CMS Requirements Specifications

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1.1 Project Overview

Technology nowadays is developing really fast and it is being implemented in almost all the areas of our lives. One of the main fields that is trying to incorporate technology, is the health field. For each patient is needed to store its personal information. When analyzed this detailed handwritten information it is a very difficult and slow to process.
Our project is a Web application for Clinic Management System. Its main functionalities include: request appointments online and keeping medical records for each patient in a digital form instead of on paper, which is the nowadays examination form, especially in our country.
The implementation of the idea will work closely with clinics by having access at their databases for patients they forward to us.
Patients will require/set an appointment based on the calendar that is online, which is accessible by all the users which are part of the system except pharmacies.
Each doctor will have his/her own account where he/she can see the appointments , can cancel them, upload prescriptions, check the medical records of a patient , see the list of patients.
Also, in our system we will keep track of each doctor's timetable. Besides doctors, receptionists will have their profile, in order to manage the patients and doctors profiles.
Receptionists will inform patients and doctors for any change in the schedule for example.
Pharmacies get the prescription via email from the doctor and have a list of medical drugs.
The project is intended for private clinics.

1.2 Purpose and Scope of this Specification

The purpose of our project is to facilitate the way clinics work in our country. Patients will not have to save their examination documents year by year but they will have their personal information stored in their own online profile.
Also our management system aims to reduce the time of waiting by leaving an appointment online for each patient.
The patient will also be able to go to the pharmacy and get the medicines without a hand recipe.

In scope:

- Modifying the appointment reservations.
- Modifying the way patients' records are kept.

Out of scope:

- Modifying the administrative procedures of the clinic.

2. Product/Service Description

2.1 Product Context

Our software is related with an ordinary clinic and a group of pharmacies that will be available for that clinic. It will be an independent system that will be available to 4 levels of users: Patient, Doctor, Receptionist and Pharmacist. These 4 levels will be directly connected to each other.

2.2 User Characteristics

There are 4 types of users that will interact within our systems:

1. Patient
    - Can log in his account
    - Can read its personal data
    - Can contact his doctor
    - Can contact the receptionist
    - Can check for the nearest pharmacy and the medicines that each of them offers
    - Can look at all his/her visits and check ups
    - Can log out

2. Doctor
    - Can log in his account
    - Can read its CV
    - Can contact patients
    - Can contact receptionist
    - Can fill the form of examinations
    - Can log out hic account

3. Receptionist
    - Can log in his account
    - Can add new patient
    - Can delete an existing patient
    - Can contact with patient
    - Can contact with doctor
    - Can change personal data of patient
    - Can add new doctor
    - Can delete an existing doctor
    - Can log out of his/her account

4. Pharmacy
    - Can log in its account
    - Can update their medicinal list
    - Can log out

2.3 Assumptions

It is assumed that most part of the actions taken are legally allowed.

It is assumed that information added about doctors and users is already verified.

It is assumed that the profile of the receptionist is already created by an administrator.

It is assumed that when writing the examination form of the patient the only person responsible for that is the doctor.

2.4 Constraints

Our project is constrained only by the Internet connection since we have decided for it to be a Web Application.
The Internet is needed for the connection with the database and also for the Map.

2.5 Dependencies

Our system is independent.
This means there is no dependency between the users in our Web application.

3. Requirements

3.1 Functional Requirements

The requirement numbering has a scheme –FR_##(FR for Functional Requirement).
The following table is a format for requirements.

Req#	Requirement	Comments	Priority	Date when was reviewed	SME Reviewed/Approved
FR_01	A reCaptcha should be used to detect abusive traffic on our web application without any user friction.	To verify that a user is not a robot,he should fill the reCaptcha.	1	03/06/2019	Pironada/Xhensila
FR_02	Each user will be uniquely identifiable by his/her own id and username.	2 different users cannot have the same id or username.	1	03/06/2019	Pironada/Xhensila
FR_03	Every user should have different usernames and valid passwords as well.	This can be achieved by hashing passwords before saving them in a database.	1	03/06/2019	Pironada/Xhensila
FR_04	Our application should have different views and different functionalities for different users	Patient,Doctor, Clinic and Pharmacist should have different views.	2	03/06/2019	Pironada/Xhensila

FR _04	The user can have the chance to edit personal information.	This can be done by updating credentials in database.	2	03/06/2019	Pironada/Xhensila
FR _05	Receptionist can add, remove or edit doctors, patients and pharmacies profile, as well set the timetable for doctors and patients.	The receptionst is responsible for Create,Read,Update and Write functionalities .	1	03/06/2019	Pironada/Xhensila
FR _06	The receptionist should be able to have a list of all the patients.	All patients should be listed.	2	03/06/2019	Pironada/Xhensila
FR _07	The software should be able to generate an XML file which will contain all the records for a specific patient.	The records of a patient are written on a medical cartel.	3	03/06/2019	Pironada/Xhensila
FR _08	The receptionist checks which patient belongs to which doctor.Doctor checks which pharmacist is connected with him.	The doctor has the permission to create a medical visit record and make it visible for its patient as well.	2	03/06/2019	Pironada/Xhensila
FR _09	A patient can edit its medical records .	The profile of a patient is on a read view.	3	03/06/2019	Pironada/Xhensila
FR _10	Each user can look the general webpage and information of the clinic.	General information is accessable from all users.	3	03/06/2019	Pironada/Xhensila
FR _11	A patient belongs to only one doctor ,he is not able to choose another doctor.	A patient has only to do with his doctor.	1	03/06/2019	Pironada/Xhensila
FR _12	The doctor is able to set appointments for patients.	The doctor have the right to set appointments.	2	03/06/2019	Pironada/Xhensila

FR _13	The doctor can see the records of each patient.		2	03/06/2019	Pironada/Xhensila
FR _14	Doctor,receptionist and patients have the right to cancel appointments based on different reasons.	If for any reason , an appointment cannot be made, these users can cancel it.	2	03/06/2019	Pironada/Xhensila
FR _15	Receptionist has restricted access to all patients' medical records.	Receptionist has no right to have sensitive information about any of the patients.	1	03/06/2019	Pironada/Xhensila
FR _16	All the patients' data that are added by the doctor or the receptionist have to obey the validation rules determined by the system itself.	Every attribute that is inserted into the database must strictly stick to the rules previously set.	1	03/06/2019	Pironada/Xhensila
FR _17	When doctors are logged in, they can search only their patients.	Ethical reasons because ofthe confidentiality of the information for all other patients that this doctor has no relation to.	3	03/06/2019	Pironada/Xhensila
FR _18	The system generates automatically reports for medical records.	Reports, such as for number of appointments in a special ward, number of patients, number of visits etc.	2	03/06/2019	Pironada/Xhensila
FR _19	Pharmacy should have a list of medicines that is available for patients.	Only the pharmacy has access on this list.	2	03/06/2019	Pironada/Xhensila

FR _20	Pharmacies can receive prescriptions from doctors via email.	After giving the prescription's medications to the patient, the doctor should send the prescription to one pharmacy.	2	03/06/2019	Pironada/Xhensila
FR _21	Patients and doctors can chat with each other.	There are individual chats and group chats for doctors and patients.	1	03/06/2019	Pironada/Xhensila
FR _22	Patients can download personal medical reports.	Each patient has hiw own medical records saved in a file.	1	03/06/2019	Pironada/Xhensila
FR _23	Each user interface has displayed each users' username password and profile picture.	Each user has some personal data displayed in its profile.	2	03/06/2019	Pironada/Xhensila

3.2 Non-Functional requirements

3.2.1 PRODUCT REQUIREMENTS

3.2.1.1 User Interface Requirements

The user interface should be grouped in 5 main interfaces .

- **Log In interface:**
    1. Enter your Username in the field labeled 'User'.
    2. Enter your Password in the field labeled 'Password'.
    3. Click the Log In Button or the reCaptcha to protect the user.

- **Steps to Change your password after you have been logged in:**

1. Enter your current Password in the field labeled 'Old Password'.
2. Enter your New Password in the field labeled 'New Password'.
3. Re-enter Your New Password in the field labeled 'Repeat New Password'.
4. Click the Change password Button.

- **Patient's Interface**
    1. The header bar containing CMS logo, Patient Panel and a Menu on the left side of the page
    2. The menu has the following options :
    3. The "**Enter an appointment**" Menu will allow the user to fix an appointment with the doctor.
    4. The "**Medicine Records**" Menu will show to the user medical visits and medical cartel created by the doctor.
    5. The "**Home**" Menu will bring user to main home page.
    6. The "**Chat with Doctor**" Menu will all allow the user to chat with the doctor.
    7. The "**Log Out**" will return the user to Log In page.
    8. The "**Change Password**" Menu will allow user to change its profile password.

- **Doctor Interface**
    1. The header bar containing CMS logo, Doctor Panel and a Menu on the left side of the page.
    2. The Menu has this options:
    3. The "**Enter an appointment**" Menu will allow the user to fix an appointment with the patient.
    4. The "**Chat with Patient**" Menu will all allow the doctor to chat with the patients.

5. The"**Patient's List**" Menu allows the doctor to see a full list of the patients under their control.
6. The "**Log Out**" will return the user to Log In page.
7. The "**Medicine Record**" contains all the medicines from the prescriptions that the patient needs to take.
8. The "**Home**" button returns user to home page.
9. The "**Change Password**" Menu will allow user to change its profile password.
10. The "**Email**" button in order to send prescription to the pharmacies.

- **Receptionist Interface**

1. The header bar containing CMS logo, Receptionist Panel and a Menu on the left side of the page.
2. The Menu Icon showing all the menus the user can access after logging in as a doctor: Profile, Doctor's List, Add a Doctor, Search a Doctor, Create a Visit, Log Out.
3. The "**Profile**" Menu will allow the user to see all his personal information saved in database.
4. The "**Doctor's List**" Menu where the receptionist could see a full list of the doctors with their CV included.
5. The "**Patient'sList**" Menu where the receptionist could see a full list of the patients that have fixed an appointments in the clinic.
1. The "**Add a Doctor**" Menu allows the receptionist to create a new user ,type Doctor.
2. The "**Add a Patient**" allows the receptionist to create a new user ,type Patient.
3. The "**Delete Doctor"** allows receptionist to delete a doctor.
4. The "**Delete Patient"** allows receptionist to delete a patient.
5. The "**Edit Doctor"** allows receptionist to edit info on doctors' profile.
6. The "**Edit Patient"** allows receptionist to edit info on patients' profile.
7. The "**Create an Appointment**" Menu will see the doctor's agenda and will reserve an appointment.
8. The "**Log Out**" will return the user to home page.

- **Pharmacist Interface**

1. The header bar containing CMS logo, Pharmacist Panel and a Menu on the left side of the page.
2. The Menu Icon showing all the menus the user can access after logging in as a pharmacist:
3. The "**Drug Recipe**" Menu will allow the pharmacist to see the recipe of the current patient uploaded by the doctor and check it as served.
4. The "**Log Out**" will return the user to Log In page.
5. The "**Change Password**" Menu will allow user to change its profile password.
6. The "**Home**" button will allow user go to home page.

3.2.1.2 Usability

- The software is easy to work with.
- Receptionist will be the only person that can register doctors, pharmacies and patients. The system has the right instructions to make this step easier.
- After registration, receptionist can edit or delete patients , doctors and pharmacies.
- After changing the given password, pharmacies ,patients and doctors are the only ones with access to their accounts.
- The system is conceptualized to be easy to learn and to use.

3.2.1.3 Efficiency

Efficiency

- Each operation will be executed in a real time.

Performance

- The software will be based on web and has to be run from a web server.
- The software shall support all the users in the hospital who must have access in the system at any time.
- The software will take initial load time depending on internet connection strength which also depends on the media from which the product is run.
- The performance will depend upon hardware components of each user.
- Registration of data for each entity shall be processed in a few milliseconds.

Errors

- How many errors user can face and how easily the server gets recover that errors that also impact on the users to the application.

Satisfaction

- How much user satisfied with using our application.

Latency

- Internet latencies since the application is web based.

3.2.1.4 Dependability

- Our application depends only on Internet connection.
- Pharmacies depend on doctors, because they get patients' prescreptions from doctors.

3.2.1.5 Security

To protect the system from malicious or accidental access, modification, disclosure ,destruction, or misuse we will take the following precautions.

- Encrypt the most sensitive information such as passwords using hashing method to protect privacy .
- We will keep track of the activity of each user, such that in case of error the user will be held responsible .

- The receptionist is responsible for the personal data authenticity of the user he/she enters, hence the system is not responsible.
- The system will validate passwords, and each data for special characters and other specific conditions before inserting in the database.
- Each patient will see only the information related to him/her.
- Each doctor will only see the data of every patient.

Authorization and Authentication factors:

- The user authentication will be using username password and reCaptcha.
- Authorization will be based on the user type Each user will access only their information.
- Using sessions for the currently logged user.

3.2.2 ORGANIZATIONAL REQUIREMENTS

3.2.2.1 Environmental

- By the administrative point of view, every document such as: patient's personal info, prescriptions, etc. must be imported and obtained by the receptionist from the polyclinic's system into our system, because otherwise it can't be proceeded with other phases of medication by the doctors of other specialties. Of course the polyclinic's system must take into consideration that all other legal and ethical issues concerning confidentiality for patient's sensitive information aren't exploited.

3.2.2.2 Operational

- The application will be available to the user 24/7.
- The information entered to the system shall be accessed only by the people who are previously registered to the system.
- Create, Read, Update and Delete users.
- Create, Read, Update and Delete examinations.
- Create periodic reports.
- Create drug recipe.
- Create medical visit.
- Update agenda.

3.2.2.3 Development

- The development process to be used must be explicitly defined and must be conformant with ISO 9000 standards.
- Reports setting out the effort expended on each identified system component must be produced every week.
- A disaster recovery plan for the system development must be specified.

3.2.3 EXTERNAL REQUIREMENTS

3.2.3.1 Regulatory

3.2.3.2 Ethical

3.2.3.3 Legislative

This project should not break the laws of the Ministry of Health in Albania.

3.3 DOMAIN REQUIREMENTS

This Web Application operates in the field of Medical System of our country, Albania. The main purpose is to digitalize patients' records, in order to make data retrieval easier and more efficient. However, the most important thing in this Web Application is the security of data. Since it is sensitive information, it should be accessible only by the users that have an account on this software. This application is assumed to be used in a specific polyclinic with private network and it does not have to communicate with any other system.

4. User Scenarios/Use Cases

4.1 User Scenarios (General)

Use Case Nr.	User Story Name	Description
1	User logs in.	Using username and password to access the system, doctors, receptionists and patients logs in.
2	User logs out.	Doctors, receptionists, pharmacist and patients logs out.
3	User changes password.	Doctors, receptionists and patients enter new password.
4	User edits and views profile.	Doctors, receptionists and patients can view and edit their personal profile.
5	Receptionist views/edits patients, doctors, pharmacys' profile.	Receptionist can view/edit profile of other users.
6	Receptionist sets an appointment.	Receptionist can set the appointment for other users.
7	Receptionist adds/deletes users.	Receptionist is the only user that can add a new user (doctor, pharmacy, patient).
8	Receptionist has a list of all users.	Receptionist has lists for patients, doctors and pharmacies.
9	Receptionist views monthly reports.	Receptionist can view monthly reports.
10	Receptionist has a telephone number available to be contacted.	Receptionist can be reached by calling on a telephone number shown in the main page.

11	Receptionist sees all doctors' CVs	Can see all CVs in order to inform patients.
12	Receptionist searches for doctors/patients	
13	Doctor sets appointment.	Doctor sets appointment based on his agenda.
14	Doctor finishes appointment.	Doctor adds medical records on patients' profile.
15	Doctor cancels appointment.	Doctor cancels appointment when not able to make it because of emergency.
16	Doctor checks patient records.	Doctor sees all the patients records including all his visits, analysis, prescriptions etc.
17	Doctor checks patient progress.	Specialist doctor sees all the patients' progress since he had the first visit in the clinic by visiting the patients' profile.

18	Doctor searches for a patient.	Doctor searches by username a patient
19	Doctor has access to his own CV.	Each doctor can edit his CV, which is published for all users.
20	Doctor communicates with patient through Chat option	Doctor can have a group chat with all his patients or individual chats.
21	Doctor contacts with pharmacist via email.	Doctor sends email to pharmacist for patients' prescriptions.
22	Patient contacts doctor	Patient can contact the doctor by chatting.

23	Patient can have access of his medical records.	Patients has access to all the visits he has made.
24	Patients can set appointment by himself.	Patients can set appointment based on the agenda that is available.
25	Pharmacy can communicate with the doctor.	Pharmacy communicates with the doctor via email.
26	Pharmacy can see the patient's drug recipe.	Patients views the drug recipe ,which is sent by the doctor and check it as served.

4.2 User Scenarios (Detailed)

Scenario 1 →User logs in

- User enters username
- User enters password
- If username and password match, user is signed in
- Else user must re-enter them.

Scenario 2 →User logs out

- Provided the user is signed in
- User is signed out of the system

Scenario 3 →User changes password

- User enter new password
- User retypes new password

Scenario 4 →User edits and views profile

- User can see his/her username ,password and profile picture.
- User can change his/her own password, username

Scenario 5→ Receptionist views/edits/deletes Doctors, Patients

- Provided that the user (Doctor, Patient) is signed in
- Views information about the profile of each patient and doctor
- Views information about the patient's medical record

Scenario 6→Receptionist sets the appointment

- Receptionist chooses the user to set his/her agenda/appointment.
- Receptionist selects the shift for all the days of that week
- Receptionist selects the day for the duty call of that specific user

Scenario 7→ Receptionist adds/deletes new user (Doctor, Patient, Pharmacist)

- Admin enters data in the form: ID , Username, Name ,Surname etc.
- If data is entered accordingly and correctly then the user is created in the system and added to the database as well
- Else data must be re-entered once again from the beginning
- Receptionist deletes a user if that user does not belong to that clinic anymore

Scenario 8→ Receptionist has a list of all users.

- Receptionist accesses his profile.
- Generates a list of all users from the database.

Scenario 9→ Receptionist views monthly reports

- Receptionist can view the auto-generated reports for the number of hospitalizations, appointments and emergency cases of specific wards for that month
- Receptionist can also download the medical records of each patient as PDF file

Scenario 10→ Receptionist has a telephone number

- A patient can contact receptionist via phone ,because the receptionist has an available number to be contacted.

Scenario 11→ Receptionist sees all doctors' CVs

- Receptionist sees all CVs in order to get a detailed information about doctors.

Scenario 12→ Receptionist searches Doctors, Patients

- Receptionist can search for users by ID, name, surname
- Information related to that ID, name, surname, or ward is shown, provided that the entered word exists anywhere in the database except for the patient's data

Scenario 13→ Doctor sets appointment

- Doctor sets appointment based on his agenda .
- Doctor can delete an appointment and can set that appointment to another date .

Scenario 14→Doctor finishes appointment

- Doctor has appointment with patient
- Doctor finishes appointment
- Doctor fills the form with the information on how the appointment went
- Doctor saves appointment notes, which are added to patient records

Scenario 15→ Doctor cancels appointment

- If a doctor wants another date for a patient ,he can set the appointment on another date .
- If doctor cancels the appointment ,he informs the patient via chat .

Scenario 16-17→Doctor checks patient progress/medical records.

- Doctor sees all the patients' progress since he had the first visit in the clinic by visiting the patients' profile.
- Doctor sees all records of his patients including all his visits , analysis, prescriptions,medicaments etc.

Scenario 18→ Doctor searches for a patient

- Doctor searches by username a patient .
- Doctor is shown a list of all entries that contain his search keyword

Scenario 19→Doctor has a CV and can access it every time.

- Each doctor can edit his CV ,which is published for all users .

Scenario 20→ Doctor communicates with patient through Chat.

- Doctor can have a group chat ,in order to communicate with his patients if he has to announce something .
- Doctor can have an individual chat with a specific patient.

Scenario 21→ Doctor contacts pharmacist via email.

- Doctor sends email to pharmacist for patients' prescriptions.

Scenario 22→Patient contacts Doctor.

- Patient creates a chat account and communicates with the doctor for each problem he/she has.
- Patient can delete the message he maybe has sent accidentally.

- Patient can record his voice ,if he has no time to write .
- Patient can sent photos to the doctor .

Scenario 23→Patient can have access of his medical records

- Patient can see his medical progress.
- Patient can change his doctor ,so the other doctor can see his new patient progress and he knows what diagnosis should define to him .

Scenario 24→Patients set appointment by himself

- Patients can set appointment based on the agenda that is available.
- Patient can change the data of appointment
- Patient can delete an appointment

Scenario 25→ Pharmacy communicates with the Doctor

- Pharmacy can receive emails from Doctor ,where the content is the patient's drug recipe .
- All the pharmacists that are employed to the Pharmacy have the same email .
- Pharmacy checks for the drugs that are written in recipe and inform the doctor if any of them is missing.
- If a drug is not found in pharmacy than the doctor can make the patient to wait, until all the medicines are ready(medicines should be ready within a day) .

Scenario 26→Pharmacy can see the patients' drug recipes and check it as served

- Patients views the drug recipe, which is sent by the doctor .

4.3 Use Cases

Use Case 1

Name	**User logs in**
Summary	User enters the system by providing genuine credentials
Actor	Receptonist, Doctor, Pharmacy, Patient
Description	User provides username and password
Precondition	User must have an existing account
Alternatives	The same user can sign in only once at a time
Post condition	User enters the system

Use Case 2

Name	**User logs out**
Summary	User logs out of the system
Actor	Receptionist,Doctor,Patient,Pharmacy
Description	User signs out of the system.
Precondition	Useris logged in.
Alternatives	

Post condition	User has no access to the system until he/she is logged in.

Use Case 3

Name	**User changes password**
Summary	User enters a new password ,repeats it and saves it.
Actor	Receptionist, Doctor, Patient, Pharmacy
Description	User enters a new password.
Precondition	Useris signed in
Alternatives	
Post condition	New password is saved on the database.

Use Case 4

Name	**User edits and views profile.**
Summary	User can edit and also view his/her profile.
Actor	Receptionist,Doctor,Patient,Pharmacy
Description	User views and updates the personal data on his/her profile.
Precondition	User is logged in.
Alternatives	
Post condition	User's data have been viewed/changed/updated in the database.

Use Case 5

Name	**Receptionist views/edits other user's profiles.**
Summary	Receptionist can view/edit the profile of every other user.
Actor	Receptionist
Description	Receptionist can view/edit the profile of each doctor,patient,pharmacy.
Precondition	Recepetionist is signed in.
Alternatives	Information that receptionis sees cannot be used for other reasons.
Post condition	User's profiles are changed and updated on the database.

Use Case 6

Name	**Receptionist sets the appointment.**
Summary	Receptionist sets the timetable.
Actor	Receptionist
Description	Receptionist has access on the calendar and can add an appointments based on doctor or patients request.
Precondition	Receptionist is signed in
Alternatives	

Post condition	The timetable is set and updated on the database.

Use Case 7

Name	**Receptionist adds/deletes users.**
Summary	Receptionist is the only user who adds/deletes the Doctors, Patients and Pharmacies accounts.
Actor	Receptionist
Description	Receptionist enters data based on attributes of each user when adds an account. Recepetionist only click on the user he wants to delete.
Precondition	Receptionist is signed in
Alternatives	
Post condition	Changes are saved on the database. New user is created / user is deleted.

Use Case 8

Name	**Receptionist has a list of all users.**
Summary	Receptionist can have a list of all different users that are registered on the system.
Actor	Receptionist
Description	Receptionist can see all users of the system in a list.
Precondition	Receptionist is logged in.
Alternatives	
Post condition	

Use Case 9

Name	**Receptionist views monthly reports.**
Summary	Receptionist can have monthly reports for medicaments , patients etc.
Actor	Receptionist
Description	Receptionist can view monthly reports on a file.
Precondition	Receptionist must be logged in and have access to the database.
Alternatives	
Post condition	

Use Case 10

Name	**Recepetionist has a telephone number available.**
Summary	Receptionist has a telephone nr available to be contacted
Actor	Receptionist
Description	Receptionist can be reached by calling a telephone nr shown in the main page.
Precondition	Telephone number mus exist.

Alternatives	
Post condition	

Use Case 11

Name	**Receptionist sees all doctors' CVs.**
Summary	Receptionist sees all doctors' CVs.
Actor	Receptionist.
Description	Receptionist is logged in.
Precondition	
Alternatives	
Post condition	

Use Case 12

Name	**Receptionist searches for doctors/patients**
Summary	Receptionist can search a doctor/patient
Actor	Receptionist.
Description	Receptionist can search a doctor /patient by its ID/Username/Name.
Precondition	Doctor/patient must be registered in the system.
Alternatives	
Post condition	

Use Case 13

Name	**Doctor sets new appointment.**
Summary	Doctor adds new appointment for patients.
Actor	Doctor
Description	Doctor checks the calendar and decides a date based on his agenda.
Precondition	Doctor must be allowed to have access at the calendar.
Alternatives	Doctor can also contact receptionist to set appointment for him.
Post condition	Doctor must be allowed to create appointments.

Use Case 14

Name	**Doctor finishes appointment.**
Summary	Doctor finishes appointment.
Actor	Doctor
Description	Doctor after completing the appointment,writes the information(results,drugs taken) on patients profile.
Precondition	Appointment must have been made.
Alternatives	
Post condition	Info is updated on database.

Use Case 15

Name	**Doctor cancels appointment.**
Summary	Doctor can cancel appointment with patients .
Actor	Doctor
Description	Doctor can cancel appointment with patients in case of emergency.
Precondition	Doctor must have an existing appointment with patient.
Alternatives	
Post condition	Appointment is rescheduled through polyclinic receptionist.

Use Case 16

Name	**Doctor checks patient records.**
Summary	Doctor can look at his patients' records.
Actor	Doctor
Description	Doctor can see all the patients records found on his/her profile.
Precondition	Patients' records must have been saved in the database.
Alternatives	
Post condition	

Use Case 17

Name	**Doctor checks patient progress.**
Summary	Doctor can look at his patients' records/progress
Actor	Doctor.
Description	Doctor can see all the patients records found on his/her profile (visits,diagnoses,prescriptions etc) in order to check the progress.
Precondition	Patient must be in the care of that doctor
Alternatives	
Post condition	

Use Case 18

Name	**Doctor searches for a patient/pharmacist.**
Summary	Doctor searches for a patient/pharmacist
Actor	Doctor.
Description	Doctor searches for a patient under his care and for a pharmacist on the list that has all pharmacies displayed.
Precondition	Patients must be under the care of that doctor.
Alternatives	
Post condition	

Use Case 19

Name	**Doctor has access to his own CV.**

Summary	Doctor has access to his own CV.
Actor	Doctor
Description	Each doctor has access to his own CV and can make changes everytime.
Precondition	Doctor must have an existing account, have access to change the CV.
Alternatives	
Post condition	Changes are saved in the database.

Use Case 20

Name	**Doctor communicates with patient through chat.**
Summary	Doctor communicates with patient through chat.
Actor	Doctor,Patient
Description	Doctor can have a group chat with his patients or individual chats.
Precondition	Doctor/patient must have existing account.
Alternatives	
Post condition	Chats are saved on database.

Use Case 21

Name	**Doctor contact with pharmacy via email.**
Summary	Doctor contact with pharmacy via email.
Actor	Doctor,Pharmacy
Description	Doctor sends email to pharmacist for patients' prescriptions.
Precondition	Doctor and pharmacist must have existing accounts.
Alternatives	
Post condition	

Use Case 22

Name	**Patient contacts doctor or other patients through chat.**
Summary	Patient contacts doctor through chat.
Actor	Patient,Doctor
Description	Patient can have a group chat with other patients or individual chat with doctor.
Precondition	Patients and doctor must have existing accounts.
Alternatives	
Post condition	

Use Case 23

Name	**Patient can have access of his medical records.**
Summary	Patient can see all his/her medical records.
Actor	Patient
Description	Patient can see all his/her medical records.
Precondition	Patient must have an account and medical records saved on the database.
Alternatives	
Post condition	

Use Case 24

Name	**Patient can set appointment by himself.**
Summary	Patient can set appointment by himself.
Actor	Patient
Description	Patient has access to the calendar and based on the doctors' agenda can set appointment by himself.
Precondition	Appointment is set by receptionist.
Alternatives	
Post condition	Appointment is saved on the database.

Use Case 25

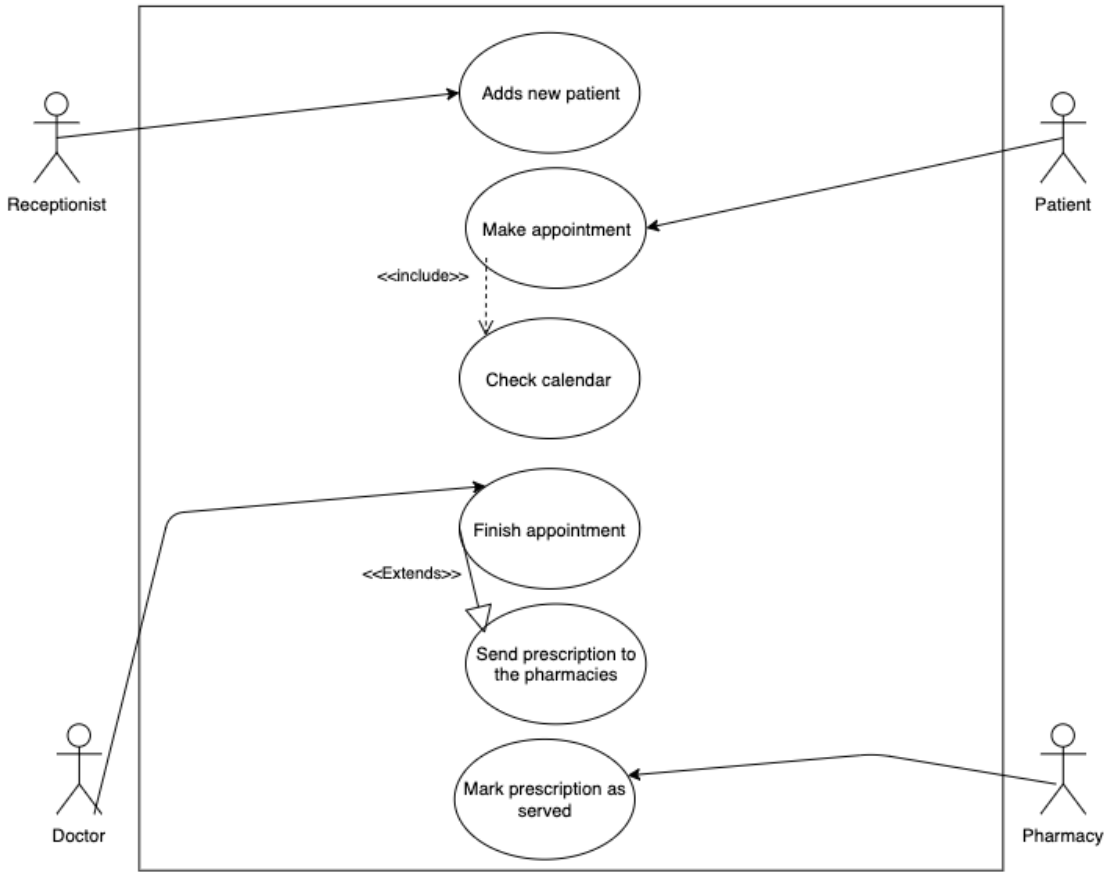
Name	**Pharmacy can communicate with the doctor.**
Summary	Pharmacy can communicate with the doctor.
Actor	Pharmacy,Doctor.
Description	Pharmacy communicates with doctor via email so it can get the prescriptions of the patients.
Precondition	Pharmacy and doctor must have existing accounts.
Alternatives	
Post condition	

Use Case 26

Name	**Pharmacy can see the patient's drug recipe and check it as served.**
Summary	Pharmacy can see the patient's drug recipe.
Actor	Pharmacy
Description	Pharmacy can see the patient's drug recipe which is sent by doctor.
Precondition	Doctor must send the recipe to the pharmacy.
Alternatives	
Post condition	

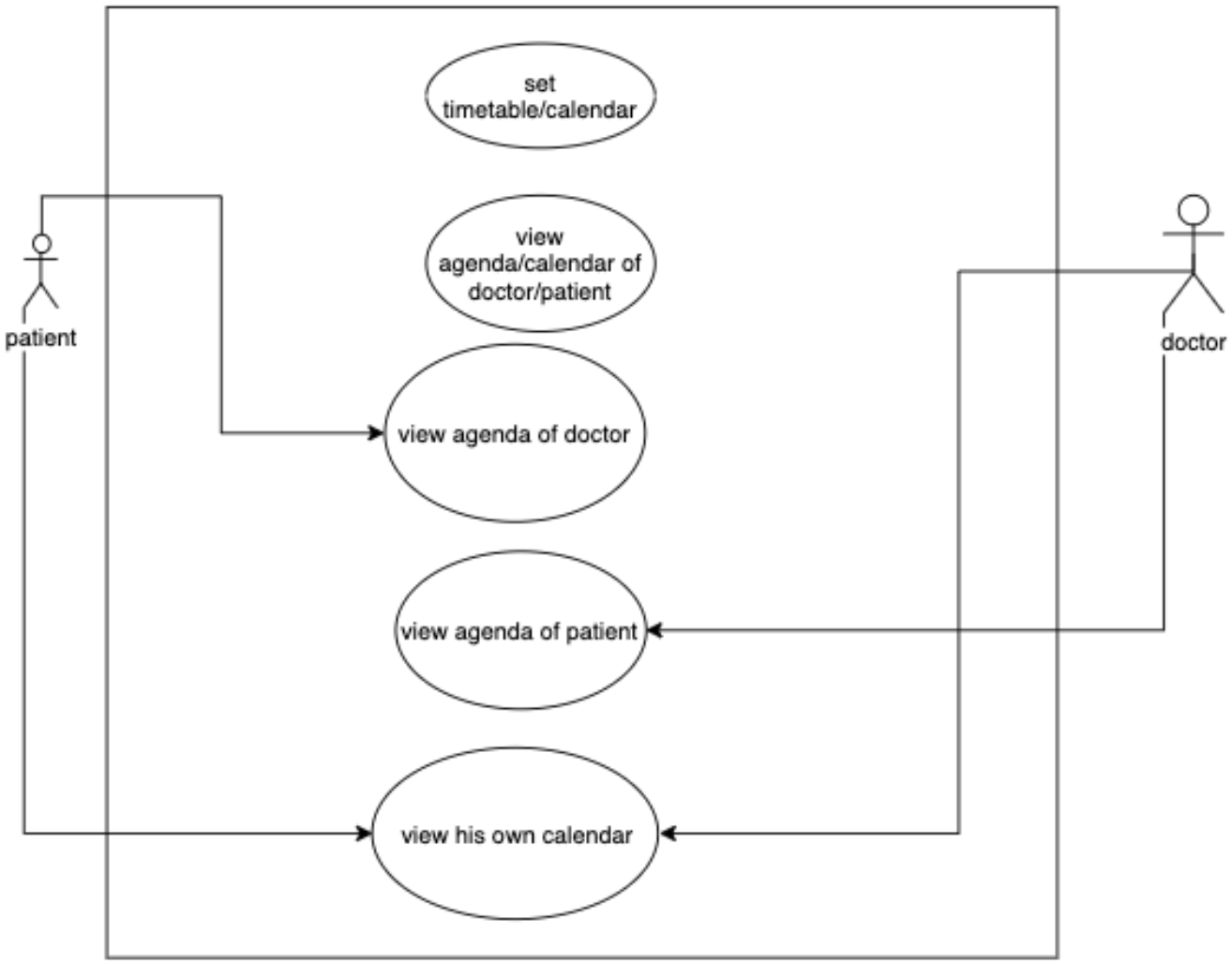
4.4 User Case Diagram

All-Users Interaction



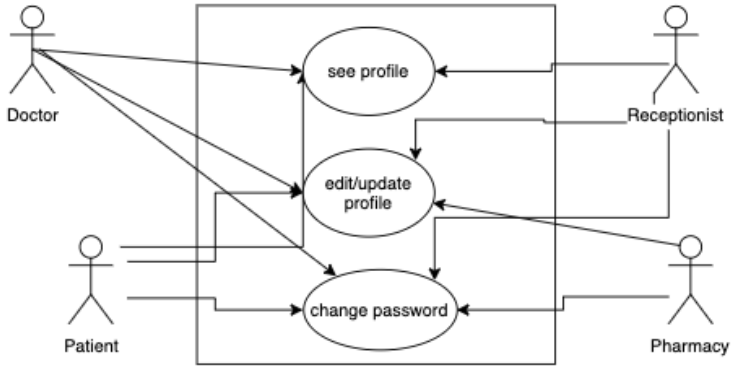
UC_7,UC_24, UC_14, UC_21, UC_25, UC_26

Calendar



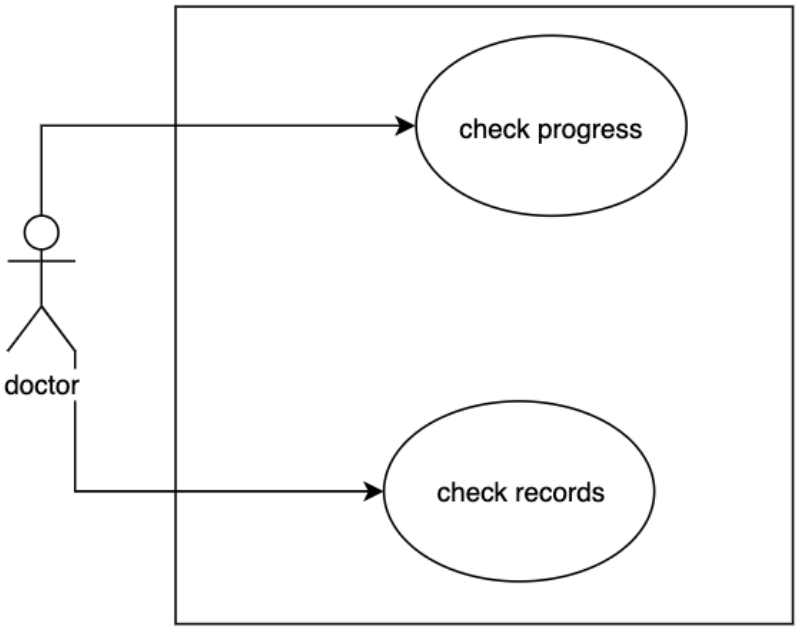
UC_6,UC_13, UC_24

Profile



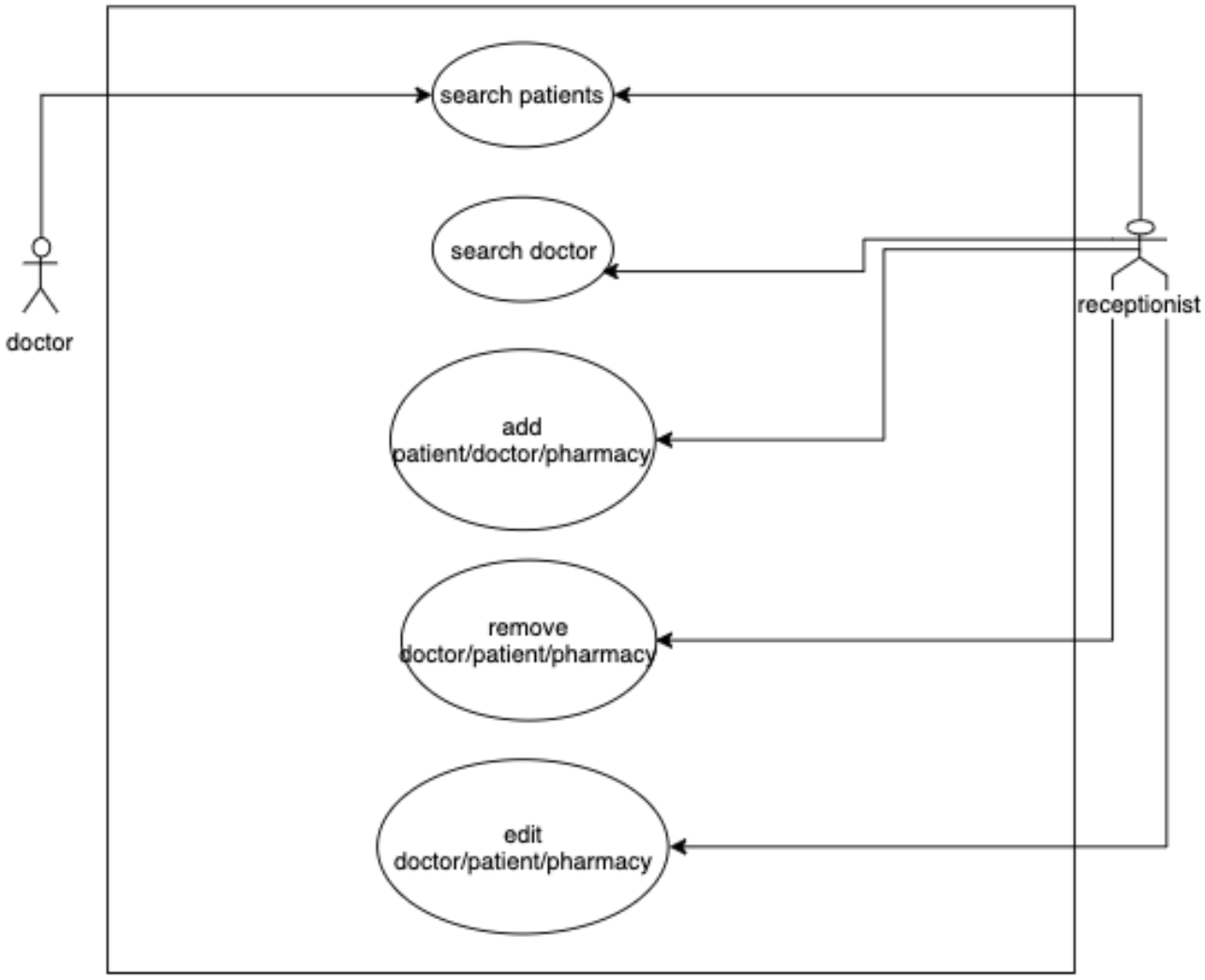
UC_4,UC_3

Checking



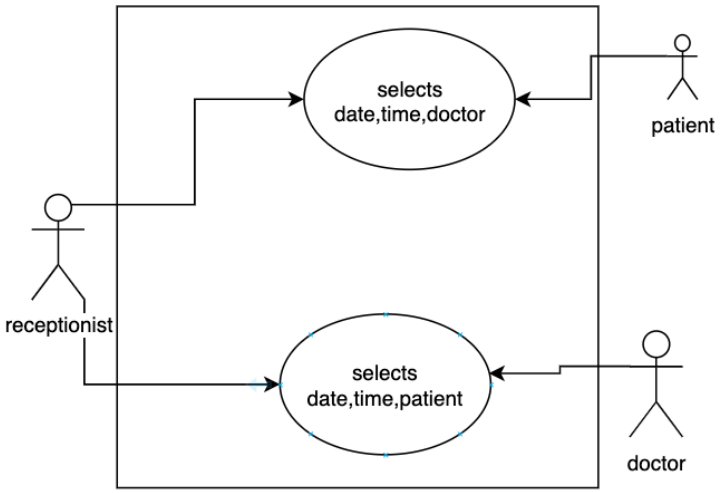
UC_16,UC_17

Add/Delete/Edit/Search



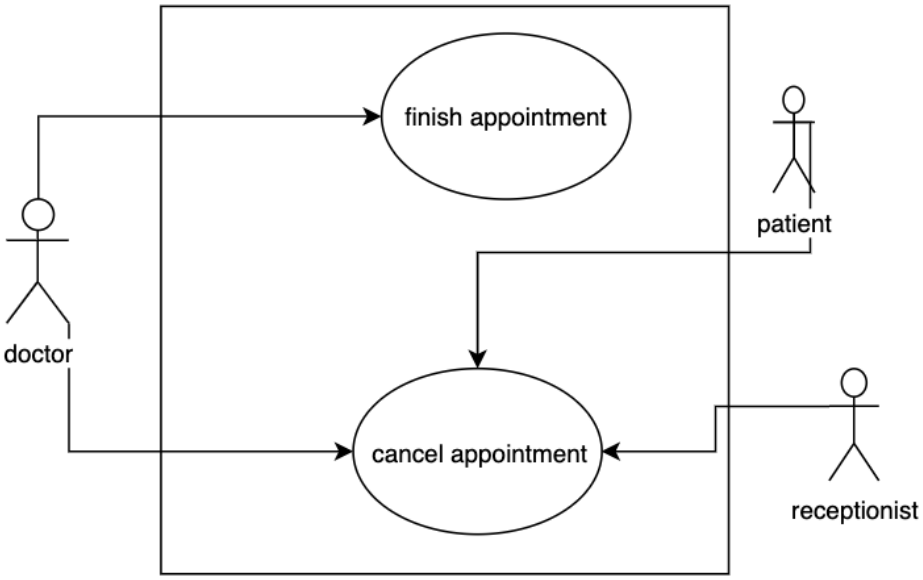
UC_18,UC_12, UC_7, UC_5

Set Appointments



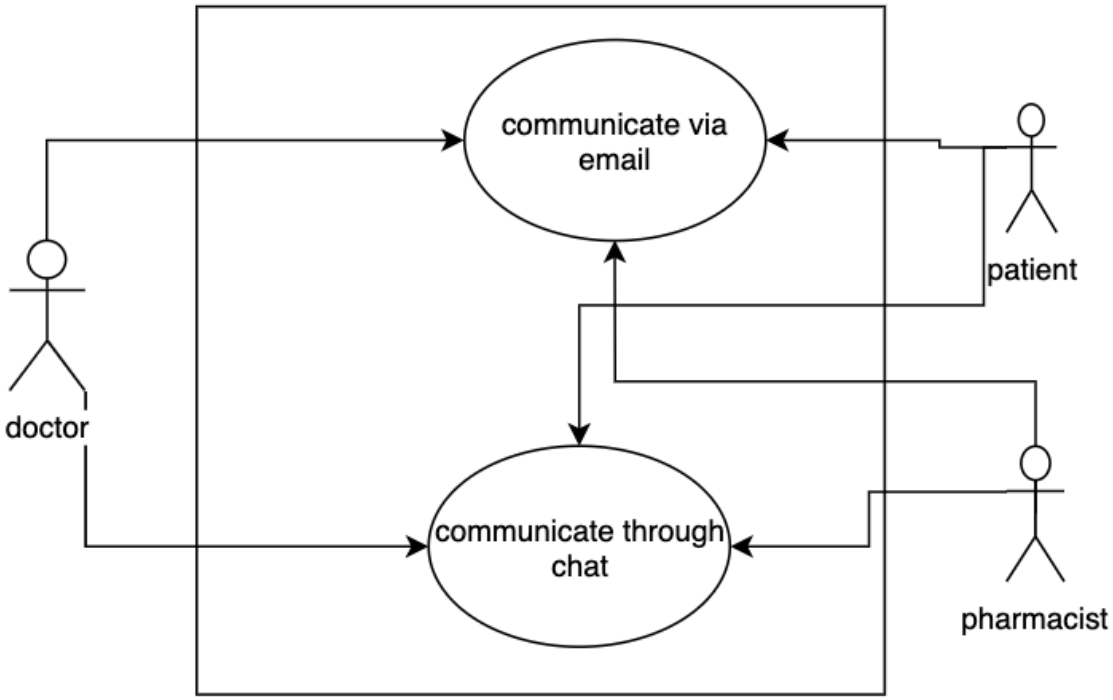
UC_6,UC_13, UC_24

Appointments



UC_14,UC_15

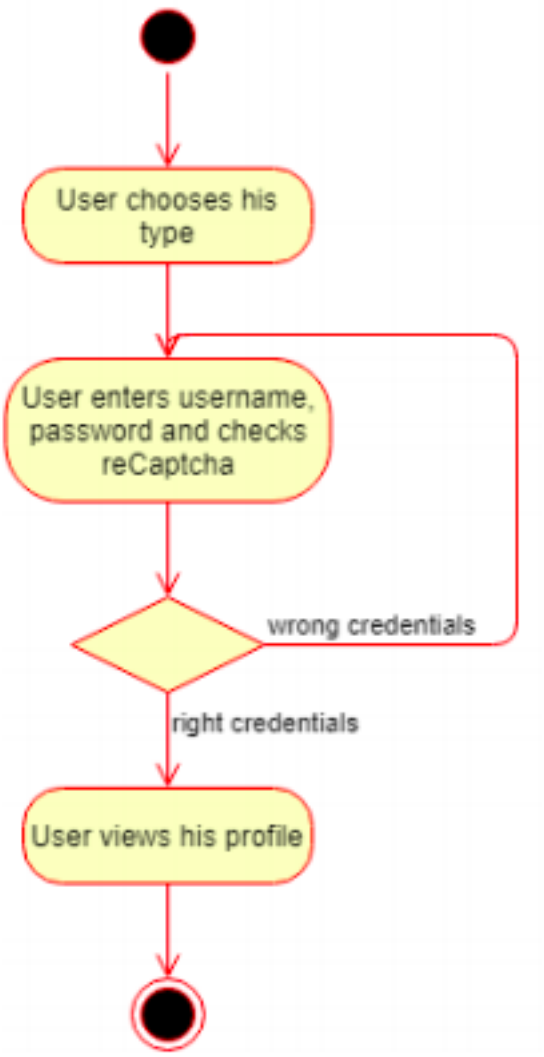
Communication



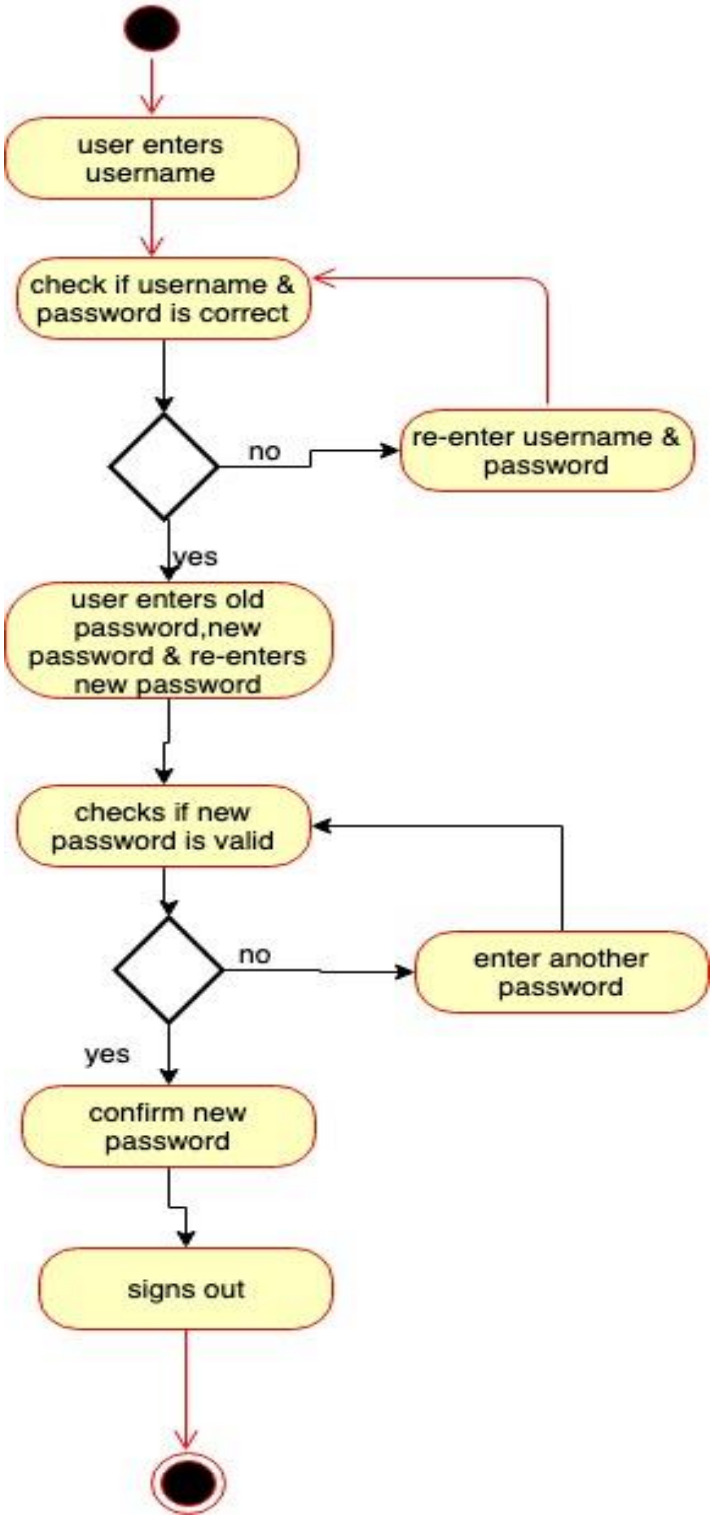
UC_22,UC_25, UC_20,UC_21

4.5 Activity Diagrams/Swimlanes

Login - **AD01**

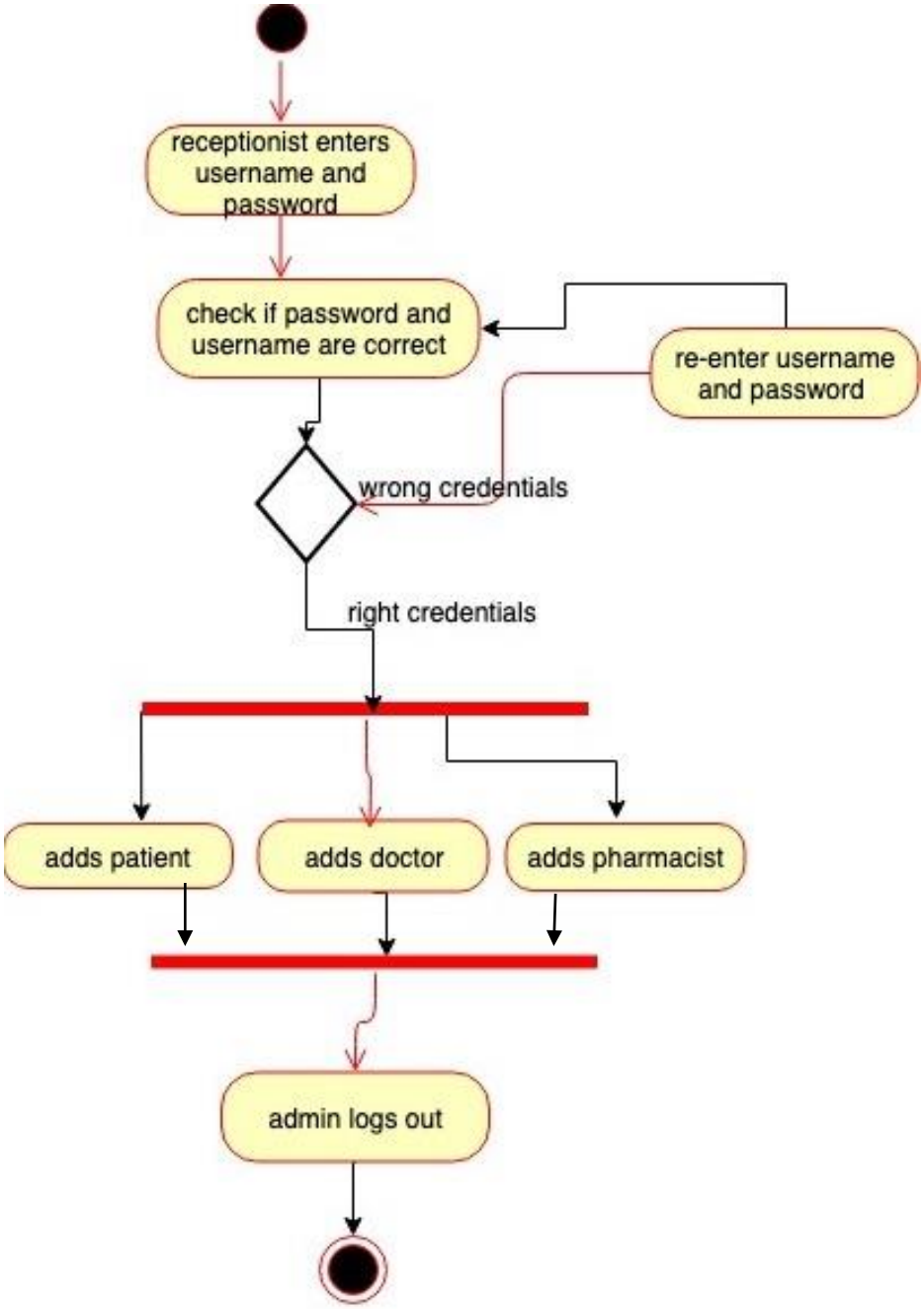


UC_1


user enters username
check if username & password is correct
no
re-enter username & password
yes
user enters old password,new password & re-enters new password
checks if new password is valid
no
enter another password
yes
confirm new password
signs out

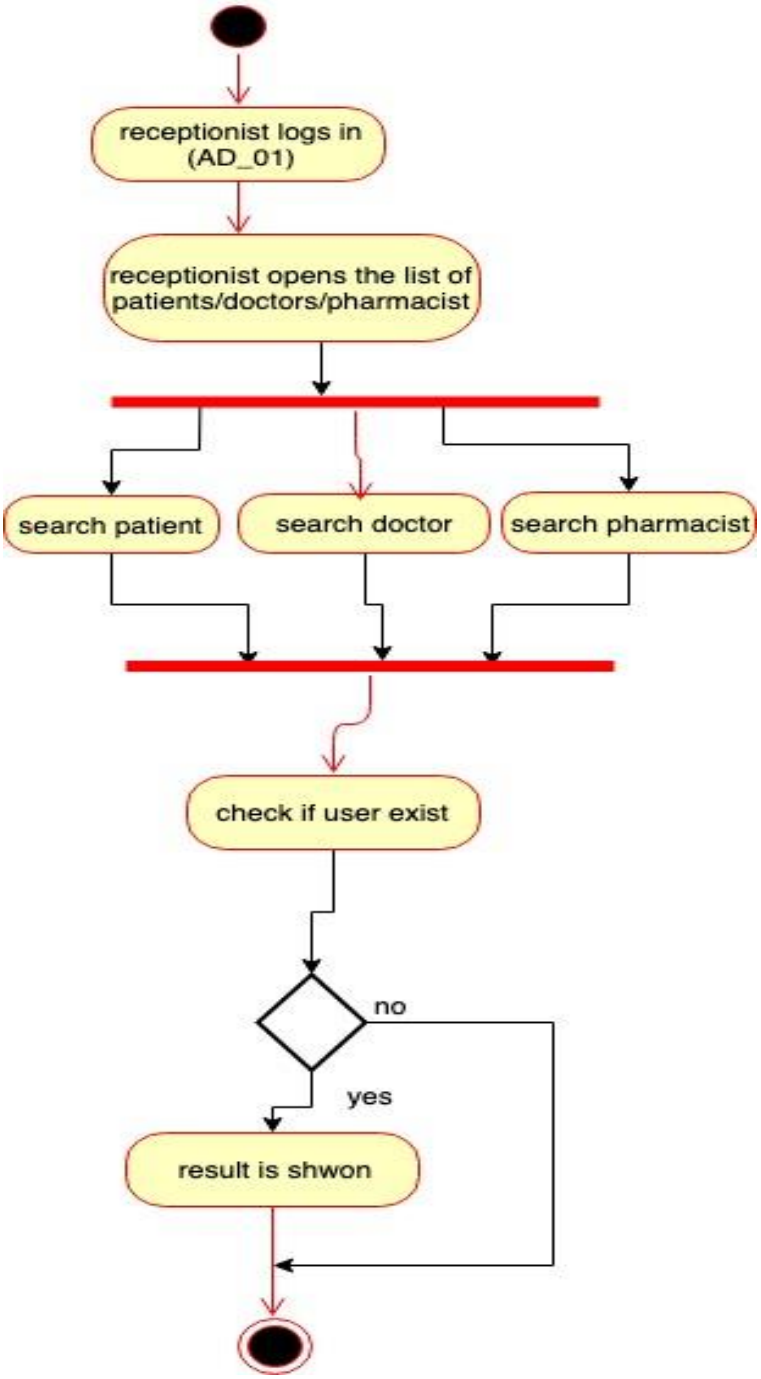
UC_3

Receptionist adds new user - **AD 03**

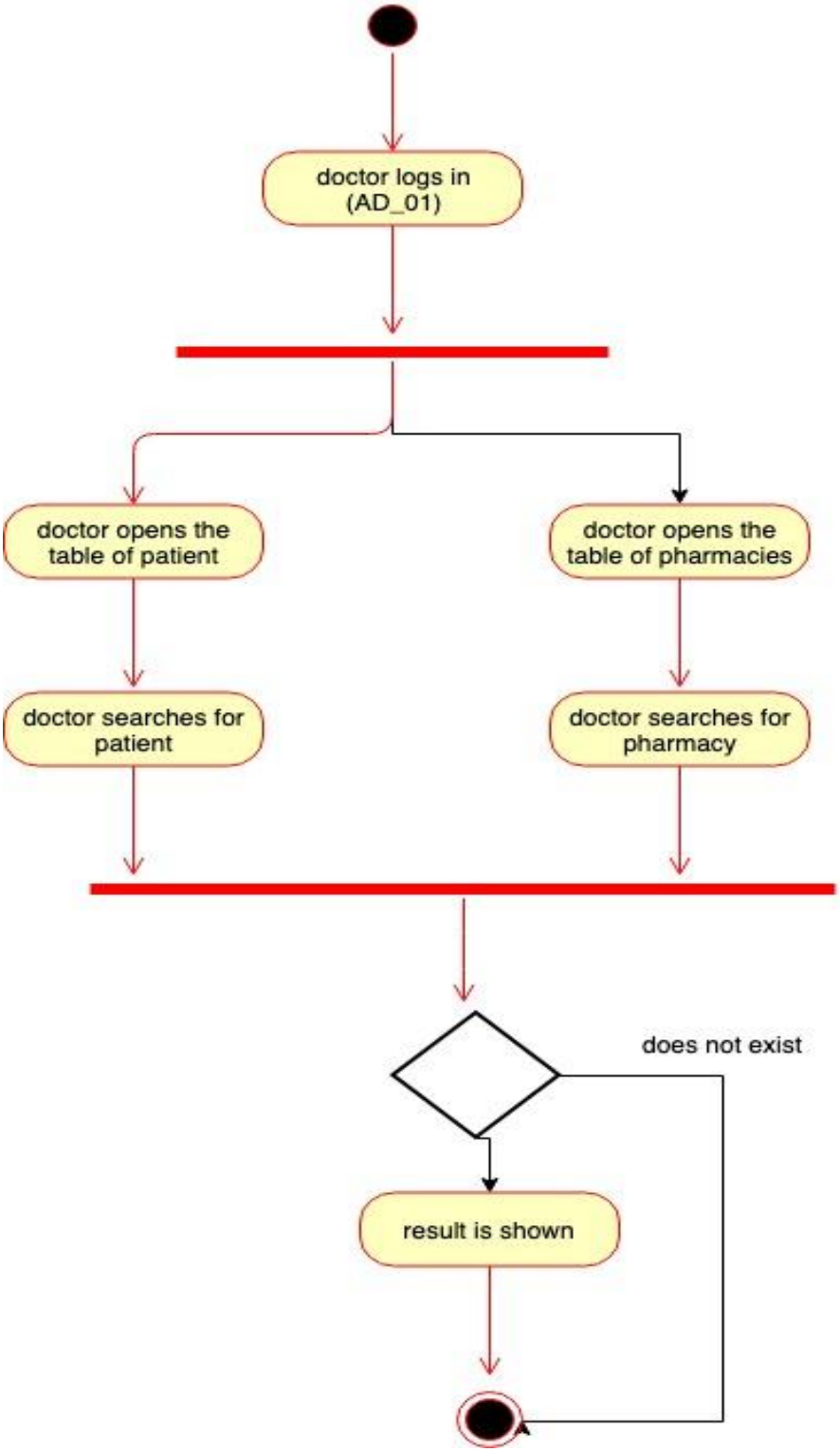


UC_7

Receptionist searches patient/doctor/pharmacy - **AD 04**

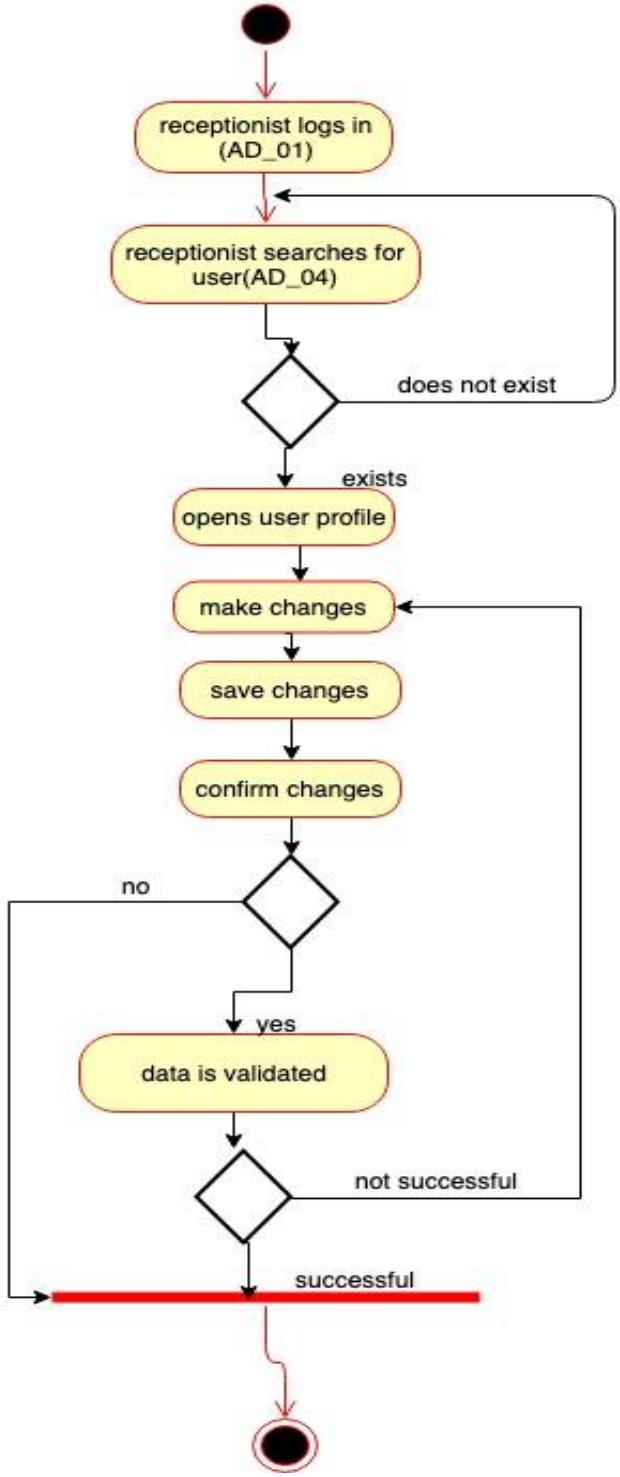


UC_12


doctor logs in
(AD_01)
doctor opens the
table of patient
doctor opens the
table of pharmacies
doctor searches for
patient
doctor searches for
pharmacy
does not exist
result is shown

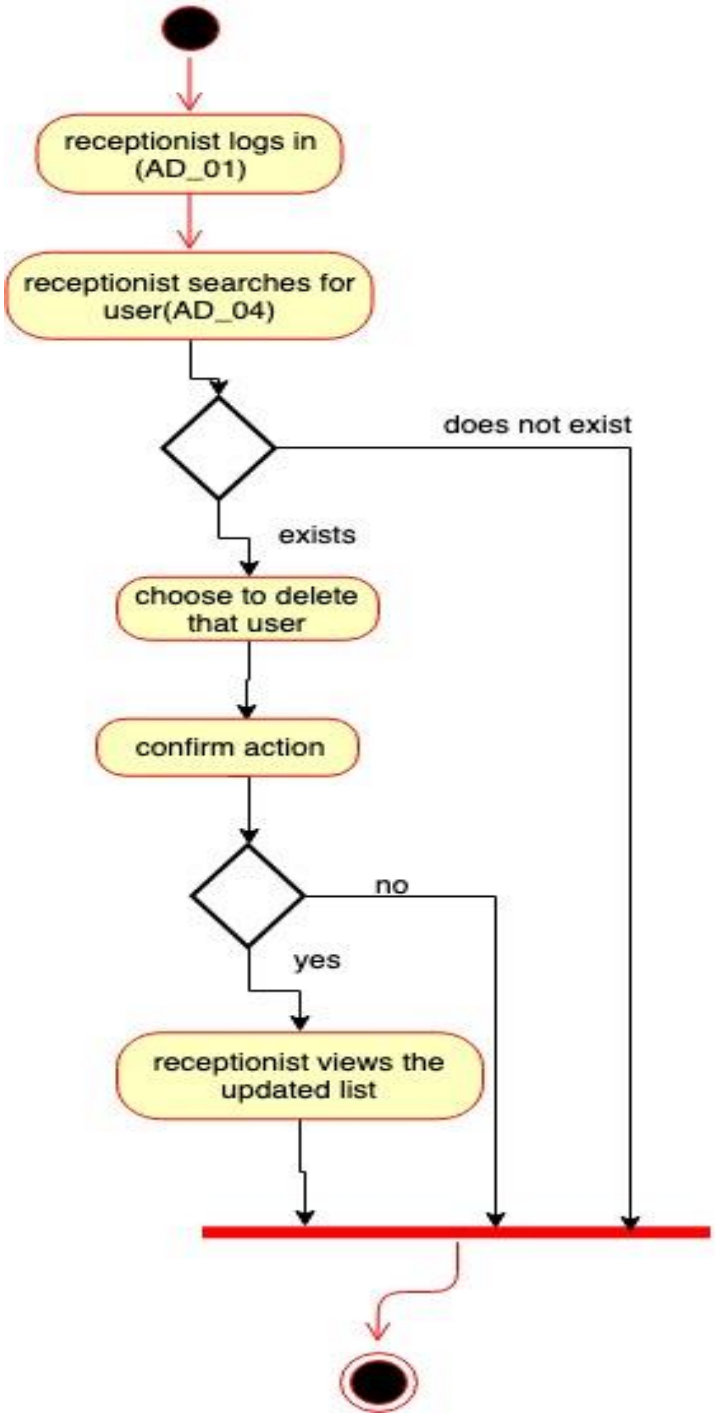
UC_12

Receptionist updates/edits users - **AD 06**



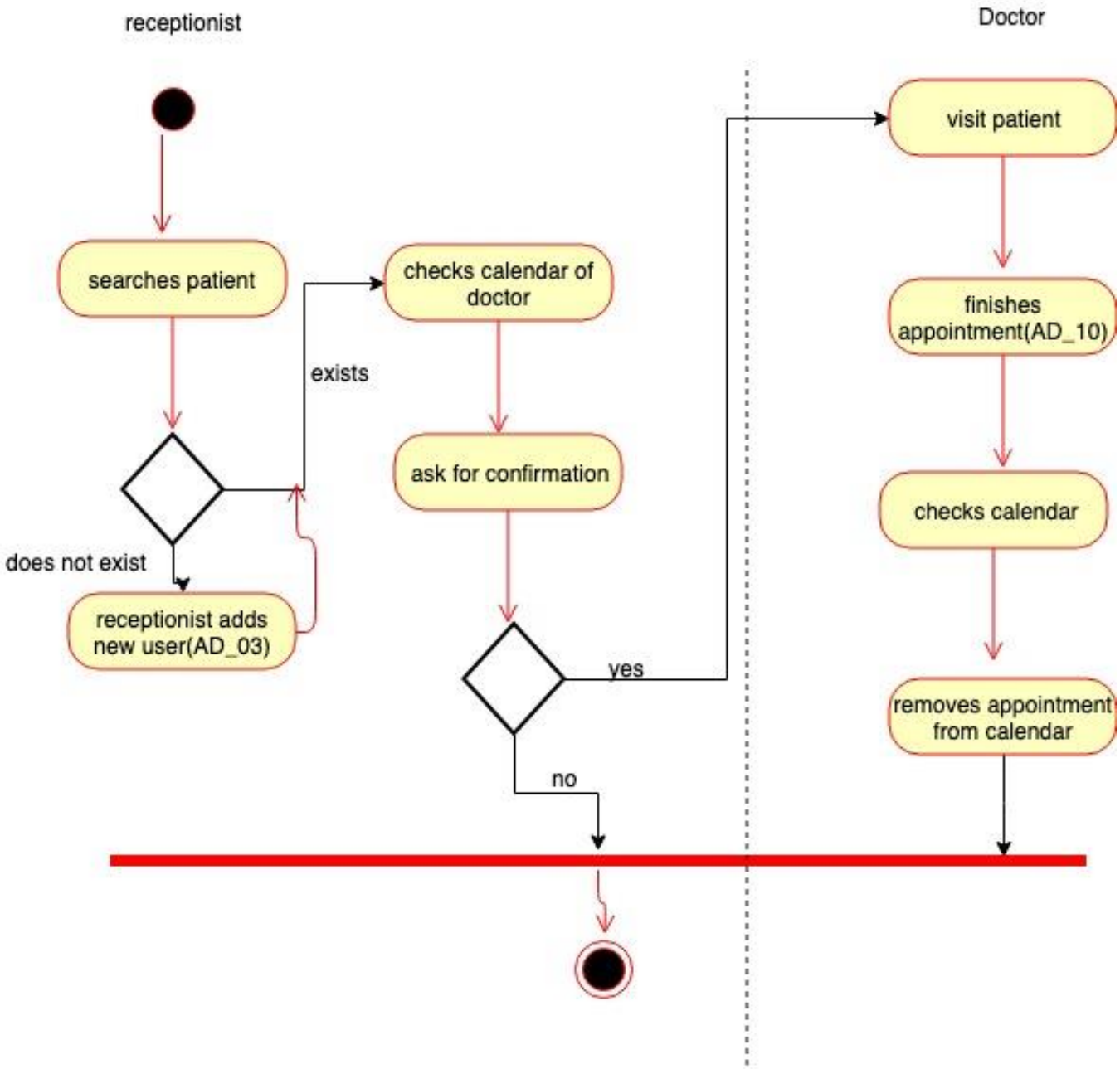
UC_5

Receptionist deletes users - **AD 07**



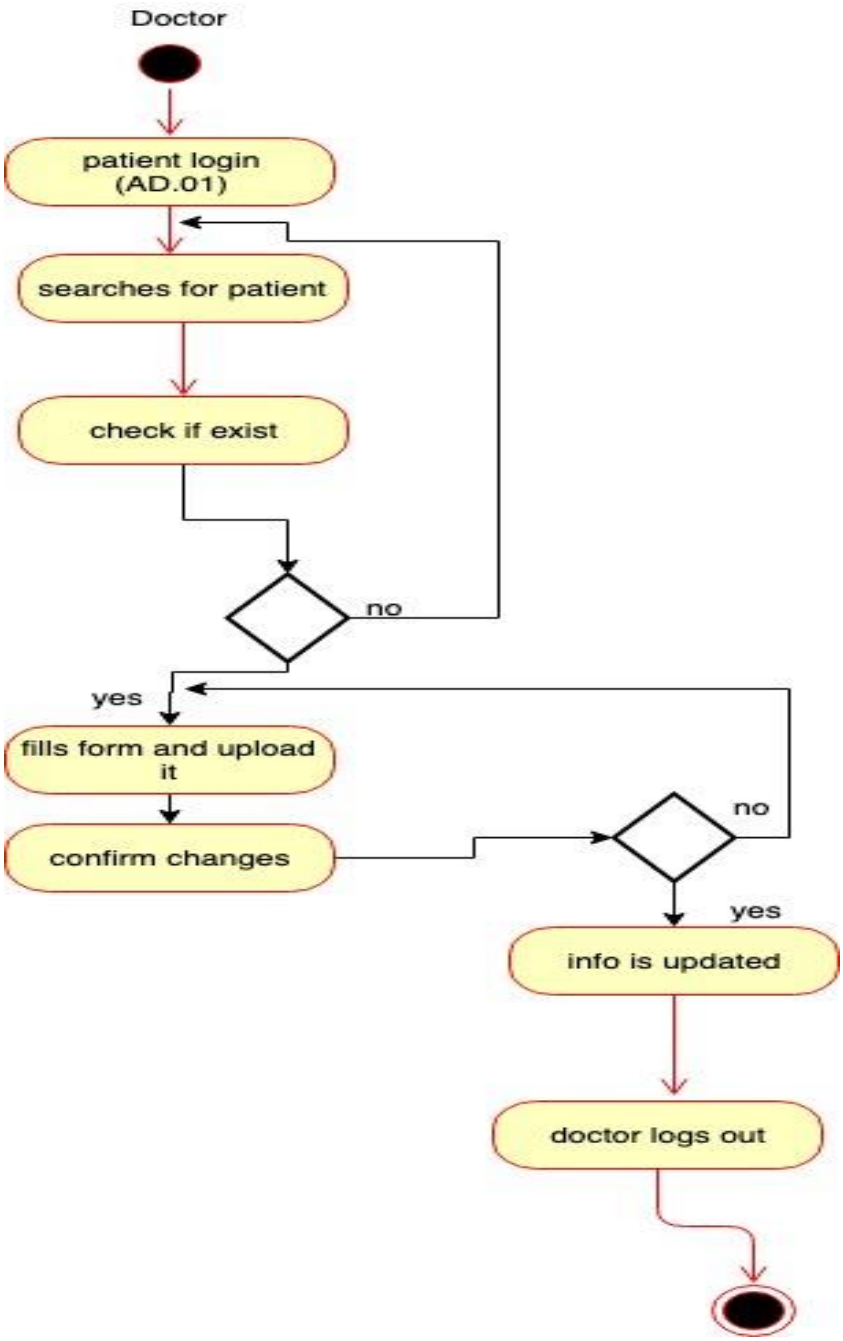
UC_7

Patient sets appointment through a call to receptionist **-AD 08**



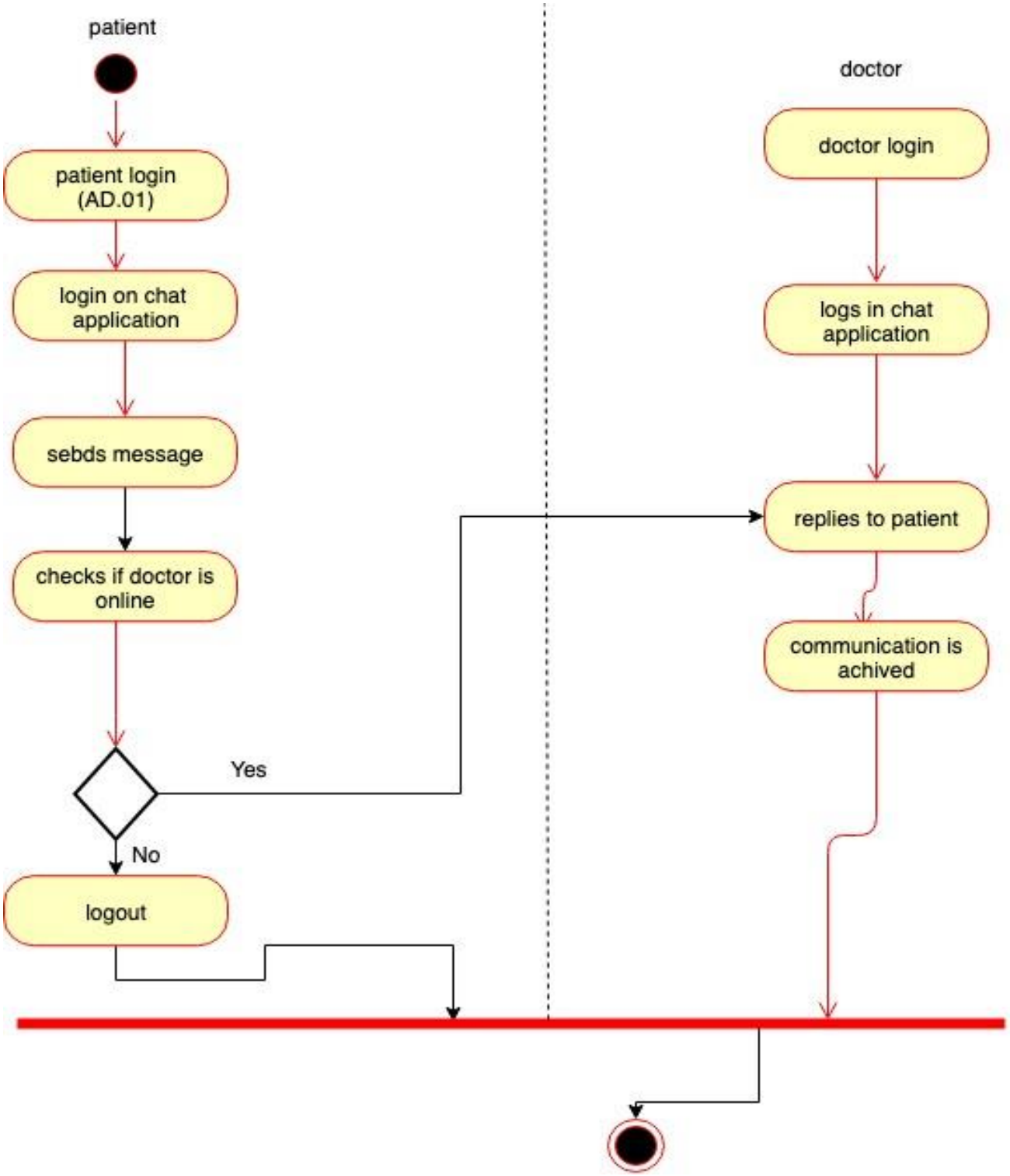
UC_6, UC_14

Doctor finishes appointment - **AD 09**



UC_14

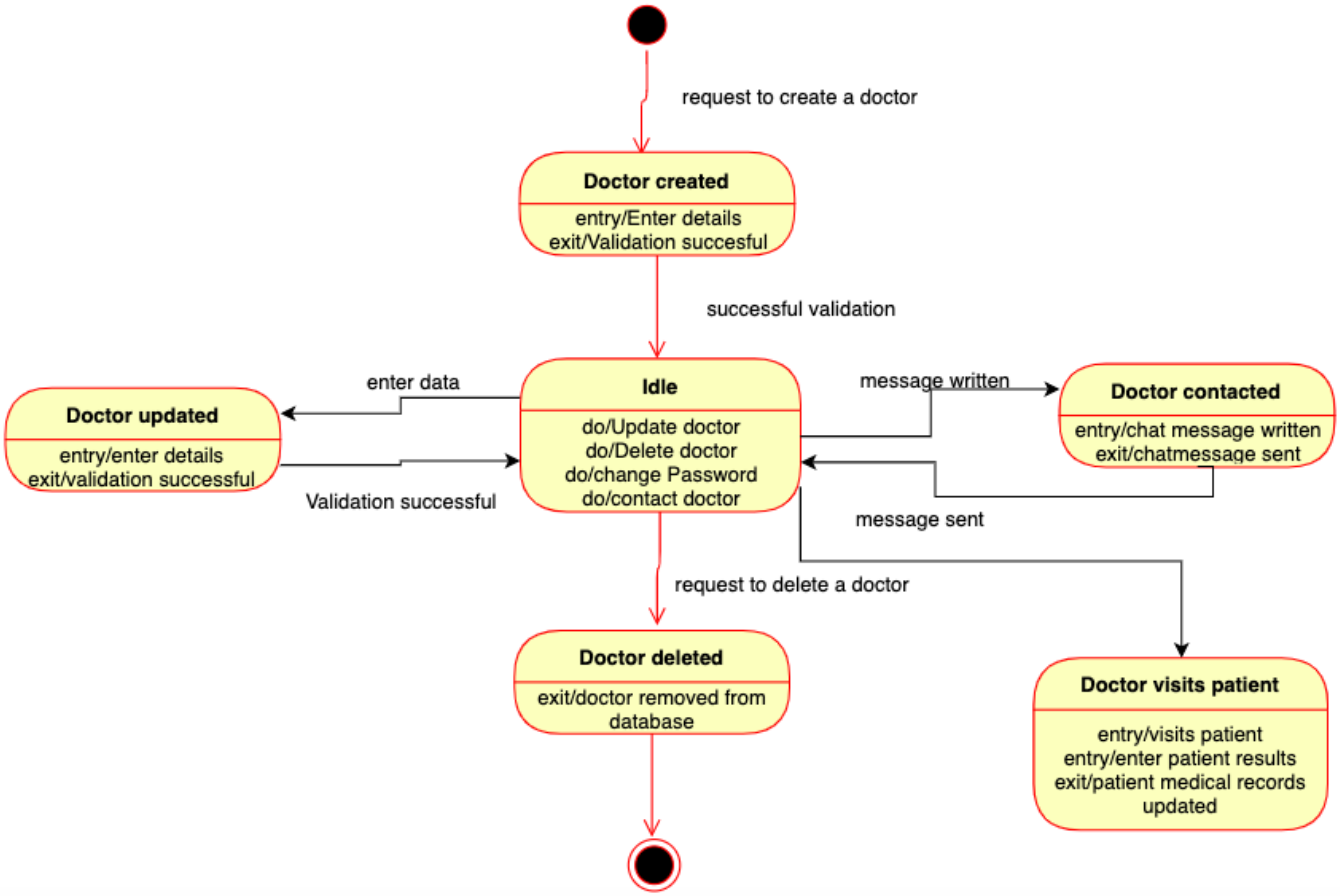
Patient and doctor communicate through chat -**AD 10**



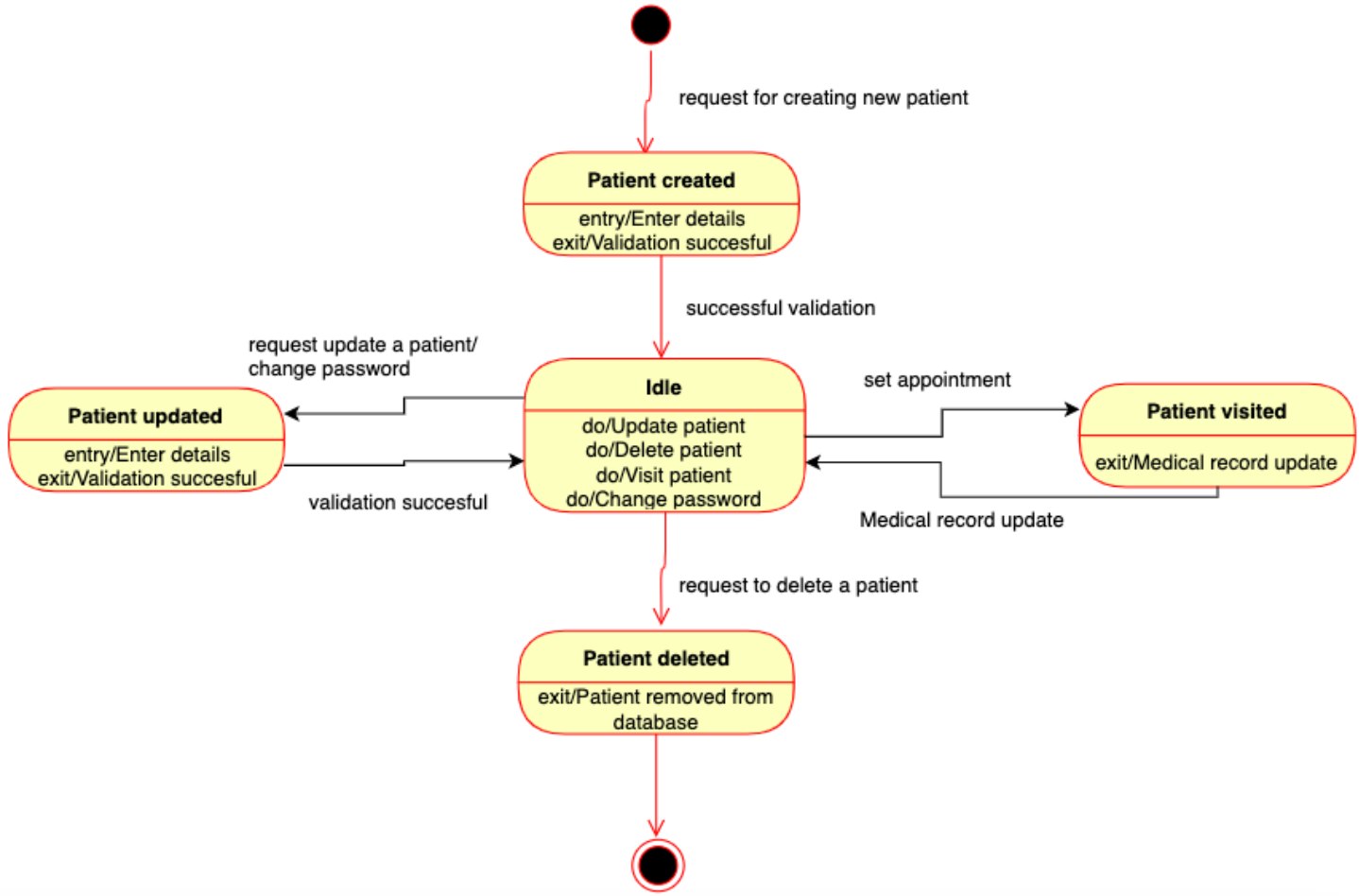
UC_20, UC_22

4.6 State Diagram

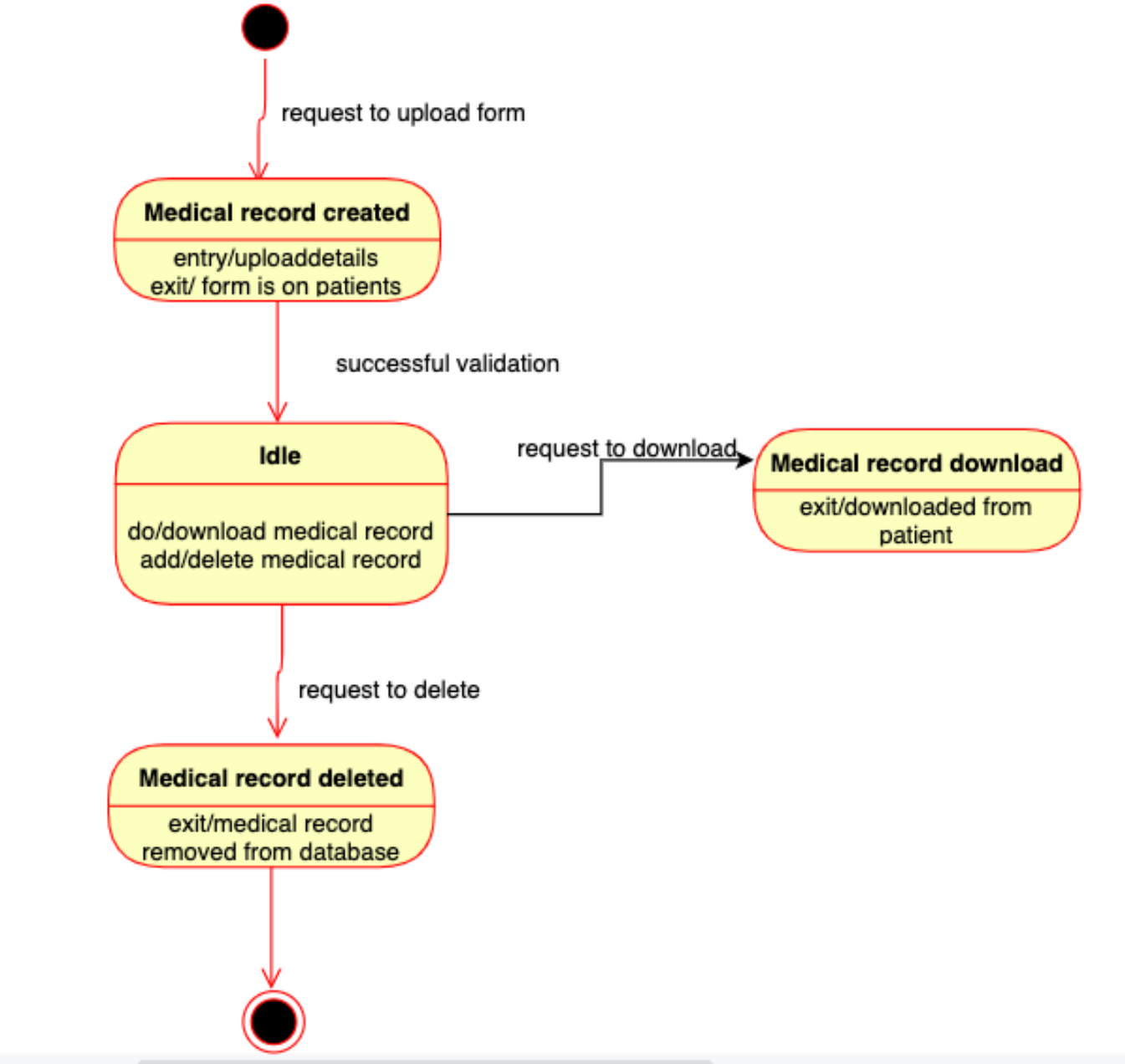
SD1



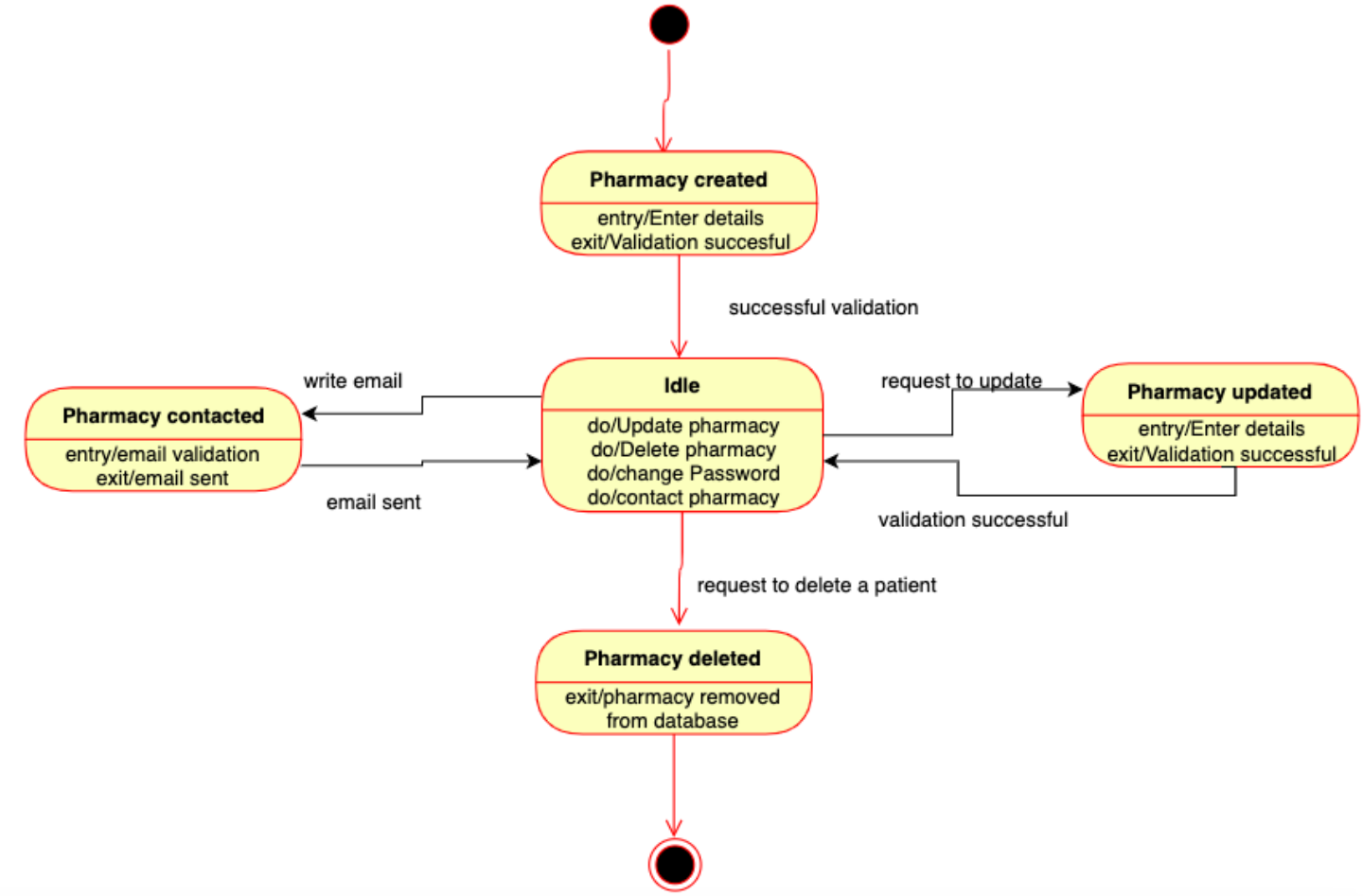
SD2


request for creating new patient
Patient created
entry/Enter details
exit/Validation succesful
successful validation
request update a patient/
change password
Idle
do/Update patient
do/Delete patient
do/Visit patient
do/Change password
set appointment
Patient updated
entry/Enter details
exit/Validation succesful
validation succesful
Patient visited
exit/Medical record update
Medical record update
request to delete a patient
Patient deleted
exit/Patient removed from
database

SD3

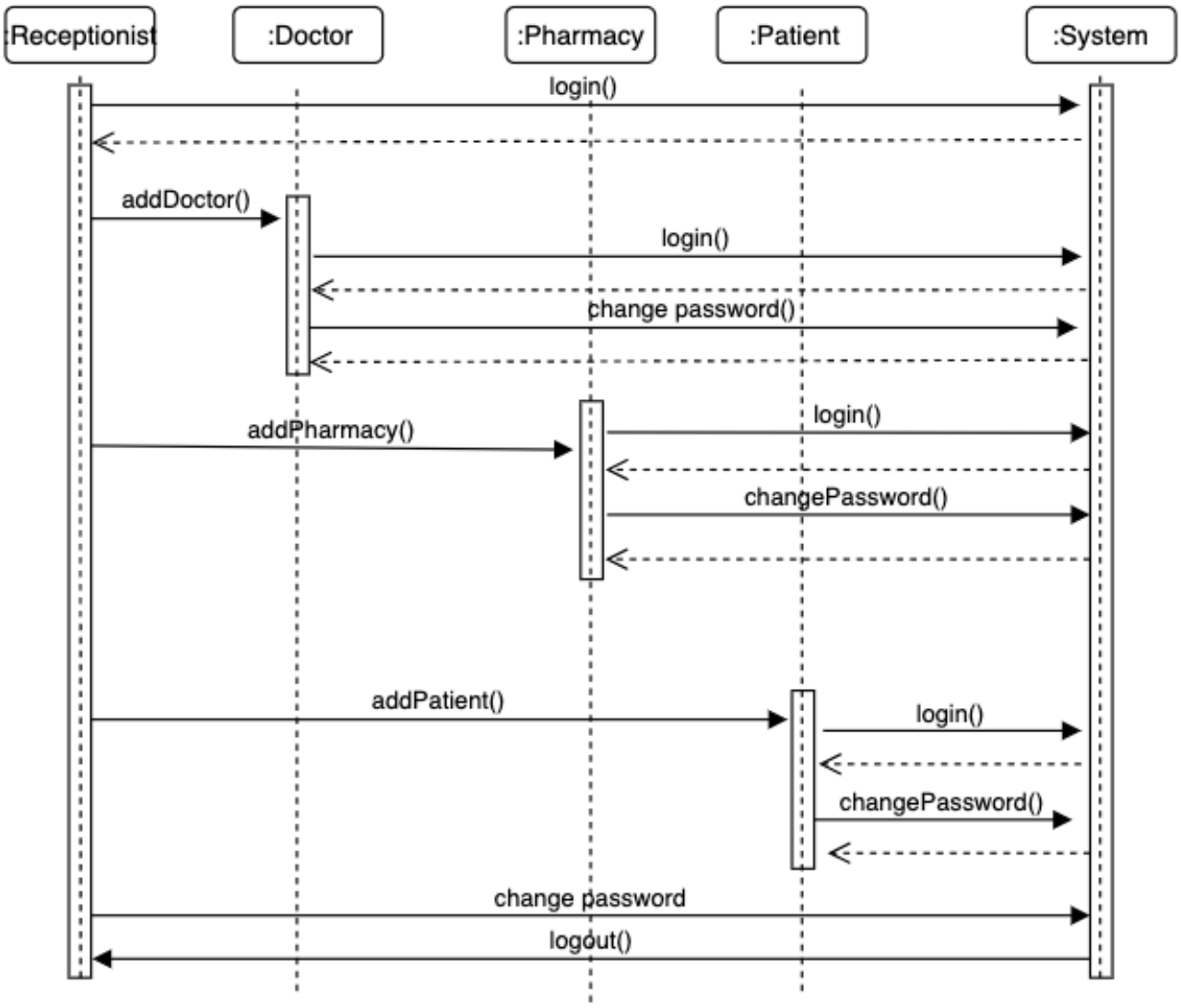

request to upload form
Medical record created
entry/uploaddetails
exit/ form is on patients
successful validation
Idle
do/download medical record
add/delete medical record
request to download
Medical record download
exit/downloaded from patient
request to delete
Medical record deleted
exit/medical record removed from database

SD4

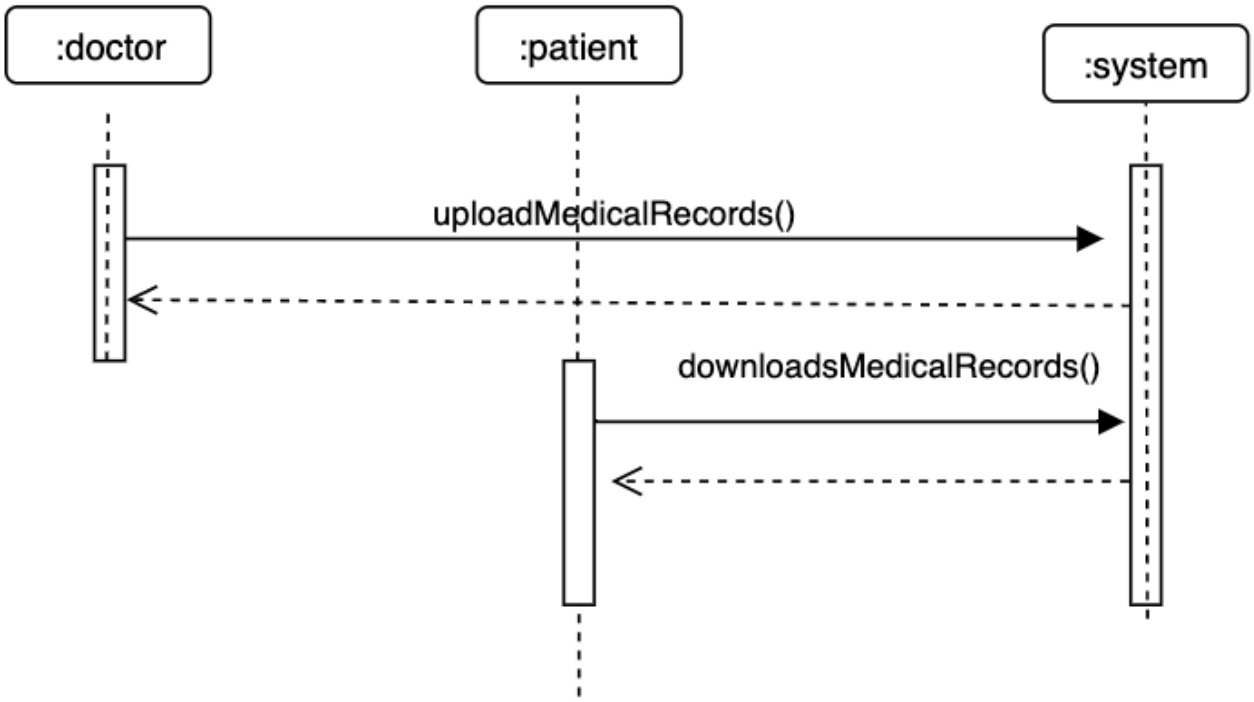

Pharmacy created
entry/Enter details
exit/Validation succesful
successful validation
Idle
do/Update pharmacy
do/Delete pharmacy
do/change Password
do/contact pharmacy
write email
Pharmacy contacted
entry/email validation
exit/email sent
email sent
request to update
Pharmacy updated
entry/Enter details
exit/Validation successful
validation successful
request to delete a patient
Pharmacy deleted
exit/pharmacy removed
from database

1.5 Sequence Diagrams

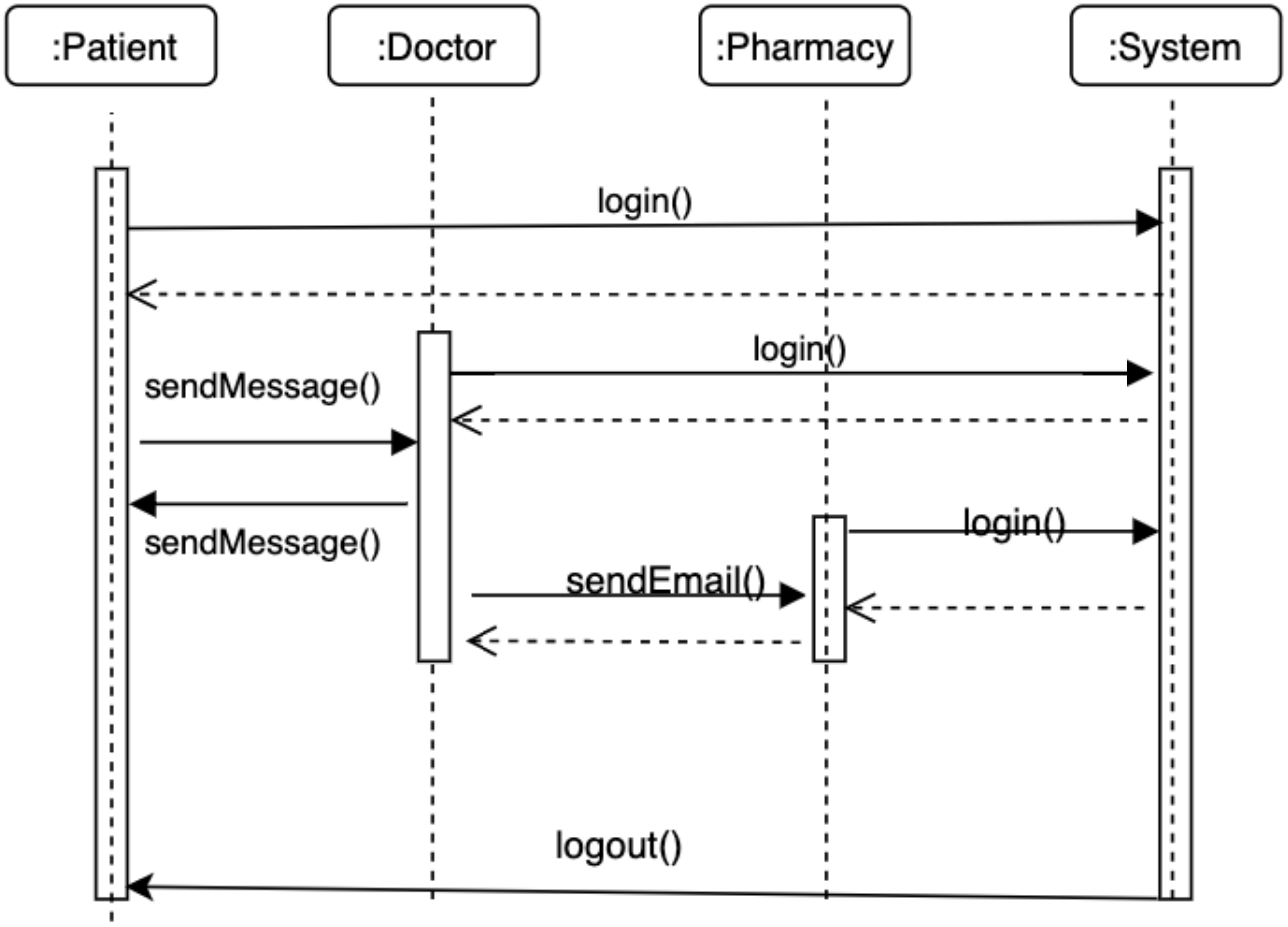
Add user and user edits profile – **SD1**



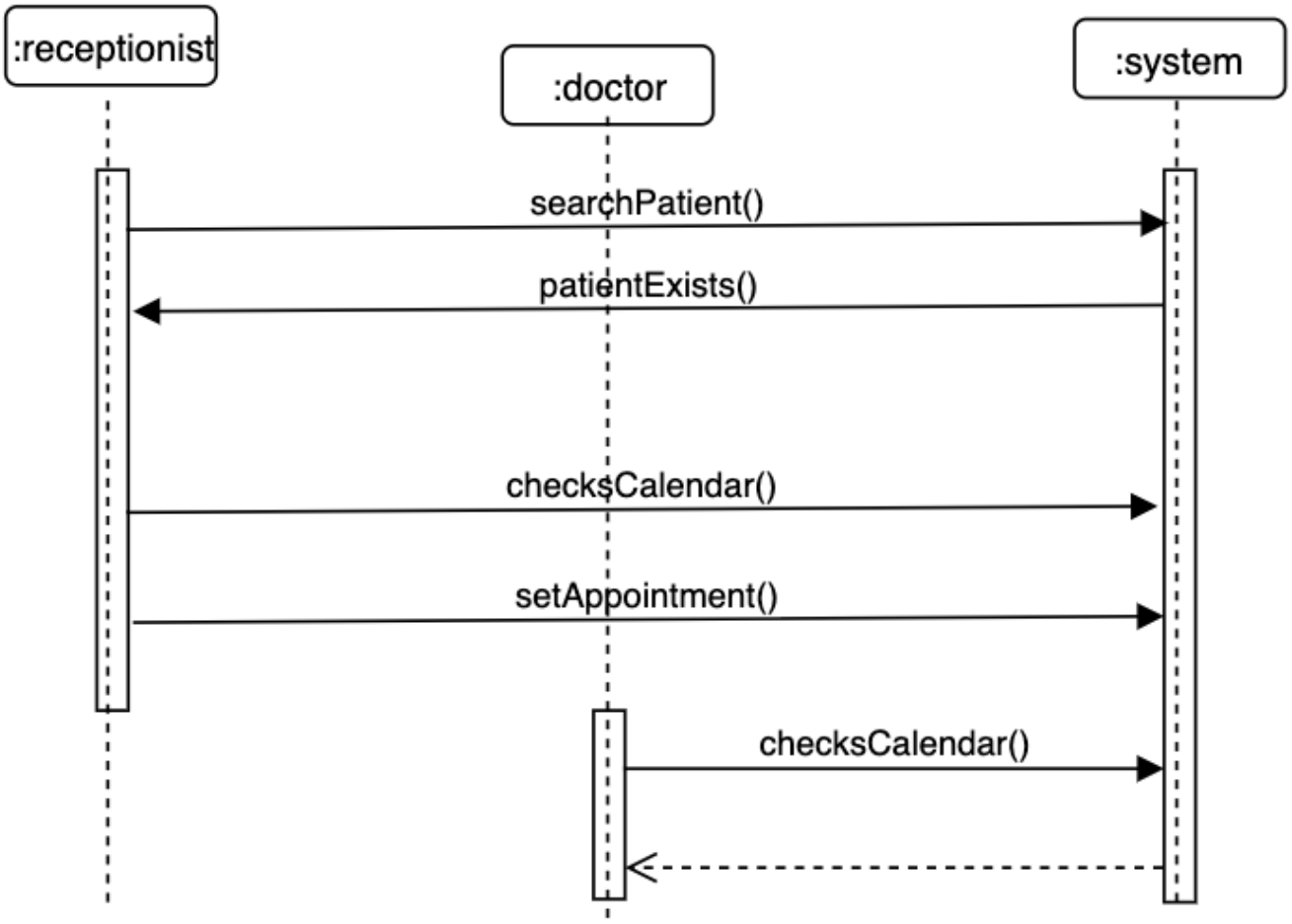
Upload/Download Medical Record -**SD2**



Doctor communicates with patient and pharmacy -**SD3**

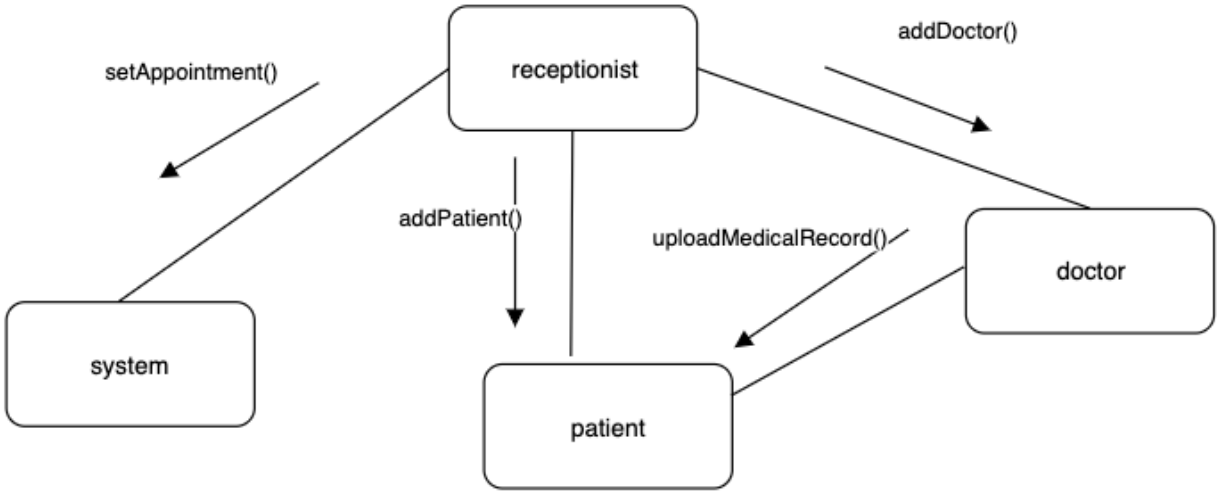


Set appointment through receptionist **-SD4**



1.5 Collaboration Diagrams

Set appointment when there does not exist a doctor and patient

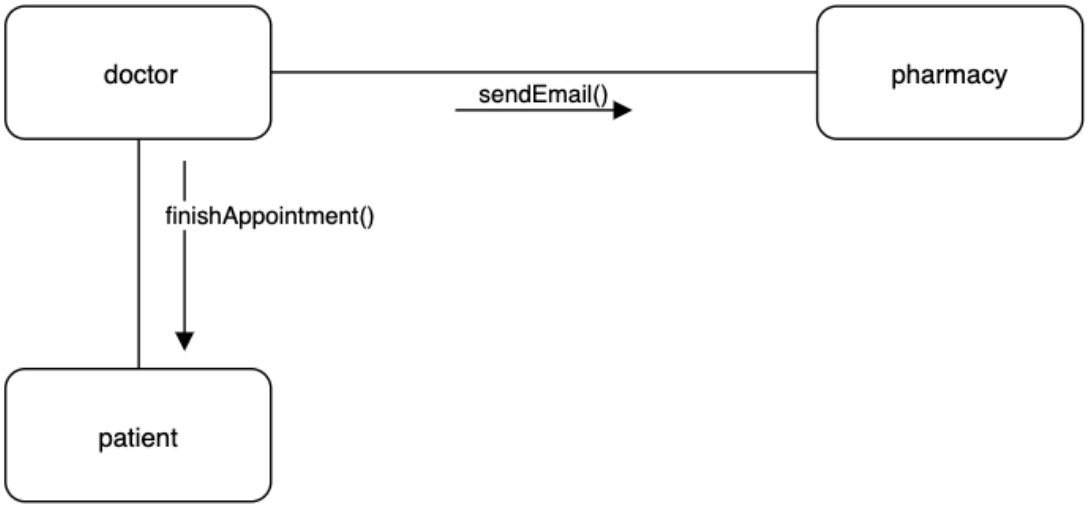


SD1 , SD4

Patient asks doctor for his results on chat and doctor redirects patient to download it from the profile.

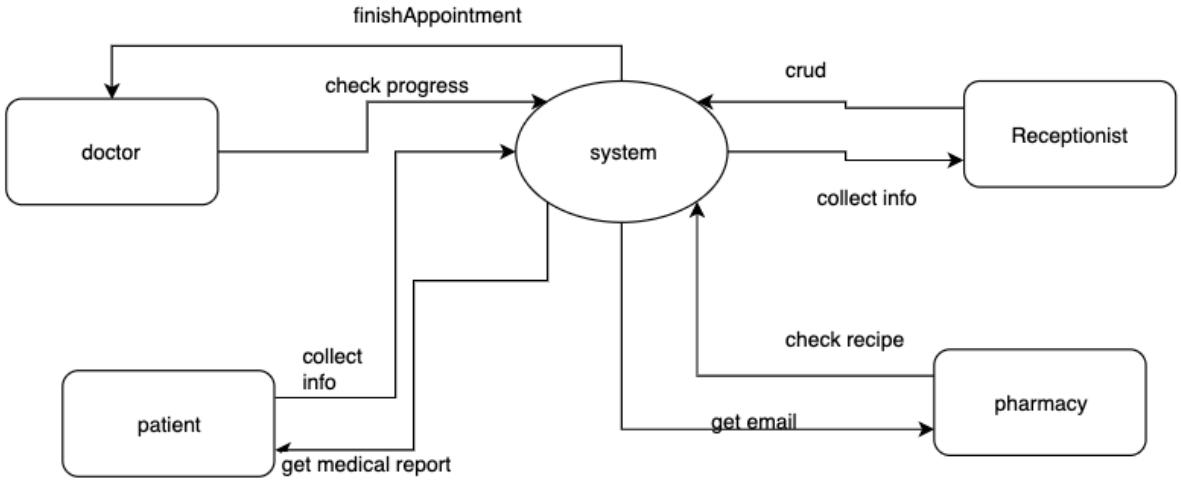
SD2,SD3

Doctor sends prescription to pharmacy via email after finishing the visit.

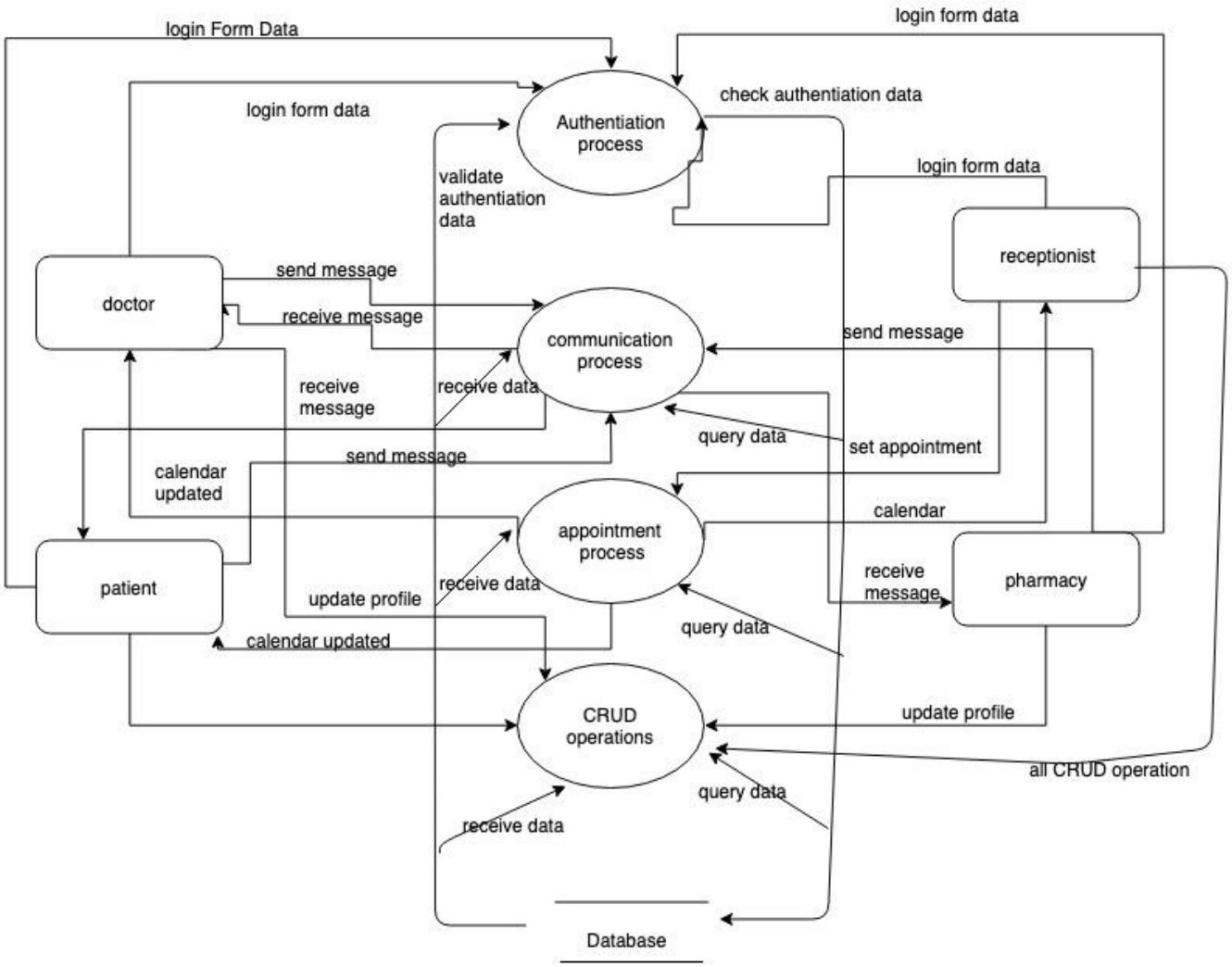


1.5 DATA FLOW DIAGRAM

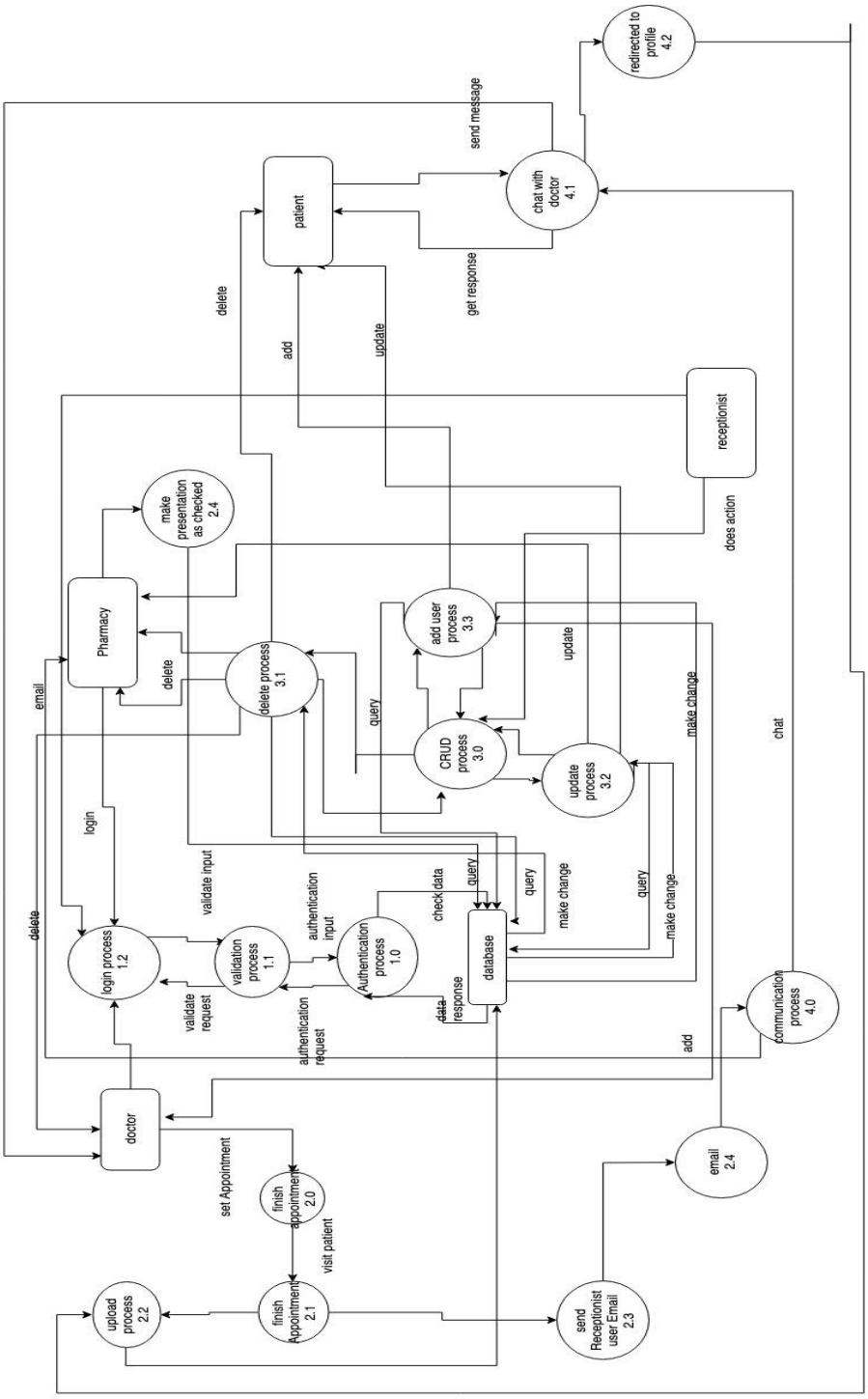
DFD Level 0



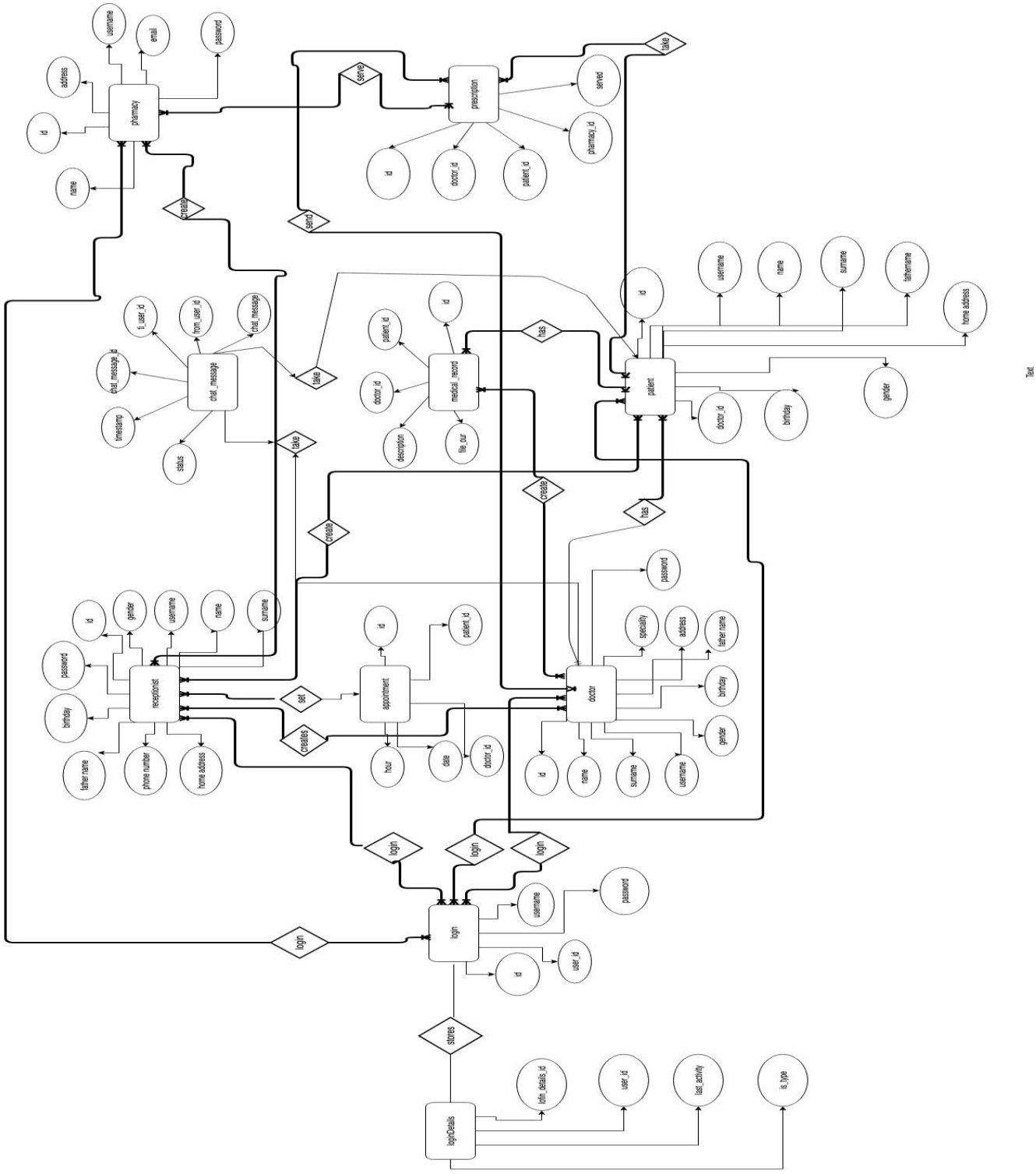
DFD Level 1


login Form Data
login form data
login form data
Authentiation process
check authentiation data
validate authentiation data
login form data
receptionist
doctor
send message
receive message
communication process
send message
receive message
receive data
query data
set appointment
send message
calendar updated
calendar
appointment process
patient
receive message
pharmacy
update profile
receive data
query data
calendar updated
CRUD operations
update profile
all CRUD operation
query data
receive data
Database

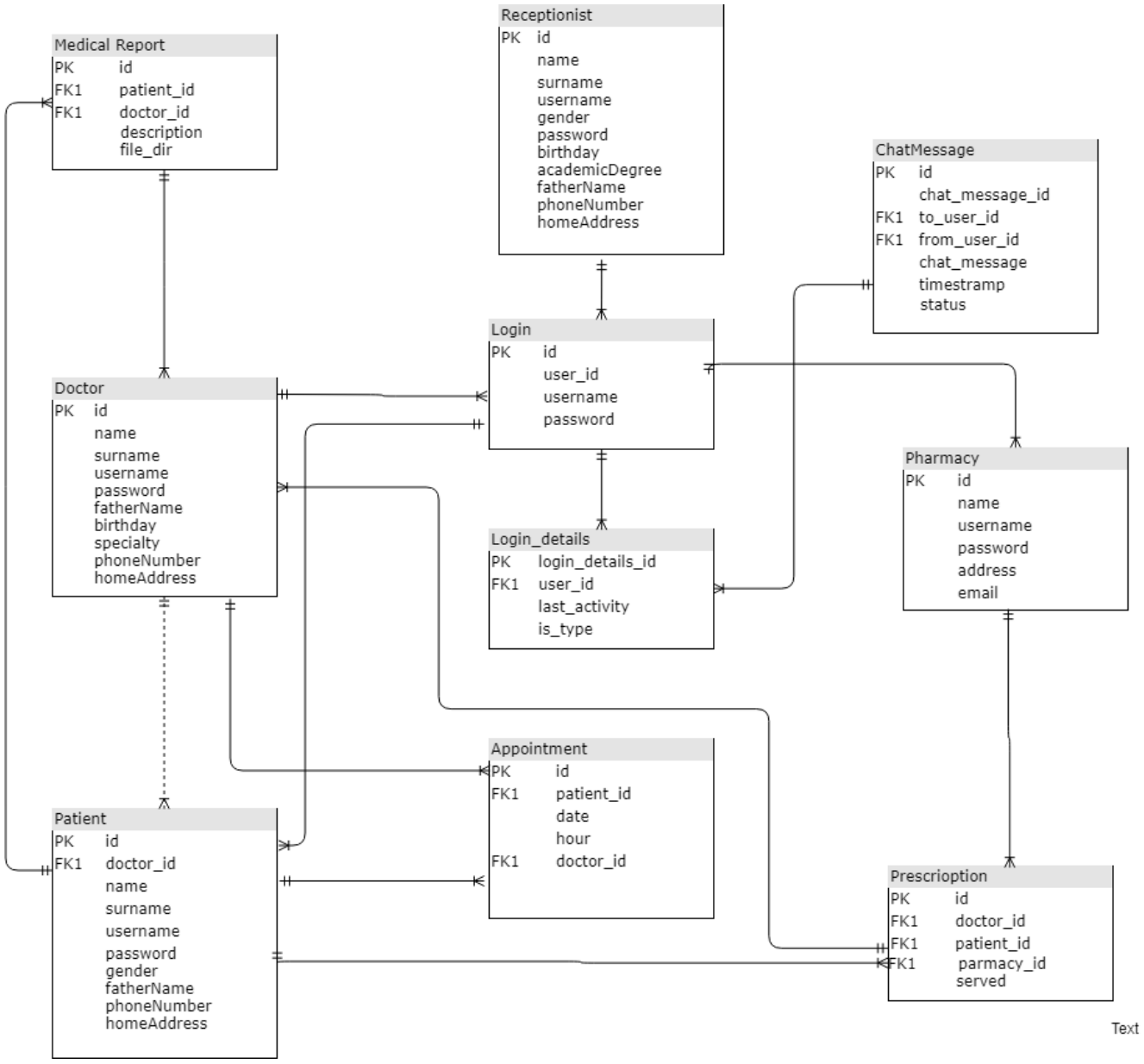
DFD Level 2


redirected to profile 4.2
send message
chat with doctor 4.1
patient
get response
delete
add
update
receptionist
does action
make presentation as checked 2.4
Pharmacy
add user process 3.3
update
delete process 3.1
delete
email
query
CRUD process 3.0
update process 3.2
make change
chat
login
validate input
authentication input
check data
query
query
make change
query
make change
delete
login process 1.2
validation process 1.1
Authentication process 1.0
database
validate request
authentication request
data response
communication process 4.0
add
doctor
email 2.4
set Appointment
finish appointment 2.0
visit patient
upload process 2.2
finish Appointment 2.1
send Receptionist user Email 2.3

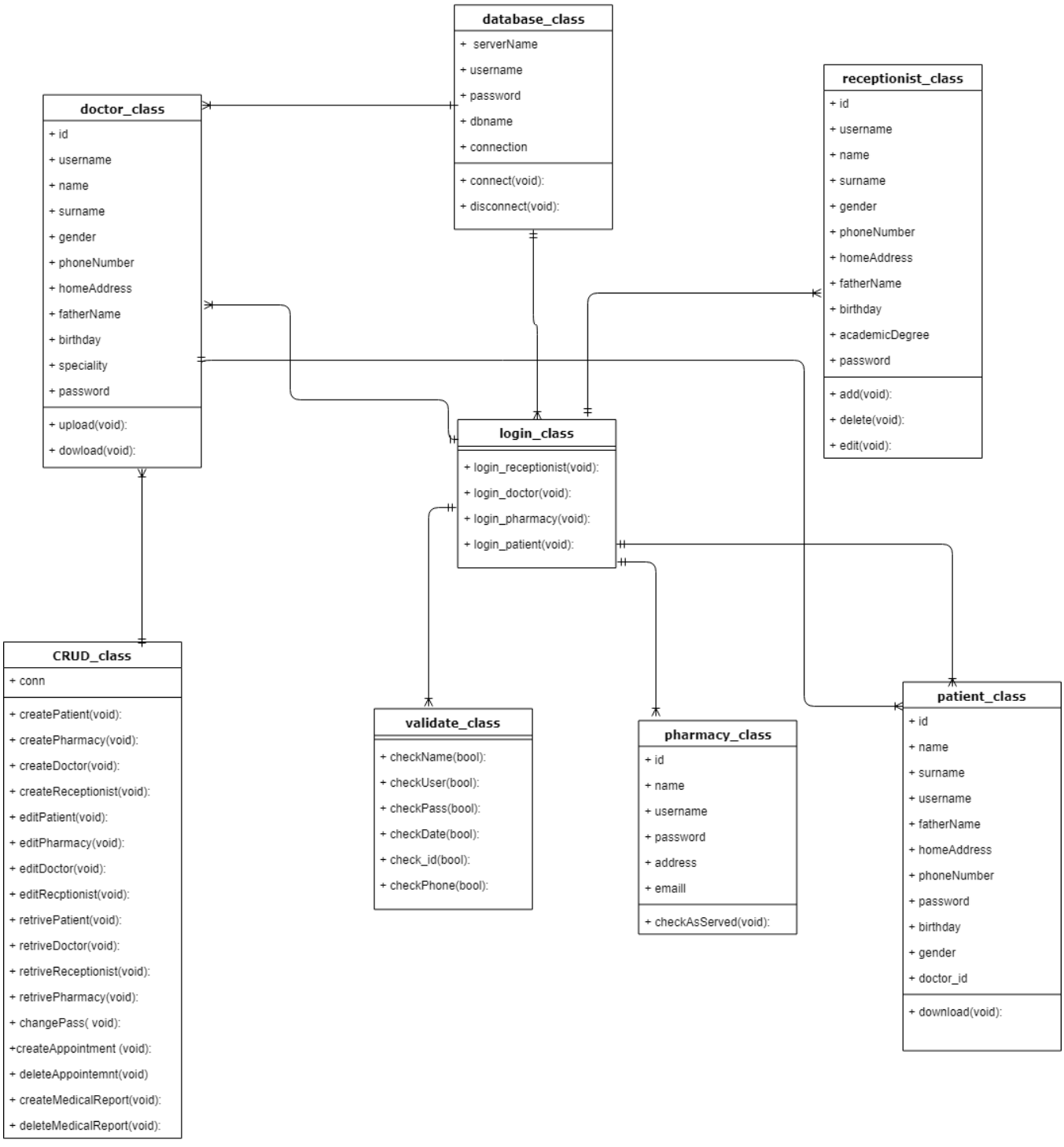
ENTITY RELATION DIAGRAM



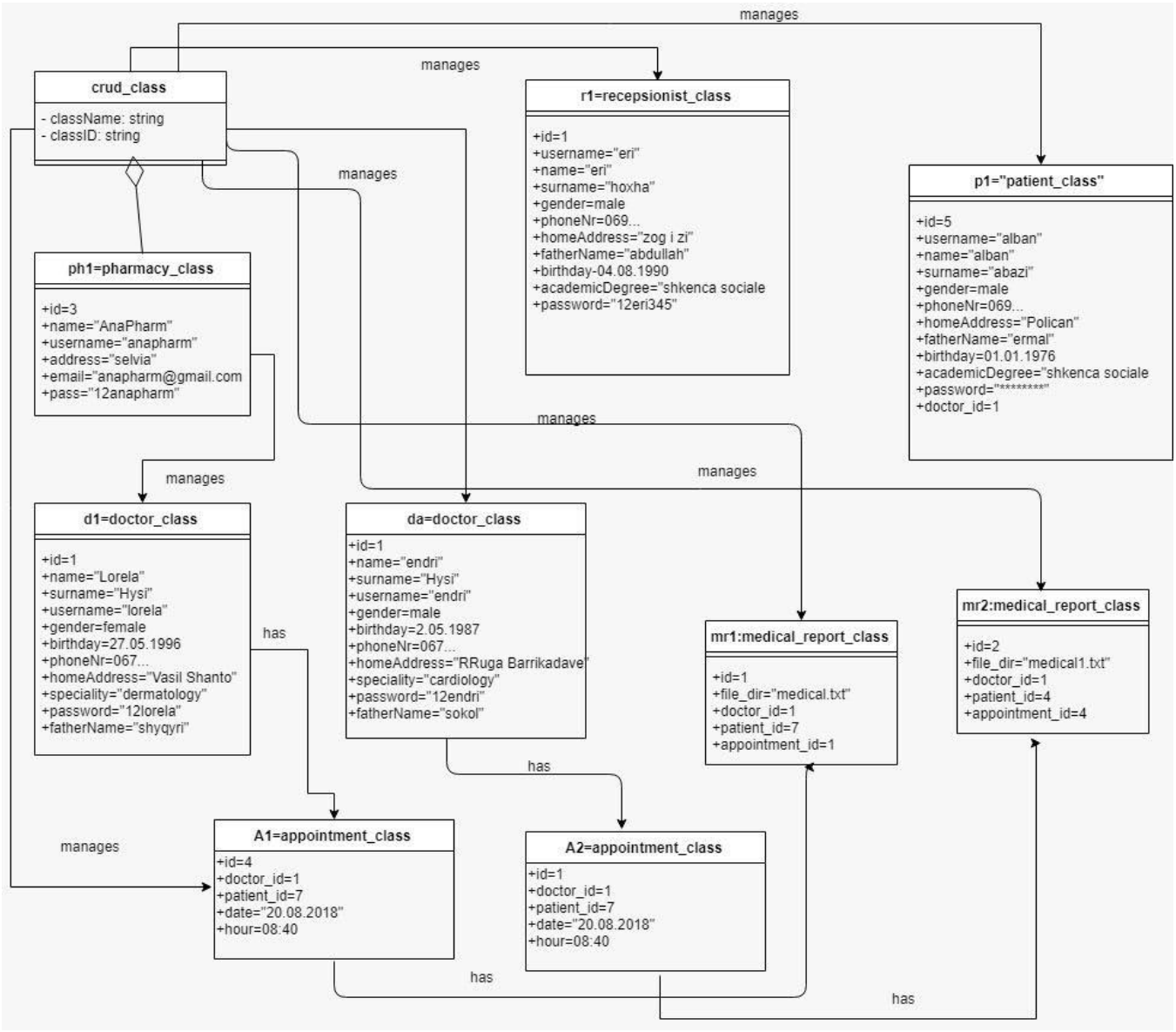
DB Schema


Medical Report
PK id
FK1 patient_id
FK1 doctor_id
description
file_dir
Receptionist
PK id
name
surname
username
gender
password
birthday
academicDegree
fatherName
phoneNumber
homeAddress
ChatMessage
PK id
chat_message_id
FK1 to_user_id
FK1 from_user_id
chat_message
timestramp
status
Login
PK id
user_id
username
password
Doctor
PK id
name
surname
username
password
fatherName
birthday
specialty
phoneNumber
homeAddress
Pharmacy
PK id
name
username
password
address
email
Login_details
PK login_details_id
FK1 user_id
last_activity
is_type
Appointment
PK id
FK1 patient_id
date
hour
FK1 doctor_id
Patient
PK id
FK1 doctor_id
name
surname
username
password
gender
fatherName
phoneNumber
homeAddress
Prescrioption
PK id
FK1 doctor_id
FK1 patient_id
FK1 parmacy_id
served
Text

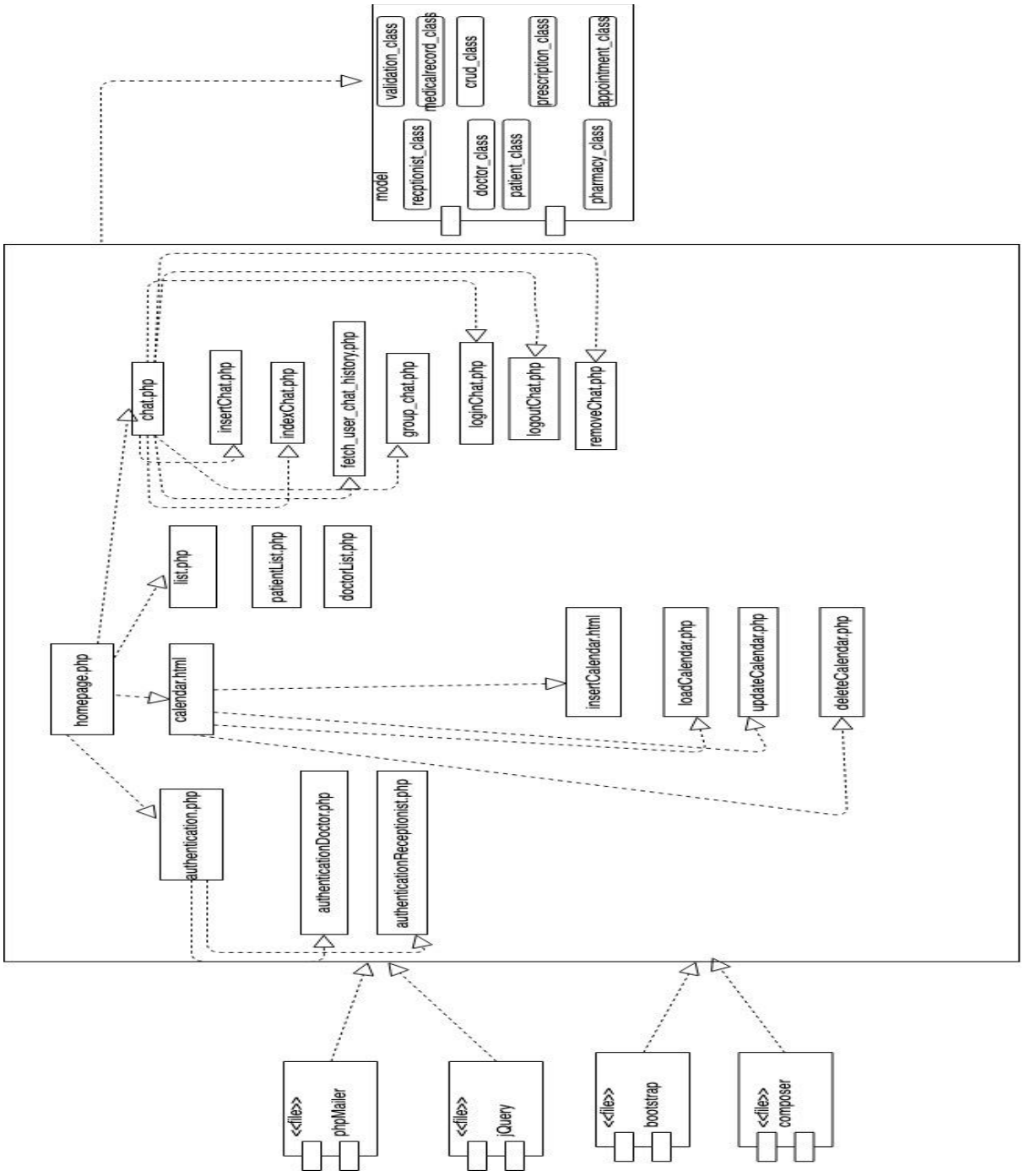
CLASS


database_class
+ serverName
+ username
+ password
+ dbname
+ connection
+ connect(void):
+ disconnect(void):
doctor_class
+ id
+ username
+ name
+ surname
+ gender
+ phoneNumber
+ homeAddress
+ fatherName
+ birthday
+ speciality
+ password
+ upload(void):
+ dowload(void):
receptionist_class
+ id
+ username
+ name
+ surname
+ gender
+ phoneNumber
+ homeAddress
+ fatherName
+ birthday
+ academicDegree
+ password
+ add(void):
+ delete(void):
+ edit(void):
login_class
+ login_receptionist(void):
+ login_doctor(void):
+ login_pharmacy(void):
+ login_patient(void):
CRUD_class
+ conn
+ createPatient(void):
+ createPharmacy(void):
+ createDoctor(void):
+ createReceptionist(void):
+ editPatient(void):
+ editPharmacy(void):
+ editDoctor(void):
+ editRecptionist(void):
+ retrivePatient(void):
+ retriveDoctor(void):
+ retriveReceptionist(void):
+ retrivePharmacy(void):
+ changePass(void):
+createAppointment (void):
+ deleteAppointemnt(void)
+ createMedicalReport(void):
+ deleteMedicalReport(void):
validate_class
+ checkName(bool):
+ checkUser(bool):
+ checkPass(bool):
+ checkDate(bool):
+ check_id(bool):
+ checkPhone(bool):
pharmacy_class
+ id
+ name
+ username
+ password
+ address
+ emaill
+ checkAsServed(void):
patient_class
+ id
+ name
+ surname
+ username
+ fatherName
+ homeAddress
+ phoneNumber
+ password
+ birthday
+ gender
+ doctor_id
+ download(void):

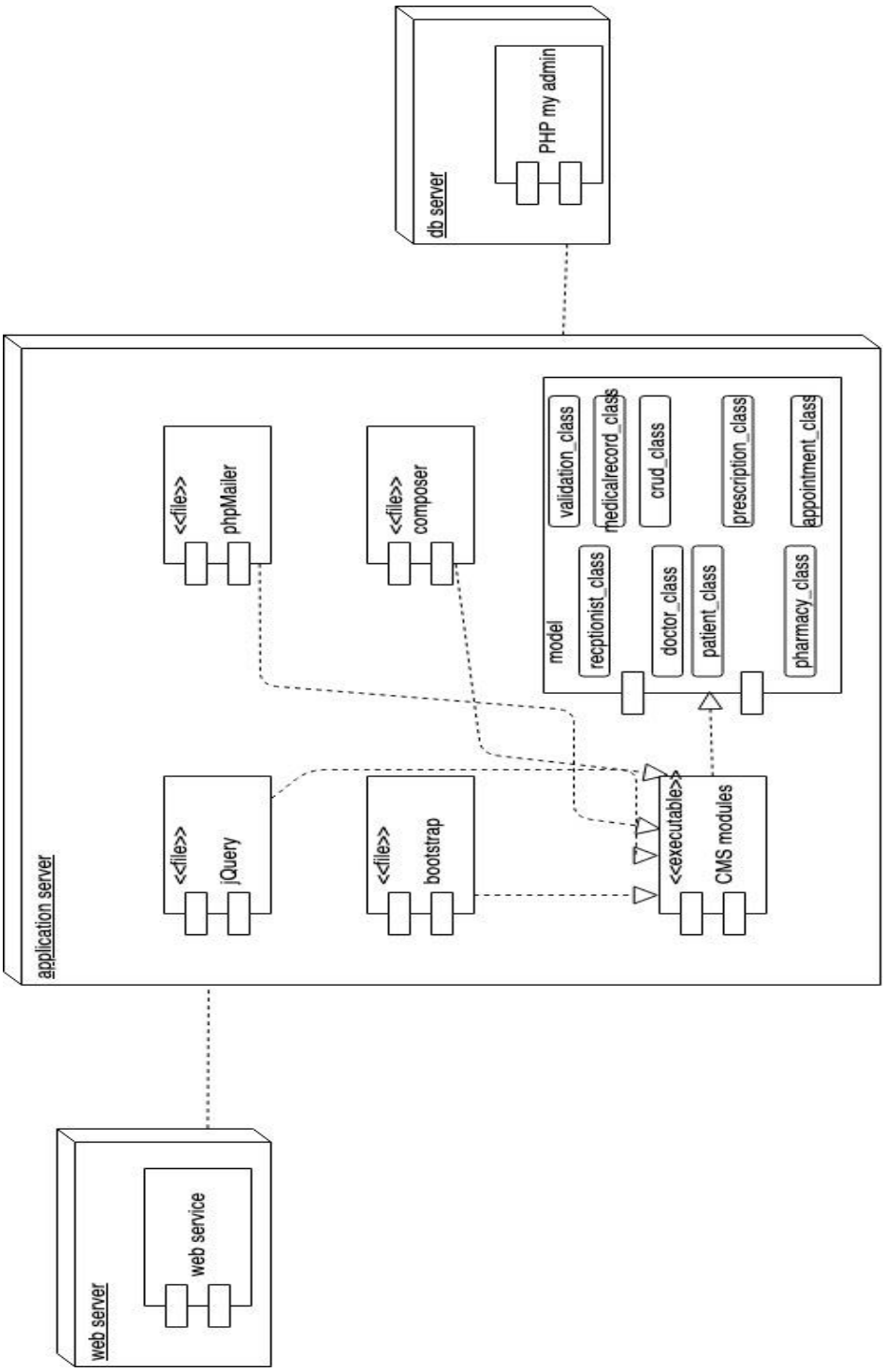
OBJECT DIAGRAM



COMPONENT DIAGRAM



DEPLOYMENT DIAGRAM



5. Implementation Technology

CMS is a dynamic Web Application. For the creation of this software, we have combined Client Side Scripting and Server Side Scripting. The communication between the client and the server will take place via HTTP protocol.

For the Client Side Scripting we have used the following technologies:

- HTML 5 (HyperText Markup Language)
- CSS 3 (Cascading Style Sheets)
- JavaScript
- jQuery (JavaScript Framework Library)
- Bootstrap

For the interfaces of users and for the main page we have used some open source templates.We have made the necessary changes to this template in order to make it similar with what we had planned before.

For the Server Side Scripting, we have used PHP. This allows the users to interact with the software and with each other. We have even used the OOP.

To administrate MySQL over the web, phpMyAdmin has been used. The database that we have created for this Web Application can be found in the Epoka University Server:

http://stud-proj.epoka.edu.al/phpmyadmin/

In the same server, you can also find the entire project (Web Application) under a personal account:

http://stud-proj.epoka.edu.al/~pnako16/

This project is also published in github, where you can find the step by step procedure of the creation of this project (diagrams, designs, requirements, meeting reports, personal logs, etc.):

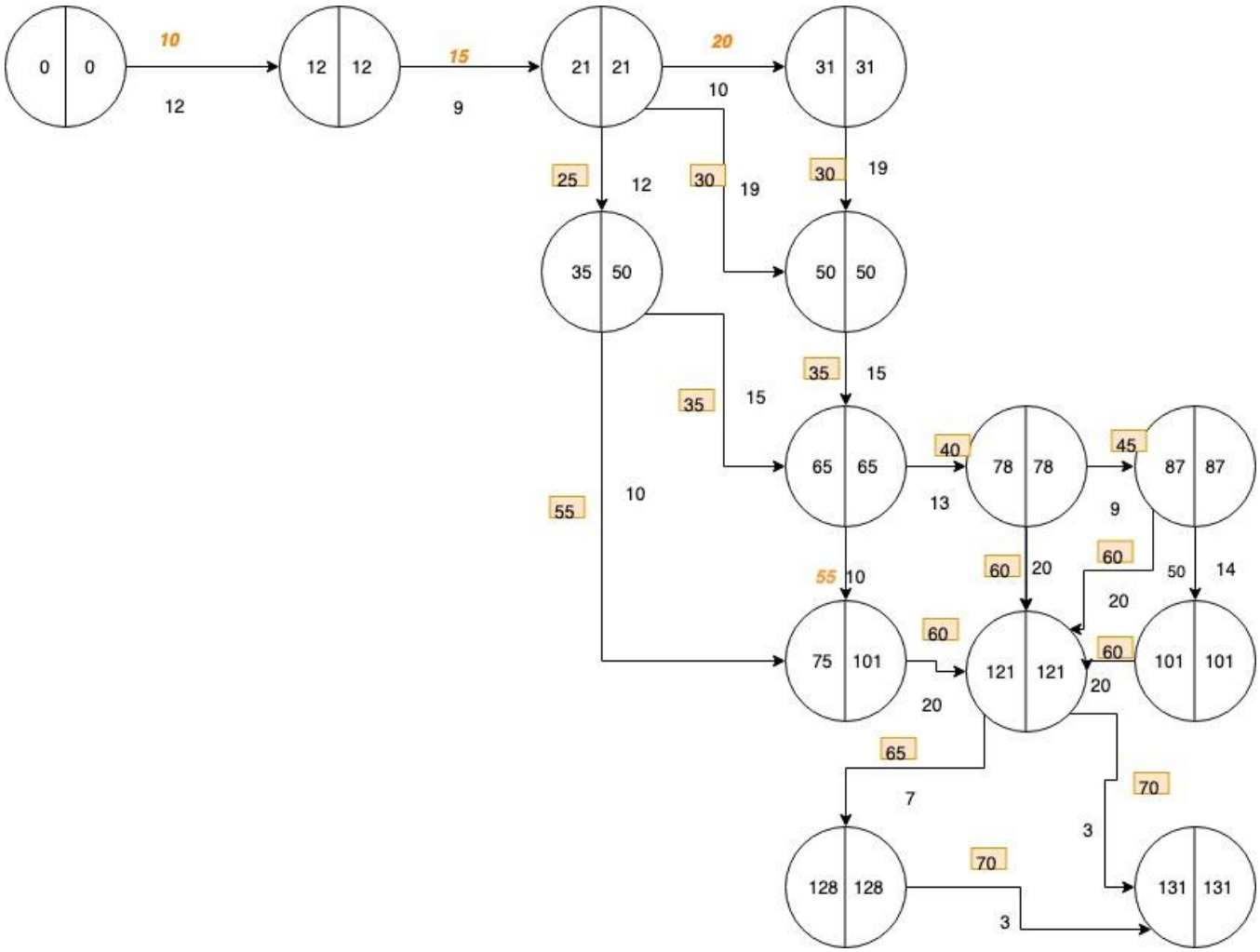
https://github.com/Pnako16/CMS

6.PROJECT PLANNING

Project Name: CMS (Clinic Management System)
Members: Pironada Nako , Keti Hysi , Xhensila Hysi, Gerald Jovani , Ardit Gega.
Real start and end days : 04.03.2019 – 05.06.2019
Estimated start end end days: 04.03.2019 – 04.08.2019
Real total days: 85 days
Estimated total days: 155 days

Nr	Activity	Duration(days)	Dependencies
10	Proposed topics	12	-
15	Research	9	10
20	Project Description	10	15
25	Sketches on paper	12	15
30	Requirements	19	15,20
35	User Scenarios, Use cases	15	25,30
40	Activity Diagram State Diagram DFD ERD	13	35
45	Sequence Diagram Collaboration Diagram	9	40
50	Class Diagram Object Diagram Component Diagram Deployment Diagram	14	45
55	Detailed Design	10	25,35
60	Coding	20	40,45,50,55
65	Testing	7	60
70	Opening on Web	3	60,65

Networks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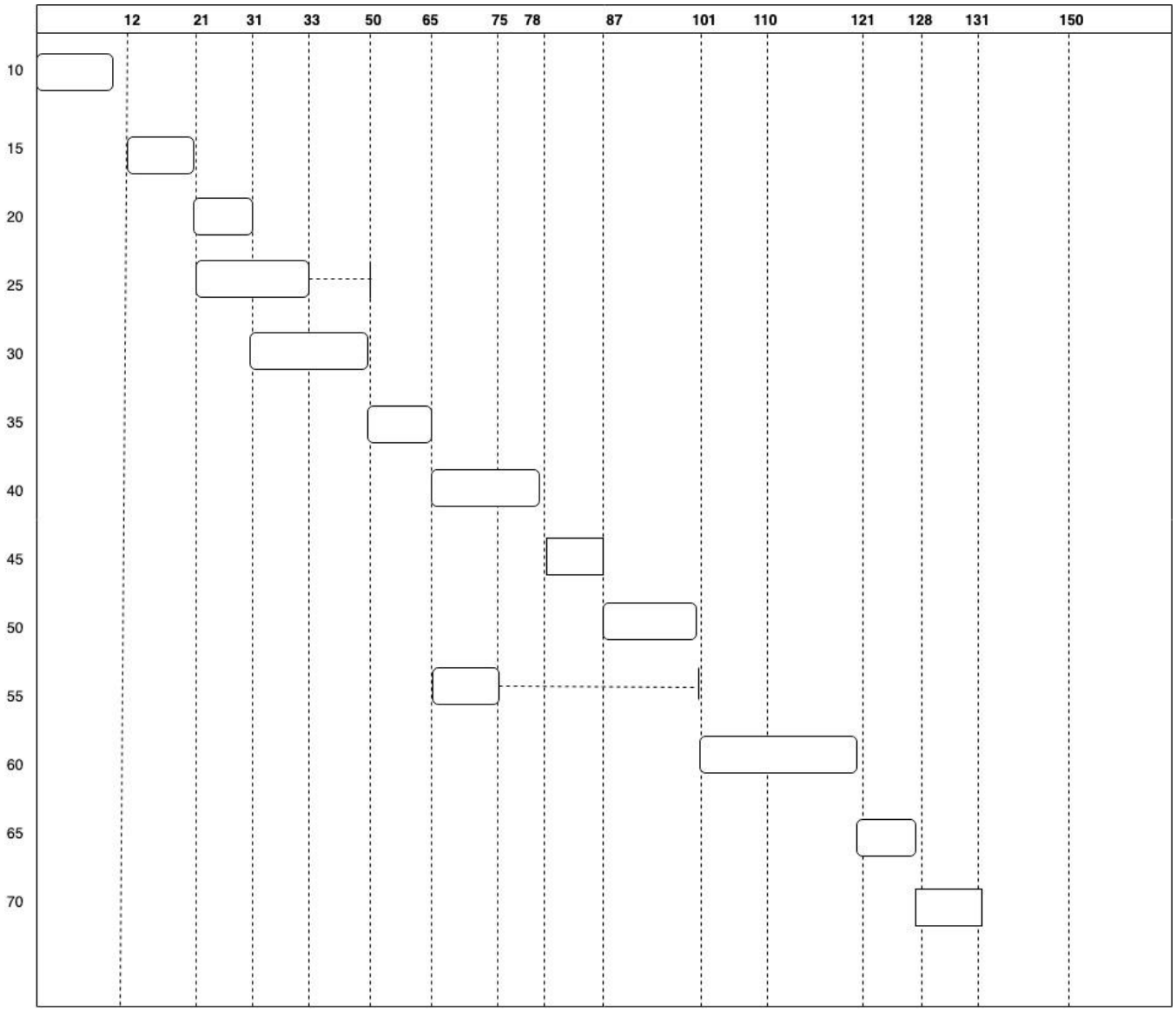
131 131

Gantt Chart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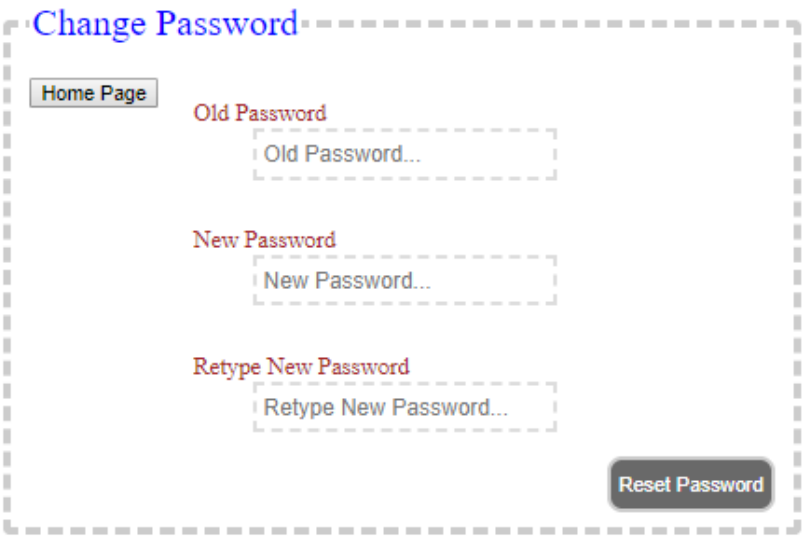
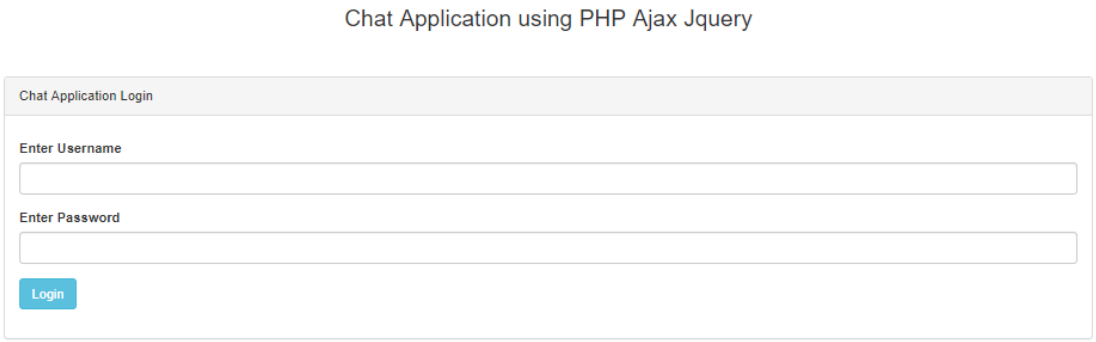
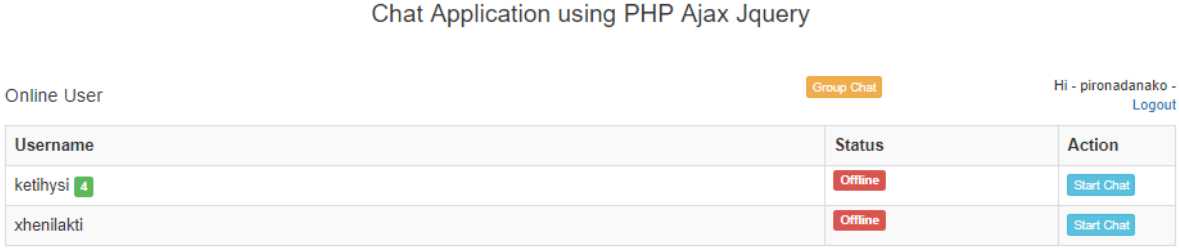
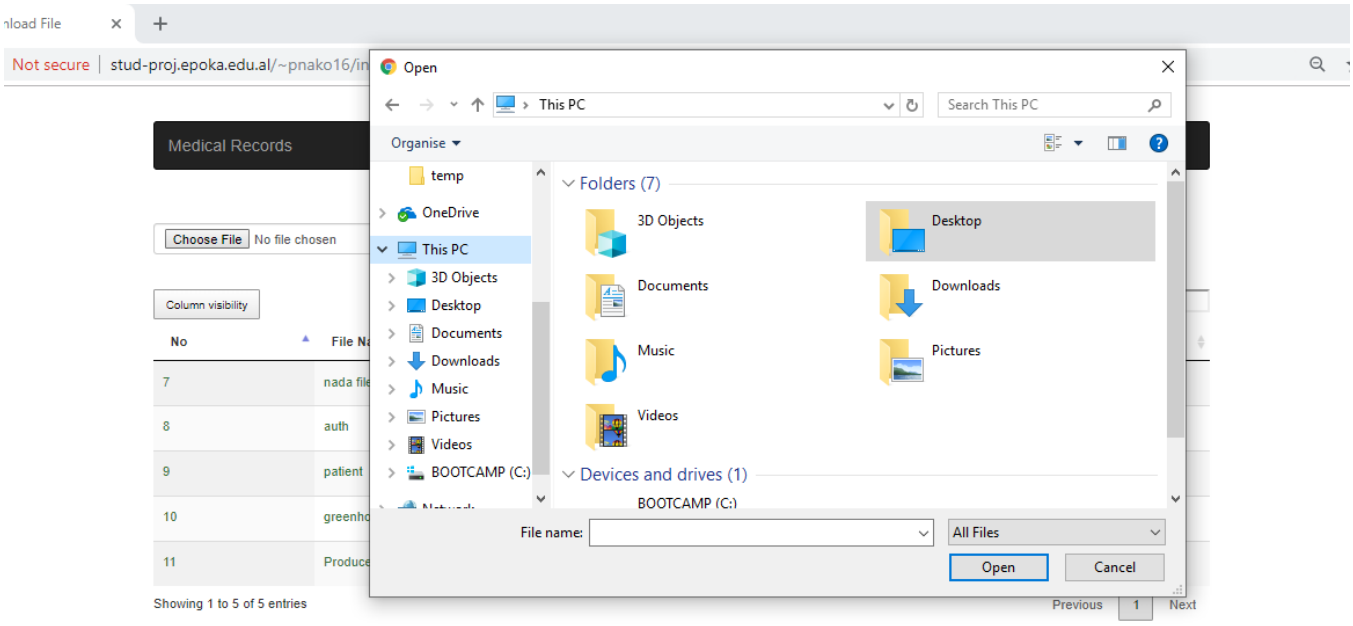
SCREENSHOTS








Not secure | stud-proj.epoka.edu.al/~pnako16/in
Medical Records
Choose File No file chosen
Column visibility
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Showing 1 to 5 of 5 entries
Previous
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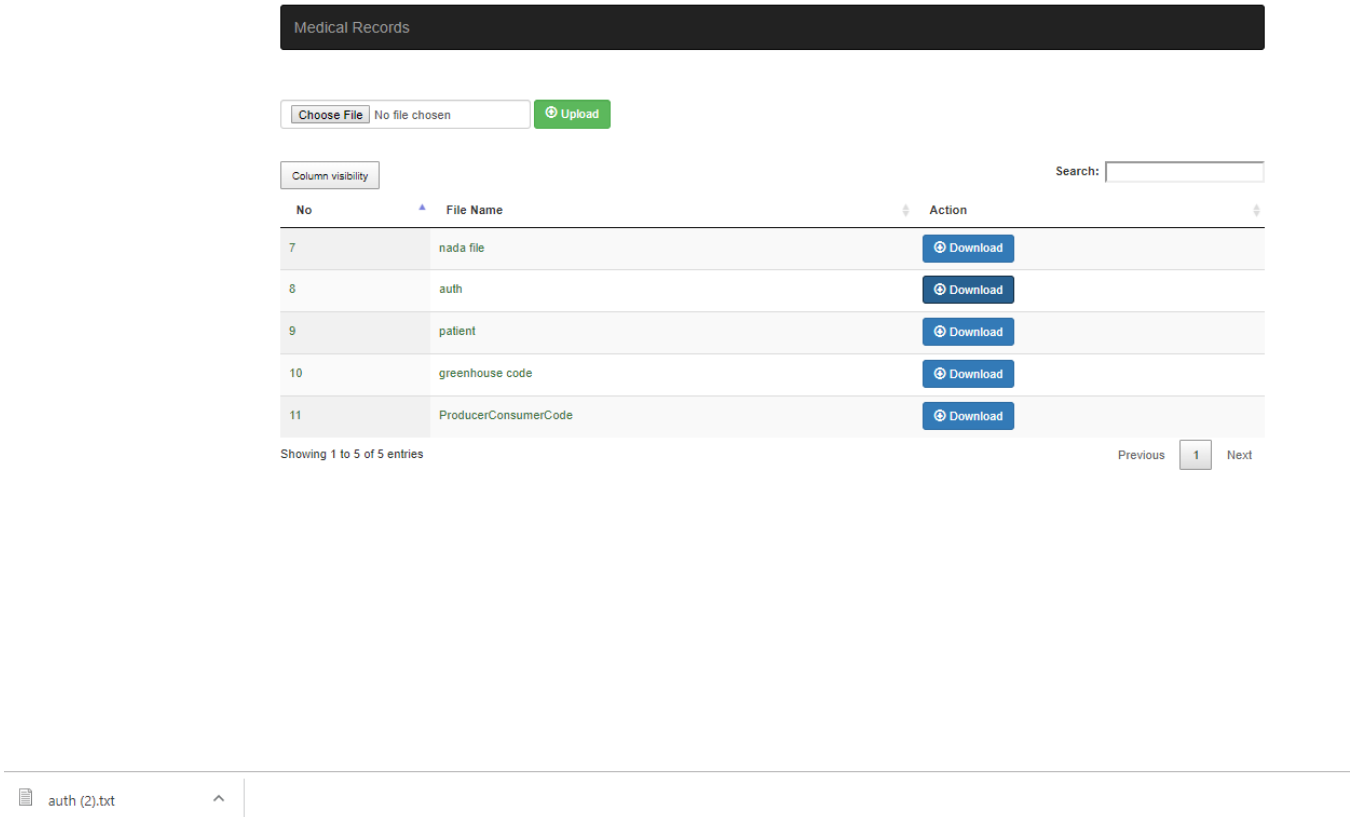
Next
Open
This PC
Search This PC
Organise
temp
OneDrive
This PC
3D Objects
Desktop
Documents
Downloads
Music
Pictures
Videos
BOOTCAMP (C:)
Folders (7)
3D Objects
Desktop
Documents
Downloads
Music
Pictures
Videos
Devices and drives (1)
BOOTCAMP (C:)
File name:
All Files
Open
Cancel


Medical Records
Choose File No file chosen
Upload
Column visibility
Search:
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File Name
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nada file
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8
auth
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9
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10
greenhouse code
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11
ProducerConsumerCode
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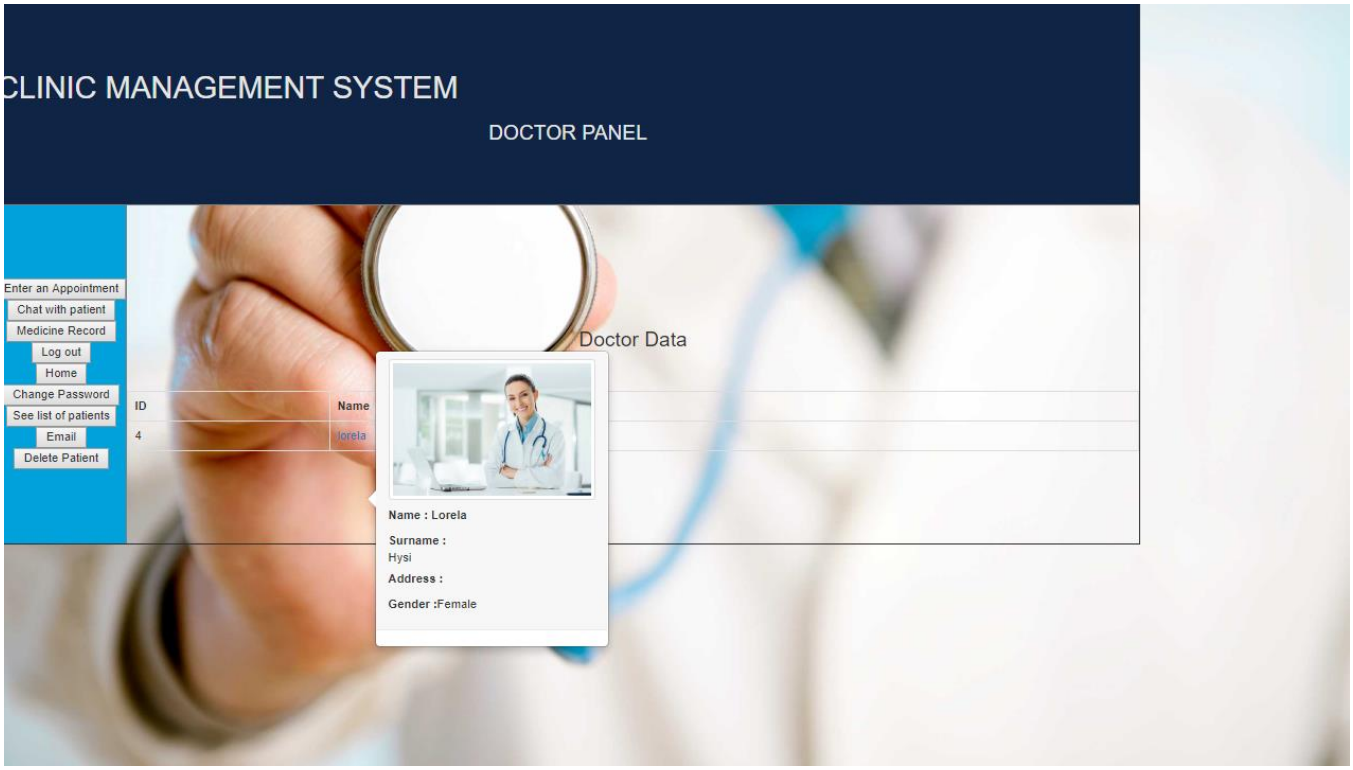
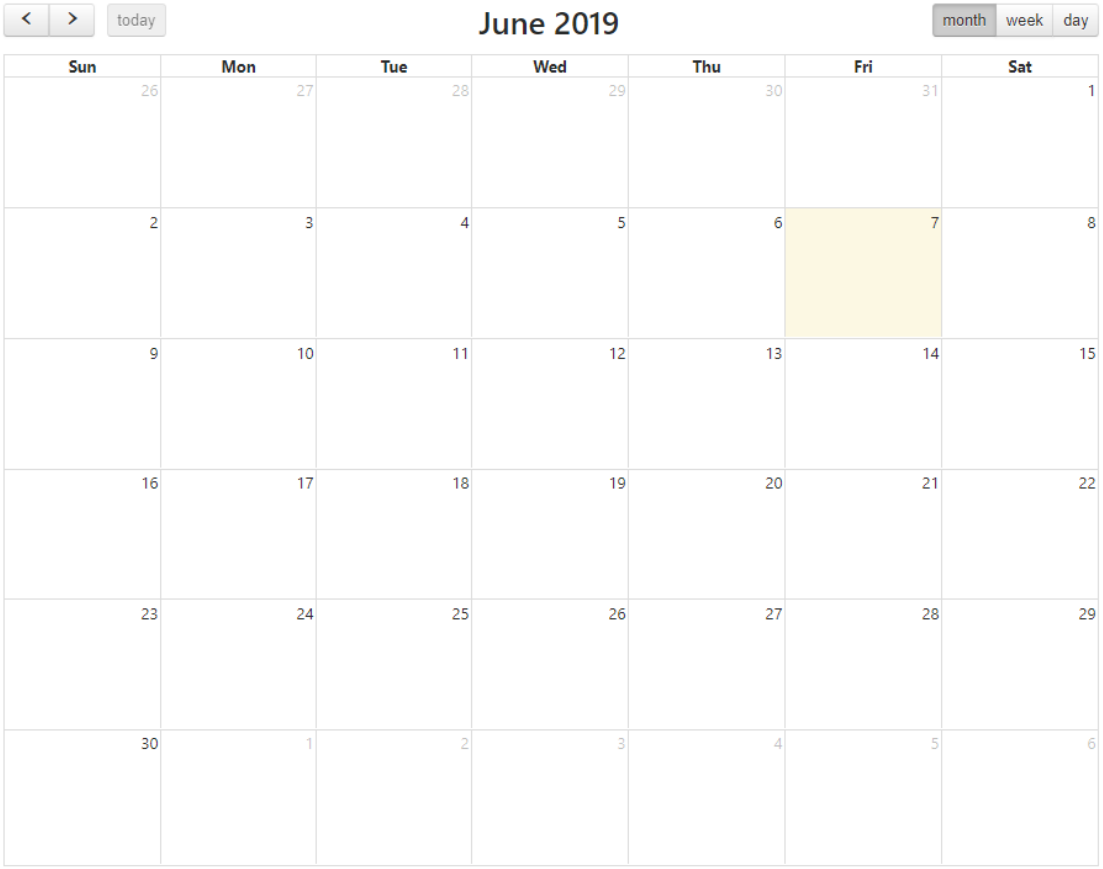
Showing 1 to 5 of 5 entries
Previous
1
Next
auth (2).txt


CLINIC MANAGEMENT SYSTEM
DOCTOR PANEL
Enter an Appointment
Chat with patient
Medicine Record
Log out
Home
Change Password
See list of patients
Email
Delete Patient
Doctor Data
ID
Name
4
lorela
Name : Lorela
Surname :
Hysi
Address :
Gender :Female


today
June 2019
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week
day
Sun
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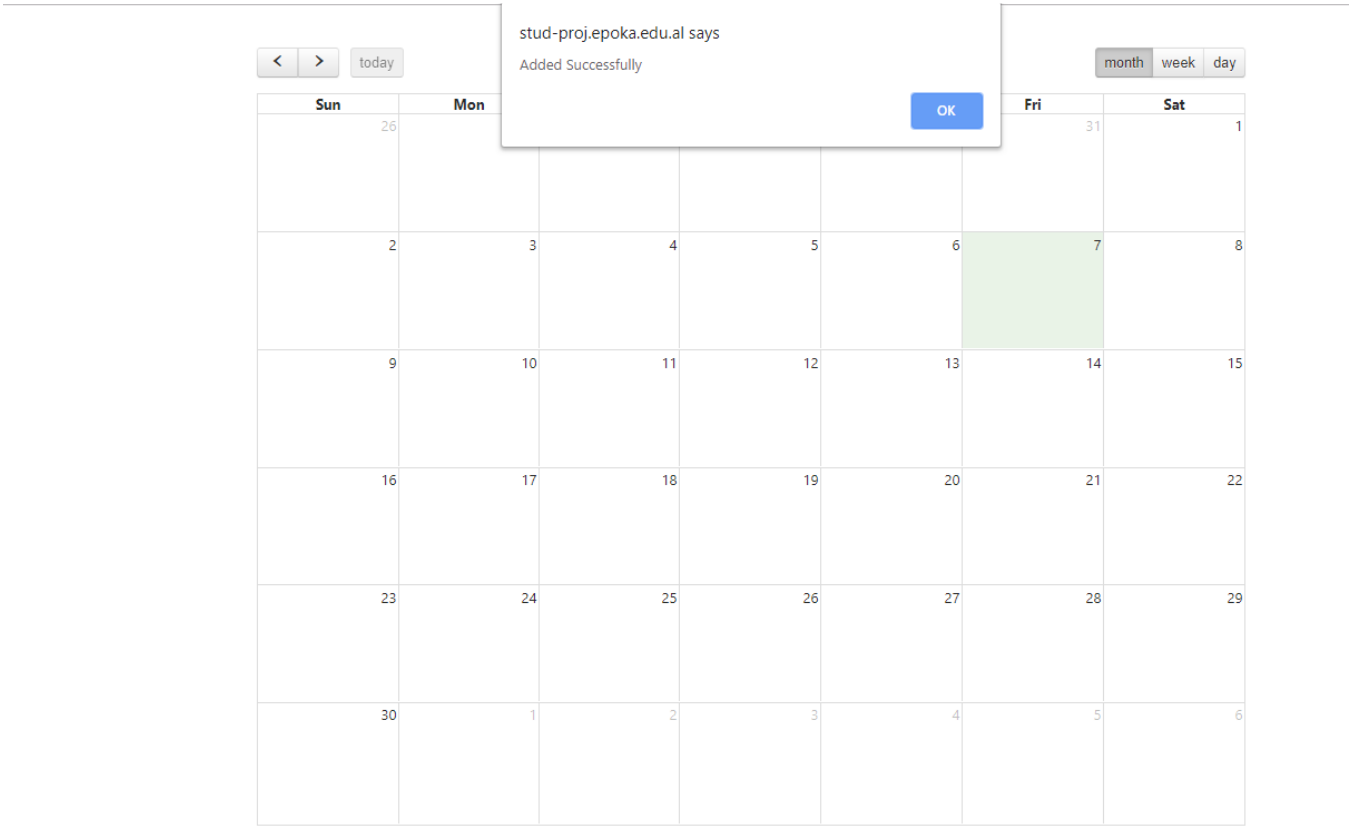
Tue
Wed
Thu
Fri
Sat


stud-proj.epoka.edu.al says
Added Successfully
OK
today
month
week
day
Sun
Mon
Fri
Sat

Chat Application using PHP Ajax Jquery

Online User

Group Chat

Hi - pironadanako - Logout

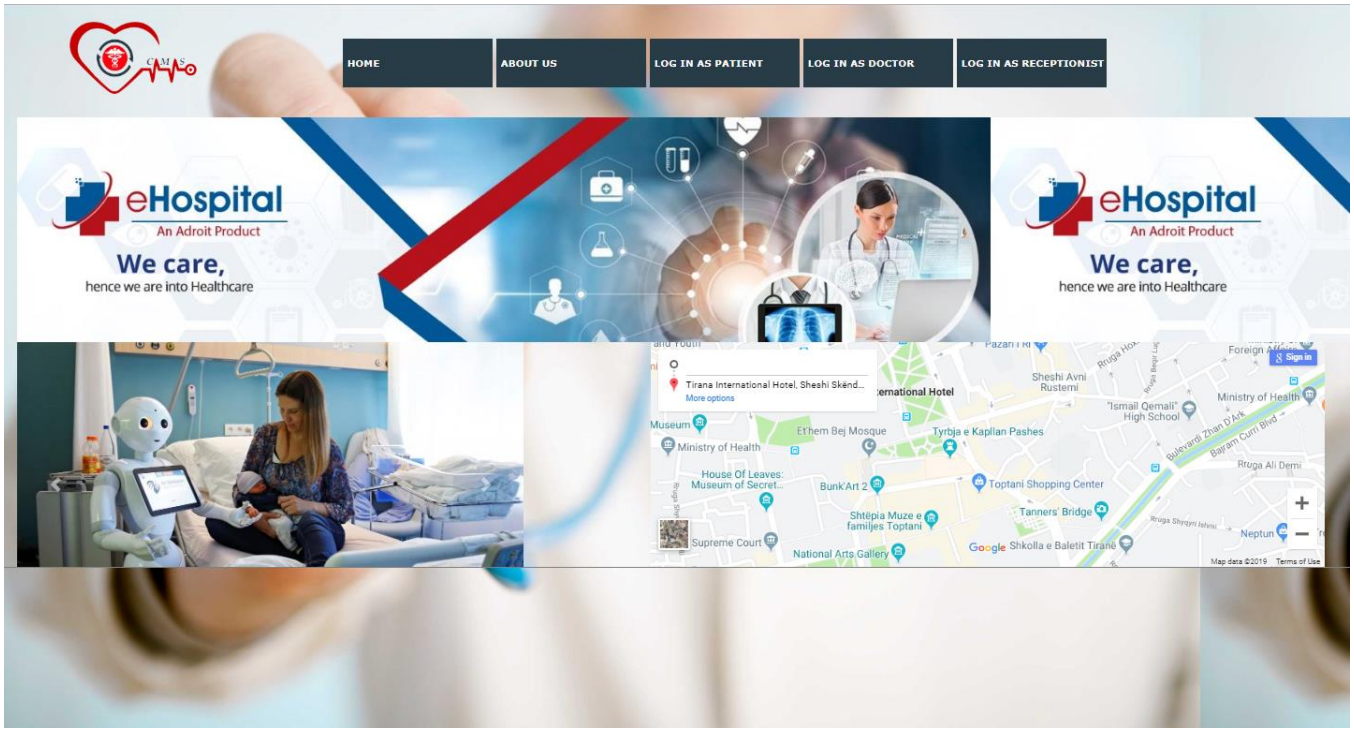
Username	Status	Action
ketihysi 2	Offline	Start Chat
xhenilakti	Offline	Start Chat

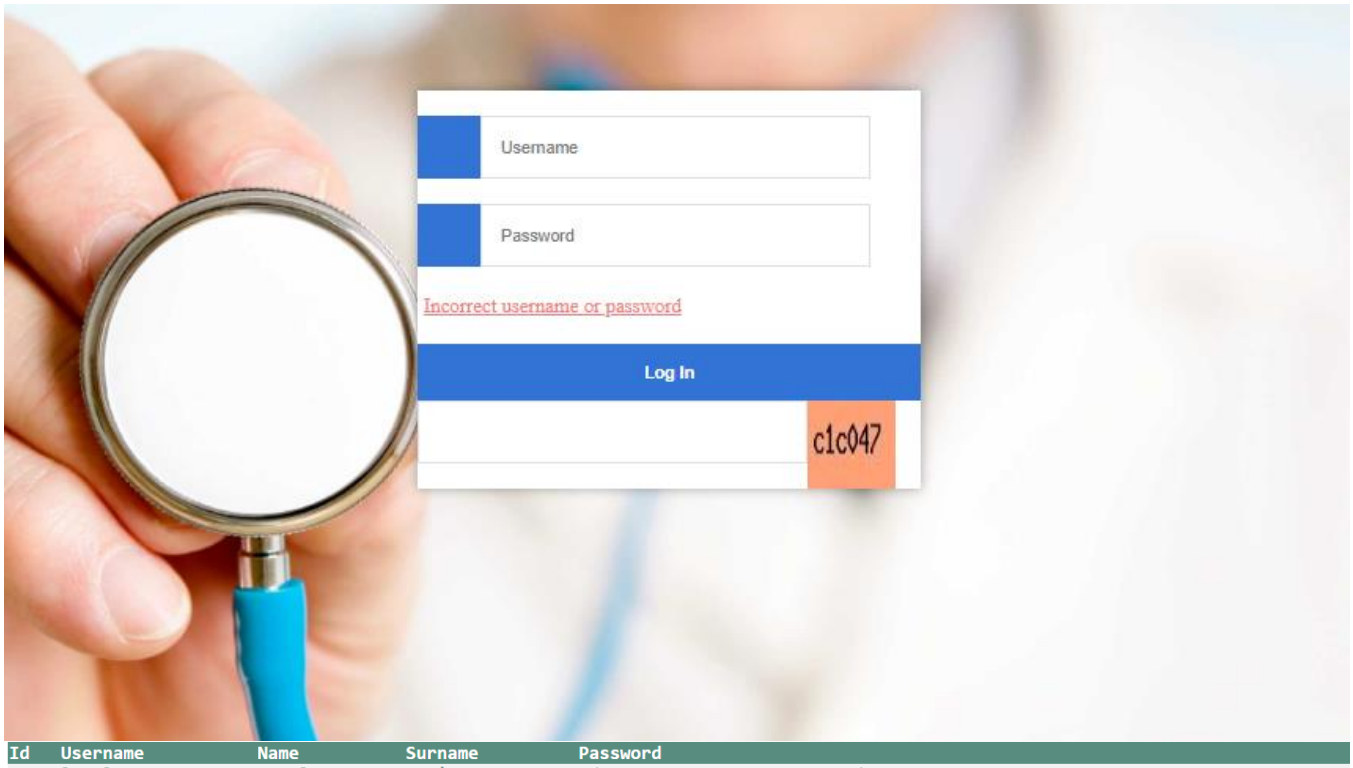
Group Chat Window

x You - hello

- 2019-06-07 11:24:29

Send





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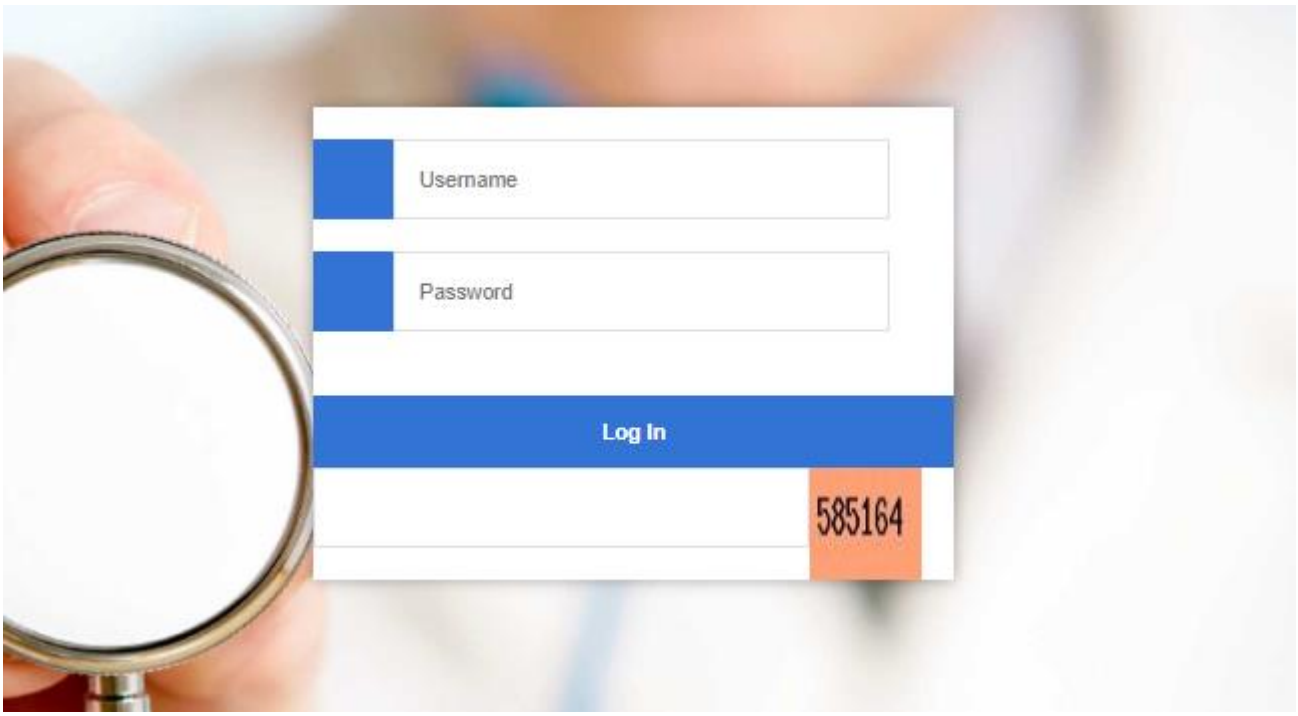
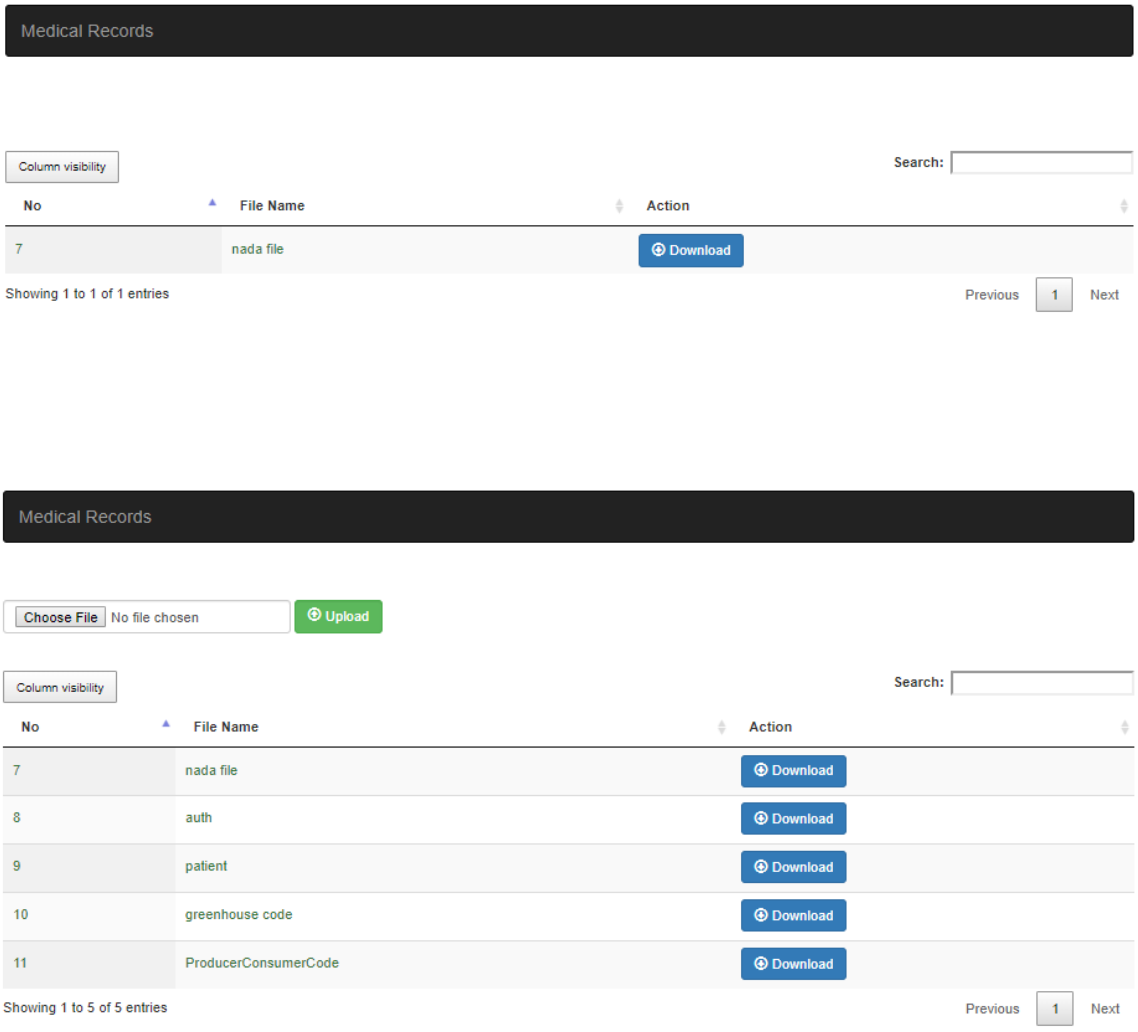
4	lorela	Lorela	Hysi	8dc911aaac3c2c4ec304e8c0e64b5951
6	shaban	Shaban	Dhima	201266726f8b8e2da5d8c7d42f7693cc

Id	Username	Name	Surname
2	nada	Pironada	Nako
5	ana	Ana	Lelo
7	dalina	Dalina	Marku




Medical Records
Column visibility
Search:
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File Name
Action
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nada file
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Showing 1 to 1 of 1 entries
Previous
1
Next
Medical Records
Choose File
No file chosen
Upload
Column visibility
Search:
No
File Name
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7
nada file
Download
8
auth
Download
9
patient
Download
10
greenhouse code
Download
11
ProducerConsumerCode
Download
Showing 1 to 5 of 5 entries
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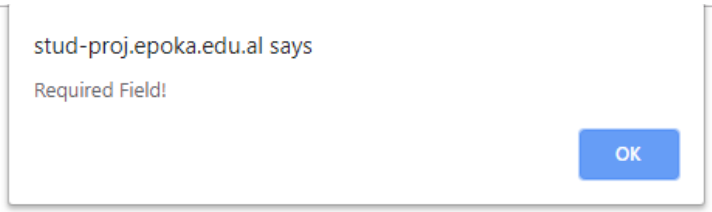
Next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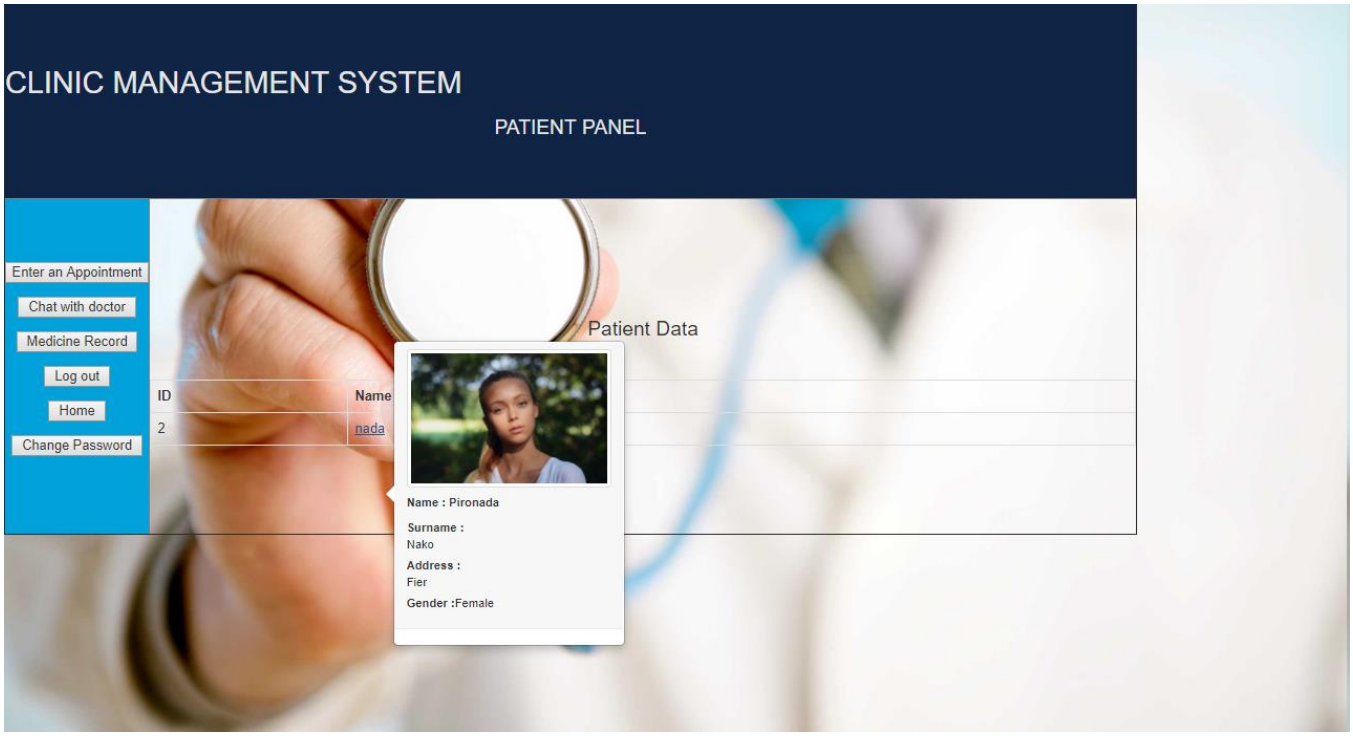
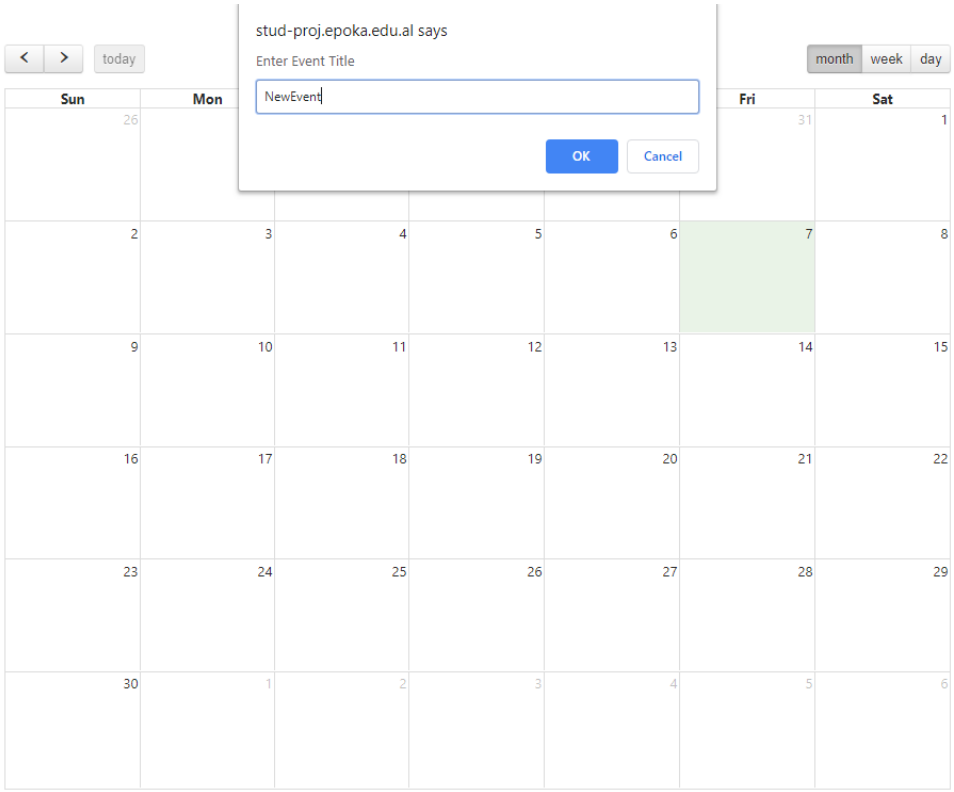
Required Field!
OK


CLINIC MANAGEMENT SYSTEM
PATIENT PANEL
Enter an Appointment
Chat with doctor
Medicine Record
Log out
Home
Change Password
Patient Data
ID
Name
2
nada
Name : Pironada
Surname :
Nako
Address :
Fier
Gender :Female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Enter Event Title
NewEvent
OK
Cancel
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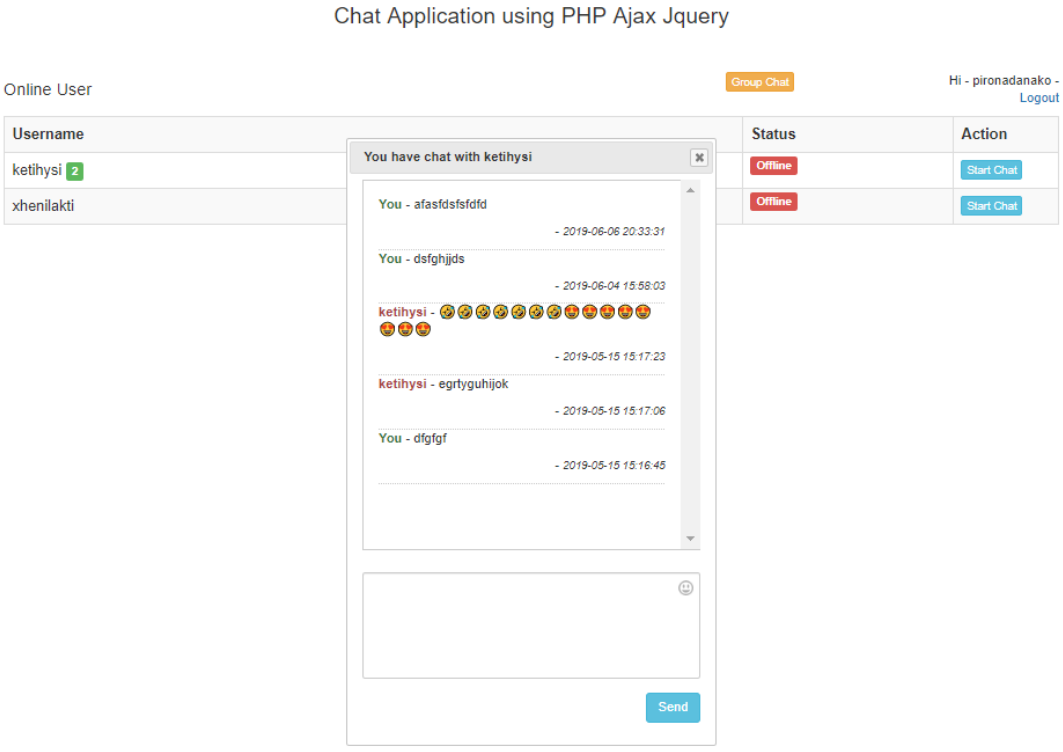
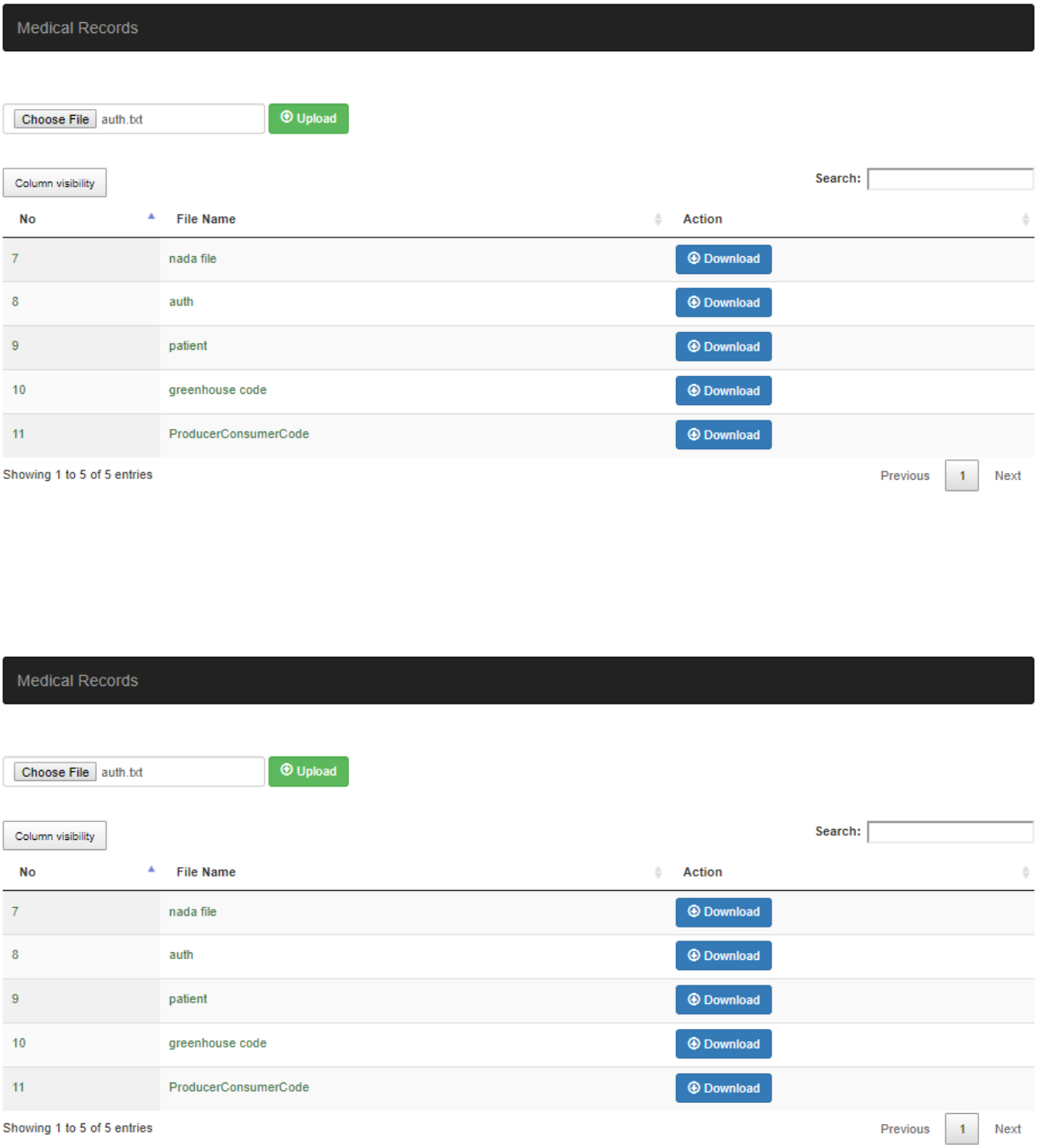
Sat


Chat Application using PHP Ajax Jquery
Online User
Group Chat
Hi - pironadanako -
Logout
Username
Status
Action
ketihysi 2
Offline
Start Chat
xhenilakti
Offline
Start Chat
You have chat with ketihysi
You - afasfdsfsfdfd
- 2019-06-06 20:33:31
You - dsfghjjds
- 2019-06-04 15:58:03
ketihysi -
- 2019-05-15 15:17:23
ketihysi - egrtyguhijok
- 2019-05-15 15:17:06
You - dfgfgf
- 2019-05-15 15:16:45
Send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ProducerConsumerCode
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Medical Records
Choose File
auth.txt
Upload
Column visibility
Search:
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greenhouse code
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ProducerConsumerCode
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Showing 1 to 5 of 5 entries
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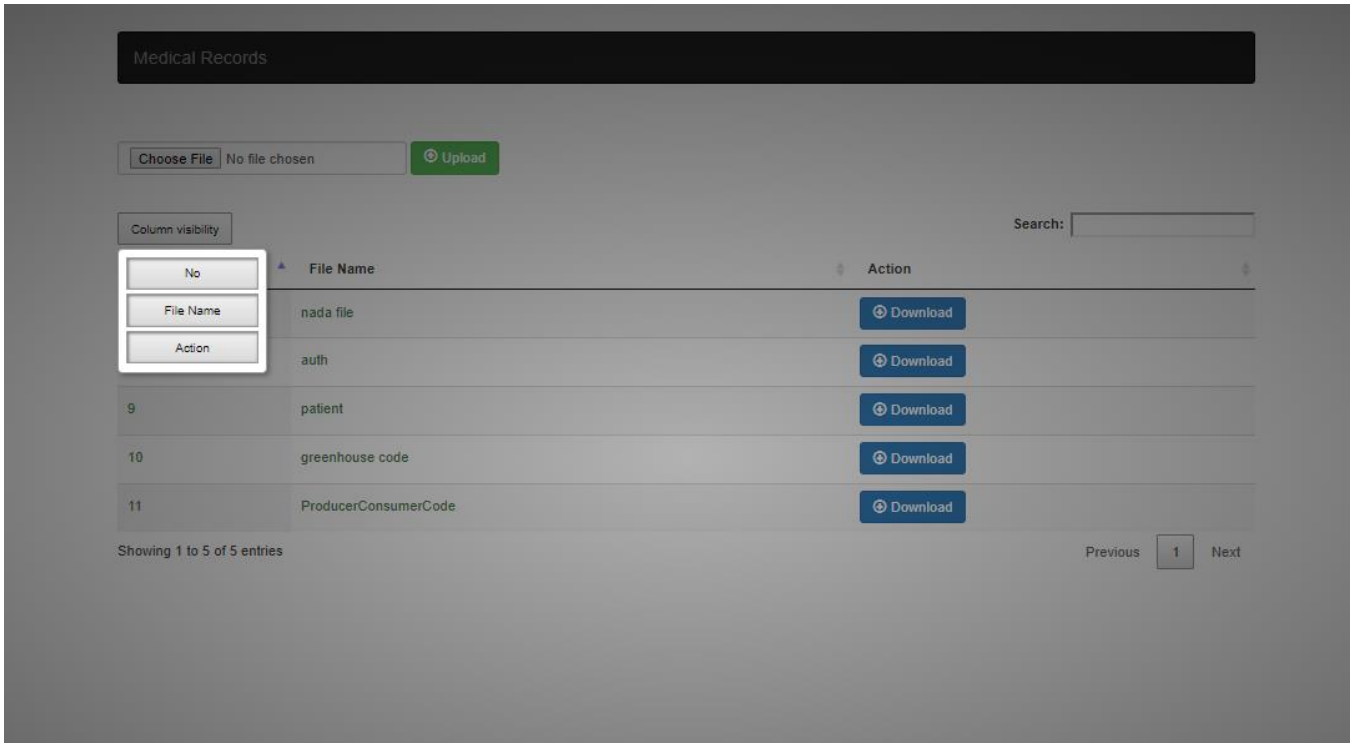
Medical Records
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Column visibility
Search:
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File Name
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Download
Showing 1 to 5 of 5 entries
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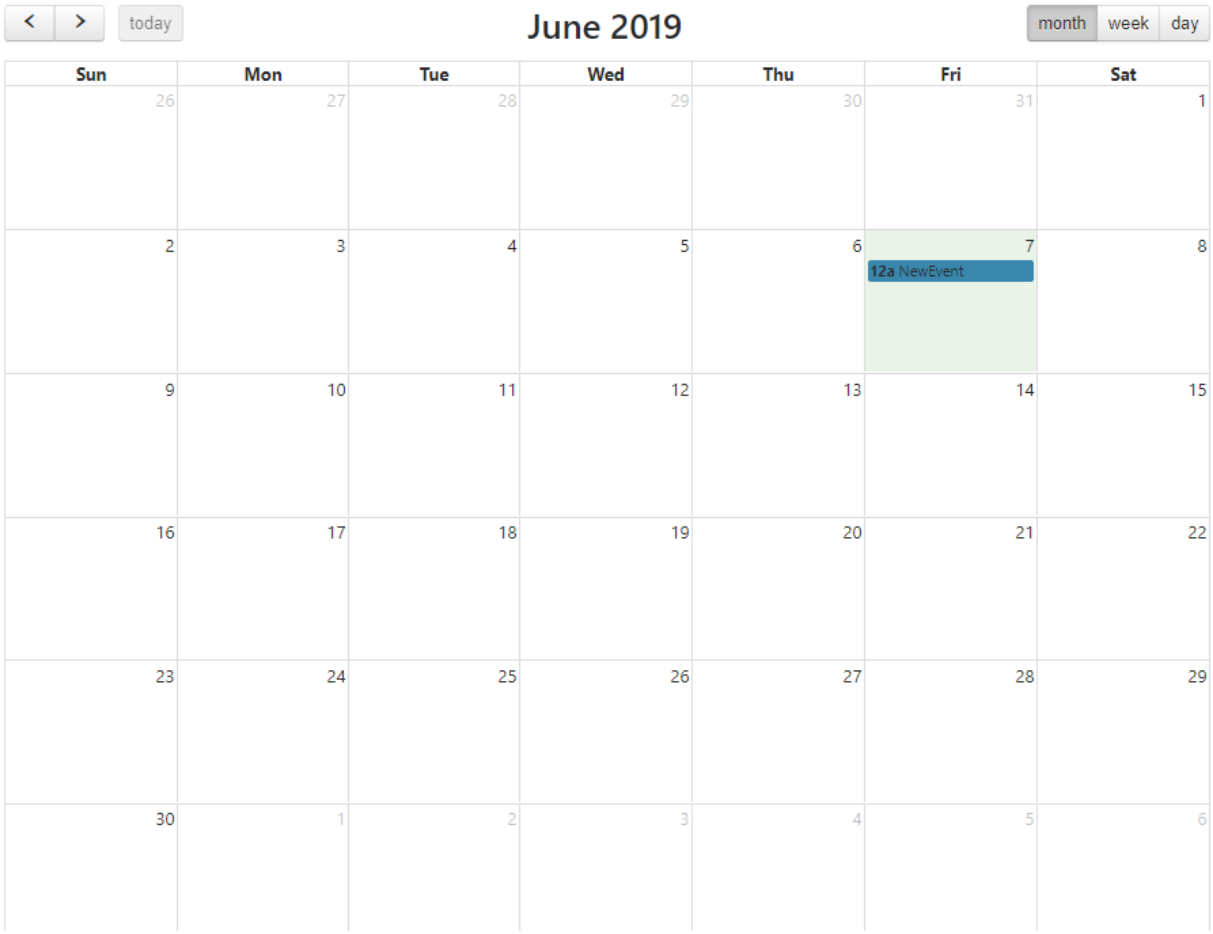
Next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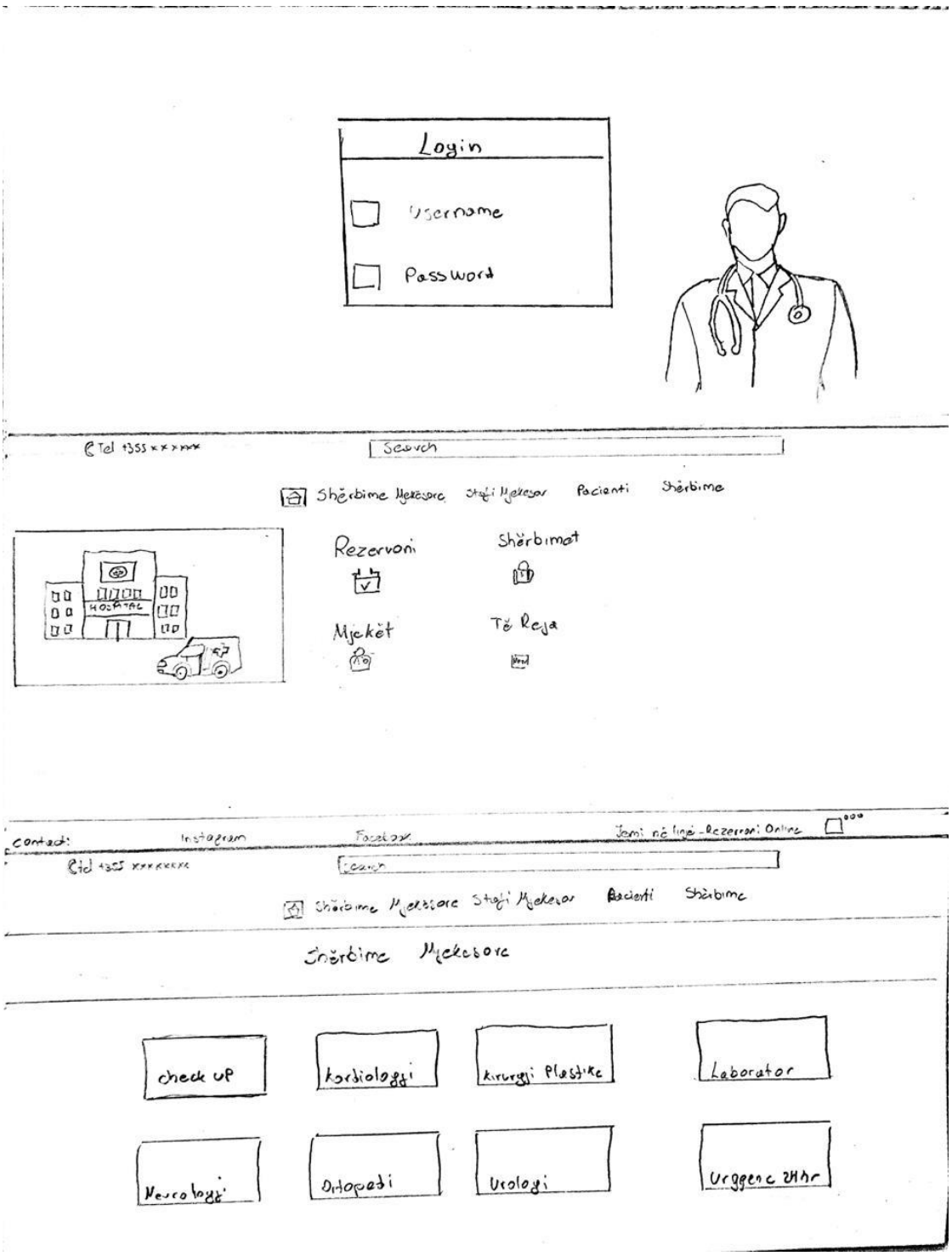
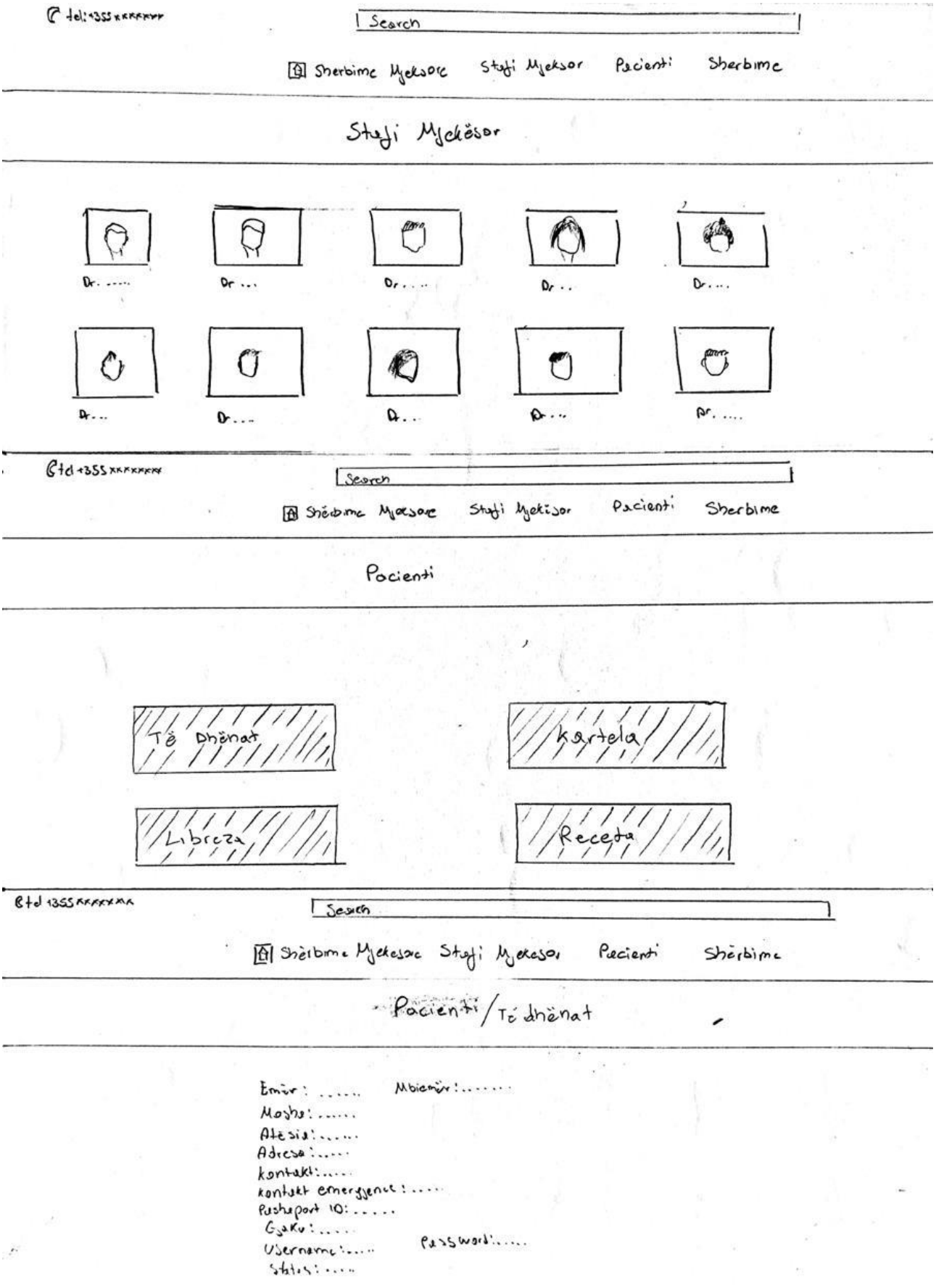
12a NewEvent

APPENDIX

Sketches




tel:+355 xxxxxxx
Search
Shërbime Mjekesor
Stafi Mjeksor
Pacienti
Sherbime
Stafi Mjekësor
Dr. .....
Dr ...
Dr. ...
Dr ..
Dr. ...
Dr...
Dr...
Dr...
Dr...
Dr. ....
tel +355 xxxxxxx
Search
Shërbime Mjekesor
Stafi Mjekesor
Pacienti
Sherbime
Pacienti
Të dhënat
kartela
Liberza
Receta
tel +355 xxxxxxx
Search
Shërbime Mjekesor
Stafi Mjekesor
Pacienti
Shërbime
Pacienti / Të dhënat
Emër: .....
Mbiemër: .....
Moshe: .....
Atesia: .....
Adresa: .....
kontakti: .....
kontakt emergjence: .....
Pashaport ID: .....
Gjaku: .....
Username: .....
Password: .....
Status: .....

Search

Shërbime Mjekësore Stafi Mjekësor Pacienti Shërbime

Rezervoni

◄	Mars					►
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

Search

Shërbime Mjekësore Stafi Mjekësor Pacienti Shërbime

Rezervoni

1	Dr	X
2	Dr	Y
3	Dr	A
4	Dr	D
5	Dr	H
6	Dr	L
7	Dr	ZH

→

01:00 AM	11:00 AM	10:00 PM
02:00 AM	12:00 AM	11:00 PM
03:00 AM	01:00 PM	00:00
04:00 AM	02:00 PM	
05:00 AM	03:00 PM	
06:00 AM	04:00 PM	
07:00 AM	06:00 PM	
08:00 AM	07:00 PM	
09:00 AM	08:00 PM	
10:00 AM	09:00 PM	

Search

Shërbime Mjekësore Stafi Mjekësor Pacienti Shërbime

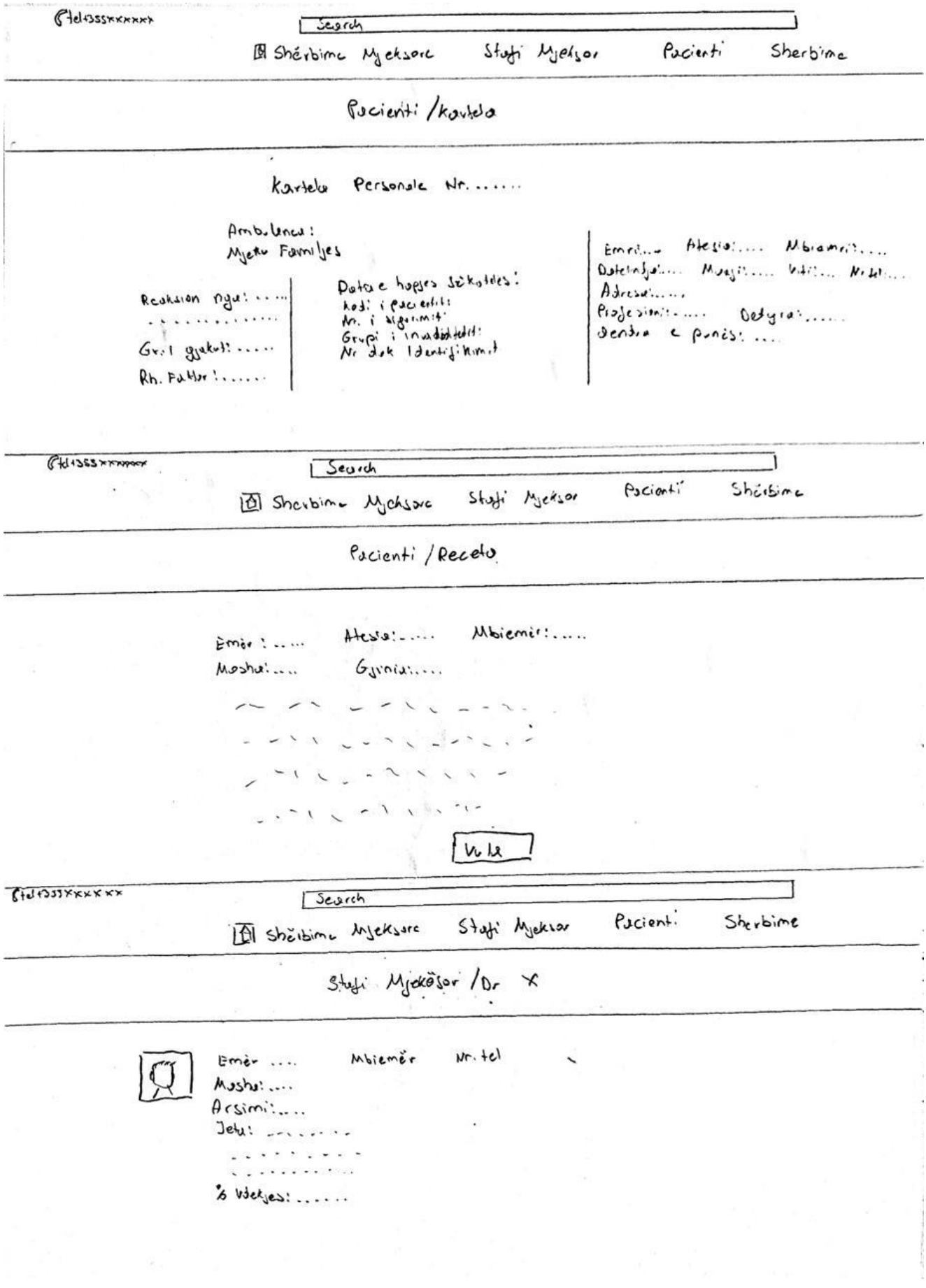
Rreth Nesh

Info

1/3

2/3

3/3


Tel+355xxxxxx
Search
Shërbime Mjekësore
Stafi Mjekësor
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Sherbime
Pacienti / kartela
Kartela Personale Nr. .....
Ambulanca:
Mjeku Familjes
Reaksion nga: .....
Grupi gjakut: .....
Rh. Faktori: .....
Data e hapjes sëkartelës:
kodi i pacientit:
Nr. i sigurimit:
Grupi i invalidëtetit:
Nr dok Identifikimit
Emri:... Atesia:.... Mbiemri:....
Datelindja:.... Mosha:.... Vdiq:.... Nr.tel:...
Adresa:.....
Profesioni:.... Detyra:.....
Qendra e punës: ....
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Arsimi:....
Jeta: .....
% vdekjes: .....