Web-Based - Medical Center Management System for Medcare Medical Center

By

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DECLARATION

I hereby certify that this project and the all the artifacts associated with it is my own work and it has not been submitted before nor is currently being submitted for any other degree program

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ABSTRACT

Digitization has been able to deliver superior efficiency over manual processes in most circumstances because to advancements in information technology. As a result, every company nowadays tries to use some form of technology in order to get an advantage.

Dr. Indunil Rupasinghe's medical center is also looking to use information technology to better its day-to-day operations, which are now done by hand. These manual activities have resulted in a variety of inefficiencies that have hampered the organization's performance.

They will be able to attain better efficiency using the technology presented by this project. This would also enable them to provide better service to their customers, ensuring high retention rates. Furthermore, the suggested system would provide them with useful information even throughout the decision-making process.

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CHAPTER 1

1 INTRODUCTION

This chapter outlines the introduction of the organization, nature of the business, the current business process and issues. Furthermore, it analyses the objectives and aims of the proposed system, scope and boundaries and the organization of the dissertation.

Outline of the chapter

1.1 Description about the organization and the business area chosen.

1.2 Business Process

1.3 Problem Definition

1.4 Aims and Objectives

1.5 Scope with clear boundaries

1.6 Organization of the dissertation

1.7 Summary of the chapter

1.1 Description about the organization and the business area chosen

Medicine became an important aspect of research as science and technology advanced. Medical science evolved into a totally new discipline of study over time. Medical institutions, research and development institutes, and medical colleges make up the health industry today. As a result, the health industry strives to provide the greatest medical care to the general public. Medcare is a medical center situated in Gampaha area. Dr. Indunil Rupasinghe is the owner of this medical center. They want to provide a better service while improving the quality of health services offered to patients and ensuring safe and timely integration of patients and doctors.

1.2 Business Process

At the moment they haven't any computer-based system. All the processes are done manually. According to the existing manual system, if a patient wants to get medicine, he/she can come to the medical center and get an appointment with a number from the receptionist's counter. After that he/she should wait in the lobby until his/her turns come to meet the doctor.

Then after meeting the doctor, the doctor issue the medical prescription to that relevant patient. Then the patient should hand it over to the pharmacist's counter. Then the pharmacist can issue medicine. When a patient wants to check, a blood or urine sample patient meet the nurse and the nurse collect it. The nurse records it on a manual file-based system. Finally, nurse sends all collected samples to the laboratory. After receiving the reports, they issue it to the patient.

Medcare Medical Center is currently using a manual and file base system to enter and store their data like patient's details, appointments, lab reports etc.

1.3 Problem Definition

As mentioned before Medcare Medical Center is currently using a manual and file base system to enter and store their data. When handling those processes manually it becomes more complicated.

- Patient can't book an appointment remotely.

  - According to the existing manual system, if a patient wants to book an appointment, he, or she should come to the medical center. They are willing to get a distance system to booking appointment process.

- Updating past records becomes difficult.
- All the data are stored and handled manually.

- Hard to find the past medical history of a patient - If the doctor needs to see some past medical history of a patient when treating, the doctor always needs to ask the patient about details of past medical history. Because patient details are not saved properly.
- All the employees at the medical center can access these data.
- Human errors.
- Poor drug Inventory managed- They are willing to maintain a computerized drug inventory management system.
- Problems when collecting and managing samples and lab reports.

1.4 Aims and Objectives

The proposed Medical Center Information System is intended to manage and update the current process of the medical center. The system will provide access to the relevant users to create, retrieve, update, and delete the information within their access area.

An online booking appointment process is a major requirement, they willing to get from the new system. Apart from that, they want to maintain a database for their patients to get in touch with patient details, specially to see theirs past medical history.

Apart from that doctor is willing to prescription creating and editing through the computer system and as they mentioned the pharmacist should have access to see the prescription of relevant patients and issue medicine with printed prescriptions. Furthermore, hoping to manage financial transactions such as salary balances, determining charges fees, etc. As specified by MedCare Medical Centre, the project focuses on the automation of operations related to the management process. When providing laboratory services, we are hoping to use computerize databases to manage that process in a proper manner.

This Information System is developing intending to enhance Medical Outcomes, Quality of Care, and Morbidity, Medical Errors, and Cost. The healthcare industry

constantly produces data. This information system helps gather, compile, and analyze health data to help manage patients' health and reduce healthcare costs. Then the management can improve patient care.

1.5 Scope with clear boundaries

The proposed system will cover medical center management processes. It will computerize the booking system and other administration activities presently carried out by the Doctors, patients, nurses, pharmacists, and receptionist. I am hoping to develop a webbased Management System for MedCare Medical Center in order to improve the efficiency, effectiveness, and accuracy of its operations. Here the database will store patient details, appointment details, doctor details, receptionist details, nurse details, lab report details, and drug inventory details. The application will be designed so that patient, receptionists, doctors, nurses, and pharmacists can use and manage it. There will be five different levels of access to the system: patient, receptionist, doctor, nurse, and pharmacist. To ensure data security, the system will ask for a username and password for each login. The proposed Medical Center Information System is intended to manage and update the current process of the medical center. The system will provide access to the relevant users to create, retrieve, update, and delete the information within their access area.

1.6 Organization of the dissertation

This section will cover a briefing of the contents of this report.

Chapter 1– Introduction

Chapter 1 introduces the origin and the concept of the project and the need of a system to facilitate the process. And it gives a brief description about the existing system and the problems identified in it. Finally, the chapter is concluded with a description of aims and objectives to be met in the proposed system.

Chapter 2 – System analysis

Chapter 2 mainly covers the requirement analysis of the system. It deeply analyzes the existing system and represent it using use case and activity diagrams. And, a complete system requirement specification and possible business options are provided in this chapter.

Chapter 3 – System design

System designing chapter is all about designing the system. This is the continuation of the project after the requirement analysis and specification. And also, this chapter will describe the functionality of the designing system using different diagrams. By the end of the chapter, database design will show the tables which will be used in the system

Chapter 4 – Conclusion

This chapter will summarize the report and provide a conclusion to the report. This also explains the theories used practically for this project

1.7 Summary of the chapter

This chapter provides a description of the organization as well as an explanation of the current procedure to the report's reader. In this chapter, the flaws in the current procedure are identified. Finally, the prospective system's goals and objectives, as well as the extent of the project that can overcome those restrictions, are discussed.

CHAPTER 2

2 SYSTEM ANALYSIS

This chapter mainly focuses on the critical analysis of the existing business process. By using the object-oriented modelling techniques, the chapter depicts a sequence of diagrams which goes deeper into the existing process. This chapter will also cover the requirement analysis of the system. Furthermore, it shows what are the business system options of the project and which BSO is the option to design the system.

Outline of the chapter

2.1 Requirements Analysis

In order to analyse requirements first the information regarding the requirements should be gathered using means like interviews, discussions etc. Information for the

requirements of the project could be collected through interviews done with the doctors, pharmacists, nurses, and the receptionist of the medical center.

2.2 Use case diagram for the current business process

The overall use case diagram for the existing system is displayed in the Figure 1 that includes the business operations focused in the medcaere medical center. The main actors of the system are receptionist, doctor, nurse, and pharmacist.

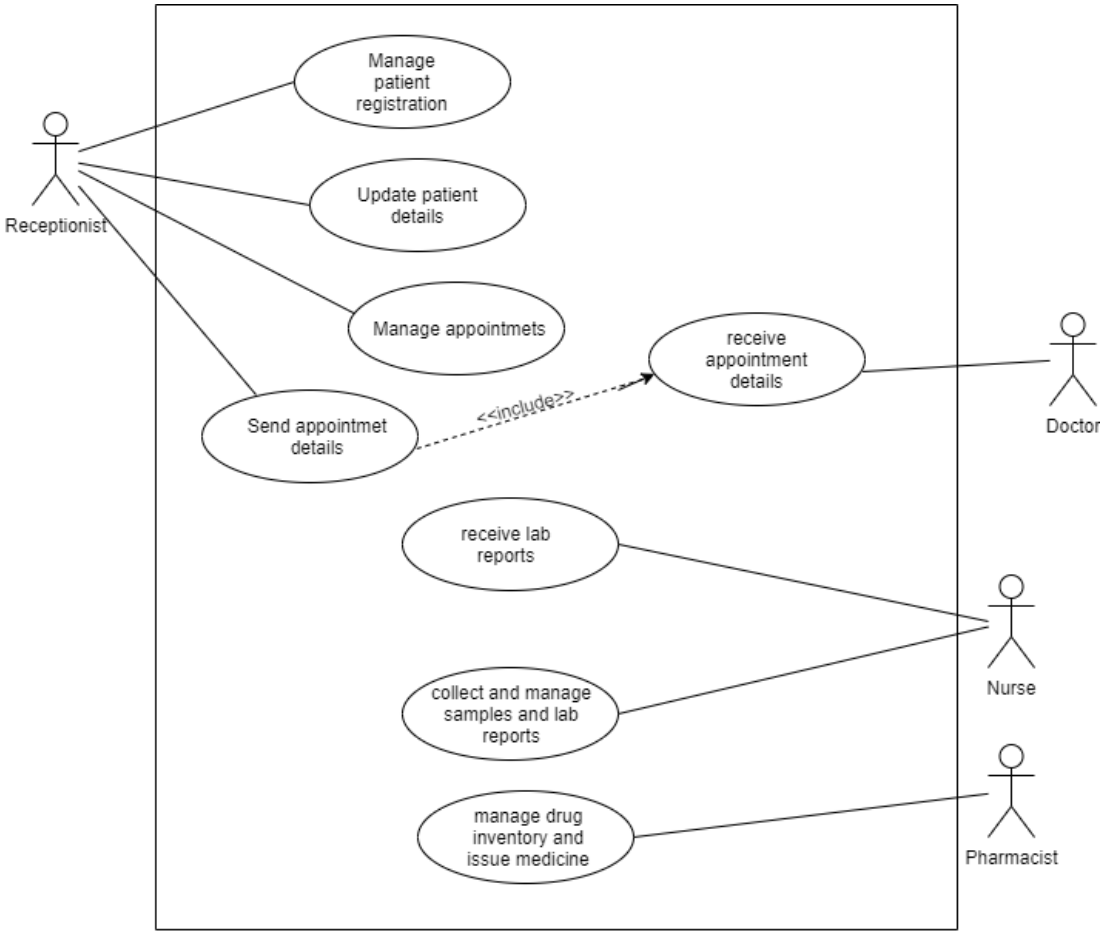

Figure 1 Use case diagram for the current business process

2.3 Use case descriptions for the current business process

2.3.1 Use case descriptions for patient registration

Table 1 Use case description for patient registration

Use case :	Patient registration
Short description:	Patient can go to receptionist counter and register
Precondition:	The patient has a requirement of medical care.
Postcondition:	After registration patient have a patient ID
Actors:	Receptionist, Patient
Standard process:	i. Patient tells details to receptionist ii. Receptionist recorded these details and give a patient Id.
Alternative processes:	-

2.3.2 Use case descriptions for update patient details

Table 2 Use case descriptions for update patient details

Use case :	Update patient details
Short description:	Receptionist can update patient details
Precondition:	New details received by receptionist
Postcondition:	Patient details are now up to date details
Actors:	Receptionist

Standard process:	i. New details received by receptionist (e.g.: patient's new weight) ii. Receptionist includes those new details.
Alternative processes:	-

2.3.3 Use case descriptions for manage appointments

Table 3 Use case descriptions for manage appointments

Use case :	Manage appointments
Short description:	Manage doctor appointments
Precondition:	Receiving an appointment
Postcondition:	Book the appointment
Actors:	Receptionist, doctor
Standard process:	i. Patient books appointments ii. Receptionist issue appointment numbers and record about it iii. Receptionist sends appointment details to doctor
Alternative processes:	-

2.3.4 Use case descriptions for manage samples and lab reports

Table 4 Use case descriptions for manage samples and lab reports

Use case :	Manage samples and lab reports
Short description:	Nurse mange samples and lab reports
Precondition:	Collect the vials with samples
Postcondition:	Receive reports from laboratory
Actors:	Nurse, Patient
Standard process:	i. Patient asks for sample vials ii. Issue the vials iii. Receive the vials with samples by nurse iv. Record its details
Alternative processes:	Patient can check samples by directly go to another laboratory and bring the report.

2.3.5 Use case descriptions for issue medicine

Table 5 Use case descriptions for issue medicine

Use case :	Issue medicine
Short description:	Issue medicine by pharmacist
Precondition:	Receive the prescription from patient
Postcondition:	Issue the medicine
Actors:	pharmacist

Standard process:	i. Receive the prescription from patient ii. Issue medicine and get payment

2.4 Activity diagrams for the current business process

The activity diagrams that illustrate the flow of the process regarding the major use cases are displayed below.

2.4.1 Activity diagram for register or update patient details

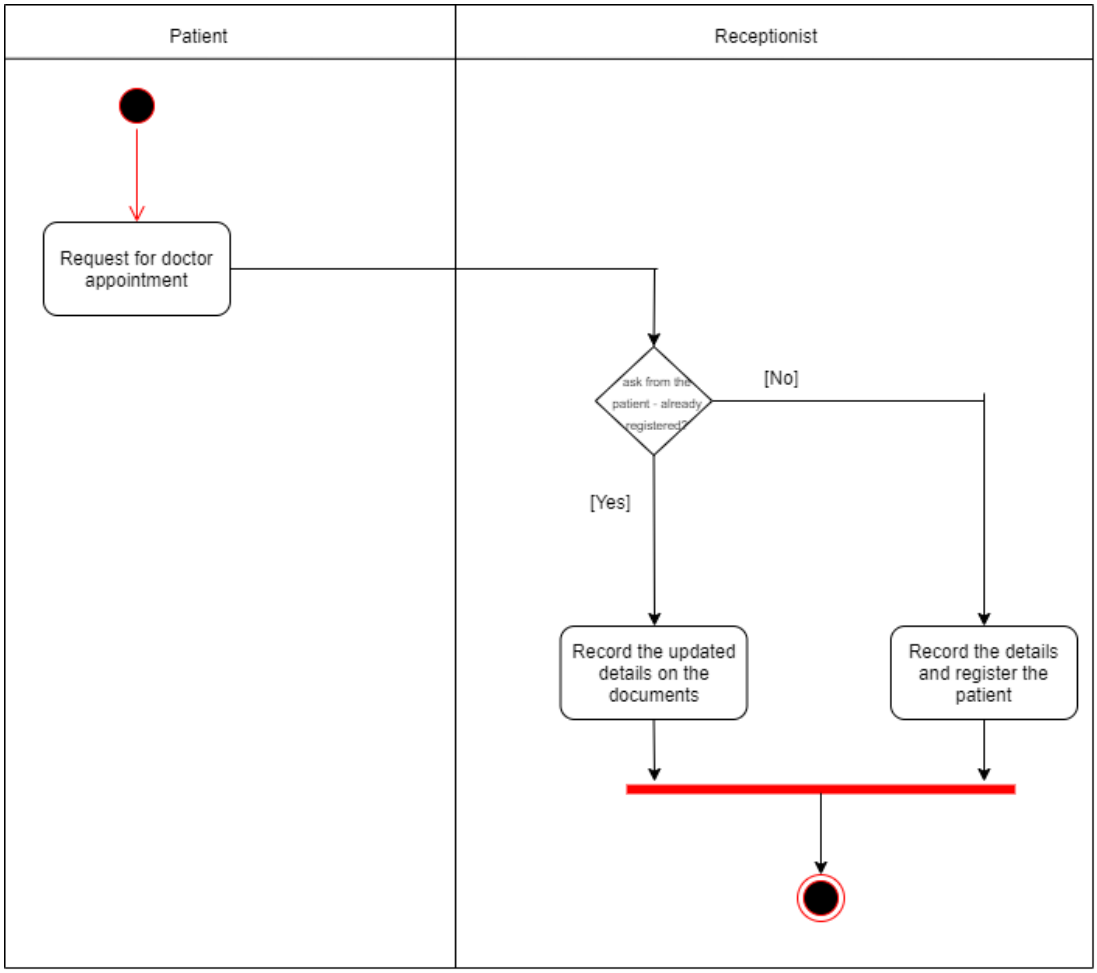

Figure 2 Activity diagram for register or update patient details

2.4.2 Activity diagram for managing appointments

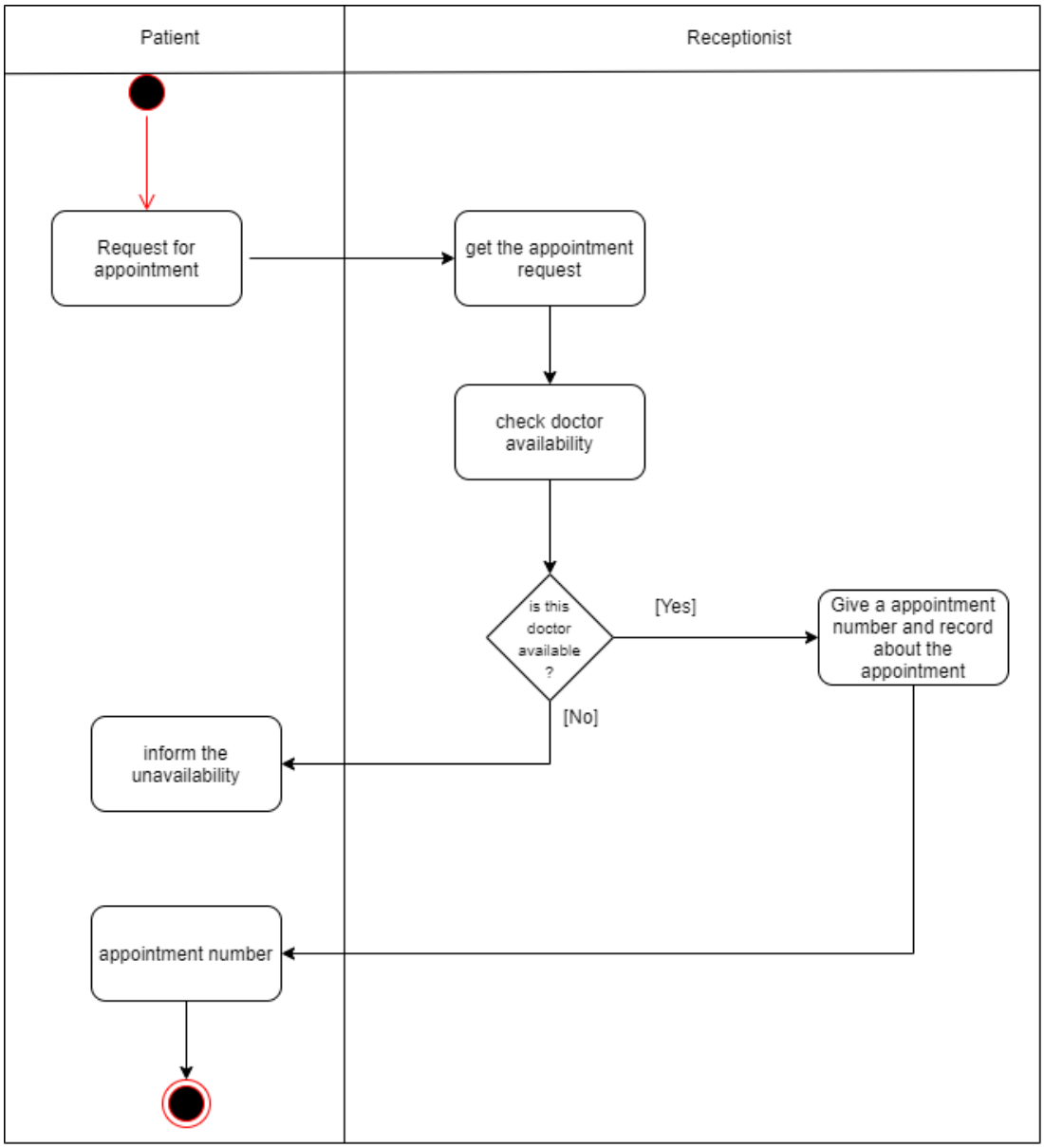

Figure 3 Activity diagram for managing appointments

2.4.3 Activity diagram for issue medicine

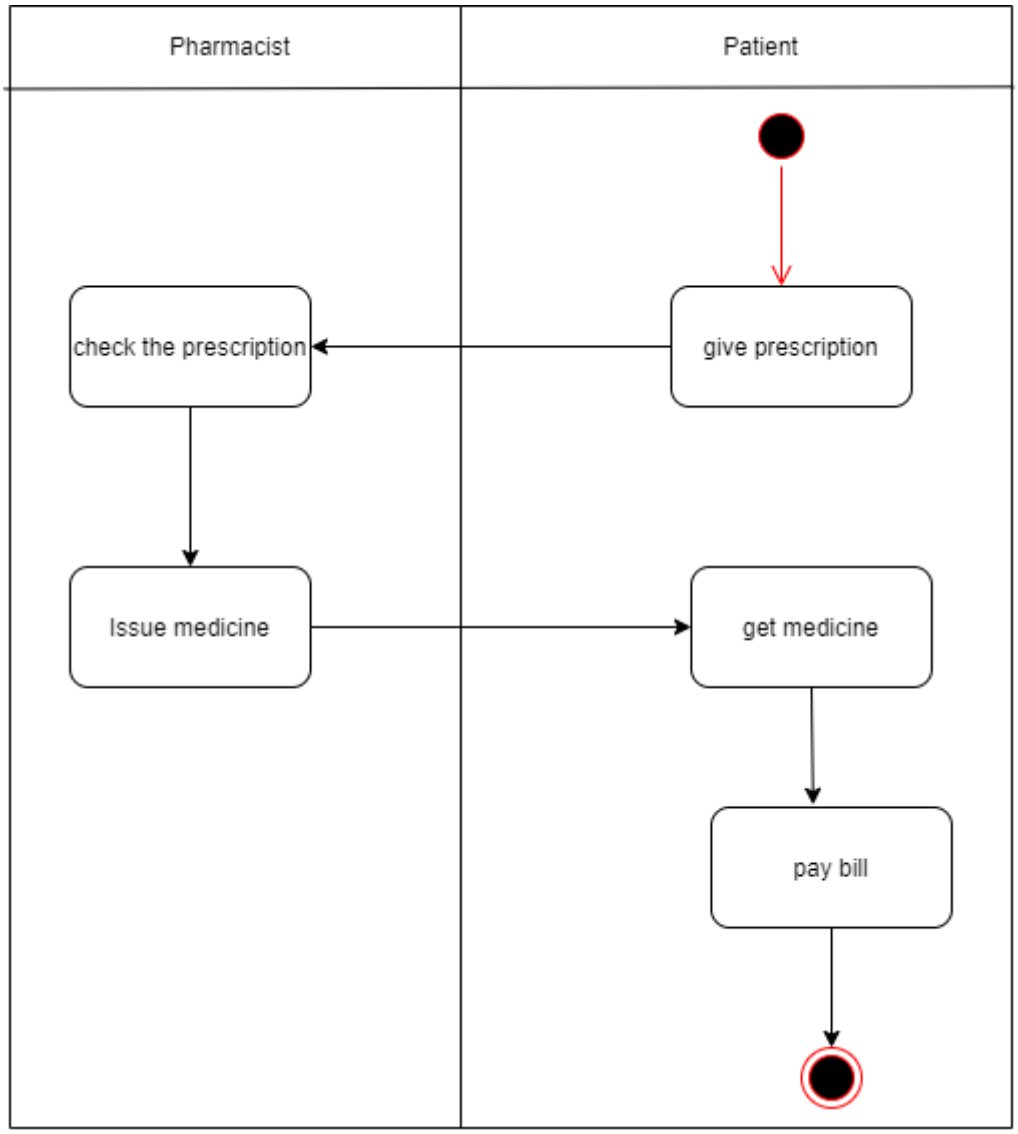

Figure 4 Activity diagram for issue medicine

2.4.4 Activity diagram for collect samples

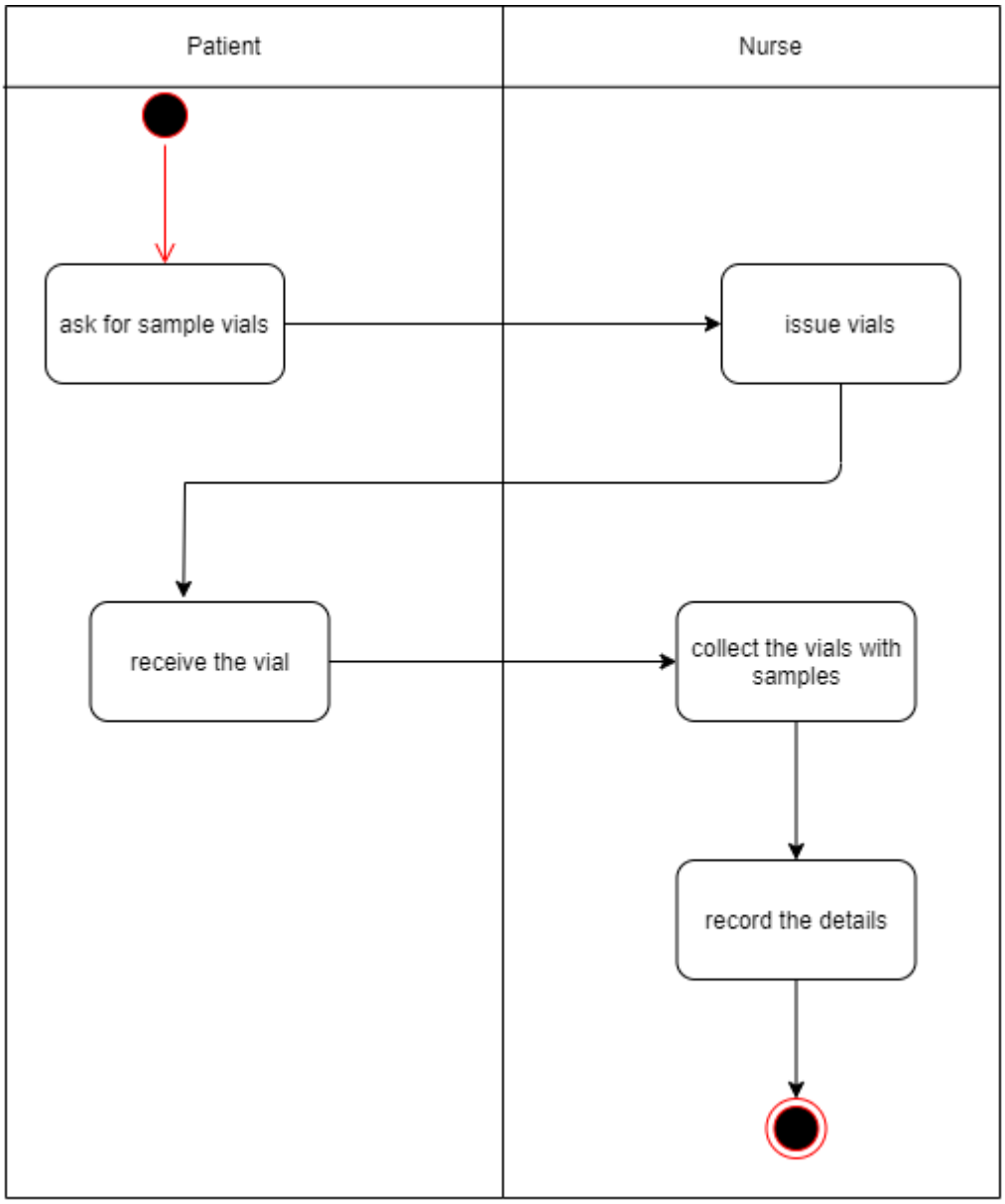

Figure 5 Activity diagram for collect samples

2.4.5 Activity diagram for issue lab reports

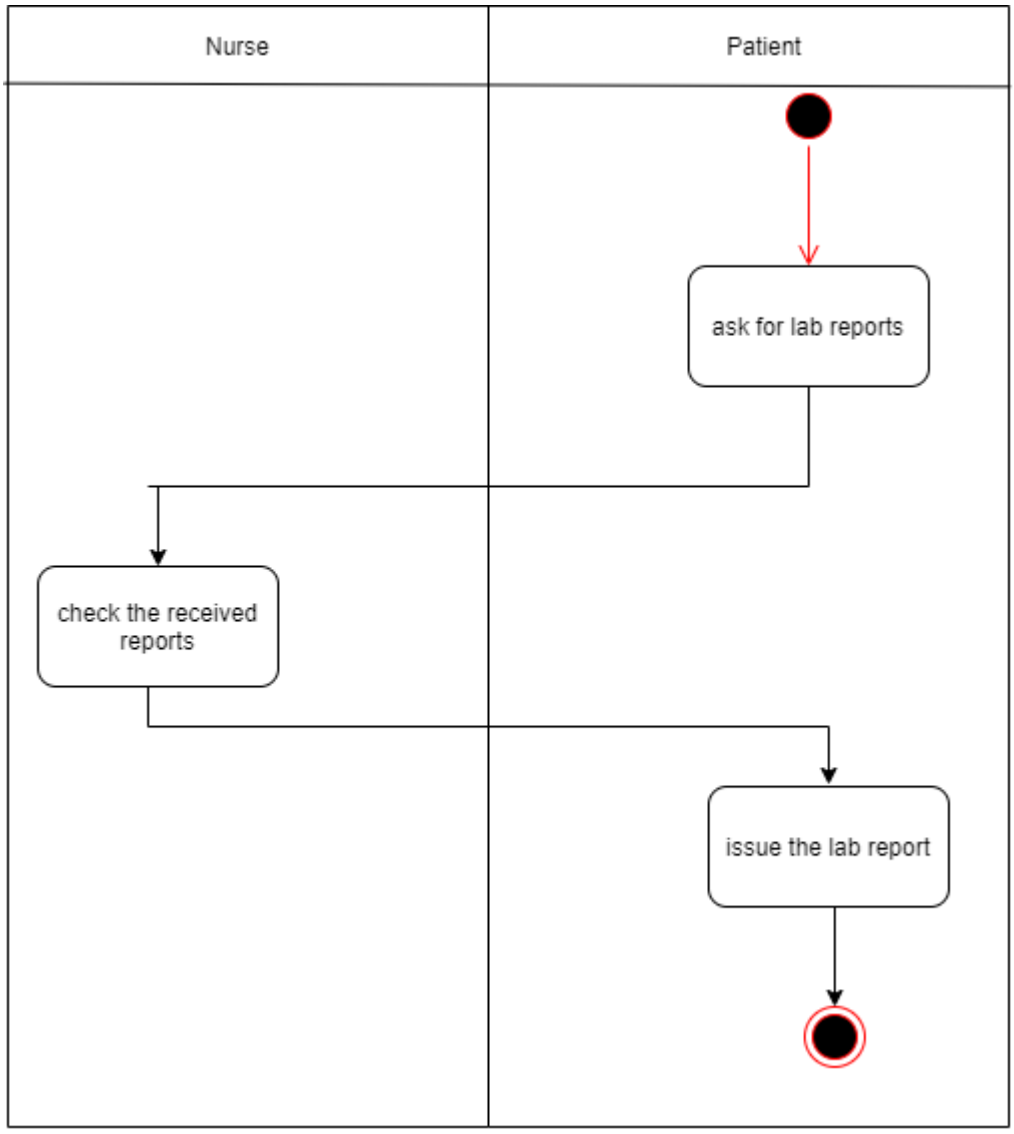

Figure 6 Activity diagram for issue lab reports

2.5 Activities to be computerized

Activities of the existing system that are recognized to be computerized in the proposed system to increase the efficiency of the business process are elaborated as below.

2.5.1 Patient registration process

2.5.2 Manage appointment process

2.5.3 Record and update patient details

2.5.4 Booking appointment process

2.5.5 Prescription creating and handling

2.5.6 Manage lab reports

2.5.7 Access to patients' past medical history and lab reports

2.6 Requirements Catalogue

2.6.1 Requirements identification

2.6.1.1 User Story list

User stories are used to explain the description of a software feature from an end user perspective. User story contains the type of the user, what user want and why.

Table 6 User stories

User Story ID	**User Story**
US-1	As a patient, I want to register to the Medical Centre via receptionist.
US-2	As a patient, I want to make appointment through receptionist.
US-3	As a patient, I want to buy medicine from the pharmacy in the medical center.
US-4	As a patient I want to do payments online.
US-5	As a patient, I want to make appointment via web portal.

US-6	As a receptionist, I want to log in to the system.
US-7	As a receptionist I want to register the patients in their first appointment and enter their personal details to the system with providing a patient id.
US-8	As a receptionist I want to update the patient's details and consultant's details if there is any change
US-9	As a doctor I want to login to the system
US-10	As a doctor I want to go to patient profile and look at patient's medical history
US-11	As a doctor I want to send prescription to the pharmacists and issue the prescription to patients.
US-12	As a pharmacist I want to log in to the system.
US-13	As a pharmacist I want to receive the prescription consultant sent.
US-14	As a pharmacist I want to issue the payment receipt to the patient.
US-15	As a nurse I want to log in to the system.
US-16	As a nurse I want to collect and manage samples and lab reports.

2.6.2 System requirements specifications

System requirements analysis phase aims at providing a full description of the problem based on the concepts defined in the problem domain.

2.6.2.1 Functional Requirements

Table 7 Functional Requirements

Requirement		Priority H/M/L	M/O	Weight H/M/L
1. Shall be able to log into the system		H	M	M
	1.1. Shall be able to verify users through usernames and passwords	H	M	M
	1.2. Shall be able to reset password	H	M	M
2. Shall be able to manage patient records		H	M	H
	2.1. Shall be able to update details of the patient.	H	M	M
	2.2. Shall be able to add a new patient	H	M	M
	2.3. Shall be able to search patient records	H	M	M
	2.4. Shall be able to check patient's past medical history	H	M	M
3. Shall be able to generate invoices for patients		H	M	H
	3.1. Shall be able to include sales of drugs	H	M	H
	3.2. Shall be able to include consultation fees	H	M	H
4. Shall be able to manage lab reports		H	M	M
	4.1. Shall be able to include details of lab reports	H	M	M
	4.2. Shall be able to check lab reports status	H	M	M
5. Shall be able to manage doctor information		H	M	M
	5.1. Shall be able to add new doctors	H	M	M
	5.2.Shall be able to update doctor details	M	M	M
6. Shall be able to restrict accessing to the patient records related to the position.		H	M	H

2.6.2.2 Non-functional Requirements

Table 8 Non-Functional Requirements

Requirement	Priority H/M/L	M/O	Weight H/M/L
1. Shall be able to provide a web interface	H	M	H
2. Shall be able to provide user friendly GUIs	M	M	H
3. Shall be able to facilitate 24x7 availability	M	M	L
4. Shall be able to use a more accurate and efficient system.	M	M	M
5. Shall be able to establish the new system in a short period of time.	M	O	L
6. Shall be able to maintain the security of data (passwords, patient records etc.)	H	M	H
7. Should be able to connect with the finance section.	M	M	M

2.7 Business System Options (BSOs)

Business System Options (BSO) defines the scope of the current implementation and should satisfy the stake holder's requirements.

2.7.1 Business System Options Identification

BSO 1 - A web based medical center management system that satisfies all the requirements of the Business

BSO 2 - A web based medical center management system that satisfies all the essential requirements with connect finance section, including online transactions to management section to make one system.

BSO 3 - A web based medical center management system that satisfies all the compulsory requirements of the business and with inventory and lab report management

2.8 Evaluation of the BSOs

2.8.1 Functional Requirements vs BSOs

Table 9 Functional Requirements vs BSOs

Requirement		BSO1	BSO2	BSO3
1. Shall be able to log into the system		x	x	x
	1.1. Shall be able to verify users through usernames and passwords	x	x	x
	1.2. Shall be able to reset password	x	x	x
2. Shall be able to manage patient records		x	x	x
	2.1. Shall be able to update details of the patient.	x	x	x
	2.2. Shall be able to add a new patient	x	x	x
	2.3. Shall be able to search patient records	x	x	x
	2.4. Shall be able to check patient's past medical history	x	x	x
3. Shall be able to generate invoices for patients		x	x	x
	3.1. Shall be able to include sales of drugs	x	x	x
	3.2. Shall be able to include consultation fees	x	x	x
4. Shall be able to manage lab reports		x	x	x
	4.1. Shall be able to include details of lab reports	x	x	x
	4.2. Shall be able to check lab reports status	x	x	x
5. Shall be able to manage doctor information		x	x	x
	5.1. Shall be able to add new doctors	x	x	x

	5.2.Shall be able to update doctor details	x	x	x
6. Shall be able to restrict accessing to the patient records related to the position.		x	x	x
7. Should be able to connect with the finance section.		-	x	-
8. Shall be able to do payments online		-	x	-

2.8.2 Non-functional Requirements vs BSOs

Table 10 Non-functional Requirements vs BSOs

Requirement	BSO1	BSO2	BSO3
1. Shall be able to provide a web interface	x	x	x
2. Shall be able to provide user friendly GUIs	x	x	x
3. Shall be able to facilitate 24x7 availability	x	x	x
4. Shall be able to use a more accurate and efficient system.	x	x	x
5. Shall be able to establish the new system in a short period of time.	x	x	x
6. Shall be able to maintain the security of data (passwords, patient records etc.)	x	x	x

2.8.3 BSO Cost analysis

Approximate Development Cost

Table 11 BSO Cost analysis

Cost	BSO1	BSO2	BSO3
Development cost	2000	3000	1000

Deployment cost - Domain purchase cost - Hosting cost	5000 13000	5000 13000	5000 13000
Maintenance cost - Hosting cost for monthly - Database maintaining cost for monthly	4000 14000	5500 27000	4000 16000

2.8.4 Selected BSO Justification

The BSO3 is chosen for this Web Based Medical Centre Management system because it can best meet the needs of the client. This BSO facilitates all of the client's key requirements while also addressing some of the nice-to-have features. This BSO can perform fundamental business operations while also giving features that will improve the efficiency of the processes. At the same time, it remains in the moderate-cost regions, where the benefits outweigh the expenditures.

2.9 Summary of the chapter

The current business process is examined in this chapter. To give a system analysis, it starts with a use case diagram and then moves on to use case descriptions and activity diagrams. The system requirement specifications come next, followed by the final product. To wrap up the chapter, there are a few possibilities for business systems.

CHAPTER 3

3 SYSTEM DESIGN

This chapter focuses on the system's System Design. It concerns the project's continuation following the requirement analysis and definition. With the diagrams utilized, it will provide a clearer understanding of the system's behaviors and interactions. To show the functionality, entities, and their relationships, one diagram will lead to another. Database design will reveal the tables that will be used in the system by the end of the chapter.

Outline of the chapter

3.1 Use case diagrams for Proposed System

A use case is a logical representation of a system's functionality. They are used to collect a system's requirements, encompassing both internal and external influences. The majority of these requirements are design-related. When a system's functionalities are assessed, use cases are created, and actors are identified. This is critical since the project management system's next phase is system design. Use case diagrams are made up of various use cases as well as the system's actors. The many tasks that users will

perform to interact with the system are referred to as use cases. Users who interact with the system are known as actors.

3.1.1 Overall use case diagram for the Proposed System

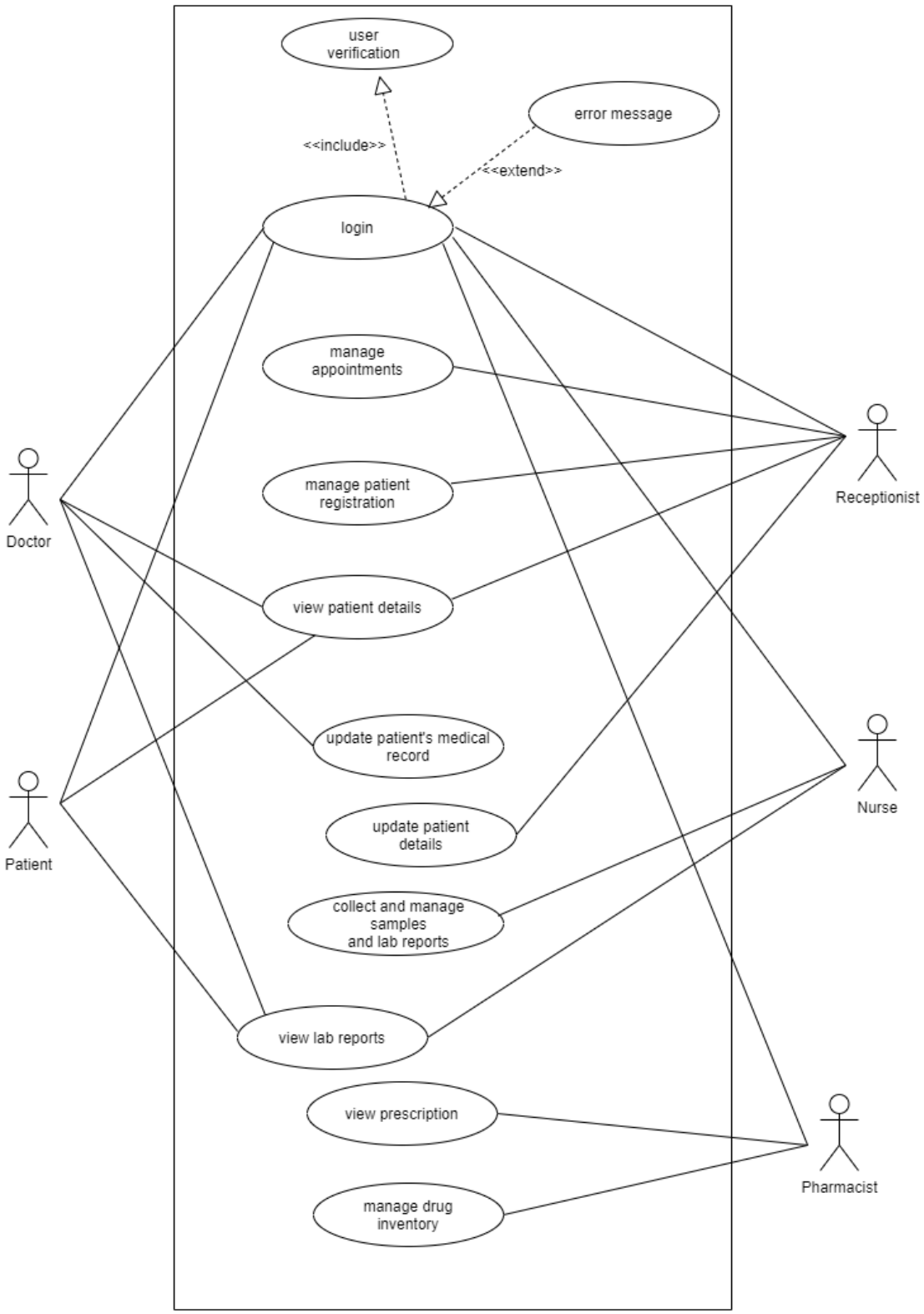

Figure 7 Overall use case diagram for the Proposed System

3.2 Use case descriptions for Proposed System

3.2.1 Use case description for Login

Table 12 Use case description for Login

Use case:	Login to the system
Short description:	Doctor, Patient, Receptionist, Nurse and Pharmacist can login to the system by using their username and password
Precondition:	Doctor, Patient, Receptionist, Nurse and Pharmacist must authorize in the system
Postcondition:	Doctor, Receptionist, Staff Manager and Pharmacist logged in to the system
Error situation:	The username or password is invalid
System state in the event of an error:	An unauthorized access
Actors:	Doctor, Receptionist, Nurse, Patient and Pharmacist
Trigger:	A user needs to login want to login
Standard process:	i. User elects an account ii. Enter username iii. Enter Password iv. Click login button
Alternative processes:	-
Exception :	Invalid username or password

3.2.2 Use case description for patient registration

Table 13 Use case description for patient registration

Use case:	Patient registration

Short description:	Receptionist can register patient
Precondition:	Patient gives their details to receptionist
Postcondition:	Receptionist adds data to the data base
Actors:	Receptionist
Trigger:	Patent wants to register
Standard process:	i. Receptionist select add new patient ii. Receptionist adds patent's data to the system iii. Patient gets their patient id
Alternative processes:	-

3.2.3 Use case description for Manage appointments

Table 14 Use case description for Manage appointments

Use case:	Manage appointments
Short description:	The receptionist involves in the appointment booking process between doctor and patient.
Precondition:	Receptionist checks availability of doctors
Postcondition:	Receptionist creates the appointment
Actors:	Receptionist Patient
Trigger:	Patient requires a doctor appointment
Standard process:	i. Receptionist checks availability of doctors

	ii. Receptionist creates the appointment iii. Receptionist gives an appointment number
Alternative processes:	Patient can book appointment through web portal.

3.2.4 Use case description for view patient details

Table 15 Use case description for view patient details

Use case:	View patient details
Short description:	The receptionist, patient and doctor have access to view patient details.
Precondition:	Request to view patient details
Postcondition:	System gets the details form the database
Actors:	Receptionist, Patient, doctor
Standard process:	i. Enter required patient id ii. System displays patient details
Alternative processes:	-

3.2.5 Use case description for update medical records

Table 16 Use case description for update medical records

Use case:	Update medical records
Short description:	The doctor updates the patient's medical record and also prescription.

Precondition:	Patient gets treated by doctor
Postcondition:	doctor gives prescripts
Actors:	Doctor
Standard process:	Updating the past medical history of patient
Alternative processes:	-

3.2.6 Use case description for update patient details

Table 17 Use case description for update patient details

Use case:	Update patient details
Short description:	Receptionist updates some patient's details
Precondition:	Receptionist gets new details form patient
Postcondition:	Receptionist updates the database
Actors:	Receptionist
Standard process:	i. Receptionist selects the related patient id ii. Input new details which got from patient
Alternative processes:	-

3.2.7 Use case description for view prescription and manage drug inventory

Table 18 Use case description for view prescription and manage drug inventory

Use case:	View prescription and manage drug inventory
Short description:	Pharmacist can manage drug inventory and has access to view prescription
Precondition:	Request to view prescription
Postcondition:	Update inventory
Actors:	Pharmacist
Standard process:	i. Pharmacist checks the prescription and issue medicine ii. Pharmacist updates drug inventory
Alternative processes:	-

3.2.8 Use case description for manage samples and lab reports

Table 19 Use case description for manage samples and lab reports

Use case:	manage samples and lab reports
Short description:	Nurse collects and manage samples and drug reports
Precondition:	Request to vials to give samples Request to collect reports.
Postcondition:	Update database by receptionist
Actors:	Nurse
Standard process:	i. Patient hand over samples ii. Nurse collects samples and record it iii. Reports are collected by nurse

	iv. Update system v. Handover reports

3.2.9 Use case description for view lab reports

Table 20 Use case description for view lab reports

Use case:	View lab reports
Short description:	Nurse and relevant patient have access to see lab reports
Precondition:	Nurse should have uploaded lab reports to the system
Postcondition:	Under the relevant patient's profile, they can see their reports.
Actors:	Nurse Patient
Trigger:	Patient needs to view reports.
Standard process:	i. Patient or Nurse login to the system. ii. Enter the relevant patient id and see the reports.

3.3 Activity diagrams to describe the functionality of the Use-Cases

Activity diagrams logically represent a task represented by a use case. This aids in the design of the system's functions, as well as the decision-making process. The activities from the primary functionality, as well as the people who are active in certain activities, are displayed in this area via separate lane. Furthermore, the parallel actions, pre-conditions, and post-conditions of each activity are explained in these diagrams.

3.3.1 Activity Diagram for Login

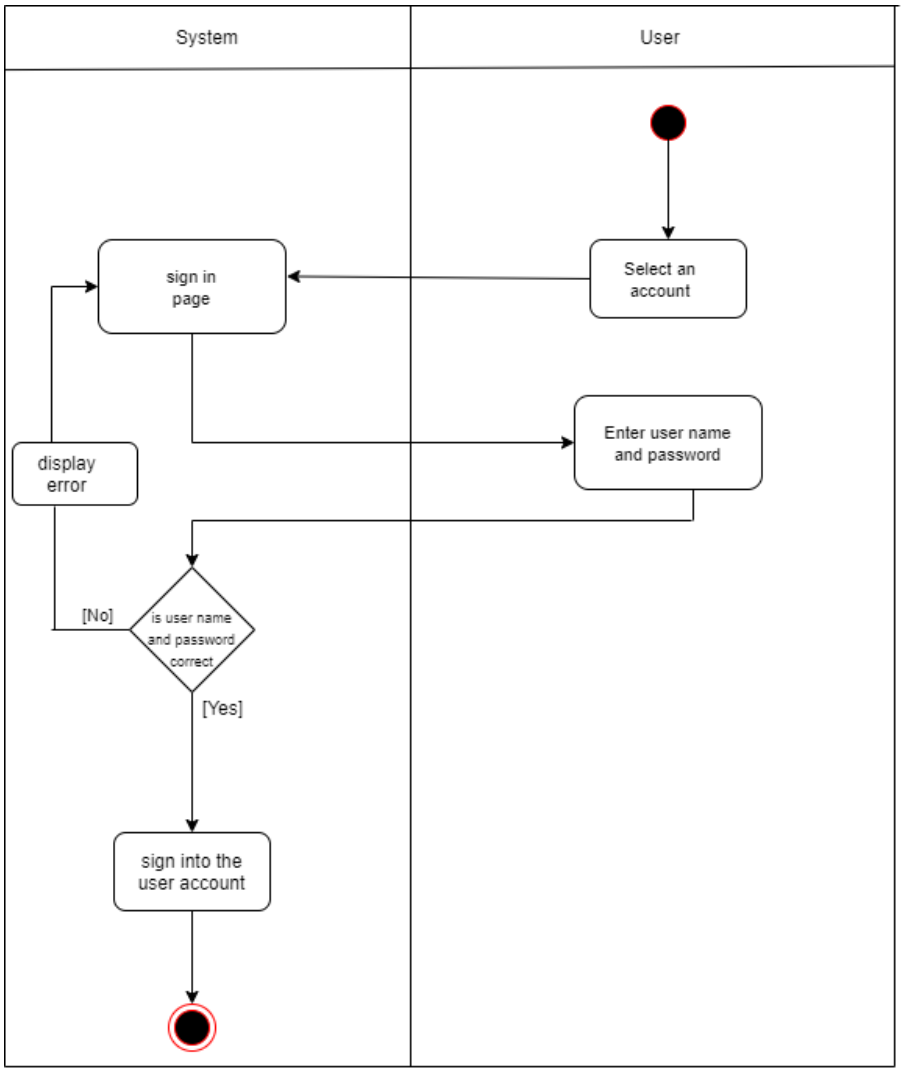

Figure 8 Activity Diagram for Login

3.3.2 Activity Diagram for patient registration and manage appointments

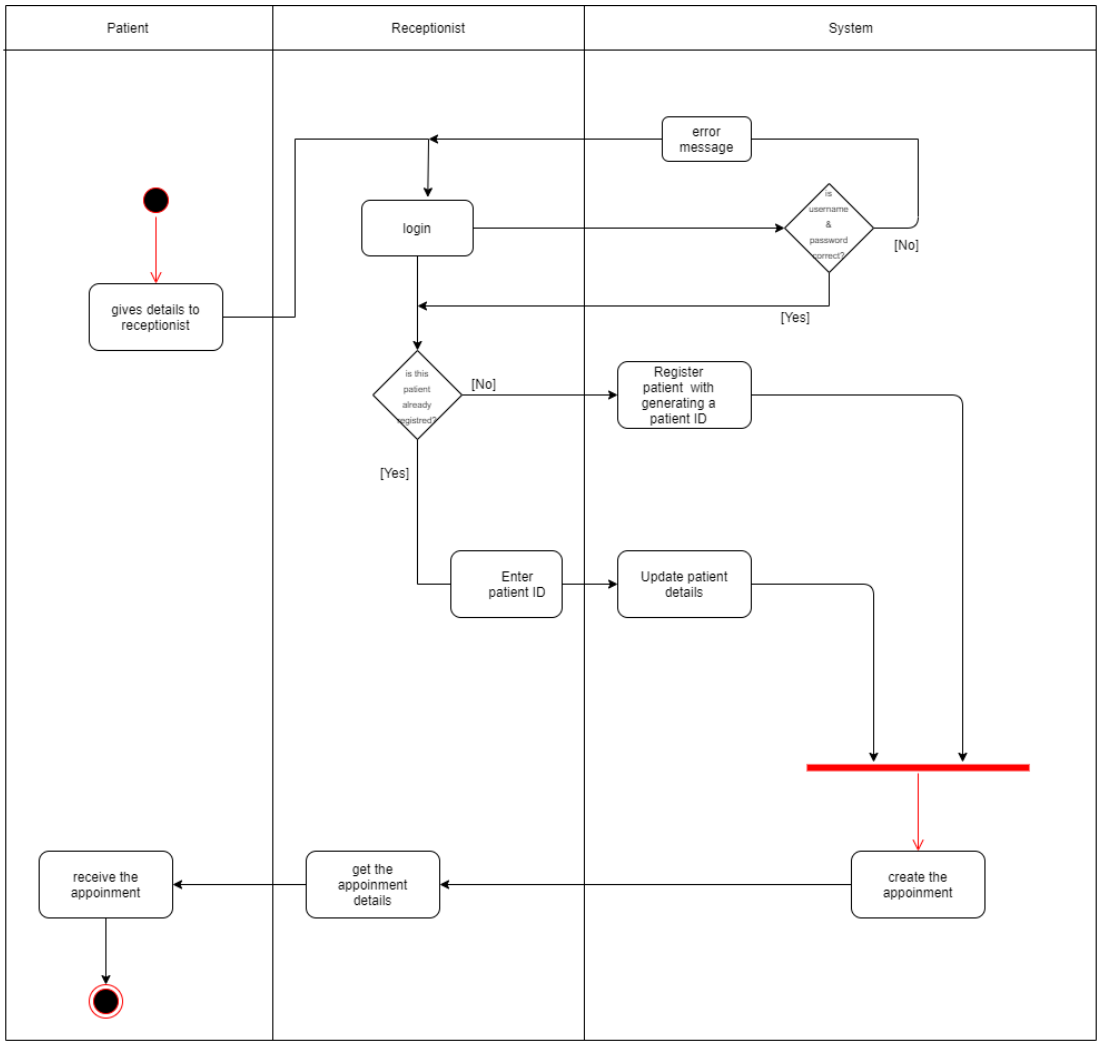

Figure 9 Activity Diagram for patient registration and manage appointments

3.3.3 Activity Diagram for view patient details

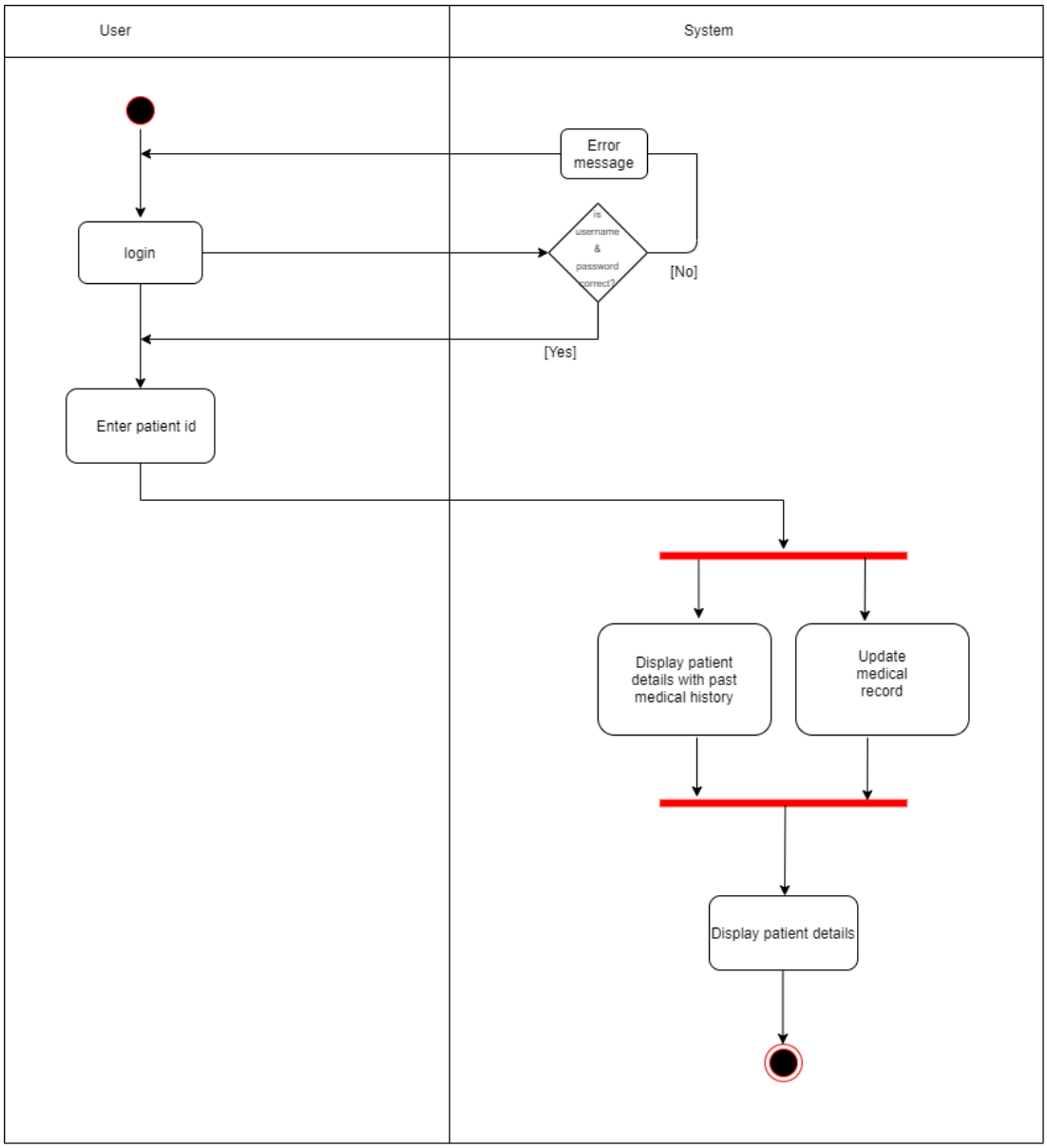

Figure 10 Activity Diagram for view patient details

3.3.4 Activity Diagram for update medical records

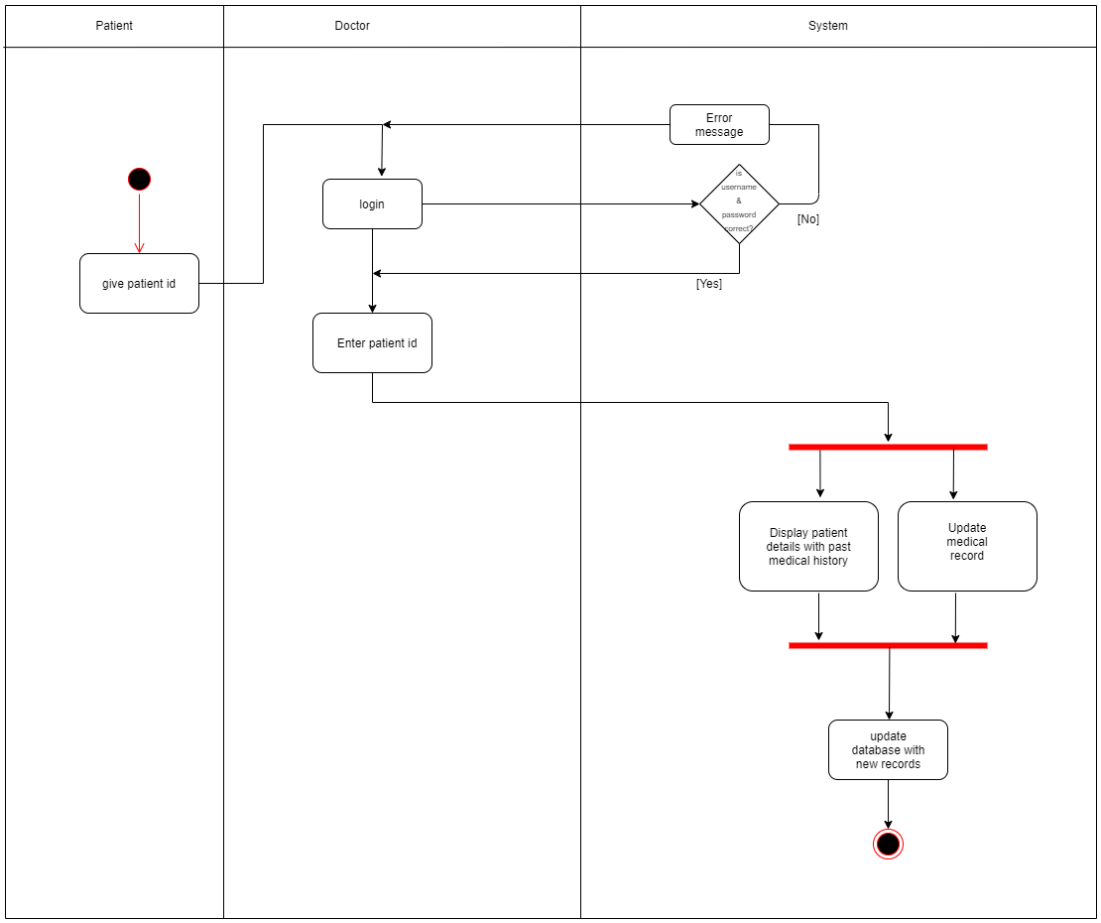

Figure 11 Activity Diagram for update medical records

3.3.5 Activity Diagram for update patient details

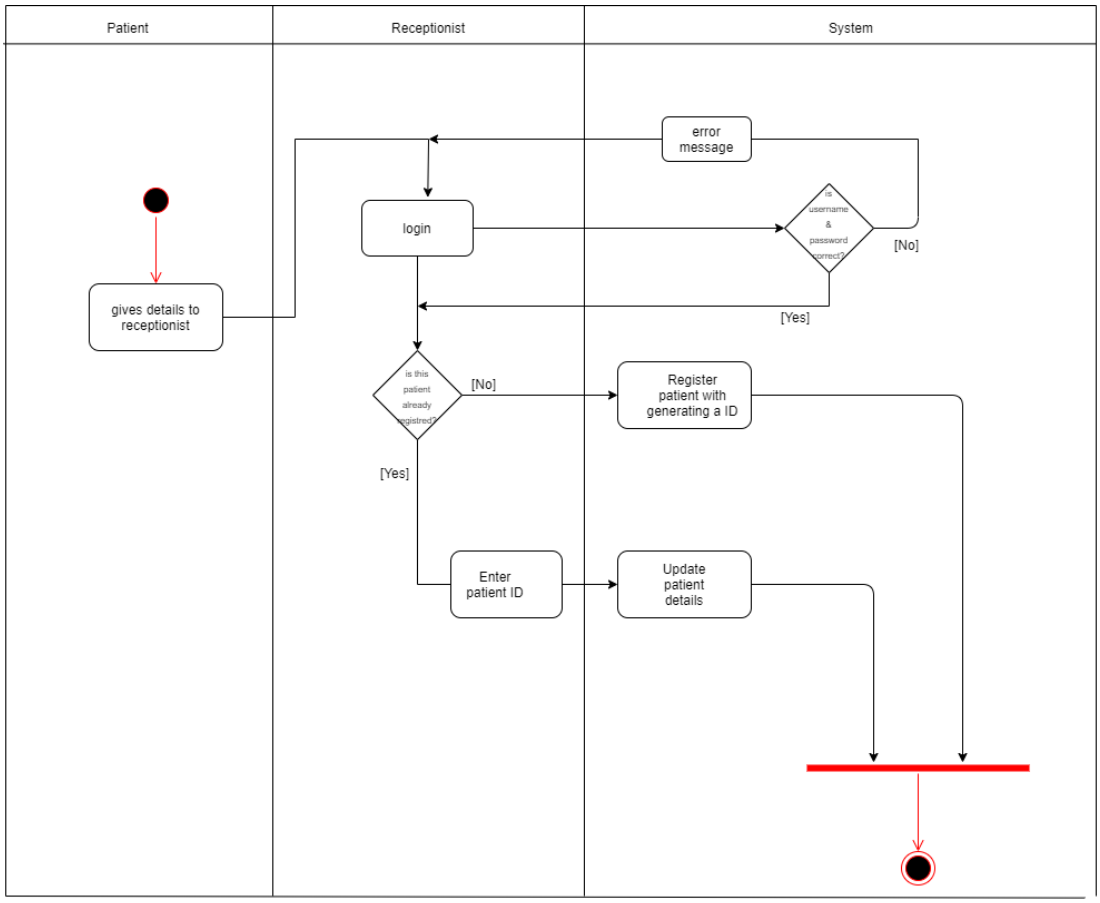

Figure 12 Activity Diagram for update patient details

3.3.6 Activity Diagram for medication process

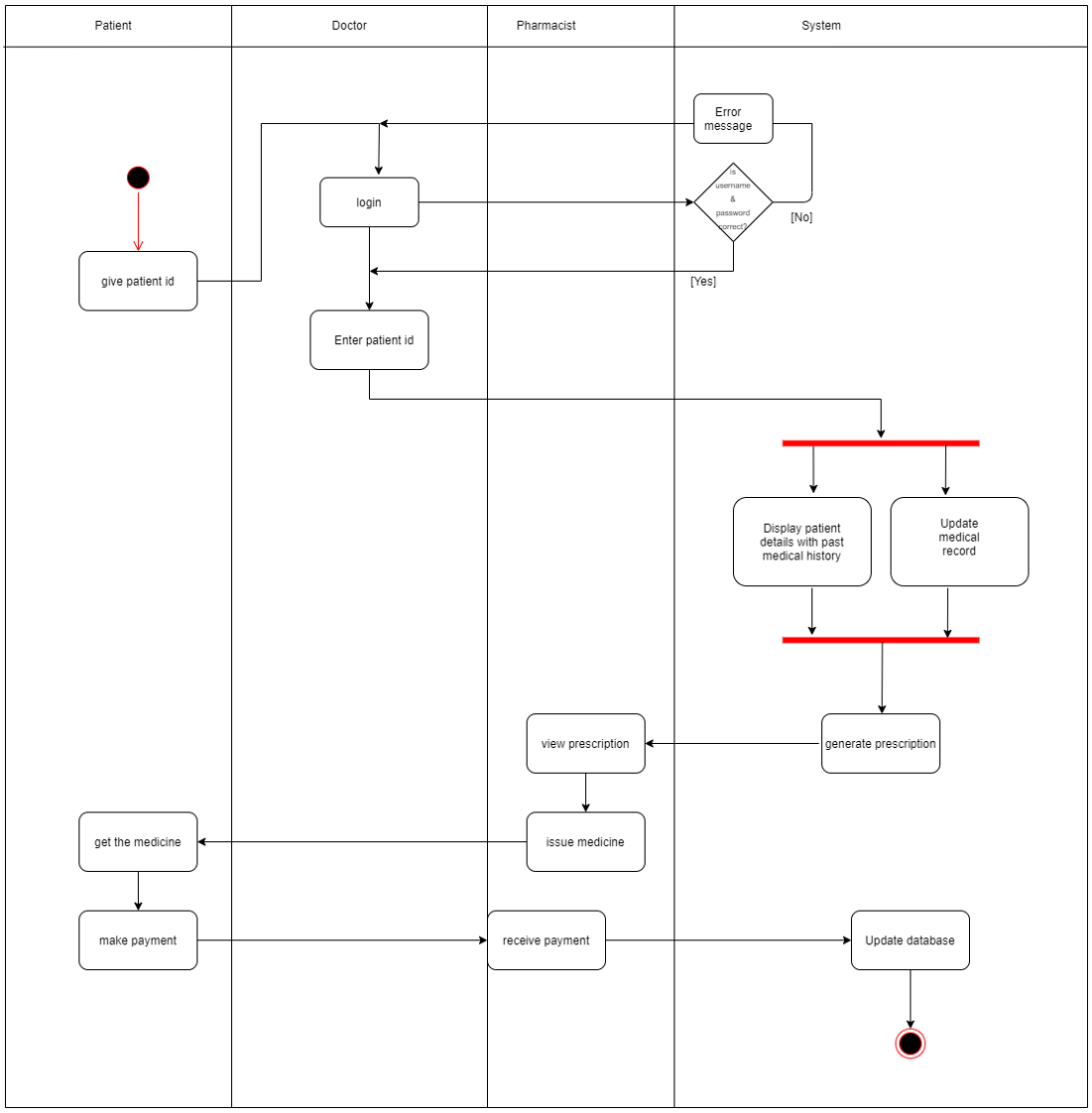

Figure 13 Activity Diagram for medication process

3.3.7 Activity Diagram for manage samples and lab reports

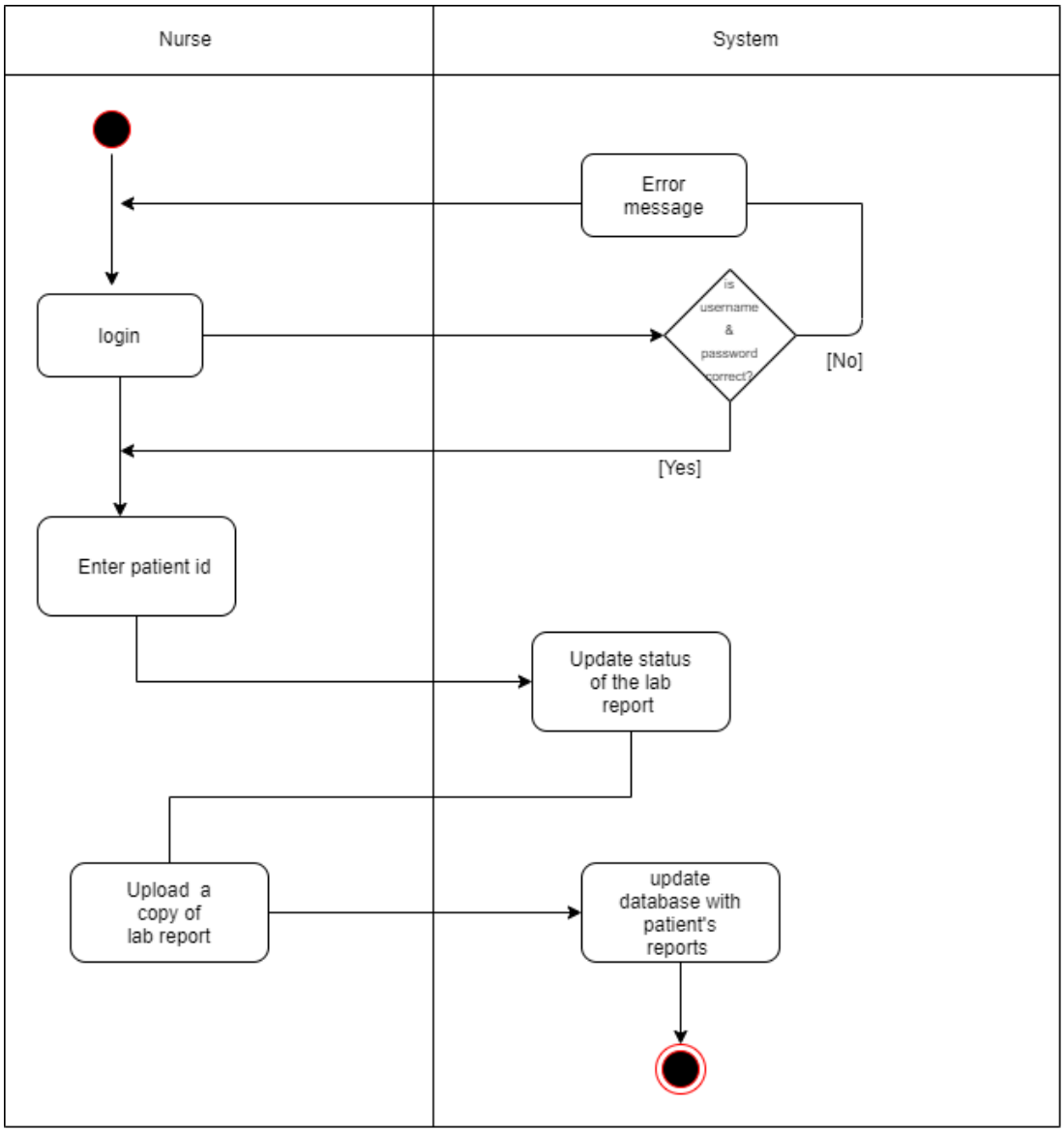

Figure 14 Activity Diagram for manage samples and lab reports

3.4 Class Diagram

Class diagram shown below describes the structure of the proposed system by showing the system's model classes, their attributes, and functionalities

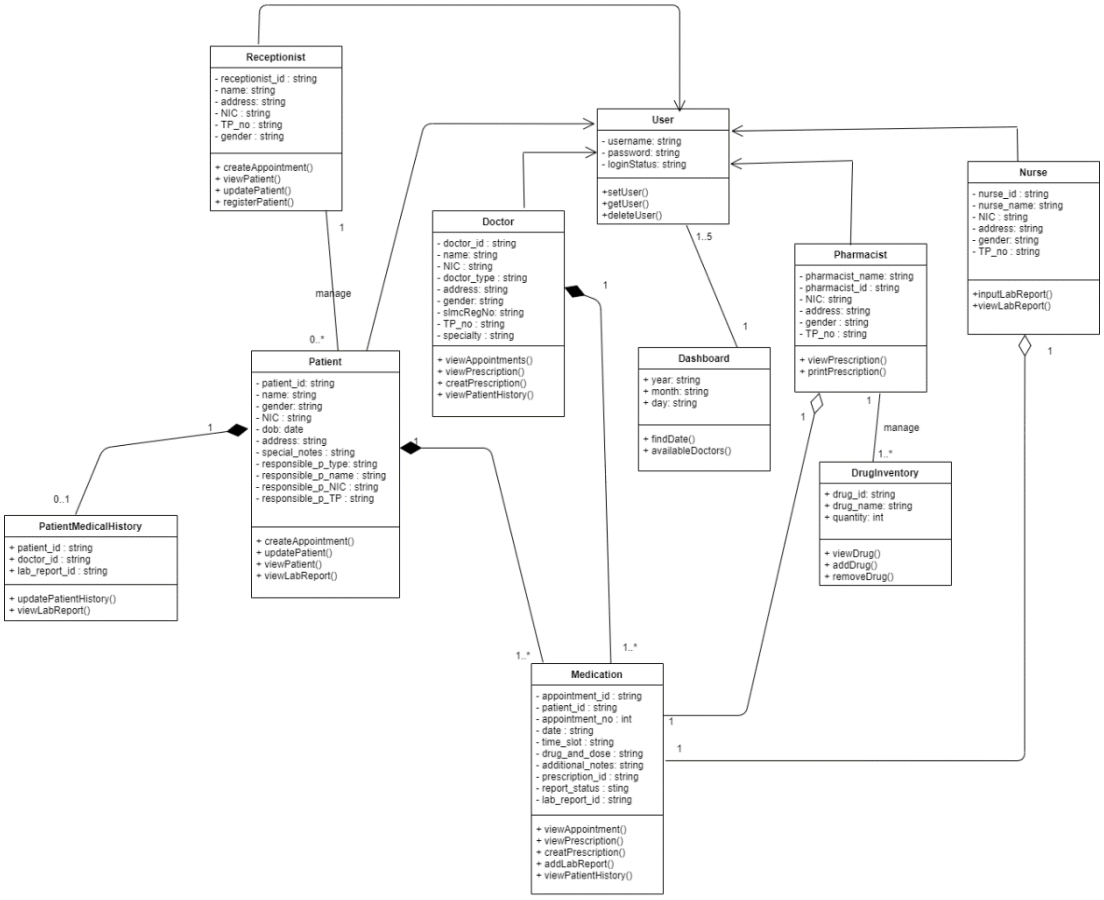

Figure 15 Class Diagram

3.5 Sequence Diagram

The system interacts with the actors in a use case functionality using sequence diagrams. Each actor is represented by a horizontal lifeline, with data transactions flowing from one lifeline to the next or within the same lifeline. The sequence diagrams that follow describe some of the main use cases that are difficult to understand based on use case descriptions alone.

3.5.1 Sequence diagrams for login

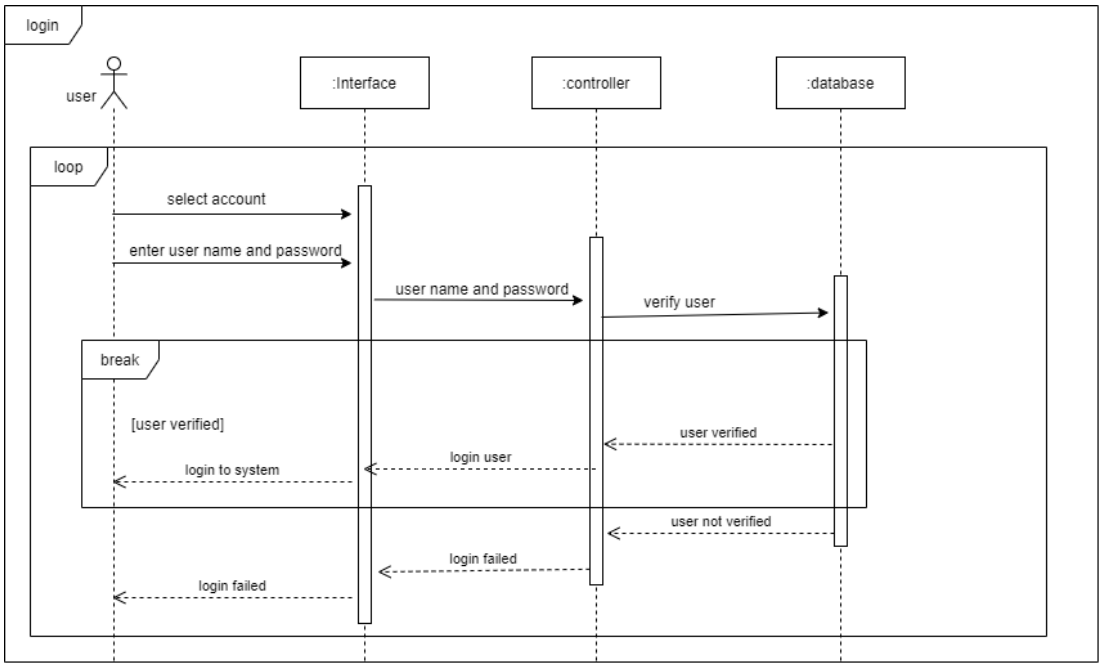

Figure 16 Sequence diagrams for login

3.5.2 Sequence diagrams for register patient

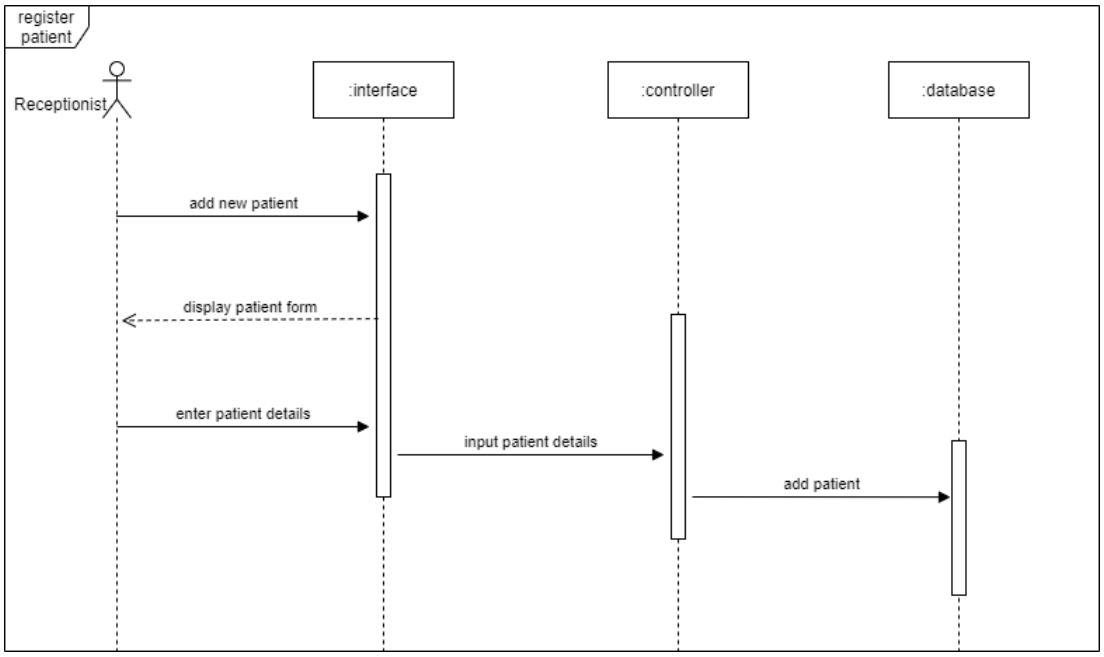

Figure 17 Sequence diagrams for register patient

3.5.3 Sequence diagrams for view patient details

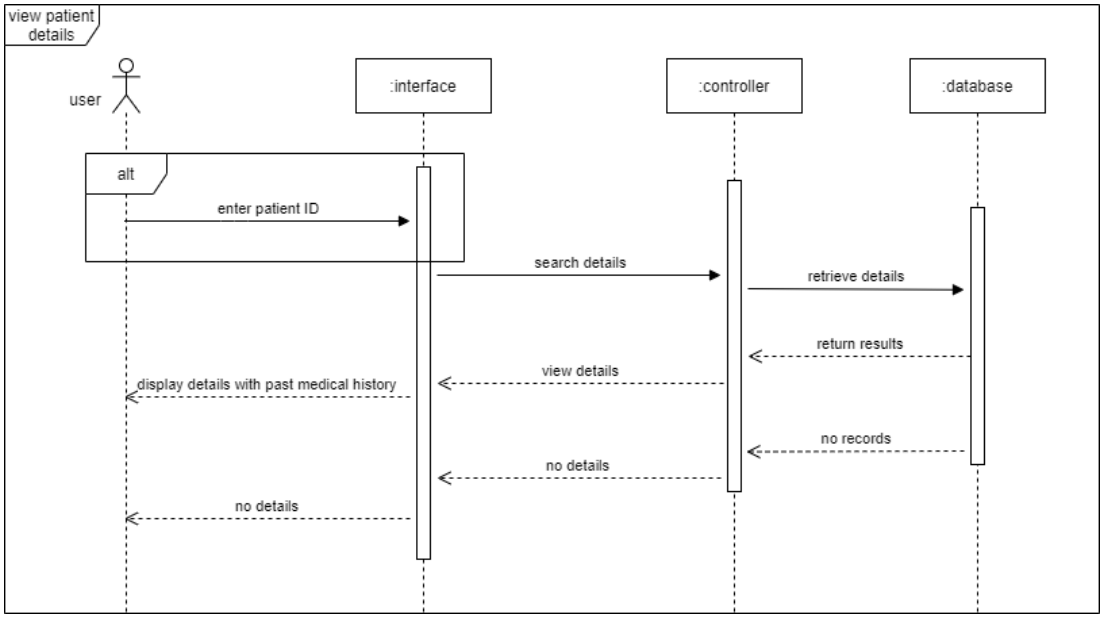

Figure 18 Sequence diagrams for view patient details

3.5.4 Sequence diagrams for update account

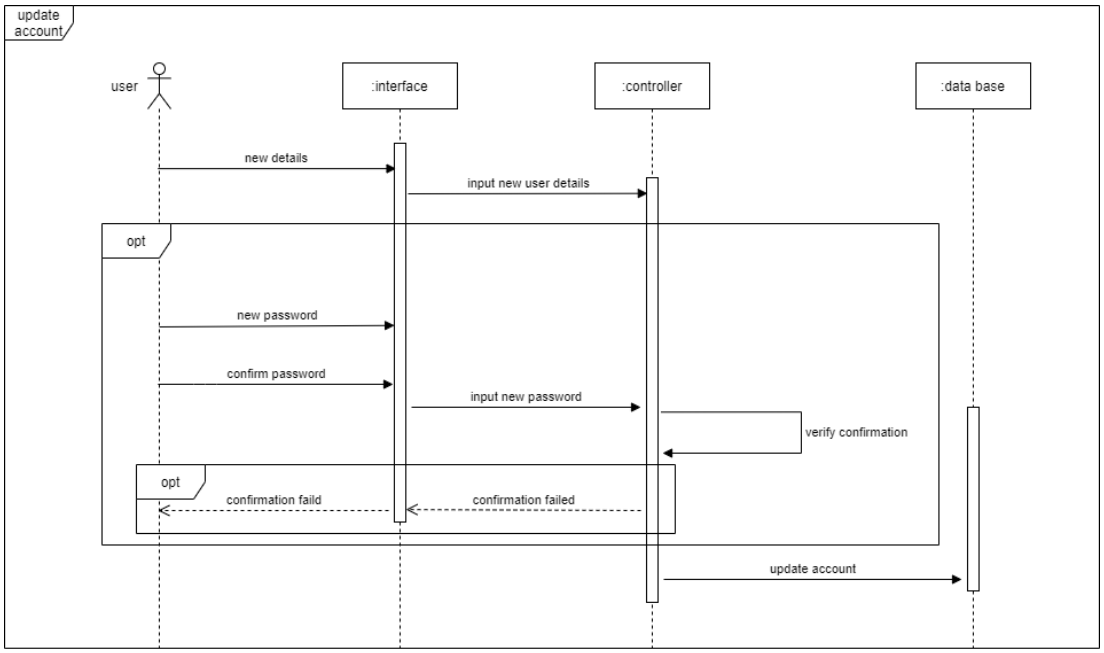

Figure 19 Sequence diagrams for update account

3.5.5 Sequence diagrams for medication

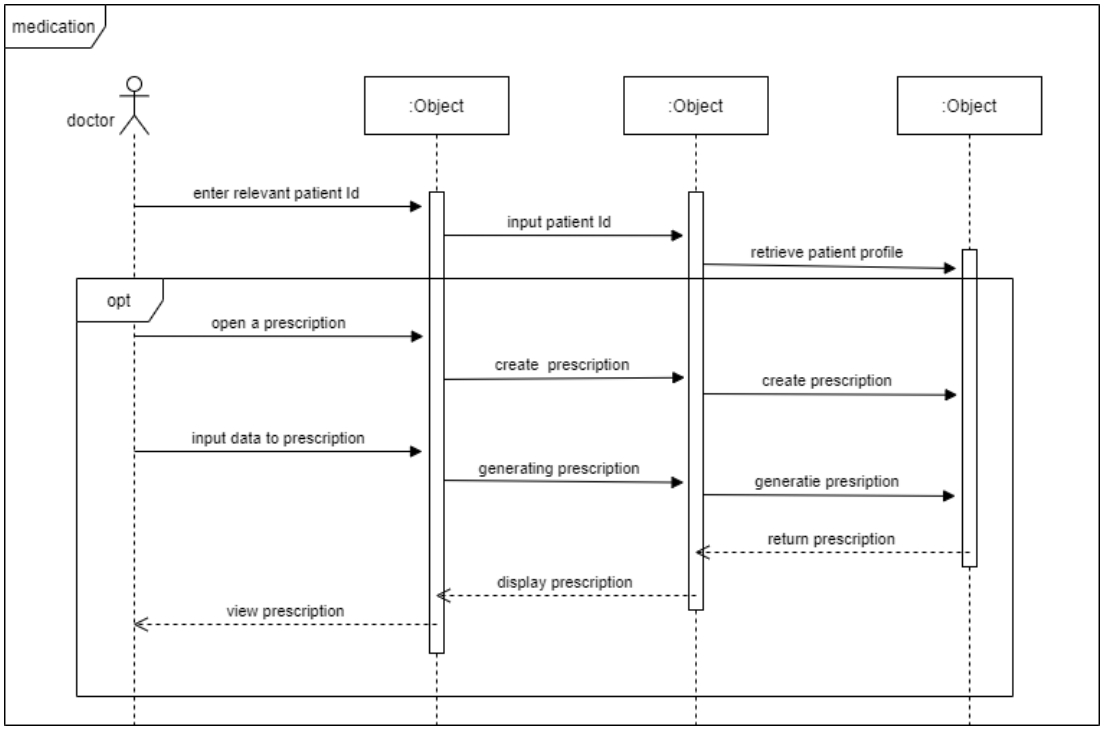

Figure 20 Sequence diagrams for medication

3.5.6 Sequence diagrams for patient's reports managing

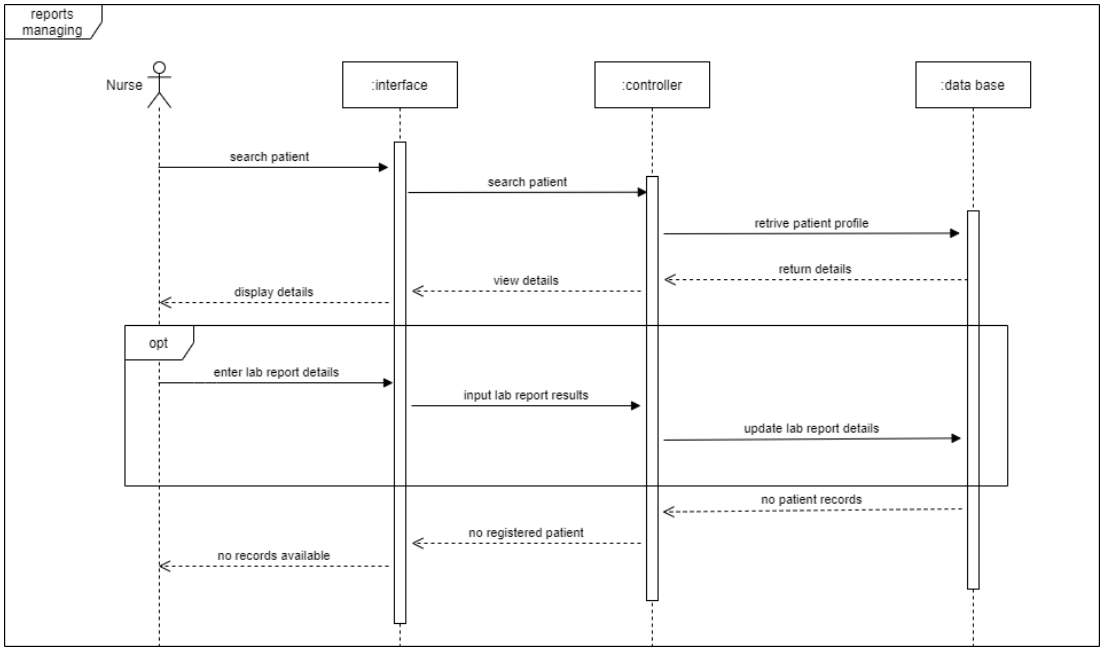

Figure 21 Sequence diagrams for patient's reports managing

3.6 ER Diagram

The ER model that follows is made up of the proposed system's entity categories and specifies the relationships that can exist between instances of those entity types.

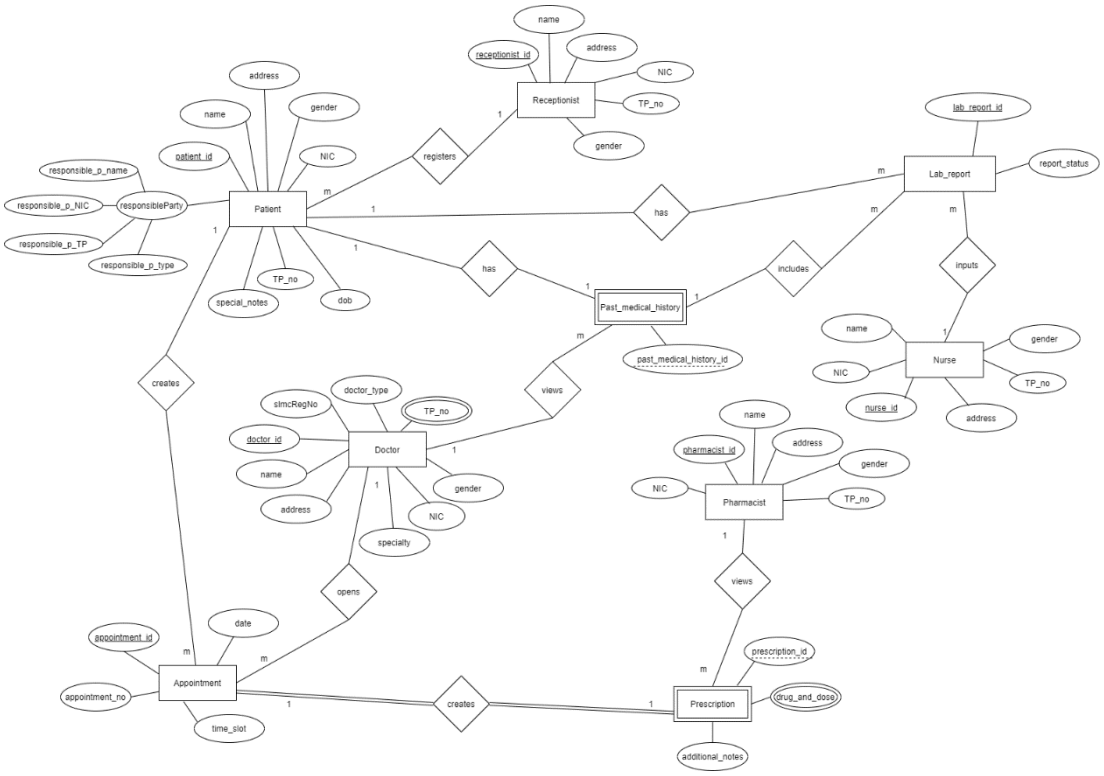

Figure 22 ER Diagram

3.7 Normalized Database design

Data base relationship diagram illustrates the relationship between the data tables in the database

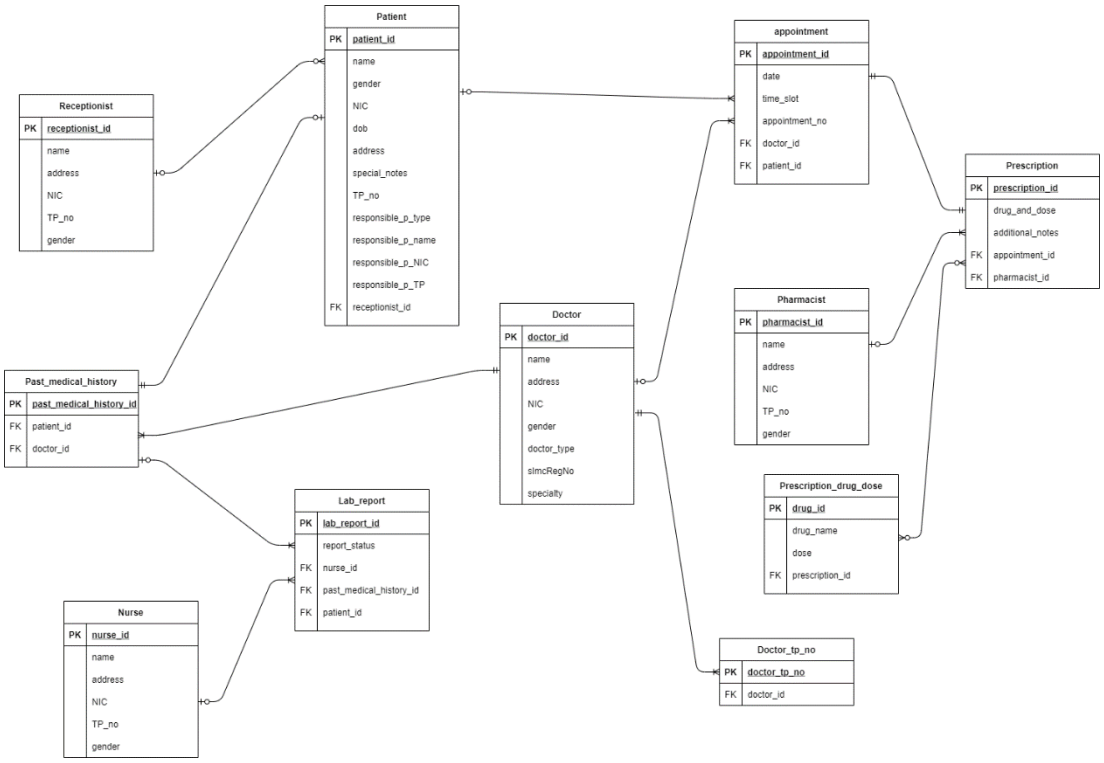

Figure 23 Normalized Database design

3.8 Graphical User Interfaces

A web application's graphical user interface (GUI) is one of the most important components for communicating with the system's users. One of the system's key non-functional requirements is a user-friendly GUI. The most important design considerations for GUIs (Graphical User Interfaces) are described below, and these factors are properly considered in system GUI designs.

• Attractive user interfaces

• User friendly interfaces, easy to use and easily learnable

• Easy to navigate forward and backward, while keeping the process flow of the actions

• Prevent errors as much as possible and use client-side validations to give immediate feedback

• Give good error messages with information to recover from the error occurred

• Provide feedback of all the actions if succeeded or not

3.8.1 Login Interface

This figure shows the login interface for users.

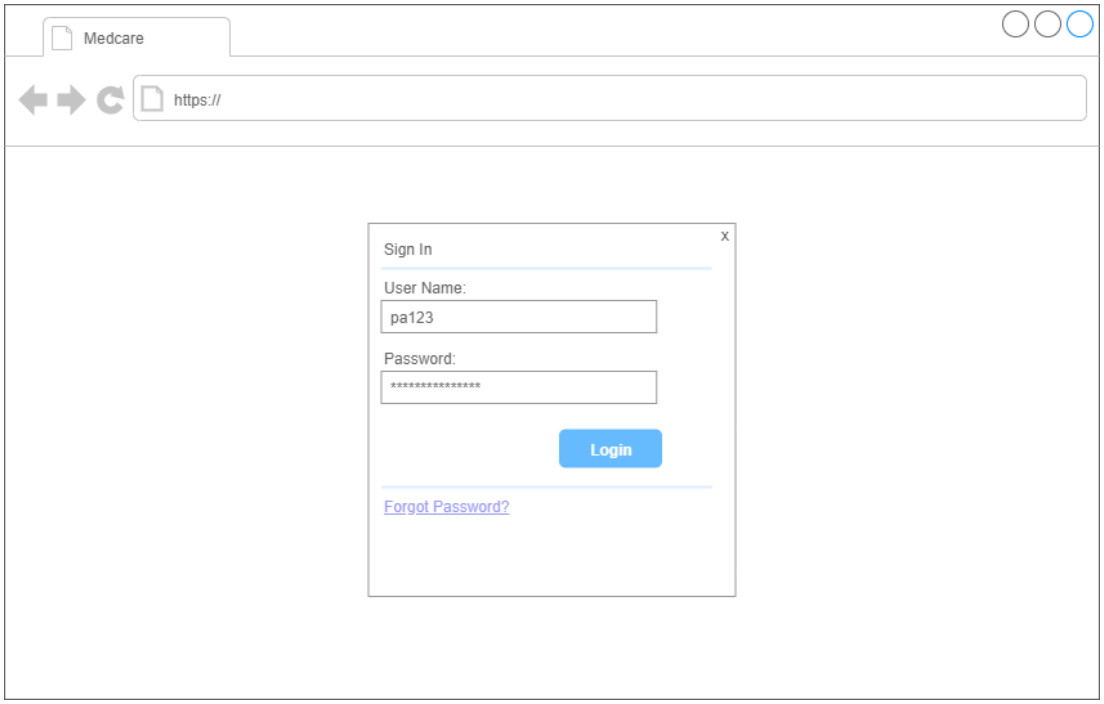

Figure 24 Login interface for users

3.8.2 Patient's Interfaces

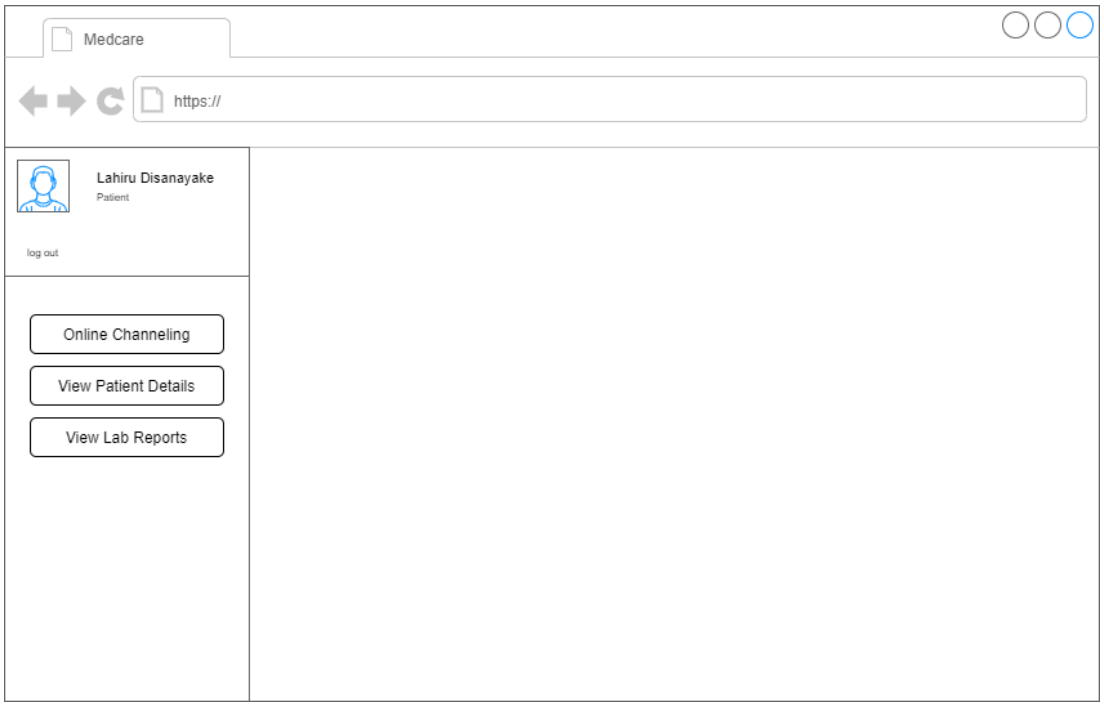

Figure 25 Patient's interface after login

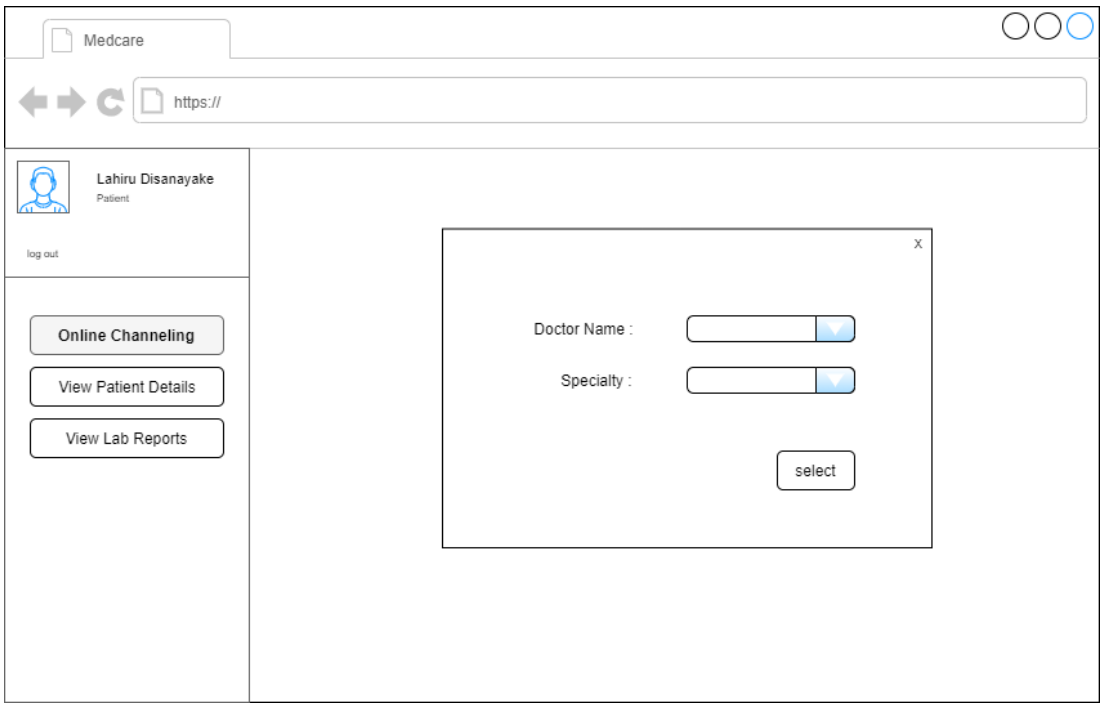

Figure 26 Patient's interface after clicking Online Channelling

As follows this figure shows the available time slots related to the selected doctor. Then user can select a time slot at user's will by clicking Book Now button.

Figure 27 Patient's interface after selecting a doctor

As follows figure, user has to select a date by using a date picker and confirm the reservation by entering Patient ID and clicking Confirm button.

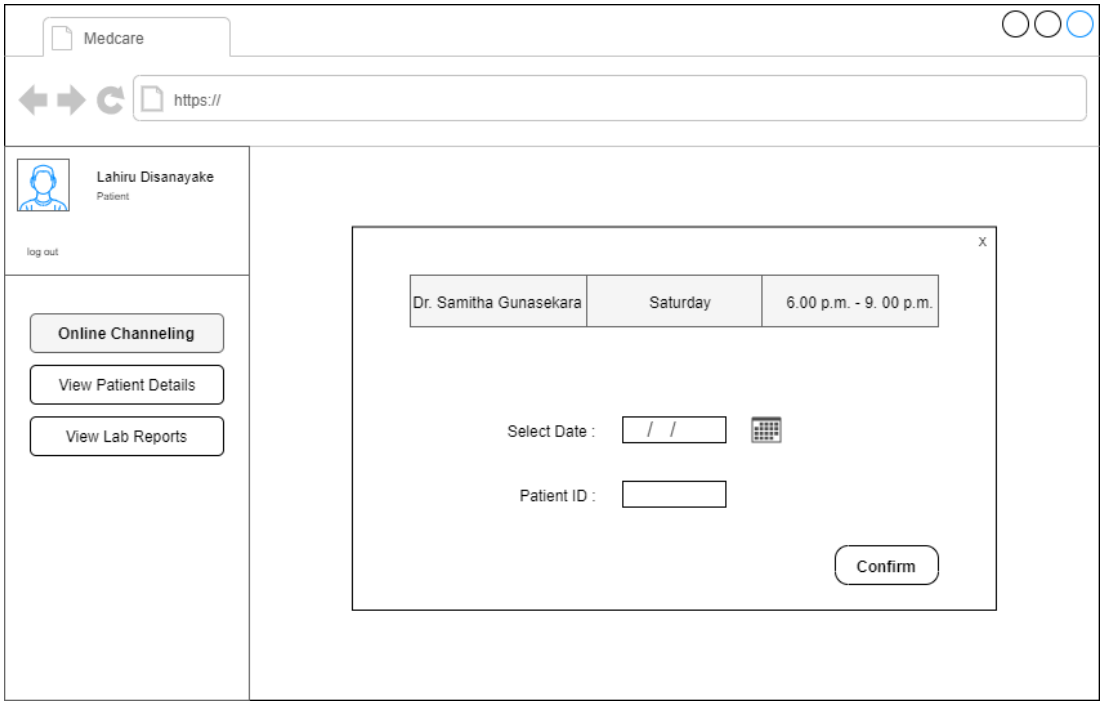

Figure 28 Patient's interface after selecting a time slot

3.8.3 Receptionist's Interfaces

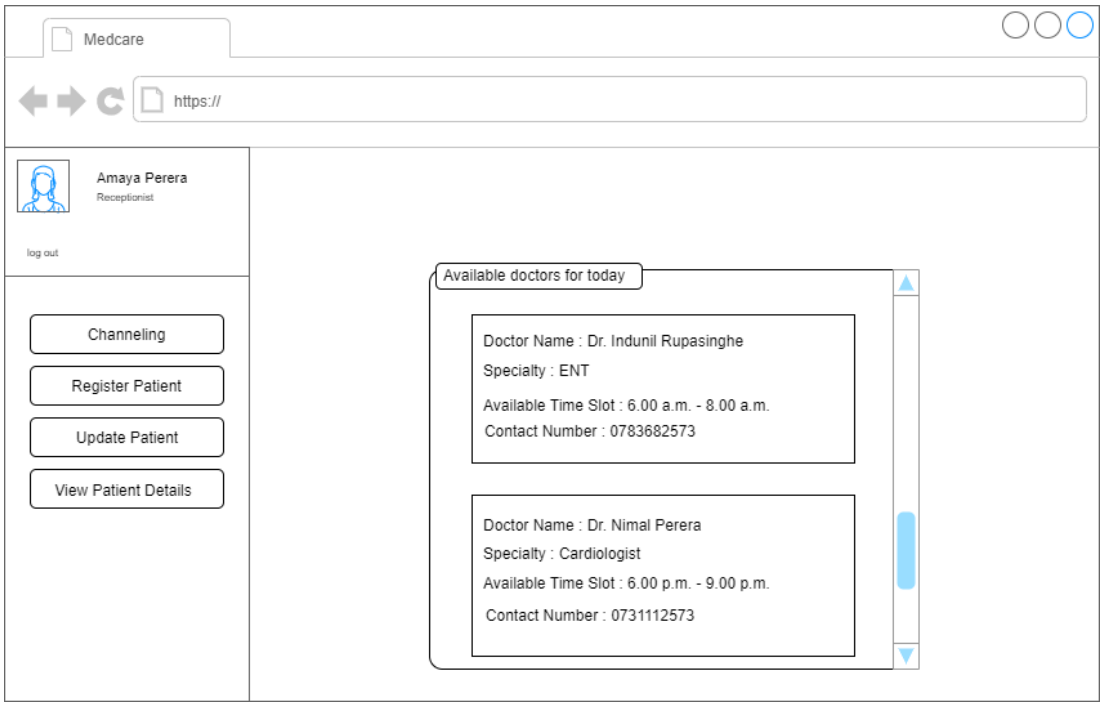

Figure 29 Receptionist's interface after login

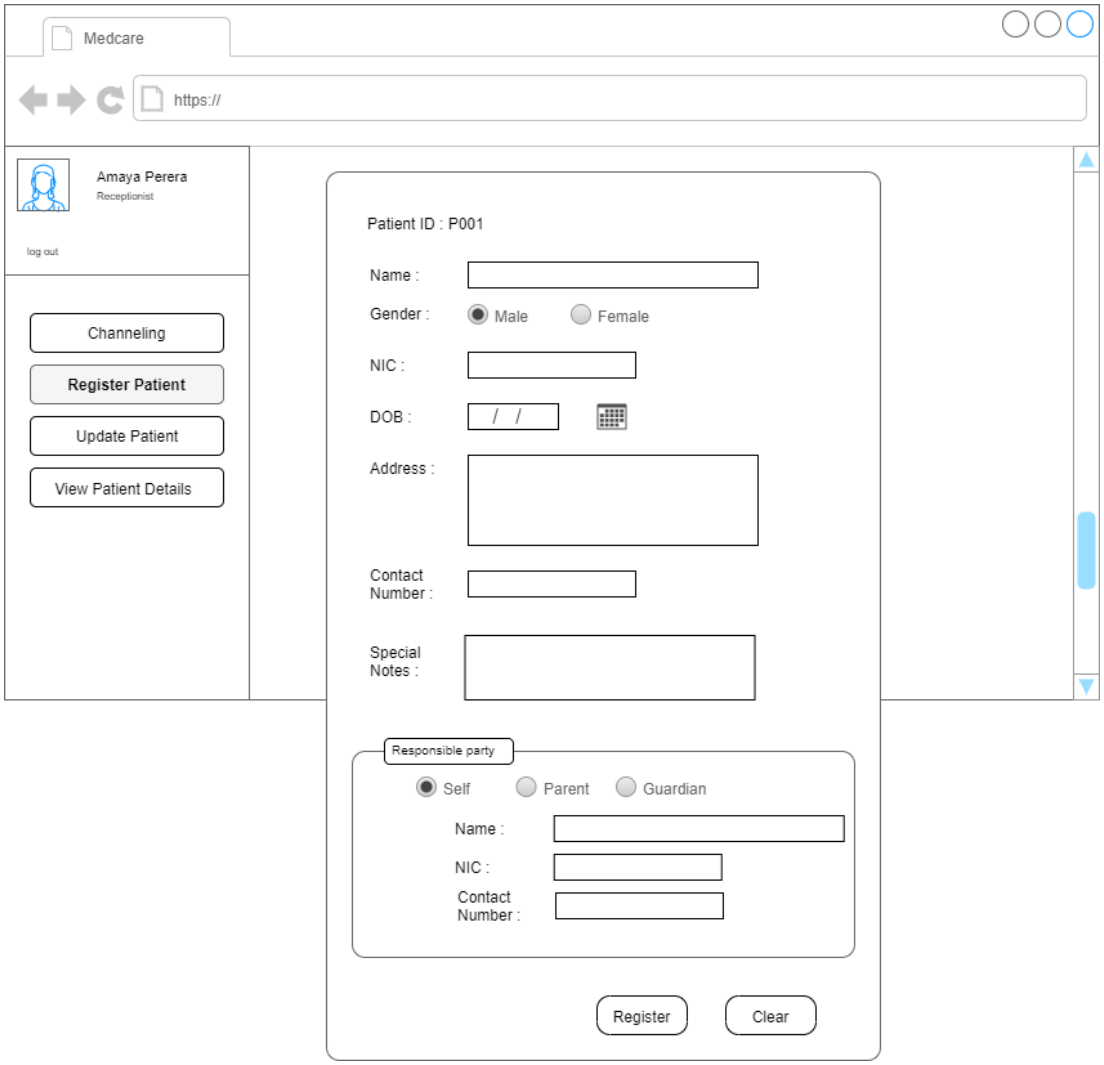

Figure 30 Receptionist's interface after clicking Register Patient button

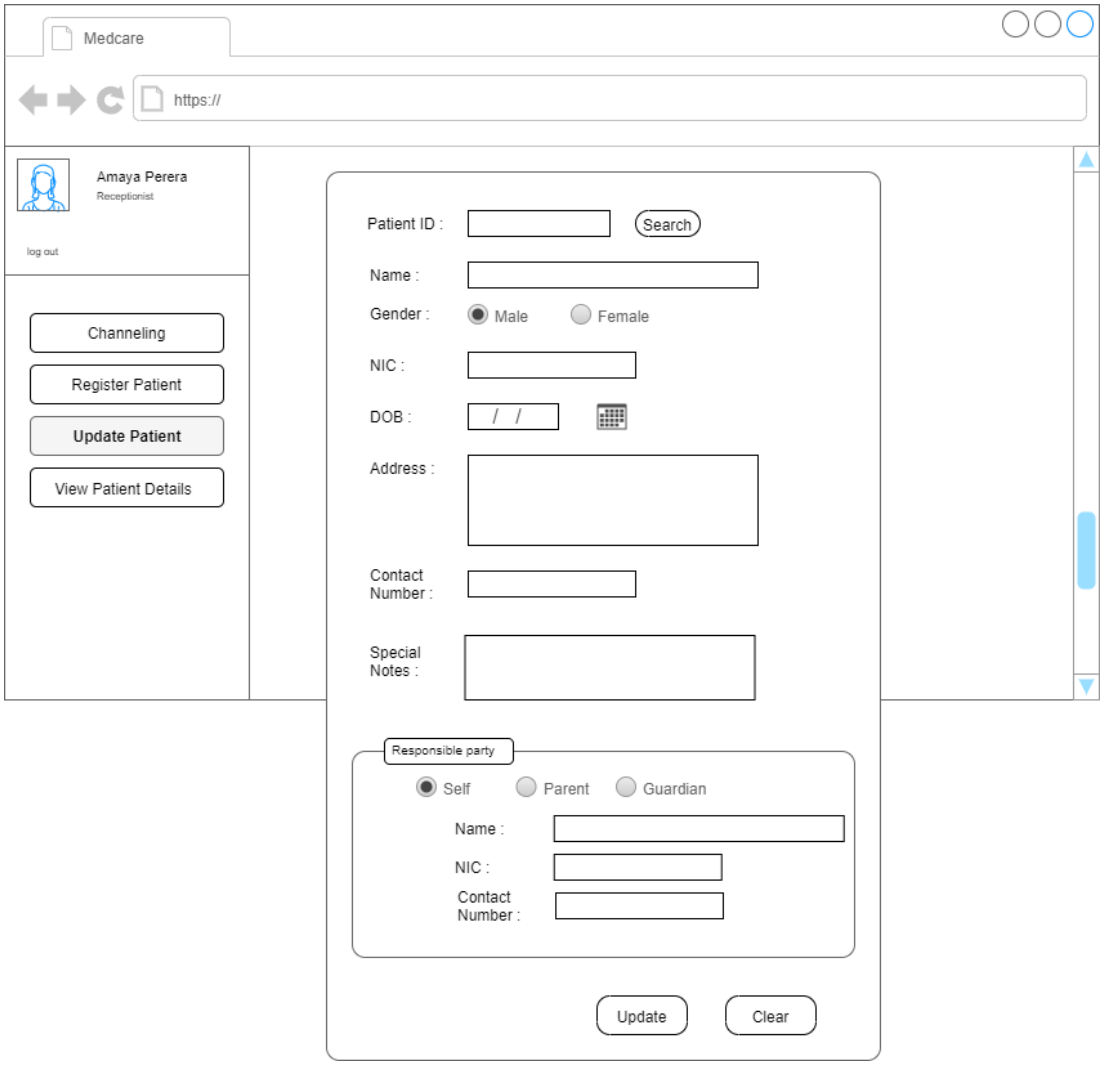

Figure 31 Receptionist's interface after clicking Update Patient button

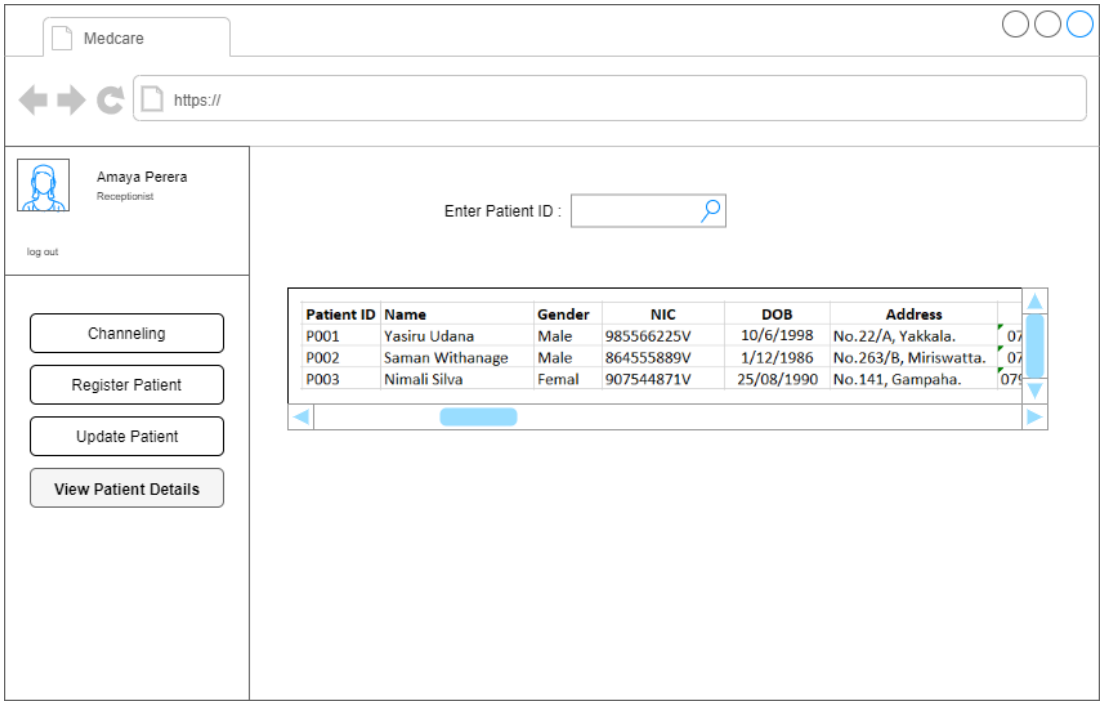

Figure 32 Receptionist's interface after clicking View Patient Details button

3.8.4 Nurse's Interface for Input Lab Reports

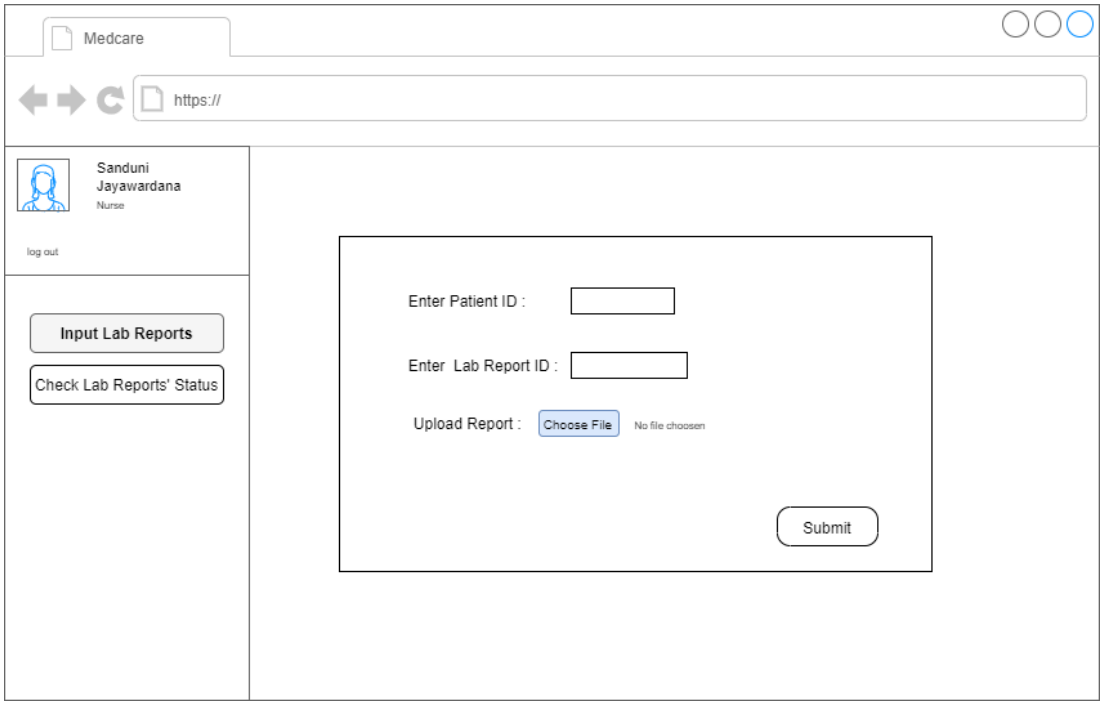

Figure 33 Nurse's interface after clicking Input Lab Reports button

3.8.5 Pharmacist's Interface related to View Prescription

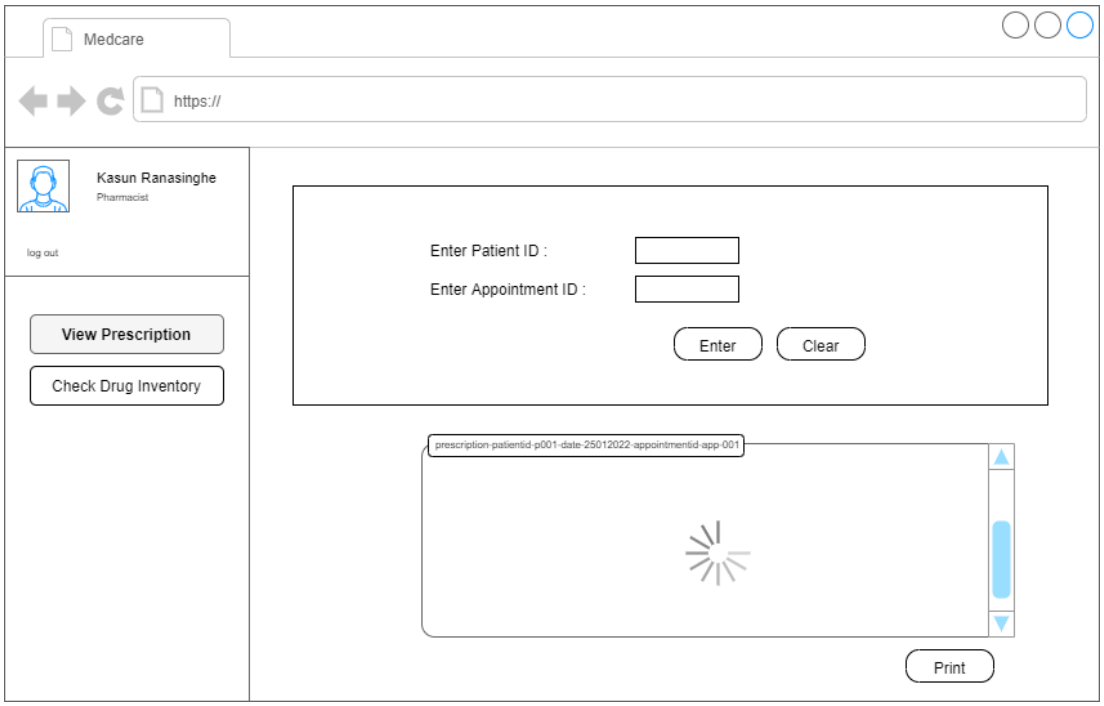

Figure 34 Pharmacist's interface after clicking View Prescription button

3.8.6 Doctor's Interfaces

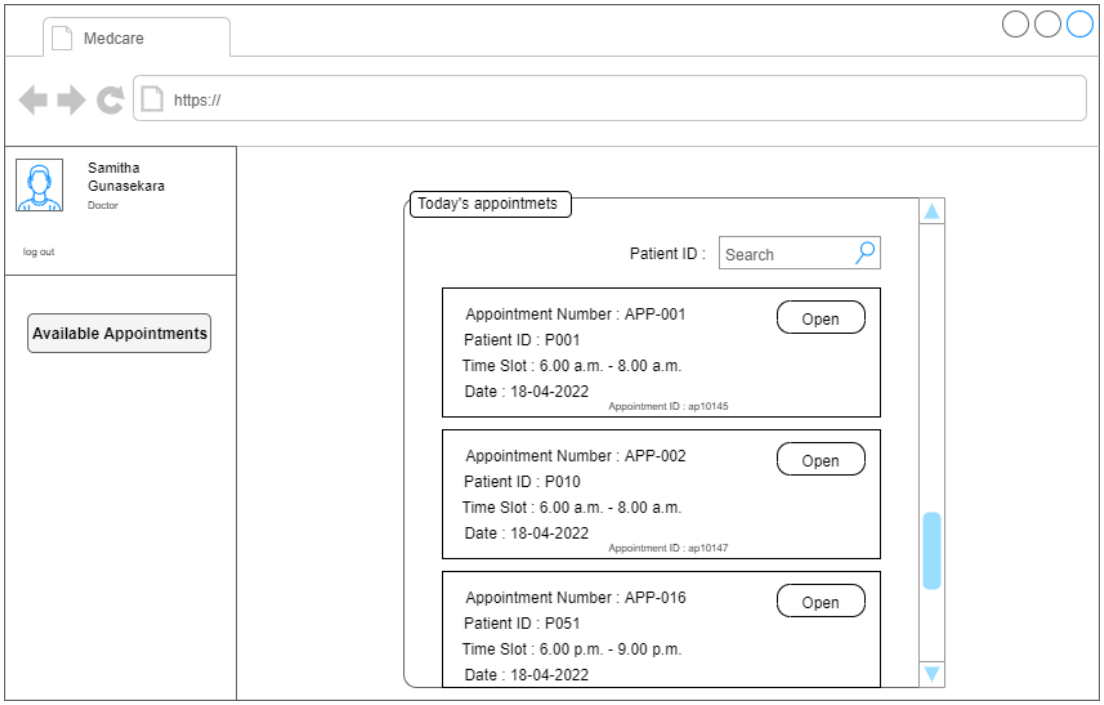

Figure 35 Doctor's interface after clicking Available Appointments button

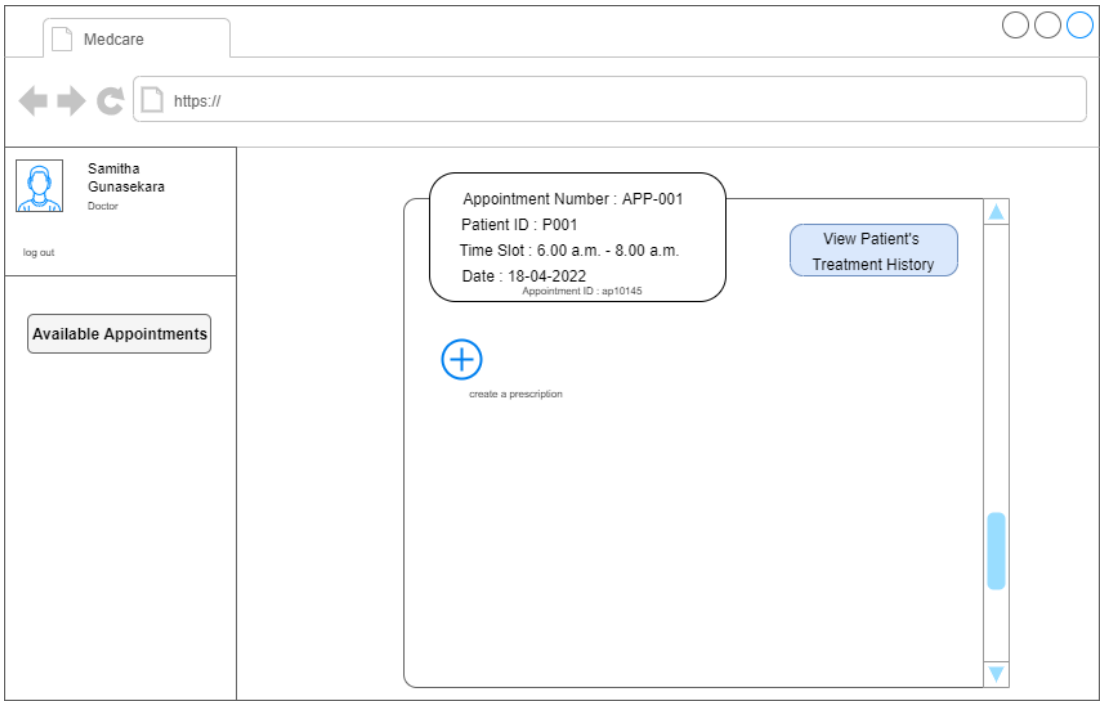

Figure 36 Doctor's interface after clicking an Open appointment button

Related to the above figure, doctor has opened the first appointment.

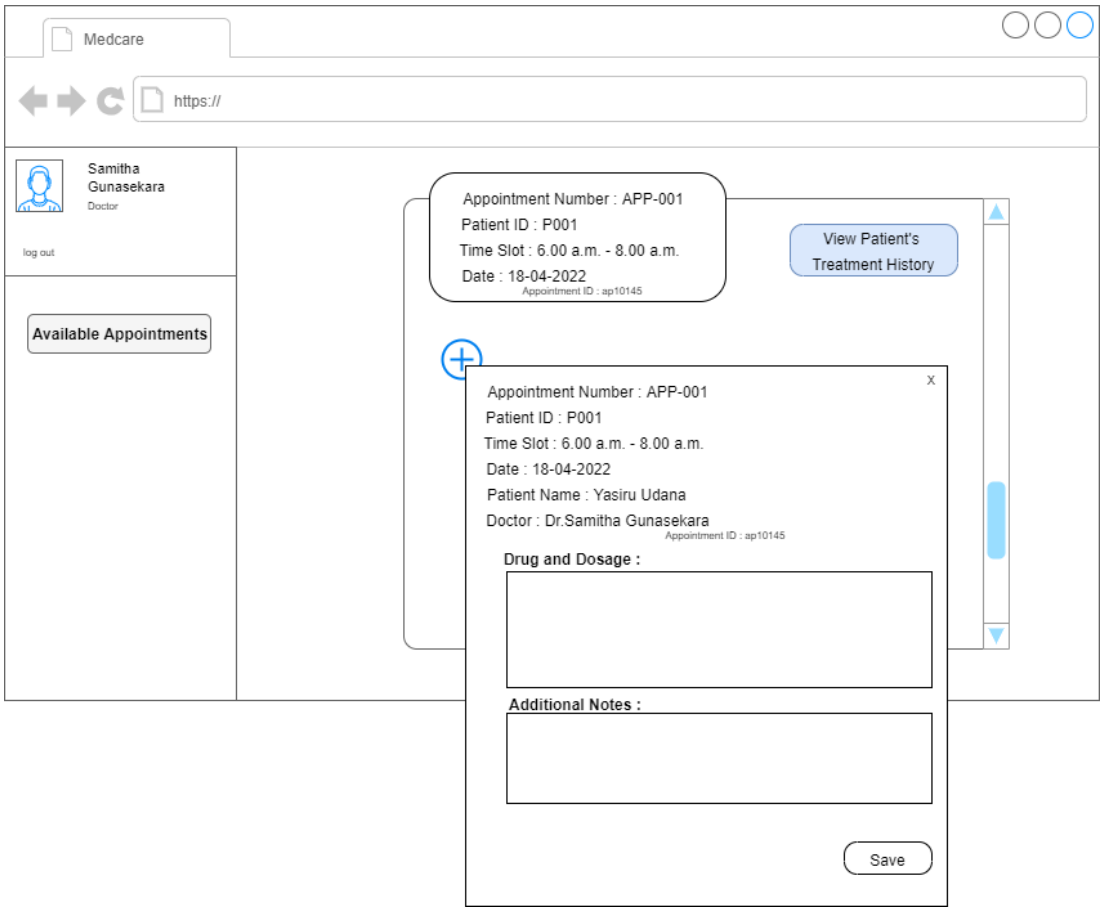

Figure 37 Doctor's interface after clicking on create a prescription icon

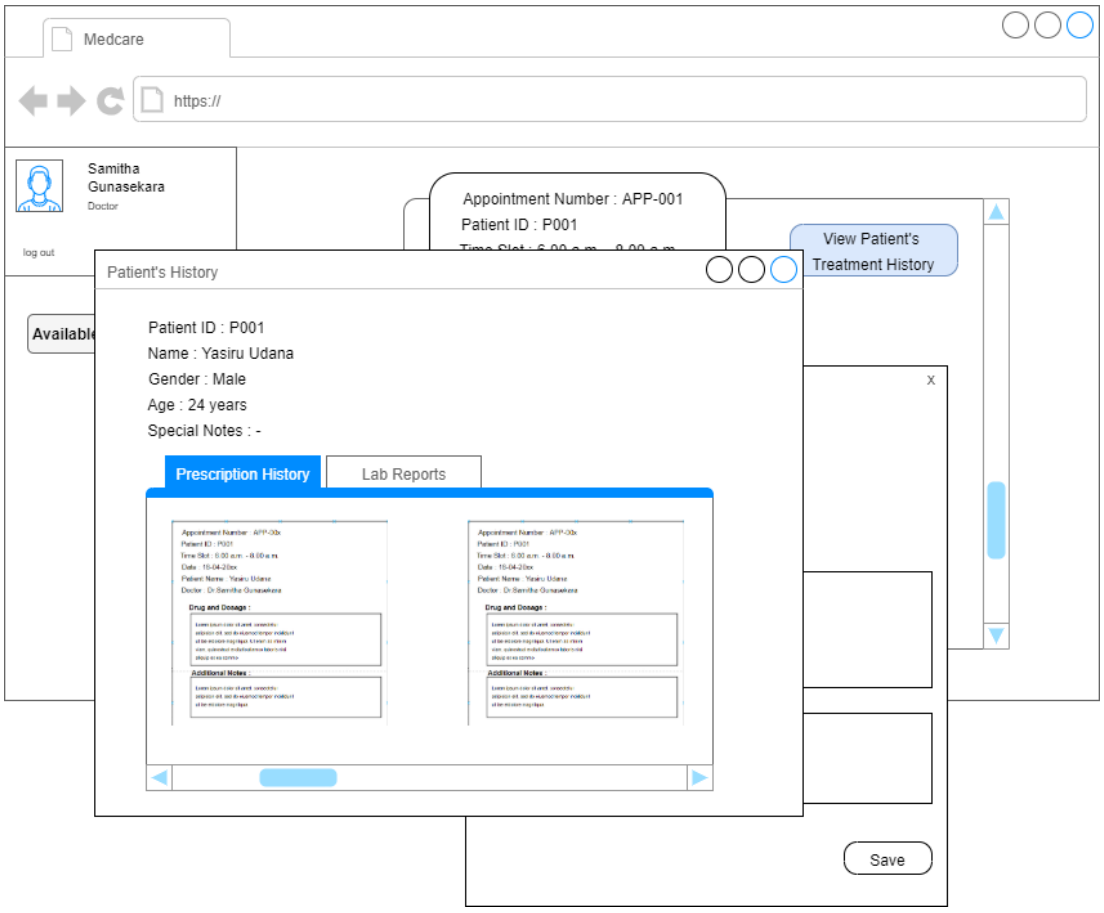

Figure 38 Doctor's interface after clicking on View Patient's Treatment History button

3.8.7 Admin’s Interface

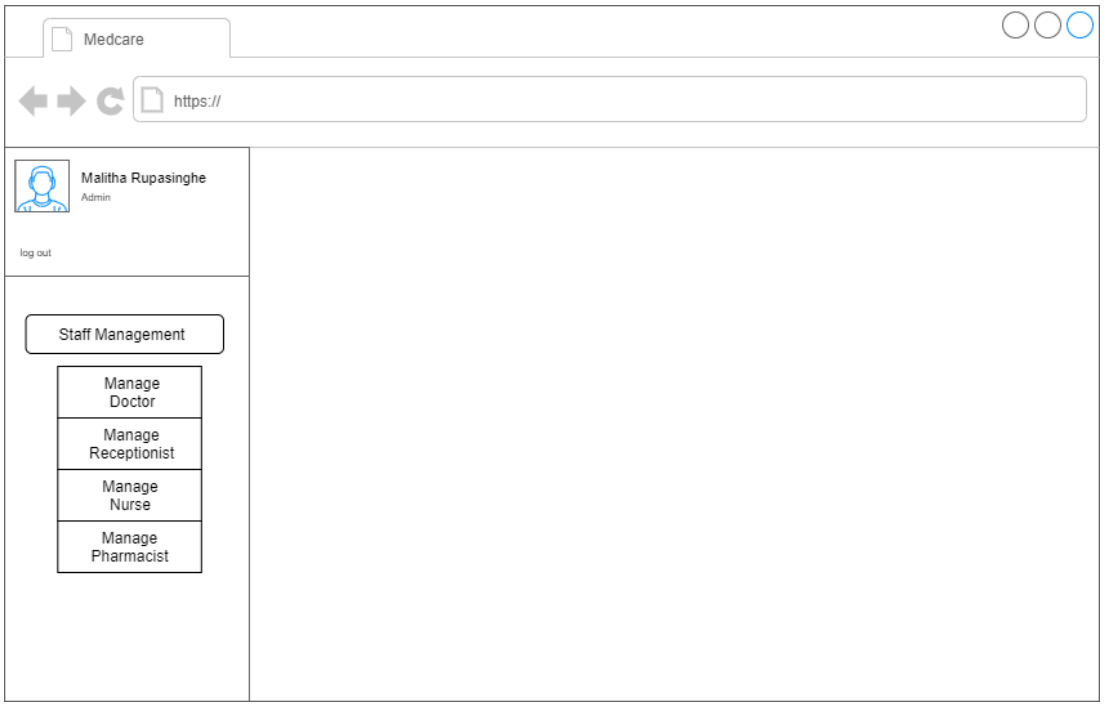

Figure 39 Admin's interface after login

CHAPTER 4

4 CONCLUSION

This chapter assesses the project's efforts and concludes the project. It contains the degree to which objectives were realized, as well as limitations and downsides, as well as prospective revisions, upgrades, and extensions.

Outline of the chapter

4.1 Degree of objectives met

The main purpose of this Medical Center Information System was to convert an existing manual system into a computerized management system. Its purpose is to oversee and upgrade the medical center's present processes. Users will be able to create, retrieve, update, and remove information inside their access area according to the system. The goal of this Information System is to improve medical outcomes, quality of life, quality of care, morbidity, medical errors, and cost. These are the main objectives of the Information System. This information system focuses on data management and efficiency. The healthcare side generates a lot of data. This information system aids in the collection, compile, and analysis of health data in order to better manage patients' health and lower healthcare expenditures. The management can then focus on improving patient care. Patients may require therapy from a variety of healthcare providers. Users can readily obtain health records using this way. Because every data is linked together.

4.2 Usability, accessibility, reliability, and friendliness

The graphical user interfaces make it simple to complete a task. Users will have no trouble navigating the system. Learnability, memorability, efficiency, and contentment all work together to improve the user's usability.

The system's accessibility is kept at a sufficient level to allow all types of users to interact with it with minimal difficulty. Users can easily observe, comprehend, and contribute to the system.

The security of the system is protected by access restrictions. Only authorized users have access to the system. In addition, the admin user can decide which role should be assigned to which party. This permits a specific user to have access to certain system components, enhancing the system's reliability.

The user friendliness of the system is enabled by the graphical user interfaces, which preserve the system in a minimalist form. Icons, typefaces, colours, and objects all work together to help users through their activities in a simple and effective manner.

4.3 Users' Response

Since the project's inception, the client has been extremely supportive. The favorable reaction made it simple to collect data and requirements, examine present procedures by monitoring the workflow in real time, and so on.

4.4 Limitations and Drawbacks

With the time and resource limitations, this web-based Medical Center System has its own limitations and drawbacks with the current completion state. At the moment initial level system uses a localhost database, so the application can run only in the

installed local computer. The system should have internet facility as it is a web site. And this system does not facilitate online payments. And inventory management and financing management part is not included in this system. Apart from that, being unable to provide online booking access for unregistered patients. This can be solved by the future modifications.

4.5 Future modifications, improvements, and extensions possible

Facilitate online payments option is a major thing can be implemented in the future. Apart from that developing a drug inventory management system for the application is another important thing. And also, we hope to develop video call consultation facility in the future.

4.6 Summary

This chapter concludes the report with the degree of objectives met, usability aspects, limitations, and future modifications.

4.7 References

- https://app.diagrams.net
- https://www.tutorialspoint.com
- https://www.figma.com