



Coal City University Journal of Science

ISSN: 2734-3758(Print), 2734-3766 (Online)



*A publication of faculty of Natural and Applied Sciences,
Coal City University, Enugu Nigeria.*

DESIGN AND IMPLEMENTATION OF AN ONLINE STUDENT HOSTEL ALLOCATION MANAGEMENT SYSTEM

Olusanya Olayinka Olufunmilayo

Department of Computer and Information Sciences, Tai Solarin University of Education,
Ijagun, Ogun State, Nigeria.

Corresponding Author: Olusanya, O.O. (olusanya_oo@tasued.edu.ng)

ABSTRACT

The accommodation problem of students is a major aspect that the management board of tertiary institutions needs to consider very seriously. An increasing number of students will mean more paperwork and less efficiency than the automated registration system. This study presents an automated hostel allocation management system that can be used by both students and hostel staff of Tai Solarin University, Ogun State. The study identified the functional and non-functional requirements of the proposed system and specified the system design using unified modeling language (UML) diagrams such as use case diagrams, activity diagrams, and flowchart diagrams. The system was implemented using web 2.0 technologies such as HTML, PHP, and JavaScript including SQL for the database. The results showed that the development of the system will improve the provision of services to students allocated to the hostel while reducing stress associated with the existing manual-based system of approach.

Keywords: Hostel allocation, Accommodation, Management Information system, Education technology

1. INTRODUCTION

The hostel is a place where students stay to pursue formal education away from their homes. The concept of a hostel is not only limited to a place of residence but also a human practical laboratory. Therefore, a hostel is not simply a place for living it is a center of education (Amina, 2016). Students' accommodation has been identified as one of the essential components of tertiary institutions. The availability of accommodation for students enables tertiary institutions to attract a large number of students of different nationalities and backgrounds to pursue higher education (Kolawole & Boluwatife, 2016). Tertiary institutions have the responsibility to provide decent accommodation for students who successfully gain admission to pursue various programs of study. For government institutions, accommodation facilities are usually provided by the government. However, as a result of the high demand for

tertiary education in recent times, governments of many countries are not able to adequately provide accommodation for the students of tertiary institutions (Sharman, 2012). According to Onclin (2014), tertiary institutions' involvement in accommodation was initially seen as a means of attracting students however it would also influence students' success, retention rates, and overall satisfaction and mobile learning (Owolabi, 2015; Onyema et al, 2020). The traditional paper-based process of student allocation to hostels is time-consuming and expensive. The students usually have to go through several layers of authorization, generating many documents along the way.

The accommodation problem of students is a major aspect that the management board of tertiary institutions needs to consider very seriously. An increasing number of students will mean more paperwork and less efficiency than the automated registration system (Muskan, 2016). This is because the system of hostel allocations that is being used presently is still manual and partly computerized despite the increasing number of students to be accommodated. In handling such problems, a user-friendly, online, and automated computer system for the hostel allocation should be implemented. In the existing hostel allocation system, staff in the accommodation office needs to record all kind of transactions and processes manually which require more manpower. This leads to more paperwork to be done including the possibility of duplicate tasks in data entry thus making it much difficult to handle and store data efficiently. This study aims to provide a solution to the problem facing the traditional method of managing hostel allocation. The proposed system attempts to improve institutions' hostel services for stakeholders – administrators, management, and students of the hostel. It automates the administrative processes and reduces the stress associated with searching for information on a student/a facility in a bundle of registers.

The use of computers in the hostel allocation system is an extremely important function in any educational institution with the gradual increase in the student population in the universities system today. The use of manual methods in the allocation of hostel accommodation to students is becoming an impossible task as a result of the huge amount of detailed information that needs to be processed. More so, manual methods can physically be cumbersome and demanding, and could also affect the security of students data (Onyema et al, 2021). However, the use of computers guarantees efficiency, speed, accuracy, and the ability to perform these tasks more efficiently and effectively.

2. Related Works

Askar et al. (2023) developed a web-based Hostel Management System to streamline hostel operations, simplify allocation for students and administrators, reduce manual work, and improve data security and integration. The methodology involved creating a web application using HTML, PHP, JavaScript, and MySQL, based on user requirements and current framework research. The system offers features like login, user registration, dashboards, and a database. Results showed successful development of the system, enabling online data access from anywhere, eliminating manual documentation.

RajendraPatil et al. (2023) aimed to alleviate manual hostel management challenges through their Hostel Management System, aiming for a computerized solution enhancing efficiency and effectiveness. Developed using PHP and XAMPP servers, following the Software Development Life Cycle (SDLC), the system caters to hostel officers, administrators, and students, offering user-specific modules. Featuring HTML, CSS, JavaScript, PHP, MySQL, and Bootstrap, it supports tasks like personnel data management, fee tracking, and grievance handling. The study was limited to management of hostel and fail to take into consideration student hostel allocation.

Odili and Obiunu (2022) proposed a computerized web-based hostel management and allocation system to address challenges faced by students in securing accommodations, particularly at Anchor University Lagos. The methodology involved designing and implementing the system using HTML, PHP, and MySQL, utilizing UML charts like USE case and ACTIVITY diagrams to illustrate structure and functionality. The database structure and table relationships were also discussed. The results indicated successful tracking of available rooms, occupants, and student records in real-time, eliminating double allocations and enhancing hostel facility management and data safekeeping. The system effectively streamlined hostel allocation processes and improved management efficiency at the university. However, the study is limited as it focuses on a specific institution.

Bhowmik and Riaz (2022) researched designing and implementing an accommodation management system for educational institutions, focusing on the Abdus Salam Hall Accommodation Management System (ASHAMS) as a case study. The methodology involved a top-down design approach, decomposing the system into modules for flexibility, and following the Agile Methodology for efficient development. Visual Studio, .NET Framework, SQL Server Management Studio, and specific hardware were utilized, along with an authentication algorithm for security. The results showed successful automation of the accommodation management system, capturing and managing student details, providing user-friendly interfaces, enabling seat allocation management, and easy entry/updating of hall information. The ASHAMS system streamlined accommodation management processes, enhancing efficiency and accuracy within the educational institution. The study is limited in scope as it focused on a particular hall for the accommodation management system in an institution.

Mahendra et al. (2022) developed a web-based Smart Hostel Management System to efficiently manage hostel activities like student data, room allocation, fees, mess bills, and staff information. The aim was to address challenges in traditional manual processes and enhance overall efficiency through automation and user-friendly interfaces. The methodology involved literature review, requirement analysis, software development using XAMPP Server, HTML5, CSS3, PHP, MySQL, hardware specifications, and system architecture design. However, the study's limitation was the lack of specific details regarding the outcomes of implementing the proposed web-based hostel management system.

Mensah et al. (2022) aimed to enhance hostel management efficiency and security at Babcock University, Nigeria, by developing a web application utilizing image recognition technology. The methodology involved analyzing the existing system, designing a web-based system for hostel affairs and item management with image uploading capabilities, and developing the application using HTML, CSS, JavaScript, and C#. The results showed

successful implementation of the system, improving efficiency, enhancing security through image recognition, simplifying operations, and enabling automated SMS alerts to parents, leading to a more streamlined and secure hostel environment. However, the study was limited in scope to a particular hostel management in a university.

Chaudhri&Kevat (2021) aimed to introduce and analyze the "eHostel" Android application designed to automate manual hostel management processes like room allocation, fee management, student management, complaint handling, visitor records, leave management, and notice board management. The application also provides secure user authentication, digital hostel passes, notifications, form updates, and profile management. The methodology adopted was Rapid Application Development (RAD). The results achieved were the successful development of the "eHostel" application, effectively automating hostel management processes and providing various features to enhance the overall experience. However, limitations such as platform compatibility issues may affect user experience.

Pundir et al. (2021) aimed to develop a web application to automate and streamline various hostel management activities, reducing manual work, improving allocation processes, facilitating communication, and enhancing overall operations for students and administrators. The methodology likely involved requirement analysis, system design, development, testing, deployment, and evaluation to create the web application. However, the specific results achieved were not explicitly mentioned, limiting the understanding of the study's outcomes.

Karthikeyan et al. (2021) aimed to develop software for managing hostel activities and addressing challenges faced by manual systems. The goal was to create a user-friendly, GUI-oriented system that improves efficiency, minimizes manual work, and provides online applications for accommodation, student selection, mess calculation, complaint registration, and notice board management. The methodology involved identifying drawbacks of existing manual systems, designing a computerized user-friendly system, developing web-based software with features like hostel details, student information, warden administration, online applications, student selection, mess calculation, complaint registration, and notice board management using technologies like PHP, MySQL, JavaScript, and Dreamweaver. However, the specific results achieved were not explicitly mentioned, limiting the understanding of the study's outcomes.

Magar et al. (2021) developed a web application for hostel management to simplify the booking process, reduce manual work, streamline allocation, and effectively manage data. The methodology involved utilizing HTML, CSS, JavaScript, PHP, MySQL, and Bootstrap frameworks to implement functionalities like booking, filters, grievances, and login options for admins, hostels, and students. The system allowed other hostels to list accommodations, creating an aggregation platform. Results included successful implementation of booking, filtering, grievance lodging, login/logout for different roles, an attractive user interface, easy navigation, and a proposed database design to enhance the overall booking experience. The project aimed to overcome manual booking methods through advanced technologies for efficiency and user-friendliness.

Adetunji et al. (2020) developed a Personality-Based Hostel Allocation System (PHAS) to address roommate incompatibility issues in student accommodations by allocating rooms based on temperaments. The methodology involved developing a sorting algorithm using Eric

Jorgenson's open four temperament scale test to allocate students to available rooms. A PHAS model was designed for implementation by educational institutions with hostel facilities, considering future work on algorithms for allocating bed spaces and other facilities. The results included the successful development of the PHAS framework, incorporating a personality sorting algorithm to allocate compatible roommates, prioritizing student welfare. However, the limitation was the sole focus on room allocation based on temperaments, without considering bed space or other facility allocations.

According to Aswar et al. (2019), the aim was to integrate college hostel activities into an IT-enabled comprehensive system to streamline room allocation for 1200 students and manage room changes efficiently. The methodology involved a modular approach using .Net Technology and SQL Server, with modules for student application and ID allocation, hostel details management, and room allotment based on criteria. The results achieved an integrated hostel automation system that streamlined room allocation, improved accuracy in student data management, addressed drawbacks of manual systems like errors and redundancy, and enhanced user experience for students and administrators through a user-friendly GUI.

Ojha, Sojan, Roy, and Varghese (2019), worked on the development of a mobile-based system for the management of information across a tertiary institution. The study developed an android application that maintains the routine data of Students and enables communication among Students/Parents and Teachers. The study identified the user and system requirements of the proposed system via interviews with the stakeholders. The system was implemented via the Android Studio using programming languages such as Java, XML and MySQL. The study was limited to the development of a system required for assessing information across an institution. Onyema et al (2021b) also emphasized the importance of students' living environment and the need to ensure proper accommodation to enhance their ability to engage in flipped learning activities. The reviewed works underscores the importance of digitizing hostel management processes and the potential benefits of automated systems. While significant progress has been made in developing efficient and user-friendly solutions, further refinement is needed to address specific institutional requirements. Therefore, this study aims to develop an automated student hostel allocation system tailored for Tai Solarin University of Education.

3.0 Materials and Methods

This section presents the various materials and methods that were adopted for the development of the online hostel allocation management system proposed in this study. The section presents the various requirements of the proposed system which were specified using unified modeling language (UML) diagrams followed by the various programming languages which were selected for the implementation of the proposed system.

3.1 Requirement analysis

This is the analysis of the functionalities and components of a proposed system. It is achieved through the requirement process which involves analyzing, finding, and sustaining the requirement of a system still under development or already in use.

The specific functional requirements of the proposed system include the following:

- The system shall allow students to login with their matric number (which is their username) and password respectively.
- The system shall allow hostel workers to log in with their usernames and passwords respectively as assigned to them by the system administrator.
- The system shall allow students to make payment via the payment portal after which the confirmation of payment will reflect on the student dashboard as long as it has been verified by the admin.
- The system shall allow students to print their receipts upon confirmation of payment.
- The system shall allow the students to pay for their monthly or yearly bed fees through their virtual account that has been credited.
- The system shall allow students to make complaints about any facility that is either bad or faulty for repair or replacement.
- The system shall allow hostel staff to take inventory of hostel contents.

The specific non-functional requirements include the following:

- The system shall allow usernames with a minimum number of 11 characters for students and a minimum number of 10 for hostel staff.
- The system shall allow passwords with a minimum number of 8 characters consisting of at least one lowercase letter, one uppercase letter, and one symbol for both students and staff.
- The system shall allow the upload of a picture of a profile of not more than 1MB and any document of not more than 3MB.

3.2 System design

Unified modeling language (UML) diagrams such as use case diagrams can be used to describe the functionality of a system horizontally. This implies that it represents the details of individual features of a system and its available functionality. As seen in Figure 1 (left), the use case diagram shows a system administrator with five actions. A user of the system can update information entered about a particular hostel, allocate students to hostel rooms, search for information stored on the database, create new users, and also view all allocations on the system. Figure 1 (right) shows the diagram of a client with five actions. A user of the system can update information provided about a particular hostel, login, search for information stored on the database, update profile and also add or view all payment on the system.

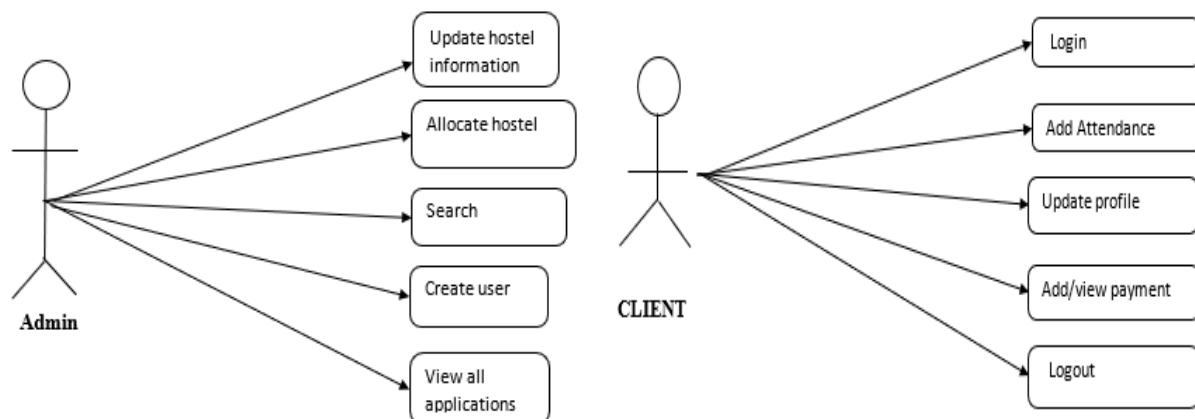


Figure 1: Use Case Diagram of Proposed System

An activity specifies the coordination of executions of subordinate behaviors using a control and data flow model. The subordinate behavior coordinated by these models maybe initiated because other behaviors in the model finish executing, because objects and data become available, or because events occur external to the flow. The flow of execution is modeled as activity nodes connected by activity edges. The activity diagram of the proposed system represents the operations that are viable to the users (user and moderator) of the proposed system. Activities in this system describe procedural computations are shown in Figure 2.

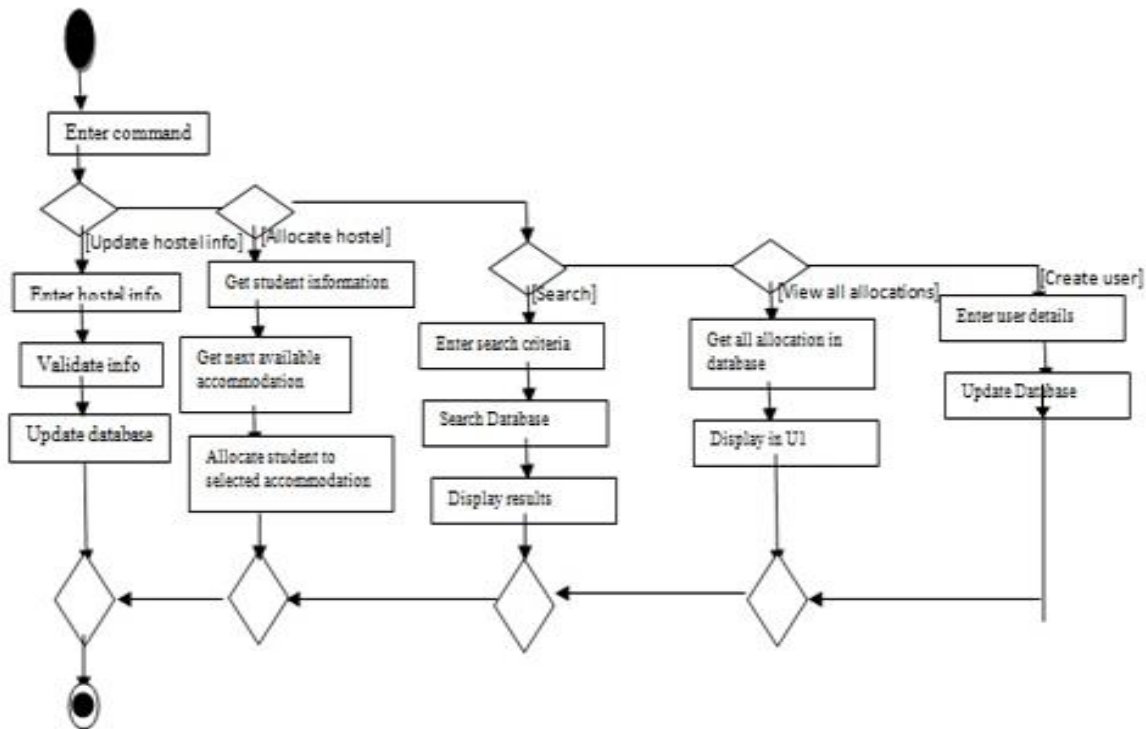


Figure 2: Activity Diagram of Proposed System

Flowcharts are used in designing and documenting complex processes. Like other types of diagrams, they help visualize what is going on and thereby help the viewer to understand a process and perhaps also find flaws, bottlenecks, and other less obvious features within it. Figure 3 shows the diagrammatic representation of the system in terms of the process operations. The process begins with the user having to login. The login operation confirms both the validity and access rights of a user. The user is then offered the process operations of updating hostel information, allocating hostels, searching the database, creating new users and viewing all allocations. If the access is not right that user is not valid, then an error message is flagged.

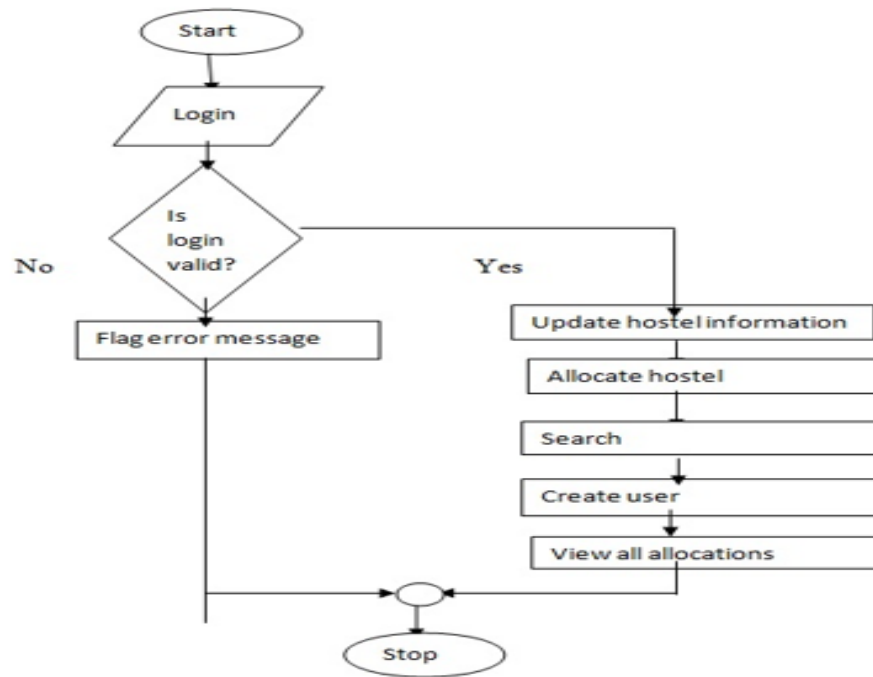


Figure 3: Activity Diagram of Proposed System

4. Results

This section presents the results of the implementation of the user interface of the proposed system. There are so many programming languages that can be used to implement this system. To test the effectiveness of the design, PHP and HTML were used with MySQL as the back-end integration database. The choice of these programming languages is based on the features of the languages that make them very appropriate for this work. Figure 4 shows the home page is an interface which aids users and administrator to perform certain operations, prepare input and output of the system or components. In this page, we have the home screen with the school hostel building, the facilities menu, information, contact and the login menu.

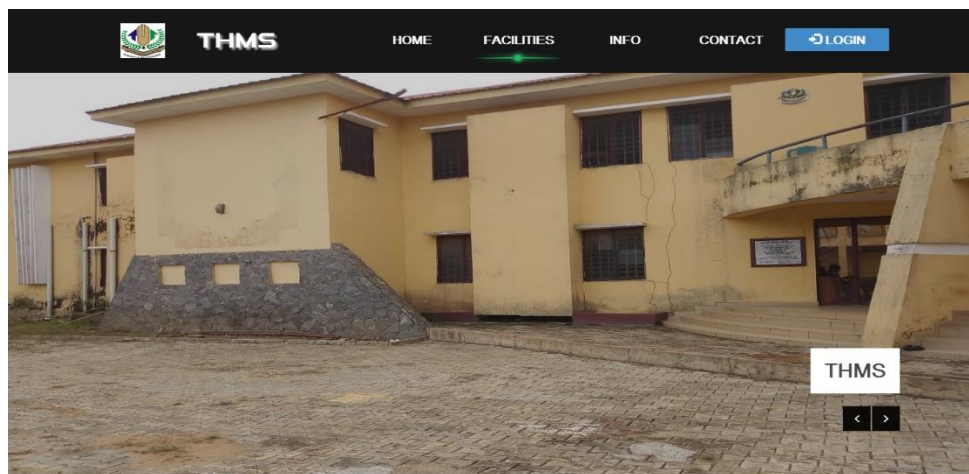


Figure 4: Home Page of Proposed System

Figure 5 shows the user interface for the various facilities which are made available in the hostel. The list of the available facilities which are made available in the hostel include: the common room, free parking space for cars, outdoor terrace, free Wi-Fi, washing machines, tea shop, cable and satellite TV to mention a few.

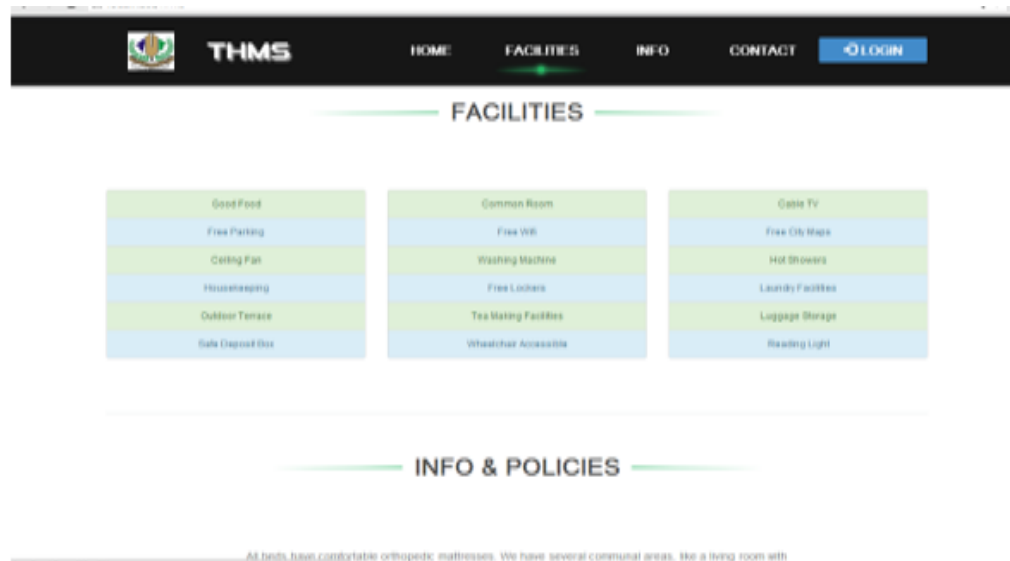


Figure 5: Facility Page of Proposed System

Figure 6 shows the information and policy page of the proposed system. The page displays information about the hostel and various policies applicable to the students living in the hostel. Figure 7 shows the login page of the proposed system. The login interface contains two fields; the username field and the password field. These fields are unique to a user and when entered are checked against the entries in the database. There's also a box which says remember me and the forget password in case of resetting your password. This interface gives direct access to the system.

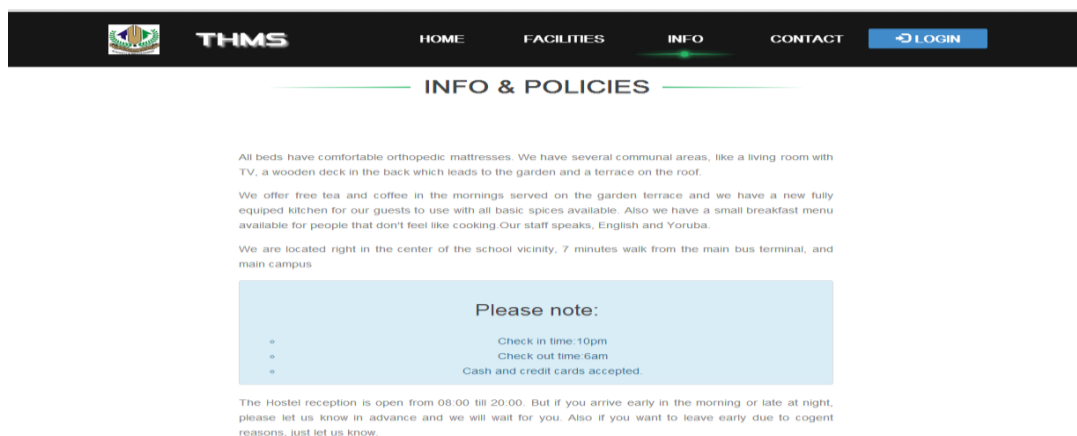


Figure 6: Information and Policy Page of Proposed System

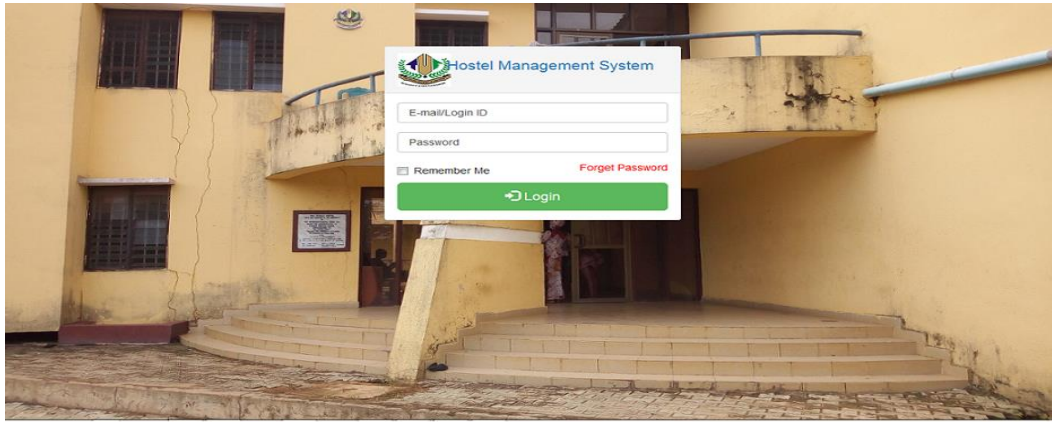


Figure 7: Login Page of Proposed System

Figure 8 shows the interface displaying the registration page of the proposed system. This is where the users of the system enter all the information about a particular student in order to allocate a room for that student. It contains some field such as Name, matric number, college, gender to mention a few. Figure 9 shows the interface which displays information about the respective rooms in the hostel allocated to students. Figure 10 shows the interface which displays the payment page via which students make their payments for available rooms.

Figure 8: Registration Page of Proposed System

Room No	No Of Bed	Block No	Amount	Action
R-01	4	BL-01	Block-01(North)	☒ ☐
R-02	2	BL-01	Block-01(North)	☒ ☐
R-03	8	BL-01	Block-01(North)	☒ ☐

Figure 9: Room Page of the Proposed System

Figure 10: Payment Page of Proposed System

5. Conclusions

The traditional way of allocating hostel is associated with so many problems ranging from overcrowding and stress of the students and the hostel staff in order to keep records. However, an online hostel allocation system has been proposed through which this shortcoming can be overcome with fewer problems. The internet has truly changed the way we do a lot of things today; we now have the ability to do virtually everything from our computers. The online hostel allocation system is an emerging technology and a computer system has revolutionized the world thereby making task that are seem difficult easy by the use of internet. This study has emphasized the capabilities and reliabilities of a computer system in terms of its accuracy, speed and timeliness of information that is encompasses. Recommendations for future research work includes, the use of biometrics for ensuring security and tracking student's movement across hostel and provision of dashboards for the visualization of information stored on the system.

References

- Adetunji, O.O., Akintunde, O., & Otuneme, N. C. (2020). Hostel-Based Hostel Allocation System: Beyond the First Come First Serve Principles. *International Journal of Computer Science and Information Security (IJCSIS)*, 18(8), 29-36.
- Amina I. (2016). A Qualitative Study Investigating the Impact of Hostel Life. *International Journal of Emergency Mental Health and Human Resilience*, ISSN: 1522-4821.
- Askar, A., Gaur, S., Deollikar, S., & Ubale, A. (2023). Hostel Management System. *International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)*. 3(1), 185-189.
- Aswar, A., Ganesan, A., Kavitha, V., & Karthicksabri, V. (2019). Hostel Automation System. *International Journal of Computer Science and Mobile Computing*, 8(9), 161-166.
- Bhowmik, R., & Riaz, M. H. (2022). Designing and Implementing Accommodation Management System: ASHAMS as Case Analysis. *International Journal of Innovative Technology and Exploring Engineering*, 11(7). DOI: 10.35940/ijitee.G9983.0611722

- Chaudhri, K., &Kevat, R. (2021). Study of Digitalized Hostel Management System. *International Journal of Scientific Research in Computer Science, Engineering and Information Technology (IJSRCSEIT)*, 7(2), 366371.
- Karthikeyan, A., Rajasree, V. S., Begum, S. A., &Kaviya, A. (2021). Implementing and Improving Room Pooling. *International Journal of Innovative Research in Technology*, 7(11), 549-557.
- Magar, S., Jadhav, R., Said, S., &Jadhav, S. (2021). Hostel Management System and Aggregation. *J. of Emerging Technologies and Innovative Research*, 8(10), 234 -238.
- Mahendra, M., Lavanya, O., Reddy, A. B., Keerthi, C., Chandana, N., &Ambika, S. R. (2022). Web-Based Smart Hostel Management System. *International Journal of Research Publication and Reviews*, 3(6), 2203-2207.
- Mensah, A, Y., Olasubomi, O., Chinatu-N,O.O., Judah,O., &Jonah,J. (2022). Hostel Management System Using Image Recognition. *Engineering and Technology Journal*, 7(7), 1383-1391.
- Muskan, (2016). Hostel Life Advantages and Disadvantages. *European Scientific Journals*, 7, 2-3.
- Onyema E.M., Choudhury T., Sharma A., Atonye F.G., Phylistony O.C., Edeh E.C. (2021b) Effect of Flipped Classroom Approach on Academic Achievement of Students in Computer Science. In: Singh T.P., Tomar R., Choudhury T., Perumal T., Mahdi H.F. (eds) Data Driven Approach Towards Disruptive Technologies. Studies in Autonomic, Data-driven and Industrial Computing. Springer, Singapore. https://doi.org/10.1007/978-981-15-9873-9_41
- Onclin, W. (2014). How Student Accommodation Impacts the International Student's Experience. *European Scientific Journals*, 13: ISSN: 1857-7881
- Onyema, E.M., Edeh, C. D., Gregory, U.S., Edmond, V.U., Charles, A.C. and Richard-Nnabu, N.E. (2021). Cybersecurity Awareness Among Undergraduate Students in Enugu Nigeria. *International Journal of Information Security, Privacy and Digital Forensic* 5 (1), 34 -42.
- Owolabi, B.O. (2015). The Effects of Students Housing on Academic Performance. *International Journal of Scientific & Engineering Research*, 6. ISSN 2229-5518.
- Odili, J.B., &Obiunu, G.E. (2022).a web-based hostel management system For nigerian universities. *Anchor university journal of science and technology (aujst)*, 3(1), 161-168.
- Onyema, E.M; Quadri, N.N; Alhuseen, O.A; Nwafor,C.E; Abdullahi, I. and Faluyi S.G. (2020). Development of a Mobile-Learning Platform for Entrepreneurship Education in Nigeria. *British Journal of Science (BSJ)*, 18 (2), 123-141.
- Pundir, A., Singh, A., Varshney, T., Singh, T., & Gupta, A. (2021). Online Smart Dashboard for Hostel Management Activities. *International Journal of Creative Research Thoughts*, 9(6), 209-214.
- RajendraPatil, R., Sapkal, A. K., Thakre, S. S., Shaikh, S. A., &Gaikwad, R. (2023). Hostel Management System. *International Journal of Research Publication and Reviews*, 4(12), 5038-5042.