Software Requirements Specifications

For

MOBILE LIBRARY RESERVATION SYSTEM

Version 0.0

4 Dec 2020

Cankaya University

Computer Engineering Department

Prepared By:

Burcu BİTER

Beyza YÜKSEL

Eda Gül SÜMER

Abstract

This document contains the software requirements specification of the Mobile Library Reservation System project, which has the mission of users to create membership through the mobile application and to keep and change the reservation information on the firebase.

This document is prepared according to IEEE STD 830-1998, IEEE Recommended Practice for Software Requirements Specifications. This document includes the product perspective, user interfaces, product functions, user characteristics, system assumption and constraints, system requirements and more.

Keywords: Mobile Library Reservation, Software Requirements Specification, Library Member, Librarian, System Requirements Specifications

TABLE OF CONTENTS

Abstract **2**

1 Introduction **5**

1.1 Purpose 5

1.2 Scope 5

1.3 Definitions, Abbreviations, Acronyms 6

1.4 Reference 6

1.5 Overview 6

2 Overall Description **7**

2.1 Product Perspective 7

2.1.1 System Interfaces 7

2.1.2 User Interfaces 7

User interfaces will be provided for the IOS and Android mobile operating systems. 7

2.1.2.1 Initial Screen 8

2.1.2.2 Sign Up Screen 8

2.1.2.3 Sign In Screen 8

2.1.2.4 Main Screen for All User Types 8

A) Main Page For Library Member 8

B) Main Page For Admin 9

C) Main Page For Librarian 9

2.1.3 Hardware Interfaces 9

2.1.4 Software Interfaces 10

2.1.5 Communication Interfaces 10

2.1.6 Memory Constraints 10

2.1.7 Operations 10

2.2 Product Functions 11

2.3 User Characteristics 12

2.3.1 Library Member 12

2.3.2 Librarian 12

2.3.3 Admin 12

2.4 Constraints 13

2.5 Assumptions and Dependencies 13

2.5.1 Dependencies 13

2.5.2 Assumptions 13

3 Specific Requirements **13**

3.1 External Interface Requirements 13

3.2 Functional Requirements 13

3.2.1 Common Functions 13

3.2.1.1 Sign Up Function 13

3.2.1.2 Sign In Function 14

3.2.1.3 Sign Out Function 15
3.2.1.4 Send Message Function 15
3.2.1.5 List Libraries Function 16
3.2.3.5 Change Account Details Function 18
3.2.2 Library Member Functions 18
3.2.2.1 Make Reservation Function 18
3.2.3 Librarian Functions 19
3.2.2 Admin Functions 20
3.2.2.1 Add Library Function 20
3.2.2.2 Delete Library Function 20
3.2.2.4 Change Library Status Function 21
3.3 Performance Requirements 21
3.4 Security Requirements 21
3.5 Design Constraints 21
3.6 Software System Attributes 22
3.6.1 Reliability 22
3.6.2 Usability 22
3.6.3 Availability 22
3.6.4 Security 23
3.6.5 Maintainability 23
3.6.6 Adaptability 23
3.6.7 Portability 23
3.7 Other Requirements // Beyza 23

1 Introduction

The following subsections are an overview of the entire Software Requirements Specification (SRS) document.

1.1 Purpose

This document provides a technical description of all software requirements of the Mobile Library Reservation System. The document will not only define the product functions, user interfaces, product functions, user characteristics, system constraints, and specific system requirements, but also serve as a basis for the Software Design Document that will be prepared according to IEEE 830 [1]. This SRS is prepared to establish communication between the acquirers, users (Admin, Librarian, Library Members), and the software development team.

1.2 Scope

The mission of the project is to enable users who are members of the library to make reservations online through the mobile application and to check the availability of the library selected from the listed libraries and make it easier for them to make reservations. In order to make a reservation, users must complete their membership process and log into the system. When the users enter the mobile application, they select one of the libraries in their city. Then, they check the occupancy rate and make a reservation for their desired study desk in case of any space in the desired date and time slot. When the reservation is made, a special QR code is assigned to the users by the system. Users can enter the library by having the QR code read into the system at the library entrance. MLRS will be accessible only to registered users. Thanks to this application, users will be able to access the libraries of their city online. The objectives of the project are:

- To create an effective communication channel between the library and its members.
- To make reservations quickly and easily.
- To facilitate reservation tracking via QR code.
- To create a healthy working environment by ending the look for an empty study desk
- To avoid wasting time by reducing queuing in libraries.

- To encourage compliance with reservations by creating a punishment system
- Ensuring data privacy and security

While developing this project in line with our purposes, we prefer React Native language to be used on both IOS and Android devices. We will keep the information on Google Firebase.

1.3 Definitions, Abbreviations, Acronyms

SRS: Software Requirements Specification
SDD: Software Design Document
MLRS: Mobile Library Reservation System
ORS: Online Reservation System
QR: Quick Response
IOS: IPhone/iPad OS
OC: Online Chat
OS: Operating System
IDE: Integrated Development Environment

1.4 Reference

[1] IEEE Std 1016-1998, Recommended Practice for Software Design Description.

1.5 Overview

In the first part of this document we explained why SRS is necessary and gave a brief description about the project. The remaining chapters and their contents are listed below.

In section 2, we explained product perspective, product functions, user characteristics, system constraints, assumptions and dependencies.

In section 3, we explain specific requirements for the project. External requirements, functional requirements, performance requirements, security requirements and design constraints will be explained. Also, we mention software system attributes in this section.

2 Overall Description

This section describes the general factors affecting MLRS and their requirements. This part of the SRS provides a background for the requirements to be easily understandable. Detailed definitions can be found in Chapter 3 of the SRS.

2.1 Product Perspective

2.1.1 System Interfaces

Projemizin adı MLRS Mobil Kütüphane Rezervasyon Sistemidir. Kullanıcılar kütüphane sırası beklemeden önceden boş yada dolu olan kütüphaneleri görüntüleyebilir ve istediği saat aralığında seçtiği herhangi bir ankaradaki kütüphaneden rezervasyon yapabilir . Ürünümüz, güvenli ve verimli bir rezervasyon sağlamanın yanı sıra insan hayatını da kolaylaştırarak zaman kaybını önleyerek verimli çalışmaya olanak sağlamaktadır.Kullanıcının rezervasyon yapabilmesi için uygulamamızı indirerek kayıt olması yeterlidir . Kullanıcı kayıt olup giriş yaptıktan sonra Ankaradaki bütün kütüphaneleri görüntüleyerek doluluk oranına göre isteğini bir kütüphaneyi seçerek rezervasyonunu sağlayabilir . Belli bir saat aralığını , kütüphaneyi ve sıra numarasını seçerek rezervasyonunu tamamlamış olur . Rezervasyonunu tamamladıktan sonra Kütüphanelerdeki herhangi bir tadilat veya özel gün , tatil vb zamanlarda çalışma saatleri güncel olarak değiştirilip uygulamamızda gözükecektir.

ANLAM OLARAK ÇOK KARIŞIK SİSTEM AKIŞINI TAM ANLATMIYO

2.1.2 User Interfaces

User interfaces will be provided for the IOS and Android mobile operating systems.

2.1.2.1 Initial Screen

This page is the first page that users encounter. There are two options for users on this page. The first option is the "Sign Up" to register to the system. The second option is the "Sign In" that will allow them to log into the system and reach the home page.

2.1.2.2 Sign Up Screen

On this page, there are text boxes where users who will perform membership transactions can enter their name, surname, date of birth, email address, phone number and password. After the necessary information is filled, the registration is made by clicking the "Sign Up" button. With the data validation feature, a warning message is given to the user for incomplete or incorrect information entered. If the registration is successful, an information message is given that the registration was successful. With the back button, the user is directed to the home page.

2.1.2.3 Sign In Screen

This page is accessed by clicking the "Sign In" button on the home page. On this page, users enter their email address and password and access their main screen. If the email address or password entered is incorrect, a warning message will be given to users. Main screen differs for admin, librarian and library members using this system.

2.1.2.4 Main Screen for All User Types

A) Main Page For Library Member

Library members can access this page by logging in from the "Sign In" screen. On this screen, there is a menu for users registered to the library. In this menu, the following options are available for the user.

- View User Profile
- List Libraries
- View All Reservations

a) User Profile Page

Users can access this page by clicking the "View Profile" on the main screen. This page contains information entered by users on the "Sign Up" page. Users can change their information on this screen.

b) Reservation Page

Users can access this page by clicking on the "List Libraries" on the main screen. After selecting the library they want, they filter the study desks with date and time slots. After the user chooses the study desk, the reservation process is completed. If the user's reservation is successful, an information message is sent to the user and a special QR code is created for this reservation on this page. The user can enter the library by scanning this code into the system at the library entrance where the reservation is made.

c) View All Reservations Page

Users can access this page by clicking on the option to "View All Reservations" on the main screen. On this page, users can see their list of all reservations and cancel their created reservations. In order to cancel the reservation, there is a "Cancel Reservation" button next to the reservation. The reservation system will be closed for 10 days from the library for users who do not make any 3 reservations within the scope of the penalty system.

B) Main Page For Admin

Admin can access this page by logging in from the "Sign In" screen. There are the following options on the Admin's main page.

- Deleting the library from the system
- Adding a new library to the library list in the system
- Viewing library lists
- Changing library availability statuses

C) Main Page For Librarian

Librarians can access this page by logging in from the "Sign In" screen. The following options are available on Librarian's main page.

- View All Reservations in the Library
-View Library Members Profile

- Change Library Members' Account Details

2.1.3 Hardware Interfaces

For the use of Mobile Library Reservation System, a mobile phone that can run the current versions of IOS and Android mobile operating systems is required.

2.1.4 Software Interfaces

- IOS or Android operating system
- React Native (JavaScript framework)
- Firebase

2.1.5 Communication Interfaces

In order to use the Mobile Library Reservation System, users must have any accessible mobile network.

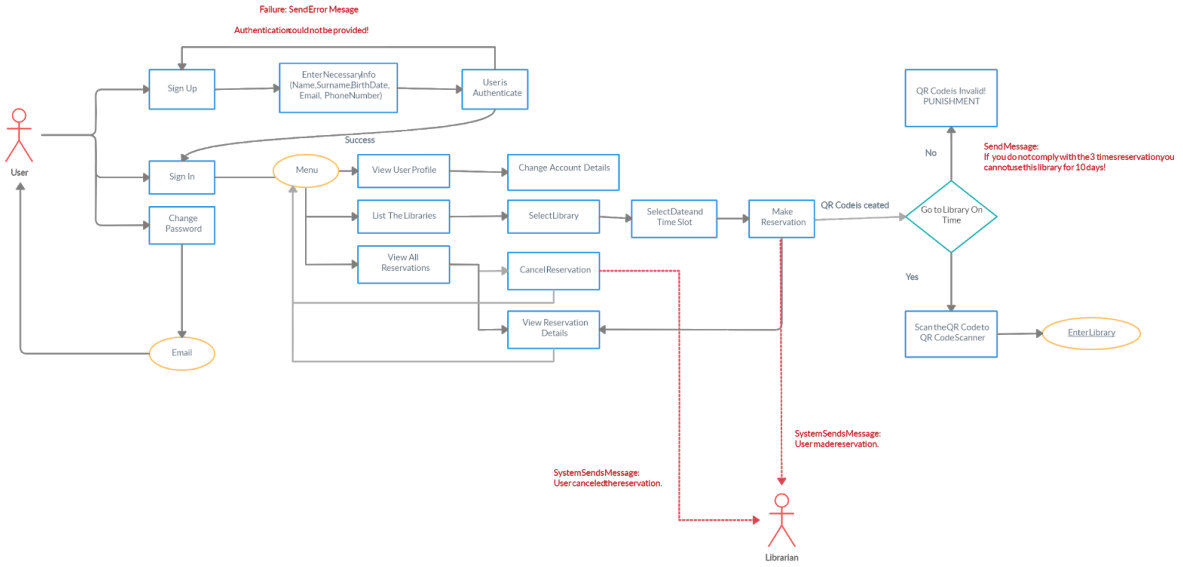
2.1.6 Memory Constraints

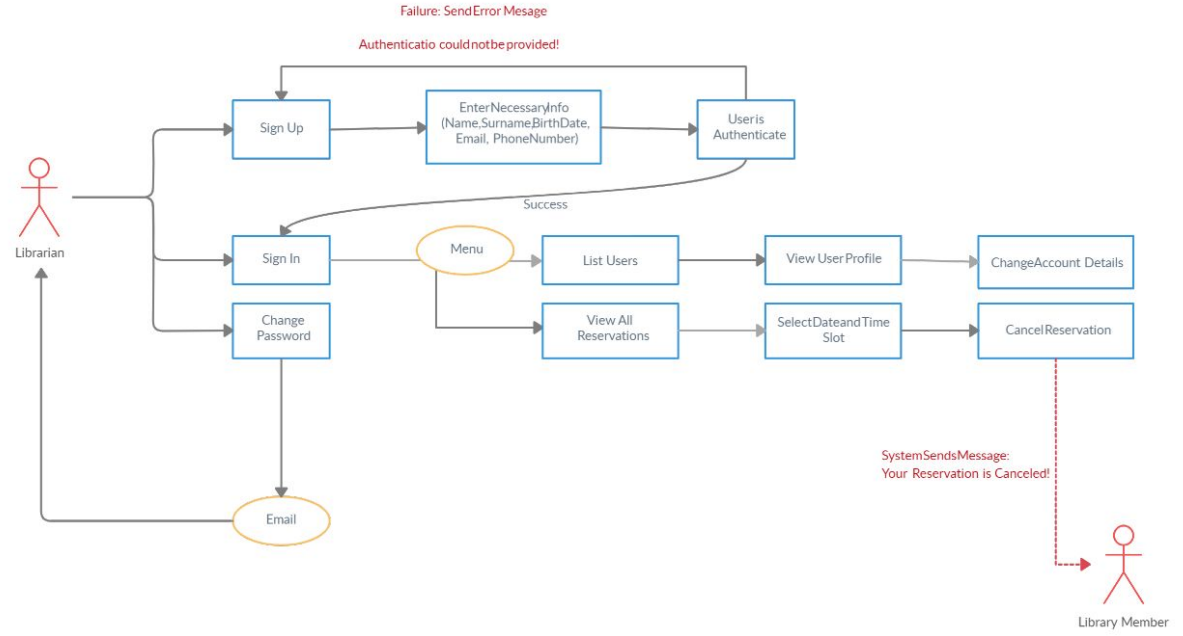
The Mobile Library Reservation System can be accessed from any phone that is connected to the internet and supports IOS or Android.

2.1.7 Operations

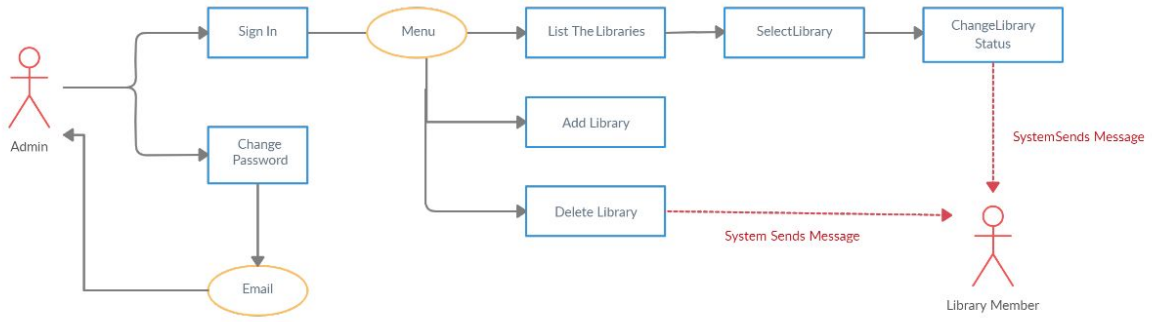
Users must be registered to use the system. If the user is not registered in the system, he can only view the login page. Registration is required to view the library list and reservation section.

2.2 Product Functions





If the librarians are not registered in the system, they can register. If librarians are registered, they can log in. When they forget their password, they can change their password via email. When registration is done successfully, librarians are directed to the Sign In screen. After logging in, librarians see the main page. The main page consists of two sections. The librarian can list all users and view the profiles of the users. At the same time, the librarian can see all reservations and cancel the reservations. They can cancel the reservation by selecting the information (date and time slot) of the reservation they want to cancel. In this case, it gives information to the user by sending a message.



The admins are registered with the application. Admins can change and update their password as wishes. When they log in to the application, they are directed to the main page. Admin can view the whole library list. By selecting the relevant library, they can change library status. After making the change, the system informs the user via a message. Admin is responsible for adding a new library to the list or deleting an existing library from the list. When they perform the library deletion, the system informs the user via a message.

2.3 User Characteristics

The system has three types of users: Library Members, Librarian, Admin.

2.3.1 Library Member

They are people who use the application and its services. In order to benefit from the application services, the person must be registered and logged in the system. Library members represent everyone who is a member to use the library, mostly students, teachers or researchers.

2.3.2 Librarian

Librarian is the person who ensures the security of the library by controlling the entrance and exit. They check the QR code scanning process at the entrance of the library when library members come to the library. The librarian can see all the reservation details on the system. Then can cancel the reservation upon request of the library member.

2.3.3 Admin

The admin has a mobile phone and appears as a registered user in the application. The admin sees the whole library list in the database. Admin can add new libraries to the library list or remove existing libraries from the library list. For any problem or special day, holiday, admin changes library status. Admin can notify all users by email that a library cannot serve for a certain reason.

2.4 Constraints

The software development team obeys the IEEE standards [1, 2, 3] for the software development process stated at the references section, which manipulates the whole requirements process.

Related hardware and software limitations were stated in sections 2.1.3, 2.1.4, 2.1.5, 2.1.6.

2.5 Assumptions and Dependencies

2.5.1 Dependencies

All user will have the appropriate hardware and software configuration stated in sections 2.1.3, 2.1.4, 2.1.5

2.5.2 Assumptions

- The system users use should support IOS and Android System.
- Each assigned QR code is personal and cannot be assigned to someone else.
- QR code check should be done by manually or by another hardware at the library.

3 Specific Requirements

3.1 External Interface Requirements

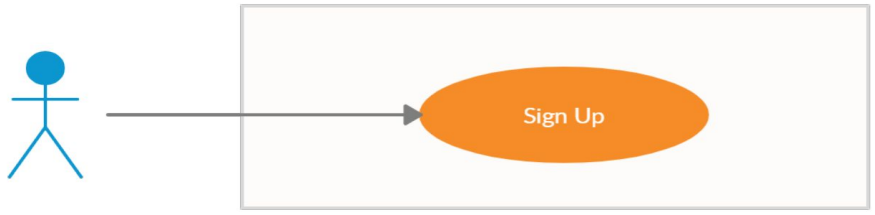
There are no external interface requirements.

3.2 Functional Requirements

3.2.1 Common Functions

Functions in this section are common for library members, librarians and admin.

3.2.1.1 Sign Up Function



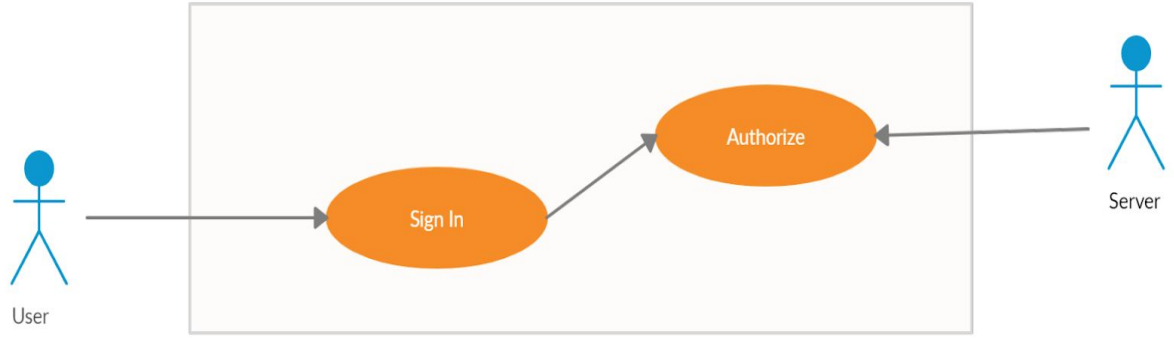
Introduction: User enters personal information to the system for registration to the reservation system.

Input: Name, Surname, Birthdate, Email, Phone Number, Password

Process: It is checked whether there is a user with this mail address in the database. If this email address is not available in the database, the new user information is saved in the database. This process cannot be completed if the email address is already registered in the database.

Output: The warning that the registration is successful or there is a registered user is returned.

3.2.1.2 Sign In Function



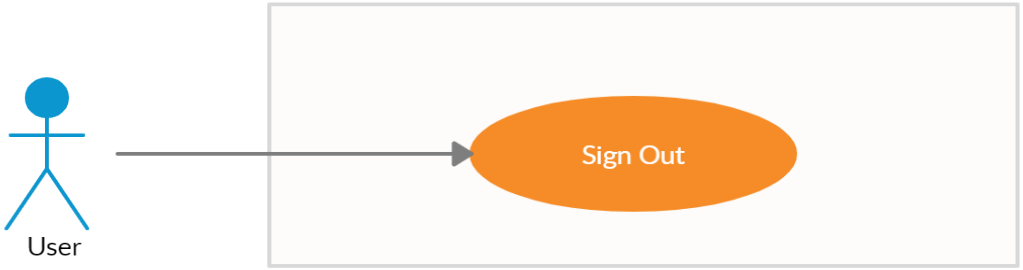
Introduction: It is the login process to log into the system.

Input: Email, Password

Process: The email address and password entered by the user are checked from the database. If the information is correct, the user is directed to his menu page. If the information is incorrect, a warning message is given.

Output: Menu Page

3.2.1.3 Sign Out Function



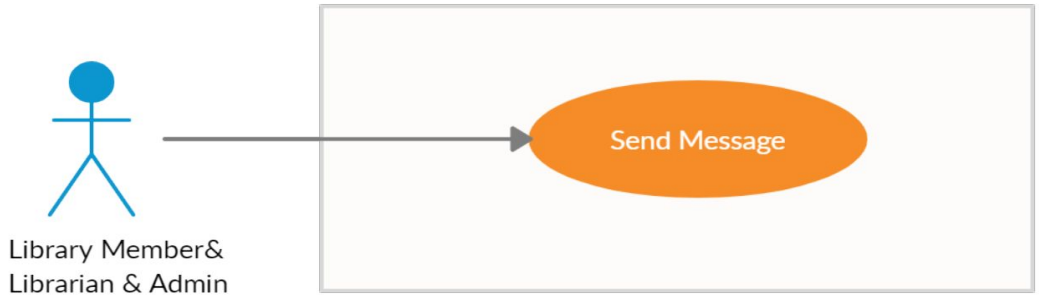
Introduction: It is the process of logging out of the system.

Input: Click "Sign Out" Button

Process: The user is enabled to exit the system and return to the home page.

Output: Main Page

3.2.1.4 Send Message Function



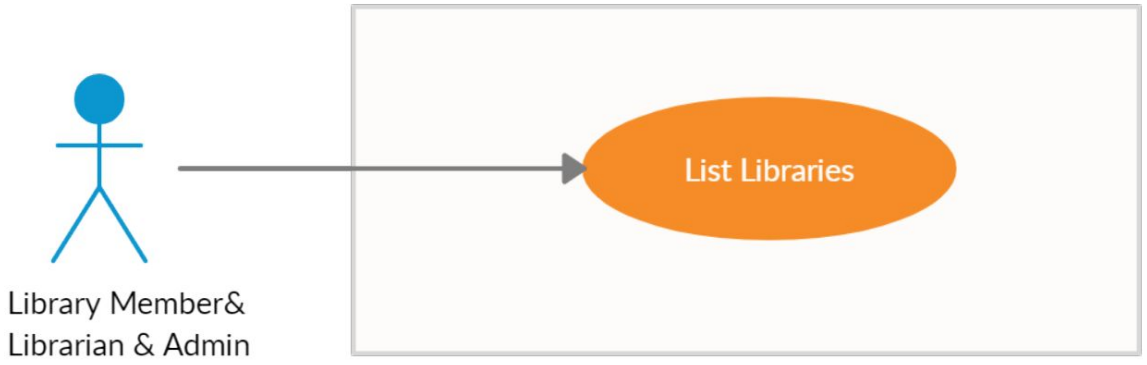
Introduction: Users are informed about the changes made on the system.

Input: Conditions that users should be informed about the changes made in the system

Process: A message is sent to the users as a result of the changes made in the system. Examples include make reservations, cancel reservations and update library status. Finds customer's email from the database and sends mail to the customer.

Output: Message

3.2.1.5 List Libraries Function



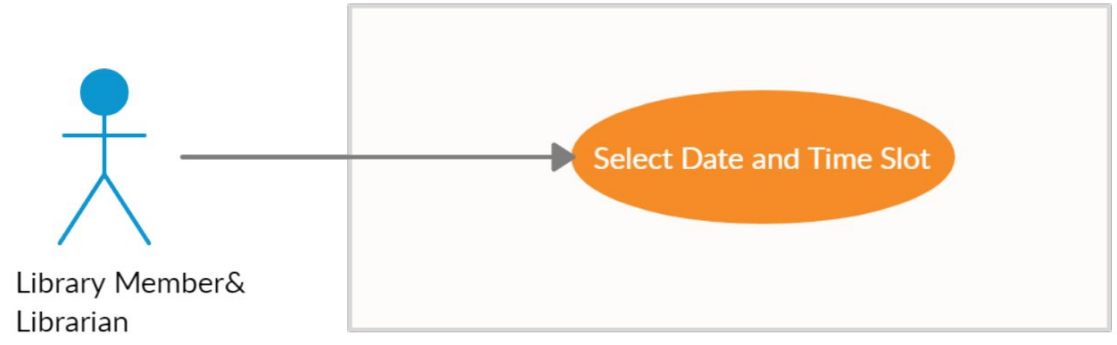
Introduction: Kullanıcıların kütüphane listesini görüntülenmesini sağlar.

Input: Click "List Library" button

Process: Library Member rezervasyon yapacağı zaman kütüphane listeleme kullanır.

Output: Library List

3.2.1.6 Select Date and Time Slot Function



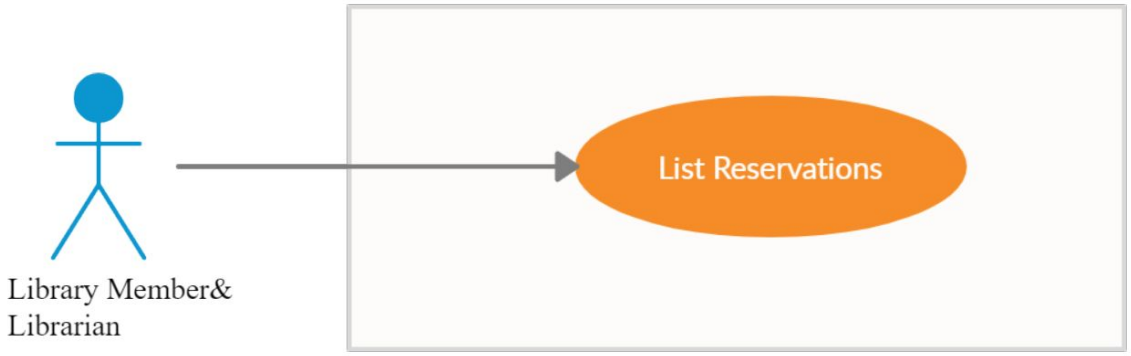
Introduction: Date and time slots are selected to view empty desks.

Input: Date, Time Slot

Process: After users reach the library list, they select the date and time slot and display the empty work tables.

Output: List of Empty Study Desk

3.2.1.6 List Reservation Function



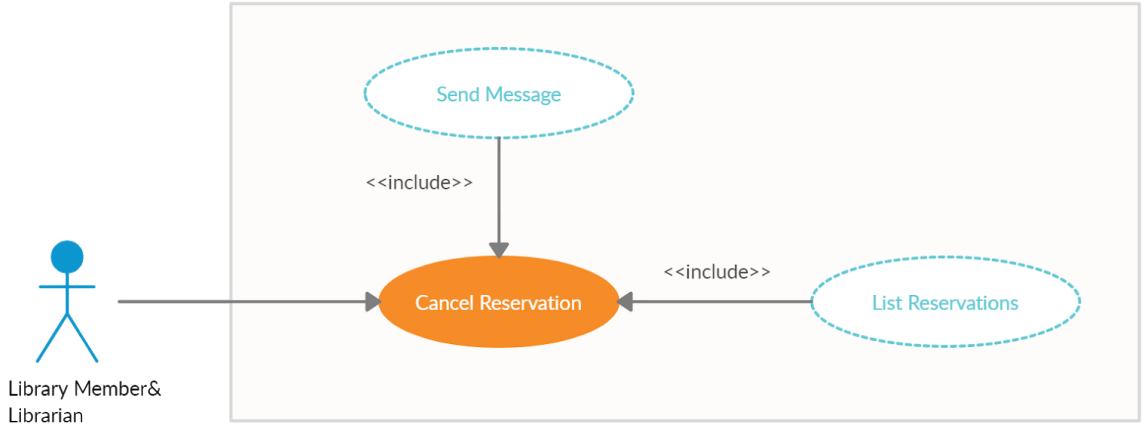
Introduction: Boş çalışma masalarını görüntüleyebilmek için date ve time slot seçilir.

Input: Date, Time Slot

Process: Kullanıcılar library liste ulaştıktan sonra tarih ve time slotu seçerek boş olan çalışma masalarını görüntüler.

Output: List of Empty Study Desk

3.2.1.6 Cancel Reservation Function



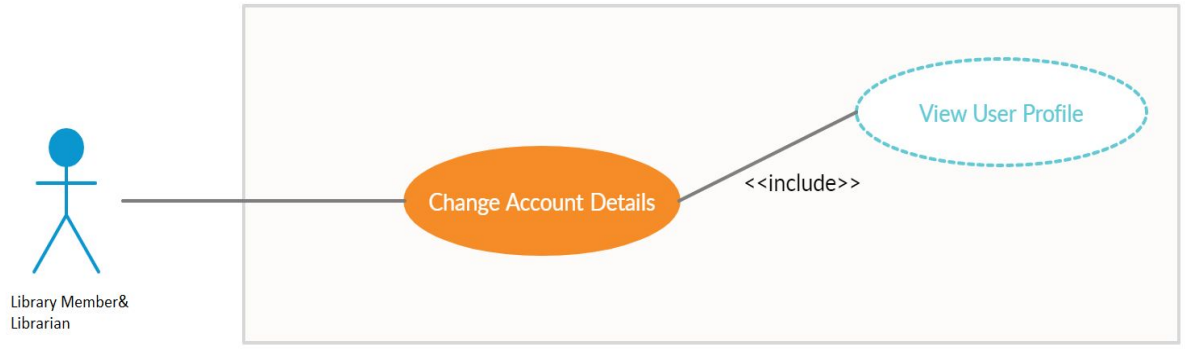
Introduction: Reservation is canceled.

Input: List Reservations

Process: Library members can cancel reservations that have already been made. Librarian is notified of cancellation. Librarians can cancel the reservation made by the library member. The cancellation information is reported to the library memb.

Output: Reservation Cancellation

3.2.3.5 Change Account Details Function



Introduction: Library member and librarian can change the user's account details.

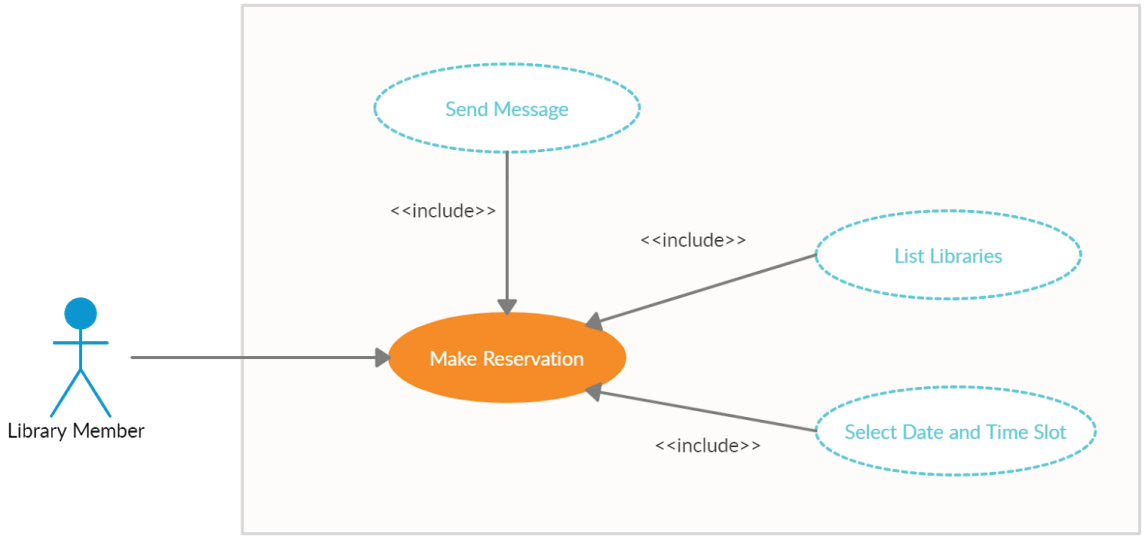
Input: View User Profile

Process: If the library member or librarian user makes changes to the account changes, the changes are processed in the database.

Output: Changes in User Account Details

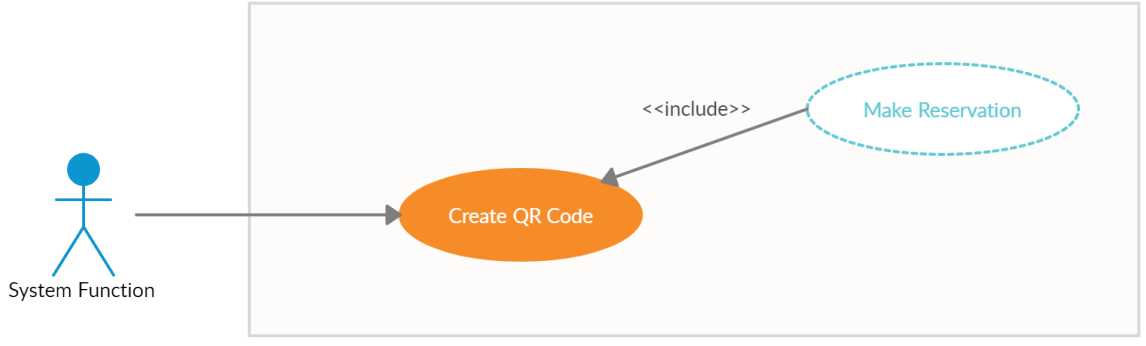
3.2.2 Library Member Functions

3.2.2.1 Make Reservation Function



Introduction: It is the process of making a reservation for the selected desk by applying the necessary filters.
Input: List Libraries, Choose Date and Time Slot
Process: Libraries are listed. The appropriate date and time slot are selected. The study desk in the library is chosen. Reservation is made. The reservation information is sent to the user by message.
Output: Confirmation Message

3.2.2.2 QR Code Function

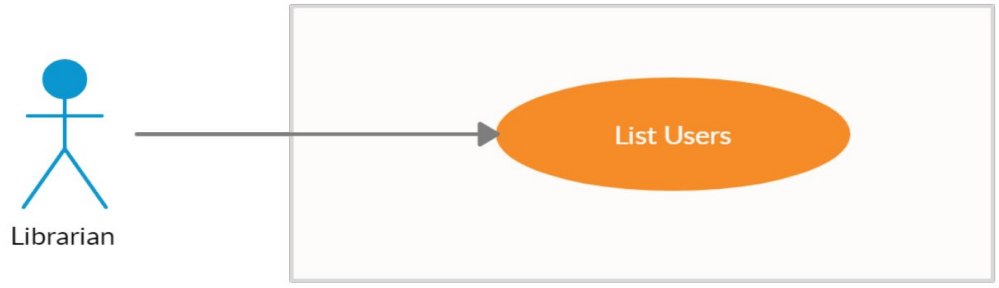


Introduction: Rezervasyon yapıldıktan sonra QR code oluşturulmasıdır.
Input: Make Reservation
Process: Kullanıcının sırasıyla seçtiği kütüphane, tarih, time slot ve çalışma masası bilgilerini içeren QR kod oluşturulur.

Output: QR Code

3.2.3 Librarian Functions

3.2.3.1 List Users Function



Introduction: It is the process of showing the list of registered users in the database of the system.

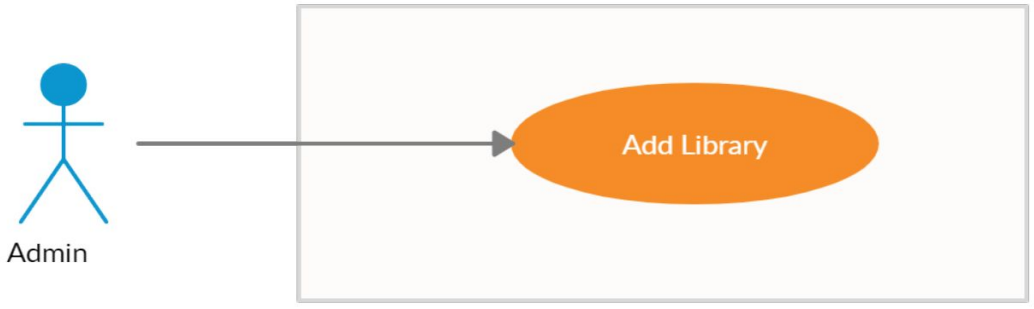
Input: Click "Users List"

Process: Library members are listed.

Output: Library Members List

3.2.2 Admin Functions

3.2.2.1 Add Library Function



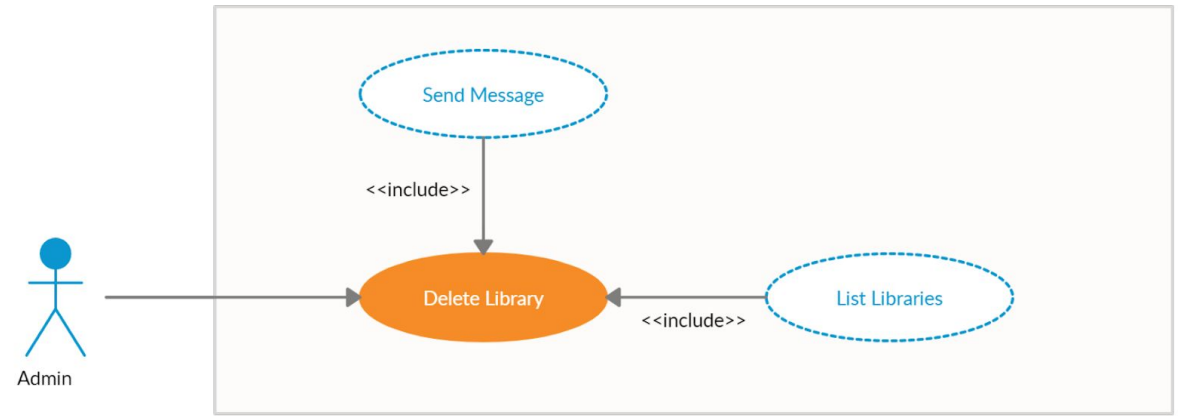
Introduction: It is the process of adding a new library to the library list in the database of the system.

Input: Library Name, Library Table Numbers, Library Capacity, Working Hours

Process: Adding new library information to the database by filling out an information form for the new library.

Output: Current Library List

3.2.2.2 Delete Library Function



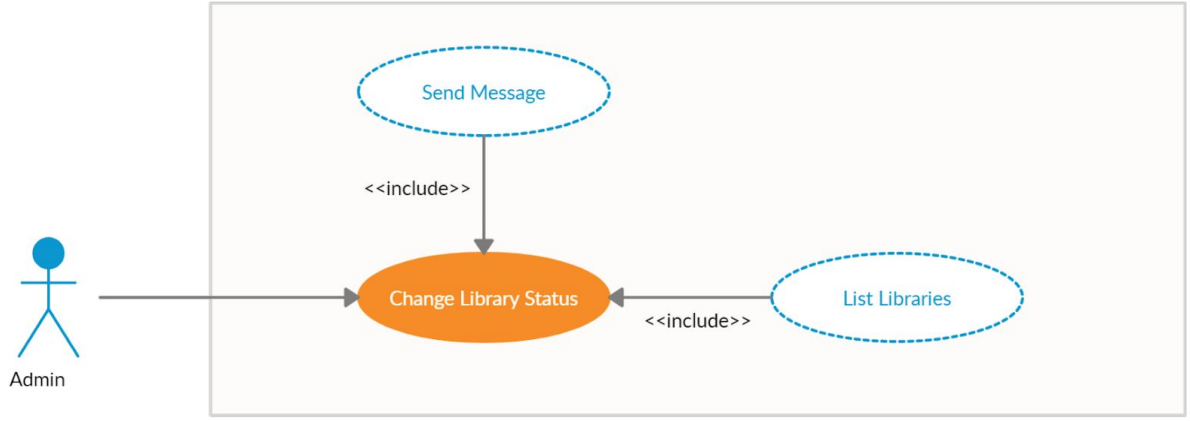
Introduction: It is the process of deleting the library determined from the library list in the database of the system and sending an information message about the subject to the user.

Input: Click "Delete Library"

Process: The data of the selected library is deleted from the database. As a result of this process, an information message is sent to the users.

Output: Current library list and Message

3.2.2.4 Change Library Status Function



Introduction: It is the process of informing the users about the status of the library (open, closed, change of time) via message on certain days.

Input: Library Open or Close, Date and Time Slot

Process: Changes made for the selected library are saved in the database and status change messages are sent to the users.

Output: Message

3.3 Performance Requirements

A mobile phone or tablet that can run the current versions of IOS and Android operating systems is recommended for good use. In addition, internet access is required to use and download the application.

3.4 Security Requirements

For us, the security and private information of our users is extremely important. Therefore, the registration information of all registered users will not be visible to any other registered or unregistered users. Only the Admin can view this information and, if necessary, can only use the email address to reach the user.

3.5 Design Constraints

BOŞ???????

3.6 Software System Attributes

3.6.1 Reliability

- We have a penalty system to ensure the reliability of the system. Thanks to this system, this penalty system will be activated when users using the MLRS application do not come to the reservations made by a certain number.
- Each user who makes a reservation in the library has a single use QR code. The fact that these codes are both personal and disposable increases the trust of our users who use the system.

3.6.2 Usability

- After users download the application, there will be options to register or log in to the application.
- After users register to the system, there are different options according to the functions of the users on the main page of the application.
- There is a session duration that allows users to log out of the system automatically after a certain period of time.

- There is a certain penalty system for users who do not comply with their transactions in the application.

- Disposable and user-specific QR codes are generated automatically by the system for our users who make reservations through the application. Thanks to these codes, users will be able to reach the library shortly before the appointment time without waiting in line for the library and easily scan these codes to the library staff and use the library. At the same time, users will save time.

- If users do any action related to the system incorrectly or incompletely, warning messages specific to users' actions will appear on the system.

- Users using the application are provided with a clear, easy, understandable and user-friendly interface.

3.6.3 Availability

Mobile Library Reservation System will be available in the App Store for mobile phones with IOS operating system and in Google Play Store for mobile phones with Android operating system. Internet access is required to access these shopping applications from mobile phones.

3.6.4 Security

For the security of the system, users must be registered in the system, and these registered users will be logged on by the system after a certain period of time.

3.6.5 Maintainability

We aim to make our product even more useful by updating the first product made to ensure the sustainability of our application.

3.6.6 Adaptability

The system will not have an adaptive feature.

3.6.7 Portability

The product will be specially designed for mobile phones. It will be supported by all operating systems found on mobile phones. In other words, our online MLRS application will be portable on all mobile phones with IOS or Android operating systems.

3.7 Other Requirements

No other requirements.

Software Requirements Specifications

For

MOBILE LIBRARY RESERVATION SYSTEM

Version 0.0

4 Dec 2020

Cankaya University

Computer Engineering Department

Prepared By:

Burcu BİTER

Beyza YÜKSEL

Eda Gül SÜMER

Abstract

This document contains the software requirements specification of the Mobile Library Reservation System project, which has the mission of users to create membership through the mobile application and to keep and change the reservation information on the firebase.

This document is prepared according to IEEE STD 830-1998, IEEE Recommended Practice for Software Requirements Specifications. This document includes the product perspective, user interfaces, product functions, user characteristics, system assumption and constraints, system requirements and more.

Keywords: Mobile Library Reservation, Software Requirements Specification, Library Member, Librarian, System Requirements Specifications

TABLE OF CONTENTS

Abstract **2**

1 Introduction **5**

1.1 Purpose 5

1.2 Scope 5

1.3 Definitions, Abbreviations, Acronyms 6

1.4 Reference 6

1.5 Overview 6

2 Overall Description **7**

2.1 Product Perspective 7

2.1.1 System Interfaces 7

2.1.2 User Interfaces 7

User interfaces will be provided for the IOS and Android mobile operating systems. 7

2.1.2.1 Initial Screen 8

2.1.2.2 Sign Up Screen 8

2.1.2.3 Sign In Screen 8

2.1.2.4 Main Screen for All User Types 8

A) Main Page For Library Member 8

B) Main Page For Admin 9

C) Main Page For Librarian 9

2.1.3 Hardware Interfaces 9

2.1.4 Software Interfaces 10

2.1.5 Communication Interfaces 10

2.1.6 Memory Constraints 10

2.1.7 Operations 10

2.2 Product Functions 11

2.3 User Characteristics 12

2.3.1 Library Member 12

2.3.2 Librarian 12

2.3.3 Admin 12

2.4 Constraints 13

2.5 Assumptions and Dependencies 13

2.5.1 Dependencies 13

2.5.2 Assumptions 13

3 Specific Requirements **13**

3.1 External Interface Requirements 13
3.2 Functional Requirements 13
3.2.1 Common Functions 13
3.2.1.1 Sign Up Function 13
3.2.1.2 Sign In Function 14
3.2.1.3 Sign Out Function 15
3.2.1.4 Send Message Function 15
3.2.1.5 List Libraries Function 16
3.2.3.5 Change Account Details Function 18
3.2.2 Library Member Functions 18
3.2.2.1 Make Reservation Function 18
3.2.3 Librarian Functions 19
3.2.2 Admin Functions 20
3.2.2.1 Add Library Function 20
3.2.2.2 Delete Library Function 20
3.2.2.4 Change Library Status Function 21
3.3 Performance Requirements 21
3.4 Security Requirements 21
3.5 Design Constraints 21
3.6 Software System Attributes 22
3.6.1 Reliability 22
3.6.2 Usability 22
3.6.3 Availability 22
3.6.4 Security 23
3.6.5 Maintainability 23
3.6.6 Adaptability 23
3.6.7 Portability 23
3.7 Other Requirements // Beyza 23

1 Introduction

The following subsections are an overview of the entire Software Requirements Specification (SRS) document.

1.1 Purpose

This document provides a technical description of all software requirements of the Mobile Library Reservation System. The document will not only define the product functions, user interfaces, product functions, user characteristics, system constraints, and specific system requirements, but also serve as a basis for the Software Design Document that will be prepared according to IEEE 830 [1]. This SRS is prepared to establish communication between the acquirers, users (Admin, Librarian, Library Members), and the software development team.

1.2 Scope

The mission of the project is to enable users who are members of the library to make reservations online through the mobile application and to check the availability of the library selected from the listed libraries and make it easier for them to make reservations. In order to make a reservation, users must complete their membership process and log into the system. When the users enter the mobile application, they select one of the libraries in their city. Then, they check the occupancy rate and make a reservation for their desired study desk in case of any space in the desired date and time slot. When the reservation is made, a special QR code is assigned to the users by the system. Users can enter the library by having the QR code read into the system at the library entrance. MLRS will be accessible only to registered users. Thanks to this application, users will be able to access the libraries of their city online. The objectives of the project are:

- To create an effective communication channel between the library and its members.

- To make reservations quickly and easily.
- To facilitate reservation tracking via QR code.
- To create a healthy working environment by ending the look for an empty study desk
- To avoid wasting time by reducing queuing in libraries.
- To encourage compliance with reservations by creating a punishment system
- Ensuring data privacy and security

While developing this project in line with our purposes, we prefer React Native language to be used on both IOS and Android devices. We will keep the information on Google Firebase.

1.3 Definitions, Abbreviations, Acronyms

SRS: Software Requirements Specification
SDD: Software Design Document
MLRS: Mobile Library Reservation System
ORS: Online Reservation System
QR: Quick Response
IOS: IPhone/iPad OS
OC: Online Chat
OS: Operating System
IDE: Integrated Development Environment

1.4 Reference

[1] IEEE Std 1016-1998, Recommended Practice for Software Design Description.

1.5 Overview

In the first part of this document we explained why SRS is necessary and gave a brief description about the project. The remaining chapters and their contents are listed below.

In section 2, we explained product perspective, product functions, user characteristics, system constraints, assumptions and dependencies.

In section 3, we explain specific requirements for the project. External requirements, functional requirements, performance requirements, security requirements and

design constraints will be explained. Also, we mention software system attributes in this section.

2 Overall Description

This section describes the general factors affecting MLRS and their requirements. This part of the SRS provides a background for the requirements to be easily understandable. Detailed definitions can be found in Chapter 3 of the SRS.

2.1 Product Perspective

2.1.1 System Interfaces

2.1.2 User Interfaces

User interfaces will be provided for the IOS and Android mobile operating systems.

2.1.2.1 Initial Screen

This page is the first page that users encounter. There are two options for users on this page. The first option is the "Sign Up" to register to the system. The second option is the "Sign In" that will allow them to log into the system and reach the home page.

2.1.2.2 Sign Up Screen

On this page, there are text boxes where users who will perform membership transactions can enter their name, surname, date of birth, email address, phone number and password. After the necessary information is filled, the registration is made by clicking the "Sign Up" button. With the data validation feature, a warning

message is given to the user for incomplete or incorrect information entered. If the registration is successful, an information message is given that the registration was successful. With the back button, the user is directed to the home page.

2.1.2.3 Sign In Screen

This page is accessed by clicking the "Sign In" button on the home page. On this page, users enter their email address and password and access their main screen. If the email address or password entered is incorrect, a warning message will be given to users. Main screen differs for admin, librarian and library members using this system.

2.1.2.4 Main Screen for All User Types

A) Main Page For Library Member

Library members can access this page by logging in from the "Sign In" screen. On this screen, there is a menu for users registered to the library. In this menu, the following options are available for the user.

- View User Profile
- List Libraries
- View All Reservations

a) **User Profile Page**

Users can access this page by clicking the "View Profile" on the main screen. This page contains information entered by users on the "Sign Up" page. Users can change their information on this screen.

b) **Reservation Page**

Users can access this page by clicking on the "List Libraries" on the main screen. After selecting the library they want, they filter the study desks with date and time slots. After the user chooses the study desk, the reservation process is completed. If the user's reservation is successful, an information message is sent to the user and a special QR code is created for this reservation on this page. The user can enter the library by scanning this code into the system at the library entrance where the reservation is made.

c) View All Reservations Page

Users can access this page by clicking on the option to "View All Reservations" on the main screen. On this page, users can see their list of all reservations and cancel their created reservations. In order to cancel the reservation, there is a "Cancel Reservation" button next to the reservation. The reservation system will be closed for 10 days from the library for users who do not make any 3 reservations within the scope of the penalty system.

B) Main Page For Admin

Admin can access this page by logging in from the "Sign In" screen. There are the following options on the Admin's main page.

- Deleting the library from the system
- Adding a new library to the library list in the system
- Viewing library lists
- Changing library availability statuses

C) Main Page For Librarian

Librarians can access this page by logging in from the "Sign In" screen. The following options are available on Librarian's main page.

- View All Reservations in the Library
-View Library Members Profile
- Change Library Members' Account Details

2.1.3 Hardware Interfaces

For the use of Mobile Library Reservation System, a mobile phone that can run the current versions of IOS and Android mobile operating systems is required.

2.1.4 Software Interfaces

- IOS or Android operating system
- React Native (JavaScript framework)
- Firebase

2.1.5 Communication Interfaces

In order to use the Mobile Library Reservation System, users must have any accessible mobile network.

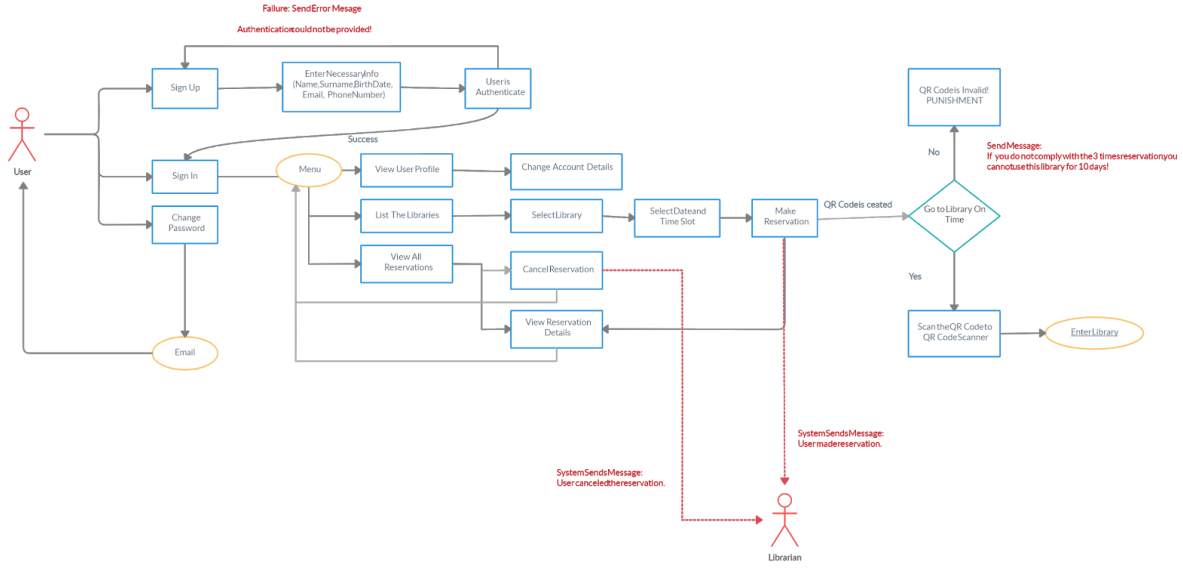
2.1.6 Memory Constraints

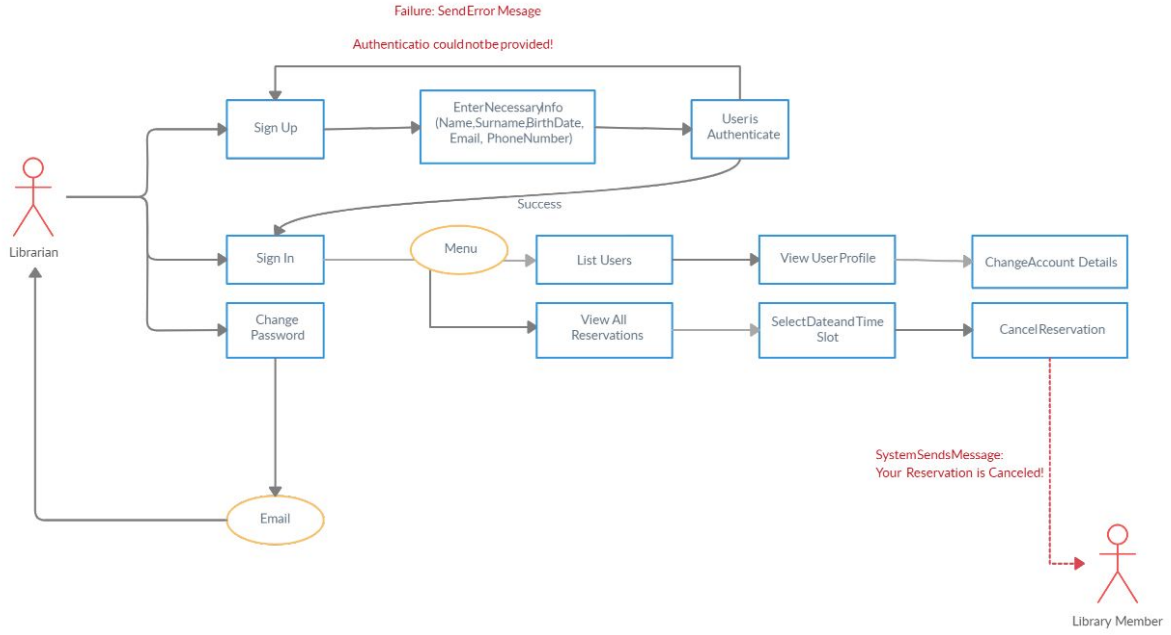
The Mobile Library Reservation System can be accessed from any phone that is connected to the internet and supports IOS or Android.

2.1.7 Operations

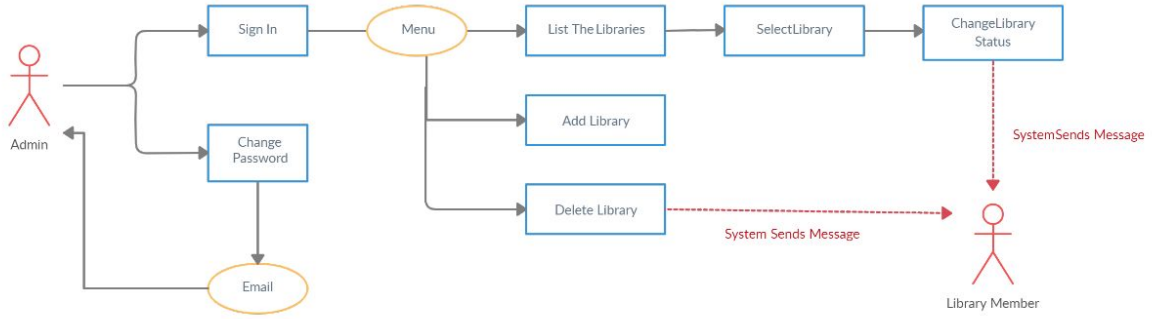
Users must be registered to use the system. If the user is not registered in the system, he can only view the login page. Registration is required to view the library list and reservation section.

2.2 Product Functions





If the librarians are not registered in the system, they can register. If librarians are registered, they can log in. When they forget their password, they can change their password via email. When registration is done successfully, librarians are directed to the Sign In screen. After logging in, librarians see the main page. The main page consists of two sections. The librarian can list all users and view the profiles of the users. At the same time, the librarian can see all reservations and cancel the reservations. They can cancel the reservation by selecting the information (date and time slot) of the reservation they want to cancel. In this case, it gives information to the user by sending a message.



The admins are registered with the application. Admins can change and update their password as wishes. When they log in to the application, they are directed to the main page. Admin can view the whole library list. By selecting the relevant library,

they can change library status. After making the change, the system informs the user via a message. Admin is responsible for adding a new library to the list or deleting an existing library from the list. When they perform the library deletion, the system informs the user via a message.

2.3 User Characteristics

The system has three types of users: Library Members, Librarian, Admin.

2.3.1 Library Member

They are people who use the application and its services. In order to benefit from the application services, the person must be registered and logged in the system. Library members represent everyone who is a member to use the library, mostly students, teachers or researchers.

2.3.2 Librarian

Librarian is the person who ensures the security of the library by controlling the entrance and exit. They check the QR code scanning process at the entrance of the library when library members come to the library. The librarian can see all the reservation details on the system. Then can cancel the reservation upon request of the library member.

2.3.3 Admin

The admin has a mobile phone and appears as a registered user in the application. The admin sees the whole library list in the database. Admin can add new libraries to the library list or remove existing libraries from the library list. For any problem or special day, holiday, admin changes library status. Admin can notify all users by email that a library cannot serve for a certain reason.

2.4 Constraints

The software development team obeys the IEEE standards [1, 2, 3] for the software development process stated at the references section, which manipulates the whole requirements process.

Related hardware and software limitations were stated in sections 2.1.3, 2.1.4, 2.1.5, 2.1.6.

2.5 Assumptions and Dependencies

2.5.1 Dependencies

All user will have the appropriate hardware and software configuration stated in sections 2.1.3, 2.1.4, 2.1.5

2.5.2 Assumptions

- The system users use should support IOS and Android System.
- Each assigned QR code is personal and cannot be assigned to someone else.
- QR code check should be done by manually or by another hardware at the library.

3 Specific Requirements

3.1 External Interface Requirements

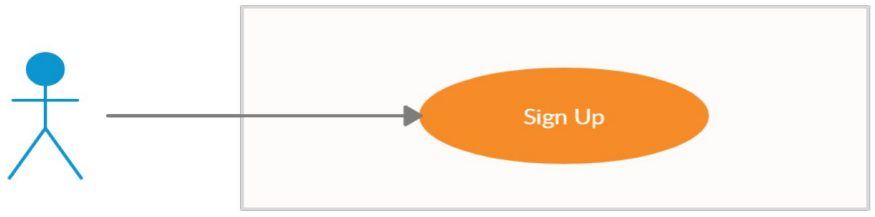
There are no external interface requirements.

3.2 Functional Requirements

3.2.1 Common Functions

Functions in this section are common for library members, librarians and admin.

3.2.1.1 Sign Up Function



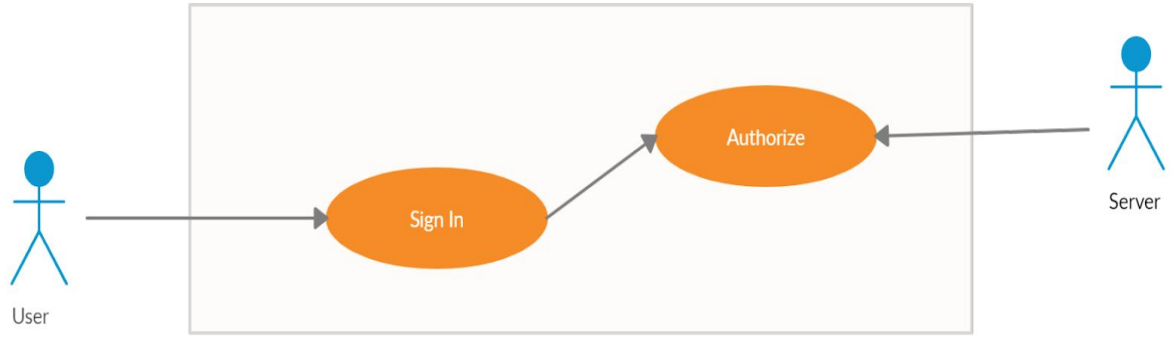
Introduction: User enters personal information to the system for registration to the reservation system.

Input: Name, Surname, Birthdate, Email, Phone Number, Password

Process: It is checked whether there is a user with this mail address in the database. If this email address is not available in the database, the new user information is saved in the database. This process cannot be completed if the email address is already registered in the database.

Output: The warning that the registration is successful or there is a registered user is returned.

3.2.1.2 Sign In Function



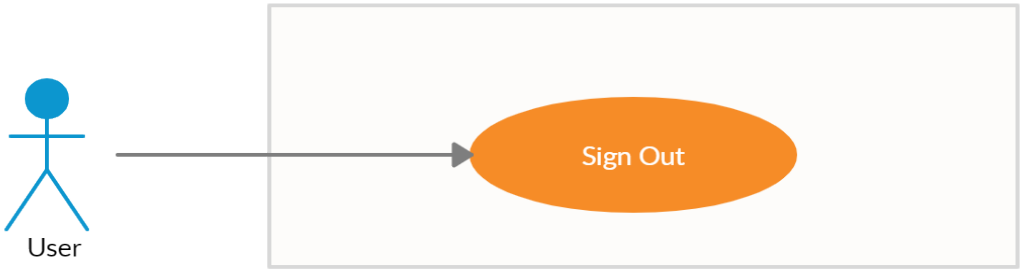
Introduction: It is the login process to log into the system.

Input: Email, Password

Process: The email address and password entered by the user are checked from the database. If the information is correct, the user is directed to his menu page. If the information is incorrect, a warning message is given.

Output: Menu Page

3.2.1.3 Sign Out Function



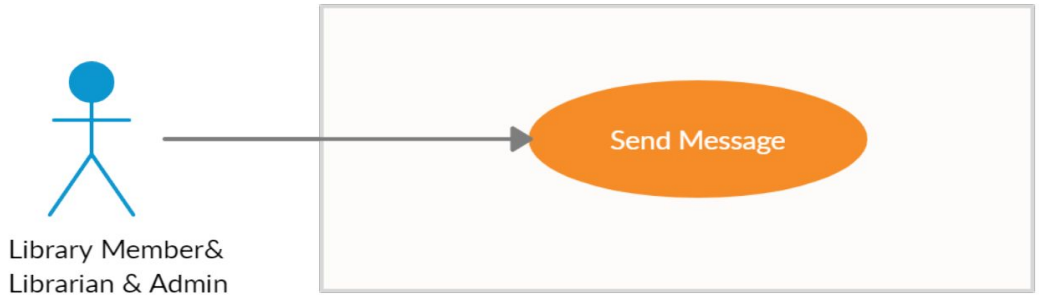
Introduction: It is the process of logging out of the system.

Input: Click "Sign Out" Button

Process: The user is enabled to exit the system and return to the home page.

Output: Main Page

3.2.1.4 Send Message Function



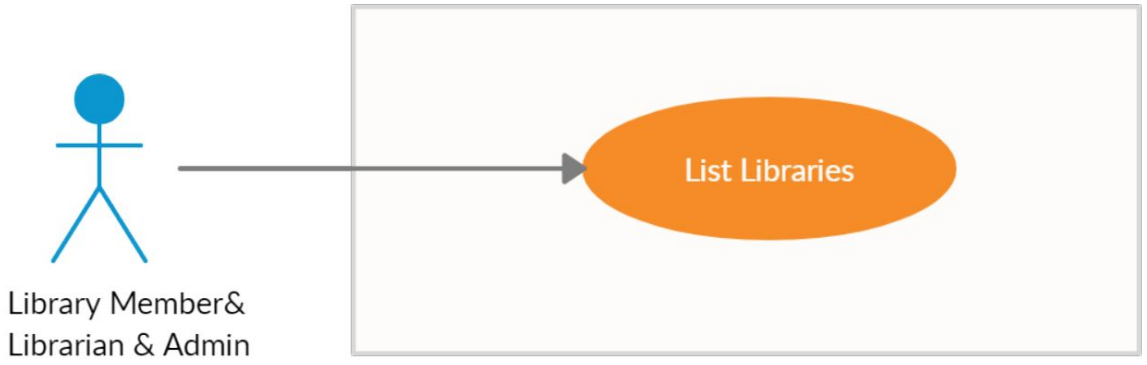
Introduction: Users are informed about the changes made on the system.

Input: Conditions that users should be informed about the changes made in the system

Process: A message is sent to the users as a result of the changes made in the system. Examples include make reservations, cancel reservations and update library status. Finds customer's email from the database and sends mail to the customer.

Output: Message

3.2.1.5 List Libraries Function



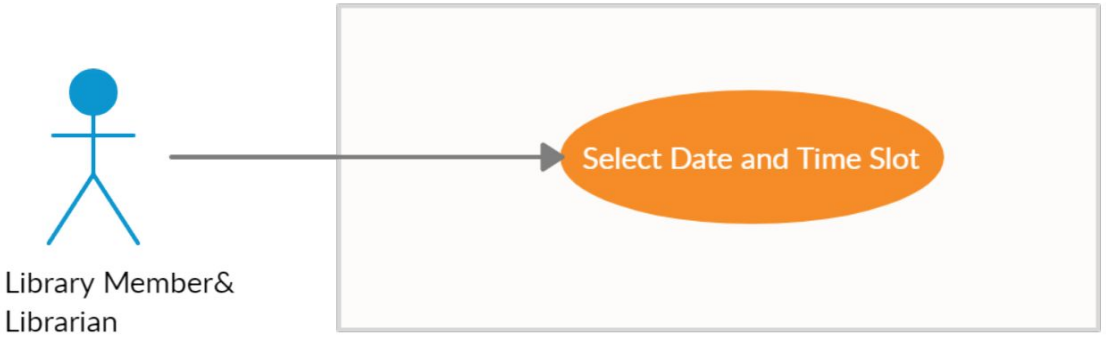
Introduction: Kullanıcıların kütüphane listesini görüntülenmesini sağlar.

Input: Click "List Library" button

Process: Library Member rezervasyon yapacağı zaman kütüphane listeleme kullanır.

Output: Library List

3.2.1.6 Select Date and Time Slot Function



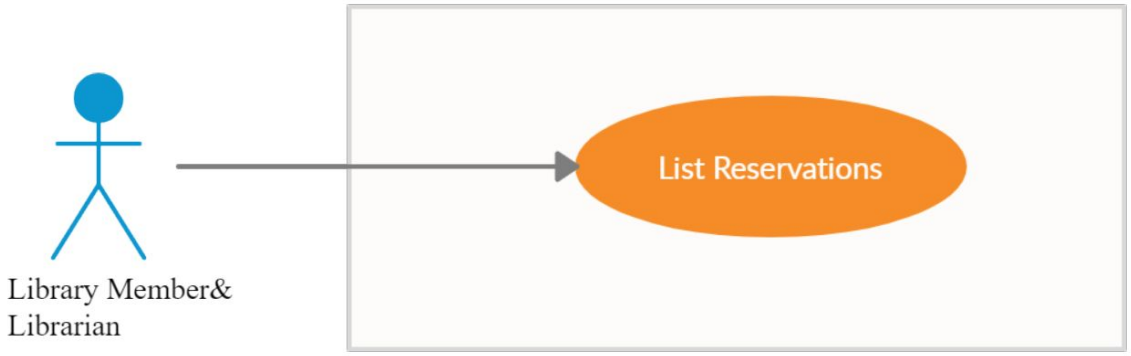
Introduction: Date and time slots are selected to view empty desks.

Input: Date, Time Slot

Process: After users reach the library list, they select the date and time slot and display the empty work tables.

Output: List of Empty Study Desk

3.2.1.6 List Reservation Function



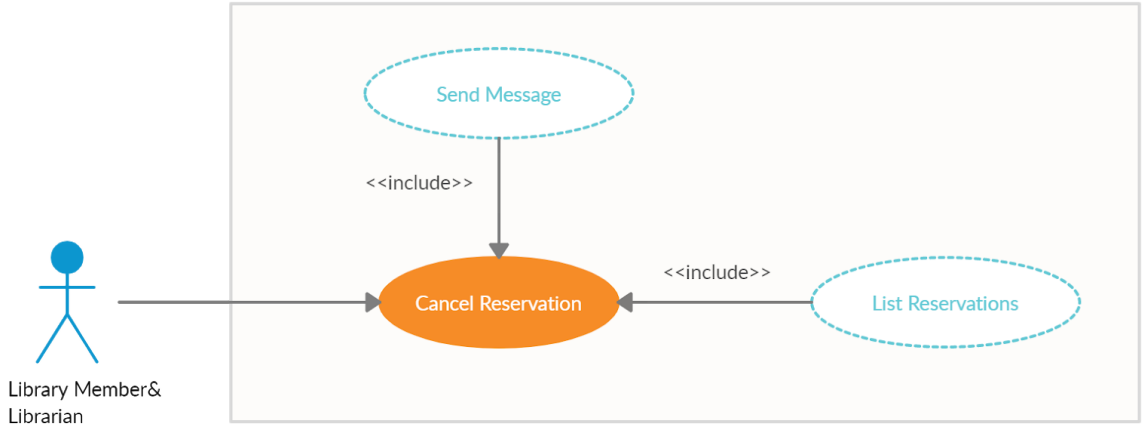
Introduction: Boş çalışma masalarını görüntüleyebilmek için date ve time slot seçilir.

Input: Date, Time Slot

Process: Kullanıcılar library liste ulaştıktan sonra tarih ve time slotu seçerek boş olan çalışma masalarını görüntüler.

Output: List of Empty Study Desk

3.2.1.6 Cancel Reservation Function



Introduction: Reservation is canceled.

Input: List Reservations

Process: Library members can cancel reservations that have already been made. Librarian is notified of cancellation. Librarians can cancel the reservation made by the library member. The cancellation information is reported to the library memb.

Output: Reservation Cancellation

3.2.3.5 Change Account Details Function

Introduction: Library member and librarian can change the user's account details.

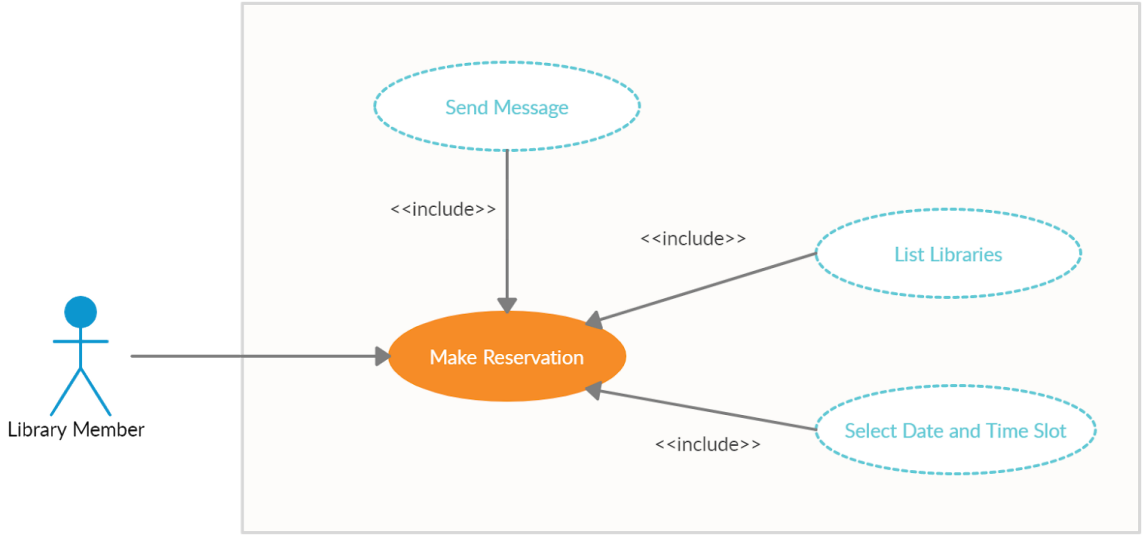
Input: View User Profile

Process: If the library member or librarian user makes changes to the account changes, the changes are processed in the database.

Output: Changes in User Account Details

3.2.2 Library Member Functions

3.2.2.1 Make Reservation Function



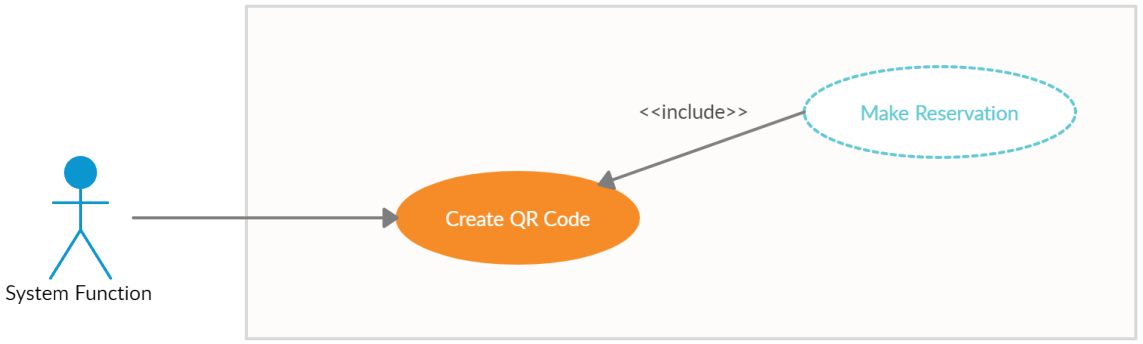
Introduction: It is the process of making a reservation for the selected desk by applying the necessary filters.

Input: List Libraries, Choose Date and Time Slot

Process: Libraries are listed. The appropriate date and time slot are selected. The study desk in the library is chosen. Reservation is made. The reservation information is sent to the user by message.

Output: Confirmation Message

3.2.2.2 QR Code Function



Introduction: Rezervasyon yapıldıktan sonra QR code oluşturulmasıdır.

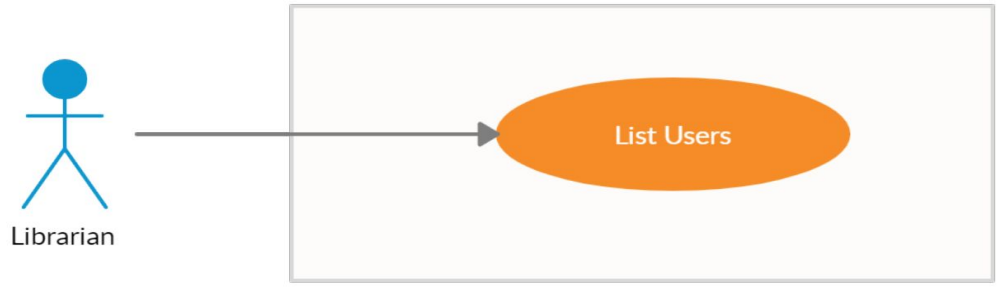
Input: Make Reservation

Process: Kullanıcının sırasıyla seçtiği kütüphane, tarih, time slot ve çalışma masası bilgilerini içeren QR kod oluşturulur.

Output: QR Code

3.2.3 Librarian Functions

3.2.3.1 List Users Function



Introduction: It is the process of showing the list of registered users in the database of the system.

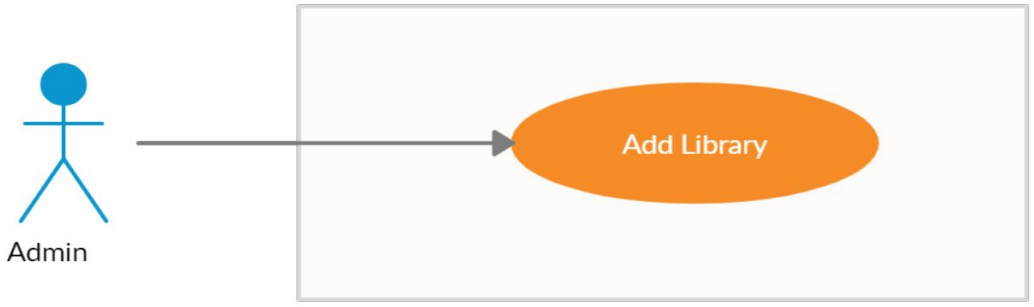
Input: Click "Users List"

Process: Library members are listed.

Output: Library Members List

3.2.2 Admin Functions

3.2.2.1 Add Library Function



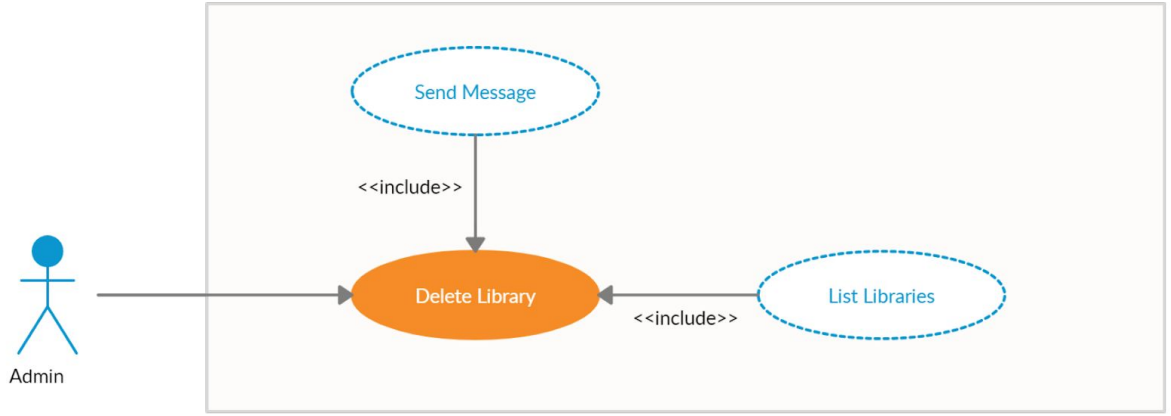
Introduction: It is the process of adding a new library to the library list in the database of the system.

Input: Library Name, Library Table Numbers, Library Capacity, Working Hours

Process: Adding new library information to the database by filling out an information form for the new library.

Output: Current Library List

3.2.2.2 Delete Library Function



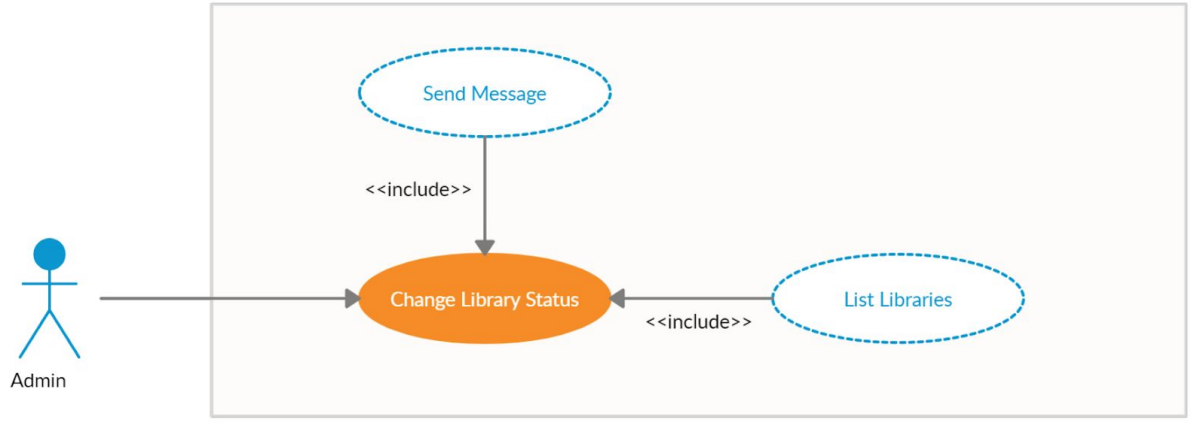
Introduction: It is the process of deleting the library determined from the library list in the database of the system and sending an information message about the subject to the user.

Input: Click "Delete Library"

Process: The data of the selected library is deleted from the database. As a result of this process, an information message is sent to the users.

Output: Current library list and Message

3.2.2.4 Change Library Status Function



Introduction: It is the process of informing the users about the status of the library (open, closed, change of time) via message on certain days.

Input: Library Open or Close, Date and Time Slot

Process: Changes made for the selected library are saved in the database and status change messages are sent to the users.

Output: Message

3.3 Performance Requirements

A mobile phone or tablet that can run the current versions of IOS and Android operating systems is recommended for good use. In addition, internet access is required to use and download the application.

3.4 Security Requirements

For us, the security and private information of our users is extremely important. Therefore, the registration information of all registered users will not be visible to any other registered or unregistered users. Only the Admin can view this information and, if necessary, can only use the email address to reach the user.

3.5 Software System Attributes

3.5.1 Reliability

- We have a penalty system to ensure the reliability of the system. Thanks to this system, this penalty system will be activated when users using the MLRS application do not come to the reservations made by a certain number.
- Each user who makes a reservation in the library has a single use QR code. The fact that these codes are both personal and disposable increases the trust of our users who use the system.

3.5.2 Usability

- After users download the application, there will be options to register or log in to the application.
- After users register to the system, there are different options according to the functions of the users on the main page of the application.
- There is a session duration that allows users to log out of the system automatically after a certain period of time.
- There is a certain penalty system for users who do not comply with their transactions in the application.
- Disposable and user-specific QR codes are generated automatically by the system for our users who make reservations through the application. Thanks to these codes, users will be able to reach the library shortly before the appointment time without waiting in line for the library and easily scan these codes to the library staff and use the library. At the same time, users will save time.
- If users do any action related to the system incorrectly or incompletely, warning messages specific to users' actions will appear on the system.
- Users using the application are provided with a clear, easy, understandable and user-friendly interface.

3.5.3 Availability

Mobile Library Reservation System will be available in the App Store for mobile phones with IOS operating system and in Google Play Store for mobile phones with

Android operating system. Internet access is required to access these shopping applications from mobile phones.

3.5.4 Security

For the security of the system, users must be registered in the system, and these registered users will be logged on by the system after a certain period of time.

3.5.5 Maintainability

We aim to make our product even more useful by updating the first product made to ensure the sustainability of our application.

3.5.6 Adaptability

The system will not have an adaptive feature.

3.5.7 Portability

The product will be specially designed for mobile phones. It will be supported by all operating systems found on mobile phones. In other words, our online MLRS application will be portable on all mobile phones with IOS or Android operating systems.

3.6 Other Requirements

No other requirements.