Software Engineering

20.04.2025

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Members	
Role	**Member Name**
Project Owner	Nida
Scrum Master	Anas
Developer	Huzaifa

1. Number of Sprints:

Sprints	3

2. Product Backlog:

User Story	**Acceptance Criteria**
As a user, I want to register on Health Hub so that I can access and view my health analytics, enabling me to make informed decisions and maintain my well-being effectively	• Given that I am on the HealthHub registration page, when I fill in the required registration fields with valid information including my full name, email address, and password, then upon submission, a new user account should be created for me.
As a user of Health Hub, I want to log in with my specified role and password so that I can access personalized features and functionalities based on my role within the healthcare ecosystem.	• Given that I am on the HealthHub login page, when I enter my registered email address and password corresponding to my specified role (e.g., administrator, doctor, or client), then upon

	submission, I should be authenticated and granted access to the system.
As a user I want to view my health analytics so that I can take rational choices and maintain my well-being	• Given that I have opened the health assessment menu when I click on the view health analytics then it should display all the health-related options in a human readable way.
As a user I want to receive my health status and risk factor so that I can keep record of my health stats and devise a plan accordingly.	• Given that I have opened the health analytics option when I fill in the required data then it should display all the stats and risk factors in a more visualized way. • Given that I have opened the health analytics option when I fill the required data wrong then it should display an error message and ask me to re-enter the information.
As a user I want to get recommendations from the system according to my health stats so that I can get a better health plan.	• Given that it displayed all the health analytics options when I ask for recommendations then it should perform certain functions on my data and provide me with personalized proactive recommendations.
As a user, I want to access health care professionals through telehealth so that I do not have to go outside for booking appointments.	• Given that I have selected for telehealth feature when I search for professional then it displays all the health care professionals in my area with their contact information
As a user, I want to schedule virtual consultations with healthcare professionals through HealthHub's telehealth feature to obtain medical advice and treatment conveniently.	• Given that users are presented with options to schedule virtual consultations with healthcare professionals when accessing the scheduled virtual consultations then it should book appointments with the professional. • Given that user has accessed the schedule virtual consultation when selected a desired time slot, the system confirms the appointment and notifies the user of the scheduled virtual consultation
As a user, I want to securely store my medical records within Health Hub so that I can maintain a centralized repository of my health information at any time.	• Given that users have medical records when users click on view records then users can view and access their stored medical records from any device

	with internet access, ensuring seamless accessibility.
As a user, I want to access my test results in HealthHub so that I can compare my past medical test history and evaluate the changes in result.	• Given that users have accessed test records when user clicks on view test record history then user can search tests using keywords or filters.
As a user, I want to access treatment plans stored in HealthHub so that I can review my past track of my ongoing healthcare journey and devise a new plan based on that.	• Given that users have accessed treatment plans when the user clicks on Give recommendation then the user can get a new treatment plan based on past plans.
As a user, I want to share specific medical records with my healthcare providers through HealthHub so that to facilitate continuity of care and informed decision-making	• Given that the user has medical history when user wants to share information then User can select and share individual medical records or sets of records with designated healthcare providers securely
As a user concerned about my long-term health, I want HealthHub to utilize modern techniques to predict potential health issues early, allowing for timely interventions and preventive measures.	• Given that I am a user of HealthHub, when I regularly input my health data and engage with the platform's features, Then the platform should use modern techniques to analyze my data over time, identifying any emerging patterns or trends indicative of potential health issues
As a user of HealthHub, I want a platform which analyzes my provided health data so that it provides me with personalized insights into my health risks	• Given that I am a user of HealthHub, when I provide my health data such as medical history, lifestyle habits, and biometric measurements then the platform should use advanced technologies to analyze my data and identify potential health risks.
As a user of HealthHub, I want the platform to utilize advanced technologies to provide tailored health recommendations based on predictive health analytics.	• Given that I am a HealthHub user, when I input my health data, including medical history, lifestyle habits, and biometric measurements, then the platform should employ contemporary methods to analyze my data and anticipate potential health risks.
As a busy professional, I want quick access to health education and resources for stress management techniques so that I can manage my stress level and improve my overall wellbeing.	• Given Health hub is accessible to user when user navigate to main menu then there is appropriate section of “Stress Management” and clicking to this section provide valuable resources to stress management in form of videos or articles

As a user concerned with managing my blood pressure effectively, I want comprehensive knowledge on managing sudden rising and falling of blood pressure in form of articles, videos, and pictures so that I can reduce risk of blood pressure related issues in future	• Given that I am a user concerned with managing my blood pressure effectively when I access the HealthHub platform then this should prominently address the sudden rising and falling of blood pressure and should contain a variety of resources including articles, videos, and pictures.
As a user facing heart disease issues, I want to gain comprehensive information and techniques in the form of articles, videos, and interactive modules on exercise, diet, and stress management for a healthy heart lifestyle to manage sudden happening heart attack issues and heart related diseases.	• Given that a user, When I access the HealthHub platform, Then there should be a prominently displayed section dedicated to exercise, diet, and stress management specifically tailored for heart health.
As a user entrusting my health data to HealthHub, I want assurance that my information is protected from unauthorized access and breaches so that I did not face any problem in future	• Given that I am a user of HealthHub when I access the platform or submit any health-related information then all data transmission between my device and the HealthHub servers should be encrypted using industry-standard protocols
As a doctor, I want secure exchange of health data of my patients' health and provide them with up-to-date information on their health, so that they get information for their well-being.	• Given that I am a healthcare provider registered with HealthHub, when I communicate with patients or access their health records through the platform, then all communication channels should be encrypted to, and patient data should only be accessible to authorized healthcare providers with proper authentication.
As a user of HealthHub, I want clear and transparent information about how my health data is handled and protected to make informed decisions about sharing my information on the platform	• Given that I am a user of HealthHub, when I review the privacy policy and terms of service, then the policy should clearly outline how user data is collected, stored, and used
As an administrator of Health Hub, I want to monitor the activities of doctors, clients, and appointments so that I can efficiently manage the healthcare services provided through the platform.	• Given that I am logged in as an administrator, when I navigate to the admin dashboard, I should see an overview of all registered doctors, clients, and upcoming appointments.
As a user, I want to receive personalized adherence plans for my medications within HealthHub so that it helps me stay organized and ensure I take them correctly.	• Given that user has enabled the medical adherence feature when users input the information about their prescribed medications, including name, dosage, and instructions then it should give reminder at specified time

As a user, I want to receive timely reminders for my medication doses so that it helps me remember to take them on time.	• Given that the user has provided the prescribed medications information when it is the specified time then the system should give push notifications on the HealthHub app, email, or SMS, according to user preferences.
As a user, I want to get my real-time health insights while monitoring devices so that it collects and evaluates different activity levels.	• Given that a remote monitoring device is connected to HealthHub when I start using it then it should update the user's health dashboard with the latest data received from each connected device.
As a user of HealthHub, I want the platform to analyze my health data to provide me with personalized insights into my health risks and challenges.	• Given that I am a user of HealthHub, when I provide my health data such as medical history, lifestyle habits, and biometric measurements, Then the platform should utilize AI-driven predictive analytics to analyze my data and identify potential health risks

Start sprint #1:

Duration : 2 weeks

User Story Template for Maintaining Backlog

Name	About
User Registration	Register a user on Health Hub

User Registration

As a user, I want to register on Health Hub so that I can access and view my health analytics, enabling me to make informed decisions and maintain my well-being effectively

Context / Note

The System must add the user by registering it so that it can access the features of healthhub

This story is related to sprint 1.

Task

- Creating user role page to select its role
- Creating a form to take input from user about their information.
- Saving the data in database to effectively fetch date when needed

Subtask List

- Handling the role page and register page communication
- Creating forms for input of data from all users
- Storing data in database.

Associated User Stories

The user stories and technical stories related to this story are referenced bellow

· **User Story**	· **Rule(s)**	· **Associated Issue**
Login User	• Must be Registered	2

	Name	About
	User Login	Login an active user on Health Hub

User Login

As a user of Health Hub, I want to log in with my specified role and password so that I can access personalized features and functionalities based on my role within the healthcare ecosystem.

Context / Note

The System must authenticate users by allowing them to log in with their specified role and password, enabling access to personalized features and functionalities within the healthcare ecosystem. This story is related to sprint 1.

Task

- Creating a login page for users to input their role and password.
- Implementing authentication logic to validate user credentials.
- Granting access to personalized features and functionalities based on the user's role.

Subtask List

- Designing the user interface for the login page.
- Developing backend logic to handle user authentication.
- Integrating role-based access control to customize user experiences.

Associated User Stories

All the user stories are directly related to this User story

Name	About
User Telehealth Consultation Scheduling	Get appointment from heath care assistants

User Telehealth Consultation Scheduling

As a user of HealthHub, I want to schedule virtual consultations with healthcare professionals through the platform's telehealth feature to obtain medical advice and treatment conveniently.

Context / Note

The system should enable users to schedule virtual consultations with healthcare professionals via HealthHub's telehealth feature, providing them with a convenient way to access medical advice and treatment remotely. This story is related to sprint 1.

Task

- Implementing a telehealth feature within HealthHub for virtual consultations.
- Developing a scheduling system to allow users to book appointments with healthcare professionals.
- Integrating communication tools for seamless virtual consultations.

Subtask List

- Designing the user interface for the telehealth feature.
- Building backend infrastructure to support virtual consultations.
- Testing the scheduling system and communication tools for reliability and usability.

Name	About
User Health Status	Get health status and risk factors analytics through HealthHub

User Health Status :

As a user I want to view my health analytics so that I can take rational choices and maintain my well-being.

Context / Note:

The system should provide users with access to their health status and risk factors via HealthHub, allowing them to maintain a comprehensive record of their health data and plan accordingly. This story is related to sprint 1.

Task

- Developing a feature in HealthHub to retrieve users' health status and risk factors.
- Implementing algorithms to analyze health data and determine risk factors.
- Designing user-friendly interfaces to display health status and risk factors.

Subtask List

- Integrating data retrieval APIs for accessing health records.
- Building algorithms to analyze health data and calculate risk factors.
- Testing the feature to ensure accurate retrieval and display of health information.

Name	About
User Health Recommendation System	Recommendations from the system based on my health

User Health Recommendation System

As a user, I want to receive recommendations from the system based on my health statistics so that I can create a more effective health plan.

Context / Note

The system should provide users with personalized recommendations based on their health statistics, assisting them in developing a tailored health plan. This story is related to sprint 1.

Task

- Implementing a recommendation system within HealthHub to provide personalized health advice.
- Developing algorithms to analyze user health statistics and generate recommendations.
- Designing interfaces to display recommendations in an understandable and actionable format.

Subtask List

- Integrating machine learning models for personalized recommendation generation.
- Testing recommendation algorithms to ensure accuracy and relevance.
- Optimizing recommendation system performance for real-time suggestions.

Name	About
User Telehealth Access for Booking Appointments	Access healthcare professionals

User Telehealth Access for Booking Appointments:

As a user, I want to access healthcare professionals through telehealth so that I can book appointments without needing to leave my home.

Context / Note

The system should provide users with the ability to access healthcare professionals via telehealth services, enabling them to schedule appointments conveniently from their own environment. This story is related to sprint 1.

Task

- Implementing telehealth functionality within HealthHub for users to connect with healthcare professionals.
- Developing a booking system to facilitate appointment scheduling through telehealth.

- Integrating communication tools for seamless interaction between users and healthcare professionals.

Subtask List

- Designing user interfaces for telehealth appointments and scheduling.
- Building backend infrastructure to support telehealth communication and appointment management.
- Testing the telehealth system to ensure reliability and usability for users and healthcare professionals.

Name	About
User Tailored Health Recommendations with Predictive Analytics	utilize advanced technologies to provide tailored health recommendations

User Tailored Health Recommendations with Predictive Analytics:

As a user of HealthHub, I want the platform to utilize advanced technologies to provide tailored health recommendations based on predictive health analytics.

Context / Note

The system should leverage advanced technologies to analyze user health data and provide personalized recommendations using predictive analytics. This story is related to sprint 1.

Task

- Implementing predictive analytics capabilities within HealthHub to analyze user health data.
- Developing algorithms to generate tailored health recommendations based on predictive analytics.
- Designing interfaces to present personalized recommendations in a user-friendly manner.

Subtask List

- Integrating machine learning models for predictive health analytics.
- Testing recommendation algorithms to ensure accuracy and effectiveness.
- Optimizing the system for real-time generation of tailored health recommendations.

Name	About
Access to Treatment Plans	access treatment plans stored in HealthHub

Access to Treatment Plans:

As a user, I want to access treatment plans stored in HealthHub so that I can review my past healthcare journey and devise new plans based on that information.

Context / Note

The system should allow users to access and review their stored treatment plans within HealthHub, enabling them to track their healthcare journey and make informed decisions about future plans. This story is related to sprint 1.

Task

- Implementing a feature in HealthHub to store and retrieve treatment plans for users.
- Developing interfaces for users to access and review their treatment plans.
- Ensuring data security and privacy measures are in place for stored treatment plan information.

Subtask List

- Designing database schema for storing treatment plans securely.
- Building API endpoints for treatment plan retrieval and management.
- Testing the feature to ensure accurate storage and retrieval of treatment plans for users.

3. Bug Report Template

Name	About
AI bot training	The bug relates to issues encountered during training of AI bot to only act as medical assistant.
Database Connection and Retrieval:	The bug relates to database connection and retrieval issues for form Admin because of Doctor Id.
MongoDB Atlas Connection Issues	The bug relates to connection issues encountered while using MongoDB Atlas for database operations because of difference in routes on user and server side.
Different Page response	Page moves to different page rather than the specified one.
Responsive toolbar	Bug in Movable Toolbar, changes the orientation of whole page when button is pressed.

4. Planning/Review Meeting Template

Name	About
Sprint Meeting	Discussed the user stories related to form categorization, Appointment management, doctor's oversight, approval process, time slot generation, health analytics display.

Framework Selection Meeting

Overview

a. Date Time Stamp

17th April 2025

b. Attendees

Present	Absent
• Anas • Huzaifa • Nida	

Topics discussed and conclusions reached

- Addressed bug reports related to data set collection, database connection and retrieval, and issues with MongoDB Atlas.
- Decided to switch MongoDB to MongoDB Atlas improved functionality and reliability.
- Assigned tasks to team members for implementation of user stories and resolution of bugs.
- Agreed on next steps and priorities for the sprint.

Conclusions

- The team will focus on implementing user stories and resolving bugs related to form processing and database operations. Firebase will be adopted as the new database solution to address connectivity and data saving issues. Tasks are assigned with clear deadlines to ensure progress and meet sprint objectives.

Overall duration: **1 hour and 46 minutes**

Next meeting scheduled for: 25**th** **April 2025**

Reported By:

Huzaifa Khalid

5. Retrospective Meeting Template

Name	About
Sprint Retrospective Meeting	Iteration/Sprint number 1

Retrospective meeting

Overview

Date Time Stamp

19th April 2025

Attendees

Present	Absent
• Anas • Huzaifa • Nida	

Retrospective Content

· Successes	· To improve	· Actions and suggestions
Identified successful implementation of user stories related to form categorization, director's oversight, and email recording.	Addressed challenges encountered with database connectivity and data retrieval.	Implement more robust error handling mechanisms for database operations to prevent data loss and connection issues.
Effective collaboration and communication among team members during the sprint.	Recognized the need for more thorough testing and validation of AI model predictions	Conduct additional training sessions for team members on MongoDb and React usage and best practices.

Overall duration: **1 hour**

Next meeting scheduled for: **29th April 2025**

Reported By:

Anas Imran

6. Equivalent Class Partitioning and Boundary Value

User Story 1: Registration

Equivalent Class Partitions:

Input or Output Event	Valid Equivalence Classes	Invalid Equivalence Classes
Email field: The User must enter their Email completely.	@ is a must .com, .org, .ai, are must	No @ or .com provided
Password: The User must provide a password so that they securely access their account.	An upper-case alphabet, a lower-case alphabet, a non-letter character, 6 chars<= Length <= 10 chars (The valid password registered in the database)	No Upper Case Alphabet No Lower-Case Alphabet No non-letter characters Length < 6 chars Length > 10 chars (anything other than the password registered in the database)
Confirm Password: The User must provide a password so that they can confirm their password.	Both password and Confirm password must be same.	Confirm Password and Password is not same
Contact Number: The User must provide their cell phone number for communication	Contact number must in n numeric form such as 1,2,3 and so on It must have 11 digits	It do not have 11 digits (Numeric validation are completed no one can add other than numeric data)

Boundary Value Analysis:

Input	Boundary Value
Email	Minimum valid length of an email address (e.g., 6 characters)
Password	Length of Password=6 and Username=10 are the boundary values and should be accepted

Confirm Password: The User must provide a password so that they can confirm their password.	Must be Same as password field value

Contact Number:	Contact number <=11

User Story 2: Login

Equivalent Class Partitions:

Input or Output Event	**Valid Equivalence Classes**	**Invalid Equivalence Classes**
Email field: The User must enter their Email completely.	@ is a must .com, .org, .ai, are must	No @ or .com provided
Password: The User must provide a password so that they securely access their account.	An upper-case alphabet, a lower-case alphabet, a non-letter character, 6 chars<= Length <= 10 chars (The valid password registered in the database)	No Upper Case Alphabet No Lower-Case Alphabet No non-letter characters Length < 6 chars Length > 10 chars (anything other than the password registered in the database)

Boundary Value Analysis:

Input	**Boundary Value**
Email	Minimum valid length of an email address (e.g., 6 characters)
Password	Length of Password=6 and Username=10 are the boundary values and should be accepted

User Story 3: Personalized Health Information

Equivalent Class Partitions:

Input or Output Event	Valid Equivalence Classes	Invalid Equivalence Classes
Age: User must add his age foe basic info to calculate BMI	Must be a number Must be positive Number	Number out of range Must not positive Number
Height: User must add his age foe basic info to calculate BMI	Must be a number Must be positive Number	Number out of range Must not positive Number
Weight: User must add his age foe basic info to calculate BMI	Must be a number Must be positive Number	Number out of range Must not positive Number

Boundary Value Analysis:

Input	Boundary Value
Age:	Length of *Age* <=3 Age>0
Height:	Length of *Height* <=1 *Height* >0
Weight:	Length of *Height* <=3 *Weight* >0

User Story 4: Test results

Equivalent Class Partitions:

Input or Output Event	Valid Equivalence Classes	Invalid Equivalence Classes
Date field: User must enter date to add test record of that date	Accurate day, month and the year is chosen according to the format	Number out of range Must not positive Number

Upper Blood Pressure: User must enter Blood Pressure to add a test result	Must be a number Must be positive	Number out of range Must not positive Number
Lower Blood Pressure: User must enter Blood Pressure to add a test result	Must be a number Must be positive	Number out of range Must not positive Number

Heartbeat rate: User must enter Heart beat rate to add a test result	Must be a number Must be positive	Number out of range Must not positive Number

Boundary Value Analysis:

Input	**Boundary Value**
Date	Must be less than current date
Upper Blood Pressure	Length of Upper Blood Pressure<=3 Upper Blood Pressure>0
Lower Blood Pressure	Length of Lower Blood Pressure <=3 Lower Blood Pressure >0
Heartbeat rate	Length of Heartbeat rate <=3 Heartbeat rate >0

User Story 5: Health Analytics

Equivalent Class Partitions User Story 5:

Input or Output Event	**Valid Equivalence Classes**	**Invalid Equivalence Classes**
Health Data estimation: User must click the button provided to check for health data calculation	Clicked only once for estimation Clicked again for results	Clicked more than once or not at all

Blood type: User must choose the blood type to store the information.	Click to add data Must choose a value from drop down	Do not clicked Didn't selected an option

No Boundary Value Analysis is possible for User Story 5.

User Story 6: Appointments Management

Equivalent Class Partitions User Story 6:

Input or Output Event	Valid Equivalence Classes	Invalid Equivalence Classes
Search for Appointments: User must add Doctor name or specification to get for a specific doctor slot	Must add alphabetic Data Doctor must be part of System	Data entered other than alphabetic User not part of system
Select timeslot: User must choose a valid timeslot of doctor to ask for appointment acceptance	Must Select a valid Slot from dropdown data	Did not select a valid slot Did not selected anything
Time slots generation: User must enter a valid date for generating slots	Must chose a valid date	Date not selected Did not selected a valid date
Accepting Appointment: The Doctor must choose the accepted or cancelled to change the status of appointment	Must click on the button provided	Did not clicked the button provided

Boundary Value Analysis:

Input	Boundary Value
Search for Appointments	Must be in alphabetic form. Any text with length>=0
Select timeslot date	Must be in range Year and month must be current

1. Equivalence Class Partitioning for Patient UI Fields

Let's create equivalence classes for common fields in a patient management system:

Patient Name Field

Field	Valid Equivalence Classes	Invalid Equivalence Classes
Full Name	EC1: Names with 2-50 characters EC2: Names with spaces EC3: Names with hyphens	EC4: Empty name EC5: Names with < 2 characters EC6: Names with > 50 characters EC7: Names with special characters (!@#$%) EC8: Names with numbers

Email Field

Field	Valid Equivalence Classes	Invalid Equivalence Classes
Email	EC1: Standard format emails (user@domain.com) EC2: Emails with subdomain (user@sub.domain.com) EC3: Emails with plus addressing (user+tag@domain.com)	EC4: Empty email EC5: Emails without @ symbol EC6: Emails without domain EC7: Emails with invalid characters EC8: Emails with multiple @ symbols

Phone Number Field

Field	Valid Equivalence Classes	Invalid Equivalence Classes
Phone Number	EC1: 10-digit numbers EC2: Numbers with country code EC3: Numbers with hyphens/spaces	EC4: Empty phone numbers EC5: Numbers with < 10 digits EC6: Numbers with > 15 digits EC7: Numbers with letters EC8: Numbers with special characters (except +,-)

Date of Birth Field

Field	Valid Equivalence Classes	Invalid Equivalence Classes
Date of Birth	EC1: Past dates (> 1 year old) EC2: Very old dates (> 100 years) EC3: Recent past dates (< 1 year)	EC4: Future dates EC5: Current date EC6: Invalid date formats EC7: Non-existent dates (Feb 30)

Blood Type Field

Field	Valid Equivalence Classes	Invalid Equivalence Classes
Blood Type	EC1: Valid blood types (A+, A-, B+, B-, AB+, AB-, O+, O-)	EC2: Invalid blood types EC3: Empty blood type EC4: Numeric values EC5: Special characters

2. Number of Test Cases for Weak and Strong Equivalence Class Testing

Weak Equivalence Class Testing

In weak equivalence class testing, we select one test case from each equivalence class. This gives us:

- Patient Name: 3 valid + 5 invalid = 8 test cases
- Email: 3 valid + 5 invalid = 8 test cases
- Phone Number: 3 valid + 5 invalid = 8 test cases
- Date of Birth: 3 valid + 4 invalid = 7 test cases
- Blood Type: 1 valid + 4 invalid = 5 test cases

Total for weak equivalence class testing: 36 test cases

Strong Equivalence Class Testing

In strong equivalence class testing, we test all possible combinations of equivalence classes. This would result in a very large number of test cases:

For all fields combined, this would be: $(3+5) \times (3+5) \times (3+5) \times (3+4) \times (1+4) = 8 \times 8 \times 8 \times 7 \times 5 = 17,920$ test cases

This is impractical, so typically we would do strong equivalence class testing for individual fields or targeted combinations.

3. Boundary Values for Each Field

Patient Name Field

- Lower boundary: 2 characters
- Upper boundary: 50 characters
- Test values: 1 character, 2 characters, 3 characters, 49 characters, 50 characters, 51 characters

Email Field

- Boundary for username part: empty, 1 character, 64 characters (RFC standard)
- Boundary for domain part: 1 character + TLD, 255 characters total
- Test values: minimum valid email (a@b.c), maximum username (64 chars), maximum domain length

Phone Number Field

- Lower boundary: 10 digits
- Upper boundary: 15 digits (including country code)
- Test values: 9 digits, 10 digits, 11 digits, 15 digits, 16 digits

1. Equivalence Class Partitioning for Doctor UI Fields

Doctor Name Field

Field	Valid Equivalence Classes	Invalid Equivalence Classes
Full Name	EC1: Names with 2-50 characters EC2: Names with spaces EC3: Names with hyphens	EC4: Empty name EC5: Names with < 2 characters EC6: Names with > 50 characters EC7: Names with special characters (!@#$%) EC8: Names with numbers

Email Field

Field	Valid Equivalence Classes	Invalid Equivalence Classes
Email	EC1: Standard format emails (doctor@hospital.com) EC2: Emails with subdomain (doctor@dept.hospital.com) EC3: Emails with plus addressing (doctor+dept@hospital.com)	EC4: Empty email EC5: Emails without @ symbol EC6: Emails without domain EC7: Emails with invalid characters EC8: Emails with multiple @ symbols

Specialty/Specialization Field

Field	Valid Equivalence Classes	Invalid Equivalence Classes
Specialization	EC1: Standard medical specialties (Cardiology, Neurology, etc.) EC2: Subspecialties (Pediatric Cardiology) EC3: General Practice	EC4: Empty specialization EC5: Non-medical terms EC6: Specialization with numbers EC7: Extremely long specialization names (>50 chars)

Medical License Number Field

Field	Valid Equivalence Classes	Invalid Equivalence Classes
License Number	EC1: Standard format (varies by region, e.g., 2 letters + 6 digits) EC2: Alternative valid formats	EC3: Empty license number EC4: Too short license numbers EC5: Too long license numbers EC6: License numbers with invalid characters

Clinic/Hospital Field

Field	Valid Equivalence Classes	Invalid Equivalence Classes
Clinic/Hospital	EC1: Names with 2-100 characters EC2: Names with spaces and common punctuation	EC3: Empty name EC4: Names with < 2 characters EC5: Names with > 100 characters EC6: Names with invalid special characters

Contact Number Field

Field	Valid Equivalence Classes	Invalid Equivalence Classes
Contact Number	EC1: 10-digit numbers EC2: Numbers with country code EC3: Numbers with hyphens/spaces	EC4: Empty phone numbers EC5: Numbers with < 10 digits EC6: Numbers with > 15 digits EC7: Numbers with letters EC8: Numbers with special characters (except +,-)

2. Number of Test Cases for Weak and Strong Equivalence Class Testing

Weak Equivalence Class Testing

- Doctor Name: 3 valid + 5 invalid = 8 test cases
- Email: 3 valid + 5 invalid = 8 test cases
- Specialization: 3 valid + 4 invalid = 7 test cases
- License Number: 2 valid + 4 invalid = 6 test cases
- Clinic/Hospital: 2 valid + 4 invalid = 6 test cases
- Contact Number: 3 valid + 5 invalid = 8 test cases

Total for weak equivalence class testing: 43 test cases

Strong Equivalence Class Testing

For all doctor fields combined, this would be extremely large. In practice, we would apply strong testing to key combinations or individual fields.

3. Boundary Values for Doctor UI Fields

Doctor Name Field

- Lower boundary: 2 characters
- Upper boundary: 50 characters
- Test values: 1 character, 2 characters, 3 characters, 49 characters, 50 characters, 51 characters

Email Field

- Same as for Patient UI

Specialization Field

- Lower boundary: 2 characters
- Upper boundary: 50 characters

- Test values: 1 character, 2 characters, 3 characters, 49 characters, 50 characters, 51 characters

License Number Field

- Boundaries depend on specific format requirements of your system
- Typical test values: minimum valid length, maximum valid length, one character less, one character more

Clinic/Hospital Field

- Lower boundary: 2 characters
- Upper boundary: 100 characters
- Test values: 1 character, 2 characters, 3 characters, 99 characters, 100 characters, 101 characters

Contact Number Field

- Same as for Patient UI