



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

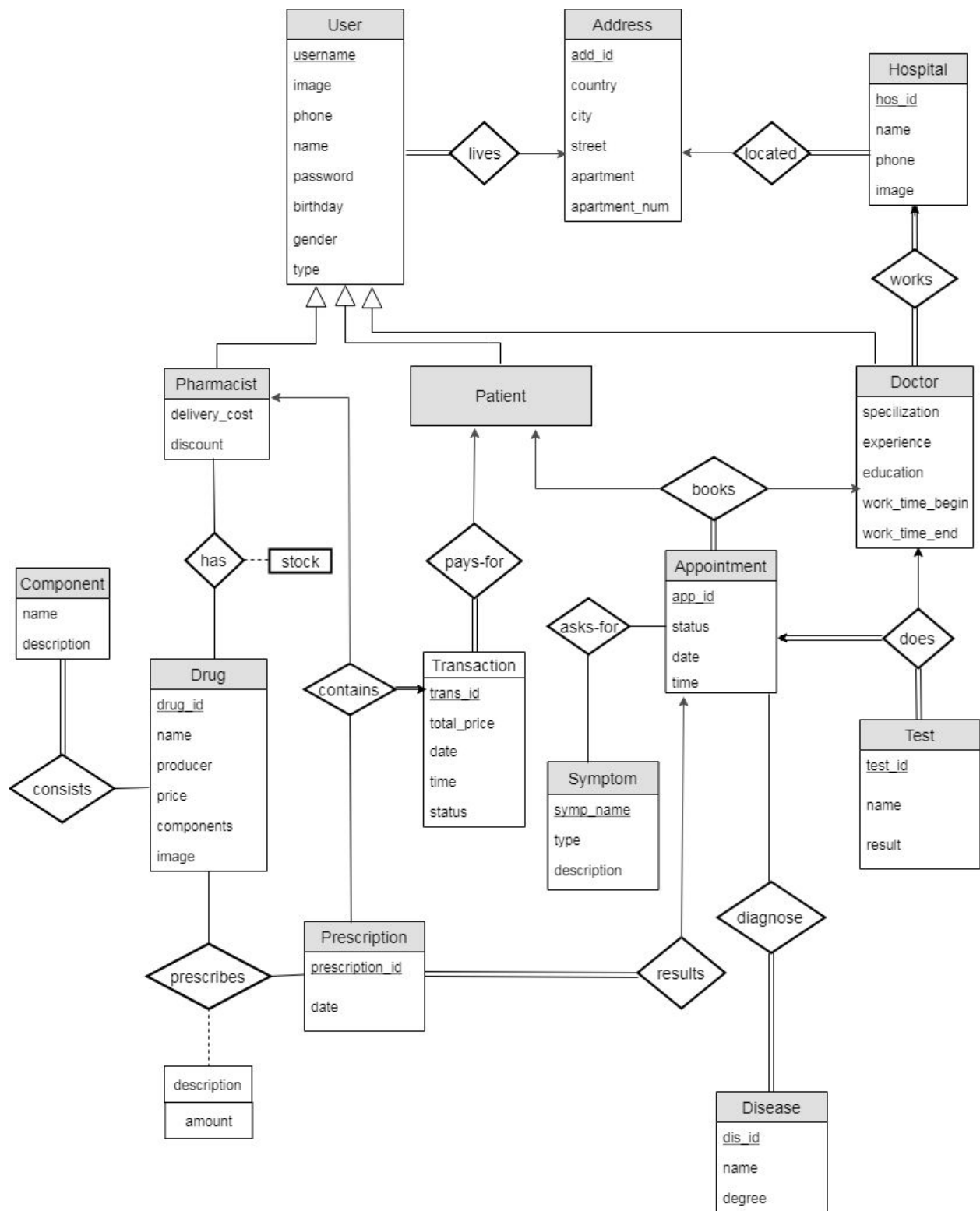
PMTTS is a web-based system application for tracking medical treatments of patients at certain hospitals. The system will be designed to be used by patients, doctors of different hospitals and pharmacists. System includes information about the hospitals and doctors working there. Doctors will be able 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



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 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

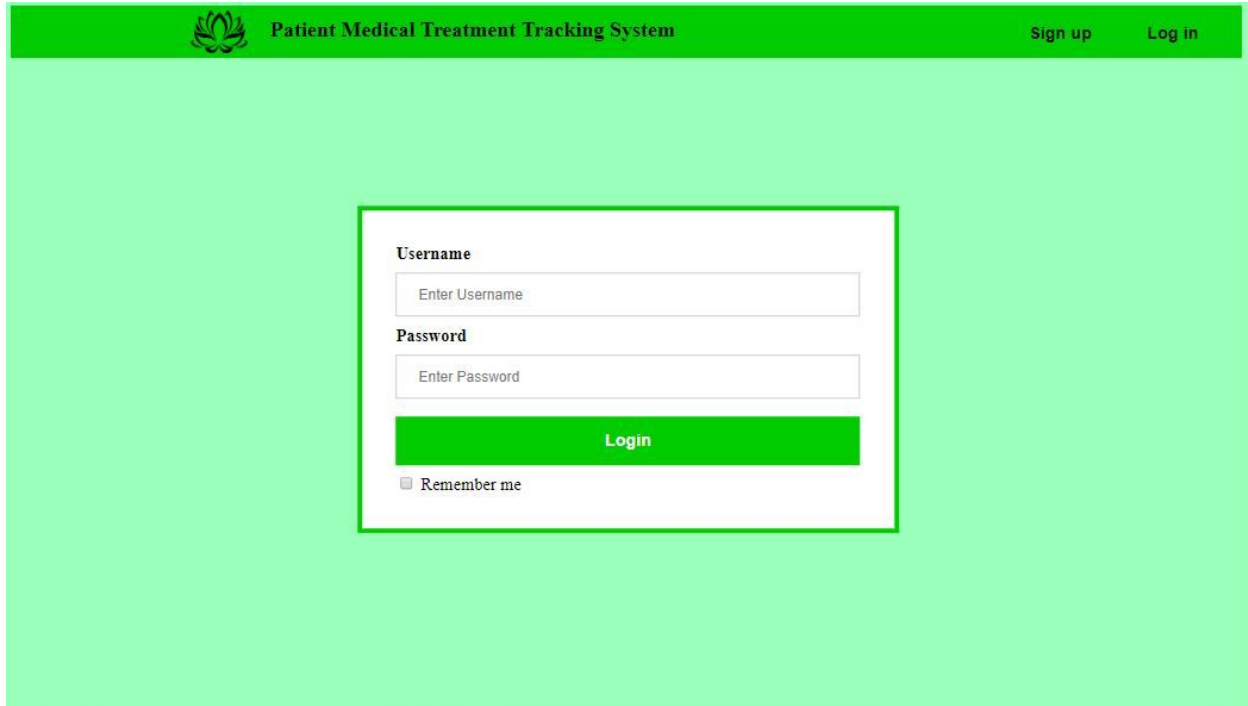
Query:

```
CREATE INDEX doctor_search
```

```
USING BTREE on DOCTOR
```

6. USER'S MANUAL

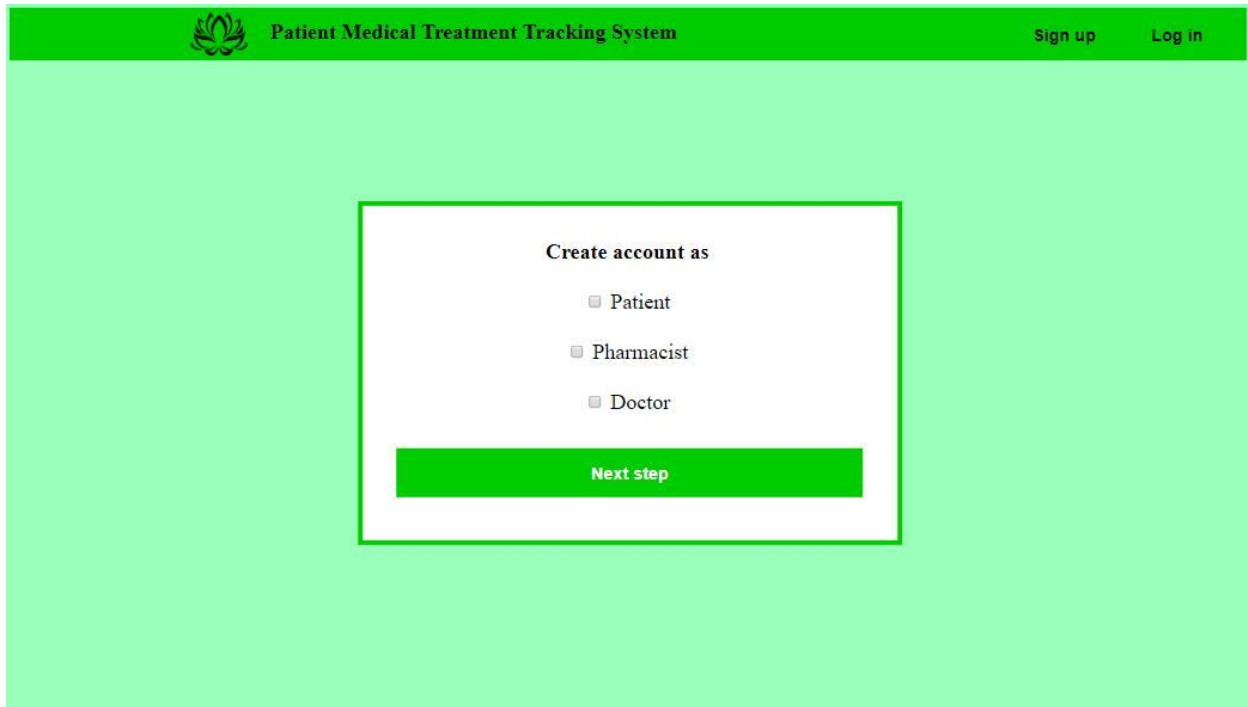
6.1. Sign in page



The screenshot displays the sign-in interface of the Patient Medical Treatment Tracking System. At the top, a dark blue header bar contains a logo on the left, the system name in the center, and 'Sign up' and 'Log in' links on the right. The main content area has a light blue background. Centered on this background is a white login box with a thin black border. Inside the box, the 'Username' label is above a text input field with the placeholder 'Enter Username'. Below this, the 'Password' label is above a text input field with the placeholder 'Enter Password'. A solid blue 'Login' button is positioned below the password field. At the bottom of the box, there is a checkbox labeled 'Remember me'.

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

6.2. Sign up page



The screenshot shows the sign-up page of the 'Patient Medical Treatment Tracking System'. The page has a light blue background. At the top, there is a dark blue header bar containing a logo on the left, the system name 'Patient Medical Treatment Tracking System' in the center, and 'Sign up' and 'Log in' links on the right. In the center of the page, there is a white rectangular box with a thin black border. Inside this box, the text 'Create account as' is displayed. Below it, there are three radio button options: 'Patient', 'Pharmacist', and 'Doctor'. At the bottom of the box, there is a solid blue button with the text 'Next step' in white.

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.



Common information:

Username

Enter Username

Password

Enter Password

Name

Date of birth

ДД.ММ.ГГГГ

Gender

male

Phone

optional

Country

Country...



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

The screenshot displays the 'Patient Medical Treatment Tracking System' interface. The top navigation bar is green and contains a logo, the system name, and links for 'Pharmacist', 'Doctor', and 'Log out'. On the left, a vertical menu lists 'Profile', 'Appointments', 'Doctors', 'Settings', and 'Developers'. The main content area features a circular profile picture of a man in a suit. Below the picture, the following fields are listed: 'Name:', 'Address:', 'Date of birth:', 'Gender:', and 'Phone:'. A green 'Edit profile' button is positioned at the bottom of this section.

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.

The screenshot displays the 'Edit profile' form within the 'Patient Medical Treatment Tracking System'. The top navigation bar is green and contains a logo, the system name, and a 'Log out' link. On the left, a vertical menu lists 'Profile', 'Appointments', 'Doctors', 'Settings', and 'Developers'. The main content area is titled 'Edit profile' and contains a section for 'Common information:'. This section includes the following fields: 'Username' (text input), 'Date of birth' (text input with a date picker icon), 'Phone' (text input with a placeholder 'optional'), 'Country' (dropdown menu), 'City' (text input), 'Street' (text input), and 'Apartment name' (text input).

6.4. Patient's Doctors menu

The screenshot displays the 'Patient Medical Treatment Tracking System' interface. On the left, a sidebar menu contains links for Profile, Appointments, Doctors, Settings, and Developers. The 'Doctors' menu item is highlighted. The main content area is titled 'Doctors' and features a search bar with a text input field, a dropdown menu labeled 'According to:' with 'hospital' selected, and a green 'Choose' button. Below the search bar is a table with the following data:

Hospital	Name	Experience	Specialization	Select
Nort home	Maria Anders	24	Cancer	View profile

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.

The screenshot displays the 'Patient Medical Treatment Tracking System' interface with the 'Doctors' menu item highlighted in the sidebar. The main content area is titled 'Doctor's profile' and features a circular profile picture of a doctor. Below the profile picture, the following information is displayed:

Name:
Hospital:
Specialization:
Experience:
Phone:

Below this information is a section titled 'Book an appointment' with two input fields for 'Date:' and 'Time:'. A green 'Book' button is located at the bottom of this section.

6.5. Patient's Appointments menu

The screenshot displays the 'Patient Medical Treatment Tracking System' interface. On the left, a sidebar menu contains links for Profile, Appointments, Doctors, Settings, and Developers. The 'Appointments' link is highlighted. The main content area is titled 'My appointments' and features a table with the following data:


Date	Time	Doctor	Status	Select
22.02.199	22:00	Seunur	Done	Go to details

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.

The screenshot displays the 'Patient Medical Treatment Tracking System' interface. On the left, a sidebar menu contains links for Profile, Appointments, Doctors, Settings, and Developers. The 'Appointments' link is highlighted. The main content area is titled 'Select symptoms' and features a form with the following elements:

- A search bar with the label 'Search name:' and a 'Search' button.
- A list of symptoms with a checkbox and the label 'Name: description'.
- A 'Submit' button.


Patient Medical Treatment Tracking System
Log out

Profile
Appointments
Doctors
Settings
Developers

Appointment's info

Doctor:

Hospital:

Date:

Time:

Symptoms:

Tests:

Results:


Disease:

Degree:

Prescription:

Buy these drugs

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.


Patient Medical Treatment Tracking System
Log out

Profile
Appointments
Doctors
Transactions
Settings
Developers

Pharmacists

Search: According to: name ▼ Search

Name	Address	Discount (%)	Delivery cost (\$)	Select
Voodoo	Kalimbor	5	15	Buy Drugs

6.6. Patient's Transaction menu

The screenshot displays the 'Patient Medical Treatment Tracking System' interface. On the left is a sidebar menu with options: Profile, Appointments, Doctors, Transactions (highlighted), Settings, and Developers. The main content area is titled 'Transactions' and includes input fields for Date, Time, Patient, and Pharmacist. Below these is a 'Shopping cart' section with a table:

Drug	Amount	Total price (\$)
Imun	3	22
Delivery cost	1	25

Below the table, it shows 'Total price:' followed by two buttons: 'Buy' and 'Discard'.

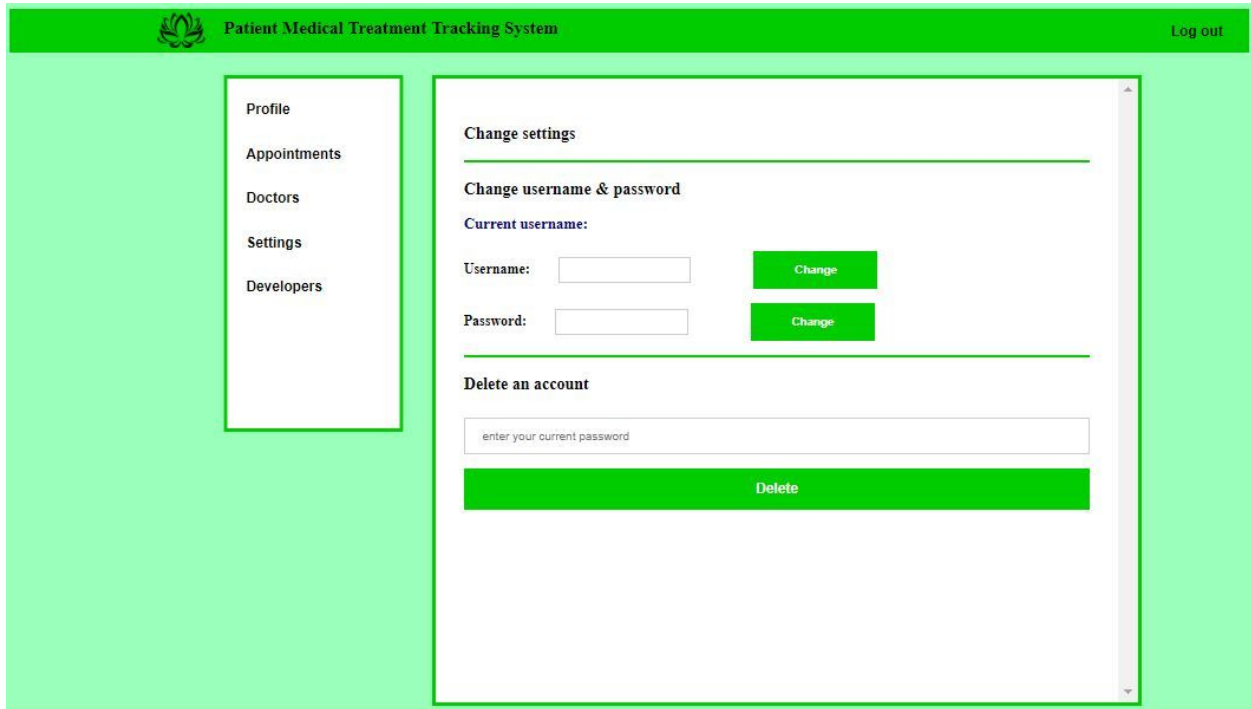
In this page user can view information about certain transaction. He/She can pay for or cancel transaction by clicking corresponding button.

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

The screenshot displays the 'Patient Medical Treatment Tracking System' interface. On the left is a sidebar menu with options: Profile, Appointments, Doctors, Transactions (highlighted), Settings, and Developers. The main content area is titled 'Transactions' and includes input fields for Date, Time, Patient, and Pharmacist. Below these is a 'Shopping cart' section with a table:

Date	Time	Pharmacist	Select
22.02.199	22:00	Seimur	View details
22.02.199	22:00	Seimur	View details

6.7. Settings menu



The screenshot shows the 'Settings' menu selected in the left sidebar. The main content area is titled 'Change settings' and contains two sections: 'Change username & password' and 'Delete an account'. The 'Change username & password' section has a 'Current username:' label, a 'Username:' input field, a 'Change' button, a 'Password:' input field, and another 'Change' button. The 'Delete an account' section has a text input field labeled 'enter your current password' and a 'Delete' button.

Patient Medical Treatment Tracking System Log out

Profile
Appointments
Doctors
Settings
Developers

Change settings

Change username & password

Current username:

Username: Change

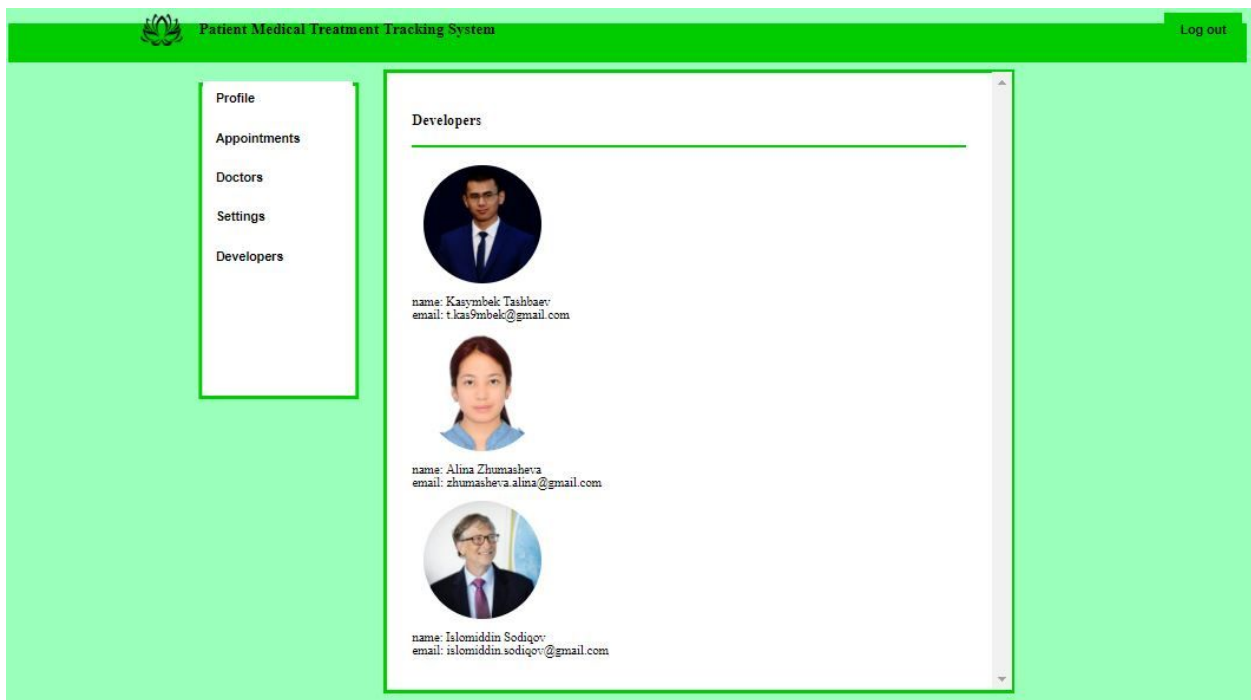
Password: Change

Delete an account

Delete

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





The screenshot shows the 'Developers' menu selected in the left sidebar. The main content area is titled 'Developers' and displays three developer profiles, each with a circular profile picture, name, and email address.


Patient Medical Treatment Tracking System Log out

Profile
Appointments
Doctors
Settings
Developers

Developers


name: Karymbek Taibbaev
email: t.kasymbek@gmail.com


name: Alina Zhumasheva
email: zhumasheva.alina@gmail.com


name: Islomiddin Sodiqov
email: islomiddin.sodiqov@gmail.com


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

6.9. Doctor's Profile menu

The screenshot displays the 'Patient Medical Treatment Tracking System' interface. At the top, a green header bar contains a logo on the left and the text 'Patient Medical Treatment Tracking System' in the center. On the right side of the header, there are three links: 'Pharmacist', 'Patient', and 'Log out'. Below the header, the main content area is divided into two sections. On the left, a vertical sidebar menu is visible, containing five items: 'Profile', 'Appointments', 'Hospitals', 'Settings', and 'Developers'. The 'Profile' item is currently selected. The right section of the page shows a profile form. At the top of this section is a circular placeholder for a profile picture, featuring a stylized doctor icon. Below the picture, the form lists several fields for profile information: 'Name:', 'Address:', 'Date of birth:', 'Gender:', 'Phone:', 'Education:', 'Specialization:', 'Experience:', 'Work time start:', and 'Work time end:'. At the bottom of the form, there is a prominent green button labeled 'Edit profile'.

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

Phone

Country


City

Street

Apartment name

Apartment no.

Gender

 Patient Medical Treatment Tracking System Log out

[Profile](#)
[Appointments](#)
[Hospitals](#)
[Settings](#)
[Developers](#)

Apartment no.

Gender

Doctor:

Hospital

Education

Specialization

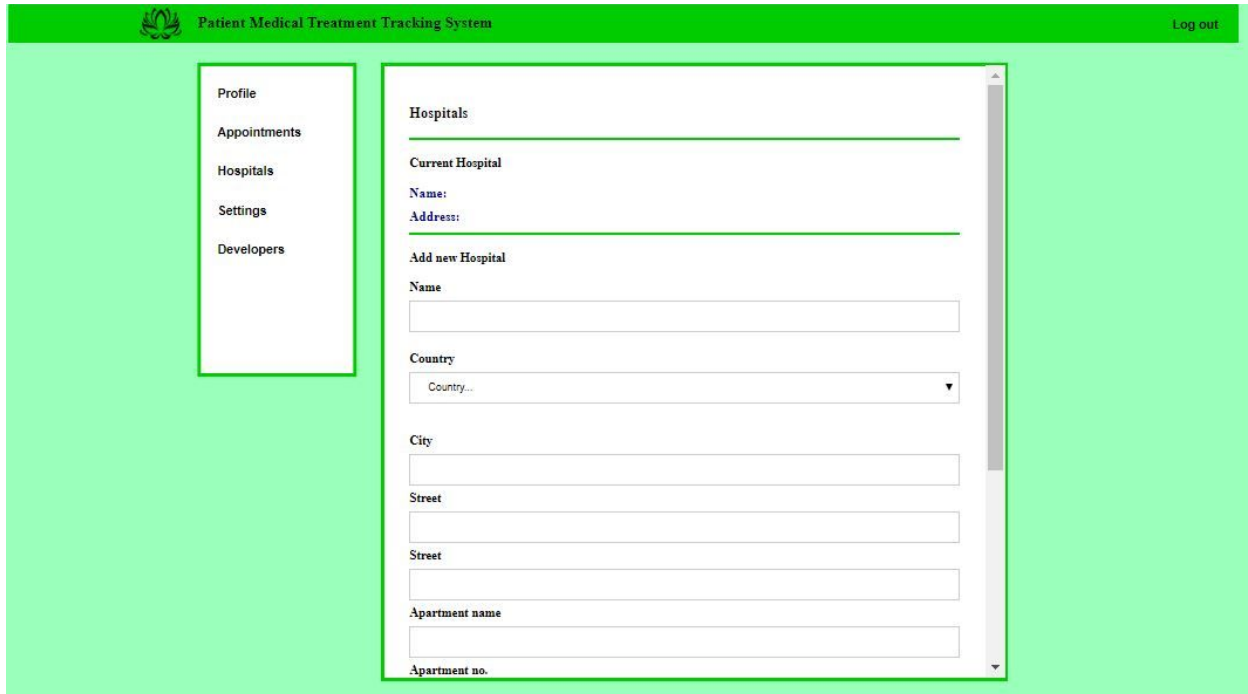
Experience

Work time starts

Work time ends

Save changes

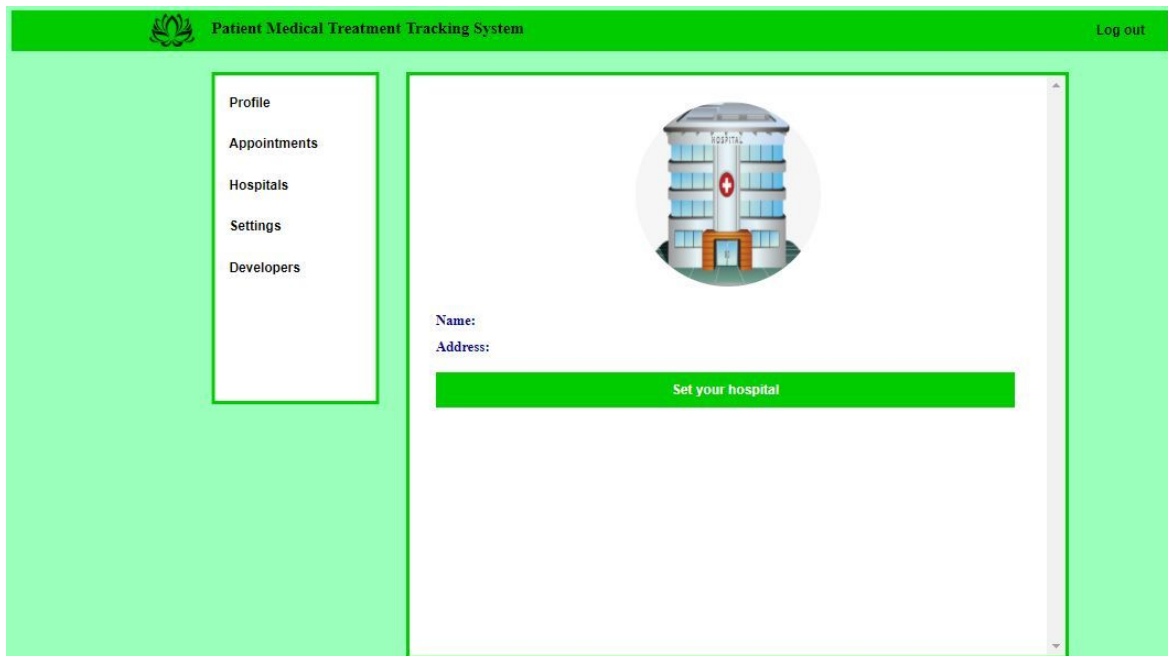
6.10. Doctor's Hospital menu



The screenshot shows the 'Hospitals' menu in the 'Patient Medical Treatment Tracking System'. The interface has a green header with the system name and a 'Log out' link. A left sidebar contains navigation links: Profile, Appointments, Hospitals (selected), Settings, and Developers. The main content area is titled 'Hospitals' and contains several sections: 'Current Hospital' with fields for Name and Address; 'Add new Hospital' with fields for Name, Country (a dropdown menu), City, Street, and Apartment name; and 'Apartment no.' with a text input field.

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.



The screenshot shows the detailed view of a hospital in the 'Patient Medical Treatment Tracking System'. The interface has a green header with the system name and a 'Log out' link. A left sidebar contains navigation links: Profile, Appointments, Hospitals (selected), Settings, and Developers. The main content area features a large circular image of a hospital building. Below the image, there are labels for 'Name:' and 'Address:', followed by a green button labeled 'Set your 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.

 Patient Medical Treatment Tracking System Log out

[Profile](#)
[Appointments](#)
[Hospitals](#)
[Settings](#)
[Developers](#)

Appointments

Requests:

Current appointments:

Completed appointments:

Requests

Patient	Date	Time	Accept	Reject
Voodoo	1	5	accept	reject

Current appointments:

Patient	Date	Time	Cancel
Voodoo	1	5	cancel

Completed appointments:

Patient	Date	Time	View
Voodoo	1	5	view details

 Patient Medical Treatment Tracking System Log out

[Profile](#)
[Appointments](#)
[Hospitals](#)
[Settings](#)
[Developers](#)

Symptoms

Ask following group of symptoms

☐ General
☐ Psychiatric
☐ Cardiovascular
☐ Integumentary
☐ Head related
☐ Body temperature

Ask symptoms

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

The screenshot displays the 'Patient Medical Treatment Tracking System' interface. At the top, a green header bar contains a logo on the left, the system name in the center, and a 'Log out' link on the right. A light blue sidebar on the left lists navigation options: Profile, Appointments, Hospitals, Settings, and Developers. The main content area is white and features a large form titled 'Appointment Result'. This form is divided into three sections: 'Tests', 'Diagnosis', and 'Prescription'. The 'Tests' section includes input fields for 'Test's name:', 'Done by:', and 'Results:', followed by a green 'Add test' button. The 'Diagnosis' section includes input fields for 'Disease:' and 'Degree:', followed by a green 'Add disease' button. The 'Prescription' section is partially visible at the bottom. A vertical scrollbar is located on the right side of the form area.

7. SOURCE CODE

Source code in the Github:

<https://github.com/babanazar/CS353-PatientMedicalTreatmentTrackingSystem>