

IMMUNISATION MANAGEMENT SYSTEM
CASE STUDY: MBARARA REGIONAL REFERRAL HOSPITAL

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A PROJECT REPORT SUBMITTED TO THE FACULTY OF SCIENCE
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DEDICATION

I dedicate this work to my beloved parents Happy Deus and Atwiine Plossy, my uncle Asimwe Arnold, my grand mum Caroline Sempa who are now staying in London who provided me with all gadgets that I used in doing my research and above all academic financial support.

ACKNOWLEDGEMENT

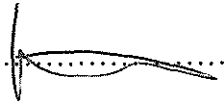
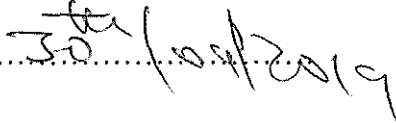
First and foremost, I want to thank the almighty God who has carried me from nowhere to this far in my education and more so life at campus. It has been a struggle but God stood on my way and for real my education is a great testimony that I shall live to tell.

Similarly, I would also like to extend my gratitude to my supervisor Dr. Kimwise Arone ,Mr. Arinaitwe Eliot for his patience and extreme support, for the time spent in coming up with this project report, his guidance and encouragement even when I felt inadequate. Sincerely this project report would not have been incomplete if it was not for your parental approach to my study endeavors; it was of a great impact to my career. May the almighty God continue to give you good health and favor till you last days.

I would also like to convey my heartfelt thanks to my beloved parents who constantly facilitated me financially during the course of my Education. I must appreciate all you did since I was toddlers till all this far may the almighty God continue to give you good health and favor till your last days.

APPROVAL

This final year project report has been done under my supervision and is now ready for approval.

Sign.......... Date..........

DR. KIMWISE ARONE

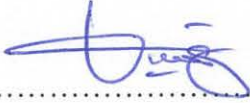
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DECLARATION

IATWONGYERE GLORIOUS hereby declare that this report written in partial fulfillment of the requirements of the award of a Bachelor of Information Technology degree of Kampala International University is my very own work has never been submitted anywhere else for any purpose.



SIGNATURE.....

NAME: IATWONGYERE GLORIOUS

Date: 29/09/2019

Definition of term

Glossary: This is an over view perception of the available and involving ideas.

Attributes: Properties that describe the entity of which they are associated. A particular instance of an attribute is a value.

Data: Raw facts that have not been processed.

Database: a shared collection of logically related data together with a description of this data designed to meet the information needs of an organization.

Administrator: is a person responsible for installing, maintaining and configuring the DBMS software.

Entity: this is any tangible or intangible object on which an organization wishes to store data.

Manual system: asystem that uses a manual means of collecting data, inputting and storage through the use manpower.

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LIST OF ACRONYMS

CSS	Cascading style sheet
HTML	Hyper Text markup language
IDE	Integrated Development Environment
MYSQL	Structured Query Language
PHP	Hypertext Preprocessor
UCC	Uganda Communication Commission
WAMP	Windows Apache MySQL and PHP

ABSTRACT

Doing research in areas which can help increase on decision making when it comes to immunization is the interesting aspect.

This study titled Immunization Management System done at Mbarara Regional Referral Hospital between the hospital staff and the parents.

The main objective was to design and develop immunization management system that allows effective immunization management activities through keeping records , scheduling those who are to be immunized the next date hence effective monitoring the use of vaccines and assigned health worker in hospital.

And specific objectives were to study and analyze the current immunization system at Mbarara Regional Referral Hospital, gather the necessary requirements for designing a convenient and flexible, design and develop Immunisation Management system test and validate the system.

Data was collected using, interviewing, questionnaire, observation, and a random sampling technique to locate 20 respondents.

It was analyzed and prototyping model was used through the whole process. The study found out at the moment was done using the archectural plan which was done using the client/server architecture and the actual Computer based system was developed using MySQL and PHP.

The study recommends thatthose students who come up with new ideas should be given extra support to go ahead even after presentations and continue working on such projects with an aim of improving technology.

CHAPTER ONE:

INTRODUCTION AND BACK GROUND STUDY

1.0 Introduction

Immunization management system is a desktop enabled. It is aimed at providing immunization information to the staff and any other category of people subjected to immunization. It has an important influence on people's attitude towards immunization by giving important information which include among others, the intended aims of immunization and enough awareness about the immunizeable diseases, doctors and nurses get informed of immunization schedules and programs. The system operates in a way that after providing the required information, the system user is able to receive notifications on immunization programs and schedules for example the date of next date one is supposed to go for immunization. On the other hand, it is be used to register newly born babies and other categories of people subjected to immunization. This gives a good estimate of immunization drugs to be purchased and how much should be distributed in different areas. This in turn enables proper planning as to how much drugs should be supplied to different health centers/immunization centers which in turn brings about good use of resources since so there will not be purchase of excess drugs.

1.1 Background

Effective communication between parents and health care providers has an important influence on people's decisions about whether or not to proceed with immunization. There is significant interest in understanding why some people are unwilling to receive vaccines and how their concerns can be addressed to encourage participation in immunization programs. Though relating it to socioeconomic disadvantage where, despite some motivation to have their children vaccinated, parents lack access to reliable information for the next date of immunization. It is quite challenging for the government or hospital to monitor the use of immunization vaccines and this makes it hard to make decisions on how much vaccine should be purchased and distributed to different health/immunization centers.

Conversely, poor communication can contribute to rejection of vaccinations or dissatisfaction based on an array of factors and parents integrate information according to their experiential and

social contexts. A parent's trust in the source of information may be more important than what is in the information.

The system is informed by evidence from communication research and is applicable for use by all parents and health professionals in their vaccination discussions, particularly where there might be parental reluctance to vaccinate. It focuses on recommended childhood [1] vaccines but is also applicable to discussions with other groups recommended for vaccination. We propose categories or 'positions' that reflect different parental attitudes and behaviors regarding vaccination and suggest specific communication strategies tailored to each position.

1.2: Problem statement

In **Uganda**, children are immunized against 8 vaccine preventable diseases routinely before they are one year old. It was found that 63% of children less than one year either fail to complete their vaccinations schedule or do not get any vaccinations at all. This is because about 53% of Parents and caretakers lose the child health cards and sometimes it becomes very hard for doctors and nurses to tell the date for the next immunization phase using their paper based records to plan for the next children to be immunized, monitor the vaccine to be used and [4] Children who miss immunization are subjected to a high risk of death caused by dangerous diseases like measles. So this system will notify and give much information about immunizing children hence avoiding those risks.

1.3 General objectives

To develop a immunization management system that allows effective immunization management activities through keeping records, scheduling those who are to be immunized the next date hence effective monitoring the use of vaccines and assigned health worker in hospital.

1.3.1: specific objectives

- I. To study the current immunization system at Mbarara Regional Referral Hospital..
- II. To gather the necessary requirements for designing a convenient and flexible immunisation management system.
- III. To design and develop Immunisation Management system
- IV. To test and validate the system.

1.4: Research questions

- i. What are the challenges associated with the current immunization management system at Mbarara Referral hospital.
- ii. what requirements are needed for designing immunization management system
- iii. What would be the best way of designing and developing such a system?
- iv. Will the designed system meet the different user requirements?

1.5 Scope

A scope specifies the area of coverage by the project and in this context we have broken it in three categories i.e. geographical scope, physical and technical scope. Geographical scope specifies the area of conduct, Physical scope specifies the area of focus during the research (case study) and the functionalities after completion with the stakeholders to be affected or will affect the project and then Technical scope specifies the requirements needed for project implementation and realization of the intended outcome.

1.5.1 Geographical scope

The study was conducted at Mbarara Regional Referral particularly in section of immunization

The hospital is located in Mbarara Municipality along Mbarara-Kabalehigh way.

1.5.2Technical scope.

Word access, MYSQL was used as an environment for creating the computerized system as well as creating activities for the various objects. This environment supports most windows on every computer to create activities and connect them to objects

1.5.Significance of the study

Immunization management system helps users to run the immunization activities effectively and in time like immunization scheduling, giving the results of the children who are to be immunized the next date , hence helping in monitoring the vaccines to be used for the next date of immunization.

CHAPTER TWO:

LITERATURE REVIEW

2.0 Introduction

This chapter briefly describes the review on existing technique related with Immunization management system that will be developed later. This chapter comprises four sections: the first section describes the comprehensive review on existing related system. The second section describes the review on software development methodology. And lastly, section four describe about the system implementation.

2.1 Study of existing system.

This section is to review the current and existing system that related to immunization management. It involves hardships and approximating how many children are to be immunized onascertain date and monitoring vaccines.

According to **Johns Hopkins Bloomberg** in their paper presented a Real-Time Immunization Monitoring System (RTIMS) that use an automated internet based system for active post-licensure monitoring of adverse events associated with influenza vaccines. The system is programmed to identify adverse events and is set up to send an alert that is displayed at central or satellite facilities allowing for prompt identification of individuals reporting serious symptoms. The goal of RTIMS would be to ask vaccine recipients if they are willing to be contacted about their experience with influenza vaccine at the time of vaccination. This contact information will be forwarded to study investigators at Johns Hopkins. On receipt of the contact information, an email will be sent to each vaccine recipient informing them about the study and asking for their consent to participate.

2.1.1 Immunization Management System.

Immunisation management system is a system specialty designed to inform and notify doctors and nurses and does immunisation scheduling. This system is customized and user friendly software. All administrative system has been designed to be kept centrally and unique for the users.

According to **the Uganda Communication Commission (UCC)**, about 19.5 million Ugandans are now using mobile phones [4] though our main focus is on those using smart phones and this gives us the reason why we decide to design a mobile phone application to cater for the highest population in Uganda. to adds on that almost every hospital has a desktop computer.

2.2 The requirements collection.

After studying and analyzing information of existing system, the researcher formulated a number of requirements namely; user requirement, functional, non-functional and systems requirements.

2.2.1 User Requirements

Users are people who have a stake in a software project according to Richards, H.et al (2000). Any person affected by the system or who influence on system development is a user. Immunization managementSystem, Administrators are the one to login as they register the required information and able to use the database.

2.3.2 Functional Requirements

Functional requirements are those requirements that specify the functionalities of the system by the different users. According to **Health Information Systems (HIS)**, which include Immunization Information Systems (IIS), Electronic Health Records (EHRs), and Health Information Exchanges (HIEs), create CDS tools based on schedules and guidelines developed by the Advisory Committee on Immunization Practices (ACIP), a federal advisory committee responsible for providing expert external advice and guidance on the use of vaccines and related agents for control of vaccine-preventable disease in the United States.

2.3.3 Non-Functional Requirements

Non-functional requirements are usually called qualities of a system. Such as security and backup disaster recovery handling.

The new system ensured security system to prevent unauthorized users from accessing the system. This was achieved by using usernames and passwords.

According to the **US National Library of medicine**[9].VAERS works by receiving reports on a standard form via mail or fax, or through a secure online submission process. The VAERS form includes data fields for patient demographic information and medical history, information on the

reporter and the facility where vaccine(s) were given, description of the adverse event and health outcomes, date of vaccination, vaccine(s) administered, onset of adverse event symptoms, recovery status, and other relevant information

Anyone can report an adverse event to VAERS, including healthcare professionals, vaccine manufacturers, patients, parents and caregivers, and others. Reports are submitted voluntarily either directly from individual reporters, who may be reporting for themselves or others, or secondarily from vaccine manufacturers, that also receive spontaneous reports and in turn submit them to VAERS.

2.4.0: steps taken in designing and developing an immunization management system.

Review the existing system, defining the data needed for relevant units with inorganisation, determine the most appropriate and effective data flow, design the data collection and reporting tools, develop the procedures and mechanisms for data processing, develop and implement training program for program for data provides and data users pre-test, and if necessary re-design the system for data collection, data flow, data processing and data utilization, monitor the evaluate the system, develop effective data dissemination and feedback mechanisms and evaluate the system.

2.4.1: testing the prototype system developed

This is used to test the whole system by linking together all the programs. Bugs are recorded and then categorized in terms of priority they are to be fixed and those with less priority are addressed in the follow-ups releases. **The following are also followed..**

2.4.2: performance testing.

This is the process carried out to validate that all response times or allocation periods specified n the functional specifications can be met by the system especially when it is fully loaded. The process involved timing how long the system takes to respond to a user request.

2.4.3: acceptance testing

This is used to prove to the client the system meets the requirements agreed on. The tested data is eplaced with live data provided by the client. The client records all errors, discrepancies and

other aspects. They are then discussed with the developer whereby, the errors are corrected by the developer and the changes are implemented.

2.4.5: implementation of an immunization management system

2.4.5.1: data take-on and conversion

Small bits of data from the oldest system are transferred safely to the new system. This is done by users entering data, the developer is to ensure that data entry errors are controlled and data conversion by using developed program that transfer data from the old format to the new format developer.

2.4.5.2: user training

User training is conducted to cover all the functions of the system to ensure that the users a competent in the use of the system. The training is done by the system developer.

CHAPTER THREE:

METHODOLOGY

3.0 Introduction

This chapter discusses the methodology that was used in gathering the data. Here the researcher aimed at identifying the objectives to be carried out and the methods and tools to be used to present and analyze data to get proper and maximum information related to the subject under study.

3.1 Study design

The study employed qualitative approach and descriptive methods to describe the characteristics of the research variables. It was qualitative in that opinions of the people were sought and the researcher had to contextualize them according to his/her understanding. The existing system was studied to establish its weak and strong points. The information that was acquired from this study gave the basis for the design of the system. Resources, the availability of existing design modules, and even the budget and the time schedule.

The reasons why the researcher chose to use this methodology are because the method is easier to understand, more user friendly and the steps are better structured. The researcher was able to modify the system continuously until it meets the general objective.

3.2: Area of the study

The study was conducted in the hospital administrator's office at Mbarara regional referral hospital which determined the accuracy, efficiency, reliability, and security, user friendly, flexible.

3.3: Study population and sample size

The researcher used Random sampling technique to locate 20 respondents, where the respondents composed of 2 administrators, 8 nurses, 5 doctors and 5 parents of the children. All the study respondents had equal chances of being included in the sample. The simple random sampling was used with a homogenous population, that is, one composed of members who all possess the same attributes that the researcher was interested in measuring.

3.3 Sample size.

The sample size was estimated using the formula (Slovene’s formula).

$$n = \frac{N}{1+N(e^2)}$$
 where n is the sample size; N is the sample population;

e is the marginal error which is constantly 0.05

Table 1.3: showing respondents.

Category	No of respondents	Sample size	Percentage
Administrator	2	2	10
Nurses	8	6	40
Doctors	5	3	25
Parents	5	4	25
Total	20	14	100%

3.3 Data Collection Methods

The researcher used the following methods during data collection: Observation, Interviewing and Questionnaires as my research methods.

3.3.1 Observation

The researcher went to Mbarara regional referral hospital to observe how immunization is carried out, how there are notified, informed and how immunization scheduling is done It helped the researcher in studying data critically, Data collected was accurate and reliable.

3.3.2 Interviews

Oral interviews were conducted between the researcher and the targeted population. Interviews gave the researcher the opportunity to motivate the interviewee to respond freely and openly to questions. Interviews permitted the researcher to adopt or reward questions for each individual and quick response was got from the respondent

3.3.3 Questionnaires

In this approach, printed questionnaires were given to some of the stakeholders to fill in the blank spaces. This helped the researcher to know the operation of the existing system. Questionnaires allowed the researcher to collect data from large number of people while maintaining uniform response, when dealing with large audience, no other fact finding technique can tabulate the same facts as efficiently.

3.4 Documentary Review

Some of the information was collected by studying documents. Information from Literature review clearly brings out the need for system. Documentary review helped the researcher to perceive the views of people elsewhere in the world towards immunization management system. According to (Mehdi, Achour, and Antony Dovgal 2009) say that **PHP** allows developers to create dynamic content that interacts with databases.

3.5 Data analysis

Microsoft office was used for data analysis and presentation. In this interview is the most of the correspondents including hospital administrator, and nurses. Microsoft word for documentation, excel and power point for slides.

Also UMLs and DFDs were used to come up with the clear entities and their functionalities within the system.

3.6 System Design

The analysis of the requirements acquired in the requirements identification phase led to the development of the computerized system for searching and locating nearby places in Uganda in line with our case study. The Database system is to be developed using MYSQL and the programming frame work of the system is to be done using HTML5, android studio, CSS, PHP, Bootstrap and Wamp server. The conceptual database design is to be done based on the Entity Relational Diagram and the Entity Relations. There is also the Logical design where entities, attributes, data lengths are to be made to remove the redundancies in the system and duplicates. This brought us to the physical database design where MySQL with PHP script was used to design the system that enables the graphical user interfaces to be used by the system as it is free software. The system design objectives includes: Usability, performance, reliability, software architecture and package

3.7: Implementation

During system implementation, the system should be able to run on computers/laptops) and it is best suited for windows OS that are running Wamp server and high processor of a considerable speed and performance, considerable amount of RAM and internal memory space for proper functionality of the system .

3.8 testing and validation

The testing was meant to prove that the completed system would do what it was meant to. Testing was carried out at each phase to identify errors and keep track of the changes made to the system. The testing was done using sample data collected from the hospital which helped to meet the required specification as they went on to train the users.

3.9:Ethical consideration

Prior to the study a researcher presented an identity card of Kampala international university. This helped the researcher to be identified before the respondents as a student's carrying out a research study to benefit him. At the end of data collection questionnaires note taken and documents collected were compiled and put together which helped the researcher in data processing.

Validity of the system and supported the ideas and concepts of the researcher.

CHAPTER FOUR

DATAPRESENTATION, ANALYSIS AND SYSTEM DESIGN

4.0: Introduction

This chapter describes how the researcher presented and analyzed data and how the new system was designed following the user requirements.

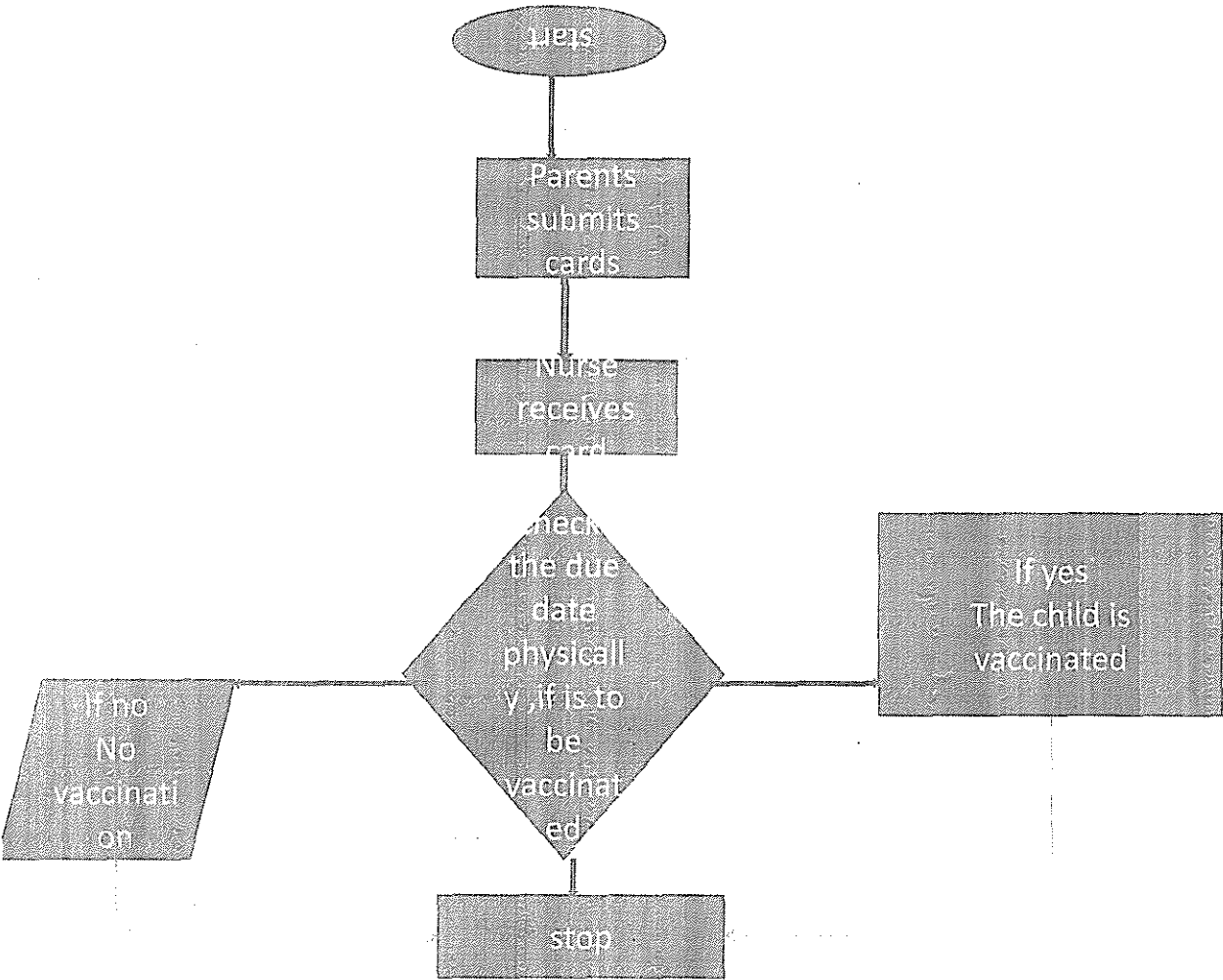
4.1: analysis of the current system

This chapter describes the analysis of data and system analysis is followed by a discussion of the research findings.

The findings relate to the research questions that guided the study. Data were analyzed to

Identify, describe and explore the relationship between Doctors and parents and to determine the need for the development of IDSS. Data were obtained from self-administered data collection methods.

Figure 1.4: The flowchart of the existing immunisation management system



1.2: Data presentation and analysis

The researcher conducted questionnaires where correspondents including the hospital administrator, nurses, doctors and even parents were asked questions about the current immunisation management system, how it works and challenges being encountered while using it. The researcher found out that the system was not perfect to the hospital and parents in terms of storing information.

Table 2: Respondent’s gender

Gender	No of respondents	%
Female	12	60%
Male	8	40%
Total	20	100%

The researcher distributed 20 questionnaires to the respondents. The table below shows response of the respondents about how the current system of information system was being conducted .

Table 3: How the current information system Process is done

how immunisation schedule is done	No of respondents	Percentage
Using computers	Nil	0%
Manually (pens and files)	20	100%
Both computers and manually	Nil	0%

From the table above, 20 respondents (100%) stated that the process of immunisation scheduling and data storage is done manually whereby immunisation cards are usually misplaced by the parents. are used as tools in that process, hence it can be noted that the hospital was entirely used the paper-based method in managing the immunisation system.

Table 4.4 how records are accessed:

If a child record is to be accessed. How is it done?	N0 respondents	Percentage	Conclusion
Through checking in the information kept in the hospital	12	40%	According to the respondents, access to records is through checking in books in the hospital.
Immunization scheduling is done manually	8	60%	
Total	20	100.0%	

Table 5.4: The questionnaire results about the challenges on the current system are presented in the table as follows in (%)

Question	Very Efficient (%)	Efficient (%)	Average (%)	Inefficient (%)	Very Inefficient (%)	Mean	Conclusion
1. How has this current immunisation system been interms of,							
Effectiveness	0 0(%)	6 (30%)	5 (25%)	11 (55%)	12 (60%)	22.6	The effect of the system is Inefficient
Speed	1 (5%)	3 (15%)	4 (20%)	20 (100%)	18 (90%)	2.3	The system Is Inefficient
Ease in Usage	1 (5%)	4 (20%)	18 (90%)	13 (65%)	10 (50%)	2.3	The system Was rated Averagely
Data retrieval	2 (10%)	3 (15%)	10 (50%)	14 (70%)	7 (35%)	1.8	The system Is

							Inefficient
Summary	0	0	4	10	19	1.65	The
Generation	(0%)	(0%)	(20%)	(50%)	(95%)		system
							Is very
							Inefficient
Security	1	3	9	15	18	2.3	The
	(5%)	(15%)	(45%)	(75%)	(90%)		system is
							inefficient
Immunisation	4	3	4	14	8	1.65	The
Scheduling	(20%)	(15%)	(20%)	(70%)	(40%)		system
							Is
							Inefficient

From the table above the researcher found out that the current system is rated as inefficient as reflected by the scaling preference the researcher used while analyzing data with the help of mean and percentage.

Table6.4 StaffComputer literacy results

Question	Very	good	average	poor	Very	Mean	Conclusion
2: how	Good				Poor		
many							
technically	1	3	2	8	10	14.5	Some, of
know how	(5%)	(11%)	(7%)	(18%)	(20%)		the staffs
to use							were
computer.							found
							good in
							computer.

From the table below, the researcher found out that the most staff members were literate about 'the computer fundamentals' and application and the internet which made the training session

easier and cost effective on how to use the designed system, hence giving the researcher to design the Immunization Management System.

4.2.1: The Designed System

The system designed is server based system whereby children’s records are accessed on the internet. It significantly saves time because there is early communication of how many children are to be immunized.

The main difference between the old system and the new system is that, there is early communication of children to be immunized and requires less storage space. It is also much more efficient since it generates summaries within minimum time and with minimum errors.

4.2.0 User Requirements

Users are people who have a stake in a software project according to Richards, H.et al (2000). Any person affected by the system or who influence on system development is a user. ImmunizationManagement System, Administrators are the one to login as they register the required information and able to use the database.

4.2.1: Functional Requirements

Functional requirements are those requirements that specify the functionalities of the system by the different users.

The system allows capturing and storing children details

It enables management to view and search for a particular child in case of needed information.

The system does enable the user to save, update information about the child. Therefore the system has the ability to permanently save data into the database.

1.2.4Non-Functional Requirements

Non-functional requirements are usually called qualities of a system. Such as security and backup disaster recovery handling.

The new system ensured security system to prevent unauthorized users from accessing the system. This was achieved by using usernames and passwords.

The system is portable and light in order not to affect the through put.

The system cost effective with the less effect on its implementation and maintenance

4.3.1The following hardware and software requirements specifications

Have been used because they are the least affordable and the system has been tested on them as per the results in the data output section.

- i. Pentium(R) Dual Core Processor 4.40 GHZ
- ii. 3.00GB of RAM
- iii. 460 GB of Hard disk, 17inch monitor with 1366x768 screen resolutions.
- iv. Android Phone was used to test the application.

Software requirements

Below are the minimum system software requirements that auser must install in his/her computer order to use the designed system.

- I. Operating system- Windows 200/XP/NT/2007/2008/8.1.
- II. Database Management System- MySQL (Wampserver 2.1 +)
- III. Firewall/Antivirus- A vast, AVG and any other
- IV. Web browser- Mozilla Firefox, Internet explorer, Google chrome, opera, UC browser.

4.3.2 Description of the designed system

mmunization management systemis a computerized system comprised of the general nformation about the immunization. Its major purpose in to manage immunization processes at he hospital. From general registration, immunization scheduling,summaries that is individual list und general list and notification with the list of children to be immunized for the next date.

Finger 2.4Aflow chart for Immunization Management System

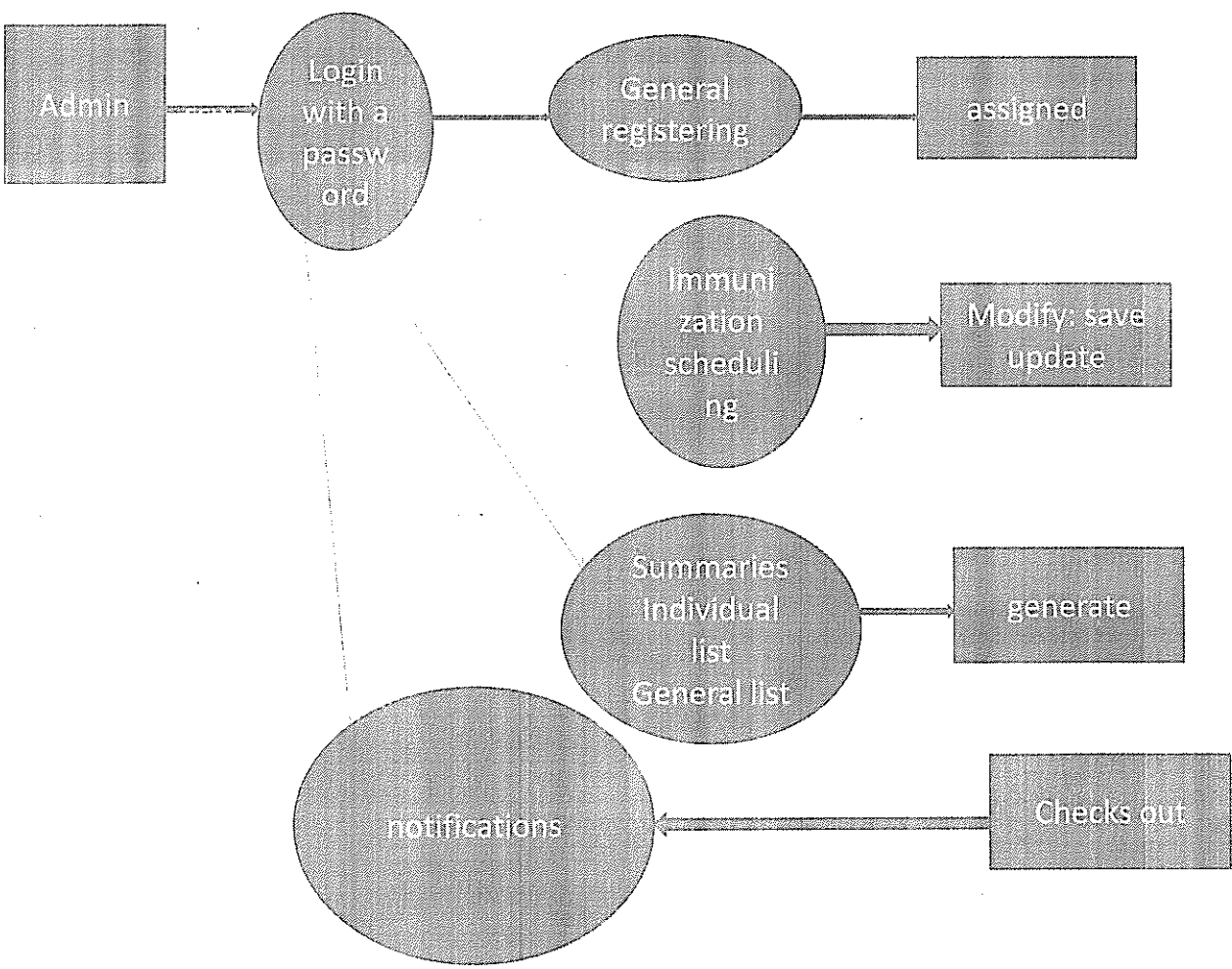


Table7.4: shows some of system entities and associated attributes

Field	Data type	NOT NULL	Key	Default	Extra
Childid	Int(12)	NO	PRI	NOT NULL	Auto Increment
Firstname	VARCHAR(24)	NO		NOT NULL	
Lastname	VARCHAR(24)	NO		NOT NULL	
DOB	Date	NO		NOT NULL	
Status	VARCHAR(24)	NO		NOT NULL	
fathersname	VARCHAR(24)	NO		NOT NULL	
Address	VARCHAR(28)	NO		NOT NULL	
Hospital	VARCHAR(28)	NO		NOT NULL	
Telno	Varchar(12)	NO		NOT NULL	
Doctorsname	Varchar(45)	NO		NOT NULL	

CHAPTER FIVE

SYSTEM IMPLEMENTATION AND TESTING

5.0: introduction

This chapter emphasizes the actual system implementation. The system was transformed from user requirements in to a workable product. The purpose of implementation was to make sure that the correct application is delivered to the end user and it also emphasizes on testing to confirm it if meets user requirements.

5.1 system implementation

It is the stage in the project where the theoretical design is turned in to a working system and is giving confidence on the new system for the users that it will work efficiently and effectively. It involves careful planning, investigations of the current system and its constraints on implementation, design of methods to achieve the changeover. According to this plan for the activities are to be carried out, discussions made regarding the equipment and the resources are needed. Implementation is the final and the most important phase. The most critical stage in achieving a successful new system is giving the users confidence that the new system will work effectively. This is done after testing is done and found to be working according to the specification using System testing, unit testing, integration testing, user acceptance testing.

5.2 system testing.

As a part of system testing we execute the program with the intent of finding errors and missing operations and also a complete verification to determine whether the objectives are met and the user requirements are satisfied. The ultimate aim is quality assurance. Tests are carried out and the results are compared with the expected document. In the case of erroneous results, debugging is done. Using detailed testing strategies attest plan is carried out on each module. The various test performed are unit testing, integration testing and user acceptance testing.

5.2.1 Unit testing

The software units in the system are modules and routines that are assembled and integrated to perform a specific function. As a part of unit testing we executed the program for individual modules independently. This enables, to detect errors in coding and logic that is filling forms and

ascertaining if the value matches to the type and entered into the database. The various controls are tested to ensure that each performs its action as required.

5.2.2 Integrated Testing

Data can be lost across any interface, one module can have an adverse effect on another, sub functions when combined, may not produce the desired major functions. Integration testing is systematic testing to discover errors associated within the interface. The objective is to take unit tested modules and build a program structure. All the modules are combined and tested as a whole. Here the admin module and parents module options are integrated and tested. This provides the assurance that the application is well integrated functional unit with smooth transition of data.

5.2.3 User Acceptance Testing

User acceptance of a system is the key factor for the success of any system. The system under consideration is tested for the user acceptance by instantly registering child and doing updates whenever required.

5.3 System functionality.

Immunization Management system is accessed on the by the administrator. The first page accessed on the server side of the system is a home page with links that guides the user on what to do with the server .

Figure 2: showing administrator login page.

The screen shot below shows an interface from where users log onto the system. Required is a user name and password.

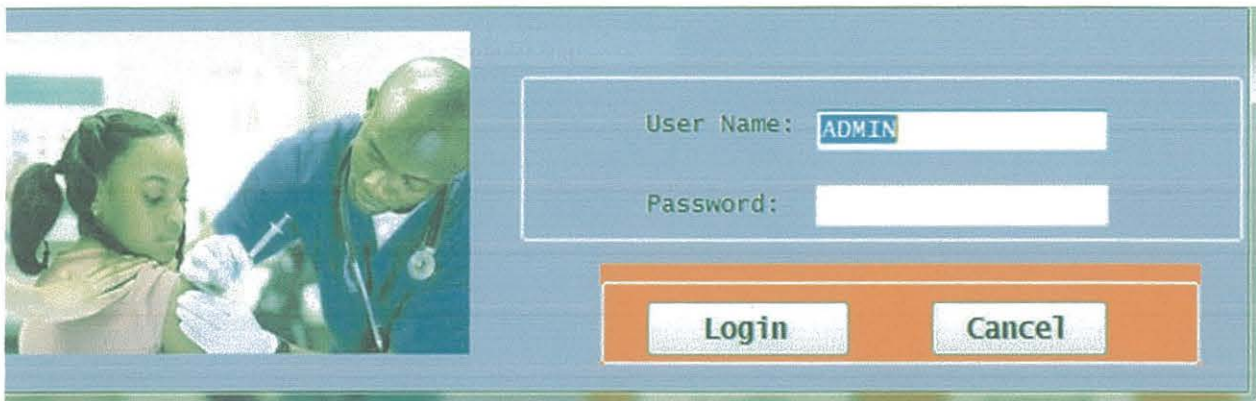


Figure 2: administrator login page.

Figure 3: Homepage



Figure 3: Homepage

Figure 4: showing general registration.

Below is a snapshot showing the general registration interface, details including name, date of birth, user type, phone contact, parents name, address, doctors name, hospital name saved to the database.

The screenshot shows a web application window titled "General Registration" with a background image of a person. The form is divided into three main sections: "P10 DATA", "GUARDIAN", and "CLINIC".

P10 DATA	GUARDIAN	CLINIC
ID: 102	Mother's Name:	Hospital Name:
First name: baguma	Mother's Tel:	Doctors Name:
Last name: juma	Address:	Tel No:
DOB: 13/09/2019	Father's Name:	
	Father's Tel:	

At the bottom of the form, there are two buttons: "Add New Record" and "Save / Update".

Figure 4:showing general registration.

Figure 5: summary Page.

General registered form.



General list

Name		1st Dose	2nd Dose	3rd Dose	4 th Dose	5th Dose
agaba	micheal	Pending 19/09/2019	Pending 11/09/2019	Pending 14/09/2019	Pending 15/09/2019	Pending 24/09/2019
tumusiime	jacob	Pending 10/09/2019	Pending 11/09/2019	Pending 17/09/2019	Pending 19/09/2019	Pending 20/09/2019
nakazibwe	wine	Complete 10/09/2019	Complete 15/09/2019	Pending 18/09/2019	Pending 18/09/2019	Pending 26/09/2019
okello	henly	Complete 09/10/2019	Complete 11/09/2019	Pending 16/12/2019	Pending 20/09/2019	Pending 25/09/2019
lepiha	sam	Complete 12/09/2019	Complete 14/09/2019	Pending 16/09/2019	Pending 17/09/2019	Pending 27/09/2019
tom	butia	Complete	Pending	Pending	Pending	Pending

The screen shot below shows an interface where registered children of the system can be viewed from.

Figure 6: individual register form

Enter Parameter Values

You can provide a single value for this parameter.
Enter the value you want to include.

search

enter_id

Discrete values

< Back

Finish

Cancel

Figure 7: Immunisation scheduling page.

Add New Record

Update Existing Record

Search By:

ID: 102

Name: baguma

juma

Log out

Schedule

Vaccine Antigen

1st Dsg: BCG,DPT-Hep-Hib,Polio:

2nd Dsg: Measles,PCV,HPV:

3rd Dsg:IPV,Rota:

4th Dsg:Measles:

5th Dsg:Tetanus Toxide:

Due Date

GroupBox

11/09/2019

13/09/2019

14/09/2019

15/09/2019

24/09/2019

Status

Complete

Pending

Pending

Pending

Pending

Complete

Pending

Pending

Pending

Pending

UPDATE EXISTING RECORD

agaba

micheal

Refresh

Figure 8: Notification page

Add New Record

Update Existing Record

Search By:

ID: 102

Name: baguma

juma

Log out

Schedule

Vaccine Antigen

1st Dsg: BCG,DPT-Hep-Hib,Polio:

2nd Dsg: Measles,PCV,HPV:

3rd Dsg:IPV,Rota:

4th Dsg:Measles:

5th Dsg:Tetanus Toxide:

Due Date

GroupBox

11/09/2019

13/09/2019

14/09/2019

15/09/2019

24/09/2019

Status

Complete

Pending

Pending

Pending

Pending

Complete

Pending

Pending

Pending

Pending

UPDATE EXISTING RECORD

agaba

micheal

5.3 system validation

This was carried out using a sample population of 20 members in the hospital. The above mentioned members worked and responded positively towards developing a new system because they all found out that the new system meets all the user requirements.

Table 4: System validation

Requirements	Yes	NO	Mean	Conclusion
Performance	19(95%)	6(13%)	2	Yes
Ease to use	18(90%)	4(9%)	2	Yes
Information capturing	14(70%)	5(11%)	2	Yes
Control and security	9(45%)	2(4%)	2	Yes
Storage	16(80%)	1(3%)	2	Yes
System validity	18(90%)	3(7%)	2	Yes
Reliability	15(75%)	2(4%)	2	Yes

5.2 Challenges.

During the study the researcher encountered a number of problems which to some extent seemed to stand in the way of success of the study. These among others include:

- 1. false information:
- 2. lack of time by doctors and nurses like after being called for a sick person.
- 3. High programming technique. The programming aspect of this project posed a lot of programmatic bugs which took me some time to solve.

5.3 Experiences and skills gained.

I gained much experience and learnt skills during the research process first and foremost I was able to associate and work with different personalities from different environments amidst handling pressure, deadlines, tension and reaction.

Secondly, I also learnt to work as a team and how to handle problems that was encountered during the time of doing research.

The project helped me to improve on my programming skill as I interacted with many programming environments and languages for instance android studio, android programming language PHP, JQuery, CSS, JavaScript and HTML.

Table 5:The questionnaire results about the current system and developed system.

	User friendly	reliability	Dependability	Cost	Availability	speed	Scalability
Immunisation Decision support system	Very good	Very good	Very good	low	Very good	good	Very good
Existing systems	fair	Fair	Poor	high	Fair	poor	Good

5.4 Limitations of the system.

Immunization Management Systemin terms of usability it only caters for the registered users who have the operational accounts.

This System is able to give the notification to the administrator and then the administrator gives the results to the health worker.

CHAPTER SIX:

DISCUSSION, CONCLUSION, AND RECOMMENDATION

6.0: introduction

In this chapter, the researcher looks at the summary of the finding, conclusion and recommendations of the study on designing an immunisation Management system.

6.1: Discussion

According to what was gathered from the data analysis, it was realized that the system has challenges of immunization scheduling where parents miss immunisation and immunisation cards. The researcher was able to define requirements for the new immunisation system and the new system was developed basing on the data collected and analyzed and presented using tables. PHP Sublime text was used to design the user graphical user interface, while PHPMy Admin was useful in developing the database. Testing was carried out on each module been implemented to detect any defect and make corrections to ensure that each module is compatible and the system was integrated and tested which conform to the user requirements specification.

However the researcher met some challenges and limitations which include the following:

- I. High programming techniques
- II. Few literature sources.

6.2: Conclusion.

The Immunisation Management system is very useful in managing the process of immunisation in Uganda; children are immunized against 8 vaccine preventable diseases routinely before they are one year old. It was found that 63% of children less than one year either fail to complete their vaccinations schedule or do not get any vaccinations at all. This is because about 53% of parents and caretakers lose the child health cards and its hard and not easy for health workers to fill the date for the next immunization phase using their paper based system. Children who miss immunization are subjected to a high risk of death caused by dangerous diseases like measles. So this system will notify and give much information about immunizing children hence avoiding those risks. So this project deals with some of the problems met during immunisation management like keeping records very well without errors as it allows updating.

This system allows you to update records and even easy access of summary reports in time than the old system where you have to do it manually. This system is characterized of accuracy and privacy interms of security.

6.3: Recommendations.

The researcher recommend that students who come up with new ideas should be given extra support to go ahead even after presentations and continue working on such projects with an aim of improving technology in the University and Uganda at large.

I recommend if possible the university should come up with the support scheme whereby all research activities should have at least a facilitation fee to curb the difficulties faced by the researchers during the process in terms of finance, time.

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APPENDICES

This section contains project product operation requirements specifications:

Appendix 1:

Questionnaire to the users

1.introduction

My name is **ATWONGYERE GLORIOUS**, a student at KIU doing Information technology, I am currently carrying out an academic project –Immunisation Management System which intends to solve problems related to immunisation system. I would like to collect information from you through this questionnaire.

1. Please fill this questions below

NAME.....

GENDER.....

POSITION.....

2. How has been this current system in terms of effectiveness, speed, ease in usage and time taken to retrieve information, summary generation and security?

QUESTION:	Very Efficient	efficient	Neutral	inefficient	Very Inefficient
How has been this immunization system					
effective	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Speed	<input type="checkbox"/>				

3. In the new system , what facilities do you want me to be included?

.....

.....

.....

.....

4. How are you on computer fundamentals, its application and phones?

Very good

☐

Good

☐

Fair good

☐

Poor

☐

Very poor

☐

Project Time Line (Gantt chart)

Table 6: Gantt Chat: Presenting the activities and Time Schedule for the Research Project.

YEARS	2018				2019					
ACTIVITY	AUG	SEP	OCT	NOV	JAN	FEB- MA R	APRI- MAY	JUNE- JULY	AUGUST	SEPT
Feasibility study										
Data collection										
Data analysis										
System design										
Coding and validation										
System implementation										
Report writing										