Software Requirements Specification

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Hospital Management System

-Introduction

Executive Summary

Hospital Management System (HMS) is a web software system made for hospitals whose main purpose is to facilitate the medical process and to develop easy steps for the patients and staff to make the system more flexible. The project also went to prepare more medical aspects such as examination and imaging.

The most we aspire is to keep the patient updated with online profile system Taking into consideration the safety principle of the patient's information and medical system.

Overview of Document

The next chapter talks about what is hospital management system and it has a block diagrams to describe it, talks about users of the system and it has a brief description of the modules of the system.

The third chapter talks about system users in details and it has diagrams to make it more readable

chapter four is talking about system modules but it describes it in diagrams way just like block or context diagram to describe the modules and submodules and also it has other diagrams to describe the operations of the modules.

chapter five it talks about system functions which is separated between staff of hospital and patient.

Chapter six is written primarily for the developers and describes in technical terms the details of the functionality of the product.

-System Description

Introduction

A website providing software system for managing the hospital resources, from doctors to receptionists to patients, all will have a streamlined process omitting unnecessary waiting time. And giving chance to index all medical info about Medical tests and Medical Radiology. Which will help in future diagnostics and will be valuable for future enhancements.

- ### Managing Resources

-Receptionists can see clearly who are the available doctors right now and see the empty time slots for patients to make reservation and can be able to see patient profiles to see their medical history.

- Receptionists can forward the examination requests to doctors.

-Medical Managers can track work progress through attendance systems for doctors and workers using computer vision and through complaints.

-All hospital info with all doctors and officials and all departments available on the website.

-Pharmacies cooperation system allowing medical prescription generator.

- ### Patients Interaction

-Every patient will be able to have a profile created by him or by the receptionists containing his medical history.
-Patients can check all the doctors available slots and make reservation online.

-They can apply health insurance online.

-They can check their medical results and medical reports online, including radio images.

-They can export their medical reports to use anywhere.

-They can submit complaints for medical managers to review.

- ### Doctors Interaction

-They can provide better diagnosis for patients as they can check their profile before the appointment.

-They can create their medical prescription using the system and check the pharmacies stock and print it with ease.

-They can create and upload examination results for the patient and forward radio image requests for them allowing smoother process for the patient comfort.

-Doctors can forward examination results to each other's.

-Doctors can edit their time slots by requesting that to the manager.

-Users

★ Patient

He is the one who needs our care , by using our system he can:
Edit his profile information
Online reservation for any service
View his medical history
Feedback form for any employee
View doctor's reviews and ratings

★ Doctor

He is person who gives treatment to the patients so he is an essential part of our system and by using our system he can :
Edit his profile information
Access the pharmacy module and prescription module
Forward requests to other doctors for any required task (Analysis - Rays ..etc)
View the medical history for any patient.

★ Receptionist

He is the person which meets the patients in any hospital and our system facilitates for him the manual work he needs to do so by using our system he can :
View the doctor's schedule
Reservations for the patients at hospital
Registration for patients and Making accounts for them
Check employees availability
Feedback form for another employees in hospital
View his own feedbacks and rating
Access the database of doctors, users

★ Admin

He is the one who is responsible for the system functionalities and he can :
Access all data base for every one deal with system
View all feedbacks and ratings for all employees
View all evaluations of all employees
Feedback , Alert and Punishment forms based on evaluations
Obtain reports about hospital resources

-Modules

- **Profile System**
  - ★ This will help aid two of the three ends we assist in the system, the patient and the managing(Receptionist) in the hospital.

  - ★ This module is aimed to create the user that is going to be stored in the patients database by providing the Full Name,Mobile, and the national id.

  - ★ A profile can be made, this allows its owner to access the platform funcuntailites such as making online reservations.

Starting from the **Receptionists** they will be able to :
- ➜ Create a profile for each new patient coming to the hospital and that goes by them collecting the:
  - i) Full name
  - ii) National ID obtained by scanning it (ID will be used as the password for the first login for the new user).
  - iii) (optional) they can ask for the mobile number of the patient.

- ➜ They will be able to check the info of the client coming to the Hospital each time he comes (see his reservations, will be Discussed in details in the online reservation module).

Now we will talk about the other end which is the **Patient** , to fill his/her own profile they will need to provide the following data :
- Full name entry and this will be checked using our computer vision algorithm(by comparing the name provided in the id with the name given by the patient) This is done to avoid fake accounts being made and as extra precaution.
- Mobile number.
- Email.
- Also a password as part of the login/signup process.

The employees of the hospital can have profiles:

A. The doctors have a profile which shows them the appointments they have, submit a request to edit their schedule to the manager,forward requests and see details about the patient they are dealing with.
They also can post, view the results of tests.

B. The reception's profile allows them to make a reservation, check the schedule of the doctors and it has the privilege of creating a new profile for the patients.

The employees of the hospital have in their profiles info that will be checked using our computer vision to check their id, and the availability module.

For example:
  A. The photo in the id, will be checked for better security.
  B. The doctor will have a section in his profile about the feedback done about him.

- ### Online Reservation Module

After the **patient** creates his profile :
  1. He needs to choose the desired doctor in the desired specialization and also the prefered time period.
  2. He can cancel the reservation before an agreed time limit.

The Receptionist can then confirm that the patient came in the timeslot he chose when the patient arrives in the hospital, also he can cancel reservations if the time limit to arrive passes, or just simply if the patient could cancel the reservation due to some technical issue or just not able to use the system.

- ### Prescription System

This module is aimed to help the doctor and the patient , using the pharmacy module which will be discussed in detail later on, the doctor can then generate a prescription for the patient's needs, which can be printed and the user can view them from his profile.

- ### Feedback System

The patient (has to be logged in) can then give his/her feedback about the preservation, the doctor he took an appointment with and leave a review, this can be viewed by user to the website/Mobile application.
To submit a proper feedback, it must have a title and a description; for it to be successfully stored and submitted to the feedback database.

- ### Pharmacy Module

This module can be used by the Prescription module, it access the databases of medicines (the doctors can access it) and this allows him to see if the drug is available in the hospital's pharmacy or the pharmacies that have a partnership with the hospital, he will be able to see their stock and determine the availability of it , helping him to choose a replacement if the desired is not available at the moment.

- ### Rays System

The user will be able to see the results of the rays he/she had in the hospital, and it will be available to download as well (he can export it as PDF image and analysis). The doctor will be the end uploading the rays results , and the patient would be able to see it from his profile.

- ## Online Results

Like the previous module, this will help the patient see the results of a waited for test requested by the doctor.
The results of previous examinations for example past symptoms showed on the patient, past allergies that are discovered can be found there.

- ## ID Recognition

By using our computer vision algorithms we will be able to check the authenticity of the provided ID card of the employees or patients, if their name matches the one in the ID, their image, etc.
Mainly it's used for registration by scanning the ID and make checks for new patient's informations after reservation either online or offline

- ## Analysis System

Similar to the previous 2 modules, the patient will be able to see his own analysis results obtained from the hospital's lab.
The user only have viewing access to those results. (we will discuss in detail how those previous three systems will be handled in the following table)

Guidelines for the results systems:

1- The doctor is the only one that have creation access for any of those 3 modules.
2-Receptionists only have viewing access.
3- Doctors can submit a request that a patient should have a chosen operation (X Ray-blood analysis for example) and this is viewed by another doctor in the lab, which tells him that a patient is to be expected to do the mentioned test and then accept it .
4-Doctors can write the results.
5-Doctors can view results
6-Patients have only VIEWING access to the results.
7-Every results has its own template to be successfully stored and loaded into the databases and the user's profile.

- ## Availability Module

By using cameras throughout the whole hospital, receptionists will be able to check which doctor is available in the hospital area and determine exactly where he is , check also who attended today and who didn't come. This will help control the workflow.

- **Evaluation Module**

By using cameras throughout the whole hospital, admin will be able to track all employees performance and efficiency . and this will be done based on feedbacks , ratings , attendance and availability.

- **Health Insurance Module**

By applying on a health insurance in hospital, this will grant you some discounts. This module can be used by the user, and the receptionist can check the integrity of it, then provide the discounted cost.

-System Users

Patient

- Edit his profile information

Every patient will be able to have a profile created by him or by the receptionists containing his medical history.

- Online reservation for any service

Patients can check all the doctors' available slots and make reservation online.

- View his medical history

They can check their medical results and medical reports online, including radio images.

- Export medical reports

They can export their medical reports to use anywhere.

- Complain and suggest

They can submit complaints for medical managers to review.

- Feedback form for any employee

They can rate any employee or write a review for them.

- View doctor's reviews and ratings

Doctor

- Edit his profile information
- View the medical history for any patient.

They can provide better diagnosis for patients as they can check their profile before the appointment.

- Access the pharmacy module and prescription module

They can create their medical prescription using the system and check the pharmacies stock and print it with ease.

- Add or upload results and reports

They can create and upload examination results for the patient and forward radio image requests for them allowing smoother process for the patient comfort.

- Forward requests to other doctors for any required task (Analysis - Rays ...etc.)

Doctors can forward examination results to each other's.

- Edit and View his own schedule

Doctors can edit their time slots by requesting that to the manager.

- View his own feedbacks and ratings

Receptionist

- Registration for patients and Making accounts for them

Receptionist can make an account for the first time patient and explain for the patient how the system in the hospital is and how to use the application.

- Reservations for the patients at hospital

Patients have the option to reserve appointments through the receptionist not only through the application.

- View the doctor's schedule & Check employees availability

Receptionists can see clearly who are the available doctors right now and see the empty time slots for patients to make reservation and can be able to see patient profiles to see their medical history.

- Receptionists can forward the examination requests to doctors.

If any doctor has been late to upload any result for a patient, the receptionist can send a request to remind the doctor.

- Access the database of doctors, users
- View his own feedbacks and rating

Admin

- Access all data base for every one deal with system

All hospital info with all doctors and officials and all departments are available for the admin.

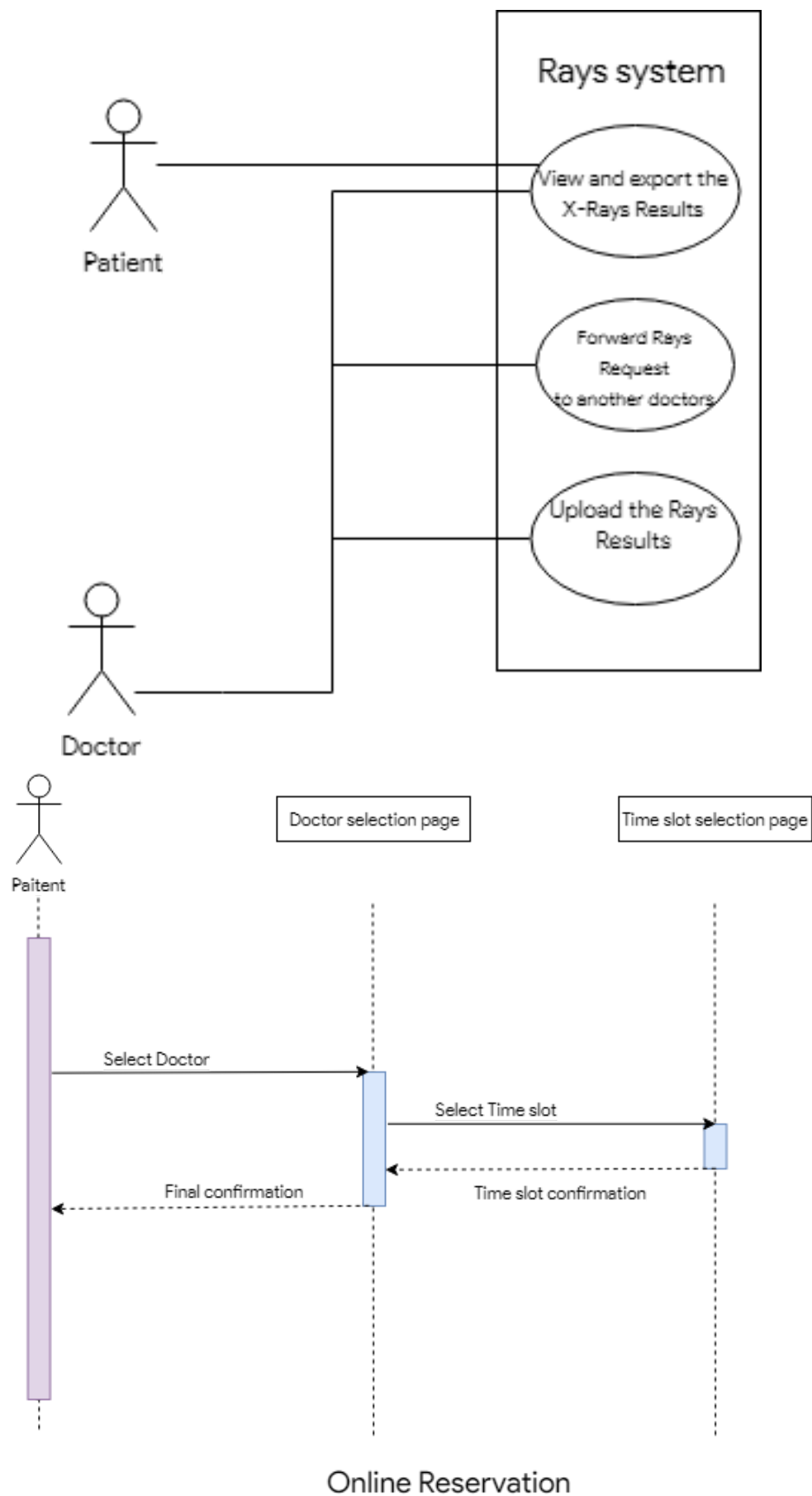- View all evaluations, feedback and ratings for all employees

Medical Managers can track work progress through attendance systems for doctors and workers using computer vision and through complaints.

- Feedback, Alert and Punishment forms based on evaluations
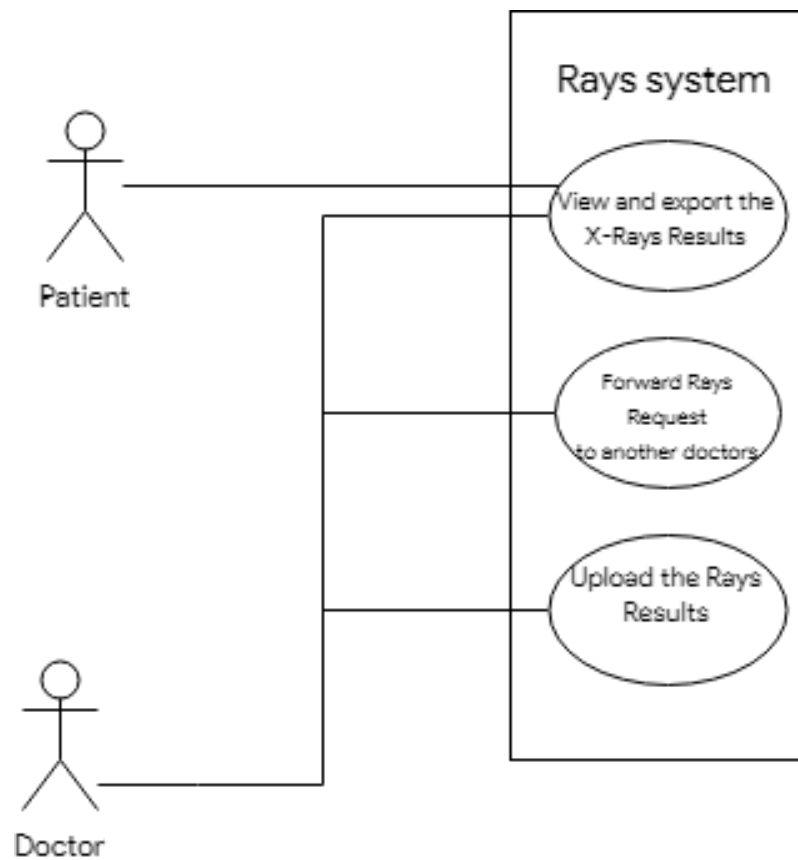- Obtain reports about hospital resources

Pharmacies cooperation system allowing medical prescription generator.
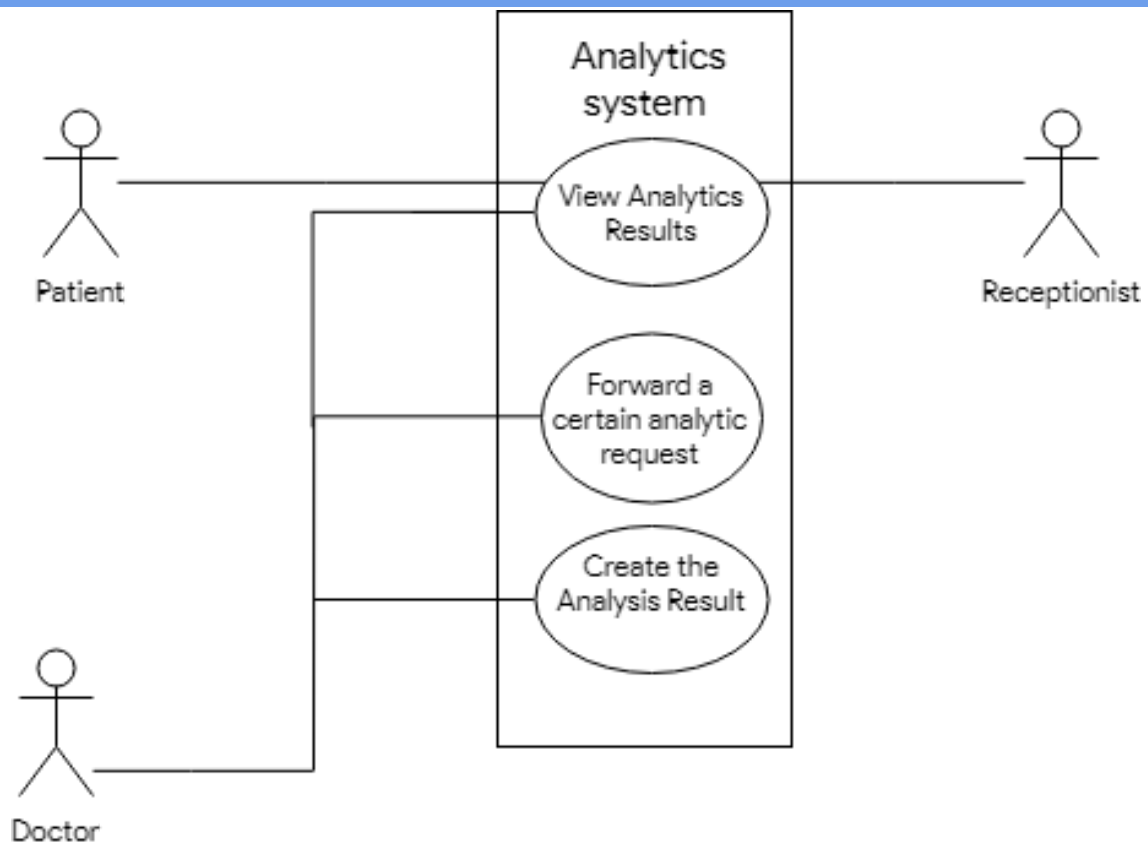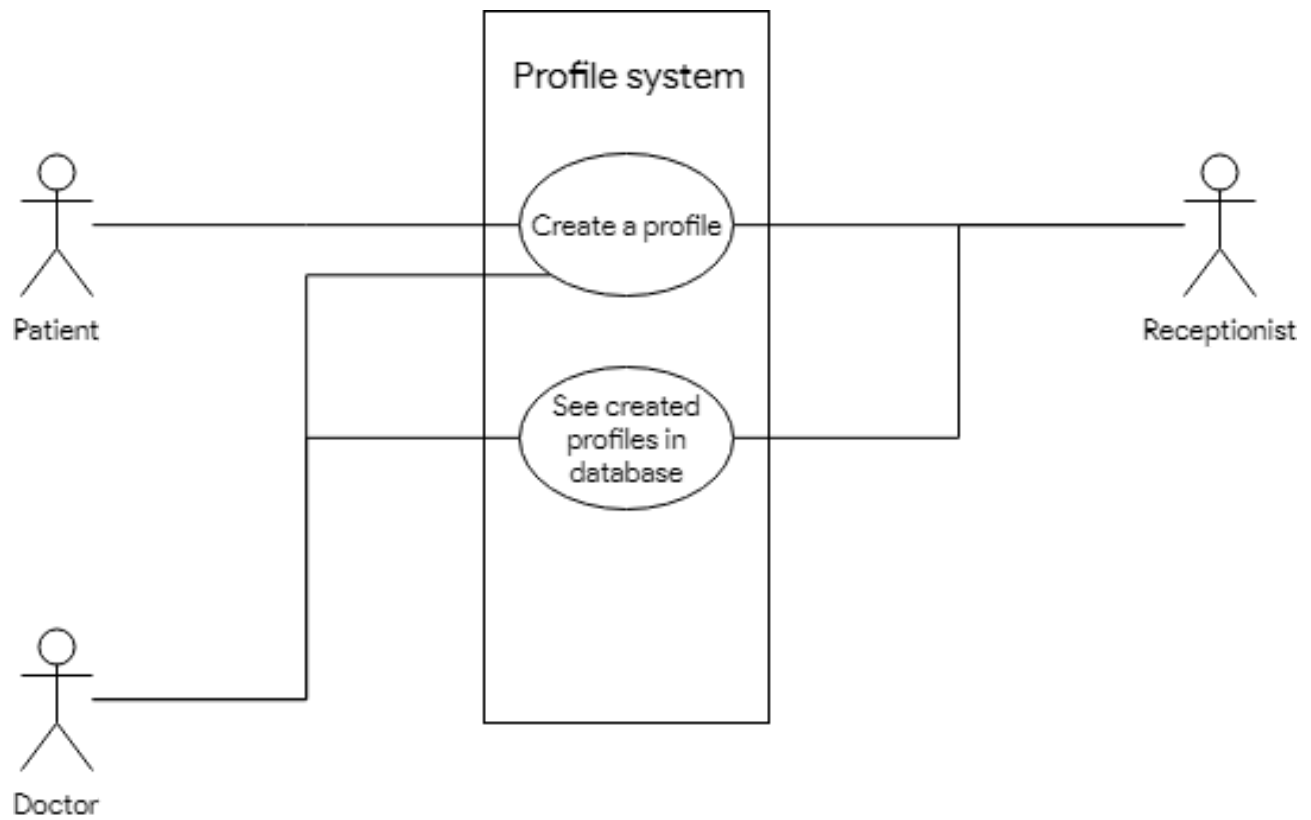
-System Modules

Online Reservation

Prescription module

Rays System

Health insurance system

Analytics system

Feedback system

HMS

Profile system

ID Recognition

Pharmacy partnership

Evaluation module

Online results

Rays system

View and export the X-Rays Results

Forward Rays Request to another doctors

Upload the Rays Results

Patient

Doctor

Paitent

Doctor selection page

Time slot selection page

Select Doctor

Select Time slot

Final confirmation

Time slot confirmation

Online Reservation

Rays System

Rays system

- View and export the X-Rays Results
- Forward Rays Request to another doctors
- Upload the Rays Results

Patient

Doctor

Analysis System

Analytics system

- View Analytics Results
- Forward a certain analytic request
- Create the Analysis Result

Patient

Doctor

Receptionist

Profile System

Pharmacy Partnership
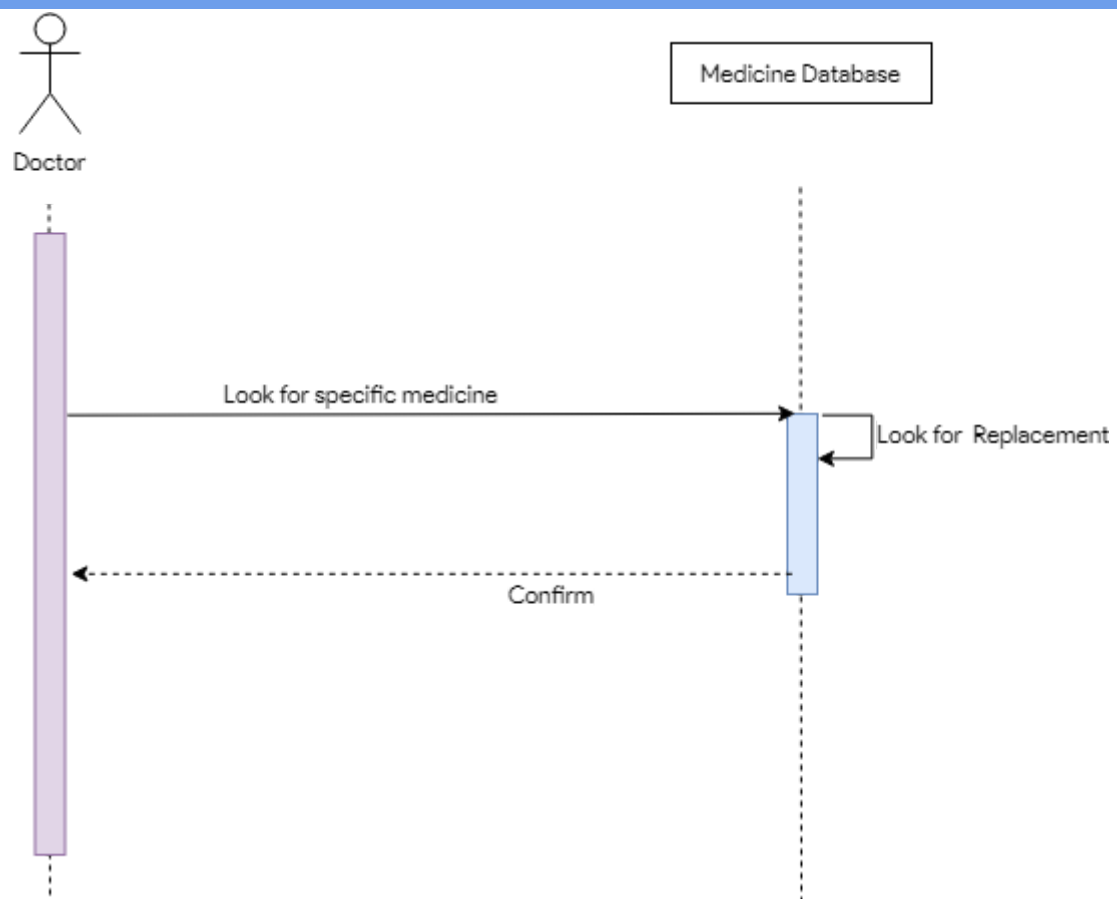
Pharmacy system

Doctor — Can view the pharmacies database to see if a specific drug is avilable and look for replacement if not
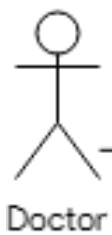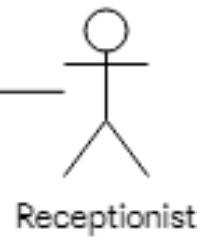
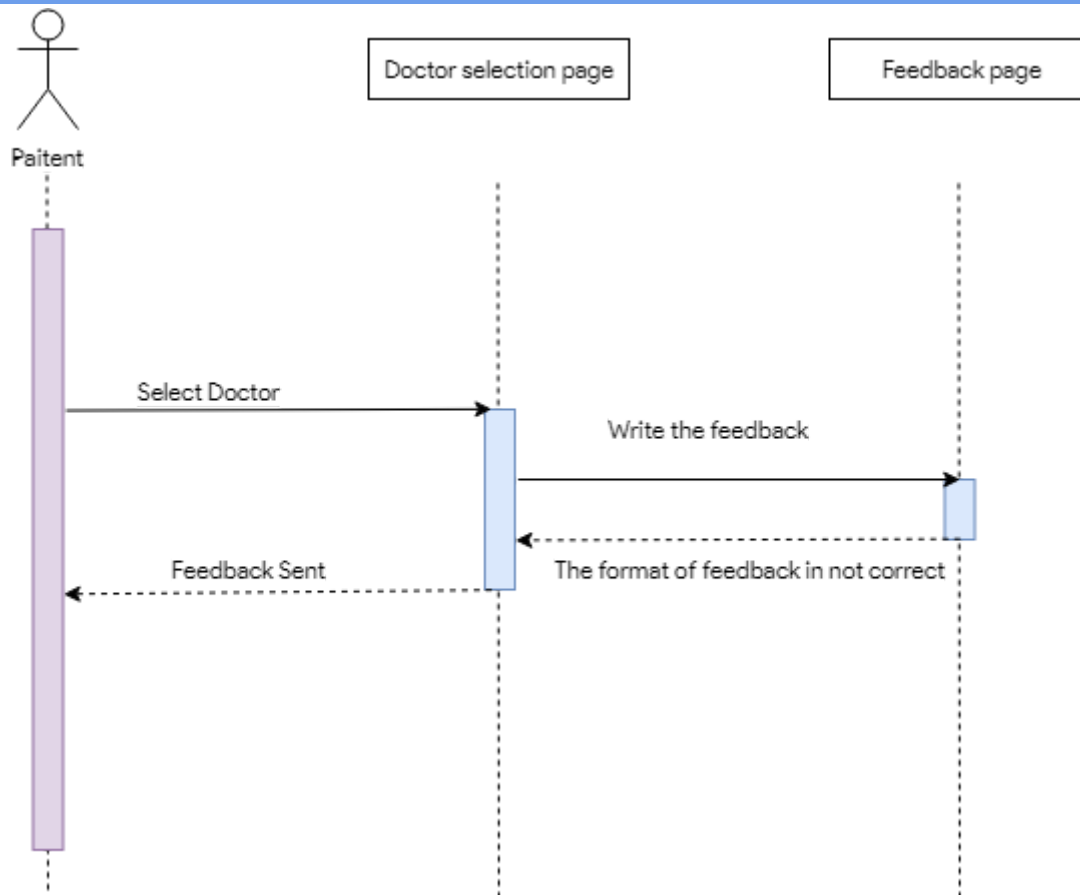# Online Results
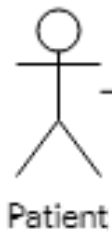
Online Results (Medical History)

Patient

Receptionist

Doctor

- View Patient's Past medical Histoy
- Add to Patient's Medical History
- Create the Analysis Result

Feedback System

Paitent

Doctor selection page

Feedback page

Select Doctor

Write the feedback

Feedback Sent

The format of feedback in not correct

Prescription System

Prescription system

Generate prescription

Doctor

View & print prescription

Patient

15
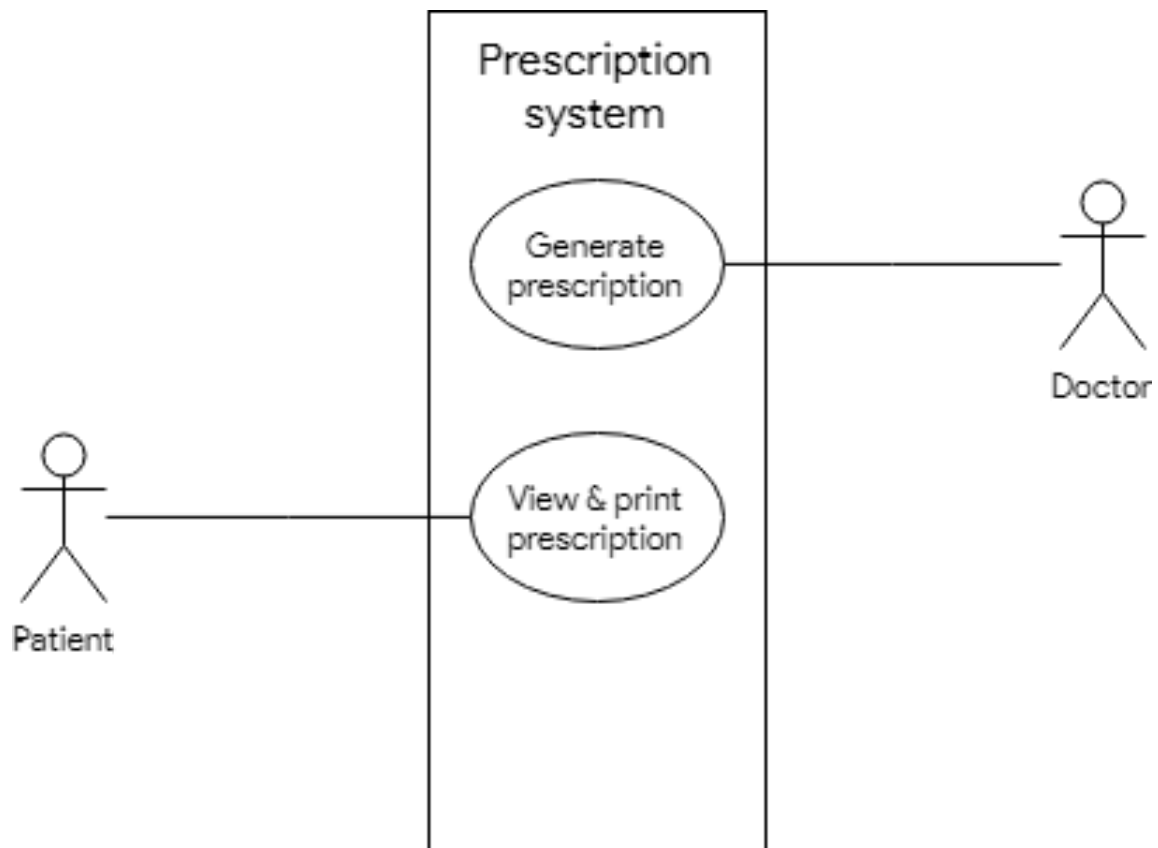
-System Functions

[FR_ORV]Online Reservation Functions

[FR_ORV_1] Make Appointment

-Description : This function is used to make an appointment with a doctor
-Inputs : Doctor id, Timeslot
-Output : Boolean Value
-Pre-Conditions : Registered Patient , Free Doctor
-Post-Conditions : Close the slot

[FR_ORV_2] Cancel Appointment

-Description : This function is used to cancel an appointment with a doctor
-Inputs : appointment id
-Output : Boolean Value
-Pre-Conditions : a reserved appointment , cancellation before certain time
-Post-Conditions : none

[FR_ORV_3]] Delete Appointment

-Description : This function is used to delete an appointment with a doctor
-Inputs : appointment id
-Output : Boolean Value
-Pre-Conditions : none
-Post-Conditions : none

[FR_RYS]Rays System Functions

[FR_RYS_1] Forward Rays Request

-Description : This function is used to forward a ray request for a patient
-Inputs : Patient id
-Output : Ray Request
-Pre-Conditions : An Appointment with a doctor
-Post-Conditions : none

[FR_RYS_2] Generate Rays Result

-Description : This function is used to generate a ray image extension or PDF result
-Inputs : rays report text for PDF , rays data for DICOM
-Output : DICOM , PDF
-Pre-Conditions : none
-Post-Conditions : none

[FR_RYS_3] Edit Rays Result

-Description : This function is used to edit a ray result
-Inputs : rays result id
-Output : PDF , DICOM
-Pre-Conditions : none
-Post-Conditions : none

[FR_RYS_4] Delete Rays Result

-Description : This function is used to edit a ray result
-Inputs : rays result id
-Output : Boolean
-Pre-Conditions : none
-Post-Conditions : none

[FR_ANT]Analysis System Functions

[FR_ANT_1] Generate Analysis Result

-Description : This function is used to generate the result of analysis
-Inputs : analysis data text
-Output : PDF
-Pre-Conditions : An Appointment with a doctor
-Post-Conditions : none

[FR_ANT_2] Edit Analysis Result

-Description : This function is used to edit the result of analysis
-Inputs : analysis result id
-Output : PDF
-Pre-Conditions : none
-Post-Conditions : none

[FR_ANT_3] Delete Analysis Result

-Description : This function is used to delete the result of analysis
-Inputs : analysis data id
-Output : Boolean
-Pre-Conditions : none
-Post-Conditions : none

[FR_FDB]Feedback System Functions

[FR_FDB_1] Create Feedback

-Description : This function is used to give a feedback
-Inputs : patient id , category of the feedback, feedback text data
-Output : Feedback Object
-Pre-Conditions : Signed in patient
-Post-Conditions : none

[FR_FDB_2] View Feedbacks

-Description : This function is used to view feedbacks of a certain category
-Inputs : category of the feedbacks
-Output : PDF formatted feedbacks
-Pre-Conditions : none
-Post-Conditions : none

[FR_FDB_3] Delete Feedbacks

-Description : This function is used to delete feedbacks
-Inputs : feedbacks ids
-Output : Boolean
-Pre-Conditions : none
-Post-Conditions : none

[FR_PHR]Pharmacy Functions

[FR_PHR_1] Check Medicine Availability

-Description : This function is used to check the availability of a medicine
-Inputs : medicine id
-Output : medicine or false
-Pre-Conditions : Prescription generation in progress
-Post-Conditions : none

[FR_PHR_2] Add Medicine

-Description : This function is used to add a medicine to the stock
-Inputs : medicine name , medicine quantity , medicine description
-Output : Boolean
-Pre-Conditions : medicine data available
-Post-Conditions : stock increases

[FR_PHR_3] Delete Medicine

-Description : This function is used to delete a medicine from the stock
-Inputs : medicine id
-Output : boolean
-Pre-Conditions : medicine available
-Post-Conditions : stock decreases

[FR_PHR_4] Edit Stock

-Description : This function is used to edit stock numbers
-Inputs : new stock quantity , medicines ids to edit
-Output : none
-Pre-Conditions : stock available in database
-Post-Conditions : stock increases or decreases

[FR_PHR_5] Request medicine for prescription generation

-Description : This function is used by prescription generator to request a medicine to append in the prescription
-Inputs : medicine id
-Output : medicine object
-Pre-Conditions : medicine available
-Post-Conditions : stock decreases

[FR_ONR]Online Results Functions

[FR_ONR_1] Export Examination Result

-Description : This function is used to send the examination result defined to the patient for download
-Inputs : examination id
-Output : Examination result PDF contains prescription and doctor report
-Pre-Conditions : Patient only requests HIS examinations
-Post-Conditions : none

[FR_ONR_2] Export Rays Result

-Description : This function is used to send the Rays result defined to the patient for download by specifying which format
-Inputs : rays request id, format to download
-Output : For PDF type : rays report , for DICOM : DICOM format rays result
-Pre-Conditions : Patient only requests HIS rays
-Post-Conditions : none

[FR_ONR_3] Export Analysis Result

-Description : This function is used to send the analytics result defined to the patient for download
-Inputs : analytics request id
-Output : PDF contains a report about the analysis
-Pre-Conditions : Patient only requests HIS analysis
-Post-Conditions : none

[FR_PRS]Prescription Functions

[FR_PRS_1] Generate Prescription

-Description : This function is used to generate a medical prescription for a patient
-Inputs : patient id, medicines ids
-Output : prescription
-Pre-Conditions : Examination result to append the prescription to
-Post-Conditions : none

[FR_PRS_2] Edit Prescription

-Description : This function is used to edit a medical prescription for a patient
-Inputs : prescription id
-Output : prescription
-Pre-Conditions : Examination result to append the prescription to
-Post-Conditions : none

[FR_PRS_3] Delete Prescription

-Description : This function is used to delete a medical prescription for a patient
-Inputs : prescription id
-Output : Boolean
-Pre-Conditions : none
-Post-Conditions : none

[FR_P]Profile Functions

[FR_P_1] Create Patient Account

-Description : this function is used to create a new patient profile
-Inputs : name , gender ,nationalID,Date of birth
-Outputs : Boolean
-Pre-Conditions : nationalID is in correct format , date of birth is less than now() .
-Post-Conditions : all patients interactions will be binded to his profile by his nationalID

[FR_P_2] View All Patient Accounts

-Description : this function is used to view all patient accounts
-Inputs : none
-Outputs : JSON of patients
-Pre-Conditions : function caller is of kind : receptionist or doctor
-Post-Conditions : none

[FR_P_3] Edit Patient Accounts

-Description : this function is used to update a record from patient accounts
-Inputs : patient id
-Outputs : Boolean
-Pre-Conditions : patient exists in the database
-Post-Conditions : none

[FR_P_4] Delete Patient Account

-Description : this function is used to delete an existing patient profile
-Inputs : patient id
-Outputs : Boolean
-Pre-Conditions : patient exists in the database
-Post-Conditions : none

[FR_P_5] View Patient Account

-Description : this function is used to view an existing patient profile
-Inputs : nationalID
-Outputs : JSON of patient
-Pre-Conditions : patient exists in the database
-Post-Conditions : none

[FR_AV]Availability Functions

[FR_AV_1] Recognise Face

-Description : identify the owner of each face and try to match it with one of employees in database
-Inputs : none
-Outputs : user id and profile type
-Pre-Conditions : Module is activated
-Post-Conditions : update records

[FR_AV_2] Update Availability State

-Description : To communicate with database and update the state of Availability of the employee
-Inputs : doctor id or receptionist id
-Outputs : Boolean
-Pre-Conditions : [FR_AV_1] was called
-Post-Conditions : updates availability and generate points

[FR_AV_3] Take Attendance

-Description : When the employee's face matched for first time in the day ,his/her attendance will be marked automatically
-Inputs : doctor id or receptionist id
-Outputs : Boolean
-Pre-Conditions : [FR_AV_1] was called
-Post-Conditions : updates attendance state

[FR_EV]Evaluation Functions

[FR_EV_1] Evaluate Doctor

-Description : Uses different inputs to evaluate the doctor's overall performance based on specific criteria to be chosen later.
-Inputs : Attendance, Availability Points, doctor id
-Outputs : Evaluation Object
-Pre-Conditions : Sufficient input data and to be called only in the end of the day
-Post-Conditions : update current evaluation data for the doctor

[FR_EV_2] Evaluate Receptionist

-Description : Uses different inputs to evaluate the receptionist's overall performance based on specific criteria to be chosen later.
-Inputs : Attendance, Availability Points, receptionist id
-Outputs : Evaluation Object
-Pre-Conditions : Sufficient input data and to be called only in the end of the day
-Post-Conditions : update current evaluation data for the receptionist

[FR_EV_3] Update Overall Evaluation

-Description : Append daily evaluation of each employee and recalculate the overall evaluation of the employee for the last specified days
-Inputs : Evaluation Object, Doctor or Receptionist ID
-Outputs : Evaluation Object
-Pre-Conditions : To be called only in the end of the day
-Post-Conditions : Update overall evaluation data for the doctor or receptionist

[FR_ID]ID Recognition Functions

[FR_ID_1] Generate Data From Card

-Description : Uses algorithm to generate data from a valid ID
-Inputs : ID Picture
-Outputs : Full name , ID Number Raw Data
-Pre-Conditions : Valid ID is used
-Post-Conditions : none

[FR_ID_2] Convert Data

-Description : Converts data obtained in [FR_ID_1] to data types can be used by the backend server
-Inputs : Full name , ID Number Raw Data
-Outputs : Full name , ID Number in valid data type
-Pre-Conditions : Valid Raw Data generated
-Post-Conditions : none

[FR_HI]Health Insurance Functions

[FR_HI_1] Check Health Insurance Number

-Description : Checks if the number provided is a valid health insurance number
-Inputs : Health Insurance Number
-Outputs : Boolean
-Pre-Conditions : none
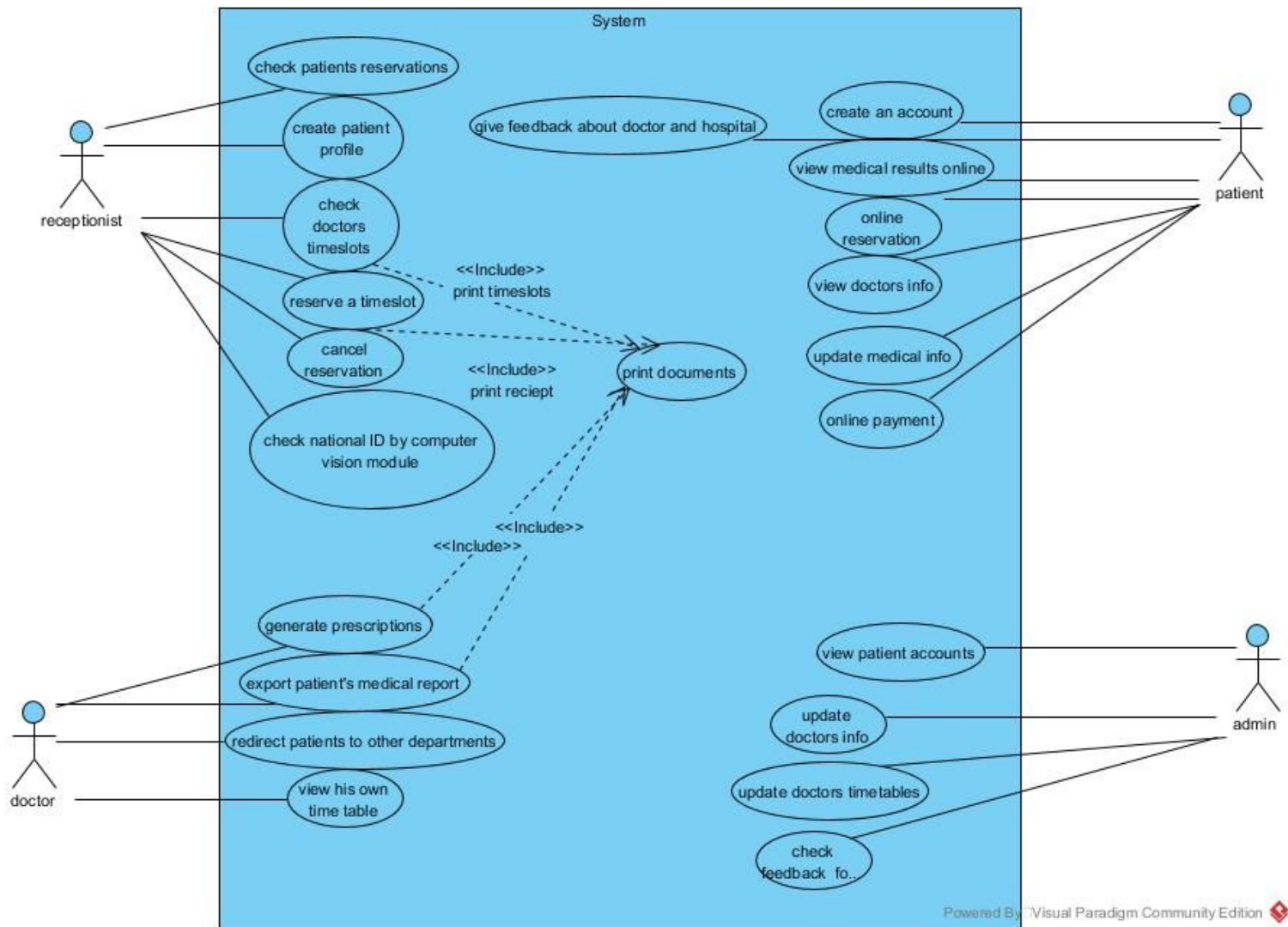**-Post-Conditions** : none

[FR_HI_2] Apply Health Insurance

-Description : Applies health insurance to the reservation made
-Inputs : Health Insurance number , reservation id
-Outputs : Boolean
-Pre-Conditions : On going reservation
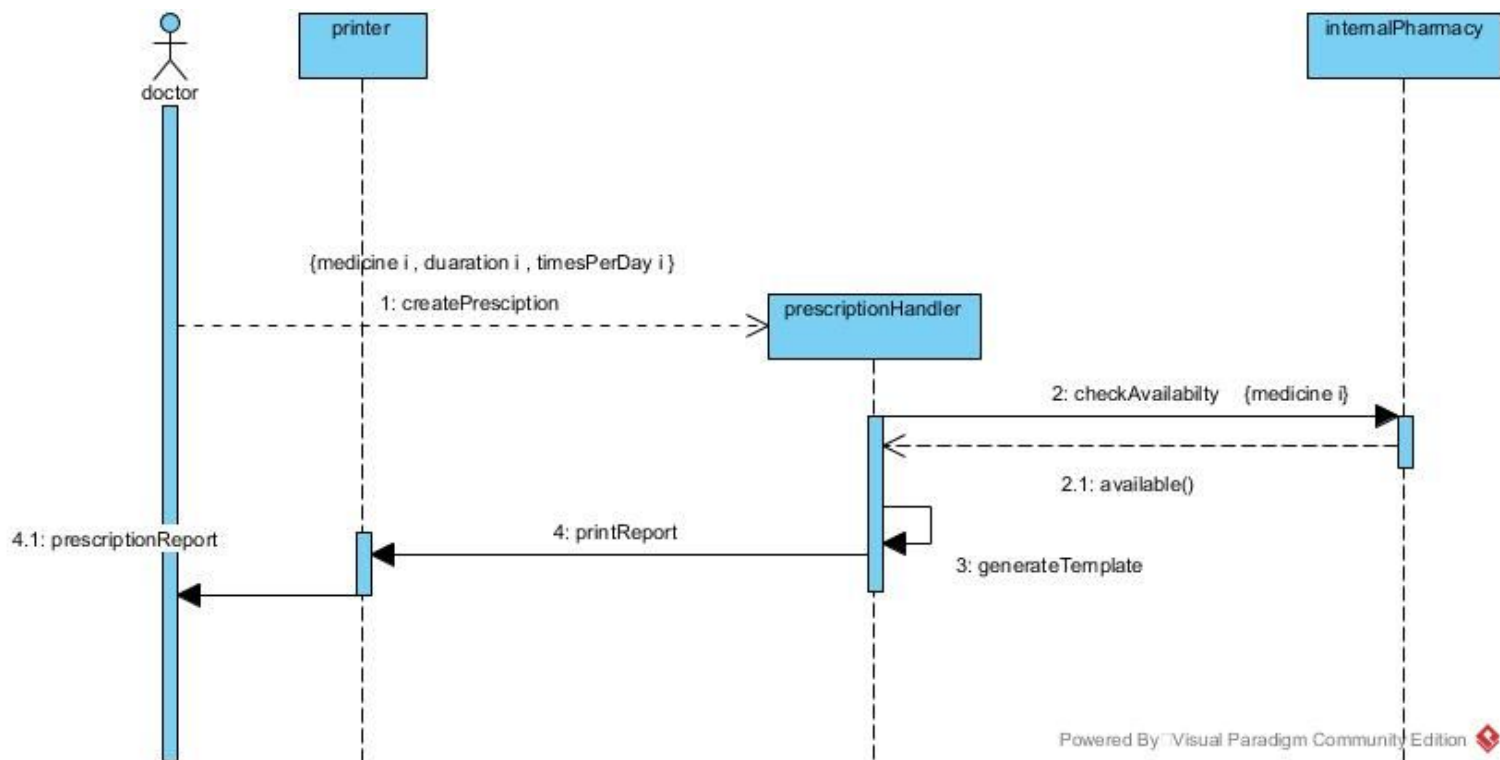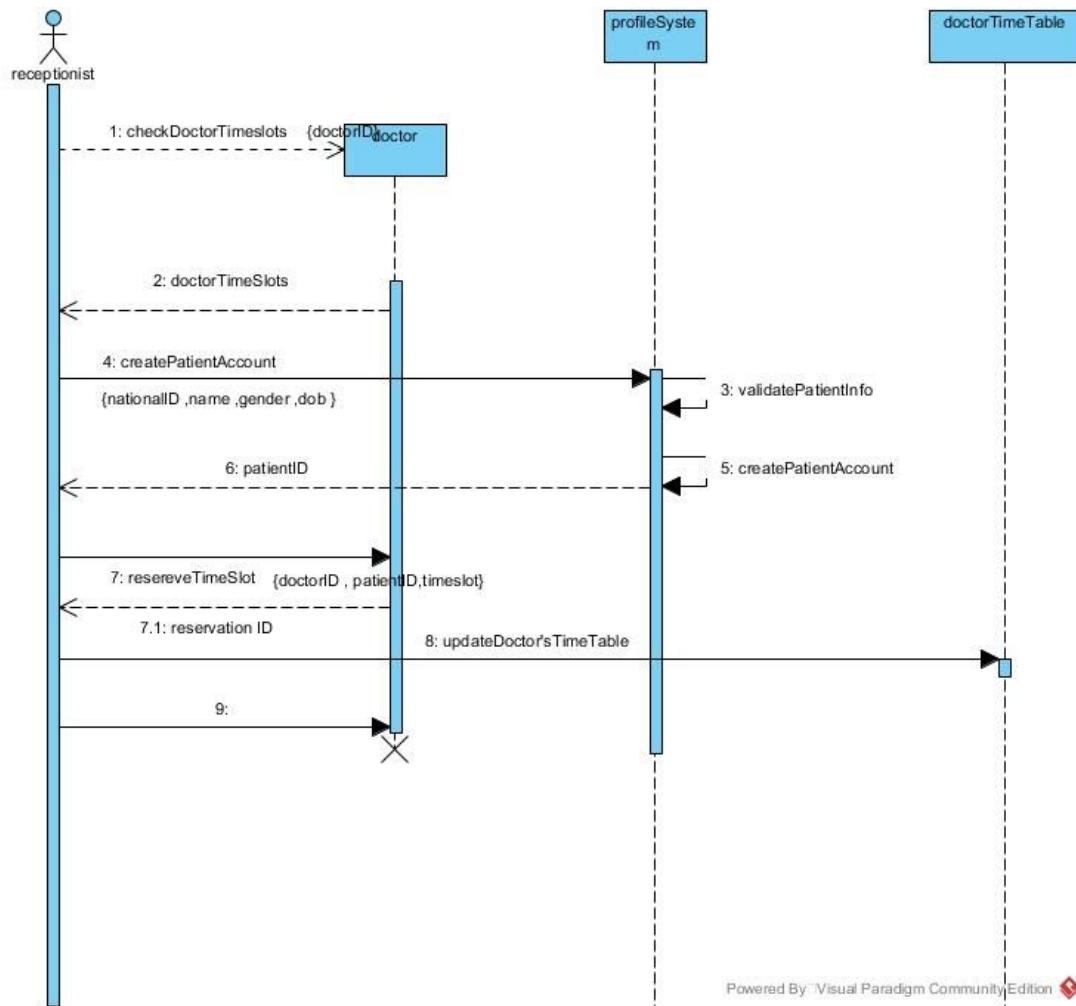**-Post-Conditions** : Cost reduced
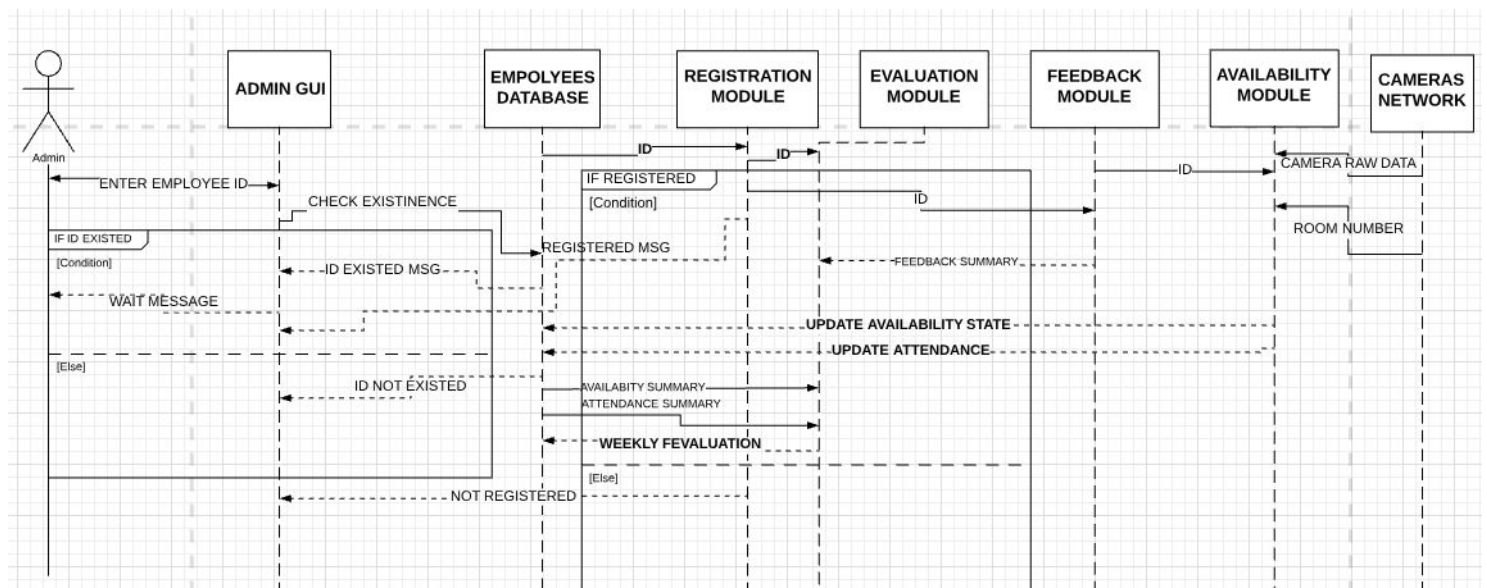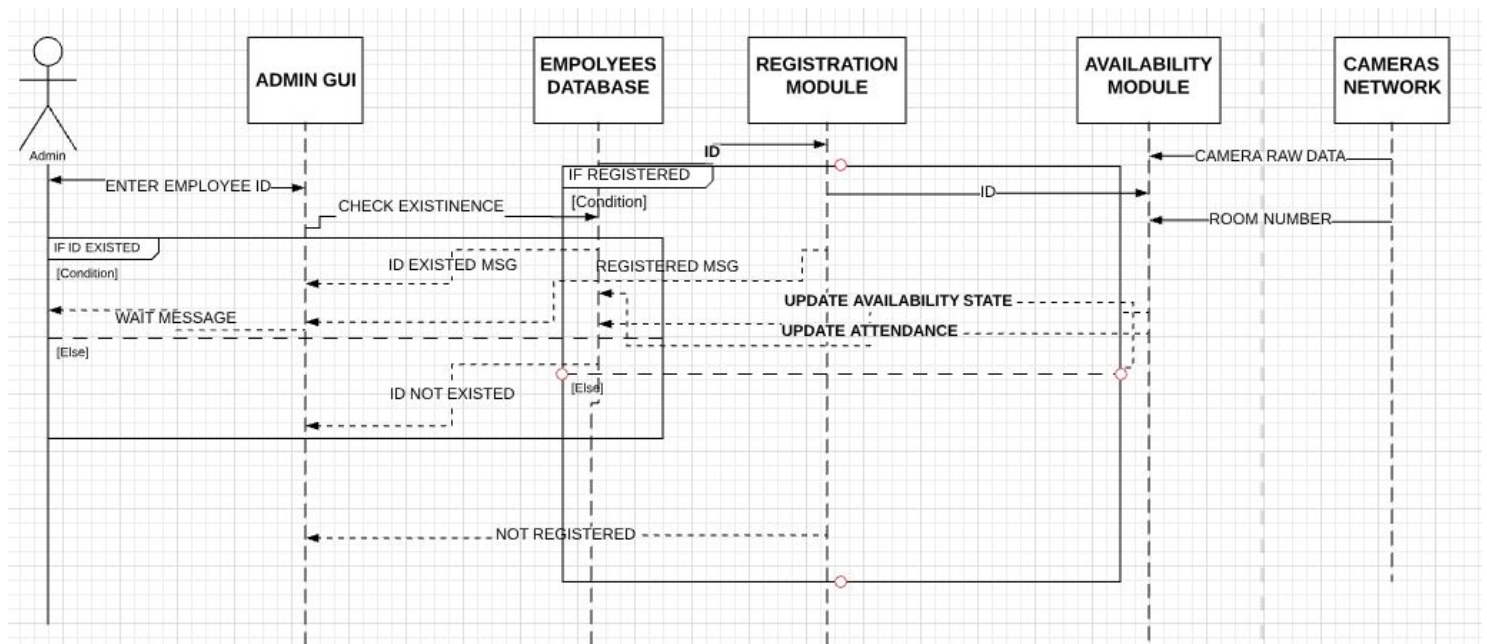
System Models

Use Case Diagram

The following diagram illustrates an overview of the system use case

Sequence Diagrams

The following diagrams illustrate the sequence of some complex functions

Non-Functional Requirements

[NFR_S]Security Requirements

Only administrators and data entry can view and modify all information by having unique login ID and password .
Each user shall have different ID and password .

[NFR_U]Usability Requirements

The system shall be available all the time .
The system shall be user friendly .

[NFR_P]Performance Requirements

Response time shall be very low.
Capacity of the system support 1000 person at time .

[NFR_M]Maintainability

The system shall provide the capability to back-up the data .

Domain-Requirements

[DR-HK] Health knowledge

Description : the developer should know the common abbreviations used by doctors and workers in hospitals , as they are common abbreviations used between doctors and pharmacist in the prescription and workers and doctors in hospitals the developer of the system should know them when developing the system so to be aware of them and develop the system with taking them into consideration if he needs them in a certain place in the system .