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Advancement in ICT: Exploring Innovative Solutions (AdICT)

Series 1/2024

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ADVANCEMENT IN ICT: EXPLORING INNOVATIVE SOLUTIONS (AdICT) SERIES 1/2024

Editors
Noor Azura Zakaria
Dini Oktarina Dwi Handayani
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Preface

Advancement in ICT: Exploring Innovative Solutions (AdICT) Series 1/2024 is an e-book showcases the collective achievements of Final Year Project (FYP) in Kulliyyah of Information and Communication Technology (KICT). This compilation represents evidence to the technical passion and academic skills of our students before they venture into the professional realm.

FYP is a journey that demands creativity, critical thinking, and perseverance. This book encapsulates the diverse range of projects undertaken by our students, each a unique exploration into the vast landscape of Information and Communication Technology (ICT). From cutting-edge software applications to groundbreaking research, these projects not only demonstrate technical proficiency but also the ability to address real-world challenges.

In this comprehensive collection, the topics covered span a spectrum from cutting-edge software development, cybersecurity, artificial intelligence and multimedia technologies reflecting the breadth and depth of our academic program. This offers a curated journey through the diverse landscape of final year ICT projects to the readers while appreciating the impact these projects can have on the wider community.

This e-book carries significant benefits and impact whereby it serves as a valuable knowledge repository, offering a diverse audience—from students and educators to industry professionals—a comprehensive view of the latest innovations and technological solutions in ICT. Moreover, the book fosters a culture of knowledge sharing and collaboration, as each project represents a unique contribution to the broader technological landscape.

"When the human being dies, his deeds end except for three: ongoing charity, beneficial knowledge, or a righteous child who prays for him" *– Sahih Muslim*

Editors

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EasyKos: Room Rental Management System

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***Abstract*— This paper introduces EasyKos, a web-based Room Rental Management System developed using the MERN (MongoDB, Express.js, React.js, and Node.js) stack. EasyKos is specifically tailored for the Indonesian room rental market and follows the Agile methodology. The system empowers landlords to effectively manage their rental properties by providing comprehensive features, including a dashboard, room and tenant listing, payment management, maintenance tracking, automated email generation, invoice generation, and a to-do list. With EasyKos, landlords can streamline their property management tasks, improve efficiency, and enhance overall productivity.**

Keywords— room rental management system, MERN stack, agile methodology, EasyKos, property management, room rental, web-based system.

I. INTRODUCTION

The room rental industry, also known as kos-kosan or kost, is a popular living concept in Indonesia. It is one of the fastest-growing industries in the country. Kos-kosan or rental rooms are the most popular option for workers and students alike, especially those who come from other cities. The most popular cities for room rentals in Indonesia are Jakarta, Surabaya, and Bandung. The industry has been around since the 1950s, but there has been very little innovation and service standardization in this segment, which make managing kost buildings difficult.

Despite the rising popularity of the room rental business, landlords confront a variety of difficulties in managing their properties and tenant information. These issues include the ongoing growth of data volume, the lack of a computerised system for data administration, data security concerns, and the lack of a centralised database. These difficulties make managing tenants and rental properties highly challenging, especially when tenants fail to meet their rent obligations.

To overcome these issues, landlords looking for more effective property management might benefit from room rental management solutions. The development of the EasyKos room rental management system is one potential option. EasyKos is a web-based solution that automates and streamlines the rental management process while providing landlords with a user-friendly interface. Tenant administration, payment tracking, invoice production, tenant alerts, and financial performance monitoring are all included in the system.

EasyKos helps landlords manage their renters more effectively by saving tenant information, managing rent payments, and producing invoices. It also makes payment monitoring easier and allows landlords to send payment reminders to renters who are behind on their payments. Landlords may quickly produce invoices for rent payments using the system's invoice production tool. EasyKos also makes it easier to communicate with tenants by sending out automatic alerts for rent reminders and planned repairs.

Furthermore, the system allows landlords to analyse their financial performance by recording income and costs. EasyKos hopes that by providing these capabilities, it may assist landlords in saving time, decreasing physical labour, and ensuring the correct care of their rental homes. The system's user-friendly design and ability to be accessed from anywhere make it a valuable tool for successful room rental management.

Overall, the EasyKos room rental management system provides a comprehensive solution to the issues that landlords confront in Indonesia's room rental market, allowing them to simplify their operations, improve data management, and increase the overall efficiency of their rental enterprises.

II. RELATED WORKS

Room rental management systems are web-based applications that help landlords and property managers automate accounting, maintenance, leasing, rent collection, and more [1]. These systems are designed to streamline business operations and improve customer service, making it easier for tenants to find and rent properties, and for landlords to manage their rental properties. This review will examine some of the previous works on room rental management systems.

One study proposed the development of an online-based smart house rental web application for both tenants and house owners. The system includes a common online-based platform where both house owners and tenants can register, and tenants can have houses for rent via sophisticated contact with the house owner [2]. The system has many smart features, making it easy for tenants to find a house to rent.

Another study proposed a rental house management system that allows users to view customers and data recorded for houses and hostels. The system enables editing or saving the user and customer data, allowing them to edit and see their records [3]. The system tends to minimize the problem caused by the existing system, making it easier for landlords and managers to oversee and manage their rental properties.

A secured mobile cloud-based house rental management system was also proposed. The system allows landlords and tenants to manage their rental properties from anywhere, at any time, using their mobile devices [4]. The system is designed to provide a secure and user-friendly interface for both landlords and tenants.

Other studies proposed rental housing management systems that use spatial databases to provide geographical information of the rental houses [5]. Some studies proposed Android applications that simplify work for the owners and tenants so their work can be efficient and effective [6]. The Rental Property Management System is developed by using Android as the front end and SQLite as the backend.

In conclusion, room rental management systems are essential tools for landlords and property managers to manage their rental properties efficiently. The previous works reviewed in this article propose different approaches to developing room rental management systems, including online-based platforms, mobile cloud-based systems, and Android applications. These systems aim to simplify work for landlords and tenants, making it easier for them to manage their rental properties.

III. Methodology

Agile methodology is a framework for developing software and other products emphasising flexibility, iteration, and customer focus. It is designed to help teams respond to changing requirements and deliver high-quality products efficiently. The agile approach involves breaking the project down into smaller segments and iteratively working on each segment to improve speed and accuracy. The specific steps involved in this process are usually illustrated in Figure 1. Agile methodology is oftens recommended because it can help teams respond to change and deliver value quickly.

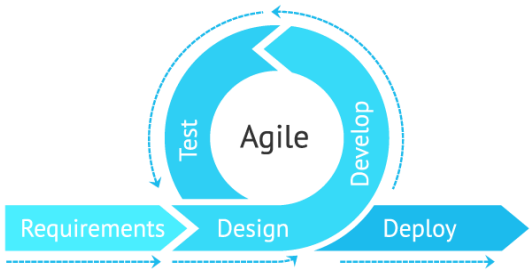

Fig. 1. Agile Methodology

A. Requirement

The procedure begins with collecting the relevant requirements to identify the required features. In addition, other methods of gathering requirements include searching numerous studies and journals relating to the system, which played a critical role in defining the system's functionalities. The interviews with landlords gave valuable insights into their needs and expectations, guiding the development team to establish the system's requirements.

The team selected key features through interviews, including tenant listing, availability management, room listing creation, and maintenance tracking. The need for an easy and user-friendly interface for managing room listings, including the option to establish rental terms and define amenities, was emphasised by landlords. Real-time tracking of room availability and effective facilitation are required.

By conducting interviews with landlords, the development team obtained valuable insights that informed the requirements phase of the room rental management system development. The input provided by landlords ensured that the system met their specific needs and addressed pain points in managing room rentals effectively. The requirements phase laid a solid foundation for the subsequent design and development stages, enabling the team to create a tailored solution that catered to the requirements and expectations of landlords.

B. Design

The design phase is a crucial stage in software development. In this phase, a detailed plan for the system is created. The plan includes the system architecture in Figure 2 and the use case diagram illustrated in Figure 3. The details of the use case are outlined in Table 1.

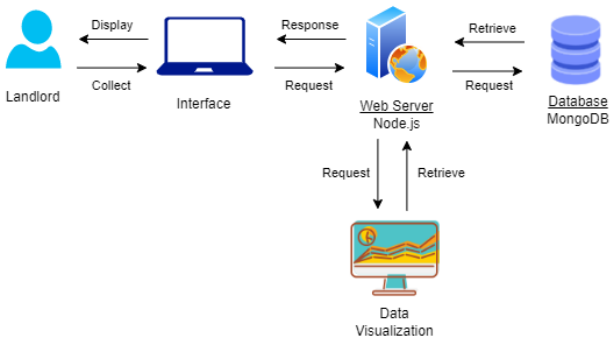

Fig. 2. System Design Architecture

Fig. 3. Use case Diagram

TABLE I. Description of Use Case

No	Use case	Description
1.	Login	This use case allowed users to log into the system and access their respective accounts securely.
2.	Manage Room	Landlords could create, update, and delete room listings through this use case. It facilitated functionalities such as adding room details and specifying availability.
3.	Manage Tenant	The landlord can manage their tenants. This includes adding new tenants, editing existing tenants, and deleting tenants.
4.	View Dashboard	This use case allows users to access a personalized dashboard that provides an overview of their room listings, tenant information, payment status, and maintenance tasks
5.	Manage Payment	The landlord can manage payments from their tenants. This includes adding new

No	Use case	Description
		payments, editing existing payments, and deleting payments.
7.	View Report	The landlord can view reports about their properties and tenants. These reports can be used to track the performance of their properties and to identify areas where they can improve.
8.	Manage Maintenance	The landlord can manage maintenance for their properties. This includes adding new maintenance requests, editing existing maintenance requests, and deleting maintenance requests.
9.	Manage Task	The landlord can manage maintenance for their properties. This includes adding new maintenance requests, editing existing maintenance requests, and deleting maintenance requests.
10.	Send Invoice	Users could generate and send invoices to tenants for rent and other associated charges through this use case. It facilitated automated invoice generation based on the agreed-upon terms and sent them via email.
11.	Send Message	The landlord can use this use case to send email to their tenants.

C. Develop

During the development phase of the room rental management system, the MERN (MongoDB, Express.js, React.js, Node.js) stack was employed to build a robust and efficient solution. The MERN stack, known for its versatility and scalability, provided a solid foundation for the development team to create a highly interactive and responsive user interface.

Using MongoDB as the database, the team designed a flexible schema to store relevant information about rooms, tenants, payments, maintenances, and users. The NoSQL nature of MongoDB allowed for easy scalability and seamless integration with the other components of the system.

Express.js, a fast and minimalist web application framework for Node.js, was used to handle server-side operations and facilitate seamless communication between the client-side and database. The developer leveraged Express.js to implement various APIs and endpoints, enabling functionalities such as managing rooms, tenants, payments, and maintenance.

For the frontend, React.js, a popular JavaScript library, was employed to build dynamic and interactive user interfaces. The modular nature of React components facilitated code reusability and maintainability, enabling the team to create a visually appealing and intuitive user experience. React's virtual DOM rendered changes efficiently, ensuring swift updates to the user interface without disrupting the overall performance of the application.

Node.js, a JavaScript runtime environment, served as the backbone of the server-side development. It provided a non-blocking and event-driven architecture, allowing for the efficient handling of multiple concurrent requests. Node.js facilitated seamless communication between the frontend and backend, enabling real-time updates and ensuring a smooth user experience.

Throughout the development phase, the MERN stack proved to be a powerful combination, enabling the team to create a room rental management system that excelled in performance, scalability, and user-friendliness. By leveraging the strengths of each component, the development team successfully delivered a feature-rich and highly functional system to streamline the room rental process.

D. Test

During the testing phase, alpha testing was used to test the room rental management system. Alpha testing is a type of software testing performed to identify bugs before releasing the software product to the real users or public. The main objective of alpha testing is to refine the software product by finding and fixing the bugs conducted by the developer.

E. Deploy

During the deployment phase, the primary objective is to launch and implement the system into the operational environment successfully. This phase involves a series of carefully planned steps to ensure a smooth transition from development to real-world usage. The system is deployed to the target environment, which include servers, cloud infrastructure, or a combination of both, while allocating adequate resources to support its requirements. System administrators configure the necessary security measures, user access controls, and backup mechanisms to safeguard data integrity and privacy. Comprehensive user documentation and training materials are prepared to assist the administrators and end-users in effectively utilizing the system. Finally, the deployment phase concludes with a thorough evaluation to verify that the system meets it functionality as intended and meets the specified requirements. This phase plays a vital role in ensuring a successful and seamless integration of the room rental management system into the operational environment, enabling efficient management of rental properties and enhancing user experience.

IV. RESULTS

There are few interfaces for different purposes for the landlord such as login, tenants, rooms, payments, maintenance and task page. Figure 4 until 9 illustrate the user interface for the selected functionality of the EasyKos system.

Fig. 4. Login Page

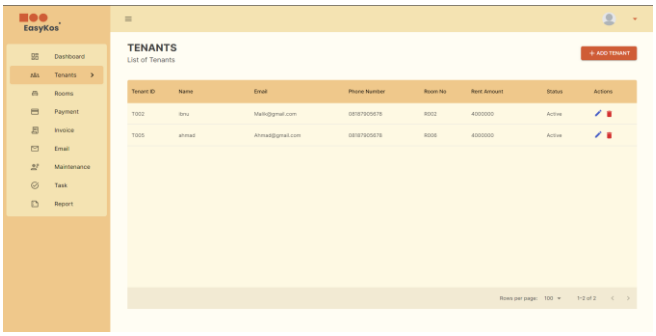

Fig. 5. Tenants Page

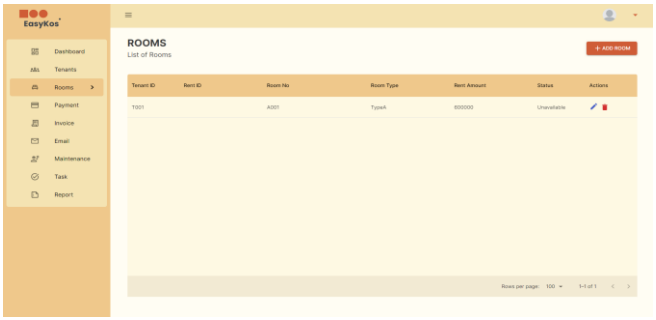

Fig. 6. Rooms Page

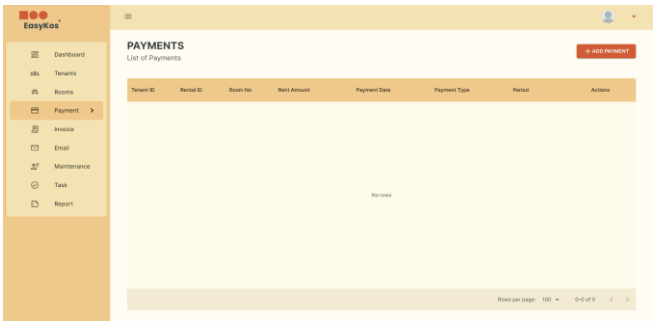

Fig. 7. Payments Page

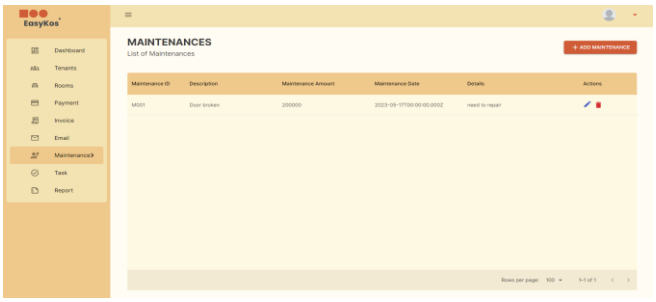

Fig. 8. Maintenance Page

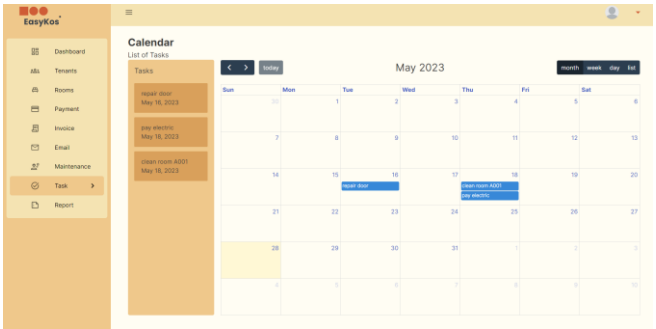

Fig. 9. Task page

V. Conclusion and Future Work

The room rental management system is a web-based software tool that assists landlords in managing their properties. Landlords may use the system to create and manage listings, track availability, produce invoices, and track maintenance activities. The technology also offers landlords with rental activity information.

The system is intended to be user-friendly and easy to operate. The system includes an easy-to-use interface that allows landlords to discover the required information quickly. The system also has a various features that make it simple for landlords to manage their properties, such as the ability to produce invoices, send emails, and list rooms and tenants.Here are some of the future works that can be done on room rental management system:

- The system can be expanded to include additional features, such as the ability to accept payments online and the ability to provide tenants with access to building amenities.
- The system can be made more secure by using additional security measures, such as two-factor authentication.
- The system can be made more scalable to accommodate the needs of larger landlords.
- The system can be made more affordable by offering a freemium version.

References

[1] Rentroom. Retrieved from https://www.rentroom.com

[2] Palani, K. et al. (2021). Design and Implementation of Smart House Rental Web Application. Journal of Software Engineering and Applications, 14, 384-394. doi: 10.4236/jsea.2021.147027. Retrieved from https://www.scirp.org/pdf/jsea_2021072114095266.pdf

[3] Kothavala, P. et al. (2019). House Individual House Apartment Rental Management System. Acta Scientific Computer Sciences, 2(11), 31-35. Retrieved from https://actascientific.com/ASCS/pdf/ASCS-05-0434.pdf

[4] Poonkodi, P. & Saravanan, S. (2019). A Secured Mobile Cloud-Based House Rental Management System. International Journal of Pure and Applied Mathematics, 121(6), 1703-1711. doi: 10.12732/ijpam.v121i6.14. Retrieved from https://www.researchgate.net/publication/340926278_A_Secured_Mobile_Cloud-Based_House_Rental_Management_System

[5] Al-Tarawneh, R. et al. (2017). A Rental Housing Management System Based on Spatial Database. International Journal of Computer Science and Mobile Computing, 6(7), 112-116. Retrieved from https://www.ijcsmc.com/docs/papers/July2017/V6I7201705.pdf

[6] Saputra, R. et al. (2019). House Rental Management System Using Android. International Journal of Advanced Computer Science and Applications, 10(3), 429-433. doi: 10.14569/IJACSA.2019.0100348. Retrieved from https://www.academia.edu/40456883/HOUSE_INDIVIDUAL_HOUSE_APARTMENT_RENTAL_MANAGEMENT_SYSTEM