

Tribhuvan University

Institute of Science and Technology



Project Report on

“Eco-Bazaar - A web portal for sustainable choices.”

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SUPERVISOR’S RECOMMENDATION

I hereby recommend that this project prepared under my supervision by **Isha Khanal, Rewant Shrestha, Samana Silwal** entitled “**Eco-bazaar - A web portal for sustainable choices**” is accepted as fulfilling in partial requirement for the degree of Bachelor of Computer Science and Information Technology. In my best knowledge, this is an original work in computer Science and Information Technology.

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CERTIFICATE OF APPROVAL

This is to certify that this project report prepared by **Isha Khanal, Rewant Shrestha and Samana Silwal** entitled “**Eco-bazaar – A web portal for sustainable choices**” in partial fulfillment of the requirements for the degree of Bachelor of Science in Computer Science and Information Technology (B.Sc. CSIT) has been well studied. In our opinion, it is it is satisfactory in the scope and quality as a project work for the required degree.

.....

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ABSTRACT

The process of finding eco-friendly products and sustainable alternatives can often be time consuming and, requiring detailed research to identify truly green options. To simplify this journey, Eco-Bazaar has been designed and implemented as a comprehensive web portal for sustainable living. The platform incorporates a recommendations system that uses advanced algorithms to suggest eco-friendly products tailored to the user's preferences and interests. The recommendations are based on user ratings and reviews, with the system analyzing similarities and patterns to provide personalized suggestions. Eco-Bazaar not only enables users to discover and purchase environmentally responsible products search, detailed information, and a seamless shopping experience, all within an intuitive interface. The primary goal of Eco-Bazaar is to empower users to make sustainable choices effortlessly, bridging the gap between eco-conscious shoppers and responsibly sourced products. By combining convenience with environmental responsibility, Eco-Bazaar makes it easy to integrate sustainability into everyday life.

Keywords: Recommendation, Collaborative Filtering and Personalization

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LIST OF ABBREVIATIONS

ER	Entity Relationship
DFD	Data Flow Diagram
COD	Cash on Delivery
UI	User Interface
SQL	Structured Query Language

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Chapter 1: Introduction

1.1 Introduction

Software applications first started getting developed after the creation of fastest digital computers, initial application build works only on standalone desktop machines or local machines as we can say. Until the internet was created in about 1999, the computer network had been their common way of communication. As the quality as well as quantity of web content websites improved, these web applications started becoming more and more interactive, and eventually their functionality evolved beyond offering mere static pages. The significance of web application development rose with the advent of business over the internet. As longtime Web-servers opened everyone now working on the internet at wide-scale, new browsers and development platforms unfold. Web applications become popular when the organizations and business started introducing an application that needs a web browser to use them. E-commerce took off with the advent of the Internet and is blooming till date. Ecommerce websites are the online portals that facilitate online transactions of goods and services through means of the transfer of information and funds over the Internet. E-commerce was partially e-mail and phone based in the early days. It is an online and an offline transaction. So, single website can be done on the web.

The Eco-Bazaar is a web application that offers an online service for users looking to purchase eco-friendly tools, equipment and products. These include basic e-commerce capabilities such as secure payment, a user registration and login features, and of course a shopping cart but it also provides more advanced ones such as personalized recommendations using Machine Learning. There are also plans for memberships, customer support, and influencers and even a way to enrich user engagement with referral programs. Ordering locally made, ecofriendly products from producers across the country should be simple and accessible to all that is the mission of Eco-Bazaar.

1.2 Problem Statement

With the increased demand for environmentally friendly items, consumers encounter difficulties in locating credible suppliers and comparing sustainable solutions. The process is often fragmented and time-consuming, with few outlets dedicated specifically to environmentally friendly products. Eco-Bazaar intends to address this issue by providing a single web-based platform that enables consumers to browse, compare, and select the highest rated eco-friendly products. Eco-Bazaar streamlines the decision process and provides individualized recommendations, making shopping easier while promoting sustainable living.

1.3 Objectives

The objective of this project can be stated as:

- To build recommendation system using User Based Collaborative Filtering Algorithm to recommend construction materials to the user based on their rated products.
- To build web portal accompanying the recommendation system to make the process of buying the eco-friendly product more efficient.

1.4 Scope and Limitation

1.4.1 Scope

The intended system must be created in a way that benefits all parties involved in it, including the end user. Because it is web-based, anyone with a device that can support a browser and an Internet connection will be able to readily use the system.

Eco-bazar as system will allow users to view and search products with their respective information. Products from different category are shown and users will be able to compare and select the products they desire manually. It allows users to create an account that allows them to buy and rate products.

Eco-bazar also allows registered users to get recommendations of related products based on their previous purchases and rating which will help them to find relevant products easily.

1.4.2 Limitations

- The system may not be available to users without an Internet connection because it is web-based.
- The recommendation features is limited to the registered users that means only the registered users get recommended products based on their interest and similarity.
- Sustainability is a broad concept, but since Eco-Bazaar focuses on eco-friendly products, some users may not immediately find what they're looking for. However, the platform is designed to expand its offerings and provide personalized recommendations for a tailored experience.

1.5 Development Methodology

This project employs agile approach because of its flexibility, adaptability, and emphasis on providing value to the client in a dynamic and iterative manner. The creation of an e-commerce platform for eco-friendly items necessitates the implementation of numerous complicated features, such as machine learning-based recommendations, incentive systems, and membership plans, all of which must be constantly refined in response to user input and industry trends.

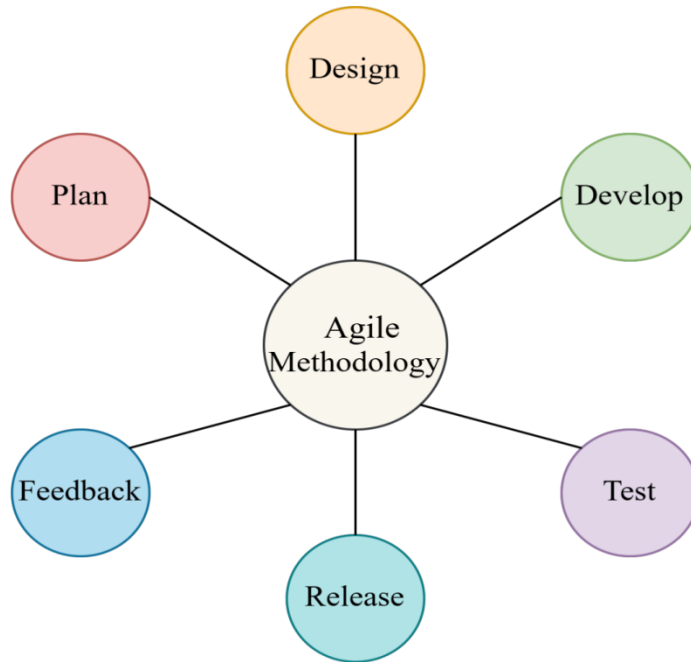


Fig 1: Agile methodology

Reason for selection of Agile Methodology as the development methodology

Agile methodology allows the Eco-Bazaar team to break down the project into manageable sprints, each focusing on developing and improving specific features. This iterative approach ensures that the platform can quickly adapt to changing requirements, whether they stem from evolving customer needs, new technological advancements, or shifts in the sustainability landscape. Additionally, Agile promotes collaboration between cross-functional teams, fostering innovation and ensuring that the final product is user-centric, reliable, and aligned with the project's sustainability goals.

1.6 Report Organization

The report has been prepared following the guidelines provided by Tribhuvan University. The report is separated into different chapters. Each chapter consists of various sub chapters with its content. The preliminary section of the report consists of Title page, Acknowledgement, abstract, Table of Contents, List of Abbreviations, List of Figures and List of Tables.

The main report is divided into 6 chapters, which include:

- **Chapter 1: Introduction:** It includes the general overview of the system and the project as a whole. It includes the Problem Statement, Objectives, Scope/Limitations and the Development Methodology for the project and the system being developed.
- **Chapter 2: Background Study and Literature Review:** It includes the study of the current scenario/environment the system will be deployed into. It includes the study of the current trends, preferences of people, the existing system, areas of improvement among others.
- **Chapter 3: System Analysis:** It includes the requirement and feasibility analysis of the system that can be generated through the studies presented in the previous two chapters. It will also include the Flowchart, ER and DFD for the system which specifies the workflow, entities, attributes and their relationships.
- **Chapter 4: System Design:** It includes the design of the database, forms and interface of the system. It also includes the implementation details of the selected methodology and the details of the algorithm used.
- **Chapter 5: Implementation and Testing:** It includes the details of the different design and development tools used and the implementation details of the modules presented in the form of code snippets of functions, classes. It also includes the testing of the system with different test cases as per the requirement.
- **Chapter 6: Conclusion and Future Recommendations:** It includes the summary of the system and the project as a whole. It also includes the possibilities/aspects which the system can implement in the future.

The final part of the report consists of References and appendices.

Chapter 2: Background Study and Literature Review

2.1 Background Study

E-commerce has transformed the way people shop, enabling ease and easy access to a diverse selection of products. However, this convenience carries a huge environmental cost. The excessive use of packaging, rising transportation emissions from express delivery, and the growing number of product returns that end up in landfills all contribute to environmental deterioration. These challenges appear to contradict sustainability aims, yet with deliberate efforts, the e-commerce business may lessen its environmental imprint. Eco-Bazaar, an online marketplace for eco-friendly products, seeks to address these concerns by offering a venue for people to shop sustainably. The emergence of millennial as the generation with the fastest-growing purchasing power and a greater knowledge of self-conscious consumption indicates a growing desire for sustainable alternatives. E-commerce companies can meet this need by using ecologically responsible practices including sustainable supply chain management, eco-friendly packaging, and effective return management.

To make e-commerce more environmentally friendly, several main tactics can be used. Sustainable supply chain management is critical for ensuring that the environmental and social effect of a product is considered at every stage of its journey, from production to delivery. Eco-friendly shipping, such as bulk delivery and lessening reliance on expedited services, has the potential to drastically reduce carbon emissions. In addition, utilizing eco-friendly packaging lowers waste, and offering accurate product information helps avoid unwanted returns. Proper return management, such as encouraging consumers to avoid returns and improving return procedures, also contributes to a reduction in the environmental impact. When these practices are applied, they not only help to lower the brand's carbon footprint but also improve its reputation as a responsible and sustainable firm.

2.2 Literature Review

The key role that user experience plays for the viability of an eco-friendly e-commerce platform has recently been documented by significant studies. Key elements of UX include navigability, product presentations, and mobile responsiveness. Personalization is provided for through tailor-made recommendations in line with preferences and user purchase history. User-friendly registration and profile management also play a big part in efficiently helping the user indicate their preference for green products to make their shopping experience even more specific.

The management of a product catalog is a fundamental feature of an effective, eco-friendly ecommerce platform. Effective detail in describing the product and its eco-certification and life cycle, from a product information standpoint, provides the consumer with knowledge to make a good decision on what to buy. Advanced searching and filtering options ensure customers seamlessly find products that meet their sustainability needs.

Yet another crucial factor involves a constant protection of user trust and engagement with secure payment mechanisms, automated order status notifications, and personalized suggestions. Other factors of user satisfaction include reward systems and tiered membership plans, which ensure that users keep coming back and allow for certain exclusive benefits. All these features, combined with data analytics, type of integration, in turn, would enable the platform to meet the needs of the environmentally aware consumers effectively and contribute to wider sustainability goals through initiatives like the one by Eco-Bazaar.

Study of Existing System

The global market offers a variety of website for eco-friendly items, some of which are listed below:

- Eco-Cart: Eco-Cart is a cutting-edge technology that assists consumers in making environmentally responsible purchasing decisions by estimating and

offsetting their carbon footprint. It integrates seamlessly with online retailers, allowing customers to contribute to environmental programs that reduce carbon footprints, making every purchase eco-friendly.

- Eco-Mart Nepal: Eco-Mart Nepal is a local e-commerce portal that promotes sustainable and environmentally friendly items in Nepal. The portal provides a diverse selection of environmentally conscious products, such as organic groceries, reusable household products, and natural personal care items, all obtained from local producers and craftsmen dedicated to sustainability.
- Earth Hero: Earth Hero is an eco-friendly online marketplace that sells a diverse range of sustainable products in categories such as fashion, home goods, and personal care.

Their platform focuses on providing products created from sustainable materials, ecofriendly packaging, and from manufacturers who use ethical manufacturing techniques. Earth Hero also supports a zero-waste lifestyle and assists clients in lowering their carbon footprint by providing carbon-neutral shipping and environmentally friendly alternatives to typical home items.

Chapter 3: System Analysis

3.1 System Analysis

3.1.1 Requirement Analysis

1. Functional Requirements

a. Customer Functionalities :

- Rate products.
- View and compare products.
- Create and edit user profile.
- Search for products.
- Create and track orders.
- View personalized product recommendations.

b. Admin Functionalities:

- Create and edit profile.
- List products on the platform.
- Add, update, or remove categories and subcategories.
- Add, update, or remove products
- • View customer (end-user) details.
- View and manage orders.

The system offers two distinct user roles: admin and customer, each with specific functionalities. The above points outline the actions that users can perform. The use case diagram below visually represents these roles and their interactions within the system.

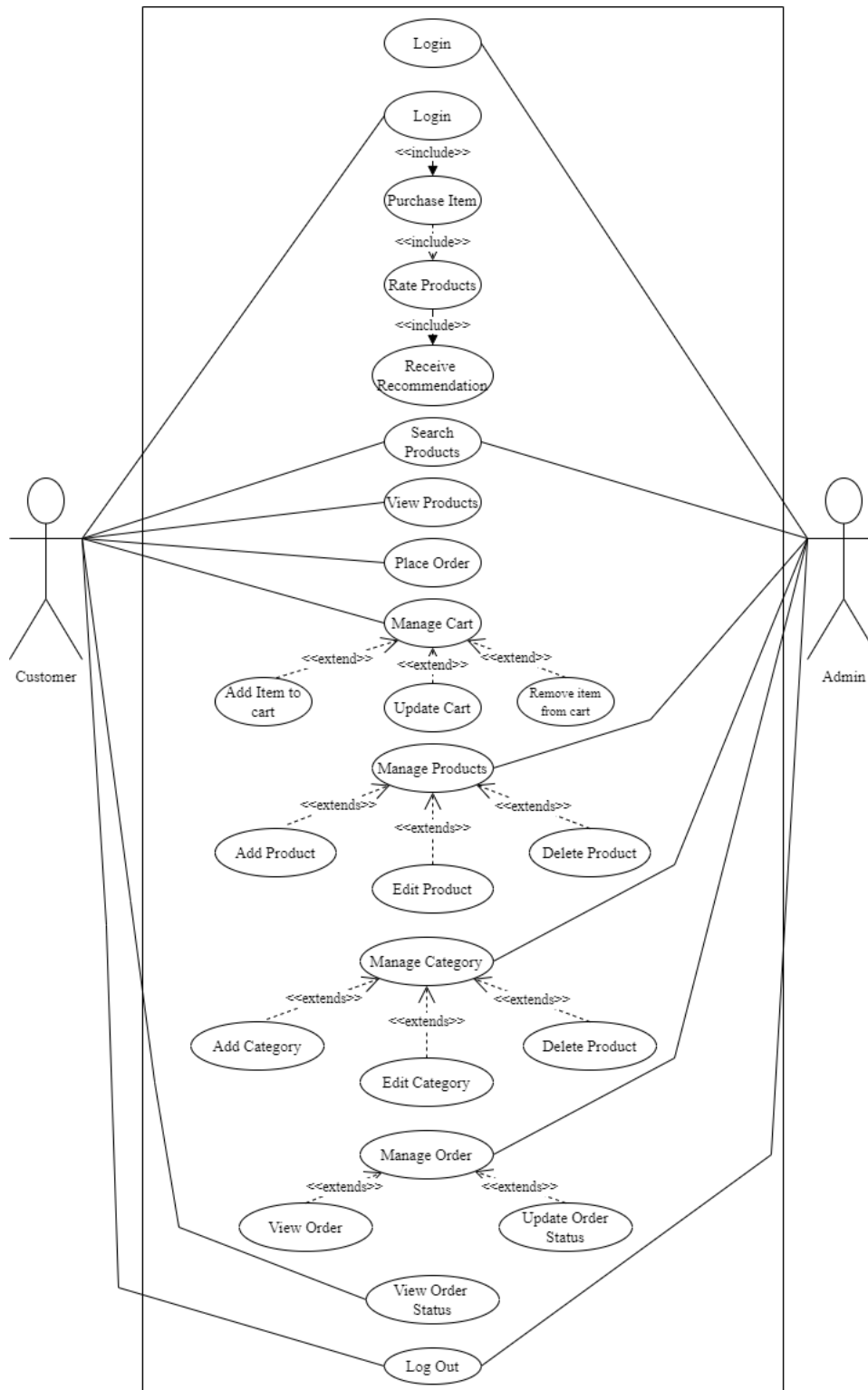


Fig 2: Use Case

2. Non- Functional Requirement:

- **Performance:** It should be ensured that the system provides fast loading, rides high traffic efficiently, and also ensures excellent management of the database so as to make access to products and user details speedy.
- **Scalability:** The developed platform has to be such that it scales with growth in a product catalog, user base, and possibly features like international shipping or new product categories.
- **Security:** Observe the best practices in cyber security, secure user authentication and data encryption, protection against SQL injection and XSS. Ensure the protection of users' data according to GDPR.
- **Usability:** Easy to use and intuitive, simple navigation. Many accessibility features should be included for all types of users that may use it, such as disabled persons.
- **Sustainability:** Green servers, powered by renewable energy or running carbon offsetting schemes, host the site, and sustainable web design practices are in place to reduce the carbon footprint of the website.

3.1.2 Feasibility Analysis

Feasibility analysis is a process used to evaluate the potential success of a proposed project or system. It considers various factors to assess a project's technical, economic, operational, legal, and practical feasibility.

Technical Feasibility: Eco-Bazaar will be built with dependable, user-friendly, and scalable technologies: HTML, CSS, JavaScript, and Django for the backend, and MySQL. These technologies are well-established with a good history of support, hence the assurance of handling the anticipated load of users without affecting their seamless shopping experience. Integration of real-time data processing, secure

payment systems, and other features with personalized recommendations can be achieved through a judicious combination of already existing libraries and APIs. The scalability and flexibility required as the platform grows will be provided by cloud hosting services.

Economic Feasibility: Eco-Bazaar's development and maintenance costs are within reasonable budgetary limits. The initial investment includes the cost of development, domain registration, hosting, and marketing. These would be offset by the revenue streams that the platform generates through commissions on sales, subscription plans, and advertisement placements to ensure profit occurrence. Thus, Eco-Bazaar would stand in a better position to witness sustainable revenue growth in the long term with the rising consumer demand for eco-friendly products.

Operational Feasibility: The Eco-Bazaar will be user-friendly and intuitive, thus requiring minimal training for users and administrators. At the back end, the platform will include an easy-to-use admin panel for managing products, orders, and customer interactions. The introduction of eco-friendly shipping and packaging options goes hand in glove with the platform's goals on sustainability, making this very attractive to the targeted audience.

Schedule Feasibility: The development timeline for Eco-Bazaar is rather realistic, with a phased approach toward implementation. It aims to complete the core features of user registration, product catalog, search functionality, and secure payments within the first six months. Continuous testing and feedback loops will ensure the platform's launch on time and satisfy users' expectations.

Given below is a Gantt chart describing the schedule for our project:



Fig 3: Gantt chart

3.1.3 Analysis

i. Level 0 DFD

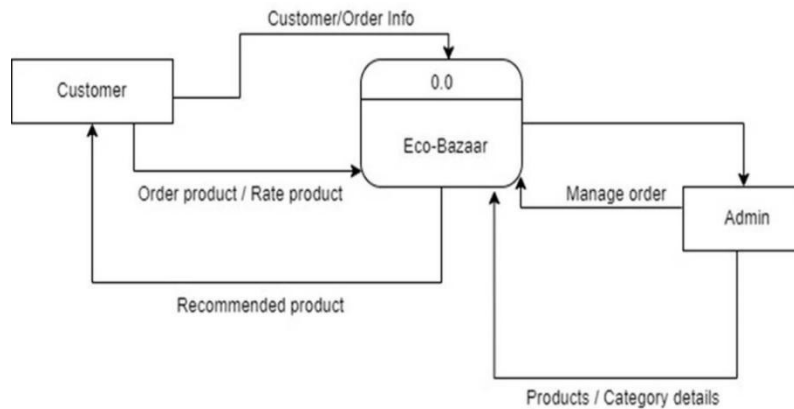


Fig 4: Level 0 DFD

This diagram represents a Level 0 Data Flow Diagram (DFD) for the Eco-Bazaar e-commerce system. It shows the interaction between three main entities: Customer, Eco-

Bazaar System, and Admin. The Customer provides "Customer/Order Info" to the Eco-Bazaar system and can perform actions such as ordering and rating products. Based on the customer's actions and input, the system generates "Recommended products" back to the customer. Simultaneously, the Admin interacts with the Eco-Bazaar system by managing orders and supplying "Products/Category details." The Eco-Bazaar system serves as the central hub, processing and coordinating the flow of information between the customer and the admin. This ensures smooth order management, product recommendations, and the organization of product data. The diagram effectively illustrates how data flows into and out of the system.

ii. Level 1 of DFD for admin

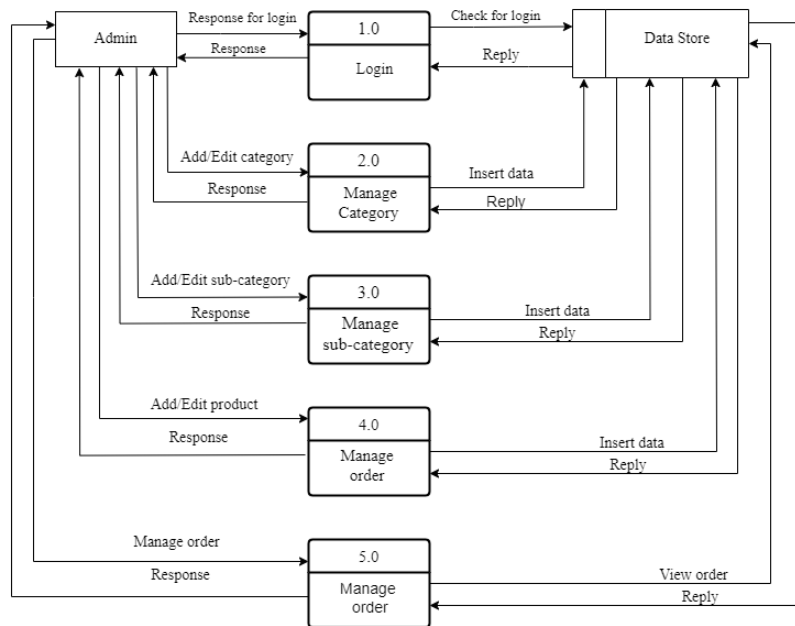


Fig 5: Level 1 DFD for Admin

The DFD level 1 for the admin in Eco-Bazaar outlines the core processes and data flows that an administrator interacts with to manage the online store efficiently. It helps in understanding the flow of information within the system and the main tasks the admin performs, such as managing products, orders, customers, and inventory. This high-level view ensures a streamlined process for system operations and decision making.

iii. Level 1 DFD for Customer

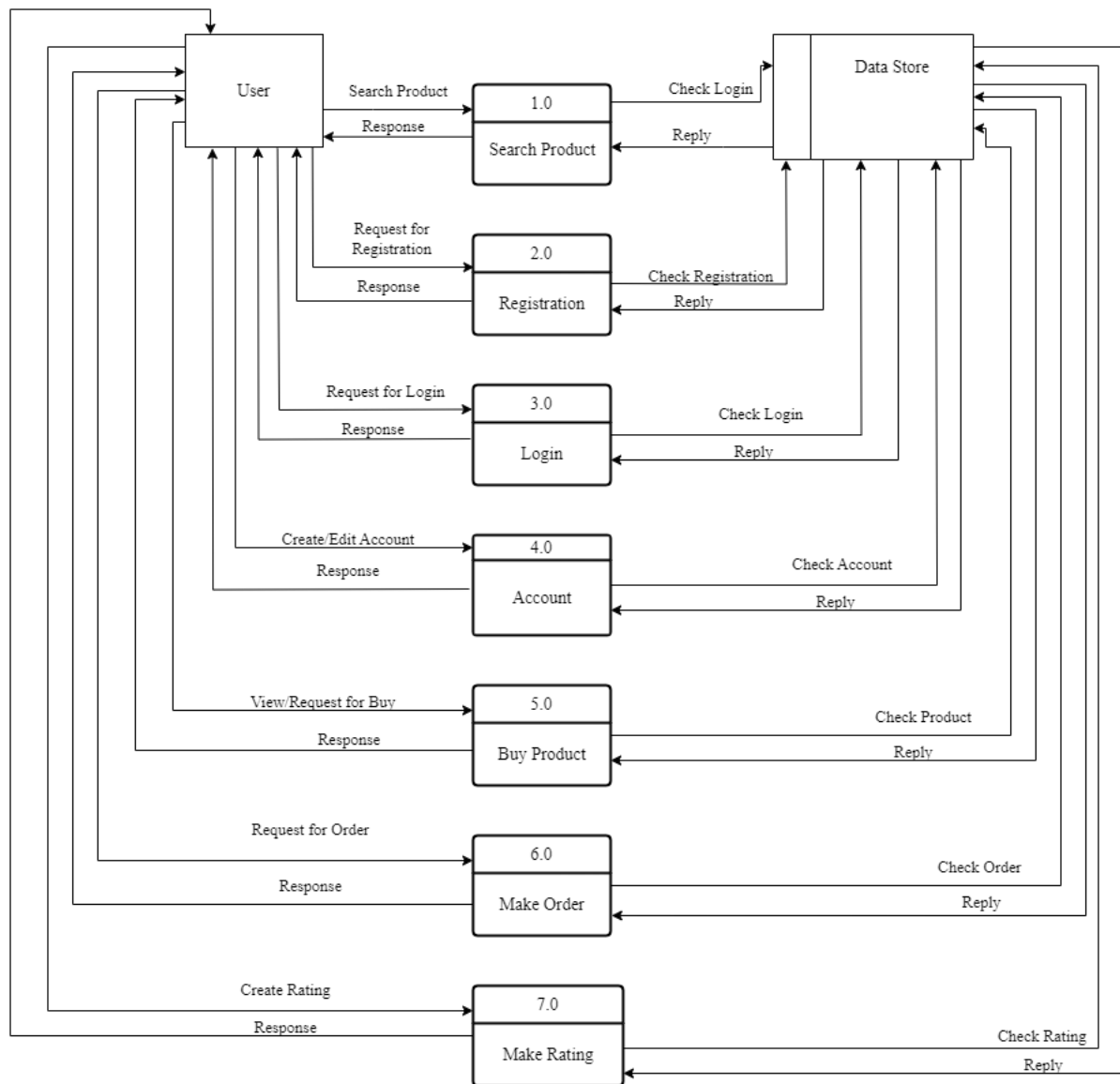


Fig 6: Level 1 DFD for Customer

In DFD level 1 for Eco-Bazaar's customer perspective focuses on depicting the main processes a customer interacts with and the data flows associated with these processes. This helps in understanding the system's functionality from the customer's viewpoint, allowing for a clearer design and development process.

iv. Flow-Chart for Admin

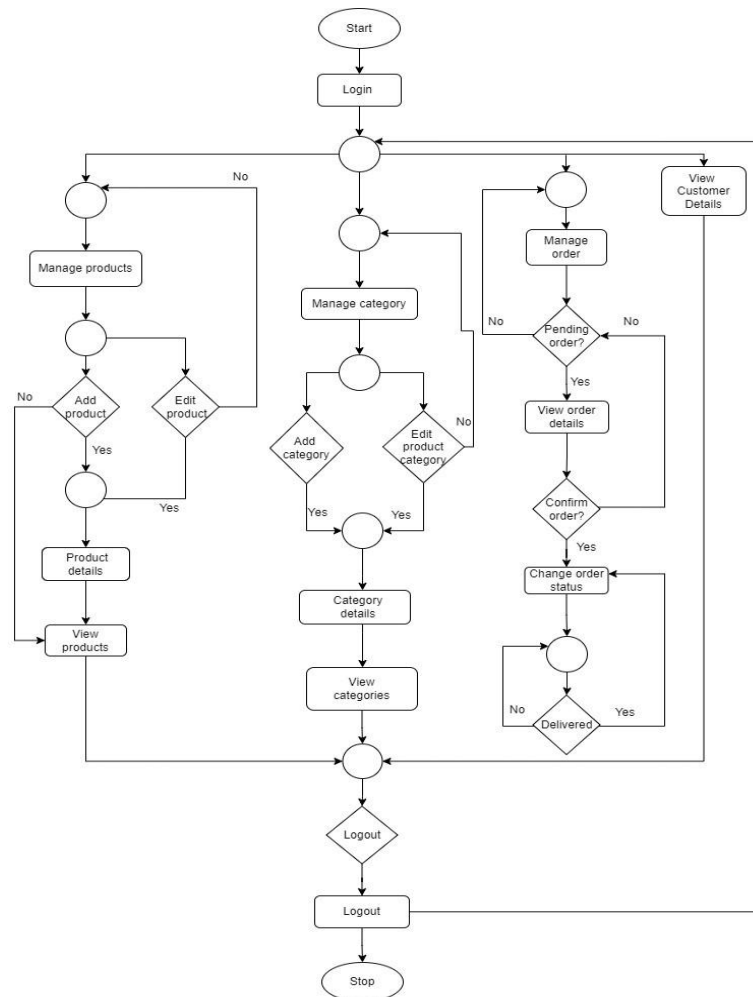


Fig 7: Flow Chart for Admin

The flowchart provides a visual representation of the key processes and admin performs in Eco-Bazaar. Each task, such as managing products, orders, customers, and inventory, is represented as a process box. Arrows show the flow of activities from one task to the next, illustrating how the admin navigates through the system to manage and oversee the online store. This flowchart helps in understanding the administrative workflows and ensures efficient management of Eco-Bazaar’s operations.

v. Flow chart for Customer

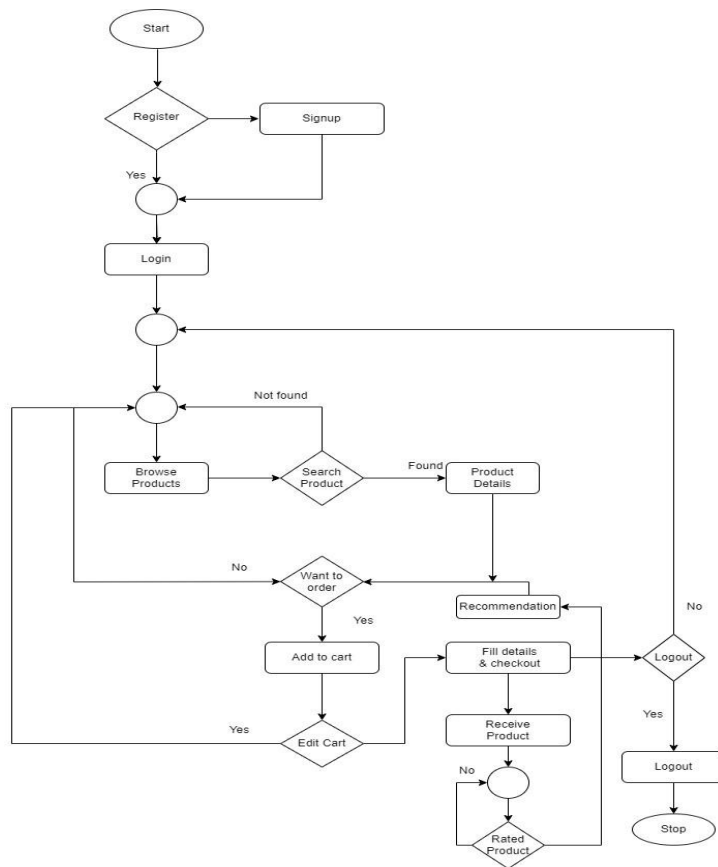


Fig 8: Flow Chart for Customer

The flowchart for a customer in Eco-Bazaar provides a clear, step-by-step visual representation of the customer's journey through the system. It starts from the initial interaction with the website to the final management of orders. Each process is depicted as a box representing a step (e.g., browsing products, adding to cart, checkout, managing orders), with arrows showing the flow from one step to the next. This flowchart helps to understand the customer's experience, ensuring that the user interface and customer journey are user-friendly and efficient.

vi. ER Diagram

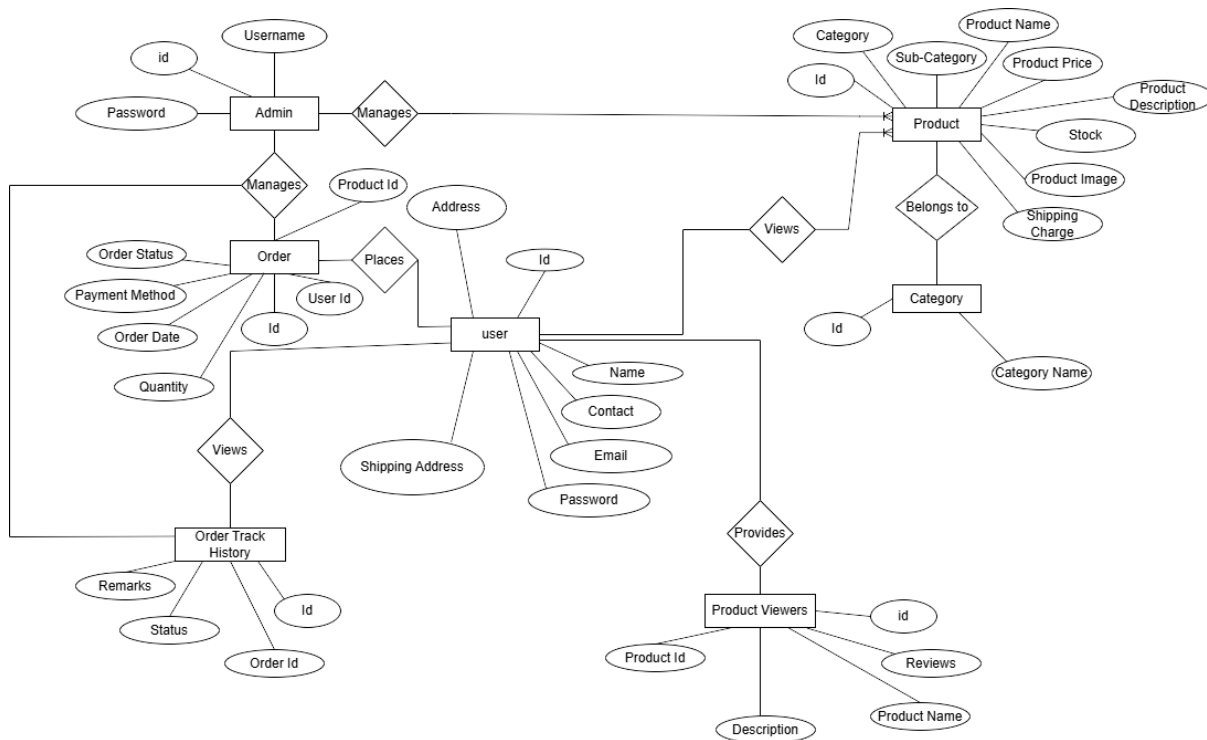


Fig 9: ER Diagram

Chapter 4: System Design

4.1. Design

- Database Design

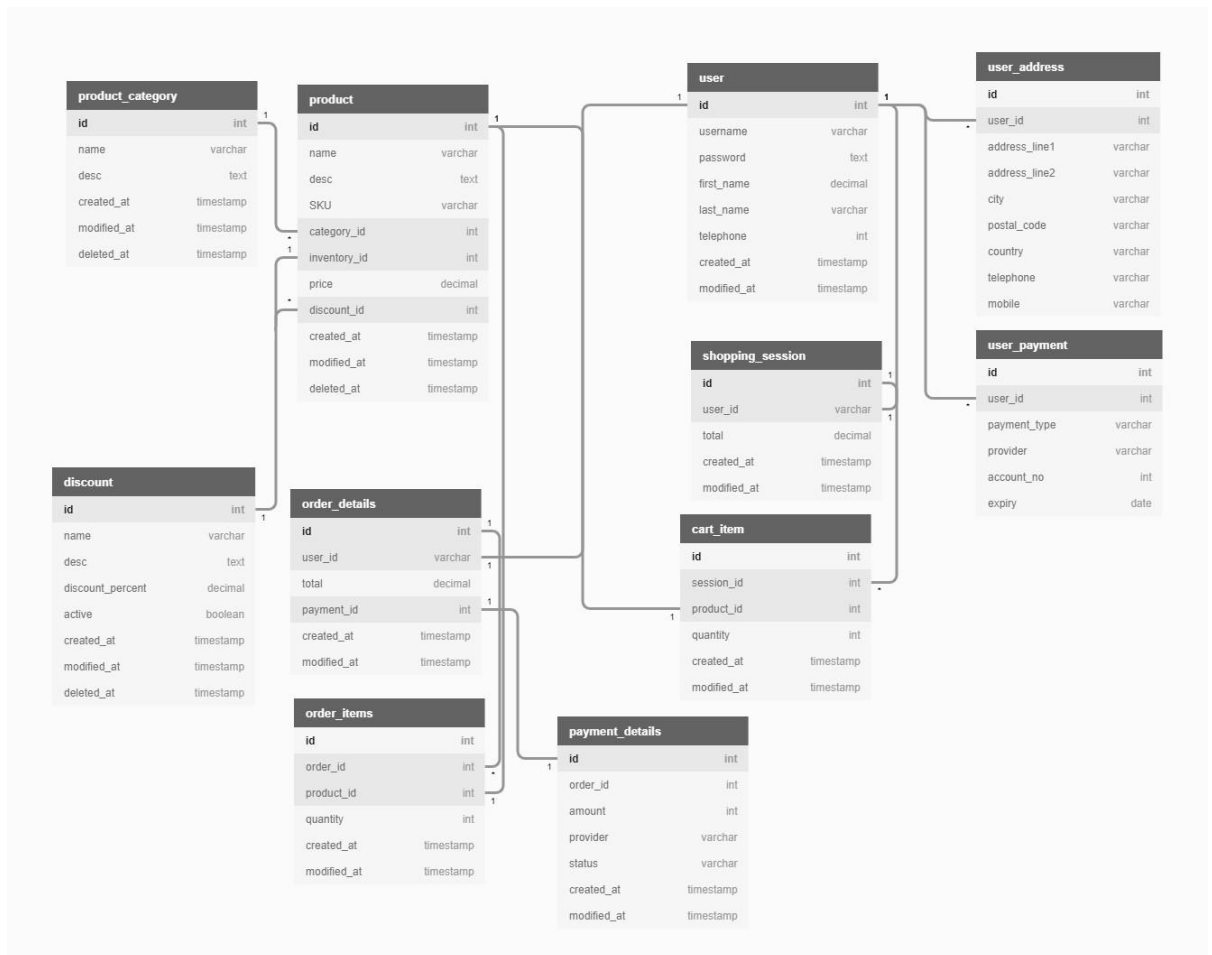


Fig 9: Database Design

4.2 Description of Algorithm

For our proposed project, technique that will be used to recommend products to customers in a better way at Eco-Bazaar is collaborative filtering. The working of this technique is basically grounded on utilizing interaction data of users for prediction and suggestion of products based on user preferences that are similar.

Here how the Collaborative Filtering algorithm help:

- **Gather Data:** Collect data about how users interact with products, including purchases, ratings, and views.
- **User-Based Collaborative Filtering:** Identify users with similar interests based on their interaction history. Recommend products that users with similar preferences have liked. For instance, if User A and User B have similar purchasing patterns, the system will suggest products purchased by User B to User A.

Collaborative filtering can enable Eco-Bazaar to make targeted and personalized recommendations toward their interests, increasing engagement and user satisfaction. The efficient promotion of eco-friendly products and features helps in increasing engagement and satisfaction.

Chapter 5: Implementation and Testing

5.1 Implementation

5.1.1 Tools Used

Design and Development Tools

Visual Studio Code

Visual Studio Code is “a free-editor that helps the programmer write code helps in debugging and corrects the code using the intelli-sense method”. In normal terms, it facilitates users to write the code in an easy manner. Features include support for debugging, syntax highlighting, intelligent code completion, snippets, code refactoring, and embedded Git makes Visual Studio Code one of the most used code editors. Users can change the theme, keyboard shortcuts, preferences, and install extensions that add additional functionality.

In the project, Visual Studio Code was used as the main code editor to write the codes for the platform. We chose Visual Studio Code as the primary code editor for the project as it is open-source software with a user-friendly interface and support for multiple programming languages and added functionality like debugging, syntax highlighting, intelligent code completion, snippets, code refactoring, embedded Git and so on.

Programming Language

Frontend Tools

- **HTML:** HTML (Hyper-Text Markup Language) is the standard markup language for creating and structuring web content, allowing browsers to render text, pictures, and multimedia as web pages.
- **CSS:** Cascading Style Sheets (CSS) is a style sheet language that specifies the display and styling of a document authored in a markup language like HTML. CSS, like HTML and JavaScript, is a foundational technology for the World Wide Web.
- **JavaScript:** JavaScript is a flexible, high-level programming language that is mostly used to create interactive and dynamic content for websites. It allows developers to add features like animations, form validations, and real-time updates, which make online applications more engaging and user-friendly.

Backend Tools

- **Python Django:** Django is a high-level, open-source Python web framework that allows for the rapid building of safe and maintained websites. It adheres to the Model-View-Template (MVT) architectural pattern, emphasizing reuse, scalability concept, which reduces code duplication and improves maintainability.

Database

- **MySQL:** MySQL is an open-source relational database management system (RDBMS) that uses Structured Query Language (SQL) to organize and manipulate data. It is well-known for its great performance, dependability, and ease of use, making it an attractive option for online applications, data warehousing, and e-commerce platforms.

Drawing Tool

- **Draw.io:** Draw.io, currently called diagrams.net, is a free online diagramming tool that lets you create flowcharts, UML diagrams, network diagrams, and organizational charts. It is easy to use and includes collaboration, templates, and interface.

5.2 Testing

5.2.1 Test Cases for Unit Testing

Test Case 1: User Registration

S.N	Test Inputs	Expected Output	Actual Output	Result
1	Username : user, email :user@example.com, password : password123,	Register success	Register success and redirected to login page	Test Successful
2	Username : user1, email:user1@example.com, password : password345,	Register unsuccessful	Username already taken	Test Successful
3	Username : user2 email:user2@example.com password: password12345	Register unsuccessful	Email field in required so registration failed	Test Successful

Test Case 2: User Login

S.N	Test Inputs	Expected Output	Actual Output	Result
1	Username: user1 Password:password345	Login success	Redirect to home page	Test Successful
2	Username: user2 Password:password123456	Login unsuccessful	Username and password did not match	Test Successful
3	Username: Password:	Login unsuccessful	Login failed with an error message indicating that fields are required.	Test Successful

5.3 Result Analysis

The unit testing focused on the product listing and payment integration functionalities, which produced positive results. The product listing worked effectively for both administrators and users. Admins could simply add, update, or remove products, and users could search and see them without difficulty. The system processed enormous amounts of product data efficiently, and error warnings were displayed correctly when products were unavailable. The payment integration has also been thoroughly tested. The system processed payments securely, gave consumers real-time feedback, and handled failed transactions gently with clear error messages. Overall, both the product listing and payment systems were deemed to be dependable and simple to use, with minor faults planned to be addressed in future releases.

Chapter 6: Conclusion

6.1 Conclusion

In conclusion, the unit testing of the product listing and payment integration features demonstrated that both functionalities are efficient, secure, and user-friendly. Admins can manage products effectively, and users experience smooth browsing and purchasing processes. While the system performed well overall, minor issues identified during testing will be addressed in upcoming development cycles to ensure an even more seamless experience for both admins and users. This ensures that the platform remains reliable and continues to meet user expectations.

6.2 Future Recommendation

In the future, Ecobazar will introduce a membership reward points system along with a refer and earn program. Customers will earn reward points based on their purchases and can redeem them for discounts on future orders. Additionally, by referring friends to the platform, users can earn extra points, promoting both customer engagement and eco-friendly shopping. This initiative will further enhance the shopping experience while encouraging sustainable practices within the community.

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Appendix

1.

Checkout

Order Items:

Product Name	Quantity	Unit Price	Total Price
Natural Fiber Rugs	1	Rs 1250.00	Rs 1250.00
Bamboo Hair Comb	1	Rs 300.00	Rs 300.00

Total: Rs1550.00

Shipping Address

Contact Number

Payment Method

Place Order

2.

Add Category form

Category name*

Add

3.

Add Products

Product name*

Product price*

Stock*

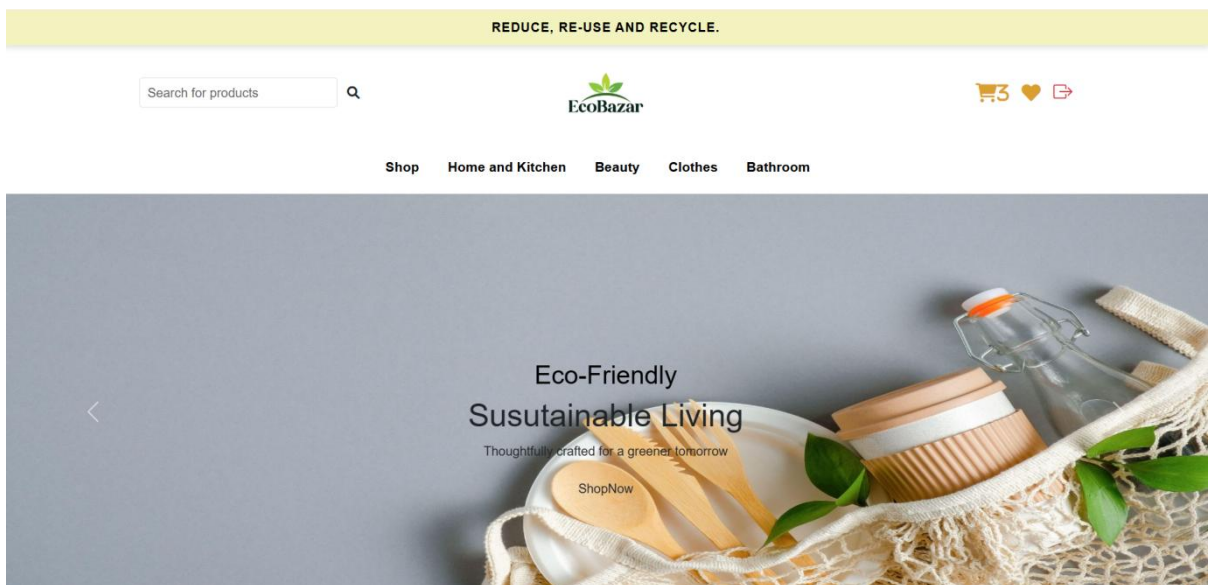
Product description*

Product image*

No file chosen

Category*

4.



5.

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