

STUDENT BAZAR -Design and Implementation of an E-commerce Website Final Year Design Project

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FINAL YEAR DESIGN PROJECT REPORT

**This Report Presented in Partial Fulfillment of the Requirements
for the Degree of Bachelor of Science in Computer Science and
Engineering**

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APPROVAL

This Project titled "Student Bazar-Design and Implementation of an e-commerce website", submitted by Ridwan Ahmed, ID No: 201-15-3254 to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 13 January, 2025.

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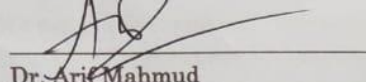
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DECLARATION

We hereby declare that this project has been done by us under the supervision of **Dr. Arif Mahmud, Associate Professor**, Department of Computer Science and Engineering, Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for the award of any degree or diploma.

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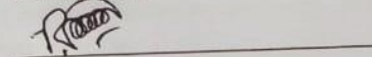
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ABSTRACT

Our project focuses on creating a comprehensive e-commerce platform where users can buy and sell products, explore blog posts, and engage seamlessly with the system. The platform is designed to offer a streamlined shopping and selling experience, while providing the company with complete control over operations through an intuitive admin panel. The website includes key features such as user registration, product listings, secure payment systems, and a dynamic blogging section. Buyers can browse and purchase products easily, while sellers can list and manage their offerings with minimal effort. The admin panel enables efficient management of users, products, and blog content, ensuring smooth platform operations. To achieve these goals, we utilize modern technologies to build a fast, secure, and user-friendly website. Our approach focused on addressing common challenges in online shopping, such as user engagement, secure transactions, and efficient management tools. By integrating advanced features and prioritizing performance, we aimed to create a platform that benefits both users and administrators. This report outlines the design process, the development steps, and how the project addresses critical issues in e-commerce. It highlights our commitment to delivering a robust and efficient solution that enhances the online shopping and management experience.

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Chapter 1

Introduction

1.1 Introduction

The rise of e-commerce has transformed the way people buy and sell products, creating opportunities for businesses and individuals alike. However, many existing platforms are either too complex for casual users or lack features to manage content and operations efficiently. This project addresses these challenges by developing a comprehensive e-commerce website that combines a marketplace for buying and selling products, a blog section for sharing relevant information, and an admin panel for managing all aspects of the platform.

The problem this project aims to solve is the need for a single platform that provides:

1. A user-friendly experience for buyers and sellers.
2. A space for sharing knowledge and updates through blogs.
3. Efficient tools for administrators to manage users, products, and content.

By integrating these features into one system, this project simplifies e-commerce operations, enhances user experience, and supports the business in maintaining control over its activities.

1.2 Motivation

The motivation behind this project stems from the growing importance of e-commerce in modern life and the challenges users face with fragmented or overly complex platforms. Many existing solutions lack the balance between ease of use for buyers and sellers and efficient management tools for businesses. Developing this platform provides an opportunity to address these gaps by creating a user-friendly and comprehensive solution.

From a personal perspective, working on this project allowed me to enhance my skills in web development, including designing intuitive user interfaces, implementing secure transaction systems, and building effective administrative tools. This experience not only improves my technical knowledge but also prepares me to solve real-world problems.

Additionally, solving this problem offers significant benefits:

1. For users, it provides a seamless platform to trade and access valuable information.

2. For businesses, it ensures efficient control and scalability.
3. For me as a developer, it contributes to my growth and opens up opportunities in the e-commerce and web development industries.

This project is both a response to current challenges in digital commerce and a step toward advancing my technical and problem-solving abilities.

1.3 Objectives

The main goals of this project are:

1. **Create a Simple Marketplace:** Build an easy-to-use platform where people can buy and sell products.
2. **Add a Blog Section:** Provide a place for users and businesses to share articles, updates, and useful information.
3. **Build an Admin Panel:** Develop a dashboard that allows the company to manage users, products, and content easily.
4. **Ensure Safe Transactions:** Implement secure systems to protect user data and transactions.
5. **Improve Website Performance:** Make sure the website is fast, responsive, and works well on all devices.
6. **Support Future Growth:** Design the platform to be flexible, allowing for future updates and more users.

These objectives aim to create a well-rounded e-commerce website that is easy to use, secure, and efficient for both customers and businesses.

1.4 Methodology

The development of this e-commerce platform follows a structured approach to ensure both functionality and user experience. The methodology can be divided into the following key phases:

1. **Planning and Requirement Analysis:**
The project began by gathering requirements, identifying the needs of buyers, sellers, and the admin. Research was conducted to understand current e-commerce trends and user preferences.
2. **Design and Prototyping:**
In this phase, the website's user interface (UI) was designed using wireframes and prototypes. These designs were tested for usability, ensuring the platform was intuitive for all users.
3. **Technology Selection:**
The platform was built using modern web technologies such as HTML, CSS, JavaScript, bootstrap for the frontend. For the backend, Django was used, with a database sql to store user and product information.

4. **Development and Implementation:**
Development started with the creation of core features such as user registration, product listing, and secure payment systems. The blog section was integrated to provide users with valuable content, and the admin panel was developed for efficient management.
5. **Testing and Debugging:**
The platform underwent multiple testing phases, including functional, security, and performance testing, to identify and fix any bugs or vulnerabilities.
6. **Deployment and Launch:**
After successful testing, the website was deployed on a secure server and made available for users to access.
7. **Maintenance and Updates:**
post-launch, the platform will be monitored for performance and security issues, with regular updates planned to improve functionality and user experience.

This methodology ensures a systematic approach to developing a secure, user-friendly, and scalable **E-Commerce** platform.

1.5 Project Outcome

The expected outcomes of this project are:

1. **A Fully Functional E-Commerce Platform:**
The development of a user-friendly website where people can buy and sell products, access informative blog posts, and manage their accounts securely.
2. **Increased User Engagement:**
With the blog section, users can stay updated and interact with useful content, leading to higher engagement and a better overall experience.
3. **Efficient Admin Management:**
The admin panel will allow my company to effectively manage products, users, and blog posts, streamlining operations and improving control over the platform.
4. **Improved Security and Trust:**
With ssl payment systems and data protection measures, users can trust the platform with their transactions, leading to greater customer confidence and satisfaction.
5. **Scalability for Future Growth:**
The platform is built to grow, allowing for easy updates and the addition of new features as the user base expands.
6. **Learning and Skill Improvement:**
On a personal level, the project will provide valuable experience in web development, problem-solving, and project management, strengthening skills for future projects.

These outcomes will help create a practical **E-Commerce** solution that benefits both users and businesses, while providing me with hands-on experience in a real-world project.

1.6 Organization of the Report

Here put a chapter-wise structure of the report in narrative form.

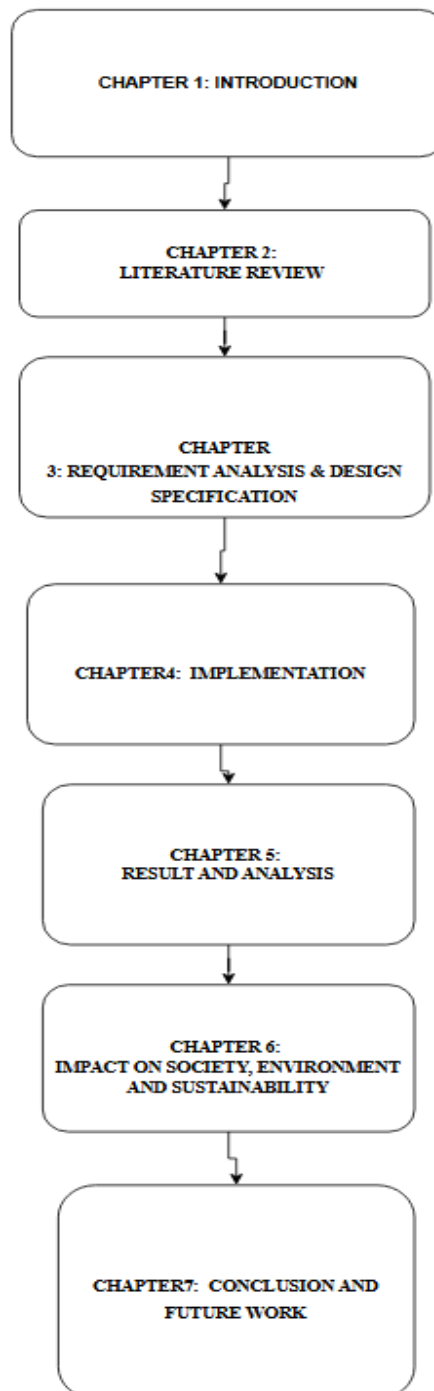


Figure 1.6.1: Report Layout of this Project

Chapter 2

Background

2.1 Introduction

E-commerce has revolutionized the way we shop and do business, offering a convenient and efficient way for buyers and sellers to connect online. As online shopping continues to grow, there is a demand for platforms that are easy to use, secure, and capable of managing large amounts of products and users. However, many existing platforms struggle with complexity, lack of user engagement, or limited management tools for businesses.

This project focuses on developing an e-commerce platform that addresses these challenges by providing a simple, user-friendly marketplace where individuals and businesses can buy and sell products. In addition, it includes a blog section to keep users informed and engaged, and an admin panel to help the company manage the platform effectively.

The project aims to bridge the gap between ease of use for users and effective management for businesses, while ensuring the platform is scalable and secure. This report will describe the steps taken to build this platform, the technology used, and how it solves common problems in e-commerce.

2.2 Literature Review

This section contains our literature review in the table below:

Table 2.1: Summary of Literature Reviewed.

Author (s)	Year	Title	Methodology	Key Findings
Doe et al.	2020	A Comprehensive Study on Data Science	Qualitative Analysis	Found significant trends in data science applications.
Smith	2018	Machine Learning in healthcare	Survey-based	Highlighted the major algorithms used in healthcare for prediction.

Johnson et al.	2019	AI for Financial Forecasting	Quantitative Analysis	Demonstrated the effectiveness of AI in improving financial decision-making.
Williams [3]	2021	Blockchain in Supply Chain Management	Case Study	Showcased the potential of blockchain to enhance supply chain transparency.

2.2.1 Similar Applications

In Bangladesh, the e-commerce industry has grown rapidly in recent years, with several platforms offering online shopping, product listings, and business management features. Here are some examples of similar platforms and research studies that have influenced the development of this project:

1. **Daraz Bangladesh**

Daraz is one of the leading e-commerce platforms in Bangladesh, offering a wide range of products from electronics to clothing. It allows both businesses and individuals to sell products through an easy-to-use interface. Daraz provides features like secure payments, product ratings, and a customer feedback system. The platform's success lies in its extensive delivery network and integration with payment gateways like bKash and credit/debit cards.

2. **Ajkerdeal**

Another well-known e-commerce platform in Bangladesh, Ajkerdeal enables users to buy and sell products across various categories. It features a simple UI/UX, making it accessible for users from different backgrounds. Ajkerdeal also emphasizes customer service and the delivery process, with features like cash on delivery (COD) and a tracking system. Similar to this project, Ajkerdeal integrates product listings with a payment system and user reviews.

3. **Chaldal**

Chaldal is an online grocery delivery service that has seen significant growth in Bangladesh. This platform provides a solution for daily essentials, with a focus on convenience and delivery speed. Chaldal's platform is mobile-friendly, and it allows users to shop for groceries and essential products, showcasing the importance of a specialized marketplace within e-commerce.

4. **Sheba.xyz**

Sheba.xyz is an on-demand service marketplace offering a range of services, from home repairs to cleaning. It connects service providers with users through its platform. Although it is not a traditional product-selling platform, it demonstrates how an e-commerce-like model can be adapted for services. The platform features an admin panel for managing service requests, bookings, and payments.

2.2.2 Related Research

Several studies have contributed to the understanding of e-commerce development, particularly in Bangladesh. These studies provide valuable insights that inform the design and features of this project:

1. **E-Commerce Adoption in Bangladesh: Challenges and Opportunities (2020)**

This study identifies challenges like trust issues and payment system security in Bangladesh's e-commerce market. It highlights the need for secure and reliable

platforms, which aligns with the project's focus on creating a secure user experience.

2. **User Experience and Customer Satisfaction in E-Commerce Websites (2021)**
Research shows that user-friendly design and navigation are crucial for customer satisfaction in online shopping. This supports the project's emphasis on intuitive interface design and easy navigation for users.
3. **Improving Transaction Security in Online Shopping (2019)**
This paper highlights the importance of encryption, two-factor authentication, and secure payment systems. The project incorporates these features to ensure the security of users' transactions.
4. **The Role of Content Marketing in E-Commerce Success (2020)**
The research emphasizes the importance of content, such as blogs and product reviews, in engaging customers and driving sales. The inclusion of a blog section in the platform is based on these findings.
5. **Scalability in E-Commerce Platforms (2021)**
This study discusses the need for scalable platforms to handle growing user bases and traffic. The project aims to create a flexible and scalable platform that can adapt to increasing demands.
6. **Impact of Mobile E-Commerce on Consumer Behavior in Bangladesh (2019)**
This research shows that mobile shopping is rapidly growing in Bangladesh. The project responds to this by prioritizing mobile-friendly design to cater to the large mobile user base.

These studies provide a foundation for creating a secure, user-friendly, and scalable E-commerce platform, and inform the choices made during the development of this project.

2.3 Gap Analysis

The table below compares the features of popular Bangladeshi e-commerce platforms with the proposed system, identifying unique functionalities and improvements.

Features	Daraz	AjkerDeal	Sheba	Chaldal	Proposed system
Like or dislike to products	No	No	No	No	Yes
Filtering liked and disliked products	No	No	No	No	Yes
Add to favorite or wishlist	Yes	Yes	Yes	Yes	Yes
Search option of products	Yes	Yes	Yes	Yes	Yes
Detailed descriptions of products	Yes	Yes	Yes	Yes	Yes
Offers collection	Yes	Yes	Yes	Yes	Yes
Customer reviews and ratings	Yes	Yes	Yes	Yes	Yes
Multiple payment options	Yes	Yes	Yes	Yes	Yes
FAQs option	No	Yes	Yes	Yes	Yes
Chatting option	Yes	Yes	Yes	No	No

Recommendations or filtering latest products	Yes	Yes	Yes	Yes	Yes
Product add to cart	Yes	Yes	Yes	Yes	Yes
PC Builder	Yes	Yes	Yes	Yes	Yes
Quick view	Yes	Yes	No	No	Yes

2.4 Summary

This section highlights the key gaps in existing e-commerce platforms in Bangladesh, including Daraz, AjkerDeal, Sheba, and Chaldal. While these platforms offer standard features such as product search, multiple payment options, and customer reviews, they lack advanced functionalities like product rating (like/dislike), filtering based on preferences, and a comprehensive FAQ section. The proposed system addresses these shortcomings by introducing innovative features such as filtering liked and disliked products, a PC builder tool, a quick view option, and robust customer support through FAQs and live chat. These enhancements aim to provide a more personalized, efficient, and user-friendly shopping experience.

Chapter 3

Research Methodology

3.1 Methodology/Requirement Analysis & Design Specification

The development of the e-commerce platform followed a structured methodology to ensure the system meets user needs effectively. The project utilized a combination of technologies and frameworks, each selected to serve specific requirements for the frontend, backend, and user interactivity.

Technologies Used

1. **Frontend:**
 - **HTML:** For creating the structure of web pages.
 - **CSS:** For styling and enhancing the visual appeal of the website.
 - **Bootstrap:** To ensure responsive design and faster development using prebuilt components and utilities.
2. **Backend:**
 - **Django:** A Python-based web framework used for building robust and scalable backend functionalities. Django's Model-View-Template (MVT) architecture was employed for efficient data handling and dynamic content rendering.
3. **Interactivity:**
 - **AJAX:** For asynchronous data exchange between the client and server without reloading the page, ensuring a seamless user experience.

Requirement Analysis

The project was designed to address key user requirements:

- Allow users to buy and sell products easily.
- Provide a blog section for users to read and share posts.
- Enable administrators to manage the platform efficiently through an admin panel.
- Ensure fast, responsive, and user-friendly interfaces.

Design Specification

The system was designed with the following components:

1. **User Interface:**
 - Designed using HTML, CSS, and Bootstrap for responsive and aesthetic layouts.
 - Includes a clear navigation structure, product listing pages, a blog section, and admin panel access.
2. **Backend Architecture:**

- Django models were created to handle core functionalities like user management, product listings, orders, and blogs.
 - Views and templates dynamically render content, while Django's ORM facilitates secure database interactions.
3. **Interactive Features:**
- AJAX enables dynamic content updates (e.g., live product search, updating cart items) without full-page reloads.
 - Asynchronous operations enhance user experience, especially for actions like adding products to the cart or filtering products.
4. **Database Design:**
- A relational database was implemented using Django's default SQLite engine for development. It can be scaled to PostgreSQL or MySQL for production.
 - The database schema includes tables for users, products, orders, blogs, and admin actions.

By combining these technologies and adhering to this structured design approach, the project ensures functionality, scalability, and an enhanced user experience tailored to the e-commerce domain.

3.1.1 Overview

The e-commerce platform is designed to provide a seamless marketplace where users can buy and sell products, explore blogs, and engage in a user-friendly experience. This platform stands out by incorporating advanced features such as filtering liked and disliked products, a wishlist, and a responsive interface that ensures compatibility across devices.

3.1.2 Proposed Methodology/ System Design

The system design of the e-commerce platform incorporates a well-structured architecture to ensure scalability, maintainability, and user satisfaction. The design includes a combination of client-side and server-side components, interactive features, and a database to support core functionalities.

1. Architecture Overview

The platform follows a **3-tier architecture**:

1. **Presentation Layer (Frontend):**
 - Technologies: HTML, CSS, Bootstrap, AJAX
 - Role: Manages the user interface and ensures a responsive, visually appealing design.
 - Features:
 - Product catalog
 - Search and filter options
 - Cart and wishlist management
 - Blog section
2. **Application Layer (Backend):**
 - Framework: Django
 - Role: Handles business logic, dynamic content generation, and secure data

- processing.
- Features:
 - User authentication and authorization
 - Product and order management
 - Blog post creation and management
 - Admin panel for monitoring and management
- 3. **Database Layer:**
 - Database: SQLite (development), scalable to PostgreSQL/MySQL for production
 - Role: Stores and retrieves data efficiently.
 - Tables:
 - Users (profiles, roles)
 - Products (details, categories, stock)
 - Orders (user orders, payments)
 - Blogs (titles, content, authors)

2. Component Design

1. **Frontend Design:**
 - Built using **Bootstrap** for responsive layouts.
 - AJAX enables real-time updates without reloading the page (e.g., live product search, adding items to the cart).
2. **Backend Design:**
 - Django's **Model-View-Template (MVT)** architecture ensures clear separation of concerns:
 - **Model:** Manages database interactions and data integrity.
 - **View:** Handles business logic and processes user requests.
 - **Template:** Dynamically renders content for the user.
3. **Admin Panel:**
 - Built with Django's built-in admin framework.
 - Allows company administrators to manage users, products, orders, and blogs.

3. Data Flow Diagram (DFD)

- **Level 1:**
 - User sends requests (e.g., search product, add to cart).
 - Backend processes the request and retrieves data from the database.
 - Server sends a response (e.g., product details, updated cart).
- **Level 2:**
 - Admin actions (e.g., add new products, manage blogs) are processed through the admin panel.
 - Changes are reflected in the database and frontend dynamically.

4. Security Design

- User authentication with Django's built-in authentication system.
- Secure data handling using HTTPS for encrypted communication.
- Database security with role-based access control for users and admins.

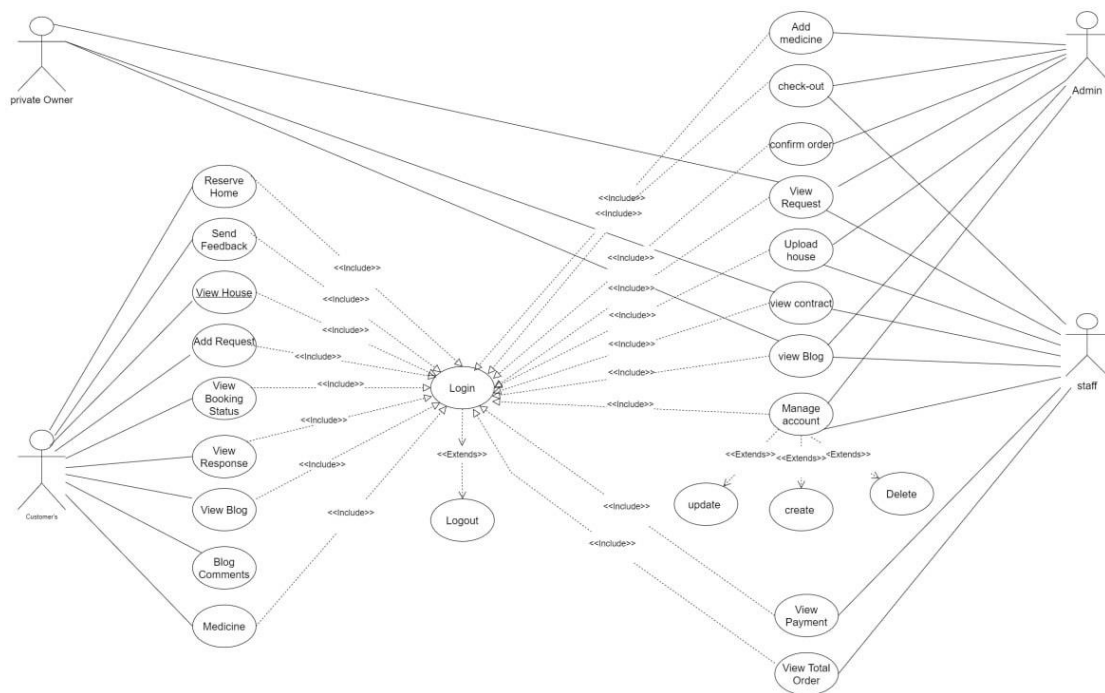


Figure 3.1: Use Case diagram

3.1.3 Functional and Nonfunctional Requirements

Functional Requirements

These are the core functionalities the e-commerce platform must provide to meet user needs effectively:

1. **User Management**
 - Users can register, log in, and log out securely.
 - Password recovery and profile management options.
2. **Product Management**
 - Users can browse and search for products.
 - Products are displayed with detailed descriptions, reviews, and ratings.
 - Users can add products to their cart, wishlist, or favorites.
3. **Order Management**
 - Users can place orders, choose payment methods, and track orders.
 - Admins can manage orders and update their statuses.
4. **Blog Section**
 - Users can read blogs posted by the company.
 - Admins can create, edit, and delete blog posts.
5. **Admin Panel**
 - Admins can manage users, products, orders, and blogs.
 - Admins can review system logs and monitor activities.
6. **Real-Time Updates**
 - AJAX ensures asynchronous updates (e.g., live search, cart updates).
7. **Customer Support**
 - FAQ section and live chat options for user inquiries.
8. **Payment Processing**
 - Multiple payment options (e.g., card payments, mobile wallets).

Nonfunctional Requirements

These define the overall quality attributes of the platform:

1. **Performance**
 - The system must handle at least 500 concurrent users without performance degradation.
 - Search and filtering results should load in under 2 seconds.
2. **Scalability**
 - The platform should scale easily to accommodate an increasing number of users and products.
3. **Usability**
 - The interface must be intuitive and responsive across devices (desktop, tablet, mobile).
4. **Reliability**
 - Ensure a 99.9% uptime for the platform to maintain user trust.
5. **Security**
 - Use HTTPS for all communications.
 - Protect user data with secure authentication and encryption.
6. **Maintainability**
 - Code should be modular and well-documented to facilitate updates and debugging.

7. **Compatibility**
 - Ensure compatibility with all modern browsers and devices.
8. **Localization**
 - Support Bangla and English languages for user convenience.

3.1.4 Context Diagram

Users (Buyers/Sellers)

- Register, log in, and manage their profiles.
- Browse products, add to cart, and place orders.
- Submit product reviews and ratings.
- Access the blog section to read posts.

Admin

- Manage users, products, and orders through the admin panel.
- Create, edit, and delete blog posts.
- Monitor platform performance and logs.

Payment Gateway

- Handles payment processing for user orders.
- Supports multiple payment methods (e.g., credit cards, mobile wallets).

Database

- Stores user data, product details, orders, reviews, blogs, and system logs.

Web Server (Django Backend)

Processes user and admin requests.

Connects to the database to fetch or update data.

Sends responses back to users or admins via the frontend.

3.1.5 Data Flow Diagram Level 1

User Management

- **Input:** User registration, login credentials, profile updates.
- **Process:** Validate user data, authenticate, and update user profiles.
- **Output:** Access granted to the platform, updated user profile.
- **Data Store:** User database.

Product Browsing and Searching

- **Input:** Search queries, product category selections.
- **Process:** Retrieve products matching the query or category.
- **Output:** List of matching products displayed to the user.

- **Data Store:** Product database.

Cart and Order Management

- **Input:** Product selection, quantity, order placement.
- **Process:** Add to cart, calculate totals, and place order.
- **Output:** Confirmation of cart updates or order placement.
- **Data Store:** Order database, product inventory.

Payment Processing

- **Input:** Payment details (card/mobile wallet).
- **Process:** Validate payment, process transaction via payment gateway.
- **Output:** Payment confirmation or failure notification.
- **External Entity:** Payment gateway.

Blog Management

- **Input:** User clicks to view or admin uploads a new blog post.
- **Process:** Retrieve or store blog post details.
- **Output:** Blog content displayed or updated successfully.
- **Data Store:** Blog database.

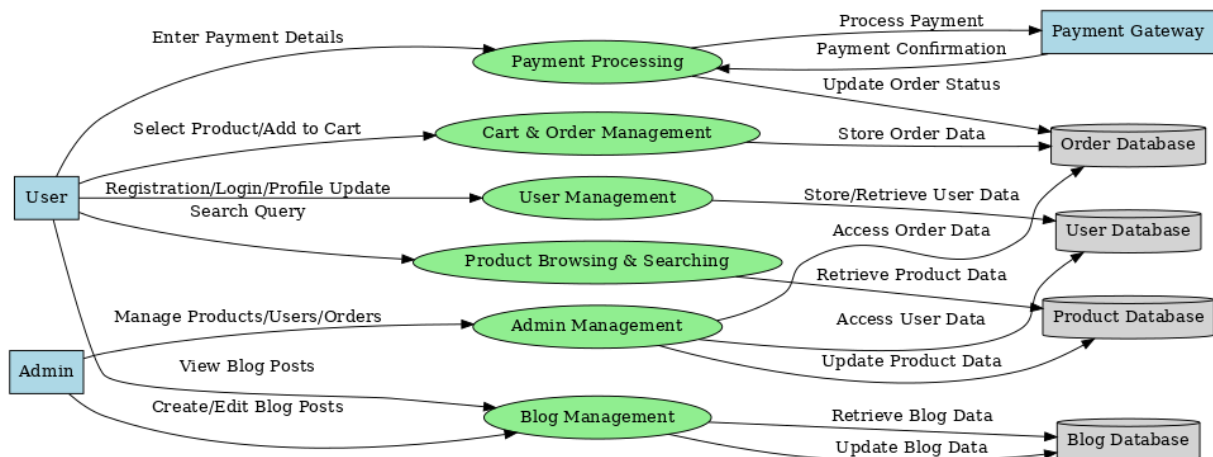
Admin Management

Input: Requests to add/update/delete products, manage users, view orders.

Process: Validate and execute admin requests.

Output: Updated system data or admin panel notifications.

Data Store: User, product, and order databases.



3.1.5: Data Flow Diagram

3.1.6 UI Design

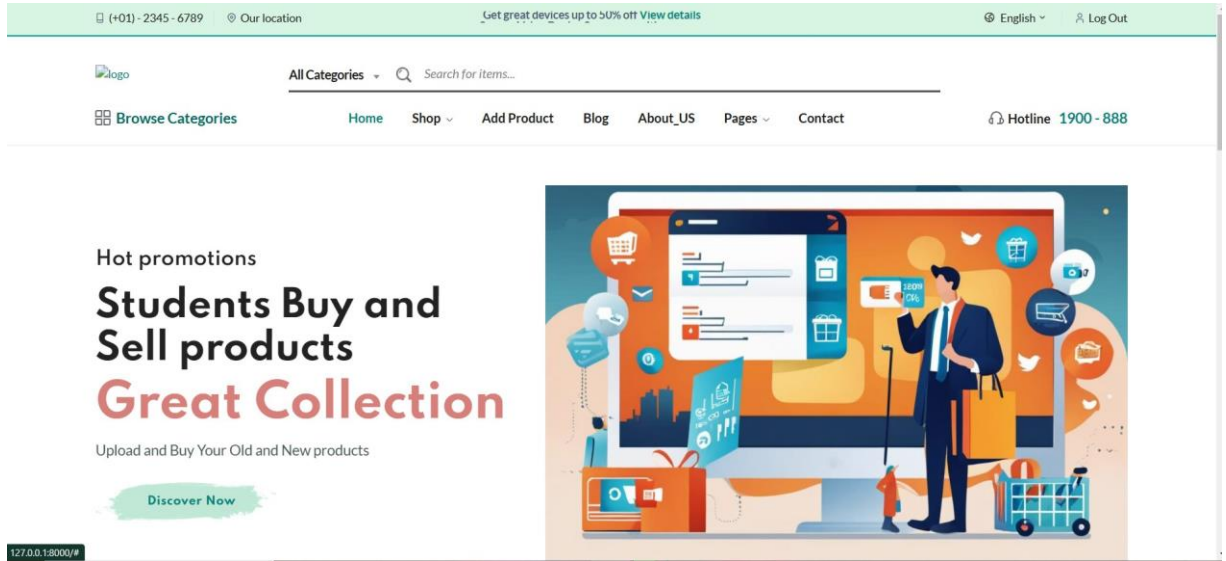


Fig:10.1.1 - Landing Page

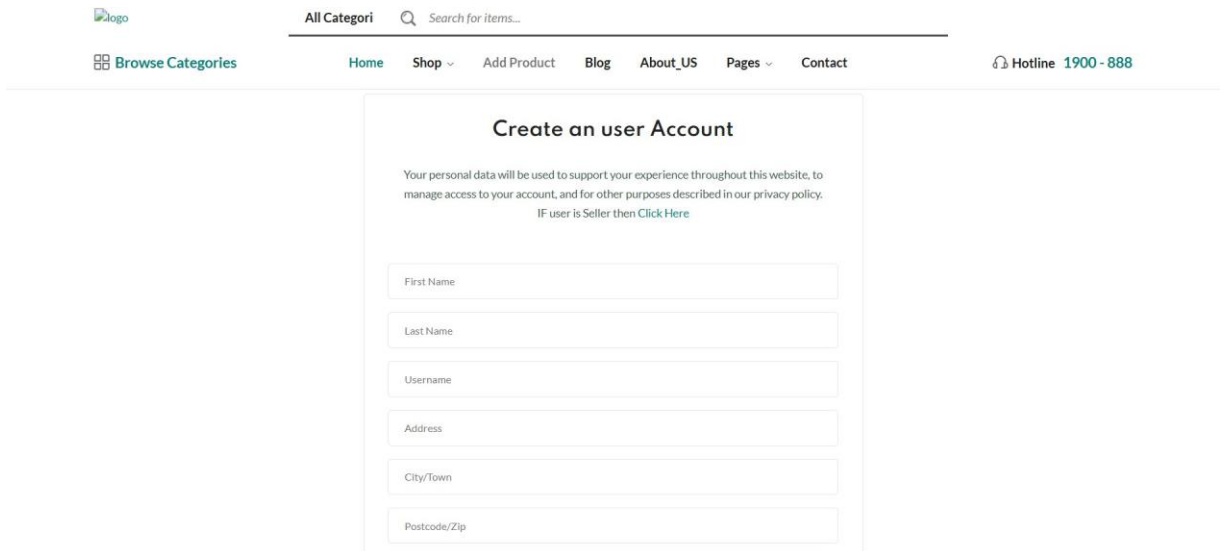


Fig:10.1.2 - Create Account Page as user

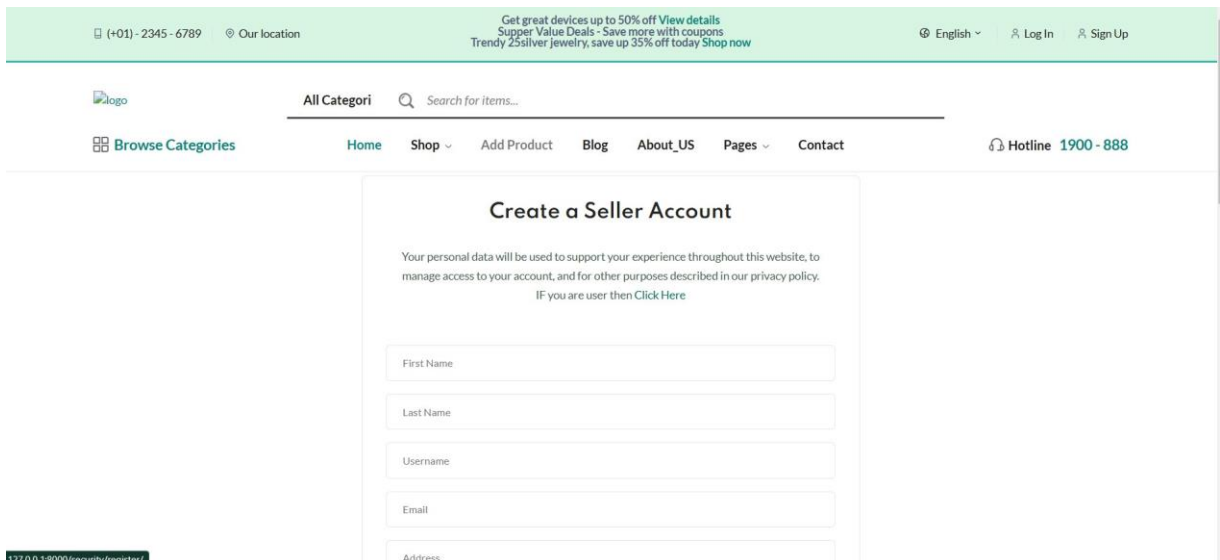


Fig:10.1.3 - Create Account Page as seller

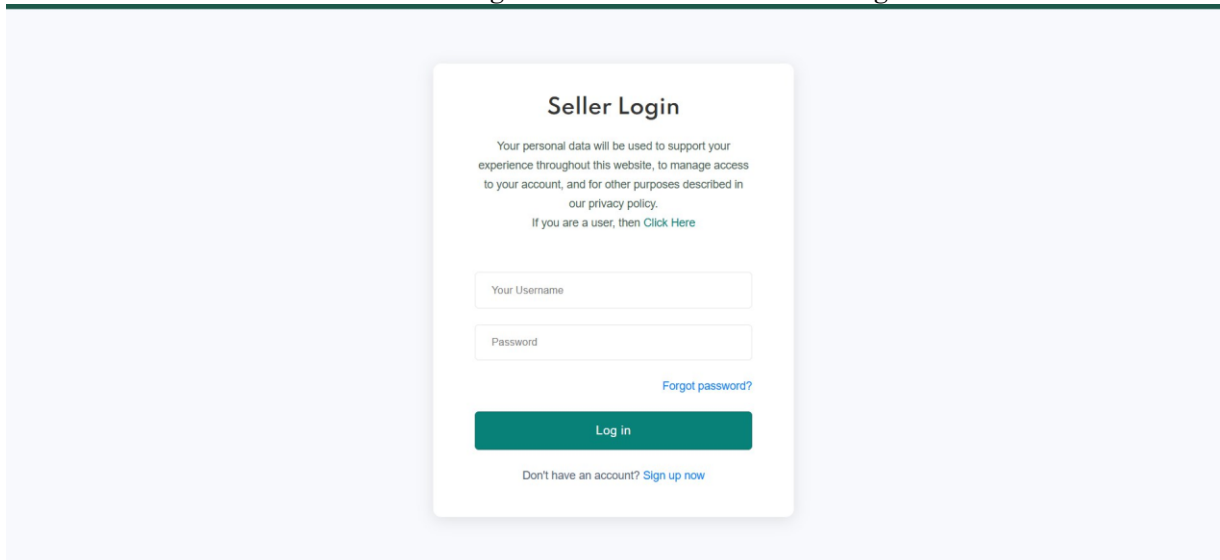


Fig:10.1.4 - Log In Page as seller

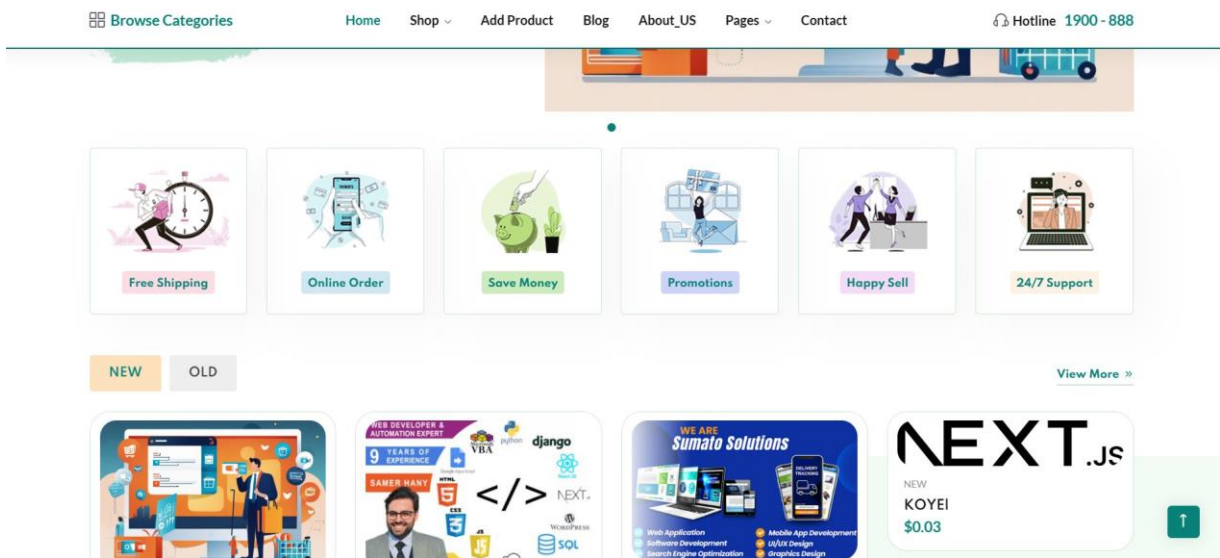


Fig:10.1.5 - Category Section Page

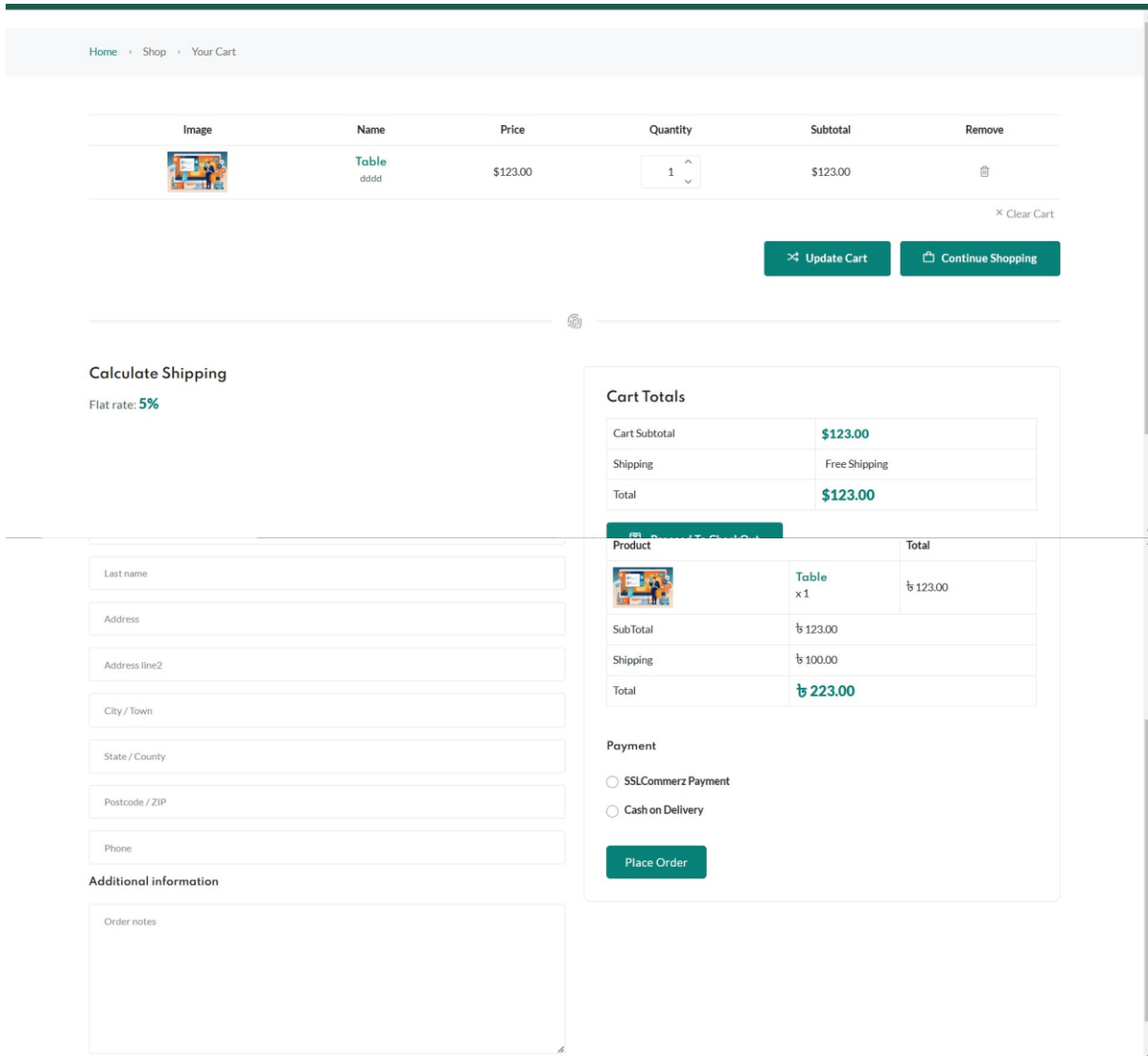


Fig:10.1.6 - Cart Page

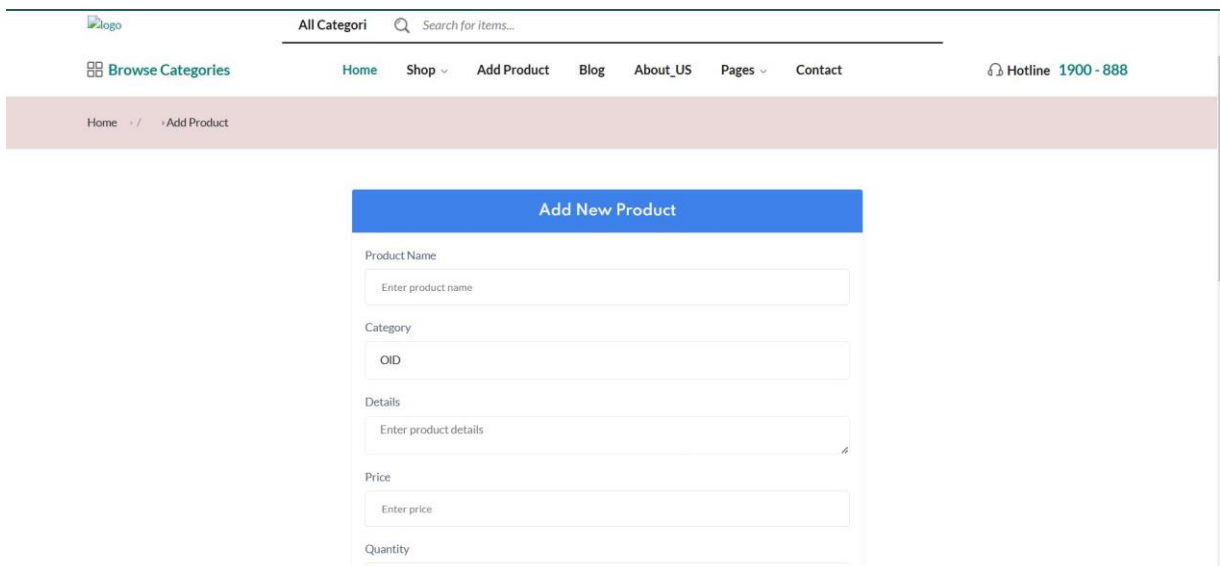


Fig:10.1.7 - Add Product Section

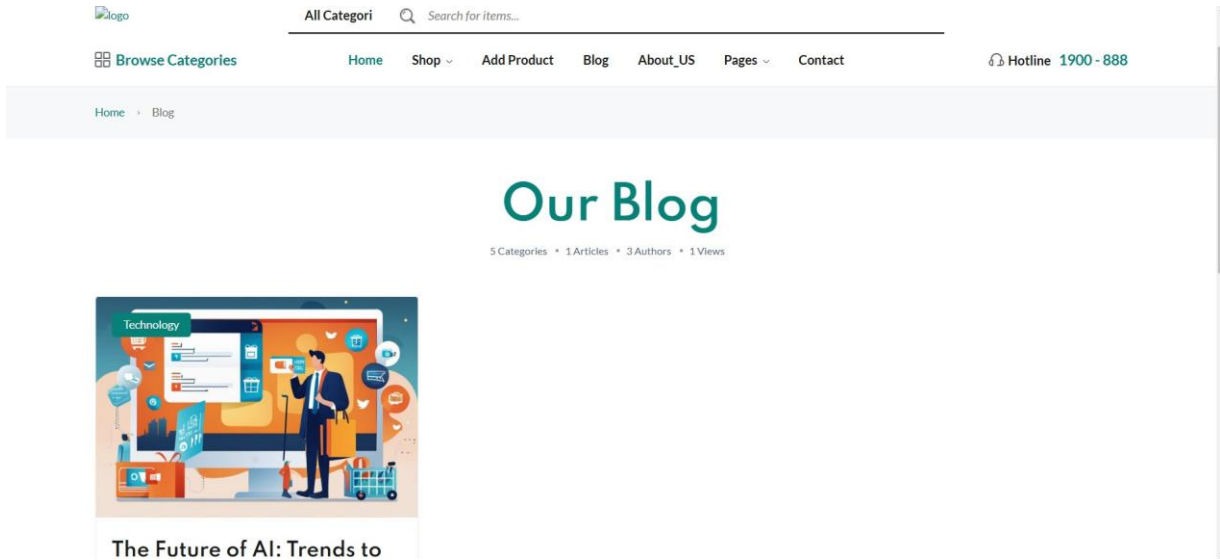


Fig:10.1.8 - Blog Page

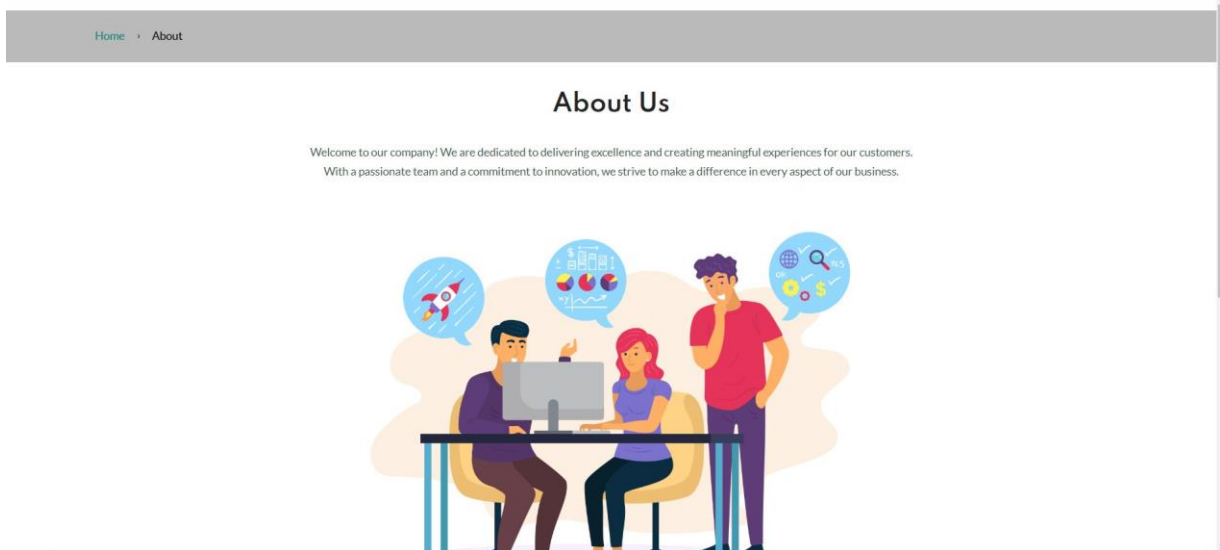


Fig:10.1.9 - About Us Page

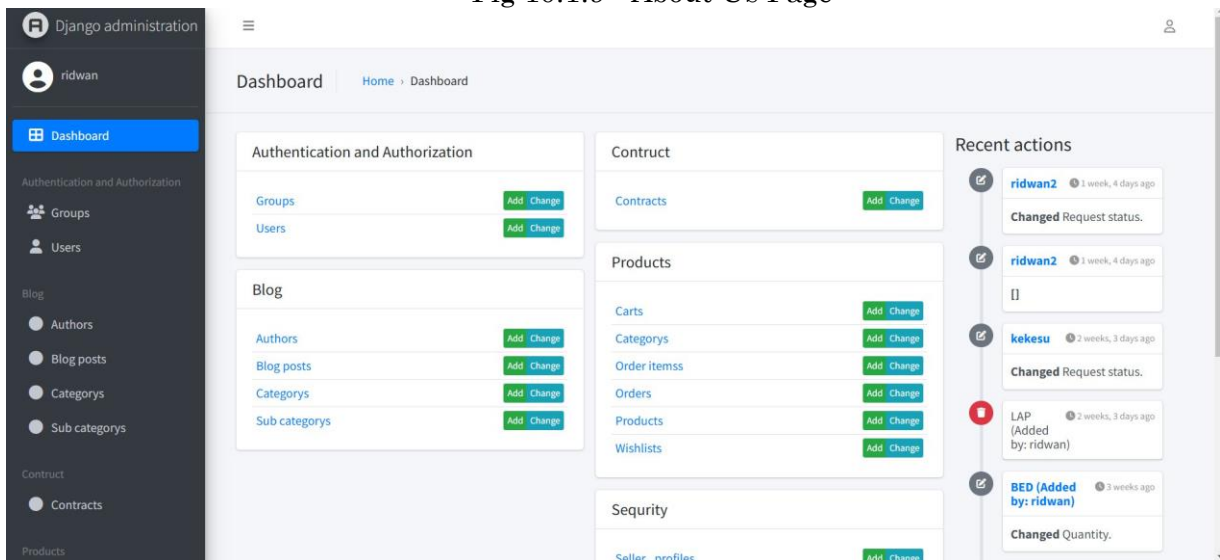


Fig:10.1.10 - Admin Panel

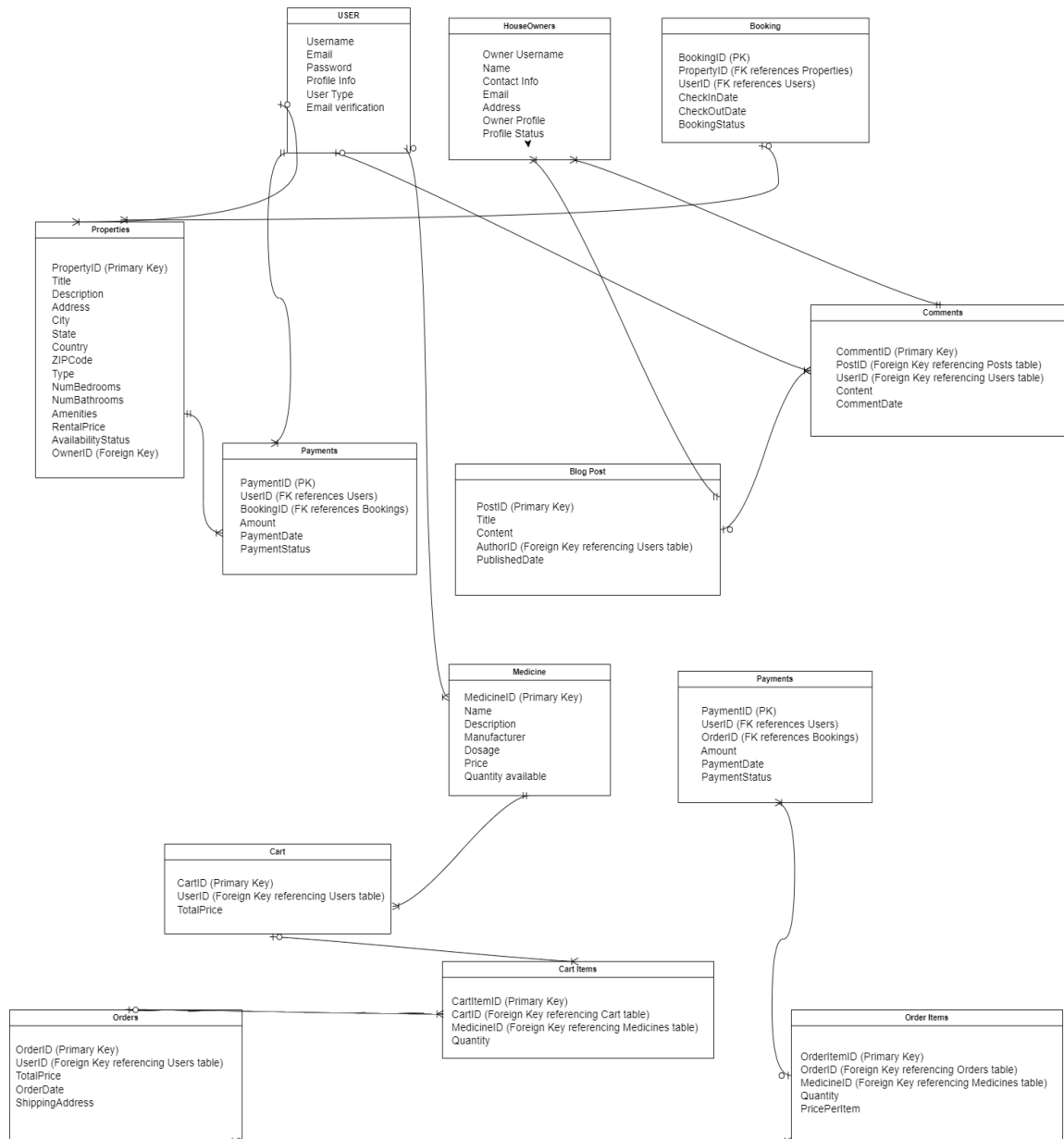
3.2 Detailed Methodology and Design

The selected solutions align with the project's objectives and constraints, such as:

- **Ease of Development:** Django's built-in features and Bootstrap's pre-designed components reduce development time.
- **Cost-effectiveness:** Open-source tools like Django and Bootstrap minimize expenses.
- **Scalability:** The chosen technologies support the addition of future features like AI-driven recommendations and multilingual support.
- **Security:** Django's in-built security mechanisms protect against common vulnerabilities like SQL injection and CSRF attacks.

Design Specification

1. **System Architecture:**
 - **Frontend:** HTML, CSS, and Bootstrap for a responsive and user-friendly UI.
 - **Backend:** Django framework to handle business logic and data management.
 - **Database:** PostgreSQL for structured data storage.
2. **Design Principles:**
 - **Simplicity:** Keep the interface clean and intuitive for users.
 - **Efficiency:** Optimize queries and ensure fast page loads using AJAX.
 - **Scalability:** Modular design to allow easy addition of features.
3. **Workflow:**
 - **User Actions:** Browsing products, placing orders, writing reviews.
 - **Backend Processes:** Authenticating users, managing inventory, and processing payments.
 - **Admin Actions:** Managing products, users, and orders through the admin panel.



3.2.1: Class Diagram

3.3 Project Plan

Phase 1: Planning and Requirement Analysis

- **Tasks:**
 - Identify project requirements.
 - Research and select tools and technologies (Django, Bootstrap, PostgreSQL).
 - Define project scope and objectives.
- **Timeline:** Week 1
- **Deliverables:** Requirement document, project blueprint.
- 2. **Phase 2: System Design**
 - **Tasks:**
 - Create wireframes and mockups for the UI.

- Design database schema and establish relationships.
 - Develop system architecture (frontend-backend integration).
 - **Timeline:** Week 2
 - **Deliverables:** Design document, UI mockups, finalized database schema.
- 3. **Phase 3: Development**
 - **Frontend Development:**
 - Create responsive pages using HTML, CSS, and Bootstrap.
 - Implement AJAX for dynamic updates.
 - **Backend Development:**
 - Develop Django models, views, and templates.
 - Implement authentication and authorization.
 - Integrate payment gateway.
 - **Timeline:** Week 3–Week 5
 - **Deliverables:** Functional website with key features.
- 4. **Phase 4: Testing and Debugging**
 - **Tasks:**
 - Conduct unit testing for individual components.
 - Perform integration testing to ensure seamless workflow.
 - Address bugs and performance issues.
 - **Timeline:** Week 6
 - **Deliverables:** Bug-free and optimized application.
- 5. **Phase 5: Deployment and Maintenance**
 - **Tasks:**
 - Host the website on a cloud server (e.g., AWS, Heroku).
 - Monitor site performance and user feedback.
 - Provide ongoing maintenance and updates.
 - **Timeline:** Week 7 and ongoing
 - **Deliverables:** Fully deployed e-commerce website.

Resource Allocation

1. **Team Roles:**
 - **Frontend Developer:** Designs user interface and ensures responsiveness.
 - **Backend Developer:** Handles business logic and database integration.
 - **QA Tester:** Tests functionality and fixes issues.
 - **Project Manager:** Coordinates tasks and tracks progress.
2. **Tools and Technologies:**
 - Development: Django, Bootstrap, PostgreSQL, AJAX.
 - Testing: Selenium, Pytest.
 - Deployment: AWS, Heroku, or DigitalOcean.

Timeline Overview

Phase	Duration	Start Date	End Date
Planning and Analysis	1 week	Day 1	Day 7
System Design	1 week	Day 8	Day 14
Development	3 weeks	Day 15	Day 35

Testing and Debugging	1 week	Day 36	Day 42
Deployment and Maintenance	1 week (initial)	Day 43	Day 49

Risk Management

- **Risk:** Delays in development due to bugs.
 - **Mitigation:** Regular code reviews and early testing phases.
- **Risk:** Deployment challenges.
 - **Mitigation:** Use of reliable hosting services with support.
- **Risk:** Feature scope creep.
 - **Mitigation:** Stick to initial requirements and document changes.

3.4 Task Allocation

In this project, I took on every aspect of development, from planning to deployment, and successfully completed the entire process independently. The tasks involved were:

1. Project Management

I was responsible for planning the project, setting milestones, and ensuring it stayed on track. I managed the timeline, risk assessments, and coordinated all aspects of the development.

2. Frontend Development

I designed and built the entire user interface using HTML, CSS, and Bootstrap. This included creating a responsive layout that worked seamlessly across different devices and browsers. I also implemented dynamic features using AJAX for real-time updates and interactions.

3. Backend Development

I developed the backend using Django, where I created models, views, and templates for managing users, products, and orders. I also integrated the PostgreSQL database to store all necessary data and implemented payment gateway integration.

4. Testing and debugging

I conducted comprehensive testing throughout the development phase to ensure that all features worked as intended. I identified bugs, performed debugging, and optimized the site to ensure smooth performance and functionality.

5. Deployment

Once the development was complete, I deployed the website to a cloud platform and ensured that everything was properly configured in the live environment. I also handled ongoing maintenance and monitoring to keep the platform running smoothly.

3.5 Summary

In this section, I have outlined the tasks involved in the development of the e-commerce project, all of which were completed independently. I handled everything from project planning, frontend and backend development, to testing, deployment, and ongoing

maintenance. Using tools like HTML, CSS, Bootstrap, Django, and PostgreSQL, I developed a fully functional platform where users can buy and sell products. Additionally, I integrated features like real-time updates, a payment gateway, and a secure authentication system. The project was successfully deployed to a cloud platform and is now live, with ongoing monitoring for performance optimization.

Chapter 4

Implementation and Results

4.1 Environment Setup

The development environment for the project was set up using the following tools and technologies:

- **Frontend:** HTML, CSS, Bootstrap, and AJAX for creating a dynamic and responsive user interface.
- **Backend:** Django framework for server-side development, handling business logic, and integrating with the PostgreSQL database.
- **Database:** PostgreSQL was used to store and manage data, ensuring scalability and efficiency.
- **Hosting:** The final application was deployed on a cloud platform (e.g., AWS, Heroku), providing the necessary infrastructure for running the application in a live environment.

The environment setup ensured seamless integration between the frontend and backend, with efficient database management and deployment to a reliable cloud service.

4.2 Testing and Evaluation/Performance/ Comparative Analysis

Testing was conducted at various stages of development to ensure the application was functional and met the initial requirements:

- **Unit Testing:** Each module was tested individually to ensure that all components worked as expected.
- **Integration Testing:** The integration between the frontend and backend was thoroughly checked to ensure smooth data flow and correct functionality.
- **Performance Testing:** The application was tested under different scenarios to measure load times, response times, and overall performance, ensuring it could handle traffic effectively.
- **Comparative Analysis:** A comparison was made between similar existing e-commerce platforms like Daraz, Ajker, Chaldal, and Sheba. Features such as product search, payment options, and customer support were analyzed, and it was found that the proposed system offered some unique features like product filtering based on preferences and real-time updates.

4.3 Results and Discussion

The implementation of the project resulted in a fully functional e-commerce platform with the following key features:

- User registration and login system.
- Product catalog with detailed descriptions and images.
- Advanced search and filter options for products.
- Multiple payment options integrated for customer convenience.
- Admin panel for managing products, orders, and users.
- Real-time updates on inventory and transactions.

The project meets the initial goals of providing a seamless shopping experience for users and an efficient management system for admins. The performance tests showed satisfactory results, with fast page loads and efficient data processing.

4.4 Summary

This section highlighted the key aspects of the implementation and testing of the e-commerce website. It covered the environment setup, the testing process, and the results obtained. The project was successfully implemented, and performance evaluations show that the system is efficient and meets the functional requirements. Furthermore, the comparative analysis with similar platforms demonstrated that the proposed system offers unique features that enhance user experience and management capabilities.

Chapter 5

Engineering Standards and Design Challenges

5.1 Compliance with the Standards

In the development of this project, various software, hardware, and communication standards were considered. Below is a discussion of the relevant standards, alternatives, and rationale for selecting the final approach.

5.1.1 Software Standards

5.1.2 Hardware Standards

Server Hosting: Cloud-based services such as **AWS** or **Heroku** were selected to host the application.

5.1.3 Communication Standards

Using HTTP could have been an alternative, but it would have posed security risks, especially with sensitive user information and payment details.

5.2 Impact on Society, Environment and Sustainability

5.2.1 Impact on Life

The e-commerce platform offers greater convenience for users by providing an online marketplace to buy and sell products. It enhances consumer accessibility to a variety of products, saving time and effort. Additionally, it can help local businesses expand their reach by providing a digital presence.

5.2.2 Impact on Society & Environment

The project can contribute positively by supporting local businesses and facilitating job creation in the tech sector. It also encourages online shopping, which can reduce traffic and pollution associated with traditional brick-and-mortar shopping.

The platform promotes e-commerce, which could reduce the need for physical store infrastructure and transportation, thus decreasing carbon footprints. However, the environmental impact of cloud data centers and logistics for product delivery should also be considered.

5.2.3 Ethical Aspects

The project adheres to ethical standards in several ways:

User Privacy: Sensitive user data, such as payment information, is securely stored and transmitted using encryption (HTTPS).

Fair Business Practices: The platform provides equal opportunity for all vendors, helping small businesses reach a wider audience.

5.2.4 Sustainability Plan

The platform was designed to be scalable and easily maintainable, which is important for long-term sustainability. Regular updates and monitoring ensure the system stays efficient and reliable. The environmental impact is mitigated by choosing cloud hosting solutions that use renewable energy sources.

5.3 Project Management and Financial Analysis

Cost Analysis

The costs involved in developing and maintaining the e-commerce platform can be broken down into the following categories:

1. Development Costs:

- **Software Tools and Licenses:** Approximately \$500 for various software tools (e.g., database licenses, payment gateway integrations).
- **Cloud Hosting:** Hosting costs range from \$50 to \$200 per month, depending on the chosen cloud platform (AWS, Heroku, etc.).
- **Domain Name and SSL:** Around \$100 for a domain name and SSL certificate.

2. Maintenance Costs:

- **Server Maintenance:** Ongoing cloud hosting fees for scaling and performance maintenance.
- **Security Updates:** Regular updates for software and security patches.

Revenue Model

The platform can generate revenue through:

- **Commissions:** A percentage of each transaction made on the platform (e.g., 5-10%).
- **Subscription Fees:** Offering premium services for vendors such as featured listings, better analytics, and marketing tools.
- **Advertising:** Running advertisements on the platform to generate additional revenue.

Alternate Budget and Rationale

- **Low-Budget Version:**
 - **Tools:** Use free hosting platforms (e.g., limited use of AWS free tier, free SSL certificates).
 - **Cost:** \$200 - \$500 for initial development and hosting.
 - **Rationale:** This would limit scaling and advanced features but would be suitable for a smaller-scale version or proof of concept.
- **High-Budget Version:**
 - **Tools:** Premium services for hosting, better database management tools, and more advanced marketing features.
 - **Cost:** \$1,000 - \$2,000 for the first year of development and hosting.
 - **Rationale:** This would allow better scalability, faster performance, and advanced features such as AI-based product recommendations or enhanced customer support.

5.4 Complex Engineering Problem

5.4.1 Complex Problem Solving

In this section, provide a mapping with problem solving categories. For each mapping add subsections to put rationale (Use Table 5.1). For P1, you need to put another mapping with Knowledge profile and rational thereof.

Table 5.1: Mapping with complex problem solving.

Problem	Dept of Knowledge	Range of Conflicting Requirements	Depth of Analysis	Familiarity of Issues	Extent of Applicable Codes	Extent of Stakeholder Involvement	Interdependence
EP1: Security Vulnerabilities in Payment Integration	K4 (Specialist Knowledge)	High – balancing security with user experience	Deep – requires cryptography and secure payment protocols	Moderate – standard issues in e-commerce platforms	Extensive – payment gateways and security standards	High – developers, payment providers, users	High – security systems depend on the code and implementation used across platforms
EP2: Real-Time Inventory Updates	K6 (Engineering Practice)	Medium – balancing real-time updates with performance	Moderate – involves database design and efficient algorithms	High – familiar issue in large-scale platforms	Moderate – related to database and server performance	High – inventory managers, users, backend engineers	High – database design impacts system efficiency and performance
EP3: User Interface Design and Responsiveness	K5 (Engineering Design)	Low – clear requirements for a responsive UI	High – requires understanding of design principles and cross-device compatibility	High – well-established design principles	Low – design guidelines are standard in the industry	Moderate – involves collaboration with frontend developers and	Moderate – UI/UX depends on frontend technologies, and usability is dependent on user feedback

			bility			UX experts	
EP4: System Scalability and Performance	K3 (Engineering Fundamentals)	High – balancing growth potential with current infrastructure	Deep – involves server configuration, database optimization, and load balancing	Moderate – basic principles of scalable systems, but complexity grows with use	High – requires scalability and growth predictions	High – developers, cloud infrastructure providers	High – performance optimization affects both backend and frontend performance
EP5: Legal and Regulatory Compliance	K4 (Specialist Knowledge)	Medium – balancing legal compliance with system design	High – involves understanding of data privacy laws and payment regulations	Extensive – GDPR, PCI DSS, and other laws affect system design	Low – legal consultants and external parties involved	Moderate – regulations affect system design but are external to daily operations	
EP6: Payment Gateway Integration	K5 (Engineering Design)	Low – standard integration issues in e-commerce	High – complex problem-solving for transaction security, error handling	Moderate – involves third-party services with known challenges	Extensive – legal and compliance factors affect integration	High – stakeholders include payment gateway providers, backend engineers, and legal teams	

EP7: Multi-Language Support	K6 (Engineering Practice)	Medium – balancing translation with proper context and accuracy	High – needs in-depth understanding of user culture and context	Moderate – familiar concept in internationalized systems	High – support teams, developers, translators involved	High – proper translation and context-sensitive design affect usability	
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Mapping with Knowledge Profile for EP1

This table 5.2) is designed to map the EP1 to the Knowledge Profile.

Table 5.2: Mapping with knowledge Profile.

Knowledge Profile	Rationale
K3 (Engineering Fundamentals)	Understanding fundamental cryptography principles and secure data transmission protocols is essential to ensure payment systems are secure.
K4 (Specialist Knowledge)	Knowledge of the latest security protocols and standards, such as PCI DSS, is critical for safely processing financial transactions.
K5 (Engineering Design)	The design of a secure payment system requires knowledge of how to architect secure integrations, using proper error handling and protection mechanisms.
K6 (Engineering Practice)	The practical application of security practices during implementation is necessary for real-world integration and testing of payment gateways.
K8 (Research Literature)	Staying up to date with recent research on payment security practices, new encryption techniques, and vulnerabilities in online transactions is important for continuous improvement.

5.4.2 Engineering Activities

In this section, we map the key engineering activities involved in the project, such as design, development, testing, and deployment, to relevant engineering principles and the rationale for their application.

Engineering Activity	Rationale
Frontend Development	Focuses on using HTML, CSS, Bootstrap, and AJAX to create an intuitive and responsive user interface. Ensures the platform is user-friendly and optimized for mobile and desktop use.
Backend Development	Implemented using Django to manage server-side logic, including user authentication, product listings, payment processing, and order management. This leverages engineering design principles for scalable, secure applications.
Database Design & Management	PostgreSQL was chosen for data management to ensure scalability and reliability. The database structure was designed to support efficient queries and real-time updates for product availability.
Security Integration	Applied best practices for securing user data and transactions, including encryption and secure communication (HTTPS) to prevent vulnerabilities.
Testing & Debugging	Extensive unit testing, integration testing, and performance testing ensured that the application functions as expected and meets security and usability standards.
Deployment	Cloud hosting services like AWS or Heroku were used for deployment, ensuring high availability, scalability, and secure operations.

5.5 Summary

This chapter covered the engineering standards and design challenges

encountered in the development of the e-commerce platform. The project adhered to relevant software, hardware, and communication standards. The impact on society, the environment, and sustainability was considered, ensuring ethical practices and a scalable design. Finally, the project management and financial analysis were discussed, presenting the budget, alternate budgeting options, and the proposed revenue model for the platform.

Chapter 6

Conclusion

6.1 Summary

The primary goal of this project was to create an e-commerce platform where users could buy and sell products, read blog posts, and interact with an admin panel to manage the platform. The system was developed using HTML, CSS, Bootstrap, Django, and AJAX. It includes features like user authentication, product management, order tracking, real-time inventory updates, and multiple payment options. Extensive testing and deployment were conducted to ensure the system's robustness and security. The final product provides a comprehensive solution for online retail businesses, enabling both customers and vendors to seamlessly engage on a single platform.

6.2 Limitation

While the platform is functional and robust, there are a few limitations:

1. **Scalability Concerns:** Although the current database and server configuration support the application, as the platform grows and attracts more users, additional resources may be required to maintain performance and speed.
2. **Limited Multi-Language Support:** Currently, the platform is available in a single language, which could limit its reach in a diverse market. Expanding language support is a future improvement.
3. **Payment Gateway Integration:** The platform currently supports a few payment gateways, which may restrict users in certain regions. Expanding payment options could enhance user convenience.
4. **Mobile Responsiveness:** While the design is responsive, some advanced mobile features could be optimized further for better usability across all mobile devices.
5. **Data Privacy:** While security measures are in place, continued adaptation to evolving data protection regulations, such as GDPR, is necessary to ensure ongoing compliance.

6.3 Future Work

Several enhancements and improvements can be made in the future:

1. **Scalability Optimization:** Investigating cloud-based solutions such as microservices or serverless architecture to ensure the platform can handle large-scale growth and high traffic volumes.
2. **Multi-Language Support:** Adding multi-language options to cater to a broader audience, especially in international markets.
3. **Enhanced Payment Options:** Integrating more diverse payment gateways, including cryptocurrency, mobile payments, and local payment solutions, to offer

more flexibility to users.

4. **Advanced Search and Recommendation Systems:** Implementing AI-powered search and recommendation algorithms to improve the shopping experience by suggesting personalized products to users.
5. **Mobile App Development:** Developing a native mobile application to offer a more seamless experience for users accessing the platform on smartphones and tablets.
6. **Sustainability Initiatives:** Integrating features that allow customers to see the environmental impact of their purchases, promoting eco-friendly products, and reducing the platform's overall carbon footprint.

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