

**Project Title:** CarFix: Online Mechanic Booking System

## Problem Statement:

**The problem of:** Difficulty in efficiently scheduling and booking car repair services, often relying on phone calls or in-person visits, leading to delays and inconvenience for car owners.

**Affects:** Car owners (customers) and mechanics (service providers).

**The impact of which is:** Uncertainty and frustration for car owners due to unpredictable repair schedules, and inefficiencies for mechanics managing appointments manually.

**A successful solution would be:** A flexible, cost-effective, and user-friendly web-based system (CarFix) that allows car owners to book mechanic services online, view real-time availability, and track repair progress. The system would enable mechanics to manage their schedules, receive bookings, and communicate with customers efficiently. Users would access the system remotely via a web browser, ensuring convenience and reducing the need for physical or phone-based interactions.

## Feature List:

1. Register a user account.
2. Log in to the system.
3. View mechanic profiles (e.g., skills, ratings).
4. Book a mechanic for a specific date and time.
5. Select car repair services (e.g., oil change, tire repair).
6. Cancel a booking.
7. Reschedule an appointment.
8. Submit feedback/rating for a mechanic.
9. View past booking history.
10. Search mechanics by service type (e.g., brake repair).
11. Filter mechanics by availability.
12. Pay for services online.
13. Receive payment receipts.
14. Update user profile (e.g., contact info, car details).
15. Admin: Manage mechanic accounts.
16. Admin: Approve new mechanic registrations.
17. Admin: View all bookings in the system.
18. Admin: Generate reports (e.g., bookings per month)

# Functional Requirements

## 1. User Account Management

- **FR-001:** The system shall allow car owners to register an account by providing basic information (email, password, name, phone number).
- **FR-002:** The system shall validate the email during registration to ensure it is unique and not already in use.
- **FR-003:** The system shall send a confirmation message to the user upon successful registration.
- **FR-004:** The system shall allow car owners to optionally enter car details (make, model, year) during registration and associate them with the account.
- **FR-005:** The system shall allow users to log in using their email and password.
- **FR-006:** The system shall authenticate login credentials and deny access if incorrect.
- **FR-007:** The system shall redirect users to their dashboard upon successful login.
- **FR-008:** The system shall allow users to update their contact information (phone, email) and car details (make, model, year) in their profile.
- **FR-009:** The system shall save updated profile information and reflect it in the dashboard and bookings.

## 2. Mechanic Profile Viewing

- **FR-010:** The system shall display a list of mechanics with basic details (skills, ratings, location) accessible to car owners.
- **FR-011:** The system shall allow users to view detailed mechanic profiles, including experience, certifications, and customer reviews.
- **FR-012:** The system shall display mechanic ratings as a 1–5 star average and update them based on user feedback.
- **FR-013:** The system shall provide navigation to return to the mechanic list from a detailed profile view.

## 3. Booking Management

- **FR-014:** The system shall allow users to book a mechanic by selecting a mechanic, date, and time slot from available options.
- **FR-015:** The system shall check mechanic availability and prevent double-booking of time slots.
- **FR-016:** The system shall confirm bookings and display them on the user's dashboard and mechanic's schedule.
- **FR-017:** The system shall allow users to select services (e.g., oil change, tire repair, brake repairs) during booking and associate them with the appointment.
- **FR-018:** The system shall allow users to cancel a booking via the dashboard.
- **FR-019:** The system shall notify the mechanic of cancellations and update their availability.
- **FR-020:** The system shall allow users to reschedule an appointment by selecting a new date and time from available slots.

- **FR-021:** The system shall update the booking details and mechanic's schedule upon rescheduling.

#### *4. Service Selection*

- **FR-022:** The system shall provide a list of basic services (e.g., oil change, tire repair) for users to select during booking.
- **FR-023:** The system shall calculate and display an estimated cost for selected basic services.
- **FR-024:** The system shall provide a list of specialized services (e.g., brake repairs) for users to select during booking.
- **FR-025:** The system shall provide a detailed cost estimate for selected specialized services.

#### *5. Feedback and Reviews*

- **FR-026:** The system shall allow users to submit a 1–5 star rating for a mechanic after a repair.
- **FR-027:** The system shall validate and associate ratings with the mechanic's profile, updating the average rating.
- **FR-028:** The system shall allow users to submit a written review for a mechanic after a repair.
- **FR-029:** The system shall display user reviews (text, date) on the mechanic's profile.

#### *6. Booking History*

- **FR-030:** The system shall allow users to view their past booking history on the dashboard, including dates, mechanics, services, and outcomes (e.g., completed, canceled).
- **FR-031:** The system shall provide filtering and search options for booking history by date or mechanic.

#### *7. Mechanic Search and Filtering*

- **FR-032:** The system shall allow users to search for mechanics by basic service type (e.g., oil change) and display matching mechanics sorted by rating.
- **FR-033:** The system shall allow users to search for mechanics by specialized service type (e.g., brake repairs) and display matching mechanics sorted by proximity or ratings.
- **FR-034:** The system shall allow users to refine search results with filters (e.g., location, availability).
- **FR-035:** The system shall allow users to filter mechanics by availability within a specified time window and update the list in real-time.

#### *8. Payment Processing*

- **FR-036:** The system shall allow users to pay for basic and specialized services online using a payment method (e.g., credit card) after a repair.
- **FR-037:** The system shall process payments and confirm them with a receipt.
- **FR-038:** The system shall store payment history in the user's dashboard.
- **FR-039:** The system shall generate and deliver digital receipts (via email or dashboard) containing service details, amount, date, and mechanic name.
- **FR-040:** The system shall allow users to download or print receipts.

## *9. Admin Functionality*

- **FR-041:** The system shall allow admins to view, approve, or reject mechanic registrations from an admin dashboard.
  - **FR-042:** The system shall allow admins to deactivate or remove mechanic accounts if they violate terms.
  - **FR-043:** The system shall ensure only approved mechanics are visible to users.
  - **FR-044:** The system shall allow admins to review mechanic applications, including credentials and experience, and notify mechanics of their approval status.
  - **FR-045:** The system shall allow admins to generate booking reports by date, mechanic, or service type, downloadable in PDF or CSV format with filtering options.
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# Non-Functional Requirements

## *1. Performance*

- **NFR-001:** The system shall load the mechanic list and profiles within 2 seconds under normal conditions.
- **NFR-002:** The system shall process booking requests and confirmations within 5 seconds.
- **NFR-003:** The system shall handle at least 1,000 concurrent users without performance degradation.

## *2. Security*

- **NFR-004:** The system shall encrypt user passwords and sensitive data (e.g., payment information) during storage and transmission.
- **NFR-005:** The system shall implement secure authentication to prevent unauthorized access to user and admin accounts.
- **NFR-006:** The system shall comply with relevant data protection regulations (e.g., GDPR, CCPA) for storing and processing personal information.

## *3. Usability*

- **NFR-007:** The system shall provide an intuitive interface, ensuring users can complete registration, booking, and profile updates with no more than 3 clicks from the homepage.
- **NFR-008:** The system shall be accessible on both desktop and mobile devices with a responsive design.
- **NFR-009:** The system shall provide clear error messages (e.g., invalid email, incorrect login credentials) to guide users.

## *4. Reliability*

- **NFR-010:** The system shall have an uptime of at least 99.9% to ensure availability for booking and payments.
- **NFR-011:** The system shall prevent data loss during booking cancellations or rescheduling by maintaining consistent updates to schedules.

## *5. Scalability*

- **NFR-012:** The system shall support scalability to accommodate an increasing number of users and mechanics (e.g., up to 10,000 users and 1,000 mechanics within the first year).

## *6. Maintainability*

- **NFR-013:** The system shall allow updates to service lists (basic and specialized) and cost estimates without requiring downtime.
- **NFR-014:** The system shall log all admin actions (e.g., mechanic approvals, account removals) for audit purposes.

## *7. Interoperability*

- **NFR-015:** The system shall integrate with standard email services for sending confirmation messages and receipts.
- **NFR-016:** The system shall support integration with common payment gateways (e.g., Stripe, PayPal) for online transactions.

# User Stories:

## **1- Story ID: US-001**

**Story Title:** Register a User Account with Personal and Car Information

**As a car owner,**

**I want** to register an account with both my personal and car details,

**So that** I can access the booking system and mechanics have my vehicle information upfront.

- **Importance:** High

**Estimate:** 5

**Type:** Manage Data

- **Acceptance Criteria:**

- I can enter my email, password, name, and phone number on the registration form.
- The system validates my email and ensures it's not already in use.
- I receive a confirmation email or message after successful registration.
- I can enter my car details (make, model, year) during the registration process.
- The system saves my car information and associates it with my account.
- I can log in and view my personal and car information in my profile.
-

## **2- Story ID: US-002**

### **Story Title: Log in to the System**

As a car owner, I want to log in to the system so that I can manage my bookings securely.

**Importance:** High

**Estimate:** 2

**Type:** Manage Data

#### **Acceptance Criteria:**

- And I know I am done when I can enter my email and password on the login page.
- And I know I am done when the system authenticates me and denies access if credentials are incorrect.
- And I know I am done when I'm redirected to my dashboard after successful login.

## **3-Story ID: US-003**

### **Story Title: View Mechanic Profiles with Basic and Detailed Information**

**As a car owner,**

**I want** to view both basic and detailed mechanic profiles,

**So that** I can choose a mechanic based on their skills, experience, certifications, and customer reviews.

**Importance:** High

**Estimate:** 5

**Type:** Report/View

#### **Acceptance Criteria:**

- I can access a list of mechanics and click on their names to see their profile.
- The profile shows basic details including skills, a 1–5 star average rating, and location for proximity.
- I can view additional details such as the mechanic's full experience, certifications, and customer reviews with dates.
- The system displays qualifications and years of experience in a structured format.
- I can easily navigate back to the mechanic list from any profile view.
- 

## **4-Story ID: US-004**

### **Story Title: Book a Mechanic Appointment with Service Confirmation**

**As a car owner,**

**I want** to book a mechanic for a specific date, time, and services,

**So that** my car can be repaired conveniently and the mechanic knows what work is required.

**Importance:** High

**Estimate:** 6

**Type:** Workflow

#### **Acceptance Criteria:**

- I can select a mechanic, available date, and time slot from the booking interface.
- The system checks the mechanic's availability and prevents double-booking.
- I can select required services (e.g., oil change, tire repair) as part of the booking process.
- The system associates the selected services with the booking and notifies the mechanic.
- I see the confirmed appointment and selected services listed on my dashboard.
- The mechanic's schedule reflects the new appointment with service details.
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**5-Story ID:** US-005

**Story Title:** Select Car Repair Services with Cost Estimates

**As a car owner,**

**I want** to select both basic and specialized car repair services during booking,

**So that** the mechanic is prepared for the required work and I know the estimated costs upfront.

**Importance:** High

**Estimate:** 5

**Type:** Workflow

#### **Acceptance Criteria:**

- I can choose from a list of basic services (e.g., oil change, tire repair) and specialized services (e.g., brake repairs) on the booking page.
- The system calculates and displays estimated costs for both basic and specialized services.
- I see all selected services and their cost estimates clearly reflected in my booking confirmation.
- The mechanic is notified of the selected services to prepare accordingly.
- 
- 

**6-Story ID:** US-006

**Story Title:** Cancel a Booking

As a car owner, I want to cancel a booking so that I can adjust my plans if needed.

**Importance:** High

**Estimate:** 3

**Type:** Workflow

**Acceptance Criteria:**

- And I know I am done when I can cancel a booking from my dashboard or through a link in a confirmation email.
  - And I know I am done when the system notifies the mechanic and updates their availability.
  - And I know I am done when I receive a confirmation that the booking is canceled, and the booking is removed from my dashboard.
- 

### **7-Story ID: US-007**

**Story Title: Reschedule an Appointment**

As a car owner, I want to reschedule an appointment so that I can change the time if something comes up.

**Importance:** High

**Estimate:** 4

**Type:** Workflow

**Acceptance Criteria:**

- And I know I am done when I can select a new date and time from available slots on my dashboard or email link.
- And I know I am done when the system checks the mechanic's availability and updates the booking.
- And I know I am done when I see the updated booking on my dashboard, and the mechanic's schedule reflects the change.

### **8-Story ID: US-008**

**Story Title: Submit Feedback for a Mechanic (Rating)**

As a car owner, I want to submit a rating for a mechanic so that I can share my satisfaction level.

**Importance:** Medium

**Estimate:** 2

**Type:** Report/View

**Acceptance Criteria:**

- And I know I am done when, after a repair, I can rate the mechanic (1–5 stars) on the website.
  - And I know I am done when the system validates my rating and associates it with the mechanic's profile.
  - And I know I am done when I see my rating (1–5 stars) displayed on the mechanic's profile.
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**9-Story ID: US-009****Story Title: Submit Feedback for a Mechanic (Review)**

As a car owner, I want to submit a written review for a mechanic so that I can provide detailed feedback about my experience.

**Importance:** Medium**Estimate:** 3**Type:** Report/View**Acceptance Criteria:**

- And I know I am done when I can leave a written review (text) for the mechanic on the website after a repair.
  - And I know I am done when the system associates my review with the mechanic's profile and updates their ratings.
  - And I know I am done when I see my review text displayed on the mechanic's profile, and the mechanic's rating updates.
- 

**10-Story ID: US-010****Story Title: View Past Booking History**

As a car owner, I want to view my past booking history so that I can keep track of previous repairs.

**Importance:** Medium**Estimate:** 2**Type:** Report/View**Acceptance Criteria:**

- And I know I am done when I can log in and access a list of past bookings on my dashboard.
  - And I know I am done when the history shows dates, mechanics, services, and outcomes (e.g., completed, canceled).
  - And I know I am done when I can filter or search my booking history by date or mechanic.
- 

**11-Story ID: US-011****Story Title: Search Mechanics by Service Type with Filters**

As a car owner,

I want to search for mechanics by both basic and specialized service types,

So that I can quickly find suitable professionals for the repairs I need.

**Importance:** Medium**Estimate:** 4**Type:** Search**Acceptance Criteria:**

- I can enter either a basic service (e.g., oil change) or a specialized service (e.g., brake repairs) in the search field.
- The system displays a list of mechanics offering the requested service, sorted by rating or proximity.
- I can refine the search results using filters such as location, availability, or rating.
- The interface provides a consistent and intuitive experience for both service types.
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### **12-Story ID: US-012-----**

#### **Story Title: Filter Mechanics by Availability**

As a car owner, I want to filter mechanics by availability so that I can book someone immediately.

**Importance:** Medium

**Estimate:** 3

**Type:** Search

#### **Acceptance Criteria:**

- And I know I am done when I can apply a filter on the website to show only mechanics available within a time window.
- And I know I am done when the system updates the list in real-time based on mechanic schedules.
- And I know I am done when I can book an available mechanic directly from the filtered list.

### **13-Story ID: US-013**

#### **Story Title: Pay for Services Online with Payment History**

**As a car owner,**

**I want** to pay online for both basic and specialized car repair services,

**So that** I can complete transactions conveniently and keep a record of all payments.

**Importance:** Medium

**Estimate:** 5

**Type:** Payment

#### **Acceptance Criteria:**

- After a repair, I can select a payment method (e.g., credit card) on the website for any service type.
- The system processes payments for both basic and specialized services and provides a clear, itemized receipt.

- I can view my full payment history, including both service types, in my dashboard.
- The payment flow is secure, seamless, and easy to navigate.

## **14-Story ID: US-014**

### **Story Title: Receive Payment Receipts**

As a car owner, I want to receive payment receipts so that I have records of my transactions.

**Importance:** Medium

**Estimate:** 2

**Type:** Report/View

#### **Acceptance Criteria:**

- And I know I am done when, after payment, I receive a digital receipt via email or on my dashboard.
  - And I know I am done when the receipt includes service details, amount, date, and mechanic name.
  - And I know I am done when I can download or print the receipt for my records.
- 

## **15-Story ID: US-015**

### **Story Title: Update User Profile with Contact and Car Information**

As a car owner,

I want to update my contact and car details in my profile,

So that mechanics and the system have the most accurate information for communication and service preparation.

**Importance:** Medium

**Estimate:** 4

**Type:** Manage Data

#### **Acceptance Criteria:**

- I can log in and edit my contact information (e.g., phone, email) and car details (make, model, year) from my profile.
- The system saves the updated information and ensures it's reflected in future bookings.
- Mechanics can view my updated details when reviewing appointments.
- My dashboard accurately displays the latest contact and vehicle information.

## **16-Story ID: US-016**

### **Story Title: Manage Mechanic Accounts**

As an admin, I want to manage mechanic accounts so that only qualified professionals are listed.

**Importance:** High

**Estimate:** 4

**Type:** Manage Data

#### **Acceptance Criteria:**

- And I know I am done when I can view, approve, or reject mechanic registrations from the admin dashboard.
- And I know I am done when I can deactivate or remove accounts if mechanics violate terms.
- And I know I am done when only approved mechanics are visible to customers on the website.



## **17-Story ID: US-017**

### **Story Title: Approve New Mechanic Registrations**

As an admin, I want to approve new mechanic registrations so that I can maintain service quality.

**Importance:** High

**Estimate:** 3

**Type:** Manage Data

#### **Acceptance Criteria:**

- And I know I am done when I can review mechanic applications, including credentials and experience, from the admin dashboard.
- And I know I am done when I can approve or reject applications, and the system notifies mechanics of their status.
- And I know I am done when only approved mechanics appear in the system for customer bookings.



## **18-Story ID: US-018**

### **Story Title: Generate Booking Reports**

As an admin, I want to generate booking reports so that I can analyze system usage.

**Importance:** Medium

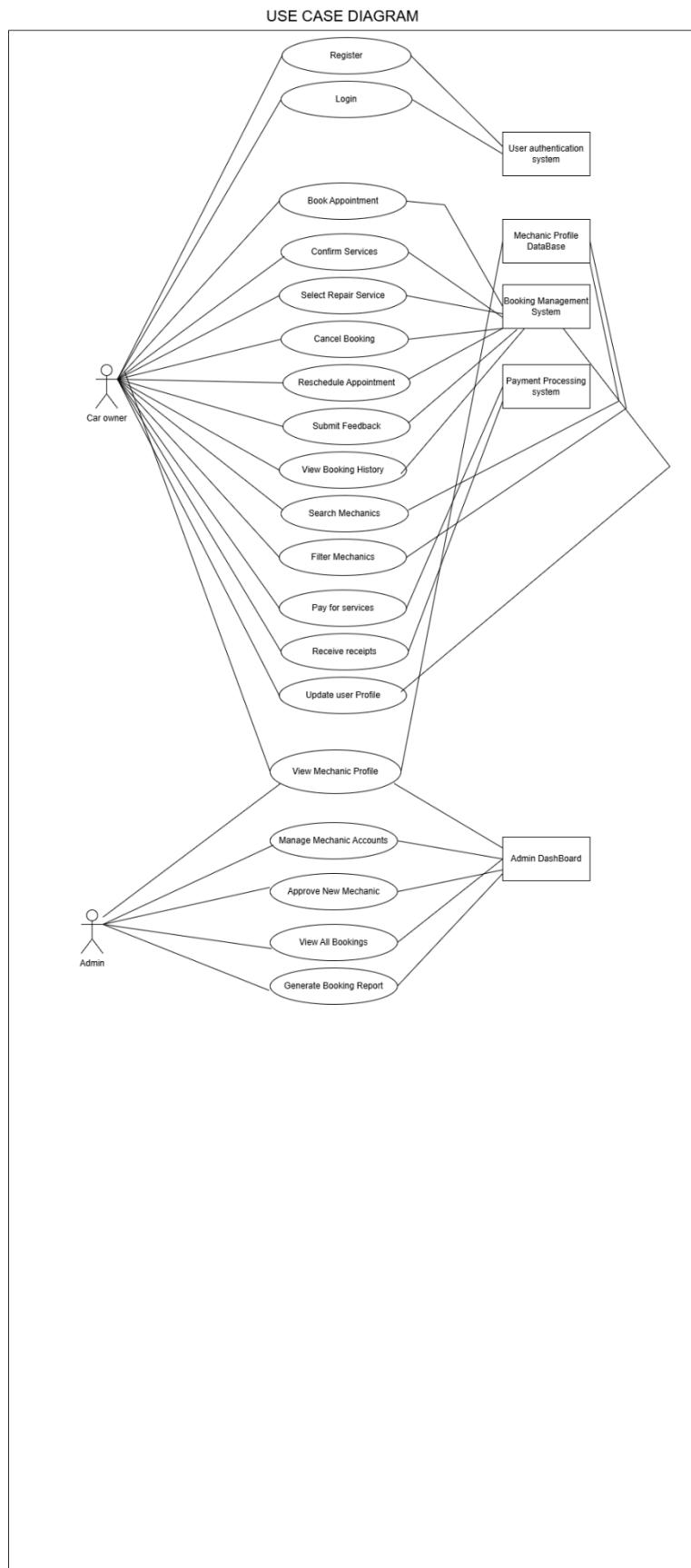
**Estimate:** 4

**Type:** Report/View

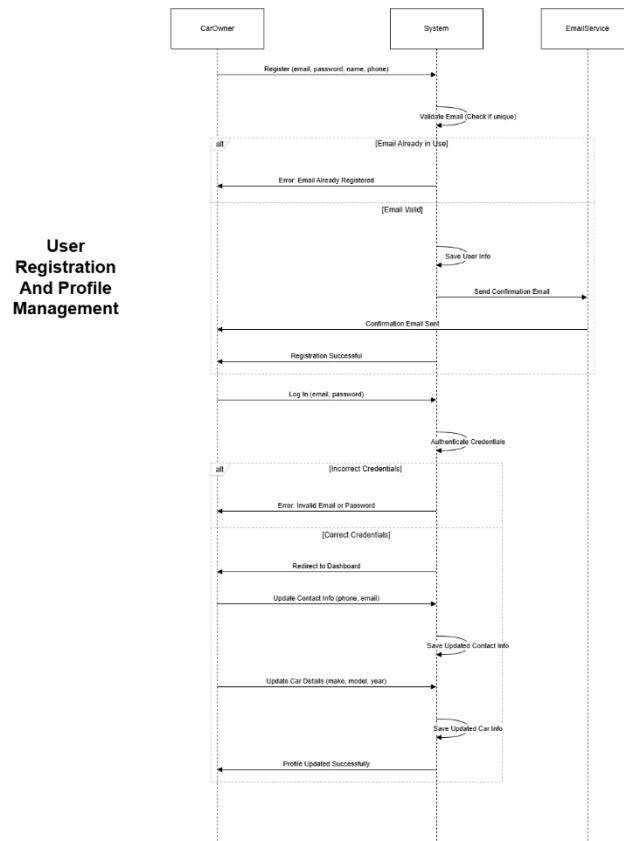
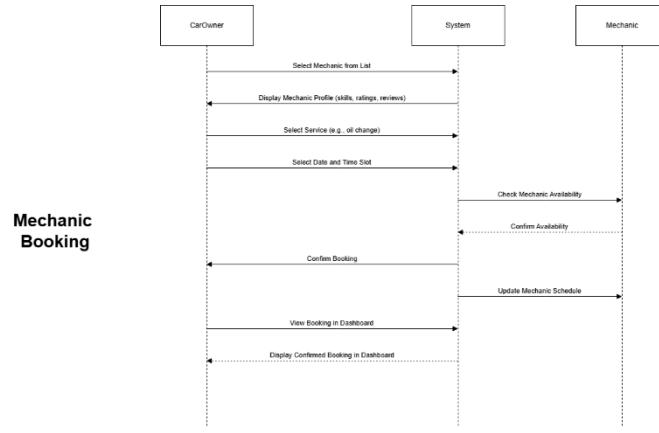
#### **Acceptance Criteria:**

- And I know I am done when I can generate reports showing bookings by date, mechanic, or service type from the admin dashboard.
- And I know I am done when the report is downloadable in PDF or CSV format and includes totals like bookings per month.
- And I know I am done when I can filter reports by time period or location.

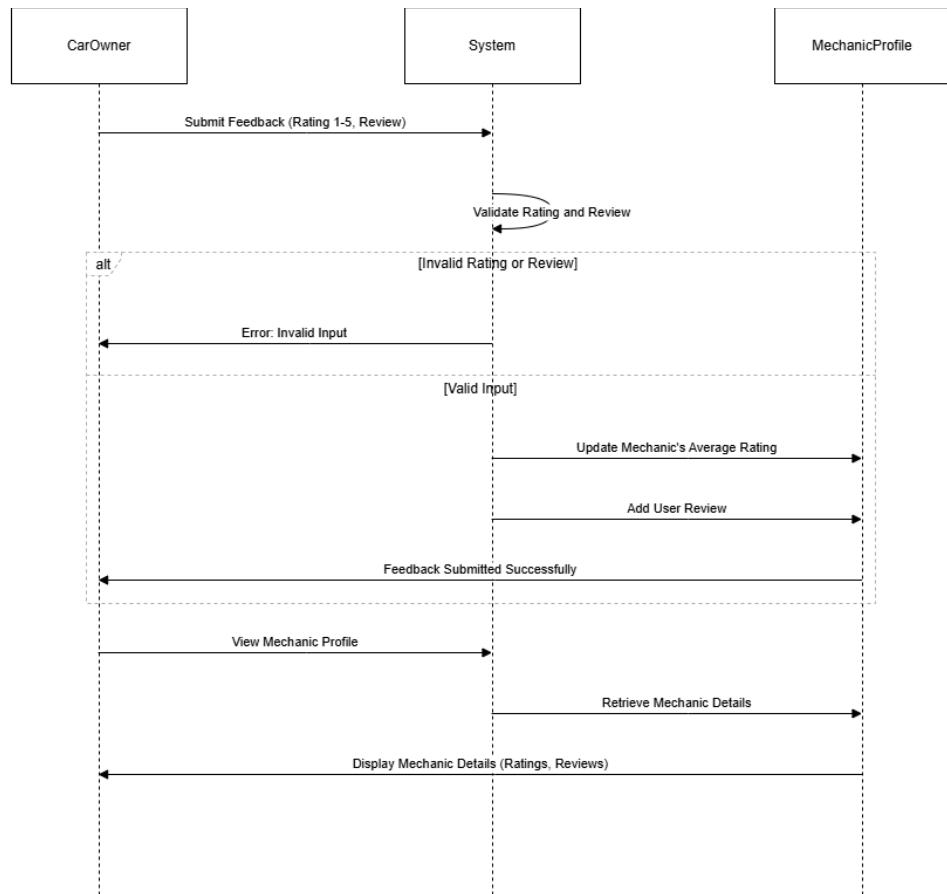
## o USE\_CASE\_DIAGRAM



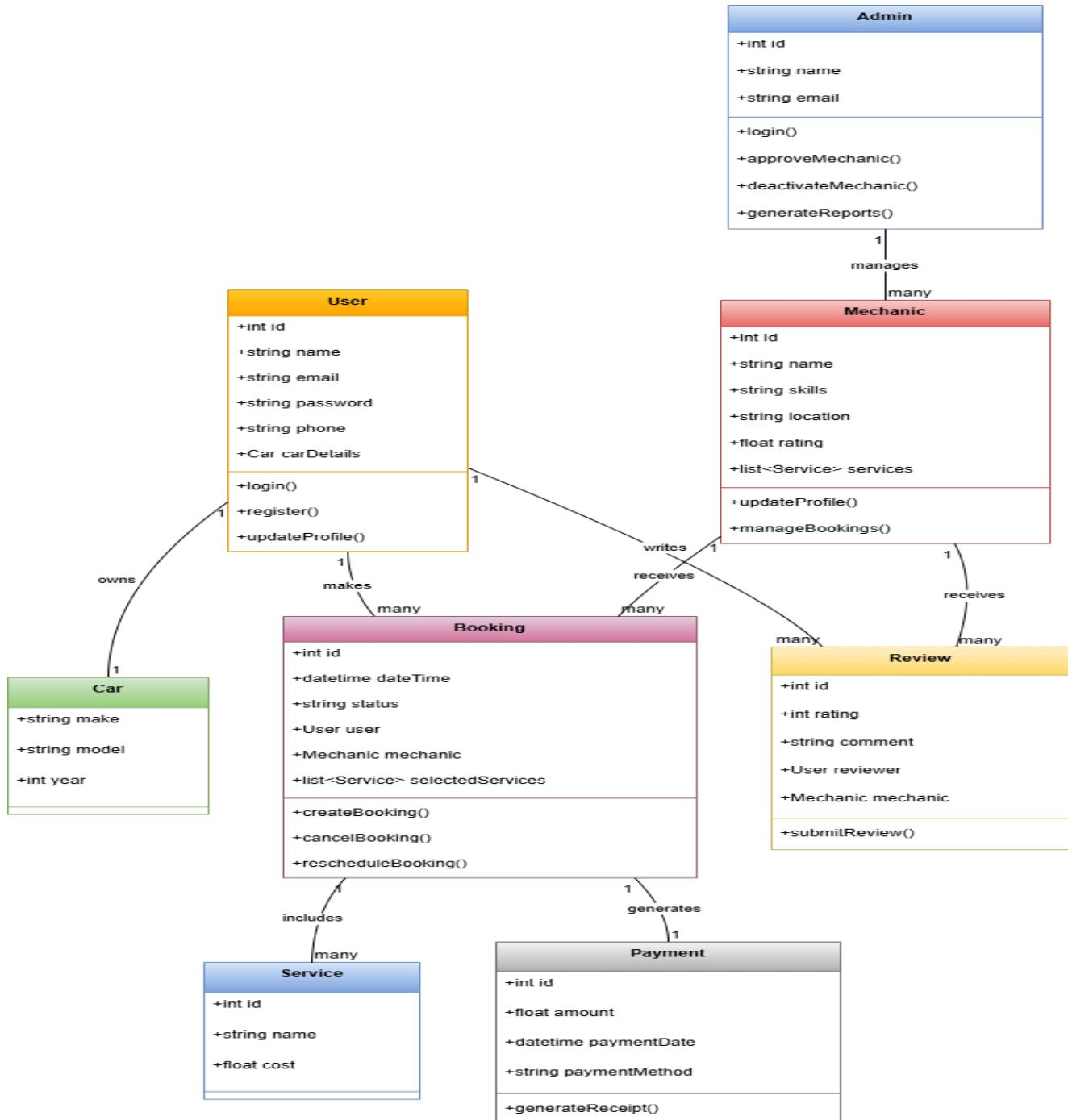
# SEQUENCE DIAGRAM



## Mechanic Feedback and Rating



## CLASS DIAGRAM:



## SPRINT-1 BACKLOG:

**Sprint Backlog 1** ...

- Register a User Account (Basic Registration)  
≡
- Register a User Account (Advanced Registration)  
≡
- Log in to the System  
≡
- View Mechanic Profiles (Basic Details)  
≡
- Book a Mechanic Appointment (Basic Booking)  
≡
- Book a Mechanic Appointment  
≡

+ Add a card

## SPRINT-2 BACKLOG

Sprint Backlog 2 ...

- Select Car Repair Services (Basic Selection)
- Select Car Repair Services (Specialized Selection)
- Cancel a Booking
- Reschedule an Appointment
- Submit Feedback for a Mechanic (Rating)
- Submit Feedback for a Mechanic (Review)
- View Past Booking History

+ Add a card

# TRELLO BOARD

This Trello board displays three main sections: Product Backlog, Sprint Backlog 1, and Sprint Backlog 2.

**Product Backlog:**

- Register a User Account (Basic Registration)
- Register a User Account (Advanced Registration)
- Log in to the System
- View Mechanic Profiles (Basic Details)
- View Mechanic Profiles (Detailed Information)

**Sprint Backlog 1:**

- Register a User Account (Basic Registration)
- Register a User Account (Advanced Registration)
- Log in to the System
- View Mechanic Profiles (Basic Details)
- Book a Mechanic Appointment (Basic Booking)
- Book a Mechanic Appointment

**Sprint Backlog 2:**

- Select Car Repair Services (Basic Selection)
- Select Car Repair Services (Specialized Selection)
- Cancel a Booking
- Reschedule an Appointment
- Submit Feedback for a Mechanic (Rating)
- Submit Feedback for a Mechanic (Review)
- View Past Booking History

**Add a card:** + Add a card

This Trello board displays two main sections: In Progress and Mark as Done.

**In Progress:**

- Cancel a Booking
- Reschedule an Appointment
- Submit Feedback for a Mechanic
- Cancel a Booking
- Reschedule an Appointment
- Pay for Services Online (Basic Payment)
- Receive Payment Receipts

**Mark as Done:**

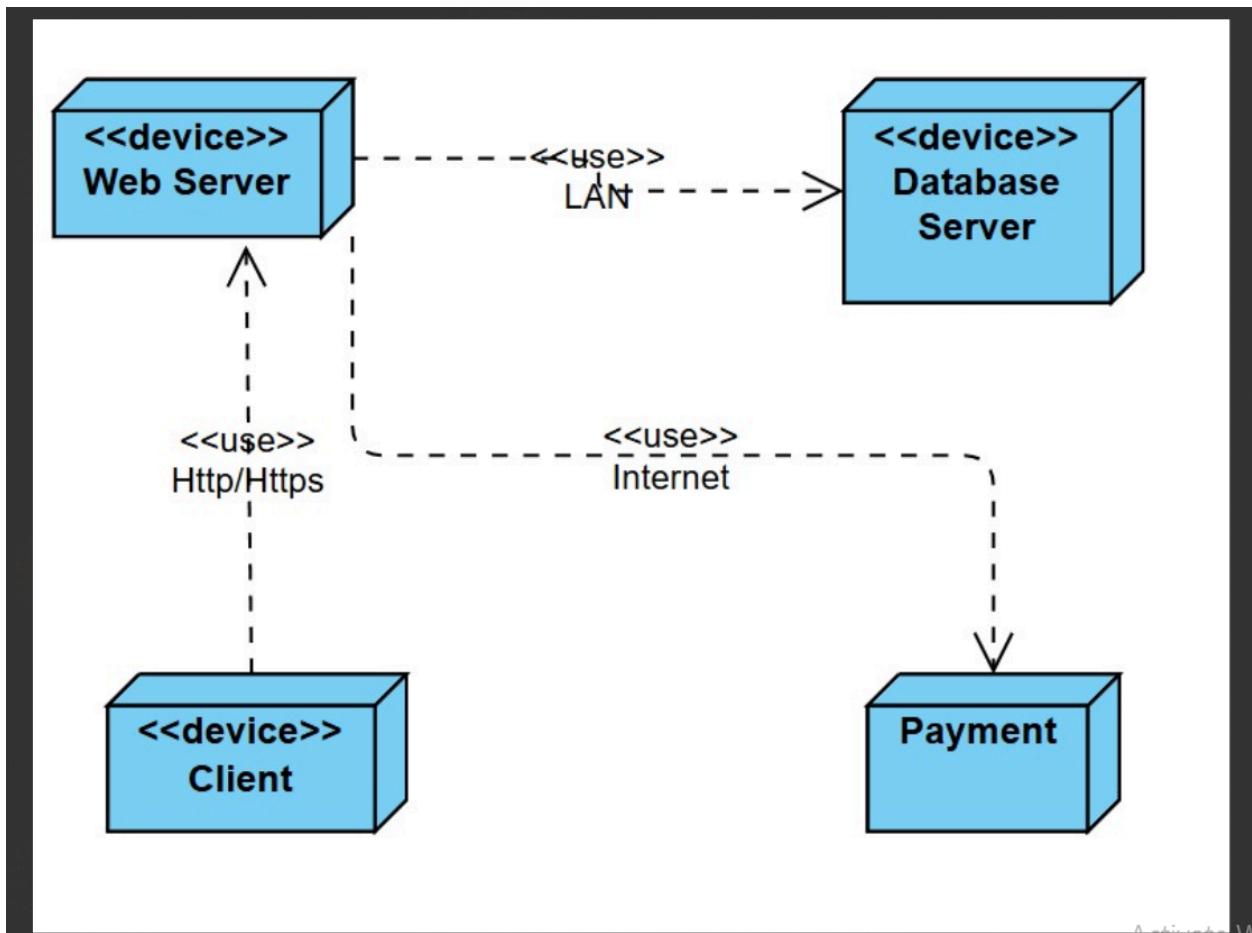
- Register a User Account (Basic Registration)
- Select Car Repair Services (Basic Selection)
- Select Car Repair Services (Specialized Selection)
- Register a User Account (Advanced Registration)
- View Mechanic Profiles (Basic Details)
- Log in to the System

# Burndown Chart

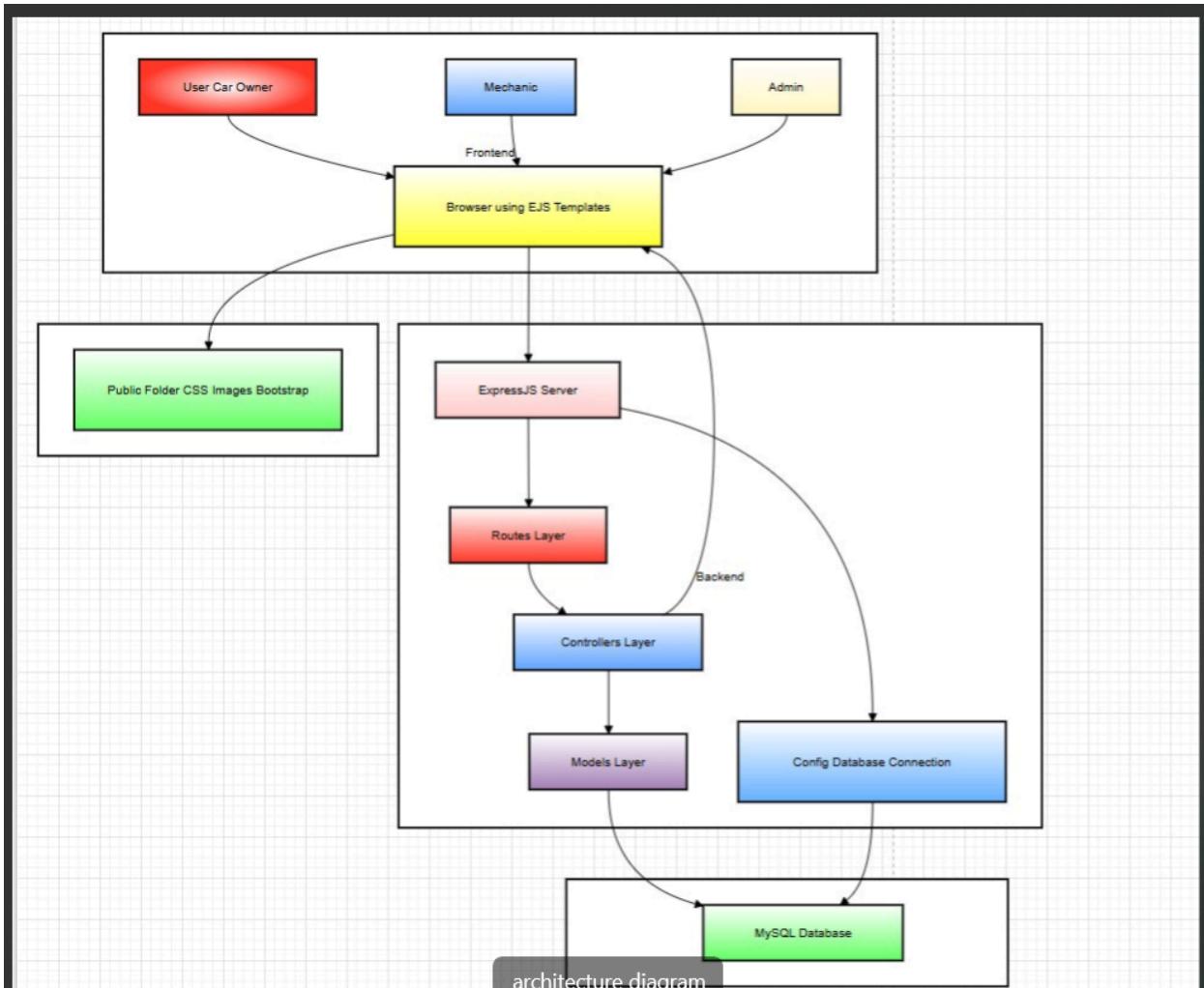
		Sprint BurnDown Chart																
Backlog ID	User Stories	Initial Estimate	13-Mar	16-Mar	19-Mar	22-Mar	25-Mar	28-Mar	31-Mar	3-Apr	6-Apr	9-Apr	12-Apr	15-Apr	18-Apr	21-Apr	24-Apr	27-Apr
		Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day 11	Day 12	Day 13	Day 14	Day 15	Day 16
1	User registration	2		1		1												
2	login	3		1	1		1											
3	view mechanic profiles	4			1	1					1				1			
4	book an appointment	5		1		1	1		1	1								1
5	select a service	2	1															
7	cancel booking	3									1		1		1			
8	reschedule appointment	3										1		1	1			
9	submit feedback	2										1						
10	view past booking history	2										1						
11	search mechanic by type	2					1											
12	payment	2																1
13	update user profile	2							1									
14	manage mechanic accounts	2								1								
15	add services	6	1		1			1			1	1						1
Remaining Effort		36	34	31	28	24	21	19	17	15	11	10	8	6	5	3	2	0
Ideal Trend		22	20.625	19.25	17.875	16.5	15.125	13.75	12.375	11	9.625	8.25	6.875	5.5	4.125	2.75	1.375	0



## Deployment Diagram



# Architecture Diagram



## Implementation Screenshots:

### Admin home:

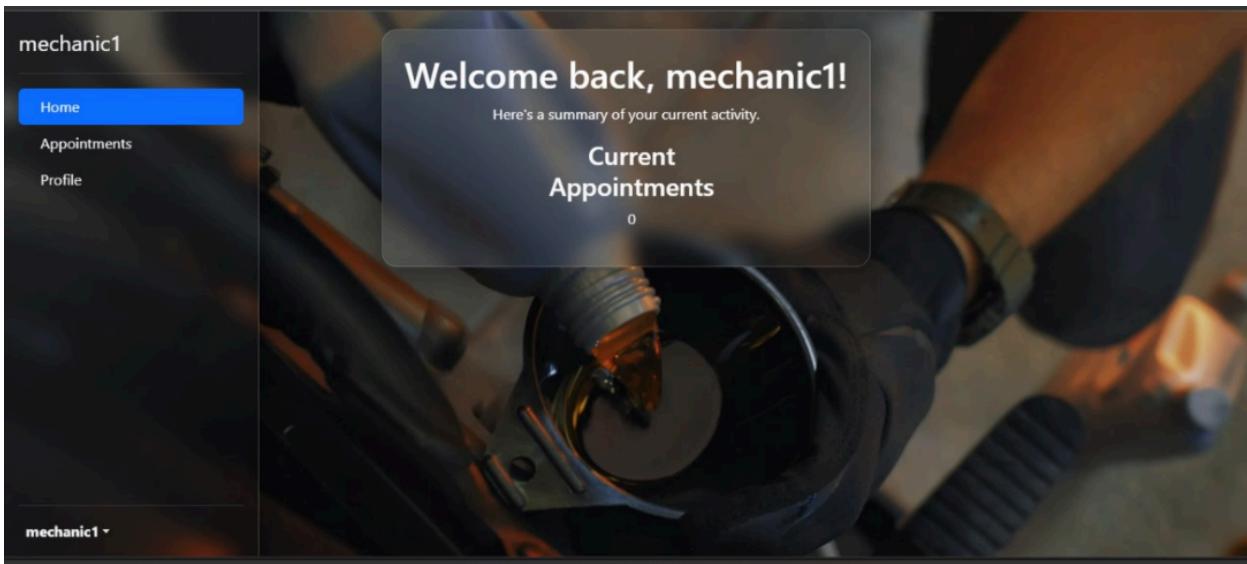
The screenshot shows the Admin Dashboard. On the left is a sidebar with a dark background and white text. It has a 'Home' button highlighted in blue. Other options include 'Appointments', 'Services', 'Add Mechanics', 'View Mechanics', and 'Customers'. At the bottom of the sidebar is a 'Logout' button. The main area has a dark background with a blurred image of a car's engine. In the center, there is a light-colored box containing the title 'Admin Dashboard' and four statistics: 'Total Mechanics' (6), 'Total Services' (20), 'Total Customers' (1), and 'Total Orders' (2).

### User Home:

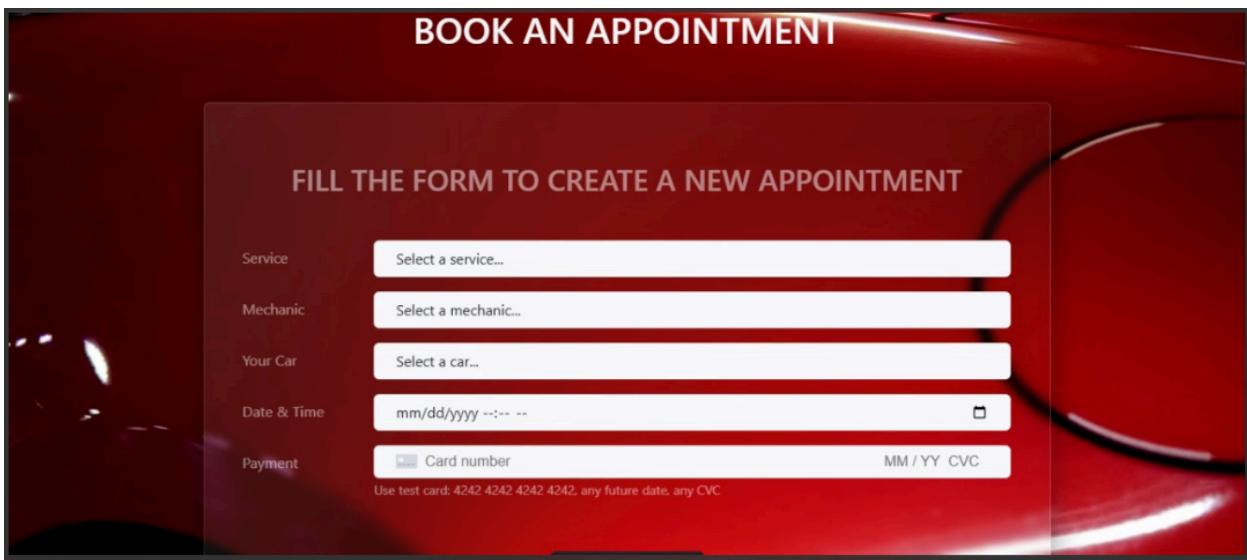
The screenshot shows the User Home page. At the top, there is a navigation bar with 'CarFix' and 'Logout' on the right, and 'Dashboard', 'Book Appointment', 'View Mechanics', and 'My Profile' on the left. Below the navigation bar, the main content area has a red background with a blurred image of a car. It features a 'Welcome Back!' message and a section titled 'Current Appointments' with a message stating 'You have no upcoming appointments.' and a 'Book Now' button. Below this is a section titled 'Recent History' with a table showing two past appointments.

Date	Service	Mechanic	Status
Apr 29, 2025	Tire Rotation	mechanic1	cancelled
Apr 27, 2025	Oil Change	mechanic1	completed

**Mechanic Home:**



**Booking appointment:**



## view available mechanics:

The screenshot displays a section titled "Available Mechanics" with six cards, each representing a different mechanic. The cards are arranged in two rows of three. Each card contains the mechanic's name, location, phone number, email, experience, average rating, and two buttons for "View Details" and "Write Review".

Mechanic Name	Location	Phone Number	Email	Experience	Avg Rating
Mechanic1	csfdse	123456	mechanic1@gmail.com	5 years exp.	Not specified
Mechanic2	csfdse	123456	mechanic2@gmail.com	5 years exp.	Not specified
Mechanic3	csfdse	123456	mechanic3@gmail.com	5 years exp.	Not specified
Mechanic4	csfdse	123456	mechanic4@gmail.com	5 years exp.	Not specified
Mechanic5	csfdse	123456	mechanic5@gmail.com	5 years exp.	Not specified
Mechanic10	csfdse	1234567890	mechanic10@gmail.com	5 years exp.	Not specified

## Update user profile:

The screenshot shows a "My Profile" update form. It includes fields for Name (user1), Email Address (user1@gmail.com), and Phone Number (123456). At the bottom of the form are two buttons: "Update Profile" and "Back to Dashboard".

## BLACKBOX TESTCASE:

Column1	Column2	Column3	Column4	Column5	Column6
Test Case ID	User Story	Test Steps	Input	Expected Output	Pass/Fail
TC01	US-001: Register a User Account	Enter valid user and car details	email: abc@example.com	password: Pass123	confirm
TC02	US-001: Register a User Account	Enter invalid email	email: abcd	password: Pass123	confirm
TC03	US-001: Register a User Account	Enter existing email	email: abc@example.com (already registered)	password: Pass123	confirm
TC04	US-001: Register a User Account	Enter mismatched passwords	email: new@example.com	password: Pass123	confirm
TC05	US-001: Register a User Account	Enter invalid car year	email: new@example.com	password: Pass123	confirm
TC06	US-002: Log in to the System	Enter valid credentials	email: abc@example.com	password: Pass123	Redirect
TC07	US-002: Log in to the System	Enter incorrect password	email: abc@example.com	password: WrongPass	Error: Invalid password
TC08	US-002: Log in to the System	Enter non-existent email	email: fake@example.com	password: Pass123	Error: Invalid email
TC09	US-003: View Mechanic Profiles	View a mechanic's profile	Click on mechanic name (ID: 1)	Basic details (skills)	5-star rating
TC10	US-003: View Mechanic Profiles	Navigate back from profile	Click "Back" from mechanic profile	Redirected to mechanic list	Pass
TC11	US-003: View Mechanic Profiles	View non-existent mechanic	Click on mechanic ID: 999	Error: Mechanic not found	Pass
TC12	US-004: Book a Mechanic Appointment	Book with valid details	Mechanic ID: 1	date: 2025-05-01	time: 10:00 AM
TC13	US-004: Book a Mechanic Appointment	Book with unavailable time	Mechanic ID: 1	date: 2025-05-01	time: 10:00 AM
TC14	US-004: Book a Mechanic Appointment	Book with invalid date	Mechanic ID: 1	date: 2024-01-01 (past date)	Error: Invalid date
TC15	US-005: Select Car Repair Services	Select services with cost estimates	Services: Oil Change (basic)	Brake Repair (specialized)	Cost estimation
TC16	US-005: Select Car Repair Services	Select unavailable service	Service: Engine Overhaul (not offered)	Error: Service not available	Pass
TC17	US-006: Cancel a Booking	Cancel a booking	Booking ID: 1	Cancellation confirmed; booking removed from dashboard; mechanic notified	Pass
TC18	US-006: Cancel a Booking	Cancel non-existent booking	Booking ID: 999	Error: Booking not found	Pass

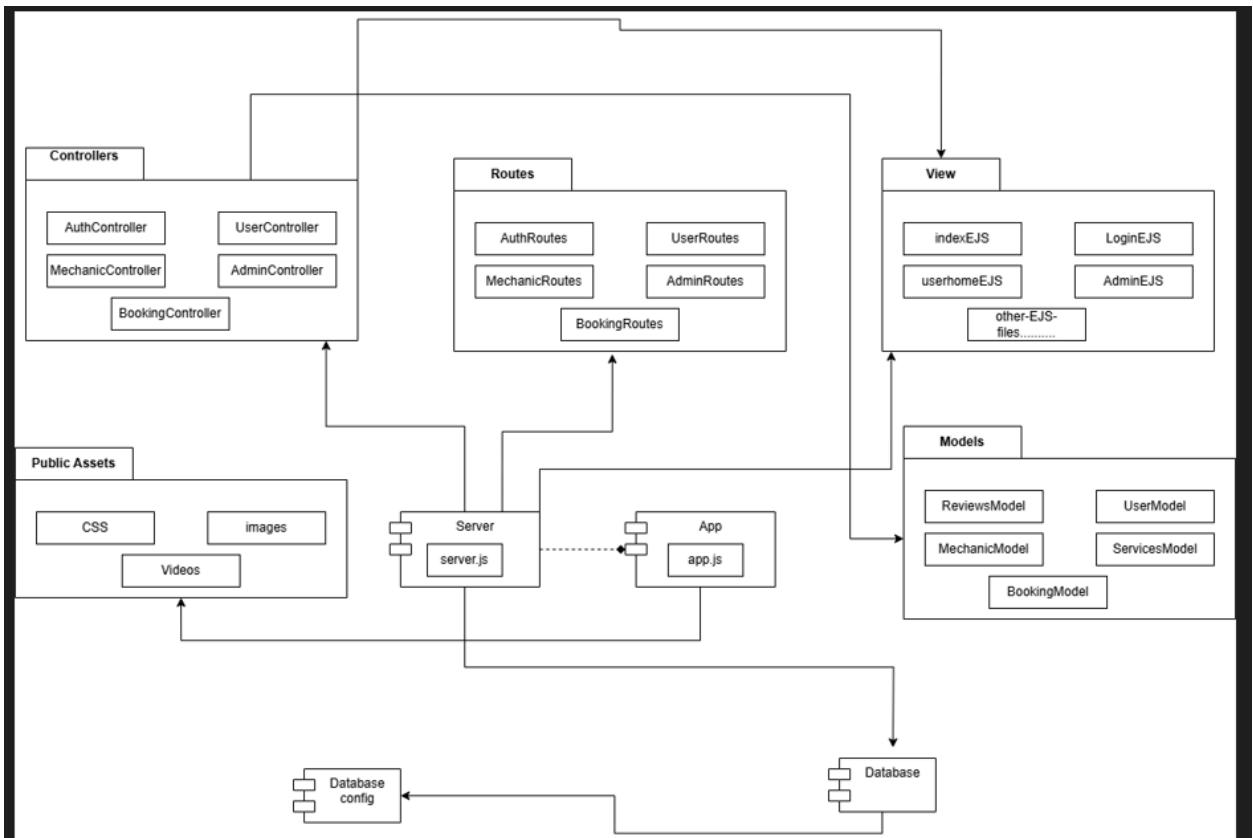
TC20	US-007: Reschedule an Appointment US-008: Submit Feedback for a Mechanic	Reschedule to unavailable slot Submit a valid rating	Booking ID: 1	new date: 2025-05-02 rating: 4 stars	time: 11:15 AM Rating submitted
TC21	US-008: Submit Feedback for a Mechanic	Submit an invalid rating	Booking ID: 1	rating: 6 stars	Error: Invalid rating
TC22	US-010: View Past Booking History	View booking history	User ID: 1	Past bookings displayed (e.g. 2025-04-01)	Booking history
TC23	US-010: View Past Booking History	Filter booking history	Filter by date: 2025-04-01	Filtered bookings displayed	Pass
TC24	US-011: Search Mechanics by Service Type	Search for a service	Service: Oil Change	List of mechanics offering Oil Change	sorted by popularity
TC25	US-011: Search Mechanics by Service Type	Search for unavailable service	Service: Engine Overhaul (not offered)	No mechanics found	Pass
TC26	US-011: Search Mechanics by Service Type	Apply filters	Service: Oil Change	filter: location = "Downtown"	Mechanics displayed
TC27	US-013: Pay for Services Online	Pay for a booking	Booking ID: 1	payment method: Credit Card (4242 4242 4242 4242)	Payment successful
TC28	US-013: Pay for Services Online	Pay with invalid card	Booking ID: 1	payment method: Credit Card (4000 0000 0000 0002)	Error: Payment failed
TC29	US-015: Update User Profile	Update contact and car details	User ID: 1	email: new@example.com	phone: 123-456-7890
TC30	US-015: Update User Profile	Update with invalid email	User ID: 1	email: invalid	Error: Invalid email
TC31	US-015: Update User Profile				

TC32	US-016: Manage Mechanic Accounts	Approve a mechanic	Mechanic ID: 2 (pending)	Mechanic approved; visible to customers	Pass
TC33	US-016: Manage Mechanic Accounts	Reject a mechanic	Mechanic ID: 3 (pending)	Mechanic rejected; not visible to customers	Pass
TC34	US-016: Manage Mechanic Accounts	Remove a mechanic	Mechanic ID: 1 (no bookings)	Mechanic removed; not visible to customers	Pass

## WHITEBOX TESTCASE:

```
17 // Mock dependencies
18 jest.mock('../src/config/dbConfig', () => ({
19   query: jest.fn(),
20   beginTransaction: jest.fn(),
21   commit: jest.fn(),
22   rollback: jest.fn(),
23 }));
24
25 jest.mock('stripe', () => {
26   return jest.fn().mockImplementation(() => ({
27     paymentIntents: {
28       create: jest.fn(),
29       retrieve: jest.fn(),
30     },
31   }));
32 });
33
34 jest.mock('bcrypt', () => ({
35   hash: jest.fn(),
36   compare: jest.fn(),
37 }));
```

## Component Diagram:



## **Lesson learnt by group:**

### **1. Importance of Planning and Design:**

**We learned that spending adequate time on requirement gathering, use cases, and architecture design significantly reduces confusion during development.**

### **2. Modular Code Structure Matters:**

**Separating our code into models, routes, controllers, and views made it much easier to debug, update, and collaborate.**

### **3. Team Communication is Key:**

**Frequent check-ins and clear task distribution helped us stay aligned and avoid redundant work.**

### **4. Version Control is Essential:**

**Using GitHub taught us the importance of version control — especially when merging branches or tracking changes.**

## **5. Database Schema Should Reflect Real-World Use**

**Cases:**

**Designing the schema based on actual use cases (like bookings, reviews, services) helped us structure relationships clearly.**

## **6. EJS is Powerful but Requires Discipline:**

**While EJS allowed us to dynamically render content, we learned to keep logic out of views and stick to clean templating.**

## **7. Error Handling and Validation Improve UX:**

**Adding input validation and error messages (like for login, booking conflicts) improved user experience and helped reduce bugs.**

## **8. Testing Early Prevents Later Headaches:**

**We learned to test each route and controller as we built them, which saved us from unexpected issues during integration.**

## **Work division**

Muhammad Moiz: User implementation

Aniq Noor: Mechanic implementation

Shayan: Admin implementation

**Github Link:** <https://github.com/Moiz005/CarFix>