

A Smart Rental Platform for Property Owners and Tenants Administration

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Abstract—The increasing rental demands in cities and towns are posing a challenge to owners of rental properties to manage their properties and tenants effectively. Conventional techniques such as using manual records and spreadsheets are time-consuming and error-prone. The objective of the project is to develop a Smart Rental Platform, a web-based application that enables owners of rental properties to manage their properties and tenants effectively. The system also enables tenants to view rental details and track their payment status and lodge complaints. The system enables effective rental management and enhances the efficiency of rental services.

Index Terms—Smart Rental Platform, Property Rental, Tenant Services, Property Services, Tenant Records.

I. INTRODUCTION

The rapid rate of urbanization and population growth in modern cities is one of the key factors that have contributed to the rising demand for rentals. As more people flock to urban centers in search of education, job opportunities, and business prospects, the importance of effective property rental services is rising. Property owners may have multiple rentals and tenants to manage, and it is not easy to keep records of all the rentals and tenants.

Most property owners have traditionally kept track of their rentals using paper documents, notebooks, and spreadsheets. The traditional methods of keeping track of property rentals are often cumbersome and are susceptible to human error. Important data regarding property rentals, tenant details, and agreements can be hard to keep track of using traditional methods. Moreover, traditional methods can cause data loss and duplication, and it can be hard to keep track of rental transactions

With the advancement of digital technology and web-based applications, many of the business processes are being transformed into efficient and effective business models. A web-based rental platform can help in simplifying property rental activities in an efficient and organized manner. A property rental web-based platform can offer a centralized facility where property rental information can be managed in an efficient and organized manner.

A smart rental platform offers a structured and efficient way of handling property rental activities. With a smart rental platform, property owners can efficiently manage multiple properties and tenants in an organized and efficient way. Tenants can also efficiently manage property rental information and communicate with property owners in an efficient and organized manner. Such a digital platform not only offers efficient management of property rental activities but also enhances transparency and communication.

Moreover, contemporary web technologies such as cloud databases, authentication mechanisms, and user interfaces facilitate the construction of reliable and scalable rental systems. These technologies allow users to access rental information using different devices, thereby increasing the flexibility and ease of managing property rentals.

Generally, the main aim of this research is to design and develop a smart rental system that simplifies property rental operations for both property owners and tenants. The proposed rental system is intended to facilitate the achievement of several features such as property registration, tenant information management, rent tracking, complaints, and document storage through a centralized web-based system. This helps to

improve the efficiency and organization of property-related information.

This research is intended to design and develop a user-friendly and reliable system that facilitates the achievement of efficient rental services and enhances the experience of both property owners and tenants.

II. LITERATURE REVIEW

In the last few years, many research works have been carried out to design digital systems that can help in the management of property rentals. Singh and Kumar (2019) have presented a web-based property management system that can replace traditional manual systems. The system can help property owners to efficiently manage their tenants and rentals.

Lee and Park (2018) have designed a smart property rental system that utilizes advanced web technologies. Sharma and Gupta (2020) have presented an online rental management system that can help property owners to efficiently manage their tenants and rentals. Similarly, Patel and Shah (2021) have presented a cloud-based rental management system that can help in the management of rentals.

In addition to this, Khan and Ali (2022) have presented a smart rental system that includes various components such as rent management, complaint management, and communication management.

III. PROBLEM STATEMENT

The increasing demand for rented houses has also increased the complexity of property rental operations. Most property owners still follow traditional methods of property and tenant information management, such as manual record-keeping or documentation of information in paper or spreadsheet formats. Such methods are not efficient and are also time-consuming, as there is a higher possibility of human error in such processes. Managing multiple properties and tenants using such methods can also create problems in maintaining accurate information and efficient tracking of rental operations.

One of the major problems faced by property owners is that there is usually a lack of a centralized information management system. Most property owners usually keep important information about property and tenants in various formats and locations, which makes it difficult to manage and access this

information in a most efficient manner. Such a lack of a centralized information management system also creates problems in tracking property and tenant information and in protecting this information from being lost.

Another major issue is that of difficulty in monitoring rent payments and communication between property owners and tenants. For instance, property owners may have to remind tenants of rent payments through personal communication. This may not be very effective and may vary in terms of implementation. Also, it is not always easy for tenants to access their property and rent details and related communications. Another issue with the current scenario is that of the lack of automation of various rental operations. For instance, without a digital platform, it is not always easy for property owners to automate various aspects of property management, such as tenant management and complaint handling. As a result, property owners may end up spending more time on such tasks instead of focusing on how to better the property rental services offered to clients.

IV. OBJECTIVE

The major aim of carrying out this research is to design and develop a smart rental platform that makes the process of rental property operations more accessible for both property owners and tenants. The proposed smart rental platform is intended to provide a central digital system for managing rental properties and tenants, and for monitoring rental transactions.

Another significant aim of carrying out this research is to design and develop a system that makes the process of rent tracking and tenant communication more efficient. This makes the process more accessible and helps reduce the problems associated with managing rental records.

In addition, the platform will offer the security of digital storage for property documents and rental information. Through the digitization of the rental process, the system will simplify the process and minimize the chances of data loss. Overall, the purpose of the research is to establish a reliable and user-friendly digital platform for the enhancement of efficiency, transparency, and convenience in the property rental process for property owners and tenants.

V. SYSTEM ARCHITECTURE

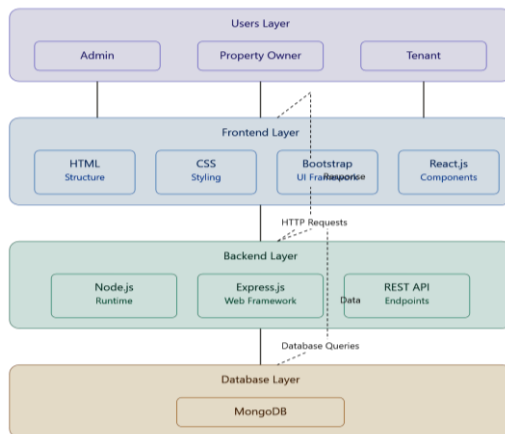


Fig.5.1 System Architecture

The Smart Rental Platform that has been proposed has a three-tier architecture that comprises the presentation layer, the application layer, and the database layer. This helps in the organization of the system components in an efficient manner.

1. Presentation Layer (User Interface)

The presentation layer deals with the interaction of the user. It offers a platform where the user can interact with the system's functionality through a web interface. In the platform, three types of users interact with the system:

- Admin
- Property Owner
- Tenant

Each user logs into the system based on their credentials. Each user has their own dashboard to interact with the system's functionality. The user interface allows users to interact with the system's functionality through various activities such as registering a property, managing a tenant, tracking the rent, submitting a complaint, and accessing the documents. The user interface is created using HTML, CSS, Bootstrap, and JavaScript.

Application Layer (Business Logic)

The application layer is used to handle the business logic of an application. This is where all the business logic is implemented. This layer is implemented using the Flask web framework. The application layer has several responsibilities. These responsibilities include:

- User Authentication
- Property Management

- Unit Management
- Tenant Information Management
- Rent Payment Tracking
- Complaint Handling
- Invoice Generation
- Document Management

All user requests are handled efficiently by this layer before storing data in the database.

Database Layer

The database layer will handle the storage of all the data used by the system. It will store structured data about the properties, units, tenants, rent records, complaints, and documents.

SQLite database will be used to store the data for the system, allowing efficient access to the data whenever it is required.

5.2 EXISTING SYSTEM

In the existing system, the management of the rental properties is done in the conventional way using paper documents, notebooks, or basic spreadsheet software. The information related to the tenants and the rental properties is maintained separately in the form of records. This creates difficulties in the management of the properties.

The existing system is not well organized, which creates difficulties for the property owners in accessing the necessary information related to the tenants and the rental properties.

Another major difficulty in the existing system is the management of the rent payments from the tenants. The property owners need to check whether the rent is paid by the tenants or not, and also remind them to pay the pending rent.

Another major difficulty in the existing system is the lack of an efficient medium of communication between the property owners and the tenants. The tenants are not able to access the necessary information related to the properties or the rent payments, which creates difficulties in the management of the properties.

5.3 METHODOLOGY

The proposed smart rental platform is developed by following a structured methodology that helps in efficient management of rental properties as well as services related to tenants. The requirements of the system are collected, which helps in understanding the

key aspects of the system, including user login, property management, tenant management, etc.

Based on the collected requirements, the system architecture is developed, followed by the design of the database schema. The smart rental platform is developed as a web application, utilizing HTML, CSS, Bootstrap, JavaScript, etc., as the front-end technologies, along with the Python Flask framework as the back-end technology.

The database schema is designed by storing information related to properties, tenants, rent, etc. The developed smart rental platform is tested, ensuring that the entire system is working efficiently without any errors.

5.4 PROPOSED SYSTEM

In the proposed system, a smart rental platform will be used to facilitate the process of property rentals. This will involve the creation of a web-based platform to make the process of property rentals more efficient. This will differ from the conventional method of property rentals, as the proposed system will offer a web-based solution to the process of property rentals. The proposed system will allow property owners to store all relevant information related to property rentals. This will make the process of property rentals more efficient and reduce the difficulties involved in managing property rentals manually.

Moreover, the proposed system will allow property owners to store relevant documents related to property rentals. This will make the process of property rentals more efficient and reduce the difficulties involved in managing property rentals manually. The proposed web-based solution will allow the process of property rentals to be more efficient and effective in meeting the needs of property owners and property tenants.

VI. API IMPLEMENTATION

The Rental Property Platform uses a REST-based API to facilitate the interaction between the system's backend and external applications. This API acts as a structured way for the system's clients, like a web interface, a mobile app, or another service, to communicate with the system's data. The API is created by utilizing the Python Flask framework, adhering to the standard principles of REST-based

APIs.

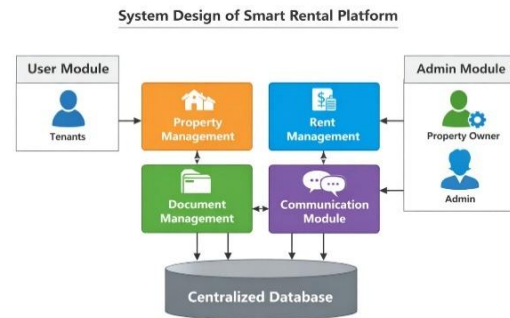


Fig 6.1 System Design

Authentication API

It is the responsibility of the authentication API to authenticate the user and allow access to the system securely. The API handles user registration, login, and logout functionality.

User Login API

- User Login API
- Endpoint: /api/login
- Method: POST

Description: The API allows the user to login into the system using the registered email and password provided during the registration process. Once the user has entered the correct credentials, the system grants access to the user dashboard.

Property API

Property API is used to perform operations on property management.

GET /api/properties – This API is used to retrieve the list of properties available in the system.

POST /api/properties – This API is used to add a new property by the property owner.

PUT /api/properties/:id – This API is used to update the property details.

DELETE /api/properties/:id – This API is used to delete the property from the system

Unit API

It manages units within a property.

GET /api/units/:property_id – Retrieves all units of a specific property.

POST /api/units – The owner can add a new unit.

PUT /api/units/:id – Updates a unit.

DELETE /api/units/:id – Removes unit from a property

Tenant API

The Tenant API is used to manage tenants.
 GET /api/tenants – This is used to retrieve tenant details.
 POST /api/tenants – This is used to register a new tenant.
 PUT /api/tenants/:id – This is used to update tenant details.
 DELETE /api/tenants/:id – This is used to remove a tenant.

Rent API

The Rent API is used to manage rent payment and tracking.
 GET /api/rent - Retrieves rent payment record.
 POST /api/rent - Creates a new rent record for tenants.
 PATCH /api/rent/{id}/status - Updates rent payment status as Paid / Unpaid.

Complaint API

Complaint API is used to manage complaints from tenants.
 POST /api/complaints: This is used by tenants to lodge their complaints.
 GET /api/complaints: This is used to retrieve complaints from tenants.
 PATCH /api/complaints/:id/status: This is used to update the status of a complaint to either 'Open', 'In Progress', or 'Resolved'.

Invoice API

Invoice API is used to manage rent invoices.
 POST /api/invoices: This is used to generate a new invoice for rent.
 GET /api/invoices/:id: This is used to retrieve an invoice.
 GET /api/invoices/:id/download: This is used to download the invoice in a PDF format.

Document API

Document API is used to manage rental documents.
 POST /api/documents: This is used to upload rental agreements/documents.
 GET /api/documents: This is used to retrieve uploaded documents.

VII. IMPLEMENTATION & RESULT

A. Implementation

System testing is carried out to ensure that the Smart Rental Platform is functioning properly and meets the required system specifications. The system testing process involves important features such as user authentication, property management, tenant management, rent management, complaint submission, and document access. Different types of tests are used to validate the systems performance and efficiency. Functional tests are used to validate the system’s features and their efficiency. Integration tests are used to validate the system’s modules and their interaction with the database and application server. User interface tests are also carried out to validate the system’s efficiency and usability. The results of the system’s testing process show that the system is functioning properly and is able to provide accurate results to ensure the efficient management of rental properties and tenant services.

The implementation phase involves the development of the Smart Rental Platform based on the system architecture. The system is created as a web application using various web technologies to enable the system to run efficiently and interact with the users in a user-friendly manner. The front end of the system is created using HTML, CSS, Bootstrap, and JavaScript to enable the user interface to interact with the users. The back end of the system is created using the Flask framework in Python to enable the application to run efficiently and execute the user requests. The system uses a SQLite database to enable the storage of data related to the properties, tenants, rent, complaints, and documents. In the implementation phase, various modules such as user authentication, property management, tenant management, rent management, and complaint management are integrated into the system. The Smart Rental Platform is a complete platform where the users

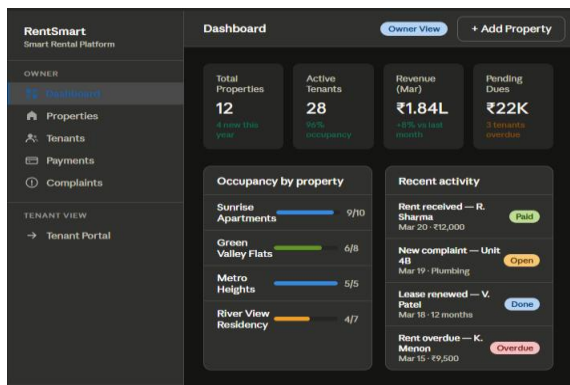


Fig 6.2 Application Design

can efficiently manage the rental services through a secure web interface.

B. Result

The Smart Rental Platform, as designed, has successfully provided a solution for the management of rental properties and tenant activities. The system has enabled property owners to efficiently manage their properties, units, tenants, and rental payments through a centralized interface, i.e., the web interface. Tenants are also provided with the ability to access their rental information, payment status, download their invoices, and even raise complaints.

The implemented system has improved the organization of data, reduced the workload, and enhanced the communication between the property owners and tenants. The results have clearly demonstrated the effectiveness of the proposed system, which has made the rental management process easier.

VIII. CONCLUSION

The Smart Rental Platform is an effective digital platform for the management of property rental activities. The platform will assist property owners in organizing their property details, tenant details, rent payments, and documents. The platform will be effective in replacing the manual method of property management. The developed platform will include various features that will allow users to register properties, manage tenants, track rents, manage complaints, and store documents. Additionally, the platform will enhance the communication between property owners and tenants.

The proposed system shows how the latest web development tools and techniques can be employed to develop an efficient and reliable platform for property rental.

IX. FUTURE ENHANCEMENTS

The Smart Rental Platform may be further improved by incorporating new and advanced features to improve its functionality and efficiency. In the near future, the system may be improved to support mobile applications, enabling both owners and tenants to access the system easily. Advanced analytical and reporting tools may also be incorporated to improve the efficiency and functionality of the system.

The system may also be improved by incorporating new and advanced security features, such as cloud storage, to improve its efficiency and functionality. These improvements will make the system more powerful and effective for managing rental properties.

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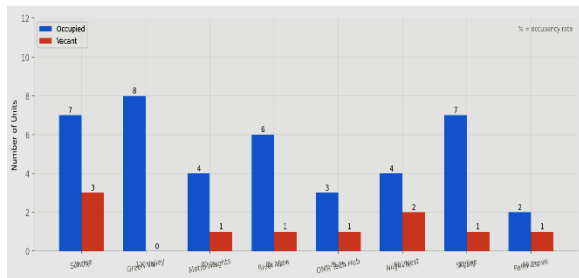


Fig 7.1 Occupancy Details

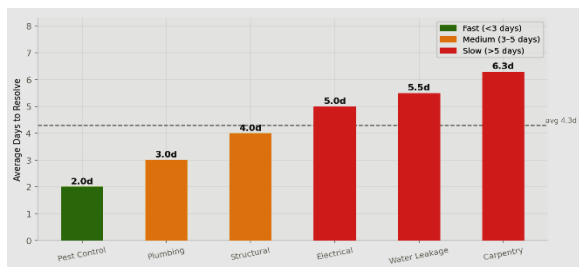


Fig 7.2 Complaint Registration

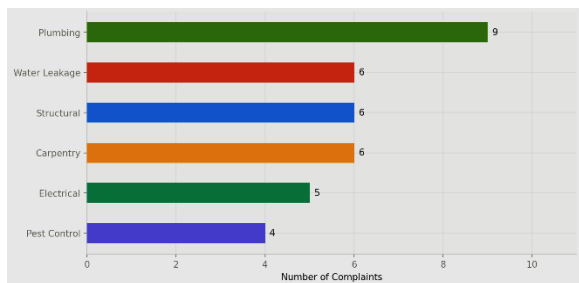


Fig 7.3 Category-wise Complaint

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