



MOBILE APPLICATION FOR CONNECTING AND BOOKING REPAIR TECHNICIANS (V-FIX)

Software Requirement Specification Document

v1.0.0

– HoChiMinh, November 2025 –

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Record of Changes

*A - Added M - Modified D - Deleted

Definition and Acronyms

Acronym	Definition
AES	Advanced Encryption Standard (A specification for the encryption of electronic data)
AI	Artificial Intelligence
API	Application Programming Interface
AWS	Amazon Web Services
CCCD	Căn Cước Công Dân (Vietnamese Citizen Identity Card)
FCM	Firebase Cloud Messaging
GMV	Gross Merchandise Value (Total value of merchandise sold over a given period)
GPS	Global Positioning System
HTTPS	Hypertext Transfer Protocol Secure
JSON	JavaScript Object Notation
KYC	Know Your Customer (The process of verifying the identity of clients/partners)
PII	Personally Identifiable Information
RBAC	Role-Based Access Control
SLA	Service Level Agreement
SLM	Small Language Model (A lightweight AI model optimized for specific tasks)
SSD	Solid State Drive
TLS	Transport Layer Security
WSS	WebSocket Secure

I. Introduction

1. Product Background

Currently, finding reliable home repair services, particularly for appliances like air conditioners, presents significant challenges for households in major Vietnamese cities. Residents often face a fragmented market where they rely on phone numbers pasted on walls or unverified posts on social media to find technicians.

This traditional approach leads to several critical issues:

- Information Asymmetry: Customers lack knowledge about technical faults and standard pricing, making them vulnerable to price gouging and unnecessary service upselling.
- Lack of Trust: There is no standardized mechanism to verify a technician's skills or background, creating safety risks and quality concerns.
- Inefficient Processes: The manual process of searching, calling, and scheduling is time-consuming and lacks transparency regarding service progress.

V-Fix was conceived to address these "pain points" by leveraging Artificial Intelligence (AI) and the Gig Economy model to build a transparent, efficient, and trustworthy connection between customers and independent technicians.

2. Existing Systems

2.1 Traditional Service Companies (Thợ Việt)

Description: These operate on a B2C model where the company employs technicians and dispatches them to customers.

Pros: Legal entity and established reputation.

Cons: Higher service costs due to operational overhead. The booking process is often manual or static, lacking instant technical consultation or diagnostic features before the technician arrives.

2.2 Social Media Groups (Facebook, Zalo)

Description: Open groups where users post requests and freelancers comment to offer services.

Pros: Fast response time and competitive pricing.

Cons: Highly chaotic and unregulated. There is no guarantee of quality, high risk of scams, and no consolidated review system to evaluate a technician's history.

3. Business Opportunity

The demand for home maintenance, especially air conditioning repair, is consistently high in Vietnam due to the tropical climate. Simultaneously, the "Gig Economy" trend is booming, with users becoming accustomed to on-demand services like Grab or Be.

However, a gap remains in the market for a specialized platform that combines the speed of on-demand booking with the reliability of a managed service. V-Fix seizes this opportunity by integrating **Generative AI** to solve the "trust" problem. By providing preliminary diagnostics and price estimations *before* booking, V-Fix empowers users with information, reducing the fear of being overcharged. This unique value proposition fits perfectly with the modern consumer's preference for transparency and technology-driven solutions.

4. Software Product Vision

V-Fix is an AI-driven on-demand marketplace designed to revolutionize the home repair industry. Our vision is to create a "Trust Platform" where booking a repairman is as easy and safe as booking a ride.

For homeowners, V-Fix acts as a digital technical assistant that diagnoses issues and connects them with rated professionals. For technicians, it serves as a powerful tool to find jobs and build their professional reputation based on merit rather than marketing budget. V-Fix aims to eliminate the information gap, ensuring every repair service is transparent, safe, and reasonably priced.

5. Major Features

FE-01: AI Diagnostics & Price Estimation An intelligent chatbot allows users to describe problems via text or images. The AI analyzes the input to identify potential faults and provides a transparent reference price range.

FE-02: On-Demand Technician Booking A location-based matching system that connects users with available technicians in their vicinity. Users can view profiles and select technicians based on skills and distance.

FE-03: AI Review Summarization Instead of reading hundreds of comments, the system uses Small Language Models (SLMs) to automatically summarize reviews into a concise "Pros & Cons" format, helping users make quick decisions.

FE-04: Real-time Order Management Both customers and technicians can track the status of the service (Booking Accepted, Arriving, In Progress, Completed) in real-time.

6. Limitations and Exclusions

LI-01: Limited Scope for MVP For the initial version (MVP), the system will focus exclusively on **Air Conditioner Repair and Cleaning services** to ensure high accuracy for the AI diagnostic model.

LI-02: Payment Methods The MVP version will prioritize **Cash payments** upon service completion. Integrated online payment gateways (e-wallets, banking) are planned for future releases to simplify the development scope.

LI-03: Platform Availability The service is primarily mobile-first (Android/iOS) for Customers and Technicians. The Web interface is reserved for System Administrators only.

II. Overall Description

1. Product Overview

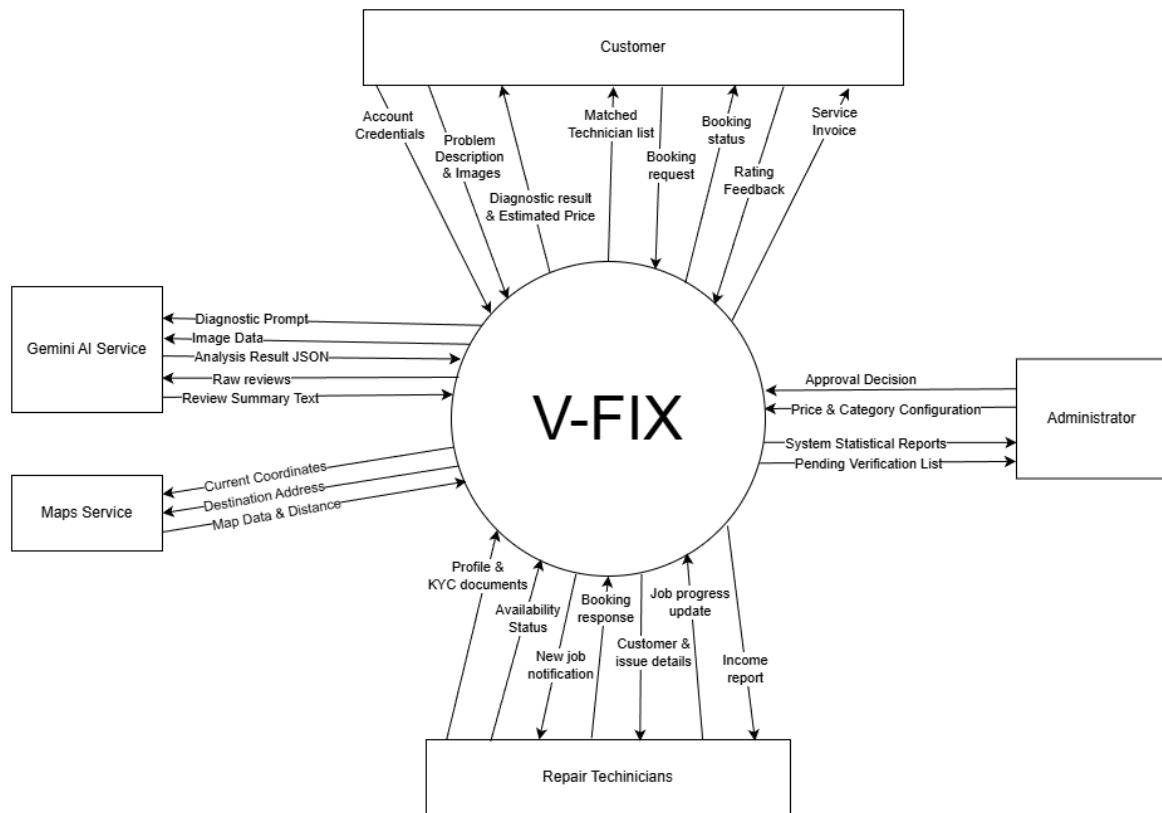


Figure II.1. Context Diagram V-Fix System

2. Business Process

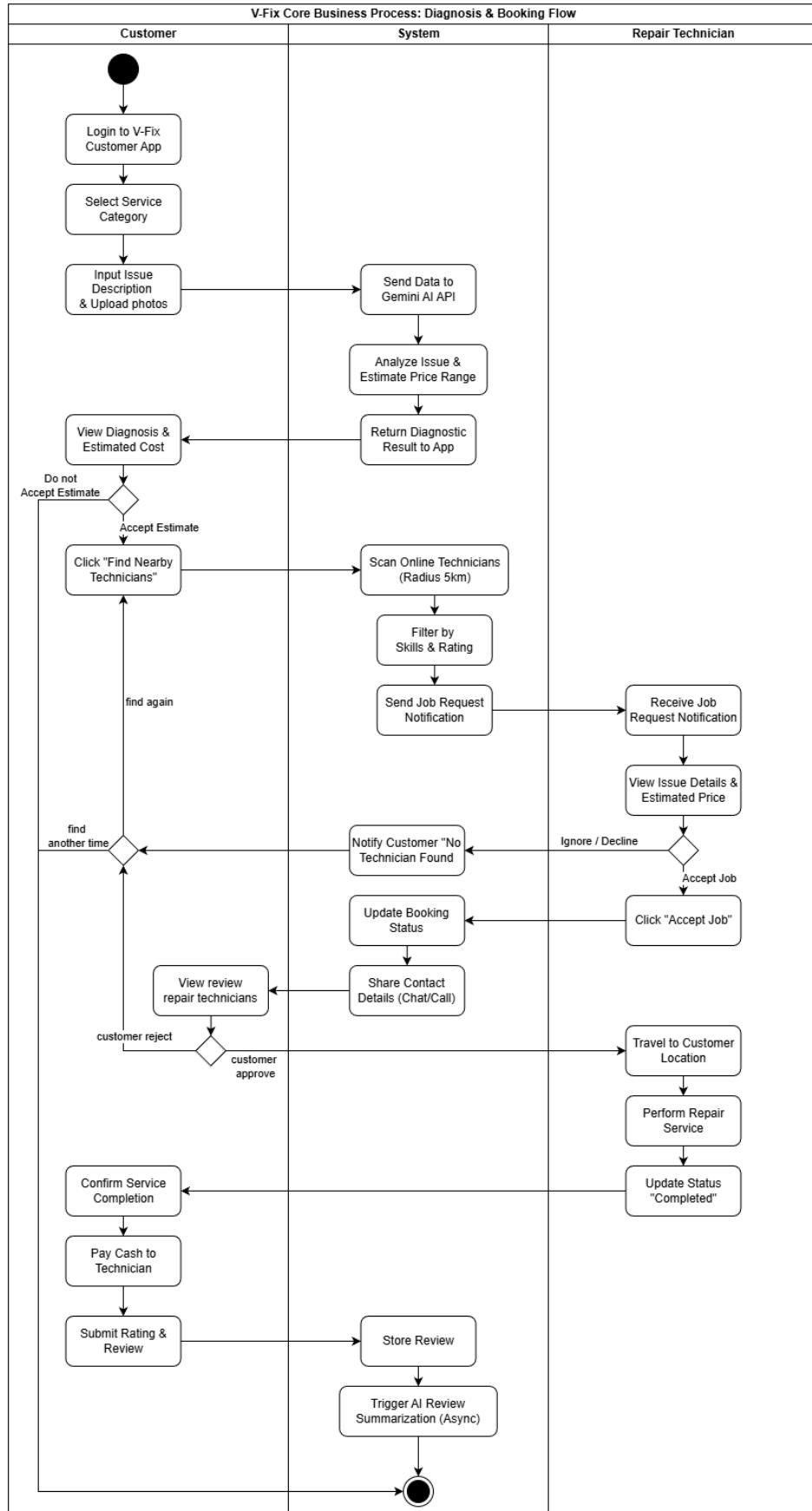


Figure II.2.1. Swimlane Diagram - V-Fix Core Business Process: Diagnosis & Booking Flow

#	Process Step	Description
1	Service Initiation	The Customer logs into the V-Fix application and selects the specific service category (e.g., Air Conditioner Repair) to begin the consultation process.
2	AI Diagnosis & Estimation	The Customer inputs a text description of the issue and uploads relevant photos. The System sends this data to the Gemini AI API, which analyzes the inputs to identify potential faults and returns a preliminary diagnosis with an estimated price range.
3	Booking Decision	The Customer reviews the diagnostic result and reference price. If the estimate is acceptable, the Customer clicks "Find Nearby Technicians" to initiate the matching process. If not, the process ends.
4	Technician Matching	The System scans for "Online" technicians within a specific radius (e.g., 5km) and filters them based on skills and ratings. A job notification is sent to the identified candidates.
5	Job Response & Preliminary Connection	The Technician receives the notification and accepts the job. The System updates the status to "Technician Found" and enables the Chat/Call feature. At this stage, the Customer can communicate with the Technician and view their full profile (including the AI Review Summary) but the specific address is still hidden.
6	Customer Validation & Approval	The Customer reviews the Technician's profile and decides to proceed: <ul style="list-style-type: none"> Case A (Approve): The Customer clicks "Approve". The System updates status to "Confirmed", reveals the Customer's specific location to the Technician, and triggers the navigation. Case B (Reject): The Customer clicks "Reject". They can then choose to "Find Again" (Loop back to Step 4 to scan for a new technician) or "Find Another Time" (End Process).
7	Service Execution	The Technician travels to the Customer's location, performs the required repair service, and updates the job status to "Completed" on the Partner App upon finishing the work.
8	Payment Feedback &	The Customer confirms the service completion, makes a cash payment to the Technician, and submits a rating and review regarding the service quality.
9	Data Processing	The System stores the review in the database and asynchronously triggers the AI service to re-summarize the Technician's review profile (updating the Pros & Cons list).

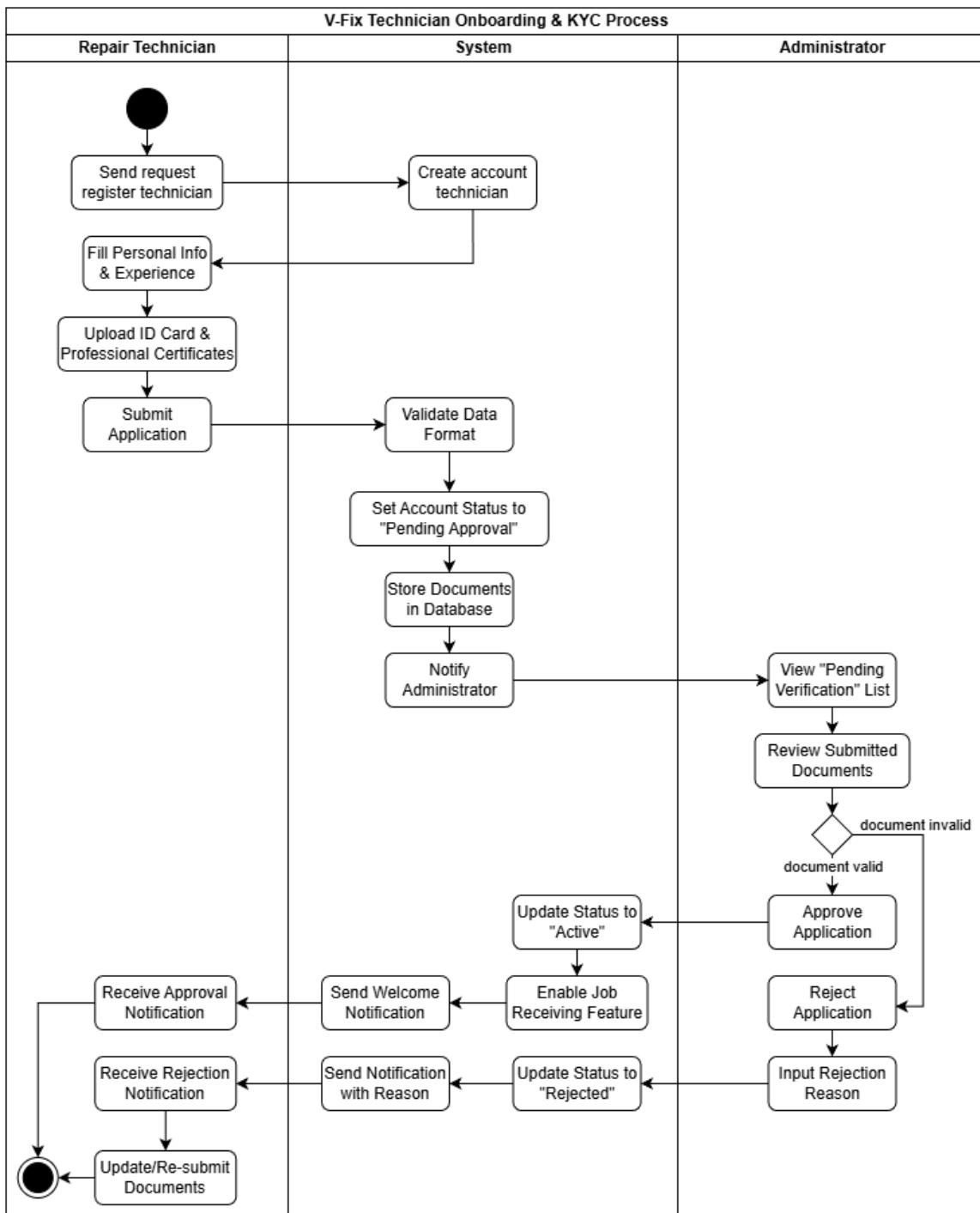


Figure II.2.2. Swimlane Diagram - V-Fix Core Business Process: Diagnosis & Booking Flow

#	Process Step	Description
1	Account Request & Provisioning	The prospective Technician sends a request to register as a partner. The System creates a designated account and sends the login credentials (username/password) to the Technician via email or SMS.
2	Profile Completion Submission &	The Technician logs into the V-Fix Partner App using the provided credentials. They fill in the required personal information (Full Name, Phone, Experience), upload digital copies of their ID Card and Professional Certificates, and submit the full application for review.
3	Automated Validation Queuing &	Upon profile submission, the System automatically validates the data format. If valid, the account status is updated to "Pending Approval". The documents are securely stored in the database, and the System sends a notification to the Administrator regarding the new verification request.
4	Manual Verification	The Administrator accesses the "Pending Verification" list on the Admin Portal and reviews the submitted documents to ensure they match the platform's quality and security standards.
5	Approval Decision	<p>Based on the review, the Administrator makes a decision:</p> <ul style="list-style-type: none"> • Case A (Rejection): If documents are invalid, the Administrator rejects the application and inputs the reason. The System updates the status to "Rejected" and notifies the Technician. The Technician must then update or re-submit the documents. • Case B (Approval): If documents are valid, the Administrator approves the application.
6	Account Activation	Upon approval, the System updates the Technician's status to "Active", fully enables the "Job Receiving" feature, and sends a "Welcome" notification. The Technician is now ready to operate on the platform.

III. User Requirements

1. Actors

#	Actor	Description
1	Customer	A Customer is a registered user (individual or household representative) who utilizes the V-Fix Customer App to seek repair services. Their primary interactions include chatting with the AI for diagnostics, posting job requests to find nearby technicians, making cash payments, and providing ratings/reviews upon service completion.
2	Repair Technician	A Repair Technician is a skilled professional or independent contractor verified by the V-Fix platform. They use the V-Fix Partner App to manage their availability status, receive job notifications based on location, view diagnostic details, accept service requests, and update the progress of ongoing repairs.
3	Administrator	The Administrator is a V-Fix internal staff member responsible for the operational management of the platform via the Web Portal. Their duties include validating Technician profiles (KYC process), managing service categories and reference prices for the AI model, and monitoring overall system activities.

2. Use Cases

2.1 Diagram

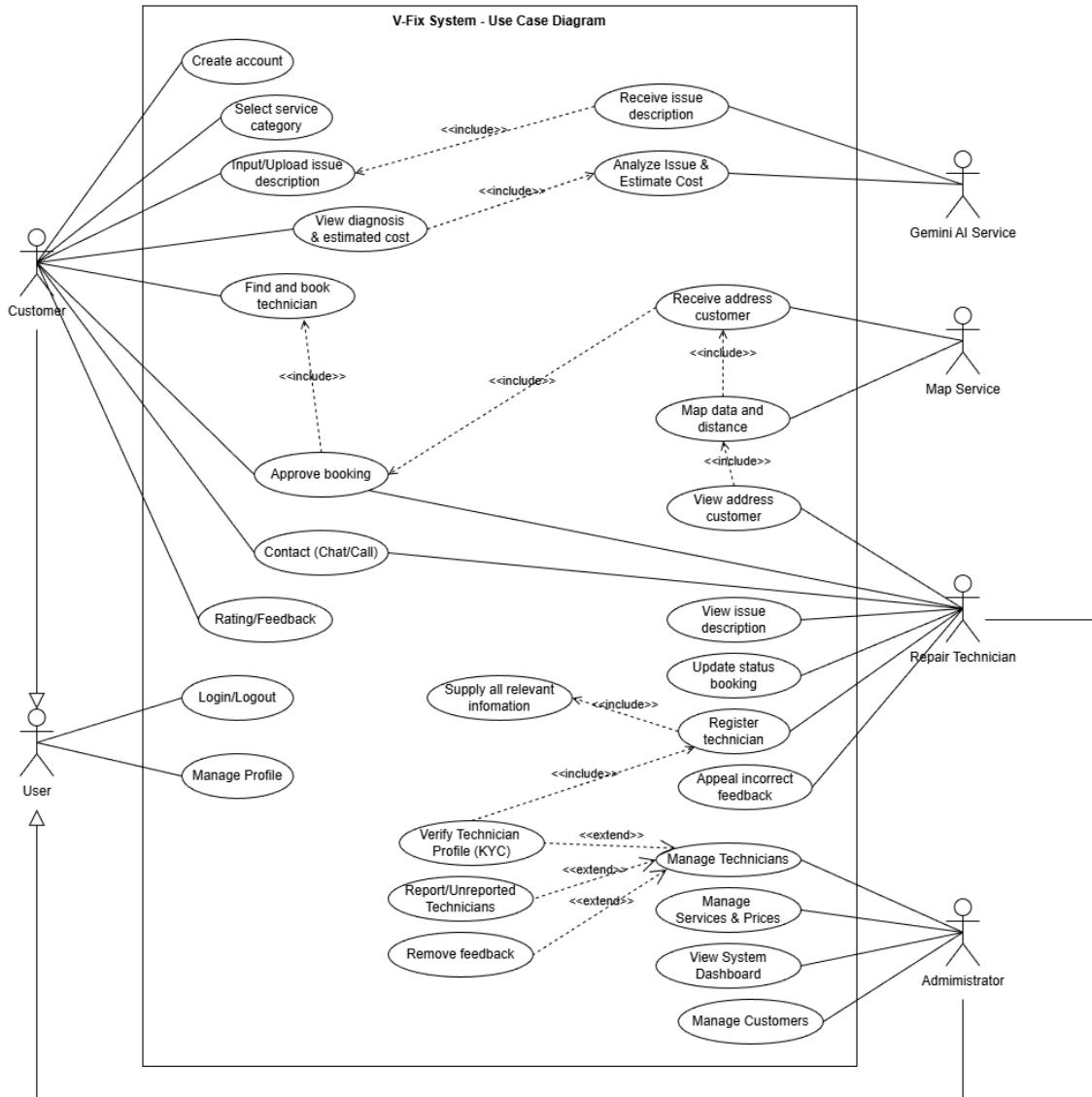


Figure III. Use Case Diagram - V-Fix System

2.2 Descriptions

ID	Use Case	Actors	Use Case Description
UC-01	Login / Logout	User (Customer, Technician, Admin)	Allows users to authenticate into the system to access their respective features or terminate their session.
UC-02	Manage Profile	User (Customer, Technician)	Allows users to view and update their personal information (Name, Phone, Password, Avatar).
UC-03	Get Diagnosis & Estimate	Customer, Gemini AI Service	The Customer inputs the issue description/images. The System invokes Gemini AI to analyze the problem and returns a diagnosis with a reference price.
UC-04	Find & Book Technician	Customer, Service Map	The Customer searches for nearby technicians. The System uses Map Service to calculate distance. Includes the process where the Customer views the Technician's profile and approves the booking request.
UC-05	Contact (Chat/Call)	Customer, Repair Technician	Enables real-time communication (text chat or phone call) between the Customer and the Technician after a booking is confirmed.
UC-06	Rate & Review Service	Customer	Allows the Customer to submit a rating (1-5 stars) and a written review for the Technician after the service is completed.
UC-07	Register Technician	Repair Technician	The process for a new Technician to supply personal info and create a partner account (includes uploading KYC documents).
UC-08	Perform Repair Service	Repair Technician	Covers the Technician's workflow: Viewing issue details, accepting the job, and updating the booking status (e.g., Arrived, Completed).
UC-09	Appeal Incorrect Feedback	Repair Technician, Administrator	Allows the Technician to report or appeal a review they believe is unfair or fake. The Administrator will review and handle these appeals.
UC-10	Verify Technician (KYC)	Administrator	The Administrator reviews submitted documents (ID, Certificates) to approve or reject a Technician's registration request.
UC-11	Manage Services & Prices	Administrator	Allows the Administrator to configure service categories, update reference prices for AI, and manage system parameters.
UC-12	Manage Users	Administrator	The Administrator views the system dashboard and manages Customer/Technician accounts (including banning users or handling reports).

Functional Description Contents

Use Case ID and Name

Give each use case a unique integer sequence number identifier. State a concise name for the use case that indicates the value the use case would provide to some user. Begin with an action verb, followed by an object.

Author and Date Created

Enter the name of the person who initially wrote this use case and the date it was written.

Primary and Secondary Actors

An actor is a person or other entity external to the software system being specified who interacts with the system and performs use cases to accomplish tasks. Different actors often correspond to different user classes, or roles, identified from the customer community that will use the product. Name the primary actor that will be initiating this use case and any other secondary actors who will participate in completing execution of the use case.

Trigger

Identify the business event, system event, or user action that initiates the use case. This trigger alerts the system that it should begin testing the preconditions for the use case so it can judge whether to proceed with execution.

Description

Provide a brief description of the reason for and outcome of this use case, or a high-level description of the sequence of actions and the outcome of executing the use case.

Preconditions

List any activities that must take place, or any conditions that must be true, before the use case can be started. The system must be able to test each precondition. Number each precondition. Example: PRE-1: User's identity has been authenticated.

Postconditions

Describe the state of the system at the successful conclusion of the use case execution. Label each postcondition in the form POST-X, where X is a sequence number. Example: POST-1: Price of item in the database has been updated with the new value.

Normal Flow

Provide a description of the user actions and corresponding system responses that will take place during execution of the use case under normal, expected conditions. This dialog sequence will ultimately lead to accomplishing the goal stated in the use case name and description. Show a numbered list of actions performed by the actor, alternating with responses provided by the system. The normal flow is numbered "X.0", where "X" is the Use Case ID.

Alternative Flows

Document other successful usage scenarios that can take place within this use case. State the alternative flow, and describe any differences in the sequence of steps that take place. Number each alternative flow in the form "X.Y", where "X" is the Use Case ID and Y is a sequence number for the alternative flow. For example, "5.3" would indicate the third alternative flow for use case number 5. Indicate where each alternative flow would branch off from the normal flow, and if pertinent, where it would rejoin the normal flow.

Exceptions

Describe any anticipated error conditions that could occur during execution of the use case and how the system is to respond to those conditions. Number each alternative flow in the form "X.Y.EZ", where "X" is the Use Case ID, Y indicates the normal (0) or alternative (>0) flow during which this exception could take place, "E" indicates an exception, and "Z" is a sequence number for the exceptions. For example "5.0.E2" would indicate the second

exception for the normal flow for use case number 5. Indicate where in the normal (or an alternative) flow each exception could occur.

Priority

Indicate the relative priority of implementing the functionality required to allow this use case to be executed. Use the same priority scheme as that used for the functional requirements.

Frequency of Use

Estimate the number of times this use case will be performed per some appropriate unit of time. This gives an early indicator of throughput, concurrent usage loads, and transaction capacity.

Business Rules

List any business rules that influence this use case. Don't include the business rule text here, just its identifier so the reader can find it in another repository when needed.

Other Information

Identify any additional requirements, such as quality attributes, for the use case that may need to be addressed during design or implementation. Also list any associated functional requirements that aren't a direct part of the use case flows but which a developer needs to know about. Describe what should happen if the use case execution fails for some unanticipated or systemic reason (e.g., loss of network connectivity, timeout). If the use case results in a durable state change in a database or the outside world, state whether the change is rolled back, completed correctly, partially completed with a known state, or left in an undetermined state as a result of the exception.

Assumptions

List any assumptions that were made regarding this use case or how it might execute.

ID and Name:	UC-01 Login / Logout		
Created By:	Tran Thanh Dat	Date Created:	27/11/2025
Primary Actor:	User (Customer, Repair Technician, Administrator)	Secondary Actors:	None
Description:	Allows users to authenticate into the system using their registered credentials (Phone/Password) or terminate their current session.		
Trigger:	User opens the App/Web Portal or clicks "Logout".		
Preconditions:	PRE-1. The user has a registered account. PRE-2. The device is connected to the Internet.		
Postconditions:	POST-1. The user is redirected to the Home Screen (for App) or Dashboard (for Admin). POST-2. Access token is generated/destroyed.		
Normal Flow:	1. User enters Phone Number and Password. (role admin enter username and password) 2. System validates credentials. 3. The system grants access and navigates to the appropriate role-based interface.		
Alternative Flows:	2a. Invalid Credentials: System displays "Incorrect phone number or password" error.		
Exceptions:	E1. Account Locked: If the user enters the wrong password 5 times, the account is locked for 30 minutes.		
Priority:	High		

ID and Name:	UC-02 Manage Profile		
Created By:	Tran Thanh Dat	Date Created:	27/11/2025
Primary Actor:	User (Customer, Repair Technician)	Secondary Actors:	None
Description:	Allows users to view and update their personal information (Name, Avatar, Password).		
Trigger:	The user selects "My Profile" from the menu.		
Preconditions:	PRE-1. The user is logged in.		
Postconditions:	POST-1. User information is updated in the database.		
Normal Flow:	1. User views current profile details. 2. The user clicks ""Edit"", changes information (e.g., uploads a new avatar), and clicks ""Save"". 3. System validates input data (format, size). 4. System updates database and displays ""Update Successful"".		
Alternative Flows:	None		
Exceptions:	E1. Validation Error: If image size > 5MB, System alerts "File too large"3.		
Priority:	Medium		
Business Rules:	None		

ID and Name:	UC-03 Get AI Diagnosis & Estimate		
Created By:	Tran Thanh Dat	Date Created:	27/11/2025
Primary Actor:	Customer	Secondary Actors:	Gemini AI Service
Description:	The Customer describes the issue via text/images. The system leverages Gemini AI to analyze the input, identify potential faults, and provide a preliminary diagnosis with a reference price range.		
Trigger:	The customer selects a service category (e.g., "Air Conditioner Repair") and chooses "Check Issue" on the Service Detail screen.		
Preconditions:	PRE-1. The customer is logged in. PRE-2. Gemini AI Service API is operational.		
Postconditions:	POST-1. A diagnostic report (Fault Cause, Solution, Price Range) is displayed. POST-2. The diagnostic session is saved to pass to the Technician later.		
Normal Flow:	<ol style="list-style-type: none"> 1. The customer enters a text description of the problem (e.g., ""AC is not cooling""). 2. (Optional) Customer uploads 1-3 photos of the appliance. 3. Customer clicks ""Analyze"". 4. The system sends the inputs (Text + Image Base64) to Gemini AI API with a specific prompt. 5. Gemini AI processes the request and returns a structured JSON response. 6. System parses the JSON and displays the Diagnosis Result screen including: <ul style="list-style-type: none"> - Predicted Fault (e.g., ""Low Gas""). - Recommended Action (e.g., ""Refill Gas""). - Estimated Price Range (e.g., ""150.000 - 250.000 VND""). 		
Alternative Flows:	<p>5a. AI Cannot Diagnose: If AI response indicates "Unclear", System displays: ""Cannot diagnose based on provided info. Please describe in more detail."</p> <p>6a. User Skips: Customers can choose "Skip AI & Book Directly" if they already know the issue.</p>		
Exceptions:	E1. API Timeout/Failure: If Gemini API does not respond within 10 seconds, System displays "AI Service Busy" and redirects Customer to the manual booking screen.		
Priority:	High		
Business Rules:	BR-07		

ID and Name:	UC-04 Find & Book Technician		
Created By:	Tran Thanh Dat	Date Created:	27/11/2025
Primary Actor:	Customer	Secondary Actors:	Map Service
Description:	The process of finding a nearby technician. Crucially, it includes the "Match & Confirm" logic where the Customer must approve the Technician's profile before the specific address is revealed.		
Trigger:	Customer clicks "Find Nearby Technicians" (either after AI Diagnosis or from Home Screen).		
Preconditions:	PRE-1. GPS Location Service is enabled. PRE-2. Customer wallet/cash is sufficient (logically checked).		
Postconditions:	POST-1. Booking status set to "Confirmed". POST-2. The customer's address is shared with the Technician.		
Normal Flow:	<ol style="list-style-type: none"> 1. The system gets the customer's current coordinates via Map Service. 2. System scans database for Technicians who are "Online" and within 5km radius. 3. The system sends a Job Request to the nearest suitable Technician. 4. The technician accepts the request. 5. The system notifies Customer "Technician Found" and shows the Technician's Public Profile (Name, Avatar, Rating, and AI Review Summary). Note: Address is NOT revealed yet. 6. The customer reviews the profile and clicks "Approve". 7. System changes Booking Status to "Confirmed". 8. The system reveals the Customer's full address to the Technician and enables navigation. 		
Alternative Flows:	<p>2a. No Technician Found: System scans for 60 seconds. If no one accepts, System alerts "No technicians available nearby" and offers to "Try Again" or "Book Later".</p> <p>6a. Customer Rejects: Customer reviews profile and clicks "Reject".</p> <ul style="list-style-type: none"> - The system asks: "Find another technician?" - If Yes: Loop back to Step 2 (exclude rejected technician). - If No: End Use Case. 		
Exceptions:	E1. Network Loss: If connection drops during scanning, System auto-retries 3 times before failing.		
Priority:	High		
Business Rules:	BR-04, BR-05		

ID and Name:	UC-05 Contact (Chat/Call)		
Created By:	Tran Thanh Dat	Date Created:	27/11/2025
Primary Actor:	Customer, Repair Technician	Secondary Actors:	None
Description:	Enables real-time communication (text chat or phone call) between the Customer and the Technician to coordinate details or location.		
Trigger:	The user clicks the "Chat" or "Call" icon on the Active Booking screen.		
Preconditions:	PRE-1. Booking status is "Technician Found" or "Confirmed". PRE-2. Both parties have an internet connection.		
Postconditions:	POST-1. Chat history is stored in the database.		
Normal Flow:	1. Chat: User types a message and sends. Recipient receives push notification and views message. 2. Call: User taps "Call". The system launches the phone dialer with the other party's number pre-filled.		
Alternative Flows:	None		
Exceptions:	E1. Booking Ended: If the booking is "Completed" or "Cancelled", the Chat/Call feature is disabled immediately to prevent harassment.		
Priority:	Medium		
Business Rules:	None		

ID and Name:	UC-06 Rate & Review Service		
Created By:	Tran Thanh Dat	Date Created:	27/11/2025
Primary Actor:	Customer	Secondary Actors:	None
Description:	Allows the Customer to submit a rating (1-5 stars) and a written review. This data feeds into the AI Review Summarization system.		
Trigger:	Booking status changes to "Completed".		
Preconditions:	PRE-1. Service is completed. PRE-2. The customer has not reviewed this booking yet.		
Postconditions:	POST-1. Review is stored publicly on the Technician's profile. POST-2. Async Trigger: If criteria met, System triggers AI to update the Technician's review summary.		
Normal Flow:	1. The system displays a "Rate Your Experience" popup. 2. Customer selects Star Rating (e.g., 5 stars). 3. Customer selects predefined tags (e.g., "Punctual", "Skillful") or types a comment. 4. Customer clicks "Submit". 5. System validates content (profanity filter) and stores the review. 6. The system displays "Thank you" and returns to Home.		
Alternative Flows:	None		
Exceptions:	E1. Profanity Detected: System blocks submission and warns "Content contains inappropriate words".		
Priority:	High		
Business Rules:	BR-10, BR-11		

ID and Name:	UC-07 Register Technician		
Created By:	Tran Thanh Dat	Date Created:	27/11/2025
Primary Actor:	Repair Technician	Secondary Actors:	None
Description:	The process for a prospective Technician to activate their provided account, complete their profile, and submit KYC documents for Admin verification.		
Trigger:	Technician logs in for the first time with credentials provided by the System via email/SMS.		
Preconditions:	PRE-1. Technician has received account credentials (Username/Password) from the System (via manual request or support channel).		
Postconditions:	POST-1. Account status changes to "Pending Verification". POST-2. Admin receives a notification to review documents.		
Normal Flow:	1. The technician opens the Partner App and logs in. 2. The system detects "New Account" status and redirects to the "Complete Profile" screen. 3. Technician enters Personal Info (Full Name, Address, Phone, Years of Experience). 4. Technician uploads ID Card (Front/Back) photos. 5. Technician uploads Vocational Certificate photos. 6. Technician reviews info and clicks "Submit Application". 7. The system validates file formats and sizes. 8. System changes account status to "Pending Approval" and locks editing.		
Alternative Flows:	7a. Invalid File: If file > 5MB or wrong format, System alerts user to re-upload.		
Exceptions:	E1. Upload Fail: If network fails during upload, System saves draft and allows retry.		
Priority:	High		
Business Rules:	BR-01, BR-02		

ID and Name:	UC-08 Perform Repair Service		
Created By:	Tran Thanh Dat	Date Created:	27/11/2025
Primary Actor:	Repair Technician	Secondary Actors:	None
Description:	Covers the Technician's workflow from the moment they accept a job until they finish it. Includes status updates and navigation.		
Trigger:	Technician clicks "Accept" on a Job Request (part of UC-04).		
Preconditions:	PRE-1. Booking status is "Accepted" or "Confirmed".		
Postconditions:	POST-1. Booking status set to "Completed". POST-2. Technician's wallet/income balance is updated (if applicable). POST-3. Technicians become ""Available"" for new jobs.		
Normal Flow:	1. Waiting for Approval: Technician waits for Customer to approve profile (as per UC-04). 2. Navigation: Once confirmed, Technician views Customer's address and clicks "Get Directions" (opens Map). 3. Arrival: Technician arrives at location and swipes/clicks "I Have Arrived". - The system notifies the customer: "The technician is at your door". 4. Diagnosis & Repair: Technician checks the appliance. If the issue matches the AI diagnosis, they proceed. 5. Completion: After finishing work, the technician clicks "Complete Job". 6. Payment: Technician confirms receiving cash payment from Customer. 7. System updates status to "Completed" and allows Technician to rate the Customer (optional).		
Alternative Flows:	4a. Additional Issue: If Technician finds more faults than AI predicted, they inform Customer and agree on a new price verbally (MVP scope). 5a. Customer Cancel: If Customer cancels mid-way, Technician receives a notification and job ends.		
Exceptions:	E1. Customer Absent: Technician arrives but Customer is not home. Technician clicks "Report Issue" -> "Customer No-Show".		
Priority:	High		
Business Rules:	BR-06, BR-07		

ID and Name:	UC-09 Appeal Incorrect Feedback		
Created By:	Tran Thanh Dat	Date Created:	27/11/2025
Primary Actor:	Repair Technician	Secondary Actors:	Administrator
Description:	Allows the Technician to report or appeal a review they believe is unfair, spam, or violates community standards. The Administrator reviews these requests to decide whether to remove the feedback.		
Trigger:	Technician views a negative review on their profile and clicks the "Report/Appeal" button.		
Preconditions:	PRE-1. The review exists and belongs to the Technician's profile.		
Postconditions:	POST-1. Appeal request is sent to the Admin Dashboard. POST-2. (Conditional) Review is hidden if Admin approves the appeal.		
Normal Flow:	<ol style="list-style-type: none"> 1. The technician selects the specific review. 2. Technician clicks "Report this Review". 3. The system displays a form to select reasons (e.g., "Fake Review", "Offensive Language", "Competitor Spam") and input details. 4. Technician clicks "Submit". 5. System flags the review as "Under Review" (visible to Admin only) and notifies the Technician "Report Sent". 6. Admin Process: Admin reviews the report, compares with chat history/job details, and makes a decision. 7. The system notifies the technician of the outcome. 		
Alternative Flows:	None		
Exceptions:	E1. Already Reported: If Technician tries to report the same review twice, System alerts "You have already reported this review".		
Priority:	Low		
Business Rules:	None		

ID and Name:	UC-10 Verify Technician (KYC)		
Created By:	Tran Thanh Dat	Date Created:	27/11/2025
Primary Actor:	Administrator	Secondary Actors:	Repair Technician
Description:	The process where the Administrator reviews submitted documents (ID Card, Vocational Certificates) to approve or reject a Technician's registration request.		
Trigger:	Administrator logs into the Portal and views the "Pending Verification" counter.		
Preconditions:	PRE-1. The technician has submitted a complete application (UC-07).		
Postconditions:	POST-1. Technician account status is updated to "Active" or "Rejected". POST-2. Notification email is sent to the Technician.		
Normal Flow:	1. Administrator selects a profile from the "Pending Verification" list. 2. The system displays uploaded images (ID Card Front/Back, Certificate) side-by-side with entered personal info. 3. Administrator verifies validity (Check ID number, Expiry date, Name match). 4. Administrator clicks "Approve". 5. The system activates the account, changes status to "Active", and enables the "Job Receiving" feature for the Technician. 6. The system sends "Welcome Partner" email/notification.		
Alternative Flows:	4a. Rejection: If documents are invalid (blurry, fake, expired): <ul style="list-style-type: none"> - Administrator clicks "Reject". - System prompts to select/type Rejection Reason (e.g., "ID card unclear"). - System changes status to "Rejected" and emails the reason to Technician requiring re-submission. 		
Exceptions:	None		
Priority:	High		
Business Rules:	BR-02, BR-03		

ID and Name:	UC-11 Manage Services & Prices		
Created By:	Tran Thanh Dat	Date Created:	27/11/2025
Primary Actor:	Administrator	Secondary Actors:	None
Description:	Allows the Administrator to configure service categories (e.g., "AC Repair", "Fridge Repair") and update the Reference Price List. This data is used by the AI Model for estimation (UC-03).		
Trigger:	Admin selects "Service Management" from the Dashboard.		
Preconditions:	PRE-1. Admin is logged in.		
Postconditions:	POST-1. System database (Service/Price tables) is updated. POST-2. AI estimation logic reflects new prices immediately.		
Normal Flow:	<ol style="list-style-type: none"> 1. Admin views list of current services and base prices. 2. Admin clicks "Edit" on a category (e.g., "AC Gas Refill"). 3. Admin updates the Min Price and Max Price (e.g., Change 150k to 200k). 4. Admin clicks "Save". 5. System updates records and logs the change. 		
Alternative Flows:	None		
Exceptions:	E1. Invalid Range: If Min Price > Max Price, System shows error.		
Priority:	Medium		
Business Rules:	BR-07		

ID and Name:	UC-12 Manage Users		
Created By:	Tran Thanh Dat	Date Created:	27/11/2025
Primary Actor:	Administrator	Secondary Actors:	None
Description:	The Administrator views the system dashboard and manages Customer/Technician accounts. Includes searching, viewing details, and Banning/Unbanning users.		
Trigger:	Admin selects "User Management" or receives a high-level report alert.		
Preconditions:	PRE-1. Admin is logged in.		
Postconditions:	POST-1. User status is changed (Active <-> Banned).		
Normal Flow:	<ol style="list-style-type: none"> 1. Admin searches for a user by Name or Phone Number. 2. The system displays a user list. 3. Admin clicks on a specific user to view details (History, Ratings, Reports). 4. Admin clicks "Ban Account" (if user violated policies). 5. System prompts for confirmation and reason. 6. System changes user status to "Banned" and logs the act. 		
Alternative Flows:	4a. Unban: If the user is Banned, Admin can click "Unban" to restore access.		
Exceptions:	None		
Priority:	Low		
Business Rules:	BR-12		

3. Business Rules

ID	Rule Definition
BR-01	Technician Eligibility: All Repair Technicians must be at least 18 years old and possess a valid citizen identification card (CCCD) and relevant vocational certificates.
BR-02	KYC Document Standards: Uploaded verification documents (ID, Certificates) must be in JPG/PNG format, clearly visible, and must not exceed 5MB per file.
BR-03	KYC Processing SLA: The Administrator must process (Approve/Reject) a Technician's registration application within 24 business hours of submission.
BR-04	Address Privacy: The Customer's specific home address (Street number, House number) must remain hidden/masked from the Technician until the Booking Status reaches "Confirmed" (Customer clicks Approve).
BR-05	Technician Matching Radius: The system shall only scan and suggest Technicians who are currently "Online" and within a 5km radius of the Customer's location.
BR-06	Concurrent Jobs: A Repair Technician can only accept one (1) active job at a time. They cannot receive new job notifications until the current job status is updated to "Completed" or "Cancelled".
BR-07	AI Price Disclaimer: The price range provided by the AI Diagnostics tool is for reference only. The final service price is negotiated and agreed upon between the Customer and Technician on-site.
BR-08	Booking Cancellation: <ul style="list-style-type: none">• Customers can cancel the booking anytime before the status becomes "In Progress" (Technician Arrived).• If a Customer cancels after the "Confirmed" status, the system may record a "Cancellation Strike" on their profile (for future penalty logic).
BR-09	Payment Method: For the MVP version, the system only supports Direct Cash Payment from Customer to Technician. Online payments are not processed via the app.
BR-10	Review Policy: Customers can only submit a rating and review once per completed booking ID. Reviews cannot be edited after 7 days from submission.
BR-11	AI Review Summarization Trigger: The AI summary of a Technician's profile is automatically re-generated/updated only when the Technician receives 3 new reviews since the last update, or manually triggered by Admin.
BR-12	Account Suspension: An account (Customer or Technician) will be automatically temporarily banned if it receives 3 valid reports (verified by Admin) within a 30-day period.

IV. Functional Requirements

1. System Functional Overview

1.1 Screen Flow

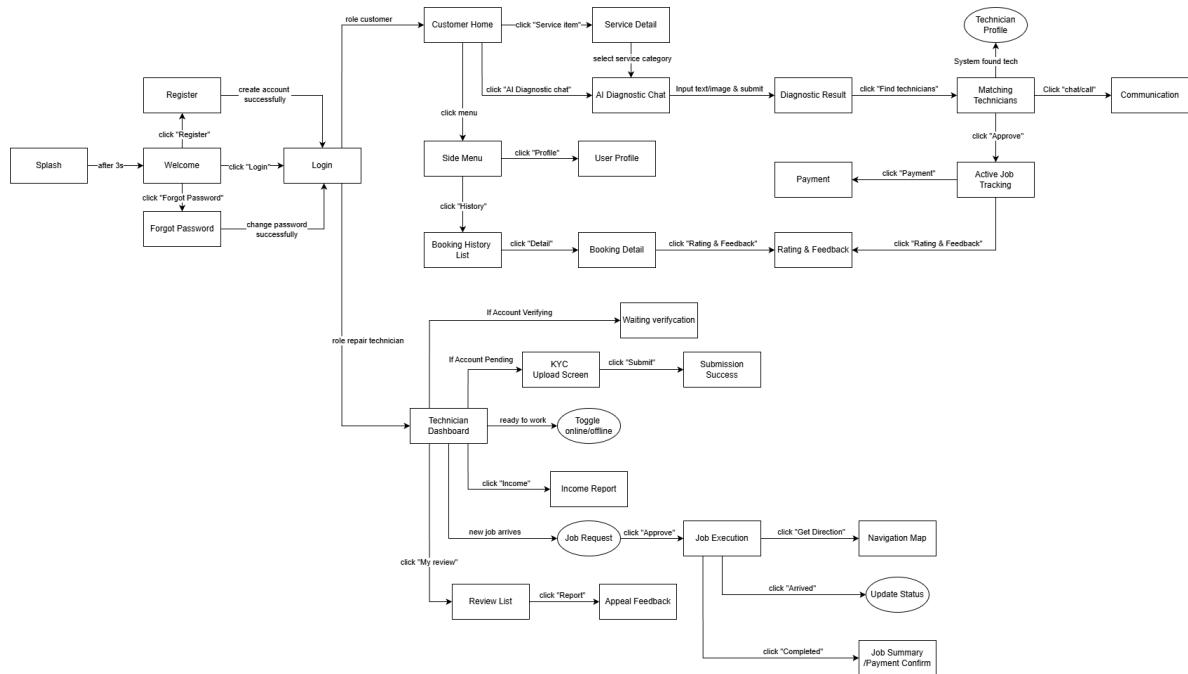


Figure IV.1.1. Screen Flow- Mobile Application

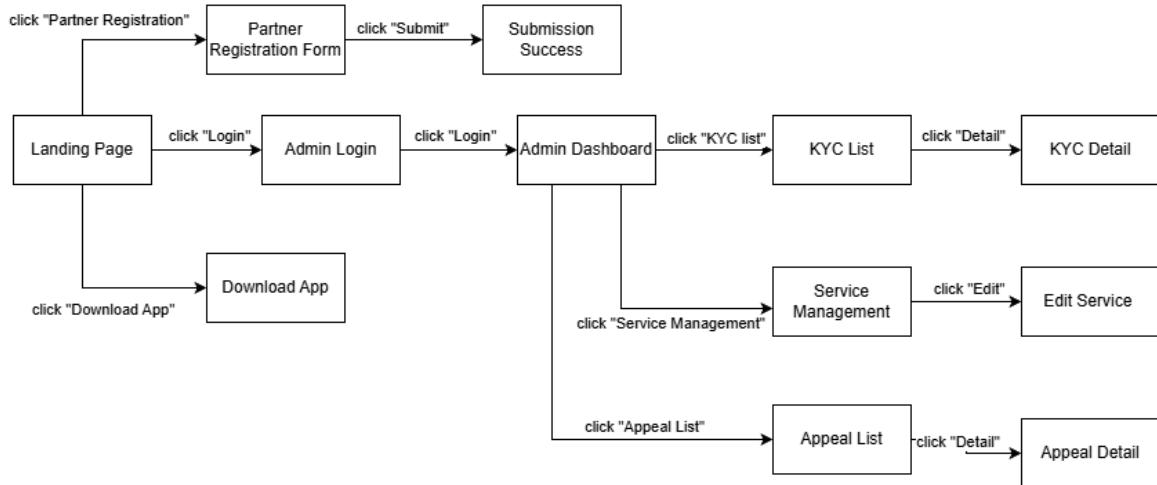


Figure IV.1.2. Screen Flow- Web Application

1.2 Screen Descriptions

#	Screen	Feature	Description
FR-01	Splash Screen	Authentication	The initial loading screen displaying the V-Fix logo. Automatically navigates to the Welcome Screen after 3 seconds.
FR-02	Welcome Screen	Authentication	The landing page allowing users to choose between "Login" or "Register" to enter the system.
FR-03	Login Screen	Authentication	Allows Customers and Technicians to authenticate using their credentials. Directs them to their respective Home screens based on their Role.
FR-04	Register Screen	Authentication	A form for new users (Customers) to create an account by providing basic information.
FR-05	Forgot Password Screen	Authentication	Allows users to reset their password via OTP/Email verification.
FR-06	Customer Home	Customer Home	- The main dashboard for Customers, displaying service categories, banners, and the side menu entry point.
FR-07	Service Detail	Customer - AI	Displays detailed information about a selected service and provides the entry point to the "AI Diagnostic Chat".
FR-08	AI Diagnostic Chat	Customer - AI	A chat interface where Customers describe their issue (text/image) to the AI for analysis.
FR-09	Diagnostic Result	Customer - AI	Displays the AI-generated diagnosis, including the potential fault and reference price range. Allows proceeding to find technicians.
FR-10	Matching Technicians	Customer Booking	- A waiting screen showing the scanning progress (Radius 5km) while the system finds a suitable Technician.
FR-11	Technician Profile (Modal)	Customer Booking	- Displays the found Technician's details (Avatar, Name, Rating, AI Review Summary) for the Customer to Approve or Reject.
FR-12	Active Job Tracking	Customer Booking	- The real-time status screen showing the booking progress (Technician Found, Arriving, Working). Provides Chat/Call buttons.
FR-13	Communication	Interaction	A chat/call interface allowing direct communication between Customer and Technician during an active booking.
FR-14	Payment Screen	Customer Booking	- Displays the final amount to be paid via cash upon service completion.
FR-15	Rating & Feedback	Customer Booking	- Allows the Customer to rate the service (1-5 stars) and write a review after payment.
FR-16	Side Menu	Customer Utility	- A navigation drawer providing quick access to Profile, History, and Settings.
FR-17	User Profile	Customer	- Allows Customers to view and edit their personal

#	Screen	Feature	Description
		Utility	Information (Name, Phone, Avatar).
FR-18	Booking History List	Customer Utility	- Displays a list of all past and cancelled bookings.
FR-19	Booking Detail	Customer Utility	- Shows detailed information of a specific past booking (Service info, Technician, Price, Review).
FR-20	Technician Dashboard	Tech Workspace	- The main workspace for Technicians to toggle Online/Offline status, view income summary, and receive jobs.
FR-21	KYC Upload Screen	Tech Onboarding	- A form for new Technicians (Pending status) to upload ID Cards and Vocational Certificates for verification.
FR-22	Submission Success	Tech Onboarding	- Confirmation screen after successful KYC document submission.
FR-23	Waiting Verification	Tech Onboarding	- A status screen informing the Technician that their account is under Admin review.
FR-24	Job Request (Popup)	Tech Workspace	- A popup notification displaying new job details (Issue, Distance, Price) for the Technician to Accept or Decline.
FR-25	Job Execution	Tech Workflow	- The main action screen for an ongoing job, allowing status updates (Arrived, Completed) and map navigation.
FR-26	Navigation Map	Tech Workflow	- Displays the route from the Technician's current location to the Customer's address.
FR-27	Job Summary / Payment Confirm	Tech Workflow	- Summary screen shown after marking a job as "Completed", confirming the cash amount received.
FR-28	Income Report	Tech Management	- Displays the Technician's earnings statistics (Daily, Weekly, Monthly).
FR-29	Review List	Tech Management	- Allows Technicians to view reviews received from Customers.
FR-30	Appeal Feedback	Tech Management	- A form allowing Technicians to report/appeal unfair reviews to the Administrator.
FR-31	Landing Page	Public - Info	The public homepage introducing V-Fix services, benefits, and providing entry points for App Download, Partner Registration, and Admin Login.
FR-32	Partner Registration Form	Public Onboarding	- A web form allowing prospective technicians to request a partner account by submitting basic contact info and working area.
FR-33	Submission Success	Public Onboarding	- Acknowledgment screen displayed after the partner request is successfully sent to the system.
FR-34	Download App	Public - Info	Displays QR Codes and direct links for Users to download the V-Fix Customer App and Partner App (iOS/Android).
FR-35	Admin Login	Admin - Auth	Secure login portal for System Administrators to access the

#	Screen	Feature	Description
			management dashboard.
FR-36	Admin Dashboard	Admin Management	The central hub for Administrators, showing high-level statistics (Total Users, Pending KYCs, Revenue) and sidebar navigation.
FR-37	KYC List	Admin - KYC	Displays a list of Technician accounts with "Pending Verification" status, sorted by submission date.
FR-38	KYC Detail	Admin - KYC	Shows the specific Technician's uploaded documents (ID Card, Vocational Certificates) side-by-side with profile data for validation (Approve/Reject actions).
FR-39	Service Management	Admin - Config	Lists all available service categories and their current Reference Price ranges used by the AI model.
FR-40	Edit Service	Admin - Config	A form/modal allowing the Admin to update the Min/Max price or description of a specific service category.
FR-41	Appeal List	Admin Support	- Displays a list of reports/appeals submitted by Technicians regarding unfair reviews or spam.
FR-42	Appeal Detail	Admin Support	- Detailed view of a reported review, showing the original comment, the Technician's report reason, and chat logs (if available) for decision making.

1.3 Screen Authorization

Screen	Customer	Repair Technician	Administrator
Splash Screen	X	X	
Welcome Screen	X	X	
Login Screen	X	X	
Register Screen	X		
Forgot Password Screen	X	X	
Customer Home	X		
Service Detail	X		
AI Diagnostic Chat	X		
Diagnostic Result	X		
Matching Technicians	X		
Technician Profile (Modal)	X		
Active Job Tracking	X		
Communication	X	X	
Payment Screen	X		
Rating & Feedback	X		
Side Menu	X		
User Profile	X		
Booking History List	X		
Booking Detail	X		
Technician Dashboard		X	
KYC Upload Screen		X	
Submission Success		X	
Waiting Verification		X	
Job Request (Popup)		X	
Job Execution		X	
Navigation Map		X	
Job Summary / Payment Confirm		X	
Income Report		X	
Review List		X	
Appeal Feedback		X	
Landing Page	X	X	X
Partner Registration Form		X	
Submission Success (Web)		X	
Download App	X	X	

Screen	Customer	Repair Technician	Administrator
Admin Login			X
Admin Dashboard			X
KYC List			X
KYC Detail			X
Service Management			X
Edit Service			X
Appeal List			X
Appeal Detail			X

In which:

- **Customer:** A registered user accessing the system via the **Customer Mobile App** to find and book repair services.
- **Repair Technician:** A verified partner accessing the system via the **Partner Mobile App** to receive jobs, manage their status, and view income.
- **Administrator:** An internal staff member accessing the system via the **Web Portal** to manage users, verify KYC documents, and configure system settings.
- *Note:* **Public Web Pages** accessible to unauthenticated guests (potential Customers or Technicians) and do not require a specific login role.

1.4 Non-Screen Functions

#	System Function	Feature	Description
FR-43	Gemini AI Integration Service	Core - AI	An API wrapper service that constructs prompts, handles secure communication with the Google Gemini API, and parses the returned JSON for Diagnostic Results (UC-03) and Review Summaries (UC-06).
FR-44	Technician Matching Engine	Core - Booking	A geospatial algorithm that runs when a customer requests a booking. It queries the database to find Technicians who are currently "Online", have the correct skill set, and are located within a 5km radius (Great-circle distance) of the Customer.
FR-45	Async Review Summarizer	Core - AI	A background job (Trigger/Scheduler) that monitors new reviews. As per BR-11, when a Technician receives 3 new reviews, this job aggregates the data and calls the AI Service to regenerate the "Pros & Cons" summary.
FR-46	Notification Dispatcher	System - Utility	A centralized service responsible for sending Real-time Push Notifications (via FCM/OneSignal) to Mobile Apps when specific events occur (e.g., "Technician Found", "Job Accepted", "Booking Completed").
FR-47	Auto-Ban Monitor	System Security	A scheduled job (Cron job) that runs daily to check user report counts. As per BR-12, if a user accumulates 3 valid reports within 30 days, this function automatically updates their status to "Banned" and sends an email notification.

2. Data Requirements

2.1 Logical Data Model

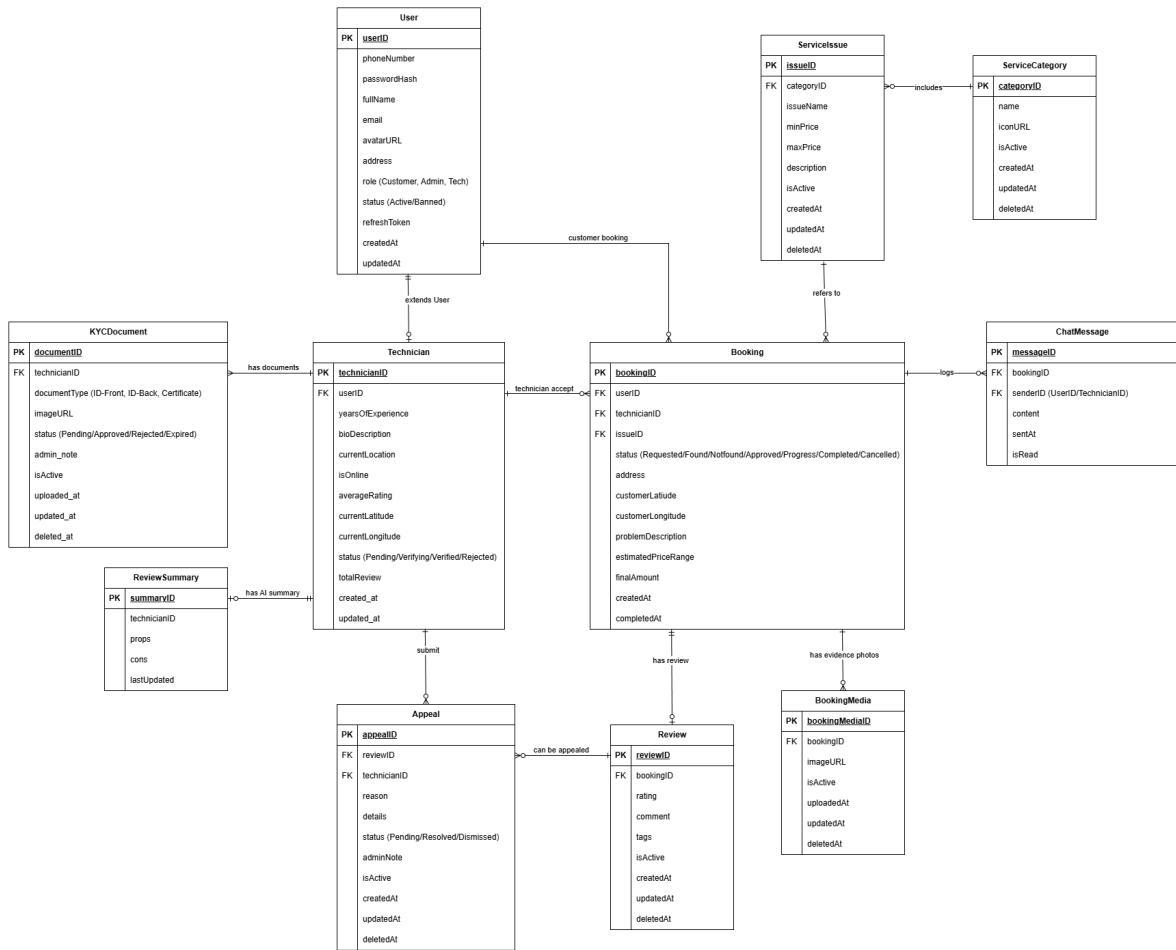


Figure IV.2.1 Logical Data Model Diagram - Entity Relationship Diagram

2.2 Data Dictionary

Data Element	Description	Composition or Data Type	Length	Values
userID	Unique identifier for the user	Integer	11	PK, Auto-increment
phoneNumber	User's phone number used for login	Varchar	15	Unique, Not Null
passwordHash	Encrypted password string	Varchar	255	Not Null
fullName	User's full display name	Varchar	100	Not Null
email	User's contact email	Varchar	100	Unique
avatarURL	Link to user's profile picture	Varchar	255	
address	Default address for the user	Varchar	255	
role	User's system role	Enum		Customer, Admin, Tech
status	Account status	Enum		Active, Banned
refreshToken	Token for maintaining session	Varchar	255	
createdAt	Timestamp of account creation	DateTime		Default: Current_Timestamp
updatedAt	Timestamp of last update	DateTime		

Figure IV.2.2.1 Entity User

Data Element	Description	Composition or Data Type	Length	Values
technicianID	Unique identifier for the technician profile	Integer	11	PK
userID	Reference to the User account	Integer	11	FK (Ref: User.userID)
yearsOfExperience	Number of years in the field	Integer		
bioDescription	Self-introduction or skills summary	Text		
currentLocation	Text representation of current location	Varchar	255	
isOnline	Availability status for receiving jobs	Boolean		True (Online), False (Offline)
averageRating	Aggregated rating score	Decimal	3,2	0.00 to 5.00
currentLatitude	GPS Latitude for geo-matching	Decimal	10,8	
currentLongitude	GPS Longitude for geo-matching	Decimal	11,8	
status	KYC verification status	Enum		Pending, Verifying, Verified, Rejected
totalReview	Total count of reviews received	Integer		Default: 0
createdAt	Timestamp of profile creation	DateTime		
updatedAt	Timestamp of last update	DateTime		

Figure IV.2.2.1 Entity Repair Technician

Data Element	Description	Composition or Data Type	Length	Values
documentID	Unique identifier for the document	Integer	11	PK
technicianID	Owner of the document	Integer	11	FK (Ref: Technician.technicianID)
documentType	Type of the uploaded document	Enum		ID-Front, ID-Back, Certificate
imageURL	Link to the document image	Varchar	255	
status	Verification status of this document	Enum		Pending, Approved, Rejected, Expired
admin_note	Note from admin regarding approval/rejection	Varchar	255	
isActive	Soft delete flag	Boolean		Default: True
uploaded_at	Upload timestamp	DateTime		
updated_at	Last update timestamp	DateTime		
deleted_at	Soft delete timestamp	DateTime		Nullable

Figure IV.2.2.1 Entity KYC Document

Data Element	Description	Composition or Data Type	Length	Values
categoryID	Unique identifier for the category	Integer	11	PK
name	Name of the category (e.g., AC Repair)	Varchar	100	Not Null
iconURL	Link to the category icon	Varchar	255	
isActive	Visibility status	Boolean		Default: True
createdAt	Creation timestamp	DateTime		
updatedAt	Last update timestamp	DateTime		
deletedAt	Soft delete timestamp	DateTime		Nullable

Figure IV.2.2.1 Entity Service Category

Data Element	Description	Composition or Data Type	Length	Values
issueID	Unique identifier for the issue	Integer	11	PK
categoryID	Parent category	Integer	11	FK (Ref: ServiceCategory.categoryID)
issueName	Name of the issue (e.g., Leaking Water)	Varchar	255	Not Null
minPrice	Minimum reference price	Decimal	10,2	
maxPrice	Maximum reference price	Decimal	10,2	
description	Detailed description of the issue	Text		
isActive	Visibility status	Boolean		Default: True
createdAt	Creation timestamp	DateTime		
updatedAt	Last update timestamp	DateTime		
deletedAt	Soft delete timestamp	DateTime		Nullable

Figure IV.2.2.1 Entity Service Issue

Data Element	Description	Composition or Data Type	Length	Values
bookingID	Unique identifier for the booking	UUID	11	PK
userID	Customer who placed the booking	UUID	11	FK (Ref: User.userID)
technicianID	Technician assigned to the booking	Integer	11	FK (Ref: Technician.technicianID), Nullable
issueID	The identified issue (AI or Manual)	Integer	11	FK (Ref: ServiceIssue.issueID)
status	Current state of the booking workflow	Enum		Requested, Found, NotFound, Approved, Progress, Completed, Cancelled
address	Service location address	Varchar	255	Not Null
customerLatitude	GPS Latitude of customer	Decimal	10,8	
customerLongitude	GPS Longitude of customer	Decimal	11,8	
problemDescription	User's description of the problem	Text		
estimatedPriceRange	Price range suggested by AI	Varchar	100	
finalAmount	Actual amount paid	Decimal	10,2	
createdAt	Booking creation time	DateTime		
completedAt	Service completion time	DateTime		Nullable

Figure IV.2.2.1 Entity Booking

Data Element	Description	Composition or Data Type	Length	Values
bookingMediaID	Unique identifier	Integer	11	PK
bookingID	Related booking	Integer	11	FK (Ref: Booking.bookingID)
 imageURL	Link to the image	Varchar	255	
isActive	Visibility status	Boolean		Default: True
uploadedAt	Upload timestamp	DateTime		
updatedAt	Last update timestamp	DateTime		
deletedAt	Soft delete timestamp	DateTime		Nullable

Figure IV.2.2.1 Entity Booking Media

Data Element	Description	Composition or Data Type	Length	Values
messageID	Unique identifier	Integer	11	PK
bookingID	Related booking context	Integer	11	FK (Ref: Booking.bookingID)
senderID	User ID of the sender	Integer	11	FK (Ref: User.userID)
content	Message text body	Text		
sentAt	Timestamp when sent	DateTime		
isRead	Read receipt status	Boolean		Default: False

Figure IV.2.2.1 Entity Chat Message

Data Element	Description	Composition or Data Type	Length	Values
reviewID	Unique identifier	Integer	11	PK
bookingID	Related booking	Integer	11	FK (Ref: Booking.bookingID)
rating	Star rating	Integer		1 to 5
comment	Written feedback	Text		
tags	Pre-defined feedback tags	Varchar	255	
isActive	Visibility status	Boolean		Default: True
createdAt	Creation timestamp	DateTime		
updatedAt	Last update timestamp	DateTime		
deletedAt	Soft delete timestamp	DateTime		Nullable

Figure IV.2.2.1 Entity Review

Data Element	Description	Composition or Data Type	Length	Values
summaryID	Unique identifier	Integer	11	PK
technicianID	Technician being summarized	Integer	11	FK (Ref: Technician.technicianID)
props	Summary of Pros/Advantages	Text		(Note: "props" as per diagram)
cons	Summary of Cons/Disadvantages	Text		
lastUpdated	Last AI generation time	DateTime		

Figure IV.2.2.1 Entity Review Summary

Data Element	Description	Composition or Data Type	Length	Values
appealID	Unique identifier	Integer	11	PK
reviewID	The review being appealed	Integer	11	FK (Ref: Review.reviewID)
technicianID	The technician appealing	Integer	11	FK (Ref: Technician.technicianID)
reason	Reason for appeal	Text		
details	Detailed explanation	Text		
status	Processing status	Enum		Pending, Resolved, Dismissed
adminNote	Note from admin	Text		
isActive	Soft delete flag	Boolean		Default: True
createdAt	Creation timestamp	DateTime		
updatedAt	Last update timestamp	DateTime		
deletedAt	Soft delete timestamp	DateTime		Nullable

Figure IV.2.2.1 Entity Appeal

2.3 Reports

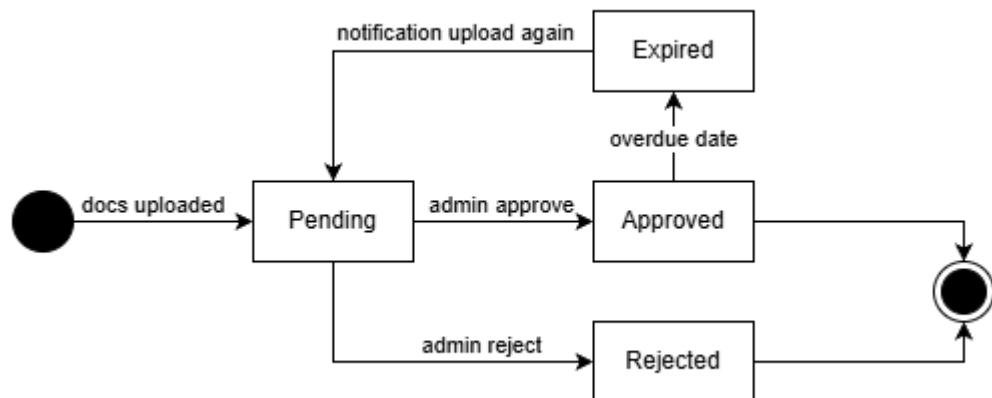
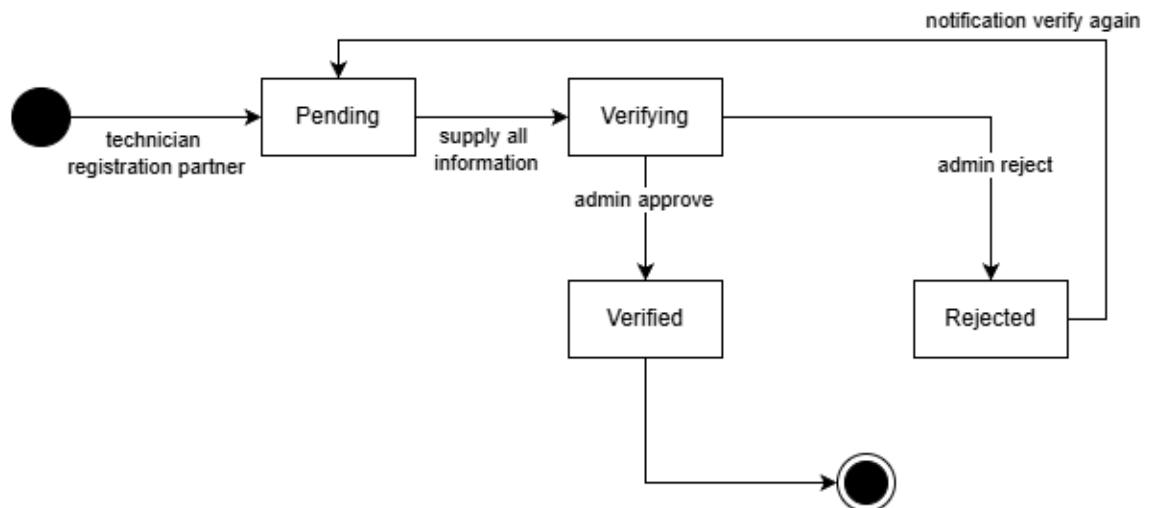
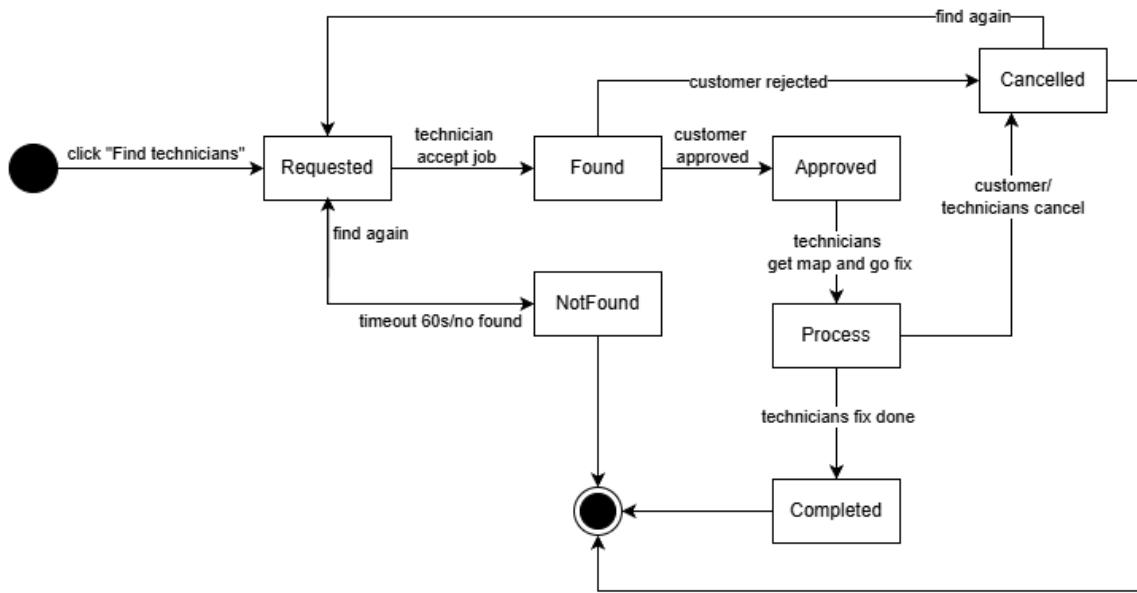
#	Report Name	Description
RPT-01	Technician Income Statement	Repair Technicians want to see a summary of their earnings over a specific period (Daily, Weekly, Monthly) to track performance and calculate income from completed jobs.
RPT-02	Platform Performance Dashboard	Administrator wants a high-level overview of the system's health, including new user growth, total booking volume, and total revenue status to monitor business performance in real-time.
RPT-03	AI Diagnostic Accuracy Analysis	Administrator wants to evaluate the effectiveness of the Gemini AI model by comparing the AI Estimated Price versus the Actual Final Price paid to adjust service pricing configurations and improve prediction quality.

Report ID:	RPT-01
Report Title:	Technician Income Statement
Report Purpose:	Allows the Repair Technician to view a summary of their earnings over a specific period (Daily, Weekly, Monthly) to track performance and income.
Priority:	High
Report Users:	Repair Technician
Data Sources:	Bookings table (finalAmount, completedAt), ServiceCategory table.
Frequency and Disposition:	Generated on demand by the Technician via the Partner App (Screen FR-28). Can be viewed as a chart or list.
Latency:	Report data must load within <10 seconds.
Visual Layout:	Portrait mode (Mobile).
Header and Footer:	Header: Total Income, Date Range. Footer: Pagination (if list view).
Report Body:	<p>Summary Section:</p> <ul style="list-style-type: none"> • Total Jobs Completed • Total Revenue <p>Detail List (Columns):</p> <ul style="list-style-type: none"> • Date • Booking ID • Service Name • Amount Received
End-of-Report Indicator:	"End of List" text or loading spinner for infinite scroll.
Interactivity:	Filter by Date Range (This Week, This Month, Custom). Tap on a row to view Booking Detail.
Security Access Restrictions:	A Technician can only retrieve their own financial data.

Report ID:	RPT-02
Report Title:	Platform Performance Dashboard
Report Purpose:	Provides the Administrator with a high-level overview of the system's health, including user growth, total booking volume, and revenue status.
Priority:	Medium
Report Users:	Administrator
Data Sources:	Aggregated data from Users, Bookings, Technician Profiles.
Frequency and Disposition:	Real-time dashboard displayed upon Admin Login (Screen FR-36).
Latency:	Dashboard widgets load within 5 seconds.
Visual Layout:	Landscape mode (Web Browser).
Header and Footer:	Header: System Status (Normal/Maintenance), Current Date/Time.
Report Body:	<p>Key Performance Indicators (KPIs):</p> <ul style="list-style-type: none"> • New Users (Today/Week) • Active Technicians (Online) • Total Bookings (Requested vs Completed) • Total Platform Revenue (GMV) <p>Charts:</p> <ul style="list-style-type: none"> • Booking Trend (Line Chart) • Service Category Distribution (Pie Chart)
End-of-Report Indicator:	None (Dashboard view).
Interactivity:	Drill down into specific lists (e.g., clicking "Pending KYC" number redirects to KYC List).
Security Access Restrictions:	Only accessible by Super Admin accounts.

Report ID:	RPT-03
Report Title:	AI Diagnostic Accuracy Analysis
Report Purpose:	Allows the Admin to evaluate the effectiveness of the Gemini AI model by comparing the AI Estimated Price versus the Actual Final Price paid for completed bookings. Helps in adjusting the ServiceIssue price configuration.
Priority:	Low (Analytical)
Report Users:	Administrator
Data Sources:	Bookings table (issueID, estimatedPriceRange, finalAmount).
Frequency and Disposition:	Generated on demand via the Admin Portal (Statistics Section).
Latency:	< 20 seconds (complex query).
Visual Layout:	Table view with Export to Excel function.
Header and Footer:	Header: Analysis Period, Service Category Filter.
Report Body:	<p>Columns:</p> <ul style="list-style-type: none"> • Booking ID • Issue Detected (AI) • AI Estimated Range (Min-Max) • Actual Final Amount • Deviation Status (In Range / Over / Under)
End-of-Report Indicator:	Summary Row (Accuracy Rate %).
Interactivity:	Sort by Deviation to find anomalies.
Security Access Restrictions:	Admin access only.

2.4 State transition diagram



3. Authentication & User Profile

3.1 Splash Screen

Function Trigger: The user launches the mobile application.

Function Description: This is the initial loading screen that displays the V-Fix branding (Logo and Slogan) to the user while the application performs necessary background initialization tasks. It serves as the entry point to check the user's session state.

Function Details (Logic):

- **Display:** The screen renders the V-Fix logo centered on a white or branded background.
- **Processing:** The system enforces a 3-second delay to ensure branding visibility. Simultaneously, it checks the local storage (or Keychain) for an existing `accessToken` or `refreshToken`.
- **Navigation:**
 - If a valid token exists, the system automatically redirects the user to the **Customer Home** (if role is Customer) or **Technician Dashboard** (if role is Technician).
 - If no token exists or the token has expired, the system navigates to **FR-02 Welcome Screen**.

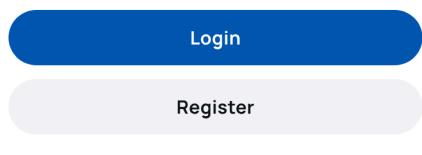
3.2 Welcome Screen

Function Trigger: The system navigates here from the Splash Screen (if unauthenticated) or after a user successfully logs out.

Function Description: This screen acts as the internal landing page for unauthenticated users. It provides a clear choice between accessing an existing account or creating a new one, ensuring users are directed to the correct authentication flow.

Function Details (Logic):

- **Navigation Actions:**
 - Tapping the "Login" button navigates to **FR-03 Login Screen**.
 - Tapping the "Register" button navigates to **FR-04 Register Screen**.
- **Language Selection:** (Optional) Users may toggle between Vietnamese and English, which updates the app's localization context immediately.



3.3 Login Screen

Function Trigger: The user taps the "Login" button on the Welcome Screen.

Function Description: This interface allows both Customers and Repair Technicians to authenticate into the system using their registered phone number and password. It handles input validation, secure API transmission, and role-based redirection upon success.

Function Details (Logic):

- **Input Validation:** The system ensures the Phone Number is not empty and follows valid format (10 digits). The Password field must not be empty.
- **Authentication Process:** Upon clicking "Login", the app sends a `POST /auth/login` request.
- **Success Handling:** If the API returns a 200 OK with a token, the system stores the token locally and checks the user role. Customers are routed to **FR-06 Customer Home**, and Technicians are routed to **FR-20 Technician Dashboard**.
- **Error Handling:**
 - Invalid credentials display a "Incorrect phone number or password" message.
 - (Security) If the user enters the wrong password 5 consecutive times, the account is temporarily locked for 30 minutes, and an error message is displayed.



Welcome Back

Phone Number

Enter your phone number

Password

Enter your password



[Forgot Password?](#)

Login

3.4 Register Screen (Customer)

Function Trigger: The user taps the "Register" button on the Welcome Screen.

Function Description: This form allows new users to create a **Customer** account. It collects essential identification information and credentials. Note that Technician registration is not handled here; it requires a separate approval process via the Web Portal.

Function Details (Logic):

- **Data Collection:** The user inputs their Full Name, Phone Number, Password, and Password Confirmation.
- **Validation:** The system checks that all fields are filled. The Password must meet minimum complexity (e.g., 6 characters), and the Confirmation Password must match the original.
- **Registration Process:** Submitting the form triggers the `POST /auth/register` API.
- **Outcomes:**
 - **Success:** A success message appears, and the user is either automatically logged in or redirected to the Login screen.
 - **Failure:** If the phone number is already registered, the system displays a specific error message preventing duplicate accounts.

← Create Account

Full Name

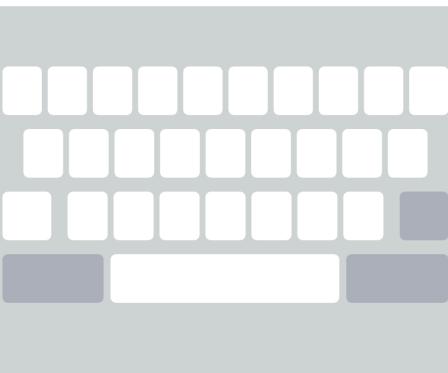
Phone Number

Password

Confirm Password

Register

[Already have an account? Login](#)



3.5 Forgot Password Screen

Function Trigger: The user taps the "Forgot Password?" link on the Login Screen.

Function Description: This workflow enables users to recover account access if they have lost their credentials. It uses a One-Time Password (OTP) verification mechanism sent to the user's registered phone number to authorize a password reset.

Function Details (Logic):

- **Step 1 (Request):** The user enters their Phone Number and requests an OTP. The system sends a 4-6 digit code (Simulated for MVP).
- **Step 2 (Verify):** The user enters the received code. The system verifies the code against the backend record.
- **Step 3 (Reset):** Upon successful verification, the user enters a New Password. The system updates the password in the database.
- **Completion:** The user is redirected back to the Login Screen to sign in with new credentials.

The image shows a mobile application interface for password recovery. It consists of three main screens arranged vertically:

- Screen 1: Enter Verification Code**
 - Header: "New Password" with a back arrow.
 - Left side: "Verify OTP" with a back arrow.
 - Middle section:
 - "Enter Verification Code" placeholder.
 - Text: "We sent a code to +84 909 *** ***".
 - Row of six empty input fields for entering the OTP.
 - "Resend Code" link.
 - Right side: "Confirm New Password" placeholder.
- Screen 2: New Password**
 - Header: "New Password" with a back arrow.
 - Placeholder: "Enter new password".
- Screen 3: Confirm New Password**
 - Header: "Confirm New Password" with a back arrow.
 - Placeholder: "Confirm new password".

Below the screens, there are two large rectangular areas representing the physical keyboards of two smartphones. The left keyboard is associated with the "Enter Verification Code" screen, and the right keyboard is associated with the "Reset Password" screen. Both keyboards show a standard QWERTY layout with some keys highlighted in grey.

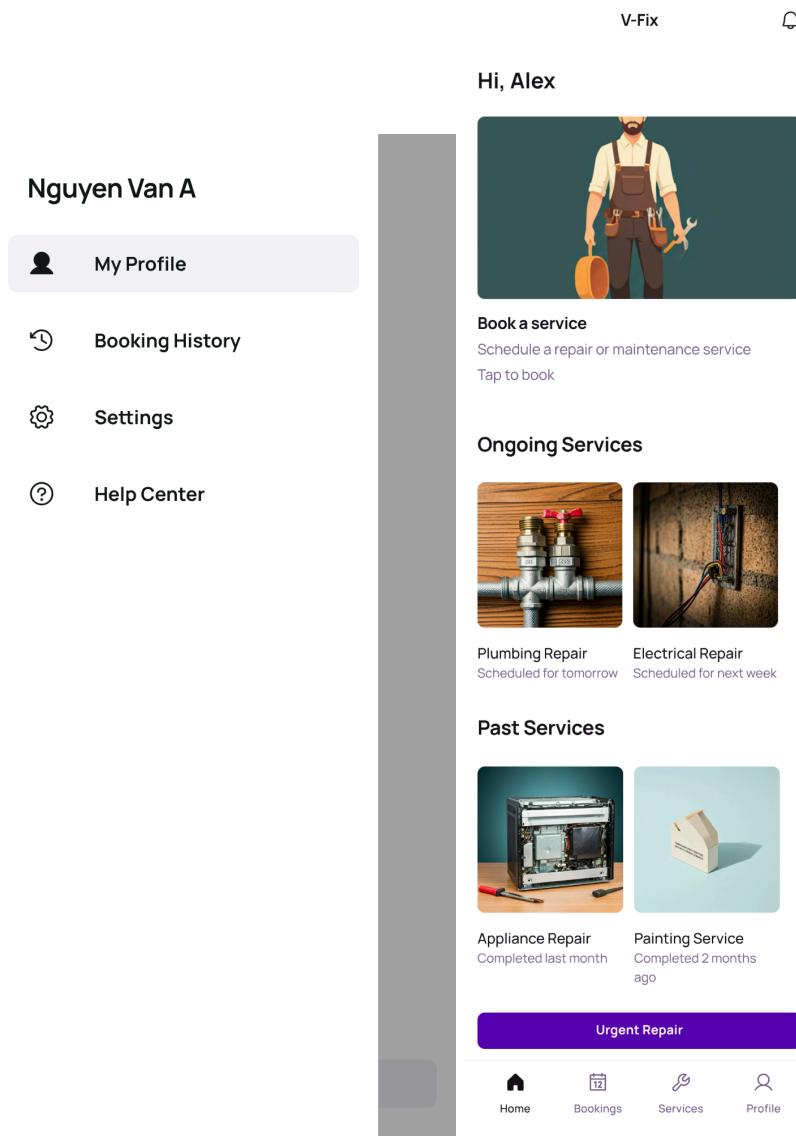
3.6 Side Menu (Navigation)

Function Trigger: The user taps the "Menu" (hamburger) icon located at the top-left corner of the Customer Home screen.

Function Description: A collapsible navigation drawer that provides quick access to secondary features and utility settings. It displays the current user's summary and lists navigation links, keeping the main interface clean.

Function Details (Logic):

- **Header Display:** The top section shows the current user's Avatar and Full Name, retrieved from the user profile data.
- **Navigation Links:** The menu contains links to **User Profile (FR-17)**, **Booking History (FR-18)**, Settings, and Help.
- **Logout Logic:** Tapping "Logout" triggers a confirmation popup. If confirmed, the system clears all local session tokens and data, then redirects the user immediately to **FR-02 Welcome Screen**.



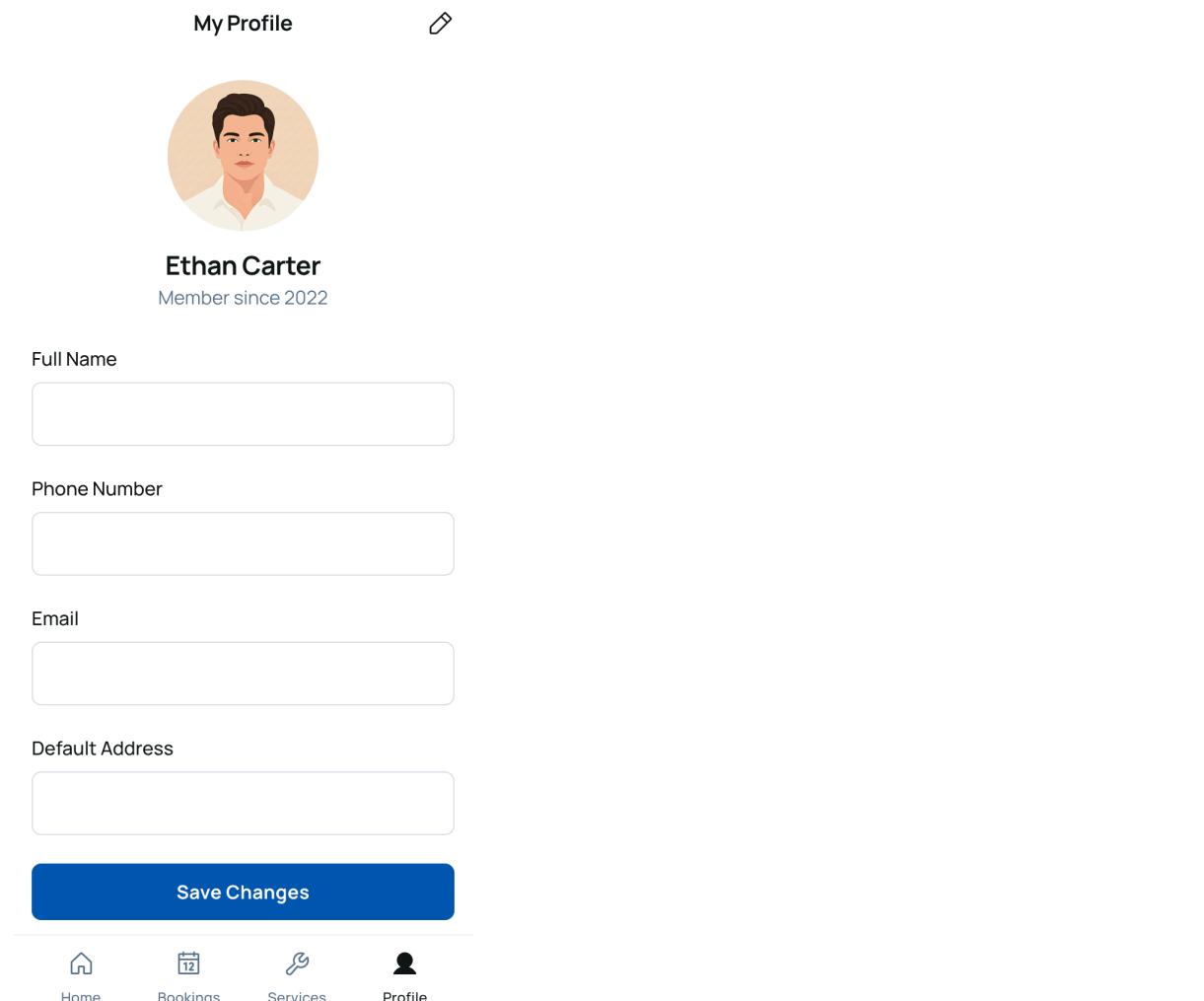
3.7 User Profile

Function Trigger: The user selects "My Profile" from the Side Menu.

Function Description: This screen allows the user to view their account details and update editable information such as their name, email, avatar, or default address. Critical fields like Phone Number are read-only to maintain account identity integrity.

Function Details (Logic):

- **View Mode:** Displays current information. Fields are disabled by default.
- **Edit Mode:** Tapping the "Edit" icon enables input fields for Full Name, Email, and Address. The Phone Number field remains locked.
- **Avatar Update:** Tapping the profile picture opens the device's image picker. The system validates that the selected image is under 5MB (Business Rule BR-02) before uploading.
- **Saving:** Tapping "Save" calls the `PUT /users/profile` API. If successful, the local user data is updated, and a success toast message is shown.



The screenshot shows the 'My Profile' screen. At the top left is the text 'My Profile'. To its right is an edit icon (pencil). Below this is a circular placeholder for the user's profile picture, featuring a male avatar. Underneath the placeholder, the user's name 'Ethan Carter' is displayed in bold black text, followed by the smaller text 'Member since 2022'. A thin horizontal line separates this section from the form fields. The first field is labeled 'Full Name' and contains a large, empty text input box. The second field is labeled 'Phone Number' and also contains a large, empty text input box. The third field is labeled 'Email' and contains a large, empty text input box. The fourth field is labeled 'Default Address' and contains a large, empty text input box. At the bottom of the screen is a prominent blue button with the white text 'Save Changes'. Below this button is a navigation bar with four items: 'Home' (represented by a house icon), 'Bookings' (represented by a calendar icon), 'Services' (represented by a wrench icon), and 'Profile' (represented by a person icon).

4. AI Diagnostics System (Core)

4.1 Service Detail

Function Trigger: The user taps on a specific service category (e.g., "Air Conditioner Repair") from the Customer Home screen.

Function Description: Displays detailed information about a selected service category, including standard service steps and base pricing. Crucially, it provides the entry point for the AI consultation feature.

Function Details (Logic):

- **Display:** The screen loads service details (Icon, Name, Description) from the **ServiceCategory** database.
- **Action - Check Issue with AI:** When the user taps the "Check Issue / Diagnose" button, the system navigates to **FR-08 AI Diagnostic Chat Screen**.
- **Action - Book Directly:** If the user taps "Book Now" (skipping AI), the system navigates directly to the technician matching flow (Feature 5).



Standard Service Includes:

- Filter cleaning
- Gas pressure check
- Drain pipe clearing

[Book Now](#)

[Check Issue with AI](#)



Home



Bookings



Services



Profile

4.2 AI Diagnostics Chat

Function Trigger: The user clicks the "Check Issue" button on the Service Detail Screen.

Function Description: A chat-like interface allowing the Customer to describe their appliance issues using natural language text and images. This input is used to query the Generative AI model.

Function Details (Logic):

- **Input Handling:** Users can type a description of the problem (e.g., "My AC is leaking water and making noise") and optionally attach up to 3 images.
- **Validation:** The system checks that the text description is not empty and that uploaded images are in valid formats (JPG/PNG) and under 5MB per file.
- **Submission:** When the user clicks "Analyze", the system shows a loading indicator (spinner) and sends the data payload to the backend service **FR-43**.
- **Navigation:** Upon receiving a successful response from the backend, the system navigates to **FR-09 Diagnostic Result Screen**.
- **Error Handling:** If the API call fails or times out (after 10 seconds), display a "Service Busy" message and allow the user to retry or skip to manual booking.



4.3 Diagnostic Result

Function Trigger: The system successfully receives a structured JSON response from the AI Integration Service.

Function Description: Visualizes the AI's analysis results, presenting the identified fault, recommended solution, and a reference price range to the user in a clear, easy-to-read format.

Function Details (Logic):

- **Data Parsing:** The screen parses the JSON object received from the previous step to display: "Potential Issue" (Title), "Explanation" (Body), and "Estimated Price" (Min-Max values).
- **Disclaimer Display:** A mandatory disclaimer text is shown: "Prices are for reference only. Final price depends on actual inspection" (Business Rule BR-07).
- **Action - Find Technician:** When the user clicks "Find Technicians", the system initiates the booking flow (Feature 5) carrying the `issueID` and `estimatedPrice` as context data for the booking.
- **Action - Retake:** The user can click "Analyze Again" to return to the Chat screen and provide more details.

Analysis Result ×



Potential Issue
Clogged Drain Pipe
Based on the image, water leakage is likely caused by a blockage in the drainage system.



Estimated Repair Cost
200.000đ - 300.000đ [View Details](#)

*Price is for reference only. Final quote depends on technician inspection.

[Find Technicians Nearby](#)

[Analyze Again / Wrong Diagnosis?](#)

Home Bookings Services Profile

4.4 Gemini AI Integration Service (Non-screen/Backend)

Function Trigger: Receives an API request `POST /api/ai/diagnose` from the Mobile App containing user text and image URLs.

Function Description: A backend service acting as a wrapper/middleware between the V-Fix System and the Google Gemini API. It handles prompt construction, security, and response formatting.

Function Details (Logic):

- **Prompt Construction:** The service combines the user's input with a predefined System Prompt.
 - *System Prompt Example:* "You are an expert repair technician. Analyze the following user description and image. Identify the likely issue from the provided list of `ServiceIssues`. Output the result strictly in JSON format containing `issue_name`, `reasoning`, and `estimated_cost`."
- **API Call:** Sends the constructed prompt to Google Gemini API (e.g., Gemini 1.5 Flash model) via secure HTTPS request.
- **Response Processing:** The service receives the raw text response from Gemini and attempts to parse it into a valid JSON object.
- **Database Mapping:** It tries to match the AI-identified issue with an existing `issueID` in the `ServiceIssues` database table to retrieve the official system pricing configuration.
- **Output:** Returns a standardized JSON response to the Mobile App. If the AI output is invalid or unclear, returns a fallback "Unknown Issue" response.

5. Booking and Matching System (core)

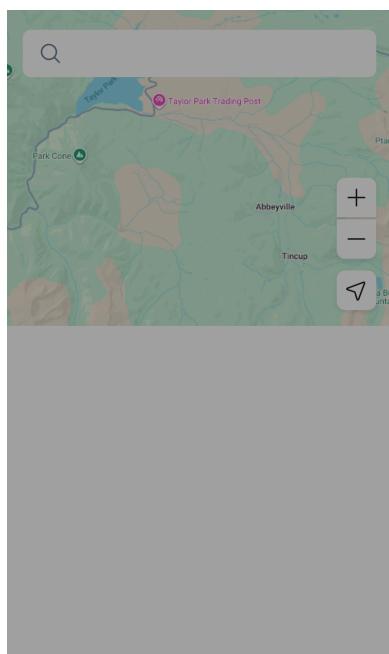
5.1 Matching Technicians

Function Trigger: The user clicks the "Find Technicians" button on the **FR-09 Diagnostic Result Screen**.

Function Description: A transition screen that displays a scanning animation (e.g., radar ripple effect) while the system searches for available technicians nearby. It provides visual feedback that the request is being processed.

Function Details (Logic):

- **Initialization:** Upon loading, the app sends a `POST /bookings/find` request with the `issueID`, `estimatedPrice`, and current GPS coordinates.
- **Timer:** A 60-second countdown is displayed. If no technician accepts within this time, the system triggers a timeout alert offering to "Try Again" or "Cancel".
- **Cancellation:** The user can click "Cancel Search" at any time to stop the process and return to the previous screen.
- **Navigation:** The screen listens for a real-time event (via WebSocket or Polling). When a `TECHNICIAN_FOUND` event is received, it automatically opens **FR-11 Technician Profile Modal**.



Finding the best repairman for
you...

Scanning radius: 5km

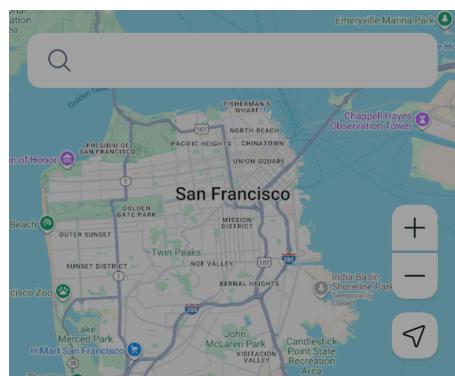
5.2 Technician Profile Modal (Match Found)

Function Trigger: The backend system notifies the app that a technician has accepted the job request.

Function Description: A modal or popup displaying the profile of the matched technician. This is a critical decision point where the customer reviews the technician's credibility before sharing their specific location (Privacy First).

Function Details (Logic):

- **Display:** Shows the Technician's Avatar, Full Name, Star Rating, Total Reviews, and the **AI Review Summary** (Pros & Cons) generated by Feature 6.
- **Privacy Logic:** The Customer's specific address is **hidden** from the Technician at this stage.
- **Action - Approve:** Clicking "Approve" confirms the booking. The system updates the status to "Confirmed", reveals the address to the Technician, and navigates to **FR-12**.
- **Action - Reject:** Clicking "Reject" declines the technician. The system asks: "Do you want to find another technician?". If yes, it loops back to **FR-10** to scan again.



Nguyen Van B

Verified Partner • 4.9

5 stars

AI Summary from 150 reviews

Punctual
Check

Very clean
Check

Good English
Check

Slightly higher price
Warning

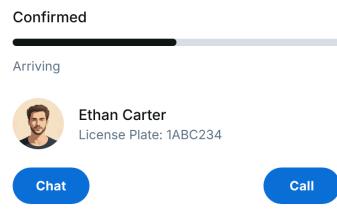
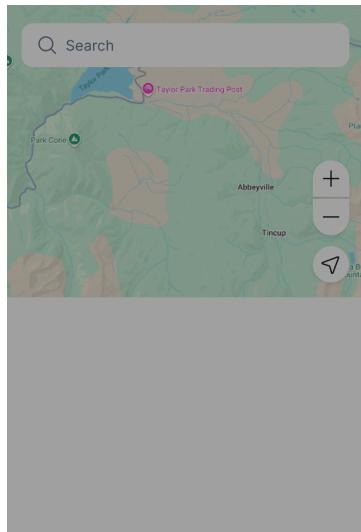
5.3 Active Job Tracking

Function Trigger: The customer approves the technician (Booking Confirmed).

Function Description: The main interface for an ongoing service. It tracks the real-time status of the booking from "Technician Arriving" to "Completed". It serves as the communication hub.

Function Details (Logic):

- **Status Display:** A progress bar or stepper shows the current state: *Confirmed* -> *Arriving* -> *In Progress* -> *Completed*.
- **Map Visualization:** Displays a map with markers for the Customer's location and the Technician's real-time location (updates every 10 seconds).
- **Communication:** "Chat" and "Call" buttons allow direct contact (Feature 6).
- **Cancellation:** A "Cancel Booking" button is available only if the status is not yet "In Progress". If cancelled, it prompts for a reason.
- **Completion:** When the backend pushes a **JOB_COMPLETED** event, the screen changes the primary action button to "Proceed to Payment".



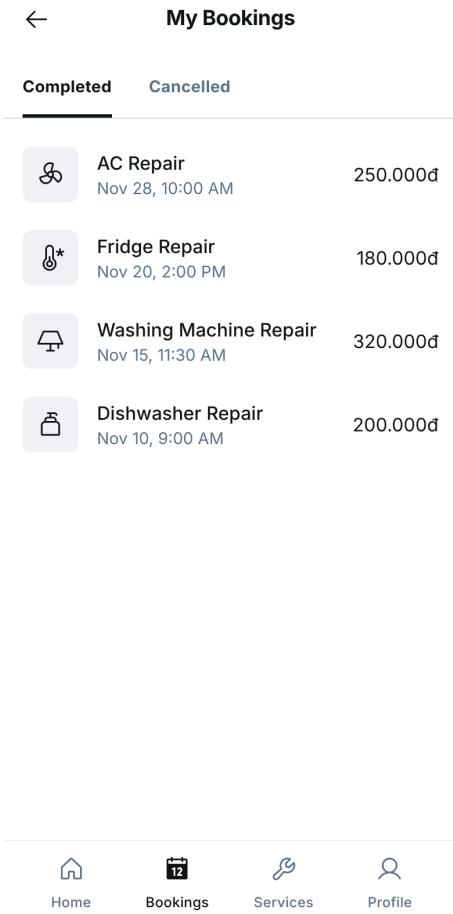
5.4 Booking History List

Function Trigger: The user selects "Booking History" from the Side Menu.

Function Description: Displays a chronological list of all past bookings, including completed and cancelled jobs, allowing users to track their expenses and service history.

Function Details (Logic):

- **List View:** Fetches a paginated list of bookings. Each card shows: Service Name, Date/Time, Technician Name, Status (Completed/Cancelled), and Final Price.
- **Filtering:** Tabs allow filtering by "Completed" vs. "Cancelled".
- **Interaction:** Tapping a card navigates to **FR-19 Booking Detail Screen**.



5.5 Booking Detail Screen

Function Trigger: The user taps a specific item in the Booking History List.

Function Description: Provides a comprehensive view of a past service record. It is useful for verifying costs or checking warranty information (if applicable).

Function Details (Logic):

- **Information:** Displays Service Type, Issue Description, AI Diagnosis Result, Technician Info, Time logs (Start/End), and Breakdown of the Final Payment.
- **Review Status:** If the user has already rated this job, show the rating. If not (and within 7 days), show a "Write Review" button.
- **Report:** Allows the user to "Report this Booking" to Admin in case of post-service issues.

← Booking #12345

Service Info



Technician



Ethan Carter
4.8 (123 reviews)

Payment Breakdown

Service Fee	200k
Parts	50k
Total	250k

Book Again

Report Issue



Home



Bookings



Services



Profile

5.6 Technician Matching Engine (Non-screen/Backend)

Function Trigger: Receives a POST /bookings/find request from the Customer App.

Function Description: A geospatial algorithm responsible for finding the best available technician. It ensures quick response times and adherence to business rules regarding distance and availability.

Function Details (Logic):

- **Query Constraints:** The engine queries the `TechnicianProfiles` database table with the following filters:
 1. `is_online` = true
 2. `status` = Active (verified)
 3. `current_job` = null (not currently busy - BR-06)
- **Distance Calculation:** It calculates the distance between the Customer and Technician using the Haversine formula or PostGIS. It filters out anyone further than **5km** (BR-05).
- **Ranking:** Candidates are sorted by Distance (closest first) and Rating (highest first).
- **Dispatch:** The system sends a Job Request Notification to the top candidate. If they decline or timeout (30s), it moves to the next candidate.

5.7 Notification Dispatcher (Non-screen/Backend)

Function Trigger: Triggered by various system events (e.g., Status Updates, Chat Messages, Matching results).

Function Description: A centralized service that manages the delivery of Push Notifications to mobile devices. It ensures users are alerted even when the app is in the background.

Function Details (Logic):

- **Integration:** Uses Firebase Cloud Messaging (FCM) or OneSignal.
- **Payload Construction:** Constructs notification payloads containing:
 - `title` & `body`: User-facing text (e.g., "Technician Arrived!").
 - `data`: Custom JSON (e.g., `{"bookingId": 123, "type": "STATUS_UPDATE"}`) to handle in-app redirection.
- **Routing:** Retrieves the recipient's `deviceToken` from the `Users` table and sends the message.
- **Logging:** Logs delivery status for debugging purposes.

6. Service Execution & Feedback

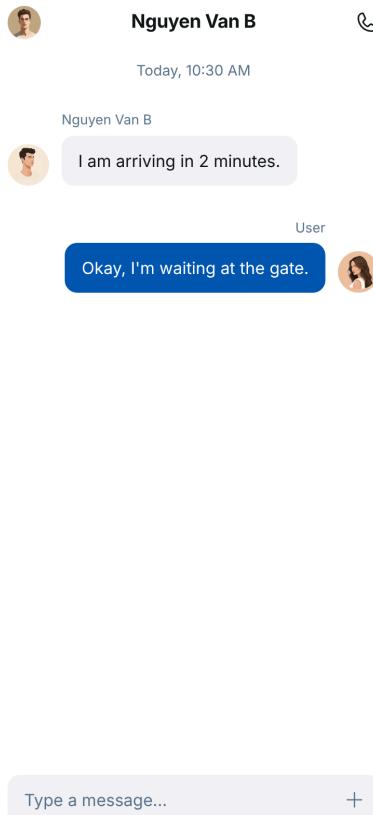
6.1 Communication (Chat/Call interface)

Function Trigger: The user taps the "Chat" or "Call" icon on the **FR-12 Active Job Tracking Screen**.

Function Description: Enables secure, real-time communication between the Customer and the Technician. It allows them to coordinate arrival details (e.g., "I'm at the gate") or clarify service requirements without sharing personal phone numbers directly (if VoIP is implemented later, but for MVP, masking is limited).

Function Details (Logic):

- **Initialization:** Loads the chat history for the current bookingID from the **ChatMessages** table.
- **Message Sending:** When the user types text and hits "Send":
 - The app pushes the message to the backend via WebSocket/API.
 - The message is stored in the database with a timestamp.
 - **Notification:** If the recipient is not currently on the chat screen, the **FR-46 Notification Dispatcher** sends a push notification: "New message from [Name]".
- **Call Feature:** Tapping the "Call" button launches the device's native phone dialer with the other party's phone number pre-filled.
- **Restriction:** Chat/Call functionality is strictly limited to the duration of the active booking. Once the status becomes "Completed" or "Cancelled," the input field is disabled to prevent harassment.



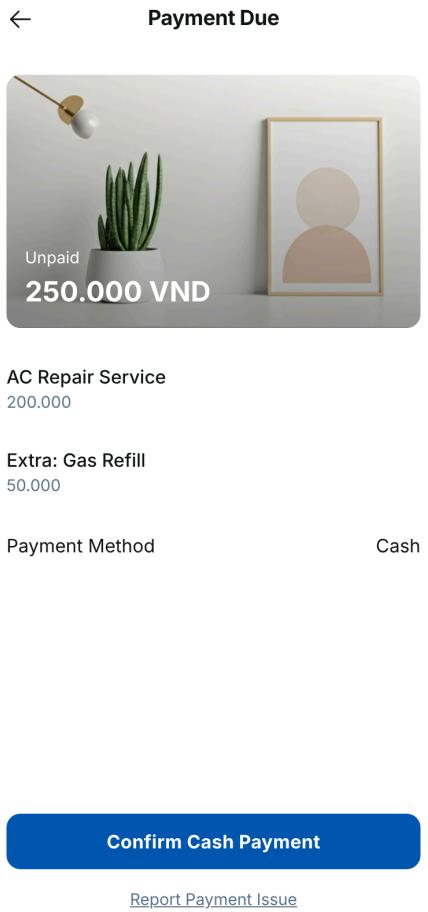
6.2 Payment

Function Trigger: The Technician marks the job as "Completed" on their app. The Customer receives a "Payment Due" status update.

Function Description: Displays the final invoice for the service. As per the MVP scope, this screen focuses on confirming the Cash Payment amount rather than processing digital transactions.

Function Details (Logic):

- **Display:** Shows a breakdown of the total cost, including the Base Service Fee and any agreed-upon extra charges (e.g., replacement parts).
- **Verification:** The system asks the Customer to verify that they have paid the displayed amount to the Technician in cash (Business Rule BR-09).
- **Confirmation:** Clicking "I Have Paid" updates the payment status in the backend and automatically transitions the user to the **FR-15 Rating & Feedback Screen**.
- **Dispute:** A "Report Issue" link is available if the amount requested by the Technician differs from the app's display.



6.3 Rating & Feedback

Function Trigger: The Customer confirms payment on the Payment Screen.

Function Description: Allows the Customer to evaluate the service quality. This feedback is essential for maintaining platform trust and provides the raw data for the AI Review Summarizer.

Function Details (Logic):

- **Star Rating:** Users must select a star rating from 1 to 5.
- **Text Review:** Users can type a detailed comment about their experience.
- **Tag Selection:** Users can select quick tags (e.g., "Punctual", "Clean", "Skillful", "Rude") to categorize their feedback.
- **Submission:** Clicking "Submit" saves the review to the **Reviews** table.
 - **Validation:** The system runs a profanity filter on the text comment.
- **Post-Action:** After submission, the **TechnicianProfile** is updated (Average Rating recalculation). If the review count hits the threshold (BR-11), the **FR-45 Async Review Summarizer** is triggered.

×

Feedback



Ethan Carter
Technician

How was your service?

filled filled filled

filled

Punctual Clean Skillful

Friendly

Write your review here...

Submit Review

6.4 Async Review Summarizer (Non-screen/Backend)

Function Trigger: Triggered automatically when a Technician receives a new review, checking if the total number of new reviews since the last summary update equals 3 (Business Rule BR-11).

Function Description: A background job that leverages the Gemini AI API to read through a Technician's raw reviews and generate a concise "Pros & Cons" summary. This ensures users get up-to-date insights without reading every single comment.

Function Details (Logic):

- **Data Aggregation:** The function queries the `Reviews` table to fetch the latest 20-50 reviews for the specific Technician.
- **Prompt Engineering:** It constructs a prompt: *"Analyze these reviews for technician [Name]. Summarize their strengths and weaknesses into two short bulleted lists: 'Pros' and 'Cons' in Vietnamese."*
- **AI Processing:** Sends the request to the **FR-43 Gemini AI Integration Service**.
- **Update:** Parses the AI response and updates the `ReviewSummaries` table (`pros_text`, `cons_text`) for that Technician.
- **Display:** The new summary will immediately appear on the Technician's profile (FR-11) for future customers.

7. Technician Workflow

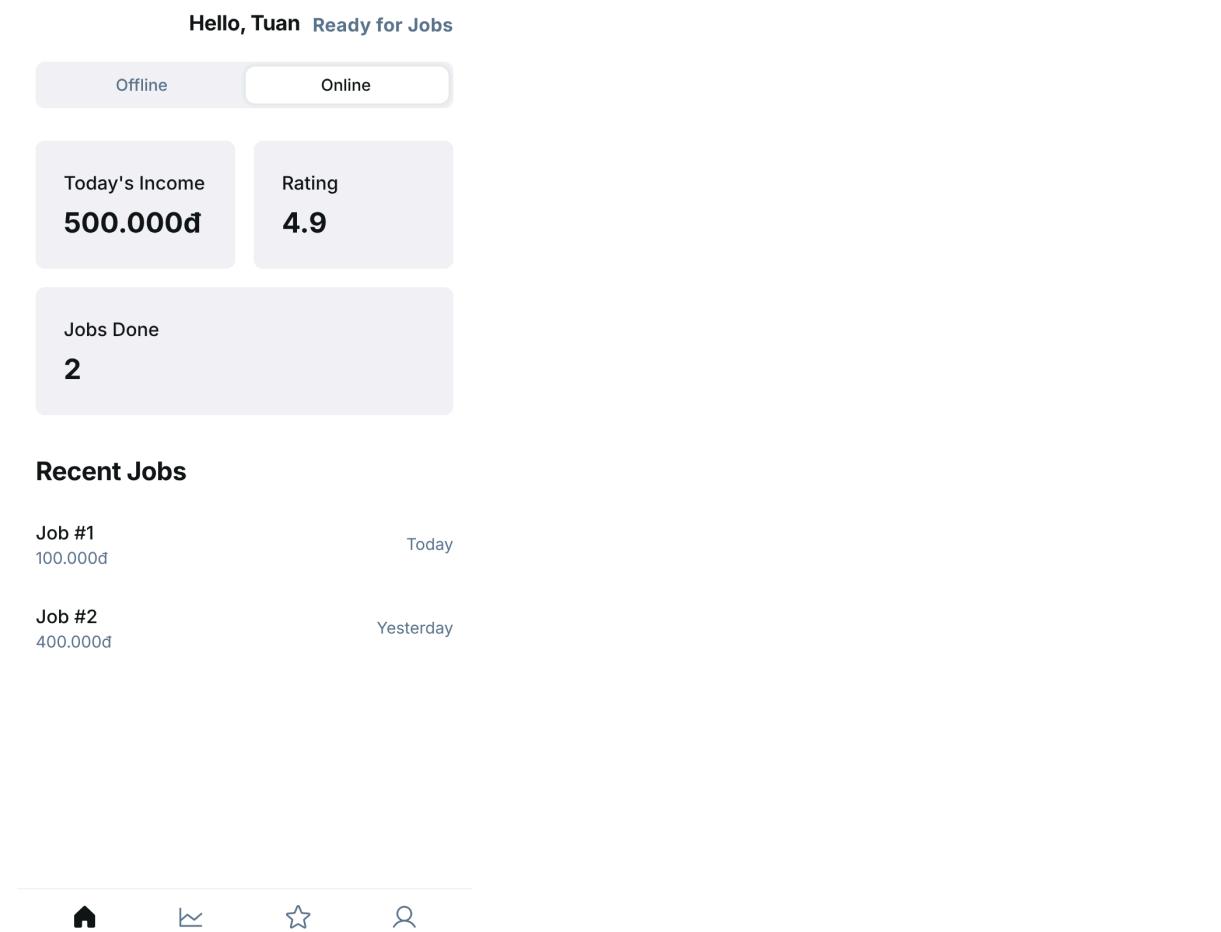
7.1 Technician Dashboard

Function Trigger: The technician successfully logs into the Partner App.

Function Description: The central workspace for the technician. It allows them to manage their availability status (Online/Offline), view quick performance statistics, and access other management modules.

Function Details (Logic):

- **Availability Toggle:** A switch to toggle between "Online" (Ready to receive jobs) and "Offline".
 - *Logic:* Toggling "Online" updates the `is_online` status in the `TechnicianProfiles` table. The system prevents going Online if the account status is not "Active" (e.g., pending KYC or Banned).
- **Current Status:** Displays the current state (e.g., "Waiting for jobs..." or "Offline").
- **Quick Stats:** Shows a summary of "Today's Earnings" and current "Star Rating".
- **Navigation:** Provides buttons/tabs to access Income Report (FR-28) and Reviews (FR-29).



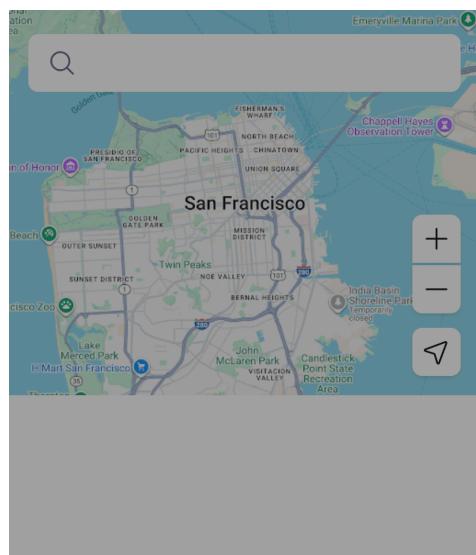
7.2 Job Request

Function Trigger: The **FR-44 Matching Engine** identifies the technician as the best match for a new booking request.

Function Description: A high-priority, full-screen popup or modal alert informing the technician of a new job opportunity. It requires immediate action.

Function Details (Logic):

- **Job Information:** Displays critical details to help the technician decide:
 - Service Type (e.g., AC Repair).
 - Issue Description & AI Diagnosis.
 - Distance to Customer (e.g., 2.5 km).
 - Estimated Price Range.
- **Countdown:** A visual timer (e.g., 30 seconds). If the timer expires, the request is automatically declined.
- **Actions:**
 - **Accept:** Calls the backend to assign the booking. If successful, navigate to **FR-25 Job Execution**.
 - **Decline:** Rejects the job. The system assigns it to the next available technician.



New Job Request

00

25

Minutes

Seconds

AC Repair (Leaking Water)



2.5 km away



250.000 VND



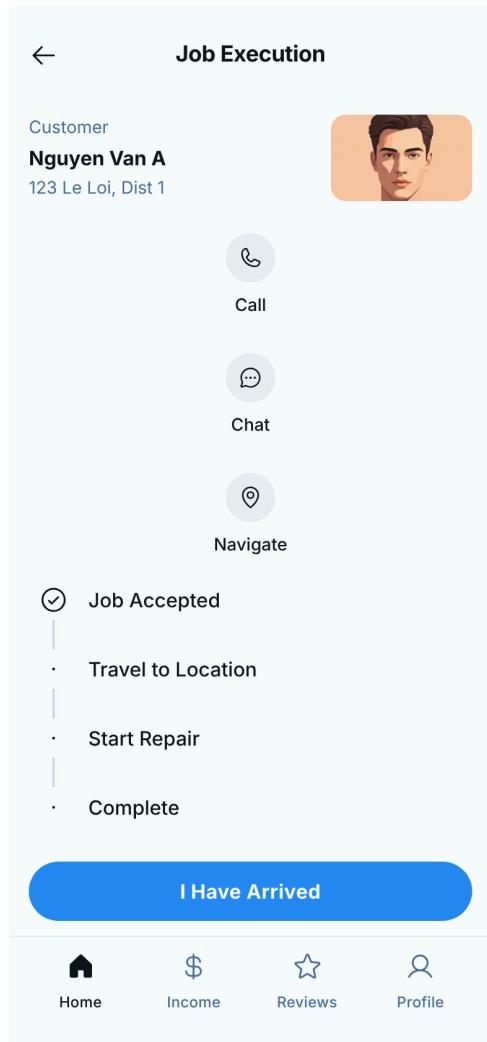
7.3 Job Execution

Function Trigger: The technician accepts a job request.

Function Description: The primary interface for managing an active job. It guides the technician through the workflow steps: Traveling -> Arriving -> Repairing -> Completing.

Function Details (Logic):

- **Customer Info:** Now reveals the Customer's Full Name and **Specific Address**.
- **Communication:** "Chat" and "Call" buttons to contact the customer (FR-13).
- **Navigation Button:** Links to **FR-26 Navigation Map**.
- **Status Workflow:**
 - **"I Have Arrived":** Technician swipes this button upon reaching the location. Sends a notification to the Customer.
 - **"Complete Job":** Technician clicks this after finishing the repair. It validates that the job is currently in progress. Navigates to **FR-27**.
- **Restriction:** As per **BR-06**, the technician cannot receive other job requests while on this screen.



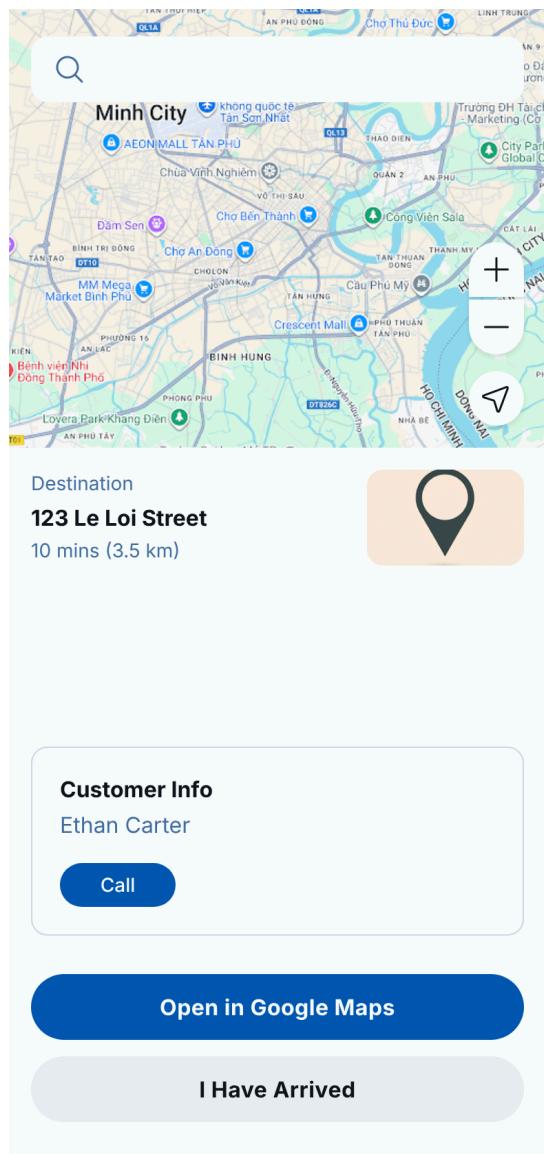
7.4 Navigation Map

Function Trigger: The technician clicks "Get Directions" on the Job Execution Screen.

Function Description: Provides route guidance from the technician's current location to the customer's address.

Function Details (Logic):

- **Map Interface:** Displays the route on an embedded map.
- **External Link:** Optionally provides a button to "Open in Google Maps" or "Open in Apple Maps" for turn-by-turn voice navigation.



7.5 Job Summary / Payment Confirm

Function Trigger: The technician clicks "Complete Job" on the Job Execution Screen.

Function Description: A summary screen to finalize the transaction. The technician confirms the total amount to be collected from the customer.

Function Details (Logic):

- **Input:** The system displays the final calculated amount (Base Price + any added extras).
- **Confirmation:** The technician must confirm they have received the cash payment from the customer.
- **Submission:** Clicking "Confirm Payment" updates the booking status to "Completed" in the database and updates the technician's wallet balance (ledger).
- **Outcome:** Redirects the technician back to the **FR-20 Dashboard** to wait for the next job.



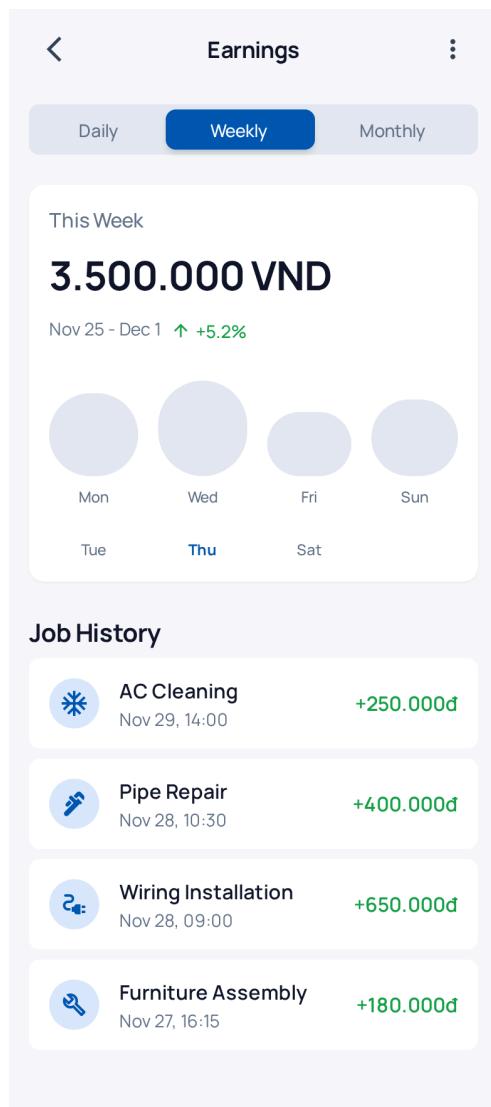
7.6 Income Report

Function Trigger: The technician clicks the "Income" button on the Dashboard.

Function Description: Detailed breakdown of earnings to help the technician track their financial performance.

Function Details (Logic):

- **Filters:** Tabs to view income by Day, Week, or Month.
- **Visualization:** A simple bar chart showing income trends over the selected period.
- **Transaction List:** A list of completed bookings within the period, showing Date, Booking ID, and Amount Earned.
- **Data Source:** Queries the **Bookings** table for records where **technicianID** matches the user and **status** is Completed.



7.7 Review List & Appeal Feedback

Function Trigger: The technician clicks "My Reviews" from the Dashboard.

Function Description: Allows the technician to view feedback left by customers and report unfair reviews.

Function Details (Logic):

- **Review List (FR-29):** Displays a list of reviews received, sorted by date (newest first). Each item shows the Customer Name, Rating, and Comment.
- **Appeal Action:** Each review item has a "Report" button (Three-dot menu).
- **Appeal Form (FR-30):**
 - Trigger: Clicking "Report" on a specific review.
 - Input: Select a reason (e.g., "Spam", "False Information", "Harassment") and add details.
 - Submit: Creates a record in the Appeals table for Admin review (UC-09).

The screenshot shows the "My Reviews" dashboard. At the top, it displays a summary: a rating of 4.8, 120 reviews, and a star distribution chart. Below this, there are three review cards, each with a customer profile picture, the star rating, and a comment. To the right of the reviews is a large, empty gray rectangular area representing the "Report Review" form.

Rating	Percentage
5	80%
4	10%
3	5%
2	3%
1	2%

Reviews:

- 5 Stars**
Great job, very fast!
- 1 Star**
Late arrival.
- 5 Stars**
Excellent service, highly recommend!
- 4 Stars**
Good work, but could be more communicative.

Report Review

Late arrival
User B

Select reason

I arrived on time but the customer was not home...

Home Income Reviews Profile

8. Technician Onboarding

8.1 Partner Registration Form

Function Trigger: The user clicks the "Partner Registration" link/button on the **FR-31 Landing Page**.

Function Description: A public web form designed for prospective technicians to request to join the V-Fix platform. Unlike typical sign-ups, this is a request-for-access flow where the system controls account creation to ensure quality control from the start.

Function Details (Logic):

- **Data Collection:** The form collects essential contact information including Full Name, Phone Number, Email Address, and Operating City/District.
- **Validation:** The system validates that the Phone Number is a valid 10-digit format and the Email Address is properly formatted. All fields are mandatory.
- **Submission:** Upon clicking "Send Request", the system creates a new user record with a "Pending" role. It automatically generates a temporary password and sends these login credentials to the technician via Email or SMS.
- **Error Handling:** If the phone number is already associated with an existing request or account, the system displays a "Phone number already exists" error.

V-Fix

Back to Home

Join V-Fix today.
Increase your
income.

Become a Partner

Full Name

Enter your full name

Phone Number

+84

Email Address

Enter your email address

Operating City

Select your city

Send Request

Already have an account? [Login here.](#)

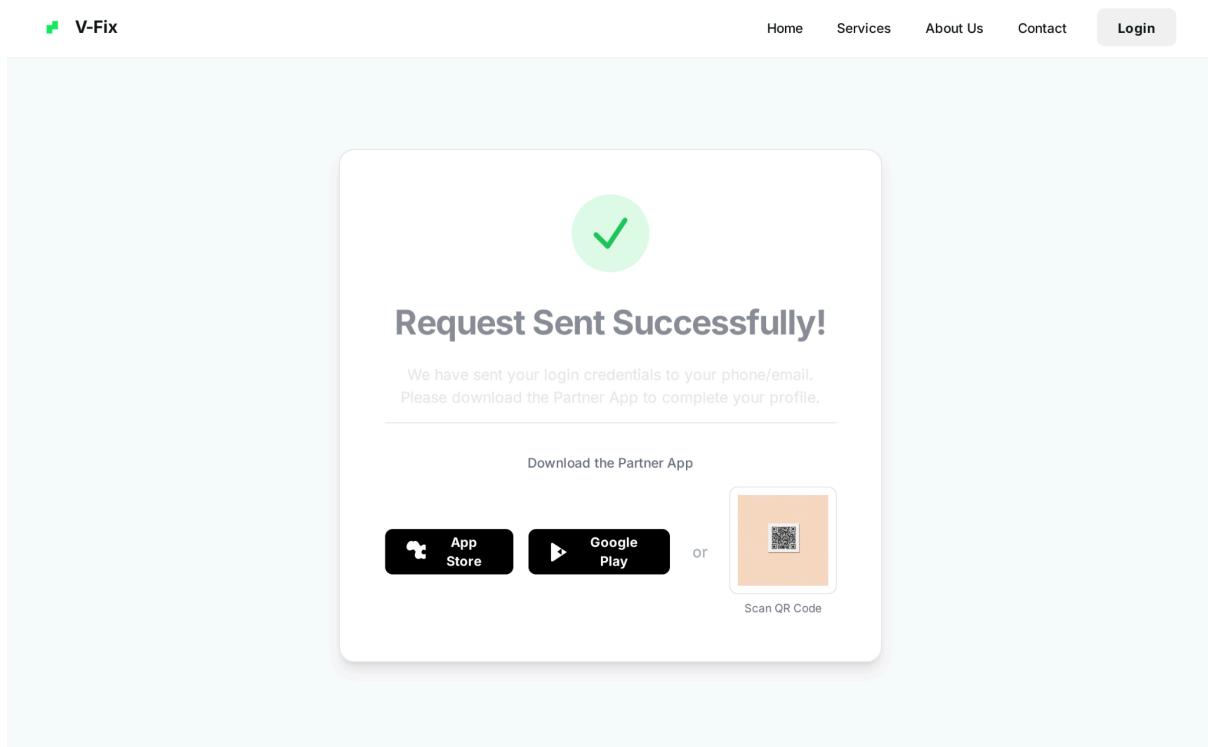
8.2 Submission Success

Function Trigger: The user successfully submits the Partner Registration Form.

Function Description: An acknowledgment screen confirming that the registration request has been processed. It guides the user on the next steps to access the mobile application.

Function Details (Logic):

- **Display:** Shows a success message: "Request Sent Successfully".
- **Instruction:** Displays clear text instructing the user to check their SMS/Email for login credentials.
- **Call to Action:** Provides direct buttons or QR codes to download the **V-Fix Partner App** (iOS/Android), encouraging the user to install the app immediately to proceed with KYC.



8.3 KYC Upload

Function Trigger: The technician logs into the Partner App for the first time (or subsequent times if their status is still "New" or "Rejected").

Function Description: This is the critical data collection screen for identity verification (KYC). It requires the technician to provide professional details and upload legal documents before they can receive any jobs.

Function Details (Logic):

- **Auto-Redirection:** If a logged-in user's status is not yet "Active", the app forces navigation to this screen, blocking access to the Dashboard.
- **Input Fields:** Users must fill in their Home Address and Years of Experience.
- **Document Upload:** The interface provides three specific upload slots: ID Card (Front), ID Card (Back), and Vocational Certificate.
- **Validation:** Before submission, the system checks that all three images are uploaded. It enforces **Business Rule BR-02** (File size < 5MB, Format JPG/PNG).
- **Submission:** Clicking "Submit Application" uploads the files to cloud storage and updates the account status to "Verifying".

The screenshot shows the 'Verify Identity' screen of the Partner App. At the top, it says 'Step 2 of 3'. Below that, there are two sections: 'Personal Info' and 'Documents'. In 'Personal Info', there are fields for 'Home Address' (with placeholder 'Enter your home address') and 'Years of Experience' (with placeholder 'e.g., 5'). In 'Documents', there are slots for 'Upload ID Card (CCCD)' with icons for 'ID Front' and 'ID Back'. Below that is a slot for 'Upload Vocational Certificate' with an 'Upload Certificate' button. At the bottom is a large blue 'Submit Application' button.

8.4 Submission Success

Function Trigger: The technician successfully submits their KYC documents on FR-21.

Function Description: A transitional confirmation screen that reassures the user that their data is safe and the verification process has started.

Function Details (Logic):

- **Display:** Shows a "Documents Uploaded" success animation.
- **Navigation:** Contains a "Go to Dashboard" or "Check Status" button which navigates the user to the **FR-23 Waiting Verification** screen.



Documents Received!

We have received your ID and Certificates. The verification process usually takes 24 hours.

[Check Verification Status](#)

[Back to Login](#)

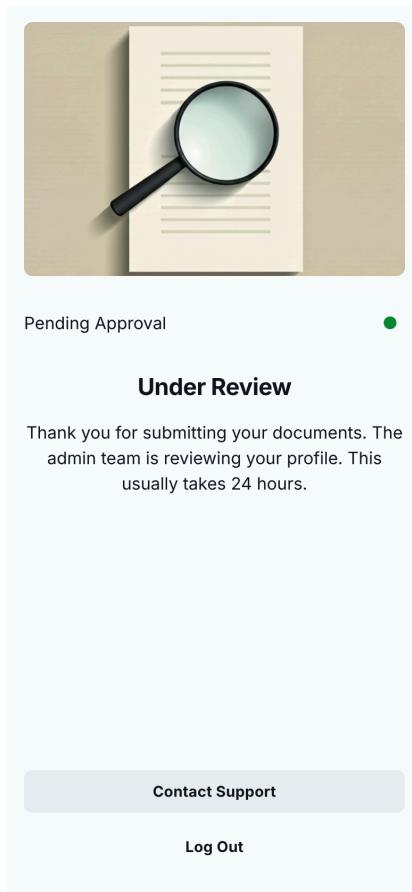
8.5 Waiting Verification

Function Trigger: The technician opens the app while their account status is "Pending Verification" or "Rejected".

Function Description: A status screen that informs the technician about the current state of their application. It acts as a holding page until the Admin processes their documents.

Function Details (Logic):

- **State Checking:** The app queries the user profile API on load.
- **Scenario A (Pending):** If status is "Pending Verification", display an "Under Review" message and mention the SLA (e.g., "We will process your application within 24 hours"). The main dashboard features remain locked.
- **Scenario B (Rejected):** If status is "Rejected", display the Admin's rejection reason (e.g., "Blurry ID Photo") and provide a "Re-submit Documents" button, which navigates back to **FR-21**.
- **Scenario C (Approved):** If the status has changed to "Active" (verified by Admin), the screen automatically redirects the user to the main **FR-20 Technician Dashboard**.



9. Administration Portal

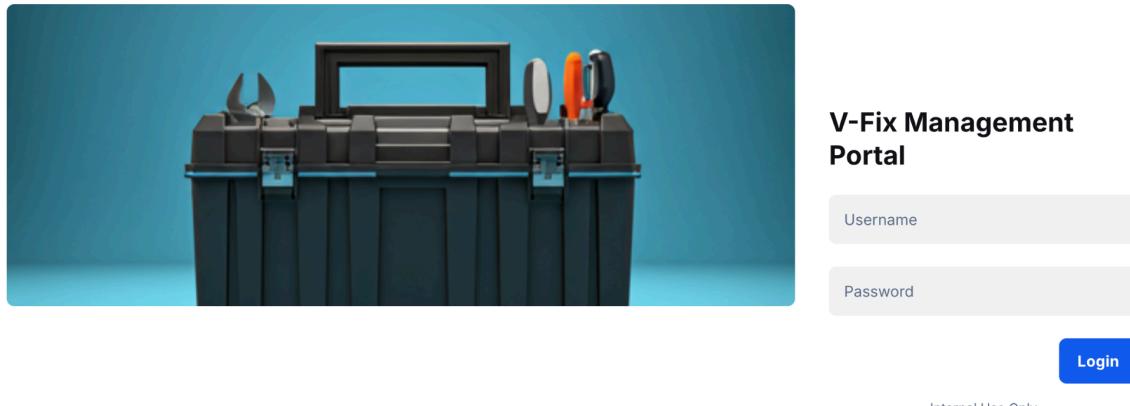
9.1 Admin Login

Function Trigger: The Administrator accesses the web portal URL (e.g., admin.vfix.com) or clicks "Admin Login" from the Landing Page.

Function Description: A secure entry point restricted to internal staff. It requires username/password authentication to access the sensitive management dashboard.

Function Details (Logic):

- **Input:** Username and Password.
- **Validation:** Both fields are mandatory.
- **Authentication:** Calls [POST /admin/login](#).
- **Security:**
 - If successful, a secure HTTP-only cookie or JWT token is issued.
 - If failed, a generic "Invalid credentials" error is shown.
 - **Rate Limiting:** IP address is blocked for 15 minutes after 5 failed attempts.
- **Navigation:** Redirects to **FR-36 Admin Dashboard** upon success.



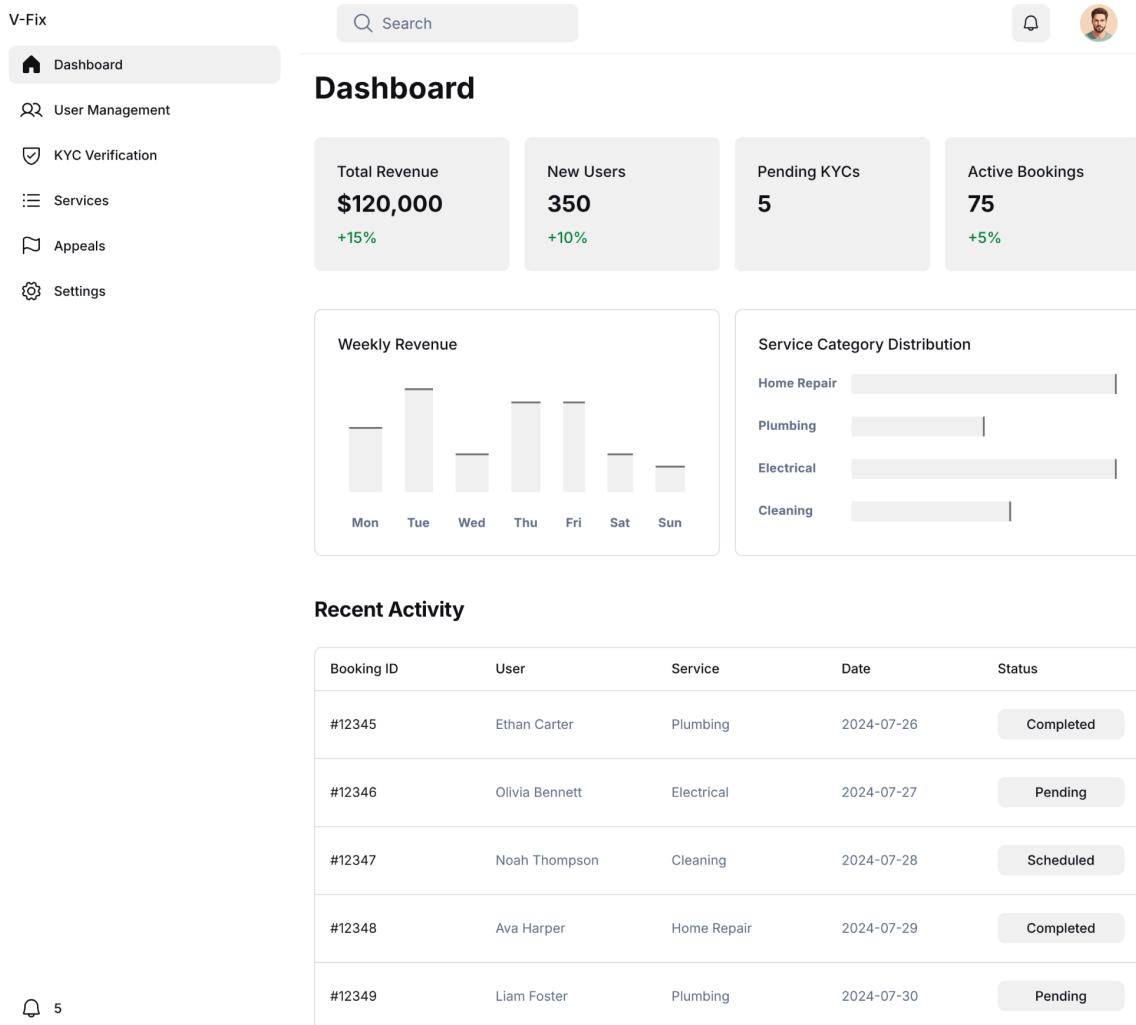
9.2 Admin Dashboard

Function Trigger: Successful Admin Login.

Function Description: The central command center providing a high-level overview of the system's health. It displays key metrics and quick navigation to all management modules.

Function Details (Logic):

- **KPI Cards:** Displays real-time counters:
 - "Pending KYCs" (Clickable -> Links to FR-37).
 - "Active Technicians".
 - "Total Bookings Today".
 - "Total Revenue".
- **Charts:** Renders graphical data (e.g., Line chart for Weekly Revenue, Pie chart for Service Categories) using a charting library (e.g., Chart.js).
- **Sidebar Navigation:** Persistent menu linking to Users, KYC, Services, Reports, and Settings.



9.3 KYC List & KYC Detail

Function Trigger: Admin clicks "KYC / Pending Verification" from the Sidebar or Dashboard.

Function Description: The core workflow for verifying technician identities (Trust Platform).

Function Details (Logic):

- **List View (FR-37):** Displays a table of technicians with status **Pending**. Columns: Name, Submission Date, Phone. Sorted by oldest first.
- **Detail View (FR-38):**
 - **Display:** Shows the Technician's profile data alongside the uploaded images (ID Front, ID Back, Certificate).
 - **Action - Approve:** Updates status to **Active**. Triggers "Welcome" email/notification to the Technician.
 - **Action - Reject:** Opens a modal to input a "Rejection Reason". Updates status to **Rejected** and notifies the Technician to re-submit.

The screenshot shows the 'Technician Verification' page in the V-Fix Admin application. At the top, there is a header with the title 'Technician Verification' and a search bar. Below the header, there is a dropdown menu labeled 'Status: Pending'. The main content area is a table listing two technicians:

ID	Full Name	Phone Number	Submission Date	Status	Action
#12345	Sophia Carter	555-123-4567	2023-08-15	Pending	Review
#67890	Ethan Bennett	555-987-6543	2023-07-22	Rejected	View Details

At the bottom of the table, there is a pagination control showing 'Showing 1-10 of 50' and a set of numbered buttons (1, 2, 3, 4, 5) with arrows for navigation.

[Dashboard](#) / [KYC](#) / [Nguyen Van A](#)

Nguyen Van A

Pending Review

Submitted Information

Name	Nguyen Van A
Phone	+84 901 234 567
Address	123 Tran Hung Dao, District 1, Ho Chi Minh City
Experience	5 years

Documents Evidence

[Reject Application](#)[Approve & Activate](#)

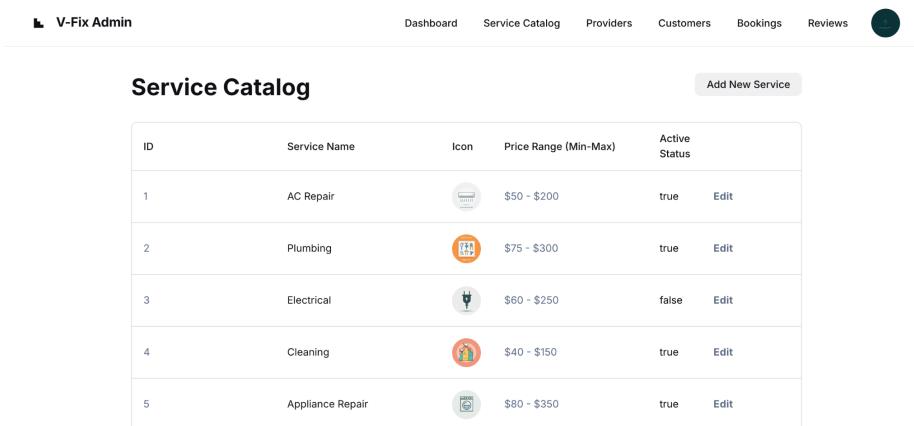
9.4 Service Management & Edit Service

Function Trigger: Admin clicks "Services" from the Sidebar.

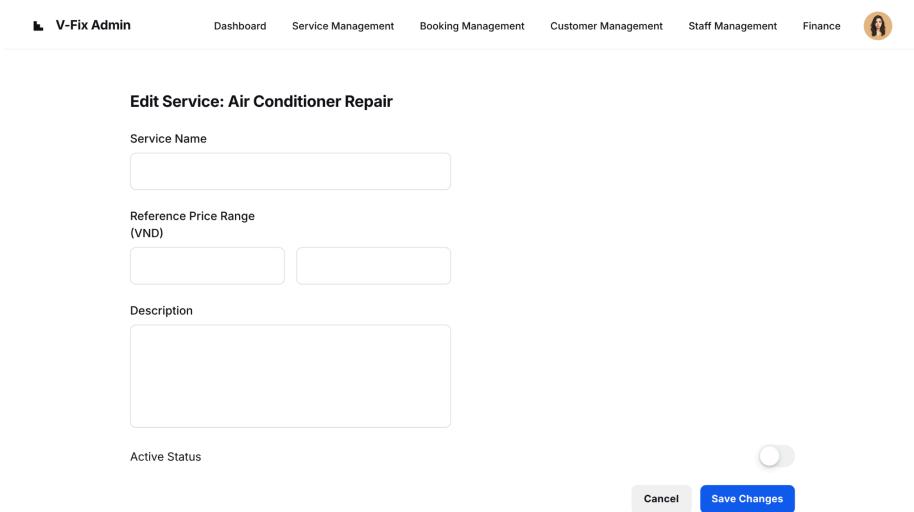
Function Description: Allows configuration of the service catalog and the reference pricing used by the AI model.

Function Details (Logic):

- **List View (FR-39):** Lists all **ServiceCategories** (e.g., AC Repair) and their sub-issues (**ServiceIssues**).
- **Edit Action (FR-40):** Clicking "Edit" on a specific Issue (e.g., "Leaking Water") opens a form.
- **Update Logic:** Admin can modify the **Min Price**, **Max Price**, and **Description**.
 - **Validation:** Min Price must be less than Max Price.
 - **Impact:** Changes update the database immediately, affecting future AI diagnostics.



ID	Service Name	Icon	Price Range (Min-Max)	Active Status	Action
1	AC Repair		\$50 - \$200	true	Edit
2	Plumbing		\$75 - \$300	true	Edit
3	Electrical		\$60 - \$250	false	Edit
4	Cleaning		\$40 - \$150	true	Edit
5	Appliance Repair		\$80 - \$350	true	Edit



Edit Service: Air Conditioner Repair

Service Name:

Reference Price Range (VND):

Description:

Active Status:

Cancel **Save Changes**

9.5 Appeal List & Appeal Detail

Function Trigger: Admin clicks "Appeals / Reports" from the Sidebar.

Function Description: A support module for handling disputes between Technicians and Customers regarding unfair reviews.

Function Details (Logic):

- **List View (FR-41):** Shows pending appeals.
- **Detail View (FR-42):**
 - Display: Shows the original Review, the Technician's Appeal Reason, and related Booking info.
 - **Action - Resolve (Remove Review):** Deletes/Hides the review and notifies the Technician.
 - **Action - Dismiss (Keep Review):** Rejects the appeal; the review remains visible.

The screenshot shows a table titled 'Review Appeals' with a 'Pending' filter applied. The columns are Date, Technician, Reported Review, Reason, Status, and Actions. Each row contains a technician's name, the date of the report, a brief description of the issue, the reason for appeal (e.g., False Info, Inappropriate Content), the current status (Pending), and a 'Review' button. The table has 10 rows, each corresponding to a different technician.

Date	Technician	Reported Review	Reason	Status	Actions
Nov 29, 2025	Ethan Carter	Technician was extremely rude and unprofessional...	False Info	Pending	Review
Nov 28, 2025	Olivia Bennett	The technician did not complete the job as requested...	Inappropriate Content	Pending	Review
Nov 27, 2025	Noah Thompson	The technician arrived late and left early...	False Info	Pending	Review
Nov 26, 2025	Ava Martinez	The technician was not qualified for the job...	Inappropriate Content	Pending	Review
Nov 25, 2025	Liam Harris	The technician damaged my property...	False Info	Pending	Review
Nov 24, 2025	Isabella Clark	The technician was dishonest about the cost...	Inappropriate Content	Pending	Review
Nov 23, 2025	Jackson Lewis	The technician did not follow safety protocols...	False Info	Pending	Review
Nov 22, 2025	Sophia Walker	The technician was unresponsive to my concerns...	Inappropriate Content	Pending	Review
Nov 21, 2025	Aiden Hall	The technician was not respectful of my home...	False Info	Pending	Review
Nov 20, 2025	Mia Young	The technician did a poor job and refused to fix it...	Inappropriate Content	Pending	Review

< 1 2 3 4 5 >

The screenshot shows the 'Appeal Decision Detail' page for Case #9281. It includes sections for 'Original Review', 'Technician's Statement', and 'Internal Decision Note'. The 'Original Review' section shows a 1-star rating and a customer complaint. The 'Technician's Statement' section shows a reason for appeal ('False Information') and a photo of an AC unit. The 'Internal Decision Note' section has a note field and two buttons at the bottom: 'Dismiss Appeal' and 'Accept & Delete Review'.

Appeals > Case #9281

Appeal Decision Detail

Original Review

★ 1 Star
"He broke my AC cover and didn't apologize."
Customer has 3 previous reports

Technician's Statement

Reason: False Information
The AC cover was already broken when I arrived. I have a photo timestamped before I started work.

Internal Decision Note

Add Internal decision note

Dismiss Appeal Accept & Delete Review

9.6 Auto-Ban Monitor (Non-screen/Backend)

Function Trigger: A scheduled Cron job running periodically (e.g., every 24 hours at 00:00).

Function Description: An automated security script that enforces **Business Rule BR-12** to maintain platform quality.

Function Details (Logic):

- **Query:** Scans the `Users` table for accounts that have received 3 or more *validated* reports/strikes within the last 30 days.
- **Action:**
 - Updates user status to `Banned`.
 - Invalidates current session tokens (forcing logout).
 - Send an email notification: "Your account has been suspended due to multiple policy violations."
- **Logging:** Records the ban action in the system audit log.

10. Public Information

10.1 Landing Page

Function Trigger: User accesses the main website URL (e.g., www.vfix.com).

Function Description: The marketing face of the product. Its goal is to convert visitors into Customers (Download App) or Technicians (Register).

Function Details (Logic):

- **Content:** Hero section with value proposition ("Fast, Reliable Repair"), "How it Works" section, and Footer.
- **Call to Action (CTA):**
 - "Download App": Scrolls to Download section or redirects to Store.
 - "Become a Partner": Navigates to **FR-32 Partner Registration Form**.
 - "Admin Login": Link to **FR-35**.

The screenshot shows the V-Fix Admin interface with the following details:

- Header:** V-Fix Admin, Dashboard, Cases, Technicians, Customers, Reviews, Appeals, and a user icon.
- Breadcrumbs:** Appeals > Case #9281
- Title:** Appeal Decision Detail (Pending)
- Original Review:**
 - Rating: ★ 1 Star
 - Comment: "He broke my AC cover and didn't apologize."
 - Customer note: Customer has 3 previous reports
- Technician's Statement:**
 - Reason: False Information
 - Comment: The AC cover was already broken when I arrived. I have a photo timestamped before I started work.
 - Image: A small thumbnail image of an AC unit.
- Internal Decision Note:**
 - Add internal decision note
- Buttons:** Dismiss Appeal and Accept & Delete Review.

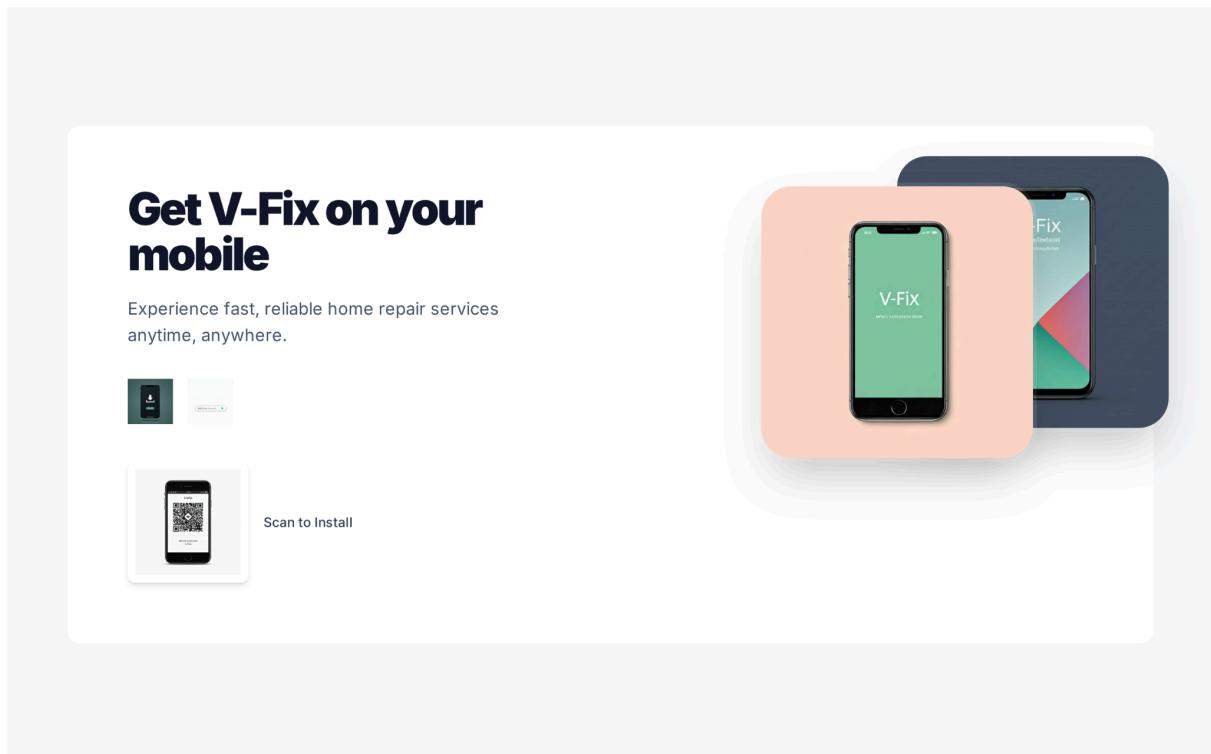
10.2 Download App

Function Trigger: User clicks "Download App" from the Landing Page.

Function Description: Provides direct access to the mobile applications.

Function Details (Logic):

- **Display:**
 - **QR Codes:** Two distinct QR codes for scanning (one for iOS, one for Android).
 - **Store Badges:** Clickable "Get it on Google Play" and "Download on the App Store" buttons.
- **Device Detection (Optional):** If accessed via mobile browser, it can automatically redirect to the relevant App Store based on the OS (iOS/Android).



V. Non-Functional Requirements

1. External Interface Requirements

1.1 User Interfaces

UI-01: The Mobile Applications (Customer & Partner) shall follow the Material Design 3 guidelines for Android and Human Interface Guidelines for iOS to ensure a native and intuitive user experience.

UI-02: The application theme must adhere to the V-Fix Brand Identity, utilizing the primary colors Trust Blue (#0056b3) and White, with Safety Orange accents for call-to-action buttons (e.g., "Book Now", "Accept Job").

UI-03: The Partner App interface must prioritize accessibility for technicians who may be older or working in low-light conditions. This includes using high-contrast text, a minimum font size of 14sp, and large touch targets (minimum 48x48dp) for primary actions.

UI-04: The system shall support both Vietnamese (Default) and English languages, selectable via the Settings menu.

UI-05: Error messages must be displayed in clear, non-technical language (e.g., "No internet connection" instead of "Error 503") via toast notifications or modal popups.

1.2 Software Interfaces

SI-01: Google Gemini AI API: The system needs to communicate with the Gemini API to transmit user descriptions and associated images. The interface is designed to accept prompts formatted as JSON and, in turn, provide structured JSON output containing the diagnostic results and price estimations.

SI-02: Google Maps Platform: The system will interface with the Maps SDK for Android/iOS to display map views. Additionally, the backend will utilize the Distance Matrix API to calculate the precise distance between the Customer and the Technician, which is a key input for the matching engine.

SI-03: SMS Gateway Service: The system must integrate with a third-party SMS provider, such as Twilio or a local Vietnamese service, to facilitate sending One-Time Passwords (OTP) for essential functions like account verification and password resets.

SI-04: Database Management System: Persistent data management for V-Fix will be handled by the backend application, which must connect with a database. This database, preferably Microsoft SQL Server or PostgreSQL, will be used to store and retrieve essential information such as user profiles, booking details, and system logs.

1.3 Hardware Interfaces

HI-01: Client Mobile Devices: The V-Fix application has specific minimum system requirements. Users must be running a device with at least Android 8.0 (Oreo) or iOS 13.0. The application requires access to key device sensors: GPS/Location Services are necessary for tracking purposes, and the Camera is required for capturing photos of issues and necessary KYC documents. Finally, to ensure full functionality, the device must maintain an active internet connection, either via 4G/5G or Wi-Fi.

HI-02: Server Configuration (Cloud-based): The application requires the following server resources: The Application Server should have a minimum of 2 vCPUs and 4GB of RAM to effectively manage concurrent API requests and WebSocket connections. The Database Server needs at least 2 vCPUs and 8GB of RAM, utilizing SSD storage to ensure rapid I/O operations. For storage, a scalable Object Storage solution (such as AWS S3, Firebase Storage, or Cloudinary) is necessary to host user-uploaded images, including booking photos and ID cards.

1.4 Communications Interfaces

CI-01: Secure HTTP (HTTPS): All communication between the Mobile Apps/Web Portal and the Backend Server shall be encrypted using TLS 1.2/1.3 over HTTPS.

CI-02: Data Format : All data exchanged via RESTful APIs shall be formatted in JSON (JavaScript Object Notation).

CI-03: Real-time Communication: The system shall utilize Secure WebSockets (WSS) or a managed service (like Firebase Realtime Database) to facilitate instant chat messaging and live location tracking updates with a latency of under 500ms.

2. Quality Attributes

2.1 Usability

USE-01: The V-Fix Customer App shall enable a new user to complete a service booking request within 3 minutes of opening the application, requiring no more than 5 distinct interactions (taps) after the initial setup. This ensures the primary business goal is easily achievable.

USE-02: The Partner App interface shall be designed with a minimal learning curve, allowing a verified technician to successfully accept and complete a job simulation without external training or manual reading. All critical actions (Accept Job, Navigate, Complete) must be explicitly labeled.

USE-03: The application shall provide immediate visual feedback for all user interactions. Buttons must change state upon tapping, and loading indicators must appear for any process taking longer than 1 second to prevent users from believing the app is frozen.

2.2 Performance

PER-01: The Technician Matching Engine must process a booking request and identify suitable candidates within a 5km radius in under 3 seconds for 95% of requests, ensuring users do not wait excessively during the "Scanning" phase.

PER-02: The Gemini AI Integration Service must return a diagnostic result and price estimation within 10 seconds of the user submitting their text description and images. If the latency exceeds this threshold, the system must display a "Taking longer than usual" message.

PER-03: The backend system shall support a minimum of 1,000 concurrent active users (Customers and Technicians combined) without degradation in response time, ensuring stability during peak hours (e.g., weekends or summer heatwaves).

2.3 Security

SEC-01: All sensitive personally identifiable information (PII), specifically the Customer's home address and the Technician's KYC documents (ID Cards), must be encrypted at rest using AES-256 standards in the database.

SEC-02: The system shall implement strict Role-Based Access Control (RBAC). Technicians must never be able to view a Customer's exact address until a booking is explicitly confirmed, and Customers must never see a Technician's private contact details outside of an active job context.

SEC-03: User passwords shall never be stored in plain text. They must be hashed and salted using a strong algorithm like Bcrypt or Argon2 before storage.

2.4 Safety

SAF-01: To mitigate legal liability and manage user expectations, the application must prominently display a disclaimer on the Diagnostic Result screen stating that "AI results are preliminary estimates only and do not replace professional on-site inspection."

SAF-02: The system shall implement a "Panic Button" or "Report Safety Issue" feature within the active job screen, allowing both Customers and Technicians to quickly alert the Administrator or local authorities in case of emergency or threatening behavior.

2.5 Availability

AVL-01: The V-Fix system shall maintain an uptime availability of 99.9% during operating hours (6:00 AM to 10:00 PM), allowing for a maximum of approximately 45 minutes of unplanned downtime per month.

AVL-02: Any scheduled maintenance that requires system downtime must be performed during off-peak hours (e.g., 2:00 AM - 4:00 AM) and users must be notified via app notification at least 24 hours in advance.

2.6 Reliability

REL-01: The mobile application shall have a crash rate of less than 0.1% per session. Critical workflows, such as "Confirm Booking" and "Complete Payment," must possess atomic transaction properties to ensure data consistency even if the network disconnects mid-process.

REL-02: The system must implement an automatic retry mechanism for failed network requests (e.g., sending a chat message or uploading an image). It should attempt to resend up to 3 times before displaying a failure message to the user.

2.7 Design Constraints

DES-01: The backend system must be developed using the .NET 8 (or later) framework to ensure compatibility with the team's existing expertise and enterprise-grade performance.

DES-02: The mobile applications must be built using a cross-platform framework (React Native or Flutter) to allow a single codebase to deploy to both iOS and Android stores, optimizing development resources.

DES-03: The primary database shall be a relational database management system, specifically Microsoft SQL Server or PostgreSQL, to handle complex transactional relationships between users, bookings, and financial records.

2.8 Scalability

SCAL-01: The system architecture shall be designed to support horizontal scaling, allowing the backend infrastructure to automatically increase server instances (auto-scaling) during high-traffic periods, such as weekends or holidays, without service interruption.

SCAL-02: The database design must support partitioning or sharding strategies for high-volume tables like Bookings and ChatMessages to ensure query performance remains stable as the dataset grows beyond 1 million records.

2.9 Maintainability

MAIN-01: All backend API endpoints must be fully documented using the OpenAPI Specification (Swagger UI). This documentation must be automatically generated from the code and accessible to the frontend development team to ensure seamless integration and rapid troubleshooting.

MAIN-02: The source code shall adhere to standard Clean Architecture principles and Clean Code conventions (e.g., proper naming, modularization) to allow future developers or the maintenance team to understand and modify the system with minimal effort.

2.10 Legal & Compliance

LEG-01: The system shall comply with relevant Vietnamese regulations regarding personal data protection (Decree 13/2023/NĐ-CP). This implies that users must have the explicit right to view all data collected about them and request the permanent deletion of their account and associated personal data (Right to be Forgotten).

LEG-02: All technicians operating on the platform must digitally agree to a "Service Provider Agreement" and "Code of Conduct" during the onboarding process to limit the platform's liability regarding on-site accidents or disputes.