A Midterm Progress Report

on

PAW CONNECT

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CHAPTER 1 – INTRODUCTION

1.1 Introduction to Paw Connect

In the current digital environment, there is no centralized and interactive system that brings together all the essential services required by pet lovers and pet store owners. Most existing platforms in the market either offer isolated services such as basic e-commerce or standalone appointment scheduling, or they fail to address the specific, interconnected workflows of a pet store. As a result, pet owners often find themselves juggling between multiple applications to meet their various needs, while pet store administrators are left with inefficient, non-integrated tools to handle customer requests, inventory, service coordination, and communication. This fragmented experience leads to lost opportunities, miscommunication, and operational inefficiencies.

To bridge this functionality gap and provide a seamless digital solution tailored for pet-centric businesses, we have developed Paw Connect, a robust, full-stack web application designed specifically for a pet store. This centralized platform is engineered to streamline all essential user interactions and administrative operations within a single, intuitive interface. Built using the MERN stack (MongoDB, Express.js, React.js, and Node.js), the system defines two primary roles: the User, representing pet lovers or customers, and the Admin, representing the pet store owner. The entire architecture is designed with scalability, security, and ease of use in mind, providing a well-organized environment for both parties.

Security and ease of access are top priorities in the user authentication process. Users can register through two methods: a standard signup form with 2-step verification via Gmail OTP, implemented using Nodemailer, or a faster and secure Google login enabled through Google Cloud OAuth Client ID integration. Once logged in, users are redirected to their personalized dashboards, where they can access multiple modules, including pet adoption, pet selling, appointment booking, and product purchasing. For pet adoption, users submit a detailed application that is forwarded to the Admin, who verifies the request and responds with confirmation or further instructions via email.

The pet selling functionality allows users to submit detailed profiles about the pet and their personal contact information. These submissions are routed to the Admin, who is responsible for validating the legitimacy of the information and continuing the conversation through email for final decisions. In both cases adoption and selling the Admin holds exclusive rights to approve or reject submissions, ensuring quality and ethical standards are maintained. One of the core modules of Paw Connect is the Service and Appointment Booking system. Here, users can request appointments for services like grooming, checkups, or vaccinations. These requests are dynamically managed by the Admin, who checks service availability and sends finalized details to both the User and the Service Provider via email.

Beyond services, the system features a fully integrated e-commerce portal where users can browse and purchase a range of pet care products, including food, toys, and accessories. Payments are securely processed using the Stripe payment gateway, allowing users to complete their purchases with confidence. The Admin, meanwhile, has full control over the platform's dynamic data including the ability to add, edit, and delete pets for adoption or sale, as well as product listings in the store. This ensures that customers always see the most up-to-date and accurate inventory.

To elevate user interaction and provide instant assistance, Paw Connect also integrates a smart AI-powered chatbot, built using the Hugging Face transformer model. This virtual assistant is trained to answer commonly asked questions related to pet care, such as dietary guidance, emergency remedies, and wellness tips. This not only adds educational value to the platform but also reduces dependency on human customer service for general inquiries. From the administrative standpoint, the platform empowers the pet store owner (Admin) with full authority over all system content and user requests. Whether it's reviewing a pet adoption form, approving a product sale, managing inventory, or scheduling appointments, all actions pass through the Admin interface. Communication is centralized through email notifications, ensuring all stakeholders are informed at every stage of the interaction. This role-based structure supports better decision-making, accountability, and workflow efficiency.

In conclusion, Paw Connect is not merely a basic web application it is a thoughtfully engineered digital ecosystem designed to meet both the operational and emotional demands of pet lovers and pet store owners. Built using the MERN stack (MongoDB, Express.js, React, Node.js), the platform integrates a wide range of modern technologies including Nodemailer for email communication, Stripe for secure online transactions, OAuth 2.0 for seamless Google authentication, and the Hugging Face Transformer model for intelligent chatbot support. To handle media efficiently, we have incorporated Cloudinary, a cloud-based media management service that enables smooth uploading, storage, and optimization of pet and product images ensuring fast load times and reliable delivery. Additionally, the entire frontend has been meticulously designed to be fully mobile-responsive, allowing users to access the platform comfortably across smartphones, tablets, and desktops without compromising user experience.

The project follows a well-defined and agile development cycle that begins with the Developer Phase, where source code is managed through Git and GitHub for version control, collaboration, and issue tracking. With its modular architecture, clearly defined user roles, and dynamic data control by the admin, Paw Connect reimagines how pet-related services can be delivered in a connected digital space. The result is a powerful, user-friendly platform that not only enhances customer satisfaction and operational efficiency but also sets a new standard for pet care technology in the modern age.

1.2 Existing System

Existing pet care platforms are often fragmented, offering isolated features like pet adoption, product purchasing, or appointment booking without connecting them into a unified experience. As a result, users are forced to juggle between multiple applications or websites to fulfill different needs, leading to a disconnected, inefficient, and frustrating user journey. These platforms commonly lack real-time notifications, personalization, centralized data management, and streamlined communication among pet owners, veterinarians, service providers, and pet store administrators. This not only decreases user engagement but also complicates daily operations for pet businesses and lowers the overall quality of care.

To bridge this gap, we have developed Paw Connect, a fully integrated, scalable, and intelligent pet care ecosystem built using the MERN Stack. Our platform enables users to register securely through two flexible methods: traditional email signup with OTP verification via Nodemailer, or Google OAuth authentication, ensuring both security and convenience. Once logged in, users gain access to a role-specific dashboard where they can explore a variety of services such as adopting pets, listing pets for sale, booking grooming or vet appointments, and shopping for pet-related products all within a single interface. Stripe has been integrated for safe and smooth payments, and Cloudinary is used to store and manage media assets like pet photos and product images, ensuring fast and optimized loading. Users can easily book appointments with registered veterinarians or service providers, and the assigned professionals receive automated email notifications, enabling quick confirmations and improved coordination. Each form submission whether it's a product purchase, a pet adoption request, or a service booking is routed through the Admin dashboard, where admins can approve and reject records in real time.

To further differentiate Paw Connect from typical platforms, we have introduced a built-in AI-powered chatbot, developed using Hugging Face's Transformer model, which provides instant answers to user queries about pet diet, health care, and general tips. This enhances the user experience by offering intelligent, interactive support directly from the dashboard. The system's mobile-friendly design ensures seamless access across all devices phones, tablets, and desktops so users can manage their pet-related needs anytime, anywhere. Admins are empowered with full control over dynamic platform content such as product listings, pet profiles, appointments, and service details, all managed via a robust, role-based dashboard.

By unifying these advanced modules into a single platform, Paw Connect eliminates the need for multiple apps, solving the biggest challenge faced by pet lovers and store owners: the lack of a centralized and cohesive system. With its modern stack, automation tools, responsive design, cloud-based media handling, and role-specific workflows, Paw Connect is set to redefine pet care management in the digital age making it more connected, efficient, and meaningful for everyone involved.

1.3 Objectives

The objectives of this project, Paw Connect, are as follows:

1. To enable easy access to pet adoption/selling, vet appointments and professional interaction.

2. To integrate Stripe for secure and seamless pet product transactions.

3. To provide AI-based pet care guidance including diet tips and home remedies.

CHAPTER 2 - SYSTEM REQUIREMENTS

2.1 Hardware Requirements

2.1.1 Server/ Processor:

- Since Paw Connect is a full-stack MERN (MongoDB, Express, React, Node.js) application featuring real-time functionalities, AI chatbot integration, email automation, and payment gateway, a powerful processor was necessary**.**
- The processor used supports concurrent user requests, REST API routing, database operations, AI calls, and frontend rendering smoothly.
- **Specifications Used:** Quad-core processor or higher, Intel Core i5/i7 or AMD Ryzen 5/7.

2.1.2 Memory (RAM):

- RAM is crucial for managing multiple background processes like user sessions, API calls, database transactions, file uploads to Cloudinary, and running AI models in memory.
- **Minimum RAM:** 8 GB
- **Recommended RAM:** 16 GB or more, especially for handling concurrent admin, donor, and veterinarian activities, as well as chatbot interactions and large image uploads.

2.1.3 Storage:

- Local storage was required to support temporary data caching, session files, and log management, even though Cloudinary was used for final image hosting. The system stores: Uploaded pet images and product photos, Adoption and appointment records and email logs.
- **Recommended Storage:** Minimum 50 GB SSD for fast read/write speeds and reduced latency in server-side operations.

2.1.4 Network Connectivity: A high-speed internet connection is essential for:

- API communication (e.g., Google OAuth, Stripe, Cloudinary).
- Real-time email notifications via Nodemailer.
- Chatbot queries to Hugging Face AI.
- **Bandwidth Requirement:** At least 100 Mbps download/upload for deployment servers or cloud-hosted platforms to ensure low-latency user experience.

2.2 Software Requirements

2.2.1 Operating System: The operating system should support Node.js, MongoDB:

- **Windows 10/11:** Suitable for development or local testing**.**
- **Linux (Ubuntu 20.04+ or CentOS):** Recommended for deployment.
- **macOS:** Supported for development environments.

2.2.2 Development Stack & Tools: These technologies were used to build the full-stack functionality of the project:

- **Node.js (v16+):** Backend development
- **Express.js:** For building RESTful APIs
- **React.js (v18+):** Frontend UI
- **MongoDB (Atlas or Local):** NoSQL database for user, product, and appointment data
- **Mongoose:** ODM for MongoDB
- **VS Code:** Code editor
- **Postman:** API testing
- **Git + GitHub:** Version control and collaboration

2.2.3 Integration Tools & Libraries: There are various integration tools and libraries used:

- **Nodemailer:** For sending OTPs and email notifications.
- **Cloudinary:** For managing and storing pet/product images.
- **Stripe:** For secure payment gateway integration.
- **Google OAuth 2.0:** For quick and secure user authentication.
- **Hugging Face Transformers:** For chatbot intelligence using pre-trained models.
- **Fetch API:** For frontend-backend communication.
- **JWT:** For secure session-based authentication.

2.2.4 Frontend Libraries: The Frontend libraries used in the developing Paw Connect are basically:

- **React Router:** Dynamic navigation.
- **Bootstrap and Tailwind CSS:** Used together for consistent and responsive design.

2.2.5 Database and Hosting: The database used in Paw Connect is MongoDB Atlas and it is hosted in the Netlify:

- **Database:** MongoDB Atlas (cloud-hosted and secure)
- **Frontend Hosting:** Netlify
- **Backend Hosting:** Render (Node.js-compatible hosting with auto-deploy from GitHub)

2.3 Network Requirements

2.3.1 Internet Connection:

- **Required for:** Accessing third-party APIs (Stripe, Cloudinary, Hugging Face**)**, Sending email notifications and Syncing with cloud database (MongoDB Atlas).
- **Requirement:** Stable and secure connection for 24x7 availability.

2.3.2 Data Transfer & Bandwidth: As the system handles user data, photos, and real-time communication:

- Minimum 100 Mbps bandwidth for deployment server.
- CDN support recommended for image deliver.

CHAPTER 3 - SOFTWARE REQUIREMENTS ANALYSIS

3.1 Problem Definition

In today's rapidly evolving digital world, managing pet-related services such as adoptions, veterinary consultations, and pet care awareness still largely relies on fragmented, manual processes. Existing systems often fail to provide a unified platform where animal lovers and veterinarians can connect, interact, and contribute effectively. Due to a lack of automation and integration, these systems face significant challenges in ensuring seamless coordination between various stakeholders, secure information handling, real-time communication, and data-driven support for pet welfare.

Traditional approaches typically involve separate platforms for donation management, veterinary appointments, adoption requests, and pet care resources causing inconvenience for users, administrative overhead, and reduced engagement. Additionally, manual communication methods, such as phone calls or emails, are inefficient and make it difficult to track vet bookings, or adoption progress. The absence of intelligent assistants or automated workflows further slows down the response time, limiting the reach and impact of pet welfare initiatives. To address these challenges, the Paw Connect system was developed as an all-in-one MERN stack web platform. It integrates pet adoption, donation of food and accessories, veterinary consultation bookings, and awareness resources into a single, interactive ecosystem. The system also introduces real-time email notifications, secure payment via Stripe, and an AI-powered chatbot using Hugging Face to assist users with pet-related queries. Image uploads are managed through Cloudinary, while authentication is secured through Google OAuth and session-based controls.

By combining intelligent automation, modern UI design, and integrated workflows, Paw Connect significantly enhances the overall digital experience for both end-users and administrators. The system leverages cutting-edge web technologies and smart tools to reduce the reliance on manual processes that are often prone to delays, miscommunication, and errors. Through automation of repetitive tasks such as appointment scheduling, email notifications, and data validation, the platform ensures that operations are fast, reliable, and consistent across all user interactions. The clean, responsive, and intuitive user interface built using React.js with Bootstrap and Tailwind CSS ensures seamless navigation and accessibility across different devices. Whether it's a donor uploading items, a user booking a vet consultation, or someone looking to adopt a pet, the interface adapts to user needs, offering a frictionless and visually appealing experience.

Moreover, the integration of real-time communication tools and third-party services like Nodemailer for emails, Stripe for secure payments, and Cloudinary for media handling ensures that the platform remains dynamic, responsive, and trustworthy. The inclusion of an AI-powered chatbot, using Hugging Face Transformers, empowers users with instant answers to common pet care queries, increasing engagement and reducing the burden on support staff.

3.2 Modules and Their Functionalities

3.2.1 User Authentication Module: This module ensures secure and seamless onboarding of users through multiple authentication methods. It serves as the foundation for accessing all platform features while enforcing role-based restrictions.

Functionality

- **Email & OTP Verification:** Users can register using their email address and receive a one-time password (OTP) for verification, ensuring authenticity.
- **Google OAuth:** Provides a quick and secure alternative for signing in using Google accounts, reducing signup friction.
- **Session Handling:** Maintains user sessions securely, allowing users to stay logged in across visits without compromising safety.
- **Role-Based Access Control:** Distinguishes between regular users and the admin (pet shop owner), enabling restricted access to features based on roles.

3.2.2 Pet Adoption Module: This module facilitates the digital adoption process, enabling users to explore available pets and request adoption with minimal hassle, while ensuring admin moderation.

Functionality:

- **Adoption Request Form:** Users provide necessary details such as pet preference and contact information to initiate the adoption process.
- **Admin Approval Workflow:** Admin reviews each request, approves or rejects it, and communicates decisions through automated emails.
- **Pet Listing Page:** Displays all adoptable pets with filtering options by category, breed, or age, making it easier for users to find suitable pets.
- **Email Updates:** Once approved, detailed adoption instructions and next steps are sent to users via email.

3.2.3 **Pet Selling Module:** This module allows users to list pets they wish to sell, ensuring their listings are reviewed by the admin for legitimacy and further communication.

Functionality:

- **Pet Selling Form:** Users submit detailed information about the pet, including breed, age, vaccination status, and seller contact info.
- **Admin Verification:** Admin checks each listing for authenticity and suitability before taking any further action.
- **Listing Management:** Admin can approve, reject, or mark listings as sold, ensuring full control over the content.
- **Email Correspondence:** Admin communicates with the user via email for additional information or to finalize the selling process.

3.2.4 **Appointment Booking Module:** Designed to streamline the process of booking veterinary or grooming services, this module connects users with service providers via the admin.

Functionality:

- **Appointment Request Interface:** Users can select services, input preferred date/time, and specify pet-related concerns.
- **Admin Coordination:** Admin verifies the request, checks provider availability, and schedules the appointment.
- **Automated Email Notifications:** Appointment confirmation with full details is sent to both the user and the assigned service provider to ensure synchronization.

3.2.5 **Product Purchase & Payment Module:** An integrated e-commerce solution that lets users browse, purchase, and pay for pet-related products directly on the platform.

Functionality:

- **Product Storefront:** Features a wide range of products such as pet food, toys, and accessories with search and filter capabilities.
- **Add to Cart & Checkout:** Users can add multiple items to their cart and proceed to a streamlined checkout process.
- **Stripe Payment Gateway:** Offers a secure and fast payment system with real-time transaction confirmation using Stripe.
- **Order Confirmation & Receipts:** After a successful transaction, users receive detailed order summaries and confirmation via email.

3.2.6 AI Chatbot Module (Hugging Face Integration): This intelligent chatbot provides instant and personalized support to users by answering common pet-related queries using machine learning.

Functionality:

- User-Friendly Chat Interface: Easily accessible from the user dashboard to ask questions anytime.
- Dietary Advice: Suggests customized diet plans based on pet type, age, and health condition.
- Home Remedies: Offers safe and simple remedies for common pet issues such as fleas, digestion problems, or minor wounds.
- 24/7 Availability: Ensures users get timely help without waiting for manual support, enhancing user satisfaction.

3.2.7 Admin Management Module: This is the central control system for the pet shop owner to manage all user interactions, product inventories, appointments, and pet listings.

Functionality:

- **Admin Dashboard:** A dedicated interface for managing adoption requests, selling forms, appointments, product orders, and chatbot insights.
- **Approval & Moderation Tools:** Provides the admin with the ability to verify, approve, or reject user-submitted data.
- **Automated Communication:** Sends timely and informative emails to users and service providers with relevant updates.
- **Inventory & Order Management:** Allows the admin to add/edit product listings, manage stock, and monitor completed transactions.

CHAPTER 4 – SOFTWARE DESIGN

4.1 Overview

This project, "Paw Connect," is a comprehensive full-stack web application that connects pet sellers, adopters, veterinary service providers, and pet product sellers under a single digital platform. It streamlines various pet-related services, offering an efficient and user-friendly interface for pet selling, pet adoption (with admin approval), vet appointment booking, product shopping, and real-time communication. Developed using Node.js, Express, MongoDB, and React, the system prioritizes modularity, scalability, and secure access, ensuring smooth operation across different roles (Admin, User etc.).

4.2 System Workflow

The workflow is divided into structured functional phases as follows:

4.2.1 User Interaction Phase

- **Signup/Login:** Users and admin can register and securely log in via email-based OTP authentication.
- **Role-Based Access Control:** Dashboards and functionalities are dynamically assigned based on user roles.

4.2.2 Pet Selling & Adoption Module

- **Pet Listing:** Sellers upload pet details (breed, age, price, image, description).
- **Pet Browsing (By Adopters):** Adopters can view available pets listed for sale.
- **Adoption Request (By Adopters):** Users can request to adopt a pet by filling out an adoption form.
- **Admin Review & Approval:** Admins review adoption requests and approve or reject based on eligibility and availability.
- **Status Notification:** Adopters receive email notifications regarding the status of their adoption request.

4.2.3 Appointment Booking Phase

- **Vet Appointment Scheduling:** Users can book appointments with vets.
- **Confirmation Notifications:** Confirmation messages are sent to users via email and shown in their dashboard.

4.2.4 Pet Product Shopping Module

- **Product Listing:** Products related to pet care (food, toys, accessories) are displayed with images, descriptions, and prices.
- **Add to Cart & Checkout:** Users can add products to their cart and complete the purchase through a simple checkout system.

4.2.5 Admin Operations Module

- **User Management:** Admins can view, verify, and manage registered users.
- **Pet Approval Workflow:** Admins validate and approve adoption requests, ensuring proper pet rehoming processes.
- **Report Generation:** Generate summary reports for user activity, pet transactions, and system usage analytics.

4.2.6 Email Notification System

- **System Triggers:** Notifications are sent for important events such as:
  - Successful registration
  - Appointment confirmation
  - Adoption approval/rejection

4.2.7 Backend and Data Processing

- **MongoDB for Data Storage:** Stores user profiles, pet listings, appointment data, and product orders securely.
- **Express.js Backend API:** Handles all routes and RESTful API calls with role-based access validation.
- **Secure Authentication:** OTP-based email login flow prevents unauthorized access and ensures data privacy.

4.2.8 Hosting and Deployment Phase

- **Deployment-Ready Architecture:** The app is designed to run on local environments and can be deployed to platforms like Render, Netlify and Vercel.
- **Environment Config Support:** Environment variables (e.g., DB_URL, MAIL_API_KEY) allow easy migration and configuration.

4.2.9 Testing and Validation Phase

- **Input Validation:** All forms and user inputs are validated both client-side and server-side.
- **Workflow Testing:** Each module is tested for real-world scenarios such as failed logins, form rejections, and successful bookings.

4.3 DFD'S:

The basic layout describing the workflow of the project is illustrated in Fig. 4.1. This system involves two primary roles: User and Admin. The system enables users to interact with the Paw Connect platform either through a manual signup/login or via Google Sign-In. Users can register on the platform by providing their details. Upon registration, an OTP is sent to the user's Gmail for email verification. Once the OTP is verified, the user is authenticated and can log in using their credentials. Alternatively, users can bypass the manual registration process and directly sign up through Google, which is handled via Google Cloud Platform APIs and services, ensuring secure and seamless access. In case of invalid login attempts or incorrect OTPs, the system returns an error, prompting the user to reattempt. Admins interact with the system by filling their login credentials into the Paw Connect platform. These credentials are verified within the system, and a response is sent back, confirming their access rights. The entire process ensures that both user and admin authentication flows are handled securely while also offering users a convenient Google-based signup/login option.
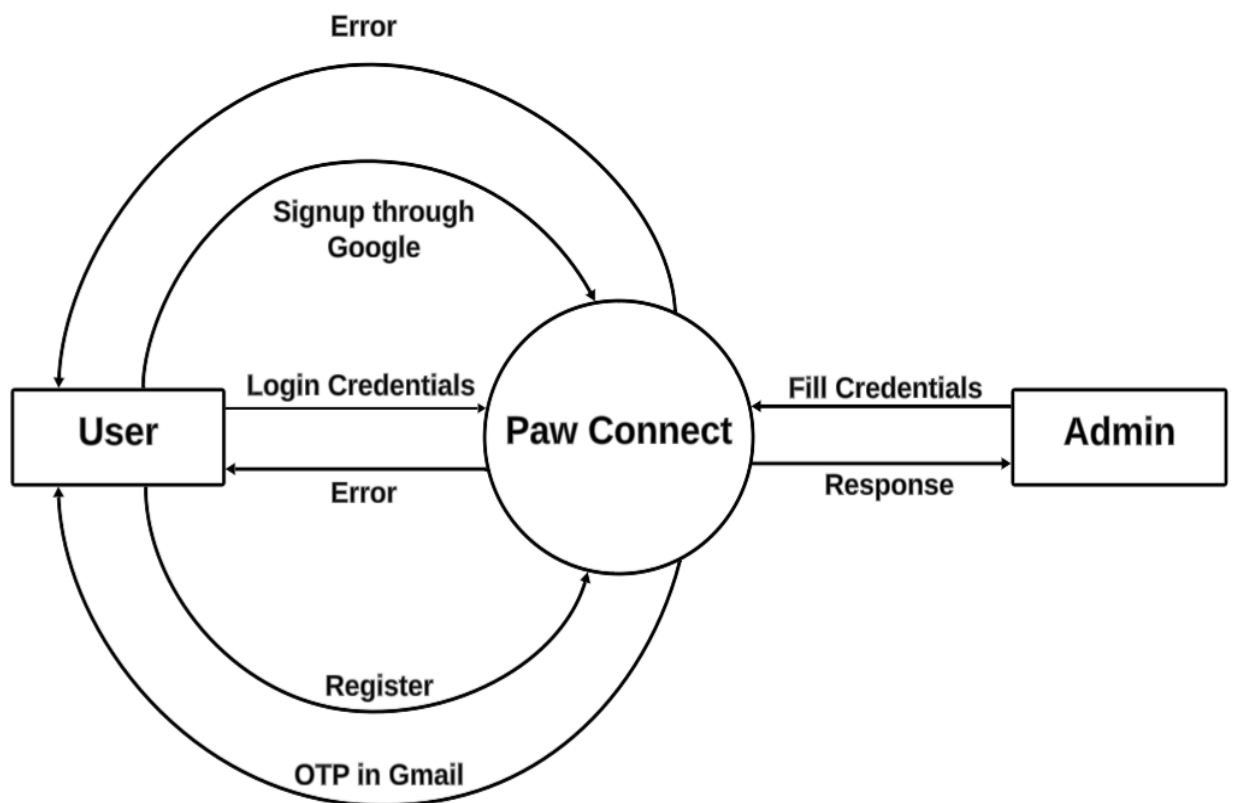
Fig 4.1: 0 Level DFD

Fig 4.2 describes how, in this system, the Paw Connect platform manages pet ownership, selling, and appointment features. After logging in or signing up (as shown in Fig 4.1), users can sell or own pets by submitting forms. These requests are then approved or rejected by the Admin. Users can also book appointments, which are likewise subject to Admin approval. The Admin through the Admin Panel, can manage user requests, approve appointments, and add new products to the platform, maintaining smooth system operations.
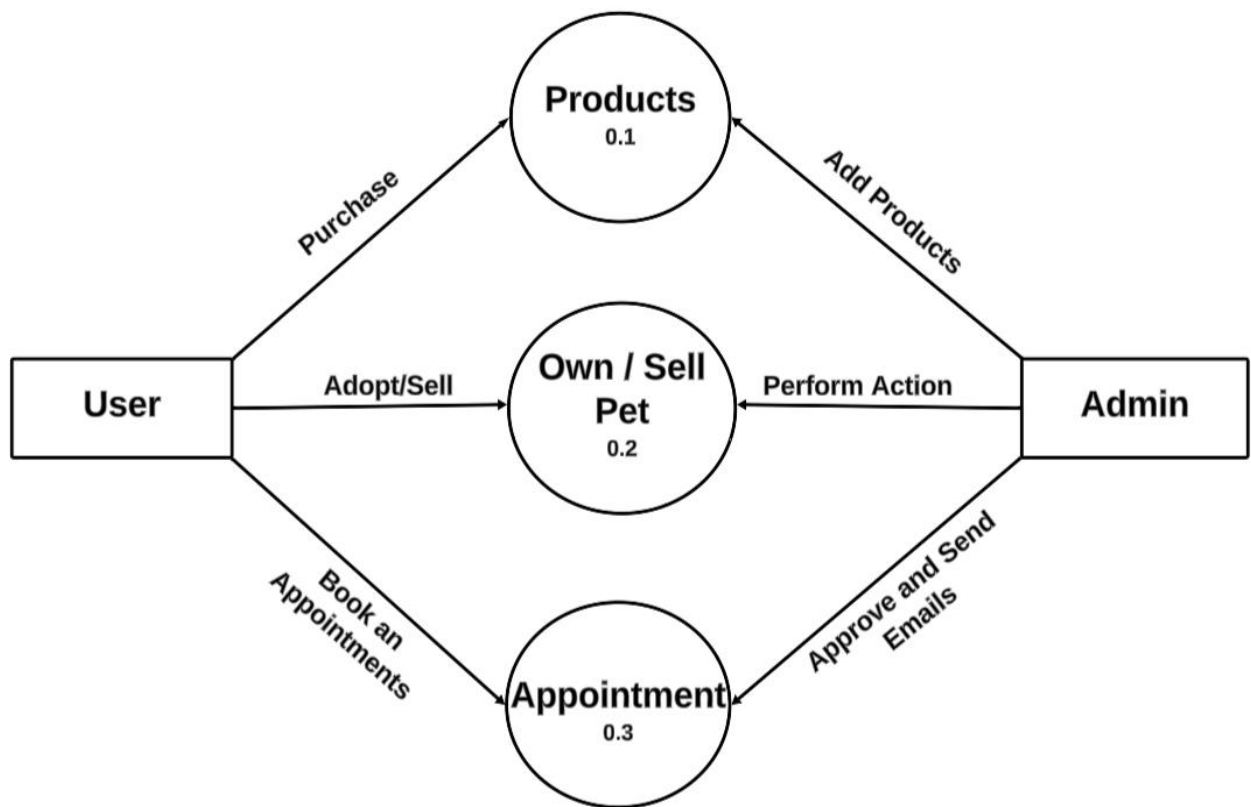
Fig 4.2: 1 Level DFD

As illustrated in Fig 4.3, the Data Flow Diagram (DFD) represents the shopping functionality for pet-related products within the Paw Connect system. The process begins with the user entering their details and completing the user registration. After successful registration, the user navigates to the product section, where they can add desired items to the cart. Once the selection is complete, the user proceeds with order processing and initiates payment, which is securely handled through Stripe integration. Upon successful payment, a purchase confirmation message is displayed to the user, and the order details are recorded in the Admin Panel. The Admin can use this panel to add new products to the system and review the order history of users, ensuring smooth management and tracking of transactions. Additionally, an AI-based chatbot, developed using a Hugging Face transformer model, is integrated into the system. This chatbot is trained to assist users by answering queries related to pet diet plans and quick home remedies, enhancing user support and interaction.
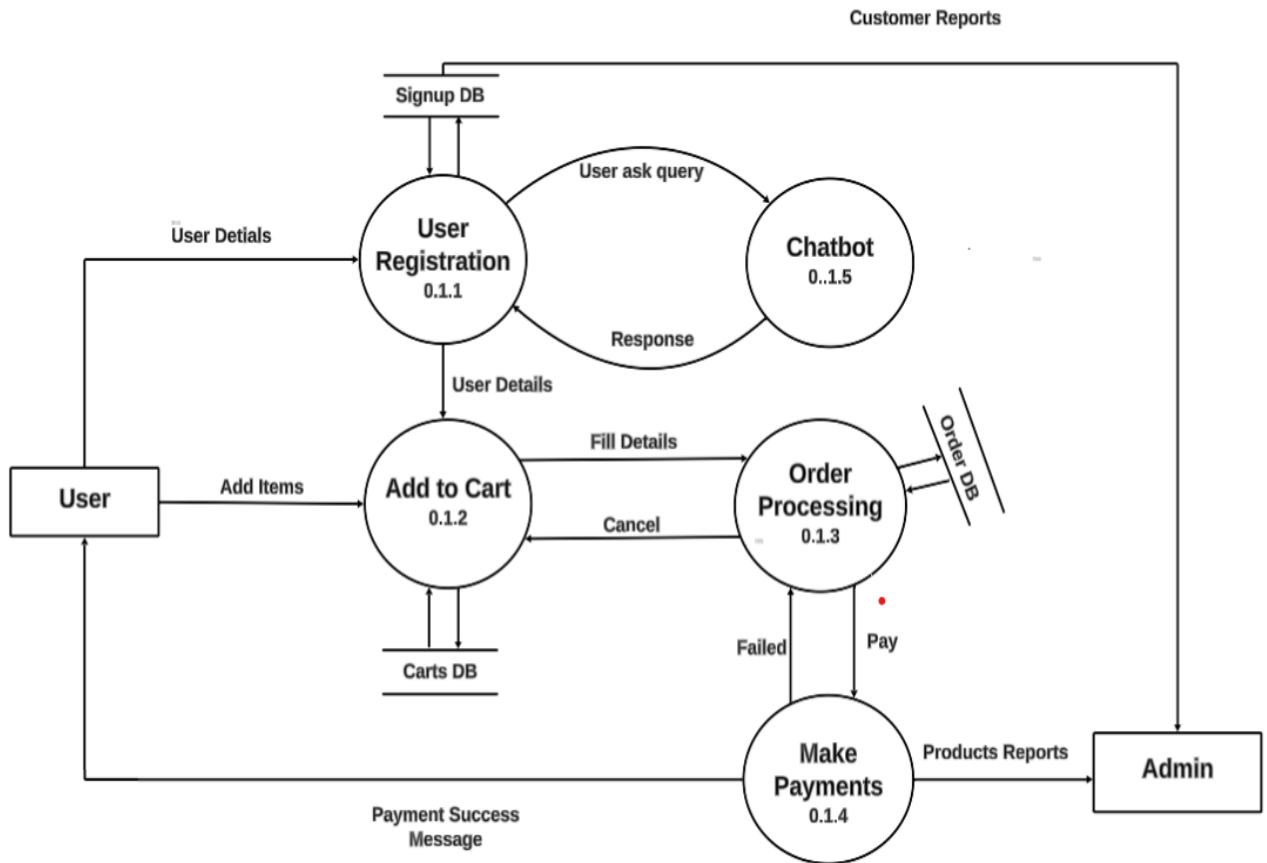
Fig 4.3: 2 Level DFD for Shopping Pet-Related Products

The Fig 4.4 is primarily explaining the flow of interactions involving user registration, chatbot support, and pet management within the Paw Connect platform. Initially, the user fills in their details and completes the user registration process. During or after registration, the user has the option to interact with an AI-based chatbot integrated into the system. This chatbot, developed using a Hugging Face transformer model, is specifically trained to respond to user queries related to pet diet plans and quick home remedies, offering intelligent and instant assistance to enhance user engagement and support. Following registration, the user can proceed to fill out the 'Own Pet' form, where they submit relevant information regarding a pet they wish to adopt or claim. The Admin then verifies the submitted details and takes appropriate action. Similarly, the user can fill out the 'Sell Pet' form to offer a pet for sale. The Admin reviews the information provided, verifies its accuracy, and then sends further details to the user via email, completing the verification and communication loop.
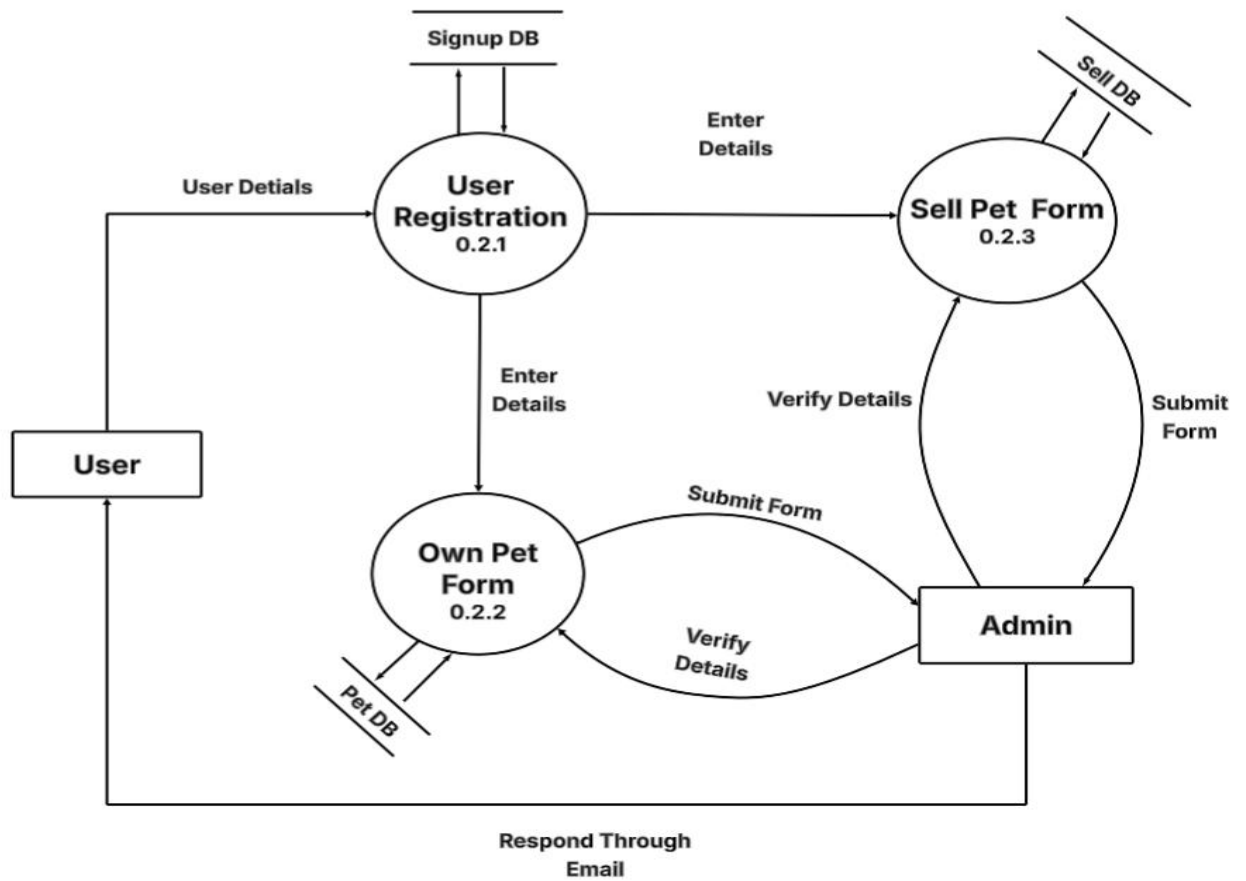
Fig 4.4: 2 Level DFD for Own/Sell Pet and Chatbot

Figure 4.5 shows the appointment scheduling process within the Paw Connect platform. The process begins when the user enters their details and completes the user registration. After registering, the user can proceed to fill out the appointment form, providing necessary information for scheduling a pet-related appointment. Once submitted, the appointment form is forwarded to the Admin, who then contacts the appointer to verify the provided details. Upon successful verification, the Admin schedules the appointment and sends confirmation emails to both the appointer and the user, ensuring both parties are informed and updated. Additionally, an AI-based chatbot, developed using a Hugging Face transformer model, is integrated into the system. This chatbot is trained to assist users with queries related to pet diet plans and quick home remedies, thereby enhancing the overall user support and interaction experience within the platform.
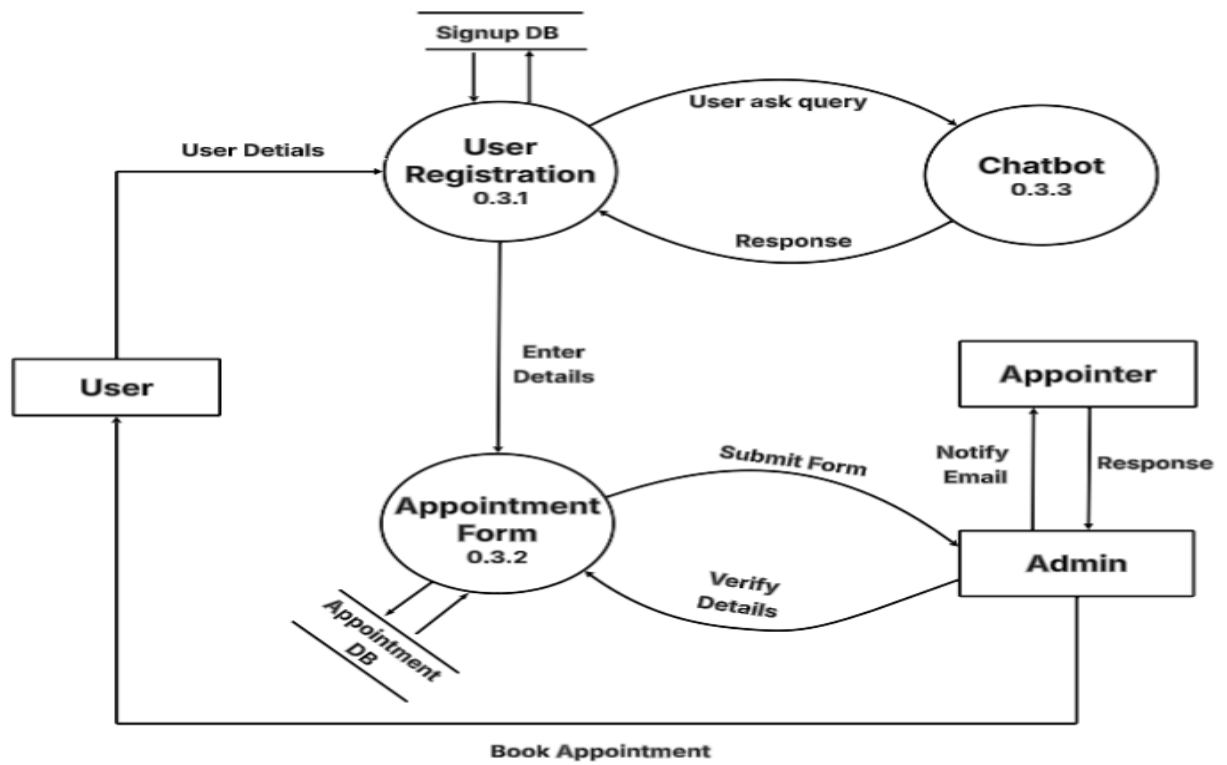
Fig 4.5: 2 Level DFD for Booking Appointments

4.4 ER Diagram

As illustrated in Fig 4.6, the ER Diagram represents the one-to-many relationship between Admin and User entities, where a single Admin can manage multiple Users. Each Admin is identified by an Admin_id and has attributes like Email, Password, and a detailed Address (Line1, Line2, City, State, PIN). Similarly, each User is identified by a User_id and includes Name (Firstname, Lastname), Address, and Email. This structure reflects the Admin's role in overseeing and managing user-related operations within the system.
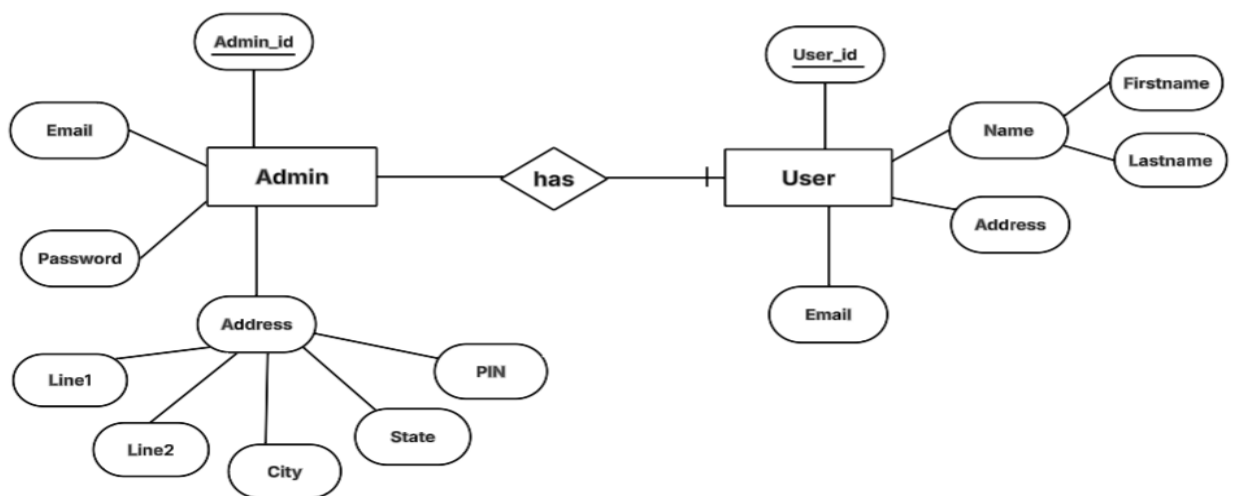
Fig 4.6: ER diagram showing Admin managing multiple Users

The Fig 4.7 depicts how Users interact with Products and the Paw Connect shop entity within the system. Each User, identified by a unique User_id, includes attributes like Name (Firstname and Lastname), Email, and Address. Users can purchase Products, where each Product has a unique Products_id along with attributes such as Name, Price, Category, Quantity, and Image. The relationship "purchase" connects Users and Products. The "Paw Connect" entity represents a shop or store, identified by Shopname and containing Address and Description. It is associated with both Users and Products, indicating that a shop manages the products and is accessible to users. This structure supports product management and user interaction within the platform.
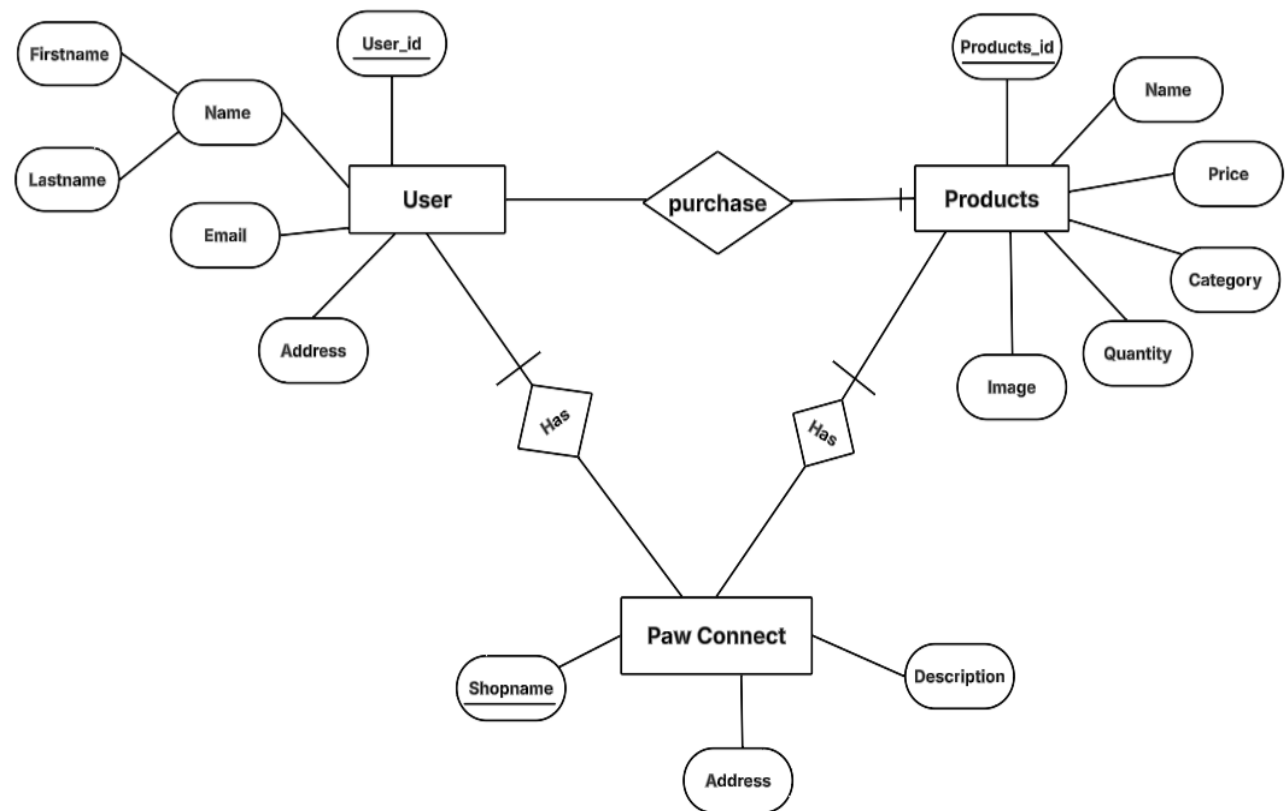
Fig 4.7: ER diagram showing Users purchasing Products through Paw Connect

4.5 Flowchart

The Fig 4.8 represents the flow of Users interacting with the Paw Connect platform. It begins with the user accessing the platform and checking if they are already signed up. If not, they can choose between email-based OTP verification or Google Signup. If already registered, users proceed with email and password login. After successful login or signup, the user is directed to a dashboard with navbar options: Home, About, Services, Products, Sell Pet, Adopt Pet, Appointment, and Chatbot.

In the Products section, users can add items to the cart and proceed to checkout, followed by a payment success message. For Sell Pet, Adopt Pet, and Appointment options, users fill out respective forms that are sent to the admin. The admin then approves or rejects the requests. Upon approval, emails are sent to users accordingly either confirming a pet sale/adoption or providing appointment details. In the Chatbot section, users can ask diet-related queries, and the chatbot responds with relevant information.
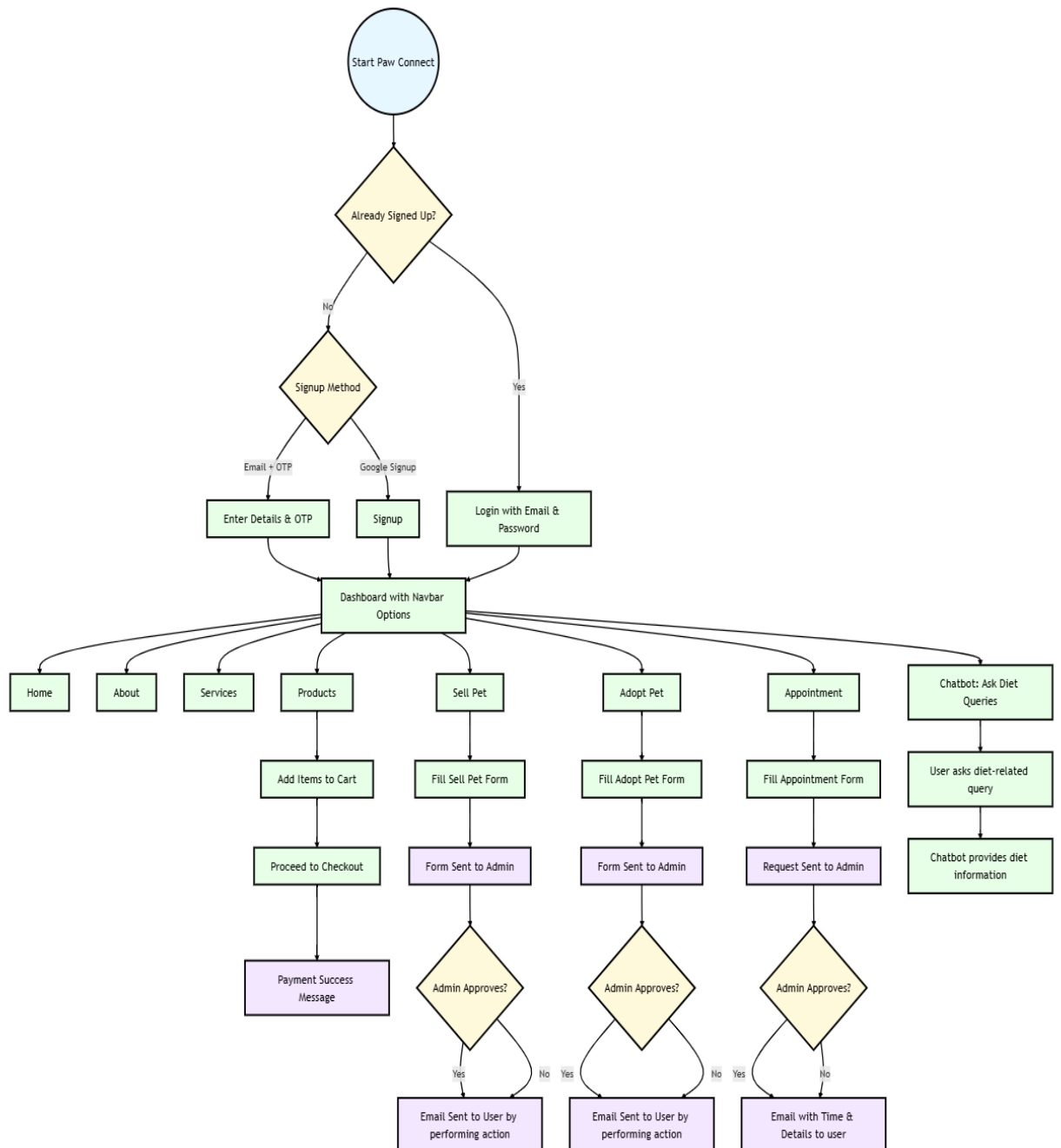

Fig 4.8: User Flow for Paw Connect

Figure 4.9 shows the admin-side flow of the Paw Connect system. The process starts with the admin logging in. If the credentials are correct, the admin accesses the dashboard; otherwise, they are prompted to retry. From the dashboard, the admin can add products, check order history, review sell and adopt pet applications, manage appointments, and update their profile. Each review action triggers an email response to the user with the relevant details.
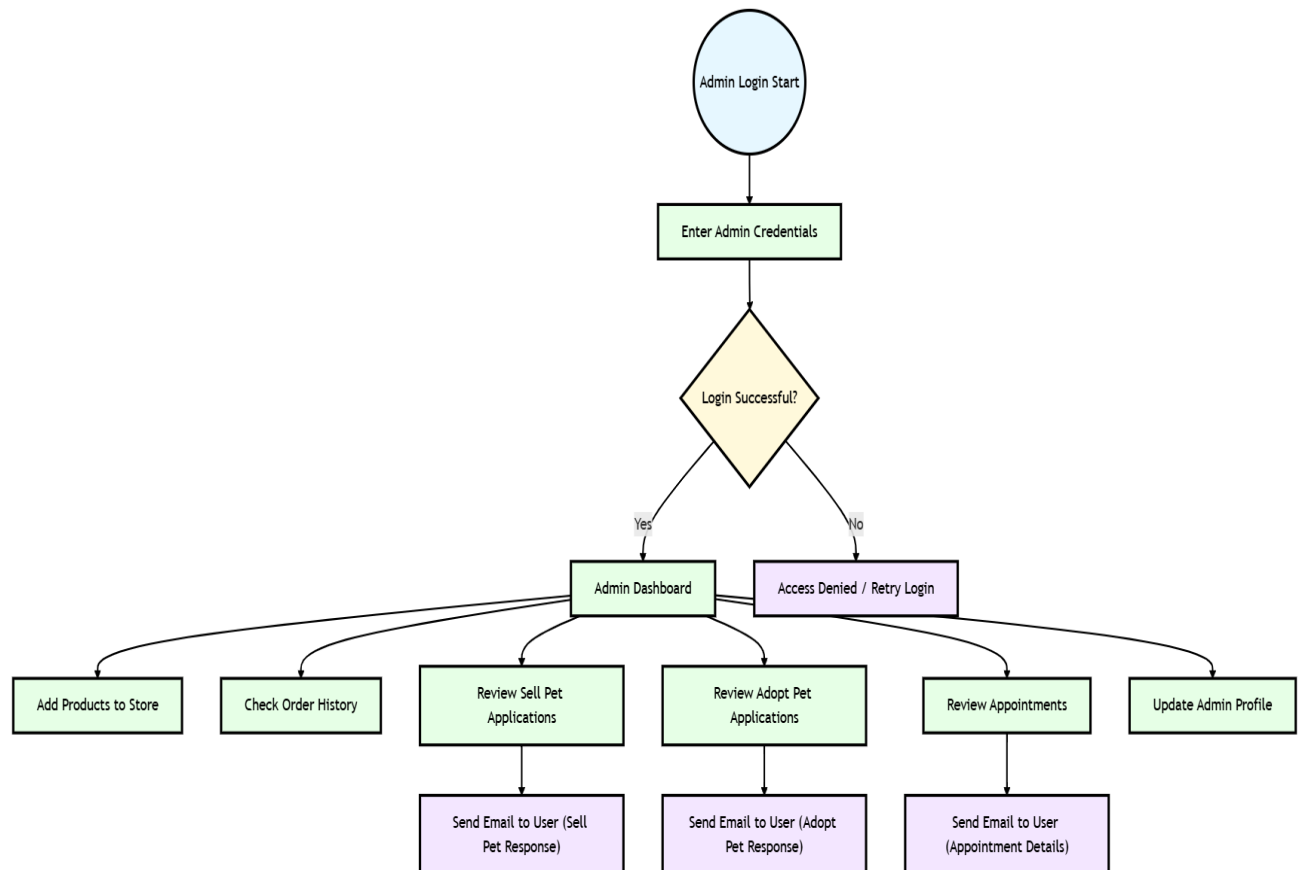
Fig 4.9: Admin Flow for Paw Connect

CHAPTER 5 - TESTING MODULE

This chapter outlines the testing methods and detailed test cases used to verify the core functionalities of Paw Connect, including pet adoption, product purchase, appointment booking, chatbot interaction, and email notifications. Each testing technique ensures that different parts of the system work as intended individually and together.

5.1 Testing Techniques

5.1.1 Unit Testing

- **Purpose:** To test individual components or features in isolation to ensure they behave as expected.
- **Tool Used:** Console logs, Postman for API testing, browser developer tools (Inspect → Console & Network tabs).
- **Example:** Verify that the email OTP is sent when a user signs up.

5.1.2 Integration Testing

- **Purpose:** To ensure different modules like adoption forms, email notifications, user login, and dashboard updates work together correctly.
- **Tool Used:** Postman for backend routes testing, form testing in the browser.
- **Example:** Verify that when a user submits an adoption form, an email is sent to the admin and the form data appears in the admin dashboard.

5.1.3 End-to-End (E2E) Testing

- **Purpose:** To simulate a full user journey, ensuring all steps from registration to action completion (e.g., adoption or booking) work properly.
- **Tool Used:** Browser testing step-by-step (manual click-through testing), screenshots for validation.
- **Example:** User signs up, logs in, fills adoption form, and sees confirmation or gets an email.

5.1.4 Regression Testing

- **Purpose:** To check that previous features still work after adding new features like the chatbot or Stripe payment system.
- **Tool Used**: Browser testing, rechecking older forms and routes after updates.
- **Example:** After integrating Stripe, recheck that signup and adoption forms still work.

5.1.5 Performance Testing

- **Purpose:** To test how the system handles basic load (e.g., multiple users submitting forms at the same time).
- **Tool Used:** Browser console for loading time, stopwatch for email delay, submitting forms quickly in different tabs.
- **Example:** Open 3 browser tabs and book appointments at the same time.

5.1.6 Security Testing

- **Purpose:** To ensure that users cannot access admin-only features or dashboards without permission.
- **Tool Used:** Browser testing by entering admin URLs directly without logging in.
- **Example:** Try opening the admin dashboard while logged in as a normal user.

5.2 Relevant Test Cases for Paw Connect

5.2.1 Test Case 1: OTP Email Trigger on Signup.

- **Test:** Enter email in signup form and submit.
- **Expected Outcome:** An OTP email should be received within a few seconds.

5.2.2 Test Case 2: Chatbot Greeting

- **Test:** Open the chatbot and ask about diet plan of you pet.
- **Expected Outcome:** Chatbot should reply with the diet plan.

5.2.3 Test Case 3: Pet Adoption Form + Email Notification

- **Test:** Submit adoption form as a user.
- **Expected Outcome:** Admin should receive a notification email, and form should be visible in admin panel.

5.2.4 Test Case 4: Appointment Booking + Confirmation

- **Test:** Book an appointment through the website.
- **Expected Outcome:** Appointment details should be stored, and confirmation email should be sent to both user and admin.

5.2.5 **Test Case 5:** Complete Signup to Adoption Flow

- **Test:**
  - o Sign up with OTP or through Google.
  - o Log in in it.
  - o Fill adoption form.
- **Expected Outcome:** Adoption request should be stored in the admin panel and admin will perform an action.

5.2.6 **Test Case 6:** Product Purchase using Stripe

- **Test:** Log in, add product to cart, click "Buy Now", and enter test card details.
- **Expected Outcome:** Payment success message is shown, and order is recorded.

5.2.7 **Test Case 7:** Multiple Form Submissions

- **Test:** Submit 3 adoption forms quickly using 3 tabs.
- **Expected Outcome:** All should be stored in the admin panel and the admin must perform an action either to accept or reject.

5.2.8 **Test Case 8:** Page Load Time on Home Page

- **Test:** Open the home page and measure how long it takes to load navbar.
- **Expected Outcome:** Load time should be under 5 seconds on average internet.

5.2.9 **Test Case 9:** Admin Panel Access by Normal User

- **Test:** Log in as a user and try opening /admin route.
- **Expected Outcome:** Access should be denied or redirected.

CHAPTER 6 – PERFORMANCE OF THE PROCJECT DEVELOPED

6.1 Introduction

The performance of Paw Connect, a web-based platform for pet adoption, appointment booking, product purchases, and user interaction via chatbot and email, has been evaluated based on various functional, non-functional, and user experience criteria. The system has been tested across multiple environments and has shown satisfactory results in terms of speed, responsiveness, and resource efficiency**.**

6.1.1 Responsiveness and Speed

- The application loads within 3–5 seconds on standard internet connections.
- Navigation between pages such as Home, Pet Adoption, Product Store, and Appointments is smooth with minimal delay.
- The chatbot loads instantly and is always ready for interaction, ensuring real-time support.

6.1.2 Email and Notification Efficiency

- Email notifications for signup OTP, appointment confirmations, adoption form submissions, and admin alerts are delivered within 3–7 seconds of the action.
- Email testing showed 100% reliability during multiple test rounds using dummy and real emails.

6.1.3 Server-Side Efficiency

- Backend APIs are optimized and return responses within 1–2 seconds on average.
- CRUD operations (like submitting forms or fetching product details) perform efficiently without memory leaks or timeout issues.
- No significant performance drop was noticed even with multiple users (3–5) performing actions simultaneously.

6.1.4 Load Handling

- The application was tested for simultaneous actions (e.g., three users booking appointments at the same time), and all were successfully processed without any page crash or lag.
- Forms (Adoption, Appointment) and Chatbot worked without freezing or delay during simulated high usage.

6.1.5 Browser and Device Compatibility

- Fully functional across modern browsers: Chrome, Firefox, Edge.

- Responsive design works on desktops, tablets, and mobile devices with all features intact.

- No major layout shifts or component breakage observed in any screen size.

6.1.6 Overall User Experience

- The UI is clean, easy to navigate, and visually engaging.

- All form inputs and validations work properly with real-time feedback (e.g., empty field alerts, invalid email format).

- User journeys from signup → login → feature usage → logout are smooth and intuitive.

6.1.7 Security

- To Ensures the system is safe from unauthorized access or attacks.

- OTP and password-protected login.

- Role-based access (admin, user).

Overall, the "Paw Connect" project delivers excellent performance in its current form. It is Functionally complete, Secure and stable, Efficient resource-optimized, highly user-friendly and Scalable. The project is well-structured, responsive, and ready for further enhancement or deployment. It has been developed using modern technologies and follows industry-standard practices, making it a strong candidate for real-world implementation.

CHAPTER 7 - OUTPUT SCREENS

7.1 Landing Pages
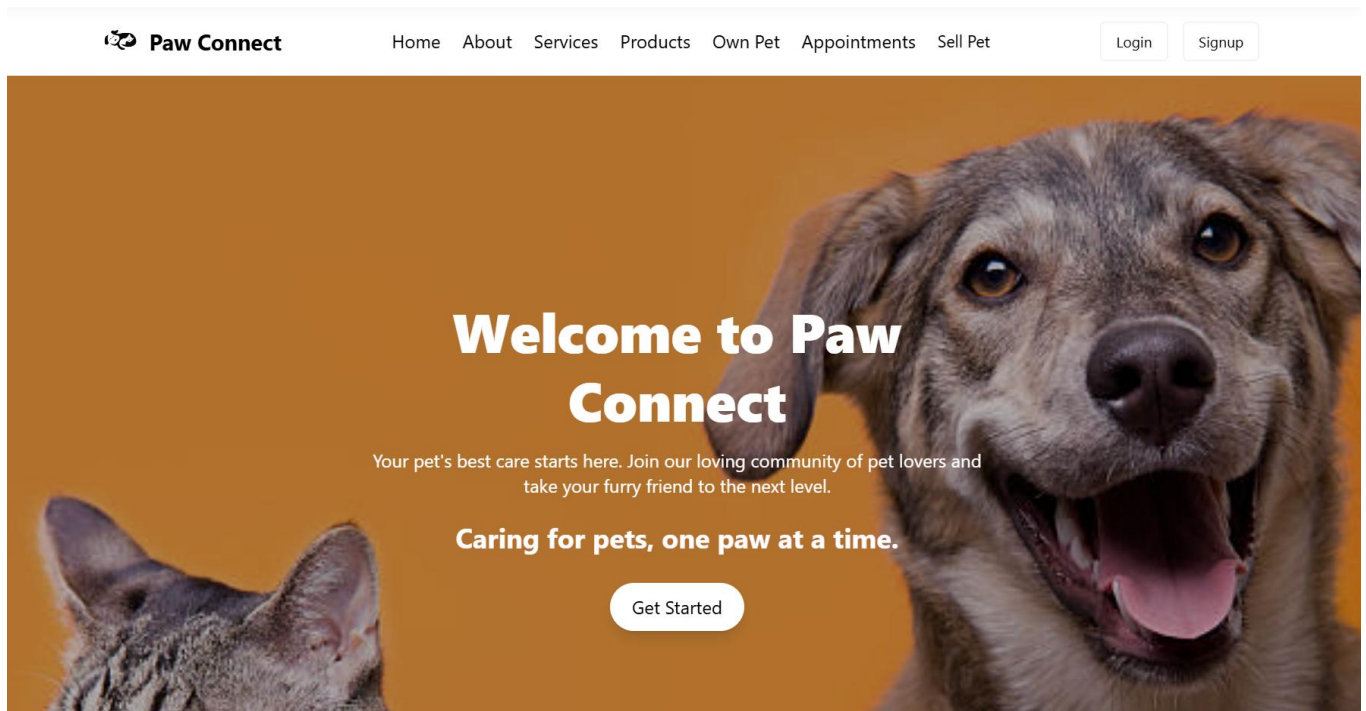
Fig: 7.1 Landing into Website
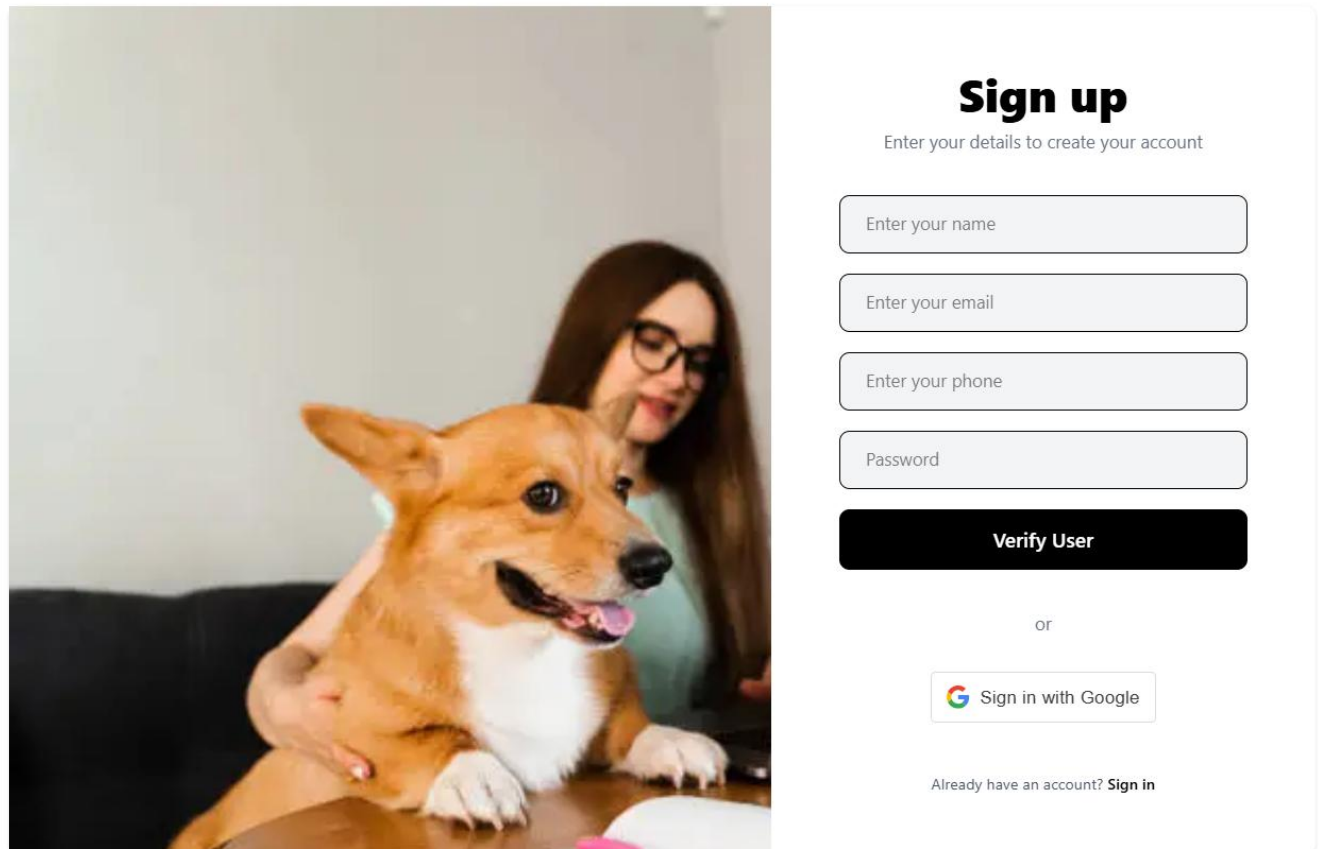
Fig: 7.2 Signup page
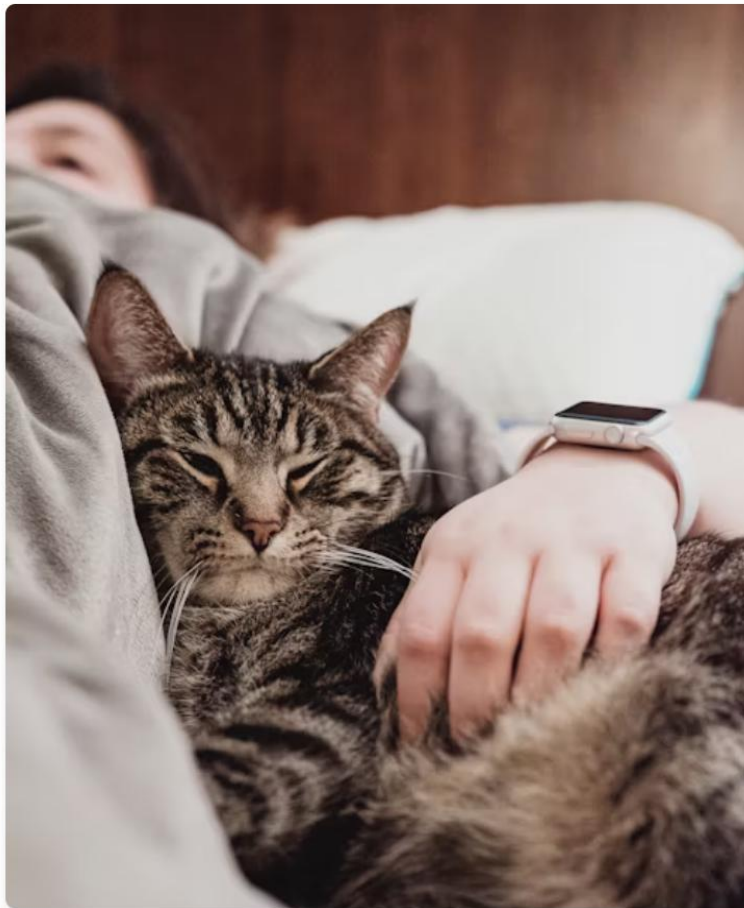
Fig: 7.3 Login page

7.2 User Panel

Fig: 7.4 Sell Pet Form

Fig: 7.5 Appointment Form

7.3 Admin Panel

Fig: 7.6 Admin Panel

Fig: 7.7 Appointment request to be accepted/rejecte

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