Digital Sheba - A web and mobile-based management system

SUBMITTED BY

Md Shahed Talukder
ID:173-35-258
Department of Software Engineering
Daffodil International University

SUPERVISED BY

Sk. Fazlee Rabby
Lecturer
Department of Software Engineering
Daffodil International University

This project report has been submitted in fulfillment of the requirements for the Degree of Bachelor of Science in Software Engineering

DECLARATION

As a result, I declare that the project entitled “DIGITAL SHEBA” submitted to the Daffodil International University is a record of an original work that I have prepared during the year 2021 under the guidance of Sk. Fazlee Rabby, Lecturer, Department of Software Engineering, Daffodil International University, submitted this project work in partial fulfillment of the Bachelors in Software Engineering award requirements.

I also declare that this project is the outcome of my effort, that it has not been submitted to any other university for the award of any degree.

Md Shahed Talukder
173-35-258
Department of Software Engineering
Faculty of Science & Information Technology
Daffodil International University

ACKNOWLEDGEMENT

First and foremost, I would like to thank Almighty ALLAH, the most gracious and merciful, for his blessing given to the courage and health to complete my project. Peach and blessing of ALLAH be upon last Prophet Muhammad (SAWS) peach be upon him.

At the very outset of this report, I would like to give my deepest gratitude to my supervisor SK. Fazlee Rabby, Lecturer, Department of Software Engineering, for his diligent guidance, inspiration, motivation, and help throughout this work. Without his support, it would be difficult to complete the project in this limited and short period.

Also, I am thankful to those people who have helped me in this endeavor. Without their active guidance, help, and cooperation, I would not have made headway in this project.

I am also incredibly thankful and pay my gratitude to the project/thesis committee and other faculty members for their valuable guidance and support in completing this project in its present.

I again extend my gratitude to Daffodil International University for giving me this opportunity. I would like to express my deep gratitude to our good department Head of the Software Engineering department for encouraging me and giving me such an opportunity. I want to thank all my respected teachers who teach us excellent, engaging, and understandable.

Any deletion in this brief acknowledgment does not mean a lack of gratitude.

Thanking You
Md Shahed Talukder

PROJECT SUMMARY

The Digital ShebAugustweb and mobile-based platform is designed to improve patient service by making a well-organized system. The project was designed to provide good services to every hospital member. Every user of the system will assume their role from the system. The system will provide the benefits of streamlined operation, enhanced administration, control, superior patient care, strict cost control, and improved profitability. The system will be flexible and easy to use and is designed and developed to deliver real conceivable benefits to the hospital.

Most importantly, it is backed by dependable support. The project has been custom-built to meet the specific requirements of the mid and large-size hospitals across our country. Required modules and features have been mainly built to just fit into conditions. This project will cover all the required modules from a doctor, patient, nurse, assistant, ambulance driver registration, medicine details, doctor assign, schedule management, telecommunication, etc. The human body is a compound and sophisticated structure and comprises millions of functions that have been understood by man, part by part their investigation and exploration. As we can see, science and technology are progressing day by day. Medicine has become an integral part of research. Gradually, medical science became an entirely new branch of science. Today, the Health Sector comprises Medical institutions, hospitals, etc. Research and development institutions and medical colleges. Thus the health sector aims at providing the best medical facilities to the commoner.

Problem statement since the hospital is associated with the lives of ordinary people and their day-to-day routines. The manual handling of the record is time-consuming and highly prone to error. The purpose of this project is to automate or make online the process of day-to-day activities like bed management, the new patient admitted, discharge a patient, assign doctor or nurse, buying medicine and computing the bill automatically, etc

LIST OF FIGURES

TABLE OF CONTENTS

CHAPTER 3

CHAPTER 4
SYSTEM ANALYSIS, DESIGN,SPECIFICATION 19-91

CHAPTER 1

INTRODUCTION

1.1 Project Overview

Many people are affected by many types of diseases every day, for which they are admitted to a hospital. However, as we know, the circumstances of our hospitals are so dire nowadays. We fall into many problems regarding being admitted into a hospital, taking seats for the patient, or taking good hospital members' good services. We fall into trials before accepting a patient and after admitting them too. Sometimes it takes so much time to call a nurse to look after the patient. Also, we fall into problems during taking equipment that we need for our patients. If we analyze deeply, we can see that not only patients but also doctors and nurses fall into so many problems, like making the schedule for a patient about what they need, maintaining time of giving medicine, assigning nurses to take care of them, visiting hours of nurses and so on. In short, the system of a hospital is not appropriately organized, for which both hospital members and patients fall into so many problems. As a result, hospital members are failing to give total effort to patients, and patients are not getting their service correctly, and this situation is getting out of hand day by day. As we know, an effectively performing health sector is an essential precondition for society's overall development.Nevertheless, there are approximately 60,000 doctors and a deficit of almost 140,000 nurses. The worst part is that there is only one nurse for every three physicians. If those hospitals' systems are not well organized, it is impossible to give their best to those patients, finally, chaos.

Hospitals are an essential part of our lives, providing the best medical facilities to people suffering from various ailments due to climatic changes, increased workload, emotional trauma, stress, etc. The hospitals must keep track of their day-to-day activities & records of their patients, doctors, nurses, assistants, and other staff personnel that keep the hospital running smoothly & successfully.

Nevertheless, keeping track of all the activities and records on paper is cumbersome and error-prone. It also is a very inefficient and time-consuming process. We observe the continuous increase in population and the number of people visiting the hospital. Recording and maintaining these records is highly unreliable, inefficient, and error-prone. It is also not economically & technically feasible to retain these records on paper. Thus, keeping the working of the laboring system according to our project, we have developed a software version of the normal data enlisting method named "**Digital Sheba**."

1.2 Motivation

After observing the limitations of existing hospital management systems and their limited features in Bangladesh, We study to solve that problem. This study argues that we can use new technology to re-develop, and those techniques could be utilized innovatively to fill these gas and address those limitations. Also, this study is essential for hospital patients since they could have medical information without delays and incorrect information. If they want to have their medical history, they would not be going through a complicated process. The hospital staff, especially the pharmacy and billing department, would not go through many paper reports regarding payments and accounting records. Paper use would still be there, but it could be reduced so that excessive paper loads would not be a problem.

The study was also significant to the staff since they could register themselves, update their information, delete it, and search their information within the system. It was advantageous to the hospital since it could improve their management by connecting all their existing computers to one system. In general, the study was essential to the hospital and patients, for it could serve as a suitable tool for maintaining the productivity and usability of service in the hospital.

1.3 Project Purpose

This project aims to develop "Digital Sheba" software based on Web and Mobile application with Reactjs as front-end and Django rest framework as back-end framework and MySQL as a database to help the hospital be more efficient in handling the daily activities and registration of their patients. This project aims to complete requirements documentation, design, and software implementation worth points. It also explains the user interface, hardware, and software, and different models that could be used to develop software such as this. As we all know, hospitals are an essential part of our lives, providing the best medical facilities to people suffering from various ailments due to climatic conditions, increased workload, emotional trauma, stress, etc. The hospitals must keep track of every hospital authority's day-to-day activities & records of admitted patients, doctors, nurses,accountants, drivers, and other staff personnel that keep the hospital running smoothly & carefully.
Nevertheless, keeping track of all the activities and records on paper is cumbersome and error-prone. It also is a very efficient and time-consuming process. Not only that, but patients also suffer from getting a follow-up consultation time when they need it. Furthermore, we have developed an automated version of the manual system named "Digital Sheba" for medical institutions.

The focal objective of this project is to provide a paperless hospital up to 90%. It also aims at providing low-cost, reliable automation of the existing system. The system also provides excellent data security at every level of user-system interaction and provides robust & reliable storage and backup facilities.

1.4 Objective

This application was designed to help all persons interact in the system. This application offered them to manage hospitals properly, and it is the main focus to help and serve a patient properly.
The objective of the project targets:

- To develop a web and mobile-based application to serve both management and the patient.
- To provide the correct information about any hospital or medicine or their previous report history.
- To schedule a patient's admission to any hospital and record their billing information.
- To provide telemedicine facility if needed.
- To calculate a piece of patient billing information correctly from bed management to buy medicine.
- To help doctors watch their schedule with patients and where they are assigned.
- To help patients with an alarm system by providing the time to have their medicine.

1.5 Expected Outcome

The "Digital Sheba " will facilitate every user of this System though its main focus is to serve patients properly. Its first feature is its multi-vendor facility or functionality. The SystemSystem can handle multiple hospitals' data simultaneously, and this functionality will be conducted via **System Admin.** A system admin will interact in every hospital dashboard to see their statistical data if he needs it. Another admin named Hospital Admin will admit or register their hospital into the SystemSystem.
There are other users like Doctors, Nurse, assistants, Accountant, Laboratories, Ambulance Driver, Pharmacists, and Patients. Here, the doctor will have their profile to see their credentials, assigned patients profile and previous diagnostics information. Also, there will be a section to see their schedule for a full day. Here the Nurse will be only able to see their assigned patient profile and their medicine to give. The accountant will be able to check patients' billing property and also will be able to handle them properly, and the central call is on the accounting section; everything will be calculated through the back-end, and the accountant will not fall into any problem to calculate any financial problem. The Laboratory Section has been made only for publishing a patient's test reports. The pharmacist will have their section to sell their medicine's inside of a hospital. We have developed a **POS(Point Of Sell)** system that automatically calculates everything from the System. Furthermore, finally, our primary users, Patients, will

have their mobile application where they will be able to see their medical information and medicine take time. They will also see follow-up consultation time and have an alarming push notification system. They will get alerted about when they need to go to the hospital for the next consultation.

CHAPTER 2

BACKGROUND ANALYSIS

2.1 Background Analysis

Integration of documentation and knowledge-based computerized services in the "Digital Sheba" project is an enormous means of helping hospital workers in their daily activities and improving the quality of services delivery.
The project "Digital Sheba" includes

- registration of patients,
- storing their details into the system, and
- computerized billing in the pharmacy and labs.

The System will keep patients' records, drug inventory, dispensation, and each relevant hospital data of the Hospital. It will be used by the Hospital's staff (Admin, Doctor, Nurse, and Assistant). It will calculate data fastly and accurately provide information while required. The System will store information, produce reports and handle inquiries. The pieces of information are well organized and protected for personal use and quickly processed data. The purpose of the project entitled "**DIGITAL SHEBA**" is to computerize the Front Office Management of the Hospital to develop user-friendly, simple, fast, and cost-effective software. It deals with collecting patients' information, diagnosis details, etc. Traditionally, it has been done manually. The system's primary functionality is registering users, storing every user detail, fetching them when required, and meaningfully changing those details. System input contains patient details, diagnosis details, while system output is to get these details on different pages on demand.

Therefore, it is hoped that the System would provide flexible and reliable hospital management. This program is designed to work in a standalone system or a multi-user environment.

2.2 Related Work

"Digital Sheba" is designed for cross-functionality hospitals to cover a wide range of hospital administration and management processes of the patient-centric system. It is an integrated end-to-end Hospital Management System that provides relevant information to support effective decision-making for patient care (medical records management and billings) and hospital administration in a seamless flow. Some researchers have contributed positively to improving health care institutions' management systems. Therefore, in the section below, we discuss some related works done in the "Digital Sheba" system.
This project is focused on comprehending the stability indicators of hospital management systems, crystallizing the most delinquent typically agreed prototypes and protocols like "Hospital Bondhu." They have developed a plan with functionality like patient history generation, doctor appointments, billing system, and storing diagnostic reports and messaging systems between hospital authority and patient. Also, another company named "Base IT" has developed a system where we can get lots of modules like registration, OT service, pharmacy management, Bed Management, Room Management, Report Generation, etc.

2.3 Stakeholders
According to project management, project stakeholders "a person, group or organization will be influenced or affected through in a decision or outcome of the project."

A Hospital Admin, System Admin, Doctor, Nurse, Accountant, Laboratories, Ambulance Driver, Pharmacist, and finally, Patient are the system's stakeholders. An in-depth discussion about them is given below:

2.3.1: Hospital Admin:

Hospital Admin is one of the essential assets of this system. They can register their new hospital and control their own hospital’s data by him. He can see the hospital’s Doctors, Nurse, Accountant, and other kinds of staff lists and manipulate them on demand; not only that, every hospital authority must have the approval to use the system by him.

2.3.2: System Admin:

One of the main assets of the entire system will directly manage the whole system and have access to every hospital dashboard. Most importantly, only will have access to manipulate hospital admin information on demand.

2.3.3: Doctor

Doctors will have their profile to see their information and will also be able to see their appointments from their dashboard. He will also be able to see patients' previous diagnosis reports.

2.3.4: Nurse

A nurse will only have access to patients' profiles about their recent reports to give patient medicine support.

2.3.5: Accountant

The accountant will look after the patients' billing information, like how many medicines were purchased, and calculate their costs about hospitals' bills from different sections.

2.3.6 Laboratory Assistant

Here, a laboratory assistant will be vital in updating patients' different test results. He will upload every detail of them as a deep need for a patient by using this system,

2.3.7 Ambulance Driver

Here an ambulance driver's role is to get patients and take them to their destination when needed. An accountant will take care of notifying the driver about this.

2.3.8 Pharmacist

Pharmacists will lead another prominent role of maintaining medicine selling and importing into the system. Here the system will give him another section named POS to do this whole work.

2.3.9 Patient

The last but most influential user of the system is the Patient. The entire system is built to serve him better service than before. He will be able to access the system from their mobile application.

2.4 Project Schedule

Table [table number]: Project Schedule

Activities During Project	**Duration (**In Week**)**	**Total Week**
Deliberate	Week-1	1
Problem Identification	Week-2, Week-3	2
Requirement Analysis	Week-4, Week-5	2
Sketching	Week-6	1
Design	Week-7, Week-8	2
Database design(MySql)	Week-9	1
Implementation/Deploy Test	Week-10, Week-11, Week-12	3
Testing(Test Case Design)	Week-13, Week-14, Week-15	3
Project Delivery	Week-16	1

2.5 Release Plan

The project release plan is given below.

Table[table number]: Release Plan

Version	Feature	Date
V0.1	System Design, Multiple User Login, Hospital User Registration, Patient Registration, Hospital Registration and Approval, Password Reset and recovery	21-10-2021
V0.2	Doctor Profile, Appointment System, Telecommunication System, POS system, Accountant System, Patient Follow-up notification system, etc	20-01-2022

2.6 Challenges:

Developers faced many problems and challenges working on it to develop a system. While developing this system, I have also encountered some problems and difficulties.

The challenges I have faced:
Professionalism: As a developer, I have some lack of professional experience. That is why our work does not consist of 100% professionalism. Nevertheless, our work meets a grade solution table.
Technology Stack: In our “Digital Sheba” project, I use different technology stacks like Django (Ib Framework of Python), ReactJs, and React Native for front-end and back-end development. As a new developer, those Are challenging for us. Those are the primary technologies of our system.
UI/UX Design: Doing UI/UX design was challenging. Because I am the new developer for this type of project, I enjoy doing this design challenge because it helps us become more efficient and creative.
Docker: As a new developer Docker concept was not so easy for us to use in our project. Because making containers and dockerize the project is so hard for the first time as a new developer.
Deploy: As a new developer deploying a project into a server or hosts (VPS, Shared Hosting) is quite challenging. However, I have deployed it correctly though with nginx into several vps hosts.

2.7 Scope:

Hospitals and healthcare centers have changed for their betterment. The administrations of the healthcare sector are opting for IT solutions for better management of caring patients in their hospitals. Looking at some noteworthy features of the hospital management system like patient registration, appointment scheduling, bed management, follow-up consultation, managing admission, and overall management of various departments can be easily performed with higher accuracy after using my system.
The modules of "Digital Sheba" are user-friendly and easy to access. It has a standard user-friendly web and mobile interface having several features. The authorities can utilize these modules in their processes without any nuisance and make the best possible use of this system. Since every hospital has some other points of worth, those vary compared to its competitors. Hence, most IT companies give on-demand solutions or features like adding new modules. It further inference that
My software can be customized by specifying the personal necessities of the hospital.
The mechanical functions of online hospital software make productivity effective. This web-based and mobile-based IT solution has automated operations and permits officials to continue their work swiftly. It further inferences that complete software automation makes

productivity easily in circulation. All in all, this improves the infrastructure of hospital management.

This software is a comprehensive solution that integrates all the departments by creating a common platform. In brief, the hospital management system has all the modules that serve the purpose of all the departments of the healthcare institute. These modules have been competitively designed to make all the operations simplified.

CHAPTER 3

SOFTWARE REQUIREMENT ANALYSIS

3.1 Requirement Analysis

Requirement analysis is a process of helping user needs for the application. Requirement analysis involves the task that decides the needs of the software, which mainly incorporates the objections and requirements of different customers. Requirement analysis needs the excellent quality of the application.

3.2 Features of the system

- The different Registration processes for both authority and patient
- Multiple user role management
- Hospital Registration System and Accept system via system admin
- Doctor profile and appointment
- Accounting section and billing information gathering
- Diagnosis information reservation of patients
- Follow-up consultation alarming system
- Fast Ambulance management system
- Telecommunication system with the doctor on demand
- Medicine information and taking time feature for patient
- Pharmacy Management system

3.3 Functional Requirements (FR)

These are the end-users prerequisites mainly demands as fundamental aptitudes that the system should offer. Functional software prerequisites capture the intended behavior of the system. The applicable provision can be a calculation, data manipulation, business process, user relations, or any specific functionality determining what function a procedure is likely to perform. All these functionalities need to be necessarily incorporated into the system as a part of the contract.

3.3.1 Authority Registration

FRQ 1	Authority Registration
Description	Hospital Authority users should be needed registration for login to access the system.
Stakeholders	Hospital Admin, Doctor, Nurse, Accountant, Laboratory Assistant, Ambulance Driver, Pharmacist.

3.3.2 Patient Registration

FRQ 2	Patient Registration
Description	Patient users should be needed registration for login to access the app.
Stakeholders	Patient

3.3.3 Authentication

FRQ 3	Authentication
Description	Authentication should be another criterion for using this application every time.
Stakeholders	Hospital Admin, Doctor, Nurse, Accountant, Laboratory Assistant, Ambulance Driver, Pharmacist, Patient

3.3.4 Register/Create Hospital

FRQ 4	Register / Create Hospital
Description	Hospital Admin should be able to create the hospital by using this application.
Stakeholders	Hospital Admin

3.3.5 Accept Hospital

FRQ 5	Accept Hospital
Description	The system admin should accept the registered hospital or create it via hospital admin. Before accepting, the hospital system admin will see proper documents of the hospital to verify the registered hospital authenticity.
Stakeholders	System Admin

3.3.6 Doctor Appointment

FRQ 6	Doctor Appointment
Description	A patient will request an appointment with a doctor, and the doctor will accept/reject the appointment.
Stakeholders	Doctor, Patient

3.3.7 Patient Report Generation

FRQ 7	Patient report generation
Description	After giving test samples to the laboratory assistant, they will submit the test report into the system. Only Patients, Nurse, and Doctors will watch those reports if necessary.
Stakeholders	Doctor, Patient, Nurse, Laboratory Assistant

3.3.8 Generate Bill

FRQ 8	Generate billing information
Description	An accountant will generate bills on patients' usage, which will be about getting a bed, staying in the hospital, buying medicine, etc.
Stakeholders	Accountant, Patient

3.3.9 Telecommunication Facility

FRQ 9	Telecommunication facility
Description	The patient should get an appointment with a telecommunication facility if needed.
Stakeholders	Doctor, Patient

3.3.10 Pharmacy Management

FRQ 10	Pharmacy Management
Description	Pharmacists should be able to sell medicine to the patient or outside customers. Both will be generated automatically and will be counted differently.
Stakeholders	Pharmacist, Patient, Other.

3.3.11 Ambulance Management

FRQ 11	Ambulance Management
Description	The system will notify the ambulance driver, and it will be managed by two different users (Accountant, Patient).
Stakeholders	Accountant, Patient, Ambulance Driver

3.3.12 User Information Management

FRQ 12	User information management
Description	Both system and hospital admin should manage user information of the entire system like a doctor, nurse, accountant, driver, etc. They will be able to update user information or delete them if needed. Also, every user will manage their information like updating and deleting.
Stakeholders	Hospital Admin, Doctor, Nurse, Accountant, Laboratory Assistant, Ambulance Driver, Pharmacist, Patient

3.3.13 Bed Management

FRQ 13	Bed management
Description	An accountant will handle the bed management section to assign a bed for a patient, and the patients will be able to see their bed information directly from their application.
Stakeholders	Accountant, Patient

3.3.14 Follow-up consultation

FRQ 14	Follow up consultation
Description	A doctor will enlist his patient for future follow-ups, and patients' will get notified on their application about their future follow-ups on time.
Stakeholders	Doctor, Patient

3.4 Non-Functional Requirements

Non-functional requirements specify the quality attribute of a software system. It defines systems attributes such as security, reliability, performance, maintainability, scalability, and usability. They ensure the significance of the entire system.

3.4.1 Performance

- Speed and latency requirements must be ensured while retrieving data from the server. All types of information such as doctor list, patient list, available ambulance/bed information should be rendered as fast as possible on page load or during searching.

NFR 1	Loading data
Description	A page must load with paginated data to render them fast after loading.
Stakeholders	Doctor, Nurse, Accountant, Laboratory Assistant, Ambulance Driver, Pharmacist

NFR 2	Faster Search Result
Description	During a search by a user, results must show within a second, and they should be accurate as possible.
Stakeholders	Hospital Admin, Doctor, Nurse, Accountant, Laboratory Assistant, Ambulance Driver, Pharmacist, Patient

3.4.2 Capacity

The system must be capable of handling all types of user data.

NFR 3	The capability of handling user data
Description	The system must handle user data of many types, relational or non-relational data.
Stakeholders	Hospital Admin, Doctor, Nurse, Accountant, Laboratory Assistant, Ambulance Driver, Pharmacist, Patient

3.4.3 Reliability

Reliability means the probability that the system will operate without failure.

NFR 4	Distributing flawless functionality
Description	The application must be reliable to perform any task when the system user interacts with them.
Stakeholders	Hospital Admin, Doctor, Nurse, Accountant, Laboratory Assistant, Ambulance Driver, Pharmacist, Patient

3.4.4 Security

Security requirements of the system are the most crucial part, determining user privacy and safety while using the system.

NFR 5	System Security
Description	The security of every user must be determined while implementing the application. Data must be protected from outside attacks like CSRF, XSS, SQL injection, etc. All the data should be secured and encrypted with minimum needs to protect it from the outside environment and internal attacks.
Stakeholders	N/A

3.4.5 Maintainability

One of the essential parts of a system is a post-support system for the end-users.

NFR 6	Maintain system data
Description	Users can read their data and modify them or delete them on their necessity.
Stakeholders	Hospital

3.4.6 Availability

The main target of developing any system solution is to make it user-friendly and uncomplicated.

NFR 7	System availability
Description	The system must be available 24 hours a day without fetching any problem.
Stakeholders	Hospital Admin, Doctor, Nurse, Accountant, Laboratory Assistant, Ambulance Driver, Pharmacist, Patient

3.5 Feasibility Study

A feasibility study is a study to find out made earlier than committing to a project. It is accomplished to specify if the solution considered to meet the criteria is feasible and viable in the software. During the feasibility study, information such as application resource availability, cost estimates for software production, advantages of the software to the enterprise after its development and deploying it into hosts, and cost to be expended on its maintenance is determined.

3.5.1 Financial Feasibility

Being a web application will have an associated hosting cost. The system has a minimal amount of multimedia data transfer, for which we have to calculate a minimal cost for deploying the back-end server to handle media files. Nevertheless, the front-end will follow the freeware software standards for which no cost will be charged for deploying it. The system will charge a minimal cost to the potential use for bug fixing and maintaining tasks. Besides the associated cost, there will be many benefits for the users. From these benefits, it is clear that the project is financially feasible.

3.5.2 Technical Feasibility

This project is a complete web-based and mobile-based application. The leading technologies and tools that are associated with this project are Django-Rest-Framework(DRF), Django-Simple-JWT, Swagger UI(for documentation of APIs), ReactJS(for web-based), React-Native(mobile-based). Each technology is freely available, and the technical skills required are technically organized. Time scheduling of the product development and the edge of implementing these technologies are synchronized. From this technology, it is clear that the project is technically feasible.

3.5.3 Legal Feasibility

The healthcare practices in Bangladesh and worldwide are expected to follow the guidelines that their respective government bodies have provided. The consultancies' healthcare experts support the management in a legal feasibility study that possesses whether the hospital approaches are consistent with the local law, the infrastructural and functional aspects go with the guidelines, and the staff's medical qualification to provide medical care as per law. Besides, the healthcare consultants also help get all the required paperwork done.

CHAPTER 4
SYSTEM ANALYSIS, DESIGN & SPECIFICATION

4.1 Development Model

As a long-term development, following the Agile Model to complete this project. The agile method anticipates change and allows for greater flexibility for development than any other traditional model. It can easily change a small section of this system without massive amendments to the schedule. Testing was achieved in each development step to ensure the system's effectiveness. The Agile Model offers the opportunity to test each part of the system while developing. Also, the Agile model gives us the opportunity to create a system that can be updated easily, frequent testing for efficiency, standard quality product, and development time in short.

4.2 Use Case Diagram

Use Case Model is an approach that combines text and pictures to improve the understanding of requirements. A use case model describes a system’s complete functionality identifying how everything outside the system interacts with it.

A Use Case Diagram is given below that relates to this application.

- **Description:** This project is a web application that manages a hospital management system.
- **Actors** – It has eight actors
    a. System Admin
    b. Hospital Admin
    c. Doctor
    d. Nurse
    e. Accountant
    f. Pharmacist
    g. Driver
    h. Patient

4.2.1 Use Case Modeling and Description

The following use case diagram represents the various functionalities the system needs to support. At first, let us start with the system admin:

4.2.2 System Admin

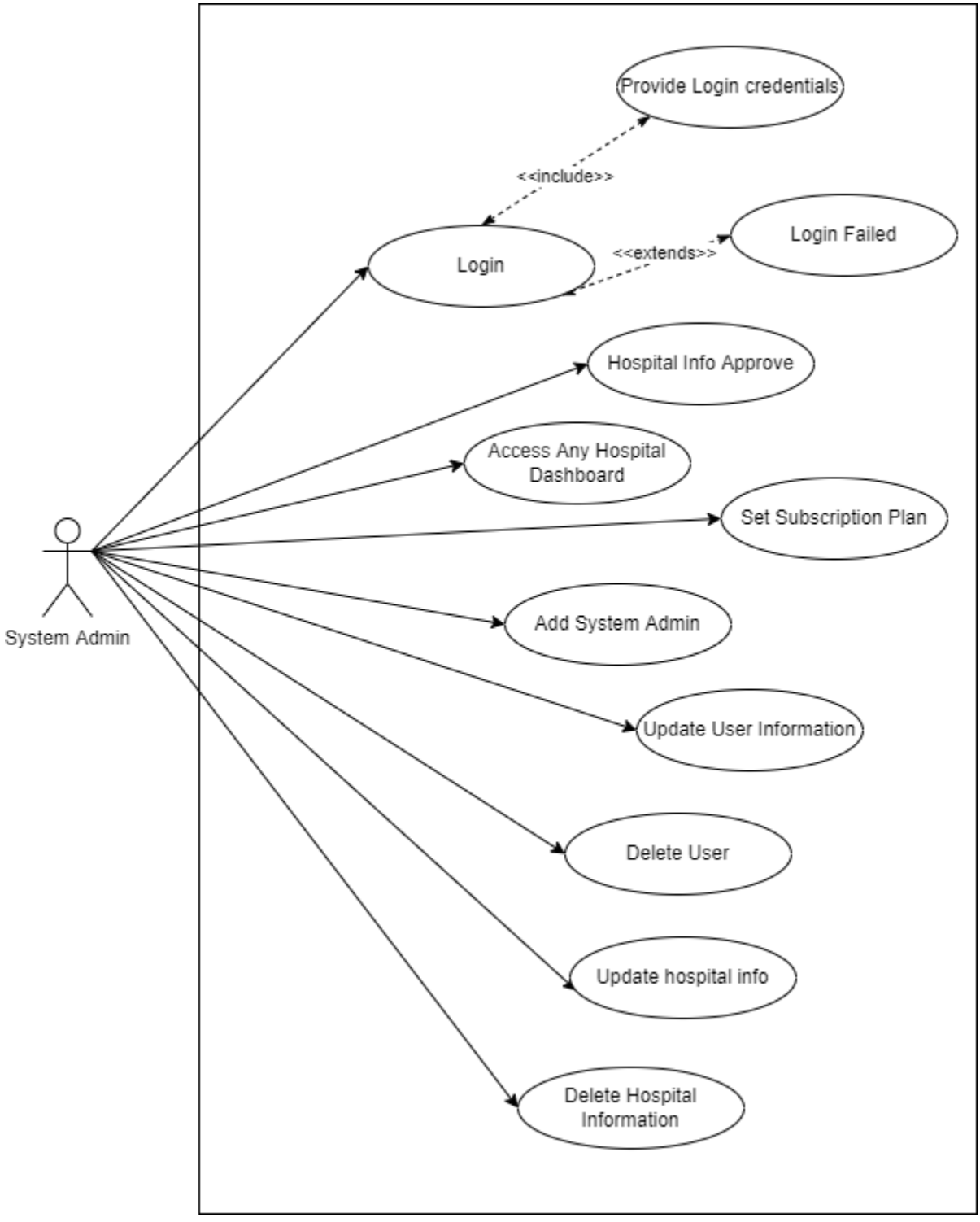

Figure: 4.2.2.1 System Admin

4.2.3 Use Case Description: System Admin

4.2.3.1 Login

Criteria	Description
Use Case Name	Login
Actor	System Admin
Pre-Condition	Visit website with URL
Flow of Events	1. System Admin fills up input fields by his email and password. 2. System Admin clicks on the “Login” button.
Exit Conditions	System Admin successfully login
Alternate flow	1. Invalid email or password. 2. Email format is not valid. 3. Passwords must be at least eight characters.

4.2.3.2 Hospital Info Approve

Criteria	Description
Use Case Name	Hospital Info Approve
Actor	System Admin
Pre-Condition	User must be authenticated as system admin and must visit the URL
Flow of Events	1. System Admin will check Hospital Information. 2. System Admin clicks on the “Approve” button.
Exit Conditions	Hospital information is approved successfully.
Alternate flow	1. No Hospital information is available for approval.

4.2.3.3 Access Hospital Dashboard

Criteria	Description
Use Case Name	Access Hospital Dashboard
Actor	System Admin
Pre-Condition	User must be authenticated as system admin and must visit the URL
Flow of Events	1. Admin clicks on the “Show” button.
Exit Conditions	Hospital Dashboard loaded successfully
Alternate flow	1. No hospital dashboard is available.

4.2.3.4 Set Subscription Plan

Criteria	Description
Use Case Name	Set Subscription Plan
Actor	System Admin
Pre-Condition	Must be authenticated user as system admin and must visit the URL
Flow of Events	1. Admin set the package name in the package section. 2. Admin sets the price for monthly and yearly in price sections. 3. Admin set package details for each package. 4. Admin clicks on the “Submit” button.
Exit Conditions	The package was added successfully.
Alternate flow	1. The package section is empty; please complete to continue. 2. Please set the price first before submitting. 3. Details fields are empty.

4.2.3.5 Add System Admin

Criteria	Description
Use Case Name	Add System Admin
Actor	System Admin
Pre-Condition	Must be authenticated user as system admin and must visit the URL
Flow of Events	1. Admin fills the email field of the new admin user. 2. Admin fill the first name. 3. Admin fill the last name. 4. Admin fill the password fields of the new admin user. 5. Admin clicks “Submit” button.
Exit Conditions	New user added successfully.
Alternate flow	1. Email format is not valid. 2. First name length cannot be less than the three letters. 3. Password length must be at least eight characters. 4. Please confirm your password.

4.2.3.6 Update User Information

Criteria	Description
Use Case Name	Update User Information
Actor	System Admin
Pre-Condition	Must be authenticated user as system admin and must visit the URL
Flow of Events	1. Admin fills necessary fields with updating user data. 2. Admin clicks “Submit” button.
Exit Conditions	The user has updated successfully.
Alternate flow	1. Email format is not valid. 2. First name length cannot be less than the three letters. 3. Password length must be at least eight characters.

4.2.3.7 Delete User

Criteria	Description
Use Case Name	Delete User
Actor	System Admin
Pre-Condition	Must be authenticated user as system admin and must visit the URL
Flow of Events	1. Admin Select any user data. 2. Admin chooses the delete option from the dropdown menu. 5. Admin clicks the “Go” button.
Exit Conditions	The user deleted successfully.
Alternate flow	1. No user available. 2. No user available with this id.

4.2.3.8 Update Hospital Information

Criteria	Description
Use Case Name	Update Hospital Info
Actor	System Admin
Pre-Condition	Must be authenticated user as system admin and must visit the URL
Flow of Events	1. Admin fills necessary fields with updating hospital information. 2. Admin clicks “Submit” button.
Exit Conditions	Hospital Information was updated successfully.
Alternate flow	1. Hospital name cannot be empty. 2. Hospital address cannot be empty.

4.2.3.9 Delete Hospital Information

Criteria	Description
Use Case Name	Delete Hospital Information
Actor	System Admin
Pre-Condition	Must be authenticated user as system admin and must visit the URL
Flow of Events	1. Admin select any hospital information. 2. Admin clicks “Go” button.
Exit Conditions	Hospital Information was deleted successfully.
Alternate flow	1. No hospital information available with the given id.

4.2.4 Use Case Hospital admin

Figure 4.2.4.1 Use Case Hospital admin

4.2.4.1 Login

Criteria	Description
Use Case Name	Login
Actor	Hospital Admin
Pre-Condition	Visit website with URL
Flow of Events	1. System Admin fills up input fields by his email and password. 2. System Admin clicks on the “Login” button.
Exit Conditions	System Admin successfully login
Alternate flow	1. Invalid email or password. 2. Email format is not valid. 3. Passwords must be at least eight characters.

4.2.4.2 Register

Criteria	Description
Use Case Name	Register
Actor	Hospital Admin
Pre-Condition	Visit website with URL
Flow of Events	1. Hospital Admin fills up input fields by his credentials. 2. Hospital Admin clicks on the “Register” button.
Exit Conditions	Hospital Admin successfully login
Alternate flow	1. Password does not match. 2. Email format is not valid. 3. Passwords must be at least eight characters.

4.2.4.3 Submit Hospital Information

Criteria	**Description**
Use Case Name	Submit Hospital Information
Actor	Hospital Admin
Pre-Condition	Visit Website with URL
Flow of Events	1. Hospital Admin fills hospital name input field. 2. Hospital Admin provides hospital frontal image. 3. Hospital Admin provides hospital logo. 4. Hospital Admin provides hospital address. 5. Hospital Admin fills email input field. 6. Hospital Admin fills password input field. 7. Hospital Admin fills confirm password field. 8. Hospital Admin clicks the “Submit Form” button.
Exit Conditions	Hospital Admin is successfully registered.
Alternate flow	1. Hospital name field is empty. Please provide the correct information for registration. 2. Hospital address cannot be empty. Please provide the correct information for registration. 3. Email Field is empty. 4. Given Email Format is not correct 5. Password field cannot be empty. 6. Password must be at least eight characters. 7. Confirm password field cannot be empty. 8. Password does not match. Please confirm your password before registration.

4.2.4.4 Update Hospital Profile

Criteria	Description
Use Case Name	Update Hospital Profile
Actor	Hospital Admin
Pre-Condition	User must be authenticated as Hospital Admin and Visit URL
Flow of Events	1. Hospital Admin gives hospital information in input fields. 2. Hospital Admin will click the “Update” button.
Exit Conditions	The package is selected successfully.
Alternate flow	1. The hospital Name cannot be empty. Please fill up the form correctly. 2. The hospital address cannot be empty. Please fill up the form correctly. 3. Password field cannot be empty.

4.2.4.5 Approve Doctor Information

Criteria	Description
Use Case Name	Approve Doctor Information
Actor	Hospital Admin
Pre-Condition	User must be authenticated as hospital admin and must visit the URL
Flow of Events	1. Hospital Admin will check Doctor’s Information. 2. Hospital Admin clicks on the “Approve” button.
Exit Conditions	The doctor is registered successfully.
Alternate flow	1. No doctor information is available for approval.

4.2.4.6 Approve Nurse Information

Criteria	Description
Use Case Name	Approve Nurse Information
Actor	Hospital Admin
Pre-Condition	User must be authenticated as hospital admin and must visit the URL
Flow of Events	1. Hospital Admin will check Nurse Information. 2. Hospital Admin clicks on the “Approve” button.
Exit Conditions	The nurse is registered successfully.
Alternate flow	1. No nurse information is available for approval.

4.2.4.7 Approve Laboratory Operator Information

Criteria	Description
Use Case Name	Approve Laboratory Operator Information
Actor	Hospital Admin
Pre-Condition	User must be authenticated as hospital admin and must visit the URL
Flow of Events	1. Hospital Admin check Laboratory Operator Information. 2. Hospital Admin clicks on the “Approve” button.
Exit Conditions	The Laboratory operator is registered successfully.
Alternate flow	1. No laboratory operator information is available for approval.

4.2.4.8 Approve Accountant Information

Criteria	Description
Use Case Name	Approve Accountant Information
Actor	Hospital Admin
Pre-Condition	User must be authenticated as hospital admin and must visit the URL
Flow of Events	1. Hospital Admin check Accountant Information. 2. Hospital Admin clicks on the “Approve” button.
Exit Conditions	The accountant is registered successfully.
Alternate flow	1. No accountant information is available for approval.

4.2.4.9 Approve Pharmacist Information

Criteria	Description
Use Case Name	Approve Pharmacist Information
Actor	Hospital Admin
Pre-Condition	User must be authenticated as hospital admin and must visit the URL
Flow of Events	1. Hospital Admin check Pharmacist Information. 2. Hospital Admin clicks on the “Approve” button.
Exit Conditions	The pharmacist is registered successfully.
Alternate flow	1. No pharmacist information is available for approval.

4.2.4.10 Update Doctor Information

Criteria	Description
Use Case Name	Update Doctor Information
Actor	Hospital Admin
Pre-Condition	Must be authenticated user as hospital admin and must visit the URL
Flow of Events	1. Admin fills necessary fields with updating user data. 2. Admin clicks “Submit” button.
Exit Conditions	The user has updated successfully.
Alternate flow	1. Email format is not valid. 2. First name length cannot be less than the three letters. 3. Password length must be at least eight characters.

4.2.4.11 Update Nurse Information

Criteria	Description
Use Case Name	Update Nurse Information
Actor	Hospital Admin
Pre-Condition	Must be authenticated user as hospital admin and must visit the URL
Flow of Events	1. Admin fills necessary fields with updating user data. 5. Admin clicks “Submit” button.
Exit Conditions	The user has updated successfully.
Alternate flow	1. Email format is not valid. 2. First name length cannot be less than the three letters. 3. Password length must be at least eight characters.

4.2.4.12 Update Accountant Information

Criteria	Description
Use Case Name	Update Accountant Information
Actor	Hospital Admin
Pre-Condition	Must be authenticated user as hospital admin and must visit the URL
Flow of Events	1. Admin fills necessary fields with updating user data. 5. Admin clicks “Submit” button.
Exit Conditions	The user has updated successfully.
Alternate flow	1. Email format is not valid. 2. First name length cannot be less than the three letters. 3. Password length must be at least eight characters.

4.2.4.13 Update Laboratory Operator Information

Criteria	Description
Use Case Name	Update Laboratory Operator Information
Actor	Hospital Admin
Pre-Condition	Must be authenticated user as hospital admin and must visit the URL
Flow of Events	1. Admin fills necessary fields with updating user data. 2. Admin clicks “Submit” button.
Exit Conditions	The user has updated successfully.
Alternate flow	1. Email format is not valid. 2. First name length cannot be less than the three letters. 3. Password length must be at least eight characters.

4.2.4.14 Update Pharmacist Information

Criteria	Description
Use Case Name	Update Pharmacist Information
Actor	Hospital Admin
Pre-Condition	Must be authenticated user as hospital admin and must visit the URL
Flow of Events	1. Admin fills necessary fields with updating user data. 2. Admin clicks “Submit” button.
Exit Conditions	The user has updated successfully.
Alternate flow	1. Email format is not valid. 2. First name length cannot be less than the three letters. 3. Password length must be at least eight characters.

4.2.4.15 Delete Doctor Information

Criteria	Description
Use Case Name	Delete Doctor Information
Actor	Hospital Admin
Pre-Condition	Must be authenticated user as hospital admin and must visit the URL
Flow of Events	1. Admin select any doctor information. 2. Admin selects the “Delete Information” option from the dropdown menu. 3. Admin clicks “Go” button.
Exit Conditions	Doctor Information was deleted successfully.
Alternate flow	1. No Doctor Information available with the given id.

4.2.4.16 Delete Nurse Information

Criteria	Description
Use Case Name	Delete Nurse Information
Actor	Hospital Admin
Pre-Condition	Must be authenticated user as hospital admin and must visit the URL
Flow of Events	1. Admin select any nurse information. 2. Admin selects the “Delete Information” option from the dropdown menu. 3. Admin clicks “Go” button
Exit Conditions	Nurse Information was deleted successfully.
Alternate flow	1. No Nurse Information available with the given id.

4.2.4.17 Delete Accountant Information

Criteria	Description
Use Case Name	Delete Accountant Information
Actor	Hospital Admin
Pre-Condition	Must be authenticated user as hospital admin and must visit the URL
Flow of Events	1. Admin select any accountant information. 2. Admin selects the “Delete Information” option from the dropdown menu. 3. Admin clicks “Go” button
Exit Conditions	Accountant Information was deleted successfully.
Alternate flow	1. No Accountant Information available with the given id.

4.2.4.18 Delete Laboratory Operator Information

Criteria	Description
Use Case Name	Delete laboratory operator Information
Actor	Hospital Admin
Pre-Condition	Must be authenticated user as hospital admin and must visit the URL
Flow of Events	1. Admin select any laboratory operator information. 2. Admin selects the “Delete Information” option from the dropdown menu. 3. Admin clicks “Go” button
Exit Conditions	Laboratory operator Information was deleted successfully.
Alternate flow	1. No laboratory operator Information available with the given id.

4.2.4.19 Delete Pharmacist Information

Criteria	**Description**
Use Case Name	Delete Pharmacist Information
Actor	Hospital Admin
Pre-Condition	Must be authenticated user as hospital admin and must visit the URL
Flow of Events	1. Admin select any pharmacist information. 2. Admin selects the “Delete Information” option from the dropdown menu. 3. Admin clicks “Go” button
Exit Conditions	Pharmacist Information was deleted successfully.
Alternate flow	1. No Pharmacist Information available with the given id.

4.2.4.20 Add Department

Criteria	Description
Use Case Name	Add Department
Actor	Hospital Admin
Pre-Condition	Must be authenticated user as hospital admin and must visit the URL
Flow of Events	1. Admin fill the department name field. 2. Admin clicks “Submit” button.
Exit Conditions	Department added successfully.
Alternate flow	1. Given that the department name already exists.

4.2.4.21 Update Department

Criteria	Description
Use Case Name	Update Department
Actor	Hospital Admin
Pre-Condition	Must be authenticated user as hospital admin and must visit the URL
Flow of Events	1. Admin fill the department name field. 2. Admin clicks “Submit” button.
Exit Conditions	Department name updated successfully.
Alternate flow	1. Given that the department name already exists.

4.2.4.22 Delete Department

Criteria	Description
Use Case Name	Delete Department
Actor	Hospital Admin
Pre-Condition	Must be authenticated user as hospital admin and must visit the URL
Flow of Events	1. Admin selects a department name. 2. Admin select the “Delete Department” option from the dropdown menu. 3. Admin clicks “Go” button
Exit Conditions	Department added successfully.
Alternate flow	1. No department name available for delete.

4.2.4.23 Add Bed Information

Criteria	Description
Use Case Name	Add Bed
Actor	Hospital Admin
Pre-Condition	Must be authenticated user as hospital admin and must visit the URL
Flow of Events	1. Admin fills the bed field. 2. Admin clicks “Submit” button.
Exit Conditions	Bed added successfully.
Alternate flow	1. Given Bed number is already exists.

4.2.4.24 Update Bed Information

Criteria	Description
Use Case Name	Update Bed
Actor	Hospital Admin
Pre-Condition	Must be authenticated user as hospital admin and must visit the URL
Flow of Events	1. Admin fills the bed with no field. 2. Admin clicks “Submit” button.
Exit Conditions	Benno updated successfully.
Alternate flow	1. Given bed is already exists.

4.2.4.25 Delete Bed Information

Criteria	Description
Use Case Name	Delete Bed
Actor	Hospital Admin
Pre-Condition	Must be authenticated user as hospital admin and must visit the URL
Flow of Events	1. Admin selects a bed no. 2. Admin select the “Delete Bed” option from the dropdown menu. 3. Admin clicks “Go” button
Exit Conditions	Bed added successfully.
Alternate flow	1. No bed no available for delete.

4.2.4.26 Add Notice

Criteria	Description
Use Case Name	Add Notice
Actor	Hospital Admin
Pre-Condition	Must be authenticated user as hospital admin and must visit the URL
Flow of Events	1. Admin selects a notice image. 2. Admin clicks “Submit” button.
Exit Conditions	Notice added successfully.
Alternate flow	1. Image file format not supported.

4.2.4.27 Update Notice

Criteria	Description
Use Case Name	Update Notice
Actor	Hospital Admin
Pre-Condition	Must be authenticated user as hospital admin and must visit the URL
Flow of Events	1. Admin selects a notice image. 2. Admin clicks “Submit” button.
Exit Conditions	Notice update successfully.
Alternate flow	1. Image file format not supported.

4.2.4.28 Delete Notice

Criteria	Description
Use Case Name	Delete Notice
Actor	Hospital Admin
Pre-Condition	Must be authenticated user as hospital admin and must visit the URL
Flow of Events	1. Admin select a notice no. 2. Admin selects the “Delete Notice” option from the dropdown menu. 3. Admin clicks “Go” button.
Exit Conditions	Notice deleted successfully.
Alternate flow	1. Notice does not exist.

4.2.4.29 Add Doctor Category

Criteria	Description
Use Case Name	Add Doctor Category
Actor	Hospital Admin
Pre-Condition	Must be authenticated user as hospital admin and must visit the URL
Flow of Events	1. Admin fills a doctor category input field. 2. Admin clicks “Submit” button.
Exit Conditions	Category added successfully.
Alternate flow	1. Doctor category field cannot be empty.

4.2.5 Use Case Doctor

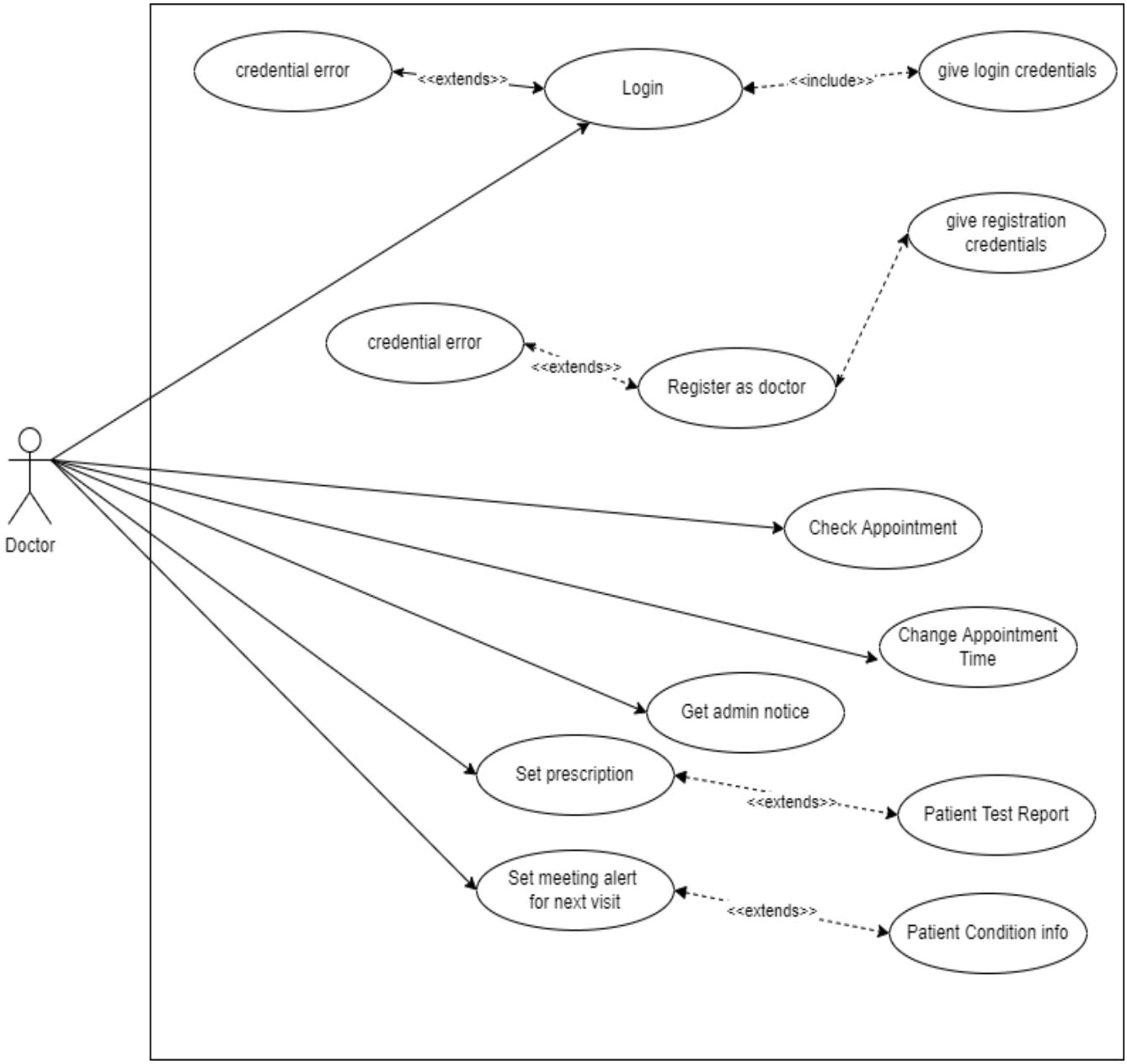

Figure 4.2.5.1 Use case Doctor

4.2.5.1 Login

Criteria	Description
Use Case Name	Login
Actor	Doctor
Pre-Condition	Visit website with URL
Flow of Events	1. Doctor fills up input fields by his email and password. 2. Doctor clicks on the “Login” button.
Exit Conditions	Doctor successfully login
Alternate flow	1. Invalid email or password. 2. Email format is not valid. 3. Password must be at least eight characters.

4.2.5.2 Register as Doctor

Criteria	Description
Use Case Name	Register
Actor	Doctor
Pre-Condition	Visit website with URL
Flow of Events	1. Doctor fills up input fields by his credentials. 2. Doctor clicks on the “Register” button.
Exit Conditions	Doctor successfully login
Alternate flow	1. Password does not match. 2. Email format is not valid. 3. Passwords must be at least eight characters.

4.2.5.3 Check Appointment

Criteria	Description
Use Case Name	Check Appointment
Actor	Doctor
Pre-Condition	Visit website with URL
Flow of Events	1. Doctor will visit the page and watch the list. 2. Doctor will accept the appointment or reject them.
Exit Conditions	Appointment accepted successfully or rejected successfully
Alternate flow	1. Network error occurred. 2. No appointment enlisted yet.

4.2.5.4 Change Appointment

Criteria	Description
Use Case Name	Change Appointment
Actor	Doctor
Pre-Condition	Visit website with URL
Flow of Events	1. Doctor will visit the page and watch the list. 2. Doctor will change the appointment time.
Exit Conditions	The appointment time changed successfully.
Alternate flow	1. Network error occurred. 2. No appointment enlisted yet.

4.2.5.5 Get Admin Notice

Criteria	Description
Use Case Name	Get Admin notice
Actor	Doctor
Pre-Condition	Visit website with URL
Flow of Events	1. Doctor will visit the notice panel.
Exit Conditions	N/A
Alternate flow	1. Network error occurred. 2. No notice enlisted yet.

4.2.5.6 Set Prescription

Criteria	Description
Use Case Name	Set Prescription
Actor	Doctor
Pre-Condition	Visit website with URL
Flow of Events	1. Doctor will visit the test report page. 2. Doctor will click on the set prescription button 3. Doctor will write in the input field and select medicines from the multi-select option.
Exit Conditions	Prescription Given Successfully
Alternate flow	1. Network error occurred. 2. No Patient available right now. 3. Medicine Field is required.

4.2.5.7 Set Meeting alert

Criteria	**Description**
Use Case Name	Set meeting alert
Actor	Doctor
Pre-Condition	Visit website with URL
Flow of Events	1. The doctor will visit the patient profile assigned for him. 2. Will click the alert options button and set the time.
Exit Conditions	Meeting alert added successfully
Alternate flow	1. Network error occurred. 2. No patient assigned yet.

4.2.6 Use Case Nurse

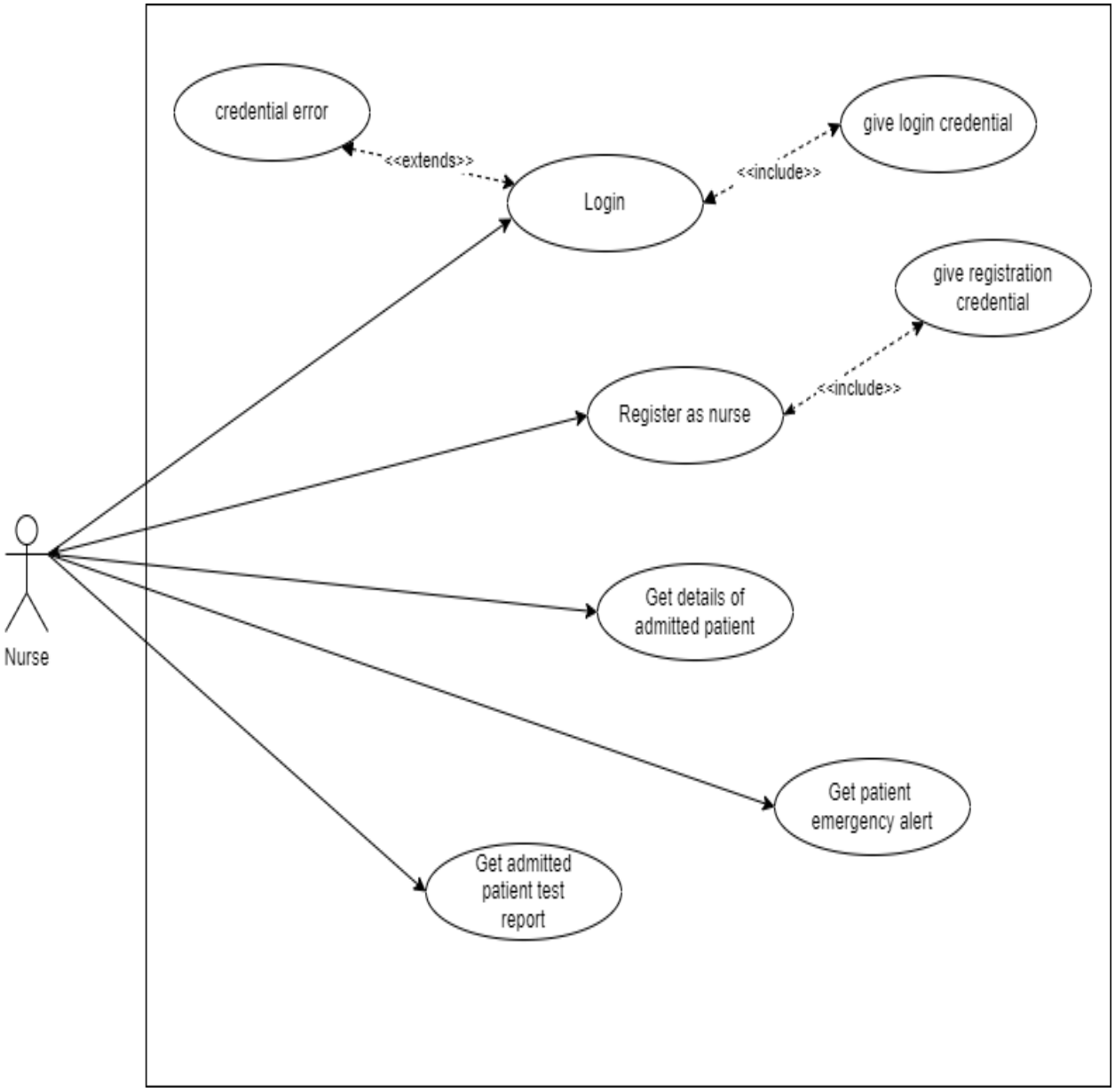

Figure 4.2.6.1 Use Case Nurse

4.2.6.1 Login

Criteria	Description
Use Case Name	Login
Actor	Nurse
Pre-Condition	Visit website with URL
Flow of Events	1. Nurse fills up input fields by his email and password. 2. Nurse clicks on the “Login” button.
Exit Conditions	Nurse successfully login
Alternate flow	1. Invalid email or password. 2. Email format is not valid. 3. Password must be at least eight characters.

4.2.6.2 Register as Nurse

Criteria	Description
Use Case Name	Register
Actor	Nurse
Pre-Condition	Visit website with URL
Flow of Events	1. Nurse fills up input fields by his credentials. 2. Nurse clicks on the “Register” button.
Exit Conditions	Nurse successfully registered
Alternate flow	1. Password does not match. 2. Email format is not valid. 3. Passwords must be at least eight characters.

4.2.6.3 Get Details of Admitted patient

Criteria	Description
Use Case Name	Get details of admitted patient
Actor	Nurse
Pre-Condition	Visit website with URL
Flow of Events	1. Nurse will visit admitted patient list page 2. Nurse will click on the view button to see patient details
Exit Conditions	Patient profile successfully loaded
Alternate flow	1. Network Error occurred. 2. Not patient

4.2.6.4 Get Patient Emergency Alert

Criteria	Description
Use Case Name	Get a patient emergency alert
Actor	Nurse
Pre-Condition	Visit website with URL
Flow of Events	1. Nurse will get a notification on their application.
Exit Conditions	N/A
Alternate flow	N/A

4.2.6.5 Get Admitted patient test report

Criteria	Description
Use Case Name	Get admitted patient test report
Actor	Nurse
Pre-Condition	Visit website with URL
Flow of Events	1. Nurse will visit Test Report Page to see a patient list. 2. Nurse will click on the view button to see diagnosis reports
Exit Conditions	Reports loaded successfully
Alternate flow	1. Network Error occurred. 2. No Patient.

4.2.7 Use Case Accountant

Figure 4.2.7.1 Use Case Accountant

4.2.7.1 Login

Criteria	Description
Use Case Name	Login
Actor	Accountant
Pre-Condition	Visit website with URL
Flow of Events	1. Accountant fills up input fields by his email and password. 2. Accountant clicks on the “Login” button.
Exit Conditions	Accountant successfully login
Alternate flow	1. Invalid email or password. 2. Email format is not valid. 3. Password must be at least eight characters.

4.2.7.2 Register as Accountant

Criteria	Description
Use Case Name	Register
Actor	Accountant
Pre-Condition	Visit website with URL
Flow of Events	1. Accountant fills up input fields by his credentials. 2. Accountant clicks on the “Register” button.
Exit Conditions	Accountant successfully registered
Alternate flow	1. Password does not match. 2. Email format is not valid. 3. Passwords must be at least eight characters.

4.2.7.3 Get Patient information

Criteria	Description
Use Case Name	Get patient information
Actor	Accountant
Pre-Condition	Visit website with URL
Flow of Events	1. Accountant will visit admitted patient list page 2. Accountant will click on the view button to see patient details
Exit Conditions	Patient profile successfully loaded
Alternate flow	1. Network Error occurred. 2. Not patient

4.2.7.4 Get Admin Notice

Criteria	Description
Use Case Name	Get Admin Notice
Actor	Accountant
Pre-Condition	Visit website with URL
Flow of Events	1. Accountant will visit notice page 2. Accountant will click on the view button to see notice
Exit Conditions	Notice successfully loaded
Alternate flow	1. Network Error occurred. 2. Not notice available now.

4.2.7.5 Get Payment information

Criteria	Description
Use Case Name	Get payment information
Actor	Accountant
Pre-Condition	Visit website with URL
Flow of Events	1. Accountant will visit admitted patient list page 2. Accountant will click on the view button to see patient payment information
Exit Conditions	Patient profile successfully loaded
Alternate flow	1. Network Error occurred. 2. Not patient

4.2.8 Use Case Laboratory Operator

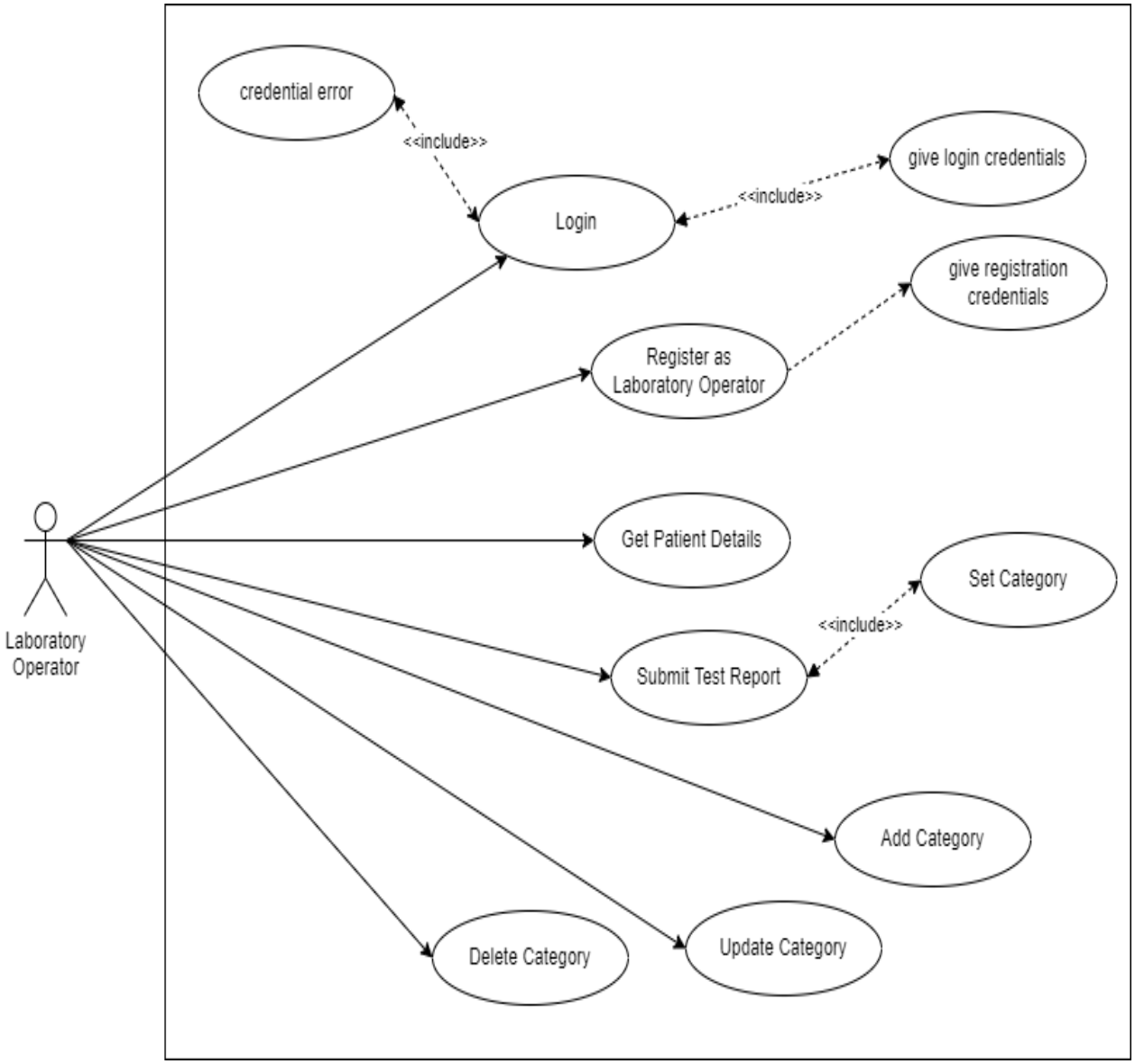

Figure 4.2.8.1 Use Case Laboratory Operator

4.2.8.1 Login

Criteria	Description
Use Case Name	Login
Actor	Laboratory Operator
Pre-Condition	Visit website with URL
Flow of Events	1. Laboratory Operator fills up input fields by his email and password. 2. Laboratory Operator clicks on the “Login” button.
Exit Conditions	Laboratory Operator successfully login
Alternate flow	1. Invalid email or password. 2. Email format is not valid. 3. Password must be at least eight characters.

4.2.8.2 Register

Criteria	Description
Use Case Name	Register
Actor	Laboratory Operator
Pre-Condition	Visit website with URL
Flow of Events	1. Laboratory Operator fills up input fields by his credentials. 2. Laboratory Operator clicks on the “Register” button.
Exit Conditions	Laboratory Operator successfully registered
Alternate flow	1. Password does not match. 2. Email format is not valid. 3. Passwords must be at least eight characters.

4.2.8.3 Get Patient Details

Criteria	Description
Use Case Name	Get patient details
Actor	Laboratory Operator
Pre-Condition	Visit website with URL
Flow of Events	1. Laboratory Operator will visit admitted patient list page 2. Laboratory Operator will click on the view button to see patient details
Exit Conditions	Patient profile successfully loaded
Alternate flow	1. Network Error occurred. 2. No patient available

4.2.8.4 Add Category

Criteria	Description
Use Case Name	Add Category
Actor	Laboratory Operator
Pre-Condition	Must visit the URL
Flow of Events	1. Laboratory Operator will visit the add category page to add the category 2. After filling in input fields, he will click on submit button to add a category to the list.
Exit Conditions	Category added successfully.
Alternate flow	1. category field cannot be empty.

4.2.8.5 Update Category

Criteria	Description
Use Case Name	Update Category
Actor	Laboratory Operator
Pre-Condition	Must visit the URL
Flow of Events	1. Laboratory Operator will visit the update category page to add the category 2. After filling input fields, he will click on submit button to update the category from the list.
Exit Conditions	Category updated successfully.
Alternate flow	1. category field cannot be empty.

4.2.8.6 Delete Category

Criteria	Description
Use Case Name	Delete Category
Actor	Laboratory Operator
Pre-Condition	Must visit the URL
Flow of Events	1. Laboratory Operator will visit the category list page 2. He will click the delete button to delete the selected category.
Exit Conditions	Category deleted successfully.
Alternate flow	1. Network Error occurred.

4.2.8.7 Submit Report

Criteria	Description
Use Case Name	Submit Patient report
Actor	Laboratory Operator
Pre-Condition	Must visit the URL
Flow of Events	1. Laboratory operator will visit report submission page to submit patient diagnosis result 2. He will file the input field and select the research category. 3. After filling in everything, he will click on submit button to submit the result.
Exit Conditions	Test results were submitted successfully.
Alternate flow	1. Category not selected 2. Image filed cannot be empty

4.2.9 Use Case Pharmacist

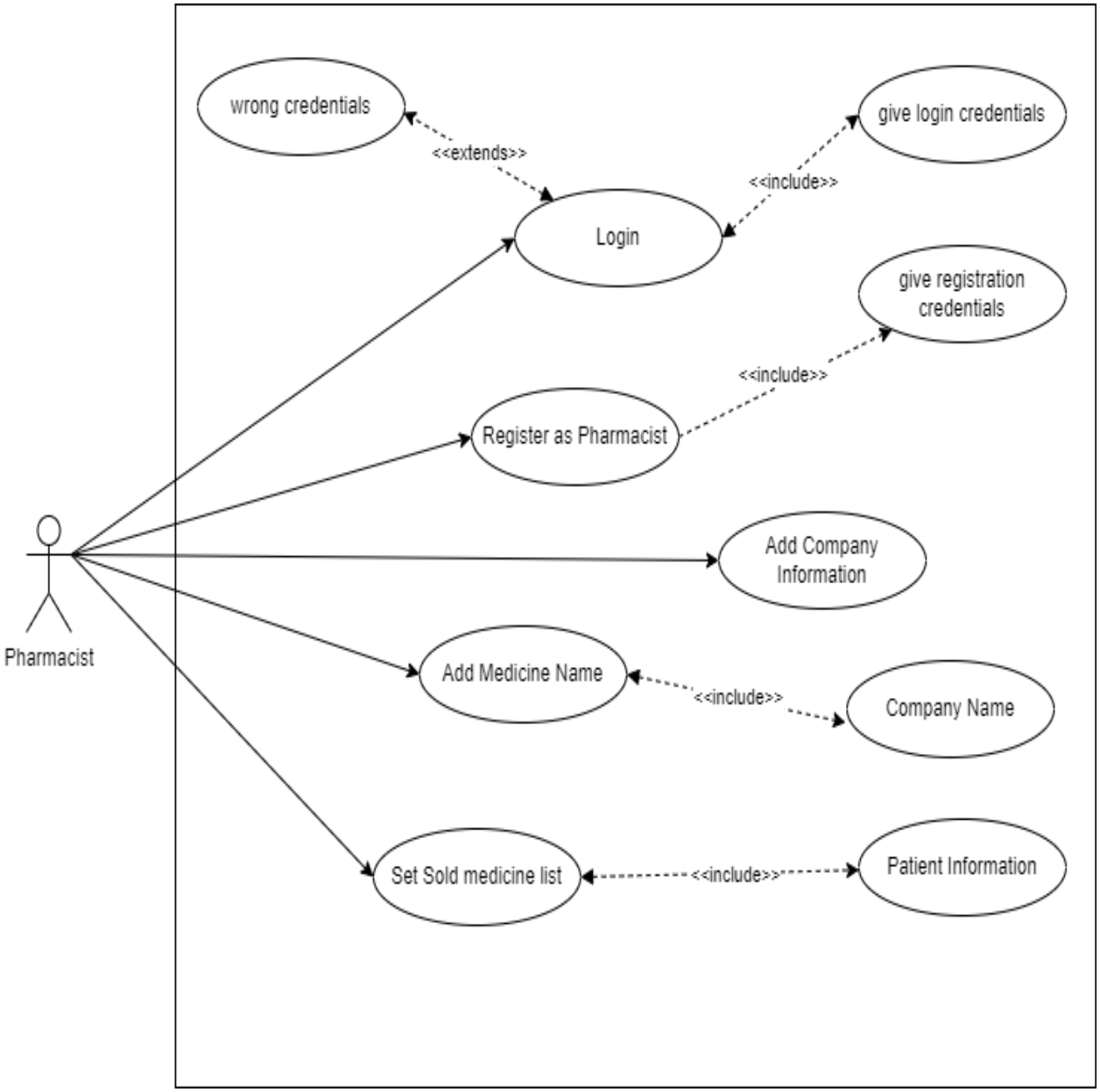

Figure 4.2.9.1 Use Case Pharmacist

4.2.9.1 Login

Criteria	Description
Use Case Name	Login
Actor	Pharmacist
Pre-Condition	Visit website with URL
Flow of Events	1. Pharmacist fills up input fields by his email and password. 2. Pharmacist clicks on the “Login” button.
Exit Conditions	Pharmacist successfully login
Alternate flow	1. Invalid email or password. 2. Email format is not valid. 3. Password must be at least eight characters.

4.2.9.2 Register

Criteria	Description
Use Case Name	Register
Actor	Pharmacist
Pre-Condition	Visit website with URL
Flow of Events	1. Pharmacist fills up input fields by his credentials. 2. Pharmacist clicks on the “Register” button.
Exit Conditions	Pharmacist successfully registered
Alternate flow	1. Password does not match. 2. Email format is not valid. 3. Passwords must be at least eight characters.

4.2.9.3 Add Medicine Company Information

Criteria	Description
Use Case Name	Add medicine company information
Actor	Pharmacist
Pre-Condition	Visit website with URL
Flow of Events	1. Pharmacist will visit to add company page and give input to input fields 2. After filling up all the fields, he will click on submit button to add the information
Exit Conditions	Medicine company information added successfully
Alternate flow	1. Medicine Company name field cannot be empty 2. Network error occurred

4.2.9.4 Add Medicine Information

Criteria	Description
Use Case Name	Add medicine information
Actor	Pharmacist
Pre-Condition	Visit website with URL
Flow of Events	1. Pharmacist will visit to add medicine page and give input to input fields 2. He will select the company name of the medicine 3. After filling up all the fields, he will click on submit button to add the information
Exit Conditions	Medicine information was added successfully
Alternate flow	1. Medicine name field cannot be empty 2. Company must be selected 2. Network error occurred

4.2.9.5 Set Sold Medicine List on POS

Criteria	Description
Use Case Name	Set Sold Medicine List on POS
Actor	Pharmacist
Pre-Condition	Visit website with URL
Flow of Events	1. Pharmacist will click on medicine to add them on POS section, and update quantity is needed 2. After setting up all things, he will click on submit button to make sell and decrease the quantity
Exit Conditions	Medicine sold successfully.
Alternate flow	1. Network error occurred.

4.2.10 Use Case Patient

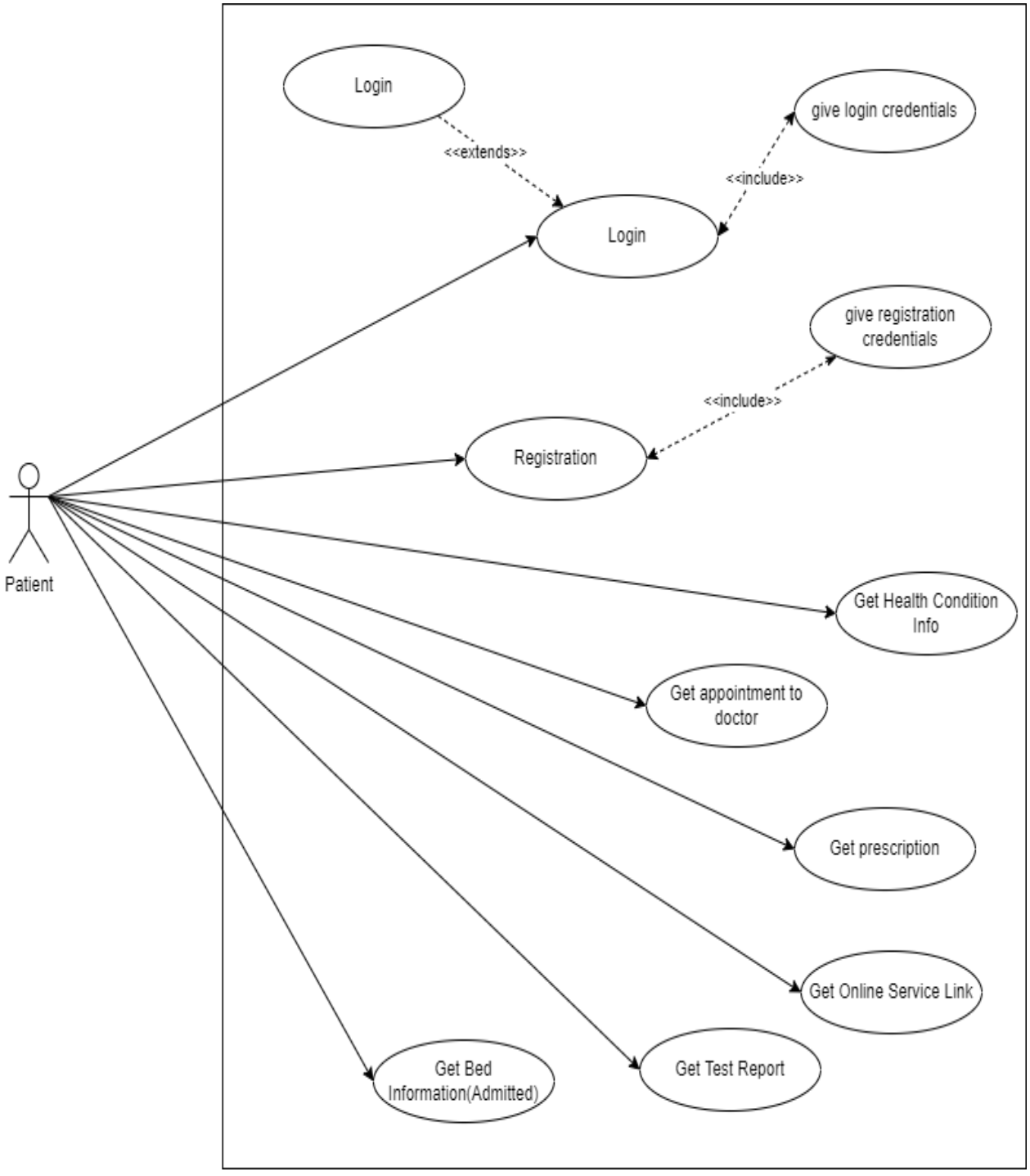

Figure 4.2.10.1 Use Case Patient

4.2.10.1 Login

Criteria	Description
Use Case Name	Login
Actor	Patient
Pre-Condition	Visit login page in mobile application
Flow of Events	1. Patient fills up input fields by his email and password. 2. Patient clicks on the “Login” button.
Exit Conditions	Patient successfully login
Alternate flow	1. Invalid email or password. 2. Email format is not valid. 3. Password must be at least eight characters.

4.2.10.2 Register as patient

Criteria	Description
Use Case Name	Register
Actor	Patient
Pre-Condition	Visit registration page in mobile application
Flow of Events	1. Patient fills up input fields by his credentials. 2. Patient clicks on the “Register” button.
Exit Conditions	Patient successfully registered
Alternate flow	1. Password does not match. 2. Email format is not valid. 3. Passwords must be at least eight characters.

4.2.10.3 Get health condition information

Criteria	Description
Use Case Name	Get health condition information
Actor	Patient
Pre-Condition	Visit mobile application
Flow of Events	1. Patient will visit the health condition section to see his current condition.
Exit Conditions	Patient health condition loaded successfully
Alternate flow	Network error occurred

4.2.10.4 Get Prescription

Criteria	Description
Use Case Name	Get Prescription
Actor	Patient
Pre-Condition	Visit mobile application
Flow of Events	1. Patient will visit the prescription section to see his current condition.
Exit Conditions	Patient prescription page loaded successfully
Alternate flow	Network error occurred

4.2.10.5 Telecommunication service link

Criteria	Description
Use Case Name	Get Prescription
Actor	Patient
Pre-Condition	Visit mobile application
Flow of Events	1. Patient will get notified on notification section with service link
Exit Conditions	N/A
Alternate flow	No notification update.

4.2.10.6 Get Test report

Criteria	Description
Use Case Name	Get Test report
Actor	Patient
Pre-Condition	Visit mobile application
Flow of Events	1. Patient will visit the report section to see his diagnosis report.
Exit Conditions	The patient report page loaded successfully
Alternate flow	Network error occurred

4.2.10.7 Get Bed Information

Criteria	Description
Use Case Name	Get bed information
Actor	Patient
Pre-Condition	Visit mobile application
Flow of Events	1. Patient will visit bed info section to see his diagnosis report.
Exit Conditions	Patient bed information page loaded successfully
Alternate flow	Network error occurred

4.3 Activity Diagram

Activity diagrams illustrate stepwise movements and actions workflows supporting preference, iteration, and coexistence. The architectural design represents the structure of data and program components instructed to build a computer-based system. It considers the architectural technique that the procedure will take, the configuration and possessions of the elements that comprise the system, and the interrelationships that occur among all architectural fragments of a system.

4.3.1 Activity Diagram: System Admin

Visit this link to see a high-resolution image.

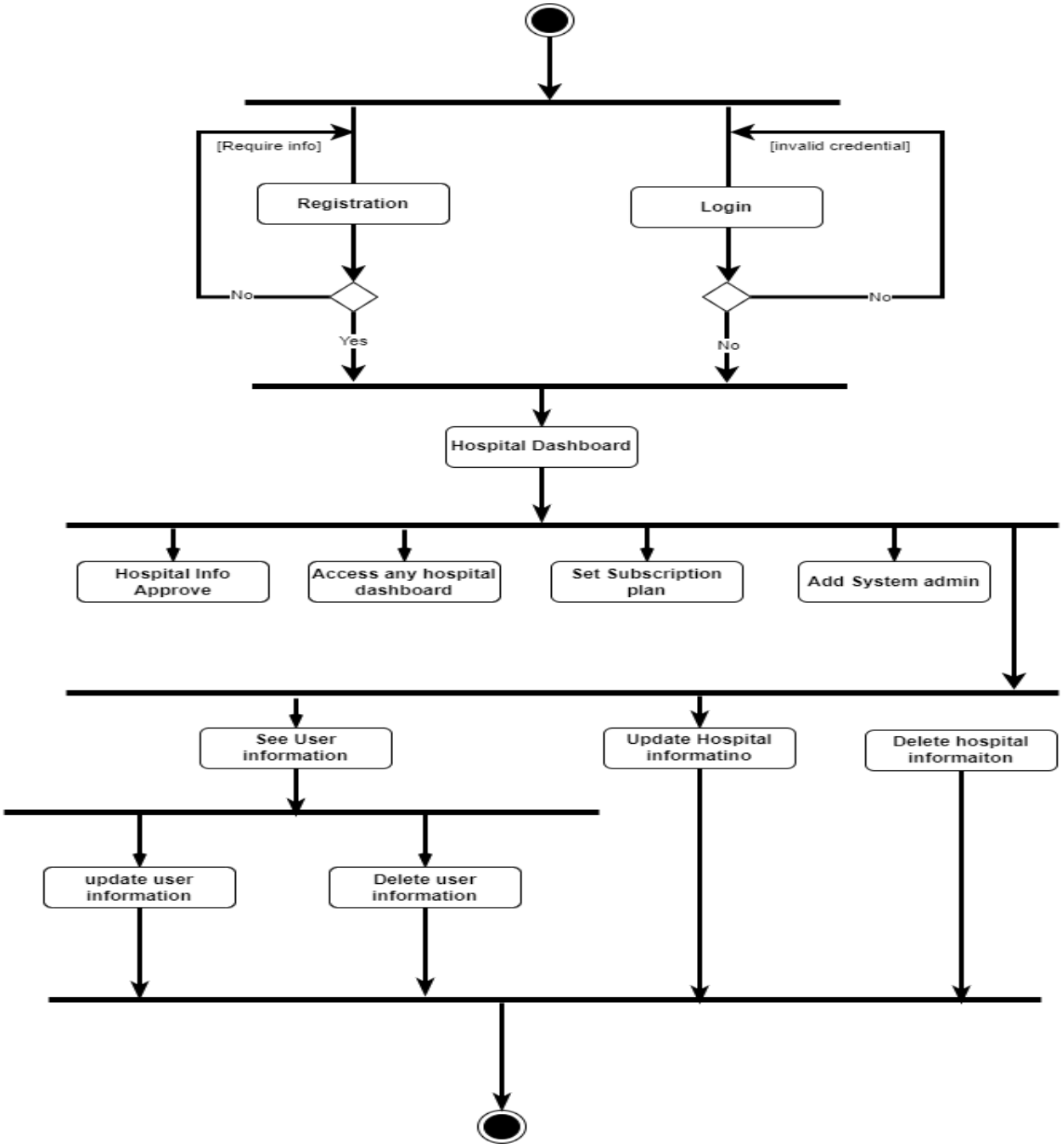

Figure 4.3.1.1 Activity Diagram of System Admin

4.3.2 Activity Diagram: Hospital Admin

Visit this link to see high-resolution image

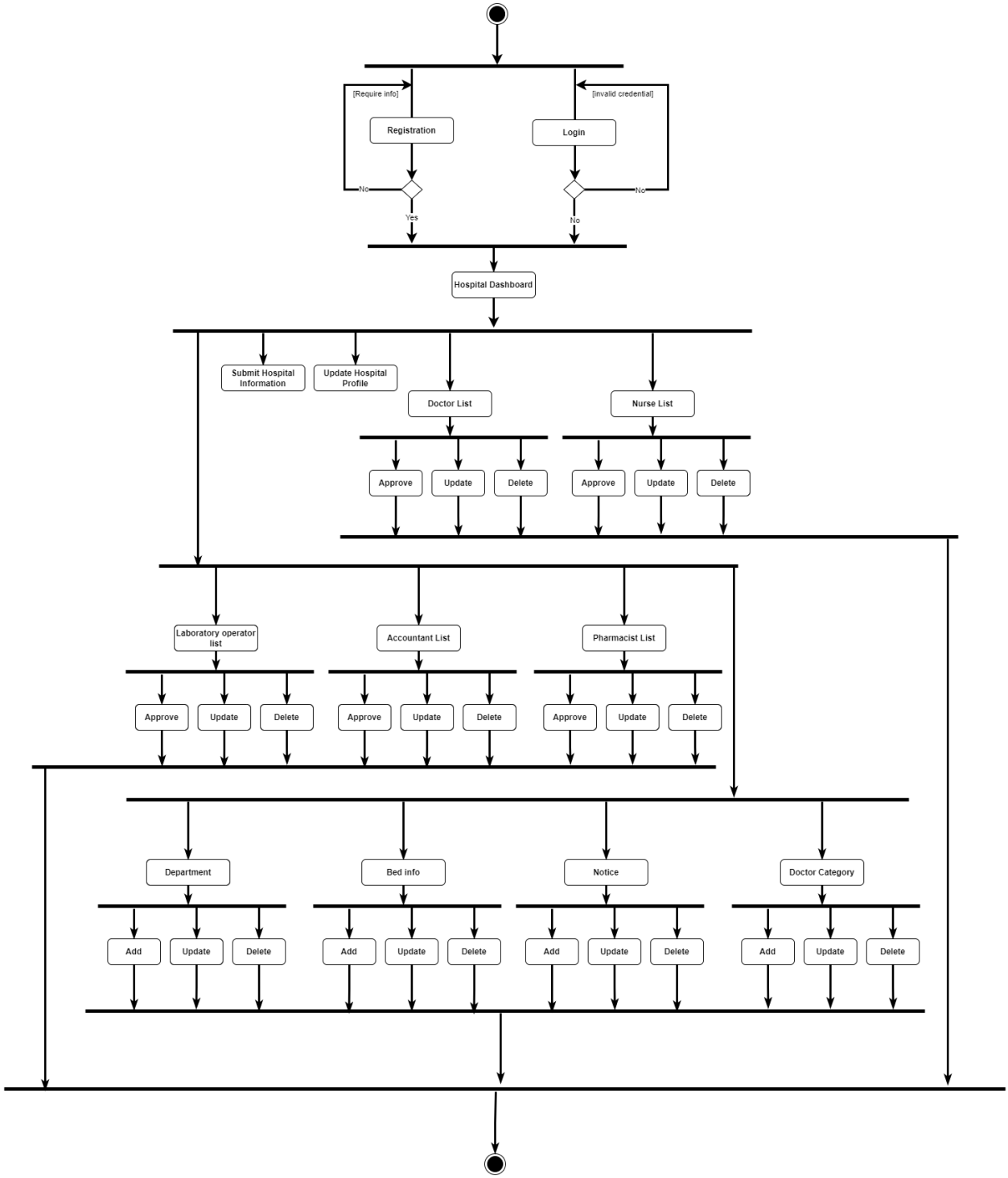

Figure 4.3.2.1 Activity Diagram of Hospital Admin

4.3.3 Activity Diagram: Doctor

Visit this link to see high-resolution image

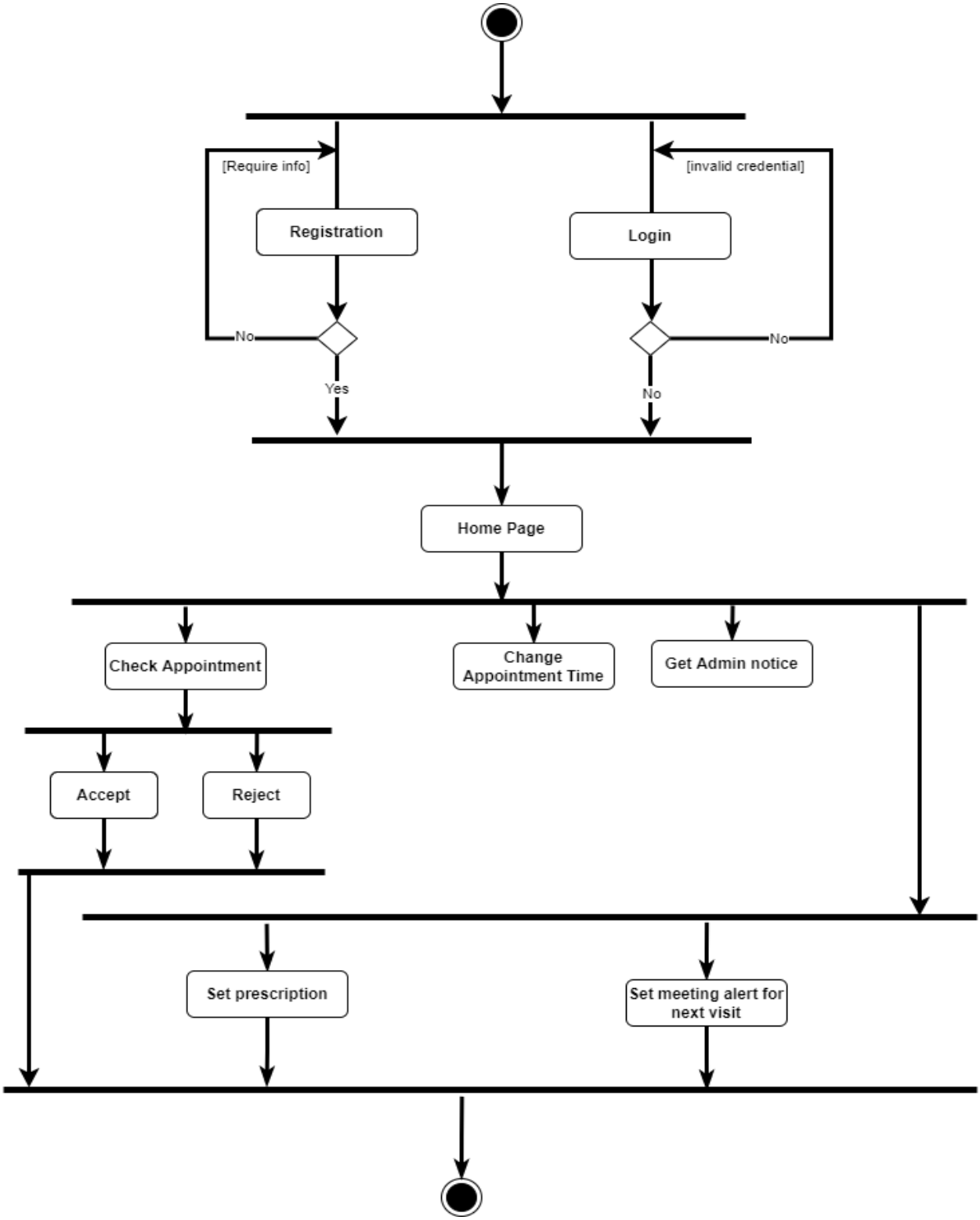

Figure 4.3.3.1 Activity Diagram of Doctor

4.3.4 Activity Diagram: Nurse

Visit this link to see high-resolution image

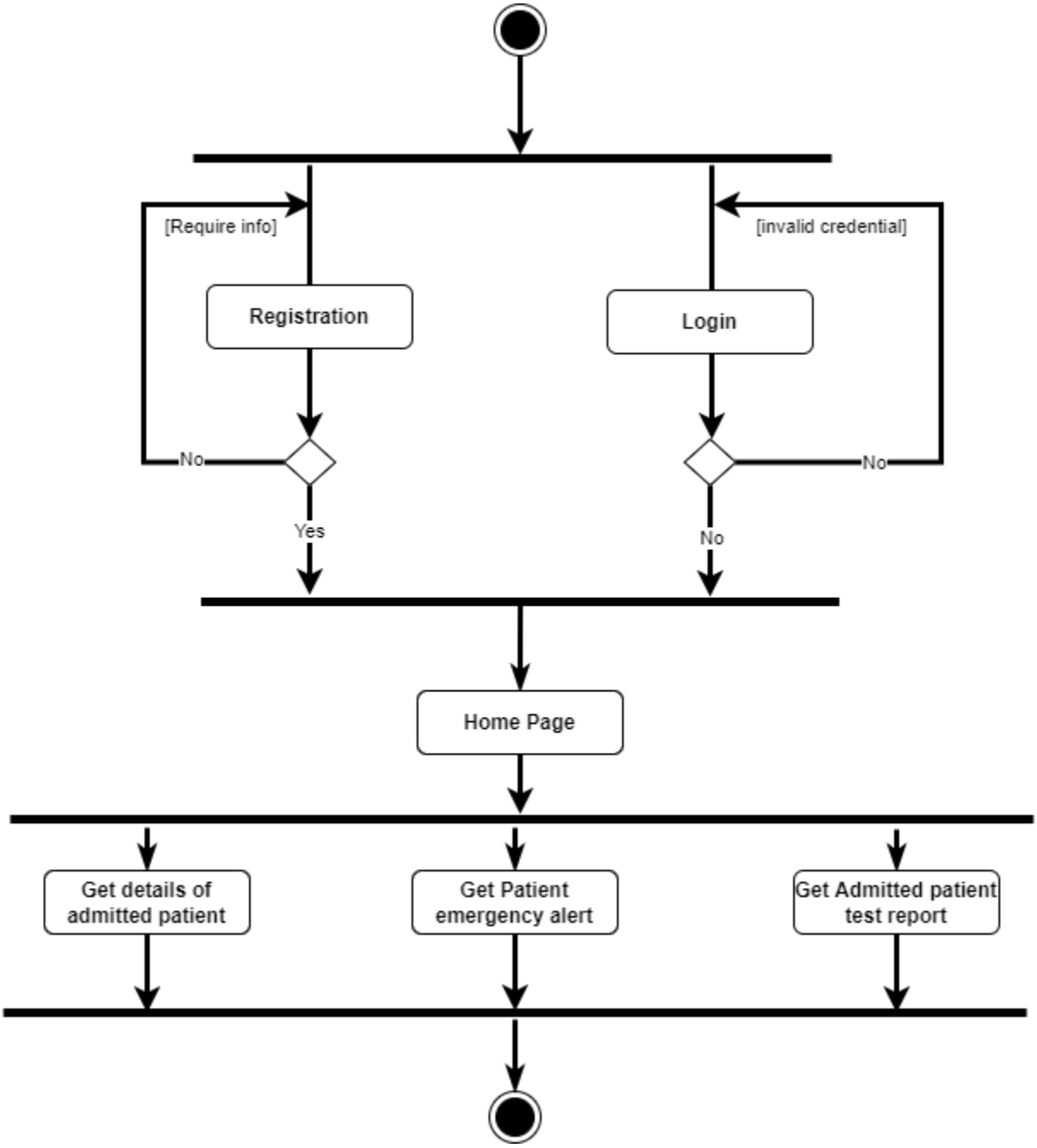

Figure 4.3.4.1 Activity Diagram of Nurse

4.3.5 Activity Diagram: Accountant

Visit this link to see high-resolution image

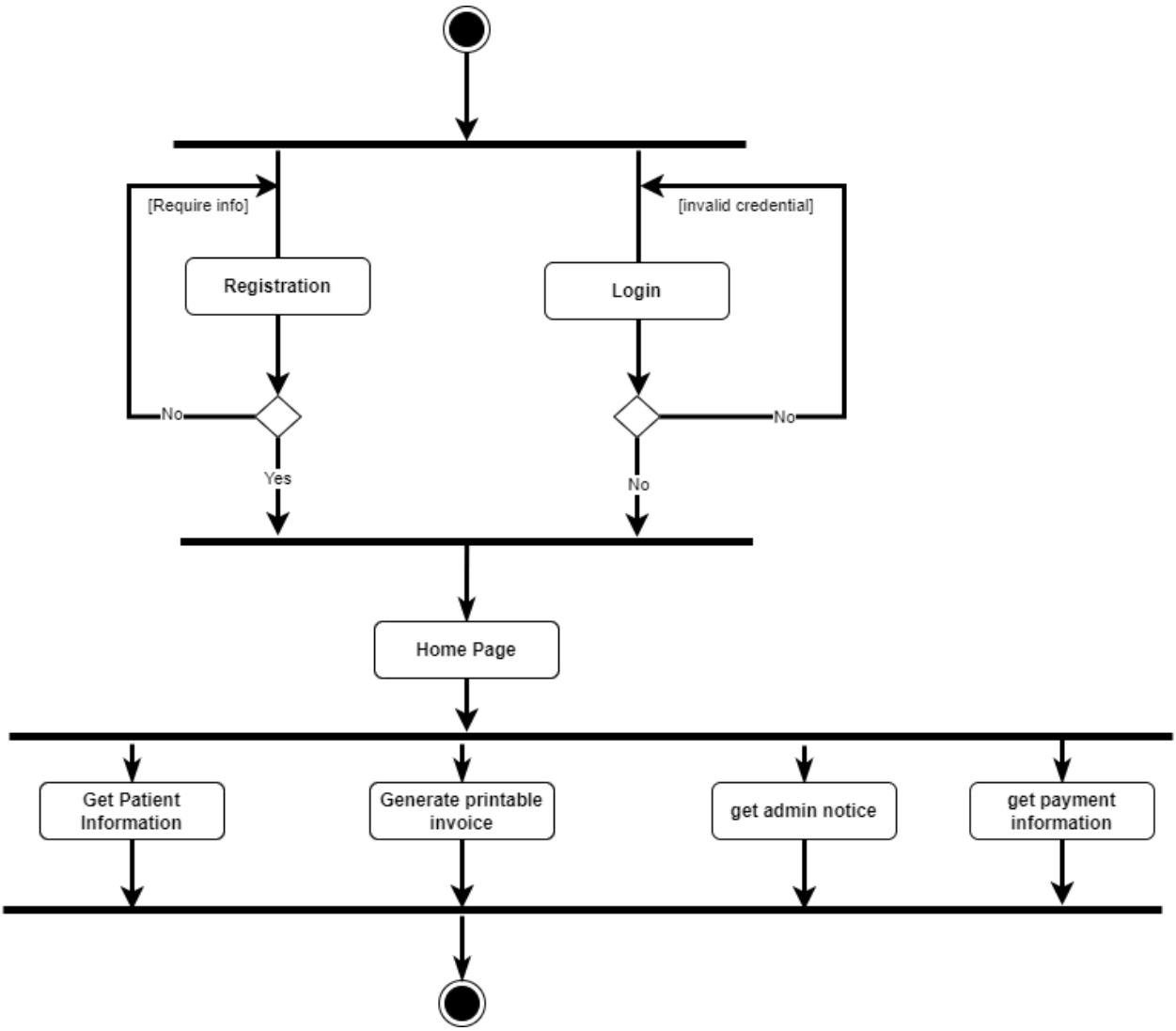

Figure 4.3.5.1 Activity Diagram of Accountant

4.3.6 Activity diagram: Laboratory Operator

Visit this link to see high-resolution image

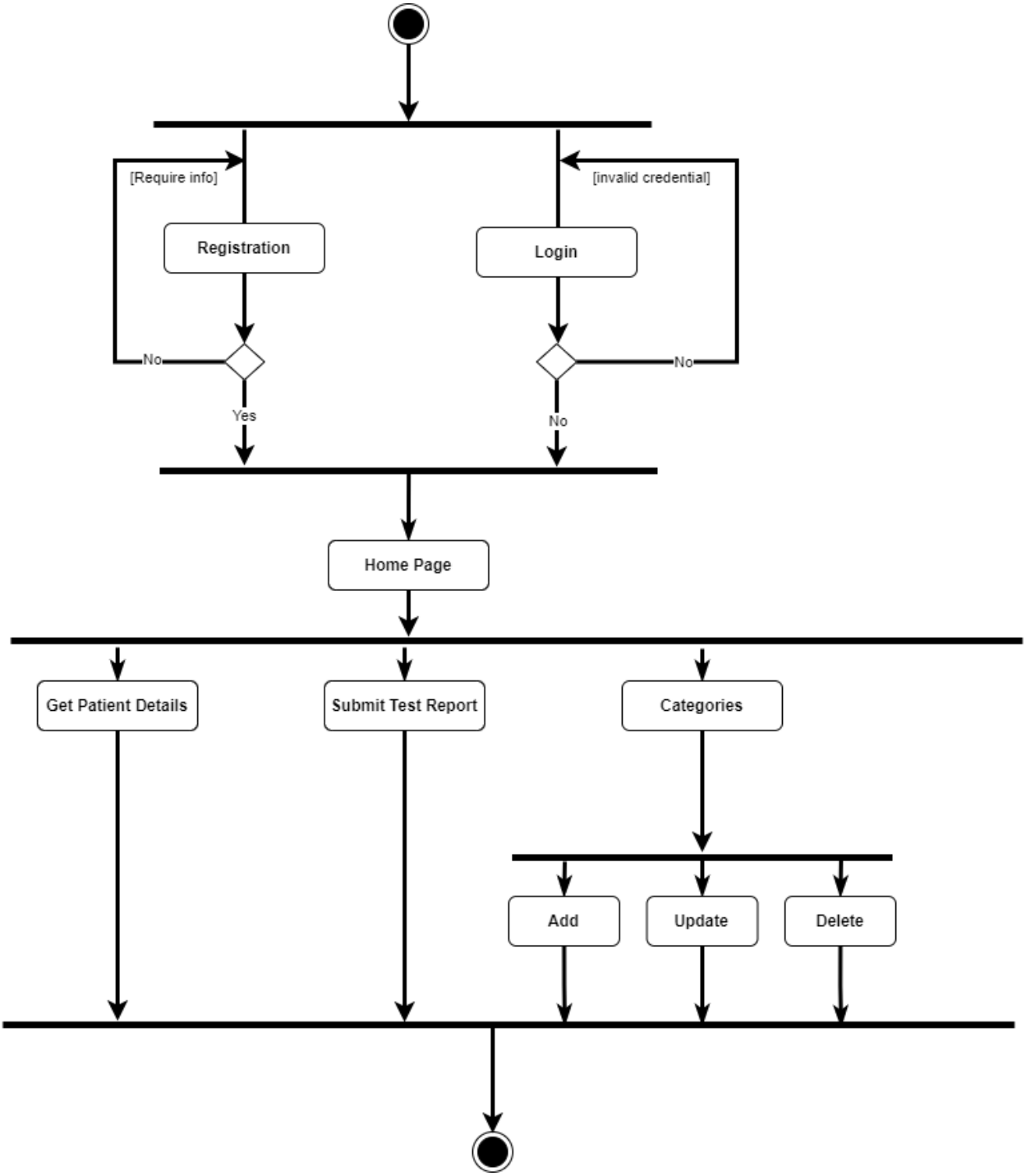

Figure 4.3.6.1 Activity Diagram of Laboratory Operator

4.3.7 Activity Diagram: Pharmacist

Visit this link to see high-resolution image

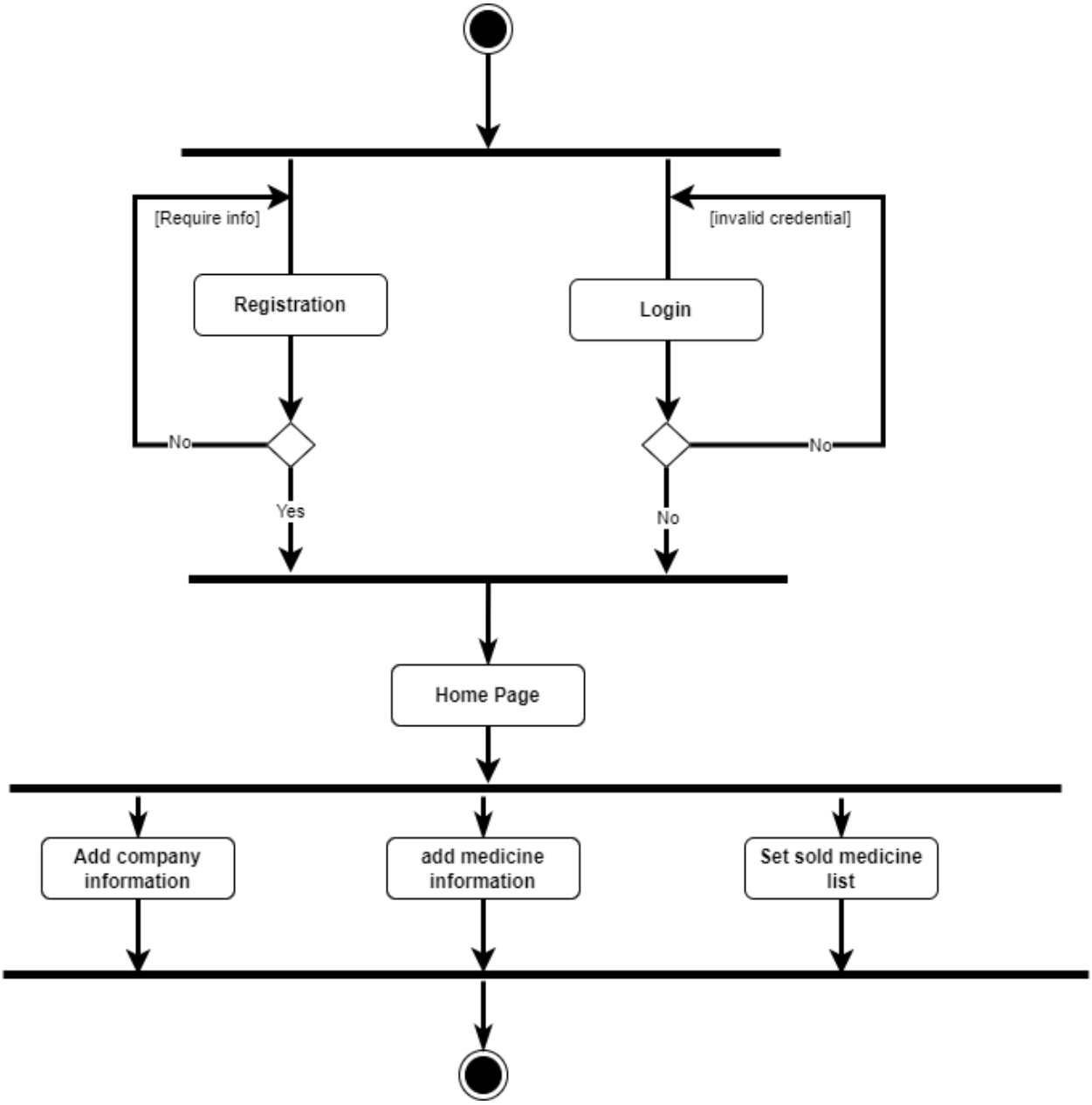

Figure 4.3.7.1 Activity Diagram of Pharmacist

4.3.8 Activity Diagram: Patient

Visit this link to see high-resolution image

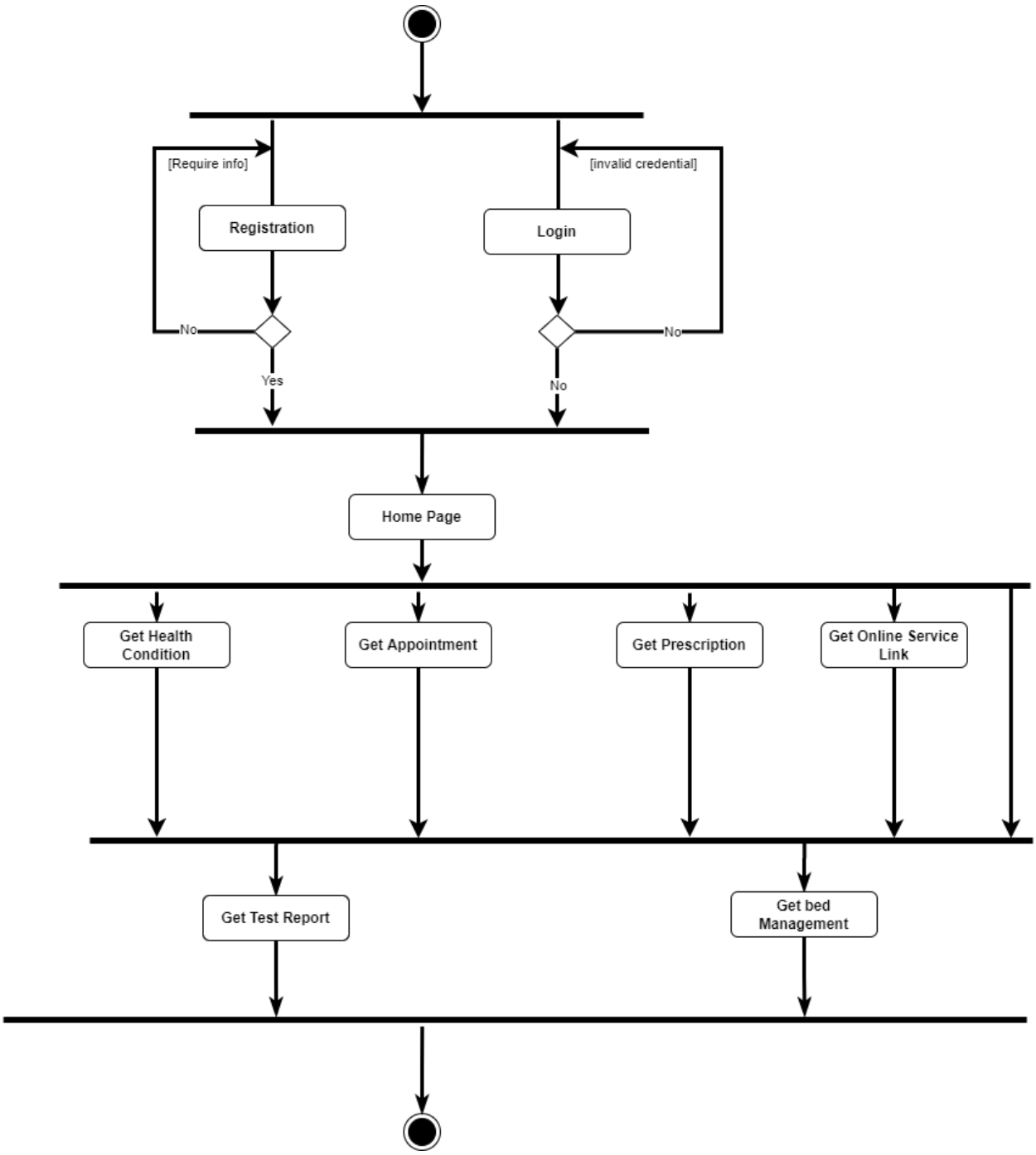

Figure 4.3.8.1 Activity Diagram of Patient

4.4 Sequence Diagram

4.4.1 Sequence Diagram: Login

Visit this link to see a high-resolution image.

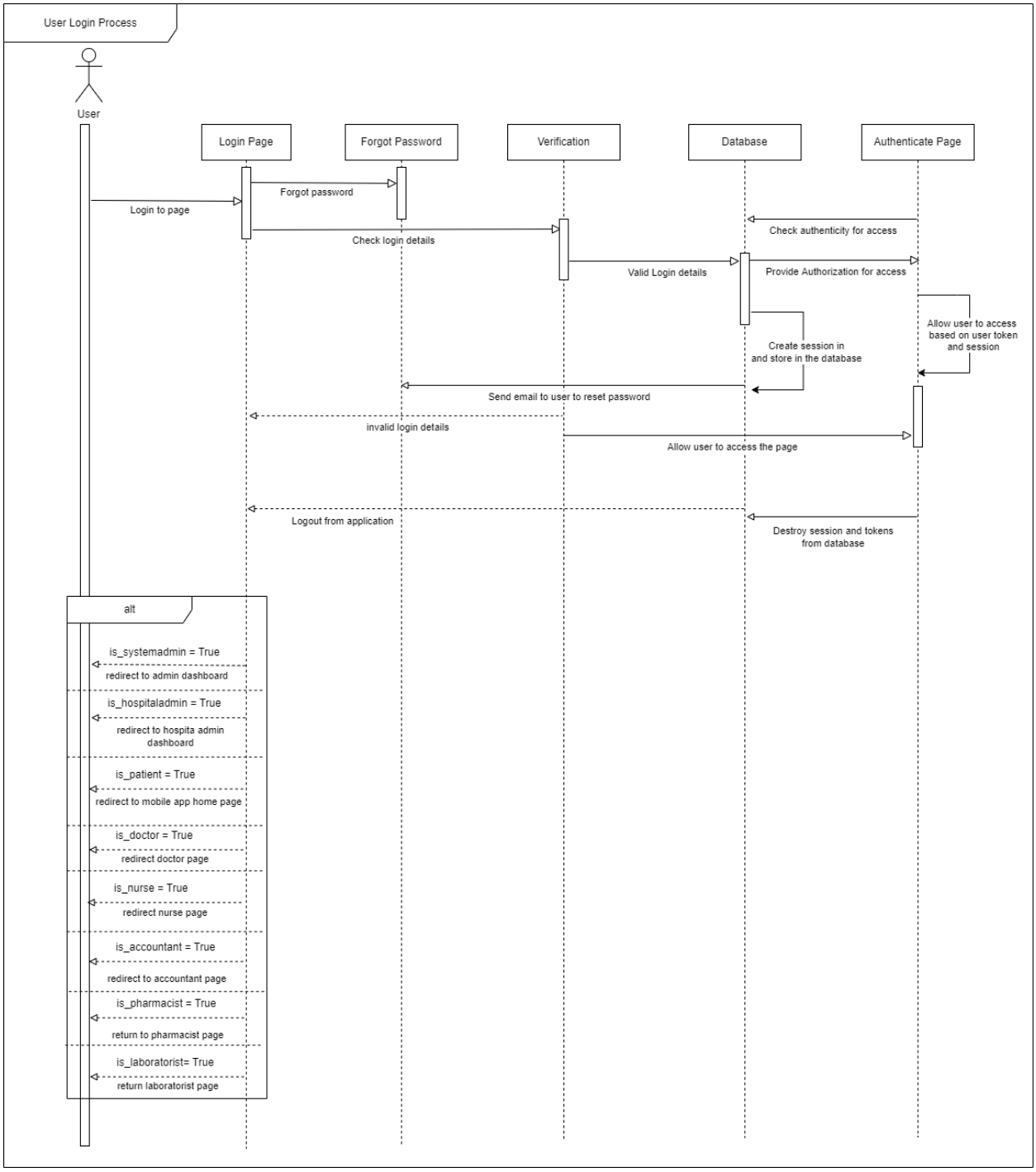

Figure 4.4.1.1 Login

4.4.2 Sequence Diagram: Registration

Visit this link to see a high-resolution logo in an image

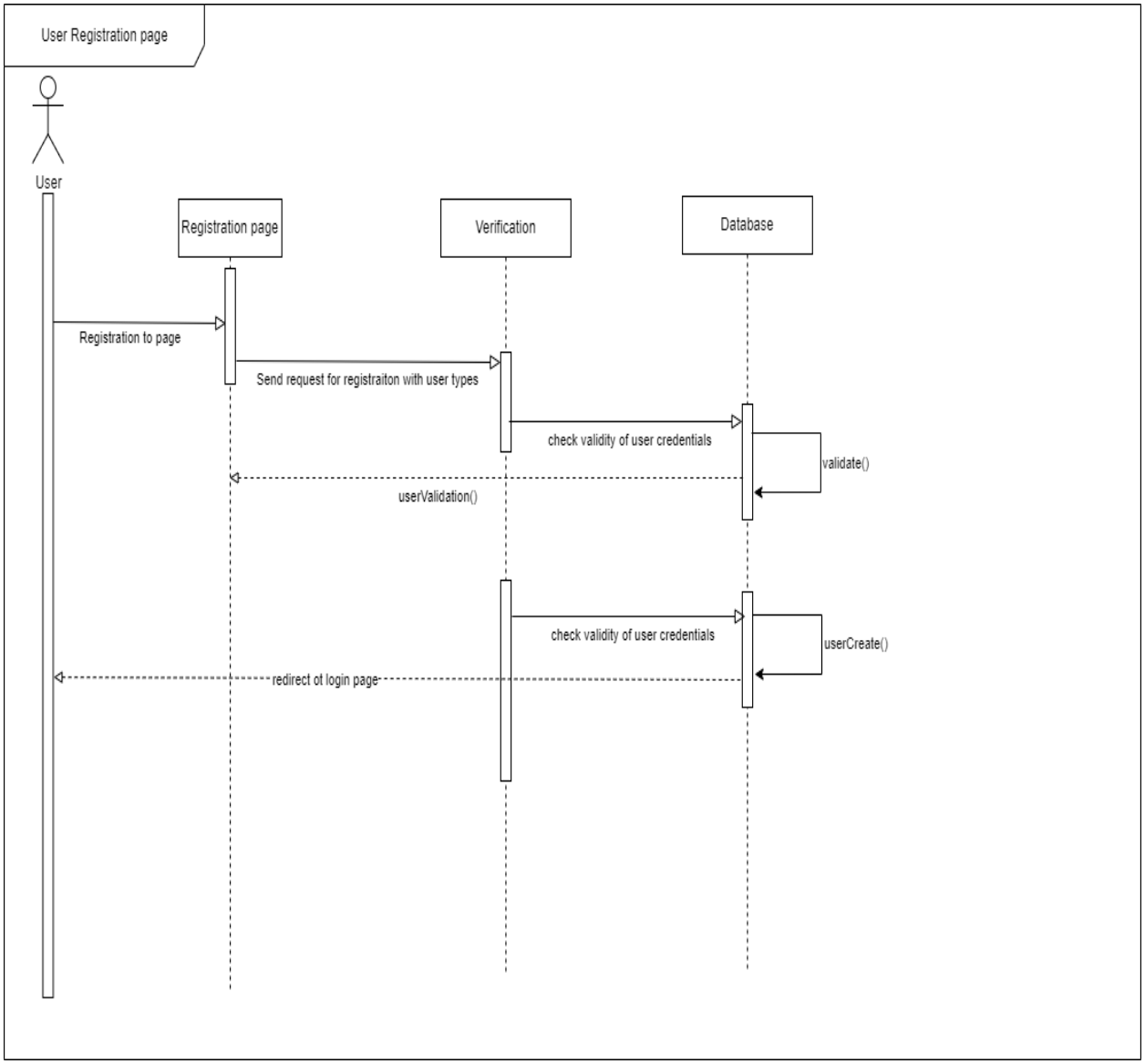

Figure 4.4.2.1 Registration

4.4.3 Sequence Diagram: System Admin

Visit this link to see high-resolution image

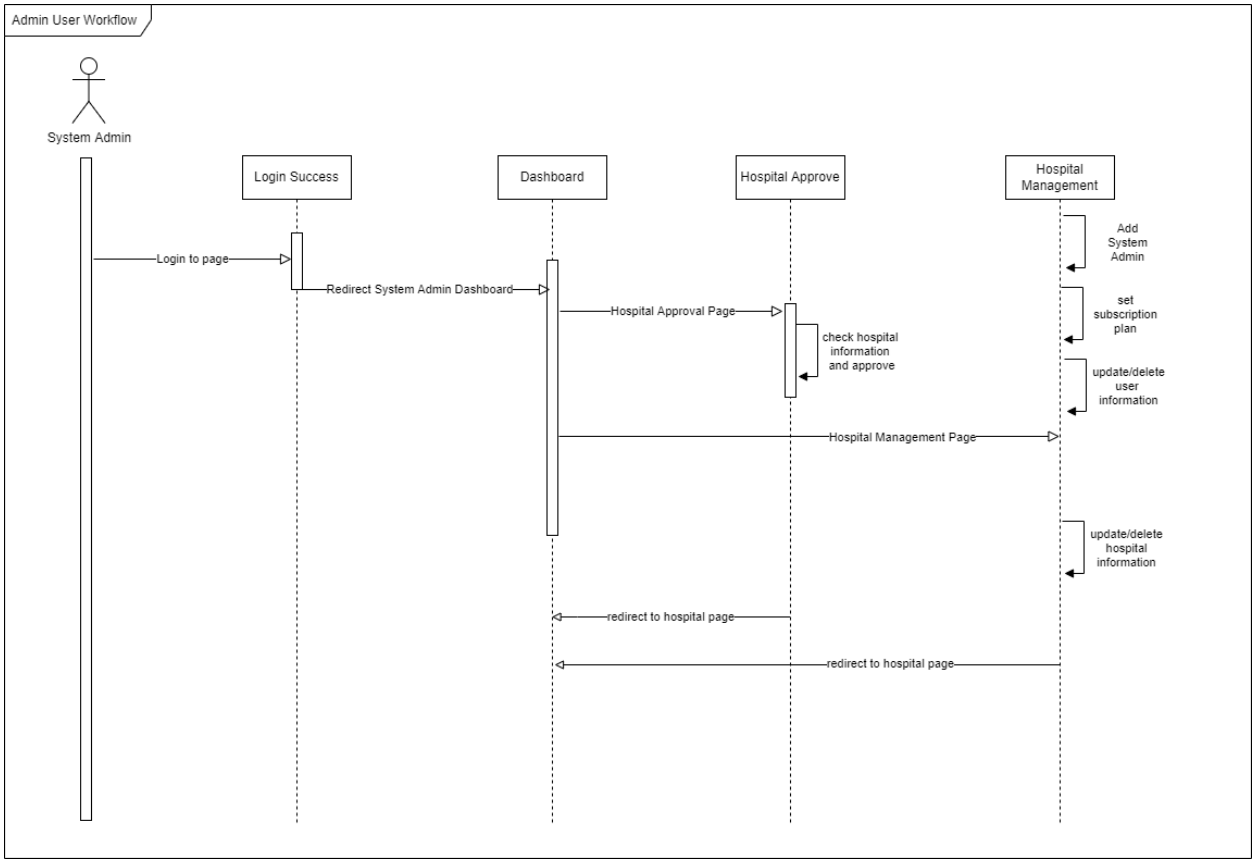

Figure 4.4.3.1 System Admin

4.4.4 Sequence Diagram: Hospital Admin

Visit this link to see a high-resolution image

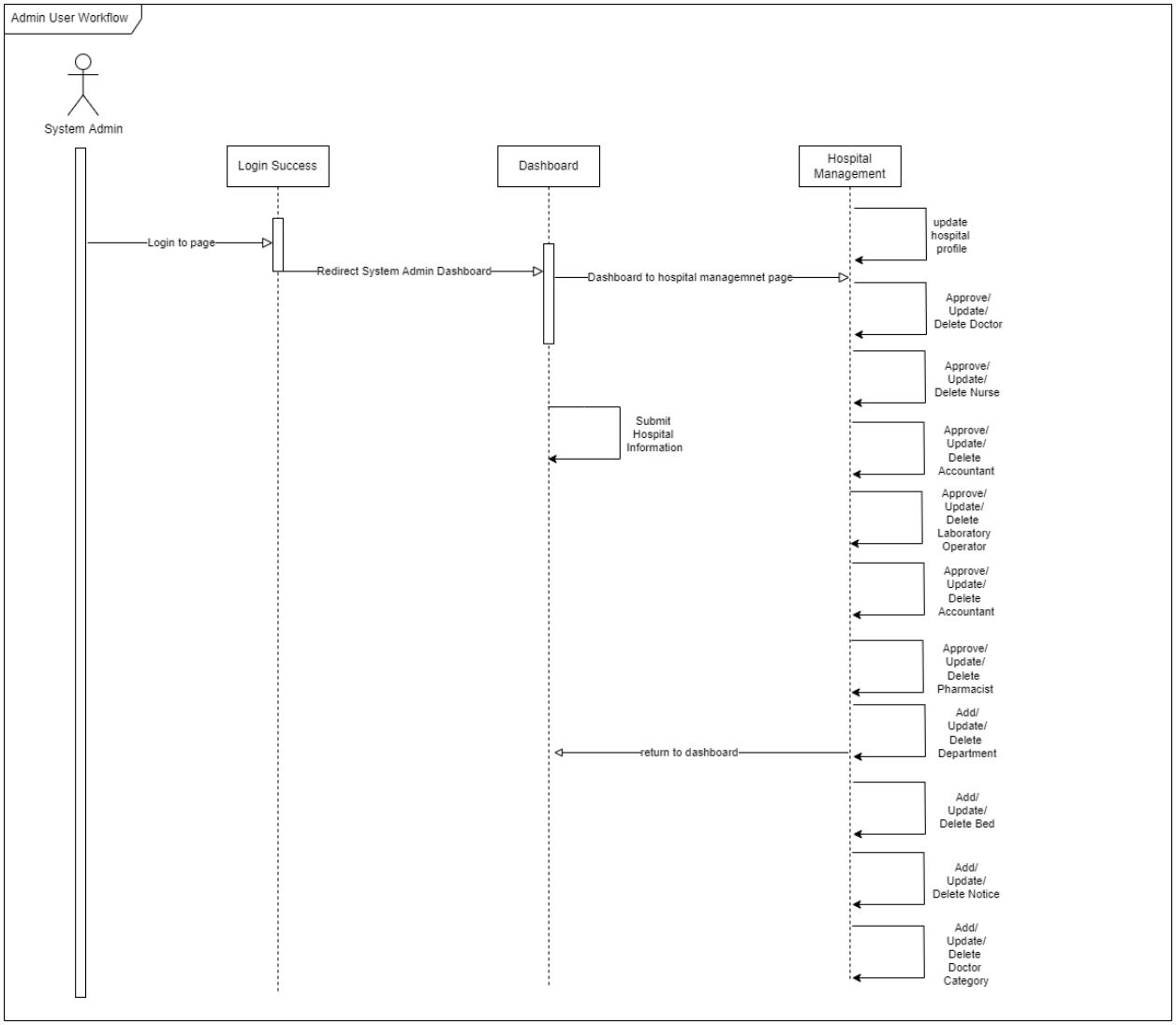

Figure 4.4.4.1 Hospital Admin

4.4.5 Sequence Diagram: Doctor

Visit this link to see a high-resolution image

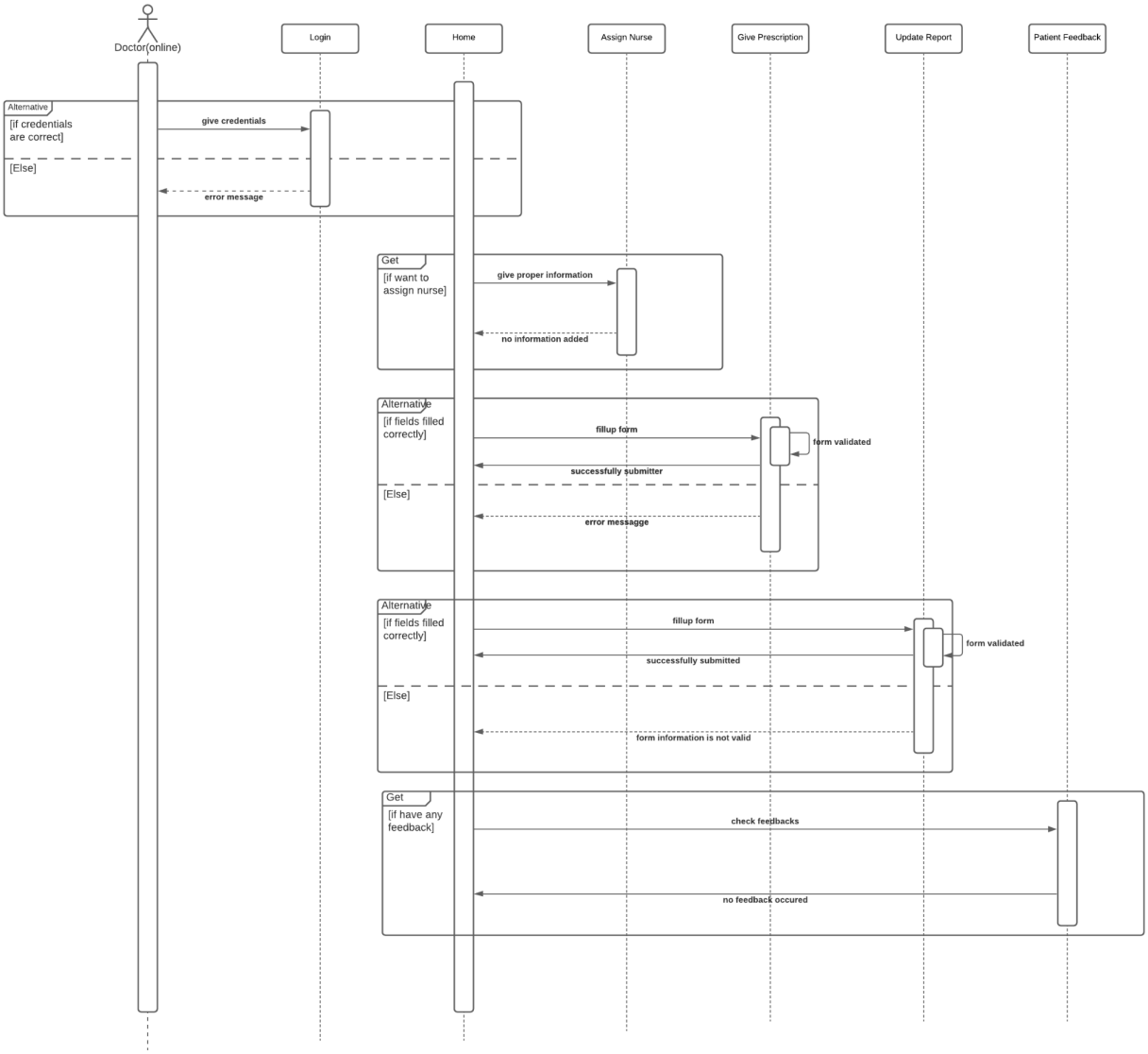

Figure 4.4.5.1 Doctor

4.4.6 Sequence Diagram: Nurse

Visit this link to see a high-resolution image

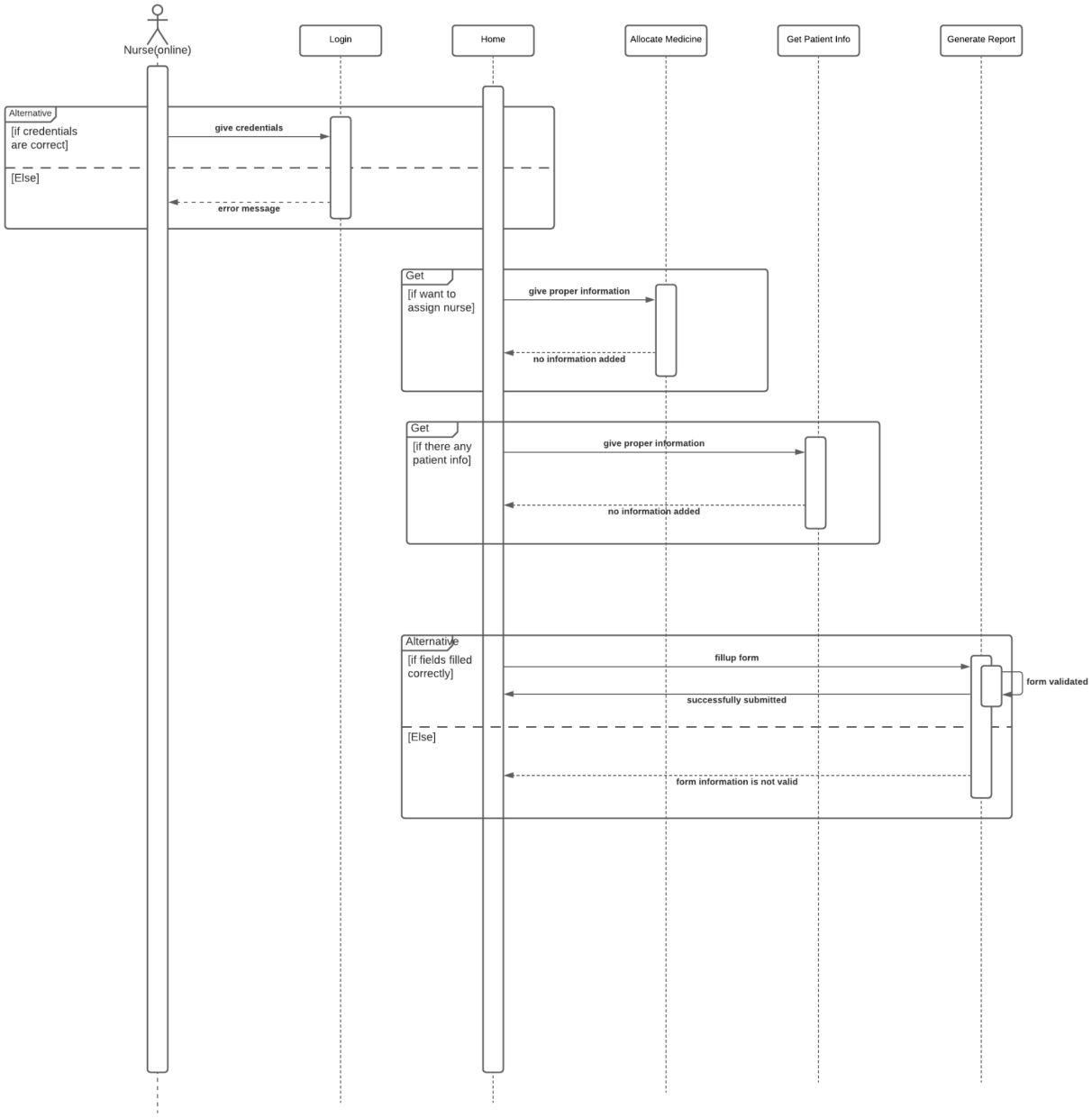

Figure 4.4.6.1 Nurse

4.4.7 Sequence Diagram: Accountant

Visit this link to see high-resolution image

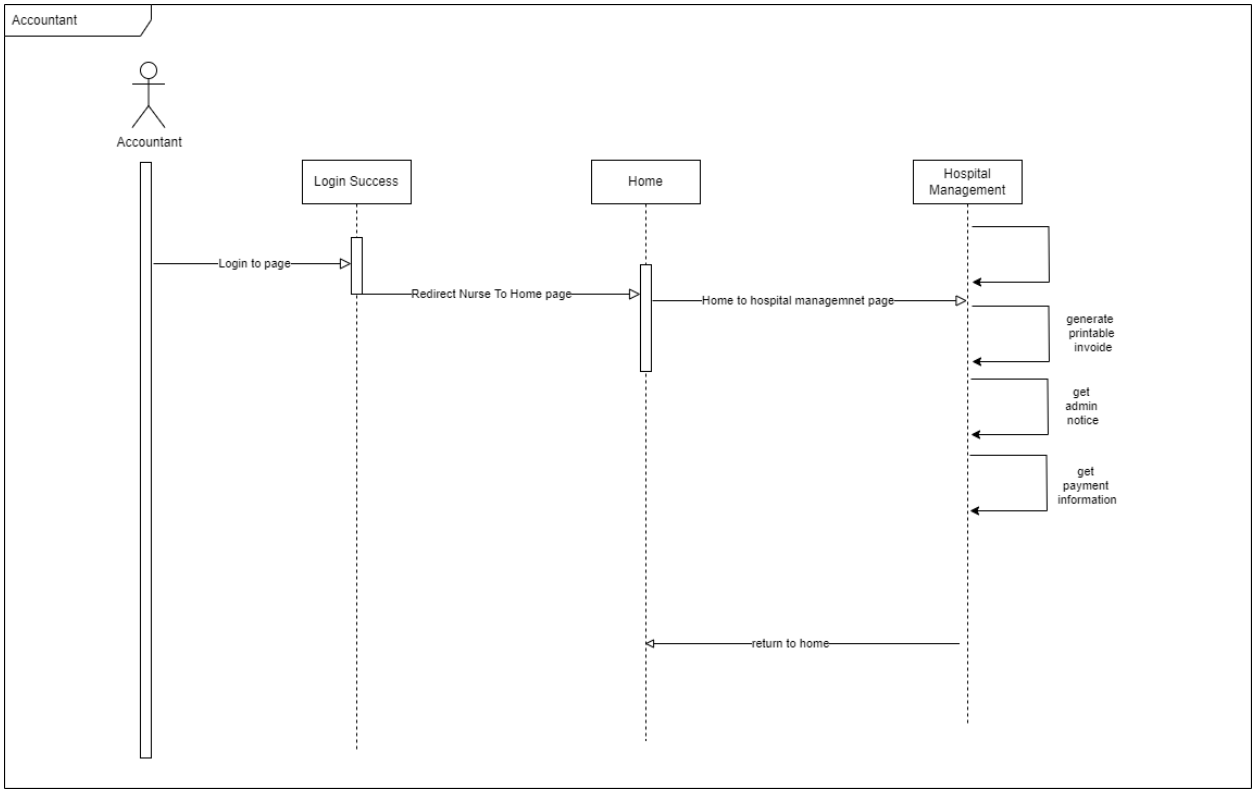

Figure 4.4.7.1 Accountant

4.4.8 Sequence Diagram: Laboratory Operator

Visit this link to see high-resolution image

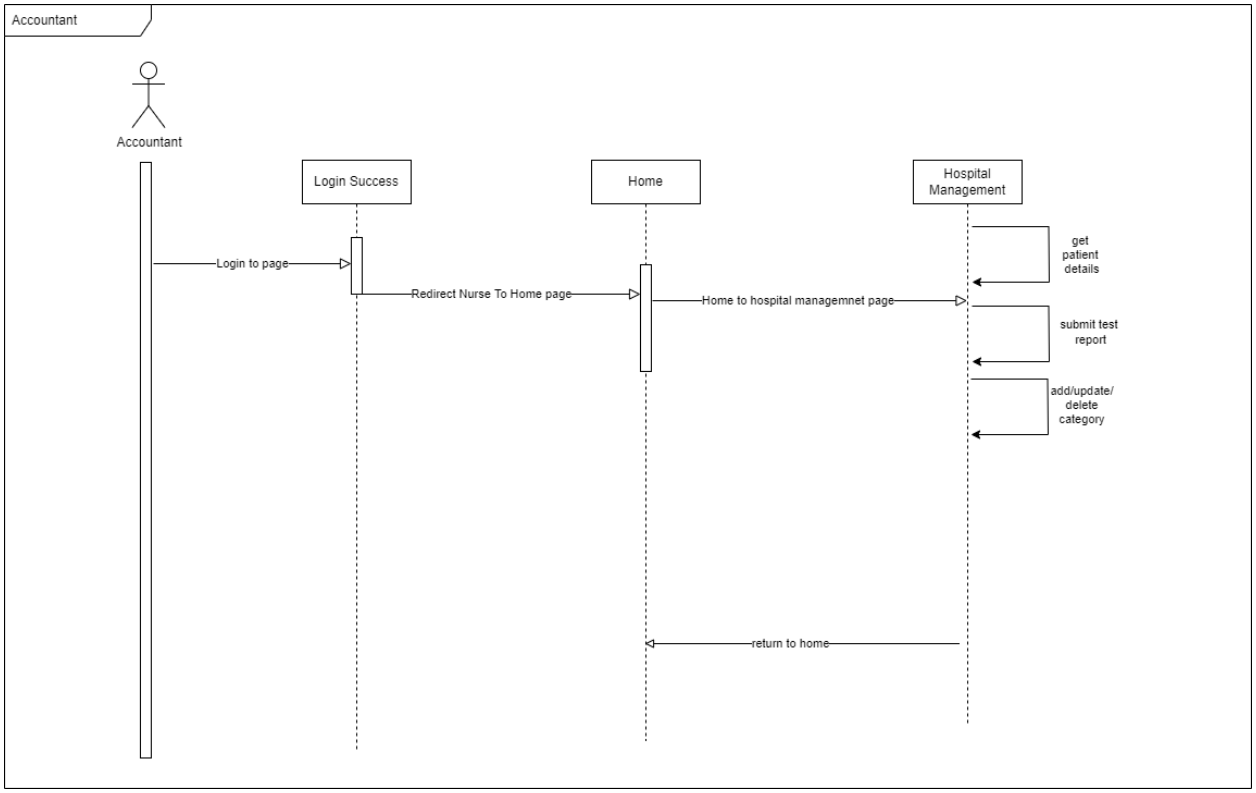

Figure 4.4.8.1 Laboratory Operator

4.4.10 Sequence Diagram: Pharmacist

Visit this link to see a high-resolution image

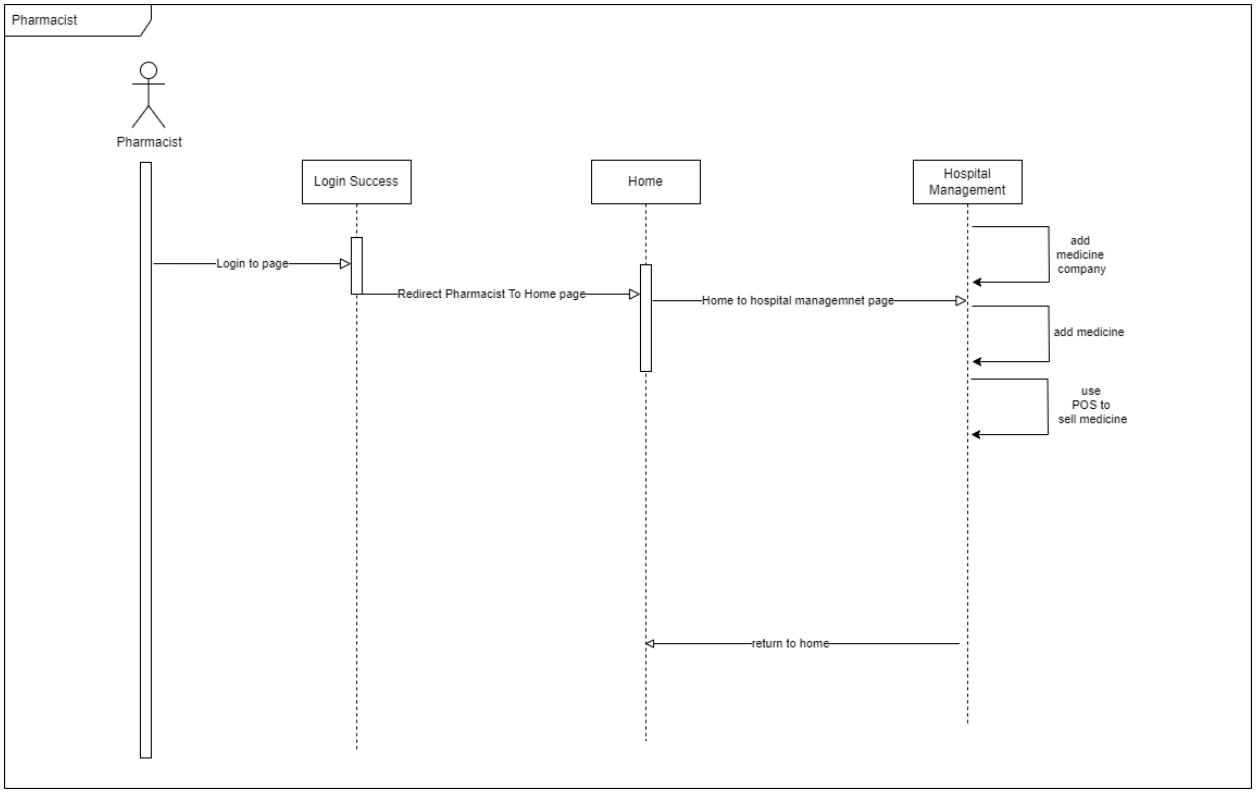

Figure 4.4.10.1 Pharmacist

4.4.11 Sequence Diagram: Patient

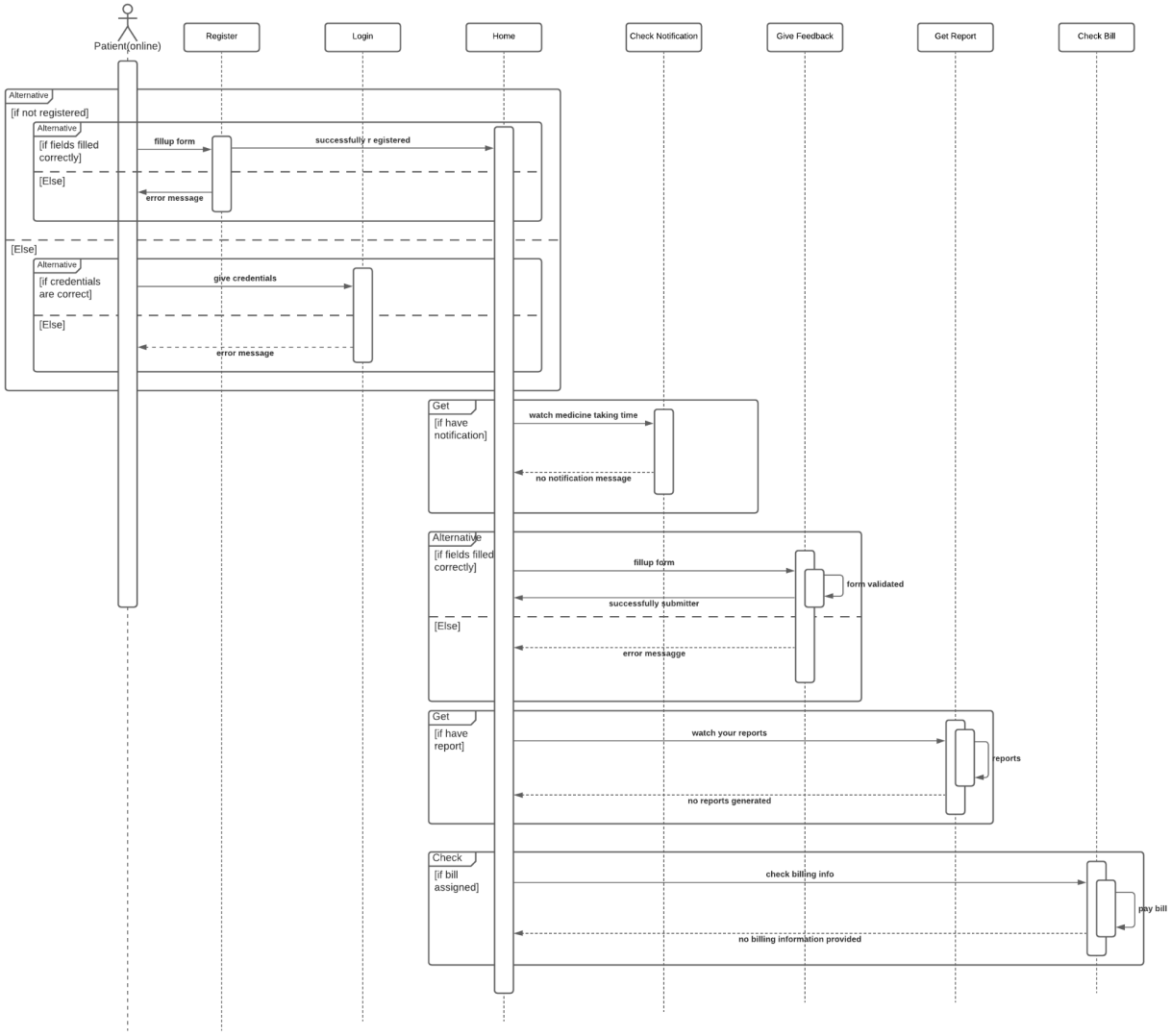

Figure 4.4.11.1 Patient

4.5 Entity Relationship Diagram

Visit this link to see a high-resolution image of this system

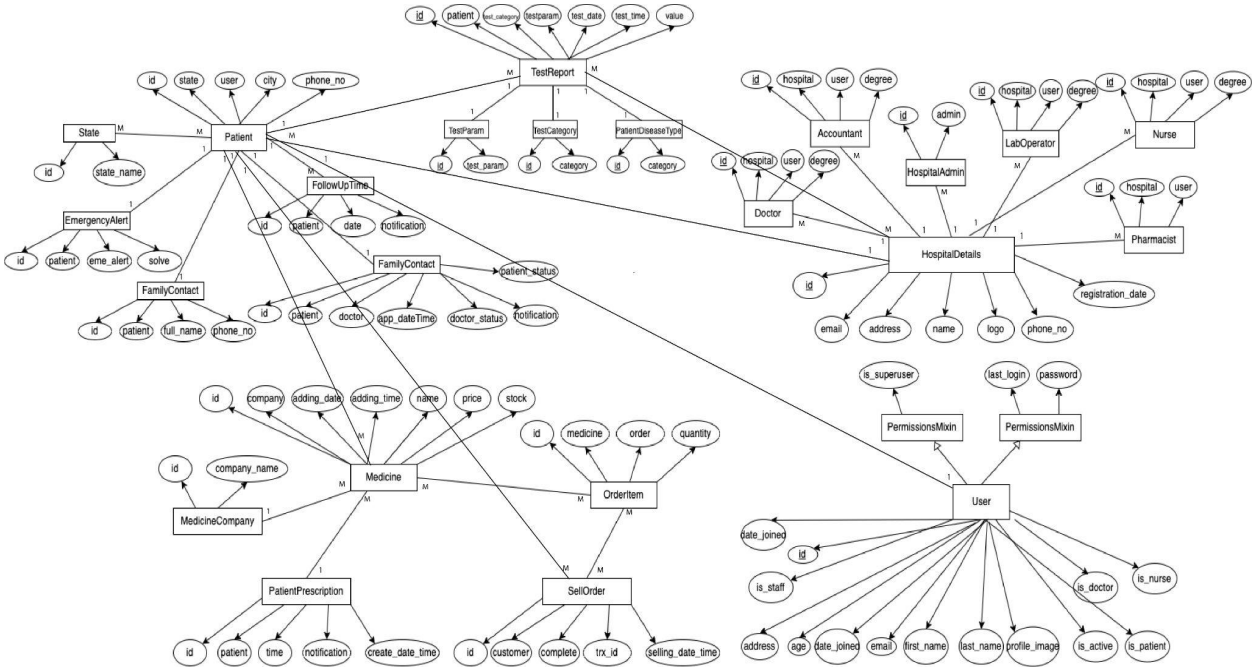

Figure 4.5.1 Entity RelationShip Diagram

4.6 DataFlow Diagram (Level-0)

Visit this link to see a high-resolution image

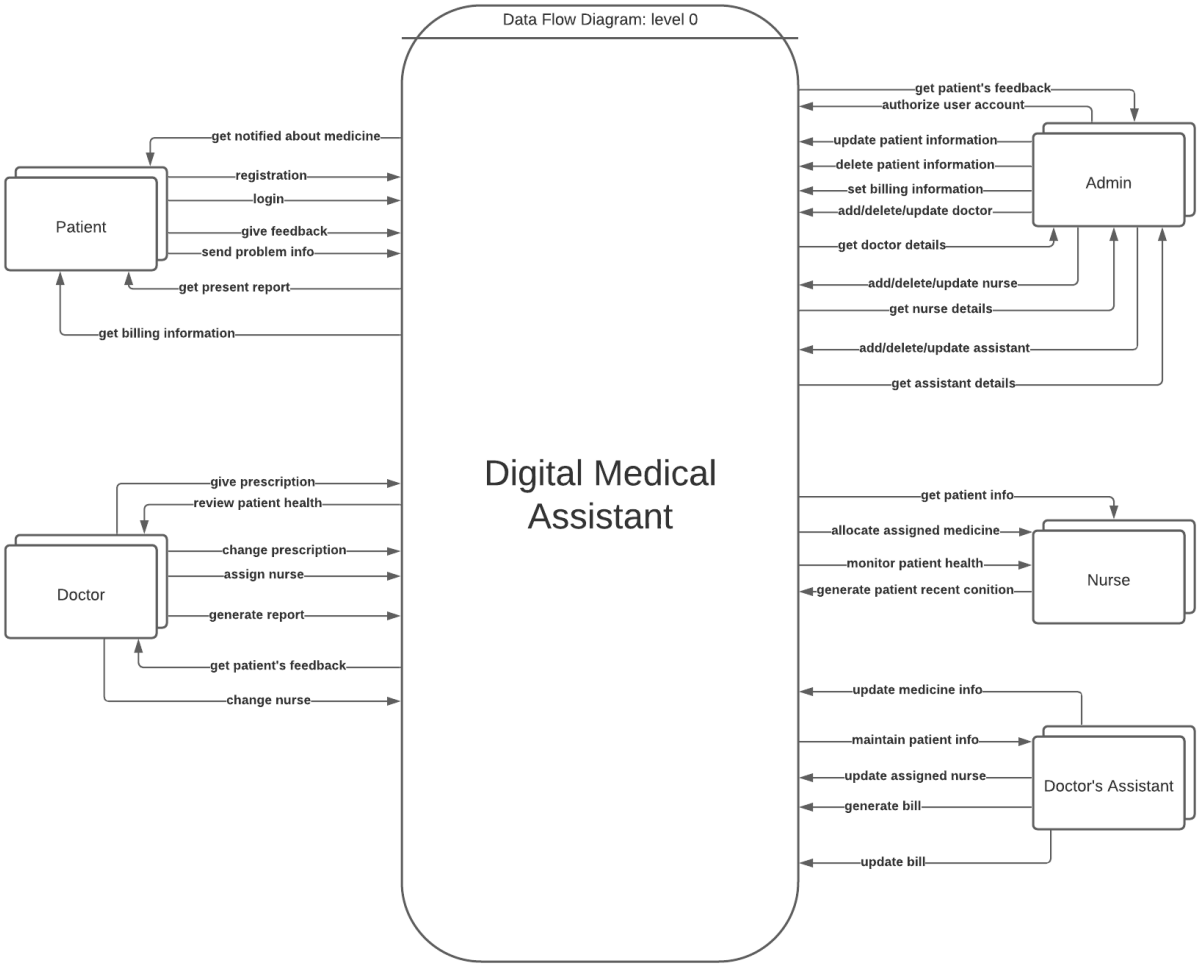

Figure 4.6.1 Data Flow Level Zero

4.7 DataFlow Diagram (Level-1)

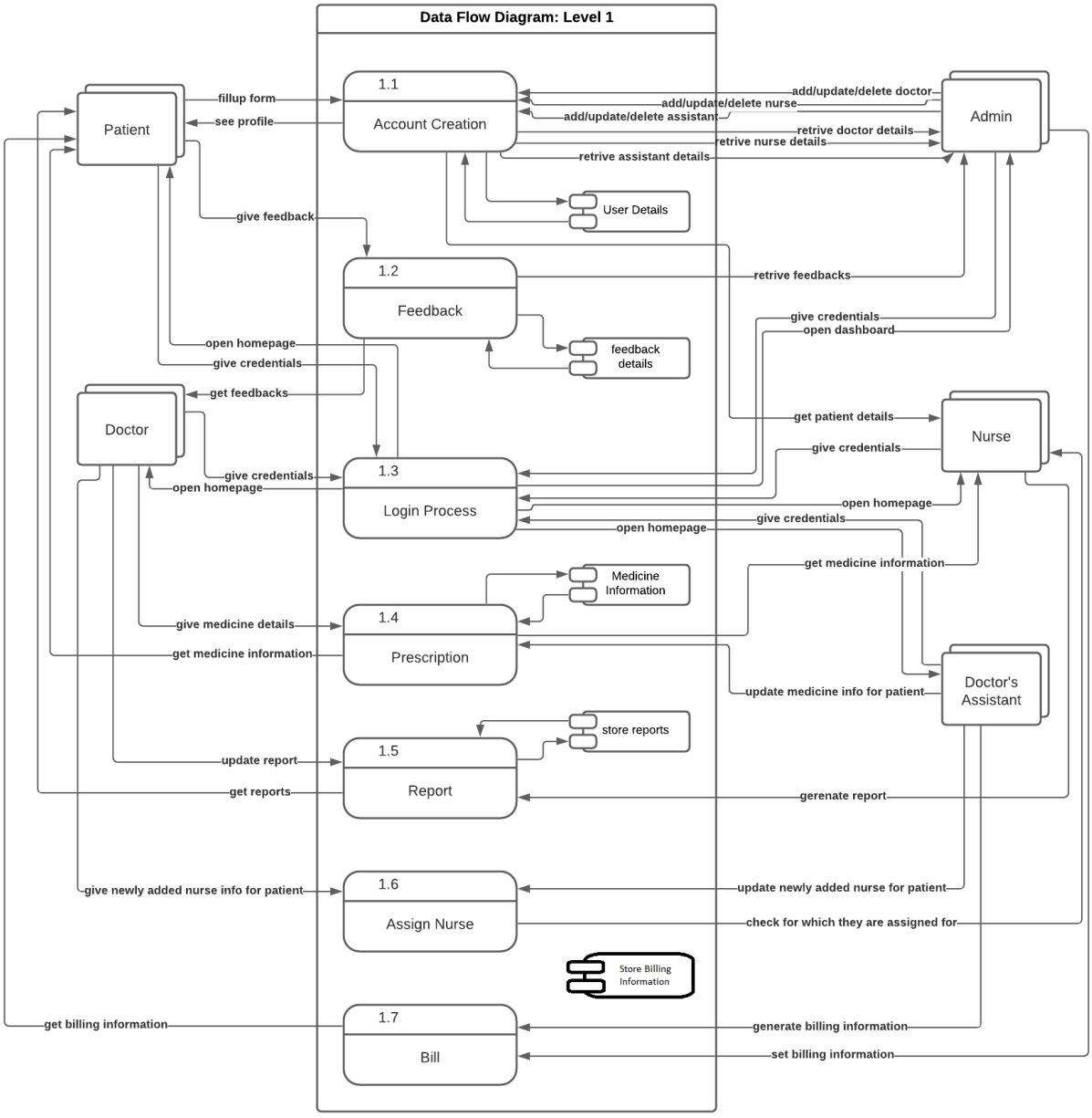

Figure 4.7.1 Data Flow Level One

CHAPTER 5

IMPLEMENTATION

5.1 Front-end Design

This hospital management system project has maximum level integration of user interface, user experience, and performance. So, the system has so much lightweight and simple front-end design for a better user experience. This hospital management project was built as a single-page application. A single-page application can store data efficiently when it sends a request to the server and then updates the other data. This way, it can use this data to function even when users are offline. If a user's connectivity breaks, it can synchronize the local data with the server when the connection is established.

5.2 ReactJS

React.js is an open-source JavaScript library used to build user interfaces specifically for single-page applications. It has been used for handling the view layer for web and mobile apps. React also allows us to create reusable UI components. React is a declarative, efficient, and flexible JavaScript library for building user interfaces. It is 'T' in MVT. React elements are plain objects and are cheap to create. React DOM takes care of updating the DOM to match the React elements. This is because JavaScript is speedy, and it is worth keeping a DOM tree in it to speed up its manipulation. Although react.js was conceived to be used in the browser, it can also be used in the server with node.js because of its design.

5.3 Django-Rest-Framework

Django-REST-framework(DRF) is a robust and excellent package for building Web APIs. There are lots of reasons for which anyone will want to use this. It has a browsable Web API with enormous usability and wins developers' minds to build the rest of APIs. Authentication policies include packages for OAuth1a and OAuth2 is another revolution and reason for using it. Its serialization technology supports both ORM and non-ORM data sources. It has extensive documentation and excellent community support. Furthermore, so many people are using this, and It is trusted by internationally recognized companies, including Mozilla, Red Hat, Heroku, and Eventbrite.

5.4 Back-End Design

Our application follows a modern application structure, a Universal Application that enables our frontend pages and assets to be rendered on the server-side. This Entire application consists of two parts – Backend and Frontend. When a user sends a request to the server, first it get handled by Nginx Web Server. Nginx then redirects the request to WSGI (Gunicorn). Now Gunicorn sends a request to the middleware that hits the URL router and then sends the request to the views. Then views check the context processor to process data using ORM, hit the database, and

return the rendered template to the middleware again to check the authentication and send the data and other components to Nginx. In the last step, Nginx will send the page to the user and see his desired page.

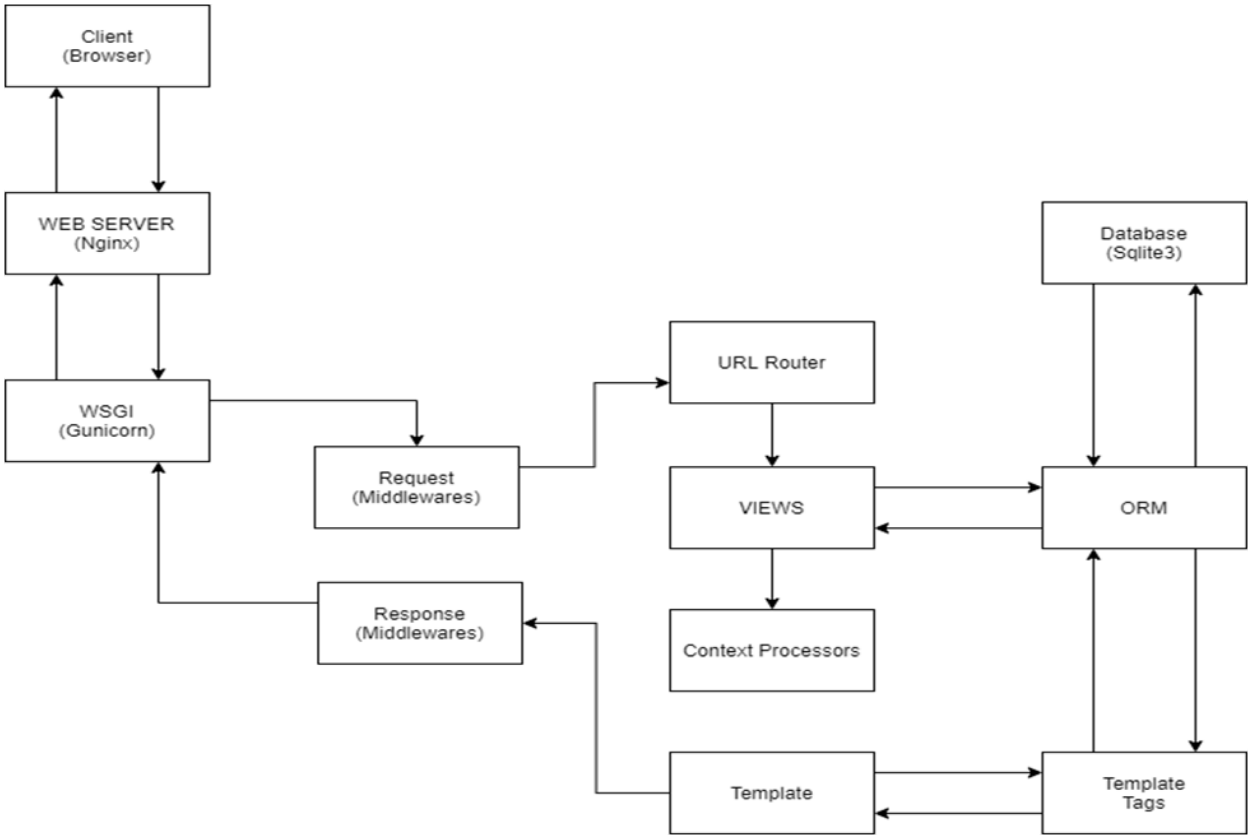

Figure 5.4.1 Django Rest Framework WorkFlow

5.5 Implementation Database

Database design is a collection of procedures that facilitate designing, developing, implementing, and maintaining this hospital management system. Properly designed databases are convenient to maintain, enhance data consistency, and are affordable in disk storage space phrases. Data modeling is sometimes considered a high-level and abstract design segment referred to as conceptual design. This system complies with the schema and builds a log inan Entity Relationship diagram to implement the database.

5.6 Database Schema

Visit this link to see a high-resolution image.

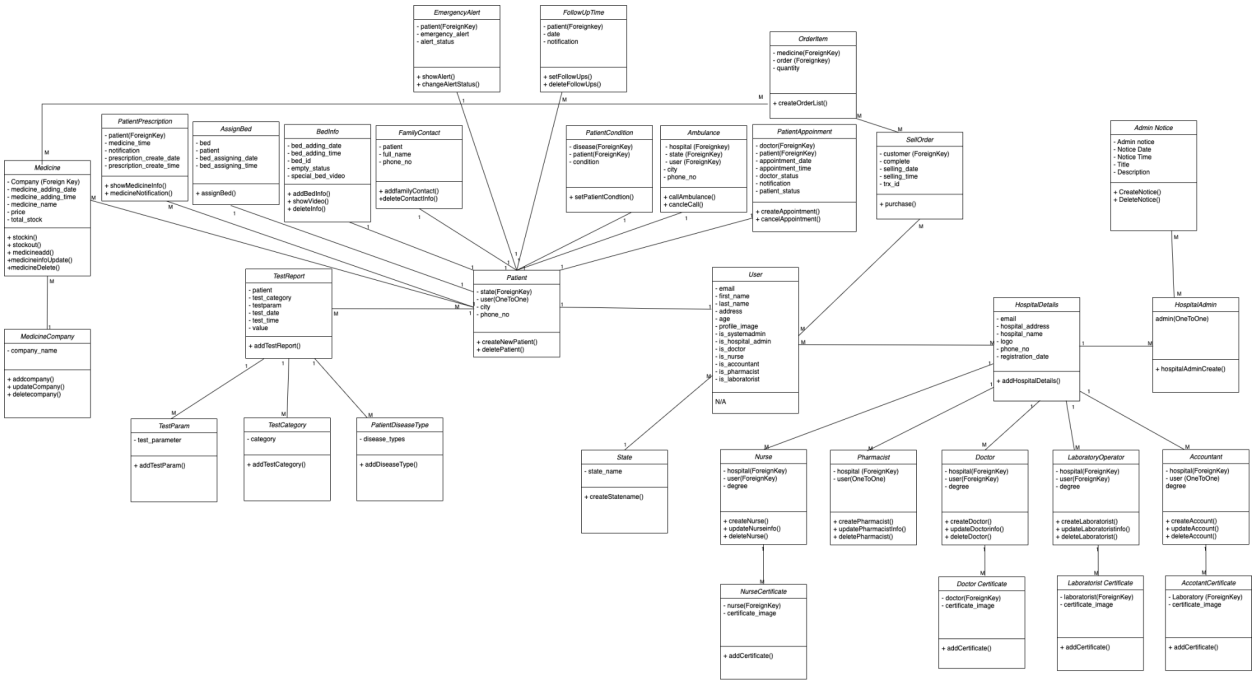

Figure 5.6.1 Database Schema

5.8 Implementation Requirements

The system will be developed using the following technologies:
a. Web Development Technology:
Operating System: Ubuntu 20.04
Web Server: Nginx(unicorn)
Language Platform: JavaScript, Django-rest-framework
Frontend Framework: ReactJs, Bootstrap
Database Server: PostgreSQL
Hosting: Azure Web Service
IDE: Visual Studio Code
Tools: Github, Trello, Draw.io
b. Web Server Configuration (VPS):
Processor: 1 Virtual central processing unit
RAM: 2GB
Storage: 14 GB SSD
Transfer Rate: Unlimited Bandwidth Transfer

CHAPTER 6

SYSTEM TESTING

6.1 Feature Testing

Testing is described as an activity to test whether or not the actual results match the anticipated outcomes and ensure that the system is defect-free. Testing can be viewed as revisions to add new functionality or modify an existing project to fix bugs. Every feature and functionalities have different markers. Feature testing is a way of including functionality or altering to be matched with the aid of new technologies. After the feature testing, each web application has grown to be more reliable, secure, and efficient.

6.1.1 Features to be tested

Features	Priority	Description
Login	2	User login testing using their credentials
Logout	2	Logging out of a user session
Registration	1	User registration testing using registration credentials by checking user existence.
Hospital Registration	1	Hospital Information verification and approval
User Profile	2	Checking user profile information of every user.
Medicine Information	1	Medicine Information adding form validation
Assign Doctor	1	Assign a doctor for patient functionality testing.
Assign Medicine	1	Assign medicine for a patient functionality testing
Notification Alert	2	Checking notification system into mobile application
Hire Ambulance	3	Hire ambulance from available ambulance list
Note: Priority of features to be tested: 1. High 2. Medium 3. Low		

6.2 Testing Strategies

Testing strategies decide how every section of the software should be handled. It is a set of total guidelines about the design of the test and every step of the cases. It determines what strategies should be accompanied and which module should be tested.

6.2.1 Testing approach

Testing is one of the necessary matters of any software project. It proves the software quality. It also helps discover software program bugs and errors so that the software appears very easy and error-free to the user.

- Black Box testing is used to check the performance of the system. Functionality is examined primarily based on inputs and the outputs revered to the inputs. This kind of testing ignores the internal mechanism of the system. Results make sure that the functionality fulfills the specifications and requirements.
- White box testing is used to affirm the internal system's structure, mechanism, and structure. The input and output flow is tested to make a standard design, security, and user-friendly experience.

6.2.2 Pass/Fail Criterion

The tester or quality assurance engineer will determine the pass / fail test criteria. It all depends on how well all the requirements are working. If test results are good, they might also be regarded as a pass or a failure. Data that is adequately worked is considered as pass criteria. If a feature does no longer work properly for the duration of the test, it will be considered a failure. There are some pass / fail criteria below:

- System crash is considered a fail case.
- If any criteria pass 100% of testing, it is considered to pass criteria only.
- If data cannot be displayed correctly, it is also considered a failure criterion.

6.2.3 Traceability Matrix

Project Manager			Business Analyst	
OA Lead			Target Implementation Date	
BR#	Functionality/ Activity	Requirement Description	Test Case Reference	Comments
BR1	Functional	Registration	Test Case 6.4.1	
BR2	Functional	Login	Test Case 6.4.2	
BR3	Functional	Hospital Registration	Test Case 6.4.3	

6.3 Testing Environment

Testing environment means preparing the environment with hardware and software so that the tester can execute test cases as required. Besides hardware and software usage, network configuration is additionally needed to execute test plans. For the testing environment, given below are some key areas.

- Test Data
- Selenium
- Pytest
- Database Server
- Network
- Browser

6.4 Test Cases

A test case refers to rules and regulations that can decide whether a system can operate or not operate properly under test scenarios. Every system has the potential to produce a mistake. This is an exceptionally regular occurrence in the software development industry. Moreover, Software testing methodologies are used to overcome these issues. So proper testing is necessary for the development process.

6.4.1 Registration

Test Case #01			**Test case name:** Registration			
System: "Digital Sheba"			**Subsystem: N/A**			
Designed By: Shahed Talukder			**Designed Date:** 13 Dec 2021			
Execute by:			**Executed Date:**			
Short description: System will save new user information to the database						
Pre-Condition: · The user must have a valid username, email, phone number, and strong password						
Serial	**Name**	**Email**	**Password**	**Expected Result**	**Pass/Fail**	**Comment**
1	shahid	shahed2	test32	Invalid Email	Fail	
2	shahid		test32	Email Field Required	Fail	
3			test32	Name and email field required	Fail	
4	Shahid	shahed2@gmail.com		Password required	Fail	
5	shahid	shahed@gmail.com	test32	User successfully registered	Pass	
Post-Condition: The user can login to the system now.						

6.4.2 Login

Test Case #01	**Test case name:** Login				
System: "Digital Sheba"	**Subsystem: N/A**				
Designed By: Shahed Talukder	**Designed Date:** 13 Dec 2021				
Execute by:	**Executed Date:**				
Short description: The system will redirect the user to interact with the system					
Pre-Condition: · The user must have a valid email, password					
Serial	**Email**	**Password**	**Expected Result**	**Pass/Fail**	**Comment**
1	shahed@gmail.com	abortable	Invalid Password	Fail	
2		test32	Email required to login	Fail	
3	shahed@gmail.com		Invalid Password	Fail	
4			Email and password are required.	Fail	
5	shahed@gmail.com	test32	The user successfully logged in	Pass	
Post-Condition: The user can now interact with the system with his functionality.					

6.4.3 Hospital Registration

Test Case #01	**Test case name:** Hospital Registration
System: "Digital Sheba"	**Subsystem: N/A**
Designed By: Shahed Talukder	**Designed Date:** 15 Dec 2021
Execute by:	**Executed Date:**
Short description: The system will add a new hospital with its credentials	
Pre-Condition: · Input fields must be filled up with proper credentials	

Serial	**Hospital Name**	**Image Docs**	**Hospital Email**	**Expected Result**	**Pass/Fail**	**Comment**
1	Aman Medical		test32	1. Hospital documentation required 2. Invalid Email	Fail	
2		Input.jpg	test32	1.Hospital Name required 2. Invalid Email	Fail	
3	Aman Medical	input.jpg		Invalid Email	Fail	
4	Aman Medical	input.jpg	shahed@gmail.com	Hospital Registered. Please wait for the approval.	Fail	

Post-Condition: The user login has to wait for the user log approval.

6.4.4 Assign Doctor

Test Case #01			**Test case name:** Assign Doctor		
System: "Digital Sheba"			**Subsystem: N/A**		
Designed By: Shahed Talukder			**Designed Date:** 15 Dec 2021		
Execute by:			**Executed Date:**		
Short description: System will assign a doctor for a patient					
Pre-Condition: · The user must select a patient-user and a doctor user					
Serial	**Doctor**	**Patient**	**Expected Result**	**Pass/Fail**	**Comment**
1		shahed2	Select a doctor first	Fail	
2	shahid		Select a patient	Fail	
3			1. Please select a doctor 2. Please select a patient	Fail	
4	shahid	shahed2	Doctor assigned successfully	Fail	
Post-Condition: Doctor and patient will see with whom they are assigned					

CHAPTER 7

USER MANUAL

7.1 Login Page

Users will first interact with this page, where they have to put their credentials to authenticate them. Users will put their email and password into those fields to authenticate them.

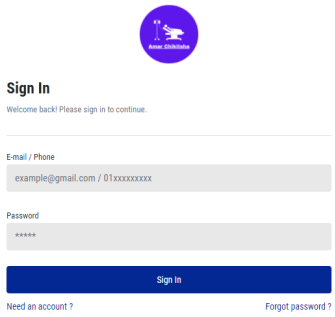

Figure 7.1.1 Login Page

7.2 Dashboard Page

This page is only restricted for system admin and hospital admin to see the hospital list. Here users will see all the lists of the hospital.

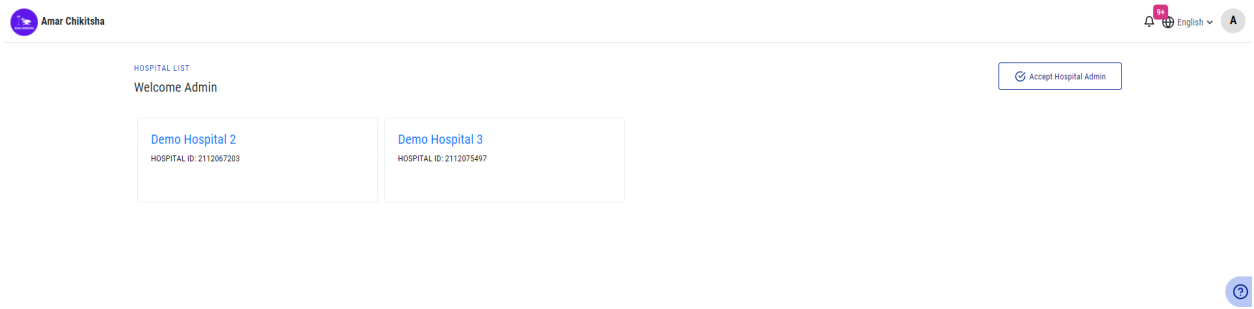

Figure 7.2.1 Dashboard Page

7.3 Unregistered hospital admin list

This page is only for system admin. He will approve the hospital admin by watching his details. The admin will click on the name to see their information, redirecting them to their profile page.

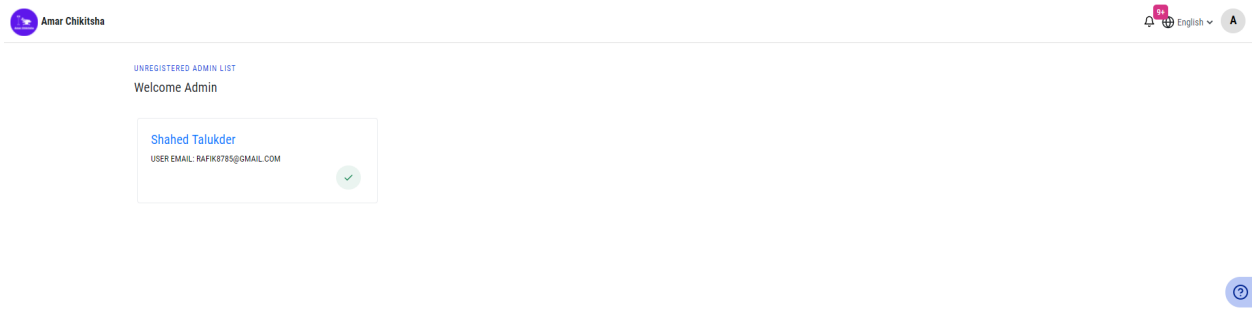

FIgure 7.3.1 Unregistered hospital admin list

7.4 Unapproved hospital list

This page is only for system admin. He will approve the hospital by watching the pertinent information. Here in this section, he/she will see hospital documents.

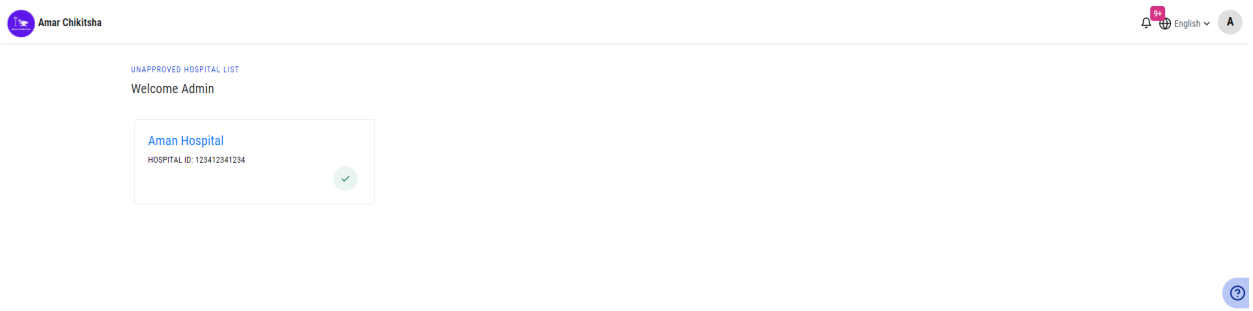

Figure 7.4.1 Unauthorized hospital list

7.5 Accounting Section

This section is only for accountants. He will see an overall calculation of a patient usage in a hospital here.

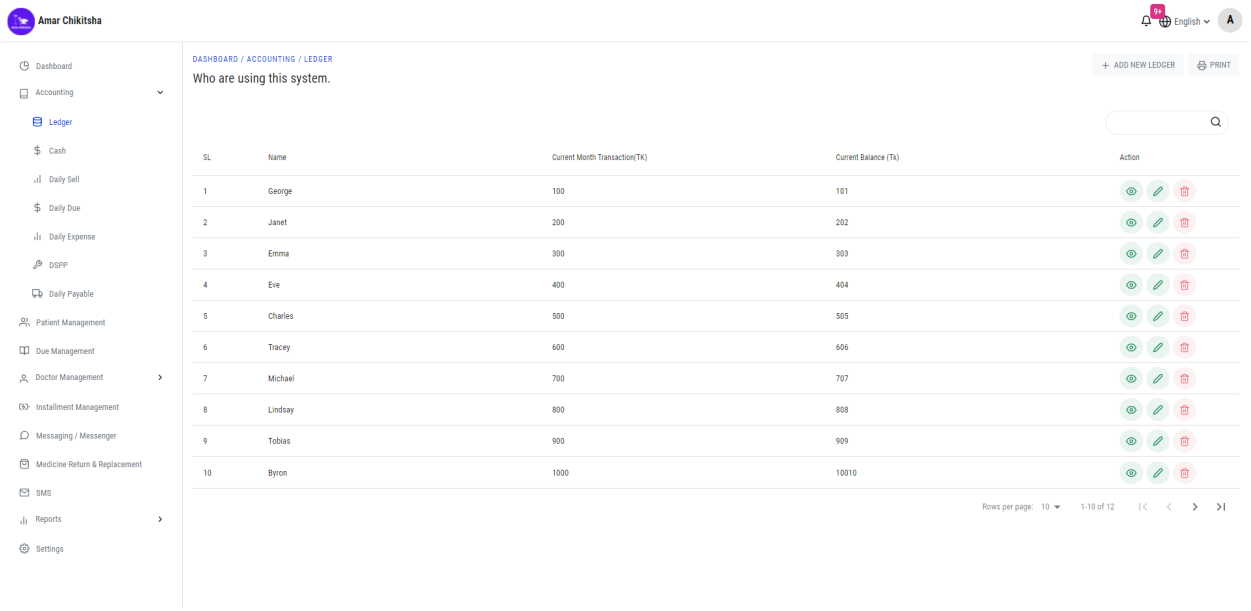

FIgure 7.5.1 Accounting Section

7.6 Doctor Management

Here in this section admin will manage doctors with these functionalities.

1. Attendance
2. Overtime calculation
3. Bonus calculation
4. Salary Calculation
5. Making attendance report

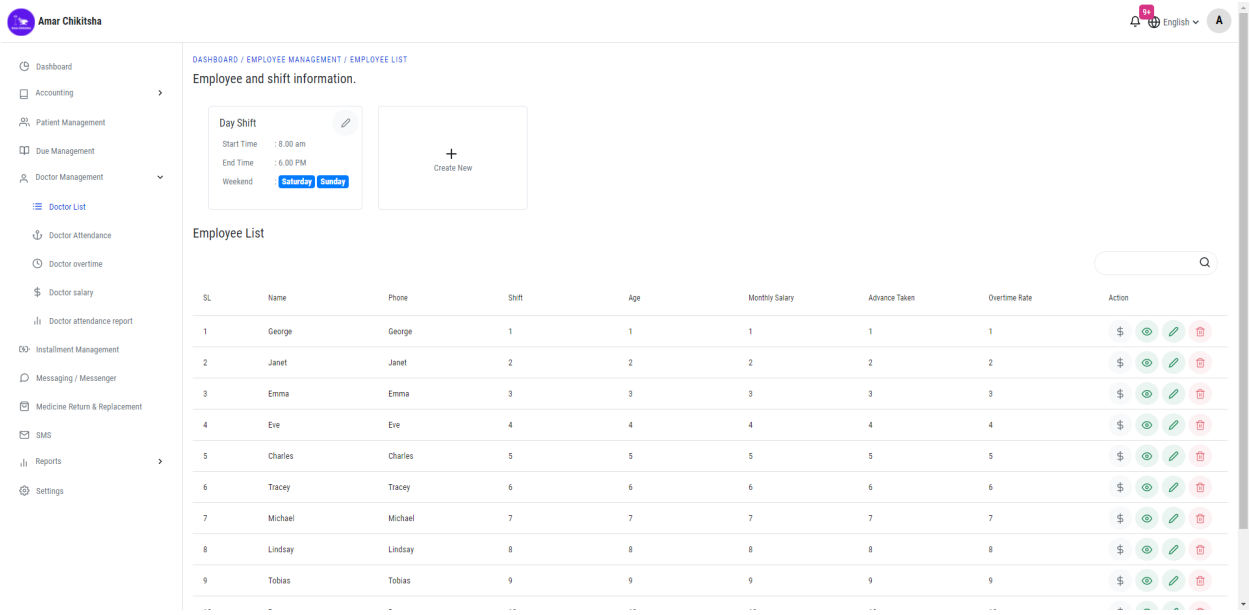

Figure 7.6.1 Doctor Management

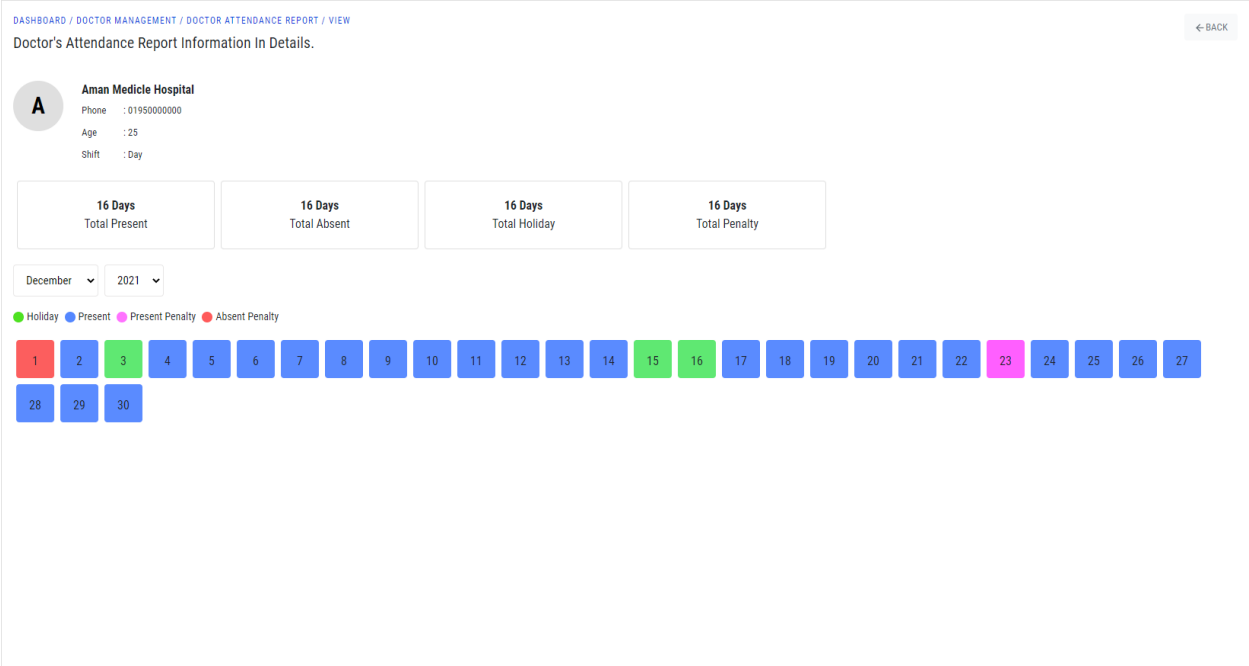

Figure 7.6.2 Doctor Management

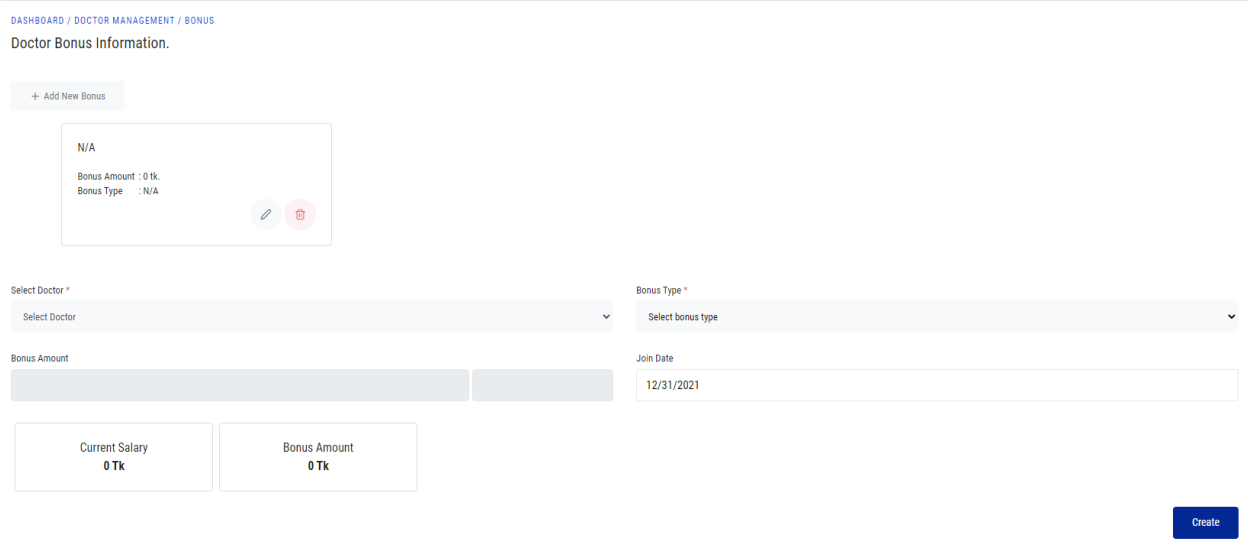

Figure 7.6.3 Doctor Management

7.7 Point of sell

This section is only for the pharmacist who will see his medicines.

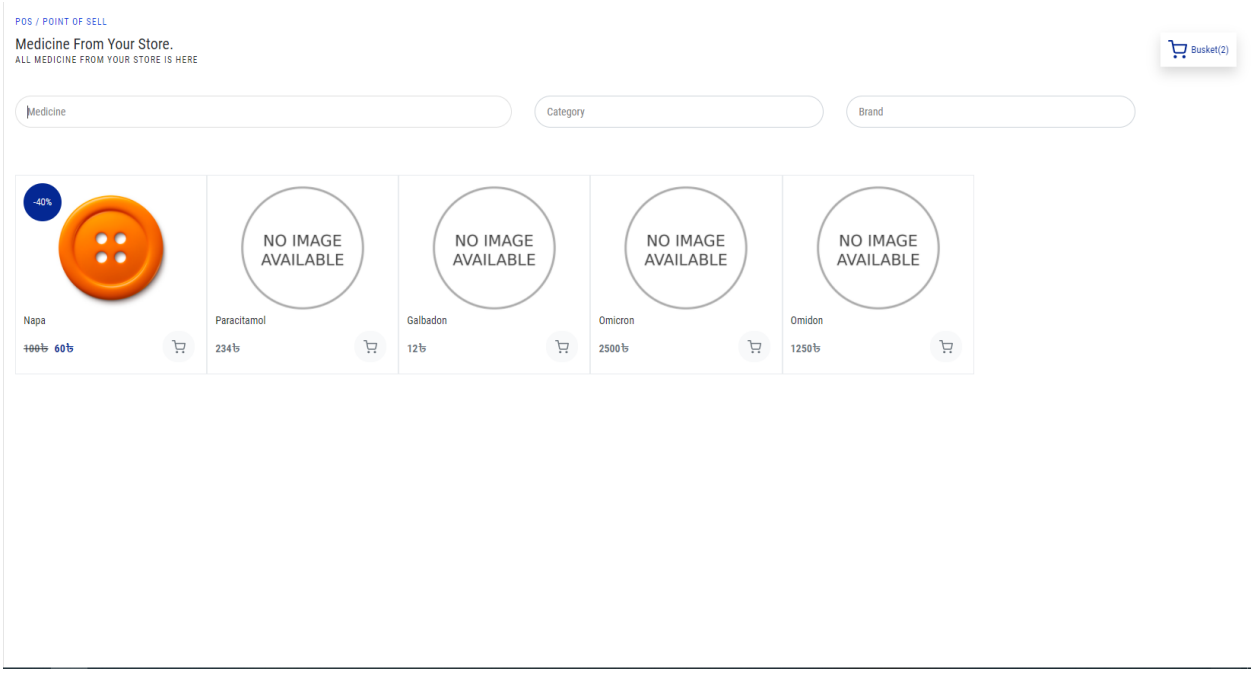

Figure 7.7.1 Point of sell

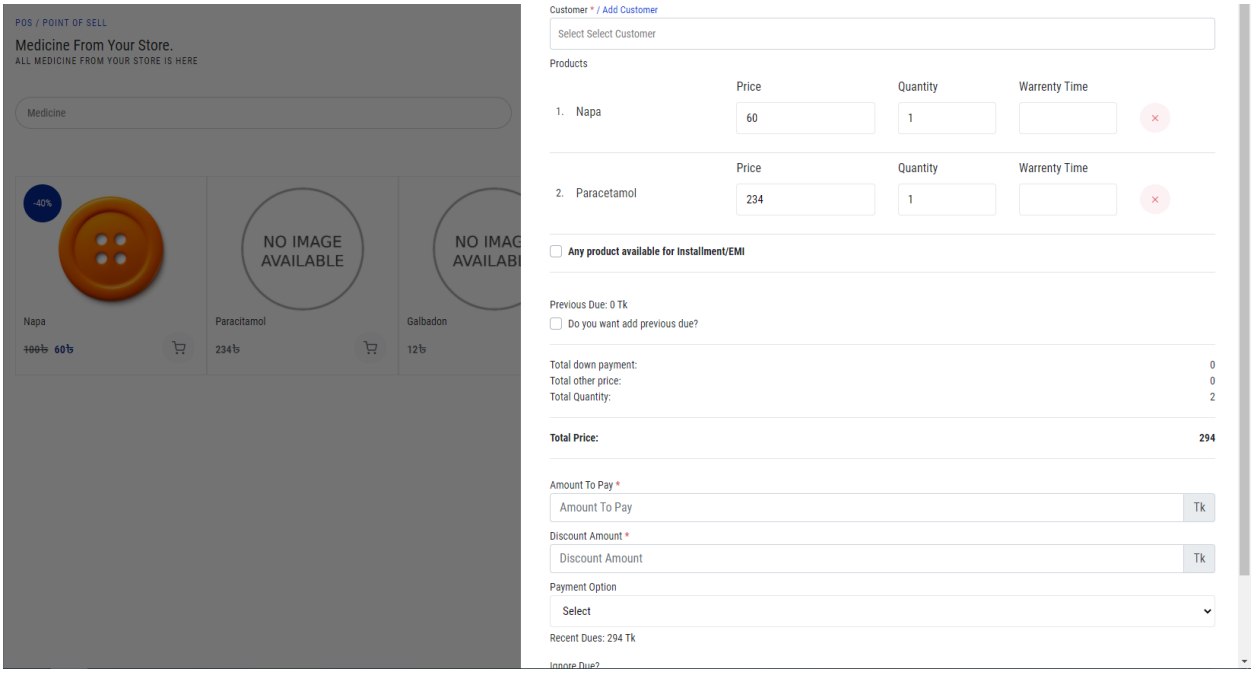

Figure 7.7.2 Point of sell

7.8 SMS Service For System Admin

A system admin will send other users to alert them of any news about the system.

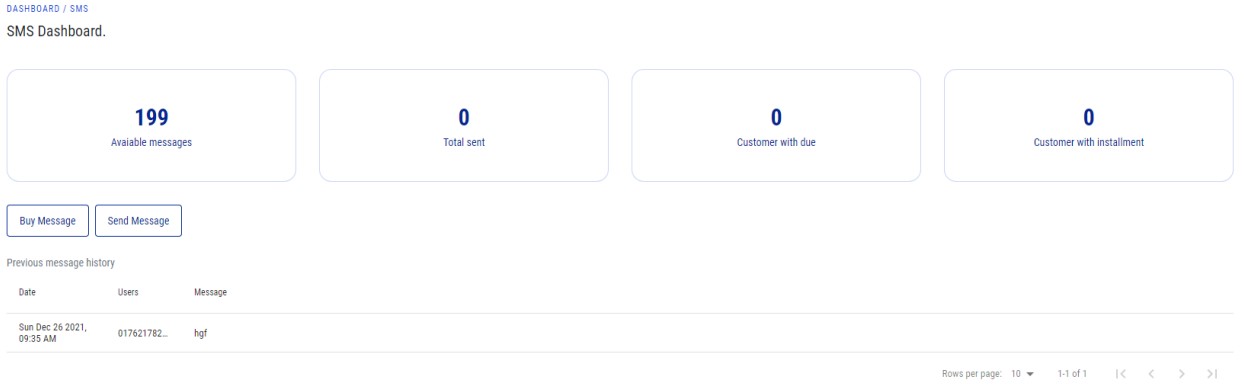

Figure 7.8.1 SMS Service for system admin

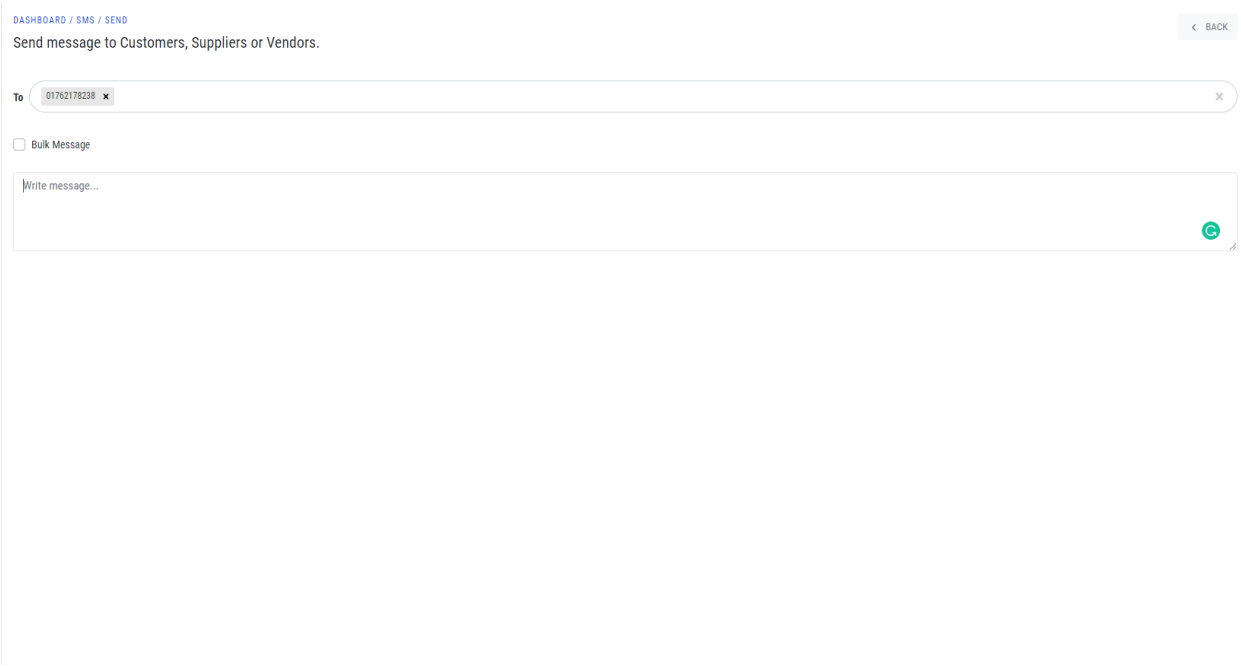

Figure 7.8.2 SMS Service for system admin

7.9 Notice Section

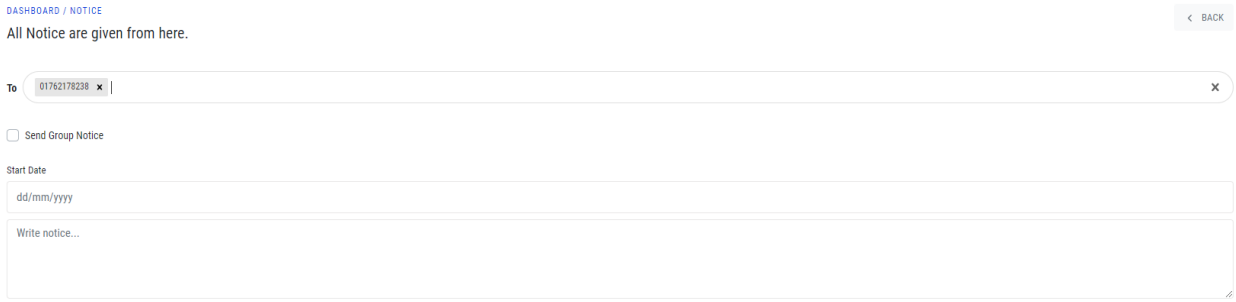

Figure 7.9.1 Notice Section

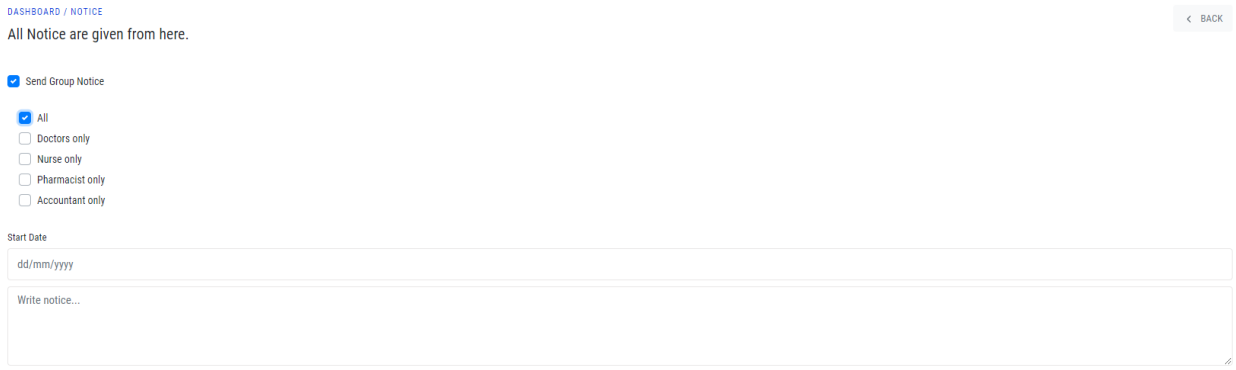

Figure 7.9.2 Notice Section

7.10 Settings Page

Only hospital authority(Hospital admin) will interact on this page.

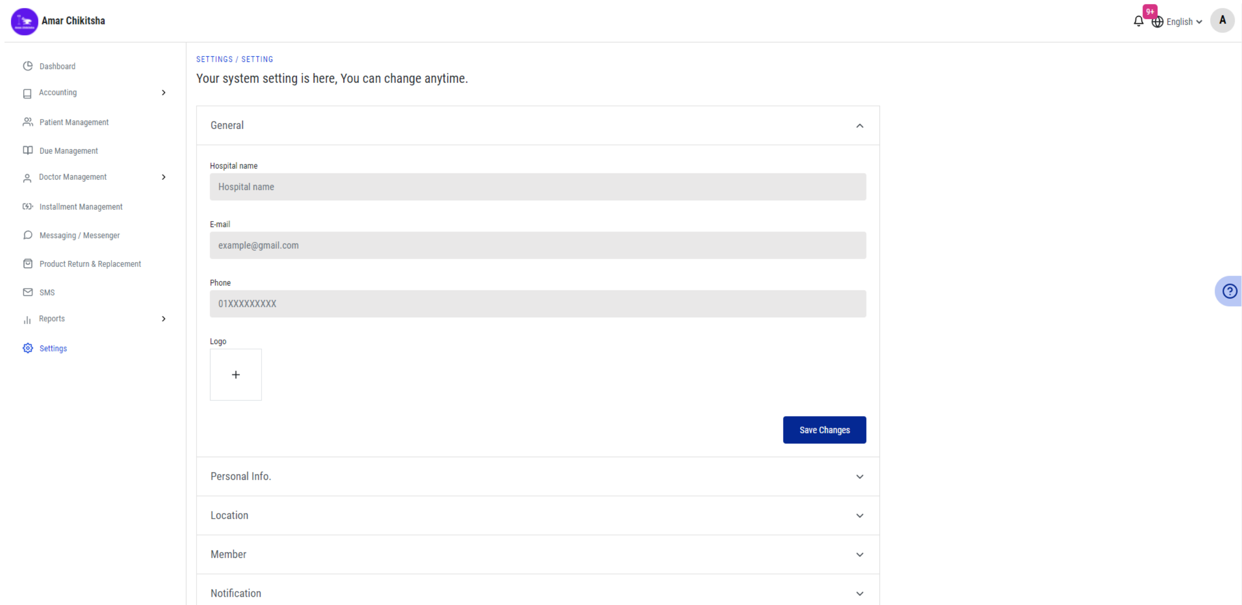

Figure 7.10.1 Setting Section

7.11 Message Page for Doctor & Patient

Here only doctor and patients will chat between them for online consultation.

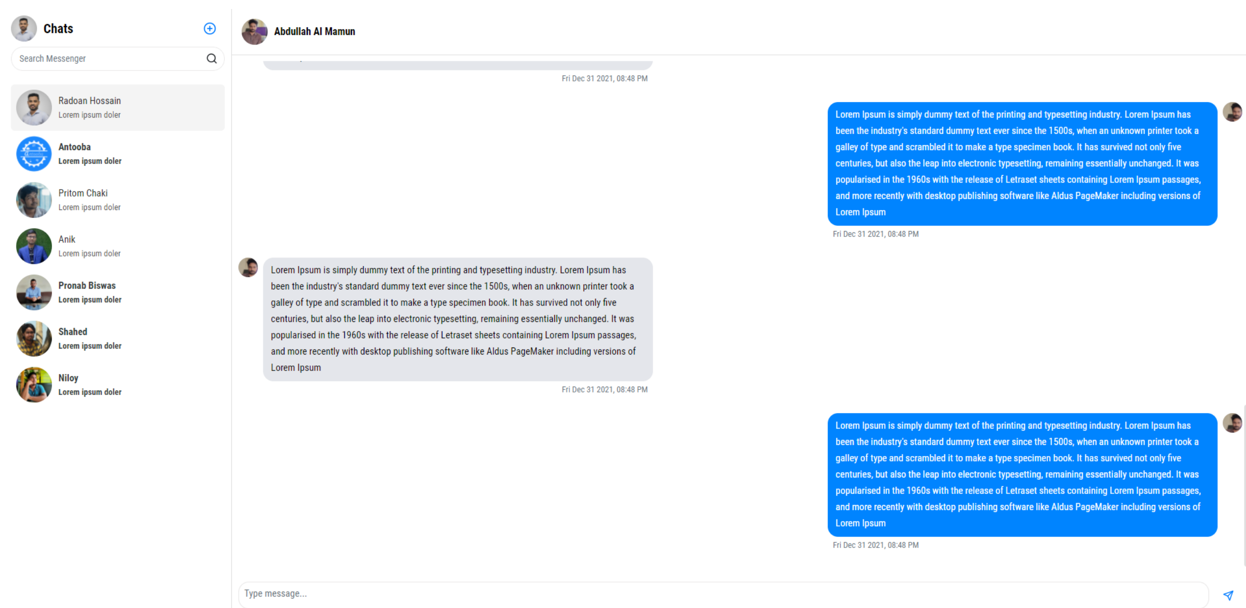

Figure 7.11.1 Message Page

CHAPTER 8

CONCLUSION

8.1 Discussion and Conclusion

The project **"Digital Sheba"** is for computerizing the working in a hospital. It is a significant improvement over the manual system. The computerization of the system has sped up the process in the current system. The front office managing is very slow. The hospital managing system was thoroughly checked and tested with dummy data and thus is very reliable. The software takes care of all the requirements of an average hospital and can provide easy and effective storage of information related to patients that come up to the hospital.

It generates test reports and provides the facility for searching the patient's details. It also provides a billing facility based on patients' status, whether indoor or outdoor. The system also provides the facility of backup as per the requirement.

8.2 Scope of Future Development

Though our requirements meet the entire thought of our objectives & motivation, there is some scope to improve the system & more accessible for the user—the further scope of developments in our future developments for this project.

Scope for further developments:

- Mobile Application: For extending portability, flexibility, and more time saving, the development of an application for mobile phones is a matter of time. Everyone wants a system in their hands for easy usability. This Mobile application will meet the desire.
- Adding Feature: The proposed system can be enhanced by including more facilities like a pharmacy system for the stock details of medicines in the pharmacy.

8.3 Obstacles and Achievements

As human beings, we face challenges in every step of our existence; however, as we are the most remarkable creation, we can adapt to the situation and overcome challenges. Perhaps, challenges permit us to prove ourselves. Obstacles, challenges, and overcoming challenges & limitations achievements draw a direction to success. Developers faced many problems and challenges working on it to develop a system. While developing this system, the author also has faced some problems and challenges. The challenges the author has faced:

Professionalism: As a junior developer, the author lacks professional experience. That is why this work does not consist of 100% professionalism.
Nevertheless, this project meets a grade solution able.
Technology Stacks: The author uses different technology stacks in the "Digital Sheba" project. React.js, React router, Bootstrap, Django-rest-Framework technologies are for front-end and back-end development. As a new developer, those were challenging for the author. Those are the primary technologies of this system.
UI/UX Design: Doing UI/UX design was challenging for the author. Because the author is new to this type of project, the author enjoys doing this design challenge because it helps the author become more efficient and creative.

Poor Workstation: Running the server continuously & developing the system consumes too much hardware. With the author's limited small resources, the author has to struggle. After six months of challenging work, the author overcame these issues, which are now effectively developed. All of the author system's components work perfectly. Nevertheless, working arduously for the last few months, the author has overcome nearly all challenges and the entire project to present. If the user feels convenient to use this system, this will be the most considerable achievement for the author.

Deployment: Deploying this project to a server was also a challengeable work for the author. Cause the concept of CI/CD pipeline, Docker, Github Action Integration, Nginx server setup, Media file handling, Static file handling, etc., was relatively new for him. Though it helps him make his new skills at this development section, he has many problems.

8.4 Github Link

- Back-end Repository: https://github.com/shahed-swe/digitalsheba_backend
- Front-end(Web): https://github.com/shahed-swe/digitalsheba_frontend
- Front-end(Mobile): https://github.com/shahed-swe/digital-sheba-patient-app

REFERENCES

1. Sura Abed Sarab, “Hospital Management System”,2019 Available, https://www.researchgate.net/publication/343149774_Hospital_Management_System[Accessed 23 June 2021]
2. Majed Hossam Oqaylan, Dr. Abdullah bajahzar, “Online Hospital Management System”Figure, Available https://m.mu.edu.sa/sites/default/files/content/2018/11/MAJD.pdf[Accessed 12 Auguast 2021]
3. Shahin Shooshtari, Shahram Tofighi, Shirin Abbasi, “Benefits, Barriers, and limitations on the use of Hospital Incident command system”, 2017, Available https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5393096/[Accessed 9th September 2021]