



WHATSAPP EXAMINATION RESULTS

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DECLARATION

I declare that this or any other University has not previously submitted this work for the awarding of the course marks. To the best of my knowledge and belief, this work contains no material previously published or written by another person except where due reference is made.

Student Name:

.....

Signature:

.....

Date:

.....

.....

APPROVAL

The project proposal of **Michael Se-lunani** was reviewed and approved by the following:

Supervisor Name: **David Kirop**

Signature:

DEDICATION

I dedicate this project to my parents who have seen me through this journey. They have been the pillars of my life and words cannot express how thankful I am to them. I also dedicate this project to my siblings who I appreciate for always giving me an ear and a shoulder when I need it to the most.

ACKNOWLEDGEMENT

My thanks go to Mr David Kirop who believed in me and in the success of this project. He has been with me through out every step of this journey and his advice has been extremely crucial in this project's success.

Riara University has given me the opportunity to do what I am passionate about. Therefore, I appreciate the opportunity and I hope this project will make my University proud.

ABSTRACT

WHATSAPP EXAMINATION RESULTS contains a WhatsApp chat bot that retrieves examination results from a SQL based database and sends those results to an authorized viewer via WhatsApp. (WhatsApp)

The application will give administration the ability to upload the results. After which the results can be organized according to various groups of students, subjects or courses.

This project aims to make it easy to access results by eliminating the hustle of physically going to collect your results. For organizations that already have a student portal, the application will save login time as only registered phone numbers can access the portal.

The project will also reduce paper costs incurred by administrations who regularly print the results on report books or papers.

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DEFINITION OF TERMS

Apache – This is cross-platform web server software. It is open-source.

API – This is an interface that defines interactions between multiple software parts.

PHP – This is a general purpose language suited for web development.

Student portal – This is a web application meant to allow students access their academic information on the web.

SQL database – This is a relational data management system.

WhatsApp – This is a social messaging platform housed by android and ios mobile devices.

ACRONYMS

API – Application programming interface

KNEC – Kenya National Examination Council

PHP – Hypertext Preprocessor

SQL- Structured Query Language.

XMPP - Extensible Messaging and Presence Protocol

CHAPTER 1: INTRODUCTION

1.0 BACKGROUND INFORMATION

In my early years as a primary and secondary student I was subjected to the pain of returning to school in the middle of the holiday just to pick my result slip of the term. I no longer wish to pass that pain to the next generation of pupils and students. This is why I have come up with **WHATSAPP EXAMINATION RESULTS**.

1.1 INTRODUCTION

WhatsApp recently unveiled a solution called WhatsApp Business API that enables customers to interact with a business' chat bot. The best example of this is Safaricom Zuri.

This project intends to use this solution to build a model that will enable a student or a parent ask for the students school results by chatting with the chat bot.

A school administration will upload the students' results using an online portal to a database that the chat bot has access to. The bot will retrieve the results from the database on the request of the student or parent. The results of the student will then be texted to the parent or student.

1.2 PROBLEM STATEMENT

Primary and secondary schools

Many students in primary and secondary schools are given report cards to take home. The report cards, usually a booklet, will contain the students' term performance and highlight remarks from the principal and class teacher.

This method is highly unsafe as students have been known to tamper with the report card so that it is in their favor.

Sometimes the report card or booklet may disappear before it is given or shown to its intended person.

It is also tiresome for teachers to write individual marks to every student in a school and then even more tiresome for the head teacher to do the same by writing individual remarks.

Universities and colleges

It can be a challenge to access your results if you do not have basic computer skills. Thus all new students at Riara University need to be taken through the process during orientation.

Furthermore, the university student portal is not responsive on mobile devices with small screens of less than 480px width. For these devices navigating through the portal might prove difficult and time consuming.

1.3 OBJECTIVES

The most important objective of this project is to promote accountability of the students work. I hope that this project will add itself among one of the motivators for students to achieve academic excellence.

General objectives

- To ensure results are only accessed by the intended viewer
- To reduce paper costs of administration by removing use of paper report booklets

Specific objectives

- To design a system where results are easily accessed via chat
- To develop a dashboard for the purposes of uploading and managing students results

1.4 JUSTIFICATION

To the best of my knowledge such a bridge of worlds (connecting a social platform with examination) has not yet been attempted since the conception of WhatsApp. This project will also open doors to the possibilities and potential of chat bots. KNEC the body in-charge of conducting national examinations has done the same thing but with normal SMS.

1.5 SCOPE

This project will focus on schools that are universities, colleges, secondary and primary schools. Narrowing down to the examination results of the school.

The project will employ the power of SQL database, WhatsApp business API and PHP.

1.6 RELATIONSHIP WITH COMPUTER SCIENCE

Computer science deals with the study of computation, hardware, software of computer systems and computer devices.

This project will rely heavily on algorithms to come up with the logic needed to give the right information. This project will also rely on connecting different software databases, and computation power through using APIs.

CHAPTER 2: LITERATURE REVIEW

WHATSAPP EXAMINATION RESULTS is a system among many which share the same objective that is to give easy access to examination results. This chapter will identify two case studies of such systems and focus a bit on what is powering the application. Later on the chapter will cover how the project merges the two case studies together through the power of WhatsApp business API

2.1.1 CASE STUDY: KNEC EXAMINATION RESULT SYSTEM

KNEC is the body that is mandated to “Conduct public academic, technical and other national examinations within Kenya at basic and tertiary levels (KNEC, 2018)”

This body employs a system that tallies national results throughout the country and organizes it per candidate. After results are realized students are asked to send their registration numbers to a certain number via text and a response with their results will be given back at a fee of roughly KES 35 as of 2019.

This method is effective as the parents do not need to wait for the results to be sent to individual schools so as to know how their child has performed.

2.1.2 CASE STUDY 1: RIARA UNIVERSITY STUDENT PORTAL

The Riara university student portal contains various information including student's transcripts. These results are organized per semester. Figure 1 shows how to access the results on Riara University's student portal

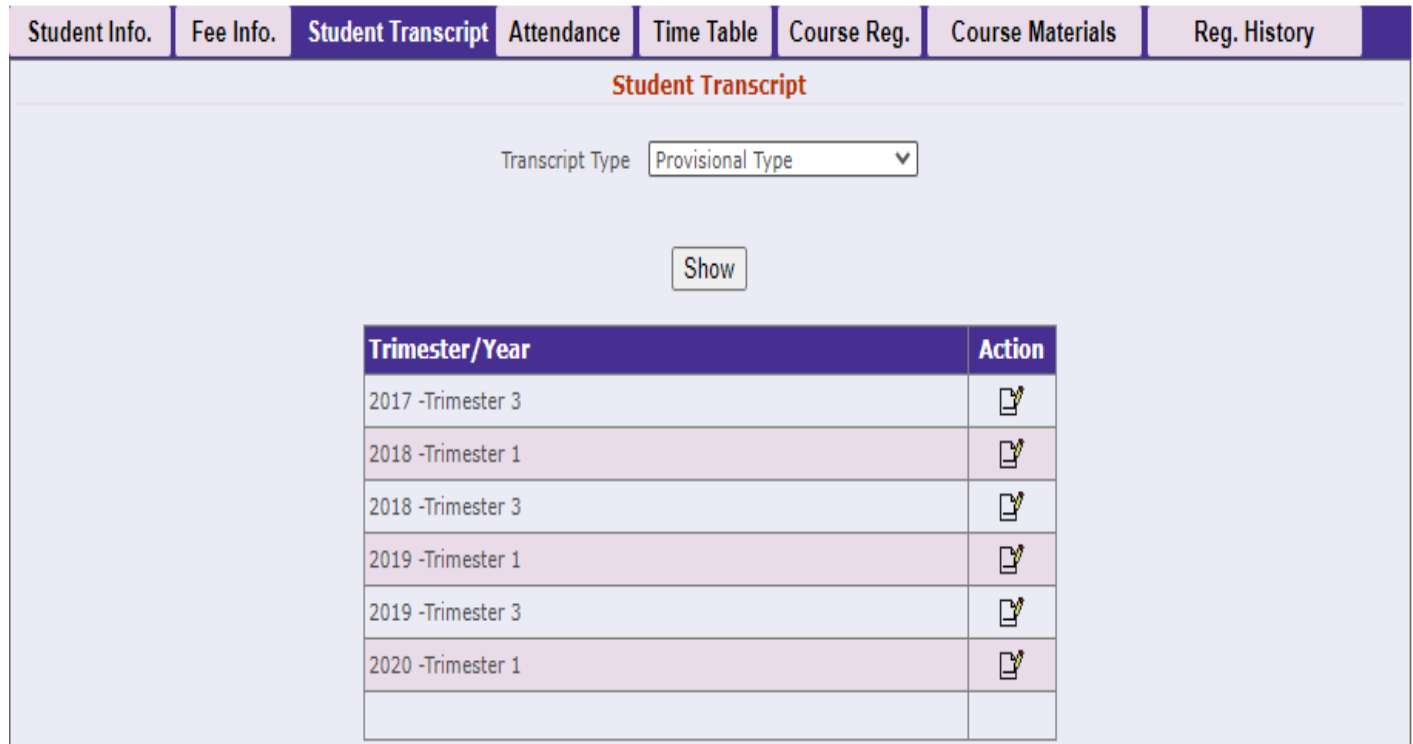


Figure 1: Student portal

Source: (University, 2020)

This portal allows students to access to their results any time. And once the results are uploaded they cannot be changed or tampered with by the student.

2.2 WHATSAPP BUSINESS API

“For medium and large businesses, the WhatsApp Business API powers your communication with customers all over the world, so you can connect with them on WhatsApp in a simple, secure, and reliable way”. (API, 2020)

This project will focus on the Messaging tools the API offers. These tools will help the chat bot to send results to the intended recipient.

2.2.1 WHATSAPP ARCHITECTURE

WhatsApp is a smart phone application that utilizes internet to allow people to send messages to one another.

When installed on any device it will scan for mobile numbers then check its database for any matches. Then you can chat with numbers whose match is found within the database



Figure 2 : WhatsApp logo

Source: (2020, WhatsApp)

2.2.2 EXTENSIBLE MESSAGING AND PRESENCE PROTOCOL

WhatsApp uses XMPP (Extensible Messaging and Presence Protocol) server. This allows you to transfer messages between two or more users provided internet is stable.

The protocol maintains a queue. Messages will wait till the queue messages are received by the nodes. Thus in WhatsApp's case the sender will get notifications only when the receiver gets the message.

The programming language used for the smooth sending of messages is called ERLANG. It helps to quickly adapt to instant updates and hot fixes.

The language also helps to push notification to the user incase the user is offline (in this case meaning not in the application)

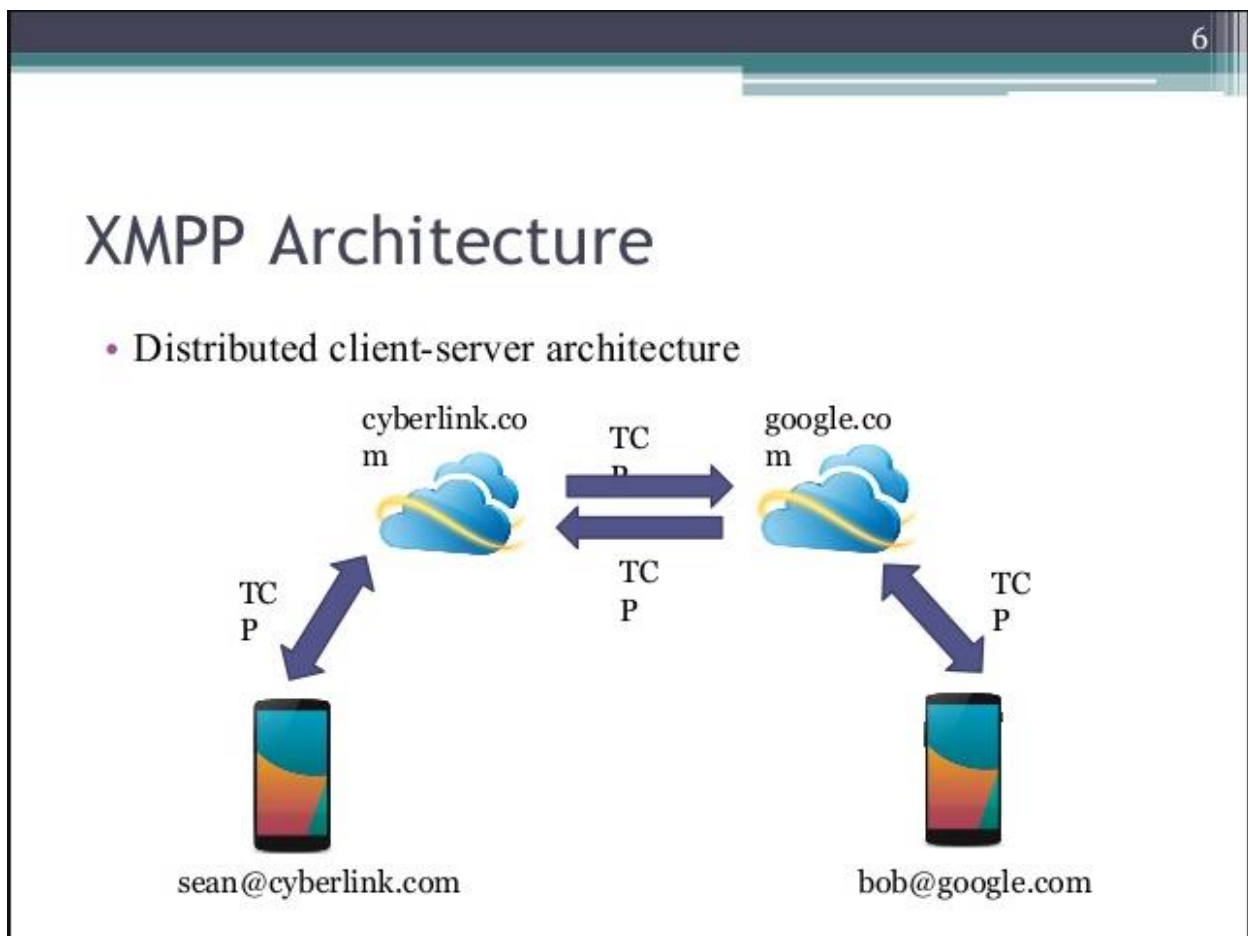


Figure 3: XMPP

Source: (IBM, 2020)

2.2.3 THE ERLANG LANGUAGE

WhatsApp chose this language because of its ability to avoid errors. The language uses an abstraction called the Actor model for concurrency. Instead of the more traditional shared memory approach.

Actors unlike conventional threads are designed to be more light weight, because actors could be on the same machine or different machines and message passing abstraction works for both.

Therefore the implementation of this approach could be: each device is represented as an actor. Thus that actor is responsible for handling the inbox of the user, how it gets serialized to disk, the messages that the user sends and receives.



Figure 4: Erlang Language

Source: (ERLANG, 2020)

2.3 WHATSAPP EXAMINATION RESULTS

KNEC got it right when they gave people the option to ask for examination results through SMS. However this option is not available to schools' internal examinations

Riara University's student portal is great but it can be a slow process to log into your portal and search for the results you need.

WhatsApp is a social platform that is accessed daily by students and even parents. Why not simply check your results as you chat with your fellow peers?

2.4 ADVANTAGES OF WHATSAPP EXAMINATION RESULTS

- It is fast – you only need a one-time registration with your phone number to access your results
- It is secure – only your number can access your results. You can also add two factor authentication for further security
- It is easily accessible – all you need is a whatsApp account which is free

2.5 LIMITATIONS

- Works only smart devices
- Requires internet connection

CHAPTER 3 SYSTEM METHODOLOGY, DESIGN AND ANALYSIS

3.1 SYSTEM DESIGN

3.1.1 CONCEPTUAL FRAMEWORK

This is an organization of ideas to achieve the project's purpose. Figure 10 shows these ideas in a Conceptual Framework.

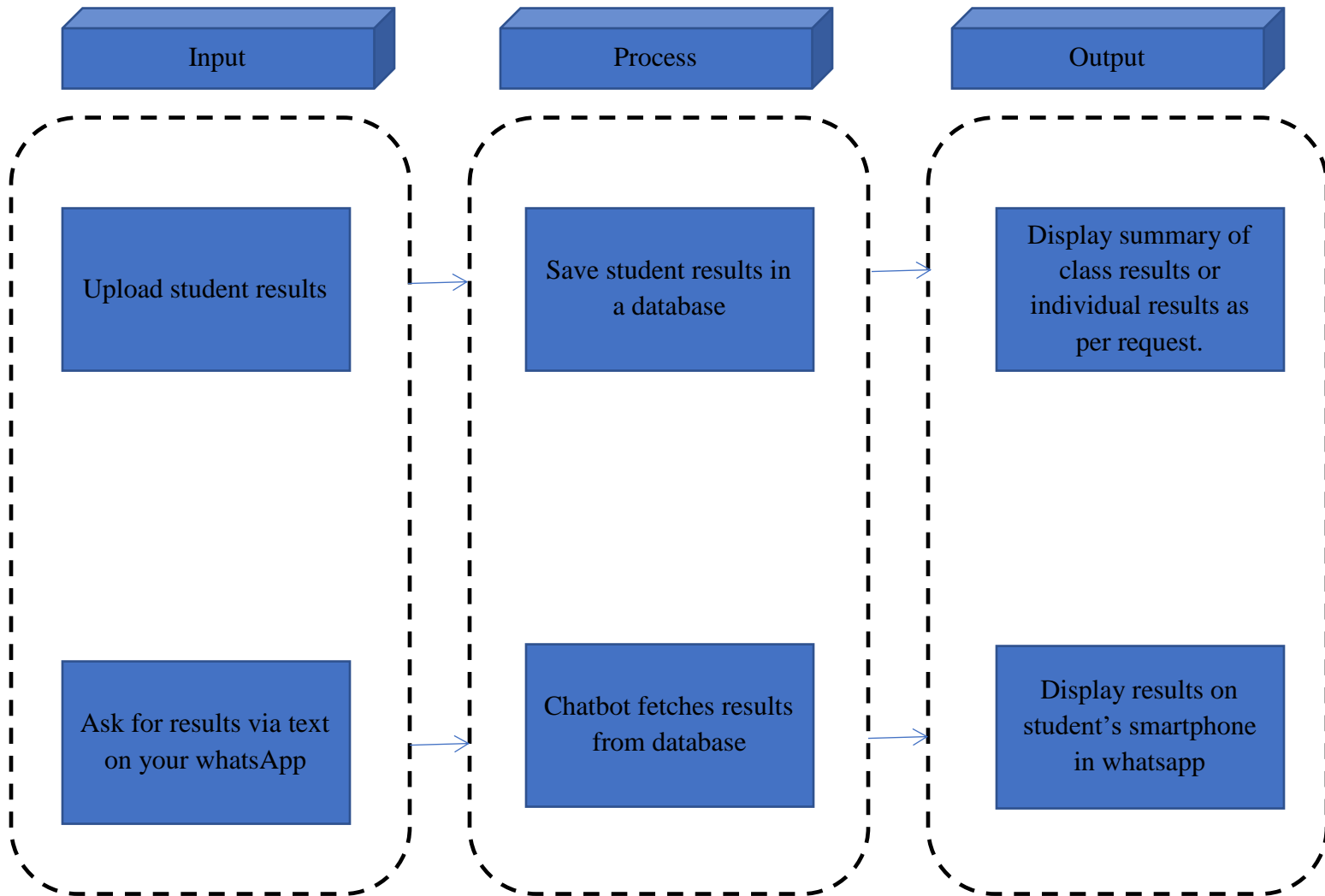


Figure 5: Conceptual framework

3.1.2 CONTEXT FLOW DIAGRAM

Figure 5 shows the boundaries of the software. It shows the flow of information between the project and external entities. It shows how various external entities such as the system admin uploading information to the system.

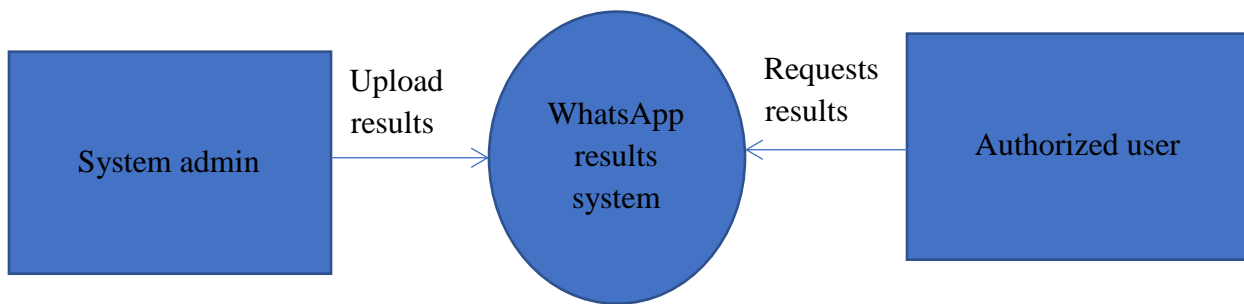


Figure 6: Software boundaries

3.1.3 ENTITY RELATIONSHIP DIAGRAM

An entity relationship diagram (ERD) shows the relationships of entity sets stored in a database. An entity in this context is a component of data. In other words, ER diagrams illustrate the logical structure of databases. Figure 6 shows an ER diagram for WHATSAPP EXAMINATION RESULTS

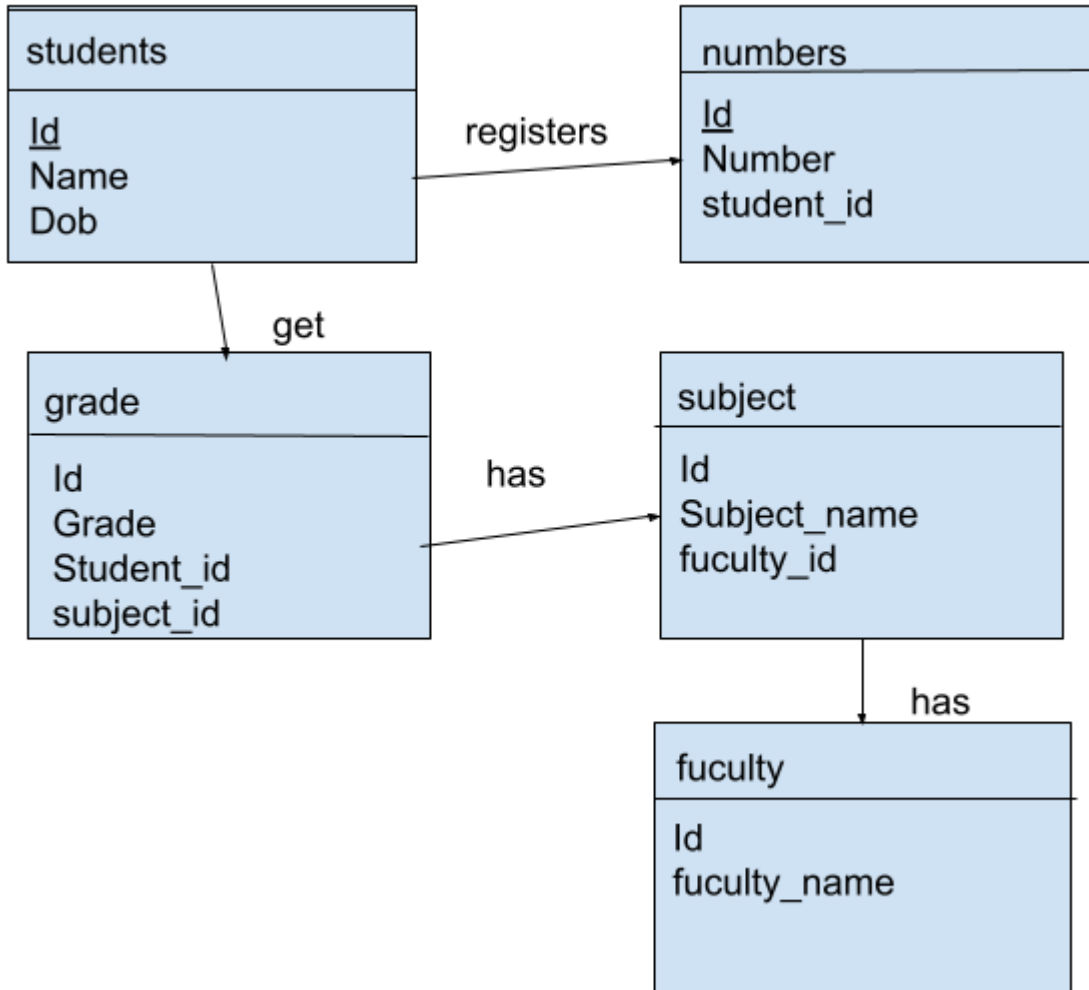


Figure 7 Entity relation diagram

3.1.4 FLOWCHARTS

Flowcharts show the flow of the program. In this section we are going to focus on how the student registers, the admin uploads results and retrieval of results in figure 7, 8 and 9 respectively.

Registration of student.

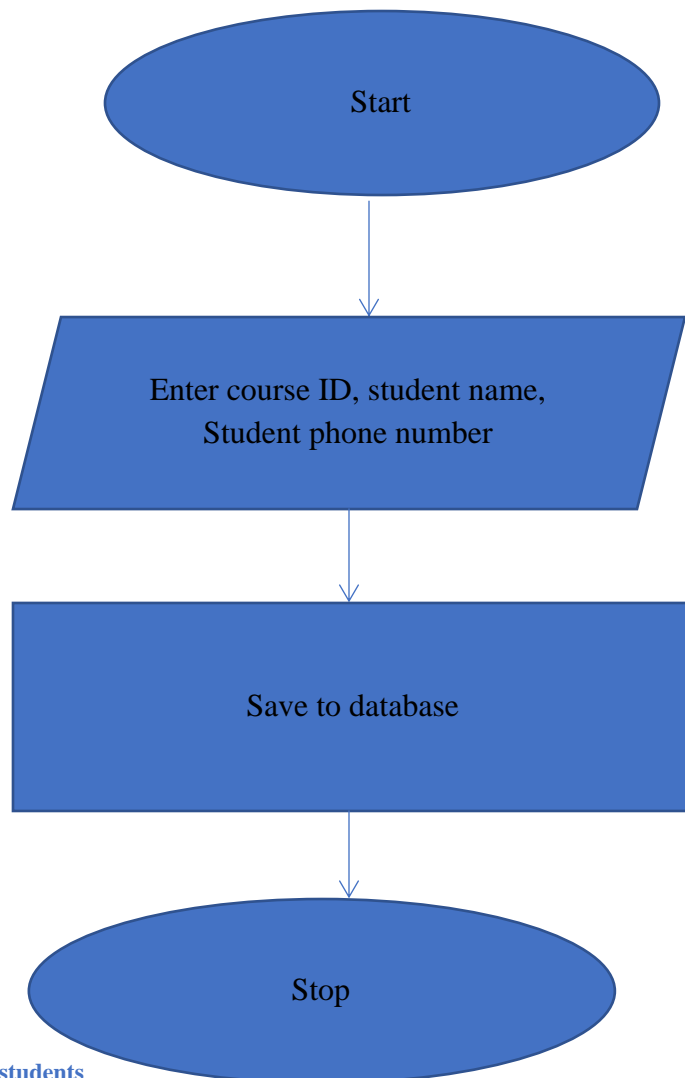


Figure 8: Registrations of students

Uploading results

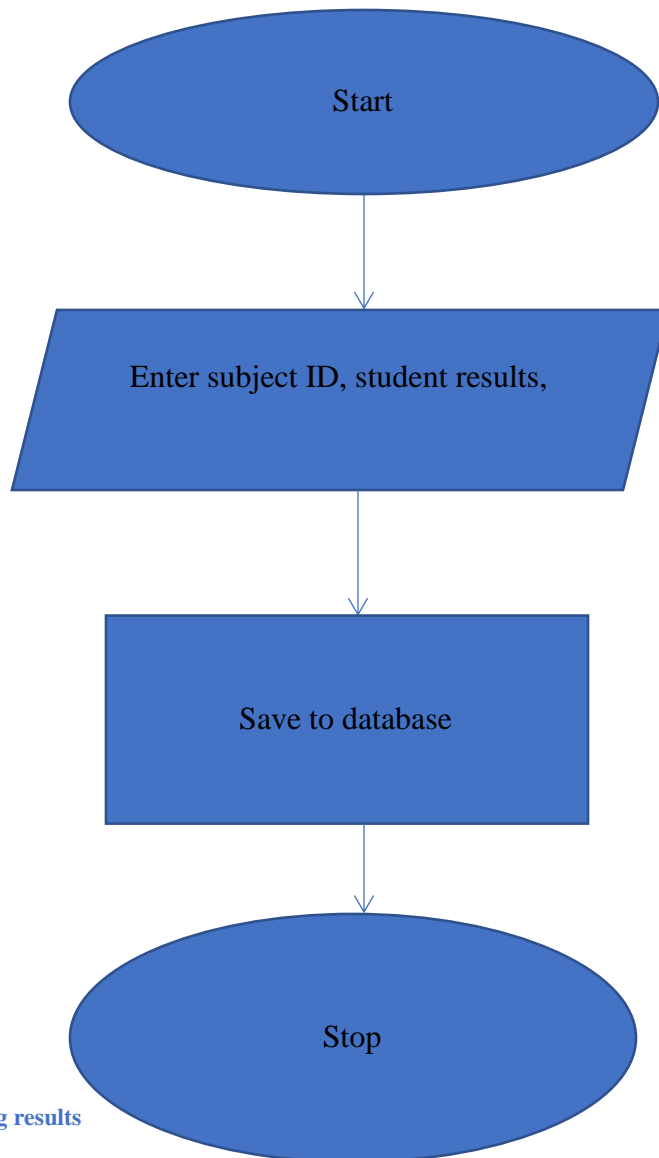


Figure 9: Uploading results

Retrieving results

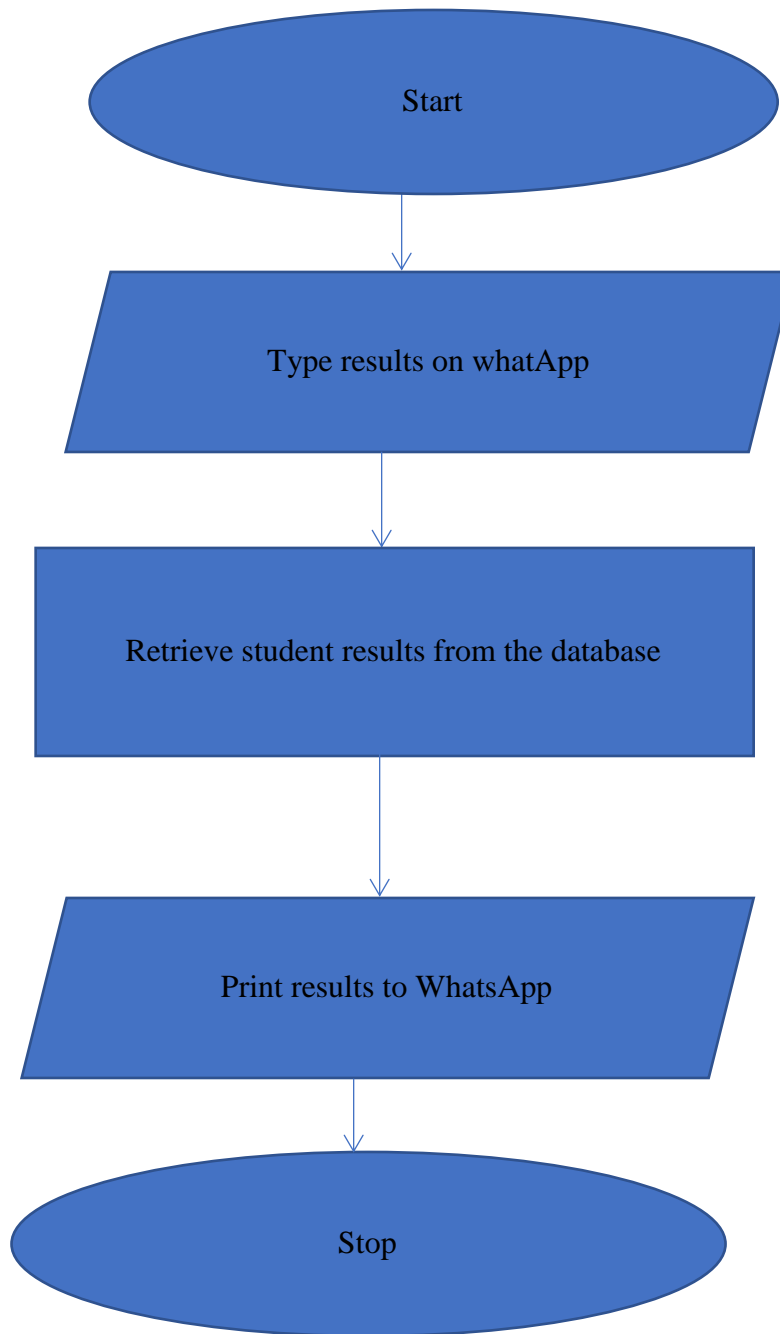


Figure 10: Retrieving results

3.2 SYSTEM ANALYSIS

WHATSAPP EXAMINATION RESULTS has many components. To fully understand what we are up against, this chapter breaks down those components to see how well they interact with each other to achieve the overall objective. A feasibility study was undertaken to see if the project is worth doing.

The current situation

In primary and secondary institutions results are given in either report books or results slip. While in campuses students have a student portal where they can access their student portal with ease.

3.3 FEASIBILITY STUDY

This study was undertaken to show the practicality of **WHATSAPP EXAMINATION RESULTS**. It involved schedule, economic, technical and financial feasibility.

3.3.1 SCHEDULE FEASIBILITY

This shows the estimate of how long the system will take to develop, and if it can be completed in a given time period using some methods like payback period. Therefore, the time allocated for undertaking the project is of three months, which is enough time to finish the project and ensure that it is working. Table 1 is a Gantt chart explaining the period.

Table 1 Gantt chart

WEEKS	1	2	3	4	5	6	7	8	9	10	11
RESEARCH AND PROTOTYPE DRAFTING											
FACT FINDING AND DATA COLLETION											
REPORT AND CODING											
EVALUATION											
DOCUMENTATION											
FINAL REPORT											

3.3.2 TECHNICAL FEASIBILITY

This project will require the following technical requirements:

Hardware requirements

- A computer loaded with apache. The computer should be at least 2 GB ram and 250 GB storage. – this is for developing the project
- A smart phone for testing. This should be android 8+
- Internet connection.

Software requirements.

- Apache server
- Twillio Account
- WhatsApp business API.

3.3.3 ECONOMIC FEASIBILITY

This concerns itself with the financial assessment of benefits of the project that may be tangible or intangible and the capital one is going to use to establish the project. This is cost effective as it only requires set up fees. Once the project is up and running on an online server the costs end there. Table 2 shows the estimated cost of the project.

Table 2: Budget

ITEM	COST IN KSH
API PRICING	36,000
COMPUTING DEVICES	30,000
2 FLASH DISKS(FOR BACKUPS)	2000
INTERNET	3000
TOTAL	71,000

3.4 METHODS USED TO COLLECT DATA

3.4.1 OBSERVATION

This is a method of data collection through the human vision or rather the eye sight. After going through the process of getting my semester results in the university student portal I noticed that a lot of time is wasted on logging in and navigating through the portal.

I deduced the following from the students I observed:

- They want a simple platform which was easy to use and user friendly with a great GUI.
- They also want a system that was accurate and retrieval of data was made easy in it.
- They also wanted a system that is secure and unauthorized access to be prevented.
- They wanted the results to be accurate and data organization to be perfect.

3.4.2 PERSONAL EXPERIENCE

I find it quite tasking to browse for my results in the student portal, especially when am in a hurry to do something else.

CHAPTER FOUR: IMPLEMENTATION, TESTING AND ANALYSIS

This chapter will cover implementation of the design, the testing process and the results obtained during development of this system.

4.1 IMPLEMENTATION

This system was developed using the following languages:

- PHP – as a server language
- JQuery – as a front end language
- CSS and HTML – also as front end languages.

Its database is SQL based and is only accessible by the system and the database administrator. The database has tables that hold basic student information and subject information. They include the following:

- Students
- Faculty
- Subjects
- Grades

The following figure 7 shows how the tables are related to each other with one to many relationships.

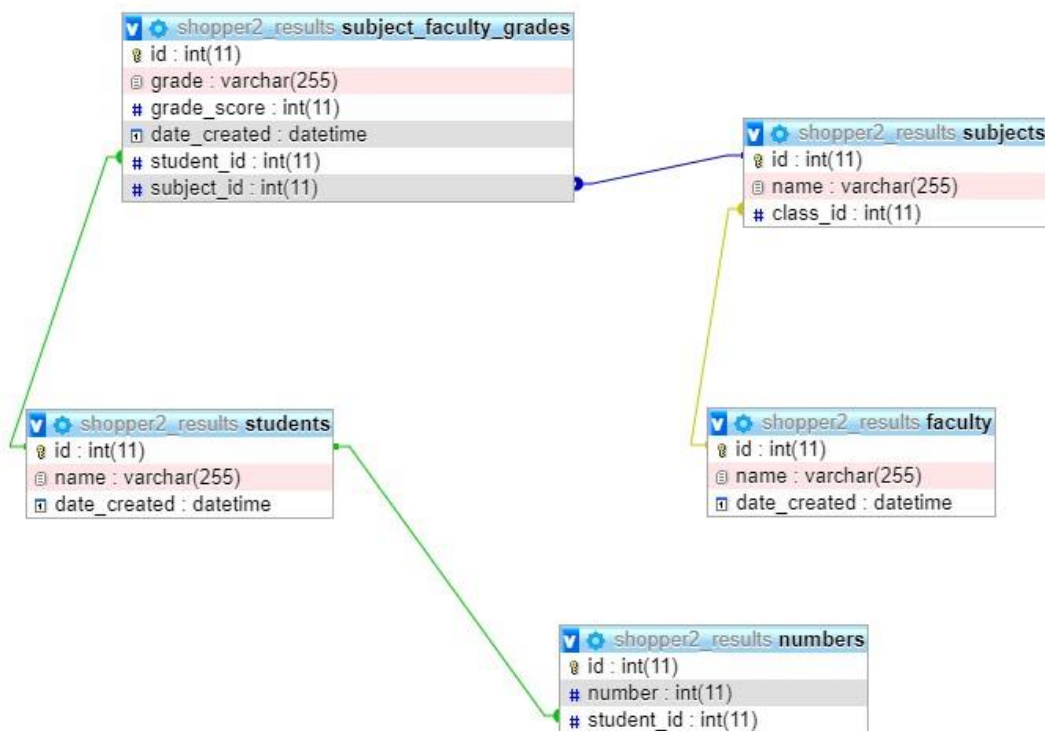


Figure 11: Table relationship

The project is hosted online with an apache based server. To access it you need to go to the following URL: https://shopperscargogo.com/whatsapp_results/dashboard/

4.1.2 HARDWARE/SOFTWARE INTERFACE

This part includes the summary of all the hardware and software tools needed to successfully run this system.

Hardware Interface:

- Intel core i5 7th Gen processor
- 64 GB of free hard-drive space
- 4 GB of RAM software Interface Software interface:
- Web Browser
- Operating System: Windows (7 or above)
- web Browser Microsoft edge, Mozilla Firefox 31 and above or Google Chrome

4.1.3 SOFTWARE RE USE

This part will focus on software that has been re used in the making of this project:

- Admin LTE Bootstrap – This is an open source library that contains user interface models necessary to create admin dashboards. These models include sidebar, cards and charts. These user elements are already designed therefore you only have to custom edit them to match your design.
- WhatsApp Messaging Tool – This is how whatsapp sends messages from one device to another on the internet. This tool will be beneficial in sending the students results to his whatsapp account.

4.1.4 SPECIAL CODING TECHNIQUES

In PHP we can create classes and objects. The objects in this case are functions, but when under the class structure they are defined as objects.

I have employed this object oriented approach to be able to reuse certain objects such as building an SQL insert statement. As shown in figure 12

```
function build_sql_insert($table,$elements)
{
    $sql = "insert into `{$table}` ( ";
    $i = sizeof($elements);
    $j = 0;
    foreach ($elements as $key => $value) {
        $j++;
        if ($i != $j) {
            $sql .= "`{$key}`" . ",";
        }
        else {
            $sql .= "`{$key}`" ;
        }
    }
    $j = 0;
    $sql.=") values (";
    foreach ($elements as $value){
        $j++;
        if ($i != $j) {
            $sql .= "'$value'" . ",";
        }
        else {
            $sql .= "'$value'";
        }
    }
    return $sql.");";
}
```

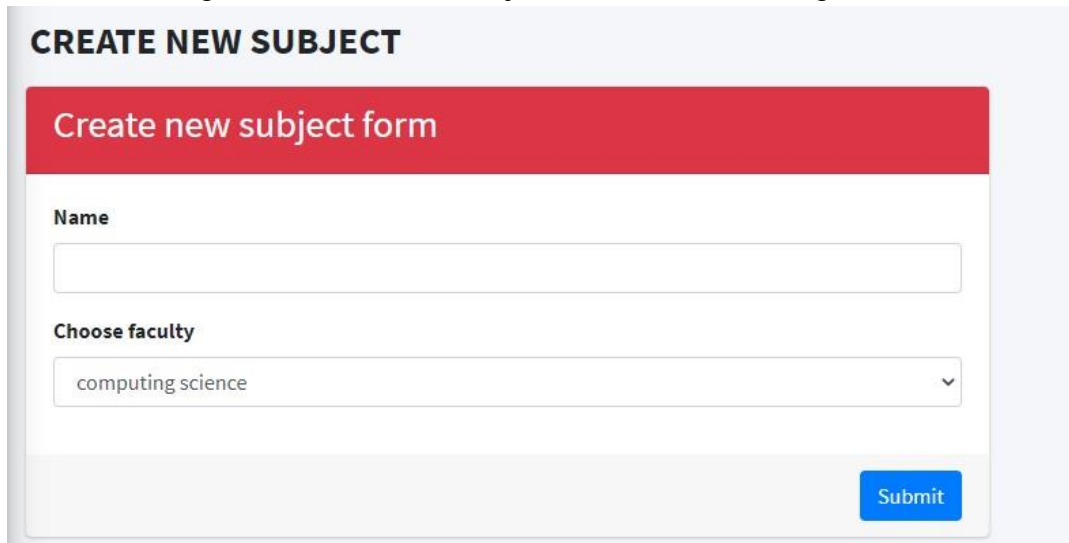
Figure 12: Class and object

This function enables me to skip writing the SQL insert statement; I can just call it by placing the name of the table and elements (columns of the table) as parameters. I haven't used this technique only in the insert query but also in edit query and delete query. This technique ensures that I avoid errors resulting from poor syntax of crude SQL statements.

4.3 TESTING

The following tests were conducted on the system.

- Inserting of records such as subject records as seen in figure



CREATE NEW SUBJECT

Create new subject form

Name

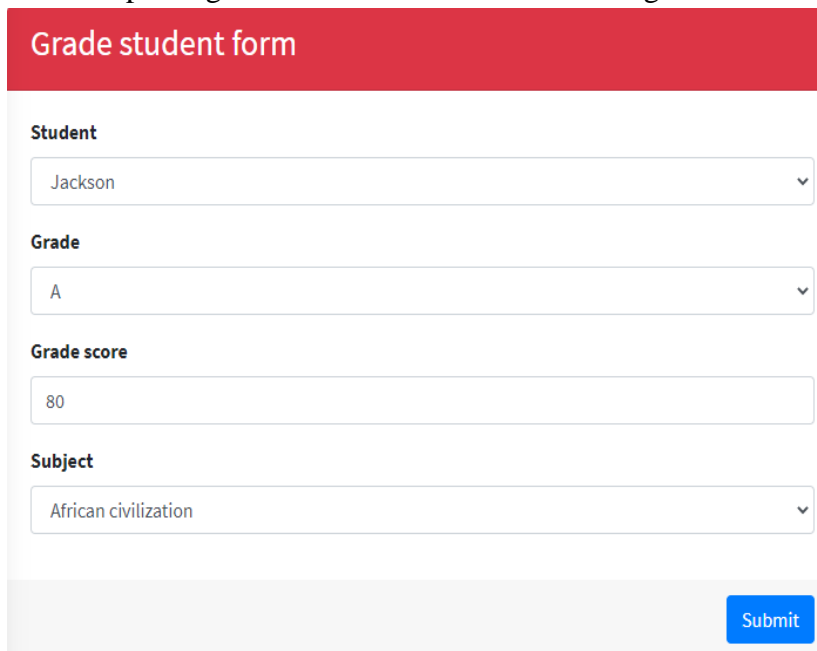
Choose faculty

computing science

Submit

Figure 13: Insert Subject

- Updating records such as those of student grades



Grade student form

Student

Jackson

Grade

A

Grade score

80

Subject





African civilization

Submit

Figure 14: Editing student grade

- Deleting of Records by clicking the trash icon on figure 15

SEARCH

↕	Grade	↕	Grade_score	↕	Actions	↕
	A		80		 	
	A		40		 	

Previous **1** Next

Figure 15: Deleting grades

4.4 ANALYSIS

The following are the results of the tests:

- Inserting Records

When inserting records such as subject records the record was able to be inserted and a success pop up was shown as in figure 16

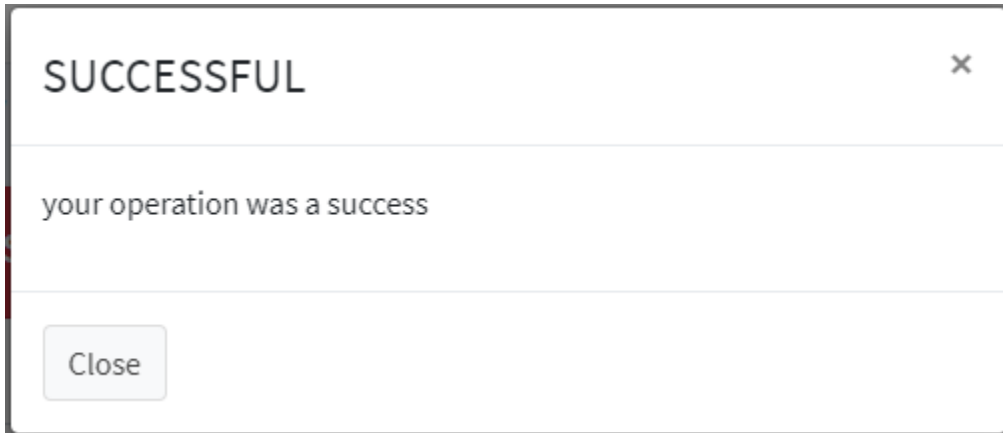


Figure 16: Success Pop Up

- Updating records

The system was able to update records and displayed a success pop up as shown in figure 16.

- Deleting records

When attempting to delete records that were used by another table like deleting a faculty yet there are records of subjects that refer to that faculty an error message was thrown as shown in figure 17

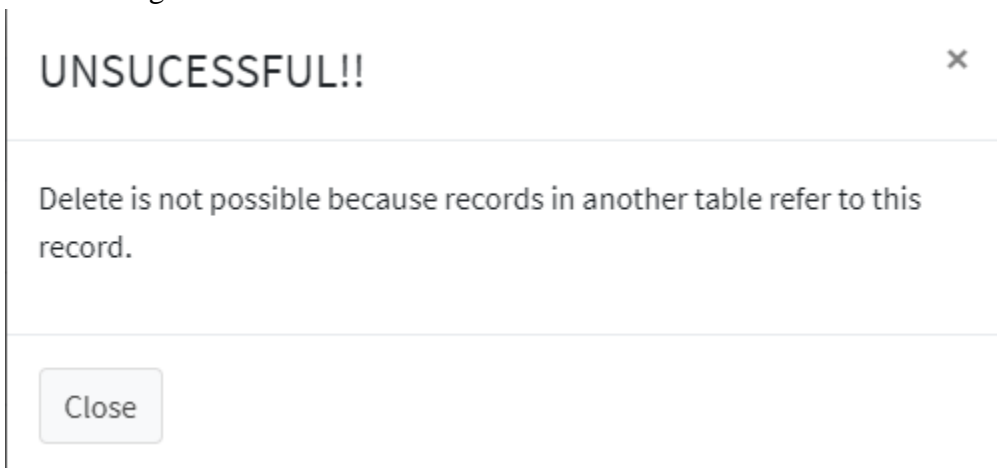


Figure 17: Unable to Delete

- Browser compatibility Test

HTML 5 failed to display correctly on older versions of edge on windows 8 and windows 7. When I changed to the older version of HTML it worked fine.

4.5 EVALUATION

This project has achieved the following:

- Sending results to students via a text on WhatsApp
- Enabling the results admin to upload students' results with ease.

Furthermore, this project has demonstrated that social media messaging can be used for so much more than just chatting.

Thus I hope that other developers will innovate new and exciting ways on how messaging bots can help ease the life of people.

After the results admin uploads the results in the system as shown in the user manual under appendix, the student will be required to text a command such as view to the admin whatsapp number and the student will get his results as shown in figure 9

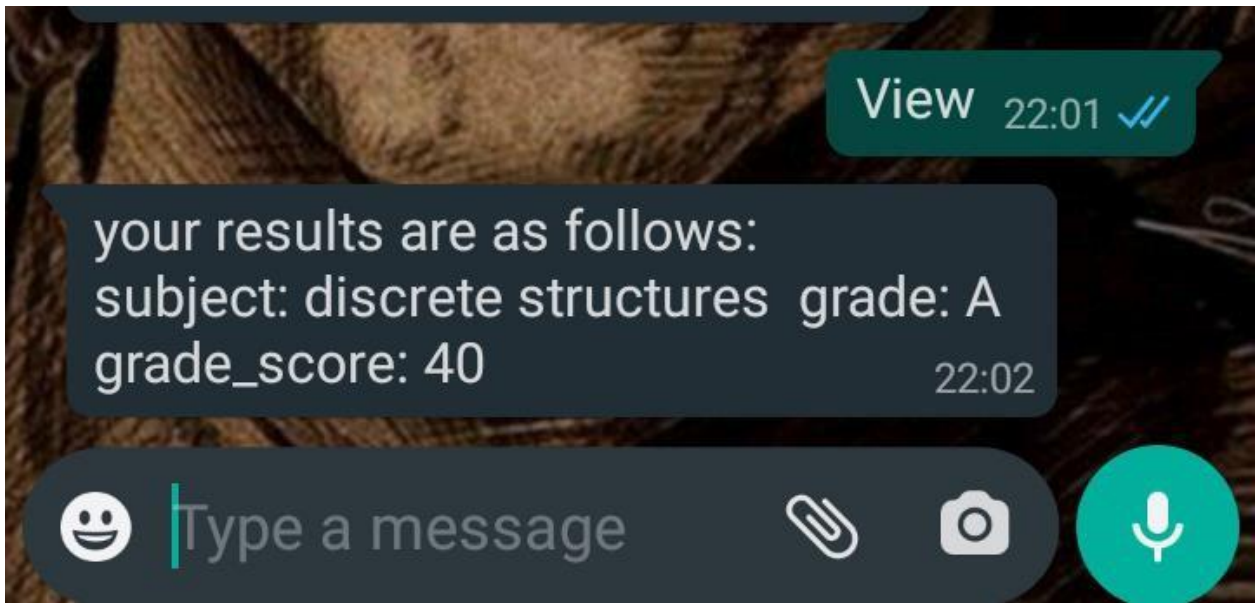


Figure 18: Results of whatsapp

CHAPTER 5: CONCLUSION, EVALUATION AND FURTHER WORK

5.1 CONCLUSION

The system is able to send student results via whatsApp making the results easily accessible to students.

The system contains a dashboard that enables admin upload results that will be later accessed by students through WhatsApp.

5.2 FURTHER IMPROVEMENTS

While the achievements of this system is notable, there is always room for improvement in the following ways

- The bot can be extended to send the examination results to Facebook or other social media apps
- The results admin portal can include a feature that allows the admin to upload results from an excel CSV file
- The results admin portal can be extended to incorporate high schools and primary schools.

5.3 CHALLENGES FACED DURING DEVELOPMENT.

The following were challengers faced during development:

- Funding for the API usage. The WhatsApp API costs about ksh 40,000 a year. Thus it is a challenge to keep it in use.
- Locating a server to host the bot service. The bot needed to be hosted online so that it can work. We managed to secure a free service but it is not permanent.
- Time to fully develop all the necessary features. There are features such as uploading results from a CSV that are still in development and couldn't be included in this version due to time constraints.

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APPENDIX

DATA TABLES – STRUCTURE

Appendix 1 shows faculty table where there are only three fields the name of the faculty, id (primary key) and date created

[Table structure](#) [Relation view](#)

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
<input type="checkbox"/>	1	id			No	None		AUTO_INCREMENT	Change Drop More
<input type="checkbox"/>	2	name	utf8mb4_general_ci		No	None			Change Drop More
<input type="checkbox"/>	3	date_created			No	current_timestamp()			Change Drop More

Appendix 1 - Faculty table structure

Appendix 2 shows numbers of students its fields are number and student_id where student_id is a foreign key.

[Table structure](#) [Relation view](#)

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
<input type="checkbox"/>	1	id			No	None		AUTO_INCREMENT	Change Drop More
<input type="checkbox"/>	2	number			Yes	NULL			Change Drop More
<input type="checkbox"/>	3	student_id			Yes	NULL			Change Drop More

Check all *With selected:* [Browse](#) [Change](#) [Drop](#) [Primary](#) [Unique](#) [Index](#) [Fulltext](#)

Appendix 2 - Numbers table structure

Appendix 3 shows students table with id as the primary key and name as the student's full name

[Table structure](#) [Relation view](#)

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
<input type="checkbox"/>	1	id			No	None		AUTO_INCREMENT	Change Drop More
<input type="checkbox"/>	2	name	utf8mb4_general_ci		No	None			Change Drop More
<input type="checkbox"/>	3	date_created			No	current_timestamp()			Change Drop More

Appendix 3 - Students table structure

Appendix four shows table of subjects with a foreign key as class_id which will be used to identify which faculty the subject is from.

[Table structure](#) [Relation view](#)

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
<input type="checkbox"/>	1	id			No	None		AUTO_INCREMENT	Change Drop More
<input type="checkbox"/>	2	name	utf8mb4_general_ci		No	None			Change Drop More
<input type="checkbox"/>	3	class_id			No	None			Change Drop More

Check all *With selected:* [Browse](#) [Change](#) [Drop](#) [Primary](#) [Unique](#) [Index](#) [Fulltext](#)

[Print](#) [Propose table structure](#) [Move columns](#) [Normalize](#)

[Add](#) column(s) [Go](#)

Appendix 4 - Subjects table structure

Appendix 5 shows the table that holds all the grades and grade scores of students it has grade, grade score then two foreign keys : student_id and subject_id

Table structure | Relation view

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
<input type="checkbox"/>	1	id			No	None		AUTO_INCREMENT	Change Drop More
<input type="checkbox"/>	2	grade	utf8mb4_general_ci		No	None			Change Drop More
<input type="checkbox"/>	3	grade_score			No	None			Change Drop More
<input type="checkbox"/>	4	date_created			No	current_timestamp()			Change Drop More
<input type="checkbox"/>	5	student_id			No	None			Change Drop More
<input type="checkbox"/>	6	subject_id			No	None			Change Drop More

Check all With selected: Browse Change Drop Primary Unique Index Fulltext

Print Propose table structure Move columns Normalize

Add 1 column(s) after subject_id Go

Appendix 5 Grades table structure

USER MANUAL – RESULTS ADMIN

Figure 10 shows the login screen that will allow the results admin entry into the system

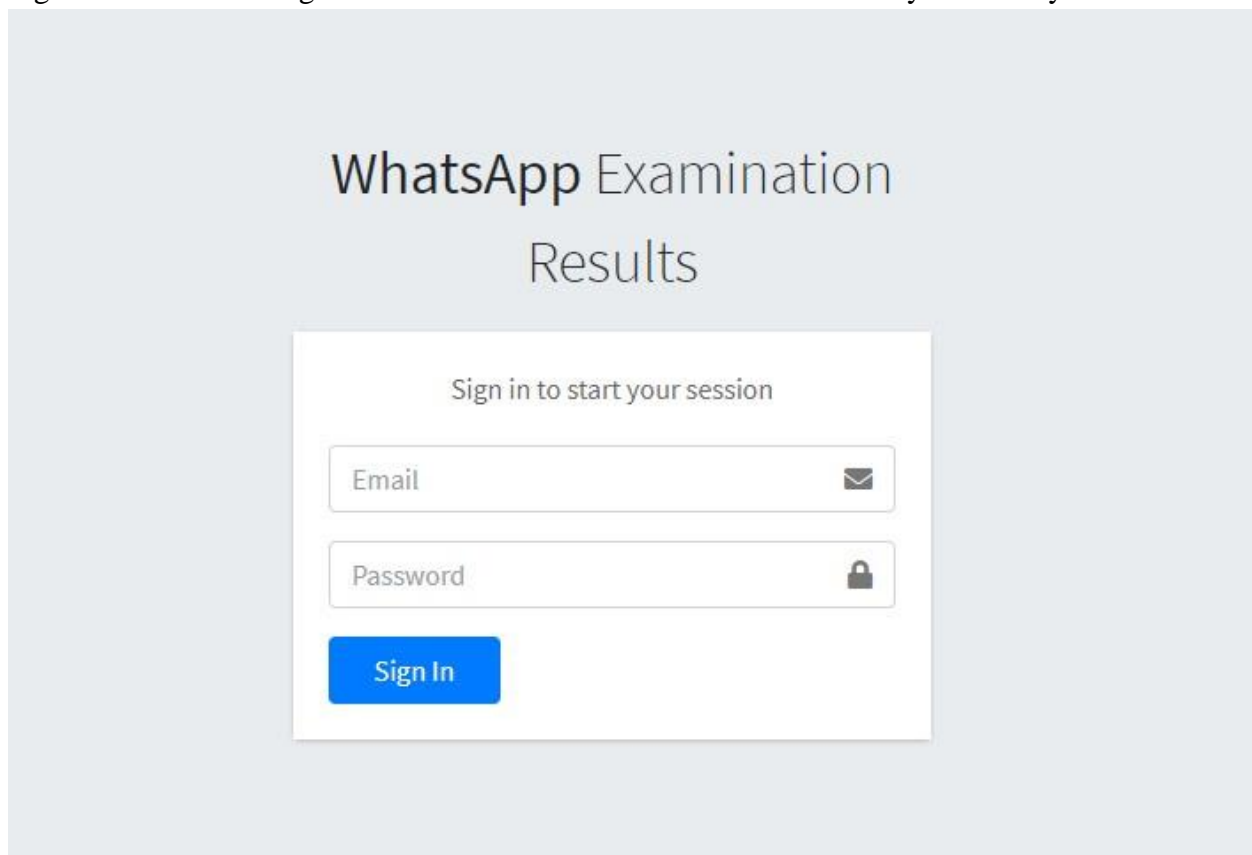
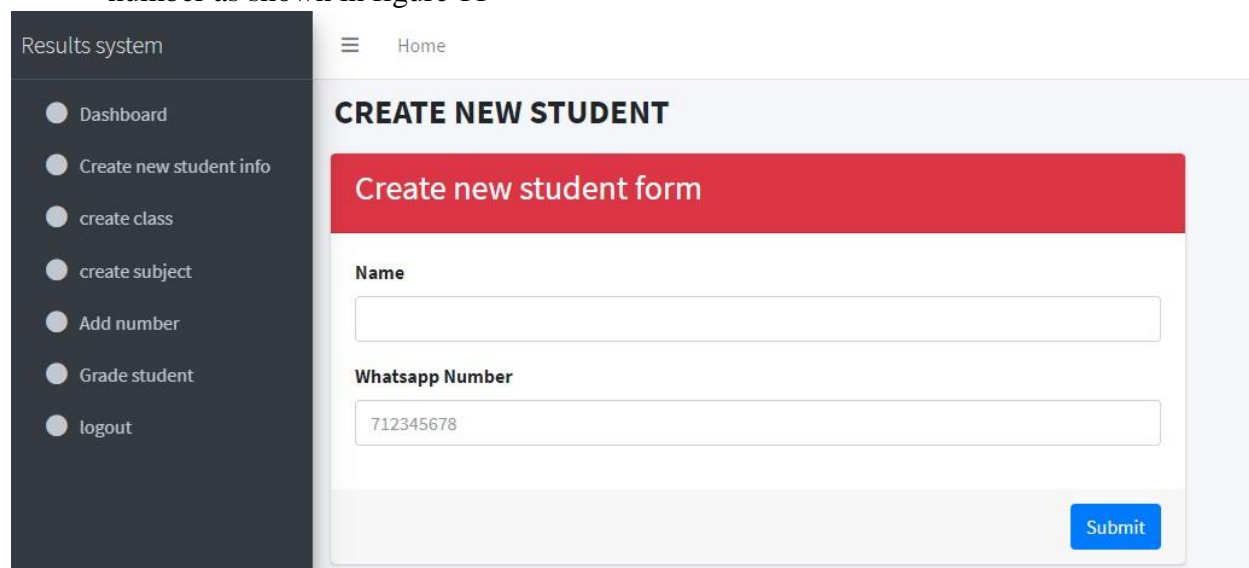


Figure 19: Login

After entering the admin email and password the admin will have the following controls:

- Create new students – the student will need at-least one whatsapp number as shown in figure 11



The screenshot displays a web interface for a 'Results system'. On the left is a dark sidebar with a menu containing: Dashboard, Create new student info, create class, create subject, Add number, Grade student, and logout. The main content area is titled 'CREATE NEW STUDENT' and features a red header 'Create new student form'. Below this, there are two input fields: 'Name' (empty) and 'Whatsapp Number' (containing '712345678'). A blue 'Submit' button is located at the bottom right of the form area.

Figure 20: Create new students

- Create a new Faculty such as the faculty of Computing science. As shown in figure 12

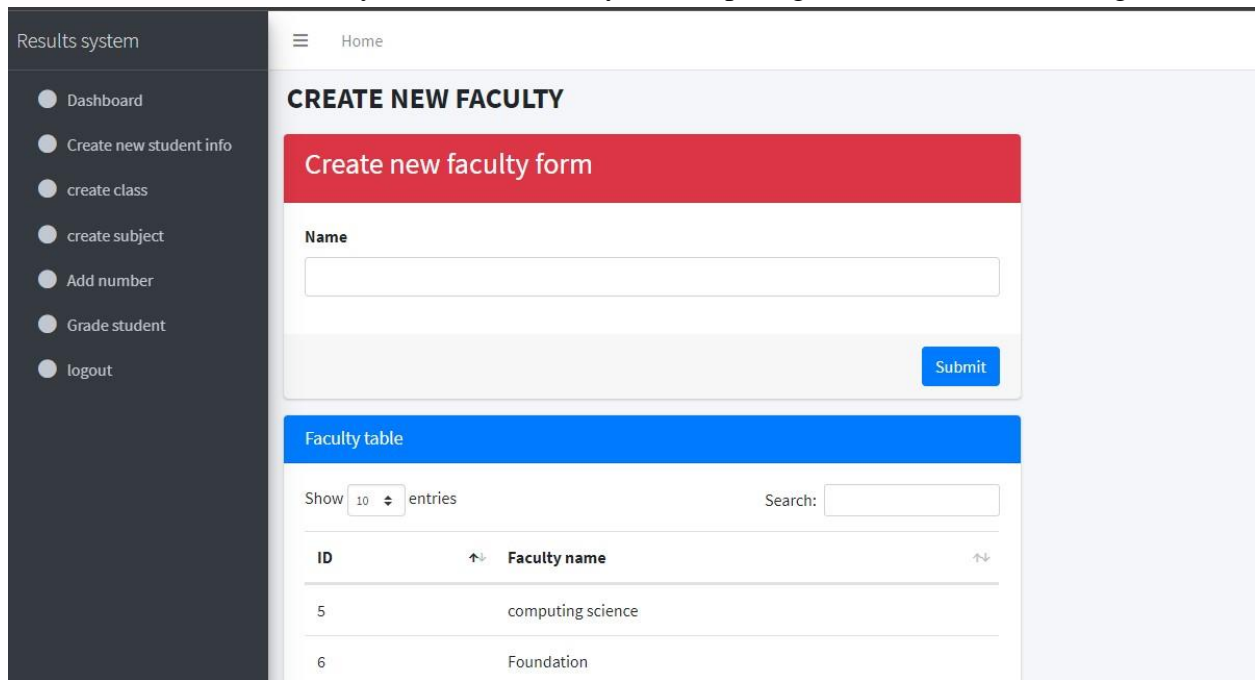


Figure 21: Create new faculty

- Create new subjects as shown in figure 13

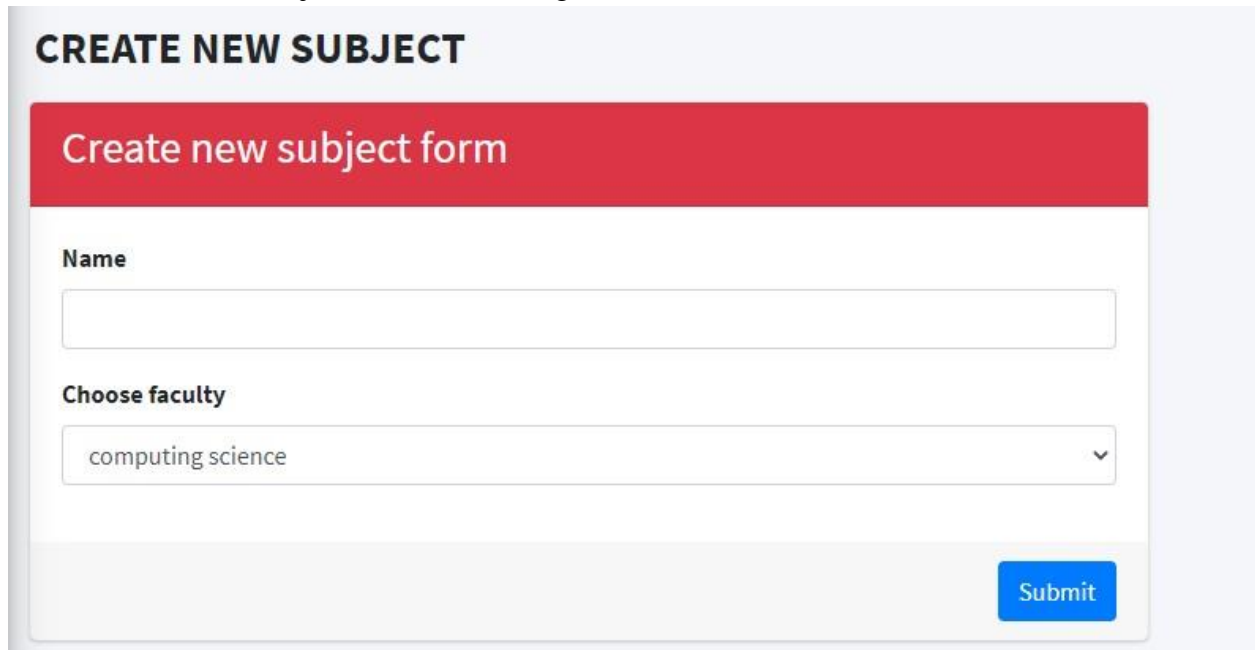


Figure 22: Create new subject

- Figure 14 will demonstrate how the student's marks are recorded

GRADE STUDENT

Grade student form

Student

michael se-lunani

Grade

A

Grade score

Subject

discrete structures

Submit



Figure 23: Record marks

After all is done the data will appear in the dashboard as in figure 15. There the admin will be able to delete or update the existing records.

DASHBOARD





Current Grades

Show entries Search:

Student name	Subject	Grade	Grade_score	Actions
michael se-lunani	discrete structures	A	40	 

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

current subjects

Subject	Faculty	Action
discrete structures	computing science	 
African civilization	Foundation	 

current faculties

Show entries Search:



Name	Action
computing science	 

Figure 24: Dashboard