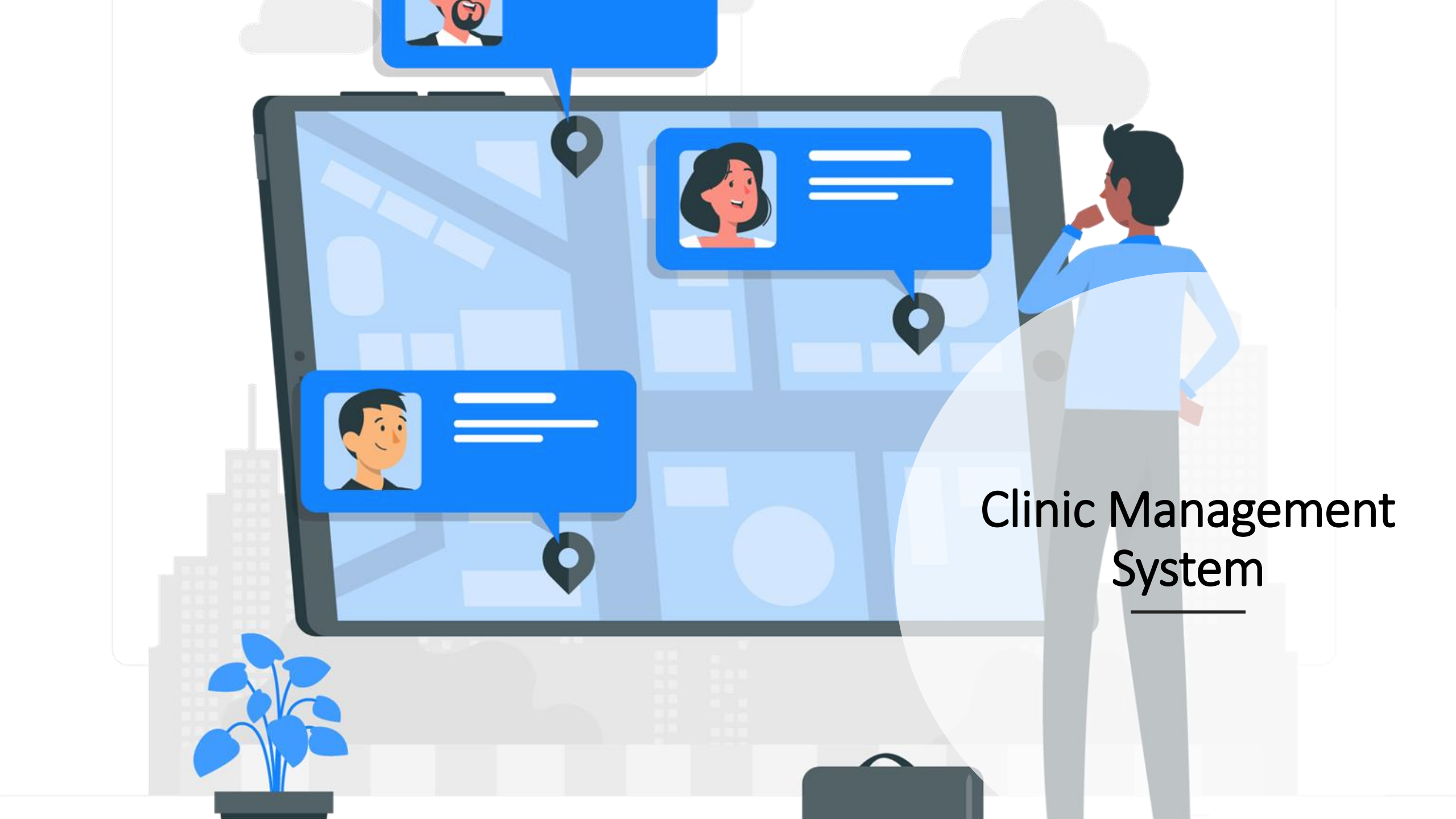
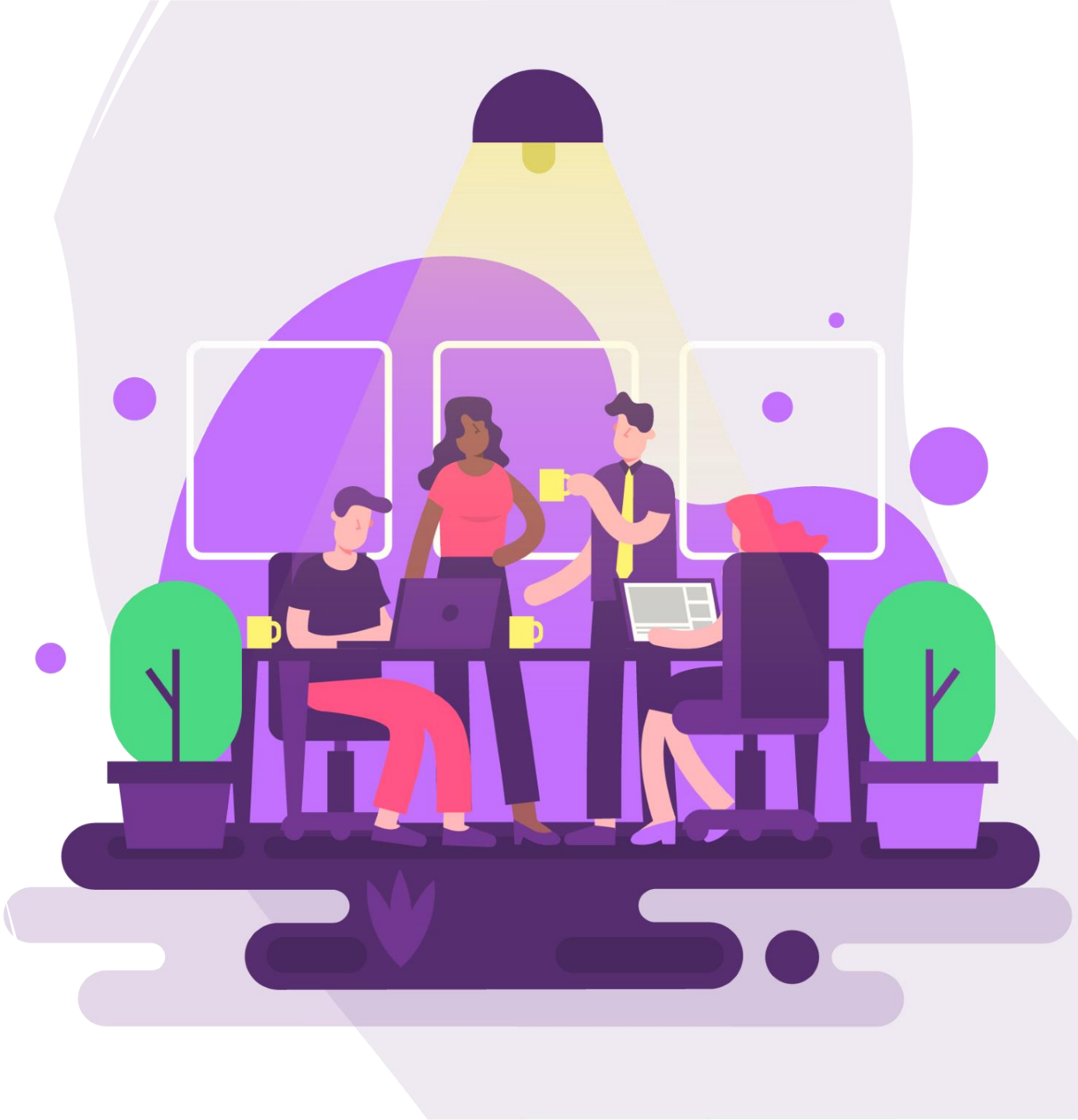


Clinic Management System

Team

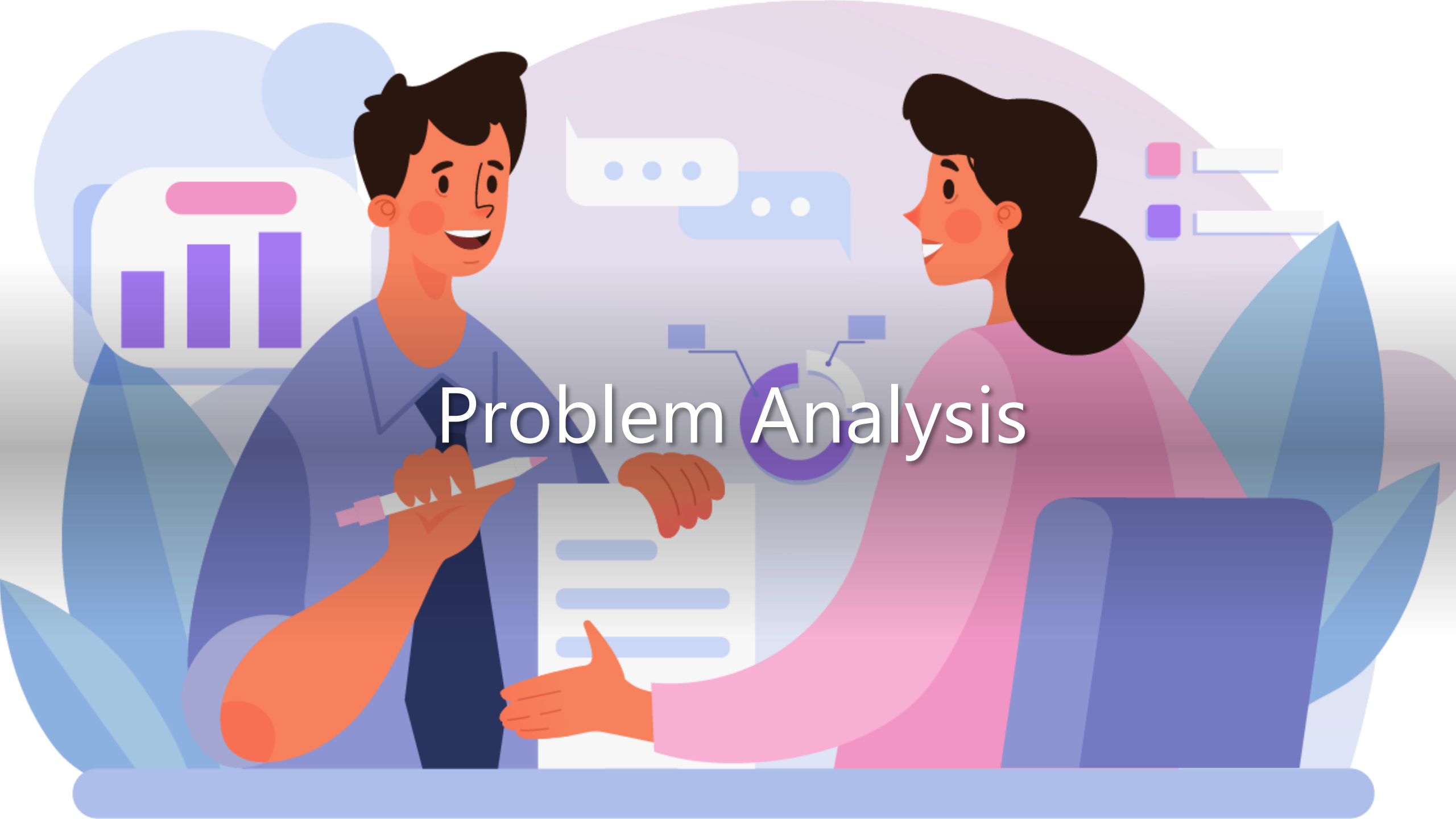
Team members:

- Khaled Alaa 20108424
- Marwan Maged 20104973
- Mahmoud Ahmed 20104039
- Adham Mohamed 20106146
- Mamdouh Hazem 20106707



Problem statement

The Medical Center problem facing uses a hands-on procedure to deliver health services, by using cards, and files to track progressive patient records, and the establishment of new patient records in the clinic. The system is intended to assist clinicians in entering and viewing patient information. When necessary, the doctor can access this data by searching for the patient's id, and he can also regulate his appointments in the clinic. reveals all of his medical conditions and prescription information from previous visits. The patient can upload and select his doctor and an appropriate appointment time.


Problem Analysis

Elements	Description
The problem of	Loss of patients past records
Affects	Doctors Patient
The result of which is	1. Difficulty of keeping track of patients past history 2. Time wasted for doctors to know patient past data 3. Complexity of organizing patient record
Benefits of a new system	1. Reduction of wasted time and resources 2. Tracking of historical data easier 3. Make sessions faster

Elements	Description
The problem of	Difficulty of communication
Affects	Doctors Patients
The result of which is	1. Decreased Doctor satisfaction with patients. 2. Conflict between patients appointments. 3. Time wasted on schedulinmg new appointments
Benefits of a new system	1. Increase patients and doctors satisfaction 2. Increase revenues 3. Doctor time table is more organized

Elements	Description
The problem of	Difficulty of appointment reservation
Affects	Patients
The result of which is	1. Harder for patients to make appointments
Benefits of a new system	1. Increase number of patients 2. Increase clinic revenue 3. Simplicity of making an appointment

Elements	Description
The problem of	Long waiting time to enter
Affects	Patients Nurse Doctors
The result of which is	1. Crowded clinic 2. Waste of patient time
Benefits of a new system	1. Decrease patient waiting time 2. Make nurse work more organized 3. Saved doctor time

Elements	Description
The problem of	Loss of pateints prescription
Affects	Patients
The result of which is	1. patient must communicate with doctor 2. Patient can take wrong medicine
Benefits of a new system	1. Availability of prescription anytime 2. Patient can read it more accurately

Stakeholders

- Doctor
- Patient
- Nurse
- Admin
- Test results system: Transfer test results from lab system to clinic system to patient's profile.
- Bank System: Secure online payments and transfer money to clinic bank account.

System boundaries

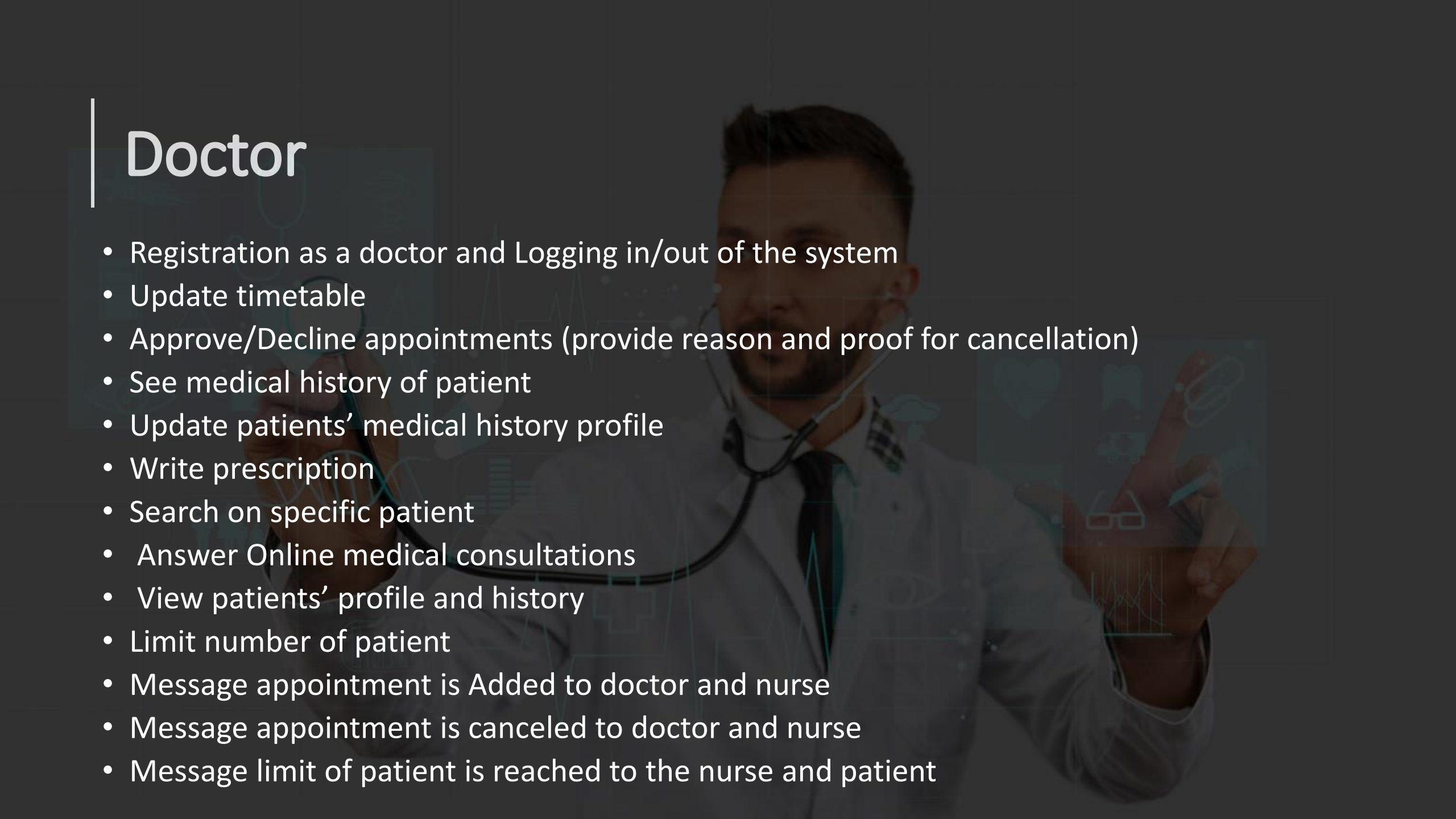
- Doctors & nurse can either add, edit, update or delete information from their profiles or their patients' profiles
- Patient can add, edit, update or delete information only from his own profile
- Patient can request and cancel appointments online.
- Admin is responsible for any maintenance required to the system
- The system will be used online to connect the users with our servers so they can reserve and change appointments and perform many other functions
- The system will get the users and other information from the connected database.
- The system is not a stand-alone system it will connect with other systems like the bank system when the user pays online or the lab system to get the result of his examinations.

System constraints

Source	Constraint
Operational	• Information of patients must be transferred accurately from patient's files to the new system. • Every patient must have a unique Id to prevent any conflict in data.
Technical	Use java language. Use python for security . Available on mobile and website.
Personal	• Fixed staffing resources and no outsourcing.
Economic	Total cost 2000000$ with new servers.
Political	• High security for patient's records that only authorized individuals see the stored data. • Accuracy of the stored data.
Schedule	• Start at 4/2/2022 • End at 12/3/2023

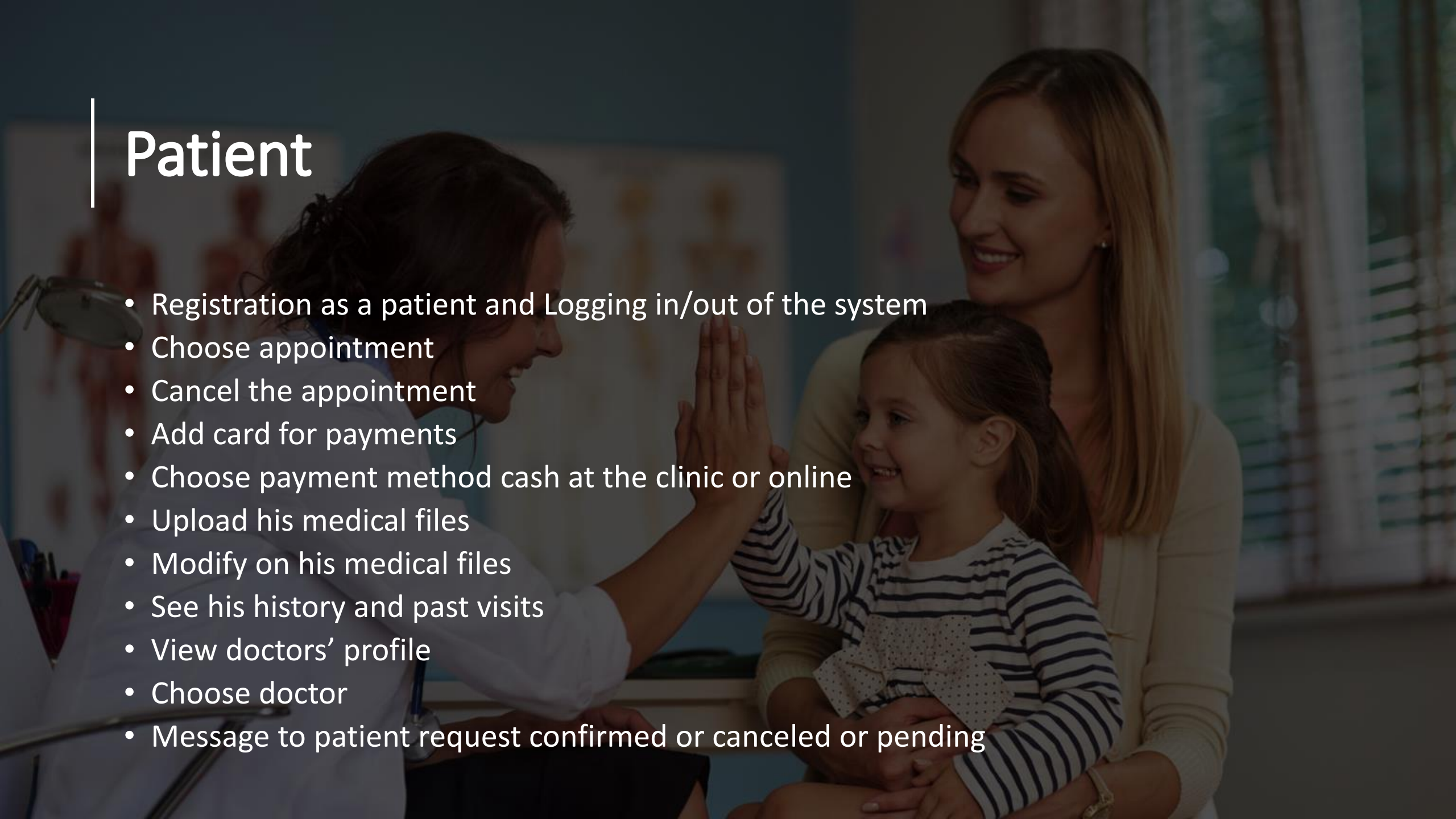
Functional Requirements

Doctor



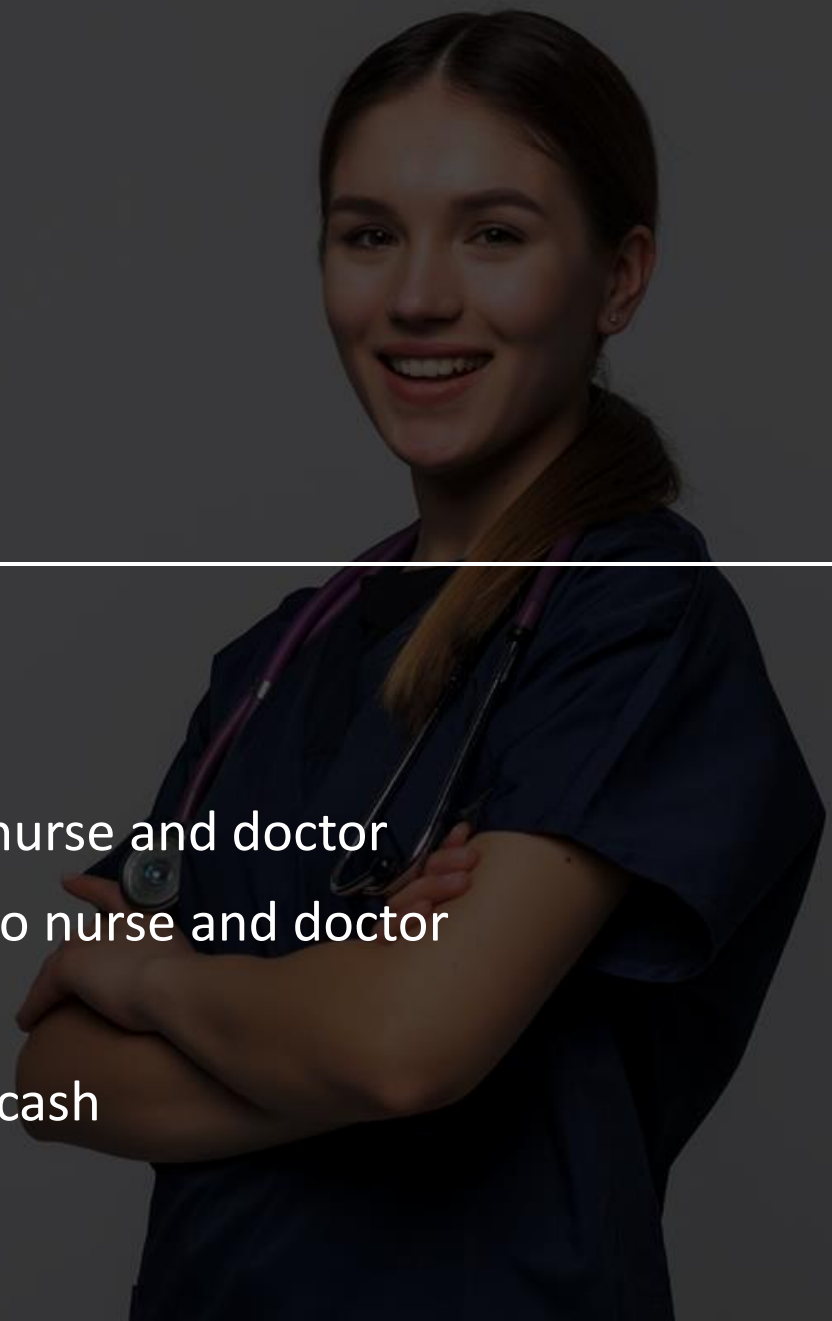
- Registration as a doctor and Logging in/out of the system
- Update timetable
- Approve/Decline appointments (provide reason and proof for cancellation)
- See medical history of patient
- Update patients' medical history profile
- Write prescription
- Search on specific patient
- Answer Online medical consultations
- View patients' profile and history
- Limit number of patient
- Message appointment is Added to doctor and nurse
- Message appointment is canceled to doctor and nurse
- Message limit of patient is reached to the nurse and patient

Patient



- Registration as a patient and Logging in/out of the system
- Choose appointment
- Cancel the appointment
- Add card for payments
- Choose payment method cash at the clinic or online
- Upload his medical files
- Modify on his medical files
- See his history and past visits
- View doctors’ profile
- Choose doctor
- Message to patient request confirmed or canceled or pending

Nurse



- Can accept and cancel requests
- View appointments
- Message appointment is added to nurse and doctor
- Message appointment is canceled to nurse and doctor
- Make doctor schedule
- Handle payments if patient pays in cash

Admin

- Manage the users involved in the system (patient, doctor or nurse)
- Insert/Delete users on the system
- Control the whole system
- Maintain the system

Non-functional

Security and encryption

- Ensure that password rules are clear (length, special characters, …)
- Ability to configure number of failed attempts allowed, when this limit reached account should be blocked and should be automatically recovered.
- Ensure that all interactions between system parts are encrypted with TLS standards
- Ensure that password saved using hashing algorithm.
- Ensure that all data inside the database in encrypted (confidentiality and data integrity).
- Ability to configure specific allowed list of IPs' to access system.
- The system needs the patient to recognize herself or himself using the phone.

Performance

- Ensure that the database able to meet the requirements of continuous data growth continuously to ensure fast response of data presentation.
- The system provides acknowledgment in just one second once the 'patient's information is checked.
- The system needs to support at least 1000 people at once.
- The user interface acknowledges within five seconds.

Integration with other systems

- Ability to integrate with other systems such as bank system and test labs.
- Ability to integrate with test labs to retrieve medical test results and update patient medical file.

Logs

- Any modifications like insert, delete, update, etc. for the database.

Maintainability

- The system offers efficiency for data backup.
- The system will track every mistake as well as keep a log of it.
- Maintenance activities can be pre-scheduled in parts considering when the activity is lowest, and it doesn't take long to upgrade.

Reliability

- Highly resilient to any technology disruptions, downtime, or crashes experienced by other technology systems.

Recovery

- The time it takes the system to return to its original shape in 5 minutes or less .

Interfaces

- System interfaces must be responsive to multiple screen sizes, including smart and tablet interfaces, by utilizing unique tools from the most recent versions of bootstrap and CSS.
- The colors in the design must be white, blue and green.
- Tool Tips should be enabled to improve the user experience and give valuable instructions that answer any questions that the user may have.
- Design compatibility with Internet browsers (Firefox, Chrome, brave, and Safari).
- Instead of vertical scrolling, utilize paging for displaying extensive material.
- Simplify the design and all of its components to create a simple and pleasant user experience.

Archiving

- Ensure that all system documents are archived on a regular basis and are easy to obtain and maintain at any time.

Languages

- Ensure that the system interface supports (Arabic/English) languages by default,

Hardware

- Ability to integrate with Colposcopes ,A pulse oximeter, Blood test kits, A blood pressure monitor.

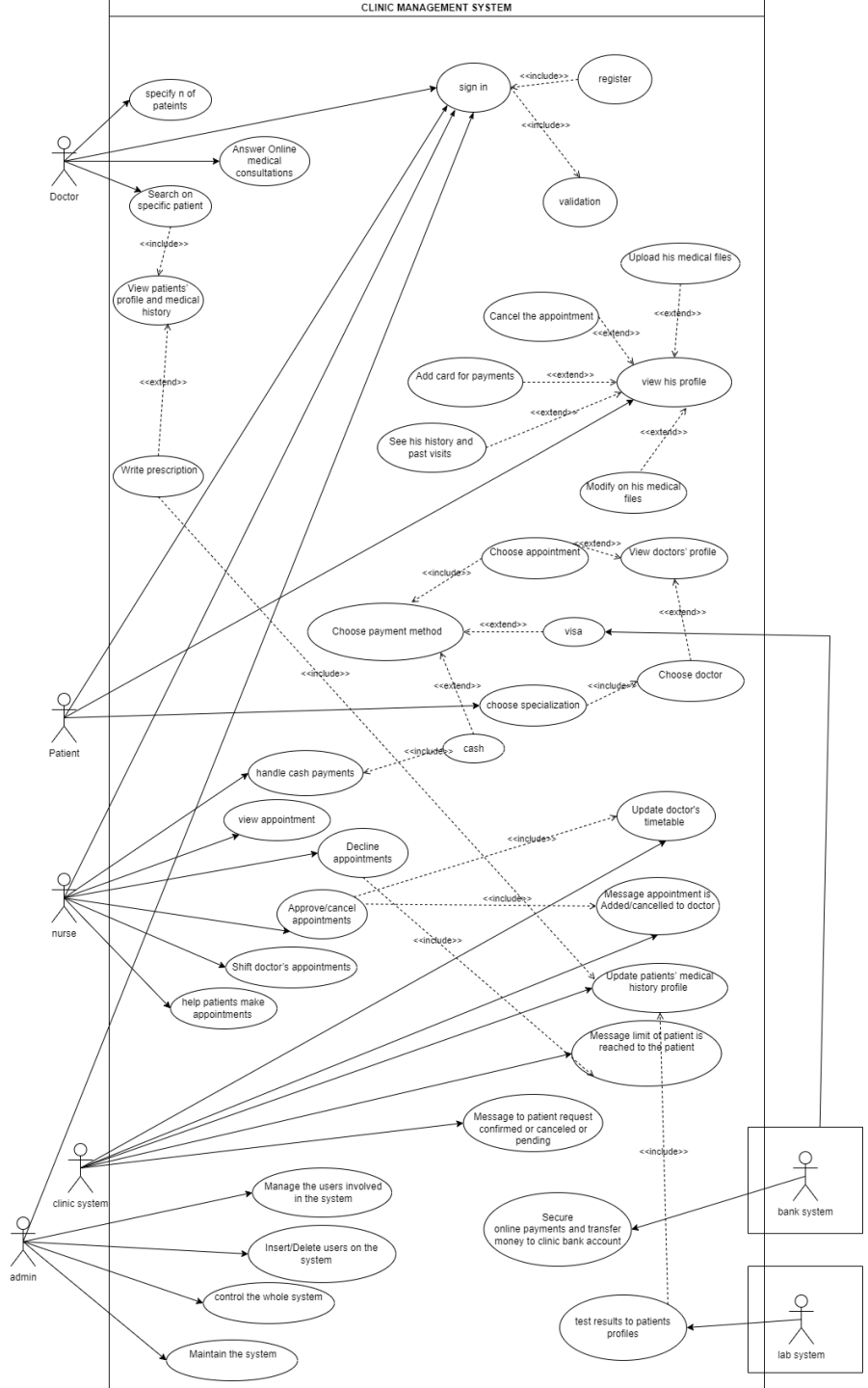
System structure:

- Ensure that system consist of more than one level (web\ app – database), web\ app for all user interactions and database to store all these data and interactions .

System interfaces for example:

- Doctor interface.
- Admin panel.
- Patient interface.
- Nurse interface.

Use case


CLINIC MANAGEMENT SYSTEM
Doctor
specify n of pateints
Answer Online medical consultations
Search on specific patient
sign in
register
validation
<<include>>
View patients' profile and medical history
Write prescription
<<extend>>
Upload his medical files
Cancel the appointment
Add card for payments
view his profile
See his history and past visits
Modify on his medical files
Patient
Choose appointment
View doctors' profile
Choose payment method
visa
Choose doctor
choose specialization
cash
handle cash payments
nurse
view appointment
Decline appointments
Approve/cancel appointments
Update doctor's timetable
Message appointment is Added/cancelled to doctor
Shift doctor's appointments
help patients make appointments
Update patients' medical history profile
Message limit of patient is reached to the patient
Message to patient request confirmed or canceled or pending
clinic system
admin
Manage the users involved in the system
Insert/Delete users on the system
control the whole system
Maintain the system
Secure online payments and transfer money to clinic bank account
bank system
test results to patients profiles
lab system

Use-case Scenario

Name:	Appointment reservation
Actors:	1.Patient 2.Clinic System
Pre-conditions:	Patient being registered in the system
Main scenario:	1.Choose doctor 2.Choose Appointment 3.Choose Payment type
Alternative scenario:	1.If reached the maximum number of patients will added to pending list. 2.If choose online payment and no confirmation from bank the reservation will canceled.
Post-conditions:	1.The reservation was completed successfully. 2.The reservation has been canceled. 3.The patient is on the waiting list.

Name:	Doctor edits patient profile
Actors:	1.Doctor 2.Clinic system
Pre-conditions:	Being registered as a doctor in the system
Main scenario:	1.Doctor enters patient id. 2.Write prescription. 3.Update and view medical files.
Alternative scenario:	1.If the patient is not with that doctor, he will not access his profile and will refuse to accept the doctor's prescription.
Post-conditions:	1.The patient profile was updated. 2.View the patient's profile. 3.Refused to open or change the patient profile.

Name:	Doctor answers online consultations
Actors:	1.Doctor 2.Patient
Pre-conditions:	1.Being registered as a doctor in the system. 2.Within two weeks, the patient had an appointment with this doctor.
Main scenario:	1.Patient makes a request for online consultation. 2.Request sent to the doctor. 3.Doctor accepts the request.
Alternative scenario:	1.If the patient does not have an appointment with the doctor within two weeks or makes a request outside of the time of online consultation, the system will refuse to process the request.
Post-conditions:	1.The doctor has responded to the patient consultation. 2.The doctor has refused the patient consultation.

Name:	Register
Actors:	patient
Pre-conditions:	User chooses to signin or to register if he doesn’t have an account
Main scenario:	Users can register to the system and profile will be created.
Alternative scenario:	1.If the data entered is not correct the user is sent back to the registration process. 2.data entered has been entered before 3.the user has been sent a message that this data has been used before.
Post-conditions:	1.The user profile has been registered to the system. 2.the user profile wasn’t created due to duplication of data.

Name:	Sign in
Actors:	Doctor – Patient – Nurse
Pre-conditions:	Being registered in the system
Main scenario:	1.user enter his data. 2.the system checks if his data is correct 3.User can sign into his profile.
Alternative scenario:	1.If the sign in data in not correct. 2.password is incorrect so the user can make a request to change his password.
Post-conditions:	1.User can open his profile. 2.User can’t open his profile.

Name:	Payment
Actors:	1. Patient. 2. Bank System.
Pre-conditions:	An appointment date is selected by the patient.
Main scenario:	1. Patient selects the appointment date 2. Patient proceeds to payment 3. Bank system verifies the payment
Alternative scenario:	1. Not enough visa credit 2. Payment unsuccessful.
Post-conditions:	1. Payment is successful and doctor’s timetable is updated. 2. Payment is not successful.

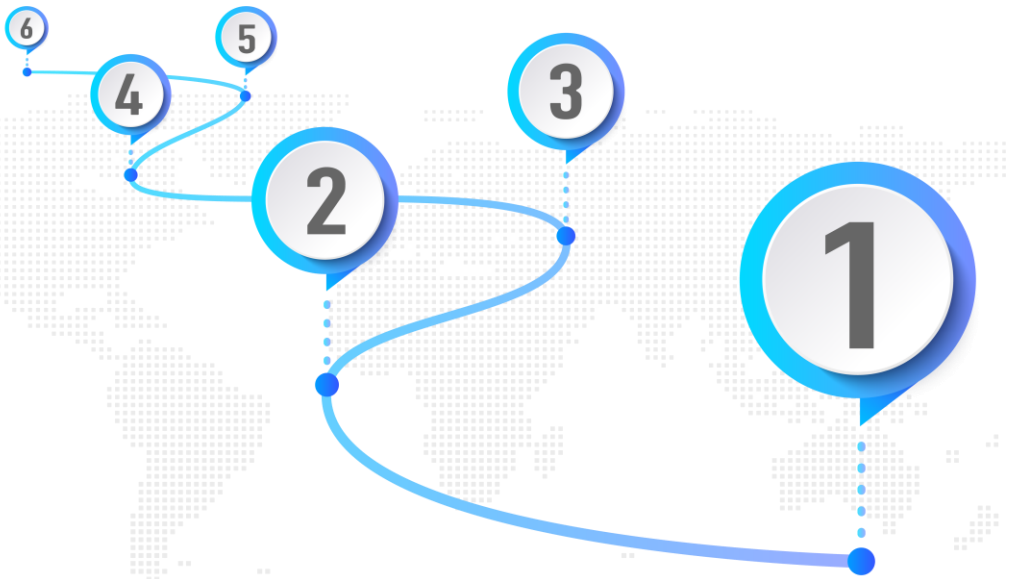
Name:	Patients cancel appointment
Actors:	Patient
Pre-conditions:	An appointment has been made
Main scenario:	1.Patient can cancel their appointment reservation. 2.the patient make a request. 3.the request is accepted by the nurse.
Alternative scenario:	1.If there is 2 hours or less left for the appointment. 2.it is too late to cancel the appointment
Post-conditions:	1.Appointment has been canceled successfully. 2. Appointment can’t be cancelled.

Name:	Nurse approves appointments
Actors:	1-Nurse 2-Clinic System
Pre-conditions:	Patient request for appointment.
Main scenario:	1.The request is sent to the nurse 2.The nurse checks if the doctor is available at the request time 3.The nurse approve the request
Alternative scenario 1:	1.The request is not sent to the nurse. 2.System send message to the patient to resend his request.
Alternative scenario 2:	1.The request is sent to the nurse. 2.The doctor is not available at the request time. 3.The nurse decline the request.
Post-conditions:	1.Appointment request approved successfully & confirmation sent to patient. 2.System asks to resend the request. 3. Appointment request declined & inform the patient.

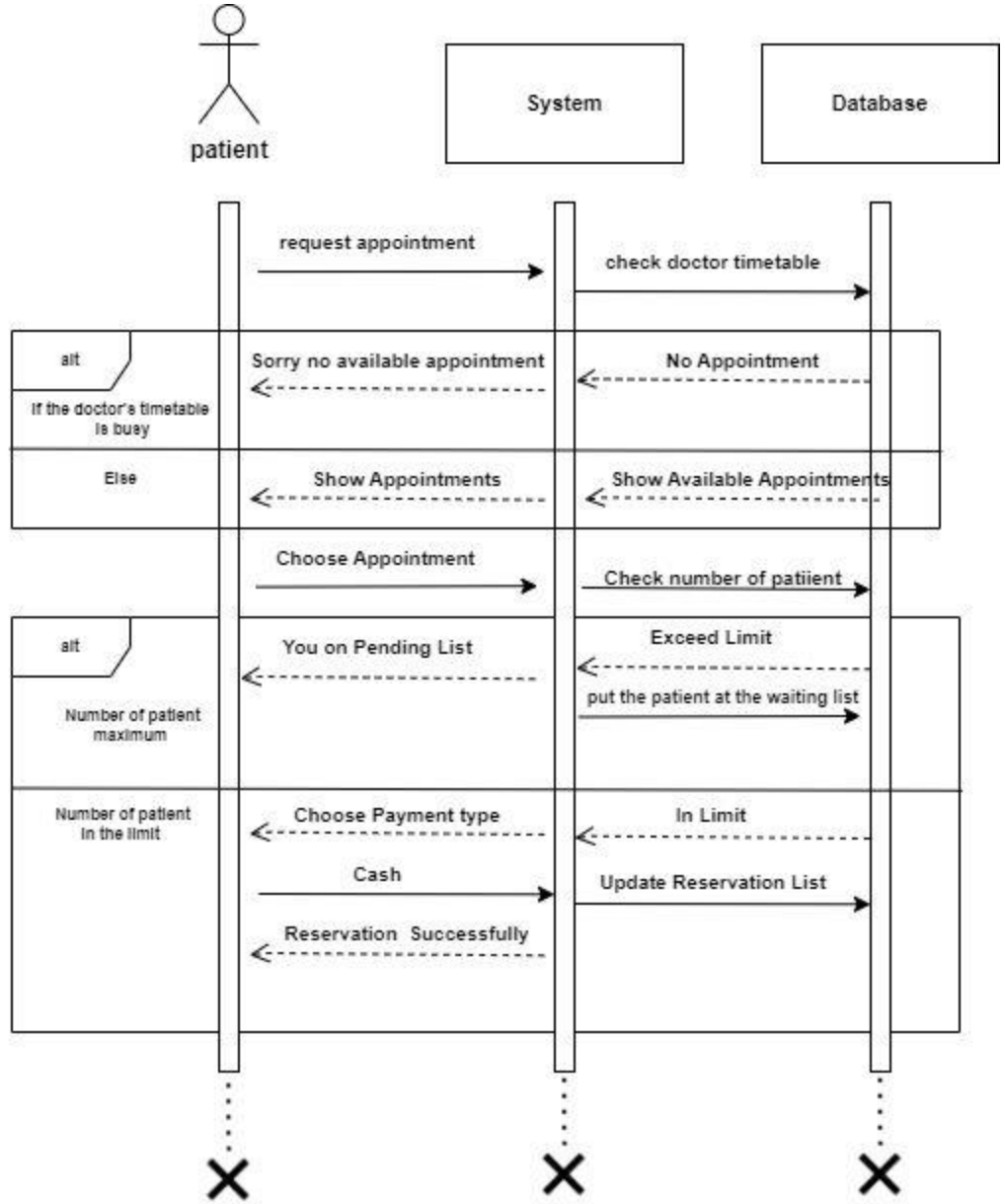
Name:	Update doctor’s timetable
Actors:	Clinic System
Pre-conditions:	An appointment has been added or canceled.
Main scenario:	1.See if the appointment is added on a free time / see the canceled appointment and free it’s space in the timetable. 2.Update the doctor’s timetable. 3.Send the updated timetable to the nurse & doctor.
Alternative scenario:	1.There is conflict in the added appointment with another appointment. 2.Send message to the patient to choose another time for his/her appointment because there is a conflict.
Post-conditions:	1.Update timetable with the added or canceled appointment and send the updated one to the doctor & nurse. 2. Send message to the patient to choose another time for his/her appointment.

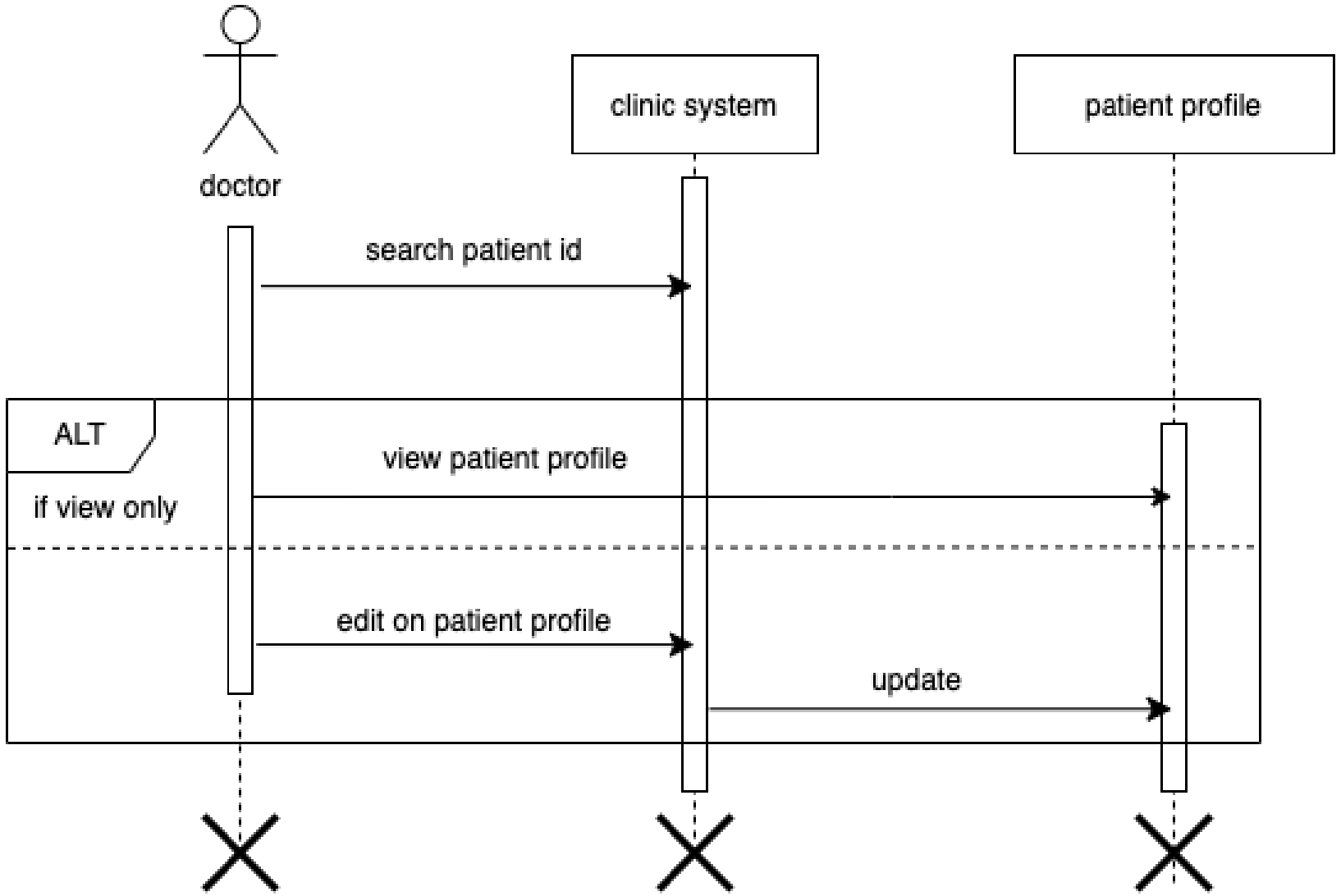
Name:	Insert doctors on the system
Actors:	1-Admin 2-Clinci System
Pre-conditions:	New doctor is added to the clinic.
Main scenario:	1.Doctor’s information is sent to the admin. 2.The admin cerate’s the doctor’s account & send it to the doctor.
Alternative scenario:	1.The System already has the doctor account. 2.The System refuses to create doctor’s account. 3.The System sends message to the admin that the doctor is already created.
Post-conditions:	1.Doctor account has been inserted successfully to the system 2.the System refuses to create doctor’s account.

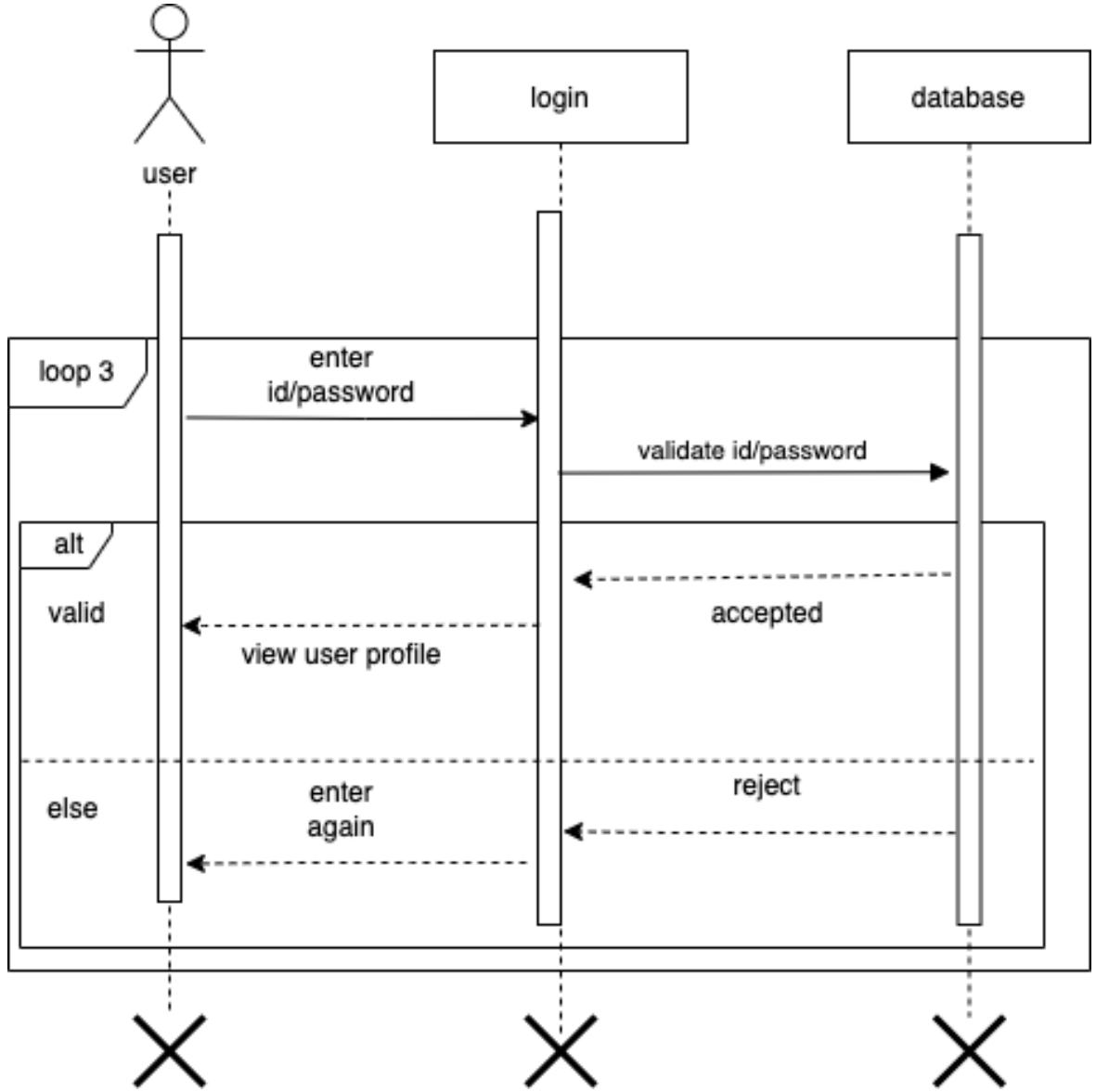
Name:	Lab test results
Actors:	1. Lab system 2. Clinic system
Pre-conditions:	Patient made a medical test with one of the clinic's registered laboratories.
Main scenario:	1. Patient went to a lab test center which is registered with the clinic and did a medical test 2. Once test results are out, the lab system sends back the results to the clinic system which to be reflected on the patient's profile.
Alternative scenario:	Test results were not delivered to the clinic's system.
Post-conditions:	1. Test results sent successfully to the patient. 2. The clinic did not receive the test results so patient cant view it.

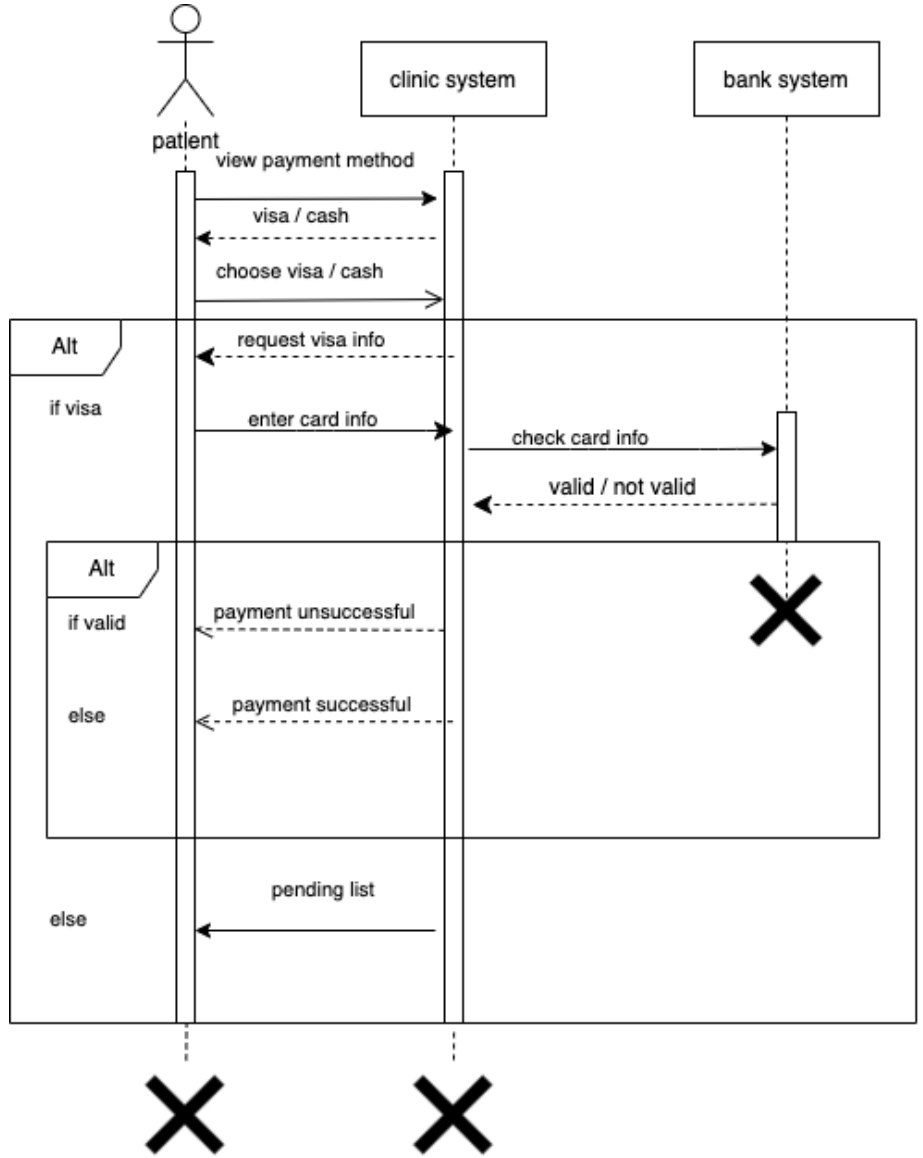


Sequence Diagram

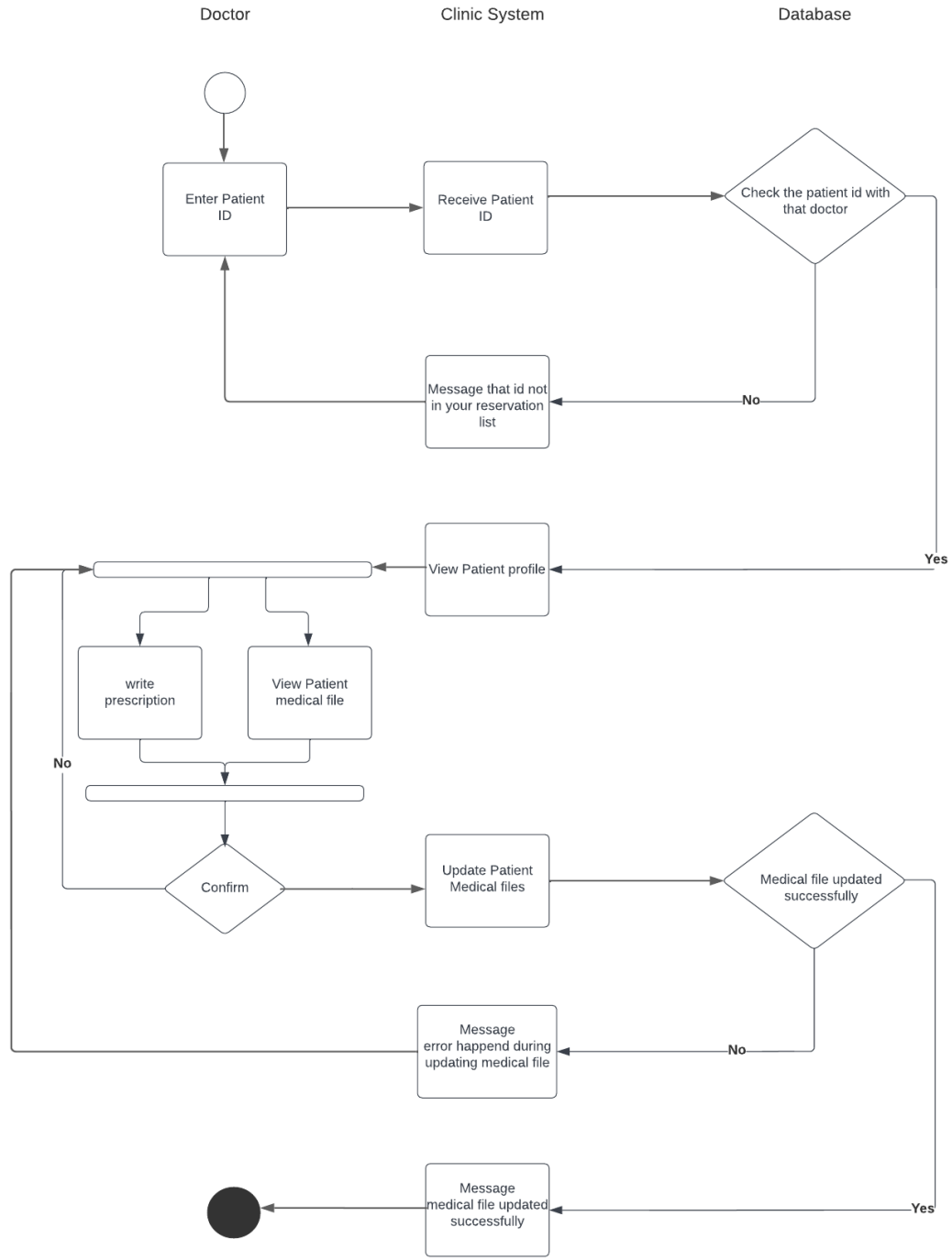

patient
System
Database
request appointment
check doctor timetable
alt
If the doctor's timetable is busy
Sorry no available appointment
No Appointment
Else
Show Appointments
Show Available Appointments
Choose Appointment
Check number of patiient
alt
Number of patient maximum
You on Pending List
Exceed Limit
put the patient at the waiting list
Number of patient in the limit
Choose Payment type
In Limit
Cash
Update Reservation List
Reservation Successfully

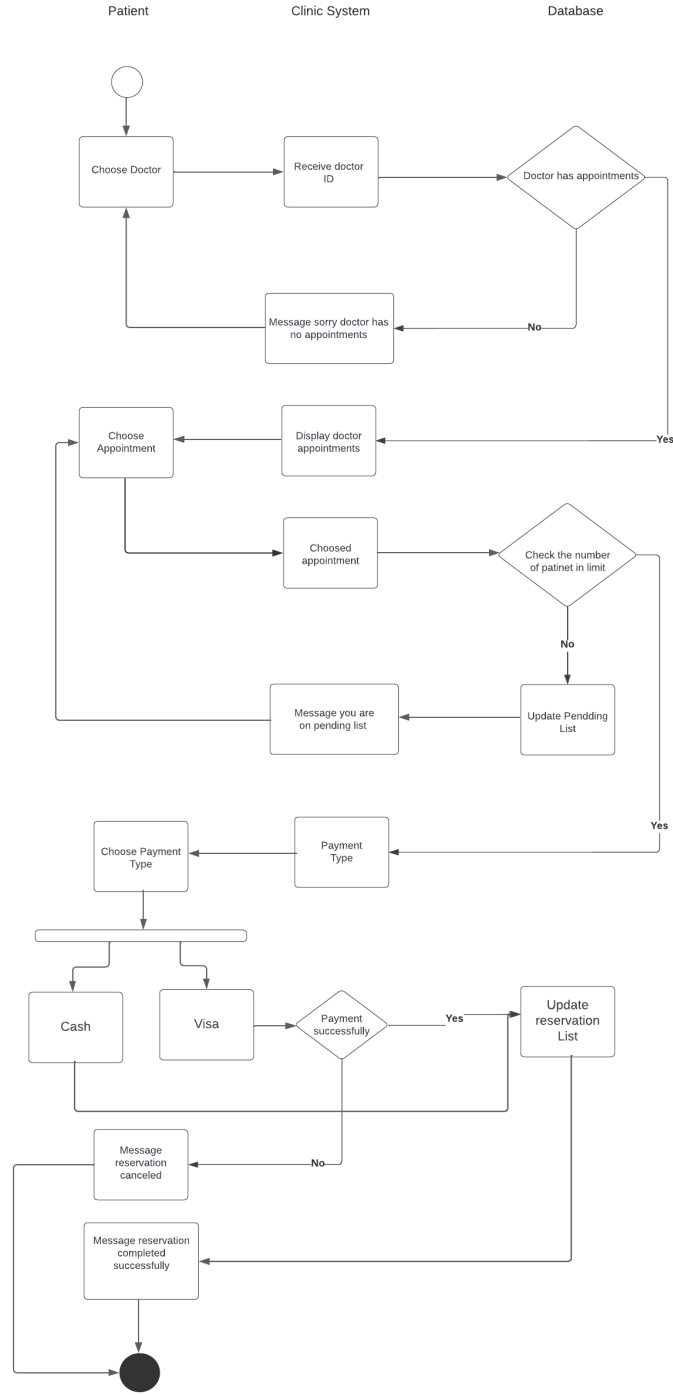

doctor
clinic system
patient profile
search patient id
ALT
if view only
view patient profile
edit on patient profile
update


user
login
database
loop 3
enter
id/password
validate id/password
alt
valid
accepted
view user profile
else
reject
enter
again

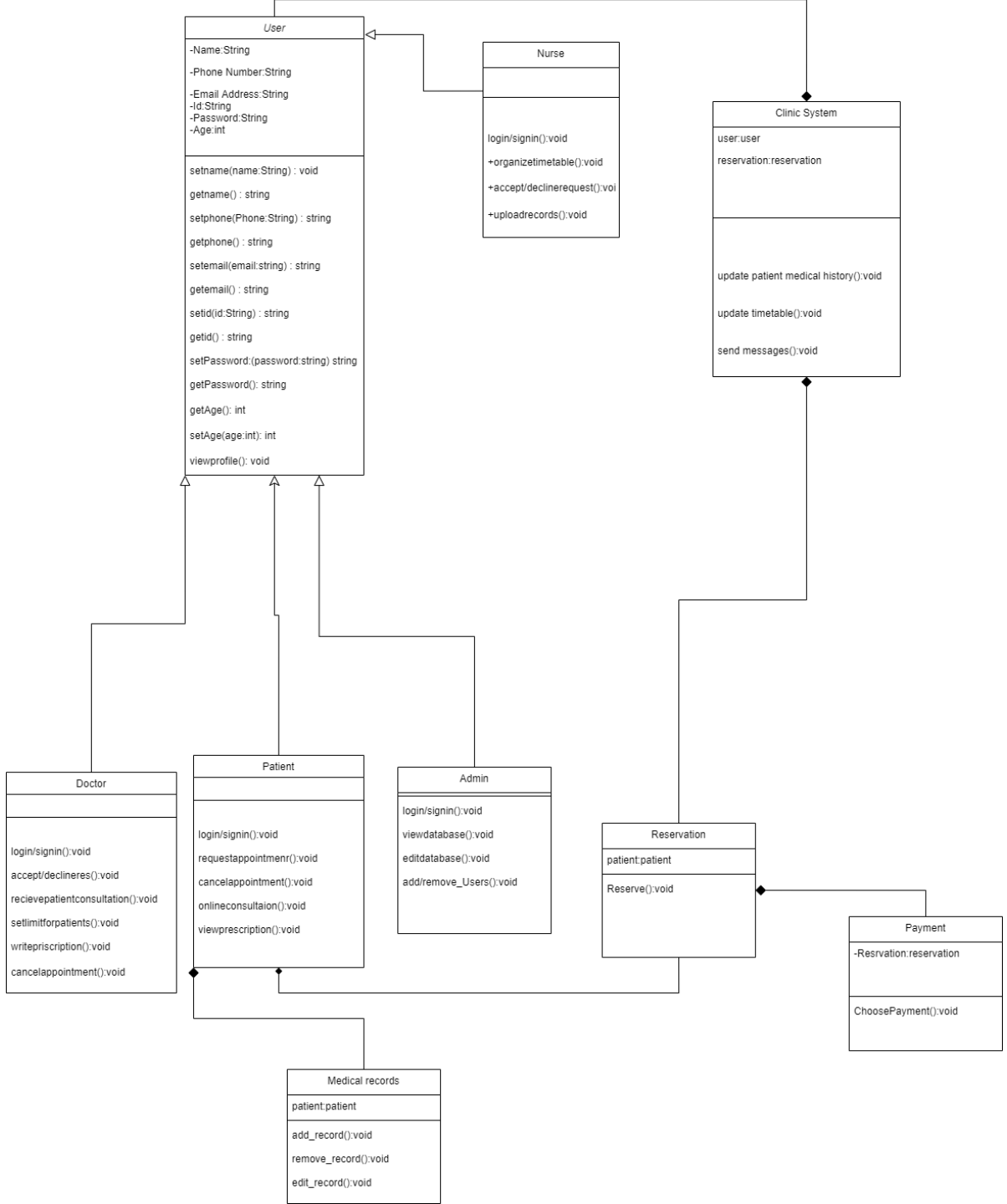

patient
clinic system
bank system
view payment method
visa / cash
choose visa / cash
Alt
request visa info
if visa
enter card info
check card info
valid / not valid
Alt
if valid
payment unsuccessful
else
payment successful
pending list
else

Activity Diagram

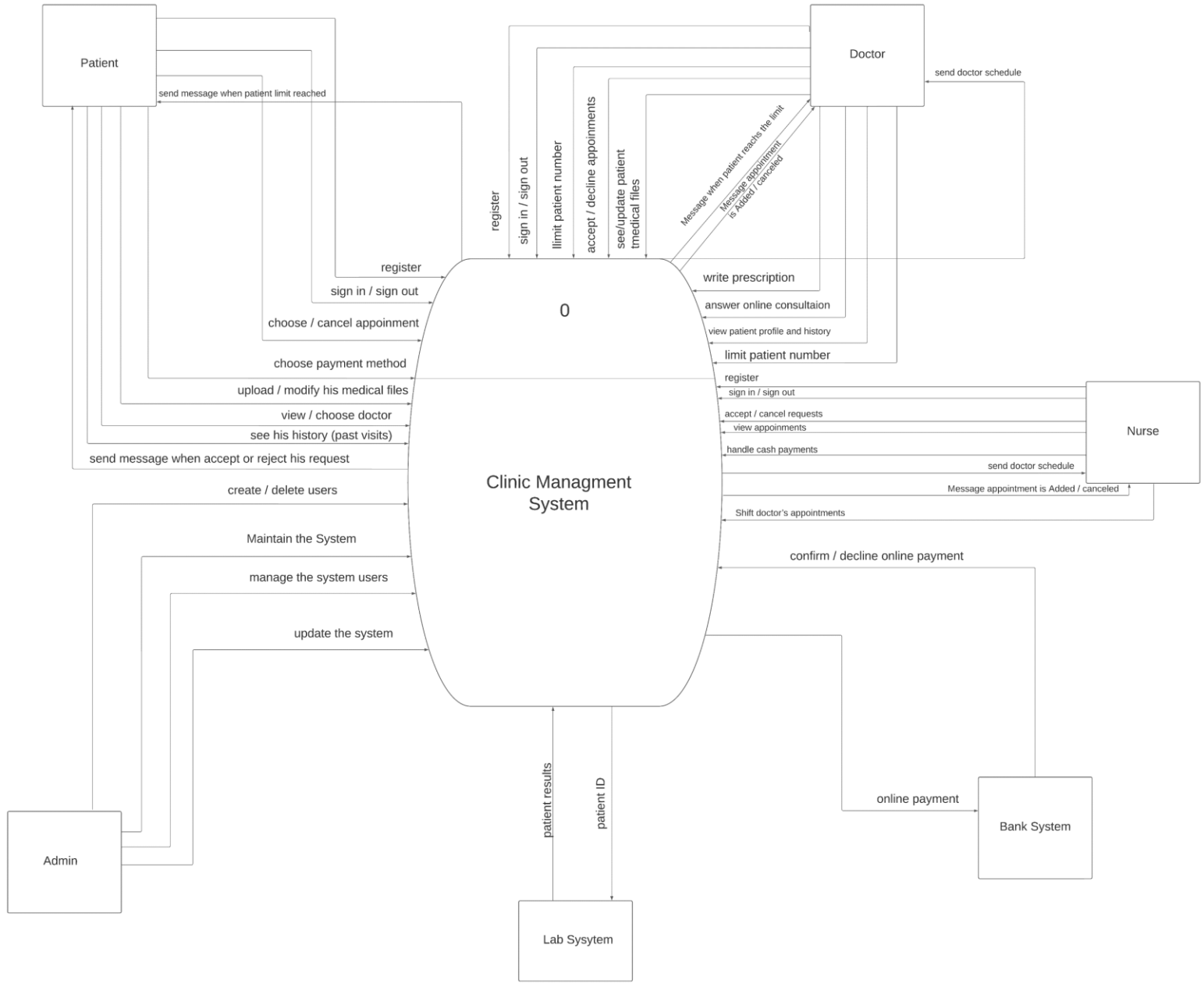

Doctor
Clinic System
Database
Enter Patient ID
Receive Patient ID
Check the patient id with that doctor
Message that id not in your reservation list
No
Yes
View Patient profile
write prescription
View Patient medical file
No
Confirm
Update Patient Medical files
Medical file updated successfully
Message error happend during updating medical file
No
Message medical file updated successfully
Yes

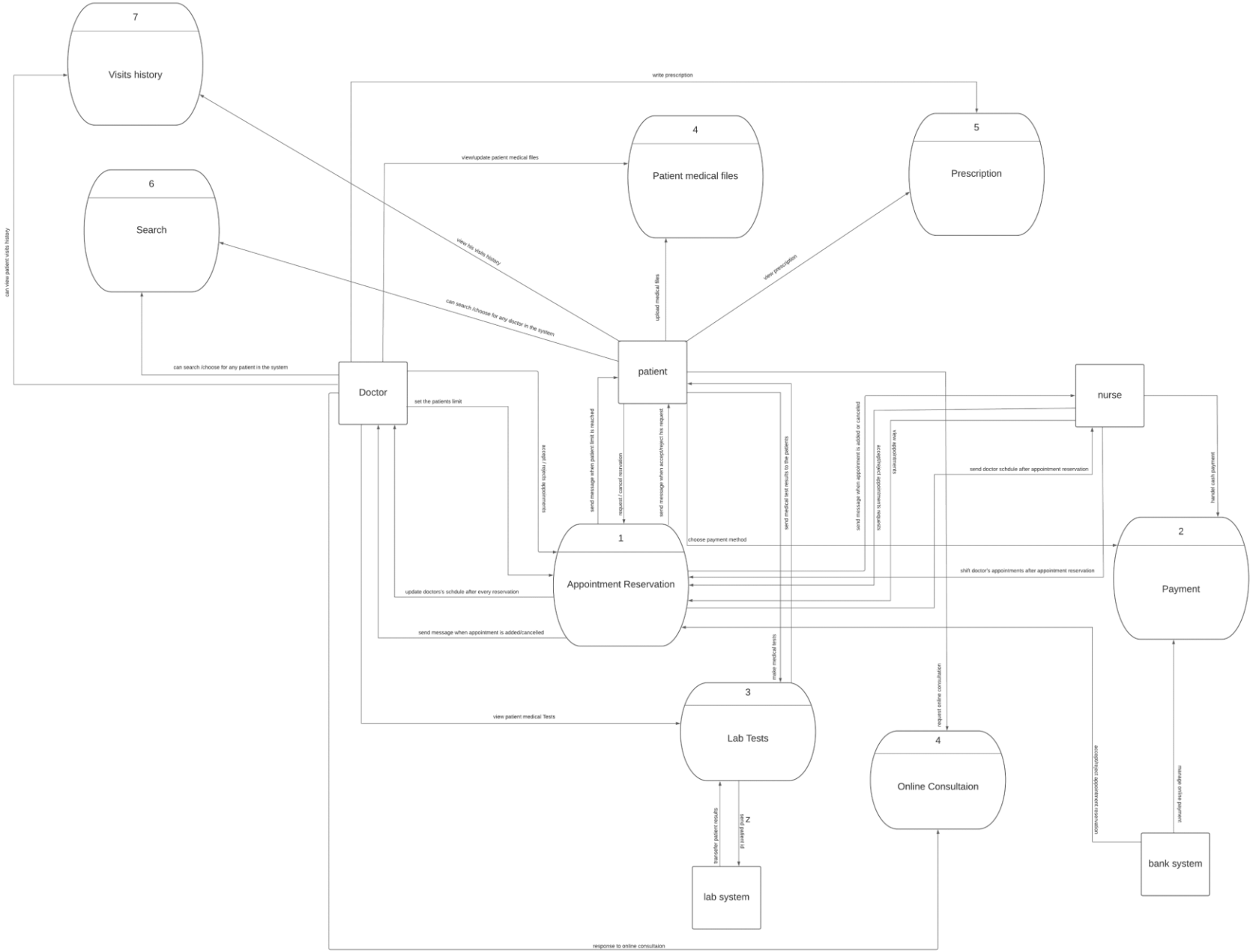

Patient
Clinic System
Database
Choose Doctor
Receive doctor ID
Doctor has appointments
No
Message sorry doctor has no appointments
Yes
Choose Appointment
Display doctor appointments
Choosed appointment
Check the number of patinet in limit
No
Update Pendding List
Message you are on pending list
Yes
Choose Payment Type
Payment Type
Cash
Visa
Payment successfully
Yes
Update reservation List
No
Message reservation canceled
Message reservation completed successfully

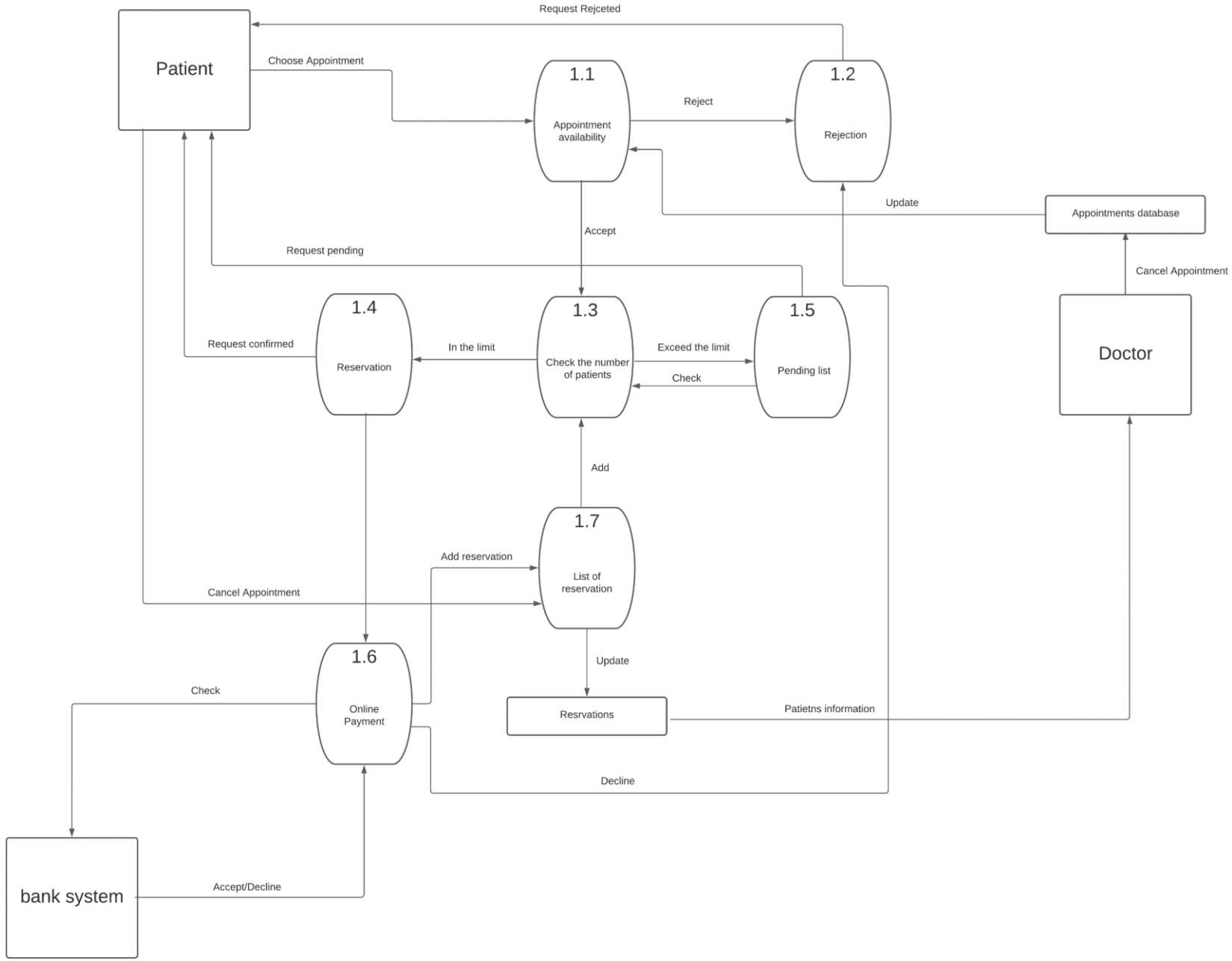
Class Diagram



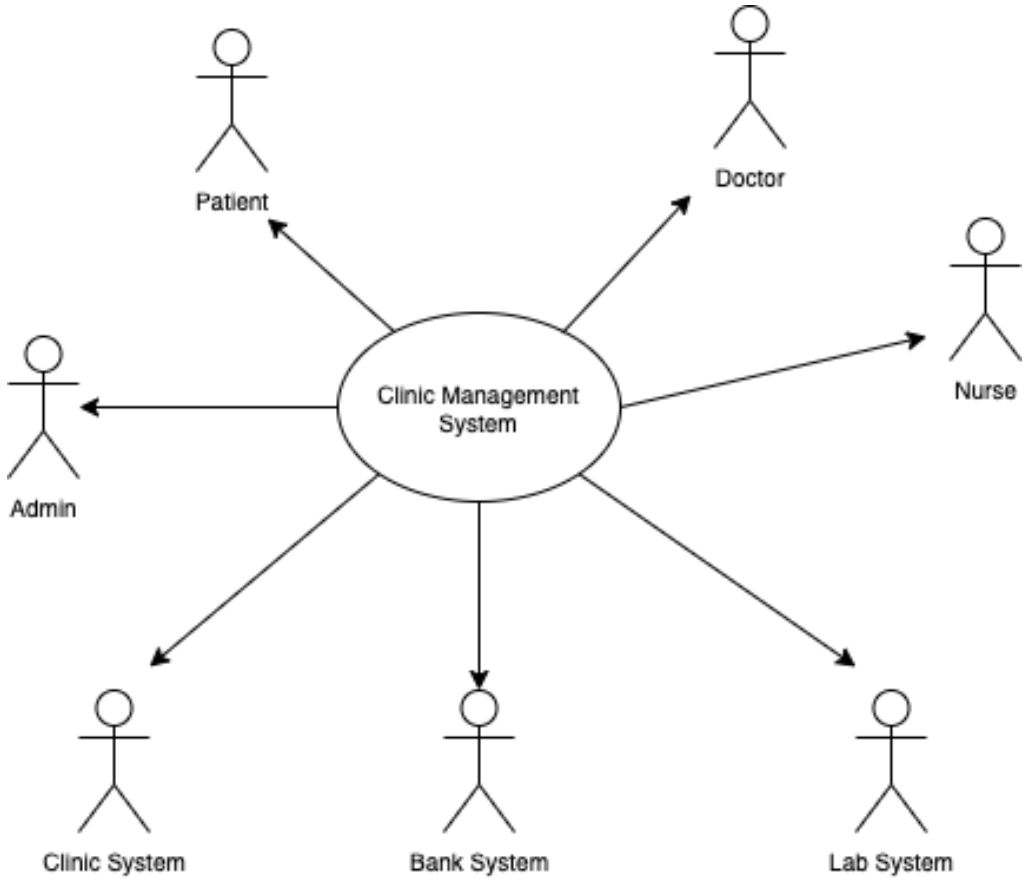
Dataflow diagram


Patient
Doctor
Nurse
Admin
Bank System
Lab Sysytem
Clinic Managment System
0
send message when patient limit reached
send doctor schedule
register
sign in / sign out
llimit patient number
accept / decline appoinments
see/update patient tmedical files
Message when patient reaches the limit
Message appointment is Added / canceled
register
sign in / sign out
choose / cancel appoinment
choose payment method
upload / modify his medical files
view / choose doctor
see his history (past visits)
send message when accept or reject his request
create / delete users
Maintain the System
manage the system users
update the system
write prescription
answer online consultaion
view patient profile and history
limit patient number
register
sign in / sign out
accept / cancel requests
view appoinments
handle cash payments
send doctor schedule
Message appointment is Added / canceled
Shift doctor's appointments
confirm / decline online payment
online payment
patient results
patient ID

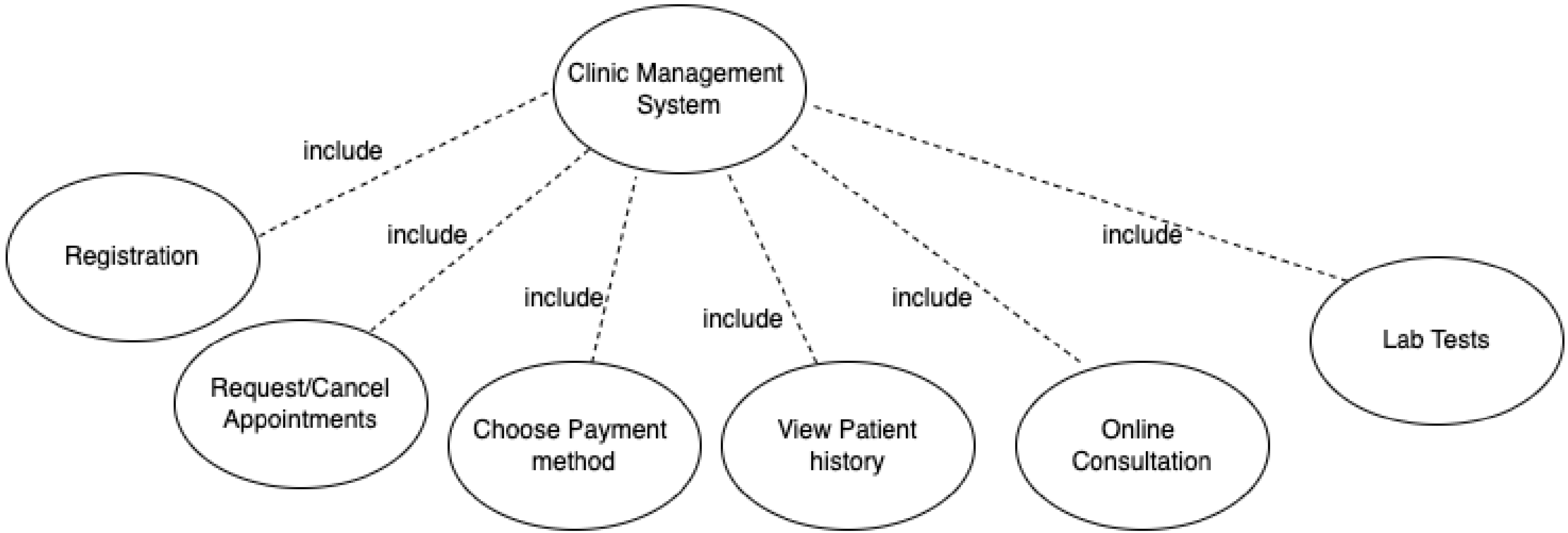

7
Visits history
6
Search
4
Patient medical files
5
Prescription
write prescription
view/update patient medical files
view his visits history
can view patient visits history
can search /choose for any doctor in the system
upload medical files
view prescription
can search /choose for any patient in the system
Doctor
patient
nurse
set the patients limit
send message when patient limit is reached
request / cancel reservation
send message when accept/reject his request
accept / reject appointments
send medical test results to the patients
send message when appointment is added or cancelled
accept/reject appointments requests
view appointments
send doctor schdule after appointment reservation
handel cash payment
1
Appointment Reservation
choose payment method
2
Payment
shift doctor's appointments after appointment reservation
update doctors's schdule after every reservation
send message when appointment is added/cancelled
make medical tests
request online consultation
3
Lab Tests
4
Online Consultaion
view patient medical Tests
accept/reject/reschedule appointment reservation
manage online payment
transfer patient results
send patient id
lab system
bank system
response to online consultaion


Request Rejceted
Patient
Choose Appointment
1.1
Appointment availability
Reject
1.2
Rejection
Update
Appointments database
Accept
Request pending
Cancel Appointment
1.4
Reservation
1.3
Check the number of patients
1.5
Pending list
Request confirmed
In the limit
Exceed the limit
Check
Doctor
Add
1.7
List of reservation
Add reservation
Cancel Appointment
1.6
Online Payment
Update
Check
Resrvations
Patietns information
Decline
bank system
Accept/Decline

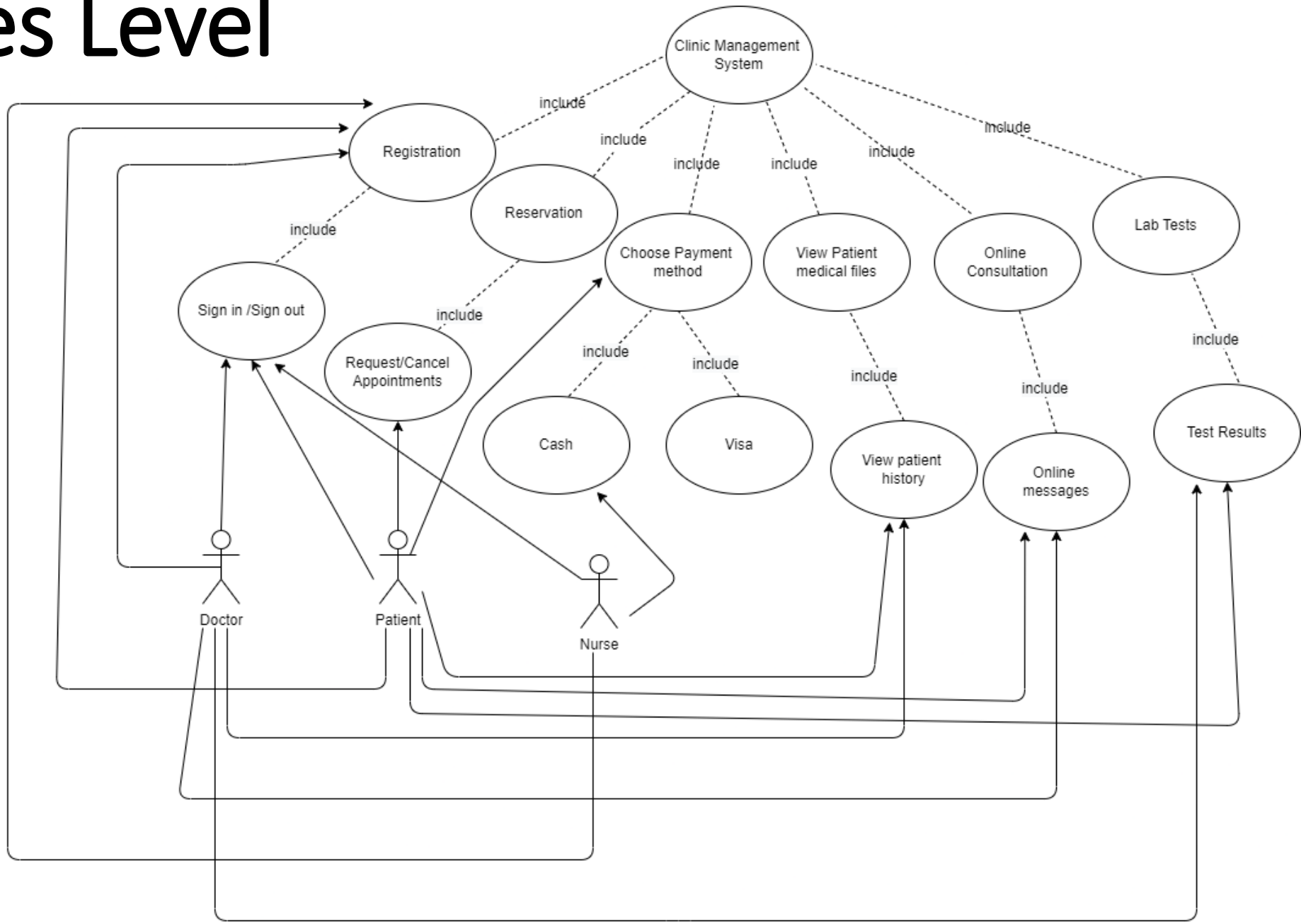
System Context Level



High Feautre Level



Sub-Features Level




Thank
you