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Development of Smart House Renting Web Application

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ABSTRACT

Finding suitable rental housing in urban areas can be challenging when done through traditional means. Similarly, property owners often face difficulties in securing tenants by simply displaying rental signs, which may result in financial losses. A digital platform can effectively address this issue by connecting tenants and landlords in a streamlined manner.

This study focuses on developing a web-based platform tailored for Bangladesh, enabling tenants to register with their phone numbers, verify their identity, explore available rental options, and communicate directly with landlords. Property owners can also create accounts, undergo a verification process, manage their listings, and review tenant details before renting out their properties.

The platform has been tested for efficiency and ease of use, offering innovative features that set it apart from existing rental websites in Bangladesh. By simplifying the rental search process and expanding the availability of listings across various locations, the system provides a more reliable and accessible solution for both parties. Additionally, it promotes secure and transparent interactions between landlords and tenants.

With its user-friendly interface and advanced functionalities, this digital house rental solution aims to enhance the overall experience of renting properties, making the process more convenient and trustworthy for users across Bangladesh.

1. INTRODUCTION

The development of rental housing has become a significant aspect of modern urban living. This chapter provides an overview of the study's background, problem statement, objectives, scope, justification, expected outcomes, budget, and timeline. Housing plays a crucial role in ensuring a good quality of life, carrying economic, social, and cultural significance. While national prosperity is often measured by economic growth, its true value lies in addressing social challenges such as access to adequate housing.

Housing is a key driver of economic growth, with shelter being a fundamental necessity. Many families choose rental housing based on their income and personal circumstances. However, the availability of quality rental properties remains a challenge, as demand continues to rise. Expanding the supply of rental housing benefits both tenants and landlords, with property owners generating steady income through rent. Managing rental properties, however, can be complex, particularly when landlords face financial losses due to unpaid rent. These challenges highlight the need for an efficient rental house management system.

In Bangladesh, the rental housing sector is a vital component of urban life. According to the **Bangladesh Labor Force Survey 2016-17**, approximately **44% of urban dwellings** are rented, whereas in rural areas, this figure drops to **3%**. Data from the **Bangladesh Bureau of Statistics (BBS)** indicates that housing and rent account for **17.25%** of a household's monthly expenses, which rises to nearly **25%** when utility costs are included.

Rapid urbanization attracts people from various regions to cities in search of better job opportunities and higher education. Many individuals relocate to cities like Dhaka with aspirations of financial growth, career advancement, and academic excellence. A large percentage of students, particularly **97% of those relocating for higher education**, seek rental housing. However, securing a suitable rental home is often a **time-consuming and complicated** process.

Given these challenges, a well-structured and efficient online rental house management system is essential. Such a platform can simplify the process for both tenants and landlords, ensuring smoother transactions and improved accessibility to rental properties in Bangladesh.

2. Literature Review

To gain a comprehensive understanding of house rental management systems, numerous research papers and websites were reviewed. Existing rental platforms have certain limitations that reduce their efficiency and user engagement. By analyzing these shortcomings, this study aims to develop an improved system that addresses challenges in both local and global rental markets. Some key studies reviewed are as follows:

- **Gommans, Henry Peter, et al. (2014)** examined traditional house rental management and highlighted the inefficiencies of manual processes involving excessive paperwork. Their study led to the development of a property rental management system aimed at reducing these challenges. While the system offered a user-friendly interface, it lacked scalability.
- **Ganiyu, S. O., et al. (2018)** investigated the rental housing challenges in the Minna metropolis, Niger State. Their findings revealed that tenants and landlords primarily relied on conventional methods such as posters, which were inefficient and prone to fraud. The study emphasized the need for an ICT-based solution to improve rental management.
- **Hasnat, I., et al. (2019)** focused on the difficulties bachelors face in finding rental accommodations, as many landlords hesitate to rent to them. To address this issue, the authors proposed the "Bachelor House Rental Management System," designed to simplify the search for suitable rental housing based on location and preferences.

- **Voumick, Dipta, et al. (2021)** developed an online rental platform specifically for Bangladesh. Their system enabled tenants to connect seamlessly with landlords, ensuring mutual benefits for both parties. The study emphasized the need for a structured online rental marketplace.

By analyzing these studies, this research identifies gaps in existing systems and proposes an enhanced rental management solution that is more efficient, scalable, and tailored to local needs.

3. Methodology

The research methodology provides a structured approach to the development of the proposed system, detailing the methods, techniques, and frameworks used in the study. This section outlines the data collection process and the system development approach.

The methodology adopted consists of multiple stages. Initially, a literature review was conducted to critically evaluate previous works and identify existing gaps. Following this, a structured development plan was formulated for designing and implementing the rental website. The final deliverable is a fully functional platform that simplifies rental management for both tenants and landlords.

Software Development Approach

This study follows the **Waterfall Model**, a widely used software development lifecycle (SDLC) methodology. The Waterfall Model follows a sequential approach, meaning each phase must be completed before progressing to the next. The key phases include:

1. **Requirement Analysis & Feasibility Study** – Identifying system needs, functional requirements, and technical feasibility.
2. **System Analysis** – Evaluating user expectations and defining core functionalities.
3. **Design Phase** – Structuring the system architecture and user interface.
4. **Implementation & Coding** – Developing the system based on the finalized design.
5. **Testing** – Ensuring the system functions correctly by identifying and fixing errors.
6. **Deployment & Maintenance** – Launching the system and making continuous improvements based on user feedback.

Functional & Non-Functional Requirements

The system requirements are classified into:

- **Functional Requirements:** Features that enable tenants to search for rental properties, landlords to list properties, and both parties to communicate securely.
- **Non-Functional Requirements:** Performance, security, scalability, and user-friendliness of the platform.

After completing the design, coding, and implementation, extensive testing was performed to identify and fix any errors. Once validated, the system was deployed and entered the maintenance phase for ongoing updates and improvements.

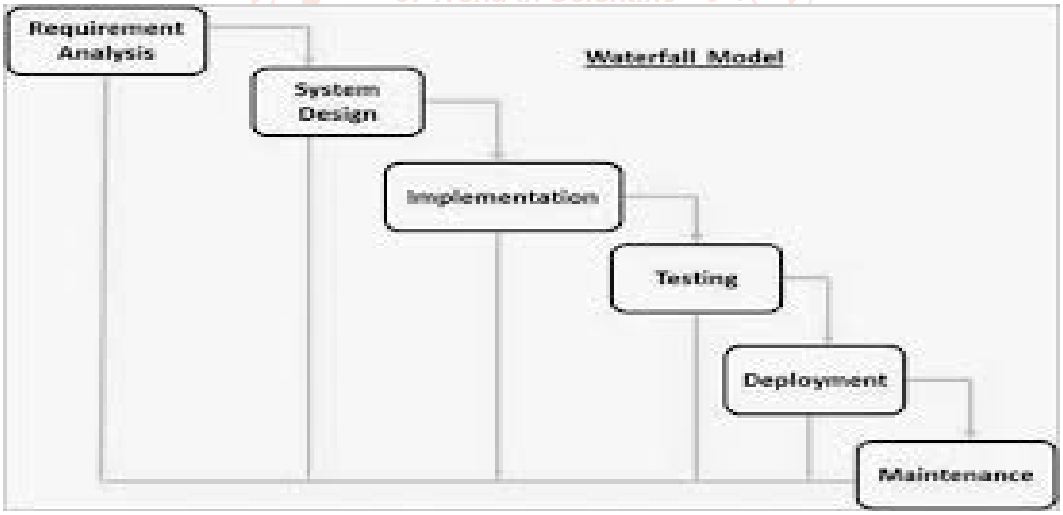

Figure 1: Waterfall Model Diagram *(Diagram to be inserted)*

4. System Design

System design involves structuring the architecture, components, interfaces, and data flow of a system to ensure it meets user requirements. The primary users of this system are the general public, so the website has been designed to be dynamic and user-friendly, ensuring accessibility for all.

This system design follows a structured approach to creating a new and efficient rental management platform, integrating systems theory into product development. The design process consists of multiple components, ensuring careful implementation for optimal performance.

4.1. Development Approach

The system design is divided into two key phases: **Logical Design** and **Physical Design**.

- **Logical Design:** This phase focuses on defining the system's structure, including input sources, output destinations, databases, and data flow processes. The user requirements are analyzed, determining how information will flow into and out of the system. Data flow diagrams and database design models are used to represent this process.

- **Physical Design:** In this phase, the logical design is transformed into a working system by specifying detailed design specifications. These specifications guide developers in writing the necessary code to process user input, manage data flow, and generate outputs, either as reports or visual displays.

4.2. Technologies Used

The system consists of two main components: **Frontend** and **Backend**. The following technologies are used for development:

Frontend Development:

1. **HTML (Hypertext Markup Language):** Used for structuring the content and elements of the website, including sections, paragraphs, headings, and media.
2. **CSS (Cascading Style Sheets):** Responsible for the visual design, including layout, colors, fonts, spacing, and responsiveness. It ensures the separation of content and presentation.
3. **JavaScript:** A dynamic programming language that enhances interactivity and client-side functionalities, allowing users to interact with the system seamlessly.

Backend Development:

1. **PHP (Hypertext Preprocessor):** A server-side scripting language that processes user requests, manages system logic, and connects with the database. It is widely used for web applications and integrates with various frameworks.
2. **MySQL:** A relational database management system (RDBMS) used to store, manage, and retrieve structured data efficiently. It ensures minimal data redundancy and optimized performance.

Database Management:

The system database is structured to store user data, rental listings, and transaction records efficiently. It ensures quick access, modification, and retrieval of information while maintaining security and integrity. The primary objective is to enable fast, flexible, and organized data handling.

4.3. Flowchart

Figure.2 Flowchart of the system

5. Implementation

To facilitate house rentals, the proposed system has been developed as a web application using **HTML, CSS, JavaScript, and PHP** to create an interactive and responsive platform. Traditionally, individuals searching for rental properties must visit locations physically, which is both time-consuming and costly. To address this issue, **"Easy Rent Hub"** has been designed to streamline the process, allowing tenants to browse and book houses, apartments, or hostels online from anywhere.

This online platform aims to **enhance user experience, increase efficiency, and improve property management** for both tenants and landlords. The implementation phase focuses on transforming the project's vision into reality by developing, testing, and deploying the system while ensuring smooth functionality.

5.1. System Functionality

The system is structured into multiple processing phases to ensure seamless operation. The major components of implementation include:

1. Database Management:
- The database is structured logically to store, retrieve, and manage user and property-related data efficiently.
- It records user profiles, rental listings, transactions, and communication history.
- A **cron job** is scheduled on the server to clean and process unstructured data before analysis.

2. Backend Processing:
- The backend is responsible for **user registration, authentication, and property management**.
- Once data is processed, it is stored in the database and made available for frontend display.
- The **controller layer** validates, processes, and updates the database as required.

3. Data Security & Encryption:
- Sensitive user information is encrypted before transmission to ensure security.
- End devices decrypt the received data for visualization, preventing unauthorized access.

5.2. Frontend Implementation

A user-friendly and intuitive interface is critical for accessibility and ease of use. Since users access the platform through various devices—including **smartphones, laptops, tablets, and desktops**—the website has been made fully **responsive** to ensure smooth navigation across all screen sizes.

Technologies Used for Frontend:
1. **HTML & CSS:** For structuring web pages and defining layouts, colors, and styles.
2. **JavaScript:** To enhance interactivity and improve user experience.
3. **PHP:** To handle backend operations, including user authentication and data retrieval.

User Access & Authentication:
- **User Registration & Login:**
  - Tenants and landlords must register and authenticate themselves to use the platform.
  - Password protection ensures account security.
- **Landlord Dashboard:**
  - Only registered landlords can list their properties for rent.
- **Tenant Dashboard:**
  - Users can log in, search for houses, and communicate with property owners.

By implementing a structured approach, **Easy Rent Hub** ensures a **seamless** and **efficient** rental experience, reducing the challenges traditionally associated with house hunting and property management.

Figure.3 Implementation of the project.

6. Basic Diagram :-

Figure.4 shows the basic diagram of this system. It shows that the admin can control the whole system and also control the database. Owners can advertise their properties with specifics, and tenants can look for places to rent a home. The owner and tenant can also talk to each other using a conversation system. Admin has the full access of database and the system. Modification and monitoring will be done by the admin. Owners and tenants will register in the system and the registration data will be saved in database for further enquiry and verification.

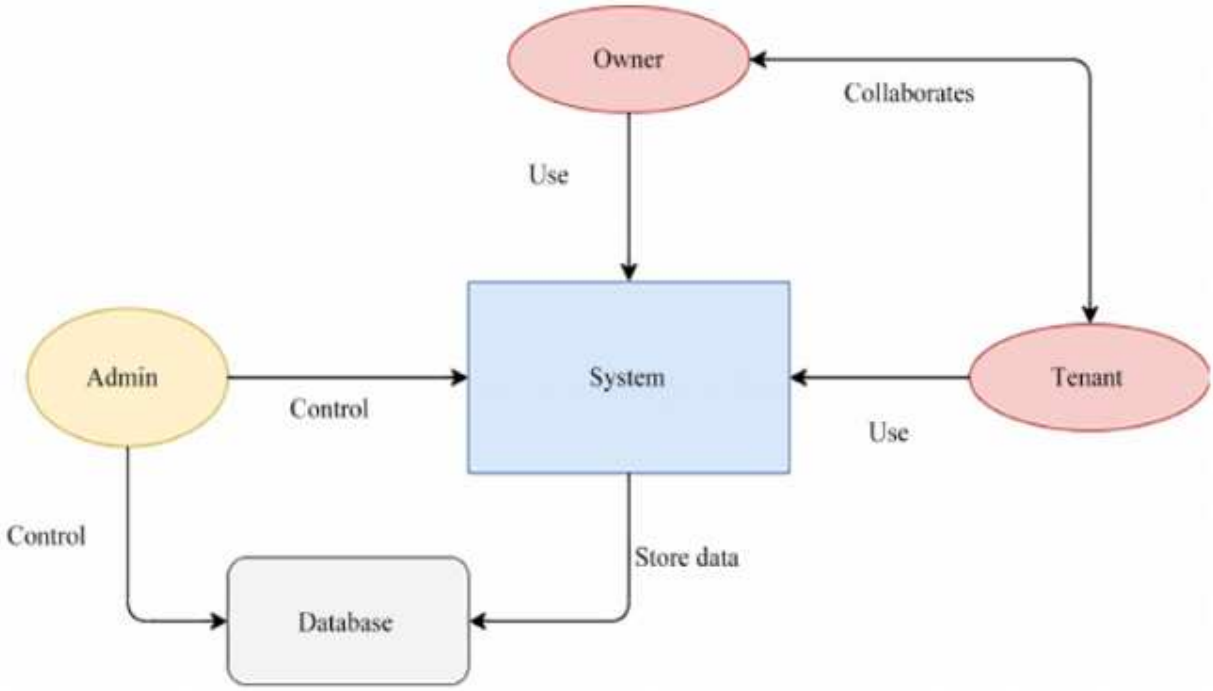

Figure.4 Basic Diagram of the system

7. Results & Analysis

This section outlines the features and functionality of the system from a general user's perspective.

7.1. Sign-Up Page

The registration process consists of **six input fields:**

- Full Name
- Username
- Email (must be verified)
- Contact Number (must be unique)
- Password
- Confirm Password

Users must fill in all required fields to create an account. The system also provides an option to reset information before submission.

7.2. Sign-In & Post Creation

The login page consists of two fields: **Username** and **Password**. Once logged in, users can access various features of the system.

For property owners, there is a **"Create Post"** section where they can list rental properties by uploading relevant details and images. Tenants can browse through these listings and contact owners directly.

Additionally, **admin users** have moderation privileges, allowing them to remove inappropriate or misleading posts.

7.3. Owner and Tenant Profile Management

Both **owners and tenants** have dedicated profile pages where they can manage their personal information.

- **Owner Profile:**
  - Full Name
  - Address
  - Verified Email
  - Contact Number
  - House ID
- **Tenant Profile:**
  - Full Name
  - Tenant ID
  - Address
  - Contact Number
  - Verified Email

Users can update their information at any time.

7.4. Password Reset Functionality

The system includes a **password reset** feature, allowing users to change their existing passwords securely. The password must meet security requirements, with a length of at least **six characters and a maximum of 50 characters**.

7.5. Messaging System

A built-in **conversation system** enables communication between users.

- Users enter their name and message in designated fields.
- Messages can be sent instantly using the **"Send"** button.
- Users can delete their messages, but cannot modify others' messages.
- This feature ensures seamless interaction between tenants and landlords.

7.6. Database Structure

The system's database efficiently manages and organizes user and property data.

- **Users Table:** Stores general user registration data.
- **Owner & Tenant Tables:** Categorize users based on their roles.
- **Post Table:** Stores rental listings uploaded by property owners.
- **Comments Table:** Stores discussions between owners and tenants.

The structured database allows smooth data retrieval, updates, and management.

8. Conclusion

This research successfully developed an **online, web-based smart house rental system** aimed at simplifying the rental process for both landlords and tenants. The platform

provides an intuitive interface, allowing users to conduct transactions efficiently.

Key benefits of the system include:

- **Real-time Communication** – A chat system enhances interaction between property owners and tenants.
- **Location Tracking** – Integrated mapping features help tenants find rental properties easily.
- **Enhanced Security** – User authentication and data encryption ensure **secure** and **private** transactions.
- **User-Friendly Interface** – A responsive and interactive design makes navigation seamless across all devices.

Overall, this **smart rental system** enhances accessibility, **reduces manual efforts**, and **optimizes** the rental process, providing an efficient solution for housing needs.

References:

[1] Trasad, A. (2016) Mundrisoft. https://mundrisoft.com/tech-bytes/flowchart-in-software-engineering-testing

[2] Real Estate and Housing Association of Bangladesh (REHAB) (2004) Annual Report.

[3] Sharma, L. (2017) Toolsqa. https://www.toolsqa.com/software-testing/waterfall-model

[4] Flat Rent in Dhaka. bdhousing. https://www.bdhousing.com

[5] Taipalus, K. (2006) A Global House Price Bubble? Evaluation Based on a New Rent-Price Approach. Bank of Finland Research Discussion, Paper No. 29/2006, 68. https://doi.org/10.2139/ssrn.1018329

[6] Alchian, B.A.-K. (1973) On a Correct Measure of Inflation. Journal of Money, Credit and Banking, 5, 173-191. https://doi.org/10.2307/1991070

[7] Zhu, H. (1983) Rent Increases Linked to CPI. 1985-1987: Indexation Temporarily Suspended. 1991: Freely Negotiated New Rental Fixed Term Contracts Introduced. 1997: Limits Set to New Short-Term Agreements. Freely Negotiated Rents in New Contracts. Minimum Duration of Contracts of Three Years, 27-28.

[8] Bristi, W.R., Chowdhury, F. and Sharmin, S. (2019) Stable Matching between House Owner and Tenant for Developing Countries. 2019 10th International Conference on Computing, Communication and Networking Technologies (ICCCNT), Kanpur, 6-8 July 2019, 1-6. https://doi.org/10.1109/ICCCNT45670.2019.8944625

[9] Juha Kilponen, A.R. (2007) Labour and Product Market Competition in a Small Open Economy—Simulation Results Using a DGE Model of the Finnish Economy. Bank of Finland Research Discussion, Paper No. 5/2006, 54, 30 Aug. https://doi.org/10.2139/ssrn.1010631

[10] Gommans, H.P., Njiru, G.M. and Owange, A.N. (2014) Rental House Management System. International Journal of Scientific and Research Publications, 4, 1-24.

[11] Shriram, R.B., Nandhakumar, P., Revathy, N. and Kavitha, V. (2019) House (Individual House/Apartment) Rental Management System. International Journal for Computer Science and Mobile Computing, 19, 143.

[12] Nandhini, R., Mounika, K., Muthu Subhashini, S. and Suganthi, S. (2018) Rental Home System for Nearest Place. International Journal of Pure and Applied Mathematics, 19, 1681.

[13] The Writing Center. https://writingcenter.unc.edu/tips-and-tools/conference-papers

[14] Khan, F. (2011) Rental Housing. United Nations Human Settlements Programme.

[15] Kamila Sommer, P.S.R.V. (2011) Run-Up in the House Price-Rent Ratio: How Much?

[16] Morris, A.L.R.F.M. and Davis, A. (2008) The Rent Price Ratio for the Aggregate Stock of Owne-Occupied Housing.

[17] Alakeson, V. (2011) Making a Rented House a Home: Housing Solutions for "Generation Rent". Resolution Foundation, London, 4-42. https://www.emcouncils.gov.uk/write/documents/resolution%20foundation%20housing_report_final.pdf

[18] Ezebilo, E.E. (2017) Evaluation of House Rent Prices and Their Affordability in Port Moresby, Papua New Guinea. Buildings, 7, 114. https://www.researchgate.net/publication/321502634_Evaluation_of_House_Rent_Prices_and_Their_Affordability_in_Port_Moresby_Papua_New_Guinea https://doi.org/10.3390/buildings7040114

[19] Sharmeen, F. (2007) Modeling Urban House-Rent Variation in Bangladesh: A Study of Four Metropolitan Cities. http://lib.buet.ac.bd:8080/xmlui/handle/123456789/1699

[20] Khanam, S. (2004) Increasing Access to Housing for Low Income People in Bangladesh through Income and Employment Generation. Access to Services Program of ITDG, Volume 12, 2004-09-17.

[21] Talukder, D. (2014) Assessing Determinants of Income of Rural Households in Bangladesh: A Regression Analysis. Journal of Applied Economics and Business Research, 4, 80-106.

[22] Sarker, R., et al. (2008) Real Estate Financing in Bangladesh: Problems, Programs, and Prospects. AIUB Journal of Business and Economics, 7, 78-84. https://www.academia.edu/1559226/Real_Estate_Financing_in_Bangladesh_Problems_Programs_and_Prospects