

Adventist University of Central Africa

ROW MATERIAL MINING ANALYTICS SYSTEM

Case Study: CIMERWA

A Final year Project Presented in partial fulfillment of the

Requirements for the degree of

BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY

Major in

NETWORKS AND COMMUNICATION SYSTEMS

By

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November, 2022

PROJECT ABSTRACT

Project for bachelor's degree in Information Technology

Emphasis in Networks and Communications System

Adventist University of Central Africa

Title: Raw Material Mining Analytics System

Name of the researcher: SINAYOBYE Jules

Name of faculty Advisor: Jean Pierre NIYODUSENGA

Date Completed:/...../.....

CIMERWA is Rwanda's integrated cement producer. Established 30 years ago, the firm's production plant is located in Bugarama, by the South Western border of Rwanda. It is the one of the companies in Rwanda that mines raw materials, produces clinker concentrate and packs and sells cement for general and civil construction. [1] Some of its products are exported to the DRC and Burundi CEMENTS DU RWANDA LIMITED (CIMERWA) [2] The Company was initially established on 16th July 1984 as a Government parastatal known as Cimerwa du Rwanda (CIMERWA SA) under a cooperation agreement between the Peoples' Republic of China and the Government of Rwanda (GoR). It was privatized in 2007 with Rwanda Social Security Board (RSSB) holding 37%, Government of Rwanda (GoR) 30%, Rwanda Investment Group (RIG) 21% and the residual held by other Investors. It later was converted into a public Company limited by shares known as CIMERWA PLC in April 2020 with registration number 101460027 with PPC International Holdings (PTY) Ltd 51% shareholding, AGDF Corporate Trust Ltd 16.55%, Rwanda Social Security Board 20.24%, Rwanda Investment Group 11.45% and Sonarwa Holdings Ltd 0.76% [3] production capacity to 600,000 tonnes per annum to meet the market demand by establishing a new state-of-the-art, modern, dry process cement plant and In the March 2018 review period [4], CIMERWA received ISO 9001:2015 QMS certification from the Rwanda Standards Board. [5]

DECLARATION

I, SINAYOBYE Jules, student at Adventist University of Central Africa in Faculty of Information Technology, Department of Networks and Communications System.

I do hereby declare that this research project entitled "Row Material Mining Analytics System" is entirely the real reflection of my own original work and experience to the best of my knowledge. It has never been either partially or wholly presented in any university or any higher learning institution.

Signature:

Date:/...../.....

APPROVAL

I, Mr. NIYODUSENGA Jean Pierre hereby certify that this project report has been done under my supervision and submitted with my approval.

Signature.....

Date.....

DEDICATION

With great pleasure, I dedicate this Research Project

To Almighty God,

To the Adventist University of Central Africa,

To my supervisor Jean Pierre Niyodusenga,

To my lovely family,

To my relatives and all my colleagues at AUCA.

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LIST OF ACRONYMS

API:	Application Programming Interface
DBMS:	Database Management System
ERD:	Entity Relationship Diagram
DFD:	Data Flow Diagram
HTML:	Hypertext Markup Language
HTTP:	Hyper Text Transfer Protocol
CSS:	Cascading Style Sheet
AJAX:	Asynchronous JavaScript and Xml
Ktpa :	Kilo Tones Per Annum
CIMERWA:	Cement du Rwanda or cement of Rwanda
KM	kilometer
MW	Megawatt

ACKNOWLEDGEMENT

I sincerely have deep recognition to my supervisor NIYODUSENGA Jean Pierre who guide me in the accomplishment of this work, especially for his substantial advice, professional assistance, guidance and precious ideas. I thank the Adventist University of Central Africa as well as the staff

of department of Information Technology according to their knowledge they gave me in information technology is where the key to build my system.

I would like to show my warm gratitude to my Family to whom I am grateful, and have always encouraged, and supported me during this Journey of my studies at AUCA and towards the completion of this work.

I genuinely offer my recognition to the academic staff and the whole Administration at large at the Adventist University of Central Africa for the work done during my stay at the University, the knowledge that I acquired helped me to conduct this work, and I take this opportunity to thank the whole AUCA corps.

Special thanks to my family, colleagues and friends for their support, encouragement, friendship and to those who participated in one way or another in the accomplishment of this work.

CHAPTER 1

GENERAL INTRODUCCION

The marvelous growth of the Rwanda cement industry during the last decade has created a widespread interest in the raw materials and in the methods of manufacture of cement the most important of the cementing materials to first step in the manufacture of cement is to combine a variety of raw ingredients so that the resulting cement will have the desired chemical composition. the best available technology to use which is the dry process, shall be used for manufacture of cement at the new cement plant CIMERWA . Cement manufacturing consists of raw meal grinding, blending, calcining to form clinker. In short, limestone and other materials containing calcium, silica, aluminum and iron oxides are crushed and milled into a raw meal. This raw meal is blended and is then heated in the pre-heater to initiate the dissociation of carbonate to calcium oxide and carbon dioxide. The meal then proceeds to the kiln for heating and reaction between calcium oxide and other elements to form calcium silicates and aluminates at a temperature up to 1450oC. [6] The products leave the kiln as a nodular material called clinker. The clinker is inter-ground with gypsum and other additives like pozzolana to a fine product called cement [7]. raw materials for cement production also have raw materials of carbonate character and raw material of acid character The basic raw materials for cement production are limestone and clay. [8] The limestone represents the dominant component, most often 75%, clay and corrective raw materials remaining 25% of the raw blend and the Corrective raw materials include corrective raw materials of silicate character and corrective raw materials with high content of iron oxide natural material containing 65-75% limestone (CaCO_3) and 25% clay without corrective properties [9] in This chapter will explain more about this study, methodologies and technique that will used to solve the existing raw material mining system

Background of the study

Based on how the current system works most companies are using old method of recording every day activities in books. And you find that is so hard to get real analytics or managing records and at the end those data are easily lost most of them don't have a modern way of managing materials

Problem Statement

Actually, most people face with many problems when they starting construction activities and They meet with some difficulties while finding the right cement and do not know where the place is used and raw material made it which result a problem of humidity on some house and the lack of information on cement and which needed to make cement that material needed to form a good quality and Some of clients are meeting the unexpected quality due to the lack of complete information about cement including raw material which made it

Choice And Motivation in the Study

Person motivation: As an Information Technology (IT) student, it is an opportunity to put in practice the knowledge gained throughout my academic training at Adventist University of Central Africa by solving problems and Making this system root factor that will help me to get it and improving services to the society using technology Making this system will prove that I have benefited from what I have learned and increasing the research capacity after finishing this project by doing second research Done as student.

General motivation: it is a great opportunity to think about my Country by developing the tools called row material mining analytics which will help the company in the field of producing cement to overview and check status in of raw material in Rwanda that would be used in further decision making and planning.

Objectives of the study

The objectives of this work are listed into general objectives and specific objectives as follows:

General objective

The project's main goal is to create a web-based data analytical tool, that will help user to view statical analysis on the raw material found in the type of cement there are to use. And the general objectives of this project” raw material mining analytics system” is to develop a system that will be used as tool to help camerwa and customer and their customers to view statical analysis and get information of good quality of cement.

The Specific Objectives

- To establish possible solutions to improve on the current ways used to get quality of cement
- To design and implement raw material mining analytics system.
- To help clients to reduce the time they spend while asking about the cement
- To avoid unexpected amount of money that are charged by clients while asking advice
- To avoid the obstacles of weak communication between clients and cement provider.
- the new system shall facilitate admin to coordinates all activities done in raw material mining analytics systems
- Time management
- To improve the services given to the community
- To develop a simple and secure system for company
- To implement computerized software used for connecting both cement users and professional users
- To develop system that will get all necessary information from Underground about their raw materials mining, getting data from raw materials will enable us to adhering to requirements of existing problem.
- System will help cimerwa to establish measures regards to the quality of mining in cimerwa
- the data stored will help raw material Analytic to the decision making
- To implement computerized application used to manage information
- To make database to store Information.
- To design and develop the graphical user interface of the system which is appropriate for users
- The new web application that will reduce the time taken while asking the information on unskilled people.

Scope of the Study

Raw material mining analytics system, is a web-based application where by research about it was conducted within Rwandans to solve the current problems of house has a problem of humidity. The project was developed for the purpose of solving quality of cement problems that most of the clients meet with in a particular company

Methodology used in Study

To conducting research, we need a data collection. Data collection is one the most important stage in conducting research. You can have the best research but if you cannot collect the required data, you will not be able to complete project objectives. There are many methods to collect data, depending on research design and methodologies hired. Some of the common methods are interview, observation, documentation.

Techniques Used in the Study

Observation

By observing churches and communities by the time when they need services such as baptism, confirmation and marriage documents, I gathered information as they were struggling to get sacraments. The observation is indispensable way to collect data on the actual work reality or field.

Interview

An interview is a conversation used to obtain information. In a research interview, both the interviewee and the interviewer are present. While the interviewee responds to the questions, the interviewer manages the conversation and poses questions. Both in-person and telephone interviews are possible. It can also be described as a two-person conversation started by the interviewer and focused by him on the material stated by the research objectives of explanations in order to gather information relevant to the Yoder, J. (2016, September 26).

Documentation

Data is systematically collected from already-existing records as part of document evaluation. This method assisted us in combing through all the information in numerous works on our subject to

include the pertinent details. many publications (books, websites, and newspapers) were consult, as well as a web graphic that aided us in conducting internet research and consulting many sites linked to our topic Welling, L. (2013, September 5).

Expected Results

When this system is completed, it will be able to provide or perform the following tasks with functionalities as follows

- Less time to get the result for your request.
- The goal of this project is to create an analytic system.
- System should display graphical representation of raw material mining.
- The system has to allow administrator to add and granting volunteer permission to gather information
- To detect about the cimerwa analyses
- To handle the problems of loss of the company data sometimes stored in disorganized manner.
- The system must generate the report about analyzing activities and how they support the process of raw material and mining

Organization of Report

This project is subdivided in five chapters below:

- First chapter is the general introduction and comprises the introduction, the problem overview, objectives, scope of the study, the expected results and the organization of the project as well.

- Second chapter is the analysis of the existing system. It discusses the environment and research of the current used system. The problems faced by that system and proposed solutions.
- Third chapter describes the entire analysis and design of the new system is normal the logical conception of the new system. It will portray the conceptual process of the solutions proposed to solve the problems of the existing system.
- Fourth chapter will come to highlight the technical realization of the application and the presentation of the all outputs that will be provided by new system.
- The fifth chapter will come up with conclusion related to results of the project and recommendation.

CHAPTER 2

ANALYSIS OF EXISTING SYSTEM

Introduction

The main purpose of developing a new system is to replace an existing system in a given environment. If so, you can benefit from analyzing the existing system in order to get deep knowledge of that system, this analysis will give you a better idea of what problem you are facing. This chapter will describe briefly how the existing system of the raw material mining in cimerwa is currently positioned, analyze the current system in details, model the existing system by identifying its problem and also propose the solution to the problems found, distinguish between functional and non-functional requirements that can improve the new system.

We will also describe the process of monitoring and evaluating activities, to better understand the existing system, we will provide a brief description and its working and values and gives a good idea of the problems of existing system and how to solve problems faced within the system, all its features and characteristics and presentation about terms and terminologies used during the development of the project.

Description of Current System Environment

Historical background of Cimerwa

CIMERWA started in 1984, with a heritage of over 30 years of changing the Rwandan landscape, is Rwanda's only integrated cement producer. CIMERWA's production plant is located in Bugarama, Rusizi district in South Western border of Rwanda at 300Km from Kigali with 600Ktpa capacity With current export market sizing 65Ktpa Bukavu Market located at 55km and 35Ktpa for Goma Market located at 275km. This is the only cement Company in Rwanda that mines raw materials, produces the clinker, packs and sells cement for general and civil construction. Some of our products are exported to neighboring countries such as DRC and Burundi. CIMERWA has nominal capacity of 600 Ktpa with current utilization of 420 Ktpa. So The current system works manually by using papers. Obviously, there is no system which can be used to automate the task, even when they keep their records in a PC, they still don't have a real system. In case of recording

data needed from laboratory they need to get a file where they record all data by writing down on a form with a pen, there is a lot of drawbacks with that old techniques, like in case of searching for a data needed they need to go through files based on date and they start looking into them one by one. Another thing is that they don't have any way to be notified when all notification needs to help admin to remember the result in system to get attention so there follows there follows date written down on the forms. All that works take them energy and time to follow .and their information are not secured though, like if someone from outside can enter in the room or laboratory where everything is keep, they can access them because no system to ask for credentials, like username or password, authorized employees and they have uniforms.

Mission

To be the leading producer and supplier of quality cement and related products as well as solutions in the great lakes region while maximizing stakeholder value. At its core, CIMERWA is fully focused on the journey of Strengthening Rwanda in a pursuit to lay strong foundations for future generations. We believe that culture is underpinned by solid values which should be demonstrated in everything we do by all CIMERWA employees. Our Company values form part of the pillars which will enable us to realize our vision and achieve our strategic goals.

Vision

CIMERWA'S vision is to be the leading producer and supplier of quality cement and related products as well as solutions in the Great Lakes region while maximizing stakeholder value.

Description of the existing system

One way of reducing the wait time and reducing the number of combinations to try is to make use of digital simulations, where we can provide information to the computer about what we know and the computer tries different combinations to predict the compressive strength. This way we can reduce the number of combinations we can try physically and reduce the amount of time for experimentation. But, to design such software we have to know the relations between all the raw materials and how one material affects the strength. It is possible to derive mathematical equations and run simulations based on equations, but we cannot expect the relations to be same in real-world. Also, these tests have been performed for many numbers of times now and we have enough real-world data that can be used for predictive modelling.

Analysis of the Current System

Currently the CIMERWA plant produces about 70,000 tpa of clinker equivalent to 100,000 tonnes of cement per annum using the wet process of cement manufacture. As per estimates, over the last few years, the local cement demand of Rwanda has increased to over 270,000 tonnes a year while the demand in neighboring countries (Southern Uganda, Burundi and Eastern DRC) averages about 100,000 tpa. CIMERWA thus proposes to expand its cement production capacity to 600,000 tonnes per annum to meet the market demand by establishing a new state-of-the-art, modern, dry process cement plant. The existing cement project of CIMERWA is located in Muganza Sector, Rusizi District of the Western Province. The location is about 350 km from Kigali and about 60 km from Kamembe town.

The new cement plant is proposed to be located adjacent to the existing plant. The topography of the project area and the surrounding consists of plains, mountains and valleys. The area is located in Rwanda Topographical Survey Sheet No. 38

Problem of the Current System

The problems of Raw Material Mining Analytics System presented below:

- Wasting time: Many people spend a lot of time and money (ticket) for moving to the office while they need some services or information.
- The services received or given are conceived in disorganized manner: hinder your ability to get where you want to be professionally, decrease your productivity, cost your employer time and money, and can even be bad for your physical and mental health.
- Difficult to establish the reports containing all information is takes a long time since the information is kept separately; also, annual reports are not easy to establish because it contains a lot information.
- Repetition of work because if there are any changes to be made, the data will have to be entered again.
- Lack of management in storing information of Raw Material Mining Analytics System
- Lack of correctness of the report submitted because due to use of papers some information be lost.

Proposed solutions

This is combination of software, hardware, other products or equipment, and all services necessary to implement the solution to the problem statements.

- A good way for storing information in database
- System will provide timely reports from Raw Material Mining Analytics System to the societies.
- System will provide available and usability
- Saving time: it saves time to the Raw Material Mining Analytics System in the store while submitting report activities.
- Data security: we have seen that file cabinet can't be compromised. They can't be stolen, accidentally destroyed or lost but the database adds another level of security to valuable information
- Storage facilities: the database shall be stored in the facility unaffected by devastating events such as fire or thievery and back up is ready to be made.
- Easy to search: when we looking for specified information, with simple query, a database will pull up information needed immediately instead of running through endless piles of paperwork. The new system will be able retrieve the information of sales and purchases and related support and how that management has been done in order to recall information.
- Report: if there are changes made, the use of a database will help to produce desired reports.
- Simple queries in a database can quickly retrieve the information needed when searching for a certain item, saving time spent digging through countless files of paper. The information can be retrieved via the new system.

Requirement of specifications

A software requirement is simply a statement of what the system must do or what characteristics it needs to have. During system development, project requirements will be created depending on what the business needs, what the users need to do, what the software should do and all the characteristics the system should have. Below we are going to be more specific on what the software should do (functional requirements) and the behaviors that the system should have (non-functional requirements).

Functional Requirements

A functional requirement is the properties of the system or description of the service that the software must offer. It describes a software system and presented below are functional requirements:

- ❖ The system should allow the administrators to view all data in the online
- ❖ The system should allow the administrators to approve verified profile of Raw Material Mining Analytics System
- ❖ They should be in position of managing all registered user accounts.
- ❖ Users should create an account in order to login to the system
- ❖ Users should provide user name and password while logging in
- ❖ Admin should approve manager's account to give him/her privileges for getting full access to the system.
- ❖ Admin should control and manage all Raw Material Mining Analytics System activities done in the system
- ❖ Admin should view all registered users
- ❖ Admin should activate or inactivate users
- ❖ The system will also support users in the communication process
- ❖ It will system owners to inactivate a dairy account in case there are the violation of agreements.
- ❖ System must be able to make search user's details in the database based on selected search type.
- ❖ System must be able to enter issue information in the database
- ❖ System must be able to display success message when registration is successfully or error message when there are some errors
- ❖ System should provide a user-friendly environment for the users.

Non-Functional Requirements

It's the characteristics of the system or is a requirement that lists standards rather than particular actions that can be used to evaluate how a system performs. It details a software system's quality attribute. They assess the software system according to non-functional criteria such as responsiveness, usability, security, portability, and other criteria that are essential to the software system's success.

➤ **Maintainability:**

- The system should be easily to maintain it, once is needed

➤ **Security:**

- The system must be able to hide the user's information
- Only church leader of parish can generate reports
- The system includes all available safeguards from viruses, worms and Trojans Etc.
- For any user to access the system they must enter on the login panel the valid username and password.
- After the system will authenticate to check if the credentials belong to the right person.

➤ **Operational:**

- The system should be able to run on any operating system.

➤ **User friendly:**

- The System will be user friendly
- The system must be easy for a user to user.

➤ **Privacy:**

- The system shall be able to protect the user's privacy

➤ **Availability:**

- The system must be available.
- The system shall not have unexpected downtime
- The ability of a system to operate continuously without failing for a designated period of time.

➤ **Performance**

- The system must perform user requests within few sec.
- The system shouldn't exceed 20 secs performance in case of downtime.
- The user request will not exceed 2 clicks in maximum to be completed.
- The system will be running for 24 hours a day.

➤ **Storage**

- The system should be cloud based completely.

➤ **Accessibility**

- The system should be accessible via laptop or other programmed electronic device such as computers, phones and tablets.
- Anyone who requires the system should be able to access it online. and also, all authorized users must have access to the system processes.

CHAPTER 3

REQUIREMENTS ANALYSIS AND DESIGN OF THE NEW SYSTEM

Introduction

The planning, analysis, design, deployment, and maintenance phases are all part of the system development process. As a result, we'll focus on requirement analysis and system design in this chapter.

System analysis is the process of collecting and understanding requirements, detecting problems, and disassembling a system into its component elements, which includes looking at end-user software implementation, gathering detailed information, defining requirements, prioritizing them, developing user-interface dialog, and evaluating requirements.

The process of specifying the components or modules of a new system or replacing an existing system to meet a certain demand is known as system design. Before implementing design, you must first understand the present system and how it achieves its goals. It involves figuring out the basic element of a system and combine them in the best way to solve a problem.

This will help to understand problem solving technique and ensuring that all system components system work efficiently to achieve their purpose.

Unified Modeling Language (UML)

The UML is a set of diagrams that function as a standardized modeling language that was created with aid to understanding, specifying, visualizing, and documenting the artifacts of the software systems we are developing. The UML provides best engineering techniques for modeling small, big, and complex systems that have been demonstrated to work. It aids in the development of object-oriented software as well as the software development process in general. The use of graphical notation to depict a system aid in the analysis' understanding of the system's functionality and communication with consumers. Modeling is at the heart of all of the activities that lead to successful software.

This is simplification of reality that provide blueprint of a system, and permits to you specify the structure and behavior of a system, guiding in construction and understanding of a system.

The UML provides many different models for a system. Following is a short summary explain the purpose of each model:

- User case show the interactions between activities within the system and surrounding environment.
- Class diagrams depict the object classes in the system as well as their relationships.
- Sequence Diagrams illustrate the object classes in the system, as well as the relationships between them.
- Activity Diagrams shows the activities involved in the process or in data processing.
- Database diagrams graphically depict the database's structure and relationships between database objects.
- System architecture design shows the structure of the system.

Design of the New System

Use-case Diagrams

These are diagrams that aid in the identification of system and actor interactions. Use case diagrams capture the behavior of a live system while also describing the system's high-level functionality and scope. It consists of four primary components: actors, use cases, and relationships.

Actors

It appears in use case diagrams. The actor is a system component that interacts with it. The major role or users involved in system operability are represented by an actor in the use case. An interaction with the use case can be triggered by any person, organization, or external element. In the system, a single actor can be associated with multiple use cases. The actor notation in UML is shown below.

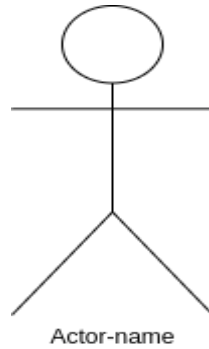


Figure 1: Actor name

Use case

Use cases represent high-level functionalities and how the user will interact with the system. A use case is a representation of the functionality of a system, component, package, or class. It has the form of an oval with the name of a use case written inside. The following is the UML notation for a use case:

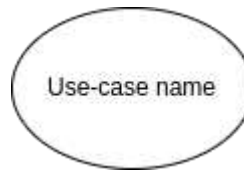


Figure 2: use-case name

Relationship

This is essentially a relationship between the two use cases. It lowers the effort necessary to define use cases in a system by allowing reuse of an existing use case utilizing various forms of relationships. Those connections can be one of two types: include or extend.

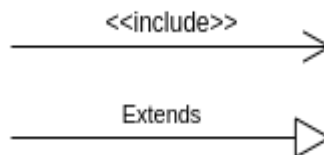


Figure 3: Relationship

Use Case Diagram of raw materials mining analytics system

Figure 4:Use case diagram

Upload Data

Use Case Name: Upload data	
Primary Actor: Admin	
Brief Description: An administrator should be able to upload data	
Precondition: Data collection	
Post-condition: successful message display.	
Normal Flow of Events: <div>1. data set existence</div> <div>2. Short data preview</div> <div>3. confirm upload confirmation button</div>	
exceptional Flows: <div>1.1. If unauthenticated User attempt to upload data set will get error or validation messages.</div>	

Table 1: Upload Data

View analytic

Use Case Name: View analytic	
Primary Actor: Analyst	
Brief Description: Analyst should be able to View analytic	
Precondition: data existence	
Post-condition: View row material mining in numbers and graphs.	
Normal Flow of Events:	
1. data set existence	
exceptional Flows:	
1.1. If unauthenticated User attempt to view analysis set will get error or validation messages.	

Table 2: View analytic

View Data

Use Case Name: View data	
Primary Actor: Admin	
Brief Description: An administrator should be able to View Data	
Precondition: -Stored data	
Post-condition: display data.	
Normal Flow of Events:	
1. data set existence	
exceptional Flows:	
1.1. If unauthenticated User attempt to view dataset will get error or validation messages.	

Table 3: View Data

Collect data

Use Case Name: Collect data	
Primary Actor: data collector	
Brief Description: An data collector should be able to Collect data	
Precondition: <div><div>1. data set existence</div><div>2. known list of required data criteria</div></div>	
Post-condition: successful message display.	
Normal Flow of Events: <div>1.Signup</div>	

2. click data collect button
<p>exceptional Flows:</p> <p>1.1. For any unauthenticated User attempt to collect data will get error or validation messages.</p>

Table 4: Collect Data

Set Role

Use Case Name: Set	
Primary Actor: Admin	
Brief Description: An administrator should be able to Role	
Precondition: - User existence registered	
Post-condition: successful message display.	
<p>Normal Flow of Events:</p> <p>1. Sign in as an administrator</p> <p>2. Give role a user</p>	
<p>exceptional Flows:</p> <p>1.1. If unauthenticated User attempt to set role will get error or validation messages.</p>	

Table 5: Set role

Class Diagram

Class diagram is a static diagram. It represents the static view of an application. Class diagram is not only used for visualizing, describing, and documenting different aspects of a system but also for constructing executable code of the software application. Class diagram describes the attributes and operations of a class and also the constraints imposed on the system. The class diagrams are widely used in the modeling of object-oriented systems because they are the only UML diagrams, which can be mapped directly with object-oriented languages.

Class diagram shows a collection of classes, interfaces, associations, collaborations, and Constraints. It is also known as a structural diagram.

A class diagram describes the attributes and operations of a class and as well as the constraints imposed on the system. Class diagrams are widely used in modeling of object-oriented systems because they are the only UML diagrams that can be mapped directly with an object-oriented language. (Dennis. A 2005).

The purpose of the class diagram is analysis and design of the static view of an application, describe the responsibilities of a system, based on diagrams of components and deployment diagrams.

Class: A class is a general template we use to define and create specific instances, or objects. Every object is associated with a class.

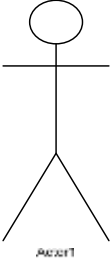



Class diagram here!!!!!!!!!!!!!!!!!!!!!!

Sequence Diagram

Sequence diagrams are one of two types of interaction diagrams. They illustrate the objects that participate in a use case and the messages that pass between them over time for one use case. A sequence diagram is a dynamic model that shows the explicit sequence of messages that are passed between objects in a defined interaction. Because sequence diagrams

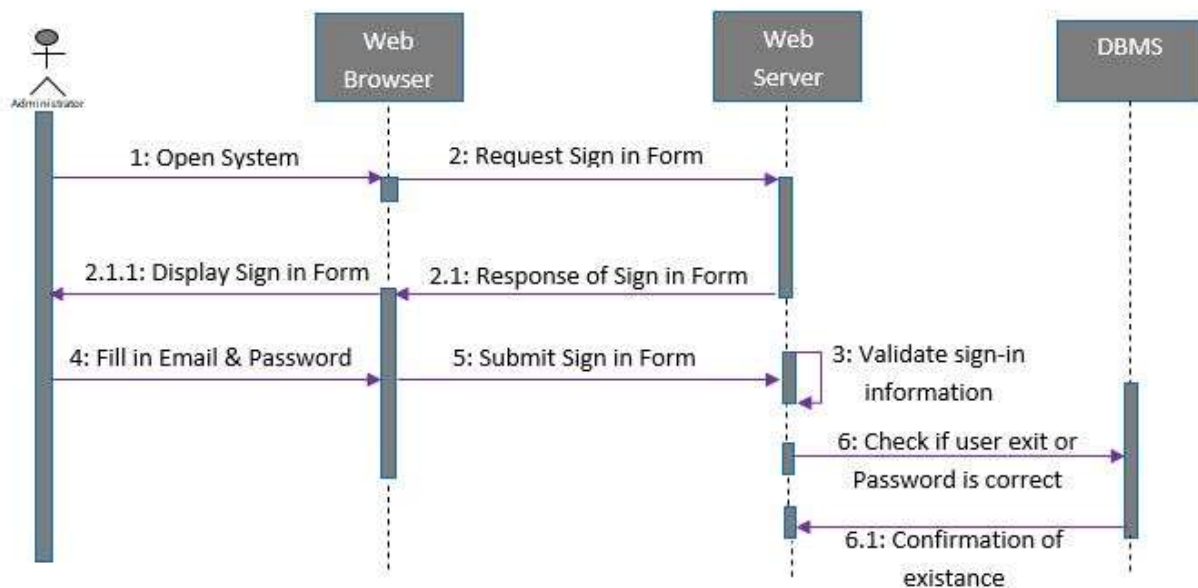
emphasize the time-based ordering of the activity that takes place among a set of objects, they are very helpful for understanding real-time specifications and complex use cases.

The elements of sequence diagram

Term and definition	Symbol
<p>An actor:</p> <ul style="list-style-type: none"> ❖ It can be a person or system that derives benefit from and is external to the system. ❖ It participates in a sequence by sending or receiving messages. ❖ It is placed across the top of the diagram. 	
<p>An object lifeline:</p> <ul style="list-style-type: none"> ❖ It participates in a sequence by sending or receiving messages. ❖ It is placed across the top of the diagram. 	
<p>An activation:</p> <ul style="list-style-type: none"> ❖ It is a long narrow rectangle placed on top of a lifeline. ❖ It denotes when an object is sending or receiving messages. 	
<p>A message:</p> <ul style="list-style-type: none"> ❖ It conveys information from one object to another one. 	 <p>: Message sends : asynchronous</p>

❖ An operation call is labeled with the message being	
Sent and a solid arrow, whereas a return is labeled with the value being returned and shown as a dashed arrow.	<p>Message return</p> <p>: Message cal</p>

Sign in sequence diagram



Analytics sequence diagram

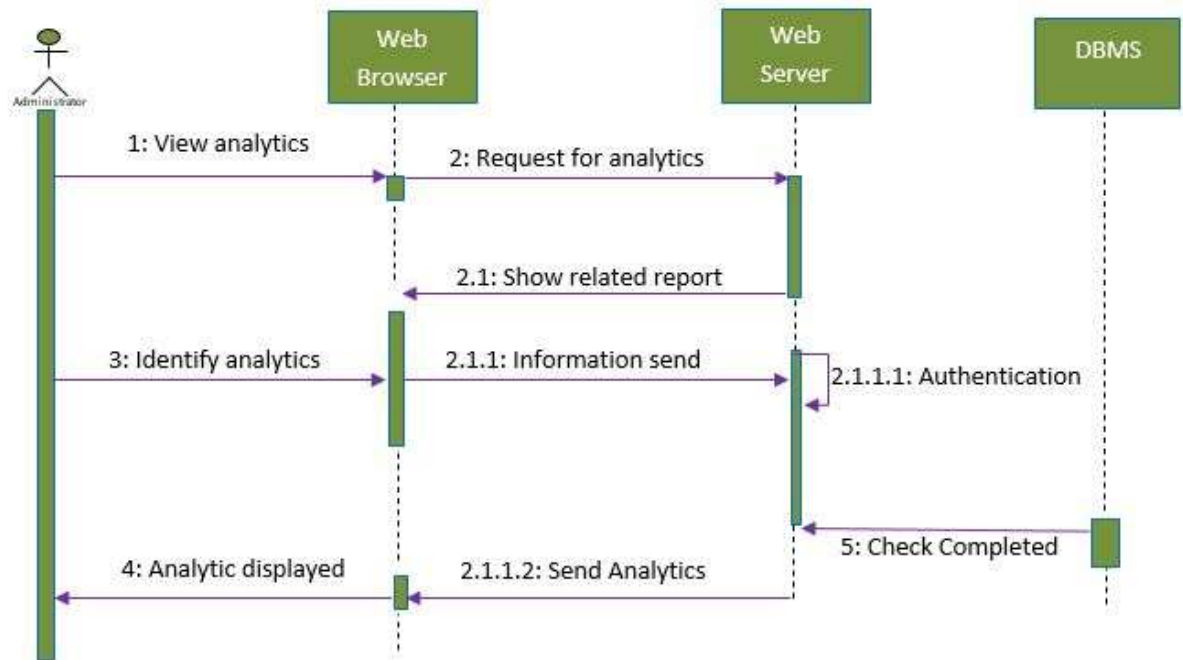
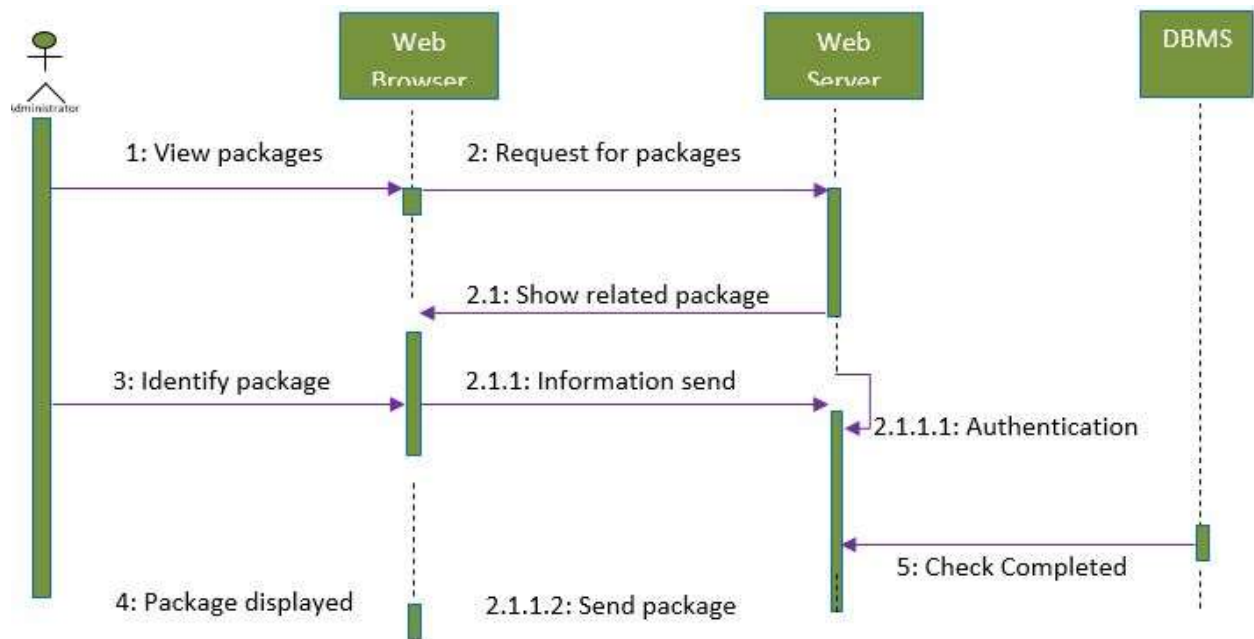


Figure 4: Analytics sequence diagram

Figure 5: packages diagram



Database schema diagram

Database schema diagram is a set of collection of information that is organized so that it can Easily be accessed, managed, and updated. Data base Management System (DBMS) are referred to as database software tools which are primarily used for storing, modifying, extracting, and searching for information within database. Invalid source specified. we are going to model database so that we can visualize and understand how tables are structured and related each other.

Database diagram here

System Architecture Design

System architecture is a representation of a system in which there is a mapping of functionalities into hardware and software components, a mapping of the software architecture onto the hardware architecture, and human interaction with these components. The following figure displays sample system architecture of the new application.

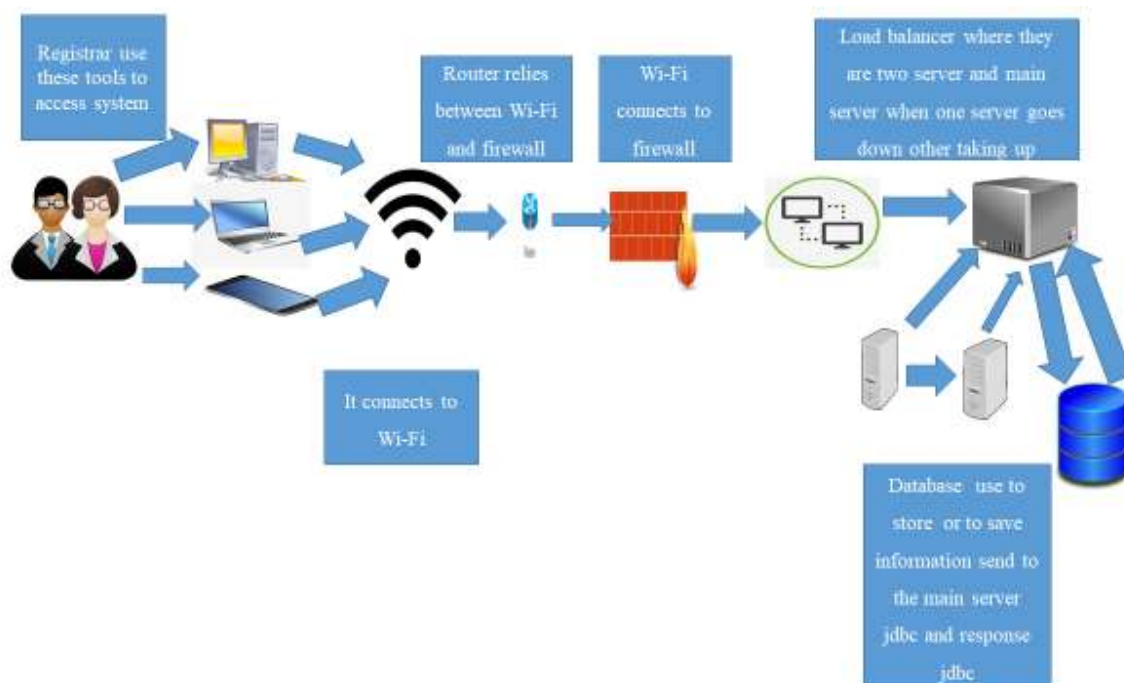


Figure 6: architecture design

CHAPTER 4

IMPLEMENTATION OF THE NEW SYSTEM AND TESTING

Introduction

This chapter describes the creation and testing of the Catholic Church Membership System. It also explains the technology that was utilized to create the system and presents the new system by displaying screenshots of the user interface.

Tools and Technologies used

The languages that will be used are:

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

Conclusions

The main objective of this project was to design and implement tool that could facilitate analysts, researchers to get current progression of raw material mining in CIMERWA.

Surely the way data collection was being made and the time it took to analyses gathered data was not fast and accurate as this system does. Undoubtedly, the design and the implementation of the new system were needed in order to revamp the existing system.

We hope that the implementation of this tool and its integration will result many benefits to analysts. Analysts and researchers will use this superior platform to view immediate analytic regarding how raw material in cimerwa are analyzed. This system should fasten data collection and reduce the duration it takes to make cement and even track where are we up to achieve goals.

In concluding, the new tool was successfully implemented as described in previous chapters. [10]

Recommendations

I conclude by requesting that everyone who is interested, researchers and other none profitable organization to use the new system for their daily analytical operations regarding to raw material mining in Rwanda

Finally, I invite all interested people and researchers to consider any alternative features that could improve this study in order to improve this issue in various Rwandan research efforts. For those who wishes to improving this activity have to focus on the data set update issue, improve the level of validation to meet higher standards and security measures and data requirement and inviting every interested people and researchers think about any other functions that could lead to the improvement of this work in order to improve this topic in different research activities in Rwanda.

REFERENCES

Books

- [1] "CIMERWA-PLC-Annual-Report-20," 25th March 2021, Kigali, 2021.
- [2] "CIMERWA Environmental social management plan for establishment of a 600,000tonne," *Transnova.*, 2022.
- [3] Directors, "CIMERWA-Prospectus," Regulatory Authorities, Kigali, 2022.
- [4] V. J. Umukunzi, " CIMERWA Ltd Information Memorandum," CIMERWA Limited, 2019.
- [5] A. d. b. group, "Rwanda - CIMERWA Cement Project in Muganza, Rusizi District, Western Province," 23, no. Africa development bank group, p. 1, 2010.
- [6] CIMERWA, "Environmental Management Plan," 2009.
- [7] S. H. Kosmatka, "Design and Control of Concrete Mixtures," Portland Cement Association, 2002.
- [8] B. Kerkhoff, "Control of Concrete Mixtures," *ReseachGate*, 2004.

- [9] P. Kolge, "ANALYSIS OF RAW MATERIALS," Bharati Vidyapeeth College of Pharmacy, 2019.
- [10] A. Edwards, "RAW MATERIALS FOR THE MANUFACTURE OF CIMENT," COMMONWEALTH OF AUSTRALIA, BUREAU OF MINERAL RESOURCES. , PAPUA, 1950/30.

Websites

- [1] "CIMERWA-PLC-Annual-Report-20," 25th March 2021, Kigali, 2021.
- [2] "CIMERWA Environmental social management plan for establishment of a 600,000tonne," *Transnova.*, 2022.
- [3] Directors, "CIMERWA-Prospectus," Regulatory Authorities, Kigali, 2022.
- [4] V. J. Umukunzi, " CIMERWA Ltd Information Memorandum," CIMERWA Limited, 2019.
- [5] A. d. b. group, "Rwanda - CIMERWA Cement Project in Muganza, Rusizi District, Western Province," 23, no. Africa development bank group, p. 1, 2010.
- [6] CIMERWA, "Environmental Management Plan," 2009.
- [7] S. H. Kosmatka, "Design and Control of Concrete Mixtures," Portland Cement Association, 2002.
- [8] B. Kerkhoff, "Control of Concrete Mixtures," *ResearchGate*, 2004.
- [9] P. Kolge, "ANALYSIS OF RAW MATERIALS," Bharati Vidyapeeth College of Pharmacy, 2019.
- [10] A. Edwards, "RAW MATERIALS FOR THE MANUFACTURE OF CIMENT," COMMONWEALTH OF AUSTRALIA, BUREAU OF MINERAL RESOURCES. , PAPUA, 1950/30.

APPENDICES

Curriculum Vitae

A. PERSONAL INFORMATION

- **Names:** Sinayobye
- **Date of Birth:** 01-01-1998
- **Residence place:** Kimihurura, Gasabo, Kigali-City
- **Sex:** Male
- **Nationality:** Rwandan
- **Marital Status:** Single

B. CONTACT INFORMATION

- **Tel:** (+250788427809)
- **E-mail:** julesinayobye@gmail.com

C. EDUCATIONAL BACKGROUND

YEAR	ESTABLISHMENT	DEGREE
2018-2022	Adventist University of Central Africa (AUCA)	Bachelor Degree in Information Technology(A0) major in Network Communication Systems in Progress
2015-2017	Marie merci de kibeho	Advanced Level Certificate in Math-Physics-Computer Science (MPC)
2012-2014	College Advantiste de Gitwe	Ordinary Level Certificate

D. SKILLS

- Programing language (C, Java(spring), dart(flutter), javascript(nodejs,react), python, kotlin]
- Github
- System analysis
- Microsoft Office (Word, Excel, PowerPoint).
- Team working

E. WORKING EXPERIENCE

- **July 2022- September 2022:** Internship at Minfra Rwanda.

F. LANGUAGE SPOKEN

LANGUAGE	SPEAKING	READING	WRITING	LISTENING
English	Good	Good	Good	Good
Kinyarwanda	Native	Native	Native	Native

G. MOTIVATION

Network engineer enthusiast, a self-starter, self-driven, highly motivated and a dedicated

H. HOBBIES

Socializing with friends and family, listening music

DECLARATION

I am here by declaring that the information given above is true

Sincerely yours

SINAYOBYE JULES

Kigali, 23th November, 2022