

INTEGRATED HEALTH RECORDS MANAGEMENT SYSTEM

SSWT ZG628T DISSERTATION

by

D CHARAN KUMAR

2020WA15718

Dissertation Work carried out at

Wipro Technologies, Chennai

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE

Pilani (Rajasthan) India



September 2024

SSWT ZG628T DISSERTATION

INTEGRATED HEALTH RECORDS MANAGEMENT SYSTEM

Submitted in partial fulfilment of the requirements of

M. Tech in Software Systems

by

D CHARAN KUMAR

2020WA15718

Under the supervision of

Muthu Kumar M, (Senior Software Test Engineer)

Dissertation work carried out at

Wipro Technologies, Chennai

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE

PILANI (RAJASTHAN)



September 2024

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI

CERTIFICATE

This is to certify that the Dissertation entitled “**INTEGRATED HEALTH RECORDS MANAGEMENT SYSTEM**” and submitted by **D CHARAN KUMAR, ID No: 2020WA15718** in partial fulfillment of the requirements of SSWT ZG628T Dissertation, embodies the work done by him under my supervision.

A handwritten signature in dark ink, appearing to read "M. Muthu Kumar", is written diagonally across the page.

Signature of the Supervisor

Name: Muthu Kumar M

Designation: Senior Software Test Engineer

Date: 12-11-2024

ACKNOWLEDGEMENT

I express my gratitude to **Muthu Kumar M**, my project supervisor, for his tireless work, wise counsel, assistance, and patience. His advice and assistance with this endeavour is indisputable in my opinion. His insightful remarks were helpful in raising the calibre of the output.

I want to sincerely thank **Saraneya Boopathi** and **Jeya Priya M** for taking the time out of their busy schedules to review my progress.

I want to express my gratitude to my **project's partners** for their assistance and cooperation.

I also want to express my gratitude to my friends and family for their encouragement and support throughout the dissertation.

I am incredibly grateful to **WIPRO Technologies** for providing me with the **M. Tech. Software Systems** program training opportunity and all the materials I needed for this dissertation

I appreciate everything that **BITS, Pilani**, and the Training department did to make this course possible.

Sincerely,
D CHARAN KUMAR

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI

First Semester 2022-23

SSWT ZG628T DISSERTATION

Dissertation Title: INTEGRATED HEALTH RECORDS MANAGEMENT SYSTEM

Name of Supervisor: MUTHU KUMAR M

Name of Student: D CHARAN KUMAR

Bits ID of Student: 2020WA15718

ABSTRACT

Patients and medical professionals alike can access the centralized INTEGRATED HEALTH RECORDS MANAGEMENT SYSTEM. In the event that the patient needs an emergency procedure, the website aims to deliver vital and significant information about their medical history. This means that the doctors will get the information without having to wait for the patient's relatives to arrive at the hospital. Additionally, this website would serve as a central hub for information exchange between patients and medical experts, and vice versa.

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- Flow Chart Diagram
- Use Case Diagram
- Database Scheme Diagram

1. Chapter 1

1.1 Introduction

In the medical field, stabilizing the patient before medically operating on them is very important and essential when they are admitted during an emergency. But due to lack of the medical history of the patient, stabilising the patient turns difficult. This project introduces a sophisticated system that merges the way the doctors, patients, pharmacists and lab technicians share the data. The main objective of this website is to help doctors and patients view the medical history of the patients simply by inputting the unique id of the patient. All the medical data from patients' diagnostics to prescriptions to lab tests are stored in the website.

2. Chapter 2

2.1 Existing system

Presently, the hospitals do not keep any records of patients who have not yet visited; only those who visit frequently are kept up to date. Patients rarely take their medical records from the hospital they usually visit when they are transferred to another facility.

2.2 Resolution

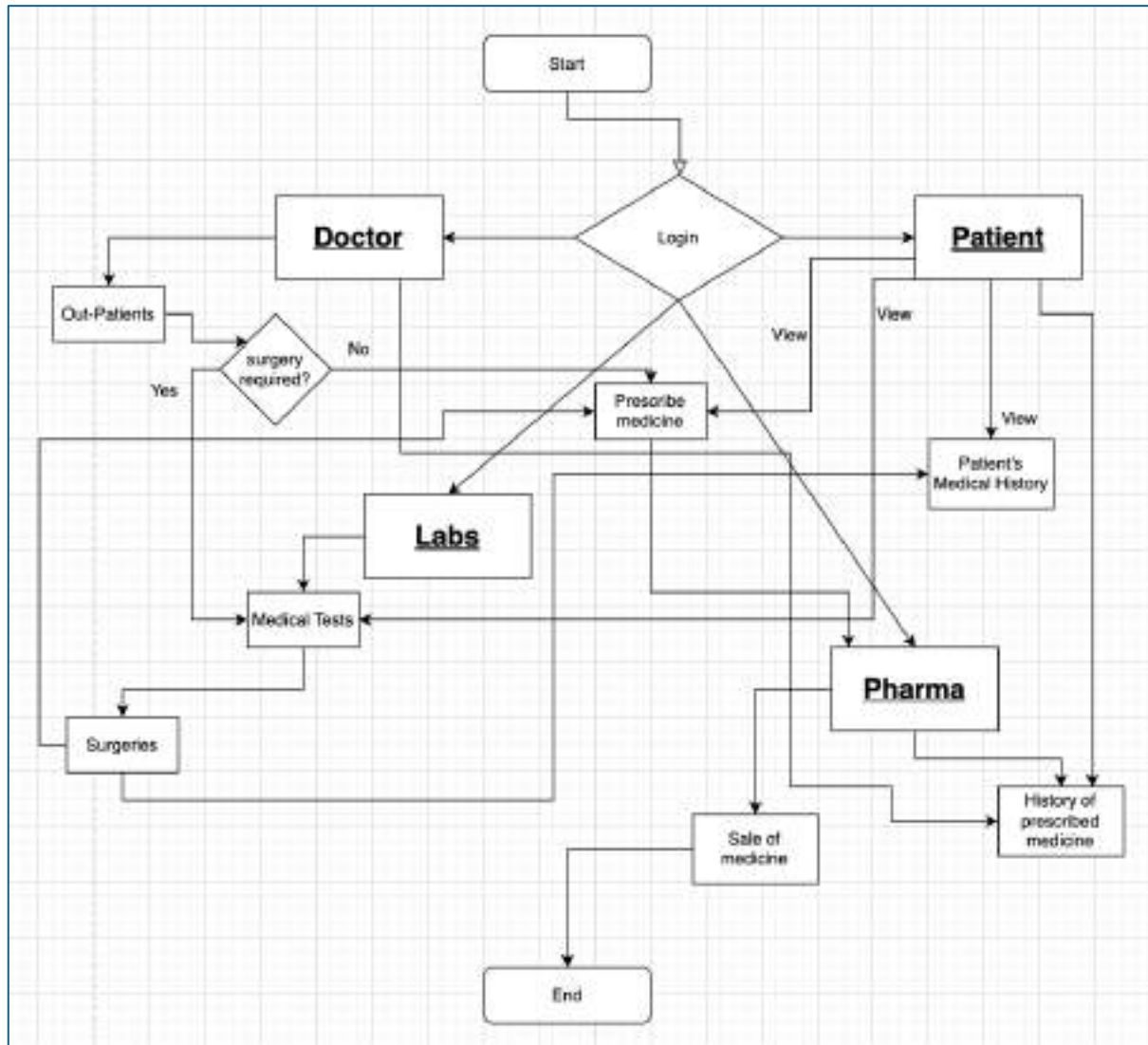
We want to resolve this issue of unavailability of medical history of the patient by creating a centralised website that can display the patient's medical history to the operating doctor. We will combine all the branches like Doctors, Pharmacies, Labs and patients in this project and provide a centralized website where the required data can be viewed by the medical professions as required.

3. Chapter 3

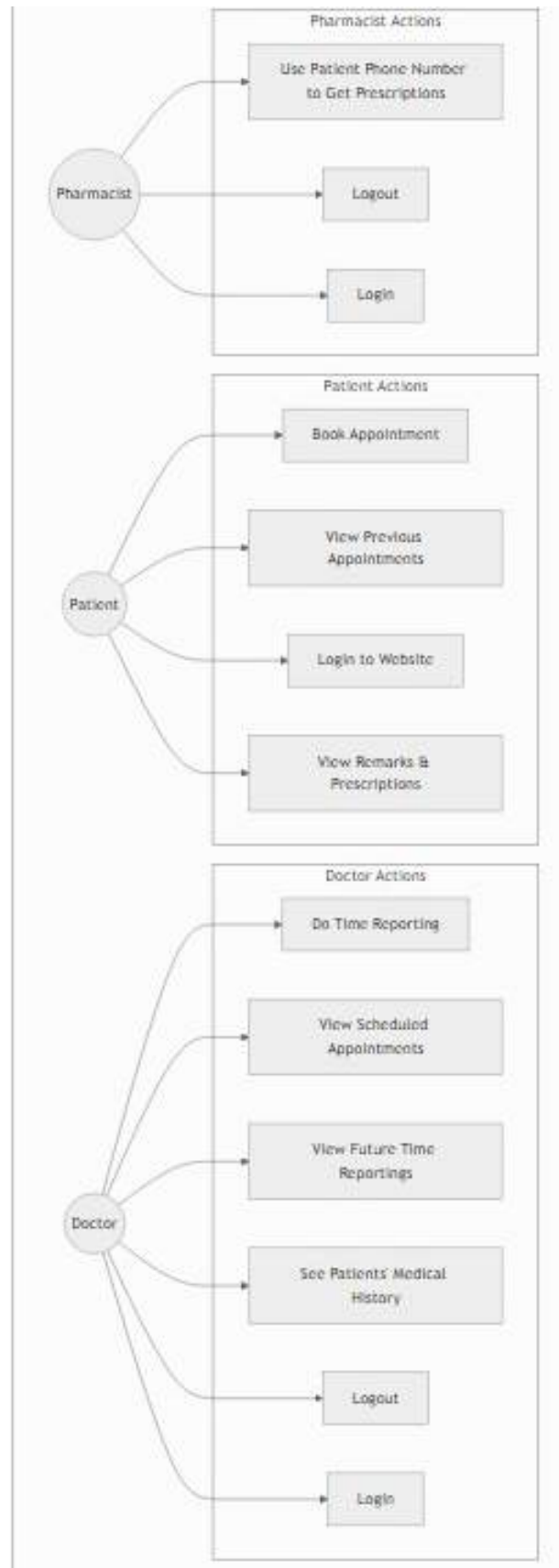
3.1. Estimate of the Project

Serial Number of Task	Tasks or subtasks to be done (be precise and specific)	Planned duration in weeks	Specific Deliverables in terms of the project
1	Requirement Gathering	Week 1	Sprint 1
2	Documentation of design for the website	Week 2 - 3	Sprint 2
3	Development of Dashboard of the website	Week 4	Sprint 3
4	Development of Doctor's module	Week 5 - 6	Sprint 4
5	Development of Pharmacist's module	Week 7 - 8	Sprint 5
6	Development of Lab's module	Week 9 - 10	Sprint 6
7	Development of Patient's module	Week 11 -12	Sprint 7
8	Customizations	Week 13	Sprint 8
9	Integration of Dashboard, Doctor's module, Pharmacist's module, Lab's module and Patient's module	Week 14 -15	Sprint 9
10	Integration of Database at the back end	Week 16	Sprint 10

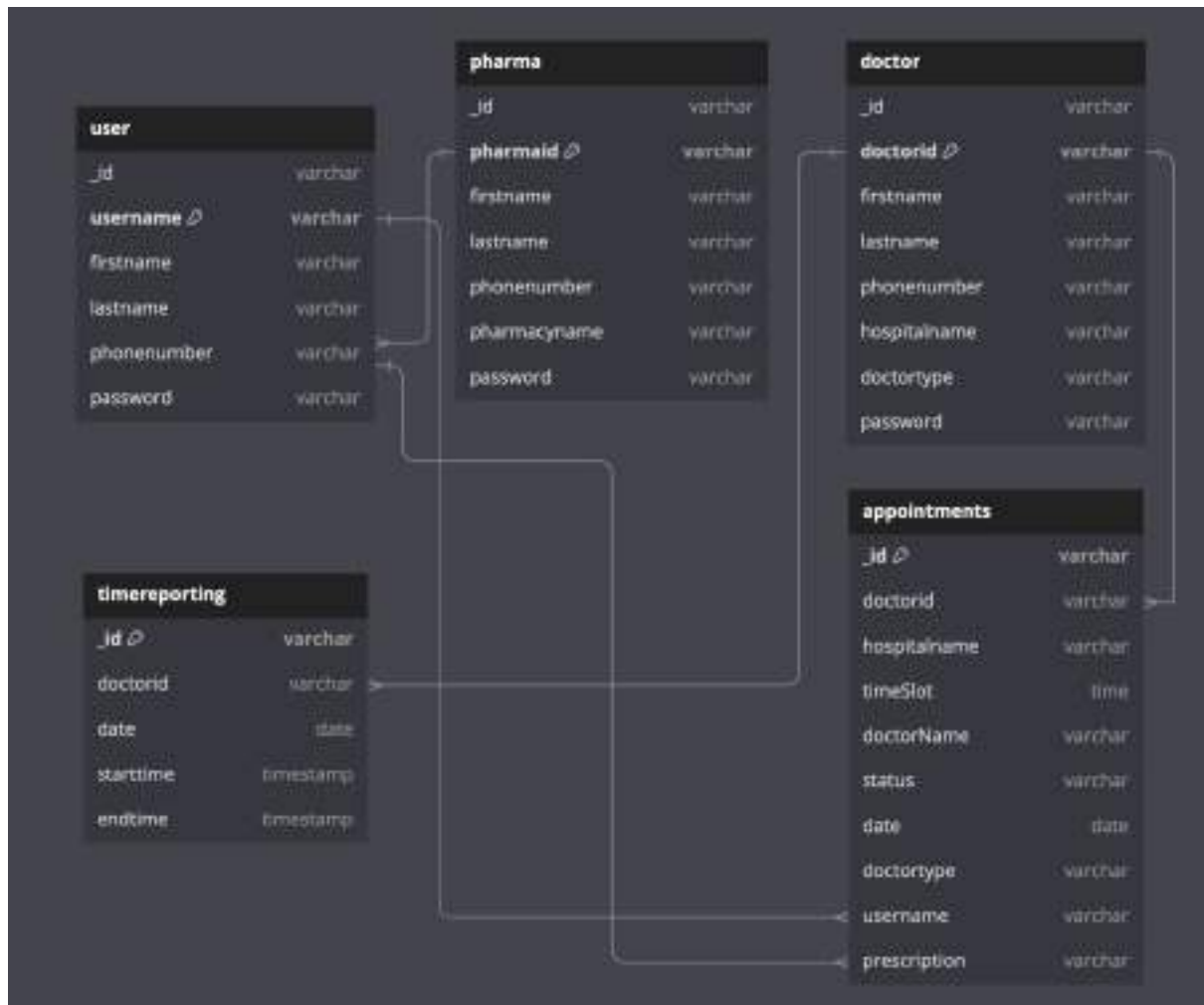
3.2. Flow Chart



3.3 Use Case Diagram

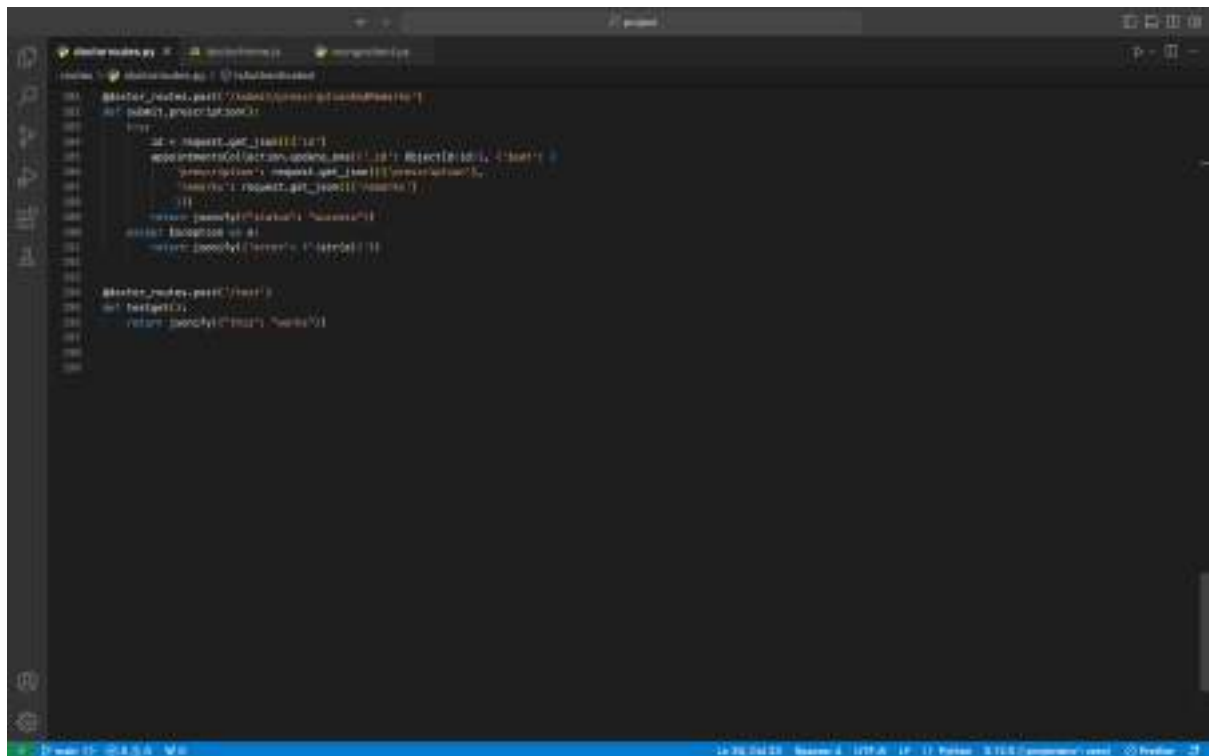


3.4 Database Schema Diagram



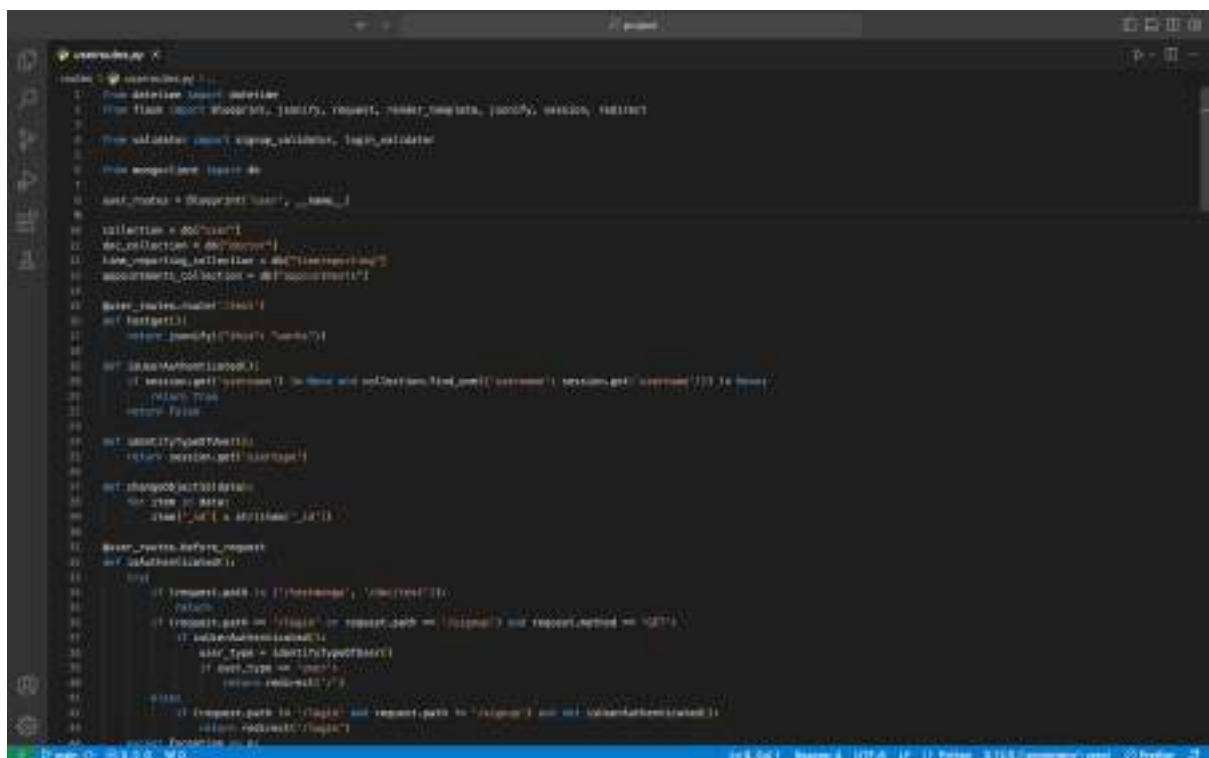
4.1 Doctor Routes

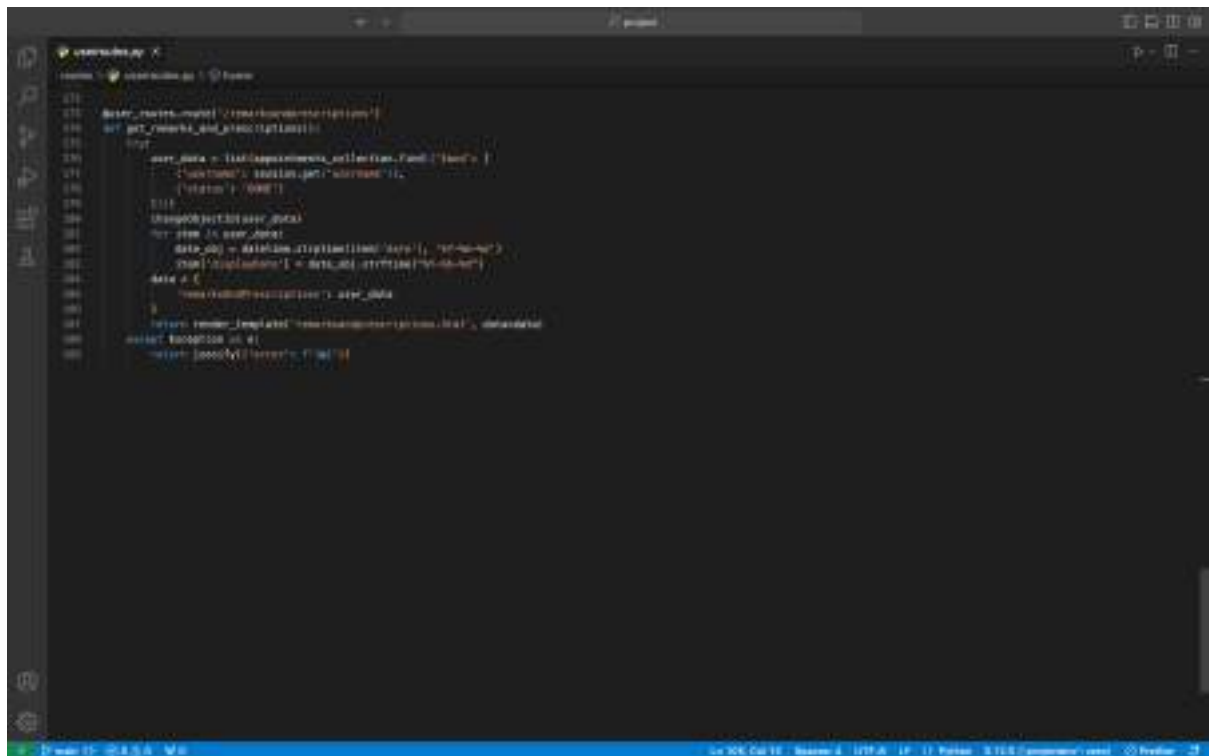
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4.2 User Routes

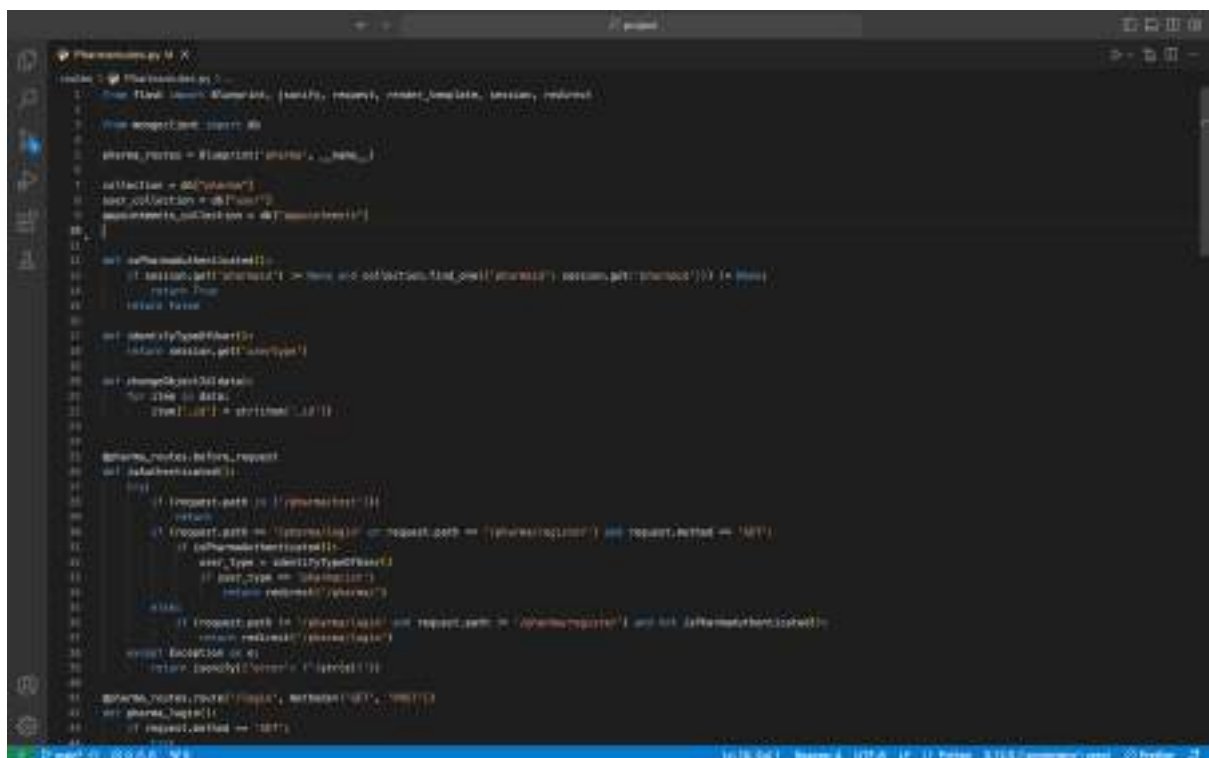
This is a python file that contains all the functions related to user flow. Below is the code for the same.





4.3 Pharma Routes

This is a python file that contains all the functions related to pharma flow. Below is the code for the same.



```

Pharmacy.py
class Pharmacy:
    def __init__(self):
        self.pharmacies = {}
        self.users = {}
        self.sessions = {}
        self.orders = {}
        self.orders_details = {}

    def register(self, username, password, first_name, last_name, phone_number):
        if username in self.users:
            return jsonify({'error': 'Username already exists'})
        if phone_number in self.users:
            return jsonify({'error': 'Phone number already exists'})
        self.users[username] = {'password': password, 'first_name': first_name, 'last_name': last_name, 'phone_number': phone_number}
        return jsonify({'message': 'User registered successfully'})

    def login(self, username, password):
        if username not in self.users:
            return jsonify({'error': 'Username not found'})
        if self.users[username]['password'] != password:
            return jsonify({'error': 'Invalid password'})
        session_id = self._generate_session_id()
        self.sessions[session_id] = {'username': username, 'password': password}
        return jsonify({'session_id': session_id, 'message': 'Login successful'})

    def _generate_session_id(self):
        return str(uuid.uuid4())

    def logout(self, session_id):
        if session_id not in self.sessions:
            return jsonify({'error': 'Session not found'})
        del self.sessions[session_id]
        return jsonify({'message': 'Logout successful'})

    def add_pharmacy(self, name, address, phone_number):
        if name in self.pharmacies:
            return jsonify({'error': 'Pharmacy name already exists'})
        self.pharmacies[name] = {'address': address, 'phone_number': phone_number}
        return jsonify({'message': 'Pharmacy added successfully'})

    def get_pharmacy(self, name):
        if name not in self.pharmacies:
            return jsonify({'error': 'Pharmacy not found'})
        return jsonify(self.pharmacies[name])

    def place_order(self, session_id, product_name, quantity):
        if session_id not in self.sessions:
            return jsonify({'error': 'Session not found'})
        if product_name not in self.products:
            return jsonify({'error': 'Product not found'})
        if quantity < 1:
            return jsonify({'error': 'Quantity must be at least 1'})
        if quantity > self.products[product_name]['stock']:
            return jsonify({'error': 'Insufficient stock'})
        order_id = self._generate_order_id()
        self.orders[order_id] = {'session_id': session_id, 'product_name': product_name, 'quantity': quantity}
        self.orders_details[order_id] = {}
        return jsonify({'order_id': order_id, 'message': 'Order placed successfully'})

    def _generate_order_id(self):
        return str(uuid.uuid4())

    def get_order(self, order_id):
        if order_id not in self.orders:
            return jsonify({'error': 'Order not found'})
        return jsonify(self.orders[order_id])

    def get_order_details(self, order_id):
        if order_id not in self.orders_details:
            return jsonify({'error': 'Order details not found'})
        return jsonify(self.orders_details[order_id])

    def update_order(self, order_id, quantity):
        if order_id not in self.orders:
            return jsonify({'error': 'Order not found'})
        if quantity < 1:
            return jsonify({'error': 'Quantity must be at least 1'})
        self.orders[order_id]['quantity'] = quantity
        return jsonify({'message': 'Order updated successfully'})

    def delete_order(self, order_id):
        if order_id not in self.orders:
            return jsonify({'error': 'Order not found'})
        del self.orders[order_id]
        return jsonify({'message': 'Order deleted successfully'})

```

```

Pharmacy.py
class Pharmacy:
    def __init__(self):
        self.pharmacies = {}
        self.users = {}
        self.sessions = {}
        self.orders = {}
        self.orders_details = {}

    def register(self, username, password, first_name, last_name, phone_number):
        if username in self.users:
            return jsonify({'error': 'Username already exists'})
        if phone_number in self.users:
            return jsonify({'error': 'Phone number already exists'})
        self.users[username] = {'password': password, 'first_name': first_name, 'last_name': last_name, 'phone_number': phone_number}
        return jsonify({'message': 'User registered successfully'})

    def login(self, username, password):
        if username not in self.users:
            return jsonify({'error': 'Username not found'})
        if self.users[username]['password'] != password:
            return jsonify({'error': 'Invalid password'})
        session_id = self._generate_session_id()
        self.sessions[session_id] = {'username': username, 'password': password}
        return jsonify({'session_id': session_id, 'message': 'Login successful'})

    def _generate_session_id(self):
        return str(uuid.uuid4())

    def logout(self, session_id):
        if session_id not in self.sessions:
            return jsonify({'error': 'Session not found'})
        del self.sessions[session_id]
        return jsonify({'message': 'Logout successful'})

    def add_pharmacy(self, name, address, phone_number):
        if name in self.pharmacies:
            return jsonify({'error': 'Pharmacy name already exists'})
        self.pharmacies[name] = {'address': address, 'phone_number': phone_number}
        return jsonify({'message': 'Pharmacy added successfully'})

    def get_pharmacy(self, name):
        if name not in self.pharmacies:
            return jsonify({'error': 'Pharmacy not found'})
        return jsonify(self.pharmacies[name])

    def place_order(self, session_id, product_name, quantity):
        if session_id not in self.sessions:
            return jsonify({'error': 'Session not found'})
        if product_name not in self.products:
            return jsonify({'error': 'Product not found'})
        if quantity < 1:
            return jsonify({'error': 'Quantity must be at least 1'})
        if quantity > self.products[product_name]['stock']:
            return jsonify({'error': 'Insufficient stock'})
        order_id = self._generate_order_id()
        self.orders[order_id] = {'session_id': session_id, 'product_name': product_name, 'quantity': quantity}
        self.orders_details[order_id] = {}
        return jsonify({'order_id': order_id, 'message': 'Order placed successfully'})

    def _generate_order_id(self):
        return str(uuid.uuid4())

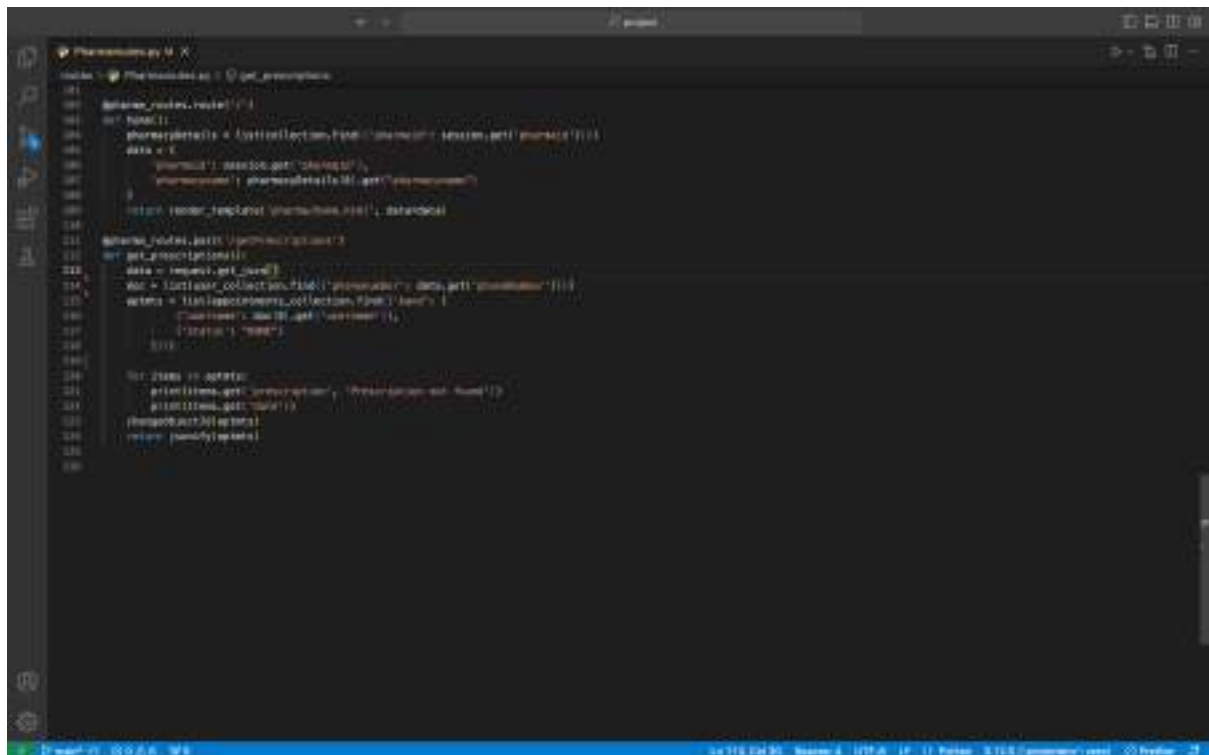
    def get_order(self, order_id):
        if order_id not in self.orders:
            return jsonify({'error': 'Order not found'})
        return jsonify(self.orders[order_id])

    def get_order_details(self, order_id):
        if order_id not in self.orders_details:
            return jsonify({'error': 'Order details not found'})
        return jsonify(self.orders_details[order_id])

    def update_order(self, order_id, quantity):
        if order_id not in self.orders:
            return jsonify({'error': 'Order not found'})
        if quantity < 1:
            return jsonify({'error': 'Quantity must be at least 1'})
        self.orders[order_id]['quantity'] = quantity
        return jsonify({'message': 'Order updated successfully'})

    def delete_order(self, order_id):
        if order_id not in self.orders:
            return jsonify({'error': 'Order not found'})
        del self.orders[order_id]
        return jsonify({'message': 'Order deleted successfully'})

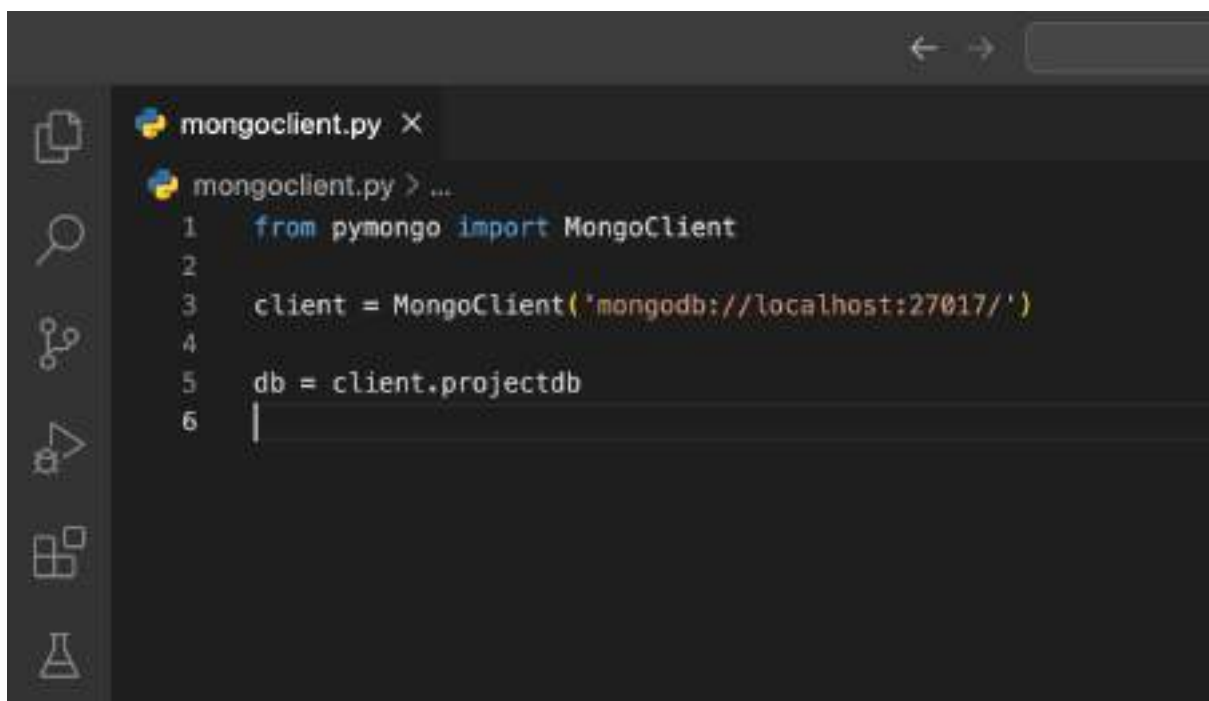
```



```
181 @app.route('/api/v1/get_prescriptions')
182 def get_prescriptions():
183     """ GET /api/v1/get_prescriptions
184     """
185     # Get the collection from the database
186     collection = db['prescriptions']
187     # Get the data from the database
188     data = collection.find()
189     # Convert the data to a list of dictionaries
190     data_list = []
191     for doc in data:
192         data_list.append(doc)
193     # Return the data as a JSON response
194     return jsonify(data_list)
195
196 @app.route('/api/v1/get_prescriptions_by_patient')
197 def get_prescriptions_by_patient():
198     """ GET /api/v1/get_prescriptions_by_patient
199     """
200     # Get the patient ID from the request
201     patient_id = request.args.get('patient_id')
202     # Get the collection from the database
203     collection = db['prescriptions']
204     # Get the data from the database
205     data = collection.find({'patient_id': patient_id})
206     # Convert the data to a list of dictionaries
207     data_list = []
208     for doc in data:
209         data_list.append(doc)
210     # Return the data as a JSON response
211     return jsonify(data_list)
212
213 if __name__ == '__main__':
214     app.run(debug=True)
```

5. Chapter 5

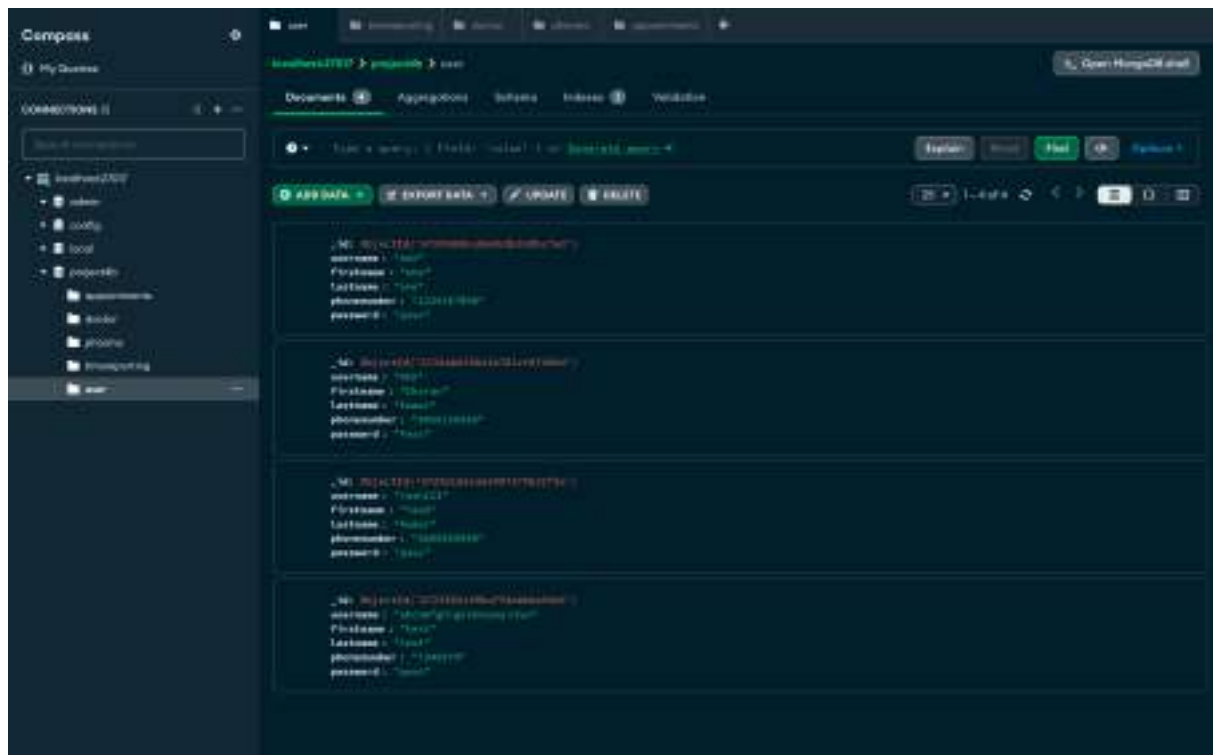
This chapter discusses about the connectivity of the mongo DB.



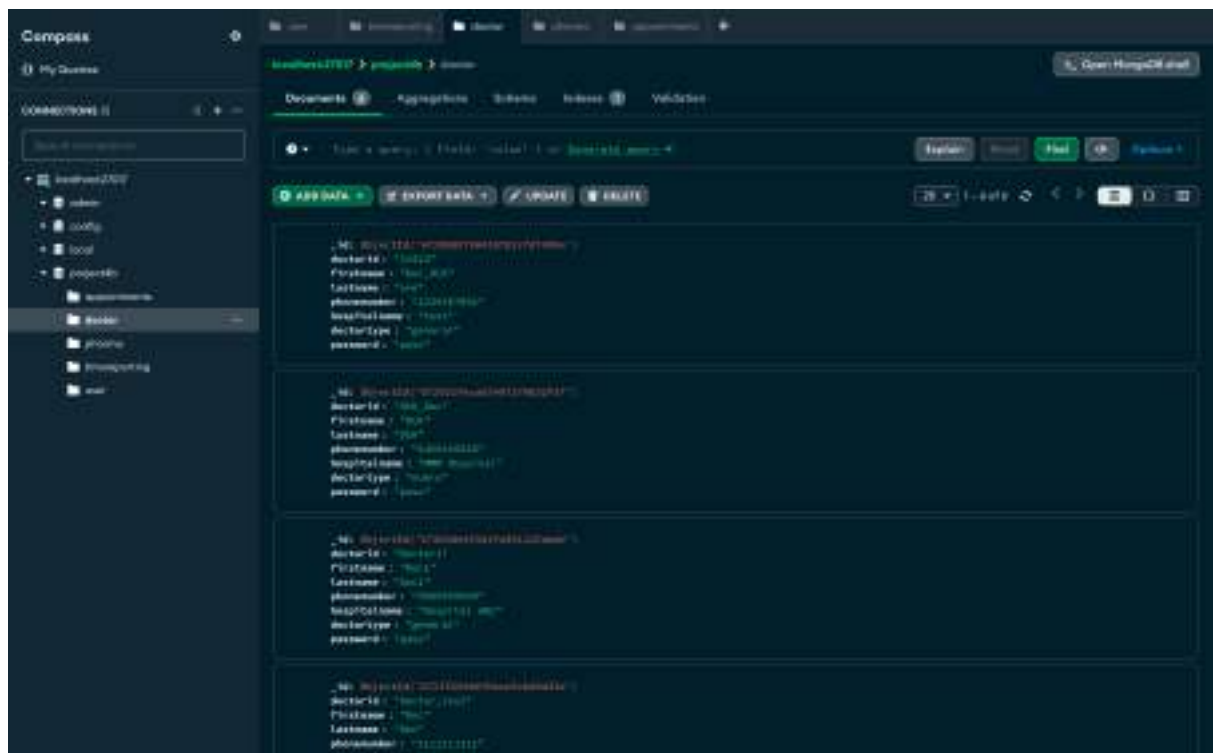
```
1 from pymongo import MongoClient
2
3 client = MongoClient('mongodb://localhost:27017/')
4
5 db = client.projectdb
6 |
```

Here 'mongodb://localhost:27017' is the port where we can access the DB.

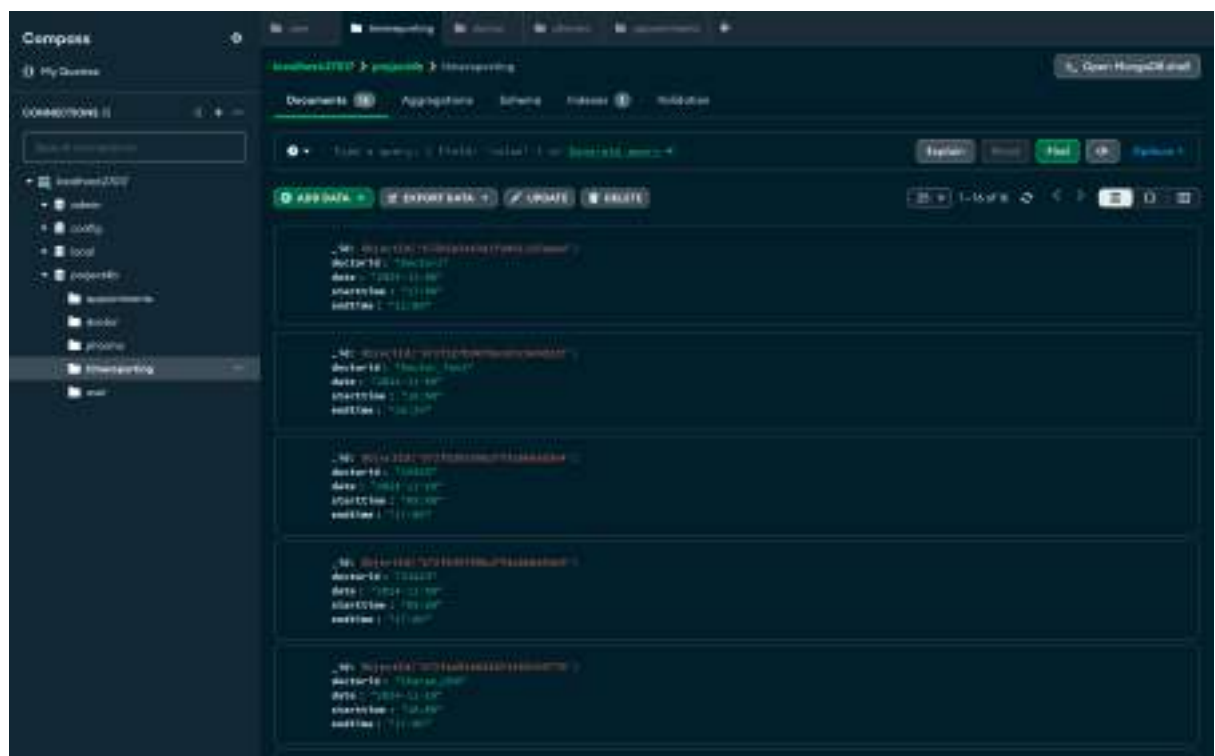
5.1 User Database collection



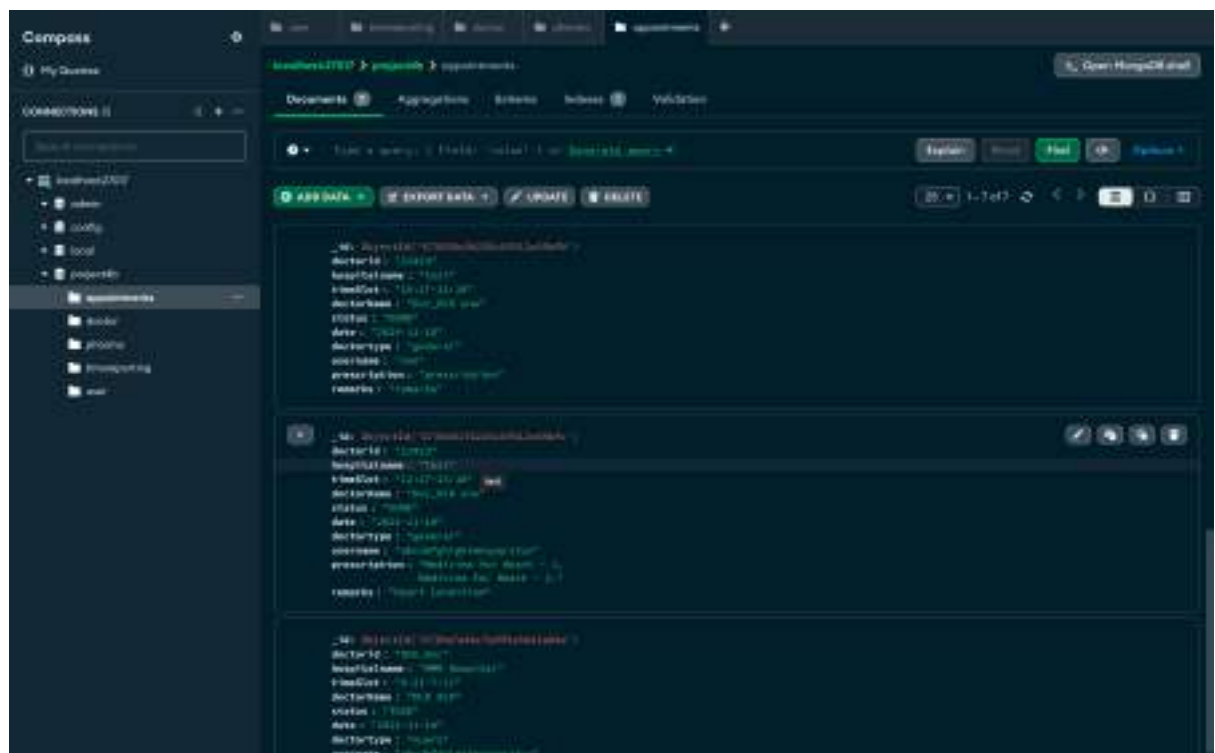
5.2 Doctor Database collection



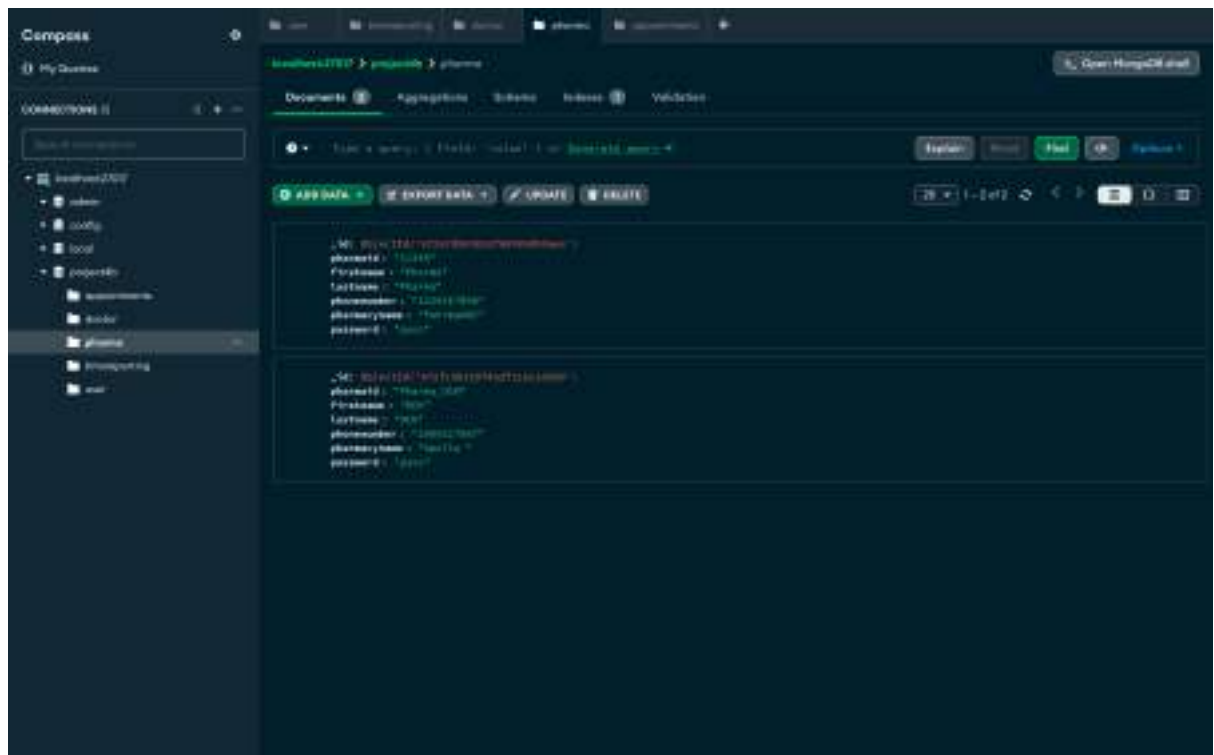
5.3 Reporting Time Database collection



5.4 Appointments Database collection



5.5 Pharma Database collection



6 Chapter 6

6.1 User Sign-Up screen

User can sign up here by providing the details on this screen. If the user already has an account, they can click on the Login button and login there.



Code for the above screen

[illegible]

```

1 // script.js
2 // script.js
3 // script.js
4 // script.js
5 // script.js
6 // script.js
7 // script.js
8 // script.js
9 // script.js
10 // script.js

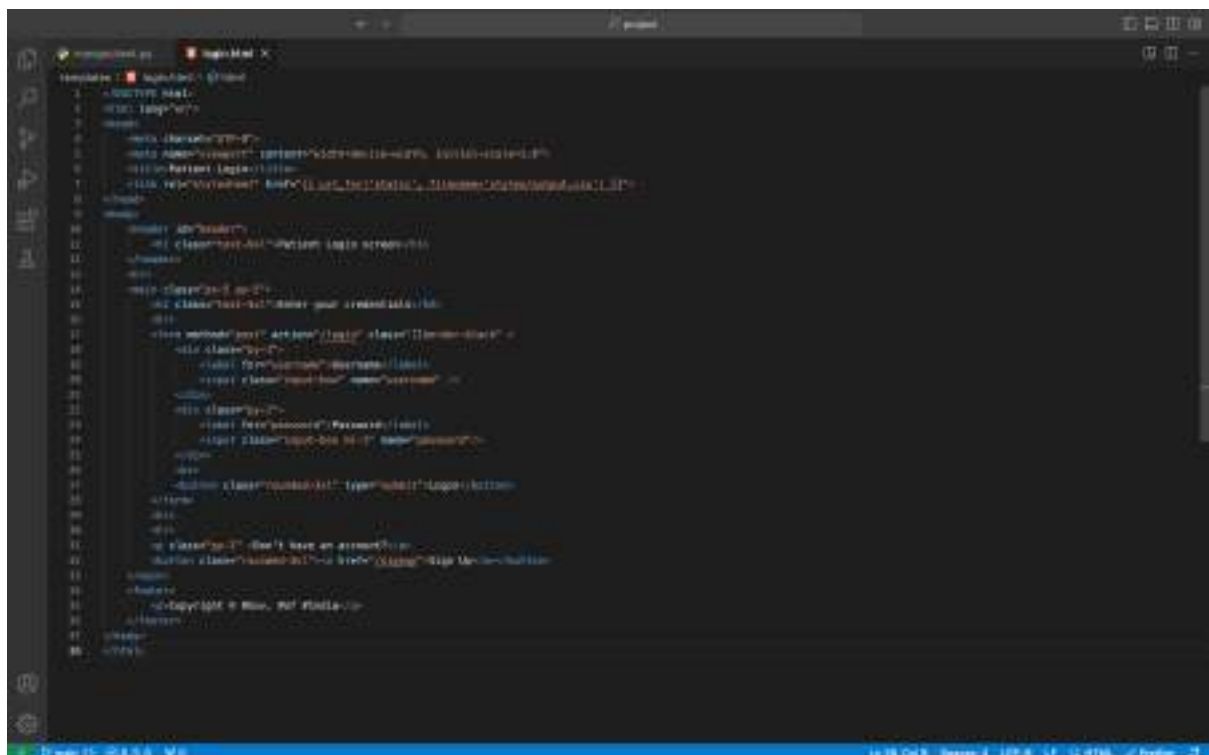
```

6.2 User Login screen

User can log in here by providing the details on this screen. If the user doesn't have an account, they will have to click on the Sign Up button and login there.

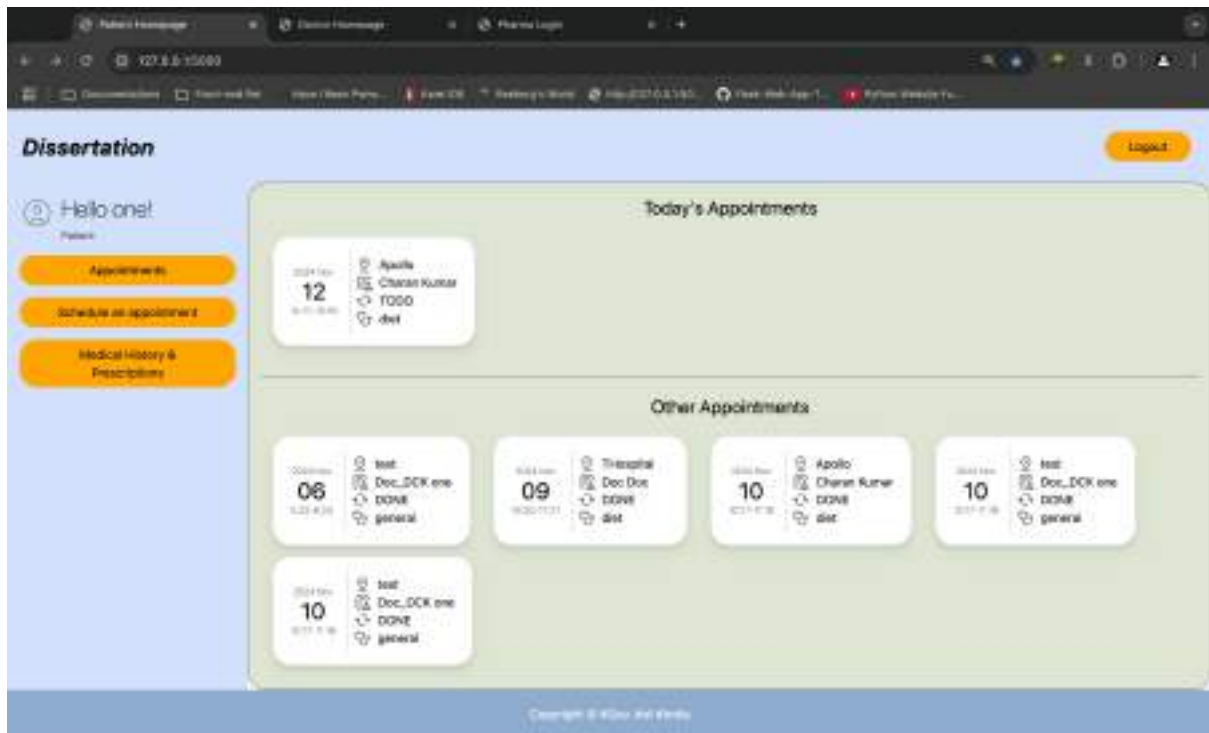


Code for the above screen

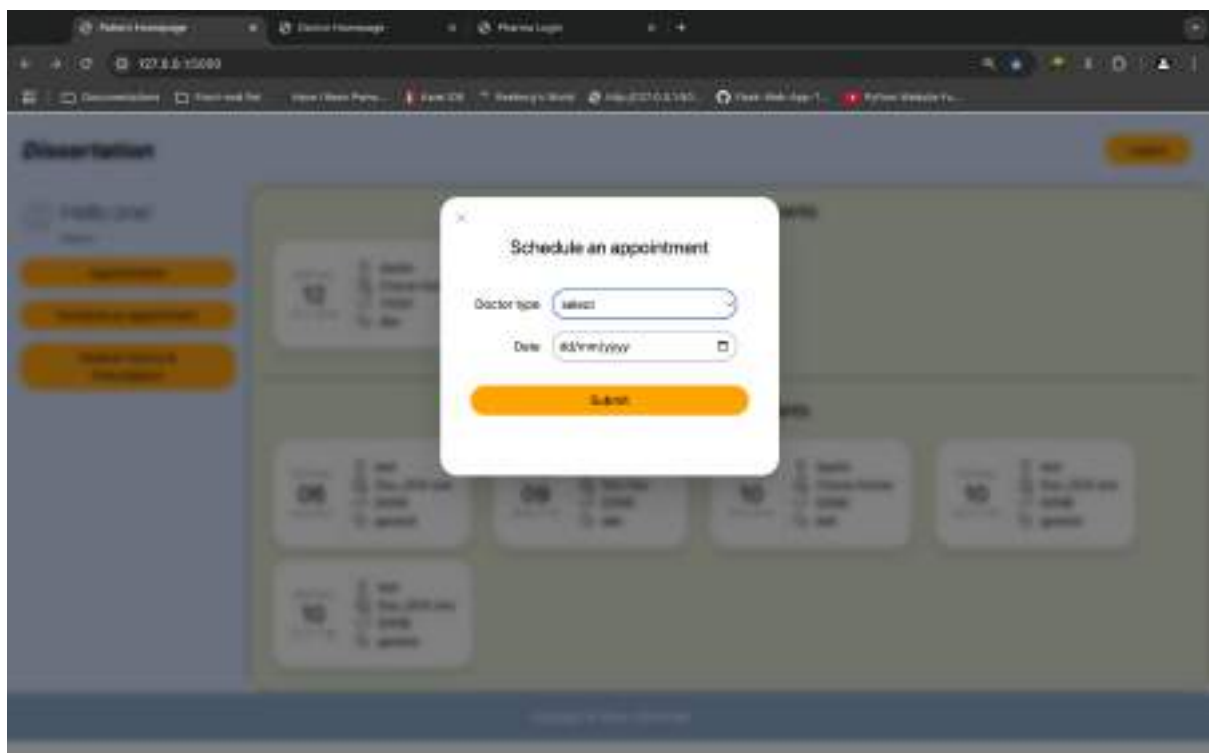


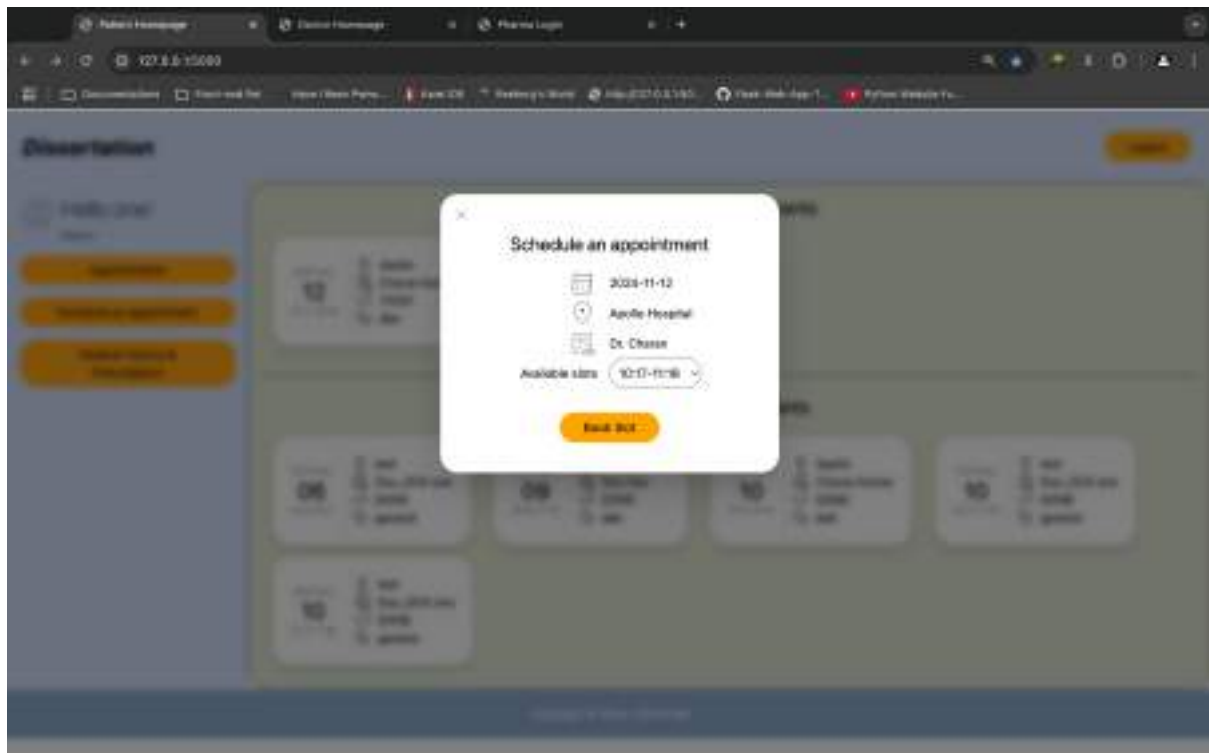
6.3 User Dashboard screen

On the Dashboard, user can view his existing and past appointments. Has an option to schedule appointments and view Medical History and Prescriptions.

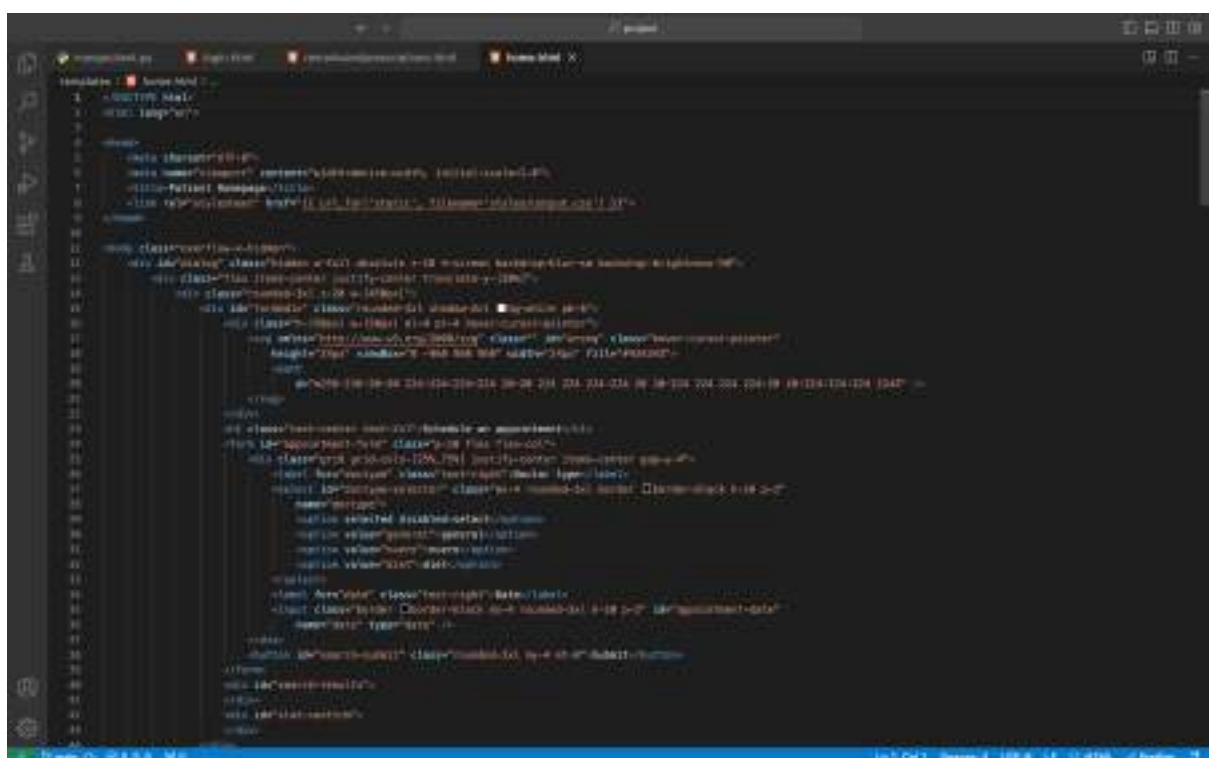


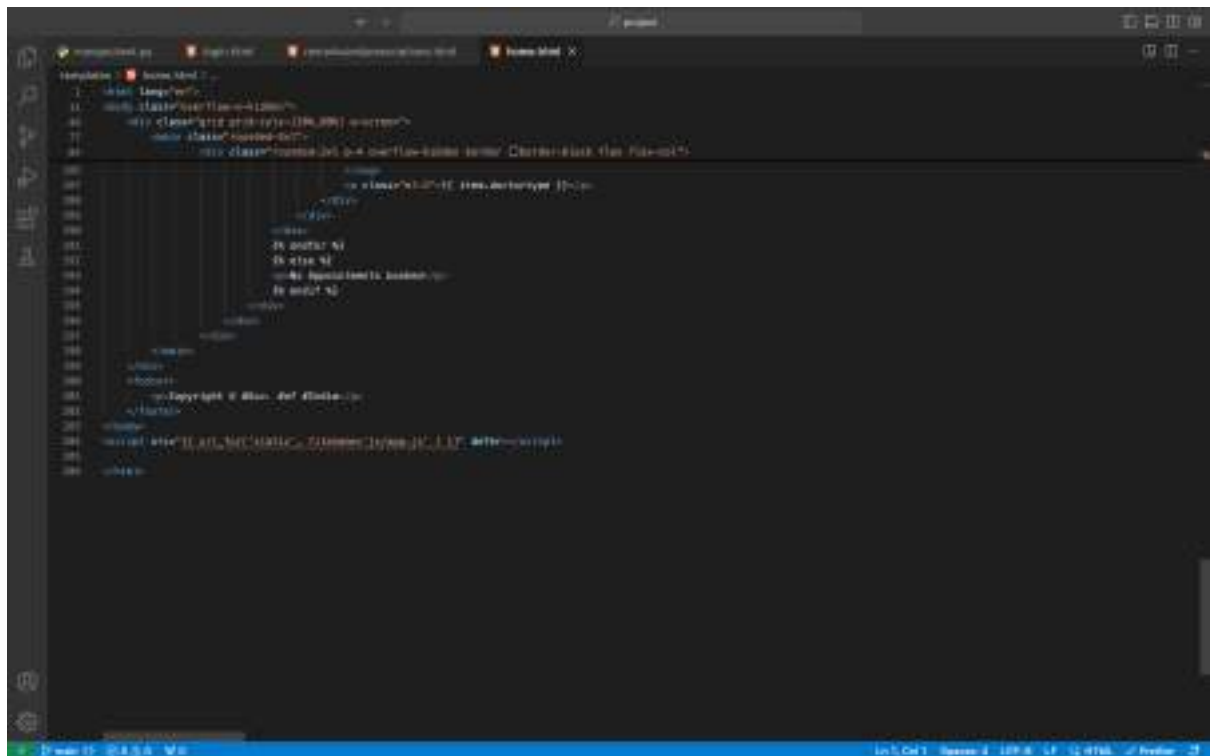
6.3.1 Appointments schedule page



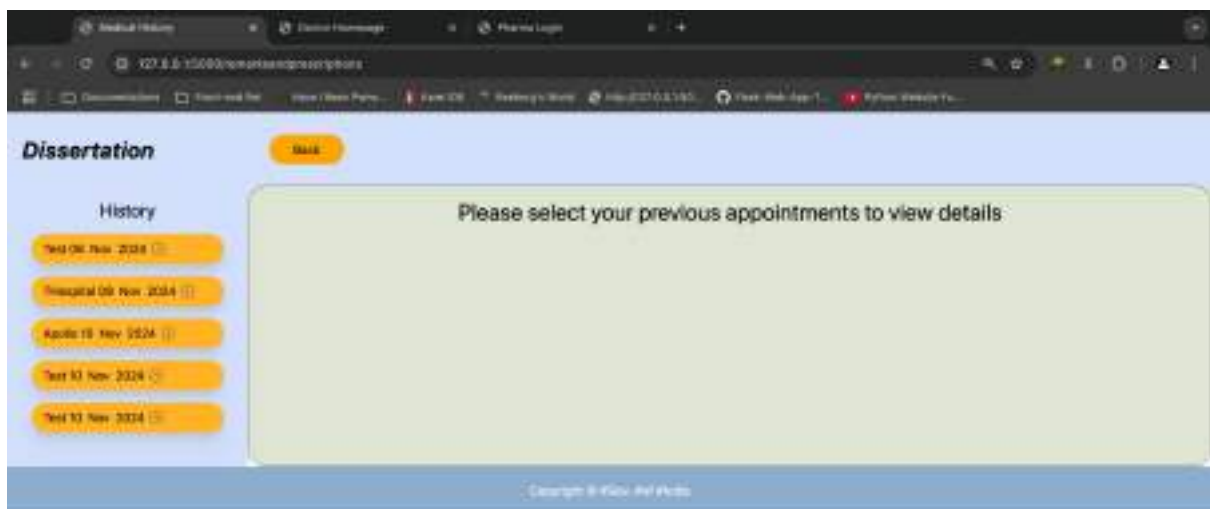


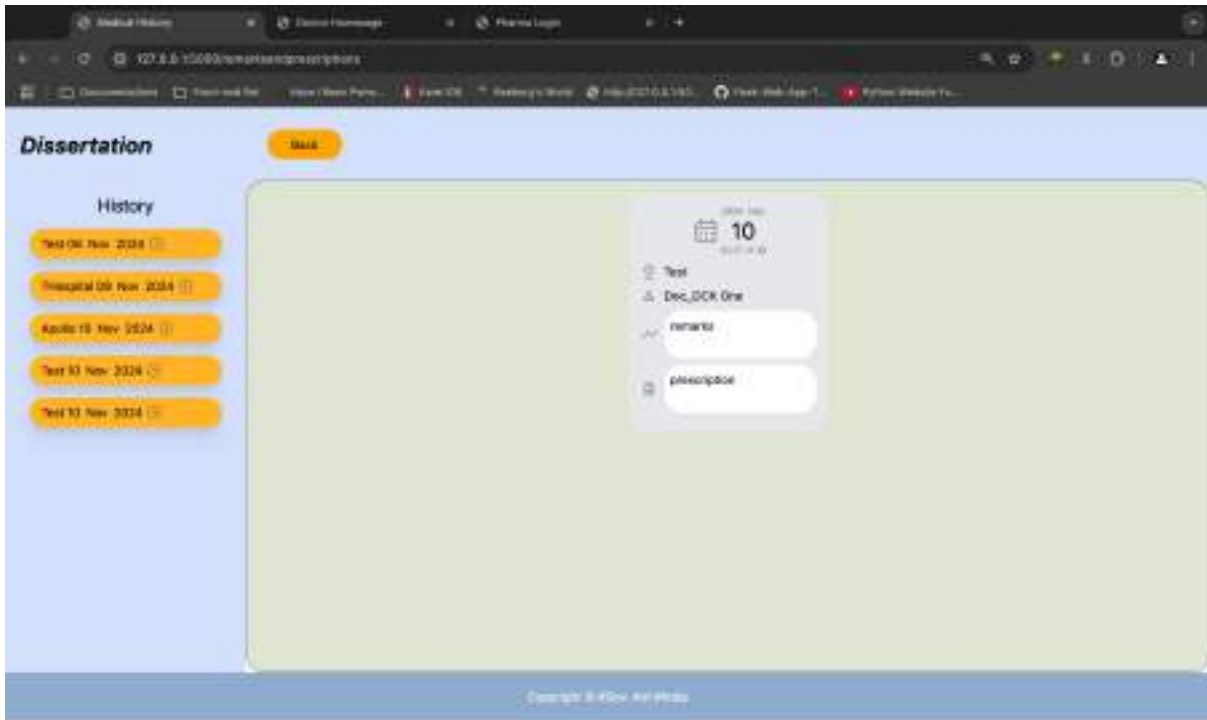
Code for the above screen





6.3.2 Medical History and prescription page



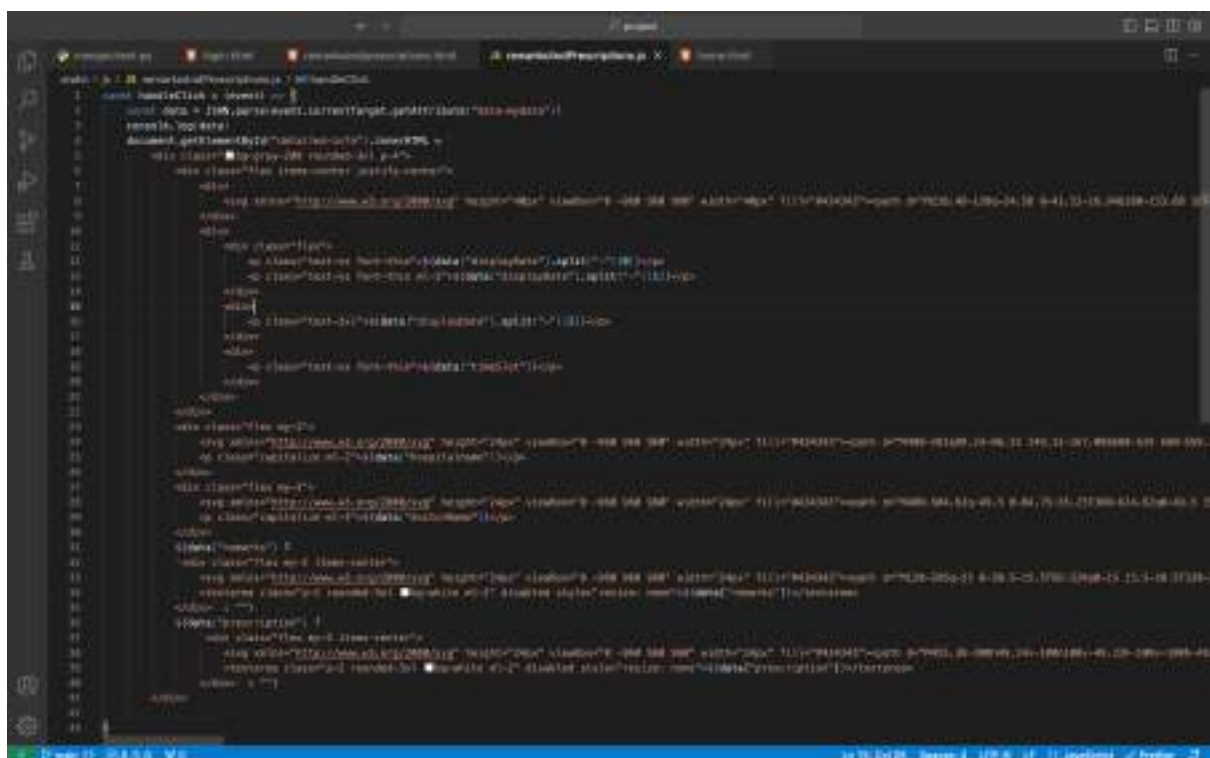


Code for the above screen

```

1 #include <iostream>
2 using namespace std;
3
4 int main()
5 {
6     // 1. 定义变量
7     int a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z;
8     char ch;
9     double d1, d2;
10    // 2. 输入
11    cout << "请输入10个整数: ";
12    for (int i = 0; i < 10; i++)
13    {
14        cin >> a;
15        // 3. 处理
16        // 将每个数字乘以2
17        b = a * 2;
18        // 4. 输出
19        cout << b << " ";
20        if (i % 5 == 4)
21            cout << endl;
22    }
23    // 5. 结束
24    return 0;
25 }

```

Doctor Registration Screen

Enter your Details

Doctor ID

First Name

Last Name

Phone Number

Hospital Name

Doctor Type

Password

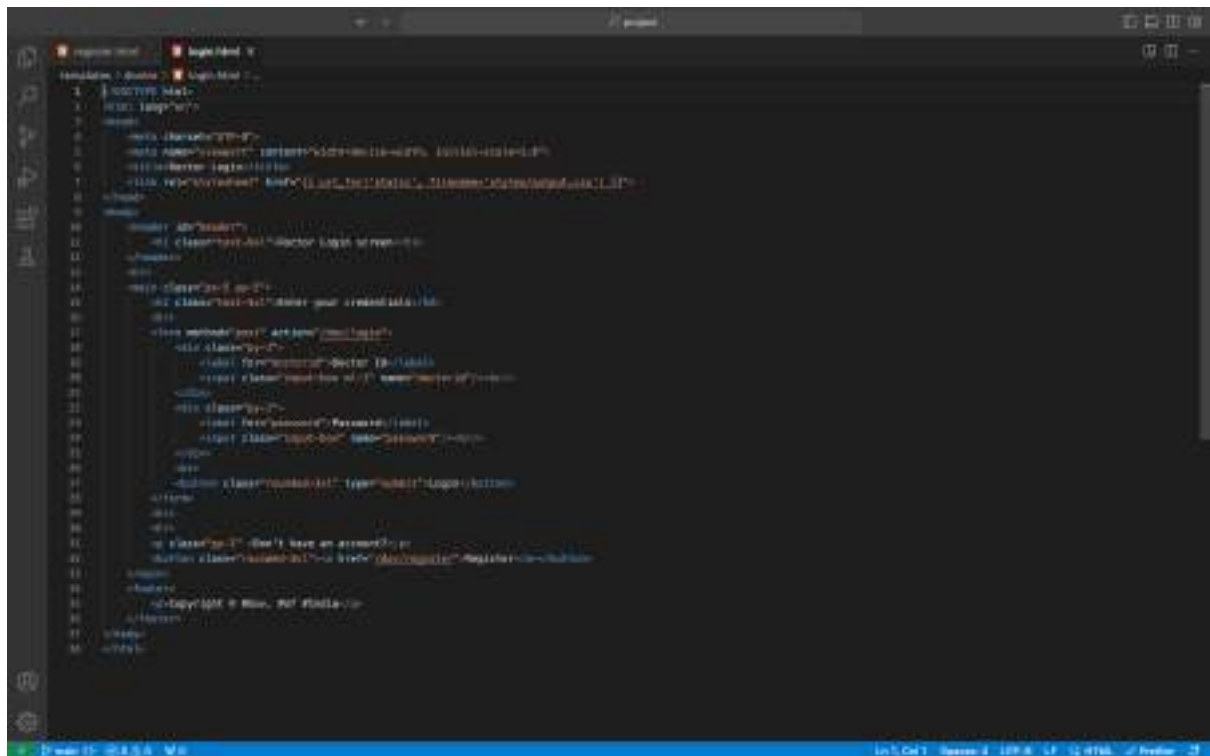
[Already have an account?](#)

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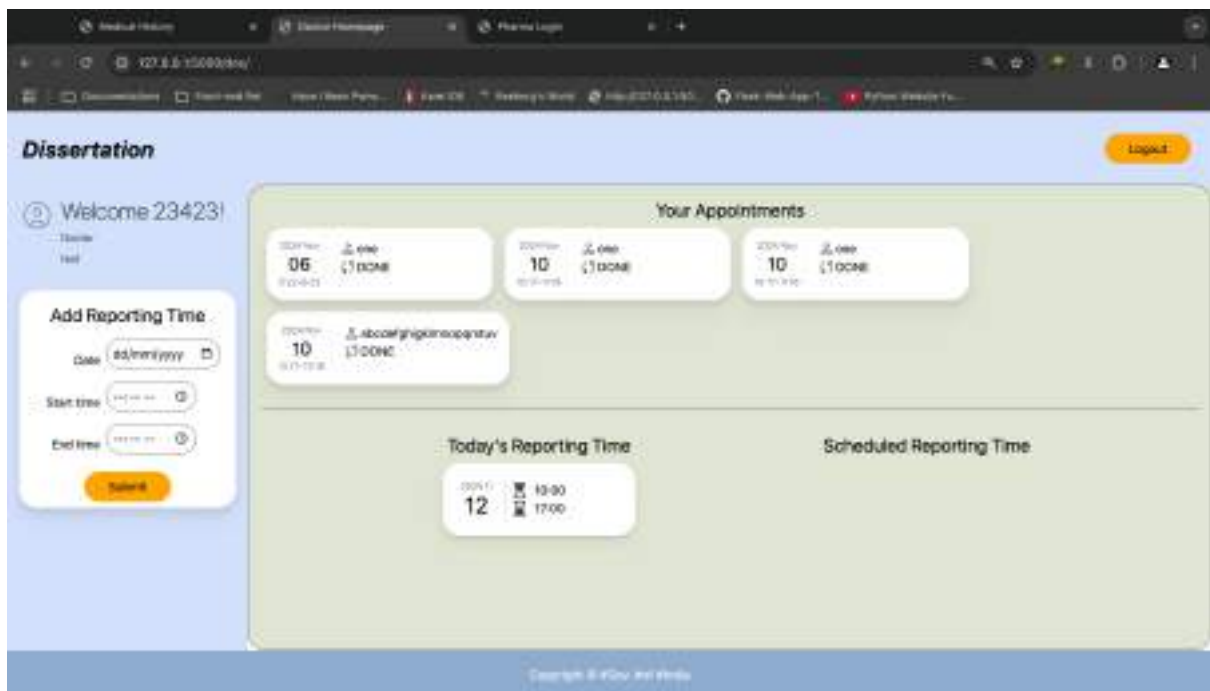
```

1 <!--DOCTYPE html-->
2 <html lang="en">
3 <head>
4 <meta charset="UTF-8">
5 <meta name="viewport" content="width=device-width, initial-scale=1.0">
6 <title>Doctor Registration Screen</title>
7 <link href="https://cdn.jsdelivr.net/npm/bootstrap@5.0.2/dist/css/bootstrap.min.css" rel="stylesheet">
8 </head>
9 <body>
10 <div class="container">
11 <div class="text-center">
12 <h2>Doctor Registration Screen</h2>
13 </div>
14 <div class="p-5">
15 <div class="text-center">
16 <h3>Enter your Details</h3>
17 </div>
18 <div class="text-center">
19 <div class="mb-3">
20 <input type="text" value="Doctor ID"/>
21 </div>
22 <div class="mb-3">
23 <input type="text" value="First Name"/>
24 </div>
25 <div class="mb-3">
26 <input type="text" value="Last Name"/>
27 </div>
28 <div class="mb-3">
29 <input type="text" value="Phone Number"/>
30 </div>
31 <div class="mb-3">
32 <input type="text" value="Hospital Name"/>
33 </div>
34 <div class="mb-3">
35 <input type="text" value="Doctor Type"/>
36 </div>
37 <div class="mb-3">
38 <input type="password" value="Password"/>
39 </div>
40 </div>
41 <div class="text-center">
42 <input type="button" value="Submit"/>
43 </div>
44 </div>
45 </div>
46 </body>
47 </html>

```

7.3 Doctor dashboard screen



```

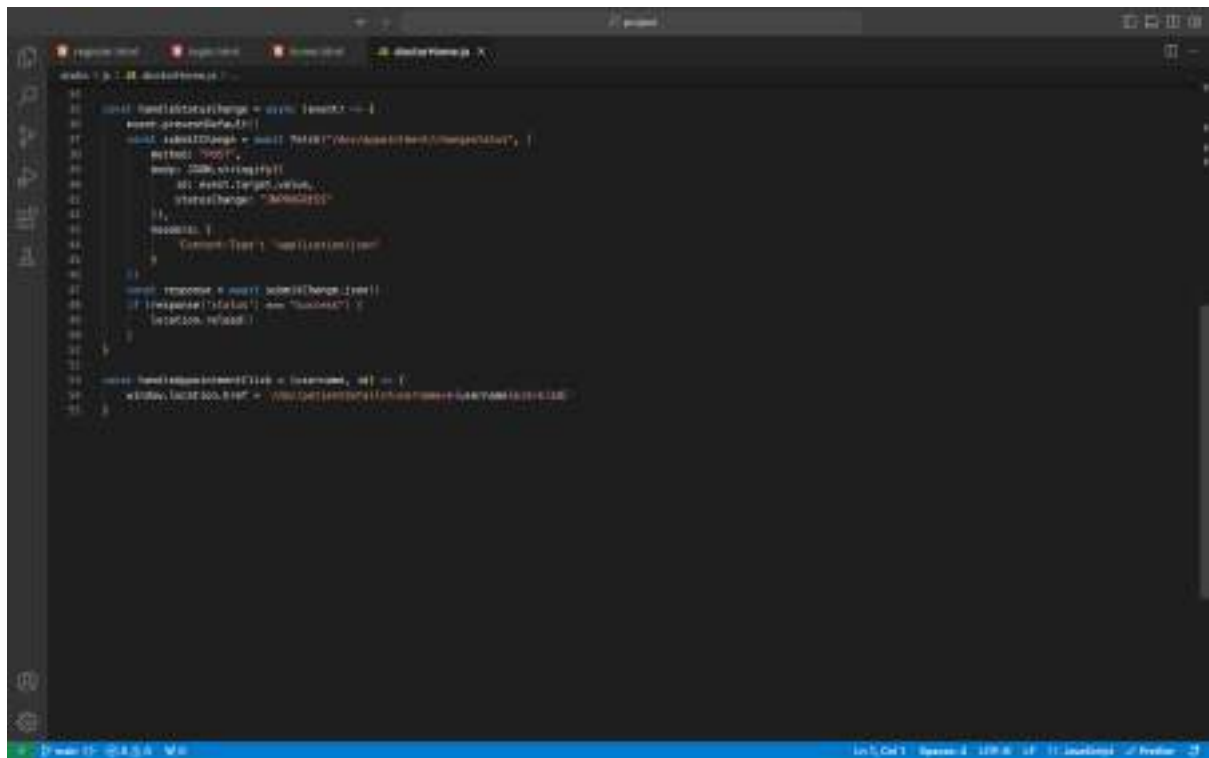
1  <DOCTYPE html>
2  <html lang="en">
3  <head>
4    <meta charset="UTF-8">
5    <meta name="viewport" content="width=device-width, initial-scale=1.0">
6    <title>Factorial Calculator</title>
7    <link href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0/dist/css/bootstrap.min.css" rel="stylesheet">
8  </head>
9  <body>
10    <div class="container">
11      <div class="row">
12        <div class="col-12">
13          <div class="text-center">
14            <h1>Factorial Calculator</h1>
15          </div>
16          <div class="text-center">
17            <div class="input-group">
18              <input type="text" value="10">
19              <button type="button" value="Calculate">
20            </div>
21            <div class="text-center">
22              <div class="display-4">
23                <math>10! = 3,628,800</math>
24              </div>
25            </div>
26          </div>
27        </div>
28      </div>
29    </div>
30  </body>
31 </html>

```

```

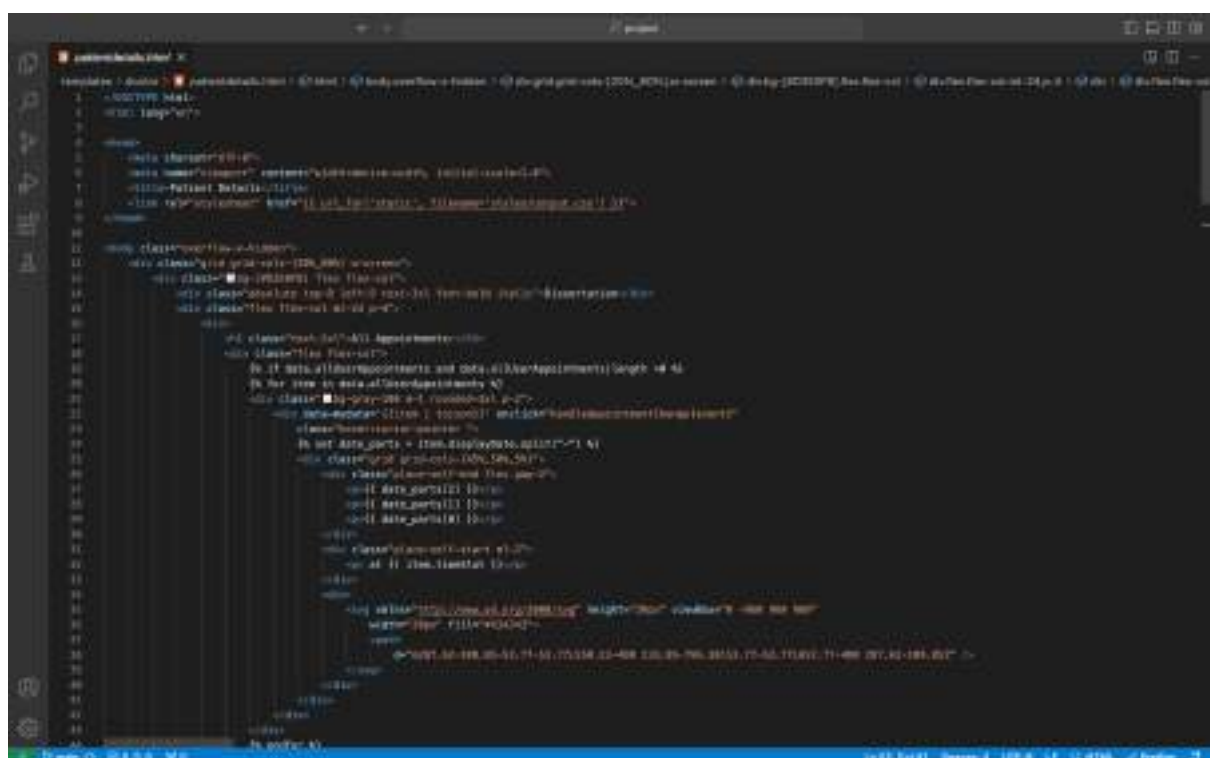
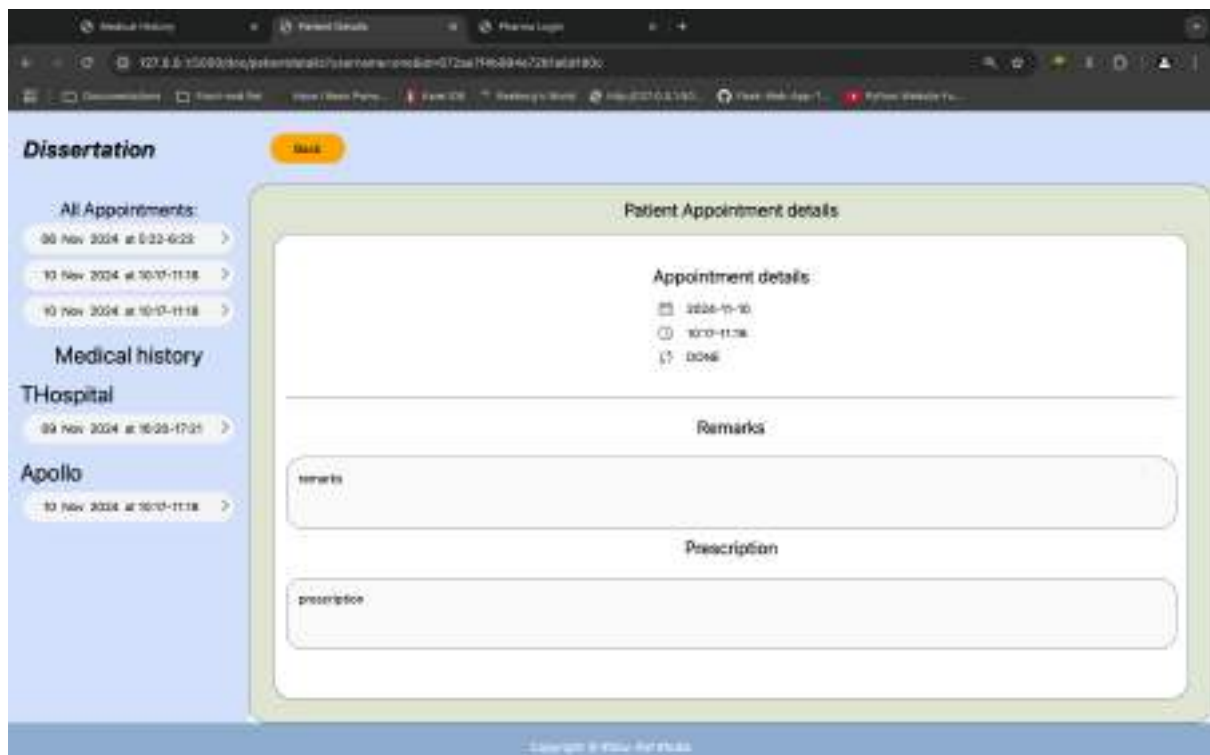
1  <DOCTYPE html>
2  <html lang="en">
3  <head>
4    <meta charset="UTF-8">
5    <meta name="viewport" content="width=device-width, initial-scale=1.0">
6    <title>Factorial Calculator</title>
7    <link href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0/dist/css/bootstrap.min.css" rel="stylesheet">
8  </head>
9  <body>
10    <div class="container">
11      <div class="row">
12        <div class="col-12">
13          <div class="text-center">
14            <h1>Factorial Calculator</h1>
15          </div>
16          <div class="text-center">
17            <div class="input-group">
18              <input type="text" value="10">
19              <button type="button" value="Calculate">
20            </div>
21            <div class="text-center">
22              <div class="display-4">
23                <math>10! = 3,628,800</math>
24              </div>
25            </div>
26          </div>
27        </div>
28      </div>
29    </div>
30  </body>
31 </html>

```

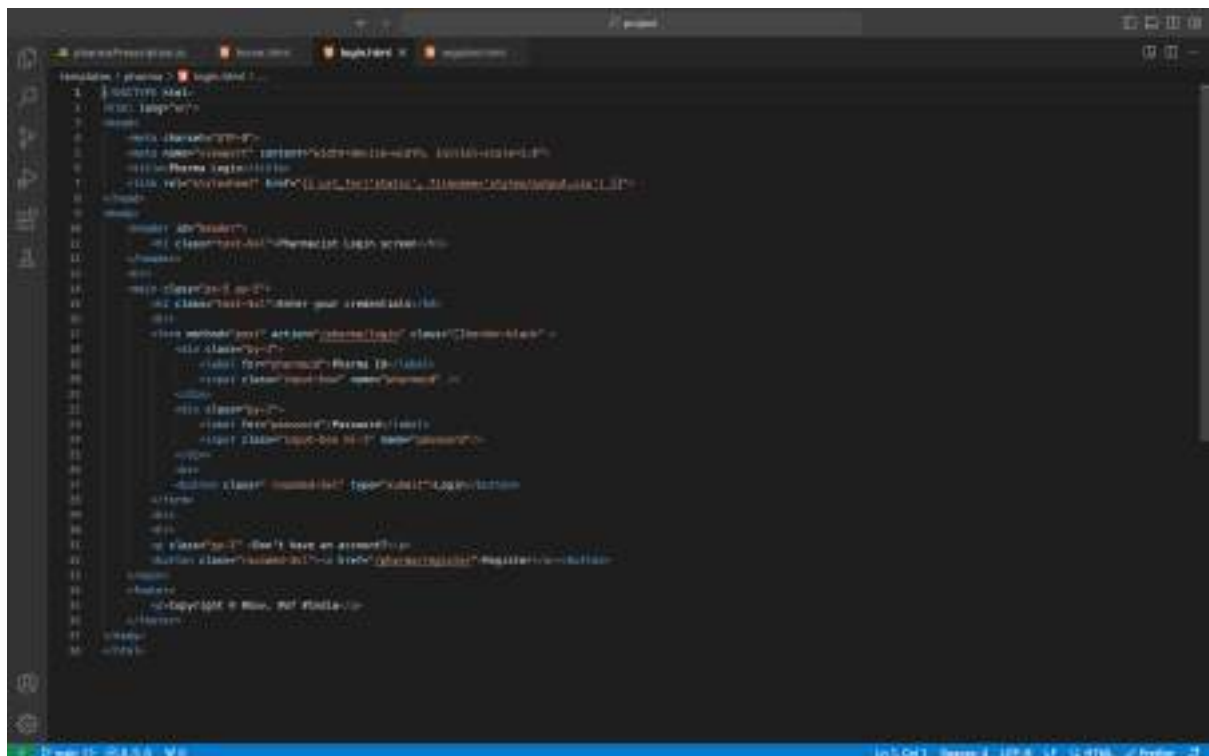



```
26 const handleInputChange = async (event) => {
27   event.preventDefault();
28   const formData = new FormData(document.getElementById('appointmentForm'));
29   const {id, name, email, phone, address, date, time, status} = Object.fromEntries(formData.entries());
30   const url = `/api/appointments/${id}`;
31   const method = 'PATCH';
32   const headers = {
33     'Content-Type': 'application/json'
34   };
35   const response = await fetch(url, {
36     method,
37     headers,
38     body: JSON.stringify({
39       name,
40       email,
41       phone,
42       address,
43       date,
44       time,
45       status
46     })
47   });
48   if (response.status === 200) {
49     alert('Appointment updated successfully');
50   } else {
51     alert('Error updating appointment');
52   }
53 }
54
55 const handleAppointmentForm = (event) => {
56   event.preventDefault();
57   const formData = new FormData(document.getElementById('appointmentForm'));
58   const {name, email, phone, address, date, time, status} = Object.fromEntries(formData.entries());
59   const url = '/api/appointments';
60   const method = 'POST';
61   const headers = {
62     'Content-Type': 'application/json'
63   };
64   const response = await fetch(url, {
65     method,
66     headers,
67     body: JSON.stringify({
68       name,
69       email,
70       phone,
71       address,
72       date,
73       time,
74       status
75     })
76   });
77   if (response.status === 201) {
78     alert('Appointment created successfully');
79   } else {
80     alert('Error creating appointment');
81   }
82 }
```

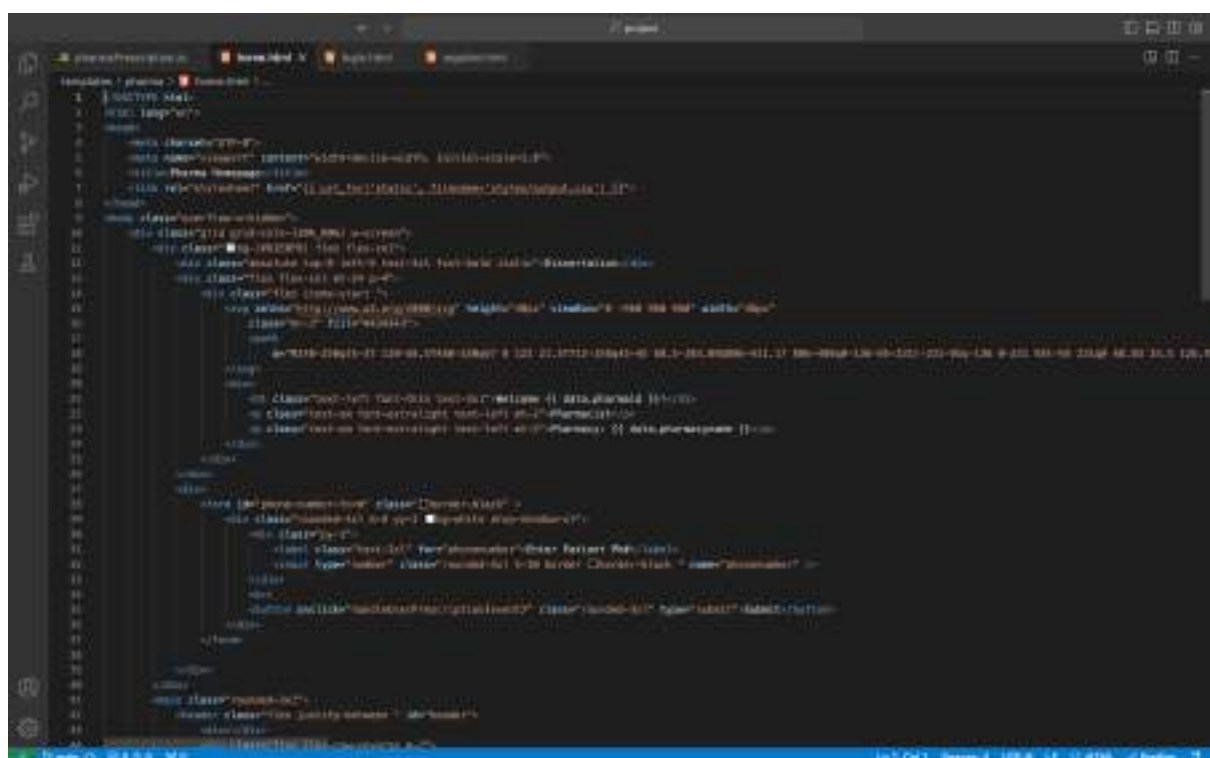
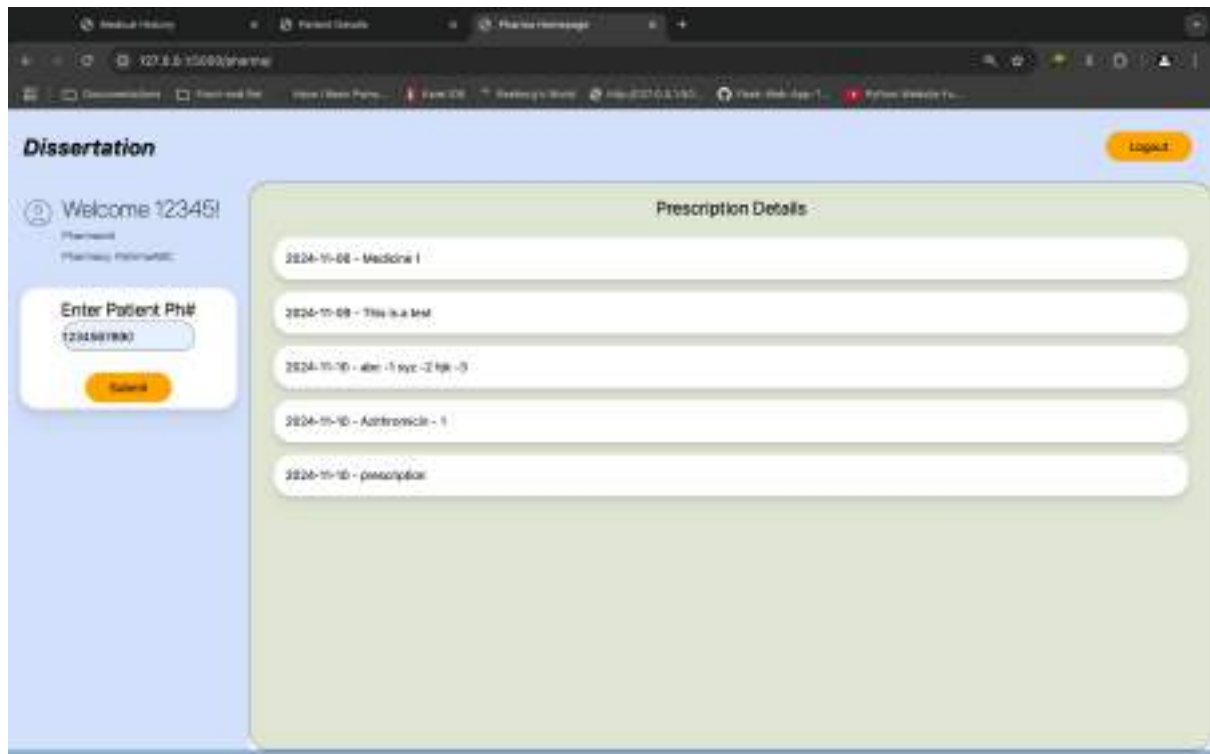
7.4 User's appointments and Medical History



8.2 Pharma Login screen



8.3 Pharma Home Page



9 Chapter 9

9.1 Bibliography

- PyMongo documentation - <https://pymongo.readthedocs.io/en/stable/tutorial.html>
- Flask framework installation - <https://flask.palletsprojects.com/en/stable/quickstart/>
- Jinja template documentation - <https://jinja.palletsprojects.com/en/stable/templates/>
- Tailwindcss - <https://tailwindcss.com/docs/installation>

9.2 Project Status

Serial Number of Task	Tasks or subtasks to be done (be precise and specific)	Planned duration in weeks	Specific Deliverables in terms of the project	Status
1	Requirement Gathering	Week 1	Sprint 1	Completed
2	Documentation of design for the website	Week 2 - 3	Sprint 2	Completed
3	Development of Dashboard of the website	Week 4	Sprint 3	Completed
4	Development of Doctor's module	Week 5 - 6	Sprint 4	Completed
5	Development of Pharmacist's module	Week 7 - 8	Sprint 5	Completed
6	Development of Lab's module	Week 9 - 10	Sprint 6	Future Scope
7	Development of Patient's module	Week 11 - 12	Sprint 7	Completed
8	Customizations	Week 13	Sprint 8	Completed

9	Integration of Dashboard, Doctor's module, Pharmacist's module and Patient's module	Week 14 - 15	Sprint 9	Completed
10	Integration of Database at the back end	Week 16	Sprint 10	Completed

9.2 Conclusion

- The Lab module is moved to future scope.
- The Integration of the database and the website is done.
- The website is fully functional with one module moved to future scope.