ABSTRACT

The purpose of the study was to develop an online mobile application to perform the task of reporting IT related faults and issues that arise at Turnall Holdings so as to capture and store all these problems for future reference easily. The objectives of the system were to remove the use of manual paper as log sheets, which consumed a lot of resources and money. The system was to create a quick reaction on the IT stuff by showing dates and times of the report of a fault and the attendance to it. The IT manager of Turnall Holdings also wanted a way to measure the work done by the IT staff on a daily or weekly basis to see how they were responding to user problems and solving them. The system was to make users feel comfortable to report their faults in the way they wanted and not have to call through the phone for IT who may not be around the office at that time. Using the various data gathering methodologies available which include interviews, questionnaires and observations, the student gained more insight on how the system works and what new things he can include in the development of the new system. The student then solved the problems by developing an android mobile application that will be used by Turnall holdings to report and document faults while providing a good reporting structure as well. The system was implemented using the android operating platform on mobile devices like smart phones and tablets so as to allow communication between users and IT. Each user has his/her own mobile device that they use to report the faults and the IT personnel have their own devices they use to attend to the faults. In future, the system can be enhanced such that they link with the profiles of each user on the computer such that when such cases like when the user is locked out the system automatically sends the report.

DECLARATION

I, **Prince Chibagidi** do hereby declare that I am the sole author of this dissertation. If students or other institutions need this document for scholarly or academic research purposes, it should therefore be granted.

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

APPROVAL

This dissertation, entitled "**Turnall Holdings Online Helpdesk and Support System**" by **Prince Chibagidi** 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:…………………………………………………………………………...

ACKNOWLEDGEMENTS

Firstly, I give thanks to the Lord God Almighty who has been with me throughout the years I have been at Midlands State University up to now. I thank my family, who provided for me financial stability and guidance in all my education. I give thanks my friends who helped me with their love and care. Special thanks to my supervisor Mr. Mzikamwi, who was always there to guide me and was patient with me up to the end. Salutations to all my lecturers who taught me and imparted unto me knowledge to perform all I did. The Lord God almighty blesses them abundantly.

DEDICATION

I dedicate this dissertation to my beloved parents Mr. and Mrs. C and Y Chibagidi who worked hard to provide for me financial stability and emotional support throughout my degree program, my family members who strengthened me and gave me support in all I needed.

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LIST OF ACRONYMS

SQL	Structured Query Language
DFD	Data Flow Diagram
ERD	Entity Relationship Diagram
EERD	Enhanced Entity Relationship Diagram
ROI	Return On Investment
NPV	Net Present Value
LAN	Local Area Network
DBMS	Database Management System
PHP	Hypertext Pre-processor
HR	Human Resources

LIST OF APPENDICES

CHAPTER ONE: INTRODUCTION

1.1 INTRODUCTION

Turnall Online Helpdesk and Support System is an online system that is used to track day to day user problems in using IT resources. Built to perform in real time mode, the system captures user information and presents it to the IT department who will respond to the requests and solve them while keeping record of the processes done and the time taken to solve each IT related problem.

1.2 BACKGROUND OF THE STUDY

Turnall Holdings IT department is mainly focused on the provision of help and support to the Turnall users from the managing director to the least employee. The IT Manager requested that he gets to know all the information pertaining to the issues that occur in the organization and how they are being solved. The current system that the manager had put in place has several loopholes since it is a manual system that uses log sheets to record the problems and solutions. This led to the requirement of a system that can avoid such manual work and also avoid biased data.

1.2.1 BACKGROUND OF THE ORGANISATION

According to www.turnall.co.zw, Turnall Holdings Limited is a subsidiary of the FBC holdings Group with 2 manufacturing plants, Harare and Bulawayo, Harare being the main division. The two plants yearly produce 12 000 tones. The Harare division is a 4 hectare property while the Bulawayo division is a 6.8 hectare property. Turnall production is categorized into two products, which are Turnall piping products and Turnall building products. For over 70 years, Turnall has been the market leader in the manufacture and supply of asbestos-cement roofing, water and sewerage conveyance products in Southern Africa. Turnall has built a reputation for excellent product support, quality, reliability and durability through pursuing world class practices in all its operations largely attributed to its Integrated Management System and Navision Enterprise Resource Planning System accreditation.

1.2.2 ORGANIZATIONAL STRUCTURE

Maxwell (2011) defines the organogram as a representation of the hierarchy of power that shows escalation of commands and information diffusion within an organization enforcing obedience and order. The organogram entails a system of organization in order to straighten

the flow of power and subordination criteria, which will be followed and respected by all employees.

```
                          Managing
                          Director
                             |
      +----------+----------+----------+------------------+
      |          |                     |                  |
   Finance      HR                Marketing          Technical
   Director   Director            Director            Director
      |          |                     |                  |
  +---+---+      |                     |          +-------+-------+
  |       |      |                     |          |               |
Finance  Purchasing  HR           Sales &    Engineering    Production
Manager  Director   Manager       Marketing   Manager        Manager
  |                               Manager                       |
+-+---+                                                         |
|     |                                                        WCP
Risk  IT                                                      Manager
Manager Manager
```
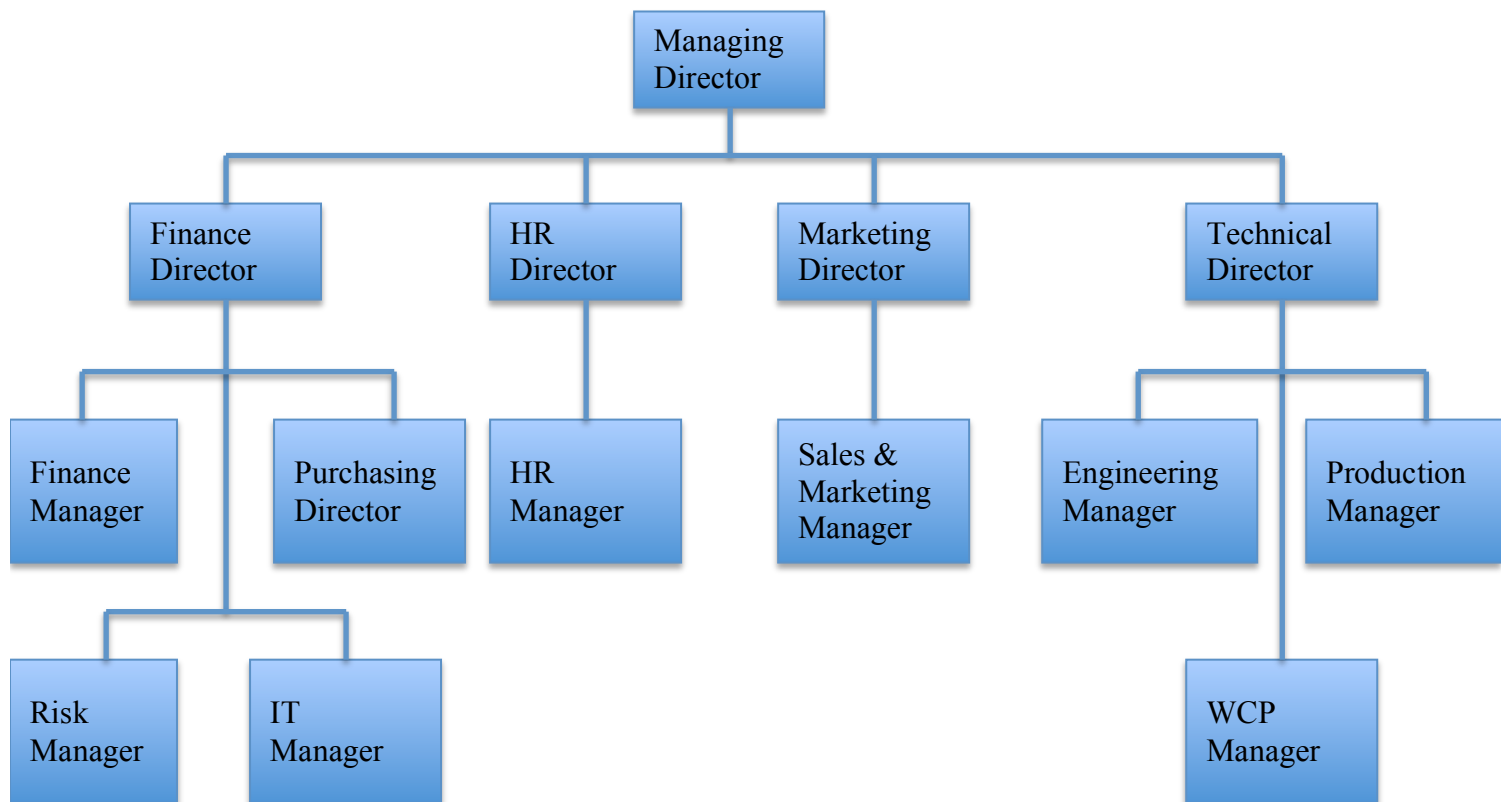
Fig 1.1 Organogram

1.2.3 VISION

To be the dominant manufacturer and distributor of construction materials for the African continent.

1.2.4 MISSION

We enrich African lives and build stakeholder value by providing high quality, affordable and environmentally-friendly construction materials using the talent and passion of our people in the safest, ethical and most professional manner.

Core Values

Results through superior customer service   Excellence and Innovation

Integrity and transparency   Teamwork and commitment

1.3 PROBLEM DEFINITION

Since Turnall Holdings management would like to evaluate their employees' performance by the amount and quality of work they do, the IT manager would like his IT staff to fill in log sheets that describe the request by the user and the response of the IT staff. This was done manually which may be biased since it can be done in advance or may be generated from no request so as to just impress the IT manager.

The problems with this system are that the system is manual and log sheets are done on paper, which may catch fire and all the records will be lost. The system has no way of backing it up. It also takes a lot of workspace storing the documents in the office. The IT manager also wanted the system to be able to show the timestamps of when a request was done and when the IT staff responded to the issue. All these details are hard to make accurate because of the manual nature of the system.

➤ As a result of recording log sheets manually, some IT staff would formulate their own problems and solutions and write them to the log sheets, which leads to misleading decisions during analysis.

➤ Users had a hard time connecting to IT through the phone such that most of the times they had to walk all the way down the plant to IT so they can report a simple fault.

➤ It was hard for the IT manager to track the issues since he had no idea what the stuff had attended to or what they are in progress of attending.

➤ It is hard for the IT manager to evaluate the work done since it is just a pile of papers, each with information he needs.

1.4 AIM OF THE STUDY

The main aim of this project is to develop and implement an online and mobile application that will be able to trigger notifications of issues to all the IT staff at once and be able to note the one who is quick to respond and avoid conflict. The system must be easy to navigate and be able to give clear results and feedback to the IT staff and the user. The system must be able to provide accurate and measurable information.

1.5 OBJECTIVES OF THE STUDY

The proposed system seeks to:

➢ Send request from a user to all The IT staff within the company

➢ Respond to the request on a first come first served basis, giving the first IT staff member to accept the request, responsibility to respond.

➢ Store all records pertaining to each issue undertaken.

➢ Generate time stamps at each stage of the process to the end of the issue.

➢ The issue's stages should be tagged accepted, responded to, finished and evaluated so as to separate each issue by stage of completion.

➢ Allow only the IT manager to evaluate the issue and tag it good or questionable.

➢ Aid the IT Manager in decision making in the context of possible promotion.

➢ Remind the staff of unfinished issues.

1.6 INSTRUMENTS

The student developer will use the waterfall model, with a step-by-step method to follow and he will use:

Android Studio

The student developer chose android studio because it is a very powerful development language that is suitable for android development and targets mobile devices since the world is heading towards the prevalence of mobile technology. Java is a very good language that he wants to use. He chose it as the programming language because of its power in development and its object oriented nature. Some alternative languages that were available to the student developer were:

XAMPP

Valade, J (2008) has Xampp defined as a software package containing apache, php and MySQL and other protocols that allow a user to connect to a sequential query language database locally on his/her computer before they can host it on a server.

1.7 JUSTIFICATION OF THE STUDY

The project will succeed since it has identified the exact problems that are being faced by the IT staff and the users themselves. It has also come up with a solution to the problems and limitations of the current system, which makes it a good research.

The project answers the need for the IT manager to know the work that has been done by his staff and also the current issues being dealt with, thus justifying its validity to the organization.

The project will also work as a decision support system for the IT manager since it will help him with statistical data concerning his employees, making it easy for him to make justified decisions in terms of promotions.

The system will be able to show the IT manager completed and incomplete tasks, making him able to drive his team to quickly finish their unfinished work.

The system also provides a good storage area, which will put the data in an organized manner and the IT manager can just query only what he wants to see and it is displayed to him.

1.8 CONCLUSION

As a conclusion, the student developer lay out the problems of Turnall holding's IT department and produced objectives to guide the study. Justification of this study has proved it to be a valid project to do. The student developer will now plan on the activities to be carried out.

CHAPTER TWO: PLANNING PHASE

2.1 INTRODUCTION

This phase is an analysis of benefits expected to emanate due to the implementation of the system to Turnall holdings. Pressman (2001) says planning phase has to do with definition of resources and timeliness, along with any other variables. It compares the feasibility of a system with factors that go against it. There is need to clearly compute the costs associated with the production of the system, from start to end to reach at an accurate cost estimate. The more the developer plans the system, the more accurate the system will be and the better quality of results that it will bring; hence this stage is a very important one in project execution.

2.2 THE REASONS FOR BUILDING THE SYSTEM

The student developer, to support the building of the system, has produced the following points: Since Turnall Holdings seeks to create a way to gather information about their IT related processes to do with the interaction of the IT staff and the users, the proposed system is a very sure way since it will create a platform on which users will communicate with IT staff to report errors and get help. The system will store all details pertaining to help-desk tasks and support issues. The problem will remove the use of manual log sheets which may be manipulated so as to create a view that is deceptive in towards a given staff member who would want to cook up information. The system, since it stores all procedures taken to come up with a solution for a problem, will act as a training tool since a novice IT staff or one who has just started work can get an idea of how past problems were solved and thus how he\she may attack the problem also. The system will be able to calculate and come up with each IT staff's work measurement by computing the number of tasks solved correctly against the total number of tasks attended. This will solve the IT manager's issue to do with performance measurement.

2.3 IDENTIFICATION OF BUSINESS VALUE

Client Value

Clients awaiting to be served at the sales front will not wait for longer periods of time when an error occurs since it will now be easy for the sales people to call IT staff. The IT staff will also take less time since they are provided with possible solutions by the system once they identify the problem.

Organization Value

One of the core values of Turnall holdings is excellence and innovation. By implementing this system, Turnall will have acted in an innovative manner since they would have made a pivotal change in making sure that their systems are always in good condition. The following are other values to be obtained:

Enhanced problem solving - Turnall will experience better quality of support from their IT staff since they will have a wide range of solutions from the system which they can use to tackle other problems that can be encountered in the day to day running of the business processes.

Less employee idle time - The system will provide timeous reporting of user problems and also timeous response through pop-up notifications and reminders. Previously a user would call IT on the phone, mail or physically which usually was ineffective since they might not be near their computer at the time, but through the use of android, the staff can have their application on their phone and it will give them notifications of any problems. This will lead to less time spent by employees walking around in the name of looking for IT staff. Also the It staff will not be idle when a job is at hand since they are notified through their phones.

Less likelihood of biased data – By using this system, there is a very slim chance for an IT staff to cook data so they can be said to have done a lot of work. To do this they would have to deal with a lot of employees and this will obviously look suspicious since the system logs the time the problem was reported and the time it was responded to.

Employee Value

Better response time to problems – The users of the system will experience quicker response to their problems since the system will notify IT quickly and there is no reason for them to say they couldn't hear or missed the notifications.

Quality problem solving - The users of the system will receive better quality solutions since the IT staff have a wide range of solutions to apply on each given problem, hence making them choose the best solution to pass to a particular problem so as to provide the most excellent results. This will make the users rely and appreciate the `it work.

2.4 FEASIBILITY STUDY

According to Kendal (2005), this aims on providing a company with a practical and feasible system. At this phase, the developer has to create a criterion to measure up the concept of the proposed system against hindrances against it. Somerville (2007) says the whole purpose of this phase is evaluating the feasibility or worth of the proposed system to the involved company and decide if it is worthwhile and beneficial to implement it or even start designing it for that matter. It is basically a phase that helps all stakeholders ready for the system outcomes and expectations. The developer will carry out a feasibility study for Turnall so as to prove the worth of the system to their organizational processes. The next stage is directly determined by the outcomes of this planning stage since it will lay a standard for which the development process will follow. Failure of positive results from this stage entail a change to objectives and other variables since it will mean the system is not feasible and cannot continue to the next stage.

2.4.1 TECHNICAL FEASIBILTY

According to Stair (2013), Technical feasibility asks the organization the question whether their architecture can be able to support the functionality of the proposed system or they need to purchase more items to adapt to the new system. This entails that, if Turnall's architecture does not support the system functions, the implementation of the system is going to be expensive to them. The cost benefit analysis is used in this case, which compares the benefits to be attained from the implementation of the system with the costs incurred during developing and installing it. Questions arise in this phase and Turnall will have to answer them. They are as follows:

Can our current technology, skills and finance be able to cope up with this system?

Is it worthwhile to implement the system?

Can we substitute the system with an off-the-shelf system?

Can the proposed system eradicate our problems with the current system and does it have a futuristic view?

The results of the above questions from the organization are as follows:

Turnall is willing to acquire any additional items that will be needed over and above their current architecture to implement the system. They will produce the funds and help needed in the development and implementation. Turnall has agreed and are sure the system will answer their problems and that it can be produced. The developer has also assured it. Buying an off-the-shelf system is not favorable to Turnall's processes. The need that Turnall needs to solve

is removing manual work and paperwork. The proposed system is able to do this since it extracts problem/task data from the database and be able to check the status of each task.

2.4.1.1 Hardware

Using the available servers at Turnall hodings may be suitable for the system but however using a new dedicated server might be a better idea for the efficiency of the system.

- ➢ Android mobile devices for each of the users
- ➢ A server (main)with at least 100GB HHD and 6GB ram

2.4.1.2 Software

The software is already available and is fully licensed. The software to be used:

- ➢ Android (operating systems)
- ➢ Macromedia Dream weaver 8 – a platform to develop web based applications for the reports
- ➢ PHP – a server scripting language
- ➢ MySQL – a database management system that enables the storage of data in a secure and faster manner.

2.4.1.3 Technical Expertise

- ➢ The users will be unable to use the system at the onset but with proper training they will all be able to use the system in just a week
- ➢ The users and developers are familiar wth the technology in use, which is android which they use on a daily basis
- ➢ The project size is small and attainable in just a few months

The student has full knowledge of how to combine all these technologies together to come up with a system that can perform these objectives. The student is familiar with the language of java and the database which is MySQL.

2.4.2 ECONOMIC FEASIBILITY

McBride (2002) has an explanation of economic feasibility. He defines economic feasibility as the ability of the system to be implemented against the current state of the organization and its surroundings. This has to do with the question whether Turnall Holdings can be able to provide the financial resources to be used in the design and implementation of the system. A detail of the cost and benefits of the system will prove if it can be done or not and if Turnall

will accept the system or not. Turnall will approve the system if the overall benefits outweigh the costs.

COSTS

Cost of development

This is the detail of the costs incurred during the production of a new system and its implementation.

Operational costs – These costs are met well after production and implementation and they are met in the day-to-day running of the system. Costs that may be accrued in this form include maintenance costs and costs to do with any backing up of data.

Here is an outlay of the costs expected in the system.

Table 2.1: Development and operational costs table

Costs of development	Quantity	Amount($)
Computer	1	400
Android devices for IT	4	600
Wages for developer	-	500
Operational costs		**Amount($)**
Wages for administrator		200
Training/Test run		300
Total Overall costs		**2000**

BENEFITS: TANGIBLE BENEFITS

These entail those benefits that can be converted to a monetary value. Tangible benefits are easily identified since they are plain in nature. They are those benefits that are directly gained from the use of the system.

Table 2.2: Tangible benefits table

Benefits	Value($)
Reduction in paperwork	3 000
Reduced Storage costs	2000
Total tangible benefits	**5 000**

Table 2.3: Net benefits table

Total benefits	Value in ($)

Tangible benefits	5 000
Less: Total costs	
Total costs	2 000
Net benefits/(Costs)	**3 000**

INTANGIBLE BENEFITS

These benefits are hardly transformable to a monetary value. They are realized through some extra indirect but noticeable merits of using the system. These can easily realize monetary value for the organization but they improve or ease the business processes or any other indirect business value gained from the use of the system. There is improved efficiency and effectiveness in problem solving, less idle times and more accurate performance measurement. Better decision support is achieved.

COST BENEFITS ANALYSIS

According to Boardman (2006) this is a systematic approach to estimating the costs and benefits of carrying out a project. Lucey (2002) has cost benefit analysis as the process of deciding a way forward by looking at the outcome of the computations in costs and benefits. It gives a decision support criterion, which is monetary so as to provide the organization with a workable comparison, which is in a value. They use the return on investment, present value analysis and the payback period. In order to proceed, this analysis has to be positive for the organization. Turnall Holdings needs to know the return on investment value since its investors are concerned with realizing profit. They will want the return on investment to be high so that they can realize high profit.

In Table 2.3, net benefits have a positive value, which is good for Turnall. However, they still need to do all of the analysis using the other methods to clearly understand the values. Turnall is mainly focused on returning their investment in the shortest possible period.

RETURN ON INVESTMENT

Randall (1996) says this method can be used when faced with different alternative projects and your main focus is to identify which one returns the investment in time.

ROI = (Total benefits – Total Costs) X 100

= 5 000 – 2 000 X100

5 000   = 60 %

A 60% return on investment rate is great for Turnall. Return on investment entails the rate at which the initial investment will be returned to the investors. 60% means the bulk of the investment will be returned in the first period of the use of the system which will make the investors realize value from the system early.

PAYBACK PERIOD

The period of payback is the period in which an investment can be paid back in full. It entails the time in years that it takes for the system to bring back value on the investment initially done on it. Turnall Holdings wants its investors to be able to gain back their investment in the shortest period possible.

Table 2.4: Payback period table

Period	Cash flow ($)
Year 1	(2 000)
Year 2	5 000

2 000 X 12 months = 4 months and 24 days
5 000

Turnall will begin to attain positive cash flow after 4 months and 24 days of using the system. This is a very good payback period value since it means Turnall's investors will realize profits from their investment in just over 4 months of using the system.

2.4.3 SOCIAL FEASIBILITY

Kendall (1999) defines this as the analysis of stakeholder needs and expectations and the acceptability of the system by these stakeholders. At this stage the society, which are the stakeholders have to be taken into consideration so as to see how the system will benefit them and the following is true:

MANAGEMENT

Turnall management is pleased with the proposed system since they have always wanted to control and keep track of the tasks attended to by the IT department. They are also interested in the fact that the system will avoid manual work and stationery while reducing idle time

EMPLOYEES

The employees are overjoyed by the system since they do not need to make calls or go to IT anymore. The system now accommodates problem data that was currently not captured, for example, pending, attended, and the time stamps for each phase.

IT STAFF

The IT staffs are also happy because the system allows them to easily refer to past solutions given by others or those that they have done themselves, creating a learning environment.

2.4.4 OPERATIONAL FEASIBILITY

According to Kendal (1999), operational feasibility of a system is an analysis done on the user or operators of a system so as to identify if the system is acceptable and friendly to their needs. The developer has a question in mind to do with whether or not the system is usable and answers best what the users expect. The management, who weigh the system functions with what they wish to attain, usually confirms this. There is need for the developer to give clarity to management about the system in order for them to make a well-informed decision. Management along with users are in consensus that this system is feasible operationally and are in favor of the system's continuance.

2.4.4.1 Training

Training is needed to familiarize the users with the actual real-time use of the system. If users are not trained to use the system, there is probably going to be a problem of errors and mistakes in the data being sent. Users need to be trained so as to be efficient in using the system. There is bound to be delays in doing tasks if someone does not know how to perform a particular task within the system. The users will be trained for a period of a week or two, depending on how much they have learnt and understood.

2.4 RISK ANALYSIS

According to Roebuck (2011), risk analysis is the process of identifying possible threats on the success of a project or it attaining its goals. The analysis seeks not only to identify the threats but also strategize how these risks may be avoided or reduced so as to protect the project from failure. It involves planning contingency plans for Turnall that will lead to a fail-proof system. Many aspects have to be considered when looking at this analysis and these may include economic and technical risks.

ECONOMIC RISKS

Issues to do with resources involve a lot of risk since resources are scarce and the organization has to act rationally. By so doing, Turnall has a risk of depleting resources for the project. Turnall has to budget for the project such that there will be no point in which the project will lack resources. A careful analysis on the requirements of the system at the initial stage can be of great importance to Turnall since it will ensure that they will plan for the project well and reduce the likelihood of risks occurring.

TECHNICAL RISKS

In project execution, there is always the risk of failing to meet user requirements and thus creates a system that will be rejected by the users. This is a very dangerous risk since resources may be depleted while doing the wrong and unacceptable thing. A Careful plan for such risks should be done by Turnall. However this risk will not be encountered if Turnall carries out a detailed problem definition and user requirement analysis. Carrying out this analysis will make the risk less likely to occur.

2.5 STAKEHOLDER ANALYSIS

According to Turner (2002), this involves the identification of the concerned parties in the project's success. This entails that Turnall identifies the interests of its stakeholders so as to make sure they meet these interests and balance the scale. Turnall's stakeholders include users (employees), management, shareholders, investors and customers. The interests of each of these stakeholders were identified and are as follows.

MANAGEMENT

Turnall management wants the system to be full proof in reporting and solving of issues to do with faults and any IT related errors. They want the system to provide them with measurement criteria that can make them able to evaluate IT staff performance.

USERS

Turnall users want the system to be able to quickly contact IT on the occurrence of a fault. They want the system to be fast and reliable so that they won't need to walk down to the IT department to call IT staff.

SHAREHOLDERS

Turnall shareholders want the system to prove itself worthy by improving business processes and bringing value to the organization

INVESTORS

Turnall investors want the system to be able to return the value of their investment and give them a profit by giving more value to the company than they have invested in it.

2.6 WORK PLAN

Badaulf and Stair (2011) defines a work plan as a tabular or graphical representation of the time period between the start and the end of a project. It shows the tasks to be carried out throughout the project and the time to be taken at each stage. It is used to plan for the activities so as to get a time period in which the project should have been completed. Turnall holdings have created a plan that they have agreed with the developer to implement in the project.

Table 2.5: Project plan

Process	Starting Time	Ending Time	Duration (Weeks)
Project proposal	**10 January 2016**	**24 February 2016**	**1**
Planning	**24 February 2016**	**20 March 2016**	**3**
Analysis	**20 March 2016**	**31 March 2016**	**1**
Design	**31 March 2016**	**10 April 2016**	**2**
Coding	**10 April 2016**	**20 July**	**5**
Testing	**20 July 2016**	**10 May 2016**	**1**
Implementation	**10 May 2016**	**20 May 2016**	**1**
Maintenance	**25 May 2016**	**Ongoing**	**1 +++++**
Documentation	**10 January 2016**	**Ongoing**	**15 ++++**

2.7 Gantt Chart

Young (2013) defines a Gantt chart as a graphical method of showing a project schedule that shows project time, dates, all activities, resources and their relationships. It is derived from the logic diagram when it has been analysed to float. It is a way of structuring activities by their durations in order to perform tasks timeously and sequentially. Mattiske C (2013) defines a Gantt chart as a chart that uses timeliness and other symbols to illustrate multiple, time-based activities or projects on a horizontal time scale.

Activity/(Period)	1	2	3	4	5	6	7	8	9	10	11	12
Proposal												
Planning												
Analysis												
Design												
Coding												
Testing												
Implementation												
Maintenance												
Documentation												

Fig 2.1: Gantt chart of project activities

2.8 CONCLUSION

In conclusion to the planning phase, the developer has carried out all necessary analysis, from cost benefit to operational feasibility. Now the developer can move to the next phase. The system has confirmed its feasibility and management and users are happy with it.

CHAPTER THREE: ANALYSIS PHASE

3.1 INTRODUCTION

The phase involves the study of the current system in order to identify its inabilities, flaws and drawbacks, with a goal at providing a better system. The analyst will identify the system's functionalities, the flow of its data, needs along with any other variables it uses. Several data gathering techniques are used to provide this data, which include the use of interviews, questionnaires and observations. The developer will identify possible alternative courses of action and from these will evaluate and select a single course as the right one.

3.2 DATA GATHERING METHODOLOGIES

These are the various methods used to attain data about the current system functionalities and the expectations of the users and management for the new system. The methodologies were created so as to ease the process of acquiring data from different stakeholders and they include observation, interviews, questionnaires and document reviews. Arora (2007) defines information gathering methodologies as finding facts as a method that is used through investigating who apply questionnaires, interviews, research, meetings and other methods to collect information about challenges of the system, also what is required and the preferences The developer used such methodologies in this phase to get data needed for an analysis between the current system and the proposed system. The developer sought out for the type of data and the processes involved in the current system. He sought to find out what the users and management thought about their current system and if it was answering their problems in the way they wish it could, the things that the users and management wanted changed or included in the new system and any misbehaviors or unnecessary processes they wish to exclude from the current system.

QUESTIONNAIRES

The developer used questionnaires to ask the stakeholders to provide data about the current system. The developer had to deal with the IT manager and database and systems administrators to get more information about the current system. The developer found the following advantages and disadvantages according to Gillham (2008).

ADVANTAGES OF QUESTIONNAIRES

It was easier for the developer to get to the point without wasting time and words. The respondents had no fear of being known since they are anonymous. Respondents were not

disturbed in their day-to-day work since they could fill the papers even when they are at home. Questions are easy to formulate since they do not need to be detailed.

DISADVANTAGES OF QUESTIONNAIRES

Data may have been a bit biased compared to interviews since an individual had a lot of time and a lot of thoughts, which could lead them to hide some information, usually if it is sensitive. There was lack of non-verbal attributes of the respondent, which do tell a lot about what a person is saying. The respondent would skip some questions. The respondent sometimes would not understand some of the questions hence gave inaccurate responses.

RESULTS OF QUESTIONNAIRES

Questionnaires were given to the users of the system to identify the poor areas of the current system and the ideas they hoped to include in the new system. Users showed that the system was cumbersome since they had to call the IT department on the phone of which most of the time was unanswered. They had to come all the way to the IT department most of the times simply to get their account unlocked, which was very tiring and boring.

IT personnel were also give the questionnaires in order to identify were they also felt the system was failing and they proved that the system was impractical since sheets of papers were used to document the faults, which could easily be lost or destroyed.

OBSERVATIONS

Brown (2000) says observation method is a great method since it provides accurate first hand data. Observations may provide particular data and behavior of the system and its users, which might not be readily provided by the management and users. This type of data gathering methodology gave the analyst a better view of the system's functionality and limitations. Advantages unique to the observation method are:

ADVANTAGES OF OBSERVATIONS

It brought out certain information about the system that was not easily gained from interviews and questionnaires. There was no bias since it is a first hand method. The developer watched the performance and processes of the system personally.

DISADVANTAGES OF OBSERVATIONS

If the users knew they were being observed, they may have changed their conduct significantly and the data would be biased. It was difficult to sample this data.

RESULTS OF OBSERVATIONS

Observations were done as users and the IT department did their work on the system. The student identified that most of the faults were reported but attended after quite some time from 10 minutes up to even an hour. This was a major drawback of the system since the IT personnel would then not show that time gap on the logging.

INTERVIEWS

Interviews were conducted with the users and management to see how they felt about the current system. Kendall and Kendall (2011) also defines an interview as a legitimate discussion that is done between two or more parties that will have to relate on something. In normal circumstances interviews are done between two consents but because of challenges in the organizations many individuals can be interviewed at the same time. Interviews always prove to bring out the most out of people since they have no defined scope of response; hence more detail is bound to come out.

ADVANTAGES OF INTERVIEWS

Interviews produced verbal and non-verbal answers to the developer and the combination was powerful. There was more detail about the system since users explained clearly about their experiences. The use of dialogue is very important and can only be found in this methodology. Accuracy of analysis was high since there was room for question rephrasing. Many ideas emanated from this methodology. Results were easily analyzed and evaluated and no time was wasted since there was direct and quick responses between the analyst and user.

DISADVANTAGES OF INTERVIEWS

Over-reliance on interviews tended to happen which could be misleading to the analyst. Interviews were not easy to carry out.

RESULTS OF INTERVIEWS

Interviews were carried out to get the actual physical response and body language of the users and the IT department. The IT manager was also interviewed. The users showed a great

dislike of the system, while the IT staff were indifferent because the system also worked to their advantage. The IT manager however found it difficult to measure the work done by the IT staff using this load of paperwork hence required an easier system and reporting.

3.3 ANALYSIS OF THE CURRENT SYSTEM

Turnall holdings uses manual log sheets which are sheets of paper designed to capture the user name and surname of the user involved and also the problem, cause and solution. The attender also has to fill in his/her details on the form. This form is filled in each time an IT staff goes to attend a problem, fault or issue at any user's work station. This form serves as the basis for record of the issue and any IT staff member can go back to these forms to see how particular problems were solved. The IT manager then takes these forms after a certain period of his own choosing and evaluates the work done against his standards. The outcome of these evaluations will serve as the basis for performance measurement and promotion. If the manager feels that a certain issue was not done well according to his standards, he will call the responsible staff member and question him/her on how they came up with that solution instead of that he deems to be the correct or more rational one. Analysing the system at Turnall was a matter of taking a close look at the processes and procedures taken from the reporting of the fault to the evaluation of the issue and the decision made out of this evaluation. The analyst had to look at the data captured, the processes and the outcomes.

3.4 DATA ANALYSIS

Inputs

User's name and surname are needed when first creating the user account and also when logging into the system. User's problem is captured when the user sends data to the IT staff and the time when the user pressed the button to call IT.

Processes

The data was used to identify the most probable cause of the problem and recording all the issues to do with the report. There is the provision of solution and signing of the finished work.

Output

A detailed record of the issue will be shown in the system, which helps the IT staff measure performance and refer to past tasks. The IT Manager will pass a decision or judgment of the work done, by evaluation.

3.4.1 CONTEXT DIAGRAM OF THE CURRENT SYSTEM

The context diagram for the current system shows how the data and entities will be related. Here the user would call IT on the phone and describe their problem and the IT staff confirms that they are attending to it. After attending to the issue, the IT staff fills a log sheet to describe problem, cause and solution and then the user signs it and it is stored fore reference.
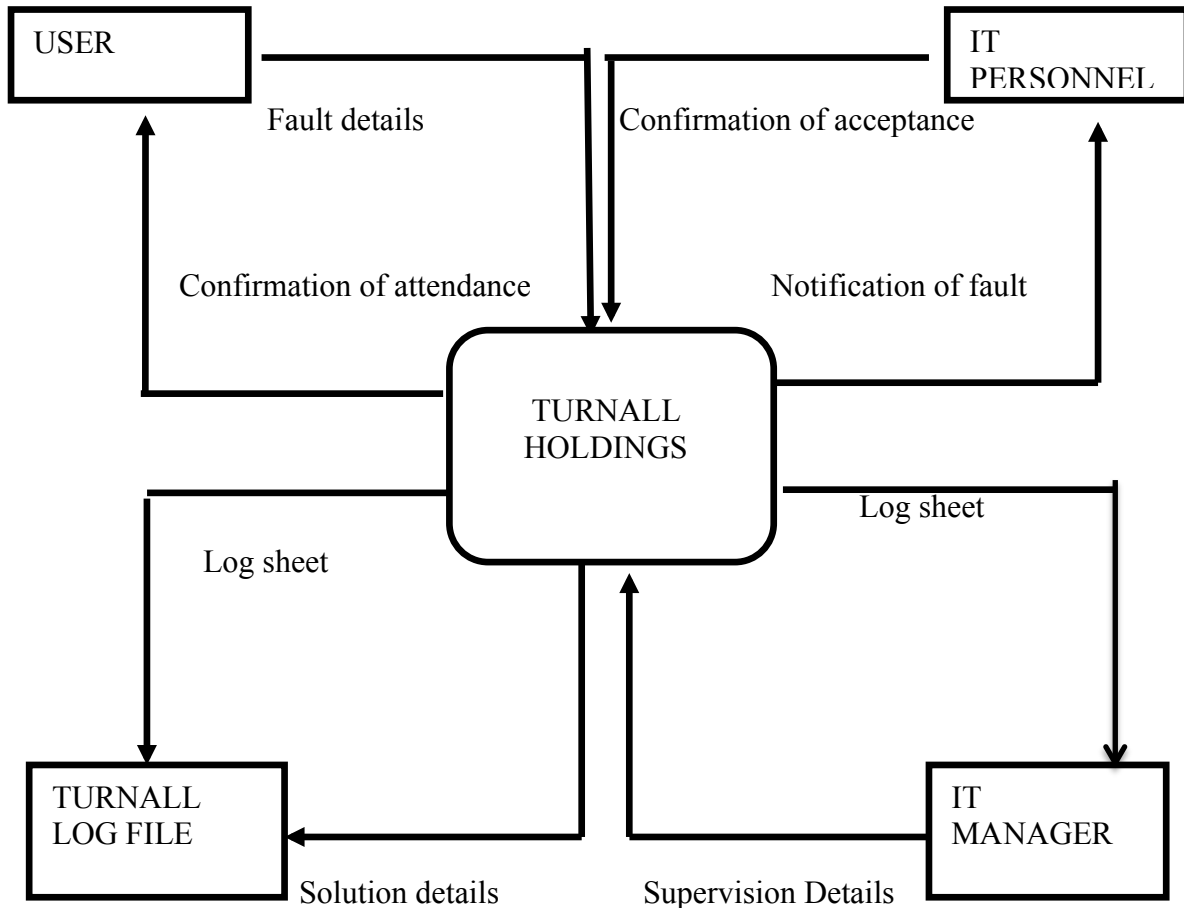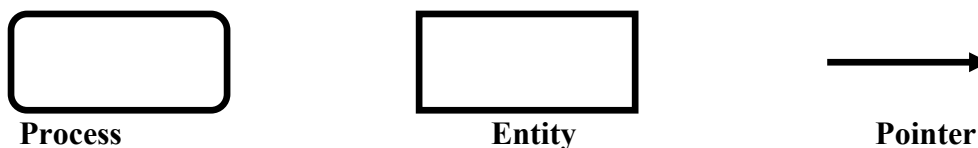

Fig 3.1: Context diagram of the current system

Key To Data Flow Diagram

Process   Entity   Pointer

3.4.2 DATA FLOW DIAGRAM OF THE CURRENT SYSTEM

The data flow diagram for the current system shows the processes and data that were being used. Here the user would send details of their problem over the phone and the IT staff jots

them down. The IT staff will go there and check possible cause and then provide solution. The IT personnel would then fill the manual log sheet, which is signed by the user to confirm. The IT Manager would then later go through all the log sheets and check how the work is going.
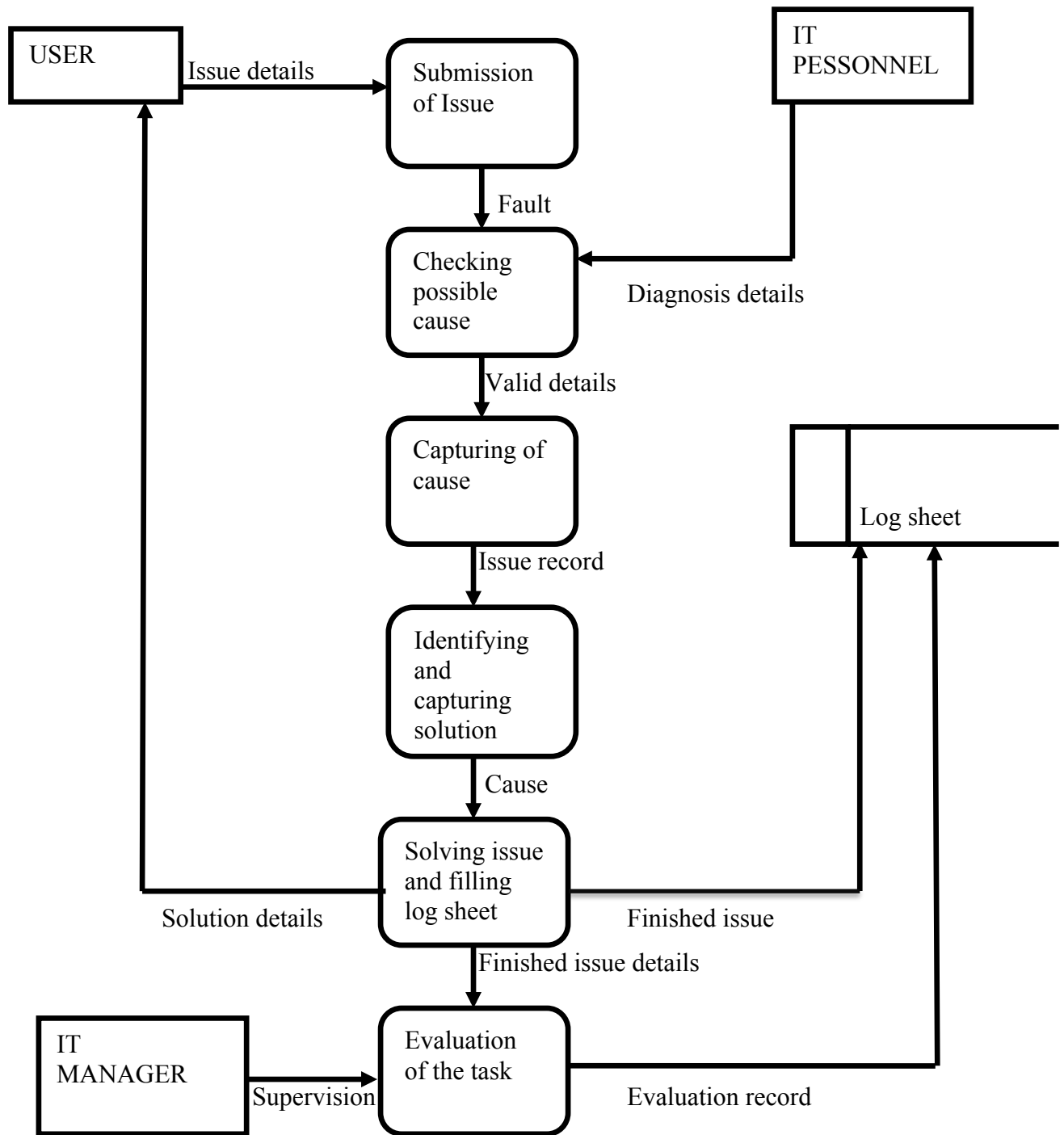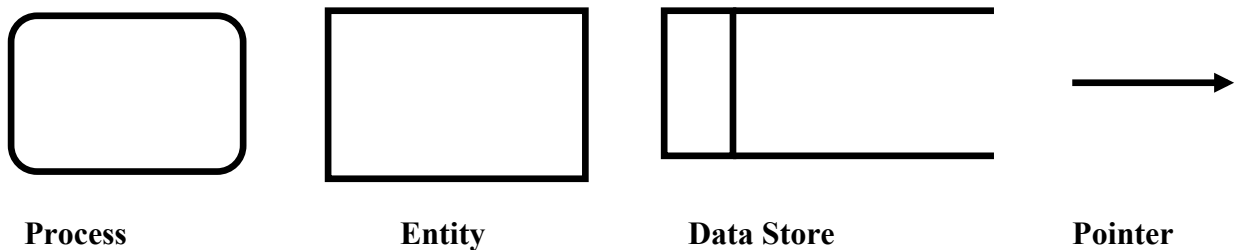
Fig 3.2: Dataflow Diagram for Current System

Key To Data Flow Diagram

| Process | Entity | Data Store | Pointer |

3.5 WEAKNESSES OF THE CURRENT SYSTEM

The use of paperwork leaves the records prone to damages like fire or getting lost. It is hard to find storage space for all of the paperwork. Unnecessary delays are encountered since the user may fail to connect to IT and have to walk to the IT offices. Costs of paperwork are large and inconvenient since there are better and less costly ways to do the same task. It is hard for the IT manager to organize this paperwork. It is hard for the IT manager to conclude an IT staff's performance from a large pile of papers. Decision-making is harder.

3.6 EVALUATION OF ALTERNATIVES

Certain alternatives were found that could potentially eradicate the current system and these are outsourcing, improvement and development.

3.6.1 OUTSOURCING

This is when an organization purchases an already existing software package from software stores and uses it to answer their problems. There are certain risks associated with this type of solution since the software package may not best suite the requirements of the organization.

ADVANTAGES OF OUTSOURCING

According to Krugman (2000), the system is quickly implemented because the company relieves itself of hand-on work. There are lower costs of development. There is the possibility of easy fixes to bugs since other people may be using it.

DISADVANTAGES OF OUTSOURCING

Outsourced software is usually not specifically written; hence it might not solve their problem accurately. More problems may arise from the use of this software since the software might not be compatible with some architecture of the organization

3.6.2 IMPROVEMENT

This is when a system is partially improved to extend its abilities without completely doing away with it. If this is possible and viable, it may sure be a good and cheap solution for Turnall.

ADVANTAGES OF IMPROVEMENT

The output will be quick and easy to implement since it will be based on the current system. Less delay in the implementation since users can quickly adapt to it since it is just an extension of their previous system.

DISADVANTAGES OF IMPROVEMENT

Due to the fact that the system will still have parts of the current system might mean that certain problematic areas of the current system will still remain. This is not advisable for Turnall. Upgrading the existing system is a cumbersome process since it means restructuring a lot of things and parts.

3.6.3 IN-HOUSE DEVELOPMENT

This involves the sitting down and analyzing of the current system with a goal of creating a brand new system that will conform to the needs and wants of the organization. A team of experts in the area will do this and they will make sure all the company's needs are met.

ADVANTAGES OF IN-HOUSE DEVELOPMENT

This system will be an original system never found anywhere else and is completely and uniquely for Turnall holdings. It will motivate the workforce since they have implemented a system out of their own interests and influence. The system becomes more reliable since it answers a specific problem that was evaluated and analyzed. Users and management will feel in control of the system and this boosts their confidence towards the system. The product of this choice will be greatly and easily acceptable by the workforce since they all contributed to the production of the system. This is probably a sure way to help Turnall realize great business value and work motive since it will work to their satisfaction. Development was chosen since it is a choice that ensures reliability on the system, morale and confidence. It does not provide a partial fulfillment of the user needs but complete and utter satisfaction.

3.6.4 SELECTION OF PREFFERED ALTERNATIVE

After comparison of these alternatives, the student and the company found in-house development as the suitable choice for the new system. In this case the student will work with Turnall Holdings to develop a new, customized and company oriented application that will be used by Turnall Holdings only. This was because it will produce custom software that can be easily manipulated by the company to work however it wants it to work.

3.7 REQUIREMENTS ANALYSIS
FUNCTIONAL REQUIREMENTS

The functional needs of the system are:

➢ It should be able to give notifications to IT staff about the issues as they come.

➢ All users must be able to report from a certain device using their own credentials.

➢ It should be able to record all the issue's variables accurately and report in time.

➢ It should be able to help the manager make decisions by calculating the rate at which each IT staff is attending to issues and the ratios of good and bad solutions.

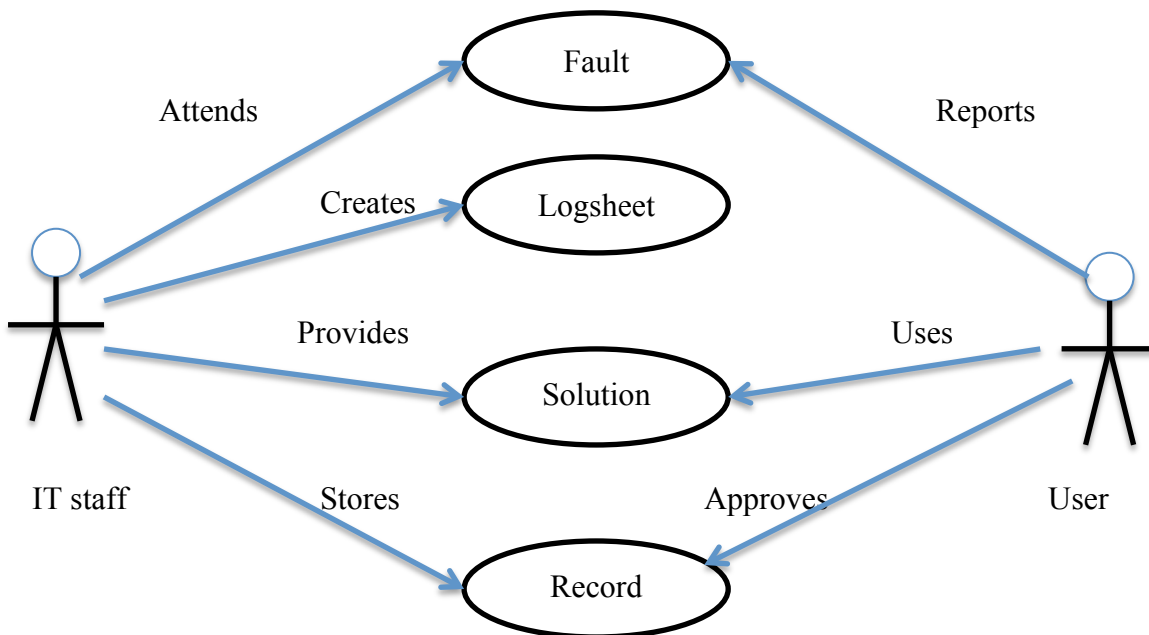These functions are important and the system must be able to accomplish them.

USE CASE DIAGRAM

Fig 3.3: Use Case Diagram

NON-FUNCTIONAL REQUIREMENTS

Security is important within the system and there should be no chance for an unauthorized user to breach the system. To achieve this, each user will be granted privileges according to their tasks in the system and their own user account and credentials. The system must be easy to maintain.

3.8 CONCLUSION

The student developer carried out an analysis on the current system and compared alternative solutions to counter the problems and came up with a single and most appropriate solution for Turnall, which is for them to develop a new system from scratch, which will perform the exact tasks that they wish to perform. Now after all these aspects, the system is ready to be developed and the next stage will show this in detail.

CHAPTER FOUR: DESIGN PHASE

4.1 INTRODUCTION

The developer has successfully analyzed the current system and has laid down the standards for the proposed system. Kendall and Kendall (2002), defined design phase as a process of application of various methods and values, the purpose of describing a system with enough detail to allow its physical realization. In this phase, the developer will start designing the proposed system. This phase will mainly concentrate on the objectives of the proposed system and how they will be met. It will show how the system will be physically designed, from its architecture, its database design and its interfaces.

4.2 SYSTEM DESIGN

In this phase the system developer will now focus on the system requirements so as to produce the right interfaces, architecture and components, Eppinger (2000). If correctly done, this phase should produce a system that is effective, reliable and maintainable. The system will be an android application that will work on any of the android devices like phones and tablets so as to ease the mobility. The following will be its design:

- ➢ The android application will have a login page as the first interact able page and this will allow the user to specify his/her credentials.
- ➢ Once the user logs into the system they will be brought to the reporting form which allows them to report a fault or problem to the IT department.
- ➢ Once the users report the fault, it goes and pops up on each user with the department equal to IT.
- ➢ The IT staff logs onto the system and they are taken to the welcome page where issues or faults are displayed. They select an issue to attend it and a notification will be sent back to the user to notify them that their issue is being attended.
- ➢ Once the IT staff attends the user, they do the job and then provide the cause and solution. Once this is done, the system pops up another notification to the user to ask them if they are satisfied with the work done. The user confirms and the issue closes and updates the database.
- ➢ After the completion of an issue. The system then pops up a notification on the Manager's profile to notify the availability of a new issue to review. Once the manager reviews it, they then approve or disapprove it and the issue is closed.
- ➢ The Manager can then be able to query for all approved issues, disapproved issues and also statistics on staff performance and other variables.

4.2.1 CONTEXT DIAGRAM OF THE PROPOSED SYSTEM

The context diagram for the proposed system shows an insight of how the entities within the system will be related and the data that will be passed between or among them. Sommerville (2011), defined a context diagram as a diagram that intends to demarcate the boundaries of applications, the involvement of entities in the system and also showing how entities communicate with the applications. Here the user passes their personal and fault data to the helpdesk system which is accessed by the IT personnel who accept responsibility to respond to the problem and they respond by giving possible cause and a solution. This is then later evaluated by the Manager to see if the task was done properly.
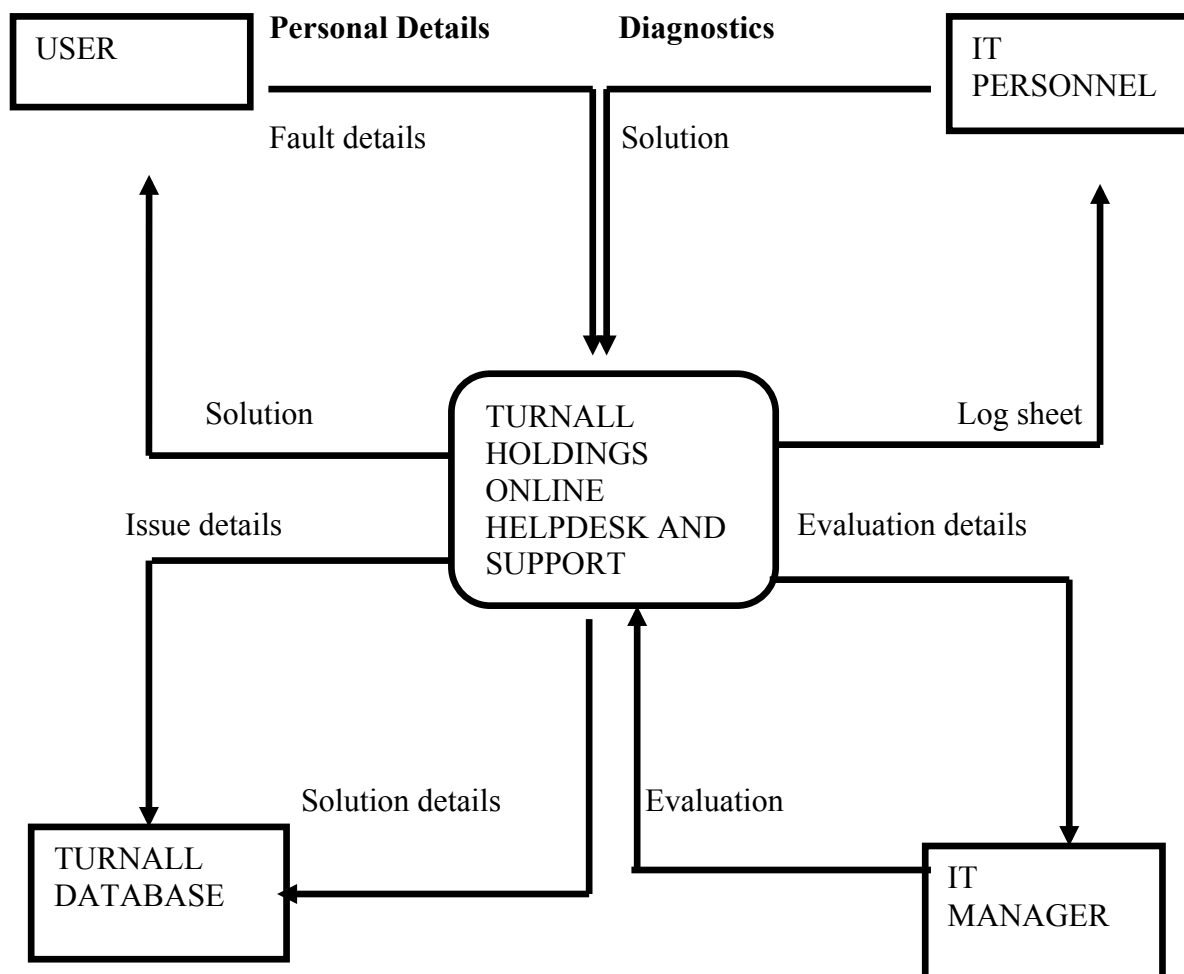

Fig 4.1: Context diagram for proposed system

4.2.2 DATA FLOW DIAGRAM FOR THE PROPOSED SYSTEM

Dennis (2012) explained that DFD is drawn so as to show how the system proposed processes would operate in achieving and fulfilling pre-defined tasks specified. Users send their issue and it appears on the IT staff profiles and when one of them accepts the issue to solve it, the issue then disappears from the other IT staff profiles. The one who accepts

suggests a possible cause and states a solution to it, which will appear at the user's profile to solve issue.
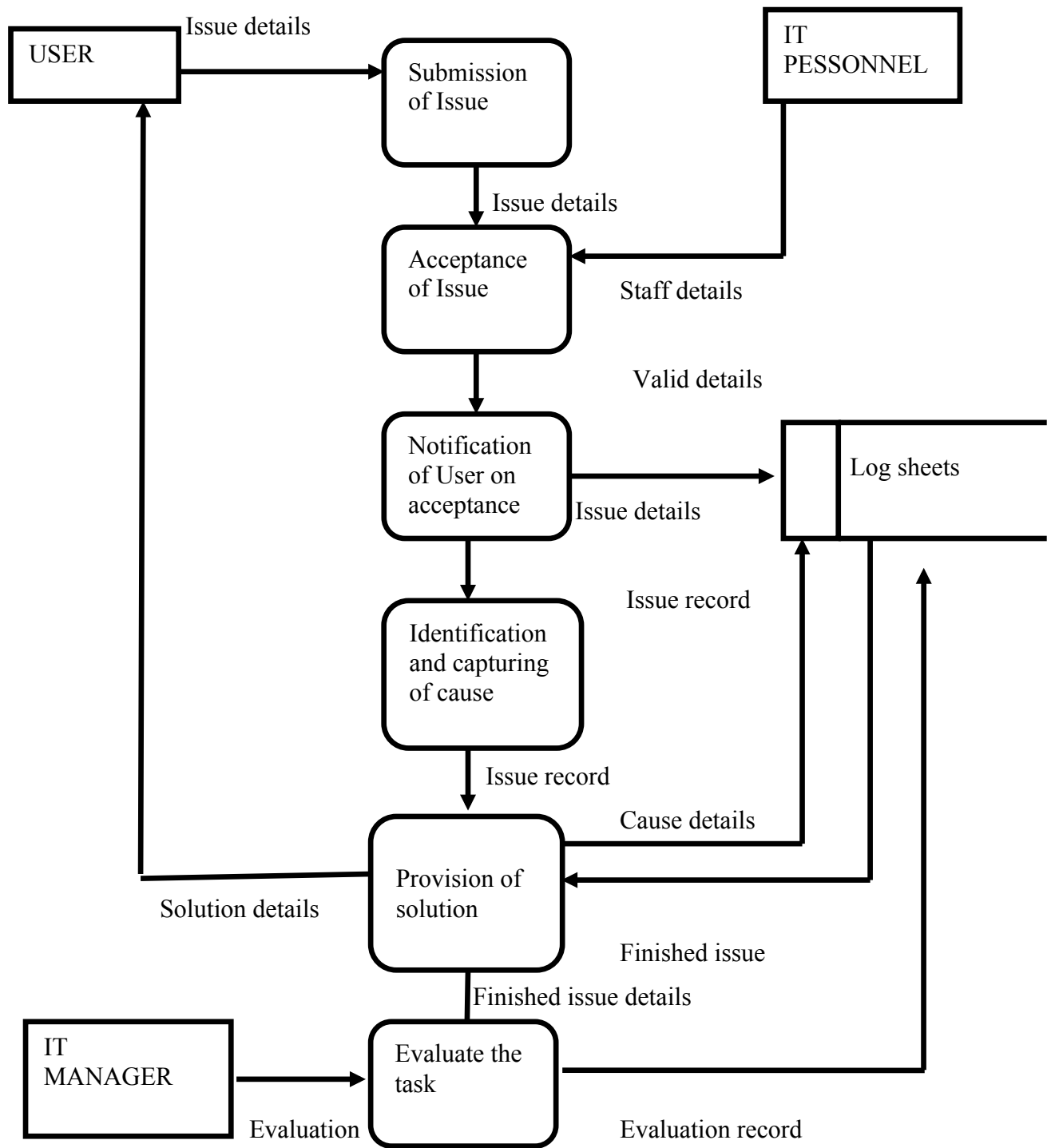

Fig 4.2: Dataflow diagram for proposed system

Key To Data Flow Diagram

Process	Entity	Data Store	Pointer

Fig 4.3: Key to dataflow diagram

4.3 ARCHITECTURAL DESIGN

According to Sommerville (2004), This deals with the physical aspects to do with the system, like hardware design. It lays out the connections of the computers forming the network within the system. It designs both the logical and physical design of the system. The main goal for architectural design is ensuring there is minimization of bottlenecks in the system proposed due to factors that are architectural and software. It further gives description of the technical platform on which the new system will run. On architectural design there is creation of network so as to display on where the components of the system will connect to one another. (Sommerville, 2004) architectural design describes the technical environment including software, hardware and user.

CLIENTS

This represents the computers or devices used by the users to access the system. In this system, the users will be using their various android phones, tablets and other android devices to communicate with the database.

COMMUNICATION MODE

Turnall holdings has Wi-Fi available at their workplace, hence the users will connect to the Wi-Fi and be able to send their requests to IT.

PRINTERS

Printers may be needed when generating physical reports of the system variables.

SERVER

This is a computer that will host the database of the system and it will be one of the servers at Turnall Holdings.

4.4 PHYSICAL DESIGN

Physical design describes the hardware components that will interconnect to make up the system. Here there are devices like the android mobile phones that will have the application installed and then the server, which will host the database. Routers will be present also to handle the networking of the system. The system will exist in a local area network, which is only for the organization. Wireless fidelity ports will be responsible for taking the signal of the Internet connection to the peripheral parts of the company so that each and every user or employee has access to the helpdesk application.
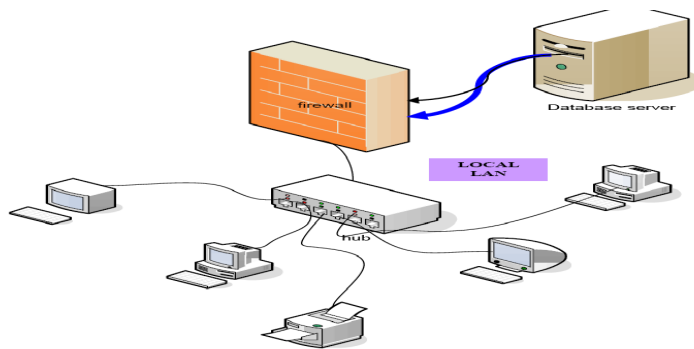

Fig 4.4 Physical design diagram

Converting the logical and abstract model to the physical realization is known as physical design (Cornel and Crocket, 2008). This has to do with the relationships between the hardware and the software that is going to be used with the system, the types and number of hardware and hardware needed by the system.

SOFTWARE REQUIREMENTS

Android platforms will be needed for the system to work, so Turnall will have to use android operating system. The android system will communicate to a MySQL server and allow the insertion of the variables in that remote server.

HARDWARE REQUIREMENTS

The hardware to be used will be android-based and this will include android phones and tablets. The system might need fingerprint lock capable devices if they wish to instill more security. This will mean that the login form will have to allow fingerprint login and also username and password login. WI-FI is already available at Turnall so there is no extra cost

to get these in place. A local area network that links Harare plant and Bulawayo plant is also available and this means that even the Bulawayo employees can get help from someone in Harare on any issue.

4.5 DATABASE DESIGN

Database design is the defining, creation and manipulation of tables and attributes and their relationships so as to store data and be able to recognize the relationships between the data. The design of the database is of great importance since it helps with security and reliability issues. Choosing a good database application will most likely entail good database functionality. The database architecture is built into three layers.

4.5.1 PHYSICAL LAYER

The layer shows the physical database storage. This is the actual data itself in its least abstract manner. Conceptual level reflects data that is actually stored in the database, constraints on the data and the relationships, which exist between the data. This level also defines how and which queries to the data store are executed.

4.5.2 CONCEPTUAL LAYER

This layer provides a detail of the definition of the data stored within the database and also its relationships. This defines data types; relationship constraints and also database queries are also in this layer. This layer is the second least abstract layer.

4.5.3 APPLICATION LAYER

The layer is built so as to remove the complexities of the user communicating with the actual physical database. This layer can also act as a security measure since it only shows what the user requires and everything else is hidden. The layer is where the program to be used by the user will lie and it has forms and commands that the user can relate to and understand rather than actual query language. This is the most abstract layer of the database architecture.

4.5.4 THE DATABASE DESIGN

The design of the database will follow a stipulated and professional format so as to maintain data abstraction and data independence throughout the database. The ANSI-SPARC committee has the following diagram to describe the database architecture.
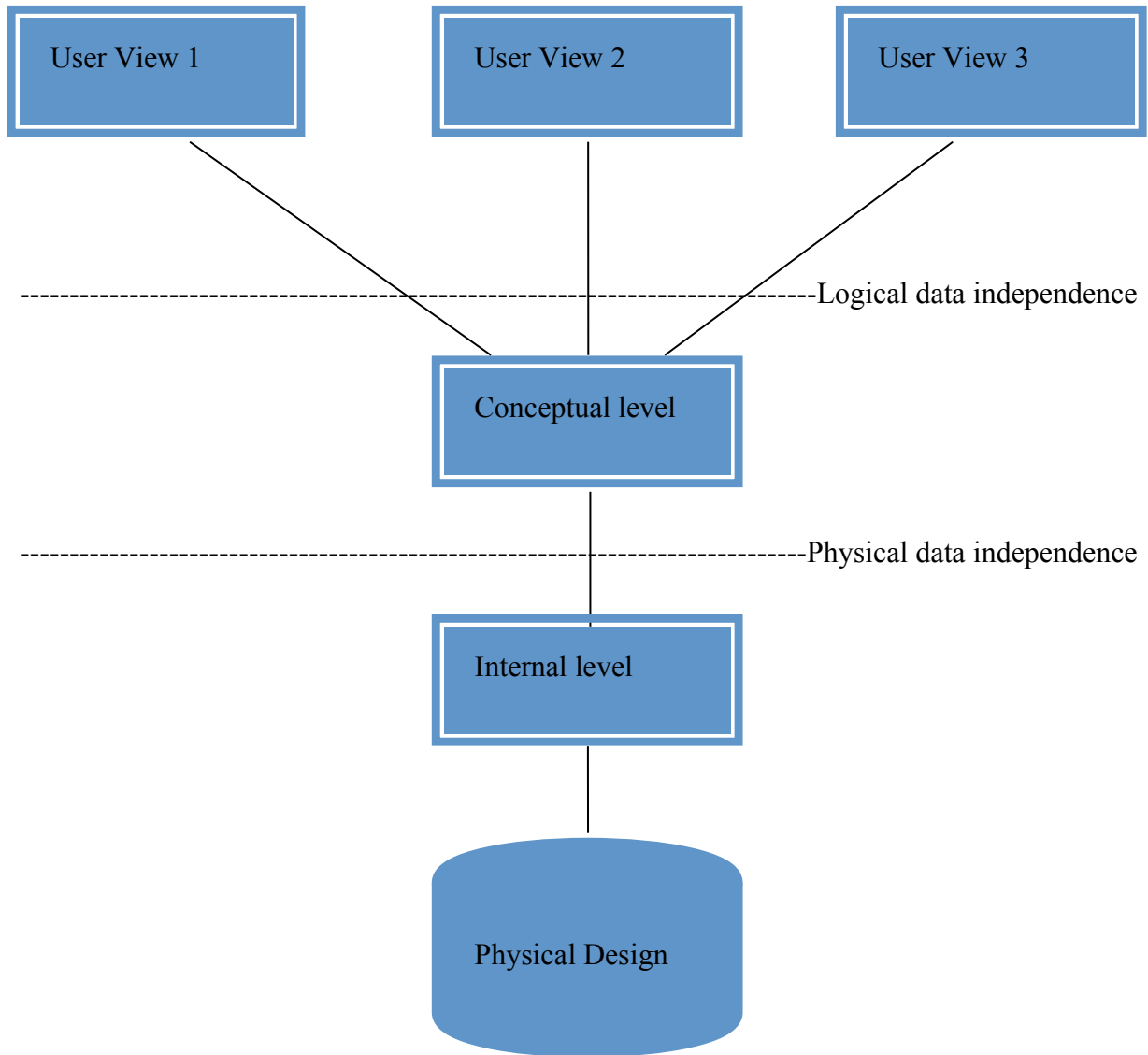
Fig 4.5 Database architecture diagram

4.5.4 ENTITY – RELATIONSHIP DIAGRAM

Entity relationship diagram is abbreviated as (ERD) is defined by Joanne (2006), as a represented graphic with the intention of showing a relation between objects, people and events within an information systems. Hazra (2013) also defined ERD as a graphical representation that has three (3) components that are entities, objects and with data stores and also the cardinality that defines the relationship within entities. Furthermore, ERD has a data modelling technique that developers use in defining an organization process used for a basis of a relational database. Below is an ERD of the proposed system.
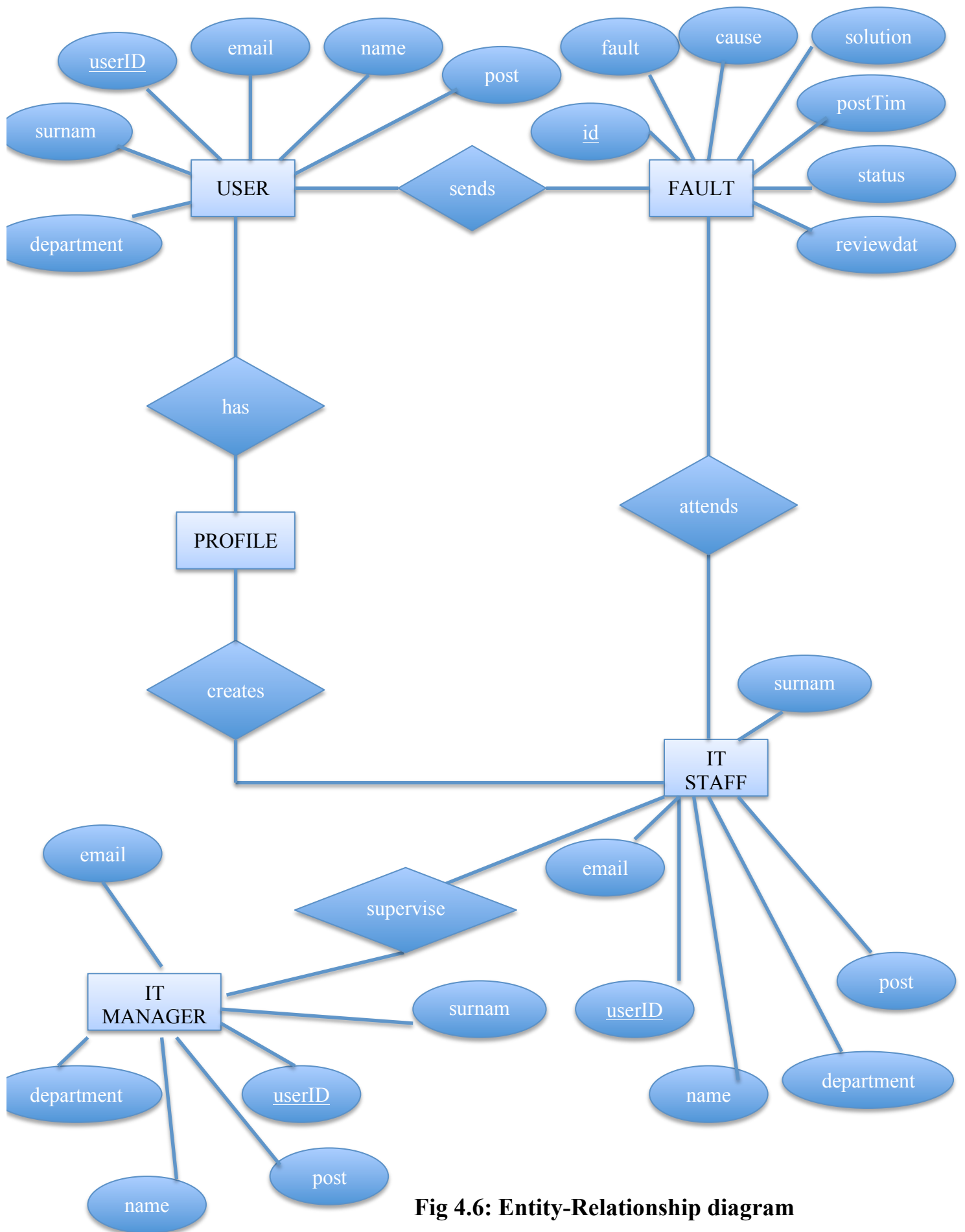
Fig 4.6: Entity-Relationship diagram

4.5.4 ENHANCED ENTITY – RELATIONSHIP DIAGRAM

Enhanced Entity Relationship Diagram (EERD) is also called Extended Entity Relationship Diagram (EERD), Cornell and Crocket (2008), defined it as an abstract ideal with descriptions and data specifications that shows graphically the super types and sub types and the participation constraints included. EERD is designed in showing composite relationships between objects found in relational database that specializes in deviating from an outdated ERD. Below is a diagram of an EERD.
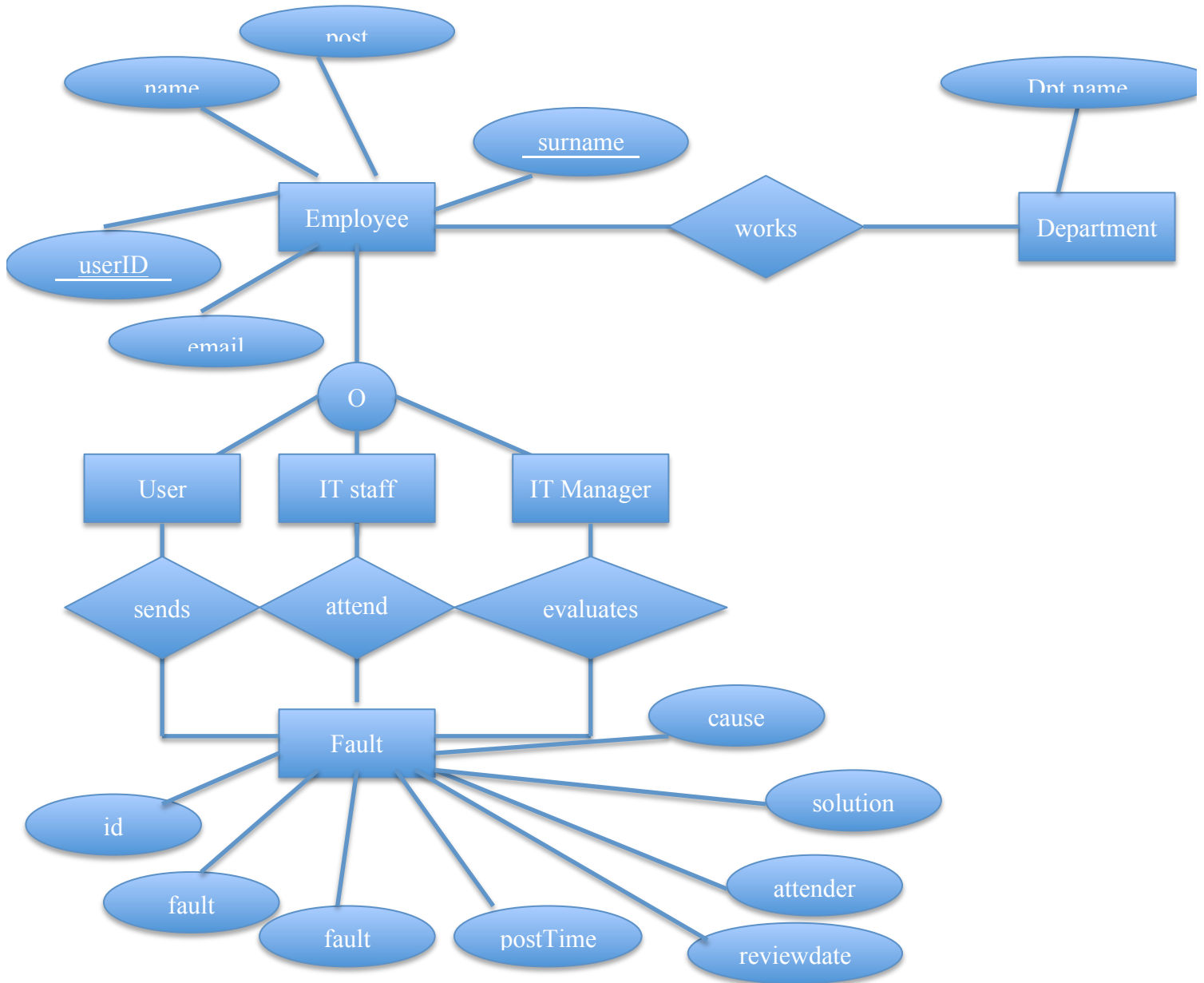

Fig 4.7: Enhanced Entity-Relationship diagram

4.5.5 DATABASE TABLES

IT STAFF

Table 4.1 Staff table

Attributes	Data type	Description
Firstname	Varchar(30)	**IT staff name**
Lastname	Varchar(30)	**IT staff surname**
Empnumber	Varchar(5)	**Employee number**
Email	Varchar(50)	**Staff Email**
Password	Varchar(30)	**Staff's password**

Table 4.2 Users table

Attributes	Data type	Description
Firstname	Varchar(30)	**User name**
Lastname	Varchar(30)	**User surname**
Empnumber	Varchar(5)	**Employee number**
Email	Varchar(50)	**User email**
Password	Varchar(30)	**User's password**
Occupation	VarChar(30)	**User work title**
Department	VarChar(30)	**User department**

Table 4.3 Issues table

Attributes	Data type	Description
Usernumber	Varchar(5)	**User's Employee number**
Staffnumber	Varchar(5)	**Staff Employee number**
Issuenumber	Int(11) Auto	**The id of the issue**
Issue	Varchar(50)	**The description of issue**
Cause	Varchar(50)	**The description of cause**
Solution	Varchar(100)	**The description of solution**
Status	Varchar(20)	**Status of the issue**
Comment	Varchar(20)	**Comment from manager**

4.6 FUNCTIONAL DESIGN

This is the design of the tasks that the system will do. The developer has chosen to produce a main page that will assert control of all the functions of the system so as to restrict unauthorized users from playing around with the system. The main page is going to direct users to their respective menus by the use of passwords and other credentials. The users, the IT staff and the IT manager will each be led to a different menu in terms of functionality. The user will only be able to report a fault and approve when they are satisfied with the given solution while the IT staff will have functions like, attend issue, provide cause and solution. The manager will have functions like evaluate issues, approve and disapprove issues.

4.7 INTERFACE DESIGN OF THE PROPOSED SYSTEM

Designing how the users and the staff will interact is vital for the physical design plan, Whitten (2003). This will give the user direction as to how to navigate to certain areas and functions. Here there is need for laying out the input, output and processes. Directing the user to their destination is the main requirement of a good interface. However an interface also has to be attractive such that the user using it will be excited about the system.
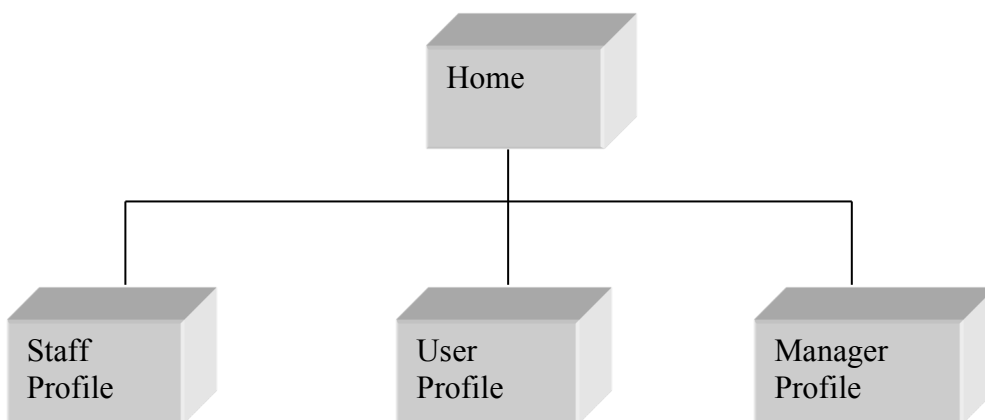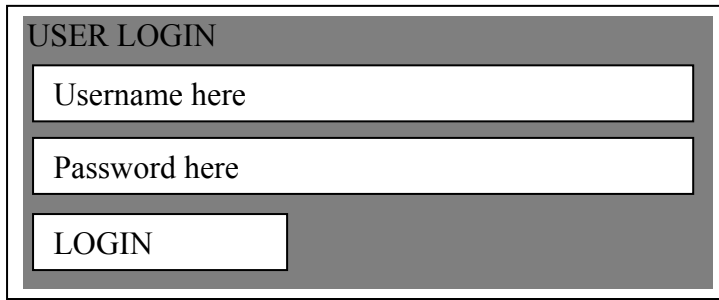
```
                    ┌─────────┐
                    │  Home   │
                    └────┬────┘
           ┌─────────────┼─────────────┐
    ┌──────┴──┐    ┌─────┴───┐    ┌─────┴─────┐
    │ Staff   │    │ User    │    │ Manager   │
    │ Profile │    │ Profile │    │ Profile   │
    └─────────┘    └─────────┘    └───────────┘
```

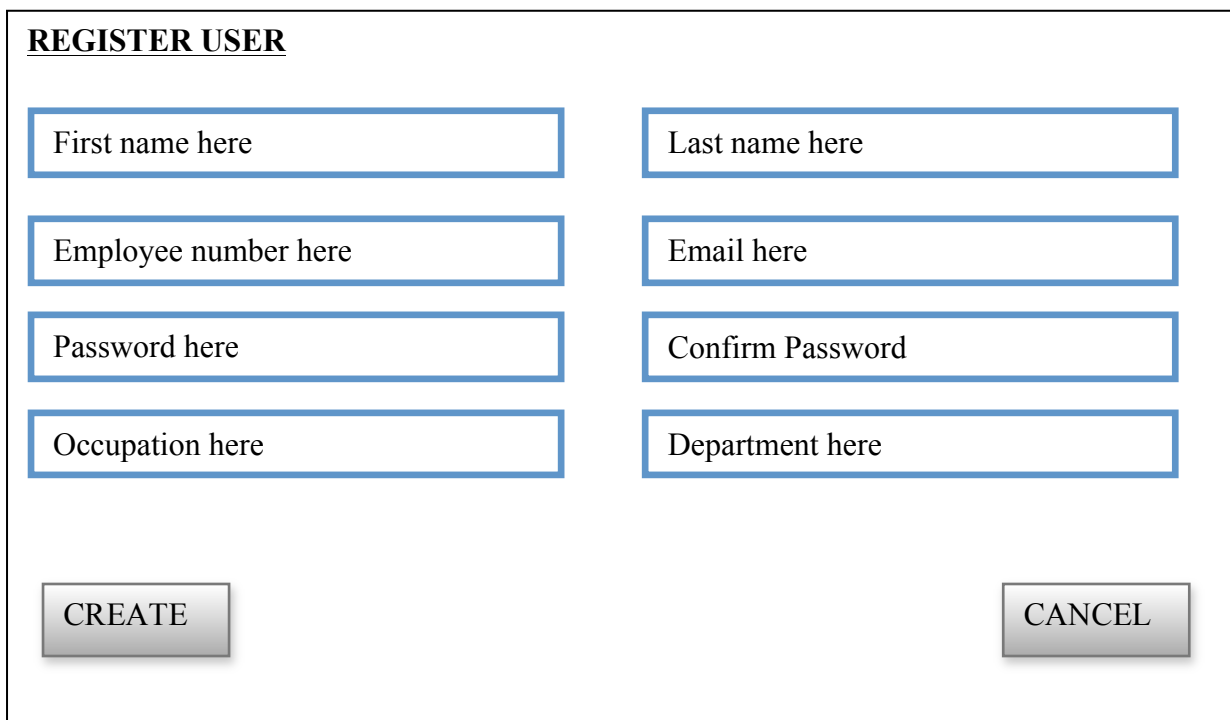## Fig 4.8 Main menu

4.7.1 INPUT DESIGN

LOGIN FORM

Clicking the login option will show the following from the main menu. Here the user will input their username or email and their password and they are taken to their respective profile where they can send a new fault and also see their previous faults

USER LOGIN

Username here

Password here

LOGIN

Fig 4.9 Login form
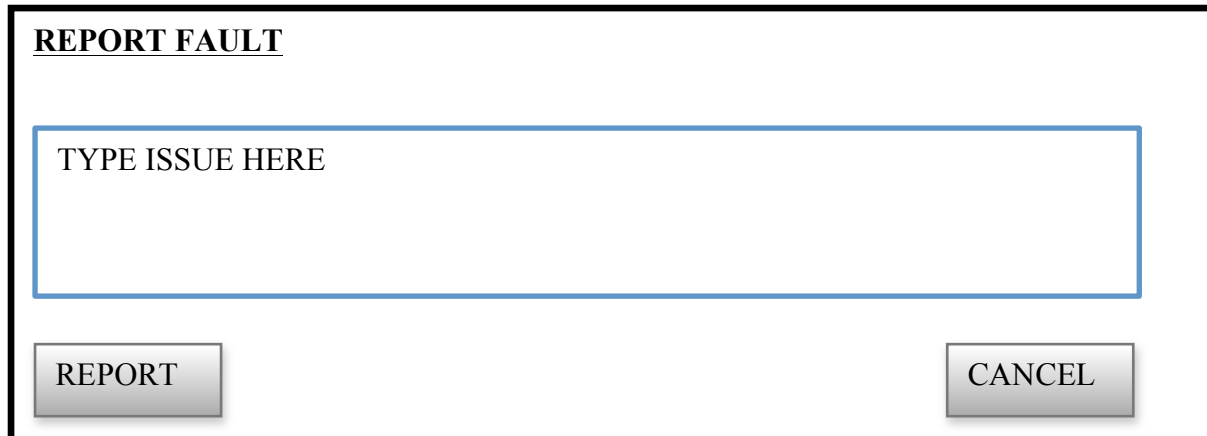
USER REGISTRATION FORM

REGISTER USER

First name here   Last name here

Employee number here   Email here

Password here   Confirm Password

Occupation here   Department here

CREATE   CANCEL

Fig 4.10 User registration form
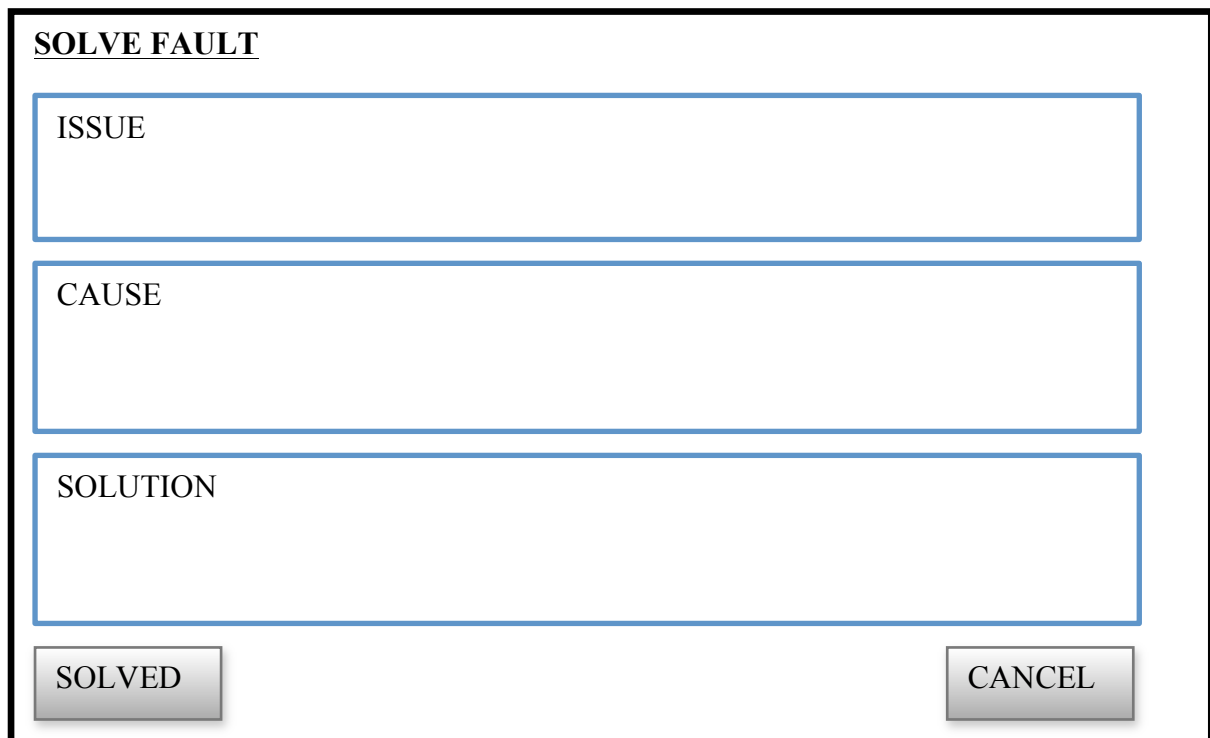
REPORT ISSUE FORM

REPORT FAULT

TYPE ISSUE HERE

REPORT   CANCEL

Fig 4.11: Report fault form

SOLVE ISSUE FORM

SOLVE FAULT

ISSUE

CAUSE

SOLUTION

SOLVED   CANCEL

Fig 4.12: Solve issue form

4.7.2 OUTPUT FORMS

REPORT LAYOUT (ISSUES)

This is a report showing the issues attended. This will be the standard way of all output forms.

Table 4.4: Issues report

Issue	From	Attender	Cause	Solution	Date attended
Cannot log in	EMP001	PRINCE	Password Expired	Reset Password	2016-03-04 18:43:34
Computer cannot turn on	EMP044	PRINCE	Power cable is not plugged in	Plug in power cable	2016-03-04 18:48:34
User Locked out	EMP056	PRINCE	wrong attempts	Unlock user	2016-03-04 19:03:14

4.8 PACKAGE DIAGRAM

The dependencies of various components or modules of the system for the system are illustrated by the package diagram below.
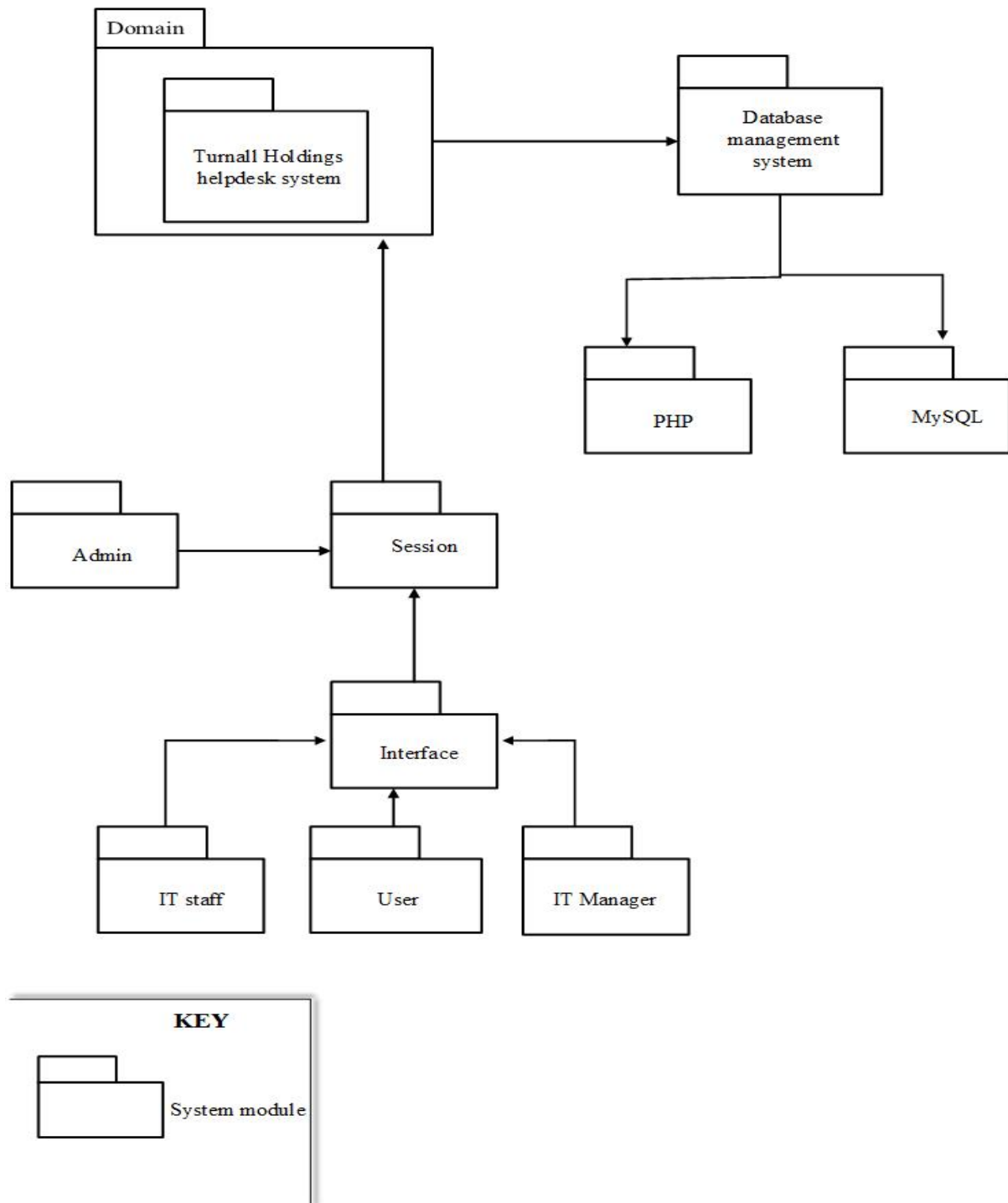
Fig 4.13: Package diagram for proposed system

4.9 CLASS DIAGRAM

Class diagrams are widely used to describe the types of objects in a system and their relationships. They express both the persistent state of the system and the behaviour of the system. The Class Diagram below illustrates the expected states and behaviours of the classes of the proposed system.
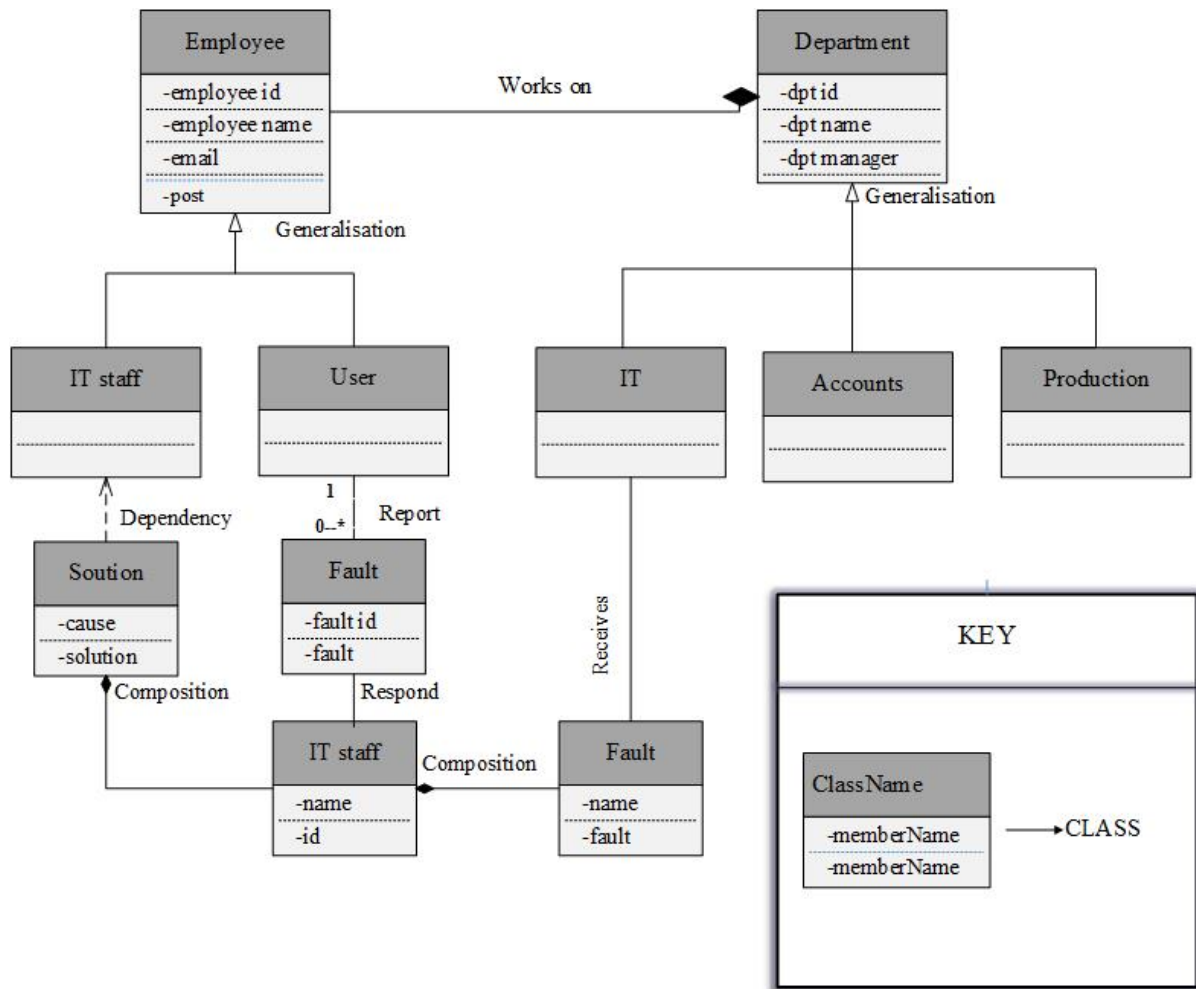
Fig 4.14: Class diagram for proposed system

4.9 SEQUENCE DIAGRAM

Demonstrates the behaviour of objects in a use case by describing the objects and the messages they pass. The diagram models the flow of logic within the system in a visual manner and enables the programmer to both document and validate the system logic. It focuses on identifying the behaviour within the system. Below is the sequence diagram
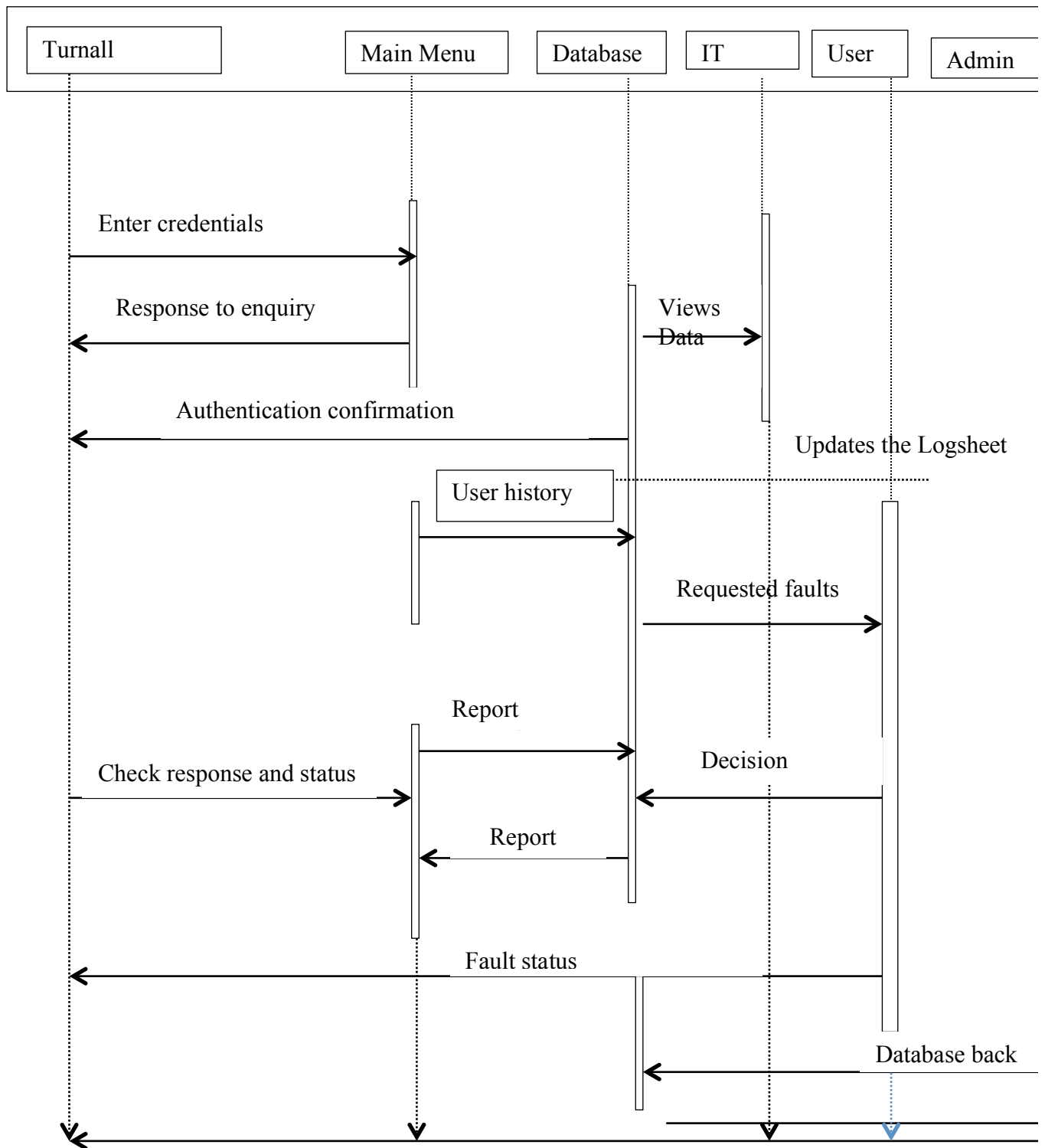
Fig 4.15: Sequence diagram for proposed system

4.10 PROGRAM PSEUDO CODE

The pseudo code of the Helpdesk will represent the statements that were used to come up with the program in a simple and generalized way so as to give a nice idea of how the system reaches the execution of the objectives.

DATABASE CONNECTION

     CONNECT TO DATABASE

      IF CONNECTION TO THE DATABASE FAILS

       PRINT (ERROR MESSAGE: DATABASE CONNECTION FAILED)

      ELSE

         PRINT (CONNECTION SUCCESS MESSAGE)

      END IF

LOGGING INTO THE SYSTEM

     LOGIN ATTEMPT

      IF USERNAME AND PASSWORD HAVE BEEN ENTERED

       VALIDATE USER CREDENTIALS

        IF USERNAME AND PASSWORD ARE CORRECT

          LOGIN USER

        ELSE

         PRINT (ERROR MESSAGE: INVALID USERNAME AND PASSWORD)

      ELSE IF USERNAME AND PASSWORD ARE NOT ENTERED

       PRINT (ERROR MESSAGE: ENTER USERNAME AND PASSWORD)

      ENDIF

FAULT REPORTING

     MESSAGE SENDING ATTEMPT

      IF MESSAGE TEXTAREA IS EMPTY

       PRINT (ERROR MESSAGE: CANNOT SEND A BLANK MESSAGE)

      ELSE IF RECEPIENT IS INVALID

       PRINT (ERROR MESSAGE: INVALID RECEPIENT)

      ELSE SEND MESSAGE

       PRINT (SUCCESS MESSAGE: MESSAGE SENT)

4.11 CONCLUSION

The outline of requirements for the physical layout, the logical design of the database tables and their relations have been made plane. The developer has lain out the design of the interface that the system will use to communicate with the user so as to ease the work done by the user. The system can now move to the next stage.

CHAPTER FIVE: IMPLEMENTATION

5.1 INTRODUCTION

This chapter focuses on the wrap around of the system after completion of coding. It shows the coding structure, installation of the system, testing and overall maintenance. It will also show how the objectives of the system have been met and what further developments can be made to the system. Activities to be undertaken under Implementation are as follows: Construction, Coding, testing the application, installation, Training, File conversion, System change over, system operation, post implementation evaluation, documentation and support activities.

5.2 CODING AND SYSTEM CONSTRUCTION

Coding and system construction entails processes relating to the conversion of the ideas and designs discussed in the previous chapter into a visual and operational system through the use of the specified programming languages and tools. Code is read more than it is written and this section aims at systematically materializing the design road map set in the previous chapter. Making reference to the user requirements for the system and various design tools such as ERDs and Class diagrams for the system, a GUI and functional code was constructed to cater for system, user and performance requirements.

The student used the android studio platform using Java and XML to create the client-side of the application and PHP, MySQL and JSON for the backend or database structure.

5.3 SYSTEM TESTING

Daniel (2004), testing is explained as a procedure of making sure that the program meets the demands that made the development and design. System testing refers to the assessment of whether or not the developed system meets user and system specification requirements. It also provides a measure of the extent to which the problems discovered prior to the system development have been resolved or what steps have been put in place that will eventually address the issues. Pressman (2013) also puts out the point that it is required to plan a series of test cases that have a high probability of discovering errors so that they can be corrected. Introduction in general, software engineers distinguish software faults from software failures. In case of a failure, the software does not do what the user expects.

5.3.1 TESTING METHODOLOGY

The methodology adapted in testing the system was made up of a series of processes focusing on different aspects of the system and system scope. Fig 5.1 illustrates the system testing procedures employed for the testing process of the helpdesk system.
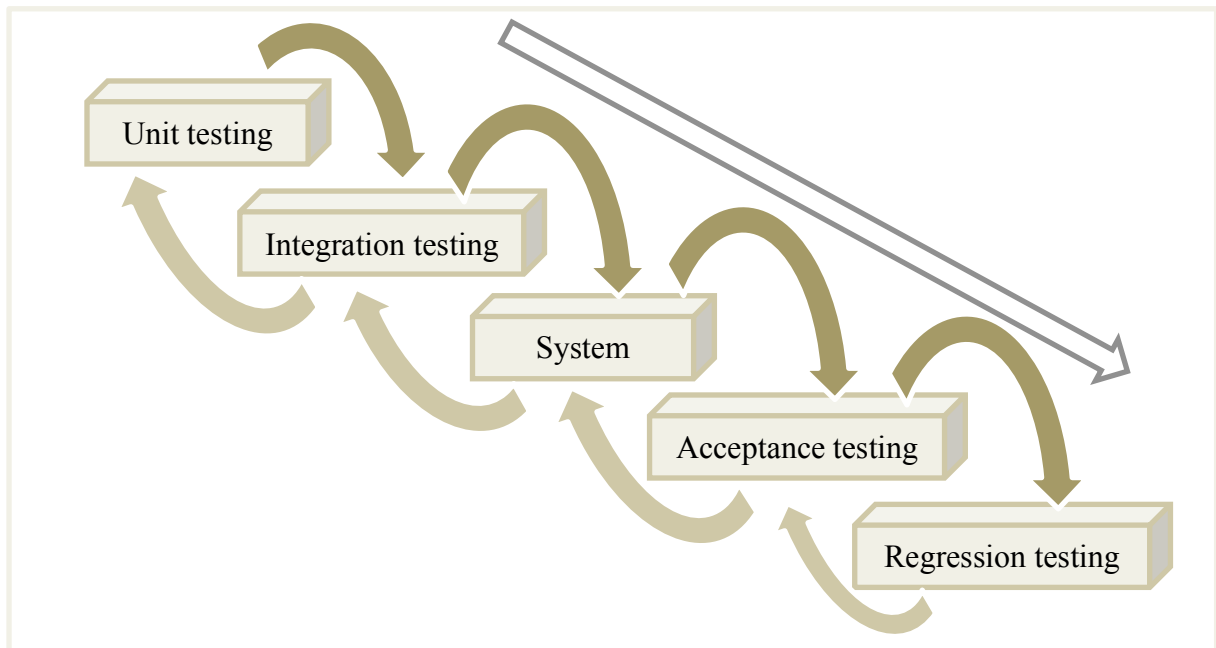
Fig 5.1: Testing methodology

5.3.1.1 UNIT TESTING

According to Welsh and Culpepper (2015), unit testing is a systems software testing technique whereby computer program modules, source codes and data conversion methodologies are effectively tested for their effectiveness for every individual unit of the system. The testing is undertaken using the white-box testing approach (Structural testing) whereby testing is done to improve code efficiency and structure. Using this testing procedure, the underlying code for the BGCMS was tested and improved at various stages during the development of the system. The barcode generation and user input manipulation programs were subsequently made more efficient and effective.

5.3.1.2 INTERGRATION TESTING

Having established that different units of the program are working properly, there is always need to test the units as an integrated or combined system. Integration testing is performed to establish whether or not the system's individual packets will continue to operate error-free following integration. Different aspects of the helpdesk system such as the fault reporting unit, fault acceptance and fault attendance units were tested and resultant integration errors were resolved.

5.3.1.3 SYSTEM TESTING

System testing is the process of compilation of different system modules into one product and testing it as a whole using functionality testing, performance testing, and security and portability testing. Functionality testing assesses the functionalities of the developed system against system requirements. Performance testing assesses the efficiency of the software with regards to the software's response time and quality of the responses. For the performance testing, the helpdesk system was subjected to high workloads in the worst expected environment to prepare for actual use.

5.3.1.4 ACCEPTANCE TESTING

During this stage, users for user-interaction and usability subject the software to tests. This is a vital aspect in implementing a software system since despite matching up to the stipulated requirements; the users might still reject the system. Acceptance testing entails two separate stages, alpha testing and beta testing. Alpha testing is performed by the system developer who poses as a system user and tries to react in the same way any other user would. Following the internal testing, the system is then handed over to the users for beta testing. The users will test the system in an environment similar to the actual operational environment but only for testing.

IF NO DATA IS ENTERED

When logging into the system, there is need for the user to input credentials. Failure to provide any data in the text fields will automatically produce a message to prompt the user to enter data when they click the login button.
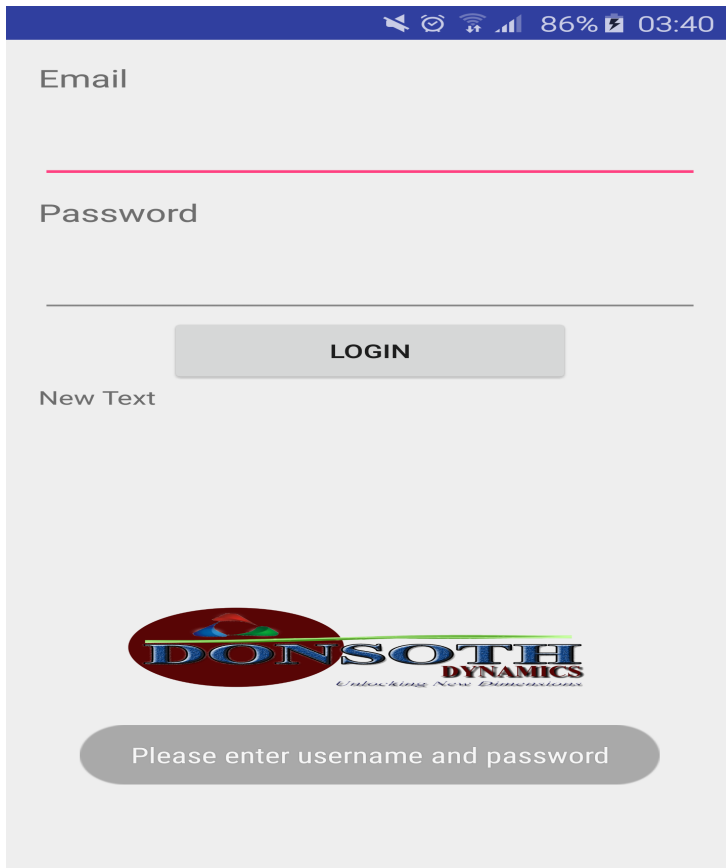
Fig 5.2: Blank credentials

IF WRONG CREDENTIALS ARE ENTERED
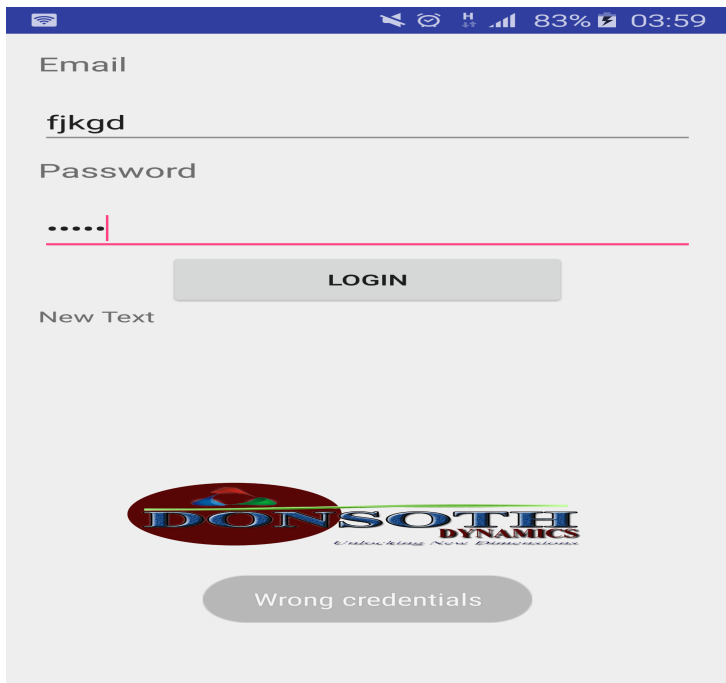
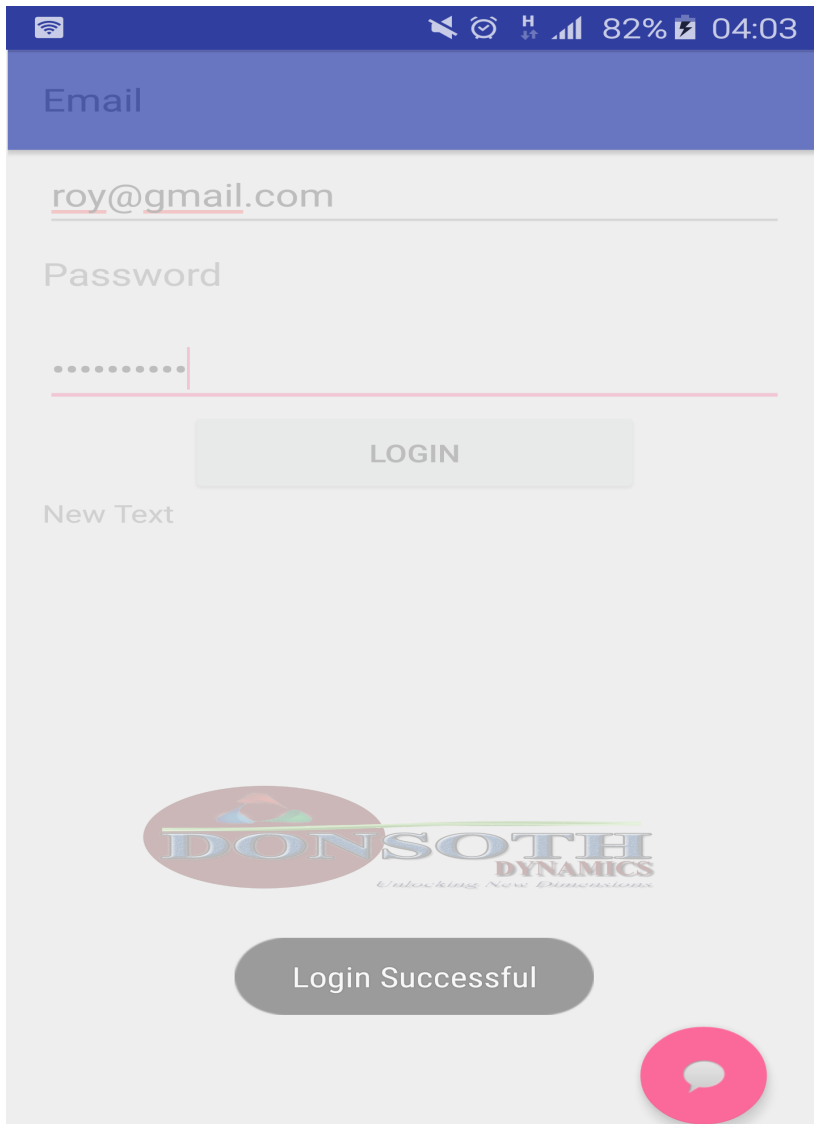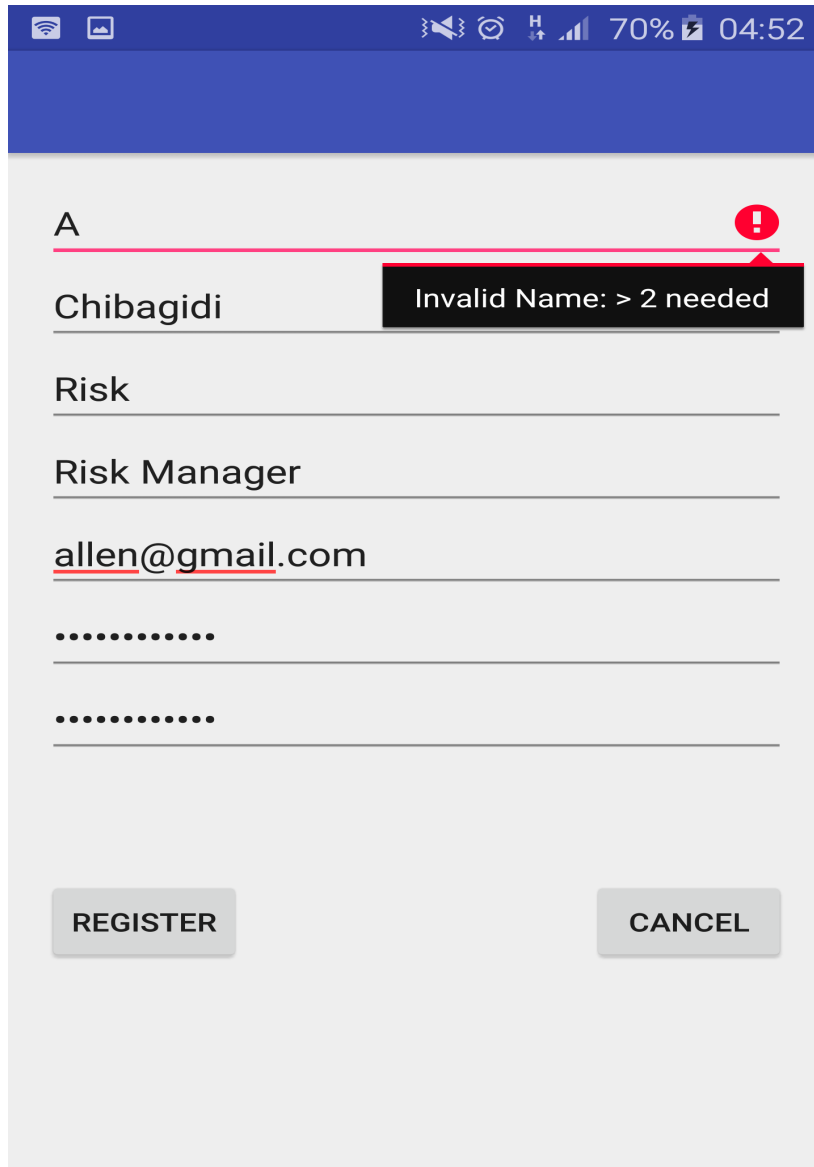**Fig 5.3: Wrong credentials**

IF CORRECT CREDENTIALS ARE ENTERED

Fig 5.4: Correct credentials

IF INVALID NAME IS ENTERED

Fig 5.5: Invalid name

5.3.1.5 REGRESSION TESTING

Regression testing is when a software application has to be reassessed following upgrades or modifications to monitor for any negative impact of the new code. The developed system is always subjected to improvements and upgrades therefore there is need to perform regression testing to safeguard from errors.

5.3.2 VERIFICATION AND VALIDATION

Software validation is a process of analyzing whether or not a software application meets user requirements. Validation is carried out at the end of the software development life cycle (SDLC) and if it meets user requirements, it passes validation. Validation attempts to answer

the question – "Did we develop the right software application". Software Verification on the other hand is the process of assessing if the developed software meets business requirements. It focuses on aligning to design and system specifications. The question verification attempts to answer is – "Did we develop the system right".

5.3.2.1 SAMPLE USER INPUT VALIDATION

User input validation is a process that is used to safeguard the software system from incorrect data input and to make the system user friendly and responsive.
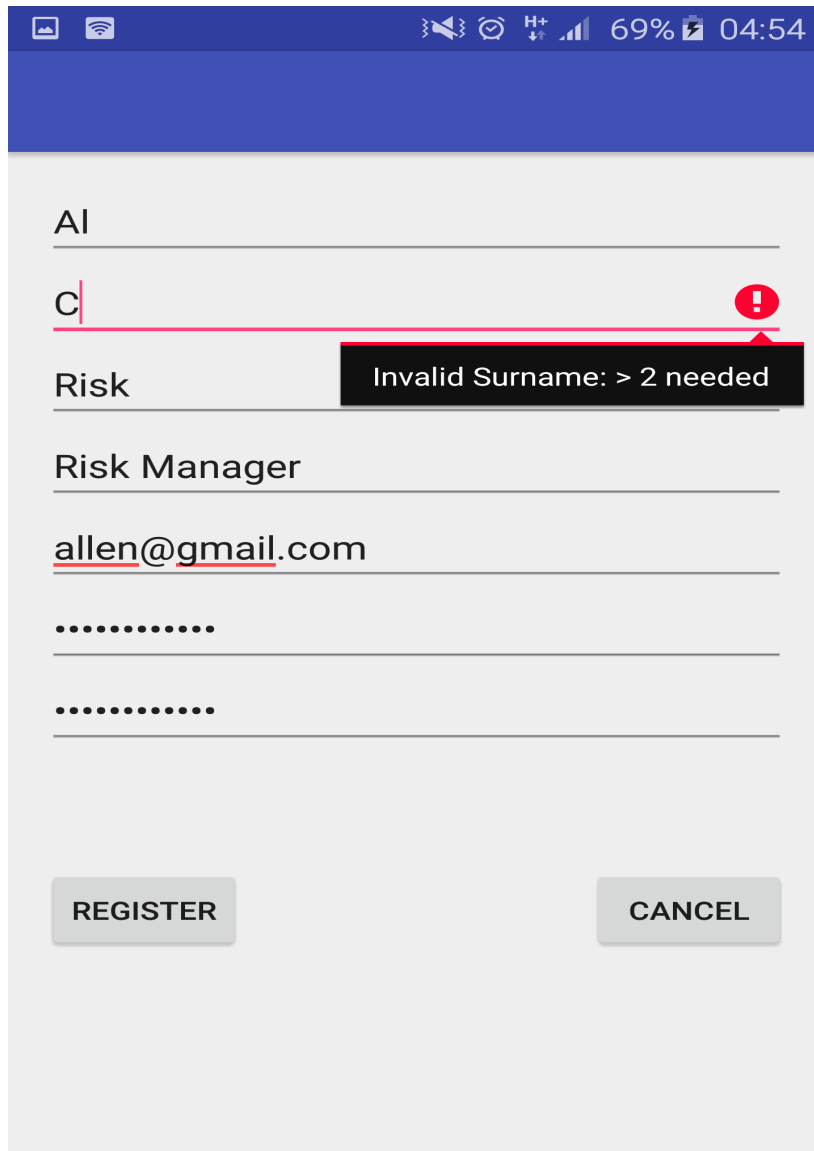
Fig 5.6: Wrong data input

SYSTEM LOGIN VALIDATION

Fig 5.6 illustrates the helpdesk's user credentials validation. A user cannot gain access to the system if they do not provide valid user login credentials.
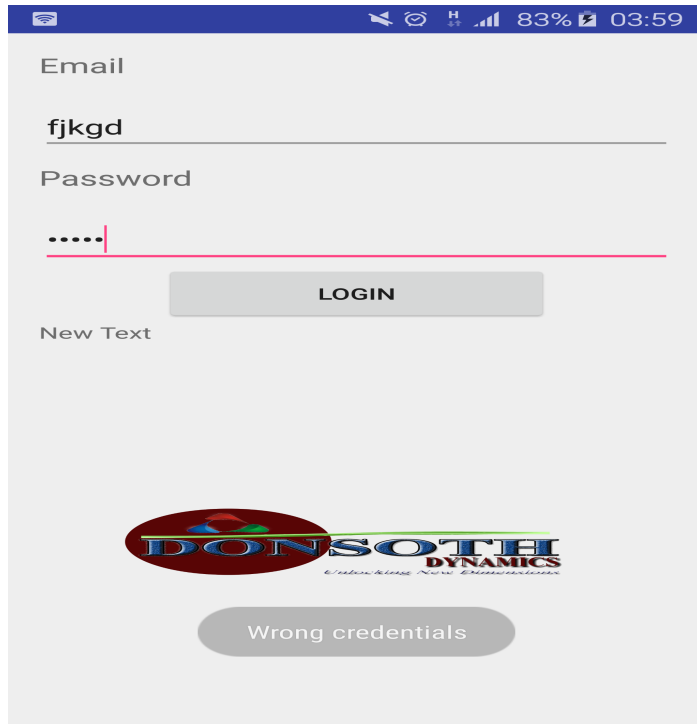
Fig 5.7: Wrong login input
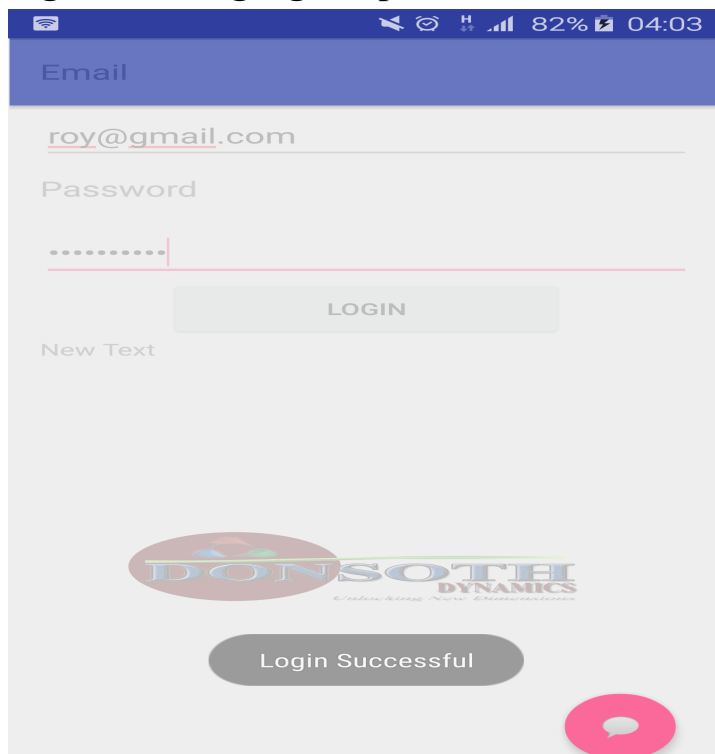
Fig 5.8: Correct login input

DATA INPUT VALIDATION

Fig 5.10 shows a sample user input validation error alert. The developed system's input forms are validated such that data being sent to the database is consistent, accurate and correct.
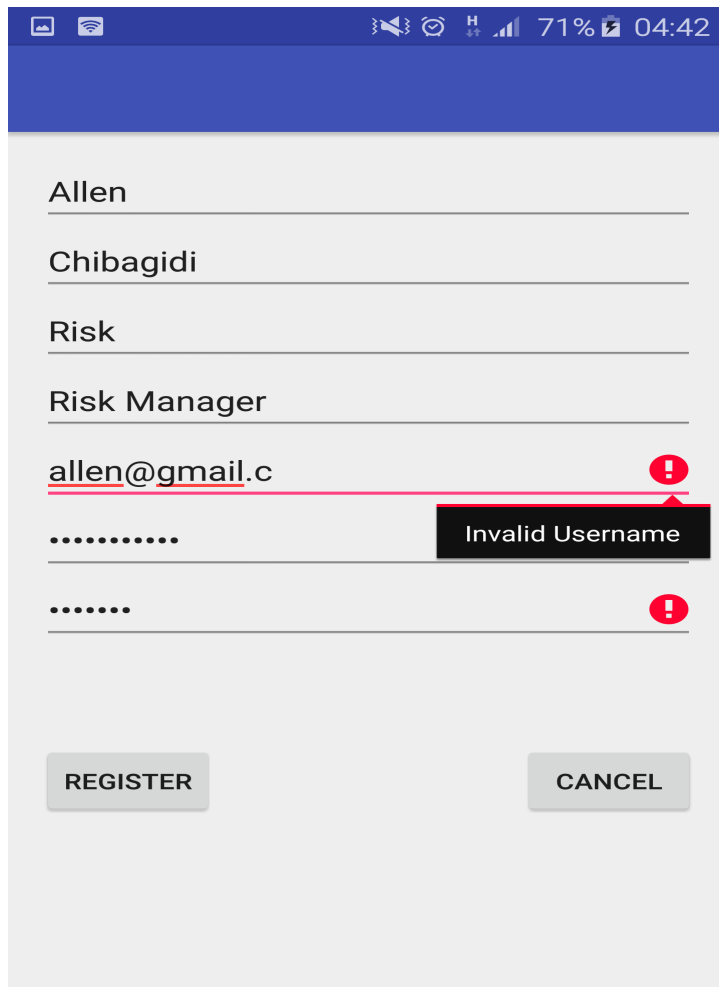
Fig 5.9: Email validation

5.4 SYSTEM INSTALLATION

System installation is the process of setting up a software application package and relevant hardware components for execution or productive usage. the installation of the system involves downloading it from the server or play store and running it on the mobile phone.

5.4.1 HARDWARE INSTALLATION

Hardware installation involves physically positioning the system's tangible resources into the pre-designed architectural layout. It is also inclusive of making any configurations and networking the hardware components. For the case of Turnall, all these are already in place. Users just need their android phones. The developed software application will be uploaded to the online server and any additional software installed on the server during software installation.

5.4.2 USER TRAINING

User training describes the process of informing and teaching users about the system and how to use the system. There are a number of ways through which the user training process can be conducted which include; one-on-one tutoring, group classroom tutoring, on-the-job training and document-based training. In one-on-one tutoring, each individual system user gets to try out the system under the supervision of the tutor, getting assistance when necessary. Class tutoring involves setting up a user-training workshop where all users will be addressed on how to use the system as a group. On-the-job training is when the users are introduced to the system in the working environment and learn by experience. For the developed system, user training will be done using the document-based method where users learn from reading the user manual.

5.4.3 FILE CONVERSON TECHNIQUES AND SYSTEM CHANGEOVER

File conversion and system changeover describes the process of migrating from one system to another, usually when a new system is to replace the current system. The entire process can be accomplished using one of four different approaches.

5.4.3.1 DIRECT CHANGEOVER

Direct changeover describes a situation whereby the new system instantaneously and completely substitutes the current system. Cliff (2004), this method sees a full fix in the use of the old system. Kendall and Kendall (2005) defines direct conversion as a process that needs the existing system to be fully "switched off" and the new system to be "switched on" there and there. All operations being carried out using the system to be replaced will be migrated to the new system. This method is quick and very risky since failure of a smooth transition will result in loss and delays in productivity. Direct changeover is however cost efficient since it exposes less operational costs. Fewer resources are required since the two systems will not run simultaneously.

5.4.3.2 PARALLEL CHANGEOVER

Parallel changeover entails a simultaneous use of both the old and the new systems for a short period of time. This is meant to allow for a smooth migration between the two systems and to safeguard against risks associated with failures and errors in the new system. Although parallel changeover is costly and demands more resource, it presents minimal risks to the overall productivity and profitability of business processes.

5.4.3.3 PILOT CHANGEOVER

With this method, a subsection of the overall business operations is directly changed over to the new system for testing and analytic purposes. A few users are nominated to use the new system as administration and the developers monitor the system's functionality and acceptability. If analysis of the new system proves to be positive, the entire user sphere is then introduced to the system. This method is cost efficient since only a few users will get to make use of both systems simultaneously. However, findings from analysing the new system on a small scale might not scale up well if the system was to be implemented on a larger scale.

5.4.3.4 PHASED CHANGEOVER

Phased changeover involves stage by change adaptations of the system. Those of the new system replace singular modules of the old system periodically over a specified time frame. It is almost similar to pilot changeover with the difference being that every user gets to use the new system but only for a few modules at a time until the old system has completely been replaced.

5.4.3.5 RECOMMENDATION

The implementation method recommended for file conversion for the helpdesk system will be parallel changeover. Although the conversion method is characterized by being costly and labour intensive, it has minimal risk and allows room to revert back to the old system in case of any unforeseen problems with the new system. Parallel changeover is customer oriented; it allows the passengers a chance to give their opinion on the system before it is fully implemented. Implementation of the helpdesk system using the parallel changeover method will be aligned to the following steps;

- Uploading system to the main server
- User training
- Data capturing
- Business process execution using both systems
- Total changeover to the new system

5.5 SYSTEM MAINTENANCE

System maintenance describes processes aligned to upholding the integrity and quality of results from system. It is inclusive of processes such as making repairs, modifications and upgrades to the system. Maintenance activities required to uphold the system in a desirable state are;

5.5.1 CORRECTIVE MAINTENANCE

This maintenance type includes fixing problems with the system discovered by the system users or gathered from comprehensive system error reports.

Corrective maintenance is to be done as soon as the system has been tested and found to be incorrectly performing a certain function. This can be the first week or two second week after implementation.

5.5.2 ADAPTIVE MAINTENANCE

It includes modifications and upgrades made to the system in order to keep it up to date and competitively relevant to constant changes in technology and business environments.

Adaptive maintenance can be done as soon as the system is implemented so as to adapt it to the environment if any variance is noticed. This can also be done when the company changes the hardware or some software then it becomes unsuitable or incompatible with the application, hence they can adapt the system at any time deemed suitable.

5.5.3 PERFECTIVE MAINTENANCE

Includes transformations and advancements made to the software system in order to keep it useable over extended time periods. It includes adding new features and catering for new user and system requirements to improve the software's performance, usability and reliability.

Perfective maintenance is a needed process, which can also begin any time after implementation. This has to do with the total and accurate functionality of the system so it needs to be done quickly and more often so as to perfect the system to perform its tasks smoothly and effectively.

5.5.4 ADAPTIVE MAINTENANCE

This includes changes made to the software system to safeguard it from future problems. It aims at reducing the impact of foreseen problems that may currently have minimal effect.

5.6 RECOMMENDATIONS FOR FUTURE DEVELOPMENT

In future, the system can be developed in such a way that the users can share devices easily and without compromising any security such that when a user is far from his/her device they can log in on any other device and file their complaint or fault to IT. The application can also

be linked to the user's profile or account on the computer such that situations such as a user locked out are automatically reported without the user's input.

5.7 CONCLUSION

The implementation phase outlined the various tests made to the system and how the developed software passed all the tests it was subjected to. A final analysis to the primary objectives of the system was made and these objectives were weighed against the operational functionalities of the system. Having established that the developed system is able to resolve problems discussed at the start of this documentation, this chapter concludes the system development documentation. The following sections contain appendixes with user manuals, code snippets, observation score sheets, interview questions and sample questionnaires.

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APPENDICES

APPENDIX A: USER MANUAL

The user manual is made so as to reveal unto the users how they can use or operate the system. There is need for the users to gain understanding of how they can go by in the system so as to be efficient.

The login page is the main point of entry into the system, which separates the admins, IT staff and the users by directing them to their respective profiles.

TURNALL HELPDESK LAUNCH SCREEN

When a user opens the system, a splash screen that shows donsoth dynamics, which powers the turnall helpdesk system, welcomes them.
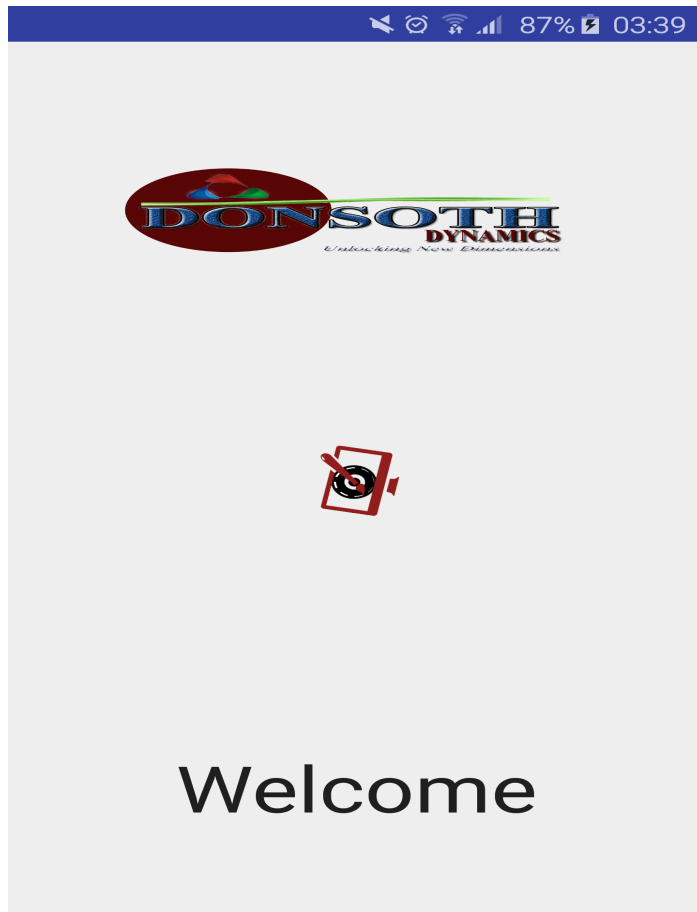
IT LOGIN PAGE

After the splash screen the user is taken to the login page or the main activity, which is the point of entry of every user. Here the user is prompted to enter credentials that are already

available in the system. These must have been input by the IT staff for the users. The user then logs into the system with those credentials given to them.
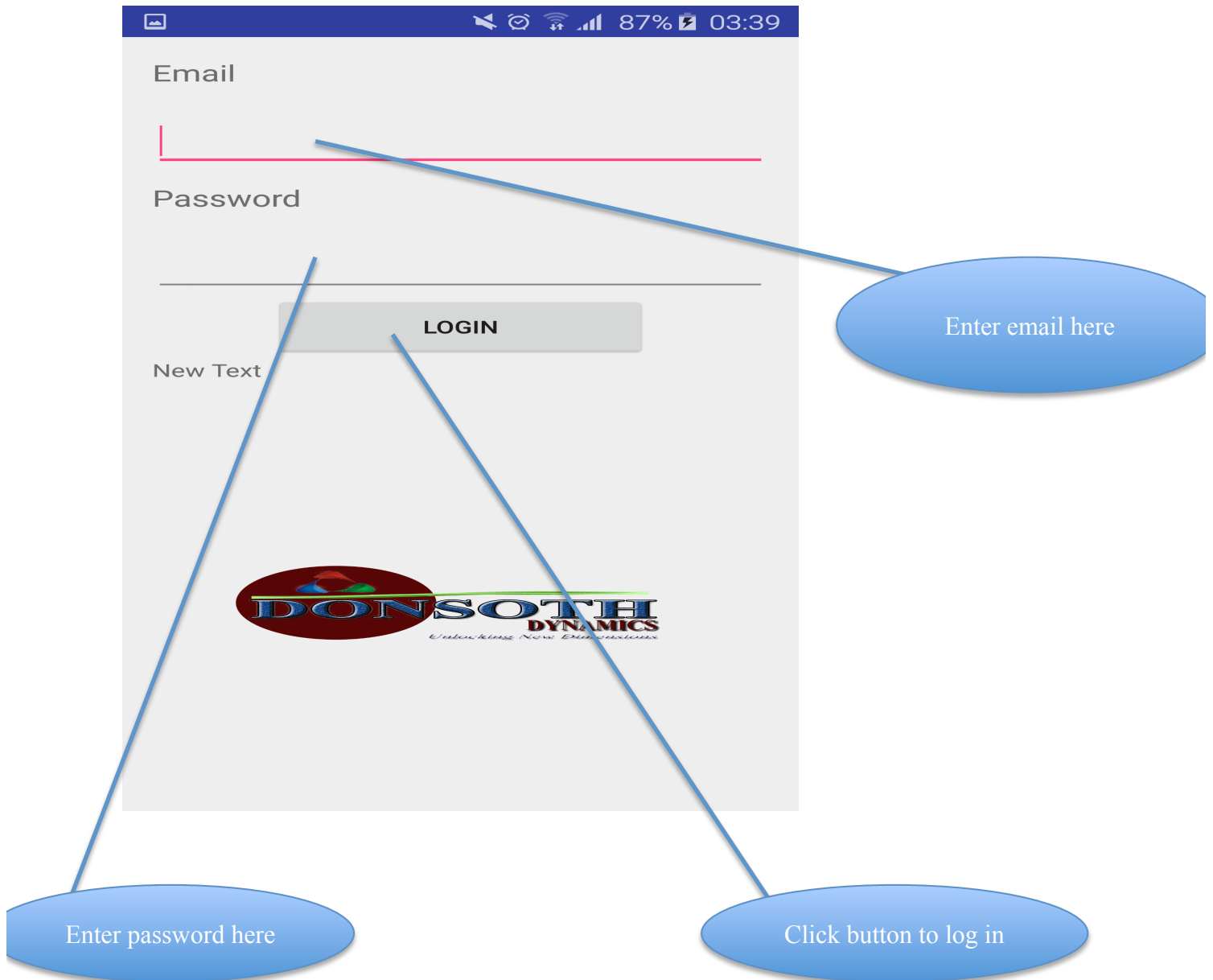
The user logs in and they are separated according to their departments and posts.

ADMIN/IT STAFF PROFILE

When IT staff log in they are taken to their profile where they have the ability to see new faults that are awaiting for their response and also current faults, which are the faults they

have responded to. Here they can also go to the **CREATE NEW USER** page by clicking the button as below.
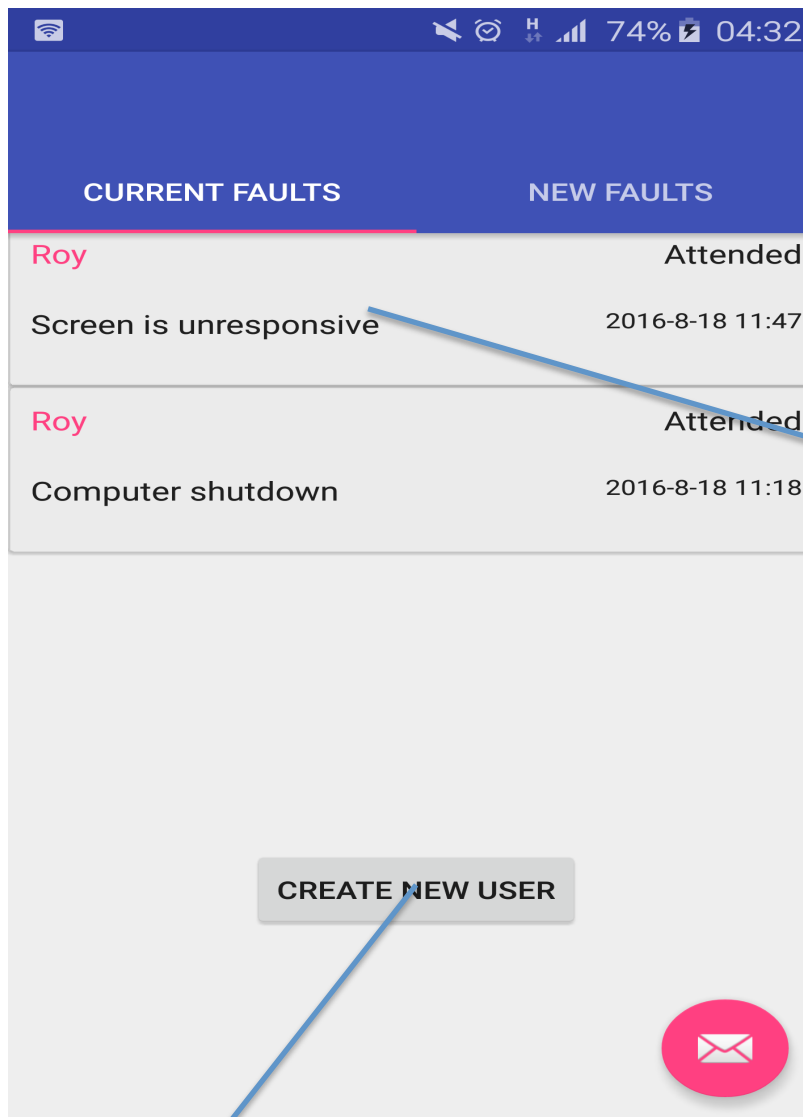
ADDING A NEW USER

When the admins click the button as above, they are taken to the following page where they can add credentials for a new user. They fill in the fields correctly and click on **REGISTER** as below. If they do not want to commit the changes when they have filled some details, they must click on cancel and they are taken back to their profile without adding the user.

Clicking **REGISTER** without entering data gives the following message.

RESPONDING TO FAULTS

The IT staff respond to faults by clicking on them and they are taken to a page where they can provide the possible cause and solution to the problem.

USER PROFILE

When a non-IT user logs in their user ID takes them to their profile, which identifies them. They are shown the list of all the faults they have reported before and they can check status by choosing any of them.

Click here to report fault

By clicking the button the user is brought to the report fault page where they can report a new fault

Clicking the item will be as follows:

This will take the user to the item that they have clicked on to check for progress on the attendance of the IT staff on their faults.

APPENDIX B: INTERVIEW SCRIPT

1. What are the requirements of the IT department on fault reporting?
2. How do users report faults to IT?
3. What data does the IT department get on each report?
4. What are the duties performed by the IT staff?
5. How do users give feedback to the success of a solution given by IT?
6. What problems are you encountering in the day-to-day fault reporting?
7. Have you found any way to tackle these challenges?
8. Is the current system working as to your liking?
9. Would you prefer a better system and what type of system would you like?
10. Does a web-based system work for your company or there is need for a mobile application.
11. How does the management evaluate these issues?
12. Does the idea of an android application make you feel closer to the users?

APPENDIX C: SAMPLE QUESTIONNAIRE

- **Please answer the questions as accurately as possible.**
- **Answer the questionnaire when seated and not in a rush.**
- **Return the questionnaire by 20 October 2016 or sooner.**

Answering this questionnaire completely and accurately is greatly appreciated, as it will provide the organization useful information in developing a new system.

Please tick where applicable:

1. How best can you describe the current system's functionality?

Satisfactory   ☐   Excellent   ☐   Poor   ☐

2. Do you think there is need for improving this system?

YES   ☐   NO   ☐

What problems have you noticed in the current system?

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

What should be done to improve the system?

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Have you encountered any lack of attention of any reported fault in the system?

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……

What are the things that you would like to be included in a new or developed system?

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How do you think users of the system should report their faults?

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Date…………………….

Signature…………………………………

APPENDIX D: OBSERVATION

Name:	Date:	Activity:
Equipment used in observation:	**Safety requirements:**	

Describe in bullet points the system activities:

- o
- o
- o
- o

First activity?	Date and time
Second activity:	Date and time
Third activity:	Date and time

Rules for the activities
- o
- o
- o

What was the main focus of the observation?

Write a brief summary of what you thought the users and organization as a whole need to change after observing the system activities

APPENDIX E: CODE SNIPPET

Login page/ MainActivity

```java
package co.donsothdynamics.turnallhelpdesk;

import android.app.Activity;
import android.content.Context;
import android.content.Intent;
import android.content.SharedPreferences;
import android.os.Bundle;
import android.view.View;
import android.widget.Button;
import android.widget.EditText;
import android.widget.TextView;
import android.widget.Toast;

import com.android.volley.RequestQueue;
import com.android.volley.Response;
import com.android.volley.VolleyError;
import com.android.volley.toolbox.StringRequest;
import com.android.volley.toolbox.Volley;

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

public class MainActivity extends Activity implements View.OnClickListener {

    public static final String KEY_USERNAME = "username";
    public static final String KEY_PASS = "password";
    public static final String KEY_ID = "";

    private EditText etUsername;
    private EditText etPassword;
    private TextView textViewResults;


    private Button buttonLogin;

    private String username;
    private String password;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);

        etUsername = (EditText) findViewById(R.id.etUsername);
```

```java
            etPassword = (EditText) findViewById(R.id.etPassword);
            buttonLogin = (Button) findViewById(R.id.buttonLogin);
            textViewResults = (TextView) findViewById(R.id.textViewResults);


            buttonLogin.setOnClickListener(this);

    }

    private void getData() {
        username = etUsername.getText().toString().trim();
        password = etPassword.getText().toString().trim();
        if (username.equals("") || password.equals("")) {
            Toast.makeText(this, "Please enter username and password",
Toast.LENGTH_LONG).show();
            return;
        }

        String url = Config.LOGIN_URL+username;

        StringRequest stringRequest = new StringRequest(url, new
Response.Listener<String>() {
            @Override
            public void onResponse(String response) {
                showJSON(response);
            }
        },
                new Response.ErrorListener() {
                    @Override
                    public void onErrorResponse(VolleyError error) {

Toast.makeText(MainActivity.this,error.getMessage().toString(),Toast.LENGTH_LONG).sh
ow();
                    }
                });

        RequestQueue requestQueue = Volley.newRequestQueue(this);
        requestQueue.add(stringRequest);
    }

    private void showJSON(String response){
        String userID="";
        String user="";
        String name="";
        String surname="";
        String department = "";
        String post = "";
        String pass = "";
        try {
            JSONObject jsonObject = new JSONObject(response);
            JSONArray result = jsonObject.getJSONArray(Config.JSON_ARRAY);
```

```java
JSONObject collegeData = result.getJSONObject(0);
userID = collegeData.getString(Config.KEY_ID);
user = collegeData.getString(Config.KEY_USERNAME);
name = collegeData.getString(Config.KEY_NAME);
surname = collegeData.getString(Config.KEY_SURNAME);
department = collegeData.getString(Config.KEY_DEPARTMENT);
post = collegeData.getString(Config.KEY_POST);
pass = collegeData.getString(Config.KEY_PASS);

SharedPreferences sharedPref = getSharedPreferences("turnallHoldings",
Context.MODE_PRIVATE);

if(department.equals("IT") && !post.equals("IT Manager") &&
pass.equals(password)){
    SharedPreferences.Editor editor = sharedPref.edit();
    editor.putString("username", user);
    editor.putString("ID", userID);
    editor.putString("name", name);
    editor.putString("surname", surname);
    editor.commit();

    Toast.makeText(this, "Login Successful", Toast.LENGTH_LONG).show();

    Intent intent = new Intent(this, ITprofile.class);
    intent.putExtra(KEY_ID, userID);
    intent.putExtra(KEY_USERNAME, name);
    startActivity(intent);
}
else if(!department.equals("IT") && pass.equals(password)) {
    SharedPreferences.Editor editor = sharedPref.edit();
    editor.putString("username", user);
    editor.putString("ID", userID);
    editor.putString("name", name);
    editor.putString("surname", surname);
    editor.commit();

    Toast.makeText(this, "Login Successful", Toast.LENGTH_LONG).show();

    Intent intent = new Intent(this, userProfile.class);
    intent.putExtra("KEY_ID", userID);
    intent.putExtra(KEY_USERNAME, name);
    startActivity(intent);
}
else if(post.equals("IT Manager") && pass.equals(password)) {
    SharedPreferences.Editor editor = sharedPref.edit();
    editor.putString("username", user);
    editor.putString("ID", userID);
    editor.putString("name", name);
    editor.putString("surname", surname);
    editor.commit();
```

```java
            Toast.makeText(this, "Login Successful", Toast.LENGTH_LONG).show();

            Intent intent = new Intent(this, managerProfile.class);
            intent.putExtra("KEY_ID", userID);
            intent.putExtra("KEY_USERNAME", name);
            startActivity(intent);
        }
        else{
            Toast.makeText(this, "Wrong credentials", Toast.LENGTH_LONG).show();
        }

    } catch (JSONException e) {
        e.printStackTrace();
    }
}

@Override
public void onClick(View v) {

    getData();
}
}
```

User Profile

```java
package co.donsothdynamics.turnallhelpdesk;

import android.content.Intent;
import android.os.Bundle;
import android.support.v7.app.AppCompatActivity;
import android.view.View;
import android.widget.Button;
import android.widget.EditText;
import android.widget.Toast;

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

import java.util.HashMap;
import java.util.Map;
import java.util.regex.Matcher;
import java.util.regex.Pattern;
```

```java
public class CreateUser extends AppCompatActivity implements View.OnClickListener {

    EditText editTextName;
    EditText editTextSurname;
    EditText editTextDepartment;
    EditText editTextPost;
    EditText editTextUsername;
    EditText editTextPassword;
    EditText editTextConfirm;
    Button buttonRegister;
    Button buttonCancel;

    String sendUrl = "http://192.168.43.97/prac/register.php";

    RequestQueue requestQueue;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_create_user);

        editTextName = (EditText) findViewById(R.id.editTextName);
        editTextSurname = (EditText) findViewById(R.id.editTextSurname);
        editTextDepartment = (EditText) findViewById(R.id.editTextDepartment);
        editTextPost = (EditText) findViewById(R.id.editTextPost);
        editTextUsername = (EditText) findViewById(R.id.editTextUsername);
        editTextPassword = (EditText) findViewById(R.id.editTextPassword);
        editTextConfirm = (EditText) findViewById(R.id.editTextConfirm);
        buttonRegister = (Button) findViewById(R.id.buttonRegister);
        buttonCancel = (Button) findViewById(R.id.buttonCancel);

        buttonRegister.setOnClickListener(this);
        buttonCancel.setOnClickListener(this);

        requestQueue = Volley.newRequestQueue(this);

    }

    @Override
    public void onClick(View v) {
        if(v == buttonRegister){
            final String name = editTextName.getText().toString();
            final String surname = editTextSurname.getText().toString();
            final String department = editTextDepartment.getText().toString();
            final String post = editTextPost.getText().toString();
            final String username = editTextUsername.getText().toString();
            final String password = editTextPassword.getText().toString();
            final String confirm = editTextConfirm.getText().toString();

            if(name.equals("") || surname.equals("") || department.equals("") || post.equals("") ||
username.equals("") || password.equals("") || confirm.equals("")){
```

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                Toast.makeText(this, "Please enter all fields", Toast.LENGTH_LONG).show();
            }
            else if(!validateName(name)){
                editTextName.setError("Invalid Name: > 2 needed");
                editTextName.requestFocus();
            }
            else if(!validateName(surname)){
                editTextSurname.setError("Invalid Surname: > 2 needed");
                editTextSurname.requestFocus();
            }
            else if(!validateName(department)){
                editTextDepartment.setError("Invalid department name: > 2 needed");
                editTextDepartment.requestFocus();
            }
            else if(!validateName(post)){
                editTextPost.setError("Invalid post");
                editTextPost.requestFocus();
            }
            else if(!validateEmail(username)){
                editTextUsername.setError("Invalid Email");
                editTextUsername.requestFocus();
            }
            else if(!validatePass(password)){
                editTextPassword.setError("Password too short. > 9 needed");
                editTextPassword.requestFocus();
            }
            else if(!password.equals(confirm)){
                editTextConfirm.setError("Passwords do not match");
                editTextConfirm.requestFocus();
            }
            else{
                StringRequest request = new StringRequest(Request.Method.POST, sendUrl, new
Response.Listener<String>() {
                    @Override
                    public void onResponse(String response) {
                        editTextName.setText("");
                        editTextSurname.setText("");
                        editTextDepartment.setText("");
                        editTextPost.setText("");
                        editTextUsername.setText("");
                        editTextPassword.setText("");
                        editTextConfirm.setText("");
                        Toast.makeText(CreateUser.this, "User Successfully Created",
Toast.LENGTH_LONG).show();
                        Intent intent = new Intent(CreateUser.this, ITprofile.class);
                        startActivity(intent);
                    }
                }, new Response.ErrorListener() {
                    @Override
                    public void onErrorResponse(VolleyError error) {
```

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                }
        }) {

            @Override
            protected Map<String, String> getParams() throws AuthFailureError {
                Map<String,String> parameters = new HashMap<String, String>();
                parameters.put("name", name);
                parameters.put("surname", surname);
                parameters.put("department", department);
                parameters.put("post", post);
                parameters.put("username", username);
                parameters.put("password", password);
                return parameters;
            }
        };
        requestQueue.add(request);
    }
}
if(v == buttonCancel){
    editTextName.setText("");
    editTextSurname.setText("");
    editTextDepartment.setText("");
    editTextPost.setText("");
    editTextUsername.setText("");
    editTextPassword.setText("");
    editTextConfirm.setText("");
    Toast.makeText(CreateUser.this, "User Creation Cancelled",
Toast.LENGTH_LONG).show();
    Intent intent = new Intent(CreateUser.this, ITprofile.class);
    startActivity(intent);
}
}

private boolean validatePass(String pass){
    if(pass!=null && pass.length()>9){
        return true;
    }
    else{
        return false;
    }
}

private boolean validateName(String name){
    String namePattern = "^[_a-zA-Z]+[\\-'\\s]?[a-zA-Z ]+$";
    Pattern pattern = Pattern.compile(namePattern);
    Matcher matcher = pattern.matcher(name);
    return matcher.matches();
}

private boolean validateEmail(String email){
    String emailPattern = "^[A-Za-z0-9-\\+]+(\\.[_A-Za-z0-9-]+)*@"
```

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                + "[A-Za-z0-9-]+(\\.[A-Za-z0-9]+)*(\\.[A-Za-z]{2,})$";
        Pattern pattern = Pattern.compile(emailPattern);
        Matcher matcher = pattern.matcher(email);
        return matcher.matches();
    }
}
```