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DEVELOPMENT OF WEB-BASED HOSTEL MANAGEMENT SYSTEM

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ABSTRACT: *The Hostel Management System (HMS) is a web-based software application designed to streamline the management of hostels in educational institutions and other accommodation facilities. The system provides a platform for managing various aspects of hostel operations, including student registration, room allocation, maintenance and reporting. The project involved extensive research and analysis of existing systems, identification of user requirements, and questionnaires to obtain a clear picture of what the system should entail and what problems should be solved. The design and implementation of the HMS offers several benefits, including increased efficiency, transparency, accountability, and enhanced student experience. The system also provides real-time access to critical information, enabling quick decision-making by hostel administrators. The project outcomes demonstrate the effectiveness of the HMS in managing hostel operations and improving service delivery, thereby enhancing the student experience.*

KEYWORDS: Hostel Management System, Web-based, Accommodation, Tracking, Room Allocation, Scheduling.

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INTRODUCTION

A hostel management system is a software that helps streamline the activities that go on in halls of residence. It also helps in the documentation of valuable and bulky information regarding the hostel and its users. Unlike the traditional method of having to be physically present in order to verify and secure spaces in the facilities. Meghana et al. (2021) maintains that the hostel management system makes it an easier experience by allowing users of said facilities to do all that within the confines of wherever their comfort lies.

With the steady advancement in technology, more and more sectors of the economy tend to welcome IT-driven solutions. Hostel management software not only became a way to facilitate easier check-ins but it also helped in the documentation of relevant data (Dixit, 2021). Data which would normally be put down in books and arranged in shelves can now be put together in a more efficient, organized and easy to access format. The traditional method proved to be ineffective as it causes a great deal of stress to the one registering and it is also not easy to maintain as the documents could be as large as possible (Agrawal et al., 2023). Also, keeping in mind that it is liable to wear and tear and can easily be misplaced or stolen. With all that being said, the proposed use of hostel management systems to ease the load on the hostel personnel and the students, is the best option.

Statement of the Problem

The absence of a comprehensive, web-based hostel management system that integrates facility documentation, maintenance tracking, and dynamic room allocation poses significant challenges in managing large student populations. This gap results in operational inefficiencies, increased administrative workload, and diminished student satisfaction. Developing a robust system that addresses these issues is imperative to enhance the effectiveness of hostel management in large educational institutions.

Aim and Objectives

This study is aimed at developing a web-based hostel management system that integrates facility documentation, maintenance tracking and dynamic room allocation. The specific objectives are to:

i. design and implement the proposed web-based hostel management system, ensuring each development stage is systematically documented and executed efficiently.

ii. test and evaluate the implemented system to ensure it effectively manages facility documentation, maintenance tracking, and dynamic room allocation while enhancing overall hostel management processes.

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LITERATURE REVIEW

Studies on hostel management systems have consistently highlighted the need for modernized, automated systems in hostel management to address persistent inefficiencies. Agrawal et al. (2023) developed a cloud-based hostel management system that utilized MongoDB and cloud technologies to automate administrative tasks. This system not only addresses parents' safety concerns but also enhances transparency, streamlines processes such as room allocation, maintenance tracking, and eliminates the need for manual paperwork. The authors emphasized the system's efficiency, user-friendliness, and reliability, setting a strong precedence for automation in hostel management.

Similarly, Meghana et al. (2021) proposed a computerized Hostel Management System designed to improve operational and administrative activities. Recognizing the inefficiencies of manual systems, especially as the number of hostels grows, the study presents a GUI-based solution that integrates seamlessly with existing processes to enhance both efficiency and usability. This system serves as a complement to current manual approaches, signalling a need for more comprehensive solutions.

A notable innovation in room allocation came from Adetunji, Akintunde, and Otuneme (2020), who introduced a Personality-Based Hostel Allocation System (PHAS). By leveraging Eric Jorgenson's four temperament scale test, the system allocated students to rooms based on personality compatibility, aiming to reduce room mate conflicts. This approach highlights the complexity of room allocation in large institutions and underscores the need for future systems to incorporate dynamic and personalized allocation algorithms alongside traditional factors.

Addressing inefficiencies in manual record-keeping, Diyaolu et al. (2024) developed an e-based hostel management system for a hostel at a Federal School of Surveying in Nigeria. Built with HTML, CSS, PHP, and MySQL, the system automated tasks such as room allocation and record management, improving reliability, security, and efficiency. This research contributes to the growing body of work advocating for digital transformations in hostel management.

Jahan et al. (2020) also aimed to improve efficiency in hostel management, particularly in the context of growing educational institutions. Their system automates room assignments, student records, and financial tracking, striving to reduce errors and improve the overall efficiency of hostel operations. This study echoes the earlier call for automation but highlights that some aspects, such as maintenance tracking and facility documentation, remain underdeveloped.

Dixit (2021) proposed a web-based Hostel Management System to simplify tasks like room registration, fee payments, and student record management. This system improves transparency and fosters trust between students and management through its user-friendly interface. However, similar to previous studies, it does not incorporate facility documentation or maintenance tracking features that are crucial for a more comprehensive management solution.

The UTHM Hostel Management System, developed by Wong and Mahdin (2022), streamlined operations at Universiti Tun Hussein Onn Malaysia (UTHM). Although it addressed slow handling complaints and improved overall operational efficiency, the system lacks integration for maintenance tracking and dynamic room allocation. Furthermore, its use of the waterfall

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model limits flexibility, suggesting that future systems should adopt agile methods for better adaptability to changing requirements.

Azeeta et al. (2021) also tackled room allocation with a web-based solution that automates the process using MySQL and PHP. The system efficiently considers various constraints to ensure optimized room assignments and provides real-time occupancy data. However, similar to other studies, it does not address maintenance tracking or facility documentation areas that could significantly improve the functionality of hostel management systems.

Ako (2021) explored the inefficiencies in managing hostel facilities at Ashesi University and developed a web-based system that replaces outdated methods with more secure, user-friendly alternatives. This system automates processes such as registration and booking, contributing to improved security and reliability. However, like other studies, it does not address key components such as facility documentation and dynamic room allocation.

Finally, Anis and Safar (2022) presented a web-based Hostel Management System that automates the application and record-keeping processes, allowing students to apply online and track their status. While it simplifies record management for hostel administration, it does not address the broader issues of maintenance tracking or room allocation, pointing to a common gap in the literature regarding comprehensive system integration.

Overall, while numerous studies have proposed innovative solutions to automate various aspects of hostel management, many systems still fail to integrate crucial features such as maintenance tracking, facility documentation, and dynamic room allocation. These gaps highlight the need for a more holistic approach to hostel management systems that do not only automate administrative tasks, but also improve operational flexibility and efficiency.

METHODOLOGY

The software development methodology adopted in this study is the incremental mode as shown in Figure l. This gives more room for changes in requirements as the team is only focused at implementing the core functionalities of the system as of that time. Feedback is gotten from the client as each successive iteration is released and the changed requirements are implemented into the new module.

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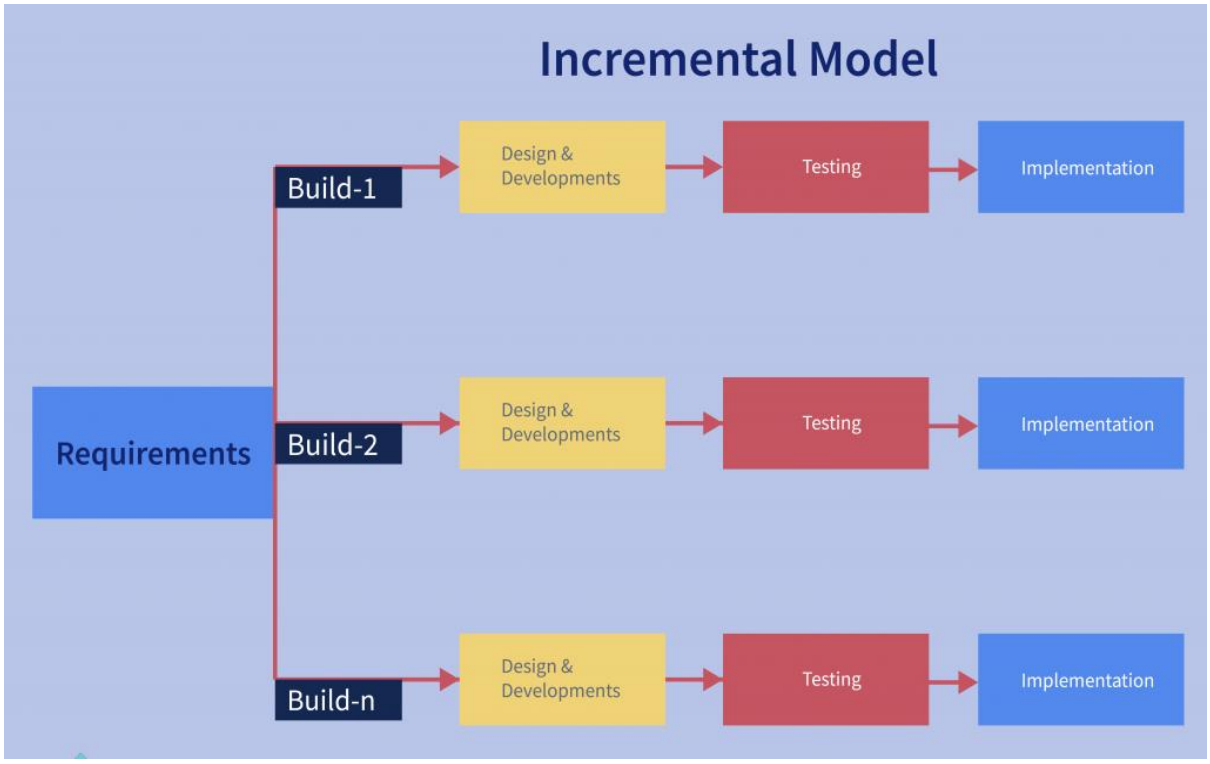

Figure 1: Incremental model in software engineering

Furthermore, the Entity Relationship diagram in Figure 2 shows the entities and relationships on the hostel management system.

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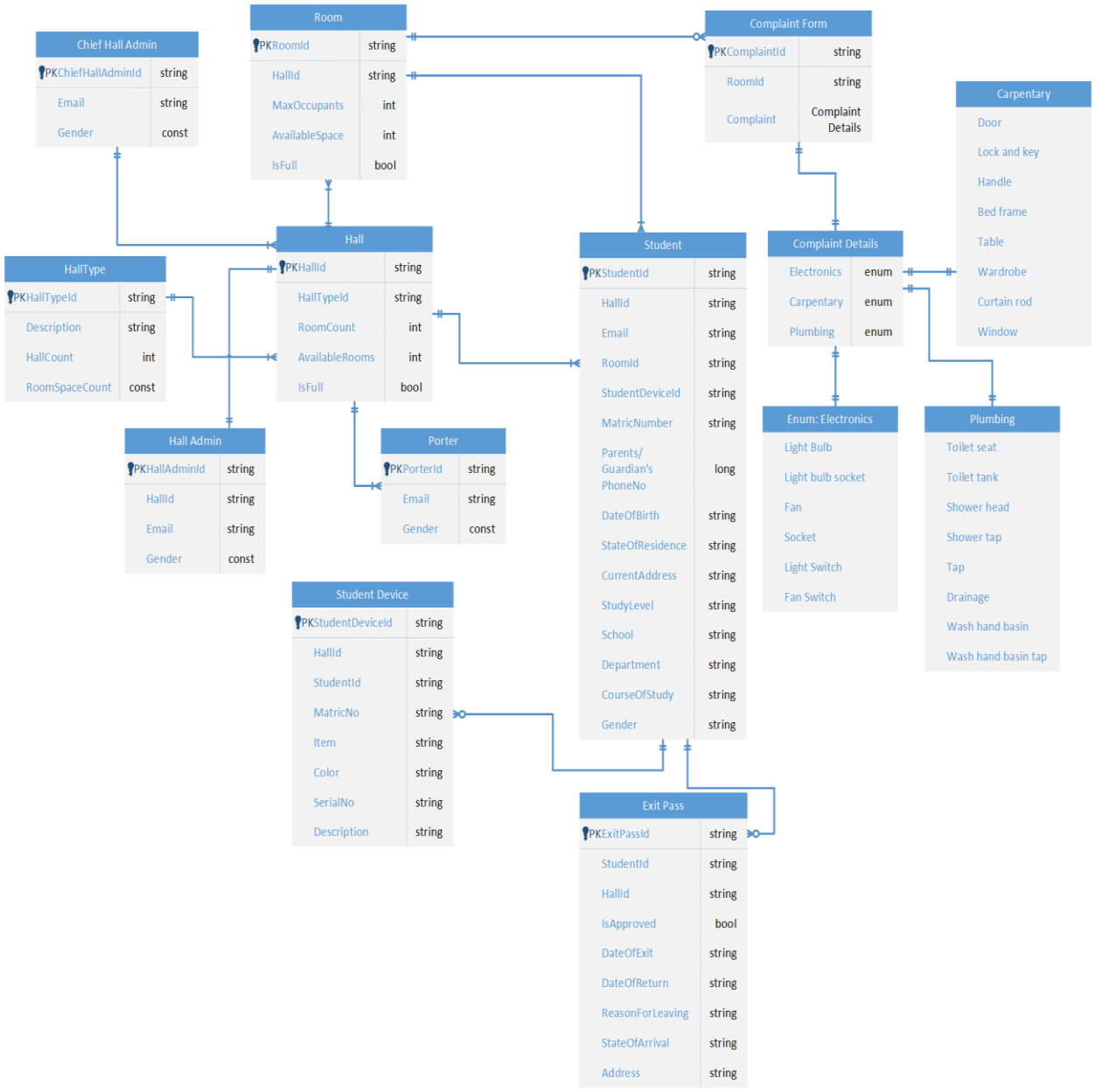

Figure 2: Entity relationship diagram

The Implementation Tools

The development of the research software utilized Visual Studio for server-side API development in C#, SQL Server and SQL Server Management Studio (SSMS) for database design and management, and Visual Studio Code for client-side programming. Azure App Service was used to host the application, while Swagger documented API endpoints. Diagrams like use cases and class diagrams were created using Microsoft Visio. The programming stack included HTML, CSS, JavaScript, C#, Bootstrap, ReactJS, and ASP.NET Core for building hostel management system.

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RESULTS

The landing page of the hostel management system provide login for different categories of users is as shown in Figure 3, students login in with their matric number and password after registration as shown in Figure 4.

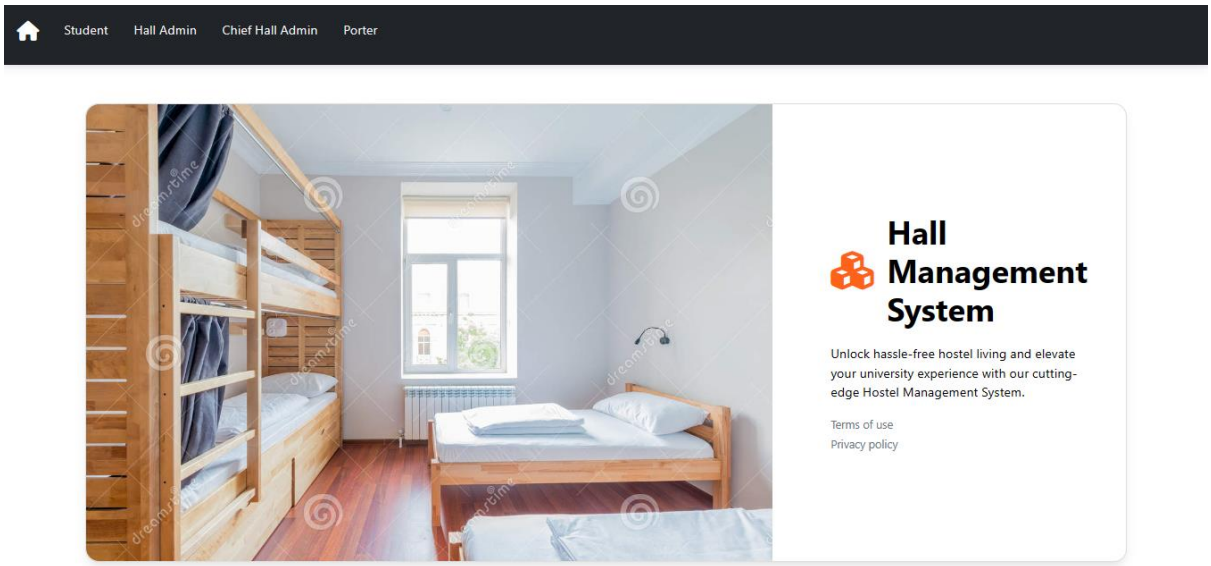

Figure 3: Landing page

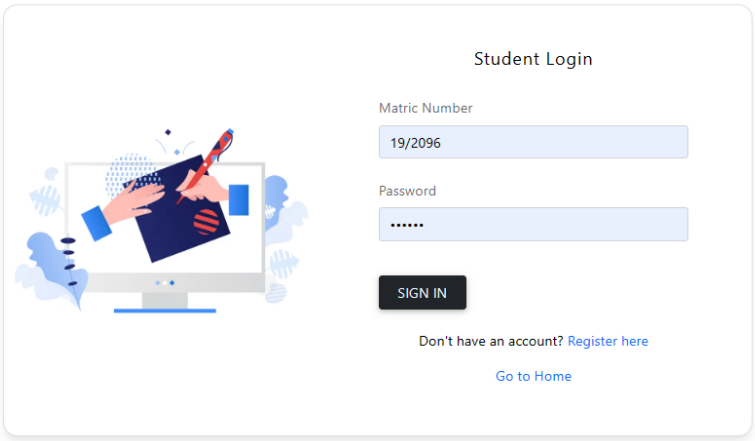

Figure 4: Student login page

Figure 5 presents the student dashboard where students have access to different components of the hostel management system, like the exit pass request, complaint form, thereafter, selection of hostels as depicted in Figure 6, rooms selection takes place as found in Figure 7. The next are the devices, these are equipment and other facilities provided for use by the students as

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choosing them is depicted in Figure 8. Complaint Form where student file complaints and provide feedback to the administrator is reflected in Figure 9.

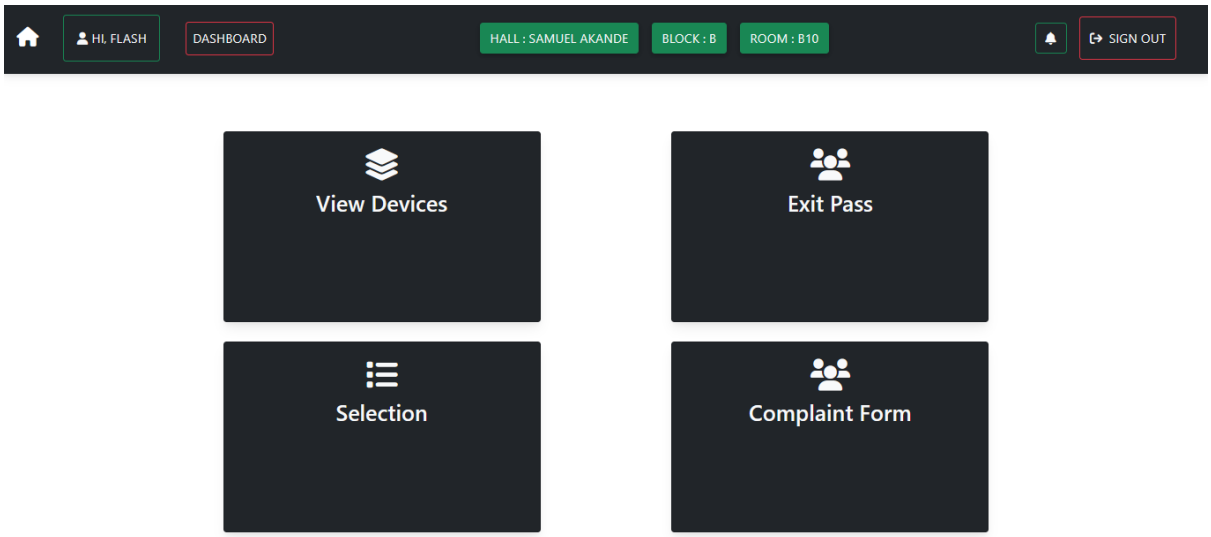

Figure 5: Student Dashboard

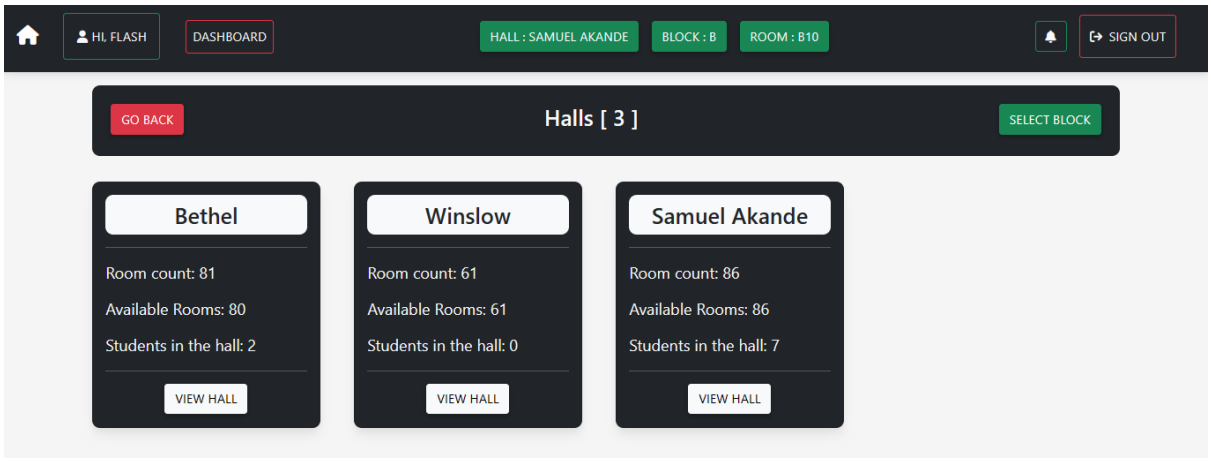

Figure 6: Hostels

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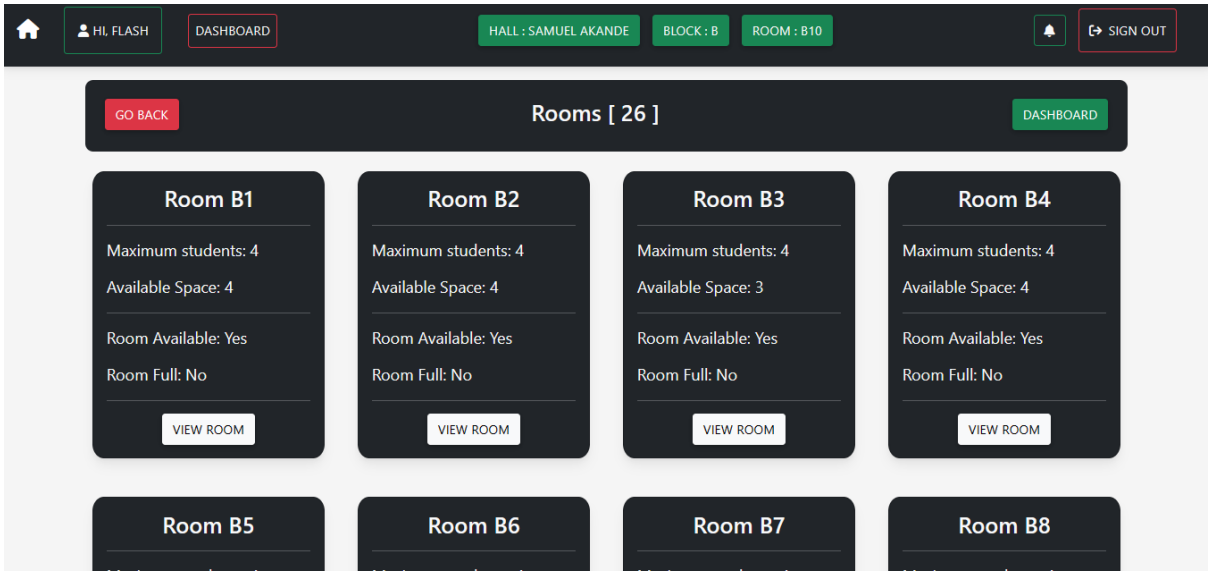

Figure 7: Rooms

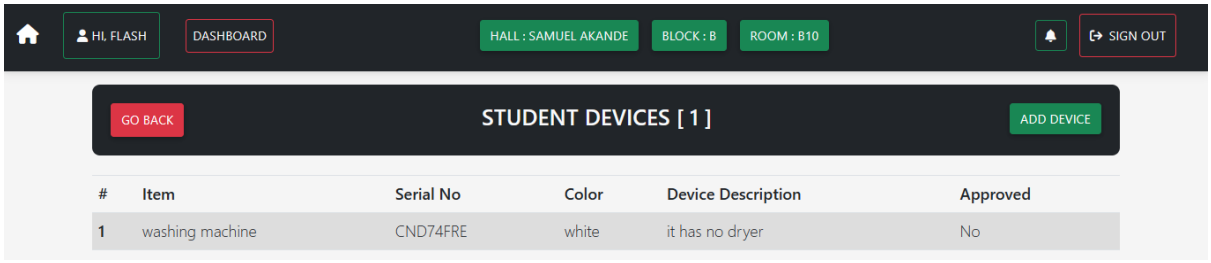

Figure 8: Student facilities

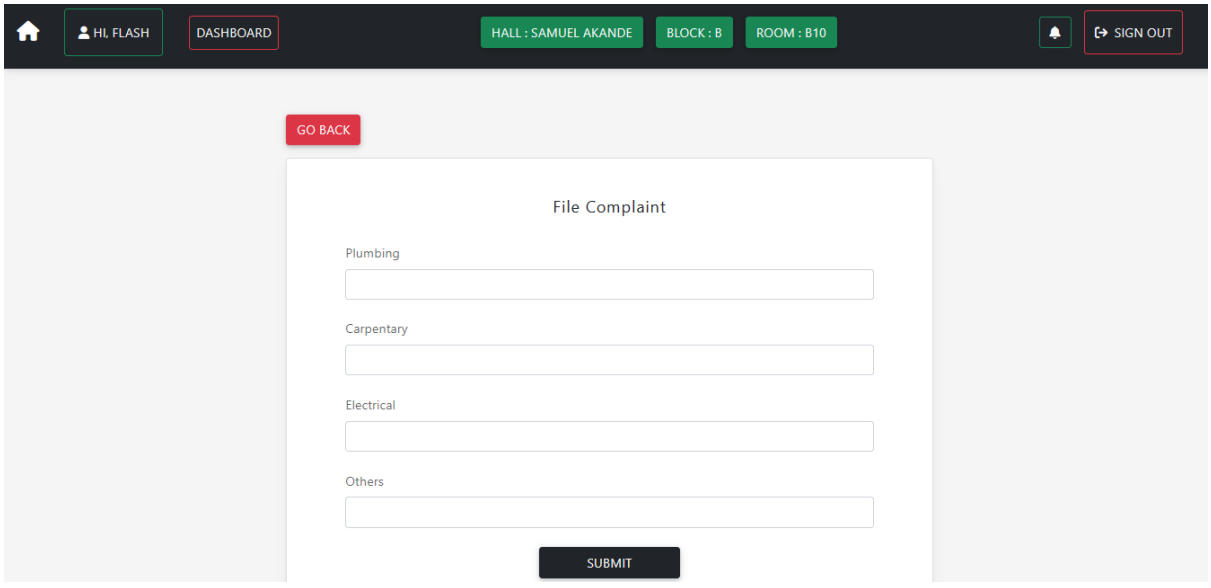

Figure 9: Complaint form

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The Admin have access to manage the hostel activities in Figure 10. Hostel admin can manage rooms, add, view, block and delete rooms. However, rooms can only be deleted when there are no students attached as demonstrated in Figure 11. Also, admin can view student in a hostel, conduct approval management of student exit pass, and view complaints for every room in an organized manner as seen in Figure 12. More appropriately displayed, Figure 13 shows the list of students in a hostel.

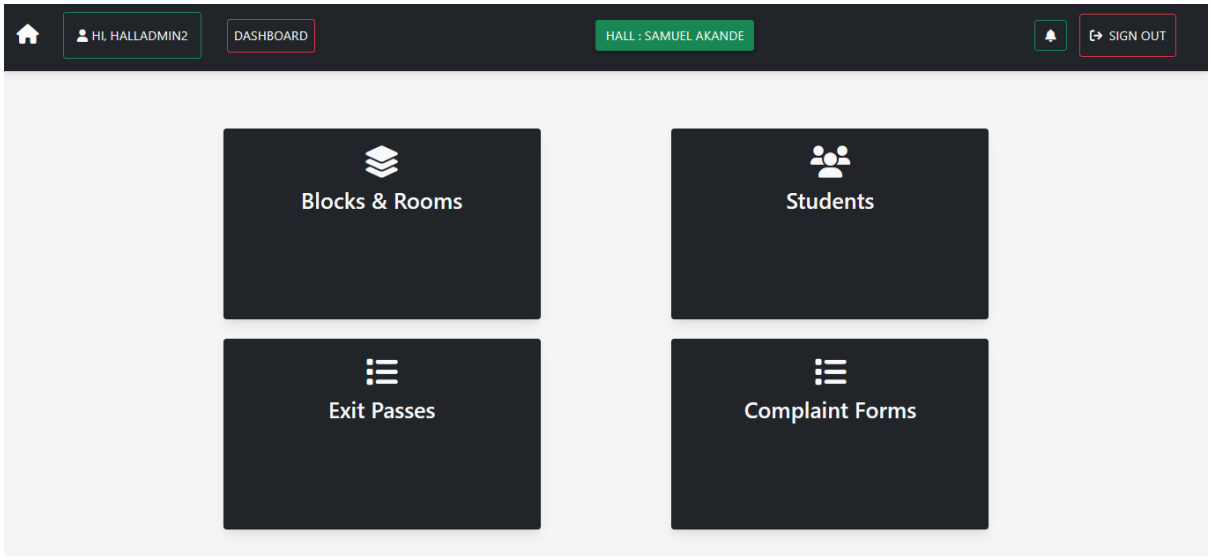

Figure 10: Hostel admin dashboard

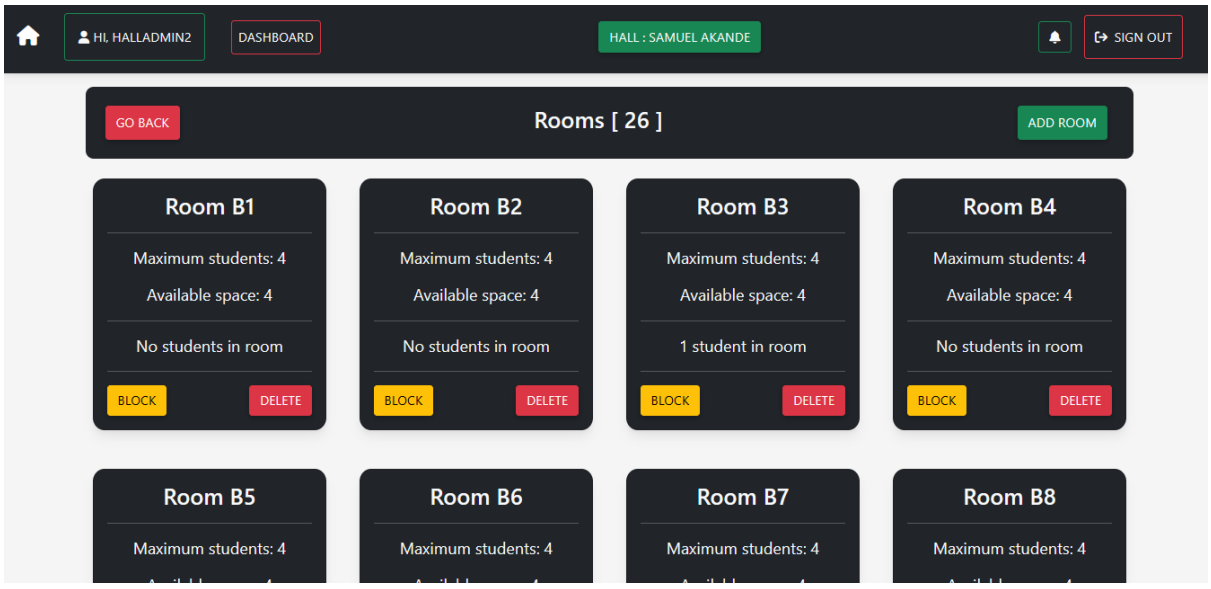

Figure 11: Hostel admin room view

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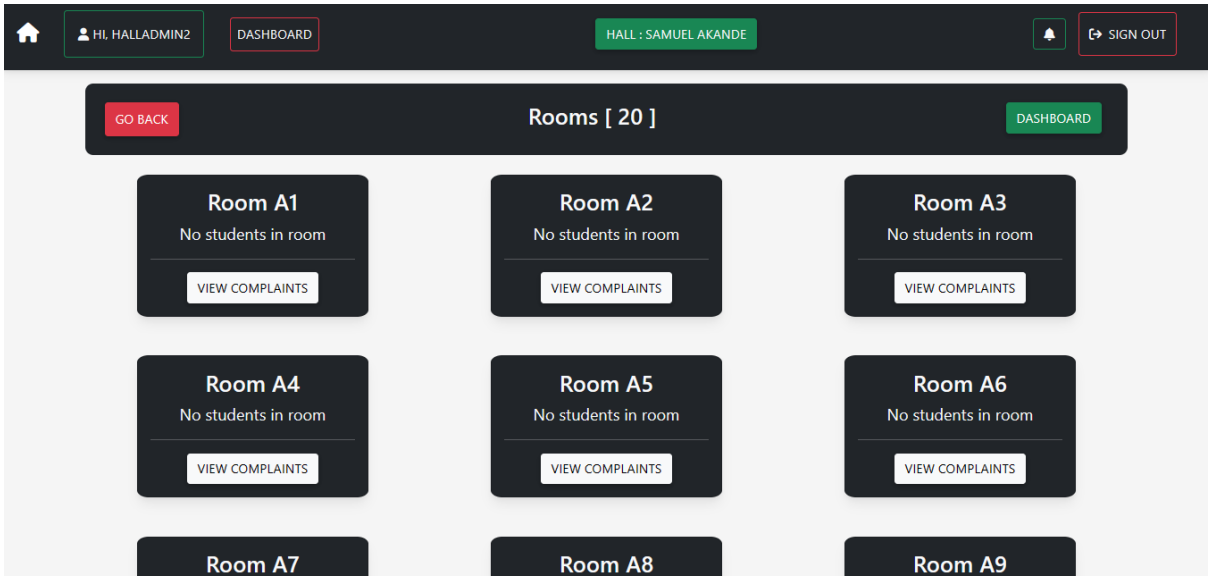

Figure 12: view complaints

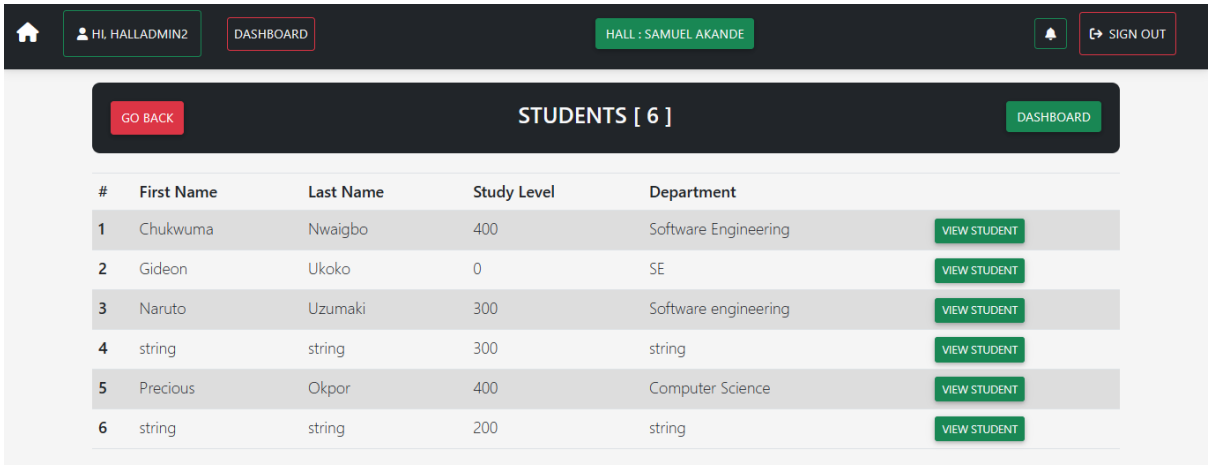

Figure 13: View students

CONCLUSION

This study concludes that Hostel Management System (HMS) is an essential tool for managing hostel operations in educational institutions or other accommodation facilities. The system streamlines various aspects of hostel management, including student registration, room allocation, maintenance, and reporting. The implementation of the HMS offers several benefits, including increased efficiency, transparency, and accountability, and enhanced student experience. The system also provides real-time access to critical information, enabling quick decision-making by hostel administrators. The development of the HMS involved research and analysis of existing systems, identification of user requirements, design, and development of the system. The project also encountered several challenges, including system compatibility, data security, and scalability. However, the solutions adopted ensured the successful development and implementation of the HMS. Overall, the HMS is a valuable tool that can

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transform hostel management operations, improve service delivery, reduce paper work, eliminate human complexities, and enhance the student experience.

FUTURE RESEARCH

Future studies will investigate the adaptability and scalability of the system for use in accommodation facilities outside educational institutions. This includes exploring its application in settings such as corporate housing, hotels, and residential complexes, where efficient room allocation, maintenance tracking, and facility documentation are equally critical.

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