TELECARE MOBILE APPLICATION

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By

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ABSTRACT

Telecare mobile application is an android based application that seeks to address the shortfalls of the USSD platform. The USSD platform have no facility for user policy switching, recommendation and grievance airing, claim posting and alerts for overdue policy payments. To solve the problems that Telecare service are facing a mobile application was proposed. Development alternatives were discussed amongst them are outsourcing, improvement and in-house development. In-house development was chosen as the best alternative. Questionnaires, interviews and observations were used as the data collection methodology and they provided enough data to show that the facilities of the mobile application were lacking. With the data at hand the feasibility to developed was done again to know if it was realistic to develop what the users asked for in the interview and questionnaires. Using the outcomes from feasibility and data analysis the coding of the proposed system took place. Coding was done using java and android studio. Implementation strategies were discussed giving preference to parallel implementation since the mobile application is not there to substitute the USSD but it complement the USSD. Maintenance of the system options were evaluated giving the perfective maintenance option since the system will be thriving through the use recommendation. For the future there is need to create a cross platform application that serve all with smartphones and also the integration of Telecash.

DECLARATION

I, **Blessing Sambadzi,** hereby declare that I am the sole author of this dissertation. I authorize the **Midlands State University** to lend this dissertation to other institutions or individuals for the purpose of scholarly research.

Signature: ………………………………………….   Date: ………………………………..

APPROVAL

This dissertation, entitled **"TELECARE MOBILE APPLICATION"** by **Blessing Sambadzis** 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's Signature: ……………………………………………….

Date: …………………………………………………………………..

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I truly appreciate having worked with my fellow colleagues for providing assistance, encouragement and support.

Amen…

DEDICATION

To my Father and Mother, who notably contributed to the laying of the foundation on which I stand and whose inspiration is my source of motivation. May the Lord continue to bless them.

Amen…

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LIST OF ACRONYMS

MSU……………………………………………...………...Midlands State University

VAS: …………………………………………...……………. Value Added Services

RAM……………………………………………………. Random Access Memory

IT: ……………………………………….… …………………Information Technology

MFS: ………………………………………………………...Mobile Financial Services

SQL…………………………………………………………...Sequential Query Language

SMPP……………………………………………….……Short Message Peer to Peer

PAT…………………………………………………………...Pre-Release Acceptance Testing

MSC…………………………………………………………...Mobile Switching Centre

VPN……………………………………………………………. Virtual Private Network

ISP………………………………………………………………Internet Service provider

CBA…………………………………………………………. Cost benefit analysis

NPV……………………………………………………………. .Net present value

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CHAPTER 1: INTRODUCTION

1.1 Introduction

Telecare android mobile application is mobile-based system that can accessed via Wi-Fi or mobile data of any MNO (Mobile Network Operator). The Telecare mobile application is an integration of Java files and SQLite database that synchronizes with the live database. Telecare mobile application is designed to allow users air grievances through the system, offer recommendations on what the users view on the system performance, switch packages without deleting their existing account and posting of a claim when a dependency is hospitalized or faced with a problem using the proposed system. The administrator of the service will be able to pull reports, add and edit packages. The system will also offer a function to view claims that were processed for a policyholder. Alerts to subscribers with overdue payments will be facilitated through the system.

1.2 Background of the Organization

Telecel Zimbabwe is a Mobile Cellular Network Operator that began operating in August 1998 headquartered at No 148 Seke road Granite side, Harare. In addition, Telecel has 25 regional offices spread across the country. These regional offices offer marketing, sales and customer care services. Telecel is a growing telecommunications company with more than 1.5 million subscribers. Telecel Zimbabwe represents a partnership of the Government of Zimbabwe and the Empowerment Cooperation. The Government of Zimbabwe has 60% equity share of the company and Empowerment Corporation owns the remaining 40%. The company boast with an employee base which exceeds 700.

WHO IS EMPOWERMENT CORPORATION

The Empowerment Corporation consists of the following indigenous business organizations.

• The Indigenous Business Women 's organization.

• The Zimbabwe Small Miners Association

• Kestrel Corporation

WHO IS ZIMBABWEAN GOVERNMENT

The Zimbabwean government who owns 60% of Telecel Zimbabwe is the Zimbabwean citizen's public representatives, who make decisions and represent Zimbabwe as a whole. As a company, Telecel Zimbabwe represents a unique combination of cellular experience and local understanding.

1.2.1 Organizational Structure

Lucey (1997) defined organisational structure as a graphical way of depicting or showing the structured system of an organisation in order to bring order and showing the delegation channels in the pursuit of the organisational objectives. Figure 1.1 provides the organisational structure for Telecel Zimbabwe.
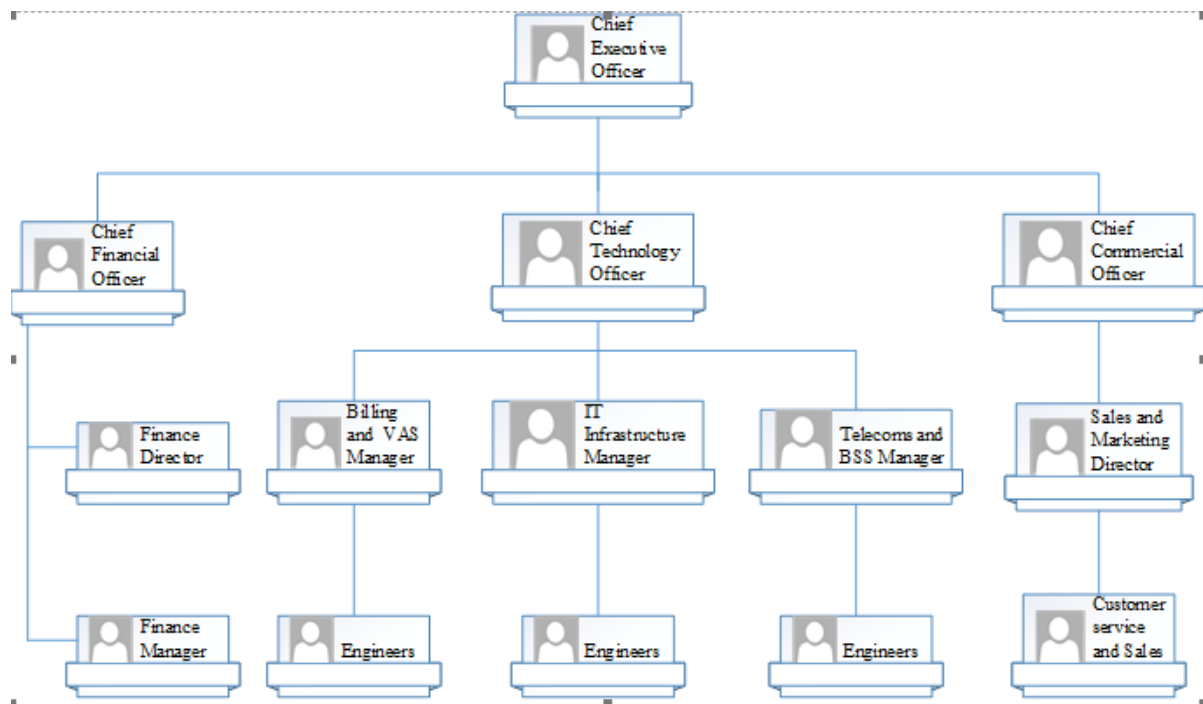
Fig1.1 Telecel Zimbabwe organizational structure

1.2.2 Vision

To become the most innovative and pioneering communications company of choice in Zimbabwe

and the region that can inspire us to impact a positive change and shape the way people live and connect with the acknowledgement that customer experience makes a difference.

1.2.4 Mission Statement

To establish the most profitable and customer centric communications business in the region with unmatched and superior quality.

1.3 Problem definition

- Users cannot post their grievances and recommendations since the service only accessible through USSD (Unstructured Supplementary Service Data) channel. USSD channel has a limit of 80 characters and it uses sessions which times out after a certain period say 10 seconds if no action has taken place within a transaction.
- For the current system there is no option to change or shift their package
- Alerts for due and overdue payments needs to be delivered to the customers as a way of reminding them to pay for their premium.
- There is no support portal for the service. Company official logs into the live database to access a record, which is time consuming and reduces the performance of the database due to increased number of connections.
- There is no facility for posting a claim without visiting the company offices, which in some causes other customers fail to submit the claim in time.

1.4 Aim

Develop a mobile application that will solve the short falls of USSD

1.5 Objectives

After completion of the proposed mobile application will address the following:

- To facilitate package switching without deletion of policy.
- To facilitate claim posting and approval through the system
- To send alerts for overdue payments and promotions through SMS and emails
- To facilitate grievance airing and recommendation posting
- To facilitate package comparisons for promotional purposes

1.6 Instruments

- Android studio

This is the official IDE for android operating that was create by Google built on Jet-Brains' IntelliJ IDEA which runs based on Gradle. It came as a direct replacement of the eclipse Android Development Tools (ADT). Gradle is an automation system that was built based on the concept of Apache an it uses directed acyclic graph (DAG) to control the order in which tasks executes. Emulators an real devices are used to run and debug the application under development.

- XAMPP

It is an open source cross-platform that comprises of:

- Apache- is a cross platform web server software that was developed by the Apache Software Foundation and they are the sole maintainers of the system. It is a fast and very reliable web server whilst secure that can be customized so as to meet the requirements of the user through the use of extensions and modules. A web server is responsible for receiving HTTP requests to access a web page.
- Maria DB- it is the cross platform database that can be used for free and it uses SQL queries its execution.
- PHP- it is a server side scripting language designed for Web development and can also be used for general development. PHP can be embedded into HTML code and can be used together with various other web template and web frameworks. The PHP code can be in

command line interface in which it can be used to implement those graphical applications, which are standalone.

1.7 Justification

After completion of the proposed system (Telecare Mobile Application), the problems that were discovered by the system analyst will be solved. There will be a centralized database that will be used for both operational and reporting purposes thereby reporting using the most current data available. Alerts to subscribers will be used when authenticating during registration so that the security of usage will be enhanced. The time taken to resolve a problem will be reduced since after sending a recommendation or a grievance it will be directed to the support team without first going through the call center and the customer care department of the service. The mobile application will target all android version 4.0.1 and better meaning it will be supported by approximately 99% of the android devices on the market.

1.8 Conclusion

The chapter concentrated on the background of the company, showing the organogram of the company. The problem that paved way for the proposal of the mobile application were discussed and the objectives of the proposed system outlined. The tools to be used be used in the development of the proposed system were listed. After the justification of the proposed system, there is green light for the planning phase that will be looking on the feasibility of the proposed system. The analysis on feasibility majoring with economic feasibility, social feasibility, operational feasibility, risk analysis and the stakeholder analysis. The work plan and the Gantt chat will be used show the time needed to finish development and implementation.

CHAPTER 2: PLANNING PHASE

2.1 Introduction

This stage succeeds the introduction chapter, which outlines the objectives for developing the proposed system. The planning phase includes investigating the proposed system considering the business goals of Telecare as a service. Feasibility study and risk analysis will be the basis for the development of the proposed system. Risk analysis will be done to identify and assess the factors that may hinder the overall accomplishment of this proposed system. At this stage, focus is around the need to draft a work plan of what is intended to be done during the execution of tasks. The researcher also completes feasibility at this stage to decide whether it is worthwhile to carry out the development of the proposed system. This phase additionally demonstrates the fundamental explanations for building up the proposed system.

2.2 Business value

According to Eppingner (2008), business value is a standard but more subjective measure to the valuation of intangible assets. The proposed system will significantly enhance the activity of the business. The Telecare mobile app will help the company as a whole to market its brand through the publication of the system on the app store. The gross additions on the network will also increase due to the increased uptake of the service. The mobile application will help the company to receive a claim from the client without wasting the user's time visiting the offices. The service will help the company to know the customers better since there is the KYC (Know Your Customer) section, which will help the company to target market the customers through their likes and preferences. The system will save the time needed to attend to customers since the service does not have an administrator panel for query processing leading to direct use of the database, which reduces the performance of the database to live services. This saves the IT VAS team to concentrate more other pressing issues since a single person will be able to assist the customers and fewer emails from ZIMNAT asking for the dump for a specific period since they will be able to access the administrator panel. The recommendations and suggestions will be

provided to the IT VAS directly by the customer reducing the waiting time is query resolution and recommendation directed to IT VAS team and be regarded as high priority issues.

2.3 Feasibility study

This is a process of evaluating and analysing the potential of a proposed system (Brown(2000)). It protects the company from pointless speculations or investment and wastage of assets. The outcomes of the feasibility are the cornerstone on the development of the proposed system since it gives out the expected development costs of the system. Through the technical feasibility, economic feasibility, social feasibility and operational feasibility.

2.3.1 Technical Feasibility

Technical feasibility emphasises on determining whether all the resources needed to develop the proposed system are available or not available (Brown, C (2000)). Additionally, it advises if the individual expected to do a task is accessible in the organisation with the required skills and qualifications. Technical feasibility is a tool that is regularly utilized by organizations in long term planning. It will survey how a specific technology will help in development of the task. The hardware and software requirements that is needed to build the proposed system is shown below.

Table 2.1 Hardware requirements

Item	Minimum requirements	Quantity	Availability
Storage	500GB	1	Yes
Processor	Quadcore	1	Yes
RAM	32 GB	1	Yes

Table 2.2 Software   Requirements

Software	Version	Status	Remarks
Operating system	CentOS 7/ Windows Server 2018 r2	Available	IT department will purchase the software.
DB Server	Oracle /SQL server	1	Yes
Application Server	Wildfly/Tomcat/Glassfish	1	Yes

2.3.1.1 Technical Expertise

Telecare as a service gets its technical support from the Telecel Zimbabwe's IT department therefore there will be no issues on the development and support of the system. Training for familiarisation with the system will be conducted using the board rooms that are at Telecel headquarters. Due to these familiarisation trainings the development team will have a real feel and understanding which propels the technical feasibility to a success

2.3.1.2 Overall comment on technical feasibility

Due to the availability of all the required hardware and software, the technical feasibility is going to ride on thee available technical expert within the organisation. There are no additional costs to be incurred so as to meet the technical demands of the system.

2.3.2 Economic Feasibility

It is the examination of the logicality aspect in carrying out the project at hand until its completion (William, 2018). This phase focus on the benefits to be derived from the production or the completion of a project against the costs that needs to be incurred until completion. Given the benefits outweigh the costs, the project is regarded as worthy embarking on. The economic feasibility of a project is done with the Cost Benefit Analysis (CBA) and recommendations are passed depending on the outcomes of the cost benefit analysis. Giving management a strong defence for the project through the cost benefit analysis will help the project team secure funds for the project since not all the project will be lined up for funding in a company's budget thereby giving a strong recommendation for the economic feasibility study on a project. A careful analysis of costs and benefits by the project analysts is vital in decision to be made towards the project.

The project is to be undertaken using available resources meaning the organisation is not going to incur higher cost in the development of the Telecare mobile app, hence due to the minimal costs to be incurred. The pay back, the return on investment or the net present value will be used to determine if the project is worthy undertaking.

There are various techniques, which can be used, and these include:

- Cost Benefit Analysis.
- Pay-back period.
- Return on Investment.

2.3.2.1 Cost Benefits Analysis (CBA)

Brent (2006) propounds that cost benefit analysis is the present value of all benefits less than all costs, subject to specified constraints. CBA of the proposed system looks at the cost and advantages to be acquired amid and after advancement of the system. The costs or benefits can be classified into:

2.3.2.1.1 Cost

Expenses to be incurred during the development of the system and after development. The costs may include Hardware and software costs, operational costs and personnel cost. For the development of the product there is less costs to be incurred.

2.3.2.1.2 Developmental costs

These are extra costs to be incurred during the development stage of the proposed system; these include additional software and hardware. The organisation will not spend on hardware during the development and maintenance phases since the required resources are readily available. The only cost anticipated during development will be the overtime for the developers pegged at $15 per day spent at work after work hours.

Table 2.3 Developmental costs

Costs	Value in USD
Overtime	330

2.3.2.1.3 Operational costs

According to Randall (1996) these are costs that continue to be incurred after every expense have been accounted for. In this case these are cost that are incurred after the Telecare mobile application and the admin-portal has been implemented and continue to be incurred as long as the system is in use for example maintenance, backup tapes, rewritable compact disk cost fall under this category. These are costs, which are going to be incurred when the system is in operation.

Table 2.4 Operational costs

Costs	Value in USD
Software maintenance	5750
Computer consumables	1600
Total costs	7350

2.3.2.1.4 Benefits
There are two types namely tangible and intangible benefits

Tangible Benefits

They are benefits of which can be physical or can have a monetary value attached to their outcome.

Table 2.5 Tangible benefits

Item	Monetary value
Availability of data	200
Reduction of Brand ambassadors	10000
Reduction in stationery costs	500
Reduction in processing errors	700

Intangible Benefits

According to Randall (1996) Intangible benefits are advantages that are difficult to measure in dollars but are important to the company. The following are examples of intangible benefits:

- Job satisfaction by front office personnel

- Query optimization that reduces the time needed to mine data of a certain customer.

- Customer satisfaction due to direct communication with the IT personnel and ease of grievances resolution.

- Better decision making by management through the use of mined data and the KYC option on the system.

- Work load reduction on back office workers mainly IT.

- Service visibility improvement

Table 2.6 Cost benefit analysis

Type of cost	Estimates over 3 years in USD		
	1	2	3
Benefits			
Tangible	11400	11400	11400
Intangible	11400	10000	10000
Total benefits	22800	21400	21400
Costs			
Development costs	840		
Operational costs	12350	9350	9350
Total costs	13190	9350	9350
Net benefits	9610	12050	12050

Conclusion on cost benefits analysis(CBA)

Since the benefits outweighs the costs associated with the development of the system it is viable to undertake the development. There is a projected net benefits of 9610 in the first year of operation and a uniform net benefits of 12050 in year 2 and year 3.

2.3.2.2 Return on Investment (ROI)

According to Sommerville (2007) "Return on Investment determines the lifetime profitability of different investments". It is the most broadly used project evaluation strategy and is calculated using percentage rate of profitability, it measures a project's average net benefit with its initial cost (the investment). The formulae is as follows:

ROI= [(Total benefits – Total costs)/Total Benefits] *100

   = [(22800-13190)/22800] *100

   =42.15%

Comments

Ration of income generated to the investment is 42.15% which is sufficient and favourable for the project to be done. Developing the mobile application with the administration platform is ideal and favourable basing with the expected return on investment.

2.3.2.3 Payback Period
Kendal (2005) defines payback period as the amount of time it will take to recoup, in the form of net cash inflows, the total dollar invested in the project. The project will be able to breakeven its first year because the project will generate enough to cover the initial cost used. The payback period is calculated as below:

Year	Cashflow in USD	Balance in USD
0	(10000)	(10000)
1	22800	12800
2	25000	

= (10000/22800) *12months

=5.2 months

=>0.2*30 days=5days.

Therefore, payback period =5 months 6 days.

 Comment

The payback period is 5 months 6 days which is a favourable period and indicates it is vital to carry on the project. This is because the time needed to breakeven is short.

2.3.3 Social Feasibility

Social feasibility analyses the extent to which an organisation interrelate with the external and internal environment that the society (Jewel, 1990). In Zimbabwe, it is a mandate for every company to engage in social responsibilities. In assessing the social feasibility of the proposed system, the project developer will be looking on how the system will help the community to a better the environment they live in. Telecel engages itself in many social projects among the many these are some of them. The proposed system will help the interaction between the service provider and the service user in a more advanced way through use of forums which enhances the user's view to be better towards Telecel thereby increasing the motivation towards usage of the Telecel products. Roads shows as a way of customer engagement whilst pushing the product into the market will help the uptake this merging customer engagement and product marketing. The proposed system will help the users live in a paperless environment since they will do away with the traditional registration which leaves the environment polluted. The claims and claim reimbursement will be easier since the administrators will be able to mine all the data they need to assist the subscriber without waiting for the other party saving time.

Engaging the users, the Telecare marketing team, ZIMNAT and the IT team will help in the attitude the team will pose towards the system. When the need to be pushed through into the marketing, enough knowledge of the product will remove the resistance by the team. It will help to do project social feasibility to know the impact it will pose to the concerned parties.

2.3.4 Operational Feasibility

Operational feasibility is defined as the willingness and ability of management and employees to operate and use the proposed system (Kendall, 2005). (Kvale, K (1996) defines operational feasibility as the ability to utilise, support and perform necessary tasks of a system or a program. When the system is completed the burden on users of waiting to call in to air their grievance and posting claims through visiting Telecel shops will be a thing of the past since all be done in the comfort of their homes. Adding dependencies will be also added on the system and package switching will be done through the system without deleting one's account. The development team will need to work through the system functionality and the desired working conditions of the system. Telecash management is in dire need of the admin portal for Telecare service to offer the intended service and query resolution through data manipulation. The system will be available on google play store and will be available for download to though with access to the internet.

2.4 Risk analysis

Risk analysis is concerned with identifying risks that can come or arise as a result of a certain action or an event (Rosenblatt, 2013). It helps the developer in creating strategies that deals with anticipated risks. The risk analysis comes as a crucial aspect on the approval of the system and its acceptance in the market. The risks anticipated may include counter deployment by competitors and the internal constraints that may be avoided before the project commences.

Table 2.7 shows expected risk and the probability of it to occur. The risk impact of the risk and the mitigation in place for the risk identified.

Table 2.7 Risk analysis log

Description of risk	probability of occurrence	Risk impact	Mitigation of risks
The developer may lack expertise in the field of research	Low	Sub-standard system Project deadlines postponement due to failure in meeting the deadlines	Pair the developer with more experience developers. Total outsourcing

Mentioned is the major risk in the development of the system which have some clear mitigations in place. It is the most anticipated to be a major cause of delay, this shows that there is need for close monitoring so that is the risk is seen can be resolved early without delaying the progress in development.

2.4.1 Other   risks

There are risks that cannot be leaved undocumented because they can affect the activities in the development negatively. These dangers require not to be disregarded since they influence adversely in completing the project. In spite of the fact that they are not significant dangers in the project, they influence the general completion of the system. Technology related issues are other hazards related with project execution. Changing development platforms can also be regarded as factors to consider for example if the project was started on wildfly application server and the project needs to be migrated to Glassfish. Unrealistic project timelines can be another hazard in project execution and this is a typical hazard. Project supervisor may set due dates that are unreasonable and therefore the product designers may fail to meet stipulated due dates.

2.5 STAKEHOLDER ANALYSIS

DeGeorge (2010) defined stakeholder analysis as the way toward assessing a system and potential changes to it as they relate to relevant and interested individuals (stakeholder). This information is used when evaluating how the interests of those stakeholders should be attended to in a project plan. Stakeholder analysis does not limit the interests of the stakeholders but it guarantees that

affected stakeholders considered. Table 2.8 shows the list of stakeholders, their stake, priority and impact, attitude and the risk posed if not engaged.

Table 2.8: Stakeholder Analysis

Shareholder	Stake in the project	Impact	What is needed of them	Perceived Risk	Risk if not engaged
Telecel	Benefiting stakeholder	High	Data on subscribers	Fear of retrenchment	Shortage in infrastructure if not engaged.
Customers	End Users of the system	High	Adoption of the system	In need of self help	If they resist to offer their contribution it will derail the progress
IT Department	Responsible for development and support	High	Development and support	Fear of over being over loaded. Interested in innovation	Failure to meet deadlines due to lack of expertise. High expenses due hiring technical experts for outside the organisation.
Customer Service	Customer support	Medium	Customer support	They fear change. Interested in doing work in easiest possible.	poor customer service due to lack customer experience.

From Table 2.8, it is clear that all stakeholders must be engaged since they all have high impact and pose a high risk if not engaged.

2.6 Work plan

A work plan is a blueprint of a set of objectives and processes by which a group can achieve those objectives, and offering the user a superior comprehension of the scope on the project. Work plan enable a designer to remain sorted out while taking a shot at tasks. Table 2.9 shows the proposed project schedule.

s

Table 2.9 Project Schedule

Phase	Start	Finish	Duration(weeks)
Introduction	30/07/2018	06/08/2018	1
Planning and Feasibility Study Phase	07/08/2018	13/08/2018	1
Analysis Phase	14/08/2018	27/08/2018	2
Design Phase	28/09/2018	10/10/2018	2
Implementation Phase	11/10/2018	11/11/2018	4
Maintenance Phase			0ngoing

2.5.1 Gantt chart

Joana and Thomas (2012), argued that a Gantt chart is a type of bar chart that illustrates a project schedule. This chart lists the tasks to be performed on the vertical axis, and time intervals on the horizontal axis. The width of the horizontal bars in the graph show the duration of each activity. Gantt charts illustrate the start and finish dates of the terminal elements and summary elements of a project. Table 2.9 illustrates the Gantt chart for this project's life cycle.

Table2.10 Gantt chart

Activity	Activity period in weeks							
	1	2	3	4	5	6	7	10
investigations	■							
Planning phase		■						
Analysis			■	■				
Design Phase					■	■		
Implementation							■	
Evaluation								■
Documentation	■	■	■	■	■	■	■	■

2.5 Conclusion

Through the research done, it is feasible to develop the proposed system. The technical feasibility was the first to be discussed were the hardware, software and technical expertise discussed and evaluated. The economic feasibility for the system was done using three approaches namely cost benefits analysis, payback period and the return on investment. The cost benefits analysis was done through evaluation of cost (developmental cost, operational costs) and benefits (tangible and intangible). Operational feasibility was discussed showing the benefits of the system when in use. Risk analysis was carried out so as to discover risks and have mitigation plans if there are any. The work plan for the proposed system was laid down in this chapter and shown in the Gantt chat in weeks. The next chapter will be looking at the analysis of the current system through the discussions on the data flow, the weaknesses it has will be discussed. All thee analysis will be basing on the data collected through the data collection methods chose. Alternatives in development will be discussed and the requirements analysis will be discussed.

CHAPTER 3: ANALYSIS PHASE

3.1 Introduction

The analysis phase discusses the different methods of data gathering systems to be used by the analyst to gather information that is required to carry out the project analysis. Current system was analysed and activities that are involved were determined. The advantages and disadvantages of the present system were additionally analysed to attempt and think of a superior system after the proposed system's completion. In this phase, context and data flow diagrams have been used to determine the data flow and process currently being used by the organisation. An intensive examination of various alternatives to the system development is also done to decide on the best possible alternative to the development of a system that addresses challenges that are being faced by the organisation. The functional and non-functional requirements of the system will be controlled by the requirements analysis.

3.2 Information gathering methodologies

Data is core in the development of a system. Data on the current system needs to be collected so as to have a better appreciation of the system. The data was collected using three techniques namely questionnaires, interviews and observation. Each one of the three is discussed giving the problems (disadvantages) and the good (merits) that came along with the use of each. Also given is how the research was conducted using the three methodologies.

3.2.1 Questionnaires

This is a research method that uses a series questions for gathering information in which the questions will either be oral or written. Written questions are the most widely used. (Gray 2009). The questionnaires were given to people in the organisation at random. Since a random distribution of the questionnaires was used there were some employees who showed that they did not even know that the service was in the market because they are only concerned with services that are provided on both channels meaning USSD and Smart phone (mobile applications). The responses given showed that the employees were more satisfied in maintaining anonymity thereby giving more reliable answers as compared to interviews.

Advantages

- They were cost effective.

- The results were easy to analyze since the answers provided were easy to understand

- It is more practical since it provides tangible results

- Availability of user anonymity provided room for genuine answers since there was no fear of superiors.

Disadvantages

- Difference in understanding and interpretation of question provided difference responses

- There was no room for conveying feelings and emotions.

- Some left some questions unanswered.

3.2.2 Interviewing

It is the verbal conversation between two people with the objective of collecting relevant information for the purpose of research (Corbin and Strauss (2008)). It is one of the most used methods in data collection since it provides primary data with notable emotions and feelings behind answers. Oral communication provides room to monitor the reaction of the next stakeholder in the development in the development of a system. The interviews were conducted in semi-structured manner since there was no enough time to book for the interview. Whilst other individuals were answering the questionnaires the interviews were being conducted since the analysts had minimal time at his disposal. The questions were focused, clear, and encouraged open-ended responses since interviews are mainly qualitative in nature.

Advantages

- Opinions, the perceptions and personal feelings were noted

- Clarification on ambiguous questions and follow up on incomplete questions

- Gave room for more direct and detailed questions.

Disadvantages

- The major disadvantage was on time management since the interviews were scheduled for free time slots of the targeted group.

3.2.3 Observation

This is a method when the researcher uses all his/her senses to gather data in a natural manner that is not notifying the targeted group their intentions. For Telecare observations was done by visiting service centre and using the USSD platform to have a view on how the system performed. The researcher visited Telecel Call centre were 8 hours were spare whilst observing how the Telecare service centre operated and what were the frequent issues being faced by service users. Through observing the call centre staff there was clear notation of their attitudes towards the system and the way of airing grievances. Also there was observation through the use of the USD platform so as to see how it works and it behaviours.

3.3 Analysis of existing system

Telecare is a service that is only available on the USSD platform, this means that if someone is away from their cell-phones they cannot be able to access the service. The Administrators of Telecare as a service have to go direct to the database to see the records of a subscriber which in turn proves to be less secure and time consuming. This shows that from the admin end it is a manual system for searching a customer's record.

3.3.1 inputs
- registration

- dependencies

3.3.2 Processes
- dial *808#

- registration

- amend policy

- view policy

3.3.3 Outputs
- policy holder details

- dependencies

3.4 Process analysis

It is a procedure of dissecting a progression of steps of a procedure that are utilized to pass on data that is inputs and the outputs. It can be utilized for potential focuses in a process by enhancing the process and expelling the excesses in this way increasing productivity (Wiegers & Beatty (2013)). It also takes into account the activity diagram which is a tool that shows the sequence of the flow of activities. It mainly there to show the general flow of activities without showing the messages displayed. The activity diagram of the current system is as shown in Figure 3.1.
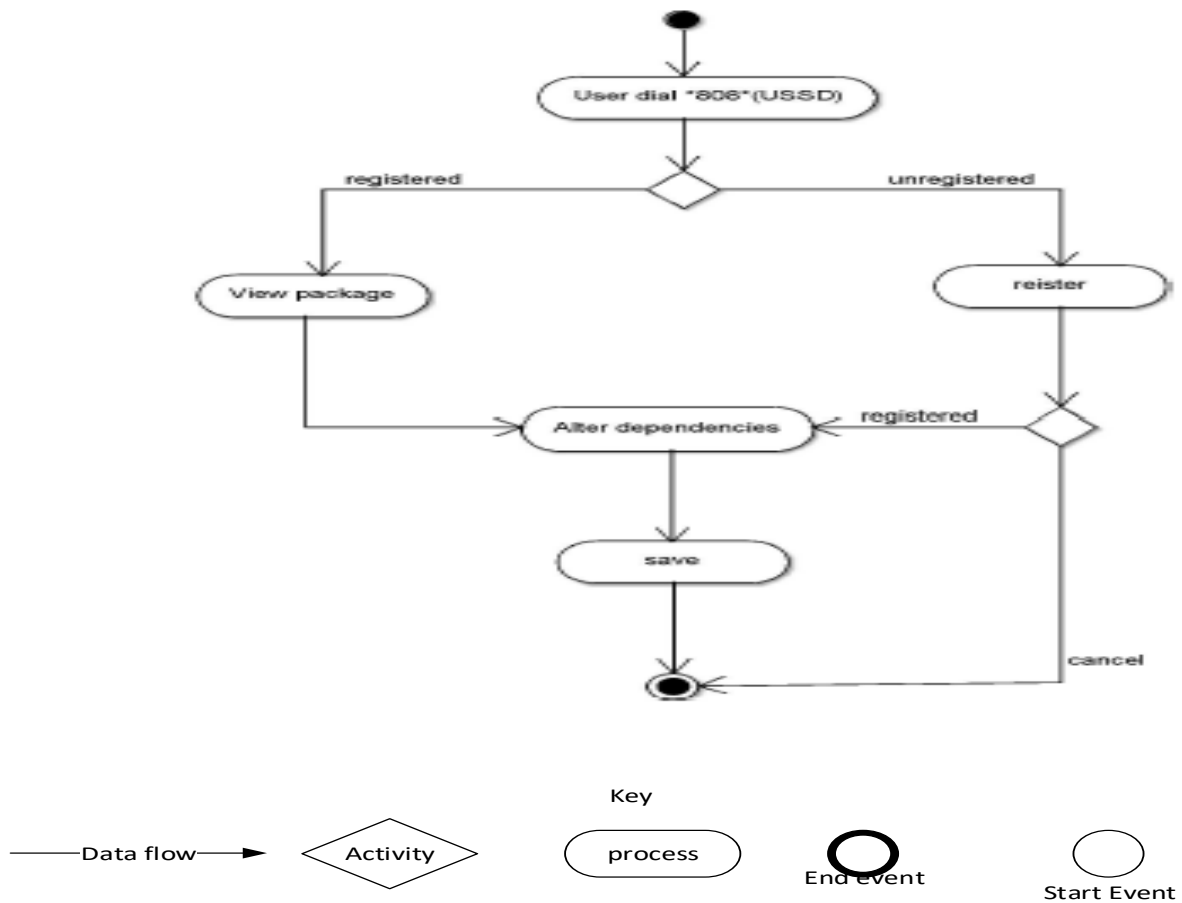
Figure 3.1 Activity Diagram of current system

3.5 Data Analysis

Jewel (1990) defined data analysis as the process of applying statistical or logical to describe and evaluate data. After the collection of data, using the various sources, analysis and evaluation is done to reach a conclusion on the current system. Data analysis for a system and its data flow representation is done through the context diagram and the context diagrams so as to show the interaction of entities of the system.

3.5.1 Context diagram

Gane and Sarson (2001) defined a context diagram as a graphical presentation of defined boundaries of a system and its interacting entities. This diagram is a high-level view of a system. Figure 3.2 shows the context diagram of the current system.
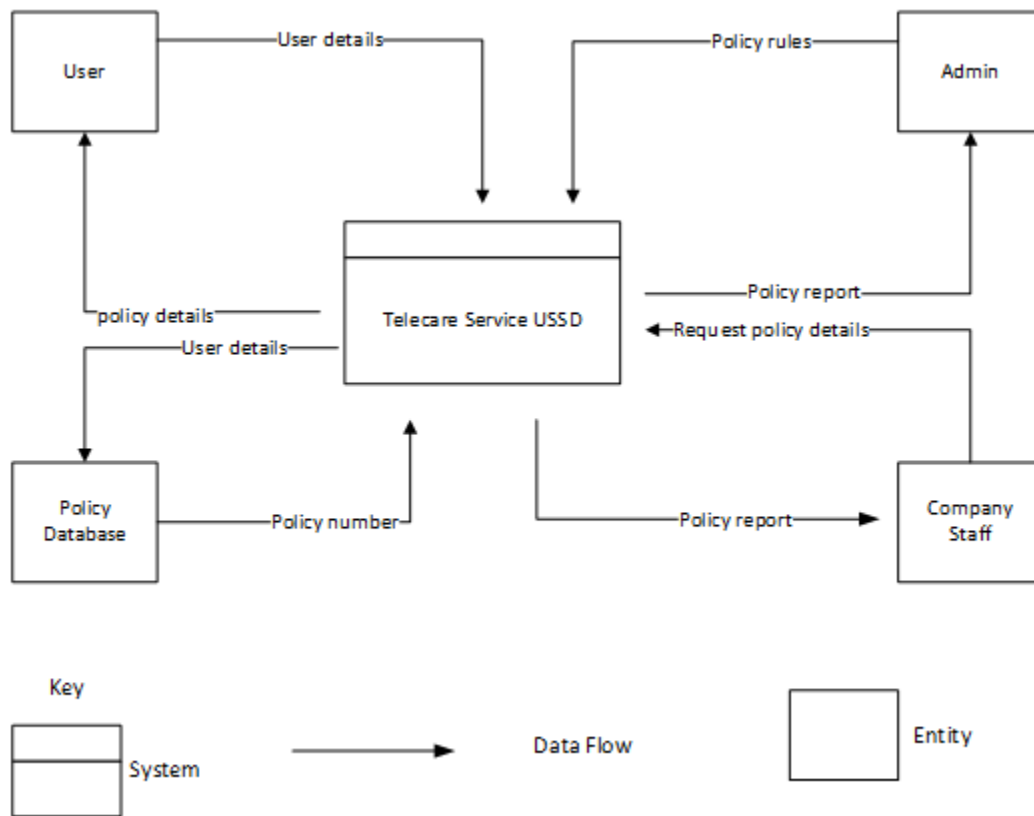
Figure 3.2 Context Diagram of the current system

3.5.2 Data flow diagram

Azzolini (2000) defined data flow diagram as a pictorial illustration of the flow of data through a system whilst modelling its process aspects. Data flow diagrams provides a preliminary step in creating a system and its analysis on data flow. Figure 3.2 provides the pictorial view of the data flow diagram for the proposed system.
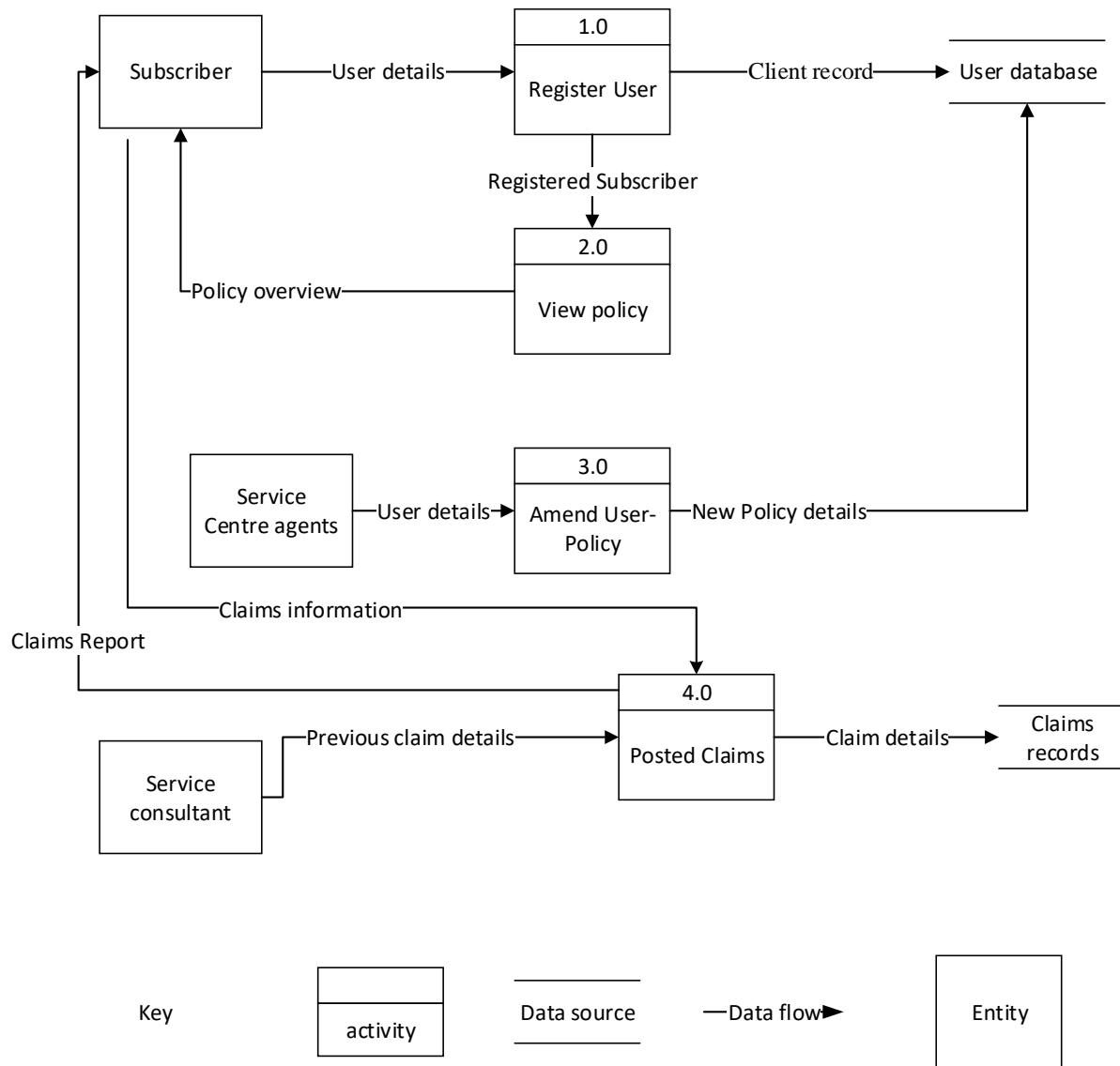
Figure 3.3 Data flow diagram for the current system

3.6 Weaknesses of current system

The weaknesses the current system are the main reasons for the proposed changes. These weaknesses include:

- inability to change from one package to the other without deregistering.

- Inability to view full details on package subscribed and making claims.

- Lacks a facility to air grievances and recommendations due to timeouts on the USSD platform.

- No room for subscriber to view history and trends of his/her policy.

3.7 Evaluate Alternatives

It is a process of evaluating the available alternatives for the successful he available options on the development of the system will be considered. These options include the following:

1. Outsourcing (packaged software)

2. In-house development

3. Improvement

3.7.1 Outsource

It is when a company gives responsibility of developing a system to a third party that is an external party will have to manage these policies on behalf of the company. Outsourcing the mobile application will be giving the task to company like Afro-soft or twenty third century. These are development houses that specialises in providing software as a service

Advantages

- Swiftness and Expertise- vendors have practical experience in their field and they have specific equipment and required expertise.

- Gives the outsourcing company time to concentrate on core processes instead of supporting development.

- Risk sharing- Outsourcing encourages the organization to move certain duties and responsibilities to the outsourced vendor thereby sharing risk with the vendor.

- Reduction in operational or recruitment costs

Disadvantages

- Risk of divulging private information

- Coordinating the deliverables – there are common errors that include sub-standard products since attention is spread to many clients thereby produce a product that is generic to the market demands.

- Unseen expenses- Outsourcing is regarded as cost effective there are costs that are hidden but are involved in contract signing.

3.7.2 Improvement

This alludes to refreshing and redesigning the current system to suit the proposed changes. Telecare is currently running on short code *808# which is a USSD channel. The proposed system is to run on Android that will be performing the exact task that the USSD is capable of achieving. The main difference will be the ability by the subscriber to view his /her policy, post a claim, shift packages without deregistering and air their grievances that cannot be achieved with the USSD channel.

3.7.3 Development(Recommended)

Shaws (2010) defined in-house development as a process whereby the organization utilizes their own specialists to create or develop an information system that fits the particular requirements of the organization. Exercises or tasks will be conducted from within an organization, rather than depending on outsourcing. Telecel will be using its own employees, infrastructure and time to develop the mobile application.

Advantages

- The organization has full ownership of the system, the source code and the expertise gained during development.

- The develop system will precisely fit to the business needs and wants of the organization

- The connection between users and the development team helps in create a system that addresses the user requirement.

- Allows differentiation from competitors (as the system is developed for specific needs).

Disadvantages

- High costs in time and maintenance.
- Switching costs high

The development of the system is best suitable with in-house development due the cost that can be incurred if the improvement or outsourcing is to be selected as the best alternative in the development of the system. The estimated costs can be shown as below.

Table 3.1 Comparison of the costs associated with each alternative

Alternative	Estimated cost(USD)
Outsourcing	15000
Improvement	N/A
Development	5000

There are no costs that are directly linked to improvement as an alternative for developing the proposed system. Improvement does not have the capacity to accommodate the proposed changes. The USSD gateway does not support the amount of characters that will be needed to effectively air a grievance; successfully post a claim and viewing the overall policy. Outsourcing have high costs as compared to the in-house development of the system.

3.8 Requirements Analysis

According to Hay and David (2003), requirements analysis is the way toward deciding client desires for another or changed item. At the most minimal level, we have system and integration

that requirements. It is definite description of every requirement. The requirements must be clearly stated so that developers can begin coding. There are functional requirements and non-functional requirements.

3.8.1 Functional Requirements

It is a behaviour that a system must do or support (Laplante and Phil (2009)). Functional requirements can be expressed with inputs, outputs, and a description of the behaviour. These functional requirements can be seen as high level expressions of what is expected of the system and should describe the system service. Use cases diagram are used to illustration the actions on the system

3.8.1.2 Use case diagram

This is a behaviour diagram that models the functionality of a system (Wiegers & Beatty (2013)). It is a set of services, actors and functions that a system must do. Actors are system users operates under roles that are defined in the system. The use case diagram is shown figure 3.4
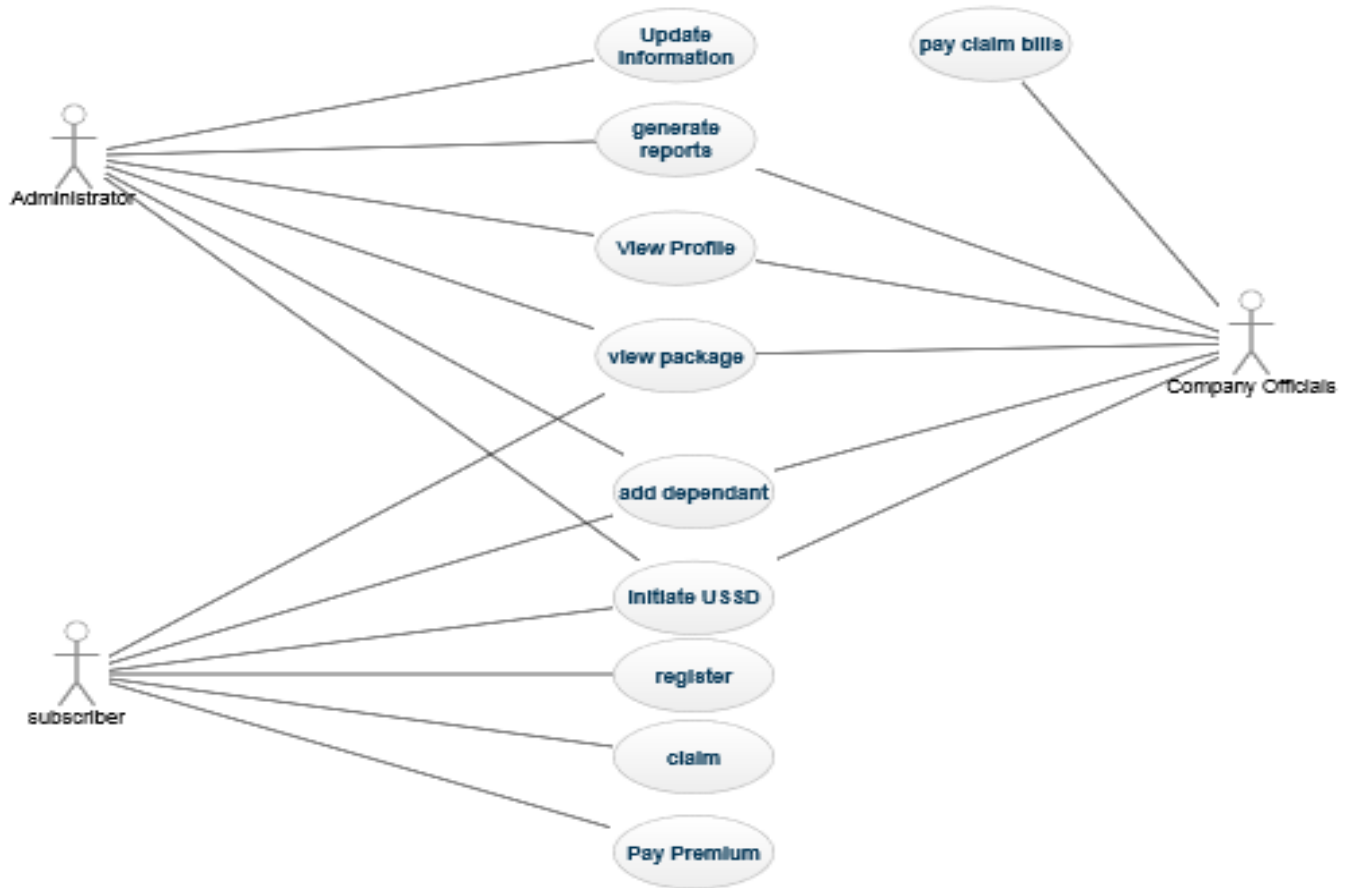

Figure 3.4 Use case of the current system

      3.8.2   Non-functional requirements

It shows how the system is expected to behave and set constraints on how functionality of system is enabled (Wiegers & Beatty (2013)). Non-functional requirements are also known as the quality attribute of the system.

The non-functional requirements include the following:

- **Performance** – this is a quality attribute that is used to measure and describe responsiveness of a system as it is exposed to user interaction

- **Usability**- this shows how easy is the system to be used and how difficult can it be for a user to learn and operate the system.

- **Security**- It contemplates diverse intensities of authorization and authentication across distinct user roles

- **Reliability**- it focuses on the number of failures per given period of time. Mainly affected by bugs in the code.

- **Availability**- the period of time by which the system is accessible by users. Scheduled maintenance is the remedy to ensure availability of the system.

3.9   Conclusion

The research methodologies that were used to collect data on the service performance namely questionnaires, interviews and observations were discussed. The weaknesses of the current system were pointed out and the flow of data within the system was discussed with data flow diagrams, context diagram, activity diagram and use case diagram. The system requirements were analysed and are in two categories namely functional and non-functional requirements. After the analysis phase the system analyst can now present the design phase of the proposed system were emphasis will be placed on system design, highlighting how the proposed system will work. The flow of data in the proposed system will presented using context diagram and data flow diagram. Architecture design and physical design of the proposed system will be presented. In addition, the database design and its structure will be discussed showing the relationships between entities. The security design of the proposed system will be scrutinised.

CHAPTER 4: DESIGN PHASE

4.1 Introduction

This phase fundamentally scrutinises at the functionality of the proposed system. The design phase shows how the proposed system is going to function, showing the data flows and how the modules on the proposed system will then integrate to each other. The proposed system is put to test on its functionality requirements and how the solution implemented. This phase focuses on system design, architectural design, physical design, database design, program design, interface design and security design of the proposed system. The proposed system must be flexible, efficient, effective and user friendly.

4.2 System Design

Suryanarayana, Girish (2014) defined system design as the process of envisioning and defining software answers to one or more sets of problem. During system design, the functionality of the proposed system will be clearly outlined showing how the entities will interact. The context diagram and the data flow diagram will aid in the presentation of the system. The following summarised how the proposed system will work and the activities related to each user of the system.

The subscriber

- Registration/ registration
- Posting claims
- Viewing policy/package
- Add dependants
- Change package.

The company officials

- Generate reports

- Add new packages
- Review claims
- Add dependants
- Attend to reviews and grievances.

4.2.1 Context Diagram

Gane and Sarson (2001), defined a context diagram as a graphical presentation of defined boundaries of a system and its interacting entities. This figure is a high-level view of a system. The context diagram of the proposed system is given in figure 4.1.
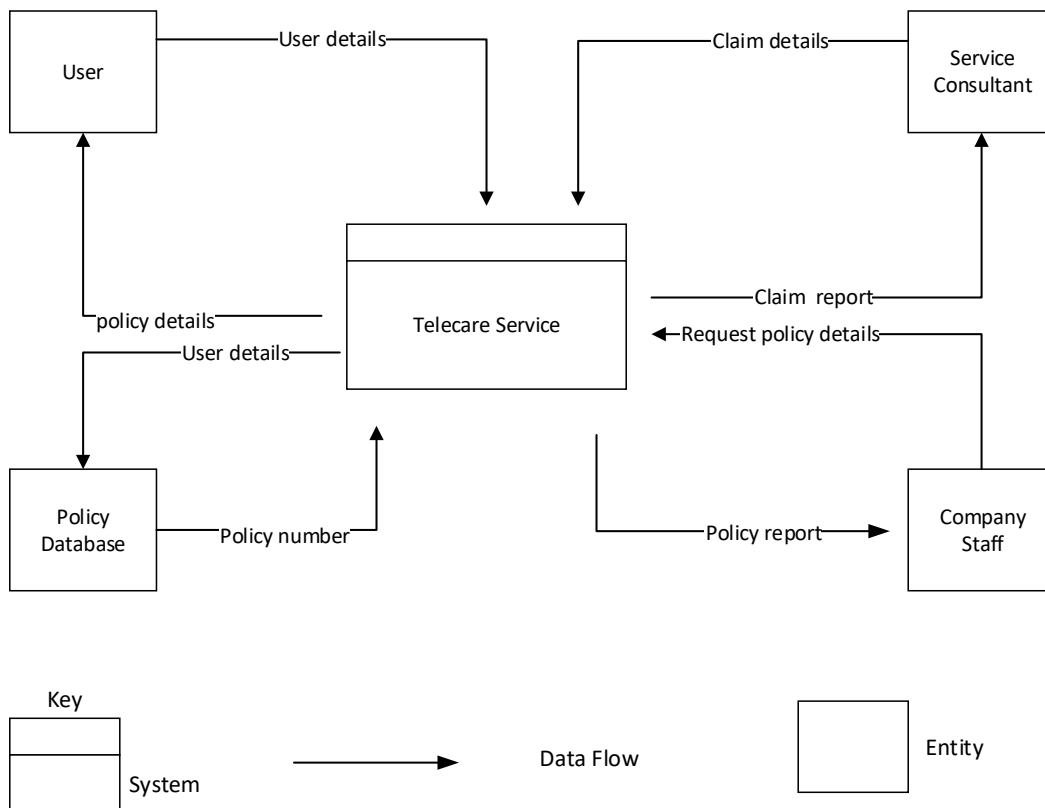
Figure 4.1 Context diagram for the proposed system

4.2.2 Data Flow Diagram

Azzolini (2000) defined data flow diagram as a pictorial illustration of the flow of data through a system whilst modelling its process aspects. Data flow diagrams provides a preliminary step in creating a system and its analysis on data flow. The data flow diagram for the proposed system will be as shown in figure 4.2.
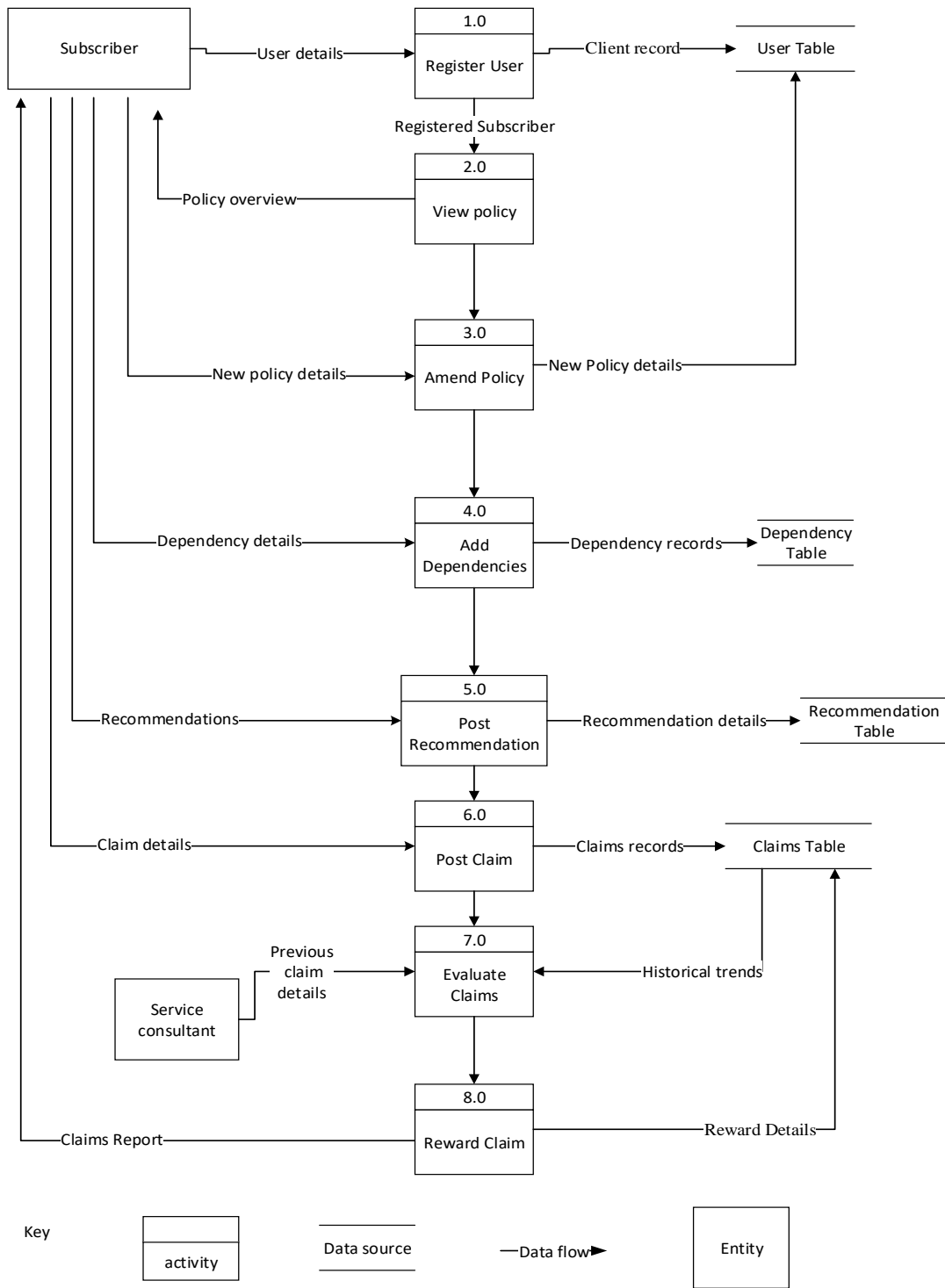
Figure 4.2 Data flow diagram of the proposed system

4.3 Architectural design

L. Bentley (2007) Architecture design defines the hardware and software modules that are involved in an information system and how they are interfacing each other so as to establish the framework for the system. The architecture of the proposed system will be defined as a client-to-server architecture as shown in the figure 4.3 below.
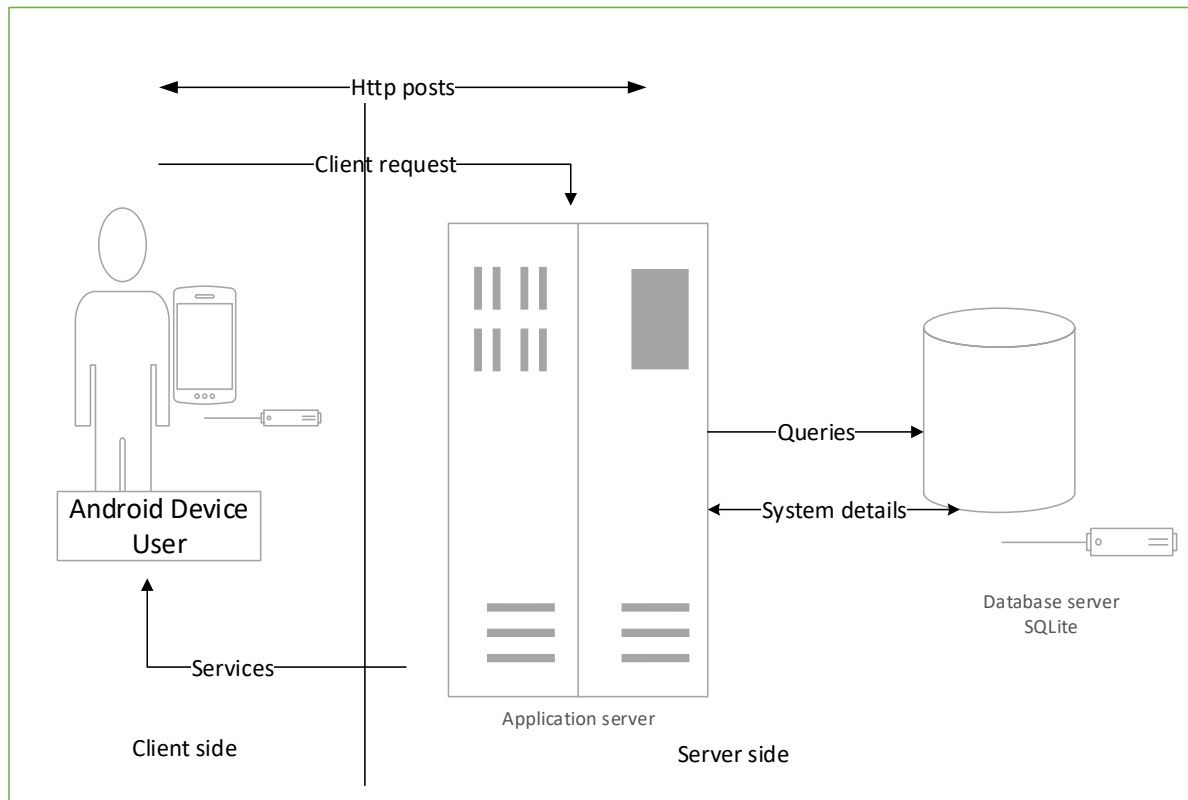
Source: self-design

Figure 4.3 Network Architecture Design of the proposed system

4.4 Physical design

Systems design is whereby the architecture of a system is defined according to its modules and interfaces of a system that is needed to satisfy user defined specifications (Ulrich & Eppinger (2000)). For the proposed system, it will show the attributes that are within the flow of information or data from the user to the content server and the DR site as shown in figure 4.4 below.
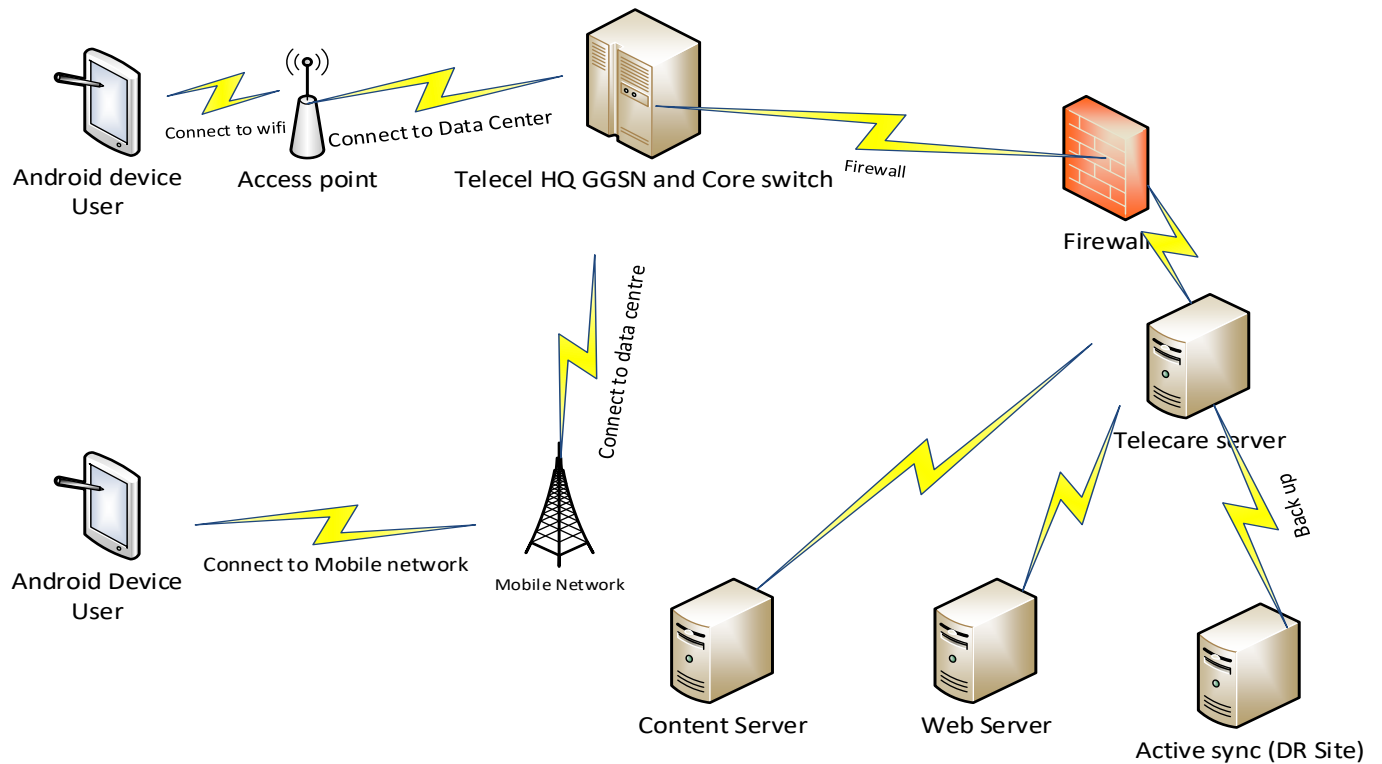
Figure 4.4 Physical design

4.5 Database design

Teorey (2005) defined database design as a way in which data is organised depending with database model. The designer determines what data must be stored and how the data elements interrelate. According to Gray and Reuter, (1992) a database is regarded as a structured pool of data, warehoused and retrieved electronically that is created to provide a central position of data

so as to assist in data requirements of the system. The logical data model stores the logical and physical design that are required in the generation of design in a DDL (Data definition language) needed in building the databases.

4.5.1 Physical design of the database

Hernandez (2013) expressed the view that physical database design interprets the logical data model into high level query statements. In relational database systems th translation from a a logical model into a high level query that is a an SQL statement. Figure 4.5 shows the physical design of the database.
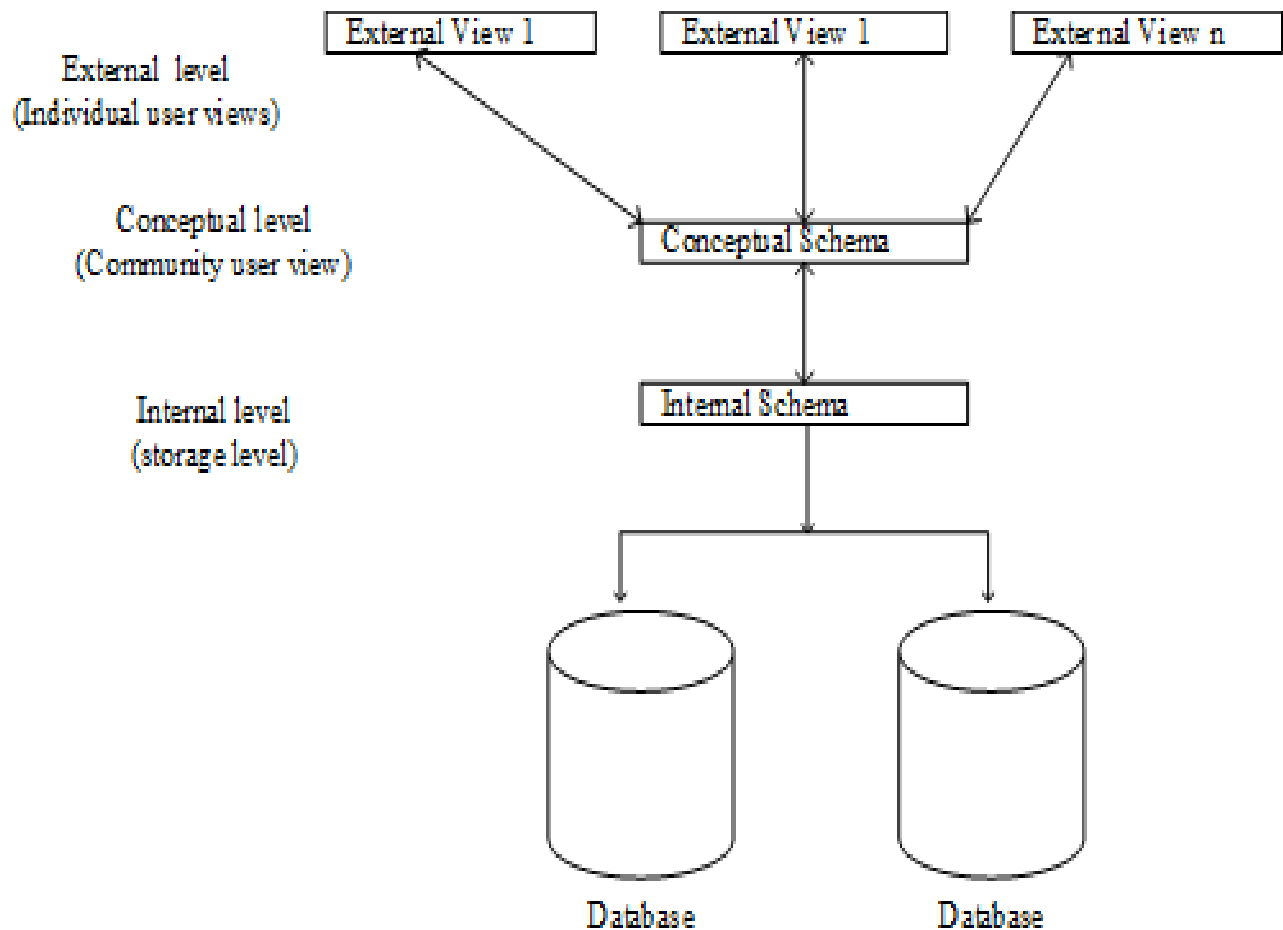
Figure 4.5 Physical design of the proposed system's database

The external level

This the level shows what a user view when provide a query to the system. It include the number of view that are available for the user and being the closest layer to the user it gives a user what he needs from the database and hide all that is not in the users domain.

The conceptual level

This level gives the data model to a group of users who have the privileges such as developers data analysts and data based administrator. Thee schema at the conceptual level represents the whole database and they hold information relevant to provide to thee external level and it does hide the details of the physical storage.

The Physical level

The internal level defines how the structure of the storage looks physically. It is the closest layer to the physical storage of data. At the lowest point of the physical level data is stored in bits. For the highest level it is in form of files.

4.5.2 Data tables

A database is made up of tables that are made up of rows and columns. Given below are the tables for the proposed system.

Table 4.5: Subscriber's table

Field	Data type
User_Id	Varchar(10)<<PK>>
FName	Varchar(250)
LName	Varchar(250)
Sex	Varchar(10)
Dob	Date
Address	Varchar(250)
CellNumber	Bigint(14)
Email_Address	Varchar(250)

Table 4.5. Dependency table

Field	Data type
Dependendencyid	Varchar(10)<<PK>>
User_Id	Varchar(10)<<FK>>
Title	Varchar(10)
FName	Varchar(250)
LName	Varchar(250)
Sex	Varchar(10)
Dob	Date
Address	Varchar(250)
CellNumber	Bigint(14)

Table 4.5. Claims table

Field	Data type
Claim_id	Varchar(10)<<PK>>
Policy_id	Varchar(10)<<FK>>
Status	Varchar(15)
Incident	Varchar (250)
Claim_value	Double(7)
Date_disbursed	Date
Date_claim_created	Date

Table 4.5. Premiums table

Field	Data type
Premium_id	Varchar(10)<<PK>>
Policy_id	Varchar(10)<<FK>>
Status	Varchar(15)
Value	Double(7)
Date_paid	Date
Date_created	Date

Table 4.5. Recommendations and grievances table

Field	Data type
Rec_id	Varchar(10)<<PK>>
Policy_id	Varchar(10)<<FK>>
View	Varchar(255)
Date_rec_created	Date

Table 4.5. Package table

Field	Data type
Package_id	Varchar(10)<<PK>>
Package_name	Varcha(250)
Package value	Double(7)
Benefits	Varcha(250)
Date_created	Date

4.5.3 Entity relationship diagram

Beynon-Davies and Paul (2004) defined entity relation diagram as a a flow chat that show how entities relates to each other in a system. Entities include people and objects. For the proposed system, the entity relation diagram will be as shown in figure 4.6 below.
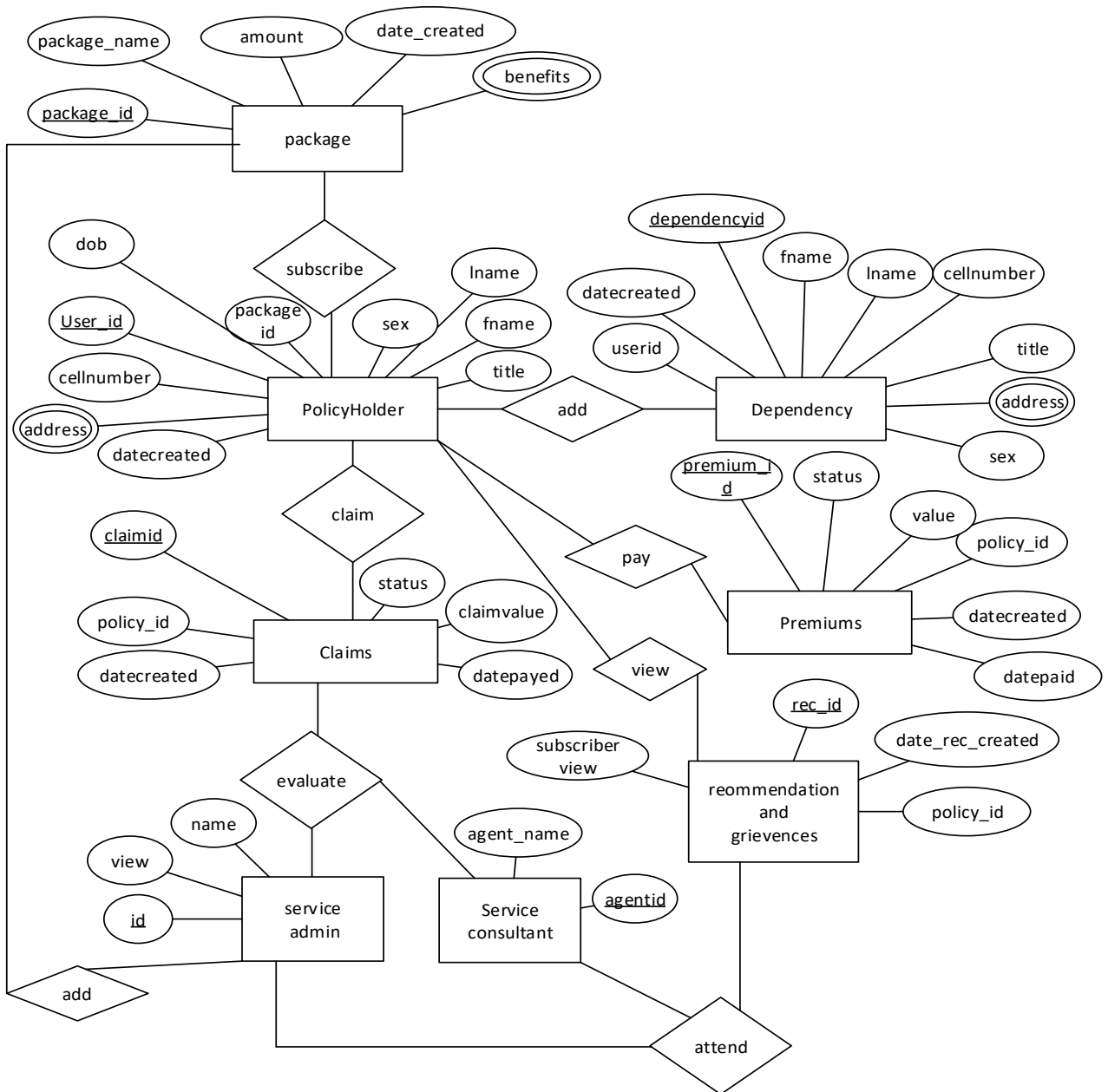
Figure 4.6 Entity relation diagram for the proposed system

4.6 Program design

McConnell (1999) defined program design as a process of describing the overall structure and the integration of code so as to make sure that user requirements are satisfied through the use of objects, methods and functions. It defines the transformation of user requirements into classes and packages

4.6.1 Package diagram

It is a configuration diagram that explains more on the structure of the system in terms of packages. Figure 4.7 shows package diagram of the proposed system.
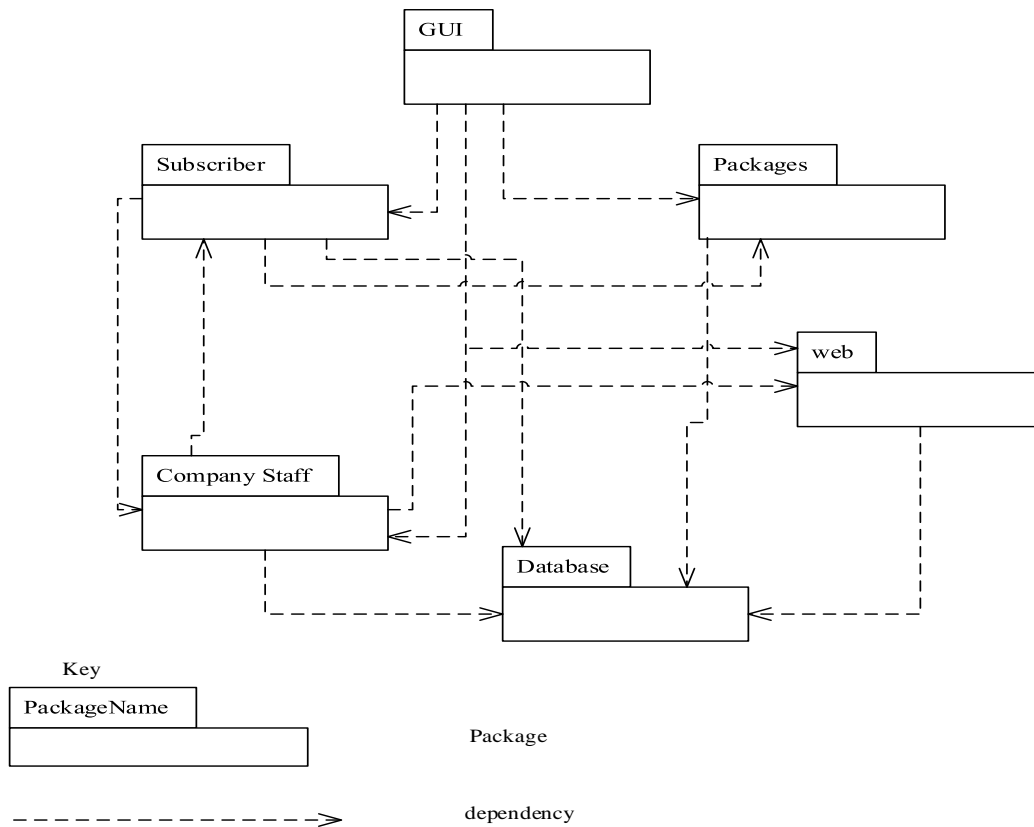
Source:Self design

Figure 4.7 Package diagram of the proposed system

4.6.2 Class diagram

It is an illustration that depict a system's static object configuration, it displays object classes that the system is made up of and the connections between the objects classes (Maciazek (2005)) Class diagram models the system' classes, attributes, operations, and relationships between objects. The class diagram for the proposed system is as given in figure 4.8 below.
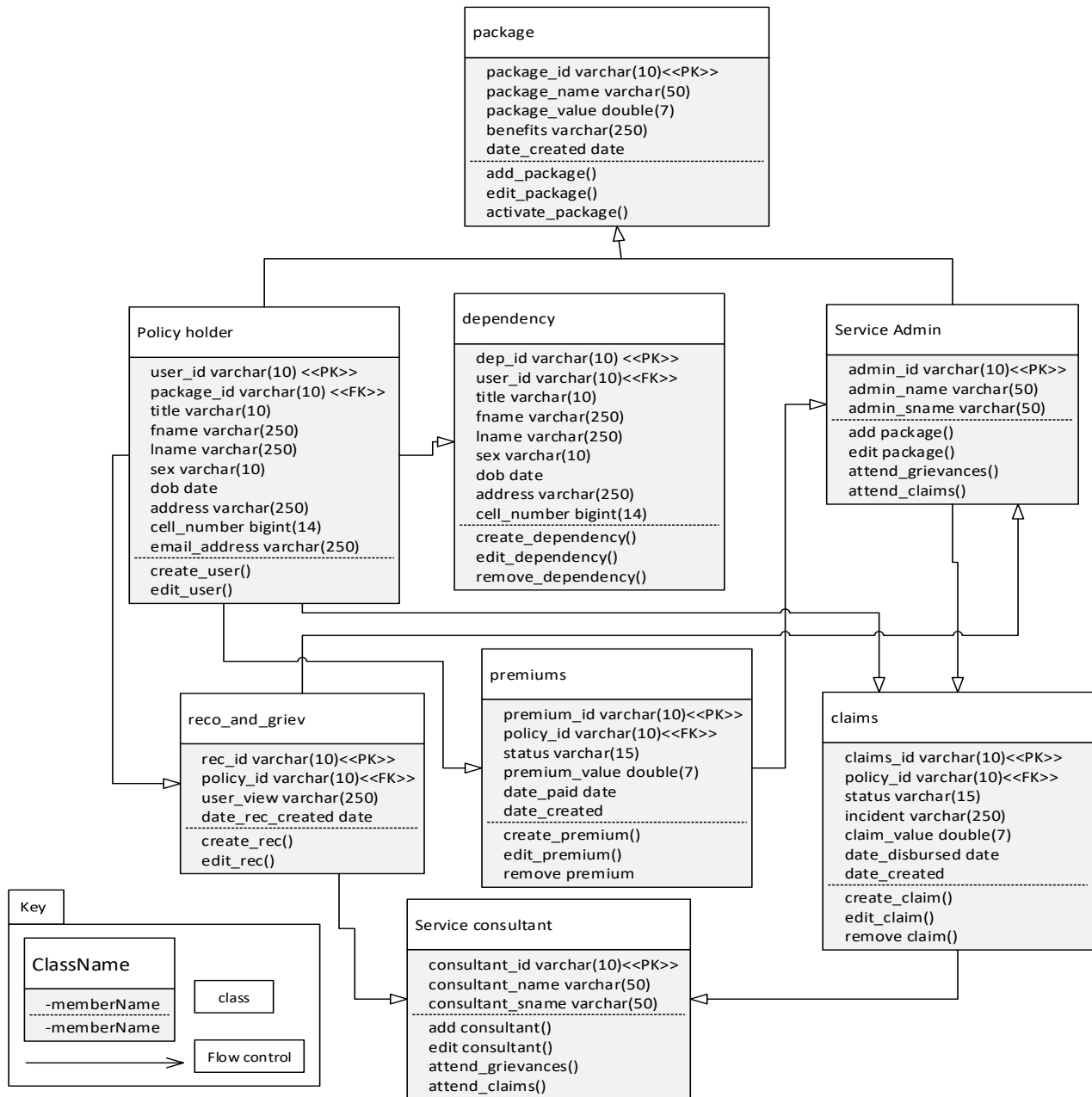
Figure 4.8 Class diagram of the proposed system

4.6.4 Sequence diagram

Mezirow (2008) suggested that a sequence diagram is a pictorial view on the logical flow of data in a system which enables documentation of logic and its validation. Figure 4.9 below depicts the logic of the proposed system.
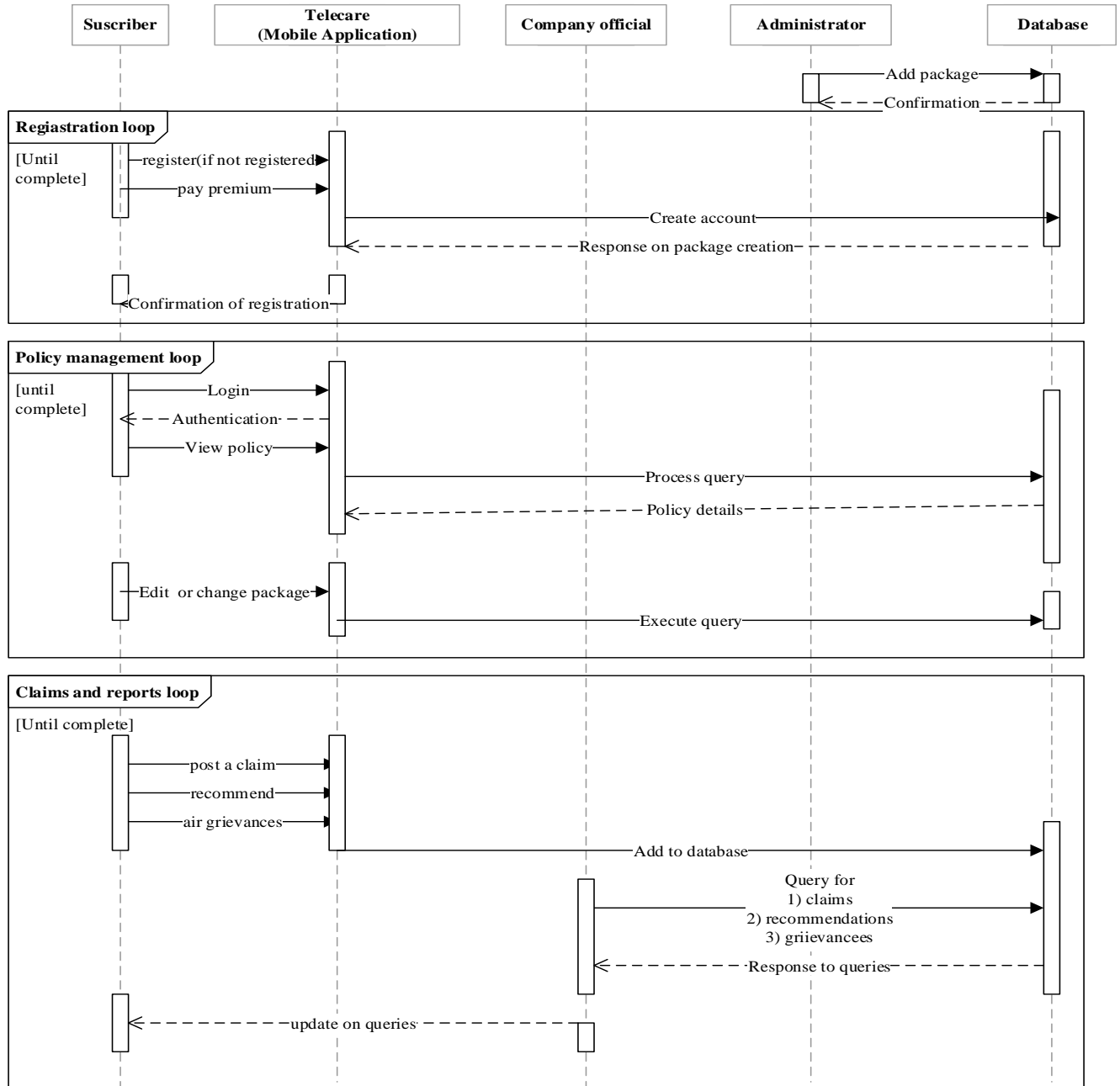
Figure 4.9 Sequence diagram of the proposed system

4.7 Interface design

It is the front end view of a system with which the user interacts with so as pass his/her requirements thus using a system (Pressman (2005)). UI can be hardware, software or a combination of both. Figure 4.10 shows the interface design
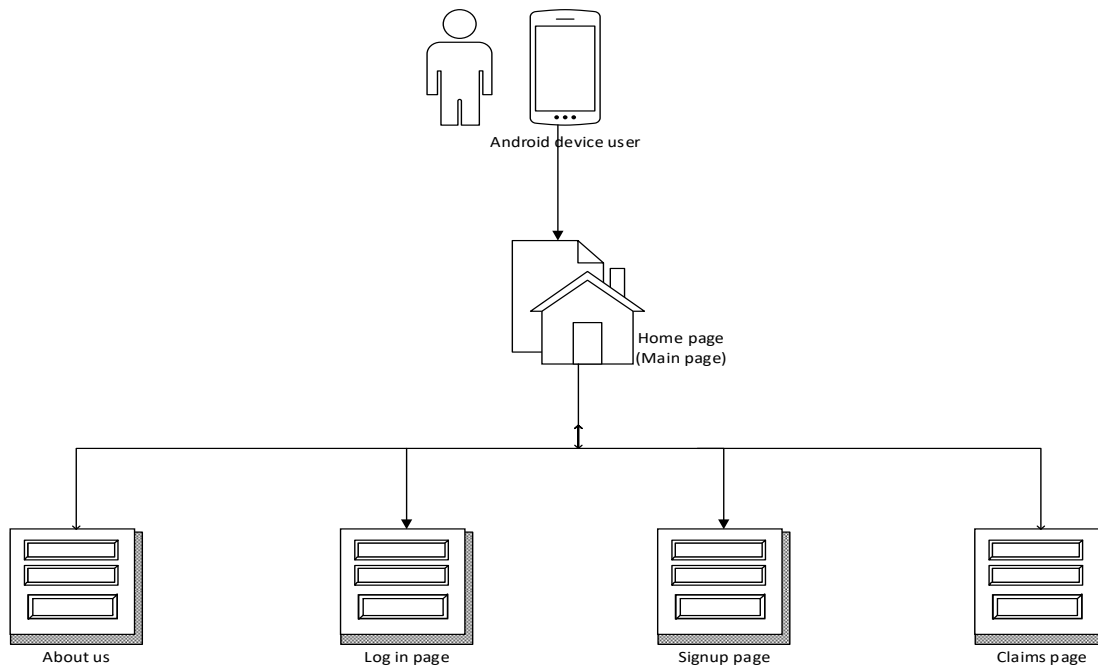
Figure 4.10 Interface design of the proposed system

4.7.1 Input design

Shelly, Cashman and Waggoner (2005) acknowledged input design as the identification of the relationship between the system and the user. Input serves the purpose of a system such as storing and recording information and also retrieval. The input design includes all the forms where user input is needed which are given below.

4.7.1.1 Login

The proposed login page will be as shown in figure 4.13. If the username and the password matches then access is granted to the system.

Figure 4.13 Login page of the proposed system

4.7.1.2 Signup

Proposed page for registering to the system is given in figure 4.14.

Figure 4.14 Registration Page of the proposed system

4.7.1.3 Add dependency

Proposed page for adding a dependency to a policy is given in figure 4.15 below.

Figure 4.15 Add dependency page of the proposed system

4.7.1.4 Post a claim

The proposed page for posting a claim is shown in figure 4.16 below:

Figure 4.16 Post a claim page of the proposed system

Figure 4.17 Post a recommendation page of the proposed system

4.7.2 Output design

This the display screen of what the user requested the system to do. The output forms are there to display what the user entered as input. Figure 4.18 – figure 4.21 shows the output pages of the proposed system.

View Policy								
User_id	Policy_id	First Name	Last Name	sex	Age	No of dependencies	Address	Package
TC001	MK1234	Blessing	Sambadzi	Male	26	4	Zengeza	Silver

Figure 4.18 View policy page of the proposed system

View dependencies						
Policy_id	Name	lastname	age	gender	address	holdernumber
mk1234	tino	sambadzi	8	male	zengeza	733736541

Figure 4.19 View dependencies page of the proposed system

View Claims			
Number	email	Reason	date
733736541	sambadzi@gmail.com	hospitalised	12-01-2012

Figure 4.20 View Claims page of the proposed system

View Recommendation			
Number	email	Recommendation	date
733736541	sambadzi@gmail.com	Improve on your response time	12-01-2012

Figure 4.21 View Claims page of the proposed system

4.8 Pseudo Code

Williams and Sawyer (2005) defined pseudo code is readable description of the system but given in a detailed manner. It is written in human language that is in way that a human understands but not the computer language.

Database connection

> If connection to the database is established
>
> THEN
>
> Proceed
>
> Else
>
> Terminate

- **Login**

> **User provide username/number and password**
>
> IF (username and password are correct) {
>
> Grant access
>
> Open main menu}

Else if (password and username are wrong) {

Deny access

Notify user}

Else {

Notify to register}

End if

- **Add dependency**

If dependency does not exist in the dependency table (for the same policy holder)

Then

Add to policy
Else

Notify dependent exist

4.9 Security design

Security design is an aspect of development, which a developer does not have to overlook but give enough attention to. The security design of a system encompasses the physical security of the system up-to its operational security. The Network security of a system is made up of firewalls, encryption and authentication. Since the proposed system will be accessed through the internet (web-based system) there is need to secure the user's data and the company's APIs (Application programming interface) to the databases. There is need to minimise the security breaches so as to make sure the system is secure as possible.

4.9.1 Physical security

Dufour and Jean-Yves (2012) discussed physical security as controls that increment the security that an organization has put in place and is done in a manner which is physical and not technical. Physical security controls what user do every day and they include the use of security guards who can be either internal or external. There are uses of physical door locks to which the keys are given to an authorised user. Building lights and fence will help thee guards to ensure security of the premises.

4.9.2 Network security

Cisco (2011) defined network security as any action intended to safeguard the reliability and usability of network and information. It ii a combination of hardware and software expertise. There are many ways of implementing network security, which include data damage anticipation an prevention, firewalls, interruption avoidance, systems and network breakdown

4.9.3 Operational security

Nelan (2006), states that operational security is a process by which management view risk and try to provided solutions on how to safeguard sensitive information from falling to wrong hands. For operational security to be achieved there is need to the following:

- Identifying the sensitive data.
- Identification of possible threats.
- Analyzing security issues and other weaknesses

4.9.3.1 Best practices to operational security

- Implement precise change management processes
- Restrict access to network devices
- Give your employees the minimum access
- Incident response and disaster recovery planning

4.10 Conclusion

The design of the proposed system was discussed showing what the subscriber will do with the system so is the company staff. The data flow diagrams for the proposed system namely context diagram and data flow diagram (DFD) were shown. The architecture design of the proposed system was discussed presenting the network architecture of the proposed system. More so, the physical design and the database structure of the proposed system were also shown focusing on the data table, entity diagram. The program design was shown in this chapter, showing the package diagram, the class diagram and the sequence diagram. The sequence diagram of the system shows the node-to-node communication in the proposed eth system. The interfaces in the proposed system were discussed and the proposed input and output forms were shown adding the pseudo code. The security design of the proposed system namely the physical security, the network security and the operational security were discussed thereby leads to the final chapter. The testing of the system will be done in the next chapter. Installation of the proposed system whilst providing the system changeover strategies as well as the recommended changeover strategy. The maintenance of the proposed system giving recommended maintenance strategies and recommendations for future improvement.

CHAPTER 5: IMPLEMENTATION

5.1 Introduction

Implementation alludes to the last procedure of moving the arrangement from development status to production status. This phase looks on how the mobile application will be incorporated at Telecel Zimbabwe. The phase will look into coding, testing, installation, maintenance and recommendations. Implementation will keep running until the point when the system is completely utilitarian in the environment and as per the characterized by client requirements.

5.2 Coding

Following the completion of the feasibility analysis, analysis phase and the design phase coding will begin. There is need to adhere to codding standards that defines the standard style for each developer. On the development of the Telecare Mobile Application, the team used Android studio and sublime text for editing scripts. SQLite a RDBMS was used as the database since it is light and can be embedded into the system. The system was developed in modules namely:

(i)   user modules
(ii)   grievances and recommendations module
(iii)   reports module
(iv)   login module
(v)   policy management module
(vi)   dependency module
(vii)   claims module

5.3 Testing

Software testing is an investigation directed to equip interested parties with data on the quality of the system being tested. Software testing can likewise give an objective, neutral view of the system to enable the business to acknowledge and comprehend the vulnerabilities of software implementation. Figure 5.1 show the testing phase of a system. Emphasis will be place on the unit testing that is the black box and the white box testing.
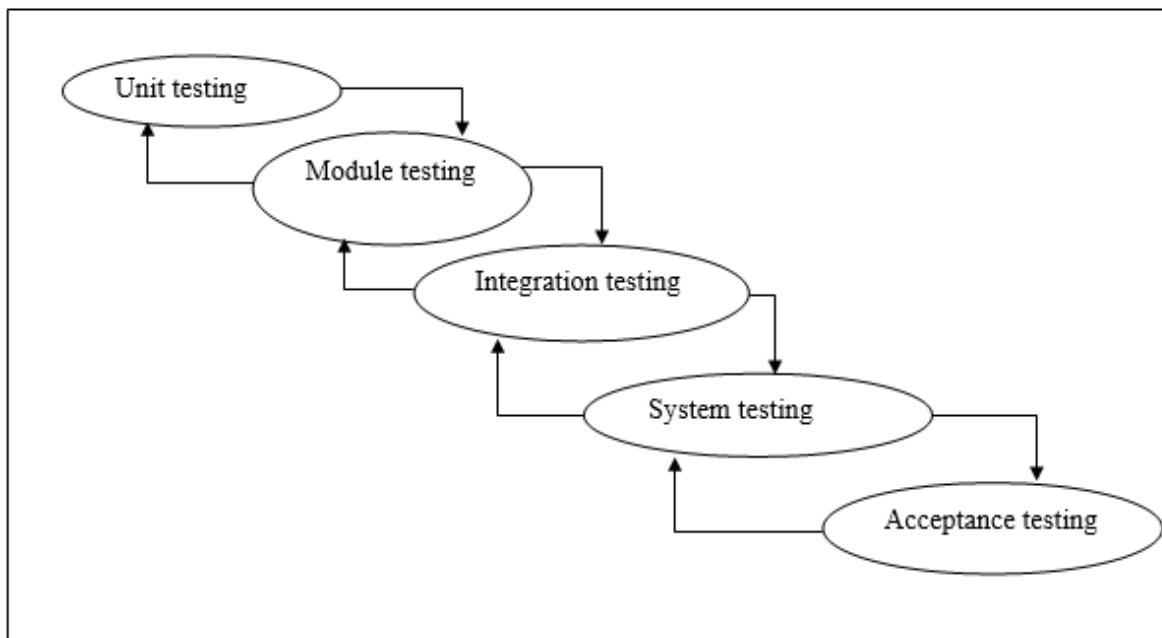
Figure 5.1 Testing phases

5.3.1 Unit testing

It is a smooth system testing where single units or components of a system are tested. The main purpose of unit testing is to authenticate if each unit of the system performed as designed. It can have one input and a single output. Unit testing can be categorised into two, namely black box testing and white box testing.
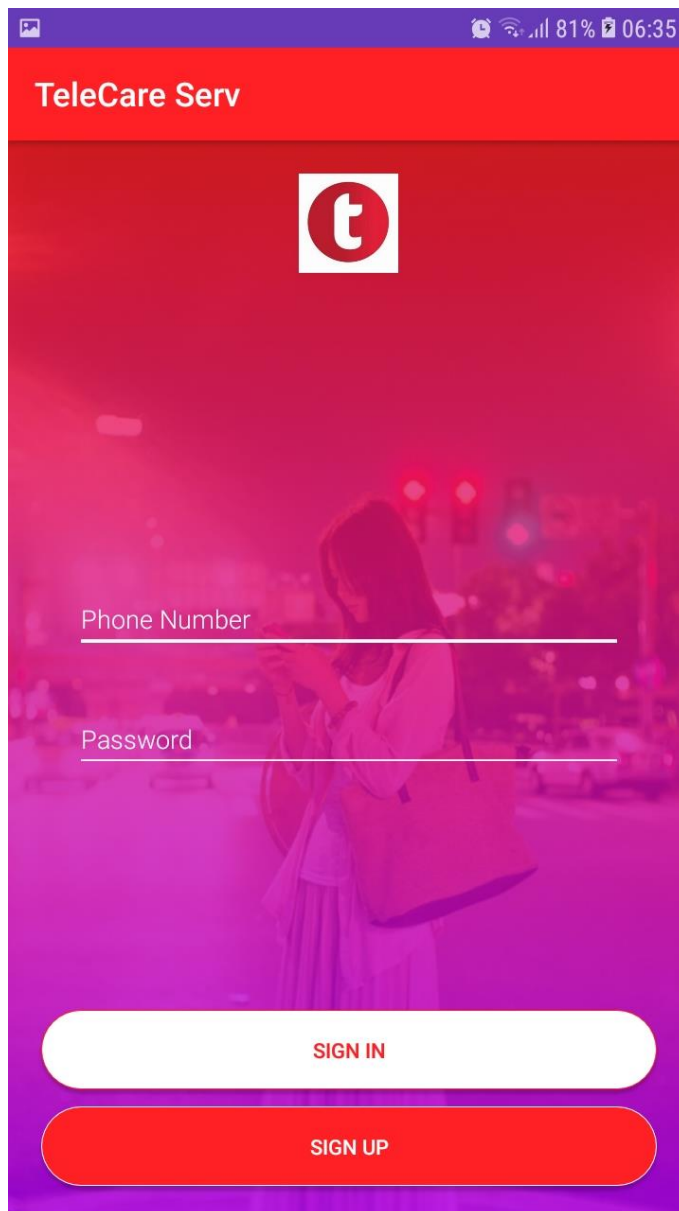
Figure 5.2 landing page of the system

5.3.1.1 Black Box Testing

It is a technique for system testing that looks at the convenience of a system without examining its interior configurations or mechanisms (Limaye, 2009). The black-box strategy for testing that can be applied to each level of software testing that is unit, combination, system and acceptance.
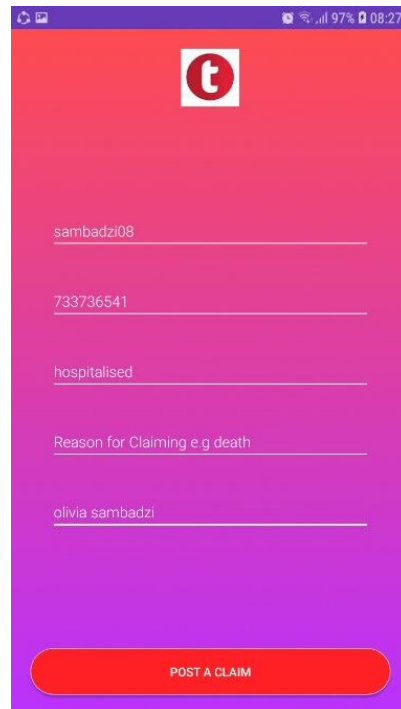
Figure 5.3 posting a claim

5.3.1.2 White Box Tests

Blinder (2008) suggested that white-box testing is a strategy for testing software that tests internal structures or workings of an application, rather than its usefulness. This strategy for test can be applied using the programing skills to test the functionality whilst the outcome is known.it focuses on validating the security functionality of the system.

5.3.2 Validation

Paul, Offutt and Jeff (2008) defined software validation as a method that watches that the software fulfils or fits the expected use (high level checking),that is if the developed system meets the requests by the users but not specific needs of those who are intended to use the system
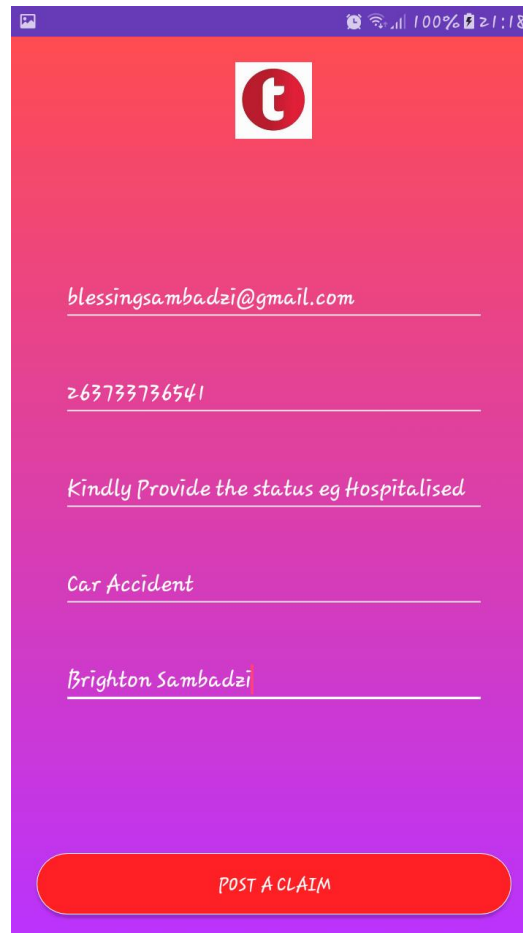
Fig 5.2 Invalid status for claims
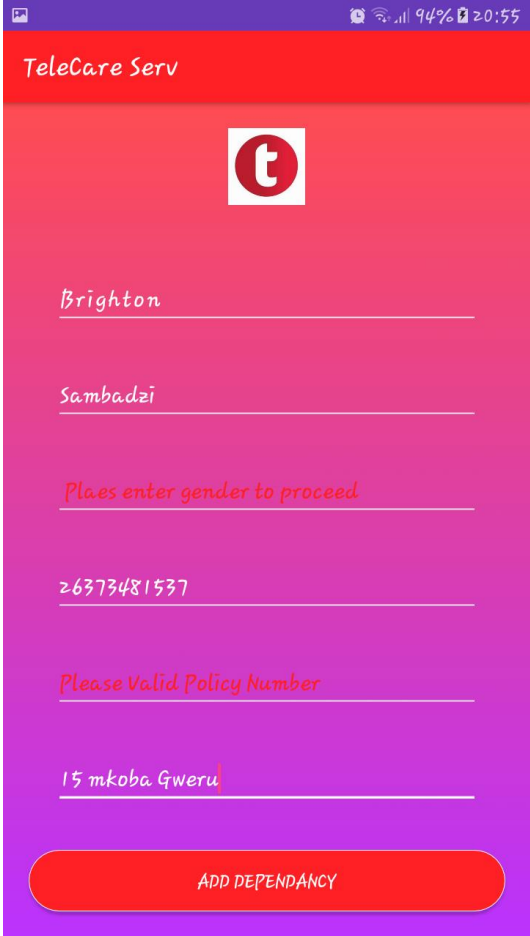
Figure 5.3 Validation on Add dependancy page
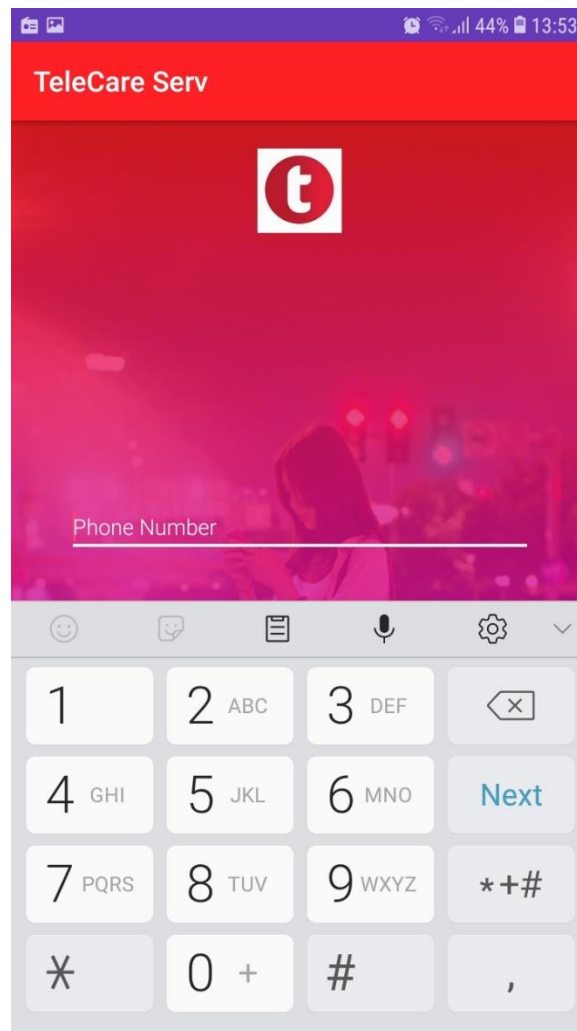
Figure5. 4 Validation of login page to accept number

5.3.3 Sample test cases

A test case is a set of conditions or factors under which a tester will decide if a system under test fulfils prerequisites or works effectively. The way toward creating test case can likewise help discover issues in the prerequisites or plan of an application. A test case must be planned in such a way it tests just a single thing at any given moment

5.3.3.1 Invalid username and password

At the point when wrong credential are used the system will show a mistake message which implies that the details are not matching the information stored in the database. Provided below are screenshots on how error messages are displayed.
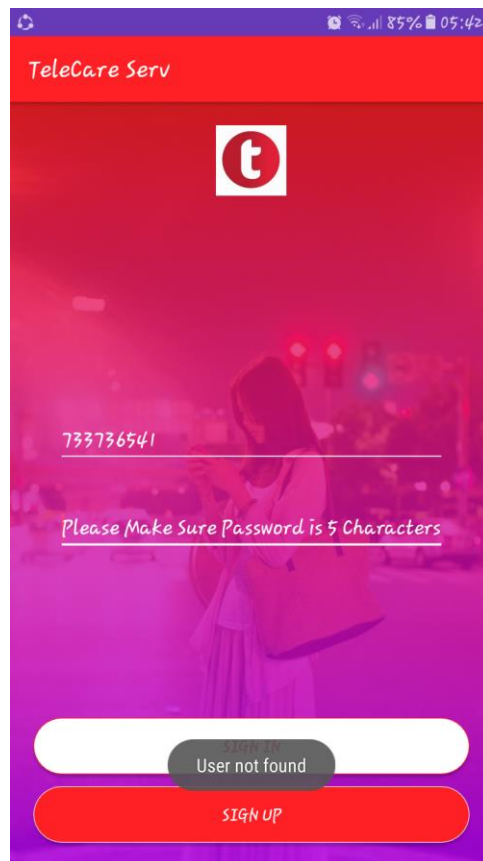
Figure 5.5 Unregistered user
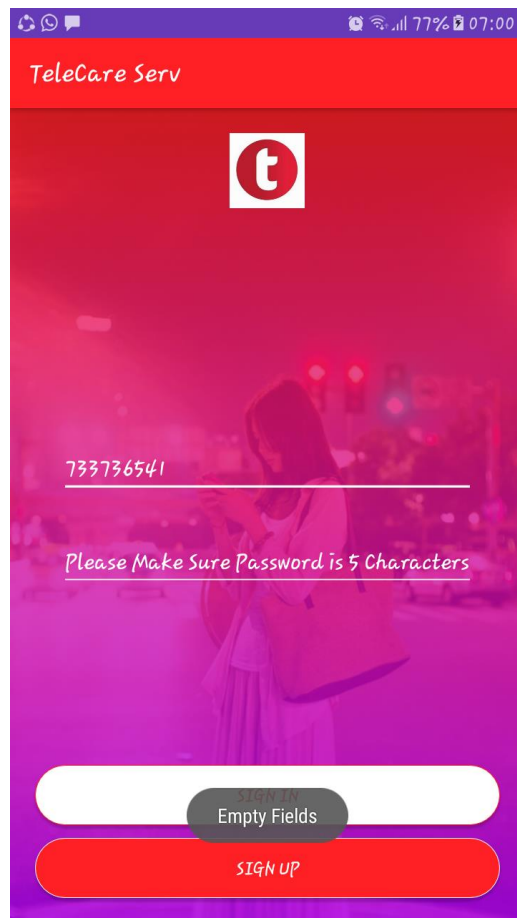
Fig 5.6 empty fields for login

5.4 Installation

Lee (2011) defines installation as the process of making hardware and/or software ready for use. Installation the process of moving from an old system to another system. The emphasis was that the system will be installed on the new segments inside the organisation. Includes code being replicated or produced from the installation files to new records on the local computer for less demanding access by the working system. For the installation to take place there strategies that are employed called changeover strategies.

5.4.1 Changeover strategies

System changeover is mainly concerned with transition from one system to another and the alleviation of downtime to business exercises amid the changeover (Wellington and Tomposon (2009)). The main change over strategies are phased, pilot, parallel and direct changeover,

5.4.1.1 Phased implementation

This is a method the thrives on implementing the system in phases as modules until the whole system is implemented. Given there is a problem they will be limited and they can be non-critical. Once a successful change is recorded the remaining phases will then be stretched until the whole system has been implemented, basing on the lessons from the initial phase used to make sure the changeover of the whole system.

5.4.1.2 Parallel running

It is when both systems (the old and the new) are used side-by-side using real data to make sure that the new system performs better and exactly as expected by the project managers thereby comparing the efficiency and the reliability. Given the testers or users are satisfied then the old system will be discontinued (taken offline) and make the new system the main and functional system.

5.4.1.3 Direct changeover

This is the riskiest of all the changeover strategies since it does not creates a reference point in case of a failure. This changeover strategy is simple, cheap and quick. If the system fails there will be no referencing point thus the role back plan is also poor. There is a point where the current system is stopped so as to make the new system active thereby high changes of system outs.

Recommendation on changeover strategies.

Then parallel changeover strategy is the best after considering the good that it brings into the organisation but since there is no direct replacement of the current system the new system will be performing what the current system is offering plus features that are not on the USSD platform. The parallel changeover strategy offers stability and recovery if there is system failure.

5.5 Maintenance

System maintenance is a continuous process, which covers an extensive variety of exercises, including evacuating system and design blunders, refreshing an updating of documentation, test information and updating customer support. Maintenance can be grouped into three categories namely corrective maintenance, Adaptive maintenance and perfective maintenance.

5.5.1 Corrective Maintenance

This type of maintenance suggests removing errors in a software, which may have slipped into the program because of structure or incorrect suspicions. In this manner, in corrective support, handling or execution disappointments are corrected.

5.5.2 Adaptive Maintenance

When adaptive maintenance is being used, system functionality is altered to meet the changing customer needs and demands. Adaptive maintenance may become necessary if one of the following changes in organisational set-up takes place:

- When the organizational procedures changes.
- When there is a change in organizational goals or policies
- When there a change in the informational needs of management
- When there is a change in security needs and controls.

5.5.3 Perfective Maintenance

In perfect maintenance new programs are added or existing features are modified so as to enhance performance of the existing system. Perfective maintenance is mainly done so as to respond to grievances and recommendations from the system users. There are factors that leads to perfective maintenance that are environmental in nature. These environmental factors include

- change in government policies,
- change in market behavior
- the advent of new technology.

Maintenance recommendations

After a discussion of the available maintenance categories, perfective maintenance is most favourable since it incorporates the changes that the users' needs, changes in government policies and the new technology that will be presented on the market. In addition, all the strategies play a pivotal role in the service delivery and availability of the system, the other maintenance strategies will need to be done periodically so as to make sure were correction are needed the corrective strategy is called and were when there are changes in the company procedures the adaptive strategy is applied.

5.6 Recommendations for future development.

The system comes with a limited feature that is one should be registered through the USSD before using the mobile application. There is need to make sure all what is done by the USSD is done through the mobile system. The USSD platform cannot be ignored there need to sync the USSD and the mobile application. Due to legal rules the mobile application will be available for users who are registered. In the near future the company should thrive to integrate the system with Telecash so that a person who uses Telecash can pay direct to his or her account.

- Back up or real time sync to the data redundancy (DR) site is recommended
- Daily application and database server checks are recommended
- There need for a reverse proxy for the system

5.7 Conclusion

After a conversion of the logical plan into reality, the Telecare subscribers can therefore fully experience the full functionality of the system. The coding phase was discussed and the testing of the system was done. White box and black box testing was done providing a real test on the functionality of the system against the one mentioned in the design phase. Validation of the system was tested in this chapter and the screenshots were included. The installation of system including the changeover strategies were discussed and recommendation given. Maintenance of the system was the last to de discussed. Perfective maintenance best suits the product since it thrives to satisfy the user thereby reacting to their recommendations and grievances. The implementation of the system is the final phase in the development of the system. For the next version of the system, there is need to incorporate the recommended changes and what the users will have send.

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APPENDICES

APPENDIX A: USER MANUAL
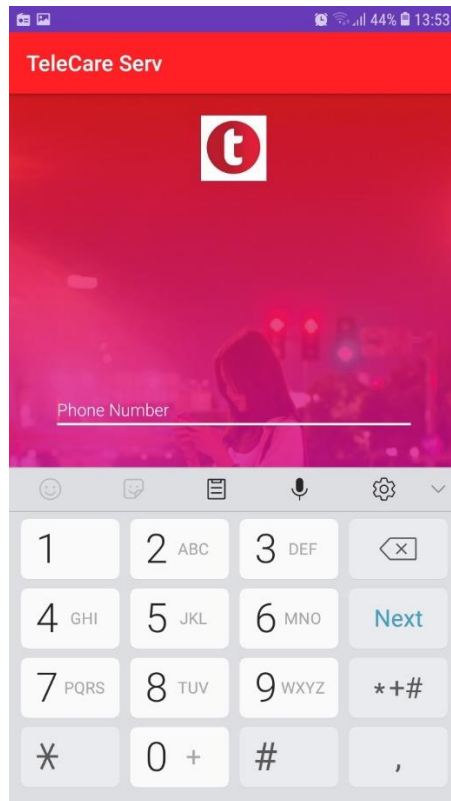
This is the landing page for the system after a successful installation of the application
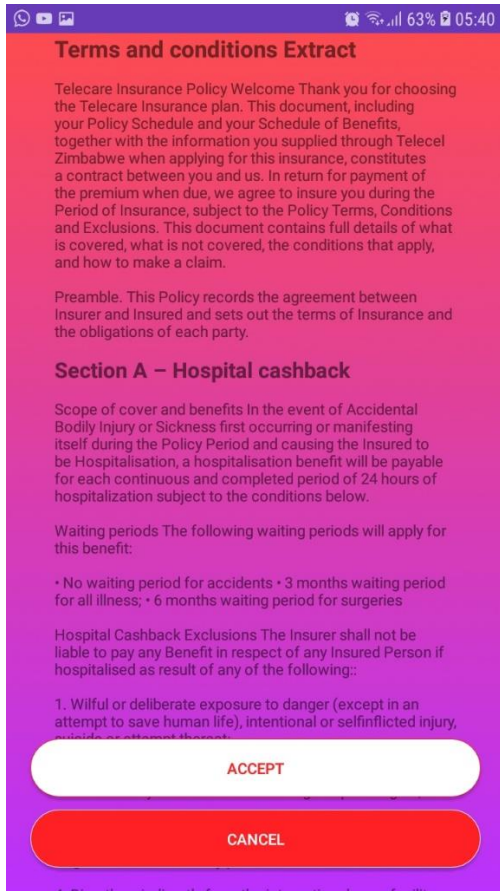
For a user to register terms and conditions should be accepted

Adding dependency but not all fields are filled. All fields must be filled
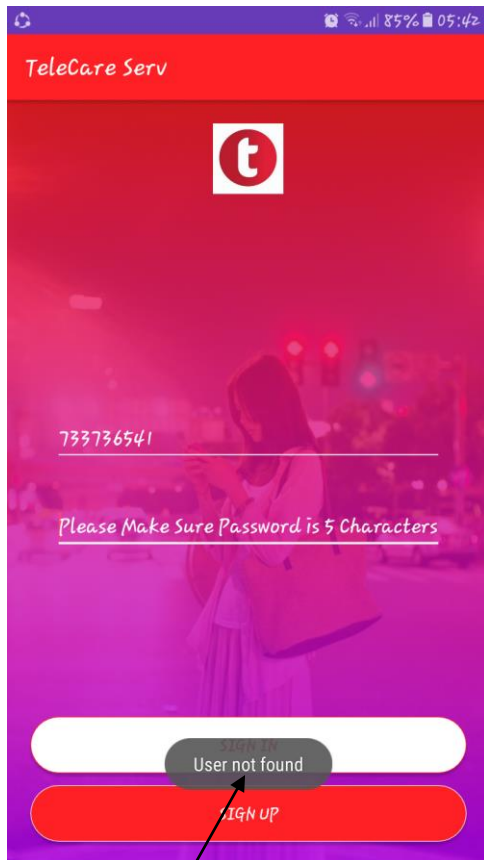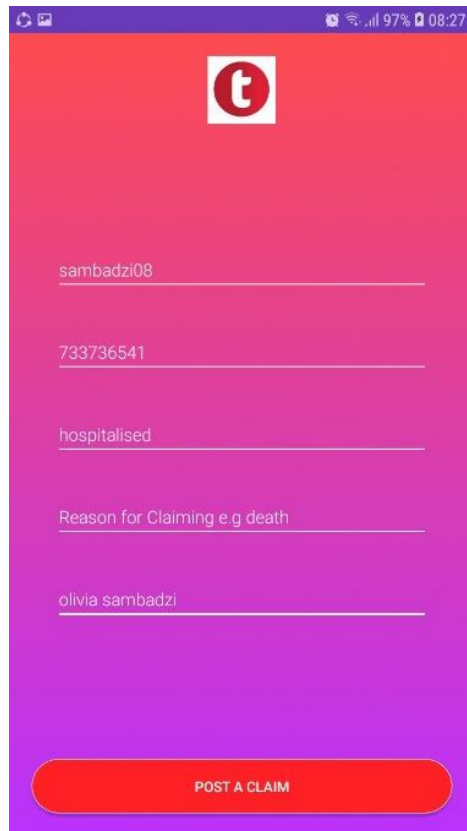
Message when an individual who is no registered but tries to login. For an individual to gain access they must sign up first.
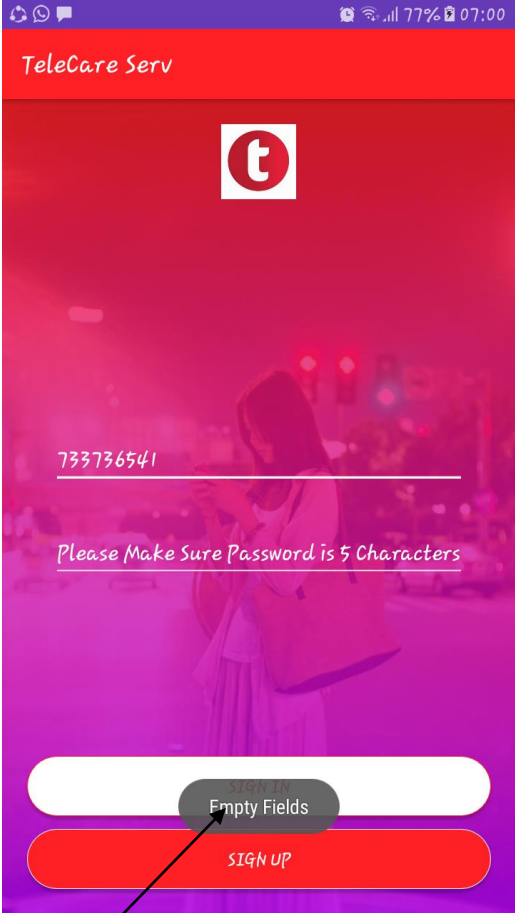
When the user tries to log in with empty fields. All fields must be filled

This is the page for posting a claim after entering the required fields

This is the page for user registration if one is not registered.

			id	name	lname	gender	phone	policy	email	address
☐	🖉 Edit 🔢 Copy ⊖ Delete		1	blesing	blesing	male	733736541	gold	asam@gmail.com	1527 harare
☐	🖉 Edit 🔢 Copy ⊖ Delete		3	Samba	bless	male	733736542	gold	blaa@gmail.com	1527 harare..

Real time synchronisation of the database
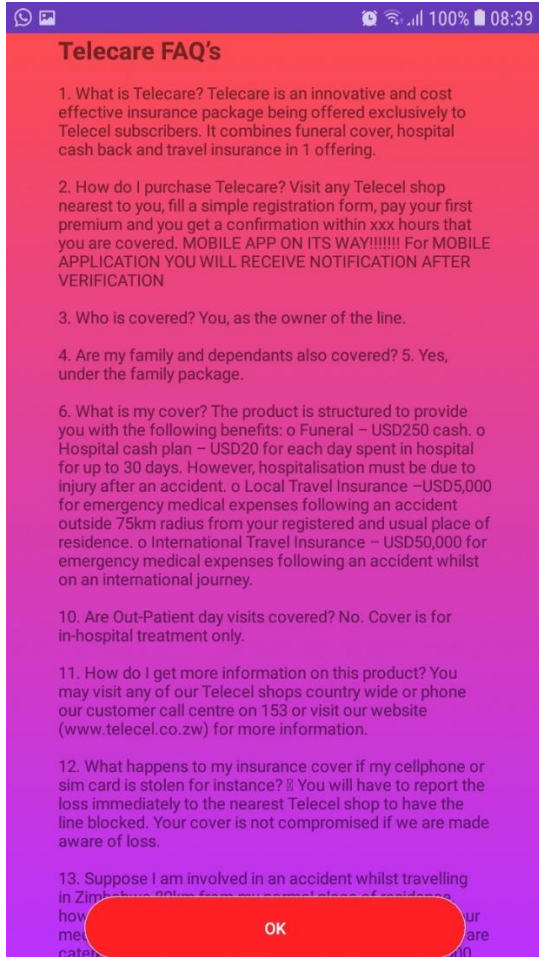
This is a page to show frequently asked questions

APPENDIX B: INTERVIEW CHECKLIST

1. How best can you describe your system towards the application and renewal of subscription?

   …………………………………………………………………………………………………
   …………………………………………………………………………………………………
   …………………………………………………………………………………………………
   …………………………………………………………………………………………………
   …………………………………………………………………………………………………
   …………………………………………………………………………………………………
   …………………………………………………………………………………………………

2. Do you think there is need for improvement on the current system? Why?

   …………………………………………………………………………………………………
   …………………………………………………………………………………………………
   …………………………………………………………………………………………………

3. Do you support the development of a mobile application to partner the USSD platform?

   ....
   ....
   ....
   ....
   ....

4. How effective is your current system?

   …………………………………………………………………………………………………
   …………………………………………………………………………………………………
   …………………………………………………………………………………………………
   …………………………………………………………………………………………………
   …………………………………………………………………………………………………

5. Are there any precautions in place to safeguard against unauthorized access to data? How do you safeguard it?

   …………………………………………………………………………………………………
   …………………………………………………………………………………………………
   …………………………………………………………………………………………………
   …………………………………………………………………………………………………
   …………………………………………………………………………………………………

6. What information is currently being kept by the company concerning the applications?

   ....
   ....
   ....
   ....
   ....

7. What are the problems associated with current system?

…………………………………………………………………………………………………
…………………………………………………………………………………………………
…………………………………………………………………………………………………
…………………………………………………………………………………………………

8. Are there any operations that you wish the proposed system should perform?

…………………………………………………………………………………………………
…………………………………………………………………………………………………
…………………………………………………………………………………………………
…………………………………………………………………………………………………

9. Any prominent risks with the current system?

…………………………………………………………………………………………………
…………………………………………………………………………………………………
…………………………………………………………………………………………………
…………………………………………………………………………………………………

APPENDIX C: QUESTIONNAIRE CHECKLIST

1. How best can you describe your system towards the application and renewal of subscription? [
   …………………………………………………………………………………………………
   …………………………………………………………………………………………………
   …………………………………………………………………………………………………

2. How best can you describe the operations of the current USSD system?

   ☐   ☐   ☐
   Satisfactory   Excellent   Poor

3. Do you think there is need for an evolution in the current USSD system?

   ☐   ☐
   No   Yes

4. Given the option will you prefer use Telecare service using a mobile application?

   ☐   ☐
   Yes   No

5. If a customer's policy subscription expires, can the customer renew it ?

   ☐   ☐
   Yes   No

6. Are there any operations that you wish the Telecare system should perform?

   ☐   ☐
   Yes   No

7. Are there any processes involved in the use of the service?

   ☐   ☐
   Yes   No

   May you please state them if **YES**

   …………………………………………………………………………………………………

8. Are there any precautions in place to safeguard against unauthorized access to data?

   ☐   ☐
   Yes   No

9. Any prominent risks with the current system?

   ☐   ☐

   Yes   No

APPENDIX D: OBSERVATION SCORE SHEET

Observation guide schedule

Name of Observer: _____   **Section:**_____

Date: _____   **Time:**   _____

 Observation:_____

_____

_____

_____

_____

_____

_____

_____

Conclusion:_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

APPENDIX E: SNIPPET OF CODE

Data base helper

```java
package com.example.shumba.telecareserv;

import android.content.ContentValues;
import android.content.Context;
import android.database.Cursor;
import android.database.sqlite.SQLiteDatabase;
import android.database.sqlite.SQLiteOpenHelper;

/**
 * Created by Zoom on 10/1/2018.
 */

public class DatabaseHelper extends SQLiteOpenHelper {

    public DatabaseHelper(Context context) {
        super(context, DatabaseOptions.DB_NAME, null, DatabaseOptions.DB_VERSION);
    }

    @Override
    public void onCreate(SQLiteDatabase db) {
        //Create table
        db.execSQL(DatabaseOptions.CREATE_USERS_TABLE_);
        db.execSQL(DatabaseOptions.CREATE_REGISTRATION_TABLE_);
    }

    @Override
    public void onUpgrade(SQLiteDatabase db, int oldVersion, int newVersion) {
        // Drop older table if existed
        db.execSQL("DROP TABLE IF EXISTS " + DatabaseOptions.USERS_TABLE);
        // Create tables again
        onCreate(db);
        db.execSQL("DROP TABLE IF EXISTS " + DatabaseOptions.REGISTRATION_TABLE);
        // Create tables again
        onCreate(db);
    }

    public User queryUser(String email, String password) {

        SQLiteDatabase db = this.getReadableDatabase();
        User user = null;

        Cursor cursor = db.query(DatabaseOptions.USERS_TABLE, new
String[]{DatabaseOptions.ID,
                        DatabaseOptions.EMAIL, DatabaseOptions.PASSWORD},
DatabaseOptions.EMAIL + "=? and " + DatabaseOptions.PASSWORD + "=?",
                new String[]{email, password}, null, null, null, "1");
        if (cursor != null)
             cursor.moveToFirst();
        if (cursor != null && cursor.getCount() > 0) {
            user = new User(cursor.getString(1), cursor.getString(2));
        }
        // return user
        return user;
    }
```

```java
    public void addUser(User user) {
        SQLiteDatabase db = this.getWritableDatabase();

        ContentValues values = new ContentValues();
        values.put(DatabaseOptions.EMAIL, user.getEmail());
        values.put(DatabaseOptions.PASSWORD, user.getPassword());

        // Inserting Row
        db.insert(DatabaseOptions.USERS_TABLE, null, values);
        db.close(); // Closing database connection

    }


}
```

Registration

```java
package com.example.shumba.telecareserv;

import android.app.ProgressDialog;
import android.content.Intent;
import android.os.Bundle;
import android.app.Activity;
import android.view.View;
import android.widget.Button;
import android.text.TextUtils;
import android.widget.EditText;
import android.widget.Toast;
import android.content.DialogInterface;
import android.support.v7.app.AlertDialog;
import android.support.v7.app.AppCompatActivity;
import android.view.LayoutInflater;
import android.view.Menu;
import android.view.MenuItem;

import com.android.volley.AuthFailureError;
import com.android.volley.Request;
import com.android.volley.Response;
import com.android.volley.VolleyError;
import com.android.volley.toolbox.StringRequest;

import org.json.JSONException;
import org.json.JSONObject;

import java.util.HashMap;
import java.util.Map;


public class RegisterActivity extends Activity {
    private EditText email;
    private EditText name;
    private EditText lname;
    private EditText phone;
    private EditText policy;
    private EditText address;
    private EditText Gender;
    private Button submit;
    private Button txt;
    public static final String URL_SAVE_NAME = "http://10.240.6.102/api/register.php";
```

```java
        @Override

    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_register);
        Button submit = (Button) findViewById(R.id.submit);
        Button txt = (Button) findViewById(R.id.tst);
        name = findViewById(R.id.name);
        lname = findViewById(R.id.lname);
        phone = findViewById(R.id.phone);
        policy = findViewById(R.id.policy);
        address = findViewById(R.id.address);
        Gender = findViewById(R.id.Gender);
        email = findViewById(R.id.email);

        final DatabaseHelper dbHelper = new DatabaseHelper(this);


     /*  submit.setOnClickListener(new View.OnClickListener() {
           @Override
           public void onClick(View v) {
               if (!emptyValidation()) {
                   dbHelper.addSub(new Register(name.getText().toString(),
lname.getText().toString(),Gender.getText().toString(),

phone.getText().toString(),email.getText().toString(),policy.getText().toString(),addr
ess.getText().toString()));
                   Intent intent = new Intent(RegisterActivity.this,
ViewPolicy.class);
                   startActivity(intent);
                   Toast.makeText(RegisterActivity.this, "You are now a registered
Telecare Subscriber", Toast.LENGTH_SHORT).show();
                   name.setText("");
                   lname.setText("");
                   Gender.setText("");
                   phone.setText("");
                   email.setText("");
                   policy.setText("");
                   address.setText("");


               } else {
                   Toast.makeText(RegisterActivity.this, " There Empty Fields. Kindly
fill in all the Field", Toast.LENGTH_SHORT).show();
               }
           }
       });
*/

        txt.setOnClickListener(new View.OnClickListener() {
            public void onClick(View v)
            {

                Toast.makeText(RegisterActivity.this, " in",
Toast.LENGTH_SHORT).show();


          mySubmit();

            }

        });
```

```java
        }

        void mySubmit()
        {

            final ProgressDialog progressDialog = new ProgressDialog(this);
            progressDialog.setMessage("Saving Name...");
            progressDialog.show();

            final String names = name.getText().toString().trim();
            final String lastname = lname.getText().toString().trim();
            final String addres = address.getText().toString().trim();
            final String polic = policy.getText().toString().trim();
            final String phon = phone.getText().toString().trim();
            final String emaill = email.getText().toString().trim();
            final String gende = Gender.getText().toString().trim();


            StringRequest stringRequest = new StringRequest(Request.Method.POST,
URL_SAVE_NAME,
                    new Response.Listener<String>() {
                        @Override
                        public void onResponse(String response) {
                            progressDialog.dismiss();
                            try {
                                JSONObject obj = new JSONObject(response);


                                Toast.makeText(RegisterActivity.this, response,
Toast.LENGTH_SHORT).show();


                            }
                            catch (JSONException e) {
                                e.printStackTrace();
                            }
                        }
                    },
                    new Response.ErrorListener() {
                        @Override
                        public void onErrorResponse(VolleyError error) {
                            progressDialog.dismiss();
                            //on error storing the name to sqlite with status unsynced

                        }
                    }) {
                @Override
                protected Map<String, String> getParams() throws AuthFailureError {
                    Map<String, String> params = new HashMap<>();
                    params.put("name", names);
                    params.put("lname", lastname);
                    params.put("gender", gende);
                    params.put("phone", phon);
                    params.put("policy", polic);
                    params.put("email",emaill);
                    params.put("address",addres);

                    return params;

                }
            };

            VolleySingleton.getInstance(this).addToRequestQueue(stringRequest);
```

```java
        }

    private boolean emptyValidation() {
        if (TextUtils.isEmpty(name.getText().toString()) ||
TextUtils.isEmpty(lname.getText().toString()) ||
TextUtils.isEmpty(Gender.getText().toString())
                || TextUtils.isEmpty(phone.getText().toString())||
TextUtils.isEmpty(email.getText().toString())
                || TextUtils.isEmpty(policy.getText().toString())||
TextUtils.isEmpty(address.getText().toString())) {
            return true;
        }    else {
            return false;
        }
    }
}
```