

ABSTRACT

The emergence of android mobile applications has allowed small and large organizations to market their services effectively and efficiently in both domestic and international markets. The problem that led to the development of the system was poor communication between the organization and clients and also there was excessive use of paper work. Furthermore some clients were not committed to their reservations there have been made as result of this the organization was left without concrete evidence to charge them. The purpose of this study was therefore to come with an android, client and reservation communication system. The objective of the study was to facilitate communication between clients and the organization. The researcher further investigated how the current system works and in-depth understanding of the problem area was gained through the use of the following research techniques, interviews, observations and questionnaires. The system comprised of web application and android application. The web application serves the organization and it acts as back end application which was developed using Php laravel. The android application is for the clients and it was developed using the android studio. In implementing the system the author used the parallel change over strategy whereby the proposed system will be running concurrently with the existing. Training was also done so that the users will know how to operate the new system developed. Conclusively the system was greatly appreciated by both the clients and the organization. The researcher recommended organization to add at least workers to work with the system. Furthermore the author recommended the firm to change the way the clients view their reservations and also to add a module for message notification.

DECLARATION

I, **Nigel T Musvazvi** hereby declare that I am the sole author of this dissertation. I authorize the Midlands State University to lend this dissertation to other organization or individuals for the purpose of scholarly research.

Signature.....

Date.....

APPROVAL

The dissertation entitled “**MTB android client and reservation communication system** “ by **Nigel Tafadzwa Musvazvi** meets the regulations governing the award of the degree of **BSC HONOURS INFORMATION SYSTEMS** of the Midlands State University, and is approved for its contribution to knowledge and literary presentation.

Supervisor

Signature

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DEDICATION

I would like to dedicate this project to my parents especially Munyaradzi and Mugove Musvazvi for their sterling encouragement from project introduction to implementation. Truly, when I felt tired and stressed, looking at my brothers gave me the zeal to go on.

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LIST OF ACRONYMS

ERD.....	Entity Relationship Diagram
EER.....	Enhanced entity relationship diagram
DFD.....	Data Flow Diagram
FO.....	Functions Officer
IT.....	Information Technology
MTB.....	Management Training Bureau
SDLC.....	System Development Lifecycle
ROI.....	Return on investment
UML.....	Unified Modelling Language

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CHAPTER ONE: INTRODUCTION

1.1 Introduction

The research briefly provided details of Management Training Bureau (MTB) Android client reservation and communication system and highlighted information on the past of MTB and the aim of the application. The system provided Management Training Bureau with practicable benefits henceforth allowing the clients to view, seek requests and create reservations. In this chapter of the project development the objectives were stated demonstrating how the suggested system would resolve those identified problems. A suggestion on development procedure, instruments and projected period for the project was done. The chapter included justification of new suggested system.

1.2 Background study

The background of study provided a brief detail about the organization and its structure. As an associate and consumer to the firm, a thorough investigation was conducted by the researcher regarding all the activities engaged from the beginning to the end of facilities delivered by Management Training Bureau and need to create Android client reservation communication system was discovered to be the answer for more reliability and competence in their mode of operations.

1.2.1 Background of the organization

Management Training Bureau was found under the Zimbabwe Manpower Planning and Development Act (Chapter 28:02) in 1984 with the mandate to:

“Provide management development courses and consultancy services in an endeavor to bridge the skills gap of various management levels in all sectors of the economy in Zimbabwe and beyond.”

After the government realized that they were management void which had arisen because of post-independence skills flight in 1980s. MTB serves to boost interest of nearby organizations inside store network to guarantee positive effect on the economies and lives of local communities where they operate. It supports providers in their quest for constant change and operational greatness. In the meantime, it anticipates that their providers will meet the most elevated guidelines as far as quality, morals and maintainability. Management Training Bureau is focused on general

engagement and communication with nearby providers to guarantee they comprehend what they need, local suppliers can easily explore their contracting and procurement forms and be a piece of their inventory network.

1.2.2 Organogram

According to McGrill (2009), an organogram is defined as the division of human labor and outlines ways of communication, patterns of coordination, workflow and recognized power that controls organizational activities. An organogram can also refer to the order of an entity and how the divisions of the hierarchy collaborate together to attain organizational goals.

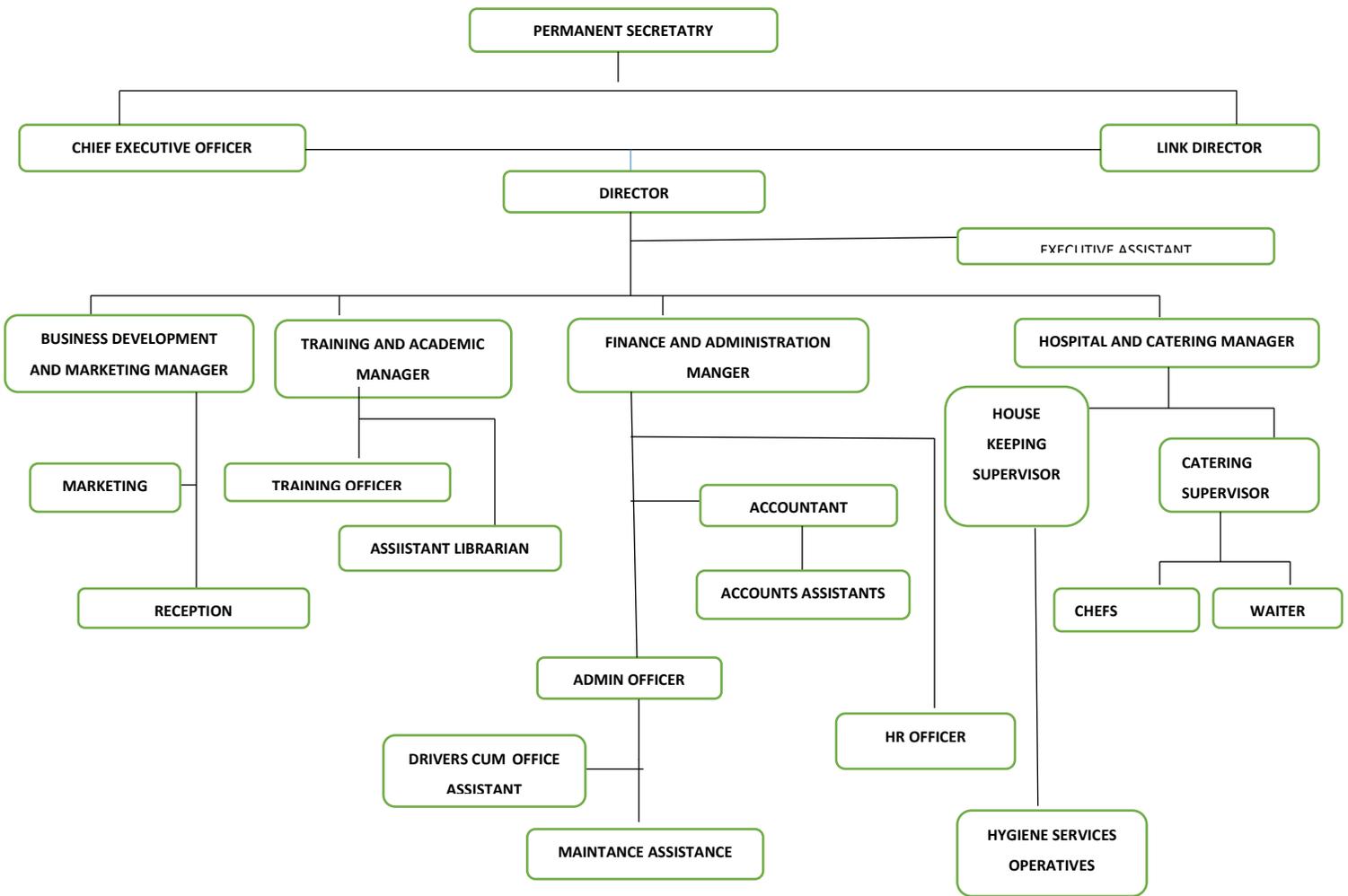


Fig 1.1 Organogram

1.2.3 Mission

To provide excellent in managerial skill development, consultancy services that contribute to the local economy and abroad.

1.2.4 Vision

Offer administration skills and developed programmes, in-house guidance and consultancy services that suite the requirements of various parts of the local economy and abroad.

1.3 Problem statement

MTB used a manual system on reservations and confirmation of those bookings through the cell. Often times after clients had approved the booking they would cancel it and decide not to come but most importantly fail to communicate, whilst MTB would have prepared and arranged for those reservations and that resulted in loses since there would be no concrete evidence to lay charges against those clients. The manual system that MTB used resulted in increased administrative expenses that are associated with the buying and maintenance of files for each customer. The existing system was inefficient, it included many problems and it also failed to provide accurate stock level information for reservations. Another concern was on report generation, the reports were generated manually and this led to miscalculations and errors especially error of omission. It was also time consuming to do all the paper work for a certain reservation.

1.4 Project aim

The research aimed to provide MTB with automated system that will accommodate clients to view the reservations and acquire about the services currently offered at that particular.

1.5 Objectives of the study

Mochal (2004) stated that objectives are established aims that the created application tend to attain and the objectives should be specific, measurable, attainable, relevant and time constrained. The objectives of the study were as follows:

- To develop a system that would allow customers to view, apply for reservation.
- To develop a system that would allow registration of clients seeking service on the system.
- To develop a system that would enable the administrator to approve the payments.

- To develop a system that will show the rooms that are not currently available.
- To develop a system that would allow customers to share their views.
- To develop a system that would allow only single application for a reservation

1.6 Instruments

The researcher was done by acquiring knowledge and guidelines from various sources that are available. Some of the instruments that were used in conducting researcher includes internet and statistical protocol.

1.6.1 Instruments

A number of tools used to build the proposed system that included php laravel for the server side operations as they link between the cellphone applications. API is another tool used in the development of the application. It is a set of procedures, rules and tools for developing applications. It clearly shows how software components should interact. The other tool that the researcher used was the Bootstrap, which is a dominant front end outlined for quick and easier web creation. It involves HTML and CSS centered design models for shared user interface modules. It also provides the capability to form a receptive design with much less work.

Android Studio was another software application used in the development of the system. It is the official Integrated Development Environment (IDE) for Android application advancement, in view of IntelliJ IDEA. Over IntelliJ's intense code proofreader and engineer devices, Android Studio offers considerably more components that improve efficiency when building Android applications.

1.6.2 Methods

The scholar used three techniques to obtain the required information. These techniques include interviews, observations and questionnaires. The interviews with three Management Training Bureau staff were conducted in January 2017. This delivered direction to hindrances imperatives to MTB system. This was reinforced by an extensive problem definition, which contributed to the design of the proposed system.

The questionnaire was the main instrument of this exploratory study and was designed after going through a few similar research studies on reservation systems. A number of the questionnaires were administered in departments' using e-mail surveys. A letter provided and explained the

purpose of the study, assured anonymity of respondents and their departments and provided instructions on how and who should complete the questionnaire.

Observation was a dynamic way of obtaining data from an essential source used by the author. The researcher created a schedule time in conducting the observations.

1.7 Justification

The system decreased the inefficiency that arise when bookings are being made and when the clients fail to communicate the cancellation of the reservation which will result in loss to the entity.

Android client, reservation and communication system have an integrated database which will decrease data idleness and unnecessary reputation of bookkeeping via strict authentication and automation. The application improve the integrity of data, reliability; eliminate data consistency and error free data.

The system has a platform for online chats where clients can acquire more information on the services offered by the company. Enhanced communication established with the system between the two parties' clients and the company. A well-maintained integrated system with the quality content targeting the needs and adding value to the targeted clients.

1.8 Conclusion

Conclusively, the chapter provided a clear picture of the contextual of the problem in an effort to expose the depth of the problem to the entity. The statement of the problem in the chapter triggered the researcher to carry out the study. The chapter also shortlisted the objectives and justification of the study. The next chapter was therefore going to look at the planning phase of the proposed system.

CHAPTER TWO: PLANNING PHASE

2.1 Introduction

According to Wixom (2012), the planning stage is the major procedure of understanding why the proposed application should be in place and defining how the development members will go about constructing it. This phase showed the objectives of designing MTB android, client and reservation communication systems. A feasibility study to see if it was practical to carry on with the proposed system was conducted. It covered concepts like operational, economical, technical, and social and schedule feasibility.

2.2 Business value

Vachon (2016) propounded that business values are the essential doctrines that monitor the method of conducting business activities. They add up what the firm stands for and what creates it exceptional, the proposed system would be a comprehensive upgrade from the previous system and add business value to the company as whole. The focus was on the internal and external stakeholders of the company.

2.2.1 Shareholder value

Andrew (2013) explained that shareholder value is the value delivered to shareholders because of administration's capability to produce sales, incomes and cash flow over time. The company decision to introduce an Android client and reservation communication would enhance a healthy return on invested capital and as this value would be created for a long term hence the share price also increase as a result of this the organization would be able to pay larger cash dividends to shareholders.

Cumulative shareholder value rises the total sum in the stockholders' equity segment of the balance sheet. The proposed system would increase the earnings as well the ratio would increase and the investors viewed the company as more valuable

2.2.2 Customer value

According to Weinstein (2012), customer value is the addition the customers obtains for the benefit evaluated against the cost the consumer offers on the product or services. The formula is:

$$\text{Customer Value} = \text{Benefits} - \text{Cost}$$

The customer value was assessed against the customer values assigned for same products and services that provide same benefit. The highest-quality product does not constantly offer the maximum customer value, since the benefit of each item was measured against its cost.

The customers would be able to see the condition of their bookings and reply accordingly. This ought to prize the business with a great status complemented with a viable benefit on a global. The proposed system provided a high level of services to the customers since they would be able to make and track the reservations. This would add value to customers since all operations would be on the online platform reducing the costs of travelling. The customers would also be able to navigate through the system.

The employees are of great concern also, through the proposed system work for them was made easier since the physical tasks would now be completed automatically for instance update of the database. Improvement of communication and technical skills as the workers received training on how to use the new system.

2.2.3 Channel partner value

Dent (2011), stated that channel partner is a business that collaborate with the producer to market and trade the manufacture's products, services or technologies. Channel partners could be consultants, system integrators. The proposed system was of greater value to these channel partners since it provided chat forum which enabled them to communicate with the organization on what is required of them in terms of the products and services they could be marketing.

2.2.4 Supplier Value

Hintze (2014) explained that supplier values involved the relationship between the supplier and the organization at the same time the organization is the supplier of the services require or needed

by the clients. The system enhanced good communication between the two parties and instant feedbacks, the organization would be able to respond quickly to the request by the clients.

2.2.5 Managerial Value

Nedelko (2017), propounded that managers lead organization as a whole towards the goal, they launch programs and objectives, form relational networks and then perform the plans concerning organizational goal. They were extremely inspired with the ease of use of the system and enhanced performance. The managers using the system are less prone to errors, they are more accurate in their work and hence productivity increases

2.2.6 Societal Value

According to French (2015), social value is the esteem that partners' involvement through changes in their lives that consider this more extensive meaning of significant worth, to build fairness, enhance prosperity and. increment environmental sustainability.

The system provided benefits to the society in such way that they would be able to navigate on the system. The system provided all the information. The products and services had a comprehensive detailed information. The system is very easy to operate and does not require more detailed information to operate the manual system is so simple to understand.

Business values are calculated additions to Management Training Bureau, these additions can be categorized into two categories namely tangible and non- tangible profits;

Tangible Benefits

Hall (2013) propounded that these are benefits, dignified in financial terms. The proposed application would provide some of the profits as follows;

Accuracy of work since everything would be automated and the event of the reservations the system will automatically terminate those bookings which are due if the customers had not communicated with the company as a result of this facility the losses which were experienced previously with the existing system will be eliminated.

The organization would also have an increased competitive advantage over other rivals because the system operate in real time access which means the changes applied to a system are instantly

shown to the users this gives advantage to the organization when it places its adverts it quickly reaches out too many geographic areas.

Work is also made easier since a lot of paperwork is reduced which causes frustrations and many errors hence with the proposed system there are error free, because of this, the productivity will increase leading to greater profit margins. A reduction in stationary costs is another benefit, which the organization experienced since most of the task would be automatic.

Intangible benefits

According to Dixit (2007), intangible benefits contains of personal approaches and views about firm that cannot be measured in economic values on a balance sheet even though they add to the organization's importance as a firm.

Better communication within the business members in time. They are also improved assurance of users due to user sociable system because of this it boosted the staff morale.

Through the proposed system, there will be an increased goodwill and consumer satisfaction. The services that the system provides to its users take into consideration the customers will be at its best level. Better quality of service delivery and information because of this they will be better handling of vast quantities of information.

After mentioning all the firms' values of the organization this segment was now complete and we moved on to the feasibility study.

2.3 Feasibility study

According to Bentley and Whitten (2007), feasibility analysis is the procedure by which practicability is measured. It was an action executed before development process actually took place. It was also a monitored procedure for distinguishing complications and chances, determining goals, describing scenarios, defining fruitful outcomes and evaluating the series of costs and benefits related with many choices for resolving a problem.

The key goal of the feasibility study was to check the operational, technical, economic and social feasibility for tallying fresh components and clear up existing running system. Feasibility study was mainly concerned with the following;

Technical feasibility referring to questions like will the system function?

Economic feasibility also be looking at cost effective of the system.

Social feasibility analyses the effects the system will have to its users.

Operational feasibility checks if the system will be operationally effective.

2.3.1 Technical feasibility

According to Bentley (2007) technical feasibility is the degree of the feasibility of a technical clarification and readiness of funds. It highlighted three crucial issues, which are;

- Was the proposed resolution practical?
- Do we presently have the essential skill?
- Do we currently have the technical know-how?

The author focused at the software and hardware needed for the project to continue and readiness of expertise that would be needed for the development of the software. Technical feasibility evaluation assess the technical rationality of the suggested solution and it assess whether business has the architecture and materials including software, hardware and network competence to assist the system.

2.3.1.1 Hardware requirements

Filson (2006), states that a computer hardware is the accumulation of the considerable number of parts you can physically touch. The required materials needed for the application development are on the table below;

Table 2.1 Hardware requirements

ELEMENT	Description	Available	Required
Processor	2.8 Ghz I7	4	10
Cache Processor	4mb	6	8
Hard Disk	456 Gb	2	6
Network Card	10/500mbps	3	5
Dvd Rom Drive	24x	1	3
Tape Drive	13mm	5	7
UPS	APC Smart-UPS 300va	2	6

2.3.1.2 Database server requirements

According to Klein (2007), database server is a computer program that gives database administrations to other computer programs or to computers, as characterized by the client server model. The requirements are indicated below;

Table 2.2 Database server instruments

Element	Recommended
Processor	2.4Ghz
Memory	2GB
Hard Drive Disk	100 GB
Network Card	10/120 LAN

2.3.1.3 Client specifications

According to Butler (2001), client specification recognizes the sort of objects that may communicate with a pattern. The table shows the specifications of client device.

Table 2.3 Client specifications

Android Version	5.1.1
Baseband Version	J500FXXU1APEI
Memory	16 GB

2.3.1.4 Networking equipment

Dennis (2012), defined networking as the development, design, and utilization of a network, including the physical (cabling, center, connect, switch, switch and router), the choice and utilization of media transmission protocol and computer software for utilizing and dealing with the system, and the foundation of operation policies and methods identified with the system. The networking requirements are shown on next page.

Table 2.4 Networking equipment

Software	Description
Android Studio	It is the official Integrated Development Environment (IDE) for Android application advancement, in view of IntelliJ IDEA. Over IntelliJ's intense code proofreader and engineer devices, Android Studio offers considerably more components that improve your efficiency when building Android applications
PHP laravel	A powerful programming language suitable for large projects
Xamp 3.2.2	XAMPP is meant only for development purposes. It has certain configuration settings that make it easy to develop locally but that are insecure if you want to have your installation accessible to others. If you want have your XAMPP accessible from the internet, make sure you understand the implications and you checked the FAQs to learn how to protect your site.

2.3.1.4 Software requirements

According to Andrews (2009), software is a gathering of instructions that empower the client to collaborate with a computer, its hardware, or perform assignments. Below is a list of software required?

Table 2.5 Software requirements

Software	Description
API	Is a set of procedures, rules and tools for developing applications? It clearly shows how software components should interact
Emulator	It is a software development context by adobe system, which was used to create portable applications.

Recommendations

The organization had enough information on how to suite the new structures to be placed in as far as the technical feasibility was apprehensive.

Conclusively the proposed system to be developed was technically feasible. It provided an ease access and fast problem rectification. Hence, it gave the technical assurance of correctness, consistency and security.

2.3.2 Economic feasibility

According to Castro (2002) explained economic feasibility as a way to evaluate whether the benefits estimated from the proposed application offsets the experienced expenses of doing the project. It was also a degree of cost efficiency of a project. Application appeal was economically feasible if the estimated benefits outweighs the cost of implementing the system, which included the installing, and operation processes. The project is continued when the estimated benefits outweighs the estimated cost of the project. It consisted of tangible and in tangible benefits.

Tangible benefits or costs - this can be easily counted.

Examples of the latter stated matters are below.

Tangible Benefits

- Increased profit
- Increased market share
- Increased customer base

Intangible Benefits

- Improved handling of vast volumes of information
- Increased good will and consumer satisfaction
- Increased staff morale
- Tangible and non-tangible benefits.

2.6 Tangible and Intangible benefits

Year	2018	2019	2020	Total
Tangible benefits (US\$)				
Increased profit	400	550	700	1650
Increased market share	600	700	850	2150
Increased customer base	200	350	400	950
Total	1200	1600	1950	4750
Intangible benefits				
Good will	300	350	400	1050
Staff morale	50	400	500	950
Total intangible benefits	350	750	900	2000
Total benefits (tangible + intangible)	1550	2350	2850	6750

The organization would experience some development costs and maintenance costs in the application lifespan. Development costs are intended to shelter the costs sustained during the development of the application and these include:

- Communication expenses
- Travelling expenses
- Stationery expenses
- Buying of hardware, software and networking tools.

Table 2.7 Development cost

Year	2017	2018	2019	Total
Computer hardware*5	2500	400	100	3000
Software licences	500	100	50	650
Networking equipment	300	200	0	500
Communication expense	200	100	50	350
Total development costs	3500	800	200	4500

Installation and Training costs

These costs cover the expense of setting up the user's computers and induction of the end users on features of the system.

Operation costs

These are expenses experienced in the running of the system. They involve stationary for printing forms and other computer peripherals such as printer inkers.

Operational costs

Table 2.8 Operational costs

2017	2018	2019	Total
100	100	100	300
150	150	100	400
0	50	20	70
50	50	50	150
50	50	30	
350	400	300	1050

Cost Benefit Analysis

Cost benefit examination measured the monetary effect of the project and it compared the benefits against the cost of the system development. According to Castro (2002) the aim of this analysis is to help to respond the questions like:

- Is the project reasonable because the merits outweigh the merits?
- Can the project be completed, inside the agreed cost limits?

What is the least cost to achieve a definite system?

Table 2.9: Cost Benefit Analysis

Year	2017	2018	2019	Total
Tangible benefits	1200	1600	1950	4750
Intangible benefits	350	750	900	2000
Total benefits	1550	2350	2850	6750
Less:				
Development cost	3500	800	200	4500
Operational cost	300	350	270	920
Net benefits	(1650)	1900	2380	2550

Investment Appraisal Techniques

The researcher used three techniques during the research to come with the best alternative

Return on investment

Return on investment is a measure of performance used to evaluate an investment efficiency. According to Alvarez (2007) propounds that return on investment determines the lifespan of various investments. The researcher calculated the return on investment as follows;

$$\text{Return on investment} = \frac{\text{Average annual profit}}{\text{total investment}} * 100$$

$$\text{ROI} = \frac{\text{Total Benefits} - \text{Total cost}}{\text{Total cost}} * 100$$

$$\text{ROI} = \frac{6750-5420}{5420} * 100$$

$$= 24.5387\%$$

$$= 25\% \text{ (nearest 2 significant numbers)}$$

According to the workings, it indicated that the return on investment was favorable.

Advantages of return on investment

This technique measured the complete rate of return on investment uses yearly value. This has gave the author the right to continue because the value obtained was favorable.

It was simple to use and enhance the author did the workings within a short period.

Payback period

Wood (2001) explained payback period as the length of time the project will take to recover the amount used during its development. According to Woodruff (2007), the payback period is the period articulated in years, it takes for the cash returns from capital investment to equal the original cost of the investment. Payback period with short time was the most favorable because it generated back the cash fast. The author calculated the payback period as follows:

$$\frac{\text{Remaining cash flow} * 12}{\text{Total investment}}$$

Table 2.10 Payback period

Years	Cash flows\$	Accumulative Balance\$
0	(1650)	(1650)
1	1550	(100)
2		
3		

$$\begin{aligned} \text{Payback period is } & 1 \text{ year} + \{100/2350*12\} \\ & = 1 \text{ year} + 0.5 \\ & = 1 \text{ year } 6 \text{ months} \end{aligned}$$

Advantages of payback

It gave a magnificently turned approximation of the time required to recover the initial investment. The author noted that this technique quickly covered the costs incurred during system development. According to the calculations done, the payback period is one year six months, which was more reasonable.

Disadvantages of payback

This method did not consider the other cash flows after the payback period.

Comment

The payback period of the project was favorable in the sense that it took one year and six months for the project to reach the equilibrium point.

Net Present Value

Wood (2001) expounded that the net present value is the variance between the cash injected and the present values of upcoming cash flows. Johnson (2003), further elucidated on the net present value as the value an investment must symbolize currently on a discounted cash flow basis to make an investment worthwhile after taking into consideration the cost of investment. The author used the formula calculate net present value as follows:

$$\frac{\text{Total benefits- total costs}}{(1+r)^n}$$

Where r = interest rate (12%) and n is the number of years

NPV after 3 years = 6750-5420

$$\begin{aligned} & (1+0.12)^3 \\ & = \$946.66 \end{aligned}$$

The net present value indicated that the project was feasible since the value generated is optimistic and considers merits the entire life span of the application.

Economic feasibility recommendation.

The expected cash flow of the project was acceptable, hence it was economically feasible, and the project continued.

2.3.3 Social feasibility

The objective of the social feasibility was to identify how the subordinates would cooperate after putting into practice the system. It was vital to involve the collaboration of the subordinates after the implementation since they are the people who would be working with the application. The

suggested application required to be competent in the collaboration between the workers hence the application is socially viable.

According to Brien (1996), the social feasibility embeds more than just human element issues. It takes into consideration the cost to the environment, society and to the company culture. A new android, client and reservation communication system seemed to be an intimidation to some workers who could face retrenchment or those who could be insecure. This subsequently would affect adversely on the employee's families, friends and relatives. Nevertheless, administration would reduce any cutbacks and safeguard the introduction of the application does not come as an intimidation, but trained them with better presentation skills.

Recommendations

The introduction of the new application largely would affect positively to the people and the inside society as well as the environment. Data storage and electronically transaction would reduce paperwork hence reducing junk to the environment. The system enabled quick problem resolving therefore removing negative effects of the problems. The subordinates would like the error declined and quick handling of the transactions among other merits conveyed by the suggested application.

2.3.4 Operational feasibility

Whitten (2007) expounded that the operational feasibility is the degree of how the suggested application solved the challenges and took advantage of the chance discovered in the course of the scope definition and problem assessment phase and how well it gratified the application needs recognized in the requirement phase. PIECES Framework was used to assist in recognizing challenges to be worked on and their determination as follows:

Performance: The author looked at the performance of the existed if it was sufficient to deliver throughput and response time.

Information: The required information required was the existing type of process deliver to end users and management with suitable, relevant accurate and conveniently structured information.

Control: The major thing the researched examined was the existing mode of process deliver efficient regulations to guide against fraud and ensure correctness and protection of data and information.

Efficiency: The author worked on several issues like is the “existing type of operation create maximum use of current resources, together with people, movement of forms and time.”

Services: The researcher examined on the type of process offered reliable services

A comparison was carried out between the existing system and the suggested system. The comparison was in terms of:

Timeliness: The author looked at the amount of time required for the processes to be attained within the system.

Business integration: The researcher be looked at the system integration aspects such as does the system integrates company activities?

Speed: The researcher was assessing how quick the results created and the efficiency on the attendances of queries are.

There are other threats that would be engaged with the creating of the application like the failure of hardware. Some users inside the existing manual application were used to the old file centered application, sometimes it could be difficult to persuade them that the proposed application would still cater the same old things for them in an even efficient and effective way. The problem is that some subordinates were resistant to change and it would take quite some time for them to approve of the system.

Overall Recommendation

Relatively to the preparedness to use the system, the system was worth to be developed. This fits the company since the user needs were the same with the objectives of the system. The company’s control supported the creation of several different systems within the company and outside the company.

2.4 Risk analysis

According to Kendall (2002), risk analysis is the controlling of threats upon having a mode of evaluating, measuring of the threats and captivating extent according to the outcomes received with the goal of deducting and sustaining a positive and satisfactory level. The procedure was of much use and important since it have larger impact on the project development. Taking not into account of the procedure might ended up in delay or negative effect which could led to the project termination.

2.4.1 Technical risk

Technical risk resulted from the application failing to meet the necessities indicated by the operators in a method that its application would not please them as anticipated. This could be due to complexity of the proposed application, which on the way form conflicts, such threats were because of the abilities of the current staff. Some of the major technical risks identified are as follows:

Failed to meet user requirements and specifications as the user could always rises negative complains on the working and structures of the system.

The staff within the organization could also not be able to maintain the system, which might led them in making conclusions that the system is of less or no use.

2.4.2 Economic risk

Cost of the overall software and hardware are not precisely fixed since their prices are fluctuating which could place the budgeted sum had a negative balance and in the end, it could result in project being terminated. As result of these constraints, it would cause the company to budget very well as to avoid shortages during the system development process.

The company could use its resources financing some unfinished projects, which it would had catered first which could disadvantage the proposed system to be developed

However, besides all these risks mentioned they are some other risks, which could affect the overall project development process such as the virus attacks. Further, the ISP could cut down their internet bandwidth due to several reason, which would cause the system not to perform well since it required high quality levels of internet bandwidth.

2.5 Stakeholder analysis

Nedelko (2017), stakeholder analysis is the method used to recognize the persons or teams that possibly affect or are affected by the proposed system and arranging them in respect to their effects on the action and the effects will have on them.

Looking at the subordinates' view first, the system was going to make job much easier and efficient for them. The subordinates would be guaranteed accuracy and free of errors hence increasing productivity as well as increasing the company sales which could result in the long run. However, the system would greatly affect those subordinate who were not well vexed with the technology especially the android application hence they would have some sort of the negative attitude towards the system.

2.5.1 Client

Clients would benefit more on the system considering that most of the organizational services shown on the system are in favor of the clients. Clients had the chat facility that allow them to have further clarification on their services. Furthermore, the system though it provided easy navigation it requires someone who has the ability to use the chat facility since it is much authenticated.

2.5.2 Management

Management on the other hand would benefit more from the system since they would be able to make quick decisions using the generated reports by the system. The management should view the system technology as way of reducing the number of the top management in the organization as a result might face resistance.

2.6 Work plan

These showed the time of all breakdown activities. The phases shown below represented the work plan table. After the completion of the development work plan then the researcher will draw the Gantt chart. As illustrated below,

Table 2.11 Development work plan

Phase	Start	End	Duration (weeks)
Proposal	27/02/2017	03/03/2017	1
Introduction	10/03/2017	17/03/2017	1
Planning	24/03/2017	31/03/2017	1
Analysis	10/04/2017	21/04/2017	2
Design	24/04/2017	05/05/2017	2
Implementation	08/05/2017	19/05/2017	2
Maintenance	22/05/2017	Ongoing process	+++++++
Documentation	27/02/17	Ongoing process	+++++++

Gantt chart

A gantt chart is a kind of bar chart that demonstrates a project timetable. It illustrated the beginning and ending dates of the terminal elements and summary of a project. The gantt is shown below

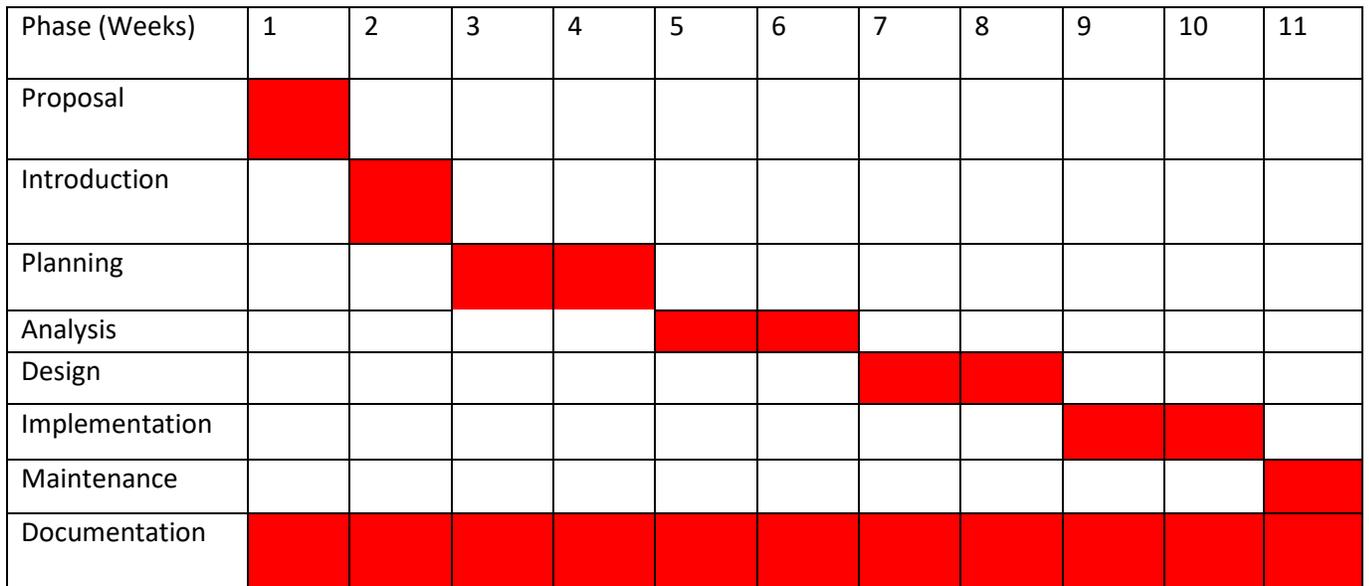


Fig 2.1 Gantt chart

2.7 Conclusion

From the evaluation done on feasibility, it showed that it was very feasible to build Android client and reservation communication system. The developer was able to evaluate resources and have matched them to the objective to be achieved. The author concluded that the project was feasible

and was given the permission to continue with the project. The next chapter was therefore going to look at analysis of the existing system of Management Training Bureau.

CHAPTER THREE: ANALYSIS PHASE

3.1 Introduction

The last phase indicated the suggested system's aims as well as its feasibility study. The conclusion of the assessment of the system's objective and its feasibility study which was clarified in the previous chapter created a path to the analysis phase of the system. According to Godfrey (2000), system analysis is a method that focuses on the inspection, modeling and transformation of information with the goal of bringing out data that is valid since a standard and good deliverable artifact is the one that suites the operators anticipations. This phase was typically regarded as one of the important stages in the forming of the sdlc. The phase focused basically on the functionality, processes related with the current system and also the direction of flow in relations of how they would be connecting and synchronizing with each other. In the systems development life cycle stage all the activities such as the inputs, processes and outputs of the existing system are examined. Questions like "what is the operation of the existing system" were answered in this phase. It offered an overview on who was using the existing system.

3.2 Information gathering techniques

The method was engaged so as to obtain comprehensive, practical and realistic information from people who were involved in the activities of the existing system. Green (2000) postulated that a data gathering technique aimed to define the procedures to be followed so as to obtain relevant information needed. The scholar used three techniques in obtaining the required information and these were interviews, observations and questionnaires.

3.2.1 Interviews

According to Kvale (1996), an interview refers to a chat between two or more people, one being the interviewer and the other being the interviewee so as to get data concerning a specific subject. The author chose individuals whom he questioned regarding the operation of the existing system, the interviews were conducted in different formats, some were asked over the internet and others orally. The researcher conducted the interviews on 30th March 2017 at Management Training Bureau. The interviews involved the management team of the company and some individuals who work in the department of reservations. The researcher conducted the interviews in two ways

namely structured and unstructured interviews. This was done to obtain vast information about the current system.

3.2.1.1 Structured Interviews

Dennis (2009) postulated that a structured interview is an evaluation process that is created to rate candidates' work related capabilities through a logical inquiry in relation to their past know-how behavior and how they tend to act in theoretical scenarios. It was regarded to be a personal method as evaluated to others because the interviewee would be answering the same scheduled questions in the same sequence of order.

3.2.1.2 Unstructured Interviews

This type of interview did not make use of scheduled question as it intends to obtain as much data as possible. The interviews were conducted secretly by the researcher. The employees were approached and asked about the current status of the existing system and how viable it was at the moment.

- **Recommendation**

The unstructured interviews tended to be the best as compared to the structured interview since interviewees ended up sharing information which the interviewer would not have asked for and some of the points they would highlight are of great importance. The interviewees were given the platform to air out all their ideas and to explain. Contrasting with the structured questions where the interviewee was only guided with the provided questions and was only required to answer a given question. Use of the unstructured interviews allowed the author to gather all the particulars regards to the existing system.

3.2.1.3 Advantages of interviews

- The data obtained was reliable since the interviewer had chance to ask where he or she was not understanding. The author gave clarity to the questions which he was asking to the interviewee through this process it made the source more reliable.
- The interviewees felt being part of the project and this has enabled them to be so free and open to the questions which were being asked by the research. Some hidden information was brought to the ground which were ignored by the research of which they were of great value.

3.2.1.4 Disadvantages of interviews

- Some individuals participated very well during the course of interviews however they were other participants who were not willing to participate and even to collaborate with the researcher. This has made interviews difficult to conduct and some information was never clear to the researcher.
- The major problem faced by the researcher was some individuals wanted to manipulate the project by providing false information. The researcher noted that those individuals were fearing change.
- The process of conducting the interviews was so time consuming since the researcher had to wait for the targeted people to finish their business activity.

3.2.1.5 Finding from Interviewers

The author conducted some interviews with various interested parties from different field areas. This involved both the internal and external current system users. It was discovered that most of the responses were emphasizing on the recent problems faced by stakeholders for instance communication failure between the clients and subordinates, duplication of data leading to its inconsistency and poor security mechanism.

3.2.2 Observation

Blaxter (2006), postulated that an observation is a method frequently used for case readings. This is a process whereby the author visits the company to investigate the flow of files, competence of the existing system and its methods of operations. It requires the author's capability to execute the job, since he or she is the one who know the points to be brought to observation and the ones to be indicated. The technique encompasses physical interaction and noticing how the subordinates will be handling their operations.

3.2.2.1 Advantage of Observations

- The research's results were less biased since the subordinates were not aware of what was taking place at the particular time. The researcher just pretended to be like a client and this had helped him to gain more information without being noticed.
- The results obtained by the researcher were much better than he had collected before. The researcher acted normal during the course of the observation some clients thought he was

a subordinate at MTB and some would go to the extent of sharing information thinking that he was client too.

- This procedure of conducting observations offered the researcher admission to some circumstances where the use of questionnaires and interviewers would not spread. The researcher even took note of the relationship between the clients and the organization.

3.2.2.2 Disadvantages of observation

- During the course of the process the researcher was not able to get the adequate information because sometimes human behavior was so unpredictable. The actions of the subordinates at that particular time were not constant so coming with the correct judgement was difficult.
- The scheduled time made by the author sometimes would clash with some activities because they were happening the usual times.

3.2.2.3 Findings from observations

A short roundup of the results acquired from use this data gathering technique:

- During the distribution of information across the departments some the data would go missing and this result in compiled reports being inaccurate leading to poor decisions.
- This process took four days and it might certainly not be known perhaps those days the process of the existing application was in a good condition, hindering the author to see some of the shortfalls.

3.2.3 Questionnaires

Popper (2004), indicated that these are kind of questions arranged in a manner that suites a certain section provided or set by the author. The questionnaire might include a number of alternatives where people would select accordingly. The alternatives on closed ended questionnaires were limited as to how many responses a person might offer, there could be yes or no responses and the kind of responses delivered cold be simply transformed into quantitative information.

3.2.3.2 Open- ended questionnaires

According to Johnson (2010), stated that open-ended questionnaire were kind of questions that needed responses above one word and they might be in various methods, some maybe a speech, sentence which can be a paragraph or a list. They were unlike form of the closed ended in a way

that they were not focused on one-word feedback questions. They required further clarification on a given question.

3.2.3.3 Advantages of questionnaires

- The researcher obtained more information about the existing system within a short time and it was very cost effective. Questionnaires were distributed to different sections of the organization and each person was given room at their own free time
- The researcher quickly and easily quantified the results of the questionnaires and it made possible for the researcher to compare and contrast other researches and he used to it to measure change.
- The researcher had no pressure since he was just distributing the questionnaires and people answered the questions and returned them on their own free will time.

Disadvantages of questionnaires

- The researcher had some challenges with those subordinates who had no idea about the existing system. The responses were vague and made it so difficult for the researcher to come up with a conclusion on those provided responses.
- The information which was obtained it was difficult to tell the degree of its accuracy since some of the responses tends to be more biased. The researcher had to make random selection of the questionnaires and it was tiresome and stressing.
- Some of the responses obtained by the research lacked conscientious responses because there is no way the respondent would have really done some thinking before answering the given questions.

3.2.3.5 Findings from Questionnaires

The researcher realized that most answers given were a little biased to the clients and most of them lack validity. The answers given clearly showed that the respondents are just answering without any concern of the existing application being asked about. Furthermore, some of the questionnaires showed that individuals had pure understanding about the existing application and this assisted the author so much since more reflection about the existing method of operations were given such as duplication of data and failure to communicate with the clients in real time. The researcher used a simple formula to calculate the respondent rate.

$$\frac{\text{Questionnaires returned}}{\text{Total number of questionnaires}} * 100$$

The rate of response per 15 questionnaires was: $12/15 * 100 = 80\%$

3.3 Analysis of the existing system

The author did an evaluation on the existing method of operation of the current system, and how the facilities or services of Management Training Bureau are controlled from the beginning to the completion. The system began with the client making an inquiry on the available reservations at the functions officer. The functions officer then makes discussion with the manager. The functions officer assigned the receptionist to attend the client. The client is showed the available rooms by the receptionist. This is conducted manually which means the receptionist will took the client to the physical place where the rooms sited. After all this has be done the receptionist would then name the price of each rooms. When the client is satisfied is required to fill in the registration form indicating the check in and check outs and the room will be reserved for that client.

3.3.1 Inputs

- Client details
- Payment details
- Room details

3.3.2 Processing

- Registering clients
- Attending to clients request
- Approving services request

3.3.3 Outputs

- Reservation forms
- Rooms
- Payments

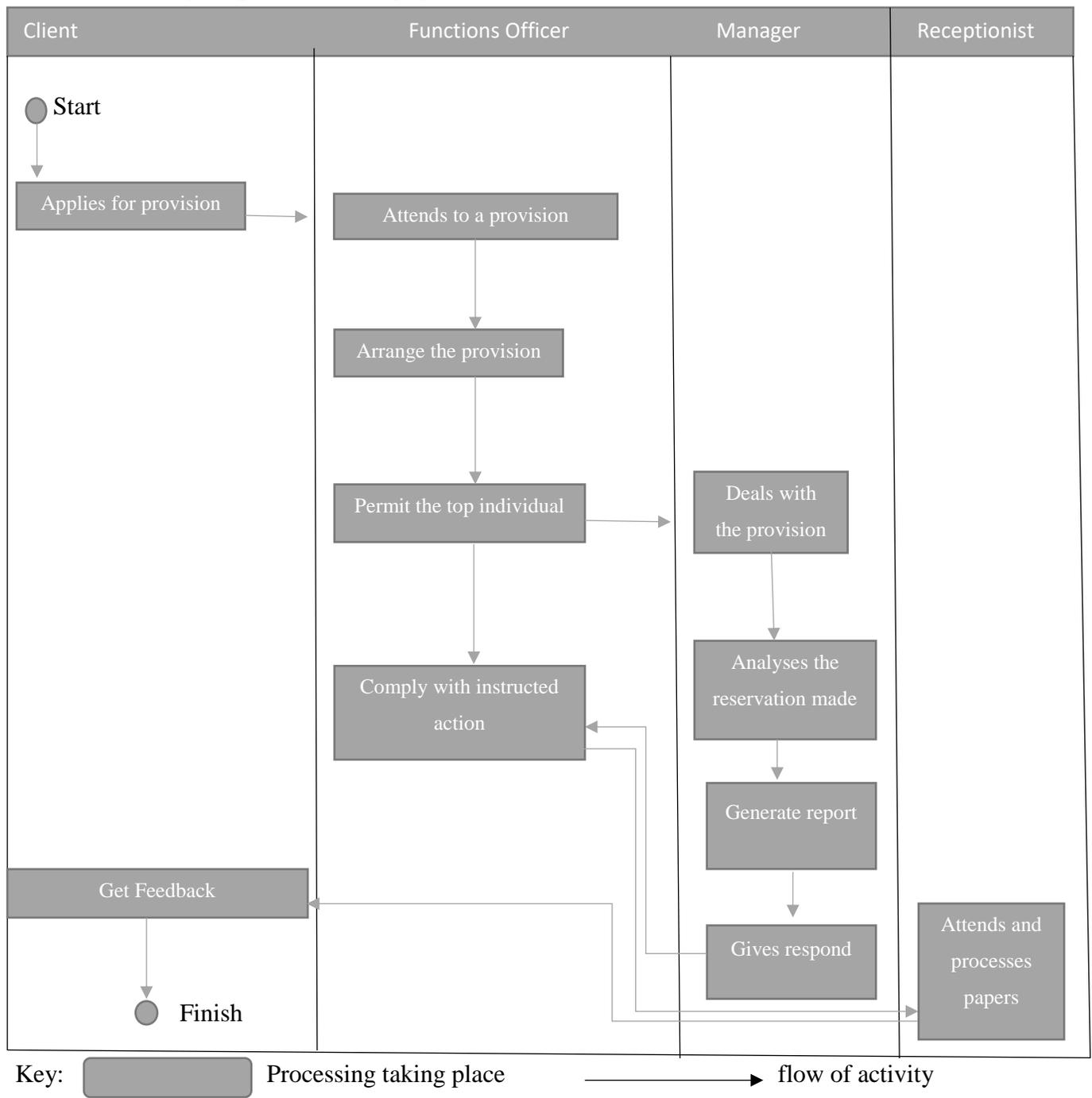
3.4 Process Analysis

Shelly (2012), propounded that process analysis is a sequential means of dividing the sequences of activities included in transferring the inputs, outputs and processes related with each stage during the system development process.

3.4.1 Activity diagram

According to Felicia (2004), an activity diagram is a cohesive forming verbal behavior diagram which shows objects' movement from one process to another pointing on the order and state of movement.

Table 3.1 Activity diagram of existing system

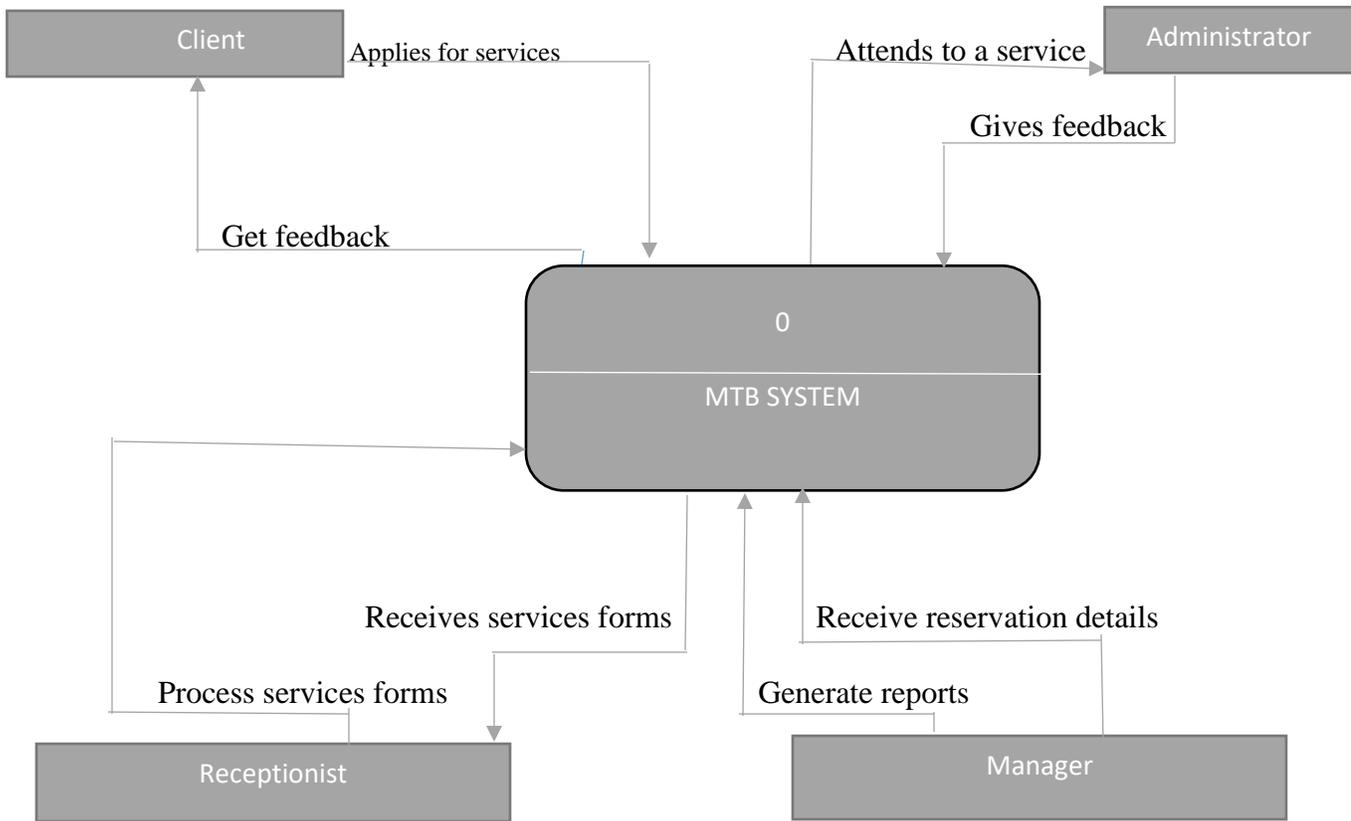


3.5 Data Analysis

Robinson (2004), propounds that data analysis is a procedure which includes the collection, arranging and organization of information in a method that makes it functional and valuable to the requirements needed. The evaluation was undertaken by making use of a context diagram and data flow diagram which made it simple to show the operations of the current system.

3.5.1 Context diagram

Scott (1999), explains that a context diagram is a demonstration indicating the movement of information through a data application and modelling its activities features. The mirror image of the extent to which the application communicates to its outside environment is defined. This is shown below:

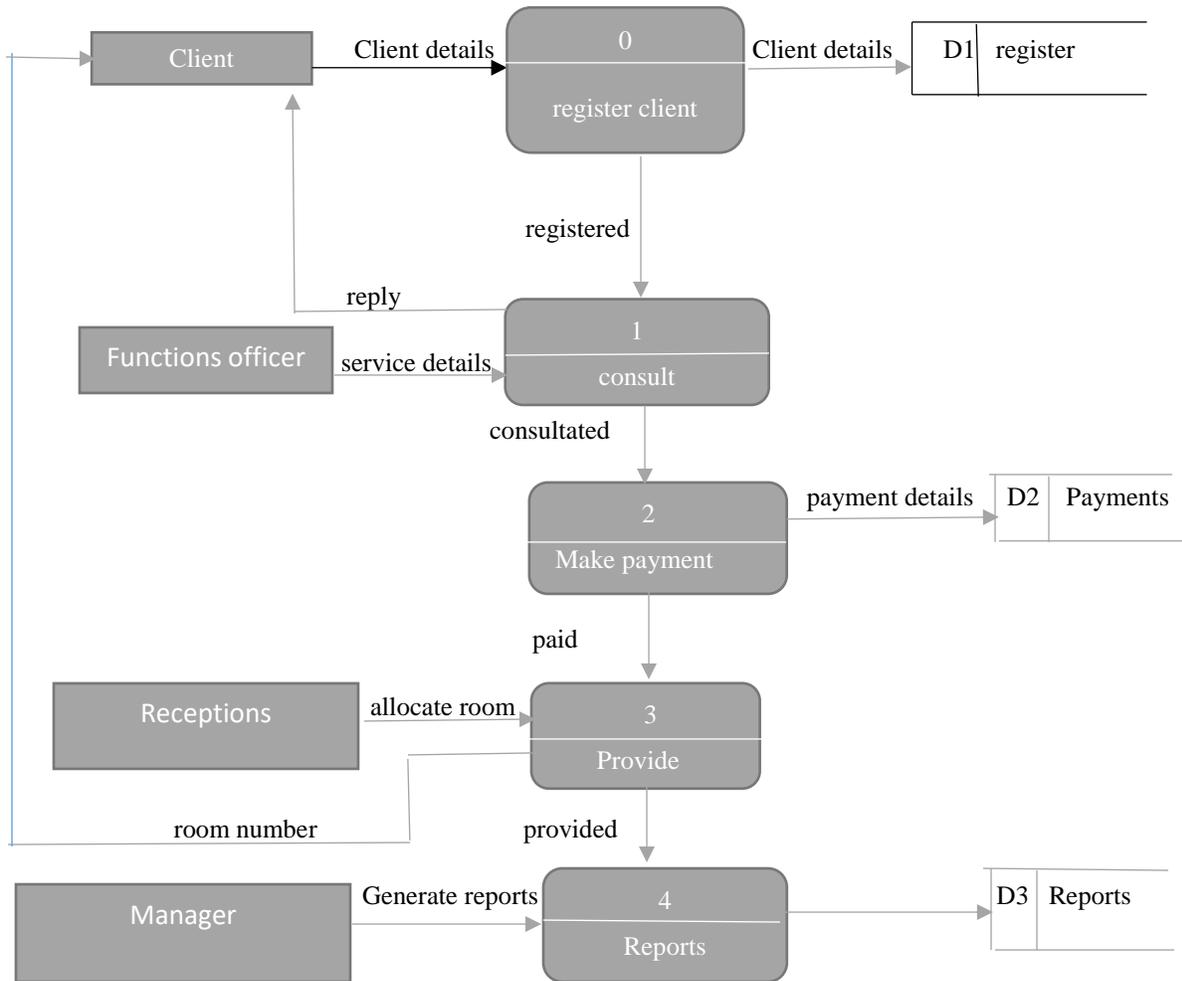


Key  = Entity  = data flow

Fig 3.1 Context diagram of existing diagram

3.5.2 Data flow Diagram of the existing system

Chowdory (2005), stated that a data flow illustration denotes to a graphical picture of the system elements processes and the flow of data in the system. It was used to visibly indicate the functionality of the application being signified.



Key

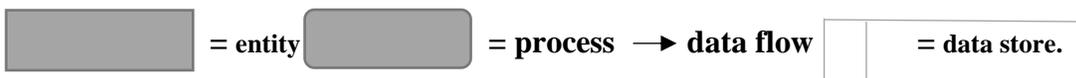


Fig 3.2 Data flow of existing diagram

3.6 Weaknesses of the current system

- It did not permitted customers real time admission to vital data about their facilities
- Too much duplication since the customer had to go through many stages
- The system did not supported fast response since sometimes it needed physical presence of a customer
- Generation of reports was manually done leading to errors.

3.6.1 Strengths of the existing system

Where they were only weakness found, it could be never be a way of operation, during the investigation the author discovered there were also strength associated with the current system. It enabled the clients to get further clarification on the services they would require, the activity of having a customer passing through many stages during service delivery enabled some kind of confirmation of given data.

3.7 Evaluation techniques

The researcher searched for the best method of developing the proposed system through the use of information gathered using various methods. The researcher presented the results to the management. It would be the decision of management to decide whether to develop the system on their own which is presently used or they would hire expertise for them to develop the system thus outsourcing.

3.7.1 Outsourcing

Hirschleim (2007) describes outsourcing as an exercise used by organizations whereby they consult outside companies to handle section or every aspect of their projects. It is a scenario where the business intends to give a task to external parties instead of handling it on their own.

3.7.1.1 Merits of Outsourcing

- The researcher noted that it was operative and cost saving plan if it was properly applied.
- Risk was shared since the company would have given an external part to create the system for them
- The firm would have more time to concentrate on their core business,

- It provided efficiency, competitive advantage and also high quality software since the developer has high levels of great expertise

3.7.1.2 Demerits of outsourcing

- The author discovered it was expensive and quite hard to maintain as time progresses
- Through this method MTB privacy information could be exposed since the system developer might gain access to it
- Challenges might be experienced to suite various changes on external software

3.7.2 Improvement of the current system

Management Training Bureau could select to eliminate the challenges that the current application has and thereby attempting to expand it. This would refer to an upgrade of the system from the way it was currently operating to a better way of operating. This could be enhanced through recruiting some subordinates who would assist in the procedure of service distribution and it could be fulfilled by eliminating many tasks on subordinates.

3.7.2.1 Merits of improving the existing system

- Very inexpensive in the long run in terms of maintainance since it would be catered for by the inside staff
- The business procedures and policies rarely changed due to no interference of the third part
- Subordinates would carry on working on the same way they are used to.

3.7.2.2 Demerits of improving the current system

- There would be requirement to hire new subordinates which might be too expensive
- The existing system was actually time wasting and sometimes it would never change after improvement
- Improvement did not guaranteed an improvement on decision making since the same old style will be still be used.

3.7.3 In house development

According Stover (2012), in-house development is when a firm make use of the internal stakeholders to develop their software. It included putting together financial resources as well as making use of the inside experts who designed the system that met the user requirements. There should be a project coordinator from the IT department and would be accountable for

each and every aspect. He would be also controlling the flow of the activities that would be going in the system development process. At the end of the development process they would be project's documentation and user manual as they will be used for references.

3.7.3.1 Merits of in house development

- It offers better advantage to the subordinates to use the application as they would be offered some models in the development process
- Company information is much secured since the internal user would be the only ones using it
- There is exhaustive removal of the current system challenges

3.7.3.2 Demerits of in house development

- Lack of expertise from the internal stakeholders to bring up complicated application
- There might be financial limits within the project development
- It could take a period to develop the system since the workers would be having some tasks to tackle.

Table 3.2 Analysis Table

Alternatives	Summarized Costs
In house development	10 000
Outsourcing software	15 000
Improving the current system	12 000

3.7.4 Conclusion of the analysis

There was a cautious evaluation of the choses and the managers of Management Training Bureau saw it valuable to create their software by means of the in-house development technique. There are major reasons mainly concerning the security of their information, they did not want it to be exposed to third part.

3.8 Requirements Analysis

Robertson (2012), defined Requirement analysis as a stage that is conducted to understand the user requirements and anticipations from the system they want. It was also a well demarcated stage in SDLC. The requirement analysis phase of the proposed application could be determined by considering the user's requirements and anticipations of the application. It was perceived as a

portrayal of how an application must act or an explanation of application elements. It covered a difficult task of producing and authenticating the need of all the users. It took into consideration the evaluation of the realism of the proposed application.

3.8.1 Functional Requirements

Davis (1990), propounded that the functional requirements explains a set of same features which involves inputs, processes, outputs and the information required for the gratification of application aims. It also indicated the key system's functionality and also considers the requirement in terms of handling of information, technicality and also the proposed limitations. The suggested systems functional requirements are as follows;

- The application should have a security mechanism in a way no intruder could access it.
- The system should allow functions manager to come up with comprehensive, precise decisions since the reports will be produced instantly.
- Customers should be able to view the accommodation available and current prices
- Clients should be able to make calls and send instant messages

3.8.1.1 Use of case diagrams

Pilone (2005), propounded that the case diagram is a transparent presentation which portrays the collaboration of the objects in the system and stipulating each objects role. The use case diagram is shown on the next page for Management Training Bureau system

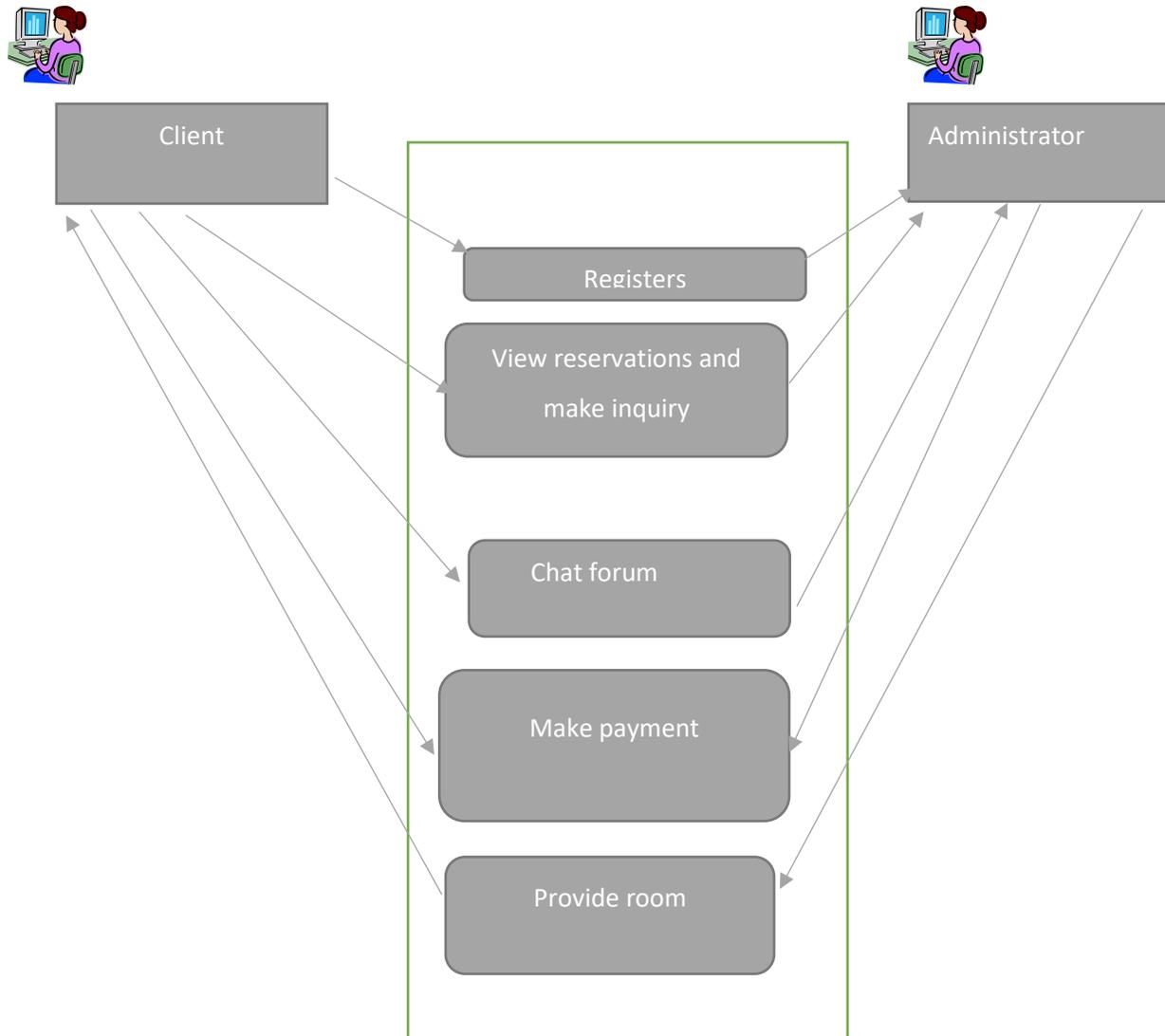


Fig 3.3 MTB use case diagram

3.8.2 Non-Functional Requirements

Spence (2003), indicated that non- functional requirements seeks to explain the attributes and qualities of the suggested application. They put some limitations on the system being created. They are limitations that propounds the competences of the application with relative to its presentation in terms of safety, response time, ease of use and reliability. The following are the non-functional requirements linked with the suggested application.

- User friendly- It should be friendly and easy to work with.
- Professional interface- The core interface must be easy to interpret
- Error handling- It should give a space for error retrieval

- Response time- The system should be fast to respond to the queries.
- Ease of use- It should not be unclear, it must be simple to control
- Security- The system must provide a robust security mechanism to cater for privacy information

3.8.2.1 Constraints

- Adequate Funds- The funds could fail to sustain the completion of the project due to under estimations.
- Costs- Management Training Bureau could fail to meet the costs associated with system development
- Time Frame- Due to some hindrances or delays the project might fail to be completed within a specified time

3.9 Conclusion

The chapter provided a highpoint on the descriptive opinion of the current application and after an in depth evaluation of the existing application and consideration of all the likely choices has been taken into account, also an application of all processes and functionality of the existing application has been debated and the conclusion was to develop a new system. The next phase was therefore going to look at designing of the proposed application.

CHAPTER FOUR: DESIGN PHASE

4.1 Introduction

The phase concentrated on the designing and development of the suggested application. The suggested application should meet the objectives mentioned in the first chapter of the document. The phase indicated the lifecycle of the system from the development to the deployment of it. In short the phase showed the various designs involved which are architectural, physical, database, program, and the interface design.

4.2 System design

According to Eppinger (2000), system design is a technique of describing the architecture elements, components, interfaces and information application to gratify stated requirements. It involved all the items aligned with the proposed system responded to a question of 'how the suggested system was going to work. A well planned system tried to meet the following; effectiveness, consistency, competence, safety and maintainance.

Effectiveness

It referred to the extent to which a system could be anticipated to meet its objectives within a certain environment. System effectiveness was the utility of system convenience, ability, and reliability. Convenience referred to the probability that a system would function as needed when required during a time of a task. It involved non-operational times engaged with reliability, maintainance and logistics. System reliability referred to the probability that a system involving all hardware, firmware and software would adequately do the task for which it was intended for a specified time and in specified environment.

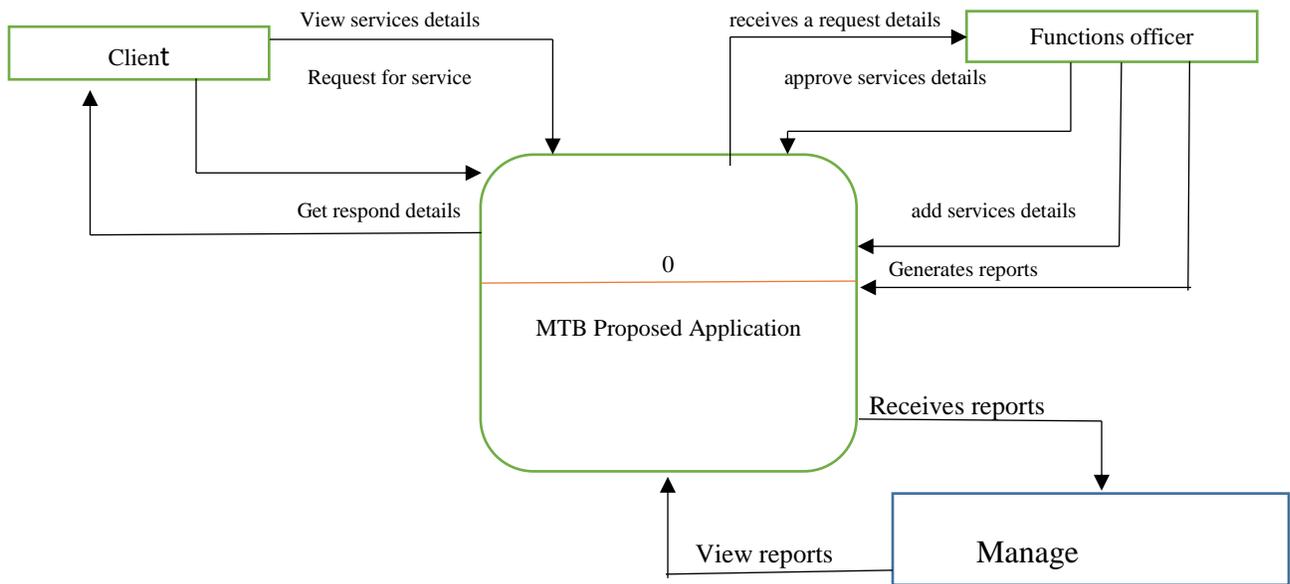
Security

It was the fundamental mechanism required on the proposed system. Security would help in safeguarding the confidential information that was stored or transmitted by the system requires an in depth knowledge of cryptography techniques. Normalization procedures smeared to relational database management system should be enforced by correctly designed referential integrity constraints.

The system had three entities the client, administrator and manager. On the client side, the client would check on the services available if he or she is interested would then book provided that the requested service is available. If the client was not registered the system would prohibit the client from making a reservation. The client should register first to login in the system. After the client completed the registration process he or she would be able to make reservations and chats with the system administrator. The functions manager was responsible for updating the services and responding to the queries of the customers. Also the functions manager was the one who approved or disapproved reservations. The manager would check on the progress of the reservations by viewing the generated reports.

4.2.1 Context diagram of proposed application

It is the demarcation between the application or a section of an application and its atmosphere, indicating entities that interacts with it. The context diagram is a high view of an application. It is more similar to a block diagram. Below is an illustrated context diagram of the proposed system.



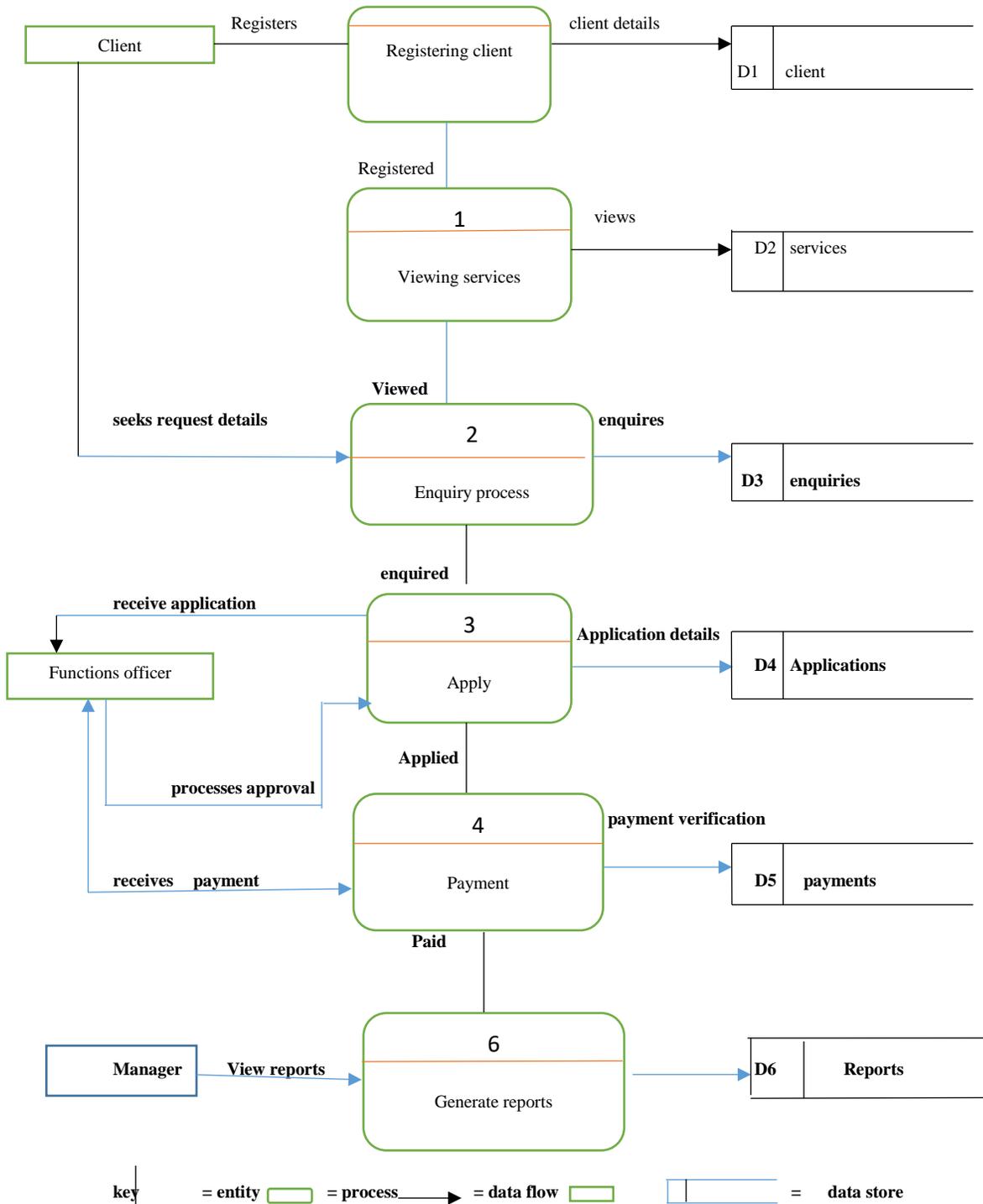


Fig 4.2 Data flow diagram

4.3 Architectural design

Sommerville (2007), pointed out that the architectural design concentrated on the components of an application and brings them together into intelligible and operational entire, as per specific approach in accomplishing goals under the provided limitations. The architectural model was subjected to software quality review like any other design work products. Architectural design would comprise of the client server approach and the company server as well.

4.3.1 Client server approach

Pilone (2005), postulated that it was an effort which tend to show the communication which occurred between the client and the server. Furthermore, the database acted as server which implied that each and every query that is made by the client would be acted upon through the use of the database hence defining this kind of the approach, as illustrated below:

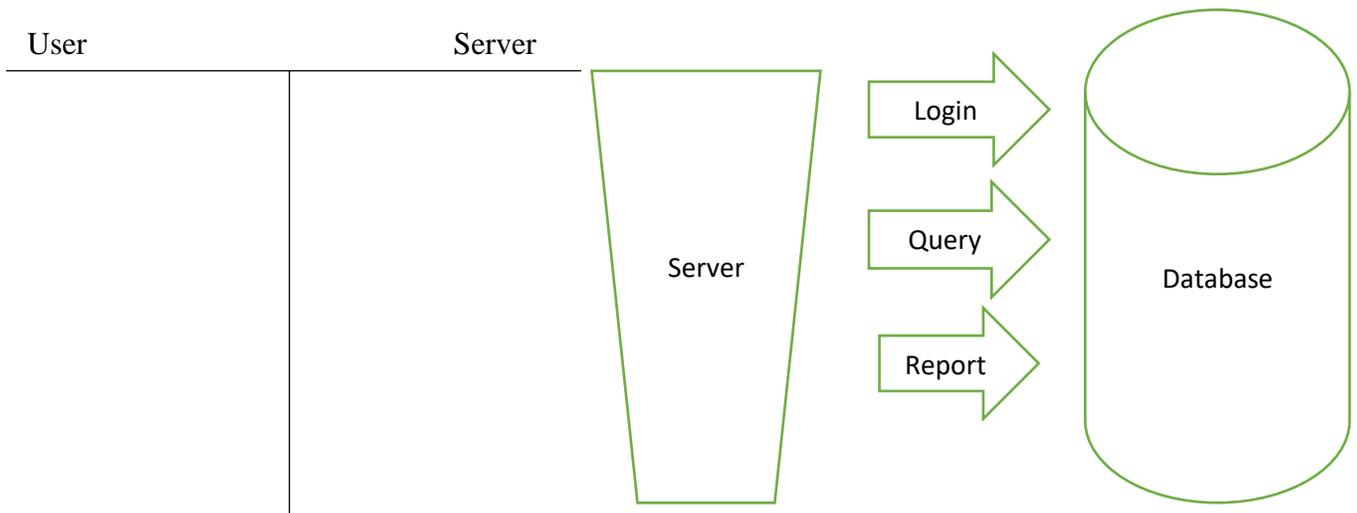


Fig 4.3 Architectural Design

4.4 Physical design

It was the conversion of organization needs into a structure prototype that represented specialized implantation of operators' firm's needs. It indicated the arrangement of the hardware and software and their interaction. The physical design clearly indicated the hardware platform of the proposed system. In order for the system to work correctly configurations should be corrected. The diagram on the next page clearly indicated the whole physical and setup of the suggested system. A system server would be made up of the database installed on the server. Firewall acted as a security

mechanism to prevent the viruses from being downloaded from the server side.

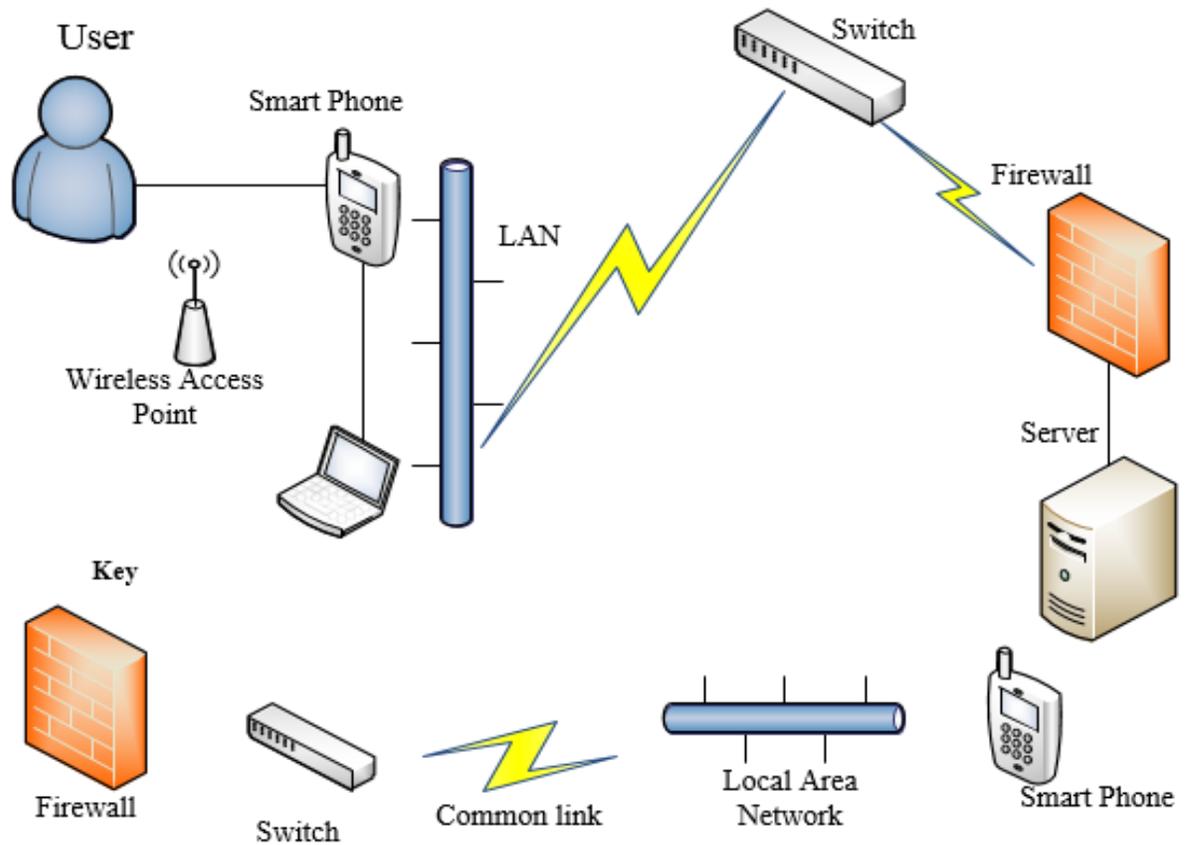


Fig 4.4 Proposed physical design

4.5 Database design

Crockett (2008), stated that database design included the creation of information components and the way they would be denoted in the database. An understood information prototype of a database was created. The database captured the needed visible and rational design substitutes and capacity constraints that are required to make an outline in an information meaning dialect.

4.5.1 Database architecture

The Ansi-sparc architecture comprised of three levels which are exterior, reasonable and interior. Database created a view depending on what the operators requested like in this scenario the clients and function manager they had views which are different. The conceptual level also known as the collective viewpoint. All information captured in the database and the interactions between information was completely portrayed at this stage. The coherent structure of the entire database

was contained here. Ultimately internal level defined data stored at this level. It represented the physical layer.

The reason why the database management system was used is because it minimized the duplication of files as they are integrated. Also the security mechanism of the database is advanced since it was enhanced with the use of encrypted passwords and the administrator was the independent person to had access to all the confidential information of the business organization. Below the Ansi-sparc architecture of the database.

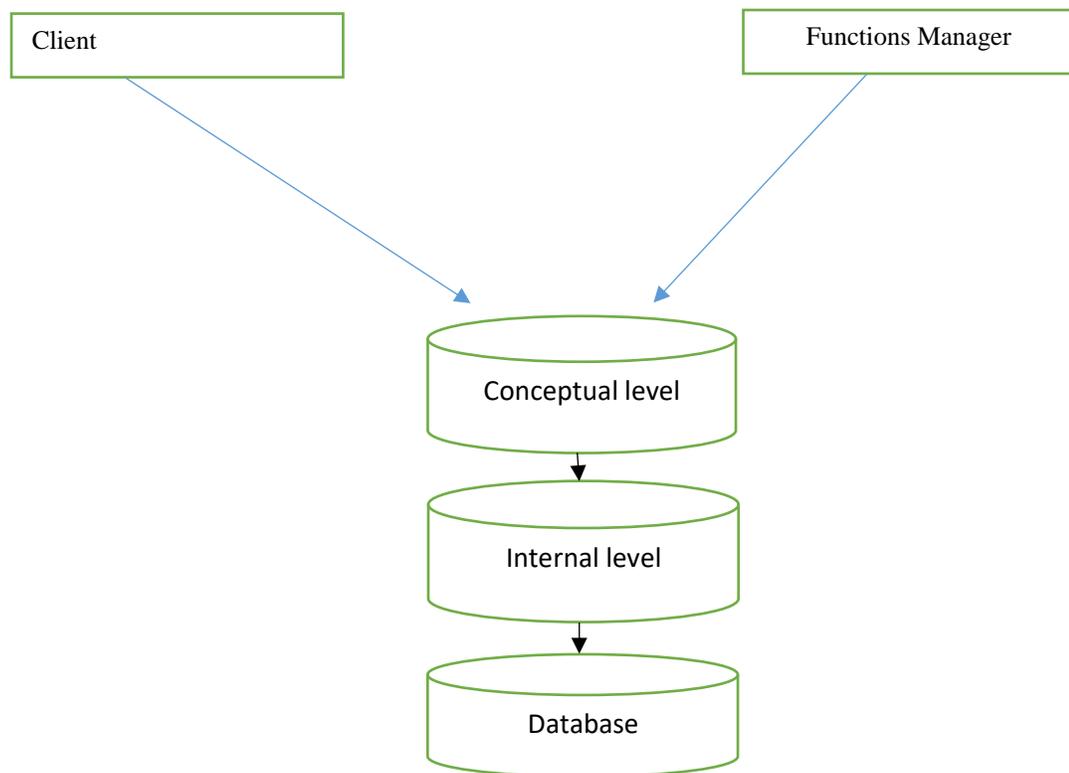


Fig 4.5 System database architecture

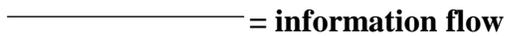
4.5.2 Data modelling

Krugman (2005), stated that data modelling is a method whereby evaluation and describing of the required to sustenance activities of the firms with the objective of aligning the firm information system. The concepts of data modeling was clearly stated with entity relationship and enhanced entity relationship diagram.

4.5.2.1 Entity relational diagram

Wiley (2010), stretched out a point that, it is a modified detailed outline which purposes to exemplify the association between the several objects in a database. The kinds of graphics utilized images to signify the several kinds of data. Objects are denoted by rhombuses and attributes are ordinarily denoted by elliptical forms. The entity relationship diagram was shown below:

Key



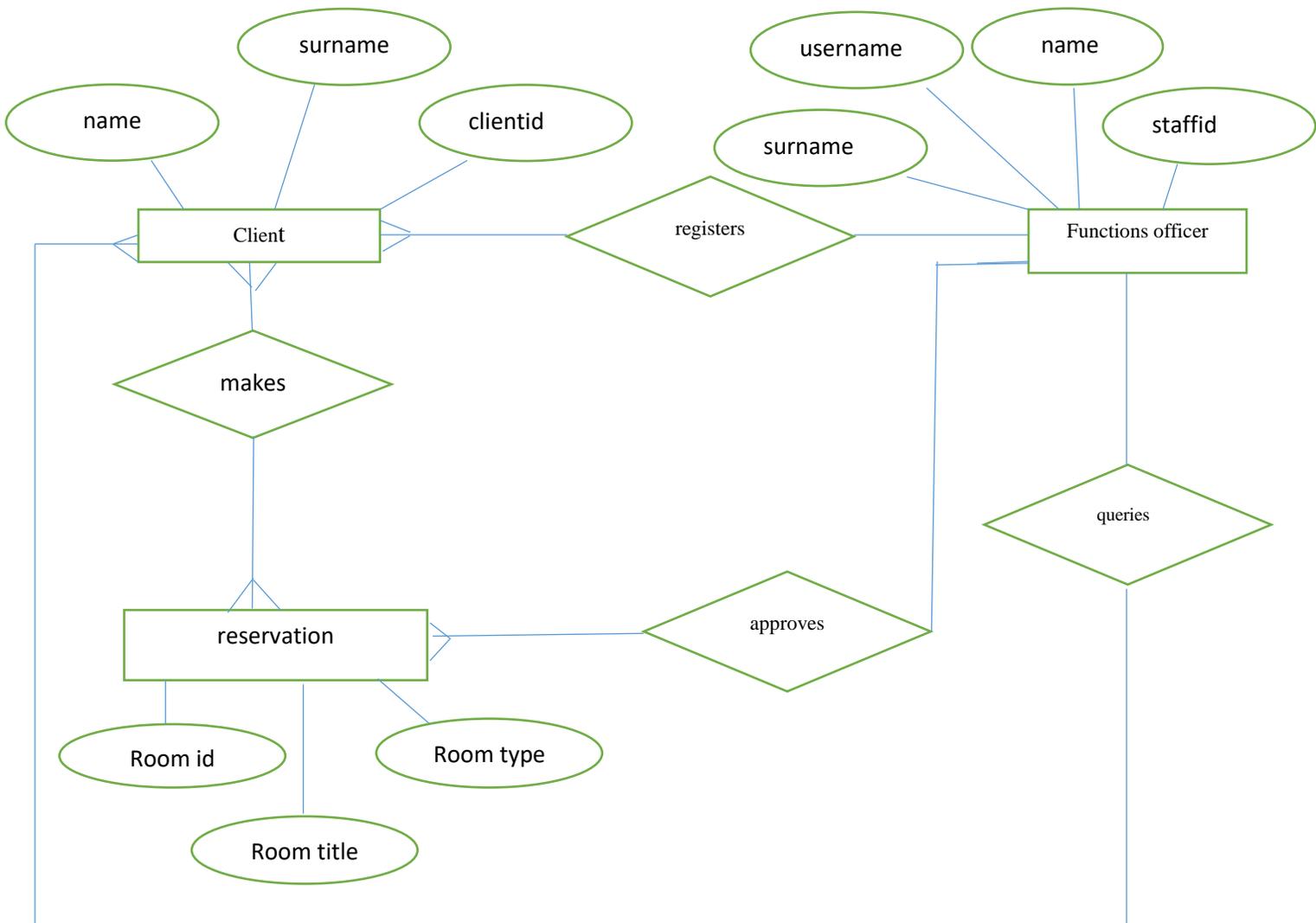


Fig 4.6 Entity Diagram

4.5.2.2 Tables representing application database

Client registration table

The client registration table mainly kept the information of clients who had been registered with Management Training Bureau

Table 4.1 Client registration

Title	Length	Datatype
Client email	3	Alphanumeric
Name	10	String
Surname	12	String

Chat information table

This was designed to make communication between the clients and function manager over the application

Table 4.2 Chat Table

Date	Username	Designation	To	From	Message
Date	Varchar(20)	Varchar(15)	Varchar(10)	Varchar	Text

4.5.2.3 Enhanced entity relationship diagram

Was a high level data ideal that joined the extensions to the original entity relation model? It was a diagrammatic technique for displaying the following concepts such as sub class and super class, specialization and the generalization



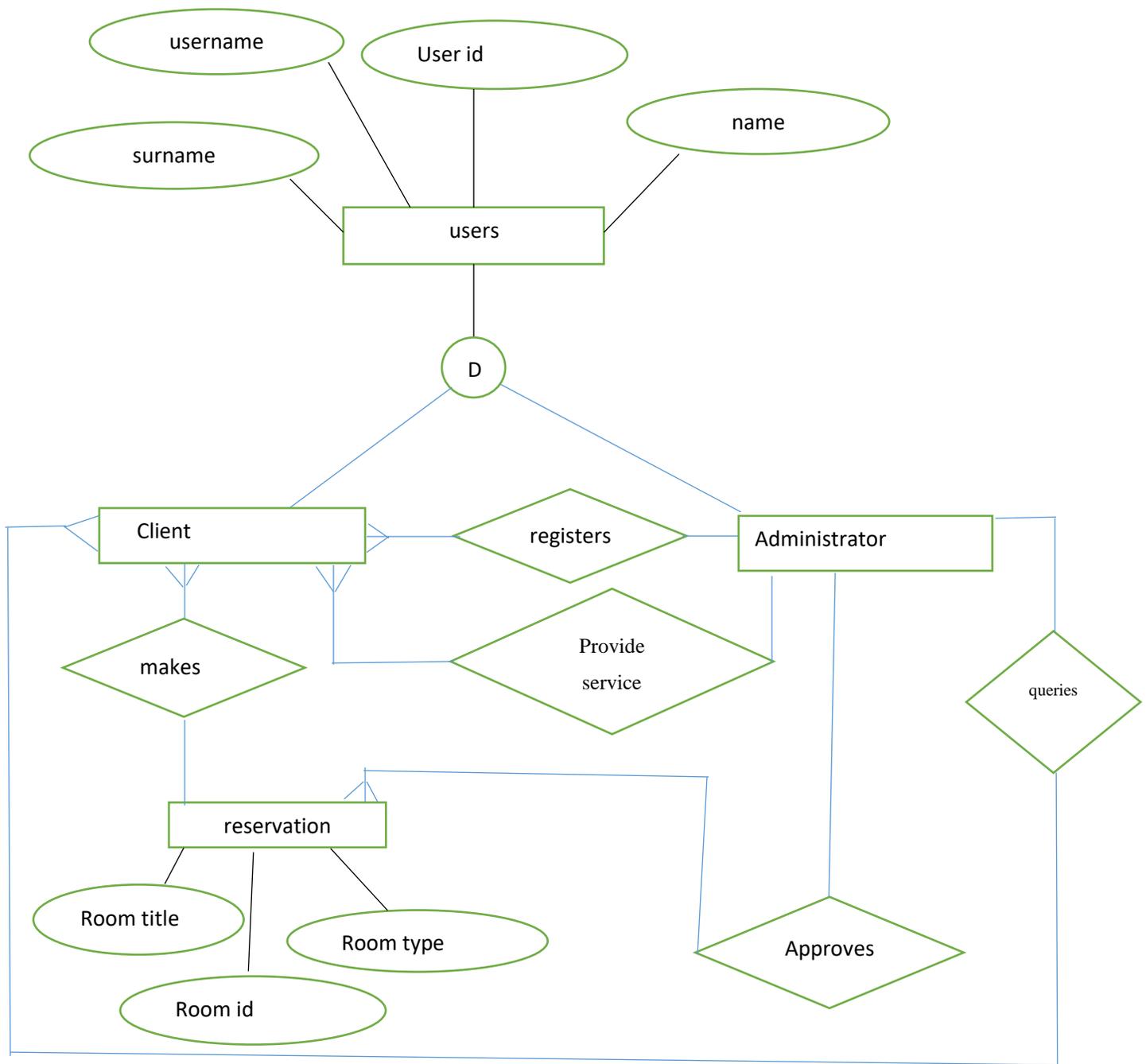


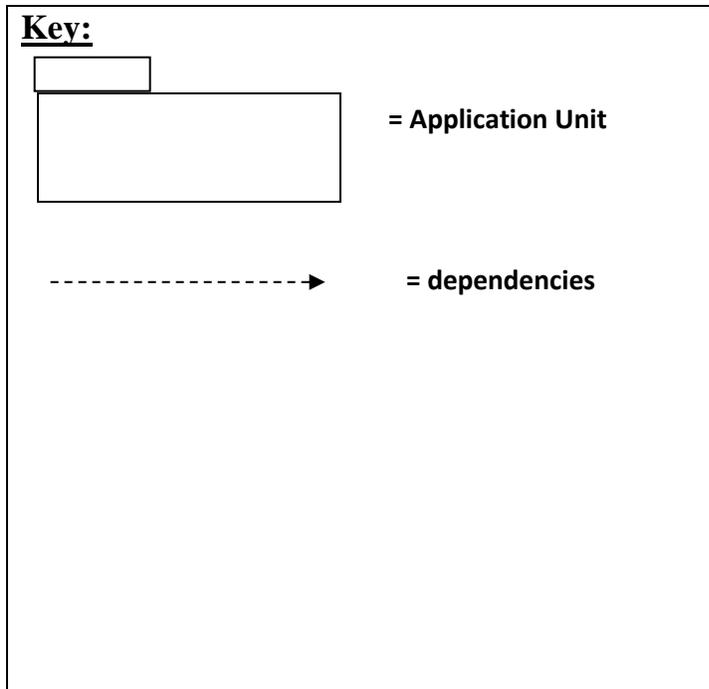
Fig 4.7 Enhanced entity relation

4.6 Program design

It was a process for creating and writing procedures and methods in code, it was more similar to pseudocode. It was put down in clear language short of any terms that could propose the use of any coding language

4.6.1 Package diagram

Keyes (2002), postulated it is a structure diagram which indicates bundles and conditions between the bundles. Package was namespace used to gather together components that are descriptive interrelated and might strongly alter together. Diagram can be used as a representation to break down a major problem into simplicity illustration



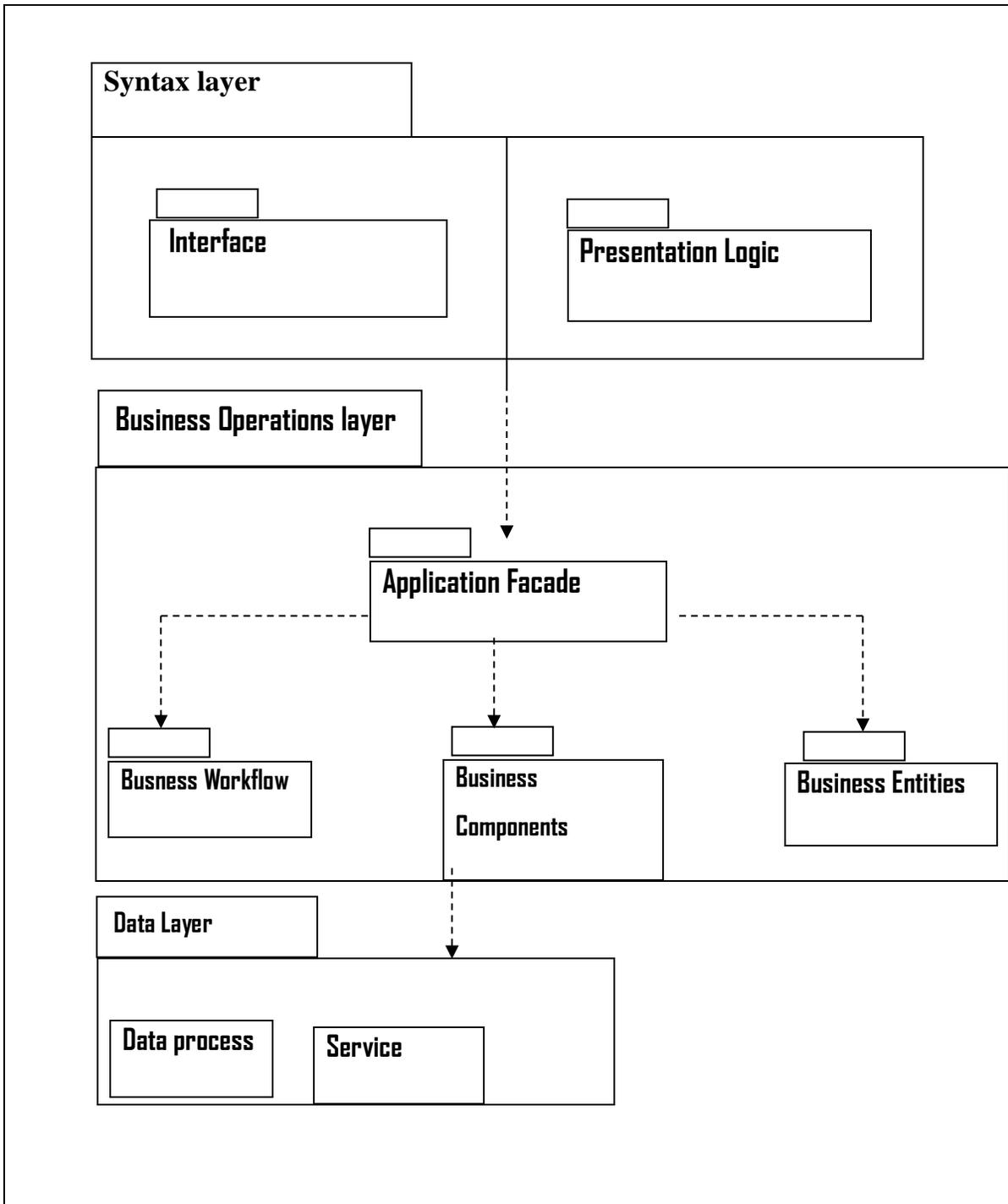


Fig 4.8 Package Diagram

4.6.2 Class diagram

It was a constant illustration that highlighted the construction of the application by indicating the application category, their components, procedures and the relationship among the components. It was the key building block of the object oriented programming.

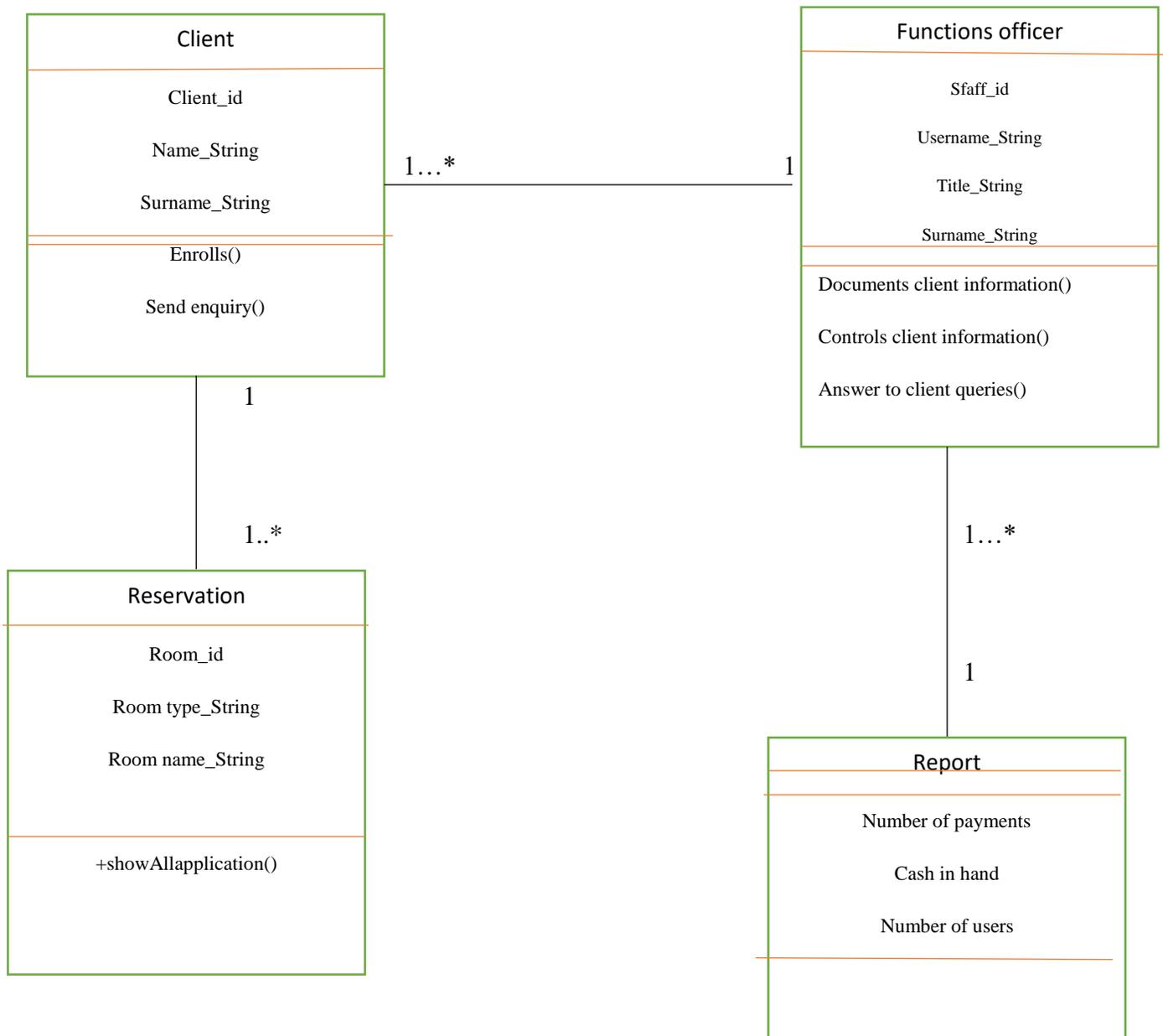


Fig 4.9 Class diagram

4.6.4 Sequence diagram

Shelly (2005), mentioned that sequence diagram is a collaboration outline that highlights how components function together and in what arrangement. It represented the objects and classes needed in the at that particular time and the arrangement of messages exchanged between the objects anticipated to be effectiveness at that particular time.

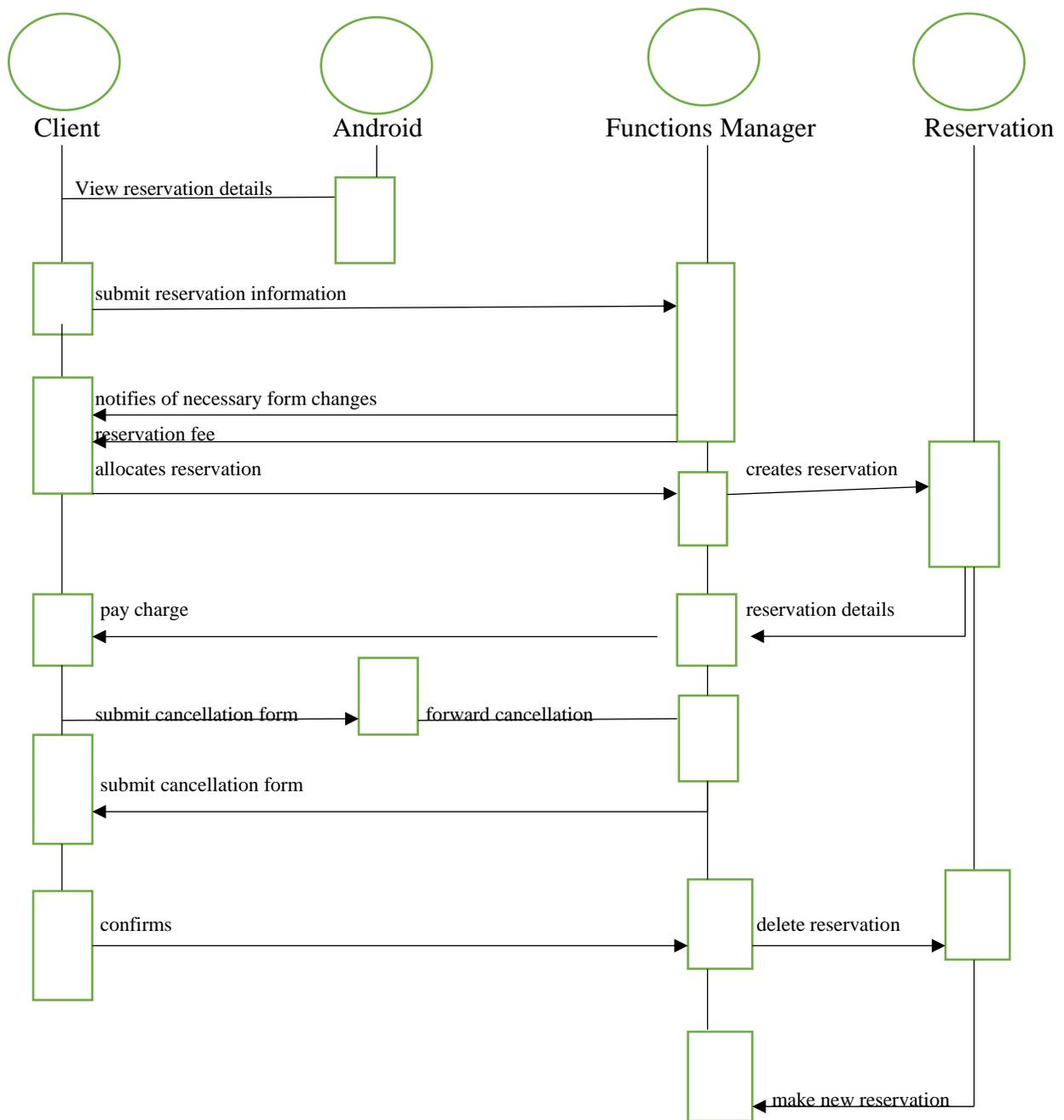


Fig 4.10 Sequence diagram

4.7 Interface design

Kendall (1992), postulated that interface design emphasized on forecasting what users might require to do and enhancing that the interface had components that are simple to retrieve, comprehend and use to ease those actions. It brought together concept from interaction design,

visual design and data architecture. It involved elements such as input controls, information components and navigational components.

4.7.1 Main menu

The main menu it showed the home page of the organization android application after the user installed and created the account. The main menu was characterized with the navigation bar and quick access button. The navigation bar aid visitors or clients in accessing the organization information. The quick access button when clicked it redirected the user to submenus. The main menu of Management training bureau is illustrated below:

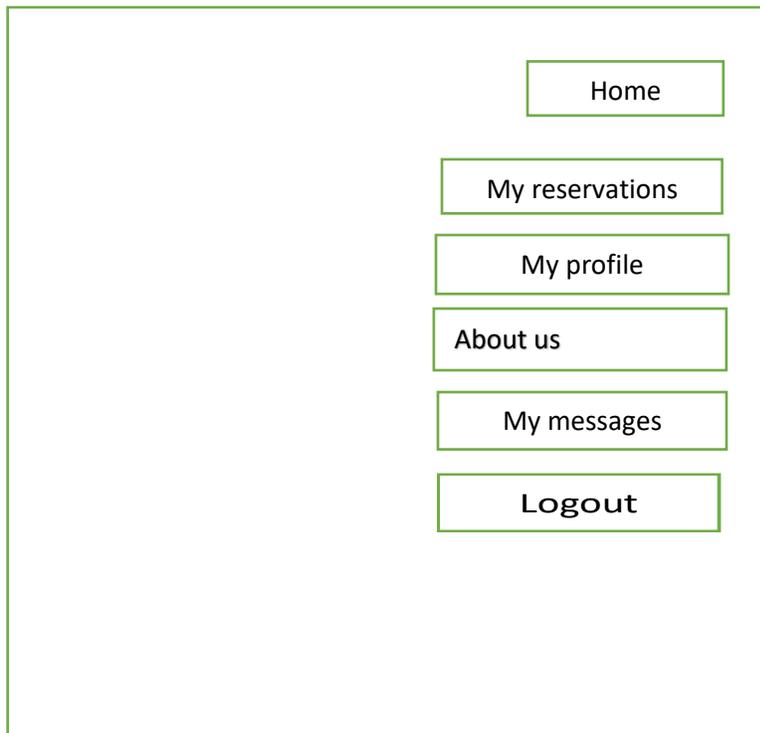


Fig 4.11 Main menu

4.7.1.1 Sub menus

A submenu was a derivative menu driven dependent on top level menu in a drawn user interface application. Sub menus are invisible from a start screen or homepage. They appear when the user was redirected to another page.

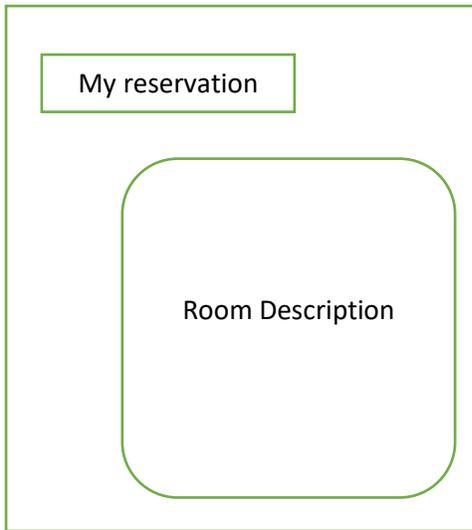


Fig 4.12 Rooms

The submenu appeared when the user click on rooms. It showed the rooms available and their prices as well. On the submenu the user was given two options either to make a payment or make service request.

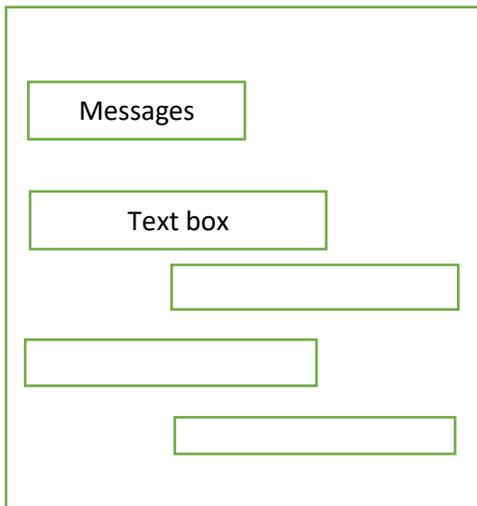


Fig 4.13 Messages

The menu would pop out when the user click on messages. He/she will be redirected to the chat facility.

4.7.2 Input design

It was the connection linking the data application and user. It included creating identification and policy for data provision and those measures are crucial to place transactional data into a working form for processing can be attained by investigating the computer to read data from the document

that is written. It concentrated on monitoring the sum of input needed, monitoring the faults, evading delay and further steps and keeping the process easy. The key users of the system would be the client, functions manager. The input design forms will be created in the following manner:

Client form

The form underneath filled in as the stage utilized by the administrator to include customer related subtle elements for the firm

Client form

Email Address	<input type="text"/>
Username	<input type="text"/>
Password	<input type="text"/>
Address	<input type="text"/>
Phone number	<input type="text"/>
Id_number	<input type="text"/>

Fig 4.14 Clients interface

Checking platform

The form will be filled by the user given details specifying the number of days is intended to stay

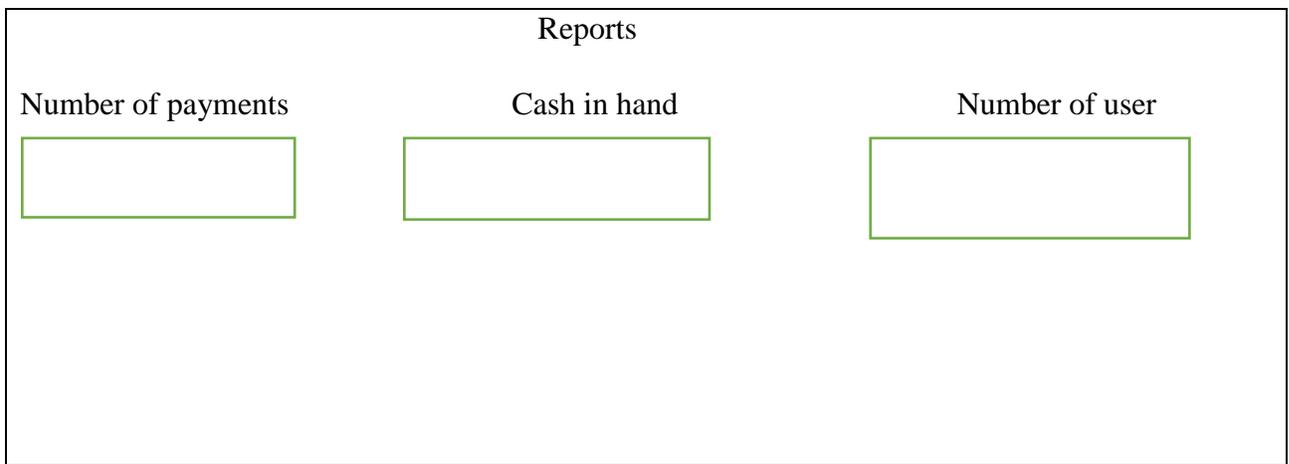
Check in date	<input type="text"/>
Days to be spent	<input type="text"/>

4.7.3 Output design

Shows how handled information is seen after it is asked for from the application. In this manner results from configurations are basics considering covered inborn information to be highlighted for arrangement and data purposes.

Report generation interface

The form on the below showed how reports are created. The reports are generated in real time every activity occurred will instantly appear on the reports.

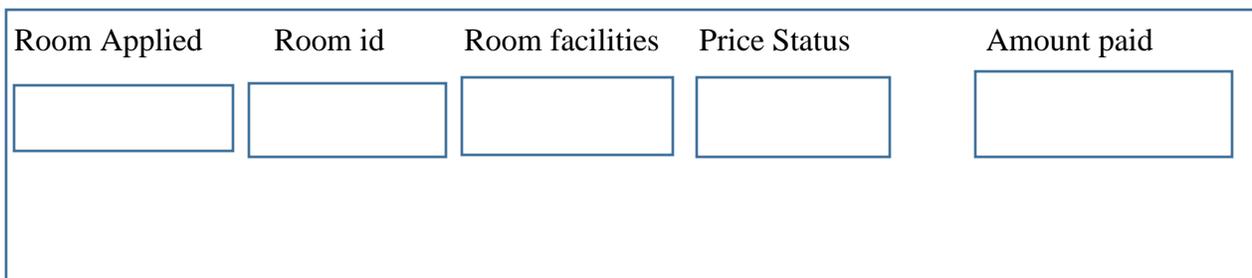


The diagram shows a rectangular box titled "Reports" at the top center. Inside the box, there are three labels: "Number of payments" on the left, "Cash in hand" in the center, and "Number of user" on the right. Below each label is a rectangular input field with a green border.

Fig 4.15 Report Interface

Payment approval interface

The form on the next page indicated the payment approval form interface that is created when the user has made the payments



The diagram shows a rectangular box containing five labels in a row: "Room Applied", "Room id", "Room facilities", "Price Status", and "Amount paid". Below each label is a rectangular input field with a blue border.

Fig 4.16 Payment Approval interface

4.8 Pseudo code

Logging into the System

Begin:

Open MTB android app

Input username and password

If correct Then

Login

Else

Message Box Indicates “Invalid login”

Return()

User addition

Fill in all details required

Click save

All filled information get authenticated

If details are correct

Then

Query performed

Save record to database

Disconnect connection

Show approval message

Else

Query cannot be executed

Return 0;

Reservation Addition

Fill in all details required

Click save

All filled information get authenticated

If details are correct

Then

Reservation successfully added

Else

Enter all fields.

Viewing services

Click on services

Tap on any service

Then

Get result

Report Generation

Click on reports

Values get validated

Then

Get result

Return 0;

}

4.9 Security design

According to Godfrey (1999), security design is a methodology to software and hardware creation that pursues to create applications as free of weaknesses and resistant from malicious attacks through such actions as endless testing, verification protections.

4.9.1 Physical security

It alluded to the parts of computer security that needed to do with the physical component of the machine itself, the machine working condition, and how much the machine is shielded from equipment level trade off. This physical security includes guards, fences, lighting and property controls.

4.9.2 Network security

It was the way towards taking visible and coding deterrent actions to protect the fundamental application from unapproved get to, abuse, glitch, change, or demolition, accordingly making a controlled platform for computers, clients and users to do their permitted basic transactions inside a safe environments. The network security for MTB consists of passwords and username as indicated on the next page.

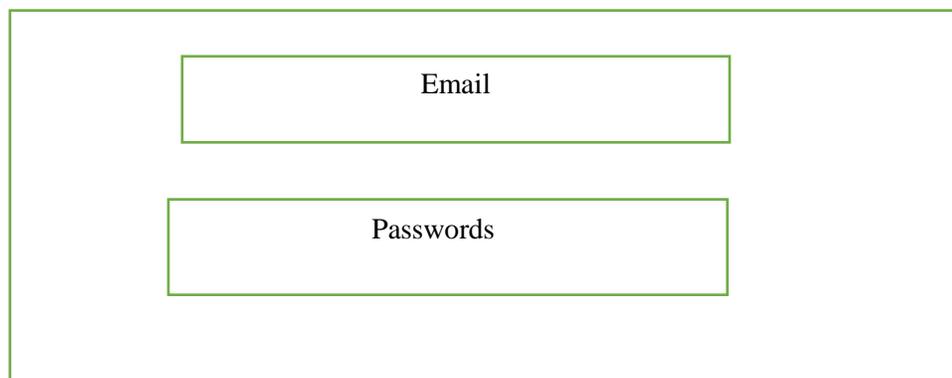


Fig 4.16 Network security

4.9.3 Operational security

It was an important component in creating security mechanism to protect sensitive data and reserve essential secrecy. IT consisted five processes starting with identifying the critical information and on the last stage applying the appropriate operational security. The designed system would go through out all the processes. This is shown on the fig below:

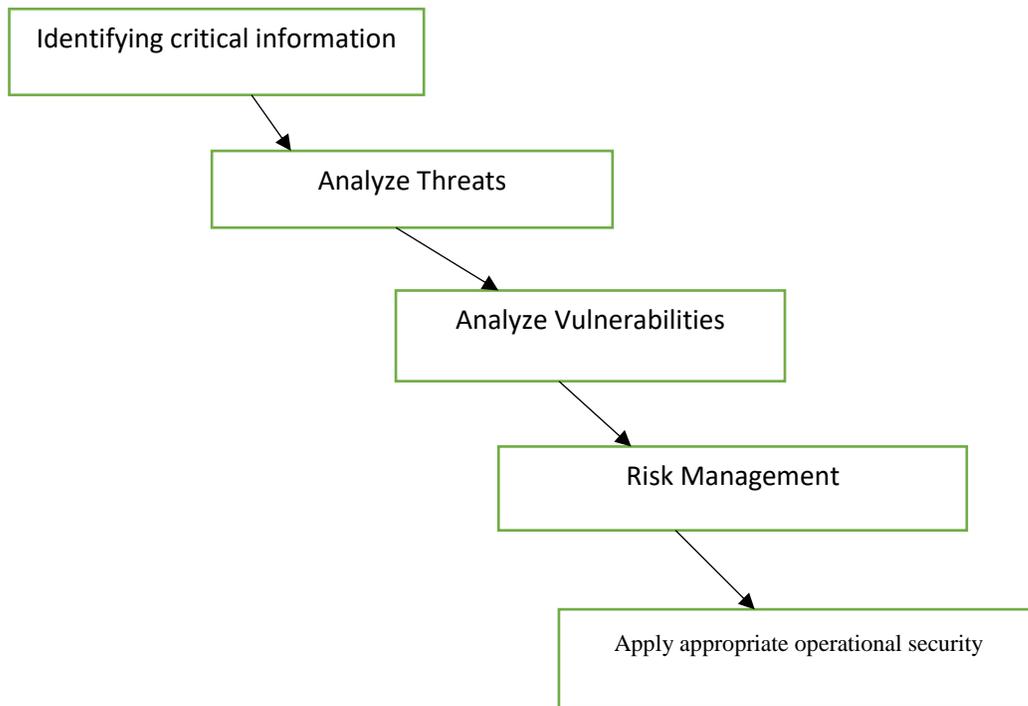


Fig 4.17 Operational security

4.10 Conclusion

The design stage showed the method the new application to be created, configured and installed and also highlighted how the application would function in a real environment. The design stage helped in the creation of user friendly application which operators find simple to comprehend and work with

CHAPTER FIVE: IMPLEMENTATION STAGE

5.1 Introduction

The stage demonstrated every one of the procedures connected with the execution of the recommended application. The stage was done after a point by point assessment of the application's usefulness. Application implementation was a strategy of ensuring that, the application was furnished to the customer with all the necessities required (Coronel 2014). A few examinations were accomplished on every single of the segments of the application and distinctive parts were assessed independently making foundation of their interfaces. This was altogether done to decide the application skills and confinements.

5.2 Coding

Smith (2005) postulated that the coding stage is done for changing over the plan of the application arranged among the outline stage onto the code in a programming language, which executes according to plan necessities and is executable by a computer. Coding part was the foundation of the application since every one of the operations and functionalities of the segments are dictated by the program. The blend of the application components and furthermore connection to database was done via code.

5.3 System Testing

The way towards playing out an assortment of tests on an application to explore usefulness or to distinguished issues. Dustin (2002) stated that application testing was generally required prior and then afterward an application was set up. A progression of precise methods are alluded to while testing was being performed.

5.3.1 Unit testing

According to Stair (2013), unit testing is unit testing is a product advancement process in which the littlest testable parts of an application, called units, are exclusively and autonomously investigated for appropriate operation. Unit testing should be possible physically yet was frequently automated. The author made use of the following strategies.

5.3.1.1 Black box testing

Beizer (1995) stated that black boxing testing was a method for software testing that examines the effectiveness of a system deprived of peering into its internal design or workings. This method for test could be linked for all aims and reasons to respectively stage of software testing: unit, incorporation and application. The diagram on below shows black box of MTB android, reservation and client communication system

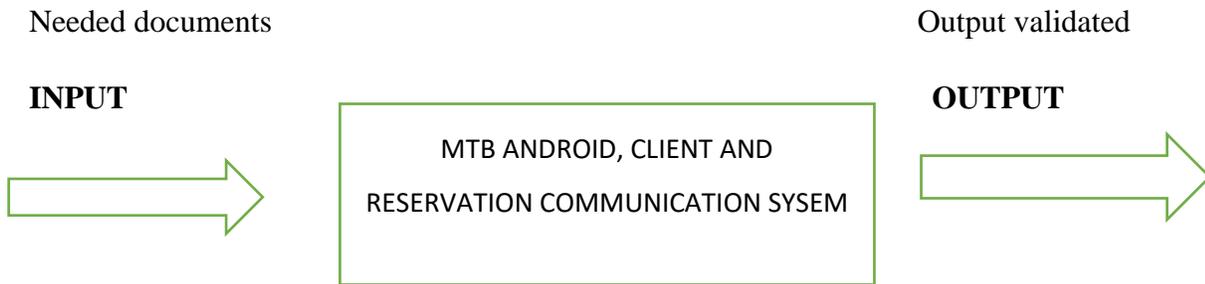


Fig 5.1 Black box testing

5.3.1.1.1 Advantages

- Black box tests are reproducible.
- The condition the program was additionally tried in terms of operations
- The contributed exertion could be utilized various circumstances.

5.3.1.1.1 Disadvantages

- The results were often overestimated.
- Not all properties of a software product could be tested.
- The reason for a failure was not found.

5.3.1.2 White box testing

According to Eppinger (2008), white box testing is a testing strategy that analyzes the program structure and gets test information from the program rationale/code. Alternate names of glass box testing are clear box testing, open box testing, rationale driven testing or way determined testing or basic testing.

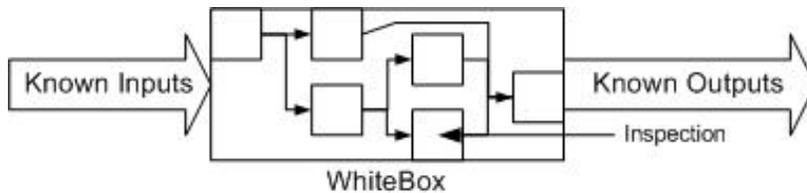


Fig 5.2 White box testing

5.3.1.2.1 Advantages

- Powers test designer to reason deliberately about usage.
- Uncovered blunders in "shrouded" code.
- Recognized the dead code or unlike issues regarding best programming rehearses.

5.3.1.2.1 Disadvantages

- Costly as organization wants to capitalize both energy and money to do white box testing.
- Each likelihood that little lines of code were missed coincidentally.
- Inside and out information about the programming language was important to perform white box testing.

5.3.2 Module testing

Zorian (2012), stated that module testing was used to term testing done on fully assembled component as a single system. It was anticipated that defective components could not be isolated during module test and that as result no rework could be performed based on failure during module test.

5.3.3 Sub system testing

Chronoles (2011), propounded that this stage includes testing accumulations of modules which had been coordinated into sub-applications. Sub-applications might be autonomously planned. The most widely recognized issues which emerged in expansive programming applications were sub-system interface mis-matches. The sub-application test process ought to in this manner focus on the location of interface errors by thoroughly practicing the interfaces.

5.3.4 System Testing

Sub applications were coordinated to make up the whole application. According to Reynolds (2013), the testing procedure was concerned with discovering mistakes that results from unforeseen collaborations between sub-applications and system parts. It was likewise worried about approving that the application meets its useful and non-practical requirements.

5.3.5 Acceptance testing

This was the previous phase in the testing procedure before the system was approved for working use. The application was tested with information provided by the application procurer as an alternative of simulated test information. According to Limaye (2009), acceptance testing it might likewise expose issues where the system's facilities did not generally addressed the client's issues. . It compromised of alpha and beta testing.

5.3.5.1 Alpha testing

Wiley etal (2010) propounded that alpha testing was a sort of acceptance testing done to distinguish every one possible issue before distributing the application to general customers. Alpha testing was done in a lab situation and usually the inspectors were inner workers of the organization.

5.3.5.2 Beta testing

Michael (2002) postulated that beta test is designed to safeguard that the product is ready for release by distributing it into the real world and getting response. It was done by customers of the product system in a real situation and could be well-thought-out as a kind of external customer acknowledgment testing. It decreased application dissatisfaction dangers and gave expanded nature of the application through customers' approval.

5.3.6 Testing strategies

A testing procedure was a general way to deal with the testing procedure as opposed to a technique for formulating specific application or part tests. Distinctive testing techniques might be embraced relying upon the kind of application to be tried and the improvement procedure utilized. The strategies used are as follows:

5.3.6.1 Validation

Wiley etal (2010) stated that validation is a group of activities which are engaged in verifying application in conjunction with its objective and roles. Activities are frequently done all over the

application's life sequence. The main objective the author had to conduct a severe authentication exercise was to make a facility of a great level of assertion that, the key detailed procedures would continuously bring product without faults as well as reaching the firm application requirements and characteristics.

5.3.6.2 Log in validation

This is a section where the operators of the application were required to put login details and if the operator inserted the right information would be redirected to another platform which he or she is permitted to use. A pop error message was shown when an unauthorized person tried to gain access to the system. The diagram on the next page indicated the application login page.

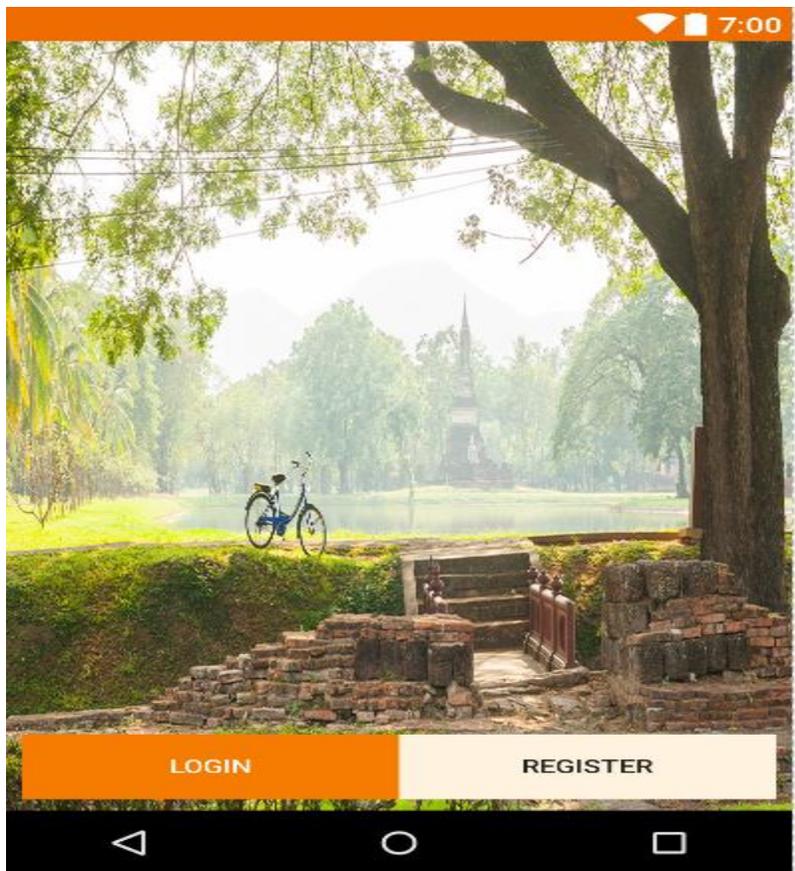


Fig 5.3 Application login page

The diagram shown above indicated the log in page for the users of application and if the operator was not signed up he or she could sign up by clicking on the register

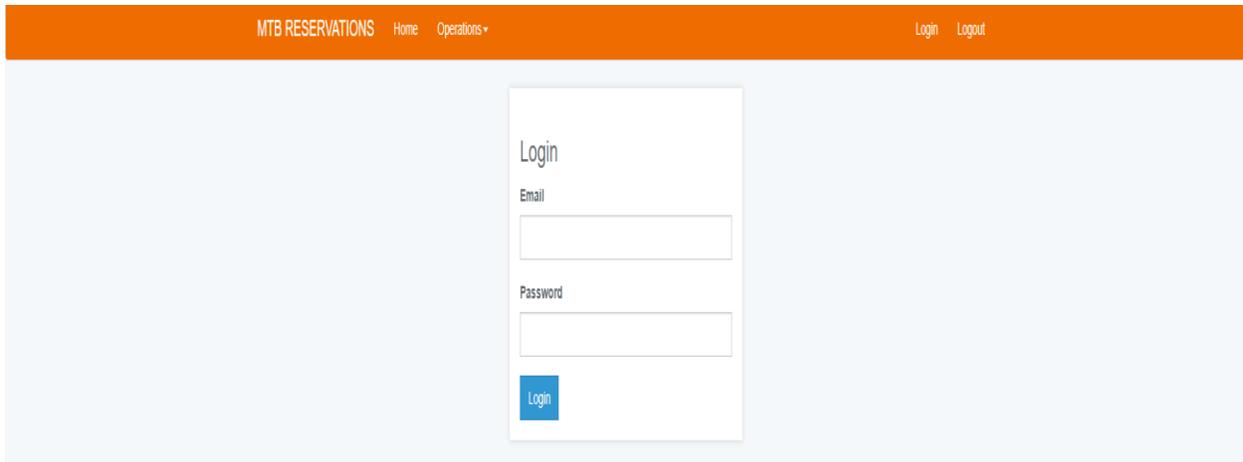


Fig 5.4 Internal user login

This diagram above shows the login platform for the MTB internal operators of the application.

5.6.3.2 User input validation

This denotes to the accuracy of the data provided by the operator

5.3.7.1 Test cases

A test case is a group of test inputs, completing conditions and anticipated results established for a certain aim such as to practice a particular program path.

Test Case One: User signing in

Table 5.1: Test case One

Pre- Condition	Test step	Anticipated results
The user should know his or her signing credentials	<ul style="list-style-type: none"> • Enter username • Enter logging password • Click sign in button 	If the details are correct the user will be redirected to the corresponding form

The developer filled the required details for him to login and ran the program. The program had errors at first because the database was not recognizing information entered. The developer had to revisit the code and checked on the login platform to see if they was error with database connection. The error was wrong spelling of the database name in the code and it was rectified. The test was done again and the developer was able to login.

Screen shot of the signing user

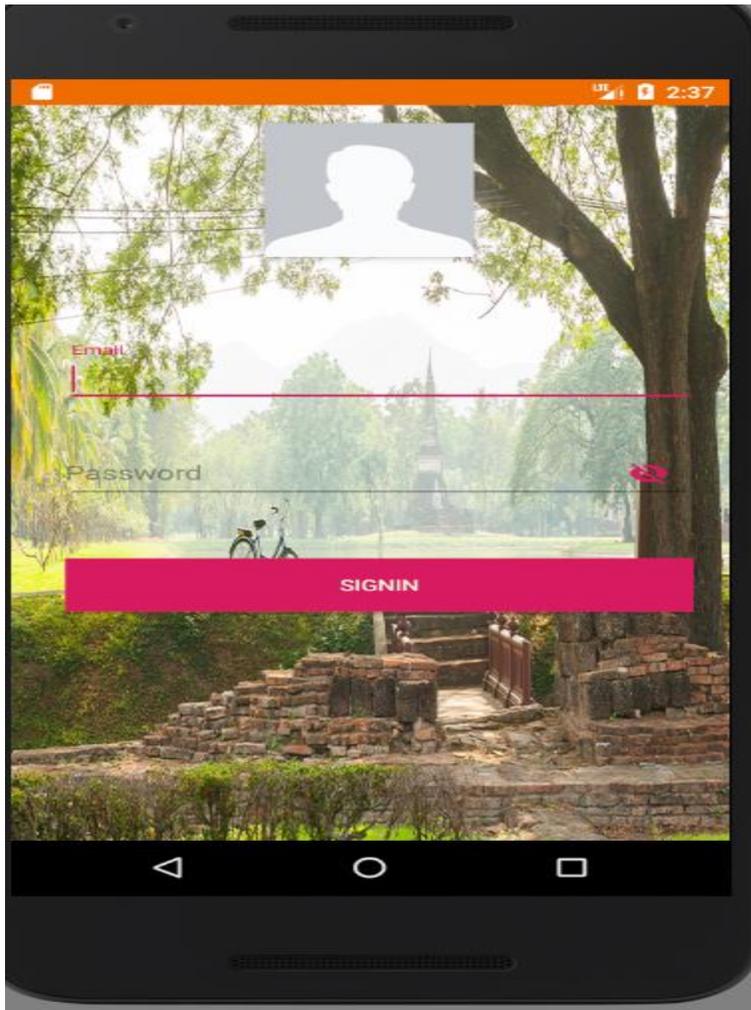


Fig 5.5 User logging

Test case two: User creation

Table 5.2 Test case two

Pre- Condition	Test step	Anticipated results
User installs the application	<ul style="list-style-type: none"> • Open the application • Enter username • Enter email address • Enter password • Click on sign up 	A message will be shown to the user showing that has been successfully signed up.

The test case two was conducted before the login phase. The developer first built and ran the application using the android emulator. The emulator was displaying the compatibility error which

means the version of the application was not supported with the available emulator. The author had to reduce the version of the application to 5.1 version which would be supported by many android phones. After that the developer tried to run the application and it was successfully executed. The developer entered the registration and he was successfully registered in the system no errors were found during the registration process.

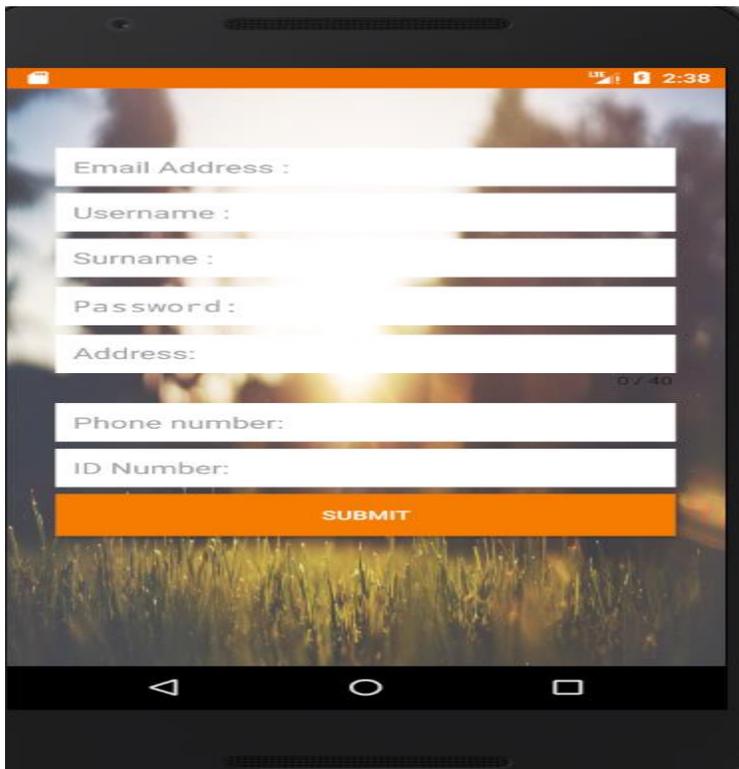


Fig 5.6 Test case two

Test case three: Application for reservation

Table 5.3 Test case three

Pre- Condition	Test step	Anticipated results
Select the type of reservation	<ul style="list-style-type: none"> • View reservations • Click on apply for reservation 	The notification will pop up indicating room application

The test case three was for room application. The developer created a code that would allow a user to apply for reservations on apply. The developer at first tried to apply for the room and the case failed.

They was one line of code which had error and it was fixed. The test was done again and it was successfully executed.

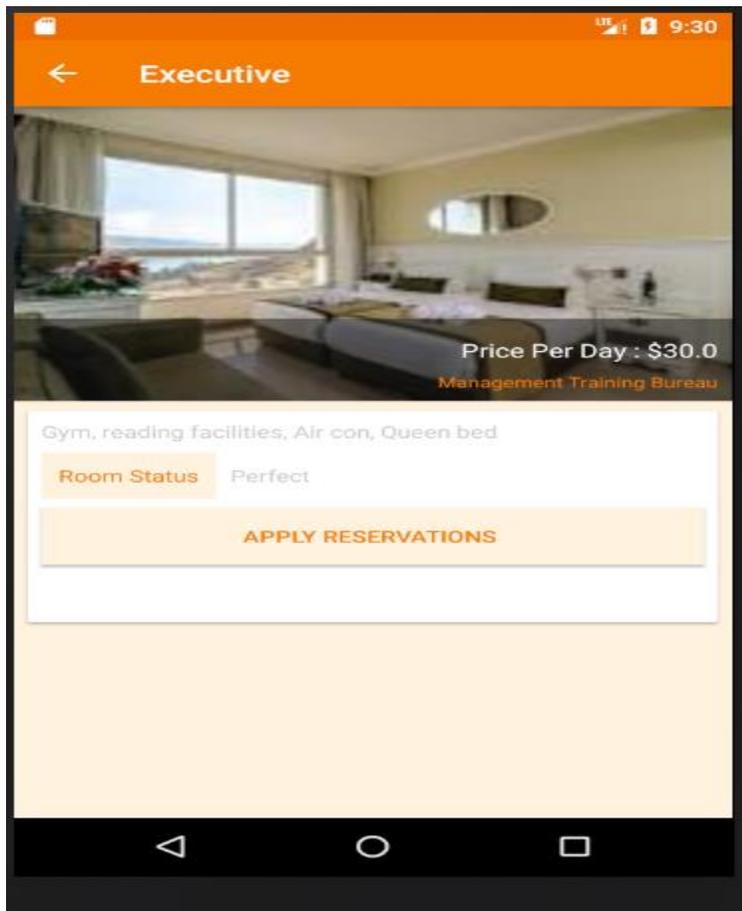


Fig 5.7: Reservation application

5.3.7.2 Verification.

It denoted to the accuracy of the application in terms of reaching operators requirements and desires mentioned.

5.3.7 System Review

This is the evaluation of the previously mentioned objectives in chapter 1 with the application's functionality.

5.3.7.1 System vs Objectives

- Provision for customers to view, and apply for the available reservation

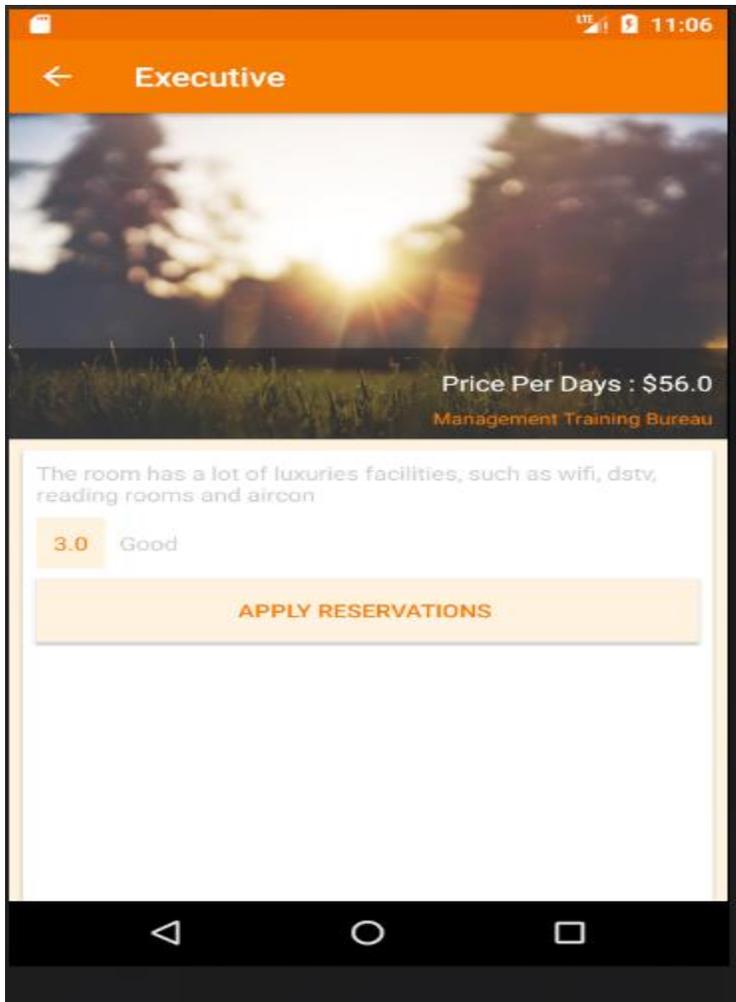


Fig 5.8 Reservation requests.

- Provision of system to show rooms not available to the user

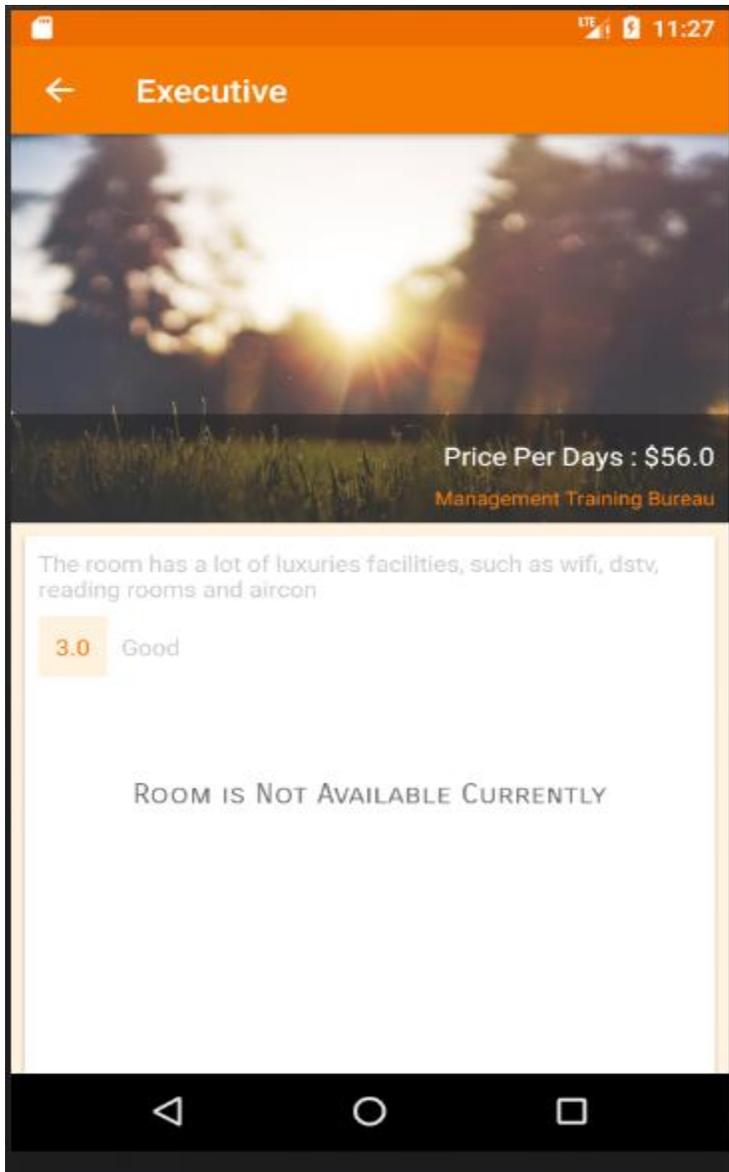


Fig 5.9 Showing rooms not currently available

- Provision for functions officer to make approvals on payments made.

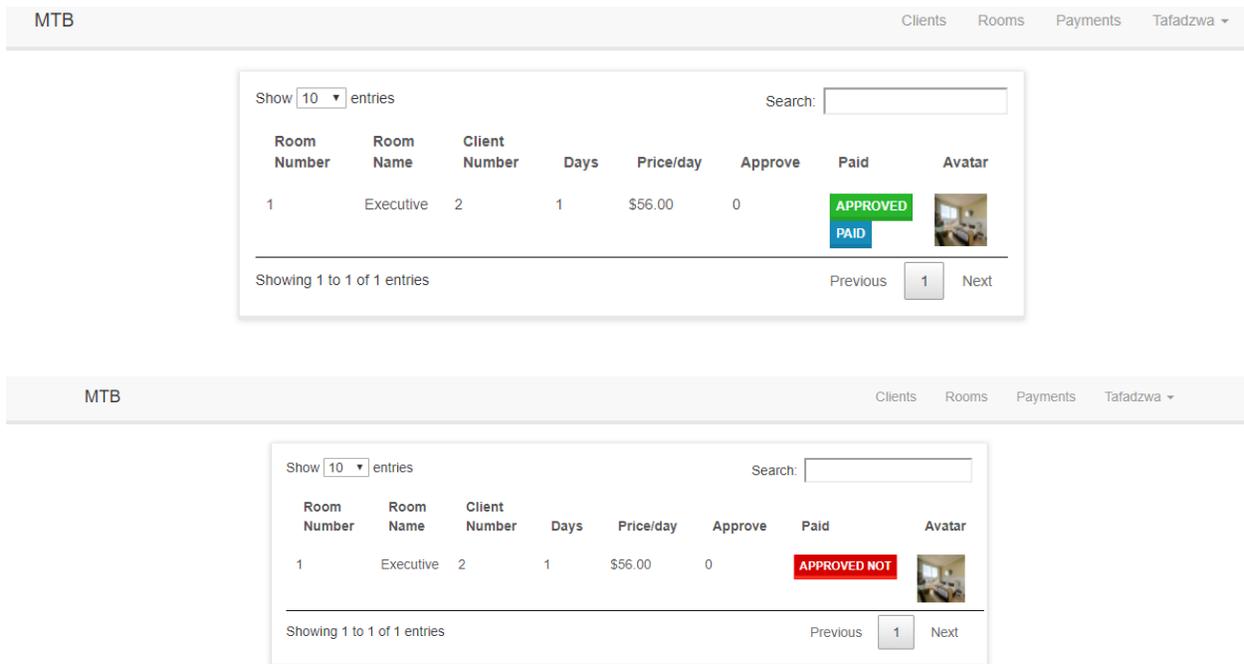


Fig 5.10 Payment Approval

- Provision for chat forum

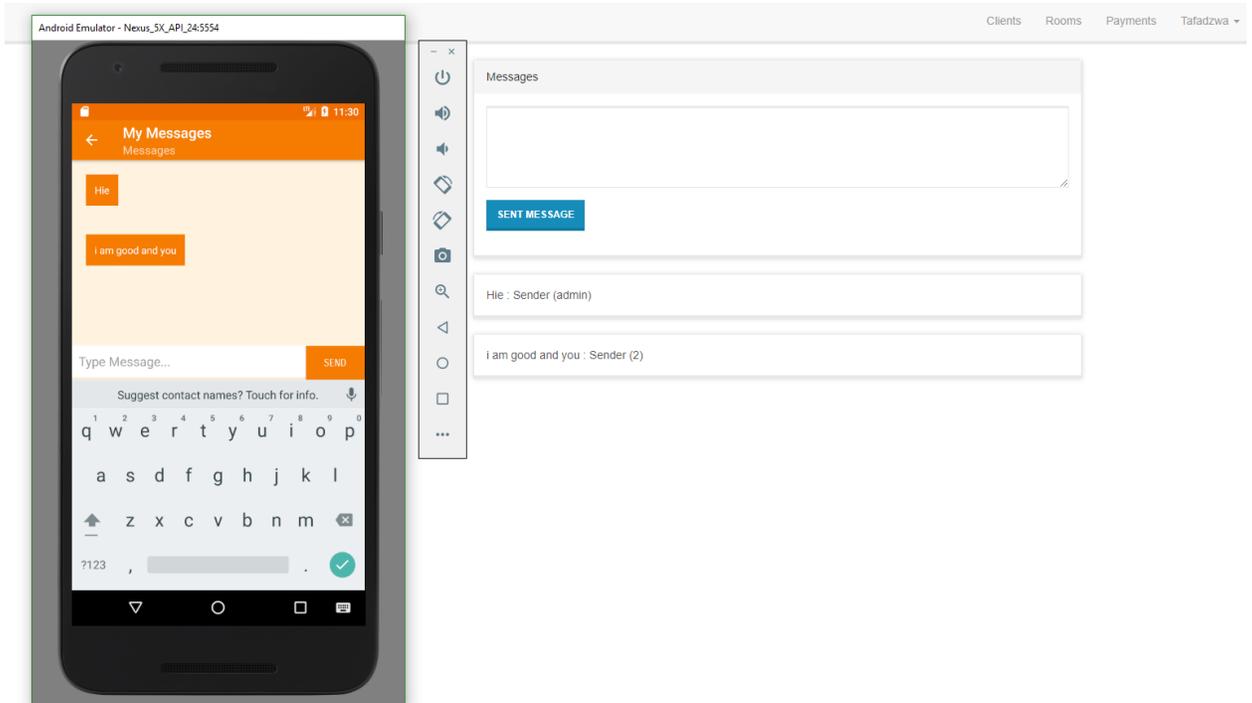


Fig 5.11 Clients chat forum

- Generation of real time reports

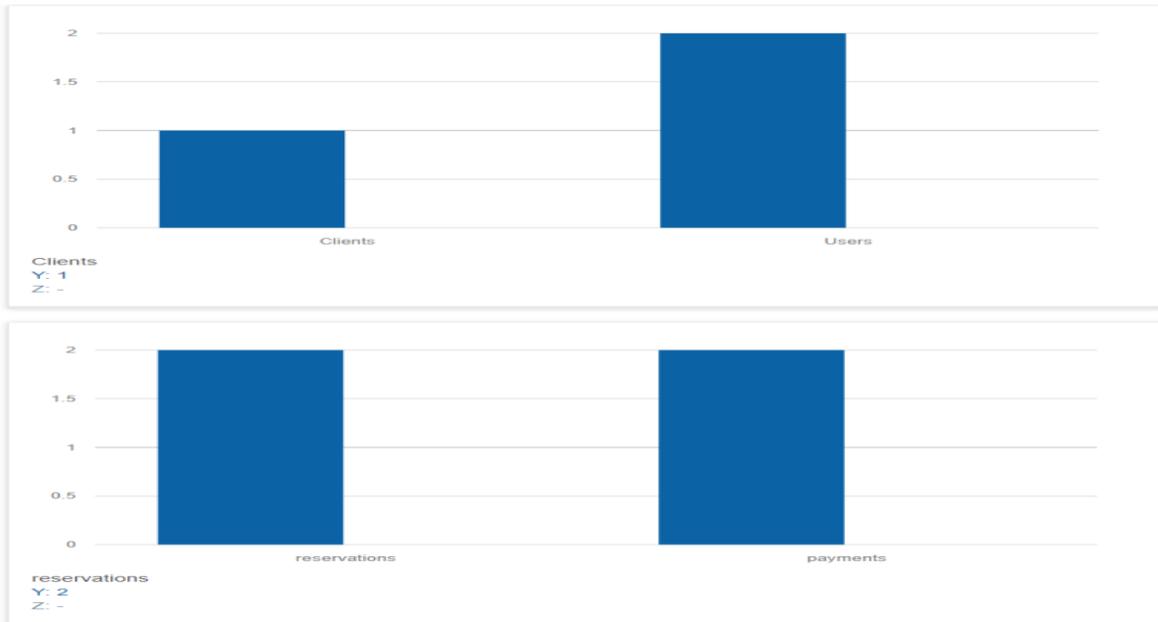


Fig 5.12 Generation of reports

5.4 Installation

According to Denis (2012), it is the procedure of linking, setting and creating the application ready for implementation. The procedure of alignment and installation was engaged with sub activities to it. These activities included user training, and reference as in where it was to be placed such that it could be retrieved by the entire firm. The web application of the MTB Android Client Reservation Communication System was to be installed at main branch in Harare where the server was and the android application was to be placed on google play store where all clients could access it.

5.4.1 Installation procedure

The system was divided in two parts that is web application on the company side and the android application was on the client therefore the installation of the two differs.

Installation procedure of the web application (Company side)

Steps to be taken

- Open web browser
- Type localhost/mbt
- Wait till it finishes compiling system file
- Use the local host IP address 192.168.56.1

Installation procedure of android application (Client side)

Steps to be taken

- First make sure your android version is 5.0 and above
- Download application from play store
- Click on the application
- Select install and after installation
- Click finish
- Open the application and sign up first to start using it.

5.4.2 User Training

Sommerville (2011) mentioned that user training was a procedure whereby all the operators of the application are familiarized to it so that they would know the how the application works. In adequate training results in the entire setting up activity being considered as partial. The author made use of graphic aids in conducting training with all the users within the organization. It was a good and quite fascinating exercise since all users were curious to learn how to operate the system.

5.4.2.1 Training Plan

The operators of application arranged a strategy on which they trailed in the method of the maneuver and familiarization with the application. The exercise was conducted in 3 divisions.

First session

The first session is highlighted below;

Table 5.4 Training session one

Venue	Management Training Bureau
Selected trainees	Inside department operators using the system
Training scope	Showing the key functionalities of the application and how to troubleshooter
Objective	Provide knowledge to the users about the application since they are the ones who will be using it

Second session

Table 5.5 Training session two

Venue	Management Training Bureau
Selected trainees	Top management
Training scope	To show them also the key functionalities of the application and private security features
Objective	Give full detail about the application in terms of functionality

5.4.3 Operation Environment

The environment in which operators run programs. It involves number of resources related with the working system. The following are the important parts that made up the application's environment.

- Hardware devices
- Network equipment
- Software configuration
- Control systems

5.3.4 Conversion

It is a method whereby the application is conveyed into practice and acquires the opportunity to be used as a share of the set-up of the firm managements. It was a technique of converting from the previous way of operation to another new executed process for making use of the MTB android client and reservation communication system.

5.3.5 System changeover

Godfrey (1999) stated that system changeover it is a technique for actualizing the new application over the old application. The switch might occur in three conducts which are direct, phased and parallel changeover.

5.3.5.1 Direct Changeover

Godfrey (1999) defined direct changeover as the completely removal of the existing system replacing it with the new system.

Advantages of direct change over

- The direct changeover was cheap to undertake as compared to parallel in terms of working since the application would be a stand-alone.
- In terms of implementation, it was very easy to implement the system because few procedures were required to setup the system

Disadvantages

- The process was too risky to undertake since there was no backup of the previous system.
- The developer feared the risk of its acceptance by the users since it was new advanced technology was to be implemented on the organization
- Another problem with this type of changeover was there would be no reference of the old system since it would had been eliminated.

5.3.5.2 Parallel change over

Ghezzi (2004) postulated that parallel changeover strategy is when the new application runs concurrently with the existing system for a specified period of time. This clearly demonstrated the distinctions of the two as far as efficiency and viability. The diagram on the next page demonstrated the model of how the parallel transformation will resemble.

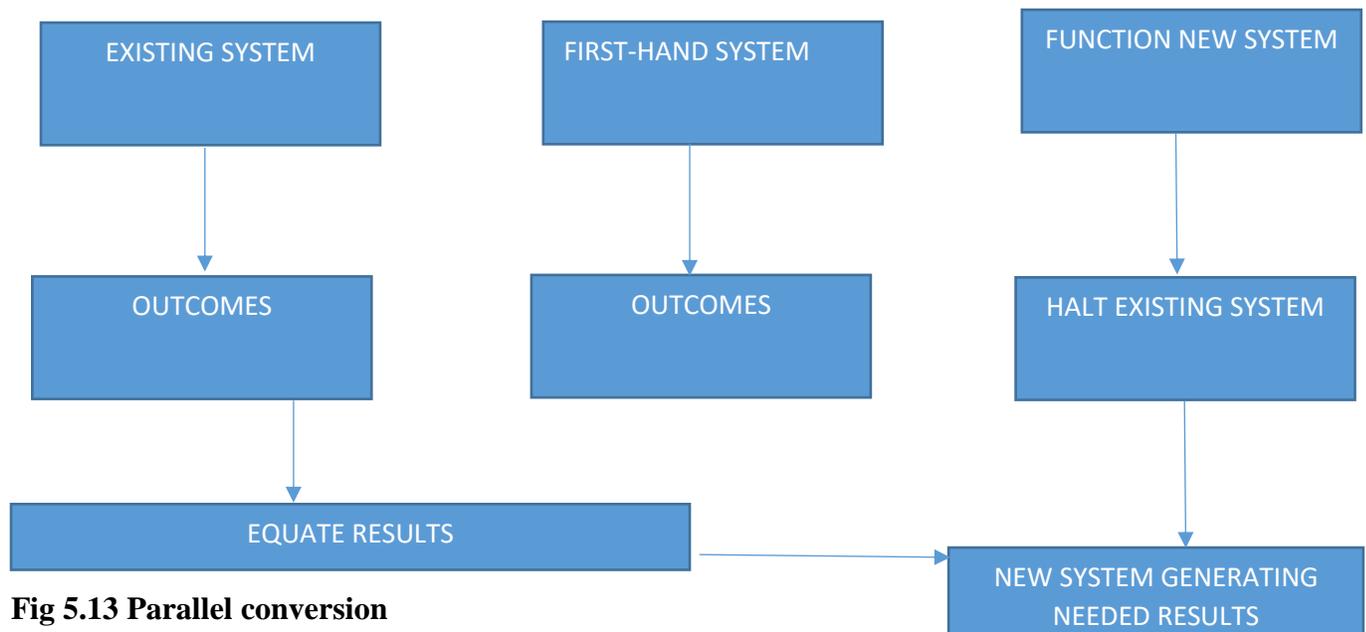


Fig 5.13 Parallel conversion

5.3.5.2.1 Merits of Parallel change over

- With this type of changeover the chances of risk were low since both the old and new application were running at the same time. They was also reference to the old system if anything was required.
- The information was kept safe since there was backup of the old system
- This type of changeover it allowed the comparability of the Android, client and reservation communication and the one which was manually functioning at the organization.

5.3.5.2.2 Disadvantages

- The changeover was so costly because two systems were running at the same time both they would need attention in terms of maintenance and preventative measures. This resulted in MTB incurring vast amounts of costs.
- The delays were too much during processing tasks. The functions manager had to manually verify first the reservation first before she approved the same reservation requested on the online system.

5.3.5.3 Phased change over

A change plan whereby the new application is executed in phases of various components accordingly removing the existing one depend on its competence

5.3.5.3.1 Advantages

- The changeover was cheap as compared to parallel method since the system was implemented in stages and gradually eliminating the old system.
- The chances of failure only affected the selected phase. Mainly the clients were the ones who were affected since they would be upgrades on the system.
- It permitted users to know the application phase by phase.

5.3.5.3.2 Disadvantages

- The changeover somehow was costly because some of the modules were so complicated and they would require assistance from other experts.
- The process was long to implement the whole system on the organization since it is done in modules. This was major hindrance for the system to be implemented.

5.4.5.5 Recommended changeover method

- The author recommended the parallel change over strategy because with this type of changeover the chances of risk were low since both the old and new application were running at the same time. They was also reference to the old system if anything was required.

5.4 Maintenance

Sommerville (2004) points out that maintenance was a frequently technique finished from the time the application is presented and during its everyday working with the fact of assuring the application is acting admirably of course. It likewise included distinguishing requirement for alterations and endeavoring to expand effects regarding working so there might be recognized adjustments that perhaps be seen during the maintenance procedure.

5.4.1 Perfective maintenance

Krugman (2009) stated that perfective maintenance is for the most part worried about the execution of a superior version than the present one, in this way attempting by all way to improve it as far as functionalities. The inner clients or the individuals who were specifically connected to the application were triggered the requirement for facilitate perfectiveness. This was done as such as to stay up with the clients' latest necessities. Perfective maintaince would be done after every six months and some features would be upgraded.

5.4.2 Adaptive maintenance

Adaptive maintenance is carried out so that the application adjust to changes that are to transpire in its process. Due to technological changes, the system should be capable to adjust to any alterations. The need for adaptive maintenance can only be identified by controlling the environment. Adaptive maintenance is to be carried out every time the application changes the environment.

5.4.3 Preventive Maintenance

According to Krugman (2009) perfective maintenance are activities that involve application alterations leading top better functional aspects of the software. It was implemented to improve, performance, accessibility and other features of an application. Preventive maintenance will be done every week to make sure the application is continuously meeting the requirements of users.

5.5.4 Corrective Maintenance

Vilacich (2012) stated that corrective maintenance encompasses changing a software system to eliminate errors. The major causes of maintenance are design errors, coding errors and logic errors. Corrective maintenance will be done every time end users reports about application errors or immediately when the error occurs.

5.5.5 Disaster Recovery

The main objective of this recovery was to recover data in the event that a catastrophe took place and all the data is lost. It was used as reinforcement tool with the end goal that data can be recovered.

5.5.6.1 Security

Dorian (2003) stated that system security dealt with identifying and authenticating the user to restrict many intruders to the system. The security mechanism of the application involves a quite lot measures as listed below:

Operator identification

It is an application capability to recognize a specified operator who is to sign up into the application for certain reasons

User authentication

A method in which an operator was confirmed if he or she has the permission to gain access into the application

Access control

It referred to the application's ability to recognize the duty which a certain signed in user is to conduct.

Data policy

It described the different representations of the database layout that are included.

Data backup

It was under taken to backup information in different storage to avoid unanticipated loss that may occur.

User Creation

It denoted to the ability to create other users for the system in this case any individual who feels to use the application will create his or her own account without the interference of the administrator.

5.5.6.2 Security Measures

The accompanying are the safety efforts that were set up by the author during the time spent creating and outlining the application

- The pin code alpha characters

- Cloud backup of entire application is available
- Logging platforms used by users are different

5.5.6.2.1 System backup

Sommerville (2004) stretched out a point that a system backup includes the entire of the application documents, boot records, and program documents. Just backing up both the application and boot records can guarantee that the working application works regularly while reestablishing the working application.

5.5.6.2.2 Types of backups

There are different versions of backup ways present henceforth the author had recommended a few below:

5.5.6.2.3 Incremental Backup

Nelson (2011), stated that incremental backup was a method for reliably backing up every one of the progressions that would had occurred from the past backups. This kind of backup, there was on one occasion complete backup which was done. One of the real favorable circumstances of such a kind of moving down documents was that information is dependably up and coming and it is somewhat quicker.

5.5.6.2.4 Full backup

According to Brooks (2009), explained that this was a sort of backup application which enabled an application rebuilding to a given point in time. This would imply that every one of the applications and the working application itself would get the chance to be reestablished.

5.5.6.2.5 Mirror Backup

Preston (1999) stated that mirror backup is the reflection of the first basis, which means to state that any alteration done to the first record would likewise be made in the back up document. Along these lines, when a unique document is erased it would likewise be in the long run erased in the glass support.

Recommended Method

The incremental strategy has ended up being of compelling from the analyst's point of view because there is predictable updated and backup of current information. It was additionally quicker in a route and there was fewer repetition of information.

5.6 Recommendations

The application was an amazing particularly to the present application investigators of the firm yet as specialists they had somewhere in the range of couple of thoughts to flavor up the entire thing and these were after a meeting with the best administration and every one of the individuals who have an awesome wisdom of brain for the firm's basic leadership. The recommendations are shown below:

- There were a few components that were discussed about to be sound viable and this prompted the leading group of administration proposing to consolidate it with single of their transaction administration programming to such an extent that digital receipts would be automatically be given.
- The author recommended MTB to add at least two more subordinates to work with the application. There was also need of additional database manager who was equipped for creating and keeping up the application running easily.
- Since it was integrated with the web application, there was a great need to check up the status of the malware, application's product included to overcome a few instabilities.
- The author recommended MTB to add another module for payment notifications.
- The author also recommended the firm to add another module for message notifications
- The author also recommended MTB to change the structure of their reports on the back end application.

5.7 Conclusion

The application development process was fruitful in that all the goals of this stage were fulfilled. All the stages were according to the plan indicated in the planning phase. The application was also tested to check if it met the needs of the users. User training was also done and all the application users were trained on the functions of the application. The user manual for the application has been attached to the appendix.

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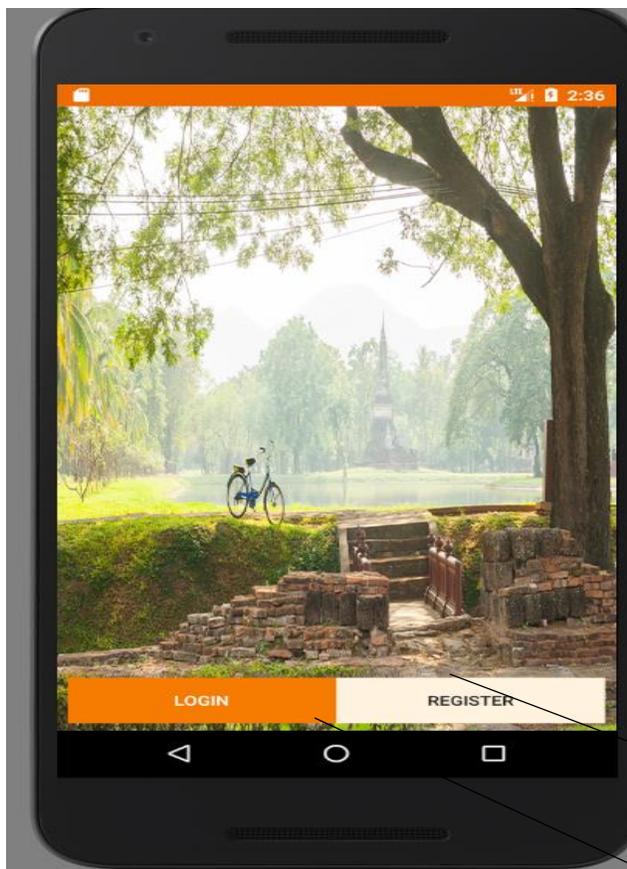
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Appendices

User manual: Android Application

The user manual is going to help the users of the newly developed system in using it, thus it will be containing close to all the controls and meanings of the controls and instructions on how to use them. For every system to effectively be used it needs to have a very informative user manual to assist users on the system's functionality thus the user manual is also an important area of concern in software operation. The user manual also in used as a training tool which is used by trainers when they will be training users on how to use the system thus it makes it easy for the trainers and also the new users as they will always have somewhere to refer to in the event that they want a certain instruction.

Home page.



Click on register to register into the system

Click on login to login into the system

Fig A1 Login page

- 1) Clicking the login link will directly lead to the login page which will be prompting the user to enter the required credentials.

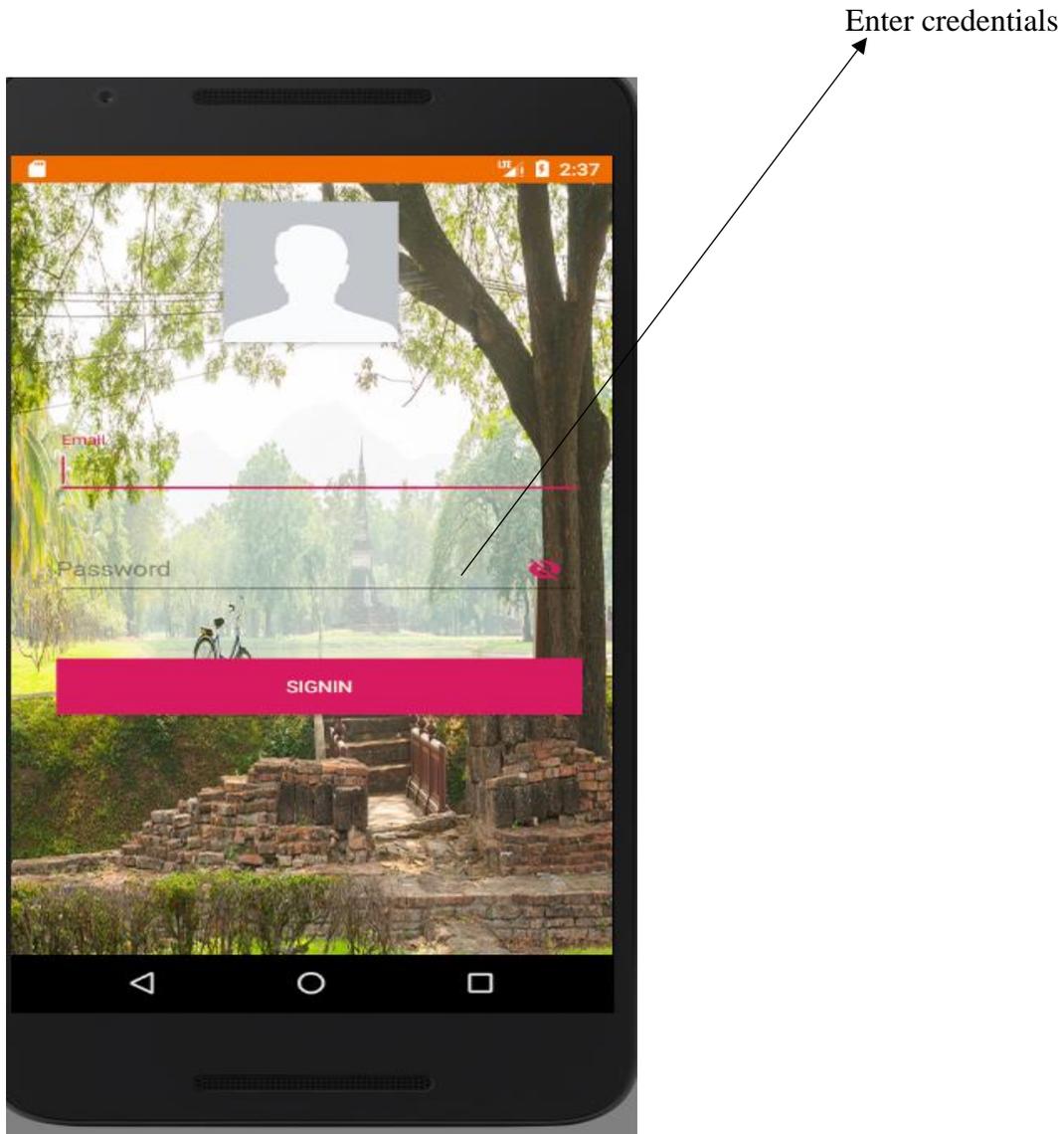
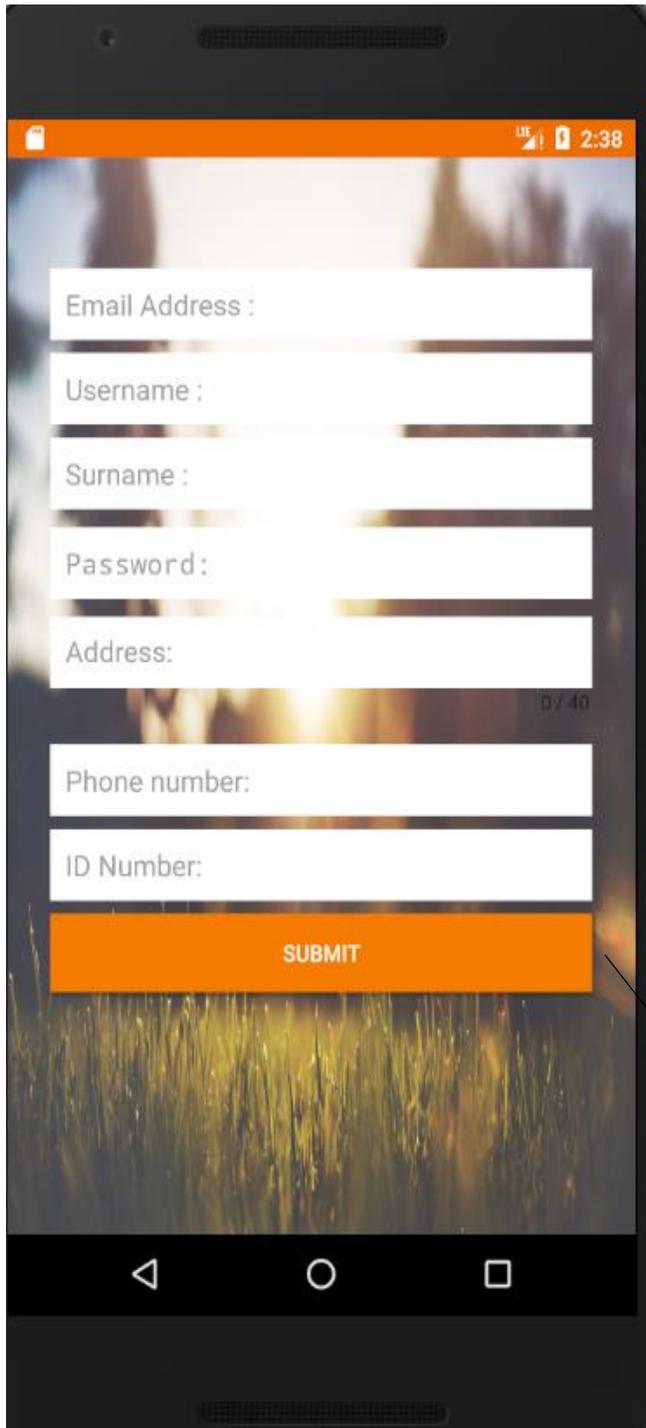


Fig A2 User login

Clicking the create account link will directly prompt the user to enter his/her information details.



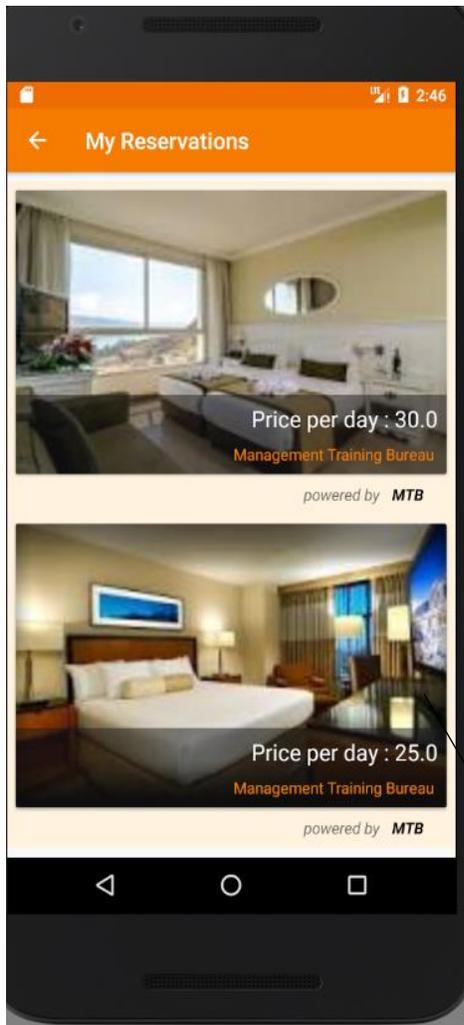
The image shows a mobile application registration form. At the top, there is an orange status bar with a signal strength icon, a battery icon, and the time 2:38. Below the status bar is a blurred background image of a person's face. The form consists of several white input fields with labels: "Email Address :", "Username :", "Surname :", "Password:", "Address:", "Phone number:", and "ID Number:". The "Address:" field has a character count "0 / 40" at the bottom right. Below the input fields is a large orange button with the text "SUBMIT" in white. At the bottom of the screen is a black navigation bar with three white icons: a back arrow, a circle, and a square. An arrow points from the "SUBMIT" button to the text below.

Fill in the details and then click on submit button to register

Fig A3 User registration

After login the user will be directed to this page.

The welcome page consists of all the menus of the application. This is the page you first see when you start the application to start navigations.



Click here and will redirected to applications for rooms

Fig A4 Home page

These are homepage sub menus after clicking on the home button. Click on any of the drop downs and will redirected to the specified destination.

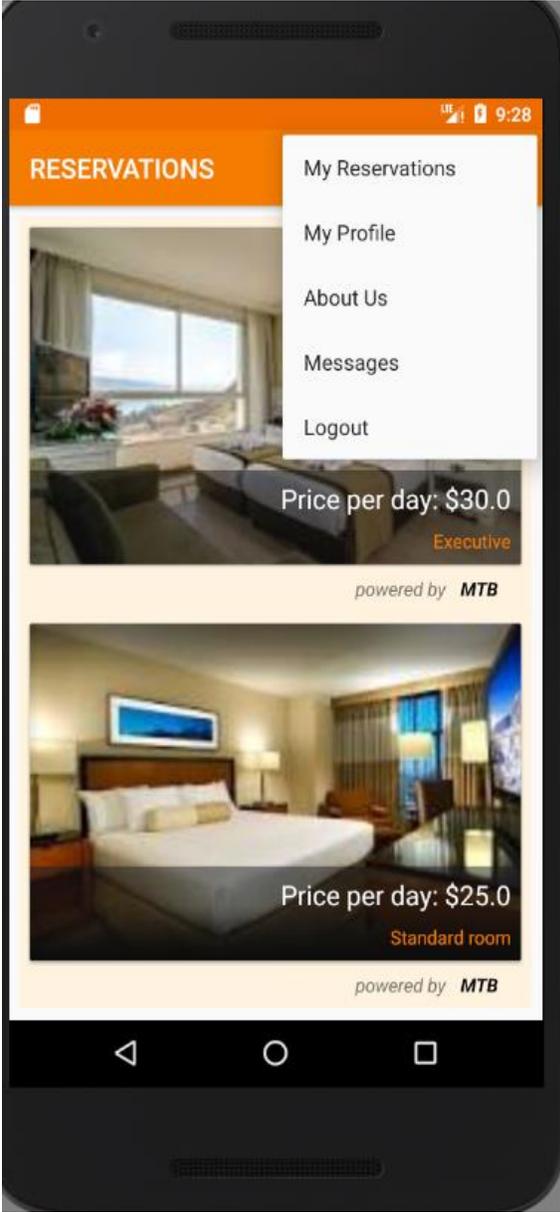


Fig A5 Sub menus.

When you want to make payments or seek services request tap on the image and the options will be provided.

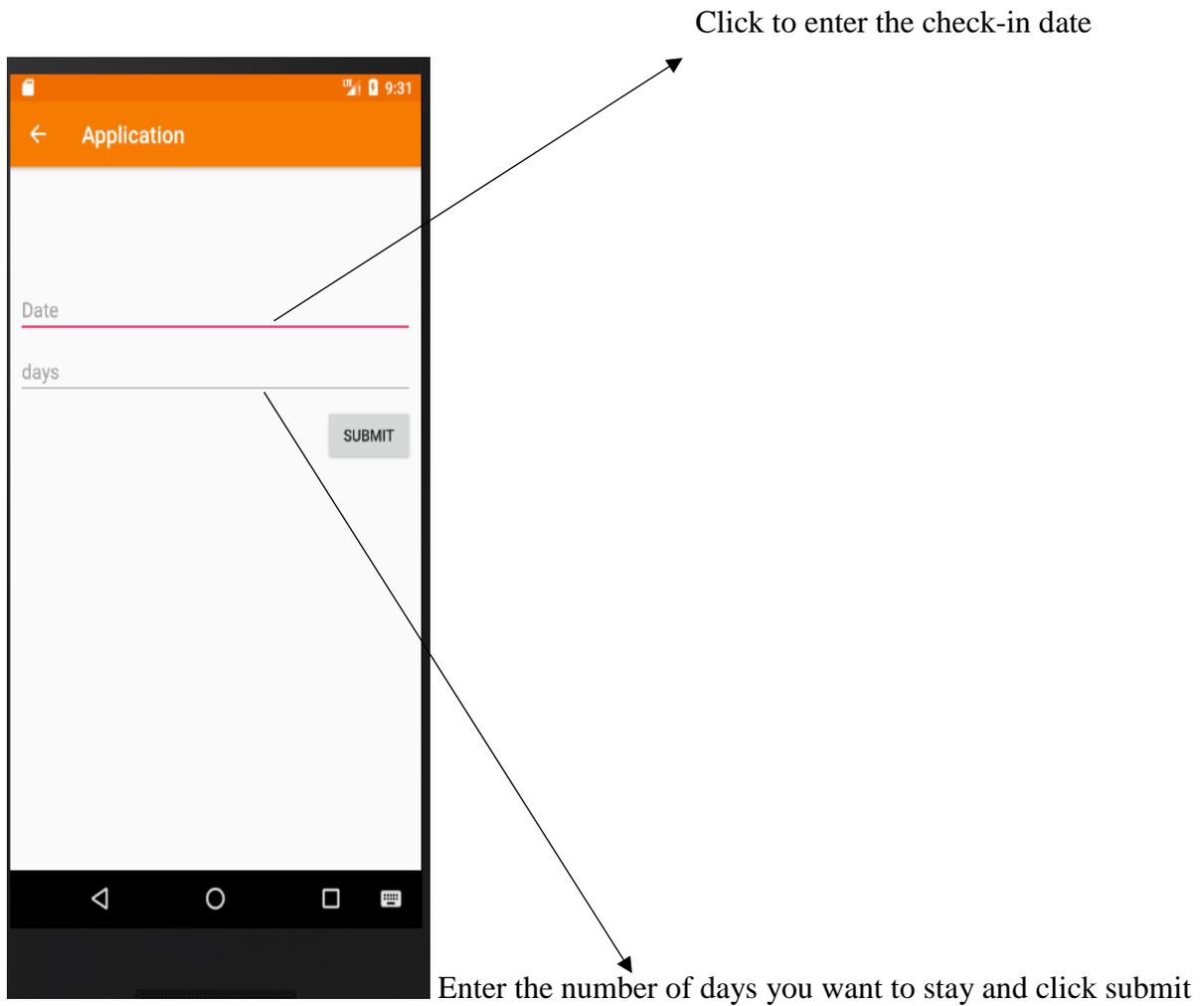
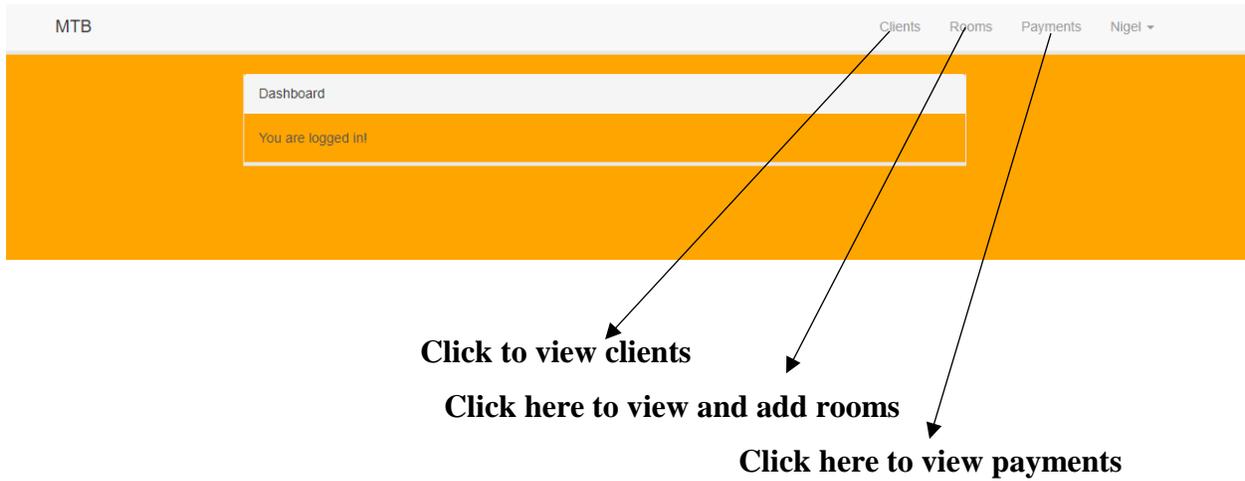


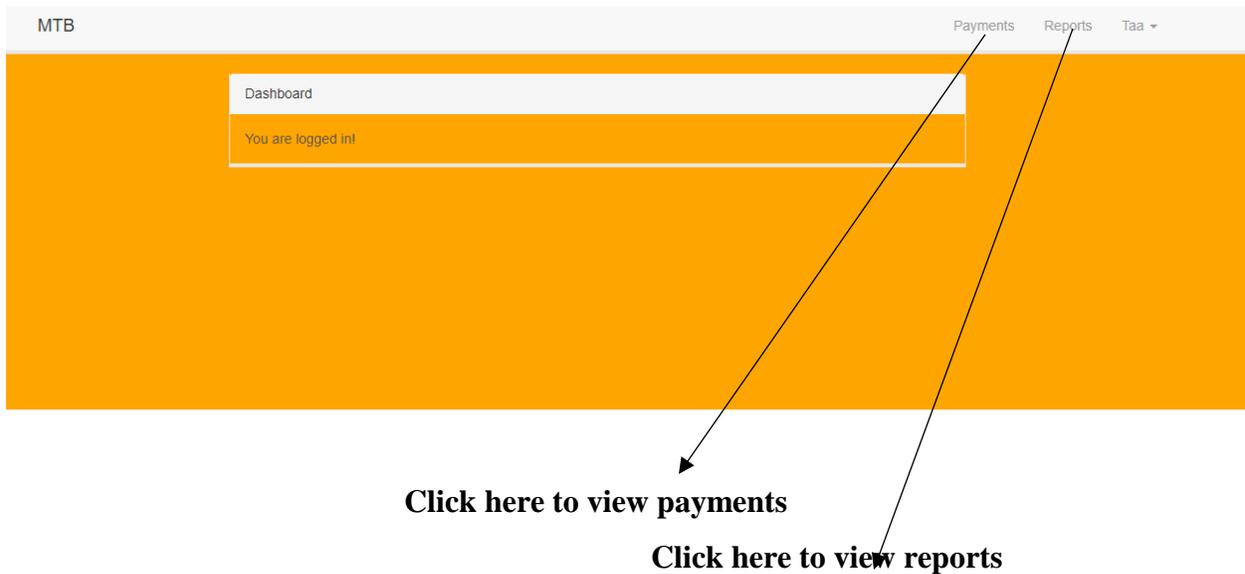
Fig A6 Check-in dates

User manual: Web application

This is homepage of the administrator after he/she had logged in



This is the home page of the manager



6.2 Appendix B - Interview Checklist

Sample of the interview questions conducted by Mr. Nigel Tafadzwa Musvazvi

- 1) Are you required as an organization to comply with the implementation of the Android client and reservation communication system

- 2) What happens if you don't comply

- 3) How does the current system work?

- 4) Can you safely say the current system comply with the high technological change environment.

Agree Disagree Other _____

- 5) What other things would you want the system to address?

- 6) What proof do the organization need in order to upgrade their manual system in use?

7) What is your view with the existing system?

Record of Discussion – Interview

Date 24/02/17

Time 09:00 AM

Present

Mrs. D. Gwati	IT Manager
Mr. A. Zaemba	Systems Administrator
Mr. N. Musvazvi	Helpdesk
Mr. T.C. Chimedza	Business Development and Marketing Manager
Miss Toropa	Functions Manager

Agenda – Android client and reservation communication system

Miss Toropa the chairperson started by thanking everyone who was present and thanked Mr. Musvazvi for bringing up the Agenda item as it was very important that the organization fully complies with the POTRAZ laws that govern the flow of information in Zimbabwe. She said for the organization to continue being viable and continue to provide top class reservation facilities it has to welcome the android client and reservation communication system as it come with competitive advantages. Mr. T. C Chimedza welcomed the idea and promised to offer enough support so as to see to it that the system is implemented in the organization. Mrs. Gwati said that the system will be online necessitating function manager to take their duties even if they are not on the company premises. Mr. N. Musvazvi advised them that although the purpose of the meeting was on automating android client and reservation communication system it was also helping him to develop a project for his BSC honours Information systems degree he was currently doing. Everyone was happy that a computerized system was being developed that will help them fulfill their duties. Being a short meeting it ended at 09:45

6.3 Appendix C – Questionnaire Checklist

Questionnaire cover letter

Management Training Bureau

Android client and reservation communication system

Dear Sir/Madam

Management Training Bureau has detected that is facing with clients who fail to comply with their reservations henceforth resulting in making losses. As part of trying to automate the android client and reservation communication system so as to prevent bogus clients, we are asking the corporate governance team, branches team and the IT team to contribute by filling out a questionnaire on the operations of the current system and what they think should be done to address any challenges inherent in the system. The results of this questionnaire will be used as requirements to develop a new automated android client and reservation communication system. This questionnaire will take approximately five minutes to complete. There are no right or wrong answers to these questions. It is your own responses that are important. Responses to the questionnaire will be kept anonymous and confidential. Please return completed questionnaires by Tuesday, 31 March 2017 to IT Helpdesk MTB centre by email.

Thank you for your valuable participation. Your opinions are important to the undersigned.

Yours faithfully,

Nigel Musvazvi

6.4 Appendix D – Observation score sheet

Observation Score Sheet

Date:

Time:

OBSERVATION POINTS:

- The implementation of the android client and reservation communication system would allow clients first to seek for a reservation and is only approved when the payment is approved.
- MTB was complaining about the clients' behavior so the online system will promote a strong restriction on making the reservations.

6.5 Appendix E- Code snippet

Payment Activity

```
@Override
    public void onClick(View v) {
        Calendar cal = Calendar.getInstance();
        int year = cal.get(Calendar.YEAR);
        int month = cal.get(Calendar.MONTH);
        int day = cal.get(Calendar.DAY_OF_MONTH);

        dpd = new DatePickerDialog(PaymentsActivity.this,
            android.R.style.Theme_Holo_Light_Dialog_MinWidth,
            mDateListener,
            year,
            month,
            day);
        dpd.getWindow().setBackgroundDrawable(new ColorDrawable(Color.TRANSPARENT));
        dpd.show();
    }
};

mDateListener = new DatePickerDialog.OnDateSetListener() {
    @Override
    public void onDateSet(DatePicker view, int year, int month, int dayOfMonth) {

        month += 1;
        String date = year + "/" + month + "/" + dayOfMonth;
        CheckIn.setText(date);
    }
};

PayBtn.setOnClickListener(new View.OnClickListener() {
    @Override
    public void onClick(View v) {
        String number_01 = mDays.getText().toString();
        String day_01 = CheckIn.getText().toString();
        if (!TextUtils.isEmpty(number_01) && !TextUtils.isEmpty(day_01)) {
            final ProgressDialog mProgress = new ProgressDialog(PaymentsActivity.this);
            mProgress.setMessage("Payment in progress...");
            mProgress.setCanceledOnTouchOutside(false);
            mProgress.show();
            int num1 = Integer.parseInt(price);
            int num2 = Integer.parseInt(number_01);

            sum = num1 * num2;
            FirebaseUser mUser = FirebaseAuth.getInstance().getCurrentUser();
            DatabaseReference Approved=FirebaseDatabase.getInstance().getReference().child("Approved");
            HashMap chld=new HashMap();
            chld.put("amount",sum);
            Approved.push().setValue(chld);
            DatabaseReference payments = FirebaseDatabase.getInstance()
                .getReference()
                .child("Payments")
                .child(mUser.getId());

            HashMap has = new HashMap();
            has.put("room_id", room_id);
            has.put("title", title);
            has.put("room_number", room_number);
            has.put("facilities", facilities);
```


Chat Activity

```
private ImageButton SendBTN,iconBTN;
private EmojiconEditText Msg;
EmojIconActions EmojIcon;
private FirebaseListAdapter<Chat> adapter;
private FirebaseUser mUser;
@Override
protected void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.activity_messages);
    sortNavigation();
    mUser= FirebaseAuth.getInstance().getCurrentUser();

    MessageDatabase=
    FirebaseDatabase.getInstance().getReference().child("Messages").child(mUser.getId());
    SendBTN=(ImageButton) findViewById(R.id.send_btn);
    iconBTN=(ImageButton) findViewById(R.id.icon_btn);
    Msg=(EmojiconEditText) findViewById(R.id.message);
    RelativeLayout mLayout=(RelativeLayout) findViewById(R.id.message_layout);
    EmojIcon=new EmojIconActions(this,mLayout,Msg,iconBTN);
    EmojIcon.ShowEmojIcon();

    displayMessages();
    SendBTN.setOnClickListener(new View.OnClickListener() {
        @Override
        public void onClick(View v) {
            String Message=Msg.getText().toString();
            if(!TextUtils.isEmpty(Message))
            {
                HashMap message=new HashMap();
                message.put("message",Message);
                message.put("sender",mUser.getEmail());
                message.put("sent_at", new Date().getTime());
                MessageDatabase.push().setValue(message);
                Msg.setText("");
            }else{
                Toast.makeText(MessagesActivity.this, "Insert all fields", Toast.LENGTH_SHORT).show();
            }
        }
    });
}

private void sortNavigation(){
    getSupportActionBar().setTitle("Messages");
    getSupportActionBar().setDisplayHomeAsUpEnabled(true);
}
```

```

private void displayMessages(){
    ListView mList=(ListView) findViewById(R.id.chat_list);
    adapter=new FirebaseListAdapter<Chat>(
        this,
        Chat.class,
        R.layout.chat_layout,
        MessageDatabase
    ){
        @Override
        protected void populateView(View v, Chat model, int position) {
            TextView message=(TextView) v.findViewById(R.id.message);
            TextView my_time=(TextView) v.findViewById(R.id.my_time);
            message.setText(model.getMessage());
            my_time.setText(DateFormat.format("dd-MM-yyyy",model.getSent_at()));

            if(!model.getSender().equals("admin")){
                message.setBackgroundResource(R.drawable.bg1);
                LinearLayout.LayoutParams llp=(LinearLayout.LayoutParams)message.getLayoutParams();
                llp.gravity=Gravity.LEFT;
                message.setLayoutParams(llp);
                my_time.setLayoutParams(llp);
            }else{
                message.setBackgroundResource(R.drawable.bg1);
                LinearLayout.LayoutParams llp=(LinearLayout.LayoutParams)message.getLayoutParams();
                llp.gravity=Gravity.RIGHT;
                message.setLayoutParams(llp);
                my_time.setLayoutParams(llp);
            }
        }
    };

    mList.setAdapter(adapter);
}
}

```