

Clinic Appointment & Queue Management System (CAQM)

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Part 1

Introduction

1.1 Abstract

Currently, clinics are crowded, and appointment reservations require personal attendance. This process can be time-consuming, and schedules may not be organized. and this is where the CAQM system comes in. This system will help both customers and employees.

1.2 Goal

Our goal is to make appointments and transactions (such as canceling or updating appointments) easier and save patients time, and help administrators organize appointment scheduling, and make doctor appointments clearer and easier to track, so our goal is patients, admins and doctors. so we want to save their time and energy.

1.3 Current practice

We are not aware of any clinic that provides the CAQM system or solutions for these problems; however, we searched using an AI tool and found Doctolib.com site which has an app but the service is available in Italy, France and German. Anyway, the site/app provides booking appointments, searching for doctors and clinics and appointment reminder which solve the problems that might happen with the old-way booking, patients can book appointments without personal attendance, thereby saving their time and energy. most of apps or sites like Doctolib.com cover everything about schedule but the differences is in the extensions (like chat with doctor, video call and online payment), so Most foreign countries have a good CAQM system.

1.4 Impact

In our country most of clinic need the CAQM system even they don't say it, because clinics are so crowded, and patients become angry and confused while they are waiting for their turn, and may be the employees do a mistake when they're booking an appointment, and perhaps the clinic have an announcement of a doctor's presence or absence, so with CAQM system we can solve these problems and make all happy.

1.5 Novelty

we thought it will be nice if the app has a discussion section, so patients can interact with each other and discuss things related to their case. so patients can interact with each other and discussion things that related to their case, and maybe let patients evaluate doctors and clinic system and leave feedback, so the clinic can improve the system and solve the common problems.

Part 2

Functional Requirements

2.1 Main Functional

2.1.1 Patient Registration : P0

The system shall allow new patient to register via (first name, last name, email, password, date of birth, emergency contact, address and gender).

2.1.2 User Login & Authentication : P0

The system shall allow existing patients, administrators, doctors, and nurses to log in (email and password).

2.1.3 Appointment Management : P0

The system shall enable patient to book(can book for more than one appointment), view, reschedule, and cancel appointment with specific doctor.

2.1.4 Queue Status Tracking: P1

The system shall provide real-time queue status updates(position in queue, estimated time), and patient's status(waiting, in-progress, terminated, and emergency) to patient.

2.1.5 Attendance at the Consultation: P1

The system shall enable the patients to attend at the consultation after they waiting in the queue and allow them to enter one by one(First-In-First-Out).

2.1.6 Send Notification: P0

The system shall provide notifications and remainders to patients regarding the success or failure(send why did it fail) of booking, upcoming appointments, the success or failure(send why it fail) of payment process, announcement, and emergencies.

2.1.7 Receive Notification: P0

The system shall enable users to receive notification When something happens that concerns them (such as when patients book appointments, they receive the results. or doctors receive notification about patients who book appointments with them).

2.1.8 Admin Panel : P1

The system shall provide an administrative panel for clinic staff to view statistics (such as peak times and no-shows / cancellations rates).

2.1.9 User's Registration: P0

The system shall allow the admin to add doctors, patients, nurses, and admins to the system and fill in their data, **Doctor**, **Nurses**(first name, last name, email, password, date of birth, gender, phone number, specialization, license number, consultation fee, and bio), **Admin**(first name, last name, email, password, date of birth, gender, phone number, and permission), and **Patient**(As mentioned in FR-1 Patient Registration).

2.1.10 Digital Check-in : P1

The system shall allow patients and doctors to digitally check-in (The patient shall scan the QR code in the reception) for their appointments upon arrival at the clinic.

2.1.11 QR Code Generating: P1

The system shall automatically generate **Unique** QR code for each doctor appointments.

2.1.12 Patient Feedback & Rating : P1

The system shall allow patients to provide feedback and rate after an appointment to evaluate the clinic services.

2.1.13 Emergencies: P0

The system shall allow the administrator to handle emergencies and take appropriate action such as the unexpected absence of the doctor, and patient appeared in an emergency situation.

2.1.14 Patient Form Submission : P1

The system shall send electronic forms to patients(e.g, medical history form, health insurance form) before visiting, and enable patients to fill out and submit these forms online to speed up the reception process.

2.1.15 Upcoming Appointments Reminder: P0

the system shall send reminders to patients about their upcoming appointments periodically (e.g, send reminders every day for the last week or last three days) before the schedule time.

2.1.16 View Patients' Appointment: P1

The system shall allow doctors to see their current and upcoming patient's appointments.

2.1.17 View Patients Form: P1

The system shall allow doctors to see their patients form in order to speed up the consultation time.

2.1.18 Read/Remove Notification: P2

The system shall allow patient to read and remove the notification that sent to him\her.

2.1.19 View Patients' Feedback & Rating: P2

The system shall allow doctors to see their patients' review.

2.1.20 Start and End Consultation: P1

The system shall allow nurses to start and end the consultation by pressing the button on their screen.

2.2 Wish List Functional

2.2.1 Online Payments : P2

The system shall allow the patient to pay after booking an appointments.

2.2.2 Announcement Section : P2

The system shall allow admin to make announcement in announcement section and allow the patient to see it and send a notification to them.

Part 3

Non-Functional Requirements

- 3.1 The system shall be responsive and not affected by large number of users(at least 1000 users), and take maximum **5** seconds response time.(**Performance**)
- 3.2 The system shall protect patients and clinic data from unauthorized access, use, modification, ...etc.(**Security**)
- 3.3 The system shall be easy to learn and use for patients and staffs(admins, doctors) , so the interface should be simple, clear and provide clear and understandable error messages and feedback to users.(**Usability**)
- 3.4 The system shall be available when required, meaning that it shall achieve an uptime of **99.9%**, so it should be available every time except for unexcepted reason, and it should be handle unexcepted errors and failures without data loss or system crash.(**Reliability**)
- 3.5 The system shall be able to scale to increase the number of users(patients, admins and doctors) and data volume without affecting the quality of performance, so the system should support up to **15000** registered patients.(**Scalable**)
- 3.6 The system shall be easy to modify, update and debug, so based on that the codebase shall be well-document and follow established coding standard which is **PEP 8** in our case since we will use Django(python framework).(**Maintainability**)

Part 4

Risks

4.1 User Adoption Resistance : (**Low**)

clinic staffs and patients may resist adopting the new system because they may be not familiar with it or the interface is complex.

Mitigation : Provide training.

4.2 Resignation or illness of a team member : (**High**)

Since we are team of two members if one of us resigns or gets sick without save his progress or the team members don't know about the progress of each other, the project will be delayed or even halted.

Mitigation : The team members should aware of each other's progress, so they should submit every certain period(2-3 weeks) and upload it to GitHub or other tools to save it.

4.3 Requirements Problems & Difficulty : (**Medium**)

The system may have some difficult requirements and the given time is not enough, so it will lead to delayed.

Mitigation : agree with customer(in our case professor) to take account of requirements difficulty and difficulty of delivering the project on time.

4.4 Not understanding the requirements correctly : (**Medium**)

The system analyst may misunderstand the customer or get the wrong idea, so it will lead to change project's plan and the project will delay.

Mitigation : The system analyst shall display a simple design about the system and make a question list to remember what he wants to ask.

Part 5

Technologies

5.1 Frontend : HTML & CSS & React.js.

HTML for web page structure and CSS for styling and React for make the page more interactive and it has javascript library for building user interface. Backend : Django (Python Framework). Django has collection of models and libraries that will help us to write the code and it let us manage database easily since it let you create tables and relationship between them easily and it has a strong security because it encrypt the data before load it to database.

5.2 Database : MySql

Mysql is free and open-source database management system and any team member can access it without coast barriers.

5.3 Version Control : Git with GitHub.

Git is the industry standard for version control, enabling developer collaboration, tracking changes and managing code branches. GitHub will serve as the remote repository.

5.4 IDE : Visual Studio code.

it is lightweight and fast performing and it has many extensions and you can customize it as you like. it supports platforms(Windows, macOS and Linux).

5.5 Design Tools : Latex, Google Docs, Draw.io , and Visual Paradigm

We will use Latex and Google Docs to write documents because it easy to write and edit in them. And we will use Draw.io to design UML (use case diagram, class diagram and sequence class diagram because we can access many shapes and templates for free.

Part 6

Use Case Diagram

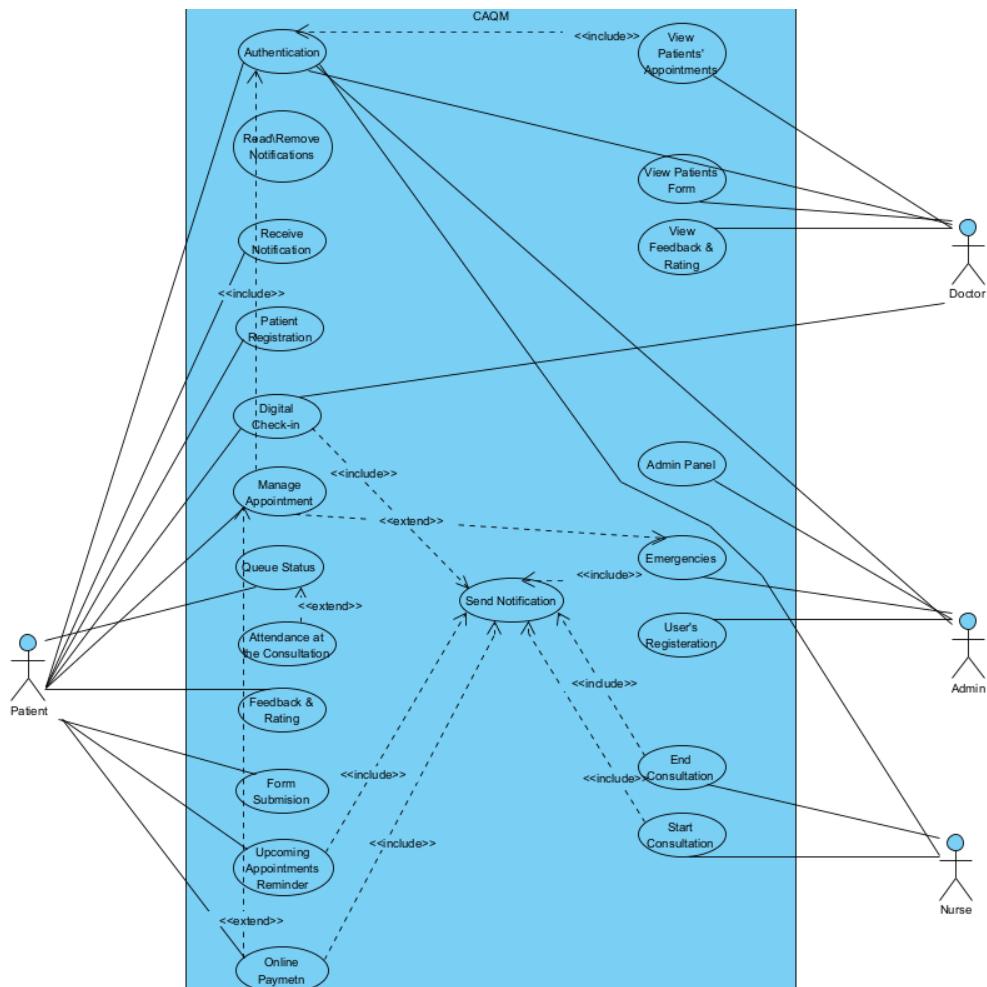


Figure 6.1: Use Case Diagram

Part 7

Use Case Description

7.1 Patient Registration

7.1.1 Requirement ID:

FR-01

7.1.2 Rational:

allow the new patient to register by (first name, last name, email, password, date of birth, emergency contact, address and gender).

7.1.3 Actors:

Patient.

7.1.4 Triggers:

New patients want to enter the system and access its features.

7.1.5 Pre-Conditions:

There is no pre-condition.

7.1.6 Post-Conditions:

Patient is successfully registered on the system and is directed to the home page.

7.1.7 List Of Steps:

1. Patient visits the website via link.
2. Patient clicks on sign up button to visit the sign up page.
3. Patient fills in all fields.
4. Patient clicks on sign up button to confirm his\her data.

7.1.8 Extensions:

system provides (Remember me).

7.1.9 Exceptions:

- If required fields are missing, system highlights them.
- If there is any invalid input, system highlights them.
- If the patient already has an account, clicks on the sign in button.

7.1.10 Includes:

Nothing.

7.1.11 Extends:

Login.

7.1.12 Author:

Mouaz Ahmed.

7.1.13 Date:

3 Oct 2025.

7.2 Login & Authentication

7.2.1 Requirement ID:

FR-02

7.2.2 Rational:

The system shall allow existing patients, administrators, doctors, and nurses to log in (email and password).

7.2.3 Actors:

- Patient.
- Admin.
- Doctor.
- Nurse.

7.2.4 Triggers:

Users who have an account and want to enter the system.

7.2.5 Pre-Condition:

Register in the system.

7.2.6 Post-Condition:

Users are successfully logged in the system.

7.2.7 List Of Steps:

1. User visits the website via link.
2. User clicks on the sign in button to visit the login page.
3. User fills in all fields.
4. User clicks on the sign in button to confirm his\her data.

7.2.8 Extensions:

- System provides (Reset Password).
- System provides (Remember me).

7.2.9 Exceptions:

1. If required fields are missing, system highlights them.
2. If there is any invalid input, system highlights them.

7.2.10 Includes:

- Nothing.

7.2.11 Extends:

- Nothing.

7.2.12 Author:

Aymn Algamoudi

7.2.13 Date:

3 Oct 2025.

7.3 Manage Appointment

7.3.1 Requirement ID:

FR-03

7.3.2 Rational:

allow patients to schedule, view and modify their appointments with specific doctor, and reduce the traditional way of scheduling appointments.

7.3.3 Actors:

- Patient.
- Admin.

7.3.4 Triggers:

- Patient initiates booking, viewing or modifying/canceling appointments.
- admin update patient's appointments in case of emergency.

7.3.5 Pre-Condition:

- The patient must be registered and logged in the system.
- Doctor must have available slots for appointments.

7.3.6 Post-Condition:

- Appointment is successfully booked, viewed, canceled or changed.
- Appointments records are updated.
- The allowed number of patients in queue is reduced by one.

7.3.7 List Of Steps:

1. patient logs into the CAQM system.
2. patient navigates to the Appointments Management section.
3.
 - Book appointments:
 - (a) the patient selects a doctor, date and available time slot.
 - (b) the patient confirms the appointment.
 - (c) the system confirms the appointment.
 - View appointments:
 - (a) the patient selects to view his\her appointments.
 - (b) the system displays a list of all appointments(current and previous).
 - Modify appointments:
 - (a) the patient selects an existing appointment from their list.
 - (b) the patient chooses cancel or update.
 - (c) in case of cancellation : the system prompts for confirmation, then cancels the appointment.
 - (d) in case of update : the patient selects new doctor, date and/or time slot.
 - (e) system confirms modification or cancellation.

7.3.8 Extensions:

- system suggests alternative times or doctors.
- system allows patient to undo the cancellation within a few moments.
- system allows patient to pay online.

7.3.9 Exceptions:

- if there are not time slots available, the system shall suggest adding the patient to waiting list.
- patient selects time slot that's no longer available, the system shall suggest alternative.

7.3.10 Includes:

- Login.

7.3.11 Extends:

- Submit forms.
- Online Payment.

7.3.12 Author:

Mouaz Ahmed.

7.3.13 Date:

4 Oct 2025.

7.4 Queue Status Tracking

7.4.1 Requirement ID:

FR-04.

7.4.2 Rational:

To provide patients with real-time updates on their queue status, and to inform them of their position in the queue. This reduces crowding and saves patient's time.

7.4.3 Actors:

- Patient.

7.4.4 Triggers:

- Patient has an appointment with the doctor and checks his\her queue status.

7.4.5 Pre-Condition:

- patient has a booked appointment for the current day.
- patient has checked-in.

7.4.6 Post-Condition:

- patient receives real-time updates.
- patient is informed about his\her place in the queue.
- patient is informed about his\her status.

7.4.7 List Of Steps:

1. patient checks-in.
2. system automatically adds the patient to the queue for their
3. system provides real-time updates on the patient's current position in the queue, and informs patient of his\her current status.

7.4.8 Extensions:

- Nothing.

7.4.9 Exceptions:

- in case of patient absence and there is still time left, the system shall allow patients in waiting list to check-in.

7.4.10 Includes:

- Login.
- Digital check-in.

7.4.11 Extends:

- Attendance at the consultation.

7.4.12 Author:

Mouaz Ahmed

7.4.13 Date:

4 Oct 2025

7.5 Digital Check-in

7.5.1 Requirement ID:

FR-05

7.5.2 Rational:

enable patients and doctors to digitally check-in for their appointment upon arrival at the clinic, and speed up the reception process.

7.5.3 Actors:

- Patient.
- Doctor.

7.5.4 Triggers:

- patients arrive at the clinic for their scheduled appointment.
- doctors arrive at the clinic for their appointment.

7.5.5 Pre-Condition:

- patient has a confirmed appointment for the current day.
- doctor has consultations at the current day.
- QR Code for check-in available at the reception.

7.5.6 Post-Condition:

- patient and doctor is successfully checked-in.
- queue status is updated.

7.5.7 List Of Steps:

1. patient\doctor arrives the clinic for the appointment\consultations.
2. patient\doctor open CAQM system on hish\er phone.
3. patient\doctor locates QR code at the reception and scan it.
4. system verifies the appointment\consultations and patient\doctor identify.
5. system confirms successful patient\doctor digital check-in and add patient to the appointment's queue.

7.5.8 Extensions:

- Nothing.

7.5.9 Exceptions:

- patient\doctor can't scan the QR code for some reason (such as the code is not clear or the patient\doctor does not have network), the admin make it manually instead of the system.

7.5.10 Includes:

- Login.

7.5.11 Extends:

- Nothing.

7.5.12 Author:

Mouaz Ahmed.

7.5.13 Date:

5 Oct 2025.

7.6 Attendance at the Consultation

7.6.1 Requirement ID:

FR-06

7.6.2 Rational:

Enable patients to attend consultations in an organized manner following FIFO (First-In-First-Out) principle after waiting in the queue.

7.6.3 Actors:

- Patient.
- Nurse.

7.6.4 Triggers:

- Patient's turn arrives in the queue.
- Nurse calls the next patient for consultation.

7.6.5 Pre-Condition:

- Patient has checked-in and is in the queue.
- Patient status is "waiting".
- Previous patient consultation has ended.

7.6.6 Post-Condition:

- Patient enters consultation room.
- Patient status updated to "in-progress".
- Next patient in queue is notified.

7.6.7 List Of Steps:

1. Doctor completes consultation with current patient.
2. System identifies next patient in queue based on FIFO.
3. System sends notification to next patient.
4. Patient proceeds to consultation room.
5. Nurse confirms patient attendance.
6. System updates patient status to "in-progress".

7.6.8 Extensions:

- System displays patient information to doctor before calling.

7.6.9 Exceptions:

- If patient doesn't respond within timeout period, system marks as "no-show" and calls next patient.
- If patient has emergency status, they bypass FIFO order, and be at the beginning of the queue.

7.6.10 Includes:

- Queue Status Tracking.

7.6.11 Extends:

- Nothing.

7.6.12 Author:

Aymn Algamoudi

7.6.13 Date:

4 Oct 2025

7.7 Send Notification

7.7.1 Requirement ID:

FR-07

7.7.2 Rational:

Provide automated notifications to patients regarding booking confirmations, payment status, appointments reminders, announcements, and emergencies.

7.7.3 Actors:

- System.

7.7.4 Triggers:

- Appointment booking/cancellation/modification.
- Payment completion or failure.
- Scheduled reminder time reached.
- Admin creates announcement.
- Emergency situation occurs.

7.7.5 Pre-Condition:

- Patient is registered in the system.
- Event requiring notification has occurred.

7.7.6 Post-Condition:

- Notification is sent to patient.
- Notification is logged in system.
- Notification appears in patient's notification panel.

7.7.7 List Of Steps:

1. System detects event requiring notification.
2. System generates appropriate notification message.
3. System determines recipient(s).
4. System sends notification via configured channels.
5. System logs notification in database.

7.7.8 Extensions:

- System sends notifications via multiple channels (email, SMS, in-app)
- System includes relevant details (appointment time, and reason for failure)

7.7.9 Exceptions:

- If notification delivery fails, system retries up to 3 times.
- If patient has disabled notifications, system logs but doesn't send.

7.7.10 Includes:

- Nothing.

7.7.11 Extends:

- Receive Notification.

7.7.12 Author:

Mouaz Ahmed.

7.7.13 Date:

5 Oct 2025

7.8 Receive Notification

7.8.1 Requirement ID:

FR-08

7.8.2 Rational:

Enable users to receive real-time notifications about events concerning them.

7.8.3 Actors:

- Patient.
- Doctor.
- Nurse.
- Admin.

7.8.4 Triggers:

- Notification is sent by the system.
- User logs into the system.
- User opens notification panel.

7.8.5 Pre-Condition:

- User has an account in the system.
- Notification has been generated and sent.

7.8.6 Post-Condition:

- User receives and views notification.
- Notification status updated to "read" (if opened).

7.8.7 List Of Steps:

1. System sends notification to user
2. User receives notification alert.
3. User opens notification panel.
4. System displays all notifications (read and unread).
5. User views notification details.

7.8.8 Extensions:

- System shows unread notification count badge.
- System groups notifications by type or date.
- System provides notification filtering options.

7.8.9 Exceptions:

- If user has no internet connection, notifications are queued and delivered when online.

7.8.10 Includes:

- Login.

7.8.11 Extends:

- Read/Remove Notification.

7.8.12 Author:

Aymn Algamoudi

7.8.13 Date:

5 Oct 2025.

7.9 Admin Panel

7.9.1 Requirement ID:

FR-09

7.9.2 Rational:

Provide administrators with a dashboard to view clinic statistics, monitor system performance, and make data-driven decisions.

7.9.3 Actors:

- Admin.

7.9.4 Triggers:

- Admin logs in and navigates to admin panel.
- Admin requests specific statistics or reports.

7.9.5 Pre-Condition:

- Admin is logged into the system.
- Admin has appropriate permissions.

7.9.6 Post-Condition:

- Admin views requested statistics and reports.
- Admin can export data if needed.

7.9.7 List Of Steps:

1. Admin logs into CAQM system
2. Admin navigates to Admin Panel section.
3. System displays dashboard with key metrics.
4. Admin selects specific report or statistic to view.
5. System generates and displays requested information.

7.9.8 Extensions:

- System provides date range filters for statistics.
- System allows exporting reports to PDF or Excel.
- System provides graphical visualization of data.
- System shows real-time updates of active appointments.

7.9.9 Exceptions:

- If the available data is insufficient for the required period, system displays appropriate message.

7.9.10 Includes:

- Login.

7.9.11 Extends:

- Nothing.

7.9.12 Author:

Mouaz Ahmed.

7.9.13 Date:

6 Oct 2025.

7.10 User's Registration

7.10.1 Requirement ID:

FR-10

7.10.2 Rational:

Allow admin to add new users (doctors, nurses, admins, patients) to the system and manage their information.

7.10.3 Actors:

- Admin.

7.10.4 Triggers:

- New nurse or doctor joins the clinic.
- New patient needs to be registered by admin.
- New admin needs system access.

7.10.5 Pre-Condition:

- Admin is logged into the system.
- Admin has permission to add users .

7.10.6 Post-Condition:

- New user is successfully added to system.
- User receives login credentials.
- User can access system with assigned role.

7.10.7 List Of Steps:

1. Admin logs into CAQM system.
2. Admin navigates to User Management section.
3. Admin selects user type (Doctor/Nurse/Admin/Patient).
4. Admin fills in required fields based on user type:
 - Doctor/Nurse: first name, last name, email, password, DOB, gender, phone, specialization, license number, consultation fee, bio.

- Admin: first name, last name, email, password, DOB, gender, phone, permissions.
 - Patient: first name, last name, email, password, DOB, emergency contact, address, gender.
5. Admin submits the form.
 6. System validates information.
 7. System creates user account.
 8. System sends credentials to new user.

7.10.8 Extensions:

- System generates random secure password if not provided.
- System sends welcome email with login instructions
- Admin can assign multiple permissions to new admin users.

7.10.9 Exceptions:

- If email already exists, system displays error and suggests verification.
- If required fields are missing, system highlights them.

7.10.10 Includes:

- Login.

7.10.11 Extends:

- Nothing.

7.10.12 Author:

Aymn ALgamoudi.

7.10.13 Date:

6 Oct 2025.

7.11 QR Code Generating

7.11.1 Requirement ID:

FR-11.

7.11.2 Rational:

Automatically generate unique QR codes for each doctor's appointments to facilitate digital check-in process.

7.11.3 Actors:

- System(Primary).
- Admin(Secondary).

7.11.4 Triggers:

- New appointment is scheduled.
- Doctor's schedule is created for the day.
- Admin requests QR code regeneration.

7.11.5 Pre-Condition:

- Doctor has appointments scheduled.
- Appointment date and time are confirmed.

7.11.6 Post-Condition:

- Unique QR code is generated.
- QR code is stored in database.
- QR code is available for display at reception.

7.11.7 List Of Steps:

1. System detects new appointment creation.
2. System generates a single unique QR code for patient appointments with a specific doctor.
3. System stores QR code in database linked to appointments that related to it.
4. System makes QR code available for display.

7.11.8 Extensions:

- Admin can manually regenerate QR code if needed.

7.11.9 Exceptions:

- If QR code generation fails, system retries up to 3 times.

7.11.10 Includes:

- Nothing.

7.11.11 Extends:

- Digital Check-in.

7.11.12 Author:

Aymn Algamoudi.

7.11.13 Date:

6 Oct 2025.

7.12 Patient Feedback & Rating

7.12.1 Requirement ID:

FR-012.

7.12.2 Rational:

Enable patients to provide feedback and ratings after appointments to help improve clinic services and doctor performance.

7.12.3 Actors:

- Patient.

7.12.4 Triggers:

- Appointment is completed.

7.12.5 Pre-Condition:

- Patient is logged into the system.
- Patient has completed an appointment.

7.12.6 Post-Condition:

- Feedback and rating are stored in system.
- Doctor can view the feedback.
- The doctor's overall rating is calculated based on all ratings.

7.12.7 List Of Steps:

1. System sends feedback request to patient after appointment completion.
2. Patient navigates to feedback section.
3. Patient selects completed appointment to review.
4. Patient rates service(1-5 stars).
5. Patient writes optional text feedback.
6. Patient submits feedback.
7. System stores feedback and updates doctor's rating.

7.12.8 Extensions:

- System allows rating different aspects (professionalism, communication, wait time).
- System allows anonymous feedback option.
- Patient can attach photos if relevant.

7.12.9 Exceptions:

- If patient submits without rating, system ignore this rating.
- Patient can edit feedback within 24 hours of submission.
- System filters inappropriate language in feedback.

7.12.10 Includes:

- Login.

7.12.11 Extends:

- View Patients' Feedback & Rating.

7.12.12 Author:

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7.12.13 Date:

6 Oct 2025.

7.13 Emergencies

7.13.1 Requirement ID:

FR-13.

7.13.2 Rational:

Enable administrators to handle emergency situations such as unexpected doctor absence or patient emergencies efficiently.

7.13.3 Actors:

- Admin.
- System.

7.13.4 Triggers:

- Doctor unexpectedly absent.
- Patient arrives with emergency condition.
- System detects critical situation requiring immediate action.

7.13.5 Pre-Condition:

- Admin is logged into system.
- Emergency situation has occurred.

7.13.6 Post-Condition:

- Appropriate action taken (such as appointments rescheduled, and patient prioritized).
- Affected patients notified.
- System logs emergency event.

7.13.7 List Of Steps:

1. Admin identifies or system detects emergency situation.
2. Admin navigates to Emergency Management section.
3. Admin selects emergency type:
 - Doctor Absence:
 - (a) Admin marks doctor as unavailable.
 - (b) System identifies affected appointments.
 - (c) Admin chooses action (reschedule, assign to another doctor, cancel).
 - (d) System notifies all affected patients.
 - Patient Emergency:
 - (a) Admin marks patient as emergency priority System moves patient to top of queue.
 - (b) System notifies doctor and nurse.
 - (c) System notifies other waiting patients of delay.
 - Feature Failed:
 - (a) Admin does it manually.
4. Admin confirms action.
5. System executes emergency protocol.

7.13.8 Extensions:

- System suggests alternative doctors based on specialization.
- Admin can broadcast emergency announcement to all users.

7.13.9 Exceptions:

- If no alternative doctors available, system suggests next available dates.
- If emergency occurs outside clinic hours, system put it at the beginning of the first queue that related to the emergency in the next day.

7.13.10 Includes:

- Login.
- Send Notification.

7.13.11 Extends:

- Manage Appointment.
- Queue Status Tracking.
- Announcement Section.

7.13.12 Author:

Mouaz Ahmed.

7.13.13 Date:

7 Oct 2025.

7.14 Patient Form Submission

7.14.1 Requirement ID:

FR-14

7.14.2 Rational:

Enable patients to fill out and submit required forms (medical history, insurance) online before their visit to speed up the reception process.

7.14.3 Actors:

- Patient.
- System.

7.14.4 Triggers:

- Patient books new appointment.
- Scheduled reminder for form completion.

7.14.5 Pre-Condition:

- Patient has confirmed appointment.
- System requires forms from patient.

7.14.6 Post-Condition:

- Forms are completed and submitted.
- System allow patient to preview the forms.
- Forms are accessible to doctor.

7.14.7 List Of Steps:

1. System sends electronic forms to patient after appointment booking.
2. Patient receives notification about pending forms.
3. Patient navigates to Forms section.
4. Patient views list of required forms.
5. Patient opens each form.
6. Patient fills in all required fields.
7. Patient reviews completed form.
8. Patient submits form.
9. System validates and stores form data in json type.

7.14.8 Extensions:

- System saves draft forms automatically.
- Patient can upload supporting documents (insurance card, ID).
- System pre-fills known information from patient profile.
- System sends reminders for incomplete forms.
- System pre-fills the forms from the previous appointment and allow patient to edit it if needed.

7.14.9 Exceptions:

- If patient skips required fields, system highlights them.
- If patient doesn't submit, system notifies admin and patient to fill out the form manually at the reception.
- Patient can request paper forms at reception if unable to complete online.

7.14.10 Includes:

- Login.
- Manage Appointment.

7.14.11 Extends:

- View Patients Form.

7.14.12 Author:

Mouaz Ahmed.

7.14.13 Date:

7 Oct 2025.

7.15 Upcoming Appointment Reminder

7.15.1 Requirement ID:

FR-15

7.15.2 Rational:

Automatically send periodic reminders to patients about their upcoming appointments to reduce no-shows and help patients prepare.

7.15.3 Actors:

- System.
- Patient.

7.15.4 Triggers:

- Scheduled reminder time is reached (e.g., 7 days, 3 days, 1 day, 1 hour before appointment).
- Appointment is booked.

7.15.5 Pre-Condition:

- Patient has confirmed appointment.
- Appointment date is in the future.
- Reminder schedule is configured in system.

7.15.6 Post-Condition:

- Reminder notification sent to patient.
- Reminder is logged in system.

7.15.7 List Of Steps:

1. System monitors all upcoming appointments.
2. System checks reminder schedule configuration
3. When reminder time is reached, system generates reminder notification.
4. System includes appointment details (doctor name, date, time).
5. System sends reminder via configured channels.
6. System logs reminder as sent.
7. System schedules next reminder if applicable.

7.15.8 Extensions:

- Patient can set preferred reminder times.

7.15.9 Exceptions:

- If appointment is canceled, system cancels pending reminders.
- If appointment is rescheduled, system updates reminder schedule.
- If notification delivery fails, system retries.

7.15.10 Includes:

- Send Notification.

7.15.11 Extends:

- Nothing.

7.15.12 Author:

Aymn Algamoudi.

7.15.13 Date:

8 Oct 2025.

7.16 View Patients' Appointments

7.16.1 Requirement ID:

FR-16.

7.16.2 Rational:

Allow doctors to view their current and upcoming patient appointments to prepare and manage their schedule effectively.

7.16.3 Actors:

- Doctor

7.16.4 Triggers:

- Doctor checks daily schedule.
- Doctor needs to review upcoming appointments.

7.16.5 Pre-Condition:

- Doctor is logged into system.
- Doctor has appointments scheduled.

7.16.6 Post-Condition:

- Doctor views appointment list.

7.16.7 List Of Steps:

1. Doctor logs into CAQM system.
2. Doctor navigates to Appointments section.
3. System displays list of appointments filtered by:
 - Today's appointments (default view)
 - Upcoming appointments.
 - Past appointments.
4. For each appointment, system displays:
 - Patient name.
 - Appointment time.
 - Appointment status (scheduled, checked-in, in-progress, completed).
 - Patient contact information.

7.16.8 Extensions:

- Doctor can click on appointment to view more details.
- Doctor can filter appointments by date range.
- Doctor can search for specific patient.
- System highlights next appointment.
- System shows estimated time for each appointment based on consultation duration.

7.16.9 Exceptions:

- If no appointments scheduled, system displays appropriate message.
- If appointment is canceled by patient, system updates list.

7.16.10 Includes:

- Login.

7.16.11 Extends:

- View Patients Form.

7.16.12 Author:

Mouaz Ahmed.

7.16.13 Date:

11 Nov 2025.

7.17 View Patients Form

7.17.1 Requirement ID:

FR-17.

7.17.2 Rational:

Allow doctors to access patient forms before or during consultations to review medical history and insurance information, in order to speed up consultation time.

7.17.3 Actors:

- Doctor.

7.17.4 Triggers:

- Doctor prepares for consultation.
- Doctor reviews patient information.
- Doctor opens patient appointment details.

7.17.5 Pre-Condition:

- Doctor is logged into system.
- Patient has submitted forms.
- Doctor has appointment with patient.

7.17.6 Post-Condition:

- Doctor views patient forms.

7.17.7 List Of Steps:

1. Doctor navigates to appointment list.
2. Doctor selects specific patient appointment.
3. Doctor clicks on "View Patient Forms" button.
4. System displays list of all submitted forms for patient.
5. Doctor selects form to view.
6. System displays form content with all patient responses.
7. Doctor reviews information.

7.17.8 Extensions:

- Doctor can download or print forms.
- Doctor can add notes to patient forms.
- System shows form completion status.

7.17.9 Exceptions:

- If patient hasn't submitted forms, system displays appropriate message.
- If forms are incomplete, system highlights missing information.
- Doctor can request patient to complete forms.

7.17.10 Includes:

- Login.
- View Patients' Appointments.

7.17.11 Extends:

- Nothing.

7.17.12 Author:

Aymn Algamoudi.

7.17.13 Date:

11 Nov 2025.

7.18 Read/Remove Notification

7.18.1 Requirement ID:

FR-18.

7.18.2 Rational:

Allow patients to manage their notifications by marking them as read and removing unwanted notifications to keep notification panel organized..

7.18.3 Actors:

- Patient

7.18.4 Triggers:

- Patient opens notification.
- Patient wants to clear notifications.

7.18.5 Pre-Condition:

- Patient is logged into system.
- Patient has received notifications.

7.18.6 Post-Condition:

- Notification marked as read or removed.
- Notification panel updated.
- Notification count badge updated.

7.18.7 List Of Steps:

1. Patient navigates to notification panel.
2. System displays all notifications (unread highlighted).
3. To read notification:
 - (a) Patient clicks on notification.
 - (b) System displays full notification content.
 - (c) System marks notification as read.
 - (d) System updates unread count.
4. To remove notification:
 - (a) Patient selects notification(s) to remove.
 - (b) Patient clicks delete button.
 - (c) System prompts for confirmation.
 - (d) Patient confirms.
 - (e) System removes notification from list.

7.18.8 Extensions:

- Patient can mark all notifications as read at once.
- Patient can remove all notifications at once.
- System archives removed notifications (recoverable for 30 days).
- Patient can filter notifications (read/unread/by type).

7.18.9 Exceptions:

- If patient accidentally removes notification, they can undo within 5 seconds.

7.18.10 Includes:

- Login.
- Receive Notification.

7.18.11 Extends:

- Nothing.

7.18.12 Author:

Mouaz Ahmed.

7.18.13 Date:

14 Oct 2025.

7.19 View Patients' Feedback & Rating

7.19.1 Requirement ID:

FR-19.

7.19.2 Rational:

Allow doctors to view patient feedback and ratings to understand patient satisfaction and identify areas for improvement.

7.19.3 Actors:

- Doctor.

7.19.4 Triggers:

- Doctor wants to review their performance.
- Doctor wants to see overall rating.

7.19.5 Pre-Condition:

- Doctor is logged into system.
- Patients have submitted feedback for doctor.

7.19.6 Post-Condition:

- Doctor views feedback and ratings.

7.19.7 List Of Steps:

1. Doctor logs into CAQM system.
2. Doctor navigates to Feedback & Ratings section.
3. System displays:
 - Overall rating (average).
 - Total number of ratings.
 - Rating distribution (5-star, 4-star,.., 1-star).
 - Recent feedback comments.
4. Doctor can filter feedback by:
 - Date range.
 - Rating level(High 5-4, Medium 3, Low 2-1).
 - Appointment type.
5. Doctor reviews individual feedback entries.
6. Doctor can see patient name (if not anonymous).

7.19.8 Extensions:

- Doctor can flag inappropriate feedback for admin review.

7.19.9 Exceptions:

- If no feedback available, system displays appropriate message.
- Anonymous feedback doesn't show patient identity.

7.19.10 Includes:

- Login

7.19.11 Extends:

- Nothing.

7.19.12 Author:

Aymn Algamoudi.

7.19.13 Date:

15 Nov 2025.

7.20 Start and End Consultation

7.20.1 Requirement ID:

FR-20.

7.20.2 Rational:

Enable nurses to control consultation flow by marking when consultations start and end, ensuring accurate queue management and timing.

7.20.3 Actors:

- Nurse.

7.20.4 Triggers:

- Patient is at the beginning of the queue and the current consultation is completed.

7.20.5 Pre-Condition:

- Nurse is logged into system.
- Patient is at the beginning of the queue with status "waiting".
- Patient is in the consultation with status "in-progress" and is completed.

7.20.6 Post-Condition:

- **Start:** Patient status updated to "in-progress", consultation timer started
- **End:** Patient status updated to "Terminated", next patient notified, consultation time recorded

7.20.7 List Of Steps:

1. Start Consultation:
 - (a) Nurse views current queue on their screen.
 - (b) Patient enters consultation room.
 - (c) Nurse clicks "Start Consultation" button.
 - (d) System updates patient status to "in-progress".
 - (e) System starts consultation timer.
 - (f) System updates queue display for waiting patients.
2. End Consultation:
 - (a) Consultation is completed.
 - (b) Nurse clicks "End Consultation" button.
 - (c) System updates patient status to "Terminated"
 - (d) System records consultation duration.
 - (e) System removes patient from queue and updates queue status.
 - (f) System notifies next patient in queue.
 - (g) System sends feedback request to completed patient.

7.20.8 Extensions:

- System records actual consultation time vs estimated time.

7.20.9 Exceptions:

- If nurse forgets to end consultation, system prompts after extended time.
- Emergency Patient is not bound by the estimated consultation time.

7.20.10 Includes:

- Login.
- Queue Status Tracking.

7.20.11 Extends:

- Patient Feedback & Rating.

7.20.12 Author:

Mouaz Ahmed.

7.20.13 Date:

16 Nov 2025.

7.21 Online Payment

7.21.1 Requirement ID:

FR-21.

7.21.2 Rational:

Enable patients to pay consultation fees online after booking appointments, providing convenience and reducing cash handling at clinic.

7.21.3 Actors:

- Patient.
- Payment Gateway.

7.21.4 Triggers:

- Patient completes appointment booking.
- Patient chooses to pay online.

7.21.5 Pre-Condition:

- Patient has booked an appointment.
- Payment gateway is configured and operational.
- Patient has valid payment method.

7.21.6 Post-Condition:

- Payment is processed successfully.
- Payment status updated in system.
- Patient receives payment confirmation.
- Appointment is confirmed.

7.21.7 List Of Steps:

1. Patient completes appointment booking
2. System displays payment summary (consultation fee, tax if applicable)
3. Patient selects "Pay Online" option.
4. System redirects to payment gateway.
5. Patient enters payment details (card/mobile payment).
6. Payment gateway processes payment.
7. System receives payment confirmation.
8. System updates appointment status to "paid".
9. System sends payment receipt to patient.
10. System sends booking confirmation notification.

7.21.8 Extensions:

- System supports multiple payment methods (credit card, debit card, mobile payment).

7.21.9 Exceptions:

- If payment fails, system notifies patient with reason and allows retry.
- If payment gateway is unavailable, system offers pay-at-clinic option.
- Patient can cancel payment before completion.
- System handles refunds for canceled appointments.

7.21.10 Includes:

- Login.
- Payment Online.

7.21.11 Extends:

- Send Notification.

7.21.12 Author:

Aymn Algamoudi.

7.21.13 Date:

16 Nov 2025.

7.22 Announcement Section

7.22.1 Requirement ID:

FR-22.

7.22.2 Rational:

Enable administrators to create and publish announcements for patients and staff, keeping everyone informed about important clinic updates.

7.22.3 Actors:

- Admin(Creator).
- Patient(Viewer).
- Doctor(Viewer).
- Nurse(Viewer).

7.22.4 Triggers:

- Admin needs to communicate important information.
- System event requires announcement (holiday closure, new service).
- Emergency announcement needed.

7.22.5 Pre-Condition:

- Admin is logged into system.
- Admin has permission to create announcements.

7.22.6 Post-Condition:

- Announcement is published.
- Target users receive notification.
- Announcement is visible in announcement section.

7.22.7 List Of Steps:

- Creating Announcement(Admin):
 1. Admin navigates to Announcement Management section
 2. Admin clicks "Create Announcement"
 3. Admin fills in announcement details:
 - Title
 - Content/Description
 - Announcement's Target (all users, patients only, staff(Admin, Nurse, and Doctor) only, specific doctor's patients)
 - Priority (normal, high, urgent)
 - Validity period (start date, end date)
 4. Admin previews announcement.
 5. Admin publishes announcement.
 6. System sends notification to target audience.
 7. Announcement appears in announcement section.
- View Announcement(Users):
 1. User logs into system.
 2. User sees announcement notification.
 3. User navigates to Announcement section.
 4. System displays all active announcements.
 5. User clicks on announcement to read full content.

7.22.8 Extensions:

- Admin can edit or delete announcements.
- Admin can pin important announcements to top.
- Users can mark announcements as read.
- Admin can attach files or images to announcements.
- System tracks announcement view statistics.

7.22.9 Exceptions:

- If user has disabled notifications, announcement still appears in section.

7.22.10 Includes:

- Login.
- Send Notification.

7.22.11 Extends:

- Receive Notification.

7.22.12 Author:

Mouaz Ahmed.

7.22.13 Date:

18 Nov 2025.