

# **Requirement & Design Specification**

## **HIV Clinic Appointment Booking System**

Version: 1.0

January 2025

## Record of Changes

Version	Date	A* M, D	In charge	Change Description
V1.0	28/6	A	KhoaDDSE196260	Create document Add requirements, Add actors (1.1) Design Specification
V1.0	28/6	A	TuanTMSE192397	Add descriptions for guest and admin (1.2.b) Authentication & User Management (2.1)
V1.0	28/6	A	DatNTSE194083	Add Use Case Diagram (1.2.a) Add Requirement Speciality
V1.0	28/6	A	AnPPSE196260	Add Use case Table(1.2.1) Add Screen-Flow Diagram (2.1) (2.2) Screen Descriptions, Appendix Add Requirement Speciality

Table 1: Version Change Log

*\*A - Added M - Modified D - Deleted*

# Contents

<b>1</b>	<b>Overview</b>	<b>4</b>
1.1	User Requirements . . . . .	4
1.1.1	Actors . . . . .	4
1.2	Actor Description . . . . .	4
1.2.1	Use Cases . . . . .	6
1.3	Overall Functionalities . . . . .	17
1.3.1	Screens Flow . . . . .	17
1.3.2	Screen Descriptions . . . . .	19
1.3.3	Screen Authorization . . . . .	21
1.3.4	Non-UI Functions . . . . .	23
1.4	System High Level Design . . . . .	23
1.4.1	Database Design . . . . .	23
1.4.2	Code Packages . . . . .	25
1.4.3	Data Flow Architecture . . . . .	26
<b>2</b>	<b>Requirement Specifications</b>	<b>26</b>
2.1	Common functions . . . . .	26
2.1.1	UC-01 – Register Donor Account . . . . .	26
2.1.2	UC-02 – Log In . . . . .	28
2.1.3	UC-03 – View Hospital Information . . . . .	29
2.1.4	UC-04 – Read Blogs . . . . .	30
2.1.5	UC-05 – Manage Personal Profile . . . . .	31
<b>3</b>	<b>Design Specifications</b>	<b>32</b>
3.1	Authentication System . . . . .	32
3.1.1	User Login . . . . .	32
3.2	Appointment Management . . . . .	33
3.2.1	Appointment Booking . . . . .	33
3.3	Patient Care System . . . . .	34
3.3.1	Patient Records Management . . . . .	34
<b>4</b>	<b>Appendix</b>	<b>36</b>
4.1	Assumptions & Dependencies . . . . .	36
4.2	Limitations & Exclusions . . . . .	36
4.3	Business Rules . . . . .	37
4.4	Technical Specifications . . . . .	37

# 1 Overview

## 1.1 User Requirements

### 1.1.1 Actors

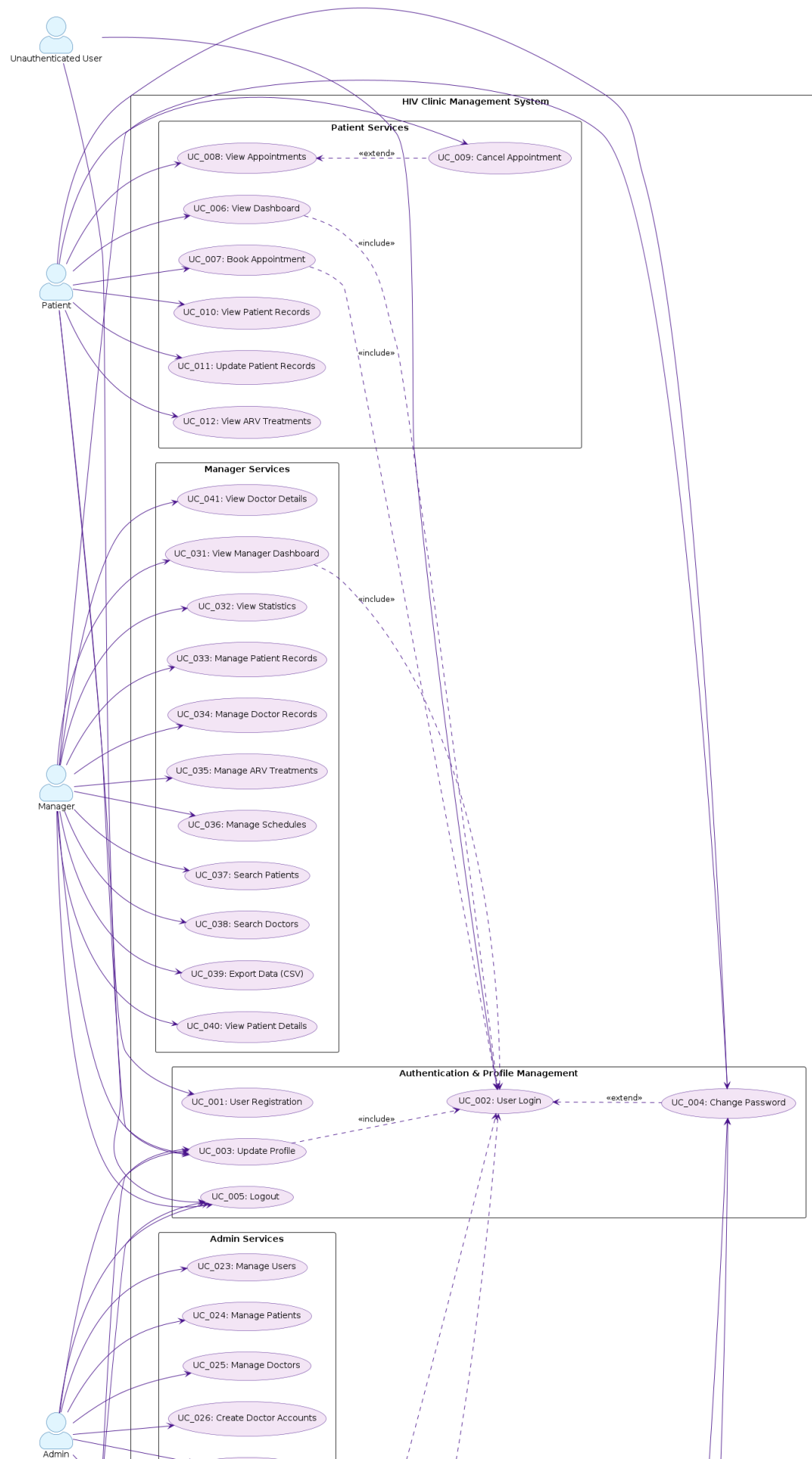
The HIV Clinic Appointment Booking System involves four main actors who interact with the system to perform various healthcare-related tasks:

## 1.2 Actor Description

No	Actor	Description
01	Guest	An unauthenticated individual. Allowed to access public website features such as browsing content, registering for an account, or initiating the login process.
02	Patient	A registered and authenticated user. Can book appointments (public or private), view their medical history, receive notifications, and access personalized treatment plans.
03	Doctor	A registered and authenticated medical professional. Can manage their availability, handle appointments and consultations, prescribe ARV or other treatments, and manage related patient notifications.
04	Admin	A privileged user responsible for system administration. Manages user accounts (Patients and Doctors), handles booking rules and exceptions, and monitors overall system integrity.
05	Manager	An authenticated user with oversight capabilities. Views system-wide analytics, monitors KPIs related to appointments and treatments, and supports data-driven strategic decisions.



### 1.2.1 Use Cases



a. **Diagram(s)** The system provides comprehensive use cases covering patient care, appointment management, and administrative functions for an HIV clinic environment.

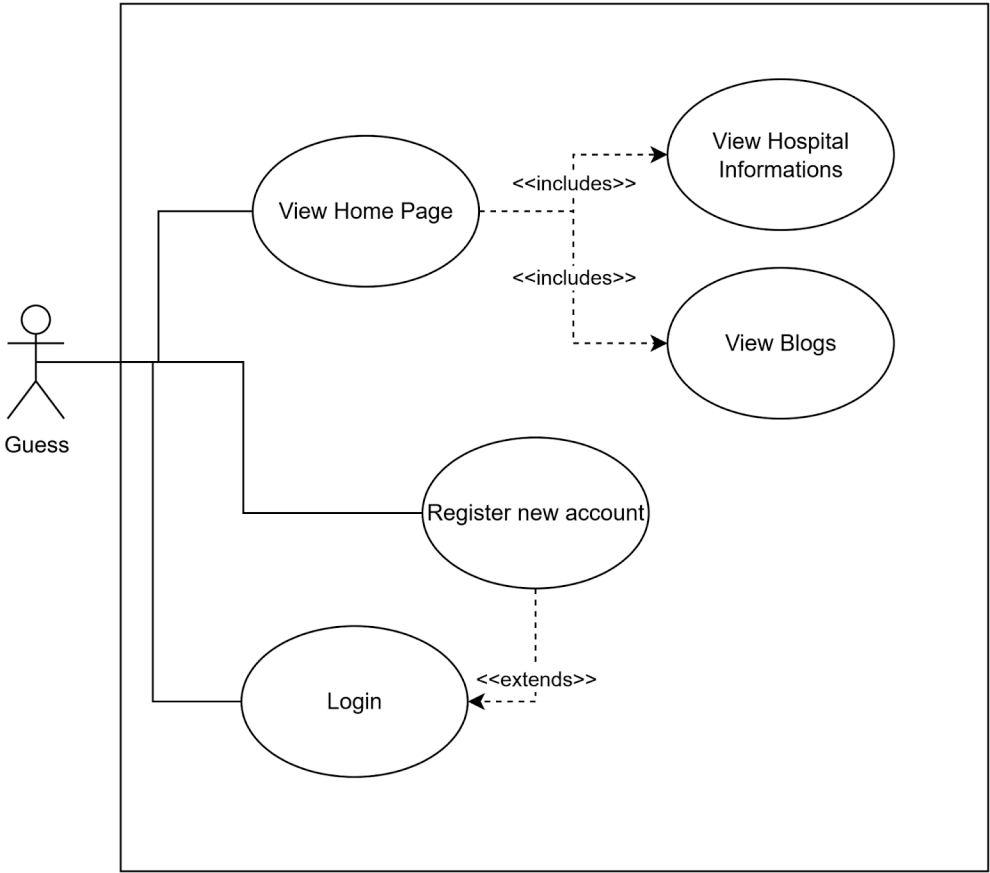


Table 1. Guess Use Case

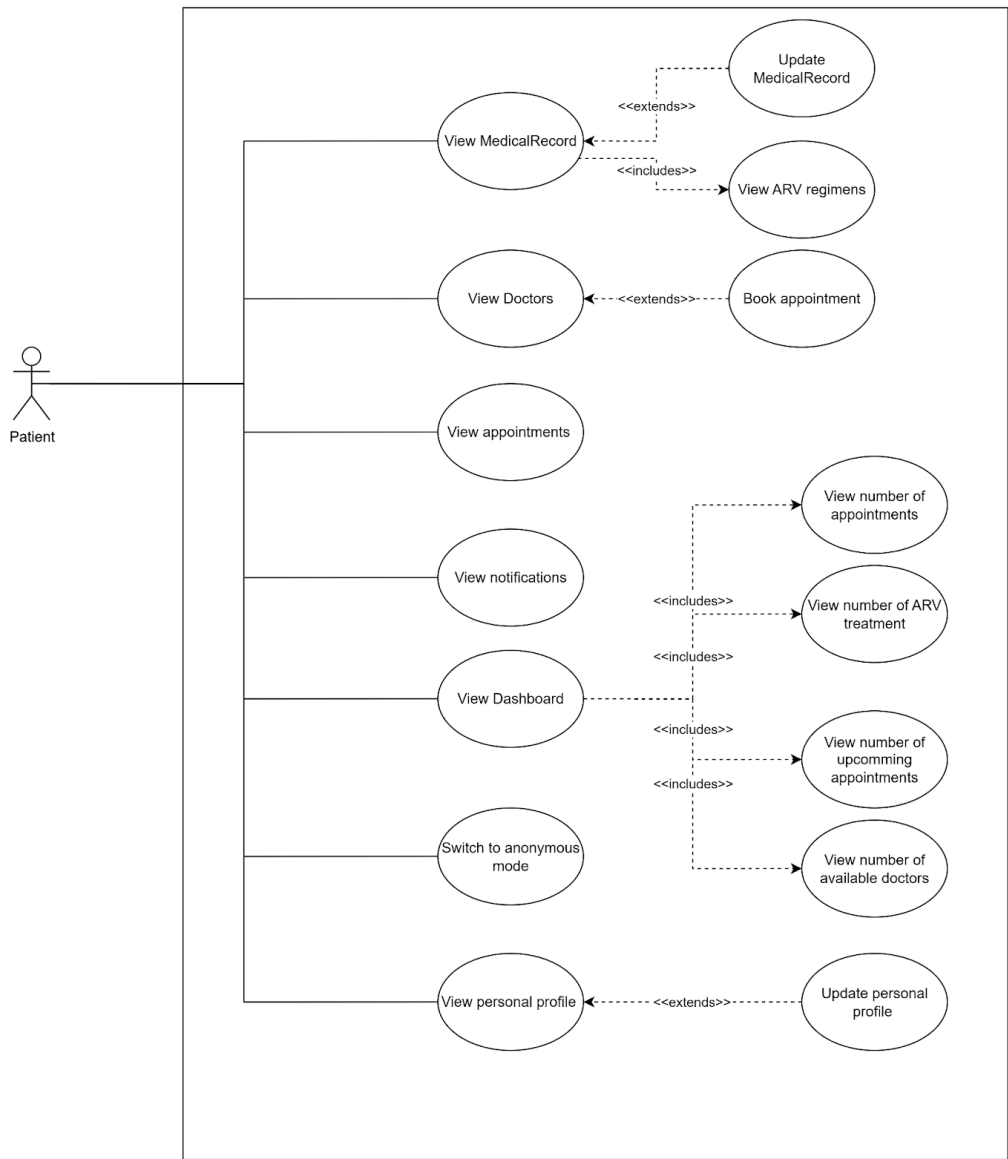


Table 2. Patient Use Case



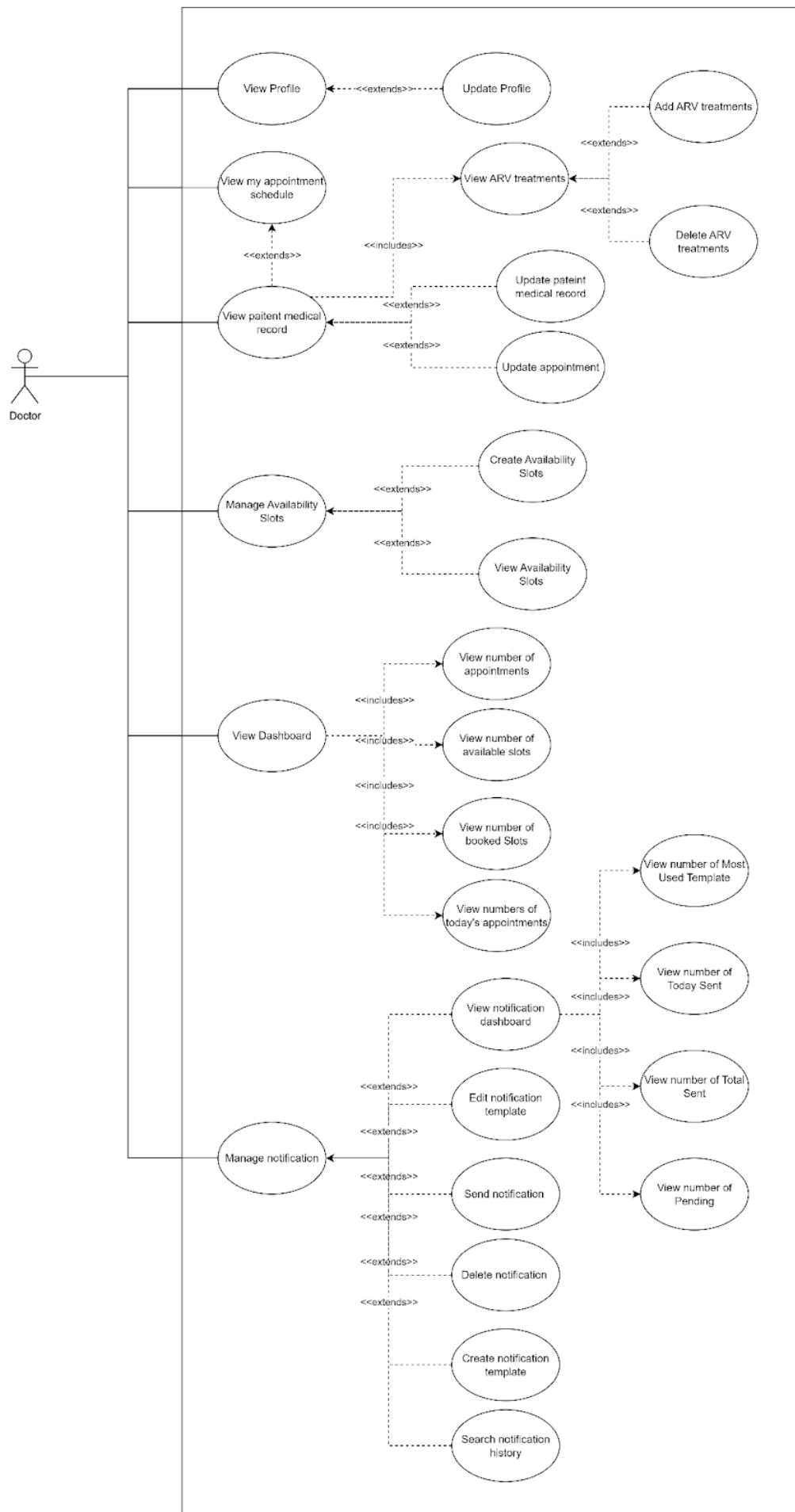


Table 3. Doctor Use Case

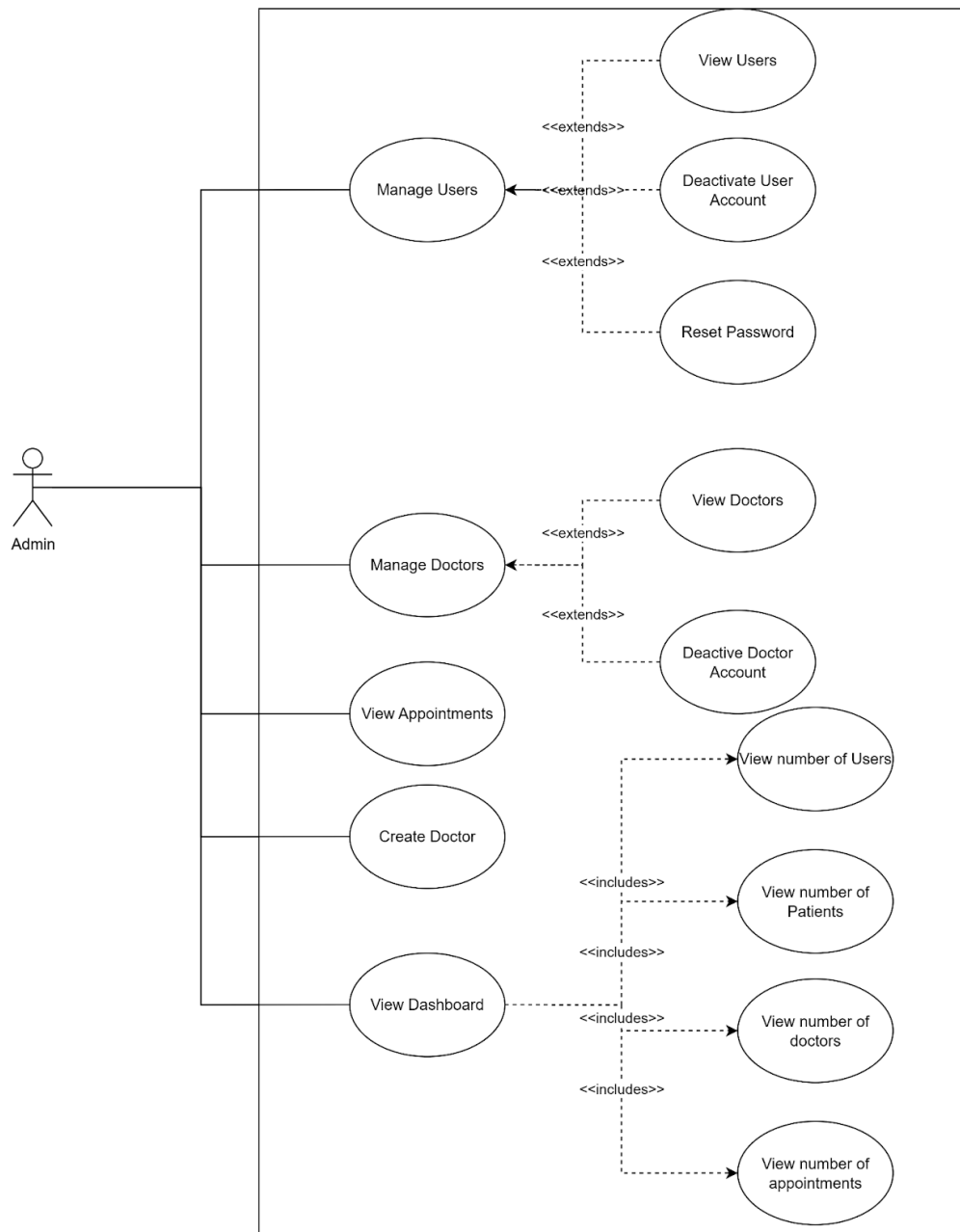


Table 4. Admin Use Case

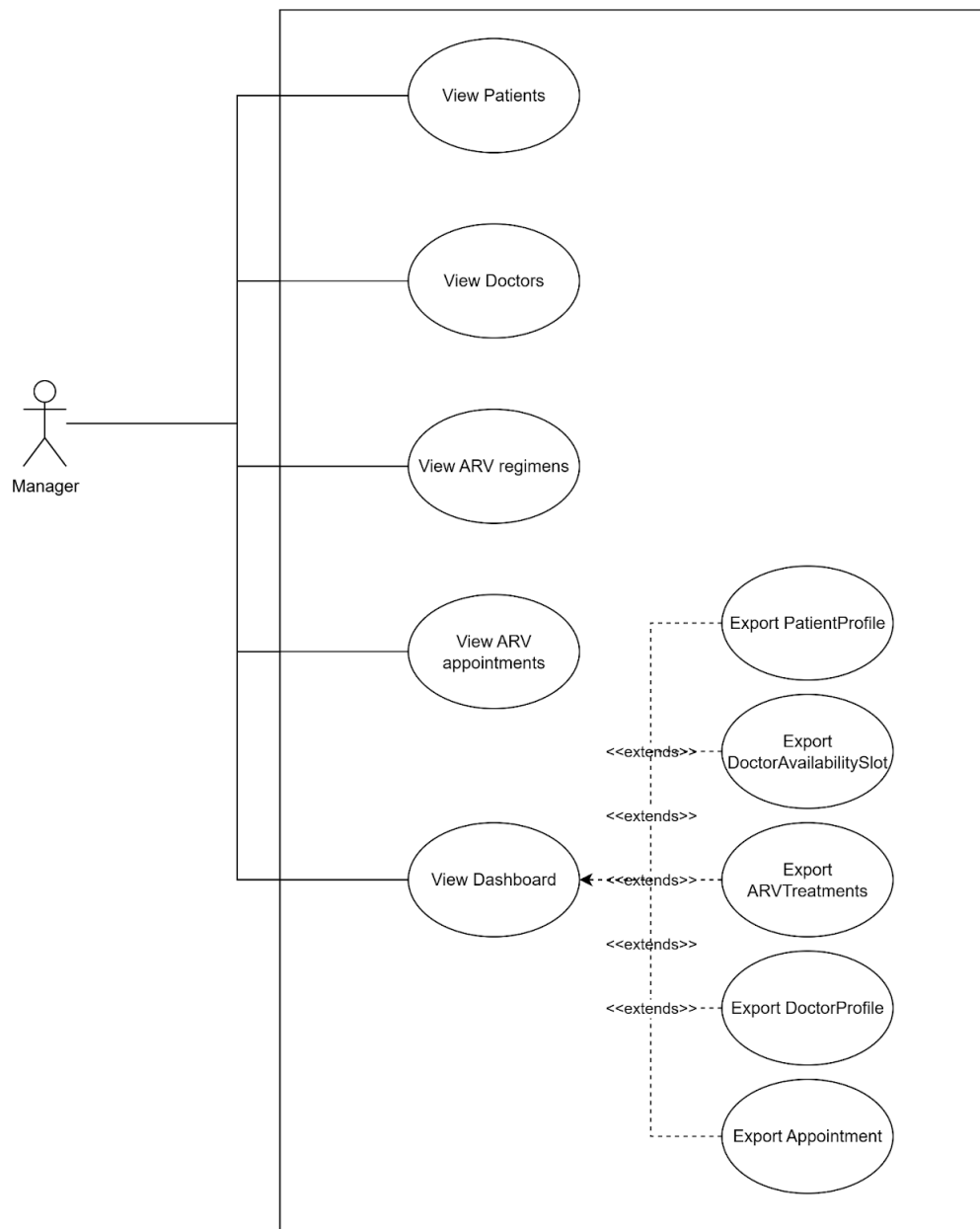


Table 5. Manager Use Case

## b. Descriptions

ID	Feature	Use Case	Use Case Description
<b>Authentication &amp; Profile Management</b>			
UC-001	User Management	User Registration	New users (patients/doctors) create accounts with role-based access to the HIV clinic system
UC-002	Authentication	User Login	Existing users authenticate using username/password with JWT token-based security
UC-003	Profile Management	Update Profile	Users update personal information, contact details, and profile images

UC-004	Authentication	Change Password	Users change their account passwords with validation and security checks
UC-005	Authentication	Logout	Users securely logout from the system and invalidate their session
<b>Patient Services</b>			
UC-006	Patient Dashboard	View Dashboard	Patients access their personal dashboard with overview of appointments and treatments
UC-007	Appointment Management	Book Appointment	Patients schedule appointments with available doctors based on doctor availability slots
UC-008	Appointment Management	View Appointments	Patients view their scheduled, completed, and cancelled appointments with details
UC-009	Appointment Management	Cancel Appointment	Patients cancel scheduled appointments with cancellation reasons
UC-010	Patient Care	View Patient Records	Patients access their own medical records, treatment history, and current medications
UC-011	Patient Care	Update Patient Records	Patients update their personal medical information and emergency contacts
UC-012	HIV Treatment	View ARV Treatments	Patients view their HIV antiretroviral treatment regimens and adherence status
<b>Doctor Services</b>			
UC-013	Doctor Dashboard	View Doctor Dashboard	Doctors access their professional dashboard with patient appointments and notifications
UC-014	Appointment Management	Manage Appointments	Doctors view and manage their scheduled appointments with patients
UC-015	Appointment Management	Update Appointment Status	Doctors update appointment status (completed, cancelled, rescheduled)
UC-016	Doctor Operations	Manage Availability Slots	Doctors create, update, and manage their availability time slots for patient appointments
UC-017	Patient Care	Access Patient Records	Doctors access comprehensive patient medical records during consultations
UC-018	HIV Treatment	Manage ARV Treatments	Doctors manage HIV antiretroviral treatment regimens, monitor adherence, and track side effects
UC-019	Notification System	Send Notifications	Doctors send custom notifications to patients regarding appointments and treatments
UC-020	Notification System	View Notification History	Doctors review history of notifications sent to patients

UC-021	Notification System	Manage Notification Templates	Doctors create and manage templates for common notifications
<b>Admin Services</b>			
UC-022	Admin Dashboard	View Admin Dashboard	Administrators access system-wide dashboard with user and system management
UC-023	User Management	Manage Users	Administrators manage all user accounts across the system
UC-024	User Management	Manage Patients	Administrators specifically manage patient accounts and information
UC-025	User Management	Manage Doctors	Administrators manage doctor accounts and professional information
UC-026	User Management	Create Doctor Accounts	Administrators create new doctor accounts with specialized permissions
UC-027	User Management	Toggle User Status	Administrators activate or deactivate user accounts across the system
UC-028	User Management	Reset User Passwords	Administrators reset passwords for users who cannot access their accounts
UC-029	System Management	Manage Specialties	Administrators manage medical specialties for doctor categorization
UC-030	System Management	View All Appointments	Administrators view all appointments across the system for oversight
<b>Manager Services</b>			
UC-031	Manager Dashboard	View Manager Dashboard	Managers access operational dashboard with clinic statistics and analytics
UC-032	Analytics	View Statistics	Managers view comprehensive clinic statistics and performance metrics
UC-033	Operations	Manage Patient Records	Managers oversee patient records management and data integrity
UC-034	Operations	Manage Doctor Records	Managers oversee doctor records and professional information
UC-035	Operations	Manage ARV Treatments	Managers monitor and oversee ARV treatment programs across the clinic
UC-036	Operations	Manage Schedules	Managers oversee clinic scheduling and appointment distribution
UC-037	Search	Search Patients	Managers search for specific patients across the clinic database
UC-038	Search	Search Doctors	Managers search for specific doctors in the clinic system
UC-039	Data Export	Export Data (CSV)	Managers export various clinic data in CSV format for reporting and analysis
UC-040	Detail Views	View Patient Details	Managers access detailed patient information for operational oversight
UC-041	Detail Views	View Doctor Details	Managers access detailed doctor information for operational oversight

**Chart 7.** Guest Use Case Diagram

ID	Feature	Use Case	Use Case Description
01	Appointment Booking	Manage Appointment	Patient can create appointment option to receive notification.
02	Online Consultation	Online Consultation	Patient books online consultation (anonymous) and has consultation with doctors.
03	Medical Records	View Patient Record	Patients can view treatment records.
04	Personal Information	View Profile	Patients view their personal information (address, phone number).
05	Appointment Booking	Book Appointment	Patient can book an appointment (extends from View Doctors).
06	Appointments	View Appointments	Patient can view their scheduled appointments.
07	Appointment Metrics	View Number of Appointments	Patient can see the total number of appointments.
08	Notifications	View Notifications	Patient can view notifications from the system.
09	Dashboard Overview	View Dashboard	Patient can access the dashboard to monitor key statistics.
10	ARV Statistics	View Number of ARV Treatment	Included in Dashboard Overview - ARV regimens.
11	Appointment Forecast	View Number of Upcoming Appointments	Included in Dashboard Overview - upcoming appointments.
12	Doctor Availability Stats	View Number of Available Doctors	Included in Dashboard Overview - doctors count.
13	Anonymous Mode	Switch to Anonymous Mode	Patient can switch to anonymous mode.
14	Profile Viewing	View Personal Profile	Patient can view their personal information.
15	Profile Updating	Update Personal Profile	Patient can update their personal information (extends from View Personal Profile).

**Table 8.** Patient Use Case Description

ID	Feature	Use Case	Use Case Description
01	Profile Management	View Profile	Doctor views their profile
02	Profile Management	Update Profile	Doctor updates profile (from View Profile).
03	Appointment Schedule	View My Appointment Schedule	Doctor views their schedule.
04	Medical Records	View Patient Medical Record	Doctor views the medical record of a patient.
05	ARV Treatment	View ARV Treatments	Included when viewing patient medical records.
06	ARV Treatment	Add ARV Treatments	Doctor adds ARV treatment from View ARV Treatments.
07	ARV Treatment	Delete ARV Treatments	Doctor deletes ARV treatment from View ARV Treatments.
08	Medical Records	Update Patient Medical Record	Doctor updates medical record from View Patient Medical Record.
09	Appointment Schedule	Update Appointment	Doctor updates appointment details from View Patient Appointment.
10	Availability Management	Manage Availability Slots	Doctor manages time slots for appointments.
11	Availability Management	Create Availability Slots	Doctor creates time slots for appointments.
12	Availability Management	View Availability Slots	Doctor views time slots for appointments.
13	Dashboard	View Dashboard	Doctor accesses dashboard.
14	Dashboard	View Number of Appointments	Included in Dashboard - Appointments.
15	Dashboard	View Number of Available Slots	Included in Dashboard - Availability Slots.
16	Dashboard	View Number of Booked Slots	Included in Dashboard - Booked Slots.
17	Dashboard	View Numbers of Today's Appointments	Included in Dashboard - Today's Appointments.
18	Notification	View Notification Dashboard	Doctor views stats on notifications.
19	Notification	View Number of Most Used Template	Included in Notification - Most Used Template.
20	Notification	View Number of Today Sent	Included in Notification - Today Sent.

ID	Feature	Use Case	Use Case Description
21	Notification	View Number of Total Sent	Included in Notification
22	Notification	View Number of Pending	Included in Notification
23	Notification Management	Manage Notification	Doctor manages all no actions.
24	Notification Management	Edit Notification Template	Doctor edits templates (Manage Notification).
25	Notification Management	Send Notification	Doctor sends notification (Manage Notification).
26	Notification Management	Delete Notification	Doctor deletes notificatio (Manage Notification).
27	Notification Management	Create Notification Template	Doctor creates a new te from Manage Notification.
28	Notification Management	Search Notification History	Doctor searches notifica tends from Manage Noti

**Table 9.** Doctor Use Case Description

ID	Feature	Use Case	Use Case Description
01	User Management	Manage Users	Admin manages user-related acti
02	User Management	View Users	Admin views user list (extends fr age Users).
03	User Management	Deactivate User Account	Admin disables a user account from Manage Users).
04	User Management	Reset Password	Admin resets user password (exte Manage Users).
05	Doctor Management	Manage Doctors	Admin manages doctor-related a
06	Doctor Management	View Doctors	Admin views doctor list (exter Manage Doctors).
07	Doctor Management	Deactivate Doctor Account	Admin disables a doctor account from Manage Doctors).
08	Appointment Management	View Appointments	Admin views all appointments.
09	Doctor Management	Create Doctor	Admin creates a new doctor acco
10	Dashboard	View Dashboard	Admin views system-wide statist
11	Dashboard	View Number of Users	Shows total number of users (inc Dashboard).



ID	Feature	Use Case	Use Case Description
12	Dashboard	View Number of Patients	Shows total number of patients (included in Dashboard).
13	Dashboard	View Number of Doctors	Shows total number of doctors (included in Dashboard).
14	Dashboard	View Number of Appointments	Shows total number of appointments (included in Dashboard).

**Table 10.** Admin Use Case Description

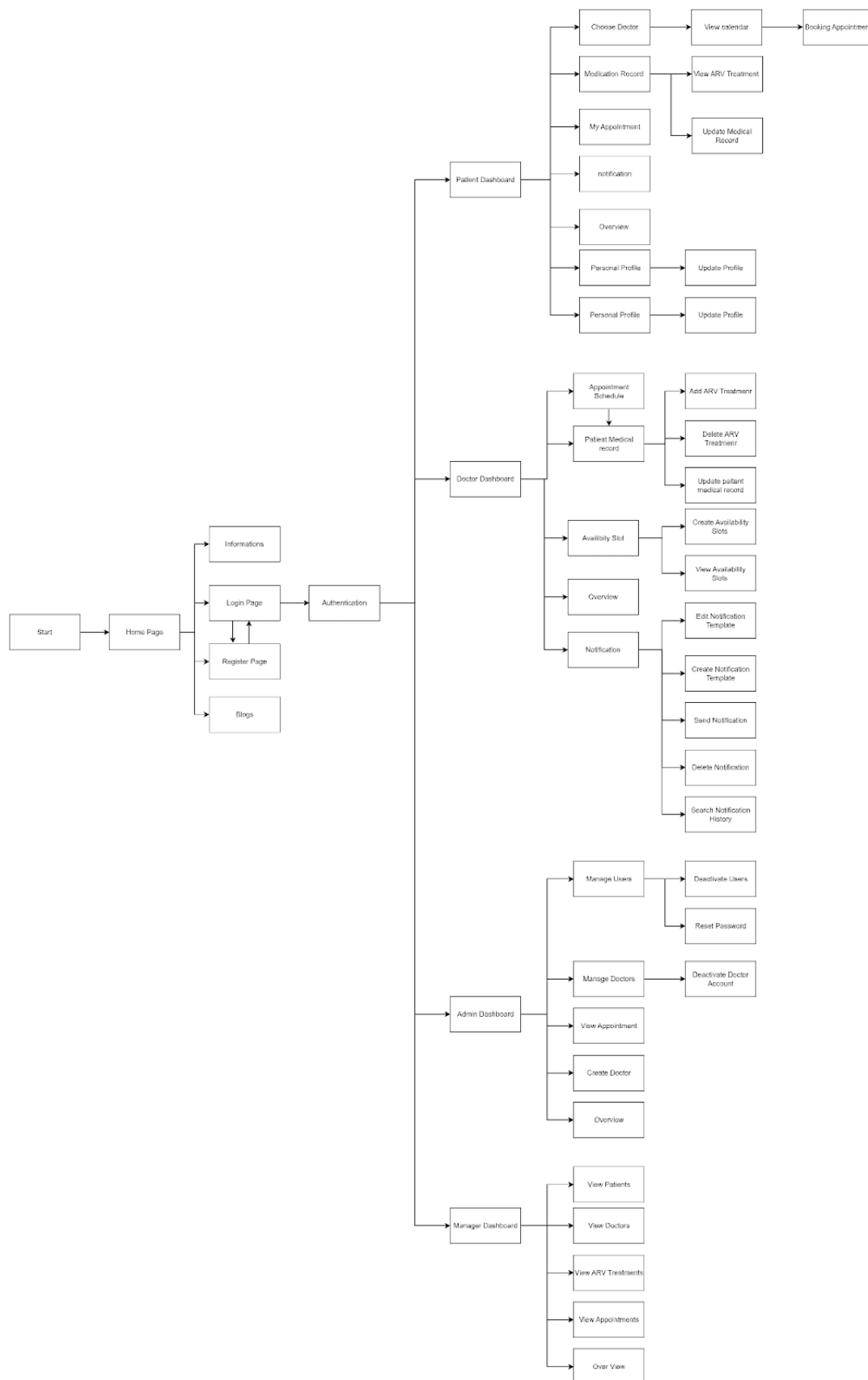
ID	Feature	Use Case	Use Case Description
01	Patient Management	View Patients	Manager views all patient profile
02	Doctor Management	View Doctors	Manager views all registered doc
03	ARV Management	View ARV Regimens	Manager views ARV treatment r
04	Appointment Management	View ARV Appointments	Manager views ARV-related appointments.
05	Data Overview	View Dashboard	Manager views data summaries dashboard.
06	Data Export	Export Patient Profile	Manager can export patient profile (extends from View Dashboard).
07	Data Export	Export Doctor Availability Slot	Manager can export doctor availability slots (extends from View Dashboard).
08	Data Export	Export ARV Treatments	Manager can export ARV treatments (extends from View Dashboard).
09	Data Export	Export Doctor Profile	Manager can export doctor profile (extends from View Dashboard).
10	Data Export	Export Appointment	Manager can export appointment (extends from View Dashboard).

**Table 11.** Manager Use Case Description

## 1.3 Overall Functionalities

### 1.3.1 Screens Flow

The HIV Clinic system provides role-based screen flows ensuring appropriate access to sensitive medical information:



**Chart 12.** Overall Screen Flow

(Screen Flow Link: <https://tinyurl.com/3hhmmk6x>)

### 1.3.2 Screen Descriptions

#	Feature	Screen	Description
1	Authentication	HOME PAGE	The landing page of the system. Includes introduction, access to login/register, and medical knowledge.
2	Authentication	Register Page	Allows users (patients, doctors, admins) to create new accounts with basic info and phone verification.
3	Authentication	LOGIN PAGE	Login page for all users. After successful login, users are routed to their respective dashboard based on role.
4	Information	Information Page	Displays hospital or system information accessible from Home Page without login.
5	Blog	Blog Page	Public health blogs and articles available for reading from the Home Page.
6	Dashboard	Patient Dashboard	Main landing screen after login for patients. Central hub for accessing medical features.
7	Appointment	Choose Doctor	Screen to browse/select available doctors.
8	Appointment	View Calendar	Displays doctor availability slots in a calendar view.
9	Appointment	Booking Appointment	Patient books an appointment based on doctor availability.
10	Medical Records	Medication Record	Access patient's medication history.
11	Medical Records	View ARV Treatment	Displays current and past ARV regimen assigned to the patient.
12	Medical Records	My Appointment	Lists patient's past and upcoming appointments.
13	Medical Records	Update Medical Record	Allows editing/updating of medical information.
14	Notification	Notification	Patient receives alerts and system notifications.
15	Overview	Overview	Summary screen showing appointment status, ARV status, and doctor availability.
16	Profile	Personal Profile	View patient personal profile details.
17	Profile	Update Profile	Edit patient personal information.
18	Dashboard	Doctor Dashboard	Main dashboard for doctors after login to manage appointments, records, availability, and notifications.

#	Feature	Screen	Description
19	Appointment	Appointment Schedule	View the list of scheduled appointments for a doctor.
20	Medical Record	Patient Medical Record	View and access patient-specific medical information.
21	ARV Treatment	Add ARV Treatment	Add a new ARV regimen to a patient's treatment plan.
22	ARV Treatment	Delete ARV Treatment	Remove an existing ARV regimen from a patient's record.
23	Medical Record	Update Patient Medical Record	Edit and update patient medical records.
24	Availability	Availability Slot	Manage doctor's available time slots for appointments.
25	Availability	Create Availability Slots	Create new time slots in which doctor is available.
26	Availability	View Availability Slots	View existing availability slots of the doctor.
27	Overview	Overview	Summarized statistics on appointments and availability.
28	Notification	Notification	Access the notification center to view and manage messages.
29	Notification	Edit Notification Template	Modify existing templates for notification messages.
30	Notification	Create Notification Template	Create new templates for sending system notifications.
31	Notification	Send Notification	Send notifications to patients or other users.
32	Notification	Delete Notification	Remove previously created notification messages.
33	Notification	Search Notification History	Search and review previously sent notifications.
34	Dashboard	Admin Dashboard	Main screen for administrators to manage doctors, appointments, and system overview.
35	User Management	Manage Users	Access user account controls including activation and password reset.
36	User Management	Deactivate Users	Disable user accounts from the system.
37	User Management	Reset Password	Reset passwords for user accounts.
38	Doctor Management	Manage Doctors	Manage doctor-related data and account information.
39	Doctor Management	Deactivate Doctor Account	Temporarily or permanently disable doctor access.
40	Appointment	View Appointment	View and monitor scheduled appointments within the system.

#	Feature	Screen	Description
41	Doctor Management	Create Doctor	Add new doctors into the system with setup.
42	Overview	Overview	Summarized data including number of doctors, appointments.
43	Dashboard	Manager Dashboard	Main screen for managers to view and patient care and resource availability.
44	Patient Management	View Patients	View and review list of registered patients.
45	Doctor Management	View Doctors	Review registered doctors and their status.
46	ARV Management	View ARV Treatments	View current ARV treatments across patients.
47	Appointment	View Appointments	Access all ARV appointment records.
48	Overview	Overview	Manager-level data insights for patient management, and appointments.

**Table 12.** Screen Description Table

### 1.3.3 Screen Authorization

Screen	Patient	Doctor	Admin	Manager
HOME PAGE	X	X	X	X
Register Page	X	X	X	X
LOGIN PAGE	X	X	X	X
Information Page	X	X	X	X
Blog Page	X	X	X	X
Patient Dashboard	X			
Choose Doctor	X			
View Calendar	X			
Booking Appointment	X			
Medication Record	X			
View ARV Treatment	X	X		X
My Appointment	X			
Update Medical Record		X		
Notification	X	X		
Overview	X	X	X	X
Personal Profile	X			
Update Profile	X			

Screen	Patient	Doctor	Admin	Manager
Doctor Dashboard		X		
Appointment Schedule		X		
Patient Medical Record		X	X	
Add ARV Treatment		X		
Delete ARV Treatment		X		
Update Patient Medical Record		X		
Availability Slot		X		
Create Availability Slots		X		
View Availability Slots		X		
Notification		X		
Edit Notification Template		X		
Create Notification Template		X		
Send Notification		X		
Delete Notification		X		
Search Notification History		X		
Admin Dashboard			X	
Manage Users			X	
Deactivate Users			X	
Reset Password			X	
Manage Doctors			X	
Deactivate Doctor Account			X	
View Appointment			X	
Create Doctor			X	
Overview				X
Manager Dashboard				X
View Patients				X
View Doctors				X
View ARV Treatments				X
View Appointments				X
Overview				X

**Table 14.** Screen Authorization Matrix

### 1.3.4 Non-UI Functions

#	Feature	System Function	Description
1	Notification Scheduling	Automated Reminder Service	Background service that schedules and sends appointment and medication reminders based on configured templates.
2	Security	JWT Token Management	Automatic token generation, validation, and refresh for secure API access.
3	Data Validation	Input Sanitization	Server-side validation and sanitization of all user inputs to prevent SQL injection and XSS attacks.
4	Audit Logging	Activity Tracking	Automatic logging of user actions, login attempts, and data modifications for security and compliance.
5	Database Management	Automated Backups	Scheduled database backups and maintenance operations.
<b>Table 15.</b> System Functions Description			

## 1.4 System High Level Design

### 1.4.1 Database Design

**a. Database Schema** The HIV Clinic system uses Microsoft SQL Server with the following core tables:

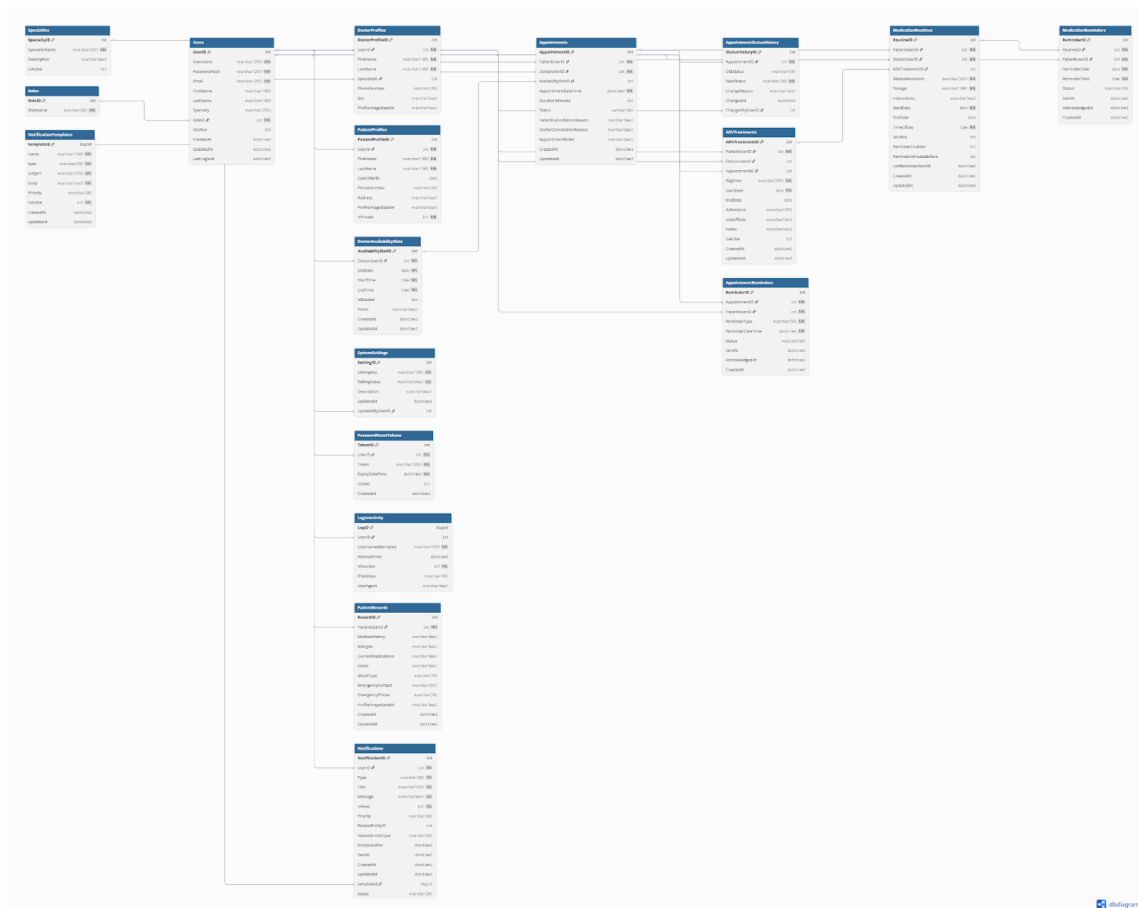


Table 16. Database Design Overview

### b. Table Descriptions

No	Table	Description
01	Users	Central user management with role-based access.
02	Roles	System roles (Patient, Doctor, Admin, Manager).
03	PatientProfiles	Extended patient information.
04	DoctorProfiles	Extended doctor information with specialties.
05	Appointments	Appointment scheduling and management.
06	DoctorAvailabilitySlots	Doctor availability management.
07	PatientRecords	Medical records and patient history.
08	ARVTreatments	HIV antiretroviral treatment tracking.
09	MedicationRoutines	Daily medication schedules.
10	Notifications	System notification management.
11	NotificationTemplates	Reusable notification templates.



No	Table	Description
12	Specialties	Stores medical specialty categories linked to doctors.
13	SystemSettings	Stores system-wide configuration settings.
14	PasswordResetTokens	Manages secure password reset tokens.
15	AppointmentStatusHistory	Tracks changes in appointment status over time for audit and traceability.
16	LoginActivity	Logs login attempts for security monitoring.
17	MedicationReminders	Tracks individual medication reminder instances sent to patients.
18	AppointmentReminders	Tracks specific reminders for upcoming appointments.
<b>Table 17.</b> Database Table Description		

#### 1.4.2 Code Packages

The HIV Clinic system follows a layered Spring Boot architecture:

No	Package	Description
01	com.hivclinic.controller	REST API controllers handling HTTP requests for appointments, authentication, patient records, doctor operations, and notifications.
02	com.hivclinic.service	Business logic layer containing services for appointment management, user authentication, patient care, ARV treatment, and notification scheduling.
03	com.hivclinic.repository	Data access layer with JPA repositories for database operations.
04	com.hivclinic.model	Entity classes representing database tables including User, Appointment, PatientRecord, ARVTreatment, and Notification models.
05	com.hivclinic.dto	Data Transfer Objects for request/response handling and API communication.
06	com.hivclinic.config	Configuration classes for security (JWT), database, and application settings.
07	com.hivclinic.exception	Custom exception handling for application-specific errors.

No	Package	Description
08	com.hivclinic.validation	Input validation and sanitization utilities.

**Table 18.** Package Descriptions

### 1.4.3 Data Flow Architecture

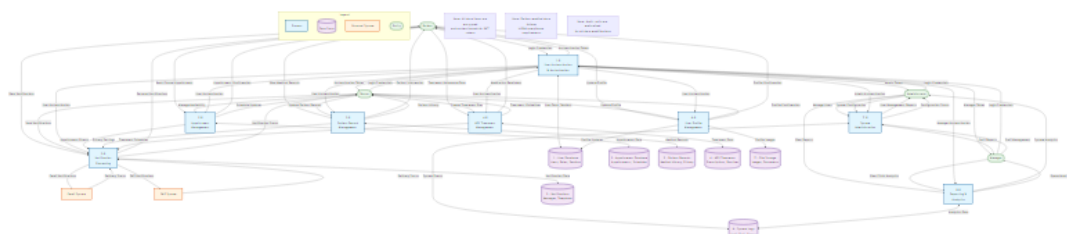


Figure 2: System Data Flow Diagram

## 2 Requirement Specifications

### 2.1 Common functions

#### 2.1.1 UC-01 – Register Donor Account

<b>UC ID and Name:</b>	UC-01 – Register Donor Account
<b>Created By:</b>	DatNT
<b>Date Created:</b>	28/6
<b>Primary Actor:</b>	Guest
<b>Secondary Actors:</b>	System
<b>Description:</b>	A new user registers using email, password, and date of birth. The system creates a Level 1 account with the "Donor" role. To upgrade to Level 2 (eligible for blood donation registration), the user must visit a certified medical facility for in-person identity and eligibility verification.
<b>Trigger:</b>	The user clicks the 'Register' button.
<b>Preconditions:</b>	<ul style="list-style-type: none"> <li>• The user is not logged in</li> <li>• The email is not already in use</li> </ul>

<b>Postconditions:</b>	<ul style="list-style-type: none"> <li>• A Level 1 donor account is created</li> <li>• The user can log in</li> <li>• The account remains ineligible for donation event registration until verified (Level 2)</li> </ul>
<b>Normal Flow:</b>	<ol style="list-style-type: none"> <li>1. User opens the registration page</li> <li>2. Fills in the form</li> <li>3. Submits the form</li> <li>4. System validates input and creates the account</li> </ol>
<b>Alternative Flows:</b>	None defined
<b>Exceptions:</b>	<ul style="list-style-type: none"> <li>• EX-1: If the email is already in use, the system shows an error message: <i>"Email is already in use. Please use another email."</i></li> <li>• EX-2: If the user is under the required age, the system shows an ineligibility message: <i>"You are not eligible to register as a blood donor."</i></li> <li>• EX-3: If a database or server error occurs, the system shows a retry message: <i>"A system error occurred. Please try again later."</i></li> </ul>
<b>Business Rules:</b>	<ul style="list-style-type: none"> <li>• BR-21: Only Level 2 (verified) users can register for donation events</li> <li>• BR-22: User profile must be accurate and match official documents (relevant for Level 2 verification)</li> </ul>
<b>Assumptions:</b>	<ul style="list-style-type: none"> <li>• The user provides a valid email and basic profile information</li> <li>• Level 2 access requires identity and health status confirmation at a medical center</li> </ul>
<b>Priority:</b>	High
<b>Frequency of Use:</b>	Daily

## 2.1.2 UC-02 – Log In

<b>UC ID and Name:</b>	UC-02 – Log In
<b>Created By:</b>	KhoaDD
<b>Date Created:</b>	28/6
<b>Primary Actor:</b>	Guest, Donor
<b>Secondary Actors:</b>	System
<b>Description:</b>	The user logs into the system using their email and password. Upon successful login, the system redirects the user to their personal dashboard. Account access may be limited based on verification level (Level 1 or Level 2).
<b>Trigger:</b>	The user submits the login form.
<b>Preconditions:</b>	<ul style="list-style-type: none"> <li>• A registered account exists</li> <li>• The user is not currently logged in</li> </ul>
<b>Postconditions:</b>	<ul style="list-style-type: none"> <li>• The user is authenticated</li> <li>• The user is redirected to their personal dashboard</li> </ul>
<b>Normal Flow:</b>	<ol style="list-style-type: none"> <li>1. User opens the login form</li> <li>2. Enters email and password</li> <li>3. Submits the form</li> <li>4. The system validates the credentials and logs the user in</li> <li>5. User is redirected to the dashboard with access based on account verification level</li> </ol>
<b>Alternative Flows:</b>	None defined
<b>Exceptions:</b>	<ul style="list-style-type: none"> <li>• EX-1: If the email or password is incorrect, show an error message: <i>"Invalid email or password."</i></li> <li>• EX-2: If the system is unavailable (e.g., server error), show an error message: <i>"Unable to connect. Please try again later."</i></li> </ul>

<b>Business Rules:</b>	<ul style="list-style-type: none"> <li>• BR-24: Email must follow institutional format (e.g., *@gmail.com)</li> </ul>
<b>Assumptions:</b>	<ul style="list-style-type: none"> <li>• The account is active and verified</li> <li>• The user provides correct credentials</li> </ul>
<b>Priority:</b>	High
<b>Frequency of Use:</b>	Daily

### 2.1.3 UC-03 – View Hospital Information

<b>UC ID and Name:</b>	UC-03 – View Hospital Information
<b>Created By:</b>	AnPP
<b>Date Created:</b>	28/6
<b>Primary Actor:</b>	Guest
<b>Secondary Actors:</b>	None
<b>Description:</b>	The user views information about the hospital, including its services, location, and contact details.
<b>Trigger:</b>	The user accesses the homepage or selects the "About Us" section.
<b>Preconditions:</b>	<ul style="list-style-type: none"> <li>• The system is online and accessible</li> </ul>
<b>Postconditions:</b>	<ul style="list-style-type: none"> <li>• Hospital information is displayed to the user</li> </ul>
<b>Normal Flow:</b>	<ol style="list-style-type: none"> <li>1. User opens the website</li> <li>2. Clicks on "About Us"</li> <li>3. The system displays hospital information</li> </ol>
<b>Alternative Flows:</b>	None defined
<b>Exceptions:</b>	<ul style="list-style-type: none"> <li>• EX-1: If hospital data is unavailable, the system displays a default message or an error: <i>"Hospital information is currently unavailable."</i></li> </ul>

<b>Business Rules:</b>	<ul style="list-style-type: none"> <li>• BR-19: Only admins can make changes to system about hospital information</li> </ul>
<b>Assumptions:</b>	<ul style="list-style-type: none"> <li>• Hospital information is properly maintained and updated in the system</li> </ul>
<b>Priority:</b>	Medium
<b>Frequency of Use:</b>	Occasional

#### 2.1.4 UC-04 – Read Blogs

<b>UC ID and Name:</b>	UC-04 – Read Blogs
<b>Created By:</b>	AnPP
<b>Date Created:</b>	29/6
<b>Primary Actor:</b>	Guest
<b>Secondary Actors:</b>	System
<b>Description:</b>	The user reads educational blog posts related to blood donation.
<b>Trigger:</b>	The user clicks on the "Blog" section.
<b>Preconditions:</b>	<ul style="list-style-type: none"> <li>• At least one blog post has been published</li> </ul>
<b>Postconditions:</b>	<ul style="list-style-type: none"> <li>• A list of blogs is displayed</li> <li>• The user can read individual posts</li> </ul>
<b>Normal Flow:</b>	<ol style="list-style-type: none"> <li>1. User clicks "Blog"</li> <li>2. System displays list of available posts</li> <li>3. User selects and reads a blog</li> </ol>
<b>Alternative Flows:</b>	<b>AF-1:</b> No blog posts available → Show message: <i>"No blog content is currently available."</i>
<b>Exceptions:</b>	<ul style="list-style-type: none"> <li>• EX-1: System error → Show message: <i>"Unable to load blogs. Please try again later."</i></li> </ul>

<b>Business Rules:</b>	<ul style="list-style-type: none"> <li>• BR-17: Only blog authors or admins can edit blog articles</li> </ul>
<b>Assumptions:</b>	<ul style="list-style-type: none"> <li>• Blog content is reviewed and approved before being published</li> </ul>
<b>Priority:</b>	Medium
<b>Frequency of Use:</b>	Frequent

### 2.1.5 UC-05 – Manage Personal Profile

<b>UC ID and Name:</b>	UC-05 – Manage Personal Profile
<b>Created By:</b>	TuanTM
<b>Date Created:</b>	28/6
<b>Primary Actor:</b>	Donor
<b>Secondary Actors:</b>	System
<b>Description:</b>	The donor views and updates their personal profile, including contact information.
<b>Trigger:</b>	The user accesses the "My Profile" section.
<b>Preconditions:</b>	<ul style="list-style-type: none"> <li>• The user is logged in to the system</li> </ul>
<b>Postconditions:</b>	<ul style="list-style-type: none"> <li>• Profile data is updated and saved successfully</li> </ul>
<b>Normal Flow:</b>	<ol style="list-style-type: none"> <li>1. User navigates to profile section</li> <li>2. Edits personal information</li> <li>3. Clicks "Save"</li> <li>4. System validates and saves changes</li> </ol>
<b>Alternative Flows:</b>	<b>AF-1:</b> Invalid input (e.g., phone number format) → Show error: <i>"Please correct the highlighted fields."</i>
<b>Exceptions:</b>	<ul style="list-style-type: none"> <li>• EX-1: If update fails due to system error → Show error: <i>"Failed to update profile. Please try again."</i></li> </ul>

<b>Business Rules:</b>	<ul style="list-style-type: none"> <li>• BR-22: User profile information must be accurate and match official documents</li> </ul>
<b>Assumptions:</b>	<ul style="list-style-type: none"> <li>• Profile data is accurate and editable</li> </ul>
<b>Priority:</b>	High
<b>Frequency of Use:</b>	Occasional

## 3 Design Specifications

### 3.1 Authentication System

#### 3.1.1 User Login

This screen allows users to authenticate into the system with role-based access to appropriate functionalities.

**Related use cases:** UC-002 User Login

#### UI Design

Field Name	Field Type	Description
Username*	Text Box	User enters registered username or email address for authentication
Password*	Password Box	User enters password (masked input for security)
Login	Button	Submits authentication request to server
Register	Hyperlink	Redirects to user registration page for new users
Forgot Password?	Hyperlink	Initiates password reset process

#### Database Access

Table	CRUD	Description
Users	R	Verify username/email and password hash for authentication
Roles	R	Retrieve user role information for authorization
LoginActivity	C	Log login attempt for security audit



— 1. *Authenticate user credentials*

```
SELECT u.UserID, u.Username, u.Email, u.IsActive, r.RoleName
FROM Users u
INNER JOIN Roles r ON u.RoleID = r.RoleID
WHERE (u.Username = ? OR u.Email = ?) AND u.IsActive = 1
```

— 2. *Log login activity*

```
INSERT INTO LoginActivity
(UserID, UsernameAttempted, AttemptTime, IsSuccess, IPAddress, UserAgent)
VALUES (?, ?, GETDATE(), ?, ?, ?)
```

## 3.2 Appointment Management

### 3.2.1 Appointment Booking

This screen enables patients to book appointments with available doctors by selecting from available time slots.

**Related use cases:** UC-004 Book Appointment

#### UI Design

Field Name	Field Type	Description
Doctor Selection*	Dropdown	List of available doctors with specialties
Appointment Date*	Date Picker	Calendar widget for selecting appointment date
Available Time Slots*	Radio Buttons	Dynamic list of available time slots for selected doctor/date
Appointment Notes	Text Area	Optional notes about appointment purpose or concerns
Book Appointment	Button	Submit appointment booking request
Cancel	Button	Return to previous screen without booking

#### Database Access

Table	CRUD	Description
Users	R	Retrieve available doctors with their specialties
DoctorAvailabilitySlots	RS	Query available slots and mark as booked

Appointments	C	Create new appointment record
Notifications	C	Schedule appointment reminder notifications

— 1. *Get available doctors*

```
SELECT u.UserID, u.FirstName, u.LastName, dp.Bio, s.SpecialtyName
FROM Users u
INNER JOIN DoctorProfiles dp ON u.UserID = dp.UserID
LEFT JOIN Specialties s ON dp.SpecialtyID = s.SpecialtyID
WHERE u.RoleID = (SELECT RoleID FROM Roles WHERE RoleName = 'Doctor')
AND u.IsActive = 1
```

— 2. *Get available time slots*

```
SELECT AvailabilitySlotID, SlotDate, StartTime, EndTime
FROM DoctorAvailabilitySlots
WHERE DoctorUserID = ? AND SlotDate = ? AND IsBooked = 0
ORDER BY StartTime
```

— 3. *Create appointment*

```
INSERT INTO Appointments
(PatientUserID, DoctorUserID, AvailabilitySlotID, AppointmentDateTime,
Status, AppointmentNotes, CreatedAt, UpdatedAt)
VALUES (?, ?, ?, ?, 'Scheduled', ?, GETDATE(), GETDATE())
```

— 4. *Update availability slot*

```
UPDATE DoctorAvailabilitySlots
SET IsBooked = 1, UpdatedAt = GETDATE()
WHERE AvailabilitySlotID = ?
```

### 3.3 Patient Care System

#### 3.3.1 Patient Records Management

This screen provides comprehensive medical record management for HIV patients including treatment history and current medications.

**Related use cases:** UC-007 Manage Patient Records

#### UI Design

Field Name	Field Type	Description
Medical History	Text Area	Comprehensive medical history including HIV diagnosis details

Current Allergies	Text Area	Known allergies and adverse reactions
Current Medications	Text Area	List of current medications including ARV regimens
Blood Type	Dropdown	ABO blood type classification
Emergency Contact	Text Box	Emergency contact person name
Emergency Phone	Text Box	Emergency contact phone number
Clinical Notes	Text Area	Doctor's clinical observations and notes
Save Record	Button	Save medical record updates
View ARV Treatments	Button	Access HIV treatment management screen

### Database Access

Table	CRUD	Description
PatientRecords	R,U	Retrieve and update patient medical records
ARVTreatments	R	Access HIV treatment history
MedicationRoutines	R	View current medication schedules
Users	R	Verify doctor access permissions

— 1. *Retrieve patient record*

```
SELECT RecordID, PatientUserID, MedicalHistory, Allergies,
        CurrentMedications, BloodType, EmergencyContact,
        EmergencyPhone, Notes, UpdatedAt
FROM PatientRecords
WHERE PatientUserID = ?
```

— 2. *Update patient record*

```
UPDATE PatientRecords
SET MedicalHistory = ?, Allergies = ?, CurrentMedications = ?,
    BloodType = ?, EmergencyContact = ?, EmergencyPhone = ?,
    Notes = ?, UpdatedAt = GETDATE()
WHERE PatientUserID = ?
```

— 3. *Get ARV treatment history*

```
SELECT ARVTreatmentID, Regimen, StartDate, EndDate,
        Adherence, SideEffects, IsActive
FROM ARVTreatments
```

```
WHERE PatientUserID = ?  
ORDER BY StartDate DESC
```

## 4 Appendix

### 4.1 Assumptions & Dependencies

- **AS-1:** Microsoft SQL Server database is available and properly configured for healthcare data storage
- **AS-2:** SMTP email service is configured for sending appointment and medication reminders
- **AS-3:** System users have basic computer literacy and internet access
- **AS-4:** Clinic staff will receive training on HIV patient management workflows
- **DE-1:** Integration with existing hospital information systems may be required
- **DE-2:** HIPAA compliance requirements must be met for patient data protection
- **DE-3:** System depends on reliable internet connectivity for real-time operations

### 4.2 Limitations & Exclusions

- System does not include billing or insurance processing capabilities
- Laboratory result integration is not included in current scope
- Telemedicine or video consultation features are excluded
- Mobile application development is not part of initial release
- Integration with pharmacy systems for prescription management is excluded
- Advanced analytics and reporting dashboards are limited in scope

### 4.3 Business Rules

ID	Category	Rule Definition
BR-016	Data Security	All patient data must be encrypted at rest and in transit using AES-256 encryption
BR-017	Access Control	Role-based access ensures patients can only view their own records unless explicitly shared
BR-018	Appointment Scheduling	No overlapping appointments allowed for any doctor or patient
BR-019	Medication Adherence	ARV medication reminders are mandatory for all HIV patients unless opted out
BR-020	Record Retention	Patient medical records must be retained for minimum 7 years per healthcare regulations
BR-021	Emergency Access	Emergency override allows authorized medical staff to access any patient record
BR-022	Notification Preferences	Patients must be able to opt-out of non-critical notifications
BR-023	Data Backup	Daily automated backups of all patient data with 30-day retention

### 4.4 Technical Specifications

- **Backend Technology:** Spring Boot 3.x with Java 17
- **Frontend Technology:** React 18 with modern JavaScript (ES6+)
- **Database:** Microsoft SQL Server with T-SQL stored procedures
- **Authentication:** JWT (JSON Web Tokens) with BCrypt password hashing
- **API Architecture:** RESTful APIs with JSON data exchange
- **Security:** HTTPS/TLS encryption, CORS configuration, input validation
- **Deployment:** Containerized deployment ready (Docker compatible)