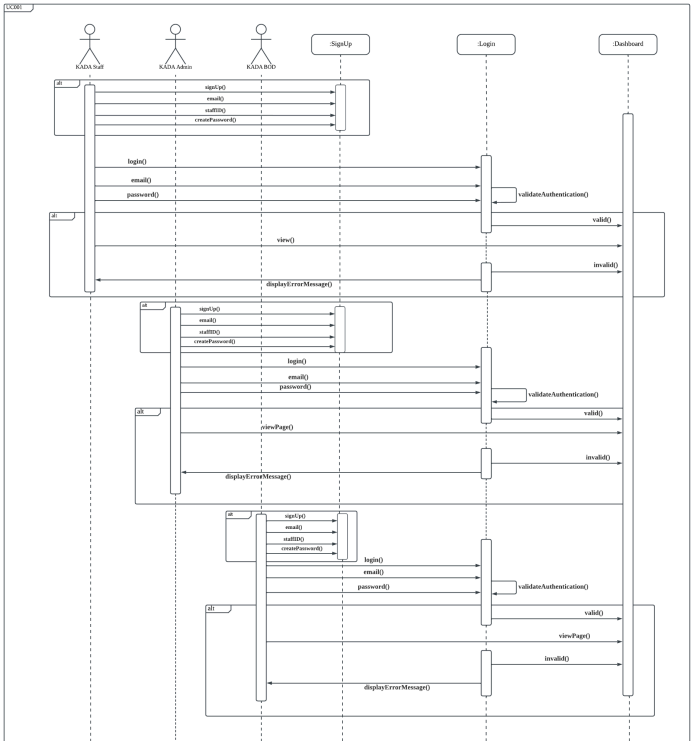


Figure 4.3.1: Sequence Diagram of Authentication

4.3.2 Member Registration Process

This process starts with the Controller instructing the View to display a registration form. The KADA Staff will enter their details, which the Controller sends to the Model for validation. If the information is valid and not a duplicate, the Model saves the data in the database and the KADA Staff sees a confirmation message. This process ensures secure and smooth member registration. Figure 4.3.2 represents the sequence diagram of member registration.

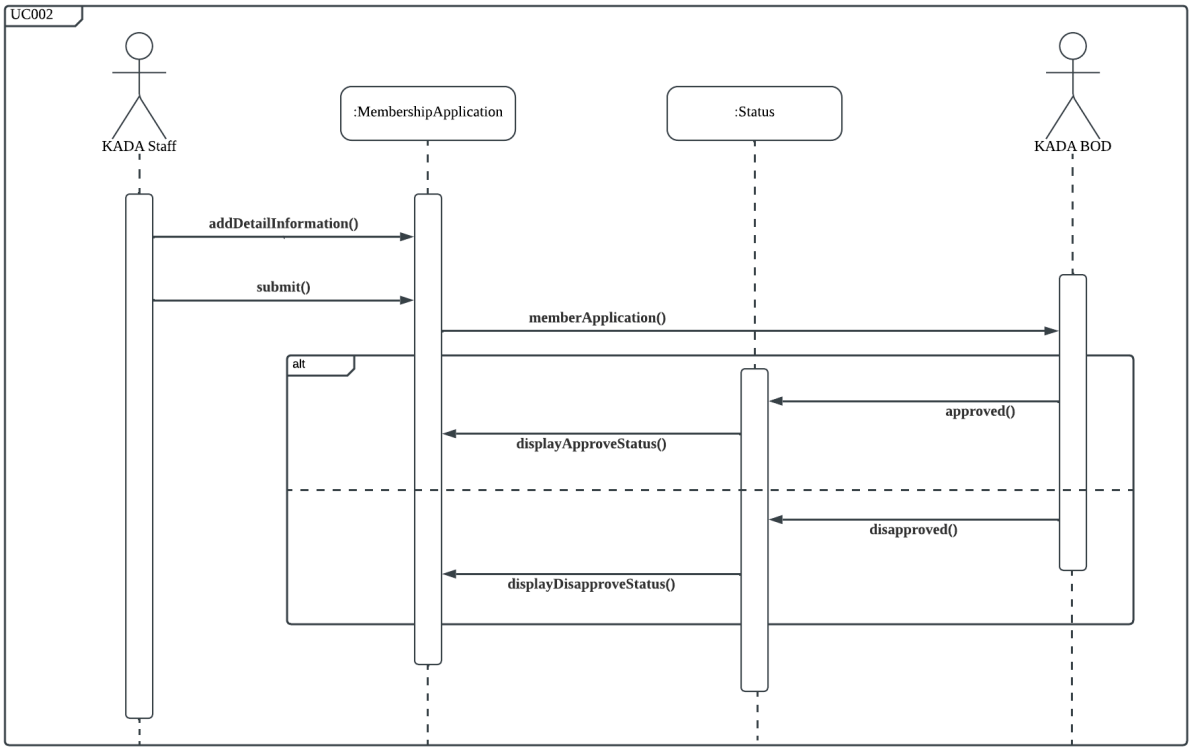


Figure 4.3.2: Sequence Diagram of Member Registration

4.3.3 Loan Application Process

It begins with the Controller instructing the View to display the loan application from. The KADA Staffs will fill in the required information, which the Controller sends to the Model for processing and eligibility checks. The Model verifies the user's data against the database. The Controller then updates the View to notify the user of the successful application. This process ensures an efficient and secure loan application process. Figure 4.3.3 shows the interaction view by sequence diagram of the loan application process.

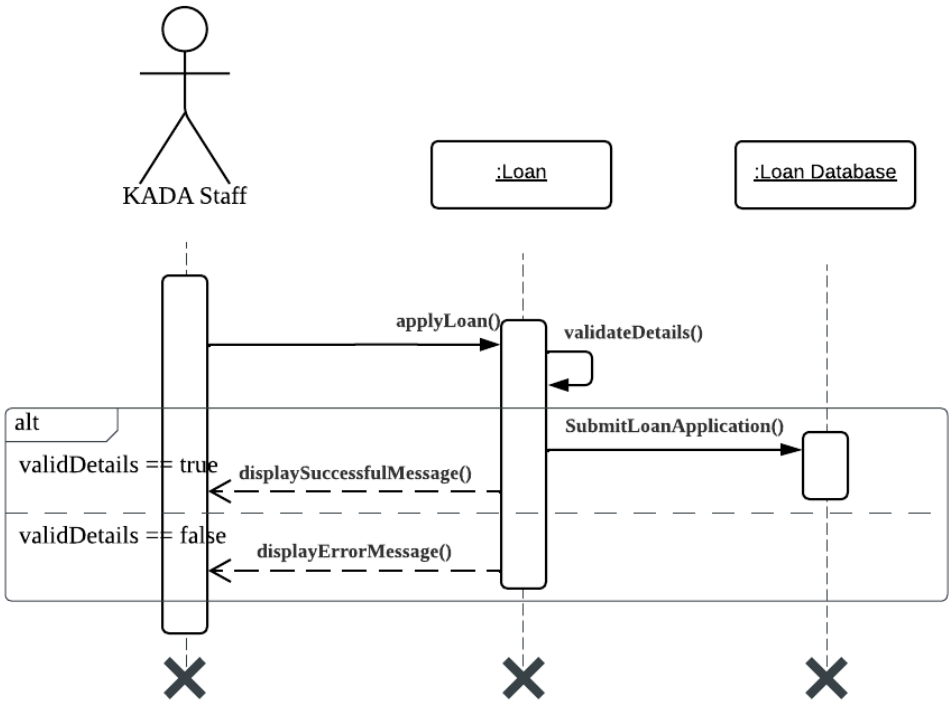


Figure 4.3.3: Sequence Diagram of Loan Application

4.3.4 Manage Financial Statement Process

The process of managing financial statements in the KADA Cooperative System starts with the Controller instructing the View to display the relevant interface for managing the financial statement. An Admin selects the desired action which is managing the financial statements. The Controller forwards this request to the Model, which retrieves the financial data from the database. Then, the processed information is returned to the Controller, which updates the View to display the financial statements or confirm successful updates. This process ensures accurate and efficient financial statement management. Figure 4.3.4 represents the sequence diagram of a managed financial statement.

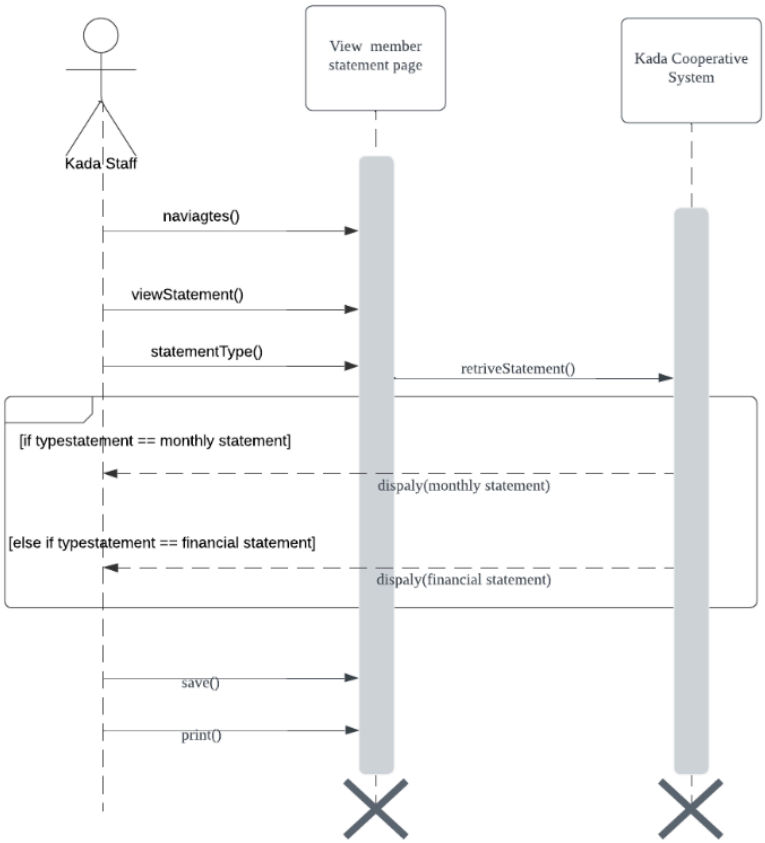


Figure 4.3.4: Sequence Diagram for Manage Financial Statement

4.3.5 View Financial Statement Process

The process of viewing financial statements in the KADA Cooperative System starts when the Controller instructs the View which is the member statement page to display the financial statement interface. KADA Staff selects the option to view and the Controller sends a request to the Model to fetch the required information. The Model retrieves the financial data from the database and returns it to the Controller. The Controller then updates the View to display the financial statements to the KADA Staff. Then, the Controller updates the member page view to display the financial statement to the KADA Staff. This process ensures that users can ensure and efficiently view. Figure 4.3.5 represents the sequence diagram for viewing financial statement processing.

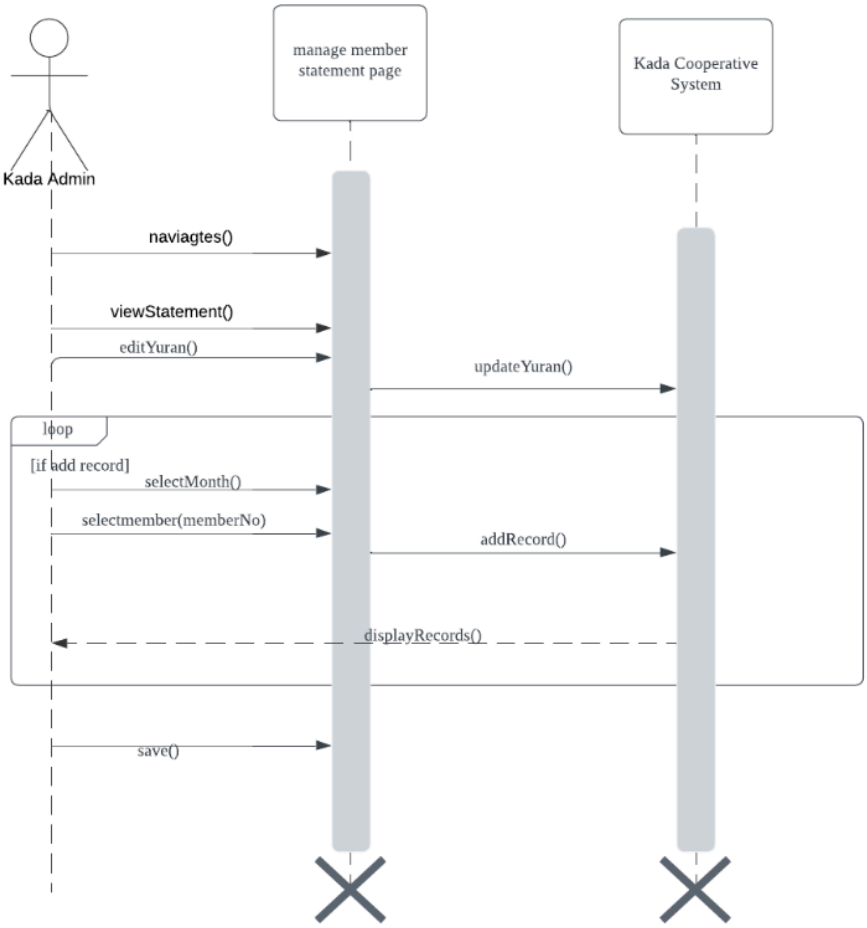


Figure 4.3.5: Sequence Diagram for View Financial Statement

4.3.6 Manage Financial Report Process

The process of managing financial reports in KADA Cooperative System starts with the Controller instructing the View to display the financial report interface. The Admin performs actions such as adding, editing and deleting the financial reports. These requests are sent to the Controller and then forwarded to the Model for processing. The Model validates the request and updates the database accordingly. Once the operation is completed, the Controller updates the View to display a confirmation message or the updated report. If there are issues, an error message will be shown. This process ensures that the system management is accurate and efficient. Figure 4.3.6 shows the sequence diagram of the managed financial report process.

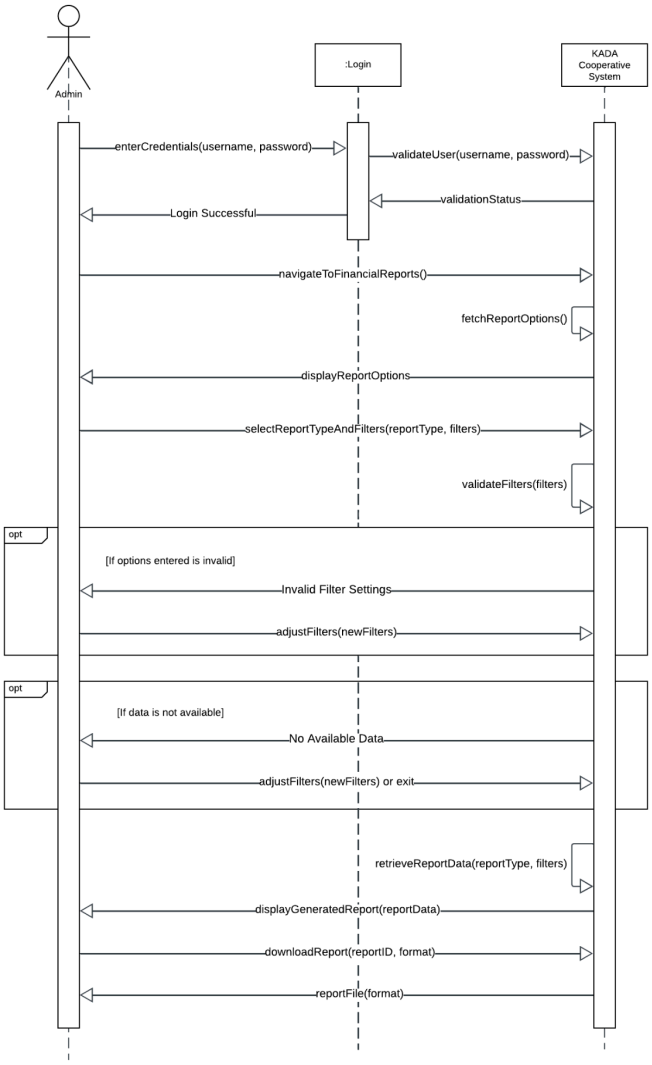


Figure 4.3.6: Sequence Diagram for Manage Financial Report

4.3.7 View Financial Report Process

The process of viewing financial reports in the KADA Cooperative System begins with the Controller instructing the View to display the financial report interface. The BOD selects the option to view a specific financial report and the Controller sends a request to the Model to retrieve the necessary information. The Model fetches the financial data from the database and returns it to the Controller. Then, the Controller updates the View to present the financial report to the BOD. If there are issues, an error message will be displayed. This process ensures BOD can securely view the financial report. Figure 4.3.7 displays the sequence diagram of the view financial report process.

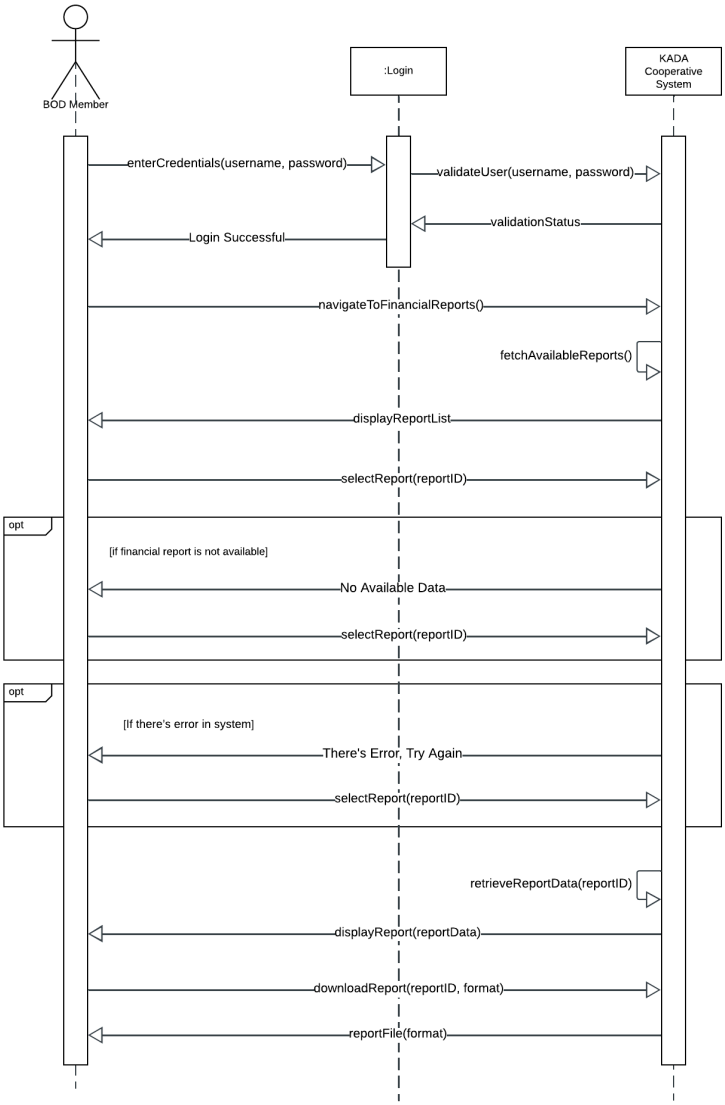


Figure 4.3.7: Sequence Diagram for View Financial Report

4.3.8 Manage Member Process

This process in the KADA Cooperative System allows Admin to handle tasks like manage application, updates, approvals and report generation. The process begins with the Controller processes the Admin's actions and coordinates the flow of data, sending the requests to Model for validation and database updates. The Model validates the credentials and retrieves the data, manages the applications and generates reports. Once the Model completes the operation, the Controller updates the View to display the results. If there are issues, the system will show an error message to the Admin. This interaction ensures secure and accurate management of member tasks. Figure 4.3.8 represents the sequence diagram for managing member processes.

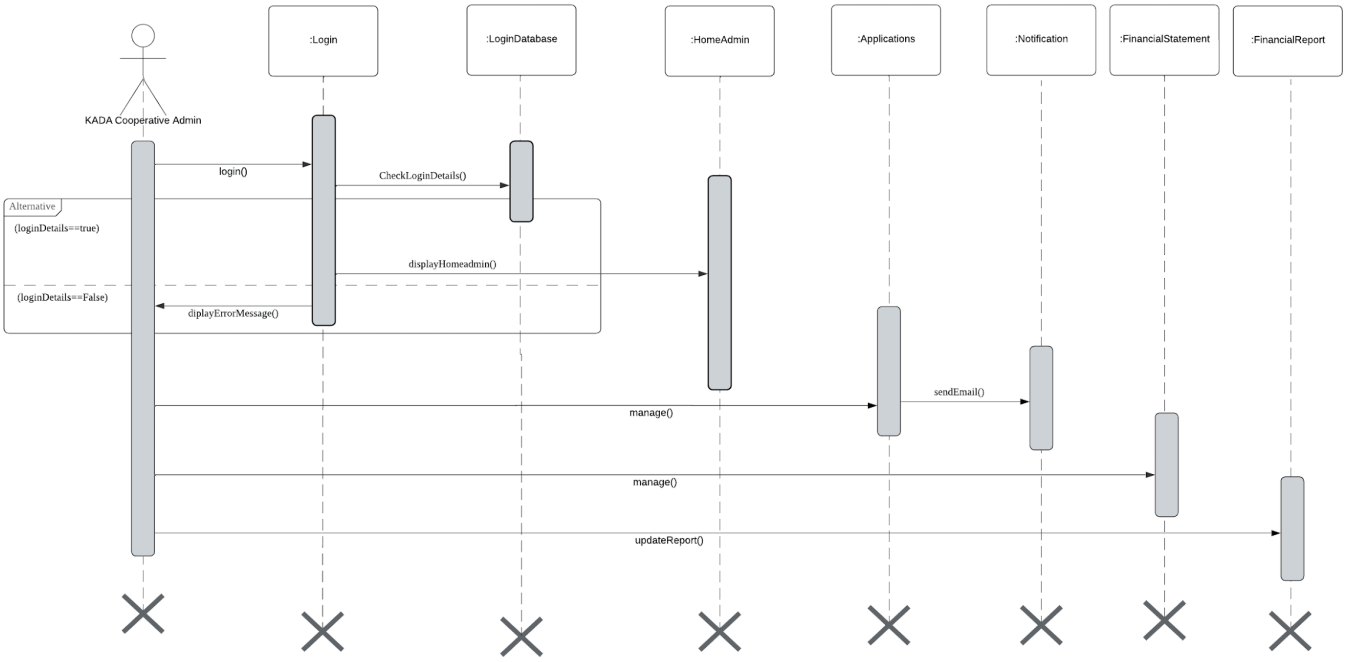


Figure 4.3.8: Sequence Diagram for Manage Member

4.3.9 Review Application Process

In the review application process for KADA Cooperative System, the View allows the BOD to access and review applications and if they want to approve or reject the applications. The Controller processes the BOD's actions by interacting with the Model. The Model retrieves application information from the database and the View displays the detailed information of each application. This approach ensures efficient and secure application management. Figure 4.3.9 shows the sequence diagram of the review application process.

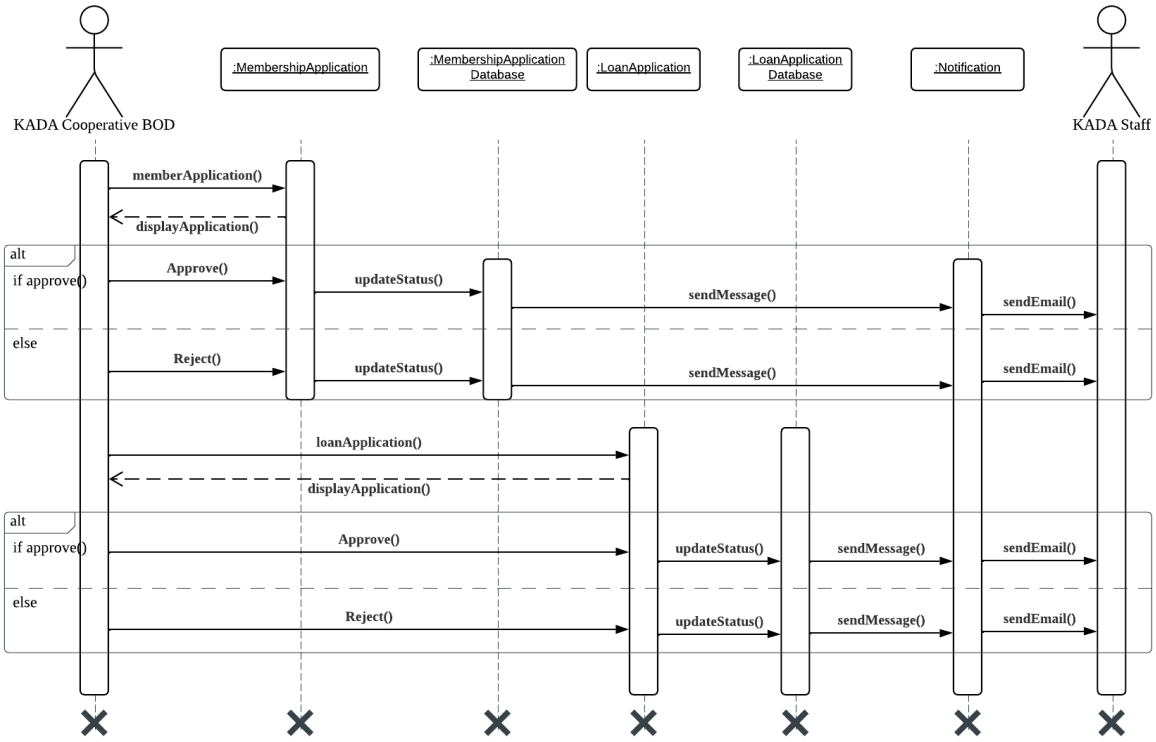
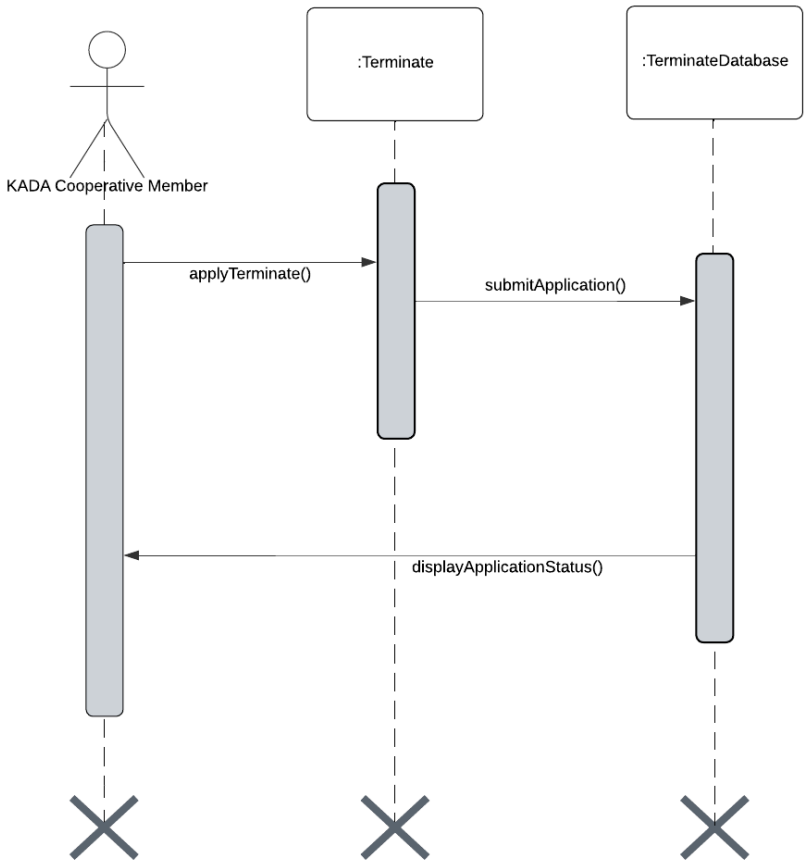


Figure 4.3.9: Sequence Diagram for Review Application

4.3.10 Terminate Membership Process

In the terminate application process, the View allows KADA Cooperative Members to submit a termination request through a form. The Controller processes this request by sending it to the Model, which handles the data and submits the application to the database. Once the status of the termination request has been updated, the Model retrieves the status and send it backs to the Controller and it will update the View to display the application status to the member.The detailed structure is shown as Figure 4.3.10 to ensure a smooth and clear termination process.



4.3.10: Sequence Diagram for Terminate Membership

4.4 Development View

The Figure 4.4.1 illustrates the modular structure of the KADA Cooperative System, showing how different system components interact. Each module represents a key functional area of the system, with individual components handling specific tasks.

1. Authentication Module
    - Handles user authentication and login process.
    - Ensures secure access control for different user roles.
2. Membership Module
    - Manages new member applications (apply membership) and member termination requests (apply termination).
    - Connected to the Approval Module, where membership applications are reviewed.
3. Admin Module
    - Includes member management functionalities.
    - Allows administrators to handle user information and system configurations.
4. Loan Module
    - Provides functionality for users to apply for loans and check loan application status.
    - Integrated with the Approval Module, where loan requests are reviewed.
5. Approval Module
    - Manages approval workflows for membership applications, loan applications, and termination requests.
    - Used by admins and the board of directors to accept or reject applications.
6. Statement Module
    - Handles financial transactions and allows users to view their financial statements.
    - Ensures users have access to their financial data.
7. Admin Module
    - Handle member management and allow users to change their personal information.
    - Used by admin to change any personal information.

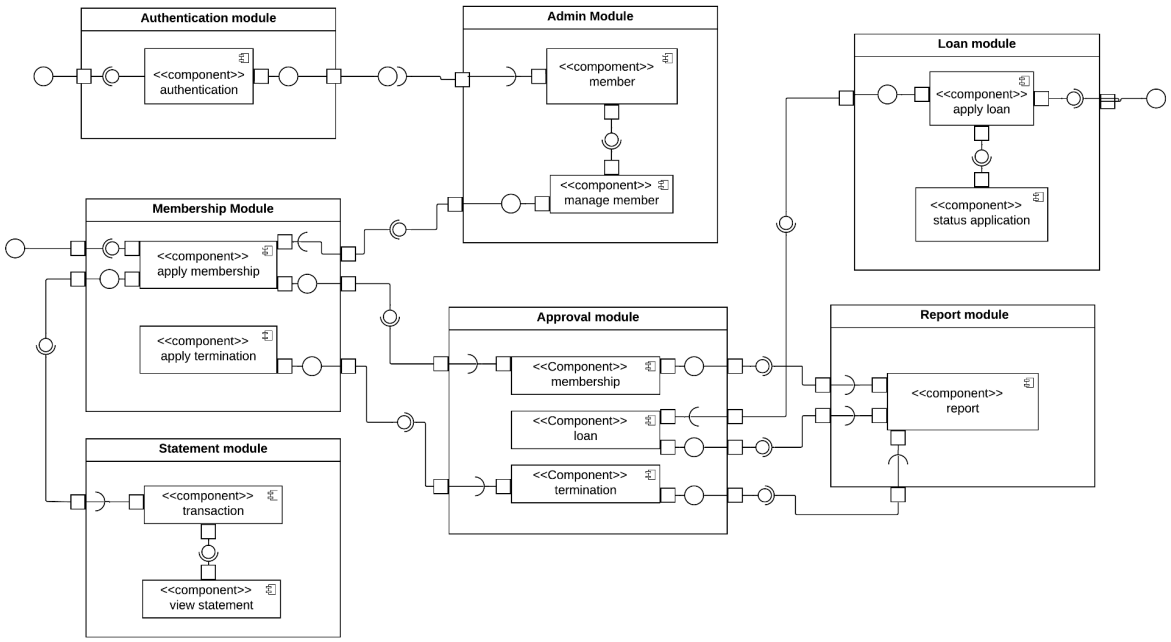


Figure 4.4.1: Component Diagram of KADA Cooperative System

Figure 4.4.2 is the package diagram for the KADA Cooperative System organizes the system into distinct modules to ensure modularity and maintainability. The Authentication Module manages user authentication, while the Membership Module handles registration and termination requests. The Loan Module allows users to apply for loans and track application statuses, and the Approval Module enables the admin and board members to review and approve applications. The Statement Module provides users with financial statements, while the Report Module generates system and financial reports. Lastly, the Admin Module manages members and overall system administration. These interconnected packages ensure a structured and efficient system workflow.

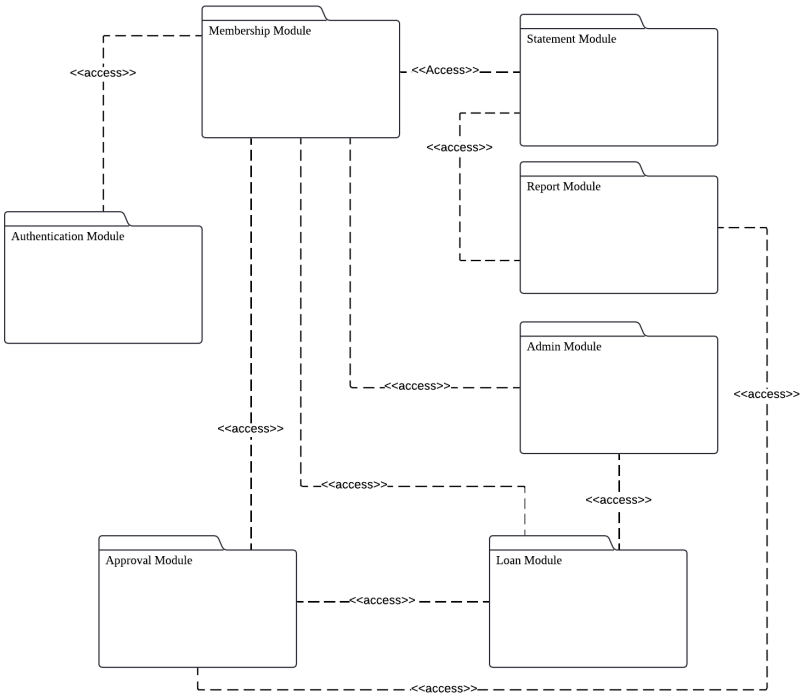


Figure 4.4.2: Package Diagram for KADA Cooperative System

Figure 4.4.3 illustrates the structure and organization of the module authentication within the system. The model layer handles the data and logic process for data retrieval from components such as the login, savePassword, register and updateMembership. In the view layer, which manages the presentation and provides the user the interface needed for login, resetPassword and register component. The controller layer will be interacting with the user to process user input, update the model and choose which view to display.

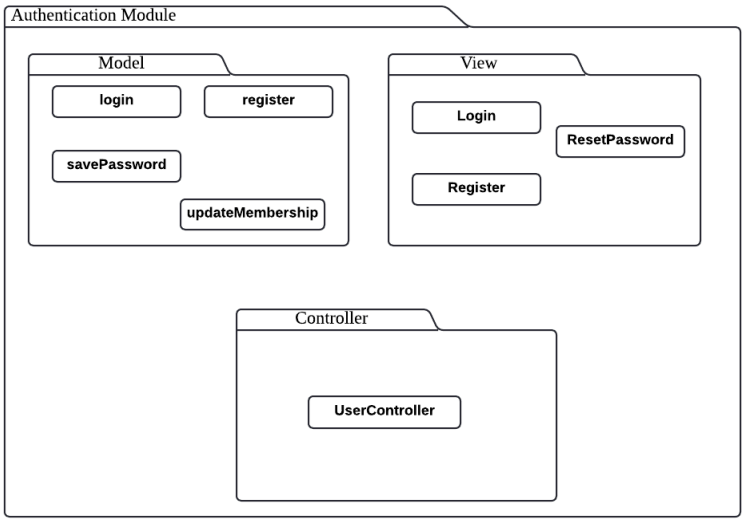


Figure 4.4.3: Package Diagram for Authentication Module

Figure 4.4.4 illustrates the structure and organization of the Membership module within the system. The Model Layer is responsible for handling data processing and business logic, managing components such as checkEligibility, MemberRegister, MemberDetails, and MemberResign, which facilitate the membership registration process into the system. The View Layer manages the user interface, ensuring a seamless user experience through components like homeMember, applyMember, and member_resign, which support membership application or membership termination process. Finally, the Controller Layer serves as the intermediary between users and the system, processing user inputs, updating the model, and determining the appropriate views to display. This modular structure ensures separation of concerns, enhancing maintainability and scalability within the system.

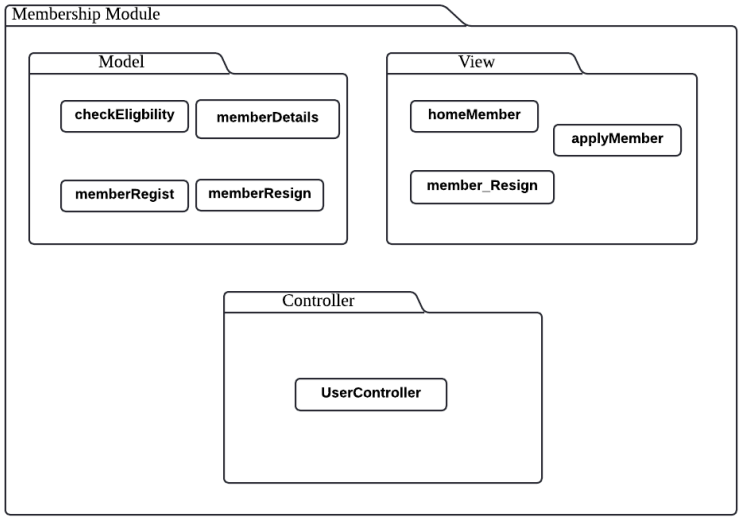


Figure 4.4.4: Package Diagram for Membership Module

Figure 4.4.5 illustrates the structure and organization of the Loan module within the system. The model layer is managing the data updates and retrieval process from the loanRate, createLoan, statusLoan and financialDetail component to ensure a smooth loan application process. The view layer provides the user the interface for the loan application process from the loanMember, loanStatus and loan component. The controller acts as the domain layer where it controls the processing of user input, updates data to the model and selects the view the need to display to the user.

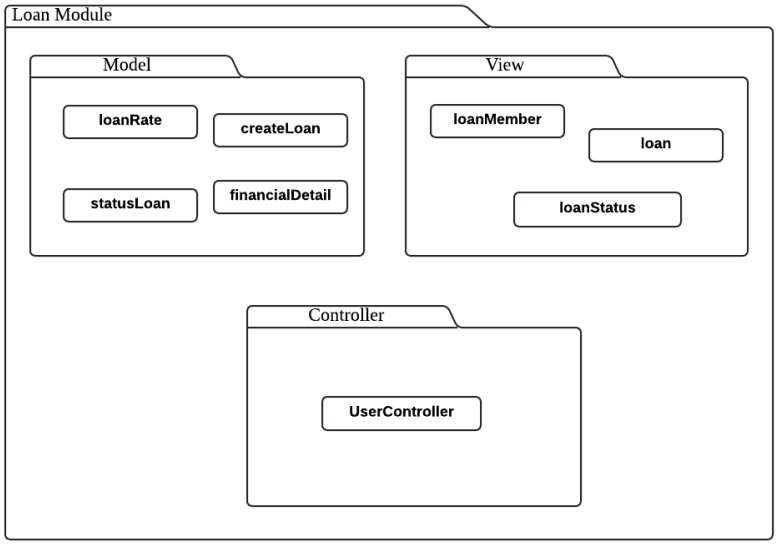


Figure 4.4.5: Package Diagram for Loan Module

Figure 4.4.6 illustrates the structure and organization of the Approval module within the system. The model layer is managing the data updates process to the approveMember, rejectMember, approveLoan, rejectLoan, approveTerminate, and rejectTerminate components to ensure a smooth application reviewal process. The view layer provides the user the interface for loan application using listLoan, membership application using listMember, and termination application using listBerhenti. The controller acts as the domain layer where it controls the processing of user input, updates data to the model and selects the view the need to display to the user.

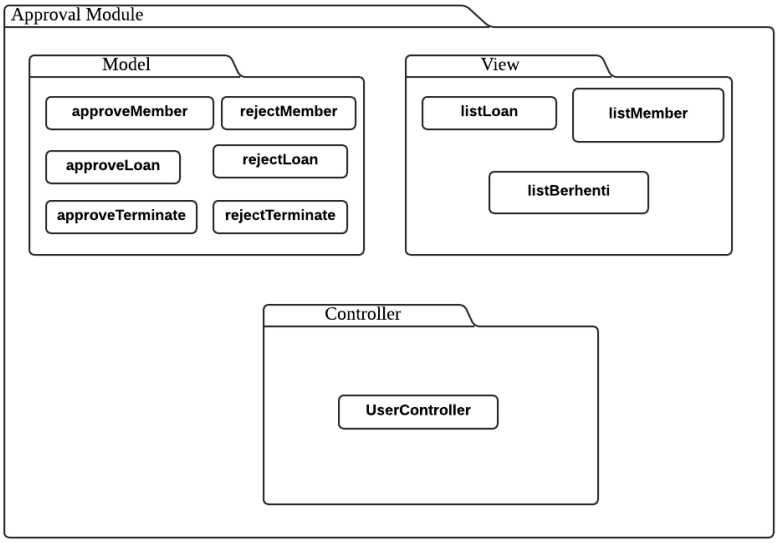


Figure 4.4.6: Package Diagram for Approval Module

Figure 4.4.7 illustrates the structure and organization of the Statement module within the system. The model layer is managing the data updates and retrieval process to the financialDetails, monthlyRecord, sahamDetail and recordFee components to ensure a smooth statement updates process. The view layer provides the user the interface to view financial statements using components such as financialStatus, monthlyStatement and showStatement. The controller acts as the domain layer where it interacts with users, updates and fetches data from the model and selects the view the need to display to the user.

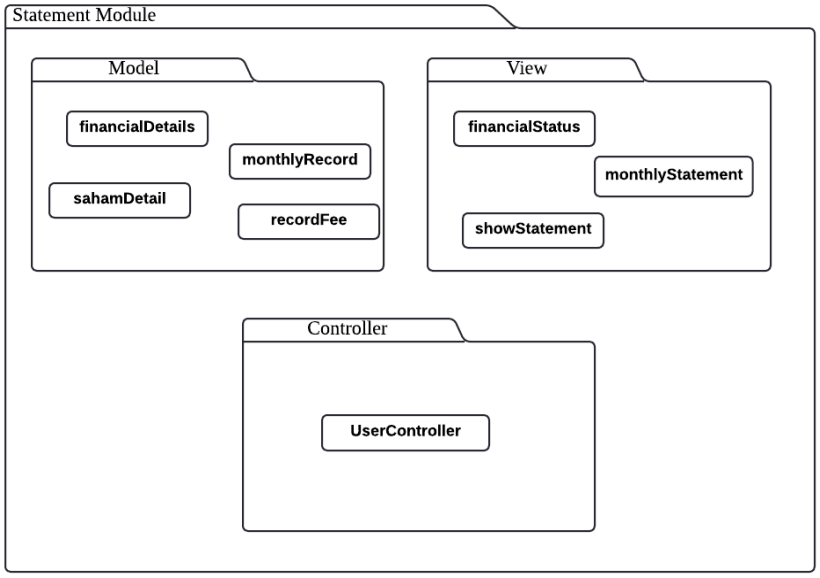


Figure 4.4.7: Package Diagram for Statement Module

Figure 4.4.8 illustrates the structure and organization of the Report module within the system. The model layer is managing the data retrieval process from the rumusan, statistic and laporan components to ensure a smooth report updates and creation process. The view layer provides the user the interface to view financial reports and statistics using components such as rumusanAdmin, statisticAdmin and laporanAdmin. The controller acts as the domain layer where it interacts with users, processing user input, fetches data from the model and selects the view the need to display to the user.

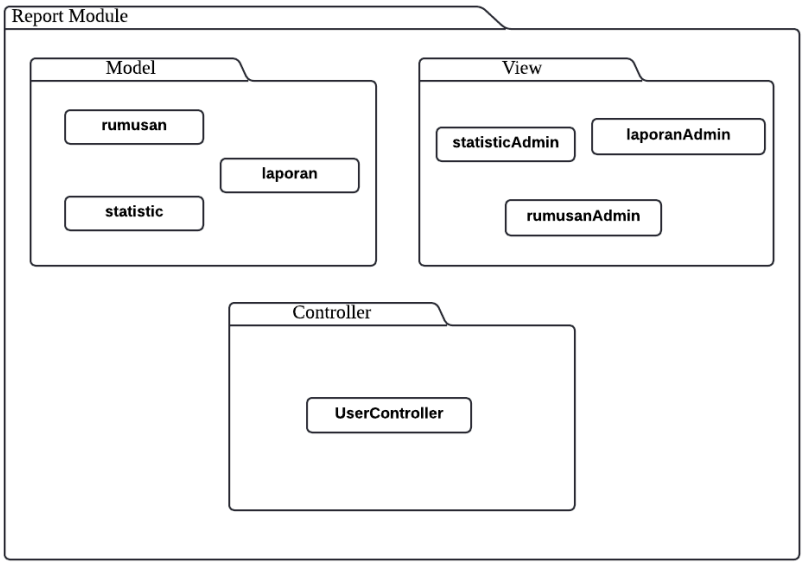


Figure 4.4.8: Package Diagram for Report Module

Figure 4.4.9 illustrates the structure and organization of the Admin module within the system. The model layer is managing the data updates process from the adminProfile and updateStatus components to ensure a smooth member management process. The view layer provides the user the interface to view member's data and provides the interactive interface to manage members using components such as homeAdmin, applyAdmin, loanAdmin, memberDisplay. The controller acts as the domain layer where it interacts with users, processing user input, updating and fetches data from the model and selects the view the need to display to the user.

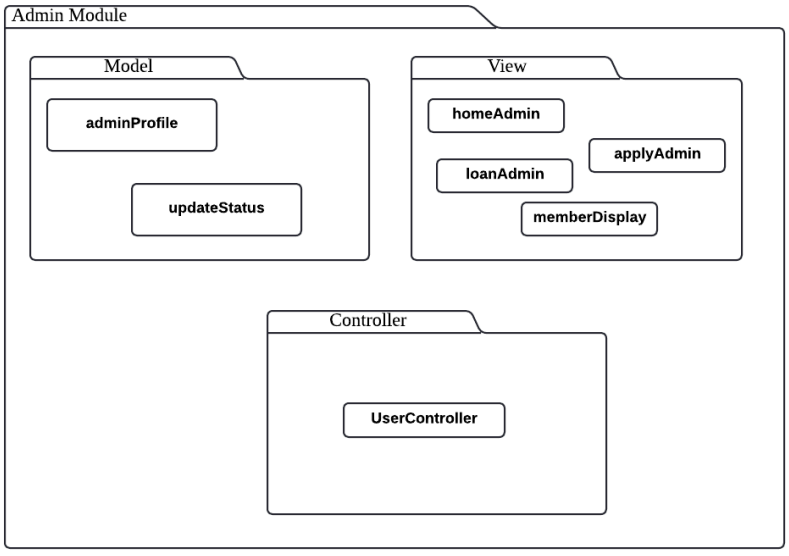


Figure 4.4.9: Package Diagram for Admin Module

4.5 Physical/ Deployment View

The associated deployment diagram shows the architecture of the KADA system and interaction between its components. The Client (Browser) is a user interface to which a listener is connected securely by Server via HTTPS/TLS. The Server dealing with user requests consists of an Internet Server and an Application Server, manages business logic. To retrieve and save data, it establishes a connection with the Database System (MySQL Database) via DB Connection. This configuration guarantees efficient communication, modularity along with a clear separation of duties so that the whole system can also be scaled properly for management.

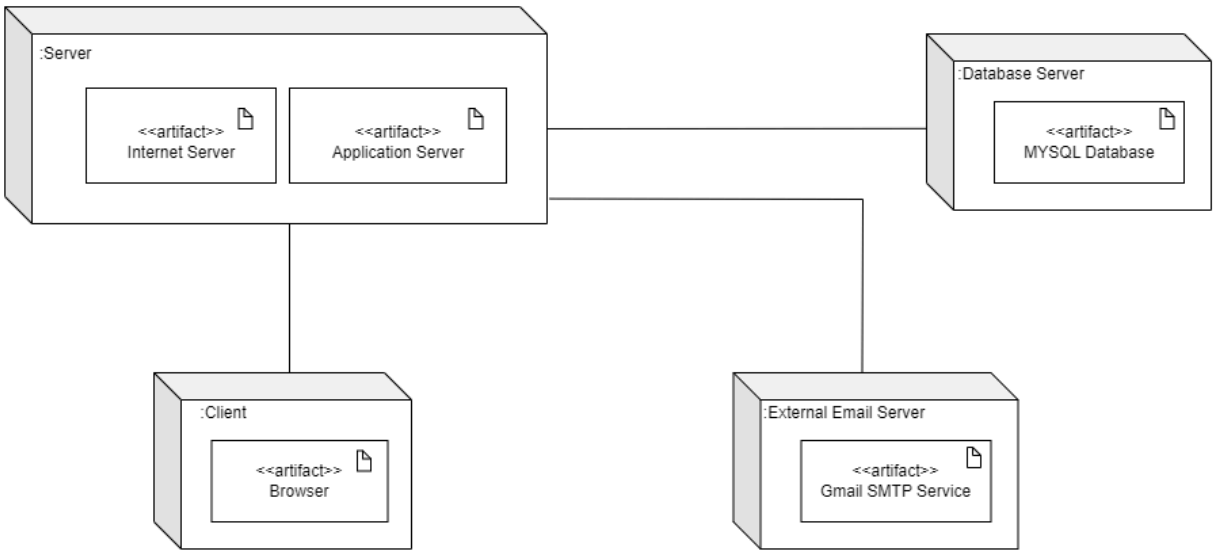


Figure 4.5: Deployment diagram for Internet-based System

5. Data Design

The major data or systems entities are stored into a relational database named as User, BoardOfDirector, KADAAdmin, KADAStaff, NonMember, Member, Membership, FamilyInfo, Loan, Guarantor, Notifications and Stock processed and organized into 12 entities as listed in Table 5.1.

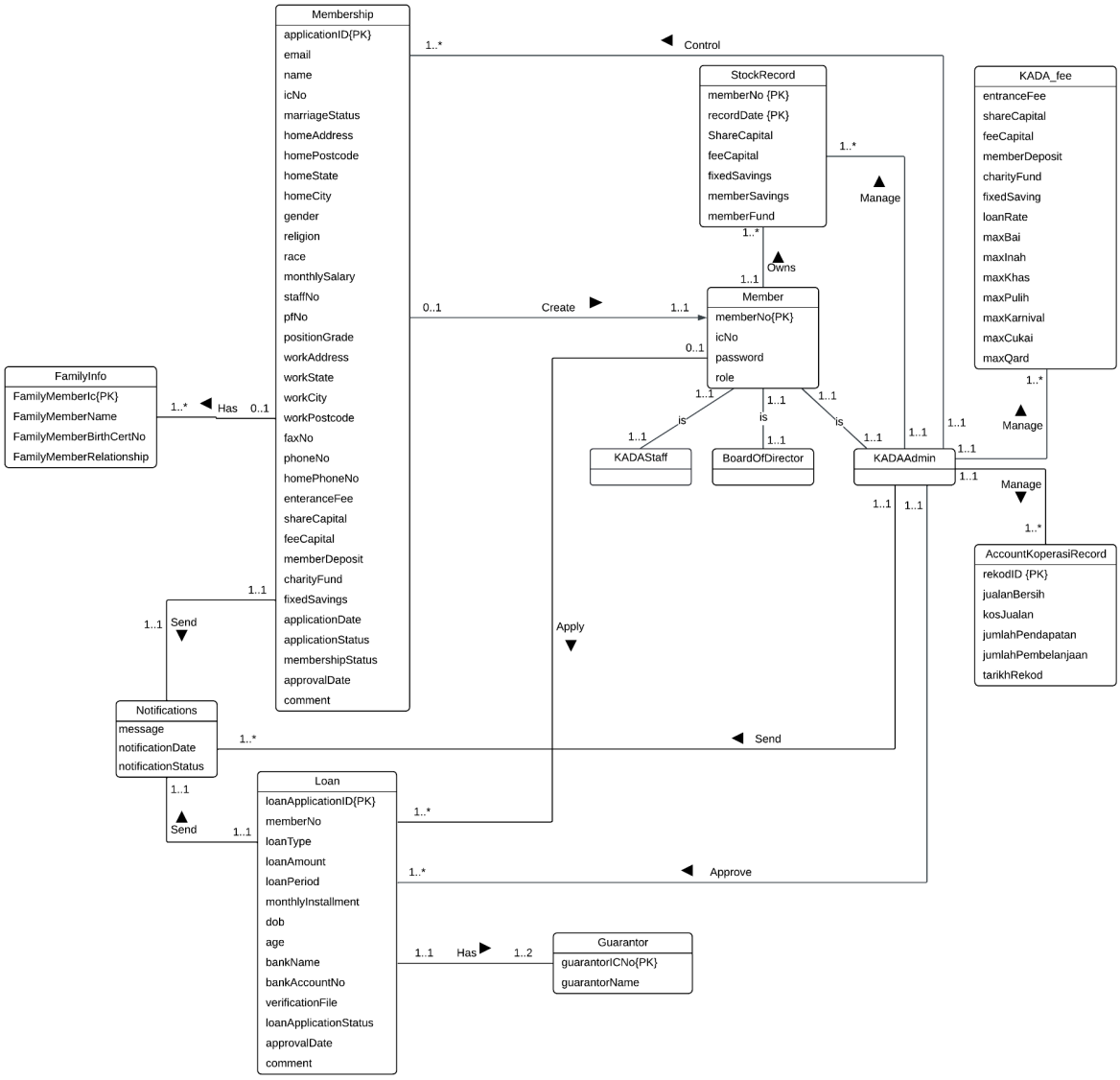


Figure 5.1: Logical ERD of the system

Table 5.1: Description of Entities in the Database

No.	Entity Name	Description
1.	AccountKoperasi	This entity will hold the data of the cooperative main account.
2.	Family_Info	This entity will hold the data of the family information for the membership applications.
3.	Guarantor	This entity will hold the data of the guarantors for the loan applications.
4.	KADA_fee	This entity will hold the data of the maximum or minimum value needed for membership and loan application.
5.	Loan	This entity will hold the data of the loan applications.
6.	Member	This entity will hold the data for the cooperative member.
7.	Membership	This entity will hold the data of the membership applications.
8.	Notification	This entity will hold the data of the notification status and detail for each application.
9.	Stock_Record	This entity will hold the data of the stocks for the cooperative member.

5.1 Data Dictionary

5.1.1 Entity: <AccountKoperasi>

Table 5.1.1: Description of AccountKoperasi Entity

Attribute Name	Type	Description
rekodID	Big Integer (20 characters)	Unique ID for every AccountKoperasi record
jualanBersih	Decimal (12 characters, 2 decimal point)	Total selling of the company
kosJualan	Decimal (12 characters, 2 decimal point)	Total cost of the the company
jumlahPendapatan	Decimal (12 characters, 2 decimal point)	Total income of the company
jumlahPembelanjaan	Decimal (12 characters, 2 decimal point)	Total spend of the company
tarikhRakod	Date	Record date
adminNo	Integer (11 characters)	Foreign key for the admin references Member

5.1.2 Entity: <Family_Info>

Table 5.1.2: Description of Family_Info Entity

Attribute Name	Type	Description
icNo	Big Integer (20 characters)	Uniquely identify family member
name	100 Variable characters	Name of family member
birthCertNo	100 Variable characters (NULLABLE)	Birth Certificate Number of family member
relationship	100 Variable characters	Relationship between family member and applicant(member)
applicationID	Big Integer (20 characters)	Foreign key for the applicationID references Membership_Notif

5.1.3 Entity: <Guarantor>

Table 5.1.3: Description of Guarantor Entity

Attribute Name	Type	Description
guarantorICNo	Big Integer (20 characters)	Uniquely identify a guarantor
guarantorName	255 Variable characters	Name of the guarantor

loanApplicationID	Big Integer (20 characters)	Uniquely identify loan application of the guarantor

5.1.4 Entity: <KADA_fee>

Table 5.1.4: Description of KADA_fee Entity

Attribute Name	Type	Description
entranceFee	Decimal (12 characters, 2 decimal point)	The minimum value for entrance fee for membership registration.
shareCapital	Decimal (12 characters, 2 decimal point)	The minimum value for capital share fee for membership registration.
feeCapital	Decimal (12 characters, 2 decimal point)	The minimum value for fee capital for membership registration.
memberDeposit	Decimal (12 characters, 2 decimal point)	The minimum value for member deposit for membership registration.
charityFund	Decimal (12 characters, 2 decimal point)	The minimum value for charity fund for the membership registration.
fixedSaving	Decimal (12 characters, 2 decimal point)	The minimum value for fixed savings for membership registration.
loanRate	Decimal (5 characters, 2 decimal point)	The value of the loan rate for the loan application process.
maxBai	Decimal (5 characters, 2 decimal point)	The maximum value for Al-Bai loan type
maxInah	Decimal (5 characters, 2 decimal point)	The maximum value for Al-Inah loan type
maxKhas	Decimal (5 characters, 2 decimal point)	The maximum value for Special loan type
maxPulih	Decimal (5 characters, 2 decimal point)	The maximum value for Vehicle Repairment loan type
maxKarnival	Decimal (5 characters, 2 decimal point)	The maximum value for special season carnival loan type
maxCukai	Decimal (5 characters, 2 decimal point)	The maximum value for Road Tax loan type
maxQard	Decimal (5 characters, 2 decimal point)	The maximum value for Al-Qardhul loan type

5.1.5 Entity: <Loan>

Table 5.1.5: Description of Loan Entity

Attribute Name	Type	Description
loanApplicationID	Big Integer (20 characters)	Uniquely identify a loan application
memberNo	Integer (11 characters)	Uniquely identify a member of application
loanType	100 Variable characters	Type of the loan
loanAmount	Decimal (12 characters, 2 decimal point)	The loan amount
loanPeriod	Integer (11 characters)	The loan period in month
monthlyInstallment	Decimal (12 characters, 2 decimal point)	The monthly installment
dob	Date	The data of birth of the member
age	Integer (11 characters)	The age of the member
bankAccNo	Integer (11 characters)	The bank account number of the member
bankName	100 Variable characters	The bank name of the member
verificationFile	255 Variable characters	The verification file for employee of the member
loanApplicationStatus	Enum (“Sedang Diproses”, “Lulus”, “Gagal”)	The application status
loanApplicationDate	Date	The application status
approvalDate	Date	The approval date of the application
adminNo	Integer (11 characters)	The foreign key of the admin references Member

5.1.6 Entity: <Member>

Table 5.1.6: Description of Member Entity

Attribute Name	Type	Description
memberNo	Integer (11 characters)	Uniquely identify a member references Membership_Notif
icNo	Big Integer (20 characters)	The identity card number of the member
password	100 Variable Characters	The password of the member
role	255 Variable Characters	The role of the member
applicationID	Big Integer (20 characters)	The foreign key of the applicationID of the member references Membership_Notif

5.1.7 Entity: <Membership>

Table 5.1.7: Description of Membership Entity

Attribute Name	Type	Description
applicationID	Big Integer (20 characters)	Uniquely identify an application
email	100 Variable Characters	Email of the applicant
name	100 Variable Characters	Name of the applicant
icNo	Big Integer (20 characters)	Identity Card Number of the applicant
marriageStatus	50 Variable Characters	Marriage Status of the applicant
homeAddress	100 Variable Characters	Home address of the applicant
homePostcode	Integer (11 characters)	Home Postcode of the applicant
homeCity	50 Variable Characters	Home city of the applicant
homeState	50 Variable Characters	Home state of the applicant
gender	10 Variable Characters	Gender of the applicant
religion	50 Variable Characters	Religion of the applicant

race	50 Variable Characters	Race of the applicant
monthlySalary	Decimal (12 characters, 2 decimal point)	Monthly salary of the applicant
staffNo	Integer (11 characters)	Staff No of the applicant
pfNo	Integer (11 characters)	Personal file no of the applicant
positionGrade	255 Variable Characters	Position and position grade of the applicant
workAddress	255 Variable Characters	Work address of the applicant
workPostcode	Integer (11 characters)	Work postcode of the applicant
workState	50 Variable Characters	Work state of the applicant
workCity	50 Variable Characters	Work city of the applicant
faxNo	Integer (11 characters)	Fax no of the applicant
phoneNo	Integer (11 characters)	Personal phone number of the applicant
homePhoneNo	Integer (11 characters)	Home phone no of the applicant
entranceFee	Decimal (12 characters, 2 decimal point)	Entrance fee of the applicant
shareCapital	Decimal (12 characters, 2 decimal point)	Share capital of the applicant
feeCapital	Decimal (12 characters, 2 decimal point)	Fee capital of the applicant
memberDeposit	Decimal (12 characters, 2 decimal point)	Membe deposit of the applicant
charityFund	Decimal (12 characters, 2 decimal point)	Charity fund of the applicant
fixedSavings	Decimal (12 characters, 2 decimal point)	Fixed savings of the applicant
role	255 Variable Characters	Role of the applicant
membershipStatus	30 Variable Characters	Membership status of the applicant
applicationStatus	30 Variable Characters	Application status of the application
applicationDate	Date	Apply date of the application

approvalDate	Date	Approval date of the application
adminNo	Integer (11 characters)	The foreign key of the adminNo references Member

5.1.8 Entity: <Notification>

Table 5.1.8: Description of Notification Entity

Attribute Name	Type	Description
notificationDate	Date	The date of the notification is send for the application after reviewal
notificationStatus	255 Variable characters	The notification success status
message	255 Variable characters	The message for the application

5.1.9 Entity: <Stock_Record>

Table 5.1.9: Description of Stock_Record Entity

Attribute Name	Type	Description
memberNo	Integer (11 characters)	Uniquely identify a member
recordDate	Date	Uniquely identify stock record of a member The date of the stock record
shareCapital	Decimal (12 characters, 2 decimal point)	Share capital of the member
feeCapital	Decimal (12 characters, 2 decimal point)	Fee capital of the member
fixedSavings	Decimal (12 characters, 2 decimal point)	Fixed savings of the member
memberSavings	Decimal (12 characters, 2 decimal point)	Member savings of the member
memberFund	Decimal (12 characters, 2 decimal point)	Member fund of the member
AdminNo	Integer (11 characters)	Foreign key of the adminNo references Member

6. User Interface Design

The interface shows that users can login into the system whether it is the KADA Cooperative staff, admin or BOD. The interface also provides a homepage tailored to each user role and displaying the relevant features. It also enables the non-members to register as members in KADA Cooperative and for members, they can apply for loans.

6.1 Screen Images

Here is the user interface design for each use case, showcasing the layout and functionality specific to the tasks and roles involved.

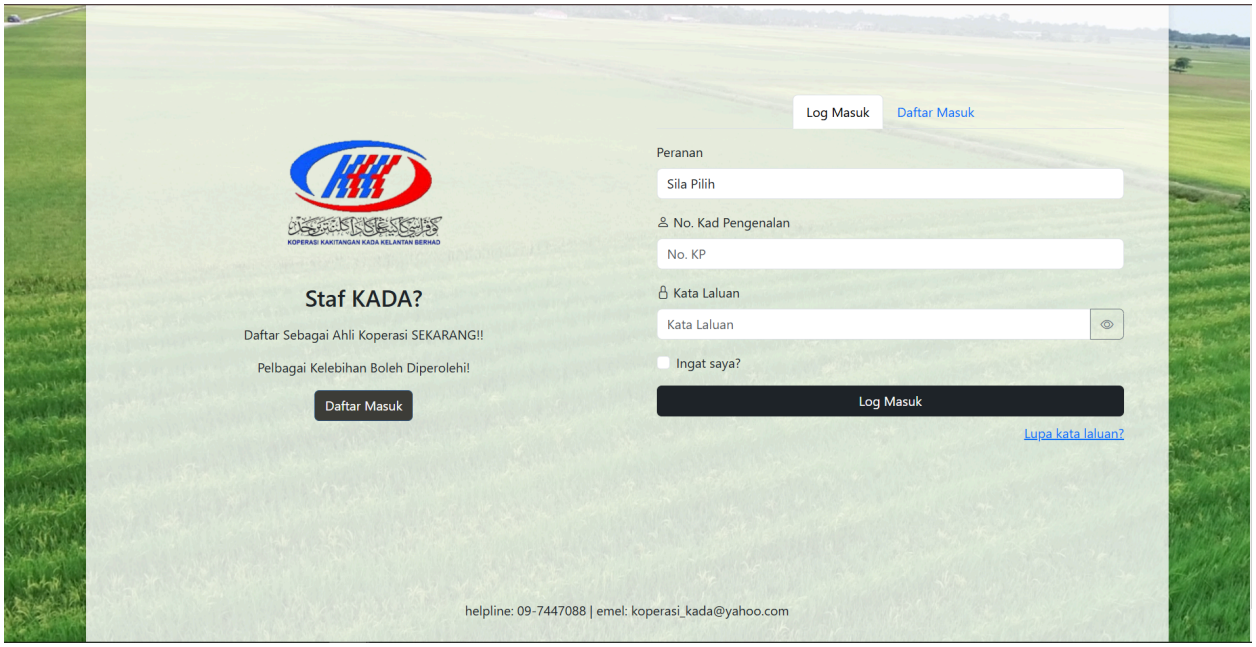


Figure 6.1.1: Interface for Authentication

Figure 6.1.2: Interface for Membership Registration

Figure 6.1.3: Interface for Loan Application

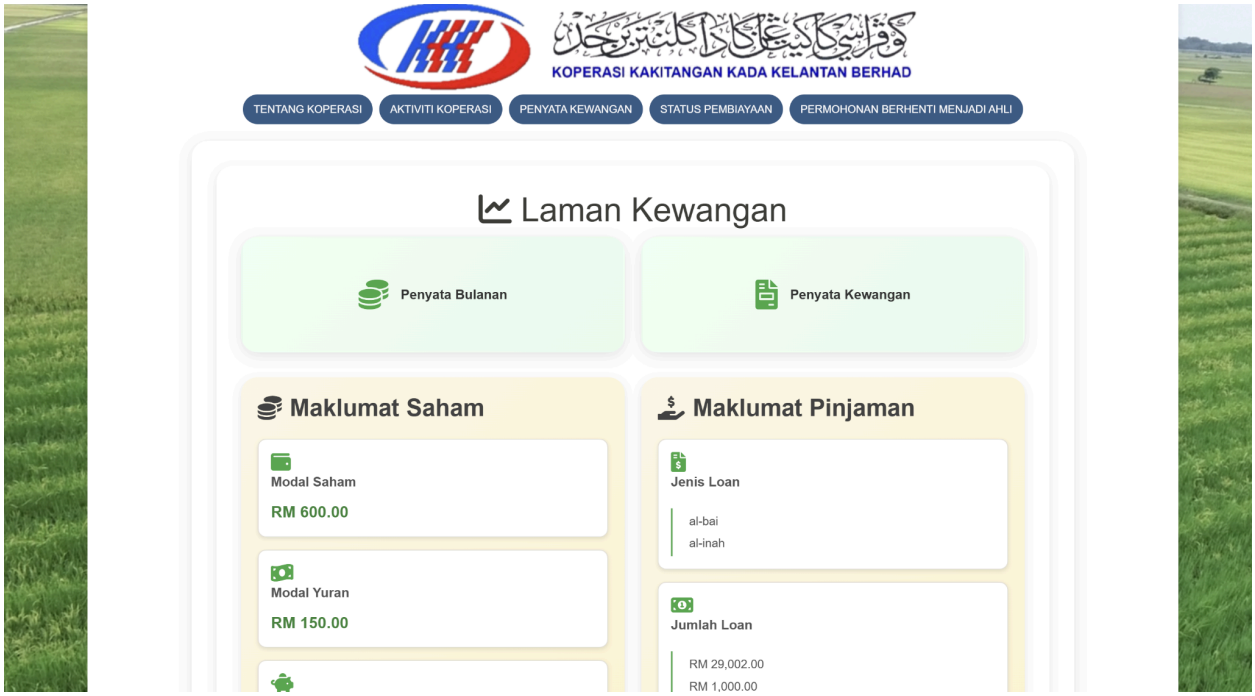


Figure 6.1.4: Interface for View Financial Statement

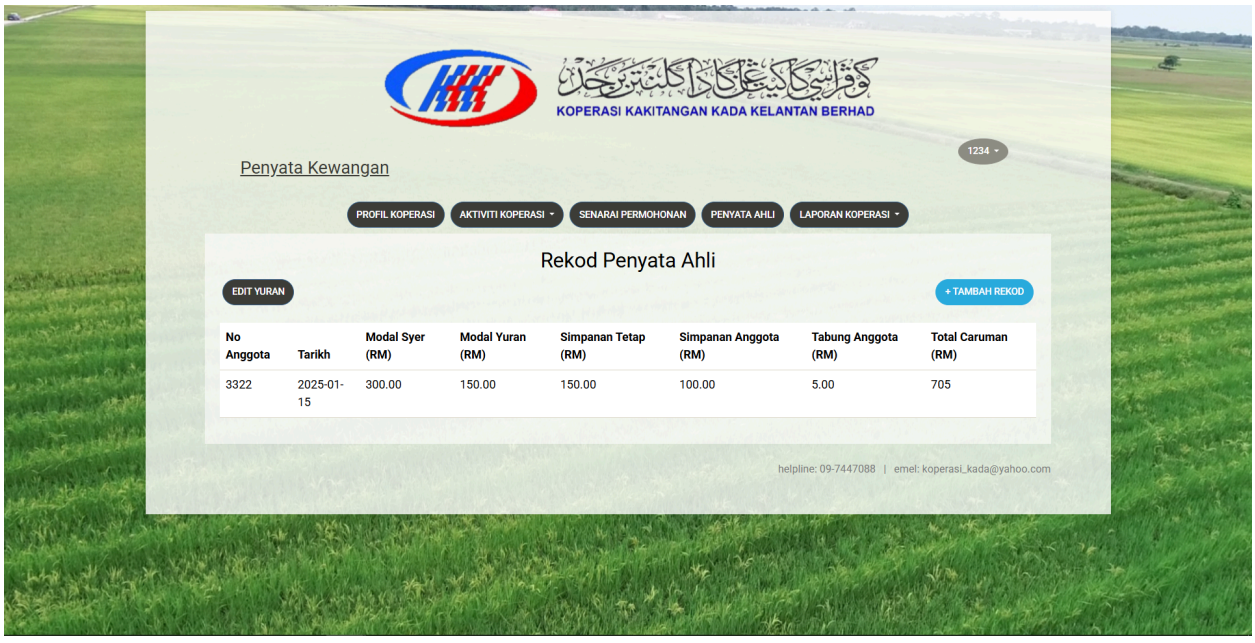


Figure 6.1.5: Interface for Manage Financial Statement

Figure 6.1.6: Interface for View Financial Report

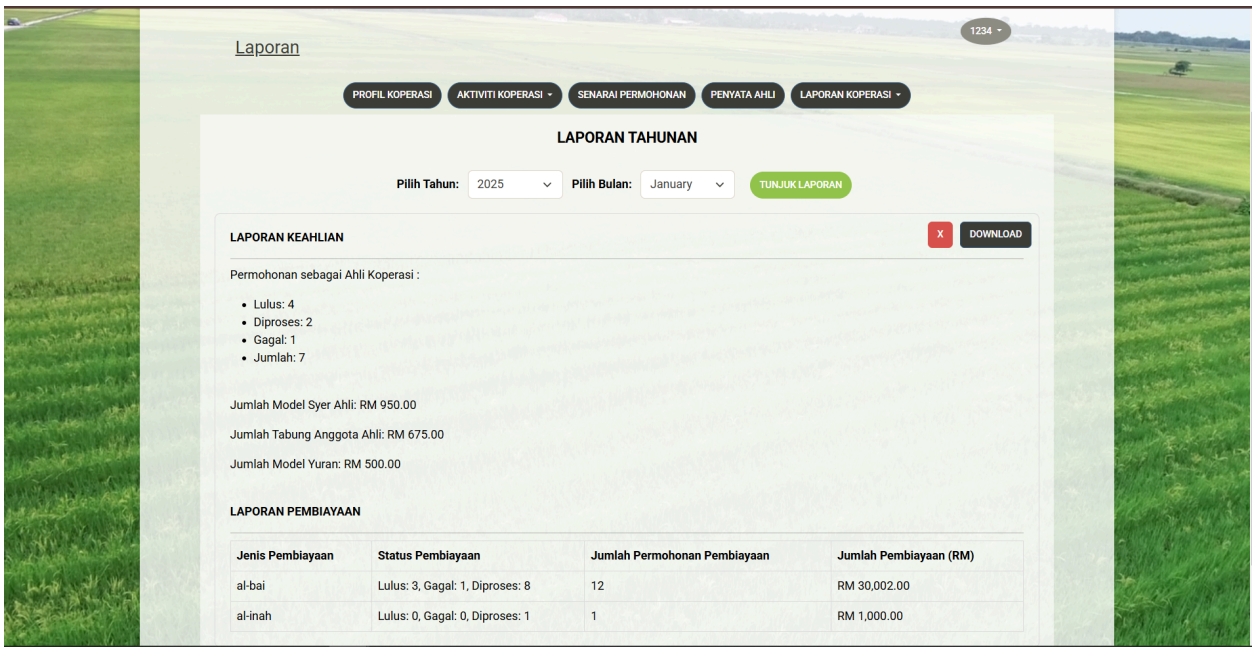


Figure 6.1.7: Interface for Manage Financial Report

Figure 6.1.8: Interface for Manage Member

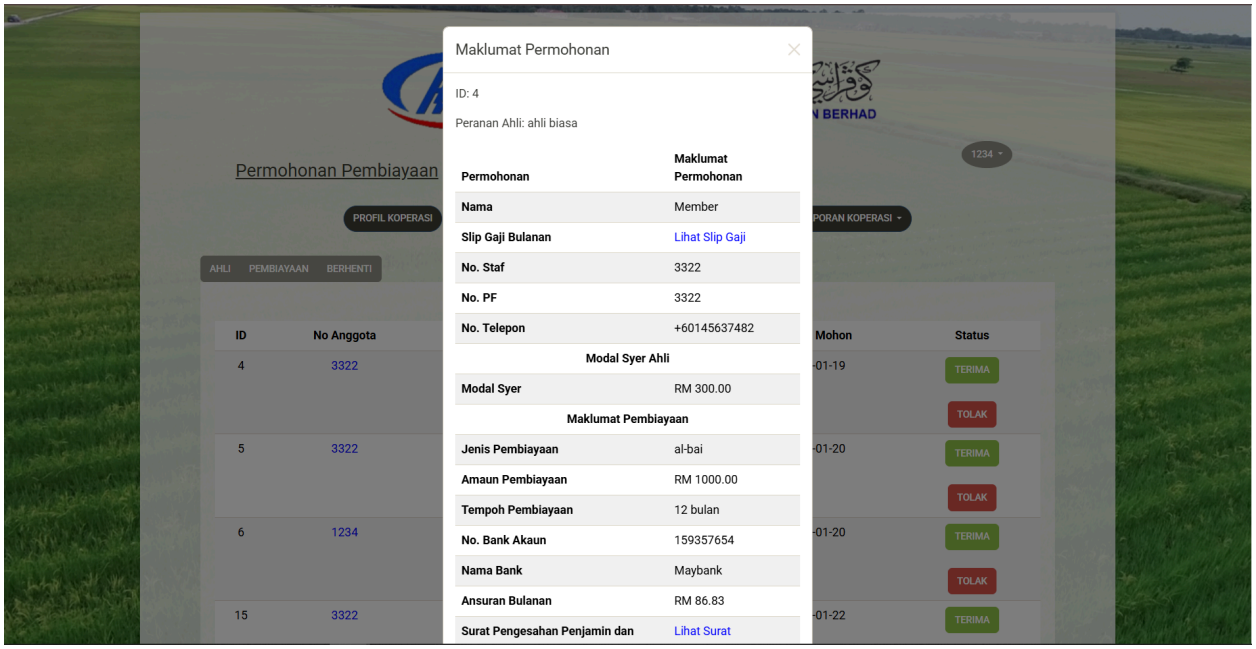


Figure 6.1.9: Interface for Review Application

Figure 6.1.10 Interface for Terminate Membership

7. Traceability

This section shows the cross-references to trace the components and the data structures to the requirements of the KADA Cooperative System. The table below shows how each of the system components will satisfy the requirements that are represented as use cases.

Table 7.1: Requirement Matrix

Package, UC , Sequence Diagram /EntityClass	KADAStaff	KADA Admin	Board OfDirector	Membership	FamilyInfo	Loan	Notifications	Guarantor	Stock
P001, UC001, SD001	X	X	X						
P002, UC001, SD002	X		X	X	X				
P003, UC003, SD003	X		X			X		X	
P004, UC004, SD004	X					X			
P004, UC005, SD005	X					X			
P005, UC006, SD006			X			X			X
P005, UC007, SD007			X						
P006, UC008, SD008		X		X	X				X
P007, UC009, SD009		X	X	X		X		X	X

STD

SECJ2203: Software Engineering

System Documentation (SD)

KADA Cooperative System

Version 4.8

18th February 2025

Faculty of Computing

Prepared by: KodeLab

Revision Page

a. Overview

This version 4.5 of the documents outlines how the system is designed based-on the requirements of the system. This includes as shown below;

1. Introduction including purpose, scope, definition, acronym and abbreviations, references, and overview.
2. Specific requirements including user characteristics, system features, use case details, performance and other requirements, and design constraints.
3. Architectural rationale including architectural style and rationale.
4. Architectural views including use case view, implementation view, logical view, process view, and physical/ deployment view.
5. Data design including data dictionary for each entity.
6. User interface design including screen image.
7. Traceability of the system.

This version of the document acts as a blueprint for the stakeholders of the KADA Cooperative, future developer, and team members to understand and implement the system as the requirements needed.

b. Target Audience

- Stakeholder
- Development Team
- KADA Staff, Admin, and Board of Director

c. Project Team Members

The table below shows the list of the team members by stating their roles and status for each assigned task e.g. by section for this SD version (complete, partially complete, incomplete). If the assigned tasks are not done and have been assigned to other team members, state accordingly.

Member Name	Role	Task	Status
Lubna Al Haani Binti Radzuan (A23CS0107)	Team Leader	4.0 Architectural View Introduction 4.3 Controller View 5.0 Data Design 8.3 TC003	Completed Completed Completed Completed

		8.7 TC007 9.0 Traceability Matrix	Completed Completed
Nabil Aflah Boo Binti Mohd Yosuf Boo Yong Chong (A23CS0252)	Team Member	2.2 System Features 2.3 Launch Phase 2.5 Performance and Other Requirements 2.6 Design Constraints 7.0 Traceability 8.1 TC001 8.2 TC002 9.0 Traceability Matrix	Completed Completed Completed Completed Completed Completed Completed Completed
Nur Firzana Binti Badrus Hisham (A23CS0156)	Team Member	2.4.2 User Story of Admin 4.4 Interaction View 6.0 User Interface Design 8.6 TC006 9.0 Traceability Matrix	Completed Completed Completed Completed Completed
Nurul Adriana Binti Kamal Jefri (A23CS0258)	Team Member	2.4.1 User Story of KADA Staff 4.1 Model View 8.5 TC005 9.0 Traceability Matrix	Completed Completed Completed Completed
Pravinraj A/L Sivabathi (A23CS0171)	Team Member	2.4.3 User story of BOD 3.0 Relational architecture 8.4 TC004 9.0 Traceability Matrix	Completed Completed Completed Completed

d. Version Control History

Version	Primary Author(s)	Description of Version	Date Completed
4.0	Nurul Adriana (Team member)	Updated Table Of Contents	14/12/2024
	Pravinraj A/L Sivabathi(Team Member)	Completed section 2.4.2	
4.1	Nurul Adriana (Team Member)	Completed Section 2.4.1	15/01/2025
	Nur Firzana (Team Member)	Updated 2.1.2 Persona 2	
	Pravinraj A/L Sivabathi(Team Member)	Completed 3.0	
4.2	Nurul Adriana (Team Member)	Completed Section 4.1	16/01/2025
	Lubna Al Haani (Team leader)	Completed 4.0 Architectural Views Update 5.0 Data Design	
	Nur Firzana (Team Member)	Updated Section 2.3 Completed Section 2.4.3	
	Pravinraj A/L Sivabathi(Team Member)	Completed 8.4 TC004	
4.3	Nurul Adriana (Team Member)	Updated Section 4.1 Model View	17/01/2025
	Lubna Al Haani (Team leader)	Completed 5.0 Data Design	
	Nur Firzana (Team Member)	Completed Section 4.4	
	Pravinraj A/L Sivabathi(Team Member)	Updated 8.4 TC004	
4.4	Nurul Adriana (Team Member)	Completed Section 2.4.1 User Story : KADA Staff	19/01/2025
	Lubna Al Haani (Team leader)	Completed 4.3 Controller View	
	Nabil Aflah Boo (Team Member)	Updated Figure 2.2.3 State diagram for Authentication and Authorization Updated 2.3 Launch Phase Updated Figure 4.3.1 SD001 Sequence diagram for <Authentication>	

	Nur Firzana (Team Member)	Completed Section 6.0	
	Pravinraj A/L Sivabathi(Team Member)	Completed 9.0	
4.5	Nurul Adriana (Team Member)	Completed Section 8.5 Completed Section 9.0	20/01/2025
	Lubna Al Haani (Team leader)	Completed Section 8.3 Completed Section 8.7 Completed Section 9.0	
	Nabil Aflah Boo (Team Member)	Completed Section 7.0 Completed Section 8.1 Completed Section 8.2 Completed Section 9.0	
	Nur Firzana (Team Member)	Completed Section 8.6 Completed Section 9.0	
	Pravinraj A/L Sivabathi(Team Member)	Completed section 8.4 Completed section 9.0	
4.6	Nur Firzana (Team Member)	Updated Section 2.1.2	09/02/2025
4.7	Nur Firzana (Team Member)	Updated Section 2.4.2 Updated Section 8.6 Update Section 6.0 Updated Section 4.4	12/02/2025
	Nabil Aflah Boo (Team Member)	Updated Section 2.3 Updated Section 2.5 Updated Section 8.2.2	
	Lubna Al Haani (Team Leader)	Updated Section 4.3 Updated Section 5.0	
	Pravinraj A/L Sivabathi(Team Member)	Updated section 8.4 Updated section 9.0	
4.8	Lubna Al Haani (Team Leader)	Updated section 4.0, 4.4	18/2/2025
	Nur Firzana (Team Member)	Updated Section 4.4	

Table of Contents

1. Introduction

This SD elaborates on the components and processes concerning designing the KADA Cooperative System, including SRS, SDD, and STD. SRS stipulates the functional and non-functional requirements of the system, which spell out the objectives and constraints that the system is to observe. SDD elaborates on the architecture and design of the system, hence stating data flow, modules, and their interaction that guide the development process. It includes test plans, cases, and expected results within the STD that validate the system will meet all requirements and work as intended. This document is used as a quick reference for both stakeholders and team members alike.

1.1 Purpose

This SD is to describe the design and strategy of implementation for KADA Cooperative System, an e-cooperative that is to digitalize the operations of cooperatives. It details the technical and functional requirements needed for development, testing, and deployment. The intended audience this document will serve includes:

1. Development Team Members: To understand the required technology and to validate the specifications of the system.

2. KADA Cooperative System's Administration, Board of Directors, and Staff: To ensure the system aligns with cooperative goals and operational requirements.

1.2 Scope

a. The software product is the KADA Cooperative System, an automated and modern platform designed to replace the existing manual, paper-based processes of the cooperative.
b. The system shall enhance core functionalities to include online applications for membership and loans, real-time reporting, and efficient membership management. It will provide secure, role-based access to different user groups, including applicants, members, administrators, and board members, ensuring that data integrity and user privacy are maintained.

c. The primary objectives of this software are to boost operational efficiency, improve the user experience, and safeguard data integrity. The system is not intended to support unrelated functionalities, such as third-party interactions with non-cooperative financial services.

d. By digitizing operations, the KADA Cooperative System aims to streamline processes and align with the cooperative's mission of providing efficient and transparent services to its stakeholders.

1.3 Definitions, Acronyms and Abbreviation

Term	Definition
SRS	System Requirements Specification
SDD	System Design Document
SD	System Documentation
KADA	Kemubu Agricultural Development Authority
BOD	Board Of Directors
Admin	System Administrator
SSD	Solid-State Drive

1.4 References

[1] Dennis, A., Wixom, B. H., & Tegarden, D. (2015). *Systems Analysis and Design: An Object-Oriented Approach with UML* (A. Dennis, B. H. Wixom, & D. Tegarden, Eds.). Wiley.

1.5 Overview

This System Documentation, SD, offers an in-depth guide in designing, developing, and deploying the KADA Cooperative System. Overall, the document will be organized around the following key sections:

1. **Specific Requirements:** This outlines the characteristics, capabilities, and limitations of the system by defining the essential criteria for functionality and performance.
2. **Design Components:** Includes the wireframes for the visual models of the use-case diagram, class diagram, and state diagram to portray the architecture and interaction with the system.
3. **Launch Phase:** Describes the iterative development process, defining the sprints and user stories that should guide the project implementation.
4. **Testing and Validation:** Verification of functional and non-functional requirements, performance measures, and quality standards.

This structured arrangement ensures the SD serves as a comprehensive reference for all phases of the project, thus making it easy to work together as a team in ensuring the successful delivery of the KADA Cooperative System.

2. Specific Requirements

This section of the SD explains about the user story of the requirements for the system. This section contains the system's personas, launch phase, user story detail, performance constraint and also design constraints of the system.

2.1 Persona

Personas are fictional representations of key users that help to understand their needs, goals and behaviors. It guides the design and development of the system to ensure it meets user expectations effectively

2.1.1 Persona 1 (KADA Staff)

User Need

- The staff need a way to apply for membership and loan, view loan application status and view financial statements

User Stories

1. As a KADA staff, I want to apply for KADA membership so that I can use its loan benefits.
2. As a KADA staff, I want to apply for a loan so that I can exercise my rights as a member of the cooperative.
3. As a KADA staff, I want to view the loan application status so that I can know if my application is successful or not.
4. As a KADA staff, I want to be able to view my financial statements in the system so that I know my current financial status.
5. As a KADA staff, I want to be able to apply for a membership termination so that I can leave the cooperative when necessary.

Table 2.1.1.1 : An applicant user story 1

An applicant apply for membership
The system must be open for input.Complete the registration form. Fill in the required information and submit it. The system will check if the submitted information is complete and accurate.Then, the application is assessed by the competent authority.

If the application is approved as a member, the system generates a member ID. An email is dispatched to the applicant containing login details. If rejected, the system records the grounds for refusal. The email provides the reasons for denial.

Table 2.1.1.2 : A KADA staff user story 1

A KADA staff apply for a loan
The system must be open for input. Click on the loan application. Click on the new application. Fill the form with the details needed. If you have completed filling in all the required details on the form, click submit. The system will notify you that the application is successfully accepted into the system reviewing. If you do not fill in some of the required details, click submit. The system will alert you to fill the empty required fields. Then, click submit again after filling in all details. In all cases, the system requires you to login into the system to be able to apply for a loan.

Table 2.1.1.3 : A KADA staff user story 2

A KADA staff view the application status
Click on the loan application. Click on status. If the KADA staff has applied for a loan, the system will display the list of loan applications with its status. If the KADA staff has not yet applied for a loan, the system will not display any loan application. The system will give you a note that you have not yet applied for a loan.

In all cases, the system requires you to login into the system to be able to view financial statements.

Table 2.1.1.4 : A KADA staff user story 3

A KADA staff view the financial statements
The system must be open for input. Click on the statements and choose a month. If the chosen month's statement is available, the system will display the statement. If the chosen month's statement is not available, the system will notify you that the statement for that month is not available yet. In all cases, the system requires you to login into the system to be able to view financial statements.

Table 2.1.1.5 : A KADA staff user story 5

A member apply for membership termination
The system must be open for input. Click on the membership termination. The member should put in the termination reason. Then, click submit. The system should display a confirmation message to the member. The member should confirm or cancel the decision. In all cases, the system requires you to login into the system to be able to apply for membership termination.

2.1.2 Persona 2 (Admin)

User Need

- KADA Cooperative Admin needs a way to view the dashboard, review applications, manage applications, manage financial statements and manage the reports.

User Stories

1. As a KADA Cooperative Admin, I want to view the dashboard so that I can maintain accurate and updated information for users.
2. As a KADA Cooperative Admin, I want to review applications in detail so that I can ensure the cooperative's resources are reliable.
3. As a KADA Cooperative Admin, I want to manage the applications by notifying them via email whether their application is approved or disapproved so that they can be alerted with their status application.
4. As a KADA Cooperative Admin, I want to manage the financial statements so that the members can get the latest information with details.
5. As a KADA Cooperative Admin, I want to manage the financial reports so that the BOD can review it easily.

Table 2.1.2.1 : An admin user story 1

An Admin view the Dashboard
The system must be open for input. Click on the 'Profil Koperasi' tab. The system will give access to view the information details of KADA Cooperative. If you want to view the application's statistics, you can click the 'Laporan Koperasi' tab, then click on the 'Statistik Permohonan' dropdown to view the updated statistics based on the applications. If you want to view the financial summary, you can click the 'Laporan Koperasi' tab, then click on the 'Rumusan Kewangan' dropdown to view the updated summary. . In all cases, the system requires you to login into the system to be able to view the dashboard.

Table 2.1.2.2 : An admin user story 2

An Admin review applications
The system must be open for input. Click on the ‘Senarai Permohonan’ tab to view the list of membership and loan applications. There’s two applications that can be reviewed: the membership and loan application. You can click either on ‘Ahli’ or ‘Pembiayaan’ tab to review the applications. If you click on the name or ID at the row of the applications according to the list, the system will display the detailed information of the applicants. You can also click on the proof that has been uploaded by applicants to verify their application. In all cases, the system needs you to stay logged in to be able to view the applications.

Table 2.1.2.3 : An admin user story 3

An Admin manage applications
The system must be open for input. Click on the ‘Pengurusan Permohonan’ tab to view the list of applications. You can manage the applications only after meeting with the Board of Directors and get their confirmation of approval. If you want to approve the applications, click either on ‘Ahli’ or ‘Pembiayaan’ or ‘Berhenti’ tab, click the approve button at the desired applicant’s row, the system will send an email to applicants that their status has been approved. If you want to reject the applications, click the reject button at the desired applicant’s row, the system will send an email to the applicants that their status has been rejected. The new status of applications has been updated through their own account.

If you want to view the resignation form, you can click on the ‘Berhenti’ tab. The system will show the list of pending applications and you can view the previous year list of resignation forms that have been approved by clicking the title name. You also can download the list of previous resignation members by clicking on the ‘Download PDF’ button. In all cases, the system needs you to stay logged in to be able to manage applications.

Table 2.1.2.4 : An admin user story 4

An Admin manage financial statement
The system must be open for input. Click on the ‘Penyata Ahli’ tab. If you want to edit the latest financial statement, you can click the ‘Edit Yuran’ button. After completing the editing of the financial statement, you need to click the ‘Kemas Kini Yuran’ button to save the information. If you want to manage the financial statement by adding the new record, you can click the ‘Tambah Rekod’ button. The system will show the add record page. You can select the month and search the member through their member number. You can select either all members or specific members to add the new record of the financial statement. In all cases, the system needs you to stay logged in to be able to manage financial statements.

Table 2.1.2.5 : An admin user story 5

An Admin manage financial report
The system must be open for input. Click on the ‘Laporan Koperasi’ tab. Then click the ‘Laporan’ dropdown. The system will show the yearly financial report. If you want to view the financial report, you need to select the year and month. Then, click ‘Tunjuk Laporan’ button. The system will display the report of membership based on the selected year and month. You can download the report by clicking on the ‘Download’ button. The report of the loan also will be displayed in a table based on the type of loan. In all cases, the system needs you to stay logged in to be able to manage financial reports.

2.1.3 Persona 3 (Board of Director)

User Need

- The Board of Director needs a way to review members' applications, loan applications, and view financial summary.

User Stories

1. As a Board of Director, I want to view a list of all applicants including their profiles and details so that I can monitor all the members' activity effectively.
2. As a Board of Director, I want to review all the loan applications so that I can make a decision on the applicant's loan status during the annual meeting.
3. As a Board of Director, I want to view the details of the financial summary so that I can oversee the financial conditions and minimize financial risks.

Table 2.1.3.1 : A BOD user story 1

A BOD review members' application
The system must be open for any input. Click on the 'Permohonan Ahli' section to view the members application details. If you want to search for a member's name, click on the search engine and type the particular name. The system will then display the details of the members application. If the name won't appear after the search, the system will show that the member's not available. If you don't want to search the member's name, scroll down the list of tables to see all the members' applications. If you want to view detailed information of the members application, click on the blue words 'Click Here' to see their application form details.

In all cases, the system needs you to stay log in to review the members' applications.

Table 2.1.3.2 : A BOD user story 2

A BOD review loan applications
The system must be open for any input. Click on the 'Permohonan Pembiayaan' section to view the loan application details. If you want to search for the name of the loan applicant, click on the search engine and type in the name. If the name won't appear after the search, the system will display that the applicants is not available. If you want to view all loan applicants, scroll down the list of tables to see their loan details. If you want to view their loan application details, click on the 'Click Here' to be able to redirect to their forms application detail. In all cases, the system needs you to stay logged in to be able to review the members' loan applications.

Table 2.1.3.3 : A BOD user story 3

A BOD view financial summary
The system must be open for any input. Click on the 'Rumusan Kewangan' to view financial statistics.

The system will display a profit rate for month, total dividend by year, and statistics for active loan by month for the financial summary dashboard.

If you want to see the dividend history for KADA, click on the download icon or scan the qr code to review it.

If you want to review the financial report, click on the download icon or scan the qr code to see the overall financial report for the current year.

In all cases, the system needs you to stay logged in to be able to view the financial summary.

2.2 System Features

This product is a new website system for KADA Cooperative which is aimed at making a complete change from the hard copy methods of processing membership and loan applications to more automated systems. It tries to help the user eliminate all the inconveniences that are associated with applying for membership and loans, managing user details and even managing reports. In addition, the system incorporates the capabilities of calculating cooperatives' loans and interests for each member, reducing the workload on the people.

The system features are illustrated in Figure 2.2.1 below. The detailed description of each module and functions is tabulated in Table 2.2.1.

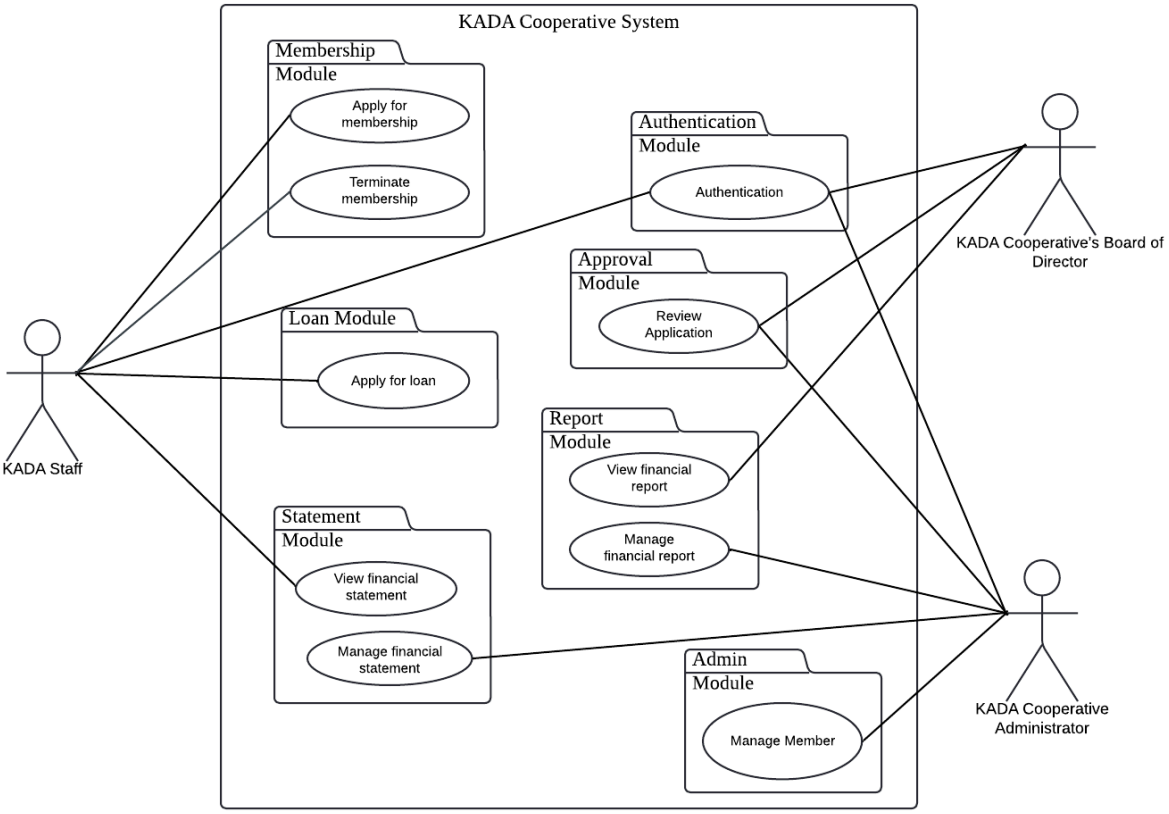


Figure 2.2.1: Use Case Diagram for KADA Cooperative System

Table 2.2.1: Description of Module and Functions for KADA Cooperative System

Module	Function	Description
Authentication	UC001-Authenticati on	This use case allows all users including staff, admin and BOD to login to the Cooperative system.
Membership	UC002-Member Registration	This use case allows non-member staff to register membership in KADA Cooperative.
	UC010-Terminate Membership	This use case allows the members to apply for membership termination as part of a fair business practice of the cooperation.
Loan	UC003-Loan Application	This use case allows members to submit a loan application along with necessary documents.
Statement	UC004-Manage Financial Statement	This use case allows administrators to manage financial statements.
	UC005-View Financial Statement	This use case allows members to view member financial details, including balances and transaction histories.
Reporting	UC006-Manage Financial Report	This use case provides detailed reports specifically designed for Administratives' decision-making purposes.
	UC007-View Financial Report	This use case allows administrators or Board of Directors (BOD) members to view comprehensive financial reports for the organization.
Admin	UC008-Manage member	This use case allows system administrators to manage user roles, permissions, and system settings.
Approval	UC009-Review Application	This use case allows BODs to decide the membership and loan applications.

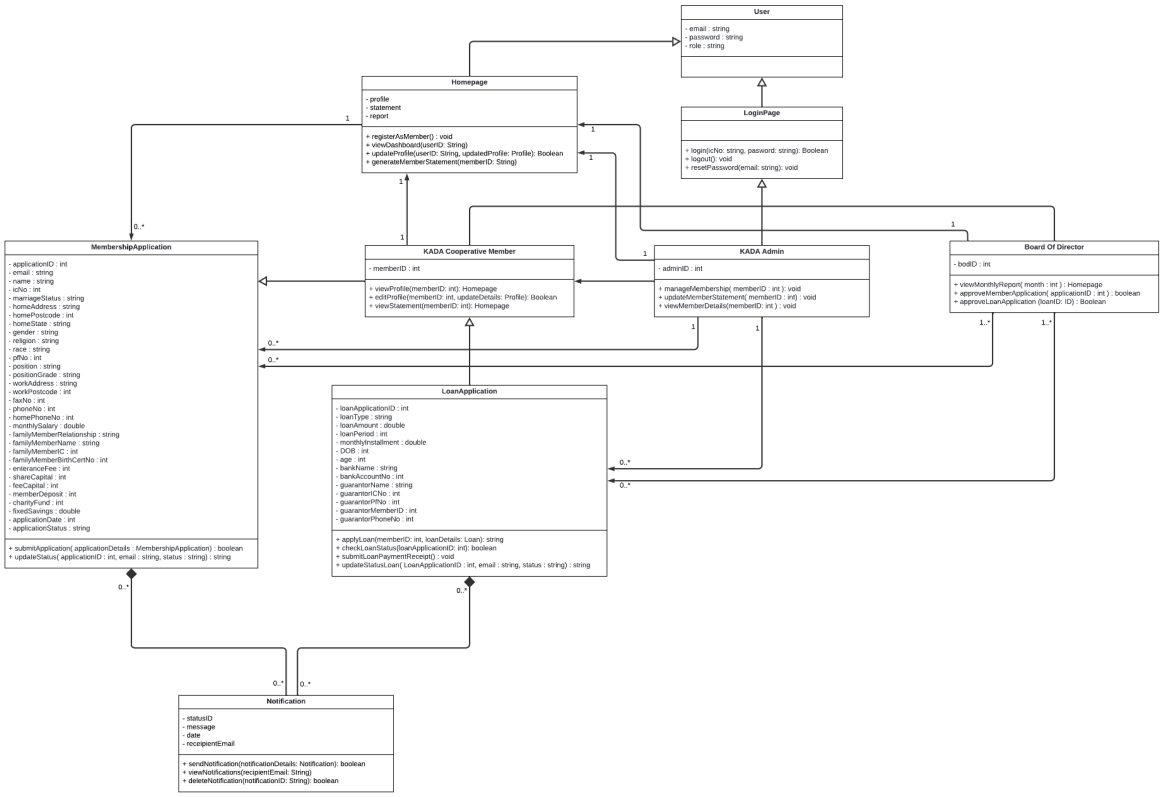


Figure 2.2.2 : Domain Model for KADA Cooperative System

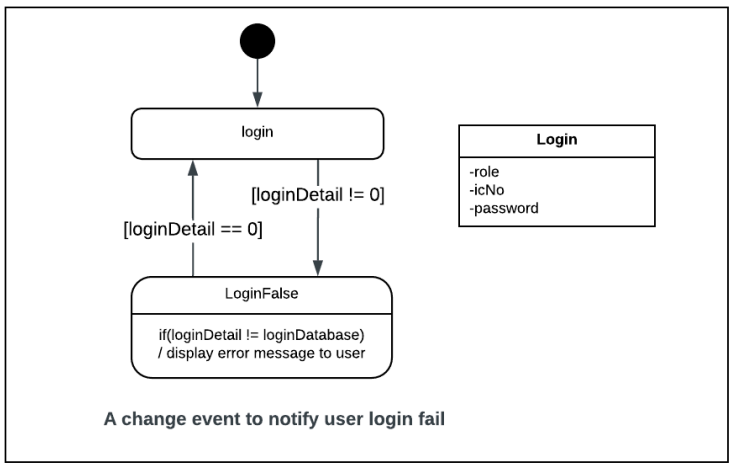


Figure 2.2.3 : State Diagram for authentication and authorization

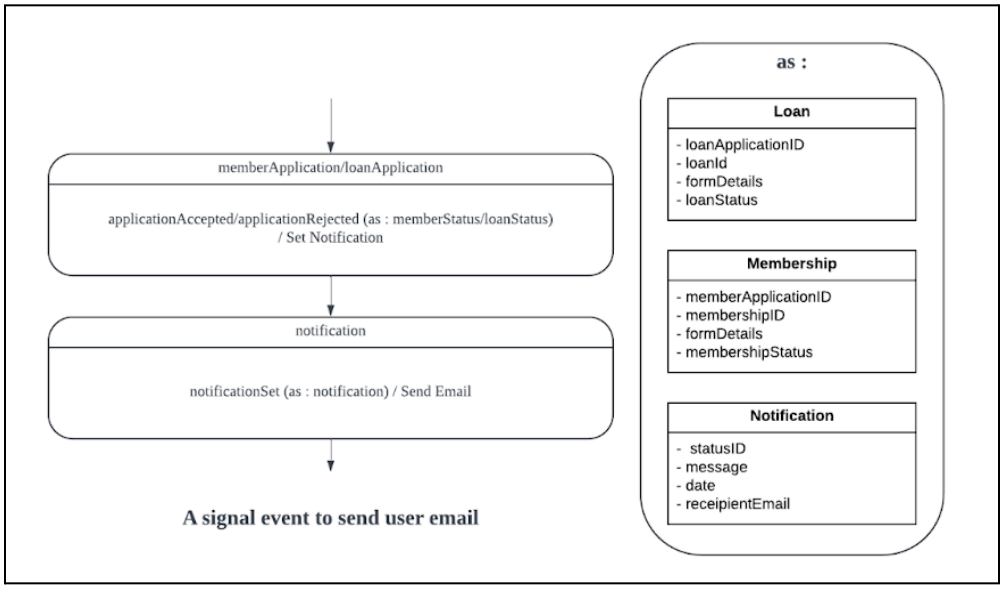


Figure 2.2.4 : State Diagram for Loan Application

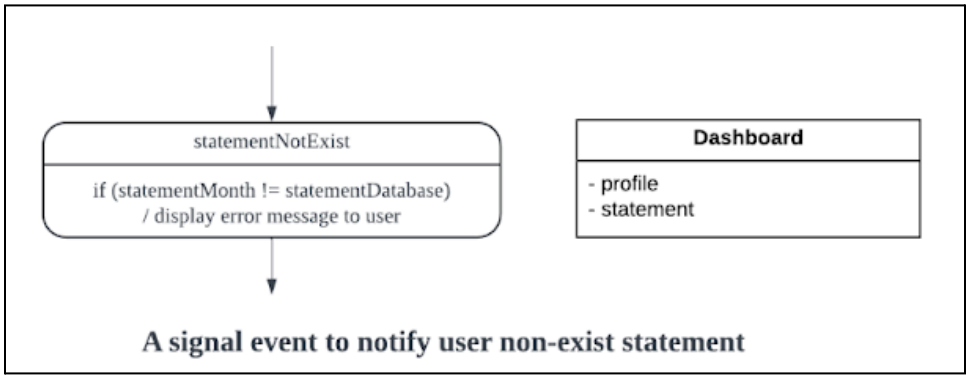


Figure 2.2.5 : State Diagram for Dashboard

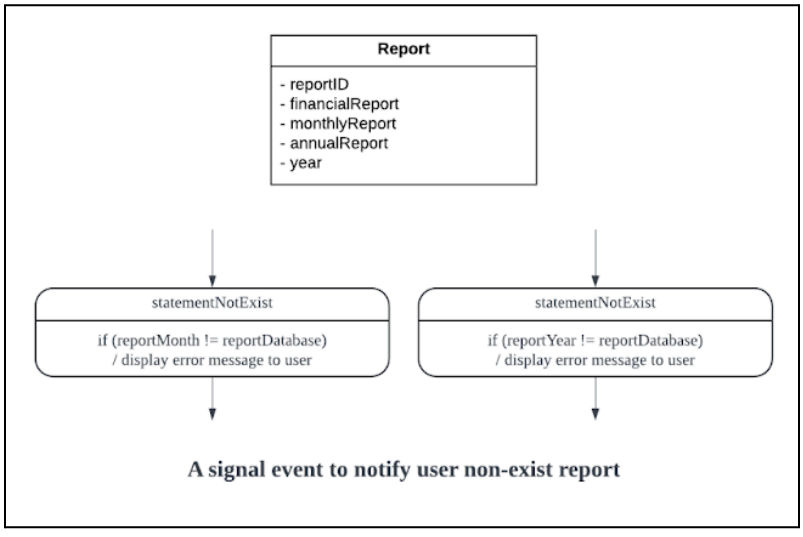


Figure 2.2.6 : State Diagram for Report

2.3 Launch Phase

The product backlog includes several sprints to develop the key features of the KADA Cooperative System. Table 2.3 lists the sprints, user stories and assigned team members.

Table 2.14 : Launch Phase

Sprint	Team members assigned
Sprint #1 A staff wants to apply for KADA membership to become a member in KADA and use its loan benefits.	Aflah
Sprint #2 A staff that is a member wants to apply for a loan so that I can exercise my rights as a member of the cooperative.	Haani
Sprint #3 A KADA Cooperative Admin wants to approve or disapprove applications after they have a meeting with BODs so that only the eligible staff members can access the cooperative's services.	Firzana
Sprint #4 A staff wants to view the financial statements in the system so that I know my current financial status	Pravin
Sprint #5 A Board of Director wants to view the details of the financial summary so that I can oversee the financial conditions and minimize financial risks.	Adriana
Sprint #6 A staff member wants to terminate the KADA membership so that I am no longer a member of KADA and can't access all of the membership opportunities.	Aflah

2.4 User Story Details

This section provides detailed descriptions of each user story for the system. It outlines the interactions between the actor and the system by showing the activity diagram and sequence diagram of the system.

2.4.1 US001: User Story <KADA Staff>

Table 2.1: User Story Description for KADA Staff

User story: KADA Staff
ID: US001
User Story Description **As a KADA Staff** **I want to apply for KADA Membership** **So that I can become a member of KADA and benefit from its loan.**
Flow of events: 1. The KADA Staff signed in into the system. 2. If the KADA Staff wants to apply for KADA Membership: 2.1. The KADA Staff navigates to the registration form section. 2.2. The KADA Staff clicks on “New Application.” 2.3. The KADA Staff fills out the registration form with the required details. 3. If all required details are completed: 3.1. The KADA Staff clicks on the “Submit” option. 3.2. The system confirms the successful submission of the application. 4. If some required details are missing: 4.1. The KADA Staff clicks on the “Submit” option. 4.2. The system alerts the KADA Staff to fill in the missing fields. 4.3. The KADA Staff fills in the required details and clicks on the “Submit” option again.
Alternative flow *1*: **If the KADA Staff has not yet applied for KADA membership:** 1. The system notifies the KADA Staff that they should fill the registration form first to obtain membership.
Acceptance Criteria ● Precondition : The KADA Staff must be signed in to apply for KADA membership. ● Postcondition : The membership application’s information is recorded in the system. ● Other conditions : The KADA Staff’s information is validated during the registration process to check completeness and accuracy of data.

Exception flow:

If the system detect any issues because of invalid data or missing required fields:

1. The KADA Staff prompt to correct the error and resubmit the form.

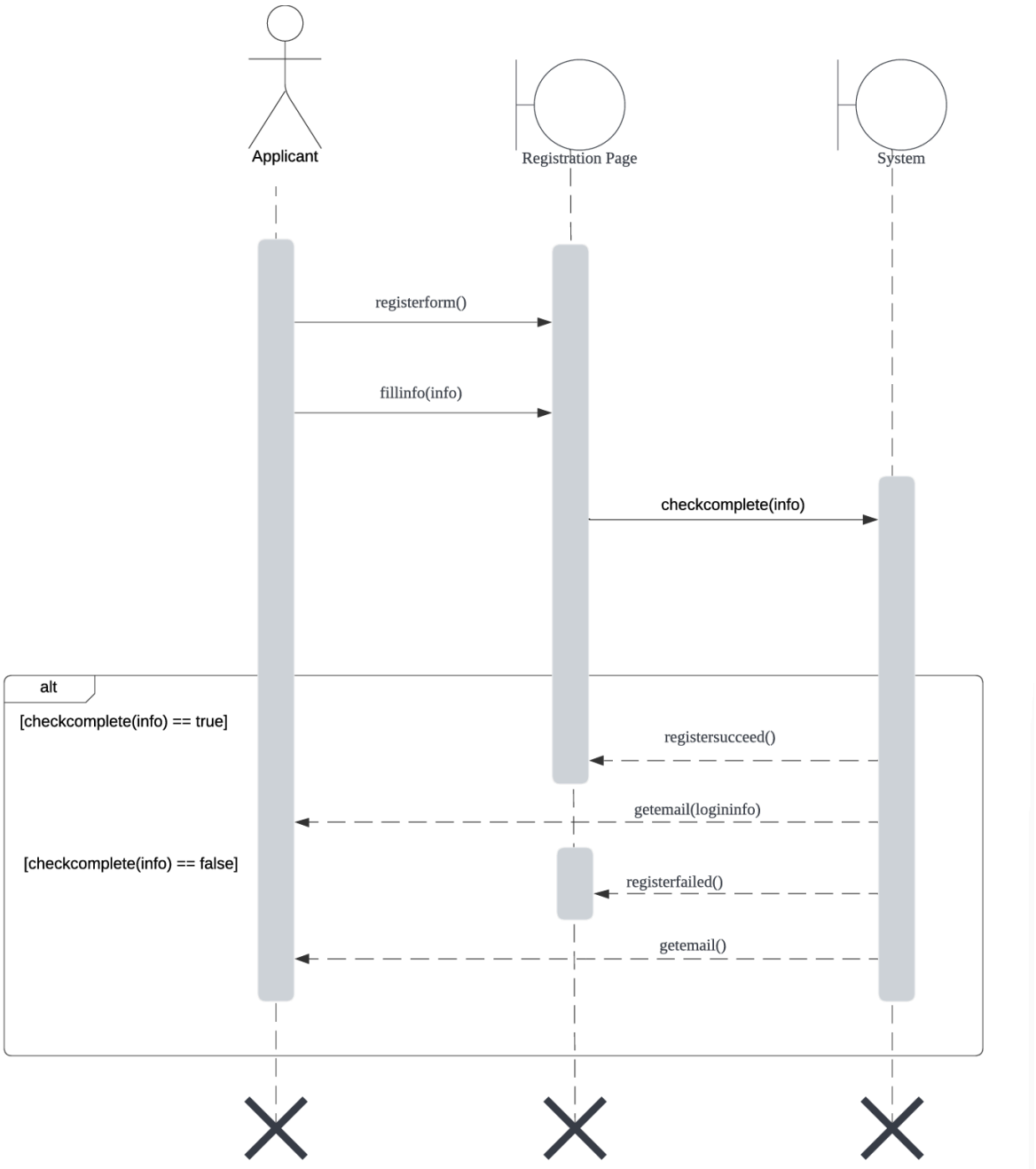


Figure 2.4.1.1 : Sequence Diagram for KADA Staff

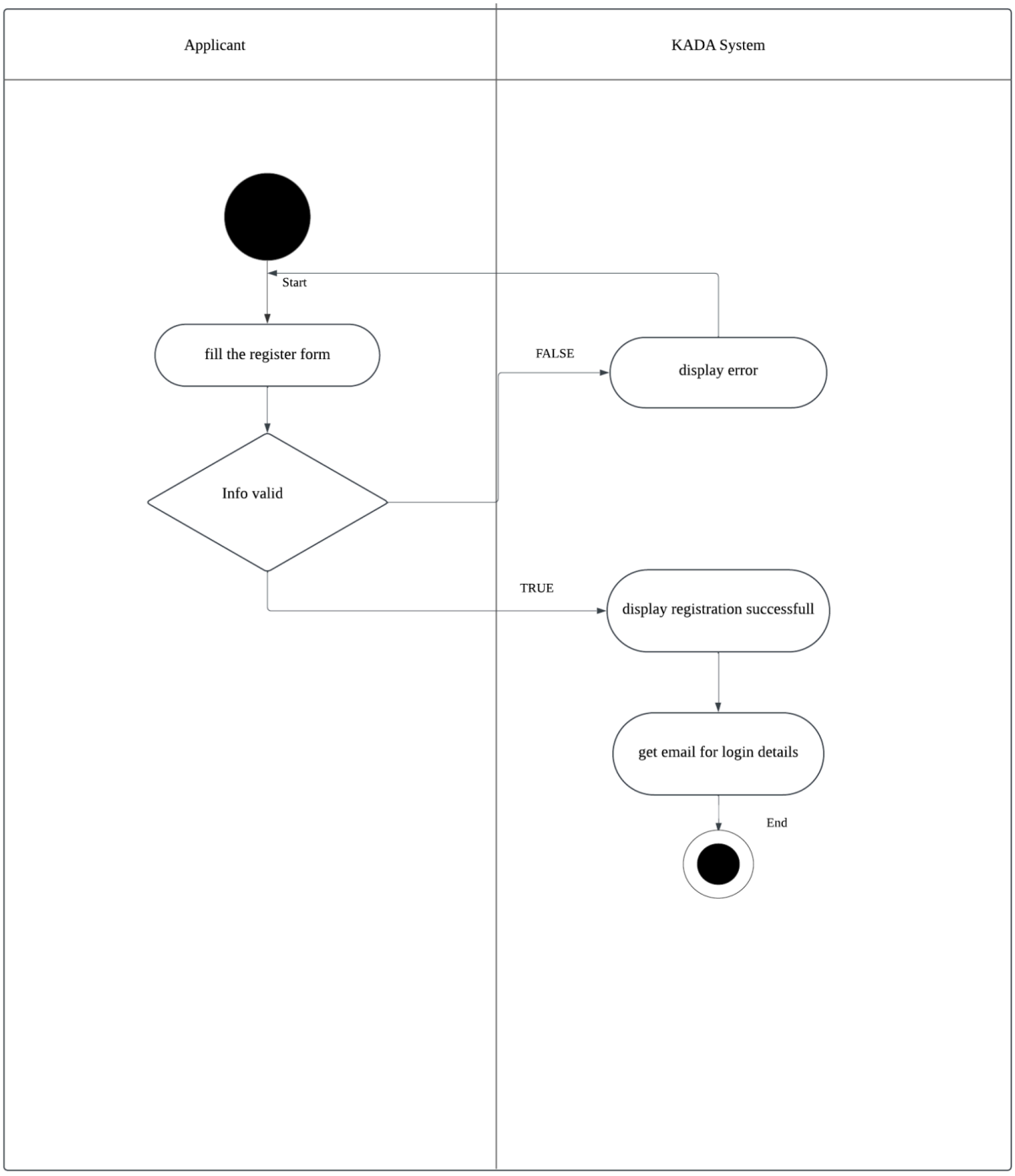


Figure 2.4.1.2 : Activity Diagram for KADA Staff

2.4.2 US002: User Story <Admin>

Table 2.4.3.1 shows the user story description for KADA Cooperative Admin and shows the flow of users to use the system. Figure 2.4.3.1 and Figure 2.4.3.2 shows the sequence diagram and activity diagram of Admin for further explanation.

Table 2.4.3.1 : User Story Description for Admin

User story: Admin
ID: US002
User Story Description 1. As a KADA Cooperative Admin, I want to view the dashboard so that I can maintain the accurate and updated information for users. 2. As a KADA Cooperative Admin, I want to review applications in detail so that I can ensure the cooperative's resources are reliable. 3. As a KADA Cooperative Admin, I want to manage the applications by notifying them via email whether their application is approved or disapproved so that they can be alerted with their status application. 4. As a KADA Cooperative Admin, I want to manage the financial statements so that the members can get the latest information with details. 5. As a KADA Cooperative Admin, I want to manage the financial reports so that the BOD can review it easily.
Flow of events: 1. An admin logs into the system. 2. If an Admin wants to view the KADA Cooperative dashboard. 2.1. The system will display an admin dashboard with a cooperative profile. 2.2. An Admin navigates to a 'Laporan Koperasi' tab and clicks the 'Statistik Permohonan' dropdown. 2.3. The system will display the statistics of membership applications and loan applications in a graph form. 2.4. An Admin can view the number of application status by scrolling down and see the pie chart of status membership applications and status of loan applications. 3. If an Admin wants to review applications in detail. 3.1. An Admin navigates to the 'Senarai Permohonan' tab. 3.2. The system will display a list of membership applications as a default page. 3.3. If an Admin wants to review the applicants' information. 3.3.1. An Admin can click on the 'Ahli' tab to view the membership applications. 3.3.2. An Admin can click on the 'Pembiayaan' tab to view the loan applications. 3.4. An Admin can click on the name or member number of the applicants. 3.5. The system will popup the detailed information of the applicants. 4. If an Admin wants to manage applications. 4.1. An Admin navigates to the 'Senarai Permohonan' tab.

4.2. The system will display the list of membership applications.
4.3. If an Admin want to manage the applications
4.3.1. An Admin can click on the ‘Ahli’ tab to manage the membership applications.
4.3.2. An Admin can click on the ‘Pembiayaan’ tab to manage the loan applications.
4.3.3. If an Admin clicks on the ‘Berhenti’ tab to manage the resignation applications.
4.3.3.1. An Admin can view the previous list of resignation members by clicking the ‘Senarai Tamat Ahli Tahun 2024’ title.
4.3.3.2. The system will display the table list of the resignation members.
4.3.3.3. An Admin clicks the ‘Download PDF’ button.
4.3.3.4. The system will automatically download the list of resignation members based on the year.
4.4. An Admin can click either ‘Terima’ or ‘Tolak’ button to manage the applications for the three applications.
4.5. The system will send the email notification to the applicants to notify them that their status application has been updated.
4.6. The system will update the status of applications on applicants' accounts.

5. If an Admin wants to manage the financial statements.
5.1. An Admin navigates to the ‘Penyata Ahli’ tab.
5.2. The system will display the financial statement records.
5.3. If an Admin wants to edit the record.
5.3.1. An Admin navigates to the ‘Edit Yuran’ button.
5.3.2. The system will display the editable page of the fee information.
5.3.3. An Admin can edit the information and click ‘Kemaskini Yuran’ to save the updated information.
5.4. If an Admin wants to add a financial statement record.
5.4.1. An Admin clicks the ‘Tambah Rekod’ button.
5.4.2. The system will display the list of member financial statements.
5.4.3. An Admin can choose the month and year.
5.4.4. An Admin can search the member number that they want to add to the financial statement record.
5.4.5. The system will display the searched member.
5.4.6. An Admin clicks the checkbox for the member searched or ‘Tambah Semua’ button to add the financial statements to the members’ account.

6. If an Admin wants to manage the financial reports.
6.1. An Admin navigates to the ‘Laporan Koperasi’ tab.
6.2. An Admin clicks on the ‘Laporan’ dropdown.
6.3. The system will display the annual financial report of financial.
6.4. An Admin needs to select the year and the month. Then, clicks the ‘Tunjuk Laporan’ button.
6.5. The system will display the financial report based on the month and year selected.
6.6. An Admin clicks the ‘Download’ button.
6.7. The system will automatically download the report.

Alternative flow *n*:

- If the applications is not recorded:
    1. The system displays an error message “Tiada Data”.

Acceptance Criteria

- Postcondition : The system will auto-generate the graph of application statistics.
- Precondition : User logs must be an authorized KADA Cooperative Admin with appropriate system access.

Exception flow:

1. If the authorization is incorrect, the system will show an error message “Log masuk tidak sah”.
2. If the session times out, the system will redirect to the login page.

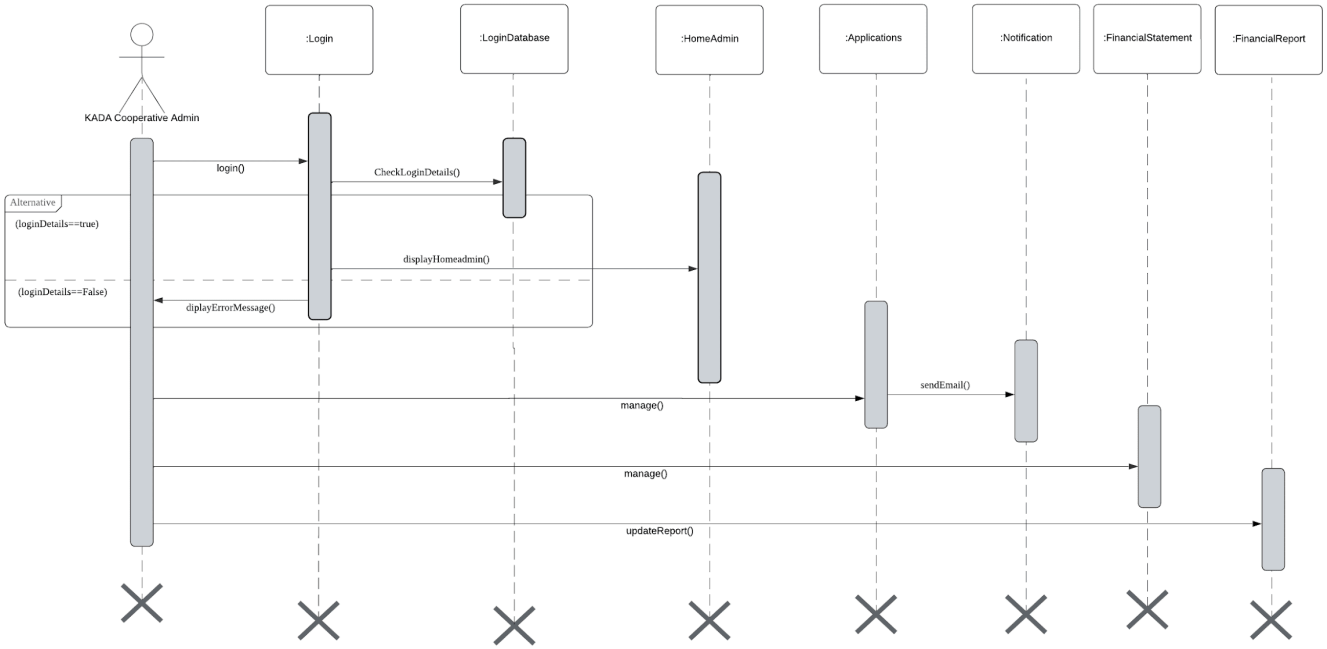


Figure 2.4.3.1:Sequence Diagram for Admin

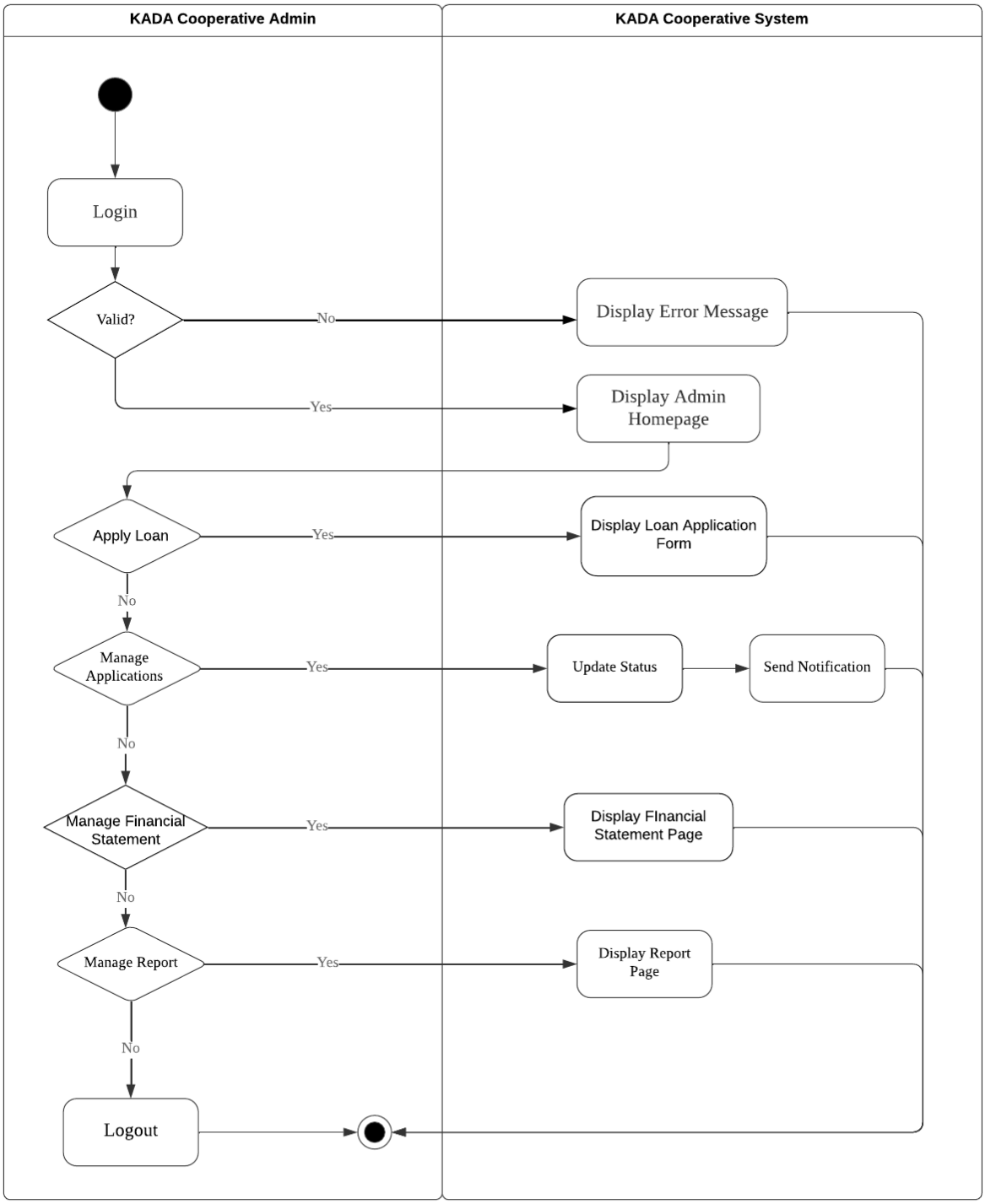


Figure 2.4.3.2: Activity Diagram for Admin

2.4.3 US003: User Story <Board of Director>

Table 2.4.2 shows the user story description for KADA Cooperative BOD and shows the flow of users to use the system. Figure 2.4.3 and Figure 2.4.4 shows the sequence diagram and activity diagram of BOD for further explanation.

Table 2.4.2 : User Story Description for BOD

User story: BOD
ID: US003
User Story Description 1. As a KADA Cooperative BOD , I want to view a list of all applicants including their profiles and details so that I can monitor all member's activity effectively. 2. As a KADA Cooperative BOD, I want to review all the loan applications so that I can make a decision on the loan status during the annual meeting. 3. As a KADA Cooperative BOD, I want to view the details of the financial summary so that I can manage the financial conditions and minimize financial risks.
Flow of events: 1. A BOD log into the system. 2. If a BOD wants to review a member's applications. 2.1. The BOD navigates to the 'Permohonan Ahli' tab. 2.2. The system displays the membership application's list. 2.3. The BOD searches and finds a specific member through the list. 2.4. The BOD clicks on the 'Click Here' button to view detailed application forms. 3. If BOD wants to review the loan applications. 3.1. The BOD navigates to the 'Permohonan Pembiayaan' tab. 3.2. The system will display a loan application list. 3.3. The BOD can search and find specific loan applicants through the list. 3.4. The BOD clicks on the 'Click Here' button to view a detailed loan applicant form. 4. If BOD wants to view a financial summary. 4.1. The BOD navigates to the 'Rumusan Kewangan' tab. 4.2. The system displays financial statistics, including profit rates by month, total

dividends by year and active loan statistics. 4.3. The BOD can review financial reports. 4.4. The BOD can save or download it for future use.
Alternative flow *1*: ● If the applicant's name is not recorded: 1. The system displays an error message "Not Available".
Acceptance Criteria ● Postcondition : The system will auto-generate the graph of application statistics.

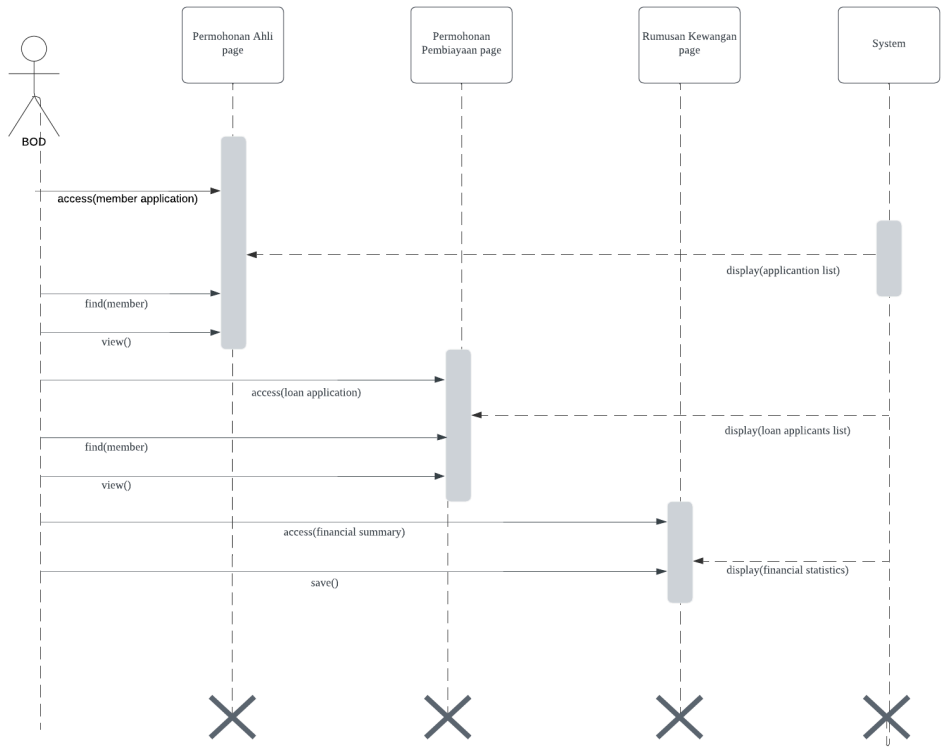


Figure 2.4.2.1 : Sequence Diagram for Board of Director

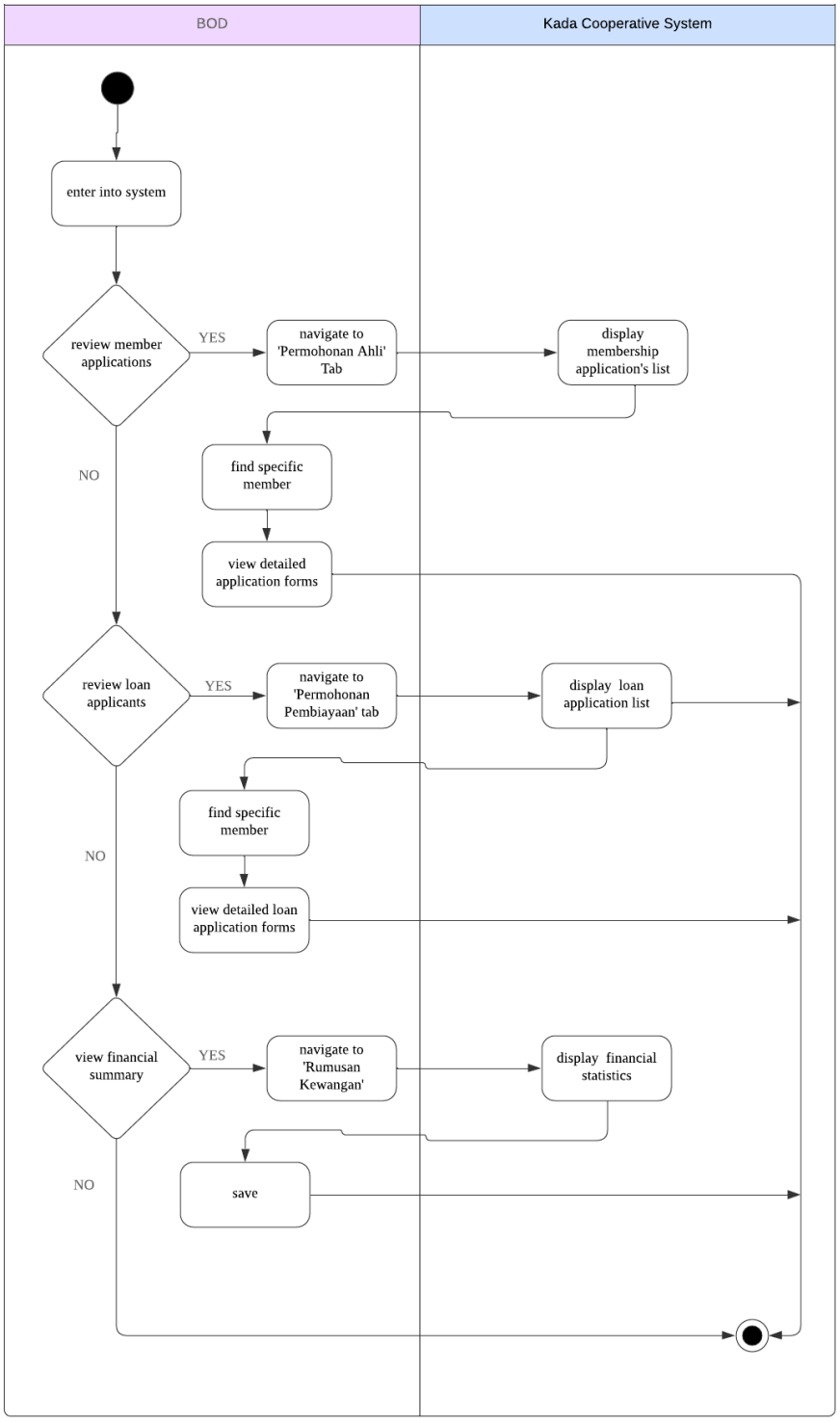


Figure 2.4.2.2 : Activity Diagram for Board of Director

2.5 Performance and Other Requirements

This section details the non-functional requirements, which have been categorized into Software System Attributes, Performance Requirements, and Other Requirements, adapted to the needs of the KADA Cooperative System.

1. Software System Attributes

- Usability:
  - ➢ The system shall provide a user-friendly interface for all user roles, enabling an efficient cooperation between the administrators, the board of directors and the staff members.
  - ➢ KADA Specific: Members will find it easy to view personal information, apply for loans and terminate their membership, while the approvals and reports can be handled effortlessly by the administrators and board members.

- Reliability:
  - ➢ Consistent performance in major features such as dashboards, loan applications, and reports should be ensured.
  - ➢ KADA Specific: With minimum downtime, loan processing and real-time transactions should be reliable to maintain trust of users and efficiency of the system.

- Maintainability:
  - ➢ The policy parameters include interest rates, repayment terms, membership benefits, or any other parameters that could change in less than 10 minutes without hindering the availability of the system.
  - ➢ KADA Specific: Grant the administrators access to a settings interface for instant policy updates, so that the system can adapt to the cooperative's needs without interruption.

- Portability:
  - ➢ The system will run on desktops, tablets, and smartphones and provide a uniform responsive interface across devices.
  - ➢ KADA Specific: Mobile access for board members enables them to approve loan applications remotely, while employees access via desktop during business hours.

- Compatibility:

- ➢ The system should ensure easy integration with payroll systems to facilitate loan repayments.
- ➢ KADA Specific: Payroll deductions for loan repayments should be greatly aligned with existing systems of the organization, thus low manual interventions.

2. Performance Requirements

- Response Time:
  - ➢ Authentication and dashboard loading shall happen in less than 2 seconds, while member data or loan application retrieval should take less than 3 seconds.
  - ➢ KADA Specific: Ensures smooth interaction for all users, especially during busy cooperative operations.

- Throughput:
  - ➢ The system shall be able to process over 50 transactions per second at peak times.
  - ➢ KADA Specific: Ensure the loan applications and approvals can be registered in real-time during the high demand.

- Capacity:
  - ➢ The system will accommodate 1,000 concurrent users without system performance degradation and data storage for 100,000 members.
  - ➢ KADA Specific: Supports currently active user volumes and scales to grow with membership.

- Availability:
  - ➢ System availability shall be maintained at 99.9%, only 8 hours shall be allowed for annual downtime.
  - ➢ KADA Specific: Ensures cooperative services will be active during work hours in order to cater to members and the organizational needs.

3. Other Requirements

- Security:

- ➢ The system shall ensure data security by employing AES-256 encryption to protect transmission of sensitive information and provide multi-factor authentication for sensitive operations.
- ➢ KADA Specific: Protects member data, loan applications, and board reports from unauthorized access or breaches.

- Safety:
  - ➢ Through the use of RBAC, maintain a strict delimitation of access to ensure that unauthorized access is not allowed and maintain audit trails that track every action performed for the sake of accountability.
  - ➢ KADA Specific: Only the admin and board members shall have access to sensitive data to extend safeguarding member trust and operational security.

- Legal and Regulatory:
  - ➢ Must assure compliance with data protection legislation, such as PDPA in Malaysia, and ISO/IEC 27001 standard.
  - ➢ KADA Specific: Ensures that all cooperative data and transactions would be legally compliant to avoid being penalized and ensure member privacy.

- Environmental:
  - ➢ Optimize and ensure CPU and memory usage do not exceed 75% during normal operations.
  - ➢ KADA Specific: Ensures system sustainability by avoiding overuse of computational resources to support long-term cooperative goals.

2.6 Design Constraints

This section explains more about the design constraints of the KADA Cooperative system which adhere to the cooperative standards and other external non-functional requirements.

a) *Environmental constraints*
   - The system is set to work well under the specific temperature and humidity levels whereby the ranges are 0^0C to 40^0C and 20% to 80%.
   - The system is fully functional in any type of network conditions which include bandwidth limitation situations to ensure the system remains accessible by the users.

b) *Hardware constraints*
   The hardware specifications that are minimum requirements to be able to run the system are describing as following:
   - Memory: a minimum of 8 GB of RAM
   - Processor: 2.4 GHz multi-core
   - Storage: at least 500 GB of SSD storage

c) *Security Constraints*
   - The system implements a Role-Based Access Control (RBAC) to restrict users' access to sensitive data according to their roles in the organization.
   - Certain sensitive members and financial data must be encrypted using AES-256 and secured with access protocols.

d) *Compatibility constraints*
   - The system can perform well across several operating systems such as Microsoft Windows, macOS, and Linux and various types of devices without further modifications on the system.

e) *Performance constraints*
   - Each user has a maximum response time of 3 seconds under normal load conditions which is crucial to maintain the user satisfaction of the system.
   - The system accommodates up to 500 user access and interactions through the system at one time without any performance degradation.
   - Major transactions such as the loan process would have a response time not more than 2 seconds.

3. Architectural Rationale

KADA Online System is based on a customized form of Model-View-Controller design pattern. Implementation utilizes tools compatible with Visual Studio Code. This methodology ensures that the system architecture is structured, maintainable, and scalable without being overly flexible or coupled to a specific framework such as Laravel.

Architecture Style and Rationale

- Authentication and Authorization
  Authentication and authorization mechanisms have been implemented with the integration of custom-built middleware and user session management. In Role-Based Access Control, this is achieved by assigning roles and permissions, which ensures that users access only those resources that their privileges will allow.

- Support for MVC Pattern
  Model-View-Controller architecture is a division of an application into three major components:
  - Model: Responsible for data and business logic, involving database operations.
  - View: It concerns the UI and presentation logic, ensuring data will be in good shape.
  - Controller: It stands between the model and view, gets input from the user, and executes on the model or view.
  Both of these are part of one concern that is separated. Such separation makes maintenance easier, allows for modular development, and enhances system scalability.

- Security and Data Protection
  The system contains the following powerful security features:
  SQL injection protection by using prepared statements and parameterized queries.
  CSRF protection implementation by using custom tokens.
  Data of the users is stored securely by using different encryption algorithms.

Session handling is done with secure cookies to avoid unauthorized access.

- Cross-Browser Compatibility

The various components of the system's front-end have been tested to be compatible on all major web browsers, including Google Chrome, Mozilla Firefox, and Microsoft Edge. Responsive design techniques ensure a consistent user experience on various devices and screen sizes.

- Scalability and Extensibility

  The system should be modularly built in a way that scaling is easy when more users are added by query optimization and caching. Adding features and modules can also be extended without affecting the rest of the feature areas.

- Active Development Ecosystem

  Using such a widely adopted editor as Visual Studio Code means there is an extensive ecosystem of extensions, plugins, and tools to boost productivity. Integrated debugging, version control support, and third-party libraries are some of the resources that will speed up general development and debugging.

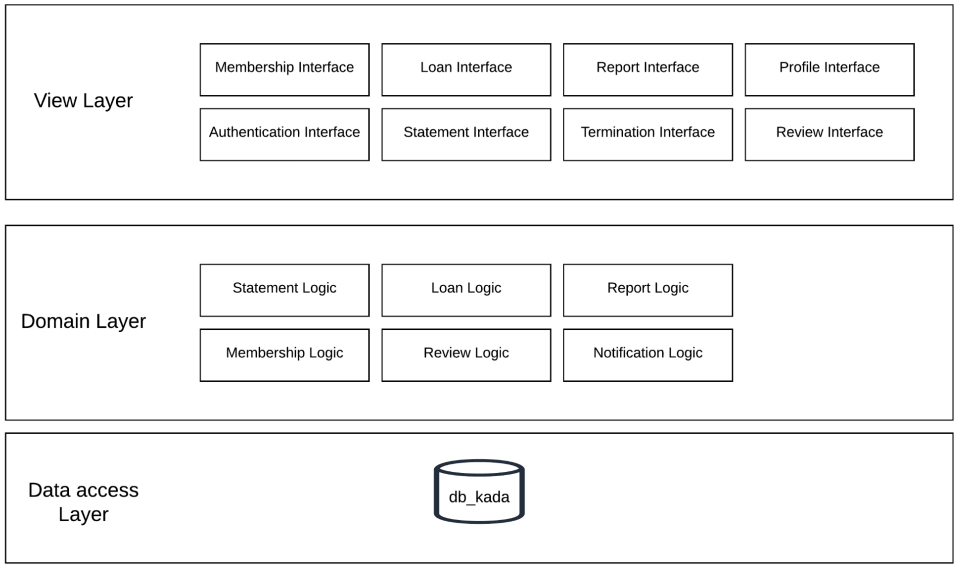


Figure 3.1: Architectural Layered for KADA Cooperative System

Conclusion

The use of a custom implementation of the MVC pattern in this project means that the KADA Online System is bound to meet particular project requirements, leaving room for flexibility. This approach ensures strong security, cleanliness in code organization, and scalability; hence, the system is able to adapt to future needs efficiently.

4. Architectural Views

This chapter describes the architectural views of the system based on the Laravel framework which use the Model-Controller-View framework as the basic architecture. The views consist of Model view, View, Controller view, Interaction view and Deployment view as shown in Figure 4.1 to further explain the architectural view of MVC framework. Each view is described in detail in table 4.1.

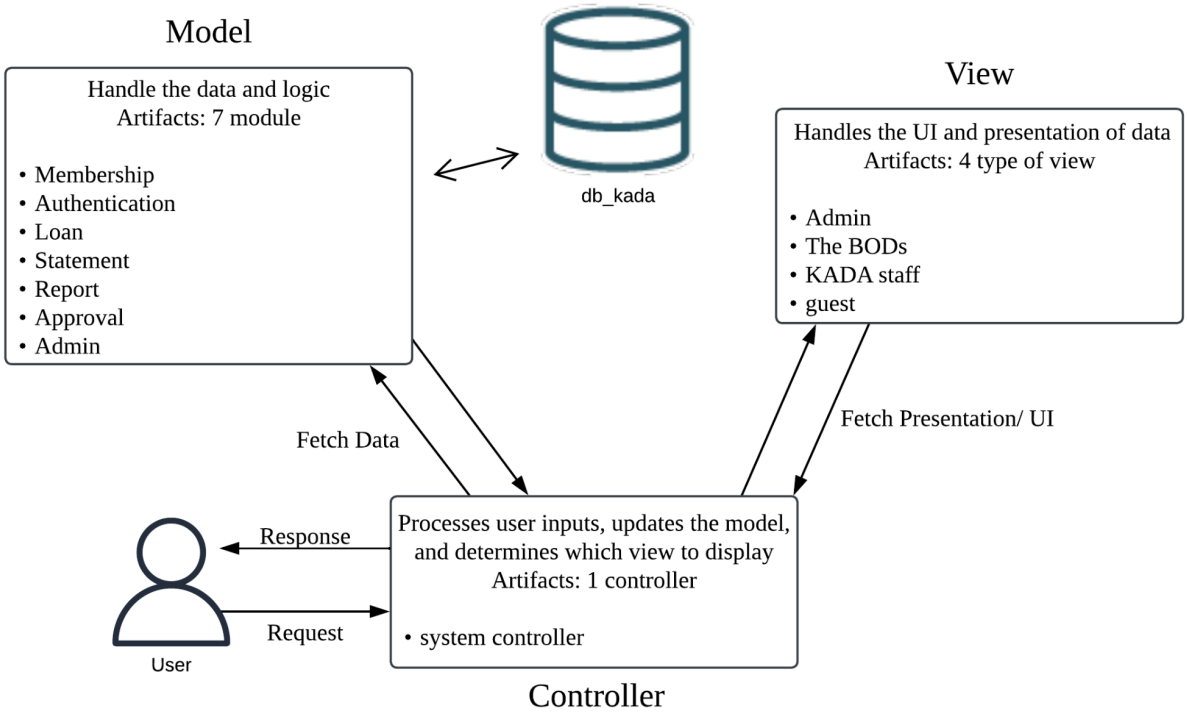


Figure 4.1: Architectural Views

Table 4.1: Views description and diagram used

Architectural Views	Description	Diagrams used
Use Case View	Defining interactions between KADA staff, admin, The BOD's and the system.	Use Case Diagram
Logical View	Represents the system's structure, focusing on the business logic such as membership and loan and interactions between them and data.	Class Diagram
Process View	Describes the system's process execution flow, interactions	Sequence Diagram

	between model, view and controller.	
Development View	Represents the organization of KADA Cooperative System components and their dependencies on model, view and controller components.	Component Diagram Package Diagram
Physical/Deployment View	Illustrates how KADA Cooperative System components are deployed on server side and storage management.	Deployment Diagram

4.1 Use Case View

The use case diagram for the KADA Cooperative System illustrates the interactions between different user roles which are KADA Staff, KADA Cooperative's Board of Directors (BOD) and KADA Cooperative Administrator. The use case also includes the various modules like membership, authentication, loan, approval, statement, report and admin module. KADA Staff members can apply for a membership, then they can access the authentication after being a cooperative member, apply for loan, view financial statements and terminate the membership. The KADA Cooperative Administrator oversees and accesses the user authentication, reviews the applications, manages members and handles the financial reports including viewing and managing the financial statements. The Board of Directors focuses on reviewing applications and also has access to authentication and view the financial reports. Each user interacts with specific system modules to ensure a clear system operation through each module. Figure 4.1 shows the detail of use case diagram that can helps to maintain the system security, efficiency and proper management of KADA Cooperative System.

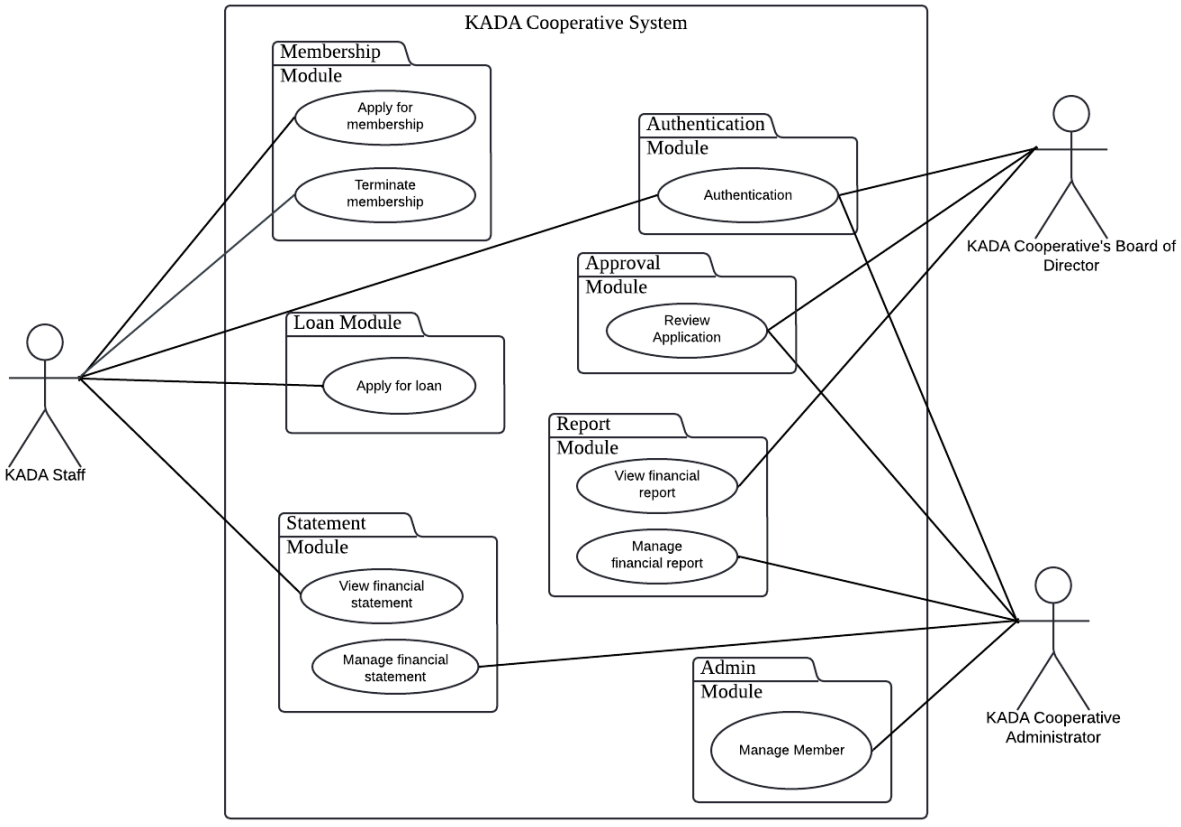


Figure 4.1: Use Case for KADA Cooperative System

4.2 Logical View

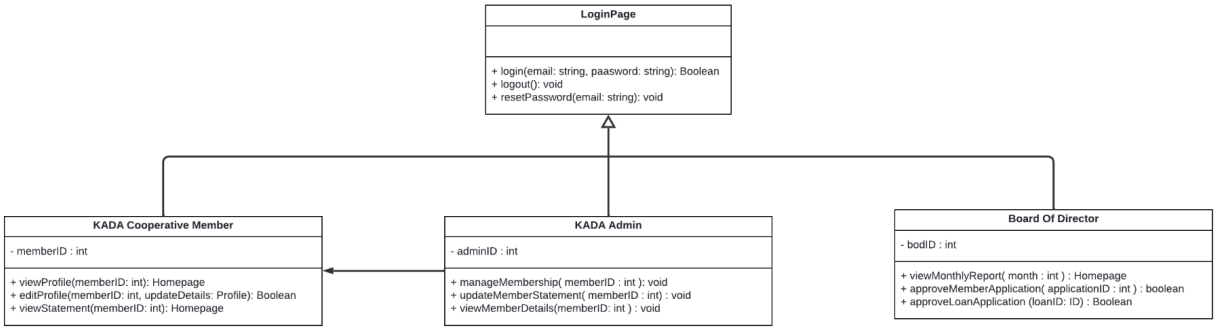


Figure 4.2.1: Class diagram for <Authentication> Subsystem

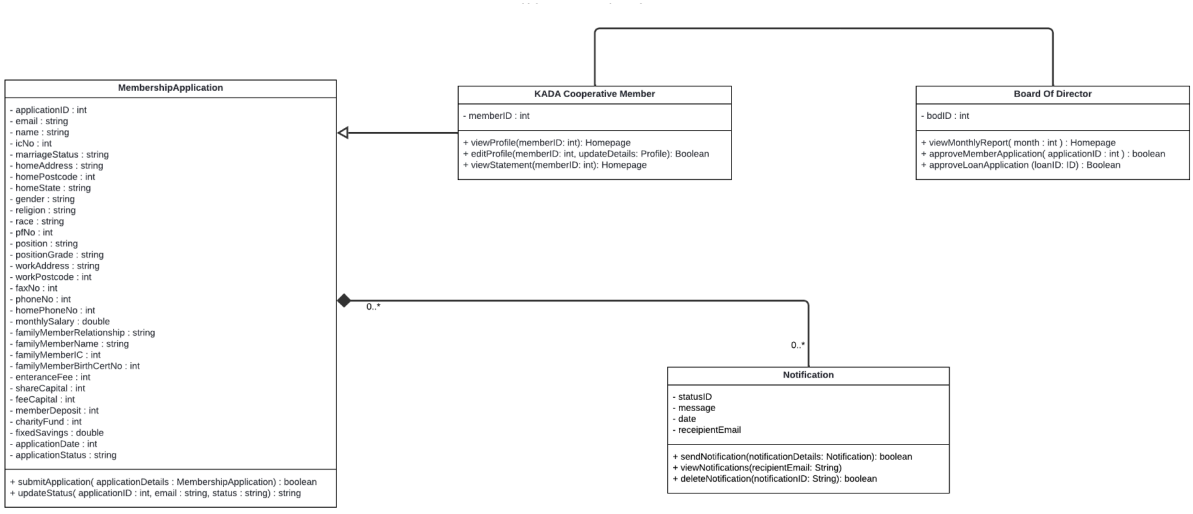


Figure 4.2.2: Class Diagram for <Apply For Membership> Subsystem

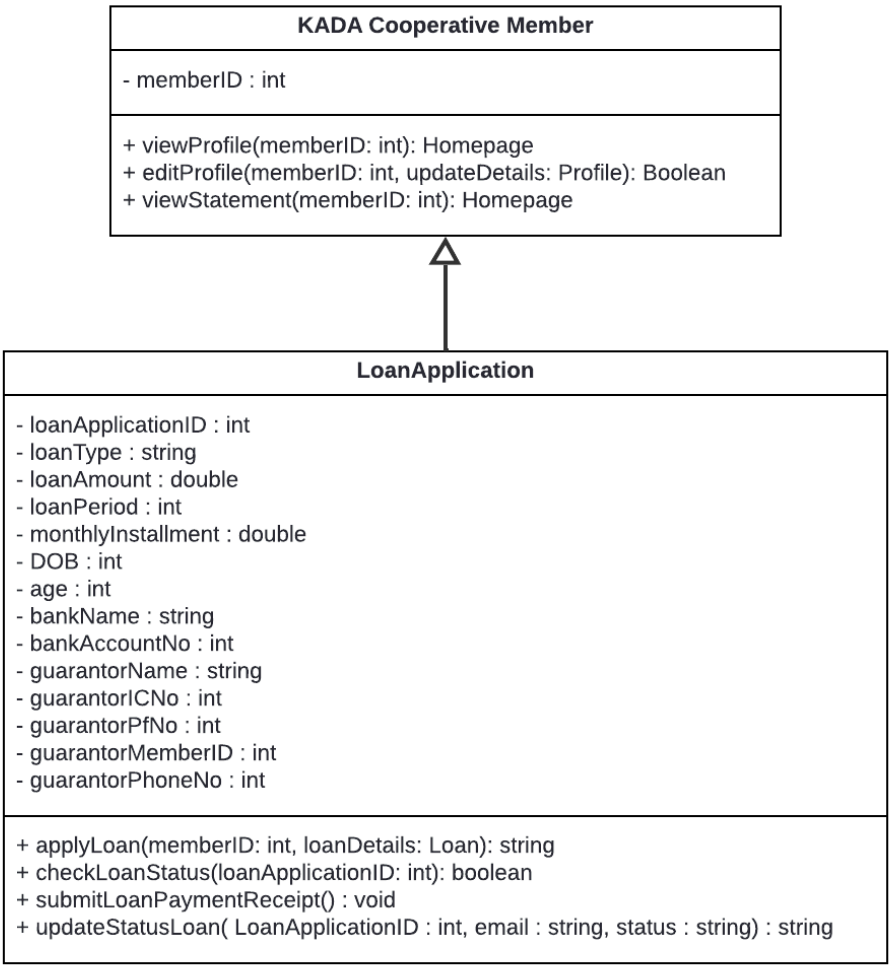


Figure 4.2.3: Class Diagram for <Apply For Loan> Subsystem

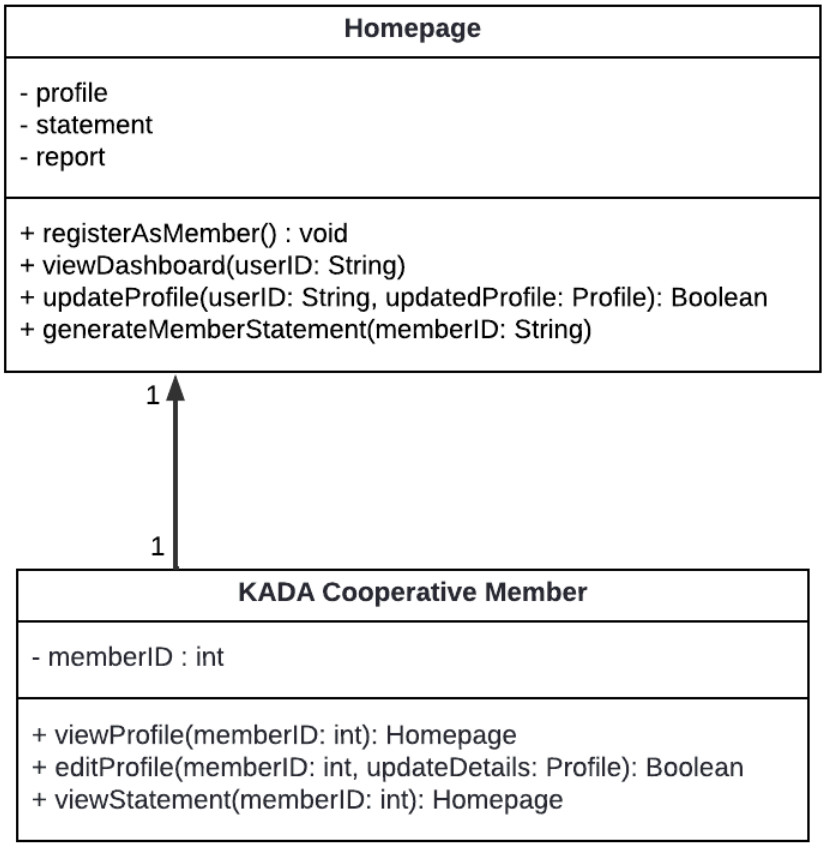


Figure 4.2.4: Class Diagram for <Manage Financial Statement> Subsystem

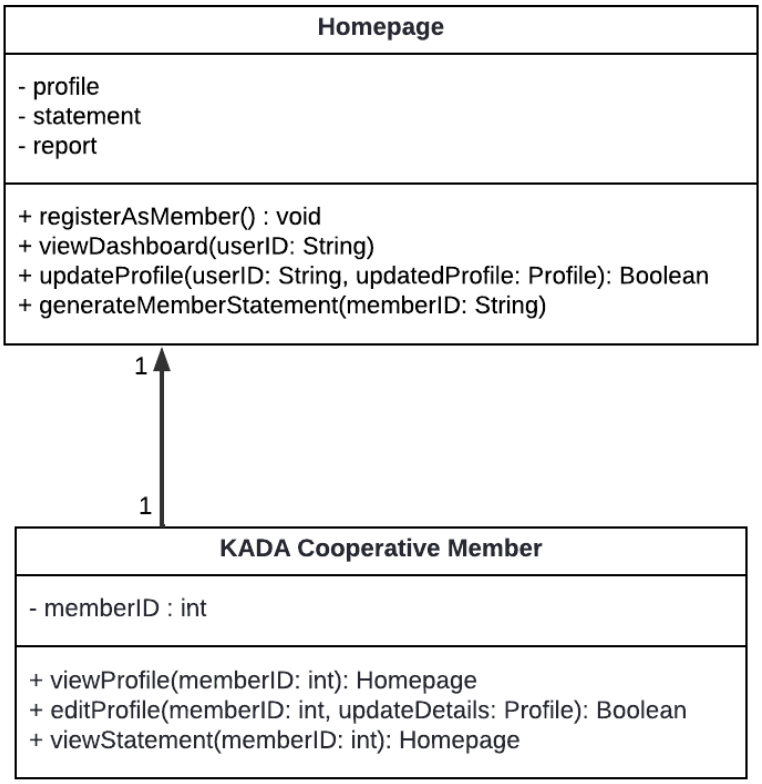


Figure 4.2.5: Class Diagram for <View Financial Statement> Subsystem

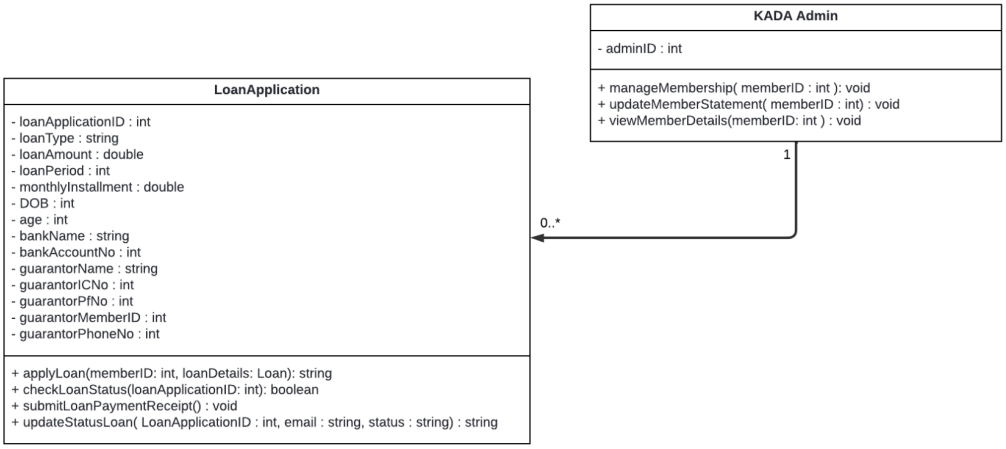


Figure 4.2.6: Class Diagram for <Manage Financial Report> Subsystem

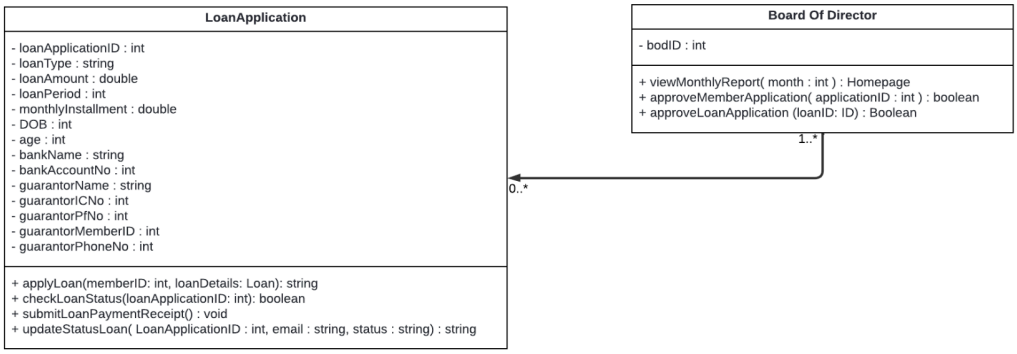


Figure 4.2.7: Class Diagram for <View Financial Report> Subsystem

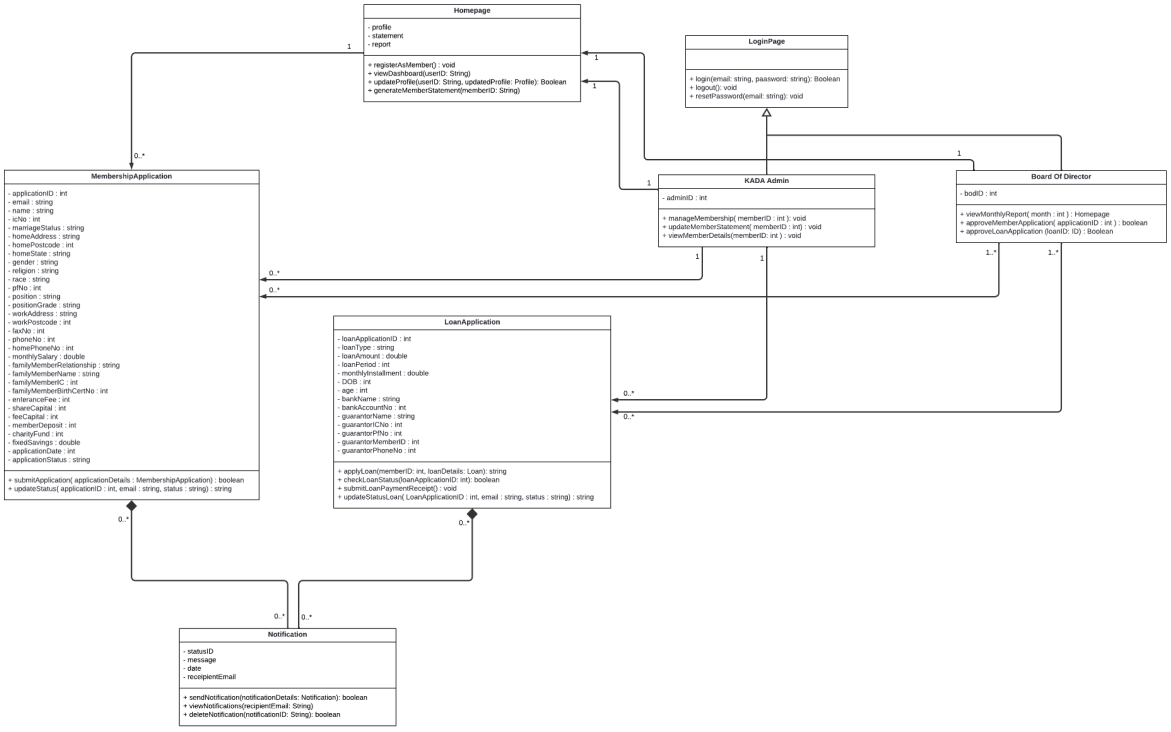


Figure 4.2.8: Class Diagram for <Manage Member> Subsystem

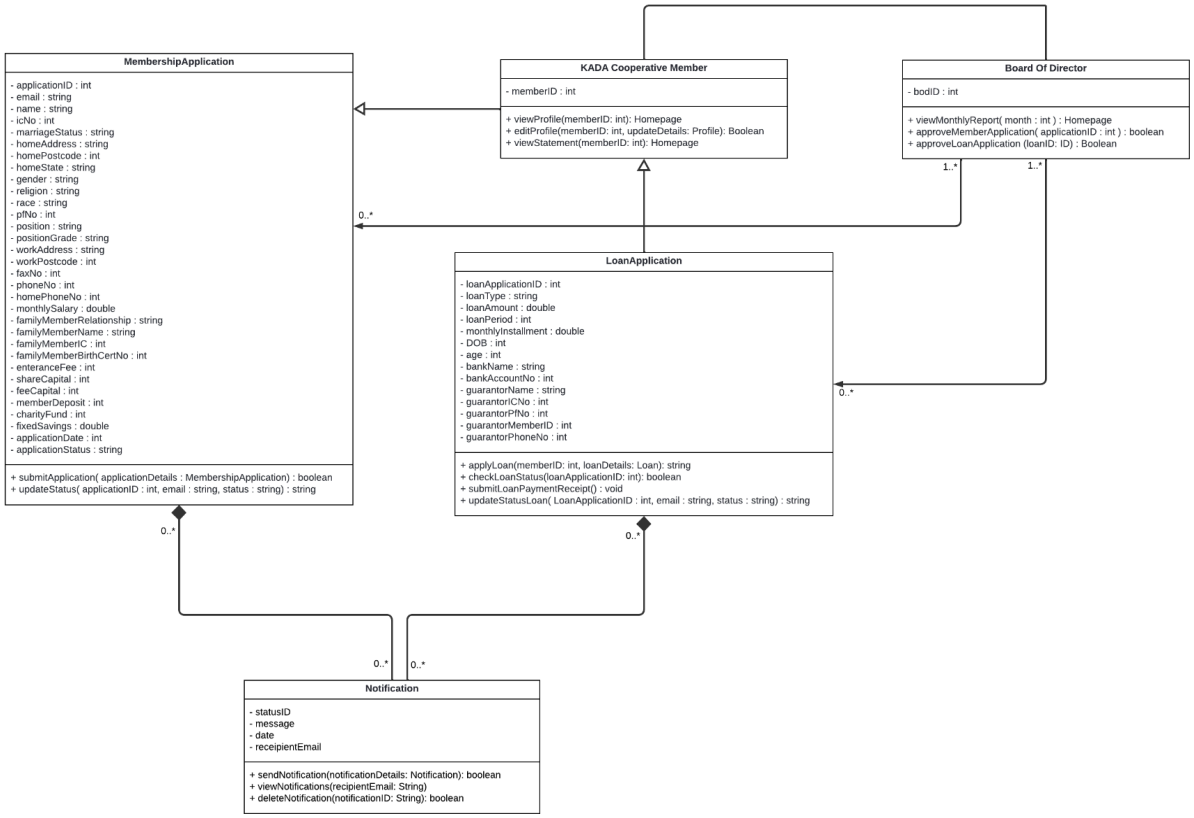


Figure 4.2.9: Class Diagram for <Review Application> Subsystem

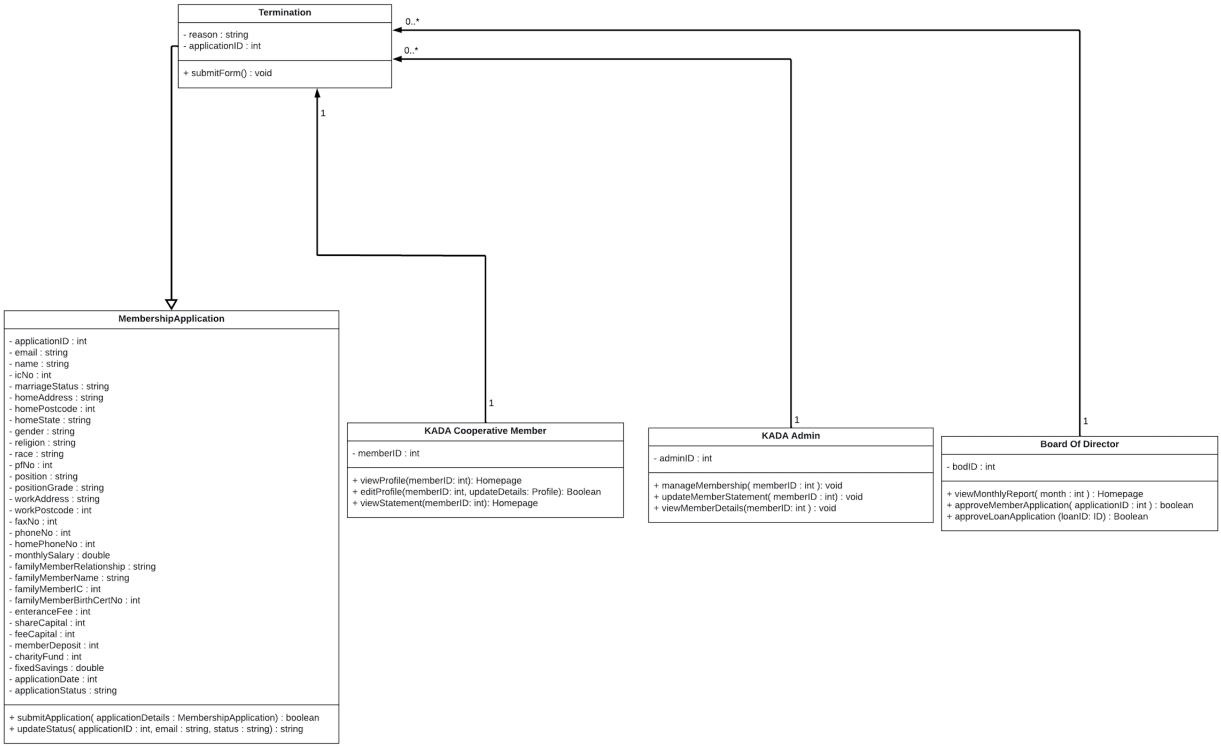


Figure 4.2.10: Class Diagram for <Terminate Membership> Subsystem

4.3 Process View

The interaction view for KADA Cooperative System can be represented effectively through a sequence diagram. This diagram visually illustrates the dynamic interaction between components within the Model-View-Controller(MVC) architecture to achieve the system's goals. Here's how the sequence diagram reflects the interaction view.

4.3.1 Authentication Process

Authentication process is to ensure the security of the system includes the login and forgot password process. The Controller will instruct the View to display the login for the user to insert information for the authentication process. While the Controller will give the Model to handle the data for the validation process with the data in the system. This data is sent to the Model for validation against the system's records. If the information is correct, the user is granted access, if not, an error message is displayed. Figure 4.3.1 represents the sequence diagram of authentication.

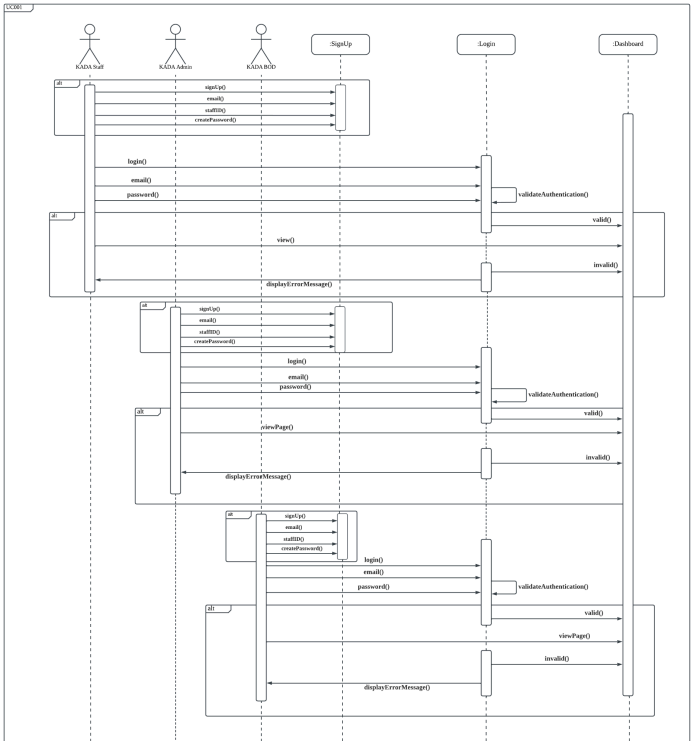


Figure 4.3.1: Sequence Diagram of Authentication

4.3.2 Member Registration Process

This process starts with the Controller instructing the View to display a registration form. The KADA Staff will enter their details, which the Controller sends to the Model for validation. If the information is valid and not a duplicate, the Model saves the data in the database and the KADA Staff sees a confirmation message. This process ensures secure and smooth member registration. Figure 4.3.2 represents the sequence diagram of member registration.

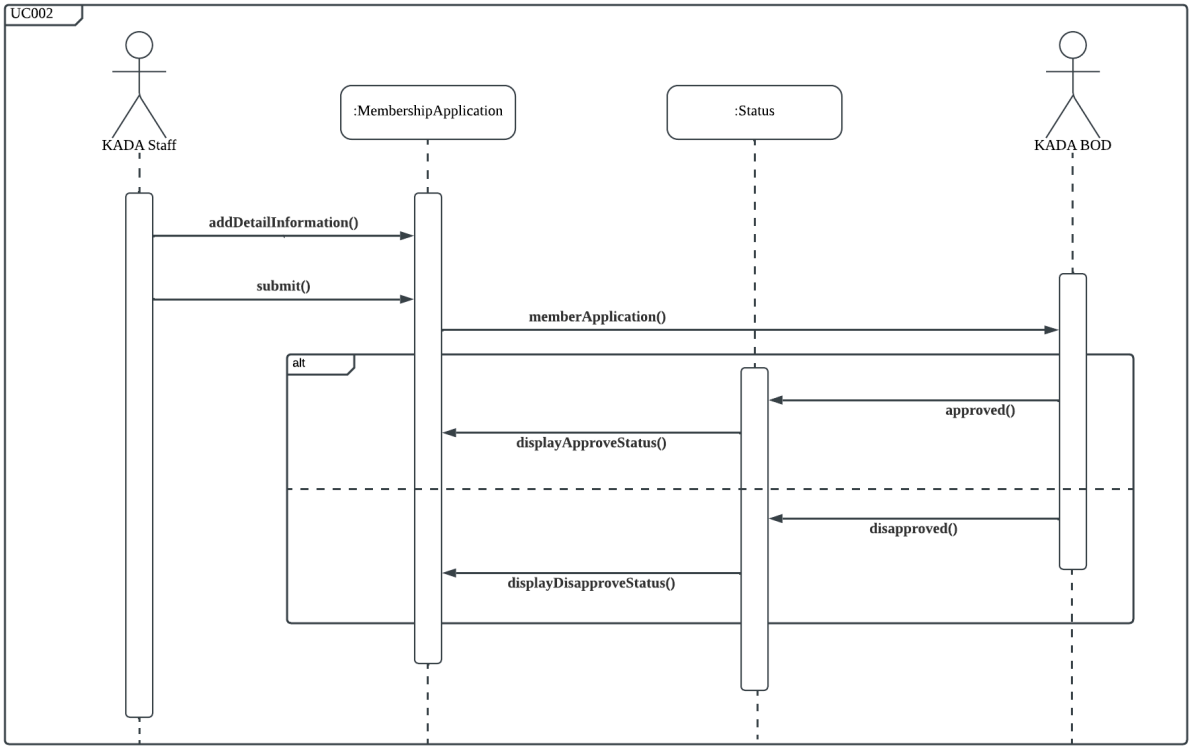


Figure 4.3.2: Sequence Diagram of Member Registration

4.3.3 Loan Application Process

It begins with the Controller instructing the View to display the loan application from. The KADA Staffs will fill in the required information, which the Controller sends to the Model for processing and eligibility checks. The Model verifies the user's data against the database. The Controller then updates the View to notify the user of the successful application. This process ensures an efficient and secure loan application process. Figure 4.3.3 shows the interaction view by sequence diagram of the loan application process.

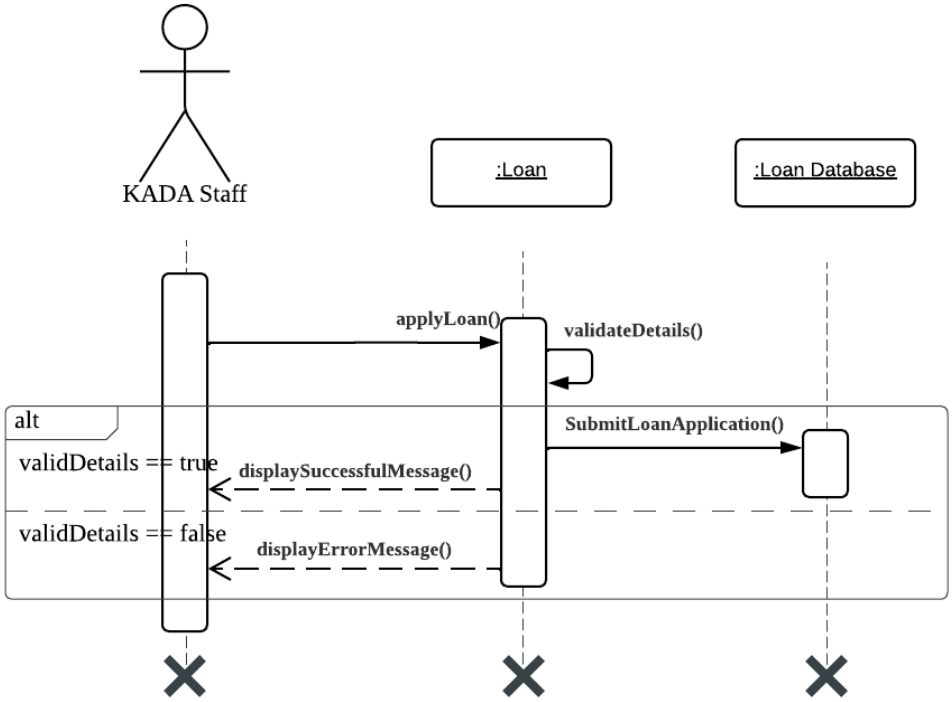


Figure 4.3.3: Sequence Diagram of Loan Application

4.3.4 Manage Financial Statement Process

The process of managing financial statements in the KADA Cooperative System starts with the Controller instructing the View to display the relevant interface for managing the financial statement. An Admin selects the desired action which is managing the financial statements. The Controller forwards this request to the Model, which retrieves the financial data from the database. Then, the processed information is returned to the Controller, which updates the View to display the financial statements or confirm successful updates. This process ensures accurate and efficient financial statement management. Figure 4.3.4 represents the sequence diagram of a managed financial statement.

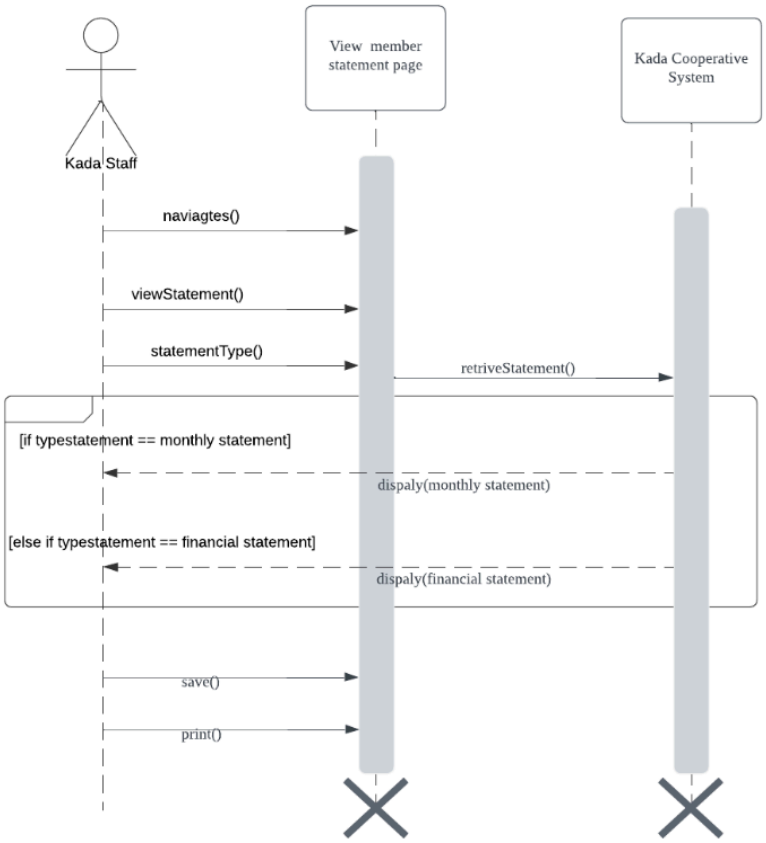


Figure 4.3.4: Sequence Diagram for Manage Financial Statement

4.3.5 View Financial Statement Process

The process of viewing financial statements in the KADA Cooperative System starts when the Controller instructs the View which is the member statement page to display the financial statement interface. KADA Staff selects the option to view and the Controller sends a request to the Model to fetch the required information. The Model retrieves the financial data from the database and returns it to the Controller. The Controller then updates the View to display the financial statements to the KADA Staff. Then, the Controller updates the member page view to display the financial statement to the KADA Staff. This process ensures that users can ensure and efficiently view. Figure 4.3.5 represents the sequence diagram for viewing financial statement processing.

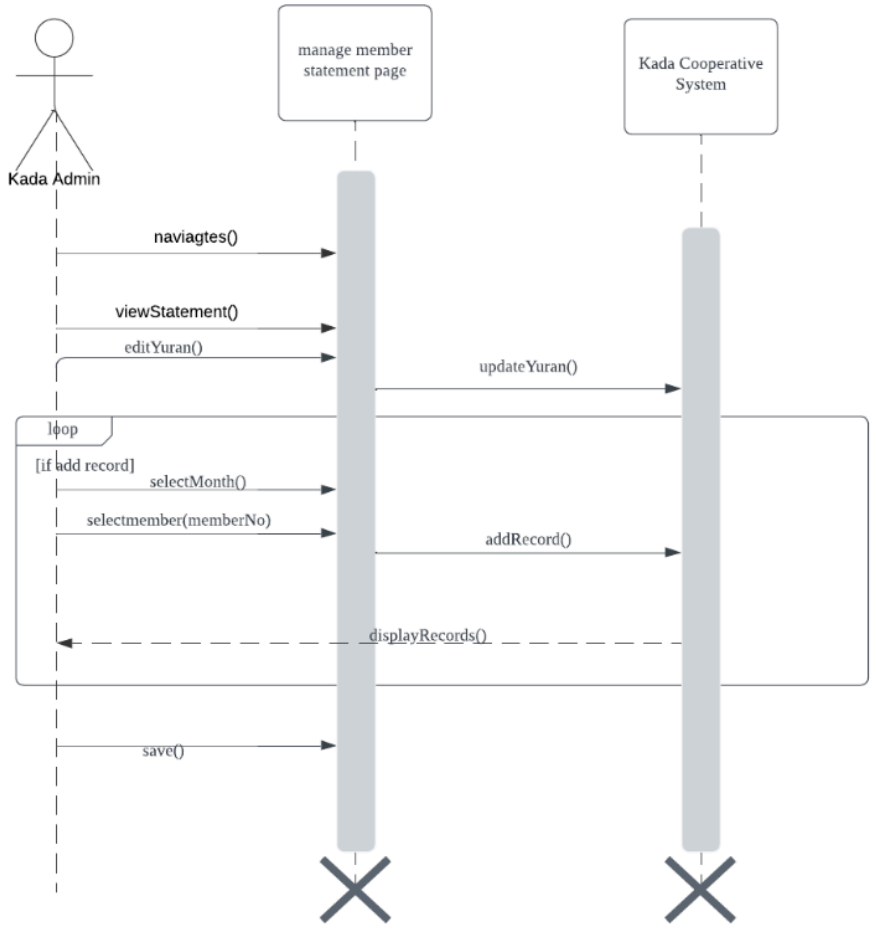


Figure 4.3.5: Sequence Diagram for View Financial Statement

4.3.6 Manage Financial Report Process

The process of managing financial reports in KADA Cooperative System starts with the Controller instructing the View to display the financial report interface. The Admin performs actions such as adding, editing and deleting the financial reports. These requests are sent to the Controller and then forwarded to the Model for processing. The Model validates the request and updates the database accordingly. Once the operation is completed, the Controller updates the View to display a confirmation message or the updated report. If there are issues, an error message will be shown. This process ensures that the system management is accurate and efficient. Figure 4.3.6 shows the sequence diagram of the managed financial report process.

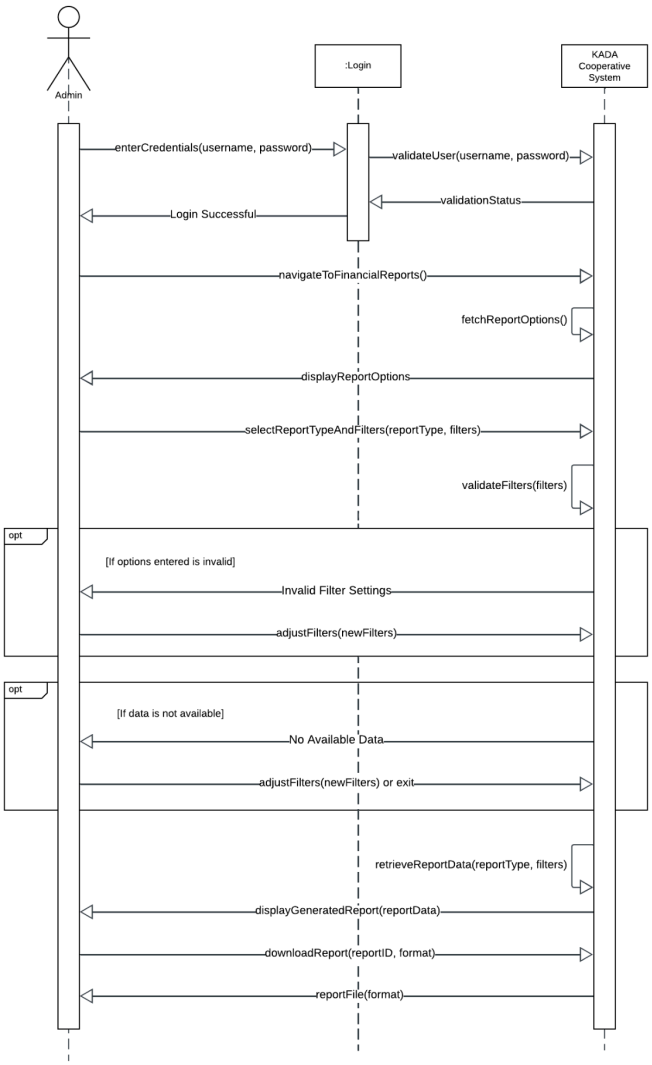


Figure 4.3.6: Sequence Diagram for Manage Financial Report

4.3.7 View Financial Report Process

The process of viewing financial reports in the KADA Cooperative System begins with the Controller instructing the View to display the financial report interface. The BOD selects the option to view a specific financial report and the Controller sends a request to the Model to retrieve the necessary information. The Model fetches the financial data from the database and returns it to the Controller. Then, the Controller updates the View to present the financial report to the BOD. If there are issues, an error message will be displayed. This process ensures BOD can securely view the financial report. Figure 4.3.7 displays the sequence diagram of the view financial report process.

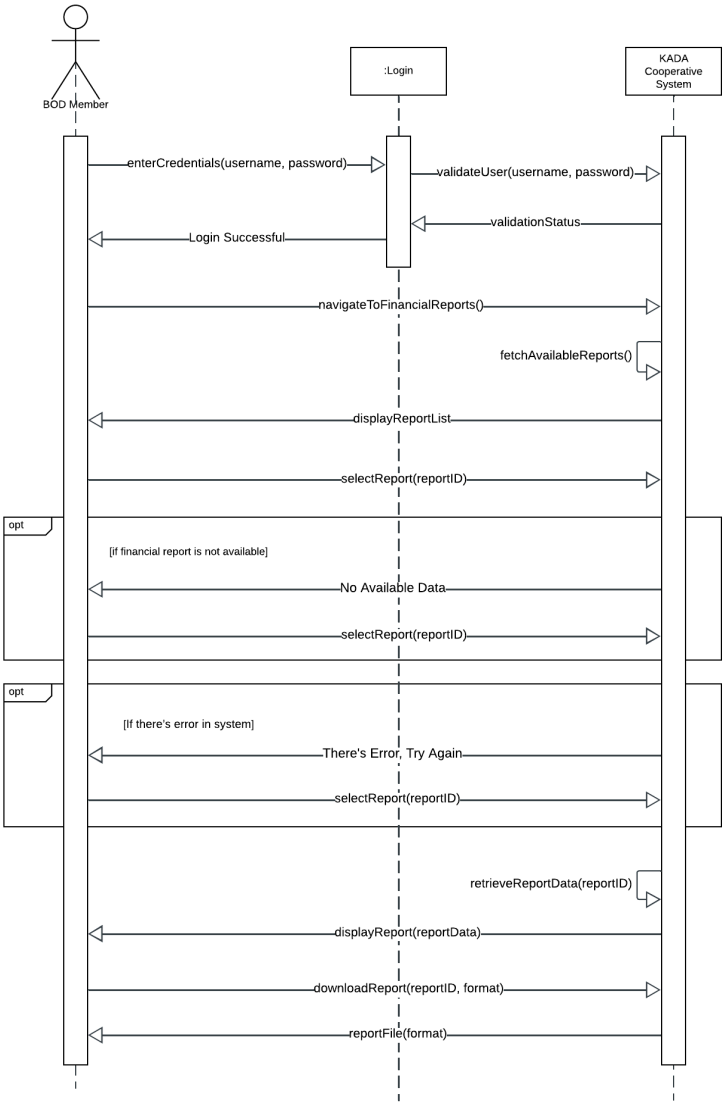


Figure 4.3.7: Sequence Diagram for View Financial Report

4.3.8 Manage Member Process

This process in the KADA Cooperative System allows Admin to handle tasks like manage application, updates, approvals and report generation. The process begins with the Controller processes the Admin's actions and coordinates the flow of data, sending the requests to Model for validation and database updates. The Model validates the credentials and retrieves the data, manages the applications and generates reports. Once the Model completes the operation, the Controller updates the View to display the results. If there are issues, the system will show an error message to the Admin. This interaction ensures secure and accurate management of member tasks. Figure 4.3.8 represents the sequence diagram for managing member processes.

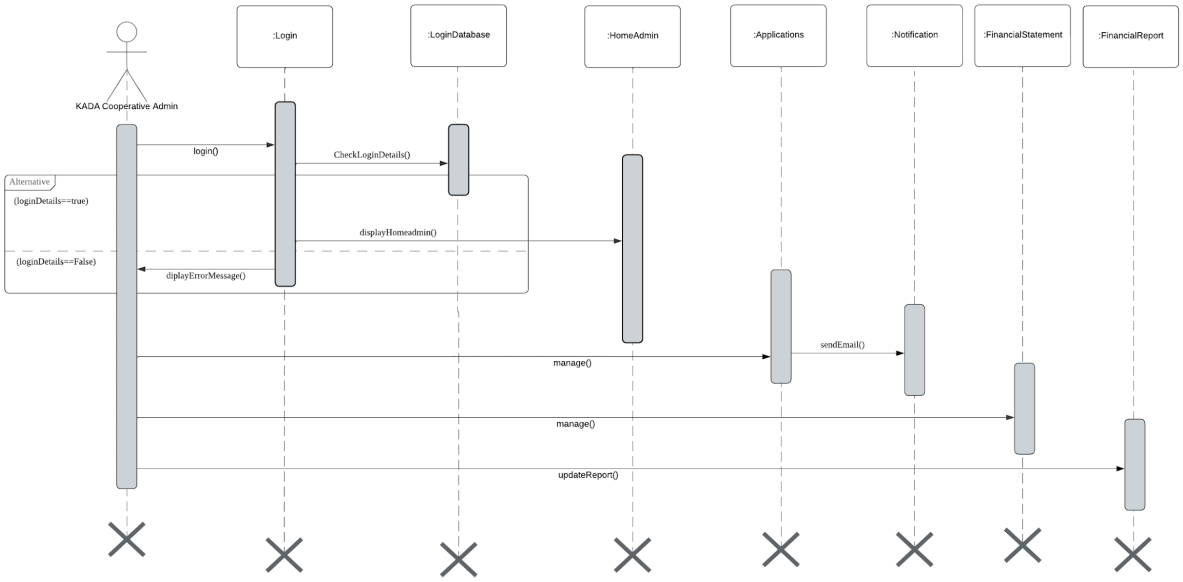


Figure 4.3.8: Sequence Diagram for Manage Member

4.3.9 Review Application Process

In the review application process for KADA Cooperative System, the View allows the BOD to access and review applications and if they want to approve or reject the applications. The Controller processes the BOD's actions by interacting with the Model. The Model retrieves application information from the database and the View displays the detailed information of each application. This approach ensures efficient and secure application management. Figure 4.3.9 shows the sequence diagram of the review application process.

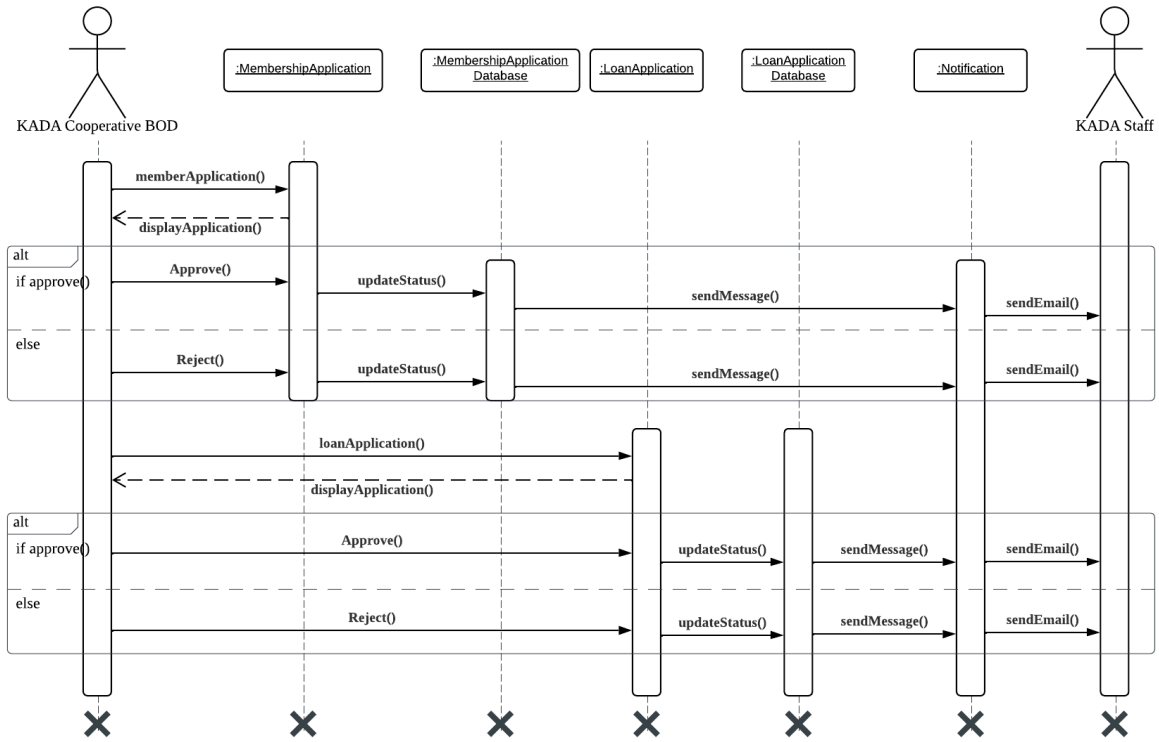
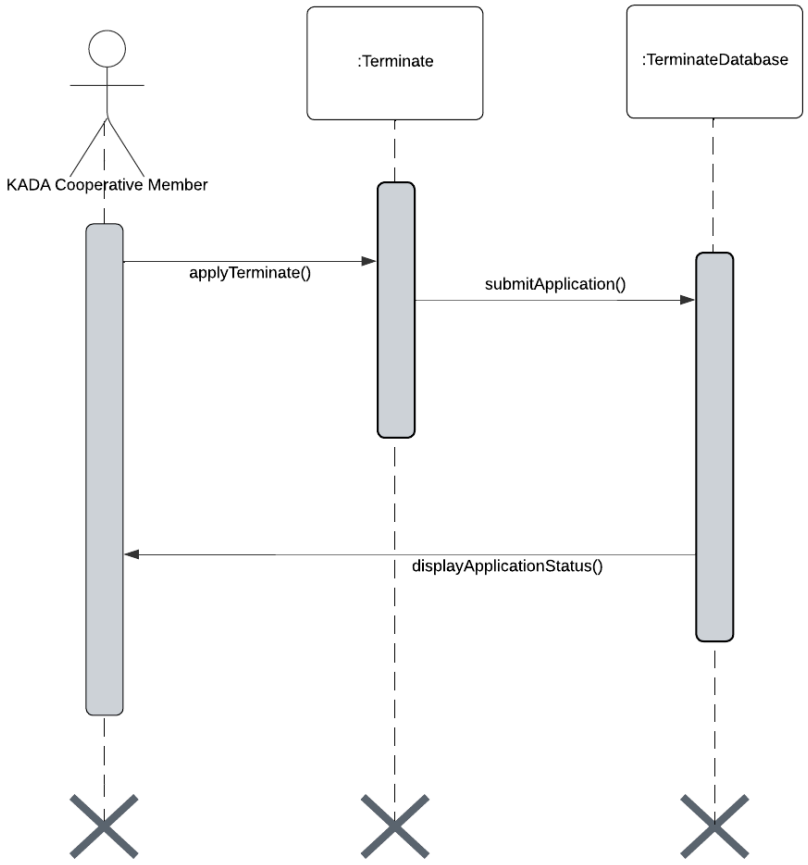


Figure 4.3.9: Sequence Diagram for Review Application

4.3.10 Terminate Membership Process

In the terminate application process, the View allows KADA Cooperative Members to submit a termination request through a form. The Controller processes this request by sending it to the Model, which handles the data and submits the application to the database. Once the status of the termination request has been updated, the Model retrieves the status and send it backs to the Controller and it will update the View to display the application status to the member.The detailed structure is shown as Figure 4.3.10 to ensure a smooth and clear termination process.



4.3.10: Sequence Diagram for Terminate Membership

4.4 Development View

The Figure 4.4.1 illustrates the modular structure of the KADA Cooperative System, showing how different system components interact. Each module represents a key functional area of the system, with individual components handling specific tasks.

1. Authentication Module
    - Handles user authentication and login process.
    - Ensures secure access control for different user roles.
2. Membership Module
    - Manages new member applications (apply membership) and member termination requests (apply termination).
    - Connected to the Approval Module, where membership applications are reviewed.
3. Admin Module
    - Includes member management functionalities.
    - Allows administrators to handle user information and system configurations.
4. Loan Module
    - Provides functionality for users to apply for loans and check loan application status.
    - Integrated with the Approval Module, where loan requests are reviewed.
5. Approval Module
    - Manages approval workflows for membership applications, loan applications, and termination requests.
    - Used by admins and the board of directors to accept or reject applications.
6. Statement Module
    - Handles financial transactions and allows users to view their financial statements.
    - Ensures users have access to their financial data.
7. Admin Module
    - Handle member management and allow users to change their personal information.
    - Used by admin to change any personal information.

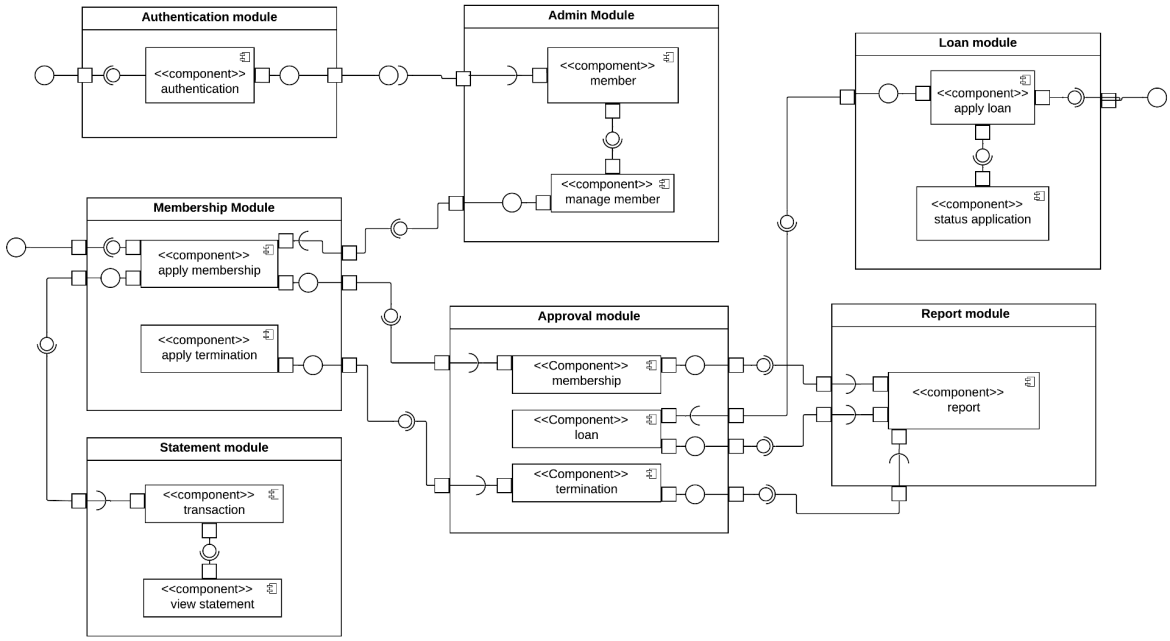


Figure 4.4.1: Component Diagram of KADA Cooperative System

Figure 4.4.2 is the package diagram for the KADA Cooperative System organizes the system into distinct modules to ensure modularity and maintainability. The Authentication Module manages user authentication, while the Membership Module handles registration and termination requests. The Loan Module allows users to apply for loans and track application statuses, and the Approval Module enables the admin and board members to review and approve applications. The Statement Module provides users with financial statements, while the Report Module generates system and financial reports. Lastly, the Admin Module manages members and overall system administration. These interconnected packages ensure a structured and efficient system workflow.

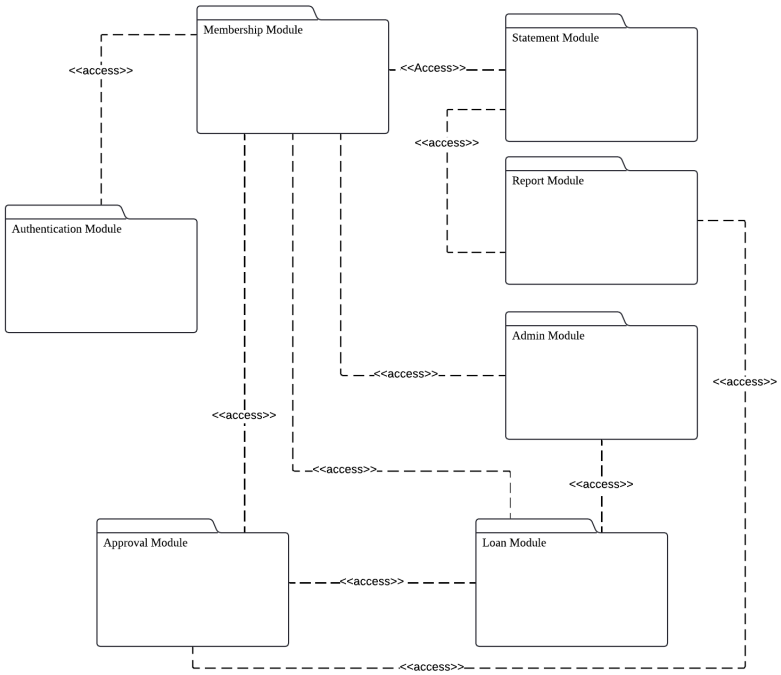


Figure 4.4.2: Package Diagram for KADA Cooperative System

Figure 4.4.3 illustrates the structure and organization of the module authentication within the system. The model layer handles the data and logic process for data retrieval from components such as the login, savePassword, register and updateMembership. In the view layer, which manages the presentation and provides the user the interface needed for login, resetPassword and register component. The controller layer will be interacting with the user to process user input, update the model and choose which view to display.

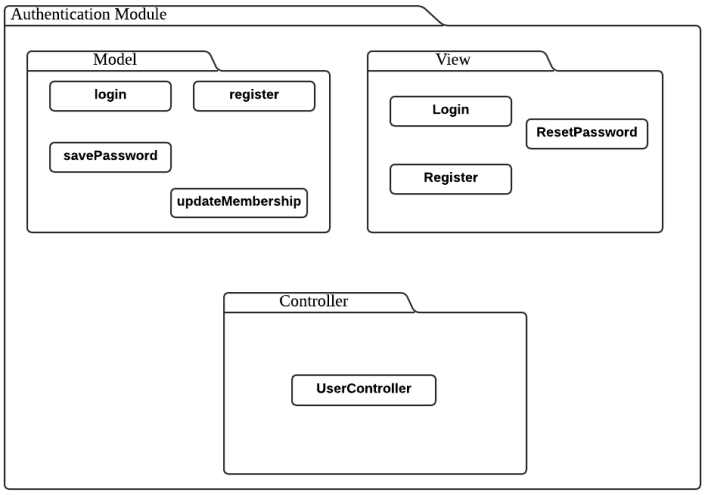


Figure 4.4.3: Package Diagram for Authentication Module

Figure 4.4.4 illustrates the structure and organization of the Membership module within the system. The Model Layer is responsible for handling data processing and business logic, managing components such as checkEligibility, MemberRegister, MemberDetails, and MemberResign, which facilitate the membership registration process into the system. The View Layer manages the user interface, ensuring a seamless user experience through components like homeMember, applyMember, and member_resign, which support membership application or membership termination process. Finally, the Controller Layer serves as the intermediary between users and the system, processing user inputs, updating the model, and determining the appropriate views to display. This modular structure ensures separation of concerns, enhancing maintainability and scalability within the system.

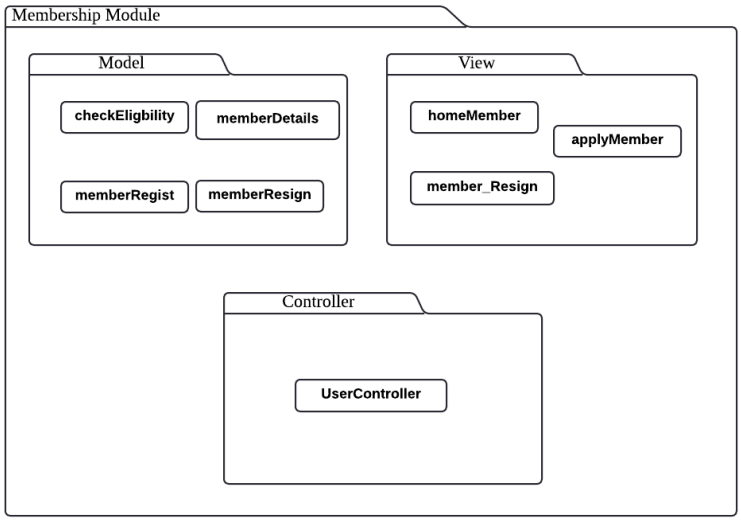


Figure 4.4.4: Package Diagram for Membership Module

Figure 4.4.5 illustrates the structure and organization of the Loan module within the system. The model layer is managing the data updates and retrieval process from the loanRate, createLoan, statusLoan and financialDetail component to ensure a smooth loan application process. The view layer provides the user the interface for the loan application process from the loanMember, loanStatus and loan component. The controller acts as the domain layer where it controls the processing of user input, updates data to the model and selects the view the need to display to the user.

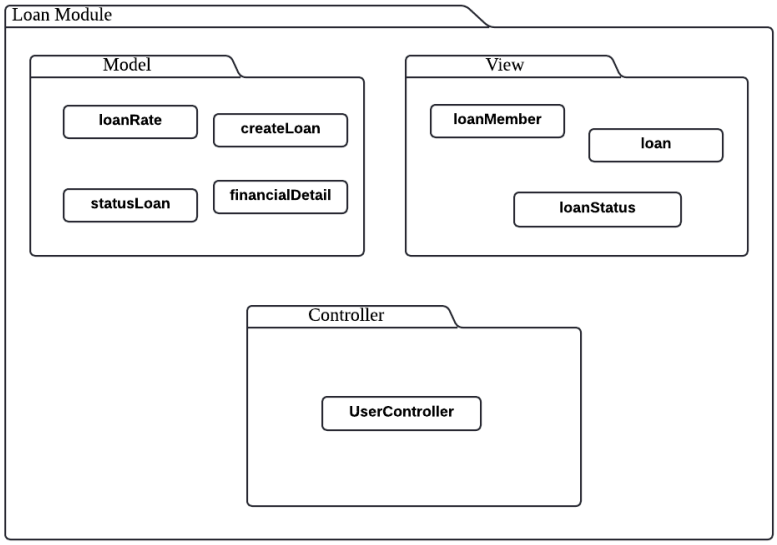


Figure 4.4.5: Package Diagram for Loan Module

Figure 4.4.6 illustrates the structure and organization of the Approval module within the system. The model layer is managing the data updates process to the approveMember, rejectMember, approveLoan, rejectLoan, approveTerminate, and rejectTerminate components to ensure a smooth application reviewal process. The view layer provides the user the interface for loan application using listLoan, membership application using listMember, and termination application using listBerhenti. The controller acts as the domain layer where it controls the processing of user input, updates data to the model and selects the view the need to display to the user.

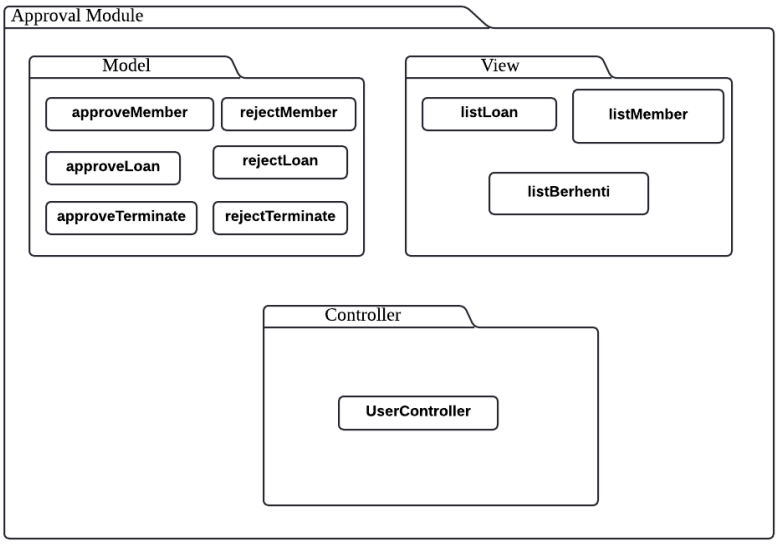


Figure 4.4.6: Package Diagram for Approval Module

Figure 4.4.7 illustrates the structure and organization of the Statement module within the system. The model layer is managing the data updates and retrieval process to the financialDetails, monthlyRecord, sahamDetail and recordFee components to ensure a smooth statement updates process. The view layer provides the user the interface to view financial statements using components such as financialStatus, monthlyStatement and showStatement. The controller acts as the domain layer where it interacts with users, updates and fetches data from the model and selects the view the need to display to the user.

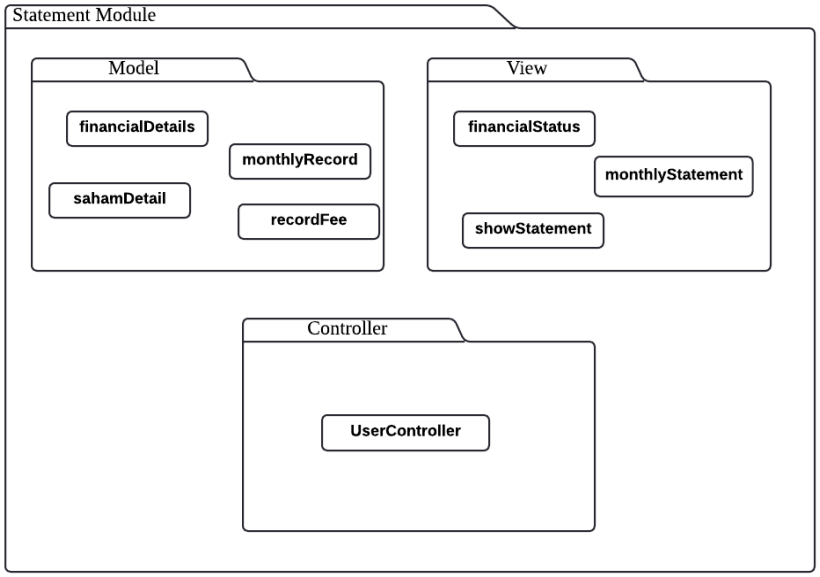


Figure 4.4.7: Package Diagram for Statement Module

Figure 4.4.8 illustrates the structure and organization of the Report module within the system. The model layer is managing the data retrieval process from the rumusan, statistic and laporan components to ensure a smooth report updates and creation process. The view layer provides the user the interface to view financial reports and statistics using components such as rumusanAdmin, statisticAdmin and laporanAdmin. The controller acts as the domain layer where it interacts with users, processing user input, fetches data from the model and selects the view the need to display to the user.

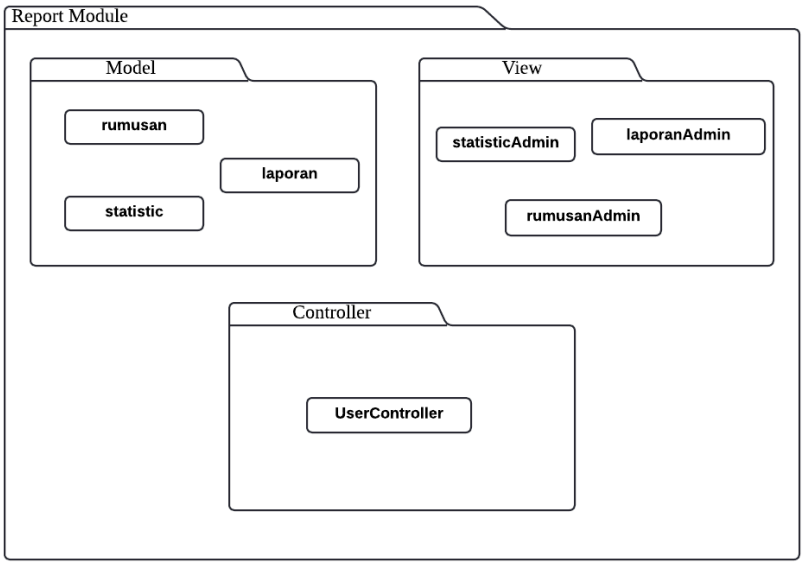


Figure 4.4.8: Package Diagram for Report Module

Figure 4.4.9 illustrates the structure and organization of the Admin module within the system. The model layer is managing the data updates process from the adminProfile and updateStatus components to ensure a smooth member management process. The view layer provides the user the interface to view member's data and provides the interactive interface to manage members using components such as homeAdmin, applyAdmin, loanAdmin, memberDisplay. The controller acts as the domain layer where it interacts with users, processing user input, updating and fetches data from the model and selects the view the need to display to the user.

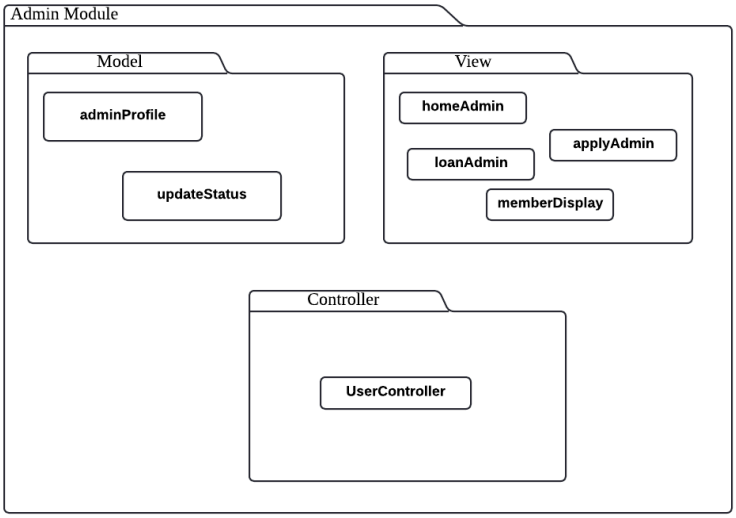


Figure 4.4.9: Package Diagram for Admin Module

4.5 Physical/ Deployment View

The associated deployment diagram shows the architecture of the KADA system and interaction between its components. The Client (Browser) is a user interface to which a listener is connected securely by Server via HTTPS/TLS. The Server dealing with user requests consists of an Internet Server and an Application Server, manages business logic. To retrieve and save data, it establishes a connection with the Database System (MySQL Database) via DB Connection. This configuration guarantees efficient communication, modularity along with a clear separation of duties so that the whole system can also be scaled properly for management.

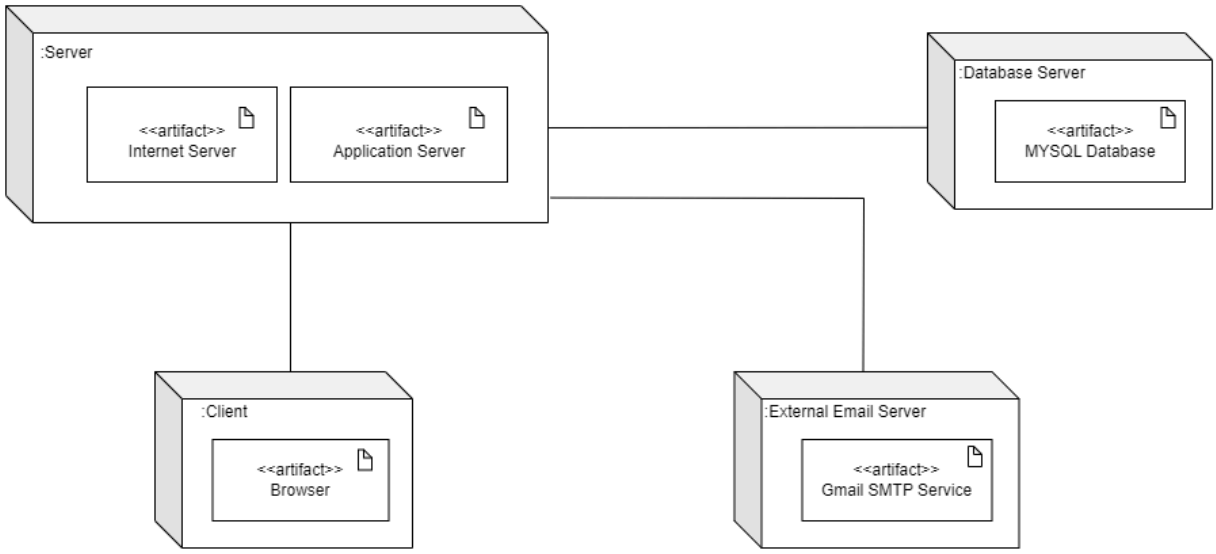


Figure 4.5: Deployment diagram for Internet-based System

5. Data Design

The major data or systems entities are stored into a relational database named as User, BoardOfDirector, KADAAdmin, KADAStaff, NonMember, Member, Membership, FamilyInfo, Loan, Guarantor, Notifications and Stock processed and organized into 12 entities as listed in Table 5.1.

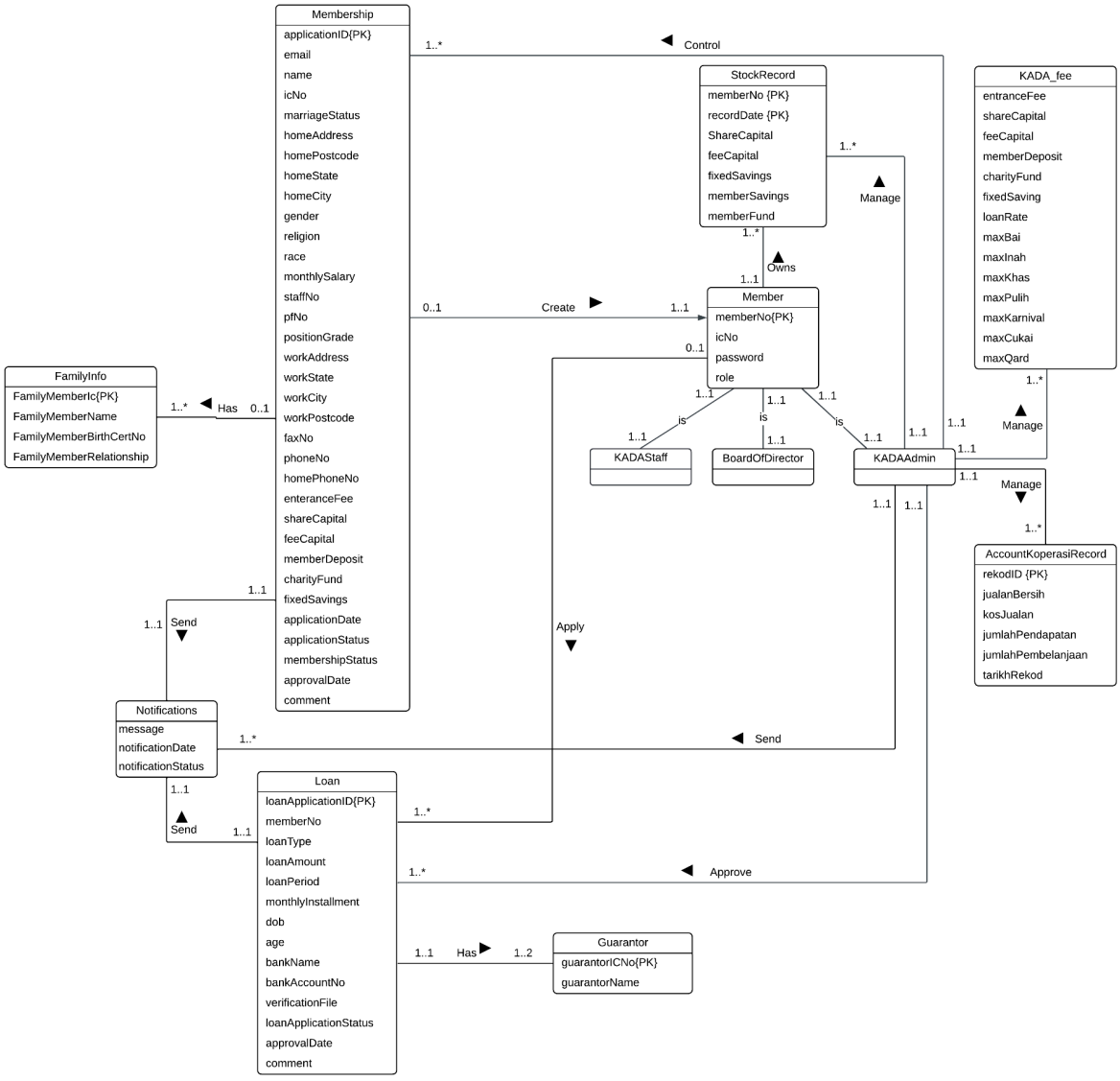


Figure 5.1: Logical ERD of the system

Table 5.1: Description of Entities in the Database

No.	Entity Name	Description
1.	AccountKoperasi	This entity will hold the data of the cooperative main account.
2.	Family_Info	This entity will hold the data of the family information for the membership applications.
3.	Guarantor	This entity will hold the data of the guarantors for the loan applications.
4.	KADA_fee	This entity will hold the data of the maximum or minimum value needed for membership and loan application.
5.	Loan	This entity will hold the data of the loan applications.
6.	Member	This entity will hold the data for the cooperative member.
7.	Membership	This entity will hold the data of the membership applications.
8.	Notification	This entity will hold the data of the notification status and detail for each application.
9.	Stock_Record	This entity will hold the data of the stocks for the cooperative member.

5.1 Data Dictionary

5.1.1 Entity: <AccountKoperasi>

Table 5.1.1: Description of AccountKoperasi Entity

Attribute Name	Type	Description
rekodID	Big Integer (20 characters)	Unique ID for every AccountKoperasi record
jualanBersih	Decimal (12 characters, 2 decimal point)	Total selling of the company
kosJualan	Decimal (12 characters, 2 decimal point)	Total cost of the the company
jumlahPendapatan	Decimal (12 characters, 2 decimal point)	Total income of the company
jumlahPembelanjaan	Decimal (12 characters, 2 decimal point)	Total spend of the company
tarikhRakod	Date	Record date
adminNo	Integer (11 characters)	Foreign key for the admin references Member

5.1.2 Entity: <Family_Info>

Table 5.1.2: Description of Family_Info Entity

Attribute Name	Type	Description
icNo	Big Integer (20 characters)	Uniquely identify family member
name	100 Variable characters	Name of family member
birthCertNo	100 Variable characters (NULLABLE)	Birth Certificate Number of family member
relationship	100 Variable characters	Relationship between family member and applicant(member)
applicationID	Big Integer (20 characters)	Foreign key for the applicationID references Membership_Notif

5.1.3 Entity: <Guarantor>

Table 5.1.3: Description of Guarantor Entity

Attribute Name	Type	Description
guarantorICNo	Big Integer (20 characters)	Uniquely identify a guarantor
guarantorName	255 Variable characters	Name of the guarantor

loanApplicationID	Big Integer (20 characters)	Uniquely identify loan application of the guarantor

5.1.4 Entity: <KADA_fee>

Table 5.1.4: Description of KADA_fee Entity

Attribute Name	Type	Description
entranceFee	Decimal (12 characters, 2 decimal point)	The minimum value for entrance fee for membership registration.
shareCapital	Decimal (12 characters, 2 decimal point)	The minimum value for capital share fee for membership registration.
feeCapital	Decimal (12 characters, 2 decimal point)	The minimum value for fee capital for membership registration.
memberDeposit	Decimal (12 characters, 2 decimal point)	The minimum value for member deposit for membership registration.
charityFund	Decimal (12 characters, 2 decimal point)	The minimum value for charity fund for the membership registration.
fixedSaving	Decimal (12 characters, 2 decimal point)	The minimum value for fixed savings for membership registration.
loanRate	Decimal (5 characters, 2 decimal point)	The value of the loan rate for the loan application process.
maxBai	Decimal (5 characters, 2 decimal point)	The maximum value for Al-Bai loan type
maxInah	Decimal (5 characters, 2 decimal point)	The maximum value for Al-Inah loan type
maxKhas	Decimal (5 characters, 2 decimal point)	The maximum value for Special loan type
maxPulih	Decimal (5 characters, 2 decimal point)	The maximum value for Vehicle Repairment loan type
maxKarnival	Decimal (5 characters, 2 decimal point)	The maximum value for special season carnival loan type
maxCukai	Decimal (5 characters, 2 decimal point)	The maximum value for Road Tax loan type
maxQard	Decimal (5 characters, 2 decimal point)	The maximum value for Al-Qardhul loan type

5.1.5 Entity: <Loan>

Table 5.1.5: Description of Loan Entity

Attribute Name	Type	Description
loanApplicationID	Big Integer (20 characters)	Uniquely identify a loan application
memberNo	Integer (11 characters)	Uniquely identify a member of application
loanType	100 Variable characters	Type of the loan
loanAmount	Decimal (12 characters, 2 decimal point)	The loan amount
loanPeriod	Integer (11 characters)	The loan period in month
monthlyInstallment	Decimal (12 characters, 2 decimal point)	The monthly installment
dob	Date	The data of birth of the member
age	Integer (11 characters)	The age of the member
bankAccNo	Integer (11 characters)	The bank account number of the member
bankName	100 Variable characters	The bank name of the member
verificationFile	255 Variable characters	The verification file for employee of the member
loanApplicationStatus	Enum (“Sedang Diproses”, “Lulus”, “Gagal”)	The application status
loanApplicationDate	Date	The application status
approvalDate	Date	The approval date of the application
adminNo	Integer (11 characters)	The foreign key of the admin references Member

5.1.6 Entity: <Member>

Table 5.1.6: Description of Member Entity

Attribute Name	Type	Description
memberNo	Integer (11 characters)	Uniquely identify a member references Membership_Notif
icNo	Big Integer (20 characters)	The identity card number of the member
password	100 Variable Characters	The password of the member
role	255 Variable Characters	The role of the member
applicationID	Big Integer (20 characters)	The foreign key of the applicationID of the member references Membership_Notif

5.1.7 Entity: <Membership>

Table 5.1.7: Description of Membership Entity

Attribute Name	Type	Description
applicationID	Big Integer (20 characters)	Uniquely identify an application
email	100 Variable Characters	Email of the applicant
name	100 Variable Characters	Name of the applicant
icNo	Big Integer (20 characters)	Identity Card Number of the applicant
marriageStatus	50 Variable Characters	Marriage Status of the applicant
homeAddress	100 Variable Characters	Home address of the applicant
homePostcode	Integer (11 characters)	Home Postcode of the applicant
homeCity	50 Variable Characters	Home city of the applicant
homeState	50 Variable Characters	Home state of the applicant
gender	10 Variable Characters	Gender of the applicant

religion	50 Variable Characters	Religion of the applicant
race	50 Variable Characters	Race of the applicant
monthlySalary	Decimal (12 characters, 2 decimal point)	Monthly salary of the applicant
staffNo	Integer (11 characters)	Staff No of the applicant
pfNo	Integer (11 characters)	Personal file no of the applicant
positionGrade	255 Variable Characters	Position and position grade of the applicant
workAddress	255 Variable Characters	Work address of the applicant
workPostcode	Integer (11 characters)	Work postcode of the applicant
workState	50 Variable Characters	Work state of the applicant
workCity	50 Variable Characters	Work city of the applicant
faxNo	Integer (11 characters)	Fax no of the applicant
phoneNo	Integer (11 characters)	Personal phone number of the applicant
homePhoneNo	Integer (11 characters)	Home phone no of the applicant
entranceFee	Decimal (12 characters, 2 decimal point)	Entrance fee of the applicant
shareCapital	Decimal (12 characters, 2 decimal point)	Share capital of the applicant
feeCapital	Decimal (12 characters, 2 decimal point)	Fee capital of the applicant
memberDeposit	Decimal (12 characters, 2 decimal point)	Membe deposit of the applicant
charityFund	Decimal (12 characters, 2 decimal point)	Charity fund of the applicant
fixedSavings	Decimal (12 characters, 2 decimal point)	Fixed savings of the applicant
role	255 Variable Characters	Role of the applicant
membershipStatus	30 Variable Characters	Membership status of the applicant

applicationStatus	30 Variable Characters	Application status of the application
applicationDate	Date	Apply date of the application
approvalDate	Date	Approval date of the application
adminNo	Integer (11 characters)	The foreign key of the adminNo references Member

5.1.8 Entity: <Notification>

Table 5.1.8: Description of Notification Entity

Attribute Name	Type	Description
notificationDate	Date	The date of the notification is send for the application after reviewal
notificationStatus	255 Variable characters	The notification success status
message	255 Variable characters	The message for the application

5.1.9 Entity: <Stock_Record>

Table 5.1.9: Description of Stock_Record Entity

Attribute Name	Type	Description
memberNo	Integer (11 characters)	Uniquely identify a member
recordDate	Date	Uniquely identify stock record of a member The date of the stock record
shareCapital	Decimal (12 characters, 2 decimal point)	Share capital of the member
feeCapital	Decimal (12 characters, 2 decimal point)	Fee capital of the member
fixedSavings	Decimal (12 characters, 2 decimal point)	Fixed savings of the member
memberSavings	Decimal (12 characters, 2 decimal point)	Member savings of the member

memberFund	Decimal (12 characters, 2 decimal point)	Member fund of the member
AdminNo	Integer (11 characters)	Foreign key of the adminNo references Member

6. User Interface Design

The interface shows that users can login into the system whether it is the staff, admin or BOD of KADA Cooperative. The interface also provides a homepage tailored to each user role and displaying the relevant features. It also enables the non-members to register as members in KADA Cooperative and for members, they can apply for loans.

6.1 Screen Images

Here is the user interface design for each use case, showcasing the layout and functionality specific to the tasks and roles involved.

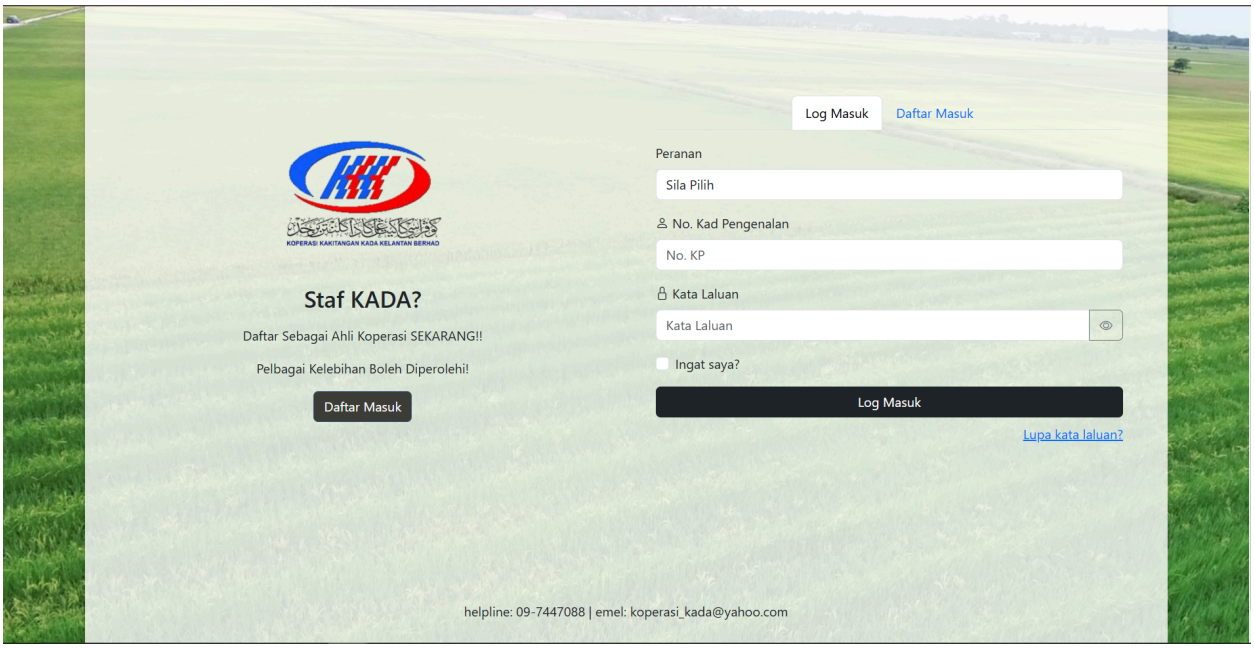


Figure 6.1.1: Interface for Authentication

Figure 6.1.2: Interface for Membership Registration

Figure 6.1.3: Interface for Loan Application

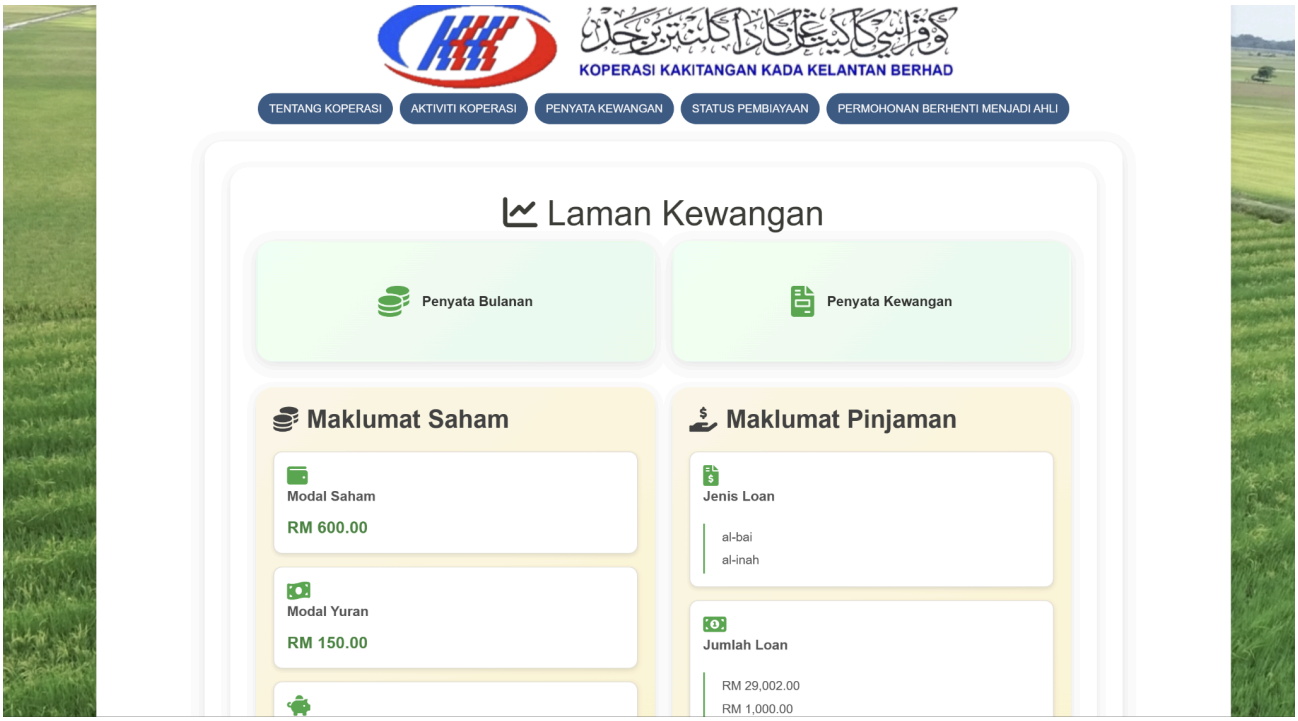


Figure 6.1.4: Interface for View Financial Statement

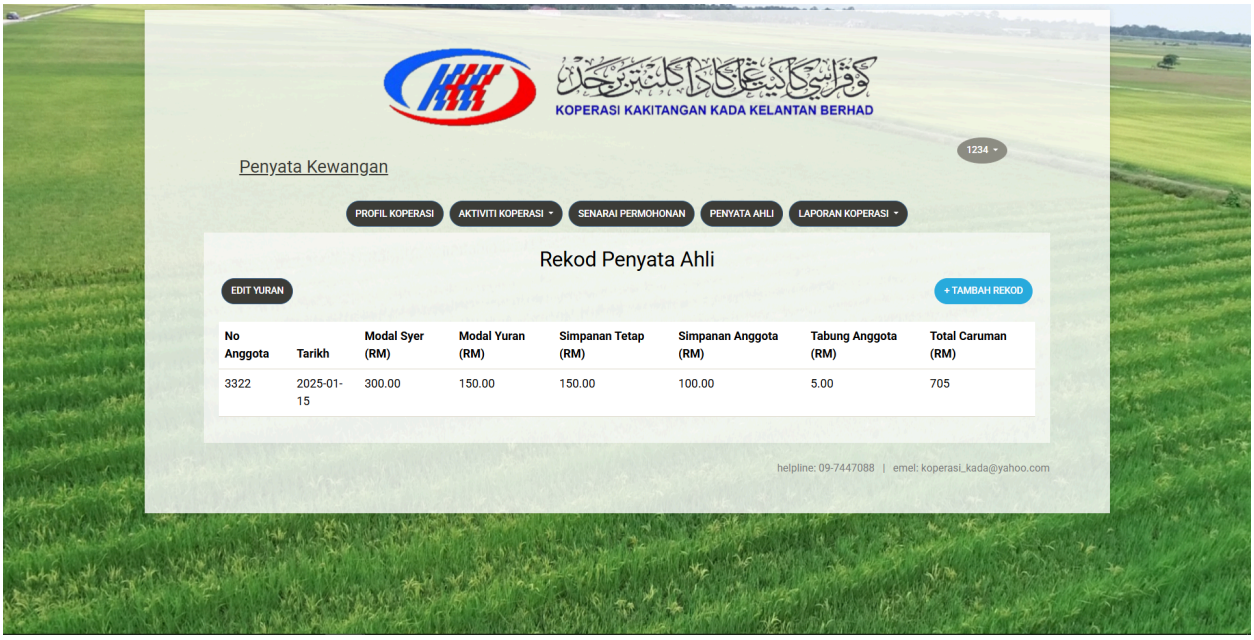


Figure 6.1.5: Interface for Manage Financial Statement

Figure 6.1.6: Interface for View Financial Report

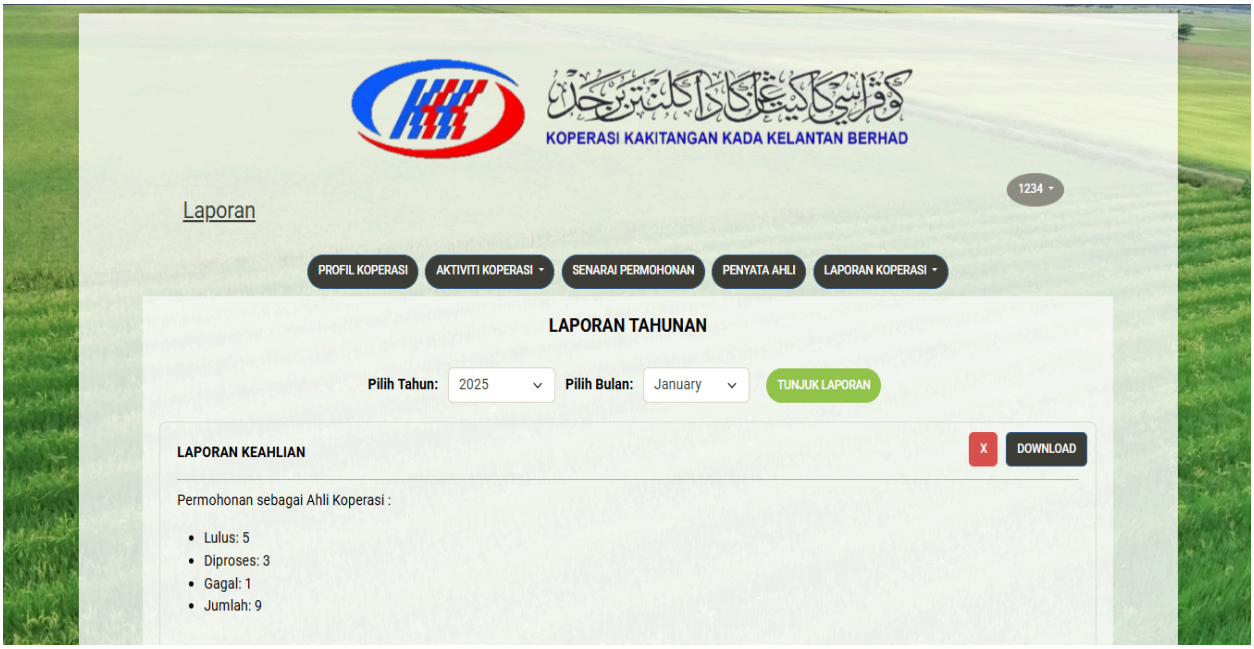


Figure 6.1.7: Interface for Manage Financial Report

Figure 6.1.8: Interface for Manage Member

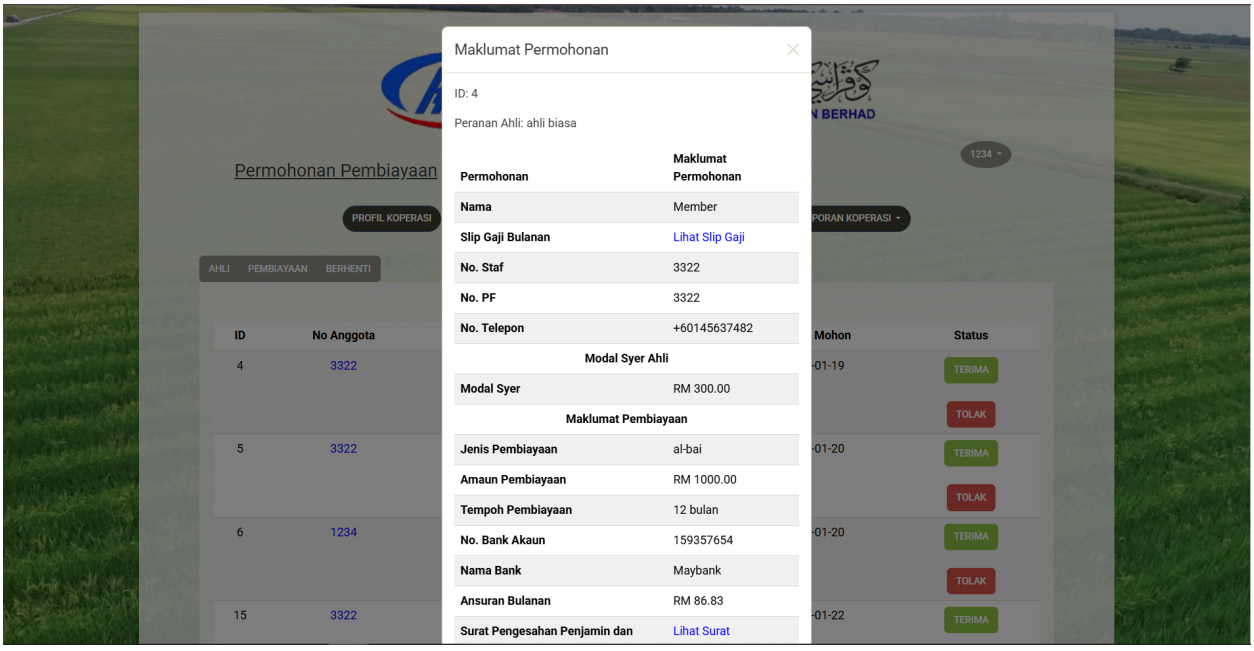


Figure 6.1.9: Interface for Review Application

Figure 6.1.10 Interface for Terminate Membership

7. Traceability

The traceability section focuses on the streamlined view in the transformation process for loan application process and membership management. The traceability table below will clearly map the user's needs which is recorded as the user story ID with the components, subsystem, and the data structures in the system that is designed to address them. This traceability ensures that each delivered functional and data-related aspects are aligned with the user needs.

Table 7.1: Traceability

Sprint #	Subsystem/Package	User Story ID
Sprint #1 A staff wants to apply for KADA membership to become a member in KADA and use its loan benefits.	Authentication Subsystem Apply For Membership Subsystem	US001
Sprint #2 A staff that is a member wants to apply for a loan so that I can exercise my rights as a member of the cooperative.	Apply For Loan Subsystem	US001
Sprint #3 A KADA Cooperative Admin wants to approve or disapprove applications after they have a meeting with BODs so that only the eligible staff members can access the cooperative's services.	Manage Member Subsystem Review Application Subsystem	US002
Sprint #4 A staff wants to view the financial statements in the system so that I know my current financial status	Manage Financial Statement View Financial Statement Subsystem	US001

Sprint #5 A Board of Director wants to view the details of the financial summary so that I can oversee the financial conditions and minimize financial risks.	View Financial Report Subsystem Manage Financial Report Subsystem	US003
Sprint #6 A staff member wants to terminate the KADA membership so that I am no longer a member of KADA and can't access all of the membership opportunities.	Terminate Membership Subsystem	US001

8. Test Cases

Test cases below show the conditions, inputs and expected results that are designed to assess each of the KADA Cooperative subsystem functionality. There are specific steps to be followed for each subsystem and the expected results to be observed during the testing process.

8.1 TC001: Test <Authentication Module> Subsystem: <Authentication (UC001)>

This test contains the following test cases:

(a) TC001_01: Test <Login (SD001)>

8.1.1 TC001_01: Test <Authentication (SD001)>

This test contains the following scenarios:

(a) TC001_01_01: Test <Normal scenario of Login (SD001)>

(b) TC001_01_02: Test <Invalid scenario of Login (SD001)>

(c) TC001_01_03: Test <Alternative scenario of Login (SD001)>

DESCRIPTION	VERSION	TEST DATE
Test the Login Functionality.	1.0	19-1-2025
TEST OBJECTIVE	**AUTHOR**	**REVIEWER**
1. Enable the user to login to the system according to their roles. 2. Validate the user login by their credentials.	AFLAH	

Test Case ID (TC001_01_01)	Test Steps	Input Data	Expected Results	Actual Results	PASS / FAIL	Tested By	Tester Comments
1	Navigate to the KADA Cooperative System homepage.	localhost:8000	The homepage should be able to open.	As expected	PASS	Aflah	
2	Click on the "Log Masuk" button at the upper right corner at '?' symbols.		The login page should appear.	As expected	PASS	Aflah	
3	Select the Role, and enter the No. KP and Password.	Peranan = **ahli biasa** No. KP = **123456142536** Pass = **member123**	Credentials can be entered.	As expected	PASS	Aflah	
4	Click submit		User is logged in	As expected	PASS	Aflah	

Test Case ID (TC001_01_02)	Test Steps	Input Data	Expected Results	Actual Results	PASS / FAIL	Tested By	Tester Comments
1	Navigate to the KADA Cooperative System homepage.	localhost:8000	The homepage should be able to open.	As expected	PASS	Aflah	
2	Click on the "Log Masuk" button at the upper right corner at '?' symbols.		The login page should appear.	As expected	PASS	Aflah	

3	Select the Role, and enter the No. KP and Password.	Peranan = **ahli biasa** No. KP = **123456142536** Pass = **member12**		As expected	PASS	Aflah	
4	Click submit		An error message will appear that indicates invalid login credentials.	As expected	PASS	Aflah	
5	Insert the correct password.	Pass = **member123**		As expected	PASS	Aflah	
6	Click submit.		User is logged in.	As expected	PASS	Aflah	

Test Case ID (TC001_01_03)	Test Steps	Input Data	Expected Results	Actual Results	PASS / FAIL	Tested By	Tester Comments
1	On the Login page, click on the "Lupa Kata Laluan?" link.		The reset password page should appear.	As expected	PASS	Aflah	
2	Enter the email, new password and confirm the password.	Emel: **john@gmail.com** Kata laluan baharu: **1234** Sahkan kata laluan: **1234**	Credentials can be entered.	As expected	PASS	Aflah	
3	Click submit.		Users can now log in using a new	As expected	PASS	Aflah	

			password.				

8.2 TC002: Test <Membership Module> Subsystem: <Member Registration (UC002)>

This test contains the following test cases:

(a) TC002_01: Test <Apply For Membership (SD002)>

(b) TC002_01: Test <Terminate Membership (SD010)>

8.2.1 TC002_01: Test <Apply For Membership (SD002)>

This test contains the following test case:

(a) TC002_01_01: Test <Normal scenario of Apply For Membership (SD002)>

(b) TC002_01_02: Test <Invalid scenario of Apply For Membership (SD002)>

DESCRIPTION	VERSION	TEST DATE
Test the Membership Application Functionality.	1.0	19-1-2025
TEST OBJECTIVE	AUTHOR	REVIEWER
1. Enable the staff to register the membership application. 2. Clear flow on the registration process. 3. Validate the staff inputs and the data is inserted to the database.	AFLAH	

Test Case ID (TC002_01_01)	Test Steps	Input Data	Expected Results	Actual Results	PASS / FAIL	Tested By	Tester Comments

1	Navigate to the KADA Cooperative System homepage.	localhost:8000	The homepage should be able to open.	As expected	PASS	Aflah	
2	Click the "Daftar Masuk" button at the upper right corner at '?' symbols.		The membership application page should appear.	As expected	PASS	Aflah	
3	Enter all the information required.	**Maklumat Peribadi:** Emel: **john@gmail.com** Nama: **John** No. KP: **123456789012** Status perkahwinan: **Bujang** Alamat Rumah: **123, ungku** Poskod: **12345** Bandar: **skudai** Negeri: **Johor** Jantina: **Lelaki** Agama: **Kristian** Bangsa: **Cina** Gaji Bulanan: **5000** No. Staff: **1616** No. PF: **1521** Jawatan & Gred: **member, DG19** Alamat Kerja: **15, Sri Pulai** Poskod: **81300** Bandar: **Skudai** Negeri: **Johor** No. Fax: **045624566** No. Telefon Bimbit: **01123456798** No. Telefon Rumah: **07894561** **Maklumat keluarga / waris:**	All information can be entered.	As expected	PASS	Aflah	

		Nama: **Johny** Hubungan: **Ayah** No. KP: **957461234542** **Yuran dan Sumbangan:** Yuran masuk: **35** Modal syer: **50** Modal yuran: **50** Wang deposit Anggota: **50** Sumbangan tabung kebajikan: **50** Simpanan tetap: **50**					
4	Clicks submit.		A success message and go back to the homepage.	As expected	PASS	Aflah	

Test Case ID (TC002_01_02)	Test Steps	Input Data	Expected Results	Actual Results	PASS / FAIL	Tested By	Tester Comments
1	Navigate to the KADA Cooperative System homepage.	localhost:8000	The homepage should be able to open.	As expected	PASS	Aflah	
2	Click the "Daftar Masuk" button at the upper right corner at '?' symbols.		The membership application page should appear.	As expected	PASS	Aflah	

3	Enter all the information required.	**Maklumat Peribadi:** Emel: **john@gmail.com** Nama: **John** No. KP: **123456789012** Status perkahwinan: **Bujang** Alamat Rumah: **123, ungku** Poskod: **12345** Bandar: **skudai** Negeri: **Johor** Jantina: **Lelaki** Agama: **Kristian** Bangsa: **Cina** Gaji Bulanan: **5000** No. Staff: **1616** No. PF: **1521** Jawatan & Gred: **member, DG19** Alamat Kerja: **15, Sri Pulai** Poskod: **abcde** Bandar: **Skudai** Negeri: **Johor** No. Fax: **045624566** No. Telefon Bimbit: **01123456798** No. Telefon Rumah: **07894561** **Maklumat keluarga / waris:** Nama: **Johny** Hubungan: **Ayah** No. KP: **957461234542** **Yuran dan Sumbangan:** Yuran masuk: **35** Modal syer: **50** Modal yuran: **50** Wang deposit Anggota: **50** Sumbangan tabung	All information can be entered.	As expected	PASS	Aflah	

		kebajikan: **50** Simpanan tetap: **50**					
4	Click submit.		Cannot submit. There is an error message indicating that the postcode needs to be in 5 digits.	As expect ed	PASS	Aflah	
5	Change the postcode.	Poskod: **12345**		As expect ed	PASS	Aflah	
6	Click submit.		Pop up message shows that "**Permohon an Berjaya!**" and "**Ingin kembali ke laman utama?**"	As expect ed	PASS	Aflah	
7	Click "ok".		Will be redirected to the homepage.	As expect ed	PASS	Aflah	

8.2.2 TC002_02: Test <Terminate Membership (SD010)>

This test contains the following test case:

a) TC002_02_01: Test <Normal scenario of Terminate Membership (SD010)>
b) TC002_02_02: Test <Invalid scenario of Terminate Membership (SD010)>

DESCRIPTION	VERSION	TEST DATE
Test the Membership Termination Application Functionality.	1.0	12-02-2025
TEST OBJECTIVE	AUTHOR	REVIEWER
1. Enable the staff to terminate the membership. 2. Clear flow on the termination process. 3. Validate the staff inputs and the data is inserted to the database.	AFLAH	

Test Case ID (TC002_02_01)	Test Steps	Input Data	Expected Results	Actual Results	PASS / FAIL	Tested By	Tester Comments
1	On the Member dashboard, navigate to the "Permohonan Berhenti Menjadi Ahli" button.		The application for membership termination should appear.	As expected	PASS	Aflah	
2	The personal details have already been filled in by the system.		Members can see their personal details.	As expected	PASS	Aflah	
3	Enter the reason for termination.	Reason: want to resign.		As expected	PASS	Aflah	
4	Click on the "Hantar" button.		The system will confirm the user for his actions and appear a successful message.	As expected	PASS	Aflah	

Test Case ID (TC002_02_02)	Test Steps	Input Data	Expected Results	Actual Results	PASS / FAIL	Tested By	Tester Comments
1	On the Member dashboard, navigate to the "Permohonan Berhenti Menjadi Ahli" button.		The application for membership termination should appear.	As expected	PASS	Aflah	
2	The personal details have already been filled in by the system.		Members can see their personal details.	As expected	PASS	Aflah	
3	Enter the reason for termination.	Leave blanks		As expected	PASS	Aflah	
4	Click on the "Hantar" button.		The system will require the user to enter the reason to proceed for termination.	As expected	PASS	Aflah	

8.3 TC003: Test <Loan Module> Subsystem: <Loan Application (UC003)>

This test contains the following test cases:

(a) TC002_01: Test <Apply For Loan (SD003)>

8.3.1 TC003_01: Test <Apply For Loan (SD003)>

This test contains the following test case:

(a) TC002_01_01: Test <Normal scenario of Apply For Loan (SD003)>

(b) TC002_01_02: Test <Invalid scenario of Apply For Loan (SD003)>

DESCRIPTION	VERSION	TEST DATE
Test the Loan Application Functionality.	1.0	19-1-2025
TEST OBJECTIVE	**AUTHOR**	**REVIEWER**
1. Enable the member to apply for a loan application. 2. Clear and direct flow on the loan application process. 3. Validate the member inputs and the data is inserted to the database.	HAANI	

Test Case ID (TC001_01_01)	Test Steps	Input Data	Expected Results	Actual Results	PASS / FAIL	Tested By	Tester Comments
1	Navigate to the “Aktiviti Koperasi” at the tab		The “Aktiviti Koperasi” page should be able to open.	As expected	PASS	Haani	
2	Click on the "Mohon Pembiayaan" button at the bottom right on the page.		The loan page should be displayed.	As expected	PASS	Haani	
3	Fill in loan application form 1 : Pembiayaan and click “Seterusnya” to go to the next	Jenis Pembiayaan = **Al-Bai** Amaun Pembiayaan (RM) = **1000.00** Tempoh Pembiayaan = **12 bulan**	Credentials can be entered.	As expected	PASS	Haani	

	form	Ansuran Bulanan (RM) = **86.83**					
4	Fill in loan application form 2 : Pemohon and click “Seterusnya” to go to the next form	Tarikh Lahir Pemohon = **12/1/2001** Umur Pemohon = **24** No. Bank Akaun Pemohon = **159263487** Nama Bank Pemohon = **Maybank**	Credentials can be entered.	As expect ed	PASS	Haani	
5	Fill in loan application form 3 : Penjamin dan Majikan	No.IC Penjamin 1 = **111111333333** Nama Penjamin 1 = **ahmad** No.IC Penjamin 2 = **222222555555** Nama Penjamin 2 = **ali**	Credentials can be entered.	As expect ed	PASS	Haani	
6	Download blank verification document		Document can be downloaded	As expect ed	PASS	Haani	
7	Upload verification document	File = **Verification Document**	Document can be uploaded	As expect ed	PASS	Haani	
8	Click “Hantar”		The form is submitted and a success pop up is displayed.	As expect ed	PASS	Haani	

Test Case ID (TC001_ 01_02)	Test Steps	Input Data	Expected Results	Actual Results	PASS / FAIL	Tested By	Tester Comme nts
1	Navigate to the “Aktiviti Koperasi” at the tab		The “Aktiviti Koperasi” page should	As expect ed	PASS	Haani	

			be able to open.				
2	Click on the "Mohon Pembiayaan" button at the bottom right on the page.		The loan page should be displayed.	As expect ed	PASS	Haani	
3	Fill in loan application form 1 : Pembiayaan and click “Seterusnya” to go to the next form	Jenis Pembiayaan = **Al-Bai** Amaun Pembiayaan (RM) = Tempoh Pembiayaan = **12 bulan** Ansuran Bulanan (RM) = **86.83**	Error message “Sila lengkapkan maklumat” will be displayed.‘	As expect ed	PASS	Haani	
4	Fill in loan application form 1 : Pembiayaan and click “Seterusnya” to go to the next form	Jenis Pembiayaan = **Al-Bai** Amaun Pembiayaan (RM) = **1000.00** Tempoh Pembiayaan = **12 bulan** Ansuran Bulanan (RM) = **86.83**	Credentials can be entered.	As expect ed	PASS	Haani	
5	Fill in loan application form 2 : Pemohon and click “Seterusnya” to go to the next form	Tarikh Lahir Pemohon = **12/1/2001** Umur Pemohon = **24** No. Bank Akaun Pemohon = Nama Bank Pemohon = **Maybank**	Error message “Sila lengkapkan maklumat” will be displayed.‘	As expect ed	PASS	Haani	
6	Fill in loan application form 2 : Pemohon and click “Seterusnya” to go to the next form	Tarikh Lahir Pemohon = **12/1/2001** Umur Pemohon = **24** No. Bank Akaun Pemohon = **159263487** Nama Bank Pemohon = **Maybank**	Credentials can be entered.	As expect ed	PASS	Haani	

7	Fill in loan application form 3 : Penjamin dan Majikan	No.IC Penjamin 1 = Nama Penjamin 1 = **ahmad** No.IC Penjamin 2 = **222222555555** Nama Penjamin 2 = **ali**	Error message “Sila lengkapkan maklumat” will be displayed.‘	As expect ed	PASS	Haani	
8	Fill in loan application form 3 : Penjamin dan Majikan	No.IC Penjamin 1 = **123** Nama Penjamin 1 = **ahmad** No.IC Penjamin 2 = **222222555555** Nama Penjamin 2 = **ali**	Error message “Maaf, penjamin bukan ahli koperasi.” will be displayed.‘	As expect ed	PASS	Haani	
9	Fill in loan application form 3 : Penjamin dan Majikan	No.IC Penjamin 1 = **111111333333** Nama Penjamin 1 = **ahmad** No.IC Penjamin 2 = **222222555555** Nama Penjamin 2 = **ali**	Credentials can be entered.	As expect ed	PASS	Haani	
10	Download blank verification document		Document can be downloaded	As expect ed	PASS	Haani	
11	Upload verification document	File =	Error message “Sila masukkan dokumen” will be displayed.‘	As expect ed	PASS	Haani	
12	Upload verification document	File = **Verification Document**	Document can be uploaded	As expect ed	PASS	Haani	
13	Click “Hantar”		The form is submitted and a success pop up is	As expect ed	PASS	Haani	

			displayed.				

8.4 TC004: Test <Financial statements> Subsystem: < financial statements (UC004)>

This test contains the following test cases:

(a) TC004_01: Test <scenario of view financial statements(SD004)>

8.4.1 TC004_01: Test <View Financial Statement (SD002)>

This test contains the following test case:

(a) TC004_01_01: Test <scenario of view financial statements (SD004)>

(b) TC004_01_02: Test < scenario of manage financial statements (SD005)>

DESCRIPTION	VERSION	TEST DATE
Test the financial statement functionality for staff KADA	1.1	15-Jan-2025
TEST OBJECTIVE	**AUTHOR**	**REVIEWER**
1. The financial statement function enable member can select financial statement type base on month and year 2. The financial statement function enable member can view financial statement	Pravin	

Test Case ID **(TC004_01_01)**	Test Steps	Input Data	Expected Results	Actual Results	PASS/FAIL	Tested By	Tester Comments
1	Navigate to "Penyata ahli"'	http://localhost:8000/	'Penyata Ahli' page should be open	As expected	PASS	Pravin	
			Display 'saham' and 'pinjaman' details	As expected	PASS	Pravin	
2	Select statement type	Type ='penyata bulanan'	Display 'penyata bulanan' details	As expected	PASS	Pravin	
		Type = 'penyata kewangan'	Display 'penyata kewangan'	As expected	PASS	Pravin	

3	Click save and print	-	display save and print option	As expected	PASS	Pravin	
4				As expected	PASS	Pravin	

- TC004_01: Test <Manage financial statements (SD005)>

DESCRIPTION	VERSION	TEST DATE
Test the financial statement functionality for admin KADA	1.0	17-Jan-2024
TEST OBJECTIVE	**AUTHOR**	**REVIEWER**
1. The financial statement function enable admin can update member's "saham' 2. The financial statement function enable admin can view member's financial statement	Pravin	

Test Case ID **(TC005_01_01)**	Test Steps	Input Data	Expected Results	Actual Results	PASS/FAIL	Tested By	Tester Comments
1	Navigate to "Penyata Ahli'	http://localhost:8000/	'Penyata Ahli' page should be open	As expected	PASS	Pravin	
2	Edit yuran	YuranMasuk :5 Modal Syer : 100 Modal Yuran : 50 Deposit Ahli : 30 Tabung Ahli : 50 Simpanan Tetap : 10 Kadar keuntungan : 40	All information required completed	As expected	PASS	Pravin	
3	Click 'kemaskini'	-	Display yuran details	As expected	PASS	Pravin	
3	Click 'tutup'	-	Edit yuran tab will be closed	As expected	PASS	Pravin	
4	Click 'Tambah Rekod'	Bulan : Jan 2025	All information required completed	As expected	PASS	Pravin	

		Cari ahli : 1122					
5	Click 'Cari'	Modal syer : 50 Modal yuran : 150 Simpanan tetap : 150 Simpanan anggota : 50 Tabung anggota : 5	All information required completed	As expected	PASS	Pravin	
6	Click 'Tambah selected'	-	Display the updated records	As expected	PASS	Pravin	

8.5 TC005: Test <Reporting Module> Subsystem: <Financial Report (UC006)>

This test contains the following test cases:

(a) TC005_01: Test <Manage Financial Report (SD006)>
(b) TC005_02: Test <View Financial Report (SD007)>

8.5.1 TC005_01: Test <Manage Financial Report (SD006)>

This test contains the following test case:

(a) TC005_01_01: Test <Login as Member/Admin/BOD (SD006)>
(b) TC005_01_02: Test <Normal scenario of Manage Financial Report (SD006)
(c) TC005_01_02: Test <Normal scenario of View Financial Report (SD007)

DESCRIPTION	VERSION	TEST DATE
Test the Financial Report Functionality.	1.0	19-1-2025
TEST OBJECTIVE	AUTHOR	REVIEWER

1. Enable the admin to manage financial reports. 2. Shows latest state of loan application in chart form. 3. Allow for the report to be exported in physical version.	ADRIANA	

Test Case ID (TC005_01_01)	Test Steps	Input Data	Expected Results	Actual Results	PASS / FAIL	Tested By	Tester Comments
1	Navigate to the KADA Cooperative System homepage.	localhost:8000	The homepage should be able to open.	As expected	PASS	Adriana	
2	Click on the "Log Masuk" button at the upper right corner at '?' symbols.		The login page should appear.	As expected	PASS	Adriana	
3	Select the Role, and enter the No. KP and Password.	Peranan = **admin** No. KP = **123456142536** Pass = **member123**	Credentials can be entered.	As expected	PASS	Adriana	
4	Click 'Log Masuk'.		The admin homepage should appear.	As expected	PASS	Adriana	

Test Case ID (**TC005_01_02**)	Test Steps	Input Data	Expected Results	Actual Results	PASS / FAIL	Tested By	Tester Comments
1	Navigate to the 'Senarai Permohonan' tab.		The list of membership applications that only status in progress should appear.	As expected	PASS	Adriana	

2	Navigate to the ‘Statistic Permohonan’ tab.		The list of loan applications that only status in progress should appear.	As expect ed	PASS	Adrian a	
3	Navigate to the ‘Rumusan Kewangan’ tab.		This will allow admin to observe the current chart of application.	As expect ed	PASS	Adrian a	
4	Navigate to the ‘Laporan Keseluruhan’ tab.		This tab shows the annual report for the admin to see and is able to export the report into a pdf version.	As expect ed	PASS	Adrian a	

8.6 TC006: Test <Admin Module> Subsystem: <Manage Member (UC008)>

This test contains the following test cases:

(a) TC006_01: Test <Manage Member (SD008)>

8.6.1 TC006_01: Test <Manage Member (SD008)>

This test contains the following test case:

(a) TC006_01_01: Test <Login as admin(SD008)>

(b) TC006_01_02: Test <Manage Application(SD008)>

(c) TC006_01_03: Test <View Dashboard (SD008)>

DESCRIPTION	VERSION	TEST DATE
Test the Manage Member Functionality as Admin.	1.0	19-1-2025
TEST OBJECTIVE	**AUTHOR**	**REVIEWER**
1. Enable to login and direct to the admin homepage. 2. Ensure an organised display of the list of applications. 3. Enable access to all of the admin features.	FIRZANA	

Test Case ID (**TC006_01_01**)	Test Steps	Input Data	Expected Results	Actual Results	PASS / FAIL	Tested By	Tester Comments
1	Navigate to the KADA Cooperative System homepage.	localhost:8000	The homepage should be able to open.	As expected	PASS	Firzana	
2	Click on the 'Log Masuk' button at the upper right corner at '?' symbols.		The login page should appear.	As expected	PASS	Firzana	
3	Select the Role, and enter the No. KP and	Peranan = **admin** No. KP = **121212014556**	Credentials can be entered.	As expected	PASS	Firzana	

	Password.	Pass = **admin123**					
4	Click ‘Log Masuk’.		The admin homepage should appear.	As expect ed	PASS	Firzan a	

Test Case ID (**TC006_ 01_02**)	Test Steps	Input Data	Expected Results	Actual Results	PASS / FAIL	Tested By	Tester Comme nts
1	Navigate to the ‘Senarai Permohonan’ tab.		The list of membership applications that only status in progress should appear.	As expect ed	PASS	Firzan a	
2	Click on the ‘Pembiayaan’ button.		The list of loan applications that only status in progress should appear.	As expect ed	PASS	Firzan a	
3	Click on the ‘Berhenti’ button.		The list of termination applications that only status in progress should appear.	As expect ed	PASS	Firzan a	
3	Select either ‘TERIMA’ or ‘TOLAK’ button on the column Status to manage the applications.		An email will be sent to the applicants.	As expect ed	PASS	Firzan a	

Test Case ID (**TC006_01_03**)	Test Steps	Input Data	Expected Results	Actual Results	PASS / FAIL	Tested By	Tester Comments
1	Navigate to the 'Laporan Koperasi' tab and clicks the 'Statistik Permohonan' dropdown..		The statistics of the number of membership and loan applications are displayed in a graph.	As expected	PASS	Firzana	
2	Navigate to the 'Rumusan Kewangan' dropdown.		The financial summary page should appear.	As expected	PASS	Firzana	

8.7 TC007: Test <Approval Module> Subsystem: <Review Application (UC009)>

This test contains the following test cases:

(a) TC007_01: Test <Admin Review Application (SD009)>
(b) TC007_02: Test <BOD Review Application (SD009)>

8.7.1 TC007_01: Test <Admin Review Application (SD009)>

This test contains the following test case:

(a) TC007_01_01: Test <Normal scenario of Admin Review Application (SD009)>

DESCRIPTION	VERSION	TEST DATE
Test the Review Application Functionality for Admin	1.5	20-1-2025
TEST OBJECTIVE	AUTHOR	REVIEWER
1. Enable the admin to review membership and loan applications. 2. Enable the admin to approve or reject applications.	HAANI	

Test Case ID (TC007_01_01)	Test Steps	Input Data	Expected Results	Actual Results	PASS / FAIL	Tested By	Tester Comments
1	Navigate to the “Semak Permohonan” page.		The “Semak Permohonan” page should be displayed.	As expected	PASS	Haani	
2	Click on the "Ahli" button on the top left.		The list of membership applications should be listed.	As expected	PASS	Haani	

3	Click on applicant name	memberNo = 1234	Membership application details for applicant 1234 should be displayed.	As expected	PASS	Haani	
4	Click anywhere outside the modal or click “X”.		Exit the member details screen.	As expected	PASS	Haani	
5	Click “Terima”	ApplicationID = 4	The application should be approved and show the message “Permohonan berjaya diterima. Email berjaya dihantar.”	As expected	PASS	Haani	
6	Click “Tolak”	ApplicationID = 5	The application should be rejected and show the message “Permohonan berjaya ditolak. Email berjaya dihantar.”	As expected	PASS	Haani	
7	Click on the "Pembiayaan" button on the top left.		The list of loan applications should be listed.	As expected	PASS	Haani	
8	Click on applicant member No.	memberNo = 3322	Loan application details for applicant 3322 should	As expected	PASS	Haani	

			be displayed.				
9	Click anywhere outside the modal or click “X”.		Exit the loan details screen.	As expected	PASS	Haani	
10	Click “Terima”	loanApplicationID = 1	The application should be approved and show the message “Permohonan berjaya diterima. Email berjaya dihantar.”	As expected	PASS	Haani	
11	Click “Tolak”	loanApplicationID = 3	The application should be rejected and show the message “Permohonan berjaya ditolak. Email berjaya dihantar.”	As expected	PASS	Haani	

8.7.2 TC007_02: Test <BOD Review Application (SD009)>

This test contains the following test case:

(b) TC007_02_01: Test <Normal scenario of BOD Review Application (SD009)>

DESCRIPTION	VERSION	TEST DATE
Test the Review Application Functionality for BOD	1.5	20-1-2025

TEST OBJECTIVE	AUTHOR	REVIEWER
1. Enable the BOD to review membership and loan applications.	HAANI	

Test Case ID (TC007_02_01)	Test Steps	Input Data	Expected Results	Actual Results	PASS / FAIL	Tested By	Tester Comments
1	Navigate to the “Semak Permohonan” page.		The “Semak Permohonan” page should be displayed.	As expected	PASS	Haani	
2	Click on the "Ahli" button.		The list of membership applications should be listed.	As expected	PASS	Haani	
3	Click on applicant name	memberNo = 1234	Membership application details for applicant 1234 should be displayed.	As expected	PASS	Haani	
4	Click anywhere outside the modal or click “X”.		Exit the member details screen.	As expected	PASS	Haani	
5	Click “Terima” button	ApplicationID = 4	The application should be approved and show the message “Permohonan berjaya diterima.”	As expected	PASS	Haani	
6	Click “Tolak” button	ApplicationID = 5	The application	As expect	PASS	Haani	

			should be rejected and show the message “Permohonan berjaya ditolak.”	ed			
7	Click on the "Pembiayaan" button.		The list of loan applications should be listed.	As expected	PASS	Haani	
8	Click on applicant member no.	memberNo = 3322	Loan application details for applicant 3322 should be displayed.	As expected	PASS	Haani	
7	Click anywhere outside the modal or click “X”.		Exit the loan details screen.	As expected	PASS	Haani	
8	Click “Terima” button	loanApplicationID = 2	The application should be approved and show the message “Permohonan berjaya diterima.”	As expected	PASS	Haani	
9	Click “Tolak” button	loanApplicationID = 4	The application should be rejected and show the message “Permohonan berjaya ditolak.”	As expected	PASS	Haani	

9. Traceability Matrix

The Traceability Matrix is a tool to ensure that all KADA Cooperative System's requirements are linked and tracked throughout the development process. It establishes the connection between various elements like user requirements, design documentation, sequence diagram and test cases. By providing a clear reference, Table 9.1 represents the Traceability Matrix for KADA Cooperative System, organized by module.

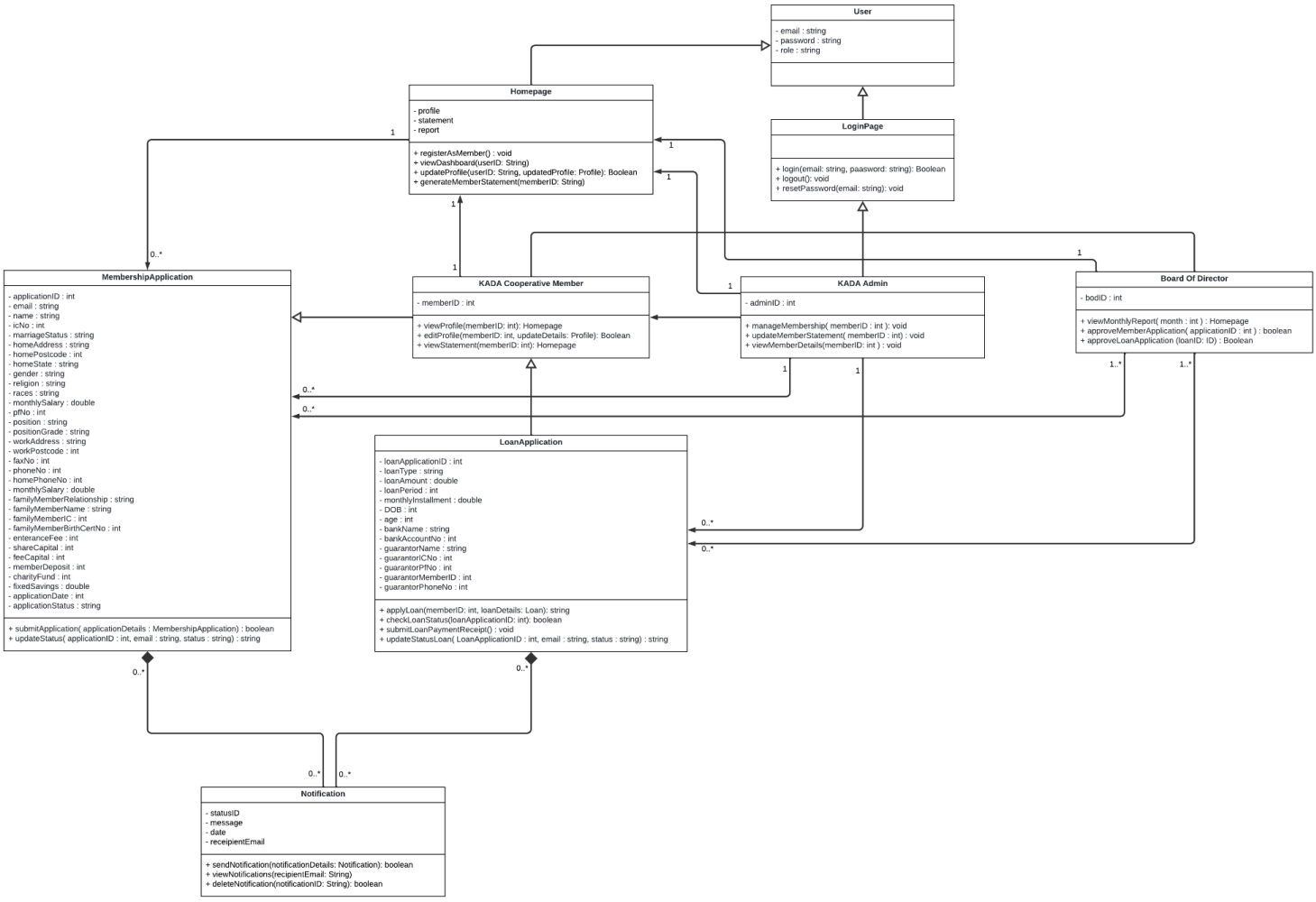
Table 9.1: Traceability Matrix for KADA Cooperative System

Sprint No	Module Item	User Story ID	User Story Description	Sequence Diagram ID	Sequence Diagram Description	Test Case ID
1	Module 1: Authentication	US_001	User Login	SD_001	Illustrates the user login process	TC001_01_01
						TC001_01_02
			User Change password	SD_001	Shows the process for changing a user's password.	TC001_01_03
	Module 2: Membership	US_002	User Apply for membership	SD_002	Shows the steps for the membership registration process	TC002_01_01
						TC002_01_02
		US_002	User terminate membership	SD_010	Shows the steps for the membership termination process	TC002_02_01
						TC002_02_02

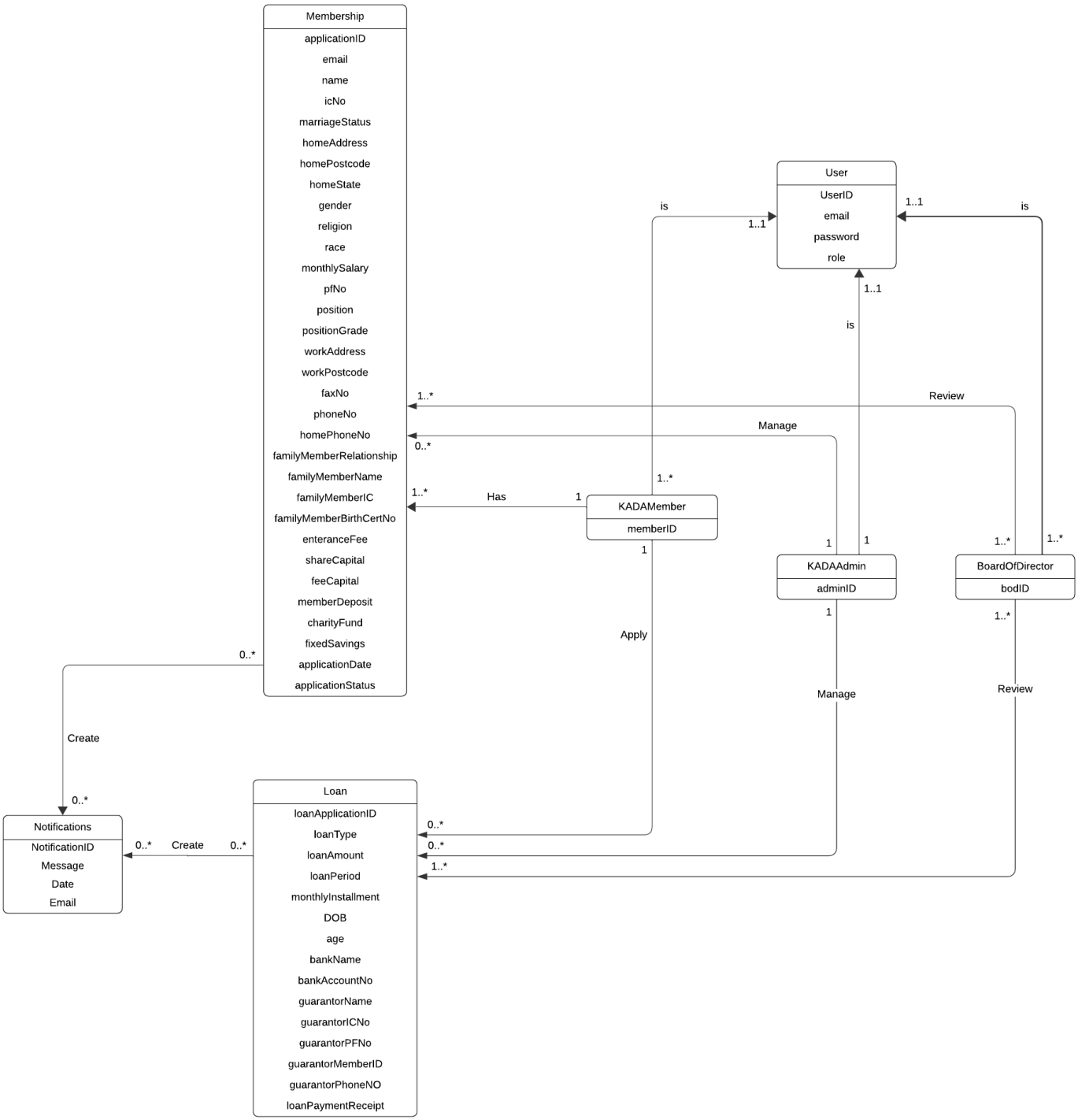
2	Module 3: Loan	US_001	User apply for loan	SD_003	Show the step for loan application process	TC003_01_01
						TC003_01_02
3	Module 6: Manage Member	US_002	Admin login	SD_008	Illustrate the Admin login process.	TC006_01_01
		US_002	Admin manage applications	SD_008	Show the process of managing applications.	TC006_01_02
		US_002	Admin view dashboard	SD_008	Show the steps to view the dashboard.	TC006_01_03
	Module 7: Approval	US_002	Admin review applications	SD_009	Show the process of the application review for admin.	TC007_01_01
		US_003	BOD review applications	SD_009	Show the process of the application review for BOD.	TC007_02_01
4	Module 4: financial statements	UC004	Member view financial statement	SD_004	Show the loan and savings statements	TC004_01_01
		UC005	Admin manage financial statement	SD_005	Show updated member's financial statements	TC004_01_02

5	Module 5: Financial Report	US_002	Admin manage financial report	SD_006	Shows the steps on how to see the list of applicants, overall current state and annual report of loan application	TC005_01_02

Class diagram Updated + ERD



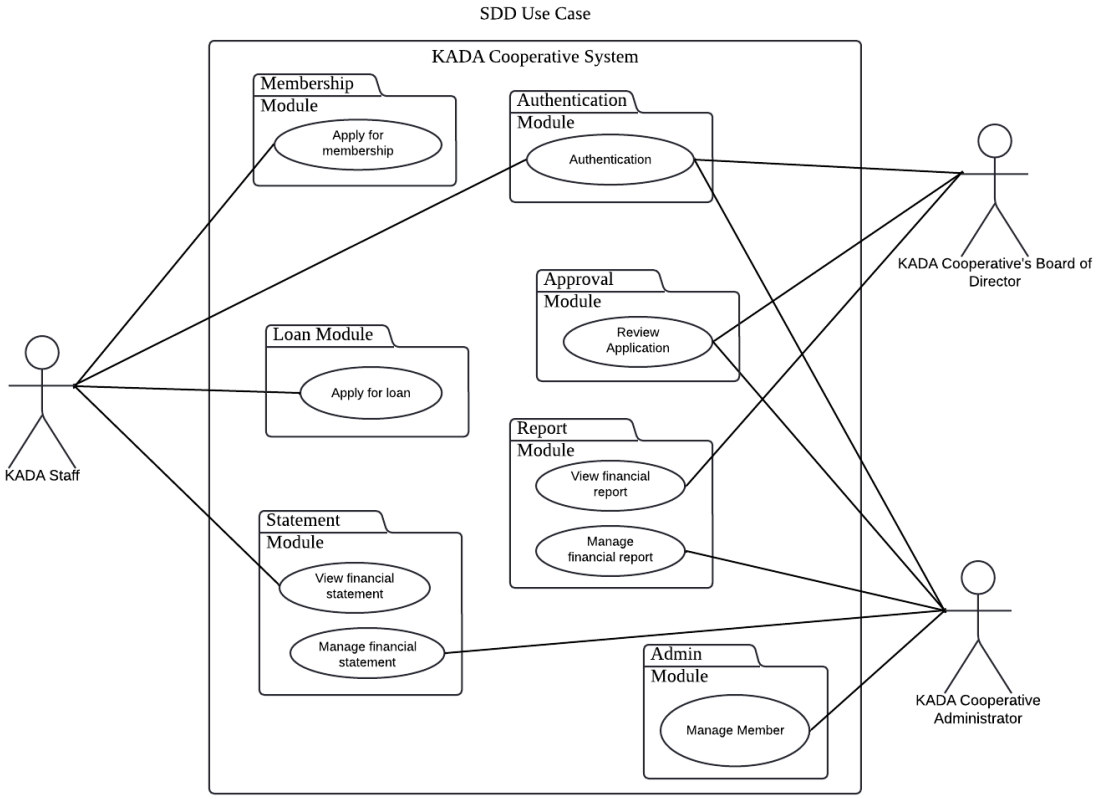
Updated class diagram - KodeLab



ERD of KADA Cooperative System - KodeLab

Print Out

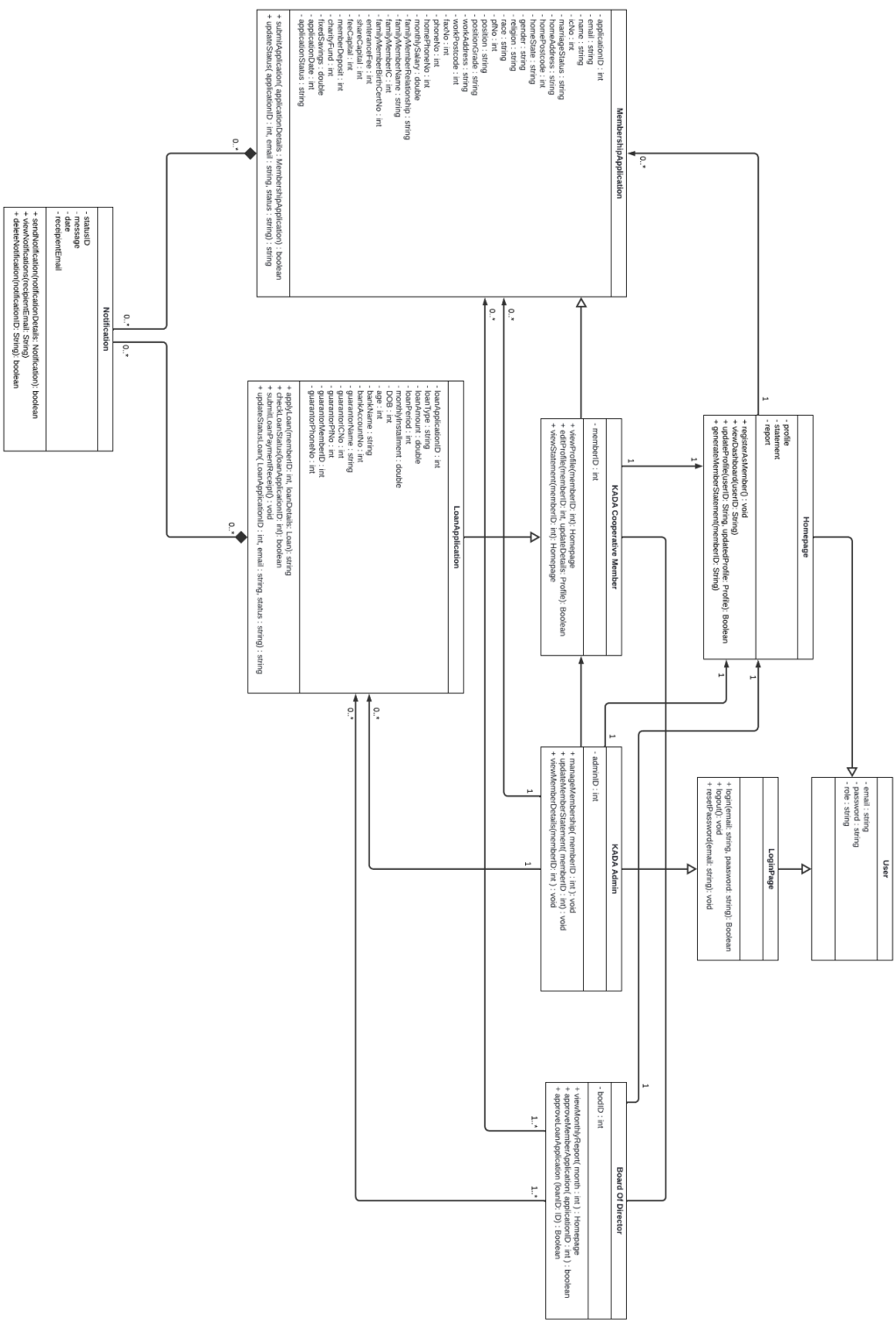
USE CASE



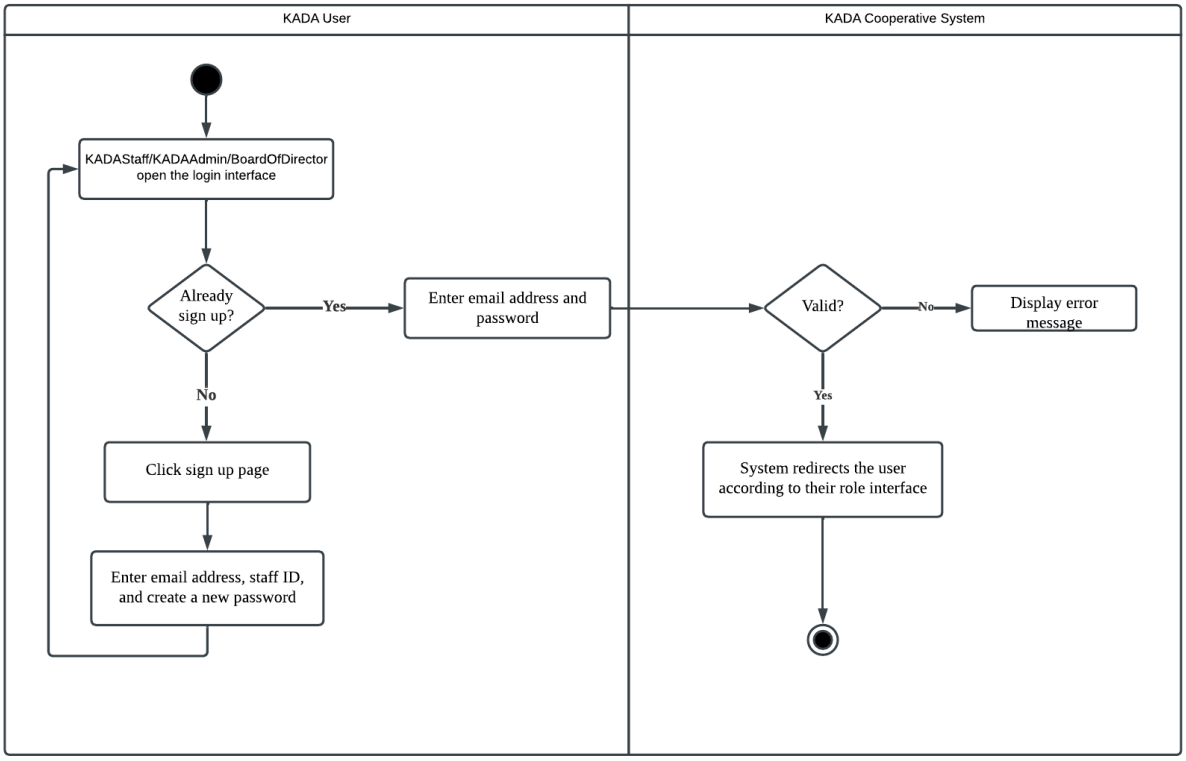
Module	Function	Description
Authentication	UC001-Authentication	This use case allows all users including staff, admin and BOD to login to the Cooperative system.
Membership	UC002-Member Registration	This use case allows non-member staff to register membership in KADA Cooperative.
Loan	UC003-Loan Application	This use case allows members to submit a loan application along with necessary documents.
Statement	UC004-Manage Financial Statement	This use case allows both members and admin to view member-specific financial details, including balances and transaction histories.
	UC005-View Financial Statement	This use case allows members to view their statements.

Reporting	UC006-Manage Financial Report	This use case provides detailed reports specifically designed for Administratives' decision-making purposes.
	UC007-View Financial Report	This use case allows administrators or Board of Directors (BOD) members to view comprehensive financial reports for the organization.
Admin	UC008-Manage member	This use case allows system administrators to manage user roles, permissions, and system settings.
Approval	UC009-Review Application	This use case allows BODs to decide the membership and loan applications.

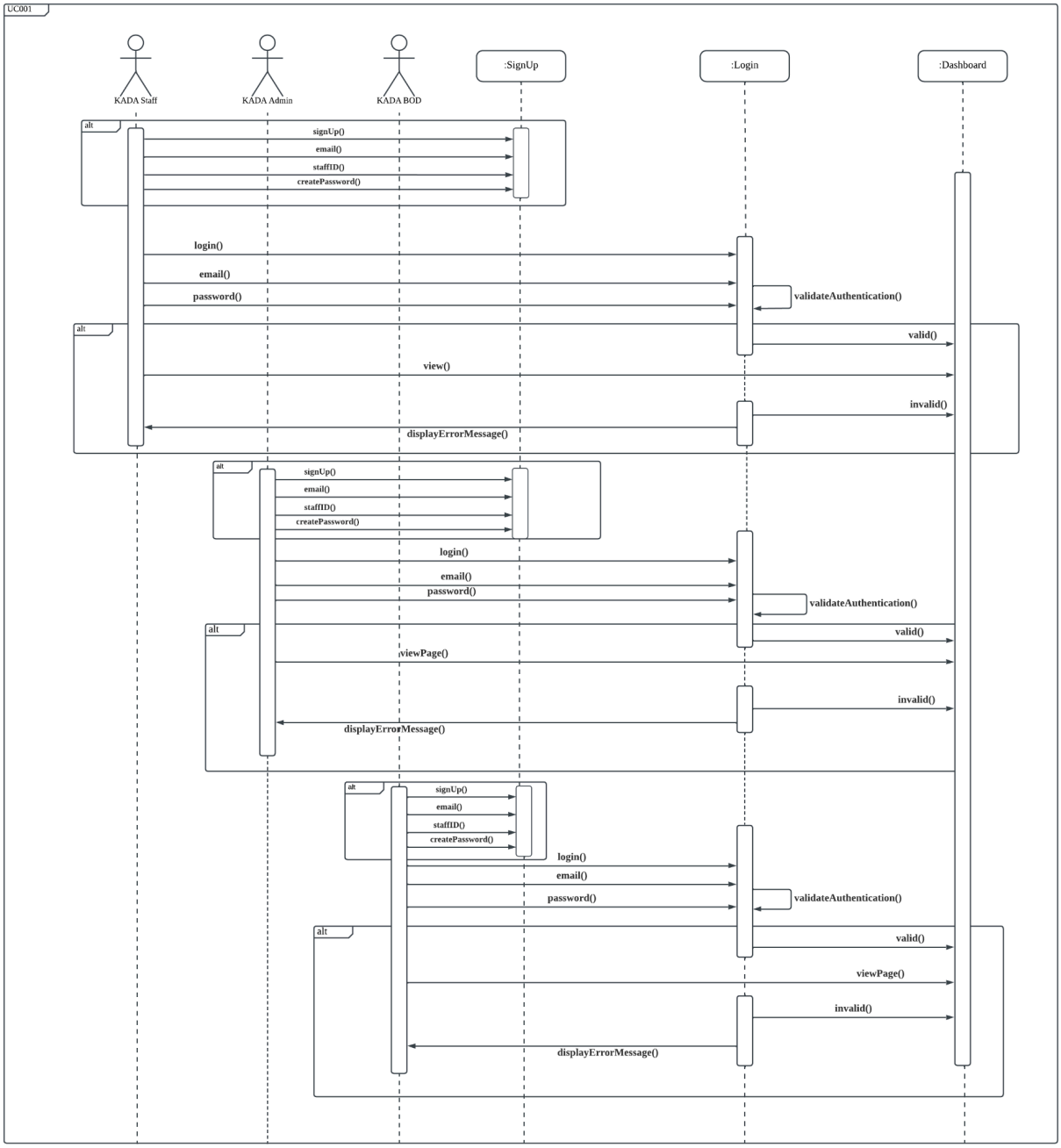
CLASS DIAGRAM



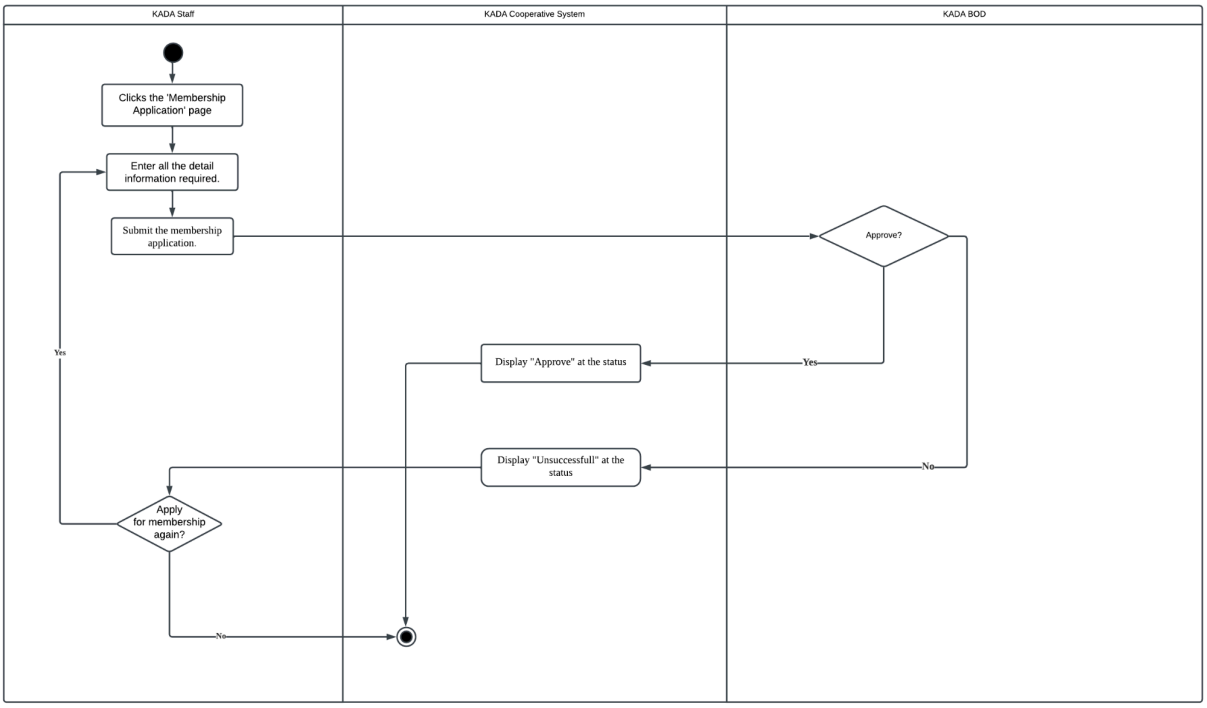
AUTHENTICATION: ACTIVITY DIAGRAM



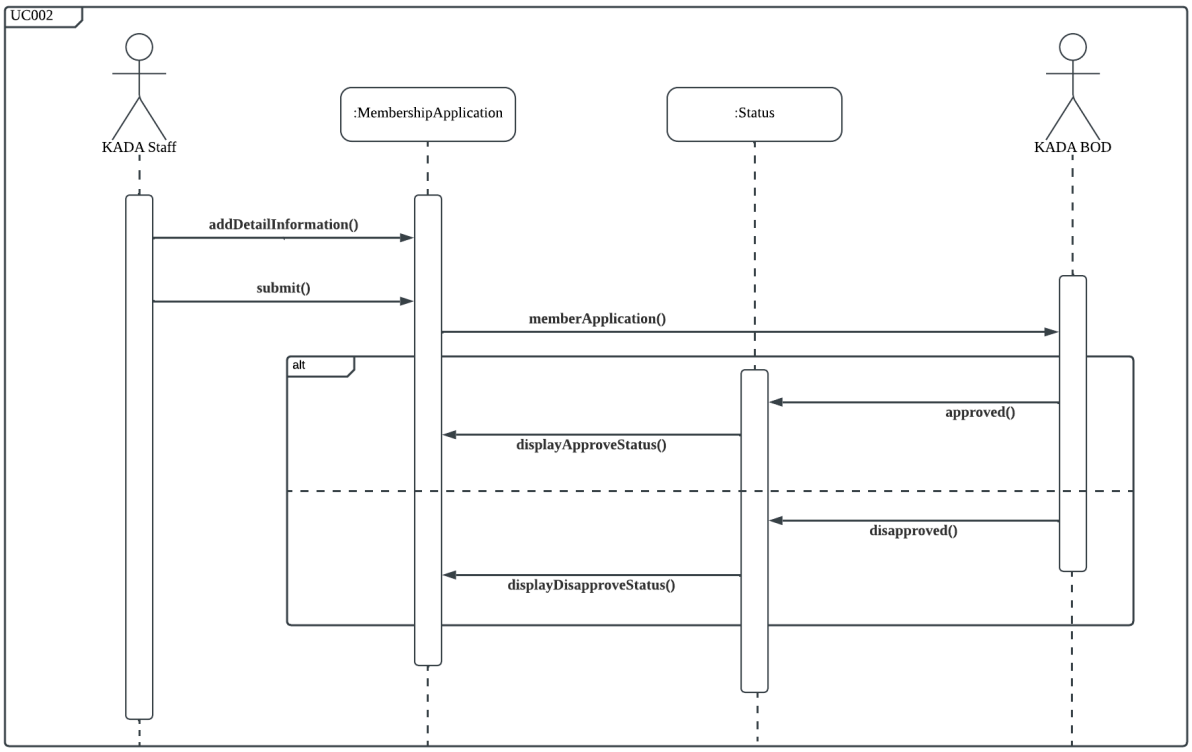
AUTHENTICATION: SEQUENCE DIAGRAM



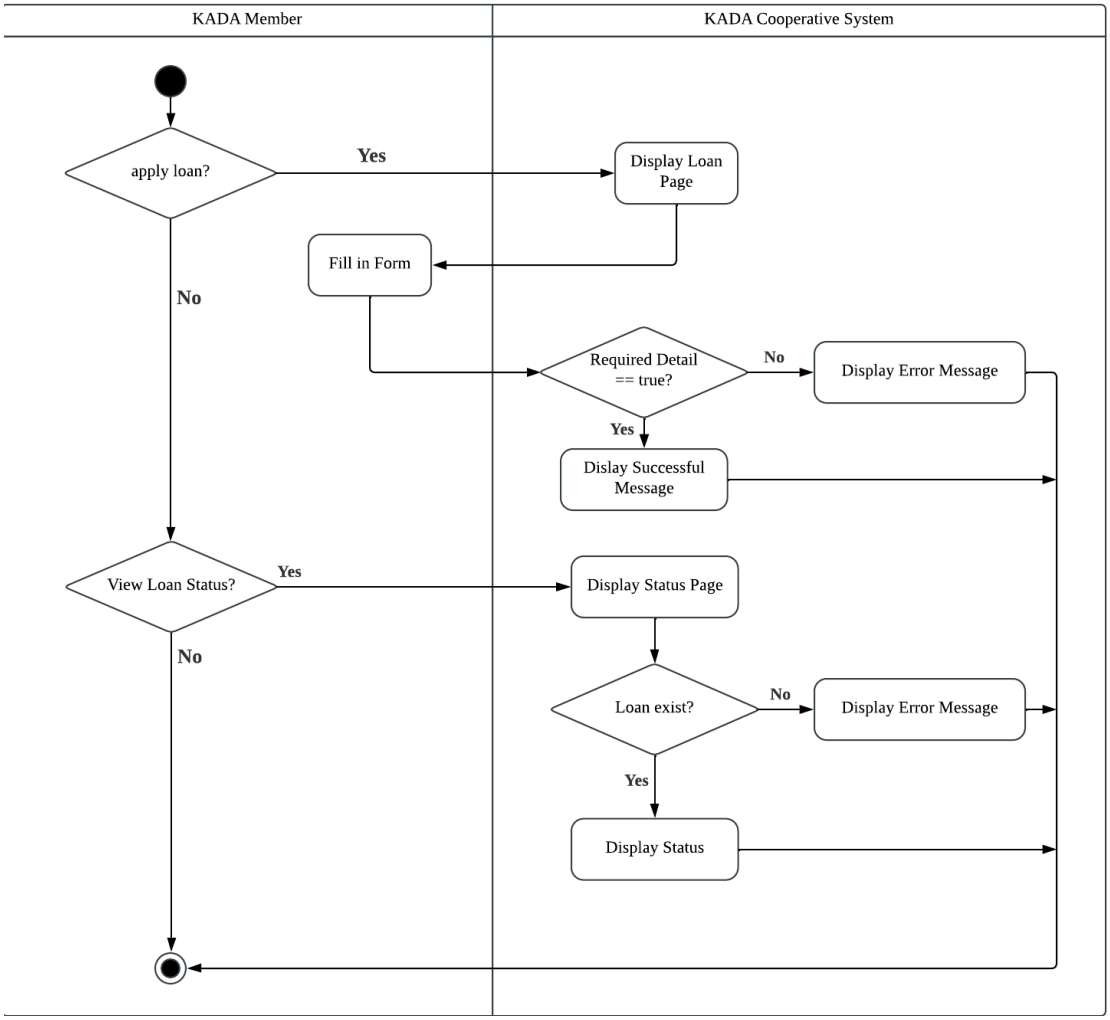
APPLY FOR MEMBERSHIP: ACTIVITY DIAGRAM



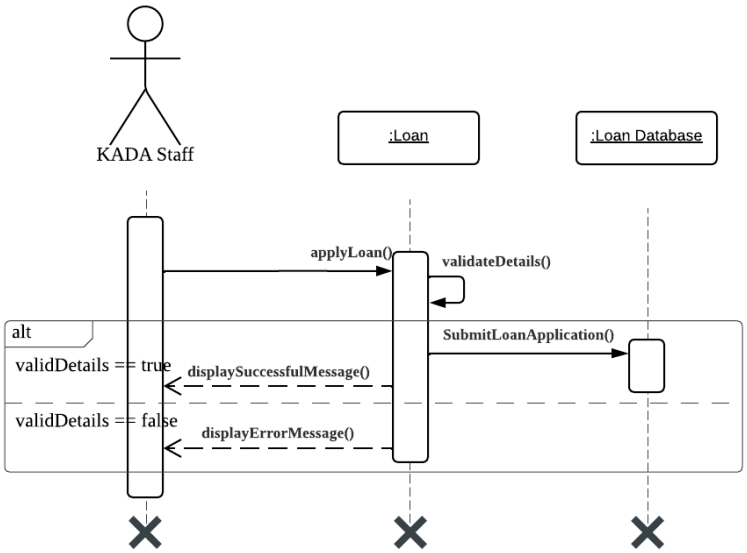
APPLY FOR MEMBERSHIP: SEQUENCE DIAGRAM



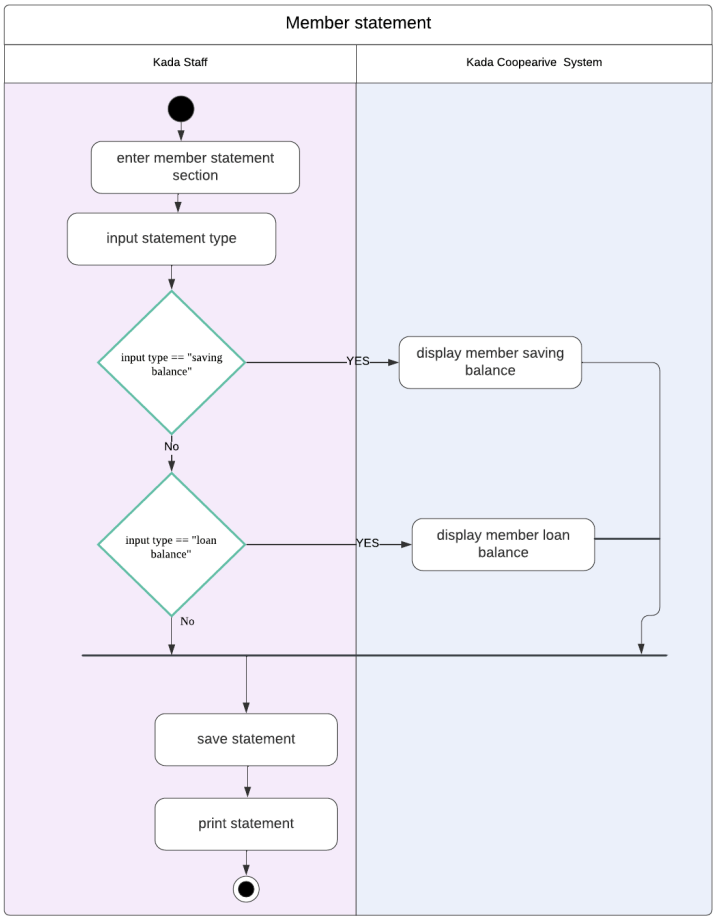
APPLY FOR LOAN: ACTIVITY DIAGRAM



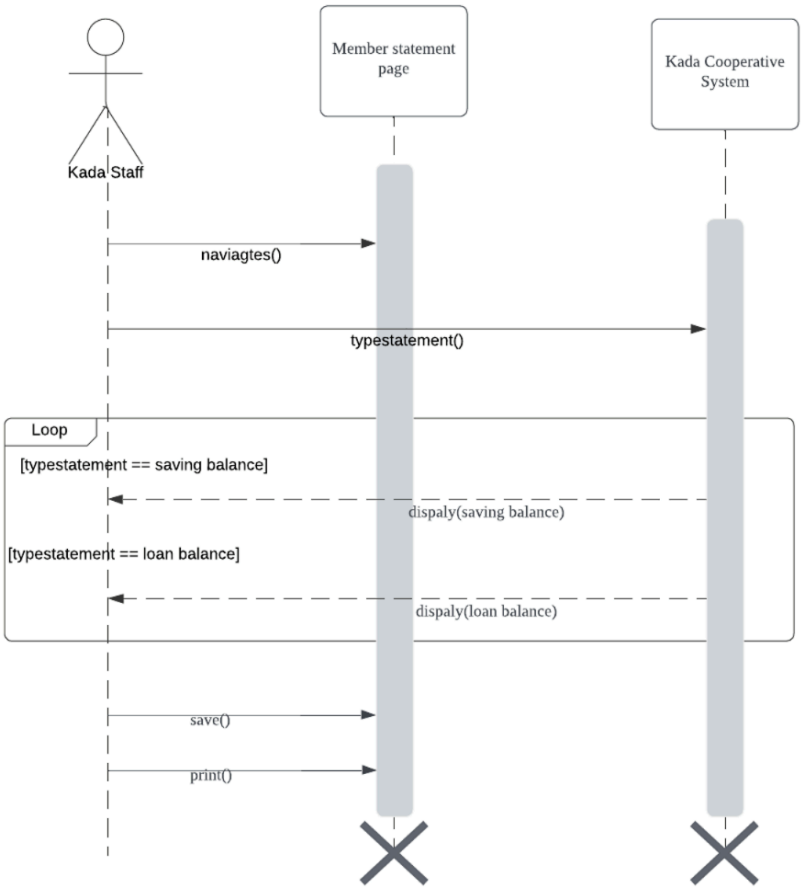
APPLY FOR LOAN: SEQUENCE DIAGRAM



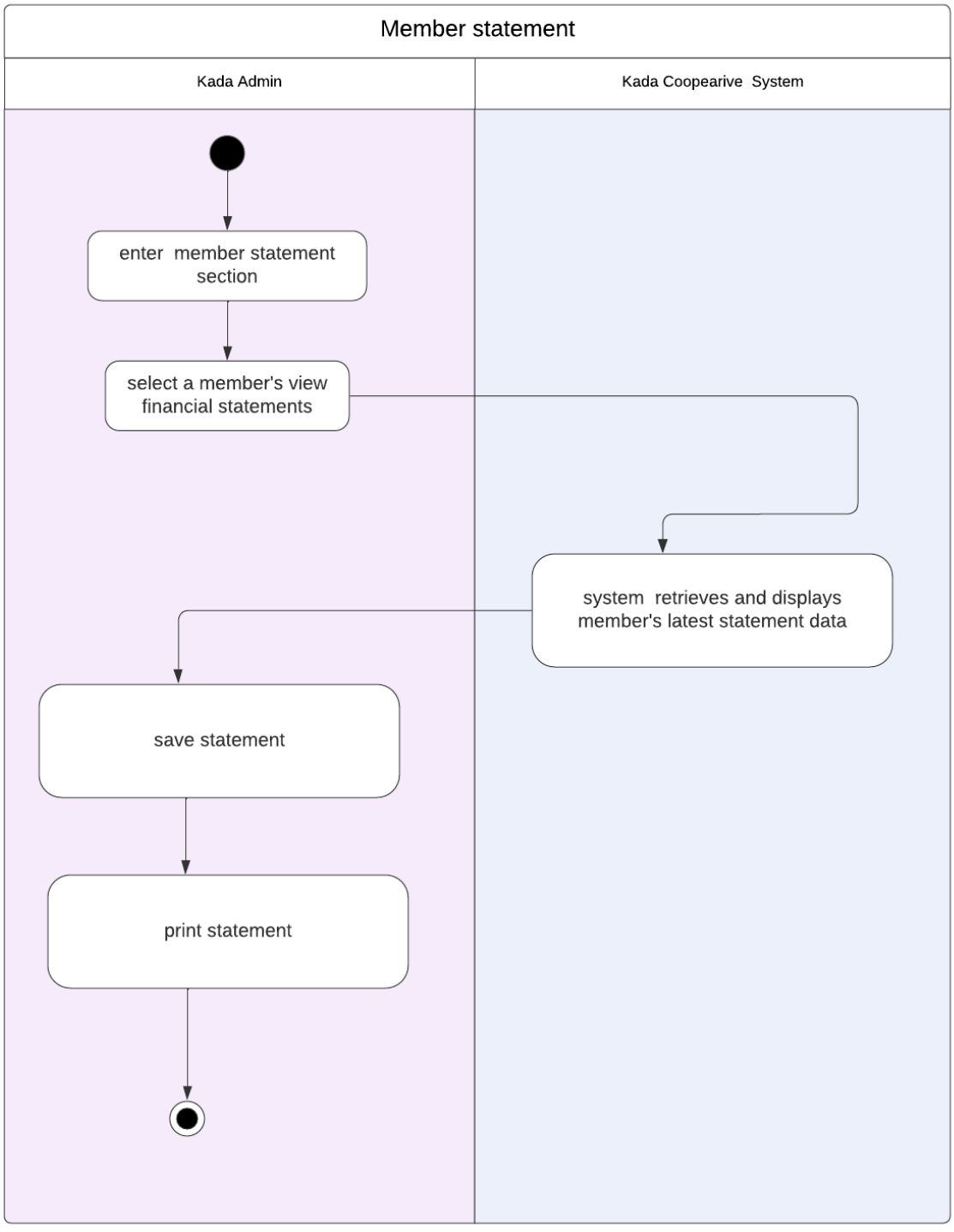
VIEW MEMBER STATEMENT: ACTIVITY DIAGRAM



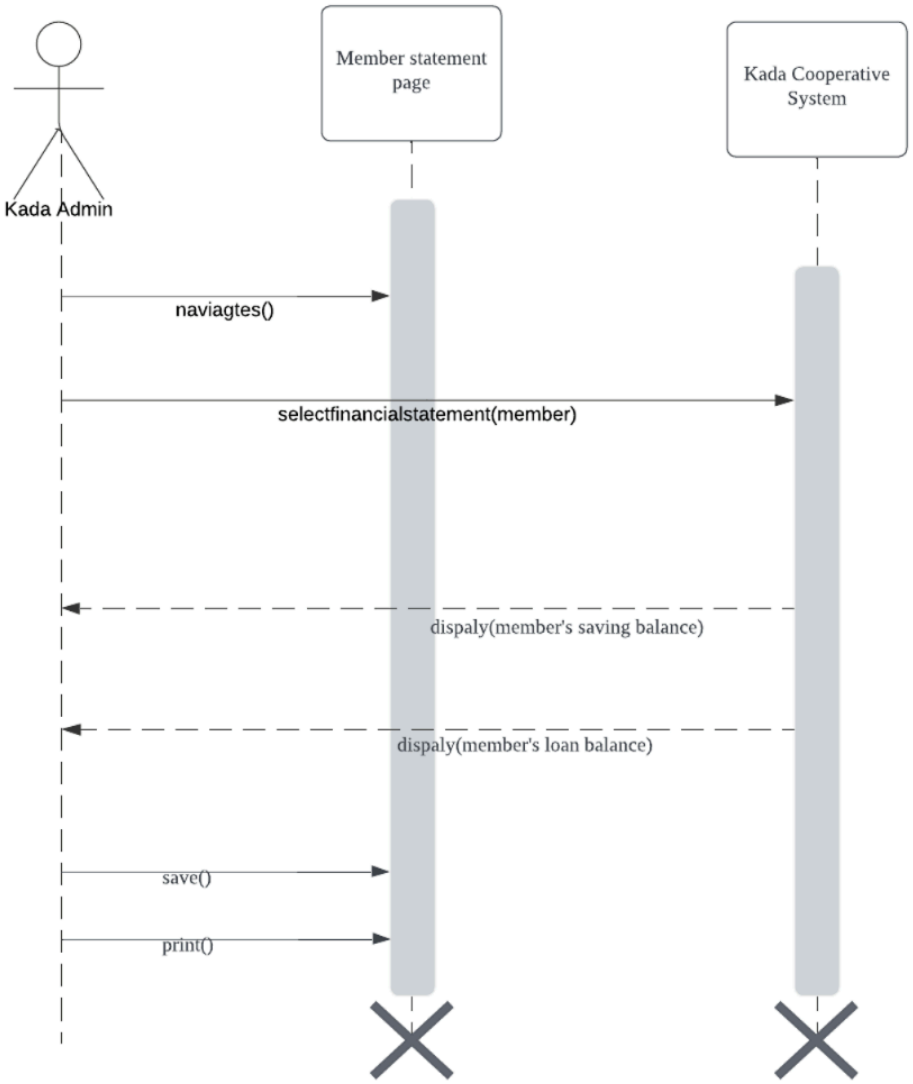
VIEW MEMBER STATEMENT: SEQUENCE DIAGRAM



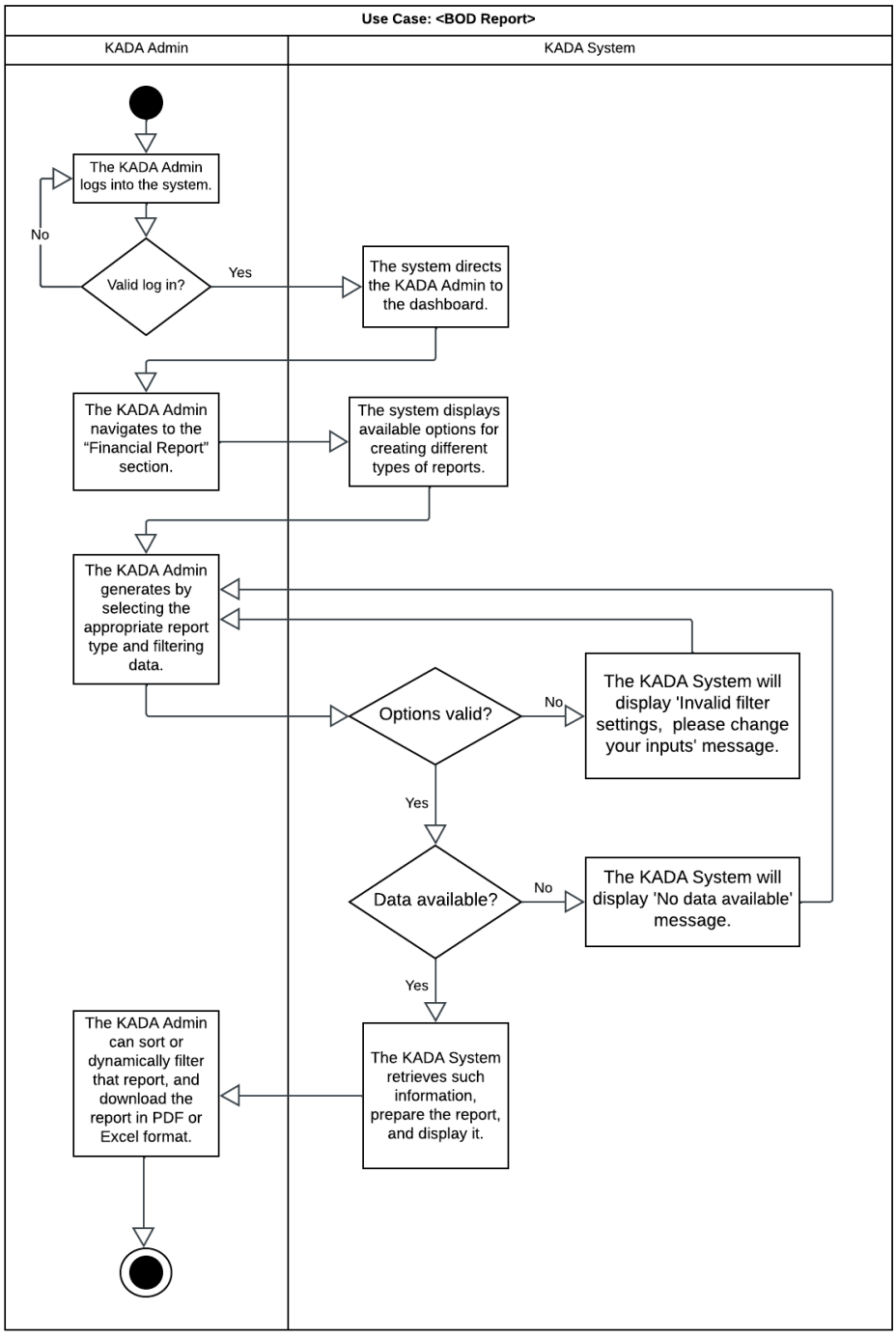
MEMBER STATEMENT: ACTIVITY DIAGRAM



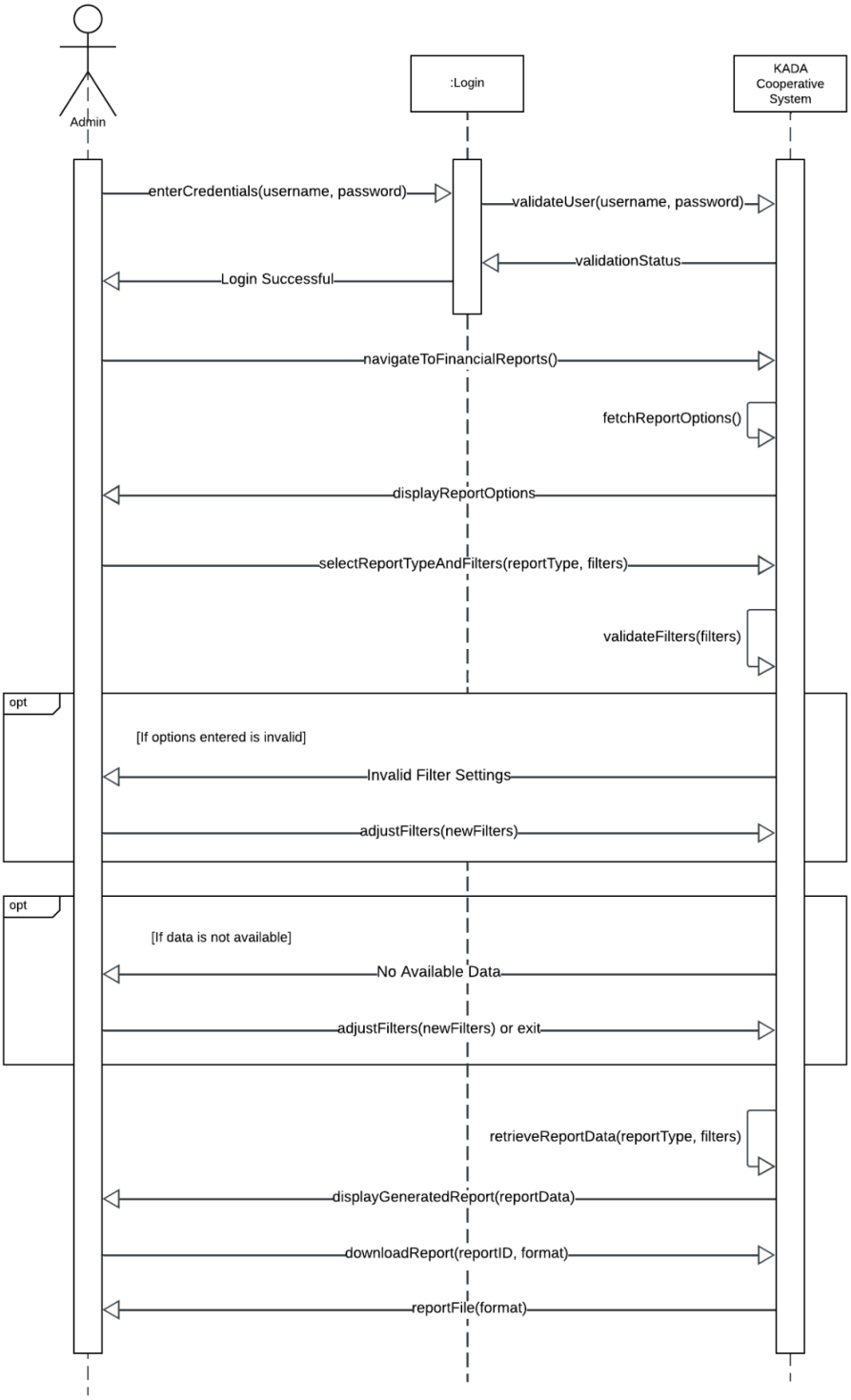
MEMBER STATEMENT: SEQUENCE DIAGRAM



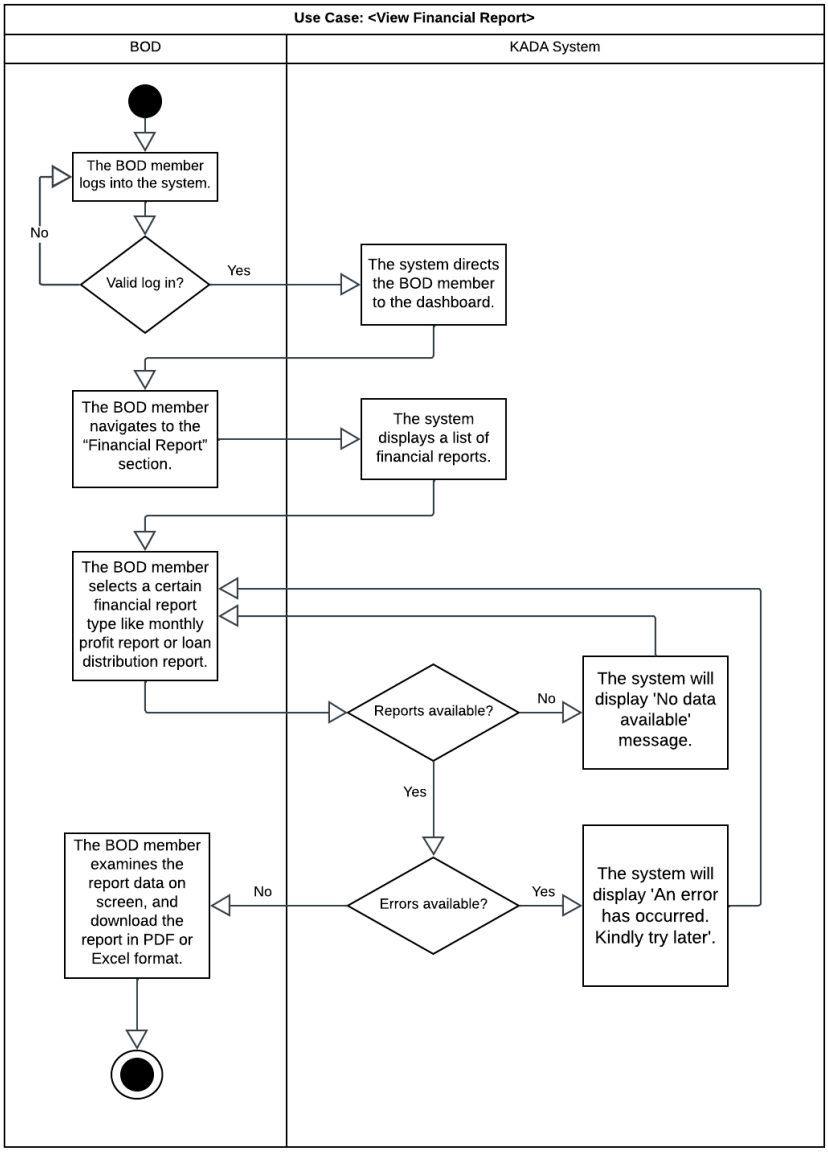
MANAGE FINANCIAL REPORT: ACTIVITY DIAGRAM



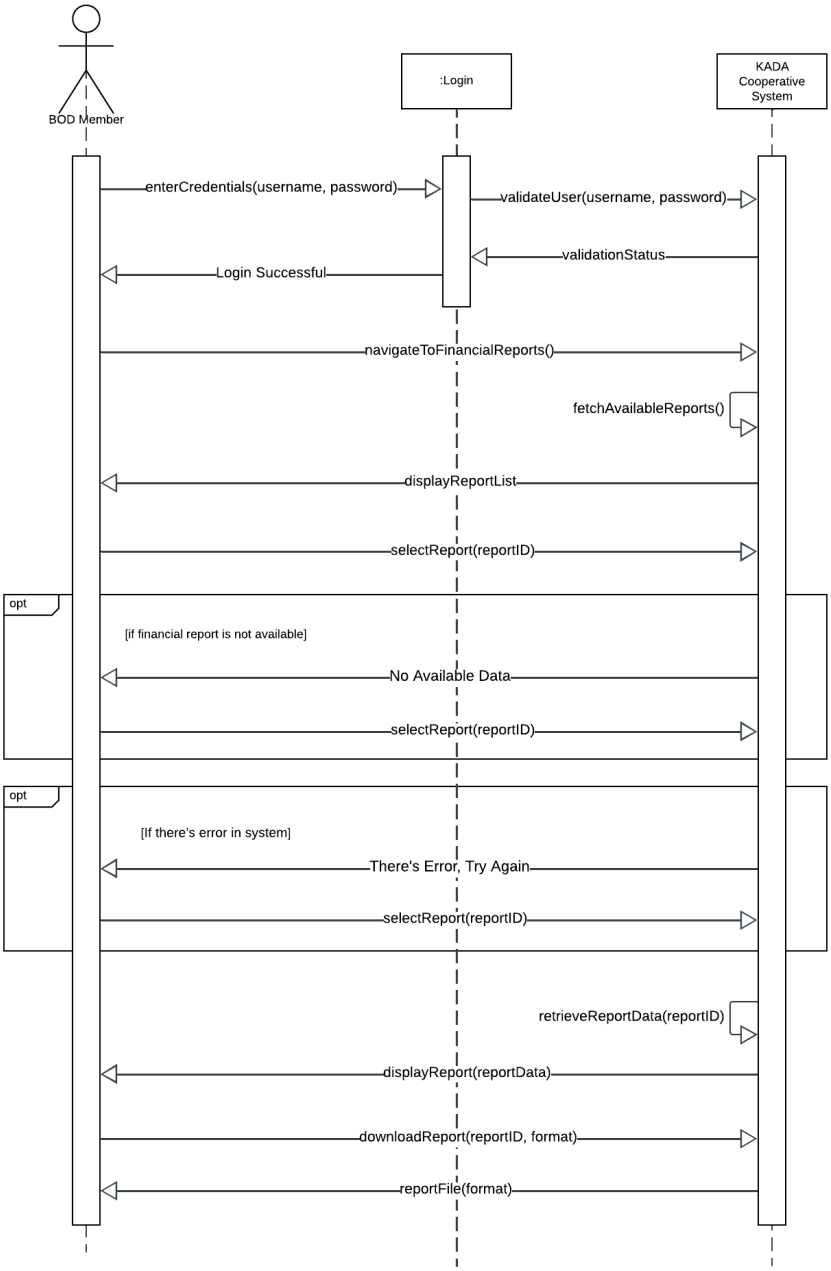
MANAGE FINANCIAL REPORT: SEQUENCE DIAGRAM



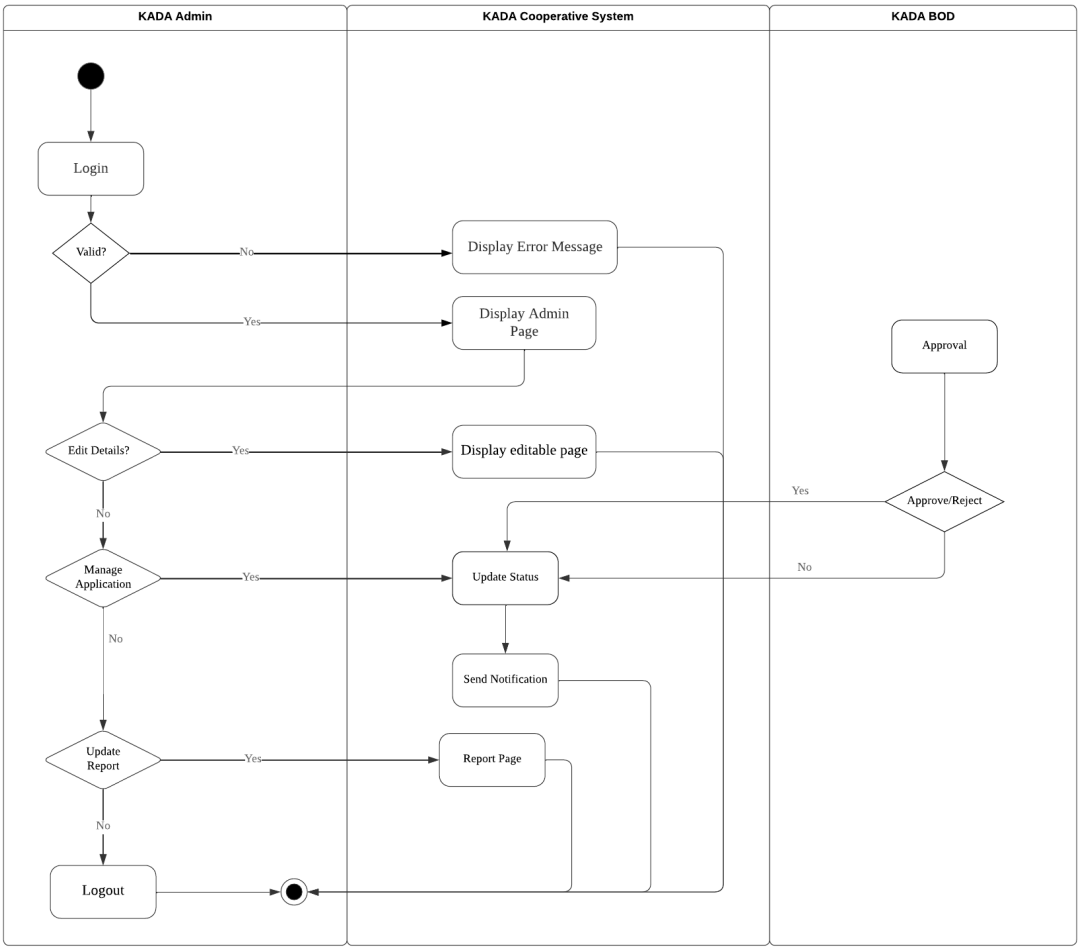
VIEW FINANCIAL REPORT: ACTIVITY DIAGRAM



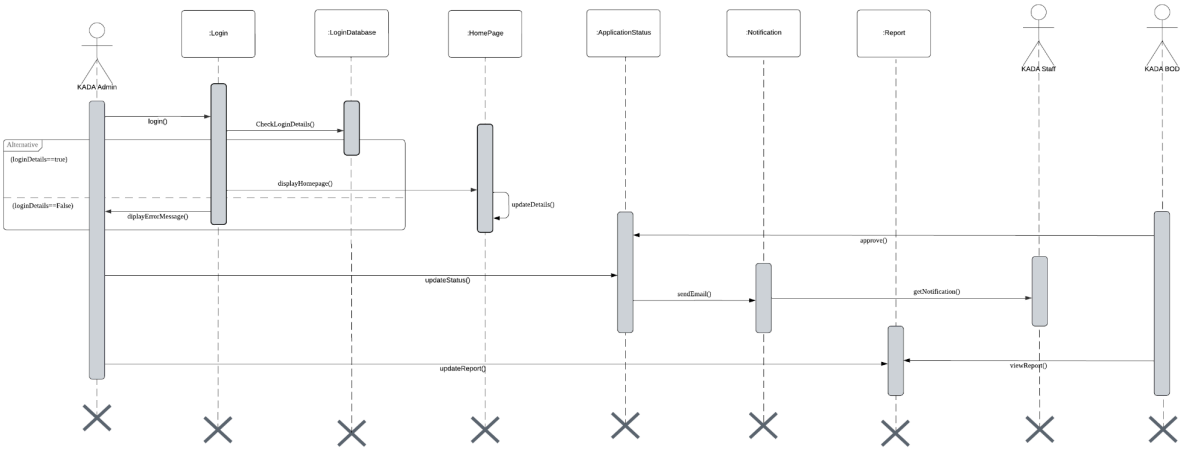
VIEW FINANCIAL REPORT: SEQUENCE DIAGRAM



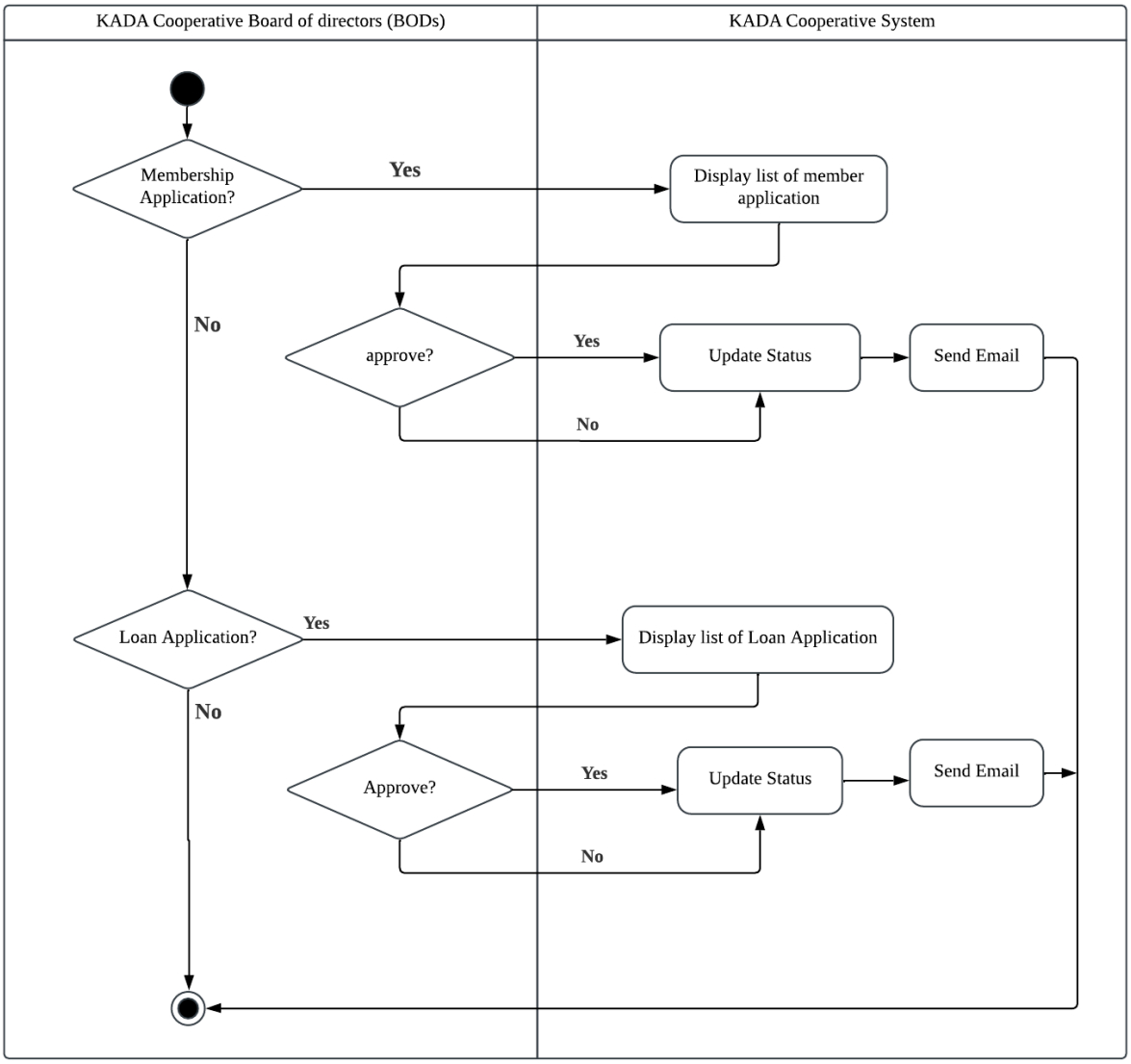
MANAGE MEMBER: ACTIVITY DIAGRAM



MANAGE MEMBER: SEQUENCE DIAGRAM



REVIEW APPLICATION: ACTIVITY DIAGRAM



REVIEW APPLICATION: SEQUENCE DIAGRAM