Project Proposal

Database (MII212501)

PawPoint: Veterinary Clinic Appointment Scheduling and Management Application

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1. Introduction

1.1. Background

Veterinary clinics provide medical care for all kinds of animals, from large livestock animals like horses and cows to exotic pets like birds and reptiles, as well as aquatic animals such as fish and amphibians. Due to the contrasting variety of animals, an organised veterinary clinic appointment system is crucial to manage all the different species and their medical histories. Moreover, a single client (pet owner) could have multiple animals, which could make manual record-keeping difficult and be prone to errors.

Therefore, an organised computerised system that can manage pet, owner, and veterinarian data in an integrated database is vital for the clinic. This system would not only improve the accuracy and accessibility of medical records but also enhance efficient communication between clinic staff, veterinarians, and pet owners.

1.2. Objectives

The main objective of PawPoint is to develop a structured and efficient database solution that automates appointment scheduling and record management in a veterinary clinic. Our system aims to:

1. Store and manage information about pet owners, pets, veterinarians, and appointments.
2. Simplify the scheduling process and prevent overlapping appointments.
3. Record treatment or vaccination details after each appointment.
4. Allow easy retrieval of pet medical history and appointment records.
5. Provide search and reporting function to support administrative tasks and decision making.

1.3. Target Users

The PawPoint Veterinary Clinic Appointment System is made for different types of users who help run the clinic's daily activities. Each user has their own role and level of access to make the system organized and efficient. There are four main types of users: Superadmin, Receptionist, Veterinarian, and Pet Owner.

1.4. Use Cases

The main use cases for the system include:

1. Registering new pet owners and their animals.
2. Scheduling and updating appointments between client and veterinarians.
3. Recording medical treatments and diagnoses for each pet visit.
4. Managing veterinarian schedules to prevent overlapping appointments.
5. Generating reports like appointment summaries, veterinarian workloads, or pet medical histories.

2. Database Design

2.1. Entity Relationship Diagram

The Entity Relationship Diagram (ERD) illustrates the overall structure of the database and how the entities are related to one another. It represents the

main components of the Veterinary Appointment System, including users, pet owners, pets, veterinarians, appointments, clinics, and treatment records. The ERD helps visualize the logical connections and cardinalities between entities, ensuring that the system supports efficient data management and integrity. The ERD is shown in Diagram 1.
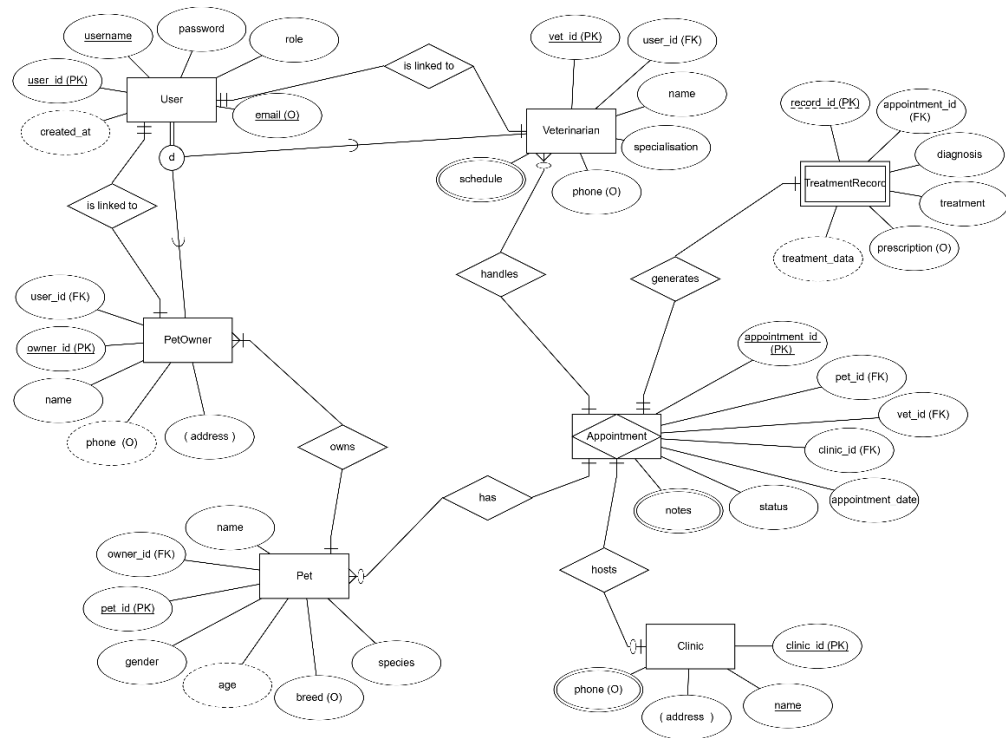

Diagram 1. ERD of PawPoint

2.2. Entities and Attributes

Each entity represents a key component of the PawPoint system and the attributes describe the data stored for each one. These entities work together to manage information about users, pets, veterinarians, and appointments within the database. The main entities and their attributes are:

1. User

   This entity holds the main account details of people who use the system. It helps identify each person and define their role.

   a. user_id (Primary Key)
   b. username
   c. password
   d. role
   e. email
   f. created_at

2. PetOwner

   This entity contains information about pet owners who use the system to manage their pets. It connects each owner to their user account for easier access.

       a. owner_id (Primary Key)

       b. user_id (Foreign Key)

       c. name

       d. phone

       e. address

3. Pet

    Holds data about each pet, including its name, type, and other information. Every pet is linked to one pet owner.

       a. pet_id (Primary Key)

       b. owner_id (Foreign Key)

       c. name

       d. species

       e. breed

       f. age

       g. gender

4. Veterinarian

    Includes information about veterinarians such as their name, specialization, contact details, and schedule. Each one is linked to a user account.

       a. vet_id (Primary Key)

       b. user_id (Foreign Key)

       c. name

       d. specialization

       e. phone

       f. schedule

5. Appointment

    Records all appointment details including the pet, veterinarian, and clinic involved, along with date, notes, and status.

       a. appointment_id (Primary Key)

       b. pet_id (Foreign Key)

       c. vet_id (Foreign Key)

       d. clinic_id (Foreign Key)

       e. appointment_date

       f. status

       g. notes

6. TreatmentRecord

    Stores medical details from each appointment such as diagnosis, treatment, and prescription information.

       a. record_id (Primary Key)

       b. appointment_id (Foreign Key)

       c. diagnosis

       d. treatment

       e. prescription

       f. treatment_date

7. Clinic

Keeps information about the clinic like its name, address, and phone number. It also links to all related appointments.
   a. clinic_id (Primary Key)
   b. name
   c. address
   d. Phone

2.3.Relationships

In the PawPoint Veterinary Clinic Appointment System, each entity is connected to others to show how data in the system is related and managed. These relationships help the system link information between users, pets, veterinarians, and appointments properly. Clear connections between entities make it easier for the system to manage data properly and keep everything consistent and easy to retrieve. The main relationships in the system are:

1. User and PetOwner (1:1) = One user account is linked to one pet owner profile.
2. User and Veterinarian (1:1) = One user account is linked to one veterinarian profile.
3. Admin and User (1:N) = One admin linked to multiple users.
4. PetOwner and Pet (1:N) = One pet owner can have multiple pets.
5. Pet and Appointment (1:N) = One pet can have multiple appointments.
6. Veterinarian and Appointment (1:N) = One veterinarian can handle multiple appointments.
7. Appointment and TreatmentRecord (1:1) = One appointment generates one treatment record.
8. Clinic and Appointment (1:N) = One clinic can have multiple appointments.

3. Project Scope and System Design

3.1.Scope

The scope of this project is to design and develop a web-based Veterinary Appointment System that facilitates the management of veterinary clinic operations. The system focuses on appointment scheduling, pet and veterinarian data management, and administrative control through different user roles.

3.1.1. In Scope

1. Development of a web application using Flask (Python) as backend and React (Node.js) as frontend.
2. Implementation of user roles: Superadmin, Admin, Veterinarian, and Pet Owner.
3. Appointment scheduling system between pet owners and veterinarians.
4. Pet and owner data management (add, view, update, delete).

5. Basic authentication (login, register, logout) and authorization by role.
6. Integration with a MySQL/SQLite database to store system data.
7. Display of appointment history and veterinarian schedules.

3.1.2. Out of Scope
1. Integration with online payment systems.
2. Mobile application development.
3. Real-time notification or chat features.
4. AI-based diagnosis or recommendation systems.

3.2. User Flow Diagram

3.2.1. Superadmin Journey

The goal of superadmin journey is to oversee and manage the entire veterinary appointment system, ensuring that all clinic operations, users, and data run smoothly and securely.
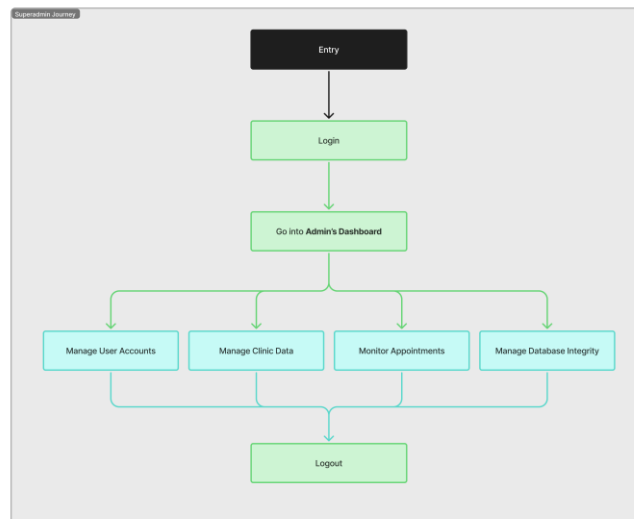

Diagram 2. Superadmin Journey Diagram

Each of blocks has their own process. The explanation of each process is in Table 1.

Table 1. Main Stages in Superadmin Journey

Stage	Action / Interaction	System Response / Output
1. Login	Super Admin logs into the system using credentials.	System authenticates the Super Admin and displays the dashboard.
2. View Dashboard	Views system overview, such as total	Dashboard loads analytics and key

	users, active appointments, and clinic data summary.	metrics for monitoring system status.
3. Manage User Accounts	Adds, updates, or removes Admin, Veterinarian, or Pet Owner accounts.	System updates user database and adjusts access permissions.
4. Manage Clinic Data	Adds or edits clinic information (name, address, contact info).	System updates the Clinic table and reflects changes in the appointment module.
5. Monitor Appointments	Reviews overall appointment data, identifies active/inactive users, or detects issues.	Displays appointment records and related user activity.
6. Manage Database Integrity	Performs maintenance actions (e.g., data backup or reset).	System confirms actions and updates logs.
7. Logout	Logs out of the system securely.	System ends the session and returns to login page.

3.2.2. Admin Journey

The goal of admin journey is to manage daily clinic operations, including registering pet owners and pets, scheduling appointments, and maintaining accurate clinic records.
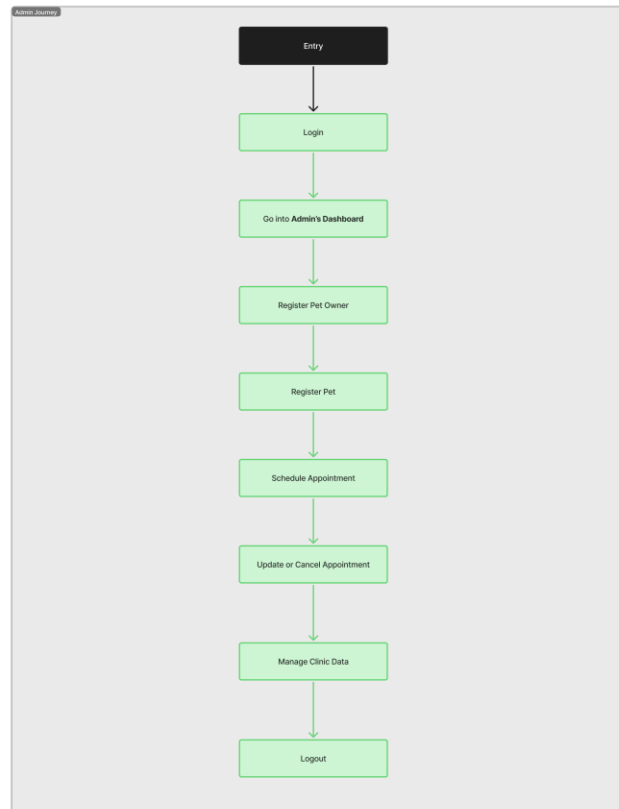
Diagram 3. Superadmin Journey Diagram

Each of blocks has their own process. The explanation of each process is in Table 2.

Table 2. Main Stages in Admin Journey

Stage	Action / Interaction	System Response / Output
1. Login	Admin logs into the system using valid credentials.	System authenticates the admin and displays the main dashboard.
2. View Dashboard	Views summary of upcoming appointments, registered pets, and veterinarian schedules.	Dashboard loads relevant operational data.
3. Register Pet Owner	Adds a new pet owner profile (name, phone, address).	System saves the new owner record in the database.

4. Register Pet	Adds a pet linked to a specific owner, including species, breed, and age.	System stores pet data and associates it with the owner.
5. Schedule Appointment	Creates an appointment by selecting pet, veterinarian, and available time slot.	System saves appointment details and notifies the veterinarian.
6. Update or Cancel Appointment	Modifies or cancels existing appointments if needed.	System updates appointment records accordingly.
7. Manage Clinic Data	Updates clinic contact info, hours, or general data (optional).	System saves changes to the Clinic entity.
8. Logout	Logs out securely after finishing administrative tasks.	System ends session and returns to login screen.

3.2.3. Veterinarian Journey

The goal of veterinarian journey is to view assigned appointments, provide medical treatment, and update pet health records efficiently through the system.
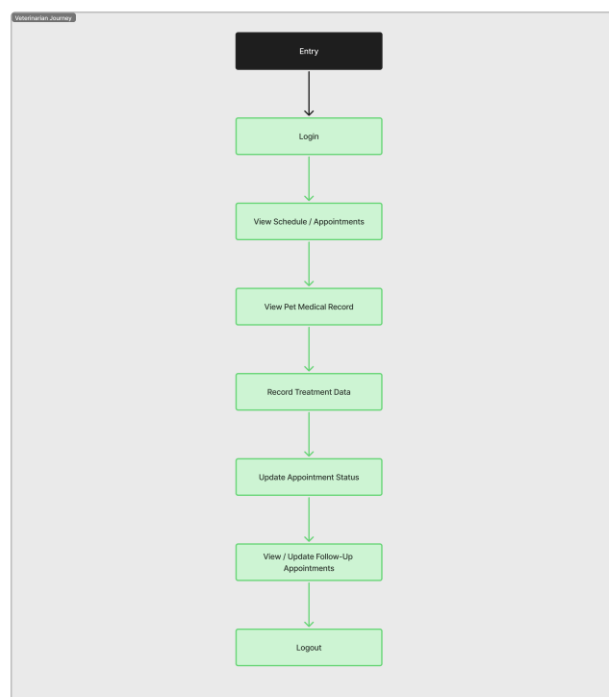

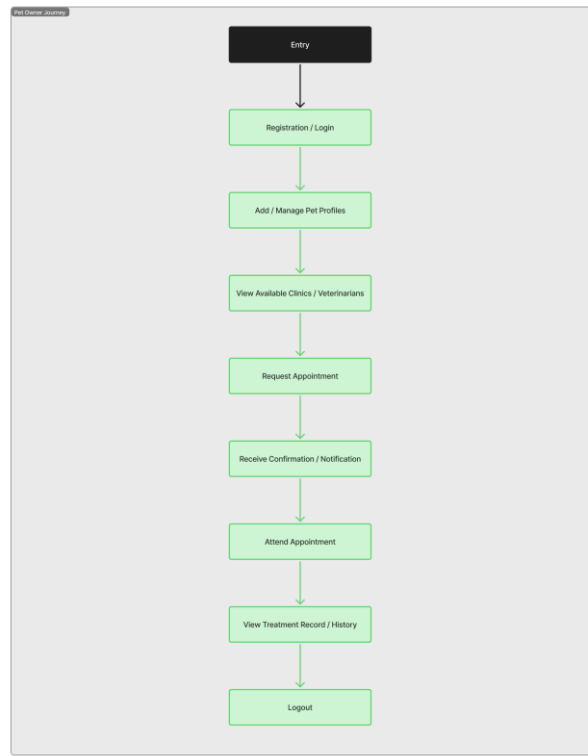Diagram 4. Veterinarian Journey Diagram

Each of blocks has their own process. The explanation of each process is in Table 3.

Table 3. Main Stages in Veterinarian Journey

Stage	Action / Interaction	System Response / Output
1. Login	Veterinarian logs into the system using secure credentials.	System authenticates the veterinarian and loads their personalized dashboard.
2. View Schedule / Appointments	Views upcoming and current-day appointments assigned to them.	System displays the appointment list with pet and owner details.
3. View Pet Medical Record	Opens pet profile to review medical history before treatment.	System loads the pet's past treatment data and notes.
4. Record Treatment Data	Adds new treatment details, such as diagnosis, medication, notes, and recommendations.	System stores treatment data linked to the appointment and pet record.
5. Update Appointment Status	Marks appointment as "Completed", "Follow-up Needed", or "Cancelled".	System updates the appointment record and notifies the admin or owner if necessary.
6. View / Update Follow-Up Appointments	Checks if further treatment or follow-up is required and schedules or suggests accordingly.	System records the follow-up plan in the appointment database.
7. Logout	Ends session after updating all treatment records.	System securely logs out and redirects to login page.

3.2.4. Pet Owner Journey

The goal of pet owner journey is to manage pet profiles, book veterinary appointments, and track the status or results of treatments easily through the system.

Each of blocks has their own process. The explanation of each process is in Table 4.

Table 4. Main Stages in Pet Owner Journey

Stage	Action / Interaction	System Response / Output
1. Registration / Login	Pet owner registers for an account or logs in using existing credentials.	System authenticates the user and loads the owner dashboard.
2. Add / Manage Pet Profiles	Adds or updates pet details (name, species, breed, age, gender).	System saves pet information linked to the owner account.
3. View Available Clinics / Veterinarians	Browses available clinics or vets based on schedule or specialization.	System displays available options and schedules.
4. Request Appointment	Selects a clinic, veterinarian, pet, and	System checks availability, creates the

	preferred date/time for an appointment.	appointment record, and confirms booking.
5. Receive Confirmation / Notification	Gets notification of appointment confirmation or status updates.	System sends a confirmation message or email automatically.
6. Attend Appointment	Brings the pet to the clinic as scheduled.	Veterinarian updates appointment status in the system.
7. View Treatment Record / History	Checks completed appointments and reviews treatment details or prescriptions.	System displays treatment history linked to the pet.
8. Logout	Ends session after viewing or updating information.	System securely logs out and returns to home page.

3.3. System Users

The database system involves three main types of users, each with their own distinct roles and access levels to the system which displayed in Table 5.

Table 55. System Users Table

User Type	Description	Main Functions
Superadmin	Oversees the entire system and manages administrative accounts.	Manage admin/receptionist accounts, monitor system activity, and maintain overall database integrity.
Admin/Receptionist	Manages registrations, appointments, and clinic data.	Add, update, or delete owner, pet, and appointment records.
Veterinarian	Provides treatment and updates appointment status.	View assigned appointments, record treatment data, and update pet records.
Pet Owner	The client who registers pets and books the appointments.	View/request appointments, and update contact information.

4. Tools and Technologies

The development of the PawPoint will utilize several tools and technologies to support both backend and frontend implementation, as well as database management and version control. The selected technologies are as follows:

4.1. Database

The system will use MySQL as the primary relational database management system (RDBMS). MySQL is reliable, easy to integrate with Flask via SQLAlchemy, and well-suited for structured data such as appointments, users, and pet records. For initial testing or development purposes, SQLite may also be used as a lightweight alternative.

4.2. Backend

The backend of the system will be developed using Flask, a lightweight and flexible Python web framework. Flask will handle RESTful API creation, data processing, and communication between the database and frontend. It allows rapid development and easy integration with SQL-based databases.

4.3. Frontend

The frontend will be built using React, a JavaScript library running on Node.js. React enables the creation of a dynamic and responsive user interface, while Node.js supports package management and dependency installation. The frontend will interact with the Flask backend through HTTP requests (API calls).

4.4. Version Control

GitHub will be used for version control and collaboration among team members. It allows for efficient code tracking, issue management, and sharing of the project repository in a centralized platform.

4.5. Deployment

For deployment, the backend (Flask) can be hosted on Render, while the frontend (React) can be deployed on Vercel or run locally via localhost during development. These platforms allow easy deployment and public access to the system for testing and demonstration.