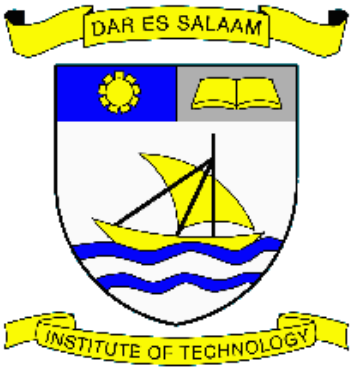
DAR ES SALAAM INSTITUTE OF TECHNOLOGY



DEPARTMENT OF COMPUTER STUDIES

BACHELOR OF COMPUTER ENGINEERING

NTA LEVEL 8

SENIOR PROJECT II

PROJECT TITLE: DIT ACCOMMODATION SYSTEM

PROJECT TYPE: PROBLEM IMPLEMENTATION

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AUGUST, 2021.

DECLARATION

I SANDRA P. SOMMI, declare to the best of my knowledge that the project presented here, as a partial fulfillment of Bachelor Degree of Computer Engineering is my own work and has not been copied anywhere or presented elsewhere except where explicitly indicated otherwise as all sources of knowledge have been acknowledged.

CANDIDATE NAME	SIGNATURE	DATE
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DR. MASOUD M. MASOUD	……...	….. /… /……

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First, I would like to thank the Almighty God for always providing me with the gift of life, strength and overall a healthy and steady body and mind from birth to my senior year at the Institute.

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I would like to express my gratitude to my project supervisor dr. Masoud M. Masoud for his important advice, guidance, supervision, consultations throughout the development of the project.

Lastly, I would like to thank our project coordinator dr. Eliphace Tongora who was responsible for overseeing the entire project process for the class of 2021 Bachelor of Computer Engineering, along with the entire staff Department of Computer Studies for the insights, advise and cooperation during our time together before and during our last year at the Dar es Salaam Institute of Technology, (DIT).

ABSTRACT

Students' accommodation is one of the basic human needs and it is of contemporary interest to all University sectors. Most public universities in Tanzania offer accommodation to their students. However, the high influx of students, both government and self-sponsored, greatly supersedes the ability of these institutions to offer accommodation to all students. The primary purpose of this project is to establish an on- and off -campus accommodation system for DIT. Data will be collected using questionnaires for students and interview schedules for house owners and ISAB responsible for student's accommodation. The proposed system, will help provide an efficient method to seek for accommodation in the rental market that will help students to save the time and money spent on searching and have easy access to information on available rentals. In addition, landlords and brokers will be able to advertise their properties to students. The system will help beat the downsides of the existing system that is less human error, strength and strain of difficult work can be decreased, high security, data repetition can be kept away from to some degree and increase data consistency.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS AND ACRONYMS

APP	Application
CSS	Cascading style sheet
DIT	Dar es salaam Institute of technology
DITSO	Dar es salaam Institute of technology student's organization
DFD	Data flow diagram
ERD	Entity relationship diagram
GB	Gigabyte
GIS	Geographic information system
HEI	Higher education institutions
HTML	Hypertext markup language
IDE	Integrated development environment
ISAB	Institute's Students Accommodation Bureau
JS	JavaScript
ORM	Object oriented mapping
RAD	Rapid application development
RAM	Random Access Memory
SDLC	System development life cycle
SRS	Software requirement specification
SQL	Structured query language
TB	Terabyte
TCU	Tanzania Commission for Universities
TZS	Tanzanian shillings
UI	User interface
UML	Unified modeling language
VS	Visual studio

CHAPTER ONE

INTRODUCTION

1.0 BACKGROUND

Housing is one of the essential basic needs in everyone's life. Just like it is for any other individuals, housing is the central need for students also, having an impact on the general wellbeing of students. As they pursue their studies, many students leave their homes and parents and reside in what is known as students' housing where they stay for the given time of their studies. In describing students housing various terms have been used which include accommodation, hostel, hall of resident and dormitory(Ghani et al., 2017).

Accommodation according to the oxford dictionary is defined as a room, building, or space in which someone may live or stay (Stevenson, 2010). Accommodation allocation is the act or process of deciding to give a room, building, or space in which someone may live in.

Student accommodation plays a significant part in a student's life. Student learning can be enhanced and made more effective when learning environment is made adequate and appropriate (Adegun et al., 2019). Previous studies show that accommodation plays a vital role in the physiological needs of the students, and that is considered as a condition for student's quality survival in terms of health, academic performance and learning (Delizo and Esguerra, 2013). Therefore, a favorable environment plays a significant role to maintain the academic performance of the students. In general, all students (local or international) experience different adjustment problems while moving to one place to another place. (Mohd Zin, 2007) states that leaving home carries various difficulties; out of them, finding suitable accommodation is the most challenging one.

In many countries, government plays a role as primary suppliers of accommodation to students in government-owned higher education institutions. Due to constrained funds, governments are not able to sufficiently cover the need for accommodation for all higher education institutions (HEIs) (URT, 1999). However, the accommodation challenge affects

not only public HEIs but also private HEIs to the extent of being unable to give accommodation to every single student, all because of an increase in the number of enrolled students (Gupta et al., 2018). This increased enrollment is not in line with the available facilities necessary for the wellbeing of students enrolled. Despite that few other students may refuse to live on-campus or choose to reside in their family house still the provision of accommodation to every student in HEIs turns out to be a hard task. Due to this shortage of student accommodation in the HEIs, students need to find accommodation from other sources which mostly is through renting from private housing (Abubakar et al., 2016).

In most cases, it is difficult for students to get a rental house in the private market in various towns where there are higher education institutions for the reasons that the supply of private house rental is insufficient, and students have no clue about the housing market, circumstances that often constrained students to rent houses which are below the standard having low or poorly provided with services and infrastructure facilities hence unqualified for them to live (Abubakar et al., 2016).

It is evident from the studies that HEIs in Tanzania are faced with inadequate student accommodation, subsequently, the majority of the students are either required or prefer to look for their own accommodation from the private rental (Nyahende et al., 2015).However, studies in the area of student accommodation in relation to private rental accommodation are scanty.

The studies on student accommodation in Tanzania looked at how living in private rental accommodation as a result of the shortage of institutionally provided student's accommodation affects students in higher education. But the question remains about how easy/difficult is the access to private rental accommodation and what these students go through in the whole process of searching for accommodation in the private rental market as the alternative solution to accommodation challenge in HEIs, especially in cities where there is high housing demand due to dramatic increases in migration and financial flow (WCR, 2016.). According to (Rudic,2016) having information about the house rentals might not be an easy task which usually involves methods such as middlemen or word of mouth, signboard or simply notes written on walls by owners indicating that the house is

for rent. Other searching methods include asking around, using one's social network or approaching a broker. The searching process looks complicated and is even more complicated for students coming from other regions of the country (Öhman, n.d.).

At Dar es salaam Institute of technology (DIT), the accommodation is provided within the campus territory and chang'ombe only. However, the system to manage and mitigate the accommodation within the campus and chang'ombe campus for the students is utilized by the traditional method for managing and processing the issues related to the student's accommodation. Whereas for the students who miss allocation/ want to stay off campus is quite a problem, since there is no system that support the student of such kind. Thus the need for the online system which will help the students of DIT to tackle the problems present of the current accommodation system as a whole. (Mohd Zin, 2007) states that the ability of online services not mainly focuses on reducing the effort and the time of the users, but also on improving client services and the services validation efficiency. Students' accommodation should be treated as an issue of great priority. accommodation problem is considered as one of the daily stressors, affecting the students' performance (Louise, n.d.).

1.1 Problem Statement

The campus accommodation while one is pursing studies is deemed to be important to the satisfaction of students within their period of study. Many institutions of higher learning generally provide on-site accommodation to their students. The large demands for admission to universities have prompted the Tanzanian government to admit large numbers of secondary school graduates, while facilities remain static. In the past, double intake has been experienced in universities leading to accommodation shortages in the campuses thus forcing university administrators to seek alternative off-campus accommodation, although in isolated cases students organize their own accommodation either, own residence, parents' homes, or rentals. Regardless of on- or off- campus accommodation, the conditions of students housing in some higher institutions of learning like DIT is a major challenge to students.

The major problems facing the current student accommodation system at DIT are:

i. Uncertainty on whether all students have been notified of the hostel application process, especially those in need to reside in on-campus hostels.
ii. Cumbersomeness of the hostel allocation process, since it requires one to be very precise and vigilante.
iii. Poor handling of student's information requesting for hostels, especially students residing in on-campus hostels.
iv. Inadequate monitoring of students living, mostly for those living outside the institute's campus.
v. For students not allocated in on-campus hostels, find it difficult to attain settlements outside the institute. This is because of their lack of knowledge of hostels near by the institute.
vi. No clearly defined contracts and assurance of settlements for the students residing outside the institute's campus.

Therefore the aim of this project is to design and develop an accommodation system for DIT which will solve the forementioned problems.

1.2 Objectives

The objectives of this project are divided into two parts which are the main objective and specific objectives.

1.2.1 Main Objective

The main objective of this project is to design and develop an accommodation system for students at DIT.

1.2.2 Specific Objectives

The following are the specific objectives of this project:

i. To design and develop a validation sub-system
ii. To design and develop a booking sub-system
iii. To integrate with a geolocation subsystem
iv. To integrate a payment subsystem

v. To integrate a push notification service
vi. To design and develop a feedback subsystem
vii. To design and develop a platform for advertising

1.3 Significance of The Project

The following are the significances of this project:

i. Provide a platform where service providers can advertise their services.
ii. Reduce unnecessary expenses that students incur.
iii. Help to know student's whereabouts, incase anything bad happens.
iv. Gives students more options in case they are not selected for in campus hostel
v. To ease the process of allocating students to the hostels.
vi. To keep track of information and generate the report which is vital in data handling.
vii. To easily identify the students assigned in their respective rooms.
viii. To provide an efficient way for validating student's information when applying for hostels

1.4 Scope of The Project

The DIT smart accommodation system will focus on allocating students both on/off campus hostels/accommodations. Also, the distance for off-campus hostels covered in this system will be 3km radius from DIT in all directions. The integration of payment subsystem will differ for off-campus and in-campus process allocations.

1.5 Chapter Summary

This chapter introduces the inspiration behind the call for this project, by giving the background information about the project, the problem statement, objectives, significance, and scope of the project as to how the project will be accomplished.

CHAPTER TWO

LITERATURE REVIEW

2.0 INTRODUCTION

This chapter reviews literature by various authors on factors that enhance students' level of satisfaction with either on or off- campus accommodation at DIT main campus, determine if students residing either on campus or off- campus differ significantly in their level of satisfaction with accommodation and accommodation challenges facing students either on or off- campus.

Student housing presents a unique opportunity for student affairs administrators to contribute to and support the stay and educational experience of the university student. Besides that, the student housing plays a role as a place of shelter. Strange and Banning cited in (Crimmin, 2008) proposed three conditions that help make a students' living environment productive, namely: a sense of security and attachment; processes for involvement; and an experience of neighborhood. Examination of the ecological perspective on the relationship between students and their environments described the influence of environments on "persons and persons on environments". Foremost in this relationship is the responsibility of the institution to create an environment conducive to meeting the educational needs of the population (Crimmin, 2008).

The matter of student housing has been addressed from several viewpoints. Disciplines such as urban development and planning, geography and housing policies are concerned with issues associated to student community, as it has been witnessed that a high concentration of student residents in specific areas has effects for these urban neighborhoods (Muslim et al., 2012), as for instance on the social cohesion. Other matters are related to questions on how to adapt students and what is appropriate housing for these provisional residents. The type of housing, the standard and the architectural design is important issues in this context.

(Ware and Miller,2009) reviewed research trends in student life, and found that even though there were some differences in the how the studies were conducted; student housing

play an important role in the success of university students. Student housing plays an important role in the enrolment of students and the adequacy of facilities can add to the desire them to remain on campus. They drew the following conclusions from several studies.

(Bowman and Partin, 2009) conducted a study to be determine if there is a significant difference between the academic achievement of students that lived on-campus and their off-campus counterparts. Bowman and Partin stated no statistically significant differences in grade point averages of students regardless of residence. (Thompson, Samiratedu, and Rafter, 2009) claimed that progress and retention were higher among students who lived on-campus, regardless of race, gender, or condition of admittance. Students engaged in remedial work were shown to have performed better than their off-campus counterparts. (Headershott, Wright, and Henderson, 2009) conducted a survey to measure the quality of life within the university community. Regarding on-campus living environment, the study found that students were less satisfied with university housing than with their academic or social lives. The researchers attributed this to space limitations, lack of privacy, lack of freedom, and poor maintenance that is commonly found in on-campus housing.

The influence of the environment and accommodation on the satisfaction level of University students has been an area of study and of compelling interest to Universities. Studies on accommodation indicate that good hostel condition and facilities in campuses have a positive influence on the students (Bekurs, 2007). Studies which have been conducted focus on the satisfaction level of students on university accommodation and the influence of physical attributes, psychological, and management aspects. These studies (Bekurs, 2007) & (Mohit, Ibrahim & Rashid, 2010), found out that there is a direct co-relation between the students' satisfaction level and the hostel environment. The findings indicated that when the environment meets the individual's expectation more satisfaction was met (Mohit, et. al., 2010). This study generally looked at the general hostel environment in relation to the students' satisfaction level. However, the current study sought to determine the factors influencing students' level of satisfaction with either on-or off-campus accommodation specifically in Moi University, Main Campus.

The matter of student housing has been addressed from several viewpoints. Disciplines such as urban development and planning, geography and housing policies are concerned with issues associated to student community, as it has been witnessed that a high concentration of student residents in specific areas has effects for these urban neighborhoods (Sabri & Ahmad Nazir, 2009) & (Smith & Denholm, 2006), as for instance on the social cohesion. Other matters are related to questions on how to adapt students and what is appropriate housing for these provisional residents. The type of housing, the standard and the architectural design is important issues in this context. To understand what students consider being suitable and satisfactory housing, shall to investigate their points of view.

Despite the reluctance to outsource student housing operations, it is evident nationwide that housing facilities are in major disrepair and are virtually obsolete when faced with the increasing needs of today' college students. On-campus dormitories built in the 1950s and 1960s is the most predominant housing option for students, which typically consist of single rooms housing two students each in long corridors that do not provide much, if any, privacy. Additionally, most traditional dormitories do not have the highly-desired amenities and building infrastructure that students and their parents now see as essential to the university experience. Such amenities and infrastructure include fitness and recreation centers, wireless networking capabilities, kitchens, and single bedrooms with private bathrooms. Universities are continuing to find themselves to be competing with the off-campus private housing market as it caters to student preferences, offers a continual supply of appealing amenities and is often close enough to campuses to allow for a reasonable commute to classes (Survey Unit, 2008).

Studies have investigated the effects of on-campus accommodation and it generally provides a positive impact on its residence. Among the positive effects are more engagements with their academic environment, higher rates of graduation, greater satisfaction with college experiences, and greater perception of personal growth, better social interaction higher educational aspiration and better academic performance. Besides, research in this area generally supports the notion that students living in campus organized housing tend to be more socially adjusted and tend to participate more often in extra-

curricular and campus activities than students living off- campus (Rinn, 2004). In addition, (Cross and Grady, 2009) who investigated among 440 students living on-campus found that the hostel environment can influence the student alcohol use. This was accelerated by halls of suites which increased the situational motivation to drink alcohol. In study done by (Rinn, 2004), he examined the effects of on and off- campus living arrangements on student's openness to diversity 25 than living off-campus was directly associated with significantly higher level of open nest diversity than living off- campus.

(Rinn, 2004), suggests that students are more independent, and have the highest level of supportive achievement and interaction orientation. Most college students today commute to campus. The perception is that off-campus students are less committed because they live away from college compared to those who live on campus. This seems challenging on students because what the gain from their college experience depends on how much time and effort students put into their studies and other educationally purposeful activities. The learning in campus indicates that level of academics, college time on tasks and participating on other educational purposeful activities directly influence the magnitude of students living and their overall educational experiences (Rinn, 2004). Many colleges and universities cannot keep up with the demand if they are unable to provide adequate housing for students (Bekurs, 2007).

In the Business Daily newspaper, (Herbling,2013) reveals that off-campus accommodation for students' costs more than TZS. 80,000 per month, charged for university hostel rooms. Some students with financial difficulties are thus forced to live in the slums, while some of them have been forced to live illegally in the university housing (with fellow students) still others jointly rent a unit outside campus and share the expenses, which adversely affect their learning. With the number of students increasing each year with no new hostels being put up, public universities have been forced to partner with private developers to build student accommodation. However private developers are seeing the shortage as a business opportunity and some are already bidding to provide housing facilities for public universities. This arrangement has led to high accommodation costs for students.

Furthermore, in relation to off-campus accommodation, (University World News, 2015) reporting on Tanzanian Universities, states that students using meagre amounts from loans extended by the government are finding themselves with no choice but to rent rooms in very cheap places inhabitable to meet their needs because of the large numbers. In most cases the places are crowded and for these students to make more money they engage in illegal businesses by getting into illicit businesses for example peddling in drugs, running movie theatres where cheap liquor is consumed.

2.1 Related Works

In Tanzania, there are some existing applications that provide information on private rental housing. They include web and mobile applications. Among them is Dalali GIS, an android mobile application based in Tanzania that provides information and geographic information concerning house/rooms, hotels, plots, halls, office buildings, and restaurants. The information provided includes price to rent or buying, street, location, landlord contacts as well as satellite view and distance from apartments to other places around that house/room (Rwechungura, n.d.). Also, the application provides search capability and a general description of houses/rooms with pictures. However, the application does not provide filtering capabilities for the search results obtained. Moreover, it is a general-purpose application, not suited to the students' accommodation reality hence does not meet students' needs in Tanzania.

Dalali App is another mobile application in Tanzania that allows brokers or owners to list houses for sale or rent and plots for sale. The application has features such as submitting orders, property owners or brokers are able to respond to customer's orders, the ability to call broker, house owner or customer instantly (Mixtape, n.d). The user can search for brokers, houses or plots by region and street and can filter results. However, a search result filtering is limited to rent fees per month and the number of rooms only. Moreover, itis a general-purpose application, not suited to the students' accommodation reality hence does not meet students' needs in Tanzania.

Kupatana is another application in Tanzania available at kupatana.com; it is an online and mobile web-based classifieds platform that offers a market place for buyers and sellers to

meet (Kupatana AB, n.d). Apart from listing various items for selling, the application has a section for real estate. Among other items listed in this section include houses/apartments/rooms for rent. A user can search by specifying the region and category and then filter the search by using various criteria. The user is also able to send an email to the landlord. With the mobile app, the user can call or send a message to the landlord. However, the application does not show the geographical location of the house/apartment/room for rent on a map. Also, the application does not provide house sharing or roommate finding options. Moreover, it is a general-purpose application, not suited to the students' accommodation reality hence does not meet students' needs in Tanzania.

Currently, in Tanzania there is no application dedicated to serving the needs of students regarding private rental accommodation, the existing applications are general-purpose applications that do not meet students' requirements as they search for private rental accommodation. Therefore, this study proposes the development of an online portal that will provide a link between prospective student tenants and private rental accommodation service providers and will act as a central source of information regarding private rental students' accommodation for HEIs in Tanzania, described in terms of the geographical setting of Tanzania, and according to the needs of students in HEIs in Tanzania, hence making room/house finding an easy process to students. Portals usually provide an entry to services and information from different sources. HEIs are adopting online portals for various purposes as they offer search capabilities, registration for new users, database access and personalization (Vaira Muthu and Anouncia, 2016).

2.2 Existing System

The current system is such that students first undergo the in-campus allocation process. When they miss out the chance to be allocated in on-campus hostels, it is when they tend to look for alternatives' areas outside the Institution. Below is a pictorial representation of the current system and how it works.

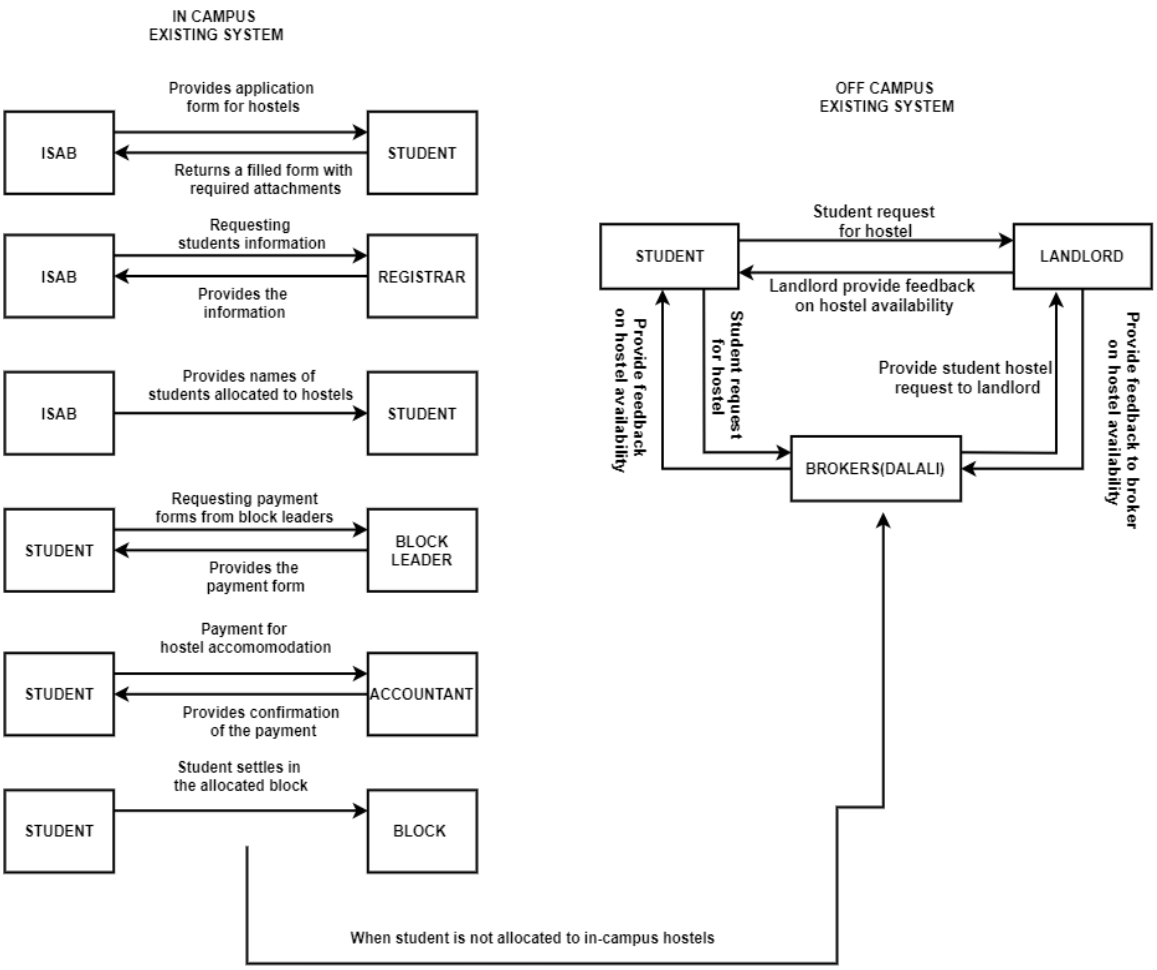


Figure 1: Block Diagram of the existing system

2.3 Proposed System

The proposed system will provide a platform where students can request for accommodations both on- and off-campus. This system will also enable the private housing owners to be able to advertise their spaces for rent. But this will only be made possible after those places have verified and confirmed a fit for student accommodation.

This system will also be able to send push notifications to students on information concerning the accommodation process be it either application for hostel allocation or any other useful information. The contracts about hostel residence will also be signed through the system by integrating electronic signature functionality.

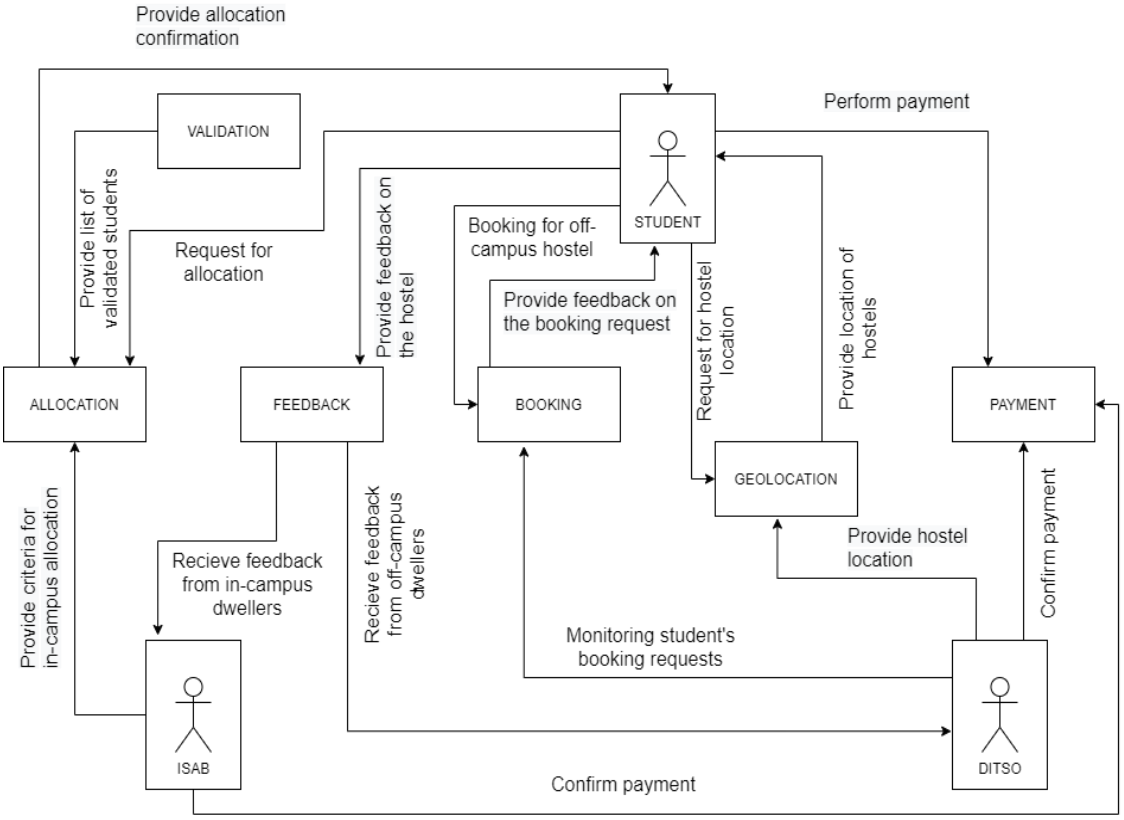


Figure 2: Block diagram of proposed system

2.3.1 Components of Proposed System

Below is the tabulated list of the proposed system components and the specific users that will be using that system. Also, their functionalities.

Table 1: Subsystems and their functionalities

SUB SYSTEM	USERS	FUNCTIONALITY
Validation	Registrar	Accept criteria for student's validation from the registrar. Validate student's legitimacy using provided criteria and algorithms.
Booking	Students DITSO	Provide a platform where students can book for off-campus hostels.

		Accept information for available hostels for students provided by the DITSO office. Provide a way in which DITSO office can monitor student's booking activities.
Allocation	ISAB	Accept criteria for student's allocation process from the ISAB. Perform Allocation process using a provided algorithm.
Geolocation	Student DITSO	Accept request for location of accommodation made by students. Provide location of accommodation present off-campus.
Payment	Student ISAB DITSO Landlord	Allow students to generate control number for in-campus hostel and normal payment for off-campus hostels. Enable ISAB and DITSO office to confirm student's office. Direct payments to landlord.
Feedback	Student DITSO ISAB	Allow students to provide comments on the accommodation. Enable ISAB and DITSO offices to view students' feedback on both in- and off-campus hostels.

2.4 Chapter Summary

This chapter provided a review on the meaning of accommodation and its importance to the students. Also explained on the current working system and the proposed system and how it is going to combat the challenges of the existing system.

CHAPTER THREE

METHODOLOGY

3.0 INTRODUCTION

Methodology refers to a systematic investigation and study of materials and sources to establish facts and reach new conclusions. It also involves specific techniques that are adopted in the research process to collect, assemble, and evaluate data. It defines those tools that are used to gather relevant information in a specific research study. Surveys, questioners, and interviews are common tools of research.

3.1 Rapid Application Development

Rapid application development is a software development methodology that uses minimal planning in favor of rapid prototyping. A prototype is a working model that is functionally equivalent to a component of the product.

In the RAD model, the functional modules are developed in parallel as prototypes and are integrated to make the complete product for faster product delivery. Since there is no detailed preplanning, it makes it easier to incorporate the changes within the development process.

RAD projects follow iterative and incremental model and have small teams comprising of developers, domain experts, customer representatives and other IT resources working progressively on their component or prototype.

Unlike the more traditional waterfall model, which focuses on a stringent step-by-step process of development stages, the iterative model is best thought of a cyclical process. After an initial planning phase, a small handful of stages are repeated over and over, with each completion of the cycle incrementally improving and iterating on the software. Enhancements can quickly be recognized and implemented throughout each iteration, allowing the next iteration to be at least marginally better than the last.

In the RAD model, the functional modules are developed parallel as prototypes and are integrated to make the complete product for faster product delivery. Since there is no detailed preplanning, it is easier to incorporate the changes within the development process. RAD projects follow an iterative and incremental model and have small teams comprising developers, domain experts, customer representatives and other IT resources working progressively on their component or prototype. The most important aspect for this model to be successful is to make sure that the prototypes developed are reusable(Tutorials point, 2021).

In this project, Rapid Application Development (RAD) Methodology is used to develop the project up to the final stage due to the following reasons;

i. Enhanced flexibility and adaptability as developer can adjust quickly during the development process.
ii. Quick iteration that reduces development time and speed up delivery.
iii. Encouragement of code reuse, which means less manual coding, less room for errors, and shorter testing times.
iv. Increased customer satisfaction due to high-level collaboration and coordination between developers, clients, and end-users.
v. Better risk management as developers, clients, and end-users can discuss and address code vulnerabilities while keeping development processes going.
vi. Fewer surprises as, unlike Waterfall method, RAD includes integrations early in the software development process.

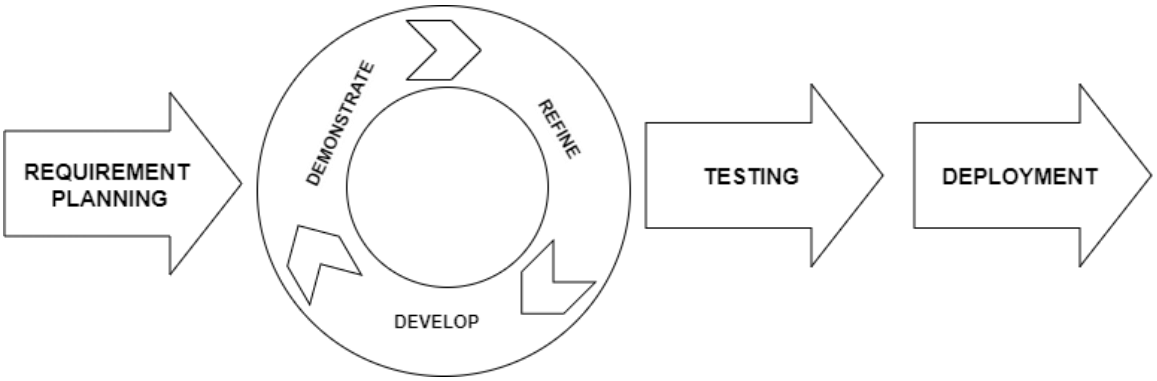


Figure 3:Phases of RAD model

The following are the merits of using Rapid Application Development (RAD) methodology to develop the project,

i. Costly Inherent Versioning: It is rather obvious that most software development life cycles will include some form of versioning, indicating the release stage of the software at any stage. However, the iterative model makes this even easier by ensuring that newer iterations are incrementally improved versions of previous iterations. Moreover, if a new iteration fundamentally breaks a system in a catastrophic manner, a previous iteration can quickly and easily be implemented or "rolled back," with minimal losses, a particular boon for post-release maintenance or web applications.

ii. Rapid Turnaround: While it may seem like each stage of the iterative process isn't all that different from the stages of a more traditional model like the waterfall method and thus the process will take a great deal of time the beauty of the iterative process is that each stage can effectively be slimmed down into smaller and smaller time frames; whatever is necessary to suit the needs of the project or organization. While the initial run through of all stages may take some time, each subsequent iteration will be faster and faster, lending itself to that agile moniker so very well, and allowing the life cycle of each new iteration to be trimmed down to a matter of days or even hours in some cases.

iii. Suited for Agile Organizations: While a step-by-step process like the waterfall model may work well for large organizations with hundreds of team members, the iterative model really starts to shine when it's in the hands of a smaller, more agile team. Particularly when combined with the power of modern version control systems, a full "iteration process" can effectively be performed by a number of individual team members, from planning and design through to implementation and testing, with little to no need for outside feedback or assistance.

iv. Easy Adaptability: Hinging on the core strength of constant, frequent iterations coming out on a regular basis, another primary advantage of the iterative model is the ability to rapidly adapt to the ever-changing needs of both the project or the whims of the client. Even fundamental changes to the underlying code structure or implementations (such as a new database system or service implementation) can

typically be made within a minimal time frame and at a reasonable cost, because any detrimental changes can be recognized and reverted within a short time frame back to a previous iteration.

Not only the benefits but Rapid Application Development (RAD) Methodology has the following challenges,

i. Costly Late-Stage Issues: While not necessarily a problem for all projects, due to the minimal initial planning before coding and implementation begin, when utilizing an iterative model, it is possible that an unforeseen issue in design or underlying system architecture will arise late into the project. Resolving this could have potentially devastating effects on the time frame and costs of the project, requiring a great deal of future iterations just to resolve one issue.
ii. Increased Pressure on User Engagement: Unlike the waterfall model, which emphasizes nearly all user/client engagement within the initial stages of the project during a brief crunch time period, the iterative model often requires user engagement throughout the entirety of the process.
iii. Based on the above challenges facing the following are the strategies that I used to ever come them in order to implement my project using this methodology.
iv. Creation of the Questionnaire with the option for the users to add other features that are forgotten. This will help to get all necessary features required for the first version of the system and reducing increase pressure by the user in the implementation stage. This will help to reduce the unnecessary cost and time wastage.
v. Using best tools for architecture design of the system. This will help to create the system that will be effective for adapting the changes that will be rapidly involved in the project by using Rapid Application Development (RAD) methodology.
vi. Development of the system with Testing Driven Development (TDD) flow. This will help the system components to be testable and improved without effecting other system components.

3.2 Phases of Rad Methodology

The key principle of the RAD process is a reduction in planning to focus on a highly iterative design and construction process, enabling teams to accomplish more in less time, without impacting client satisfaction. The prototyping and rapid construction phases may be repeated until the product owner and users are satisfied that the prototype and build meet the project requirements.

3.2.1 Planning and Requirements

During this phase, detailed requirements of the software system to be developed are gathered from client. As with most any development project, the first step is going through an initial planning stage to map out the specification documents, establish software or hardware requirements, and generally prepare for the upcoming stages of the cycle. The purpose of this phase is to perform a preliminary investigation to evaluate an IT-related business opportunity or problem. The preliminary investigation or planning phase is very critical since it affects the entire development process. The better planning phase ensures a better and less complex system development process. Planning phase helps to anticipate costs and benefits of a new system.

Using software engineering and data collected, we composed a Software Requirements Specification (SRS), which lays out function and non-functional requirements and it includes a set of use cases that describe user interactions that the software must provide to the user for perfect interaction which will enable proper definition of the software to be developed. This will be simultaneously done with investigation of the current technology on the mobile phones which will be the main hardware of the project. Other documents like the Graphic and Digital Marketing Guideline and respective content will be addressed. At this stage, project estimation in terms of resource demand and time management will also be laid out to ensure that the project will reach all milestones at the right times without delay or reduced functionality.

3.2.2 System Analysis and Design

This phase is dealt with once planning is complete, an analysis is performed to nail down the appropriate business logic, database models, and the like that will be required at this stage in the project. The design stage also occurs here, establishing any technical requirements (languages, data layers, services, etc.) that will be utilized in order to meet the needs of the analysis stage.

In this project, using graphic designing tools Adobe Photoshop and Illustrator, will design and outline the Graphic. This will include the logo, font, official colors, icons, clipart guides, poster guides, and web-content guides. This will ensure that the project will have a common layout and view that will distinguish it from other works. On web development, Visual Studio Code (VS) will be used as the main tool with Hypertext Markup Language (HTML), Cascading Style Sheet (CSS), JavaScript (JS) will be used as the front-end development languages and Structured Query Language (SQL) will be used as the scripting language for database designing and structuring the queries for data transaction and storage, Go lang will be used for back-end and scripting development.

3.2.3 Implementation

With planning and analysis out of the way, the actual implementation and coding process can now begin. All planning, specification, and design docs up to this point are written and implemented into this initial iteration of the project.

After database design, understanding of the variables, entities, and their corresponding attributes. The focus on bringing this project to life through development and integration of different components of the system. In this project, we will work with the front-end side and programming backend scripts simultaneously and then connect them to the database. This projects components namely; validation, allocation, booking, feedback, platform for advertisement, and geolocation. The validation will focus on the validation of user (students' information) information. This is to say that, it will check to assure that it is the student of DIT who is using this system. The allocation will focus on using the algorithm that will automatically allocate students to the hostels based the criterions available. The

booking will focus on allowing students who have missed the in-campus allocation of hostels to have another choice of hostels off campus, this will allow students to have variety of choices. The platform for advertising, will focus on giving students a lot of options when it comes to choosing accommodation, also will be helpful for the hostel owners to advertise their hostels. The feedback component, will allow the institute to know the quality of service that they provide to their students and this will help them improve the services. The Geolocation component will be used primarily in the case of locating off campus hostel and showing the distance from the institute which will help students. The other factors including mode of payment, notification services to notify the students on the open window of allocation, and electronic signature for the valid contracts will be included in the system.

3.2.4 Testing

Once this current build iteration has been coded and implemented, the next step is to go through a series of testing procedures to identify and locate any potential bugs or issues that have cropped up.

The project will undergo a set of test cases to locate shortcomings and the rectify the misbehaviors that have been found. This is done in order to improve the accuracy of the system in allocating and validating the students. At this phase as well identification of vulnerabilities of the system that might affect confidentiality, integrity and availability of the student's personal information and data.

3.2.5 Evaluation

Once all prior stages have been completed, it is time for a thorough evaluation of development up to this stage. This allows the entire team, as well as clients or other outside parties, to examine where the project is at, where it needs to be, what can or should change, and so on.

3.2.6 Maintenance

This phase involves making sure that the application is up and running in the respective environment. Incase user encounters and defect, make sure to note and fix the issues faced. In case any issue is fixed; the updated code is deployed in the environment. The application

is always enhanced to incorporate more features, update the environment with the latest features.

3.3 Data Collection

Data collection is the process of gathering and measuring information on variables of interest, in an established systematic fashion that enables one to answer stated research questions, test hypotheses, and evaluate outcomes.

The task of data collection begins after a research problem has been defined. The interview (Personal interviews) method is one that will be used for data collection.

3.3.1 Interview

The interview method of collecting data involves presentation of oral-verbal stimuli and reply in terms of oral-verbal responses. This method can be used through personal interviews and, if possible, through telephone interviews.

For this project Personal interview will be the mode for interviewing. Personal interview method requires a person known as the interviewer asking questions generally in a face-to-face contact to the other person or persons. (At times the interviewee may also ask certain questions and the interviewer responds to these, but usually the interviewer initiates the interview and collects the information.) This sort of interview may be in the form of direct personal investigation or it may be indirect oral investigation. In the case of direct personal investigation, the interviewer must collect the information personally from the sources concerned. He must be on the spot and must meet people from whom data must be collected. This method is particularly suitable for intensive investigations.

3.3.1.1 Advantages of interview

i. More information and that too in greater depth can be obtained.
ii. Interviewer by his own skill can overcome the resistance, if any, of the respondents; the interview method can be made to yield an almost perfect sample of the general population.

iii. There is greater flexibility under this method as the opportunity to restructure questions is always there, especially in case of unstructured interviews.
iv. Observation method can as well be applied to recording verbal answers to various questions.
v. Personal information can as well be obtained easily under this method.
vi. Samples can be controlled more effectively as there arises no difficulty of the missing returns; non-response generally remains very low.
vii. The interviewer can usually control which person(s) will answer the questions. This is not possible in mailed questionnaire approach. If so desired, group discussions may also be held.
viii. The interviewer may catch the informant off-guard and thus may secure the most spontaneous reactions than would be the case if mailed questionnaire is used.
ix. The language of the interview can be adopted to the ability or educational level of the person interviewed and as such misinterpretations concerning questions can be avoided.
x. The interviewer can collect supplementary information about the respondent's personal characteristics and environment which is often of great value in interpreting results.

3.3.2 Questionnaire

The questionnaire method of collecting data consists of several questions printed or typed in a definite order on a form or set of forms. Here, the questionnaire is sent to the respondents who are expected to read and understand the questions and write down the reply in the space meant for the purpose in the questionnaire itself.

3.3.2.1 Advantages of questionnaire

i. It is free from the bias of the interviewer; answers are in respondent's own words.
ii. Respondents have adequate time to give well thought out answers.
iii. Respondents who are not easily approachable, can also be reached conveniently.

3.4 Data Analysis

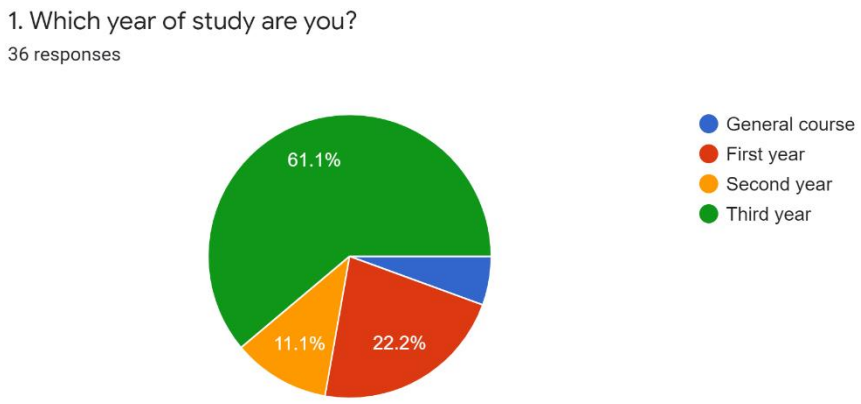
The study was carried out in Dar es salaam institute of technology. In this study, a total of 47 people was involved as respondents, including 36 students, and other staff members and offices responsible for accommodation activity at Dar es salaam institute of technology.

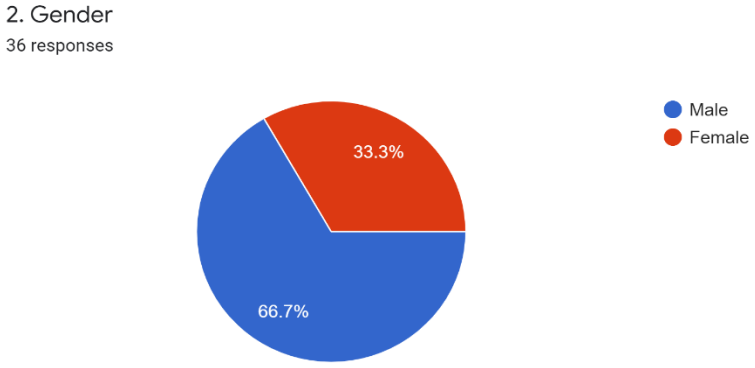
The sampling technique used was probability sampling where each student had the probability of being selected in for the study.

3.5 Results

This section presents quantitative and qualitative results obtained after data analysis.

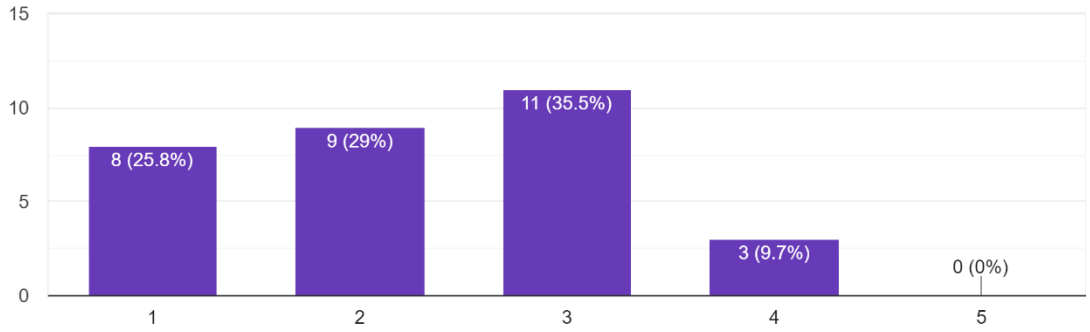
3.5.1 Results from Student Questionnaires



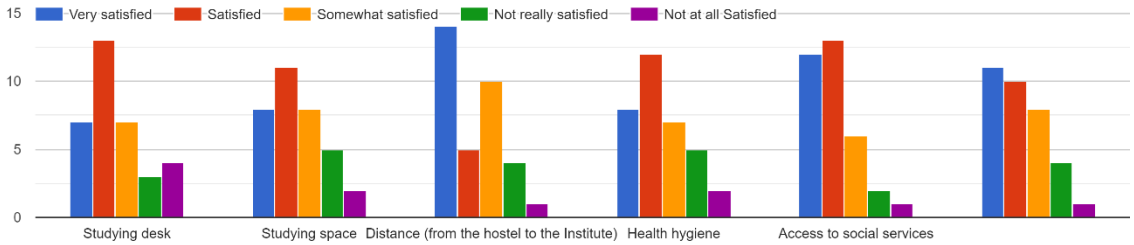


7. (For off campus) Please rate how safe are you at off- campus residence

31 responses

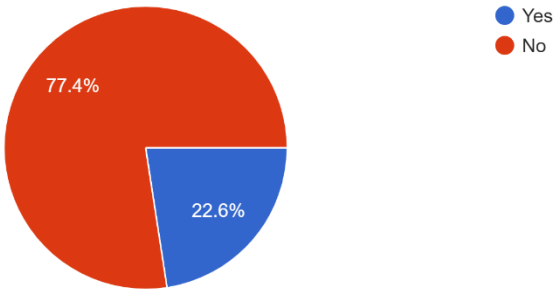


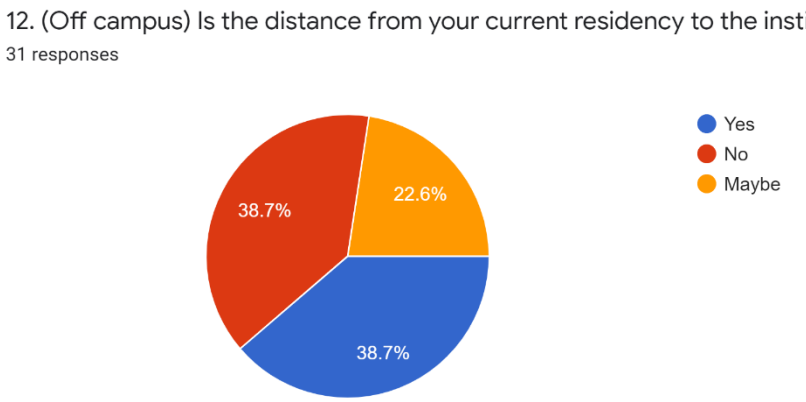
9. Looking at your total accommodation environment, are you satisfied with study related facilities? (Select the appropriate)



10. (Off campus) Is the institute leadership aware that you are residing here?

31 responses





3.6 Chapter Summary

This chapter explains about the methodology that will be undertaken for the accomplishment of this project. It introduces the methodology in general and in relation with the project. The stages of the methodology as well as the importance of the methodology used.

CHAPTER FOUR

SYSTEM ANALYSIS AND DESIGN

4.0. SYSTEM REQUIREMENT SPECIFICATION

This is also known as a Software Requirements Specification (SRS). It is a document or set of documentation that describes the features and behavior of a system or software application. It includes a variety of elements that attempts to define the intended functionality required by the customer to satisfy their different users.

From the data which were collected from the system through data collection methods mentioned in chapter three, they were analyzed very careful in order to obtain the requirement of the users and to see how the system will work then the software requirement specification document was produced as follows.

4.1 Functional Requirements

i. Student should be able to view, book, search and pay for rooms.
ii. DITSO should be able to add, delete, update and view details for off-campus hostels.
iii. Student should be able to request for location of off-campus hostels.
iv. DITSO should be able to add, delete and update hostel location
v. DITSO/ISAB should be able to confirm payment done by students.
vi. Student should be able to generate control numbers for payment.
vii. Student should be able to receive notification from the system.
viii. Student should be able to post, view and delete feedback.
ix. DITSO/ISAB should be able to view and comment on feedback

4.1.1 Use Case Diagram

Based on the above requirements, then the following are how the users will be interacting with the system.

Use case diagram for students

The use case depicts all the operations a student will be able to perform inside the system.

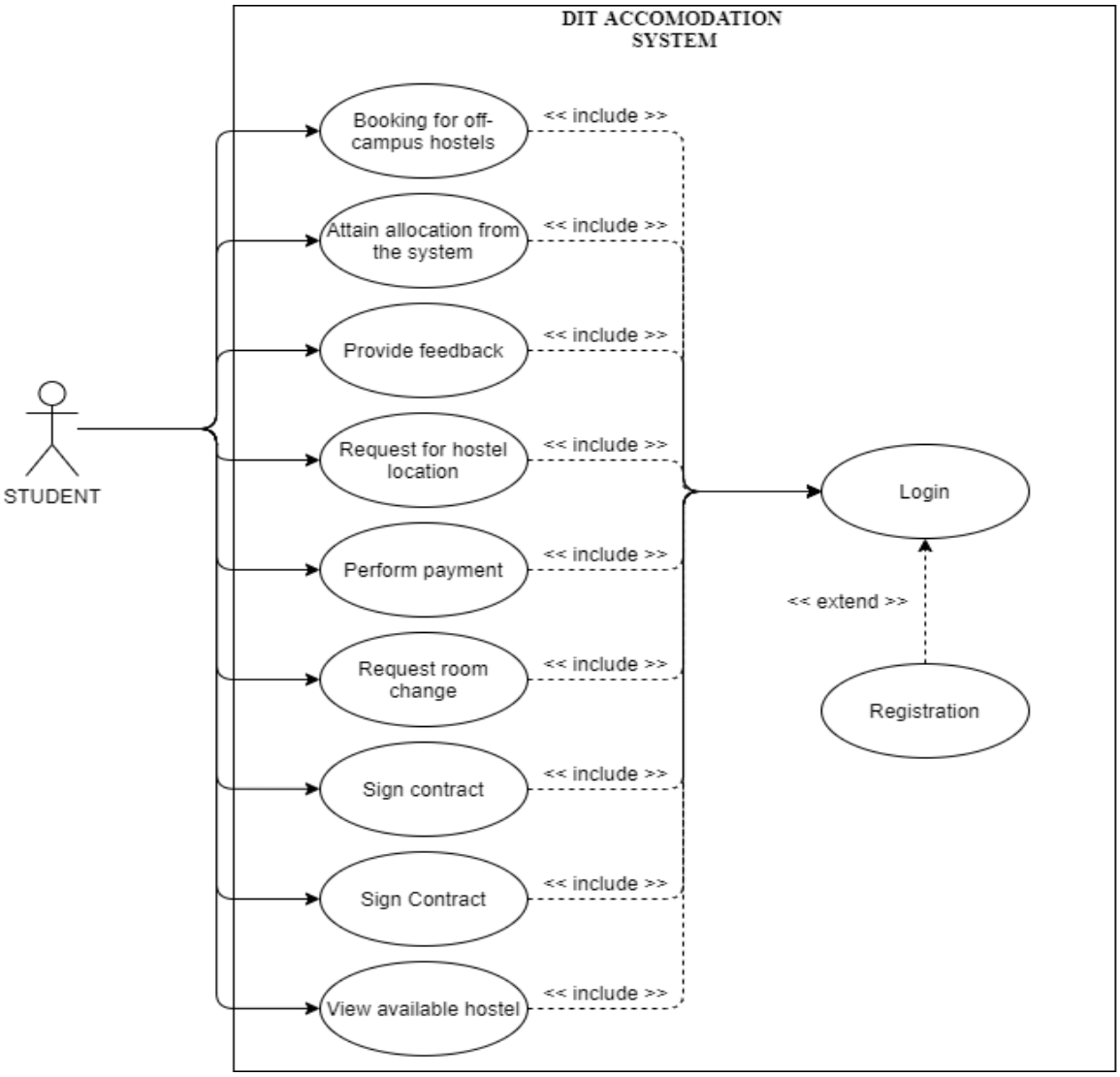


Figure 4: Use case diagram for student

Use case diagram for ISAB

This use case tries to show all the operations ISAB office will be able to perform inside the system. As illustrated in the use case below, ISAB will be able to manage rooms (i.e. add, delete, update and search for rooms), view complaints registered by students based on their

place of stay, provide the necessary conditions/criteria so as students can be allocated to the various available rooms and confirm payments from students.

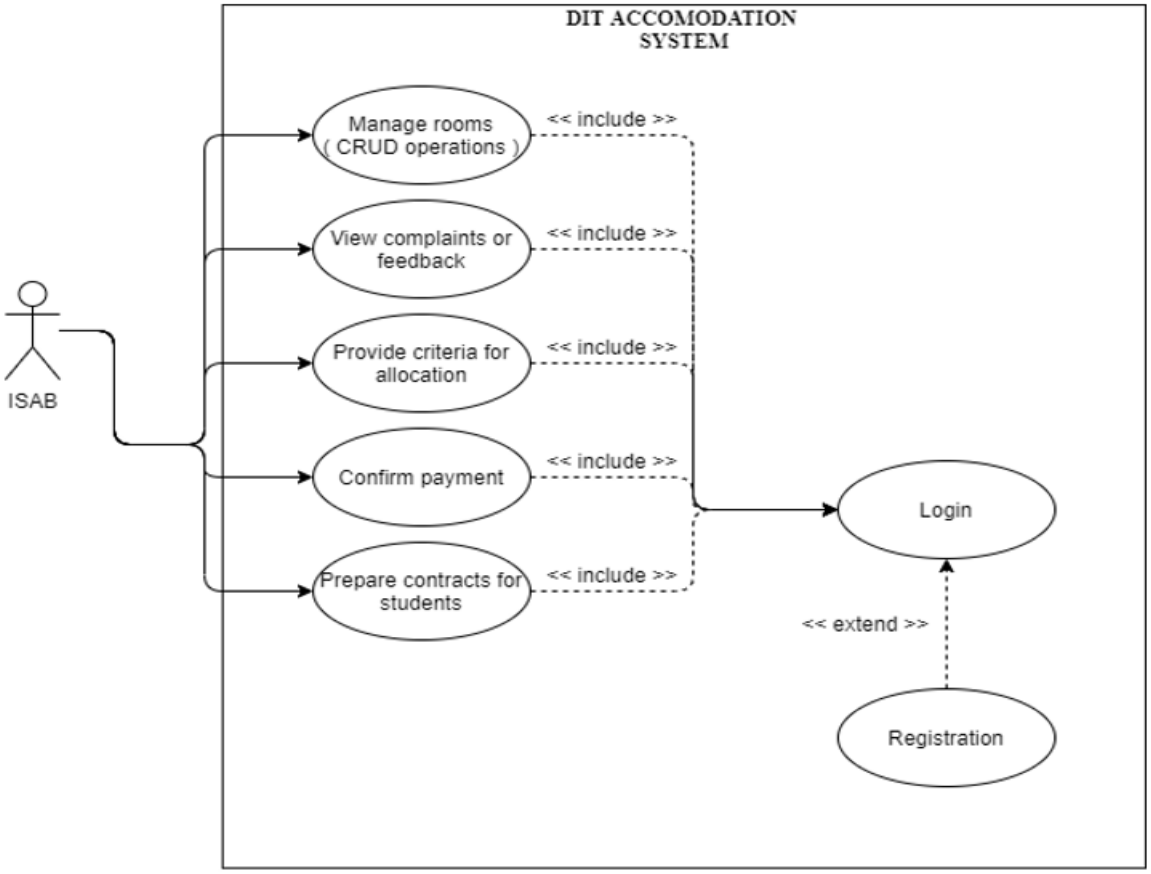


Figure 5: Use case diagram for ISAB

Use case diagram for DITSO

DITSO is an organization that represents the students in the institute's administration office, thus play an important role in the hostel/accommodation process for the students especially those living (want to live) off-campus. Below is a use case depicting all the activities/operations that will be performed by the DITSO office in the system.

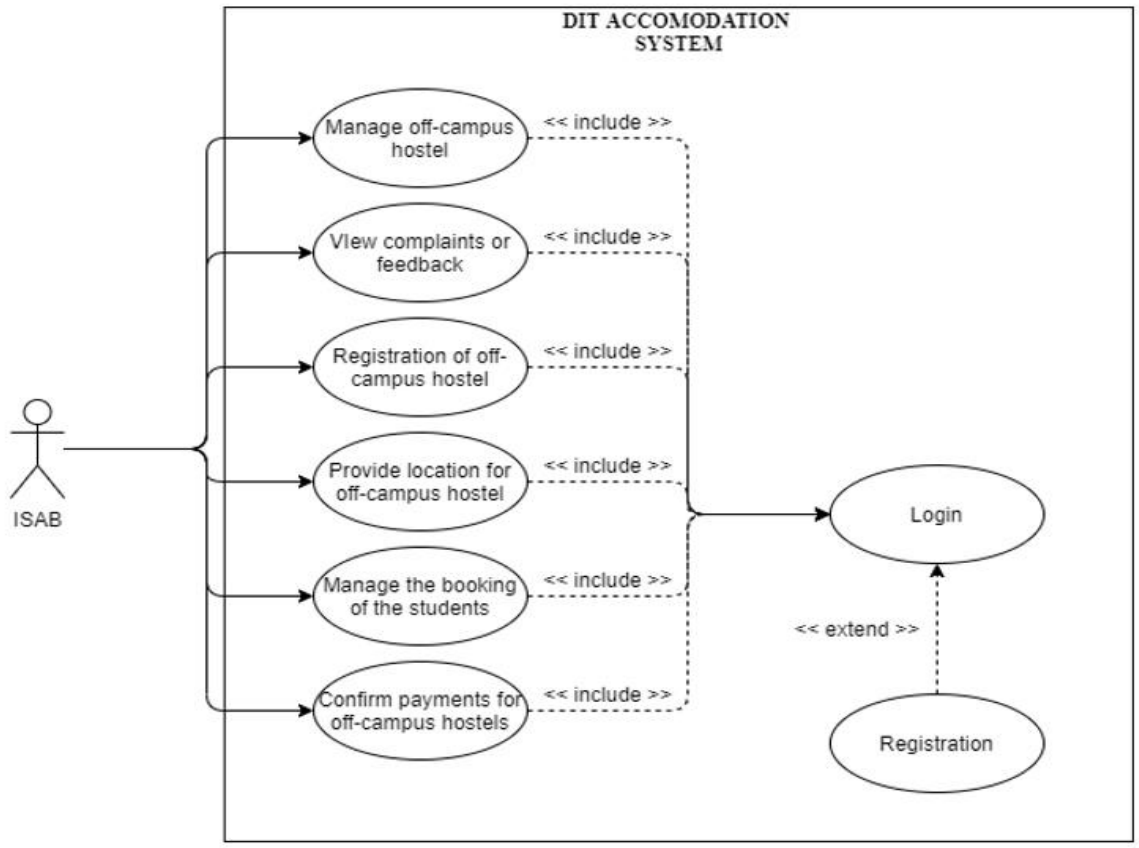


Figure 6: Use case for DITSO

4.2 Non-Functional Requirements

This specifies the quality attribute of a software system. They judge the software system based on Responsiveness, Usability, Security, Portability, and other non-functional standards that are critical to the success of the software system. Failing to meet non-functional requirements can result in systems that fail to satisfy user needs

4.2.1 Performance Requirement

System should be able to handle many users at the same time. The application should be fast. It should not slow down with increase in the number of users. Search functionality should be fast to enable better end-user experience

4.2.2 Security Requirement

i. During registration, the given email address is validated

ii. The password should be at least 8 characters, containing at least a small letter and capital letters, a number, and a special character.
iii. Password is stored as hash value in the database

4.2.3 Software Quality Attributes

i. User interface should be simple and clear to be able to understand.
ii. System should always be available.
iii. The system should be developed in such a way that it is extensible, that is it should be easy to incorporate new features.
iv. It should be reliable.

4.3 Chapter Summary

This chapter gives a brief about software requirement specifications and gives a brief about the functional requirements. It also explains about the use case diagram of the users of the system, i.e. Students, ISAB and DITSO.

CHAPTER FIVE

SYSTEM DESIGN

5.0 INTRODUCTION

The system was designed with the aid of Unified Modeling Language (UML). The UML is a graphical language for specifying, visualizing, constructing, and documenting the artifact of software systems. Different features to be presented which gives a view of a system that emphasizes the behavior as it appears to outside users.

5.1 Data Modelling

Data modeling process involved creating a data model for the data to be stored in a database. This data model is a conceptual representation of Data objects, the association between different data objects and the rules.

5.1.1 Data Flow

Data flow is a flow of a data of a process or a system (information system). The DFD was used to provide information about the outputs and inputs of each entity and the process itself.

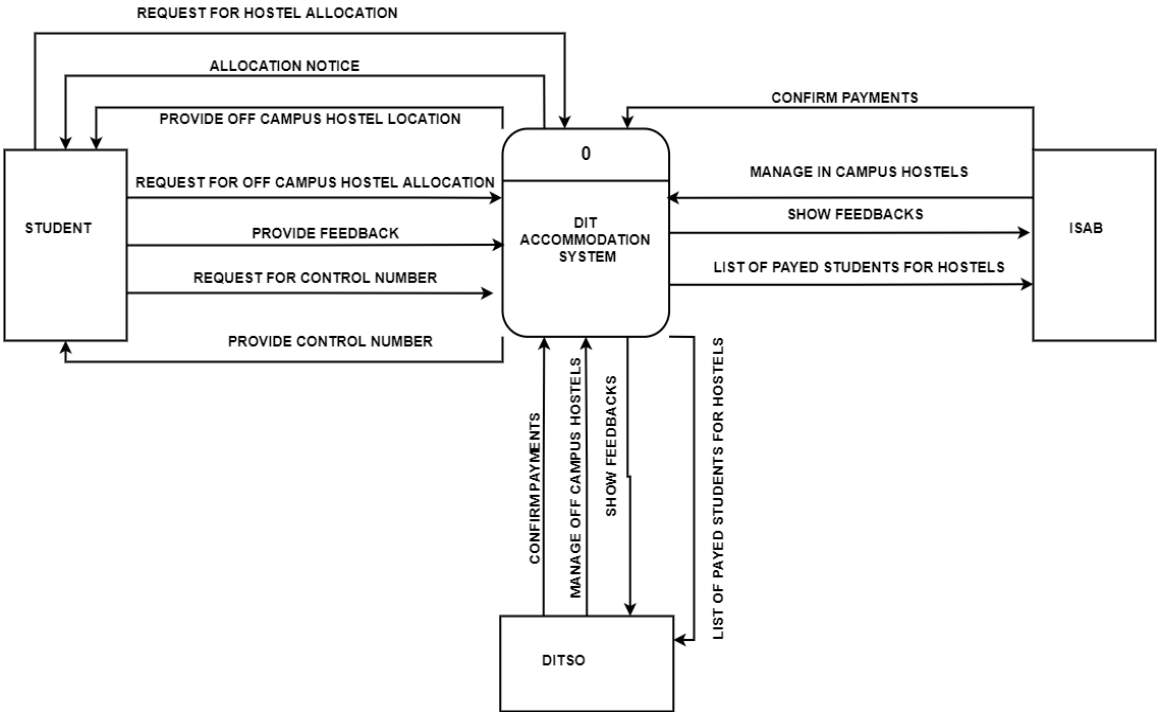


Figure 7: DFD for level 0

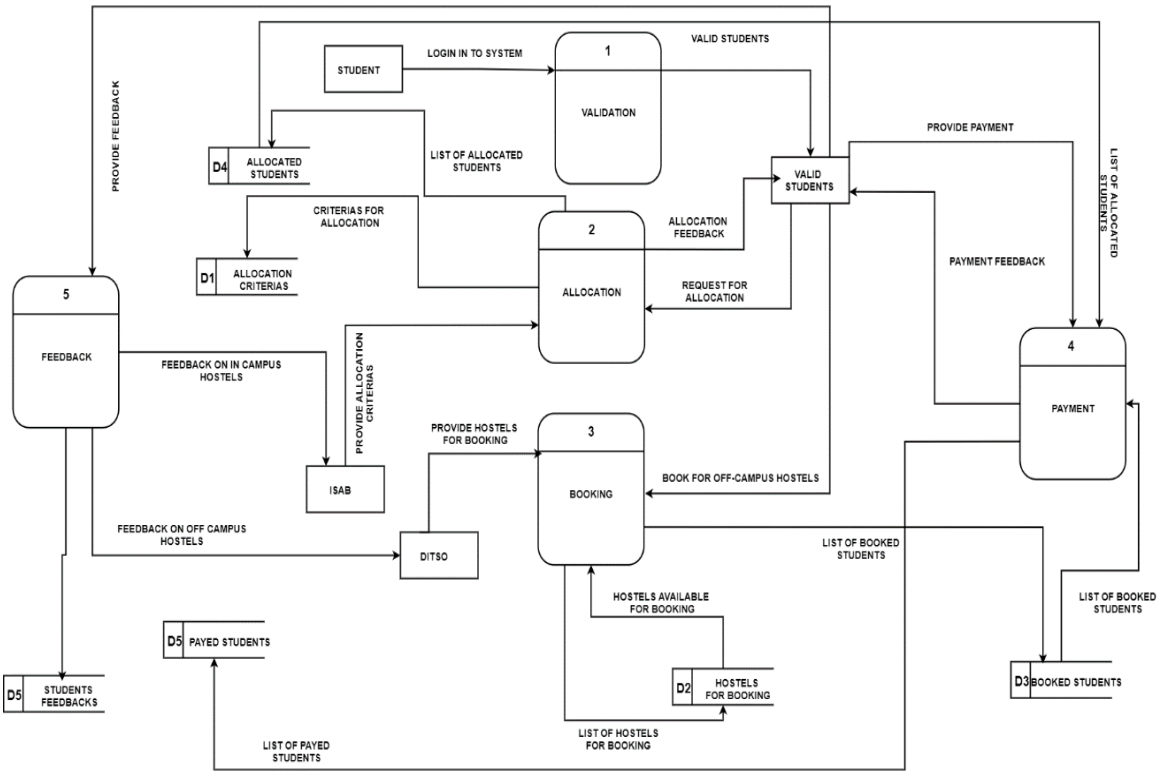


Figure 8: DFD level 1

5.2 Database Model

A database model refers to the logical structure, representation, or layout of a database and how the data will be stored, managed, and processed within it. It helps in designing a database and serves as blueprint for application developers and database administrators in creating a database.

5.2.1 Entity Relationship Diagram

An entity-relationship diagram (ERD) is a data modeling technique that graphically illustrates an information system's entities and the relationships between those entities. An ERD is a conceptual and representational model of data used to represent the entity framework infrastructure. By defining the entities, their attributes, and showing the relationships between them, an ER diagram illustrates the logical structure of databases.

5.2.1.1 Entities

i. Student
ii. ISAB
iii. DITSO
iv. Feedback
v. Rooms
vi. Payment
vii. Location
viii. Hostel
ix. Contract
x. Criteria
xi. Message
xii. Block
xiii. Control number

5.2.1.2 Attributes

The attributes are listed below with their corresponding entities.

Table 2: Attributes and Entities

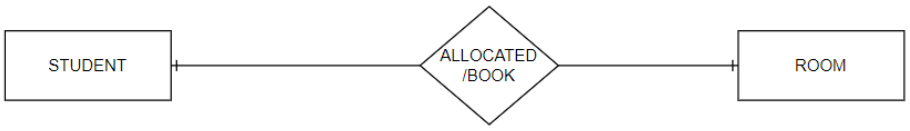
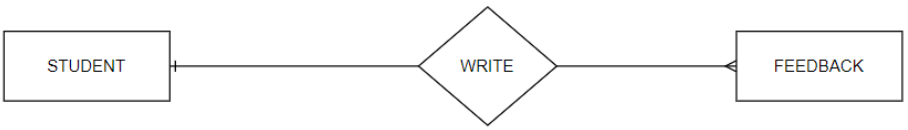
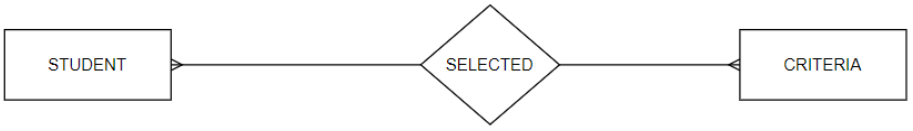
Entities	Attributes
Student	Reg_no
	Student_name
	Gender
	Phone_no
	Level
	Class
	Status
ISAB	Isab_id
	Full name
	Gender
DITSO	Ditso_id
	name
	status
Feedback	Feedback_id
	Feedback_type
	Description
Rooms	Room_no
	Room_capacity
	Description
	Status
Payment	Payment_id
	Payment_type
	Payment_date
Hostel	Hostel_id
	Hostel_name
	Hostel_space
	Hostel_Address
	Price

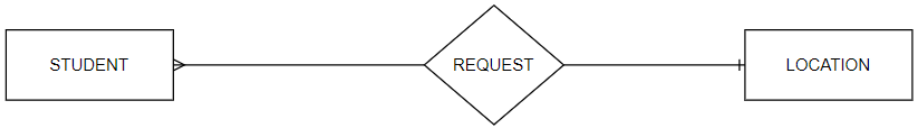
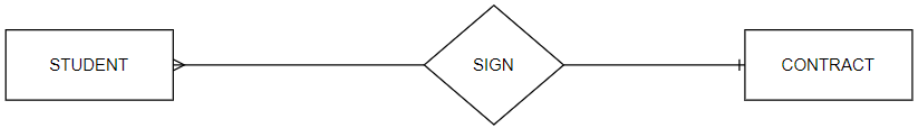
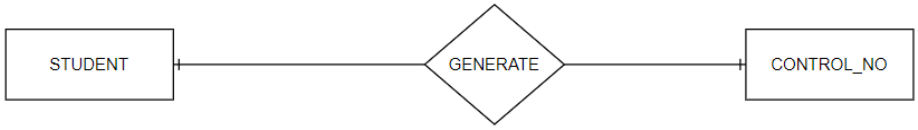
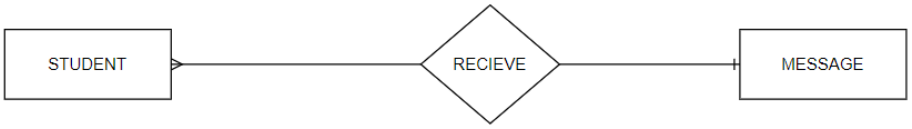
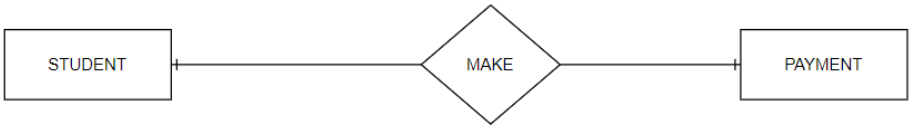
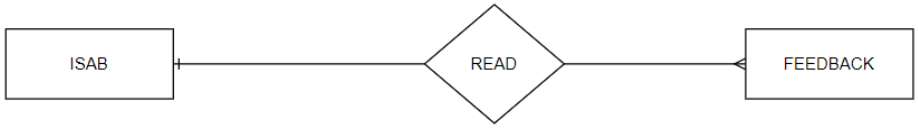
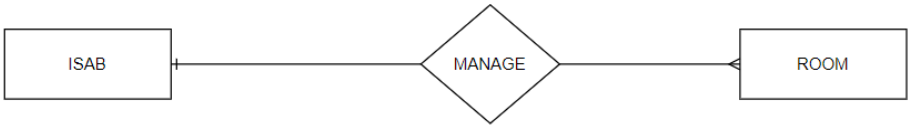
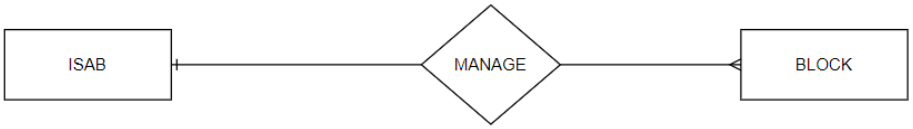
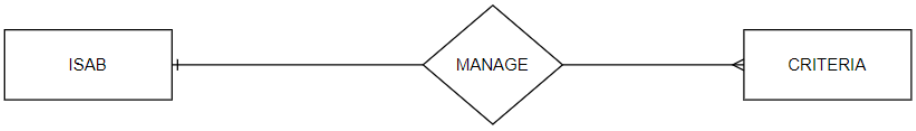
	Contact
	Status
Contract	Contract_id
	Contract_name
	Contract_date
Criteria	Criteria_id
	Criteria_name
Message	Message_id
	Message_type
	Message_name
Block	Block_number
	Block_name
Control Number	Control_number
	Date

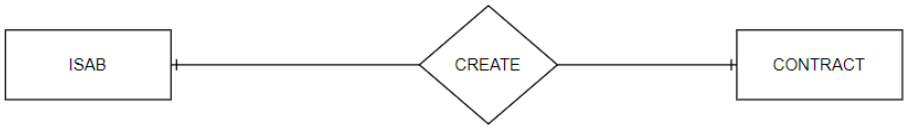
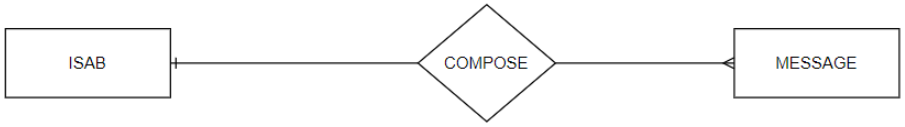
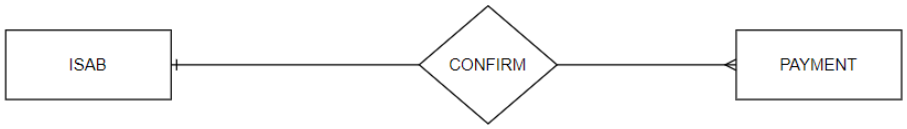
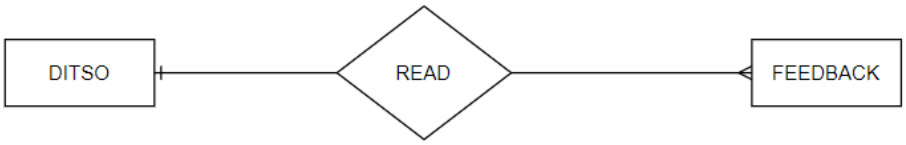
5.2.1.3 Relations and cardinalities for entities

The entities are tabulated with the corresponding relationships and their cardinalities.

Table 3: Entities and their relationship

i.	
ii.	
iii.	

iv.	
v.	
vi.	
vii.	
viii.	
ix.	
x.	
xi.	
xii.	

xiii.	
xiv.	
xv.	
xvi.	
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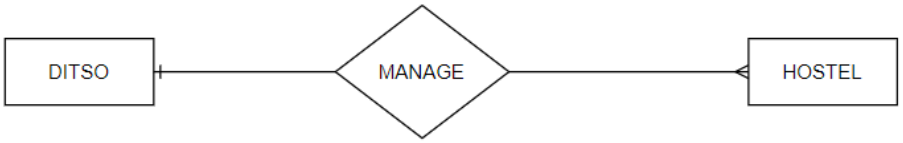
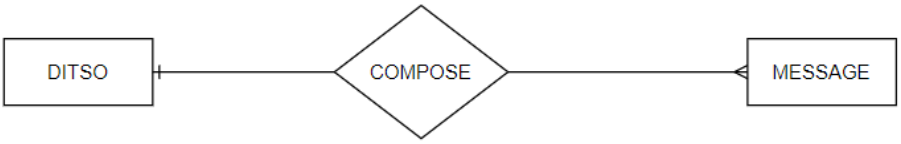
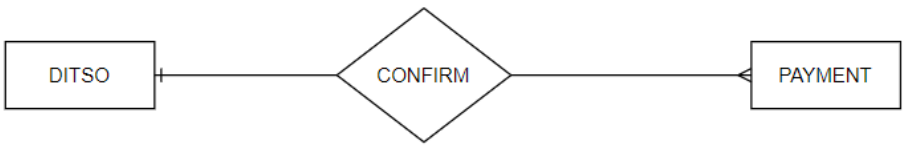
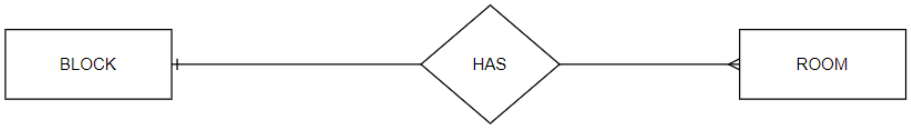
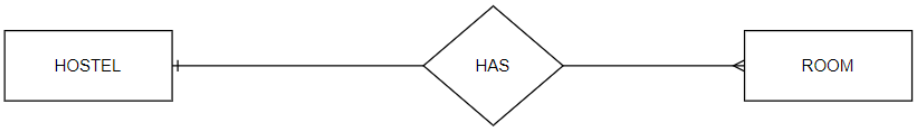
xviii.	
xix.	
xx.	

xxi.	
xxii.	

5.3 Process Modelling

Process modeling is the graphical representation of business processes or workflows. Like a flow chat, individual steps of the process are drawn out so there is an end-to-end overview of the tasks in the process within the context of the business environment.

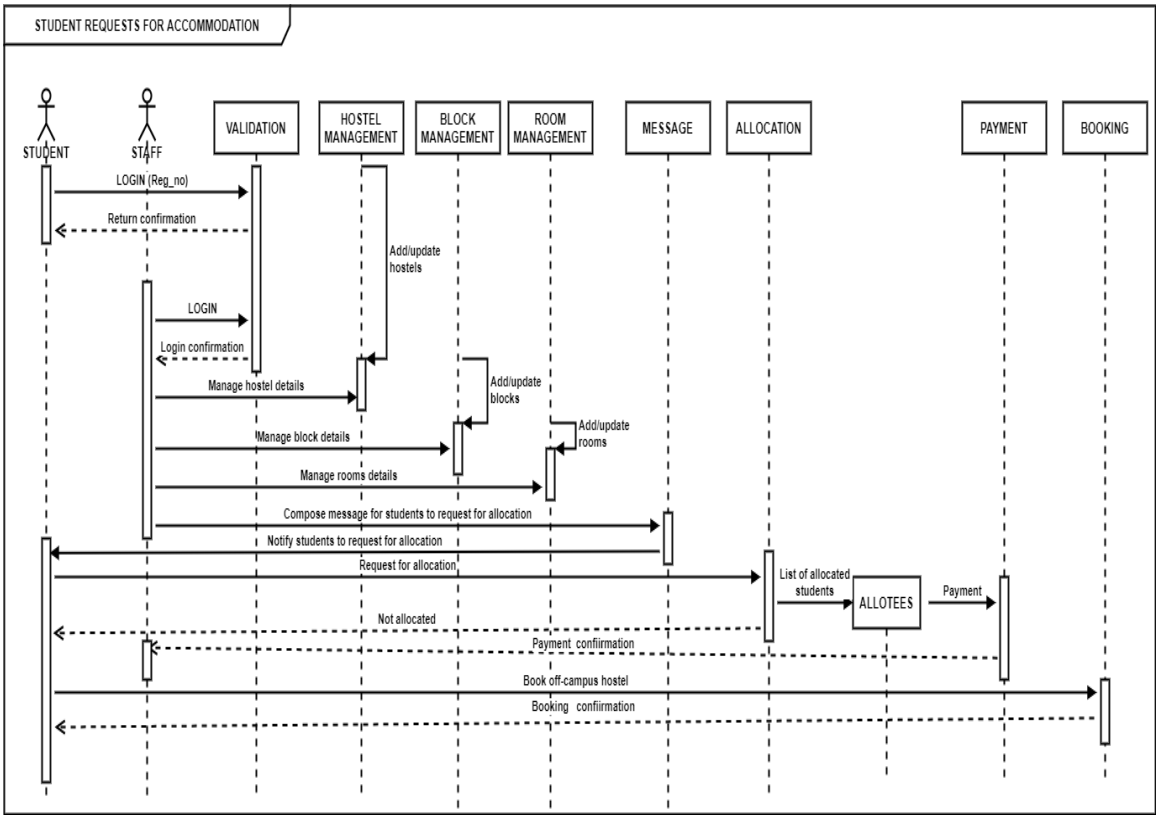


Figure 9: UML diagram for student accommodation

5.4 Interface Design

User Interface (UI) Design focused on anticipating what users might need to do and ensured that the interface has elements that are easy to access, understand, and use to facilitate those actions. Different concepts were used when designing the interface such as interaction design, visual design, and information architecture.

Best practice followed when designing the interface;

i. Kept the interface simple. The best interfaces are almost invisible to the user. They avoid unnecessary elements and are clear in the language they use on labels and in messaging.
ii. Created consistency and use common UI elements. By using common elements in your UI, users feel more comfortable and can get things done more quickly. Once a user learns how to do something, they should be able to transfer that skill to other parts of the system.
iii. Be purposeful in page layout. Consider the spatial relationships between items on the page and structure the page based on importance. Careful placement of items can help draw attention to the most important pieces of information and can aid scanning and readability.
iv. Strategically used color and texture. Directed attention toward or redirected attention away from items using color, light, contrast, and texture.
v. Made sure that the system communicates what's happening. Informed users of location, actions, changes in state, or errors. The use of various UI elements to communicate status and, if necessary, next steps can reduce frustration for your user.
vi. Think about the defaults. This becomes particularly important when it comes to form design where you might have an opportunity to have some fields pre-chosen or filled out.

5.4.1 Index Page for All Users (Login Page)

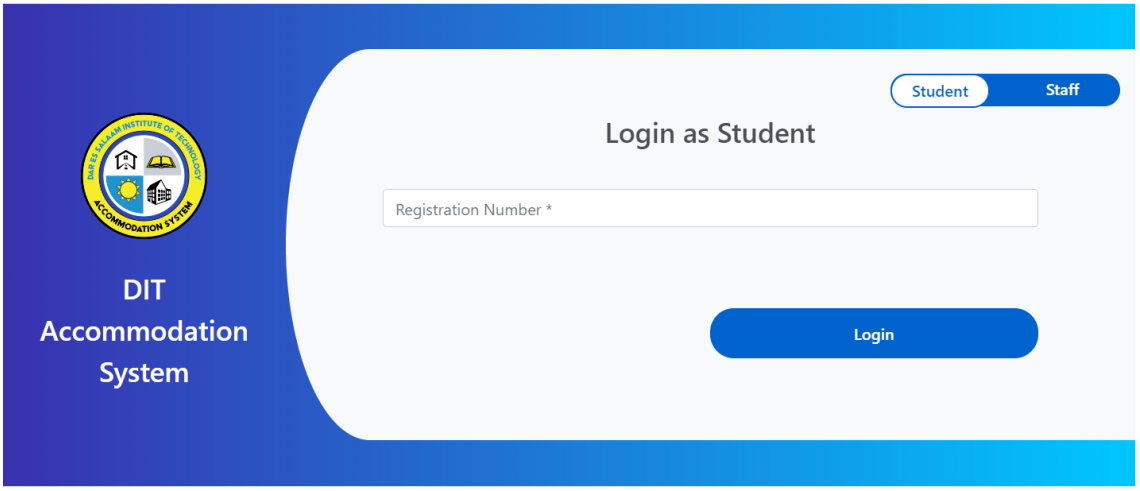


Figure 10: Index page

An index page will serve as entry point for all users. Each user regardless of his role in a system will provide login credentials through this page and login into the system.

5.4.2 Designed Interface

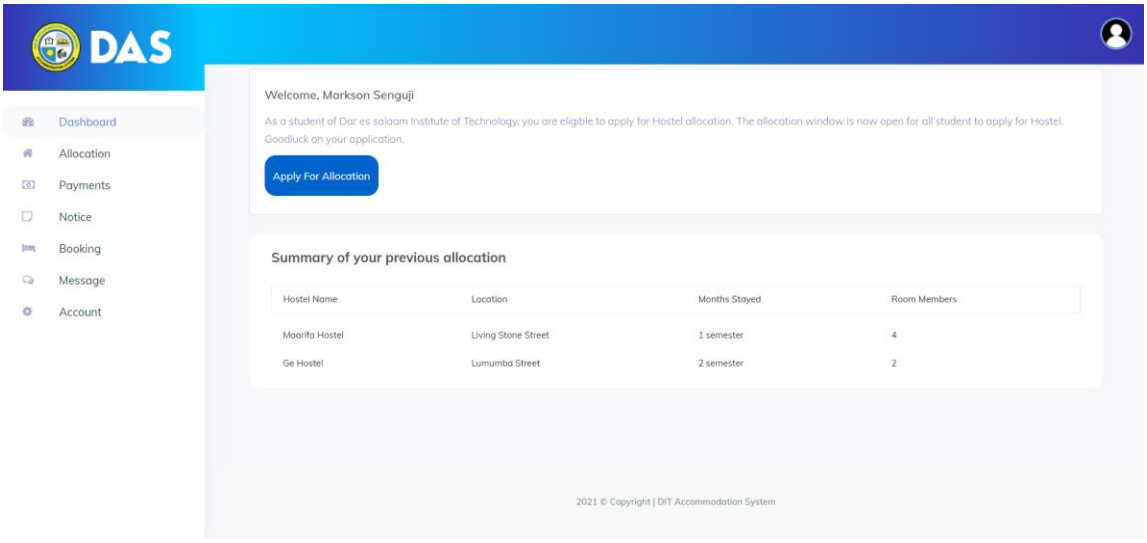


Figure 11: Dashboard overview

The above dashboard will be used by all users. The only difference will be in main navigation menu since each user has own set of activities in a system. For instance, Staff

(ISAB and DITSO) will have the menu where they will be able to see number of students who applied for allocation for in campus or off campus.

5.4.3 Booking Page

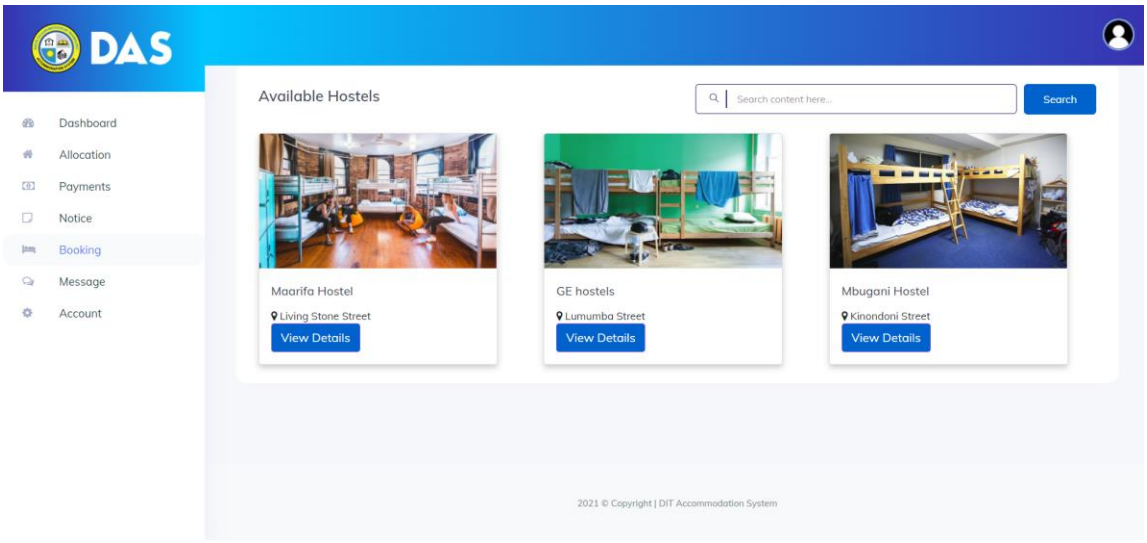


Figure 12: Booking overview

This shows the number of available hostels and the location for the specific hostels. It gives an option to students who are seeking for off campus hostels to see available hostels. And once the students click the view details, it shows the overview of the hostel, and precise location as shown below;

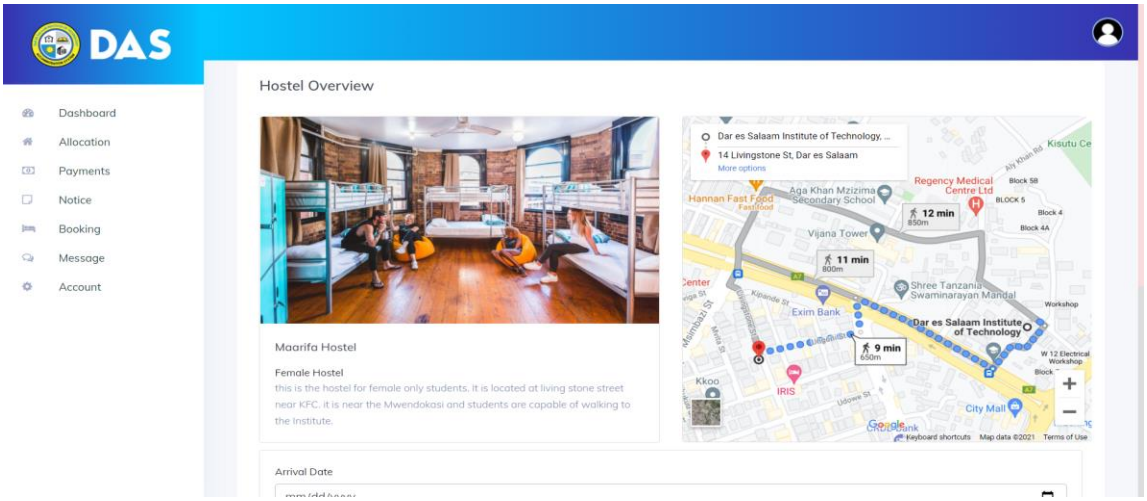


Figure 13: Booking details

5.5 Chapter Summary

This chapter explains about system design process which includes data modelling, database design and project modelling. It also includes the interface design, which explains about the interfaces of the project.

CHAPTER SIX

SYSTEM DEVELOPMENT AND IMPLEMENTATION

6.0 INTRODUCTION

System development is the process of designing, implementing, maintaining, and reviewing in order to help your organization achieve its goals. System development can include designing new systems or changing the existing ones according to the needs of your organization. Implementation deals with the purchasing, developing, or revamping of your current hardware or software system. Implementation also includes training for its users, installation, start up and testing.

6.1. Tools Used in Software Development

A software or a programming tool is a set of computer programs that are used by the developers to create, maintain, debug, or support other applications and programs.

6.1.1 Database Management System

MySQL is an Open Source, high performance, feature-rich relational database management software. MySQL performs well as the data size grows, from GB to several TB of data. The newest storage engine InnoDB, now the default engine for new tables, has been re-architected to take the advantage of multi-core systems. MySQL also provides query cache and main memory table to take advantage of today's hardware with large amount of memory resources.

6.1.2 Web Server

XAMPP server (X-Cross platform Apache MySQL PHP server). It is open source from Microsoft and is only operate in Ms. Windows. It gives the localhost for hosting the web based locally before hosting to the online servers.

6.1.3 Integrated Development Environment

VS CODE IDE: VS CODE analyzes your code, looking for connections between symbols across all project files and languages. Using this information it provides in depth coding assistance, quick navigation, clever error analysis, and, of course, refactoring.

6.2. Languages

GOLANG is an open-source programming language that makes it easy to build simple, reliable, and efficient software.

JavaScript with its libraries like jQuery. It is client-side scripting language which can be used to handle all event in client side like validation and loading some part of page.

HTML (Hypertext Markup Language) used to build and display web contents. Almost all browsers support HTML. Certainly, more browsers support HTML than any other web programming language. As a result, when you build a website using HTML, it would show up on most web browsers.

CSS (Cascade Style Sheet) used to style the layout of the webpages. One of the primary advantages of CSS is that it allows developers to separate content from its presentation layer. CSS change the traditional method of setting style and layout on each individual web page by allows CSS designers to use a single file to control the style and layout of multiple web pages in the same website.

6.3 Components, Libraries and Web Services

i. GORM – fantastic ORM library for Golang
ii. Gorilla Mux for routing
iii. HTML rendering for html files
iv. Twilio for messaging
v. Bootstrap
vi. JavaScript
vii. Font Awesome

6.4 System Implementation

Systems implementation is a set of procedures performed to complete the design (as necessary) contained in the approved systems design document and to test, install, and begin to use the new or revised Information System.

6.4.1 Validation Module

This module is responsible for validating and authenticating users and also providing necessary permissions for how different users are to use the system. The system comprises three types of users namely the student, the staff and the admin. Thus this module is responsible for validating each type of user with their respective roles and permissions in the system.

6.4.2 Booking Module

This module involves only two types of users in the system, the DITSO who is responsible for managing (i.e., adding, updating, viewing and deleting) off-campus hostels and the student who can view and book for rooms in respective off-campus hostels.

This module will also comprise of a platform where off-campus hostels can be advertised and students can easily book their desired choices.

6.4.3 Allocation Module

This module involves two users only, the ISAB who is responsible for managing in-campus hostels, notifying students of the commencing of requesting for hostels process. The other user is the student who is responsible for requesting for allocations for in-campus hostels.

This module also comprises of an algorithm responsible for allocating students to different available rooms based on criteria provided to it

6.4.4 Payment Module

This module is responsible for transaction purposes. For the case of off-campus students will be able to pay using any mode of mobile payments. For the case of in-campus hostels students must generate control numbers to perform payments for respective rooms.

6.4.5 Feedback Module

This module will help a student to provide a feedback on where they are staying based on different aspects such as study environment, cleanliness, availability to social services and distance from the institute (for off-campus students).

6.5 Hardware and Software Requirements

The following are the minimum resource requirement for the hardware and software for the system to work smoothly

i. Microsoft windows 7 operating system or above
ii. 1GB physical memory (RAM) or above
iii. Processor 1.5GHz clock speed duo core or above
iv. Storage of 20GB free or above

6.6 Chapter Summary

This explains about how the system implementation processes about the explanations about modules and how each module was implemented.

CHAPTER SEVEN

CONCLUSION AND RECCOMMENDATION

7.1 Conclusion

Advancement in technology is making automation of manual activities become a very important aspect of our daily lives. Since the use of computers is now widespread, the adoption of this system will make life become easier for students and staff.

The project sought to develop an automated accommodation system that provides relief of the long-endured problems of the current modes of accommodation at Dar es salaam Institute of Technology. Problems that students and the staff face regarding hostel allocation process at the institute were identified and the solution was designed. A web-based system that enables students and staff to perform hostel allocation was developed. This system was welcomed by all its users who believed it would solve most of the problems and improve conditions regarding hostel allocation in Dar es Salaam Institute of Technology. The project achieved all its objectives and as a result, APPS was designed, developed, tested, and validated by real users. Hence, it was proved that this system was fit to be implemented.

7.2 Recommendations

Having met the specified objective of the proposed project and after a profound evaluation of the developed system, there are several suggestions which can be regarded as recommendations for further improvement of the system as follows:

i. DIT should embrace and implement the developed system as it will improve the conditions of hostel allocation process.
ii. A mobile version of the system should be created to allow user access the system from any device other than a computer thus improving the mobility of the device.

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APPENDIX

A1. Project Timeline

Table 4: Timeline

	PROJECT DURATION IN WEEKS							
	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL
Project Initialization								
Planning								
Analysis and Design								
Implementation, Testing								
Deployment								
Verification, Evaluation								

A2. Cost Estimation

Table 5: Cost estimation

ITEMS	QUANTITY	AMOUNT
Internet	20 GB	30,000
Reports	8	54,000
Contingency		50,000
Transport		30,000
Total		164,000

APPENDIX B

B1. Questionnaire For Students

Questionnaire for DIT ACCOMMODATION SYSTEM.

DAR ES SALAAM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF COMPUTER STUDIES

Dear respondent, we SANDRA P. SOMMI & MARKSON F. SENGUJI, bachelor students at the Dar es salaam Institute of Technology (DIT) undertaking a final year project on the DIT ACCOMMODATION SYSTEM at DIT company, case of Dar es salaam region. I kindly request you to assist by filling the required information as honestly as possible.

This request is carried out as partial fulfilment of the award of Bachelor of Computer engineering. This information will be kept confidential and will be used only for our project work.

Please fill out the provided questionnaire so that we may better understand the challenges faced during hostel allocation process at Dar es salaam institute of technology. The more information you can provide about DIT accommodation process, the smoother the development of this project will be. Please answer all questions as completely as possible then submit the completed form to us directly. Thank you in advance.

i. Which year of study are you?

General course ☐
First year ☐
Second year ☐
Third year ☐

ii. Gender

Male ☐
Female ☐

iii. Where do you reside?

On Campus ☐
Off Campus ☐

iv. How long have you stayed at your current place of residence?

One semester ☐
One academic year ☐
Two academic years ☐
Three academic years ☐

v. If changed the residence, give reasons.

_____

_____

_____

_____

vi. Describe the major problems or concerns you have about off- or on- campus residence?

_____

_____

_____

_____

vii. If you are residing on off- or on- campus, would you recommend a friend to reside where you stay?

Yes ☐
No ☐

Explain briefly

_____

_____

_____

_____

viii. (For off campus) Please rate how safe are you at off- campus residence

Very safe ☐
Safe ☐
Somewhat safe ☐
Not safe at all ☐

ix. How satisfied are you with your current residency?

Very satisfied ☐
Satisfied ☐
Somewhat satisfied ☐
Not satisfied ☐

x. Looking at your total accommodation environment, are you satisfied with study related facilities? (Tick the appropriate)

	Very satisfied	Satisfied	Somewhat satisfied	Not really Satisfied	Not at all satisfied
Reading desk					
Study space					

Distance					
Lighting					
Access to social services					
Health hygiene					
Number of members residing in a room					

xi. (Off campus) Is the institute leadership aware that you are residing here?

Yes ☐
No ☐

xii. (Off campus) Did you get any assistance in finding the place you are currently residing?

Yes ☐
No ☐

xiii. (Off campus) Is the distance from your current residency to the institute a challenge?

Yes ☐
No ☐

Briefly explain

_____

_____

_____

xiv. Do you get any challenges during the hostel application process?

Yes ☐
No ☐

Briefly explain

xv. Are there challenges with hostel accommodation contracts?

Yes ☐
No ☐

Briefly explain

B2. Interview Questions For ISAB

i. How is the hostel allocation process conducted (For both freshers and continuing)?

ii. How are students notified of the commencing in hostel allocation process?

iii. How do you know that the information provided by the student is legitimate?

iv. What are the criteria's used for allocating hostels?

v. How is the payment of hostels conducted?

vi. How long does a student reside in a room?

vii. What offices at DIT are involved in the hostel allocation process?

viii. What methods do you use to receive student's complaints?

ix. What are some of the services you provide to the students?

x. Have you ever experienced cases of dissatisfaction from student's accommodation? If yes, give reasons

xi. In your own opinion what do you think can be done to ensure that the students are fully satisfied with accommodation on campus?

APPENDIX C

C1. Models For Migrating into The Database

```
package models

import (
	"github.com/sandra/application/helpers"
	"gorm.io/gorm"
)

type Admin struct {
	gorm.Model
	Username string
	Password string
}

type Role struct {
	gorm.Model
	RoleName string
	Staffs   []Staff `gorm:"constraint:OnUpdate:CASCADE,OnDelete:CASCADE;"`}

type Staff struct {
	gorm.Model
	Full_name    string
	Email        string
```

```
	MobileNumber string
	RoleID	string
	Code	string
	Payments[]Payment
`gorm:"constraint:OnUpdate:CASCADE,OnDelete:CASCADE;"`
}
type Hostel struct {
	gorm.Model
	Hostel_name  string
	StreetNo	string
	StreetName	string
	MobileNumber string
	Location	string
	OFFRooms[]OFFRoom
`gorm:"constraint:OnUpdate:CASCADE,OnDelete:CASCADE;"`
	Feedbacks[]Feedback
`gorm:"constraint:OnUpdate:CASCADE,OnDelete:CASCADE;"`
}
type Block struct {
	gorm.Model
	Block_name	string
```

```
	Block_gender   string
	Block_capacity string
	INRooms[]INRoom
`gorm:"constraint:OnUpdate:CASCADE,OnDelete:CASCADE;"`
	Feedback[]Feedback
`gorm:"constraint:OnUpdate:CASCADE,OnDelete:CASCADE;"`
}
type Feedback struct {
	gorm.Model
	Description string
	HostelID    string
	BlockID     string
}
type INRoomData struct {
	gorm.Model
	Room_capacity    string
	Room_description string
	INRooms[]INRoom
`gorm:"constraint:OnUpdate:CASCADE,OnDelete:CASCADE;"`
}
type INRoom struct {
```

```
	gorm.Model
	Room_no      int
	INRoomDataID string
	BlockID      string
	Allocation[]Allocation
`gorm:"constraint:OnUpdate:CASCADE,OnDelete:CASCADE;"`
}
type OFFRoom struct {
	gorm.Model
	Room_capacity    string
	Room_description string
	Status           string
	Number_of_rooms  int
	Price            float64
	HostelID         string
	Booking          Booking
}
type Student struct {
	gorm.Model
	RegNo              int
```

```
	Name		string
	Gender		string
	MobileNumber	string
	Year		string
	Level		string
	Allocation_request  string
	Academic_status	string
	Registration_status string
	ControlNumber	ControlNumber
	Allocation	Allocation
	ContractContract
`gorm:"constraint:OnUpdate:CASCADE,OnDelete:CASCADE;"`
	Bookings[]Booking
`gorm:"constraint:OnUpdate:CASCADE,OnDelete:CASCADE;"`
	Messages   []Message `gorm:"many2many:student_messages"`
}
type Booking struct {
	gorm.Model
	OFFRoomID uint
	StudentID uint
}
```

```
type Allocation struct {
        gorm.Model
        StudentID string
        INRoomID  string
        Criterias []Criteria `gorm:"many2many:criteria_allocations"`
}
type ControlNumber struct {
        gorm.Model
        ControlNo int
        StudentID string
        Payment   Payment
}
type Payment struct {
        gorm.Model
        ControlNumberID string
        StaffID         string
}
type Message struct {
        gorm.Model
        MessageTitle string
```

```
	MessageDesc  string
}
type Contract struct {
	gorm.Model
	Contract_title      string
	Contract_descrption string
	StudentID           string
}
type Criteria struct {
	gorm.Model
	Criteria_name string
}
func CreateAdmin() {
	db := helpers.ConnectDB()
	var admin Admin
	admin.Username = "admin"
	admin.Password = "dit@2020"
	generatedPassword := helpers.HashAndSalt([]byte(admin.Password))
	user := Admin{Username: admin.Username, Password: generatedPassword}
	db.Create(&user)
```

```
}

// Function for models migration

func Migrate() {

        db := helpers.ConnectDB()

        db.AutoMigrate(

                &Admin{},

                &Role{},

                &Staff{},

                &Hostel{},

                &Block{},

                &Feedback{},

                &INRoomData{},

                &INRoom{},

                &OFFRoom{},

                &Student{},

                &Booking{},

                &Allocation{},

                &ControlNumber{},

                &Payment{},

                &Message{},
```

```
                &Contract{},

                &Criteria{})

}
```

C2. Helper Functions

```
package helpers

import (
	"math/rand"
	"time"
	"github.com/thedevsaddam/renderer"
	"golang.org/x/crypto/bcrypt"
	"gorm.io/driver/mysql"
	"gorm.io/gorm"
)

const DNS = "root:@tcp(127.0.0.1:3306)/accommodation"

var rnd *renderer.Render

//Function for handling errors

func HandleErr(err error) {
	if err != nil {
		panic(err.Error())
	}
}

//Function for converting passwords

func HashAndSalt(pass []byte) string {
```

```
	hashed, err := bcrypt.GenerateFromPassword(pass, bcrypt.MinCost)
	HandleErr(err)
	return string(hashed)
}
//Function for connecting to database
func ConnectDB() *gorm.DB {
	db, err := gorm.Open(mysql.Open(DNS), &gorm.Config{})
	HandleErr(err)
	return db
}
func init() {
	rand.Seed(time.Now().UnixNano())
}
//Generate random values
func RandomString(len int) string {
	bytes := make([]byte, len)
	for i := 0; i < len; i++ {
		bytes[i] = byte(randInt(97, 122))
	}
	return string(bytes)
```

```
}

func randInt(min int, max int) int {

	return min + rand.Intn(max-min)

}
```

C3. Routes

```
package routers

import (
	"log"
	"net/http"
	"github.com/gorilla/mux"
	"github.com/sandra/application/handlers/admin"
	"github.com/sandra/application/handlers/auth"
	"github.com/sandra/application/handlers/staff"
	"github.com/sandra/application/handlers/students"
	"github.com/sandra/application/middleware"
)
var r = mux.NewRouter()
func InitializeRouter() {
	// This will serve files under http://localhost:8000/static/<filename>
	r.PathPrefix("/static/").Handler(http.StripPrefix("/static/",
http.FileServer(http.Dir("static/"))))
	// HandleFunc registers the handler function for the given pattern in the
DefaultServeMux.
	r.HandleFunc("/", auth.IndexHandler)
	r.HandleFunc("/staffAuth", auth.StaffAuthHandler)
```

```
	r.HandleFunc("/studentAuth", auth.StudentAuthHandler)
	r.HandleFunc("/logout", auth.LogoutHandler)
	adminRoutes()
	staffRoutes()
	studentRoutes()
	log.Fatal(http.ListenAndServe(":8000", r))
}
func adminRoutes() {
	r.HandleFunc("/admin", auth.AdminHandler)
	r.HandleFunc("/adminAuth", auth.AdminAuthHandler)
	r.HandleFunc("/admin/", middleware.Auth(admin.AdminDashboardHandler))
	r.HandleFunc("/admin/roles", middleware.Auth(admin.ShowRolesHandler))
	r.HandleFunc("/admin/serveRole", middleware.Auth(admin.CreateRoleHandler))
	r.HandleFunc("/admin/addRole", middleware.Auth(admin.AddRoleHandler))
	r.HandleFunc("/admin/staffs", middleware.Auth(admin.ShowStaffHandler))
	r.HandleFunc("/admin/serveStaff", middleware.Auth(admin.CreateStaffHandler))
	r.HandleFunc("/admin/addStaff", middleware.Auth(admin.AddStaffHandler))
}
func staffRoutes() {
	r.HandleFunc("/staffs/", middleware.Auth(staff.StaffDashboardHandler))
```

```
	r.HandleFunc("/staffs/criteria", middleware.Auth(staff.ShowCriteriaHandler))

	r.HandleFunc("/staffs/addCriteria", middleware.Auth(staff.AddCriteriaHandler))

	r.HandleFunc("/staffs/serveCriteria",
middleware.Auth(staff.CreateCriteriaHandler))

	r.HandleFunc("/staffs/block", middleware.Auth(staff.ShowBlockHandler))

	r.HandleFunc("/staffs/addBlock", middleware.Auth(staff.AddBlockHandler))

	r.HandleFunc("/staffs/serveBlock", middleware.Auth(staff.CreateBlockHandler))

	r.HandleFunc("/staffs/roomData",
middleware.Auth(staff.ShowRoomDataHandler))

	r.HandleFunc("/staffs/addRoomData",
middleware.Auth(staff.AddRoomDataHandler))

	r.HandleFunc("/staffs/serveRoomData",
middleware.Auth(staff.CreateRoomDataHandler))

	r.HandleFunc("/staffs/room", middleware.Auth(staff.ShowRoomHandler))

	r.HandleFunc("/staffs/addRoom", middleware.Auth(staff.AddRoomHandler))

	r.HandleFunc("/staffs/serveRoom", middleware.Auth(staff.CreateRoomHandler))

	r.HandleFunc("/staffs/hostel", middleware.Auth(staff.ShowHostelHandler))

	r.HandleFunc("/staffs/addHostel", middleware.Auth(staff.AddHostelHandler))

	r.HandleFunc("/staffs/serveHostel", middleware.Auth(staff.CreateHostelHandler))

	r.HandleFunc("/staffs/offroom", middleware.Auth(staff.ShowOFFRoomHandler))

	r.HandleFunc("/staffs/addOFFRoom",
middleware.Auth(staff.AddOFFRoomHandler))
```

```
	r.HandleFunc("/staffs/serveOFFRoom",
middleware.Auth(staff.CreateOFFRoomHandler))

}

func studentRoutes() {

	r.HandleFunc("/students/", middleware.Auth(students.StudentDashboardHandler))

	r.HandleFunc("/students/hostels",
middleware.Auth(students.ShowallHostelHandler))

	r.HandleFunc("/students/search",
middleware.Auth(students.SearchHostelHandler))

	r.HandleFunc("/students/bookingDetails",
middleware.Auth(students.BookingDetailsHandler))

	r.HandleFunc("/students/createBooking",
middleware.Auth(students.CreateBookingHandler))

	r.HandleFunc("/students/bookings",
middleware.Auth(students.ShowBookingshandler))

	r.HandleFunc("/students/requestAllocation",
middleware.Auth(students.RequestAllocationHandler))

}
```