

Project Report

Thread-Based Health Portal

BSCS

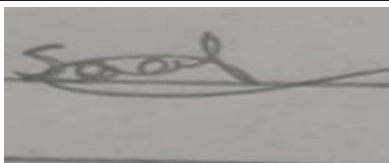
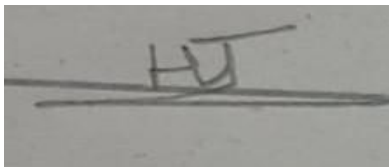
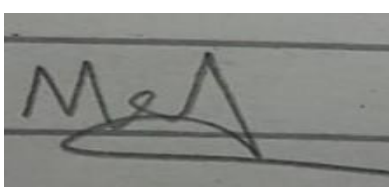
Session (2017-21)

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Project Registration

Project ID (for office use)	CS 46					
Type (Nature of project)	[--] Development [] Research [] R&D					
Area of specialization	Artificial Intelligence					
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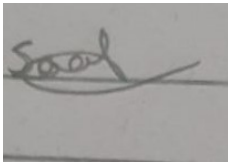
Plagiarism Free Certificate

This is to certify that, I am Saad Awais S/D/o Awais Mohsin, group leader of FYP under registration no CIIT/ FA17-BCS-094/LHR at Computer Science Department, COMSATS Institute of Information Technology, Lahore. I declare that my FYP proposal is checked by my supervisor and the similarity index is 6% that is less than 20%, an acceptable limit by HEC. Report is attached herewith as Appendix A.

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Abstract

It is a web-based app which allows users to register either as a doctor or a patient. Patients can then open threads in which they explain the problem they are facing along with their case history. A doctor from the concerned field will look into the threads mostly by applying location parameters so that the doctor will see the threads of only those patients that are near to them. After looking into the patients thread the doctors would offer their pitch.

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1 Introduction

1.1 Introduction

Recent studies show that about one-third cases involving misdiagnosis usually by doctors results in the death of the patient. According to a study by the John Hopkins University School of Medicine, misdiagnosis is the number one cause of serious medical errors. It is found that about 40000 to 80000 deaths in the U.S occur due to misdiagnosis. Another estimation shows that there are about 12 million Americans who die every year due to misdiagnosis. This is the case in almost every country and Pakistan is no exclusion.

The current year has been not a normal year, the outbreak caused due to COVID-19 has been a massive one. People from all parts of the world have suffered in one way or the other. In such testing times, people from everywhere were trying to avoid visits to hospitals, clinics or places where infected people were being treated.

Due to these circumstances that were created by COVID-19, we came up with the idea of a thread-based health portal where doctors and patients can connect with each other virtually. In this portal, the basic stakeholders are doctors, patients and administrators. All of them will be able to register themselves and then login. As the name says that it is a thread-based portal, therefore once logged-in the patient can post their problem in the form of a thread. The patient will have an option to filter out doctors either by their location or by doctor ratings. When a doctor replies to a thread, the user will be allowed to check the doctor's complete profile and reviews. To start a private chat with the doctor, the patient will have to pay an upfront of the doctor's fees.

1.2 Objectives

- Our first and foremost objective is to provide a satisfying experience to our patients. Therefore, when a patient registers themselves on our portal, they will have to provide their medical history. So as, when the doctor writes a prescription, they can write it keeping in view the patient's medical record.
- The doctors can write the prescription on the patient's profile. The patients will be able to view it on their portal.
- Our aim is to provide an easy-to-use system for patients, therefore if a doctor recommends lab tests for the patient, they can recommend it from the registered labs on our application.
- The patient will be able to keep their identity anonymous for privacy issues.
- We plan to maintain integrity, therefore every doctor that registers on the portal will be verified on the basis of their PMDC number.

1.3 Problem statement

One of the main reason behind this idea was about the people that live in the rural areas, who find it difficult to pay visits to urban areas just for the purpose of consultation. Our portal will be effective for such people as it won't require a very strong internet connection as long as there is a need for video conferencing. Along with this, another reason was where people require out of city consultations. In this world full of technology, rather than travelling long distances just for the sake of consultation from a doctor of one's liking, isn't it better to just be at home and get that consultation. Moreover people who suffer from any phobia or are in some way or the other are mentally retarded and need consultation along with being anonymous. This platform that we are providing will keep them anonymous if they want hide their identity.

1.4 Assumptions & constraints

- Our portal will be available for users of all age groups.
- Restrictions will be applied on users that are found to be abusive.
- Our proposed portal or system will not require a very fast internet connection, as long as there does not exist a need for a video call between the patient and the doctor.
- We plan to deliver the complete project by the end of May 2021.

1.5 Project scope (what and what not to consider)

There are a couple of systems in Pakistan that are providing relatively the same services, but the major difference between our proposed system and the existing systems is that this will be the only portal where the doctors themselves will connect to the patients, whereas in the existing systems it is the patients that go searching out for a suitable doctor according to their requirements. One reason why we are working on this idea is that there are multiple doctors who are currently unemployed and such through such a portal they will be able to earn a good monthly income.

2 Chapter 2: Requirements Analysis

2.1 Stakeholders list (Actors)

- Doctors
- Patients
- Administrator

2.2 Requirements elicitation

2.2.1 Functional requirements

2.2.1.1 1. Register ○ The portal allows patients and doctors to register themselves. ○ The portal also allows admins to register themselves. ○ Each individual will register himself or herself by providing his or her complete information that is required.

2.2.1.2 Login

- Both doctors and patients will login through their login id and password.
- Admins will login using their personal login id and password.

2.2.1.3 Authentication

- The portal authenticates the login id's and passwords of all the users.
- Whenever an incorrect id or password is entered, a pop-up will appear having an error message.
- Once authenticated, the users can use the portal.

2.2.1.4 Set Profile

- The portal allows users to edit their profiles.
- Every time the profile is edited, it must be saved.
- Admins will also be allowed to update their profiles.

2.2.1.5 Search

- The portal allows both doctors and patients to search out for each user.
- Admins can also search for doctors and patients for the purpose of authentication and maintain integrity.

2.2.1.6 Add, Remove or Post Thread

- The portal allows patients to post a thread.
- The portal allows patients to remove a thread.
- The portal allows patients to edit their existing threads.

2.2.1.7 Connecting with the Doctor

- When a doctor responds to a particular thread, then both doctor and patient can enter a private chat, once the patient approves the doctor.

2.2.1.8 Doctors Response

- Once the customers issue is addressed, then the doctor gives his diagnosis, prescription and recommendation.

2.2.1.9 Feedback

- Both doctors and patient can provide feedback about each other.
- Both doctor and patient can also provide their feedback about the portal.

2.2.1.10 Logout

- All users, which include doctors, patients and admins, can logout.

2.2.2 Non-functional requirements

2.2.2.1 Safety and Security

- The portal allows users to login, once registration is completed. □
Only authorized personnel's can login to the portal.

2.2.2.2 Compatible

- Our portal will be compatible with all devices as well as browsers.

2.2.2.3 Flexible

- The portable will be suited to all sets of users.

2.2.2.4 Useable

- The portal will be user-friendly and easy to use.

2.2.2.5 Maintainable

- The portal will be maintained for keeping it save from bugs.

2.2.2.6 IT Support

- Users that face any issue regarding the portal can lodge their complaints to IT Support.
- Requirements traceability matrix

2.2.3 Requirements Traceability Matrix

Table 1. Requirements Traceability matrix

ID	TYPE	DESCRIPTION	PRIORITY
REQ-1	Non-Functional Requirements	Each user has different credentials.	HIGH
REQ-2	Non-Functional Requirements	Only an authorized user can login.	HIGH
REQ-3	Non-Functional Requirements	User-friendly design.	LOW
REQ-4	Non-Functional Requirements	The portal will be compatible with all browsers and devices.	MEDIUM
REQ-5	Non-Functional Requirements	The portal will be easy to keep up.	HIGH

REQ-6	Non-Functional Requirements	All the documentation for the portal will be kept up and saved.	LOW
REQ-7	Functional Requirements	The portal allows users to register themselves.	HIGH

REQ-8	Functional Requirements	The portal will allow every user that has a valid id and password to login.	MEDIUM
REQ-9	Functional Requirements	The portal allows each user to logout.	MEDIUM
REQ-10	Functional Requirements	The database validates each id and password.	HIGH

REQ-11	Functional Requirements	The portal will allow every user edit their profile.	MEDIUM
REQ-12	Functional Requirements	The portal allows patients to post their threads.	MEDIUM
REQ-13	Functional Requirements	The portal allows doctors to view the threads.	MEDIUM
REQ-14	Functional Requirements	The portal allows doctors to write prescriptions.	MEDIUM
REQ-15	Functional Requirements	The portal allows users to rate each other.	LOW

2.3 Use case description

USD Table 3

UCD ID:	03
UCD Name:	Set Profile
Actors:	Doctor, Patient
Objective:	All users are authenticated.
Pre - Condition:	User must login to the system.
Post - Condition:	User(Patient) can post their issues, while user (Doctor) can reply to their posts.
Events:	1 Users login to the portal. 2 User clicks on set profile. 3 A drop down menu appears, with two options, namely doctor and patient. 4 If the user is a patient, they will need to provide their personal details along with their medical history. 5 If the user is a doctor, they will need to provide their personal details along with their PMDC number. 6 The portal will validate the PMDC number against other details.
Alternative flows:	As long as the PMDC number is not verified, the doctor cannot connect with the patient.

USD Table 4

UCD ID:	04
UCD Name:	Post Thread
Actors:	Patient
Objective:	The patient can post their thread in the form of a thread.
Pre - Condition:	Patient must have completed their profile.
Post - Condition:	Patient can get a response from the doctor.
Events:	1 The patient goes to the portal. 2 The patient clicks on post thread. 3 Patient describes their problem in the thread.
Alternative flows:	None.

UCD ID:	05
UCD Name:	View Threads
Actors:	Doctor
Objectives:	Doctor can reply to the patient offering a solution.
Pre - Condition:	The doctor will view a thread only if a patient has posted a thread. Also, if the thread describes a problem related to the doctor's field of specialization, only then can they view it.
Post - Condition:	The doctor can reply and offer their expertise.
Events:	1 The doctor visits the portal site. 2 The doctor clicks on view threads. 3 The doctor replies to the threads where they can provide their expertise.
Alternative flows:	None. .

3 UCD 6

UCD ID:	06
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UCD Name:	Select Doctor
Actors:	Patient
Objectives:	Patient can select the best doctor.
Pre - Condition:	User must have posted a valid thread describing the problem.
Post - Condition:	Patient can communicate with the doctor.
Events:	1 Patient visits the portal site. 2 Patients check if a doctor has replied to their thread. 3 If a doctor has replied to a thread, the patient can check the doctors profile along with their charges. 4 If the patient is satisfied with the doctors profile and fees, they can ask for an appointment time. 5 Patients can ignore the doctors with whose profile they are not satisfied with.
Alternative flows:	None. .

4 UCD 7

UCD ID:	07
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UCD Name:	Book Appointment
Actors:	Doctor, Patient
Objectives:	Users can communicate with each other.
Pre - Condition:	Patient approves the doctor and pays the fees.
Post - Condition:	Doctor diagnosis the patient and gives a prescription.
Events:	1 When patient approves the doctor, the patient pays the fees of the doctor. 2 Doctor views it and gives a appointment time when they can communicate over a live chat.
Alternative flows:	None. .

UCD ID:	08
UCD Name:	Discussion
Actors:	Doctor, Patient
Objectives:	Both users can interact with each other efficiently.
Pre - Condition:	An appointment must have been booked.
Post - Condition:	The patient is satisfied.
Events:	1 Both of our users, that include doctors and patients join a live chat. 2 At first the patient will elaborate their issue and describe it completely. 3 After addressing the patients illness, the doctor provides their diagnosis.
Alternative flows:	None. .

6 UCD 9

UCD ID:	09
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UCD Name:	Prescription
Actors:	Doctor, Patient
Objectives:	Patient is prescribed medicines according to their illness.
Pre - Condition:	The doctor diagnosis the illness.
Post - Condition:	The patient adheres to the doctors prescription to get cured.
Events:	1 Once the doctor has diagnosed the patients illness, he can give a prescription. 2 Before handing out any prescriptions, the doctor must view the patients medical history, so as there is no contradiction among the medicines that the patient already uses.
Alternative flows:	Doctor must check the patients medical history before posting any prescription on the patients profile. .

11UCD 10

UCD ID:	10
UCD Name:	Edit Profile
Actors:	Doctor, Patient, Admin

Objectives:	Users can edit and save their profiles.
Pre - Condition:	The user must have a record.
Post - Condition:	The users profile must be edited and saved.
Events:	1 The user clicks on “My Profile”. 2 The user edits their profile. 3 The user presses the save icon. 4 The Database is updated. 5. The portal shows “successfully saved” message to the user.
Alternative flows:	Incase, the portal doesn’t save the users changes, it will inform the user.

UCD ID:	11
UCD Name:	Feedback
Actors:	Doctors, Patients
Objective:	Both users can provide feedback about each other.
Pre - Condition:	The user is asked for feedback.

Post - Condition:	The feedback is saved successfully.
Events:	1 User will be asked to rate the other user at the end.. 2 The user writes their feedback. 3 The user presses the “Rate” icon. 4 Feedback will be saved in the database.
Alternative flows:	None.

12 UCD 12

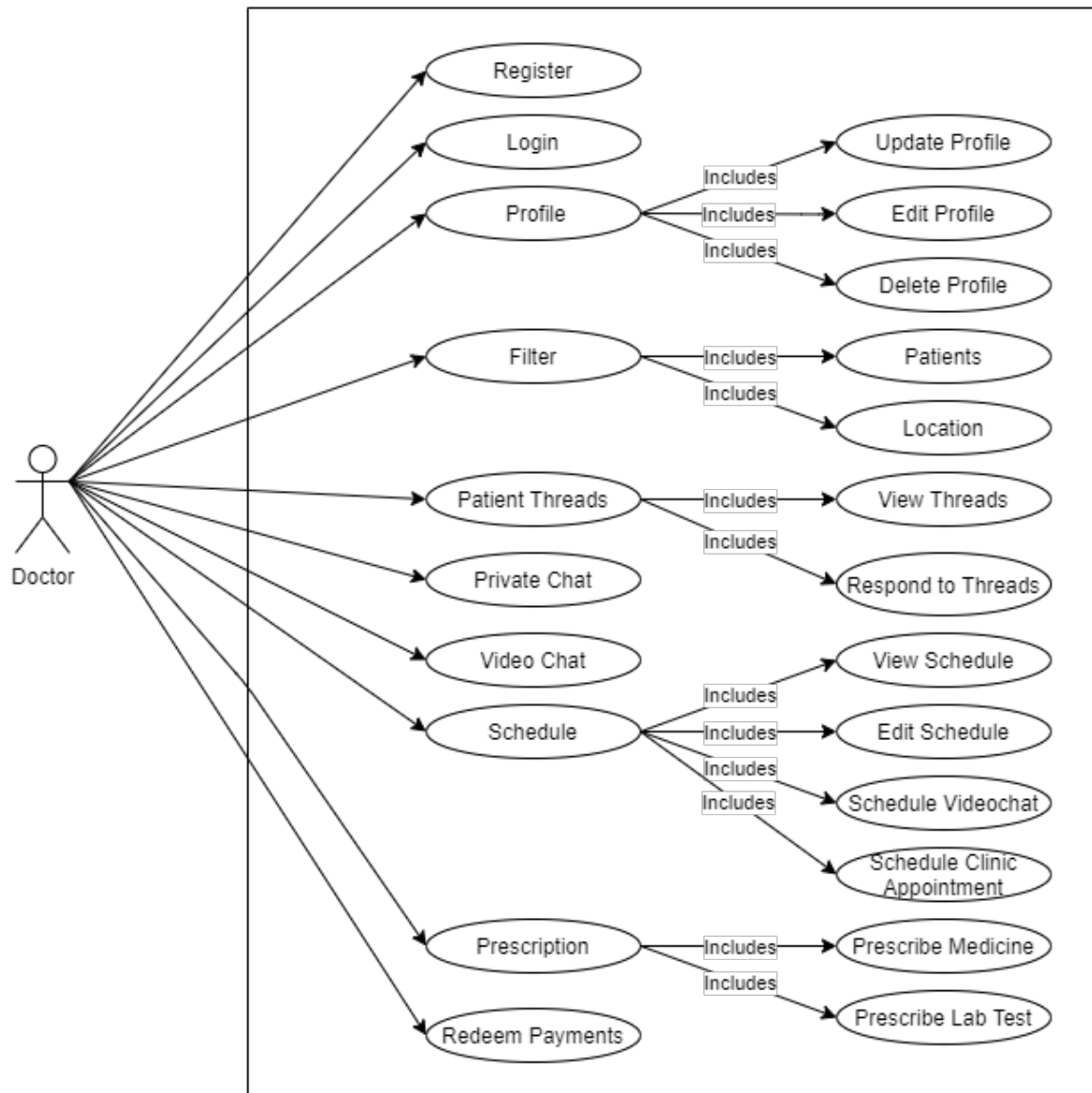
UCD ID:	12
UCD Name:	Logout
Actors:	Doctor, Patient, Admin
Objective:	The users can logout from the portal.
Pre - Condition:	The user must be logged in.
Post - Condition:	The user shall be logged out successfully..
Events:	1 Once the users are done with the portal, they can logout. 2 User will have to click on the “LogOut” icon. 3 The user will be logged out.

Alternative flows:	The user will be informed if they are not logged out.
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2.4 Use Case Diagram

Figure 1 UCD 1

System



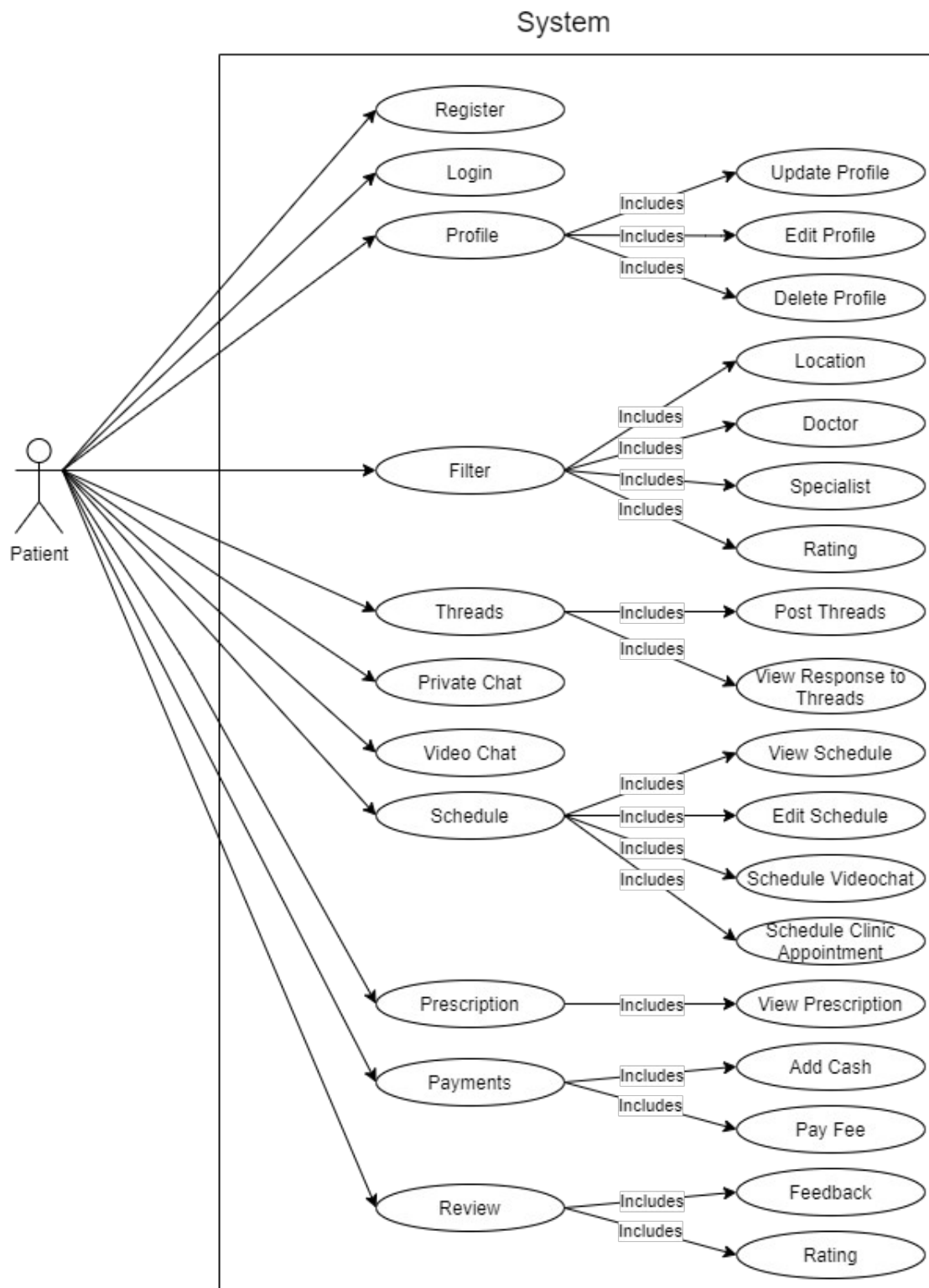
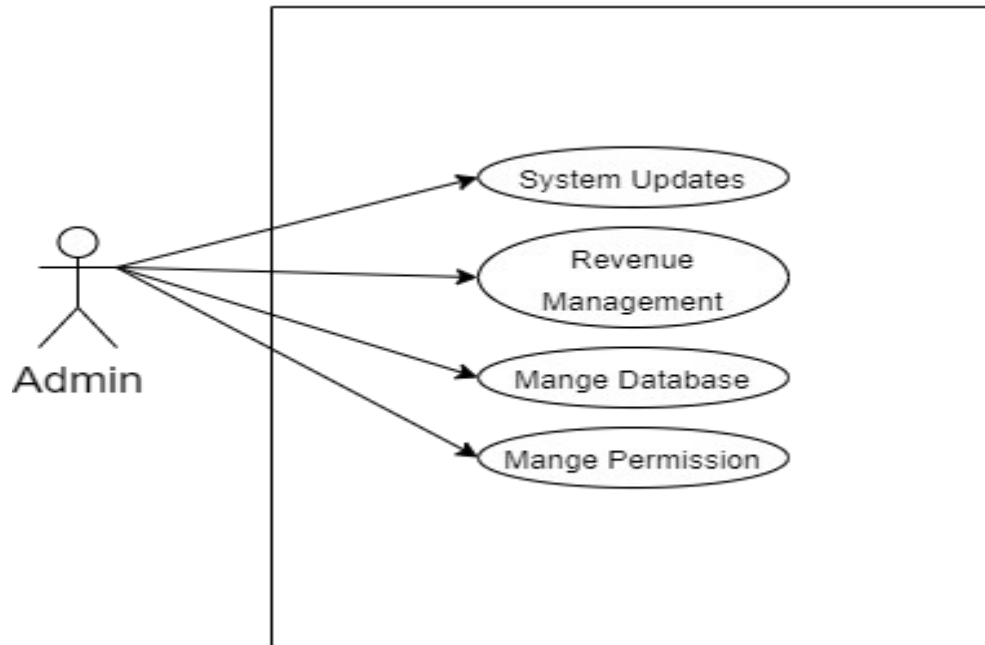


Figure 3 UCD 3



2.5 Software Development Life Cycle

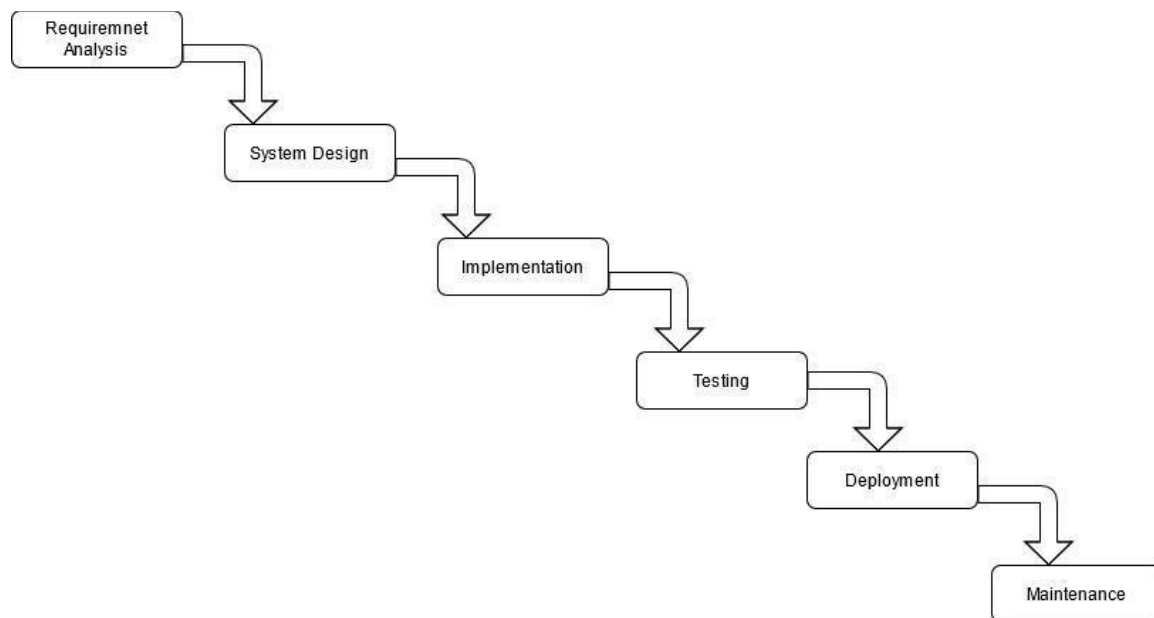
The SDLC model that we are using is waterfall model. It is the first process model that was introduced. It is also referred as a linear-sequential model. It is a relatively simple model to implement. In this model, every phase must be completed before we begin with the new phase as we cannot overlap in this model. This model is usually used where documents are usually clear and well documented. It is also used where the project is relatively short.

The waterfall model works on the basis of the following principles.

- 1 Requirement Analysis.

- 2 System Design.
- 3 Implementation.
- 4 Testing.
- 5 Deployment.
- 6 Maintenance.

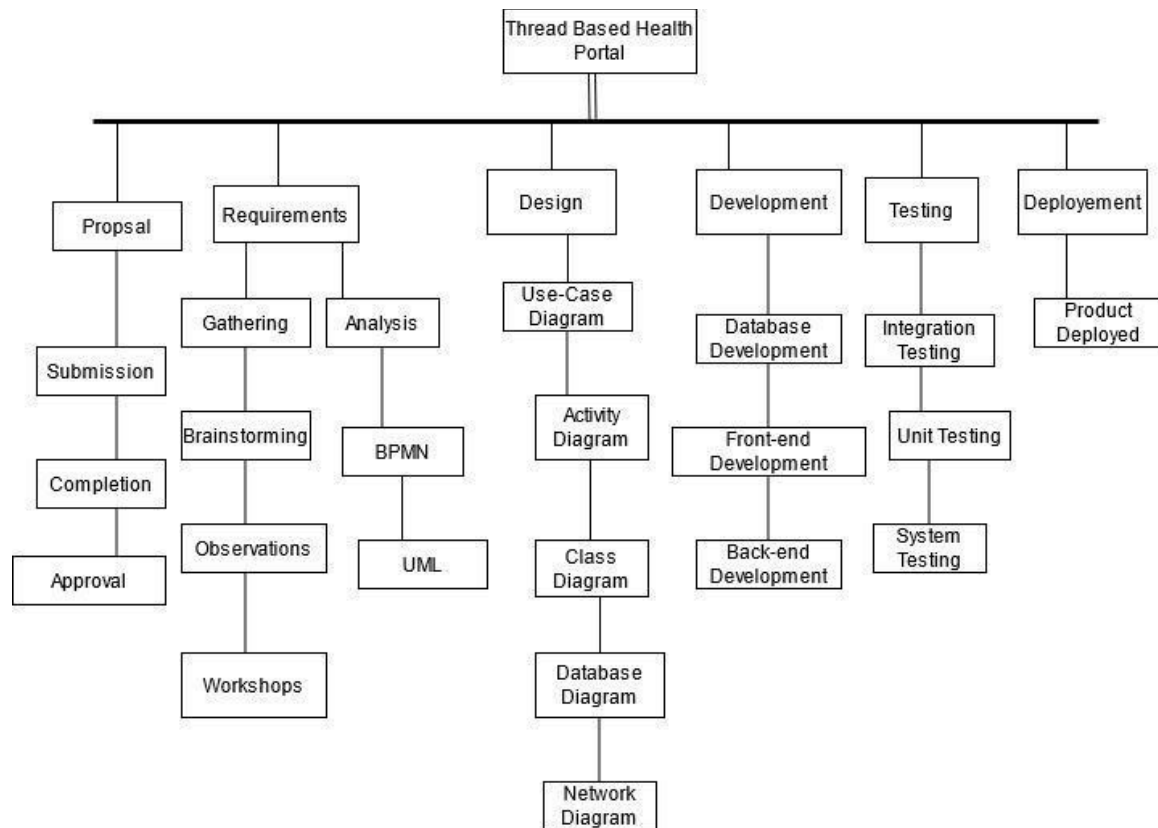
Figure 4 SDLC



3 Chapter 3: System Design

3.1 Work breakdown structure (WBS)

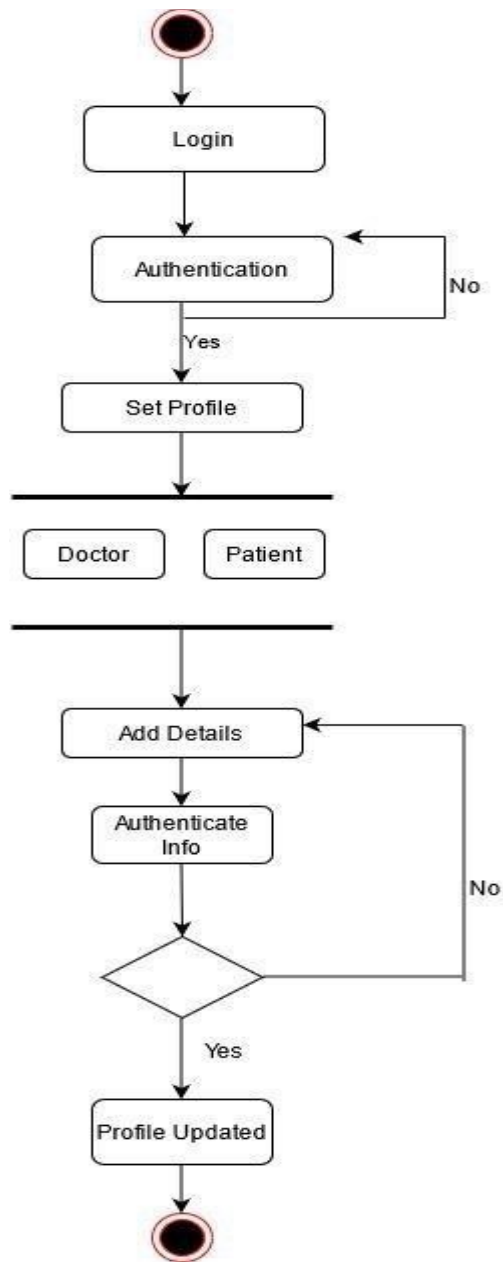
Figure 5 WBS



3.2 Activity diagram

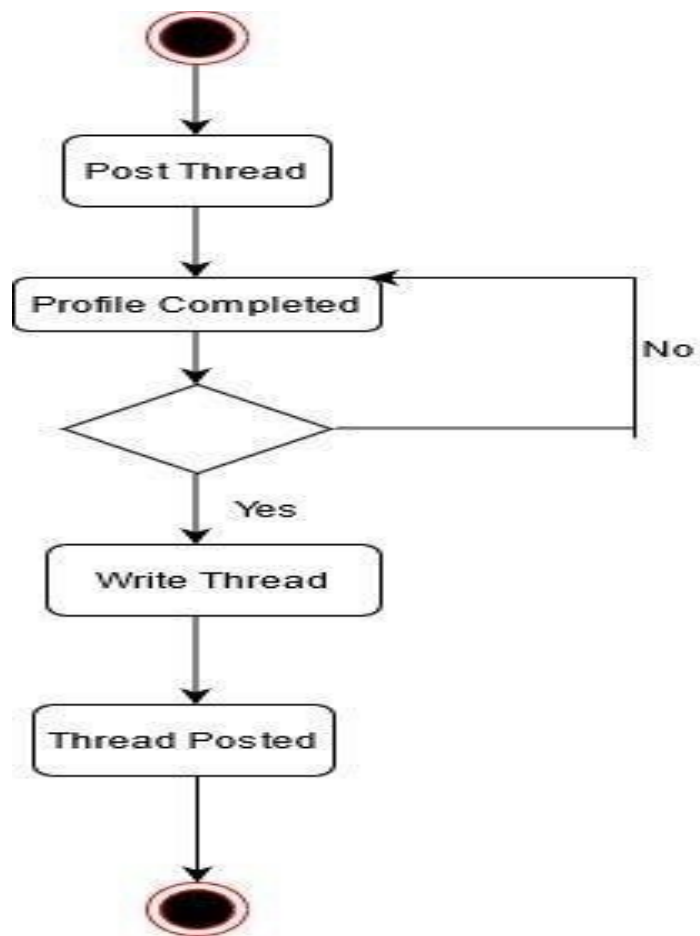
3.2.1 Login/Register

Figure 6 Activity 1



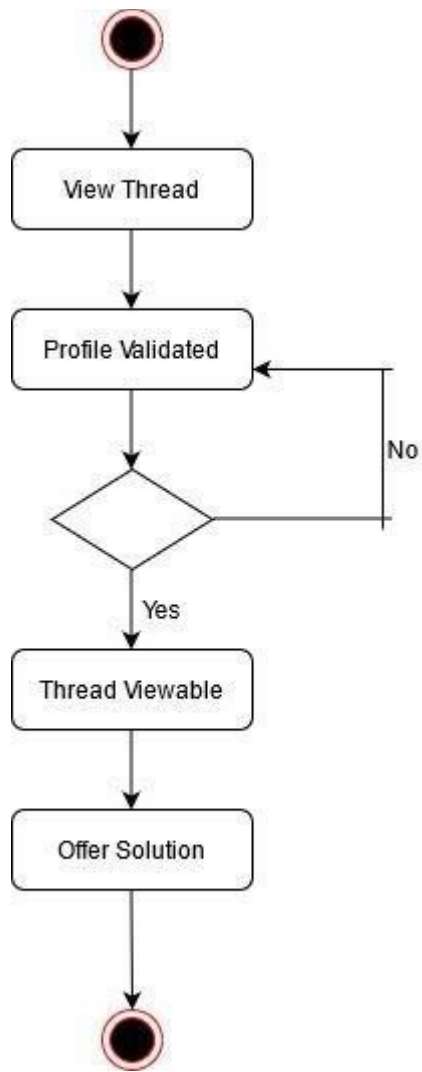
3.2.2 Post Thread

Figure 7 Activity 2



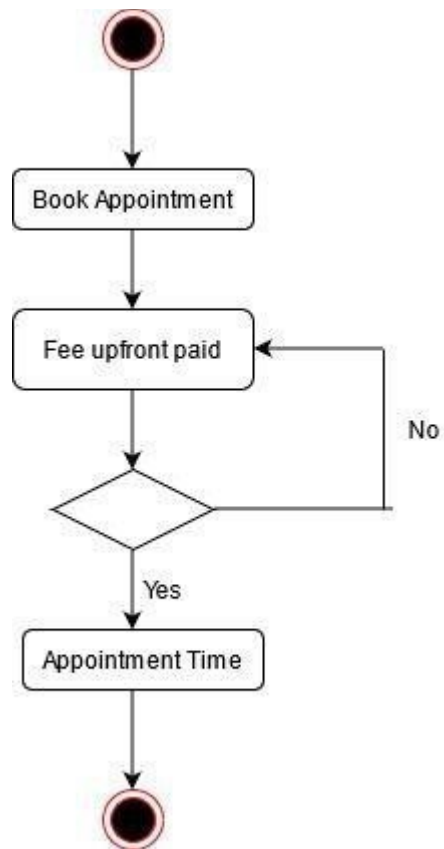
3.2.3 View Thread

Figure 8 Activity 3



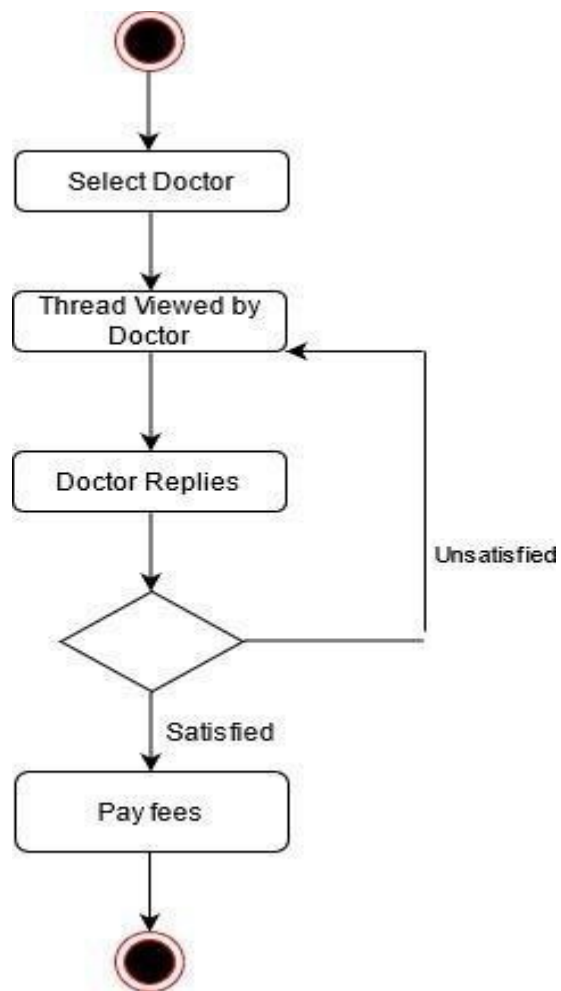
3.2.4 Book Appointment

Figure 9 Activity 4



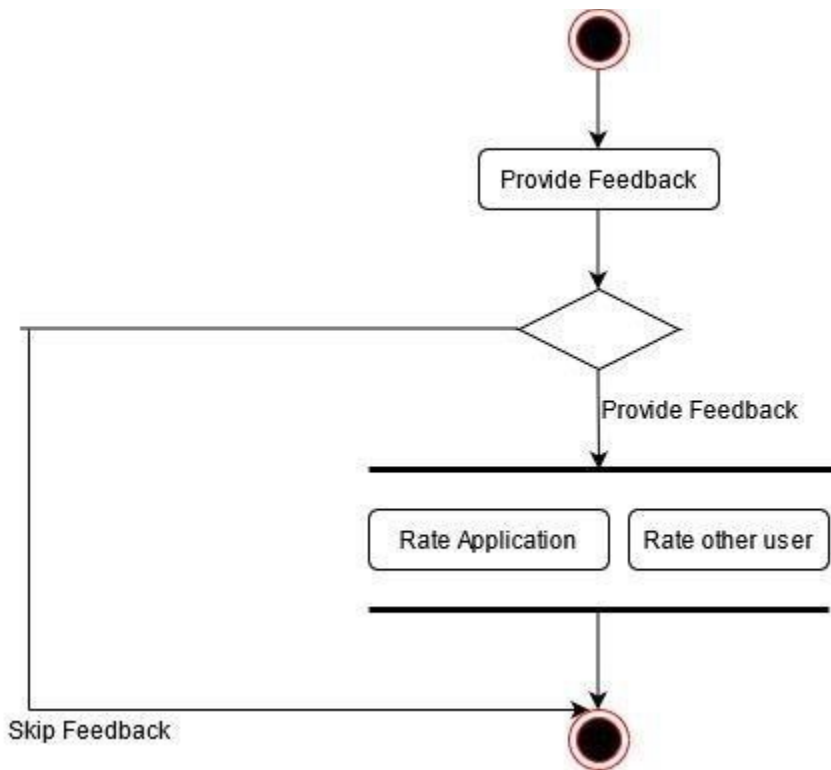
3.2.5 Select doctor

Figure 10 Activity 5



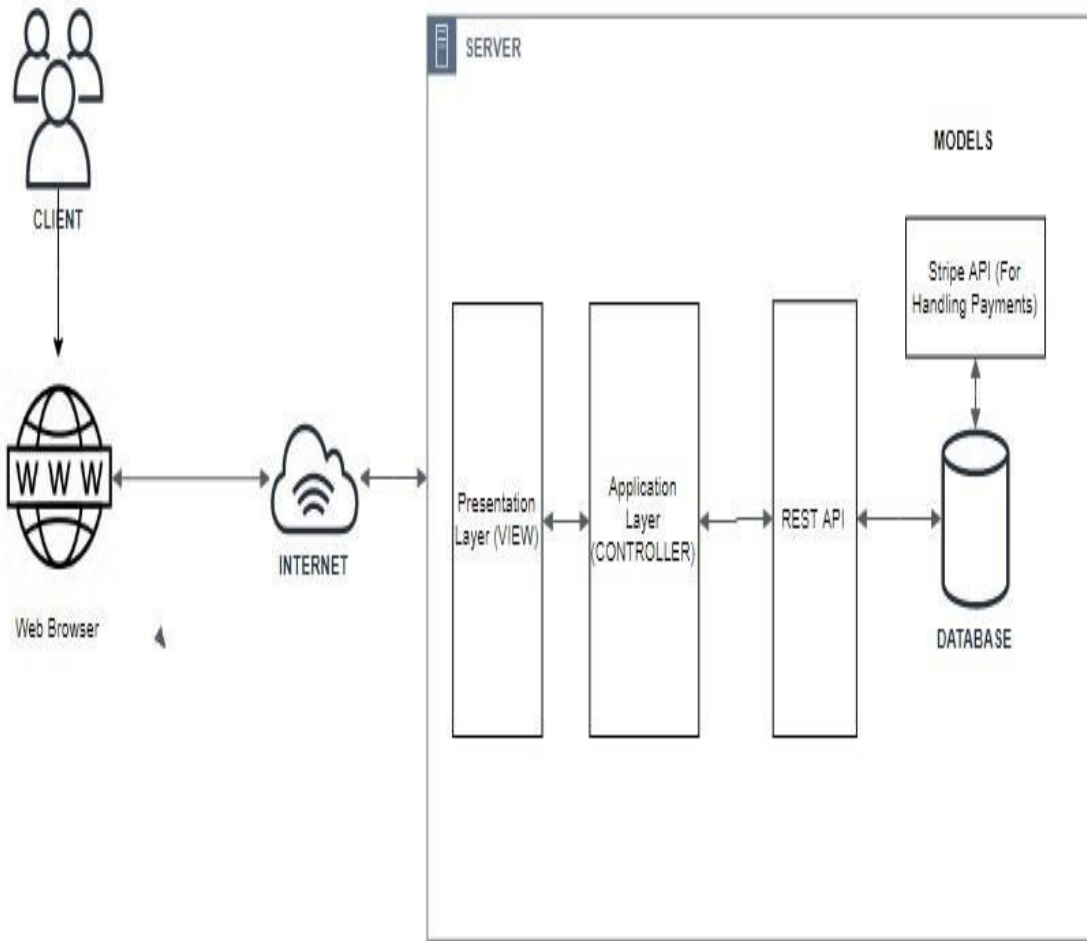
3.2.6 Feedback

Figure 11 Activity 6



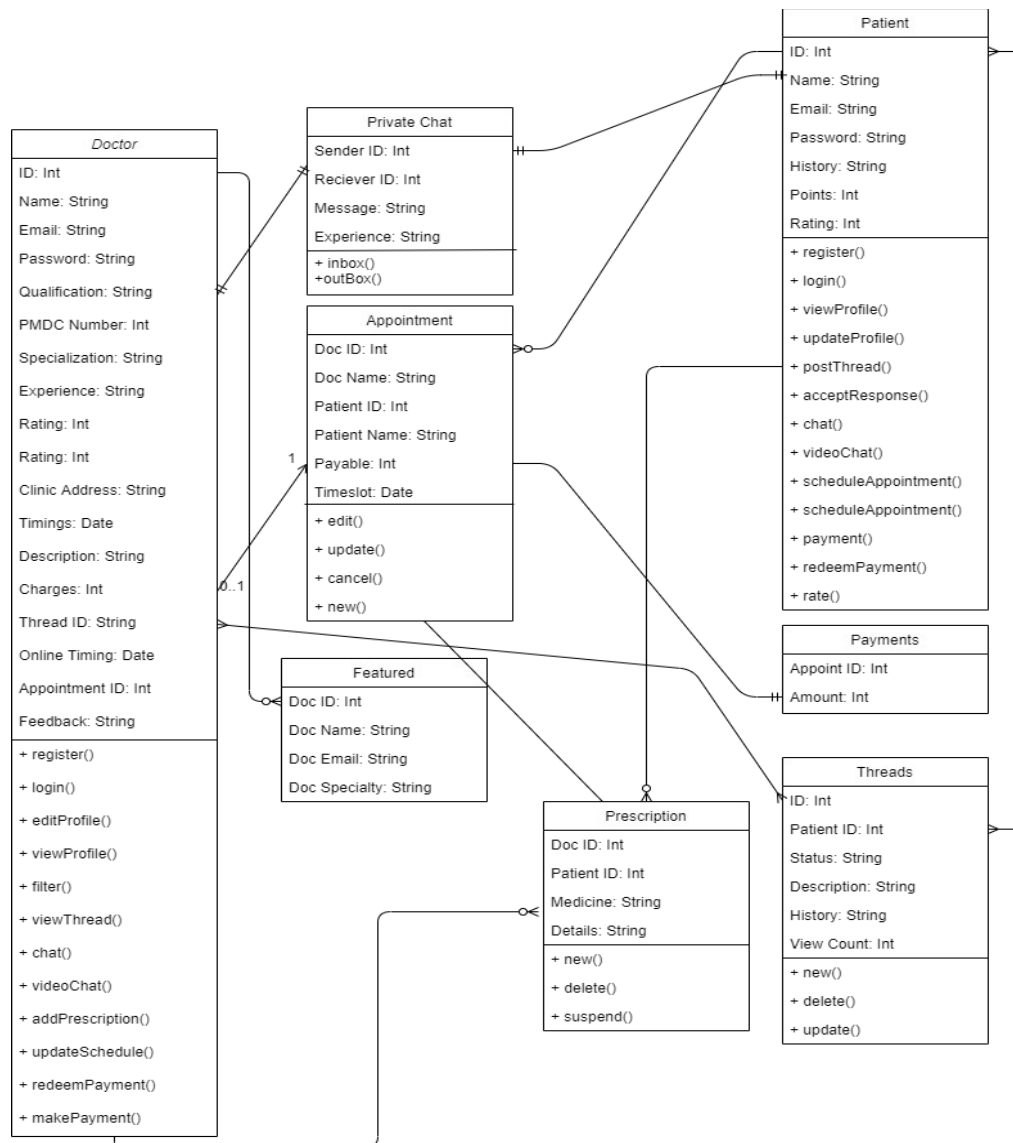
3.3 Software Architecture Design

Figure 12 SAD



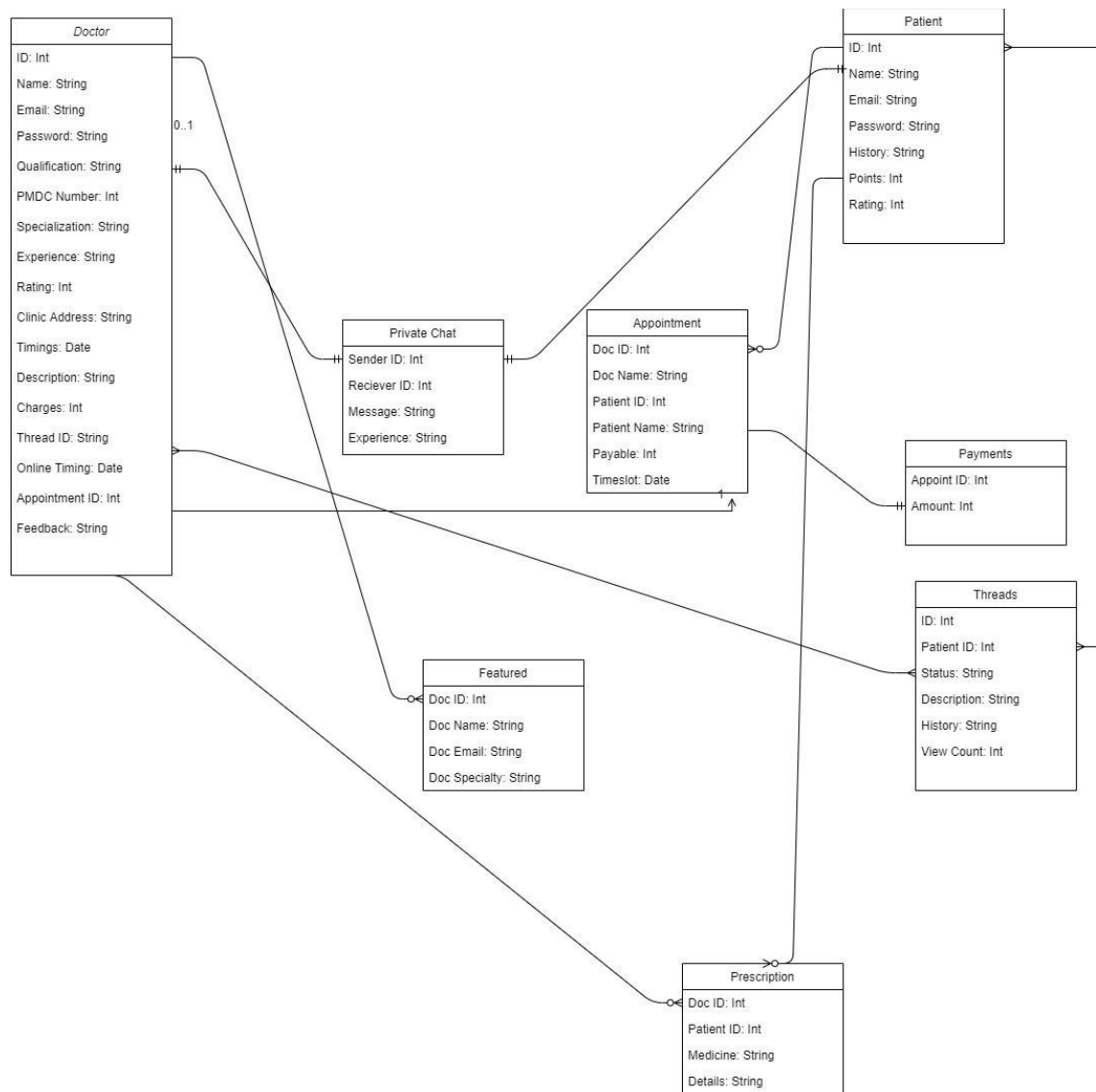
3.4 Class diagram

Figure 13 Class



3.5 Database diagram

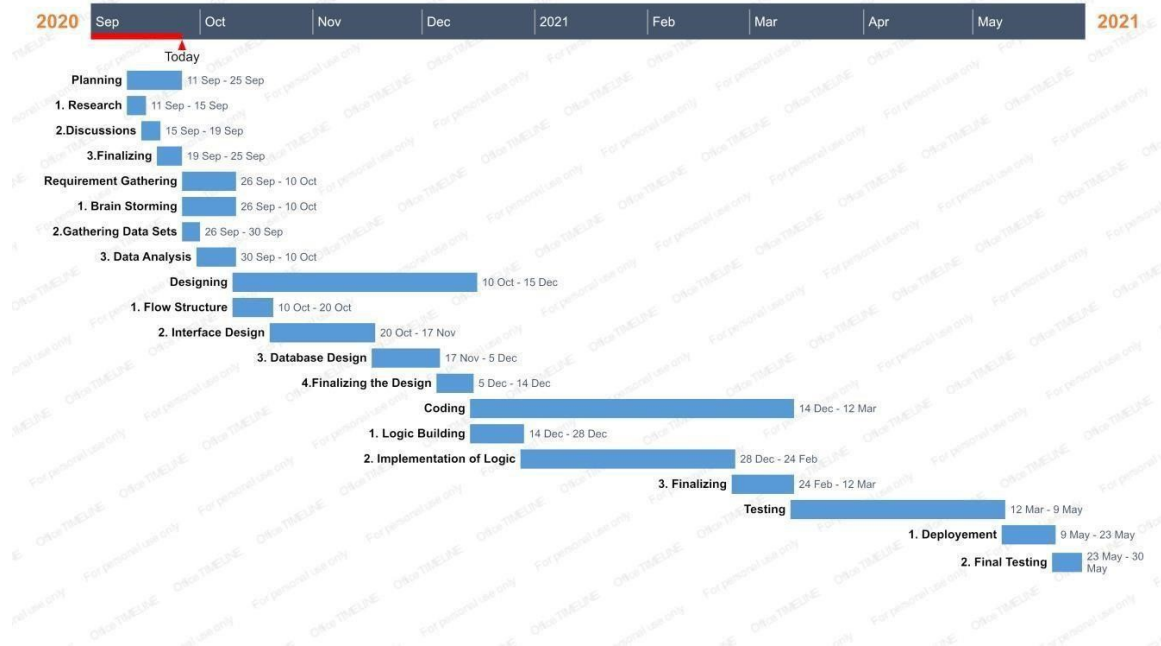
Figure 14 Database



3.6 Network diagram (Gantt chart)

Figure 15 Gantt

Thread Based Health Portal



4 Chapter 4: System Testing

4.1 Test cases

Table 14 Test Case 1

NO:	1	Name:	Registration
System:	Thread based Health Portal	Subsystem:	
Designed By:	Affan Nadir	Design Date:	

Executed By:		Execution Date:	
Description:	A user wants to register themselves.		

Pre-Conditions:	The user must not be previously registered.
------------------------	---

Step	Action	Expected System Response	Pass/Fail	Comment
1.	The user clicks on the sign up icon.	Portal will display the sign up page.		
2.	User enters all the information required.	The portal will validate the data entered.		
3.	User saves the entered information.	User will move to the login page.		

Post-Conditions:	The users request to register is looked by the server. The database saves the users information.
-------------------------	--

Table 15 Test Case 2

NO:	2	Name:	Login
System:	Thread based Health Portal	Subsystem:	
Designed By:	Affan Nadir	Design Date:	
Executed By:		Execution Date:	
Description:	The user wants to login into the portal.		

Pre-Conditions:	The user must have been already registered.
------------------------	---

Step	Action	Expected System Response	Pass/Fail	Comment
1.	The user enters the credentials.	The portal validates whether the information is correct.		

2.	The user clicks on login button.	The entered credentials will be sent to the main server. If the credentials are correct and the user has right to access the portal. The home page will open up.		
----	----------------------------------	--	--	--

Post-Conditions:	The user will move to the home page.
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Table 16 Test Case 3

NO:	3	Name::	Set Profile
System:	Thread based Health Portal	Subsystem:	
Designed By:	Affan Nadir	Design Date:	
Executed By:		Execution Date:	
	The user needs to set their profiles.		

Description:		
---------------------	--	--

Pre-Conditions:		The user must be registered.		
Step	Action	Expected System Response	Pass/Fail	Comment
1.	The user will click on “My profile”.	Portal will open up the profile page.		
2.	User will complete their profile and click on update.	The portal will make the required changes, and the database will be updated.		

Post-Conditions:	The users profile will be updated.
-------------------------	------------------------------------

Table 17 Test Case 4

NO:	4	Name::	Post Thread
System:	Thread based Health Portal	Subsystem:	

Designed By:	Affan Nadir	Design Date:	
Executed By:		Execution Date:	
Description:	The user (Patient) wants to post their problem.		

Pre-Conditions:		The user (Patient) must have completed their profile.		
Steps	Action	Expected System Response	Pass/Fail	Comment
1.	User will post thread.	Thread will be visible to all doctors of that specialization.		
2.	User can apply filters if they want their post to be viewed only by specific doctors.	The post will be available to doctors who fall in the category of those filters.		

Post-Conditions:	The users thread is successfully posted and can be viewed by doctors.
-------------------------	---

Table 18 Test Case 5

NO:	5	Name::	Select Doctor
System:	Thread based Health Portal	Subsystem:	
Designed By:	Affan Nadir	Design Date:	
Executed By:		Execution Date:	
Description:	The user (Patient) wants select their doctor who they think will help them out.		

Pre-Conditions:		More than one doctor must have replied to the users thread.		
Steps	Action	Expected System Response	Pass/Fail	Comment
1.	User will be able to review the doctor and then select one of the doctor.	Once selected, the user will be asked to pay the doctor's fees.		

2.	After paying the fees, the patient will wait for the doctors response.	The doctor will respond by giving an appointment time.		
----	--	--	--	--

Post-Conditions:	Both users can communicate with each other.
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Table 19 Test Case 6

NO:	6	Name::	Discussion
System:	Thread based Health Portal	Subsystem:	
Designed By:	Affan Nadir	Design Date:	
Executed By:		Execution Date:	
Description:	The patient can openly elaborate their problem to the doctor.		

Pre-Conditions:	User must be available at the time of appointment.	

Steps	Action	Expected System Response	Pass/Fail	Comment
1.	Patient will elaborate their problem to the doctor.	The doctor will ask questions from the patient..		
2.	The patient will answer the doctors questions.	The doctor will try figuring out the patients issue.		

Post-Conditions:	The doctor is able to figure out the patients issue.
-------------------------	--

Table 20 Test Case 7

NO:	7	Name::	Recommendations
System:	Thread based Health Portal	Subsystem:	
Designed By:	Affan Nadir	Design Date:	
Executed By:		Execution Date:	
	The doctor gives a solution to the patient according to their condition.		
Description:			

Pre-Conditions:		The doctor must have viewed the patients history before handing out any prescription.			
Steps	Action		Expected System Response	Pass/Fail	Comment
1.	The doctor will look the patients' medical history before giving any prescription.		Portal will display the patients' medical history to the doctor.		
2.	After looking the patients' medical history, the doctor can click on "write prescription" for the patient.		Patient will be able to view the prescription on their home page.		

Post-Conditions:	The patient must be satisfied by the doctor's response.
-------------------------	---

NO:	8	Name::	Feedback
System:	Thread based Health Portal	Subsystem:	
Designed By:	Affan Nadir	Design Date:	
Executed By:		Execution Date:	
Description:	Both users are satisfied with the portal, as well as with each other.		

Pre-Conditions:		The discussion must have been completed.			
Steps	Action		Expected System Response	Pass/Fail	Comment

1.	At the end of the chat, both users will be able to rate each other and write comments.	The portal will give the option to rate and write comments at the end of the live chat.		
----	--	---	--	--

Post-Conditions:	Both users must be satisfied.
-------------------------	-------------------------------

4.2 Unit Testing

During this phase, the individual elements or components were tested to check whether each component is performing its task. We identified a few bugs and resolved them.

4.2 Acceptance Testing

During this phase the project was tested against the business requirements that were mentioned in the proposal.

The following functionalities were tested during this phase:

- User Authentication
- Updation of Threads

After going through different stages of development, the project is now ready to fulfill the requirements.

5 Chapter 5: Application Frontend

This section contains all the screenshots of different screens that exist in our project.

5.1 Doctor Interface:

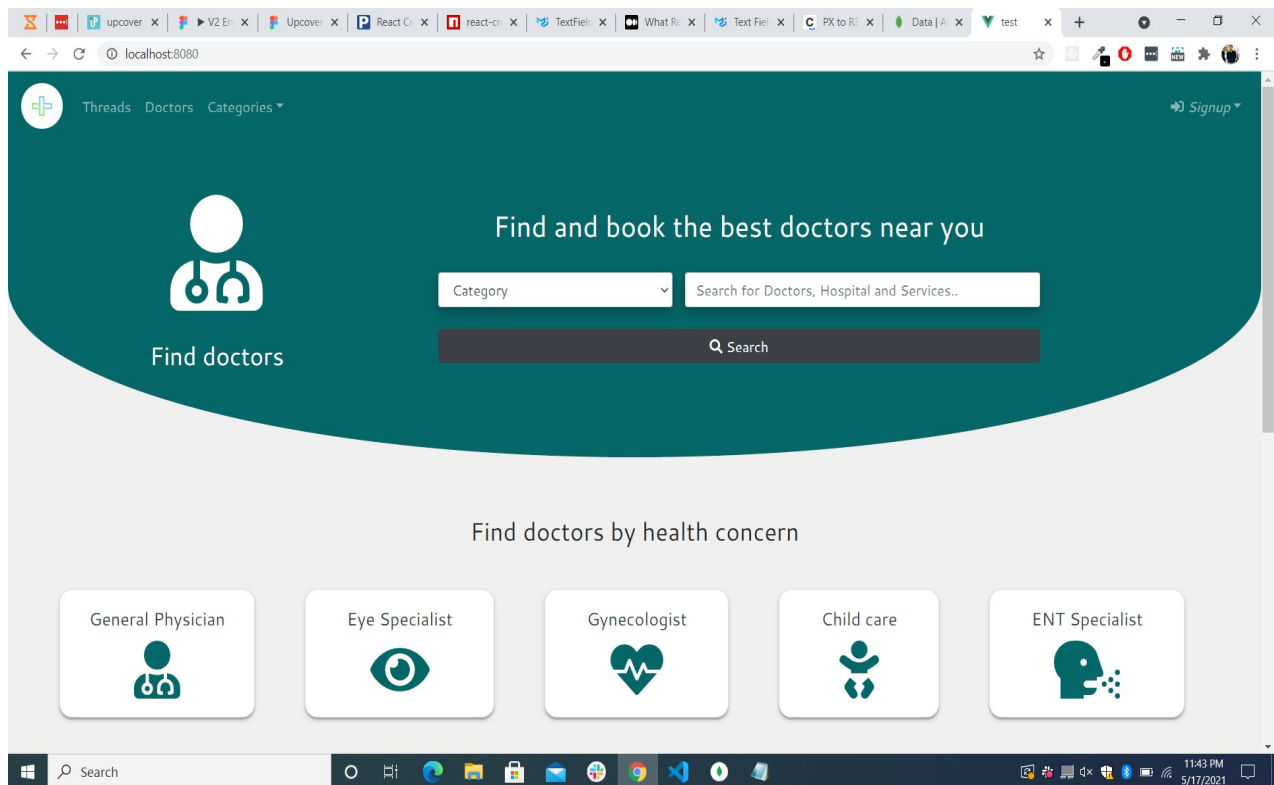


Figure Landing Page: This is the landing page of our website. Here one can sign up as either a doctor or a patient.

Threads Doctors Categories [Signup](#)

Doctor Register

Name	Email
Dr. John	Email
Password	Qualification
*****	qualification
Clinic Address	
1234 Main St	
PMDC Number	Specialization
pmdc number..	
Experience	Charges
2 years etc	1000 PKR
Description	

Figure: Doctor registration form: For anyone signing up as a doctor, they need to fill this registration form.

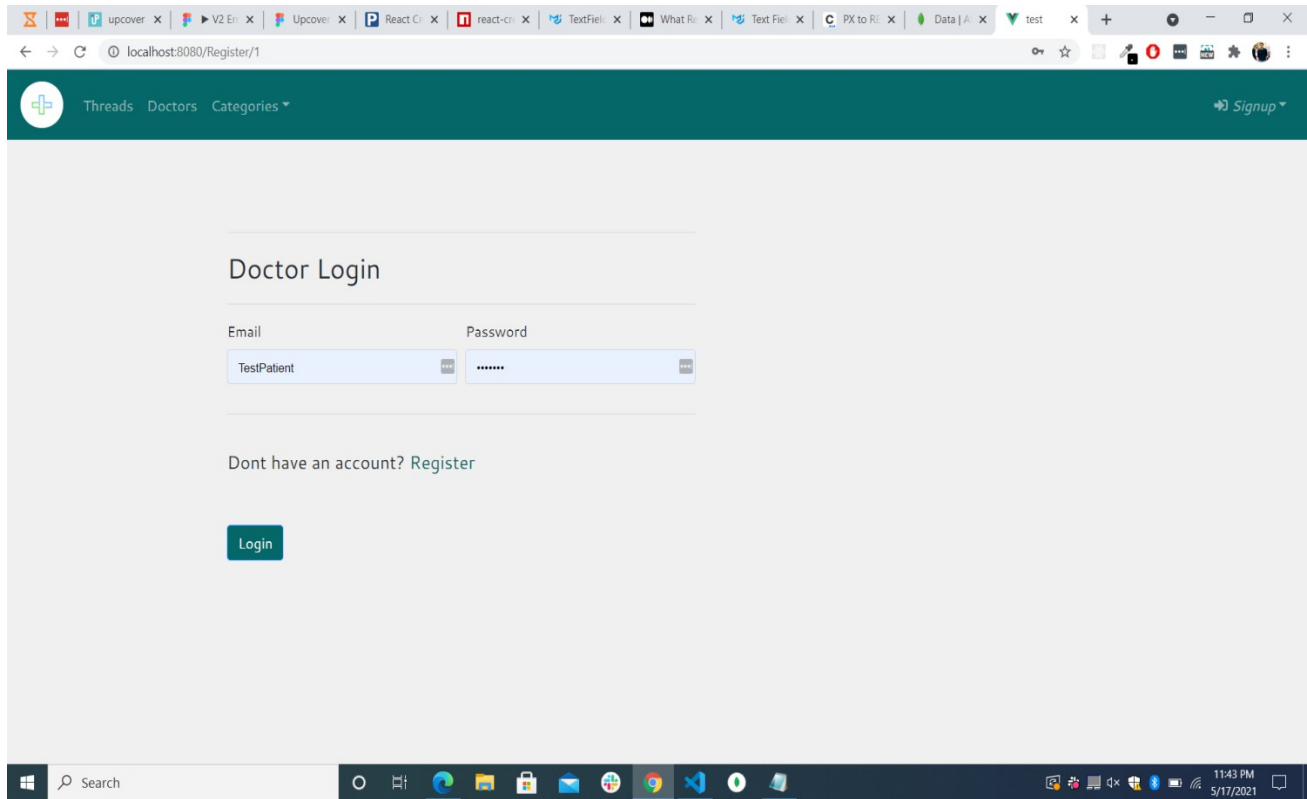


Figure Doctor Login: After signing up by filling the registration form, the doctor can login by providing their credentials.

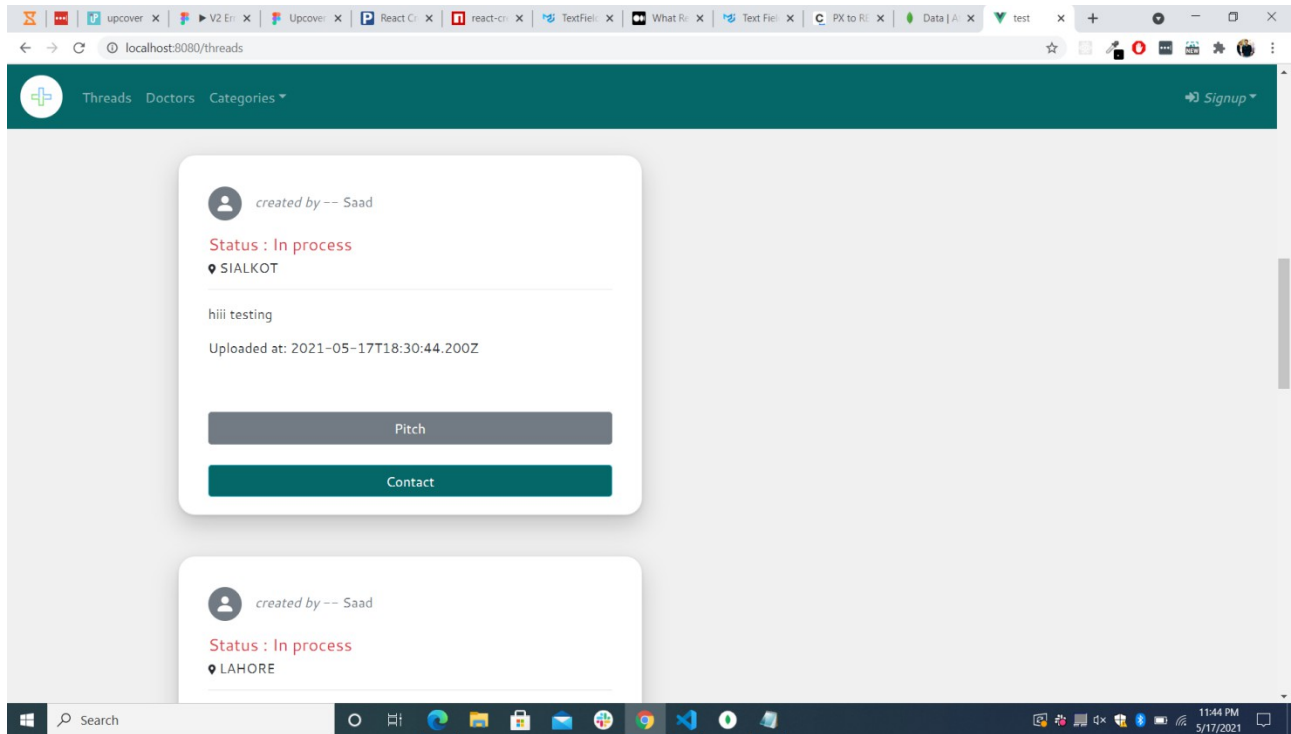


Figure View Threads: Here the doctors can view the threads posted by the patients and can pitch a solution to the patient.

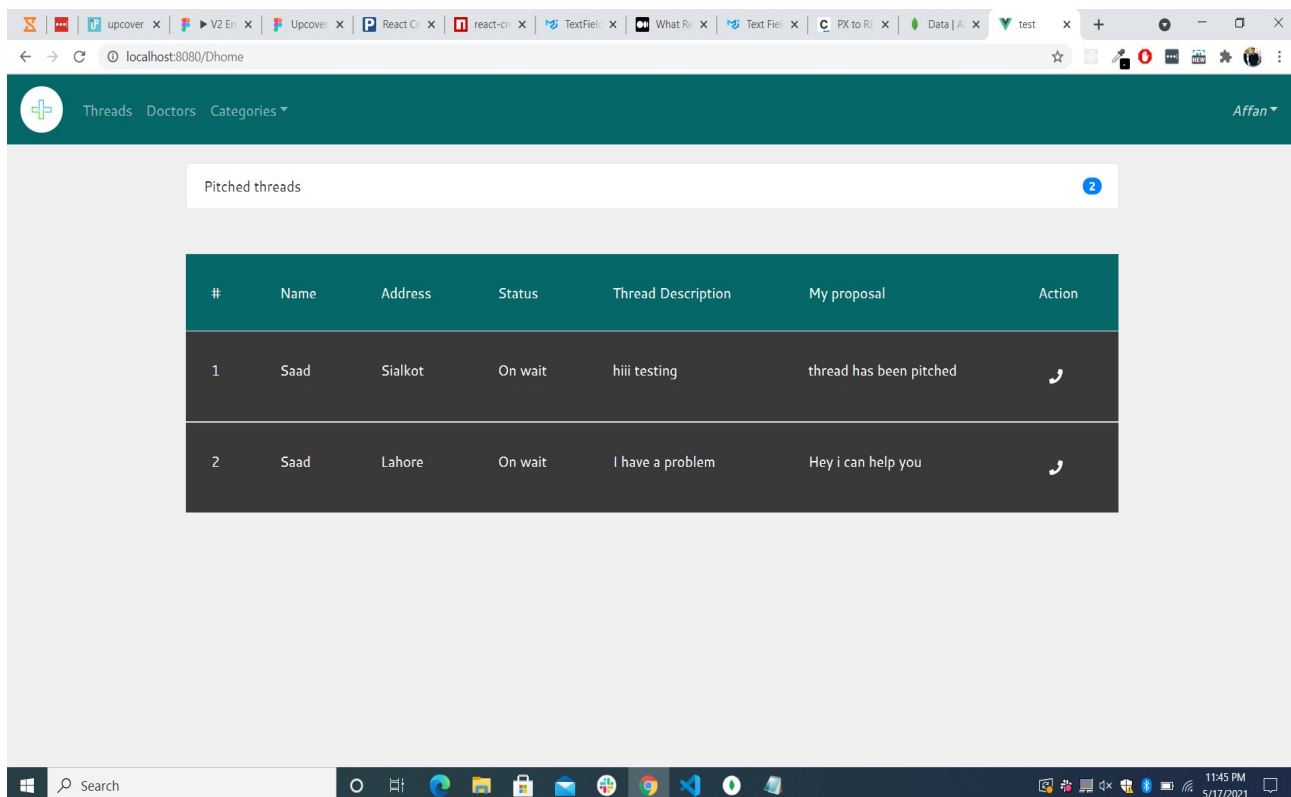


Figure View Pitched: On this screen, the doctor can view the threads which have been already pitched.

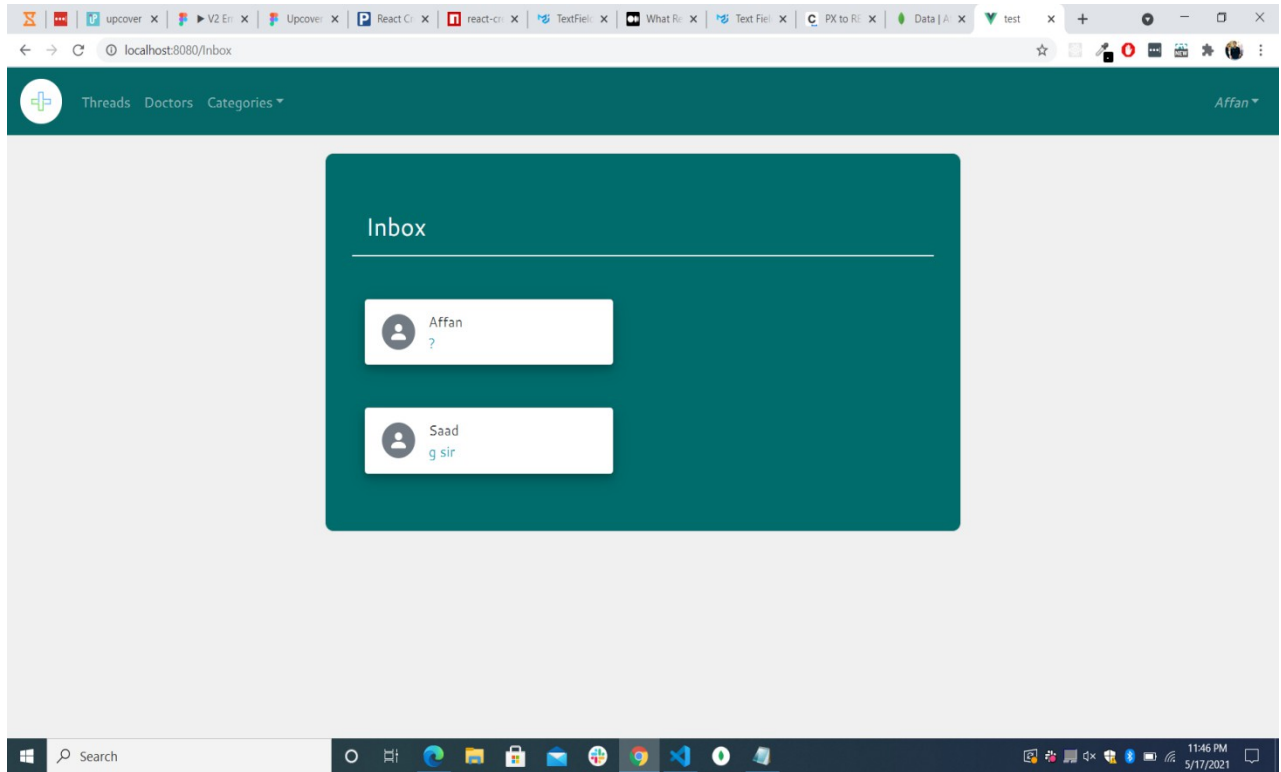


Figure Inbox: In this tab, the doctors can view their messages and chats that they have had with their patients.

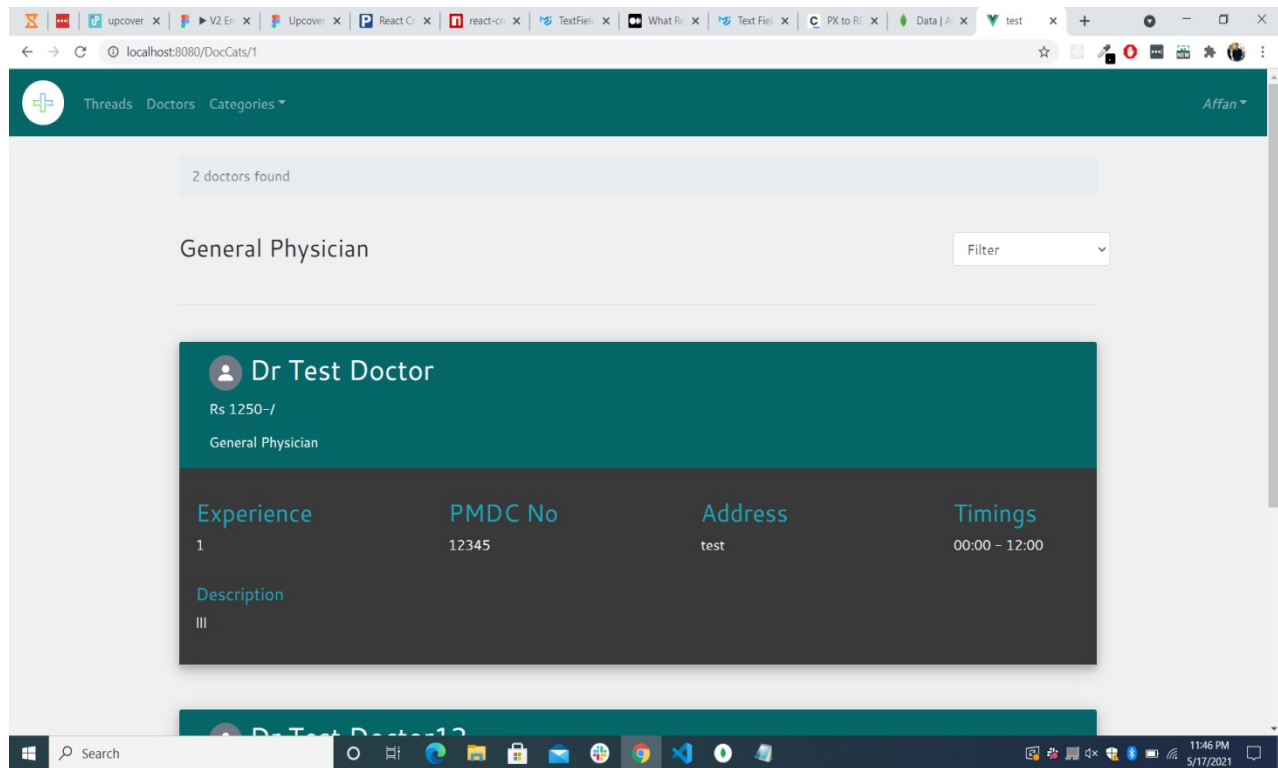


Figure View profile: In this tab, a doctor can view the profile of another doctor to see their expertise as well as their fees.

5.2 Patient Interface

The screenshot shows a web browser window with the address bar displaying 'localhost:8080/Register/2'. The page has a dark teal header with a logo on the left and a 'Signup' link on the right. Below the header, the main content area is light gray. The 'Patient Register' form is centered and contains three input fields: 'Full name' under the 'Name' label, 'Email' under the 'Email' label, and a password field with masked characters '*****' under the 'Password' label. Below these fields is a link that says 'Already have an account? Login'. At the bottom of the form is a dark teal button labeled 'Register'. The Windows taskbar is visible at the bottom of the browser window, showing the search bar and various application icons.

Figure Patient Register: The sign up process for a patient is relatively simple. The patient just needs to provide their name and email, and then set a password to process further.

The screenshot shows the same web browser window, but the page displays the 'Patient Login' form. The header and taskbar are identical to the previous screenshot. The 'Patient Login' form is centered and contains two input fields: 'Email' with the text 'Saad' and 'Password' with masked characters '*****'. Below these fields is a link that says 'Dont have an account? Register'. At the bottom of the form is a dark teal button labeled 'Login'.

Figure Patient Login: The patient needs to provide their email and password to login.

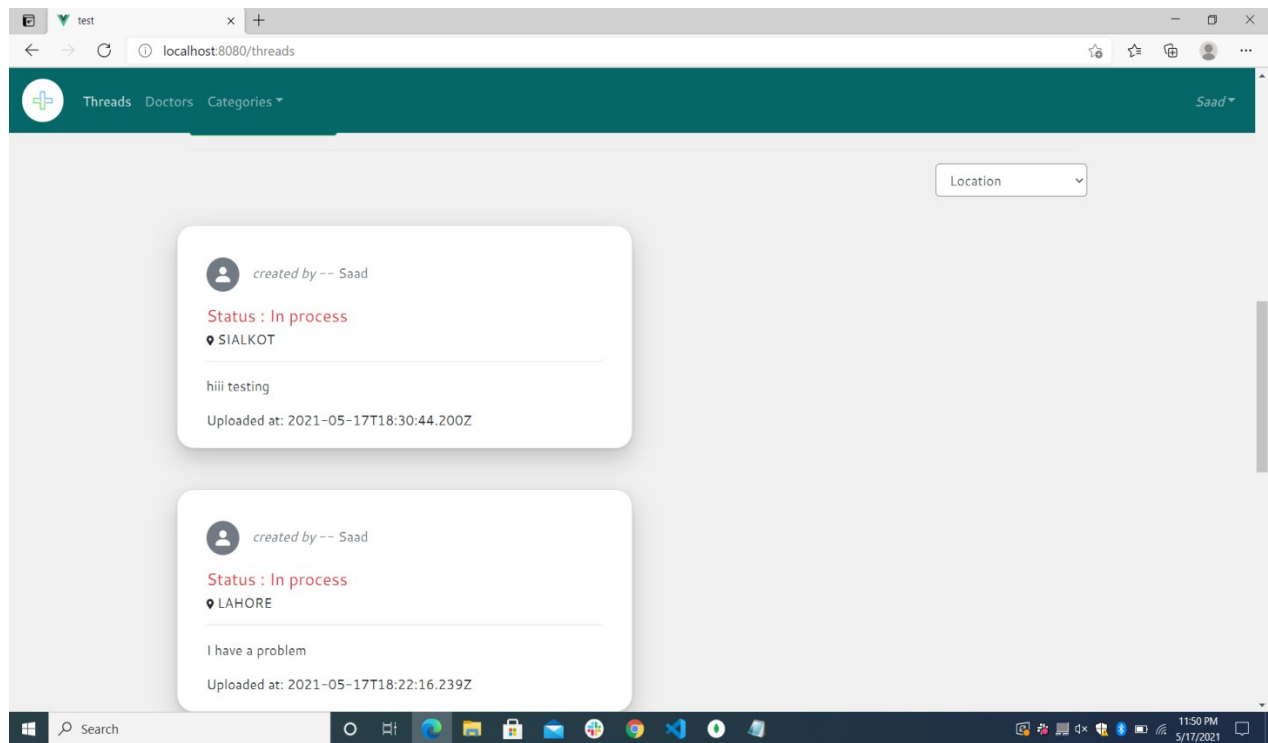


Figure Post a problem: On this screen, the patient can post their threads describing their problem, the patient will also be able to view their previous threads here.

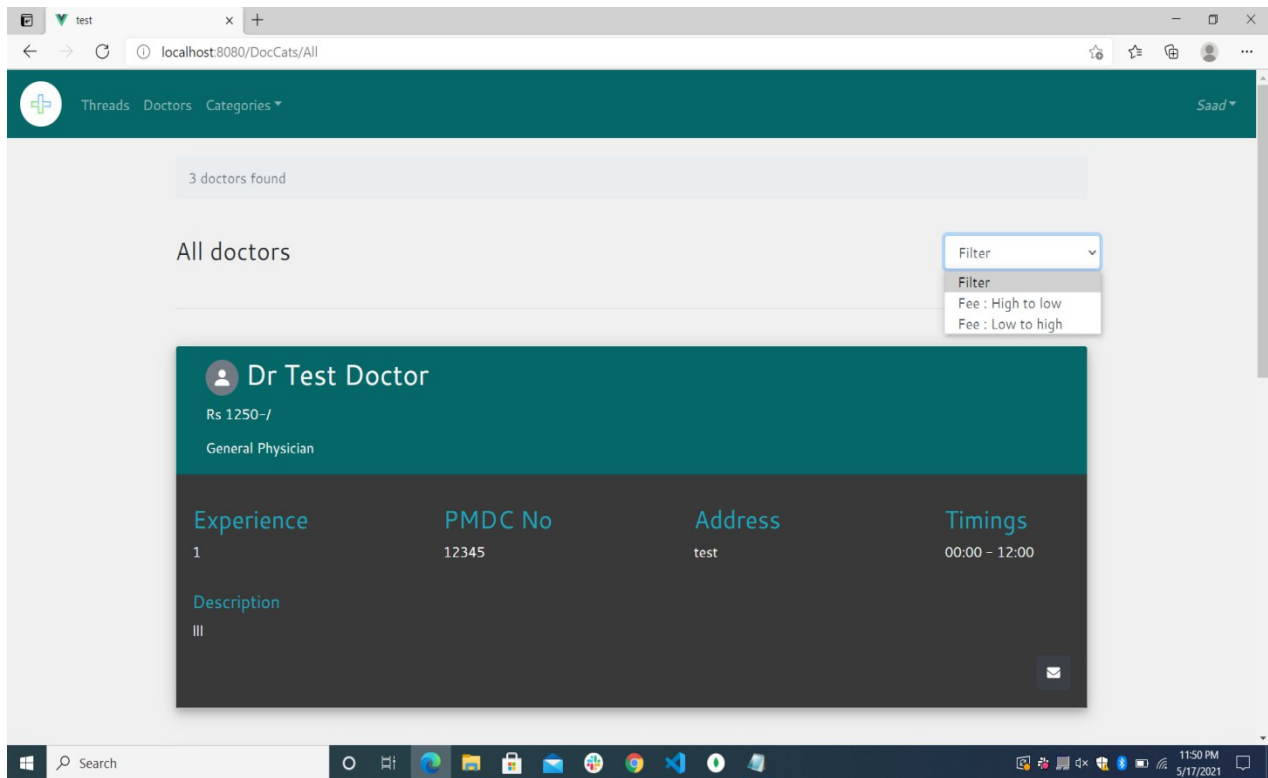


Figure View doctors through Filters: The patients can also search for doctors by applying different filters.

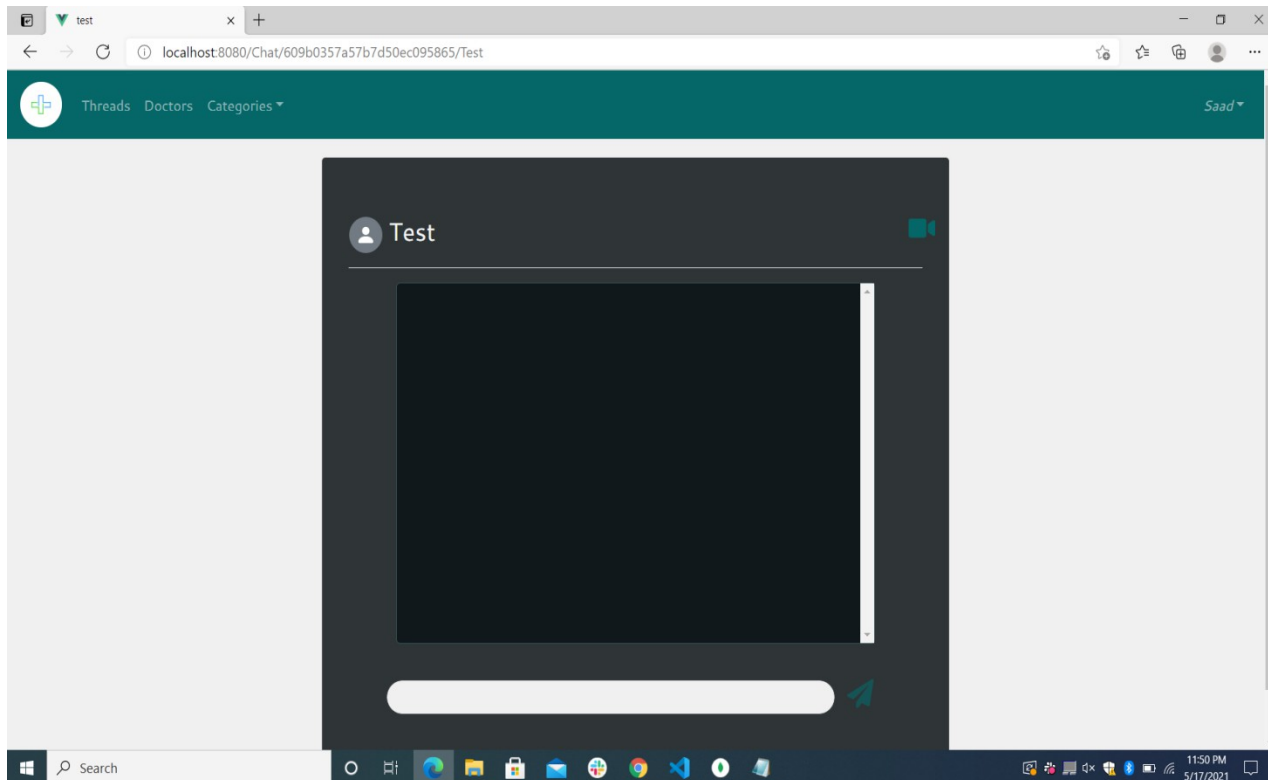


Figure Chat box: This is the chat box where the doctor and patient can chat with each other.

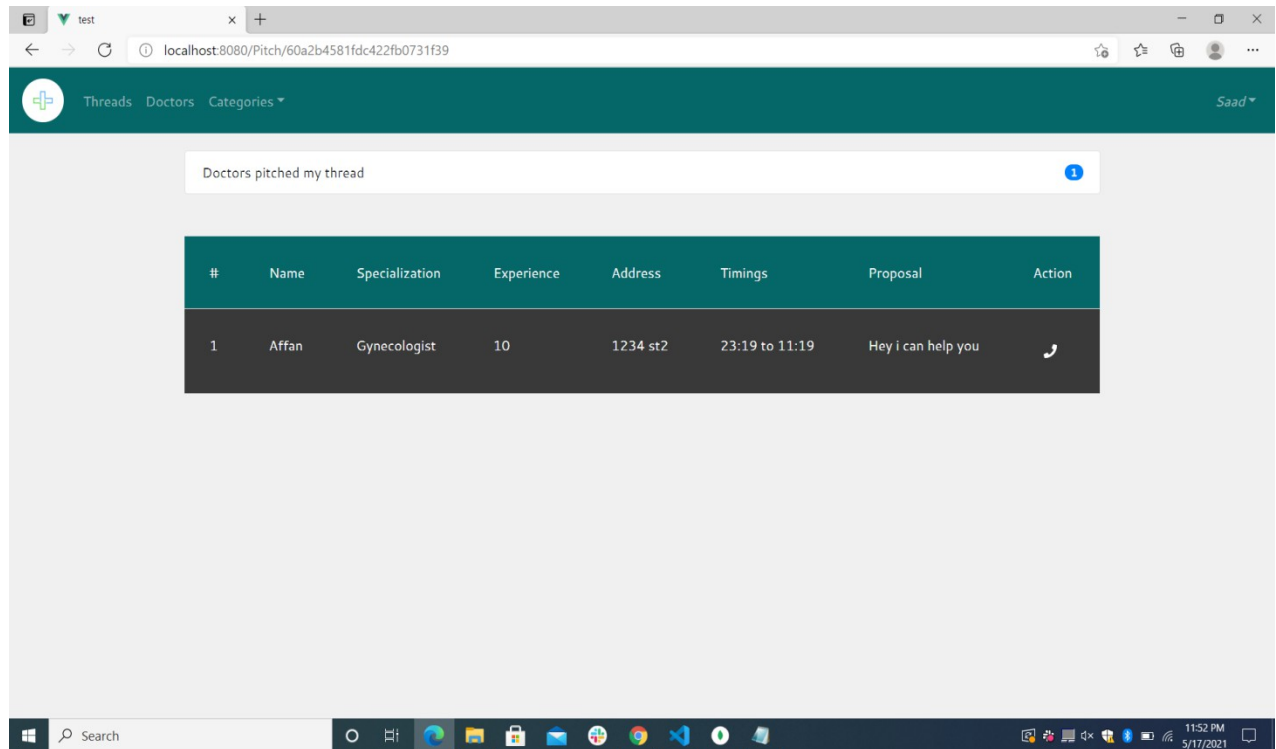


Figure View Pitched Thread: On this screen, the patient can view which doctor has pitched on their thread. If the user is satisfied with the doctors information, then they can proceed further.

6 Chapter 6: Conclusion

6.1 Problems faced and lessons learned.

- **Hardware Limitations**

One issue that arises is if the disk space is exhausted. This can only be resolved by extending the disk space.

- **Internet Speed**

The Internet speed must be at least 128 kbps.

6.2 Project summary

The major goal of our project is to facilitate the needs of the stakeholders involved. The project is divided into different modules that will strive to make a friendly experience for the users. The patient module will help patients to connect to the best doctor possible, keeping in view their requirements and resources. The doctor module will allow doctors to find patients that they will be able to help out. The admin module helps admins to keep notice of the activities of the other two users. In case if there are any abusive users found, the admin has the right to block them. This project will be a MEVN stack app. Database will be design in mongo DB. Server will be design in Node.js and Express.js. Frontend will be design in Vue.js.

For this project, we have studied different kind of courses Web engineering, Database System, Object Oriented Programming, Human Computer Interaction and Software Engineering. These Courses helped us too much.

6.3 Future work

Our primary point is to make an undertaking to encourage the sick and introverts of our society not having access to Remote health resources and consultations. Patients can get consultation of experienced and world-renowned Doctors. In future, our point is to make the application easy to understand and to develop a native mobile app. What's more, other point is to defeated boundary of correspondence between Doctors and Patients.

7 References

- <https://oladoc.com/>
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Thread-Based Health Portal

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