Bilkent University
Department of Computer Engineering

CS 353

Database Management Systems
Term Project

Final Report

Patient Medical Treatment Tracking System

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1. BRIEF DESCRIPTION

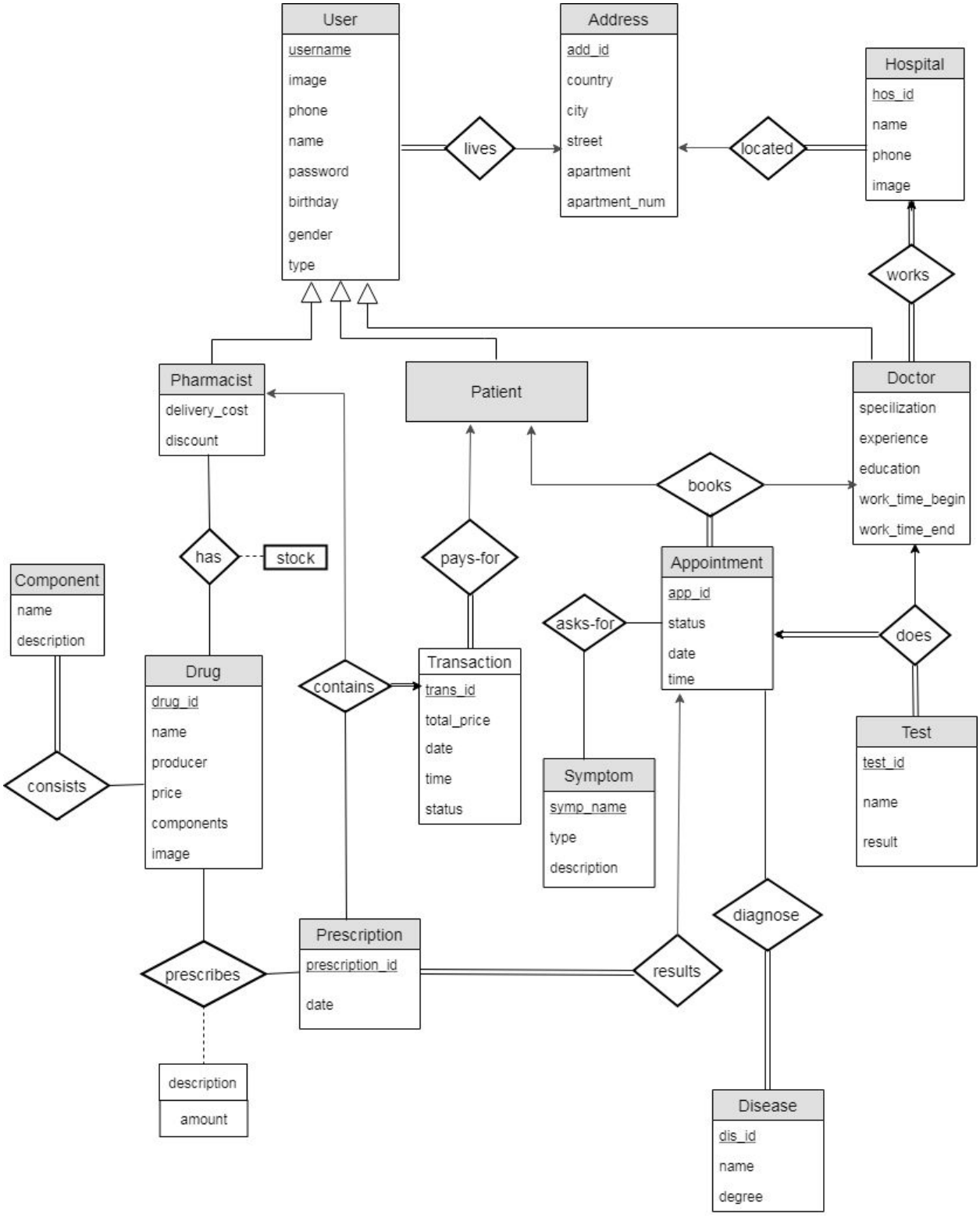
PMTTS is a web-based system application for tracking medical treatments of patients at certain hospitals. The system will be designed to be used by patients, doctors of different hospitals and pharmacists. System includes information about the hospitals and doctors working there. Doctors will be able to set or change hospitals where they work, set their schedule of working hours and available slots for appointments. Patients can book or cancel an appointment from a certain doctor. After the appointment, patients can view their test results and a list of prescribed drugs. Patients then can buy drugs from a pharmacist, and if the drug is not available, patient will be able to buy similar drugs having same ingredients. The security of payment and maintenance of the data are very crucial factors in this database system so that the users will not get into any unwanted situations.

Shortly, **PMTTS** will be a web-application system that will help to ease maintaining the interactions between patients, doctors and pharmacists.

2. FINAL E/R DIAGRAM

The following changes were made:

1. Diagnosis entity was removed
2. xLoc and yLoc attributes were removed from Address
3. Prescription entity was added
4. Type attribute was added to User
5. Mapping cardinalities were fixed


User
username
image
phone
name
password
birthday
gender
type
lives
Address
add_id
country
city
street
apartment
apartment_num
located
Hospital
hos_id
name
phone
image
works
Pharmacist
delivery_cost
discount
Patient
Doctor
specilization
experience
education
work_time_begin
work_time_end
books
has
stock
pays-for
Component
name
description
Appointment
app_id
status
date
time
asks-for
does
Drug
drug_id
name
producer
price
components
image
contains
Transaction
trans_id
total_price
date
time
status
Test
test_id
name
result
consists
Symptom
symp_name
type
description
diagnose
Prescription
prescription_id
date
prescribes
results
description
amount
Disease
dis_id
name
degree

3. FINAL LIST OF TABLES

3.1. User

User(username, image, phone, name, password, birthday, gender, add_id, type)

FOREIGN KEY(add_id) REFERENCES Address(add_id),

3.2. Pharmacist

Pharmacist(username, delivery_cost, discount)

FOREIGN KEY (username) REFERENCES User(username)

3.3. Patient

Patient(username)

FOREIGN KEY (username) REFERENCES User(username)

3.4. Doctor

Doctor(username, specialization, experience, education, work_time_begin, work_time_end, hos_id)

FOREIGN KEY (username) REFERENCES User(username)

FOREIGN KEY (hos_id) REFERENCES Hospital(hos_id)

3.5. Hospital

Hospital(hos_id, name, phone, image, add_id)

FOREIGN KEY(add_id) REFERENCES Address(add_id)

3.6. Appointment

Appointment(app_id, status, date, time, patient_username, doctor_username)

FOREIGN KEY (patient_username) REFERENCES Patient(username)

FOREIGN KEY (doctor_username) REFERENCES Doctor(username)

3.7. Test

Test(test_id, name, result)

3.8. Symptom

Symptom(symp_name, type, description)

3.9. Disease

Disease(dis_id, name, degree)

3.10. Prescription

Prescription(prescription_id, date)

3.11. Drug

Drug(drug_id, name, producer, price, components, image)

3.12. Transaction

Transaction(trans_id, total_price, date, time, status, patient_username)

FOREIGN KEY(patient_username) REFERENCES Patient(username)

3.13. Address

Address(add_id, country, city, street, apartment, apartment_num)

3.14. Does

Does(test_id, app_id, doctor_username)

FOREIGN KEY(test_id) REFERENCES Test(test_id),

FOREIGN KEY(app_id) REFERENCES Appointment(app_id),

FOREIGN KEY(doctor_username) REFERENCES Doctor(username)

3.15. Has

Has(pharmacist_username, drug_id, stock)

FOREIGN KEY(pharmacist_username) REFERENCES Pharmacist(username),

FOREIGN KEY(drug_id) REFERENCES Drug(drug_id)

3.16. Ask-for

Asks-for(symp_name, app_id)

FOREIGN KEY(symp_name) REFERENCES Symptom(symp_name),

FOREIGN KEY(app_id) REFERENCES Appointment(app_id)

3.17. Prescribes

Prescribes(pres_id, drug_id, description, amount)

FOREIGN KEY(pres_id) REFERENCES Prescription(prescription_id),

FOREIGN KEY(drug_id) REFERENCES Drug(drug_id)

3.18. Contains

Contains(trans_id, pharmacist_username, pres_id)

FOREIGN KEY(trans_id) REFERENCES Transaction(trans_id),

FOREIGN KEY(pharmacist_username) REFERENCES Pharmacist(username),

FOREIGN KEY(pres_id) REFERENCES Prescription(prescription_id)

3.19. Diagnose

Diagnose(app_id, dis_id)

FOREIGN KEY(app_id) REFERENCES Appointment(app_id)

FOREIGN KEY(dis_id) REFERENCES Disease(dis_id)

3.20. Results

Results(app_id, pres_id)

FOREIGN KEY(app_id) REFERENCES Appointment(app_id)

FOREIGN KEY(pres_id) REFERENCES Prescription(prescription_id)

3.21. Component

Component(name, description)

3.22. Consists

Consists(drug_id, comp_name)

FOREIGN KEY(drug_id) REFERENCES Drug(drug_id)

FOREIGN KEY(comp_name) REFERENCES Component(name)

4. IMPLEMENTATION DETAILS

4.1. Database

Used technologies: MySQL, Java, IntelliJ Idea

We wrote Java code in IntelliJ Idea to create the SQL tables and insert some main queries, then by using JDBC driver we executed it.

4.2. Front-end

Used technologies: HTML5, CSS3, PhpStorm

We implemented the front-end of the website by using CSS3 and HTML5 in the PhpStorm environment by JetBrains.

4.3. Back-end

Used technologies: JavaScript, PHP, PhpStorm, Notepad++

The back-end of the website was fully implemented in PHP, except alerts, which were implemented in JavaScript. We had used Notepad++ text editor and PhpStorm to write the PHP and JavaScript codes. Filezilla and PuTTy applications were used to upload our files to to the Dijkstra machine to test back-end code.

4.4. Problems

Image files were not displayed, so we removed images from database, and in the code we replaced them with the avatar image, which is located in the local folder.

We were lacking time, so we decided not to implement the Pharmacist's part and did not implement some other features, which we were planning to do in the design report.

5. ADVANCED DATABASE FEATURES

5.1 Reports

Total transactions and money spend

Query:

```
SELECT patient_username, count(trans_id), sum(total_price)
FROM TRANSACTION
GROUP BY patient_username
```

Result:

user1: 10, 150

user2: 1, 25

user3: 12, 486

Total amount of appointments of different status done by certain doctor

Query:

```
SELECT status, count(app_id)
FROM Appointment
GROUP BY status
WHERE doctor_id = $doctor_id
```

Result:

requests: 1

wait for symptoms: 1

current: 1

completed: 2

5.2 Advanced features

Trigger:

When doctor changes hospital, all his appointments are canceled

Query:

```
CREATE TRIGGER cancel_app after update of DOCTOR on (hos_id)

referencing new row as nrow

referencing old row as orow

for each row

when nrow.hos_id <> orow.hos_id

begin atomic

    DELETE FROM Appointment
    WHERE doctor_username = nrow.username;

end;
```

5.3 Secondary indices

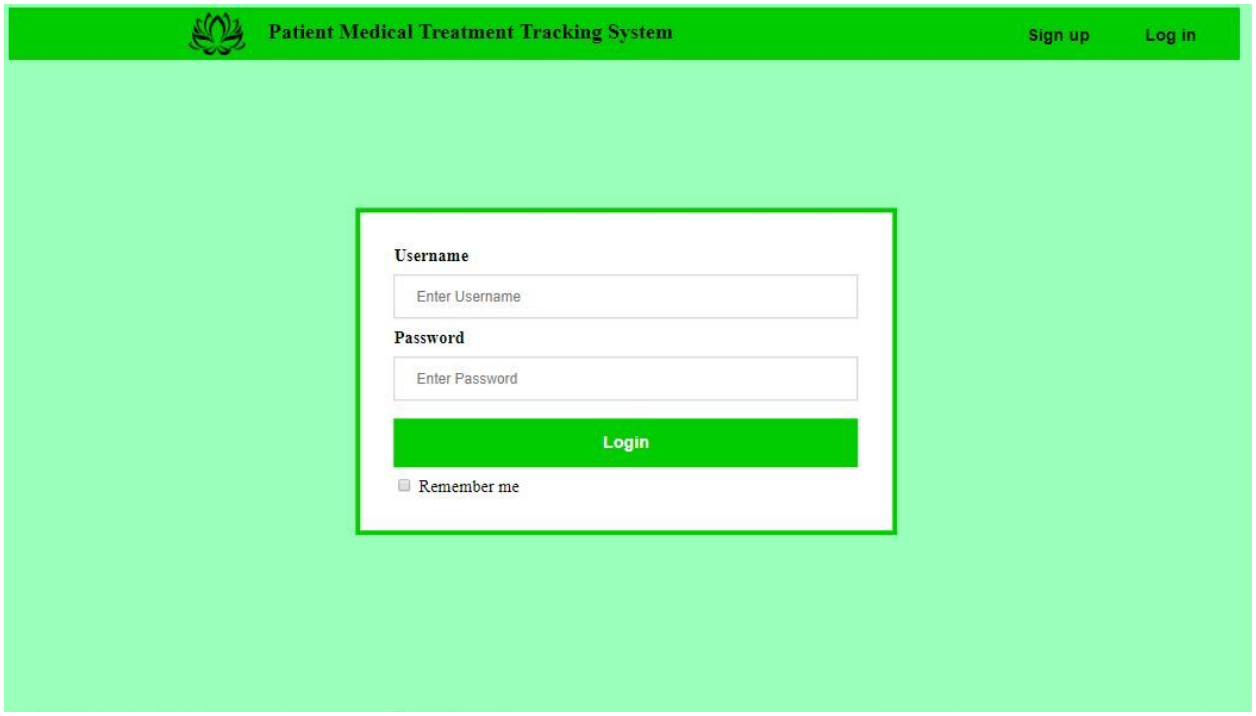
To make more efficient search of doctors by their name we used secondary indices

Query:

```
CREATE INDEX doctor_search
USING BTREE on DOCTOR
```

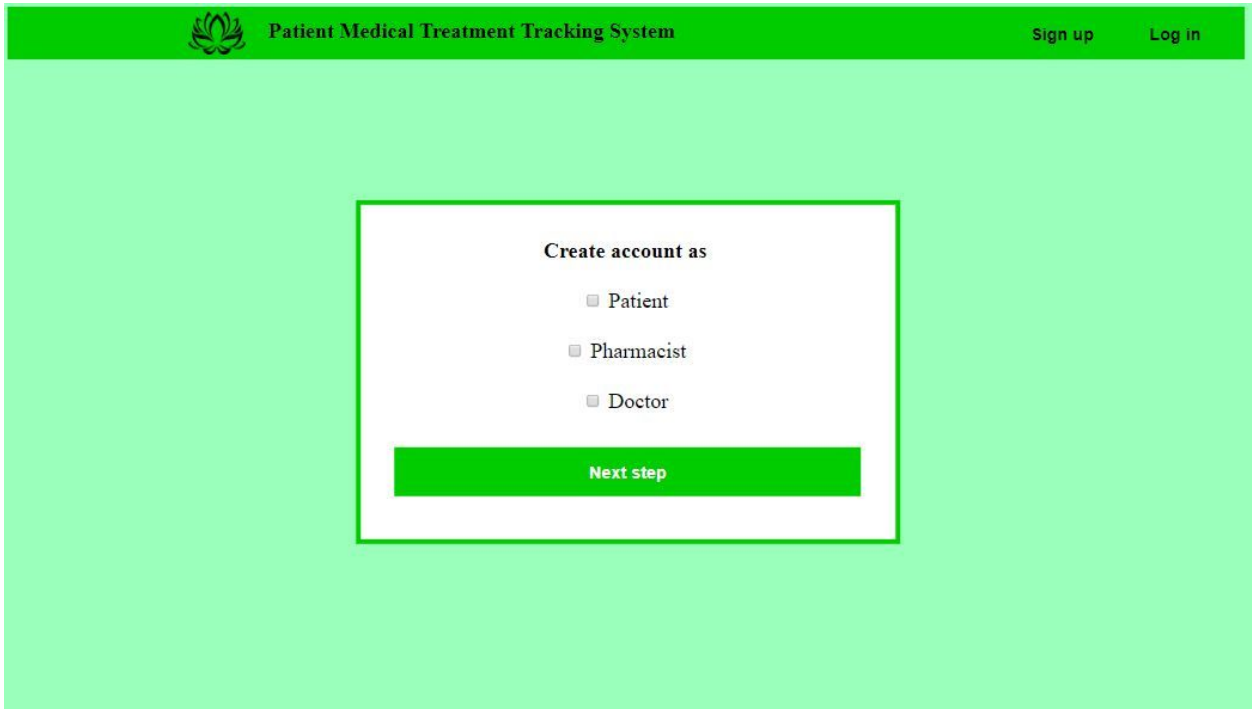
6. USER'S MANUAL

6.1. Sign in page

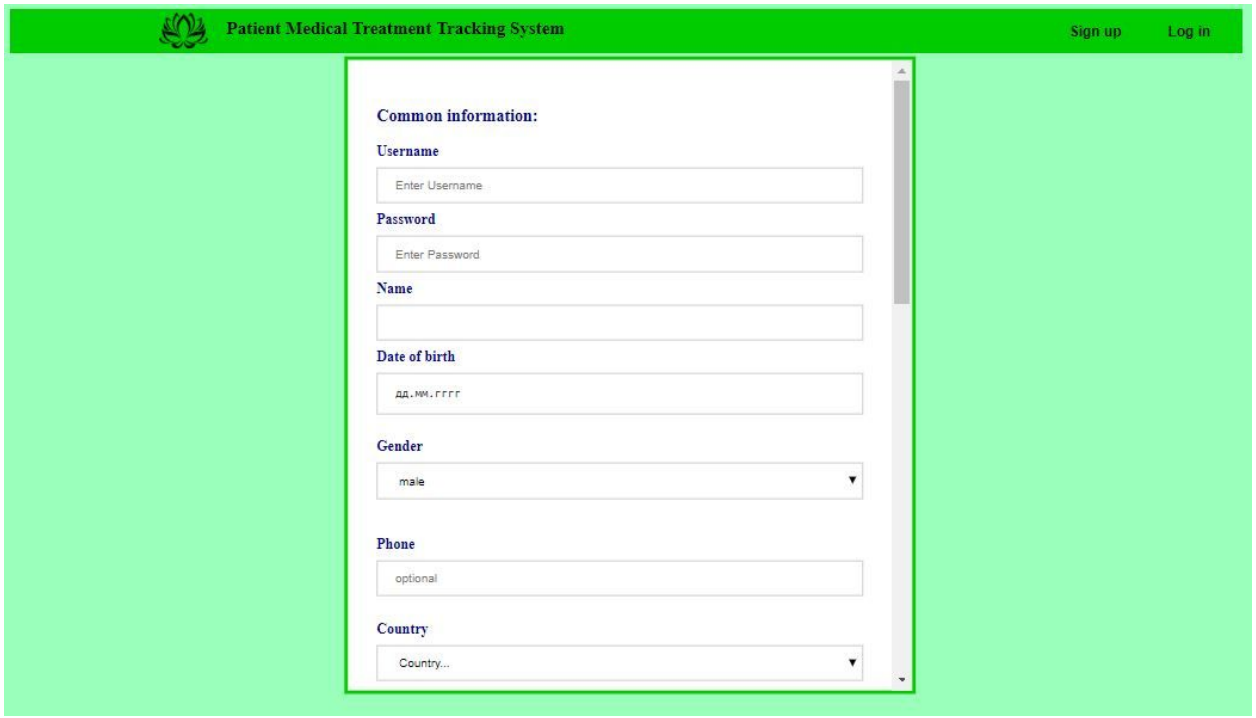


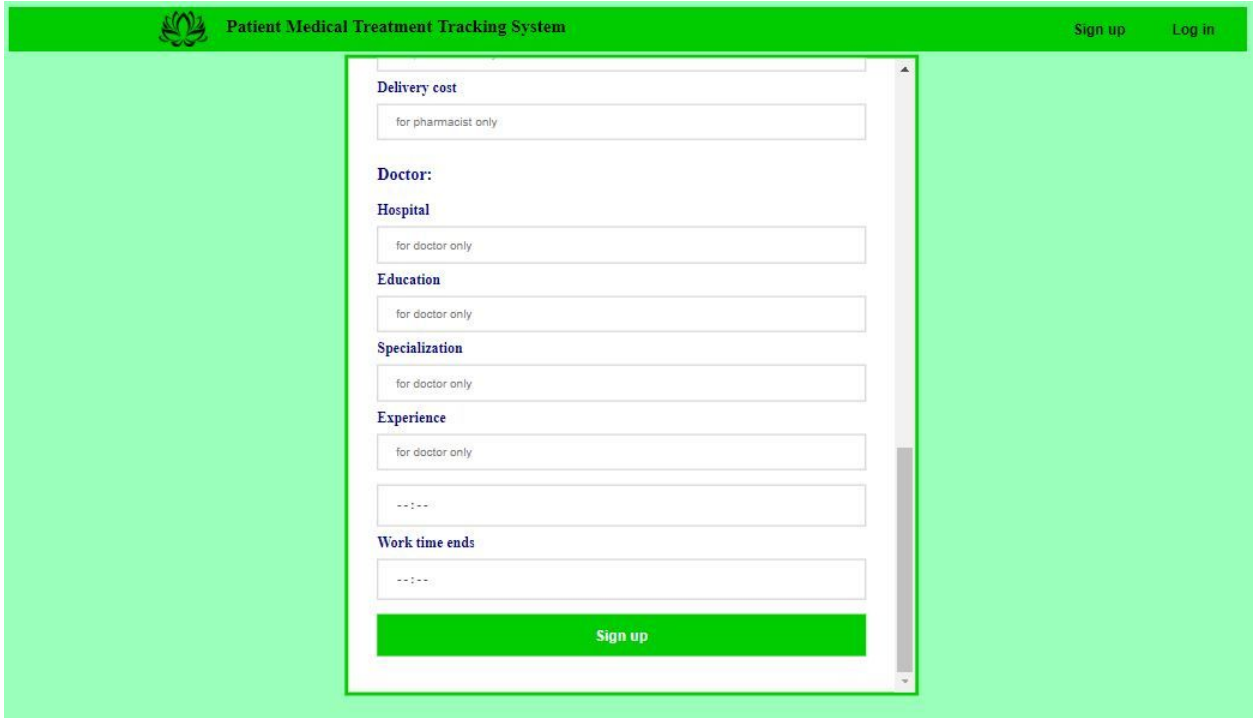
This page allows user to login if username entered contained in database and password entered matches username.

6.2. Sign up page

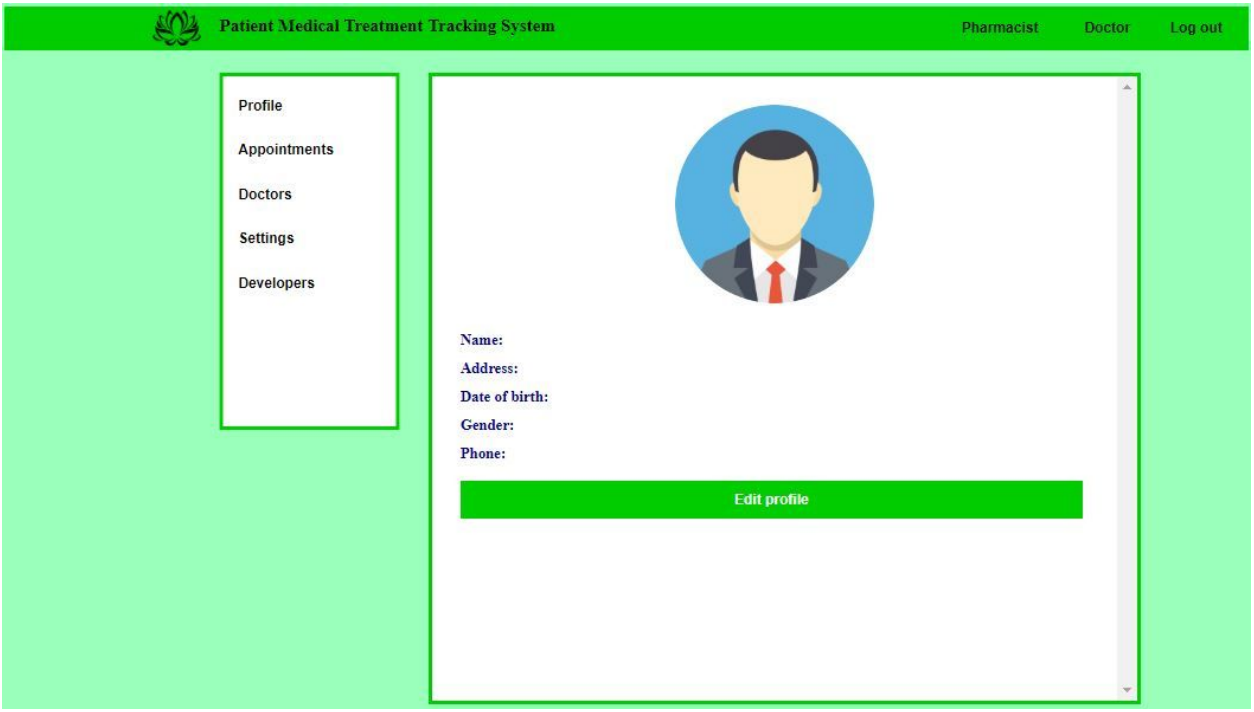


In this page user should choose which account he is going to create. There are three different types of accounts: Patient, Pharmacist, Doctor. He/She can choose more than one type. According to the types of account user chosen in the previous page, the page below asks user to enter user's information, some of them are optional. If user cannot find his/her address, hospital, education or specialization, he/she can enter a new data by clicking on the plus button.

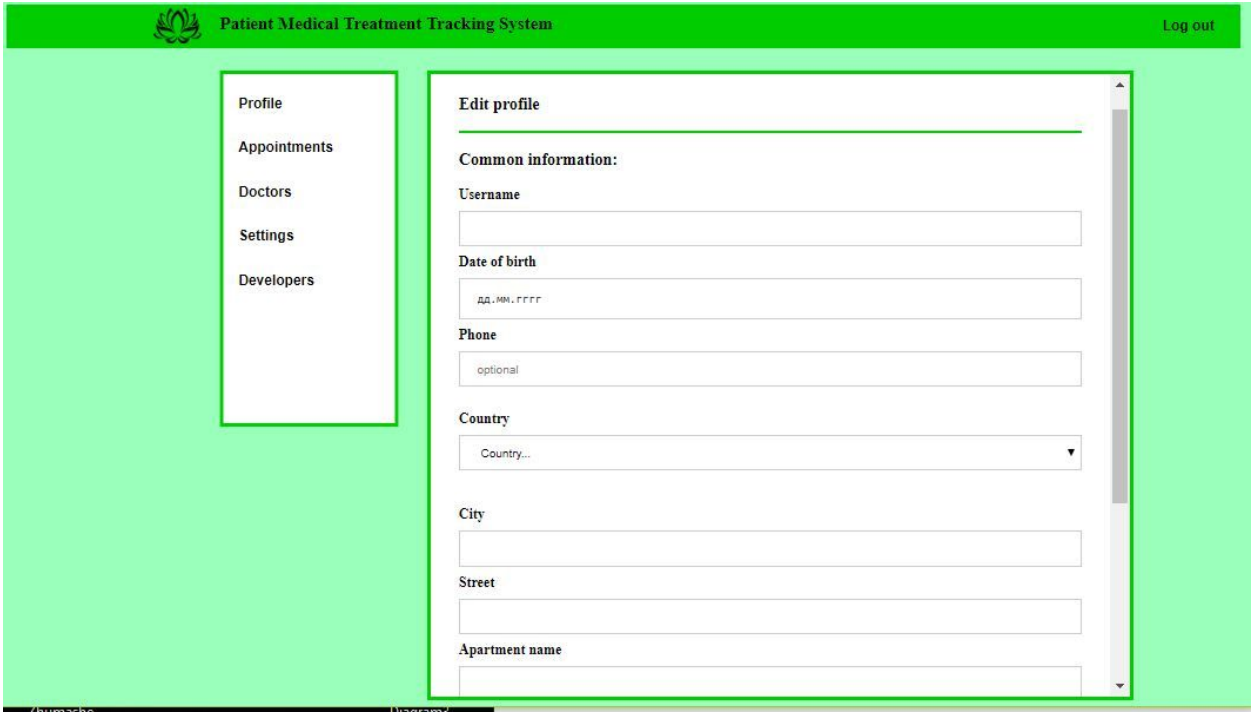

Patient Medical Treatment Tracking System
Sign up
Log in
Common information:
Username
Enter Username
Password
Enter Password
Name
Date of birth
дд.мм.гггг
Gender
male
Phone
optional
Country
Country...


Patient Medical Treatment Tracking System
Sign up
Log in
Delivery cost
for pharmacist only
Doctor:
Hospital
for doctor only
Education
for doctor only
Specialization
for doctor only
Experience
for doctor only
--:--
Work time ends
--:--
Sign up

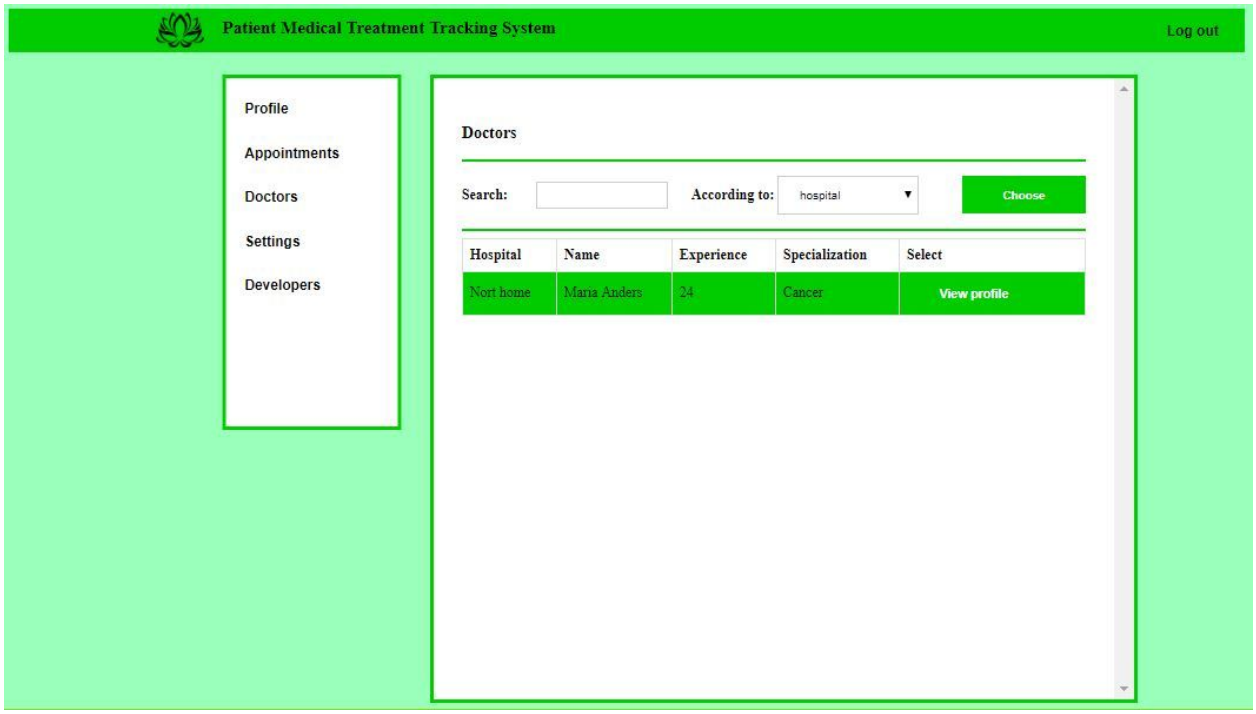
6.3. Patient's Profile menu



This is a welcome page for Patient accounts. In this page user can view his/her profile information of patient account. He/She can edit it by clicking edit button. In addition, here he/she can switch his account to Pharmacist or Doctor account. Patient account has Profile, Appointments, Doctors, Transactions, Settings and Developers menu.

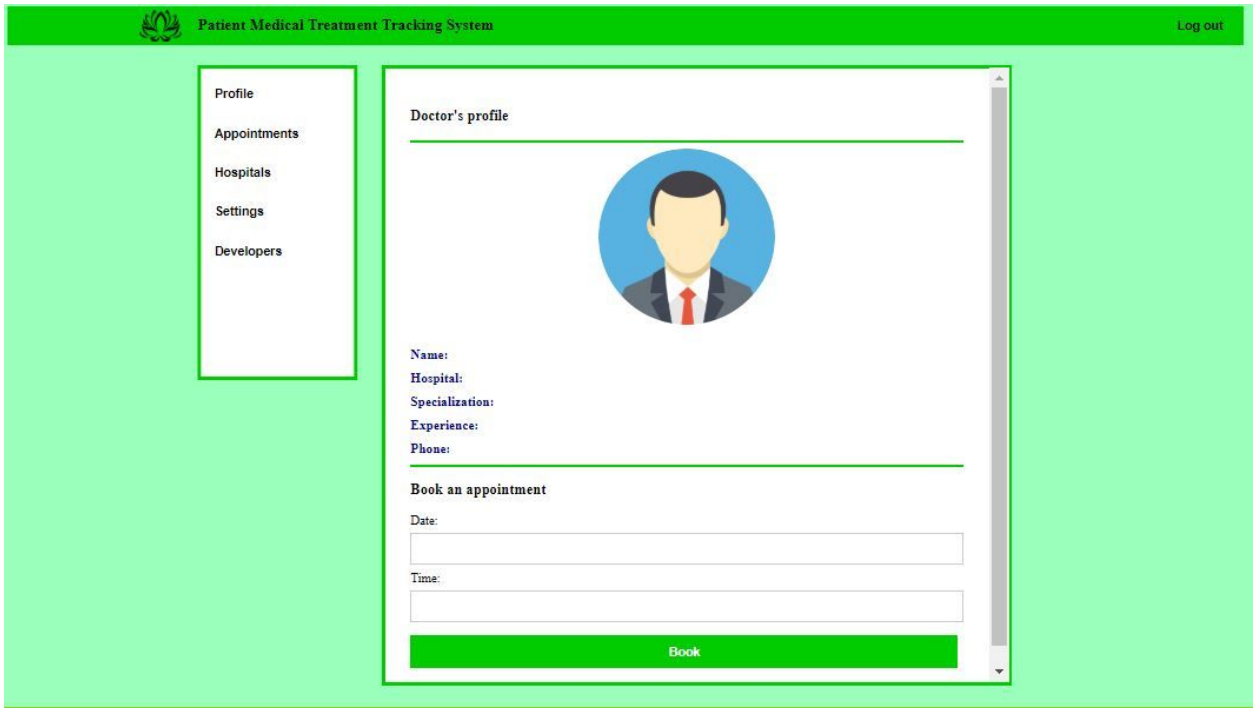


6.4. Patient's Doctors menu

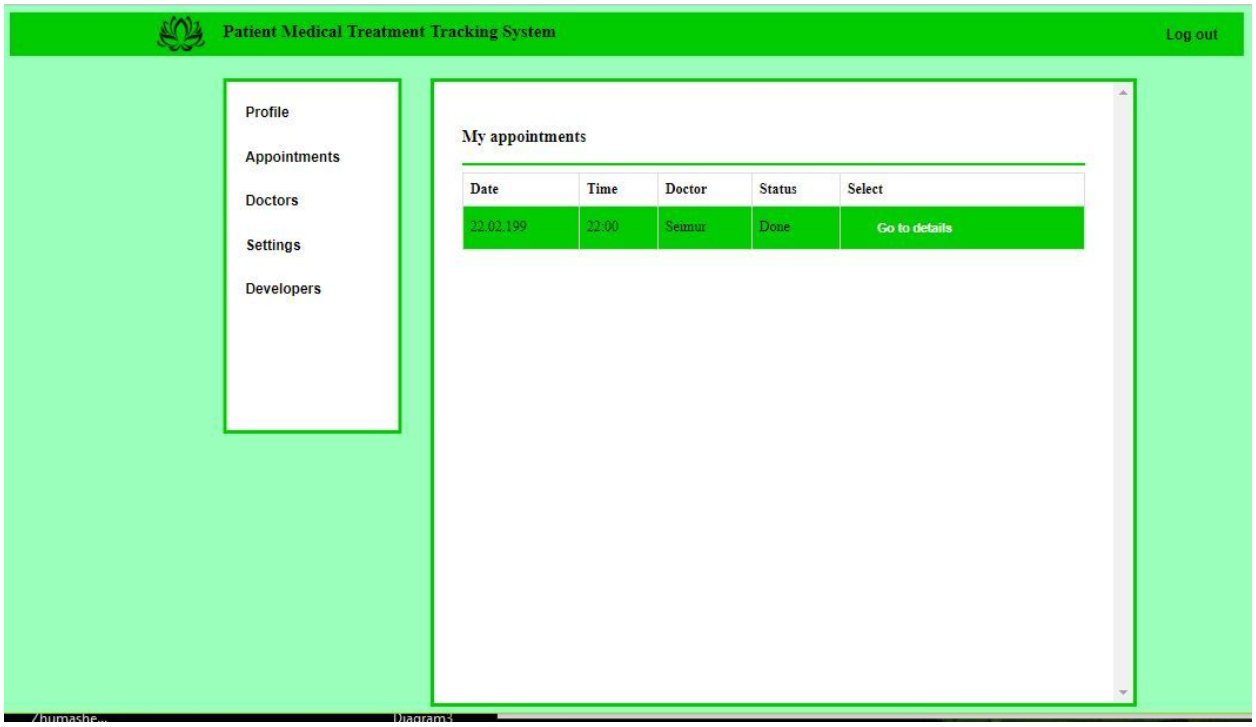


In this page user can view information about doctors. He/She can search doctors and get sorted table according the attribute chosen or by distance, which is calculated by algorithm.

When user clicks one of the doctors, his/her information and his/her current booked appointments will be shown. In addition, user can book appointment by entering available date and time, then clicking "book" button. The page is provided below.

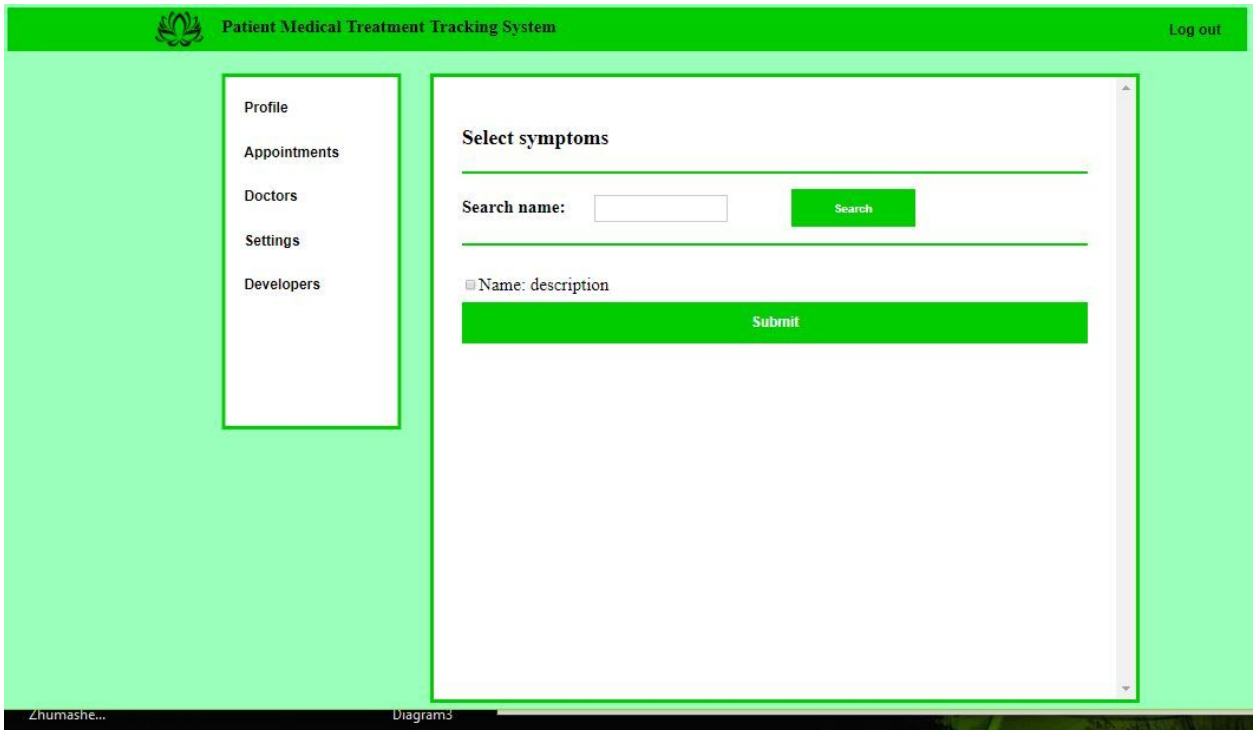


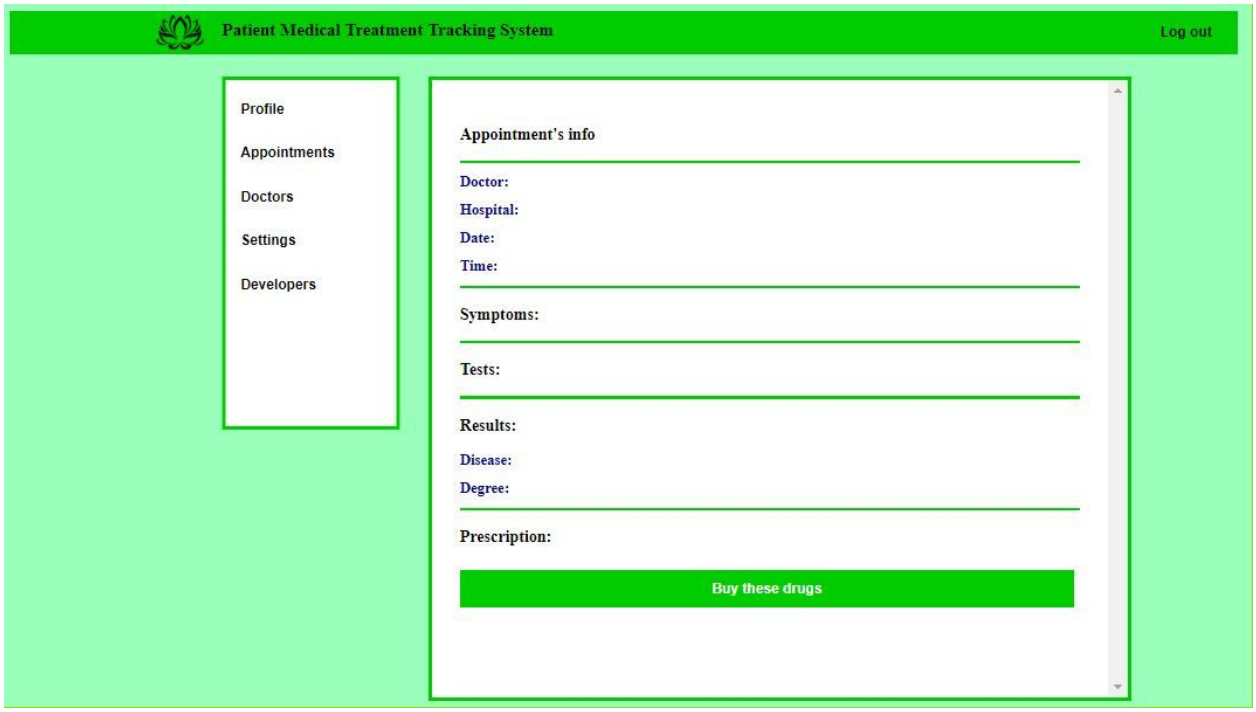
6.5. Patient's Appointments menu



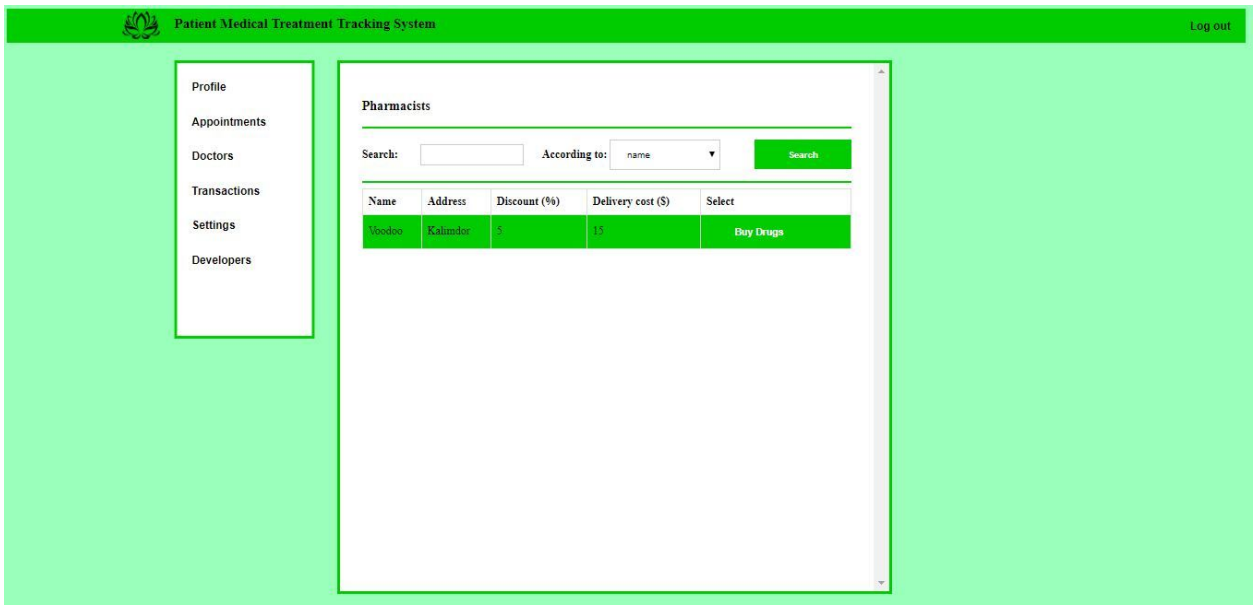
In this page user can view information about his appointments. User can view detailed information about appointment by clicking on "go to details".

The page below is where user should choose symptoms that he/she has and press send button.

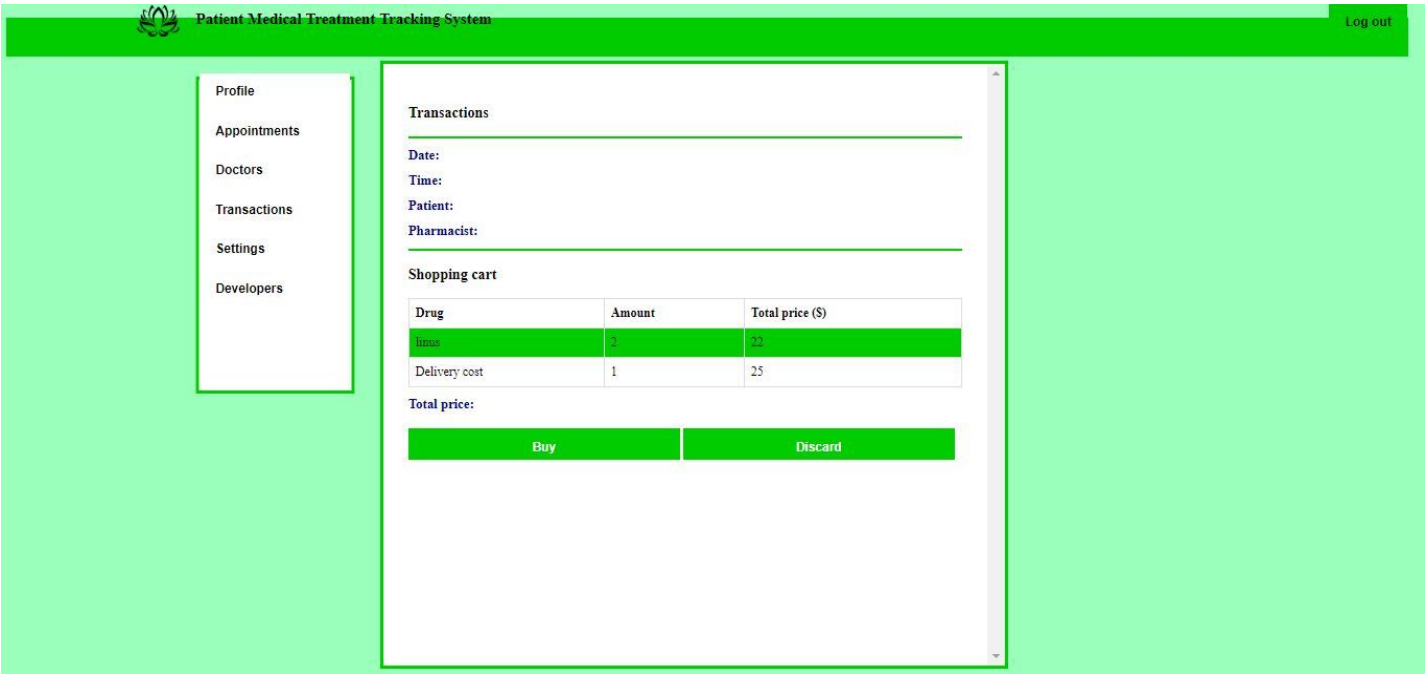




In this page user can view detailed information about appointment and its results. Here he/she can also click on buy these drugs button and webpage with the list of pharmacists is opened, where he/she can choose from whom buy drugs.

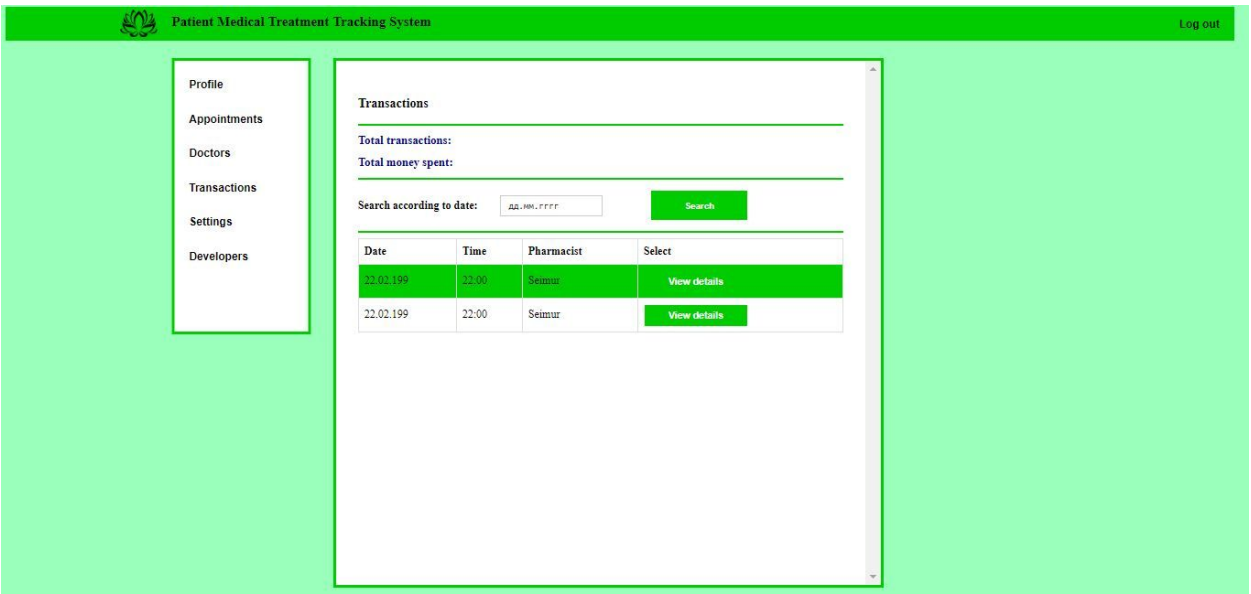


6.6. Patient's Transaction menu

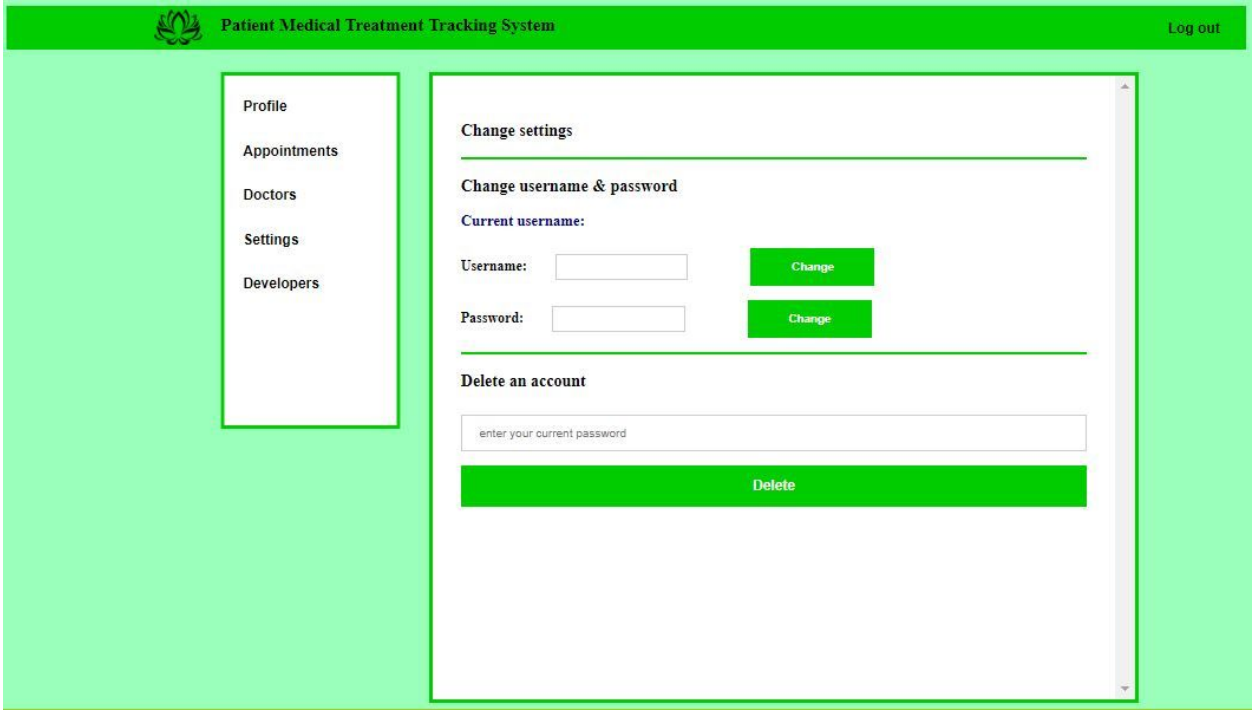


In this page user can view information about certain transaction. He/She can pay for or cancel transaction by clicking corresponding button.

Page below is Transaction menu of the patient. Here he/she can view his transactions list and total money spent.

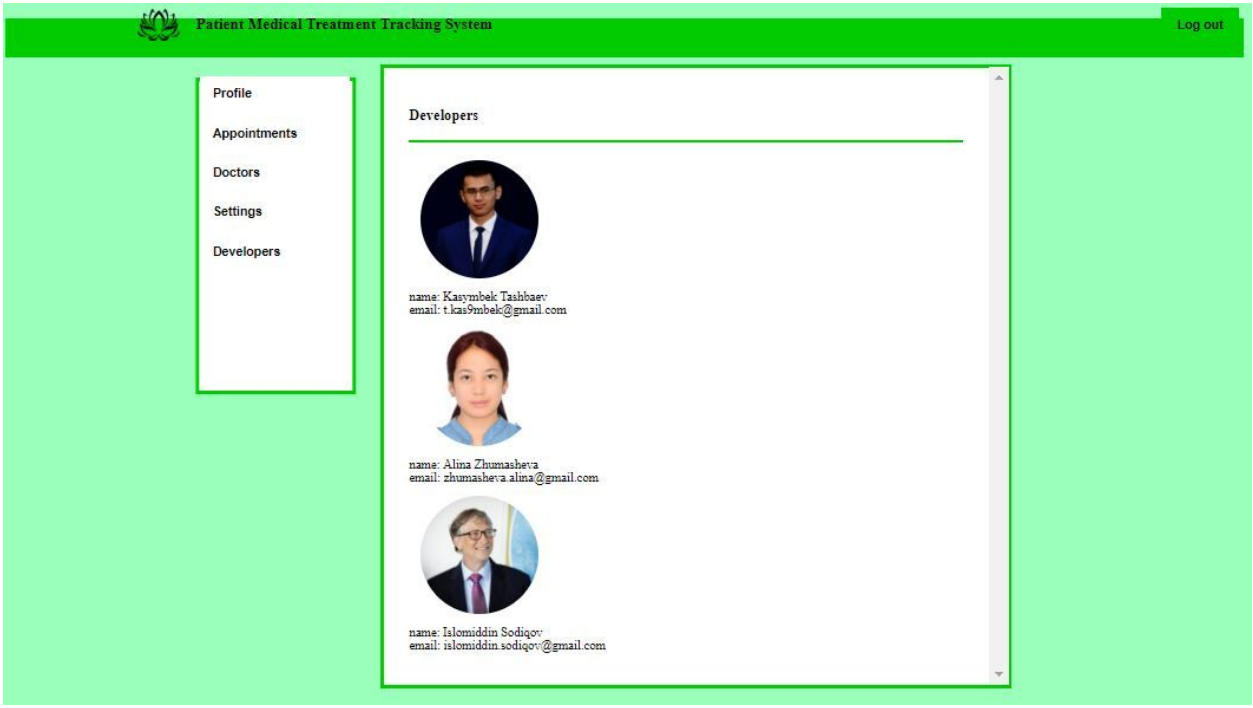


6.7. Settings menu



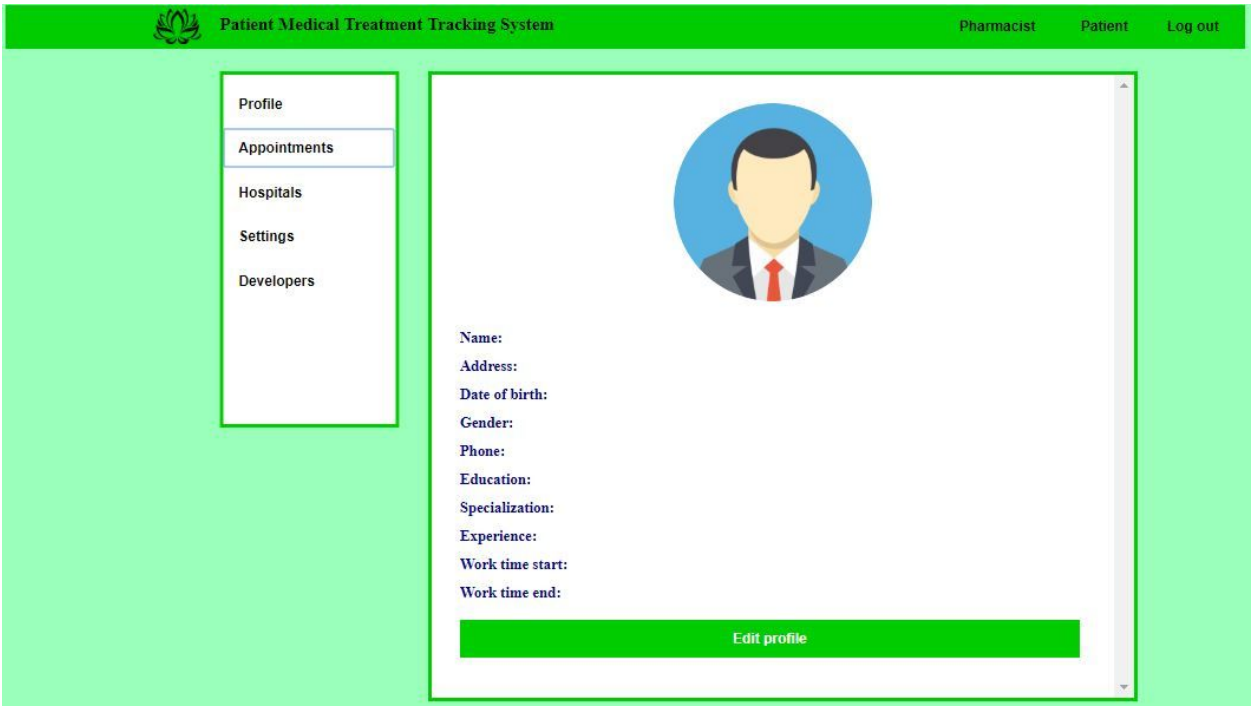
In this page user can view his/her username, as well as change the password or username or delete his/her account.

6.8. Developers menu



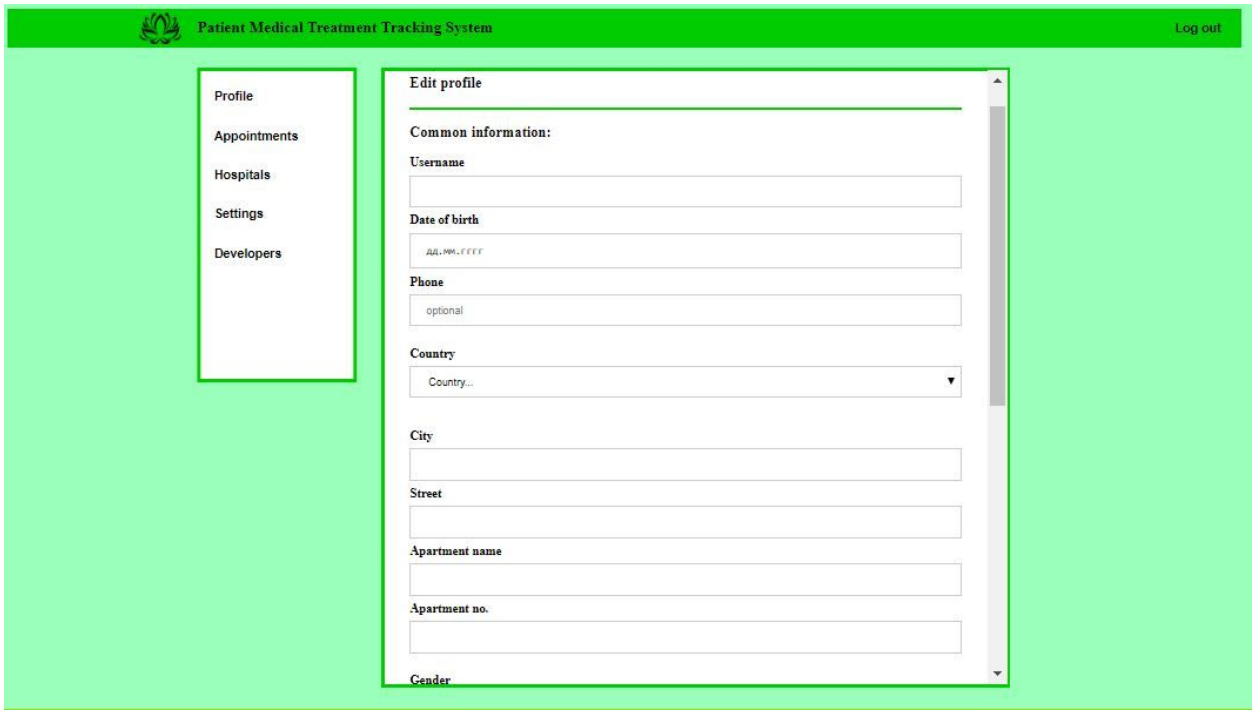
In this page user can view information about delevelopers of this application.

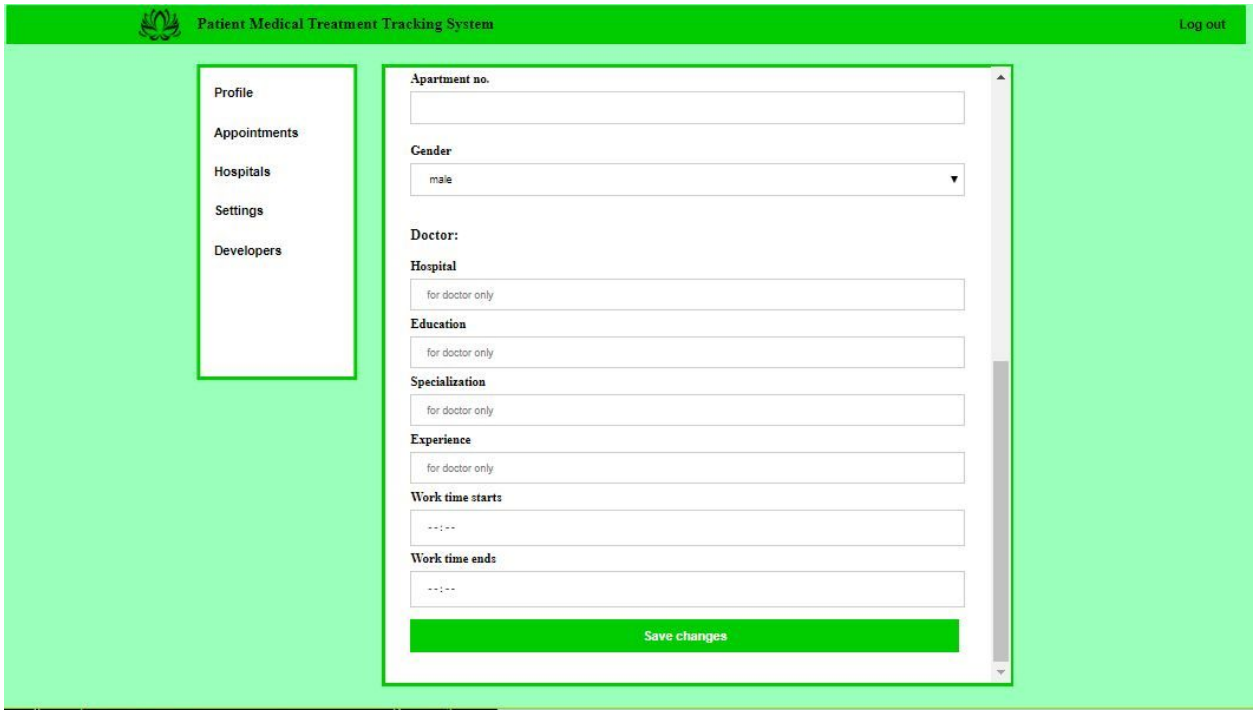
6.9. Doctor's Profile menu



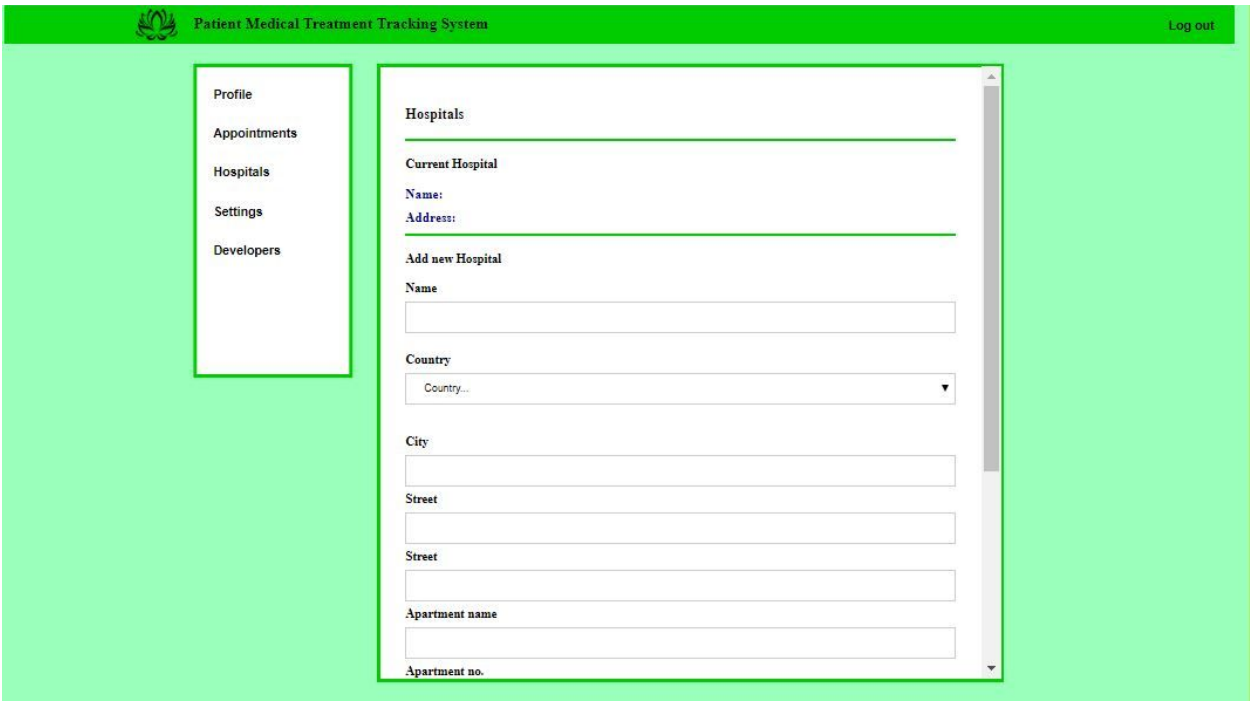
This is a welcome page for Patient accounts; if user has both Doctor and Patient type accounts, Doctor type has higher priority. In this page user can view his/her profile information of doctor account. He/She can edit it by clicking edit button. In addition, here he/she can switch his/her account to Pharmacist or Doctor account. Doctor account has Profile, Appointments, Hospitals, Settings and Developers menus. All menus are similar to Patient's menus except Hospitals and Appointments

Doctor can edit profile information by clicking on edit profile button.


Patient Medical Treatment Tracking System
Log out
Profile
Appointments
Hospitals
Settings
Developers
Edit profile
Common information:
Username
Date of birth
dd.mm.yyyy
Phone
optional
Country
Country...
City
Street
Apartment name
Apartment no.
Gender

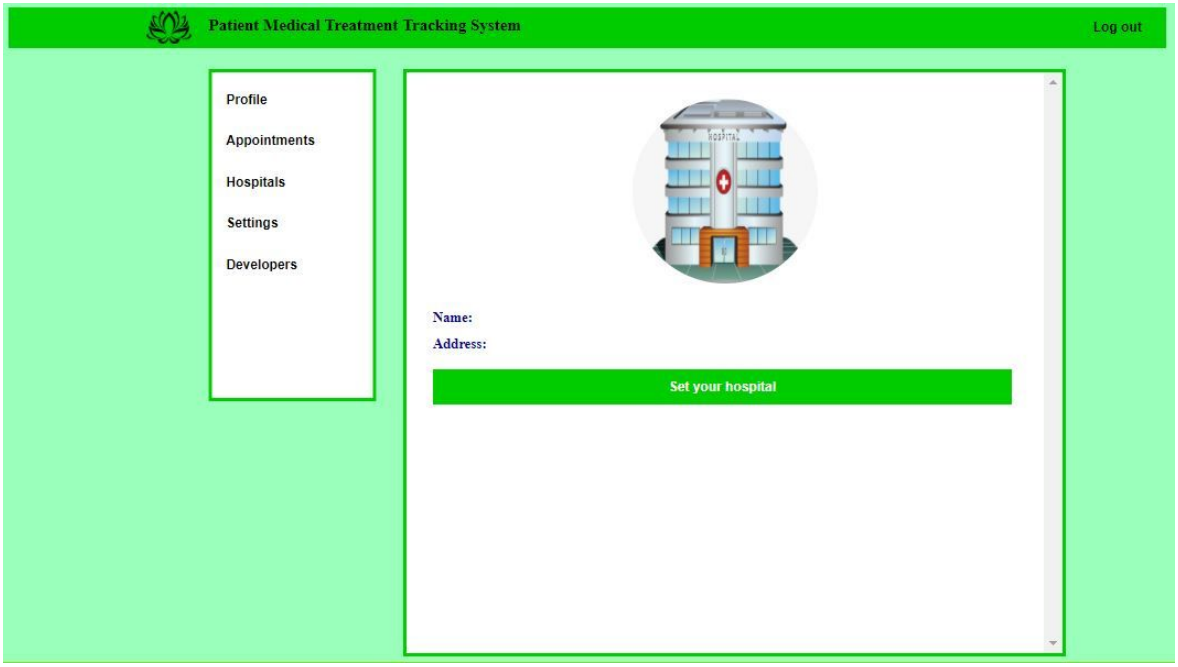

Patient Medical Treatment Tracking System
Log out
Profile
Appointments
Hospitals
Settings
Developers
Apartment no.
Gender
male
Doctor:
Hospital
for doctor only
Education
for doctor only
Specialization
for doctor only
Experience
for doctor only
Work time starts
--:--
Work time ends
--:--
Save changes

6.10. Doctor's Hospital menu



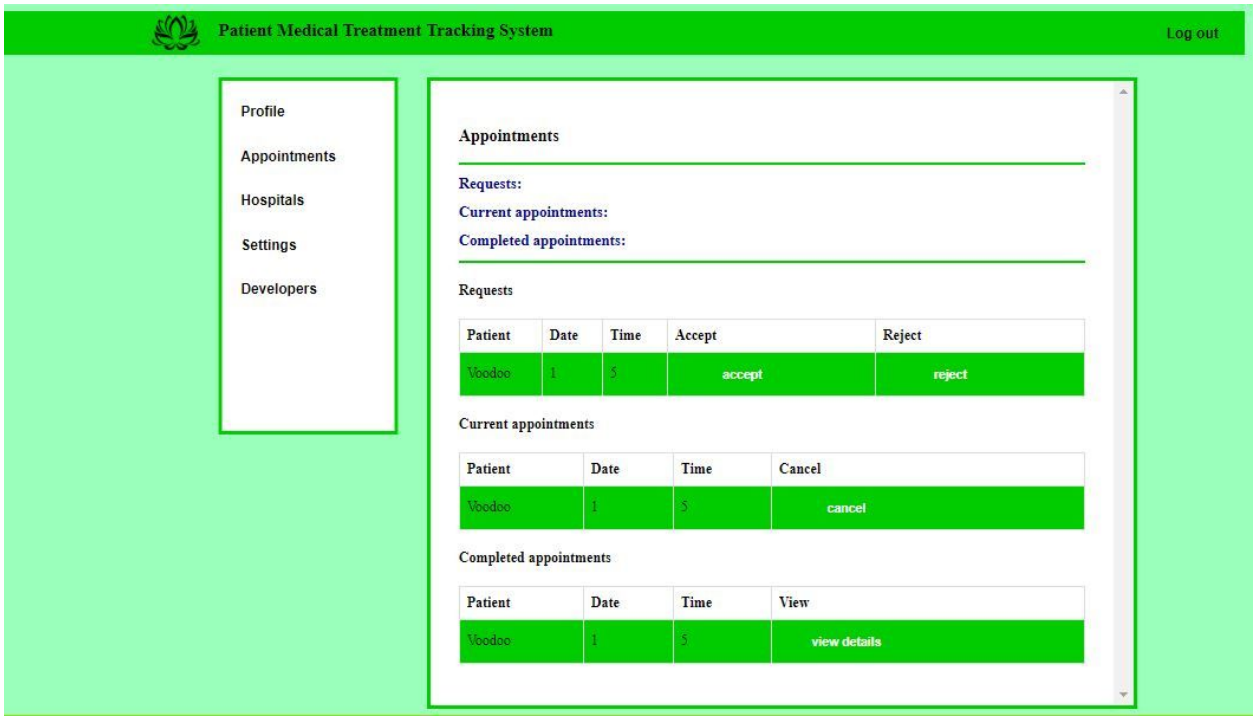
In this page doctor can view information about his/her current hospital. He/She can search other hospitals, leave his current hospital or go to page where he/she can add a new hospital to database by clicking the corresponding buttons. Detailed information about hospital is displayed, if doctor clicks hospital's name.

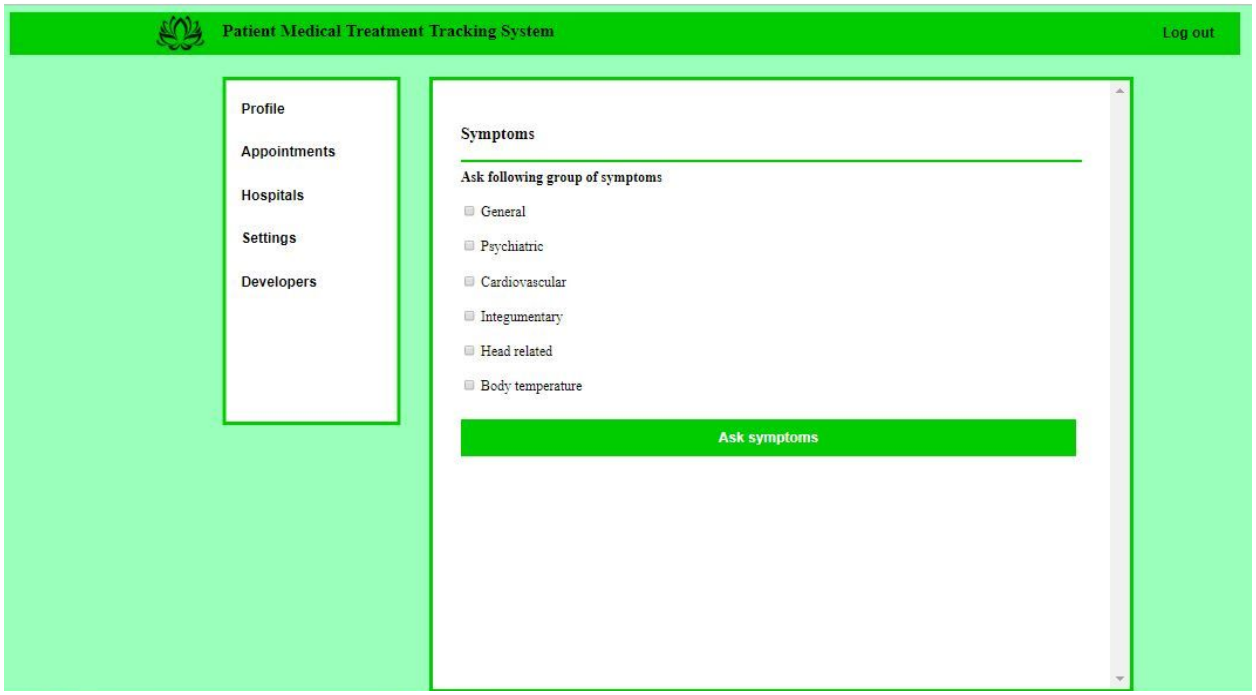
The page below is how doctor can view detailed information about chosen hospital. He/She can search set this hospital as his current hospital.



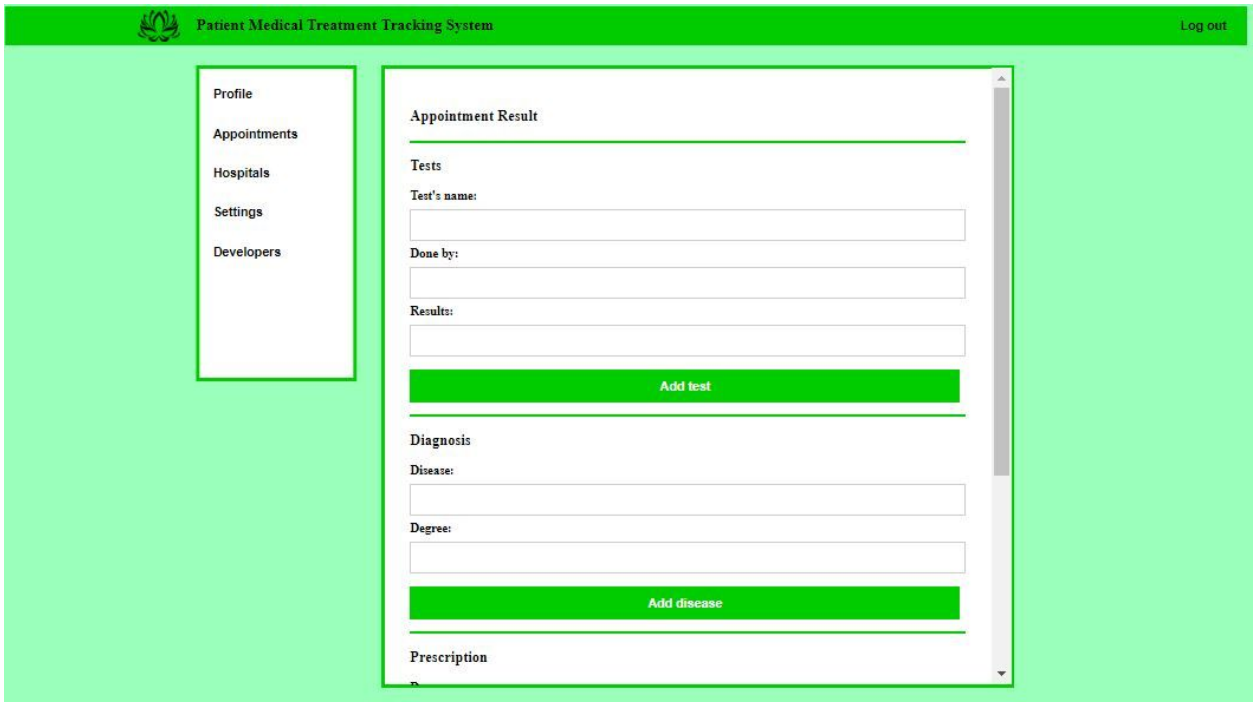
6.11. Doctor's Appointment menu

This is Doctor's Appointment menu, where he can see the list of his appointments. He/she can accept/decline certain appointments. See details of the appointment and ask for symptoms later.





Here Doctor can write result of the appointment and prescribe drugs for a patient.



7. SOURCE CODE

Source code in the Github:
https://github.com/babanazar/CS353-PatientMedicalTreatmentTrackingSystem