AGROGETAWAY WEB APPLICATION

A PROJECT REPORT SUBMITTED TO THE FACULTY OF ENGINEERING, DESIGN AND TECHNOLOGY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY OF UGANDA CHRISTIAN UNIVERSITY

May, 2024

UGANDA CHRISTIAN UNIVERSITY

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DECLARATION

We hereby declare that this Project Proposal is our work. Where other people's work has been used, we have correctly provided citations following the university standards.

We confirm that we have not used work previously produced by another student or another person to hand in as our own.

We understand that we could be held responsible and accountable for plagiarism if any work of another person is detected

We have not allowed and will not allow anyone to copy our work to pass it off as their work.

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ACKNOWLEDGEMENT.

We take this opportunity to extend our gratitude to Uganda Christian University as an institution that has instilled important life values necessary for proper Christian living and has given us a platform to express our skills throughout this learning journey.

Additionally, we are grateful for our colleagues in the class of 2021 & 2022, in information technology. You have provided us with a delightful and wholesome experience and we will sorely miss the time in and away from school and we are sure this is a mutual feeling we all share.

We also thank our supervisors, Mr.Opio Solomon & Miss Mercy Nekesa, whose multiple insights and guidelines issued, kept us on the right path. We are incredibly indebted to them for their willingness to go beyond the call of duty to ensure that we learn how to turn ideas into solutions.

We are exceedingly grateful to our families and friends for the continuous and diligent support especially during the vicissitudes of the COVID-19 pandemic and other hardships.

They relished the challenge and relentlessly provided for us to fulfill the requirements for this course and for that we are eternally indebted to them and heavily appreciative of their efforts.

Lastly, we thank the faculty of Engineering, Design and Technology, particularly, the Department of Computing and Technology, for the addition of this valuable course unit to the syllabus which enriches us as students with the real-life applications of the knowledge with which we're imparted at Uganda Christian University.

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ABSTRACT

The Agrogetaway project is an innovative initiative aimed at transforming the agricultural landscape by leveraging technology to facilitate knowledge exchange between farmers and agricultural enthusiasts. This web-based platform serves as a conduit for sharing best practices, advanced farming techniques, and practical knowledge through an interactive and user-friendly interface. The project's cornerstone is the creation of a digital community where users can book farm tours, access a wealth of educational resources, and engage in real-time discussions with experienced model farm managers.

Agrogetaway addresses the critical challenge of improving agricultural produce quality in Uganda, which directly impacts the nation's competitiveness in the global market and its food security. By connecting users with model farmers and providing a repository of multimedia educational content, the platform fosters a collaborative environment for learning and growth. The project also introduces a novel feature, 'Communities,' structured around model farmers, where users can subscribe for exclusive insights and direct mentorship.

The platform's development followed a mixed-methods approach, incorporating both qualitative and quantitative research to ensure comprehensive user-centric design and functionality. Evaluations indicate user satisfaction and a gradual increase in engagement, although challenges such as a lack of scientific depth and device compatibility were identified. Recommendations for future enhancements include infrastructure improvements, user education programs, and advanced security measures.

Agrogetaway's vision is to empower farmers with the knowledge and tools necessary to enhance productivity and sustainability, ultimately contributing to the advancement of the agricultural sector. The project's ongoing development and research aim to expand its reach, improve user experience, and solidify its position as an indispensable resource for modern agriculture.

CHAPTER ONE

INTRODUCTION AND BACKGROUND OF THE STUDY

1.1 Introduction

Agrogetaway is an ambitious project that aims to revolutionize the agricultural sector in Uganda by harnessing the power of technology to facilitate knowledge sharing and enhance farming practices. The project introduces a web-based platform that serves as a bridge connecting farmers and agricultural enthusiasts with industry experts and model farmers. Through Agrogetaway, users can book farm tours, access a rich library of educational resources, and participate in a dynamic online community dedicated to agricultural learning and collaboration. The platform's innovative features are designed to address the pressing need for improved agricultural education and the dissemination of modern farming techniques. By creating a space where knowledge can be easily shared and practical skills can be learned, Agrogetaway empowers farmers to increase the quality and quantity of their produce, thereby boosting their competitiveness in both local and international markets as affirmed by (Dilleen, Claffey, Foley, & Doolin, 2023).

1.2 Background of the study

The background of the Agrogetaway project is rooted in the challenges faced by the agricultural sector in Uganda. Despite agriculture being a significant part of the country's economy, many farmers lack access to the latest advancements in farming methods and technologies. This gap in knowledge and resources has led to suboptimal farming practices, resulting in produce that often falls short of international quality standards. The study behind Agrogetaway involved an extensive analysis of the agricultural landscape, identifying key areas where intervention could lead to substantial improvements. It recognized the potential of digital platforms to serve as catalysts for change, providing scalable solutions to widespread issues. The project was conceived as a response to the urgent need for a system that could deliver expert knowledge directly to farmers, offer practical training, and foster a sense of community among those seeking to modernize their farming operations as elaborated by (Ingram & Maye , 2020).

By addressing these needs, Agrogetaway sets out to contribute significantly to the advancement of sustainable agriculture in Uganda, aligning with the global Sustainable Development Goals and paving the way for a more prosperous future for farmers and the nation as a whole as elaborated by (Ballantyne, 2010).

1.3 Problem Statement

In Uganda, the agricultural sector is grappling with a significant challenge: approximately 70% of the country's agricultural output is deemed to be of low quality. This issue is primarily attributed to a widespread lack of access to contemporary farming knowledge and techniques among local farmers. As a

consequence, Uganda's contribution to the international market is markedly low, accounting for only 0.25% of the share. The Agrogetaway project seeks to address this critical problem by establishing a web-based platform that facilitates the transfer of expert farming knowledge directly to farmers. This platform aims to empower farmers with the necessary skills and information to enhance the quality of their produce, thereby improving Uganda's standing in the global agricultural market and contributing to the nation's food security.

1.4 Objectives

1.4.1 Main objective

The primary aim of Agrogetaway is to enhance the quality of Ugandan agricultural produce.

1.4.1 Specific Objectives

I. Facilitating practical knowledge transfer from experienced farmers to novices or young farmers and enthusiasts through regular farm visits, workshops and community engagements.

II. Promoting the adoption of advanced and sustainable farming techniques by Ugandan farmers through skills sharing at farm visits.

III. Increasing the overall productivity and marketability of Uganda's agricultural sector by 15% in the next 5 years.

1.5. Project Scope

1.5.1 Geographical Scope

Our main focus were schools and farmers in Uganda. We focused on them because it aligns with our primary objective of optimizing Uganda's agricultural produce as the two are a fraction of the major stakeholders of the agricultural industry.

1.5.2 Technical Scope

The main challenge was access of knowledge whenever one required the

Service, fast and efficiently.

1.5.3 Time Scope

This considered the time span for which data was collected and considered for analysis. However, since this was sensitive data, it would be unethical to use the data for any kind of analysis without getting permission from the Personal Data Protection Office.

1.6 Significance of the System

Agrogetaway has the potential to make a significant impact on Uganda's agriculture by raising the standard of farming practices, mitigating post-harvest losses, and addressing food waste issues. Additionally, its contributions align with Sustainable Development Goal 12, which focuses on promoting responsible consumption and production practices. Through its innovative approach and integrated features, Agrogetaway aims to drive positive change in the agricultural sector of Uganda, ultimately leading to improved productivity, sustainability, and food security.

1.6.1 Organizational Structure of the Current System

The current system is structured to support:

A centralized database of model farms and educational content.

A network of model farmers who provide insights and guidance.

An administrative framework for managing bookings and user interactions.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The literature review delves into various studies and publications that discuss the impact of knowledge sharing in agriculture, the role of technology in enhancing farming practices, and the benefits of experiential learning in the agricultural sector. It examines case studies of successful agricultural knowledge transfer programs and analyzes the potential of web-based platforms in transforming traditional farming practices. The review also explores the economic, social, and environmental implications of adopting advanced farming techniques, drawing parallels with the objectives of Agrogetaway.

The integration of technology in agriculture has led to the development of various platforms aimed at improving knowledge dissemination among farmers. This literature review examines the current state of e-learning platforms, the role of social media, and the implications of digitalization in agricultural knowledge sharing.

E-Learning Platforms for Farmers

E-learning platforms have emerged as a significant tool for farmers, providing them with access to agricultural education and resources. (Anusha, Pujitha, & Prusty, 2023) conducted a comprehensive review of these platforms, highlighting their potential to enhance agricultural productivity and sustainability. The study underscores the importance of such platforms in facilitating continuous learning and adaptation among farmers, which is crucial for the Agrogetaway project.

Agricultural Information Systems

Information systems in agriculture serve as a critical component for the development of the sector. A review study was conducted on agricultural information systems which emphasizes their role in the growth of agriculture and rural communities (Vidanapthirana, 2019). These systems offer a structured approach to managing agricultural data, which is essential for informed decision-making and strategic planning.

Social Media's Impact

Social media platforms have become a vital channel for promoting agricultural knowledge. According to (Rabbi, 2024), research exploring the impact of social media on agricultural knowledge sharing among students reveals its effectiveness in engaging younger demographics in the agricultural sciences. This aligns with Agrogetaway's goal of creating an interactive community for knowledge exchange.

Digital Agriculture and AKIS

The digitalization of agriculture has significant implications for Agricultural Knowledge and Information Systems (AKIS). (Ingram & Maye, 2020) analyzes the supply-oriented narrative of digital agriculture, examining its effects on AKIS. The study suggests that digital platforms can bridge the gap between farmers and extension services, providing a model for Agrogetaway's community-based approach.

Data-Enabled Agricultural Transformation

Digital agriculture platforms support data sharing and analysis, fostering collaboration with public and private sectors. However, according to (Runck & Joglekar, 2021), there is a noted lack of clarity around what constitutes a "digital agriculture platform," indicating a new research domain with significant potential for growth. This is particularly relevant for Agrogetaway, which seeks to leverage data analytics to enhance its service offerings.

Systematic Reviews of Agricultural Data Platforms

(Kutha, Tekinerdogan, Catal, & van der Tol, 2022) carried out a systematic literature review on agricultural data analytics platforms focusing on the domains, stakeholders, objectives, and technologies adopted. The findings provide valuable insights into the design and implementation of platforms like Agrogetaway, ensuring they meet the needs of their stakeholders effectively.

In conclusion, the literature underscores the transformative potential of digital platforms in agriculture. Agrogetaway, with its focus on community building and knowledge sharing, is well-positioned to capitalize on these advancements, driving innovation and growth in the agricultural sector.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This section includes the tools, techniques, procedures and approaches that were employed in this research to develop the Agrogetaway web application and the steps involved.

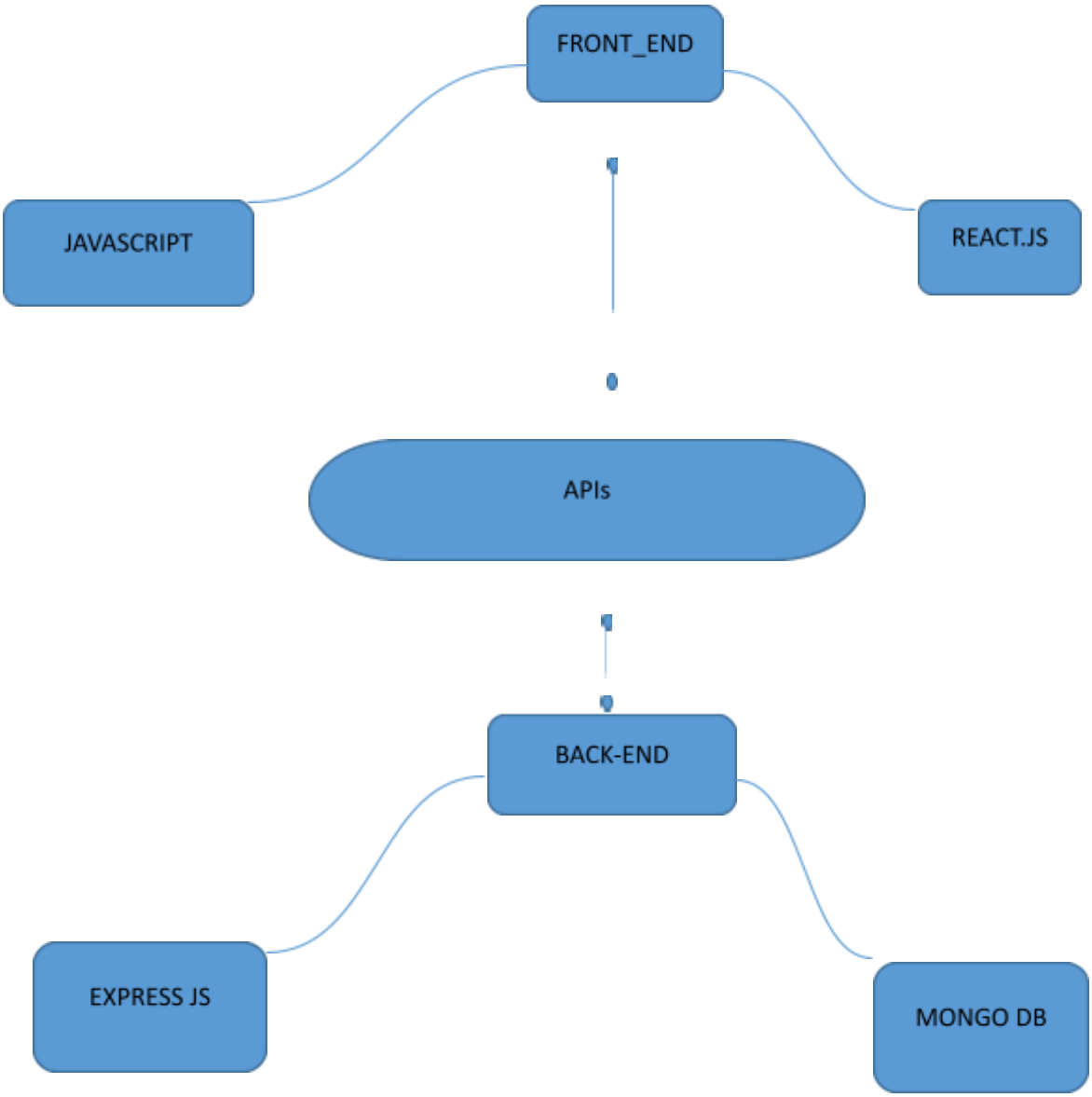
3.2 Data collection

We collected data through interviewing and observing. We interviewed farmers and found what we need to put on our applications.

3.3 Project Structure

No major frameworks were used to build this project and therefore it does not conform to a particular architecture however, the project follows the following structure in the figure below.

Figure 1 The Project Structure



3.3.1 Structure Breakdown: Front-end

The Agrogetaway web application follows the structure above with the front-end hard coded using JavaScript as the core language and React.js for the building the application front-end.

3.3.2 Application programmable interfaces

The main role of the APIs used was to link the front-end to the back-end as depicted in Figure 1.0 above, through the following:

The custom APIs were used to extend the functionality of the application through allowing access to different services therefore allowing the exchange of information at different points.

The APIs were also used to hide the complexity of the code to ease development.

APIs were used to provide the necessary security for the registration process since they were used for encryption.

3.3.2.1 Testing the APIs

The above-mentioned APIs were tested using Postman which utilizes a Graphical User Interface through which we obtained the different responses which needed subsequent validation. The following methods were used:

GET: To obtain information existing in my ‘Farms’ database
POST: To add information/data to the database
PUT: Replace/update information in the database
DELETE: to erase data/information from the database.

NodeJS acts as some form of compiler. NodeJS is an asynchronous event-driven JavaScript runtime, Node.js is designed to build scalable network applications. NodeJS was used to transform the React.js code and build the web application.

Why we Used Prototype

A prototype provides a system for the users to interact with, even if it is not initially ready for use. This means even if we have not fully finished the application, the users have a working prototype rather than attempting to understand a system specification on paper.

Reduced time and cost. Prototyping can improve the quality of requirements and specifications provided to developers. Because changes cost exponentially more to implement as they are detected later in development, the early determination of what the user really wants can result in faster and less expensive software.

Improved and increased user involvement. Prototyping requires user involvement and allows them to see and interact with a prototype allowing them to provide better and more complete feedback and specifications. The presence of the prototype being examined by the user prevents many misunderstandings and miscommunications that occur when each side believes the other understood what they said. Since users know the problem domain better than anyone on the development team, increased interaction can result in a final product that has

greater tangible and intangible quality. The final product is more likely to satisfy the users' desire for the look, feel, and performance.

Improvement in quality of requirements and specifications. This methodology can improve the quality of requirements and specifications provided to developers. Because changes cost exponentially more to implement as they are detected later in development, the early determination of what the user really wants can result in faster and less expensive software.

IT illiterates. The system is mainly going to be used by IT illiterates, prototyping methodology approach is the best since they can easily take a look at how the real system will look like hence making or asking for specifications that they understand and need.

Re-education in the risk of failure. This method significantly reduces the risk of failure, as potential risks can be identified in the early-stage and moderation steps can be taken quickly to work on them other than noticing them in the final stages.

CHAPTER FOUR

IMPLEMENTATION

4.1 Introduction

In this chapter, the development process is broken down to depict the structure of the project, architectures, the project team structure and technologies used to build the application.

4.2 Unstructured Interviews and Structured interviews

Through unstructured interview, we did more verbal communication with the farmers whereby we asked questions in relation to our scope and the project as well. This helped us to get desired knowledge since the questions were flexible that is to say we easily changed them so as to suit our context.

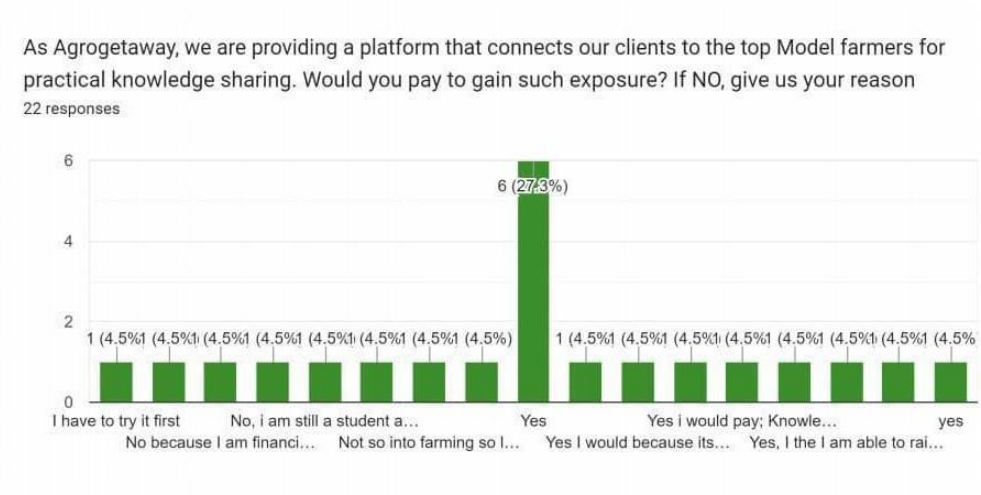
Structured is a formal type of interview. It is characterized and always operates within formal written instrument referred to as an interview schedule. We designed the questions to be asked prior to the interview and sent the questions to the clients so that they get to know the questions to be asked, and get to prepare responses in advance. We asked questions either in person or online via Google forms and this helped us get direct answers.

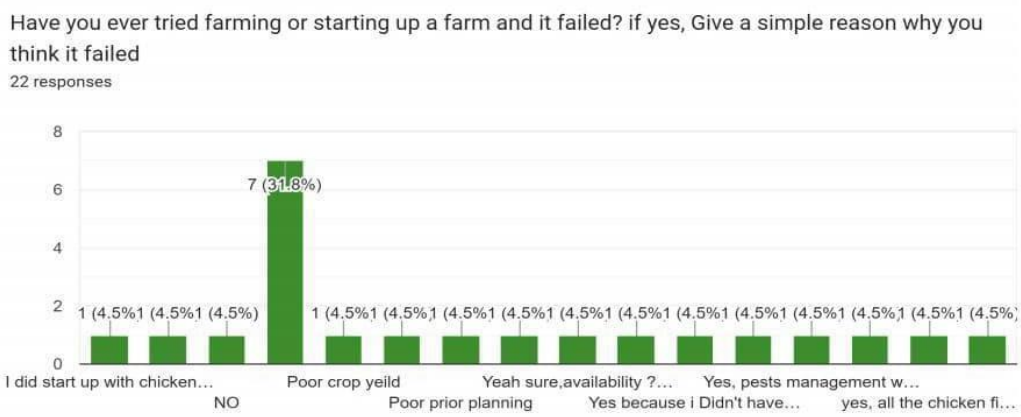
Why we used interviews

Interviews allow a researcher to be directive. That is, one can focus on a specific area of interest and successfully gather the required information needed. This is key in this research project, reason being, the project is focused at incorporating the use of new technology, need for specific information to make the design swift.

Interviews also provide a provision of getting into depth of the area of interest with the interviewee. This makes interviewing a resourceful tool in the gathering of technical information, hence helpful and useful to this project. We used interview

as data collection technique because we had a handful of people to ask, that is, schools and farmers.





4.3 system design

The planning process for the Agrogetaway web application system is evidenced with a context diagram and Entity Relationship Diagram (ERD) as depicted:

4.3.1 The Agrogetaway web Application Context Diagram

According to the Context diagram below, the client enters the account details via the sign-up screen and details saved in the database of the Agrogetaway application system. This then takes them to a page that has variety of farms that they can look through where we rank the best farms in a country and also farms with events are shown. If interested in any, the user clicks visit for more information.

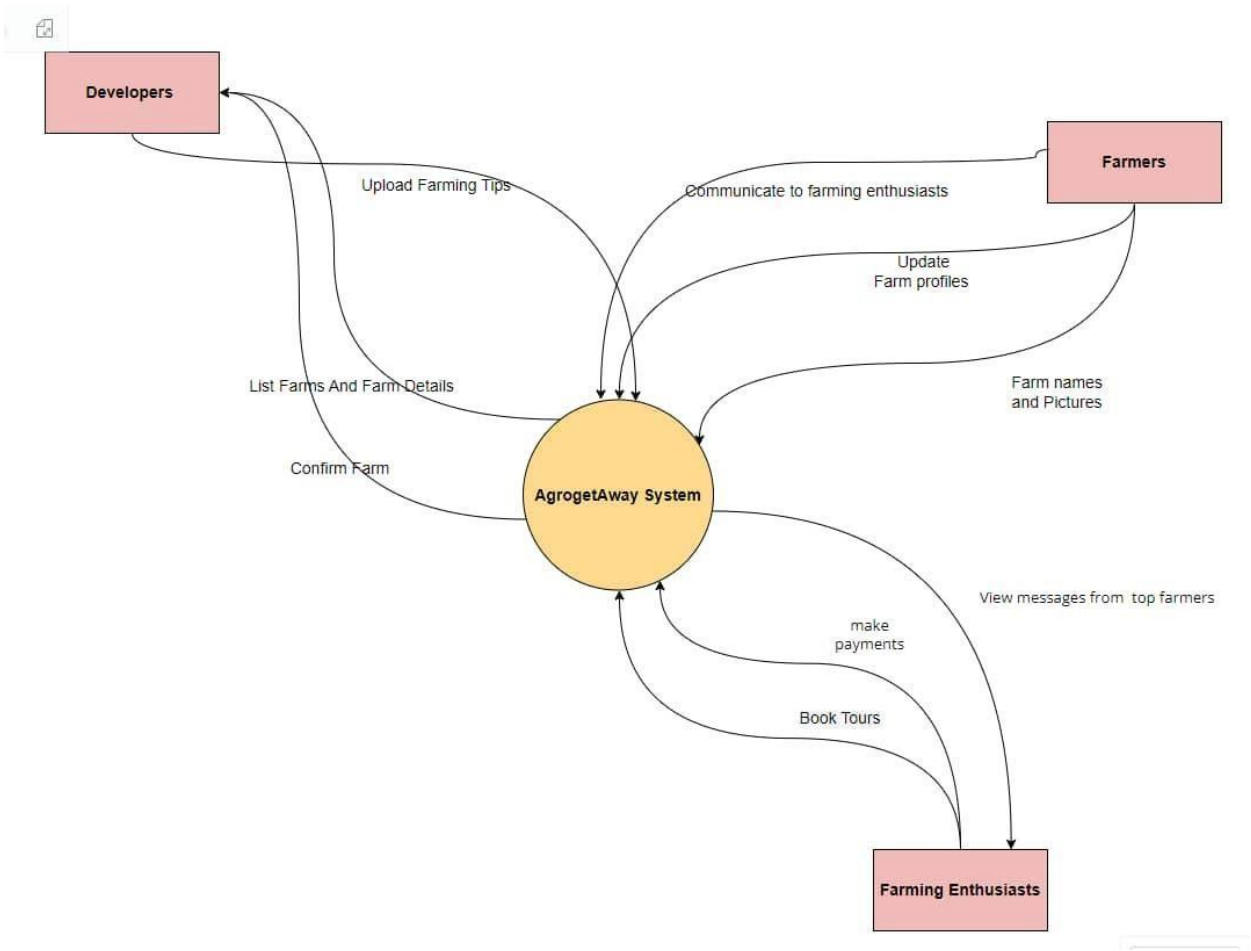
After looking through the information about any particular farm which includes types of crops grown, types of events held, history of the farm and biography of the farmer, the user can then click the “Book” button to book a visit to the farm.

The user will then be redirected to another page that has a booking form where he or she will be required to fill in details about themselves concerning whether they are a private individual or an organization. They will also fill in details regarding when they'd like to come and visit and with how many people.

After filling in the details it will bring up a pop up message thanking the user and letting them know that they will receive an email. Then the user will click a button that will take them back to

the dashboard.

Figure 2 The Context Diagram



The context Diagram above represents activities carried out by the different Entities in The Agrogetaway System.

The Developers: Monitor the system and ensure the farmers are living up to the purpose of the project.

They upload Farming Tips

They approve model Farms from which the farming enthusiasts are meant to learn.

The also pick farm lists and details from the system and monitor them.

The Model Farmers who are also the farm owners: Update and upload their farm details so that they are up to date and authentic.

They also upload farms on the platform which are then approved by the developers.

They also communicate to the Farming enthusiasts through the system using the community feature.

The Model Farmers also confirm tours so that the farming enthusiasts can visit at the right time.

The Farming Enthusiasts: These are people who are interested in farming but lack the practical skills.

They visit the platform in order to acquire knowledge from the system through the community and the daily tips.

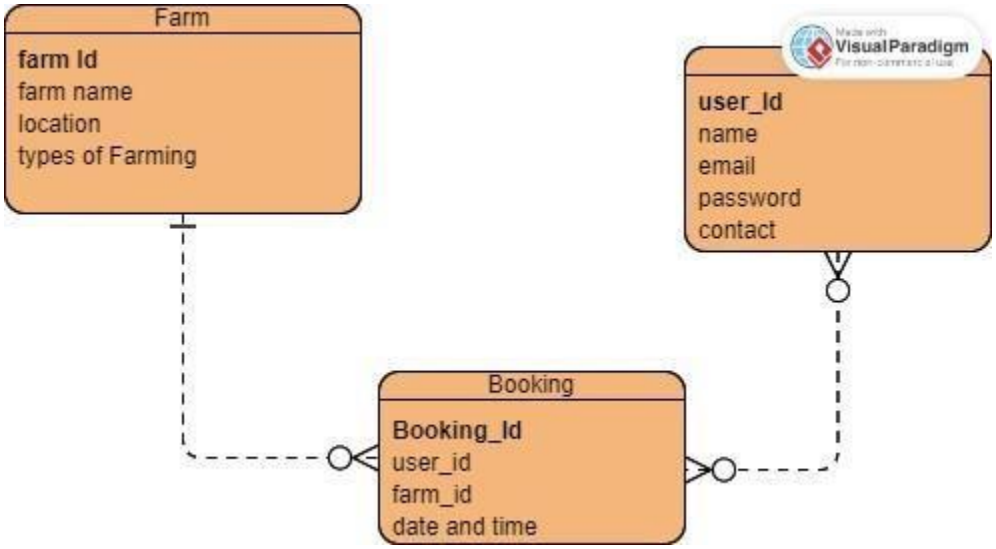
They book visits and learn how to farm from a model farmer of their choice.

The also make payments on the platform for the tours and different services they receive.

4.3.2.1 The Entity Relation Diagram

Figure 3 The Entity Relationship Diagram

The Entity Relationship Diagram (ERD) illustrates the relationship between the three entities of Farm, User and Booking.



The Entity Relationship Diagram described:

One farm can have many bookings

Many users can make many bookings

4.4 The Agrogetaway Project Team Structure

Below is the six-man team that was responsible for the implementation Agrogetaway project and the different roles that each played.

Project Manager – Ddumba Timothy

Assistant Project Manager/Product Manager – Jim James Gortland

Sales Officer – Namuwonge Josephine

Marketing Officer – Murungi Adam

Front End Developer – Nalule Tryphine Ruth

Back End Developer – Nabirye Joan

CHAPTER FIVE

TESTING AND RESULTS

5.1 INTRODUCTION

This chapter includes the results of the testing procedures undertaken upon completion of the Agrogetaway web application.

5.2 TESTING AND RESULTS

The testing of the system was done in phases. First each particular hardware component was tested alone and its readings verified. Below are how the vital

parts of the system were tested.

5.2.1 Interface testing

After developing the interfaces for the system, we went on to test and see if it could fulfill its major goal. First, we tested for the security of the system whereby we tried

to log in with wrong credentials. We then tried to access hidden “jwt”to see whether we could get the hidden data.

5.2.2 Interface results

Having tried to log into the system without correct credentials, we found out that it

could not let us in, we continued trying out different credentials but it was all in vain.

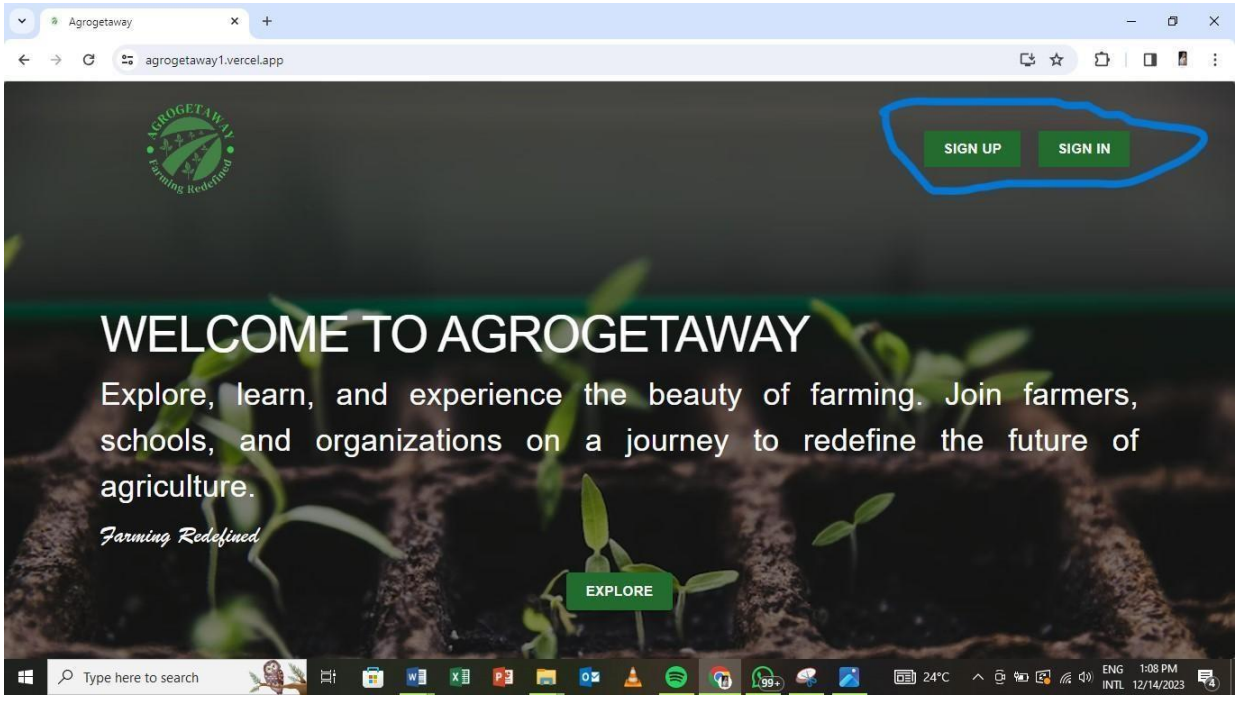
For the hidden pages we would be kicked out of the application without accessing

anything at all. From these findings therefore, we proved that the system was secure.

5.3 USE-CASES

This section dives deeper into various use cases, exploring the practical applications of Agrogetaway across different fields and situations. By understanding these scenarios, we can gain a clearer picture of the potential impact and value it can offer.

Figure 4 sign up/sign in



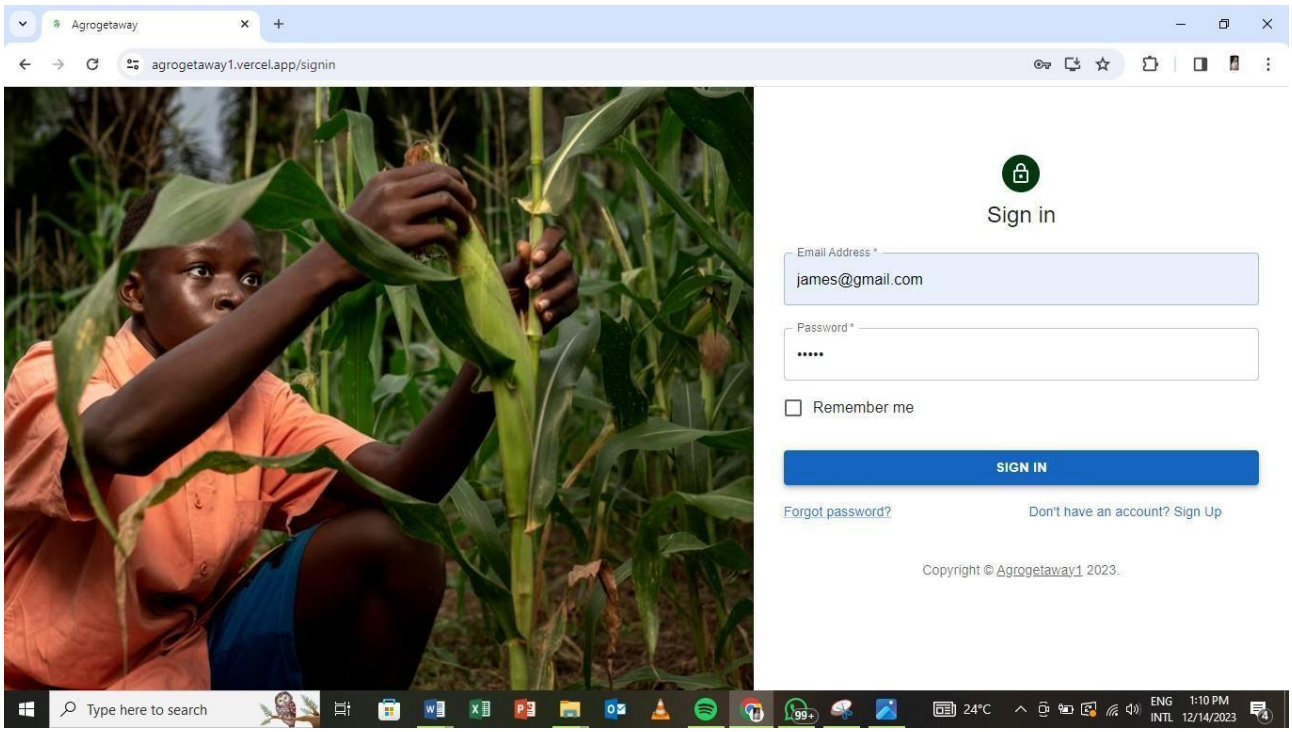
A user is prompted to login for existing clients while new users are prompted to sign up.

Use-case 1: Login

If a user logs in to an existing account with a wrong Password or email, they are prompted with the message “Incorrect Password/Email”.

They can either create an account which once completed prompts the message “Account successfully created, await Admin Approval”

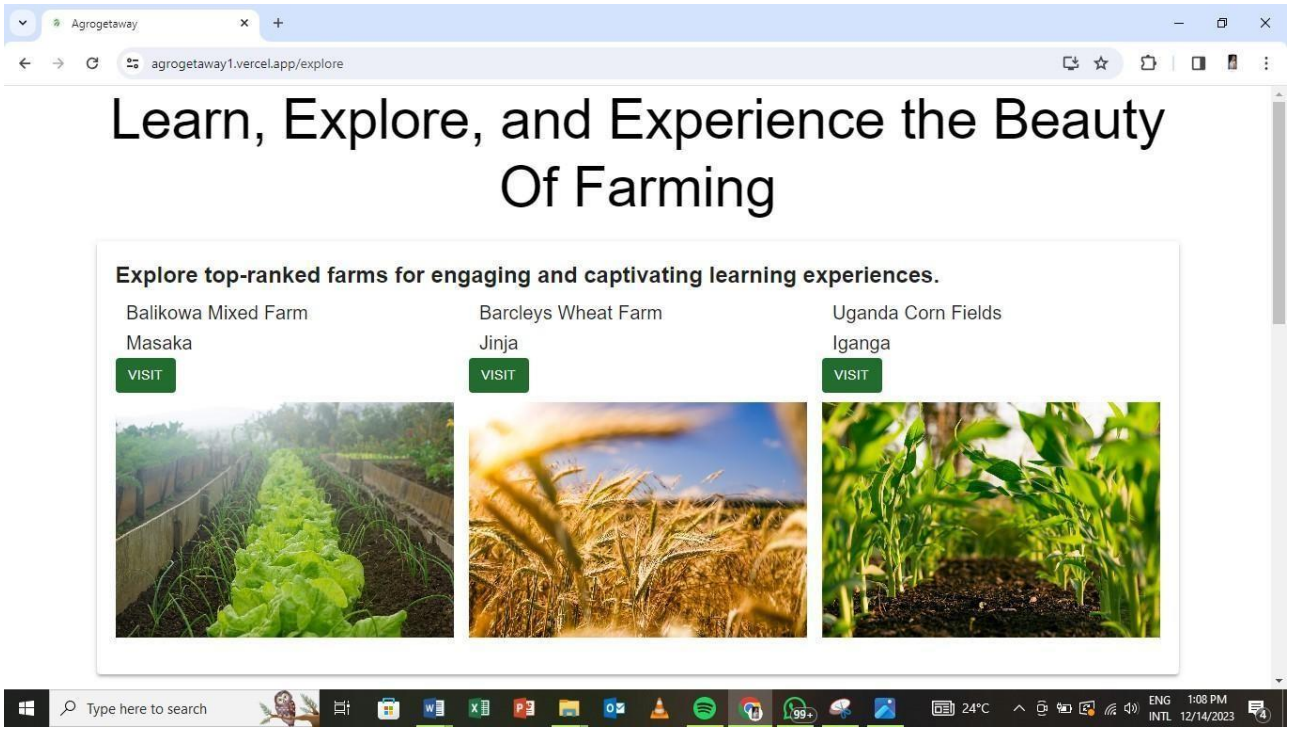
Figure 5 sign in/ sign up page



Use-case 2: Client logs on

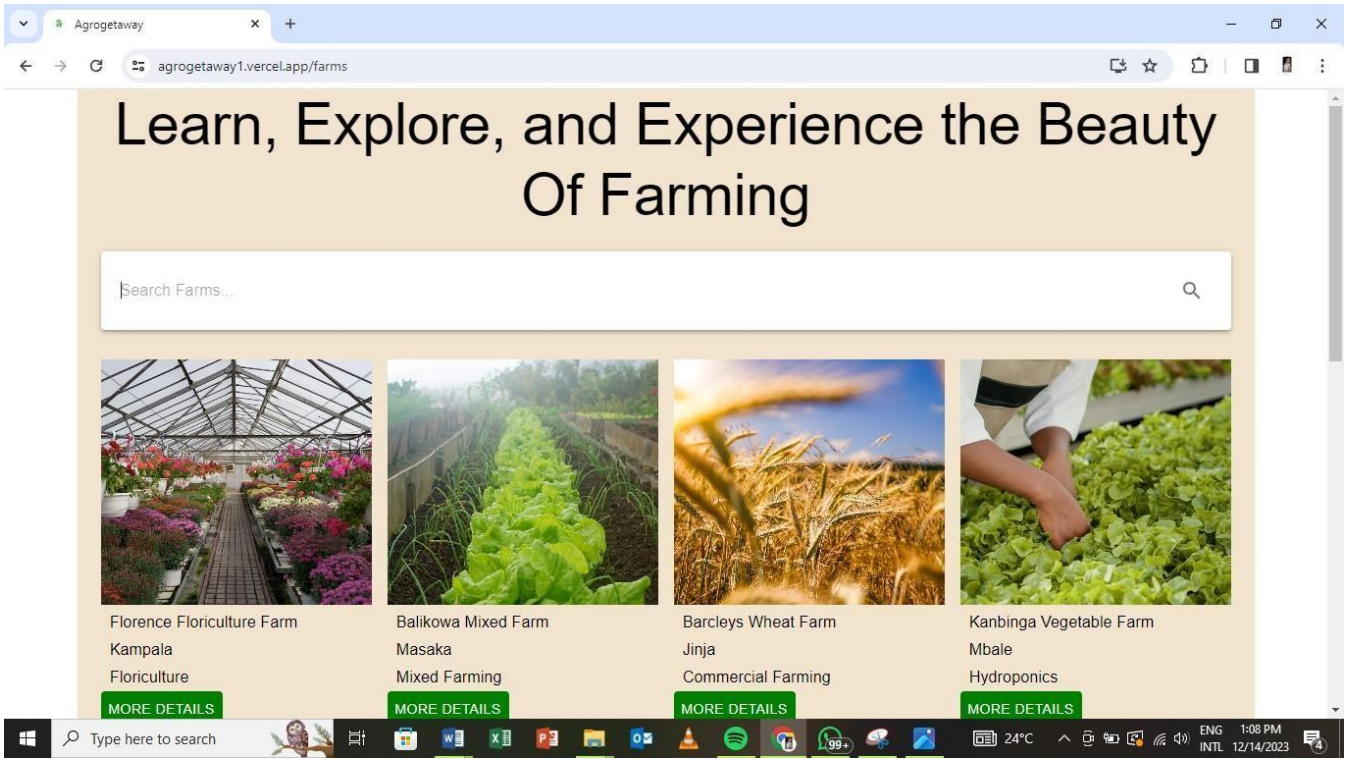
Once a client has successfully signed-up for an account and it has been approved, they can login and the following screen is displayed.

Figure 6 top ranked farmers



This page has the top farms in the country.

Figure 7 searching page



This page gives a user freedom of searching for any farm of their interest.

After viewing the profile of the farm, later, the booking comes. After successfully booking, one receives an email.

5.4 SECURITY

Security of web applications is the most important aspect to consider with the ever-present cyber security threats in the Information Technology ecosystem.

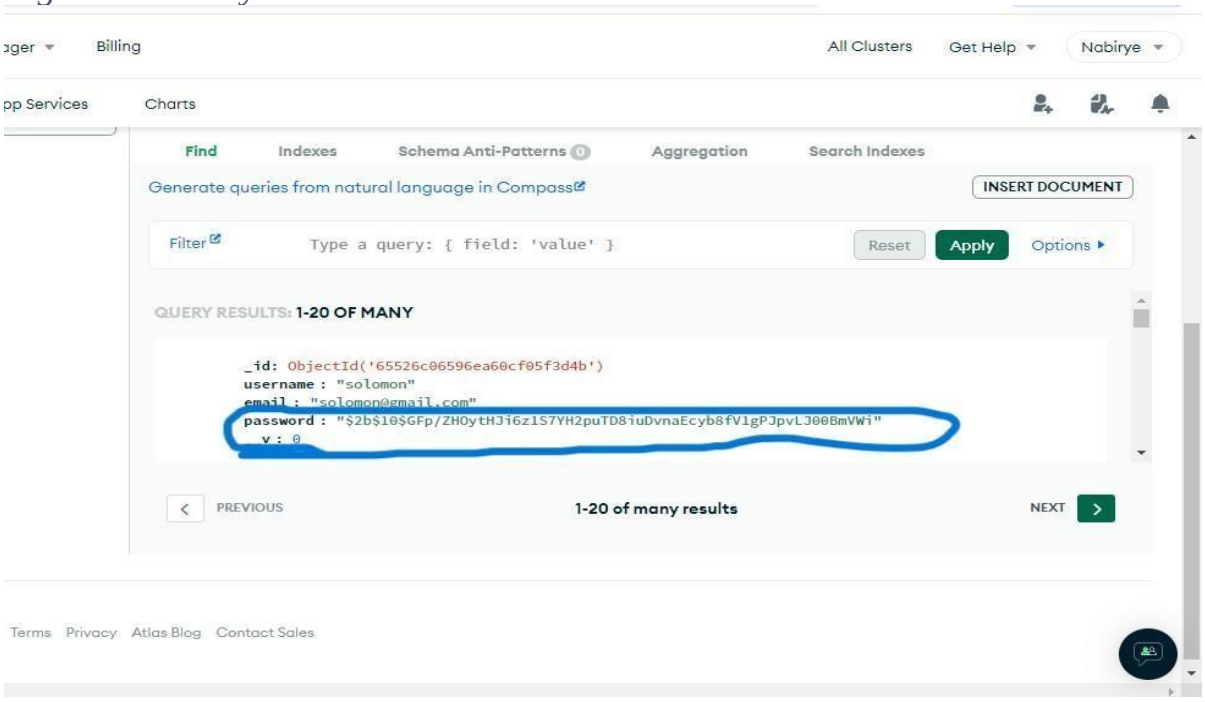
The Agrogetaway application utilizes an API (Application Programmable Interface)

known as hashing for password encryption.

The MD5 hash function produces a 128-bit hash value and it was designed for use in cryptography. Other alternatives explored include: SHA-1 through to SHA-3, however they were all less secure than MD5.

The MD5 encryption is depicted in the image below which shows the database storing user information however the passwords are encrypted and not displayed in the database.

Figure 8 security



CONCLUSION

Project Achievement

In terms of the study, we made a tremendous step into the unknown, and this the move was rewarded with accomplishments.

Our first accomplishment was to bring this concept to life, or to make it a reality,

which introduced us to a variety of new technologies.

Project Benefits

The Agrogetaway project pioneers technology in agriculture, aiming to enhance practices.

It effectively facilitates knowledge sharing among farmers and enhances farming techniques.

Continuous efforts are needed to tackle technological limitations and ensure sustained effectiveness.

Ongoing development and user-centric improvements are crucial for Agrogetaway to become indispensable for modern farmers.

The Agrogetaway project represents a significant step forward in leveraging technology to enhance agricultural practices. While it has demonstrated potential in improving knowledge sharing and farming techniques, ongoing efforts are required to overcome technological limitations and ensure the platform's long-term success.

With continued development and user-centric improvements, Agrogetaway has the potential to become an indispensable tool for the modern farmer.

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