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Automated Hostel Allocation System In State University of Medical And Applied Sciences (SUMAS) Igbo-Eno, Enugu State Using E-Commerce

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Abstract: *Given that the internet allows thousands of networks to share resources, this project, which was created especially for State University of Medical and Applied Sciences Igbo-Eno in Enugu State, aims to automate the hostel allocation system so that students can finish the procedures from the comfort of their homes. In order to access the application dashboard, which includes information on hostel room registration, fee payments, student record checks, and the ability to update as needed, administrators and students must first provide their login credentials. The suggested system would solve the shortcomings of the conventional management system approach; it is dependable, user-friendly, and has a graphical user interface. The suggested system will be developed using PHP, using MYSQL for back-end (database) development and e-commerce for financial transactions. The suggested system would create an atmosphere of transparency that fosters trust in the digital world and between students and management.*

Keywords: *Automate, Allocation, PHP, MYSQL, Back-end.*

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1.0 Introduction

Applications that circulate via a network and run in a web browser on various mobile devices, smartphones, tablets, desktop computers, laptops, and other devices are referred to as web-based applications (Holl & Elberzhager 2019). The software utilizes a client-server architecture, with the user interface and client-side logic operating within a web browser. Online sales, Webmail, push notifications, and many other capabilities utilizing the Internet and mobile network are standard features of Web applications that are easily and conveniently accessible from any location at any time (Roberts *et al*., 2012), (Varia *et al*., 2014). A student is essentially an individual who has been enrolled in a school or other educational institution and attends lessons in order to achieve the appropriate level of authority in a subject under the guidance of an instructor. An understudy, in a broader sense, is any person who devotes a concentrated effort to a serious scholarly commitment with a topic significant enough to rank it as a major component of some intentional endeavor in which such authority is essential or defining (George *et al*,., 2012). A

computerized system that is compatible with the current system, user-friendly, and more graphical user interface (GUI) oriented is developed as a result of the identification of the shortcomings of the current system. Giving students good housing is one of the most effective ways to manage the students successfully. There are many problems with the allocation process that could be easily avoided, such as students being assigned to rooms that are in poor condition, students who are not physically able to use the stairs up to the fourth floor, and students who are assigned roommates who are bullies. The necessity to create a hostel allocation system that gives managers a better idea of what rooms are suitable for habitation and provides the information they need to make judgments is what drives this study. Numerous methods have been developed to solve HSAP, including rule-based models (Olatunji *et al*., 2015), (Bolaji *et al*, 2017), heuristic models (Wei *et al*, 2013), (Gajjar *et al*., 2011) and metaheuristic models (Zeng *et al*., 2017), (Chang *et al*, 2019). These models may search for optimal solutions in a reasonable amount of computational time, but they tend to become stuck in a local optimum, which may make them ineffective for domain-specific knowledge (Obit *et al.*, 2019).

Despite the availability of rule-based, heuristic, and metaheuristic approaches to hostel allocation, these models often suffer from limitations such as getting stuck in local optima and requiring significant domain-specific customization. Furthermore, most existing systems are not tailored to the specific needs of Nigerian universities and do not incorporate automated online payment options. At SUMAS, hostel allocation is still largely manual, which makes the process time-consuming, error-prone, and inconvenient for both administrators and students. This gap necessitates the design of a web-based, automated hostel allocation system with integrated e-commerce functionality that can streamline the process and ensure greater accuracy, transparency, and efficiency.

In this project, we suggest an internet-based system and methods that would utilize e-commerce, MySQL Database for database manipulation, PHP for the application tier, which takes user input and transmits the necessary data to the data tier, HTML/CSS for the front end, and Sublime Text as the tool for integrated development. The goal of this project is to develop an automated system that uses PHP/MySQL and e-commerce to assign students to dorms.

The significance of this study lies in its potential to transform hostel allocation management at SUMAS. By automating the process and integrating e-commerce for payments, the system will minimize human error, save administrative time, and provide students with a seamless and transparent experience. It will also foster trust between students and management by ensuring fairness in room assignment and improving record-keeping accuracy. Beyond SUMAS, the system serves as a model that can be adapted by other institutions facing similar hostel allocation challenges.

The primary objective of this study is to support hostel allocation management at SUMAS by developing an automated system that simplifies the process for both administrators and students. Specifically, the system aims to enable checks on hostel room availability, allow students to make payments through e-commerce using debit cards issued by their banks, and update records to accommodate new hostels and rooms. In addition, the system seeks to generate proof of room assignment for students, produce occupancy reports for the hostel management, and ensure that all qualified and registered students are allocated to appropriate dormitories.

2.0 Literature Review

We started this study by briefly reviewing the literature on the hostel management system,

where we found several concepts, designs, and implementations. Below are a few of them: In his paper (Bista *et al*., 2018), claims that the management system reduces the amount of human labor and uses a web application to make it much simpler for students to be assigned to dorms. In addition to keeping track of mess billing, out-of-pass creation, complaint registration, and other tasks, the software automatically chooses the student from the waiting list. (Bister *et al*., 2018) states that the authors have developed PHP-MySQL with the goal of minimizing paperwork and the efforts required of the hostel management to oversee the hostel. In addition to providing data, such as information about hostel rooms and accounts, the framework eliminates the need for manual hostel administration. Because it is an internet tool, anyone may use it from anywhere, which increases the effectiveness of hostel management. Six modules make up the system, according to (Elakkiya *et al.*, 2021): student information, room assignment, and attendance entry module, computation of mess payment, stock availability, and gate pass. This facilitates the transition from a paper-based system to a site-based structure. It relieves the administrative personnel of physical labor, which makes it extremely difficult to monitor student records. The eight primary modules of the management system that (Srikant *et al*., 2020) proposed include the registration module, the student module, the hotel management module, and others. In furtherance of managing student data, the system maintains track of each student's room number and payment information. Because the system is paperless and controllable from any location, it simplifies work. (Kola *et al*, 2014) study claims that the number of educational institutions has increased significantly, primarily in the previous forty years. As a result, it has helped to create a population of informed citizens. However, the majority of these new educational institutions are still operating their systems using outdated methods, particularly when it comes to hostel amenities, which has a detrimental effect on the system's overall effectiveness. In this study, they suggested creating an automated system for managing hostel accommodations. Microsoft Access for the database and Visual Basic were used in the development of the automated system, which also has an integrated authentication mechanism to prevent unwanted access. Compared to a typical hostel administration system, the designed system is more efficient and focused on Graphical User Interfaces (GUIs).

3.0 Methodology

This study adopted the prototype development model to design and implement the automated hostel allocation system. The prototype model was selected because it allows iterative refinement of the system based on user feedback, ensuring that the final product meets the needs of administrators, wardens, and students. The stages followed include requirement gathering and analysis, rapid design, prototype construction, initial user evaluation, prototype refinement, and eventual implementation and maintenance.

The methodology was aimed at understanding the existing hostel allocation process at the State University of Medical and Applied Sciences (SUMAS), identifying its limitations, and generating the requirements necessary for the proposed automated system. To achieve this, both qualitative and observational methods were employed.

3.1 Data Capturing and Analysis

Data was captured from the existing manual system to establish its procedures, limitations, and associated costs. This process made it possible to evaluate how hostel allocation is currently managed and to identify areas requiring improvement, such as delays, inaccuracies, and inefficiencies in record keeping.

3.2 Research Approach

The research approach was structured to provide reliable information for system design. Interviews and direct observation were the primary methods used to obtain factual details about the current allocation process.

3.2.1 Observation

Visits were made to the student affairs unit at SUMAS to observe the manual hostel allocation process. Key activities recorded included the completion of allocation forms by clerks, manual processing and storage of forms, and display of allocation results.

3.2.2 Interviews

Interviews were conducted with staff of the student affairs unit to obtain additional insights into the allocation process. Questions addressed issues such as methods of data collection from students, the number of students per room, total room capacity of the hostels, allocation costs, validity periods of payments, and equipment used for record keeping.

This combination of observation and interviews provided a comprehensive understanding of the challenges of the existing system and informed the requirements for developing the automated hostel allocation system.

4.0 Results and Discussion

4.1 Results

4.1.1 System Modules of the Developed System

The developed hostel management system is structured into three main modules: the Administrator Module, the Warden Module, and the Student Module. Each module provides distinct functionalities to streamline the operations of the Student University Management and Allocation System (SUMAS). Administrator Module he administrator has full system privileges and oversees both students and wardens. Only authorized administrators with valid credentials can access the admin dashboard through the login feature. They can add, edit, and remove student records, ensuring real-time updates in the database. Administrators also have the authority to create and update warden records, while their login credentials can be securely updated through the password management function.

Wardens, who supervise students under their care, have partial administrative privileges. They must authenticate with a valid username and password before gaining access to the system. Once logged in, wardens can update their personal information and manage student records assigned to their hostel by adding, editing, or deleting them. In the event of a lost password, wardens can retrieve a new one using the "forgot password" recovery option.

Students interact with the system primarily before and after payment. To gain access, each student must log in with a unique username and password. After logging in, they can view and update their personal information when necessary. For password changes, however, students are required to contact either the administrator or the warden.

4.1.2 Database Design

To support efficient data storage and retrieval, three core databases were developed and generalized across multiple entities. These include Warden Login, SWO Login, Student Login, Student, and Hostel entities. Login entities handle authentication, while student and staff tables store detailed personal records.

Schema Diagrams and Entity-Relationship Diagrams (ERD) were constructed to depict relationships among entities (Figs. 1 to 3).

4.2 Discussion

The development of this web-based SUMAS addresses the limitations of the manual hostel allocation system, which was previously prone to delays, human error, inefficiency, and poor record management. Manual systems also lacked real-time data access and verification, often leading to duplicate allocations and student dissatisfaction.

By integrating rule-based system logic and drawing on concepts from heuristic models reviewed in the literature, the web-based SUMAS offers a more practical, user-friendly, and scalable solution. Unlike heuristic and purely rule-based models that may be computationally heavy or difficult to implement in real-world university settings, this system ensures that tasks such as registration, hostel

allocation, and management can be performed quickly and accurately via the internet.

Furthermore, the modular design (Administrator, Warden, and Student modules) provides role-based access, which strengthens data security and improves accountability. The centralized database eliminates redundancy and supports efficient record retrieval, ensuring that administrators and wardens can manage hostel allocations seamlessly while students access accurate, updated information.

This combination of features demonstrates that the system is not only an improvement over manual processes but also a more practical and adaptable alternative to existing models highlighted in the literature.

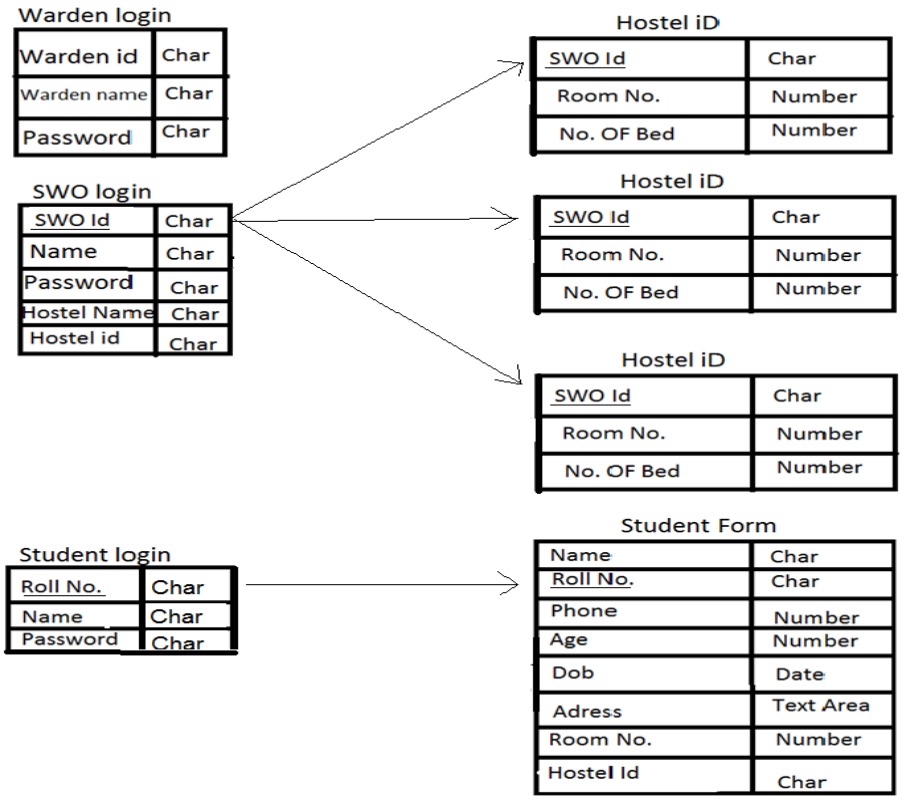

Fig. 1: ERD shows how login entities are linked with student and hostel records.

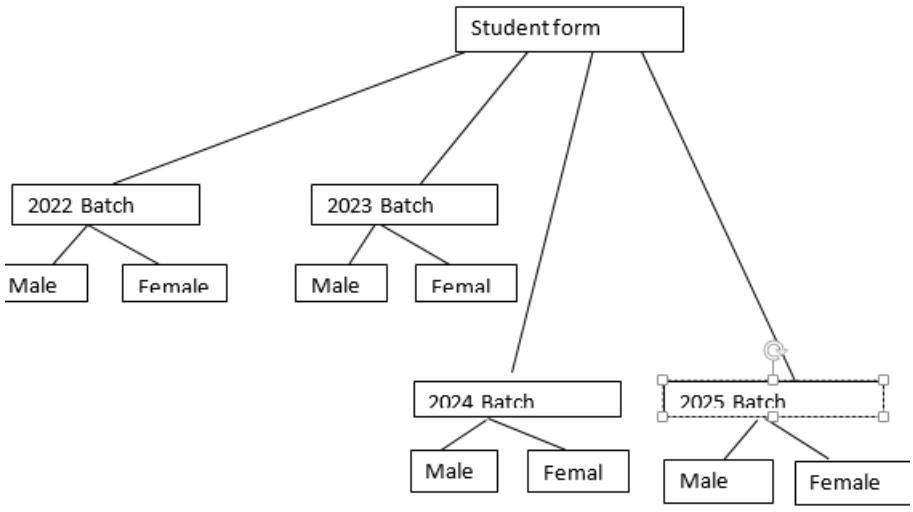

Fig. 2: Generalized Student Database stores key student details such as name, ID, and contact

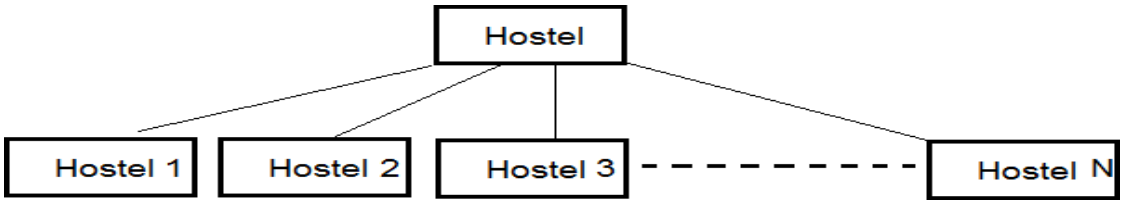

Fig. 3. : **Generalized Hostel Database manages hostel allocation and available spaces**

4.3 Graphical User Interface (GUI) Results

The implemented system includes interactive web-based interfaces for different users:

Fig. 4: (Main Page): Provides entry into the system, allowing users to navigate to login or registration depending on their role.

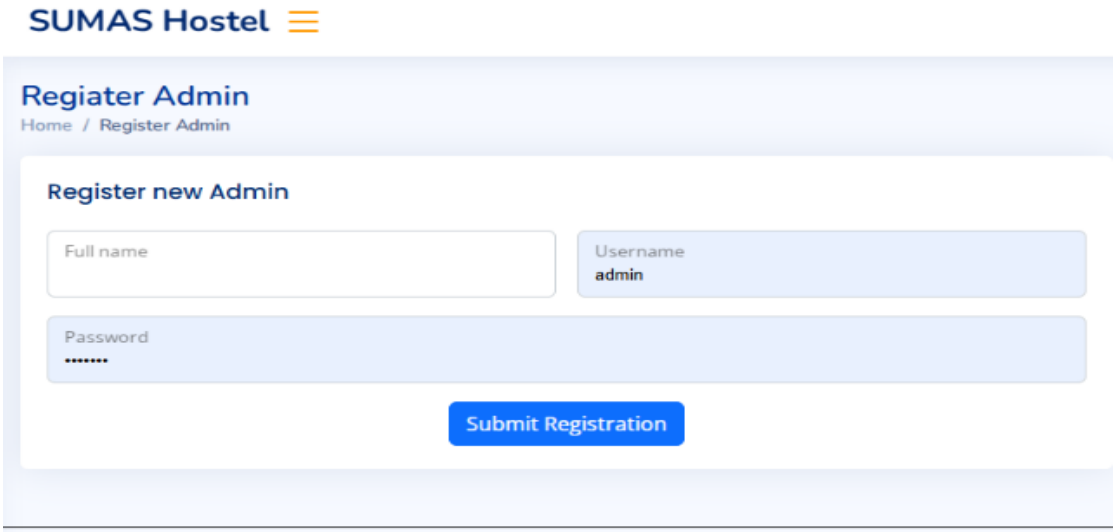

Fig. 5 (Admin Registration Form): Allows administrators to register and create login credentials.

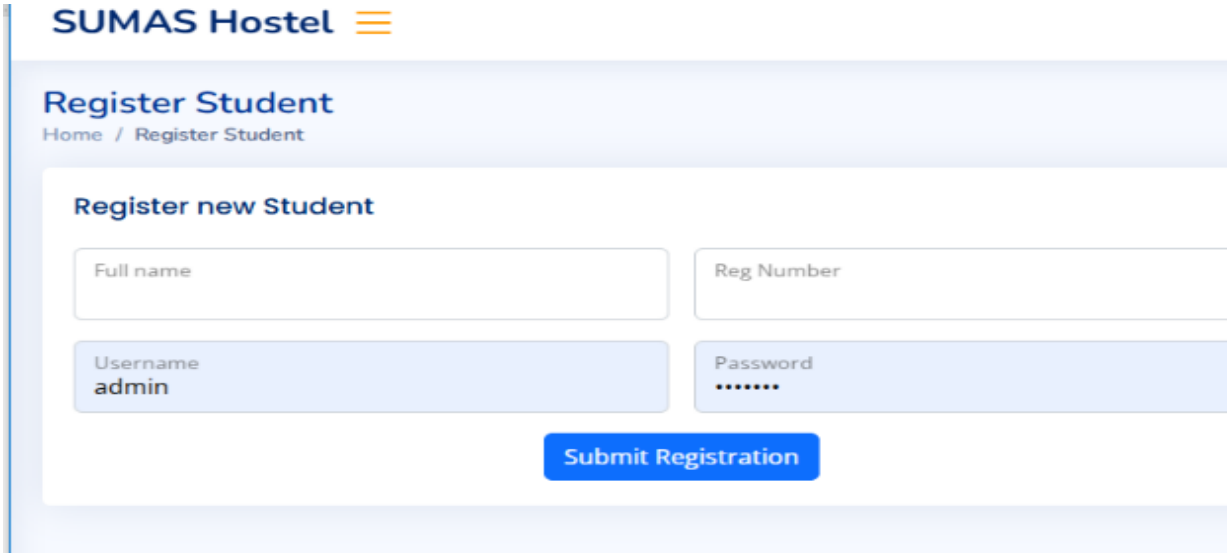

Fig. 6: (Student Login Page): Enables students to securely log in and access their personal details and allocation status.

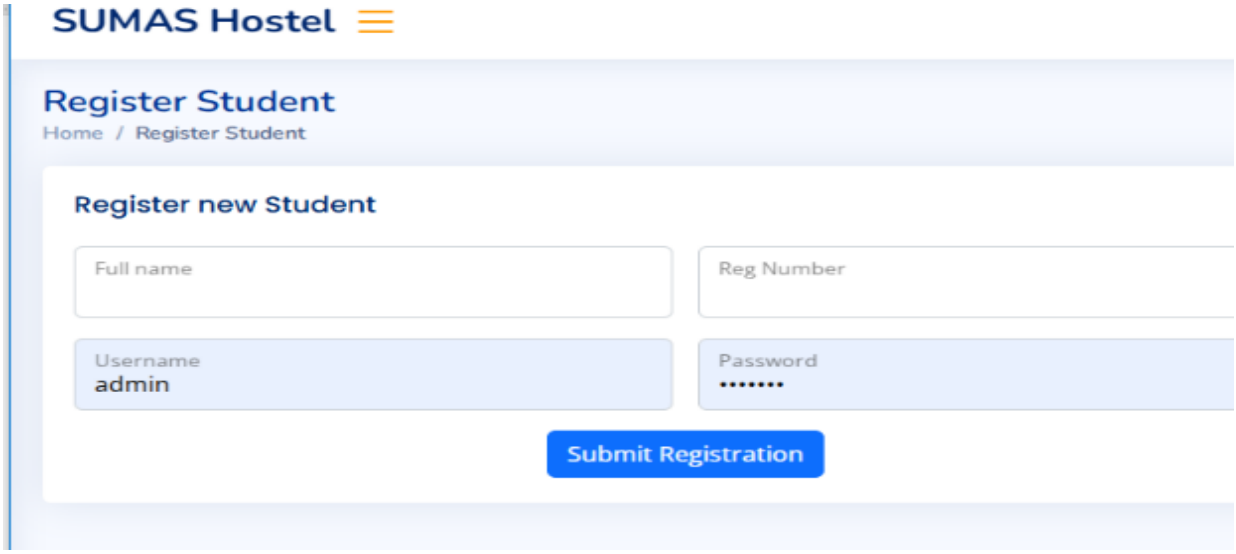

Fig. 7: (Warden Login Page): Provides wardens with secure access to their management dashboard.

5.0 Conclusion

This study successfully developed an automated hostel allocation system for the State University of Medical and Applied Sciences (SUMAS), Igbo-Eno, to address the inefficiencies of the conventional manual method. The developed system integrates PHP, MySQL, and e-commerce functionalities to ensure secure online payments, reliable record keeping, and transparent room distribution. It incorporates three modules—administrator, warden, and student—that collectively

streamline hostel management. The findings show that the system reduces delays, minimizes errors, saves time, and lessens paperwork compared with the manual approach, thereby enhancing efficiency and trust between students and administrators.

In conclusion, the system is user-friendly, modular, and easy to maintain, aligning with SUMAS's broader goal of digital transformation. Its deployment provides a sustainable solution to hostel allocation while improving accountability and resource management.

Based on the findings, it is recommended that SUMAS management adopt the developed system fully across all hostels and provide training for staff and students to maximize its benefits. Future enhancements should focus on developing a mobile application, incorporating biometric authentication for stronger security, and integrating advanced analytics for better decision-making in hostel resource allocation.

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Declaration

Consent for publication

Not Applicable

Availability of data and materials

The publisher has the right to make the data public

Ethical Considerations

Not applicable

Competing interest

The authors report no conflict or competing interest

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Authors' Contribution

Ugwuanyi Sunday C conceptualized the study, designed the system architecture, and supervised implementation. Nwanmadu Chukwuebuka E developed the backend database and e-commerce integration. Kenneth C. Ugwu implemented the PHP application and user interface. Nweze Rosemary Chika handled system testing, documentation, and validation of results.