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CEN302 – Software Engineering

PMS Requirements Specification

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1. Executive Summary

1.1 Project Overview

Nowadays, technology is developing really fast and it is being implemented in many areas of our lives. One of the main fields that is trying to incorporate technology, is the health field. A detailed and accurate anamnesis of the patient's health conditions is often the key to curing and healing him. However, keeping this detailed information for every patient and then analyzing this handwritten information whenever it is needed is usually a difficult and slow process.

Technology in this field has been developing continuously. Today, we can check our health parameters with just the help of a smartphone (glucometer – to measure glucose level in blood, otoscope – ear examination instrument, sphygmometer – to measure blood pressure, Doppler ultrasound machine – for blood vessel control etc.). There have also been developed some watches, smart devices, which helps you to measure the pulse, oxygen in blood, breathing etc. These watches contain software that allows them to communicate in real-time with devices that periodically measure some parameters that cause strokes and warns the patient before it happens.

What we described earlier is a huge revolution of technology in health field; however, the massive use of these technologies has not yet been implemented. Today, it is doctor's responsibility to examine and keep track of patient's detailed records. In developed countries, health centers have their own computerized systems that store and process information quickly and correctly. This removes administrative obligation from doctors and nurses, who are currently dealing with, here in Albania. It would also help to improve the performance of this existing medical system.

In Albanian polyclinics, the patient's information is stored in hardcopy files. These files are eternal and are physically transferred when the patient changes his polyclinic. At Appendix D you can see an example of the actual file format that stores the information for a patient.

1.2 Purpose and Scope of this Specification

The software's purpose is to facilitate the operations of a polyclinic in Albania by providing a web application that will make the documentation of the patient's records easier, by digitalizing them and removing the hardcopy files.

The web application should offer to the patient the possibility to access at any time his electronic medical files. It should make the process of medical examination easier for the doctor and it should also offer a solution for the administrative procedures, such as: adding a new patient, removing a patient, changing a patient's record etc. This should be done by the receptionist or an authorized nurse. The system should be transparent in order to avoid malicious operations, but at the same time it should be trustworthy because it is tightly connected with the patient's life and his private information.

This documentation is written for all the users of the software. It will give detailed information about how it works and its facilities.

2. Product/Service Description

Public healthcare in Albania is the major provider of health services, health promotion, prevention, diagnosis and treatments for the population of Albania. According to the Albanian law, citizens must have equal access to public healthcare services. The Ministry of Health is in charge of this health service, which is a rigidly structured centralized system experiencing difficulty meeting the medical needs of its citizens.

Polyclinics have an important role in this public health service. They are health centers that provide medical support for each specific neighborhood of each city. Explaining briefly how the system works, each citizen that needs medical care should first go to his polyclinic and consult with his family's doctor. If that doctor thinks that the patient needs more specialized medical consultancy, then he recommends him to another polyclinic or hospital.

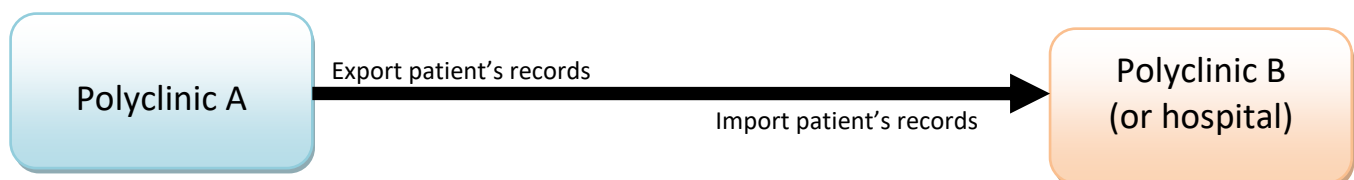
However, in our everyday life we see that this system is not well structured. One of the main problems that needs an immediate solution is digitalizing the patients' records. Until these days, their medical records are kept in hardcopy files, which makes the process of examination harder and slower. Also, these files are eternal and are physically transferred when the patient changes his polyclinic. In order to make it easier, faster and more secure, we need to keep these files in a digital form.

PMS is a platform that gives a solution to this problem. It is thought to be a management system for a polyclinic, with three main actors (receptionist, doctor, patient). It aims to remove these hardcopy files and make the documentation of patients' records easier.

Our software's conception is a web application based on object oriented PHP.

2.1 Product Context

Our software is directly related to the "Polyclinic Nr.9, Tiranë". It is conceived to be an independent system that will be available to three major genres of users that fall into one of these categories: doctors, patients or receptionists (or nurse). There is only one specific case where this system has to corporate with other polyclinics or hospitals. When a patient is moving from one polyclinic to another, it should be able to export a file with patient's records and send it to the other polyclinic, which can easily import that information. The same thing happens when the patient goes to a hospital.



2.2 User Characteristics

There are three types of users that will interact with the system:

1. Patient:

- Can look at the map of polyclinics in Tirana
- Can log in his account
- Can read his personal information
- Can look at the medical visits created by the doctor
- Can download his medical visits in PDF files
- Can contact his doctor by sending an email
- Can change his account password
- Can log out

2. Doctor:

- Can look at the map of polyclinics in Tirana
- Can log in his account
- Can read his personal information
- Can see a list of all his patients
- Can see a list of his current patients waiting to be examined
- Can fill the medical visit forms for each patient waiting to be examined
- Can view the profiles of his patients
- Can view the examination records of his patients
- Can download a specific examination record of a patient in a PDF file
- Can change his account password
- Can log out

3. Receptionist:

- Can look at the map of polyclinics in Tirana
- Can log in his account
- Can read his personal information
- Can view the list of all patients
- Can view the profiles of patients

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- Can view the examination records of the patients
- Can change personal information of a patient
- Can export the files of a patient, which can be sent to another polyclinic or hospital
- Can add a new patient
- Can delete an existing patient
- Can create a visit and allow the doctor to fill the form for the current examination
- Can search for a patient
- Can view the list of all doctors
- Can view the profiles of doctors
- Can change personal information of a doctor
- Can add a new doctor
- Can delete an existing doctor
- Can search for a doctor
- Can change his account password
- Can log out

2.3 Assumptions

- It is assumed that some actions performed behind the scenes are performed regularly according to law.
- It is assumed that the profile of the receptionist is created initially by the administrator of the system and nobody else can add, delete or change information of the receptionist. If the receptionist changes, then the administrator of the system has to be contacted.
- It is assumed that while adding a new patient or changing his personal information, the receptionist should verify all the needed documents. That is why the receptionist is the only one who can do this.
- It is assumed that while adding a new doctor or changing his personal information, the receptionist should verify all the needed documents. That is why the receptionist is the only one who can do this.
- It is assumed that the receptionist is responsible for deleting patients or doctors from the polyclinic.
- It is assumed that the information of the patient is fully confidential. Apart from the patient himself, it can be read only by the receptionist or his family's doctor. The receptionist can

export his file only if the patient is changing the polyclinic or has to continue some further examinations in the hospital. The doctor can download the file of a patient but he is fully responsible for this action and has to be careful with who he shares it.

- It is assumed that while filling the form for the current examination, the doctor is the only responsible person of what it is written in that form. For security reasons, when the doctor finishes the examination, the system will ask him if he is sure he wants to finish it and if he clicks YES, he cannot change that record anymore.
- It is assumed that doctors and receptionist will be trained to use this software, in order not to have any misconceptions. As for the users there is no need for training, because their profile is only in read mode.
- It is assumed that all the doctors and the receptionist of the polyclinic are equipped with a computer connected to the internet, in order to be able to access this web application.

2.4 Constraints

- The receptionist of the polyclinic and every doctor of the polyclinic should have a personal computer available during the work hours in order to be able to access this web application.
- The receptionist of the polyclinic as well as every doctor of the polyclinic should know how to use this web application. They should know their capabilities and their duties in order not to interfere with each other and to respect the privacy of their patients. Using this application efficiently and correctly will increase the performance of it.
- The project is constrained also by the Internet connection. Since it is supposed to be a web application, it is crucial that there is stable Internet connection for the application to function. The internet is needed mainly because the data should be fetched from the database over the Internet. It is also needed for the reCaptcha module and Google Map. If the patient wants to contact the doctor through the application, in order for that email to be sent the Internet connection should be available.
- In order for Google Map to be available at any time, the Google Satellite should be available all the time too.

2.5 Dependencies

Since the receptionist is the main actor that coordinates the actions between the doctor and the patient, there exist some dependencies between the doctor and the receptionist or between the patient and the receptionist:

- No new patient or new doctor can be added if the receptionist is not registered at the system or is not available.
- An existing patient or an existing doctor cannot be deleted if the receptionist is not available.

- The profile of a patient or the profile of the doctor cannot be updated if the receptionist is not available.
- The medical file of a patient cannot be exported and sent to another polyclinic or hospital if the receptionist is not available.

There exist also some dependencies between the doctor and the patient:

- The doctors cannot view the profile or examination records of the patients of the polyclinic if they are not assigned to him.
- The patient cannot see the latest medical visit record if the doctor has not filled the form and saved that.

Also, between the three of them (the receptionist, the doctor and the patient):

- The doctors cannot create a new examination record for one of his patients if the receptionist has not allowed him to do that.

3. Requirements

3.1 Functional Requirements

The requirement numbering has a scheme – BR_## (BR for Business Requirement).

Req#	Requirement	Comments	Priority	Date	SME Reviewed/ Approved
BR_01	The software should have different views for different user levels.	The view for patient, receptionist and doctor will be different.			
BR_02	A reCaptcha should be used for security issues while trying to log in.	To verify that you are not a robot, you should fill the reCaptcha.			
BR_03	The user accounts have to be secured by passwords.	Ethics will be maintained by hashing the passwords before saving them in database.			
BR_04	After the user has taken the password he/she can edit it, but he/she can't edit the username.	Editing usernames is not available since it is decided that the format that will be used will be the same for everybody.			

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BR_05	The receptionist should be able to add a new patient.	The receptionist is the only user that is responsible for adding a new patient. He/she can fill a form or can import a file if that person already has a medical record file.			
BR_06	The information entered by the receptionist while creating or changing information about a specific user should be first validated.	It is important that all the information entered is accurate.			
BR_07	The receptionist should be able to edit the personal information of a patient.	The receptionist is the only responsible user for editing the information of a patient.			
BR_08	The receptionist should be able to delete an existing patient.	The receptionist is the only responsible user for deleting an existing patient.			
BR_09	The receptionist should be able to view the full profile of a patient.	In order to verify things when needed or to make the necessary updates, the receptionist should be able to view the current information of the patient.			
BR_10	The receptionist should be able to export the medical file of a patient. The system should be able to generate an XML file.	The receptionist is the only user responsible for exporting the medical file of a patient, in order to send it to another polyclinic or hospital when needed.			
BR_11	The receptionist should be able to view all the patients of that polyclinic in a list.	All the patients of the polyclinic can be listed in order for the receptionist to see them.			
BR_12	The receptionist should be able to search for a	The polyclinic will have many patients therefore it would be efficient to have a search			

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	specific patient.	possibility.			
BR_13	The receptionist should be able to add a new doctor.	The receptionist is the only user that is responsible for adding a new doctor.			
BR_14	The receptionist should be able to edit the personal information of a doctor.	The receptionist is the only responsible user for editing the information of a doctor.			
BR_15	The receptionist should be able to delete an existing doctor.	The receptionist is the only responsible user for deleting an existing doctor.			
BR_16	The receptionist should be able to view the full profile of a doctor.	In order to verify things when needed or to make the necessary updates, the receptionist should be able to view the current information of the doctor.			
BR_17	The receptionist should be able to view all the doctors of that polyclinic in a list.	All the doctors of the polyclinic can be listed in order for the receptionist to see them.			
BR_18	The receptionist should be able to search for a specific doctor.	It is supposed that the polyclinic will have many doctors therefore it would be efficient to have a search possibility.			
BR_19	The receptionist should be able to allow the doctor to fill the form for the current examination.	The receptionist is the user that correlates the relationship between the doctor and the user. He/she is the one that should give permission to the doctor to create a new record examination for the patient.			
BR_20	The doctor should be able to view all his patients.	The doctor needs to have a list of his patients.			
BR_21	The doctor should be able to view or even download	In order to verify things when needed, the doctor should be			

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	the full profile of his patients.	able to view the current information of the patient.			
BR_22	The doctor should be able to view all the patients that are waiting to be examined.	The doctor needs to have a list of the patients that are waiting to be examined.			
BR_23	The doctor should be able to fill a form while examining a patient and save that new record.	The doctor should create a new record in his patient's file every time he examines him/her. However, this has to be allowed by the receptionist first.			
BR_24	The patient should be able to view his personal information and medical visit records.	The system should be transparent and the patient can see everything that the doctor writes for him.			
BR_25	The patient should be able to download a PDF file of his records.	The patient may want to have a hardcopy file of his records.			
BR_26	The patient should be able to contact the doctor.	An email will be sent to his doctor.			
BR_27	A patient cannot see the profiles of other doctors of the polyclinic.	A patient has only to do with his family's doctor.			
BR_28	All the users should be able to view their profile, but they cannot change that information.	The receptionist is the only user that can change information of patient or doctor.			
BR_29	Each user should be able to look at the map of polyclinics in Tirana.	All users can see the map of polyclinics in Tirana.			
BR_30	The web application has to be responsive.	The users should be able to access this web application from many devices.			

Table 1. Functional Requirements

3.2 Non-Functional Requirements

3.2.1 Product Requirements

3.2.1.1 User Interface Requirements

The user interface for the web applications should be compatible to any browser in order for the user to access it from Desktop or Mobile.

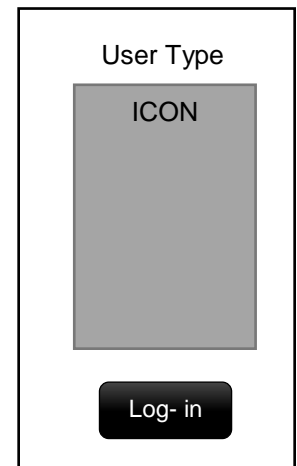
In addition to functions required, we are going to describe the characteristics of each interface which are supported from the sketches attached at the Appendix E.

The User interface could be grouped in 4 main interfaces:

- Log In Interface


Which will contain:

- The header bar containing PMS logo, “Polyclinic Nr. 9” and a telephone number.
- Three boxes which will show the user types that the user can choose and log in. Each user can log in as a patient, doctor or receptionist depending on his/her role. Each box will contain the user type, an icon and a <Log In> button. As shown on the schema on the right. When the button is pressed the log in form displays.
- The log in form which contains fields <Username> and <Password>, a reCaptcha to make sure the user is not a robot and a button <Submit>. When submit is pressed the information is validated and the respective interface is showed to the user (patient/doctor/receptionist) or an error notification indicating a wrong username or password will be shown.



- Patient Interface

Which will contain:


- The header bar containing PMS logo, “Patient <Name> <Surname>” and a menu icon , which when pressed shows all available menus.
- The menu icon, showing all the menus the user can access after logging in as a patient: profile, records, contact doctor, change password, log out.
- The “**Profile**” menu will allow the user to see all his personal information.
- The “**Change Password**” menu will display a simple form which contains fields <Current Password>, <New Password>, <Confirm New Password> and a button <Submit>. When submit button is pressed the system checks if the current password

matches, then checks if the new password is the same in the both fields and validates the password format (for example: only alphanumeric characters at least one number and one uppercase). If all the validations are correct it displays a message that says "Password was changed successfully!", otherwise displays a message with the respective error.

- The "**Records**" menu will show to the user all the medical visits created by the doctor. The information will be displayed showing the most recent information first. For each medical visit the patient can choose to download a PDF file of that.
- The "**Contact Doctor**" menu will allow the user to communicate with his/her doctor via e-mail. The page will provide a simple form containing the sender's name which will be filled automatically from the user's personal information, as well as the respective doctor to whom the e-mail will be sent, a text field for the message and a sent button to deliver the email. This menu will be similar to the "New e-mail" menu of the well-known pages like www.gmail.com , www.yahoo.com etc.
- The "**Log out**" will terminate the current session and will resent the user to the main page.

- Doctor Interface

Which will contain:

- The header bar containing PMS logo, "Doctor <Name> <Surname>" and a menu icon , which when pressed shows all available menus.
- The menu icon, showing all the menus the user can access after logging in as a doctor: home, my patients, change password, log out
- The "**Home**" menu directs the doctor to a page, where he can see the personal information on the left side of the screen and a table with all the patients waiting to be examined by him at the center. For these patients the doctor can choose to view their profiles or to write the examination. If he chooses "**Create Visit**" a form with all the necessary fields of an examination will be shown.
- The "**My Patients**" menu will display a table with all the patients of that specific doctor. For each patient he can view the full profile: personal information and all the medical examinations. He can also download a PDF file of this information.
- The "**Change Password**" menu will display a simple form which contains fields <Current Password>, <New Password>, <Confirm New Password> and a button <Submit>. When submit button is pressed the system checks if the current password matches, then checks if the new password is the same in the both fields and validates the password format (for example: only alphanumeric characters at least one number and one uppercase). If all the validations are correct it displays a

message that says “Password was changed successfully!” otherwise displays a message with the respective error.

- The “**Log out**” will terminate the current session and will resent the user to the main page.

- Receptionist Interface

Which will contain:

- The header bar containing PMS logo and “Receptionist <Name> <Surname>” and a “Log out” button.
- The main view contains eight buttons: my profile, patients’ list, add a new patient, search a patient, doctors’ list, add a new doctor, search a doctor and change password.
- “**My Profile**” will allow the user to see all his personal information.
- “**Patients’ List**” will show a full list of the patients of that polyclinic. For each patient the receptionist can view his/her full profile, can update his/her information, can delete his/her profile, can export his medical file or can allow the doctor to create a visit for that patient. When he/she clicks “**View profile**”, he can see the full details and the examinations of that patient. He can also download that information in a PDF file. When he/she clicks “**Update profile**”, he can change only the personal information of that patient. When he/she clicks “**Delete**” a pop up window will appear to make sure that the receptionist really wants to delete that patient. When he/she clicks “**Export**”, an XML file will be created and it can be sent to other polyclinics or hospitals. When he/she clicks “**Create visit**”, it allows the doctor to add a new examination record for that patient.
- “**Add a New Patient**” allows the receptionist to create a new user, type patient. He/she will be responsible for filling all the obligatory fields with valid information provided by the patient.
- “**Search a Patient**” allows the receptionist to search the list of the patients. The result will be a table like the one in “Patients’ list” view.
- “**Doctors’ List**” will show a full list of the doctors of that polyclinic. For each doctor the receptionist can view his/her full profile, can update his/her information, can delete his/her profile. When he/she clicks “**View profile**”, he can see the full details of that doctor. When he/she clicks “**Update profile**”, he can change the personal information of that doctor. When he/she clicks “**Delete**” a pop up window will appear to make sure that the receptionist really wants to delete that doctor.

- **“Add a New Doctor”** allows the receptionist to create a new user, type doctor. He/she will be responsible for filling all the obligatory fields with valid information provided by the doctor.
- **“Search a Doctor”** allows the receptionist to search the list of the doctors. The result will be a table like the one in “Doctors’ list” view.
- **“Change Password”** will display a simple form which contains fields <Current Password>, <New Password>, <Confirm New Password> and a button <Submit>. When submit button is pressed the system checks if the current password matches, then checks if the new password is the same in the both fields and validates the password format (for example: only alphanumeric characters at least one number and one uppercase). If all the validations are correct it displays a message that says “Password was changed successfully!” otherwise displays a message with the respective error.
- The **“Log out”** will terminate the current session and will resent the user to the main page.

3.2.1.2 Learnability

- Receptionists and doctors should be able to master using the system within a few hours.
- The patients will not need a specific training since the system will be intuitive.
- This documentation can serve as a user guide to the receptionist or the doctors of the polyclinic.
- In case of an error, a specific and detailed message will be shown to the user in order for him to understand what went wrong.
- The user is responsible for his/her own actions.

3.2.1.3 Accessibility

- Each user is provided with his/her username and password at the time they are registered at the system.
- The receptionist and the doctors who are part of the polyclinic can access the system.
- The patients of that polyclinic can access the system.
- The registered users can access the system at any time and at any place.

3.2.1.4 Efficiency

- Each operation will be fast and in real time.
- Once the users have learned the system they will be able to perform each operation within minutes.

3.2.1.5 Memorability

- The system is intuitive hence, it is not a problem if you 'vaguely remember' how to use it.
- If the users return to the design after a period of not using it they will be able to re-establish proficiency within the first hour.
- The user interfaces are designed to be easy understandable by the user (pictures, icons, buttons, descriptions etc.)

3.2.1.6 Errors

- The error rate is lower than the current error rate.
- Each time sensitive data is entered in the system double check procedure is applied where the user confirms the entered data.
- If an error occurs it can be edited and corrected immediately.

3.2.1.7 Satisfaction

- The system is user-friendly and it is very easy to use.

3.2.1.8 Capacity

This application will be developed to cover all the necessities of one polyclinic. The application will work at the same time for the patient, doctor and receptionist. It will work on real time, so every change made will be reflected immediately to the other users (based on their clearance).

Every user will use the same database, therefore if multiple requests are made to the server the requests will form a query slightly delaying the process. To increase the capacity and to lower the amount of times this happens the user will make the changes storing them in his/her computer then they will be sent to the database. This way even if there is a delay it will allow them to continue their job.

The application will be stored in a web server. The applications itself is not large and the database that we are going to use does not occupy a large space either.

3.2.2 Organizational Requirements

3.2.2.1 Availability

- The application will be available 24 hours per day, every day.
- The application will be available to everyone who owns a PC connected to the Internet, therefore any user can access his data anywhere.
- The application will be developed such that it will not be forced to encounter downtime since the data used by the users is very sensitive and time-varying.
- Scheduled maintenance on the system shall not affect its functionality. In case of any problem unscheduled maintenance of the application shall not allow the system to be down for more than 1 hour.

3.2.2.2 Latency

The latency of the web application will depend on:

- Internet connection strength.
- The size of the database.
- The efficiency of the algorithms used to fetch data from the database.

3.2.2.3 Monitoring

- The system will be built to be secure and reliable. The user interfaces will be easy and it is assumed to not be any cases where the system crashes. However, logs will be used to keep track of the system, such that in case of any mal-function it will be easier to detect the problem and to fix it.
- Periodic reports shall be generated by the system maintenance group. These reports shall be used not only to detect problems but also to find possible ways to improve the system.
- Validation of fields will be used, for example when trying to log in, when a new patient is added, when a new doctor is added, when the personal information of a doctor or a patient is updated, when trying to change a password etc. In this cases when the input does not match the requirements a specific message will be shown to the user to inform about the problem that occurred.
- For most of the possible error scenarios, informative messages will be prepared to be shown to the user, in order for him to know what the problem is.

3.2.2.4 Maintenance

- The system will be developed using MySQL for the database and APACHE server. Therefore, these two platforms will be used to maintain the application.
- The application will be developed in modules so it can be easily extended. New modules can be easily added to the application anytime.
- In case of system malfunction, a system restart should help. If that does not help, then maybe the server is down, so the maintenance department should be contacted.
- In case of any software update or bug correction, the users will be informed.

3.2.2.5 Operations

Some of the operations that will be provided to the users are:

- The users can log in and access their personal information anytime.
- The information entered to the system is accessed only by the people who really need access.
- Create, Read, Update and Delete doctors.
- Create, Read, Update and Delete patients.
- View personal information and medical records of patient.
- Download a PDF with the medical examinations of a specific patient.
- Export the medical file of a specific patient and use it to send it to another polyclinic or hospital.
- Allow the doctor to create a new examination record for a specific patient.
- Create a new examination record for a specific patient.
- Contact the doctor.

The application will be available 24/7, although the busiest time frames shall be 8 AM to 11 AM and from 4 PM to 7 PM. These time frames are based on the flux of the people requesting visits, thus it is not fixed and it varies from day to day.

The information entered to the system is considered to be sensitive, that is why it is secured with hashed passwords.

3.2.2.6 Standards Compliance

Our application is a new system developed to digitalize the filing system in polyclinics. Although the system is a new concept, it is bounded by some existing standards. Despite the view, the personal information of the user must have all the fields that are present in the current file format of the polyclinic. The same obligation is valid for the examination page. Also the user ID and other information will continue to follow the standards created by the Ministry of Health of Albania. Everything will be in accordance with the law and the Ministry of Health.

3.2.2.7 Portability

- The system will be web-based; therefore, it will operate the same regardless of the operating system.
- All you need is a computer or mobile phone and an Internet connection.

3.2.3 External Requirements

3.2.3.1 Security

The information kept in the system's database is considered to be sensitive information. Therefore, we should make sure that the security of our system is high. According to the law No.9887, dated 10.03.2008, as amended with law No.48/2012, "On the Protection of Personal Data", the personal information of each user should be private and possible to be accessed only by the specified actors. Therefore, this information is secured with hashed passwords. Moreover, the doctors and the receptionist have to be careful with the usage of the personal information of the patients.

3.2.3.2 Protection

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 his/her patients.

3.2.3.3 Authorization and Authentication

The 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 the respective information.
- Using sessions for the currently logged user.
- Using Cookies and PubCookie tool.
- If the user tries to log in with the wrong credentials a message will be shown to him/her.

4. Software Design / Diagrams

4.1 User scenarios

4.1.1 5User scenarios list

Nr	Name	Description
1	User logs in	Users: patients, receptionist and doctors log in using username and password
2	Change password	Users: patients, receptionist and doctors change their password
3	Add a new patient user	Receptionist creates an account for a new patient
4	Add a new patient from existing files	Receptionist creates an account for a patient by importing his existing file
5	Add a new doctor user	Receptionist creates an account for a new doctor
6	Patients' list	View all the patients
7	Doctors' list	Receptionist views all the doctors of the polyclinic
8	Search a patient	Search for a specific patient
9	Search a doctor	Receptionist searches for a specific doctor
10	Update user patient	Receptionist updates personal information of a specific patient
11	Update user doctor	Receptionist updates personal information of a specific doctor
12	Delete user	Receptionist can delete an account of an existing patient or doctor
13	Allow doctor to create an examination/visit	Receptionist allows the doctor to create a new examination/visit record for a specific patient. This patient appears in doctor's visit list.
14	Patients waiting for examination list	Doctor views a list of the patients waiting to be examined
15	Create examination/visit	Doctor creates an examination/visit for the patients that the receptionist has allowed to do so
16	Export user	Receptionist exports user information (an xml file) which will be sent to another polyclinic or hospital
17	View profile	Patient, doctor and receptionist can view their profiles

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18	View patient's examinations	Patients can view all of their examinations from this polyclinic. Doctors can view their patients' examinations. Receptionist can view examinations of all patients of the polyclinic.
19	Patient contacts doctor	Patient can contact the doctor by completing a form and an email will be sent to his doctor
20.	Download patient's examinations	Receptionist can download the examinations of all patients. Doctor can download the examinations of his patients. Patient can download his examinations.
21.	User logs out	Receptionist, doctor and patient log out from their accounts

Table 2. User scenarios list

4.1.2 User scenarios extended

1. Scenario – User logs in
 - a. User chooses his user type: patient/receptionist/doctor
 - b. User is redirected to the log in page
 - c. User enters his username and password
 - d. User checks the reCaptcha 'I am not a robot'
 - e. User presses the log in button
 - f. If data is correct the user is redirected to his profile page
 - g. If data is not correct an error message will be shown and user repeats the process from step b.
2. Scenario – Change password
 - a. User logs in following the steps in "Scenario - User logs in"
 - b. User chooses the menu change password
 - c. User types his old password
 - d. User types his new password
 - e. User types again his new password to confirm it
 - f. User presses the button "Save Changes"
 - g. If the old password is correct and if the new password is the same in both fields the user is alerted: "Password was changed successfully!"
 - h. In case the old password is wrong or the new password is not the same in both fields then user is alerted: "Password was not changed. Please try again."
3. Scenario – Add a new patient user
 - a. Receptionist logs in following the steps in "Scenario - User logs in"
 - b. Receptionist clicks on "Add a New Patient"
 - c. Receptionist fills all the empty fields

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- d. Receptionist double checks if the data entered is correct
 - e. Receptionist clicks the button “Add Patient”
 - f. Alert: Are you sure you want to continue? YES/ NO
 - g. If NO, do nothing, we stay at the same page
 - h. If YES, system validates data according to the specified requirements
 - i. If validation is passed successfully, the data is saved in the database and the account is created. An informative message “Patient added successfully!” will be shown and the receptionist is redirected to his/her home page.
 - j. If validation is not passed successfully, informative messages will show where the problem is, so the receptionist can fix it and continue again from step d.
4. Scenario – Add a new patient from existing files
- a. Receptionist logs in following the steps in “Scenario - User logs in”
 - b. Receptionist clicks on “Add Patient”
 - c. Receptionist clicks the button “Import data”
 - d. Receptionist selects the file with the data and clicks OK
 - e. Receptionist clicks the button “Add Patient”
 - f. Alert: Are you sure you want to continue? YES/ NO
 - g. If YES, the data is saved in the database and the account is created. An informative message “Patient added successfully!” will be shown and the receptionist is redirected to his/her home page.
 - h. If NO, do nothing, stay at the same page
5. Scenario – Add a new doctor user
- a. Receptionist logs in following the steps in “Scenario - User logs in”
 - b. Receptionist clicks on “Add a New Doctor”
 - c. Receptionist fills all the empty fields
 - d. Receptionist double checks if the data entered is correct
 - e. Receptionist clicks the button “Add Doctor”
 - f. Alert: Are you sure you want to continue? YES/ NO
 - g. If NO, do nothing, we stay at the same page
 - h. If YES, system validates data according to the specified requirements
 - i. If validation is passed successfully, the data is saved in the database and the account is created. An informative message “Doctor added successfully!” will be shown and the receptionist is redirected to his/her home page.
 - j. If validation is not passed successfully, informative messages will show where the problem is, so the receptionist can fix it and continue again from step d.
6. Scenario – Patients’ list
- Receptionist
 - a. Receptionist logs in following the steps in “Scenario - User logs in”
 - b. Receptionist clicks on “Patients’ list”

- c. A table with all the patients of the polyclinic will be shown
 - Doctor
 - a. Doctor logs in following the steps in “Scenario - User logs in”
 - b. Doctor clicks on “My Patients” menu
 - c. A table with all his/her patients will be shown
7. Scenario – Doctors’ list
- a. Receptionist logs in following the steps in “Scenario - User logs in”
 - b. Receptionist clicks on “Doctors’ list”
 - c. A table with all the doctors of the polyclinic will be shown
8. Scenario – Search a patient
- Receptionist
 - a. Receptionist logs in following the steps in “Scenario - User logs in”
 - b. Receptionist clicks on “Search a Patient”
 - c. A form where the receptionist can write a name, a surname or both is shown
 - d. Receptionist fills the name, the surname or both of the fields
 - e. Receptionist clicks “Search”
 - f. If results were found, a similar table as the one on “Patients’ list” will be shown below the form
 - g. If no result was found, the message “No results found!” will be shown
 - Doctor
 - a. Doctor logs in following the steps in “Scenario - User logs in”
 - b. Doctor clicks on “My Patients”
 - c. A table with all his/her patients will be shown and a search box above it
 - d. Doctor will write the name of the patient he is looking for in the search box
 - e. Doctor clicks “Search”
 - f. If results were found, a similar table as the one on “My Patients” with all the results will be shown
 - g. If no result was found, the message “No results found!” will be shown
9. Scenario – Search a doctor
- a. Receptionist logs in following the steps in “Scenario - User logs in”
 - b. Receptionist clicks on “Search a Doctor”
 - c. A form where the receptionist can write a name, a surname or both is shown
 - d. Receptionist fills the name, the surname or both of the fields
 - e. Receptionist clicks “Search”
 - f. If results were found, a similar table as the one on “Doctors’ list” will be shown below the form
 - g. If no result was found, the message “No results found!” will be shown

10. Scenario – Update user patient

- a. Receptionist searches a patient following the steps in “Scenario – Search a patient”
- b. Receptionist clicks the button “Update” for that specific patient
- c. A form with fields filled with current information of the patient is shown
- d. Receptionist makes the necessary changes
- e. Receptionist double checks if the data entered is correct
- f. Receptionist clicks the button “Update”
- g. Alert: Are you sure you want to continue? YES/ NO
- h. If NO, do nothing, we stay at the same page
- i. If YES, system validates data according to the specified requirements
- j. If validation is passed successfully, the data is saved in the. An informative message “Patient updated successfully!” will be shown and the receptionist is redirected to his/her home page.
- k. If validation is not passed successfully, informative messages will show where the problem is, so the receptionist can fix it and continue again from step e.

11. Scenario – Update user doctor

- a. Receptionist searches a doctor following the steps in “Scenario – Search a doctor”
- b. Receptionist clicks the button “Update” for that specific doctor
- c. A form with fields filled with current information of the doctor is shown
- d. Receptionist makes the necessary changes
- e. Receptionist double checks if the data entered is correct
- f. Receptionist clicks the button “Update”
- g. Alert: Are you sure you want to continue? YES/ NO
- h. If NO, do nothing, we stay at the same page
- i. If YES, system validates data according to the specified requirements
- j. If validation is passed successfully, the data is saved in the. An informative message “Doctor updated successfully!” will be shown and the receptionist is redirected to his/her home page.
- k. If validation is not passed successfully, informative messages will show where the problem is, so the receptionist can fix it and continue again from step e.

12. Scenario – Delete user

- For patients
 - a. Receptionist searches a patient following the steps in “Scenario – Search a patient”
 - b. Receptionist clicks the button “Delete” for that specific patient
 - c. Alert: Are you sure you want to continue? YES/ NO
 - d. If NO, do nothing, we stay at the same page

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- e. If YES, the information for that patient is deleted from the database. The message "Patient deleted successfully!" will be shown and the receptionist is redirected to his/her home page.
- For doctors
 - f. Receptionist searches a doctor following the steps in "Scenario – Search a doctor"
 - g. Receptionist clicks the button "Delete" for that specific doctor
 - h. Alert: Are you sure you want to continue? YES/ NO
 - i. If NO, do nothing, we stay at the same page
 - j. If YES, the information for that doctor is deleted from the database. The message "Doctor deleted successfully!" will be shown and the receptionist is redirected to his/her home page.

13. Scenario – Allow doctor to create an examination/visit

- a. Receptionist searches a patient following the steps in "Scenario – Search a patient"
- b. Receptionist clicks the button "Create Visit" for that specific patient
- c. Alert: Are you sure you want to continue? YES/ NO
- d. If NO, do nothing, we stay at the same page
- e. If YES, some changes will be made to the database. An informative message "You allowed the doctor to visit this patient!" will be shown and the receptionist is redirected to his/her home page.
- f. That patient will now appear on the list of patients waiting to be examined in doctor's page

14. Scenario – Patients waiting for examination list

- a. Doctor logs in following the steps in "Scenario - User logs in"
- b. Doctor is redirected to his home page (or he can manually click "Home" menu)
- c. A table with the patients waiting to be examined will appear

15. Scenario – Create examination/visit

- a. Doctor views the list of patients waiting to be examined following the steps in "Scenario - Patients waiting for examination list"
- b. Doctor clicks the button "Create Visit" for a specific patient
- c. A form with all the needed fields to be filled during a medical visit will be shown
- d. Doctor fills all the empty fields
- e. Doctor double checks if the data entered is correct
- f. Doctor clicks the button "Finish Examination"
- g. Alert: Are you sure you want to continue? YES/ NO
- h. If NO, do nothing, we stay at the same page
- i. If YES, the data is saved in the database. An informative message "Visit created successfully!" will be shown and the doctor is redirected to his/her home page. Also a PDF file is created.

16. Scenario – Export user

- a. Receptionist searches a patient following the steps in “Scenario – Search a patient”
- b. Receptionist clicks the button “Export” for that specific patient
- c. Alert: Are you sure you want to continue? YES/ NO
- d. If NO, do nothing, we stay at the same page
- e. If YES, the information for that patient is written in an XML file and downloaded in the computer. The message “Patient exported successfully!” will be shown and the receptionist is redirected to his/her home page.
- f. The exported file can be sent to another polyclinic or hospital for further examinations

17. Scenario – View profile

- Receptionist views his/her profile
 - a. Receptionist logs in following the steps in “Scenario - User logs in”
 - b. Receptionist clicks on “My profile”
 - c. Receptionist will be redirected to a page with his/her personal information
- Patient views his/her profile
 - a. Patient logs in following the steps in “Scenario - User logs in”
 - b. Patient clicks on “My profile”
 - c. Patient will be redirected to a page with his/her personal information
- Doctor views his/her profile
 - a. Doctor logs in following the steps in “Scenario - User logs in”
 - b. Doctor is redirected to his home page (or he can manually click “Home” menu)
 - c. A page with personal information on the left side of the screen and the table of patients waiting to be examined at the center will be shown
- Receptionist views profile of a patient
 - a. Receptionist searches a patient following the steps in “Scenario – Search a patient”
 - b. Receptionist clicks the button “View Profile” for that specific patient
 - c. Receptionist is redirected to a page showing the personal information of that patient
- Receptionist views profile of a doctor
 - a. Receptionist searches a doctor following the steps in “Scenario – Search a doctor”
 - b. Receptionist clicks the button “View Profile” for that specific doctor
 - c. Receptionist is redirected to a page showing the personal information of that doctor
- Doctor views profile of one of his patients
 - a. Doctor searches a patient following the steps in “Scenario – Search a patient”
 - b. Doctor clicks the button “View Profile” for that specific patient
 - c. Doctor is redirected to a page showing the personal information of that patient

18. Scenario – View patient’s examinations

- Receptionist
 - a. Receptionist views profile of a patient following the steps in “Scenario – View Profile”
 - b. Receptionist clicks the button “View Examinations” that is shown at the patient’s profile
 - c. Receptionist is redirected to a page showing all the examinations of that patient
- Doctor
 - a. Doctor views profile of a patient following the steps in “Scenario – View Profile”
 - b. Doctor clicks the button “View Examinations” that is shown at the patient’s profile
 - c. Doctor is redirected to a page showing all the examinations of that patient
- Patient
 - a. Patient logs in following the steps in “Scenario - User logs in”
 - b. Patient clicks the “Records” menu
 - c. Patient is redirected to a page showing all his examinations chronologically. The latest one is shown first.

19. Scenario – Patient contacts doctor

- a. Patient logs in following the steps in “Scenario - User logs in”
- b. Patient clicks on “Contact Doctor” menu
- c. A form containing his name and email, his doctor’s name and email as well as a place to write the message is shown
- d. Patient fills the empty fields
- e. Patient double checks what he has written
- f. Patient clicks “Send”
- g. Alert: Are you sure you want to continue? YES/ NO
- h. If NO, do nothing, we stay at the same page
- i. If YES, the system will try to send an email to his doctor
- j. If the email is sent successfully, the message “Email was sent successfully!” will be shown and the patient will be redirected to his home page.
- k. If the email is not sent successfully, the message “Email couldn’t be sent due to some problems! Please try again later!” will be shown

20. Scenario – Download patient’s examinations

- Receptionist
 - a. Receptionist views examinations of a patient following the steps in “Scenario – View patient’s examinations”
 - b. Receptionist clicks “Download” button for a specific examination
 - c. A PDF file will be downloaded in the computer

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- Doctor
 - a. Doctor views examinations of a patient following the steps in “Scenario – View patient’s examinations”
 - b. Doctor clicks “Download” button for a specific examination
 - c. A PDF file will be downloaded in the computer
- Patient
 - d. Patient views examinations of himself following the steps in “Scenario – View patient’s examinations”
 - e. Patient clicks “Download” button for a specific examination
 - f. A PDF file will be downloaded in the computer

21. Scenario – User logs out

- a. User logs in following the steps in “Scenario - User logs in”
- b. User follows some of the scenarios listed above
- c. User clicks “Log out”
- d. User will be logged out from the system and he will be redirected to the main page

4.2 User Cases

Name	User logs in
Summary	User enters personal information to access his account.
Actor	Patient / Receptionist / Doctor
Description	User gains access on his account after typing his correct username and password.
Precondition	User must have an active account and should choose one of the alternatives (patient/ receptionist/ doctor) before logging in.
Alternatives	The user can access only one account at time and can have only one role (patient/ receptionist/ doctor), but a doctor or the receptionist can have two accounts because they can also be patients.
Post Condition	User is logged on his account.

Use Case 1 - Scenario 1 - User logs in

Name	Change password
Summary	User goes to the corresponding page to change his password.
Actor	Patient / Receptionist / Doctor
Description	User types the old password and the new one in order to make the change.
Precondition	The user should be logged in. The old password should be typed correctly and both fields with the new password should match. Also the new password should be different from the old one and it should follow the validation rules.
Alternatives	If the fields are not filled correctly (validation rules not passed successfully), then information cannot be saved. The user is allowed to try again.
Post Condition	After pressing the "Save" button, the old password is replaced with the new one.

Use Case 2 - Scenario 2 - Change password

PMS Documentation

Name	Add a new patient user
Summary	The receptionist can add a new patient user.
Actor	Receptionist
Description	Receptionist clicks on “Add Patient” menu, fills the information for the new patient and then clicks “Add Patient” button.
Precondition	Receptionist should be logged in and the patient must possess the necessary documents to be registered in the polyclinic. The new patient’s unique information should not match with any other patient in the database, so one patient cannot have two accounts.
Alternatives	If the receptionist is sure he/she should press YES to continue saving, if not then he/she should press NO and go back to the previous page. If when pressing YES, the validation of the fields is not successful, the receptionist is allowed to make the necessary changes.
Post Condition	A new patient is added on the database

Use Case 3 - Scenario 3 – Add a new patient user

Name	Add a new patient from existing files
Summary	The receptionist adds a new patient user by importing the data that is sent to her from another polyclinic or hospital.
Actor	Receptionist
Description	Receptionist clicks on “Add Patient” menu, clicks on “Import data” button and then clicks “Add Patient” button.
Precondition	The receptionist should have an XML file containing the information of the patient, which is sent by another polyclinic or hospital. The new patient’s unique information should not match with any other patient in the database, so one patient cannot have two accounts.
Alternatives	If the receptionist is sure he/she should press YES to continue saving, if not then he/she should press NO and go back to the previous page.
Post Condition	A new patient is added on the database.

Use Case 4 - Scenario 4 – Add a new patient from existing files

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Name	Add a new doctor user
Summary	The receptionist can add a new doctor user.
Actor	Receptionist
Description	Receptionist clicks on “Add Doctor” menu, fills the information for the new doctor and then clicks “Add Doctor” button.
Precondition	Receptionist should be logged in and the doctor must possess the necessary documents to be registered in the polyclinic. The new doctor’s unique information should not match with any other doctor in the database, so one doctor cannot have two accounts.
Alternatives	If the receptionist is sure he/she should press YES to continue saving, if not then he/she should press NO and go back to the previous page. If when pressing YES, the validation of the fields is not successful, the receptionist is allowed to make the necessary changes.
Post Condition	A new doctor is added on the database.

Use Case 5 - Scenario 5 – Add a new doctor user

Name	Patients’ list
Summary	Access the list of patients.
Actor	Receptionist / Doctor
Description	In the receptionist’s version he/she logs in then clicks on “Patients’ list”, to access the list of all patients of the polyclinic. In the doctor’s version, he/she logs in and clicks on “My Patients”, to access the list of his/her patients.
Precondition	To access this list you should be logged in as a receptionist or doctor. Patients have no access on the list.
Alternatives	Receptionist can view the whole list of the patients of the polyclinic, whereas the doctor can view only the list of his patients. If there is no patient registered yet, an informative message will be shown.
Post Condition	A table with the list of the patients is shown.

Use Case 6 - Scenario 6 – Patients’ list

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Name	Doctors' list
Summary	Access the list of the doctors of the polyclinic.
Actor	Receptionist
Description	The receptionist logs in then clicks on "Doctors' List", to access the list of all doctors of the polyclinic.
Precondition	To access this list you should be logged in as the receptionist. Patients and doctors have no access on the list.
Alternatives	Receptionist can view the whole list of the doctors of the polyclinic. If there is no doctor registered yet, an informative message will be shown.
Post Condition	A table with the list of the doctors is shown.

Use Case 7 - Scenario 7 –Doctors' list

Name	Search a patient
Summary	Search a specific patient in the list.
Actor	Receptionist / Doctor
Description	<p>In the receptionist's version he/she logs in then clicks on "Search a Patient", to enter the name, surname (or both) of the patient he/she is looking for and clicks "Search" button.</p> <p>In the doctor's version, he/she logs in and clicks on "My Patients", to access the list of his/her patients. At the search box, he/she enters the name, surname (or both) of the patient he/she is looking for and clicks "Search" button.</p>
Precondition	You should be logged in as a receptionist or a doctor. Patients will not have this right.
Alternatives	Receptionist or doctor can either type the name, the surname, or both. If there is no patient found, an informative message will be shown.
Post Condition	If results were found, a table with all the results will be shown.

Use Case 8 - Scenario 8 – Search a patient

PMS Documentation

Name	Search a doctor
Summary	Search a specific doctor in the list.
Actor	Receptionist
Description	Receptionist logs in then clicks on “Search a Doctor”, to enter the name, surname (or both) of the doctor he/she is looking for and clicks “Search” button.
Precondition	You should be logged in as a receptionist. Patients and doctors will not have this right.
Alternatives	Receptionist can either type the name, the surname, or both. If there is no doctor found, an informative message will be shown.
Post Condition	If results were found, a table with all the results will be shown.

Use Case 9 - Scenario 9 – Search a doctor

Name	Update user patient
Summary	Receptionist can update personal information of a patient of the polyclinic.
Actor	Receptionist
Description	Receptionist logs in and searches for a patient as we described before. After that, he/she clicks the “Update” button for that specific patient that was the result of the search. Then he/she can change any of the personal information and at the end clicks “Update” button.
Precondition	You should be logged in as a receptionist. Patients and doctors will not have this right. Also, the patient should exist in the database in order to make the changes.
Alternatives	If the receptionist is sure he/she should press YES to continue saving, if not then he/she should press NO and go back to the previous page. If when pressing YES, the validation of the fields is not successful, the receptionist is allowed to make the necessary changes.
Post Condition	Patient’s personal information has been updated.

Use Case 10 - Scenario 10 – Update user patient

PMS Documentation

Name	Update user doctor
Summary	Receptionist can update personal information of a doctor of the polyclinic.
Actor	Receptionist
Description	Receptionist logs in and searches for a doctor as we described before. After that, he/she clicks the "Update" button for that specific doctor that was the result of the search. Then he/she can change any of the personal information and at the end clicks "Update" button.
Precondition	You should be logged in as a receptionist. Patients and doctors will not have this right. Also, the doctor should exist in the database in order to make the changes.
Alternatives	If the receptionist is sure he/she should press YES to continue saving, if not then he/she should press NO and go back to the previous page. If when pressing YES, the validation of the fields is not successful, the receptionist is allowed to make the necessary changes.
Post Condition	Doctor's personal information has been updated.

Use Case 11 - Scenario 11 – Update user doctor

Name	Delete user
Summary	Receptionist can delete an existing patient or doctor of the polyclinic.
Actor	Receptionist
Description	Receptionist logs in and searches for a doctor or for a patient as we described before. After that, he/she clicks the "Delete" button for that specific doctor/patient that was the result of the search. A pop up window will be used to confirm that this is what the receptionist wants to do.
Precondition	You should be logged in as a receptionist. Patients and doctors will not have this right. Also, the doctor/patient should exist in the database in order to delete his/her account.
Alternatives	If the receptionist is sure he/she should press YES to delete that user, if not then he/she should press NO and go back to the previous page.
Post Condition	The patient or doctor is deleted from the database.

Use Case 12 - Scenario 12 – Delete user

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Name	Allow doctor to create an examination/visit
Summary	Receptionist allows the doctor to create an examination for a specific patient.
Actor	Receptionist
Description	Receptionist logs in and searches for a patient as we described before. After that, he/she clicks the "Create Visit" button for that specific patient that was the result of the search.
Precondition	You should be logged in as a receptionist. Patients and doctors will not have this right. Also, the patient should exist in the database in order to create a visit for him/her.
Alternatives	If the receptionist is sure he/she should press YES to create a visit for that user, if not then he/she should press NO and go back to the previous page.
Post Condition	The visit is created and that patient will now appear on the list of patients waiting to be examined in doctor's page.

Use Case 13 - Scenario 13 – Allow doctor to create an examination/visit

Name	Patients waiting for examination list
Summary	The doctor can view the list of the patients that are waiting to be examined.
Actor	Doctor
Description	Doctor logs in and he is redirected to his main page where a table with the patients waiting to be examined is shown. He can also access this list by clicking on "Home" menu.
Precondition	Doctor should be logged in and the receptionist must have previously allowed the doctor to visit that patient.
Alternatives	If the receptionist has not allowed the doctor to make any visits, that list will be empty. An informative message will be shown.
Post Condition	The list of the patients waiting to be examined will be shown.

Use Case 14 - Scenario 14 - Patients waiting for examination list

PMS Documentation

Name	Create examination/visit
Summary	The doctor fills the form according to his current examination.
Actor	Doctor
Description	Doctor logs in, clicks on “Create Visit” for a specific patient on the table with patients waiting to be visited, fills the form and then clicks “Finish”.
Precondition	Doctor should be logged in and the receptionist must have previously allowed the doctor to visit that patient.
Alternatives	After pressing “Finish” a pop up window will be shown. If the doctor is sure he/she should press YES to finish the examination, if not then he/she should press NO and go back to the previous page.
Post Condition	The examination is saved on the database and a PDF file is created.

Use Case 15 - Scenario 15 - Create examination/visit

Name	Export user
Summary	Receptionist can export a file with a patient’s information.
Actor	Receptionist
Description	Receptionist logs in and searches for a patient as we described before. After that, he/she clicks the “Export” button for that specific patient that was the result of the search. A pop up window will be used to confirm that this is what the receptionist wants to do.
Precondition	You should be logged in as a receptionist. Patients and doctors will not have this right. Also, the patient should exist in the database in order to export his/her files.
Alternatives	After pressing “Export” a pop up window will be shown. If the receptionist is sure he/she should press YES to continue exporting, if not then he/she should press NO and go back to the previous page.
Post Condition	An XML file with the patient’s information is created and saved on the computer.

Use Case 16 - Scenario 16 – Export user

PMS Documentation

Name	View profile
Summary	Each user can view his/her personal information.
Actor	Receptionist / Doctor / Patient
Description	<p>In case of a receptionist, he/she logs in and clicks on “My Profile”.</p> <p>In case of a doctor, he/she logs in and at the left panel of the main page is shown his personal information. He can also access it by clicking “Home” menu.</p> <p>In case of a patient, he/she logs in and clicks “My Profile”.</p>
Precondition	The user should be logged in.
Alternatives	Users can view their profile at any time.
Post Condition	The user views his personal information.

Use Case 17a - Scenario 17 – View profile (a, b, c)

Name	View profile
Summary	Receptionist can view the profile of a patient or a doctor. The doctor can view the profile of a patient.
Actor	Receptionist / Doctor
Description	<p>In case of a receptionist that wants to view the profile of a patient, he/she logs in, searches for a patient as we described before and clicks “View Profile” for that specific patient.</p> <p>In case of a receptionist that wants to view the profile of a doctor, he/she logs in, searches for a doctor as we described before and clicks “View Profile” for that specific doctor.</p> <p>In case of a doctor that wants to view the profile of his patient, he/she logs in, searches for a patient as we described before and clicks “View Profile” for that specific patient.</p>
Precondition	Receptionist or doctor should be logged in. also the doctor or the patient, whose profile the receptionist wants to see, should exist on the database. The patient that the doctor wants to see should exist on the database too.
Alternatives	Receptionist can view a profile of a patient or a doctor. Doctor can view only the profiles of his/her patients.
Post Condition	Receptionist or doctor will be redirected to the profile of the user they have chosen to see.

Use Case 17b - Scenario 17 – View profile (d, e, f)

PMS Documentation

Name	View patient's examinations
Summary	Receptionist can view the examinations of all the patients. Doctor can view examinations of his patients. Patient can view his examinations.
Actor	Receptionist / Doctor / Patient
Description	In case of a receptionist that wants to view the examinations of a patient, he/she first logs in, views the profile of a specific patient as we described before and clicks "View Examinations". In case of a doctor that wants to view the examinations of a patient, he/she first logs in, views the profile of a specific patient as we described before and clicks "View Examinations". In case of a patient that wants to view his examinations, he/she first logs in and clicks "Records" menu.
Precondition	The receptionist should be logged in if he/she wants to see the examinations of a patient. That patient should exist in the database. The doctor should be logged in if he/she wants to see the examinations of a patient. That patient should exist in the database. The patient should be logged in if he/she wants to see his examinations.
Alternatives	Examinations of a specific patient can be seen from the receptionist, from his family's doctor or from the patient himself.
Post Condition	A page with all the examinations of the patient ordered chronologically will be shown.

Use Case 18 - Scenario 18 – View patient's examinations

PMS Documentation

Name	Patient contacts doctor
Summary	Patient fills a form to send an email to his doctor.
Actor	Patient
Description	Patient logs in, clicks on “Contact Doctor” menu, fills the form then clicks “Send” button.
Precondition	Patient should be logged in. He/she must have been assigned to a specific doctor, and he/she can send an email only to that doctor.
Alternatives	After pressing “Send” a pop up window will be shown. If the patient is sure he/she should press YES to continue sending that email, if not then he/she should press NO and go back to the previous page. If when pressing YES, some error happens while trying to send that message, an informative will be shown and the patient can try again later.
Post Condition	An email is sent to the patient’s family doctor.

Use Case 19 - Scenario 19 –Patient contacts doctor

PMS Documentation

Name	Download patient's examinations
Summary	The receptionist can download the examinations of a patient. The doctor can download the examinations of one of his patients. The patient can download his examinations.
Actor	Receptionist / Doctor / Patient
Description	<p>In case of a receptionist that wants to download the examinations of a patient, he/she logs in, views the patient's examinations as described before and clicks "Download".</p> <p>In case of a doctor that wants to download the examinations of a patient, he/she logs in, views the patient's examinations as described before and clicks "Download".</p> <p>In case of a patient that wants to download his examinations, he/she logs in, views his examinations as described before and clicks "Download".</p>
Precondition	The user should be logged in and the examinations should exist in the database.
Alternatives	Receptionist, family's doctor and patient has the right to download and use carefully the information for each examination of a patient.
Post Condition	A PDF file with the information of a specific examination of a user will be downloaded in the computer.

Use Case 20 - Scenario 20 – Download patient's examinations

Name	User logs out
Summary	User has finished his/her activity.
Actor	Receptionist / Doctor / Patient
Description	First the user logs in. Then he/she interacts with the web application and when he/she finishes, he/she clicks "Log Out" button.
Precondition	The user must first be logged in.
Alternatives	The user can log out at any time.
Post Condition	The user has logged out and is no longer using his/her account.

Use Case 21 - Scenario 21 – User logs out

4.3 Use Case Diagrams

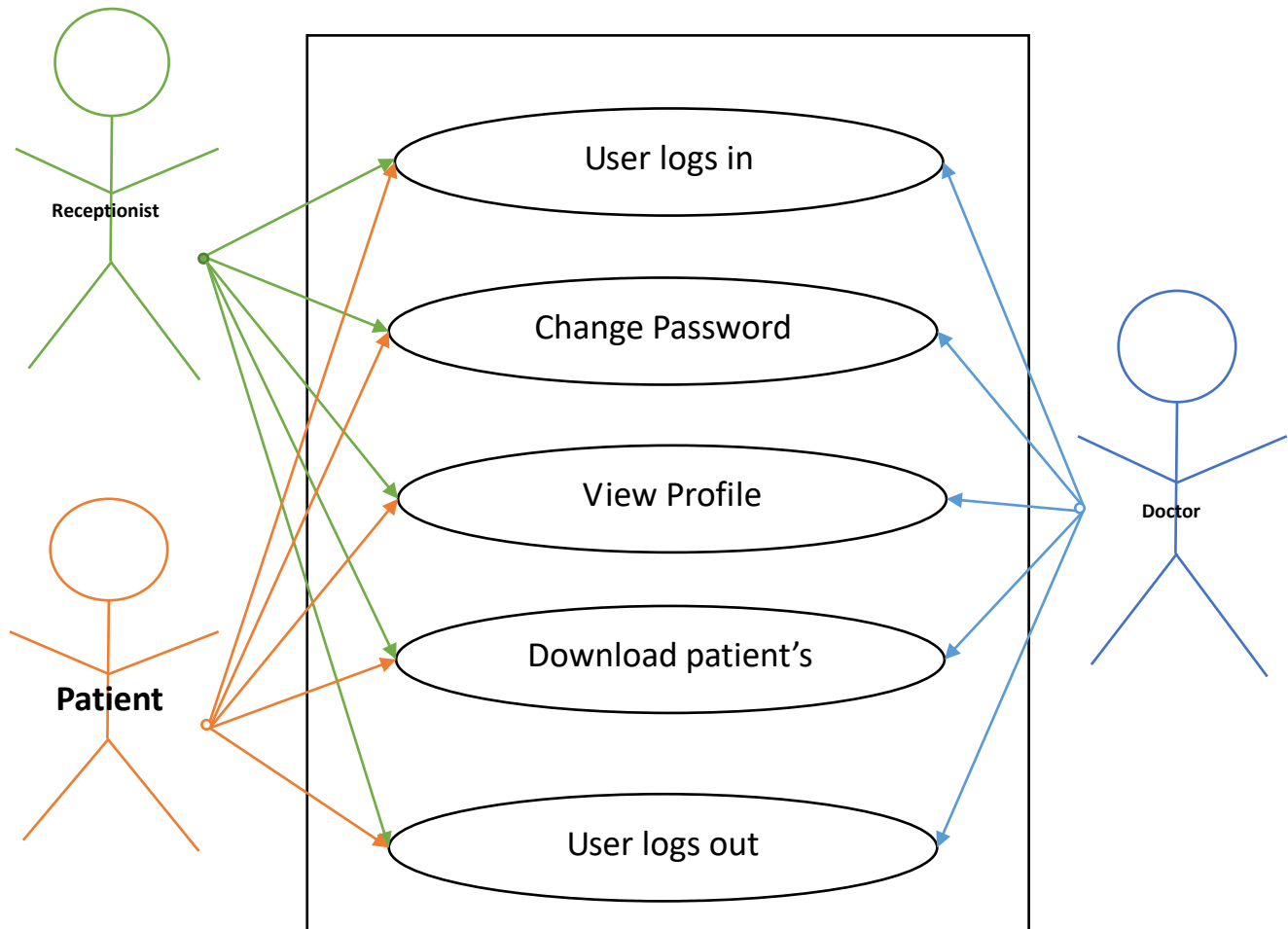


Diagram 1 – Basic – User Cases 1, 2, 17a, 20, 21

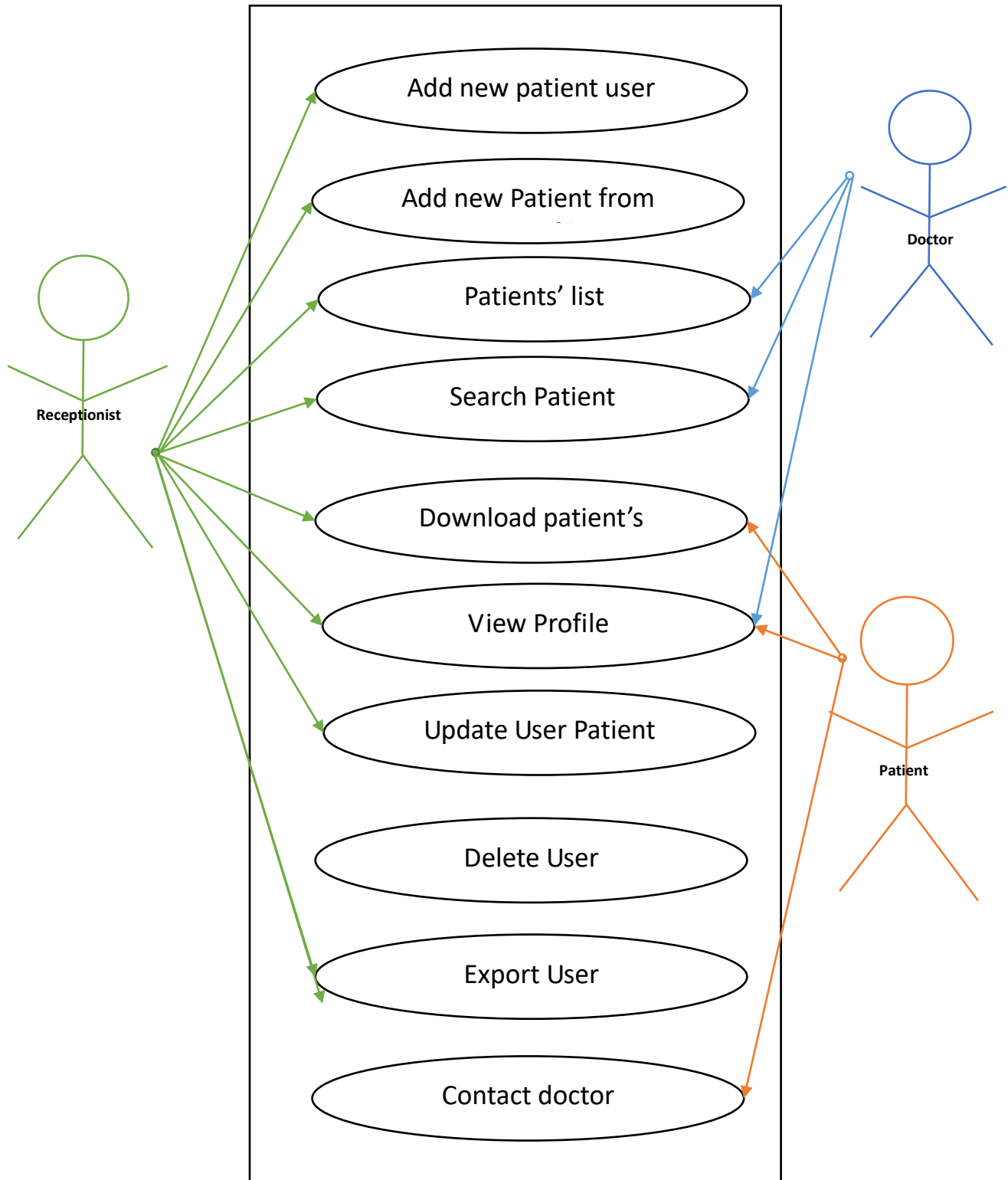


Diagram 2 –Manage User Patient – User Cases 3, 4, 6, 8, 20, 17, 10, 12, 16, 19

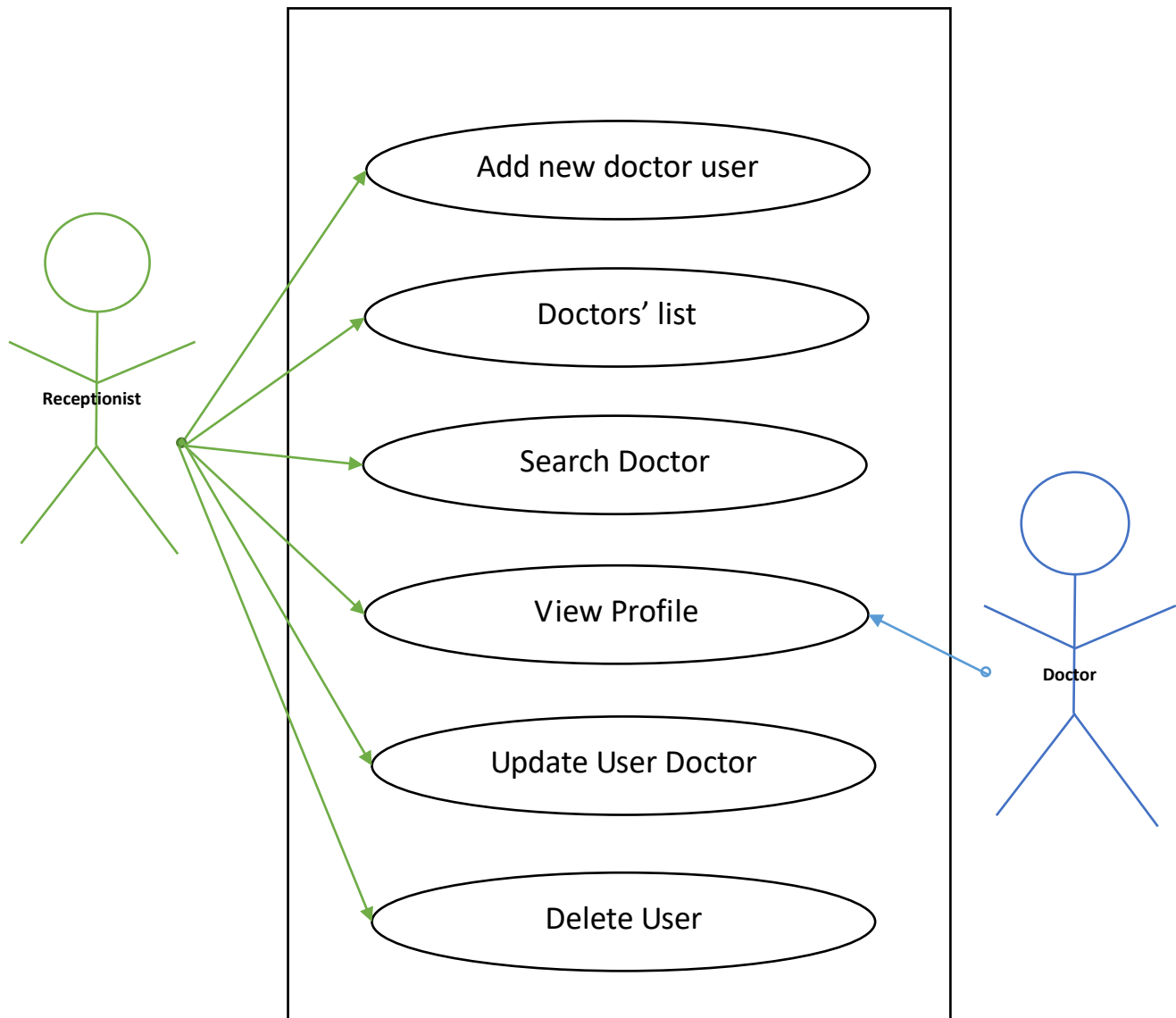


Diagram 3 –Manage User Doctor – User Cases 5, 7, 9, 17, 11, 12

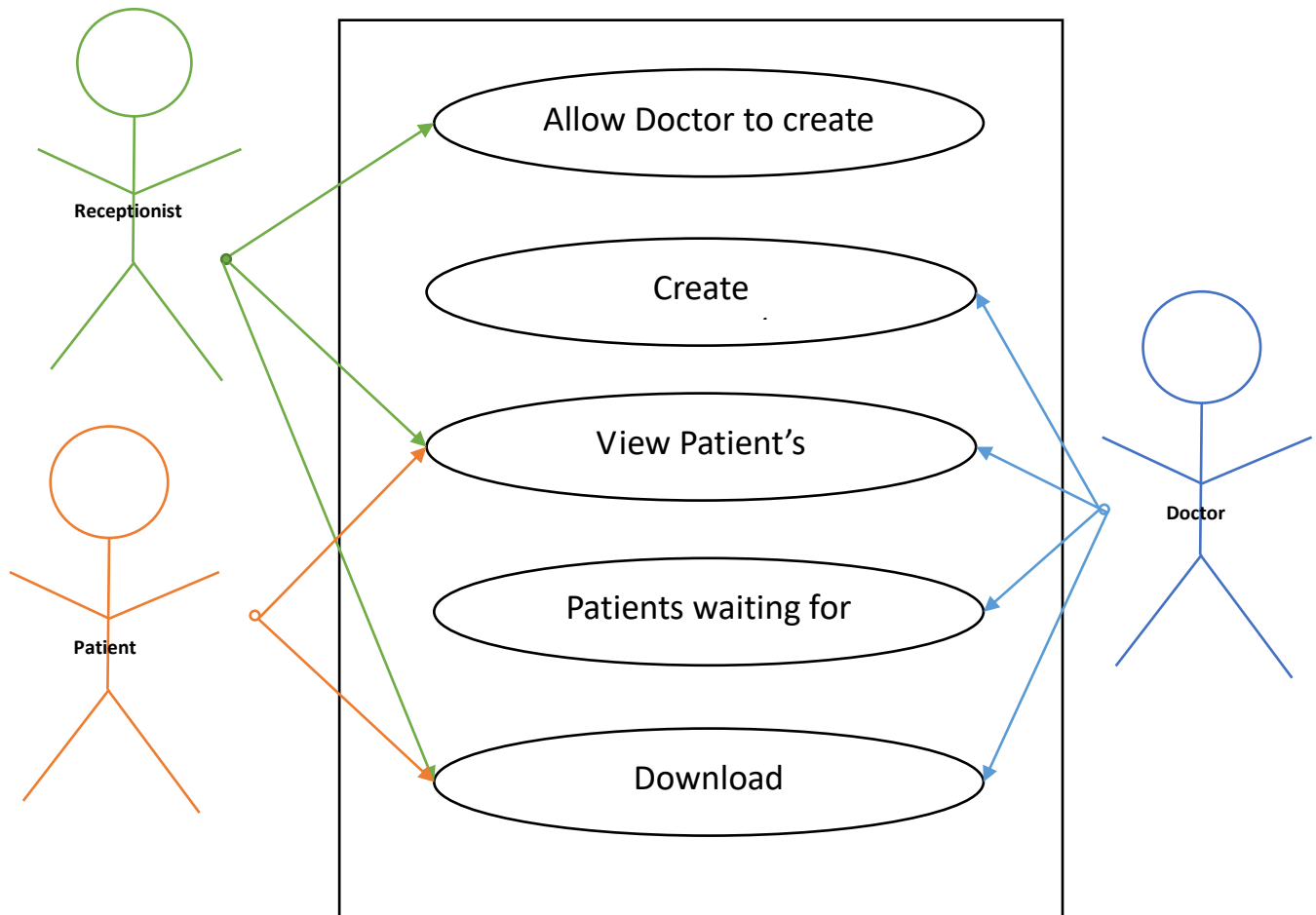


Diagram 4 –Examination – User Cases 13, 15, 18, 14, 20

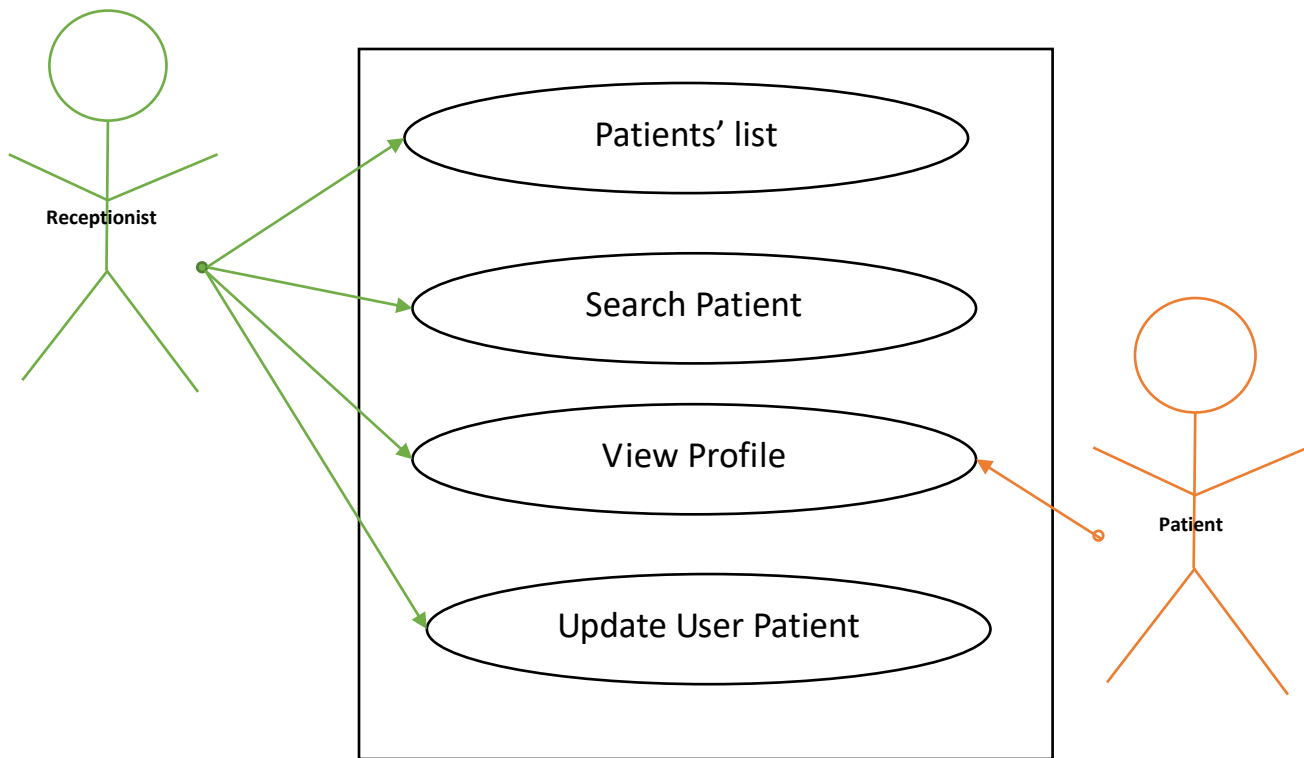


Diagram 5 –Update User Patient – User Cases 6, 8, 17, 10

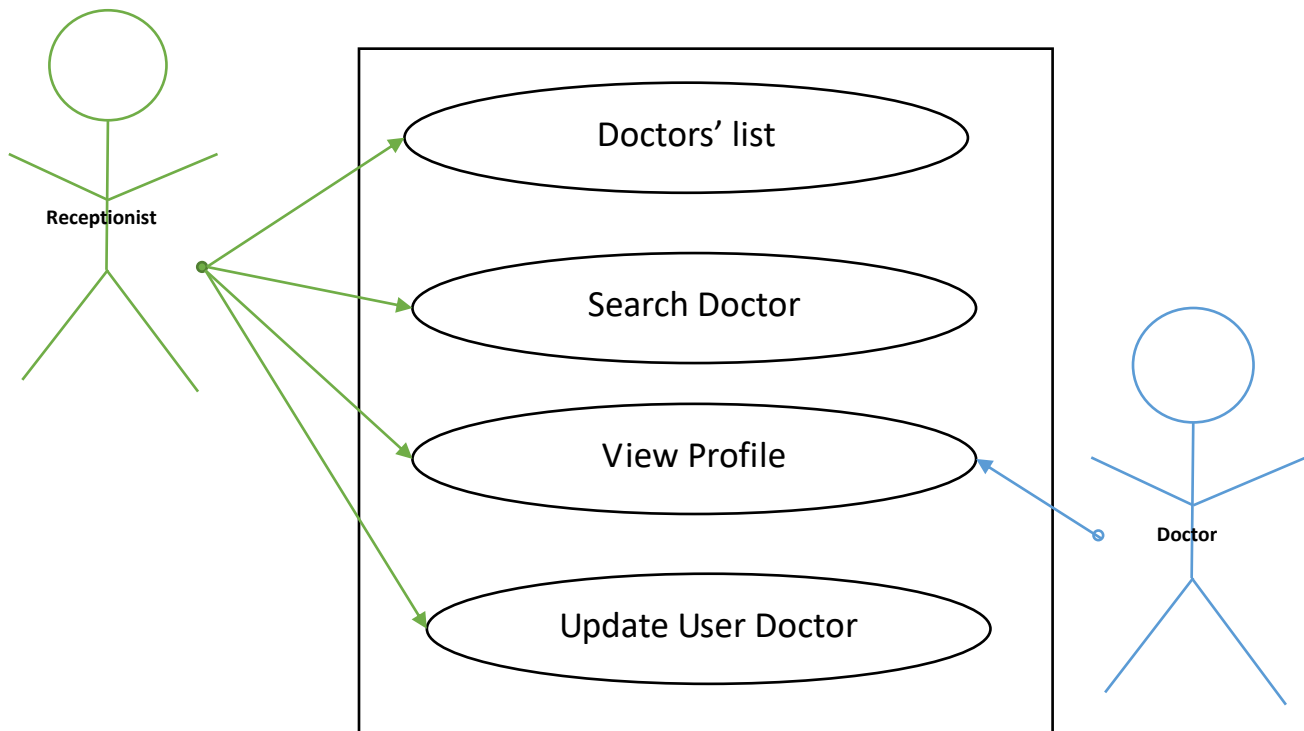


Diagram 6–Update User Doctor – User Cases 7, 9, 17, 11

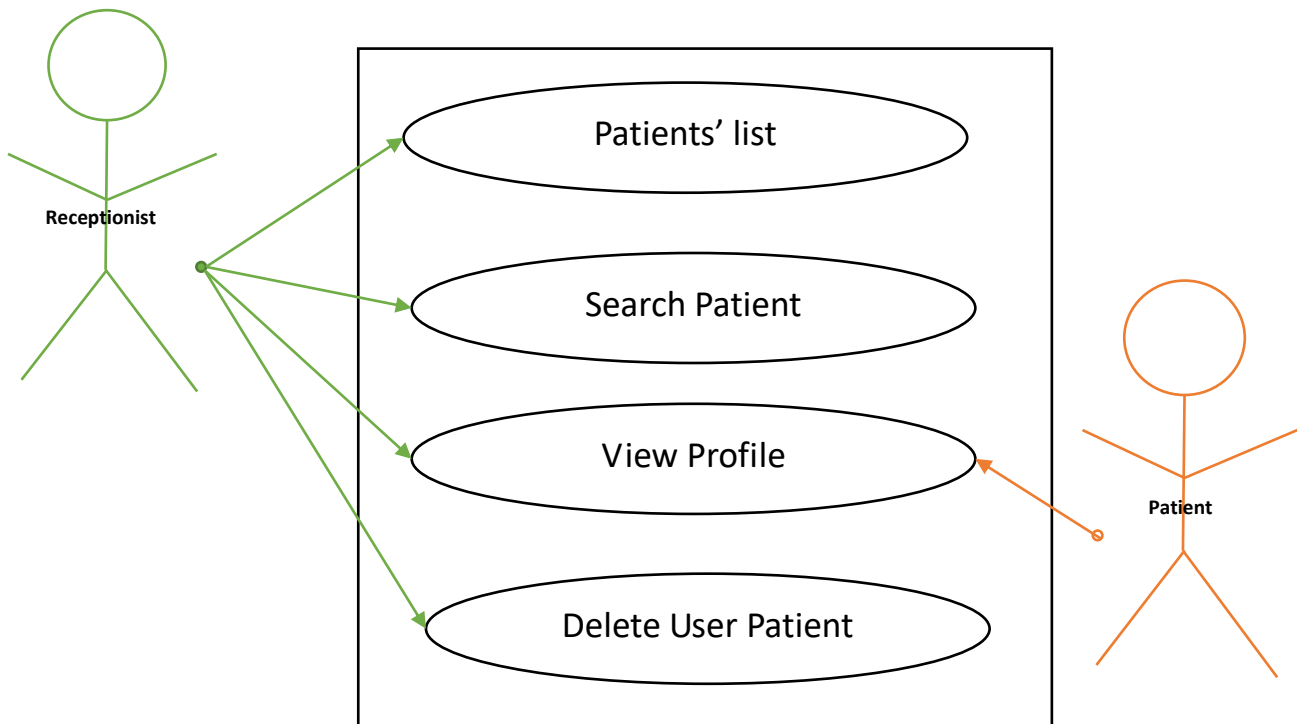


Diagram 7 –Delete User Patient – User Cases 6, 8, 17, 12

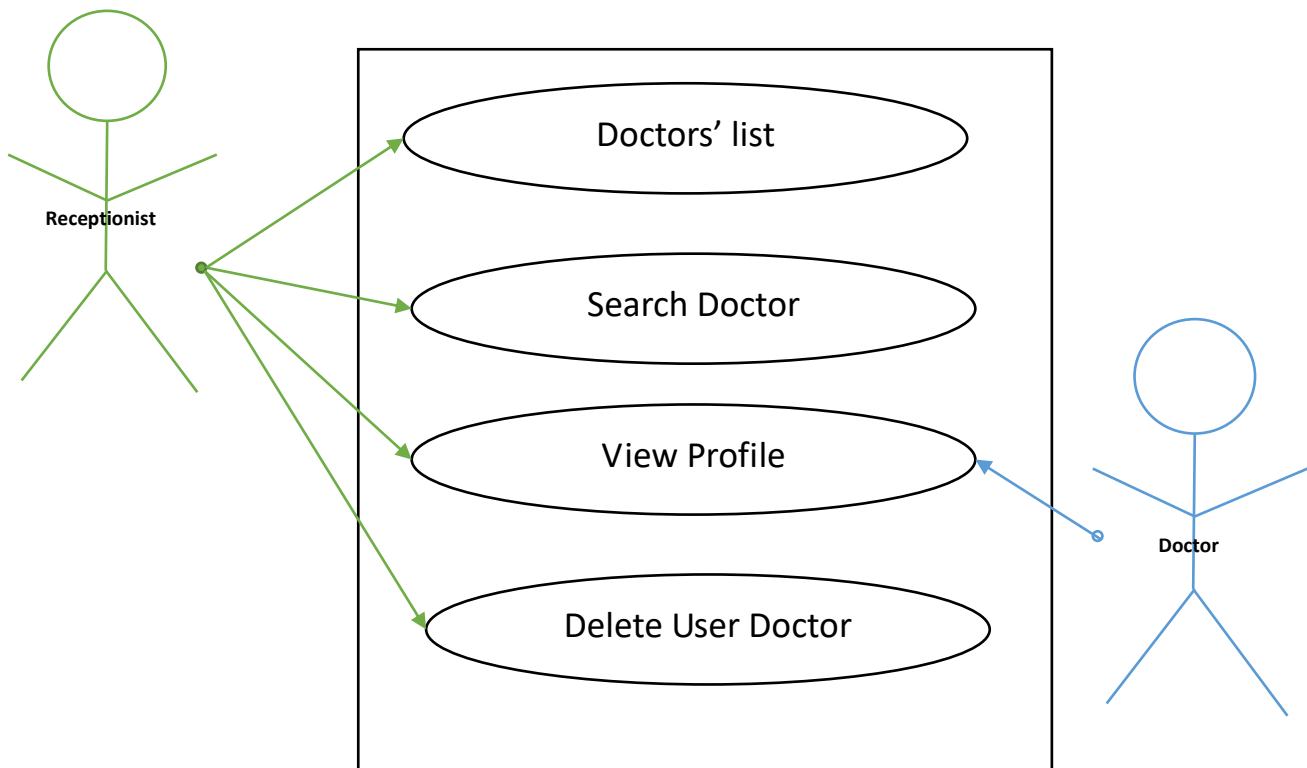


Diagram 8 – Delete User Doctor – User Cases 7, 9, 17, 12

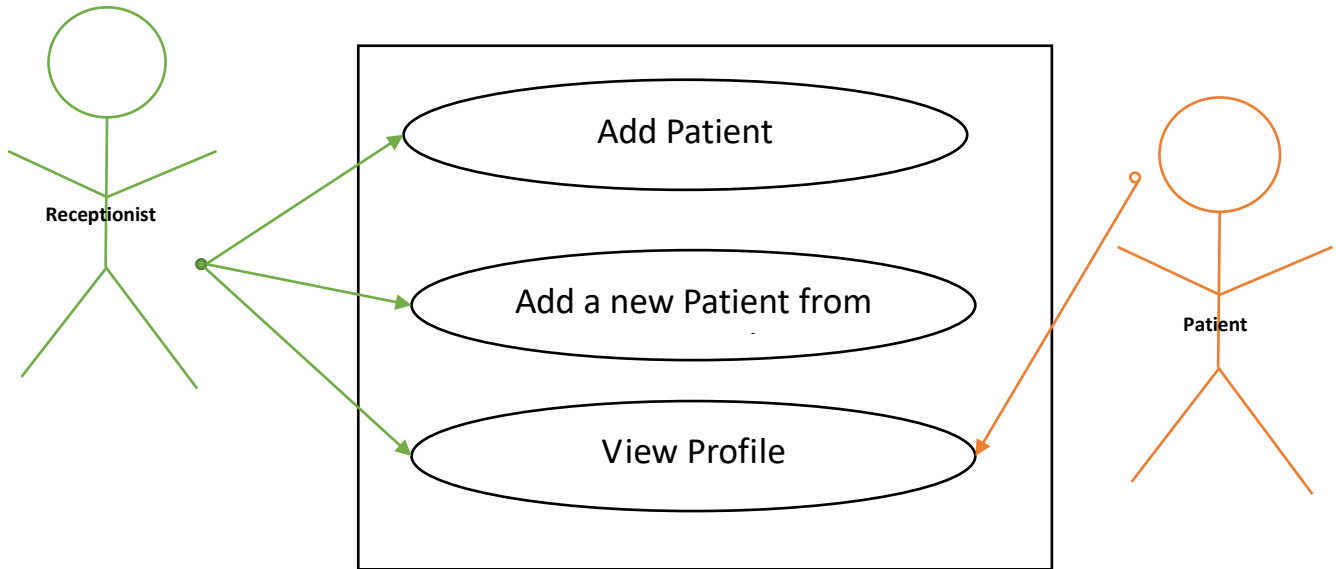


Diagram 9 –Add User Patient – User Cases 3,4,17

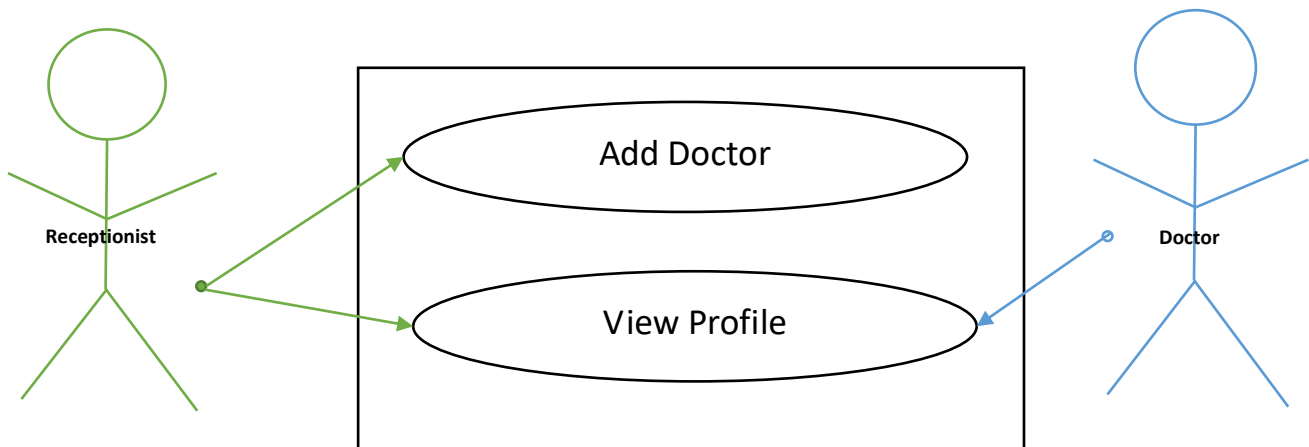


Diagram 10 – Add User Doctor – User Cases 5,17

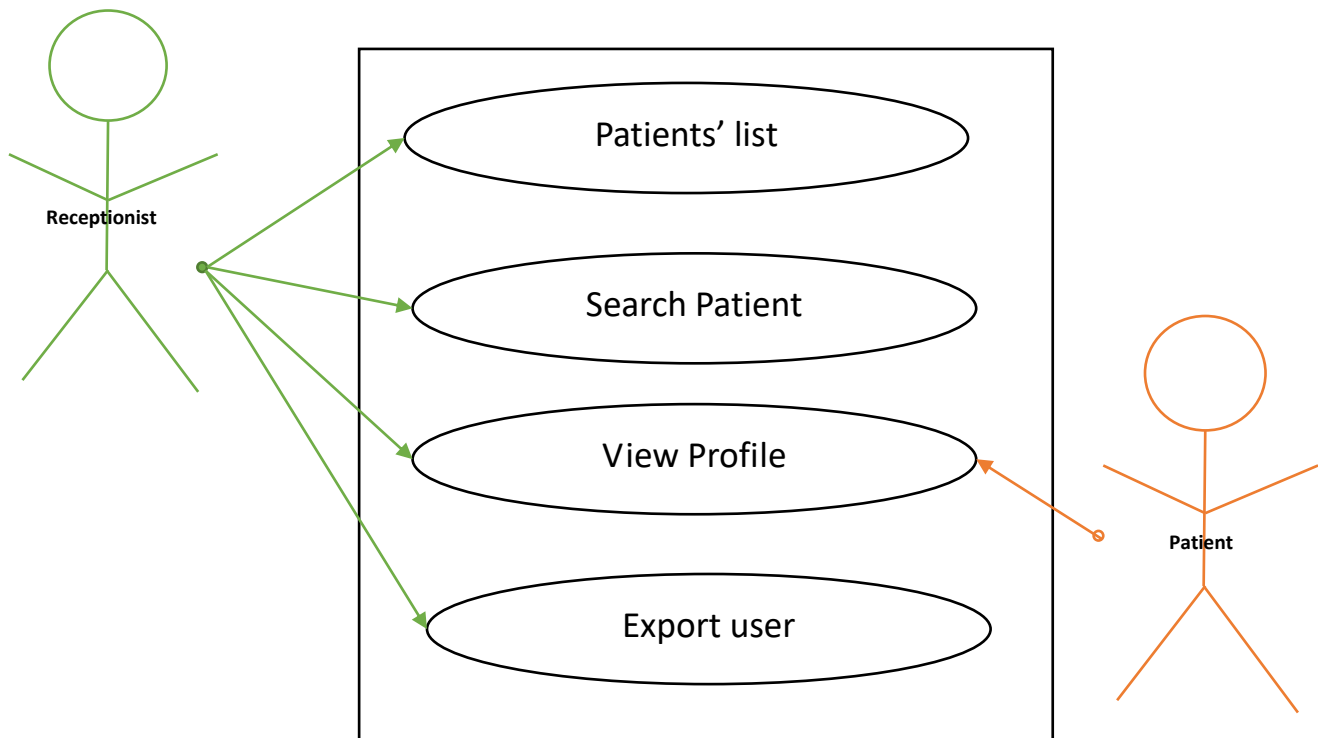


Diagram 11 – Export User Patient – User Cases 6, 8, 17, 16

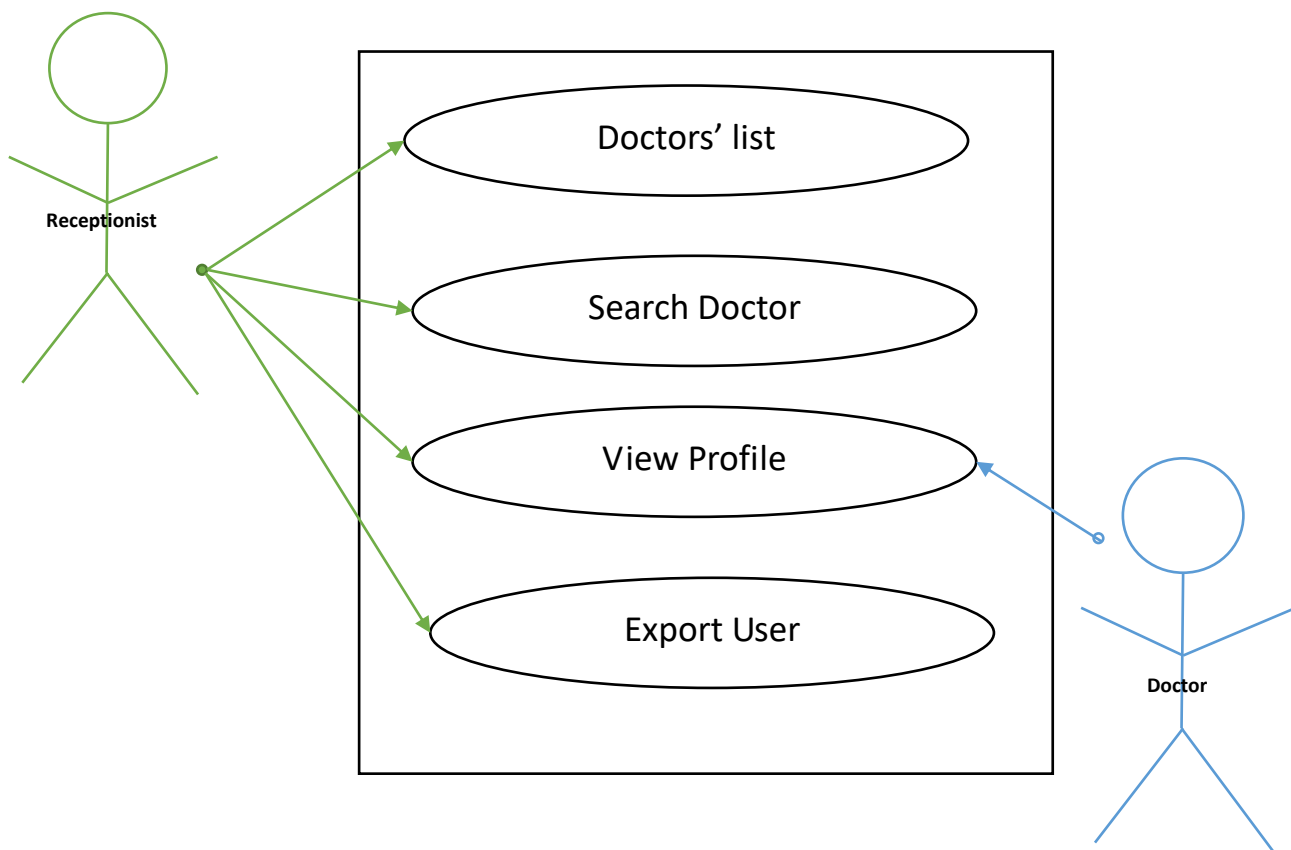


Diagram 12 – Export User Doctor – User Cases 7, 9, 17, 16

5. APPENDIX

5.1 Appendix A - Definitions, Acronyms, and Abbreviations.

PMS – Polyclinic Management System

PDF – Portable Document Format

XML – Extensible Markup Language

5.2 Appendix B - References


<http://www.shendetesia.gov.al/>

https://arsimi.gov.al/files/userfiles/mdh/Ligji_per_mbroitjen_e_te_dhenave_personale_9887_date_10_03_2008_i_ndryshuar.pdf


http://www.shendetesia.gov.al/files/userfiles/Baza_Ligjore/sistemi_i_referimit/Untitled.FR11.pdf

5.3 Appendix C - Requirements Traceability Matrix

5.4 Appendix D - File Format



REPUBLIKA E SHQIPERISE
MINISTRIA E SHENDETESISE



INSTITUTI I SIGURIMEVE
TE KUJDESIT SHENDETESOR

KARTELA PERSONALE NR. _____

Qendra Shendetesore _____

Ambulanca _____

Mjeku i Pergjithshem dhe i Familjes _____

Reaksion nga: _____

Gr. i Gjakut _____

Rh. Faktor _____

Dt. e hapjes se Karteles _____

Kodi i pacientit _____

Nr. i sigurimit shendetesor _____

Kategoria e popullates _____

Grupi i invaliditetit _____

Nr. Dok. Identifikimi _____

GJENERALITETET

Emri _____ / Atesia _____ / Mbiemri _____

Datelindja: Data _____, Muaji _____, Viti _____, Nr. Tel. _____

Adresa e plote e vendbanimi _____

Profesioni _____, Detyra _____

Qendra e punes _____

Ne ngarkim te nje tjetri kur nuk punon _____

Figure 1 - File Format Page 1

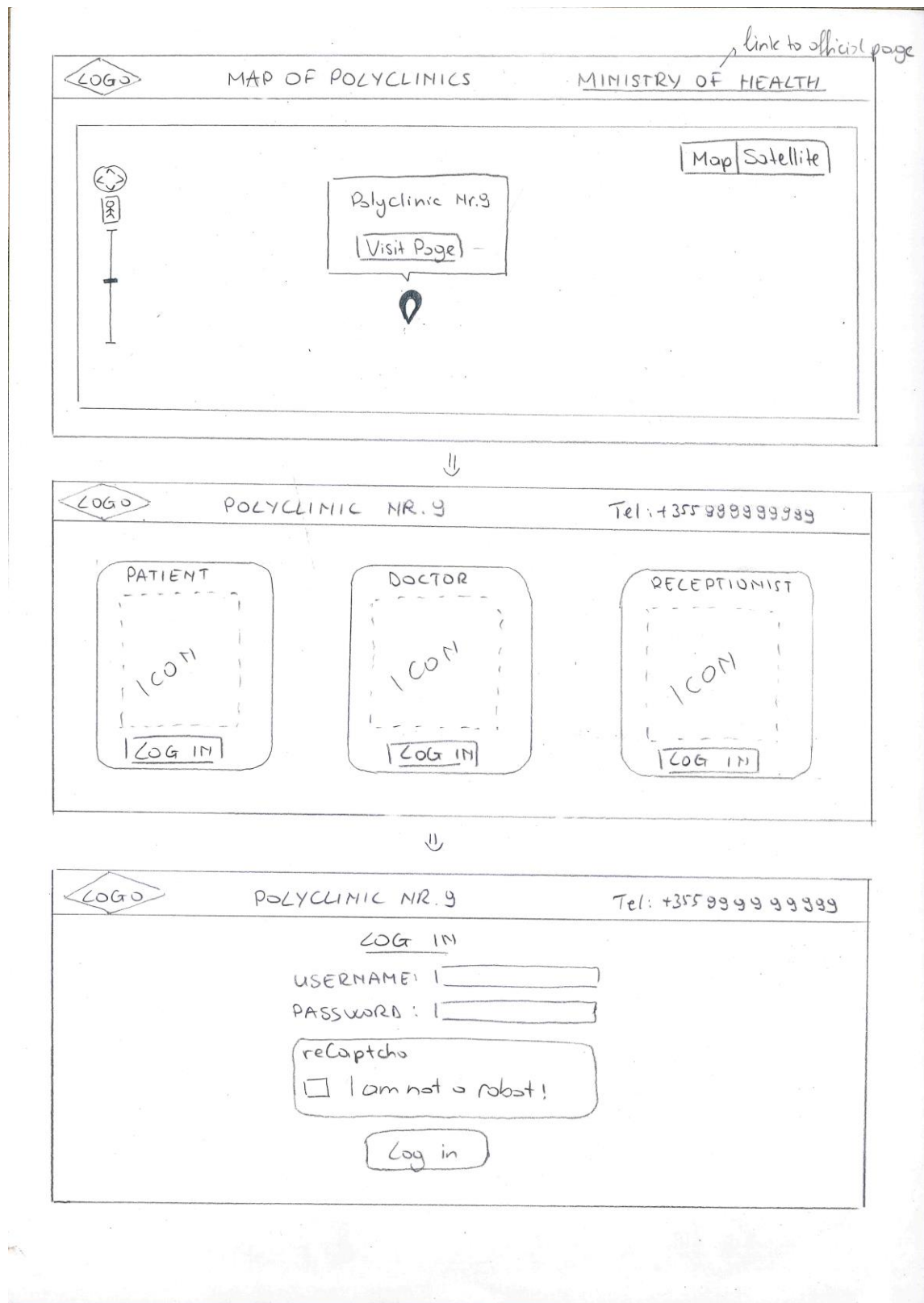
ANAMNEZA E JETËS

A form consisting of 25 horizontal lines, intended for handwritten notes or text entry. The lines are evenly spaced and span the width of the form area.

Figure 2 - File Format Page 2

Figure 3 - File Format Page 3


5.5 Appendix E - Sketches



Sketch 1. Main page



Sketch 2. Receptionist



RECEPTIONIST: NAME SURNAME, POLYCLINIC NR.9

LOG OUT


GO BACK

MY PROFILE ①

PROFILE
PICTURE

PERSONAL INFORMATION

NAME:
SURNAME:
BIRTHDATE:
BIRTHPLACE:
DEGREE:
EMAIL:



RECEPTIONIST : NAME SURNAME, POLYCLINIC NR.9

LOG OUT


GO BACK

CHANGE PASSWORD ②

CURRENT PASSWORD:
NEW PASSWORD:
CONFIRM PASSWORD:

SAVE CHANGES

Sketch 3. Receptionist


 RECEPTIONIST: NAME SURNAME, POLYCLINIC NR. 9
 LOG OUT

← GO BACK
PATIENTS OF POLYCLINIC : ③

Nr.	ID	NAME	SURNAME	ACTIONS
1	x	View Update Create Visit Export Delete
2	xx	⑨ ⑩
3	xxx	

1. View → view full profile of patient
2. Update → change personal information of patient
3. Create visit → allow the patient's family doctor to create a new record on the patient's file. A pop up window to confirm this action will be shown.
4. Export → export a file with all patient's information, if we want to send it to another polyclinic or hospital. (? we need to decide the channel of communication with other hospitals or polyclinics)
5. Delete → A pop up window will be shown to confirm this action.

* The same idea will be used for "Doctors' list" section. The only difference will be on the actions that the receptionist can take on each doctor: ④

1. View full profile
2. Update
3. Delete

Sketch 4. Receptionist

LOGO

RECEPTIONIST: NAME SURNAME, POLYCLINIC NR. 9

LOG OUT

GO BACK

PATIENT'S FULL PROFILE 9

PERSONAL INFORMATION

NAME: ...
SURNAME: ...
EMAIL: ...
ADDRESS: ...
...

PROFILE PICTURE

PHOTO

VIEW EXAMINATIONS

* The same idea will be used to view "DOCTOR'S FULL PROFILE", but it would not have a "view examinations" button. There will be only personal information and a profile picture.

LOGO

RECEPTIONIST: NAME SURNAME, POLYCLINIC NR. 9

LOG OUT

GO BACK

PATIENT'S EXAMINATIONS 11

EXAMINATION VISIT 1

DATE:
DOCTOR:
COMPLAINTS:
DIAGNOSIS:
...

EXAMINATION VISIT 2

DATE:
DOCTOR:
COMPLAINTS:
DIAGNOSIS:
...

Sketch 5. Receptionist

LOGO RECEPTIONIST: NAME SURNAME, POLYCLINIC NR.9 LOG OUT

← GO BACK UPDATE PATIENT'S PROFILE 10

NAME:

SURNAME:

ADDRESS:

EMAIL:

JOB:

PHONE:

⋮

⋮

SAVE CHANGES

- At the beginning, all fields will be filled with existing information which can be changed.

* The same idea will be used for "UPDATE DOCTOR'S PROFILE". The only difference is the fields that should be filled for patient and doctor are different.


Sketch 6. Receptionist

The sketch shows a web interface for a Receptionist. At the top, there is a header bar containing a diamond-shaped logo on the left, the text 'RECEPTIONIST: NAME SURNAME, POLYCLINIC NR. 9' in the center, and a 'LOG OUT' button on the right. Below the header, there is a main content area. On the left side of this area is a 'GO BACK' button with a left-pointing arrow. To its right is the title 'ADD A NEW PATIENT' followed by a red circled number 5. The form consists of a list of labels on the left and corresponding input fields on the right: 'NAME:', 'SURNAME:', 'FATHER'S NAME:', 'EMAIL:', 'ADDRESS:', 'PERSONAL ANAMNESIS:', 'FAMILY ANAMNESIS:', 'PROFESSION:', and 'PROFILE PICTURE:'. Each label has a corresponding rectangular input field. The 'PROFILE PICTURE' field contains the text 'UPLOAD PICTURE'. Below the 'PROFILE PICTURE' label and its field, there are three vertical dots on each side. At the bottom center of the form is an 'ADD PATIENT' button.

* The same idea will be used for "Add a new doctor" ⑥ section. The only difference will be in the fields that should be filled for adding a patient or a doctor.

? A button could be used to import a file with patient's records (ex. when coming from another polyclinic)

Sketch 7. Receptionist


RECEPTIONIST : NAME, SURNAME, POLYCLINIC NR.9

LOG OUT

GO BACK

SEARCH A PATIENT ⑦

NAME:

SURNAME:

SEARCH

RESULTS:

NAME	SURNAME	FATHERS' NAME	ACTION
SARA	QIRKO	JORGO	<div>Delete</div> <div>View</div> <div>Update</div> <div>Create visit</div> <div>Export</div>
SARA	HOXHIA	AGIM	<div>Delete</div> <div>View</div> <div>Update</div> <div>Create visit</div> <div>Export</div>

• The table of results will be the same as the one on "Patients' list" Section.

- Delete : A pop up window will be shown to confirm the deletion
- View : View full profile of patient
- Update : Change personal information of patient
- Create visit : allow the patient's family doctor to visit the patient and add a new record in his file.
- Export : create a file with all the patient's information, which will be sent to another polyclinic or hospital.

* The same idea will be used for "Search a doctor" section.
The table of results will be the same as the one on "Doctors' list" Section:

- ⑧
- Delete : A pop up window will be shown to confirm the deletion
 - View : View full profile of doctor
 - Update : Change personal information of doctor.

Sketch 8. Receptionist

①

LOGO PATIENT: KEJDA BALLA

PERSONAL INFORMATION

NAME: KEJDA
SURNAME: BALLA
BIRTHDATE: 00.00.0000
ID NUMBER: 12345678
BIRTHPLACE: TIRANA
FATHER'S NAME: X
MOTHER'S NAME: X
ADDRESS: TIRANA
POLYCLINIC NUMBER: 9
FAMILY'S DOCTOR: SARA QIRKO

ANAMN RECORDS

FAMILY

PERSONAL

PROFILE ①
CHANGE PASSWORD ③
CONTACT ④
LOG OUT

Sketch 9. Patient

②

LOGO PATIENT: KEJDA BALLA

EXAMINATION VISIT 1

DATE: 05/04/2018
DOCTOR: SARA QIRKO
COMPLAINTS: XXX
XXXX
XXX
DIAGNOSIS: XXXXXX

EXAMINATION VISIT 2

DATE: 09/05/2018
DOCTOR: SARA QIRKO
COMPLAINTS: XXX
XXXX
XX
DIAGNOSIS: XXXXX

Download

Download

Sketch 10. Patient

③

LOGO PATIENT: KEJDA BALLA

CHANGE PASSWORD

Current Password:

New Password:

Confirm Password:

Save Changes

Sketch 11. Patient

④

LOGO PATIENT: KEJDA BALLA

CONTACT DOCTOR

Name:



Email:

Message:

Send

Sketch 12. Patient

①

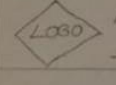


Doctor: Name, Surname, Polyclinic Nr. 9


Doctor's Photo	ID	Name	Surname	Birthdate	Birthplace	View Profile	Create Visit
	1	Ivana	Dollarovic			View Profile	Create Visit
	2	Sara	Orko			View Profile	Create Visit
	3	Nejra	Dollarovic			View Profile	Create Visit
	4	Kejda	Balla			View Profile	Create Visit

Home
My patients
Change pass
Log out

Sketch 13. Doctor

②


Doctor: Name, Surname, Polyclinic Nr. 9


Name: Ivana
Surname: Dollarovic
Doctor: Dr. Fatjon Salaj
Date: 03.28.2018
Complaints:


Diagnosis:

Go Back

Finish

Sketch 14. Doctor

③ PDF



Visit

Name: Ilvana

Surname: Dallarovic

Doctor: Dr. Fatjon Salaj

Date: 03.28.2018

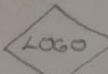
Complaints:

Diagnosis:

Dr. Fatjon Salaj

Sketch 15. Doctor

④



Doctor: Name, Surname Polyclinic Nr.9

Personal Information

Name: Ilvana

Surname: Dallarovic

Email: idallarovic15@epoka.edu

Address:

Download

Profile Picture

PHOTO

⑤

View Examinations

Sketch 16. Doctor

April 17, 2018

Page 66 of 69

5

Logo Doctor: Name, Surname, Polyclinic Nr. 9

Go Back Patient's Examinations

Patient: Ilvana Dollaroviq

Examination Visit 1

Date:

Doctor:

Complaints:

Diagnosis:

:

:

Examination Visit 2

Date

Doctor

Complaints

Diagnosis

:

:

Sketch 17. Doctor

6

Logo Doctor: Name, Surname, Polyclinic Nr. 9

Search...

1	Alban	Vogli	View Profile
2	Andi	Shega	View Profile
:	:	:	:
:	:	:	:
32	Ilvana	Dollaroviq	View Profile
:	:	:	:
:	:	:	:

4

Sketch 18. Doctor

7

Logo

Doctor: Name, Surname, Polyclinic Nhg

← GO BACK

Change Password

Current Password

New Password

Confirm Password

Save Changes

Sketch 19. Doctor