

Software Design of Smartel - AI Powered Telehealth Platform

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1. Use Case Scenarios

1.1 Use Case #1: Register User on the System

Main Success Scenario:

1. User enters an email address, password, and details such as name, age, and date of birth.
2. System verifies the validity of the email address and password.
3. System displays a confirmation message to indicate that registration was successful.

1.2 Use Case #2: Patient booking an appointment

Main Success Scenario:

1. Patient selects a specialty based on their symptoms.
2. Patient selects a healthcare professional.
3. The system displays date and time of available appointment slots created by the healthcare professional.
4. Patient selects the preferred date and time for the appointment.
5. The system confirms the selected appointment and sends the confirmation letter via email.
6. Smartel system updates the visibility of the slot to invisible.

1.3 Use Case #3: Physician schedules appointment slot

Main Success Scenario:

1. Physician enters the date and time of availability.
2. System responds with a confirmation message.
3. Physician confirms appointment slot scheduling.

1.4 Use Case #4: Recording consultation

Main Success Scenario:

1. Patient arrives for the appointment.

2. Doctor asks for the patient's consent to record the conversation.
3. User agrees to terms and conditions.
4. The system records and stores the audio of the appointment conversation.

1.5 Use Case #5: Generating medical reports from the consultation

Main Success Scenario:

1. Doctor uses *Record the appointment conversation*.
2. The system calls a third-party API to produce a medical report based on the recorded audio file.
3. The system prompts the doctor to review the generated report.
4. Doctor reviews the report and edits it if necessary.
5. The system sends the final version of the report to the medical records system.

2. System Sequence Diagrams

Use Case #1: Register User on the System

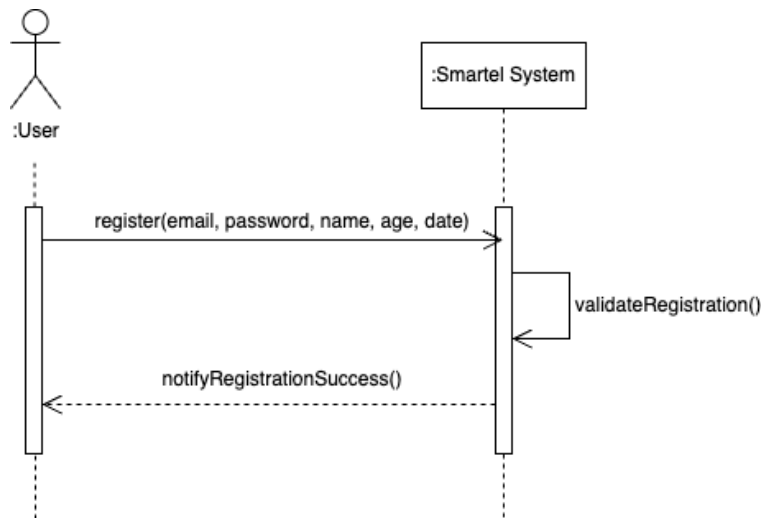


Figure 1. User registration

Use Case #2: Patient booking an appointment

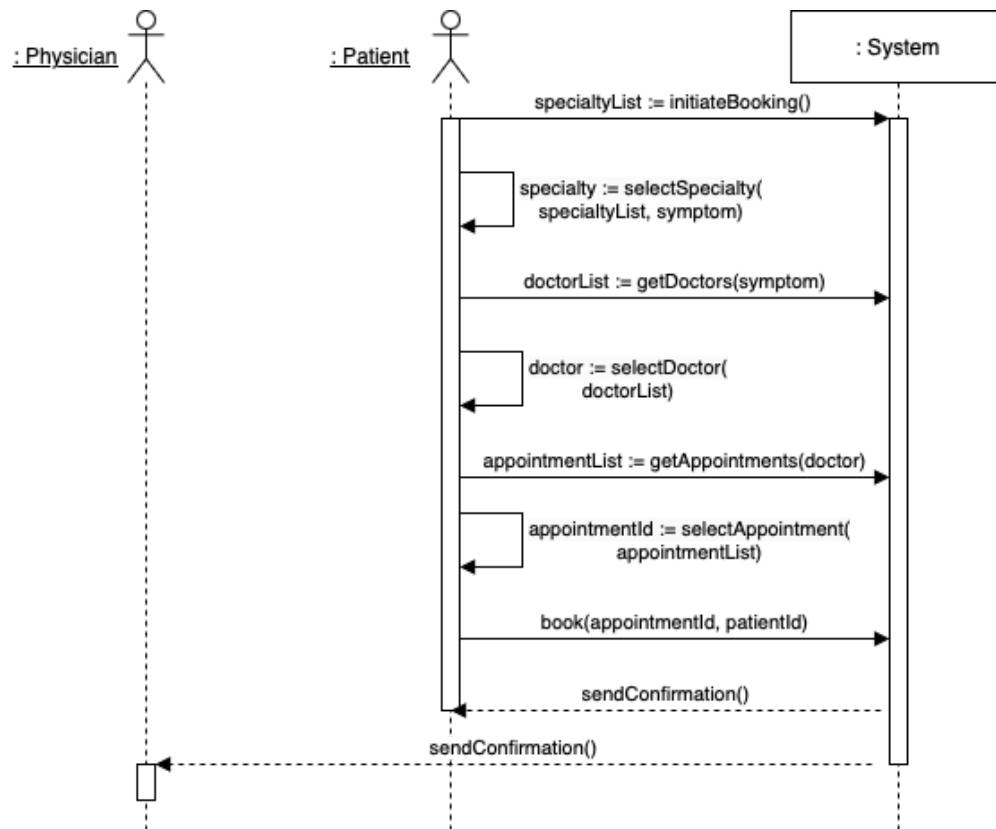


Figure 2. Patient booking

Use Case #3: Schedule physician appointment slot

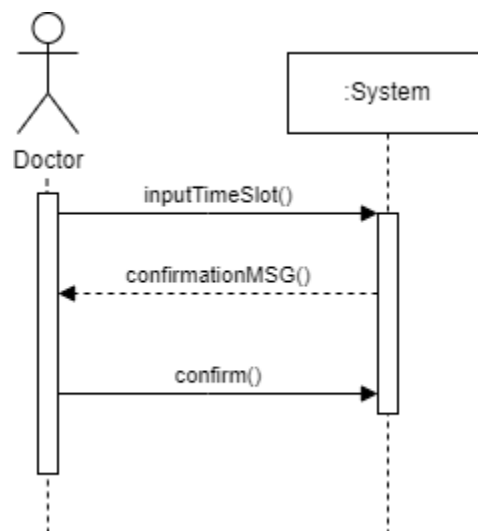


Figure 3. Schedule appointment

Use Case #4: Recording consultation

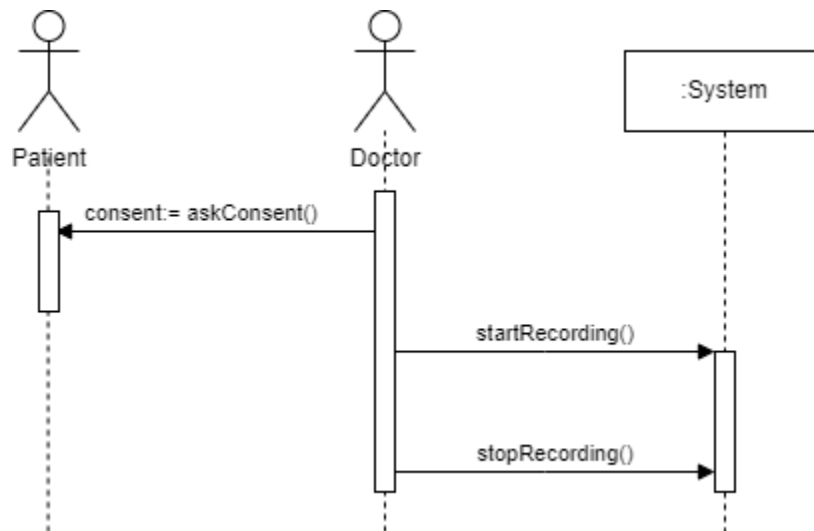


Figure 4. Recording consultation

Use Case #5: Generating medical reports from the consultation

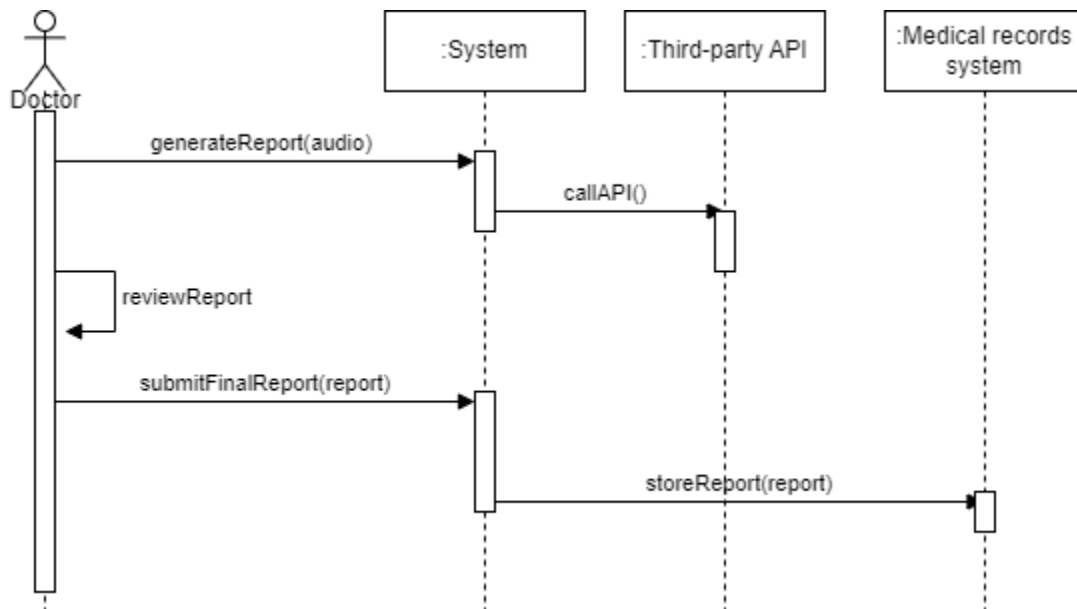


Figure 5. Generate medical reports

3. Domain Model

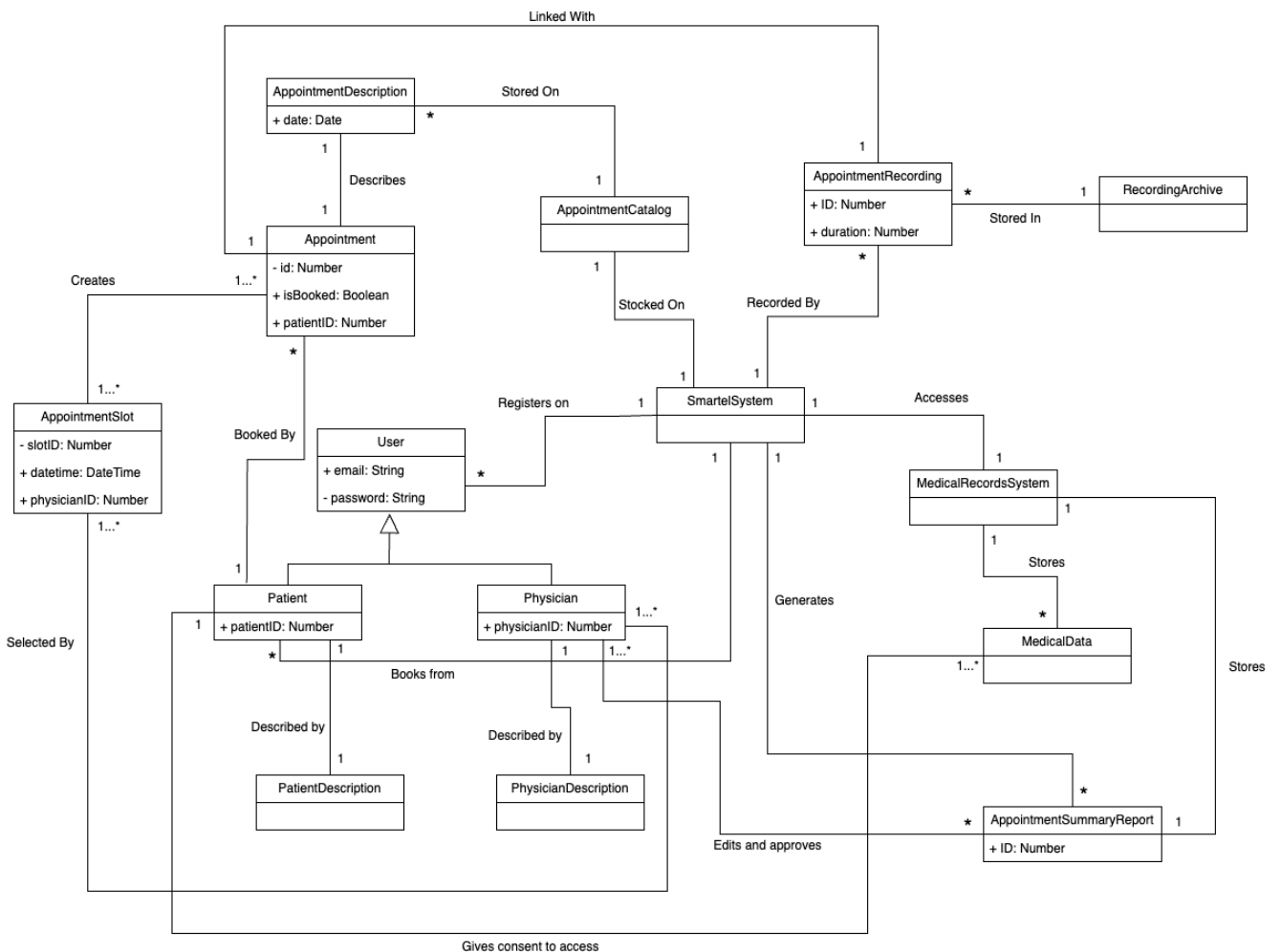


Figure 6. Domain model

4. Operation Contracts

Use Case #1: Register User on the System

Name: registerUser(email: string, password: string, userType: string)

Responsibilities:

- Validate the provided email and password according to system rules.
- Create a new user with the provided credentials.
- Assign a unique ID to the new user.
- Send a verification email to the new user to confirm their email address.

Pre-conditions:

- The email provided is not already associated with an existing user in the system.
- The userType is valid and corresponds to one of the system's recognized user types (e.g., Patient, Physician).

Post-conditions:

- A new instance of *Patient* or *Physician* is created based on the userType provided. (instance creation)
- The *User.ID*, *User.Email*, *User.Password* is modified according to the user input. (attributes modification)
- A new instance of *PatientDescription* or *PhysicianDescription* is created based on the userType provided.
- *PatientDescription* or *PhysicianDescription* is associated with the *User* instance. (association formation)

Use Case #2: Patient booking an appointment

Name: book(appointmentId: number, patientId: number)

Responsibilities:

- Confirm the booking and update the status of the appointment.
- Send a confirmation email to the patient.

Pre-conditions:

- Appointment exists in the system
- Appointment was found in the system through its ID

Post-conditions:

- If appointment is available, *Appointment.isBooked* was set to True (attribute modification)
- *Appointment.patientId* was set to *patientId* (attribute modification)

Use Case #3: Schedule physician appointment slot

Name: schedulePhysicianAppSlot(physicianId: number, datetime: DateTime)

Responsibilities:

- Validate the physician's input for date and time.
- Check the availability of the physician for the input date and time.
- Create a new appointment with the specified datetime, physicianID, and appointmentID.
- Mark the new appointment as available (isBooked is set to false).

- Provide a confirmation message to the Physician that the appointment slot has been scheduled.

Pre-conditions:

- The Physician is logged into the system and is identified by *physicianId*.
- The datetime provided has no conflicts with the Physician's schedule/

Post-conditions:

- A new *Appointment* instance was created in the system. (instance creation)
- The *Appointment.isBooked* was set to false. (attribute modification)
- The *Appointment* was associated with the *AppointmentSlot*. (association formation)

Use Case #4: Recording consultation

Name: recordConsultation(appointmentId: number)

Responsibilities:

- Check that the Patient and Physician are both registered in the system and associated with the provided IDs.
- Obtain the Patient's consent to record the consultation.
- Start recording the audio of the appointment conversation.
- Link the recording with the corresponding Appointment and store it in the RecordingArchive.

Pre-conditions:

- The Patient identified by *patientId* has a scheduled Appointment identified by *appointmentId*.
- The Physician identified by *physicianId* is scheduled for the Appointment.
- The system is ready to record (e.g., hardware operational, storage available).

Post-conditions:

- A new *AppointmentRecording* instance is created with a unique ID and the duration of the recording. (instance creation)
- Change *AppointmentRecording.duration* to the duration of the consultation. (attribute modification)
- The *AppointmentRecording* instance was associated with *RecordingArchive*. (association formation)
- The *AppointmentRecording* instance was associated with *Appointment*. (association formation)

Use Case #5: Generating medical reports from the consultation

Name: generateMedicalReport(appointmentId: number, physicianId: number)

Responsibilities:

- Retrieve the recorded audio file of the appointment conversation.
- Interface with a third-party API to transcribe and produce a preliminary medical report based on the recorded audio.
- Present the generated report to the Physician for review.
- Allow the Physician to make edits and approve the final version of the report.
- Send the approved medical report to the MedicalRecordsSystem to be stored and associated with the Patient's medical data.

Pre-conditions:

- The Appointment identified by appointmentId has been completed, and the conversation has been recorded.
- The Physician identified by physicianId is associated with the Appointment.
- There exists a recorded audio file linked to the Appointment.

Post-conditions:

- An *AppointmentSummaryReport* instance is created. (instance creation)
- The *AppointmentSummaryReport* was associated with the *MedicalRecordsSystem*. (association formation)

5. UML Interaction Diagram (at least x5)

Use Case #1: Register User on the System

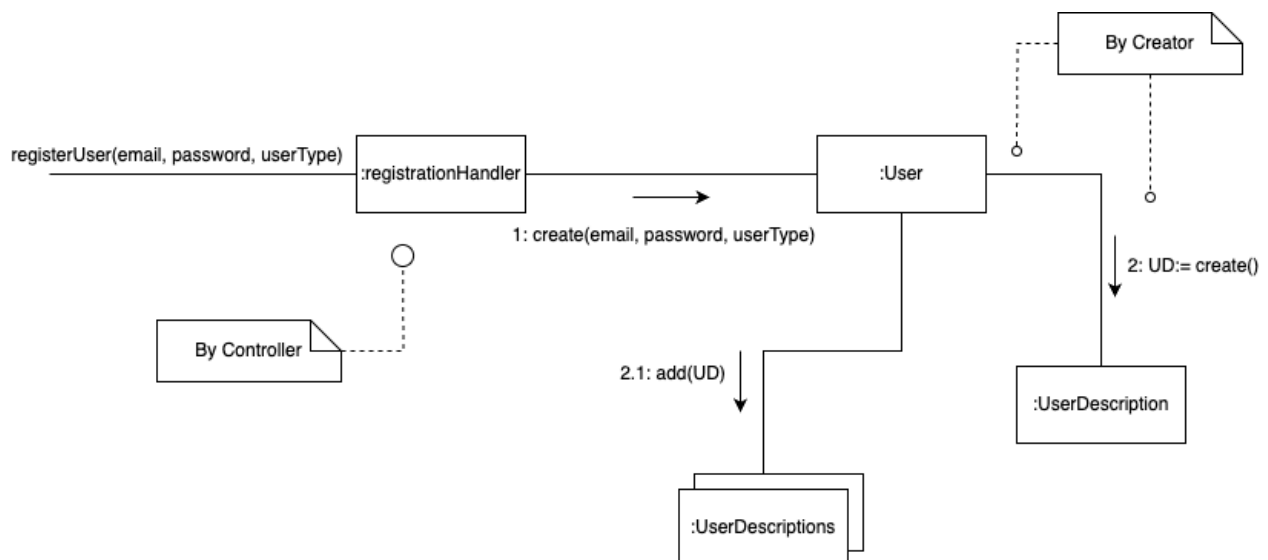


Figure 7. UML for user registration

Use Case #2: Patient booking an appointment

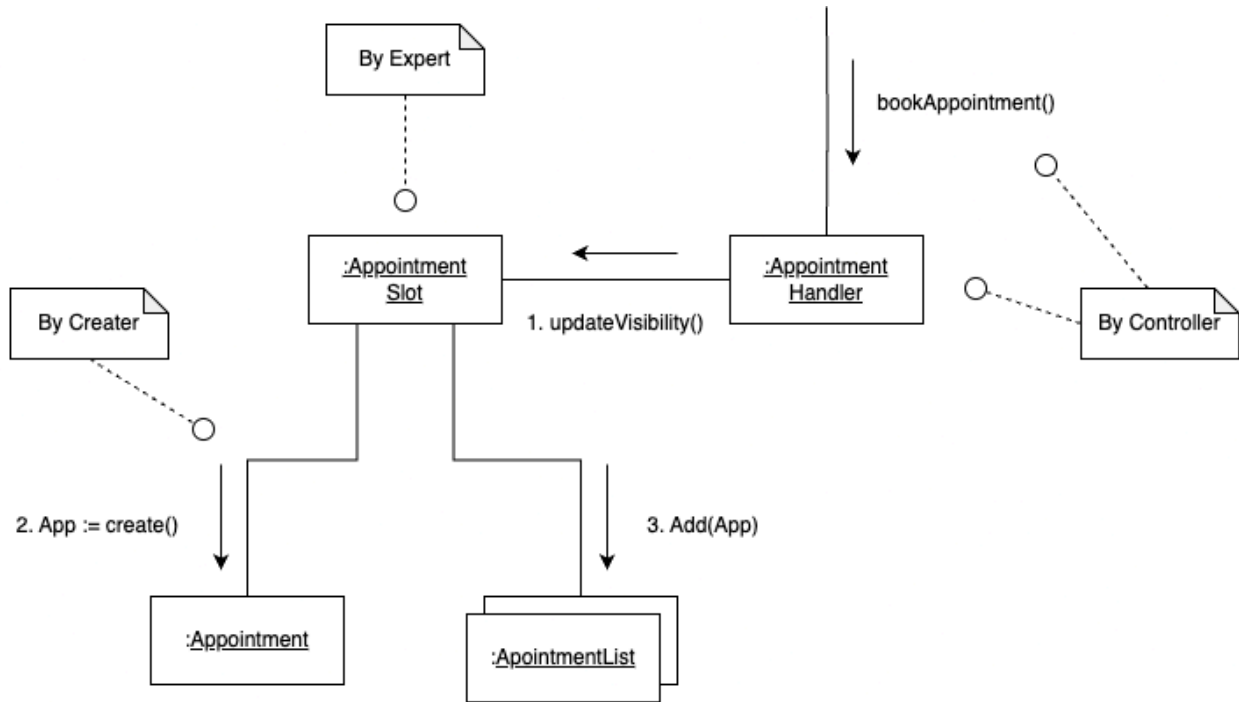


Figure 8. UML for patient booking

Use Case #3: Schedule physician appointment slot

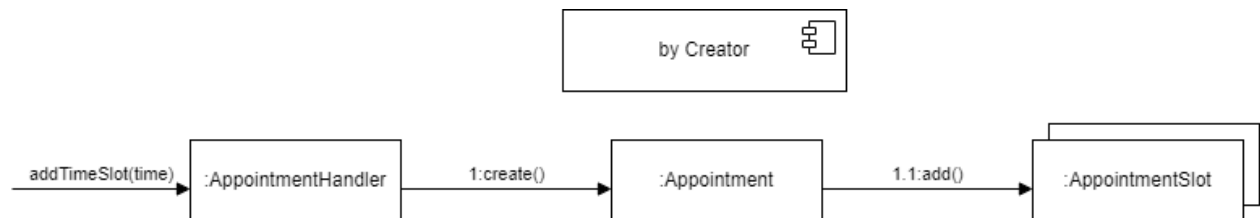


Figure 9. UML for appointment scheduling

Use Case #4: Recording consultation

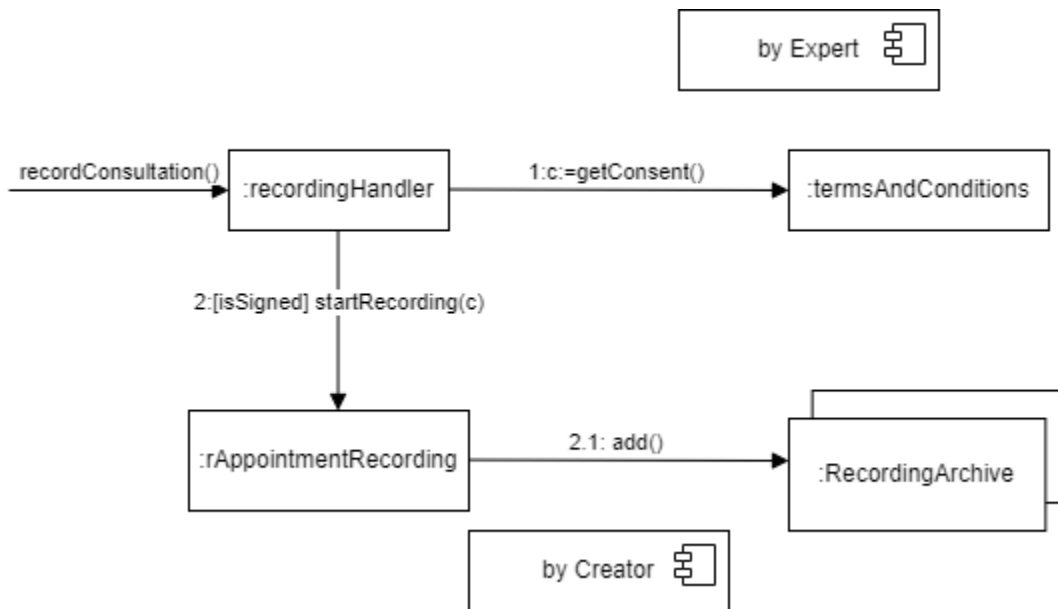


Figure 10. UML for user registration

Use Case #5: Generating medical reports from the consultation

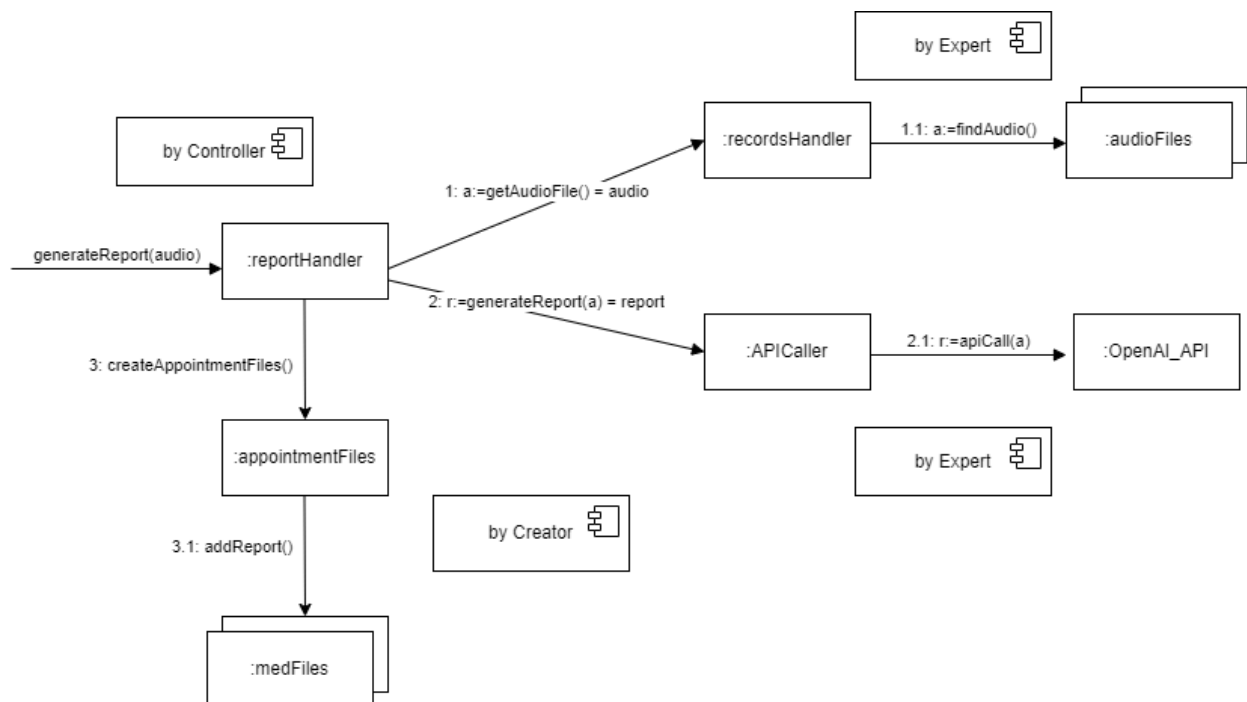


Figure 11. UML for medical report generation

6. Class Diagram

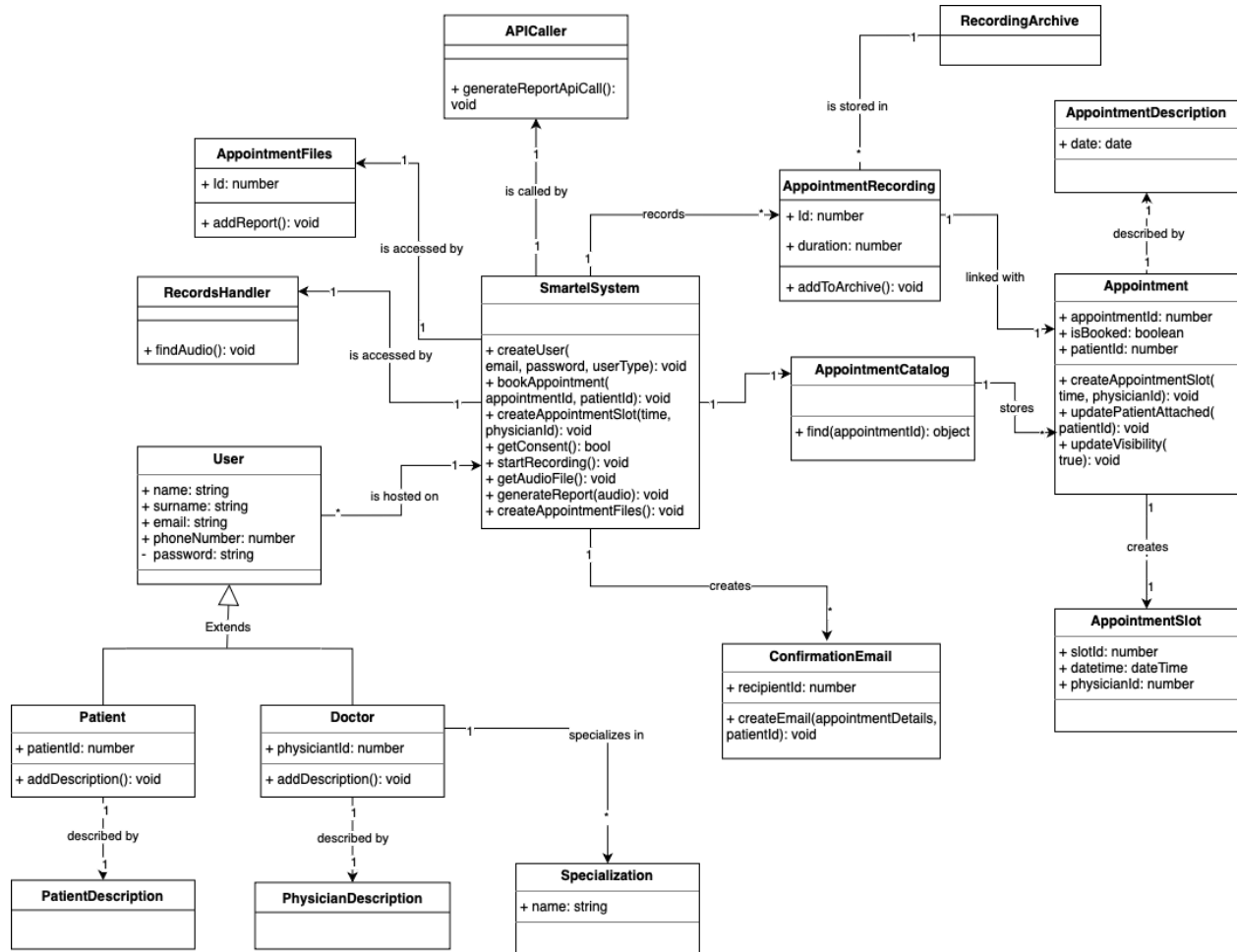


Figure 12. Class Diagram

7. UI Prototypes

Welcome to your Dashboard

Schedule appointments, upload medical documents, and view consultation reports.

Consultation Reports Dashboard

Latest Reports:

10th February 2024 with
Cardiologist

Download
Report

Previous Reports:

25th January 2024 with
Cardiologist

Download
Report

15th January 2024 with
Therapist

Download
Report

Upload Medical Documents Securely

Vaccination Records

Upload Vaccination Records

Allergy Information

Upload Allergy Information

Medical History

Upload Medical History

Manage Appointments

Search for Doctors

Start typing...

2/25/2024

today

< >

February 2024

month

week

day

Sun	Mon	Tue	Wed	Thu	Fri	Sat
28	29	30	31	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25 <div>5:08p Event</div>	26	27	28	29	1	2
3	4	5	6	7	8	9