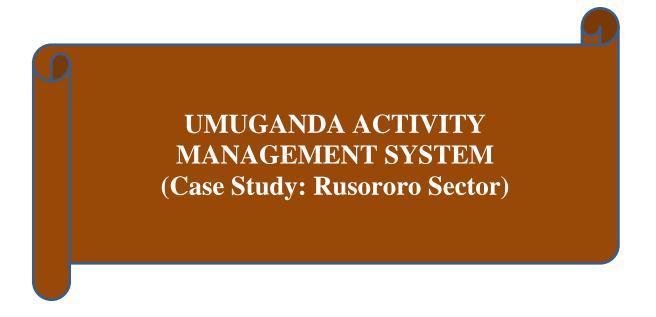**IPRC NGOMA**
Integrated Polytechnic Regional College

P.O. Box 35 KIBUNGO - RWANDA
Tel: +250 783 540 145
Email:info@iprcngoma.rp.ac.rw
www.iprcngoma.rp.ac.rw

DEPARTMENT OF INFORMATION AND COMMUNICATION TECHNOLOGY

OPTION OF INFORMATION TECHNOLOGY

UMUGANDA ACTIVITY MANAGEMENT SYSTEM
(Case Study: Rusororo Sector)

A project report submitted in partial fulfillment of the requirements for the award of an Advanced

Diploma in information and communication technology

Information technology Option

Academic Year: 2018-2019

Submitted by: Josue BYIRINGIRO

REG No: **16 RP 00199**

Supervisor's names: Mr. **Jean Paul NIYIBIZI**

Done at Ngoma, November 2019

DECLARATION

I, **JOSUE Byiringiro**, hereby declare that I carried out the work reported in this report in the department of Information and Communication Technology in Integrated Polytechnic Regional College NGOMA, under the supervision **Mr. Jean Paul NIYIBIZI**, I declare that to the best of my knowledge, there is no part of this report has been submitted here or away in a previous application for award of an academic qualification. All sources of knowledge used have been properly acknowledged. I also declare that this project report stay as Rwanda Polytechnic IPRC-Ngoma property.

Date: .... /……………/……………

Signature: …………………………….

APPROVAL

This is the confirmation that, this project titled **"Umuganda Activity Management system"** has carried out by **JOSUE Byiringiro** have been read, checked and approved for meeting part of the requirements and regulations governing the award of the Advanced Diploma in Information and Communication Technology at Rwanda Polytechnic IPRC-Ngoma

Supervisor

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

Names: **Mr. Jean Paul NIYIBIZI**

Head of ICT Department

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

Names: **Mr. Jean Paul NIYIBIZI**

DEDICATION

This project report is dedicated to Almighty God for his care and protection throughout my stay in Rwanda Polytechnic IPRC-Ngoma, I also dedicate this work to my lovely family especially my lovely Mama for making me a graduate through the mercy of God, to all my brothers and sisters; to all my relative relatives and friends. May God give them long life and prosperity and also dedication to each one who contributed to my little success in life. God bless you.

ACKNOWLEDGEMENT

First and foremost, I fondly thank the Almighty God for the gift of life and spirit of hard working I sincerely thank **Mr. Jean Paul NIYIBIZI**, who is my guide in this project, for her constant support through the course and for providing necessary advice to carry out this project work, his advices, guidance, support were highly appreciated. I expand my straight thanks to my appreciate head of ICT department Mr. Jean Paul NIYIBIZI, for allowing me to utilize the various facilities available. I would like to thank the other department's members, my family especially my Mother, friends and class members for the hold up and encouragement they have given me during the course of my work.

May God bless you!

ABSTRACT

As the title specifies "Umuganda Activity Management System" is software developed for managing attendance taken by reporters on the fields of umuganda activity especially in the way of storing and sharing data around all the areas of country. That why Umuganda activity management system is a different set of procedures used in administrations to make and manage attendance and resolve disputes (V kassarnig 2017). Attendance is act of making records of people who participated in a given activity by the purpose of identifying attended people from those who are absent ones. Where someone says those people have been participated the other ones have not participated. My project intention is to create way of sharing attendance report in every areas of the country and accessed at the same time and also will increase the speed-up, security and reduce cost used in transport by reporters from umuganda fields to the offices to depose records. This project will deal with the problems of making and managing attendance and prevents the problems which occur when the attendance carried manually. This system will be used by 3 users (Agents, reporters, administration officers), each user have own responsibilities to use the system. The purpose of designing this system leads to the computerized system that will resolve many problems found in existing system, is more user friendly and more Graphical User Interface oriented where registered people can be recorded through forms available in the system by recording their address in the Database, the responsibility for agents are equally where is to check attendance and absent times for a given person then they count amount of money that person will have to pay for absent time. Also they will be another part of reporters which will have form to use in attendance from umuganda fields where reporters will have to record the identification number of all people attended the activity. Finally there will have the other part which working in administration officers of village, cells and sectors which have capabilities to give persons the services they want after checking if they are not missing any activity, so if persons have missed some of activities, they will have first the slip of payment of the all times missed as will be counted by agents. Development and the implementation of this system have been a great instance for me to extend my knowledge and skills in web development using PHP and JAVASCRIPT. By implementing this system, the cost used by reporters to come in the officers from fields will be reduced, time to make attendance will be reduced, security of data will be increased and it will be easy to handle data updating, to keep record, to backup data and generate report of attendance.

TABLE OF CONTENTS

TABLE OF FIGURE

LIST OF ABREVIATION

RP: Rwanda Polytechnic

IPRC: Integrated Polytechnic Regional College

ICT: Information and Communication Technology

DFD: Data Flow Diagram

UML: Unified Modeling Language

CSS: Cascading Style Sheet

HTML: Hypertext Markup Language

HoD: Head of Department

DAS: Director of Academic Service

DAF: Director of Finance

GUI: Graphical User Interface

SA: System Analysis

LAN: Local Area Network

WAN: Wide Area Network

JS: JavaScript

PHP: Hypertext Preprocessor

CHAP 1: GENERAL INTRODUCTION

1.1 INTRODUCTION

Today, technology changes the life and behavior of the world, now technology as part of information communication and technology is used by different areas like companies, public sectors and private sectors and even different states in their daily activities. Therefore, many services are accessible through the internet where many people gain access to services without matter of everywhere there are, then the `time and cost of the services reduced and the production increase.

Now by looking in Rwanda and especially in its districts, information technology with communication technology had become a successful way of providing new, developed and fast services. This development of technology had broken the limitation of reporting, communicating and management of some activities in an insecure way. Nowadays after using those advanced information technologies and computerized system, it's provided a good platform of sharing information directly in every district of Rwanda by providing different services in various sectors and that is why computers had become an integral part of everyday life, where can be used for different reasons to achieve success in many activities. The technology of using a computerized management system has raised the success of every district located in Rwanda through the use of good software to facilitate their activities in one way or another.

That is why **Umuganda Activity Management System** will be computerized management system for developing the current system of Rwanda country in the report of umuganda activity through villages, cells, sectors and district which will helping them to record, manage and sharing easily information related with umuganda activity around country where the current system was done by recording all people attended the activity on papers (from: Executive of Rusororo sector KAYONGA Manuel) and also the beauty of implementing this system could translate this activity into other source way of income to the government of Rwanda through the fixed charges on the absent people in activity and as well as now days we are dealing with the system which is embedded with technopreneurship.

1.2 BACKGROUND OF THE STUDY

Since 1995 in Rwanda most records, management and reporting information of activities have been done manually written papers and this working condition was caused slow development of the country due to the lack of technology in their works. Where they used a lot of time to get recorded data, also they used a huge amount of time in transport from one way to another for delivering report of observed data and communication were very difficult because there was no way of direct communication and communication devices to facilitate people in their daily life activities.

In 2006 through the new strategies of the Rwandan government, it's decided the use of technology and ICT in different services carried in Rwanda. From 2006 up to 2016 after 10 years there was a great change in the development of the country where most of the things were changed to the development of the country in the field of information technology and communication. Nowadays some sectors carried in Rwanda many people are enjoyed to access those sectors by using technology. But on the other side, there are some of them in the district of Rwanda are stilling occurred in manual system to make report, managing even if sharing and access information.

That why the study I made was carried out at Gasabo district exactly in Rusororo sector where this sector is one of member of the other sectors located in Rwanda and was established by the government of Rwanda in 1989.Through the mission of Rwandan government known as decentralization. Where decentralization is to move the control of an organization or government from a single place to several smaller ones (from Cambridge dictionary 3rd edition). That is why my research I made in Rusororo sector was concerned on the reporting, management, sharing and access information on Umuganda activity and I have seen that the current system they used on this activity in this sector was done manually way, where the chief of village has to take time to write report and take another time to deliver that report to their superiors in cell. Simply the process starts by the village than a village to the cell reporter then cell to the sector and sector reporter to the district, after of those all process the districts, they make their own communication when some of the information required by any district.

This require a lot of energy and time for reporters to make report and deliver those reports and finally there are no ways of communicating between cells, sectors due to the purpose of sharing and access information in the way of knowing people who are attended Umuganda activity. Only it acquiring to pass through the districts as the main server of the information then district share the information to others. But for this new proposed project of Umuganda Activity Management System is going to remove all those barriers by helping the reporters to record and delivering report to their superiors at time and also will establish good way of accessing person information across whole the country by taking few seconds to run it and to avoid the late of report and limitation of accessing person information in easy way.

1.3 PROBLEM STATEMENT

In general, the current system to make reports around the country was done manually where start from the villages, cells, and sectors up to the district through the use of written papers. Also due to the current system, there is no way of sharing a person's information directly to the other villages, cells, sectors, and districts when they need to know the information of a given person. Not only could that be possible to make attendance in unfair way for a given people. Where could record that people attended the activity without coming.

Additionally, here in the current system, there is no official way of using this activity to make money to the country from those people who ignored to attend the activity (absent people). Even if there are some sectors established ways of charging absent people but there was no fixed costs. Even also, it takes high cost in transport and a long time to deliver those reports from activity place to offices. Every worker can take time to do a report and it can take another time to deliver it to his or her superior. That is why many times, the job can run slowly because of these problems and many times the people are missing the ones of the services they wanted.

1.4 OBJECTIVES OF THE PROJECT

1.4.1 GENERAL OBJECTIVE

The main objective to design this system, it will be having the ability to connect every area located in Rwanda country and this ability will establish easy way of getting all records then giving access to the areas and also sharing records across anywhere in country in a rapid and perfect way therefore will establishing officially way of costing absent people as the main goals of this project which will be coming from implementation of **Umuganda Activity Management System** using web monitoring platform is the main task I have to accomplish.

1.4.2 SPECIFIC OBJECTIVES

- ❖ To create a database for storing all the information needed by the system.
- ❖ To create reporters, agents and administrator interface (forms).
- ❖ To build an android application to make easy attendance
- ❖ To identify absent times and attended times for users.
- ❖ To count the amount of money absent people will pay.
- ❖ To generate congrats message for attended users.
- ❖ To generate reports.
- ❖ This system will generate a way of making attendance across the whole the country at the same time
- ❖ This system will remove unfair attendance that happened in the current system.
- ❖ Finally, the system will create another way of source of income to the country.

1.5 FUNCTIONAL AND NON-FUNCTIONAL REQUIREMENTS

1.5.1 Functional requirements specifically define functionalities and behaviors of the target system.

- ❖ System allowed users' authentication is required.
- ❖ Provides interaction between users and database.
- ❖ The system will be accessed on the internet.
- ❖ The notification message will be obtained on email address.
- ❖ Users use the system everywhere and anytime.

1.5.2 Non-function requirement relaying on the performance, accessibility, security, maintainability and reliability of the system.

- ❖ The system performance will be adequate in terms of throughput and response time.
- ❖ The system is easy to maintain.
- ❖ The system will be flexible and expandable for future use.
- ❖ The system will be reliable in terms of accessibility and security using user session.
- ❖ The system will be capable of exchanging information between its users.

1.6 SIGNIFICANCE OF THE STUDY

The significance of this study is to serve better than the existing system which is highly manual and therefore difficult in terms of getting records, sharing and accessing information to the other areas located in Rwandan country. And will improve the database and enhance the effectiveness, efficiency, and security of the system. It will also be intended that the study will help in the development of a new and hopefully and standard better technology aided system. The new system will save time, reduce costs used by reporters for traveling to the offices, and reduce improper handling of attendance.

Also, it will fix the gap of people who don't attend the activity because if you don't attend the activity, you will be having to pay a fixed amount of money to replace your absent

1.7 SCOPE AND LIMITATION OF THE PROJECT

- ❖ The system will be used only by the reporters, agents and the sectors officers (there will be different kinds of department to check the user's status)
- ❖ The system will be accessible through the platform over the internet.
- ❖ The system will be developed to send congrats messages for the system users.
- ❖ The system will help reporters to make attendance after umuganda activity.

CHAP 2: LITERATURE REVIEW

2.1 INTRODUCTION

In this chapter will work on theoretical concepts and basic fundamentals that support the present study. It collects much-related information with the project and it justifies the technologies used and problem-solving procedures in this project work.

2.2 WHAT IS UMUGANDA ACTIVITY MANAGEMENT SYSTEM?

First of all, if you work with people to achieve a given task or activity, then when you want to know who are participated in the activity, you likely dealing with management of the activity, and that management can take many features. Now-days many sectors manage their activities in terms of attendance like attendance of workers in institutions, attendance of students in courses and that management can be done in many areas such as companies, schools, and restaurants by trucking monthly paying clients who allowed taking launch in a month. However, by achieving this process of management the owner of the business they tried their best to use different systems to trucking activity but most of all traditional attendance is failed. Here we have some review (Grede, Roch & Kieszczynka, 2010, p.286)[1]. That why now-days, the best way to handle attendance management is to leave manual system (traditional methods)[2] like making records on paper, counting and then start using computerized systems like management system via computer, fingerprint via finger scanner, face detector, and voice recognition, etc. Therefore umuganda activity management system is a web-based platform that is designed in PHP with JAVASCRIPT and MYSQL which is used to manage the system online. This system will be allowed to be used by reporters, agents and administration officers on different areas to manage umuganda activity.

2.3 MANUAL SYSTEM AND WEB-BASED PLATFORM

A manual system basically a manual system is one that does not rely on any computerized systems where will see information recorded and kept in different ways such as in files in paper form[3]. While a web platform is an application that facilitate interactive information sharing, interoperability and collaboration on the World Wide Web over the internet through a browser interface[4] or user platform. Simply a web-based platform is any application that uses a website as the interface or front-end (user interaction) to get access and there is no big difference between web platform and web application. The only difference among them, web platform it gives access for allowed users who have that platform in their computer and web application it gives access for all users who accessed that application. Users can easily access the application from any computer or smartphone which are connected to the internet using a standard browser.

---

[1] http://decaops.com/file/definition-of-manual-information-system

[2] http://decaops.com/file/definition-of-manual-information-system

[3] http://decaops.com/file/definition-of-manual-information-system

[4] https://www.igi-global.com/dictionary/web-platform/32305

2.3.1 ADVANTAGES OF USING WEB BASED APPLICATION

- **Accessible anywhere:** unlike traditional applications (manually systems), web system is accessible anytime in different areas via any pc with an internet connection.
- **Access availability:** due to the use of platform, it also supports the use of many users from different areas and at the same time.
- **Adaptable to increased workload:** many users can access the same system without limit of particular time and this capability of web platform has increased workload.
- **Reduced Spend:** web-based systems reduce the costs and increases productivity and also it reduces time consumption.
- **Flexibility:** web-based systems are easy for use and available 24×7.
- **Transparency:** web-based system avoids corruption and other personal inclination to personal interest to provide a reliable and transparent system[5].

2.4 DEFINITION OF KEY TERMS

2.4.1 UMUGANDA
Umuganda this is community work established by the purpose to contribute to the overall national development was reintroduced to Rwandan life in 1998 as part of development[6].

2.4.2 ACTIVITY
The work of a group or organization which organized or established to achieve a certain aims[7].

2.4.3 SYSTEM
A system is a set of connected items or devices which operate together. Also is a set of detailed methods, procedures and routines created to carry out a specific activity, perform a duty, or solve a problem[8].

2.4.4 MANAGEMENT
It like responsible for controlling or organizing someone or something especially a business where someone whose job is to give advice to companies about the best way of managing and improving their businesses[9].

2.4.5 DATABASE
A database is a data structure that stores organized information. Most databases contain multiple tables, which may each include several different fields. for example, a company database may include tables for products, employees, and financial records. Each of these tables would have different fields that are relevant to the information stored in the table (Techterms, 2009). There are different types of database but the most popular is a relational database are also called relational database management systems that stores data in tables where each row in the table holds the same sort of information.

---

[5] https://www.magicwebsolutions.co.uk/blog/the-benefits-of-web-based-applications.htm

[6] http://www.allaboutrwanda.com/cgi-sys/suspendedpage.cgi

[7, 8 & 9] Cambridge Advanced Learner's Dictionary 3rdEdition

2.4.6 TABLE

A table is a data structure that organizes information into rows and columns. It can be used to both store and display data in a structured format. For example, database store data in tables so, information can be quickly accessed from specific rows. Websites often use tables to display multiple rows of data.

2.4.7 FIELDS

A field is the basic unit of data entry in a record[10].

2.4.8 RECORDS

A record is composed of fields and contains all the data about one particular person, company, or item in a database.

2.4.9 PRIMARY KEY

A primary key is a special relational database table column (or combination of columns) designated to uniquely identify all table records[11].

2.5 TOOLS USED IN DEVELOPING THE SYSTEM

2.5.1 INTERNET

The internet is a globally connected network system that uses TCP/IP to transmit data via various types of media. The internet is a network of global exchanges including: private, public, business, academic and government networks connected by guided, wireless and fiber-optic technologies. The terms internet and World Wide Web are often used interchangeably, including hardware and infrastructure, while the web is one of the services communicated over the internet. Now days we have two versions for communications include internet protocol version 4 and Internet Protocol version 6[12].

2.5.2 WEB BROWSER

A web browser, or simply "browser," is an application used to access and view websites. Common web browsers include Microsoft Internet Explorer, Google Chrome, Mozilla Firefox, and Apple Safari (Techterms, 2014). Browser is used primarily for displaying and accessing websites on the internet, as well as other content created using hypertext markup language and extensible markup language, etc.

---

[10] https://techterms.com/definition/table

[11] https://www.filemaker.com/help/12/fmp/html/create_db.8.8.html

[12] https://www.techopedia.com/definition/2419/internet

2.5.3 HTML AND CSS

HTML and CSS are two of the core technologies for building web pages. HTML provides the structure of the page, CSS the (visual and aural) layout, for a variety of devices. Along with graphics and scripting, HTML and CSS are the basis of building web pages and web applications. With HTML, authors describe the structure of pages using markup. The elements of the language label pieces of content such as paragraph, list, table, and so on. CSS is the language for describing the presentation of web pages, including colors, layout, and fonts. It allows one to adapt the presentation to different types of devices, such as large screens, small screens, or printers. CSS is independent of HTML and can be used with any XML-based markup language[13].

2.5.4 JAVASCRIPT

JavaScript is the programming language that adds interactivity and custom behaviors to our sites. It is a client-side scripting language, which means it runs on the user's machine and not on the server, as other web programming languages such as PHP and Ruby do. That means JavaScript (and the way we use it) is reliant on the browser's capabilities and settings. It may not even be available at all, either because the user has chosen to turn it off or because the device doesn't support it, which good developers keep in mind and plan for. JavaScript is also what is known as a dynamic and loosely typed programming language[14].

2.5.4.1 WHAT JAVASCRIPT CAN DO?

Most commonly we'll encounter JavaScript as a way to add interactivity to a page. Where all of the elements, attributes, and text on a web page can be accessed by scripts using the DOM. We can also write scripts that react to user input, altering either the content of the page, the CSS styles, or the browser's behavior on the fly, you have likely seen this in action if you have attempted to register for the website, entered a username, and immediately received feedback that the username you have entered is already taken by someone else. The red border around the text input and the appearance of then "sorry, this username is already in use" message are examples of JavaScript altering the contents of the page. Blocking the form submission is an example of JavaScript altering the browser's default behavior.

2.5.5 MYSQL

MySQL is a freely available open source relational database management system that uses structured query language.

2.5.5.1 WHY USE MYSQL?

There are a number of relational database management systems on the market. Examples of relational databases include Microsoft SQL Server, Microsoft Access, Oracle, DB2 etc. the answer to this question depends on a number of factors.

- ❖ Cost effective, it's relatively cheaper in terms of cost when compared to other relational databases. In fact, the community edition is free. The commercial edition has a licensing fee which is also cost effective compared to licensing fees for products such as Microsoft SQL Server.
- ❖ Cross platform: MySQL works on many platforms which means, it can be deployed on most machines, other systems such as MS SQL Server only run on the windows platform.

---

[13] https://www.w3.org/standards/webdesign/htmlcss

[14] Module of Fundamentals of web programming and php of NKURUNZIZA Evariste in Level II 2017-2018

2.5.6 PHP

PHP is a server-side scripting language designed for web development but also used as a general-purpose programming language. It was originally created in 1994 by Rasmus Lerdorf. PHP can do many things like:
PHP can generate dynamic page content, PHP can (create, open, read, write, delete, and close) files on the server, PHP can collect form data.
PHP can send and receive cookies.
PHP can add, delete and modify data in your database.
PHP can be used to control user-access and PHP can encrypt data.

2.5.6.1 WHY USE PHP?

  - ➢ PHP runs on various platforms (Windows, Linux, UNIX, Mac OS X, etc.).
  - ➢ PHP is compatible with almost all servers used today (Apache, IIS, etc.).
  - ➢ PHP supports a wide range of databases.
  - ➢ PHP is free. Download it from the official PHP resource: www.php.net.
  - ➢ PHP is easy to learn and runs efficiently on the server side[15].

2.5.7 RELATIONSHIP BETWEEN PHP AND MYSQL

MySQL is the database system where you can create tables and store data on the server. PHP is a server-side scripting language used to develop websites and mainly used for manipulating data, it is widely used to store and retrieve data from MySQL database which resides on the server.

2.5.8 PHPMYADMIN
PhpMyAdmin is the one of the most popular tools for MySQL database administration. It is portability; it can perform various tasks such as creating, modifying or deleting databases, tables, fields or rows, executing SQL statements, or managing users and permissions. PhpMyAdmin runs in a web browser, so you can access it from almost any computer. The program is also robust, PhpMyAdmin has enough functionality that you can probably create and run a web site without knowing any SQL, is free and open-source, for these reasons, most hosting sites include PhpMyAdmin in their control panel as the default MySQL administration tool[16].

2.5.9 XAMPP
XAMPP is open source free software developed by apache friends. XAMPP software package contains apache distributions for Apache server, Maria DB, PHP, and Perl. And it is basically a local host or a local server. This local server works on your own desktop or laptop computer, you can just install this software on your laptop or desktop and test the clients or your website before uploading it to the remote web server or computer. This XAMPP server software gives you suitable environment for testing MYSQL, PHP, apache and perl projects on the local computer. The full form of XAMPP is X stands for cross-platform, (A) Apache server, (M) Maria DB, (P) PHP and (P) Perl (Ganesan, 2017).

---

[15] https://www.w3schools.com/php/php_intro.asp
[16] https://www.pcworld.com/article/233948/phpmyadmin.html

2.5.10 SERVE

A server is a computer that provides data to other computers. It may serve data to systems on a local area network (LAN) or a wide area network (WAN) over the internet (TechTerms, 2014). A server is a computer designed to process requests and deliver data to another computer over the internet or a local network, most computer networks support one or more servers that handle specialized tasks. Some types of servers: Web Servers (Web servers show pages and run apps through web browsers), Email Servers (Email servers facilitate the sending and receiving of email messages), FTP Server (FTP servers support the moving of files through File Transfer Protocol tools), Identity Server (Identity servers support logins and security roles for authorized users) (Mitchel, 2018).

2.5.11 WEB SERVER

A web server is a computer that runs websites. It's a computer program that distributes web pages as they are requisitioned. The basic objective of the web server is to store, process and deliver web pages to the users[17].

2.5.12 APACHE WEB SERVER

Apache HTTP server (usually just called apache) is the most popular HTTP web server. Apache is also free software, distributed by the apache software foundation that promotes various free and open source advanced web technologies. Where the apache web server provides a full range of features, including CGI (Common Gateway Interface), SSL (Secure Sockets Layer), SSI (Server Side Includes), HTTP header metafiles, proxy caching abilities, loading modules support, URL redirection, automatic directory listings, user authentication, and virtual domains, it also supports plug-in modules for extensibility (Mitchell, 2017).

2.5.13 DIA DIAGRAM EDITOR

Dia diagram editor is free open source drawing software for Windows, Mac OS X and Linux.
Dia supports more than 30 different diagram types like flowcharts, network diagrams, and database models, more than a thousand readymade objects help to draw professional diagrams.
Dia can read and write a number of different raster and vector image formats[18].

---

[17] https://economictimes.indiatimes.com/definition/web-server
[18] https://sourceforge.net/projects/dia-installer/

CHAP 3: RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter will deal with the all methods used to gather the information during at the time of research and software development techniques used to build this system. It attempts to show the source of data, methods, and techniques used to collect information that was analyzed and interpreted to expand such a project. A research methodology is a way of collecting data for the research project and it is a full description of a particular methodology, step-by-step methods of how the researcher intends to achieve the stated objectives of the research.

Where exactly the research method is a systematic plan for conducting research, sociologists draw on a variety of both qualitative and quantitative research methods, including experiments, survey research, participant observation, and secondary data. Quantitative methods aim to classify features, count them, and create statistical models to test hypotheses and explain observations. Qualitative methods aim for a complete, detailed description of observations, including the context of events and circumstances. Now we will take a look at some of the different research methods in detail[19].

3.2 SOFTWARE DEVELOPMENT MODEL USED

In order to meet the results of this project entitled "umuganda activity management system", the researchers outlined a software development process as a planned, imposed on the development of a software product. The developers have used one of the popular methodologies of software development life cycle (SDLC) model also known as waterfall model. SDLC is a process followed for a software project, within a software organization. It consists of a detailed plan describing how to develop, maintain, replace and alter or enhance specific software. The life cycle defines a methodology for improving the quality of software and the overall development process.

---

[19] https://study.com/academy/lesson/research-methodology-approaches-techniques-quiz.html

3.2.1 WATERFALL MODEL

Waterfall model is the oldest concept of software development model to start from RA&D process and proceed to next process one by[20] one. There the outputs of the first activity flow into the second and these outputs flow into the third and so on. In a waterfall model each activity must be completed before the next activity starts.

The following is a diagrammatic representation of different phases of waterfall model.
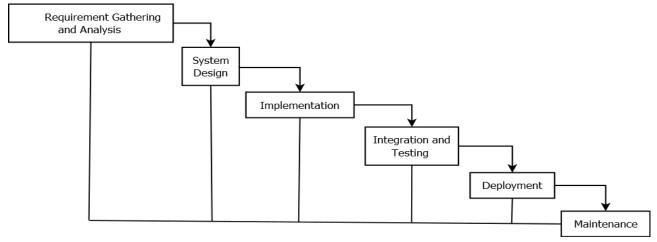
Figure 1: Waterfall Model

- ❖ **Requirement Gathering and analysis**: All possible requirements for this system are captured in this phase and documented in a requirement specification document.
- ❖ **System Design**: The requirement specifications from first phase are studied in this phase and the system design is prepared. This system design helps in specifying hardware and system requirements and helps in defining the overall system architecture.
- ❖ **Implementation**: With inputs from the system design, the system is first developed in small programs called units, which are integrated in the next phase. Each unit is developed and tested for its functionality, which is referred to as Unit Testing.
- ❖ **Integration and Testing**: All the units developed in the implementation phase are integrated into a system after testing of each unit. Post integration the entire system is tested for any faults and failures.
- ❖ **Deployment of system**: Once the functional and non-functional testing is done; the product is deployed in the customer environment or released into the market
- ❖ **Maintenance**: There are some issues which come up in the client environment. To fix those issues, patches are released. Also to enhance the product some better versions are released. Maintenance is done to deliver these changes in the customer environment. Deployment of system and Maintenance comes after development of the project.

---

[20] Module of Software Development Module of Bonnaventure UWAMAHORO in Level II 2017-2018

3.2.1.1 THE REASON WHY? I USED WATERFALL MODEL

- ❖ This model is simple and easy to understand and use.
- ❖ Each phase has specific deliverables and a review process.
- ❖ In this model phases are processed and completed one at a time.
- ❖ Waterfall model works well for smaller projects where requirements are very well understood.

3.2.1.2 ADVANTAGES AND DISADVANTAGES OF USING WATERFALL MODEL

Advantages of Waterfall model

- ❖ Simple and easy to follow
- ❖ Easy to manage (every process must output a complete set of specified deliverables)
- ❖ Activity are processed and completed at a time
- ❖ Suitable for very large-scale software development with completely fixed requirement.

Disadvantages of Waterfall model

- ❖ No or very few chances to modify or adjust requirements. User has no chance to see the working product until the very last moment of software development.
- ❖ Serious defects in earlier processes (such as RA&D) cannot be found until the very last process (V&V). This will greatly increase the additional cost and time for the correction of software.

3.3 TECHNIQUES USED IN DATA COLLECTION

The satisfactory result is obtained by the good choice of methods and techniques used for the collection of data. For creation of that in this project, i am going to put clarification on methods and techniques used to observe the reality of the current system and to reach predetermined objectives. Through this research i used interview, observation and documentation in order to collect needed data and carry out proper documentation.

3.3.1 INTERVIEW

The interview is a method of getting data by asking a number of questions to a person or a group of persons. This method can be used through personal interviews and, if possible, through telephone interviews. Personal interviews: Personal interview method requires a person known as the interviewer asking questions generally in a face-to-face contact to the other person or persons. The person who answers those questions during an interview is known as interviewee. Telephone interviews: This method of collecting information consists in contacting respondents on telephone itself. It is not a very widely used method, but plays important part in industrial surveys, particularly in developed regions. (Kothari, 2004). During my research i used personal interviews and the main respondent was been the people from different areas of Rusororo sector and some leaders of sectors, cells and villages located in the sector who make complaints about the umuganda activity process and i asked some questions about how the existing system works such as:

What time umuganda activity taken?
What time required making attendance?
What strategies used to get report of activity?
How the reporters truck the people joined activity?
How the reporters make attendance?
How they punish absent people from activity?

3.3.2 OBSERVATION

This technique was happening to observe of what really done in the existing system and make decision of how a new system will be done.

3.3.3 DOCUMENTATION

This technique was done by getting information from existing document by reading different books, note and reports related to complaint management.

3.4 SYSTEM ANALYSIS

3.4.1 INTRODUCTION

System analysis is the process of analyzing the existing system in order to propose the new improved system of an organization or institution is more like a consulting process to propose the best solution to the organization by means of variety of methods and technologies. System analysis researchers apply methodology to the systems involved, forming an overall picture. System analysis is used in every field where something is developed. Analysis can also be a series of components that perform organic functions together, such as system engineering[21].

3.4.2 ANALYSIS OF THE EXISTING SYSTEM

After finishing umuganda activity which taken on week of the end of the month from 08h00 to 11h00 all the people attended umuganda activity they come close to the reporters where their address gets recorded such as names, identification number, telephones number, etc.… and those all it happened by the purpose trucking the people who attended and those who absent. And when a person goes to the village's offices, cells offices or sector offices to request services, the first thing is to check on the list if that person have been already attended all umuganda activities as required with any missed. Then when they found some of missed, they get charged 500frw for one missing. And then they give him/her approval paper to show the other level-up like those cells and sectors by the purpose to show them already that person have been cleared for umuganda activity issues.

3.4.3 THE PROBLEM OF THE EXISTING SYSTEM

The current system for people on umuganda activity is processed manually, due to the manual system they are a lot of problems encountered:

- ❖ Time-consuming: as the system is processed manually reporters are supposed to get address of all people attended umuganda activity when the activity end at 11h00 by using pen and papers to record and then they bring those reports to the offices that why the time taken is long.
- ❖ High costly: according to the way used in the process of making attendance, due to the recording they require use of paper s and pens even those transport fees used from fields to the offices
- ❖ Difficult to manage activity.
- ❖ Difficult to store records

---

21 https://en.wikipedia.org/wiki/Systems_analysis

3.4.4 JUSTIFICATION OF THE NEW SYSTEM

The new system is designed to solve problem affecting the manual system in use. It is designed to be a web-based platform that is used through online, the work will be easier for agents, reporter and chiefs' officers especially reporters who needs to make record in easy way. This project will also have some features like:
- ❖ Accuracy in handling of data.
- ❖ Fast rate of operation and excellent response time.
- ❖ Flexibility (i.e.) it can be accessed at any time.
- ❖ Easy way of back up data.
- ❖ Better storage and faster retrieval system.
- ❖ Accessibility from any part of the world (i.e.) allowed users can access the system everywhere they are.

Through this new system reporters will have easy way of getting all person records by taking only person identification number and whole person address will be directly obtained as required on the system of the attendance. Therefore, after making the attendance those records directly could be accessed from anywhere in the country by those allowed users. As the important part of this project will gives access to the all areas around the country where all people who are attended or absented will be known everywhere from the country and anyone who will need services to the offices from different areas will be also trucked by the purpose to know their absent and present made in the activity. not only that also this project will help to know the person who are already paid that fixed charges for his/her missing anywhere in the country without carry approval paper and also will identify those absent.

3.5 SYSTEM REQUIREMENTS

The system requirements are those that are required for the implementation of this project. The system requirements or software requirements are a listing of what software programs or hardware devices are required to operate the program properly (hope, 2018). The output of the system will be efficient only with these optimum requirements.

3.5.1 SOFTWARE REQUIREMENTS

The software requirements include:
a) Operating System: window7, window 8, windows 10 and Linux.
b) Browser: Mozilla Firefox, Internet Explorer, Google Chrome etc.
c) Web Server: Apache server.
d) Database Package: MySQL.
e) Front-end: PHP, JAVASCRIPT, CSS, and HTML.
f) Editors: Notepad++, sublime-text etc.

3.5.2 HARDWARE REQUIREMENTS

The basic Hardware requirements include:
a) Processor: Above 1GHZ
b) RAM: Above 1 GB and Hard Disk: Above 50 GB

3.6 SYSTEM DESIGN

3.6.1 DESIGN OVERVIEW

System Design (SD) is the process of defining elements of a system like modules, architecture, components and their interfaces and data for a system based on the specified requirements. It is the process of defining, developing and designing systems which satisfies the specific needs and requirements of a business or organization. It is the process of designing internal structure of the target system that satisfies the requirements defined in requirement gathering and analysis process.

3.6.2 FUNCTIONAL BLOCK DIAGRAM

The function block diagram is a graphical language for programmable logic controller design, which can describe the function between input variable and output variables (Lewis, 2001). A function is described as a set of elementary blocks. Input and output variables are connected to blocks by connection lines.

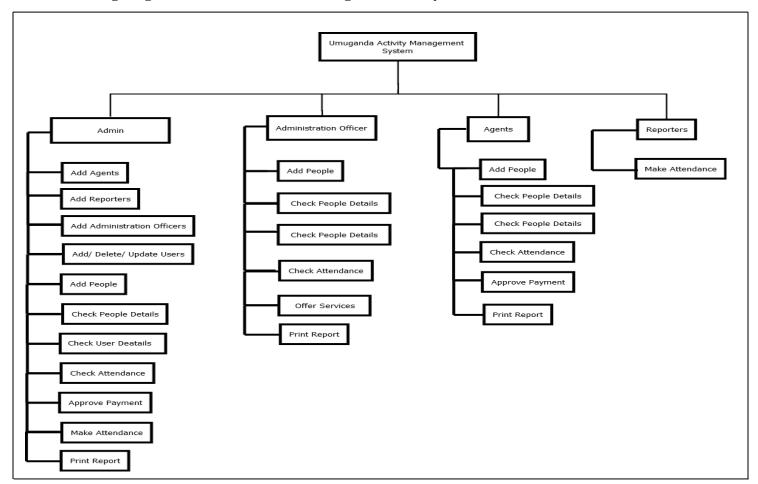**The following diagram is Functional Block Diagram of the system**

Figure 2: Functional Block Diagram of the System

3.6.3 FLOW CHART DIAGRAM

It is a graphical representation of decisions and their results mapped out in individual shapes. Flowcharts can provide a step-by-step diagram for mapping out complex situations, such as programming code or troubleshooting problems with a computer.

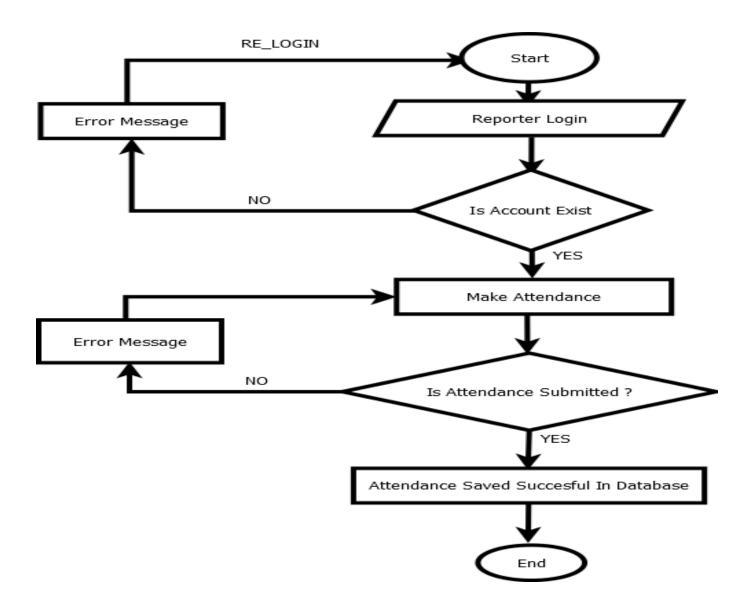**The following diagram is a flowchart that shows processes required for Umuganda Activity Management System.**

Figure 3: Flowchart Diagram of the System

3.6.4 UML (UNIFIED MODELING LANGUAGE)

UML is an object-oriented Modeling language that describes everything of the system. UML is a standardized modeling language enabling developers to specify, visualize, construct and document artifacts of a software system. Thus, UML makes these artifacts scalable, secure and robust in execution. UML is an important aspect involved in object-oriented software development. It uses graphic notation to create visual models of software systems. They are two main categories of UML Diagrams: structure diagrams and behavioral diagrams. Structure diagrams show the things in the modeled system in a more technical term, they show different objects in a system. Behavioral diagrams show what should happen in a system. They describe how the objects interact with each other to create a functioning system (Creately, 2017).

3.6.4.1 USE CASE DIAGRAM

Use case diagram is a type of UML diagram that shows how the user uses the system. UML Use Case Diagram basically consists of 3 components: actor, use case, and association.
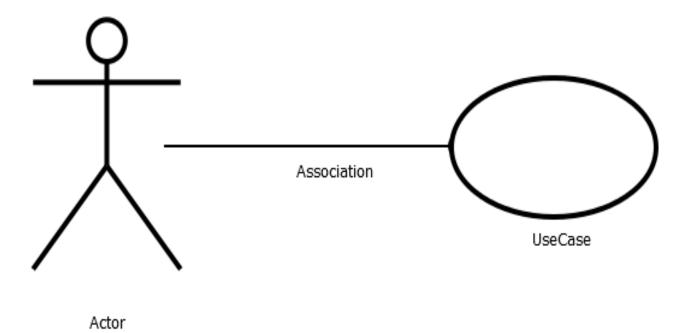

Figure 4: Components of a Use Case Diagram

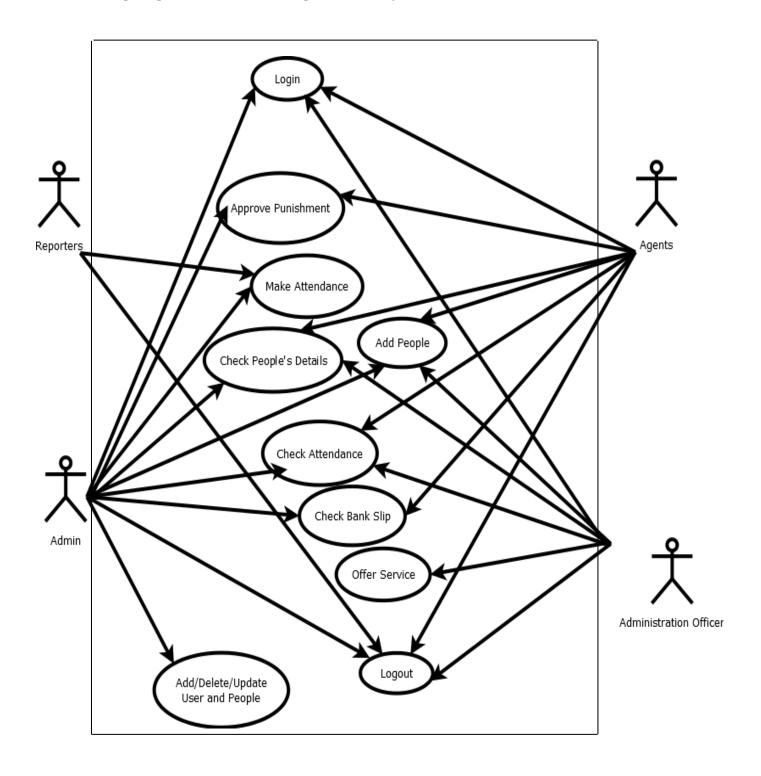**The following diagram is a use case diagram of the system.**

Figure 5: Use Case Diagram of the System

3.6.5 DFD (DATA FLOW DIAGRAM)

DFD Deals with the flow of data/information from the sender to the receiver, Data flow diagram focuses on the flow of data, the process to manipulate the data, and the storage for the data in the system. There are only four elements in DFD, data flow, process, data store and external entity.

3.6.5.1 CONTEXT DIAGRAM

Context diagram is considered as Level-0 Data Flow Diagram containing only one process representing the entire system, the diagram does not contain any data storage (Tsang, 2017).
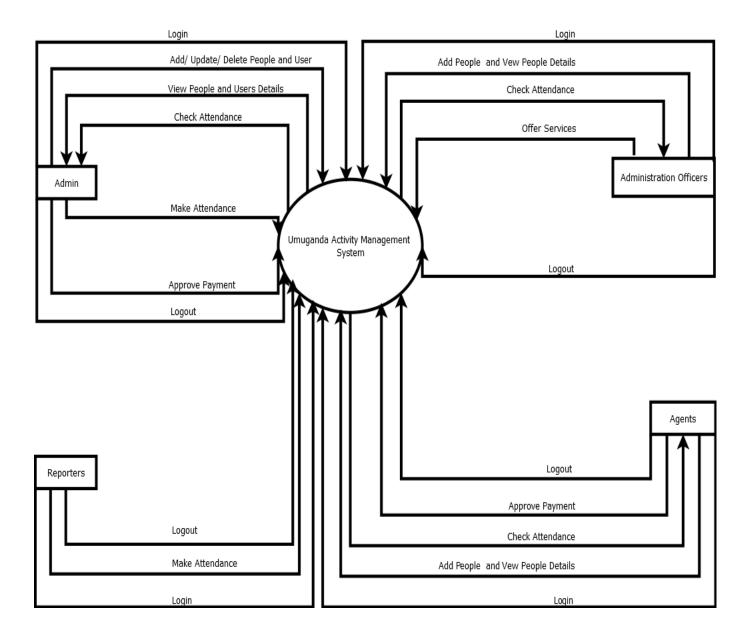

Figure 6 Level 0 Data Flow Diagram (Context Diagram) of the system

CHAP 4: SYSTEM IMPLEMENTATION

4.0. INTRODUCTION

This chapter focuses on the data analysis, people result in interpretation System development and the structure of the entire system. Data analysis is a body of methods that help to explain facts, identify patterns, develop explanations, and test hypotheses. For example, data analysis might be used to look at customer's subscriptions according to their plan. Result interpretation includes studying of conceptual data structures like tables and graphs. This helps the researcher to quickly get results of the system components like databases and code structures.

4.1 SYSTEM IMPLEMENTATION

System implementation is the process of making the new system available to a prepared set of users by putting a planned system into action. Where means the process of defining how the information system should be built (i.e., physical system design) [22], It is also the actual coding and building of the software system. It involves careful setting up, examination of the constraints on implementation, plan of methods to achieve the conversion, an assessment of modifying excess of methods. Database "**umuganda_project.sql**" and it contain 3 tables
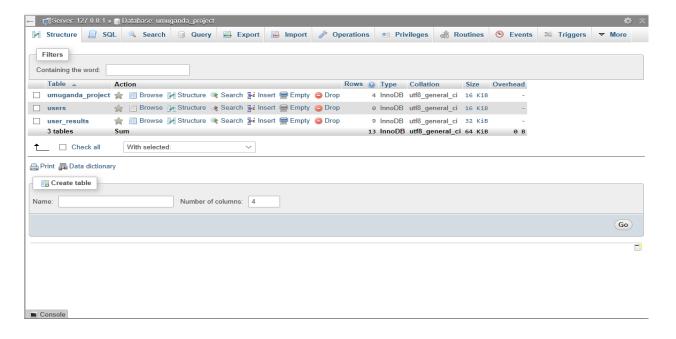

Figure 7: Database's Tables of the System

---

22 http://www.uky.edu/~dsianita/695A&D/lecture5.html

4.1.1 UMUGANDA_PROJECT TABLE

During the implementation of this project we will be having three tables as I mentioned above therefore the first table in this database is called Umuganda_project and it have 13 attributes to hold people's details as it seems in table image below.

Figure 8: Umuganda_project Table

4.1.2 USERS TABLE

Again, during the implementation of this project, We will be having three tables as I mentioned above therefore the second table in this database is called users and it have 4 attributes to hold users details and this table is related to the first table called umuganda_project table as it seems in table image below.

Figure 9: Users Table

4.1.3 USER_RESULTS TABLE

At the end during the implementation of this project we will be having third table in this database and is called user_results and it have 7 attributes to hold people's results as it seems in table image below.

Figure 10: User_results Table

4.1.4 LINKED TABLES

During the implementation of this project we will be having the tables which are linked. Where we can use some attribute from other table by referring to the foreign key which act as the primary key of that tables. Then from this linkage we can have access from other table

Figure 11: Linked Tables

4.2 SYSTEM ORGANIZATION

The following figure shows how the system is organized from Login up to Logout for all users.
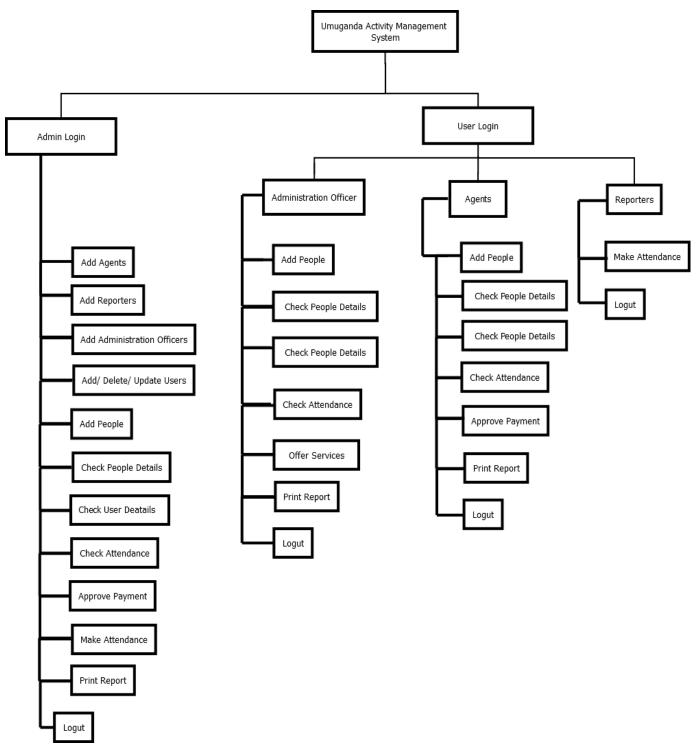

Figure 12: System Organization

4.3 UNIT TESTING

It is a level of software testing where individual units/ components of software are tested. The purpose is to validate that each unit of the software performs as designed. A unit is the smallest testable part of any software. It usually has one or a few input testing increases confidence in changing, maintaining code Reusable. In order to make unit testing possible, codes need to be modular. This means that codes are easier to reuse.

4.4 SYSTEM TESTING

It is a level of software testing where complete and integrated software is tested. The purpose of this test is to evaluate the system's compliance with the specified requirements. The result obtained after testing are shown on the following Interfaces.

4.5 INTERFACES OF THE SYSTEM

4.5.1 HOME PAGE

The Main home page for admin where is a first page of application. It contains different links the users could use to interact with the system and also there is no big difference for the other users of the system.
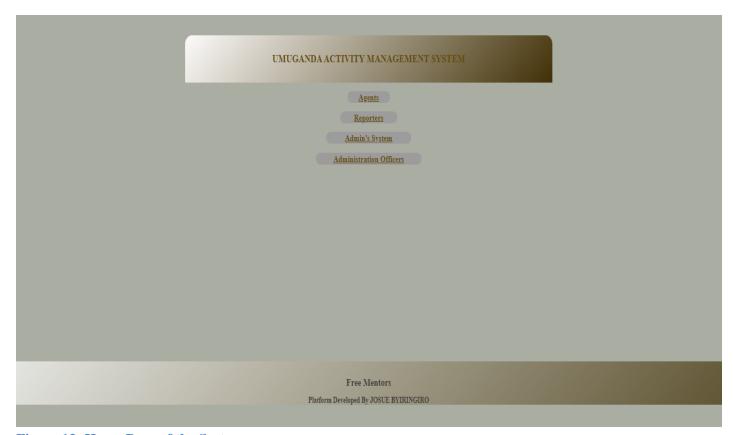

UMUGANDA ACTIVITY MANAGEMENT SYSTEM

Agents

Reporters

Admin's System

Administration Officers

Free Mentors

Platform Developed By JOSUE BYIRINGIRO

Figure 13: Home Page of the System

4.5.2 ADD NEW USERS FORM

This form is obtained when admin logged in successful to the system and then clicks on the link "Add User". Directly this form will obtained to allows admin of the system to register new agent or reporter in the system.

Figure 14: Add New User Form

4.5.3 ADD NEW PEOPLE FORM

This form is obtained when Admin, Administration Officers or Agents login successful to the system and clicks on the link "Add New people". Directly this form will allows those users to register the peoples in the system.

Figure 15: Add New People Form

38

4.5.4 VIEW PEOPLE'S DETAILS

This table is obtained when admin login successful to the system and clicks on the link "view all people". Directly this link will allow those users to be directed to view the table which contains people's details in the system.

Figure 16: View People Table

4.5.5 MAKE PERSON ATTENDANCE

Here from attendance, reporter will have to logged first and after successful logged in. Directly will be redirected to the form of attendance where the reporter will take the id number of people then insert that id number into the form in the way of making.

Figure 17: Make Person Attendance

4.5.6 CHECK PERSON ATTENDANCE

Here from people's details table there is link on person which is need to be checked that obtained when Administration Officers or Agents login successful to the system and then clicks on the link "View people". Directly this link will allow those users to be directed to view that table which contains people's details in the system where will have also link for each person in the system that contains attendance of that person.
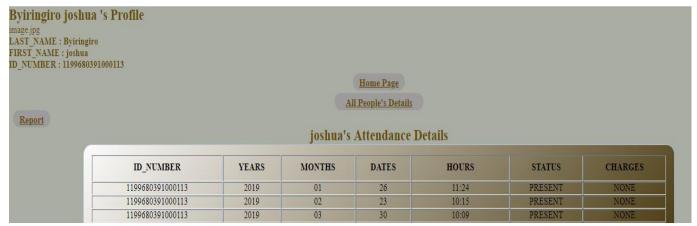

Figure 18: Check Person Attendance

4.5.7 USERS (ADMIN, ADMINISTRATION OFFICER AND AGENTS) ALLOWED TO PRINT DAY TO DAY AND PDF

This page allows those users (admin, administration officer and agents) to print pdf and day to day reports for people's attendance by the purpose of making historical in terms of shows amount of charges persons who absent will pay. This page is accessed when those users clicks on the link "Check Me" to view person information, Print PDF Report and day to day Report.
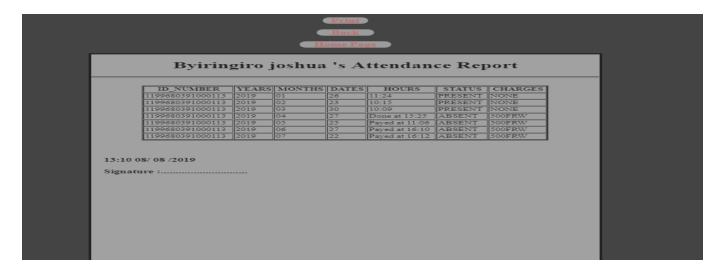

Figure 19: Users Print Report

4.5.8 AGENTS APPROVE BANK SLIP

This is page is available to be by admin or agents but it used by agents to view and approve bank slip paid by the people, where the agents will change the status of attendance in the system after checking the bank slip of payment by agree that person have already paid the required fixed absent charges.
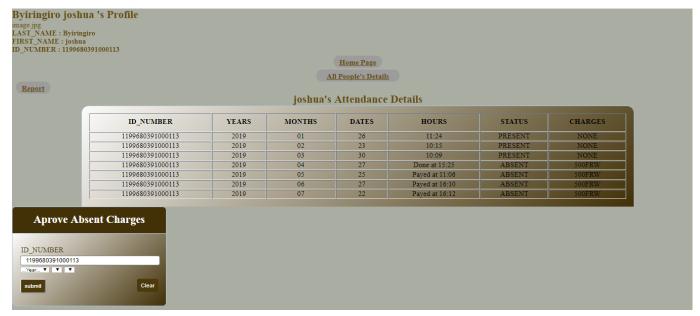

Figure 20: Agents Approve Bank Slip

4.5.9 ADMINISTRATION OFFICERS

This page is used by administration officers after logged in into to the system to view approval details confirmed by agents before giving or offering service to the people.
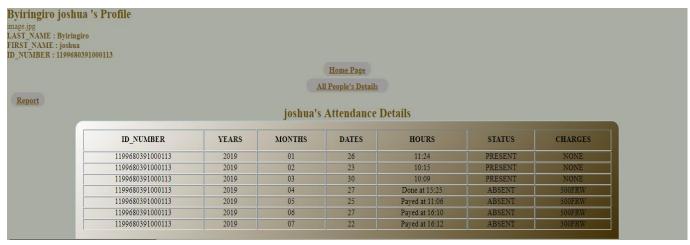

Figure 21: Offering Services

4.5.10 VIEW ABSENT PEOPLE'S

This table is obtained when Admin view attended people by notifying them by clicks on the link "Absent Attendance". Directly this link will allow admin go to notifying them. This table is obtained when Admin view attended people by notifying them by clicks on the link "Absent Attendance". Directly this link will allow admin go to notifying them.
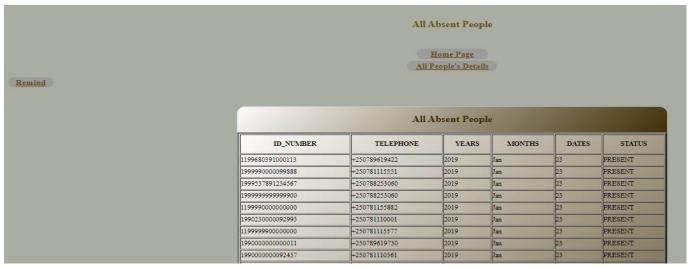

Figure 22: Absent People Table

4.5.11 NOTIFY ABSENT PEOPLE'S

This form is obtained when Admin view attended people by clicks on the link "Remind". Directly this link will allow admin go to notifying them.
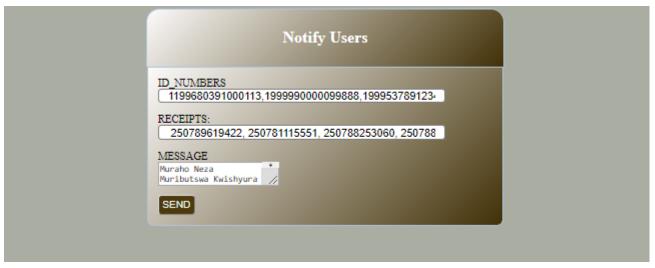

Figure 23: Notify Absent People Form

CHAP 5: CONCLUSION AND RECOMMENDATIONS

5.1 CONCLUSION

Base on the objectives of the study and the implementation of Umuganda Activity Management System, this system will help our country in development through in management of umuganda activity in the country in the way of using this activity to make money from those absent people. Not only that this project will also encourage people to attend this monthly activity, due to avoid themselves the punishment of charges as we have seen that absent persons will be cost and not only that also making Umuganda Activity Management System through the internet, the time and cost of service will be reduced, and also the system is more user friendly. Therefore, the development and implementation of this system have been a great instance for me to extend my knowledge and skills in web development through the use of PHP and JAVASCRIPT programming. Once this application will be used by Rusororo sector, I hope that it will help them by resolving the problem presented by the existing system and will improve the quality of service. Also, we will encourage other areas to start using this platform. Finally, this project has been successful achieved but it was not completed in time as I had planned, due to the lack of some resources in libraries for documentation related to my project and other were some information from interview which were difficult to get.

5.2 RECOMMENDATIONS

The project objectives that listed as well as have been achieved successfully but this system needs other functionalities such as: people could have to check their profile on themselves. Also, I wish that this project could use a fingerprint scanner to make attendance rather than taking the identification number of people on the computer. Also, am recommending IPRC NGOMA College to support students to get resources from the library and especially to redirect the students to go on fields for asking the required information before starting their projects.

REFERENCES

1. Ganesan, P. (2017, October 16). *What is XAMPP*. Retrieved 2018, from wpblogx: https://www.wpblogx.com/what-is-xampp/

2. Hope, c. (2018, January 24). *System requirements.* Retrieved 2018, from www.computerhope.com: https://www.computerhope.com/jargon/s/systrequ.htm

3. Kothari, C. (2004). Methods of Data Collection. In *Research Methodology Methods and Techniques (Second Revised Edition)* (pp. 114-117). Jaipur(India): New Age International Publishers.

4. Lewis, R. W. (2001). *Modeling Distributed Control Systems Using IEC 61499.p.9.*

5. Mitchel, B. (2018, February 06). *servers-in-computer-networking.* Retrieved 2018, from LifeWire: https://www.lifewire.com/servers-in-computer-networking-817380

6. Mitchell, B. (2017, December 19). *Apache Web Server.* Retrieved 2018, from lifewire: https://www.lifewire.com/definition-of-apache-816509

7. Techterms. (2009, October 27). *Database Definition.* Retrieved 2018, from Techterms: https://techterms.com/definition/database

8. TechTerms. (2014, April 16). *Server Definition*. Retrieved 2018, from TechTerms: https://techterms.com/definition/server

9. Techterms. (2014, February 28). *Web Browser Definition.* Retrieved 2018, from Techterms: https://techterms.com/definition/web_browser

10. Tsang, C. (2017, December 6). *What is context diagram?* Retrieved 2018, from www.quora.com: https://www.quora.com/What-is-context-diagram