

PETSHUB

Krithika P S¹, Ms. Kajal²

¹Student, 4th Semester MCA, Department of MCA, EWIT, Bangalore

²Assistant Professor, Department of MCA, EWIT, Bangalore

Abstract— Pet ownership has become increasingly significant in modern society, where pets are viewed not only as animals but as valued companions. Managing their needs, however, often requires pet owners to rely on multiple platforms—shopping for supplies on e-commerce sites, booking veterinary appointments separately, and searching for advice across forums or social media. This fragmented approach is time-consuming and inconvenient.

To address these challenges, we present PetsHub, a web-based application designed to integrate essential pet care services into a single platform. Built using Java Servlets, JSP, and MySQL, and following the Model-View-Controller (MVC) architecture, PetsHub combines modules for user registration and authentication, online shopping, shopping cart and wishlist management, order tracking, veterinary appointment booking, chatbot assistance, and an administrative dashboard for product and order management.

The system was tested in an Apache Tomcat environment, and the results show that it simplifies the overall pet care process by streamlining multiple services into one application. PetsHub makes life easier for pet owners, helps administrators manage things more smoothly, and creates room for new features in the future. Possible extensions include integrating secure online payments, developing a mobile app, and applying artificial intelligence for personalized product recommendations.

Keywords—Pet Care, Web Application, MVC Architecture, Java Servlets, MySQL, E-commerce, Chatbot

I. INTRODUCTION

To many families, pets are more than animals—they are companions and part of the family. This shift in perception has brought with it new responsibilities for pet owners, including the need to provide proper food, medical care, grooming, and overall well-being. In practice, however, managing all these aspects can be difficult. Owners often find themselves visiting pet shops for supplies, calling veterinary clinics for appointments, and searching online forums or social media groups for advice.

This scattered approach is not only time-consuming but also inefficient, particularly in the fast-paced lifestyle of urban families.

Digital transformation has already changed the way people access services in sectors such as retail, healthcare, and education. Consumers can now order groceries online, book doctor appointments through mobile apps, or attend classes virtually. Yet, the pet care industry has been slower to adopt integrated solutions. While online stores for pet products exist and some clinics provide digital

booking tools, these services often operate independently. The result is a fragmented user experience, where pet owners must rely on multiple applications or offline methods to meet their pets' needs.

To address this challenge, we propose PetsHub, a web-based platform that consolidates key services into a single system. PetsHub allows users to register securely, shop for pet supplies, manage their cart and wishlist, track orders, schedule veterinary appointments, and interact with a chatbot for quick assistance. Administrators can also benefit from features such as product management and order tracking, providing them with greater control and oversight.

The system is developed using Java Servlets, JSP, and MySQL, structured around the Model-View-Controller (MVC) architecture. This design ensures a clear separation of responsibilities: the model handles data and logic, the view manages user interfaces, and the controller processes user requests. By adopting this architecture, PetsHub achieves better scalability, and maintainability, and usability.

II. RELATED WORK

In recent years, several digital solutions have emerged to support the pet care, veterinary services, and pet-related business management. Existing platforms such as online veterinary consultation systems, pet adoption portals, and e-commerce applications for pet supplies have demonstrated the potential of technology to improve convenience for pet owners. However, many of these systems are often limited in scope, focusing on a single aspect such as health tracking, online shopping, or

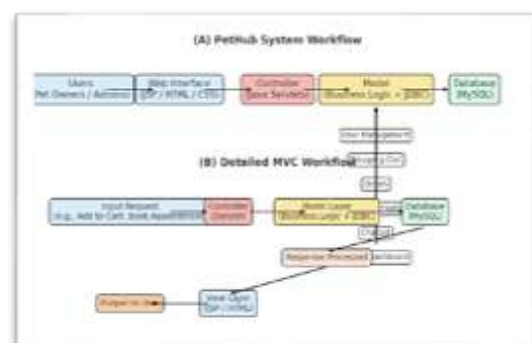
appointment

scheduling.

Studies on pet management applications highlight the need for integrated solutions that combine multiple services in a unified platform. Research also emphasizes the importance of user-friendly interfaces and secure data handling, especially when dealing with sensitive customer and pet information. Additionally, existing works have pointed out inefficiencies in order management and communication between service providers and pet owners, which often result in reduced customer satisfaction.

Compared to these approaches, PetsHub distinguishes itself by offering a comprehensive platform that integrates pet care services, order management, and administrative tools within a single application. This unified approach not only improves convenience for pet owners but also enhances operational efficiency for administrators. By addressing the shortcomings identified in earlier systems, PetsHub contributes to ongoing efforts in digital transformation within the pet care industry and provides a scalable foundation for future enhancements.

III. METHODOLOGY



Developing PetsHub required a systematic approach that ensured both functionality and scalability. The methodology adopted combines proven software engineering practices with modern web technologies. At the core of the design lies the Model-View-Controller (MVC) architecture, which provides a clear separation between data management, user interaction, and application logic. This section explains the methodology followed, the tools and technologies used, and the modular structure of the system.

A. MVC Architecture

The MVC design pattern was chosen as the backbone of the application due to its modularity and ease of maintenance.

Model: It handles the system's data and core business logic. In PetsHub, the model includes classes such as Product, Cart, Order, User, and Appointment. These classes use JDBC to store and retrieve data from the database.

View: Handles the presentation layer. JSP, HTML, and CSS were used to design user interfaces where customers can browse products, schedule appointments, or interact with the chatbot. The views make sure the system is easy to use and understand.

Controller: This component functions as a bridge, connecting the model with the view and ensuring proper communication between them. Implemented using Java Servlets, the controller processes user requests, invokes the appropriate model logic, and then sends results back to the view. Examples include LoginServlet, AddToCartServlet, AppointmentServlet.

The adoption of MVC ensures that changes in one layer do not affect others, making the system highly maintainable and scalable for future updates.

B. Tools and Technologies

The development of PetsHub relied on a set of tools and technologies selected for their reliability and industry relevance:

Programming Language: Java

Web Technologies: JSP, HTML, CSS, JavaScript

Backend Framework: Java Servlets

Database: MySQL, accessed via JDBC

Server Environment: Apache Tomcat

IDE: Eclipse and Visual Studio Code were used for coding and deployment.

Version Control: Git was used for collaboration and version control.

These technologies were chosen not only for compatibility but also for their robustness in handling web applications.

C. System Modules

PetsHub was developed as a collection of modules, each addressing a specific need. The modular design allows for independent testing and easier future enhancement.

1. User Management Module: Handles registration, login, authentication, and profile updates. Ensures secure access to customer accounts.

2. Product Management Module: Allows administrators to add, update, and delete products. Customers can view and search products.

3. Shopping Cart & Wishlist Module: Enables customers to add products for immediate purchase or save them for later.

4. Order Management Module: It lets customers track their orders while enabling admins to manage them.

5. Appointment Scheduling Module: Lets users book veterinary appointments online, reducing dependency on manual booking.

6. Chatbot Module: Offers automated support by answering frequently asked questions and guiding users through common processes.

7. Admin Dashboard: A control panel for administrators to oversee products, orders, and user activity.

D. Development Approach

The system was built using an incremental development approach. Each module was developed, tested, and integrated step by step. This approach allowed continuous feedback and reduced errors during integration.

Testing was carried out at multiple stages, including unit testing for individual classes, integration testing for module interactions, and system testing to evaluate overall performance.

IV. RESULTS AND DISCUSSION

The PetsHub system was successfully implemented and deployed in a controlled environment using Apache Tomcat as the server and MySQL as the database. Each module was tested independently and then integrated to ensure smooth end-to-end functionality. The results show that PetsHub effectively addresses the core issues of fragmentation in pet care services by bringing multiple features together in a single platform.

A. Functional Results

1. User Registration and Authentication

The system allows new users to create accounts securely and existing users to log in. User authentication is checked against the credentials stored in the database.

Result: Reliable access control was achieved, ensuring that customers and administrators could access their respective roles without errors.

2. Product Browsing and Cart Management

Customers can view available pet products, search by category, and add them to their cart or wishlist.

Result: Smooth browsing and cart operations were observed, with accurate updates to cart quantities and total price.

3. Order Placement and Tracking

Orders placed by customers are stored in the database and linked to their accounts. Customers can view the status of their orders, such as pending, shipped, or delivered.

Result: Order management worked consistently and allowed admins to update statuses effectively.

4. Veterinary Appointment Booking

Customers can schedule veterinary visits by selecting a doctor, date, and time. The appointment details are stored and accessible to both users and admins.

Result: The feature reduced scheduling conflicts and provided a reliable booking mechanism.

5. Chatbot Support

The integrated chatbot responded to common queries, such as product information and order guidance.

Result: While the chatbot provided quick answers, it is currently limited to predefined responses.

6. Admin Dashboard

Administrators were able to add, update, and delete products, view customer orders, and monitor appointments.

Result: The dashboard streamlined administrative tasks and ensured better system oversight.

B. Testing Methodology

PetsHub was evaluated through multiple testing levels:

Unit Testing: Conducted on individual classes (e.g., User, Product, Order) to ensure correctness.

Integration Testing: Verified the smooth flow of data between modules such as cart and orders.

System Testing: Tested the overall functionality and performance of the application as a whole

User Acceptance Testing (UAT): A small group of users tested the application and confirmed its ease of use and usefulness.

The testing phase confirmed that PetsHub met its functional requirements with only minor adjustments needed for optimization.

C. Comparative Advantages

Compared with existing systems, PetsHub demonstrated several advantages:

Unified Platform: Unlike fragmented services, PetsHub integrates shopping, appointments, and support.

Efficiency: Customers no longer need multiple apps to manage pet care needs.

User Experience: The interface was simple, intuitive, and responsive.

Administrative Control: The dashboard provided real-time oversight, reducing manual errors.

D. Discussion

The results show that PetsHub helps reduce inefficiencies in managing pet care. Customers appreciated the ability to book appointments and shop for supplies in one place. Administrators benefited from centralized product and order management.

However, the chatbot module was identified as an area for improvement, as it currently relies on predefined responses rather than dynamic AI-driven interactions. Future iterations can integrate natural language processing (NLP) to improve this feature.

V. CONCLUSION

The PetsHub project was developed to address a clear gap in the pet care industry the lack of a unified platform that combines shopping, veterinary appointment scheduling, customer support, and administrative management. By adopting the MVC architecture and leveraging technologies such as Java Servlets, JSP, MySQL, and Apache Tomcat, the system successfully integrates these features into a single, user-friendly web application.

The implementation and testing of PetsHub demonstrated that the system not only meets its functional requirements but also improves efficiency and convenience for both customers and administrators. Customers benefit from streamlined shopping and booking services, while administrators gain better control over product management and order tracking. Compared to existing fragmented solutions, PetsHub provides a more holistic and efficient digital ecosystem for pet care.

Despite its success, the system has certain limitations. The chatbot, for example, is currently limited to predefined responses and lacks advanced conversational capabilities. The absence of an integrated payment gateway also restricts users to manual payment methods. In addition, while the platform works effectively as a web application, it is not yet available as a mobile app, which limits accessibility for some users.

Looking forward, there are opportunities for enhancing PetsHub:

- 1. Mobile Application Development:** Expanding the system into Android and iOS apps for greater accessibility.
- 2. Payment Gateway Integration:** Allowing secure and convenient online payments.
- 3. AI-powered Chatbot:** Using Natural Language Processing (NLP) to enable dynamic, intelligent responses.
- 4. Personalized Recommendations:** Leveraging machine learning to suggest products and services based on user history and pet profiles.
- 5. Cloud Deployment:** Hosting the platform on scalable cloud infrastructure to support a larger user base.

In conclusion, PetsHub lays the groundwork for bringing digital transformation to the pet care industry. With further development, the platform has the potential to evolve into a comprehensive ecosystem that supports every aspect of pet ownership.

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