HLF ONLINE SCHOLARSHIP APPLICATION AND RECRUITMENT DECISION SUPPORT SYSTEM

ELIAH MUDAKUREVA (R158045G)

HLF ONLINE SCHOLARSHIP APPLICATION AND RECRUITMENT DECISION SUPPORT SYSTEM

By

ELIAH MUDAKUREVA (R158045G)

Submitted in partial fulfilment of the requirements for the degree of

BSc Honours Information Systems

Department of Computer Science and Information Systems

in the

Faculty of Science and Technology

at the

Midlands State University

Gweru

November 2015

Supervisor: Mr P. Mupfiga

ABSTRACT

This research is aimed at development of HLF Online Scholarship Application and Recruitment Decision Support System that is meant to assist senior managers in all branches in the selection and recruitment decision making processes. The researcher had proposed the idea of introducing a new system after discovering problems that were being experienced as a result of manual processes, some of the problems include; delays in selection decision making, repetitive work, time taken to complete the application and also lack of consistency in recruitment decision making. To identify these problems the researcher had used various data finding methodologies which includes questionnaires, interviews and observations. After discovery of the weaknesses of the system which was in place the researcher then came up with a solution in form of an automated application and recruitment decision support system. The system allows the senior managers in all branches to quickly come up with a recruitment decision without holding any meeting as the system give the decision makers the capabilities to login into the system and access the decision that would have been automatically generated by the system basing on the data that would have been captured from the applicants. Unified Modelling Language was used to carry out the in-depth analysis and also the design of the system. Objectives that had been stated were used as the guideline to the development of the project. These objectives were altered a bit due to the changing requirements of the system users and also the equipment available. The system can also be improved based on the system modules that needs to be changed and also to be in line with technological advancements.

DECLARATION

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

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

APPROVAL

This dissertation, entitled **"HLF Online Scholarship Application and Recruitment Decision Support System"** by **Eliah Mudakureva** 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

DEDICATION

I dedicate this dissertation to my supervisor Mrs Emilia Hatendi as her ideas has inspired me to pursue and complete this research to the best of my abilities. I would also like to dedicate my dissertation to all upcoming students in the Department of Computer Science and Information Systems for them to use as a benchmark for their great ideas to come.

1 TABLE OF CONTENTS

LIST OF ACRONOMY

HLF	HIGHERLIFE FOUNDATION
DFD	DATAFLOW DIAGRAM
OPR	ONLINE APPLICATION AND RECRUITMENT SYSTEM
EER	ENHANCED ENTITY RELATIONSHIP
TD	TALENT DEVELOPMENT
LLD	LIFE LONG DEVELOPMENT
SBU	SOCIAL BUSINESS UNIT
CBA	COST BENEFIT ANALYSIS
ROI	RETURN ON INVESTMENT

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

CHAPTER 1: INTRODUCTION

1.1   Introduction

This section provides a full explanation about Higherlife Foundation background in terms of its entire history which include the date it was found. It further highlights the company mission statement, purpose, and vision which is the driver that makes it thrive through hard times. The mission statement will portray what the organization seeks to archive. The way the organization is structured is going to be illustrated on an organogram which highlight different levels in the company. Problem definition of the organization is going to be given which points the pitfalls of the current system and the aim of this study. Objectives are going to be stated of the proposed system together with the justification behind the proposed system which ends with a conclusion.

1.2   Background Study

Technology has become the cutting age of today modern world. There is need to adopt it or to advance the current technology. The study undertaken has identified that the current online scholarship application portal of Higherlife Foundation is complex and slow for the whole recruiting process. In addition, there has been repetition of work with the current system which is boring, demotivating and wasting resources that can be utilised elsewhere more efficiently. The current process is taking longer to complete hence there is need to save the most important business resource which is time.

The findings of the research carried on the background study, has inspired the researcher to come up with an advanced system which is termed Online Application and Recruitment Decision Support System that tries to bring ease of use and speed up the recruiting process for Higherlife Foundation. The system will allow applicants to apply, do the screening process, select the qualified candidates and produce the list of selected candidates for the manager to have a final decision.

1.2.1   Background of the organization

In 1996, Strive Masiyiwa and Tsitsi Masiyiwa found a trust called Capernaum. The Trust offers scholarships to orphans and vulnerable children in primary, secondary and University levels. A new Trust was launched in 2005 for the gifted and talented children who did not fall under orphan hood or vulnerable category known as the Joshua Nkomo Scholarship Fund. Another Trust was launched in 2006 known as the Christian Community Partnership Trust which provided pastoral support to Pastors' vulnerable children.

The Waterford Kamhlaba was launched by the foundation in 2008, it was meant for Joshua Nkomo Scholarship beneficiaries to go and learn at Waterford Kamhlaba College in Swaziland. The foundation launched its branches in Burundi and Lesotho in 2010.

From 2010 to 2015, the foundation made several achievements which include the Andrew Young Scholarship from Georgia two colleges which are in Atlanta namely Morehouse and Spelman College. Launched a learning hub in three countries namely Zimbabwe, Lesotho and Burundi to advance internet access. The foundation developed a platform to progress quality of education to every primary and secondary child known as Ruzivo Digital Smart Learning. The foundation launched the incubation centre known as Muzinda Hub in Zimbabwe.

In 2015, all four Trusts were merged into one foundation named Higherlife Foundation, which was based on education to under privileged. In the same year, Higherlife Foundation partnered with Yale University to provide scholarships to young Africans through the Yale Young African Scholars Programme. In 2018, Higherlife Foundation launched the STAR Academy program that recruit the best of the best at '0' Level and put them on a 2-year course where the final selected candidates will be given a 2-year scholarship to study a degree of their choice to any international university of their choice.

1.2.2 Organizational structure

An organogram is a graphical illustration of the formal administrative structure (Jewells, 2018). Organogram depicts the associations among personnel in a formalized organization. We have the executive co-chair and team lead by Mrs. Masiyiwa at the top of HLF organogram. They represent power in the organization in which they can use to direct the company in the manner they see fit and productive. The executive co-chair and team appoints a managing director who run day to day business operations on their behalf and keep them updated about the business. The managing director is followed by middle managers on the hierarchy who belong to different departments at the same level. The departments operated by these middle managers include Marketing, Finance, Talent Development (TD), Risk, Ruzivo, Long Life Development (LLD) and People and Performance (P&P). Senior managers are on the last flow although they have people below them, they manage and they are responsible for the different Social Business Units in all 10 provinces of Zimbabwe.

Executive Co- Chair and Team led by Mrs. Tsitsi Masiyiwa			
Director of Education	Director of Finance	Director of R.P. A	Director of Operations

Ruzivo	LLD	T. D	FINANCE	MARKETING	P&P	R.P. A	RISK

Social Business Units led by Regional Managers
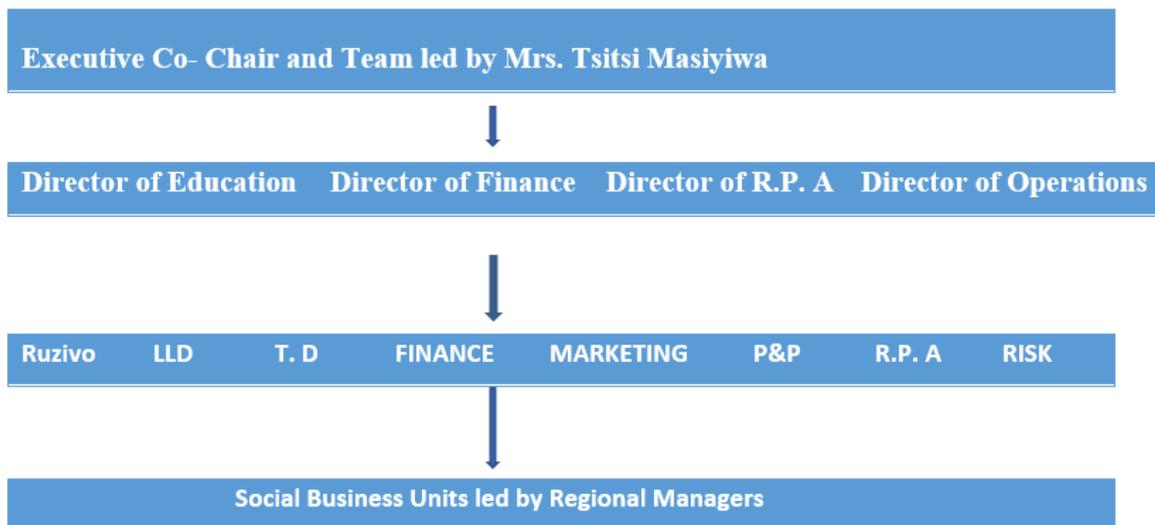
Figure 0-1 Higherlife Foundation organogram

The foundation headquarters is located in Harare capital city of Zimbabwe. All major activities such as planning, coordination, monitoring and control are carried out for the whole foundation at Westgate centre main office. The foundation is divided into departments and sub departments known as Social Business Units (SBUs) which are led by regional managers. The Foundation has also offices in the following countries Lesotho and Swaziland.

Weakness of the organogram

❖ Higherlife Foundation has a flat organization chart which does not offer promotions prospects to its employees which is demotivating.

❖ Delegation of power is discouraged as every level require a different skill set. For instance, the Finance director maybe reluctant to delegate critical tasks to a line manager due to the scope of work involved.

❖ The organogram may discourage two-way communication due to the extent of skill difference required at each level hence discourage the spirit of innovation and creativity from employees at low levels.

However, a tall organization chart maybe ideal for Higherlife Foundation as it creates more opportunities and reduce the skill set gap at each level for its employees. Moreover, a tall organization chart encourages delegation of tasks which promotes a two-way communication to allow feedback on task assigned. In addition, two-way communication increase employee's morale through interaction of employees at different levels as they team up on delegated tasks which in turn increase their team spirit. In conclusion, they have to also consider the consequences of a very tall organogram as it affects speed of information delivery at lower levels.

1.2.3   Vision of the organization

A vision is a reliable, more appealing, inspirational and realistic future for the company (Watkins et.al, 2011).

Higherlife foundation strives on a vision which is to give a platform for people to fulfill their God-given purpose. We envision an Africa in which young people find their vocation and are positioned to develop their communities for global impact.

The decision support system of HLF will support the organization vision through recruiting orphans and give them a chance to be nurtured by professional as it allows them to embark on professional courses that nurture one's talent thereby allowing them to fulfill their God given purpose.

1.2.4   Mission statement of the organization

Mission statement represents the objectives a company seeks to accomplish (Turban, 2015).

Higherlife mission is to invest in Africa's future by empowering vulnerable children through education and creating opportunities for highly talented young people.

The decision support system of HLF will support the organization mission statement through recruiting orphans and give them a chance in pursuing education and create opportunities of been employed and also employers of their own companies.

1.2.5   Purpose

The overall purpose of H.L.F business is to identify and execute spiritual, well-being and academic associated tactics that change the lives of disadvantaged orphans into Global Leaders.

1.3   Problem definition

Higherlife Foundation current online portal is more complex for users especially parents who apply for their children. The system of recruiting applicants is done manually which is time consuming. The documents of the final applicants are been kept manually hence proper recording of the final applicants is needed. The selection and recruitment processes are been done separately and is causing continues repetition of the same job. In addition, there has been cases of applicants been lost as it is the company policy that each Social Business Unit (SBU) must select its applicants from those applicants whom have been drafted to been residing within the SBU working boundaries.

1.4   Aim of the study

The reason behind this study was to develop an online scholarship application and recruitment system which eliminates the complexity of online application and speed up the recruiting process of the applicants for Higherlife Foundation scholarship. In addition, the system is been developed to correct the criteria been used in allocating students to different SBUs whereby it is currently using place of birth to allocate applicants instead of area of school. There is need to eliminate repetition of work as the new system will carry out the screening process whereas the manager will be the one to accept or reject based on the authenticity of the uploaded documents. The online scholarship application and recruitment system eliminates the need to deliver documents physically as they will be kept online.

1.5   Objectives

❖ To come up with a system that allows scholars to apply for a scholarship and be recruited online.

❖ To come up with a system that has an expert integrated criterion which will select the right students for the scholarship and list them in descending order of best candidate for the manager.

❖ To come up with a system that will generate a list of select candidates for the scholarship for senior managers in different Social Business Units (SBUs).

❖ To develop a system that has a customised view that suites both primary and tertiary students to remove the complexity of the current system.

❖ To develop a system that will save time involved in the recruiting process by computerising the background check process.

1.6   Instruments and Methods

Instruments for system development.

❖ XAMP – a local server.

❖ Chrome/ Firefox- a debugging web browser.

❖ Visual Studio/ Dreamweaver c6- programming software for the system.

❖ PHP/HTML/CSS- programming languages used with bootstrap for design and responsiveness of the system

❖ MySQL – used for database creation.

❖ Java scripts- assist in validation and other functionalities where necessary.

Methods selected for information gathering are:

- ❖ **interviews**- allows a face to face conversation with applicants and company staff.
- ❖ **observation**- used to give a clearer picture on how things are actually been done on the ground.
- ❖ **Questionnaires**- provide a chance to get honest answers since they promote anonymity.

1.7   Justification

The online scholarship application and recruitment system of Higherlife Foundation allows effective allocation of resources such as stationery and money to buy bonds for book keeping to other departments as the system throws away dependence on paperwork. The foundation utilises its time effectively as the proposed system does most part of the process on its own. The proposed system allows the valuable resources such as employees responsible for the manual recruitment to be utilised more effectively in other areas such as been assigned field work on training Ruzivo Digital Learning to students in different areas.

The proposed system is advantageous to the organization as it allows recruitment of the applicants faster than the manual process which has been taking more than 2 months. This recruitment process has been done by all ten Social Business Units in Zimbabwe together with Lesotho and Swaziland Social Business Units. Hence, the proposed system has a great impact on the day to day business operations of Higherlife foundation across its Social Business Units.

1.8   Conclusion

The introduction has evidently explained the problem definition of the existing system and the reason behind the development of the new system as it will improve efficiency and quality delivery of service so as to maintain the company goodwill. The system has been justified on why it is vital to be developed to address the issues or problems identified. Hence, the newly proposed system must be supported as a go to advance the current online portal.

2 CHAPTER 2: PLANNING PHASE

2.1 Introduction

The method of reducing future risks thus exploiting the known and minimizing the unknown is known as planning by Laundon, 2012. Under the planning stage, the project enables the managers to oversee risk, cost, time and change. Furthermore, employees and suppliers in order to guarantee the task is done on time inside the allocated budget plan. The planning phase is used to develop a plan that is used to assess whether the project is feasible to proceed. It also includes talks about the risk involved with completing this venture and the work plan that layout how and when the task will be done.

2.2 Why build the system?

Higherlife Foundation is a nationwide organization operating in three countries with recruitment of orphans as its core aim. Hence, the need to speed up the recruitment process to ensure business effectiveness and efficiency in its operations. The online scholarship application and recruitment system will:

- ❖ Computerise the recruitment process to make work easier and motivating.
- ❖ enable computerised system security which protect the company information from authorised personnel.
- ❖ Provide back-up point facility for all information in the database.
- ❖ allow managers to view and generate reports.
- ❖ provide quick response to applicants on whether they have qualified or not than the previous system.

2.3 Business values

Business esteem or values can be clarified in three aspects which are the clients' longing, the producers' imagination and the system's maintainability (Brown, 2014). Business esteems incorporates a wide range of development or values that guides or chooses the thriving and quality of the business in short run or long run. This value does not only refer to monetary value but also include goodwill as a result of adopting the proposed system. Business value is only limited to economic value but also extend to managerial value, shareholder value, employee value, client value and social value. The newly system brings value to Higherlife Foundation due to the following business values:

- ❖ **Shareholder value** – the new system supports a large number of applicants to be recruited by HLF which allows the government to loosen tariffs or provide government grants such as tax holidays which in turn increases the shareholder value.

❖ **Managerial value** – managerial value will increase as the newly proposed system requires less input from the manager there by allowing managers to focus on major tasks and meet deadlines which will improve their status in the organisation.

❖ **Employee value-** the new system will increase employee value as some will be part of the team to develop the proposed system and others will undergo a training to know how the system works and how to use it.

❖ **Societal value-** the proposed system is of major importance to the community as more widows and widowers are relieved from pressure of supporting these recruited orphans

Table 2-1 OPR System project business values

1. It provides fast feedback to applicants thus enhance clients' trust in the administrations delivered.
2. It advances decency as it cuter for each person by dispensing with geographical barrier and favouritism associated with manual selection.
3. It brings out the best in employees as they participate in generating ideas to improve the current system thereby gaining self-satisfaction in doing so.
4. Expenses are reduced as it eliminates the use of stationery and transport cost as printed copies are required to be submitted to the Headquarters.
5. The proposed system development requires a unique skill of professionalism which brings good quality and excellent service that gives the organization a technological advantage and improves the company's image.

2.4 Feasibility Study

Feasibility study refers to "an investigation intended to decide if to set out on a proposed task" (Tripathy, 2013). The study is characterized as" the compositions of analysing and assessing a given undertaking with the expectation to lessen or dispose of the effect of risk" (Otto, 2010).The feasibility study considers assessment on the project progress as it analyses economic, technical, social, operational and innovative prerequisites expected to convey the task or project against the organization asset constraints. The four categories of the feasibility study are as follows:

❖ Social

- ❖ Economic
- ❖ Technical
- ❖ Operational

The major aim of the study is to assess the environment to ensure the project goes as planned else it becomes infeasible.

2.4.1   Technical Feasibility

It is more focused about assessing the cost viability or development of hardware, software and additional system components to take care of the problem at hand" (Satzinger, Jackson and Burd, 2016). The new system is considered viable provided that the company budget constrain can meet the project requirements. Higherlife Foundation analyst is tasked to examine the viability of the existing system in a manner that support the proposed system goals. Professional skill set is extremely vital for system developers as their skills assume an imperative job in clarifying and responding to any questions patterning this study.

Hardware and Software

The organization current system comprises of an application portal for applying and a manual process for selection and recruiting. The development of online application and recruitment system requires hardware and software which are as follows

Table 2-2 Hardware Requirements

Hardware	Description	QTY Required	QTY Available
core i5 laptop	500GB HD, 8-16 GB RAM, 4GB Graphics Card	2	1
Network Gateway	USSD Gateway	1	0
Hard drive	50 GB	2	1
Internet cables	UTP CAT 35 fly leads patch codes	6	0
Backup Hard drive	300 GB HD	1	1
Power supply	5500 watts	2	1
Server	Real time back-end database	1	1

Table 2-3 Software requirements

Software	Description	QTY Required	QTY Available
Web server software	Xampp, Wamp	2	1
Text editor	Visual studio, dream weaver c6	2	1
Antivirus	ESET nod 32	2	2
Microsoft Office	2016	2	1
Operating system	Windows 8 pro	2	1

2.4.2 Economic feasibility

A system will turn out to be financially attainable when preferences to be accomplished from the proposed system surpasses expenses or costs procured in the purchasing, making, introducing, and operating that system. This is according to Laudon and Laudon, 2016. The study is used to decide if the real expense of developing the system is superseded by benefits and the cost sparing of building up the new system. In the event that the benefits override costs, the venture is given an approval to proceed with the new system design and implementation. Below are the questions that need to be addressed under Economic Feasibility:

 ❖ Does developing the new system reduce costs?
 ❖ Can the new system bring benefits that supersede costs?
 ❖ What is the cost associated with software requirement?
 ❖ What is the cost associated with hardware requirement?

Costs

Development costs and operational costs are the two classifications of system development costs (Cohn, 2014). Costs refers to the amount incurred in acquiring a product. In relation to software projects, it is the amount of development and operation costs as well as system maintenance.

Development cost

These are once off costs incurred before the system use or realise to the end user (Cohn, 2014). Development costs are as a result of research of our clients' needs on the new system.

Table 2-4 : Development Cost

Items	Quantity	Amount USD ($)
SOFTWARE		
Windows 8 operating system	1	50
Microsoft office	1	51
Visual studio codex	1	30
HARDWARE		
Core i5 laptop	1	400
Printer	1	34
Database server	1	185
Backup server	1	170
Power supply	1	160
Network switch	2	240
Total Cost		<u>**1320**</u>

Operational cost

Refers to costs that are directly linked with the system maintenance during its operation life span. This is according to Cohn (2014).

Table 2-5: Operational Cost

Description	Amount USD ($)
Software maintenance	450
Manual labour	1500
User training	500
Consumables	200
Total cost	**2650**

Benefits

System benefits are returns enjoyed by the organization after investing in the development of a new system in achieving the company goals (Kotler, 2012). Tangible and intangible benefits are the two classifications of benefits. The following tangible and intangible benefits comes as a result of developing the new system.

Tangible benefits

System tangible benefits are benefits which can be quantified and assigned a fiscal value.

Below is a table 2.6 that illustrate tangible benefits:

Table 2-6: Tangible benefits

Description	Amount USD ($)
Automated reports and decision	400
Reduction in processing errors	500
Reduced labour cost	4000
Total benefits	**4900**

Intangible benefits

System intangible benefits refers to benefits which cannot be quantified or assigned a fiscal value but contribute significantly to the business (Wang and Wang, 2012). Intangible benefits that a company can enjoy include the following:

❖ It reduces employee work load by completing the recruitment process on its own.

❖ It reduces manager's risk of misplacing documents required by the company Headquarters as every detail is saved and backed up online.

❖ The system increases customer satisfaction as it provides a customised view for each type of user such as a primary user and a secondary user.

❖ The proposed system is time saving as the process is done in a matter of few minutes.

❖ The ability of the company to appreciate new technological advancement improves the company goodwill.

❖ The newly proposed system improves employee morale as it eliminates repetitive tasks which were boring.

Cost benefit analysis

CBA refers to current accumulated benefits over the accumulated costs incurred (Ness, 2016).

Table 2-7: Cost Benefit Analysis

Cost Type	2018US ($)
Benefits	
Tangible benefits	4900
Costs	
Development costs	1320
Operational costs	2650
Net Benefits	**930**

1. **Return on investment**

ROI is a technique that evaluates the cost-effectiveness or profitability of given alternatives solutions according to Wilkinson (2014). He further explained that, the ROI of a project is a proportion rate that measure the association amongst the money the company returns from a venture against the money invested.

Return on Investment Formula

Total benefits – total costs * 100

       Total costs

$\underline{4900 – 3970 * 100}$

   3970

R.O. I= 23.6%

A solution with R.O.I that is greater is considered the best from the given alternatives. However, the organization may decide to stipulate a benchmark R.O.I as a measure of acceptability for all investments. If the given alternatives R.O. I's are below the benchmark R.O.I then they are considered economically unfeasible. For example, HLF benchmark R.O.I is 18%, therefore, any project will be considered feasible if it meets or supersedes the business benchmark R.O.I.

2. **Payback period**

A technique that measure the time period in which the project cashflows breakeven with the project initial investment (Sekhar, 2018). Table 2.7 shows the details of a system that has net benefit of $930 and development cost of $1320.

CALCULATIONS

     Cost of investment

     Net cashflows

    $= \underline{1320}$

      930

    = 1 year 5 months

Higherlife Foundation can state a benchmark of 3 years as a maximum payback period allowed for any project undertaken to be considered feasible. The payback period of the proposed system was 1year 5 months hence the project must be accepted as it is feasible to continue.

Payback period formula and calculations

    <u>Cost of investment</u>

    Net cashflows

    <u>1320</u>

     930

Payback period= 1 year 5 months

Higherlife Foundation can state a benchmark of 3 years as a maximum payback period allowed for any project undertaken to be considered feasible. The payback period of the proposed system was 1year 5 months hence the project must be accepted as it is feasible to continue.

2.4.3 Social feasibility

Social feasibility follows the communication of both clients and workers within a system thus, it determines the extent of collaboration of the system with clients and workers after it has implemented at the company (Bigoli, 2011). stakeholders will benefit since the proposed system encourage enlistment or recruitment of numerous candidates within a short time space. Stakeholders equality is achieved as everyone is eligible for recruitment at any time due to elimination of favouritism that was associated with the current system. Higherlife Foundation benefits from system increased efficiency because of quick execution of the application and enrolment procedure of the new proposed system. The newly proposed system might require IT skills that may promote workers to undergo ICT training development so as to upgrade their skill set in order to use the system effectively.

2.4.4 Operational Feasibility

Refers to a technique that determines the degree of acceptance of a solution within a company (Fracheti, 2011). Operational feasibility of Higherlife Foundation is determined by the assistance of the company human resource management in helping the project by predicting whether the introduction of the new system will be accepted if it is implemented within an organization. The success of this study depends on the business support and obligation in seeing the project through. The study shows the final user that the proposed system is designed for and promotes management to take into account workers' moral towards the use of the system. Below are the questions that need to be addressed under Operational Feasibility:

- ❖ Can the current system process information faster and provide quick response?
- ❖ Can the organization get data in the format they requested on the current system?
- ❖ Does the development of the system deliver benefits that outweighs costs of development?

❖ Can the system offer flexible services?

Be that as it may, the responses to these questions were observed to be as per the following:

❖ The proposed system provides faster processing of data and provides quick feedback to management.

❖ The new system will deliver data in the format requested by the organization.

❖ Cost are reduced as the new system changes Higherlife Foundation from been labour centred to been technological centred which saves the organization costs associated with wages.

❖ The proposed system provides flexibility as it is easy to both navigate and apply without assistance from company employees.

2.5   Risk Analysis

It refers to a method used to outline possible constrains that may occur as a result of adopting the new system (Kotler, 2012). The organization will be reviewing the potential risk that may arise in proceeding with the project and more likely alternatives to mitigate the threats. Below are threats notified and possible alternatives.

❖ **Hardware crush**- a backup will be done using an external hard drive at a regular interval to prevent information loss.

❖ **Virus**- antiviruses including ESET and Norton will be installed to prevent internet malware or virus from external sources such as flash drive to affect the system.

❖ **Hacking**- hackers can be prevented from accessing unauthorised information by installing firewalls that are impossible to penetrate together with intrusion detection systems and intrusion prevention systems to tighten security.

❖ **Power load shading**- Zimbabwe has been experiencing power cuts due to shortage of electricity hence the organization backup generator will smooth the operations of the business in curbing this threat.

❖ **Workers resistance**- fear of losing jobs as they think they are been replaced by technology results in project sabotage. However, offer training to upgrade their skill set so as to work together with the system.

❖ **Exchange rate**- Zimbabwe has been experiencing dramatic fluctuations on foreign currency exchange rates with rates going as high as 1:5 which is a major setback for HLF in importing resources outside such as equipment need for the development of the proposed system nor hiring foreign programmers. However, HLF can take the opportunity of unemployment in the country and hire local programmers at a cheaper

fee and also using local companies in purchasing equipment needed for the development.

2.6   Stakeholder Analysis

People who are concerned about everyday business processes are called Stakeholders. Stakeholder evaluation is a procedure of identifying these people and the way they are going to influence or be influenced by the new system and probable ideas **to** keep connected in harmony.

Below are various stakeholders that are likely to be affected and possible measures to limit the effect:

- ❖ **Workers**- the introduction of the proposed system will make some skills of workers outdated as there is a conversion from manual capture to digital capture, so training can be offered to upgrade them with the necessary skills.
- ❖ **Clients**- the proposed system caters for 24-hour service and provide few well clearly explained application steps that are easy to follow therefore, it aids flexibility as the system provide user friendly design that is not complicated for the user.
- ❖ **Shareholders**-HLF is a non-profit organization therefore, the company shareholders were satisfied by knowing that, the newly introduced system will reduce incompetence costs associated with manual processing of applicants.
- ❖ **Government**- the proposed system will increase the number of orphans been recruited per year, as a result, this will reduce pressure on the government of creating trusts that provide the same service as Highlife Foundation as it is serving the public at large.

2.7   Work Plan

It is a stage-by-stage process that illustrates the time variant from beginning to end of each facet in the plan (Wang and Wang, 2012). As illustrated below, it acts as a calendar displaying the time slit allocated to each stage.

Table 2-8: Project Schedule

CHAPTER	START	FINISH	WEEKS
PROPOSAL	18/02/2019	25/02/2019	1
PLANNING	26/03/2019	11/03/2019	2
ANALYSIS	12/03/2019	25/03/2019	2
DESIGN	26/03/2019	08/04/2019	2
CODING	09/04/2019	22/04/2019	2
TESTING	23/04/2019	29/04/2019	1
IMPLEMENTATION	30/04/2019	06/05/2019	1
MAINTENANCE	07/05/2019	14/05/2019	1

2.7.1 Gantt Chart

It is a pictorial illustration showing a project schedule as a parallel line sequence. It depicts the entire project's starting time and finishing time. The left side of the Gantt chart shows assignments in their chronological order and weeks in the top horizontal row show the project's time frame. The Gantt chart for the development of the newly proposed system is shown in figure 2.1 below.

ACTIVITY	WK-1	WK2-3	WK4-5	WK6-7	WK8-9	WK10-11	WK-12	WK-13
PROPOSAL	■							
PLANNING		■						
ANALYSIS			■					
DESIGN				■				
CODING					■			
TESTING						■		
IMPLEMENTATION							■	
MAINTENANCE								■
DOCUMENTATION	■	■	■	■	■	■	■	■

Figure 2-1: Gantt Chart

2.8 Conclusion

The proposed system was considered viable to continue the project after conducting the economic, social, operational and technical feasibility study. The R.O.I project and the payback period for the continuation of the project were both calculated and considered viable. The work plan for the project has been formulated and a pictorial Gantt chart has been developed showing the concurrent phases that need to be completed for the project to be completed. The limitations of the business resource were evaluated and the project was considered feasible for progress to the next stage.

3   CHAPTER 3:   ANALYSIS PHASE

3.1   Introduction

The analytical phase includes learning methods that the business uses to recover and review data in order to generate useful information to determine how best to use it. System analysis provides a more in-depth examination of how the system performs by collecting vital information from different sources, as well as the problems associated with the current system that require modification. Different techniques for collecting information, such as observations, questionnaires and interviews, will be used. In addition, the current system will be represented diagrammatically in the form of a process modelling, a data flow diagram and a context diagram showing the logical movement of information or data within the current system. A study will be carried out on the current system weakness and alternatives to these weaknesses will be presented.

3.2   Information gathering techniques

It is defined as a formal process of collecting data from the field regarding system requirements, preferences and issues (Kumar, 2014). It also defined as fact-finding methodologies where users ' reactions and collective opinions will propound the ultimate decision (Manual, 2014). According to Shelly and Rosenblatt (2010), interviews, questionnaires and observations are the most common finding techniques. To carry out the research, these three facts finding techniques have been chosen. Each technique is explained in detail below.

3.2.1   Interviews

An interview is a two-way oral communication fact-finding methodology using a face-to-face interaction according to Wilson (2013) to gather information from individuals. It was also defined as an individually conducted fact-finding technique for obtaining information from the oral reaction of an individual (Seidman, 2013). In an interview, they are two types of roles that are the interviewer and the interviewee. The interviewer is the system analyst whose task is to organize and conduct the interview, whereas the interviewer is the system user responsible for answering the interviewer's various questions.

The interview was used to have a face-to-face conversion with various stakeholders that helped to collect information quickly as quick feedback to the question was asked. It helped the interview gain more information through no verbal indications such as facial expressions by both employees and applicants who were interviewed as to whether the current portal was easy to use or complicated. It also helped to engage in a fruitful conversion as it was flexible to use

the language in which the interviewee was more comfortable to use and, more importantly, it helped create a less tense environment for conducting an interview, making the interviewee more open to answering questions.

The interview helped in shed more light on the frustration of both employees and applicants on the current system as employees claimed that the system was repetitive and monotonous while the applicants were claiming that they are too many steps needed to be completed to successfully apply for the scholarship. In addition, the employees claim that there was more manual input needed during screening and recruiting the applicants for the scholarship.

However, they were challenges faced during the interview such as language difference as some interviewee's were able to speak Ndebele only while the interviewer was fluent in English and Shona only. The interview involved elderly people who were custodians of some orphans whom were end users of the system hence, they took long to respond to questions which become time consuming. Some responders were giving bias information especially HLF employees whom were fearing of losing their jobs.

3.2.2   Questionnaires

A questionnaire is a methodology for gathering information in which a series of open or closed structured questions are written down and respondents are given written answers on a particular field of study (Stanislaw, 2011). Questionnaires can also be referred to as special purpose documents used by the system analyst to collect targeted audience information and opinions.

Questionnaires proved to be a useful tool as they enabled employees to respond at their own pace and time, leading to better quality responses from participants. Vital information has been obtained from questionnaires on issues such as what steps you think are necessary on our current online portal and what steps you do not think are necessary. They also provided participants with anonymity, which made them more comfortable with the challenges they are currently facing with the current system. This enabled the researcher to gain an insight into what our users are experiencing from the current online portal, rather than speculating on what our users might think.

3.2.3   Observations

Observation is an information gathering methodology where one collect information by watching from a distance a certain process or routine being done (Seidman, 2013). Covert participation technique is a type of observation which involves an individual been included in a given event whilst observing carefully and noting every aspect required but without other member knowing exactly about the mission (Halliwell et.al, 2012).

The researcher was able to notice employee's performance at first hand and also, he was able to determine the time taking to complete the screening process and recruitment procedure been done by these employees. Furthermore, the researcher was stationed at the HUB which was used to apply for the scholarship hence, he was able to determine the time taken to complete the application process by the applicants which was within the range of 1 hour to 1 hour 30 minutes per applicant. This assist the observer in determining the level of improvement required on the proposed system to increase system performance.

3.3   Current system analysis

The analyst was able to collect data from the current system using the above-mentioned information collection techniques. The current system analysis is conducted to expose the strengths and weaknesses of the existing system to identify areas of improvement or additional needs (Stair and Reynolds, 2015). It is necessary to fully understand how the current system works in order to develop a better system.

HLF existing system comprised in two parts which include an online application portal and a manual recruiting system. The online portal serves as an information capturing tool about applicants' full details such as personal details, school details, guardian details, religion background, guardian working background and authentic proof of birth certificate and death certificates of parents.

Whereas, the manual recruiting system is responsible for verting the applicants in terms of conducting a background check of each applicant, scoring of each applicants and fill forms of selected applicants. The scoring was done using a var tool designed on excel that comprises of questions each carrying a particular weight.

3.4 Process analysis

Process analysis is defined as learning processes to help know their vital characteristics and how these processes are practiced by the individuals involved (Laudon, 2012). The activity diagram is used to diagrammatically display the existing system process analysis. The whole system is divided into activities that are performed during process analysis at different intervals throughout the entire system process. Figure 3.1 below shows the current system activity diagram.
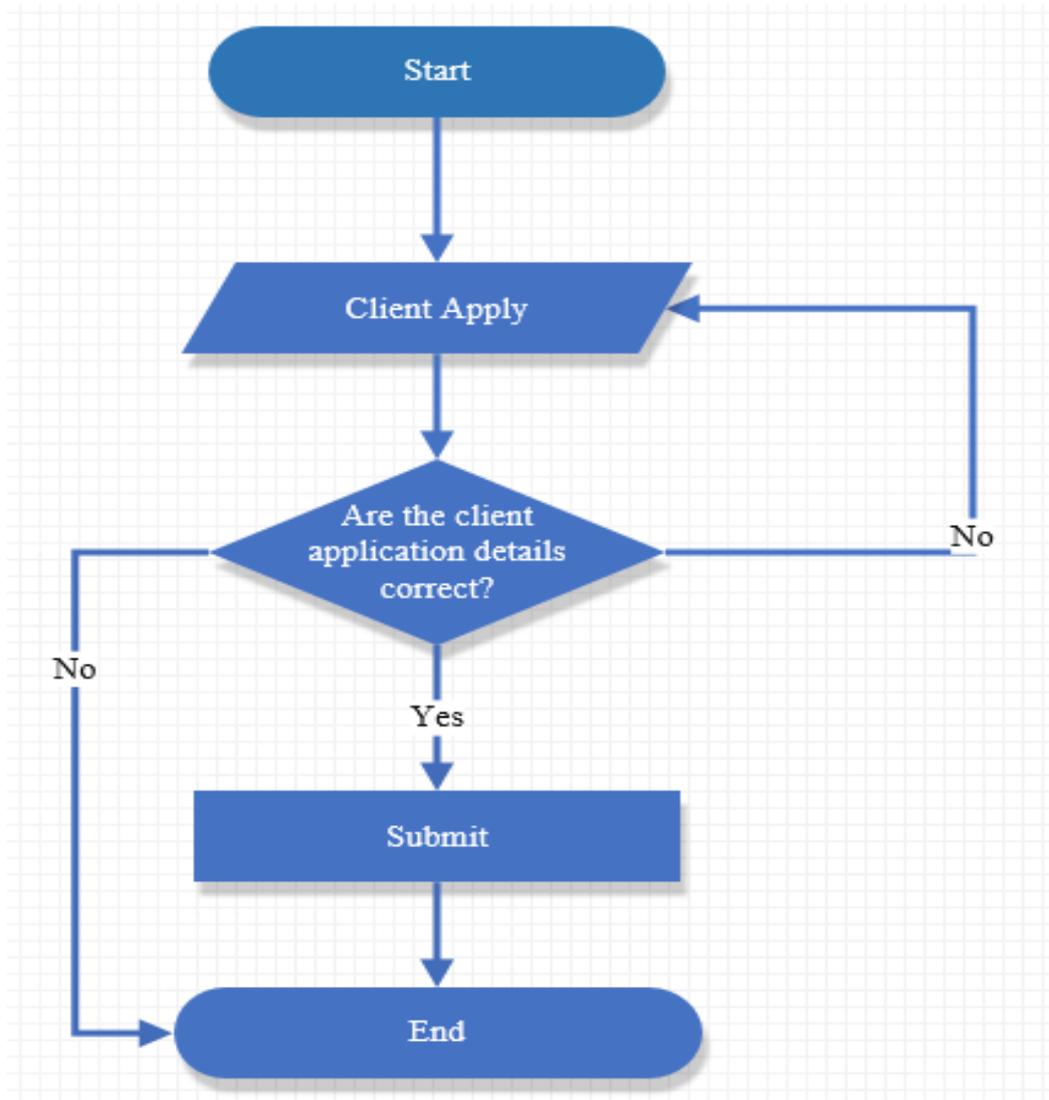
Figure 3-1: Current system online application process diagram
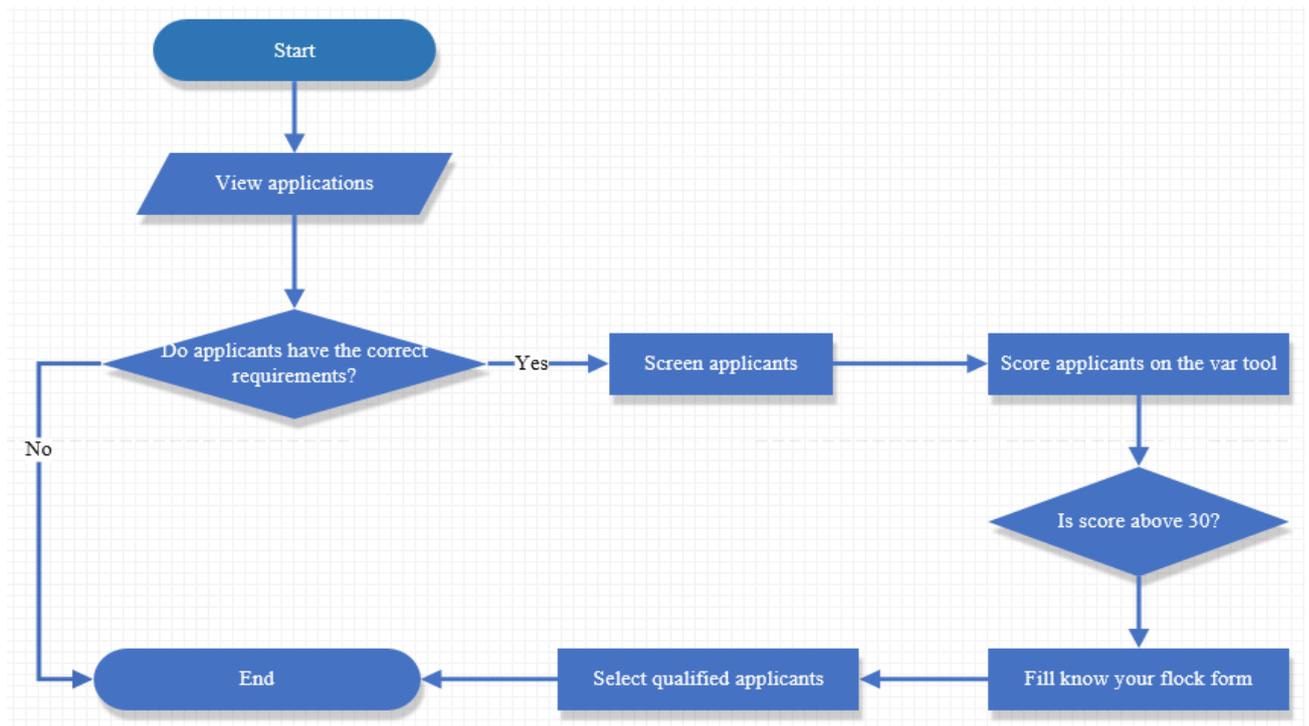
Figure 3-2: Current system manual recruitment process diagram

3.5 Data analysis

Information process evaluation using systematic information inspection is known as data analysis to obtain a clear understanding of data (Twisk, 2013). It was also defined as a procedure to interrogate the information collected or to look more closely at the data in order to understand it (Rouse, 2011). To give a clear picture of the data analysis, the context diagram and the data flow diagram will be used.

3.5.1 Context diagram

Context diagram is defined as a graphic representation showing associations between entities and their activities and integrating all activities into the system as a whole (Gomma, 2016). It has also been suggested to imitate the main objects of the system and examine how the objects interact with the current system showing the inputs and outputs (Bittner and Spencer, 2013). Below is the current HLF system context diagram.
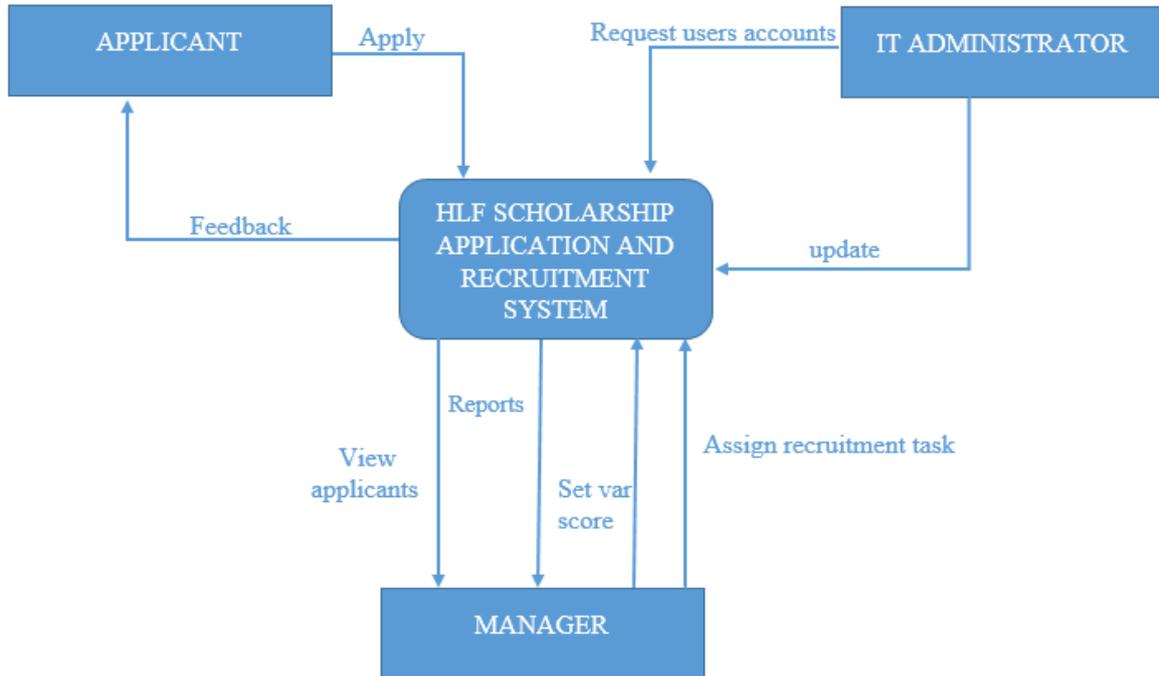
Figure 3-3: Current system context diagram

3.5.2   Dataflow diagram

Pictorial illustration of how information flows in a system is known as dataflow diagram (Manning, 2014). DFD is also defined as a pictorial tool that illustrate how information flows within a system (Rajaraman, 2016).
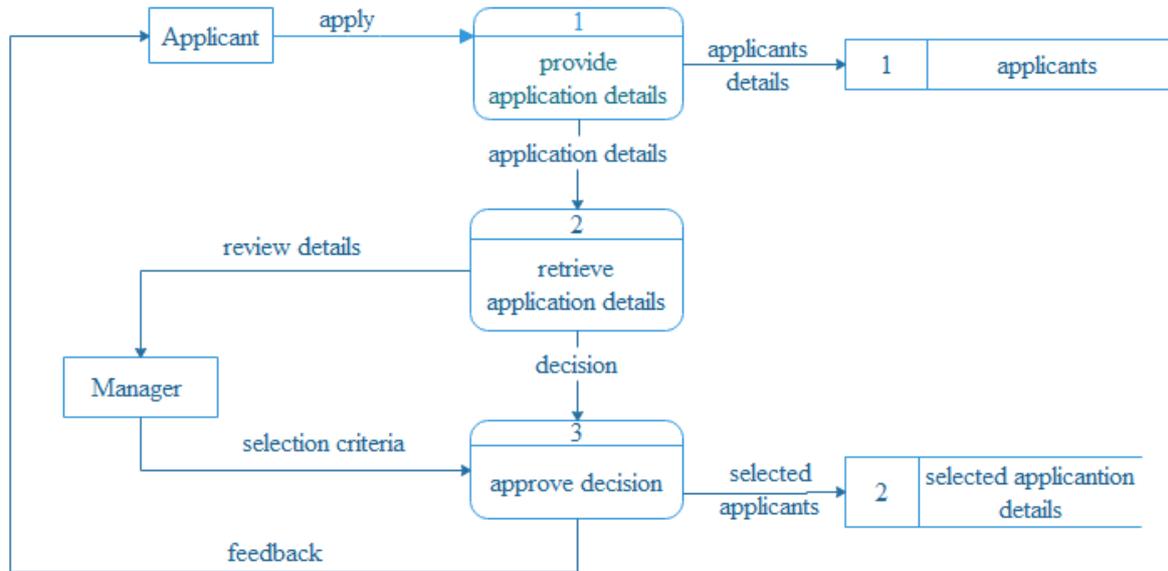
Fig 3. Current system dataflow diagram

Figure 3-4: Current system dataflow diagram

3.6 Weaknesses of the current system

❖ the current system is time consuming as it has been noticed through research carried out that applicants took long to apply and the recruitment process took months to complete.

❖ Keeping of physical documents has been noticed to occupy unnecessary space and also in terms of security they can be easily misplaced or destroyed by water, mice or fire through negligence.

❖ Too many employees have been recruited to do the recruitment process which is costly in terms of salaries given to each hence, there is a need to cut such business costs.

❖ As documents are requested frequently and on a short time interval, it is difficult to track progress due to physical storage layout.

❖ Recruitments from branch offices are required to be submitted in physical form to the head office, hence, travelling costs are contributing to business costs.

3.7   Evaluation of alternatives

The research was carried out using various techniques of collecting information highlighted above, where the current system was analysed and its weaknesses discussed. The current system can be improved from the above research and the organization can also benefit more from the new system development.

This section refers to a process of using the research information gathered to evaluate the best pursuit option. This section tends to evaluate various alternatives and choose the organization's best to pursue. The three alternatives identified to be evaluated are in-house development, outsourcing and improvement of the current system.

3.7.1   Outsourcing

When a company acquires a fully packaged system or hires an outside developer to custom develop a system for them is called outsourcing (Wijers and Verhoef, 2012).

Merits of Outsourcing

- ❖ Enables the company to hire experts to have a competitive advantage through provision of quality services.
- ❖ Allows the organization to focus on core business activities that require immediate attention.
- ❖ It promotes utilization of limited resources as outsourcing can mean that the hired company will have to use its own resources.
- ❖ It cutter for the company to benefit from technological advancement of offshore vendors as it may be expensive for the business to acquire them.
- ❖ There's risk sharing with offshore vendors as they will be responsible for delivering a free bug functional system.

Demerits of Outsourcing

- ❖ It promotes job resentment from workers as it stills promotion prospects that help them to achieve self-fulfilment levels considering the level of importance of the job to the organization.
- ❖ High maintenance costs as all upgrades require rehiring of the offshore vendor who have full knowledge of the system development.
- ❖ It jeopardizes organizational information security as it promotes information sharing with an outsider.

3.7.2   Improvement of the current system

System improvement within the organization is done to correct problems affecting the current system functionality (Kiddiq, 2014). The current system weaknesses and features to be added to the system at this level will be addressed. The current online portal and the manual system are combined to create a decision support system that incorporates both current systems ' functionality. Below are some of the advantages of improving the existing system.

Benefits of improvement of the current system

- ❖ The new system will shorten the recruitment process time.
- ❖ There is system flexibility in terms of people being able to apply and be accepted by the employees of the company without too much intervention.
- ❖ It removes human limitations like the speed of doing things.
- ❖ Wage-related business costs will be reduced as the manager only needs to access the final list of accepted applicants.
- ❖ The new system improves information security of the company.
- ❖ Better quality service delivery to our valued stakeholders due to quick response time and easy navigation of the system.
- ❖ Provide backup security of the company information online.

Limitations of improvement of the current system

- ❖ System improvement from manual to digital allows the company to incur data conversion costs.
- ❖ The organization will incur accumulated maintenance costs of the new system.
- ❖ Training costs of IT personal of monitoring and maintaining the proposed system.

3.7.3   In-house development

It is defined as the development from nothing of an entire new system (Setende, 2012). It refers to the company's IT department's internal development of a completely new system to exploit the company's resources (Kenneth and Kendell, 2012). In addition to the availability of open source tools such as android studio and PHP, the emergence of forums such as w3schools, sourcecodester, and GitHub has fostered the expansion of the software industry that has made in-house development more viable and common. Below are the internal development merits and demerits.

Merits of In-House Development

 ❖ The company enjoys full ownership privileges as the system is developed internally.
 ❖ There's utilization of the company resources including its workers which promote motivation and worker's self-fulfilment will be achieved by taking praises developing the system.
 ❖ There is avoidance of cultural conflicts by using in-house development.
 ❖ Security of information is maintained as in-house development does not allow sharing of information with outsiders.
 ❖ Employees have a better understanding of areas that require automation and what client's requirements need to be considered and how best to deliver those requirements in the new system. For example, HLF IT workers are the best at coming up with the expert recruitment algorithm through deeper understanding of the recruitment process.
 ❖ Costs associated with maintenance of the new system are reduced as the company has its own developers

Demerits of In-House Development

 ❖ It can be time consuming to develop the same in-house that can interfere with other business priorities.
 ❖ There may be a lack of expertise within the organization needed to develop the proposed system, which may result in the development of a poor-quality system.
 ❖ Attract sabotage by workers if the feel like the system is going to replace them.
 ❖ As the company develops the new system in-house, it means that they will have to bear a 100% risk involved in developing the entire system, such as system bugs or crushing in trying to meet the requirements of the client.

In conclusion, from the above evaluation of various alternatives and with the help of the analysis of cost benefit performed on chapter 2. Due to its merits and nature of privacy compared to sourcing, in-house development was chosen as the best alternative to go forward. Improving the current system implies making several changes as the new system nature proposed is different from the current system in terms of functionality and the design was therefore more ideal in-house development. Choosing in-house development means that the company will incur development costs of $1320 from the cost benefit analysis performed in Chapter 2. These are, however, one-time costs and compared with the benefits that will follow

in a short period of time since the payback period of 1 year 5 months was calculated on chapter two with an investment return of 23.6 %.

3.8   Requirement analysis

A methodology that is conducted in an organised manner to determine the system development resources required to produce better quality software is called requirement analysis (Glady, 2012). Is a methodical utilization of certain standards, techniques and dialects and devices in the examination and portrayal of client needs and the depiction of the conduct and nonbehavioral highlights of a product framework fulfilling client needs.

3.8.1   Functional requirements

Functional requirements are the objectives of the genuine plan of the new system says Thompson (2013). This stage focus for the most part around clients, it tries to point out on improving clearness on the customer needs and how those requirements will be tended to and it extends up to the normal standard of the system execution (Paradkar, 2017).

Functional requirements portray what the framework (system) do. The new system functions include the following:

➢ It allows creations of SBU managers accounts and administrator account.
➢ Allows managers to view and print reports.
➢ It allows applicants to apply online.
➢ It allows managers to conduct performance evaluation or analysis.
➢ It allows manager to set flexible targets of required applicants.
➢ It provides back-up facility for the administrator.
➢ The system provides validation functionality of results, birth and death certificates uploaded.
➢ The system provides different access levels authentication through use of sessions that are also recorded for security reasons.
➢ Allows managers to track how the expert part of the system as arrived at its decision.

3.8.2   User case diagram

The user case is a portrayal of the system's activity arrangements to deliver an actor outcome. They indicate the normal behaviour and not the correct technique. The case chart captures who does what (connections) with the system (performer) for what (objective) reason.
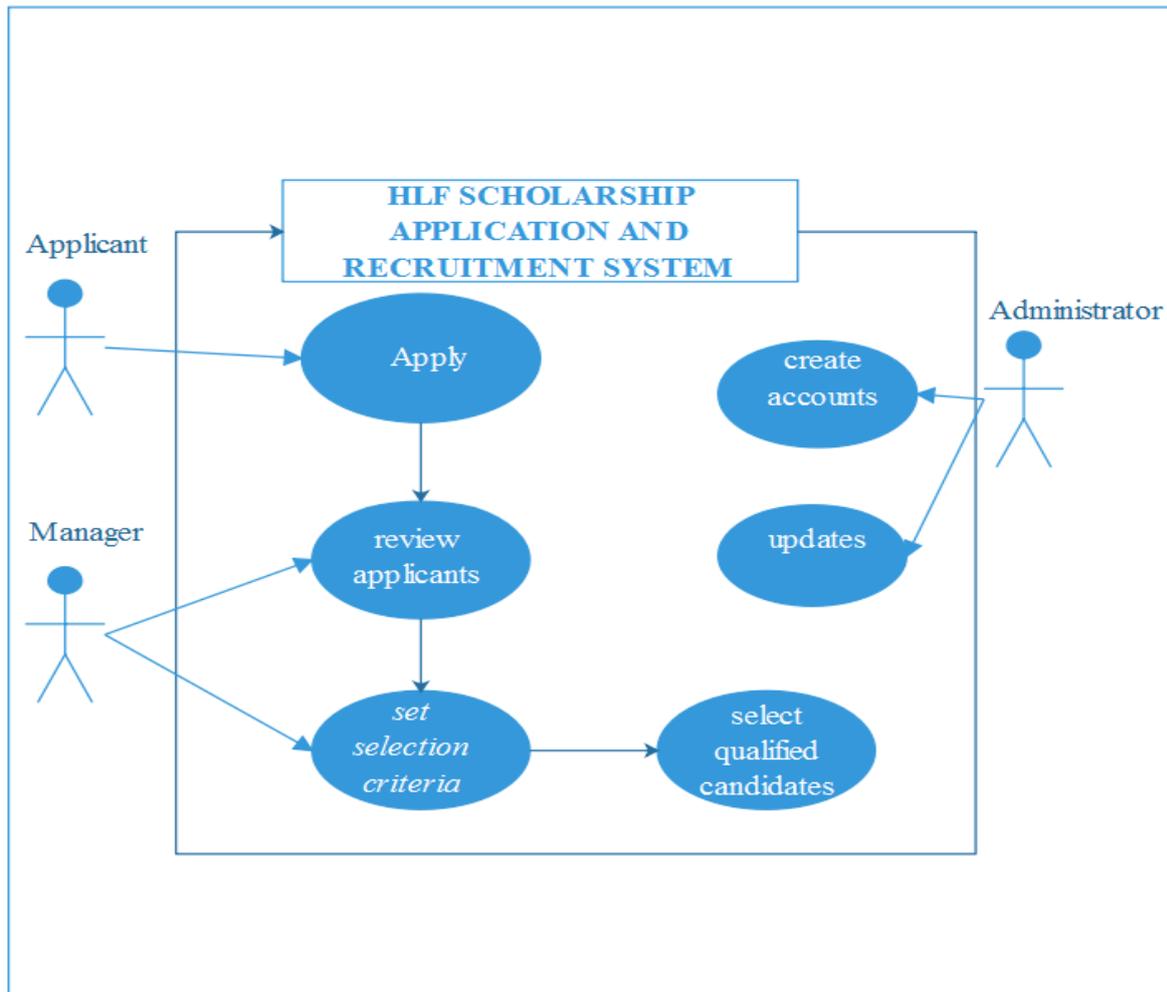
Figure 3-5: Current system Case diagram

3.8.3 None functional requirements

They determine the criteria that will be used to measure the system activity rather than its behaviour that is a system's quality traits (Rosenblatt, 2014). None functional requirement is a prerequisite characterizing a system property. Non-functional requirements make it clear how the system works. Below are the proposed new system's non-functional requirements:

❖ **System usability-** the new system should have the capacity to acknowledge right or legitimate data in the system.

❖ **System response time-**the new system should permit fast retrieval of information whenever required.

❖ **System throughput and efficiency-** the new system must enable a large number of applicants to apply in a short time. It should also allow applicants to apply for 5 to 7 minutes instead of an hour per applicant.

- ❖ **System security issues-**the new system must have strong login passwords mixed with numbers and different letters with a length of at least 8 characters.
- ❖ **System user interface-** the new system should be straightforward and easy to use with a user interface that is self-explanatory.

3.9 Conclusion

The current system was analysed in terms of strengths and weakness, process diagram, context diagram and data flow diagram, as well as the recommended alternatives were evaluated where the best alternative was chosen for in-house development. The proposed development of the system should therefore continue to the next phase called the design phase. The design stage will focus on the proposed system's architecture design.

4   **CHAPTER 4: DESIGN PHASE**

4.1.1 Introduction

The previous chapter reviews the strength and weaknesses of the current system that resulted in a new system being developed. This chapter will focus on system design of the new system in terms of system design, architectural, physical, database design, program, interface design, and security. The design phase will focus on building the proposed system, including the equipment, the workforce and the proposed system's various prerequisites. That's what Wang and Wang (2012) say.

4.2 How the system works

The proposed system is designed to allow applicants to apply online without geographical barriers and recruiting these applicants. The new system will use an integrated criterion to select the correct applicants for the scholarship with the manager holding the final decision. The new system will provide quick feedback than the current system after application on whether the applicant qualifies and has been selected for the scholarship or not. Managers will be able to view statistics of vulnerable children in terms of number of applicants who are double orphan, single orphan mother deceased and single orphan father deceased. The system will be able to provide mentorship guide topics to managers using the statistics been provided. The system allows managers to print list of final applicants as well as generating reports as per request from Head office. System inputs are login form, application form and add user form whereas, system outputs are accepted applicants form, audit trail form, view users form and statistical form.

4.2.1 Context diagram

It is a pictorial tool used to portray the system's connection to its condition in which it operates. The context diagram is defined as a graphical representation of a system and its upper-class procedure as constituted by entities and the system as the focal procedure (Jordan, 2011).
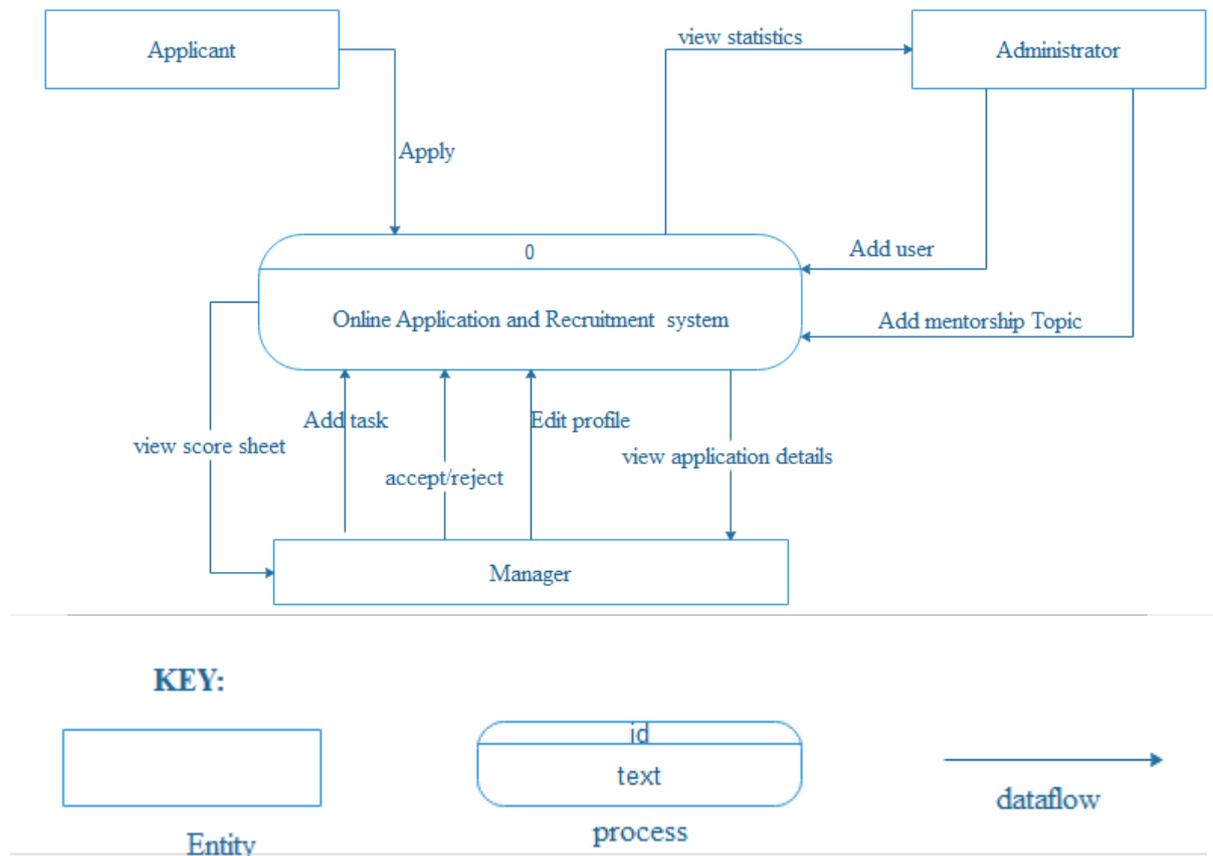
Figure 4-1: HLF new system context diagram

4.2.2 Dataflow diagram

Dataflow diagram is a remarkable tool in manual and mechanized business processes to imagine and dissect conditions and associations (Thomas and Angela, 2016). It displays data movement within a system. Four components of a data flow diagram are data flows, data stores, entities, and processes. Entities depict individuals interacting with information about the system. Due to the information from data sources, the processes are responsible for delivering data just like the entities. Data flows will illustrate the movement of information from source to destination and the data sources are also responsible for the accumulation of repositories of information or data storage.
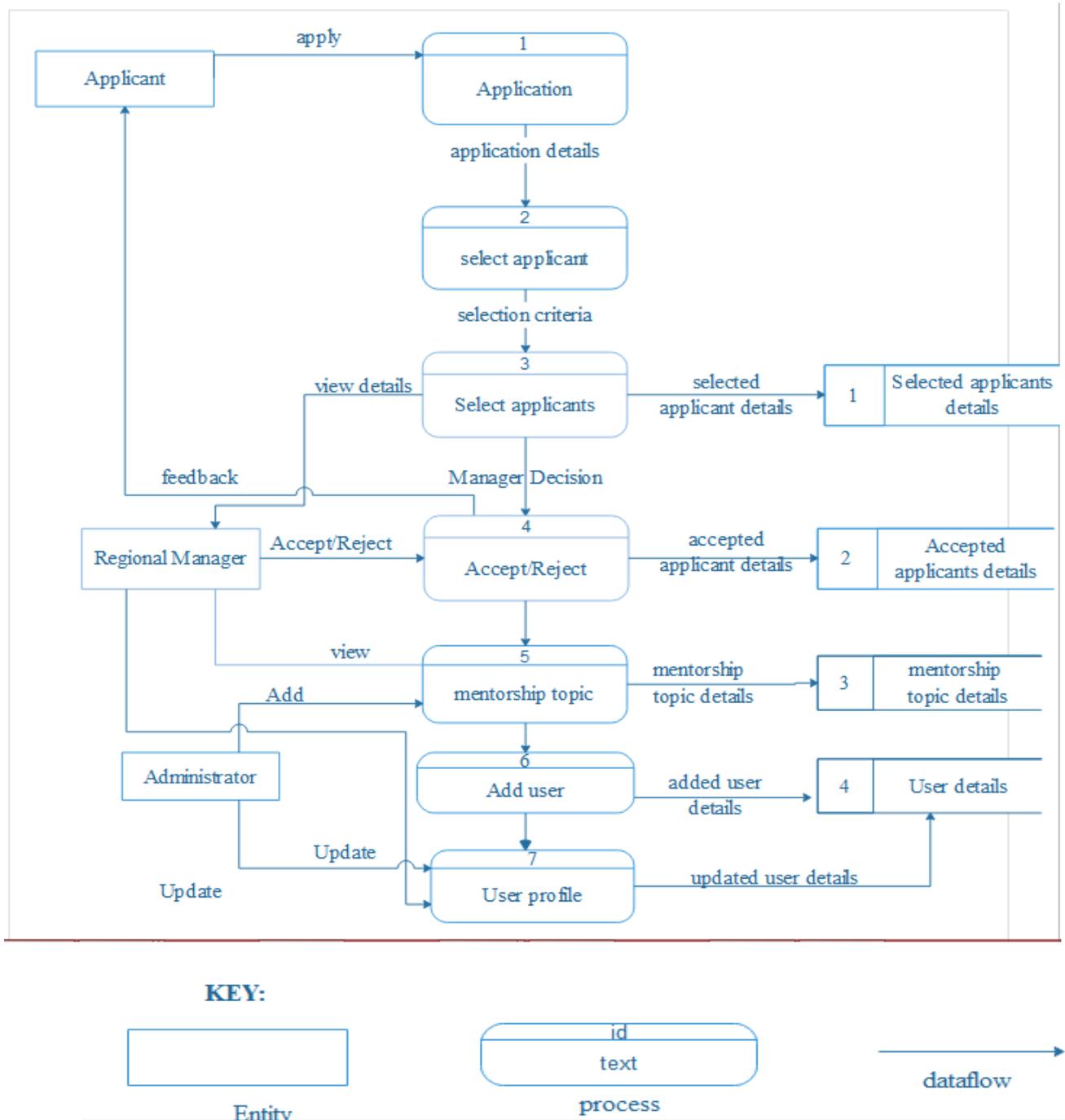
Figure 4-2: HLF new system dataflow diagram

4.3   Network architectural design

The network design architecture characterizes a system's externally accessible utilities so that the customer can use the system for all purposes by considering the architectural design (Pires et.al, 2016). They went on to say that the implementer can define the interior arrangement of parts to the system that offers these roles by understanding the design. The new system design will connect external service providers to the system via an integrated web browser so that they

can access the system externally via the browser. Internal partners will access and communicate with the database using the LAN on the windows application. External service providers will communicate with the database using the browser interface. Below is a graphical representation of the architecture diagram of the new system network.
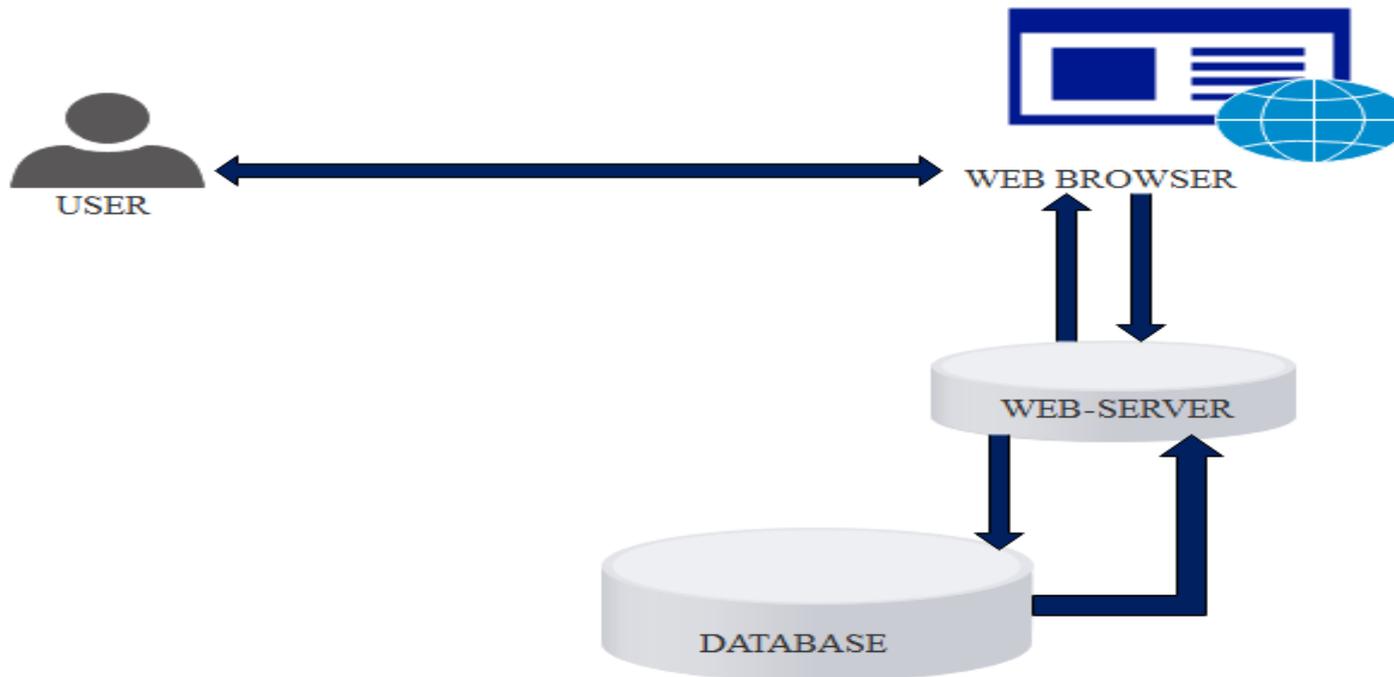
Figure 4-3: Proposed system Network Architecture

4.3.1   Client server approach

It is a methodology that demonstrates the connection between the user and the web server. This is according to McCabe (2010). They are two different ways that will be used by the system users to communicate with the servers based on their authorization category and functionality. The web browser is going to be used by service providers to communicate with the server. This is the point at which they will apply and check whether they have been accepted or not. For internal use the windows platform is used to communicate with the server for rating and reporting purposes.

4.4   Physical design

The proposed system internal and external entities are represented by the physical design of the system (Goyal,2011). The system environment in which it works in is depicted by the physical design, the system structure together with the physical modules included. It also includes the physical aspects of the system, structure of data, storage devices, physical data security, network configuration as well as inputs and outputs.
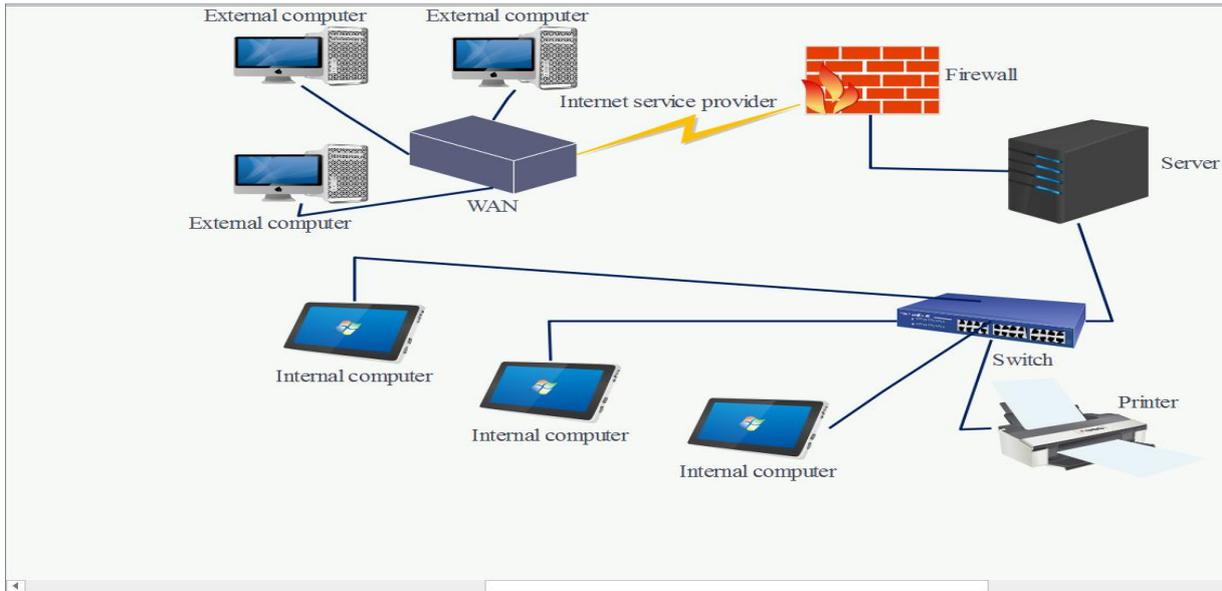
Figure 4-4: HLF new system physical design

4.5 Database design

A database is defined as a composed information collection in computerized form by Muller (2011). It therefore allows system users to store and retrieve data easily. The ANSI-SPARC architecture is going to be used for database design which is comprised of three levels of schema which are internal, conceptual and external levels. There is data independence with the ANSI-SPARC architecture which means that changes done by any schema will not affect other levels of schema.
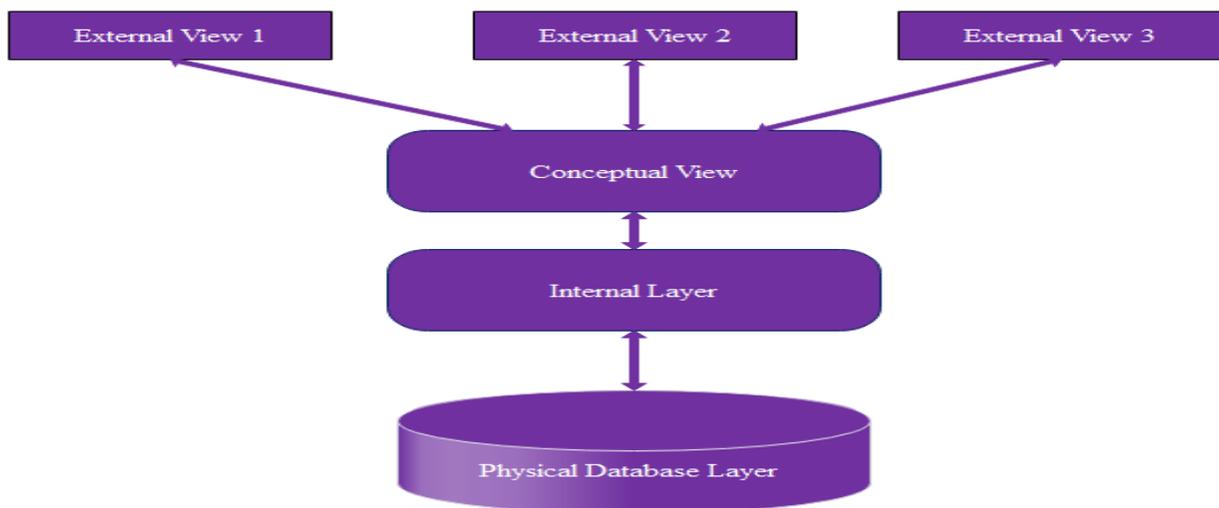
Figure 4-5: Database design ANSI/SPARC Architecture

Below are the three-level schema of the ANSI/SPARC architecture.

❖ **The External schema**

It is in charge of authorization restrictions. It provides a customized view for each user as a result user are only able to access information which is relevant to them. In addition, it allows users to perceive the database as a single user system.

❖ **The Conceptual schema**

It defines entities with their traits and associations, data integrity and constraints. It is also addressed as the community view of a database schema.

❖ **The Internal schema**

It is intended mainly for the database as it focuses on the manner in which data is to be captured in the database. It only focuses on data definition as its major concern at the database low level design.

4.5.1   Database tables

All the information the system requires is captured in the database in table format designed by rows and columns. This is in accordance to Gillenson (2011). Below is the table format of the system database.

4.5.2   Logical database design

It is carried out to define the manner in which the traits of numerous entities of the system can be organized into database structures (Gillenson, 2011). The aim of the database tables is to facilitate data storage and to control associations between the information within several database tables using foreign keys.

Table 4-1: Personal details table

FIELD	DATA TYPE	STRUCTURE DESCRIPTION
First Name	Varchar (50)	Not Null
Surname	Varchar (50)	Not Null
Vulnerability State	Varchar (50)	Not Null
National Id	Varchar (50)	Not Null
Gender	Varchar (50)	Not Null
D.O. B	Varchar (50)	Not Null
Province	Varchar (50)	Not Null
Educational Level	Varchar (50)	Not Null
Grade/Form	Varchar (50)	Not Null

Table 4-2: Guardian/Parent Details

FIELD	DATA TYPE	STRUCTURE DESCRIPTION
Fullname	Varchar (50)	Not Null
Relationship	Varchar (50)	Not Null
Mobile Number	Int (10)	Not Null
Email	Varchar (50)	Not Null
Address	Varchar (50)	Not Null
Age	Int (2)	Not Null
Chronically Illness	Varchar (50)	Not Null
Disabled/Poor	Varchar (50)	Not Null

Table 4-3: Parent/Guardian Employment Details

FIELD	DATA TYPE	STRUCTURE DESCRIPTION
Occupation Type	Varchar (40)	Not Null
Occupation	Varchar (40)	Not Null
Average monthly income	Int (5)	Not Null

Table 4-4: House Hold Information

FIELD	DATA TYPE	STRUCTURE DESCRIPTION
Household members	Int (5)	Not Null
bedrooms	Int (5)	Not Null
Household ownership	Varchar (40)	Not Null
Do you live in town or rural	Varchar (30)	Not Null

Table 4-5: School Information

FIELD	DATA TYPE	STRUCTURE DESCRIPTION
Enrolment Type	Varchar (30)	Not Null
School Name	Varchar (50)	Not Null
School Address	Varchar (50)	Not Null
School Head	Varchar (30)	Not Null
Head Mobile Number	Int (10)	Not Null
Head Email	Varchar (50)	Not Null

Table 4-6: Academic Background

FIELD	DATA TYPE	STRUCTURE DESCRIPTION
Last term class position	Int (5)	Not Null
Latest end of term results	Varchar (30)	Not Null
Career Aspiration	Varchar (30)	Not Null

Table 4-7: Upload Documents

FIELD	DATA TYPE	STRUCTURE DESCRIPTION
Upload Birth	Varchar (30)	Not Null
Upload Mother's Death	Varchar (30)	Not Null
Upload Father's Death	Varchar (30)	Not Null

4.5.3 EER diagram

IS a graphical interpretation which demonstrates the association between several system entities (Tupper, 2011). It is also comprised with super classes and sub classes which assist in presenting the association between the system entities.
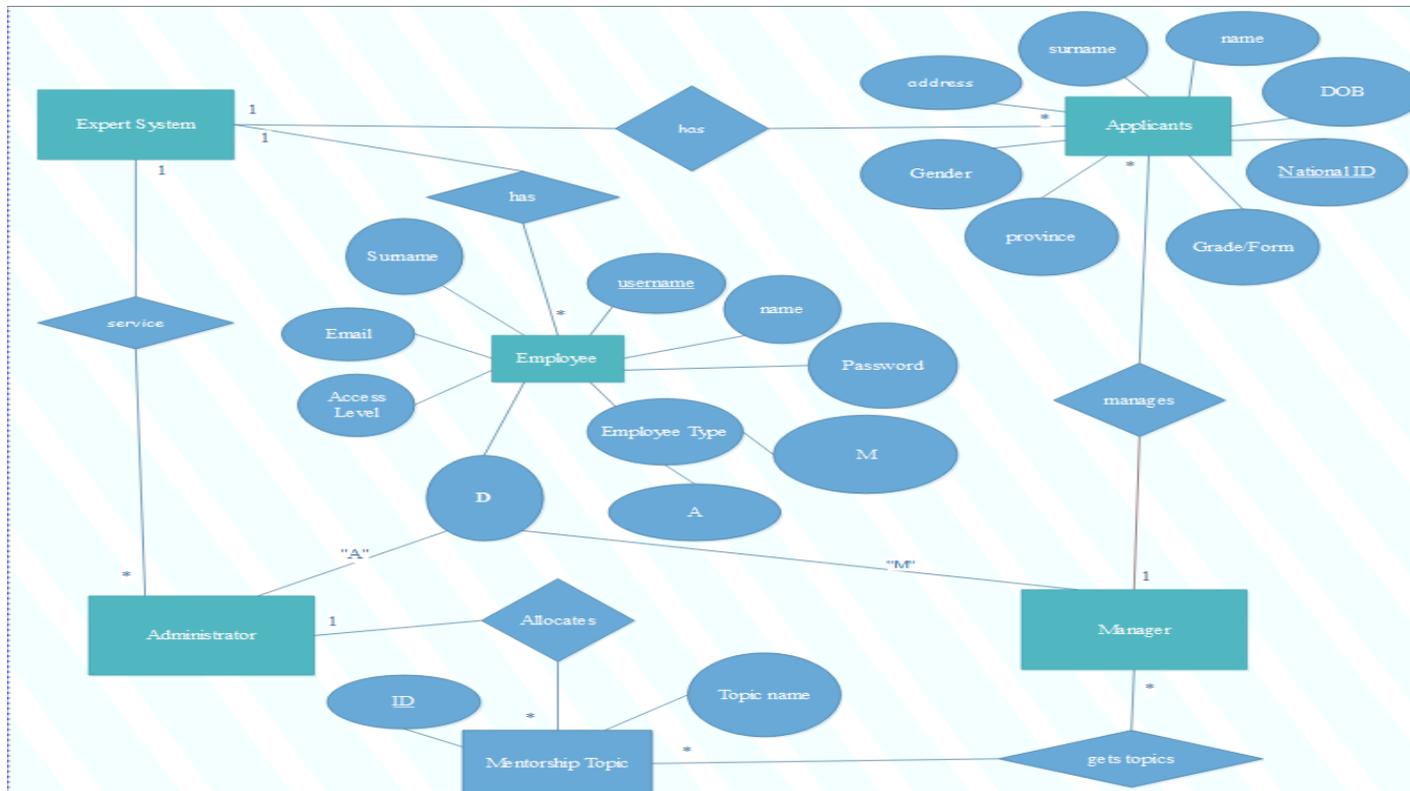
Figure 4-6: new system EER

4.6 Program design

It demonstrates the several components of the system, that is, the manner in which the several components are to be programmed and how the components are going to interconnect together to create a single system. It consists of package, class and sequence diagrams which clearly stipulates the manner in which the program will perform.

4.6.1 Class diagram

Class diagram is defined as a pictorial view of entity sets and the relationship between them in accordance with Satzinger, Jackson and Burd (2016). Class diagram apprehend the image of the system as a result, it is an essential Unified Modelling Language.
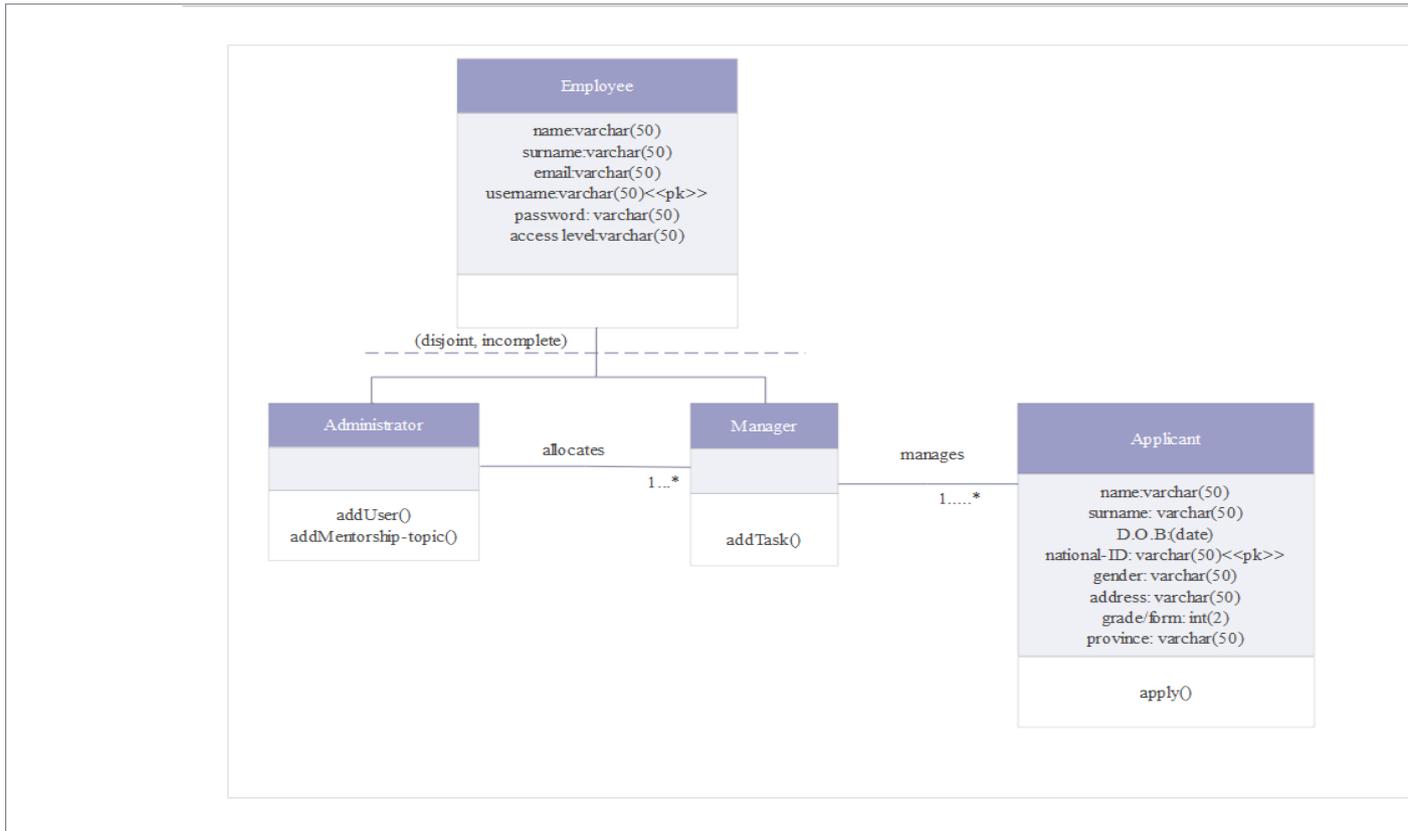
Figure 4-7: New System Class Diagram

4.6.2 Package diagram

The graphical representation illustrates packages and their association in the program. Packages are vital in demonstrating basics such as cases and classes into sets. The association is demonstrated in the illustration below.
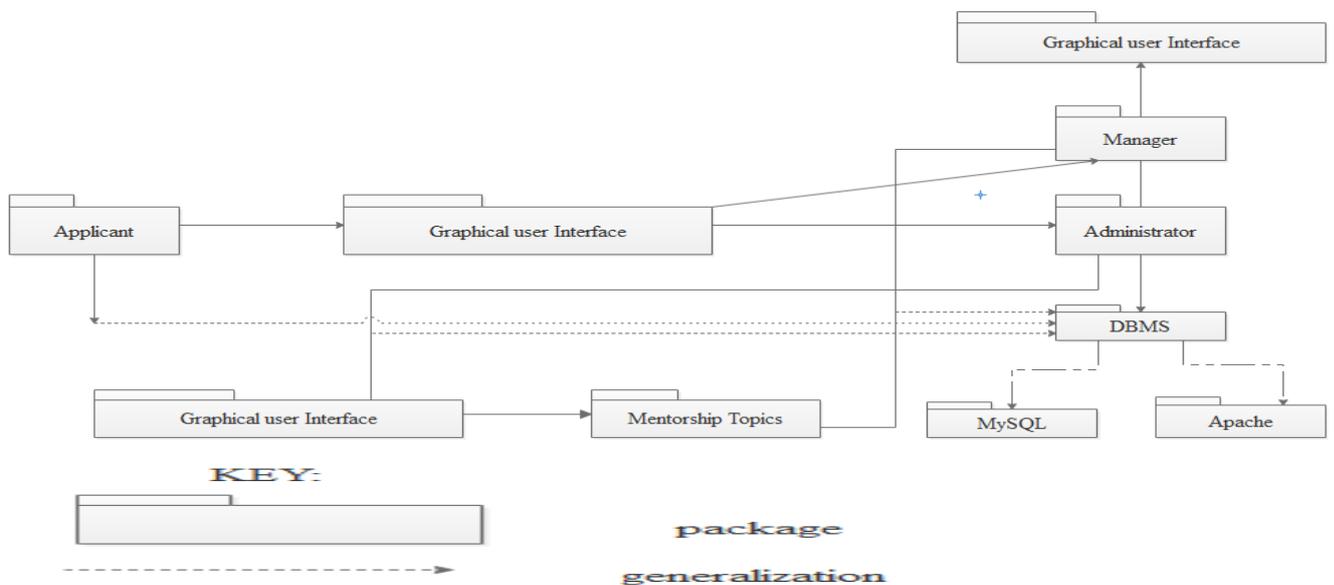
Figure 4-8: New System Package Diagram

4.6.3 Sequence diagram

Is defined as a tool for analysing data in order to demonstrate the logical ordering of it undergo various processing level in an information System (Conger, 2014). Fig 4.9 below shows the Higherlife new system sequence diagram.
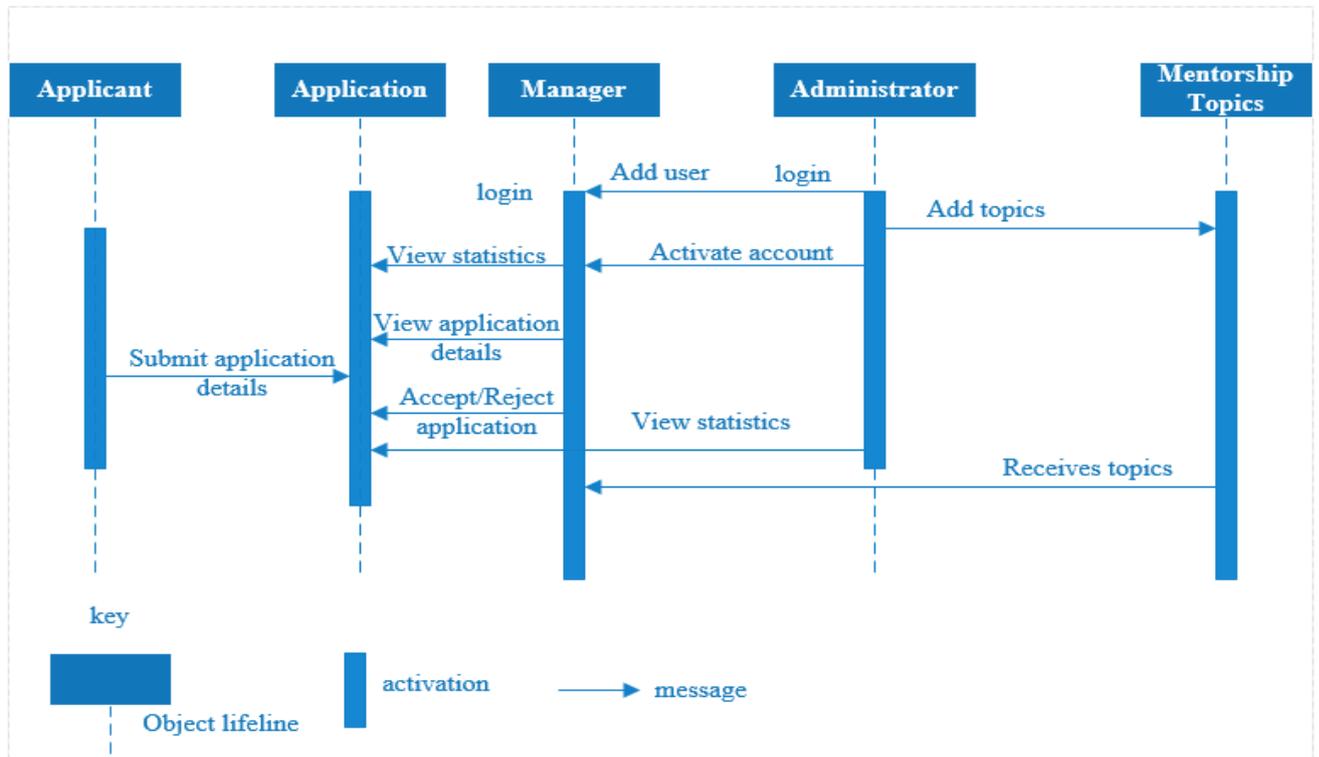
Figure 4-9: New system Sequence Diagram

4.7 Interface design

Interface design focus on the development of hardware and software applications that enhance user interaction and experience with the system (Rosenblatt and Tilley, 2016). User interactions are done to aid simplicity to the manner in which certain applications operates. It is referred to as user centred design because it focuses on user interface. The system is designed with a user interactive interface which is designed using labels, icons which are picture like in nature which enables users to understand and interpret very quickly their meanings.

4.7.1 Menu design

Menu design represents an interface design that displays altogether the available navigation possibilities for each user. Therefore, each different user has a customized menu view according to his/her authorization level.

Main menu design

The main menu design is the system home page design which is referred to as the index design of the system which is the first form load before any other form upon system launch. Main menu design shows the system sub menus.
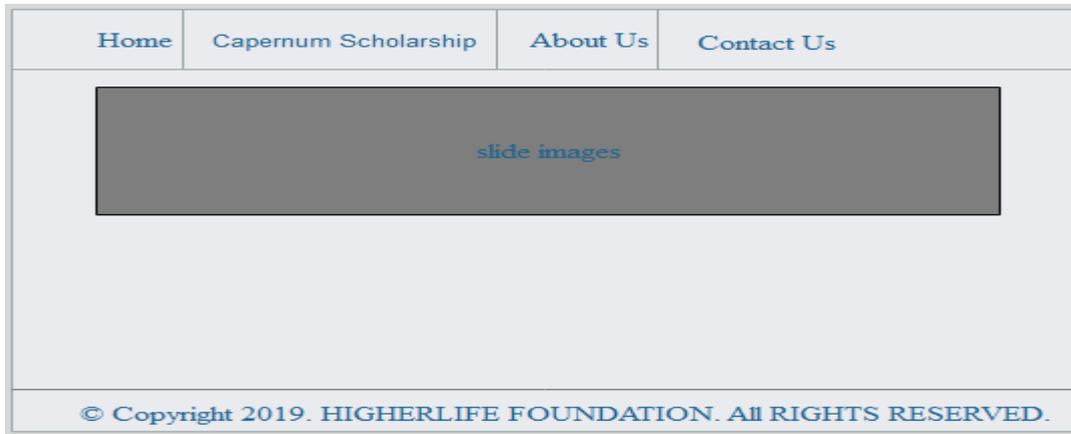
Figure 4-10: Home page

Sub menu design

Sub menus are different sections used as navigation links to redirect users to various pages. Each sub menu has a customized view and users are restricted from accessing every sub menu depending on the authorization level assigned to each user. Sub menu is made up of the following sections, home section, who we are section, application section, contact us section and login section where different users access their different accounts on the system.
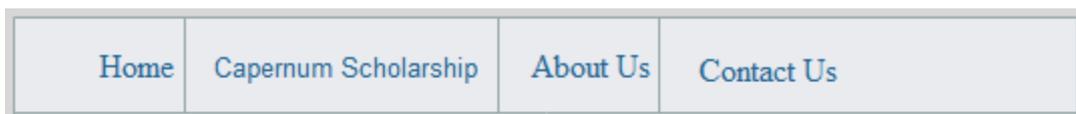
Figure 4-11: System submenu

ADMIN PAGE

The system administrator has access to this level and maintains full authorization of controlling the entire system using an admin username and password. The administrator is responsible for various tasks such as adding and deleting users, viewing audit trail, backing up the system database, generating reports just to mention a few.
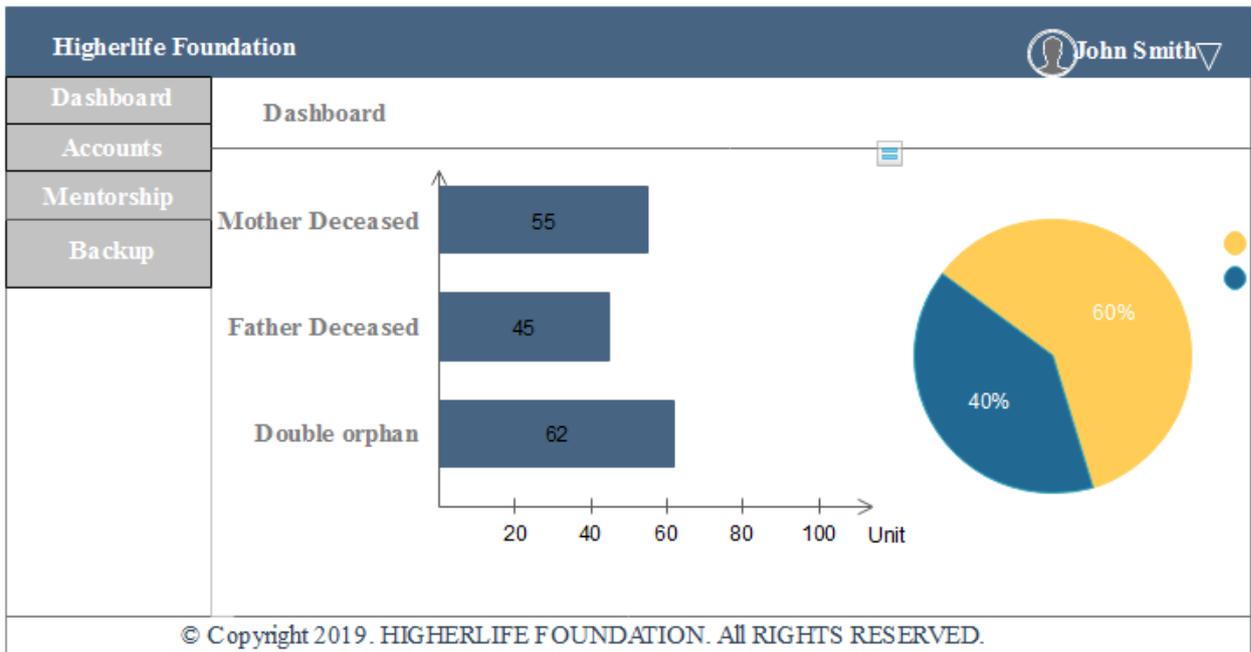
Figure 4-12: Admin Home Page

Other users such as the manager will have limited access to the system and as a result, the manager has a different view customized according to system functions authorized to him/her by the organization.
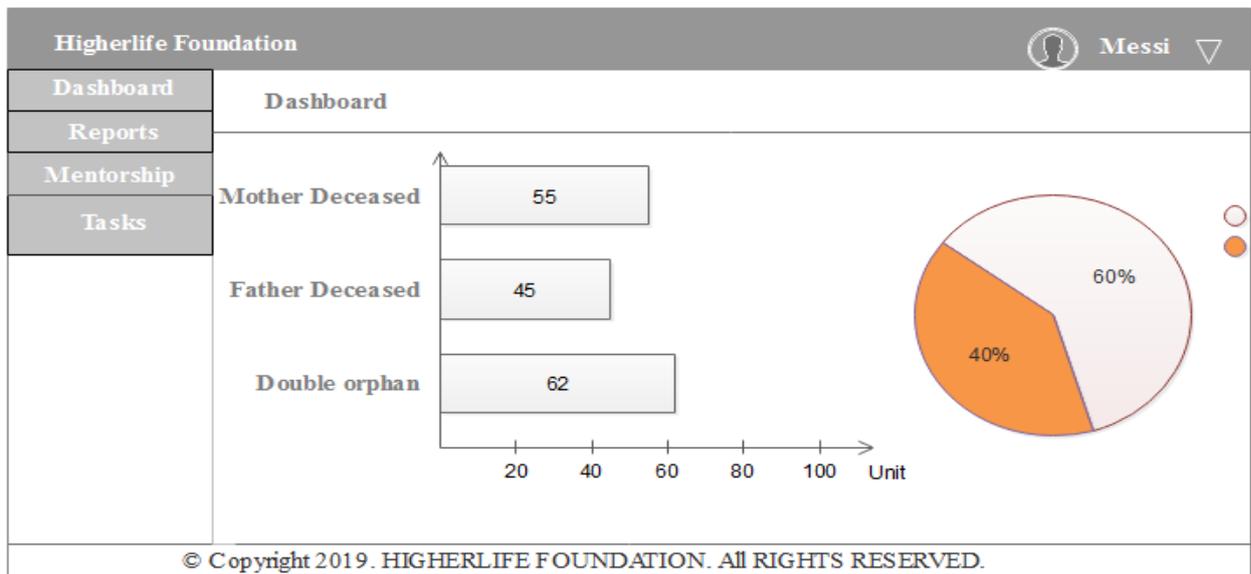
Figure 4-13: Manager homepage

4.7.2 Input design

It refers to graphical user interface forms designed to allow users to apply for scholarship, login into the system or add more users to the system. The major objective of the input design is to

allow applicants to submit their application details online and automate the recruitment process and give feedback to applicants within a short period of time.

LOGIN FORM

It is used to authenticate users and redirect them to their respective accounts.
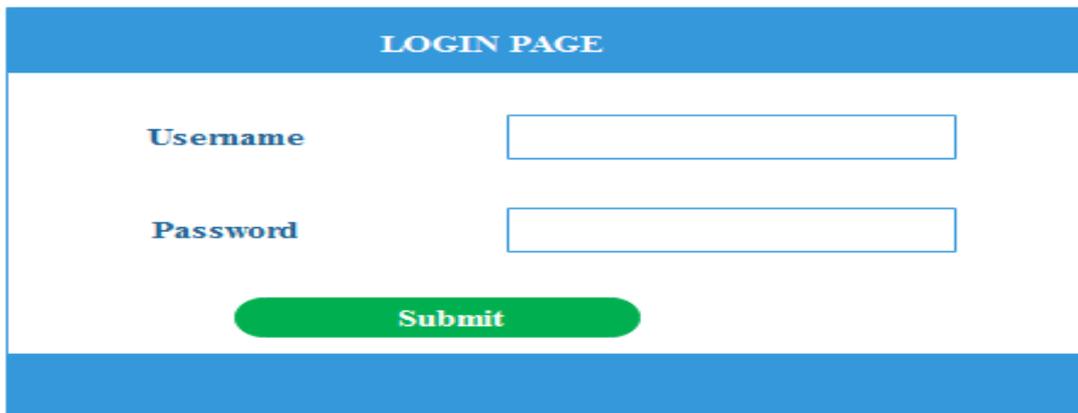
Figure 4-14: Login Form

APPLICATION FORM

It used to capture the details of the applicants which are used to assess and assign scholarships to qualified candidates selected.

Figure 4-15: Application Form

ADD USER FORM

It is used to add users or create users accounts and assign different access levels according to their respective positions in the organization.
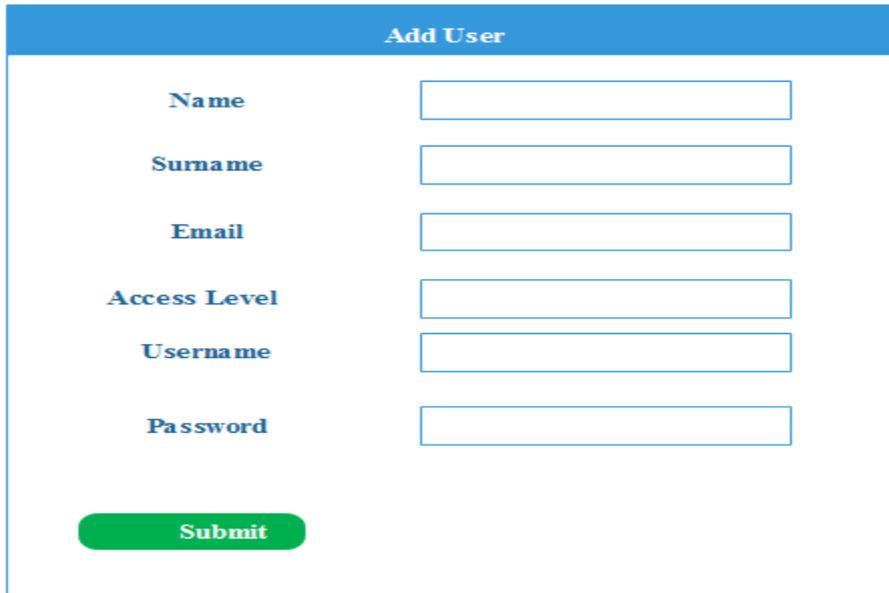
Figure 4-16: Add User Form

4.7.3 Output design

The system produces final information and displays it using output forms in the form of reports produced in tabula format, graphical format or designed forms.

Accepted applicants list form

It is used to show applicants who have been selected for the scholarship.
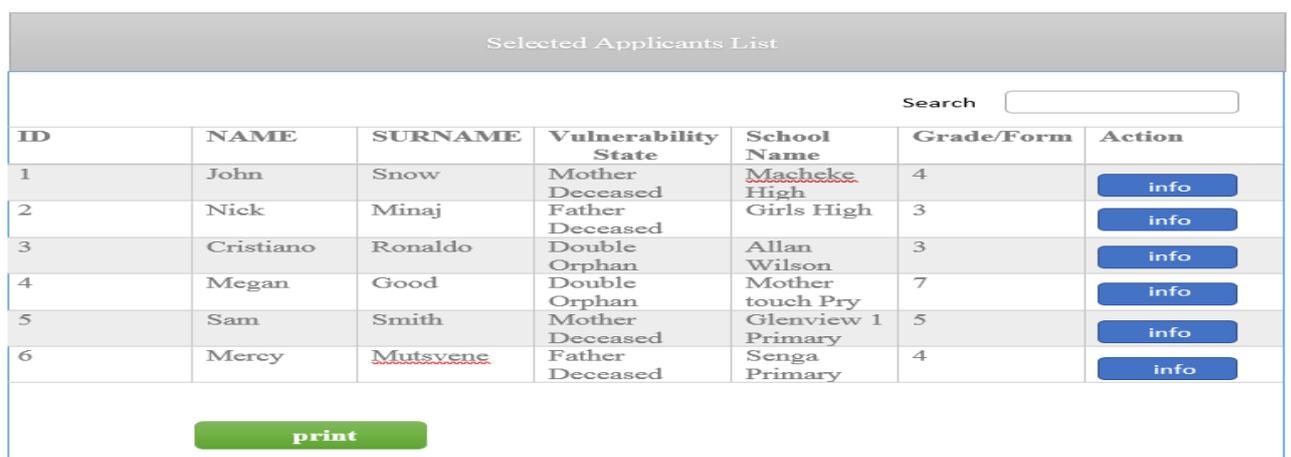
ID	NAME	SURNAME	Vulnerability State	School Name	Grade/Form	Action
1	John	Snow	Mother Deceased	Macheke High	4	info
2	Nick	Minaj	Father Deceased	Girls High	3	info
3	Cristiano	Ronaldo	Double Orphan	Allan Wilson	3	info
4	Megan	Good	Double Orphan	Mother touch Pry	7	info
5	Sam	Smith	Mother Deceased	Glenview 1 Primary	5	info
6	Mercy	Mutsvene	Father Deceased	Senga Primary	4	info

Figure 4-17: selected applicants list form

VIEW USERS

It is used to show all system users and their access levels.

ID	NAME	SURNAME	EMAIL	USERNAME	Access Level	Action
1	Talent	Hungwe	thungwe@gmail.com	Talent23	Admin	delete
2	Sean	Pise	Sean98@gmail.com	Sean12	Admin	delete
3	Mary	Stanley	Stanley07@gmail.com	mstanley	Manager	delete
4	Takudzwa	Banda	bandat@gmail.com	TB2018	Manager	delete

Figure 4-18: users form

STATISTICAL FORM

It is used to show graphical statistics of applicants in form of pie chart, bar graph or line graph.
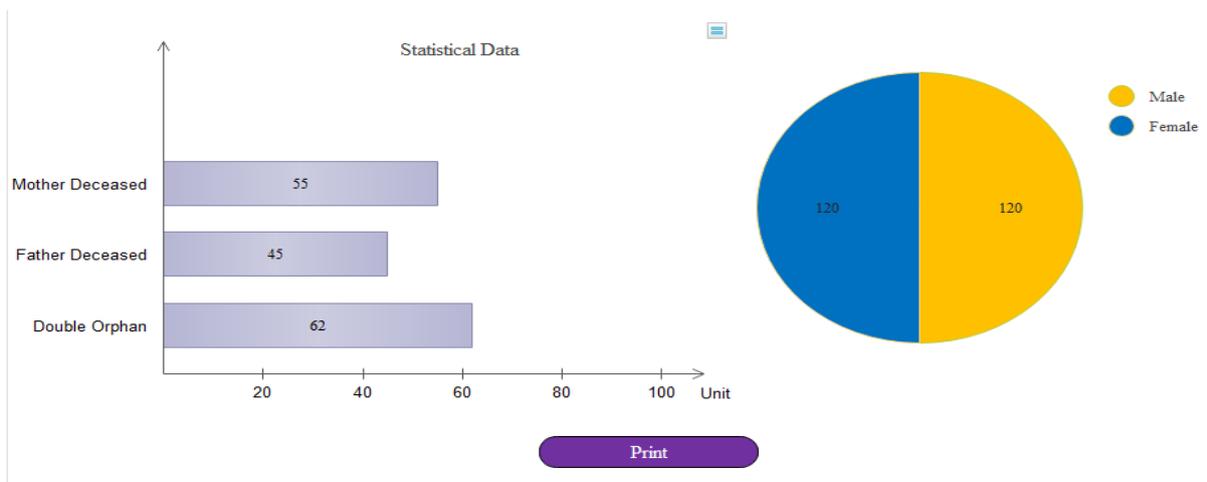
Figure 4-19: Statistics Form Data

4.8   Pseudo coding

Pseudo coding refers to an easily and understandable English like programming algorithm or structure put in a simplified manner (Stephen, 2016). A pseudo code portrays computer programs that does exclude original programming language syntax since it is not an executable code but instead an expressive statement of what the program ought to do. One does not need to be a specialist to easily understand the flow of pseudo code computer program.

LOGIN PSEUDO CODE

Click login button AND Enter login credentials

   IF credentials are valid THEN

         Redirect to Account Home Page

 ELSE

      Show login error message AND Return to Login Page

END

APPLICANT REGISTRATION PSEUDO CODE

Set database connection

  IF database connection available THEN

     Declare AND Initialize Applicant Details

        ELSE

               Display Database connection error message

IF applicant details are correct THEN

            Display Registration Success Message

   ELSE

               Display Registration Error Message

    END

ADD USER PSEUDO CODE

Set Database Connection

    IF Database Connection Available THEN

Capture New User All Required Details

     ELSE

       Display Database Error Connection Message

IF New User Details are Correct THEN

Display User Registration Successfully Message

  ELSE

        Display User Registration Error Message

END

4.9   Security design

Security structure of a system is significant in guaranteeing system assurance from every conceivable part of interruption and harm (Lopez, Huang and Sandhu, 2013). The security configuration along these lines has three perspectives which incorporate physical security, network security and operational security. These guarantee full system assurance against unauthorized guest.

4.9.1   Physical design

Physical security is whereby all IT equipment gear, programs together with network gadgets are defended from physical occasions that could destroy hardware and causing the organization to incur loss (Harris, 2013). It in this manner includes shielding hardware from things, for example, floods, robbery, vandalism as well as other physical risks. Measures have been set up to defend the hardware from such risks. These incorporate biometric security with CCTV innovation, fire detection censors as well as a backup generator for a continuous supply of power. Alerts and surveillance cameras have been set up as well as security guards at the premises to recognize unapproved entry in order to decrease burglary cases.

4.9.2   Network security

Network Security is intended to guarantee assurance of the network and data streaming in a network (Kizza, 2015). It accordingly incorporates hardware technologies and software technologies. It is in this manner intended to secure physical network infrastructure against unapproved access, misuse of the network, unauthorized modifications together with destruction to guarantee that users' carryout their day to day tasks in a safer domain. Latest antivirus will be installed to scan for potential threats in order to ensure network infrastructure will keep on working in a progressively proficient way. In addition, network firewall will be set as a protection mechanism to filter every request to ensure hackers are prevented from attacking the network. Traffic will be obstructed through different approaches which will be set by the system administrator to ensure a secure network environment.

4.9.3   Operational security

Operational security includes active security measures, administration security which includes policies, measures through policy and standard documents (Voelz, Moran and Philpott, 2011). Operational security involves defined measures that are permitted and those the company prohibit. Procedural document is used to outline business processes. Different users have different actions depending on their access levels hence, it regulates actions of various users in

order to maintain control over the system. Higherlife foundation NEW system has different users with different privileges hence, each user has restrictions on the type of information he/she can access based on each user's rights and as a result, access level rights are controlled.

4.10 Conclusion

Higherlife Foundation NEW system design phase has fully explained the system design where the entities and processes involved have been highlighted through context diagram and dataflow diagram which shows the relationship among them and the information flow of the system. The architecture design explained the network architecture of the system and the physical design explained the interaction between the system hardware and software. The database design shows the system ANSI-SPARC model with the new system conceptual view having been made. The system interface design gives a brief of what the system will look like and how it's going to interact with the users and the security design outlined how the system is going to be protected against any threat both physically and electronically as it includes physical security, network security and operational security. Therefore, the next phase will be the implementation phase which is the last phase of the development life cycle which involves the practical implementation of every plan and design done on the design phase. This is where the actual coding and implementation of the system in the organization take place.

5   CHAPTER 5: IMPLEMENTATION PHASE

5.1   Introduction

After successfully completed HLF online application and recruitment system design phase, we proceed to the implementation phase according to the software development life cycle. According to Sommerville (2015), implementation phase denotes the accomplishment of a plan or design together with its practice. System coding and testing methods are the main emphasis of this chapter. It also explains system installation as well as the maintenance methods which are going to be outlined which will be used to evaluate the system in order to know whether it has met its objectives. Recommendations about system upgrade are going to be suggested.

5.2   Coding

It refers to writing of a code, debugging the code and system maintenance by system developer which is also known as programming (Dickins et.al, 2015). HLF system will be developed by the system programmer in accordance with the stipulated objectives. In this case, PHP and MYSQLI are the programming language and database connection used for the system development. Despite the programmer been the only one involved in coding, they were other people involved during system testing for bugs.

5.3   Testing

A strategy used to identify bugs, testing system functionalities and also amending bugs in order to ensure high quality performance and conforms with system objectives. All bugs that hinder system performance to its best ability and security are detected and corrected during this phase. Mahapatra (2016) says the objective of testing the software is to see whether system requirements are meet. Testing phase include verification and validation since they both additionally help to increase software quality. User requirements are fulfilled at the completion of the system through system validation whereas, verification guarantees in the introductory part of system development that the system objectives are meet. White box and black box are two testing categories under testing methodology.

Black box testing focuses on matching the given input against the system output (Suryn, 2014). Therefore, Black-box technique is used for the purpose of validation.
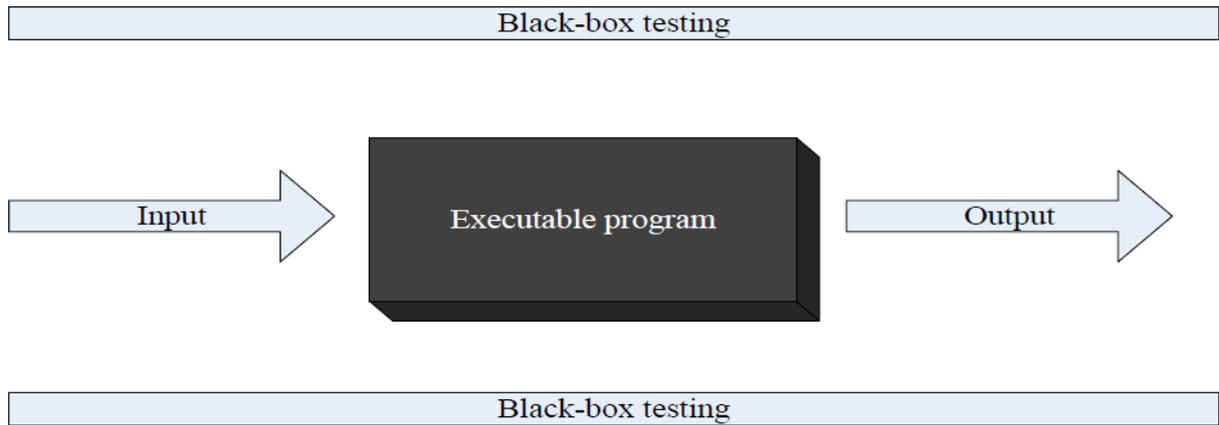
Figure 5.1 Black box testing   **[Source: Glenford (2004)]**

Figure 5-1: Black box testing

Whereas, white box focus on system internal mechanisms and requires experience so that it can   perform this exercise since it is used of verification purposes.
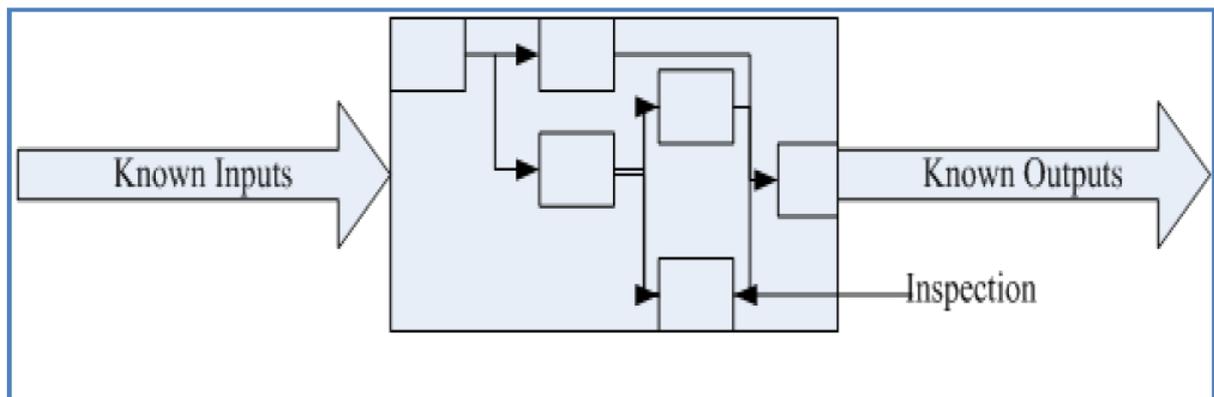
Fig 5.2 White box testing   **[Source: Glenford (2004)]**

Figure 5-2: White box testing

Software testing is done at different levels for the purpose of coming up with an acceptable and error free software. The Higherlife Online Application and Recruitment Decision Support System undergo different levels of testing which are shown below on Fig 5.3.
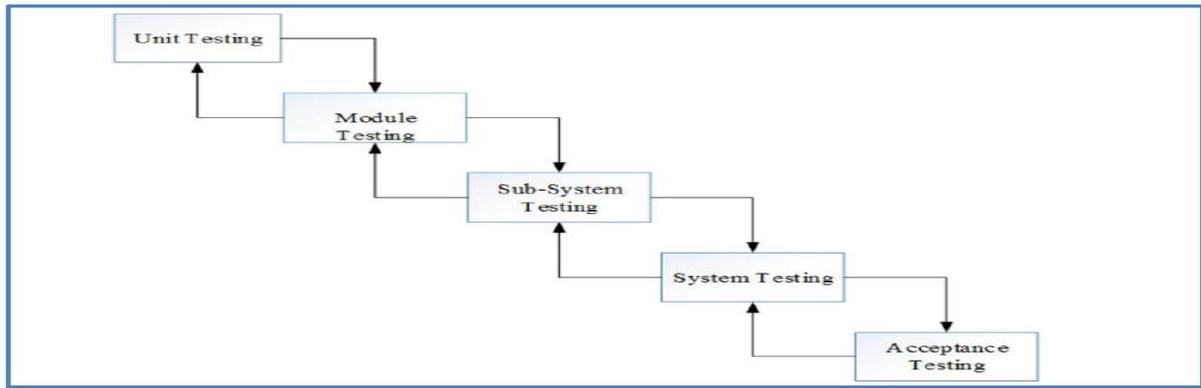
Fig 5.3 Testing levels

Figure 5-3: Testing levels

5.3.1 Unit testing

The smallest component of a computer program that can be tested independently is called a unit. This is according to Mall, (2014). The Higherlife Online Application and Recruitment Decision Support System was fragmented into testable several units which were tested as separate objects. The login page is an example of a unit test which was carried out where user authentication during login attempt was verified. This was done to determine whether the system grades clients according to predefined access levels. The first step of the application process where the applicant enters his/her personal details in the format prescribed was also tested as a unit. The mix up of different patterns where letters only pattern was accepting number pattern during application was noted and corrected accordingly.
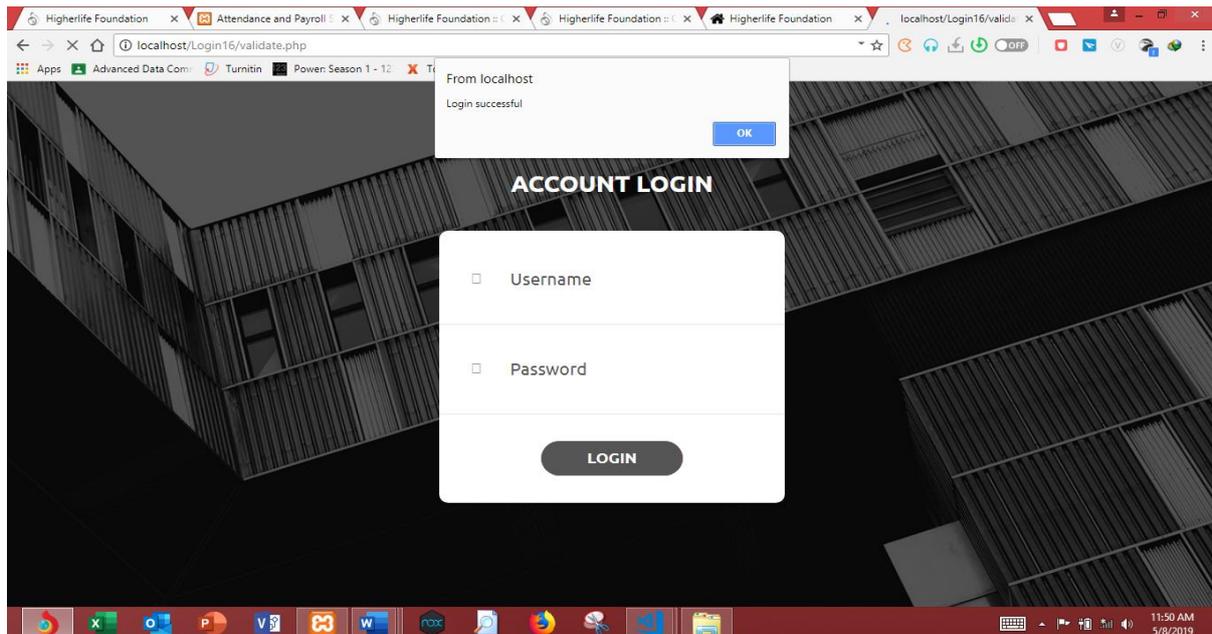
Figure 5-4: Login test

The login page was tested by login without entering username and password and it was noted that it allows a user to proceed without any authentication to prove his/her access level hence the error was noted and addressed accordingly.
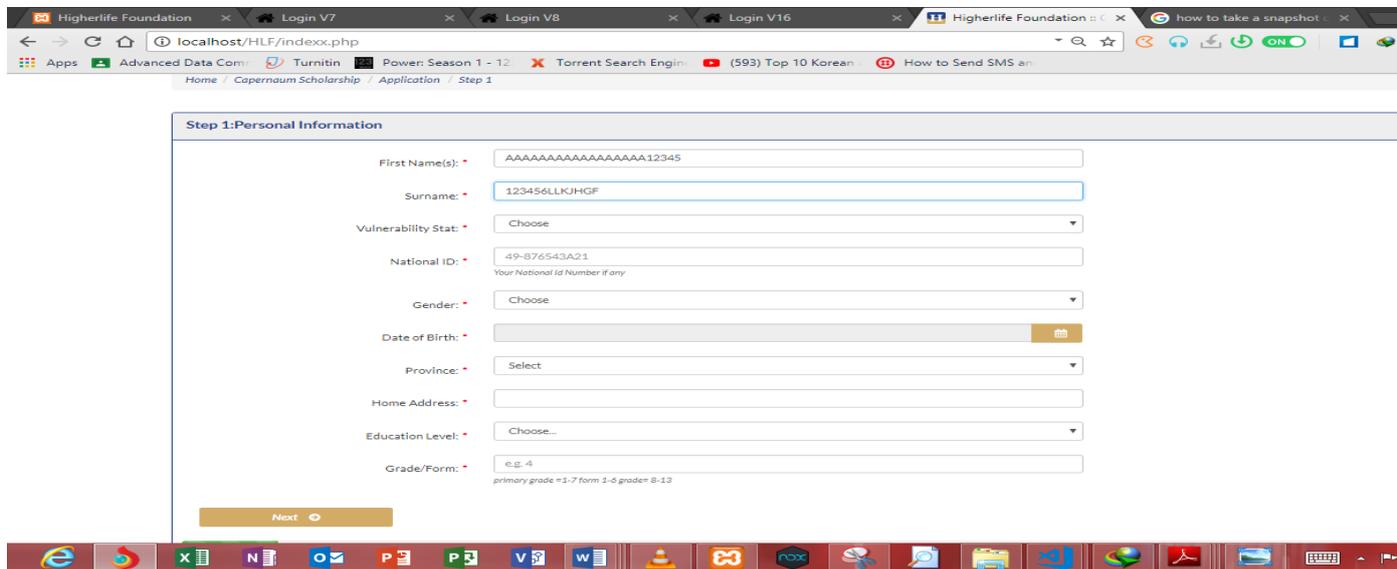
Figure 5-5: Personal details form

Personal details form was tested for character patterns whether it was accepting letters only for the applicant name or numbers on the name text field and it was not that it was accepting character mix with letters. Hence, the error was addressed accordingly.

5.3.2   Module testing

It refers to passing of values to system input fields and debug in order to relate the output data to the input data against projected outcomes (Scach, 2011). It is the testing of a group of dependent units on a system. System modules can be tested independently of each. Admin home page was tested by the developer for functionality to see whether it meets the desired performance. It is also known as integration testing which is necessary in testing whether different units are connecting together and test different units' interfaces.
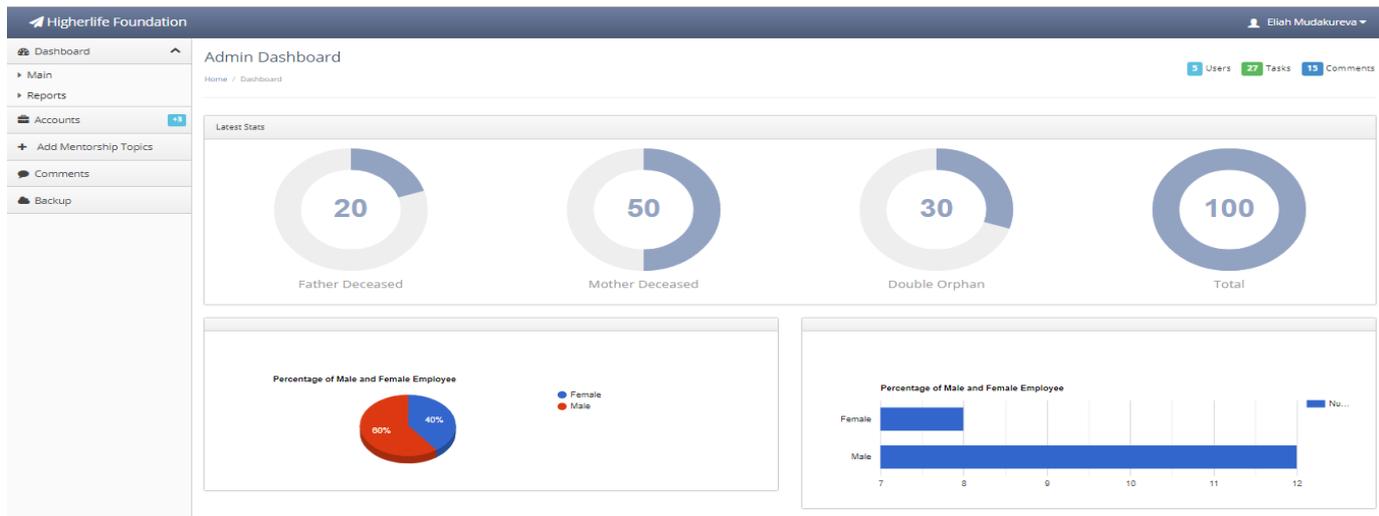
Figure 5-6: Administrator dashboard

5.3.3 Sub-system testing

Testing communication among units or between modules is done under subsystem testing. Specific functions are tested under subsystem testing to determine whether they are executed properly and aid on fault isolation on the whole system. The tests carried out under subsystem testing verify exchange of information amongst the subsystem been tested and other related subsystems. Audit trail table was used to test the database connection with the interface by search users who have accessed the system on a particular date as shown below.

Username	Operation	Date	Time
Quantam Winfrey	Logged Out	30-03-2019	17:46:38
Quantam Winfrey	Logged In	30-03-2019	17:46:14
Tendai Tinarwo	Logged Out	30-03-2019	17:55:48
Tendai Tinarwo	Logged In	30-03-2019	17:46:56
Winfrey Makamanzi	Logged Out	30-03-2019	17:58:44
Winfrey Makamanzi	Logged In	30-03-2019	17:56:04
Winfrey Makamanzi	Logged In	30-03-2019	17:44:14
Winfrey Makamanzi	Logged Out	30-03-2019	17:45:39

Showing 1 to 8 of 8 entries (filtered from 25 total entries)

Figure 5-7: Audit trail table

5.3.4   System testing

It is a technique done to assess the whole system after completion and the system's consistence against specified system requirements. An end to end perspective is used to test the functionalities of the system in system testing. It is done by none members of the development team to get end users perspective view of the system for accurate measurement of system quality and performance. Functional and none functional testing are done under system testing through system validation testing. In this case, every integrated module that is part of the system is tested in order to detect errors which are as a result of the interaction between subsystems that make up the complete system. System compatibility with hardware is also considered during testing which can result in system slowness.

System Testing Vs Objectives

Objective 1:   to allow students apply for a scholarship and be recruited online.
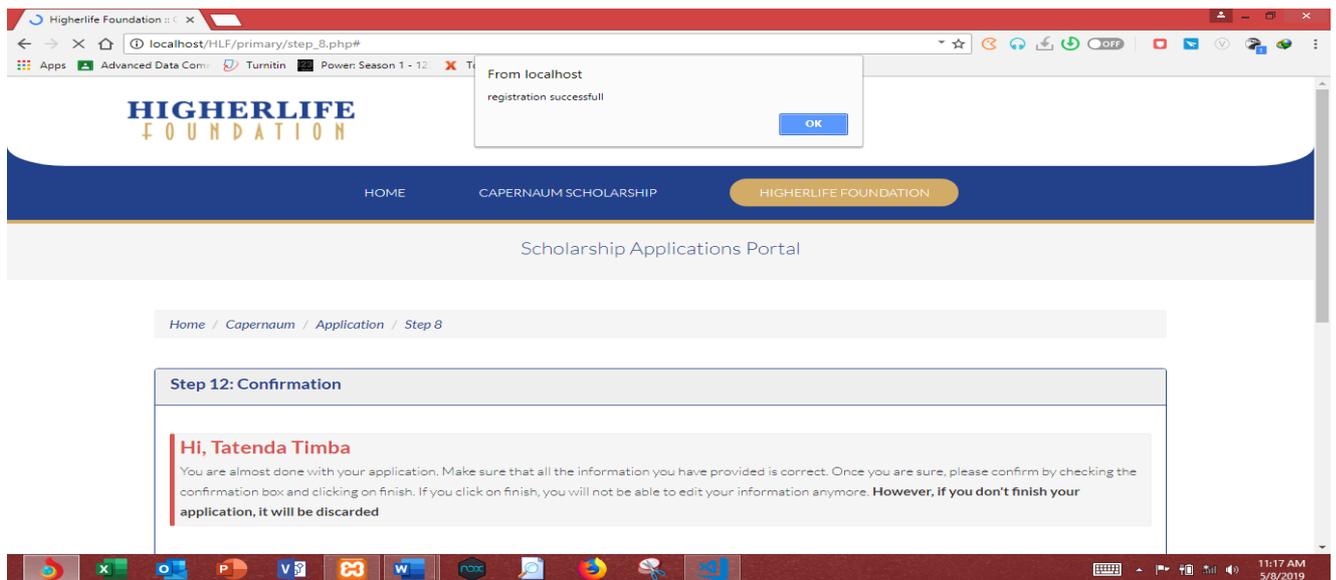
Figure 5-8: objective 1 testing

The applicant was able to register successfully online for the scholarship hence, the objective was meet.

Objective 2: To develop a system that has an expert integrated criterion which will select the right students for the scholarship and list them in descending order of best candidate for the manager.

54
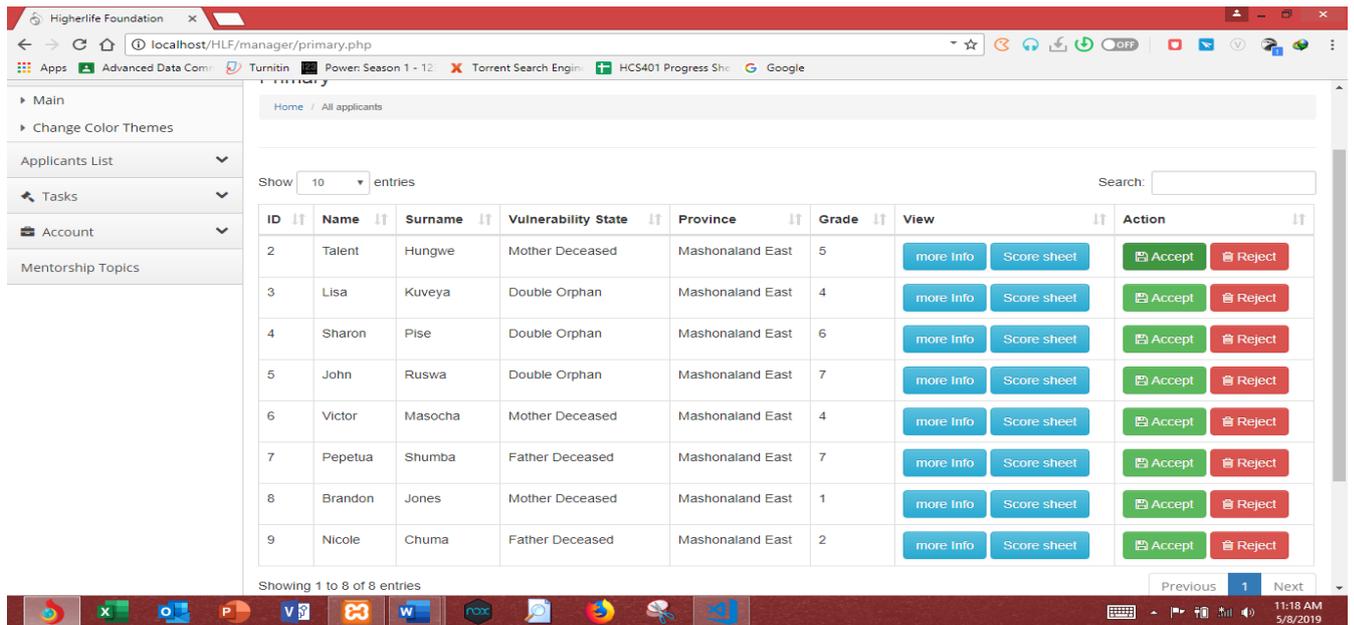
Figure 5-9: objective 2 testing

The applicants were selected using the integrated criteria and listed in descending order of score for the manager.

Objective 3: generate a list of selected candidates for the scholarship for senior managers in different Social Business Units (SBUs).
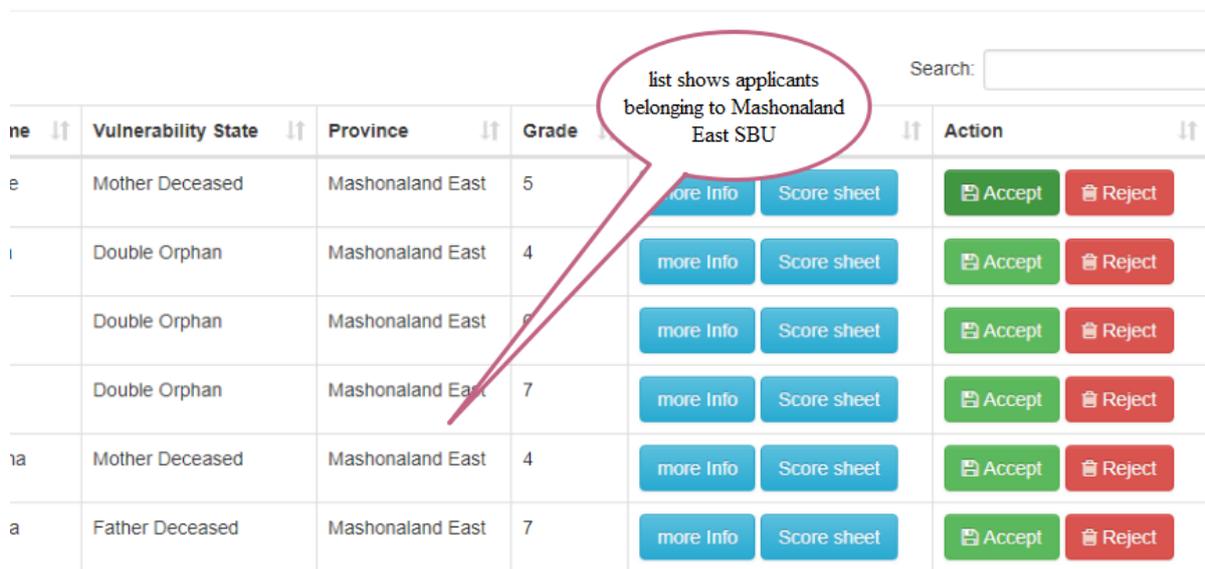
Figure 5-10: objective 3 testing

Objective 4: to come up with a system that has a customised view that suites both primary and tertiary students to remove the complexity of the current system.
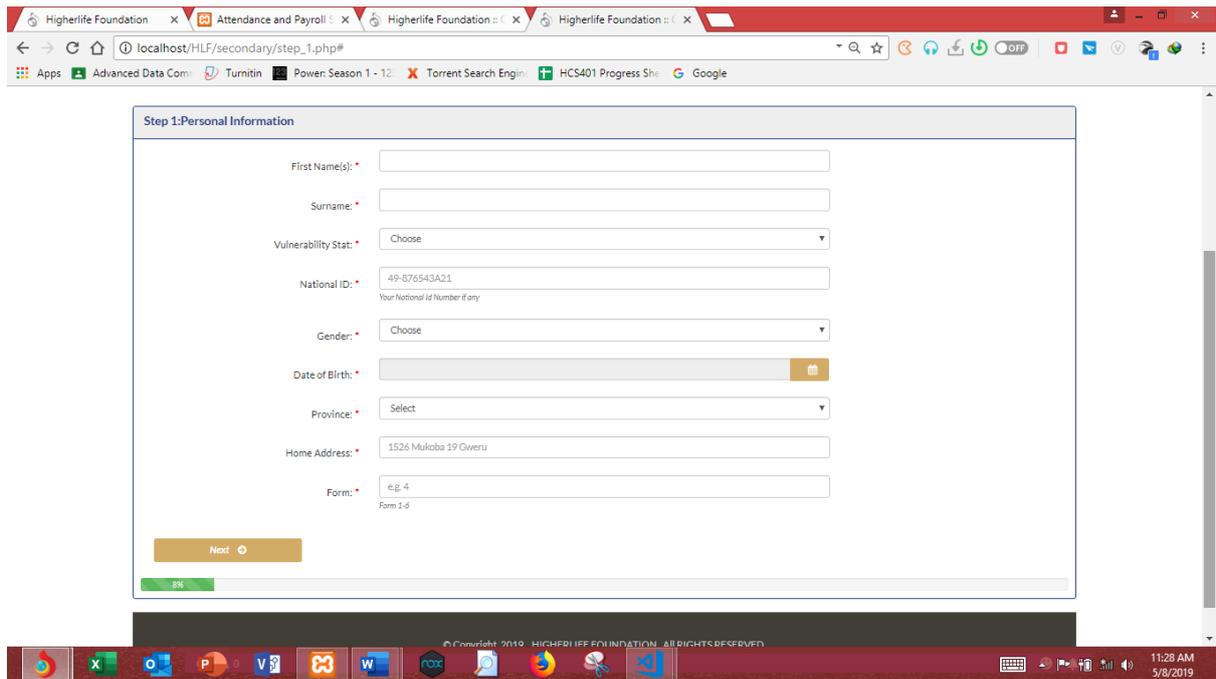
Figure 5-11: objective 4 secondary view testing
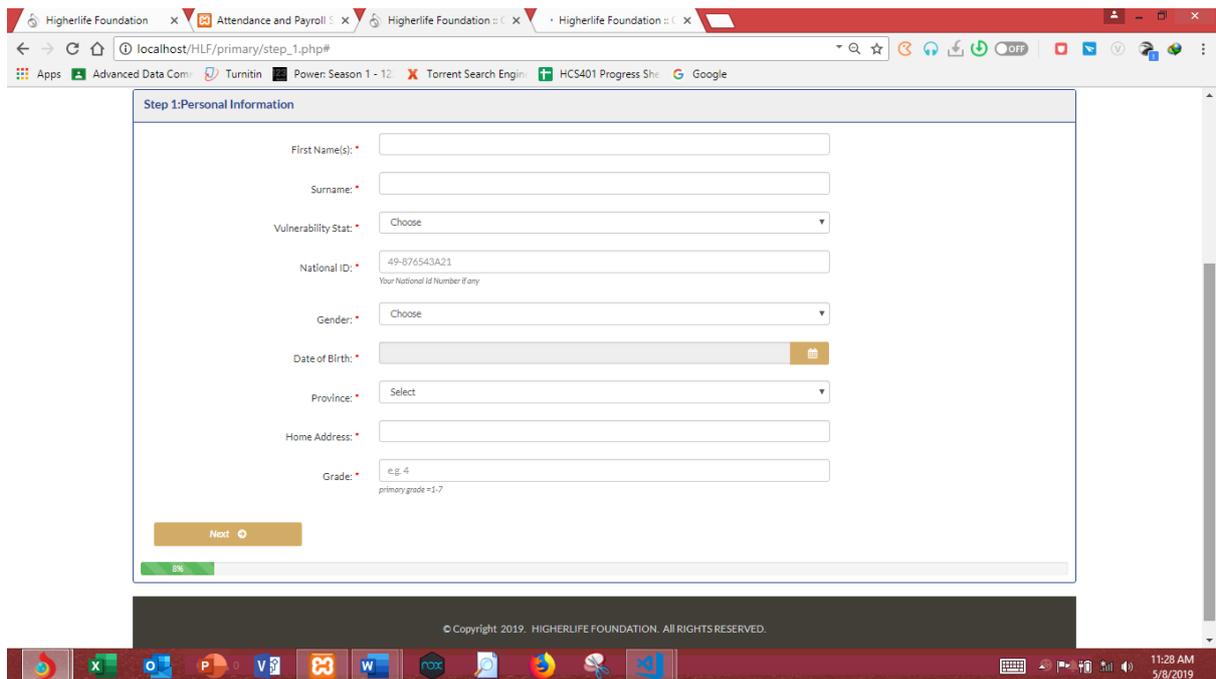
Figure 5-12: Primary view

Objective 5: to come up with a system that will save time involved in the recruiting process by computerising the background check process.

Step 4:Parent/Guardian Depriviation

Is bread winner chronically ill?	Yes	● No
Living in child headed household?	Yes	● No
Is Guardian disabled?	Yes	● No
Is bread winner employed?	Yes	● No

Next ➔

Figure 5-13: objective 5 background check processing testing

Parent/ Guardian deprivation allows us to understand the type of care the child is current receiving depending on the guardian condition state.

Step 5: Household Information

Household Members: *

How many people are in your household?

Bedrooms: *

How many bedrooms are at your household?

Household Ownership: * Choose ▼

Ownership status of household

Next ➔

8%

Figure 5-14: objective 5 background check processing testing

House hold information helps to give a clear picture about the child current living conditions using bedroom against house hold members ratio.

Step 3:Child Educational Depriviation

Have you ever been to school?　　　　　　　　　　　　　　　　　Yes　●No

Dropped out of school due to economic hardships?　　　　　　　Yes　●No

Have previous record of failure to pay fees or levies?　　　　　Yes　●No

Is child disabled?　　　　　　　　　　　　　　　　　　　　　　Yes　●No

Upload Fees arrear　　　　　　　　　　　　　　　Choose File　No file chosen
Images and PDF files only are allowed.

Next ➤

Figure 5-15: objective 5 background check processing testing

Every child has a right to good and quality education therefore, child education deprivation helps us to understand the extent to which the child needs assistance and the hardships the applicant is facing as a child.

5.3.5　Acceptance testing

It is done in order to assess system acceptability for distribution and compliance with requirements of the company (Roger, 2013). Higherlife Online Application and Recruitment Decision Support System is been tested for acceptability. It is a formal testing where the user needs and requirements are corresponded against the system's functionality as well as business processes to check if the system satisfies or not the acceptance criteria and to allow the user or other authorized personnel to determine whether or not to adopt the system. Alpha and beta testing are the two phases done under acceptance testing which when completed marks the system readiness for implementation.

5.3.6　Validation

It refers to a method used to get the correct software (Dennis et al, 2014). This implies that the developed system should meet the user's expectation level. Final user involvement in this case, is crucial throughout the system design. Therefore, system efficiency is of paramount importance in ensuring the right data is been captured in the system. Input data must be captured correctly to ensure the correct output is produced by the system. System validation achieve this by using patterns of letters only to capture user name or patterns of numbers only to capture user phone number.
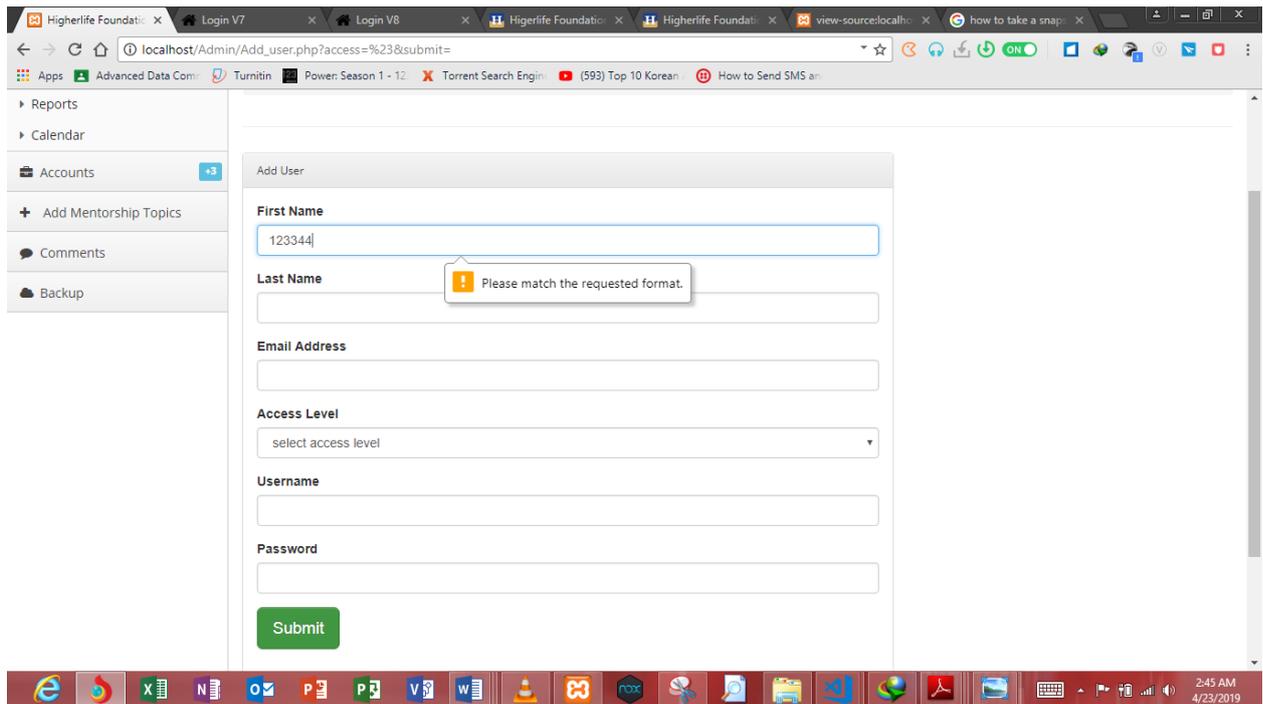
Figure 5-16: Add user form

5.3.7   Verification

It refers to a method of getting the system right (Dennis et al, 2015). The system is tested in order to see whether its design conforms with end user requirements. A work in progress system can be assessed through verification to determine whether its segments are operating as anticipated. This process will assist in determining the system quality, but it does not guarantee whether the system is useful. Its purpose is to focus on whether a given system is well-engineered and error free. Using the login form it must notify the user whether he has input the correct password and username or not as shown below.
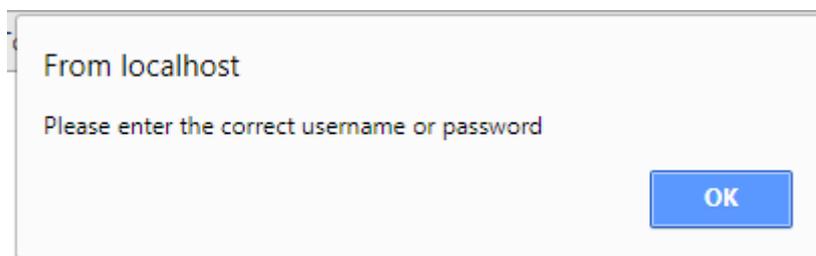
Figure 5-17: Login notification

5.4   Installation

It is the last stage which involves implementation of the system for end user to use (Nagpal 2011). Proposed software components will be configured for the system to run on a specified hardware environment. This initiate the parallel changeover protocol whereby the new system

59

is switched on and will run together with the old system until it has set the required standard then the old system will be switched off. The installation of Higherlife Online Application and Recruitment Decision Support System was installed following the steps bellow.

5.4.1 Steps involved in setting up the site

➢ XAMPP installation - it consists of apache server and MySQL database management which are both required for the web server environment. They both need to be configured with default ports which they will be running on and the have to be started for the new system to be able to run.

Figure 5-18: XAMPP Control Panel

➢ New system folder known as HLF is stored in Drive C >>XAMPP>>htdocs folder.

➢ Create site- if you are using Dreamweaver you need to create a new site however, with visual codex no site creation is required.

➢ Go to XAMPP control panel and click Admin. You will be redirected using the url(http://localhost/phpmyadmin/) to the server machine.

➢ Click databases and type the database name expertdb and click create to create the database.

➢ Click Import and Import database from the database folder which resides in the HLF folder onto the server machine.

➢ Go to browser (e.g Chrome), enter the following URL (http://localhost/HLF) and you will be redirected to the system main page and start navigating.

5.4.2   User training

Final users need to have a technical knowhow of the system as it is a technological improvement. Therefore, to use the system, employees require training to equip them with the required skills such as to navigate, edit, add or record as well as printing reports in the system. The company will have a workshop for managers, ICT Personnel together with system administrators in order to demonstrate how the system works. Ashish (2012), state that the aim of training users is to impart the knowhow of the system's technical aspect in terms of its purpose and how it works. Users will always refer to the manual which act as guide on steps needed to be taken to use the system. A routing exercise will be done after the workshop in order to check whether the users have fully understood how to navigate the system.

5.4.3   Data migration

It denotes transmission of information between data repositories. This is according to Mahapatra, (2016). Data migration is conducted for different reasons which include server replacement or server upgrade, movement of information to the cloud server of the third party who is a cloud service provider, infrastructure maintenance and to upgrade the software as well as software implementation. They are factors under data migration that must be considered which include risk involved together with migration duration. From facts findings, the current system is using manual filing system hence, the need to computerize the hard copy files. This means that there is need for file transfer from previous to new system to capture data electronically. However, it was agreed to commence the new system with data captured at day one of installation.

5.4.4   System conversion

It refers to the procedure of moving from previous to new developed system (Shelly and Rosenblatt, 2012). After developing the Higherlife Online Application and Recruitment Decision Support System and carrying out the user training workshop for managers, ICT Personnel and administrators, they were a number of changeover strategies evaluated and one been chosen as the changeover strategy for the old system. The subsections below explain different system changeover strategies which were assessed by Higherlife Foundation for adoption.

5.4.4.1 Direct changeover

It refers to a total change from previous to new system (Rosenblatt 2014). The process is conducted in one area or branch of the company normally after working hours to avoid interruption with the ongoing processes at the organization.

Advantages of direct changeover strategy

➢ Quick delivery of the system.
➢ No duplication of data as the previous and new system run independently of each other.
➢ Direct conversion is the cheapest strategy.

Disadvantages of direct changeover strategy

➢ In case of system failure, revert back is impossible.
➢ It is difficult to grasp the entire system functionality within a short-stipulated time frame.
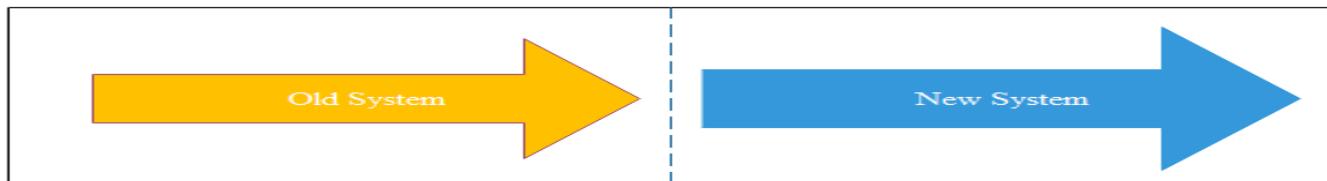
Figure 5-19: Direct Changeover Strategy

5.4.4.2 Pilot changeover

It is a procedure whereby the new system is firstly employed to a defined group of users for testing, evaluation and to give feedback on the system performance (Mahapatra 2016). The system is therefore launched at a pilot site which can be a company branch or department before it is employed to the entire organization. The feedback from the pilot survey on quality, reliability and performance of the system will be evaluated and if it meets the minimum requirements then the system will be fully implemented in the organization.

Advantages of pilot changeover

➢ System evaluation is easy since the new system can be compared with the old system as they are both still running.
➢ It reduces the risk of losing data as it is implemented on a small site.
➢ The pilot survey users can be used for training other users in the organization as they are now familiar with the new system

Disadvantages of pilot changeover

➢ It takes time to implement pilot changeover.

➢ The system may fail at full implementation due to the size of data involved than at pilot level.
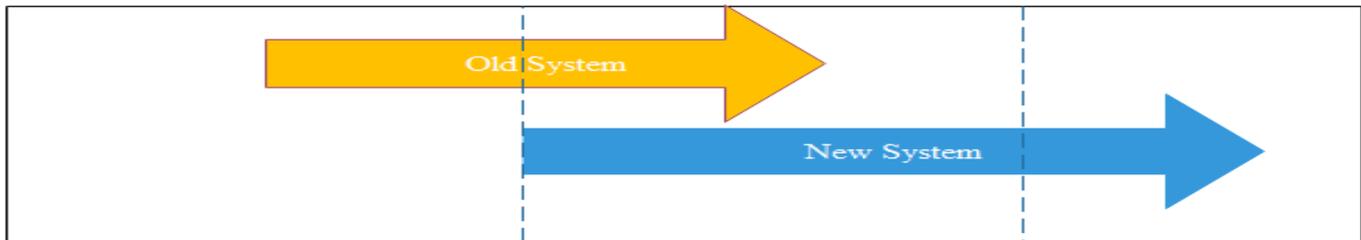
Figure 5-20: Pilot Changeover Strategy

5.4.4.3   Phase changeover

Phase changeover is a process whereby the new system is delivered in a series of versions. The first version is implemented and if it passes then a second version is implemented until all versions are implemented. Phase changeover is an incremental type of system implementation where in the long run, the whole new system will substitute the old system (Sommervillie, 2015).

Advantages of phase changeover

➢ Easy to identify and eliminate errors at every stage.

➢ It reduces risks associated with complete changeover of the entire system at once.

➢ Limited loss of data as the system is installed in phases.

Disadvantages of phase changeover

➢ Phase implementation is time consuming

➢ It is costly since each module has its own associated costs.
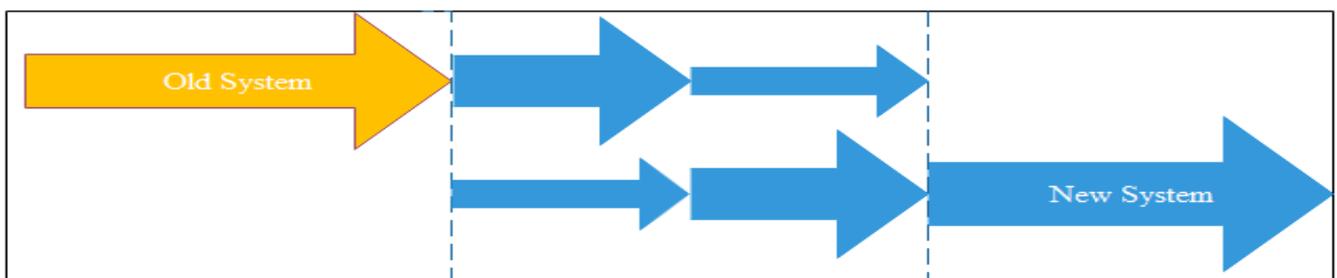
Figure 5-21: Phase Changeover Strategy

5.4.4.4 Parallel changeover (recommended)

It is the simultaneous running of both systems old and new over a stipulated time frame (Horwath, 2010). The specified time is meant for the new system to stabilize before a complete conversion of operations to the new system. As time goes on the new system will gain momentum which will eventually lead to the old system been discarded.

Advantages of parallel changeover

- ➢ The old system will provide backup in case of new system failure hence data loss is minimized.
- ➢ The dual system running provide easy performance comparisons between the two systems.

Disadvantages of parallel changeover

- ➢ There is duplication of information as the same process is been done twice.
- ➢ It is expensive to running two systems at once.
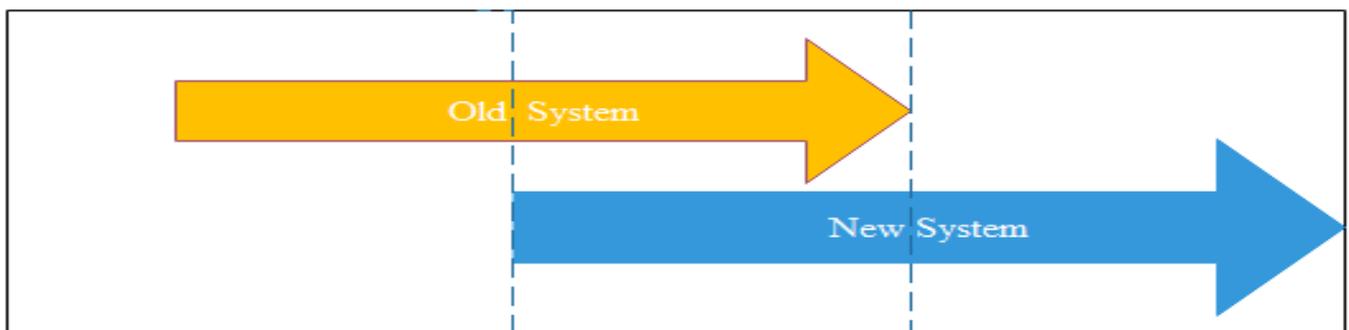
Figure 5-22: Parallel changeover strategy
Recommended changeover strategy

Higherlife Foundation management considered parallel changeover as the best strategy since it supports the use of the new system in the organization without interference. It gives the management time to assess the new system performance and if the system fails the organization can roll back to the old system without any business process compromise. Therefore, the management will evaluate the new system and once it has gain momentum, they will abandon the old system.

5.5 Maintenance

Maintenance refers to a continuous process of amendments done on a system to ensure the system functions efficiently and effectively and is free from errors (George, 2010). Its main

goal is to keep the system running at all times and to make sure it performs up to its expectations. Due to technological advancements over time, there is need to make changes and adjustments by accommodating new features to keep the system up to date with time. Different aspects under maintenance are perfective maintenance, corrective maintenance, adaptive maintenance and preventive maintenance. Therefore, the project team strategize a plan for each maintenance aspect as they are all going to be used during the life of the software system.

5.5.1 Perfective maintenance

It is concerned with the continuous adding of modules to the system to enhance system functionality and improve its performance. Perfective maintenance is when the system is upgraded or modified with the goal of extending its lifecycle (Beihelt and Tittmann, 2012). Therefore, it takes into account the user requirements, advancement in technology, performance as well as reliability issues.

Perfective maintenance plan

The project team agreed to append new system improvements and additional functionalities on a yearly basis in an effort to easy some business process and improve its appealing to users.

5.5.2 Corrective maintenance

Corrective maintenance refers to repairing of errors or bugs found in the system during day-to-day operation of the software system (Thakur,2017). The aim of corrective maintenance is to detect and isolate or correct any errors found in the software system. Faults reports are produced either on a daily, weekly or monthly basis in order to analyse and resolve these faults.

Corrective maintenance plan

The project team agreed that corrective maintenance must be carried out on a daily basis for the first 4 months and a review will be done after 4 months to see whether the number of faults have reduced or not.

5.5.3 Adaptive maintenance

Adaptive maintenance refers to the modification made to the system in order for the system to conform to its external environment. This is done to accommodate changes that may occur due to the evolving user working environment. It is undertaken to enhance the system so that it adapts to the changing requirements for example, opening new branches means more data hence the need for database upgrade to accommodate such change.

Adaptive maintenance plan

The project team agreed that the adaptive maintenance exercise will be done when the need arise to do so or in case of an expansion prospect arise.

5.5.4 Preventive maintenance

Preventive maintenance refers to a process targeted at identifying possible system glitches and preventing them from occurring beforehand (Quezada, 2017). The system code must be able to implement exception and error handling functionalities. Its aim is to avoid system malfunctioning which results from various factors which include outdatedness. Preventive maintenance is carried out to counter unexpected negative flaws ahead of time.

Preventive maintenance plan

The project team concluded to carry out the exercise on a yearly basis.

5.6 Recommendations for future/further developments

Higherlife Foundation Online Application and Recruitment Decision Support System recommendation for future/further developments that must be undertaken for the decision support system to enhance its performance are as follows:

➢ Addition of fees processing module for scholarship children.
➢ Recruitment of star leadership students.

5.7 Conclusion

The new system coding was explained as well as all the test necessary to ensure the system is free from errors and that it conforms to the expected user expectations. A detailed account of the system installation was given which include the user training, data migration and the changeover strategies with their advantages and disadvantages as well as the parallel strategy mentioned as the recommended strategy. The maintenance strategies where fully explained with all of them given an implementation plan as they are all going to be used by the organization. New future developments recommendations were outlined which marks the end of the Online Application and Recruitment Decision Support System documentation.

6   BIBLIOGRAPHY

Beihelt, F. and Tittmann, P. (2012) Reliability and Maintenance: Networks and Systems, CRC Press: Boca Raton, Florida.

Bidgoli, H. (2011), Intelligent Management Support Systems, Greenwood Publishing Group:

USA.

Bittner, O and Spencer, J 2013. Software Engineering Kindle Edition, India book Printers and Binders, Delhi

Brown, A., (2014), Calculating Business Value, Orlando.

Conger, S. (2014), Software Engineering Belmont California: Wadsworth, Inc Davis.

Dennis, A., Wixom, B. H. and Roth, R. M (2015) System analysis and Design, 6th Edition, IGI Global: Washington.

George, M. (2010), The Cost of Maintenance Managing System Maintenance. Glanford.

Gillenson, M. L. (2011) Fundamentals of Database Management Systems, Second Edition. New Jersey: John Wiley and Sons.

Glady, J. (2012) System Requirement Analysis. London: Elsevier Inc.

Gomma, S. (2016) Systems Analysis and Design in a Changing World. Boston: Cengage Learning

Goyal. A (2011), Information System Analysis and Design. Florida Universal Publishers.

Halliwell. D, Rosenblatt, J. H. and Tilley, S. (2016) System Analysis and Design, 11th Edition, Currio Press: Boston.

Horwath, N. (2010), Information Systems, Select Knowledge Limited, Hertfordshire, United Kingdom.

Harris, S. (2013). Access Control. In CISSP Exam Guide (6th ed). USA: McGraw-Hill; Kendall.

Jordan. E, (2011), Process modelling: Context Diagrams and Data Flow Diagrams (DFDs), McCombs School of business, United Kingdom.

Kenneth, J.E. and Kendall, K.E. (2012) System Analysis and Design, 8th edition, Prentice Hall: New Jersey

Kiddiq, S 2014.Software Engineering, Pearson education.inc, USA

Kizza, M. J. (2015) Guide to Computer Network Security 3rd Edition. New York: Springer Lopez.

Laudon, J.P, (2012), Management Information Systems 12th edition, Prentice Hall, UK

Laudon, K.C. and Laudon, J.P, (2012), Management Information Systems 12th edition,

Prentice Hall, UK.

Lopez, J. Huang, X. and Sandhu, R. (2013) Network and System Security. Madrid 7th International Conference.

Mahapatra, R. (2016), Software Engineering Kindle Edition, India book Printers and Binders, Delhi.

Manning, 2014. Engineering and Managing Software Requirements. Berlin: Springer-Verlag.

Manual, M. (2012) Research Methodologies, Innovations and Philosophies in Software System Engineering and Information Systems, IGI Global: Washington.

McCabe J.D, (2010), Network Analysis, Architecture and Design, Morgan Kaufmann, United States.

Otto, M., (2010), Feasibility Study and Future Projections of Suborbital Space Tourism at the

Example of Virgin Galactic, Diplomica Verlag.

Quezada N. (2017), The Four Types of Software Maintenance, https://endertech.com/blog/maintenance-bug-fixing-4-types-maintenance, (Accessed: 15 April 2019).

Rajaraman, C 2016. Software Engineering, 10th Edition, Pearson: London

Rosenblatt, J. H. (2014) System Analysis and Design, 10th Edition, Pre Media-Global: Boston.

Rosenblatt, J. H. and Tilley, S. (2016) System Analysis and Design, 11th Edition, Currio Press: Boston.

Rouse, A 2011. System Alternatives Acquisitions. Massachusetts: University Press.

Stair, G and Reynolds, I (2015) Software Engineering, 10th Edition, Pearson: London

Stanislaw, A (2011) Systems Analysis and Design. Hoboken: John Wiley and Sons Inc.

Satzinger, J. W., Jackson, R. B. and Burd, S. (2016) Systems Analysis and Design in a ChangingWorld. Boston: Cengage Learning.

Seidman, H. (2013). Access Control. In CISSP Exam Guide (6th ed). USA: McGraw-Hill;

Shelly, B.G, and Rosenblatt, H.J, (2012), Systems analysis and Design, Cengage Learning, United states.

Shelly, G. and Rosenblatt, H.J. (2010), Systems Analysis And Design, Course Technology,

Boston, USA.

Setende, F. (2012) System Alternatives Acquisitions. Massachusetts: University Press.

Sommerville, I. (2015) Software Engineering, 10th Edition, Pearson: London.

Stephens. R, (2010), Beginning Database Design Solution, John Wiley and sons, United States.

Suryn, W. (2014) Software Quality Engineering: A Practitioner's Approach, Wiley: New Jersey.

Thakur D. (2017), Types of Software Maintenance, Software Engineering, http://ecomputernotes.com/software-engineering/types-of-software-maintenance, (Accessed: 15 April 2019).

Tripathy, P., (2013), Feasibility Study for Information System Projects, Available at:

www.umsl.edu/~sauter/analysis/F08papers/Tripathy_Feasibility_Study.html, (Accessed:

04/11/2018).

Twisk, R 2013. System Requirement Analysis. London: Elsevier Inc.

Tupper, C. (2011) Data Architecture: From Zen to Reality. San Francisco: Morgan Kauffman Publishers.

Voelz, G., Moran, L. and Philpott, D. (2011) Counterintelligence and Operational Security. Washington DC: Government Training Incorporated.

Wang, S. and Wang, H. (2012) Information System Analysis and Design. Florida Universal

Publishers.

Wilkinson, J. (2014), Return on Investment, Available at: https://strategiccfo.com/returninvestment-roi/, (Accessed: 01/11/2018).

Wilson, M (2015) System analysis and Design, 6th Edition, IGI Global: Washington.

Wijers, D and Verhoef, P 2012. Software engineering, Macgraw-Hill, New York

7 APPENDICES

APPENDIX A: ONLINE APPLICATION AND RECRUITMENT DECISION SUPPORT SYSTEM USER MANUAL

INTRODUCTION

A user manual has been prepared to complement on user training and to provide help whenever users are interacting with the system.

ACCESSING THE SITE

In accessing the site of the system, a url must be written to point out the main page of the system. Currently the url in use is: http:localhost/HLF.

MAIN HOME PAGE
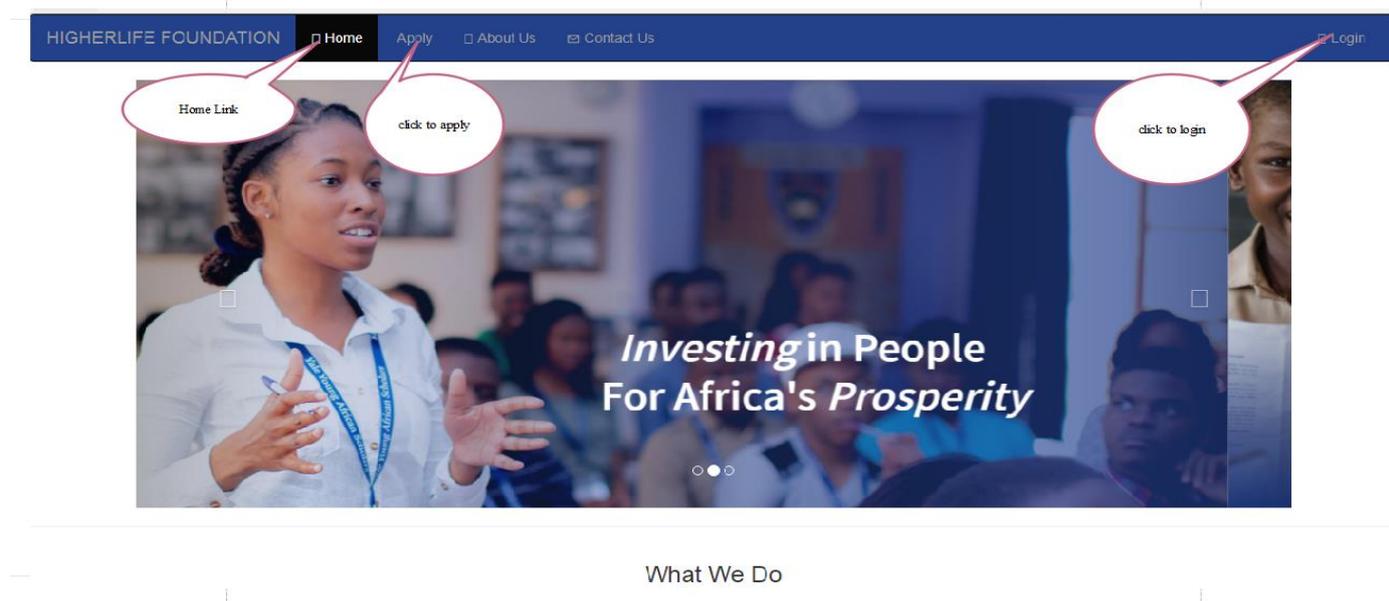
Fig A.1: Main Home Page

APPLICATION PAGE

Click apply and select the drop-down list to be redirect to the application page of primary or secondary applicants.

Fig A2: Application Page

LOGIN PAGE
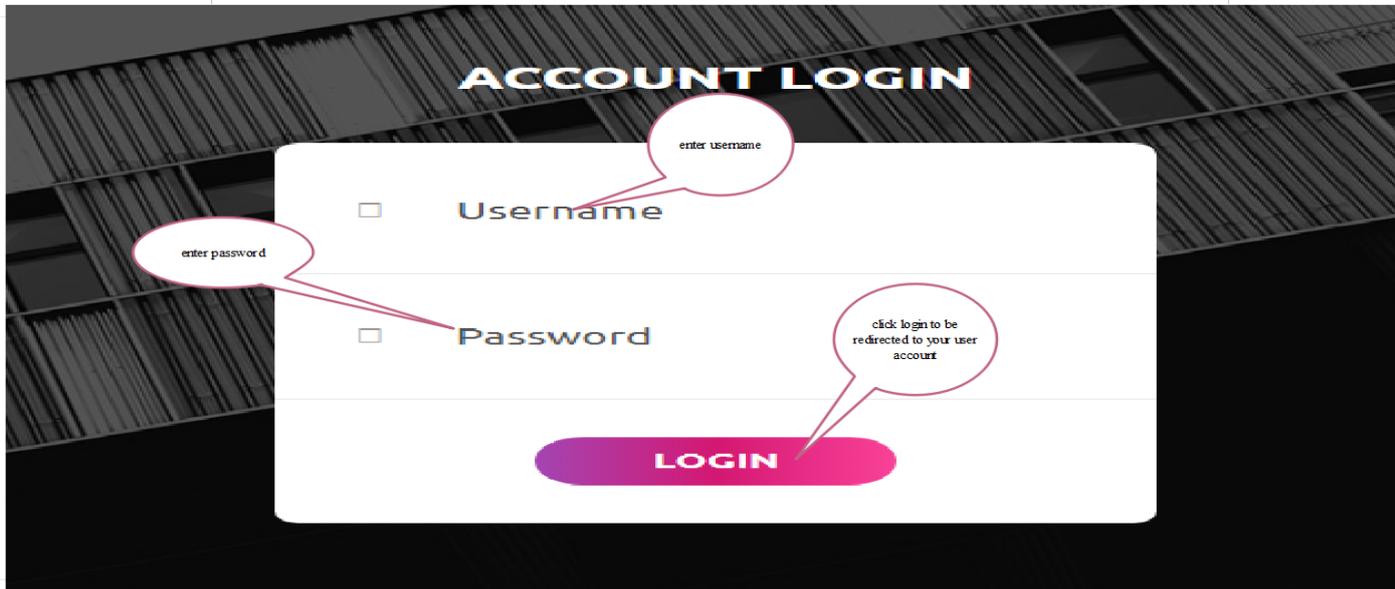
Fig A3: Login Page

ADMIN HOME PAGE
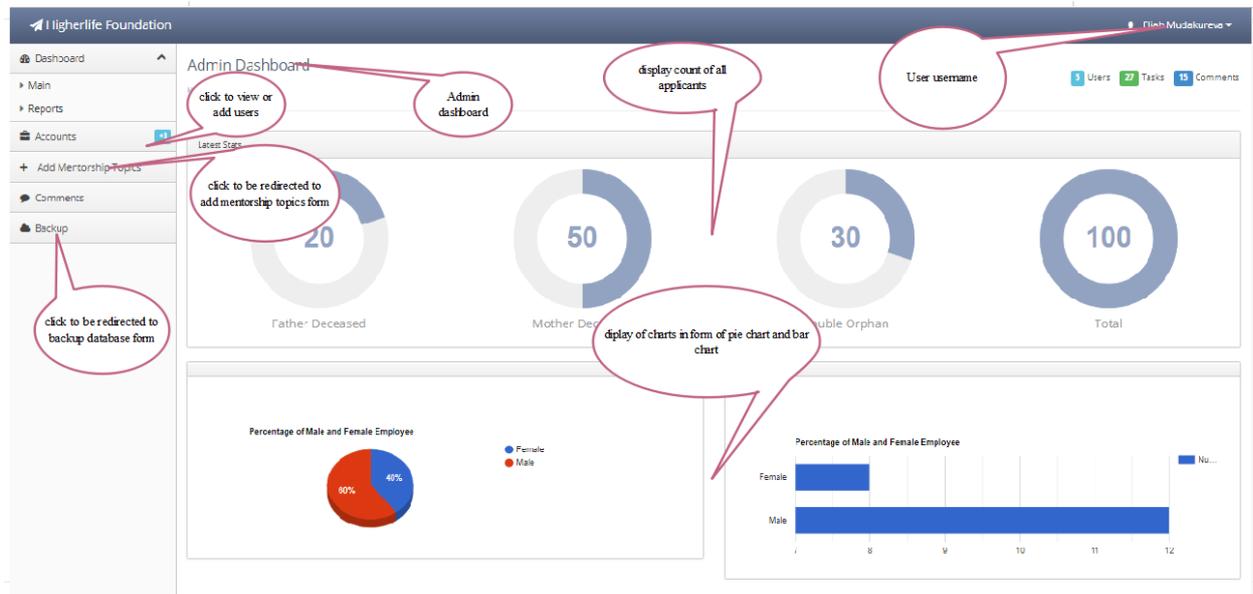
Fig A4: Admin home Page

CREATE USER ACCOUNT

Fig A5: Add user account

VIEW USERS ACCOUNTS

Fig A6: View users accounts

ADD MENTORSHIP TOPICS

Fig A7: Add mentorship topics

BACKUP DATABASE
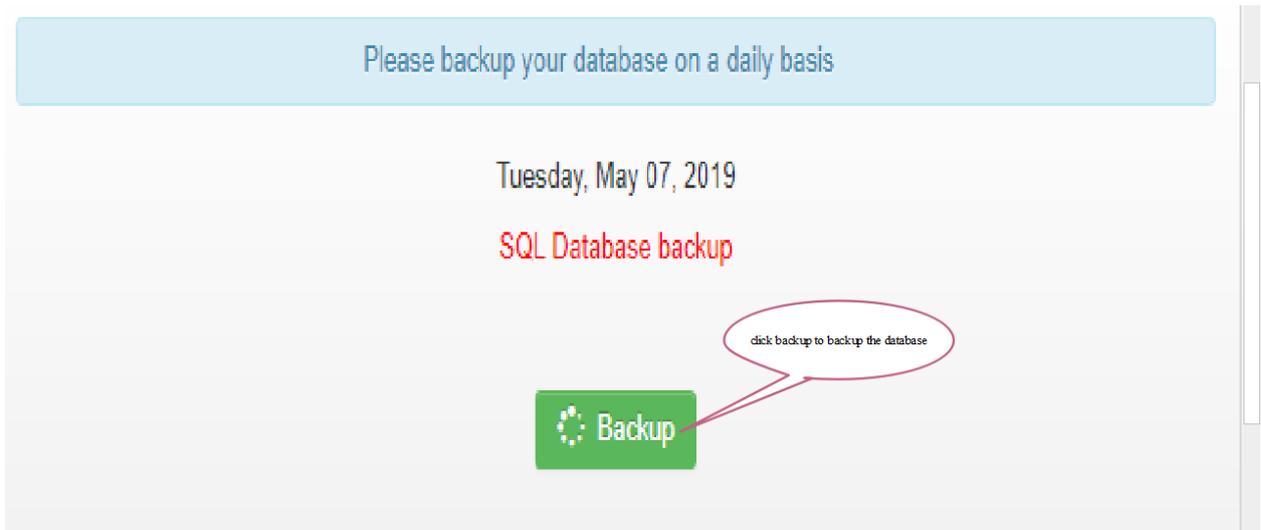
Fig A8: Back up system Database

TRACK ALL USERS

Fig A9: Audit Trail

MANAGER DASHBOARD
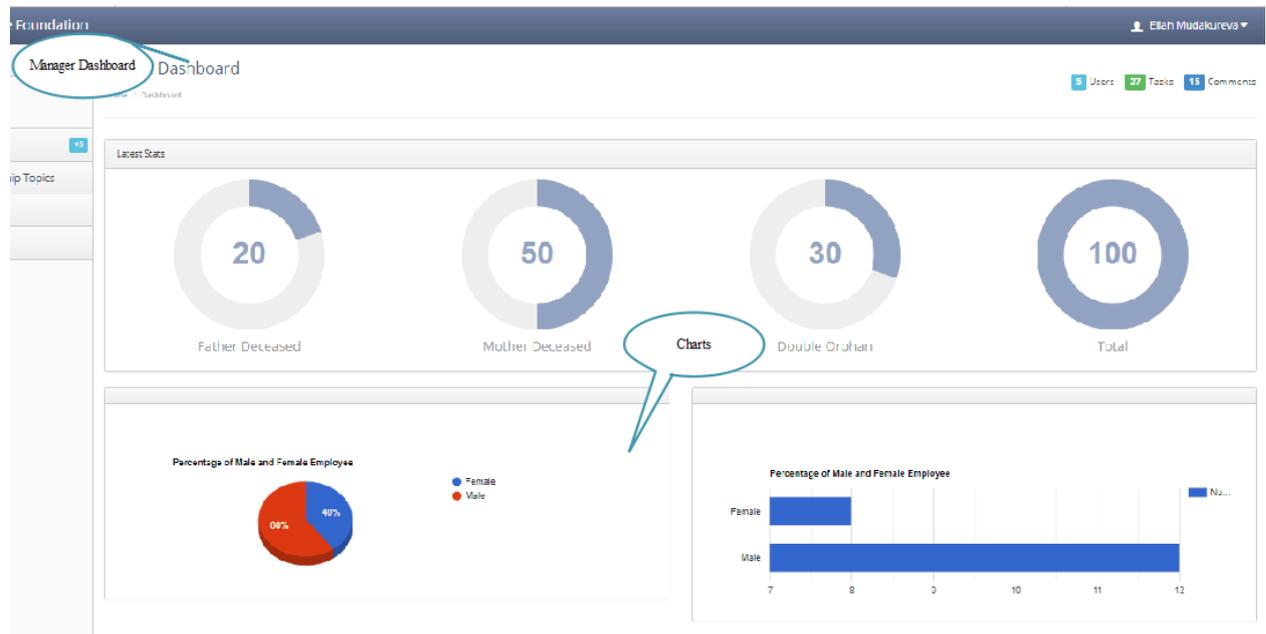
Fig A10: Manger Dashboard

VIEW APPLICANTS

Fig A11: View All applicants

SELECETD APPLICANTS

Show [10 ▼] entries   Search: [＿＿＿＿＿]

Name ↕	Surname ↕	Vulnerebility ↕	Province ↕	Level ↕	Grade ↕
Laura	Chawanda	Father Deceased	Harare	Primary	6
Talent	Hungwe	Mother Deceased	Mashonaland East	Primary	5
Lisa	Kuveya	Double Orphan	Mashonaland East	Primary	4
Sharon	Pise	Double Orphan	Mashonaland East	Primary	6
John	Ruswa	Double Orphan	Mashonaland East	Primary	7
Victor	Masocha	Mother Deceased	Mashonaland East	Primary	4
Pepetua	Shumba	Father Deceased	Mashonaland East	Primary	7
Brandon	Jones	Mother Deceased	Mashonaland East	Primary	1
Nicole	Chuma	Father Deceased	Mashonaland East	Primary	2

Showing 1 to 9 of 9 entries   Previous **1** Next

🖶 Print Report

Fig A12: selected applicants list

REPORTS

Fig A13: print reports

APPENDIX B: INTERVIEW HIGHERLIFE FOUNDATION STAFF

Sample of an interview questions used for information gathering:

How do you rate the current recruitment processing?

…………………………………………………………………………………………..

Do you think make use of online recruitment useful?

…………………………………………………………………………………………

…………………………………………………………………………………………

What challenges do you face when recruiting applicants?

…………………………………………………………………………………………

…………………………………………………………………………………………..

…………………………………………………………………………………………..

Have you ever think of computerising the process?

…………………………………………………………………………………………

…………………………………………………………………………………………

…………………………………………………………………………………………

Whats your future prediction on the technological improvement of selection and recruiting proccess at your company?

………………………………....................…………………………………………………

…………………………………………………………………………………………

…………………………………………………………………………………………

Date: …………………………/…………………………………/2019

Department: ………………………………………………………

APPENDIX C: INTERVIEW CHECKLIST FOR APPLICANTS

Sample of an interview questions used for information gathering:

How do you rate current online portal perfomance?

……………………………………………………………………………………………

……………………………………………………………………………………………

Are you satisfied with the current application and recruitment? Give reason

……………………….................…………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………

Have you ever encountered an issue of completing your application information or submission (Yes/No)?

……………………….................…………………………………………………………

If yes what did you do?

……………………….................…………………………………………………………

……………………………………………………………………………………………

Do you think putting the application and recruitment processes online will be helpful?

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………

Date: …………………………/………………………………/2019

Age: ………………………………………………………………..

Level of Education: ………………………………………………..

APPENDIX D: QUESTIONNAIRE CHECKLIST FOR HIGHERLIFE STAFF

NB: On some of the questions below indicate your answer with a tick

Where do your applicants most come from?

Online portal ☐   manual ☐

What do you think can lead to high recruitment numbers for the selected method?

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………..

Considering the high rate of internet use. Do you think putting your application and recruitment online will draw more applicants?

Yes ☐

No ☐

If yes how and why?

……………………………………………………………………………………………

……………………………………………………………………………………………

What do you think about introducing an online application and recruitment decision support system?

……………………………………………………………..

……………………………………………………………………………………………

……………………………………………………………………………………………

Date: ……………………………/…………………..…./2019

Department …………………………………………………

APPENDIX E: **QUESTIONNAIRE CHECKLIST FOR APPLICANTS**

<u>NB</u>: On some of the questions below indicate your answer with a tick

Do you like applying online?

Yes ☐

No ☐

Do you have internet access at home or a mobile internet access?

Yes ☐

No ☐

How do you rate the manual system of screening and recruiting at Higherlife Foundation?

Satisfactory ☐

Not satisfactory ☐

For the selected option give reason why?

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

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

………………………………………………………………………………………………..

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

Date: ………………………………/……………………./2019

Age …………………………………………………………………

Education Level …………………………………………………….

APPENDIX F: OBSERVATION

Observation Sheet Online Application And Recruitment Decision Support System

Observation guide schedule.

Date……………   Observer……………………………………

Time……………………………

Department……………………………………………………….

Observations

……
……
……
……
……
……
……
……
……
……
……

Conclusion

……
……
……
……

Stamp

APPENDIX G: Snippet of Code

Add user snippet code module

```
<div class="panel panel-default">

    <p class="panel-heading no-collapse">Add User</p>

    <div class="panel-body">

        <form method="post" action="">

            <div class="form-group">

            <label>Name</label>

                <input    type="text"    name="name"    value="<?php    echo    $name;    ?>"
placeholder="Sam" class="form-control span12" pattern="[A-Za-z.' ]+" required="">

            </div>

            <div class="form-group">

                <label>Surname</label>

                <input    type="text"    name="surname"    value="<?php    echo    $surname;    ?>"
placeholder="Stanley" pattern="[A-Za-z.' ]+" required="" class="form-control span12">

            </div>

            <div class="form-group">

                <label>Email Address</label>

                <input    type="text"    name="email"    value="<?php    echo    $email;    ?>"
placeholder="Sstanley@higherlifefoundation.org" required="" class="form-control span12">

            </div>

            <div class="form-group">

    <label>Mobile Number</label>

        <input    class="form-control"    required=""    value="<?php echo $user_mobile; ?>"
placeholder="0771234567 (format)" pattern="07\d{8}" name="user_mobile" type="text"
value="" id="mobile">

            </div>

            <div class="form-group">

                <label>Access Level</label>

                <select name="access" required="" value="<?php echo $access; ?>" id="access"
class="form-control">

                <option value="#">select access level</option>

                <option value="Admin">Admin</option>

                <option value="Manager">Manager</option>
```

82

```
                    </select>

            </div>

            <div class="form-group">

                <label>Username</label>

 <input    type="text"    name="username"    value="<?php    echo    $username;    ?>"
placeholder="Stanley24" required="" class="form-control span12">

            </div>

            <div class="form-group">

                <label>Password</label>

    <input   type="password"   name="pass"   required=""   class="form-control   span12"
required="this field is required">

            </div>

            <div class="form-group">

                <label>Confirm Password</label>

 <input    type="password"    name="c_pass"    required=""    class="form-control    span12"
required="this field is required">

            </div>

            <div class="form-group">

    <button class="btn btn-success btn-lg " type="submit" name="submit">Submit</button>

            </div>

                <div class="clearfix"></div>

        </form>
<?php
    include("connn.php");

    error_reporting(0);

if(isset($_POST["submit"])){

    $name = clean(qoutess($_POST["name"]));

$username= clean(qoutess($_POST["username"]));

$email = clean(qoutess($_POST["email"]));

$user_mobile = clean(qoutess($_POST["user_mobile"]));

$username= clean(qoutess($_POST["username"]));

$access = clean(qoutess($_POST["access"]));

$password= clean(qoutess($_POST["pass"]));
```

```php
$c_pass = clean(qoutess($_POST["c_pass"]));

//check whether the username already exist

$query="SELECT * FROM users WHERE username ='$username'";

$result=mysqli_query($connection,$query);

if(mysqli_num_rows($result)>0)

{echo"<script language = javascript> alert('The username ".$username." already exist.');
</script>"; }

else if(filter_var($email,FILTER_VALIDATE_EMAIL)==false)

        {echo "<script language = javascript> alert('lnvalid E-Mail address format');
</script>";}

else if($password!=$c_pass)

{echo "<script language = javascript> alert('Password do not match'); </script>";}

//security check for password length

else if(strlen($password)<5)

{echo"<script language = javascript> alert('Your password should be atleast 5 characters');
</script>";}

Else {

   $query="INSERT INTO `users`(`name`, `surname`, `email`, `mobile`, `access_level`,
`username`,                            `password`)                          VALUES
('$name','$surname','$email','$user_mobile','$username','$access','$password')";

   if($connection-> query($query)){echo "<script language = javascript> alert('user added
successfully'); </script>"; }

   else {echo "Error: ".$query."<br>".mysqli_error($connection);}

}

}

?>
```