CPE327: Software Engineering

Topic: Hospital Management Website

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Abstract

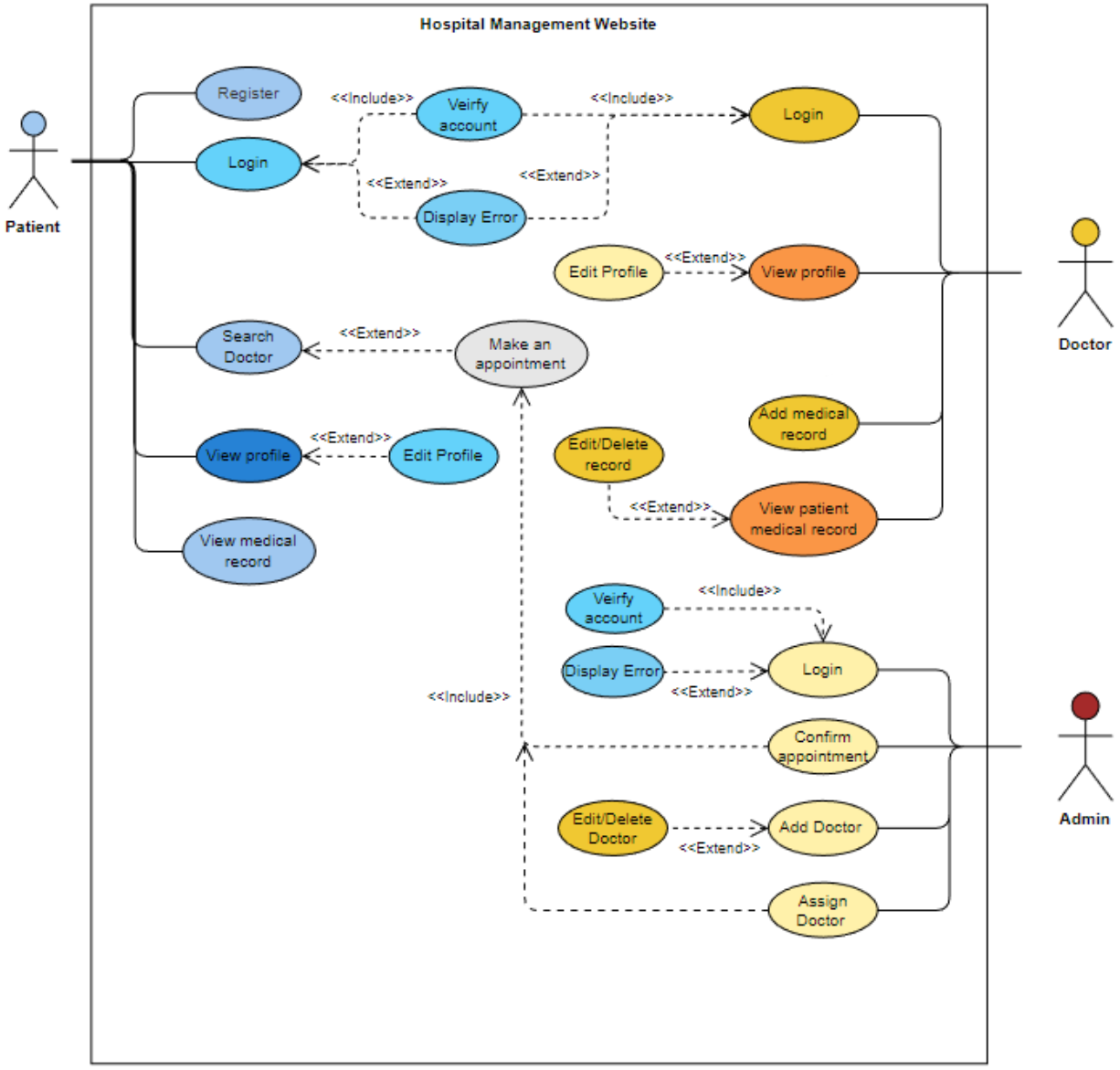
The goal of our project is to create a hospital scheduling management system to help people, especially elders to make an appointment in a hospital via a website. Our team decided to make this project to make an efficient way of scheduling an appointment. This way people can reserve a time in advance to consult a specialized doctor depending on the symptoms they have. This website consists of various users such as doctors, nurses, and patients. A patient will need to register on the website to proceed or set an appointment. On our website, patients will then be asked various questions such as their personal information and the symptoms they are feeling during that time. Doctors are also one of the main users of the website, they also have their own account in order to access the website and view the data. These data are the appointments made by the patients. The doctor can then set the time and schedule for the patient. Doctors can also leave comments based on the information given by the person making an appointment. We made our user interface as simple as it can be so that it will be easy to understand and use.

Problem Definition

1. Functional requirements

1. The system must allow the user to register and create a profile as a patient, provided that the user provides the information required for registration.
2. The system must allow all users such as admin, doctors, and registered patients to log in with email and password.
3. The system must allow all users to view their own profiles and be able to edit their own profiles.
4. The system must allow patients to search for doctors and select the doctor they want to consult by searching by doctor's name or by the type of specialist currently in the system.
5. The system must allow patients to make an appointment with a doctor by having the patient enter the date and time of the appointment and enter the patient's illness preliminary.
6. The system must allow doctors to view, delete, and edit the appointments of all patients who to consult.
7. The system must allow the doctor to comment on the patient through the initial patient-provided symptoms. Then the doctor will make an appointment for the patient to come to the hospital on the specified date and time.
8. The system must allow the admin to confirm the appointment.
9. The system will inform the appointment date and time that the doctor made the appointment with the patient.
10. The system must allow the admin to add or delete doctors, view all doctors in the system, be able to edit the doctor's profile, assign doctors, and view all admins.

2. Use case diagram



3. Use case narrative

Name	Register
Actor	Patient
Goal	The user is registered as a patient.
Preconditions	The user has to be on the register page.
Main success scenario	1. The user enters all required information to apply for registration. 3. The website validates the information and the result is successful. 4. Redirect to the login page.
Extension (a)	1a. The user has not entered all required information into the registration form. 2a. The website reviewed the information and found that the user had not entered all the required information. 3a. The website displays a message to the user to complete all required information and request the user to re-register again.
Extension (b)	1b. The user enters all the required information in the registration form but the information is incorrect such as email is incorrect, the phone number must be an only number or database error such as name or email already stored in the database. 2b. The website reviewed the information and found that the information entered by the user is incorrect or there is already information in the database. 3b. The website will show the user an error message and ask the user to re-register again.
Postconditions	The website stores the information that the newly registered user has in the database and directs to the login page.

Name	Login
Actor	Admin, Doctor, and Patient
Goal	Log in to use the website.
Preconditions	The user has to be on the login page.
Main success scenario	1. The user entered their email and password. 2. The website validates the information and the result is successful. 3. Redirect to the home page.
Extension (a)	1a. The user did not complete their email and password. 2a. The website validates the information and found that the user did not enter the email and password completely. 3a. The website displays a message that the user did not enter complete their email and password and asked the user to log in again.
Extension (b)	1b. The user has completed entering their email and password but the email or password is incorrect. 2b. The website validates the information and finds that the user enters an incorrect email or password. 3b. The website displays a message that the user entered an incorrect email or password and asked the user to log in again.
Postconditions	The user will be successfully logged in and redirected to the homepage of the website to use the website.

Name	View profile
Actor	Admin, Doctor, and Patient
Goal	View personal profile.
Preconditions	The user has to be login.
Main success scenario	1. The user clicks the “Profile” button in the navigation bar. 2. The website displays personal information.
Postconditions	The website will direct to the user’s profile page.

Name	Edit profile
Actor	Admin, Patient, and Doctor
Goal	Edit personal profile.
Preconditions	The user has to be on the user's profile page.
Main success scenario	1. The user clicks the “Edit” button to edit the information. 2. The website will direct you to the edit profile page. 3. The user enters the information that wants to be updated in the form 4. The user clicks the “Edit” button to save the corrected information. 5. The website validates the new information. 6. Validation success, save new edit information and direct back to a profile page.
Extension (a)	3a. The user incorrectly enter the information that he wanted to update in the form. 4a. The website validates the information and finds that information is incorrect such as a name or email that already exists in the database. 5a. The website will display a message prompting the user to enter the form to edit the information again.
Postconditions	The website will show the new user’s profile.

Name	Search doctor
Actor	Patient
Goal	Find a doctor to consult with.
Preconditions	Patients must log in and be on the homepage of the website first.
Main success scenario	1. The patient searches for a doctor by name or specialization. 2. The website lists doctors who are online and matches their name or specialty. 3. The patient picks a doctor from lists. 4. The website will direct the patient to a doctor profile page to display the doctor's personal information.
Extension (a)	1a. The patient search doctor by name 2a. The website can't find the doctor with the matching name. 3a. The website will not display a list of doctors for patients.
Extension (b)	1b. The patient searches for a doctor by specialization. 2b. The website can't find the available doctor with that specialization. 3b. The website will not display a list of doctors for patients.
Postconditions	The website will direct to the doctor information page for patients to view the doctor's profile.

Name	Make appointment
Actor	Patient
Goal	The patient fills in the preliminary symptoms and chooses an appointment date and time.
Preconditions	The patients have to choose the doctor first.
Main success scenario	1. The patient enters information about his or her initial medical condition. 2. The patient picks a date and time from the lists. 3. The patient presses "Confirm". The website will verify the accuracy of the information and save it to the database.
Extension (a)	2a. The patient selected the wrong date and time. 3a. The website will ask the patient to pick the date and time again.
Postconditions	The website will send information related to the appointment to the doctor chosen by the patient.

Name	View appointment record
Act-or	Patient
Goal	The patients view their appointments that have been recorded.
Preconditions	The patient must be on the appointment management page.
Main success scenario	1. The patient selects the list of appointments the patient wants to view from the list of all appointments. 2. The website will show the content of the appointment to the patient.
Postconditions	The website will display a list of appointments that the patient has selected.

Name	View their patient's appointment record
Actor	Doctor
Goal	The doctor can view the appointment record that the patient wants to make an appointment with the doctor.
Preconditions	The doctor must be on the appointment management page.
Main success scenario	1. Lists the appointments that the doctor must meet with the patient who has requested the appointment. 2. The doctor can go in and see the details of the appointment.
Postconditions	The website will list all appointments that the patient has made.

Name	Add appointment record
Actor	Doctor
Goal	Comment on initial symptoms and make appointments for patients.
Preconditions	The doctor must select one appointment from the list of all appointment records.
Main success scenario	1. The doctors view the patient's profile and make comments about the patient's condition. 2. The doctor chooses the date and time of the appointment for the patient to come and press “Confirm”. 3. The system will save details about the appointment into the database.
Extension (a)	2a. The doctor chooses the wrong date and time to make an appointment with the patient. 3a. The system will ask the doctor to choose a new date and time for an appointment again.
Postconditions	Details about the appointment are saved to the database.

Name	Edit / Delete patient’s appointment record
Actor	Doctor
Goal	Edit / Delete patient appointment record that the doctor has to consult with
Preconditions	Doctor is viewing the patient's appointment record page.
Main success scenario	**Edit case** 1. Doctor clicks the “Edit” button. 2. Website will direct you to edit the appointment record page. 3. Doctor types in the information that he wants to be update in the form. 4. Doctor clicks the “Confirm” button. 5. Websites validate the new information. 6. Validation success, save new edit information and direct back to profile page. **Delete case** 1. Doctor clicks the “Delete” button. 2. Appointment record is deleted from the database.
Postconditions	The website will finish Edit / Delete data and back to the patient's appointment record page.

Name	Add doctor
Actor	Admin
Goal	Add a doctor to the system.
Preconditions	Admin is viewing the doctor management page.
Main success scenario	1. Admin click the “Add” button. 2. Website will show a doctor information form. 3. Admin type in the information into the form and click “Confirm” 4. Website validates the form. 5. Validation successful, Information will be added to the database and directed back to the doctor management page.
Extension (a)	4a. The website has detected that the doctor's information already exists in the database previously. 5a. Failed to add a doctor the website will return to the doctor management page for admin to add a new doctor again.
Postconditions	A new doctor has been added to the database.

Name	View doctor
Actor	Admin
Goal	View all the doctors in the system.
Preconditions	Admin is viewing the doctor management page.
Main success scenario	1. The website will display a list of all available doctors in the system. 2. Select a doctor from the list displayed. 3. The website will display the personal information of the selected doctor.
Postconditions	The website will display all the doctors in the system and their information.

Name	Edit doctor / Delete doctor
Actor	Admin
Goal	Edit / Delete the doctor in the database.
Preconditions	Admin is viewing the doctor management page.
Main success scenario	**Edit case** 1. Admin click the “Edit” button. 2. The website will direct you to the edit the doctor information page. 3. Admin types in the information that wants to be edited in the form. 4. Admin click the “Confirm” button. 5. The website validates the new information. 6. Validation success, save new edit information and direct back to a profile page. **Delete case** 1. Admin click the “Delete” button. 2. Doctor is deleted from the database
Postconditions	The website will finish edit/delete the information and save the information to the database, then return to the doctor management page.

Name	Assign doctor
Actor	Admin
Goal	Determine what day and time the doctor will enter the website.
Preconditions	Admin must be on the administrator's management page.
Main success scenario	1. Admin selects one doctor from the list of all doctors. 2. Admin determines the date and time that the doctor will enter the website and press “Confirm”. 3. The website checks the accuracy and records it in the database.
Extension (a)	2a. Admin selected the wrong date and time for the doctor to enter the website. 3a. The website will ask the admin to select the date and time of entering the website of the new doctor again.
Postconditions	The website can display the date and time that the doctor will enter the website for the patient.

Name	View admin
Actor	Admin
Goal	View all the admin in the system.
Preconditions	Admin is viewing the admin management page.
Main success scenario	1. The website will display a list of all available admin in the system. 2. Select an admin from the list displayed. 3. The website will display the personal information of the selected admin.
Postconditions	The website will display all the admin in the system and their information.

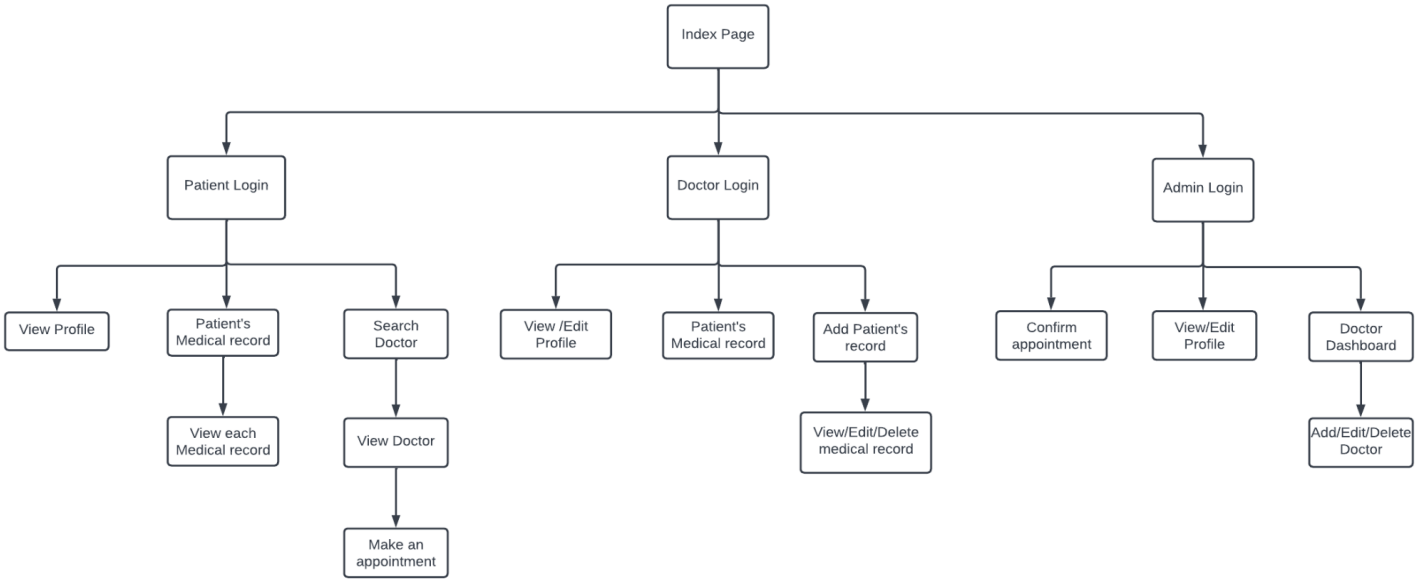
Name	Confirm appointment
Actor	Admin
Goal	Confirm appointment from a doctor.
Preconditions	Admin must be on the administrator's management page.
Main success scenario	1. The website shows all the appointments that the doctor has made. 2. Admin selects one and checks it for correctness. 3. Press “Confirm” to complete the appointment.
Postconditions	The website will send information about the appointment to the patient.

Architectural Design

- We use HTML and CSS for our front-end
    - HTML is used to create the pages and make them functional
    - While CSS, is for visualizing our web design.
- We use PHP for our back-end.
    - PHP is for managing our SQL database
- We use SQL for our database.
    - SQL is the server we used to contain our data.

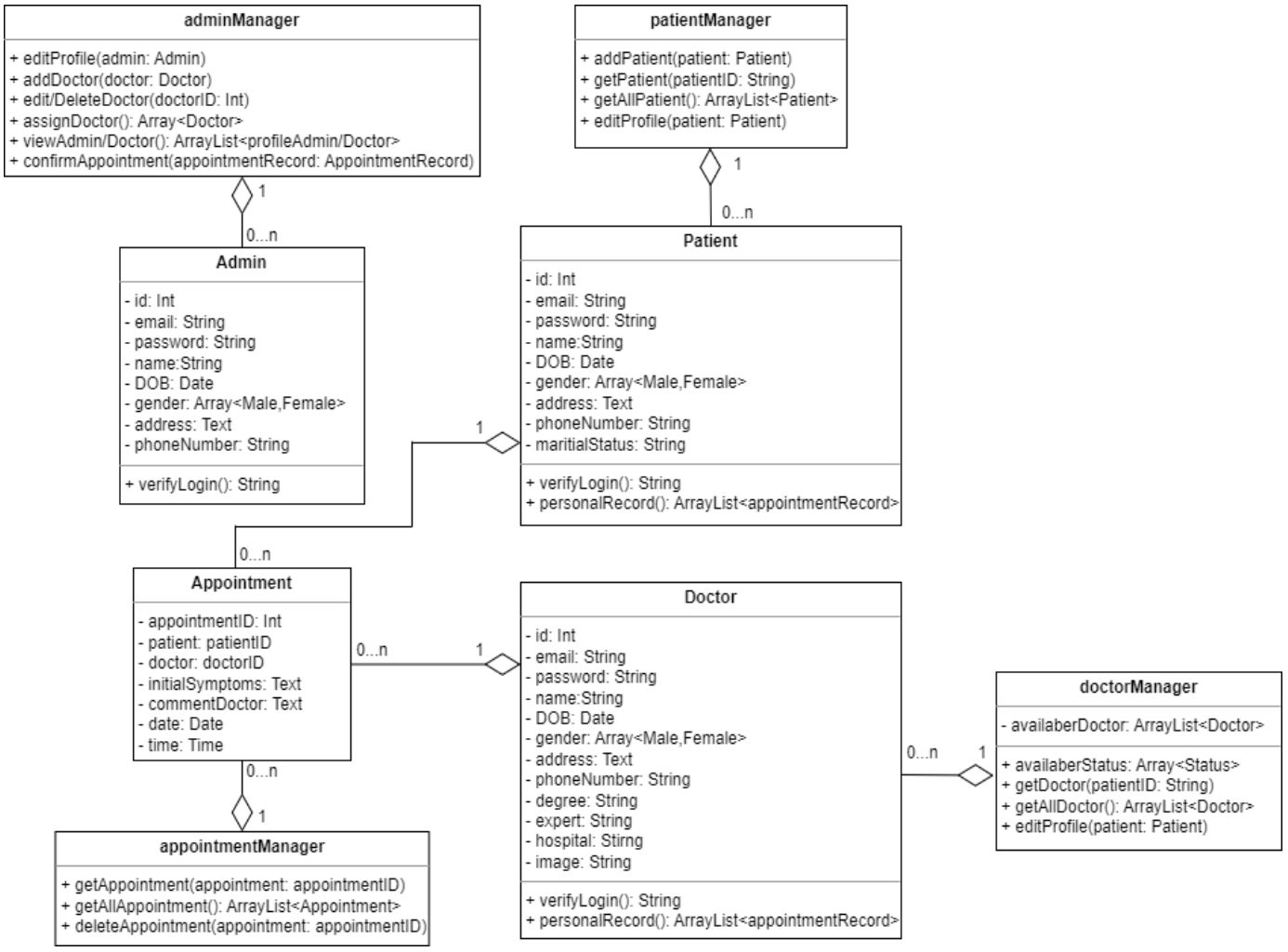
Design Artifacts

1. Navigation map



All user's will be directed to the Index Page of the website and users must login to proceed. This page is for guest users who are not logged in yet on the website.

2. Class diagram

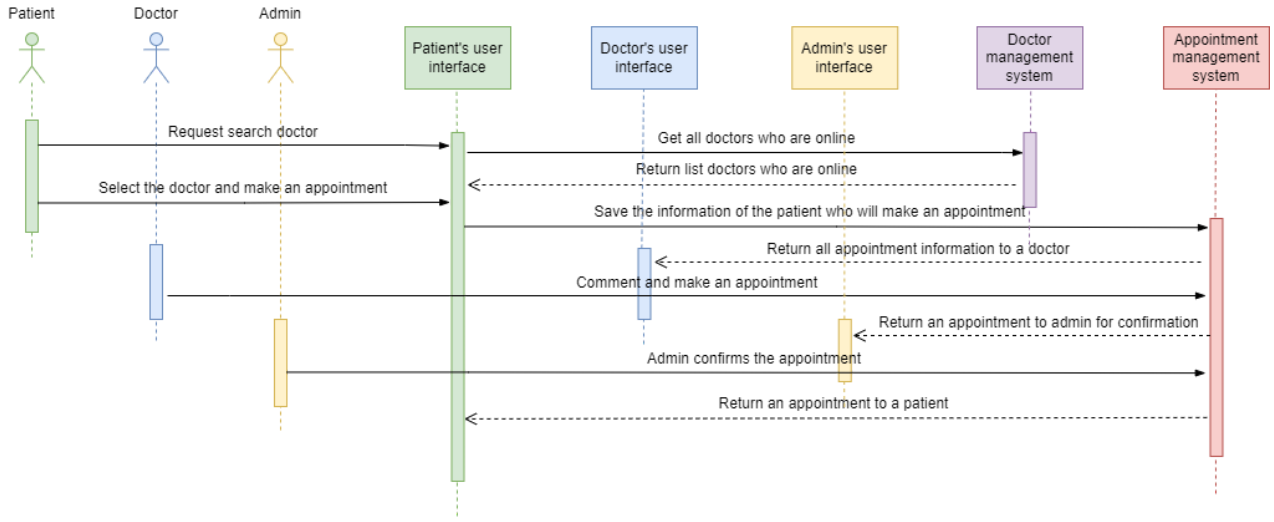


In the class diagram, there are 8 classes in this diagram, the main class such as Patient, Doctor, Admin, and Appointment this is the main classes of the website and there are manager classes that use to manage other classes such as PatientManager, DoctorManager, AdminManager, and appointmentManager.

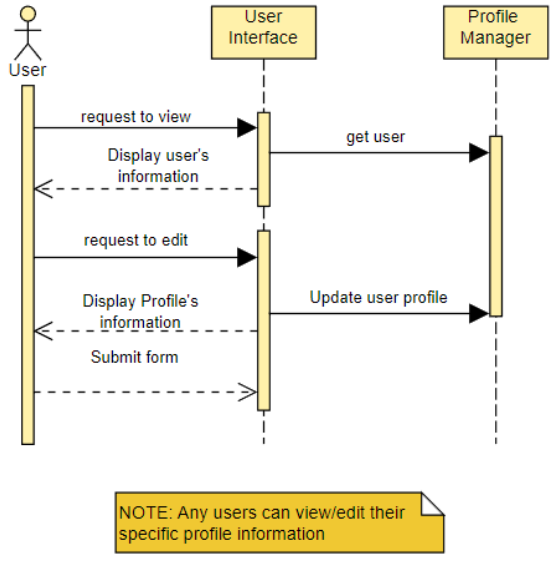
3. Sequence diagram

The website that our team created can be described into various sequence diagrams. The examples shown below are some of the main features and objectives of our website which are appointment start to end of the appointment, view/edit profile, add doctor, edit/delete doctor, assign doctor, and view admin/doctor.

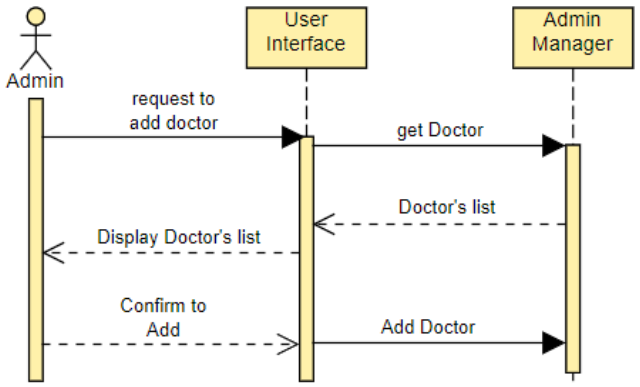
3.1 Appointment start to end of the appointment



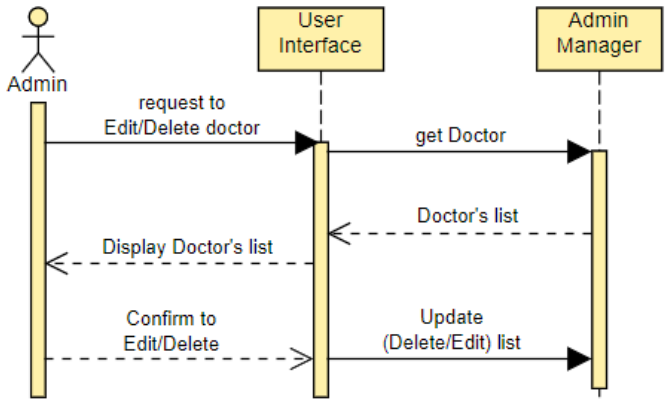
3.2 View/edit profile (Note: Profile Manager can be PatientManager,DoctorManager, or AdminManager)



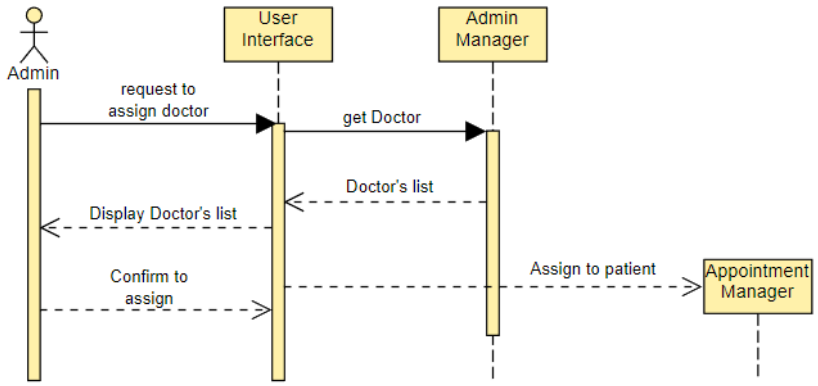
3.3 Add doctor



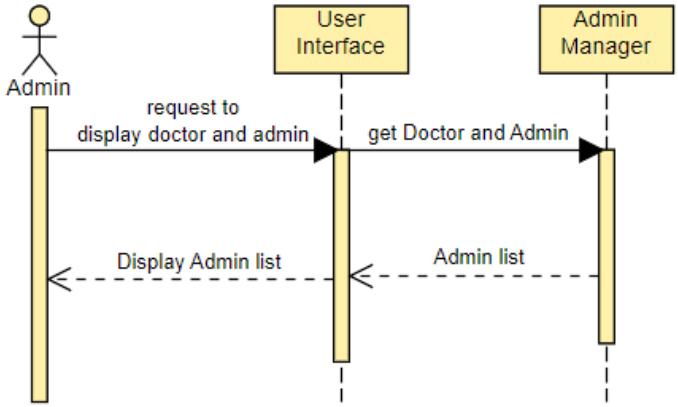
3.4 Edit/delete doctor



3.5 Assign doctor

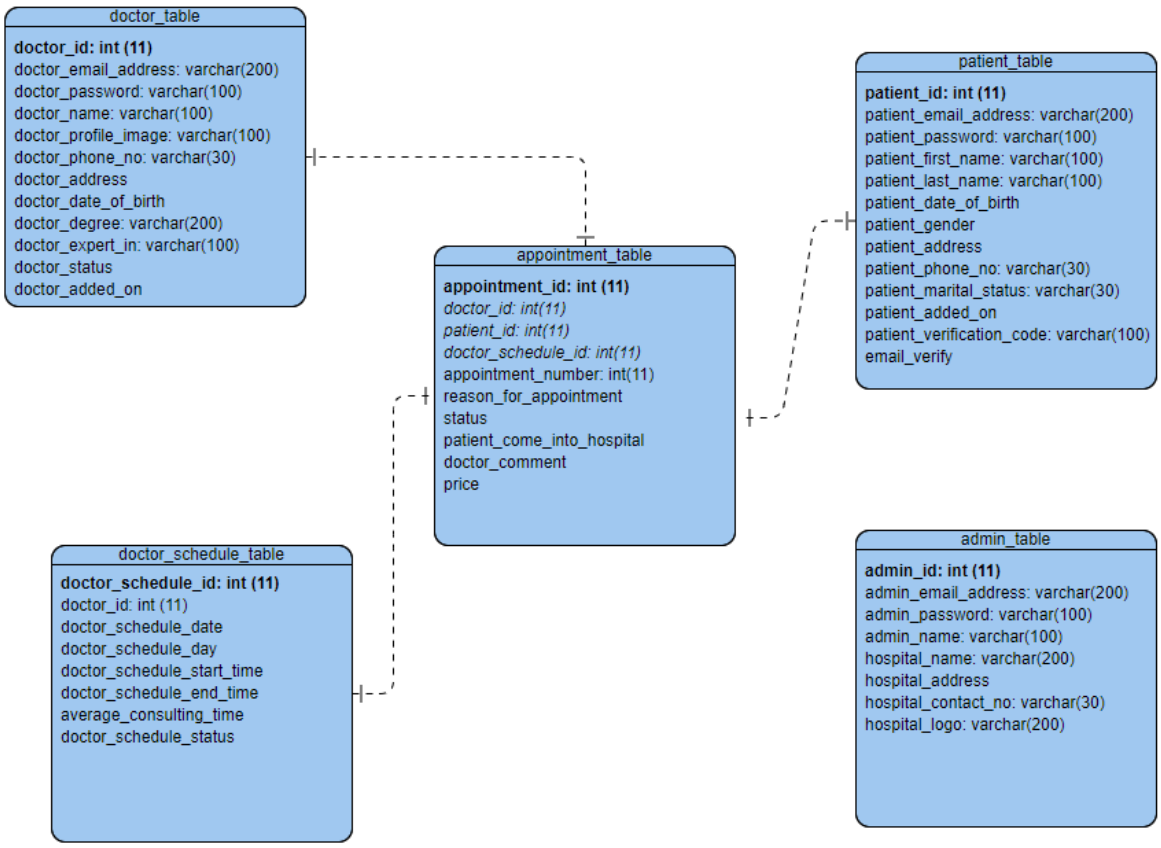


3.6 View admin/doctor



4. ER diagram

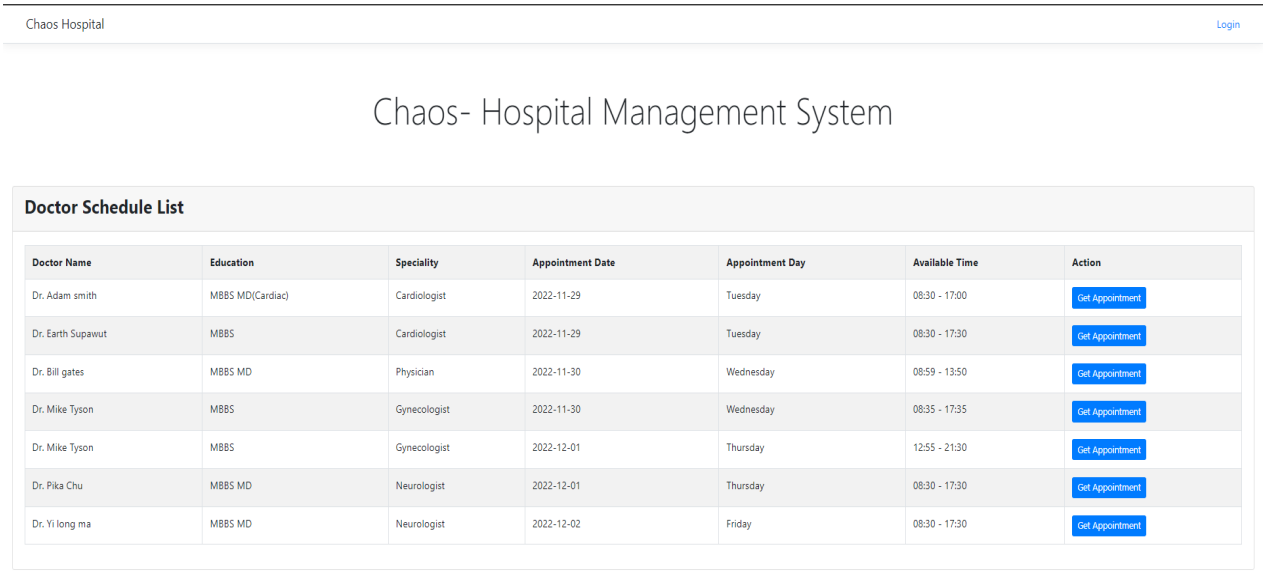
This is the ER diagram of the phpMyAdmin database of the website. The database consists of five tables such as doctor_table, patient_table, admin_table, appointment_table, and doctor_schedule_table. The doctor, doctor_schedule, and patient table are all in a one-on-one relationship with the appointment table.



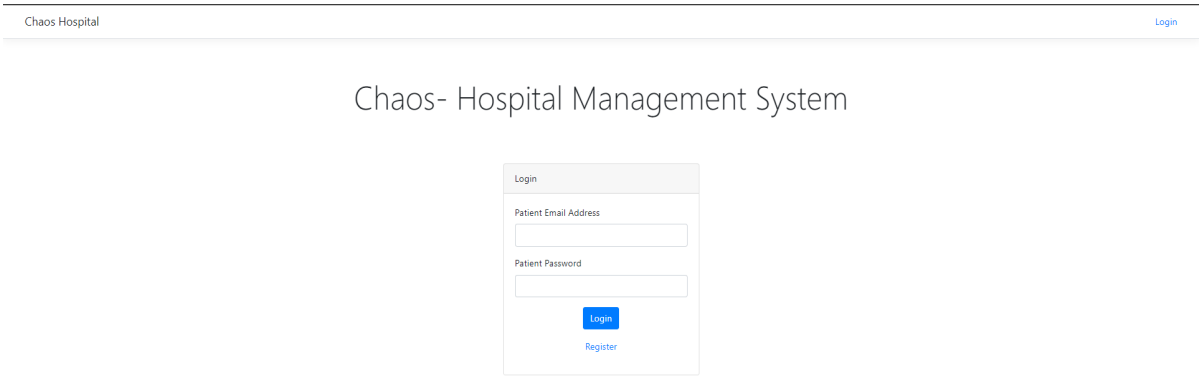
5. User-interface (UI) design

The images shown below are the UI of our created website.

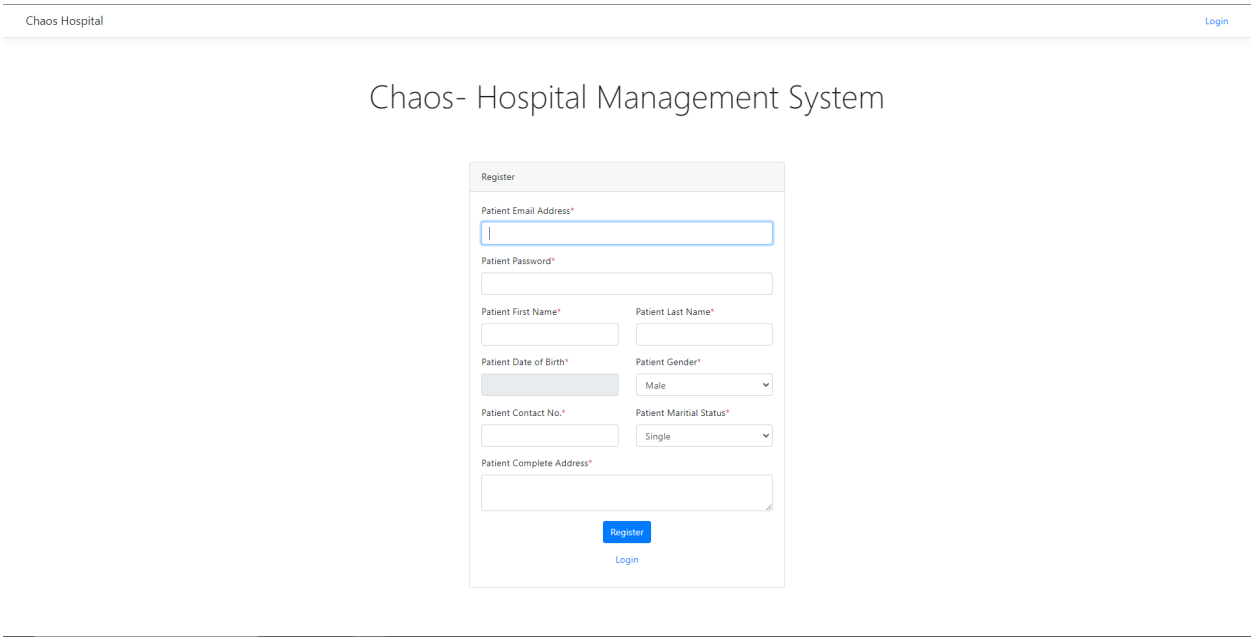
5.1 Index Page



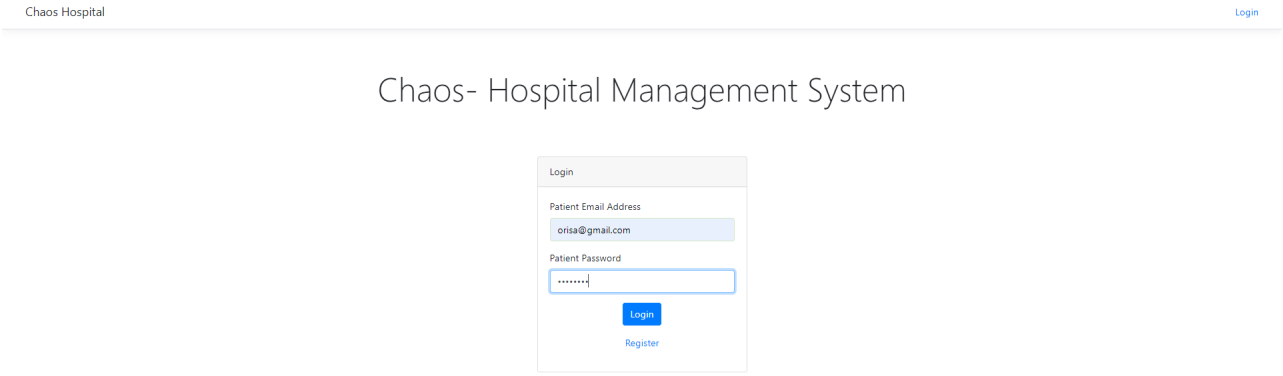
5.2 Patient Login Page



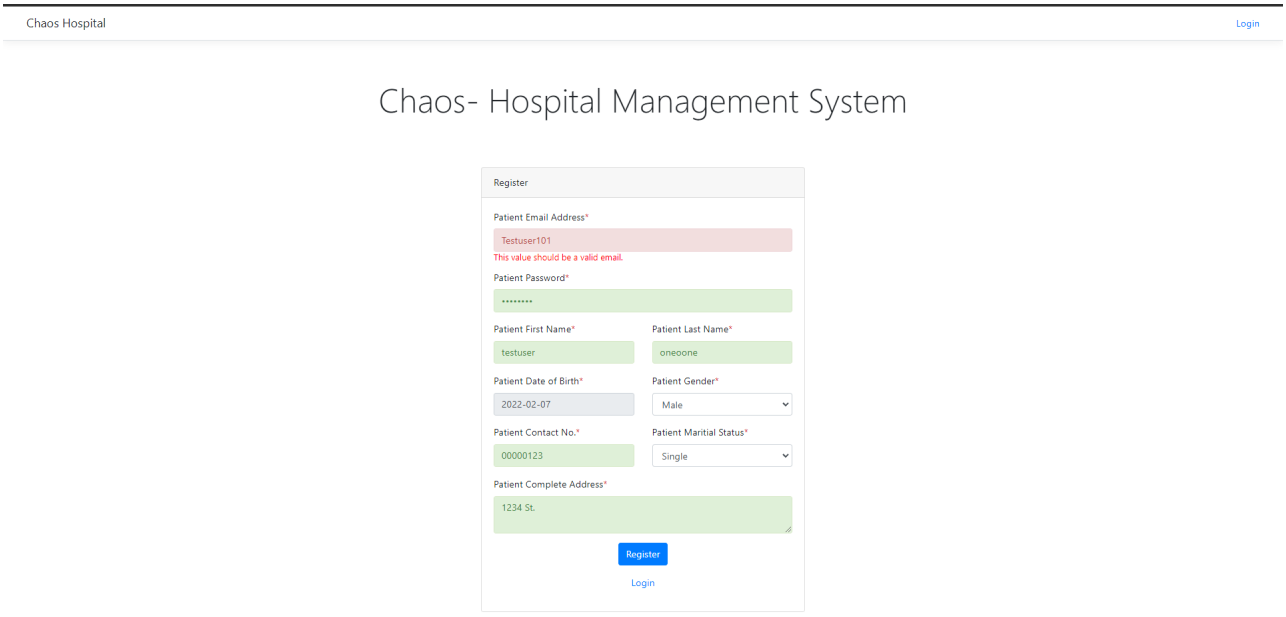
5. 3 Patient Register Page



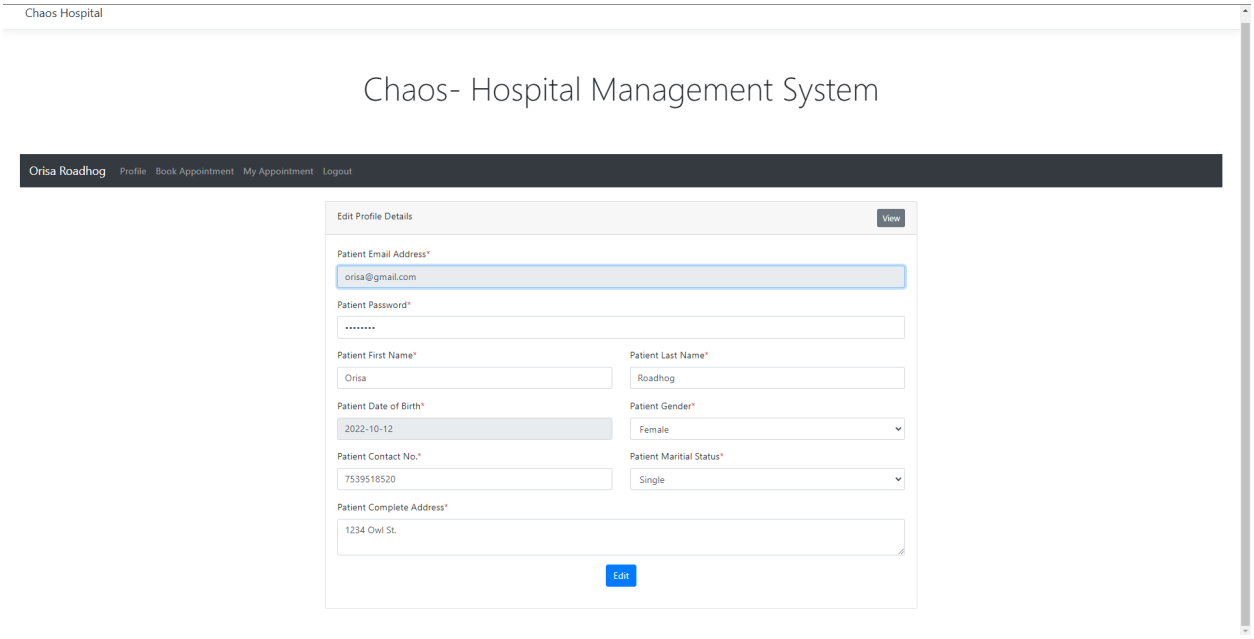
5.4 Login with information



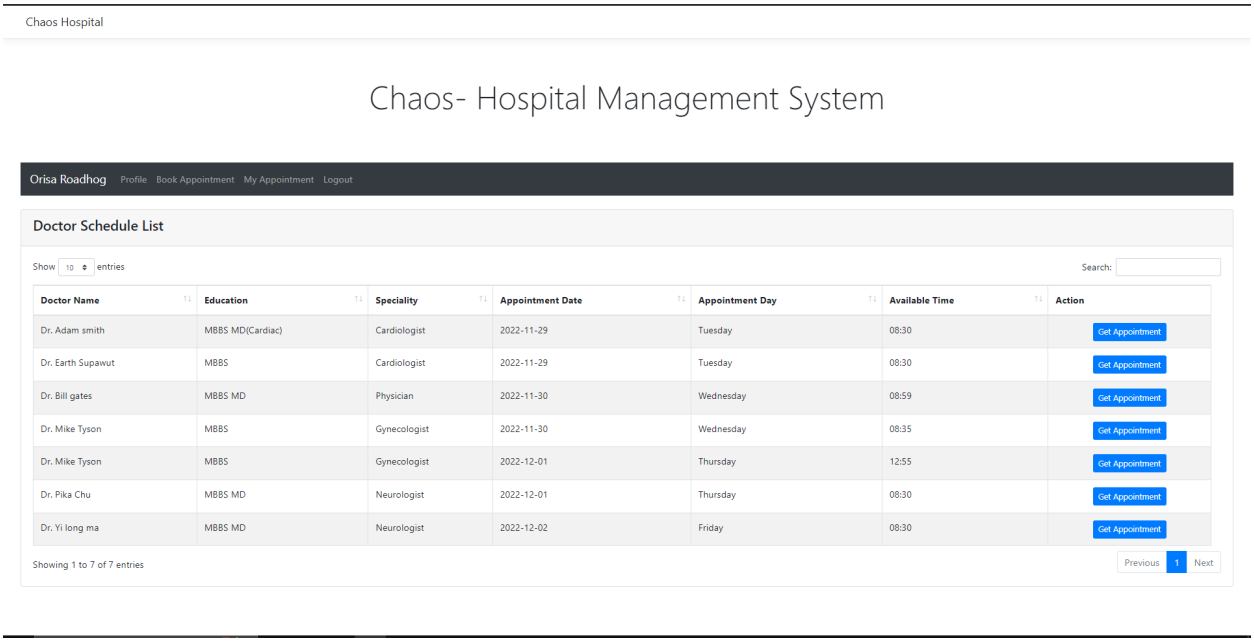
5.5 Register with validation (Valid Email format, can't be the same in the db. need to have password, name, surname, phone no, DOB., Gender,Marital status, Address)



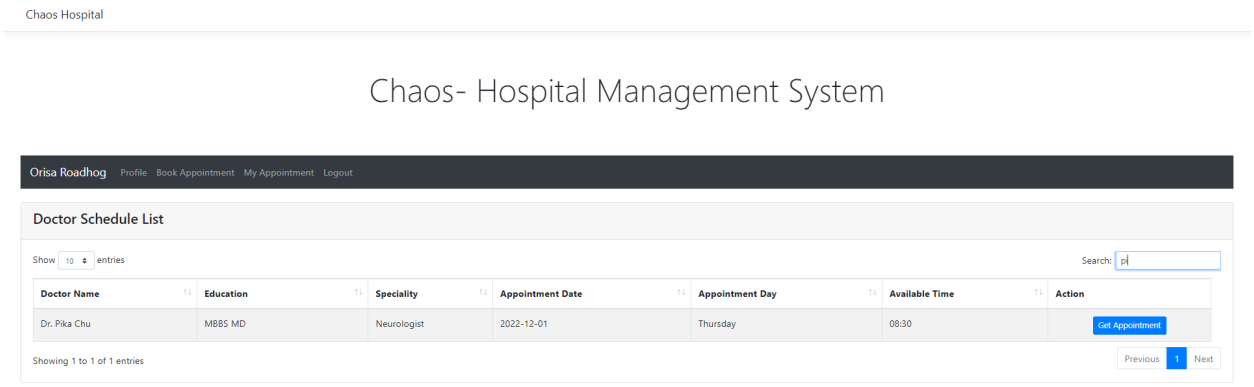
5.6 Edit profile (Patient's POV)



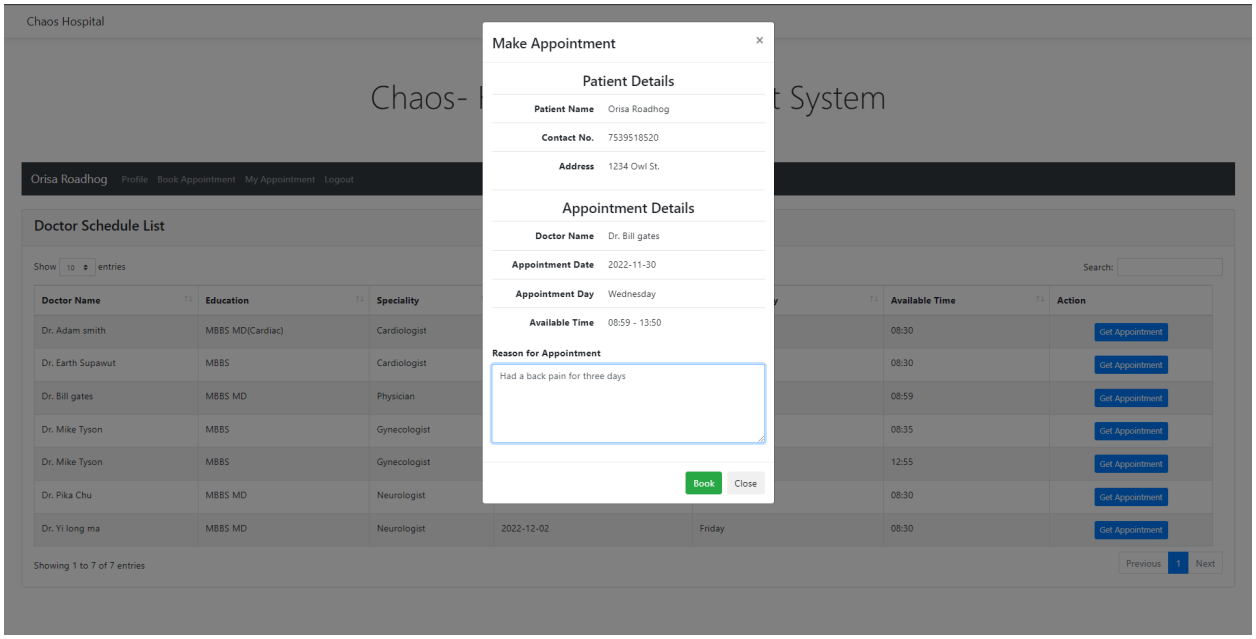
5.7 Appointment table after login (Patient's POV). There are five columns, name, profile, book an appointment, appointment history and logout.



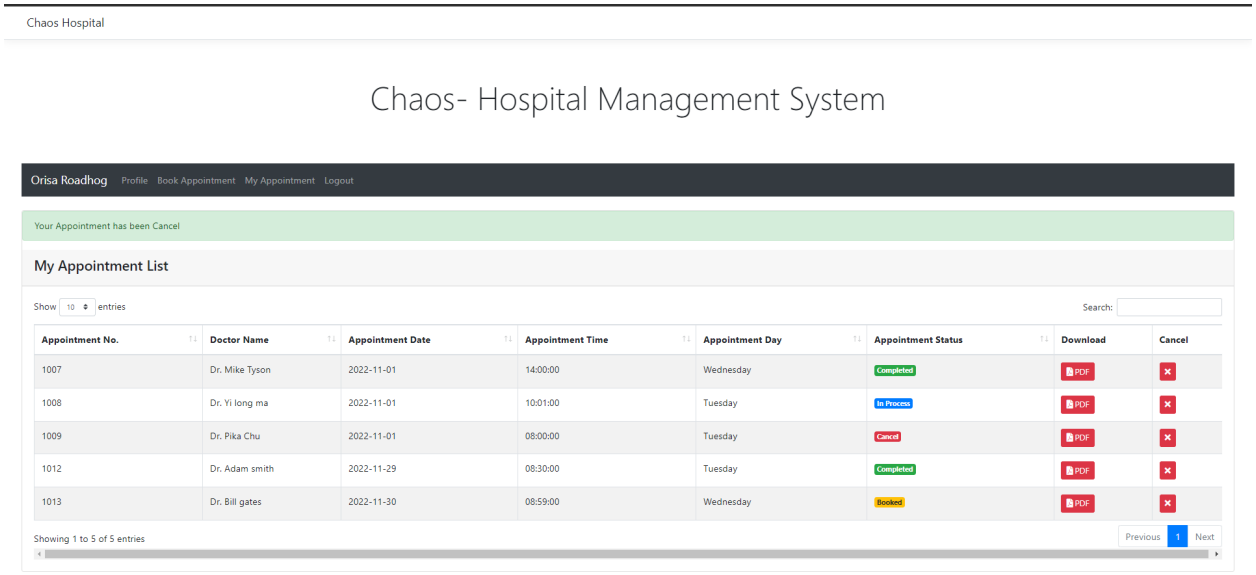
5.8 Search doctor to make appointment by inputting name, speciality, or date (Not case sensitive)



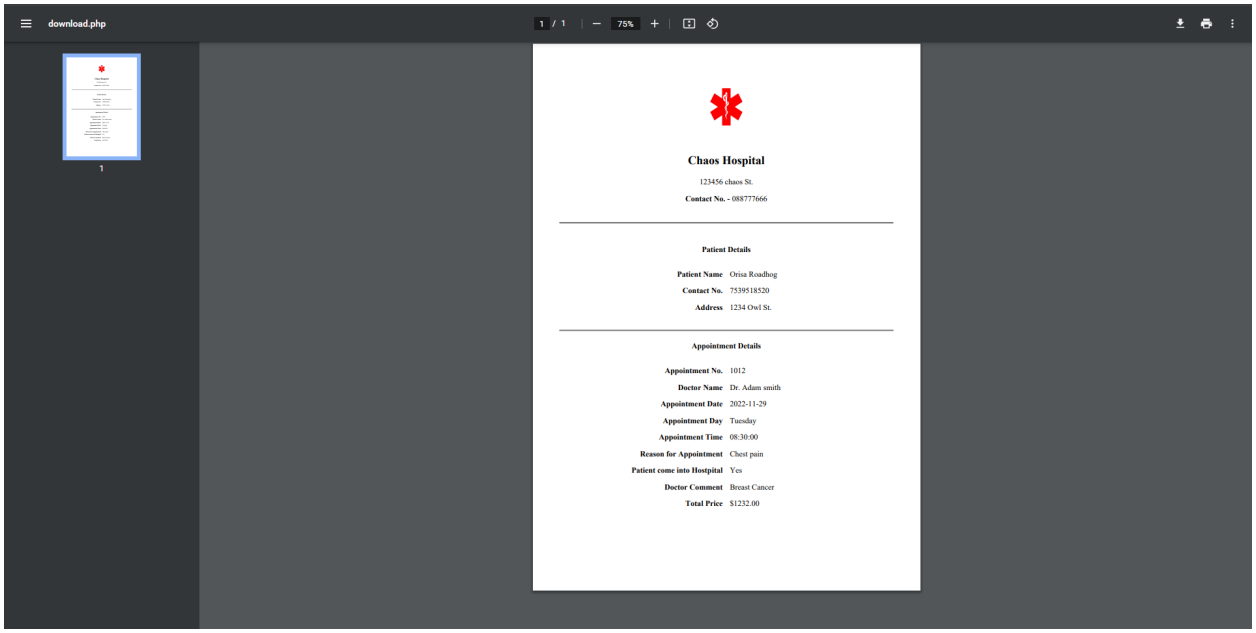
5.9 Making an appointment with the reason/symptoms



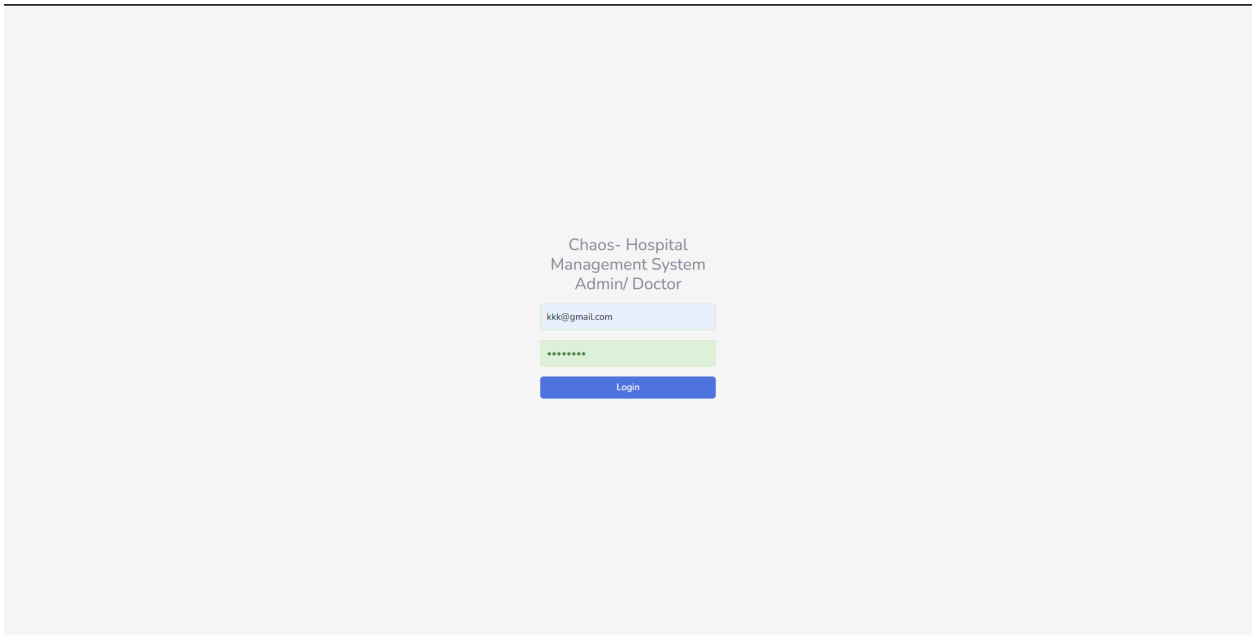
5.10 Show the medical records of the patient Status are Completed(Patient came to hospital and finished the appointment) In progress(Patient came to hospital, still in the progress) cancel(Patient canceled the appointment or did not come to the hospital). Patients can cancel the appointment in this page and can print the pdf format of the medical record with.



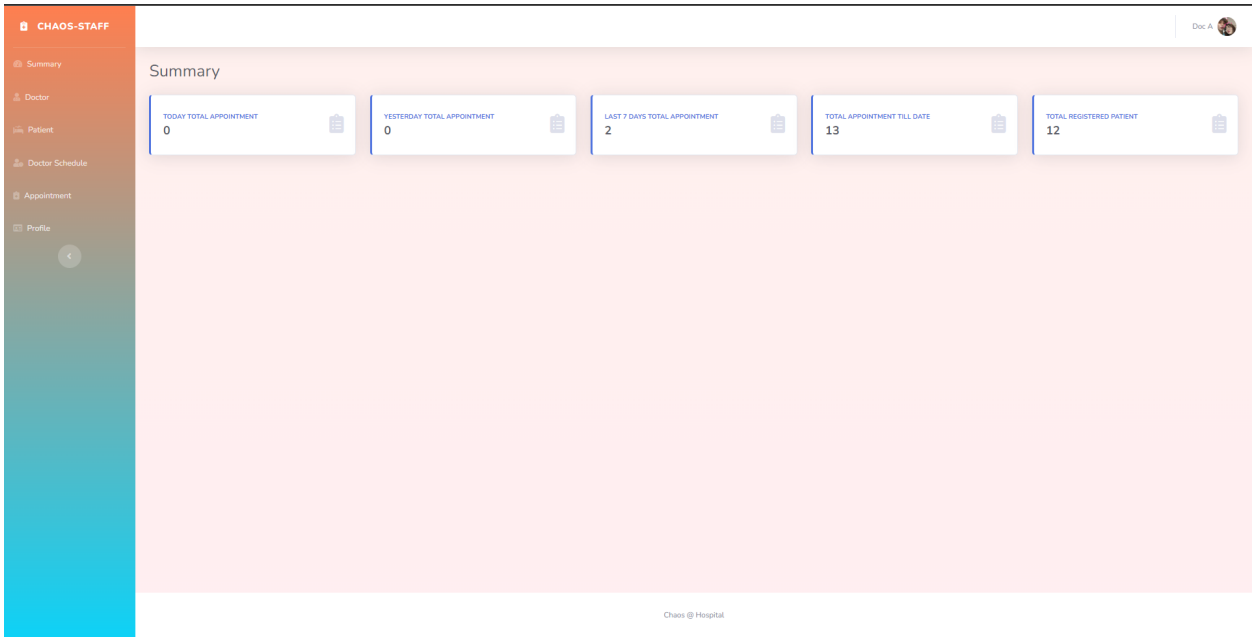
5.11 The printed medical record of a patient.



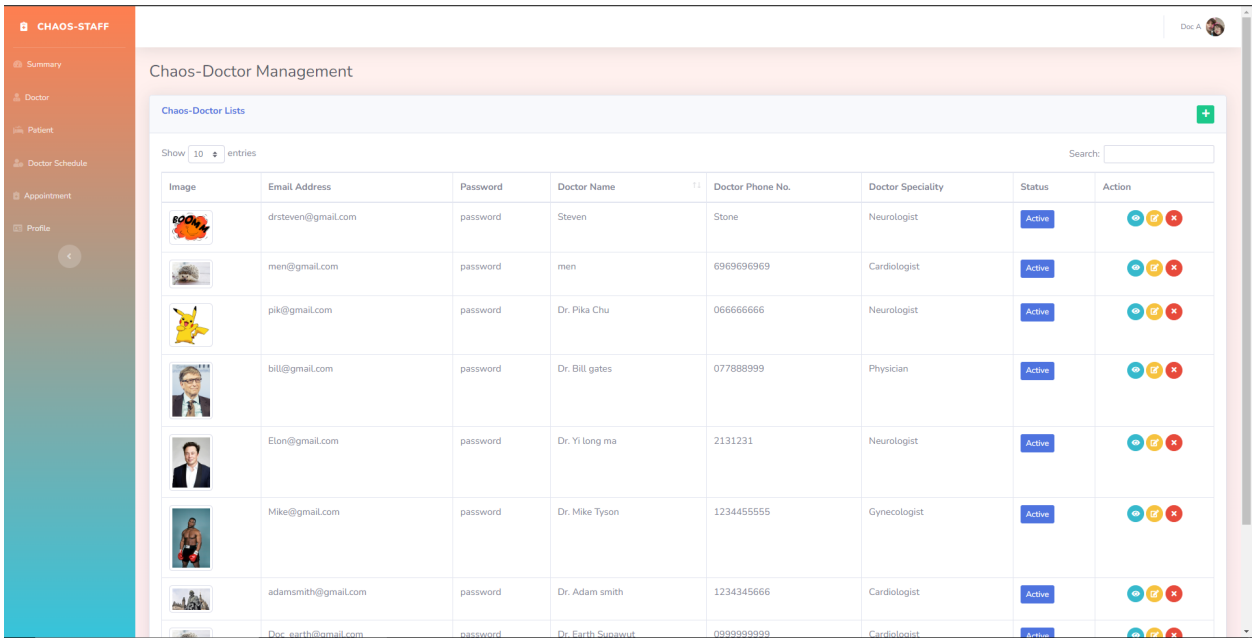
5.12 Admin/Doctor login page



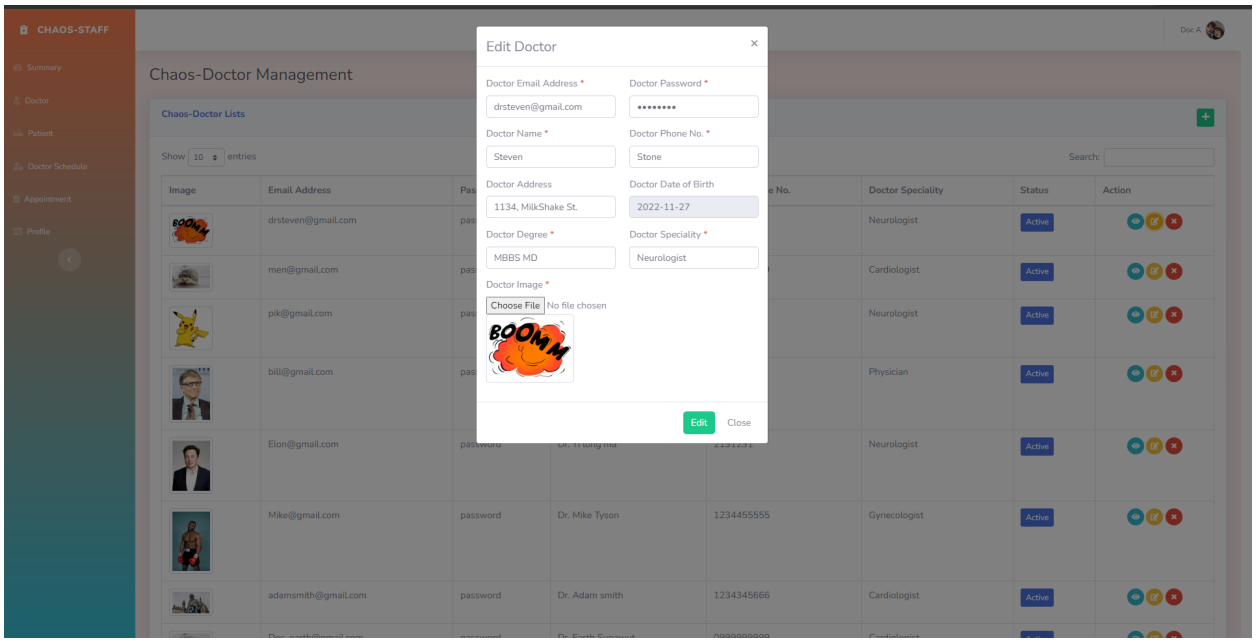
5.13 The summary of the appointment (Admin POV)



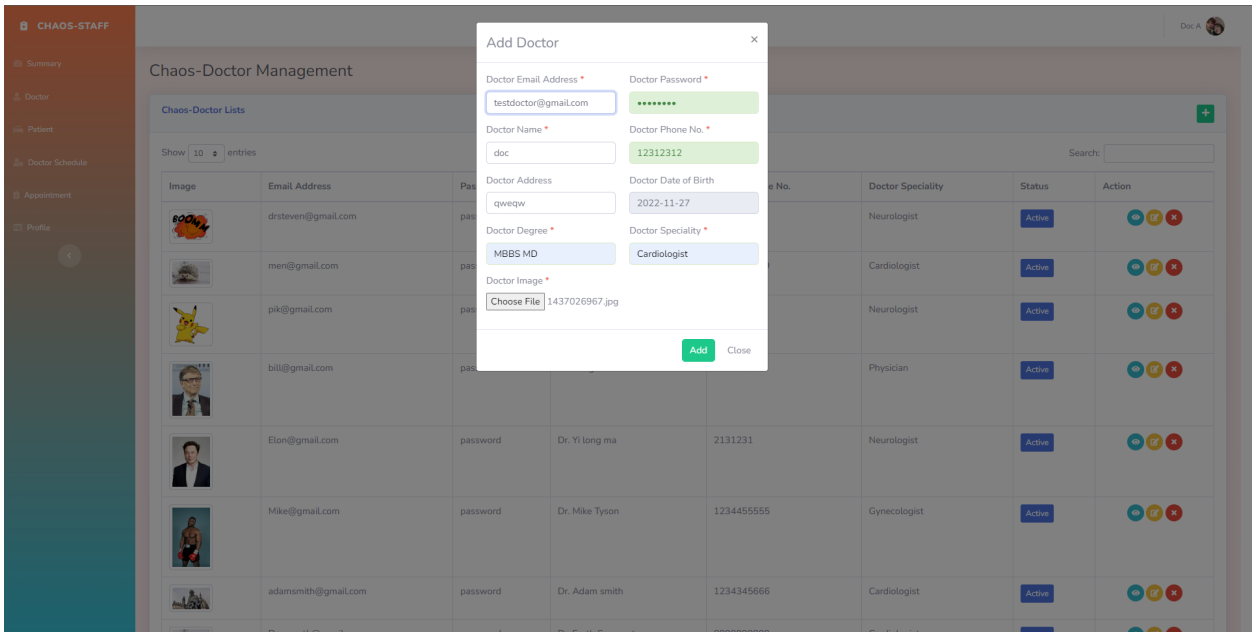
5.14 Doctor page(admin POV) admin can edit/ add or remove every doctor here as well as change the doctor status(active, inactive(holiday))



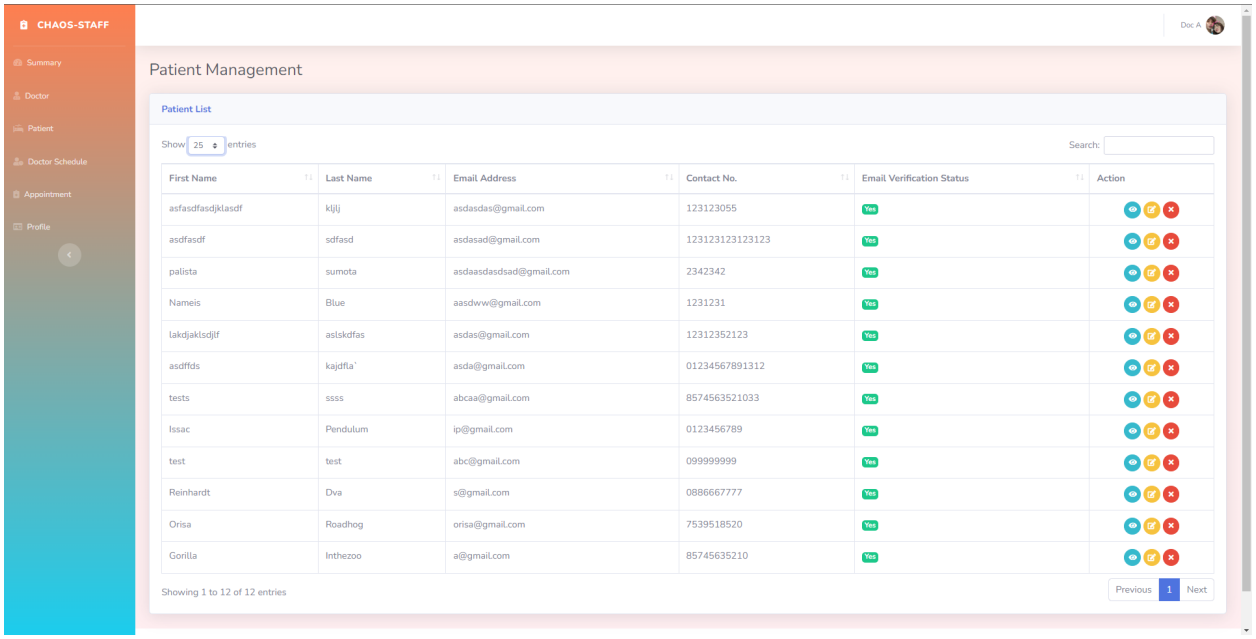
5.15 Admin edit the doctor information



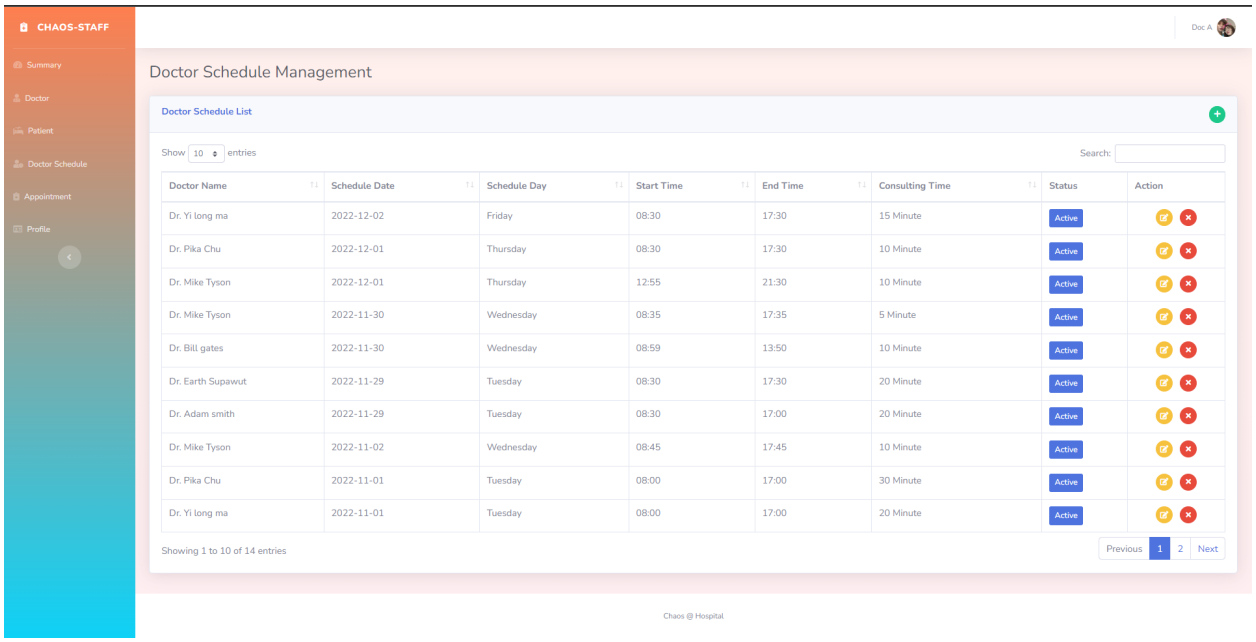
5.16 Admin add Doctor



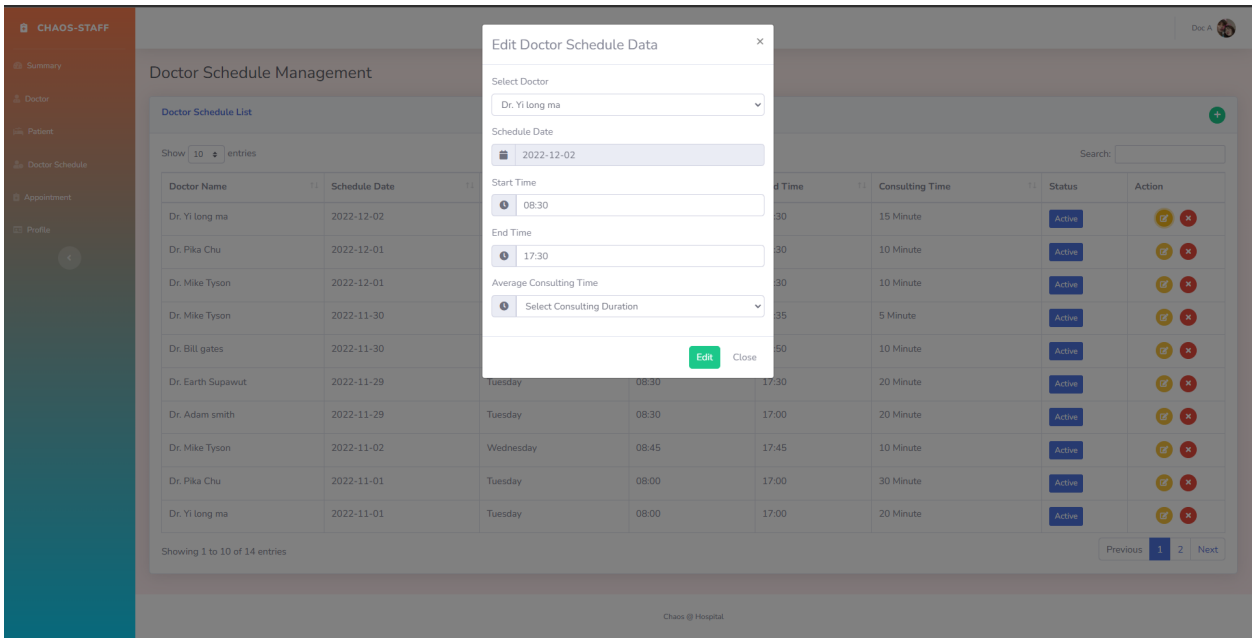
5.17 Admin view/delete patient

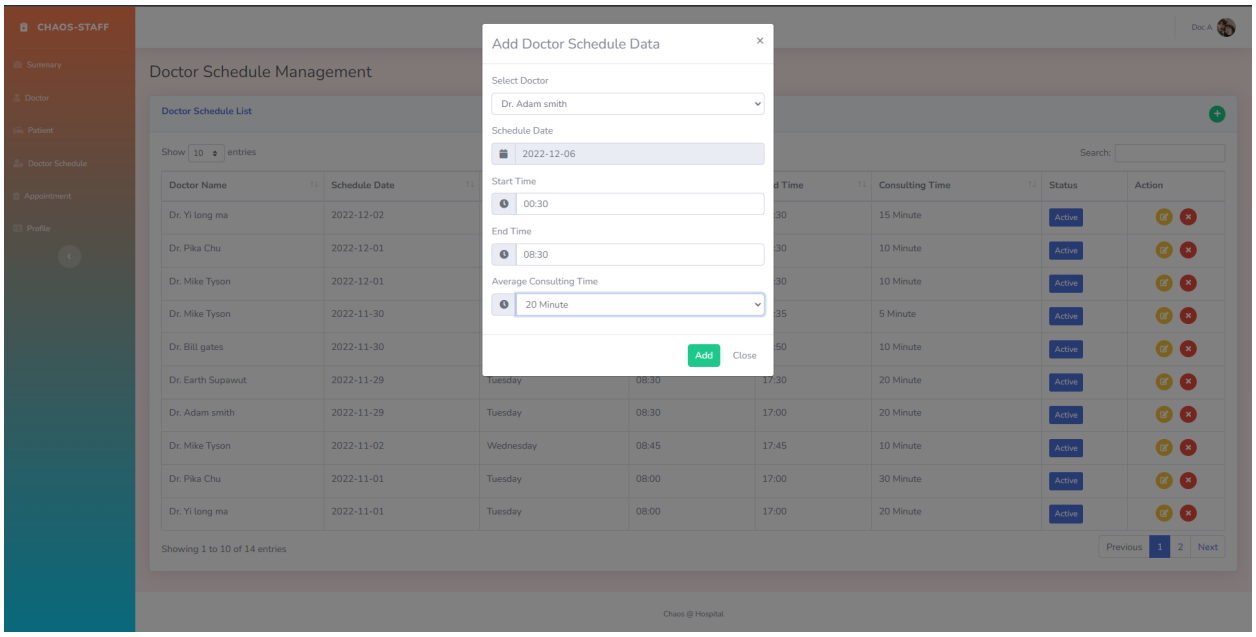


5.18 Admin view on Doctor Schedule

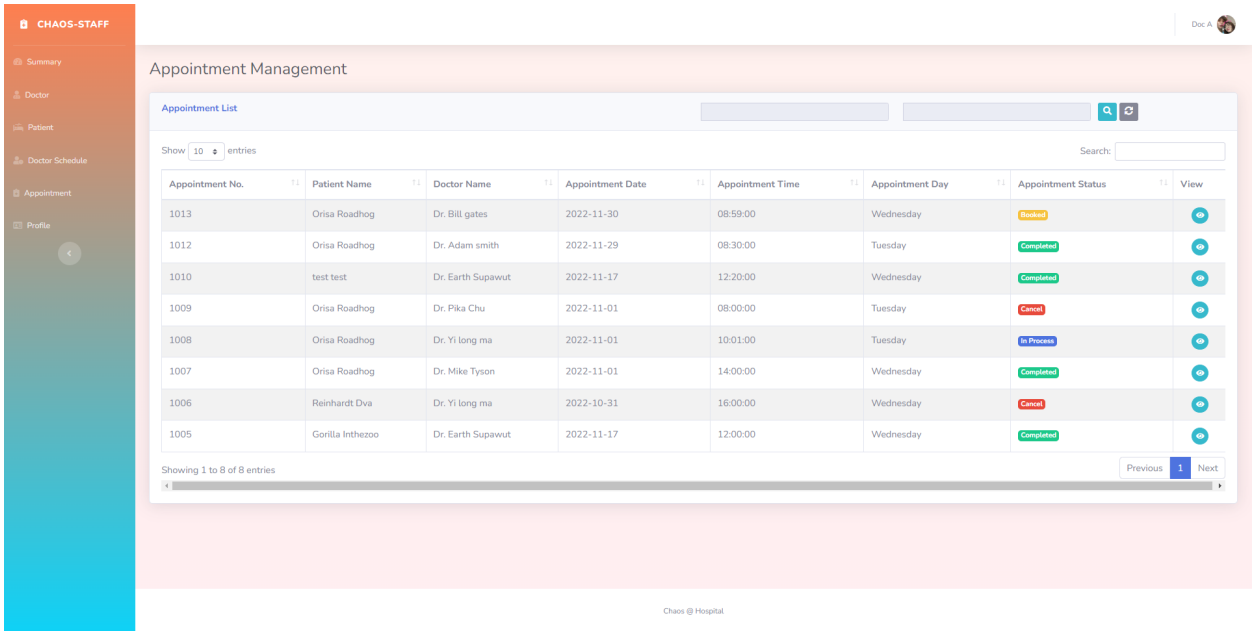


5.19 Admin add/edit work shift

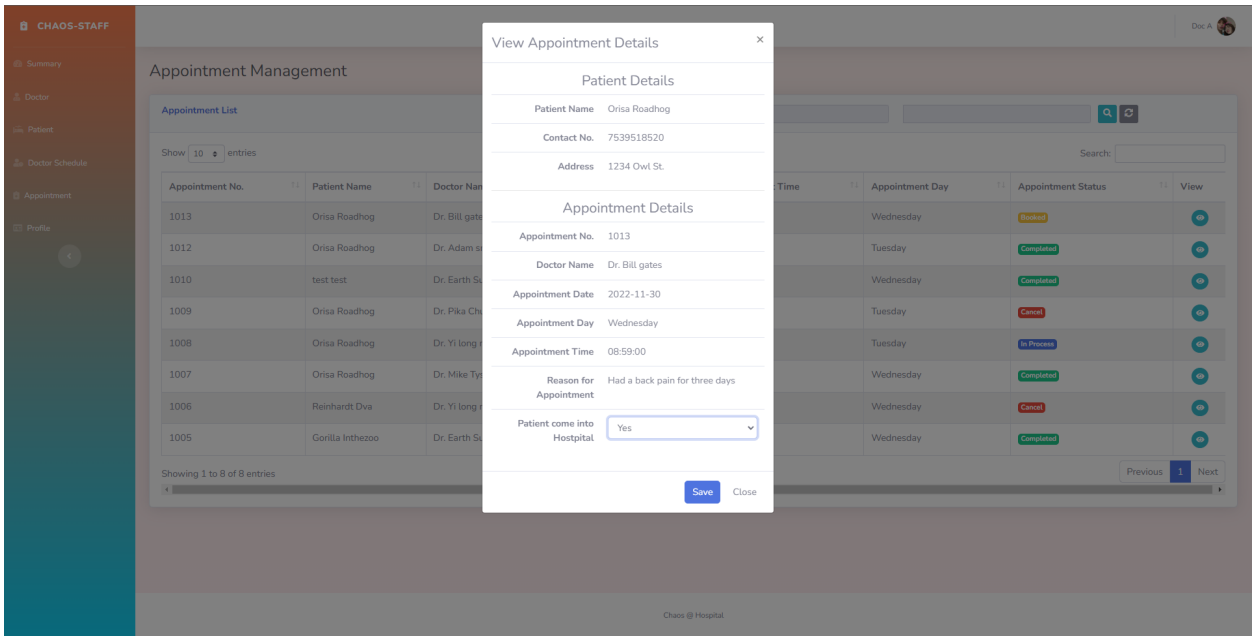




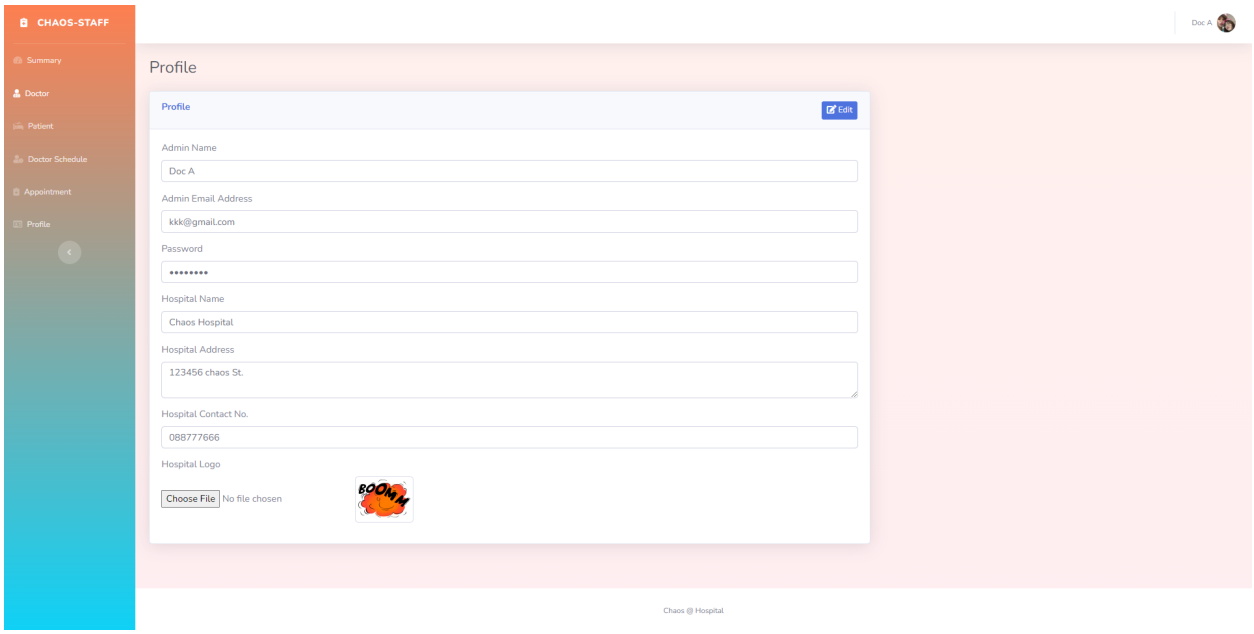
5.20 Admin see all the appointment



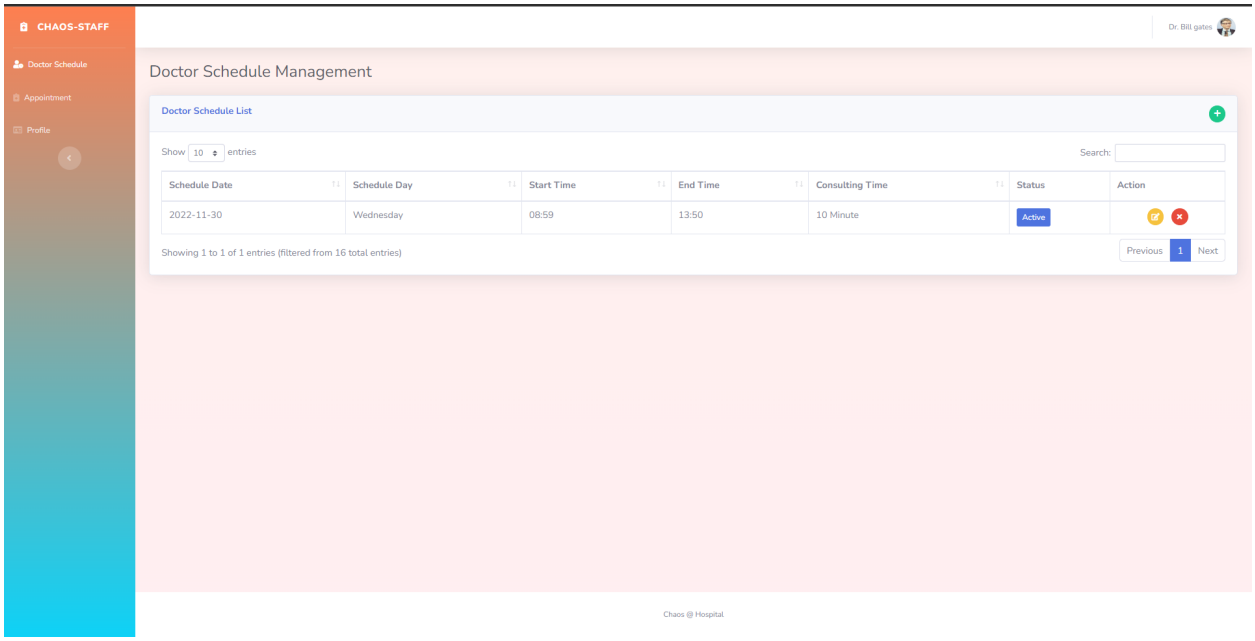
5.21 Admin confirms the booking if the patient comes to the hospital or not. If yes then the status will be in progress if not the status will be canceled.



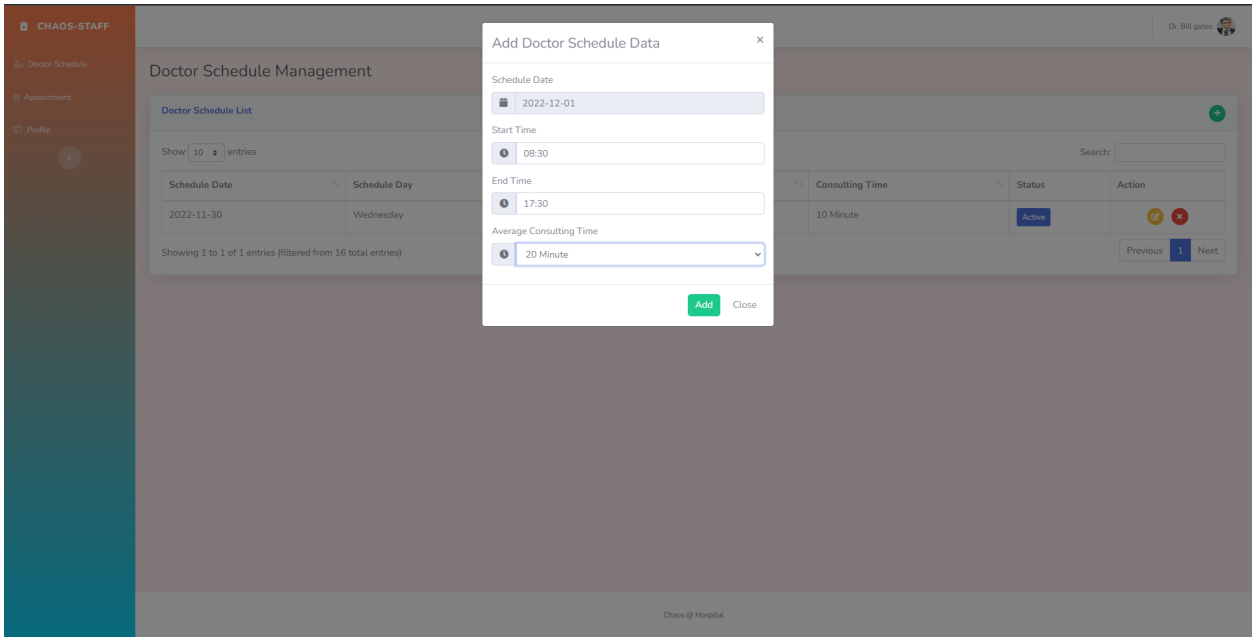
5.22 Edit the admin profile



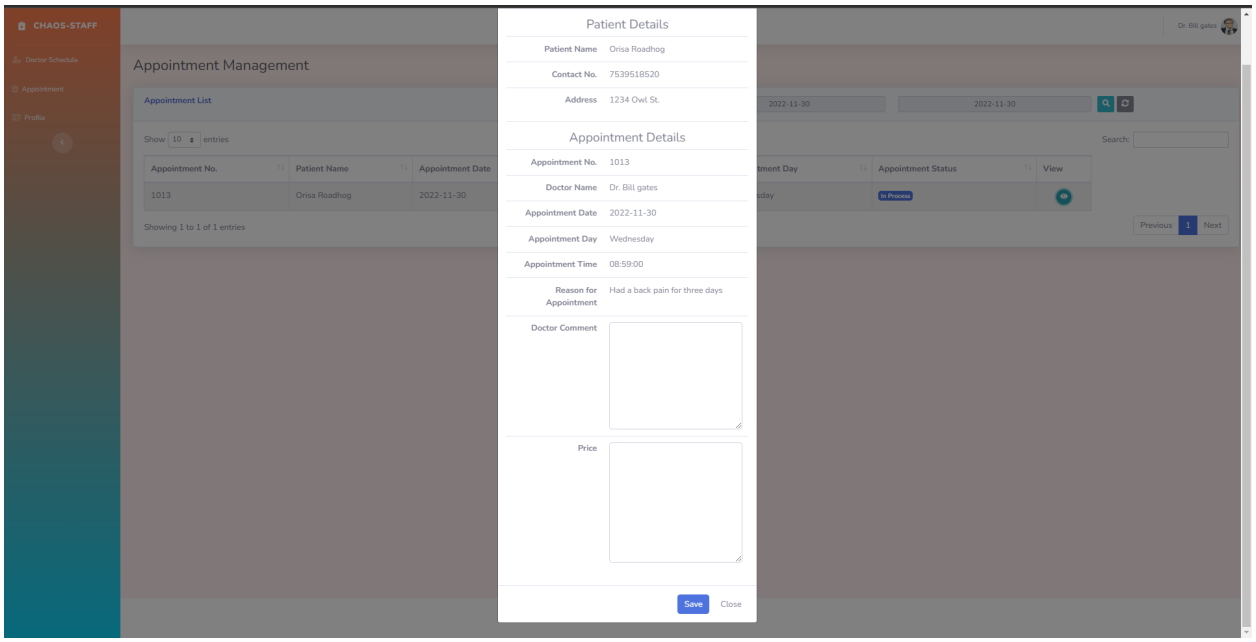
5.23 Doctor View Schedule



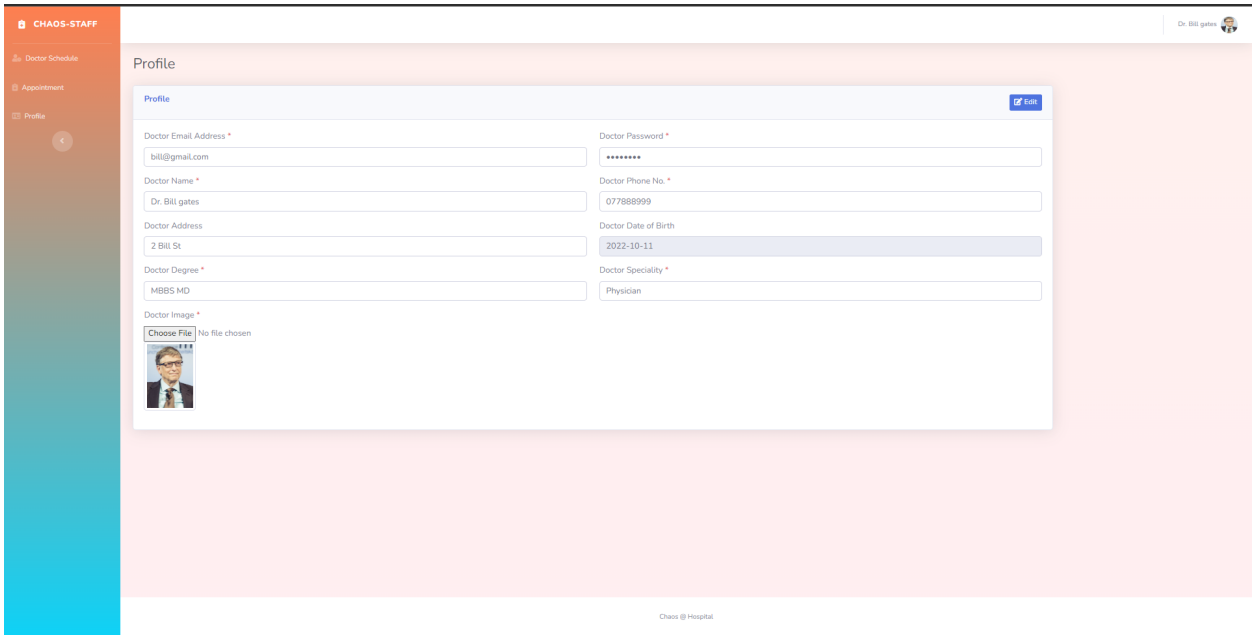
5.24 Doctor add own work schedule



5.25 Doctors can make a comment on the in progress status patient as well as adding price. Once the doctor has made a comment and added price then the status of the patient will be completed.

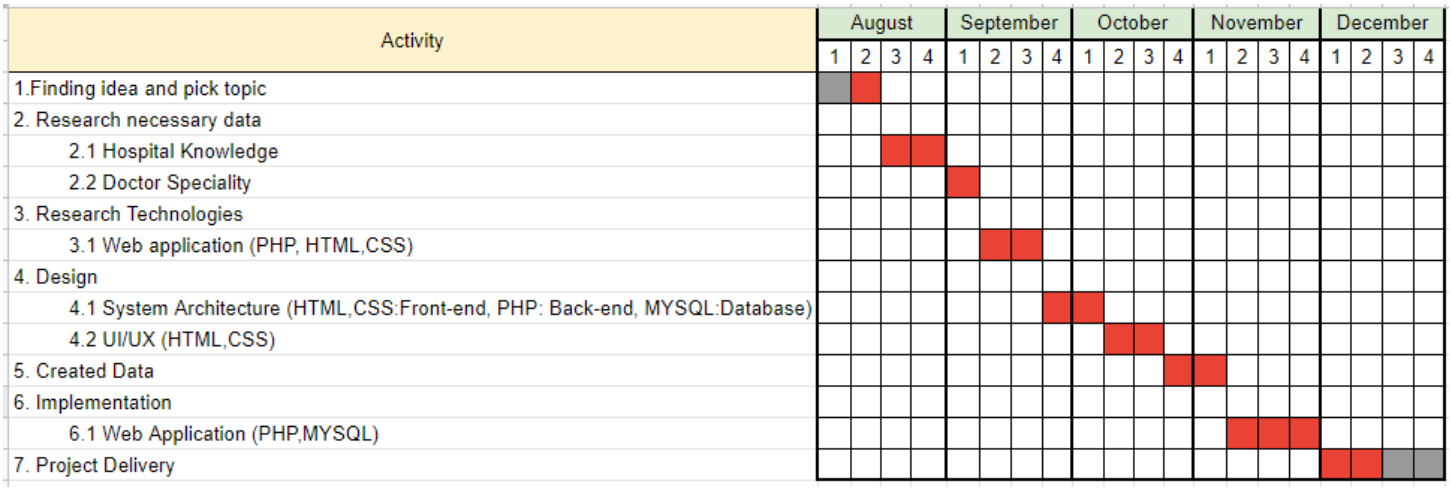


5.26 Doctor Edit Profile



Development Process Description

At first, we had a meeting about what our product or software would be. During the process of developing this software project, we separated it into various activities basing it on the waterfall model software process. The image below shows the process we had throughout this project. We did finding ideas and picking a topic, researching necessary data such as hospital knowledge and doctor speciality, around August. After that, we research technologies for web applications (PHP,HTML,CSS). We then designed our website and created our own data samples. Lastly are implementation of the web application and project delivery.



Self Evaluate

Success goals: This project met all the goals that have been set such as

Management of information in the system: The admin can view, create and delete the doctor. The admin can change the doctor information and profile picture. The admin can add or edit the doctor workshift. The admin can view, delete or edit the patient information. The admin can confirm the patient booking and can see all appointments in the system. The admin can change their own information. The doctor can change their own information. The doctor can add or delete their own workshift. The doctor can see their patient's information, appointment and medical records. The doctor can give the bill, medical certificate and comments on their patient. The patient can book any doctor that is available with the speciality related to their symptoms. The patient can cancel their booking. The patient can edit their own information. The patient can see their medical record printed in PDF format. The pdf printing was available by using “dompdf” with php by retrieving data from the SQL database.

User management: User (patient) can log in and log out of the system from the patient end website while users(admin, doctor) can log in and log out of the system from the admin end website which share the same SQL database. User(patient) can register on the patient end website.

Front-End and Back-End: The front-end part of the website can work correctly with the css style as well as the font-awesome icons. The back-end of the website can work correctly with syncing data from the SQL database and using the data to print out the medical summary in pdf format.

Problems: The most difficult problems would be printing the pdf without any bugs. Even Though adding the date time function was hard, there are a lot of examples out there on the internet. But for printing the pdf in php. It took a lot of trial and error before achieving the desired result. The website for patient and admin also share the same database which means that if a computer were already login in the patient end website and then login to the admin end website then the patient end website will logout automatically even though the two websites are in a different folder.

Future development: From the goal and the problem that we have, there are many way that we can improve our website such as

- Make the UI look better.
- Improve the login and logout so that the user will not get logged out if they are logging in to another end website.
- Improve Back-end so that it is more responsive.
- Add more features such as automatic bill calculation and medication.

In conclusion, the overall process of this project is beyond our plan and expectation. We will continue to maintain and develop this website in the future. This project did not only teach us to do coding but also taught us to work in a group in order to achieve a higher desired goal which a person cannot achieve.