Software Design Document

For

MOBILE LIBRARY RESERVATION SYSTEM

Version 0.0

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1. INTRODUCTION

Software Design Descriptions (SDD)[1][2] is a document that provides the details of how the software is built and how the hardware works properly with the software. This report aims to inform and guide the software development team about the design of software. The software design description and operating procedures of Mobile Library Reservation System mobile application will be presented in detail throughout the report.

1.1. Purpose

The purpose of developing the Mobile Library Reservation System is that people can make reservations easily and quickly. The proposed mobile application lists the libraries and provides the opportunity to check the occupancy rate and make reservations on mobile easily. We hope to contribute to our users' fast and practical booking experience in the most user-friendly and convenient way for them.

1.2 Scope

Mobile Library Reservation System is a mobile application that allows people to see the occupancy rate of any library they want and make reservations from any library without losing time. This document contains full descriptions and features of this application. Using class diagrams, activity diagrams, sequence diagrams, ER diagram, database diagram and the design of user interfaces will be detailed in this document.

1.3 Definitions, Acronyms, Abbreviations

User: Any user character that is yet to register to the system.

Admin: The user character that supervised the system and a registered administration user.

Librarian: Librarian is the person who observes the library members studying in the library and logging into the library read their QR codes into the system.

Library Member: Any character that is registered to the system and thus, is able to benefit from the services of the system.

QR Code: It is a special matrix barcode type that can be read from the cameras of mobile devices.

Database: The database where the registered users of the system are stored with their personal information.

Class Diagram: A modeling language that is used in the software development process.

IEEE: Institute of Electrics and Electronics Engineering

UML: Unified Modeling Language

SRS: Software Requirements Specifications

1.4 References

[1] IEEE Std 1016-1998, Recommended Practice for Software Design Description.
[2] IEEE Std 1058-1998, IEEE Standard for Software Project Management Plans.
[3] "Creately" [Online]. Available: https://creately.com/. [Accessed: 22 December 2020].
[4] "Lucidchart" [Online]. Available: https://lucidchart.com/. [Accessed: 24 December 2020].
[5] "Figma" [Online]. Available: https://www.figma.com/. [Accessed: 21 December 2020].
[6] "Draw.io" [Online]. Available: https://app.diagrams.net/. [Accessed: 22 December 2020].

1.5 Overview

Chapter 1 contains an introduction to the software design description of the project.

Chapter 2 contains design considerations and design elements.

Chapter 3 contains software and hardware architecture of the project.

Chapter 4 contains system Interfaces.

Chapter 5 contains design of user interface.

Chapter 6 contains process design of the project and sequence diagrams which will be provided in the SRS Document.

Chapter 7 contains the design of the database.

2. Design Considerations

2.1 Application Design Approach

2.1.1 Class Diagram

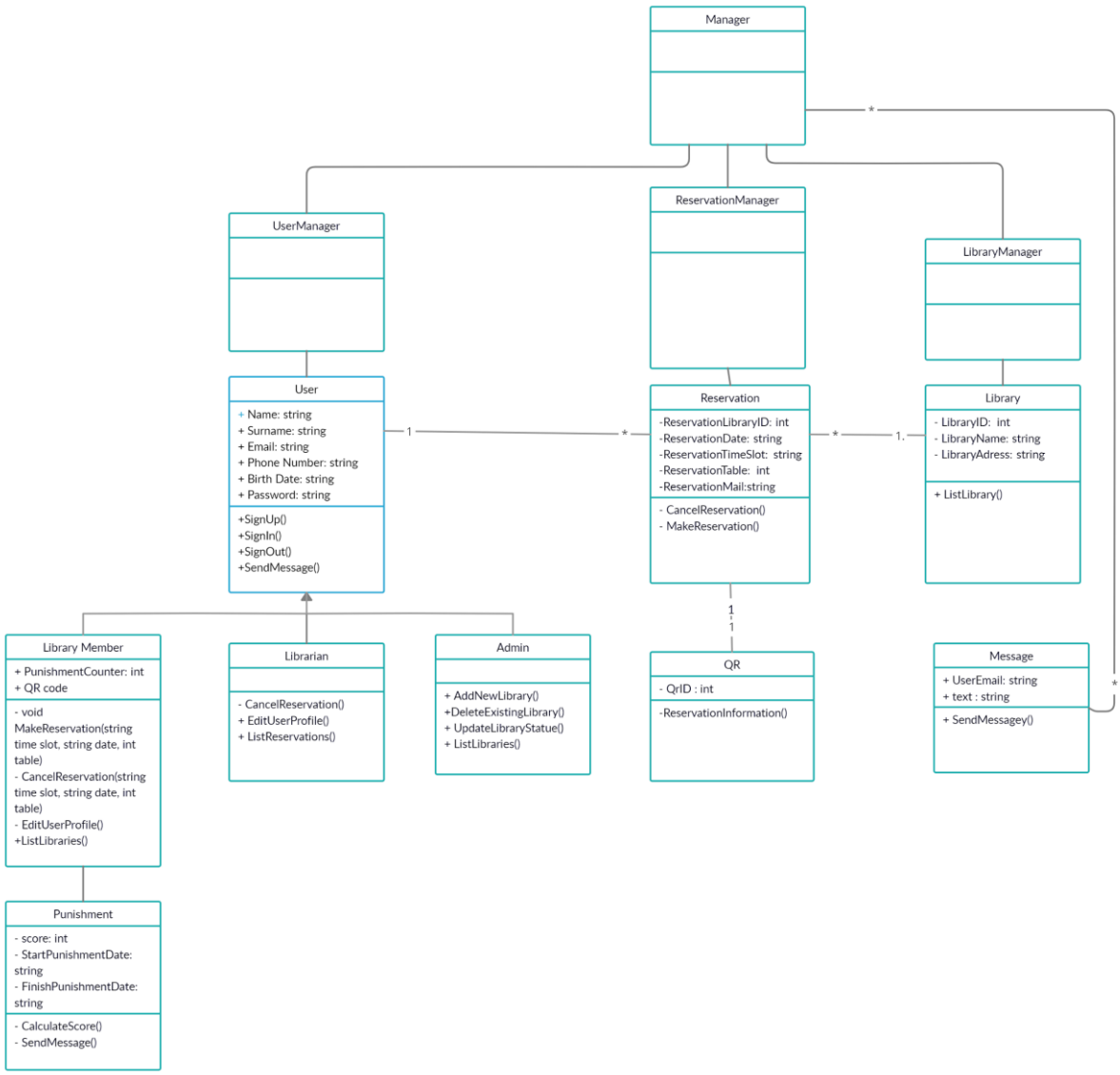


Figure 1 : Class Diagram

The connections between the entities of the mobile application are shown in Figure 1. Library Member, Librarian and Admin are inherited from the User class because they are different characters that have some common properties. Also, they have different functions and common functions of their own. Reserved library, reservation date, time slot and table number are kept in reservation class. Each reservation has one QR code.

The library class contains the name, address and capacity information of the libraries. Admin checks on the system whether the new library is added, the existing library is removed or the library is open / closed.

2.2 Design Elements

2.2.1 View and Edit the profile

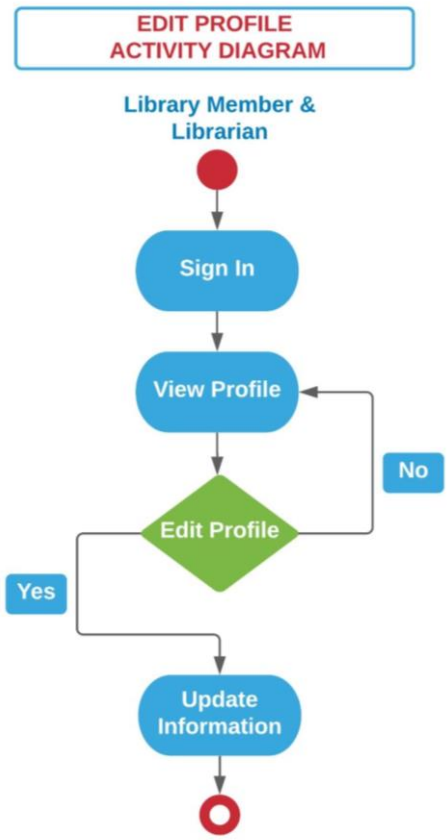


Figure 2 : View and Edit the Profile Activity Diagram

Library members can update their own personal information by selecting the view profile option from the menu that appears after signing in.

After the librarian signs in, selects the list users option from the next menu. Librarian displays the profile of any library member from the list of members of this library and can make changes to the profile information at the request of the library member.

2.2.2 Make Reservation

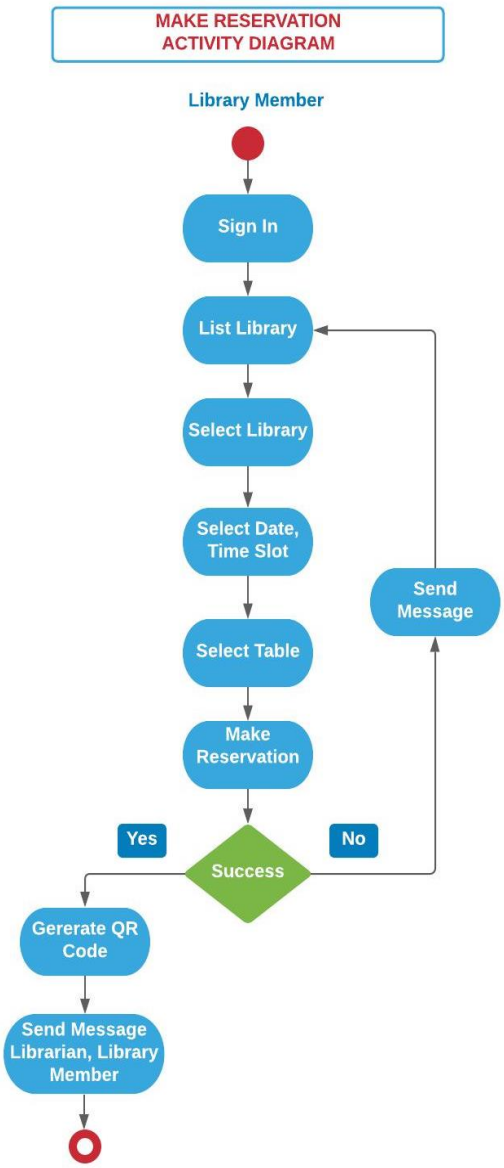


Figure 3 : Make Reservation Activity Diagram

After signing in as a library member, the library member displays all libraries in the database by selecting the list library option from the Menu page. After selecting the library, it reaches the list of available tables by selecting date and time slot. After choosing a table, it completes the process by saying Make Reservation. If the process fails, a warning message is sent to the user and the library member is directed to the List Library page. If the transaction is successful, a QR code specific to the reservation is generated by the system. The details of the reservation are sent to the library member and librarian by the system

2.2.3 List - Cancel Reservation

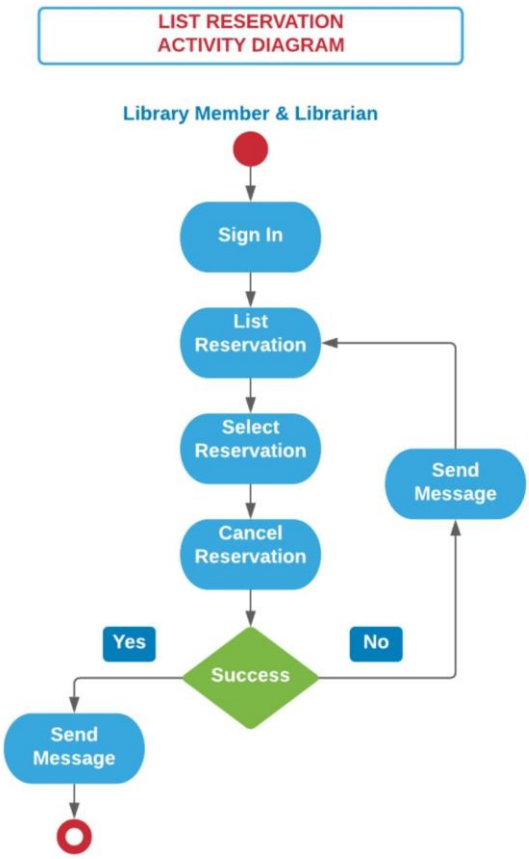


Figure 4 : List - Cancel Reservation Activity Diagram

After signing in as a library member, the library member displays all reservations by selecting the list reservation from the Menu page. Library members can cancel by selecting the reservation they want from the list. If this process is successful, a confirmation message is sent to library members. If the process is not successful, an error message is sent to the library member and the library member is redirected to the List Reservation page.

After the librarian signs in, the librarian displays all the reservations of the library where the librarian works by selecting the list reservation from the Menu page. Librarians can choose any reservation from this list and cancel it. If this process is successful, a confirmation message is sent to library members. If the operation is not successful, a warning message is sent to Librarian and the librarian is redirected to the List Reservation page.

2.2.4 Admin Add, Delete, Update Library

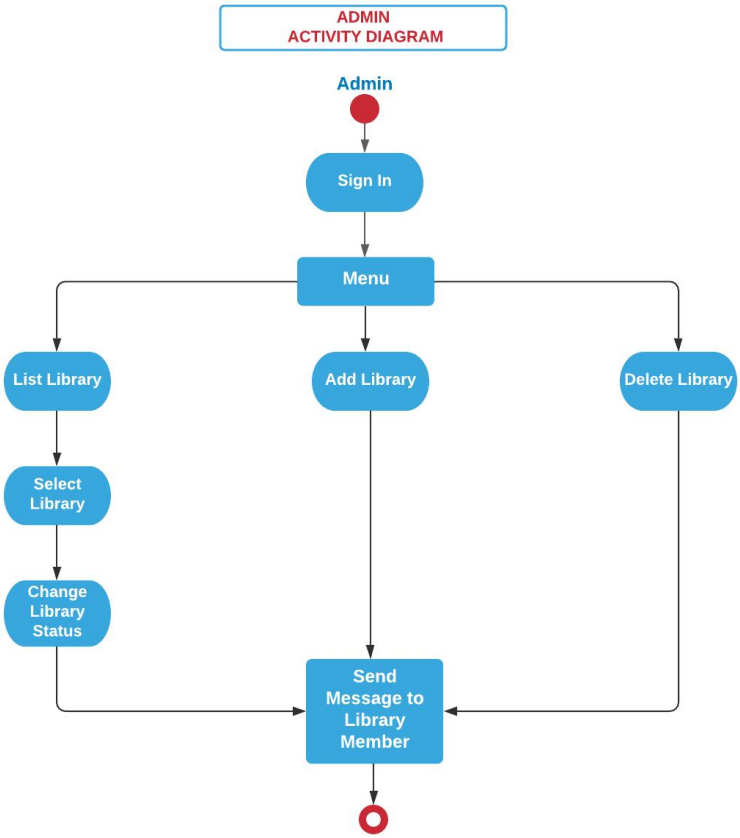


Figure 5 : Admin Add, Delete, Update Library Activity Diagram

After the admin signs in, it reaches the Menu page. Here, the admin can add a new library by selecting the Add library option from the Menu page, or delete an existing library by selecting the Delete Library option. Likewise, by clicking List Library from the Menu page, it sorts the library list. The admin can change the status of the library he chooses here due to holidays or renovations. All changes made by admin are sent to all library members registered in the database via message.

2.3 Tools Used

Creatly.com[3] is used for class diagram in section 2.1. lucidchart.com[4] is used for activity diagram in section 2.2. Figma.com[5] is used for designing user interfaces in section 5.2. Draw.io[6] is used for sequence diagram section 6.1 and database design in section 7.

2.4 Constraints

For the software development process specified in the references section, not only the software development team complies with the IEEE standard [1], but there are also rules governing the entire requirement process.

-The library members can make a reservation maximum 7 days in advance.

-The library member can access own information and edit own information

-Admin and librarian can view library member information but cannot change.

All these issues are discussed in the sections below.

2.5 Assumptions and Dependencies

Every user must have an IOS or Android device with an internet connection and appropriate software and hardware configuration stated in above sections. Appropriate software configurations are Android 9.0 and iOS 14.3.

3. ARCHITECTURE

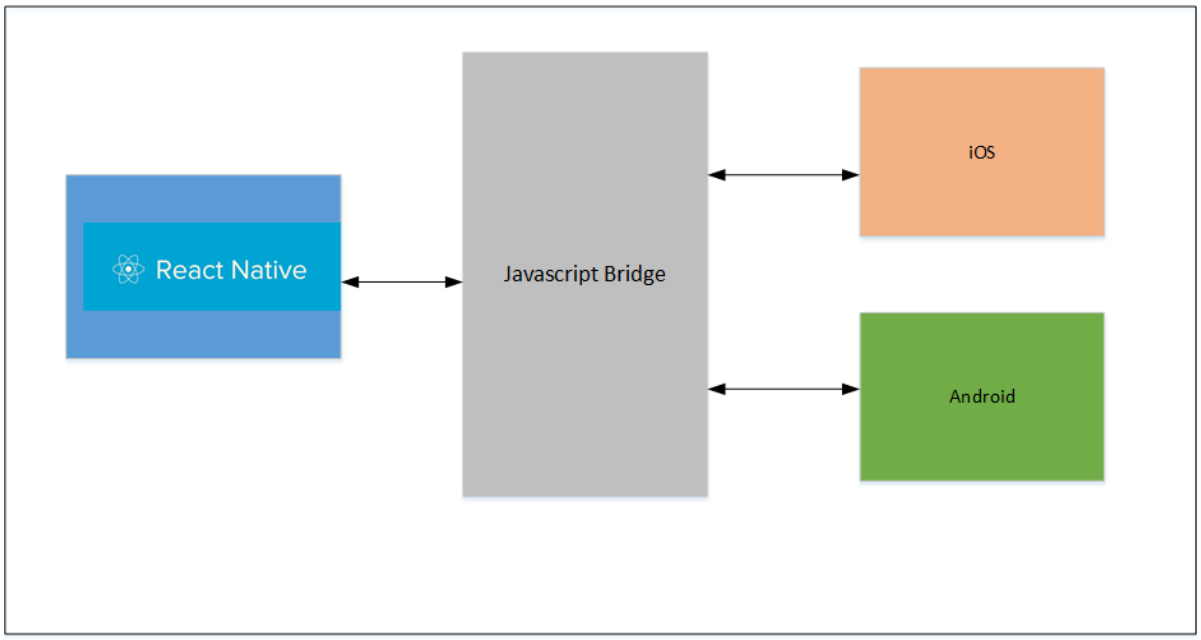


Figure 6 : Architecture Design

3.1 Software Architecture

MLRS Mobile Application software will be designed according to Figure 6. The application can be accessed from Android and iOS software-based devices. The database can hold information of all registered users. The database includes basic information of library members, librarians and admin, all libraries empty and reserved tables, all of the details of reservations, cancelled reservations and reservations QR codes.

3.2 Hardware Architecture

Devices that run on Android and IOS software need to have enough storage to operate the Library Reservation System Mobile Application and a QR code reader in the library.

4. SYSTEM INTERFACES

4.1 External System Interfaces

There is no external system interface.

5.USER INTERFACE DESIGN

5.1 Navigation

Since this application will be developed to be used on IOS and Android devices, the application must be downloaded from Play Store or App Store. The user interfaces of the application will be discussed in more detail in section 5.2.

5.2 Screen Definitions

5.2.1 Page descriptions

After developing the mobile library reservation system application, the screen images we aim to obtain are shown below.

5.2.1.1 Home Page

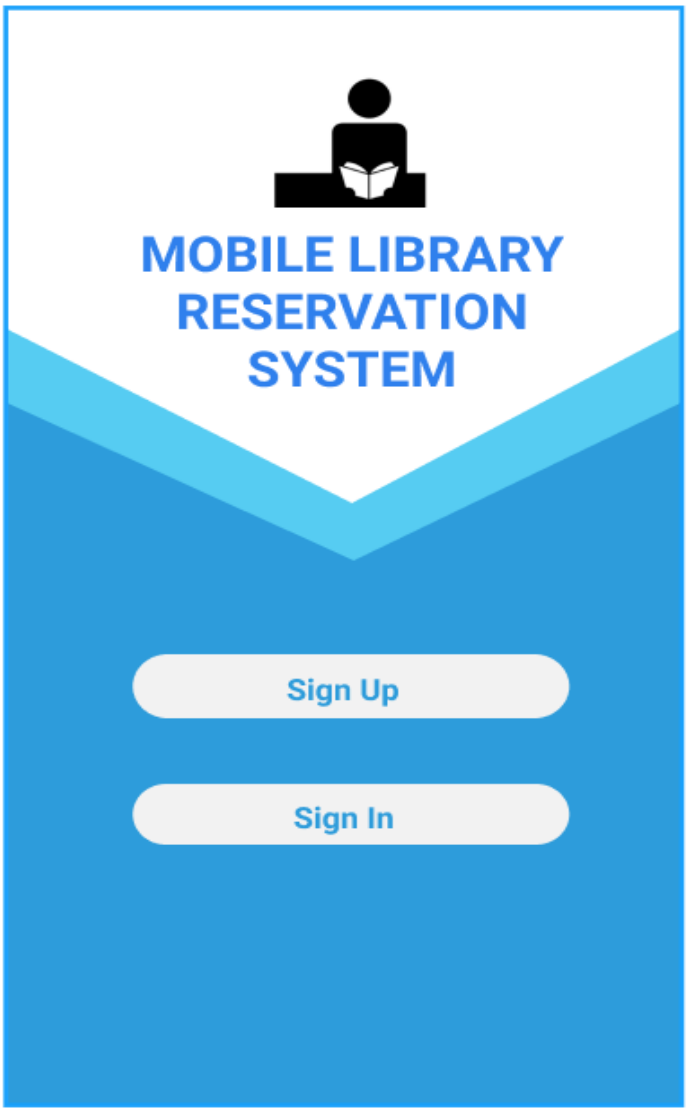


Figure 7 ： Home UI

5.2.1.2 Sign Up Page

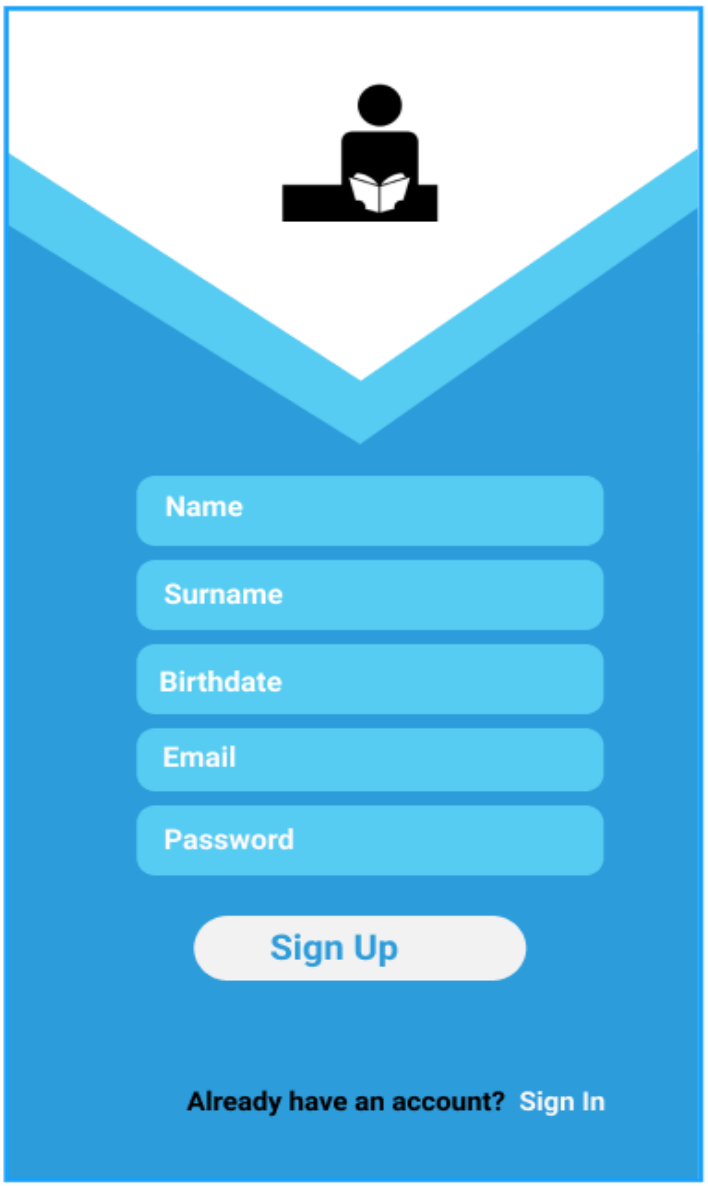


Figure 8 ： Sign Up UI

5.2.1.3 Sign In Page

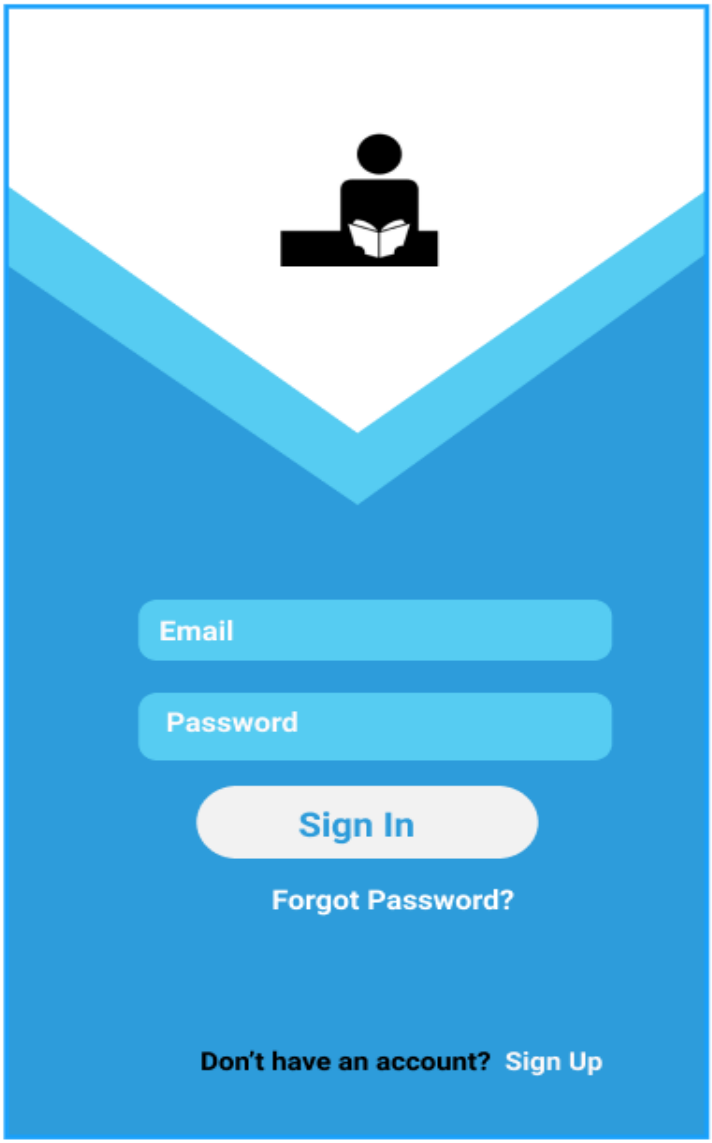


Figure 9 ： Sign In UI

5.2.1.4. Library Member - Menu Page

Figure 10 ： Library Member - Menu UI

5.2.1.5 Library Member - Edit Profile Page

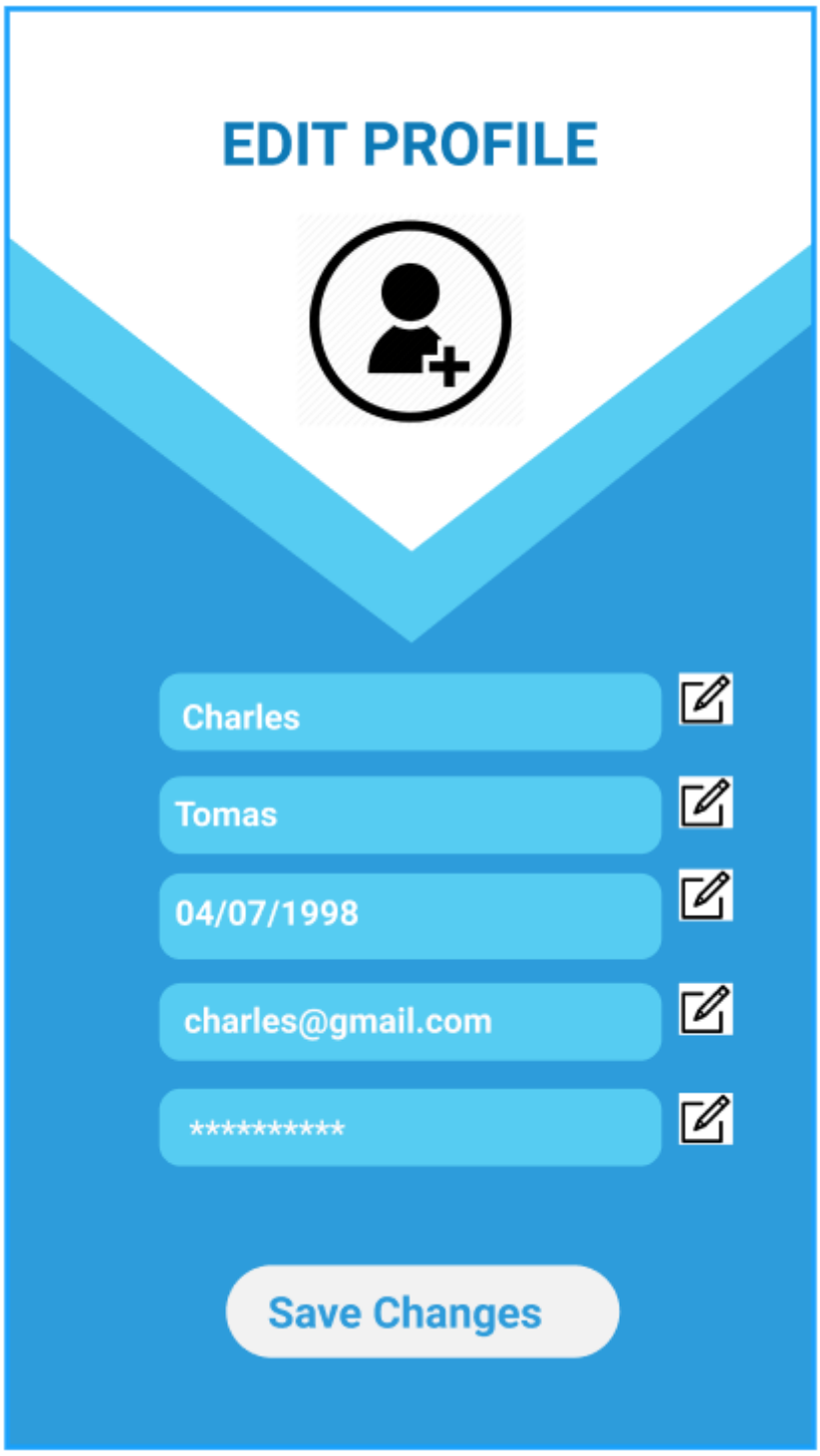


Figure 11 : Library Member - Edit Profile UI

5.2.1.6 LibraryMember - List Libraries Page

Figure 12 : Library Member - List Libraries UI

5.2.1.7 Library Member- Select Date and Time Slot Page

Figure 13 : Library Member- Select Date and Time Slot UI

5.2.1.8 Library Member - Choose Table Page

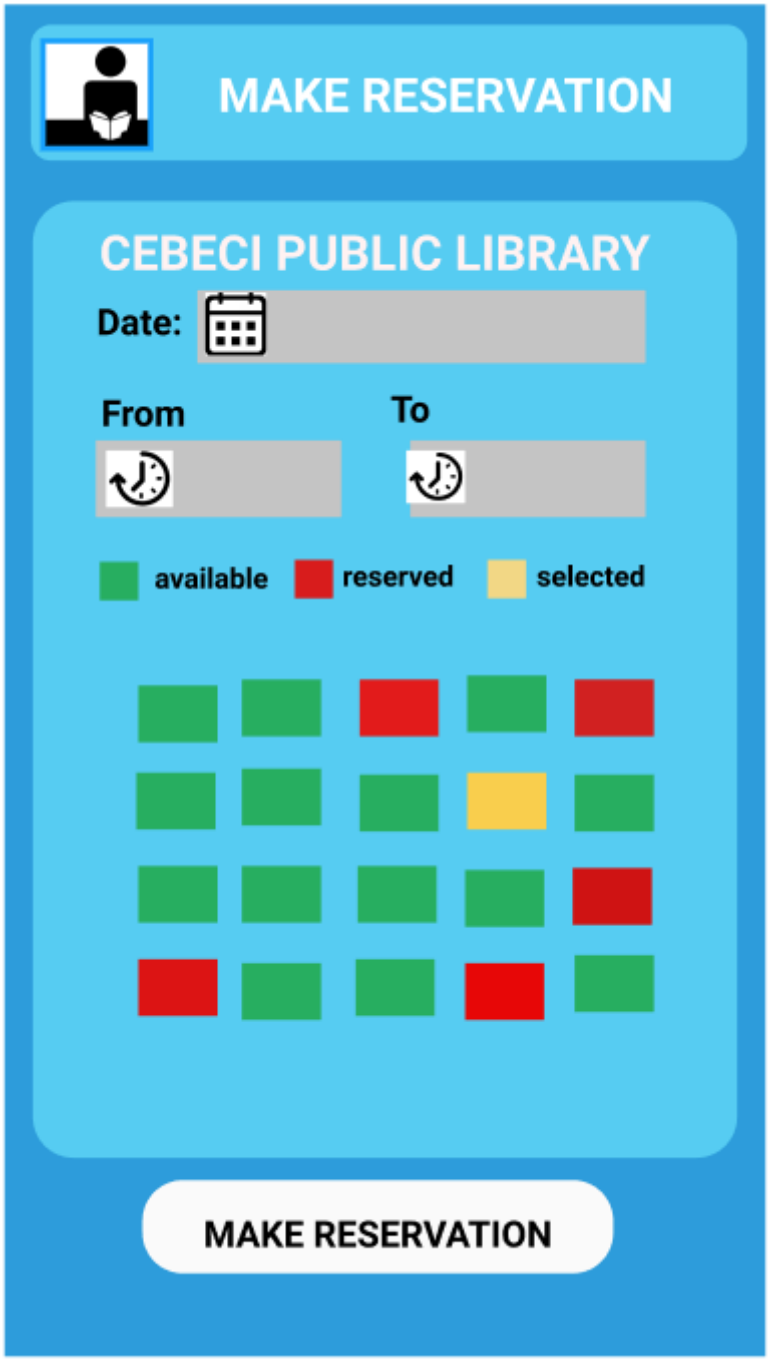


Figure 14 : Library Member - Choose Table UI

5.2.1.9 Library Member - List Reservation Page

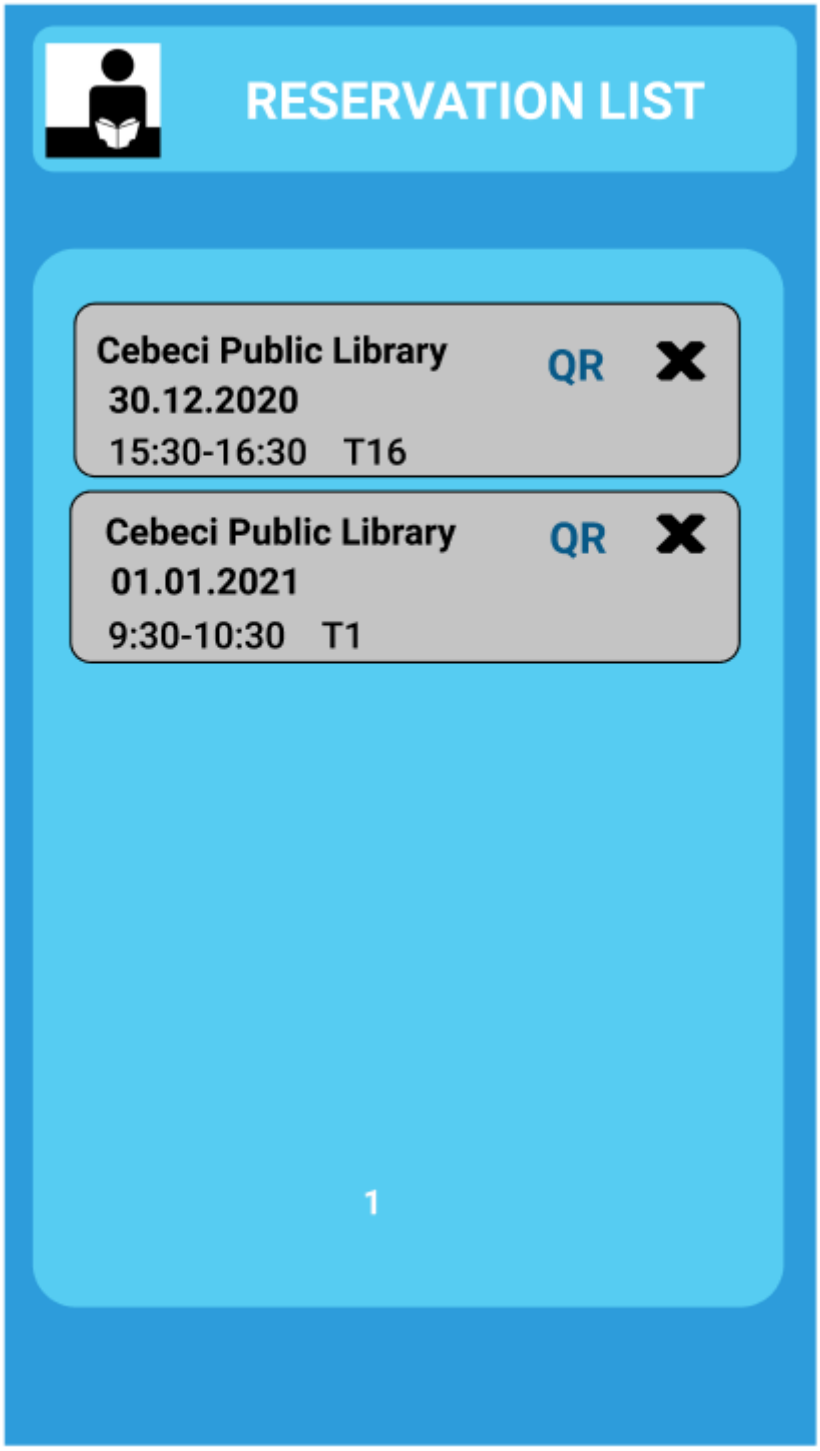


Figure 15 : Library Member - List Reservation UI

5.2.1.10 Library Member - QR Code Page

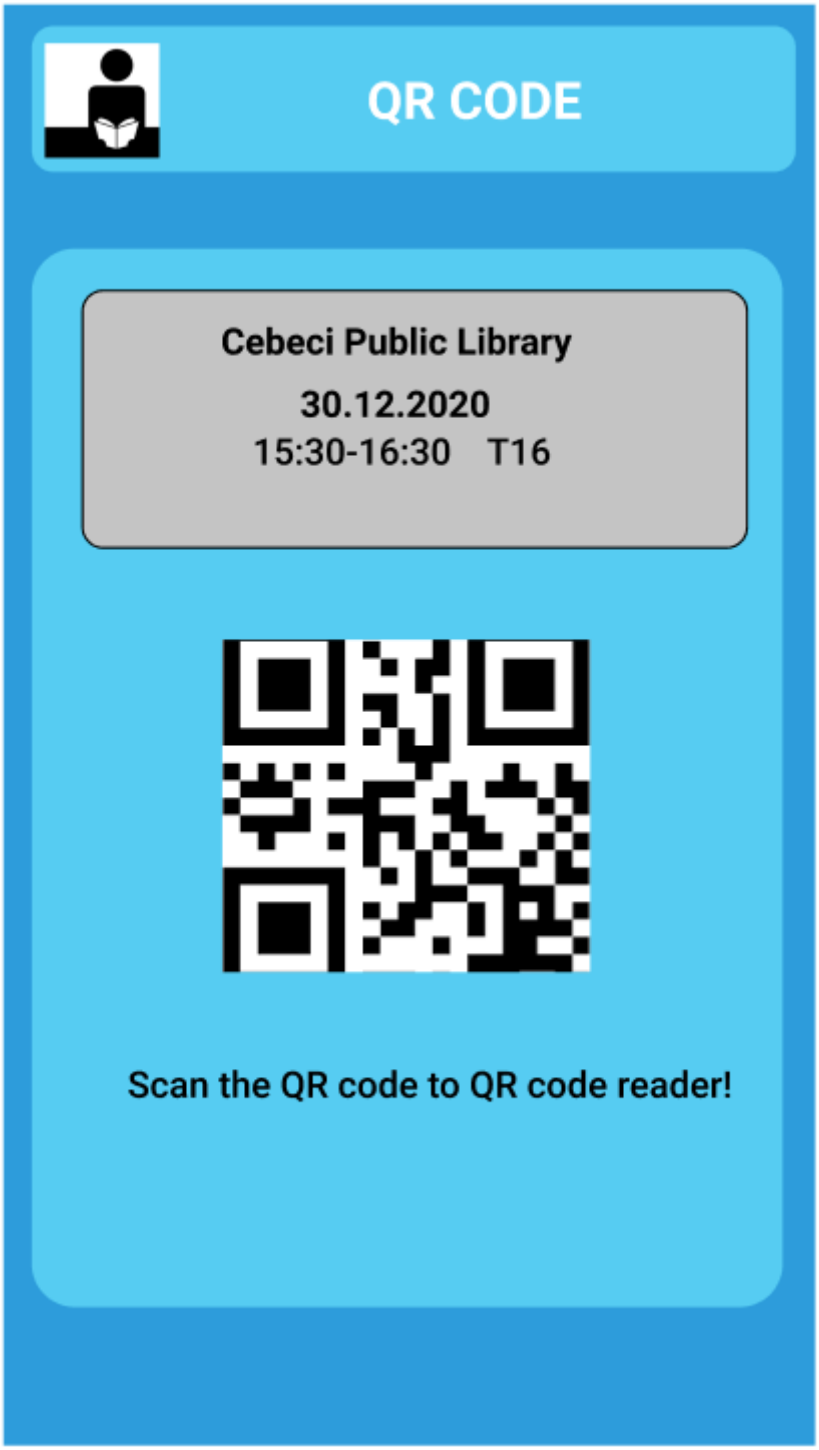


Figure 16 : Library Member - QR Code UI

5.2.1.11 Library Member - Cancel Reservation Page

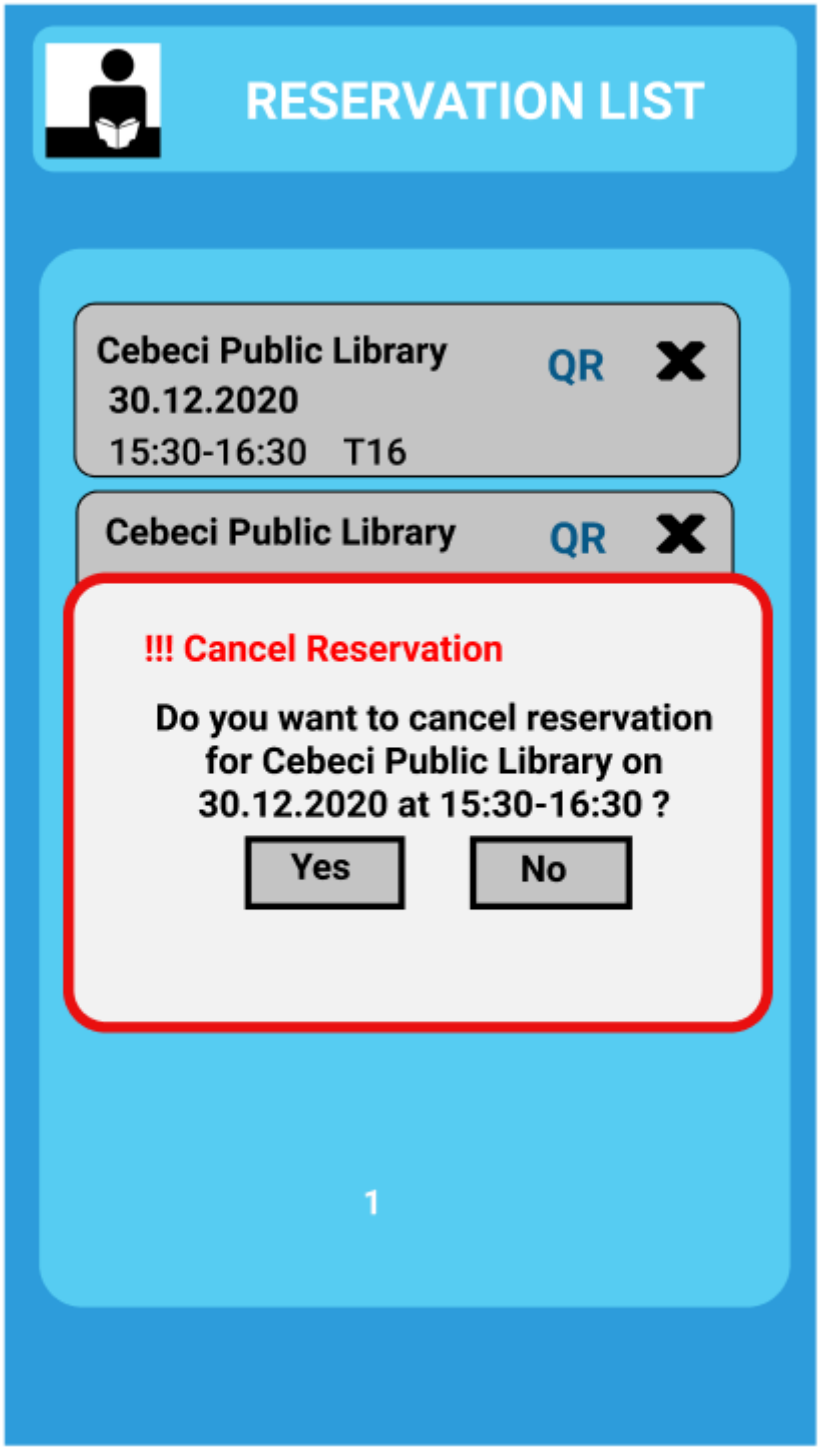


Figure 17 : Library Member - Cancel Reservation UI

5.2.1.12 Admin - Menu Page

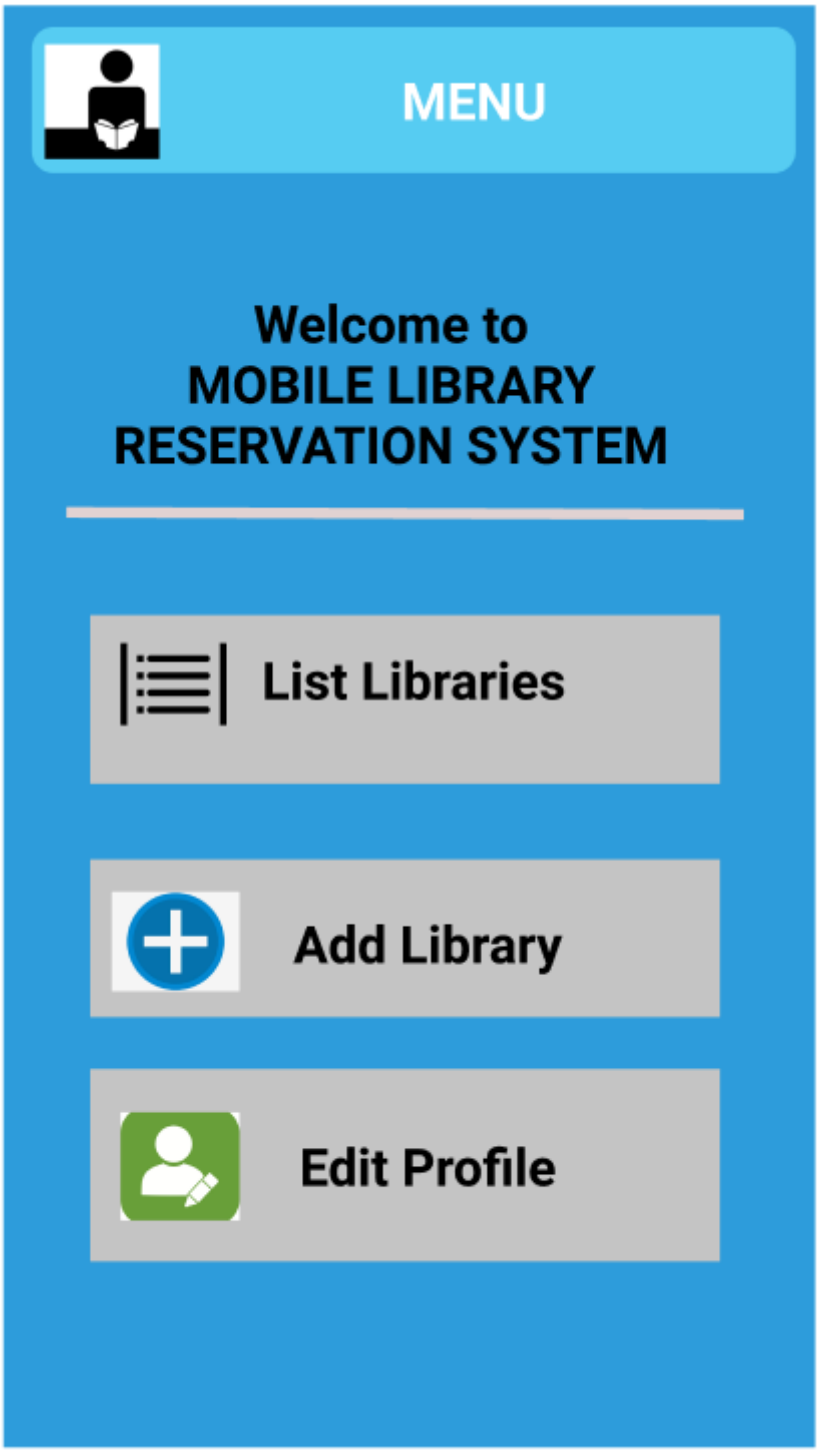


Figure 18 ： Admin - Menu UI

5.2.1.13 Admin - List Libraries Page

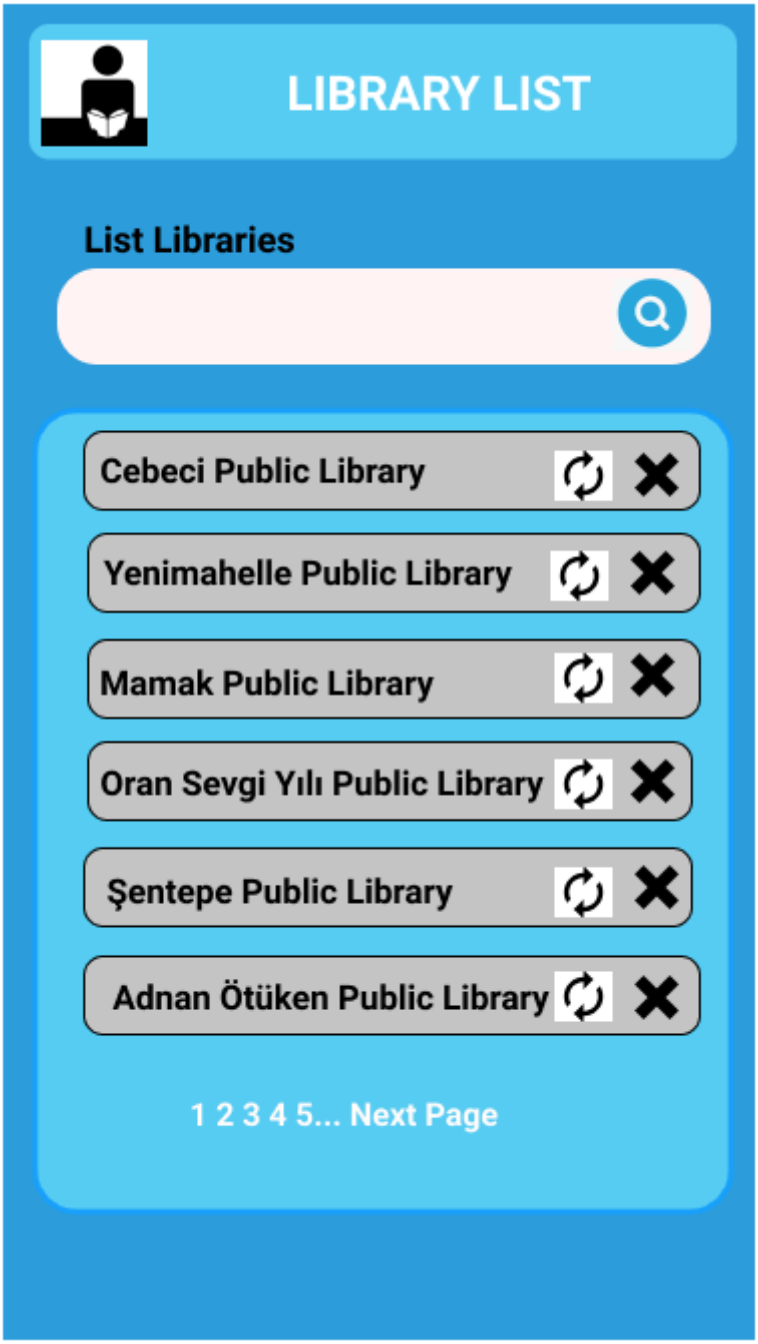


Figure 19 : Admin - List Libraries UI

5.2.1.14 Admin - Delete Library Page

Figure 20 : Admin - Delete Library Status UI

5.2.1.15 Admin - Change Library Status Page

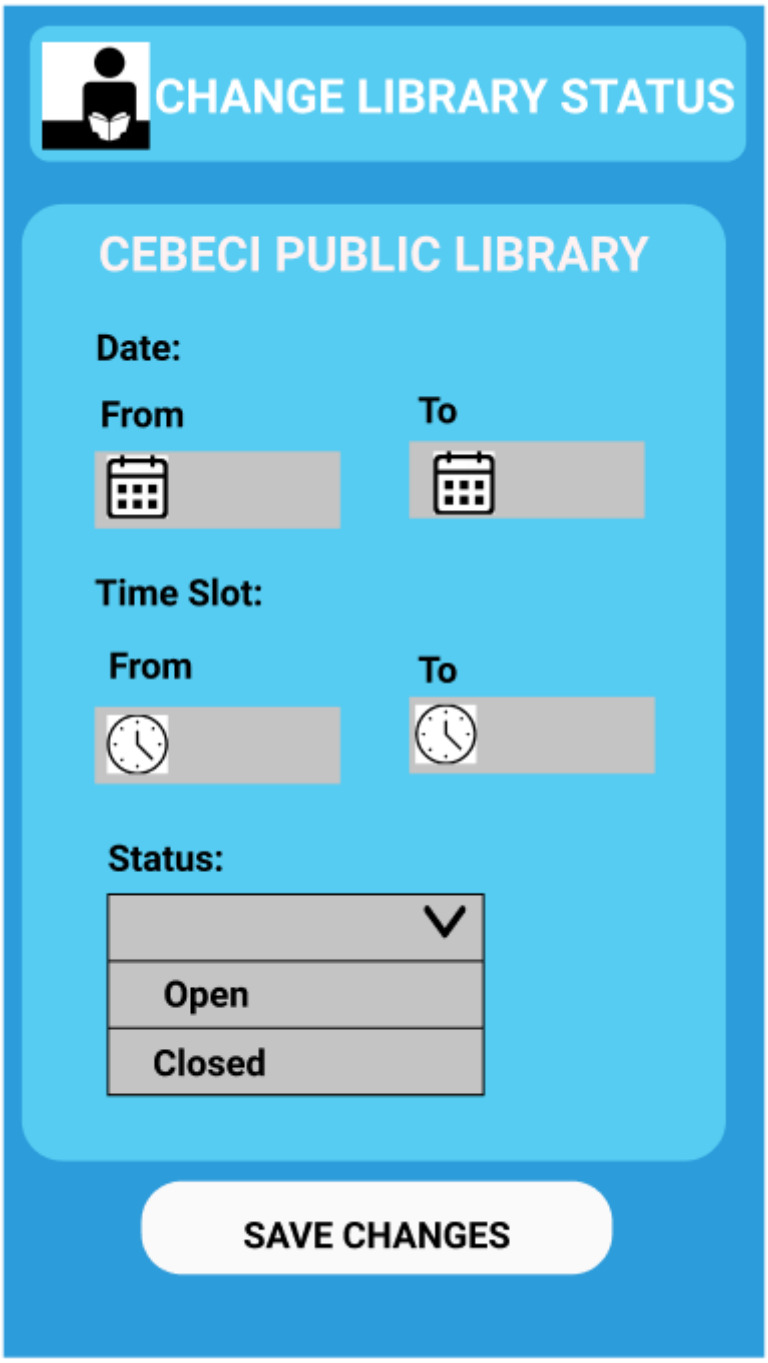


Figure 21 : Admin - Change Library Status UI

5.2.1.16 Admin - Add Library Page

Figure 22 ： Admin - Add Library UI

5.2.1.17 Librarian - Menu

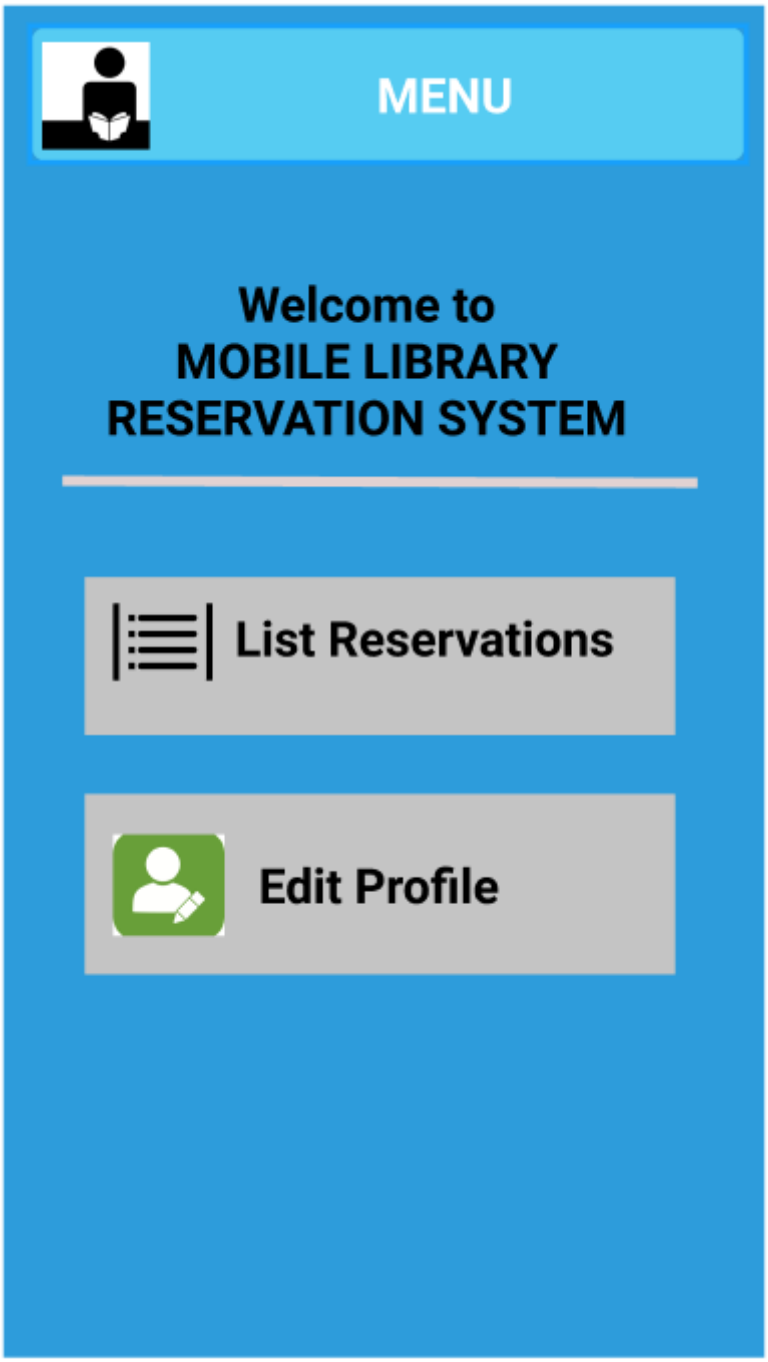
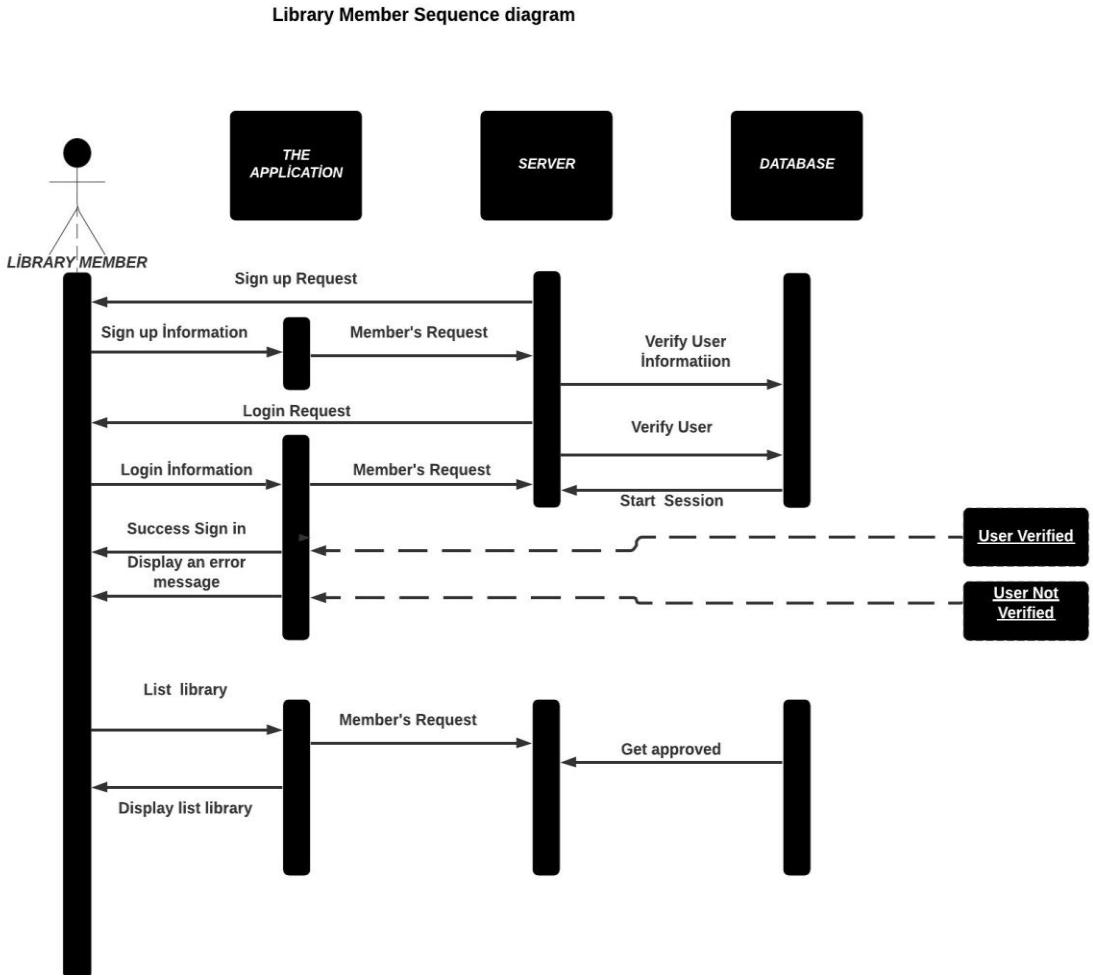


Figure 23 : Librarian - Menu UI

6.PROCESS DESIGN

6.1 Sequence Diagrams

6.1.1 Library Member



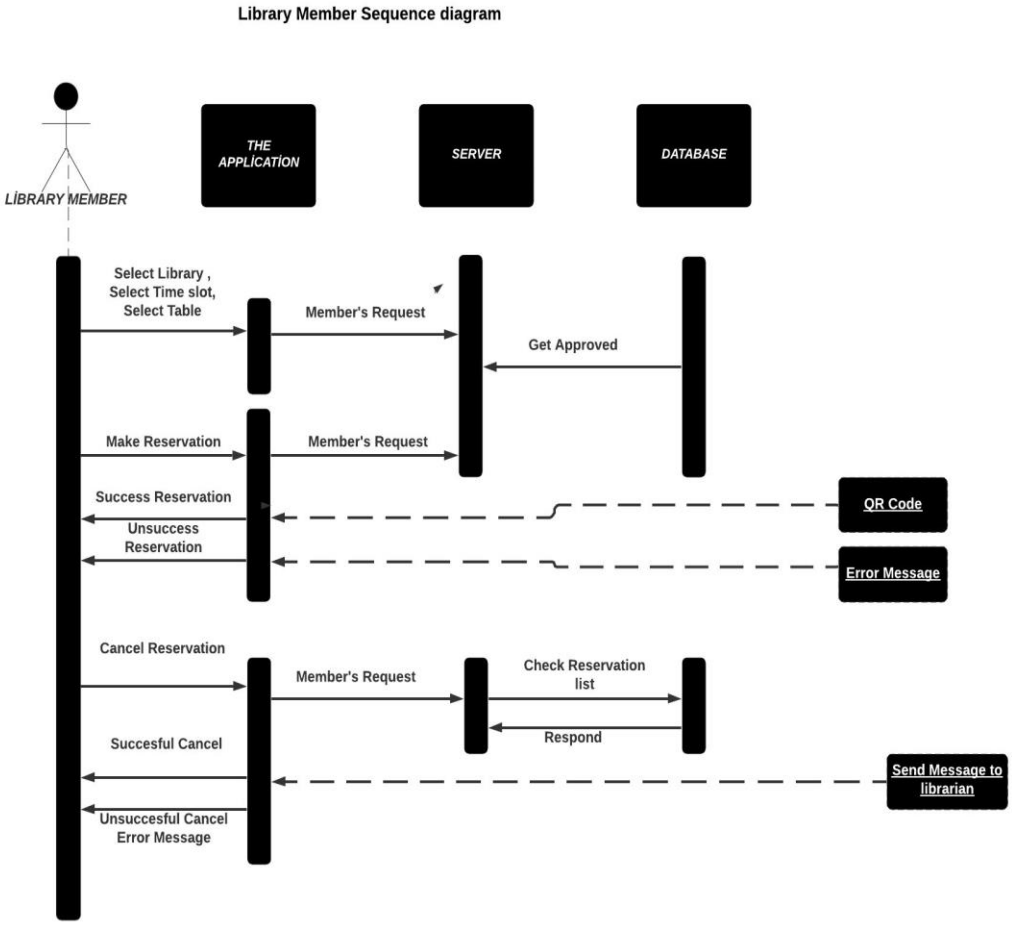


Figure 24-25 ： Library Member Sequence Diagram

6.2.2 Librarian

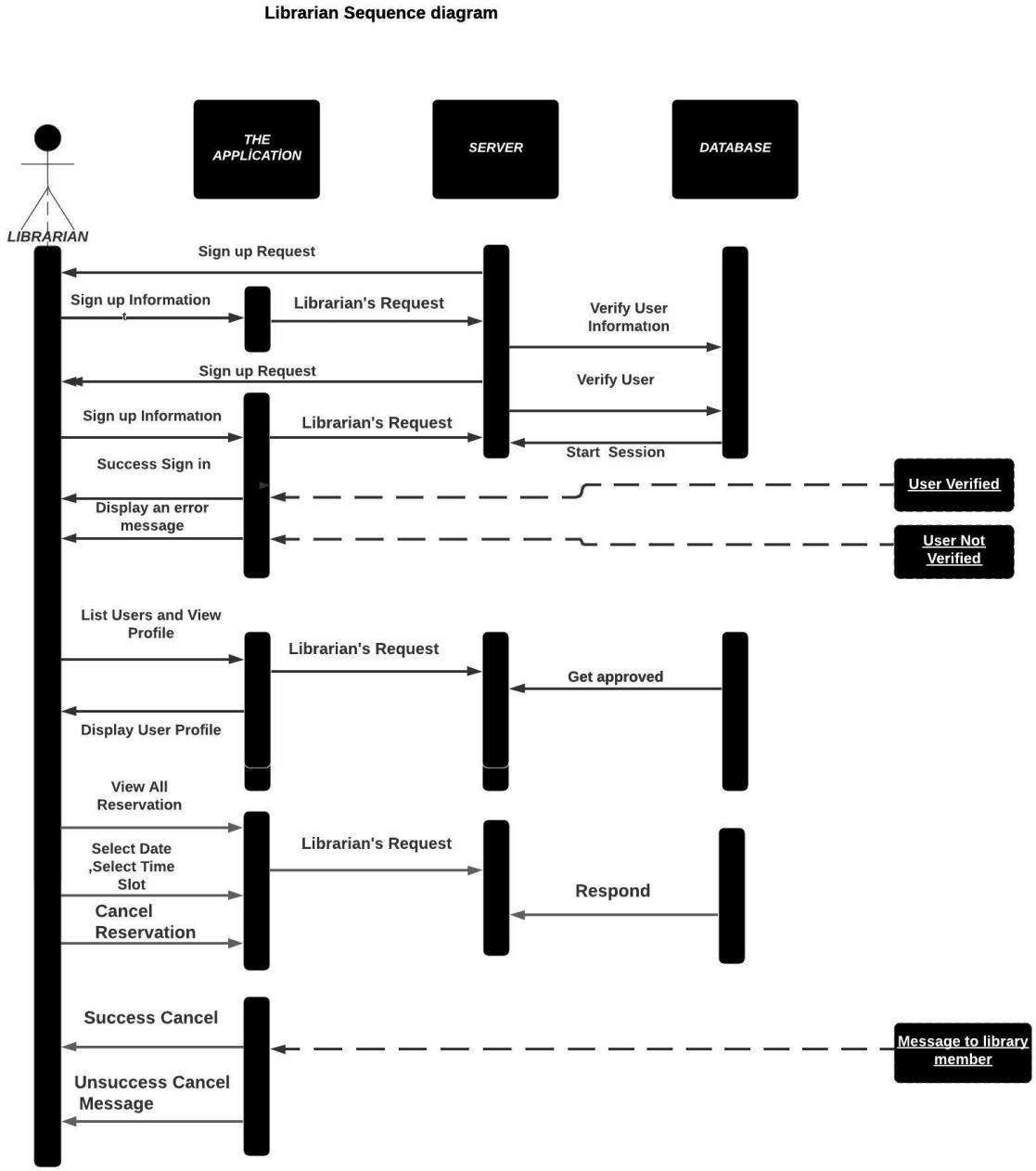


Figure 26 : Librarian Sequence Diagram

6.2.3 Admin

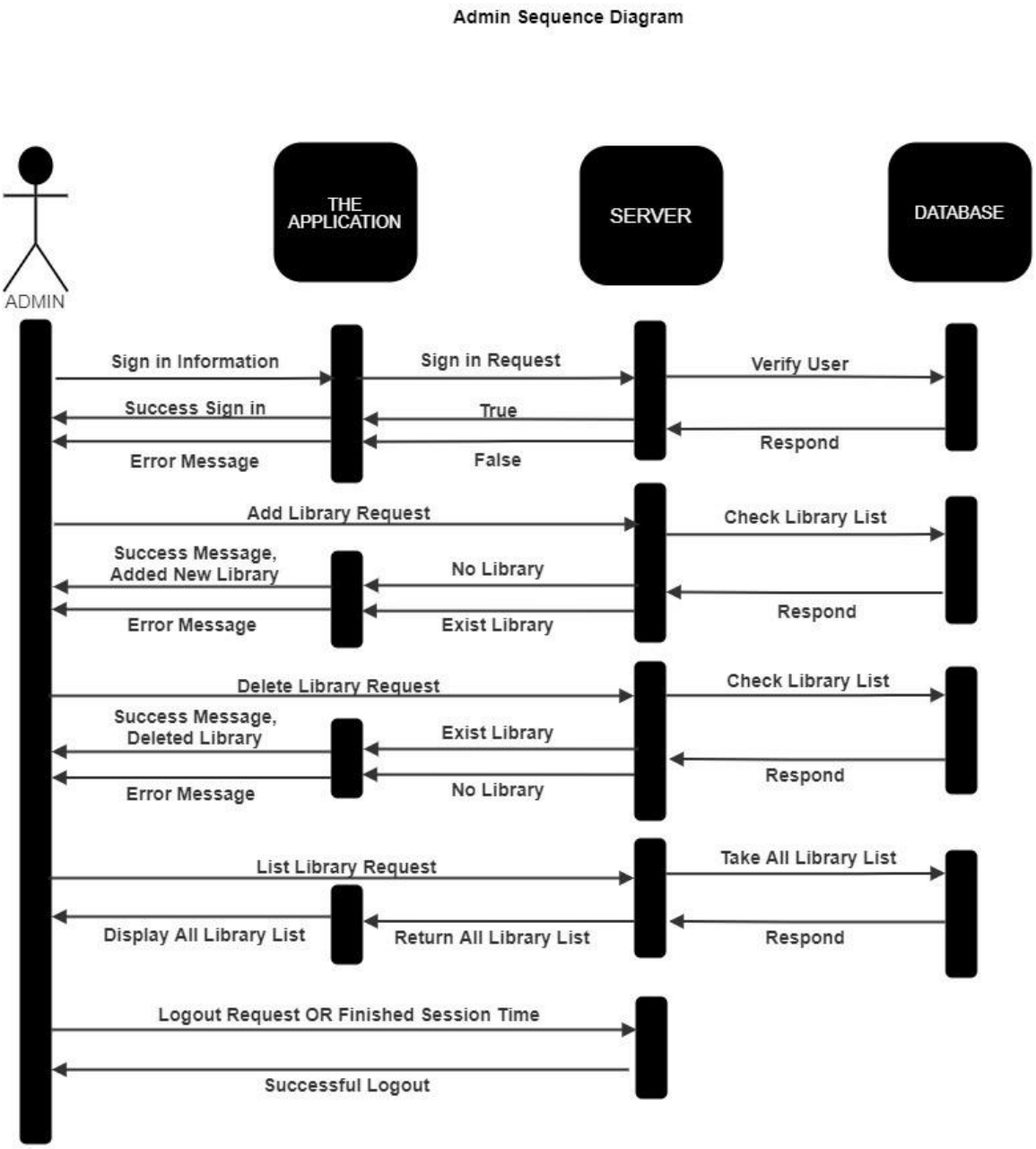


Figure 27 : Admin Sequence Diagram

7. DATABASE DESIGN

7.1 ER Diagram

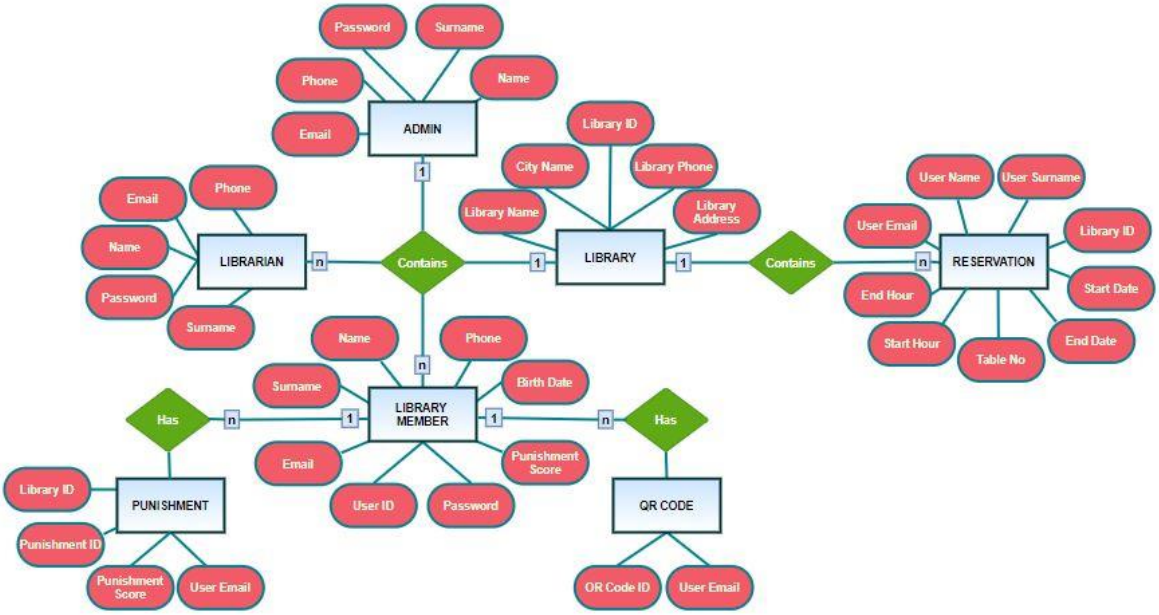


Figure 28 : ER Diagram

7.2 Database Diagram

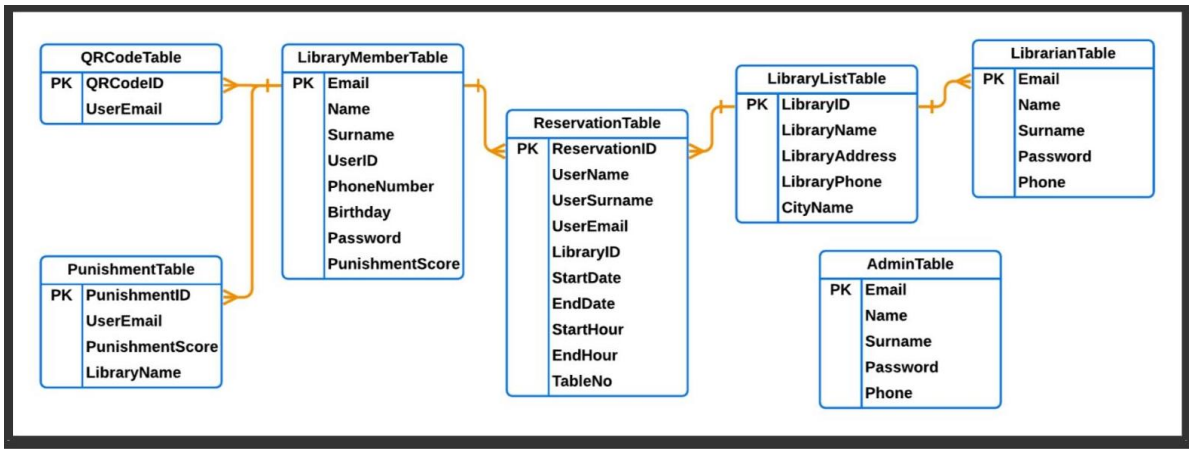


Figure 29 : Database Diagram