CSE370 : Database Systems
Project Report
Project Title : Project Title Here

Group No : 11, CSE370 Lab Section : 14, Spring 2025		
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Introduction

EcoSwap is a web application designed to facilitate the buying and selling of used products, fostering a sustainable approach to consumption by promoting recycling and repurposing. The platform provides a user-friendly environment where individuals can upload and sell their pre-owned items, as well as purchase necessary products from others. Users can order products, make secure payments, and leave reviews for items they've purchased. Additionally, Recyclify includes a dedicated feature for companies to participate by exclusively selling recycled products to users, ensuring a broader selection of eco-friendly options. Developed using PHP, CSS, and MySQL, Recyclify integrates robust frontend and backend technologies to deliver smooth, efficient functionality and a seamless user experience.

Project Features

1. User Management

- UserRegistration and Login:
  - Users can register for an account
  - Secure login with password hashing.
  - Logout functionality to end sessions.
- Profile Management:
  - Users can edit their profile information.
  - Passwords are securely hashed using a dedicated script.
- AdminandUser Roles:
  - Adminsand companies have separate dashboards

2. Product Management

- Product Listing:
  - Users and companies can add products with details like images, descriptions, and prices.
  - Products can be edited or deleted.
- Product Browsing and Search:
  - Users can view all available products.
  - Asearch feature enables filtering products by keywords.
  - Categories and product details are dynamically displayed.
- Company-Specific Features:
  - Companies can sell recycled products to users via their dashboard.

3. Shopping Cart and Order Management

- Shopping Cart:
    - Users can add products to their cart.
    - Cart displays all selected items for purchase.
- Order Processing:
    - Users can proceed to checkout to place orders.
    - Order history is available for users.
- Order Success:
    - Users are redirected to a success page after completing an order.

4. Payment System

- Payment Handling:
    - Users can securely make payments.
    - Successful payments are confirmed on a page.

5. Reviews and Ratings

- Submit and View Reviews:
    - Users can submit reviews for purchased products.
    - Reviews are displayed for products.

6. Contact and Support

- Contact Us Page:
    - Users can reach out through a contact form.

7. Dashboard Features

- UserDashboard:

    - Users can view their account details, orders, and activity.

- AdminDashboard:
    - Adminscan manage users, products.
- CompanyDashboard:
    - Companies can manage their products and sales.

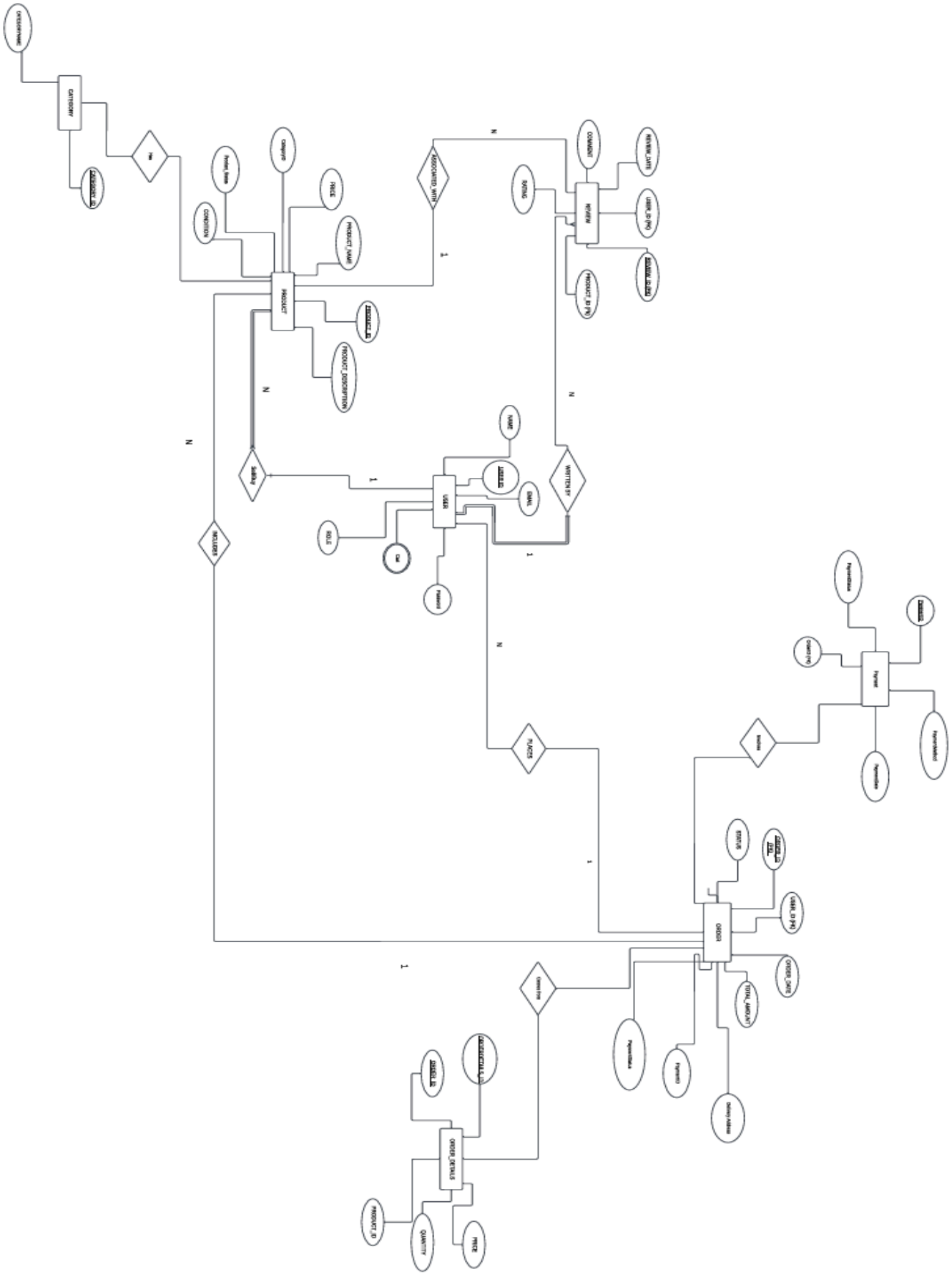
8. Visual and User Interface

- Responsive Design:
    - Multiple CSS files provide tailored designs for various pages
- Dynamic Content:
    - Includes dynamic headers and footers.

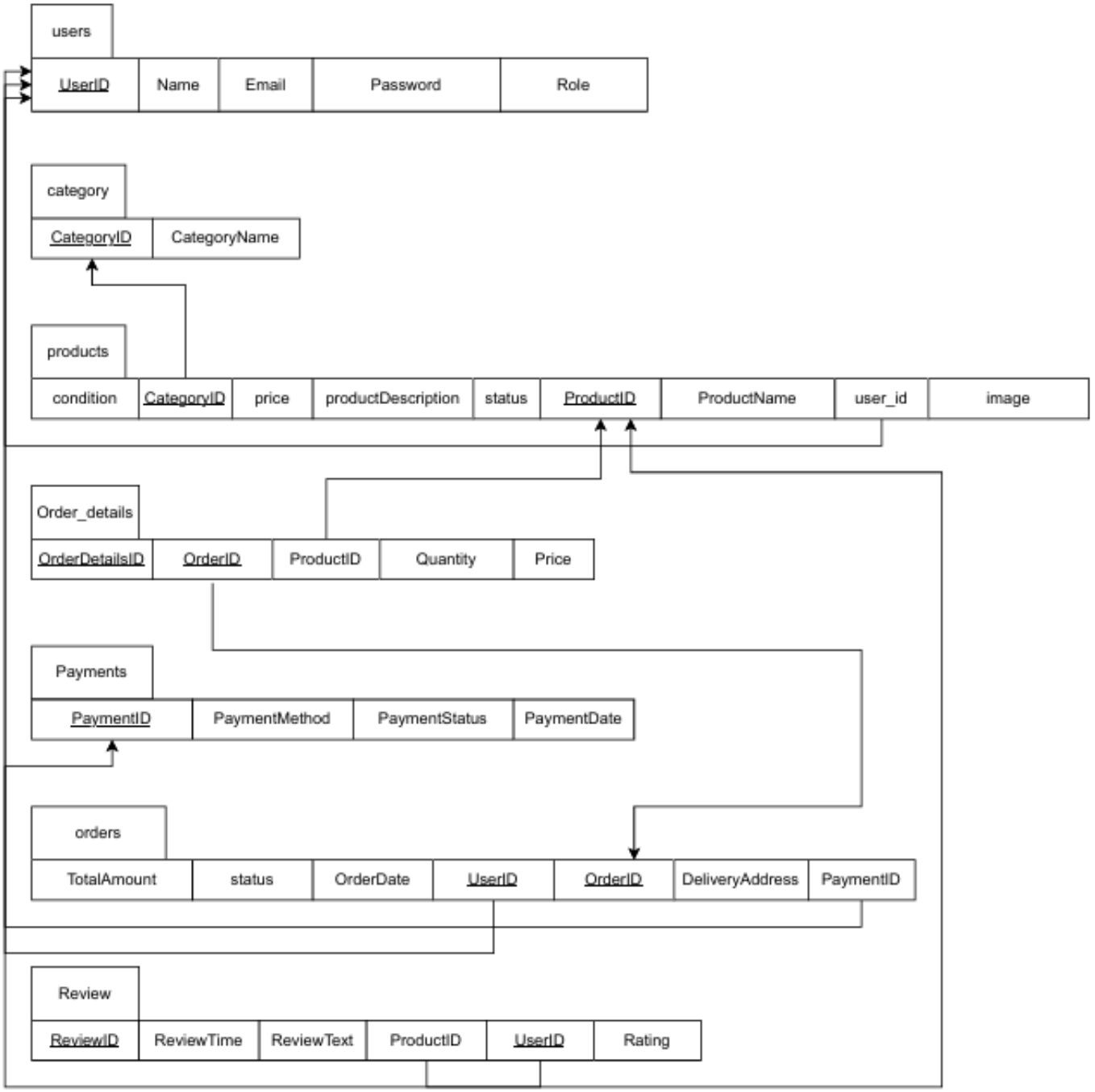
9. Home and Informational Pages

- HomePage:
    - Anoverview of the platform is presented on the homepage.
- AboutUs:
    - Information about the platform and its goals.

ER/EER Diagram



Schema Diagram



Frontend Development

The frontend development of "EcoSwap" focuses on creating an intuitive, visually appealing, and user-friendly interface that ensures seamless interaction between users and the platform. It is developed using CSS with a strong emphasis on responsiveness and usability.

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Key Components of Frontend Development:

1. Responsive Design:

- The platform uses CSS to ensure the interface is responsive and adapts to various screen sizes, including desktops, tablets, and mobile devices.
- Media queries and flexible grid layouts are employed to optimize the viewing experience across devices.

2. Custom Styles:

- Dedicated CSS files are created for different pages and features, such as product pages (product.css), cart (cart.css), user dashboards (user_dashboard.css), and forms (register.css, login.css).
- Aglobal stylesheet (style.css) ensures consistent styling across the platform.

3. Dynamic Content Display:

- HTMLtemplates and CSS are used to display content dynamically, such as product listings, order details, and user reviews.
- Components like headers and footers are dynamically included across pages for consistency.

4. Interactive Elements:

- Real-time form validation during user registration and login.

■ Smooth navigation and user feedback for actions like adding items to the cart. ■ Dynamic search functionality to filter products.

5. User-Centric Features:

○ Clean and straightforward navigation menus help users easily browse products, manage their cart, and access their dashboards.

○ Informational pages like "About Us" and "Contact" are styled for readability and aesthetic appeal (about.css, contact.css).

6. Enhanced Visuals:

○ CSS animations and transitions are used to improve the visual appeal, providing a modern and engaging look to the platform.

○ Dedicated styling ensures that key sections, such as payment success and order confirmation (payment_success.css, order_success.css).

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1. Accessibility: pages, stand out

○ Attention to accessibility features ensures the platform is usable by a broad range of users, including support for keyboard navigation and clear contrasts for better readability.

Frontend development bridges the gap between users and the backend, ensuring a smooth and visually appealing experience. By combining structured layouts, responsive design, and interactive features, the frontend of "Recyclify" delivers an engaging platform for users.

Backend Development

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Key Components of Backend Development:

1. Database Management:

○ The platform uses a MySQL database to store and manage data for users, products, orders, reviews, and payments.

○ Relationships between tables (e.g., users, products, and orders) are established using foreign keys, ensuring data consistency and integrity.

○ SQLqueries are used for CRUD operations (Create, Read, Update, Delete) on various entities.

2. User Authentication and Authorization:

○ The backend manages secure user authentication using PHP and hashed passwords to protect sensitive information.

○ Role-based access control ensures that users, admins, and companies have access to appropriate features.

3. Product Management:

○ PHP scripts handle the addition, editing, and deletion of product listings by users and companies.

○ Dynamic product details and search results are fetched from the database using queries executed by backend scripts.

4. Order and Payment Processing:

○ Backend scripts process user orders, update order statuses, and store order details in the database.

○ Payment handling is managed securely, with the backend coordinating payment processing and transaction records.

5. Admin and Company Features:

○ The backend supports admin-specific functionality, such as managing users, monitoring orders, and updating delivery statuses. ○ Companies can exclusively list and manage recycled products for users.

6. Dynamic Content Rendering:

○ PHP scripts are used to dynamically generate content, such as product listings, user-specific order histories, and review displays. ○ Includes files (e.g., header.php, footer.php) are dynamically loaded to ensure consistency across pages.

7. Error Handling and Validation:

○ Backend scripts validate user inputs during registration, login, and form submissions to ensure data integrity and prevent malicious input.

○ Errors are handled

gracefully, providing users with appropriate feedback.

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1. Review System:

○ The backend allows users to submit reviews for purchased products, which are stored in the database and displayed dynamically.

DataBase

The database development of "EcoSwap" focuses on designing and managing a robust, efficient, and scalable database system to support the platform's functionality. It ensures seamless data storage, retrieval, and management for users, products, orders, and other critical components. The database is developed using MySQL, with an emphasis on data integrity, relationships, and performance optimization.

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Key Components of Database Development:

Database Schema Design:

- Designed a relational database schema using MySQL to store critical data such as users, products, orders, reviews, payments, and categories.
- Established tables with appropriate columns, data types, and constraints (e.g., NOT NULL, UNIQUE) to ensure data accuracy and consistency.
- Implemented primary and foreign keys to define relationships between tables, such as linking orders to users and products.

Data Integrity and Constraints:

- Applied constraints like FOREIGN KEY to maintain referential integrity between related tables (e.g., ensuring an order references a valid user and product).
- Used CHECK constraints to enforce rules, such as ensuring product prices are positive values.
- Set up indexes on frequently queried columns (e.g., user_id, product_id) to improve query performance.

User Data Management:

- Created a users table to store user information, including user_id, username, email, password (hashed), role (e.g., user, admin, company), and registration details.
- Ensured secure storage of sensitive data like passwords using hashing techniques in conjunction with backend scripts.

Product and Category Structure:

- Designed a products table to store product details, including product_id, name, description, price, category_id, seller_id (linked to users), and is_recycled flag.
- Created a categories table to organize products into categories (e.g., electronics, clothing), linked to products via category_id.

Order and Transaction Handling:

- Developed an orders table to manage user orders, with columns like order_id, user_id, order_date, total_amount, status (e.g., pending, shipped, delivered), and payment_id.
- Created a payments table to store payment details, including payment_id, order_id, amount, payment_method, and transaction_status.

Scalability and Optimization:

- Normalized the database to reduce redundancy and improve data consistency (e.g., separating user addresses into an addresses table linked to users).
- Added indexes on columns used in WHERE, JOIN, and ORDER BY clauses to optimize query performance for product searches and order retrieval.

Source Code Repository

https://github.com/LittleFrogy/EcoSwap

Conclusion

The "EcoSwap" project successfully achieves its objective of providing a platform for sustainable buying and selling of used and recycled products. By integrating robust backend functionalities with an intuitive and responsive frontend, the application ensures a seamless user experience for buyers, sellers, and companies alike. The project highlights the potential of technology in promoting sustainability by encouraging the reuse of products and reducing waste. Key features, such as secure payment processing, role-based access for users and companies, and dynamic product management, demonstrate the platform's practicality and versatility. While the project meets its intended goals, there is potential for future enhancements, such as integrating advanced search filters, expanding payment options, and incorporating AI-based recommendations to improve user engagement. Additionally, further emphasis on security and scalability could make the platform more robust for larger-scale deployment. Overall, "Recyclify" serves as a functional prototype that underscores the importance of combining technical innovation with environmental consciousness, offering a meaningful solution for a more sustainable future.

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