**DESIGN AND IMPLEMENTATION OF A HOSTEL BOOKING SYSTEM :**

**NILE UNIVERSITY OF NIGERIA**

**BY**

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**HOSTEL BOOKING SYSTEM FOR NILE UNIVERSITY OF NIGERIA**

**ACADEMIC SESSION : 2023/2024**

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# **CERTIFICATION**

This is to certify that, the project titled “DESIGN AND IMPLEMENTATION OF A HOSTEL BOOKING SYSTEM FOR NILE UNIVERSITY OF NIGERIA” by ONYEKPERE CHIBUEZE KINGSLEY 201212021 has been approved by the undersigned for meeting the requirements for the award of Bachelor of Science in Software Engineering (BSc. Hons in Software Engineering by the department of Software Engineering, Nile University of Nigeria, Abuja.

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# **DECLARATION**

I hereby declare that the work in this project is my own except for quotations and summaries which have been duly acknowledged.

Student : …………………………………………………….

Date : …………………………………………………….

Supervisor : …………………………………………………….

DR. MOHAMMED ALIYU SULEIMAN

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# **DEDICATION**

I dedicate this study to God, my supportive family, and all the lecturers who supported me throughout my time at Nile university of Nigeria, most especially my supervisor, Dr. Aliyu Mohammad Suleiman, who guided me through this project, and Dr. Umar Adam Ibrahim, who has helped me over the years to become a better software engineer.

# **ACKNOWLEDGEMENT**

I am very grateful to God for his direction and guidance through this journey through university. I also thank my family for supporting me and being with me throughout. Finally, I would like to thank my project supervisor, Dr. Mohammed Aliyu Suleiman, whose guidance helped me complete this project.

# **ABSTRACT**

The hostel is an important component of secondary and tertiary institutions around worldwide. Hostels offer **cheap accommodation and an atmosphere to interact with new people**. Students share common areas such as kitchens, rooms, and bathrooms. Hostels offer a platform for people to make new friends and learn about different cultural orientations. Using technology, some processes involving the hostel reservation have been automated and made more efficient. However, hostel reservation still remains an issue. The hostel reservation process is a tedious one and the current system is inefficient and is not very transparent. The application of technology to the process of hostel reservation will go a long way in making the process more efficient and more effective. This project proposes a web-based hostel reservation system which will implement the Genetics Algorithm to optimize the hostel reservation process.

# **CHAPTER ONE**

INTRODUCTION

*Hostel reservation is important to every institution. The issue of creating an optimal system for hostel reservation is a very critical one, and there are specific constraints and rules applied to it in every institution. This chapter discusses the problems with the current hostel reservation system at Nile University of Nigeria, and introduces a solution that aims to solve this problem.*

1. **Background of the Study**

Effective hostel reservation is a very important component that supports the smooth accommodation of students. A well-organized hostel reservation system makes it easy and efficient to make hostel reservations and track hostel information relating to on-campus activities.

An extensive analysis of a wide range of factors and restrictions is required to develop a complete and useful hostel reservation system. These include essential components including the availability of suitable rooms, the assignment of rooms to students, and the avoidance of any assigning a room to too many students at a time.

Today institutions have tools used for hostel reservations. The tools however, lack a system that allows students to know their room beforehand. This leads to students staying in rooms where they barely manage to get along with their roommates. As a result, students may not get the best possible experience while staying on-campus.

Students in universities do not know which rooms they are lodging in until they get to the school which makes their reception very disorganized. Students are assigned rooms on the day they resume a new semester, and this assignment is often haphazard and disorganized.

For assignment of refectory tickets, the current system still requires human involvement in giving out the tickets which wastes a lot of paper and often results in long and disorganized queues. These queues are a result of the hostel supervisors handing out tickets manually which is very inefficient

The implementation of a digital Hostel Reservation System (HRS) appears as a promising approach to solve these problems, resulting in a more efficient and accurate hostel reservation process at Nile University of Nigeria. The Hostel Reservation System transforms how hostel reservation is carried out, by utilizing cutting-edge algorithms and computing power. By automating the process, the HRS makes sure that hostels are assigned efficiently while sticking to the established constraints and considerations at the school. The assignment process is greatly simplified by this automation, which also lessens the need for extensive manual modifications.

This Hostel Reservation System (HRS) at Nile University in Nigeria has the potential to completely alter the way that hostel reservations are made, resolving many of the issues with the current system. The HRS equips the school to assign rooms to students in an efficient, effective, and constraint-compliant by utilizing the power of algorithms and computational intelligence.

* 1. **Statement of the Problem**

The school's current system for hostel reservation has serious problems. Students are assigned rooms manually and at random. This ultimately reduces familiarity with roommates and increases the potential for conflicts. The process is not transparent as students who apply for hostel do not know the exact room they are going to lodge in until they come to the hostel reception. Ultimately a student could get frustrated or misdirected when trying to find a suitable room where they could lodge in.

For the refectory system the use of tickets is paper-intensive which is not sustainable and harmful to his environment. Additionally, the system is vulnerable to unnoticed constraint violations because of its reliance on manual labor. Supervisors could misplace the tickets which could lead to a lot of problems down the road. Also, the process of manually assigning tickets to each students at the refectory is very disorganized because the line for students to get a ticket is different from the one they would use to get their meals.

In a lot of institutions, on campus students do not have a system by which they could voice out their complaints to the hostel management. This could lead to unsettled grievances and lower student satisfaction.

* 1. **Aim and Objectives**

The aim of this study is to improve the efficiency of the hostel reservation process at the school by developing a web-based Hostel Reservation System for the school.

The objectives of this research work are:

I. To implement a reservation system that allows students book a room with their preferred roommates

II. To implement a refectory ticket assignment system

III. To test and evaluate the implemented systems

* 1. **Significance of the Study**

The proposed Hostel Reservation System (HRS), which is specifically designed for Nile University of Nigeria and takes into account the institution's unique constraints, will significantly increase the efficiency of the Hostel Reservation process by addressing the flaws of the current system. The automation of refectory ticket assignment will make the dining hall more organized during meals. It also reduces the need to print out refectory tickets which reduces paper wastage and its effects on the environment.

* 1. **Justification of the Study**

The current system of hostel reservation at the school is not efficient, and the consequences of its inefficiency have been felt by the students; thus, there is a need for a new system that solves all the problems of hostel reservation. This will enable the system to create a system that takes into account all the important constraints that are considered when dealing with hostel reservation at the university.

* 1. **Scope and Limitation of the Study**

The scope of this study is to develop a Hostel Reservation System (HRS) for Nile University of Nigeria. It will be a web-based system that automates the process of hostel assignment and allows students to book hostels before the semester begins. The system will also make sure that refectory tickets are handed out thirty minutes before a meal commences.

The limitations of the proposed system are:

1. The system only works for students who have paid for accommodation so off-campus students will not have access to the system.

2. The system is web based, meaning it can only be accessed by users with an internet connection.

3. Requires integration into school system to know who has paid for accommodation

* 1. **Definition of Operational Terms**

1 **Hostel**: A hostel is a building dedicated to housing on-campus students to provide shelter, feeding and other basic needs.

2 **Algorithm**: This is a step-by-step procedure for solving a particular problem in a finite amount of time.

3 **Database**: A centralized repository of structured data, designed to support efficient data storage, retrieval and maintenance.

4 **Hostel Reservation**: The process by which a student is assigned to a room

5 **Hostel Reservation System (HRS)**: A web-based system that will automate the process of hostel reservation by using an algorithm to assign a room to a particular group of students without clashes and constraint violations. It would also allow students to reserve refectory tickets and voice complaints about the hostel.

6. **Refectory**: A dedicated room or building where students converge to eat meals provided by the hostel during established meal times

# **CHAPTER TWO**

LITERATURE REVIEW

*Literature review is important in any academic research, as it provides examination of existing works and knowledge on the topic at hand. This chapter discusses some of the works related to automated hostel reservation.*

1. **General Information**

The process of getting a room to stay in a university’s hostel is known as hostel reservation. It could be disorganized or very efficient, depending on the system put in place. The hostel reservation process is particularly tailor-made to each and institution because each institution has its set of policies and constraints that must be taken into account.

Unfortunately, manual hostel reservation procedures are still widely employed in many universities. The students may not know the exact room they are meant to lodge into which causes a lot of confusion during resumption. The time and effort required for this manual technique appears to be unproductive because they may be better spent on more important duties.

Some universities use Commercial Off-The-Shelf (COTS) software to enable students to pay for hostel accommodation. These systems, however, usually lack the flexibility needed to accommodate the unique constraints of various institutions. As a result, institutions, including the subject of this study, are forced to use manual techniques follow-up with the hostel allocation process after the payment has been made. This defeats the point of the automation’s intended goal that is to be provided by the system.

Researchers have put forward the idea of an automated hostel reservation systems to streamline the process of allocating hostel rooms by leveraging the power of computing devices. Several factors such as creating user-friendly interfaces, securely managing user-data and addressing other important difficulties have been highlighted in past research, a variety of algorithms have been investigated to optimize the process of hostel reservation.

* 1. **Related Works**

A study by Jazira Anuar (2013) analyzed four hotels that each had an online reservation system to ensure that their room allocation is seamless. The researchers were able to determine the core services, partially common services and individual services offered by each hotel. The results of the study presented that a hotel is most efficient when they offer unique services so they can differentiate themselves from their competitors even though they shared four (4) same core services which included room reservation, check-in, check-out and cancellation of order.

Another study by Bedard (2020) explores the two main back-end systems used in hostel-reservation which are Central Reservations System (CRS) and Property Management System (PMS). Bedard stated that a CRS is used to update Availability, Rates and Inventory (ARI) between the PMS to hotel website or third party channel while a PMS manages activities such as housekeeping, point of sale (POS), check-in or check-out, as well as other management tasks.

Another study from Delta State University by Akauze (2016) posits that hotel management systems are still rigid in accommodating reservations with breaks between check-ins, check-outs, re-check-in and re-check-out. This necessitates building a model which integrates a flexible reservation process that will allow for multiple booking functionality in a hotel reservation system.

A study by Win, Myint Myint (2022) states that a computerized reservation system of hotel is to make transaction to be accurate and fast, to keep the client's record (list) systematically and effectively. Digital reservations system makes booking a swift and efficient process. Any system that does not provide this convenience of making a transaction that sorts out room allocation and presenting information could lose out on potential customers.

A study at the article titled “The Determinants of Online Hotel Reservations among University Staffs” by Bakar (2008), states that in traditional method of hotel reservations, customers could easily modify their reservation info while talking to the hotel staff. However, when customers engage online reservation systems, all the responsibility is loaded on to the customer. When it comes to airline online reservation, changes to prior reservations will be charged and flight tickets will be adjusted based on availability. Consumers might view hotel online reservation with a “halo effect”.

In another study by Ajang (2023) it was proposed that hotel management systems encourage and reward individual and unified effort and achievement, provide training and personal development opportunities and create a working environment in which staff can feel a real scene of job involvement.

In a study by Janne (2006) a hotel management system that can be used online was developed. This system made it possible for each guest to book hotels personally. The system can provide a query for date of arrival and the length of stay, as well as the number of rooms, view all available rooms and provides user the ability to choose one or more of them. It also records the number of on rooms, views all available rooms and provides the user the ability to choose one or more of them. It keeps track of the kind of guests and how many going to be in the single room, provides the cost of booking, asks the users if they would fancy any additional services; such as, dinner or breakfast, while it stores the guests’ details; like, name, address and telephone.

In a paper titled “Development of an Automated Hostel Facility Management System” by Kola Ayanlowo (2014), researchers state that manually managing and administering hostels in institutions is not because of the following challenges:

* Difficulties in record management;
* Difficulty in tracking the history of a facility;
* Managing paper files from manual hostel allocation is cumbersome and untidy as the population of student increases;
* It is time-consuming and a waste of material resources.

The study proposed a system that attempts to improve how the institutions provide hostel services for everyone involved- administrator, 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. It is specially designed to manage allocations in a hostel environment.

A study titled “Hostel Management System” by Luitel (2022) states that There are similar patterns of modules used in many hostels and dorms worldwide. Hostel Management System Software developed and used currently has mainly six modules which include reservation, accounts, assigning chores inventory, enquiry, visitors tracking modules. The system implements all six functionality using a web app built with Java and MySQL.

The use of Genetics Algorithm is explored in a study by Rayner (2020) at University Malaysia Sabah, Jalan. The study states that Automated scheduling is often carried out with a scheduling algorithm that generates actions sequentially in order to achieve certain goals. The results of testing the proposed system were successful, and the study concludes that the Genetics Algorithm is capable of allocating hostel rooms without any conflicts.

In another study titled “Hostel Management System Using Image Recognition” by Mensah, (2022) it was seen that the Babcock University Hostel Management System was used as a case study. The Babcock University hostel management system built on the University Management Information System, UMIS which Babcock University uses as a system for online registration, result checking, hostel registration etc. If you want to pick a hall for accommodation at the beginning of a new semester at Babcock University, you log on to umis.babcock.edu.ng, put in your students’ credentials, and then select login. Student registration begins by selecting a meal type, worship center, and then hall of residence. Here, the study makes uses a male undergraduate student to adequately illustrate how the registration process works. The available accommodation halls for male students are; Gideon Troopers Hall, Winslow Hall, Bethel Splendor Hall, Samuel Akande Hall, Nelson Mandela Hall, Neil Wilson Hall, and Welch Hall. The halls are classified into two based on cost and comfort, namely; Premium halls and Classic halls. The classic halls are the more expensive and comfortable while the premium halls are less expensive, and therefore less comfortable than the classic halls. To book a space in a particular hall, you select your preferred choice of residence under the “Hall of residence” section during registration. If your preferred accommodation hall is fully booked, an error message appears upon selection of that hall.

Once your registration is complete and financial approval has been given, the student is to present the generated receipt on the day of resumption. Upon arrival at the school campus, the receipt is presented to the porter of accommodation hall where the physical registration begins. The physical registration includes; retrieving your file from your previous hall of residence (in the event in which a student switches halls), and then you are allocated a room by the hall administrator.

In another study on DESIGN AND IMPLEMENTATION OF ONLINE HOSTEL MANAGEMENT SYSTEM (EMMANUEL, 2015), the system at College of Agric Lafia was reviewed. The study explains that the current hostel allocation and management system at College of Agriculture Lafia is done manually; during application, the student’s first of all go to the student’s affairs unit to verify hostel availability, if available the student is giving a BED-SPACE REQUISITION/ALLOCATION FORM. The student will have to fill the form, take the form to his/her head of department for verification, the HOD will check to find out if the student is eligible and belongs to the category of student’s entitled to hostel accommodation. If the student is qualified, the HOD will approve by signing the form. The student will now go to the bank and pay the accommodation fee to the college account, the form is giving free but the accommodation fee is ₦90 and is paid alongside with the school fees, while the maintenance fee is ₦2500 is also paid to the school account but is done separately. After the payment, the student proceeds to the bursary unit for exchange of teller to receipt, the student then goes to the student’s affairs unit with the form, the bank teller and the receipts. The student’s affairs officer keeps the record of the bank details; the student affairs officer who is also the hostel coordinator will verify the hostel availability and then allocate the student if available. The allocation of rooms to students is done on the basis of first come first serve, the category of students entitled to hostel accommodation includes: Pre ND, ND2, pre HND, HND2. College of agriculture lafia has a total number of 13 hostels, 8boys hostels and 5girls hostels. The hostels are named as follows: boy’s hostels (Lafia Hall, Wamba Hall, Keana Hall, Awe Hall, Toto Hall, Keffi Hall, Doma Hall, Nasarawa Hall,). Girls Hostels (Nasarawa Eggon, Akwanga, Obi, Kokona, and Karu Hall). The room capacity for boy’s hostel is 5per room and is based on bed-space, whereas for girls vary, some hostels are having capacity of 5, 4, 3, and 2. The method of storage of student’s data is done using hard-cover notes and is done based on hostels i.e. each hostel has a hard cover notebook for its record keeping. Some of the challenges faced by the college management and students include: limited hostel accommodation, inefficient storage method, slow retrieval of information increased student’s population each session.

* 1. **Summary of the Review**

Table 2.1: *Summary of Literature Review*

|  |  |  |
| --- | --- | --- |
| TITLE | **SUMMARY** | **LITERATURE GAP** |
| Jazira Anuar, (2013)  Smartphones Application Adoption Benefits Using Mobile Hotel,  *Procedia - Social and Behavioral Sciences* | This study states that each hotel is at its very best when they offer unique services so they can differentiate themselves from their competitors even though they all shared four (4) same core services which included room reservation, check-in, check-out and cancellation of order. | * No technical implementation of hotel reservation system was suggested |
| Bedard, M. (2020)  New Trends in CRS and PMS  *Amadeus Journal* | This study explores the two main back-end systems used in hostel-reservation which primarily include Central Reservations System (CRS) and Property Management System (PMS). | * No consideration of course sections. * No technical implementation of hotel reservation system was suggested |
| Akauze, M.1 (2016)  Enhanced Hotel Management Information System for Multiple Reservation Booking  *Delta State University* | This study suggests building a model that will allow hotel management systems offer multiple booking capability. | * No consideration of course sections. |
| Win, Myint Myint (2022).    Computerized Reservation System For Taunggyi Hotel  *Computer University Taunggyi.* | This study stated that the Computerized reservation systems ensure that transactions are faster and more accurate. | * No consideration of course sections. |
| Bakar (2008).  The Determinants of Online Hotel Reservations among University Staffs.  *Ibima Publishing.* | This paper states details the contrast between traditional reservation method (which is fast and easy) and online reservation method (which is slow and cumbersome). | * No consideration of course sections. |
| Elizabeth Betty Ajang (2023).  Hotel Reservation System  *Toaz Info* | This study proposes that hotel management systems encourage and reward staff so they feel a real scene of job involvement | * No consideration of course sections. |
| Janne (2020).  Hotel Manaement System  *Liacs.* | This study proposes a system allows the guests to do their booking online without assistance. | * No consideration of course sections. |
| Kola Ayanlowo, O. Shoewu (2014).  Development of an Automated Hostel Facility Management System.  *Journal of Science and Engineering* | Researchers state that the manual method of managing and administering hostels in institutions is not effective because it has difficulty in managing records, difficulty in tracking facilities and the reservation process is time consuming | * No consideration of course sections. |
| Mensah, Yaw A. (2022).  Engineering and Technology Journal  *Hostel Management System Using Image Recognition* | The Babcock University hostel management system is primarily based on the University Management Information System, UMIS.  . | * No consideration of course sections. |
| EMMANUEL, AYAKA AKOLO (2015)  DESIGN AND IMPLEMENTATION OF ONLINE HOSTEL MANAGEMENT SYSTEM  *International Journal of Applied Research.* | The system at College of Agric Lafia was reviewed. The study explains that the current hostel allocation  and management system at College of Agriculture Lafia is done manually; during application, the student’s first of  all go to the student’s affairs unit to verify hostel availability, if available the student is giving a BED-SPACE REQUISITION/ALLOCATION FORM.  The method of storage of student’s data is done using hard-cover notes and is done based on hostels i.e. each hostel has a hard cover notebook for its record keeping. Some of the challenges faced by the college management and students include: limited hostel accommodation, inefficient storage method, slow retrieval of information increased student’s population each session. | * No consideration of course sections. |

**CHAPTER THREE**

**METHODOLOGY**

* 1. **Introduction**

SDLC Methodologies is the process by which the methods and techniques that software development teams use to navigate the Software Development Life Cycle successfully (SDLC). There are six different SDLC models, each with numerous phases. They include Agile, Lean, Waterfall, Iterative, Spiral, and DevOps. (Half, 2021). Each SDLC model is unique in its way, but they all serve the same goal: guiding teams while they strive to produce high-quality software as quickly and cost-effectively as feasible. I have chosen to use agile methodology for my project. It is very flexible and allows the project to be developed iteratively, which means that the project can accept new changes to accommodate changing requirements. It comprises of several methodologies, all of which are founded on the ideals of flexibility, transparency, quality, and continual improvement. Due to the limited time available to work on this project, this is a very important benefit of working with this methodology.

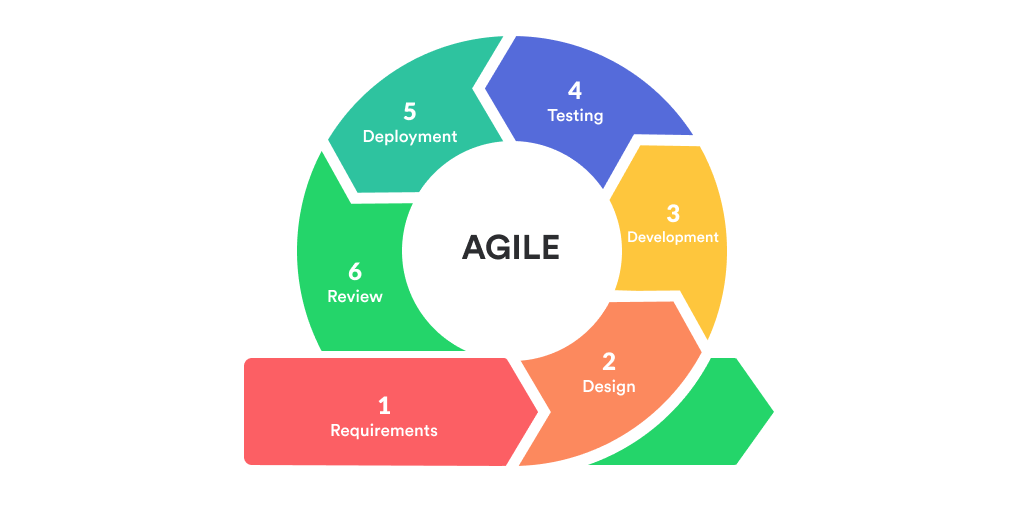


Figure 1: Agile Process

* 1. **Agile Phases**

The proposed automated hostel reservation system will be a web-based program, and there are steps that will be taken in order to achieve a solution to the above, which are as follows:

* **Phase 1: Requirements**

At this phase I will gather and document the system’s needs. I will conduct stakeholder interviews with hostel staff, potential users, and any other relevant parties to gather requirements. I will document the plan, timing, and budget for completing the iterations. I will create user stories, detailing the functionality and features needed for the hostel reservation system. At this stage the requirement document is created, containing both functional requirements (such as user interface and homepage) and non-functional requirements (such as the security) of the system.

* **Phase 2: System Design**

Based on the prioritized user stories, wireframes or mockups will be created in order to visualize the user interface and user experience. I will design the database schema for storing reservation data and other relevant information. The design document would be created in this stage.

* **Phase 3: Implementation**

I will set up a Next.js project with Tailwind CSS for the frontend and integrate Firebase for backend services. I will also implement user authentication, allowing users to sign up, log in, and manage their profiles. I will develop the reservation system, including the ability to browse available hostels, view details, and make reservations. I will also implement real-time updates using Firebase to reflect changes instantly to all users.

* **Phase 4: Testing**

I will conduct unit testing to ensure individual components work as expected. I will perform integration testing to validate the interaction between different parts of the system and conduct User Acceptance Testing (UAT) with stakeholders and potential users to gather feedback. This is the stage in which our implemented application is tested to ensure that it is fully functional and meets all standards, allowing people to utilize the platform without inconvenience.

* **Phase 5: Deployment**

The hostel reservation software is ready to be deployed after thorough testing. I will deploy the system to a production environment, making it accessible to users.

* 1. **Project Timeline Using Gantt Chart**

Below, shows estimate duration for the different phases in this project development. Please note that the dates are subtle to change.

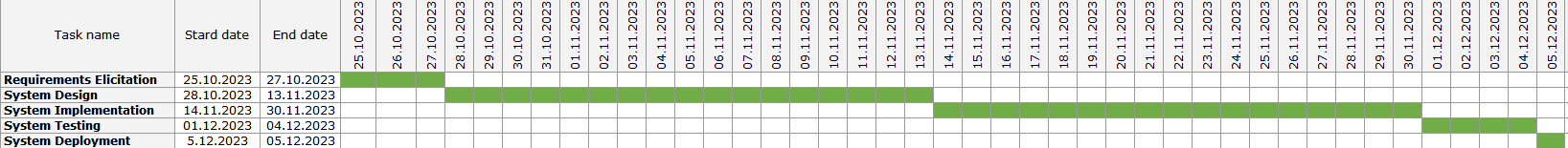


Figure 2 Gantt Chart Showing Project Timeline

* 1. **Conclusion**

Upon completion of the project, the anticipated outcomes are as follows:

* Delivery of a robust and user-friendly online platform with an intuitive and comprehensive user interface, enhancing the overall user experience.
* Implementation of a secure user authentication system, enabling users to log in and seamlessly browse available hostels while making reservations through an efficient reservation system.
* Successful establishment of a fully functional web-based application that integrates Next.js for the frontend and Firebase for the backend, ensuring real-time updates and scalability.
* Significant improvement in the efficiency of handling hostel reservations, offering a streamlined process for users to make bookings, and enhancing overall business productivity and income.
* The proposed approach is poised to revolutionize how the hostel manages reservations, providing an elevated level of customer satisfaction through an improved and efficient online reservation system. This improves the overall customer experience but also increases business productivity and revenue

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