

CSE471: System Analysis and Design



Project Report

Life Card (A Health Card System)

Submission Date: 17 December 2022

Group Information

Table of Contents

Introduction	3
Motivation	3
System Request	4
Requirement Analysis	6
Project Scenario	13
Design Diagrams	14
Project Demo UI	27
Conclusion	31
References	32

Introduction

Finance for healthcare is a top priority in global health policy. Rising health care costs and a substantial portion of out-of-pocket spending seem to be two major obstacles for middle-class or lower-middle-class people to overcome in order to escape poverty. The Health Minister says, “67% of all deaths in Bangladesh are due to non-communicable diseases.” (Correspondent, 2022) That percentage can be lower if all of them get the proper treatment for their disease, but many people in Bangladesh can not afford the expenses of their medical fees. Because half of the population of Bangladesh belongs to the middle class or lower middle class. Dr. Binayak Sen, the research director of the Bangladesh Institute of Development Studies (BIDS), believes that around 30% of the population belongs to the category where the standard monthly income of a four-member middle-class family stands between Tk70,000 and Tk150,000. (*Who Are the Middle Class in Bangladesh?*, 2020) Therefore, it gets tough for people to afford high-quality medical expenses. For this reason, the Health Card System needs to be introduced to the mass people's betterment.

Motivation

Our motivation behind the idea of a Health Card System came from an incident. A few days ago, we were going home from university on a local bus. A well-dressed man came on the bus to ask for help for his mother, and the man said he was working in a private company and earning good for his family, but all of a sudden, he got to know that both of the kidneys of his mother were damaged. It needs a lot of money for the treatment, and his mother needs full-time doctor surveillance. From the incident, we came to the idea that our hospitals need to introduce a card

that helps middle-class or lower-middle-class people get 24/7 doctor consultations and get loans if required for their treatment. Moreover, they will offer some discounts for their regular medical test for the premium card members to help the patient get updated on their health condition.

System Request

Project Sponsors:

Abdullah Khondoker, CEO, Managerial Department

Enam Ahmed Taufik, CTO, Technical Department

Business Need:

- Different customization types will help increase customer dependency on hospitals.
- The system will improve customer service and reach more potential customers.
- The system will make accessible, high-quality medical treatment for a vast middle-class population who can not afford high medical expenses in a short amount of time.
- The system features help to categorize customers and identify the targeted customers.
- The system will help to introduce a new feature for hospitals and give them a new technological edge.

Business Requirements:

➤ Admin

- Admin should have access to the admin dashboard.
- Admin should be able to set the limit of users for the hospital and select the package.
- Admin should be able to update and delete user information.

- Admin can trace the user dependency for the system.

➤ **Hospital**

- Hospital should have access to the hospital dashboard.
- Hospital should be able to update and delete user information.
- Hospital can trace the user dependency on the system.

➤ **Users**

- The user should be able to log in/register.
- Users should have access to the user dashboard.
- Users should be able to check and update their information.
- User credit history and points should be traced.
- Users can enable treatment through the ‘Treat now, Pay Later’ service by providing proper credentials and assets. Corresponding hospitals will take the liability to avail of this service.
- System will accommodate user review of the healthcare service.

Business Values:

- There is a 15% increase in the number of patients of middle-class families.
- There is a 10% increase in patients who have a life-threatening disease.
- The system will provide a ‘Treat now, Pay Later’ service with a 2% yearly interest rate which will generate revenue.
- Patients and their families are now less worried about the money and affordability of high-quality medical help.
- Increase customer satisfaction in many different sectors.

Special Constraints:

- Tutorials and guidelines must be updated regularly for hospitals and users.
- Possibility of data theft and data security issues.
- ‘Pay Later’ might be misused hence it should verify every user with proper documentation.
- Making available doctor's help with telemedicine 24/7.
- Possibility of the language barrier.

Requirement Analysis

Create User Account:

- **Functional Requirements:**
 - **FR 1.1:** System (Hospital) will authorize users to register new accounts.
 - **FR 1.2:** Users will be able to register an account using their mobile number, email address, and NID health-card service information, which will be saved for future reference.
 - **FR 1.3:** Attendants of system users will be able to register as dependents with personal information such as NID and income source.
 - **FR 1.4:** Users will be able to edit their personal information.
- **Non-Functional Requirements:**
 - **NFR 1.1:** Registration and authentication should take 10 seconds.

View Medical Helpline:

- **Functional Requirements:**

- **FR 2.1:** Users will be able to view available medical test costs in the selected hospital with before and after discounts.
- **FR 2.2:** "Treat now, pay later" users can pay using EMI. To use this service, they will link their attendants' bank accounts or income sources.
- **FR 2.3:** Users will have access to telemedicine around-the-clock.

- **Non-Functional Requirements:**

- **NFR 2.1:** Users should be notified and asked for feedback prior to receiving telemedicine services and medical tests.

Avail loyalty points for classified users:

- **Functional Requirements:**

- **FR 3.1:** Users will earn loyalty points for using the health card's services, which include telemedicine, medical tests, and loans.
- **FR 3.2:** Users will be classified into three groups based on their loyalty points and previous purchases: silver, gold, and platinum.
- **FR 3.3:** Users will also receive discounts from hospitals based on their user category (gold, silver, and platinum) for their particular medical test.

- **Non-Functional Requirements:**

- **NFR 3.1:** Users should be notified when loyalty points are awarded and their user category is updated.
- **NFR 3.2:** Users will be able to rate hospital services on a scale from 0 to 5 stars.

Create Hospital Account:

- **Functional Requirements:**

- **FR 4.1:** The system (Admin) will provide the hospital permission to create new accounts.
- **FR 4.2:** Hospitals can create user accounts using registration and license numbers.
- **FR 4.3:** Adding hospital data to the network with a unique identification.

- **Non-Functional Requirements:**

- **NFR 4.1:** Registration and authentication should take 10 seconds.

Manage medical test service:

- **Functional Requirements:**

- **FR 5.1:** Hospitals will be able to post their medical tests and require physicians for different types of tests.
- **FR 5.2:** System will allow the hospital to add new tests by clicking on 'Add new test'
- **FR 5.3:** Hospitals will be able to update the test price regularly following government instructions.
- **FR 5.4:** Hospitals will be able to schedule appointments for specific medical tests, as well as choose the discount percentage for classified users (gold, silver, and platinum).

- **Non-Functional Requirements:**

- **NFR 5.1:** Hospitals should be notified when they will drastically lose health card users.

- **NFR 5.2:** Digital marketing and television channel advertisements can be used to promote hospitals if they have the most significant number of monthly customers.
- **NFR 5.3:** Hospitals should check their rankings among hospitals that provide health cards.

Manage telemedicine service:

- **Functional Requirements:**

- **FR 6.1:** Hospitals should schedule telemedicine doctors 24/7 and customize emergency response times.
- **FR 6.2:** Hospitals should customize telemedicine service for gold, silver, and platinum consumers.

- **Non-Functional Requirements:**

- **NFR 6.1:** Hospitals should be notified when they will lose drastically health card users.
- **NFR 6.2:** Hospitals should track the number of telemedicine users.

Manage medical loan service:

- **Functional Requirements:**

- **FR 7.1:** Hospitals should set the interest rate and loan term for medical loans and personalize them in emergencies.
- **FR 7.2:** System analyzes the user's bank balance and financial assets to set loan limits.
- **FR 7.3:** Users must submit a bank solvency certificate and fixed income source for verification.

- **Non-Functional Requirements:**

- **NFR 7.1:** Users should be notified when the installment dates are close.
- **NFR 7.2:** Hospitals should be notified after every six months how many active lenders pay on time and who hasn't.

Notification Management:

- **Functional Requirements:**

- **FR 8.1:** Users will be notified about their health card renewal time.
- **FR 8.2:** Hospitals will be notified about their health-card system renewal time.
- **FR 8.3:** Users will be notified through email and phone number of any account activity.

- **Non-Functional Requirements:**

- **NFR 8.1:** Users should be able to choose which features they want to get notified about.
- **NFR 8.2:** The notification should be sent within 5 minutes after the action.

System Management:

- **Functional Requirements:**

- **FR 9.1:** Each hospital's system will track health card users, testing, and loans.
- **FR 9.2:** System should check the user's account and payment methods under the 'pay later' service before every transaction.

- **Non-Functional Requirements:**

- **NFR 9.1:** System will block user accounts if any suspicious transactions are identified.

- **NFR 9.2:** System will ban hospitals' accounts and notify the police to take action if any fraud case is proven.

Non-functional requirements:

- **Operational:**

- **NFR 10.1.1:** System should be enabled to run on any device such as a laptop, desktop, tablet, mobile phone, or iPad.
- **NFR 10.1.2:** System should work on any operating system. For instance, ios, android.
- **NFR 10.1.3:** System should be executed by any web browser like Firefox, Google Chrome, or Microsoft Edge.
- **NFR 10.1.4:** System must ensure smooth health care service efficiently.
- **NFR 10.1.5:** System should interconnect with the hospital management system.

- **Performance:**

- **NFR 10.2.1:** System should be loadable within 2 milliseconds.
- **NFR 10.2.2:** Scrolling and clicking buttons should respond within 1 millisecond.
- **NFR 10.2.3:** System must ensure smooth automation.
- **NFR 10.2.4:** System must be accessible 24/7.

- **Security:**

- **NFR 10.3.1:** System will secure patient information such as disease history, location, and health card usage history, as well as patient attendants' profession and income.

- **NFR 10.3.2:** Hospitals (the concerned authorities) of the system should observe the health card users' profiles.
- **NFR 10.3.3:** Admin (the concerned authorities) of the system should observe the health card users' profiles.
- **NFR 10.3.4:** System will verify all bank accounts, online banking, and card accounts before making any transaction (Loan, Payment).
- **NFR 10.3.5:** Users should not be allowed to create a double account.
- **NFR 10.3.6:** System will be updated regularly to enhance security, repair vulnerabilities, and keep the software up to date.
- **Cultural and Political:**
 - **NFR 10.4.1:** System will protect users' personal information according to the "Data Protection Act".
 - **NFR 10.4.2:** System should accommodate English and Bangla languages simultaneously.
- **Usability:**
 - **NFR 10.5.1:** User interface, font size, and layout should be flexible to adjust as per the screen size.

Project Scenario

The health card system has three different kinds of actors. Here, the primary actor is Patients or their caregivers are referred to as Users, while Hospital and Admin are considered secondary actors. For the Users, giving full name, mailing address, phone number, NID number, desired hospital name, membership type, and a strong password are requirements to register or create an account. Users who have registered or already have an account can log in using their own email and password after being verified by the admin. On the other hand, Hospitals must provide a name, license number, registration number, and a strong password in order to register or create an account. Hospitals can also log in using their own email and password after enrolling in the system, subject to account management's verification. To access their accounts and store their data, Hospitals, and Users both agents must log in. Before logging in and signing up, there will be a selection option to pick the account type. Hospitals may check their profile accounts after successfully logging in, where they can manage medical tests, telemedicine schedules, and loan entities. There are five different selection options based on the services they can view, including telemedicine requests and medical loan requests. However, following a successful login, Users can access their profile account, which presents five different selection options, three of which are based on hospital services like ordering medical tests, using telemedicine service, and requesting loans for medical expenses, with the remaining two options being for viewing relatable notifications and history.

Design Diagrams

Use Case Diagram:

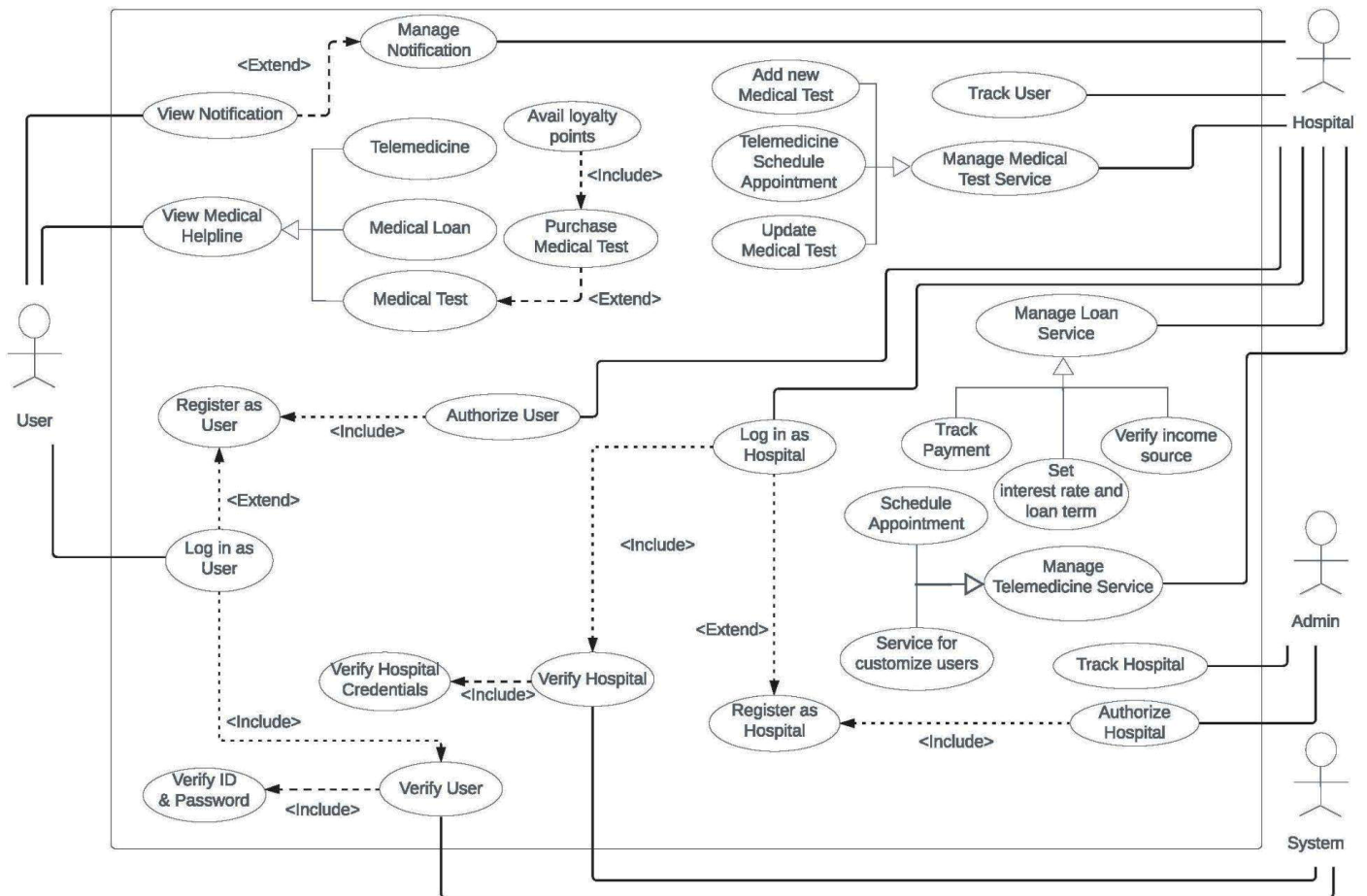
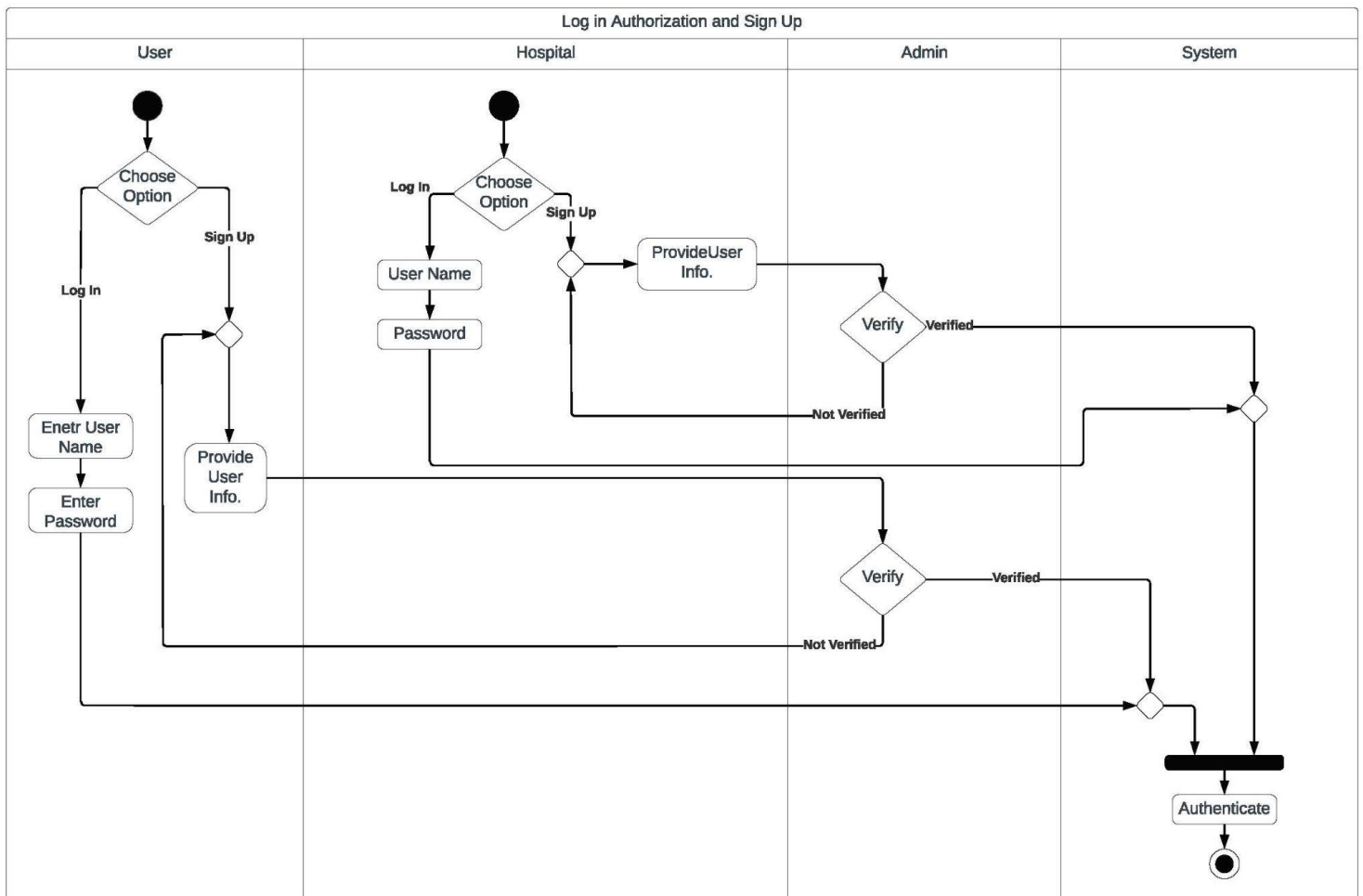


Figure 01: Use Case Diagram

Activity Diagram:**Figure 02: Activity Diagram for login and sign up**

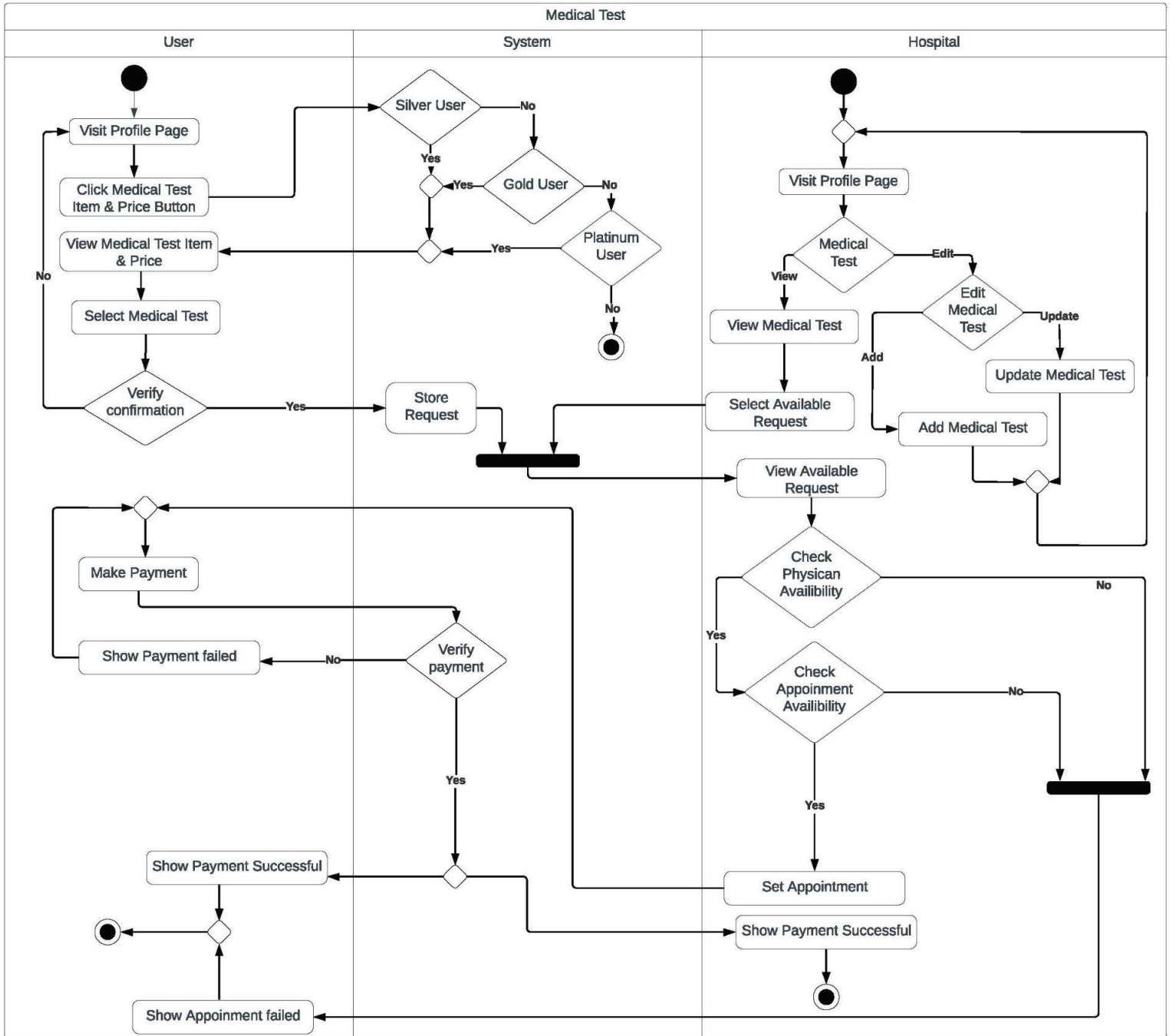


Figure 03: Activity Diagram for medical test

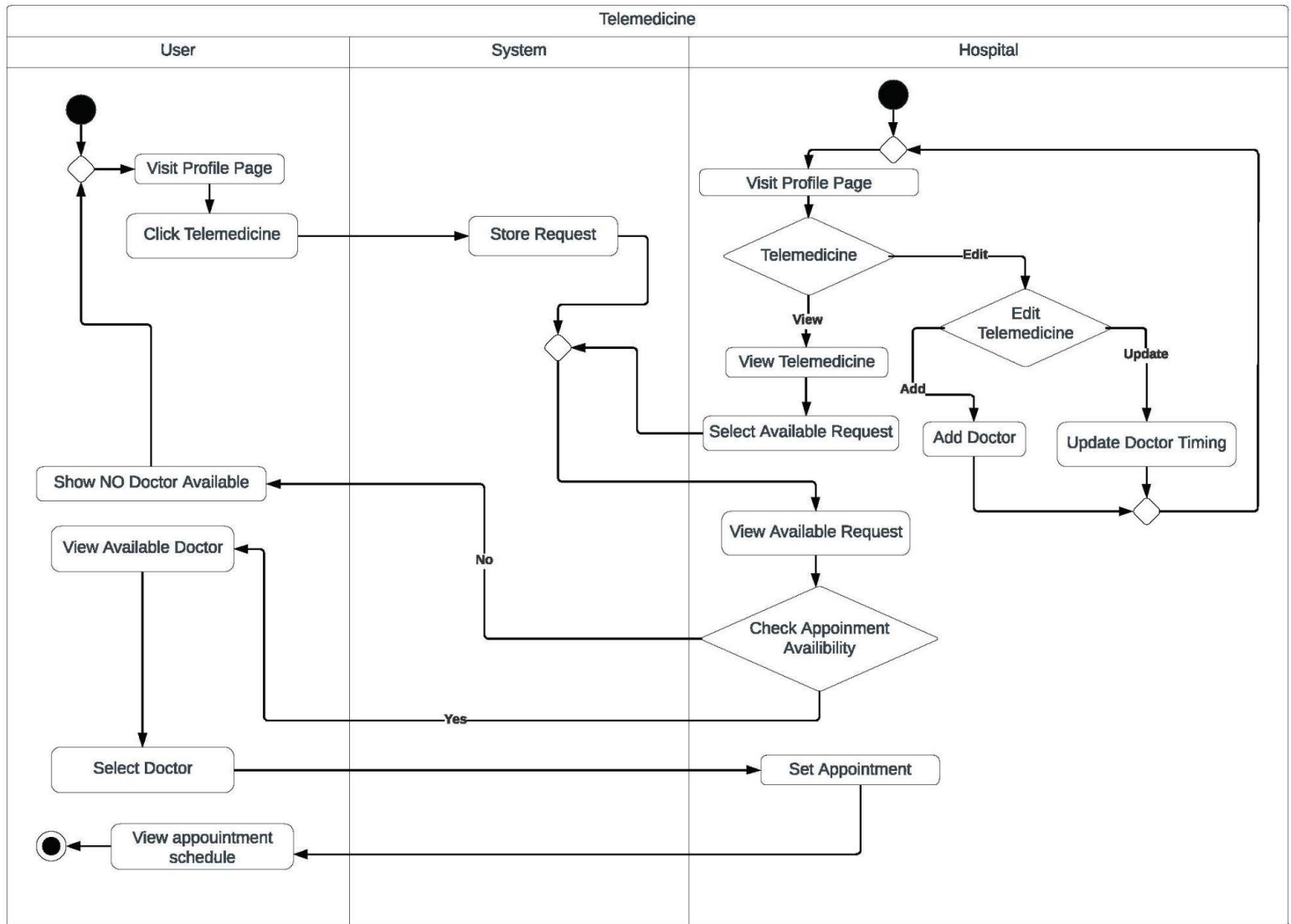


Figure 04: Activity Diagram for telemedicine

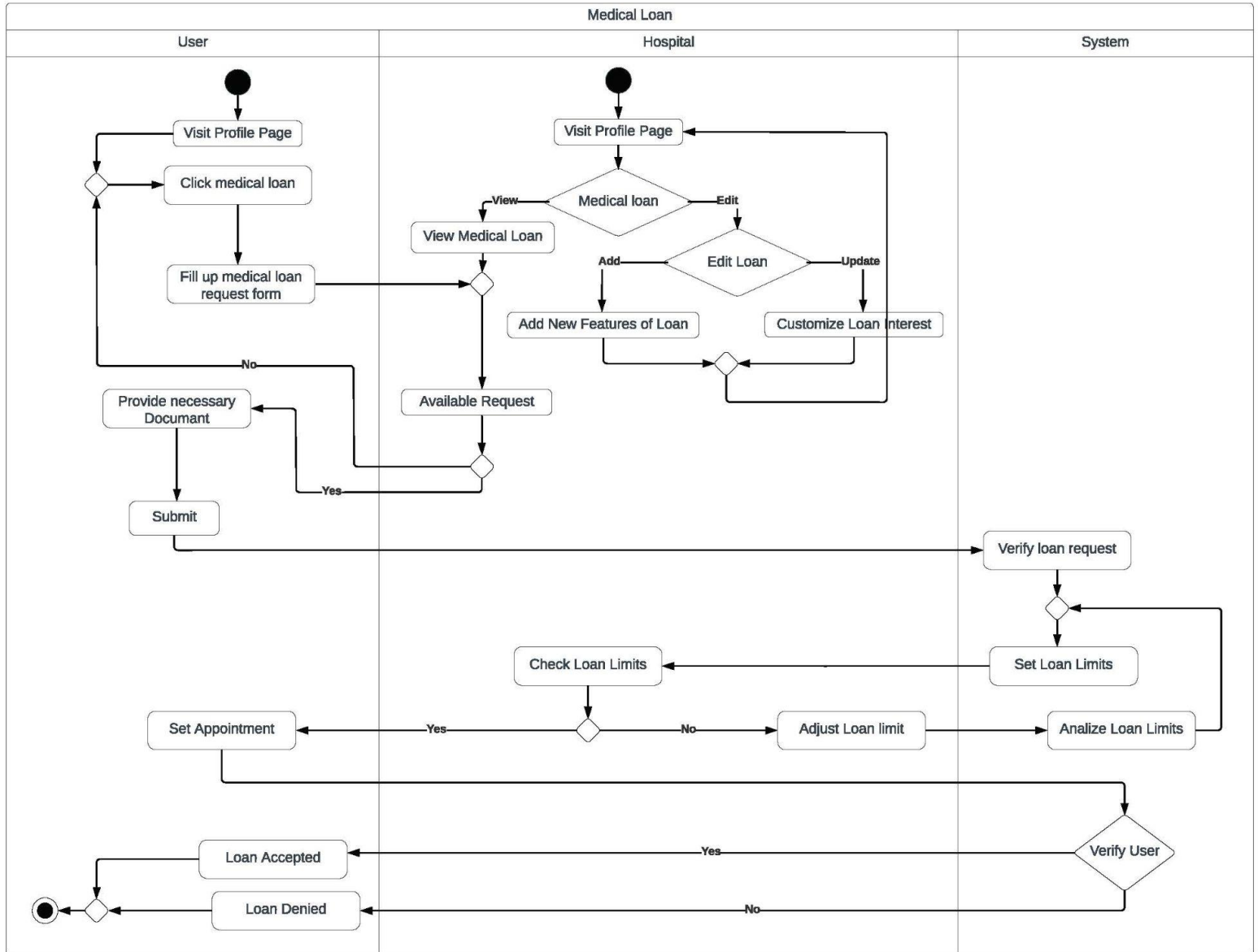
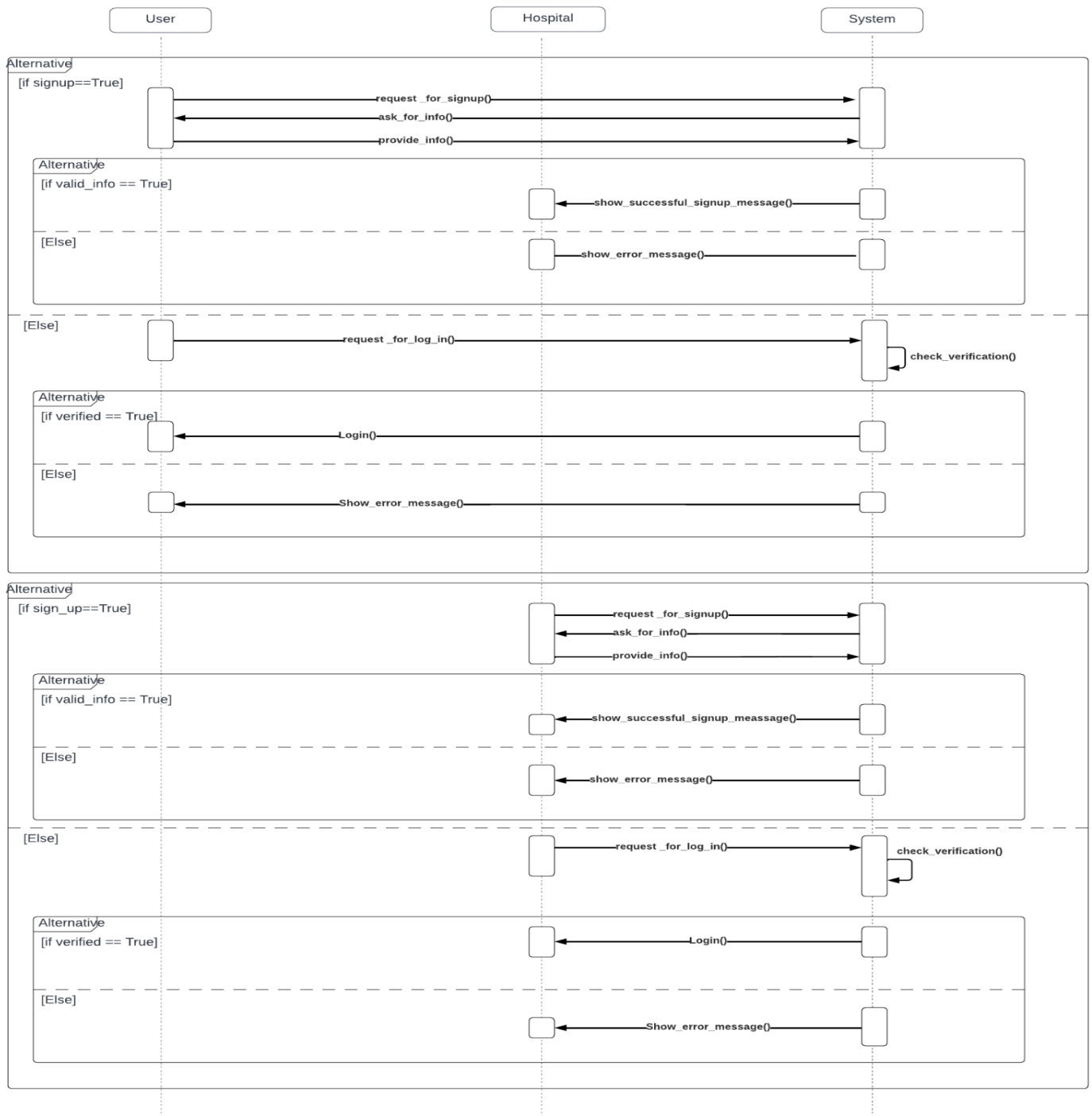


Figure 05: Activity Diagram for medical loan

Sequence Diagram:

Log in/Sign up sequence Diagram

**Figure 06: Sequence Diagram for login and sign up**

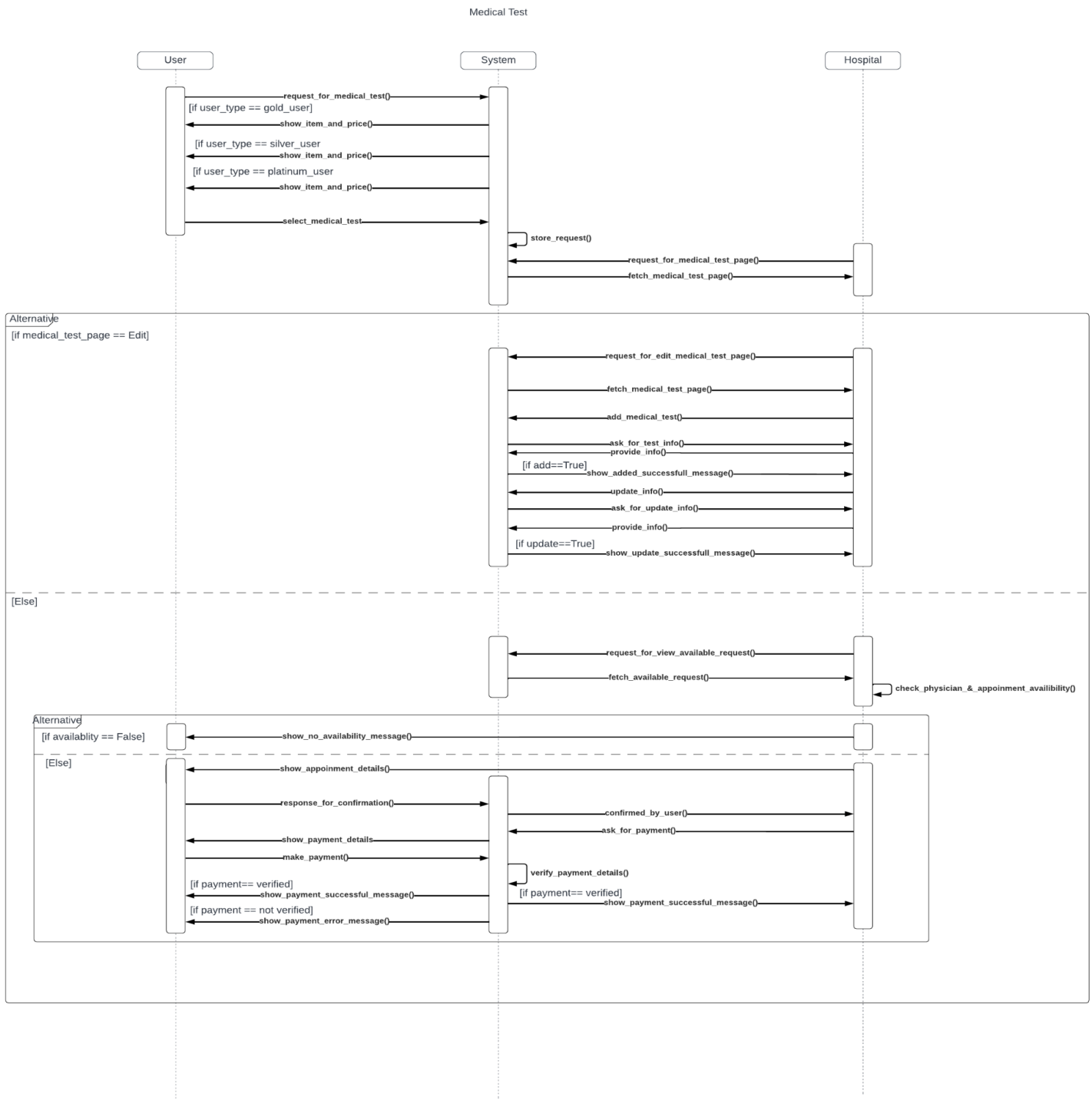


Figure 07: Sequence Diagram for medical test

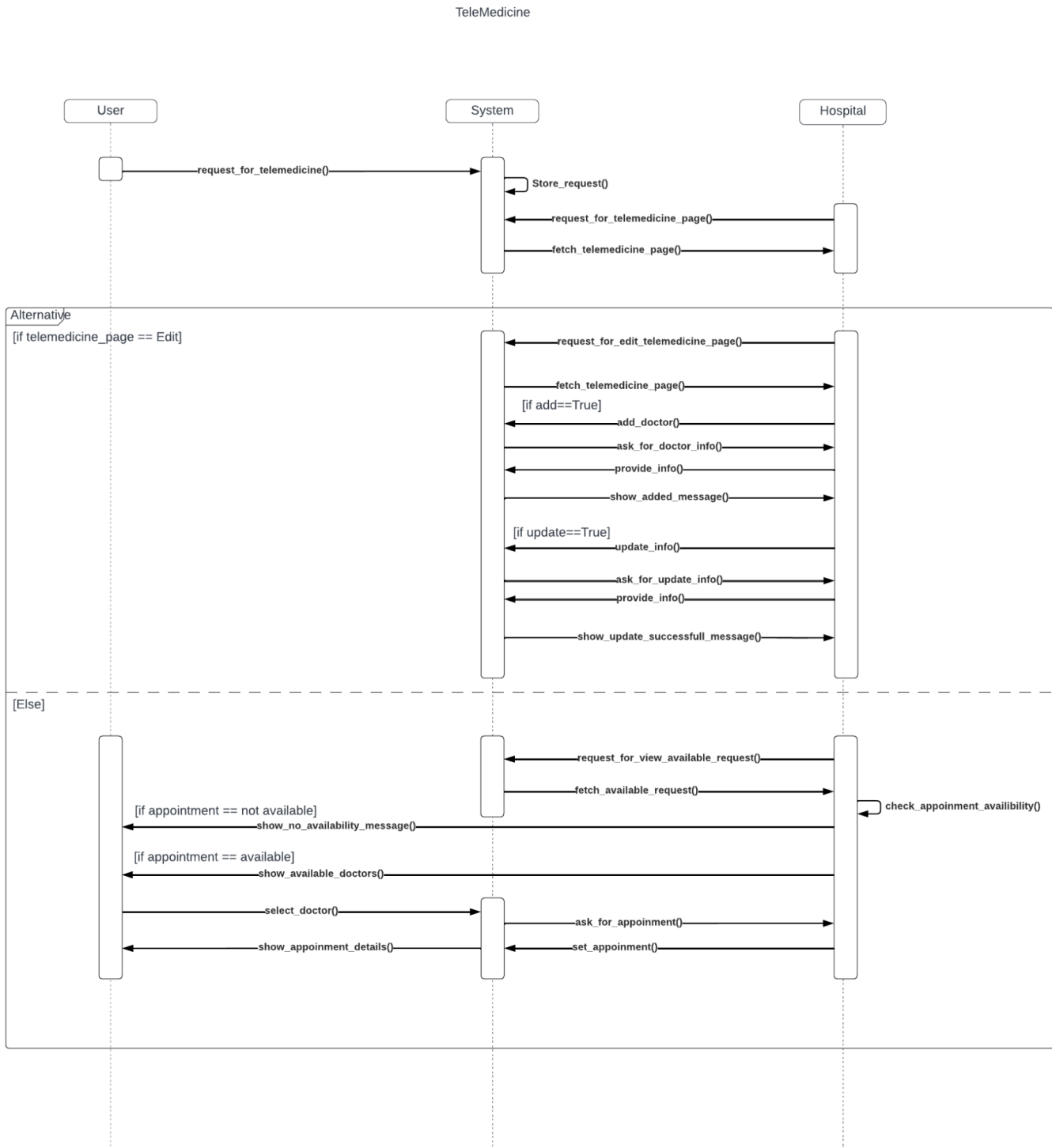


Figure 08: Sequence Diagram for telemedicine

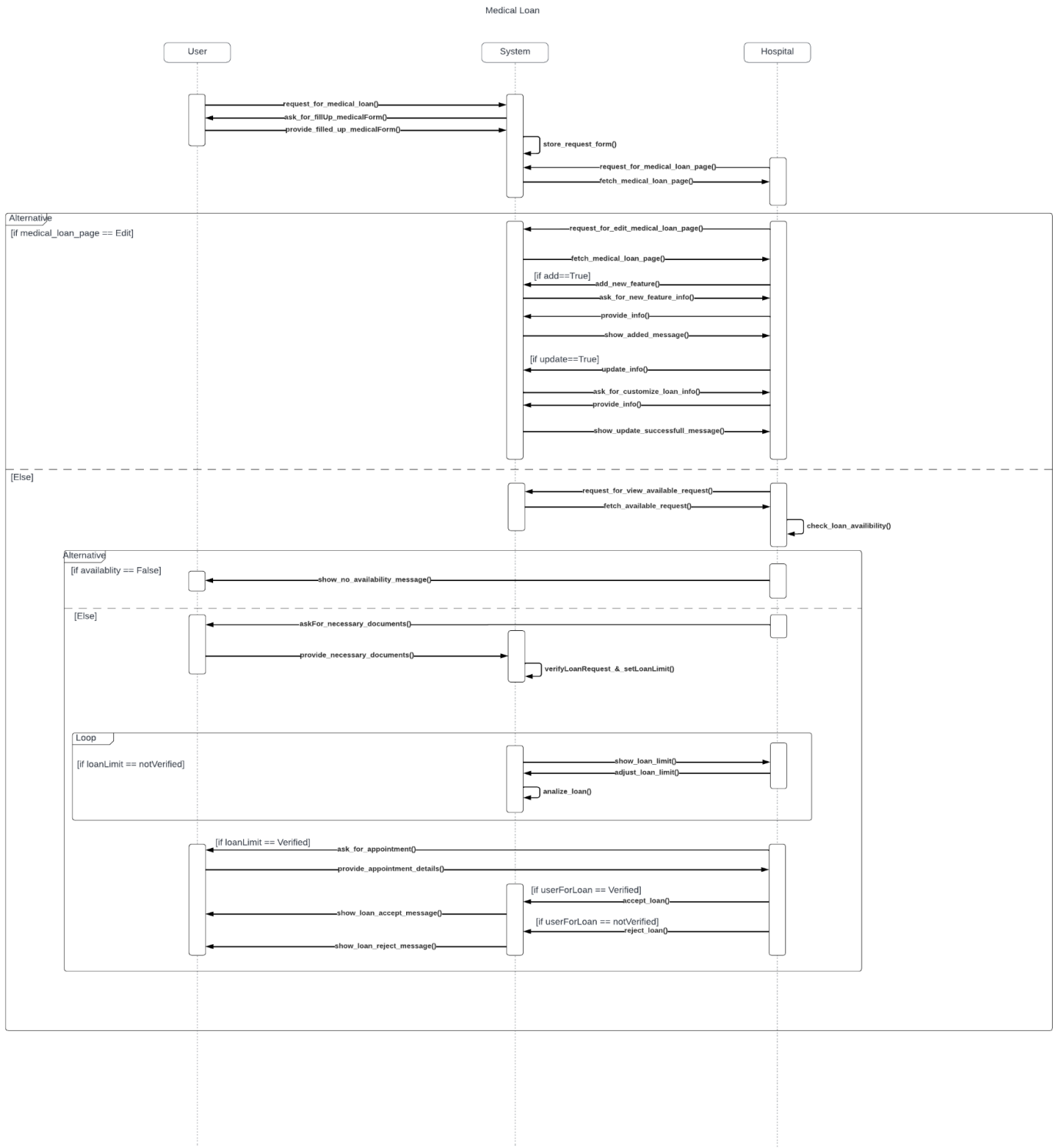


Figure 09: Sequence Diagram for medical loan

Data Flow Diagram:

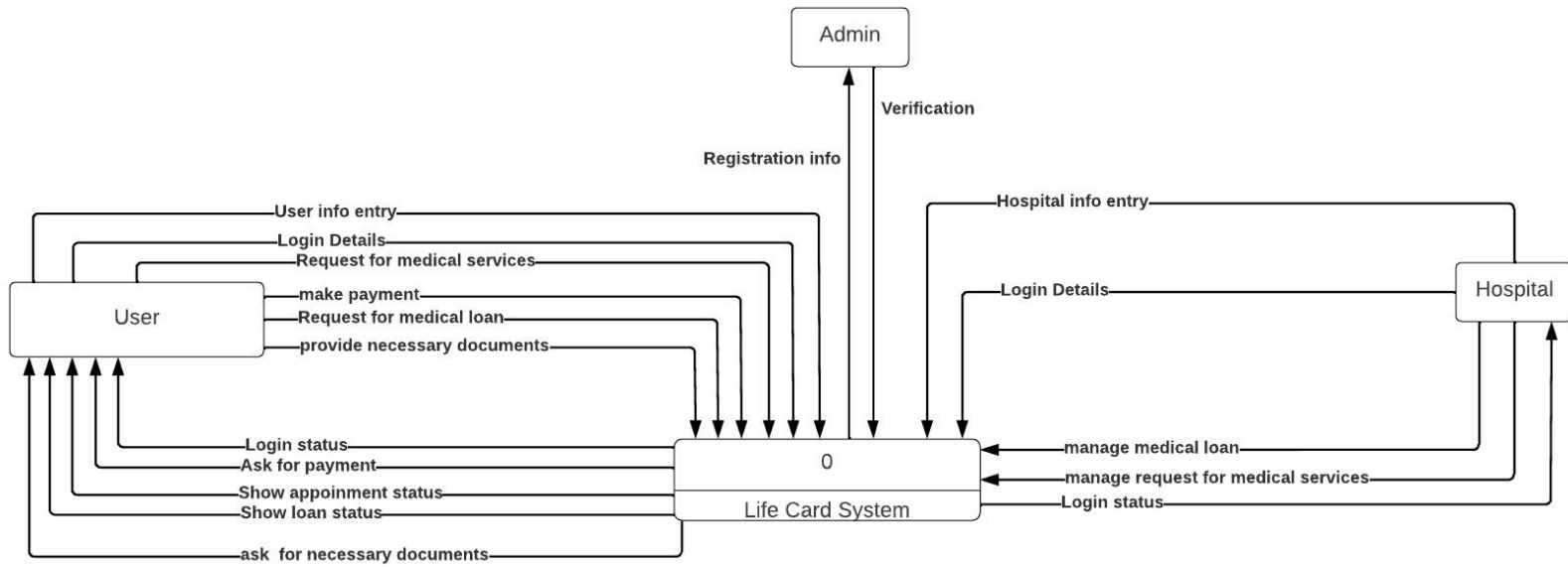


Figure 10: Level – 0 Data Flow Diagram

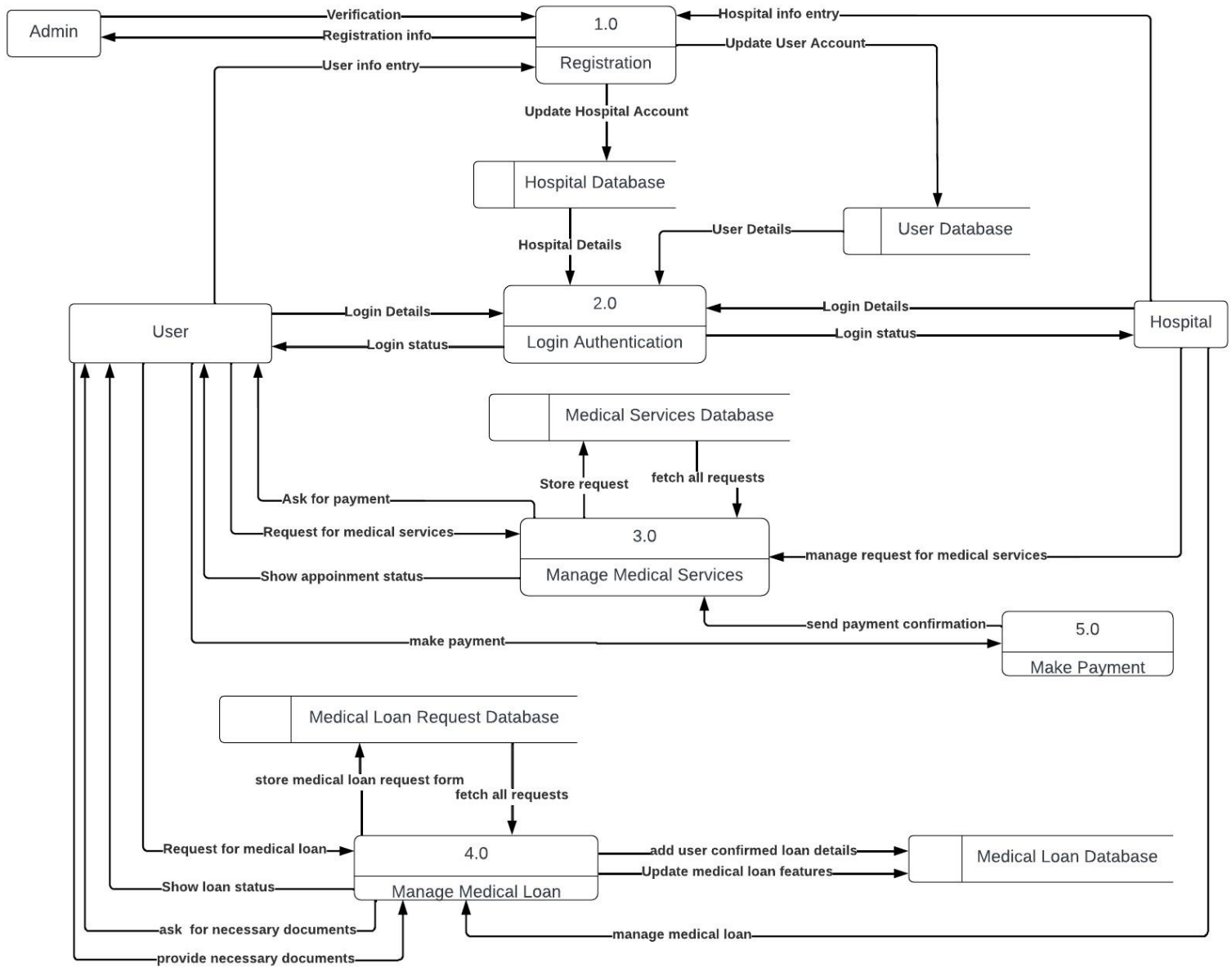


Figure 11: Level – 1 Data Flow Diagram

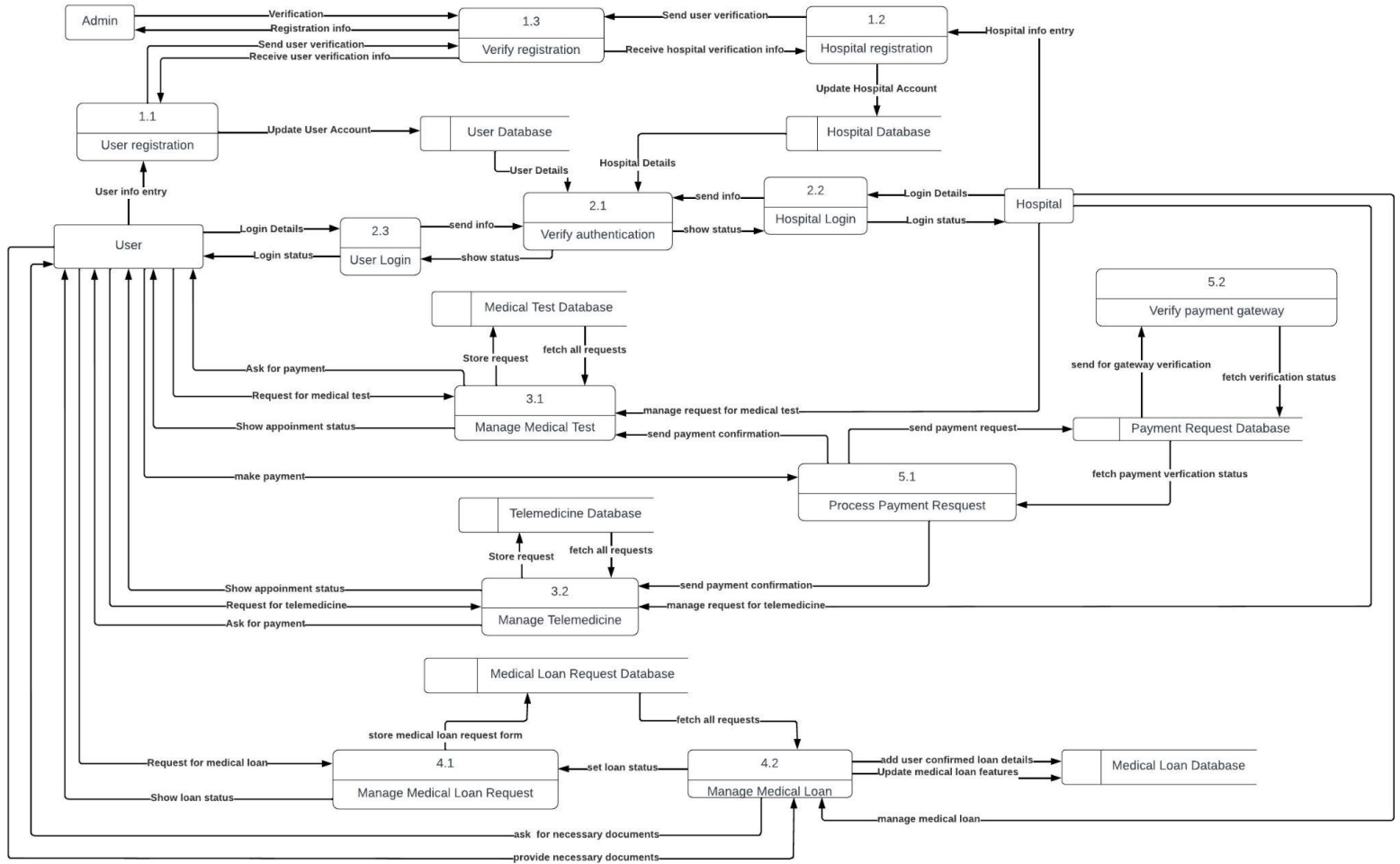


Figure 12: Level – 2 Data Flow Diagram

Windows Navigation Diagram:

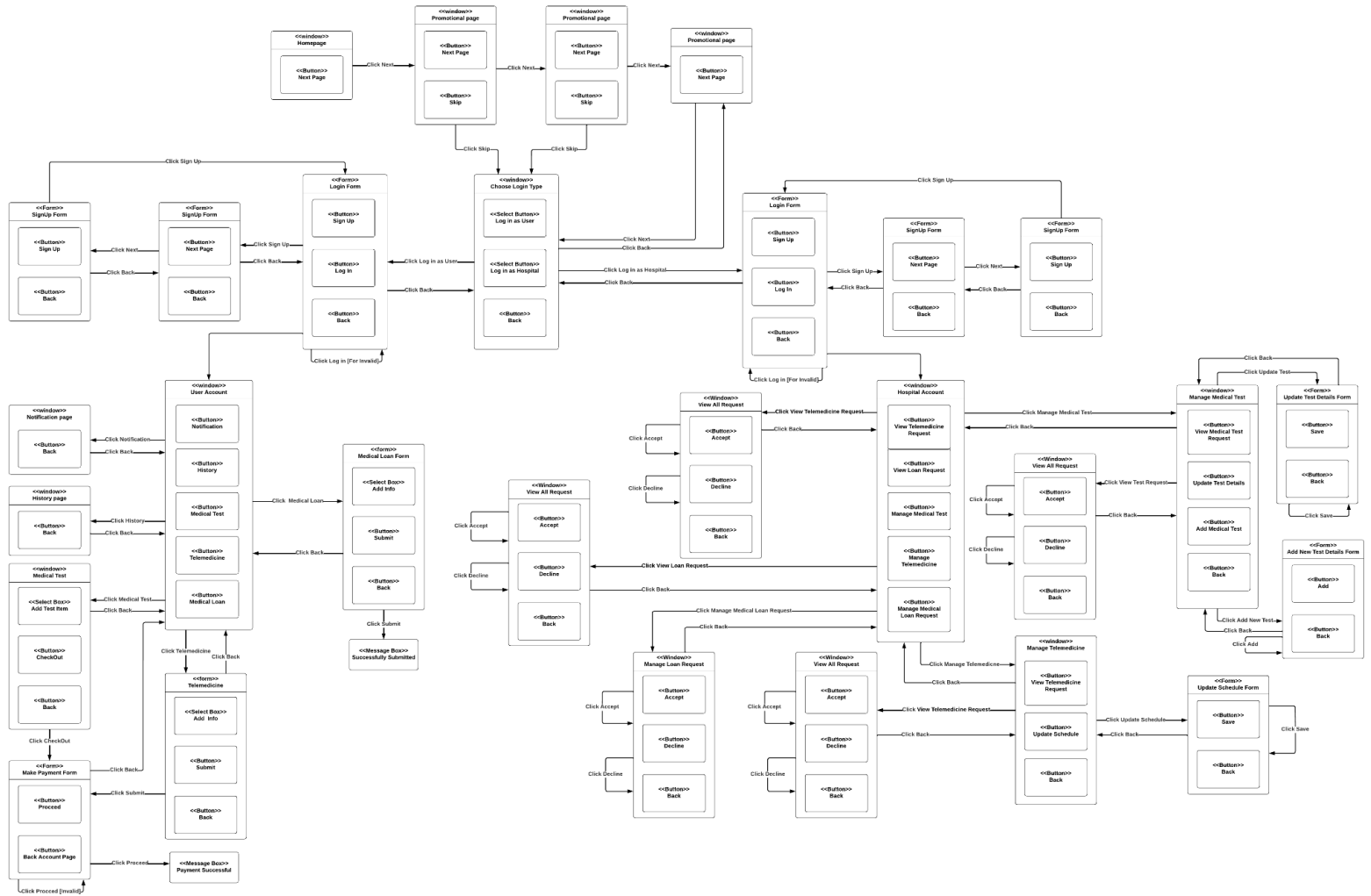


Figure 13: Windows Navigation Diagram for Life Card System

Project Demo UI

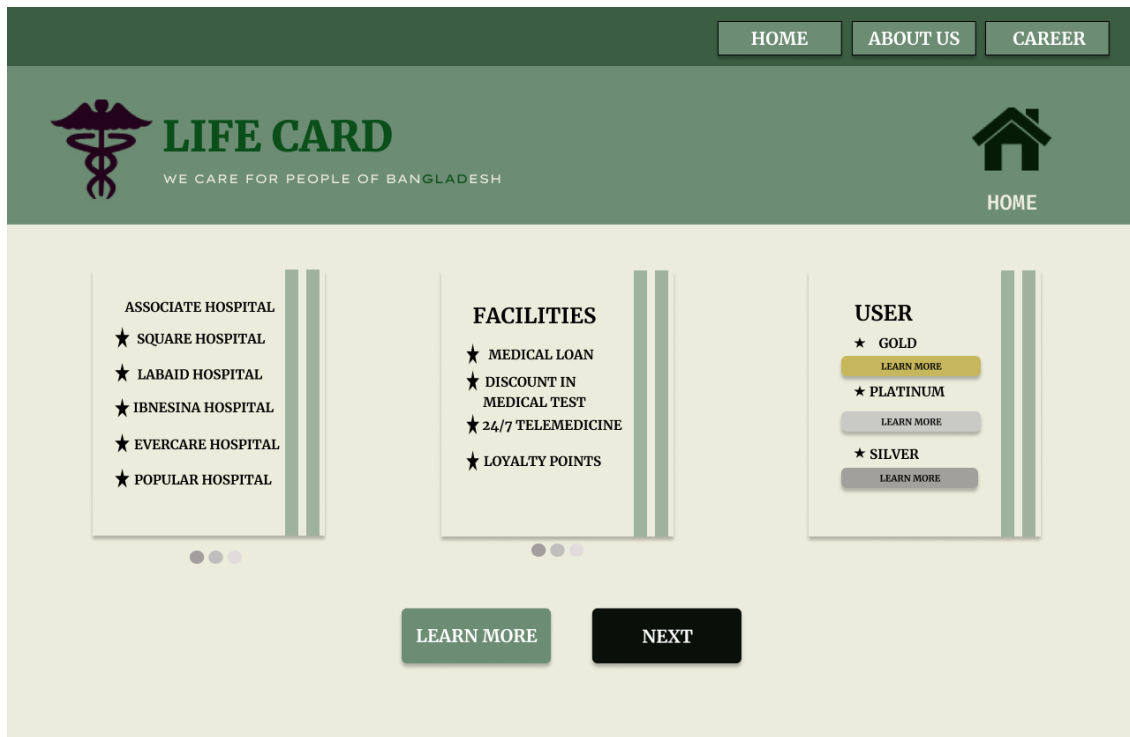


Figure 14: UI Design for Homepage

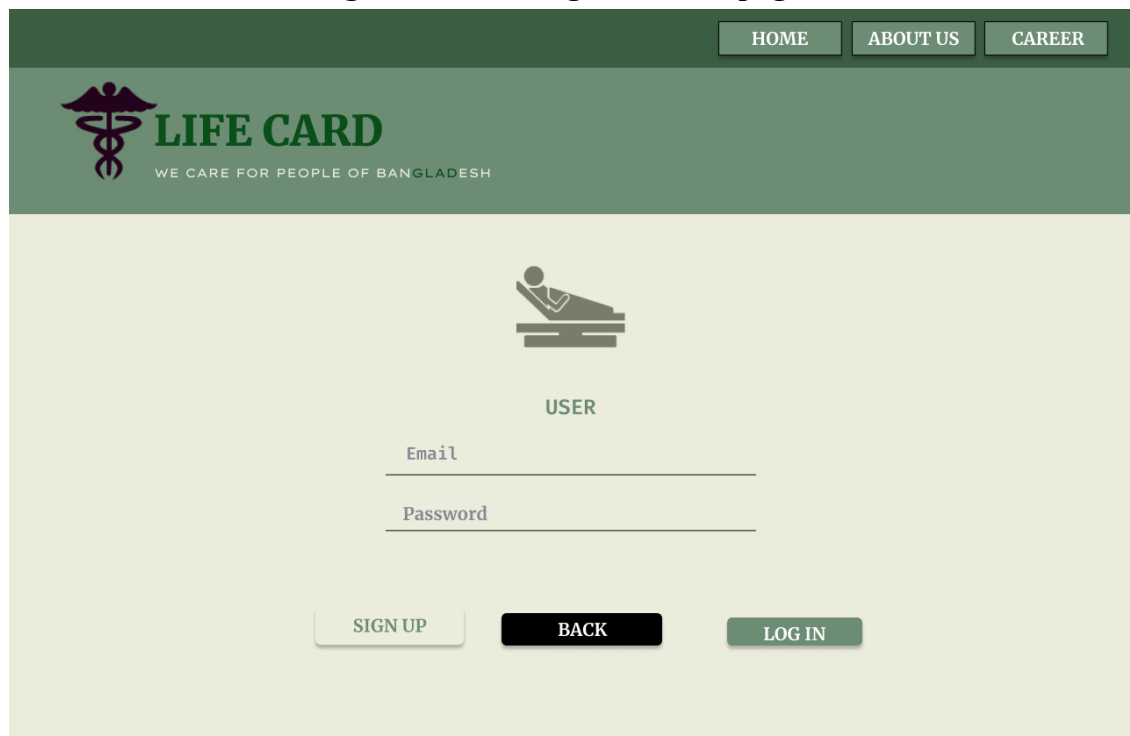
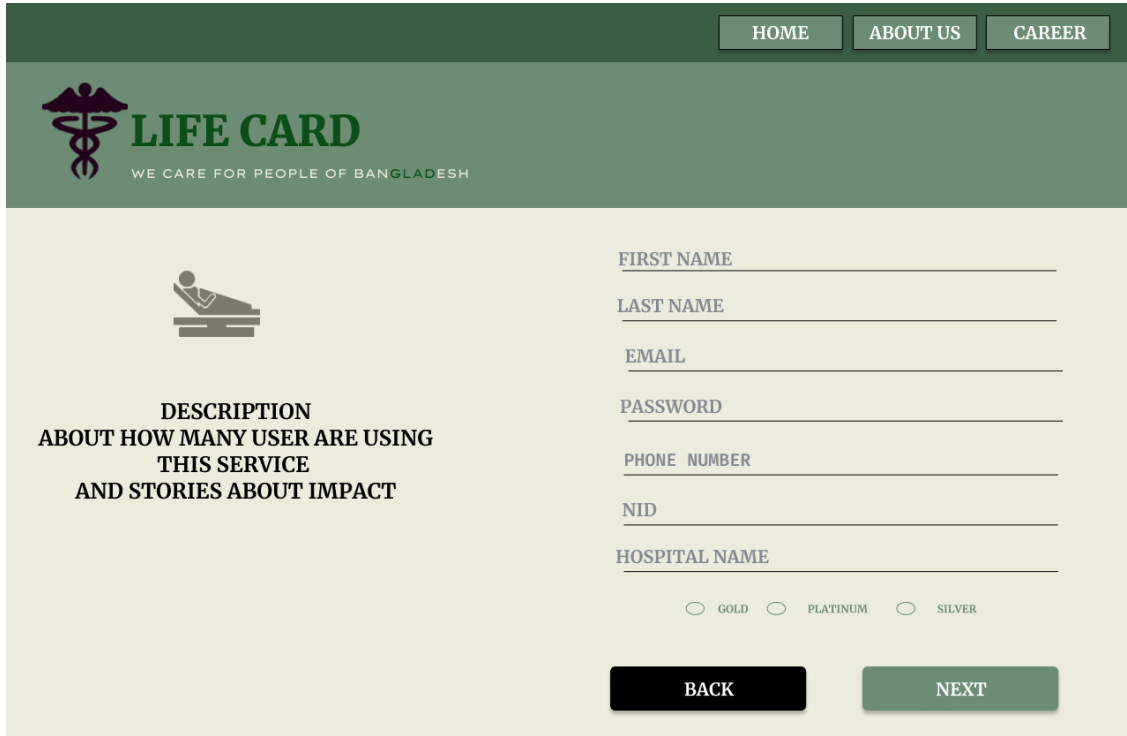
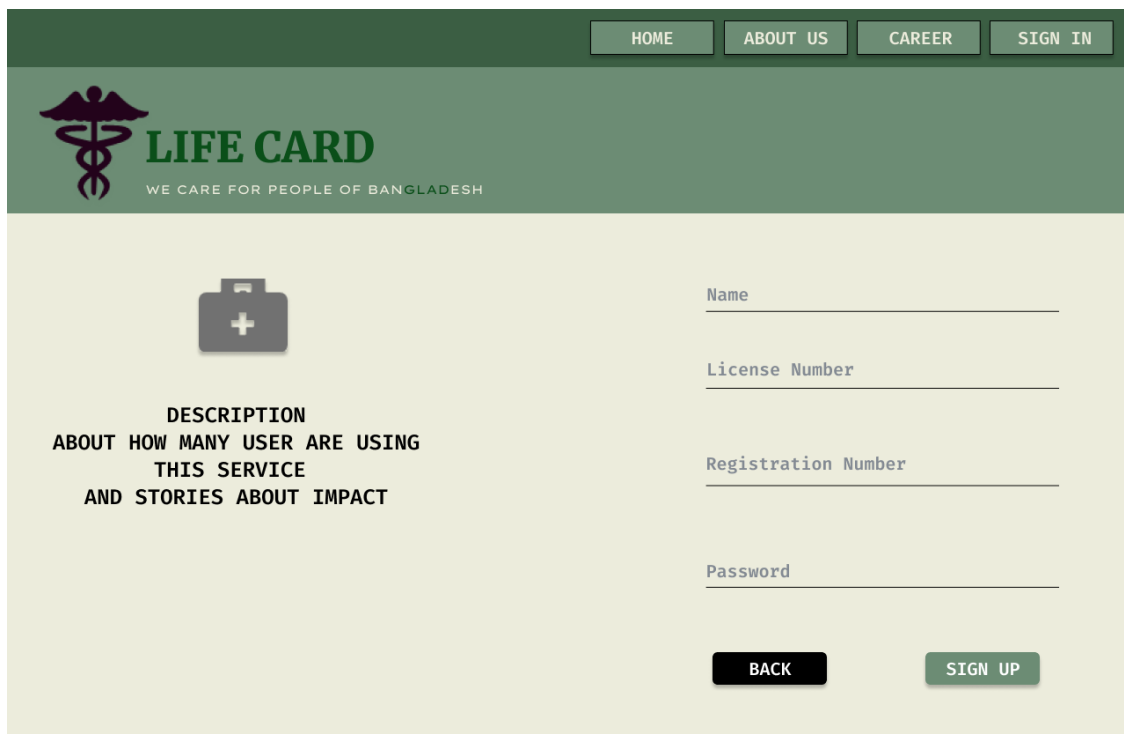


Figure 15: UI Design for User log in



The UI design for the user sign up form features a dark green header with navigation buttons for HOME, ABOUT US, and CAREER. The Life Card logo, which includes a caduceus and the text 'LIFE CARD WE CARE FOR PEOPLE OF BANGLADESH', is positioned on the left. The main content area has a light beige background. On the left side of this area, there is a grey icon of a person lying on a gurney, followed by the text: 'DESCRIPTION ABOUT HOW MANY USER ARE USING THIS SERVICE AND STORIES ABOUT IMPACT'. On the right side, there are seven text input fields labeled FIRST NAME, LAST NAME, EMAIL, PASSWORD, PHONE NUMBER, NID, and HOSPITAL NAME. Below these fields are three radio button options: GOLD, PLATINUM, and SILVER. At the bottom right, there are two buttons: a black 'BACK' button and a green 'NEXT' button.

Figure 16: UI Design for User sign up



The UI design for the hospital sign up form features a dark green header with navigation buttons for HOME, ABOUT US, CAREER, and SIGN IN. The Life Card logo, which includes a caduceus and the text 'LIFE CARD WE CARE FOR PEOPLE OF BANGLADESH', is positioned on the left. The main content area has a light beige background. On the left side of this area, there is a grey icon of a first aid kit, followed by the text: 'DESCRIPTION ABOUT HOW MANY USER ARE USING THIS SERVICE AND STORIES ABOUT IMPACT'. On the right side, there are four text input fields labeled Name, License Number, Registration Number, and Password. At the bottom right, there are two buttons: a black 'BACK' button and a green 'SIGN UP' button.

Figure 17: UI Design for Hospital sign up

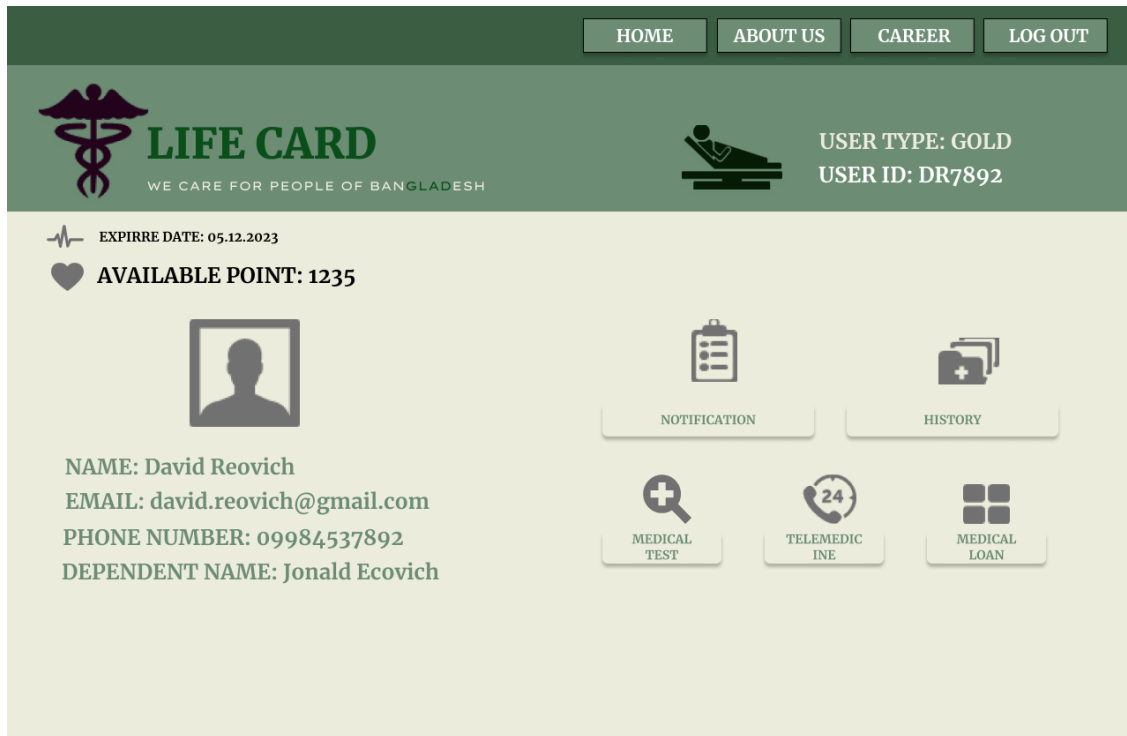


Figure 18: UI Design for User profile

The image shows a 'MEDICAL LOAN' form interface. It has the same header as Figure 18. The main content area has a light green background. On the left, there is a profile section with a placeholder for a photo, followed by the user's name 'David ReoVich'. Above the profile section, there are two status items: 'EXPIRE DATE: 05.12.2023' and 'AVAILABLE POINT: 1235'. The form itself is divided into two columns. The left column contains input fields for: First Name, Last Name, Email, Address, Phone Number, and NID. The right column contains input fields for: Dependent's Name, Dependent's Profession, Dependents Bank Solvency Report (with an 'UPLOAD' button), Dependent's Yearly Income, Loan period Expectation, and Monthly Installment Expectations. At the bottom of the form, there is a radio button for 'Accept all terms and condition or learn more', a 'BACK' button, a 'LEARN MORE' button, and a 'REQUEST FOR LOAN' button.

Figure 19: UI Design for User's Medical Loan Form

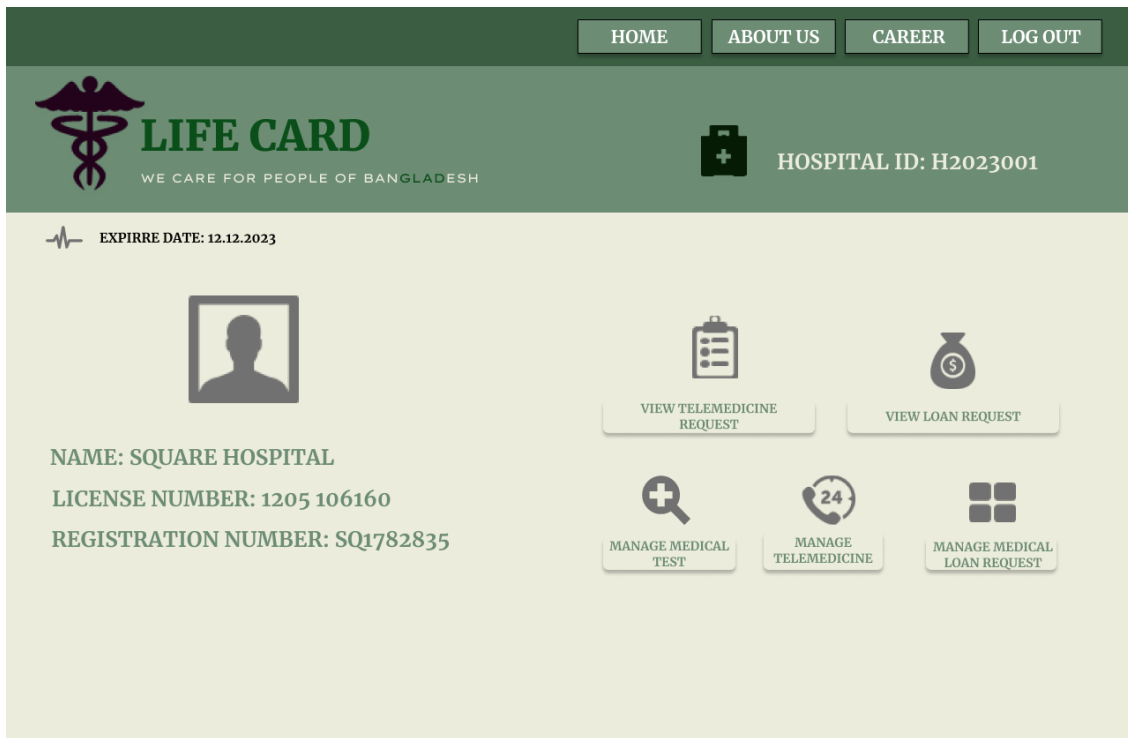


Figure 20: UI Design for Hospital profile

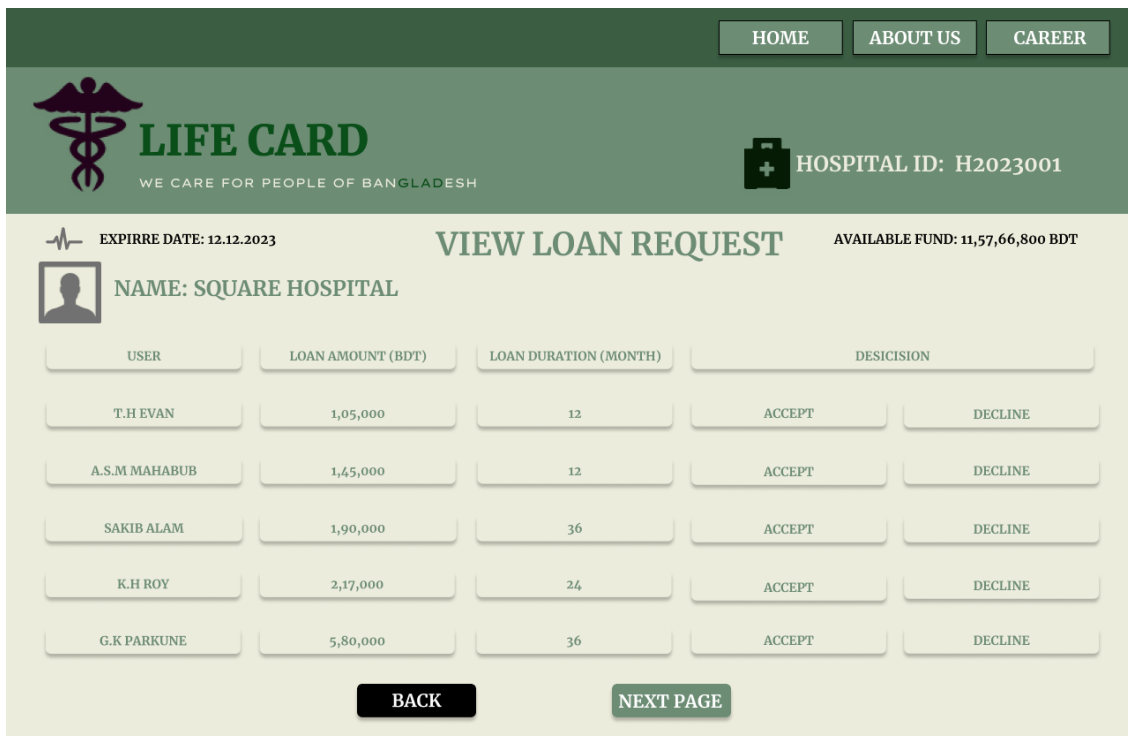


Figure 21: UI Design for Hospital's loan request management

HOME ABOUT US CAREER

LIFE CARD
WE CARE FOR PEOPLE OF BANGLADESH

HOSPITAL ID: H2023001

EXPIRE DATE: 12.12.2023

MEDICAL TEST

NAME: SQUARE HOSPITAL

SEE REQUEST UPDATE ADD NEW

TEST ID	NAME	AVAILABLE DOCTORS	AVAILABLE TIME AND DATE
S22001	ABDULLAH KHONOKER	DR. KASEM ISLAM	5:00 PM, 15.12.2022
S22002	PRIMA SARKAR	DR. HAKIM ISLAM	5:00 PM, 14.12.2022
S22003	TASIK ISLAM	DR. NAHAR ISLAM	4:00 PM, 10.12.2022
S22004	NAZMUS SAKIB	DR. WAZED ISLAM	3:00 PM, 9.12.2022
S22005	RAKIBUL ISLAM	DR. HARUN UR RASID	5:00 PM, 8.12.2022

BACK NEXT PAGE

Figure 22: UI Design for managing medical tests

Conclusion

Businesses have increased their efficiency by using Health Card systems to streamline the manufacturing and service delivery process. This kind of service would undoubtedly be helpful to as many people online, saving them time, achieving financial support, boosting their income, improving their efficiency, and, most importantly, making them feel better. As was already noted, controlling medical debts is extremely essential and is on par with maintaining good physical health since it directly affects how well-off and financially supported a person's family is. Our system of assistance works to advance the welfare of a nation while keeping in mind all those who struggle to better themselves or their families.

References

Correspondent, S. (2022, January 27). *67% of all deaths in Bangladesh due to non-communicable diseases.* The Daily Star.
<https://www.thedailystar.net/health/disease/news/rising-health-risk-2948321>

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