

ABSTRACT

The main reason that brought the scope of developing medical diagnosis support system for life style diseases is the high death rate and huge amount of people suffering from such diseases. The system is a web based application developed using PHP, JavaScript and MySQL database using Adobe Dreamweaver CC 2018 software and XAMPP. The study was conducted whether it was feasible to come up with a system in terms of economic, technological, operational and social standings and it was determined that it was viable in these aspects. Data was collected through the use of interviews and questioners the researcher targeted the patients and the doctors. Data gathering was done to identify problems faced by the Ministry of health and child care and patients. From the data gathered the researcher determined requirements and how the new system was going function. The system analysis process was done successfully and all the necessary data and process flow were modelled using various techniques including data flow diagrams and class diagrams to ensure that nothing was left out for the design and development of the system. Evaluations was made on how to deliver the new system and amongst all alternatives in-house development was favoured due to availability of developers within the organisation. The design of the system was done focusing on all system aspects that is architectural design, physical design, database design and logical design. The system was tested using Blackbox and White box testing and all the necessary verifications of data and system validation was done to ensure the system is working as intended. Parallel changeover was used to install the system this is because visiting to the hospital direct is not going to be faced out its either use the system or go direct to the hospital. Maintenance of the system was decided that all the methods of maintenance is going to be used since they save different purposes. The system will allow diagnosis by matching symptoms with appropriate diseases and suggest specialist according to diseases diagnosed in area of speciality.

DECLARATION

I, Onward Kanyasa, hereby declare that I am the sole author of this dissertation. I authorise the Midlands State University to lend this dissertation to other institutions or individuals for the purpose of scholarly research.

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

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DEDICATION

I dedicate this dissertation to Maude Masangomai, Joyce Mudzinganyama and Ella Mudzinganyama

TABLE OF CONTENTS

ABSTRACT	i
DECLARATION	ii
ACKNOWLEDGEMENTS.....	iii
DEDICATION.....	iv
TABLE OF CONTENTS.....	v
LIST OF FIGURES.....	ix
LIST OF TABLES.....	x
LIST OF APPENDICES	xi
CHAPTER ONE: INTRODUCTION	1
1.1 INTRODUCTION	1
1.2 BACKGROUND OF THE STUDY	1
1.2.1 ORGANISATIONAL STRUCTURE.....	1
1.2.2 VISION	2
1.2.3 MISSION	2
1.3 PROBLEM DEFINITION	3
1.4 AIM	3
1.5 OBJECTIVES	4
1.7 INSTRUMENTS.....	4
1.6 JUSTIFICATION	4
1.8 CONCLUSION.....	5
CHAPTER TWO: PLANNING PHASE	6
2.1 INTRODUCTION	6
2.2 BUSINESS VALUE	6
2.3 FEASIBILITY.....	7
2.3.1 TECHNICAL FEASIBILITY	7
2.3.1.1 HUMAN EXPERTISE.....	9
2.3.2 ECONOMIC FEASIBILITY.....	11
2.3.2.1 COST.....	11
2.3.2.2 DEVELOPMENT COST.....	12
2.3.2.3 OPERATIONAL COST	12
2.3.2.4 BENEFITS.....	12
2.3.2.5 TANGIBLE BENEFITS.....	13
2.3.2.6 INTANGIBLE BENEFITS.....	13
2.3.2.6 COST BENEFIT ANALYSIS	13

2.3.2.8 PAYBACK PERIOD.....	14
2.3.3 SOCIAL FEASIBILITY	15
2.3.4 OPERATIONAL FEASIBILITY	15
2.4 RISK ANALYSIS	16
2.5 STAKEHOLDER ANALYSIS	18
2.6 WORK PLAN	19
2.6.1 GANTT CHART	20
2.7 CONCLUSION.....	20
CHAPTER THREE: ANALYSIS PHASE	22
3.1 INTRODUCTION	22
3.2 INFORMATION GATHERING METHODOLOGIES.....	22
3.2.1 INTERVIEWS.....	22
3.2.2 QUESTIONNAIRES	24
3.2.2.1 ADVANTAGES OF QUESTIONNAIRES	24
3.2.2.2 DISADVANTAGES OF QUESTIONNAIRES.....	24
3.2.2.3 RESULTS OBTAINED FROM QUESTIONNAIRES	24
3.3 ANALYSIS OF THE EXISTING SYSTEM	25
3.3.1 INPUTS.....	25
3.3.2 PROCESSES.....	26
3.3.3 OUTPUT.....	26
3.4 PROCESS ANALYSIS	26
3.4.1 ACTIVITY DIAGRAM.....	26
3.5 DATA ANALYSIS	27
3.5.1 CONTEXT DIAGRAM.....	28
3.5.2 DATA FLOW DIAGRAM	28
3.6 WEAKNESS OF CURRENT SYSTEM	29
3.7 EVALUATE ALTERNATIVES	30
3.7.1 OUTSOURCING.....	30
3.7.1.1 MERITS	30
3.7.1.2 DEMERITS	31
3.7.2 IMPROVEMENTS.....	31
3.7.3 DEVELOPMENT.....	32
3.7.3.1 ADVANTAGES	32
3.7.3.2 DISADVANTAGES	33
3.8 REQUIREMENTS ANALYSIS.....	33
3.8.1 FUNCTIONAL REQUIREMENTS	33
3.8.1.1 CASE DIAGRAM.....	34
3.8.2 NON-FUNCTIONAL REQUIREMENTS.....	34

3.9 CONCLUSION.....	35
CHAPTER FOUR: DESIGN PHASE	36
4.1 INTRODUCTION	36
4.2 SYSTEM DESIGN	36
4.2.1 DESCRIPTION OF PROPOSED SYSTEM.....	36
4.2.2 CONTEXT DIAGRAM.....	37
4.2.3 DATA FLOW DIAGRAM	37
4.3 ARCHITECTURAL DESIGN	39
4.3.1 THE CLIENT SERVER APPROACH.....	39
4.4 PHYSICAL DESIGN	40
4.5 DATABASE DESIGN	40
4.5.1 ENHANCED ENTITY RELATIONSHIP DIAGRAM.....	43
4.6 PROGRAM DESIGN	44
4.6.1 CLASS DIAGRAM.....	45
4.6.2 PACKAGE DIAGRAM.....	46
4.6.3 SEQUENCE DIAGRAM.....	46
4.7 INTERFACE DESIGN.....	47
4.7.1 MENU DESIGN.....	48
4.7.2 INPUT DESIGN.....	49
4.7.3 OUTPUT DESIGN.....	52
4.7.4 REPORTS OVERVIEW	54
4.8 PSEUDO CODE	54
4.9 SECURITY DESIGN	55
4.9.1 PHYSICAL SECURITY.....	55
4.9.2 NETWORK SECURITY	56
4.9.3 OPERATIONAL SECURITY.....	56
4.10 CONCLUSION.....	57
CHAPTER FIVE: IMPLEMENTATION	58
5.1 INTRODUCTION	58
5.2 CODING.....	58
5.3 TESTING	58
5.3.1 WHITE BOX TESTING.....	59
5.3.2 BLACK BOX TESTING	59
5.3.3 UNIT TESTING.....	59
5.3.4 INTEGRATION TESTING	67

5.3.5 SYSTEM SECURITY TESTING	69
5.3.6 VALIDATION	70
5.3.7 SYSTEM TESTING.....	71
5.3.8 ACCEPTANCE TESTING	71
5.4 INSTALLATION	72
5.4.1 SYSTEM CHANGEOVER.....	72
5.4.1.1 DIRECT CHANGEOVER.....	72
5.4.1.2 PARALLEL CONVERSION.....	73
5.4.1.3 PHASED CONVERSION	73
5.4.1.4 PILOT CONVERSION	73
5.4.1.5 RECOMMENDATION.....	73
5.4.2 DATA MIGRATION.....	74
5.4.3 USER TRAINING.....	74
5.5 MAINTENANCE	75
5.5.1 CORRECTIVE MAINTENANCE.....	75
5.5.2 PREVENTIVE MAINTENANCE	75
5.5.3 ADAPTIVE MAINTENANCE.....	76
5.5.4 PERFECTIVE MAINTENANCE	76
5.6 RECOMMENDATIONS, REFLATION AND FUTURE DEVELOPMENT	76
5.7 CONCLUSION.....	77
REFERENCES:.....	78
APPENDICES.....	81
Appendix A: User Manual.....	81
Appendix C: Interview Checklist.....	86
Appendix D: Questionnaire Checklist.....	88
Appendix E: Code Snippets.....	89

LIST OF FIGURES

FIGURE 1. 1 MOHCC ORGANISATIONAL STRUCTURE.....	2
FIGURE 3. 1 ACTIVITY DIAGRAM.....	27
FIGURE 3. 2 CONTEXT DIAGRAM.....	28
FIGURE 3. 3 DFD.....	29
FIGURE 4. 1 CONTEXT DIAGRAM.....	37
FIGURE 4. 2 DFD.....	38
FIGURE 4. 3 ARCHITECTURE DESIGN.....	39
FIGURE 4. 4 PHYSICAL DESIGN.....	40
FIGURE 4. 5 EER DIAGRAM.....	44
FIGURE 4. 6 CLASS DIAGRAM.....	45
FIGURE 4. 7 PACKAGE DIAGRAM.....	46
FIGURE 4. 8 SEQUENCE DIAGRAM.....	47
FIGURE 4. 9 MAIN MENU.....	48
FIGURE 4. 10 SUB MENU.....	49

LIST OF TABLES

TABLE 2. 1 HARDWARE RESOURCES.....	8
TABLE 2. 2 SOFTWARE RESOURCES.....	9
TABLE 2. 3 TECHNICAL EXPERTISE	10
TABLE 2. 4 DEVELOPMENT COST	12
TABLE 2. 5 OPERATIONAL COSTS.....	12
TABLE 2. 6 TANGIBLE BENEFITS.....	13
TABLE 2. 7 COST BENEFIT ANALYSIS.....	14
TABLE 2. 8 RISK ANALYSIS	16
TABLE 2. 9 STAKEHOLDERS ANALYSIS	18
TABLE 2. 10 TIME SCHEDULE	19
TABLE 2. 11 GANTT CHART	20
TABLE 3. 1 OUTCOME DROM THE QUESTIONNAIRES	25
TABLE 4. 1 USERS.....	41
TABLE 4. 2 CITIZENS	41
TABLE 4. 3 BOOKINGS	42
TABLE 4. 4 ATTENDED.....	42
TABLE 4. 5 DISEASES	43
TABLE 4. 6 RESULTS.....	43
TABLE 4. 7 PATIENT REPORT	52
TABLE 4. 8 BOOKING REPORT	53
TABLE 4. 9 DOCTOR REPORT	53
TABLE 4. 10 RESULTS REPORT	53
TABLE 4. 11PRESCRIPTION	53
TABLE 4. 12 STATISTICAL REPORT.....	54
TABLE 5. 1 TRAINING SCHEDULE.....	74

LIST OF APPENDICES

Appendix A: User Manual	81
Appendix C: Interview Checklist	86
Appendix D: Questionnaire Checklist	88
Appendix E: Code Snippets	89

CHAPTER ONE: INTRODUCTION

1.1 INTRODUCTION

The purpose of the research is to develop MOHCC medical diagnosis support system for lifestyle diseases. The system will be there to tackle challenges faced by the citizens and MOHCC. Lifestyle diseases are spreading silently in Zimbabwe while remaining unnoticed. The reason the lifestyle diseases spread silently is because the MOHCC mainly focuses on communicable diseases such as HIV and aids, Typhoid and so on (Nsingo, 2019). Since the ministry of health does not warn citizens and help them with ways to prevent or avoid lifestyle diseases the citizens will be ignorant. According to WHO lifestyle diseases are contributing up to 70% of global deaths and the high percentage is from low income countries. The majority of citizens do not visit the hospital frequently unless situation worsen due to lack of funds, ignorant, distance and so on. The research will focus on 11 common lifestyle diseases in Zimbabwe which are Arthritis, Diabetes, Heart diseases, Migraine headaches, Stroke, Bladder cancer, Breast cancer, Cervical cancer, Colon cancer, Prostate cancer and Lung cancer. Implementation of the system will solve problems faced by citizens. The system will be for free, citizens will use the system anytime to check their health status and that will help them to get treatment on time before the disease spreads further.

1.2 BACKGROUND OF THE STUDY

According to statistics mentioned above lifestyle diseases death rate is too high and is increasing gradually due to some of the facts mentioned in the introduction. The outcome that the researcher gathered led him to give a conclusion that if there is no follow up made there will be high death rate of citizens suffering from lifestyle diseases. The researcher found out the reason for late identification of the diseases is due to lack of funds for medicals and long distance also other factors besides funds include long queues, shortage of doctors and ignorance. This inspired him to come up with an idea of developing a free of charge medical diagnosis support system for the life style disease.

1.2.1 ORGANISATIONAL STRUCTURE

Organizational structure is a set of methods dividing the task to determined duties and coordinates them (Martins, Terblanche, 2007). The hierarchical structure used by the organisation is defined as a set of well-arranged groupings of staff within a system. Figure 1.1 bellow shows the organisational structure of MOHCC.

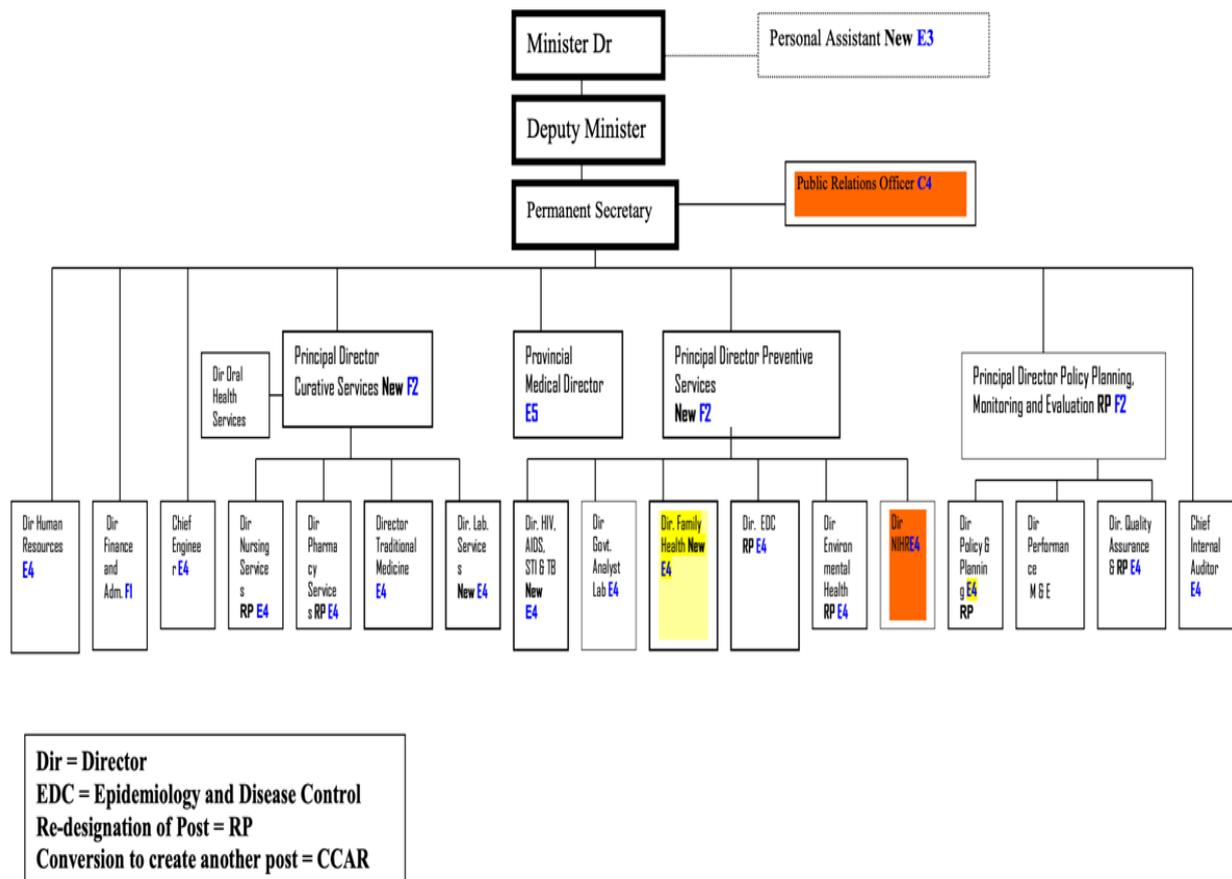


FIGURE 1. 1 MOHCC ORGANISATIONAL STRUCTURE

1.2.2 VISION

Vision presents an organisation’s desire on how the organisation would like things to be (Stonehouse, Pemberton, 2002). MOHCC’s vision is to promote the health and quality life of the people of Zimbabwe.

1.2.3 MISION

Mission characterises centre goals and purpose of an organization (Farhad, Azhdar, 2002). Mission of MOHCC is as follows

- Mobilise more resources for the health sector whilst ensuring their optimum utilisation.

1.3 PROBLEM DEFINITION

Problems associated with the existing system which are affecting the citizens and the MOHCC are as follows.

- Zimbabwe is one of the country with low income this means that the majority do not afford to go for regular medical check-ups here and then. Medical check-ups are there for one to be aware of his /her health status. For check-ups to occur they is need for funds and it is costly.
- Research shows that doctor patient ratio in Zimbabwe is 1:250000 according to (Muswiwa, 2016). Since doctors visit once in a while in some places the queues will be very long when the doctor is present. Due to long queues only few people will be attended to since they will be few doctor versus number of patients.
- Death rate of lifestyle diseases is increasing due to lack of knowledge and lack of resources. Citizens need to be warned by the MOHCC about some of the diseases so that they will be aware on how to prevent and cure them.
- The current system in Zimbabwe does not allow patients to book, to get results and prescription online, patients must travel for bookings, collection of results and to be prescribed. Travelling for collection of results, diagnosed and booking which is an expense and time consuming.
- It is difficult for MOHCC to analyse factors based on gender, region and age of the patients affected with such diseases hence it is difficult as well to come with decisions.

1.4 AIM

The main aim or objective of developing the system is that it can be accessed at any time without problems or limitations. Also to develop a system that help patients to be diagnosed at a free cost. After querying in experienced symptoms and answering questions asked by the system, it must be able to return answers or results and solutions to the diagnosed diseases based on symptoms queried in.

1.5 OBJECTIVES

Objectives of a system are the goals that a system must attain at the end of the development.

The system should be able to:

- Allow online registration of patients.
- Match symptoms with appropriate diseases and recommend appropriate ways of reduce the risk.
- Suggest specialist according to diseases diagnosed in area of speciality.
- Allow doctor to track and manage patient appointments.
- Allow doctor to upload results and prescription and allow print function of results and prescription by the patient.
- To automatically compute statically reports which show frequent diseases being suffered from according to sex, age and region.

1.7 INSTRUMENTS

These are software tools used particularly for developing systems or software's or applications (Wang, 2004). The tools used in developing the system is as follows:

- MySQL- is a free well known dbms framework established on structured query language and is used with PHP (Greenspan, Bulger, 2001). MySQL is all around famous for being the most secure and reliable dbms the management framework utilised in most of the web applications. Since the system will collect user's information the database must be secured and MySQL qualifies.
- PHP – is a server-side scripting language used for developing web systems (Suehring, Valade, 2013). PHP is flexible and allows freedom, it is compatible with many platforms such windows, Mac OS, UNIX and so on. When developing using PHP language one will not be limited on which platform to work on.

1.6 JUSTIFICATION

Justification clearly shows why it is important to come up with MOHCC web-based medical assistant for life style diseases diagnosis (Simmons, 2001). Justification is a process of uncover the significance of the developed system. Following are point out the need for developing the system.

- The proposed system will reduce death rate since diagnoses of lifestyle diseases will be done at no cost and that will result in early diagnosis of life style diseases.
- Traveling costs for regular check-ups, collection of results and booking appointments will be eliminated.
- Elimination of check-ups queues. Time used for check-ups will be used for something productive.
- The system will help to eliminate the 1:250000 patient doctor ratio even though the patient must later visit the doctor for actual test.

1.8 CONCLUSION

This chapter shows the problems associated with the existing system which is manual. Also, the chapter clearly points out what is needed to be done in solving the problems mentioned above. There is need to evaluate if the system is going to be of value to the MOHCC and to the nation. Also valuating its functionality and other alternatives, all that will be done in chapter 2 which is Planning phase.

CHAPTER TWO: PLANNING PHASE

2.1 INTRODUCTION

In chapter one it was clearly shown why there is a need for developing the system. Planning is the process by which an individual or organisation decides in advance on some future courses of action (Kerzner, 2015). The planning phase takes into consideration the feasibility study. The outcomes from the feasibility study will lead to the conclusion and decision-making on whether to develop the system or it will be just a waste of time and resources. Feasibility studies incorporate economic, social, political, technical feasibility and so on, hence it is carried out to see whether it is worthy or not to proceed with the system development. Risk analysis is another aspect which is looked into, to see if there will be risks that will arise during construction of the firmware.

2.2 BUSINESS VALUE

It incorporates all kinds of value to define the capability and well-being of the business during the time it will be functioning (Schwartz, 2013). Business value does not only include the wellbeing of the business, that is the economic profit but it also includes other types of values such as societal, managerial, employee, supplier among others. These additional values cannot be measured directly in monetary value, they boost intangible aspects which include viable relationships in the business and employee motivation. Business value explains if and how the business adds value to its stakeholders.

Firstly, and foremost the system is advantageous to the citizens who will be the users in the following aspects:

- Elimination of long queues by patients hence saving time for other necessary procedures.
- Due to the fact that the system is easily accessible on computers and mobile devices, patients no longer need to travel long distances for check-ups and can access it easily in the comfort of their homes.
- Since costs for regular check-ups are eliminated, diseases will be diagnosed early and money used to for check-ups before will be used for other purposes

- The accessibility of the system anytime online means that patients are not limited by their geographical location or by the time of the day to identify the possible disease they are undergoing

Furthermore, the organisation will greatly benefit from the introduction of the system and some of the benefits include:

- Due to 1: 250000 patient doctor ratio, MOHC will be assured that all citizens will be served by the system without a hustle like before. Previously it was difficult for every patient to access doctors since the ratio of patient to doctor is enormous.
- Employees have to deal with long queues and this is devastating as most critical patients complain, but the developed system eliminates this problem. The employees no longer feel pressurized and can work effectively.

2.3 FEASIBILITY

This is the analysing and evaluating stage of the proposed system to determine its technical, economic, social and operational feasibility, that is whether it will be feasible within the estimated cost and if a profit will be made in the long run (El-sharkawy, 2005). Large amount of money will be at stake so it is necessary to carry out the study to determine the merits and demerits of the new system. All necessary details and information needed in making the decision on whether to develop or abandon the system are carried out in this phase by the project team. The study reveals the practicability of the new system, the strong points and the short-comings of it. Many other aspects are also unveiled in this study for example the tangible and intangible benefits.

2.3.1 TECHNICAL FEASIBILITY

For implementation to be practical the technology at hand should be able to support it. Technical studies are that aspect of feasibility studies which aims to view whether or not the technology at hand can support system according (Herriott, 2014). Technical feasibility assesses the software, hardware and also the human technical expertise at present, if it will be

able to support the system and how. This study was done so that the following and some other questions were answered:

- Is the technology at hand enough for the implementation of the system?
- Is it practicable for the firmware to be developed using the available human technical expertise?
- By using the available technology do the developers need extra training.
- For the system to be developed is there a need for extra human expertise?
- Is there a need for more advanced technologies than what the organisation has to offer?
- Are the technologies accessible and does the organisation has the monetary funds.

The developer identified all the necessary software and hardware necessary and constructed a table which also includes quantity of the required item, the item specifications, the status of the resource and also other remarks.

TABLE 2. 1 HARDWARE RESOURCES

Components	Number	Status	Specifications	Comments
Workstations	20	Available	500 GB HDD, Core i3 processor, 8GB RAM	Workstations are available they is no need to purchase.
Server	1	Not available	HPE ProLiant ML350 Gen9, Cache memory 60mb, RAM 32 GB, 2TB HDD.	Currently there is no server so they is need to buy one with specifications mentioned.
External HDD	2	1 Available	1 TB	1 more external hard drive is needed (For back-up) to be purchased
Ups	1	Available	4500/5000. Watts power, output voltage 230V.	No need to buy since they is one which is

				used in the server room
Internet Router and switch	1 each	Available	Cisco 2921 router and Cisco 2960s switch	The equipment is already available so they no need to purchase new switch and router
Service provider (For internet)	2	Available	100mb/Ms bandwidth	Liquid as the main line and Powertel as a back-up line are the 2 service providers offering internet services

TABLE 2. 2 SOFTWARE RESOURCES

Software Name	Status	Specifications
Adobe Dreamweaver	Available	2018
MySQL	Available	Version 8.0
OS	Available	Mac OS, windows from 7 and above
Microsoft word	Available	2016
Apache Web Server	Available	2.4.37
Antivirus	Available	Kaspersky latest version

2.3.1.1 HUMAN EXPERTISE

Human expert is someone who is well experienced in a particular area through practice. The ability of the development crew is analysed and it is shows that the current crew has all the

necessary know-how for the system to be developed. Furthermore, the crew also shows the ability to advertise and help users on how the system works.

TABLE 2. 3 TECHNICAL EXPERTISE

Stakeholders	Current status	Company's Perspective	Comments
Expect doctors in the field of Lifestyle diseases	All of them are familiar with computers	The ministry is willing to take the costs of training the doctors on how to use the system.	Training is needed because the doctors will be of great help in analyzing the data from users And post results to users.
System developers	The developers are experts in PHP and Databases management and other languages	The ministry is ready to finance developers in whatever they want in developing the system. Developers have little knowledge required on how to host the system using their own server without third parties, MOHCC need to manage everything on its own. Since no one have experience in server management and development they is a	Only training on servers is needed. On other languages they are good.

		need for at least two from the team to go for training on how to create own server.	
End users/Patients	Patients are used to the current system whereby they see a doctor face to face and get answers from the doctor's mouth. The users might not believe the system's decisions and might take them for granted	The ministry is there to make sure that they present the system to the end users explaining how similia the system is to the information they get from the doctors.	Finding possible ways of teaching the patients/users on how to use the system.

2.3.2 ECONOMIC FEASIBILITY

System's benefits must outweigh expected costs when developing a system because it is important to do analysis of economic feasibility. For the project to be considered economically feasible the total profits must outweigh all the expenses incurred (El-sharkawy, 2005). Cost benefit analysis, pay-back period, net present value and return on investment are calculated to enhance the economic feasibility of the project.

2.3.2.1 COST

Cost is a total sum that must be paid or spent to purchase or acquire something (Hansen, Mowen, Guan, 2007). For a system to be developed and for it to operate effectively there are expenses which are incurred. The valuation of all the assets, labour and time which are involved in the set-up and operation of the project is basically the cost of the project which results in a kind of a budget. Henceforth these are basically divided into development and operational costs basing on whether they were incurred when the project was being set up or those incurred when the project is running up.

2.3.2.2 DEVELOPMENT COST

Basically, these are the expenditures the organization incurs from the beginning of the development up to the time the system started running (Larson, 2007). All the additional software and hardware, the development mindset payments and all other assets purchased before the system actually started running fall under development costs.

TABLE 2. 4 DEVELOPMENT COST

Item	Quantity	Estimated cost/unit	Total Estimated
Server	1	\$3900	\$3900
External Hard drive	1	\$120	\$120
Server Administration training	2	\$700	\$1400
Labour (Development team)	6	\$2100	\$12600
Total			\$18 020

2.3.2.3 OPERATIONAL COST

These are costs related with the support and administration of a business on an everyday premise (Madevan, 2009). For the system to run efficiently each and every day some costs have to be incurred, these include maintenance costs and the expenses which will be incurred when buying additional new equipment.

TABLE 2. 5 OPERATIONAL COSTS

Internet	2018	2019
Hardware maintenance	700	500
Software maintenance	450	600
Training Cost	300	-
Operational Cost	1250	1300

2.3.2.4 BENEFITS

The system comes with many advantages and these are divided into tangible and in-tangible benefits.

2.3.2.5 TANGIBLE BENEFITS

These are advantages of the system which can be calculated and traced back. In simpler terms tangible benefits can be quantified in monetary value (Ness, 2016). The new system reduced cost such as labour and stationery which are high due to the manual set-up.

TABLE 2. 6 TANGIBLE BENEFITS

Description	2018 Benefits	2019 Benefits
Reduction in Stationary	850	1020
Reduction in labour cost of hiring consultants from other countries	50000	65000
Estimated decrease in other expenses	5000	7000
Total	55850	73020

2.3.2.6 INTANGIBLE BENEFITS

Intangible benefits are those which are not quantifiable nor are they traceable but significantly they improve the operation of the organization Phillips (2002). These reimbursements include:

- Users were fully satisfied by the introduction of the system hence their loyalty is guaranteed
- Employees now work under high morale due to elimination of unnecessary burdens of long queues
- The manual system wasted time for both the patients and the employees but now that time can be used for other productive activities
- Improved relationships between the users and the employees

Betterment between user and employee base enhanced the organization's goodwill which is a very fundamental asset in the business

2.3.2.6 COST BENEFIT ANALYSIS

This was done so as to make an informed decision if introduction of the new system would actually be profitable in the long run. Cost benefit is just comparison between all total costs

incurred and the income which the system generated to see if a reasonable profit was made (Pearce, Atkinson, 2006). Payback period, return on investment, net present value makes up a cost benefit analysis.

TABLE 2. 7 COST BENEFIT ANALYSIS

Description	2018 \$	2019 \$
Estimated Benefits		
Tangible Benefits	55850	73020
Total	55850	73020
Estimated Cost		
Development Cost	18020	-
Operational Cost	1250	1300
Total	19270	1300
Profit or loss	36580	71720

The anticipated profit in the initial year was \$36580 and would increase gradually to \$71720. This was viewed as being favourable and the implementation of the system was considered as being economically viable. However, payback period, net present value and return on investment had to be calculated as well.

2.3.2.8 PAYBACK PERIOD

This is the time taken by an invested project to generate back all the capital which was used to start up the project. It is the time needed to pay back the capital invested when the project was being implemented (Crosson, Needles, 2007). For the project to be considered viable it should have a shorter timeframe for returning the invested funds. It is calculated as follows:

$$\text{Payback} = (\$18\,020 / 55850) * 12$$

$$= 4 \text{ months}$$

Having calculated the payback period, it is shown that 4 months is very ideal as the invested funds would be repaid in a short space of time.

2.3.3 SOCIAL FEASIBILITY

Social feasibility is carried out to foresee if the proposed system would be socially accepted and if the end users would readily adapt it (Badiru, 2009). The system should be user friendly and it should lessen the burden on patients and not further strain them. The stakeholders who are mainly involved in this project are the MOHCC and end users/citizens.

To the MOHCC the introduction of the system would lessen the burden of having to deal with long queues and impatient patients. Moreover, less paperwork means the job is easy to do and hence can be done effectively in a very short period of time. Manipulation of data is quick and easy; time is then used to do other useful tasks. However, some of the employees fear that they are going to face retrenchment since the system requires less manual labour. They are going to be assured that no one is going to lose his/her job.

Employees display a positive attitude to the implementation of the new system. To the users the introduction of the system has many positive attributes. To start with no patient would have to wait in a long queue. Patients will save money and time for doing other necessary activities. The platform will be easily accessible making it easy for the users. Furthermore, the system is highly confidential and patient privacy is guaranteed. Users are highly expectant of the new system and cannot wait for the system to be launched. In brief after social feasibility was carried out it is shown that socially the project was viable.

2.3.4 OPERATIONAL FEASIBILITY

Operational feasibility explains how the system will be used after it is implemented (Shelly, Rosenblatt, 2009). It seeks to expatiate how well the users understand and use the developed system, if it satisfies all the needs of the users. It also aims at justifying how the system solves all the problems which were being previously encountered by the manual set-up.

Some of the questions which were answered by operational feasibility include:

- After it is developed, will the system continue to operate as planned
- Will all the problems which were being faced previously by the manual system be solved by the introduction of the system at hand
- Does the system address all the needs mentioned at the requirements analysis?

After operational feasibility was undertaken all involved stakeholders showed a keen interest. Employees were fully aware that slight changes might arise and were ready to embrace these

changes. The display of acceptance by both the employees and the end users showed that the system will be operational after it is implemented.

In conclusion having analysed technical, economic, social and operational feasibilities it was shown that the system will be feasible. All the technical aspects of the project were favourable to the set-up and operation of the system. Also, the economic aspect reviewed a short payback period, a positive net present value and a high return on investment hence making the economic feasibility viable. Socially both users and employees were in support of implementing the new system and the system showed that it will be in a good operational mode for a long time. However, in every investment hiccups are likely to be experienced thus paving way for a risk analysis to be done.

2.4 RISK ANALYSIS

Risks are unwanted obstacles which might arise in the initiation and operation of the system (Bartlett, 2004). Risk analysis is important as it enables the researcher to identify all possible hindrances to the running up of the system and provide solutions or alternatives before the problem hits.

Some of the questions which raised are:

- What might actually go wrong during the whole process
- What are the chances that the problem or problems might occur
- What will be the end result of that risk, what will be its effect?
- What will be the solution or will there be an alternative to that particular problem?

A risk analysis cycle was constructed and it consisted of the potential risk, the likely hood of its occurrence, the impact it will cause and the solution to counter effect that risk:

TABLE 2. 8 RISK ANALYSIS

Potential Risk	Probability of occurrence	Risk impact	Counter Measures
Lack of resources and\or technical	minimum	Delaying of activities making it difficult for the	Before development occurs all the assets which are to be used must be in place and running effectively and all the technical expertise should be available.

expertise during the initiation stage		deadline to be met	Moreover, a fund should be set aside to cater for all unplanned expenses which might arise unexpectedly
Absence of team work among the members	low	Hiccups in the process of delivering the system for example the implantation of the system might take a longer time than that scheduled or a wrong system might be delivered	Installing a sense of team work among the involved members to make work easier and quicker as they help each other
Breakdown of objectives during development	average	Delayal in the initiation of the system	
Resilience by end users	minimum	The system might prove useless if many people do not use it	Fully explain to the end users the advantages of the system as compared to the old manual set up.

All potential risks to be expected were analysed and the corresponding counter-measures were suggested. It was shown that the development of the system should continue as any unpredictable risks which can arise in the near future would have a solution in place.

2.5 STAKEHOLDER ANALYSIS

These are the people who are affected by the introduction of the new system and partake in the daily operation of the organization (Weiss, 2008). This particular analysis looks at the affected stakeholders and emphasizes how they will be affected. Also, of particular interest is that the interest of one particular stakeholder must not override that of another. Stakeholder analysis is important as it identifies each stakeholder's interest and those who have to be informed regularly on the progress of the implementation and operation of the system. It also points out some negative attributes some of the stakeholders might have on the system. Major stakeholders who were identified are the end users, expert doctors and the MOHCC management. The table below identifies some of the interests of each stakeholder, their risks, addresses the interest and the possible reaction likely to be encountered.

TABLE 2. 9 STAKEHOLDERS ANALYSIS

Stakeholders	Interest	Risk	Address interest	Reaction
Patients / users	Avoid queues, avoid travelling long distances	since the patients are familiar with the current system whereby they interact face to face with doctors it might be difficult for patients to accept the results of the system.	Coming up with framework that solve problems faced by patients	Since they is no more consultation fee the patients/ end users are happy about the system development.
Doctors (Lifestyle Diseases Doctors)	It is very easy and fast to make a decision through the use of a system rather than	Some doctors might feel threatened by implementation of the system.	Coming up with framework that solve problems faced by doctors in making decisions. Also reduced long	

	using information on papers.		queues and cut long working hours.	
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2.6 WORK PLAN

According to (Zambruski, 2008) a work plan compares the time project to the available technical expertise and resources to see if it is practicable and reasonable. It is constructed after schedule feasibility was done to foresee if the proposed deadlines were going to be met. A work plan identifies when and how long a certain activity will take.

TABLE 2. 10 TIME SCHEDULE

Activity	Description	Duration in weeks	Anticipated deliverables
Proposal	Problem definition and objective crafting	1	justification of why the system should be developed
Planning	focuses on the business value, feasibility studies and also risk management	2	feasibility and risk analysis report and also a time frame
	Manual system analysis which was being used,		
Design	Architecture design, database design, menu designs of the new firmware	2	System design
Implementation	Installation and training of doctors and patients	2	System launching

Maintenance and evaluation	Evaluation and maintenance of the system	Ongoing	Report review
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2.6.1 GANTT CHART

A Gantt diagram is simply a bar graph showing a time frame (Murphy, 2006). It illustrates how long each activity will take and aims to meet the time scheduled for each activity so that it does not prolong and take the time intended for other activities. It makes sure that the overall time schedule will not be affected.

TABLE 2. 11 GANTT CHART

Phases	Time(weeks)									
	1	2	3	4	5	6	7	8	9	10
Proposal										
Planning										
Analysis										
Implementation										
Maintenance and evaluation										
Documentation										

The new system will continue to be documented, evaluated and maintained as long as it is being used.

2.7 CONCLUSION

After all the components of the planning phase which are business value, feasibility study, risk analysis, stakeholder analysis and work plan were fully scrutinized, it was clearly seen that the

introduction of the system would be viable. Having completed the planning phase, the next stage was the analysing phase where the manual system which was being used in the organisation was analysed in full details.

CHAPTER THREE: ANALYSIS PHASE

3.1 INTRODUCTION

Analysis phase is the stage whereby the old system is thoroughly analysed. Facts on the old system are generated by using data gathering methodologies which in this case are observations, questioners and interviews. The use of a data flow diagram, activity diagram and context diagram will allow the old system to be evaluated. Furthermore, this phase also incorporates short-comings of the current system, alternative solutions and requirement analysis.

3.2 INFORMATION GATHERING METHODOLOGIES

Information gathering methodologies are ways of collecting relevant information on the old system so as to develop a more advanced and comprehensive system (Lazar, 2001). The current system's whole process was obtained from gathering data from all the stakeholders who are using the system. Two main methodologies were used and these were interviews and questionnaires which openly exposed the demerits of the manual system and also gave a platform in which the stakeholders were allowed to express what they expected from the new system being developed.

3.2.1 INTERVIEWS

Interviews are discussions in which two people participate, an interviewer who will be providing questions and an interviewee who will be answering the questions from his/her point of view (Kvale,2008). An interview can also be defined as oral communication which is a two-way between the involved parties (King, 2010). Interviews were not done specifically to patients with life style diseases patients it was done to any patient. The developer interviewed both the patients and health workers thereby providing comprehensive insight on how the manual system worked. Parirenyatwa hospital is where the interviews were undertaken and the workshop took place on the forth of January 2019 on which these interviews were done. See Appendix C for interview scripts.

MERITS OF INTERVIEWS

- Interviews allowed the developers to make decisions instantly as they provide a platform on which interviewee provide quick replies

- A lot of information was gathered from the patient users and the employees as the interviewer was able to question further when the reply seemed unclear
- Due to the flexibility of the unstructured type of interview some hidden and unclear information on the manual system was reviewed making it easier for the developer to make decisions on the new system to be implemented
- Interviewees also provided non-verbal expressions which gave the developers more insight on the demerits of the old system
- As the interviews were private in nature interviewee clearly expressed their points of views without fear

DEMERITS OF INTERVIEWS

- The level of bias was high as the developers asked some questions in such a way that the answers would be favourable and also the patients and employees could have lied or not reviewed some useful information on the old manual system
- Interviews consumed a lot of time which could have been used on some useful activities for example a lot of time was used to prepare the questions when the structured type of interview was to be done
- some of the people to be interviewed failed to turn up due to other tight schedules hence some information was lost
- It was expensive to set up the workshop on which the interviews took place

RESULTS FROM INTERVIEWS

Some of the major concerns which arose when users were being interviewed include:

PATIENTS

- Patients point out the cost factor which rose due to regularly travelling to hospitals for consultation, tests and collection of results.
- Late diagnosis of diseases due to lack of funds.
- Shortage of doctors.
- The long queues which they have to wait in before they are served.
- Poor communication they sometimes experience from the medical practitioners

HOSPITAL STUFF

- The long queues they have to save and how tiresome and demotivating it is.
- Burnout since the doctors work long hours trying to cover the gap (doctor patient ratio).
- Inefficient electronic healthy records, doctors spend time doing administrative tasks and paperwork.

In conclusion all the interviewees were in support of the development of the new system.

3.2.2 QUESTIONNAIRES

Questionnaire is a list of questions which are to be answered relevant to a particular issue at hand (Gillham, 2008). The developers structured all the questions on the old system and these were printed and distributed to the stakeholders. The stakeholders would answer the questions at their own pace and free time hence not disturbing the running of the current program. Both the open-ended type of questionnaires and the close ended type were used. Open ended questionnaires gave the respondents the freedom to answer in whichever way they wanted but when responding to close ended questionnaires they had to pick an answer from those provided. The questionnaires were deployed at the Parirenyatwa hospital randomly.

3.2.2.1 ADVANTAGES OF QUESTIONNAIRES

- Daily operations of the organisation were not disturbed as the stakeholders responded to the questions in their own free time
- A lot of information was obtained especially from the open-ended questions

The process was not expensive as no workshop was necessary

3.2.2.2 DISADVANTAGES OF QUESTIONNAIRES

- Some of the questionnaires were returned blank hence depriving the developers of some useful information
- Unlike interviews, the use of questionnaires deprived the developers of facial expressions such as the rolling of eyes
- Some of the respondents left some questions not answered and also some employees answered in a biased manner to protect the image of the organization

3.2.2.3 RESULTS OBTAINED FROM QUESTIONNAIRES

The responds provided by the stakeholders were superb and however they were few papers spoiled not more than 15 percent. The outcome from the questionnaires clearly highlighted that patients were not at all pleased by how the existing system operated and all were in support of

the new system to be implemented. The information also showed the developers what was expected from the new system.

TABLE 3. 1 OUTCOME DROM THE QUESTIONNAIRES

Question	Common answers
Are you happy with the existing system	No
How long does it take to be attended	More than 120 minutes
How do you rate the service at hospital	Poor
How many kilometres do you travel	20km plus

3.3 ANALYSIS OF THE EXISTING SYSTEM

Diagnosis is only carried out at the hospital by doctors according to the outcomes of the interviews and questioners. A person having signs and symptoms of being sick is supposed to travel to the nearest medical facility, and in the case of a rural set-up the distance might be long and unbearable. The patient visits the enquiry desk first and gets information on whom to see depending on his/her condition and pays consultation fee. A receptionist will fill in the details of the patient such as the name, age, address if it is the first time of that person visiting that particular facility. The patient's information is kept in a file and if it is misplaced the patient has to go through the same process again which is time consuming. After the receptionist collects required information, the patient proceeds to the sister in charge then she books. The patient will have to come back on the date of appointment and get diagnosed. After diagnosis the patient comes back again to collect results. Due to doctor patient ratio, patients experience long queues during all the process mentioned above. The movements of consultation, diagnosis and collection of results is time consuming and expensive.

3.3.1 INPUTS

Inputs are a type of raw data which are entered into a system so that they can be processed to produce the desired database (Chiang, Siau, Hardgrave, 2009).

The inputs of the current running system include:

- Medical form with details such as the patient's name, age, residential address, contact details.
- Medical forms used by doctor to write down tests.
- Payment forms.

3.3.2 PROCESSES

Processes are conversions of inputs into outputs (Chiang et al, 2009).

The processes of the current system include:

- Entering of the patient's details in a file
- Booking appointment for tests
- Payment for the diagnoses
- Approval by the doctor to see the patient

3.3.3 OUTPUT

Outputs are the outcome of processed inputs (Chiang et al, 2009).

The outputs of the old system include:

- Doctor's diagnoses on the patient (results).
- Prescription.
- The treatment.

3.4 PROCESS ANALYSIS

Process analysis is the systematic and sequential way of explaining how a particular thing runs or how it is done (Roebuck, 2011). Process analysis was done to fully review how the old manual system was running and an activity diagram was used for this.

3.4.1 ACTIVITY DIAGRAM

Basically, an activity diagram is a flow chart which shows all the processes from one activity to another (Balagatabi, 2008). The processes are reviewed in a step by step approach using this basic flow chart and the activities are the daily operations of the current system.

The activity diagram is as follows:

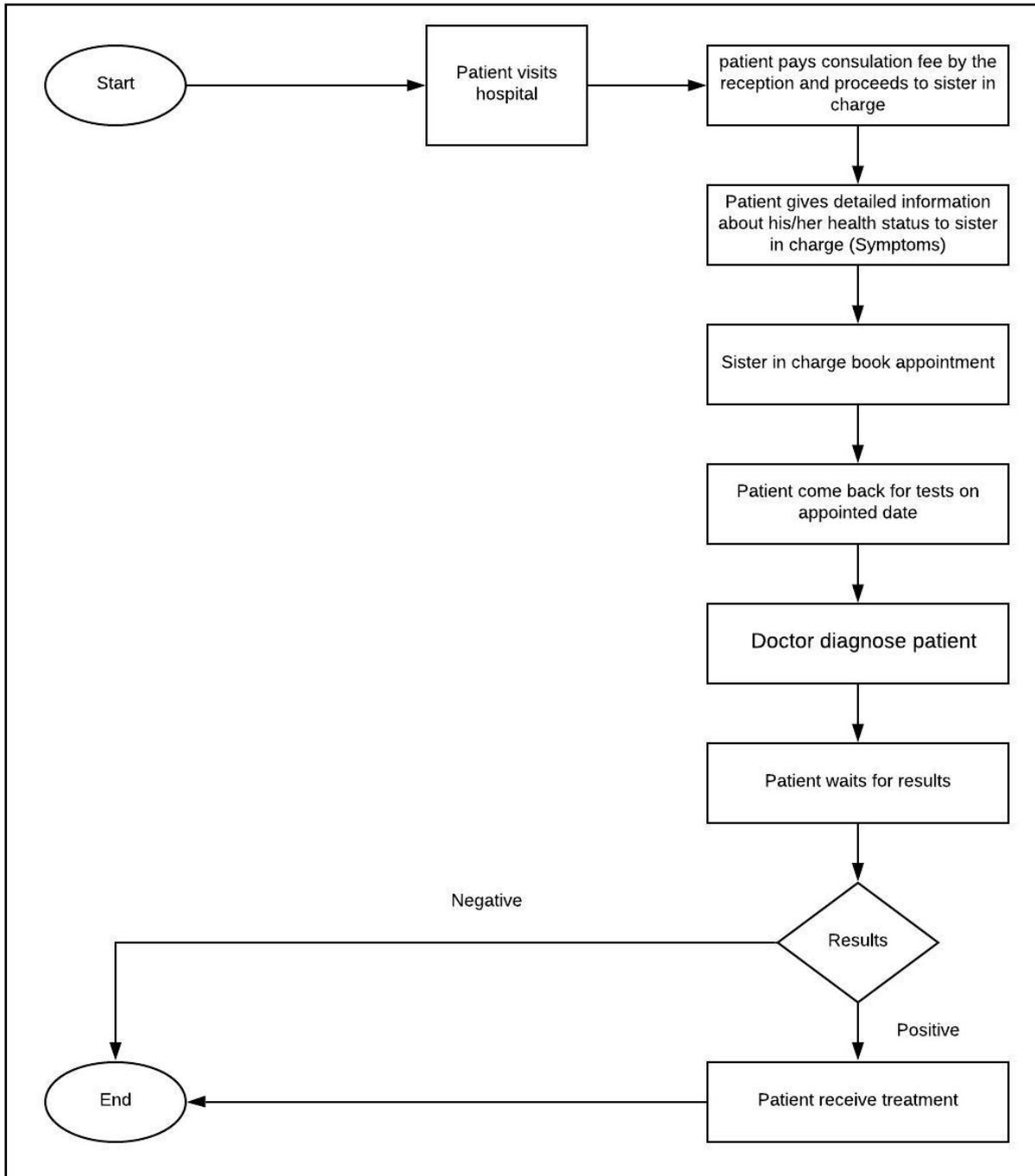


FIGURE 3. 1 ACTIVITY DIAGRAM

3.5 DATA ANALYSIS

Data analysis is the evaluation of every segment of the available information using logic and analytical skills (Grbich, 2012). The technique inspects data using methodological computations. Information from various sources was gathered, revised and analysed coming up with a detailed conclusion on the daily operation of the current system. To undertake data analysis a context diagram and a data flow diagram were used.

3.5.1 CONTEXT DIAGRAM

A context diagram is a summary image of all the whole system's functions (Russell, Cohn, 2012). Context diagram defines the boundaries between the system and its environment reviewing its main entities which co-work with the manual current system (Chonoles, Schardt, 2011). The context diagram has the system at hand at its centre surrounded by the entities which work together with the system.

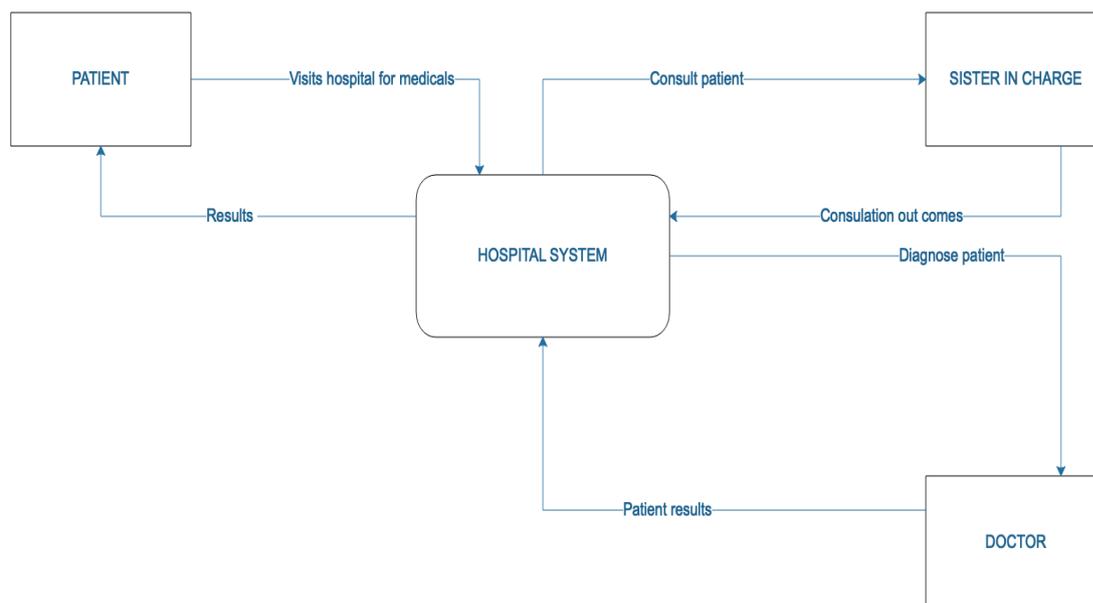
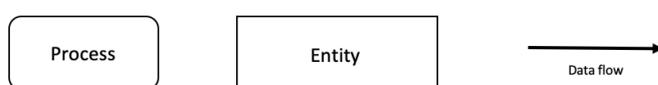


FIGURE 3. 2 CONTEXT DIAGRAM

Key



3.5.2 DATA FLOW DIAGRAM

A data flow diagram is portrayal step by step travel of data among various components of the system (Shelly, Rosenblatt, 2009). It is typically used in system modelling (Tilley, 2016). The data flow diagram was used to make an overview of the system.

Having analysed the existing system, the developers came up with the following data flow diagram:

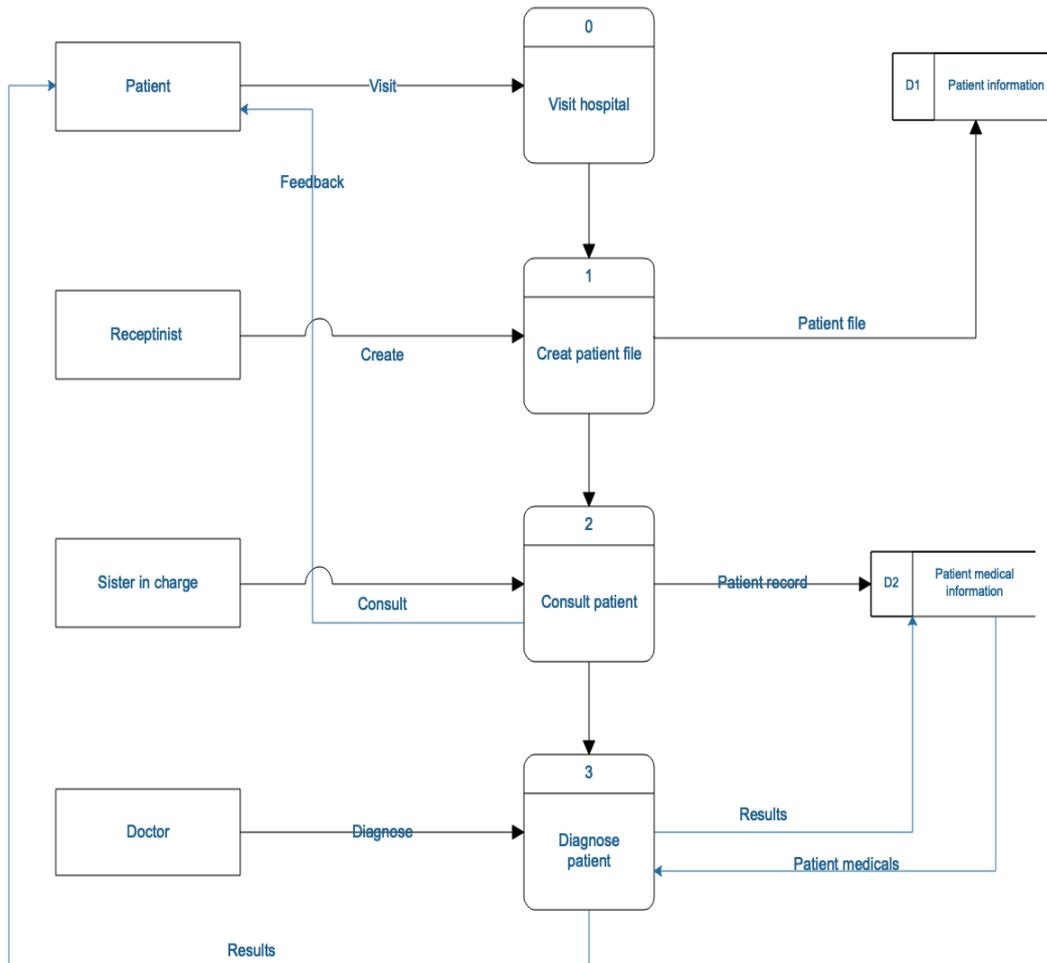


FIGURE 3. 3 DFD

Key



3.6 WEAKNESS OF CURRENT SYSTEM

These are drawbacks or state of being weak the current system Maier (2007). Analysis of the current system through interviews, questioners, activity diagram show how the system works. Following are the weakness of the current system:

Every process is done manually.

- Most patients have to travel long distances to be diagnosed and this is expensive and time consuming and it also puts a strain on an unwell being.
- The manual system is associated with long queues when patients have to first confirm at the enquiry desk and also when waiting to see the doctor.

- The system relies heavily on a lot of paperwork hence the organization loses revenue in buying the stationery and also for the printing expenses.
- Patients' confidential information is easily accessed by third and unauthorized parties hence making the patients insecure.

Most of the employees are demotivated by the operations of the manual system due to the long queues and some rude patients encountered.

3.7 EVALUATE ALTERNATIVES

This stage focused on the how part of delivering the new system and three main alternatives were considered. Firstly out-sourcing is whereby the organization hire external expertise to develop and implement the new system. The second alternative is called in-sourcing and this implies the use of the organization's already existing I.T specialists for the development and implementation of the system. Thirdly is where by the existing system could be improved such that its negativities are reduced or actually eliminated. Each particular alternative has its own advantages and disadvantages and these were analysed fully. The results were weighed against each alternative so as to make an informed decision on the choice of the alternative to be used.

3.7.1 OUTSOURCING

Out-sourcing is a process whereby an organization contracts services externally on a contract basis for the improvement or development of a system (Baltzman, 2015). Most companies provide support and maintenance after selling software for example pastel. Following are merits and demerits of out-sourcing.

3.7.1.1 MERITS

The new system implemented will likely be of a very high quality since the contracted companies are experts.

- There will be no need for the organization to purchase additional assets for the development and implementation of the new system which would be useless after the system has been implemented as the contracted companies would utilize their own resources
- The new system would be implemented in a very short space of time unlike when undertaking total in-sourcing

- Employees would need skills on the running of the system only and hence no training work-shops would be necessary for them on the development and implementation of the new system

3.7.1.2 DEMERITS

The major disadvantage of out-sourcing is that its costs are way above the proposed budget which was calculated for this new system. Companies charge for all the services to be provided and comparing this amount to that of total sourcing, there was a very huge difference which could be used for other relevant processes.

- The organisation's confidential information would be at risk since some of the information will have to be reviewed for the outsiders to better able implement the system
- If the implemented system failures or experiences errors in the future only those who developed it will be able to fix it meaning the organisation will largely depend on the contracted companies in the future and will continue losing money to them
- The system's copyright would not be owned by the organisation but it would be the property of the contracted companies
- The contracted developers can be capable of leaving a loophole when developing the new system which they can use when the system is running for hacking the organization's database hence putting the organization at risks

This first alternative was analysed fully together with its advantages and disadvantages. The disadvantages out-weighed the advantages, hence this alternative was denied. It was considered to be too costly and furthermore would put the organisation at a very high risk in the future.

3.7.2 IMPROVEMENTS

Improvement is a process of analysing the current system and making it better by reducing its negativities (Mezak, 2006). The current system was mostly manual meaning almost every process was undertaken by human effort for example the data entry and the diagnoses processes. The manual system had many insecurity discrepancies and to improve such a system was deemed impossible and impractical. Moreover, it would be time consuming to retrieve information manually so as to improve that system. All the negativities of this current system

were viewed as being difficult to eliminate. The old system was whatsoever not associated with the advancement of technology and the only possible solution would be to computerize the whole system. Due to the fact that this alternative of improving the system was ruled out in its early stages it was therefore unnecessary to analyse its advantages and disadvantages. Maintaining the old system and trying to improve it would not solve the problems being faced rather the advancement in technology had to be embraced.

3.7.3 DEVELOPMENT

Development is viewed as the use of the available resources and other additional assets which can be purchased by the organization using internal expertise to develop and implement a new system (Mezak, 2006). There will be no need of hiring external developers but rather the development of the new system will rely solely on the internal developers, a process also known as total sourcing. Development was analysed and it also had its advantages and disadvantages.

3.7.3.1 ADVANTAGES

The major advantage is that development is way less costly than out-sourcing.

Because the new system would be developed and implemented by the organization's internal developers it means the organization would fully own the system, hence giving the organization total ownership meaning the power to upgrade or modify the system at any time deemed necessary

Enhancing of the organization's developing team's skills as they will learn new and advanced skills which will not be necessary in developing this new system but will be used in other relevant projects as well.

In case of an error or failure of the system in the future it would be much easier to fix it and the developers would be internally available from the organization

Because the organization will be using its own developers there will not be insecurities about issues such as hacking by outsiders

There will be high probability that the internal developers will develop exactly what the organization needs as they also know what is needed

3.7.3.2 DISADVANTAGES

It would take time for the system to be developed and implemented as the organizations develop would need to undergo some training to advance the skills so as to be better able to development a standard system

They are possibilities that developers might underrate some discrepancies which could create problems in the future

In-house development out weighted the other two alternatives and it is viewed as the preferred alternative. The organization would however have to purchase additional assets and organize a training workshop for its developers but in overall total sourcing was viewed as the best way to go.

3.8 REQUIREMENTS ANALYSIS

Requirements analysis are techniques of finding out whether or not the system will meet what the users require (Mezak, 2006). The process involves reviewing whether the identified user requirements are meet and satisfied fully so that the demerits of the old manual system are completely eliminated by the introduction of the new system. It was essential to categorize the user requirements into two, functional and non-functional requirements.

3.8.1 FUNCTIONAL REQUIREMENTS

Functional requirements phase clearly points out how the system is supposed to work out (Aurum, Wohlin, 2006). It delineates the functioning of the system, reviewing how it will satisfy the users' needs. Some of the functional requirements include:

Ability of the system to allow a user to create an account easily

User logging authentication

User's input of the signs and symptoms being experienced in the system easily

Ability of the system to carry out a diagnose test successfully

The system should give the user list of doctors in line with the diagnosed

The system should readily facilitate the user to make a payment for the services received disease.

There should also be a platform on the system which allows users to book appointments

3.8.1.1 CASE DIAGRAM

Case diagram is a graphical illustration which shows the different interactions in a system set-up so that the desired goal is achieved at the end (Gross, 2005). The methodology handles system requirements such that they are reviewed, analysed and organised.

The case diagram is as follows:

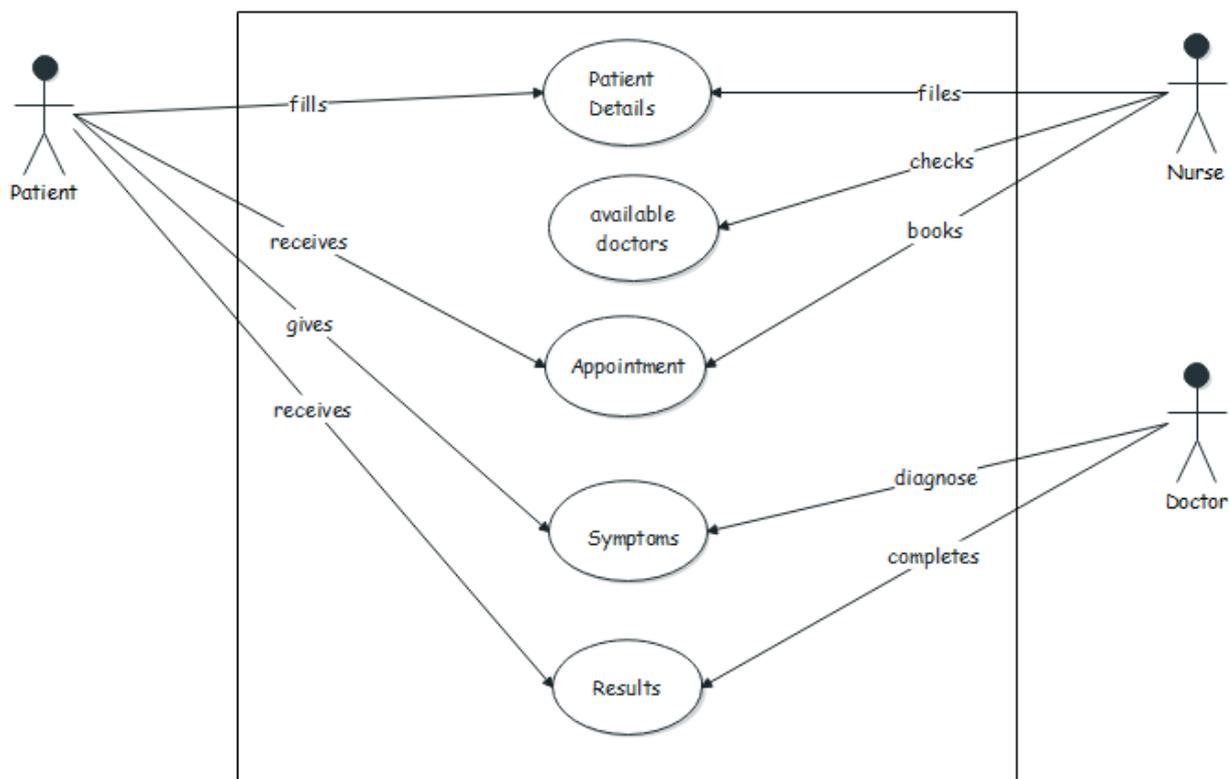


FIGURE 3. 4 ACTIVITY DIAGRAM

Key



3.8.2 NON-FUNCTIONAL REQUIREMENTS

Non-functional requirements are those attributes of the system which are not direct attributes of the system but rather support the system in such a way that the functionality of the system

is achieved (Aurum, Wohlin, 2006). The operation of the system can be judged using these non-functional requirements.

The system should be user friendly, users should experience no difficulty in using it

It should be easily compatible with other platforms

It should readily undergo modification and extension whenever need arises

It should be a confidential and private platform where no user's or the organization's private information leaks out

The response of the system should have a reasonable time lapse

The developed system must be very reliable

3.9 CONCLUSION

In conclusion this phase reviewed all the relevant information on the old system. Information gathering methodologies were of vital importance as they reviewed a lot on the old system. The old system was fully analysed using the inputs, processes and outputs involved. This section also touched on process analyses which demonstrated how the manual system ran, also weaknesses of the current system were reviewed on this section. Evaluation of alternatives was also done. The next chapter aims at the development of the proposed system.

CHAPTER FOUR: DESIGN PHASE

4.1 INTRODUCTION

The design phase focuses on the details of the new system, illustrating the system's components, interfaces and behaviour (Ousterhout ,2018). The design phase indicates system components and how it works. The implementation of the functional and non-functional requirements is clearly explained in this section hence the “how” part is fully described. System design, framework design, menu design, pseudo code, interfaces and security designs are well elaborated in this section. Furthermore, database design is fully explained to show how relevant information is going to be stored in the database.

4.2 SYSTEM DESIGN

Development of the new system should match what the users require. System design is the process of outlining the architecture, interface, modules and data of the new system to satisfy stated requirements (Ousterhout, 2018). The system should have certain characteristics for it to be acceptable to the users. The positive characteristics include flexibility, compatibility, security, usability, maintainability to mention just a few. System design is illustrated by the use of diagrams showing the flow of information or data within the system and also the entities which are involved. To attain this a Context diagram and Data Flow Diagram were used.

4.2.1 DESCRIPTION OF PROPOSED SYSTEM

Registered patients query in major symptom at first then the system shows possible symptoms in line with the first symptom queried in. Queried symptoms return results either lifestyle disease free or early stage or dangerous stage. The chances of having a disease is in form of percentage, 0% to 30% life style diseases free, 40% to 60% early stage and 70% and above critical stage. If the percentage is less than 30% the patient will be lifestyle diseases free. However, if the results are above 20% but not greater than 30% the system will recommend the patient to visit nearest hospital or clinic to check if he or she suffering from other diseases. At an early stage the system gives recommendations on how to reduce the risk of diagnosed diseases at the same time suggest specialist doctors in line with diagnosed diseases. If the results are at a critical the system suggests doctors in area of specialty of diagnosed diseases and recommends the patient to see one of them as soon as possible for diagnosis. Patients book appointments only on vacant dates and the doctor manages the appointments. After actual diagnosis the doctor uploads results and prescription if necessary.

4.2.2 CONTEXT DIAGRAM

Context diagram links the framework to its external entities (Chonoles, Schardt, 2011). It demarcates the framework from the environment from which it is being operated. The diagram is made up of a system at the centre and then surrounded with other entities henceforth illustrating the interaction between the system and its entities.

The following is the Context Diagram which was drawn up:

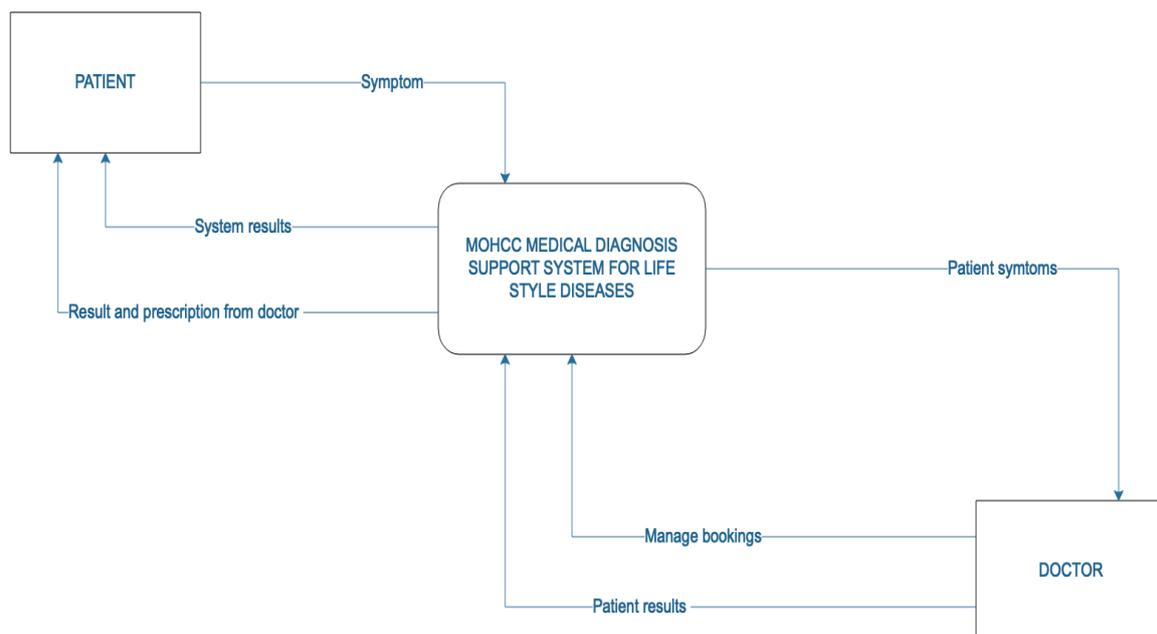
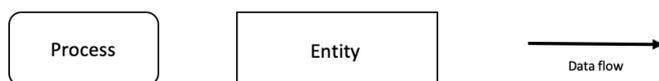


FIGURE 4.1 CONTEXT DIAGRAM

Key



4.2.3 DATA FLOW DIAGRAM

DFD is a process centric illustration depicting four major components which are data stores, data flows, entities and processes hence making the comprehension of information flow easier within the system (Shelly, Rosenblatt, 2009). Basically, a DFD is a graphical illustration of the movement of data within that particular specified system as a whole, all the major processes in the system are represented. The following data flow diagram shows numerous processes and

data stores with the flow of data in and out of each particular process and data store and the representation of this to the appropriate stakeholder when request arises.

The Data Flow Diagram:

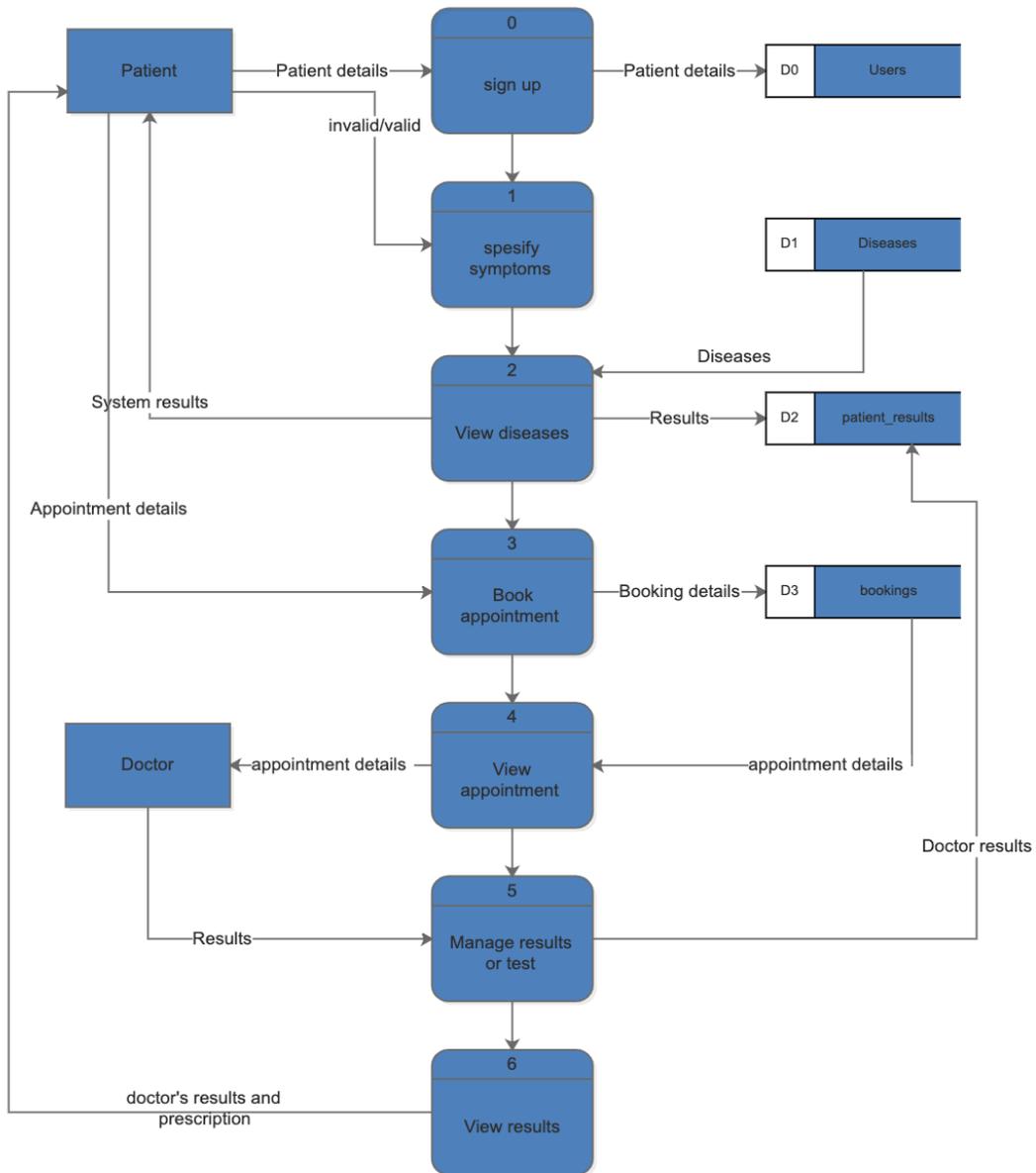
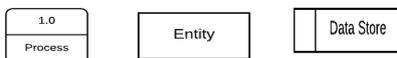


FIGURE 4. 2 DFD

Key



4.3 ARCHITECTURAL DESIGN

Demonstrates interconnection between software and the hardware that is to be used in the development and implementation of the new system (Cervantes, Kazman , 2016). Architectural design demonstrates the layout of hardware, software and all related infrastructure in an environment. The architectural design of the new system was done in such a way that the connections of each component were clearly reviewed thereby making the reduction of system blockages easy. Architectural design also encompassed the identification of all main components in the new system.

The diagram below demonstrates the architectural design of the new system:

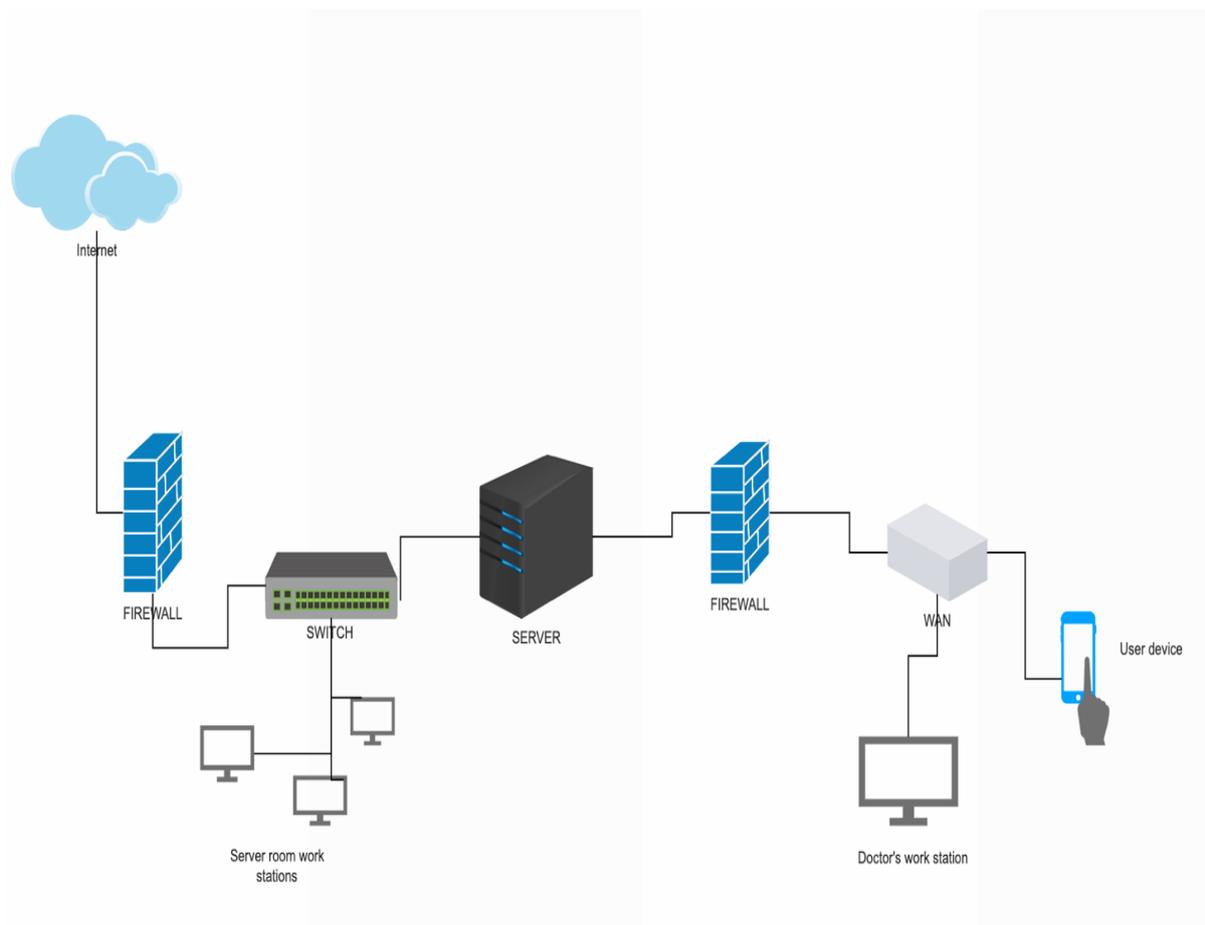


FIGURE 4. 3 ARCHITECTURE DESIGN

4.3.1 THE CLIENT SERVER APPROACH

This approach is designed for end users (patients and doctors) on the architectural design. The clients use the client server to gain access of resources such as results from the doctor, results

generated by the system, recommendations on how to reduce risk of lifestyle diseases and list of doctors from the server. Smart phones, laptops and desktops also known as clients send request to the server to access the data or information then client and server communication and connection is attained through the use of network. The server then verifies if the request is valid and if so it carries out the request thereby serving the end user. The server is also capable of sending a request to an end user. The client server approach is used because it makes it easy for administrators to manage and maintain the server. Also, the use of this approach centralizes data.

4.4 PHYSICAL DESIGN

Physical design is a process in which an analytical model is transformed into the actual/real one (Ousterhout, 2018). It displays the arrangements of components and how they communicate to each other within the system.

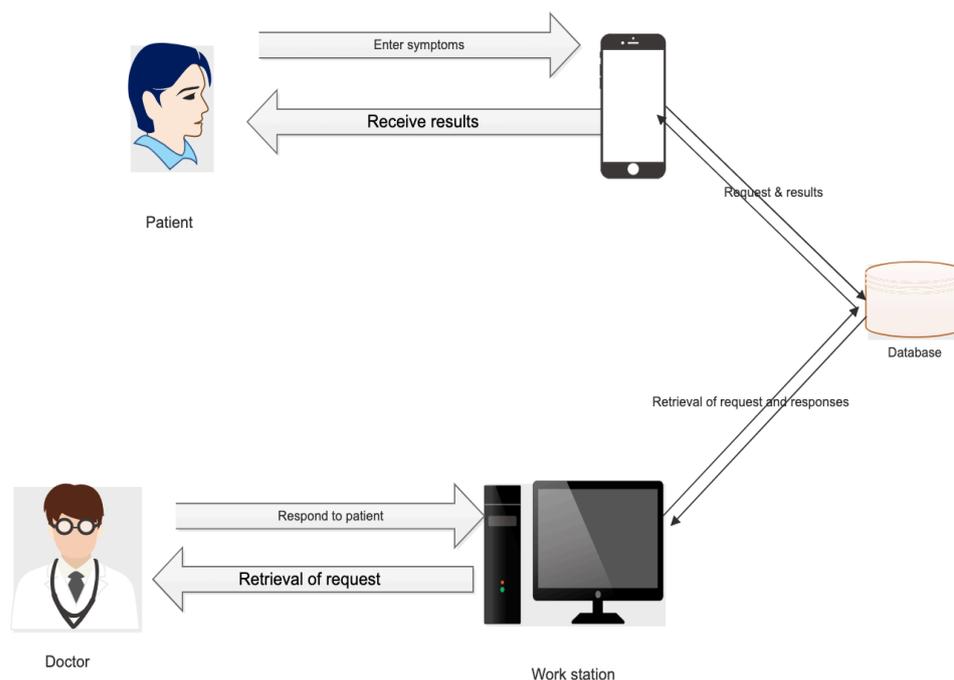


FIGURE 4. 4 PHYSICAL DESIGN

4.5 DATABASE DESIGN

This is a technique of making a fully understandable data model which will encompass all the entities and attributes of the system hence making the data model a comprehensive one

(Hopkins, 2010). Required physical and logical design decisions and all storage parameters necessary to create a plan in data definition language to be utilized in generating a database were encompassed in the data model.

DATABASE TABLES:

TABLE 4. 1 USERS

Name	Type	Comments
id	Int (11), AUTO_INCREMENT	Primary key
name	varchar (50), Not Null	Admin, Doctor and Patient name
surname	varchar (50), Not Null	Admin, Doctor and Patient surname
sex	varchar (4), Not Null	Gender
national_id	varchar (15,18), Unique, Not Null	Identity
dob	varchar (8), Not Null	Date of birth
region	varchar (20), Not Null	State
password	varchar (255), Not Null	Private code
datecreated	Datetime (6), Not Null	Date user create account
role	varchar (6), Not Null	User's role

TABLE 4. 2 CITIZENS

Name	Type	Comments
id	Int (11), AUTO_INCREMENT	Primary key
name	varchar (50), Not Null	Admin, Doctor and Patient name

surname	varchar (50), Not Null	Admin, Doctor and Patient surname
national_id	varchar (15,18), Unique, Not Null	National identity
dob	varchar (8), Not Null	Date of birth

TABLE 4. 3 BOOKINGS

Name	Type	Comments
id	Int (11), AUTO_INCREMENT	Primary key
patient_name	varchar (50), Not Null	Patient name
patient_lastname	varchar (50), Not Null	Patient surname
doc_id	varchar (20), Not Null	Doctor Identity
diseases	varchar (30), Not Null	Diseases patient is suffering from
stage	varchar (30), Not Null	Percentage diagnosed
date	date	Appointment date
time	varchar (30), Not Null	Appointment time
status	varchar (5), As defined, Not Null	If 1 appointment is still active, if 0 appointment expired

TABLE 4. 4 ATTENDED

Name	Type	Comments
id	Int (11), AUTO_INCREMENT	Primary key
patient_name	varchar (50), Not Null	Patient name
patient_lastname	varchar (50), Not Null	Patient surname
diseases	varchar (30), Not Null	Diseases patient is suffering from
date	date	Date patient attended to
doc_id	varchar (20), Not Null	Doctor Identity number

age	varchar (5), Not Null	Patient age
region	varchar (20), Not Null	Patient region
sex	varchar (6), Not Null	Patient gender

TABLE 4. 5 DISEASES

Name	Type	Comments
id	Int (11), AUTO_INCREMENT	Primary key
symptom	varchar (50), Not Null	Symptoms
value	varchar (2), Not Null	Value each symptom carries

TABLE 4. 6 RESULTS

Name	Type	Comments
id	Int (11), AUTO_INCREMENT	Primary key
Patient_name	varchar (20), Not Null	Patient Name
Patient_lastname	varchar (20), Not Null	Patient surname
Identity_number	varchar (13), Not Null	National id
Results	varchar (225), Not Null	Results from doctor
prescriptions	varchar (225), Not Null	Medication
quantity	Int (100)	Medication quantity
how_to_use	varchar (225), Not Null	How to use meds
date	timestamp	Date posted
Doc_name	varchar (225), Not Null	Doctor name
Doc_surname	varchar (20), Not Null	Doctor surname
Doc_id	varchar (30), Not Null	Doctor id

4.5.1 ENHANCED ENTITY RELATIONSHIP DIAGRAM

This is a diagrammatic illustration showing all the entities and how they are interlinked to each other in the system (Hopkins, 2010). The diagram has more features than the usual entity relationship model. Completeness and disjoint constraints as well as subtype discriminator, super type and subtype relationship are displayed using this diagram.

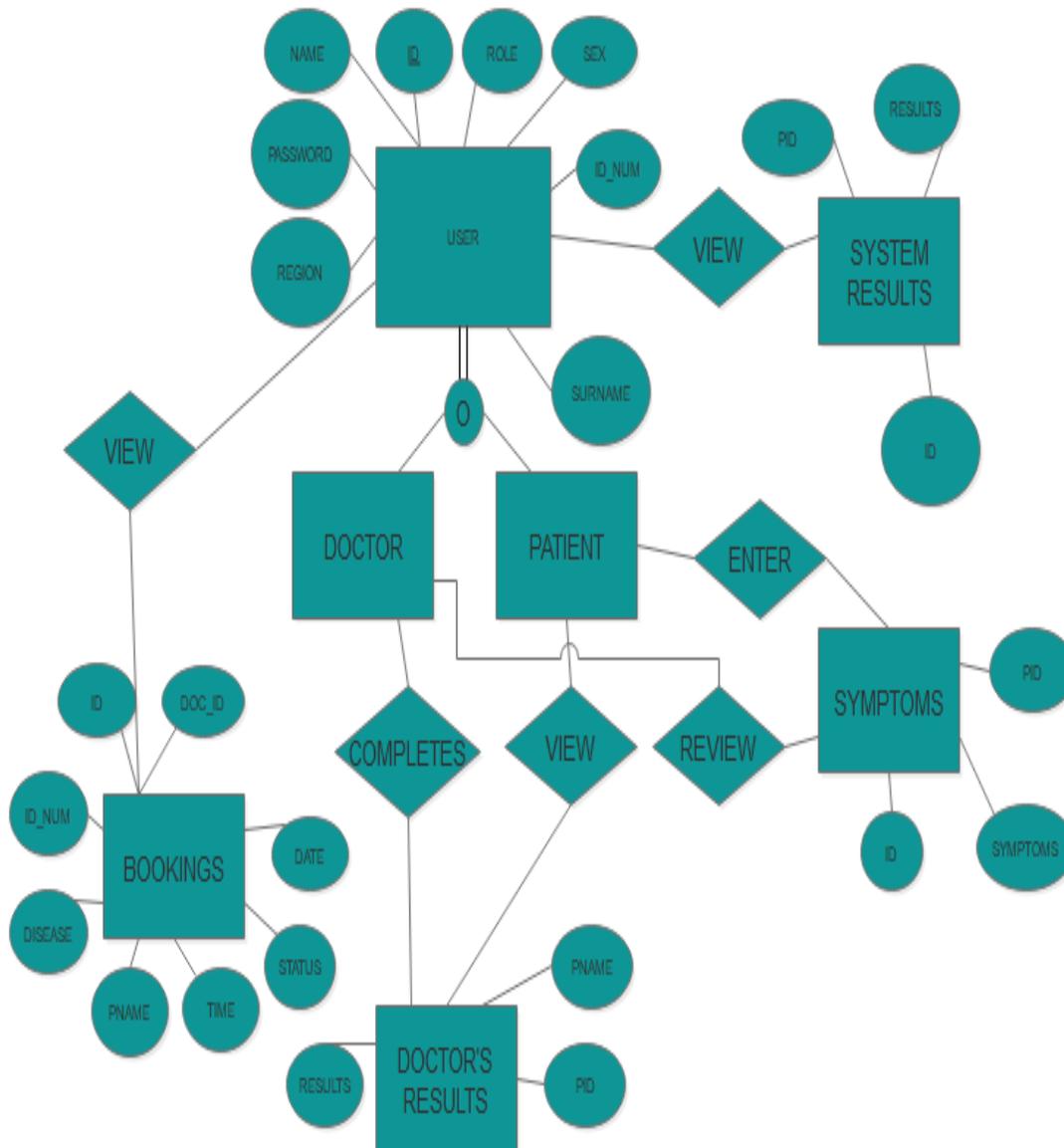


FIGURE 4. 5 EER DIAGRAM

4.6 PROGRAM DESIGN

Program design is a process of designing and creating new system modules (Liu, 2013). It entails the interrelationships among the various modules. A package diagram, a sequence diagram and class diagram, modelled so as to attain a functional program design and to create these diagrams Unified Modelling Language (UML) was used.

4.6.1 CLASS DIAGRAM

A class diagram is a static structure graphical portrayal of the structure of the new system (Abdullah, 2015). It demonstrates the new system's connections, traits, classes, techniques to mention just a few. It is within the UML and it summarises the modules of the new system and the relationship between these modules. The class diagram also shows the cardinality which is between these modules.

The Class Diagram:

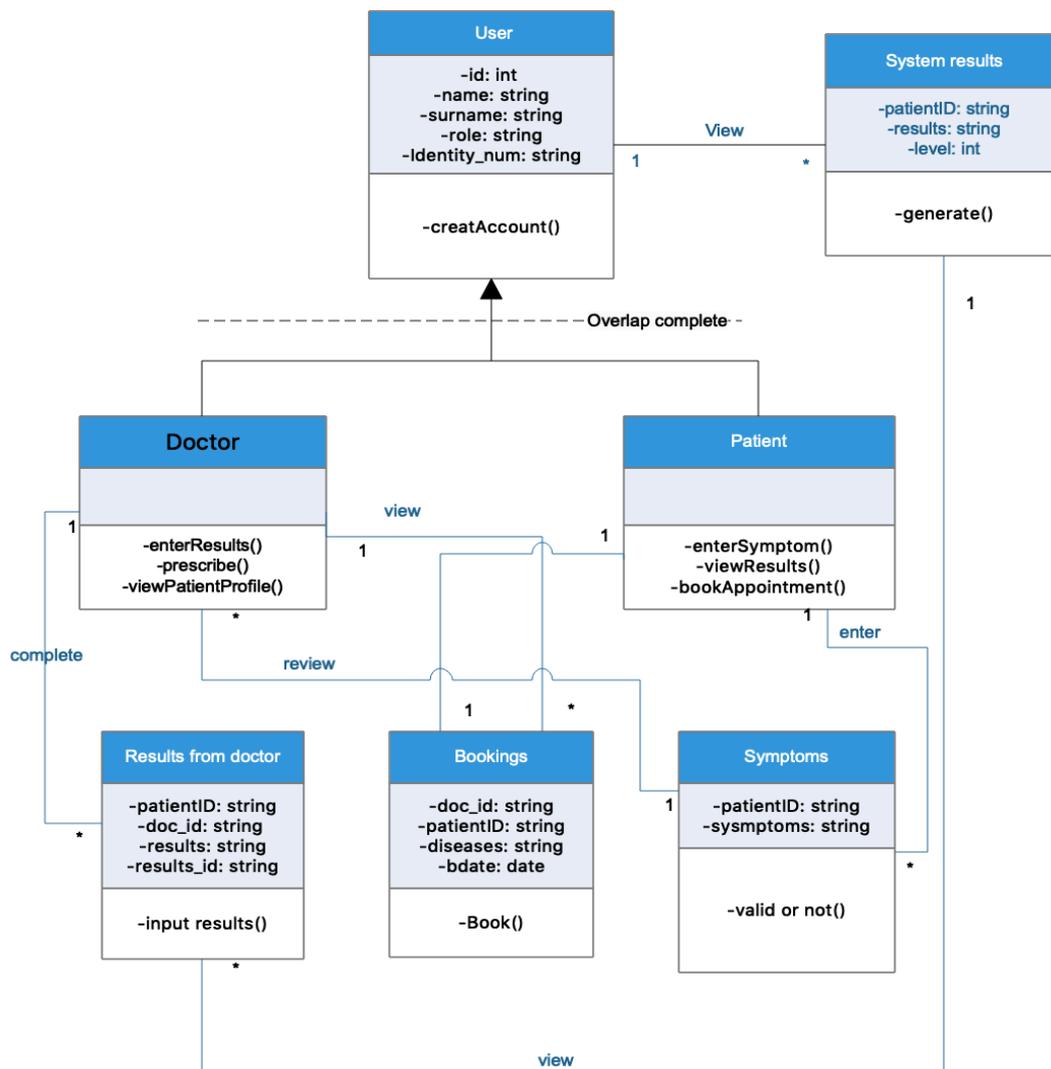


FIGURE 4. 6 CLASS DIAGRAM

4.6.2 PACKAGE DIAGRAM

This is a diagrammatic representation describing the packages forming a model in the U.M.L. it demonstrates the arrangement and organization of elements Abdullah (2015). It also shows how the modules in the new system are grouped into packages collaborating to fulfil the requirements of the system.

The Package Diagram:

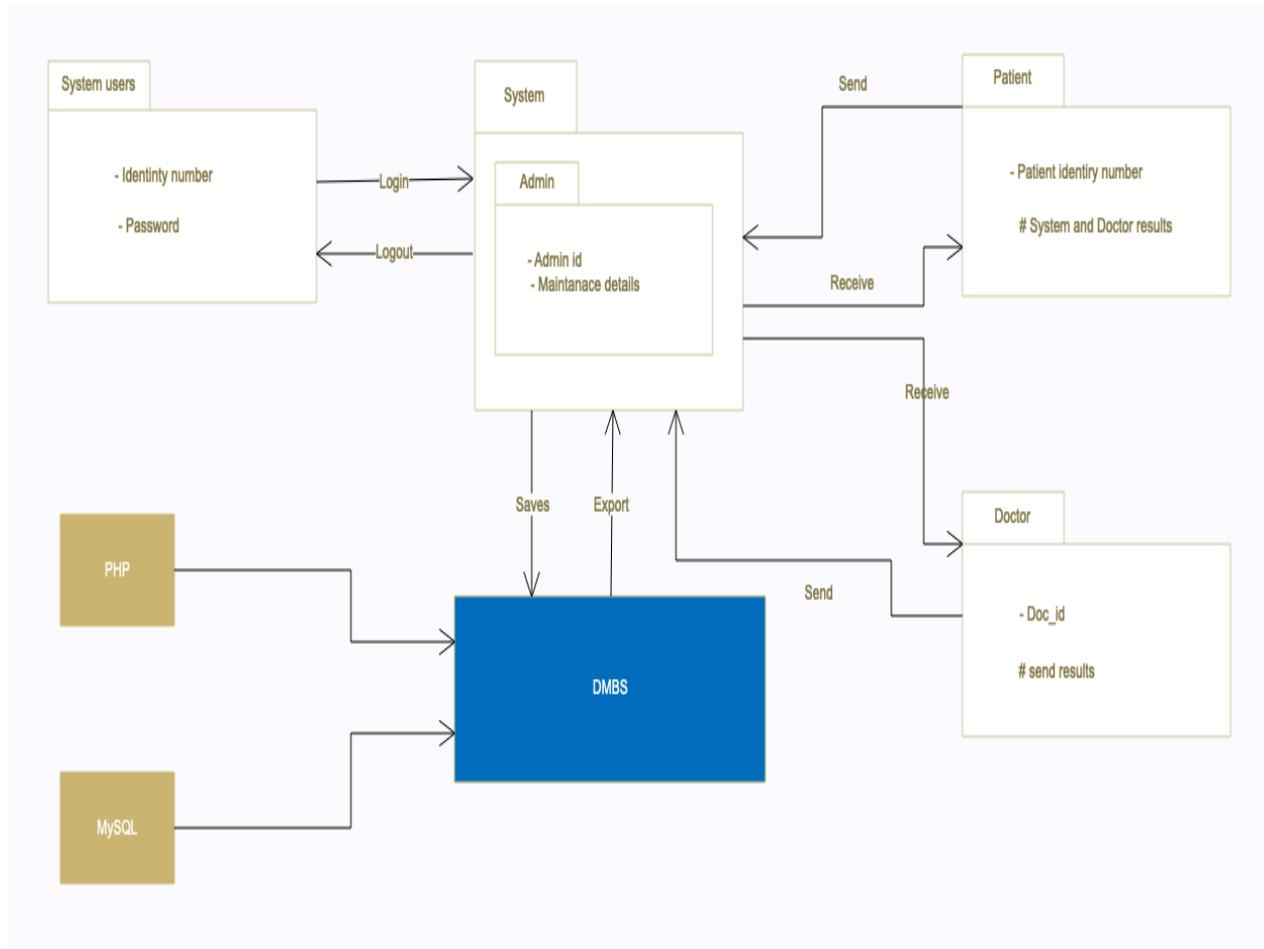


FIGURE 4.7 PACKAGE DIAGRAM

4.6.3 SEQUENCE DIAGRAM

It shows the order of operations of the new system demonstrating how objects function with each other. It is a sequential build up illustration (As'Sahra, 2015). The system's object functionality is specified and the message is delivered from one object to the next.

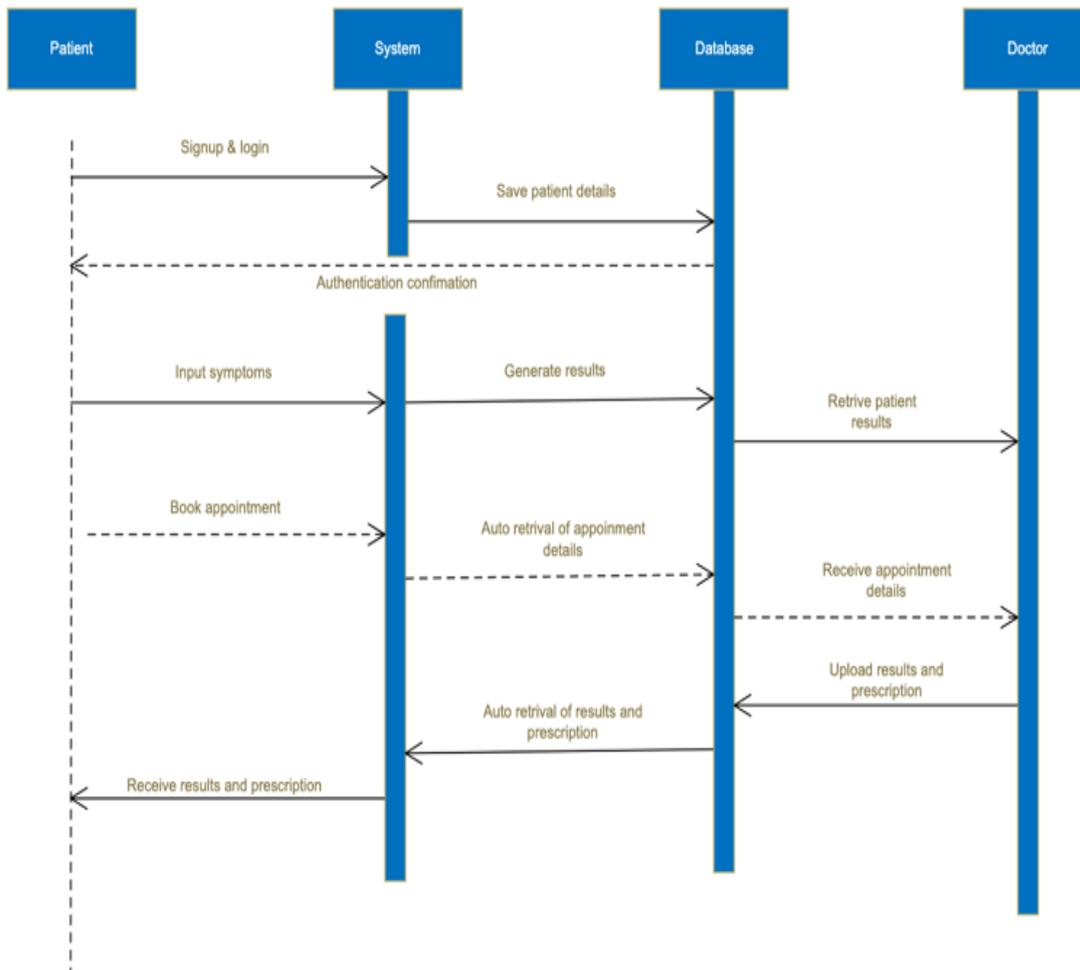


FIGURE 4. 8 SEQUENCE DIAGRAM

4.7 INTERFACE DESIGN

Interface design is undertaken to provide the platform that the end users will use on the system (Silver, 2013). It can also be defined as the design of software applications, machines, mobile devices and computers for the user’s interactive means. This design makes it possible for every user to use the system without difficulty. User goals are easily accomplished as the user’s interaction is simplified and made as efficient as possible. The characteristics of a standard interface include it being easily understandable, user friendly, responsive in the shortest possible time and its providence of a feedback which is informative.

4.7.1 MENU DESIGN

Is arrangement of universal and standardised commands brought together and put in a visible position in the application window (Silver, 2013). Generally, it can be viewed as a set of options available to different end users on the system hence helping them to navigate into the system.

The figure below shows the structure of the Main Menu:

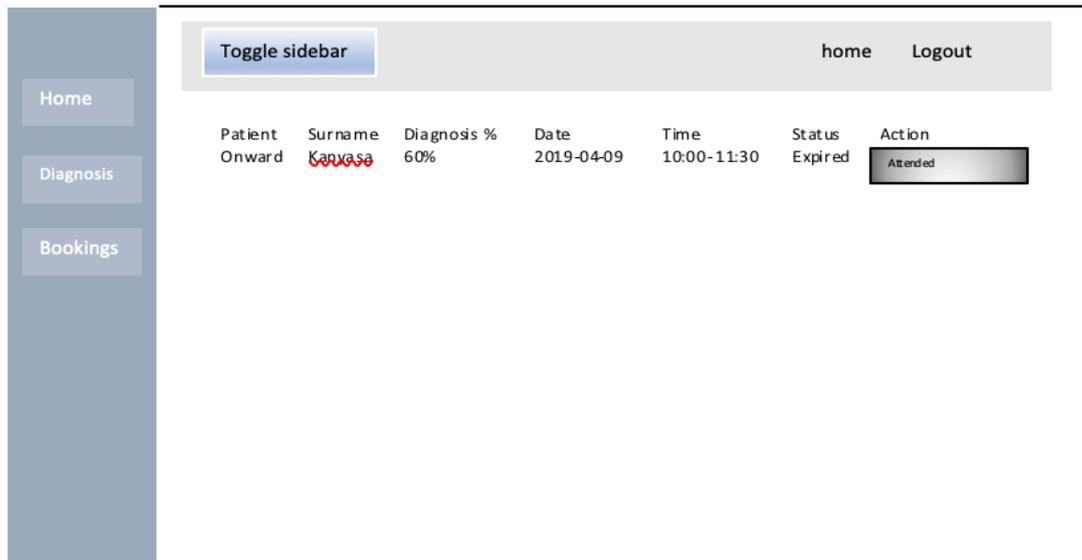


FIGURE 4. 9 MAIN MENU

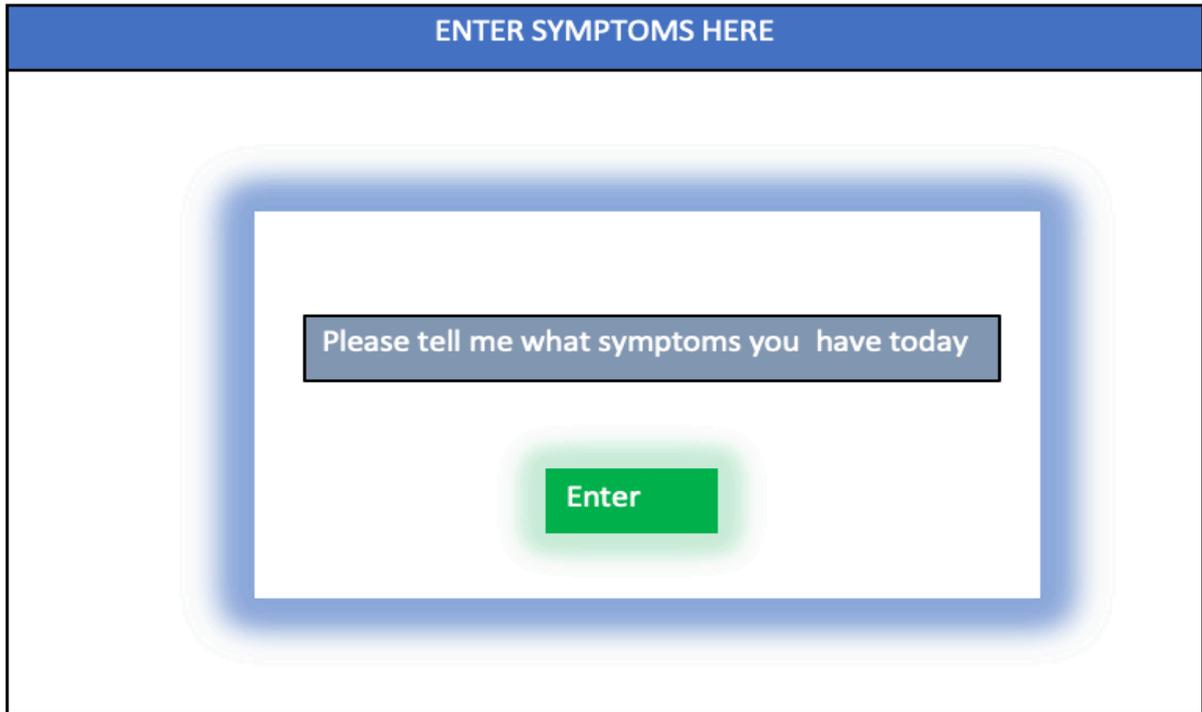


FIGURE 4. 10 SUB MENU

4.7.2 INPUT DESIGN

This is the platform on which a user creates an account, query in symptoms, login page, input results and so on by entering details which include full name, conduct details, password and so on. An efficient input design must be able to test the validity of the information input, it must also be self-explanatory and user-friendly (Rosenblatt, 2009).

New Account

The input form above is used with a patient create account feeling required details.

A login form enclosed in a rounded rectangle with a blue glow. It contains two input fields: "Identity number" and "Password", both with grey backgrounds. Below them is a green "Login" button with a white glow.

A booking form with a blue header bar containing the text "Book here". Below the header are five input fields with blue backgrounds: "Name", "Surname", "dd/mm/yyyy", "Doctor", and "Time". At the bottom is a black "Book" button with a white glow.

The image shows a form with four input fields and a submit button. The fields are labeled 'Patient Name', 'Surname', 'National id', and 'Results'. The 'Submit' button is red and located at the bottom center of the form.

4.7.3 OUTPUT DESIGN

It reviews all previously stored data which includes user details, results of symptoms queried in and so on. Output design must meet all requirements of the user, producing the right output in its right quantities and format, moreover the output must be delivered to the right personnel on time (Rosenblatt, 2009).

PATIENT REPORT:

TABLE 4. 7 PATIENT REPORT

ID	PATIENT	SURNAME	DISEASES	%	NATIONAL ID
23	Tashinga	Gutsa	Diabetes	60	63-12742643k-56
32	Munyaradzi	Misingwini	Lung cancer	70	63-89782643k-40

TABLE 4. 8 BOOKING REPORT

ID	PATIENT	SURNAME	DISEASES	date	time	NATIONAL ID
23	Munashe	Chakamba	Stroke	2019-04-10	10:00-11:00	63-12742643k-56
32	Munyaradzi	Misingwini	Lung cancer	2019-05-10	13:00-14:00	63-89782643k-40

TABLE 4. 9 DOCTOR REPORT

ID	DOCTOR	DATE	TIME	STATUS
23	DOC004	2019-04-10	15:00-16:00	Active

TABLE 4. 10 RESULTS REPORT

ID	PATIENT	SURNAME	RESULTS	NATIONAL ID
23	Tawanda	Pachirera	Diabetes stage one	63-12742643k-56
32	Melody	Tsaurayi	Lung cancer stage two	63-89782643k-40

TABLE 4. 11PRESCRIPTION

ID	PATIENT	SURNAME	PRESCRIPTION	NATIONAL ID
23	Teddy	Mbudzi		63-12742643k-56
32	Macdonald	Munetsi		63-89782643k-40

4.7.4 REPORTS OVERVIEW

TABLE 4. 12 STATISTICAL REPORT

Patients Names	Diseases Diagnosed	Region	Age	Sex
Takunda	Lung cancer	Harare	40	Male
Panashe	Stroke	Manicaland	50	Female
James	Migraine headaches	Mashonaland	25	male

4.8 PSEUDO CODE

Pseudo Code is a text based algorithmic which is detailed (Bard, 2018). It represents the system's logic. The Pseudo Code uses systematic conventions of programming languages which are common. Its intention is for human reading and conception rather than for computers or other machines. Characteristics such as system specific code and declaration of variables which are significant to the machine's inclusion of the algorithm are normally ignored by the Pseudo Code.

PSEUDO CODE:

Login

Input logins

If logins are correct

Then

Login success

Procced to user interface

Else

Failed to login

Error note pops up

Load back to login page

Signup

Input details

If identity number do not match any in database

User created

Else

User already exists

Error note pops up

Diagnosis

Enter symptom

If symptom found

List of symptoms outputted

Else

No symptom found

Error note pops up

Upload results

input results

if patient is selected

results uploaded

else

please select patient

error note pops up

4.9 SECURITY DESIGN

Security design is the measure taken against all unauthorized individuals (third parties) to access of all kinds of data and information of an organisation (Masys, 2018). Security design is branched into three categories that is physical, network and operational security.

4.9.1 PHYSICAL SECURITY

These are security measures on networks, software and hardware from physical operations or occasions which could lead to data lose (Masys, 2018). The physical measures were undertaken for protection against theft, burglary, vandalism, fire, natural disasters among others hence the providence of locks, surveillance system, smoke and fire sensors and a security guard.

PHYSICAL SECURITY LAYOUT:

Main entrance is secured by a guard

Servers are kept locked in a server which is only accessed by authorized personnel'

Installing of smoke and fire detectors in the server room so that in case of a fire emerging the disaster can be averted as soon as possible

Installing of an air con to monitor the temperature in the server room so that all assets function efficiently and effectively without crashing or overheating

4.9.2 NETWORK SECURITY

This is a technique of placing preventive measures so that the network infrastructure is well secured from being accessed by unauthorised personnel. Network security is designed in such a way that it protects the integrity and usability of network and information and it is inclusive of both software and hardware technologies www.cisco.com. For the network security to be effective it should target all numerous varieties of threats and prevent them from entering the network. The implementation of network access controls, behavioural analysis which is basically the detection of abnormalities on the network basing on its normally recognized functionalities and antimalware and antivirus software were all placed for the securement of the network. Firewall and packet sniffing among other network intrusive detection systems were put in place to secure the network of the organization. Hence the network security's framework prevented data and information from being altered, misused, destructed or abused.

4.9.3 OPERATIONAL SECURITY

Is a process which groups information asset and ensures the required controls to prevent authorised access to the system. This security measure identifies and protects the organization's data. The operational security measures were distinguished, that is, those for end users and those for employees.

PATIENTS:

Login credentials which is basically identity number and a password that has to been entered by the user to gain entry into the system

Moreover, the use of security measures such as pin codes, passwords and patterns on users' mobile devices and computers is encouraged.

DOCTORS:

The accessibility of machines by the use of domain accounts requires employee's identity and also a password which is set to be changed after every fortnight hence making the hacking of the system difficult

The password should be a combination of letters, special characters and numbers so that it cannot be easily guessed

4.10 CONCLUSION

This phase clearly reviewed how the new system is like. Interface, program, physical and architectural designs were clearly outlined and expatiated in this section. The chapter also explained how all the information of the organization is secured against all forms of insecurities. The next phase is the implementation and maintenance one whereby the developer focused on the installations of the system, and also system coding and testing among other things.

CHAPTER FIVE: IMPLEMENTATION

5.1 INTRODUCTION

In this phase the developer is going to discuss the steps to fully implement the system. Implementation is the execution of the developed system and putting the blue print into action (Alegic, 2017). The purpose of the implementation phase is to set up the developed system in the working environment so that users can be able to use it.

5.2 CODING

Coding is the process of writing programs in such a way that can be understood (Dooley, 2017). It includes the interconnection of different software modules as well as the database connection to keep the information accepted by the system. Dreamweaver was the software used to develop the system and MySQL database was used. See Appendix E for code snippet.

5.3 TESTING

There is need to test the system before its full implementation within an organisation to find out if there is need for some corrections to the system. This can be done through testing the system validation and verification to check if the user requirements are being met. The testing process evaluates the quality attributes of the software (Mostefaoui and Tariq, 2018). The figure below illustrates the testing process.

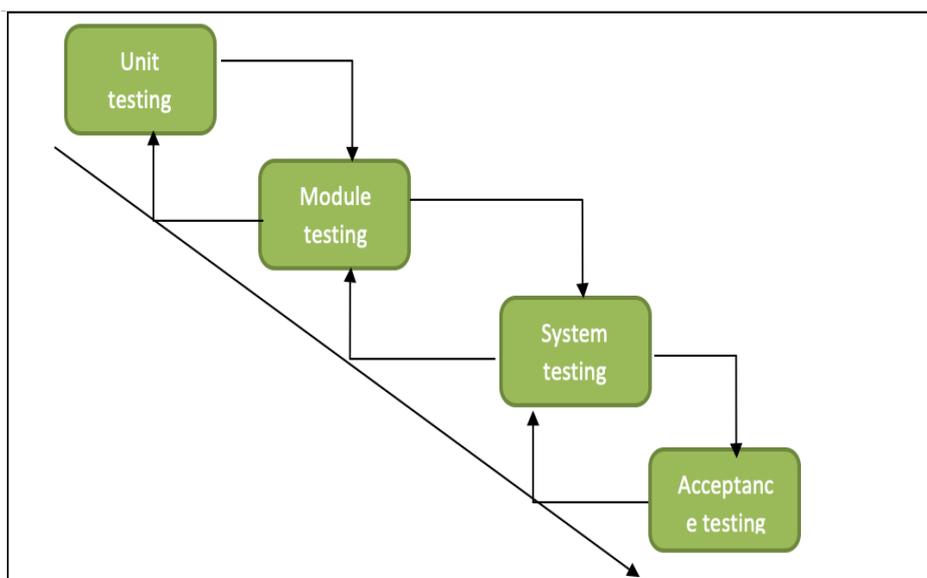


FIGURE 5. 1 TESTING PROCESS

5.3.1 WHITE BOX TESTING

White box testing it is the detailed evaluation of the inside logic of the system Lebanon, El- (Geish, 2018). It takes into consideration the internal structure of the system and also known as the glass box testing. It can be used by the developer to test the errors in the code, it as well tests the functionality of the system. Using white box testing, errors can be easily detected and can result in removing some lines of codes that contains errors.

5.3.2 BLACK BOX TESTING

Black box testing is also known as the functional testing and it is used for validation purposes (Engel, 2010). This technique focuses much on the output of the system in consideration of the inputs. It is not concerned with how the system comes up with certain output, but only to test if the outputs are correct according to the entered inputs.

5.3.3 UNIT TESTING

Unit testing is done by the tester to assess each section of the system to ensure functionality of the system before being integrated as a single system (Craig, Jaskiel, 2002). Each module should be given attention to it, to verify if it is meeting its intended functions. Unit testing helps the developer to integrate with no errors. The fig below shows the log in module testing

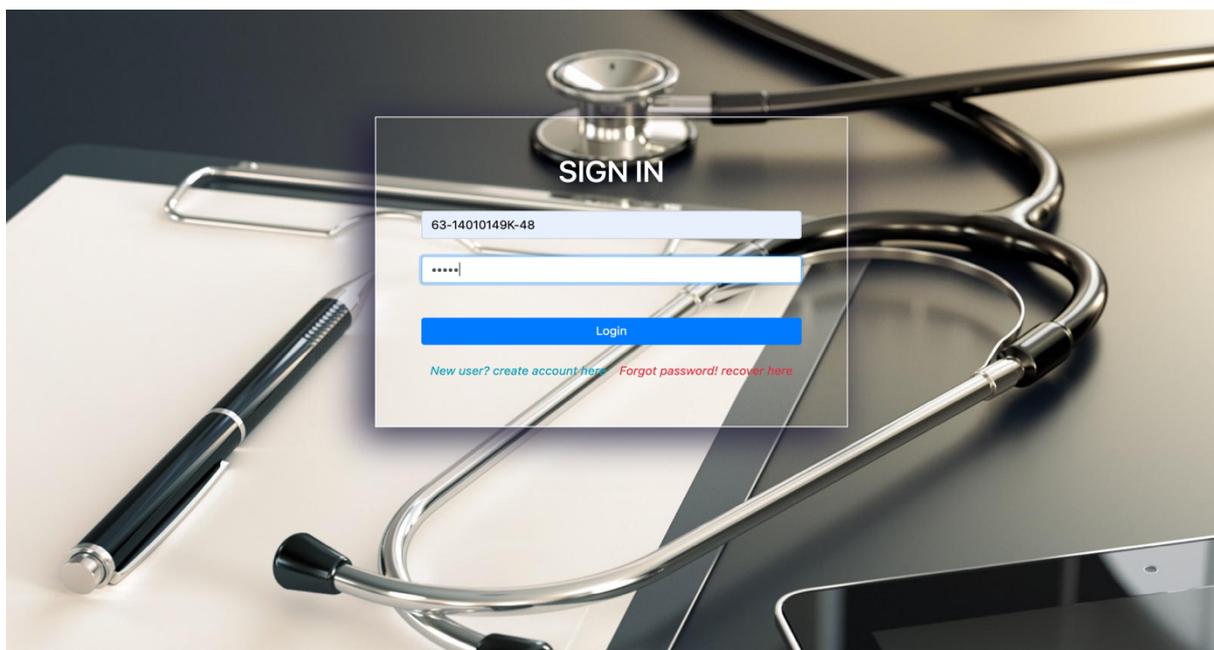


FIGURE 5. 2 UNIT TESTING

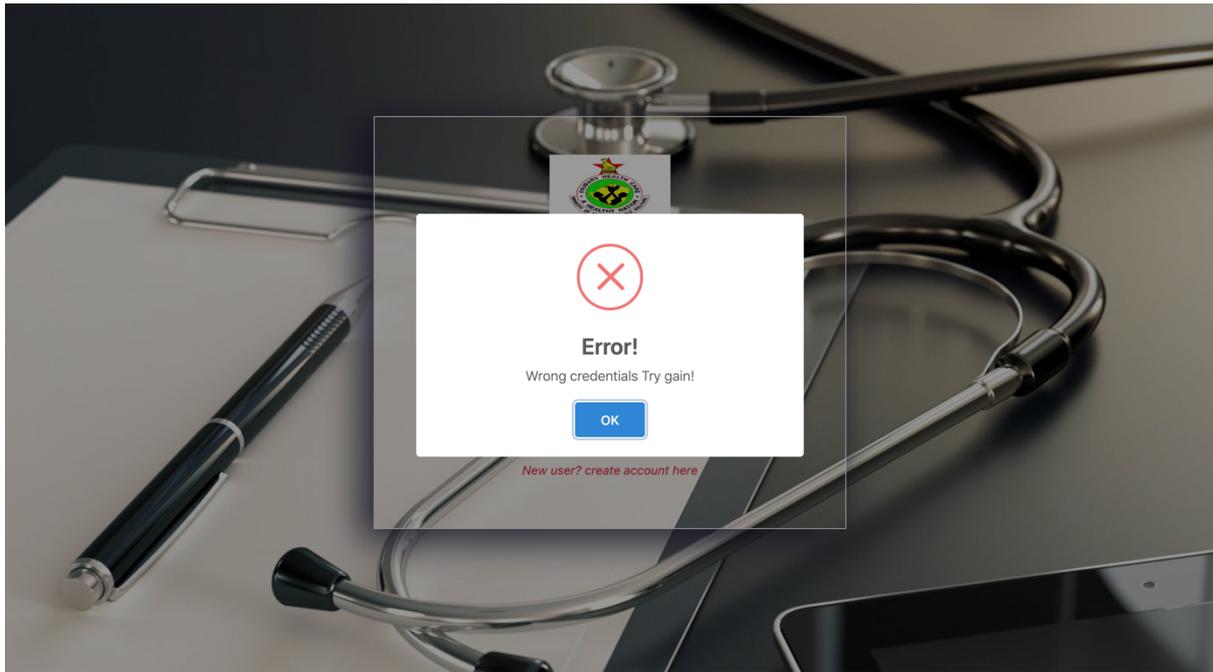


FIGURE 5. 3 UNIT TESTING

Figure 5.2 and 5.3 are showing unit testing whereby the system is being tested if it accept wrong logins to proceed to the operation menu. The test shows that the system does not take wrong credentials to login into the system.

Objective one: Allow online registration platform

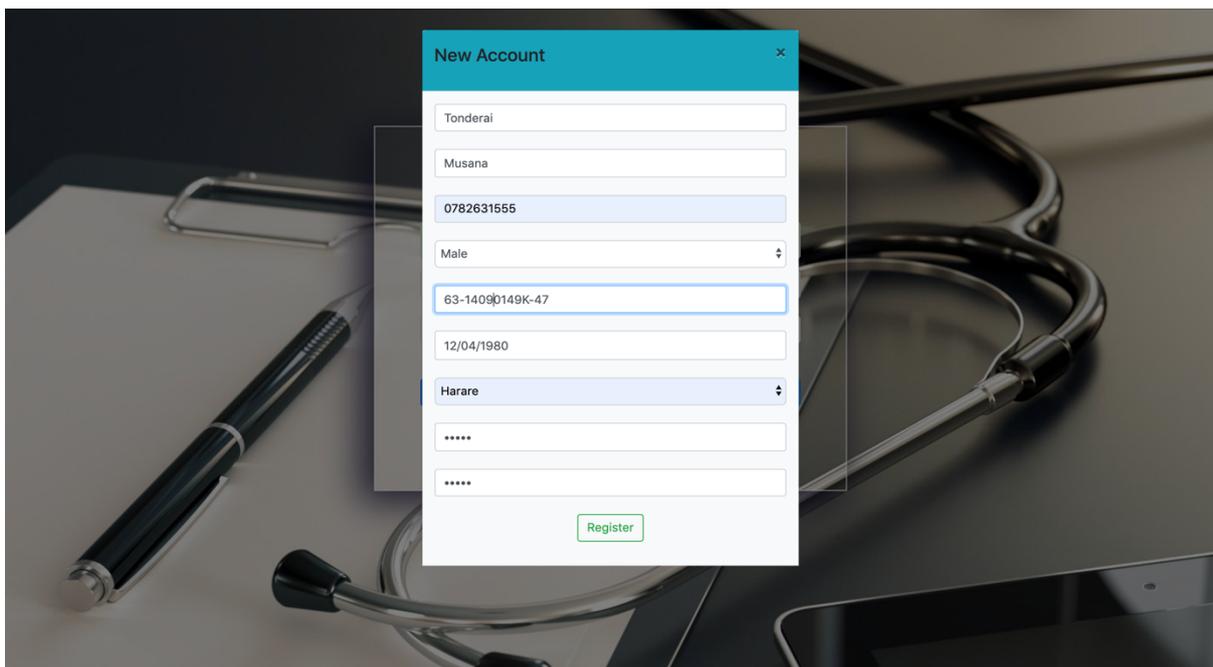


FIGURE 5. 4 SIGN UP

Figure 5.3 module focuses on the registration of patients to be diagnosed. For user to access the system and operations they must have credentials to do so. The reason for requesting user information is for future records and reports. The module was tested and it was a success.

Objective two: Match symptoms with appropriate diseases and recommend appropriate ways of reducing the risk.

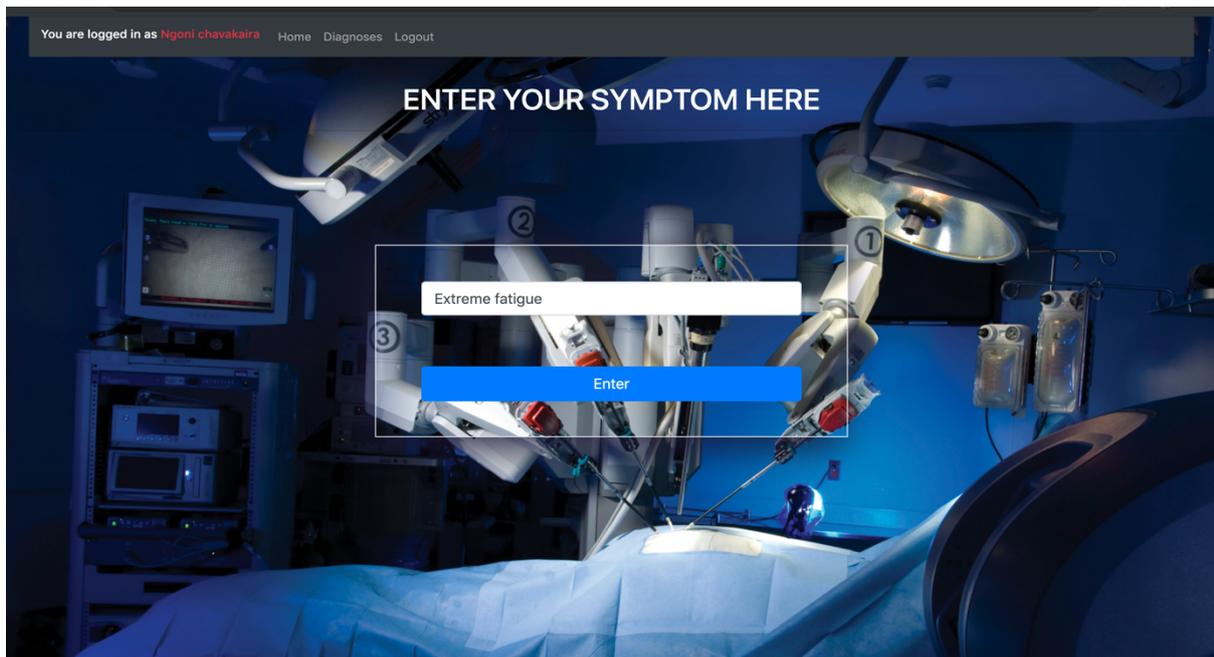


FIGURE 5. 5 INPUT SYMPTOM MODULE

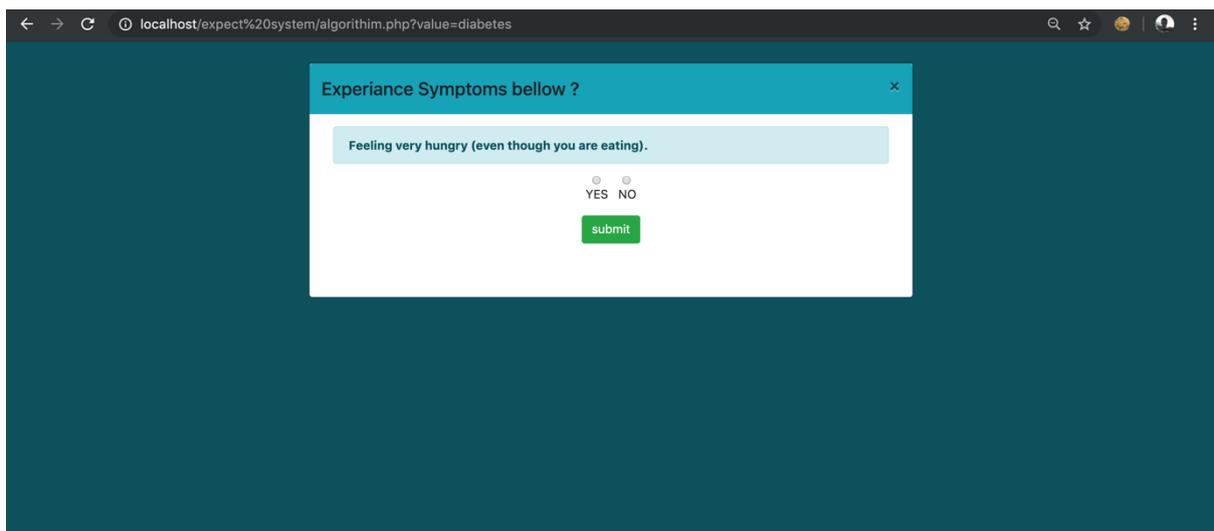


FIGURE 5. 6 SYMPTOMS MODULE

RESULTS AS PER SYMPTOMS INPUTED

You have 50% chance of diabetes

Recommendations

early stage of *Diabetes*

1). Cut Sugar and Refined Carbs From Your Diet

Eating sugary foods and refined carbs can put at-risk individuals on the fast track to developing diabetes. Your body rapidly breaks these foods down into small sugar molecules, which are absorbed into your bloodstream. The resulting rise in blood sugar stimulates your pancreas to produce insulin, a hormone that helps sugar get out of the bloodstream and into your body's cells.

2). Work Out Regularly

Performing physical activity on a regular basis may help prevent diabetes. Exercise increases the insulin sensitivity of your cells. So when you exercise, less insulin is required to keep your blood sugar levels under control.

3). Drink Water as Your Primary Beverage

water most of the time helps you avoid beverages that are high in sugar, preservatives and other questionable ingredients.

4). Quit Smoking

Smoking has been shown to cause or contribute to many serious health conditions, including heart disease, emphysema and cancers of the lung, breast, prostate and digestive tract

5). Follow a Very-Low-Carb Diet

Following a ketogenic or very-low-carb diet can help you avoid diabetes. Although there are a number of ways of eating that promote weight loss, very-low-carb diets have strong evidence behind them

6). Watch Portion Sizes

FIGURE 5. 7 RECOMMENDATIONS

Objective number two is covered with Figure 5.4, 5.5 and 5.6. The modules were tested, whereby the first module allows the user/patient to enter one of the symptoms and the second pops up quite a number of symptoms. The last module matches the symptoms with appropriate disease and produce results and recommendations on how to reduce the risk. It was a success tested by the project team.

Objective three: Suggest specialist according to diseases diagnosed in area of speciality

You are logged in as **Ngoni chavakaira** [Home](#) [Diagnoses](#) [Logout](#)

RESULTS AS PER SYMPTOMS INPUTED

Your results is 80 %

Critical stage of **DIABETES**, use the links below to book appointment.

Doctors

Name	Lastname	Speciality	Region	Book
Melody	Tsaurayi	diabetes	Bulawayo	book
Onward	Kanyasa	diabetes	Harare	book

FIGURE 5. 8 RESULTS AND SPECIALIST MODULE

Figure 4.7 focuses on the display of the results and list of doctors. System must automatically suggest specialist in area of diagnosed diseases. The module was tested and it was a success.

Objective four: Allow doctor to track and manage appointments

You are logged in as **Onward Kanyasa doctor** [Toggle Sidebar](#) [Home](#) [Diagnosis](#) [Logout](#)

Patient Name	Surname	Diagnosis results	Apointment Date	Time	Status	Upload results	Attend	Remove
Ngoni	chavakaira	80%	2019-04-13	8:00-9:30	Active	Upload	Attended	Delete
Genius	Homwe	50%	2019-04-14	8:00-9:30	Active	Upload	Attended	Delete
Nyasha	Kanyasa	40%	2019-04-11	8:00-9:30	Expired	Upload	Attended	Delete

FIGURE 5. 9 PATIENTS APPOINTMENTS

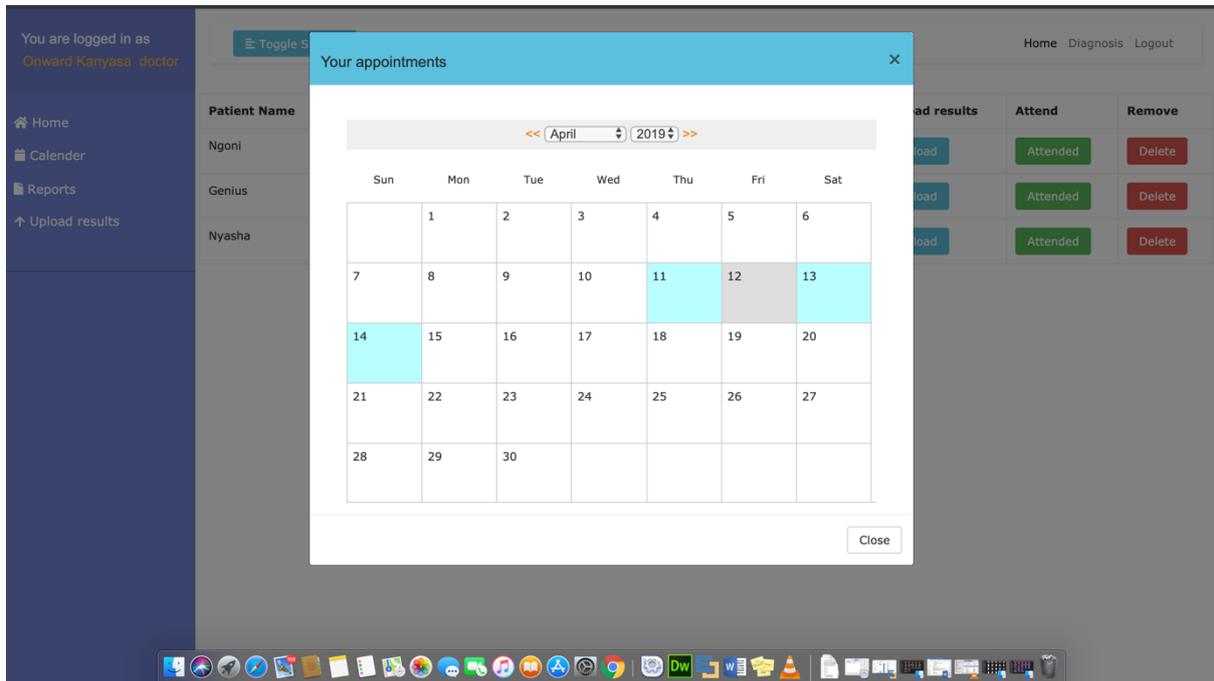


FIGURE 5. 10 APPOINTMENTS CALENDAR

Figure 4.8 and 4.9 show calendar and patient list. The list shows number of patients who requested appointment with doctor for actual diagnosis and the calendar shows the dates which are booked. Doctor can easily track and manage the patients through the use of the calendar and the list. The module was tested to see if patient's request for appointment appears to doctor's portal and the development team concluded that it was a success.

Object five: Allow doctor to upload results and prescription and allow printing function of the results and prescription to the patient side

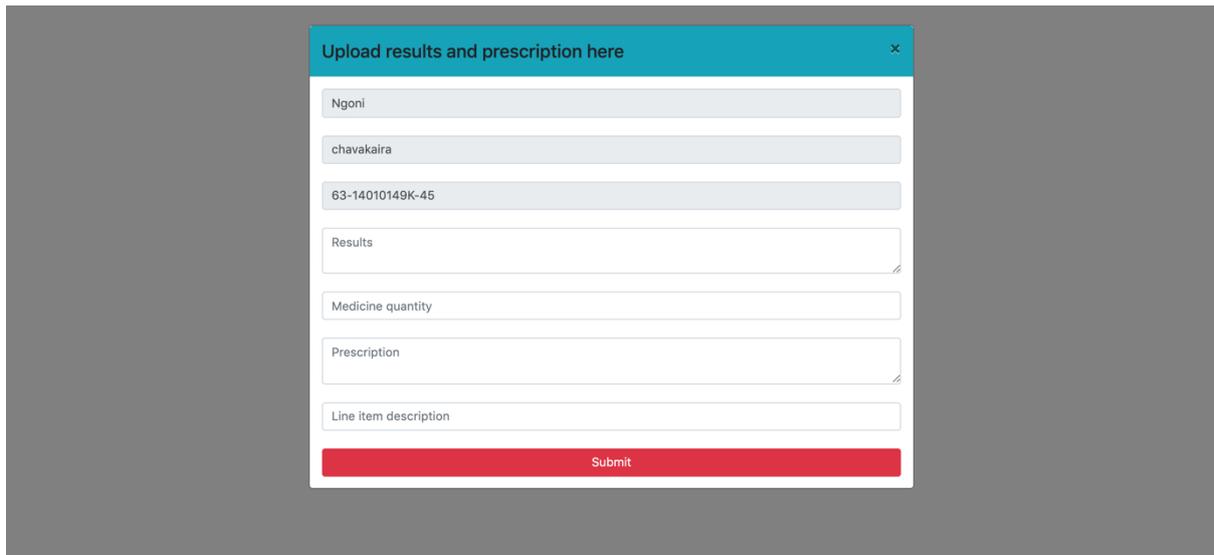


FIGURE 5. 11 RESULTS UPLOAD

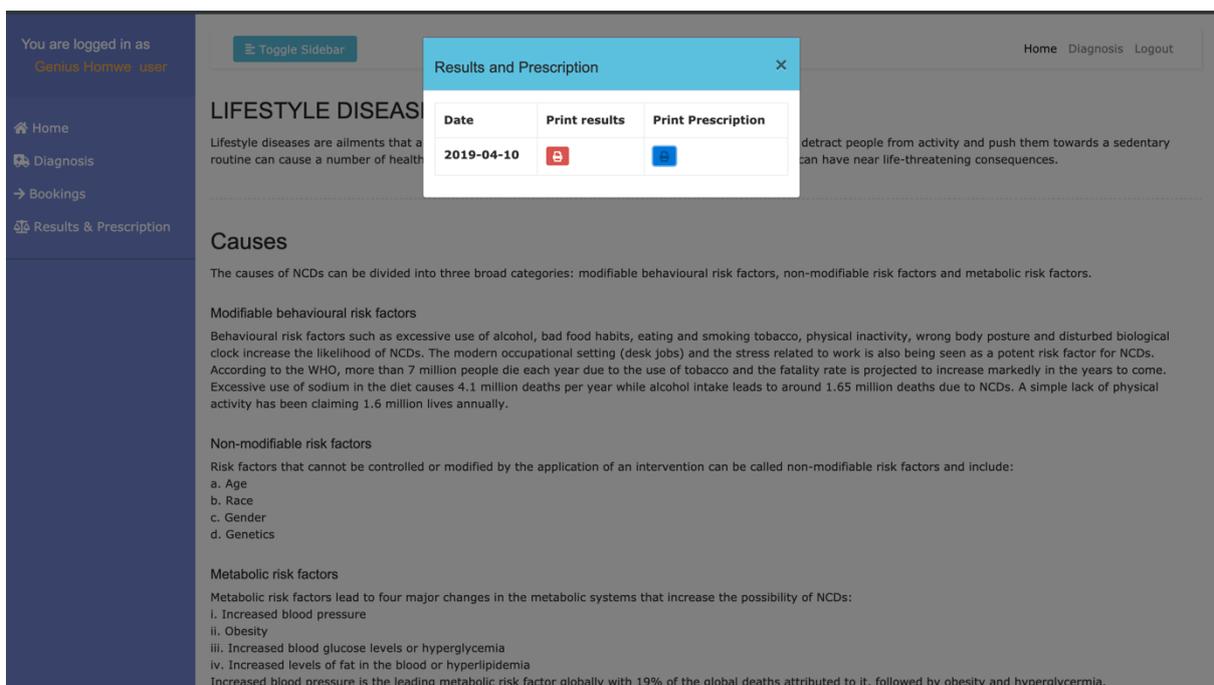


FIGURE 5. 12 RESULTS AND PRESCRIPTION MODULE

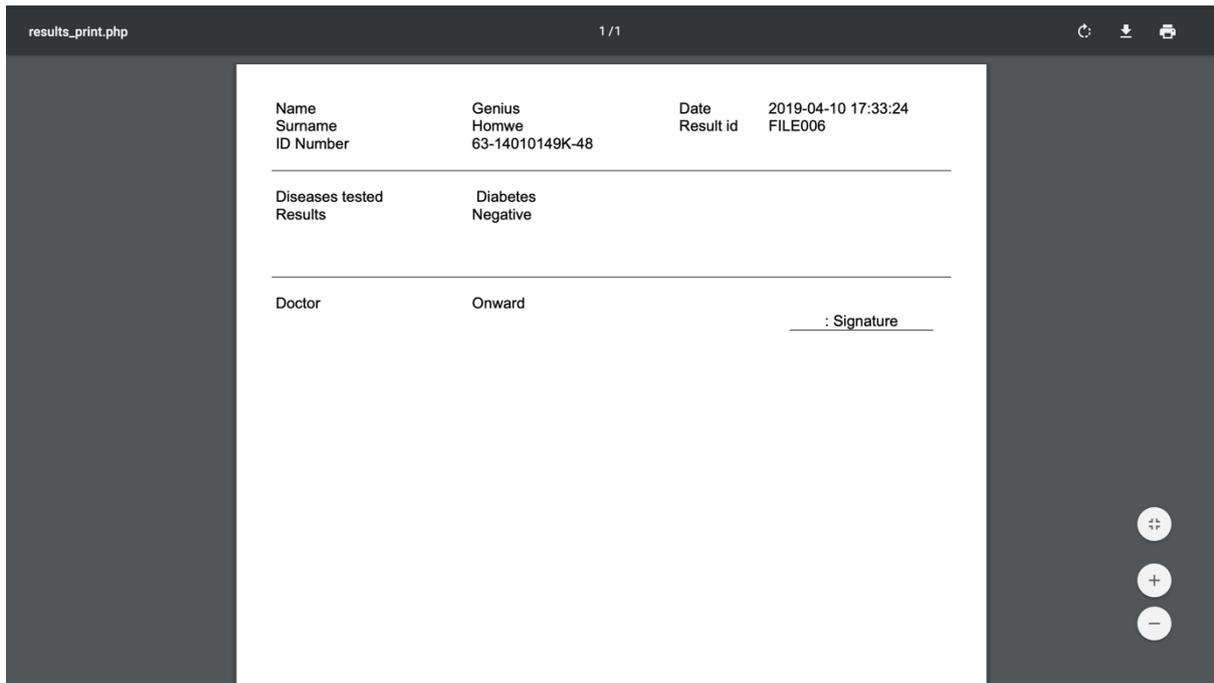


FIGURE 5. 13 PDF RESULTS

The doctor must be able to upload actual results after the patient is tested. Figure 4.10 shows the module which the doctor uses to upload medical results and prescription. The patient must be able to download or see results from the doctor in pdf format or print as shown by figure 5.11. The modules were tested by the project team and it was a success.

Object Six: To automatically compute statically reports which show frequent diseases being suffered from according to sex, age and region

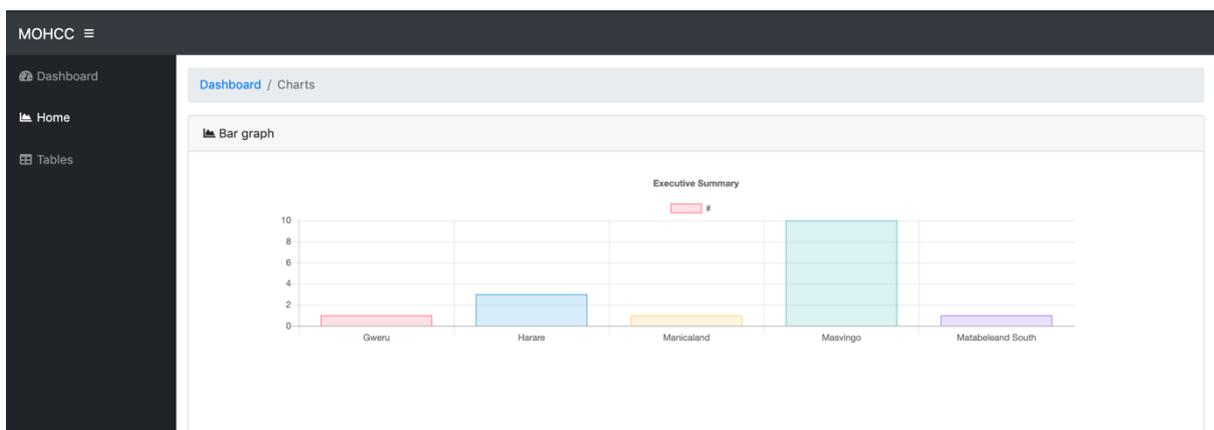


FIGURE 5. 14 Reports

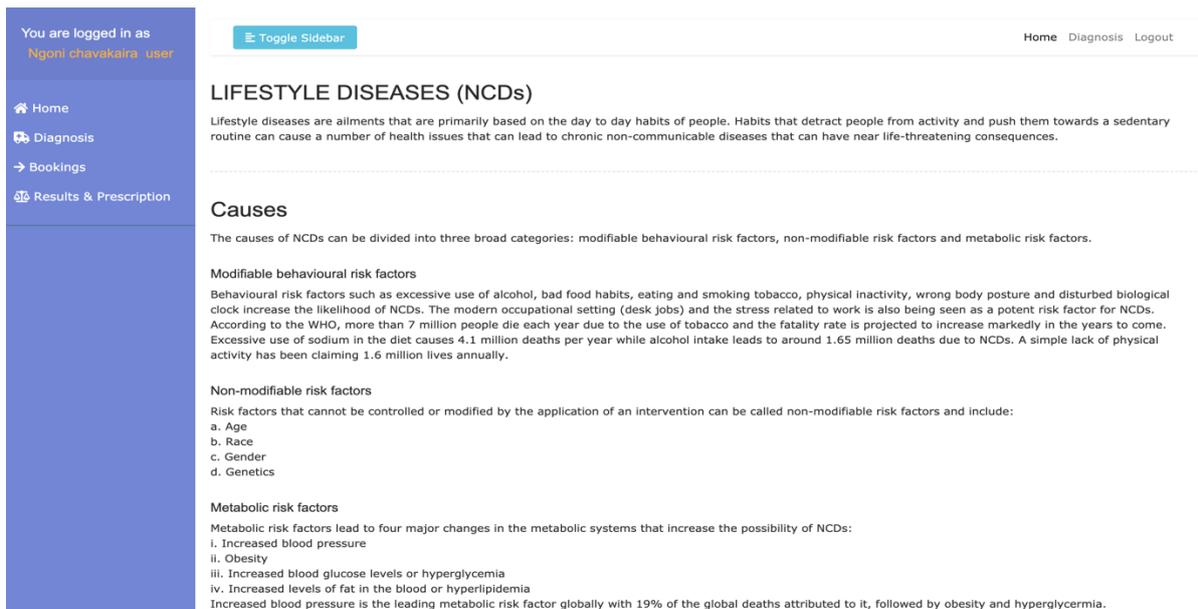


FIGURE 5. 15 PATIENTS MAIN MENU

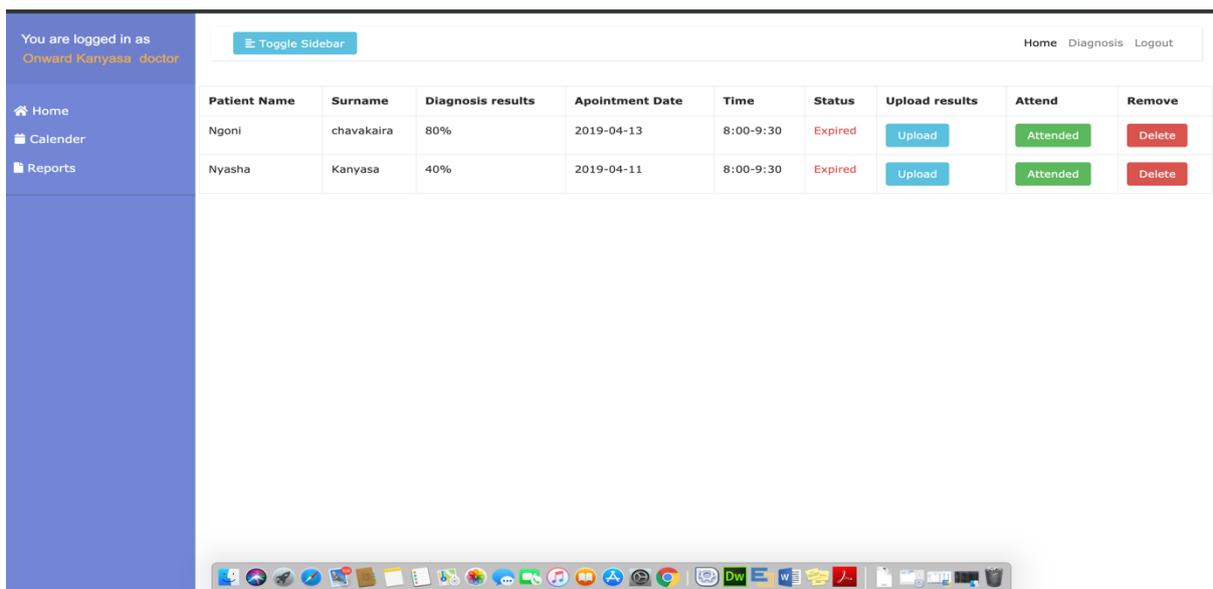


FIGURE 5. 16 DOCTORS MAIN MENU

Figure 5.13 and 5.14 shows main menu's for patients and doctors. They provide the users with the links to different pages for example from home page to diagnosis page.

5.3.4 INTEGRATION TESTING

It tests the combination of the software and as the integration between the software and hardware. Its purpose is to confirm or to ensure if the system is meeting the expected

functionalities (Craig, Jaskiel, 2002). Modules in the system include the diseases detection and results and prescription upload modules were tested and all the errors detected were corrected. These modules were tested individually and later tested as a combination of modules which is known as integration testing.

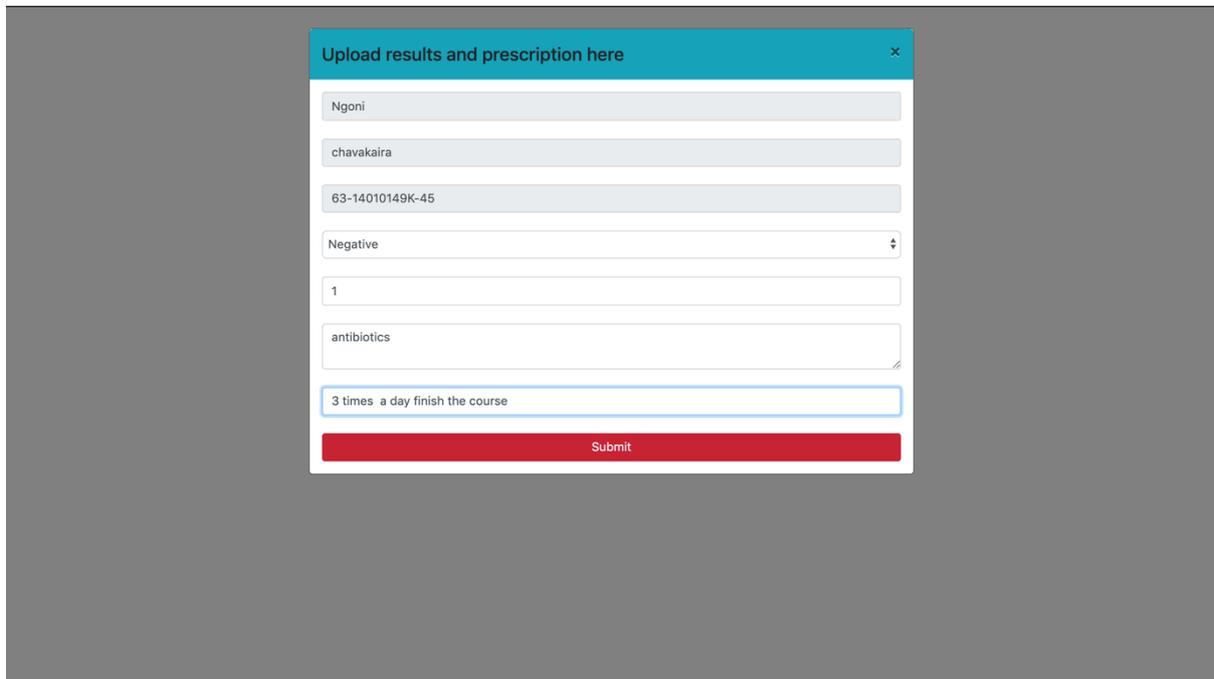


FIGURE 5. 17 INTEGRATION TESTING

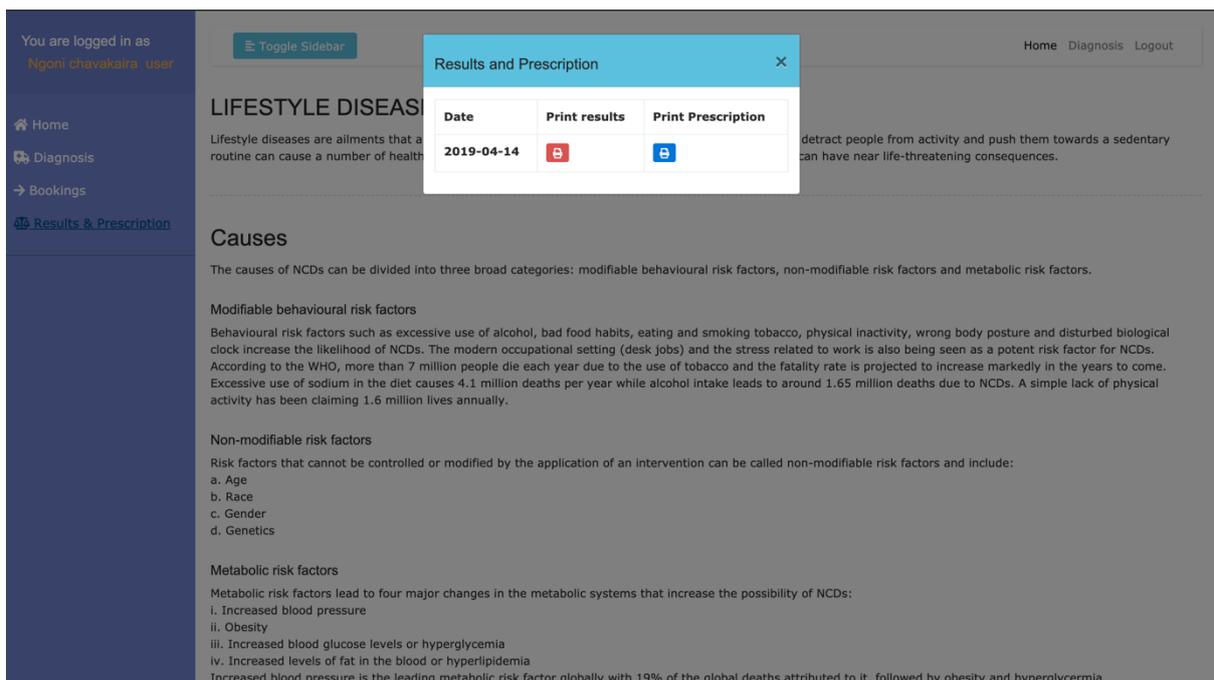


FIGURE 5. 18 INTEGRATION TESTING



FIGURE 5. 19 INTEGRATION TESTING

Figure 5.15 to 5.17 illustrates the intercommunication between the doctor and patient, whereby the doctor uploads patient's results and prescription shown on figure 5.15. The patient therefore has access to view results uploaded by the doctor shown on figure 5.16 and 5.17. The development team concluded that there were no bugs found within the integration of the modules.

5.3.5 SYSTEM SECURITY TESTING

After the accomplishment of the integration testing system it is then tested for security. Security is one of the important parts of system objectives. The system should be secured to avoid unauthorised access of information. The use of password and national id as logins credentials can help to protect the system from unauthorised users. The figure below shows the login attempt using wrong password.

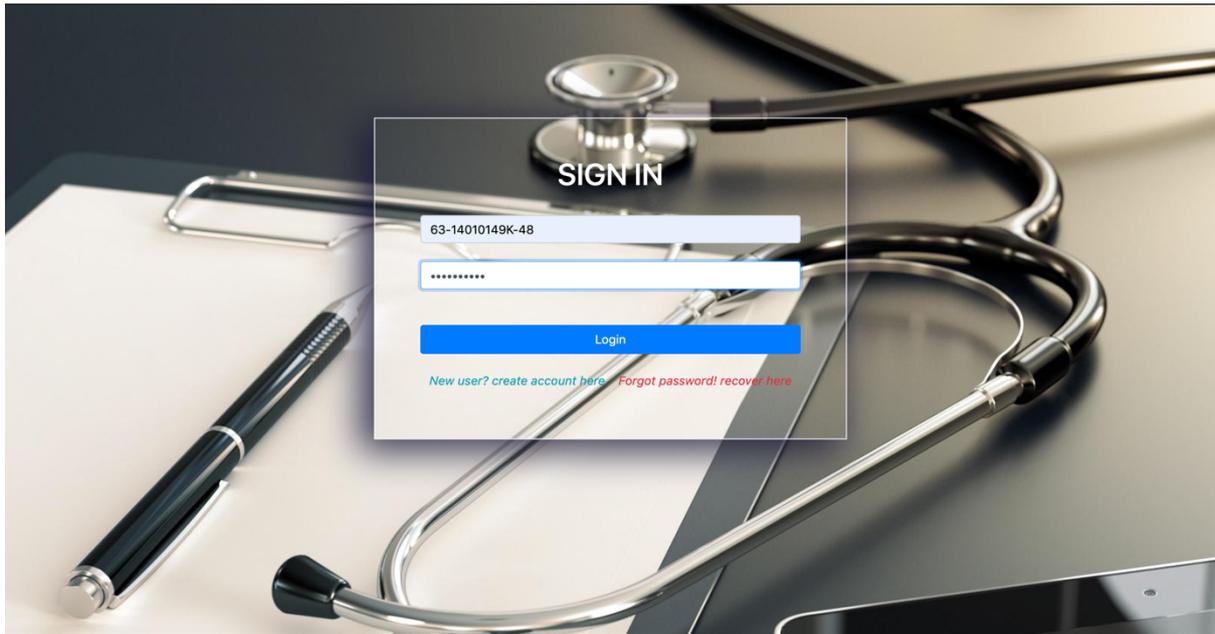


FIGURE 5. 20 SYSTEM SECURITY TESTING

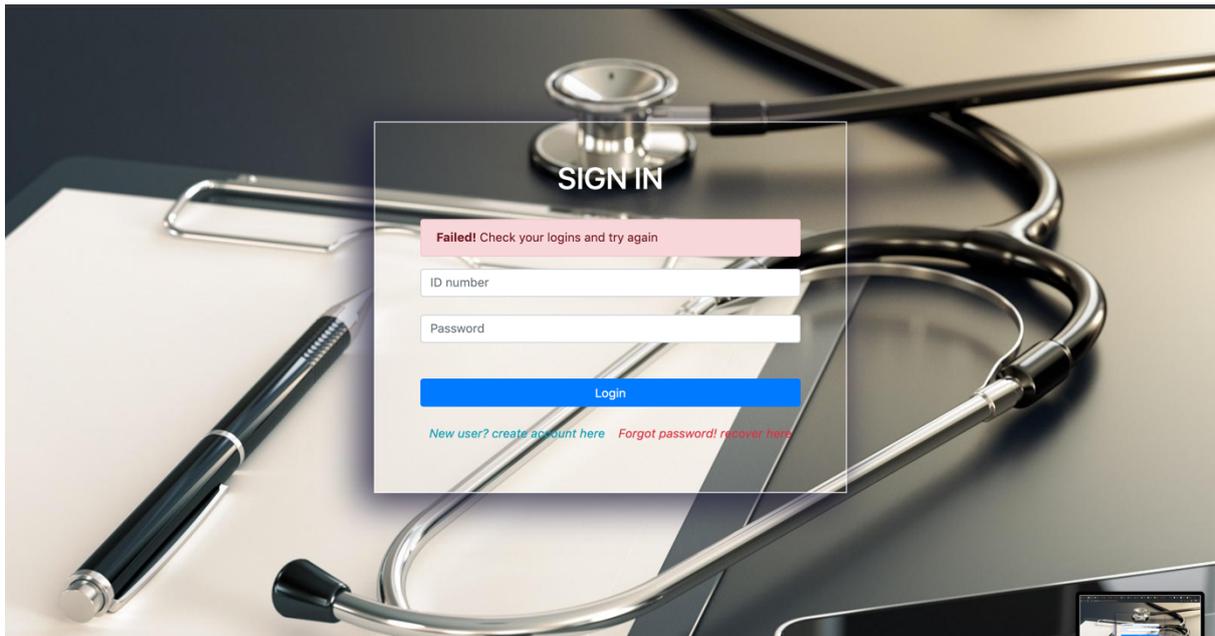


FIGURE 5. 21 SYSTEM SECURITY TESTING

5.3.6 VALIDATION

Validation is the process of confirming if the inputs are correct and can be accepted by the system. When adding a user, the user should have a valid email, if the email is not valid then the system should indicate that the email address is not valid as shown below. The system must not allow inputs with errors to be entered in the system.

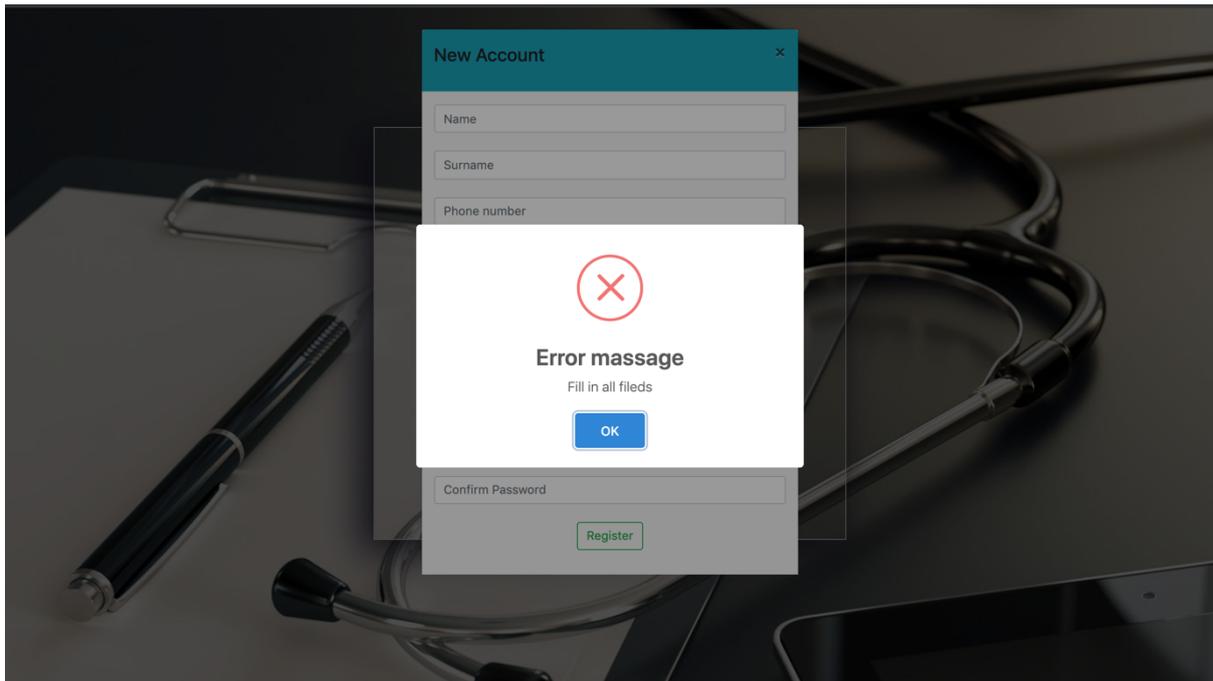


FIGURE 5. 22 VALIDATION

5.3.7 SYSTEM TESTING

It examines the combination of different sub-systems that made up the final system (Desikan, Ramesh, 2006). It aims to measure the productivity of the system and check if the user requirements are being met. The system was assessed so as to recognize those errors that arise due to the merging of the different modules. System testing includes white box and black box testing.

5.3.8 ACCEPTANCE TESTING

It is a proper software testing method that is carried out to determine whether the new system fulfils the approval principles and at the same time determining whether customers choose to use the system or not (Hambling, Gothem, 2013). It is used to examine if the system met all specified objectives. Accepting testing is the last stage of testing that determines the on-going of the system. Acceptance testing involves the use of the two sorts of tests which are alpha and beta testing.

5.4 INSTALLATION

It is a process of introducing a system to the intended organisation for it to perform its expected functionalities (Pham, 2006). It is undertaken at the production site where the system is thought to be operating at. The process of installation is done when all is done, including the removal of errors from the system and it carries out changeover strategies and user training. It includes transferring of code to new files from the installation files on the local computer for it to be easy to access by the operating system. The installation ensures that the exact record of user data is reserved in the proposed system database. It as well involves user training, data movement and system conversion or changeover techniques and approval of the best change over strategy.

Patient installation process

- On laptops or desktops install any web browser.
- On mobile phone also use any web browser.
- Use the link www.lifestylediseasesupport.co.zw on URL

Doctors installation process

- On laptops or desktops install any web browser.
- Use the link www.lifestylediseasesupport.co.zw on URL

5.4.1 SYSTEM CHANGEOVER

It is a process of switching from the old system to the new system (Cannon, 2011). They are different changeover strategies which includes parallel running, direct changeover and pilot conversion. The diagram below shows the different changeover strategies that can be used.

5.4.1.1 DIRECT CHANGEOVER

It is where the old system is stopped and replaced with the new system (Heathcote, 2004). The old system in direct changeover is totally replaced with the new system. This strategy is cheap since the organisation will be running a single system; it is also quick and easy changeover technique. However, this strategy also carries high risks of losing data for instance if a system failure occurs, since the old system has to be fully closed. The technique is mainly optional if system disaster is not severe enough to end up in a misfortune for the business.

5.4.1.2 PARALLEL CONVERSION

This changeover strategy is when the old system and the new system operate simultaneously for a specified period (Heathcote, 2004). The purpose of parallel changeover is to measure efficiency and reliability of the new system, as well as comparing the new system with the old system. After the outcome of the new satisfies the users then the old system gets offline. This strategy has certain advantages such as less risk of losing data, since the old system is available for backups. Also, users have the chance to familiarise with the new system whilst using the old system. It has disadvantages such as lots of costs that can be faced though using parallel changeover due to facilitation of two systems doing the same work

5.4.1.3 PHASED CONVERSION

Phased changeover strategy is the publication of another system through step by step (Heathcote, 2004). If one phase is operative then the implementation of the next stage starts, up and until the system is fully installed and being fully used within an organisation and completely substitute the old system. It is associated with less cost. Phased conversion takes time to completely install the whole system.

5.4.1.4 PILOT CONVERSION

This phase includes introducing the new system to some certain departments or areas in an organisation whilst some departments or areas using the old system (Heathcote, 2004). The new system is given in to a fraction of MOHCC and results will be measured to determine whether the system is performing its expected functionalities so that it can be complete implementation within the whole organisation. The changeover strategy is less costly but it is time consuming.

5.4.1.5 RECOMMENDATION

The project team, including stakeholders choose to use the parallel changeover strategy, agreed to run the system simultaneously then get fully implemented if it proves to be acceptable. The strategy was chosen because the strategy is less risk since the patients need to visit the hospital for actual tests.

5.4.2 DATA MIGRATION

Is data transfer practice between data stores or computer systems?

A data migration is carried out for many reasons, including upgrading or replacing servers or storage equipment, migrating data to cloud services, consolidating websites, maintaining infrastructure, migrating applications or databases, upgrading software, merging companies or relocating data centers and implementing the new system.

Factors to be taken into account during data transfer exercise include system performance issues, data loss and so on. Old system was a manual system whereby data was captured on files. For data migration to take place there is a need for data that is already stored in databases or servers. The project team propose hiring of data captures to capture data into the system but the Ministry decide to start afresh from the date the system was implemented.

5.4.3 USER TRAINING

It is very important to train the users of system, for them to familiarise with the new system's functionality. This helps users to understand how the system works and to know how to use the system to avoid problems because of using the new system. Doctor's side training was there to ensure that they gain the knowledge about the system and security to their jobs.

TABLE 5. 1 TRAINING SCHEDULE

Date	Department	Time	Venue	Purpose
15-17 April	Doctors	8am – 2 pm	Parirenyatwa hospital	Uploading results, prescriptions, management of bookings, analysing reports
18-22 April	Trainers	8am – 2pm	Parirenyatwa hospital	Trainers will move around teaching and advice citizens about the system. Trainers

				were taught how to diagnose, manage bookings, view results and prescriptions, bookings
--	--	--	--	--

5.5 MAINTENANCE

Maintenance is the process of improving or repairing the final system after it has been delivered to the users (April, Abran, 2012). The purpose of maintenance is to correct emerging faults and as well as improving the system performance. It can be described as well as the effort done with the purpose of modifying the system when it is already operating is considered as maintenance. It is very important to keep maintenance in place so as the system to advance with technology. There are different sorts of maintenance which includes adaptive, perfective, corrective and preventative.

5.5.1 CORRECTIVE MAINTENANCE

This type of maintenance focuses on day-to-day correcting of errors that identified by the end users (April, Abran, 2012). The bugs might come from end users complain and usually are the ones that initiate corrective maintenance. This stage is more about providing solutions for the mistakes that occurred when the system is being used. Inspection should be undertaken to continue to detect bugs and take some steps to correct them.

5.5.2 PREVENTIVE MAINTENANCE

Preventive maintenance is a maintenance technique that concentrates much on precluding the existence of faults in the system (April, Abran, 2012). It is a measure to control system failures during its execution. This type does not wait for the fault to occur but it takes measures before it occurs. Normally, the preventative maintenance focuses on making advancements to the system directive and the presentations of the interfaces of the system.

5.5.3 ADAPTIVE MAINTENANCE

Adaptive maintenance includes the adjustment of a system to adapt to the environmental changes such as operating system, database management system and hardware components (Rosenblatt, 2013). The system should be changed according to the conditions and the effects which that may affect the system. Government policies also have important influence to the system software. Adaptive maintenance allows the system to persist in operational in an ever-changing environment whilst keeping the system updated to fit the environment.

5.5.4 PERFECTIVE MAINTENANCE

It is a type of maintenance that implements extra user requirements, with the purpose of system functionality improvement (Rosenblatt, 2013). It contains the enhancement of system performance over making functional upgrading to the system in addition to the current accomplishments. Perfective maintenance usually is process of modifying the software to make it usable over a period of time. It takes into consideration user requirements in order to add the required new features to the system to improve performance.

5.6 RECOMMENDATIONS, REFLATION AND FUTURE DEVELOPMENT

Further development recommendation is an activity that suggests what the system should expected to be in the near future and includes:

- The system currently is focusing on lifestyle diseases; in future it must cover other diseases such as communicable diseases.
- It must facilitate online payment for the actual test.
- Currently the system is focusing on common lifestyle diseases in Zimbabwe which are arthritis, diabetes, heart disease, migraine headaches, stroke, bladder cancer, breast cancer, cervical cancer, colon cancer, prostate cancer, lung cancer. In future thy must be a room to add new imaging lifestyle diseases.

More recommendations are welcome, with the exception of the above, to make the new framework operations broad and effective.

5.7 CONCLUSION

The development of the medical diagnosis support system for life style diseases was a success, as a whole is delighted of its internal Information Technology developer for driving out a brilliant system. The implementation phase and all the testes succeeded and this resulted into the successful of the new system to be used within the organisation. Improvement to the system needs to be continuously done and other functionalities are always welcome.

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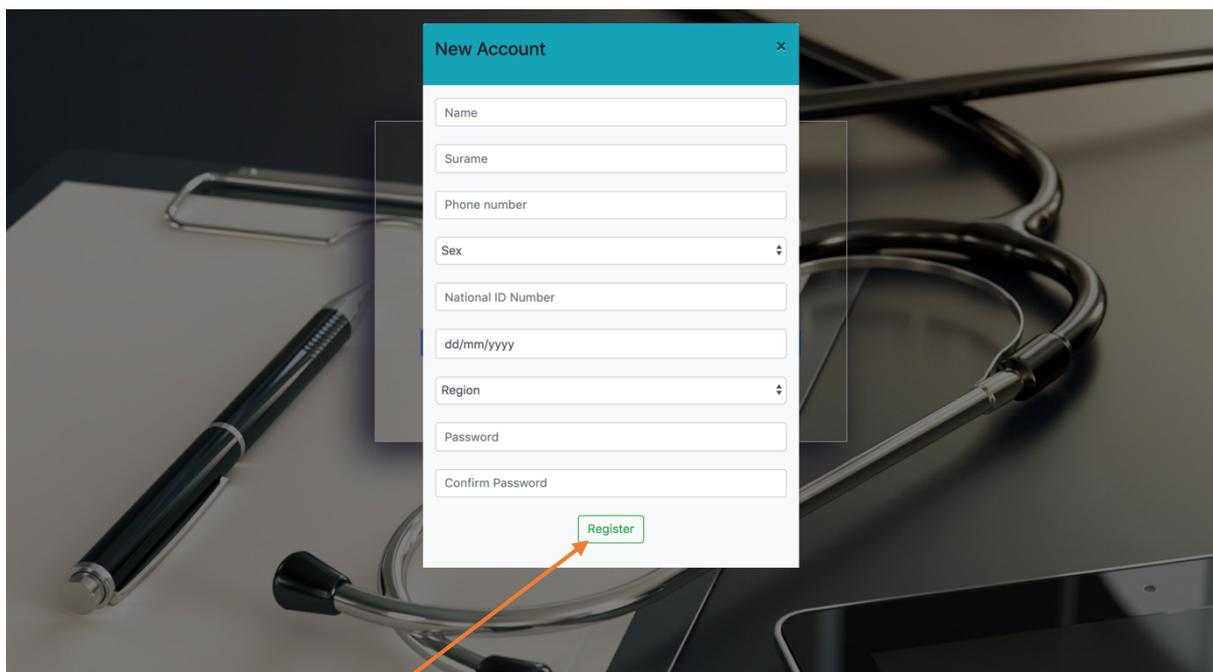
APPENDICES

Appendix A: User Manual

Patients and Doctors to access the system they must use a URL. Desktops, laptops and mobile devices are used to access the system.

User manual

Signup page:

A screenshot of a mobile application's registration form titled "New Account". The form is overlaid on a background image of a stethoscope, a pen, and a clipboard. The form contains the following fields: "Name", "Surname", "Phone number", "Sex" (a dropdown menu), "National ID Number", "dd/mm/yyyy" (a date field), "Region" (a dropdown menu), "Password", and "Confirm Password". At the bottom of the form is a green "Register" button. An orange arrow points from the text below to the "Register" button.

Fill in all required information
and click register

If account is already there enter Identity number and password to login if new user first fill in required information to register and click the register button.

Home page :

You are logged in as **Ngoni chavakaira user**

Toggle Sidebar

Home Diagnosis Logout

LIFESTYLE DISEASES (NCDs)

Lifestyle diseases are ailments that are primarily based on the day to day habits of people. Habits that detract people from activity and push them towards a sedentary routine can cause a number of health issues that can lead to chronic non-communicable diseases that can have near life-threatening consequences.

Causes

The causes of NCDs can be divided into three broad categories: modifiable behavioural risk factors, non-modifiable risk factors and metabolic risk factors.

Modifiable behavioural risk factors

Behavioural risk factors such as excessive use of alcohol, bad food habits, eating and smoking tobacco, physical inactivity, wrong body posture and disturbed biological clock increase the likelihood of NCDs. The modern occupational setting (desk jobs) and the stress related to work is also being seen as a potent risk factor for NCDs. According to the WHO, more than 7 million people die each year due to the use of tobacco and the fatality rate is projected to increase markedly in the years to come. Excessive use of sodium in the diet causes 4.1 million deaths per year while alcohol intake leads to around 1.65 million deaths due to NCDs. A simple lack of physical activity has been claiming 1.6 million lives annually.

Non-modifiable risk factors

Risk factors that cannot be controlled or modified by the application of an intervention can be called non-modifiable risk factors and include:

- Age
- Race
- Gender
- Genetics

Metabolic risk factors

Metabolic risk factors lead to four major changes in the metabolic systems that increase the possibility of NCDs:

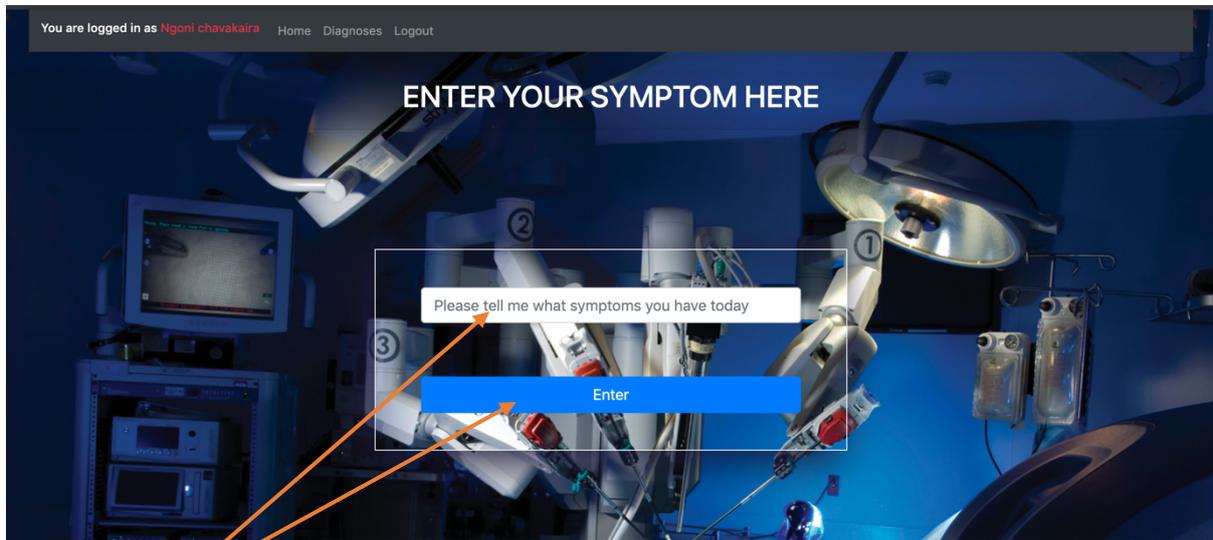
- Increased blood pressure
- Obesity
- Increased blood glucose levels or hyperglycemia
- Increased levels of fat in the blood or hyperlipidemia

Increased blood pressure is the leading metabolic risk factor globally with 19% of the global deaths attributed to it, followed by obesity and hyperglycemia.

Click navigations no access
other pages

For diagnosis click on diagnosis and you will be directed to diagnosis page. To check our bookings, click on bookings and you will be directed to your bookings. To view results and prescription from the doctor click results and prescription and you will be directed to results and prescription page.

Diagnosis page :



Enter symptom here and press enter

One of the symptoms you are experiencing is entered here by click enter list of symptoms will pop up and you choose symptoms you are feeling and get results after completing the process.

Bookings page:

A screenshot of a web application's bookings page. The page has a dark blue sidebar with navigation links for "Home", "Diagnosis", "Bookings", and "Results & Prescription". The main content area is titled "Your bookings" and contains a table with the following data:

Doctor	Date	Time	Status	Action
DOC004	2019-04-13	8:00-9:30	Expired	Cancel

An orange arrow points from the text below to the "Cancel" button in the table. Below the table, there is a "Close" button. The background of the page shows a section titled "Causes" with text about NCDs and their risk factors.

Cancel your booking by pressing cancel

Bookings page show doctor to be seen time for the appointment status (active or expired) and action for cancelling the booking.

Results and prescription page:

The screenshot displays a web application interface. On the left is a dark blue sidebar with navigation links: Home, Diagnosis, Bookings, and Results & Prescription. The main content area is titled 'LIFESTYLE DISEASES' and contains text about the causes of NCDs, divided into Modifiable behavioural risk factors, Non-modifiable risk factors, and Metabolic risk factors. A modal window titled 'Results and Prescription' is overlaid on the content. It contains a table with the following data:

Date	Print results	Print Prescription
2019-04-14		

Two orange arrows point from the text below to the 'Print results' and 'Print Prescription' buttons in the table.

Click the buttons to print prescription or results

This page show results from doctor and prescribed medication and both can be printable.

Doctors manual :

The screenshot shows a web interface for a doctor. On the left is a blue sidebar with navigation options: Home, Calender, and Reports. The main content area displays a table of patient appointments. The table has columns for Patient Name, Surname, Diagnosis results, Apointment Date, Time, Status, Upload results, Attend, and Remove. Two rows of data are visible, both for a patient named 'Genius' with surname 'Homwe'. The first row shows a 50% diagnosis result for an appointment on 2019-04-17 from 8:00-9:30, with a status of 'Expired'. The second row shows an 80% diagnosis result for an appointment on 2019-04-18 from 13:00-14:30, with a status of 'Expired'. Each row has an 'Upload' button (blue), an 'Attend' button (green), and a 'Delete' button (red). Three orange arrows originate from the bottom of the sidebar and point to the 'Upload' button of the first row, the 'Attend' button of the second row, and the 'Delete' button of the second row.

Patient Name	Surname	Diagnosis results	Apointment Date	Time	Status	Upload results	Attend	Remove
Genius	Homwe	50%	2019-04-17	8:00-9:30	Expired	Upload	Attend	Delete
Genius	Homwe	80%	2019-04-18	13:00-14:30	Expired	Upload	Attend	Delete

Click upload to upload patient results,
Delete to cancel the booking

For checking schedules click on calendar and you will be directed to calendar page to view schedules. To upload results and prescription click upload, For reports click reports and you will be directed to reports page.

Appendix C: Interview Checklist

Cover latter

MOHCC MEDICAL DIAGNOSIS SUPPORT SYSTEM FOR LIFE STYLE DISEASES

My name is..... doing information systems at Midlands state university and this year is my final. Purpose of this interview is to communicate with patients and doctors to find out on their opinions about the system and get feedback on how they feel about it for further development. The interview isn't designed to take much of your time 30 mins at most, and your expected to give an answer of your choice. We realize your busy but we would be grateful if u participate in our survey.

U are allowed to exit the interview at any time and u are not obliged to answer any questions that u are not comfortable with. We really hope u will assist us in this survey

Information that u will provide will not be published and all information is to be made anonymously

Are u willing to take part in this survey. yes no

Do u have any queries before we start

.....

Interviewer name.....

Interviewee name.....

Questions

Q i. We understand a need for a system to be developed has risen, what are the contributing factors?

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

Q ii. How does the current system work? (Current system is the existing system)

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

Q iii. What are the main challenges associated with the current system?

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

Q iv. What do you think can be done to curb all these challenges?

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

Q v. If a new system is to be introduced what are the main features or functions do you require the system to perform?

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

Q vi. Do you think the introduction of the system will improve the way you operate?

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

Appendix D: Questionnaire Checklist

Please answer all questions

Are you satisfied with the current system? (Current system is the existing system)

Yes No

If not, what suggestions and recommendations are you proposing?

.....
.....

4. How long does it take in a queue for diagnosis?

Less than 20 Minutes 30-60 Minutes More than 60 Minutes

.....
.....

5. How many kilometres do you travel to the nearest hospital?

Less than 5km 5-20km 20km plus

.....
.....

6. How do you rate the service at the hospital?

Excellent Average Bad

If not excellent, what are the challenges you encounter at the hospital and what are your suggestions?

.....
.....

7)Do you think the new system will be of benefit to your department and organisation as a whole and what's your reasons?

.....
.....

DATE.....

Appendix E: Code Snippets

Login code

```
lseif(isset($_POST['login']))
{

    $id = $_POST['id'];
    $password = md5($_POST['pass']);

    if($id!="")
    {
        $stakeDb = mysqli_query($db,"SELECT * FROM user WHERE
identity_number='$id' and password='$password'");
        $srid = mysqli_num_rows($stakeDb);
        $fetch = mysqli_fetch_assoc($stakeDb);

        $_SESSION['name'] = $fetch['name'];
        $_SESSION['surname'] = $fetch['surname'];
        $_SESSION['doc_id'] = $fetch['identity_number'];
        $_SESSION['id'] = $fetch['identity_number'];
        $_SESSION['role'] = $fetch['role'];
        $_SESSION['region'] = $fetch['region'];
        $_SESSION['sex'] = $fetch['sex'];
        //$_SESSION['age'] = date("Y-m-d") - $fetch['dob'];

        if($srid >= 1)
        {

            header('location:main.php');

        }
    }
}
```

```

else

    {
        $_SESSION['error']='true';
        echo "<script>
        window:location='index.php';
        </script>
        ";
    }

}

}

elseif(isset($_POST['recover']))
{
    $surname=$_POST['email'];
    $password =mysql_real_escape_string($db,$_POST['pass']);
    $confirm = $_POST['conf'];
    if($password==$confirm)
    {

        $search = mysql_query($db,"SELECT * FROM user WHERE
email='$email'");
        $count= mysql_num_rows($search);
        if($count>=1)
        {
            $rec = mysql_query($db,"UPDATE user SET password='$password'
WHERE email='$email' ");

            if($rec)
            {
                echo "<script>

```

```

        alert('Password Succesfully Reseted');
        window:location='index.php';
    </script>
    ";
}

}
else
{
    echo "<script>
    alert('Incorrect email','error');
    window:location='index.php';
    </script>
    ";
}

}
else
{
    echo "<script>
    alert('Passwords do not match');
    window:location='index.php';
    </script>";
}

}

```

Diagnosis code

```

<?php session_start() ;
error_reporting(0);
$stable_name=$_GET['value'];

```

```
if($table_name!="")
{

$_SESSION['TABLE']=$table_name;
```

```
}
```

```
$table = $_SESSION['TABLE'];
```

```
?>
```

```
<?php
```

```
include('connection.php');
```

```
if(isset($_GET['page']))
```

```
{
```

```
    $page = $_GET['page'];
```

```
}
```

```
else
```

```
{
```

```
    $page=1;
```

```
}
```

```
if($page=="|| $page==1)
```

```
{
```

```
    $page1=0;
```



```
echo "<p align='center'><input type='submit' name='btn' value='submit' class='btn btn-  
success form-group' ></p>";
```

```
}  
}
```

```
$dic = mysqli_real_escape_string($db,$_POST['no']);  
if(isset($_POST['btn']))  
{  
  
if($dic!="")  
{  
  
$zita = $_SESSION['id'];  
$update = mysqli_query($db,"UPDATE $table  
SET value='$dic' WHERE id='$zita' ");  
echo "<script>  
  
location.replace('?page=$next')  
  
</script>";  
  
/* if($update)  
{  
    echo "success";  
}  
}
```

```
else
```

```
    echo "failed";*/
```

```
    }
```

```
  }
```

```
?>
```

```
</form>
```

```
<?php
```

```
echo "<br>";
```

```
$sql = mysqli_query($db,"SELECT * FROM $table ");
```

```
$count = mysqli_num_rows($sql);
```

```
$page_number = $count/1;
```

```
$prev = $page-1;
```

```
$next= $page+1;
```

```
//$result = $page+0;
```



```
<p align="center"><input type='submit'  
name='result' value='Result' class='btn btn-outline-success'> </p>
```

```
</form>
```

```
<?php  
>
```

```
>
```