# GrihoSmart : A Real Estate Web Platform for Property Buy, Sell and Rent using PHP

*by*


| | |
|---|---|
| **Ummay Habiba Reene** | 193002004 |
| **Md. Mahdi Hasan** | 211002069 |
| **Mst. Maksuda Nazet Mohiny** | 211002116 |


*Project (CSE 400) submitted in partial fulfillment of the requirements for the degree of*

**Bachelor of Science in Computer Science and Engineering**

Under the supervision of

**Dr. Muhammad Aminur Rahaman**
**Chairperson, Department of CSE**



**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**GREEN UNIVERSITY OF BANGLADESH**


**SPRING 2024**

# DECLARATION

| | |
|---|---|
| **Title** | GrihoSmart : A Real Estate Web Platform for Property Buy,Sell and Rent using PHP |
| **Author** | Ummay Habiba Reene<br>Md. Mahdi Hasan<br>Mst. Maksuda Nazet Mohiny |
| **Student ID** | 193002004<br>211002069<br>211002116 |
| **Supervisor** | Dr. Muhammad Aminur Rahaman |
| **Co Supervisor** | Md. Sabbir Hosen Mamun |

---

I declare that this project entitled *GrihoSmart : A Real Estate Web Platform for Property Transactions using PHP* is the result of our own work except as cited in the references. The project has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

_____

Ummay Habiba Reene
193002004
**Date:** January 18, 2025

_____

Md. Mahdi Hasan
211002069
**Date:** January 18, 2025

_____

Mst. Maksuda Nazet Mohiny
211002116
**Date:** January 18, 2025

# CERTIFICATE OF ENDORSEMENT

This is to certify that the project entitled *GrihoSmart : A Real Estate Web Platform for Property Transactions using PHP* by **Ummay Habiba Reene, Md. Mahdi Hasan and Mst. Maksuda Nazet Mohiny** has been successfully defended and examined.

Based on the evaluation and discussion held on **january 18, 2025**, we, the undersigned, hereby endorse the project for acceptance and approval.

---

**Sameen Wasif Hussain**
**External Member, Board: 4**

External Member's Position
External Member's Affiliation

---

**Prof. Dr. Md. Saiful Azad**
**Chair, Board: 04**

Professor and Dean
Department of Computer Science and Engineering
Green University of Bangladesh

---

**Mr. Palash Roy**
**Board Member, Board: 04**

Lecturer and PC
Faculty of Computer Science and Engineering
Green University of Bangladesh

**Md. Saiful Islam Bhuiyan**
**Board Member, Board: 04**

Lecturer
Faculty of Computer Science and Engineering
Green University of Bangladesh

Department of Computer Science and Engineering
Green University of Bangladesh
Kanchon, Rupganj, Narayanganj - 1461

# CERTIFICATE

This is to certify that the project entitled **GrihoSmart : A Real Estate Web Platform for Property Transactions using PHP**, submitted by **Ummay Habiba Reene, Md. Mahdi Hasan and Mst. Maksuda Nazet mohiny** an undergraduate student of the **Department of Computer Science and Engineering** has been examined. Upon recommendation by the examination committee, we hereby accord our approval of it as the presented work and submitted report fulfill the requirements for its acceptance in partial fulfillment for the degree of *Bachelor of Science in Computer Science and Engineering*.

**Supervisor Name**
**Dr. Muhammad Aminur Rahaman**
**Chairperson, Department of CSE**

Department of Computer Science and Engineering
Green University of Bangladesh

**Chairperson Name**
**Dr. Muhammad Aminur Rahaman**
**Chairperson, Department of CSE**

Department of Computer Science and Engineering
Green University of Bangladesh

**Place:** Kanchon, Rupganj, Narayanganj - 1461
**Date:** January 18, 2025

# ACKNOWLEDGMENTS

We express our heartfelt appreciation and gratitude to Allah for bestowing His blessings upon us, allowing us to complete our project successfully. The project included in this dissertation would not have been possible without the aid, patience, and help of many individuals.

We would like to thank Dr. Muhammad Aminur Rahaman, Chairperson, Department of Computer Science and Engineering, Green University of Bangladesh and our Co-Supervisor Md. Sabbir Hosen Mamun for serving as our adviser and mentor. His inspiration, recommendations, and insights have been essential to this project. This project would not have been possible without his help and guidance. His excellent opinions, time, and input were generously provided throughout the project work, from the initial phase, which assisted us in completing our work properly. We are truly grateful to him.

Furthermore, we would like to thank the other faculty members of the CSE department who have assisted us, either directly or indirectly, in completing this work.

Finally, we would like to express our heartfelt appreciation to our parents, whose love, support, and understanding enabled us to accomplish our bachelor's degree in Computer Science and Engineering.

Ummay Habiba Reene
**Green University of Bangladesh**
**Date:** January 18, 2025

Dedicated to
*my loving Mother*

- *Ummay Habiba Reene*
- *Md. Mahdi Hasan*
- *Mst. Maksuda Nazet Mohiny*

# ABSTRACT

The GrihoSmart: A Real Estate Web Platform for Property Transactions Using PHP is a comprehensive and user-friendly web application designed to facilitate seamless property transactions. The platform aims to bridge the gap between property buyers, sellers, and renters, providing a centralized solution for managing real estate operations efficiently. By incorporating modern web technologies, intuitive design, and robust backend development, GrihoSmart offers a secure and scalable environment tailored to meet the diverse needs of its users.

The project addresses critical challenges in the real estate market, such as fragmented communication, lack of verified property listings, and insufficient administrative oversight. Through its innovative features, GrihoSmart ensures transparency and reliability in transactions. The platform includes three distinct dashboards for super admins, sellers, and field checkers, allowing effective management of properties and user roles. Sellers can list properties for sale or rent, categorized into apartments, hotels, stores, and plots, after purchasing subscription packages through a secure payment gateway. Field checkers verify property details onsite, ensuring authenticity and minimizing fraudulent listings, while super admins oversee and approve transactions, blogs, and platform data.

Furthermore, GrihoSmart introduces a blog module that allows super admins to share relevant insights, market trends, and helpful tips, enriching the user experience. The platform's intuitive interface and seamless navigation enhance accessibility for users with varying levels of technical expertise. By combining these features, GrihoSmart not only simplifies property transactions but also fosters a secure and transparent digital real estate ecosystem.

This project demonstrates the potential of integrating user-centric design with robust backend development to create a scalable and efficient real estate management system. The unique focus on verification, security, and administrative flexibility positions GrihoSmart as a game-changer in the evolving digital real estate landscape.

# Contents

# List of Figures

# List of Tables

# 1. Introduction

## 1.1 Background

The GrihoSmart: A Real Estate Web Platform for Property Transactions Using PHP is a robust and user-friendly web-based system designed to streamline property transactions. It bridges the gap between property buyers, renters, and sellers by offering a centralized platform where all interactions and transactions related to real estate can be efficiently managed. The platform provides seamless property listing, browsing, and transaction functionalities while ensuring a secure and intuitive experience for users.

The increasing complexities in property transactions, including finding suitable properties, managing listings, and ensuring secure communication between parties, highlight the need for a reliable digital solution. This project addresses these challenges by offering dedicated modules for buyers, sellers, and administrators, facilitating easy navigation and efficient management of real estate properties.

The platform supports essential features such as property listing management, detailed property views, user authentication, and secure payment mechanisms. Sellers can upload property details, including images, pricing, and descriptions, while buyers and renters can filter and search properties based on their preferences. An admin dashboard ensures the system's overall integrity and operational smoothness, making it suitable for both large-scale and small-scale real estate operations.

## 1.2 Motivation

The idea of creating an online platform for property buying, selling, and renting was inspired by the challenges and inefficiencies commonly faced in the real estate sector, especially in Bangladesh. One of the most significant issues is the heavy reliance on middlemen or brokers, who often demand high commissions and, in some cases, mislead buyers or sellers. This results in financial losses, distrust, and an overall lack of transparency in property transactions.

Additionally, there are frequent cases where fake documents and fraudulent activities cause immense distress for buyers. Many people fall victim to scams, such as purchasing disputed or non-existent properties. The absence of a reliable system to verify properties further exacerbates these issues.

Our motivation stems from the need to create a solution that minimizes these problems by providing a secure, user-friendly, and transparent platform. By integrating modern technologies such as property verification systems, user authentication, and direct communication channels, we aim to reduce dependency on middlemen and ensure fair and smooth transactions.

Furthermore, the platform is designed to cater to both buyers and renters, offering them a trusted space to explore verified properties while enabling sellers to reach a wider audience. This initiative aims to empower individuals, enhance trust in real estate transactions, and modernize the property management ecosystem.

## 1.3 Aim and Objectives

The primary aim of this project is to develop the ”Home Serve Hub” mobile application, which links consumers to various home service providers. The program offers an integrated, technologically advanced solution that reduces time, increases transparency and increases confidence in efforts to streamline the process for both consumers and service providers.

- Facilitate property listing and management for sellers through an intuitive interface.
- Provide buyers and renters with efficient search and filtering options for properties.

- Ensure secure and transparent transaction for subscription money with sslcommerz textbox environment.
- Offer comprehensive administrative tools for monitoring and maintaining the platform.
- Improve the overall user experience by offering property which is verified by our expert Field checker team.

## 1.4 Research Questions

1. How can we design an intuitive web-based platform to manage and showcase property efficiently for buyers, sellers, and renters?
2. What are the key features needed to ensure transparent, and user-friendly interactions in an online real estate platform?
3. What administrative tools can enhance the monitoring and maintenance of property and user activities?
4. How can the platform integrate modern technologies to improve user experience and address the challenges of traditional systems?

## 1.5 Research Contributions

Key contributions include:

1. Created an easy-to-use platform for buyers, sellers, and renters to manage properties efficiently.
2. Improved trust and transparency by adding verified profiles, search filters, and a wishlist feature.
3. Developed an admin panel to monitor users, properties, and activities with useful tools.
4. Used modern technologies like secure login and better property displays to solve traditional problems.

## 1.6 Conclusion

The introduction section highlights the necessity and importance of a centralized web-based solution for property transactions. By identifying and addressing gaps in current real estate systems, GrihoSmart aims to simplify and enhance user interactions for property buyers, renters, and sellers. This project's motivation and objectives lay the foundation for an efficient, user-friendly, and scalable platform that combines intuitive design with robust functionality, contributing significantly to the field of real estate management.

# 2. Literature Review

## 2.1 Introduction

In the development of GrihoSmart, a comprehensive real estate web platform for property transactions, understanding the current state of similar systems is vital. The literature review explores various existing platforms, analyzing their strengths, limitations, and areas for improvement. This section highlights the key services provided by these platforms, their limitations in addressing user needs, and the opportunities for enhancement. By identifying the gaps in current solutions, the review provides a strong foundation for justifying the development of GrihoSmart and positioning it as an innovative solution in the real estate domain.

## 2.2 Review of Relevant Literature

### 2.2.1 Bangla Mart [1]

**Key Services:**

- Provides serviced, furnished, and shared co-working spaces.
- Rents out fully furnished and managed conference rooms.

**Limitations:**

- Primarily focuses on co-working solutions and lacks residential property rental services.
- Limited user base as it mainly serves the Dhaka region.

**Scope of Improvement:**

- Expand offerings to include residential and commercial property rentals and purchases.
- Introduce multi-vendor services and extend reach beyond Dhaka.

### 2.2.2 BDHousing [2]

**Key Services:**

- Offers listings for selling and renting residential and commercial properties.
- Provides market insights and property valuation services to assist users.

**Limitations:**

- Focuses mainly on commercial properties, excluding hotel or store rentals.
- Service fees for premium services increase user costs.

**Scope of Improvement:**

- Include hotel and store rentals to attract a wider audience.
- Enable homeowners to showcase their apartments and expand beyond major cities.

### 2.2.3 Outsourcing BD [3]

**Key Services:**

- Focuses on administrative and legal challenges for property owners.
- Offers direct support through a team of professionals.

**Limitations:**

- Lacks a marketplace for direct listing and management by property owners.
- Minimal self-management capabilities for property owners.

**Scope of Improvement:**

- Allow property owners to upload and manage their own listings.
- Implement a field-checker model to verify ownership and property details.

### 2.2.4 Vrbo[5]

**Key Services:**

- Listings for vacation homes, villas, apartments, and cottages.
- Provides secure online booking and payment systems.

**Limitations:**

- Multi-step verification delays listing approvals.
- Needs a user-friendly interface to handle diverse property types.

**Scope of Improvement:**

- Expand beyond vacation rentals to include long-term rentals and property sales.
- Lower service fees to attract more users and property owners.

These improvements aim to make ”Home Serve Hub” a reliable, easy-to-use platform that meets users’ needs more effective.

# 3. Design Methods and Procedures

## 3.1 Introduction

The design methods and procedures form the backbone of any successful project. For GrihoSmart, the approach combines modern web technologies and well-structured architectural planning to ensure scalability, security, and user-friendliness. This section delves into the various design aspects, including the system's architecture and requirements, which collectively aim to meet the project objectives and provide an optimal user experience.

## 3.2 System Architecture / Model

The GrihoSmart: A Real Estate Web Platform for Property Transactions Using PHP Platform's system architecture integrates several technologies and components to provide a smooth user experience. It is meant to be safe, scalable, and adaptable.

**The Systems Development Life Cycle (SDLC)**

A conceptual model shows the stages of an information system development project; these stages include the initial feasibility study and ongoing maintenance of the final product. This framework serves as the basis for the project management processes. Many software development life cycle (SDLC) models have been established to guide these processes, such as the Agile Model and the original SDLC methodology. Despite the fact that various tactics could be effective in specific project situations, adopting a forward-looking approach is ultimately vital for project success. The Software Development Life Cycle (SDLC) comprises many processes or procedures that serve as guidelines for the design and long-term maintenance of a software program or application. It is essentially an organized framework for software development.

### 3.2.1 Client-Side (Front-end)

- **Technologies:** HTML, CSS, JavaScript

The front-end is responsible for creating an intuitive and visually appealing interface. HTML structures the web pages, CSS ensures the styling and responsiveness, and JavaScript provides interactivity for enhanced user experience.

### 3.2.2 Server-Side (Back-end)

- **Technologies:** PHP, JSON, MySQL

The server-side manages business logic, database interactions, and communication between client and server. PHP handles dynamic content and user authentication, JSON facilitates data exchange, and MySQL serves as the database system for managing structured data.

### 3.2.3 Database

- **Technologies:** MySQL

The database stores and manages structured data such as user accounts, property details, and transaction records. MySQL ensures reliability, scalability, and efficient data handling with relationships maintained through keys.

### 3.2.4 User Integrations

- **Payment Gateway:** SSLCommerz sandbox
- **Features:** Secure and reliable handling of payments, notifications, and user authentication

Integrating a secure payment gateway facilitates safe and reliable transactions. SSL encryption secures sensitive information and supports tracking transaction details, ensuring user confidence in the system. Authentication modules safeguard user accounts, while notifications (email or SMS) keep users informed about activities such as property approvals and transactions.

### 3.2.5 Deployment and Maintenance

- **CI/CD Pipelines:** Automated deployment, frequent updates, and minimal downtime

CI/CD pipelines streamline development by automating testing and deployment processes. This approach enables faster updates, resolves issues efficiently, and minimizes downtime during releases, ensuring a seamless experience for users.

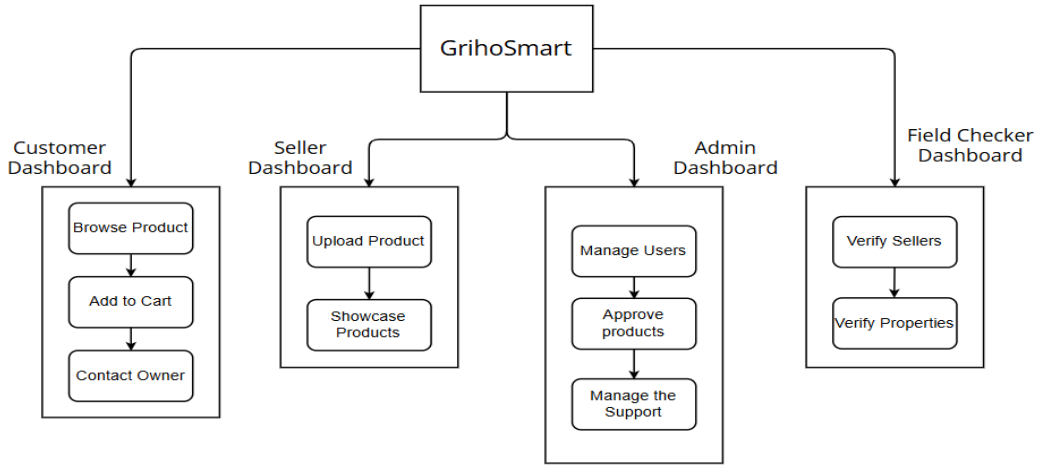


Figure 3.1: A Block Diagram of Property Buy and Rental System

## 3.3 Features

This section highlights the key features of the developed platform, categorized based on user roles and functionalities.

### 3.3.1 General Features

- **User Roles and Permissions:** The platform includes distinct roles such as Admin, Seller, Buyer, and Field Checker, each with specific access and permissions.
- **Dynamic Role Management:** Admins can add, edit, delete, disable, and reactivate roles, including managing them in trash (soft delete).
- **User Profile Management:** Users can update their profiles, with restrictions on sensitive fields like email addresses.
- **Login and Authentication:** Secure user authentication and password hashing ensure data protection.
- **Search and Filter:** Advanced property search functionality with filters based on keywords, location, price, and category.

### 3.3.2 Admin Features

- **User and Role Management:** Admins can manage user accounts and assign roles dynamically.
- **Property Management:** Approve, reject, or soft delete property listings, with the ability to restore them.
- **Data Table Integration:** Sortable and searchable data tables with export options (CSV, PDF, Print).
- **Reports and Reviews Management:** Admins can monitor property reviews, ratings, and user reports.
- **Dashboard Analytics:** Overview of system statistics, such as active users and property listings.

### 3.3.3 Seller Features

- **Property Listings:** Sellers can list properties for rent or sale, providing details such as price, location, and amenities.
- **Property Management:** Update or delete property listings and manage availability statuses.
- **Verified Owner Status:** Display verified status for sellers alongside property details.

### 3.3.4 Buyer Features

- **Property Search:** Buyers can search for properties using filters like price, location, and category.
- **Bookmark Properties:** Save favorite properties for later viewing.
- **Property Details View:** Access comprehensive property details, including features, price, and images.

### 3.3.5 Field Checker Features

- **Property Inspection:** Inspect and verify property details submitted by sellers.
- **Approval or Rejection:** Approve or reject property listings after inspections.
- **Issue Reporting:** Report inconsistencies or fraudulent information to the admin.
- **Activity Logs:** Track logs of property inspections and actions taken.

### 3.3.6 Additional Features

- **Image Management:** Upload and display multiple property images, including owner and property images.
- **Messaging System:** Users can send inquiries or messages to admins or sellers.
- **Security Features:** Input sanitization to prevent SQL injection and use of hidden fields for data integrity.

- **Responsive Design:** Fully responsive design for all devices, ensuring modern UX/UI standards.
- **Error Handling:** User-friendly error messages for invalid operations, such as login errors or failed inputs.

## 3.4 Requirements

### 3.4.1 Functional Requirements

Functional requirements define what the system should do and outline its specific features and functionality. These are directly related to user interactions and how the system supports them.

The following functional requirements outline the expected operations and features of the developed platform. These requirements are categorized based on the key functionalities provided to different user roles.

1. **User Management:**
    - The system shall allow users to register and log in using unique credentials.
    - The platform shall provide role-based access control to restrict features based on user roles (Admin, Seller, Buyer, Field Checker).
    - Users shall be able to update their profiles, except for sensitive fields such as email addresses.
2. **Property Management:**
    - Sellers shall be able to list properties for rent or sale, including details such as title, description, price, location, and images.
    - The system shall allow sellers to update or delete their property listings.
    - Approved property listings shall be displayed for buyers to view and search.
3. **Field Checker Operations:**
    - Field Checkers shall inspect property listings submitted by sellers.

- The system shall allow Field Checkers to approve or reject property submissions.
- Field Checkers shall be able to report issues or fraudulent information to admins.

4. **Admin Operations:**
    - Admins shall manage user accounts, including the ability to approve, reject, or deactivate accounts.
    - Admins shall approve or reject property listings submitted by sellers.
    - The system shall provide tools for admins to monitor platform activities, such as user actions and property updates.
    - Admins shall have access to dynamic data tables with export options (e.g., CSV, PDF).
5. **Search and Filter Functionality:**
    - The platform shall allow buyers to search for properties using filters, such as price range, location, and category.
    - Search results shall be dynamically displayed with pagination for better usability.
6. **Interactive Features:**
    - Buyers shall be able to bookmark favorite properties and save them in their profiles.
    - The platform shall provide a question-and-answer section where users can post inquiries.
    - Buyers shall be able to contact sellers directly through the platform.
7. **Reporting and Statistics:**
    - Admins shall generate reports of user and property activities in CSV or PDF format.
    - Field Checkers shall be able to create inspection reports for their assigned properties.

8. **Security and Validation:**
    - The system shall use strong password encryption to secure user accounts.
    - Input validation shall be implemented for property details, user forms, and other sensitive data inputs.
9. **Profile Management:**
    - Users shall be able to manage their profiles, including updating personal information.
    - Sensitive fields, such as email addresses, shall be non-editable to maintain data integrity.

### 3.4.2 Non-Functional Requirements

Non-functional requirements define how the system should behave and focus on qualities like performance, scalability, usability, and security. These are about the operational aspects rather than specific features.:

1. **Performance:**
    - The platform should load search results within 2-3 seconds.
    - Should handle multiple concurrent users without performance degradation.
2. **Scalability:**
    - Support an increasing number of users, property listings, and searches over time.
3. **Usability:**
    - Provide an intuitive interface for users with minimal technical skills.
    - Ensure ease of navigation through clear menu structures and breadcrumb links.
4. **Availability:**

- The platform should have a 99.9% uptime to ensure reliable service availability.

5. **Data Security:**
   - Protect user data with encryption (e.g., hashed passwords).
   - Restrict unauthorized access using role-based authentication(For example a seller cant not log in to user account with seller log in information).
6. **Compatibility:**
   - Compatible with all major browsers (e.g., Chrome, Firefox, Edge).
   - Support both desktop and mobile responsiveness.
7. **Data Integrity:**
   - Ensure accurate and consistent data for property listings, user profiles, and reports.
8. **Maintainability:**
   - The system should allow easy updates and enhancements with minimal disruption.
9. **Error Handling:**
   - Display user-friendly error messages in case of failed operations (e.g., login errors, invalid input).

## 3.5 Component Requirements

The following are the key components required for the development and deployment of the **GrihoSmart: A Real Estate Web Platform**:

### 3.5.1 Software Requirements

- **Frontend Technologies:**
  - HTML: For structuring web pages.
  - CSS: For designing responsive and visually appealing interfaces.
  - JavaScript: For interactivity and client-side functionalities.
- **Backend Technologies:**
  - PHP: For server-side scripting and application logic.[]
  - JSON: For data exchange between the frontend and backend.
- **Database:**
  - MySQL: To store and manage user, property, and transaction data.
- **Deployment and Maintenance:**
  - Hosting Platforms: AWS, Google Cloud, or Azure.
  - SSL Certificate: To secure user transactions.
  - CI/CD Pipelines: For automated deployment and updates.

### 3.5.2 Hardware Requirements

- **Development Machine:**
  - Processor: Intel Core i5 or higher.
  - RAM: 8 GB minimum (16 GB recommended for faster processing).
  - Storage: 256 GB SSD or higher.
- **Hosting Server:**
  - Processor: Dual-core processor (2.5 GHz or above).
  - RAM: 4 GB or higher.
  - Storage: 50 GB SSD for database and application hosting.
  - Bandwidth: 100 Mbps or higher for seamless access.

### 3.5.3 Third-Party Services

- **Payment Gateway Integration:**
  - SSLCommerz, Stripe, or PayPal for handling secure payments.
- **Notification Services:**
  - Email: SMTP servers (e.g., Gmail, SendGrid).
  - SMS: Twilio for sending transactional messages.

### 3.5.4 Security Requirements

- **Authentication and Authorization:**
  - Secure login for buyers, sellers, and admin users.
  - Role-based access control (RBAC).
- **Data Protection:**
  - SSL encryption for all data transmissions.
  - Proper validation and sanitization of user inputs to prevent SQL injection and XSS attacks.

## 3.6 Budget Planning

The budget for the development of **GrihoSmart: A Real Estate Web Platform for Property Transactions Using PHP** is detailed below, considering the Bangladesh context:

| Category | Description | Estimated Cost (BDT) |
|---|---|---|
| **Development** | | |
| - Backend Development | PHP, MySQL-based backend setup | 30,000 |
| - Frontend Development | HTML, CSS, JavaScript integration | 20,000 |
| - Database Setup | MySQL database schema design and setup | 10,000 |
| - API Integration | Payment gateways, SMS/email services | 15,000 |
| **Tools & Software** | | |
| - Hosting | Cloud hosting services (AWS, Azure) | 12,000/year |
| - Domain Registration | Website domain (.com/.bd) | 2,500/year |
| - SSL Certificate | Secure user transactions | 5,000/year |
| **Human Resources** | | |
| - Developer(s) | Full-stack developer for 3 months | 90,000 |
| - UI/UX Designer | Design user-friendly interface | 25,000 |
| - Tester | Quality assurance and testing | 15,000 |
| **Marketing & Operations** | | |
| - Marketing | Social media ads, content creation | 20,000 |
| - Documentation | Final report, user manuals | 5,000 |
| **Miscellaneous** | | |
| - Electricity/Internet Costs | Utilities for the development process | 5,000 |
| - Contingency Fund | Buffer for unexpected costs | 10,000 |
| **Total Estimated Cost** | | **294,500** |

Table 3.1: Budget Planning for GrihoSmart Project

## 3.7 Methodology

The development of the Online Property Buy and Rental Platform follows a structured methodology to ensure a systematic and efficient approach.

### 3.7.1 System Design

**Use-Case Diagram**

Use case diagrams offer advantages such as clear visualization of system functionalities, improved communication among client, effective identification of actors, streamlined requirements analysis, and simplified system design, enhancing overall development efficiency.

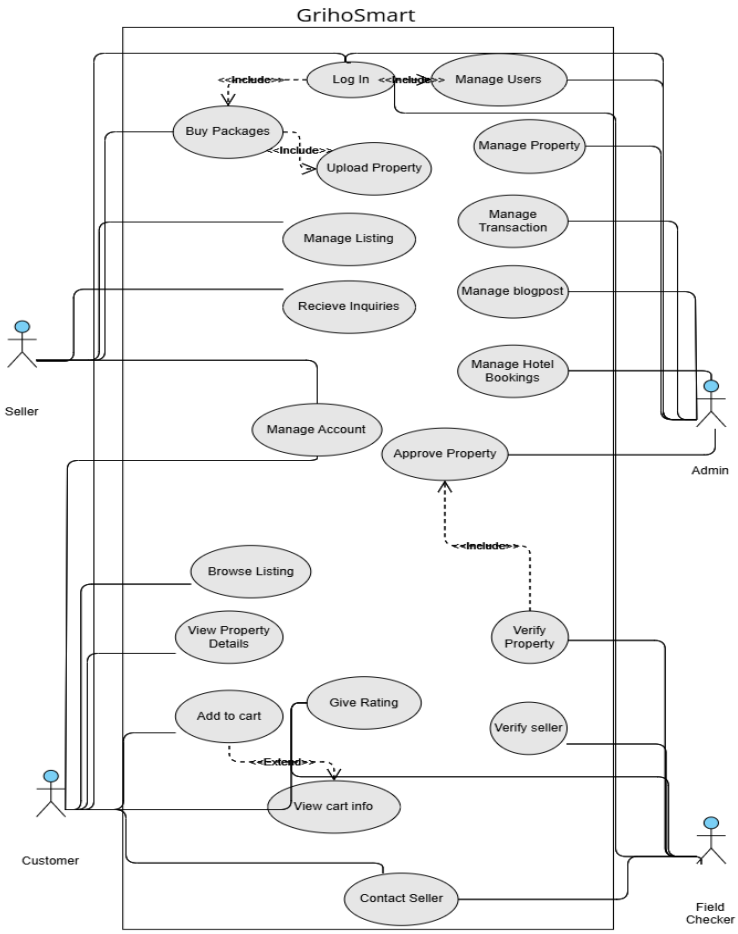


Figure 3.2: Use case diagram of Property Buy and Rental System

### 3.7.2 Data Flow Diagram (DFD)

**DFD Level 0**

The DFD-0 level diagram represents the high-level view of the system illustrating the interactions between the system and its external entities. In this project, the DFD-0 level diagram showcases the " the Online Home Services Platform" as the central process, with external entities such as users Registration, Admin and customer interacting with the system. The main purpose of the system is to provide services exploration and booking services to customers, with the assistance of external entities.

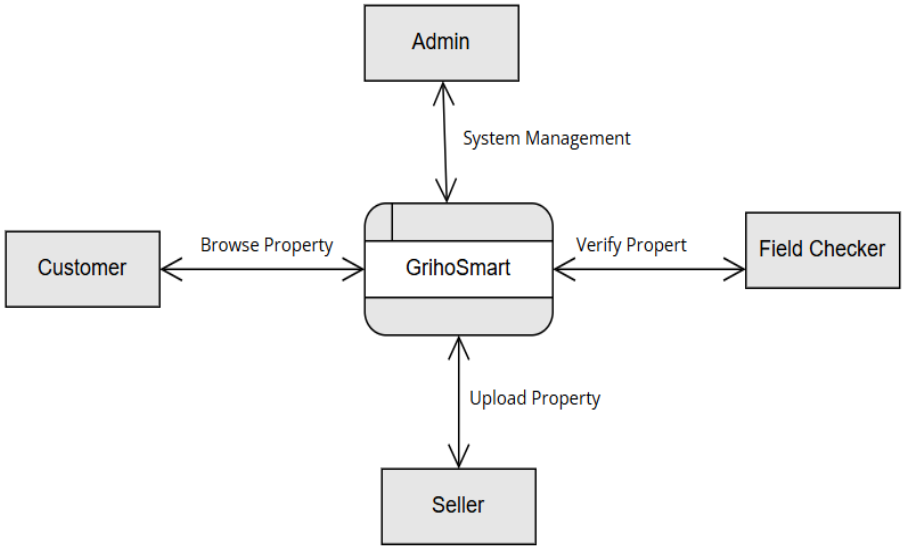


Figure 3.3: Data flow diagram(DFD Level 0) of Property Buy and Rental System

**DFD Level 1**

In the DFD level-1 diagram, the states of the user and admin are depicted, along with their respective actions and interactions with the system. The user can initiate a request for services, which involves providing the necessary information for registration. The user's information is then stored in the database. If the registration process is successful, the user will receive confirmation of their registration and access to school exploration and admission features. On the other hand, the admin has the ability to view user records, services information requests within the system. This allows the admin to monitor and manage the user activities booking services processes taking place.

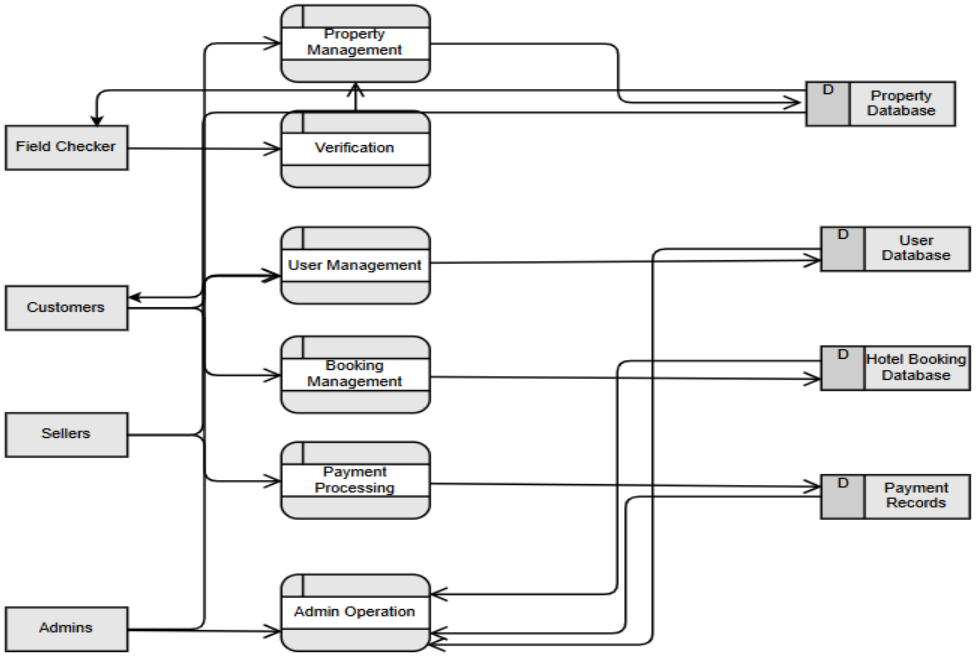


Figure 3.4: DFD Level 1 Diagram of Propert Buy and Rental System

### 3.7.3 Entity Relationship Diagram

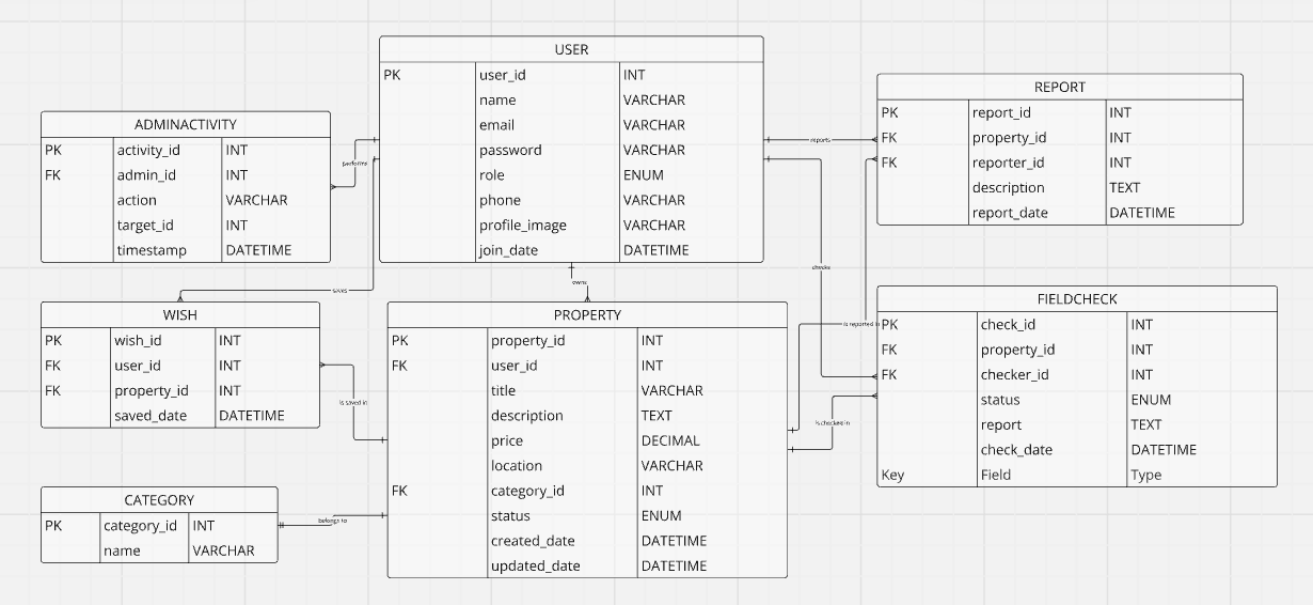


Figure 3.5: ER Diagram of Property Buy and Rental System

## 3.8 Conclusion

The design methods and procedures outlined in this chapter provide a comprehensive framework for developing a robust and scalable Online Home Services Platform. By following these structured methodologies, we ensure that the platform meets user needs, performs efficiently, and can be maintained and scaled effectively. The inclusion of detailed component requirements, budget considerations, and a clear system architecture ensures a well-planned and executed development process.

# 4. Engineering Considerations

Engineering considerations are vital in the design, development, and implementation of the GrihoSmart platform. These considerations ensure the project aligns with societal needs, minimizes environmental impacts, and adheres to ethical standards.

## 4.1 Societal Impacts of Engineering Solutions

The GrihoSmart platform is designed to address real-world challenges in property transactions, enhancing accessibility and convenience for diverse users, including buyers, sellers, and field checkers. The societal impacts include:

- **Improved Access to Services:** By digitizing property listings and integrating filtering options, the platform makes property transactions more transparent and accessible, even for users in remote areas.
- **Safety and Trust:** Features like field verification and admin approvals promote trust between buyers and sellers, reducing fraudulent activities.
- **Empowering Communities:** GrihoSmart simplifies property dealings, empowering small property owners and enabling local communities to engage in fair and secure transactions.

## 4.2 Environment and Sustainability Considerations

The development and operation of GrihoSmart consider environmental sustainability by:

- **Reducing Paperwork:** The platform minimizes the need for physical paperwork by digitizing records and transactions.

- **Promoting Remote Work:** By enabling online property listings and virtual approvals, the platform reduces the environmental impact of travel for property-related activities.
- **Efficient Hosting Solutions:** Hosting the platform on cloud-based infrastructure (e.g., AWS, Azure) optimizes resource usage and reduces energy consumption.

## 4.3 Ethical Considerations

Ethical practices are integral to the GrihoSmart platform. These include:

- **Transparency and Accountability:** Sellers are required to provide accurate property information, and field checkers validate listings to ensure authenticity.
- **User Privacy and Data Security:** The platform employs SSL encryption and robust authentication mechanisms to protect user data and maintain confidentiality.
- **Inclusivity and Fairness:** GrihoSmart is designed to be inclusive, catering to users from diverse socioeconomic backgrounds and ensuring equal access to services.
- **Adherence to Ethical Standards:** The project complies with ethical standards for software development, prioritizing user well-being and system integrity.

## 4.4 Summary

Engineering considerations for the GrihoSmart platform integrate societal impacts, environmental sustainability, and ethical practices. By addressing these factors, the platform aims to provide a responsible, efficient, and enduring solution for property transactions in Bangladesh, meeting the needs of the present without compromising the future.

# 5. Results and Performance

This chapter presents the results achieved during the development of the **GrihoSmart** platform and evaluates its performance based on various parameters, including functionality, response time, scalability, security, and user satisfaction.

## 5.1 System Functionality

The following key functionalities were successfully implemented and tested:

- **User Authentication:** Secure login and registration flows for buyers, sellers, and admin users. Role-based access control ensures each user accesses only their respective dashboard.
- **Property Listing and Management:** Sellers can purchase packages via SSLCommerz and upload properties categorized as rent or buy, with subcategories like apartments, hotels, stores, and plots.
- **Search and Filter Features:** Buyers can search for properties based on category, subcategory, price range, and location. The search engine is optimized for dynamic filtering.
- **Payment Gateway Integration:** Sellers can securely purchase packages through SSLCommerz. All transaction data is logged in the database.
- **Notification System:** Email and SMS notifications are sent for critical actions, such as property approval and status updates.
- **Admin Dashboard:** Super admin monitors user activity, approves property listings based on field checker reports, and manages platform-wide data like blogs.

## 5.2 Frontend Design

The following screenshots illustrate the user interface of the *GrihoSmart* platform, highlighting key functionalities and design choices.

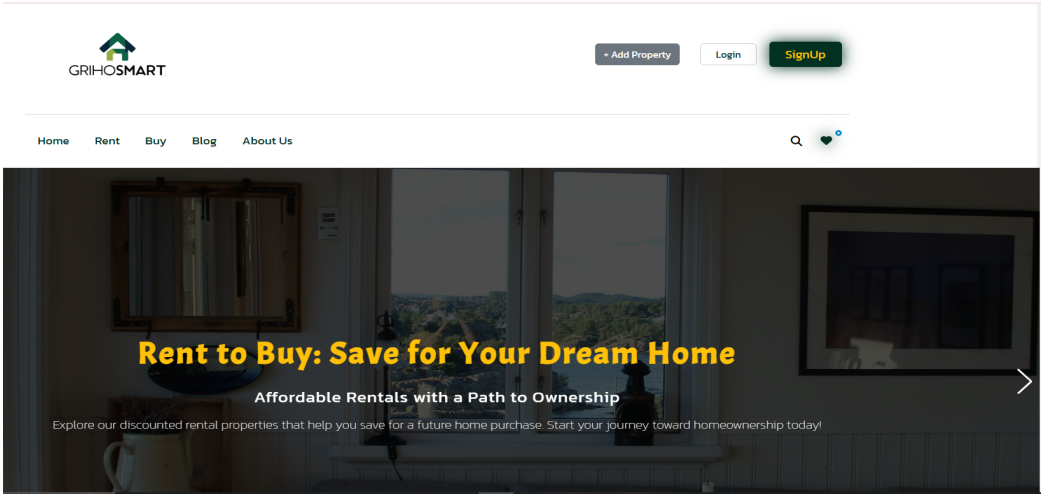


Figure 5.1: Home page and Top Header

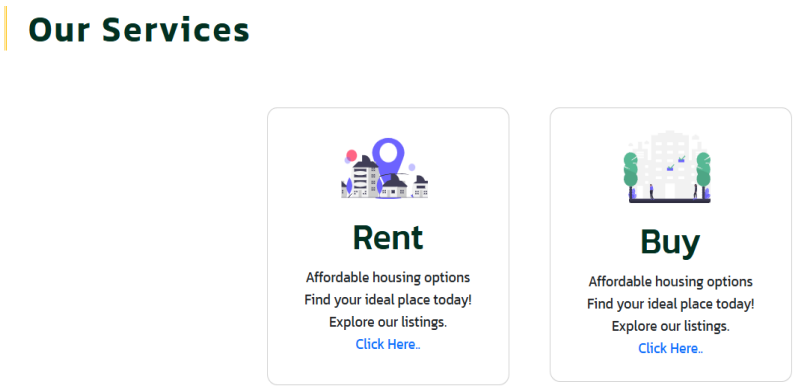


Figure 5.2: Our Services

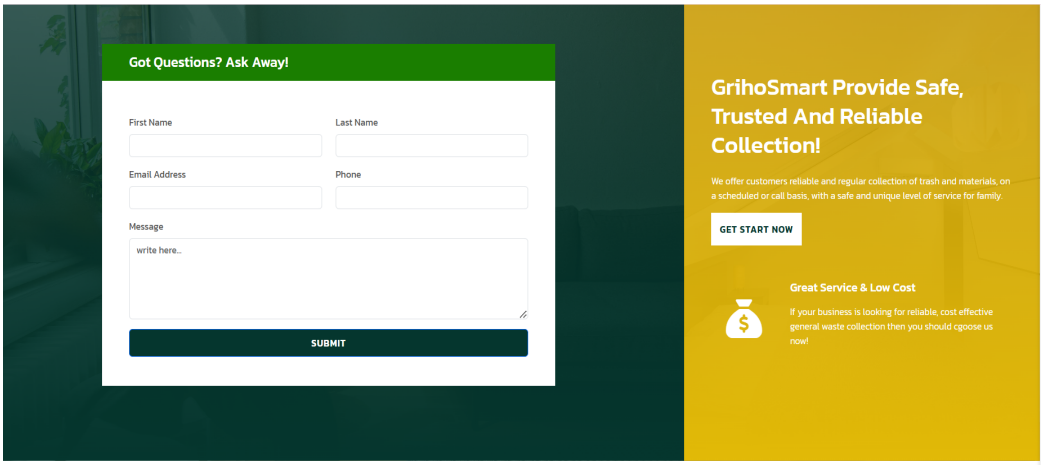


Figure 5.3: Question Asking and Support

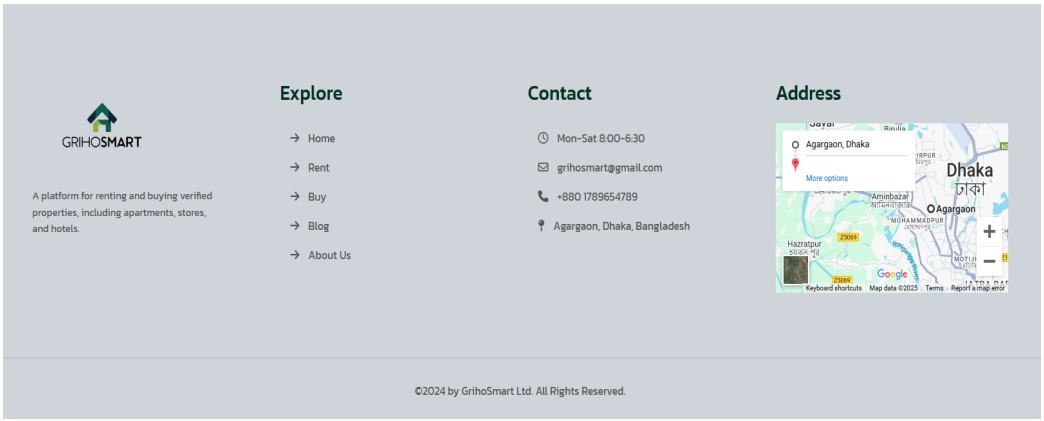


Figure 5.4: Footer Part

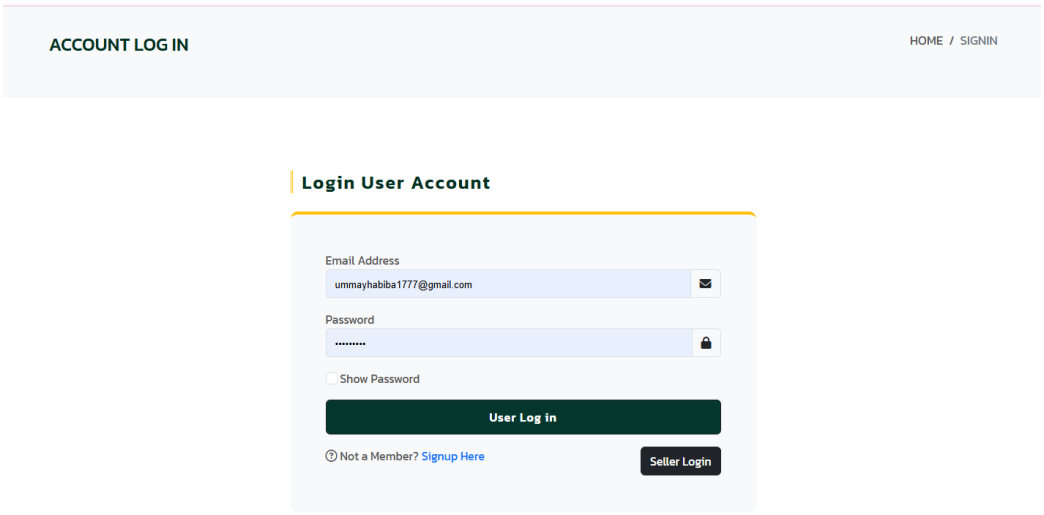


Figure 5.5: Login Interface

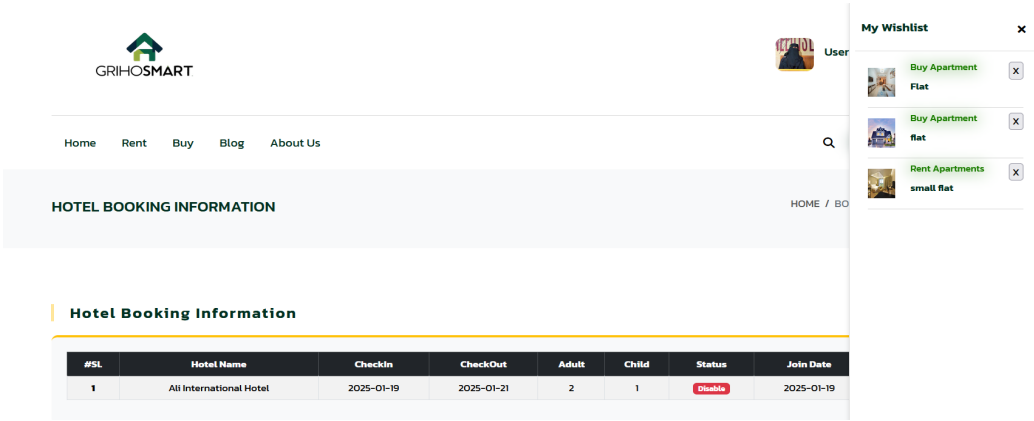


Figure 5.6: A Users Wishlist and Hotel booking Information

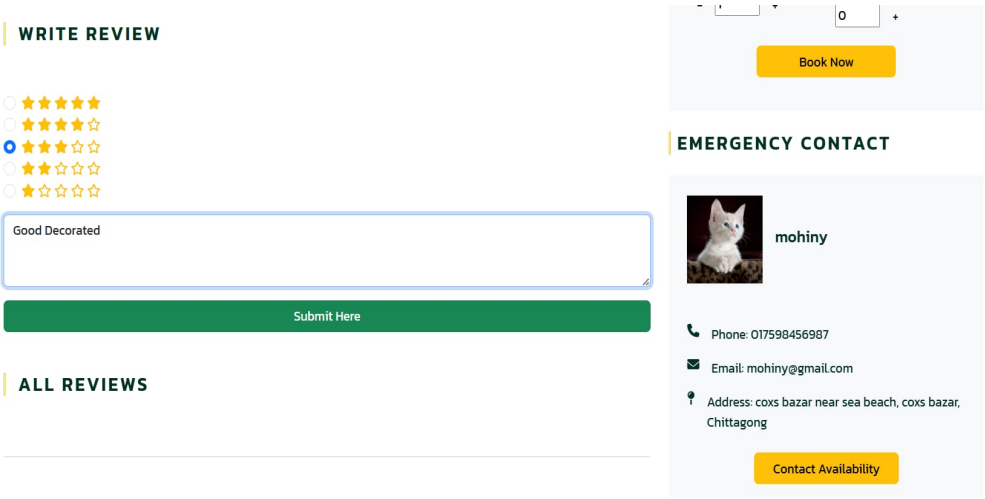


Figure 5.7: User Giving a Review

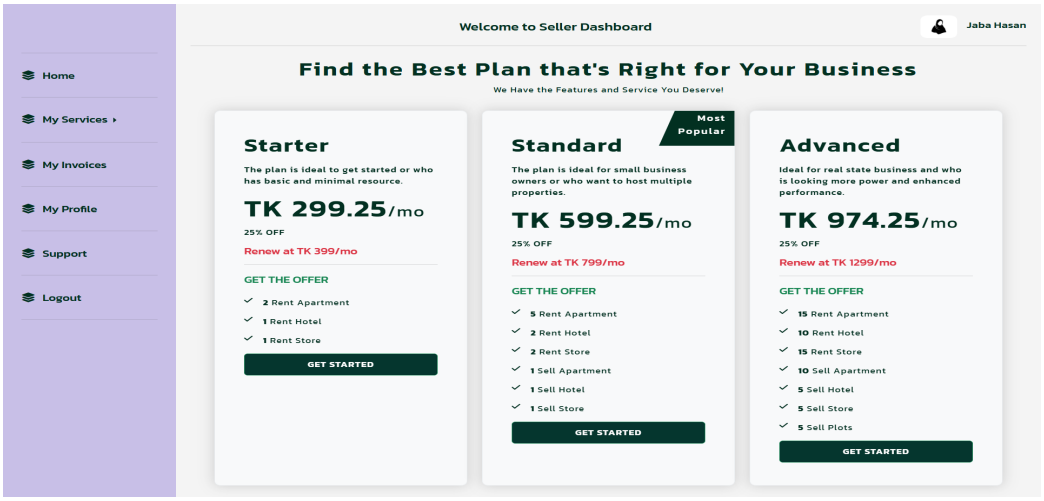


Figure 5.8: Home Page of a Seller Dashboard

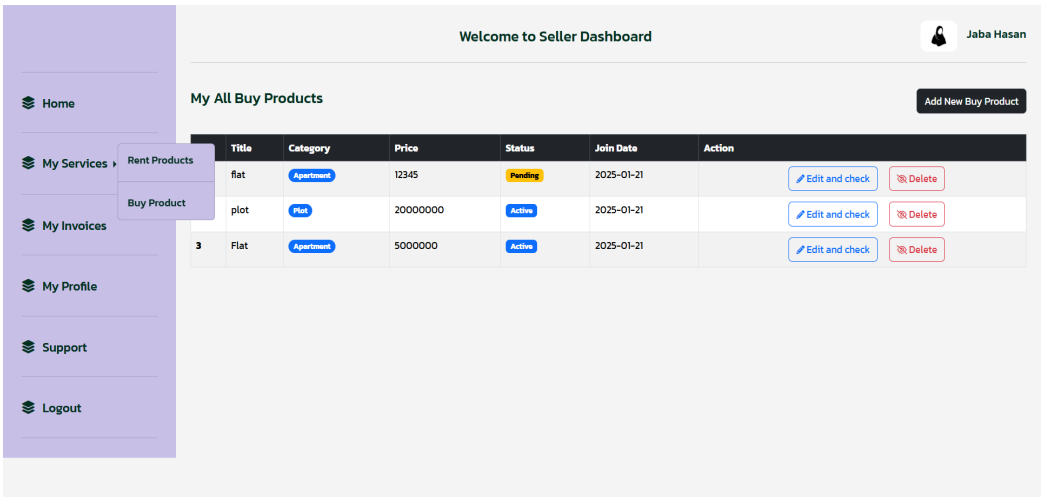


Figure 5.9: Service and Products of a Seller

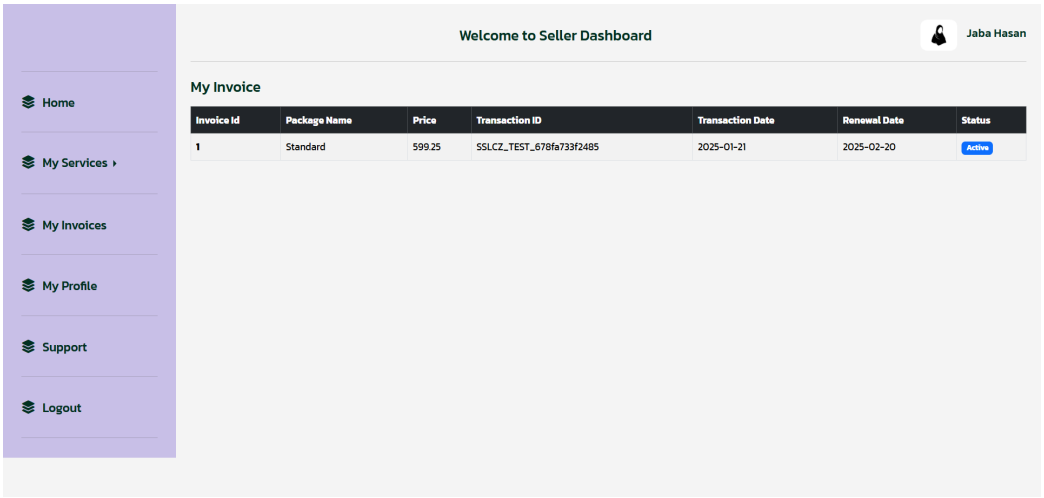


Figure 5.10: Invoice of a Seller

## 5.3 Backend Design

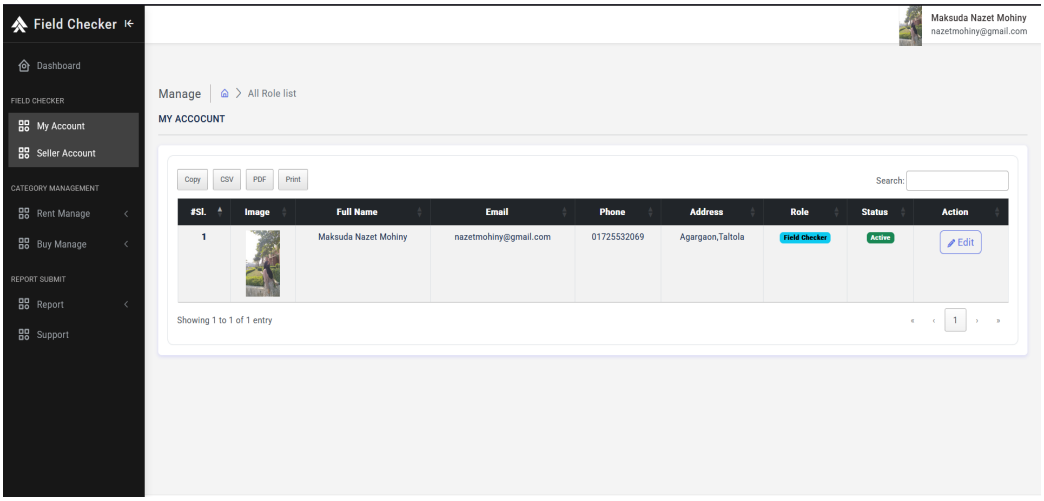


Figure 5.11: Dashboad of a FieldChecker

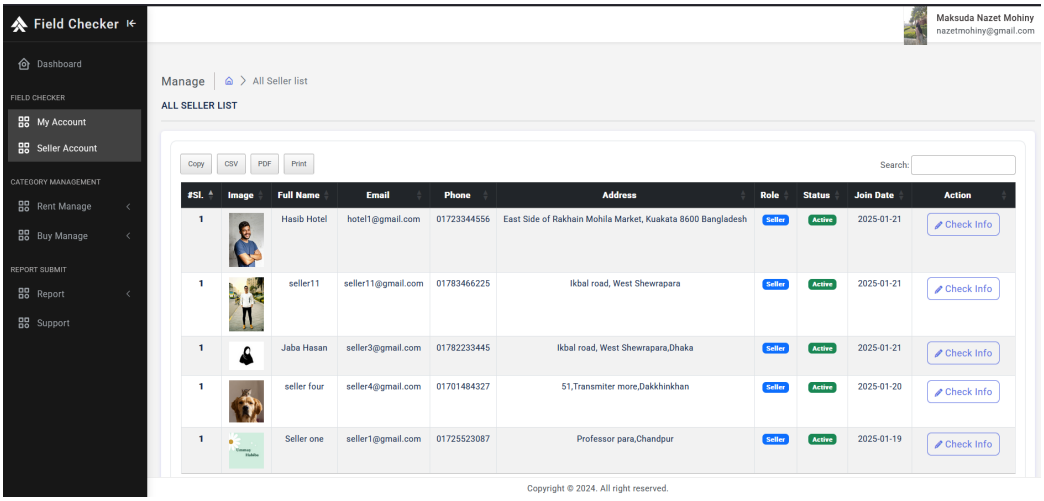


Figure 5.12: Seller List from a Field Checker Dashboard

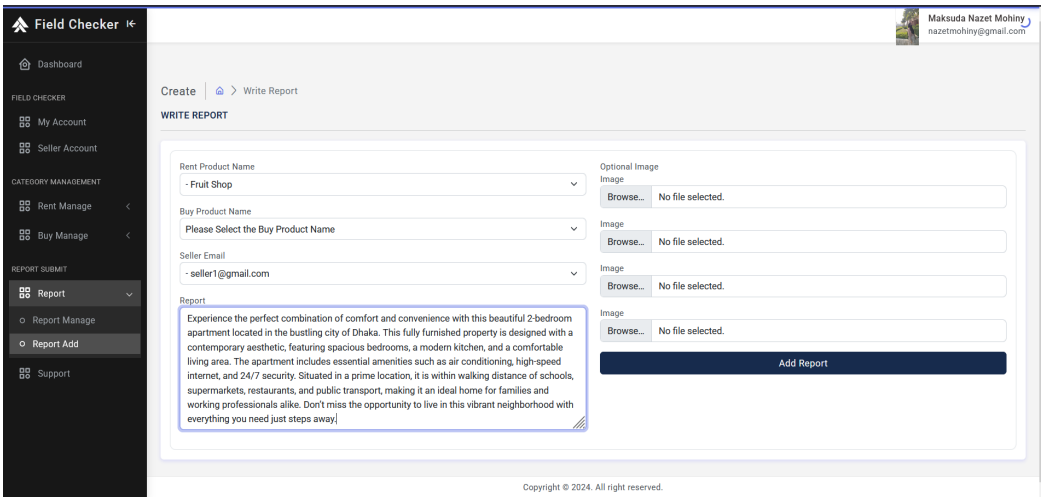


Figure 5.13: Report Generation into FieldChecker Dashboard

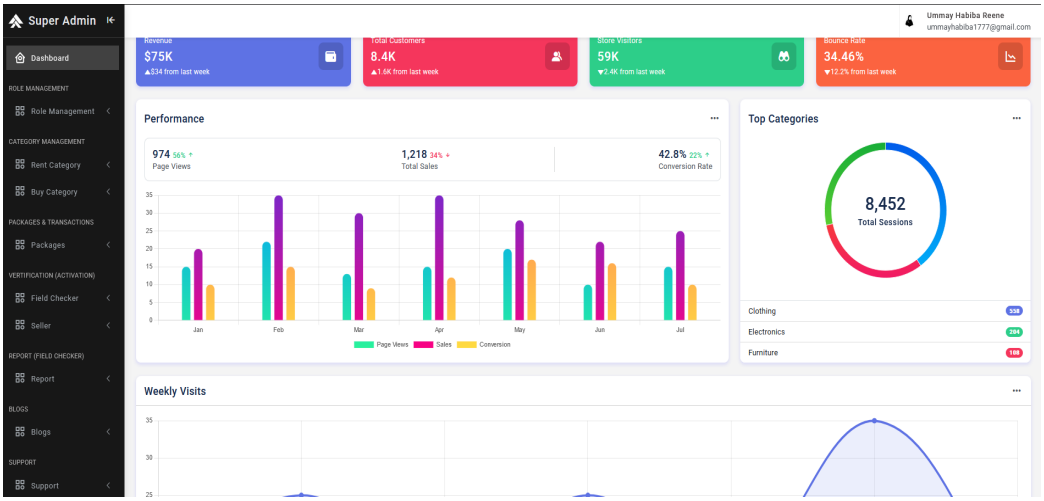


Figure 5.14: Admin Dashboard

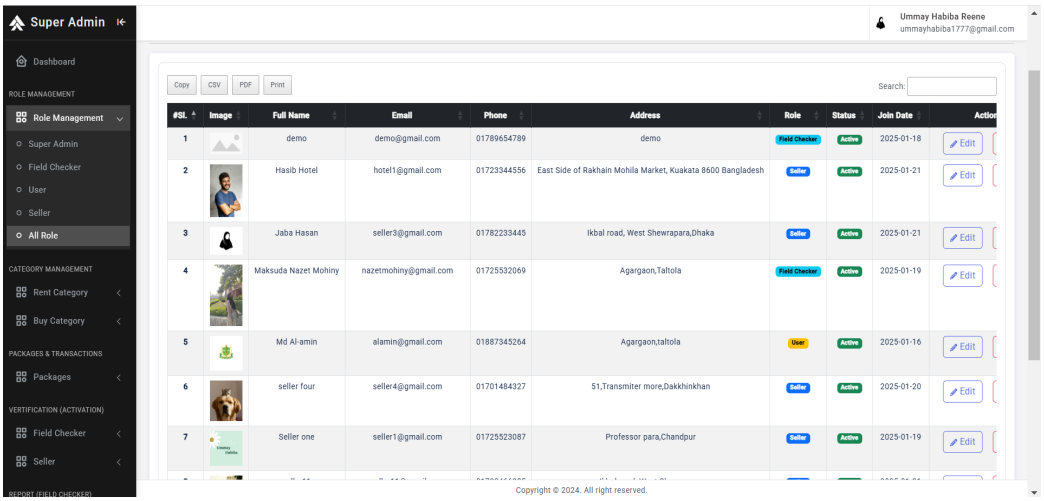


Figure 5.15: Role Management from Admin Dashboard

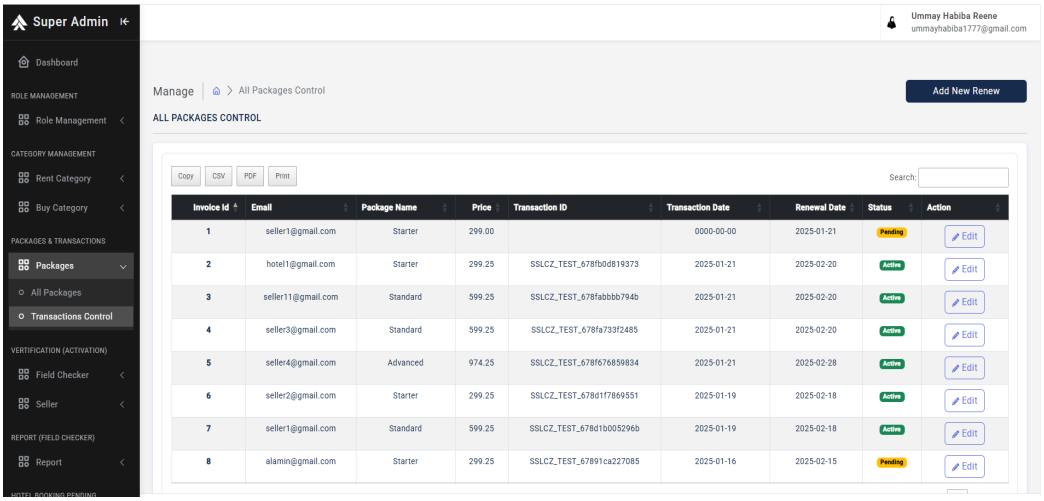


Figure 5.16: All Transaction Detail in Admin Dashboard

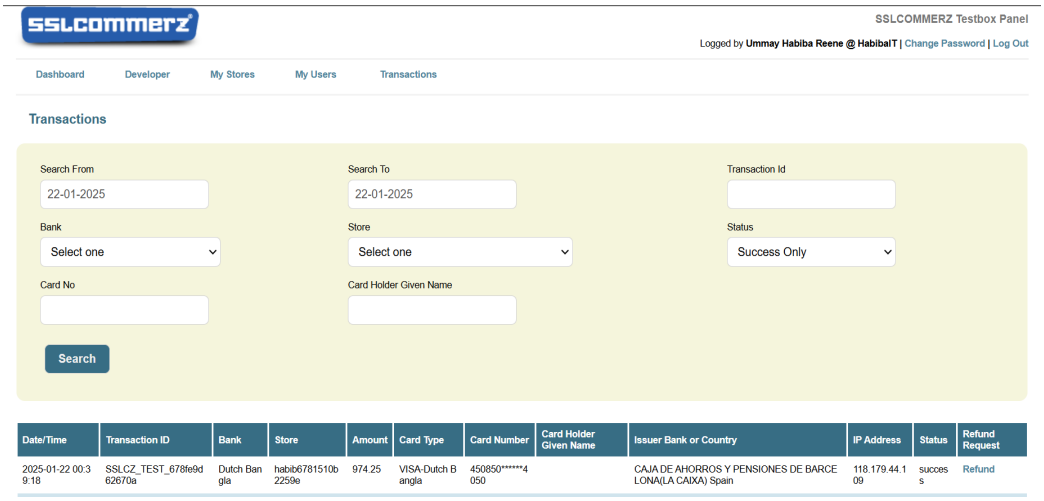


Figure 5.17: SSLCommerz Transaction List

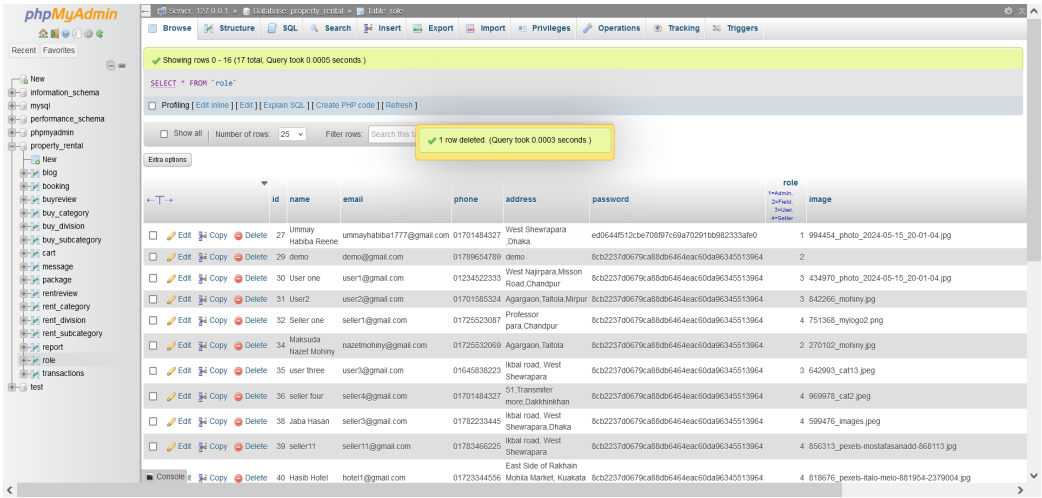


Figure 5.18: All Roles in Database

## 5.4 Security Functions Implemented

- `mysqli_real_escape_string`**:**
  - `mysqli_real_escape_string` is a function in PHP used to escape special characters in a string for use in an SQL query.
  - It helps prevent SQL injection attacks.
  - This function is particularly useful for handling user input safely in SQL queries.

```
$name      = mysqli_real_escape_string($db, $_POST['name']);
$cateId    = mysqli_real_escape_string($db, $_POST['cateId']);
$title     = mysqli_real_escape_string($db, $_POST['title']);
$details   = mysqli_real_escape_string($db, $_POST['details']);
$status    = mysqli_real_escape_string($db, $_POST['status']);

$image     = mysqli_real_escape_string($db, $_FILES['image']['name']);
$tmpImg    = $_FILES['image']['tmp_name'];
```

Figure 5.19: Prevention for Malicious SQL Injection in the Input Field

- **SHA-1 (Secure Hash Algorithm 1):**
  - SHA-1 is a cryptographic hash function designed by the National Security Agency (NSA).
  - It takes an input and produces a fixed-size 160-bit (20-byte) hash value.
  - The hash value is often rendered as a 40-digit hexadecimal number.
  - It is primarily used for:
    - Data integrity checks.
    - Digital signatures.

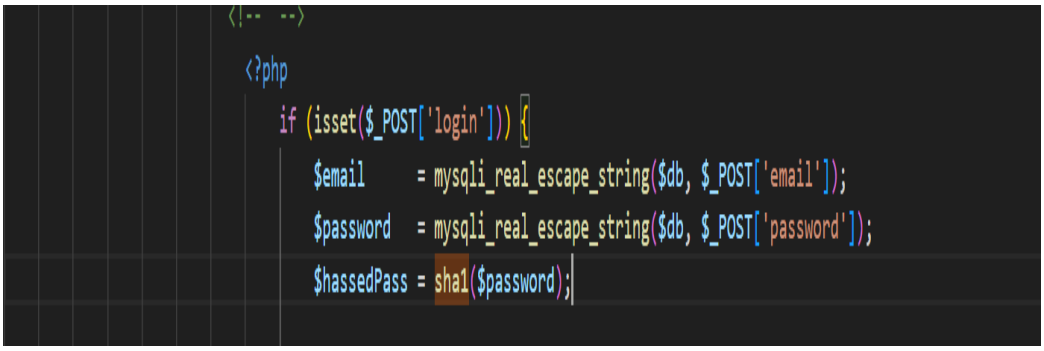


Figure 5.20: Password Security with SHA-1 function

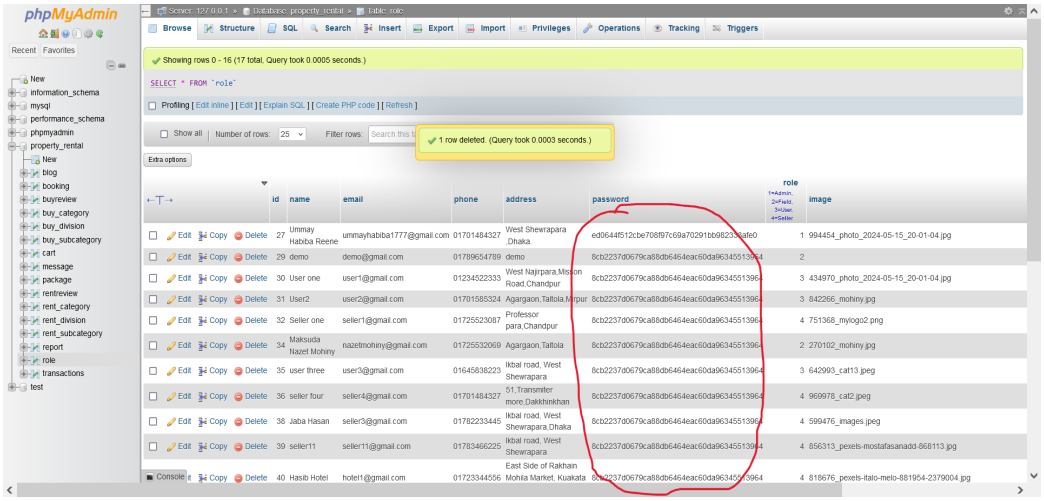


Figure 5.21: Hashed Password in Database

## 5.5 Payment gateway implemented

### 5.5.1 SSLCommerz Sandbox [4]

- **Overview:**
  - The SSLCommerz Sandbox environment is a testing platform that simulates real transactions without using actual money.
  - It allows developers to test the integration of the payment gateway before going live.
  - Transactions in the sandbox environment use mock payment details and responses.

- **Features:**
  - Provides a safe and controlled environment for testing payment functionality.
  - Simulates various payment methods, such as credit/debit cards and mobile banking.
  - Offers logs and transaction reports for debugging and validation.
- **Purpose:**
  - Validate the integration of SSLCommerz APIs with the platform.
  - Ensure accurate handling of payment requests, responses, and callbacks.
  - Identify and resolve potential issues before moving to the live environment.

```php
// Send request to SSLCOMMERZ API
$direct_api_url = "https://sandbox.sslcommerz.com/gwprocess/v3/api.php";

$handle = curl_init();
curl_setopt($handle, CURLOPT_URL, $direct_api_url);
curl_setopt($handle, CURLOPT_TIMEOUT, 30);
curl_setopt($handle, CURLOPT_CONNECTTIMEOUT, 30);
curl_setopt($handle, CURLOPT_POST, 1);
curl_setopt($handle, CURLOPT_POSTFIELDS, $post_data);
curl_setopt($handle, CURLOPT_RETURNTRANSFER, true);
curl_setopt($handle, CURLOPT_SSL_VERIFYPEER, FALSE);  // Keep it false if running locally

$content = curl_exec($handle);
$code = curl_getinfo($handle, CURLINFO_HTTP_CODE);

if ($code == 200 && !(curl_errno($handle))) {
    curl_close($handle);
    $sslcommerzResponse = $content;
} else {
    curl_close($handle);
    echo "FAILED TO CONNECT WITH SSLCOMMERZ API";
    exit;
}
```

Figure 5.22: Data Send Through SSLCommerz

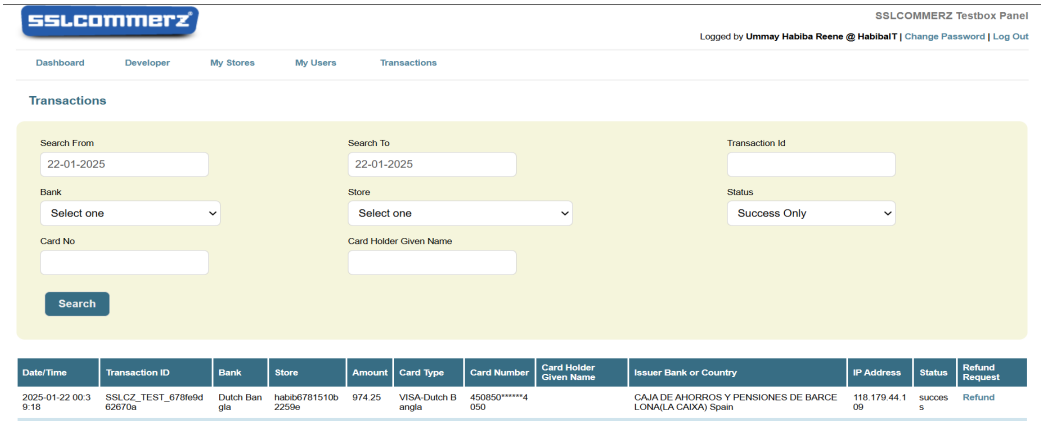


Figure 5.23: SSLCommerz Transactions

## 5.6 Performance Testing

Performance testing is a critical phase in the software development lifecycle to ensure the system performs efficiently under various conditions. It evaluates the application's speed, scalability, stability, and responsiveness when subjected to a range of workloads. This section outlines the test cases for the project, including scenarios, steps, and results.

### 5.6.1 Test Cases

- Each test case will be executed manually by following the outlined steps.
- The actual results will be recorded, and any discrepancies will be noted.
- A ”Status” column will indicate whether the test passed or failed:
  - **Passed:** The actual result matches the expected result.
  - **Failed:** The actual result deviates from the expected result.
- Issues identified during testing will be reported and resolved before final deployment.
- This manual testing ensures that the platform meets functional requirements and provides a reliable and user-friendly experience.

Table 5.1: Test Cases for the Project

| Test Case ID | Test Scenario | Test Steps | Expected Result | Actual Result | Status |
|---|---|---|---|---|---|
| TC001 | User Login | 1. Navigate to the login page.<br>2. Enter valid credentials.<br>3. Click the ″Login″ button. | User is redirected to their dashboard based on their role. | As expected | Passed |
| TC002 | Invalid Login | 1. Navigate to the login page.<br>2. Enter invalid credentials.<br>3. Click the ″Login″ button. | Error message is displayed: ″Invalid credentials. Please try again.″ | As expected | Passed |
| TC003 | Add Property (Seller) | 1. Log in as a Seller.<br>2. Navigate to ″Add Property″.<br>3. Fill in all fields.<br>4. Submit. | Property is successfully listed in ″Pending″ status. | As expected | Passed |
| TC004 | Property Search (Buyer) | 1. Navigate to the search bar.<br>2. Enter keywords.<br>3. Apply filters.<br>4. View results. | Filtered property results are displayed dynamically with pagination. | As expected | Passed |
| TC005 | Field Checker Approval | 1. Log in as a Field Checker.<br>2. Inspect assigned properties.<br>3. Approve/reject submissions. | Property status updates to ″Approved″ or ″Rejected″. | As expected | Passed |
| TC006 | Admin Approve User | 1. Log in as an Admin.<br>2. Navigate to the ″Manage Users″ section.<br>3. Approve a user account. | User account status updates to ″Approved″. | As expected | Passed |
| TC007 | Generate CSV Report (Admin) | 1. Log in as Admin.<br>2. Navigate to ″Reports″.<br>3. Generate a CSV report of user activities. | CSV file is downloaded containing the requested data. | As expected | Passed |

Table 5.2: Test Cases for the Project

| **Test Case ID** | **Test Scenario** | **Test Steps** | **Expected Result** | **Actual Result** | **Status** |
|---|---|---|---|---|---|
| TC008 | Non-editable Email in Profile | 1. Log in as a user.<br>2. Go to ″Edit Profile″.<br>3. Try to edit the email field. | Email field is non-editable and displays the correct email address. | As expected | Passed |
| TC009 | Wishlist Property (Buyer) | 1. Log in as a Buyer.<br>2. View a property listing.<br>3. Click ″wish″. | Property is saved to the user's profile under ″Wishlist″. | As expected | Passed |
| TC010 | Invalid Property Submission | 1. Log in as a Seller.<br>2. Navigate to ″Add Property″.<br>3. Leave required fields blank.<br>4. Submit. | Error messages are displayed for missing required fields. | As expected | Passed |

### 5.6.2 Some Important Screenshots for Manual Testing

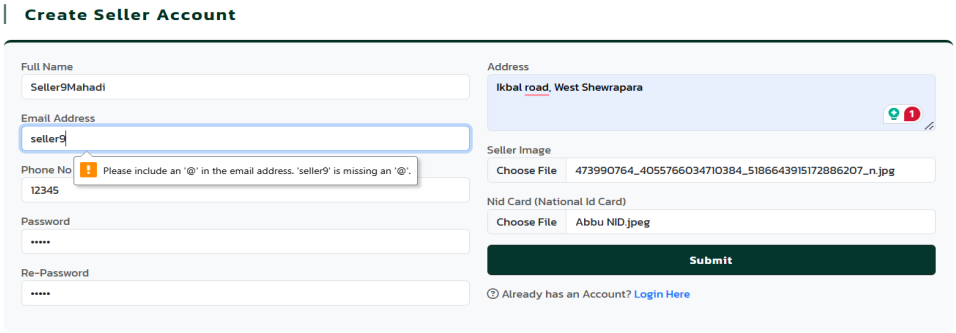


Figure 5.24: Email Authentication in seller registration

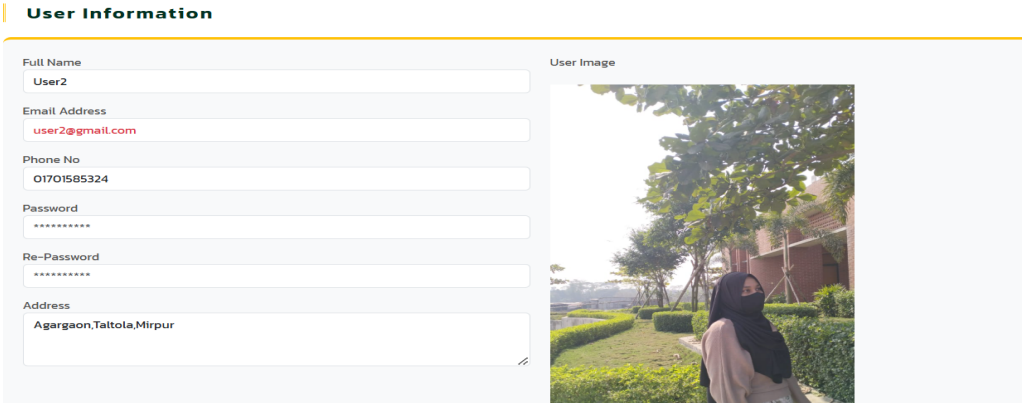


Figure 5.25: Email cant not be Changed in Profile Updation

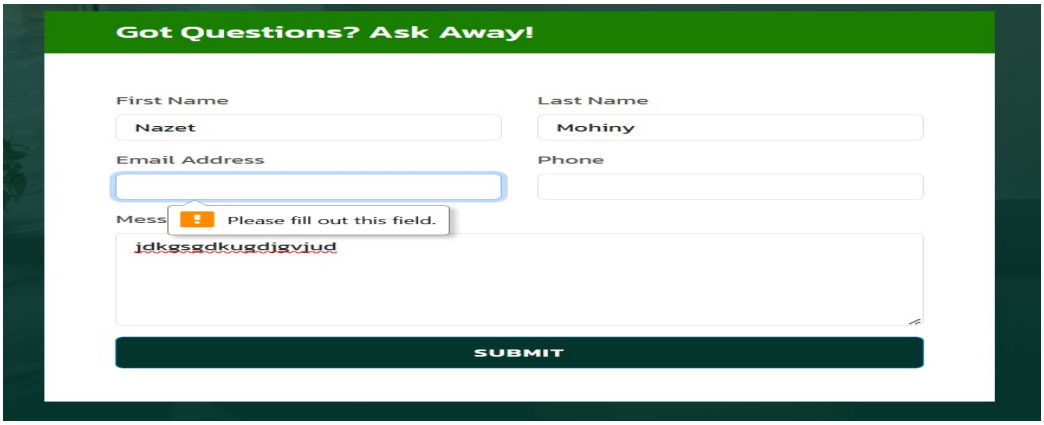


Figure 5.26: Email must Needed for Question Submission

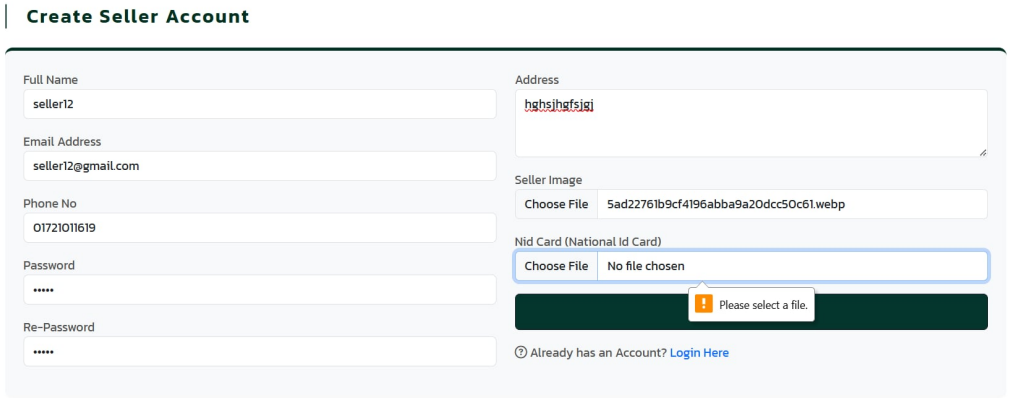


Figure 5.27: Seller Registration must Needed NID

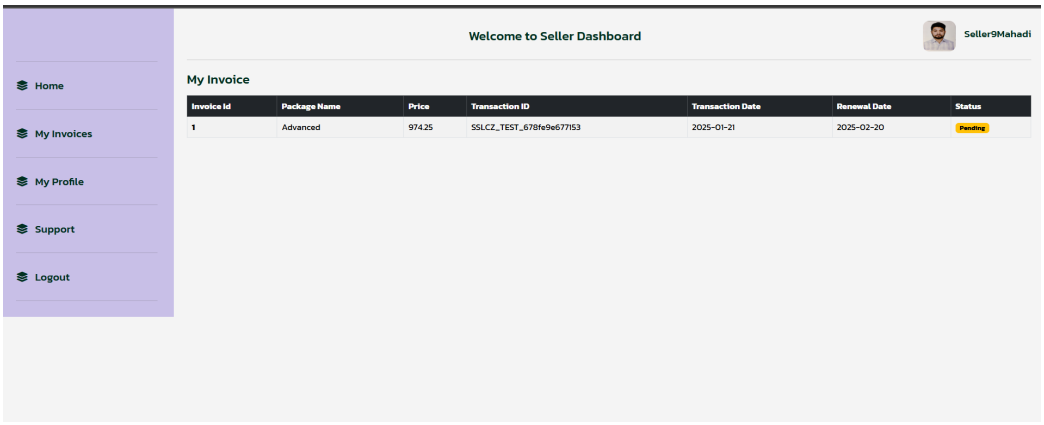


Figure 5.28: Seller does not have any Buy Rent Option When Payment activation is pending

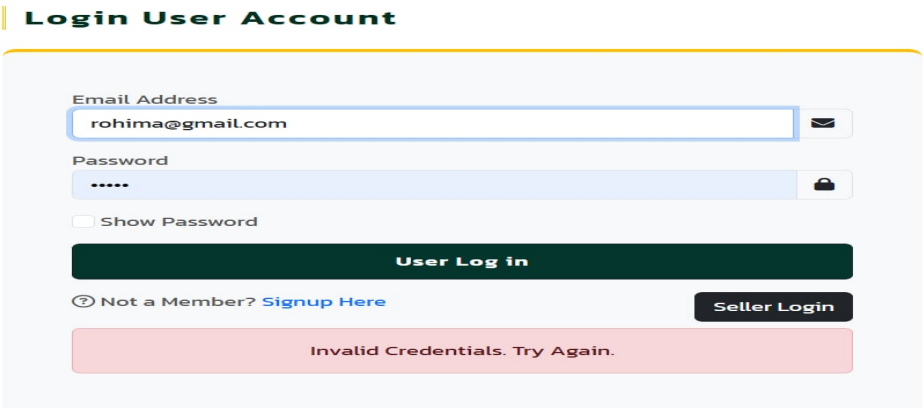


Figure 5.29: Wrong Password Input Test

## 5.7 Observations

- The platform provides streamlined workflows for sellers, buyers, and field checkers, ensuring an efficient property management process.
- Secure payment integration with SSLCommerz enhances reliability and trustworthiness in transactions.
- Role-based dashboards separate functionalities clearly, catering to the specific needs of admins, sellers, buyers, and field checkers.

## 5.8 Conclusion

The GrihoSmart platform has successfully met its objectives, providing a robust and efficient solution for property transactions. The results indicate that the platform is scalable, secure, and user-friendly, making it a valuable tool for the real estate market in Bangladesh.

# 6. Conclusion

## 6.1 Summary

The **GrihoSmart: A Real Estate Web Platform** project successfully addressed the challenges of property transactions in the Bangladeshi real estate market by providing a secure, user-friendly, and scalable solution. The platform's key features include role-based dashboards for sellers, buyers, and admins, property listing management, field verification, payment gateway integration, and dynamic search and filtering options.

The project emphasizes the importance of secure and transparent property transactions through robust authentication, encryption, and data validation mechanisms. The integration of payment gateways and notification systems further enhances the user experience, making GrihoSmart a comprehensive and efficient solution for property management.

While the platform has demonstrated its potential, there is room for further research and improvement to address limitations and introduce advanced features.

## 6.2 Limitations and Future Works

### 6.2.1 Limitations

- Although sellers can sell their properties by purchasing specific packages, they can currently display an unlimited number of properties. This feature will be restricted to a defined limit in future versions.

- Live chatting functionality is currently unavailable and will be implemented using SMTP in future iterations.
- The platform is currently hosted on a local server, which restricts access to only local users or machines connected to the same network, limiting real-world usability and global reach.
- Performance and scalability testing are limited as the local server may not simulate real-world conditions, such as handling high traffic or concurrent users.

### 6.2.2 Future Improvements

- Limit the number of property listings per seller based on their purchased packages to ensure fairness and system scalability.
- Migrate the platform from a local server to a cloud-based infrastructure (e.g., AWS, Azure, Google Cloud) to ensure global accessibility, better performance, and scalability.
- Implement real-time chat functionality between buyers and sellers to improve communication and convenience.
- Implement a dynamic pricing model that considers market trends, location, demand, and seasonality to suggest optimal pricing for properties.

## 6.3 Recommendations

Based on the findings and outcomes of the project, the following recommendations are proposed:

- **Infrastructure Upgrade:** Consider migrating to a dedicated or cloud hosting platform to handle increased user loads and ensure consistent performance.
- **User Engagement Strategies:** Enhance user engagement through personalized notifications, newsletters, and targeted promotions.
- **Regulatory Compliance:** Collaborate with local authorities to ensure compliance with property laws and regulations.

- **Partnerships with Agencies:** Establish partnerships with real estate agencies to increase the platform's credibility and reach.
- **Sustainability Initiatives:** Promote eco-friendly practices by encouraging remote property viewings through virtual tours.

## 6.4 Final Thoughts

The **GrihoSmart** platform has demonstrated its potential to revolutionize property transactions in Bangladesh. By addressing critical challenges and implementing innovative features, the project has laid a solid foundation for future advancements. Continued development and user-centric enhancements will further solidify GrihoSmart's role as a leading real estate solution in the region.

# Reference


[1] Bangla mart. https://www.banglamart.com/rental-property. Accessed Date: 2025-01-22.

[2] Bd housing. https://www.bdhousing.com/. Accessed Date: 2025-01-22.

[3] Outsourcing bd. https://www.outsourcing.com.bd/contact. Accessed Date: 2025-01-22.

[4] Ssl commerz. https://sandbox.sslcommerz.com/manage/?request=c2VjdXJpdHllbmNyaXB0bG9naW46dmlld3NlY3VyaXR5ZW5jcmlwdA%3D%3D&id=c2VjdXJpdHllbmNyaXB0MXNlY3VyaXR5ZW5jcmlwdA%3D%3D. Accessed Date: 2025-01-22.

[5] Vrbo. https://www.vrbo.com/search?adults=2&regionId=604&destination=Bangkok%2C%20Bangkok%20Province%2C%20Thailand&isInvalidatedDate=false&theme=&userIntent=&semdtl=&sort=RECOMMENDED. Accessed Date: 2025-01-22.

# Appendices (Optional)

Include in the appendices information that could not be included in the formal body of the report because it would disrupt the continuity of the discussion. Background materials, experimental data tables, and extra documentation should be placed in the appendix.