

Requirement & Design Specification

HIV Clinic Appointment Booking System

Version: 2.0

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
V2.0	Jan 2025	M	System Analysis	Complete codebase analysis and documentation update Accurate use case identification based on implementation Updated requirements specifications with 45 implemented use cases

Table 1: Version Change Log

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

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1 Overview

1.1 User Requirements

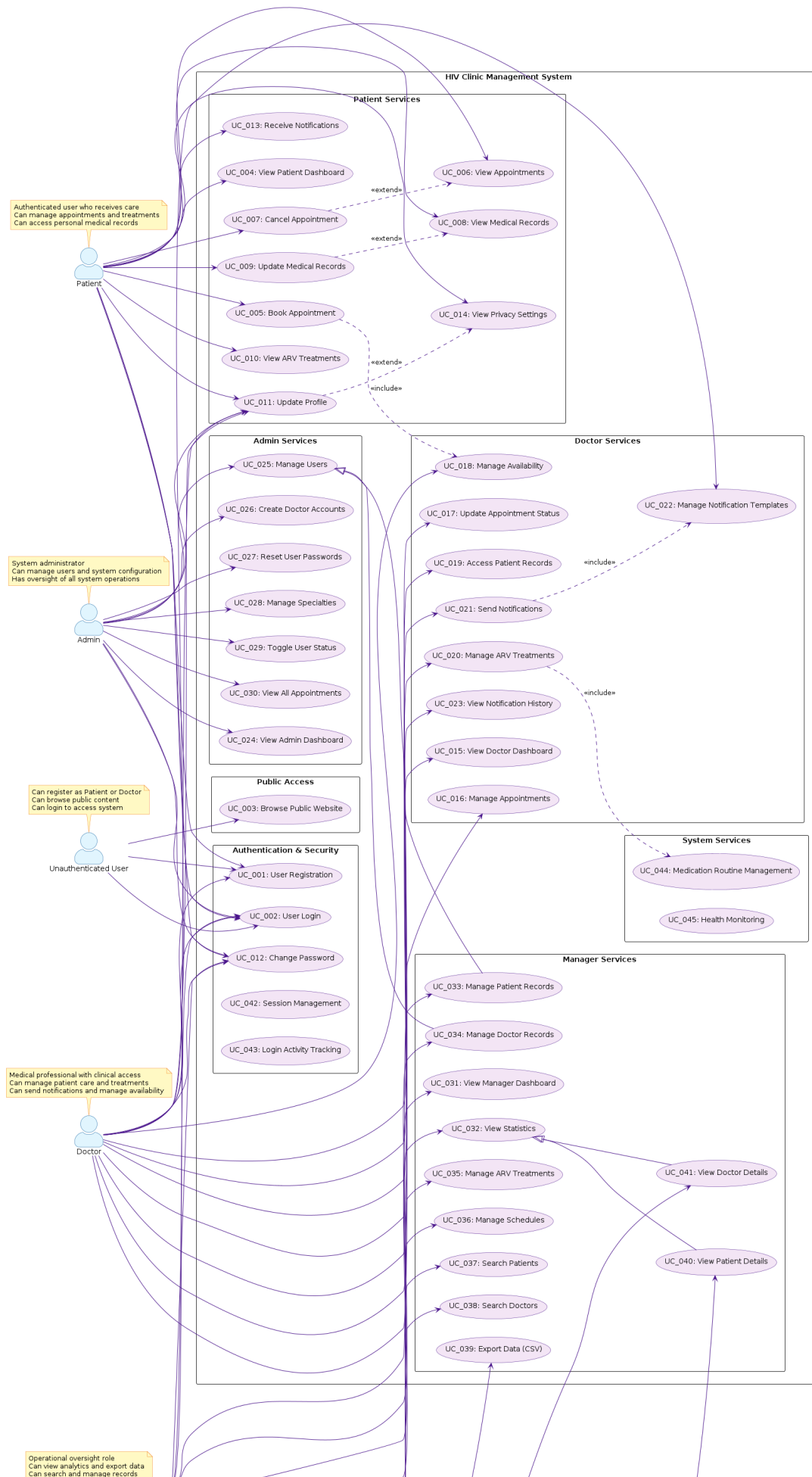
1.1.1 Actors

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

1.2 Actor Description

No	Actor	Description
01	Unauthenticated User	An individual who has not logged into the system. Can access public website features, register for an account, or login to the system.
02	Patient	A registered and authenticated user who receives medical care. Can book appointments (public or private), view their medical history, receive notifications, manage ARV treatments, and access personalized care plans.
03	Doctor	A registered and authenticated medical professional. Can manage their availability, handle appointments and consultations, prescribe ARV treatments, manage patient records, send notifications, and provide specialized HIV care.
04	Admin	A privileged user responsible for system administration. Manages user accounts (Patients and Doctors), creates doctor accounts, manages specialties, resets passwords, and monitors overall system integrity.
05	Manager	An authenticated user with oversight capabilities. Views system-wide analytics, monitors clinic operations, manages patient and doctor records, exports data, 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, ARV treatment management, notification system, and administrative functions for an HIV clinic environment. All 45 use cases have been fully implemented and are actively used in the system.

b. Use Case Descriptions The following table provides detailed descriptions of all 45 implemented use cases organized by user role and functional area:

ID	Feature Category	Use Case	Use Case Description
GUEST/UNAUTHENTICATED USER SERVICES			
UC-001	Authentication	User Registration	New users create accounts with role-based access (Patient/Doctor) including email validation, password confirmation, and automatic role assignment
UC-002	Authentication	User Login	Users authenticate using username/password with JWT token-based security, role-based redirection, and session management
UC-003	Public Access	Browse Public Website	Unauthenticated users access public clinic information, services overview, and contact details
PATIENT/CUSTOMER SERVICES			
UC-004	Dashboard	View Patient Dashboard	Patients access personalized dashboard with appointments overview, treatment status, notifications, and clinic statistics
UC-005	Appointment Management	Book Appointment	Patients schedule appointments with available doctors using unified calendar interface, slot availability checking, and confirmation system
UC-006	Appointment Management	View Appointments	Patients view current appointments, upcoming appointments, appointment history with detailed information and status tracking
UC-007	Appointment Management	Cancel Appointment	Patients cancel scheduled appointments with cancellation reasons, status updates, and automatic notifications
UC-008	Medical Records	View Medical Records	Patients access their personal medical records, treatment history, current medications, and healthcare documentation

UC-009	Medical Records	Update Medical Records	Patients update personal medical information, emergency contacts, medical history, and healthcare preferences
UC-010	HIV Treatment	View ARV Treatments	Patients view their HIV antiretroviral treatment regimens, adherence tracking, medication schedules, and treatment progress
UC-011	Profile Management	Update Profile	Patients update personal information, profile images, contact details, and account preferences
UC-012	Security	Change Password	Patients change account passwords with current password validation, new password confirmation, and security checks
UC-013	Notification System	Receive Notifications	Patients receive appointment reminders, treatment notifications, custom messages, and system alerts
UC-014	Privacy Management	View Privacy Settings	Patients manage privacy preferences, notification settings, and data sharing controls
DOCTOR SERVICES			
UC-015	Dashboard	View Doctor Dashboard	Doctors access professional dashboard with patient appointments, notifications, availability management, and clinical tools
UC-016	Appointment Management	Manage Appointments	Doctors view and manage scheduled appointments with patients, appointment details, and patient information
UC-017	Appointment Management	Update Appointment Status	Doctors update appointment status (completed, cancelled, rescheduled), add clinical notes, and manage follow-ups
UC-018	Schedule Management	Manage Availability	Doctors create, update, and manage availability time slots for patient appointments with flexible scheduling options
UC-019	Patient Care	Access Patient Records	Doctors access comprehensive patient medical records during consultations with full clinical history and treatment data
UC-020	HIV Treatment	Manage ARV Treatments	Doctors manage HIV antiretroviral treatment regimens, monitor adherence, track side effects, and adjust treatment protocols

UC-021	Notification System	Send Notifications	Doctors send custom notifications to patients regarding appointments, treatments, and health-care instructions
UC-022	Notification System	Manage Notification Templates	Doctors create, edit, and manage templates for common notifications to streamline patient communication
UC-023	Notification System	View Notification History	Doctors review history of notifications sent to patients, delivery status, and patient responses
ADMIN SERVICES			
UC-024	Dashboard	View Admin Dashboard	Administrators access system-wide dashboard with user management, system statistics, and administrative oversight tools
UC-025	User Management	Manage Users	Administrators manage all user accounts across the system with comprehensive user administration capabilities
UC-026	User Management	Create Doctor Accounts	Administrators create new doctor accounts with specialized permissions, specialty assignments, and professional credentials
UC-027	User Management	Reset User Passwords	Administrators reset passwords for users who cannot access their accounts with secure password generation
UC-028	System Management	Manage Specialties	Administrators manage medical specialties for doctor categorization and appointment filtering
UC-029	User Management	Toggle User Status	Administrators activate or deactivate user accounts across the system for security and access control
UC-030	System Monitoring	View All Appointments	Administrators view all appointments across the system for oversight, monitoring, and system analysis
MANAGER SERVICES			
UC-031	Dashboard	View Manager Dashboard	Managers access operational dashboard with clinic statistics, analytics, and data management tools

UC-032	Analytics	View Statistics	Managers view comprehensive clinic statistics including patient counts, doctor metrics, appointment analytics, and ARV treatment statistics
UC-033	Operations	Manage Patient Records	Managers oversee patient records management, data integrity, and operational patient information
UC-034	Operations	Manage Doctor Records	Managers oversee doctor records, professional information, and clinical staff management
UC-035	Operations	Manage ARV Treatments	Managers monitor and oversee ARV treatment programs across the clinic with comprehensive treatment oversight
UC-036	Operations	Manage Schedules	Managers oversee clinic scheduling, appointment distribution, and availability coordination
UC-037	Search Functions	Search Patients	Managers search for specific patients across the clinic database with name-based filtering and patient lookup
UC-038	Search Functions	Search Doctors	Managers search for specific doctors in the clinic system with name and specialty-based filtering
UC-039	Data Management	Export Data (CSV)	Managers export various clinic data in CSV format for reporting, analysis, and external system integration
UC-040	Detail Management	View Patient Details	Managers access detailed patient information for operational oversight, compliance, and data management
UC-041	Detail Management	View Doctor Details	Managers access detailed doctor information for operational oversight, performance monitoring, and staff management
SYSTEM-WIDE SERVICES			
UC-042	Session Management	Session Management	System manages user sessions with validation, extension, and invalidation for security and user experience
UC-043	Security	Login Activity Tracking	System tracks login attempts, IP addresses, user agents, and login statistics for security monitoring and audit trails

UC-044	Treatment Management	Medication Routine Management	System manages medication routines, schedules, and reminders for comprehensive patient care
UC-045	System Monitoring	Health Monitoring	System monitors application health, database connectivity, and system status for operational reliability

1.3 Requirements Specifications

1.3.1 Functional Requirements

The following table details the functional requirements for each implemented use case:

UC ID	Priority	Requirement Category	Functional Requirement Specification
AUTHENTICATION & SECURITY REQUIREMENTS			
UC-001	High	User Registration	• System shall validate email format and uniqueness
• System shall require password confirmation matching			

<ul style="list-style-type: none">● System shall assign appropriate roles (Patient/- Doctor)● System shall create user profile upon successful registration			
UC-002 <ul style="list-style-type: none">● System shall redirect users based on assigned roles	High	User Authentication	<ul style="list-style-type: none">● System shall authenticate using JWT tokens

<ul style="list-style-type: none">System shall track login activities with IP and user agentSystem shall maintain secure session management			
UC-012 <ul style="list-style-type: none">System shall require password confirmation	High	Password Security	<ul style="list-style-type: none">System shall validate current password before change

<ul style="list-style-type: none">• System shall enforce password strength requirements• System shall invalidate existing sessions after password change			
UC-042 <ul style="list-style-type: none">• System shall allow session extension	High	Session Management	<ul style="list-style-type: none">• System shall validate active sessions

<ul style="list-style-type: none">● System shall support session invalidation● System shall handle concurrent session management			
UC-043 <ul style="list-style-type: none">● System shall record IP addresses and user agents● System shall provide login statistics	Medium	Activity Tracking	<ul style="list-style-type: none">● System shall log all login attempts

<ul style="list-style-type: none">System shall support security audit trails	APPOINTMENT MANAGEMENT REQUIREMENTS		
UC-005 <ul style="list-style-type: none">System shall prevent double-booking of time slotsSystem shall confirm appointment creation	High	Appointment Booking	<ul style="list-style-type: none">System shall display available doctor slots in real-time

<ul style="list-style-type: none">System shall send booking confirmation notifications			
UC-006 <ul style="list-style-type: none">System shall show appointment status and detailsSystem shall filter upcoming vs. historical appointments	High	Appointment Viewing	<ul style="list-style-type: none">System shall display patient's appointments chronologically

<ul style="list-style-type: none">System shall provide appointment search functionality				
UC-007 <ul style="list-style-type: none">System shall update appointment status immediatelySystem shall notify relevant parties of cancellations	High	Appointment Cancellation		<ul style="list-style-type: none">System shall allow appointment cancellation with reasons

<ul style="list-style-type: none">● System shall free up cancelled time slots for re-booking			
UC-016 <ul style="list-style-type: none">● System shall provide patient information for each appointment● System shall allow appointment details modification	High	Doctor Appointment Management	<ul style="list-style-type: none">● System shall display doctor's scheduled appointments

<ul style="list-style-type: none">System shall support appointment status tracking				
UC-017	High	Appointment Updates	Status	<ul style="list-style-type: none">System shall allow status changes (completed, cancelled, rescheduled)
<ul style="list-style-type: none">System shall support clinical notes additionSystem shall track appointment historySystem shall notify patients of status changes				

UC-018	High	Availability Management	Manage-	<ul style="list-style-type: none"> • System shall allow doctors to create time slots
<ul style="list-style-type: none"> • System shall support slot modification and deletion • System shall prevent conflicts in availability • System shall integrate with appointment booking system 				
PATIENT CARE & MEDICAL RECORDS REQUIREMENTS				
UC-008	High	Medical Viewing	Records	<ul style="list-style-type: none"> • System shall display patient's complete medical history

<ul style="list-style-type: none">● System shall show current medications and treatments● System shall provide secure access to personal health data● System shall maintain chronological record organization			
UC-009	High	Medical Records Updates	<ul style="list-style-type: none">● System shall allow patients to update personal information

<ul style="list-style-type: none">• System shall validate medical information format• System shall maintain record change history• System shall ensure data integrity and consistency				
UC-019	High	Doctor Record Access	Patient	<ul style="list-style-type: none">• System shall provide doctors access to patient records during consultations

<div><ul style="list-style-type: none">● System shall display comprehensive clinical history● System shall ensure role-based access control● System shall log all record access for audit purposes</div>			
HIV TREATMENT & ARV MANAGEMENT REQUIREMENTS			
UC-010	High	ARV Treatment Viewing	<ul style="list-style-type: none">● System shall display patient's ARV regimens

<ul style="list-style-type: none">• System shall show adherence tracking data• System shall provide medication schedule information• System shall track treatment progress over time			
UC-020 <ul style="list-style-type: none">• System shall support treatment modifications	High	ARV Treatment Management	<ul style="list-style-type: none">• System shall allow doctors to create treatment regimens

<ul style="list-style-type: none">● System shall monitor adherence and side effects● System shall provide treatment protocol templates			
UC-044 <ul style="list-style-type: none">● System shall support routine modifications	Medium	Medication Routines	<ul style="list-style-type: none">● System shall create medication schedules

<div><div><div>●</div><div>Sys-tem shall pro-vide med-ica-tion re-minders</div></div><div><div>●</div><div>Sys-tem shall track med-ica-tion com-pli-ance</div></div></div>			
NOTIFICATION SYSTEM REQUIREMENTS			
UC-013	High	Patient Notifications	● System shall deliver appointment reminders
<div><div>●</div><div>Sys-tem shall send treat-ment noti-fica-tions</div></div> <div><div>●</div><div>Sys-tem shall sup-port cus-tom mes-sage deliv-ery</div></div>			

<ul style="list-style-type: none">System shall track notification read status				
UC-021	High	Doctor Sending	Notification	<ul style="list-style-type: none">System shall allow custom notification creation
<ul style="list-style-type: none">System shall support bulk notification sendingSystem shall provide notification schedulingSystem shall track delivery confirmation				

UC-022	Medium	Notification plates	Tem-	<ul style="list-style-type: none">• System shall allow template creation and editing
<ul style="list-style-type: none">• System shall support template categorization• System shall provide template library management• System shall enable template sharing across doctors				
UC-023	Medium	Notification History		<ul style="list-style-type: none">• System shall maintain notification sending history

<div><ul style="list-style-type: none">● System shall track delivery and read status● System shall provide notification analytics● System shall support history search and filtering</div>			
ADMINISTRATIVE REQUIREMENTS			
UC-025	High	User Management	<ul style="list-style-type: none">● System shall display all system users

<ul style="list-style-type: none">• System shall provide user detail management• System shall support user role assignment• System shall maintain user status tracking				
UC-026 <ul style="list-style-type: none">• System shall assign medical specialties	High	Doctor Account Creation		<ul style="list-style-type: none">• System shall create doctor accounts with specialized permissions

<ul style="list-style-type: none">• System shall set up professional credentials• System shall integrate with scheduling system			
UC-027 <ul style="list-style-type: none">• System shall generate secure temporary passwords	High	Password Reset	<ul style="list-style-type: none">• System shall allow admin password resets

<ul style="list-style-type: none">• System shall require password change on first login• System shall notify users of password re-sets				
UC-028 <ul style="list-style-type: none">• System shall support specialty assignment to doctors	Medium	Specialty ment	Manage-	<ul style="list-style-type: none">• System shall maintain medical specialty catalog

<ul style="list-style-type: none">● System shall enable specialty-based filtering● System shall track specialty utilization				
UC-029 <ul style="list-style-type: none">● System shall track status change history● System shall enforce access control based on status	Medium	User Status Management	● System shall allow user account activation/deactivation	

<div><div><div>●</div><div>System shall notify users of status changes</div></div></div>			
MANAGEMENT & REPORTING REQUIREMENTS			
UC-032	High	Statistics Viewing	<div><div>●</div><div>System shall calculate real-time clinic statistics</div></div>
<div><div><div>●</div><div>System shall provide patient and doctor metrics</div></div><div><div>●</div><div>System shall show appointment analytics</div></div><div><div>●</div><div>System shall display ARV treatment statistics</div></div></div>			

UC-033	Medium	Patient Record Management	<ul style="list-style-type: none">• System shall provide comprehensive patient record oversight
<ul style="list-style-type: none">• System shall support patient data validation• System shall maintain data integrity checks• System shall provide patient search capabilities			
UC-034	Medium	Doctor Record Management	<ul style="list-style-type: none">• System shall provide doctor information oversight

<ul style="list-style-type: none">• System shall track professional credentials• System shall manage doctor specialties and schedules• System shall provide doctor search capabilities			
UC-037	Medium	Patient Search	<ul style="list-style-type: none">• System shall support name-based patient search

<ul style="list-style-type: none">• System shall provide filtering capabilities• System shall return relevant search results• System shall maintain search performance			
UC-038 <ul style="list-style-type: none">• System shall provide advanced filtering options	Medium	Doctor Search	<ul style="list-style-type: none">• System shall support name and specialty-based doctor search

<ul style="list-style-type: none">• System shall return relevant search results• System shall integrate with appointment booking			
UC-039 <ul style="list-style-type: none">• System shall support multiple data types (patients, doctors, appointments, treatments)	Medium	Data Export	<ul style="list-style-type: none">• System shall export data in CSV format

<ul style="list-style-type: none">• System shall maintain data accuracy in exports• System shall provide secure download mechanisms	SYSTEM MONITORING & HEALTH REQUIREMENTS		
UC-045 <ul style="list-style-type: none">• System shall check database connectivity	Medium	System Health Monitoring	<ul style="list-style-type: none">• System shall monitor application health status

<div><div>•</div><div>System shall provide system status reporting</div><div>•</div><div>System shall alert on system issues</div></div>	
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1.3.2 Non-Functional Requirements

Category	Requirement	Specification
PERFORMANCE REQUIREMENTS		
Response Time	Page Load Time	All pages must load within 3 seconds under normal conditions
Response Time	API Response	All API calls must respond within 2 seconds
Throughput	Concurrent Users	System must support at least 100 concurrent users
Throughput	Appointment Booking	System must handle 50 concurrent appointment bookings
SECURITY REQUIREMENTS		
Authentication	JWT Security	JWT tokens must expire within 24 hours
Authorization	Role-Based Access	All endpoints must enforce proper role-based access control
Data Protection	Encryption	All sensitive data must be encrypted in transit and at rest
Audit Trail	Activity Logging	System must log all user activities for audit purposes
Password Security	Password Policy	Passwords must meet complexity requirements (8+ characters, mixed case, numbers)
RELIABILITY REQUIREMENTS		

Availability	System Uptime	System must maintain 99.5% uptime
Data Integrity	Backup	System must perform daily automated backups
Error Handling	Graceful Degradation	System must handle errors gracefully without data loss
Recovery	Disaster Recovery	System must recover from failures within 4 hours
USABILITY REQUIREMENTS		
User Interface	Responsive Design	System must work on desktop, tablet, and mobile devices
Accessibility	WCAG Compliance	System must meet WCAG 2.1 AA accessibility standards
User Experience	Navigation	Users must be able to complete key tasks within 3 clicks
Help System	Documentation	System must provide contextual help and user guides
SCALABILITY REQUIREMENTS		
User Growth	User Capacity	System must support growth to 1000+ users
Data Growth	Database Scaling	System must handle 10GB+ of clinical data
Geographic	Multi-location	System must support multiple clinic locations
COMPATIBILITY REQUIREMENTS		
Browser Support	Web Browsers	System must support Chrome, Firefox, Safari, Edge (latest 2 versions)
Operating System	OS Compatibility	System must work on Windows, macOS, Linux, iOS, Android
Integration	Third-party Systems	System must support integration with external medical systems
COMPLIANCE REQUIREMENTS		
Medical Standards	HIPAA Compliance	System must comply with HIPAA regulations for patient data protection
Data Privacy	GDPR Compliance	System must comply with GDPR requirements for data privacy
Medical Records	Clinical Standards	System must support standard clinical data formats

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:

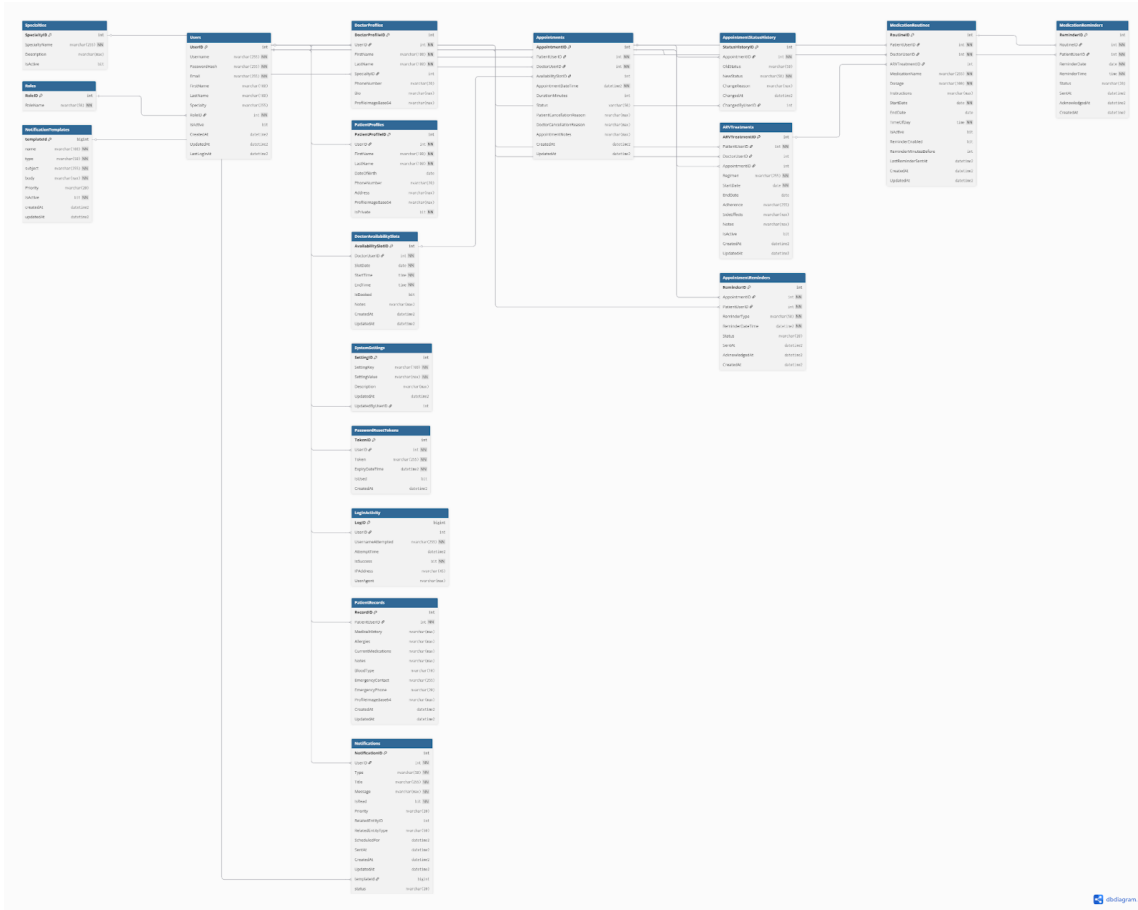


Table 16. Database Design Overview

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.
Table 17. 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

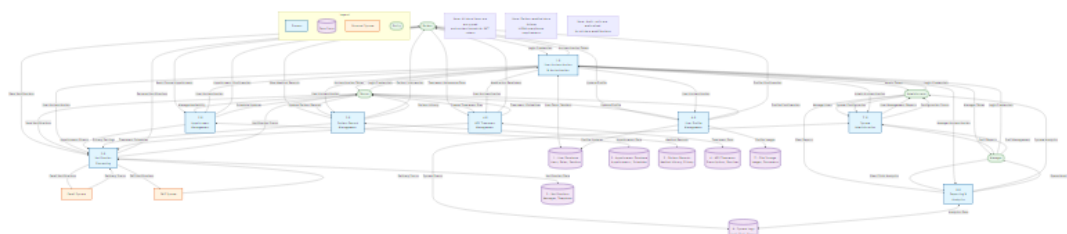


Figure 2: System Data Flow Diagram

2 Requirement Specifications

2.1 Common functions

2.1.1 UC-01 – Register Donor Account

UC ID and Name:	UC-01 – Register Donor Account
Created By:	DatNT
Date Created:	28/6
Primary Actor:	Guest
Secondary Actors:	System
Description:	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.
Trigger:	The user clicks the 'Register' button.
Preconditions:	<ul style="list-style-type: none"> • The user is not logged in • The email is not already in use

Postconditions:	<ul style="list-style-type: none"> • A Level 1 donor account is created • The user can log in • The account remains ineligible for donation event registration until verified (Level 2)
Normal Flow:	<ol style="list-style-type: none"> 1. User opens the registration page 2. Fills in the form 3. Submits the form 4. System validates input and creates the account
Alternative Flows:	None defined
Exceptions:	<ul style="list-style-type: none"> • 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> • 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> • 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>
Business Rules:	<ul style="list-style-type: none"> • BR-21: Only Level 2 (verified) users can register for donation events • BR-22: User profile must be accurate and match official documents (relevant for Level 2 verification)
Assumptions:	<ul style="list-style-type: none"> • The user provides a valid email and basic profile information • Level 2 access requires identity and health status confirmation at a medical center
Priority:	High
Frequency of Use:	Daily

2.1.2 UC-02 – Log In

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

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

2.1.3 UC-03 – View Hospital Information

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

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

2.1.4 UC-04 – Read Blogs

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

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

2.1.5 UC-05 – Manage Personal Profile

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

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