Project Title: Hospital Management System

Deliverable 5: Development Phase 3: Scalability and Optimization

Group Name: Geeky Techs

Group Members:

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Introduction:

This phase denotes a step in the direction of developing a hospital management system (HMS). The hospital administration system's sophisticated features and key functionalities will all be increased in this phase, which also provides improved user experience overall.

Requirements:

Scalability Measures (Load Balancing)

Implement load balancing techniques to distribute incoming traffic across multiple servers, ensuring efficient resource utilization and preventing server overload during peak usage periods.

Mobile App Optimization

Enhance the mobile application's performance, responsiveness, and user experience by optimizing code, minimizing resource usage, and leveraging platform-specific features for various mobile operating systems.

Advanced Security Measures

Enhance the system's security posture by implementing robust security measures such as encryption, multi-factor authentication, intrusion detection systems, and regular security audits to protect against evolving cyber threats.

Marketing and SEO Enhancements

Improve the visibility and reach of the Hospital Management System through targeted marketing campaigns, search engine optimization (SEO) strategies, and content marketing initiatives to attract more users and increase engagement.

Integration with Additional Third-Party Services (e.g., Telemedicine Platforms)

Integrate with telemedicine platforms to enable virtual consultations, remote monitoring, and telehealth services, expanding the range of healthcare services offered and enhancing patient accessibility and convenience.

Community Building Enhancements (Patient Forums, Support Groups)

Foster a sense of community and support among patients by incorporating features such as patient forums, support groups, and online communities where users share experiences, seek advice, and provide mutual support.

Continuous Performance Optimization

Implement ongoing performance optimization strategies to enhance system responsiveness, scalability, and efficiency, including code refactoring, database optimization, caching mechanisms, and server infrastructure upgrades.

Advanced Reporting for Administrators

Develop comprehensive reporting tools and analytics dashboards for administrators to track key performance indicators, monitor system usage patterns, analyze patient demographics, and gain insights for strategic decision-making.

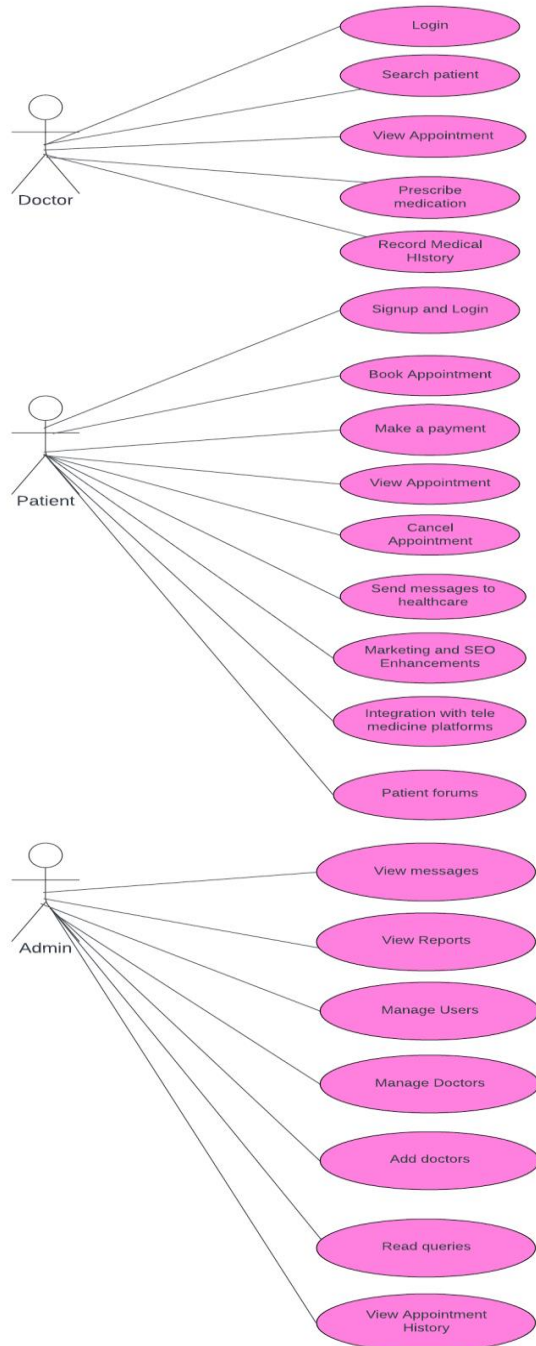### Accessibility Features for Users with Disabilities

Ensure compliance with accessibility standards (e.g., WCAG) by incorporating features such as screen reader compatibility, keyboard navigation support, text alternatives for multimedia content, and color contrast adjustments to enhance accessibility for users with disabilities.
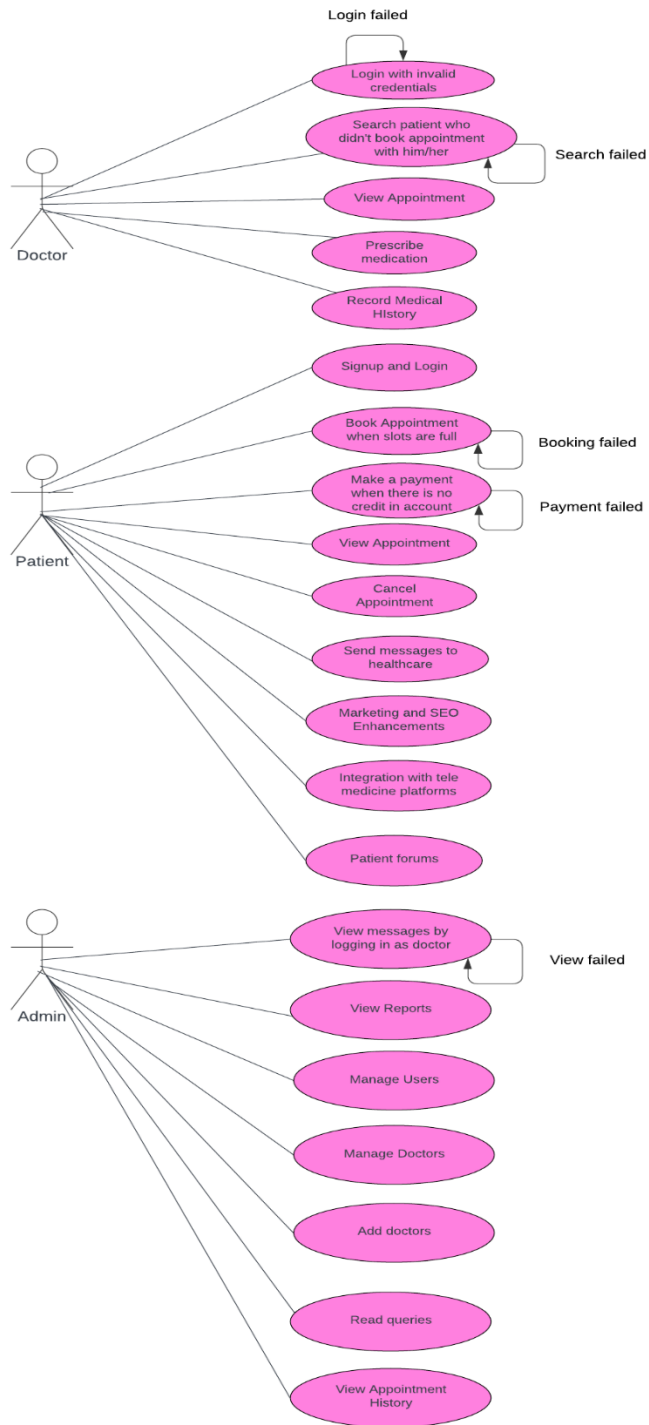
Cross-Browser Compatibility Testing

Conduct thorough testing across various web browsers (e.g., Chrome, Firefox, Safari, Edge) to ensure consistent functionality and user experience across different browser environments, addressing any compatibility issues and ensuring broad accessibility for users.
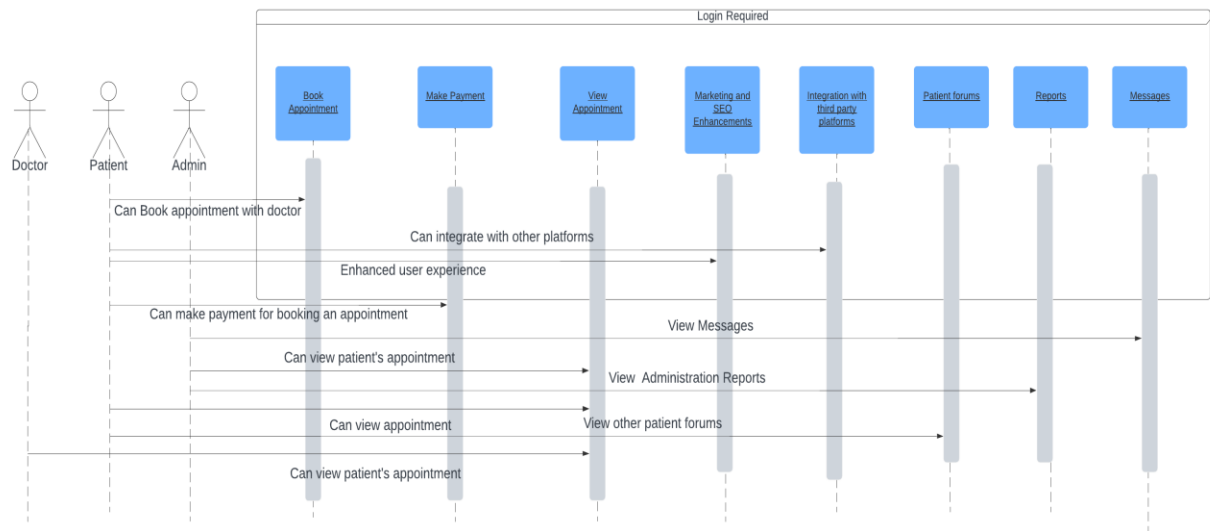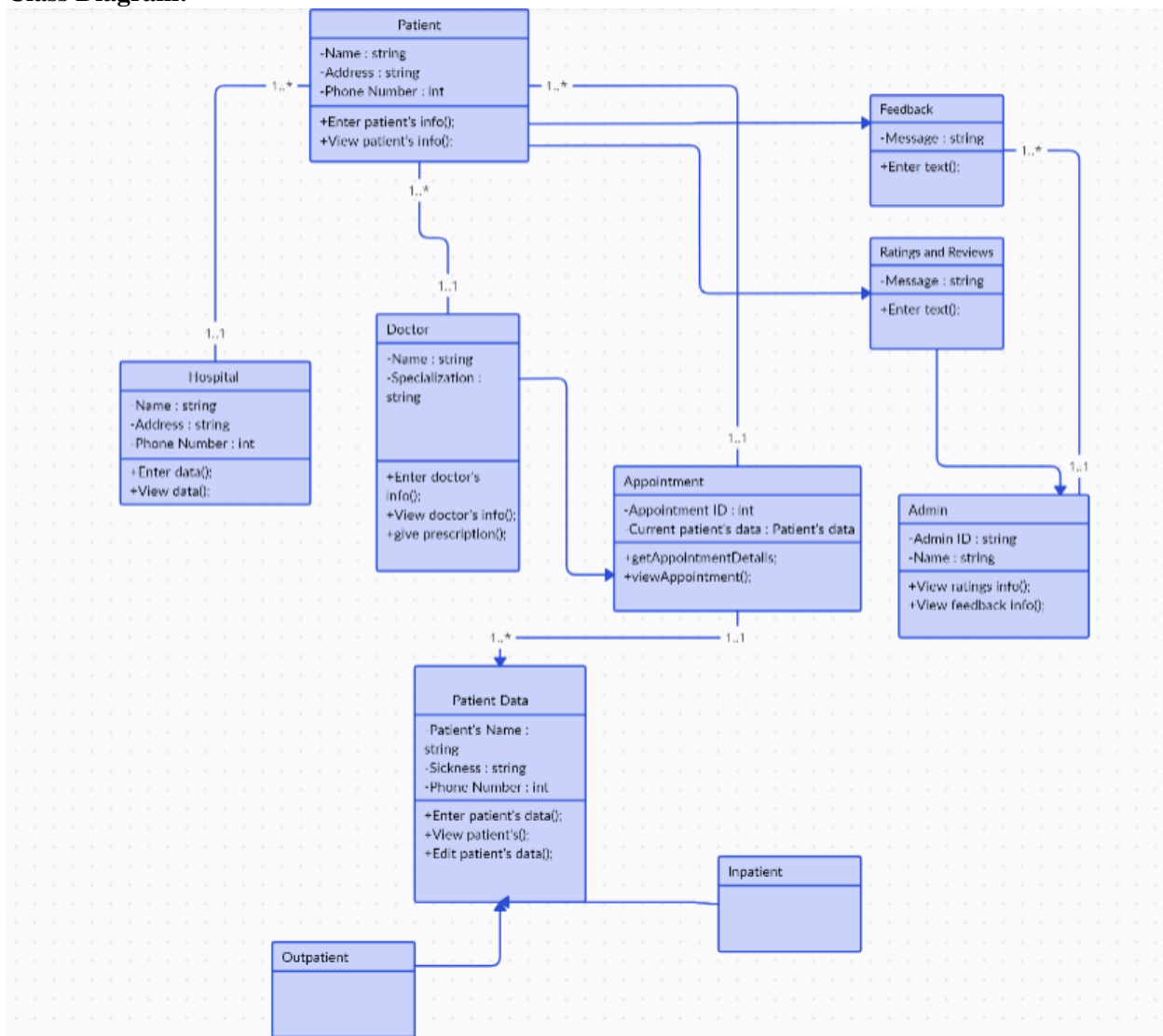
UML Diagrams:

Use Case Diagram:

Doctor
- Login
- Search patient
- View Appointment
- Prescribe medication
- Record Medical HIstory

Patient
- Signup and Login
- Book Appointment
- Make a payment
- View Appointment
- Cancel Appointment
- Send messages to healthcare
- Marketing and SEO Enhancements
- Integration with tele medicine platforms
- Patient forums

Admin
- View messages
- View Reports
- Manage Users
- Manage Doctors
- Add doctors
- Read queries
- View Appointment History

Error Use Case Diagram

Doctor
- Login failed
- Login with invalid credentials
- Search patient who didn't book appointment with him/her — Search failed
- View Appointment
- Prescribe medication
- Record Medical HIstory

Patient
- Signup and Login
- Book Appointment when slots are full — Booking failed
- Make a payment when there is no credit in account — Payment failed
- View Appointment
- Cancel Appointment
- Send messages to healthcare
- Marketing and SEO Enhancements
- Integration with tele medicine platforms
- Patient forums

Admin
- View messages by logging in as doctor — View failed
- View Reports
- Manage Users
- Manage Doctors
- Add doctors
- Read queries
- View Appointment History

Sequence Diagram:

Login Required

Doctor   Patient   Admin

Book Appointment   Make Payment   View Appointment   Marketing and SEO Enhancements   Integration with third party platforms   Patient forums   Reports   Messages

Can Book appointment with doctor

Can integrate with other platforms

Enhanced user experience

Can make payment for booking an appointment

View Messages

Can view patient's appointment

View Administration Reports

Can view appointment

View other patient forums

Can view patient's appointment

Class Diagram:

Patient

- Name : string
- Address : string
- Phone Number : int

+Enter patient's info();
+View patient's info();

Feedback

- Message : string

+Enter text();

Ratings and Reviews

- Message : string

+Enter text();

Hospital

Name : string
- Address : string
- Phone Number : int

+Enter data();
+View data();

Doctor

- Name : string
- Specialization : string

+Enter doctor's info();
+View doctor's info();
+give prescription();

Appointment

- Appointment ID : int
- Current patient's data : Patient's data

+getAppointmentDetails;
+viewAppointment();

Admin

- Admin ID : string
- Name : string

+View ratings info();
+View feedback info();

Patient Data

Patient's Name : string
- Sickness : string
- Phone Number : int

+Enter patient's data();
+View patient's();
+Edit patient's data();

Inpatient

Outpatient

Test Cases:

Unit Test Cases:

Test Case: Mobile responsiveness

Description: The ability to examine our application in a mobile perspective is known as mobile responsiveness functionality. It allows us to enlarge and shrink the dimensions. The website for the application will be adjusted based on the screen resolution.

Input: Mobile app responsiveness strategies implemented

Output: Improved mobile app responsiveness

Expected output: Mobile app responsiveness should be improved

Test Case: Load Balancing

Description: In order to accommodate incoming HTTP requests, a web application may be spread across numerous servers, as this testcase simulates. The load balancer is in charge of dividing up incoming traffic among the available servers in an equitable manner so as to keep no server from being overloaded.
Input: Let's assume there are three servers a,b,c

Output: Load balancer detects and redirects traffic away from failed servers.

Expected Output: All things considered, the system remains stable, balances the load across servers, and fulfills requests within reasonable speed limits.

Test Case: Marketing and SEO Enhancements

Description: Improve the visibility and reach of the Hospital Management System through targeted marketing campaigns, search engine optimization (SEO) strategies, and content marketing initiatives to attract more users and increase engagement.

Input: Marketing and SEO strategies implemented.

Output: Increased system visibility and engagement.

Expected Output: System should attract more users and increase engagement.

Test Case: Community Building

Description: Foster a sense of community and support among patients by incorporating features such as patient forums, support groups, and online communities where users share experiences, seek advice, and provide mutual support.

Input: Implementation of patient forums/support groups.

Output: Community engagement features available.

Expected Output: Users should be able to interact, share experiences, and provide support.

Test Case: Integration with Third-party platforms

Description: Integrate with telemedicine platforms to enable virtual consultations, remote monitoring, and telehealth services, expanding the range of healthcare services offered and enhancing patient accessibility and convenience.

Input: Integration with telemedicine platforms.

Output: Additional telehealth services available.

Expected output: Users should have access to virtual consultations and remote monitoring.

Test Case: Advanced Reporting for Administrators

Input: Choose past dates

Output: Reports should be displayed

Expected Output: Reports should be displayed

Description: For patients added during the chosen time frame, a list of their medical records is displayed.

Integration Test Cases:

Functionality	Input	Output	Expected	Description
Patient Sign Up	Valid Credentials	Successful Signup	Successful Signup	Patient can sigup to the portal by giving all their details
Patient Sign Up	Non-Unique Credentials	Sign-up error	Sign-up error	Patient can not sigup to the portal by giving non-unique details like email which is already registered
Login	Wrong Credentials	Error	Credentials Error	After sigup patient can not login by giving invalid credentials

Login	Authorized Credentials	Redirect to Patient Dashboard	Redirect to Patient Dashboard	After sigup patient can login by giving valid credentials
Add Doctor	Input the Doctor's details with some empty fields	Error	A prompt indicating the exact missing fields	Admin cannot add doctor without
				entering all the details
Add Doctor	Input the Doctor's details with	Doctor Successfully Added	Doctor Successfully added	Doctor can be added by admin by giving all the details
Doctor Login	Fill all fields	Successfully product logged in	Doctor successfully logged in	After admin gave the access doctor can login by giving correct credentials
Doctor Login	Fill in invalid credentials	Error	An error indicating either the username or password are invalid	Doctor cannot login to the dashboard if the details given are incorrect
Add Patient	Input the Patient details with some empty fields	Error indicating the missing fields	Error indicating the missing fields	Patient cannot be added by doctor if there are any fields which are not filled up
Add Patient	Input the Patient details with all	A prompt indicating a patient has been	A prompt indicating a patient has been	Patient can be added by doctor if all

	the correct details	successfully added	successfully added	fields are filled up
Book appointment	Select specialization with no registered doctor	The list of doctors will be empty	The list of doctors under that category or specialization to be empty	If patient select an specialization where there are no doctors registered in that specialization then list of doctors will be shown as empty
Book Appointment	Select the specialization with registered doctors	A list of doctors appears.	A list of doctors to appear for the chosen specialization	If patient select an specialization where there are doctors registered in that specialization then list of doctors will be shown to select

Reports	Choose previous dates	A list of patient records appears for those added within the selected period	A list of patients records added within the selected period	Admin can see the patient records if he choose the particular time frame
Patient Search	Input random search words unrelated to any patient	An output indicating no records founds for unrelated search words	An output indicating no records founds for unrelated search words	If doctor tries to search for patient who was not registered an appointment with him/her then doctor cannot see the records
Patient Search	Input random search words related to a patient	An output indicating the records founds for related search words	An output indicating the records founds for related search words	If doctor tries to search for patient who has an appointment with him/her then doctor can see the records

Patient Communication	All fields entered	Message sent	A prompt indicating that successfully submitted	Patient can send a message about doctor review or any other queries by entering all fields
Patient Communication	All fields not entered	A message indicating to fill out this field	A message indicating to fill out this field	Patient can not send a message about doctor review or any other queries without entering all fields

Reviews	Input the contact form with some empty fields	Error	A prompt indicating the missing fields	Patient cannot give reviews without entering all

				fields in contact form
Reviews	Input the contact form by entering all fields	Review sent	A prompt indicating that successfully submitted	Patient can give reviews by entering all fields
Appointment Remainder	Schedule an appointment	Exists in appointment history tab	Able to see the appointment remainder	After scheduling an appointment patient can see the appointment in appointment history tab

Appointment Remainder	Not Scheduled an appointment	Appointment history tab will be empty	Not able to see any appointment reminder	without scheduling an appointment patient can not see the appointment in appointment history tab
Feedback	Enter the all fields in contact form	Feedback sent indicating with a prompt successfully submitted	Feedback sent indicating with a prompt successfully submitted	Patient can give feedback about doctor or hospital by entering all

				the fields in contact form
Feedback	Miss the fields to enter	Please enter the field	Please enter the field	Patient can not give feedback about doctor or hospital without entering all fields
Services	Open the website and navigate to services with login	No services tab found	Unable to see the services that the hospital offers	Patient cannot see services offered by hospital with logging in
Services	Open the website and navigate to services without login	Redirects to the services page	Able to see the services that the hospital offers	Patient can see services offered by hospital without logging in

User Manual:
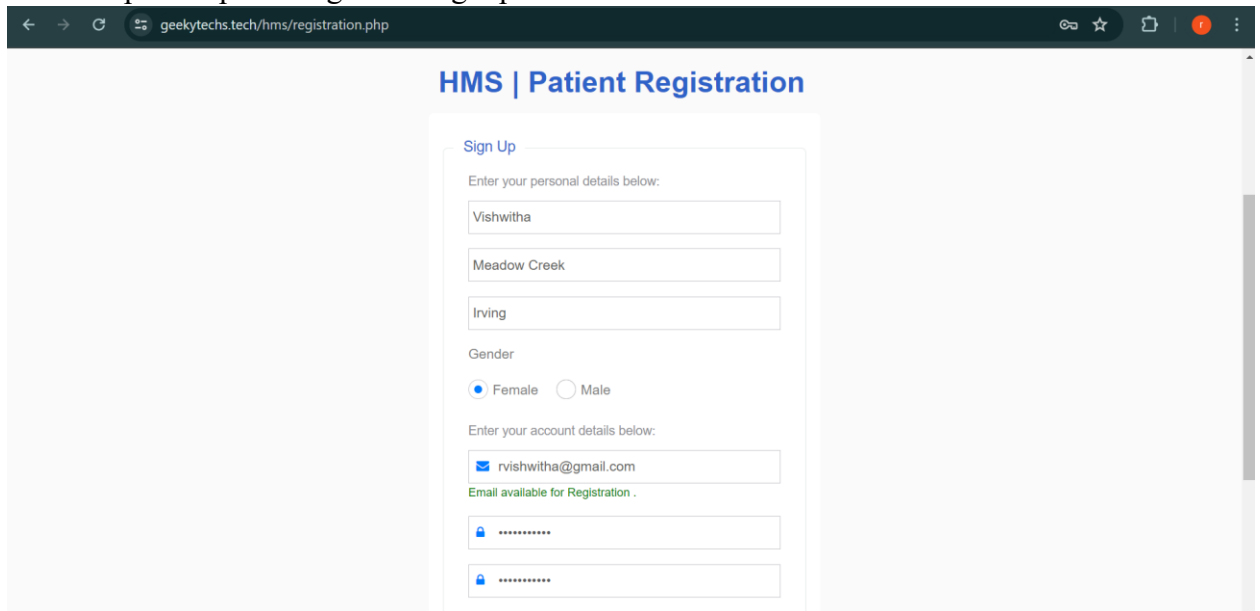
1. Click on https://geekytechs.tech it will navigate to our application website which is as shown below
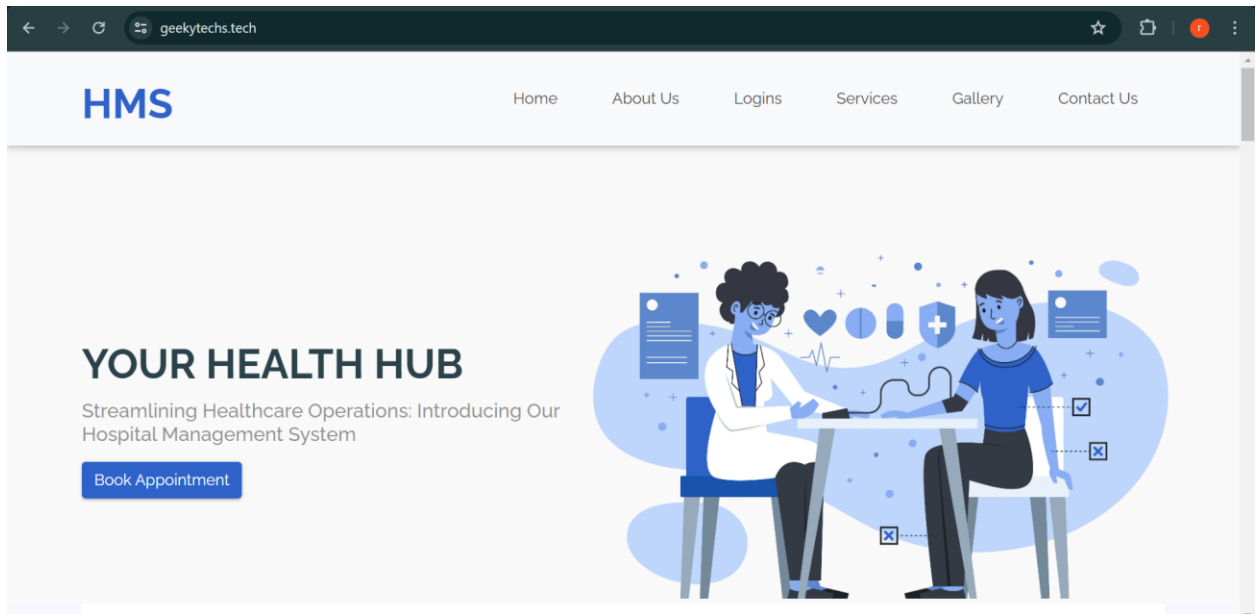
2. Click on Logins for patient, doctor and admin login
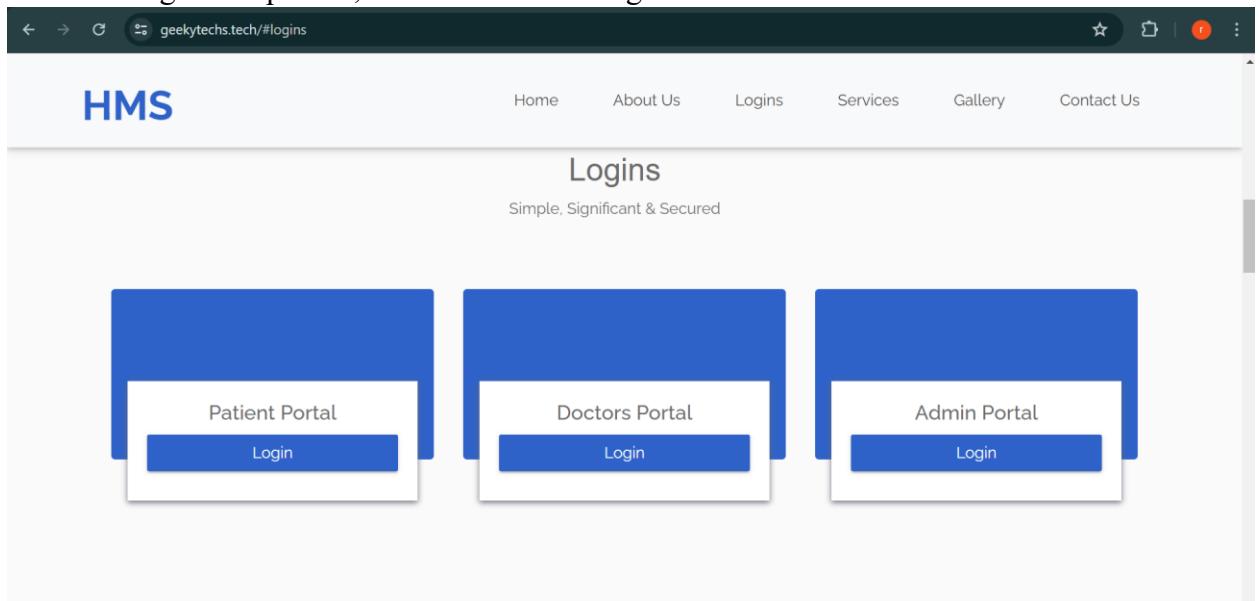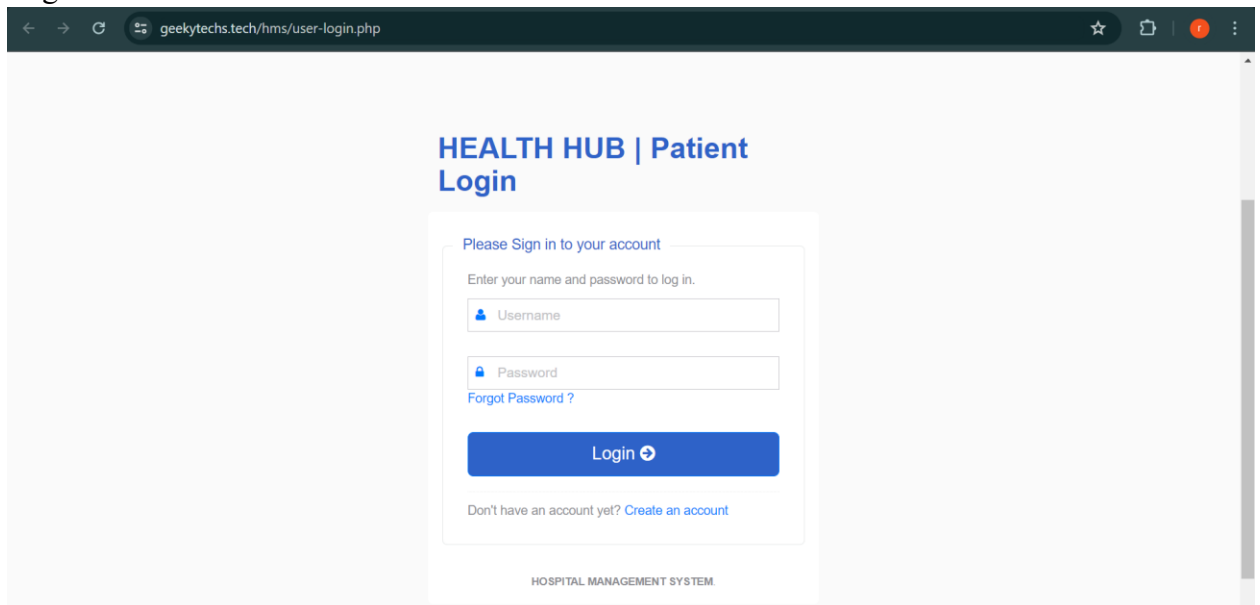
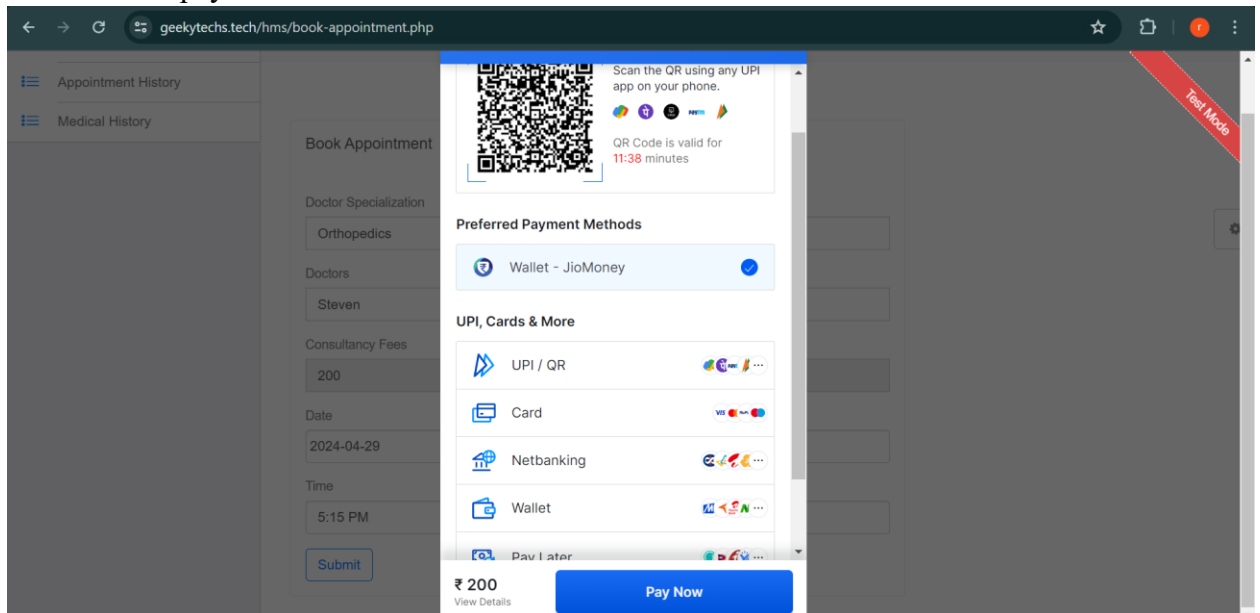3. Click on patient portal login and signup an account

4. Login now
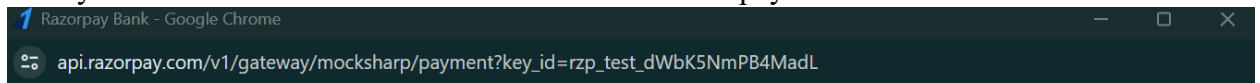
5. After login you can see Patient Dashboard
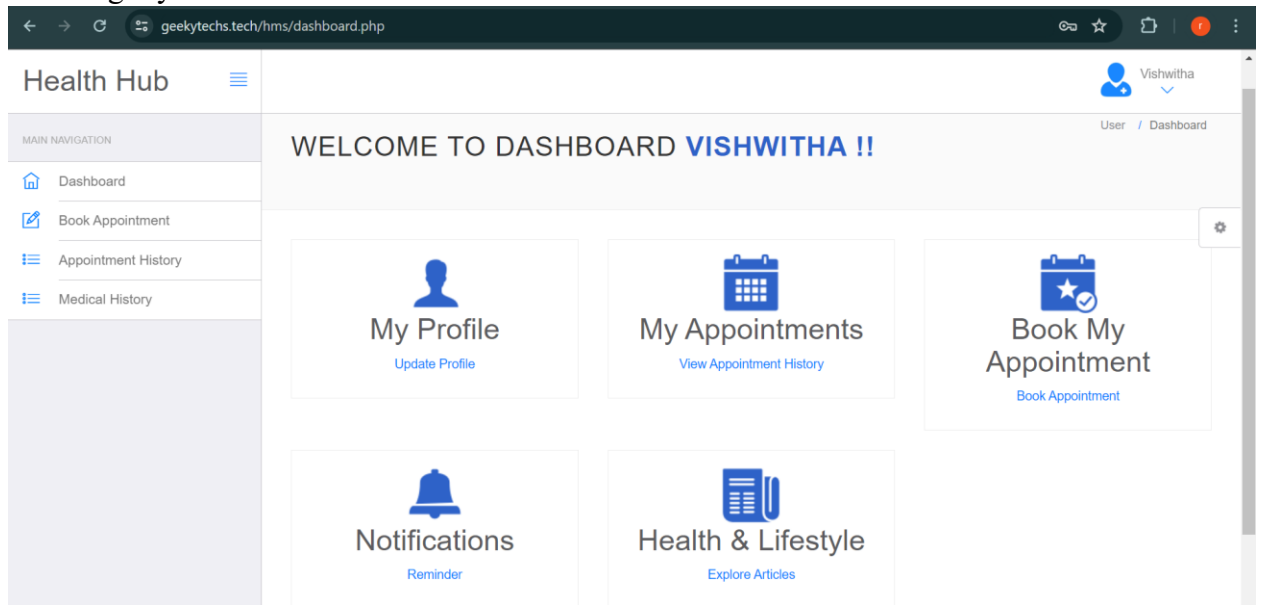
6. Click on book appointment
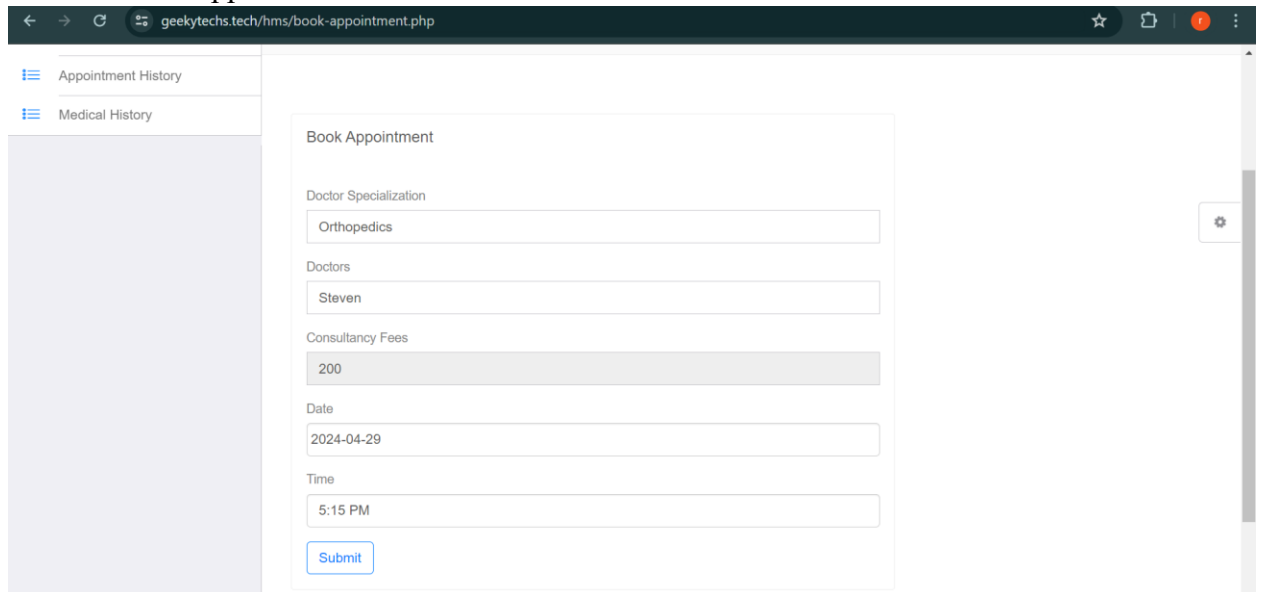
7. After clicking on submit you will be navigated to payment page select wallet- Jio money then click on pay now

8. Now you will see below screen click on success to make payment succesfull

9. Go to Dashboard
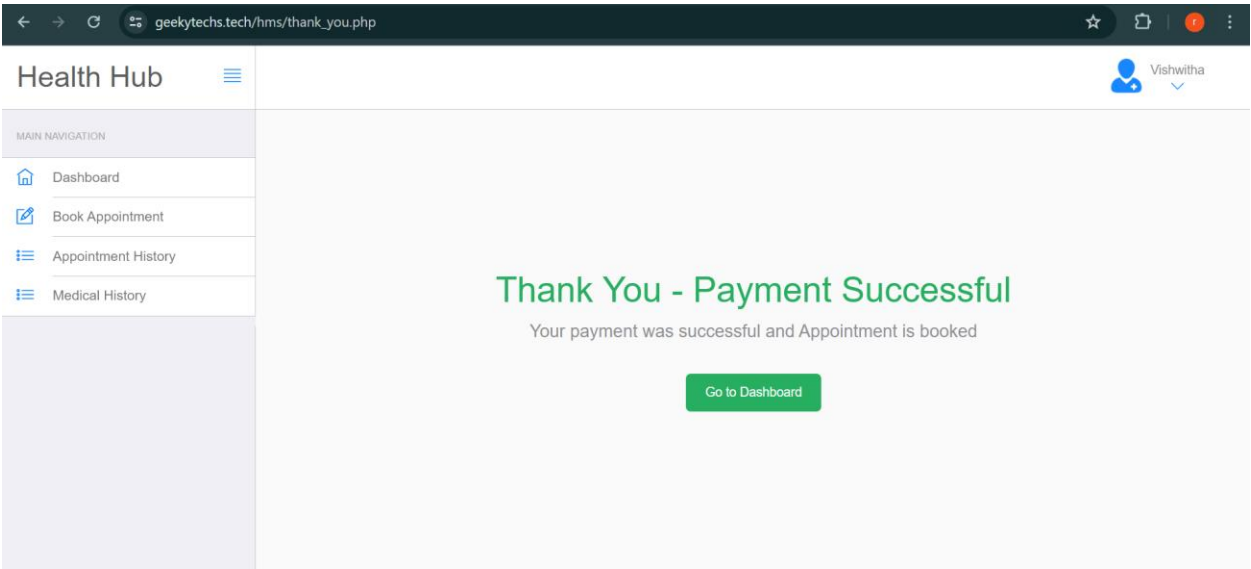
10. Click on notifications reminder
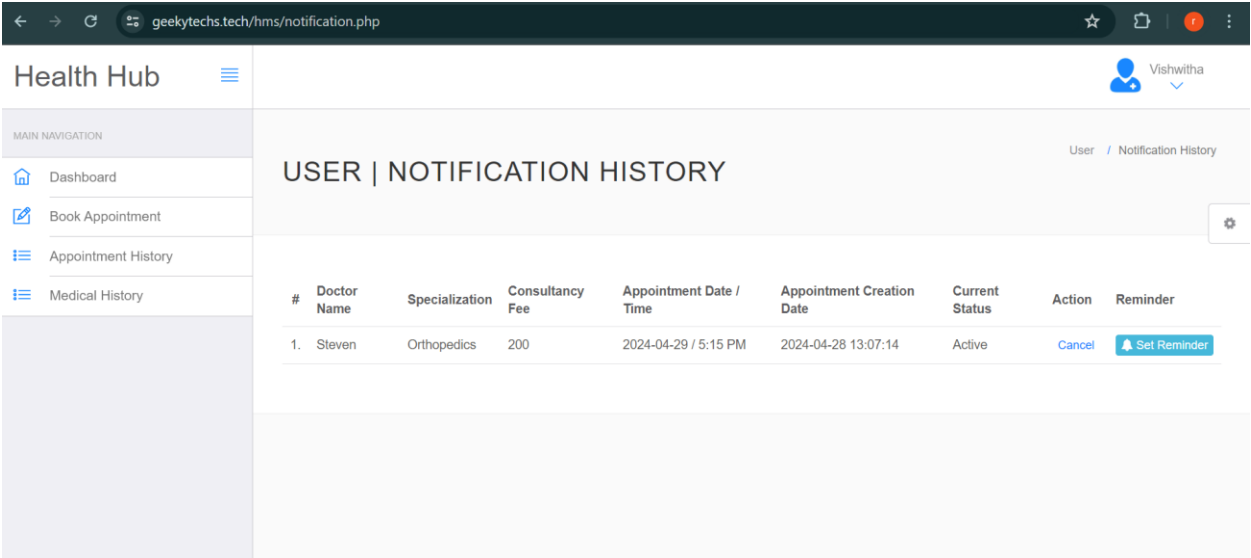
11. Click on set reminder and give email and phone number in pop-up window.


12. You will get an email
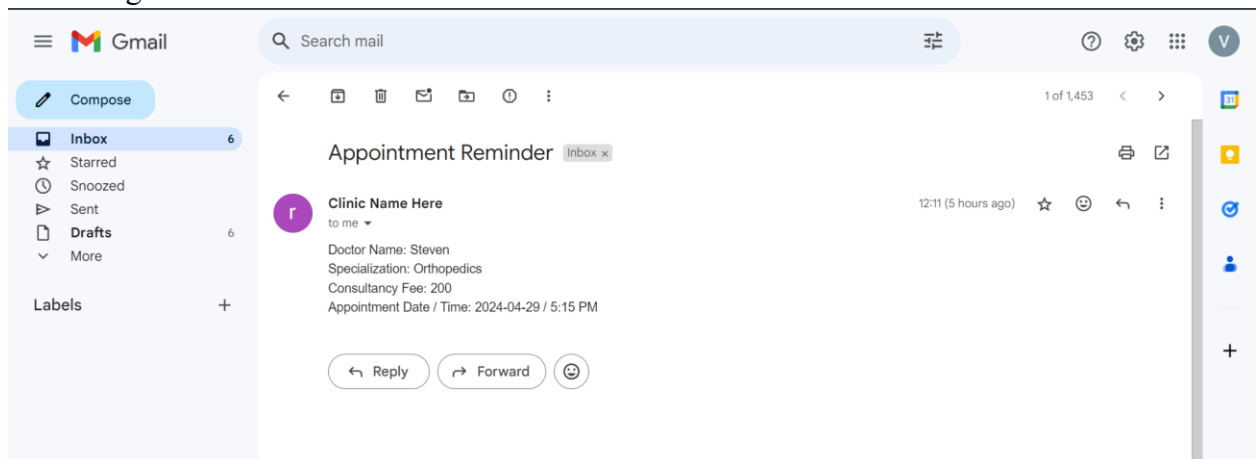
13. By clicking on Health and life style on dashboard you can see marketing & SEO Enhancements, Integrations with third party platforms and Patient forums in the given
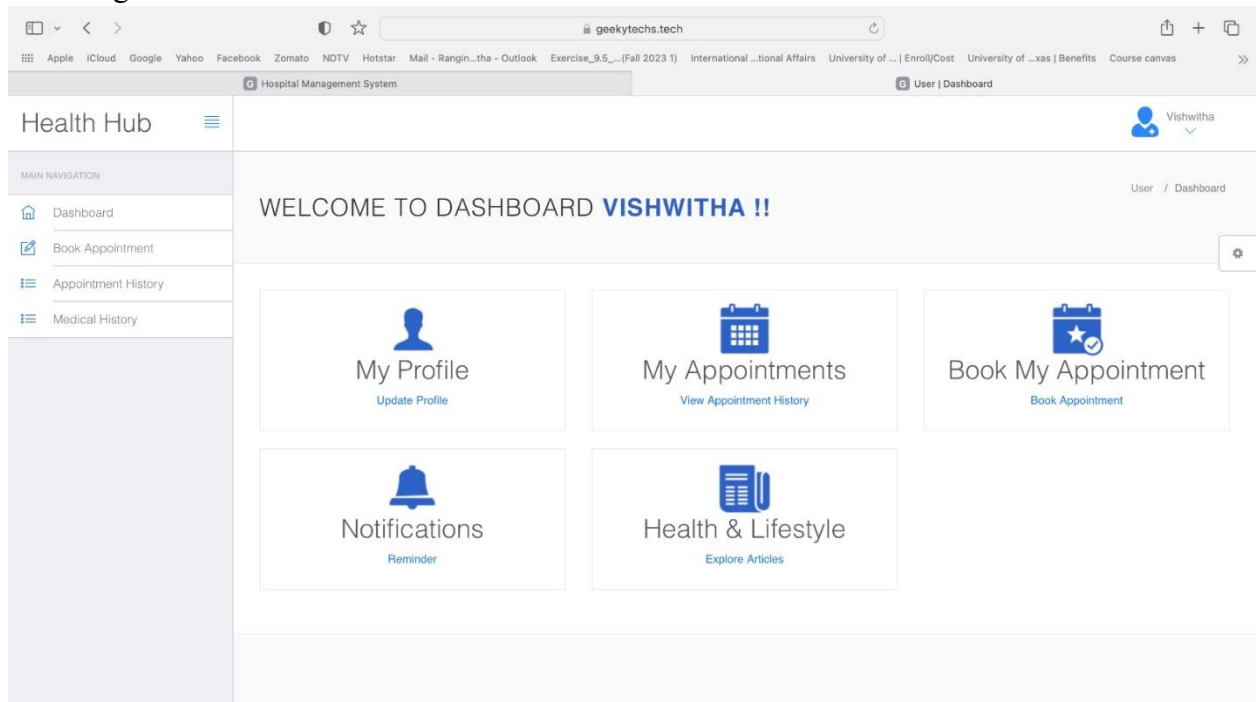
links.
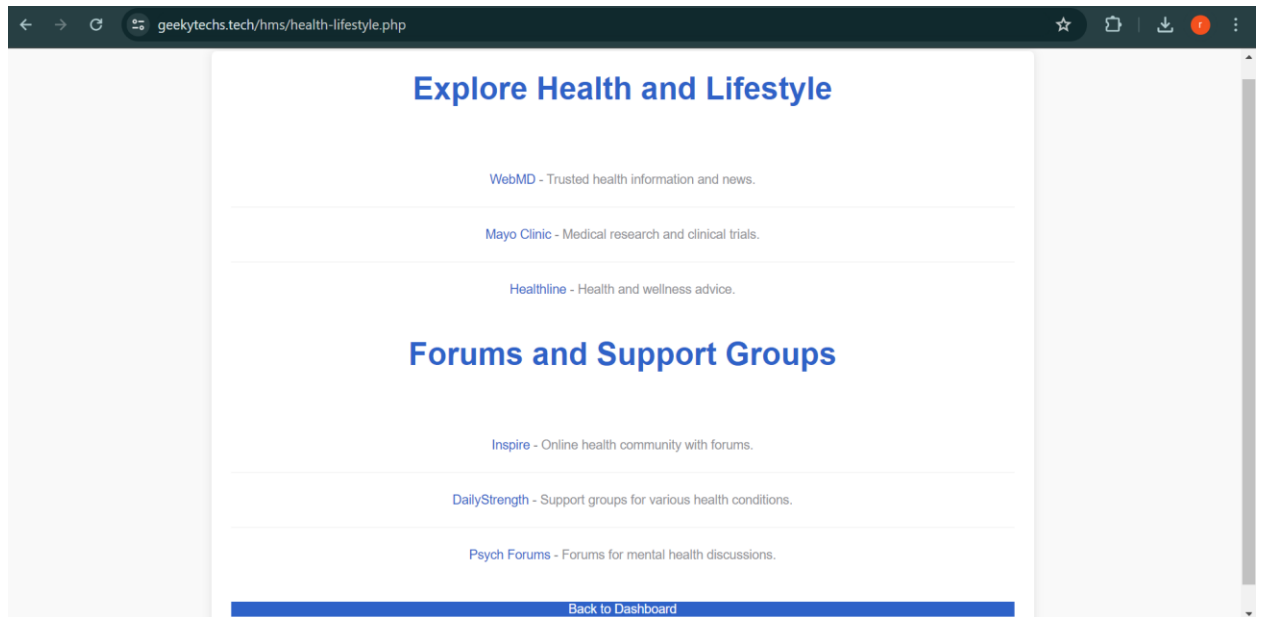
14. Users who are having eye sight issue they can set color of the application according to their vision. This is one of the accessibility feature that we have implemented.
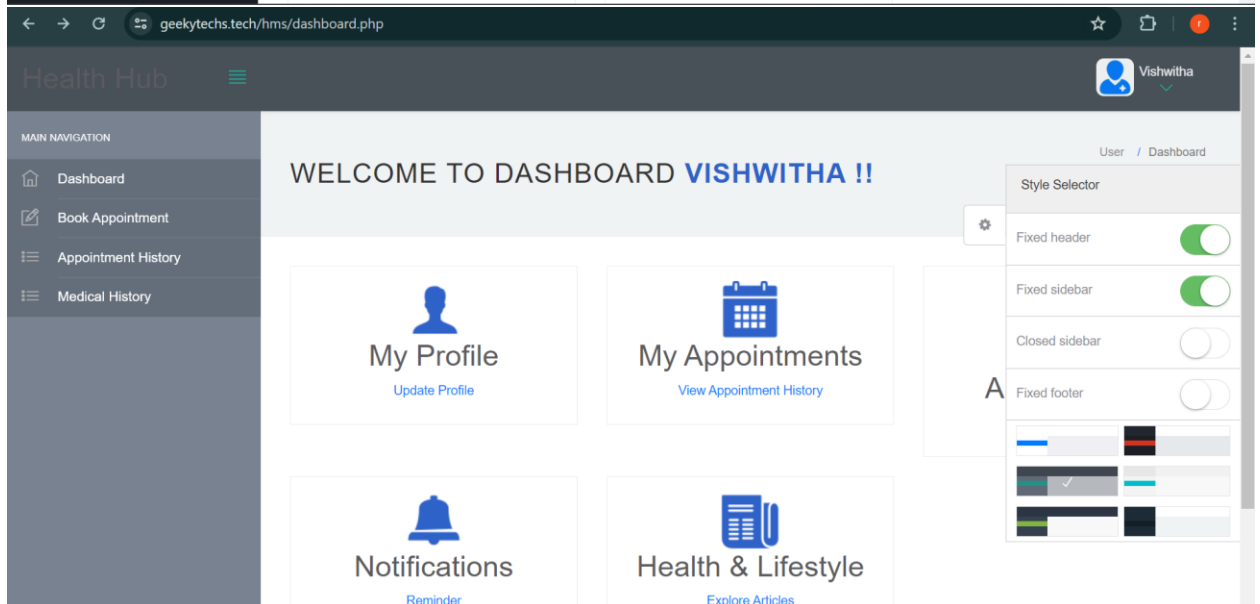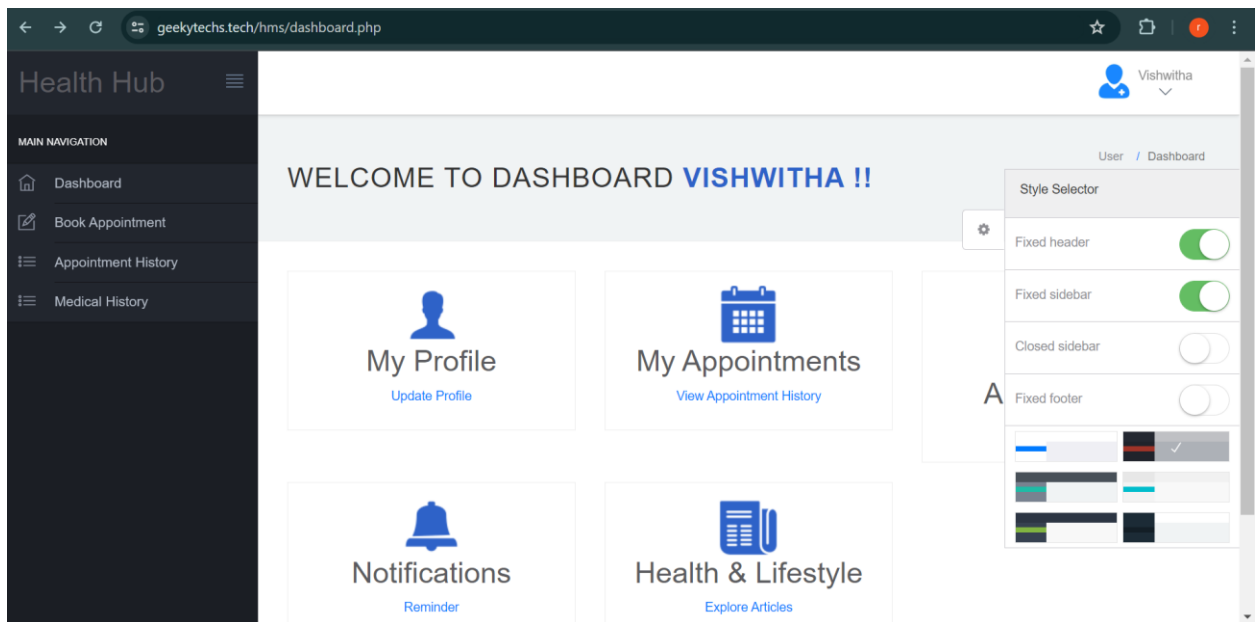
15. Our application has gone through cross browser compatibility testing where the application can open in chrome, safari IOS, mozilla firefox etc.
The image below is in safari IOS.

Instructions:

This project was developed and tested using the setup of the Xampp web server environment.
Follow these procedures to install the system:
1. To begin, download a web server (like Xampp) that supports PHP from the given URL.
Use this URL to download: https://www.apachefriends.org Click "Next" on each pop-up window, then choose "Finish."
2. After that, start Xampp and press the start button to verify that the Apache and SQL servers are operational.
3. Clone the code from github and copy the Source_code_Phase3 folder.
4. Next, open the Source Code Phase 3 folder in the htdocs folder after starting XAMPP on local drive C.

5. In Xampp, click Admin under MySQL. This will open phpMyAdmin and allow you to create a new database called hms by clicking New.
6. Next, import the hms.sql file from the Source_Code_Phase3 backend folder (Path: Source_Code_Phase3/Backend) into the database you created, hms.
7. Open Xampp, select Admin under Apache or MySQL, and then enter this URL to start the project: http://localhost/Source_Code_Phase3

8.Deployed our project in cloud you can access project from this cloud link too
https://geekytechs.tech

Ending Feature Summary:

Features Implemented: We have implemented all the features which we have mentioned in phase 1, phase 2 and phase 3. Features that we can outline are User Registration/Login, Patient Profile, Messaging system, Book Appointment, Payment Gateway, Notification Reminder, Doctor Login, Admin Login, Mobile Responsiveness, security and scalability measures and further more.

Features that are not implemented: We have covered all features which we mentioned in deliverable 2. There are no other features which we have not implemented.

Limitations:

- Time Limits: The scope and depth of our project have impacted by deadlines and time constraints.
- Technical Challenges: Development may be slowed down due to hardware constraints and software errors.
- Scope Creep: Project's scope have gone through beyond which have resulted in additional work.

Future Plans:

Integration with Wearable Devices: Integrating with wearable devices and health tracking apps to enable seamless data synchronization and monitoring. This allows patients to securely share vital signs, activity levels, and other health metrics with their healthcare providers for proactive management and personalized care.

Multilingual Support: Offering multilingual support to accommodate diverse patient populations and improve accessibility for non-native speakers. Translating key content, forms, and communication channels into multiple languages enhances inclusivity and ensures that language barriers do not hinder access to healthcare services.

Reflections:

What has been accomplished: We have put our third development phase's functionality into practice, as mentioned in deliverable 2. We have implemented all the features which are mentioned in phase - 3.

What went well: cooperation and assistance, Anyone who assisted and took part in the learning process of PHP . We created our project using PHP. We started holding meetings, and each time, all of the team members attended, which made it easier for us to talk about anything with everyone in the team.

What could be improved: Earlier we used to have some misinterpreations during our phase 1 and phase 2. But in this phase we have overcome through it and each team member have understood other team member's perspective. So, there are no any improvements needed.

Member Contribution Table:

Member name	Contribution description	Overall Contribution (%)	Note (if applicable)
Anusha	Worked on Marketing and SEO Enhancements functionality and drawn sequence diagram in report	100%	
Vishwitha	Worked on Administration Reporting enhancements and drawn usecase diagram and wrote user manul in the report	100%	
Pavan	Worked on the scalability measures, drawn error usecase diagram in the report	100%	
Dinesh	Worked on optimization and drawn class diagram and ending feature summary in the report	100%	
Deepak	Worked on integration with third party platforms functionality and wrote requirements	100%	

	and instructions in the report.		
Jaswanth	Worked on accessibility features backend database and wrote unit test cases in the report.	100%	
Divya Anusha	Worked on the mobile responsiveness functionality and wrote integration testcases in the report	100%	
Tejaswini	Worked on the patient forums and compatibility testing wrote integration testcases in the report.	100%	