Tribhuvan University

Faculty of Humanities and Social Sciences

Vishwa Adarsha College

A PROJECT REPORT

"Digital Krishi"

Submitted to:

Department of Computer Application

Vishwa Adarsha College

Itahari-02, Sunsari

In partial Fulfillment of the requirements for the Bachelors in Computer Application

Submitted by:

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Chaitra-06, 2080

Tribhuvan University

Faculty of Humanities and Social Sciences

Vishwa Adarsha College

Supervisor's Recommendation

I hereby recommend that this project prepared under my supervision by Nabin Ghimire and Rohan Karki entitled "**Digital Krishi**" in partial fulfillment for the degree of Bachelor of Computer Application is recommended for the final evaluation.

_____

Niroj Poudel

Department of Computer Application

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Faculty of Humanities and Social Sciences

Vishwa Adarsha College

Letter of Approval

This is to certify that this project prepared by Nabin Ghimire and Rohan Karki entitled "**Digital Krishi**" in partial fulfillment for the degree of Bachelor of Computer Application has been evaluated. In our opinion it is satisfactory in the scope and quality as a project for the required degree.

…….. SIGNATURE of Supervisor Mr. Niroj Poudel Department of Computer Application Vishwa Aadarsha College Itahari, Sunsari	…….. SIGNATURE of HOD/Coordinator Mr. Khagendra Basnet Department of Computer Application Vishwa Aadarsha College Itahari, Sunsari
…… SIGNATURE Internal Examiner	…… SIGNATURE External Examiner

Abstract

Nepal's agricultural sector, though vital to the economy, faces challenges like limited information access, fragmented markets, and a digital divide. This project addresses these issues by developing a web application specifically designed for Nepalese farmers. The application provides localized and up-to-date agricultural information in Nepali, alongside an online marketplace for direct product sales, eliminating middlemen and ensuring fairer prices.

This user-friendly platform aims to bridge the digital gap and empower farmers with knowledge and market access. The anticipated outcomes include increased knowledge, improved agricultural practices, higher incomes for farmers, and easier access to fresh, local produce for consumers. This project promotes sustainable agriculture and contributes to a more efficient and fair agricultural market in Nepal.

Acknowledgement

We would like to express our special thanks of gratitude to everyone who helped us finish our project report from the bottom of our heart.

First and foremost, we would like to express our sincere gratitude to our supervisor Mr. Niroj Poudel for all of his help and support during this project. His knowledge and perceptive criticism have been invaluable in determining the course and results of this project.

We also express our sincere gratitude to Vishwa Adarsha College for furnishing the essential resources, amenities, and opportunities that enabled the seamless advancement of this project. The favorable surroundings and availability of necessary resources have significantly improved the standard of the work showcased here.

We also want to express our gratitude to our friend and family for their consistent encouragement, understanding, and support along this journey. Their confidence in us and their unwavering encouragement have given us courage and inspiration to push through difficulties and reach goals.

Finally, but just as importantly, we would like to express our gratitude to all the people, groups, and information sources whose work has been cited or consulted during this project. Their contributions have given important viewpoints, insights, and bases upon which this report is built.

Yours sincerely,

Nabin Ghimire

Rohan Karki

Contents

List of Abbreviation

CSS	: Cascading Style Sheet
DFD	: Dataflow Diagram
ERD	: Entity-Relationship Diagram
HTML	: Hyper Text Markup Language
JS	: Java Script
MySQL	: Microsoft Server Structured Query Language
PHP	: Hypertext Preprocessor
UI	: User Interface

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Chapter 1: Introduction

1.1. Background of the project

In today's digital era, the agricultural sector in Nepal is in need of modernization to enhance productivity and sustainability. Digital Krishi emerges as a response to this necessity, aiming to revolutionize traditional farming practices by harnessing the power of digital technology. As farmers seek better access to information and resources to improve their yields and livelihoods, Digital Krishi serves as a user-friendly online platform dedicated to providing comprehensive agricultural guidance. From seed selection to disease management, from purchasing farming equipment to community knowledge sharing, Digital Krishi offers a holistic solution to digitally transform farming practices in Nepal.

1.2. Problem of Statement

In Nepal, farmers encounter challenges in accessing quality seeds, fertilizers, and valuable insights on crop diseases. Additionally, they face difficulties in marketing their organic and locally grown produce. Digital Krishi aims to address these issues comprehensively by offering a centralized platform where farmers can access essential information, connect with one another seamlessly, buy and sell their produce and rent farming equipment.

1.3. Objectives

Digital Krishi aims to:

- Provide farmers with useful information about seeds, fertilizers, pesticides, and common crop diseases.
- Provide a platform to buy and sell farmers produce a rent farming equipment.
- Provide farmers a community forum where farmers can share their ideas, views, pictures and videos.

1.4. Scope and Limitation

1.4.1. Scope

The project's focal point lies in crafting a web-based application named Digital Krishi, dedicated to the digitalizing of the agricultural sector. The scope of this project is:

- A seed catalog featuring a wide variety of seeds suitable for Nepalese farming conditions, including information on germination process, market price, and climate suitability.
- An E-commerce platform where farmers can buy and sell locally grown crops and rent farming equipment.
- A community forum where farmers can share their experience, crop yields, ideas and findings etc.

1.4.2. Limitation

- Digital Krishi currently lacks a payment gateway feature, limiting farmers' ability to conduct transactions directly through the platform
- The effectiveness of disease diagnosis and treatment guides may be limited by the availability of accurate data and expertise, potentially impacting their utility for farmers.
- The platform may face constraints in terms of accessibility, especially in rural areas with limited internet connectivity. Additionally, the effectiveness of disease diagnosis and treatment guides may be limited by the availability of accurate data and expertise.

1.5. Development Methodology

We carefully looked at different ways to develop our Digital Krishi project and decided to switch things up. Instead of going with the Waterfall model, we've chosen the agile model for its unique benefits that suit our project needs.

As students, we frequently encounter projects where our initial plans lack clarity. Agile development offers a powerful solution for these situations. In contrast to prototyping, which centers on a singular, early model, Agile empowers us to test smaller, more manageable portions of the project iteratively. This iterative approach is particularly advantageous as it allows for the identification and rectification of errors or unforeseen challenges at an early stage, preventing them from snowballing into larger issues later in the development process. This emphasis on continuous evaluation and adaptation makes Agile an ideal methodology for Digital Krishi characterized by evolving ideas and the need for course correction as we gain new knowledge

1.6. Report Organization

Chapter 1: Covers the system's introduction, including its goals and limitations as well as the reason behind its creation.
Chapter 2: provides an overview of the work that has been done in the field of data mining, explains what data mining is, and highlights some of the features of some current Digital Krishi related applications.
Chapter 3: This chapter explains the functional, non-functional, feasibility analysis, ER diagram, DFD diagram, and design of the system. It also focuses on the various requirements of the system.
Chapter 4: This chapter focuses on the tools used in system development, the specifics of implementation, and the outcomes of tests conducted.
Chapter 5: This chapter summarizes the lessons that were learned, the project's result, and its conclusion.

Chapter 2: Background Study and literature Review

2.1. Background Study

The agricultural sector plays a vital role in global food security and economic development. However, farmers often face significant challenges, including limited access to current agricultural information, difficulty in selling their produce at fair prices, and reaching a wider customer base. Traditional methods of information dissemination, such as extension services and agricultural fairs, can be geographically restricted and time-consuming. Existing online platforms might not cater specifically to the needs of all farmers, particularly those with limited technological literacy.

This web application aims to bridge this gap by providing a user-friendly platform for farmers to access essential agricultural information, including weather forecasts, crop care guides, and government schemes. Additionally, it will function as an online marketplace, allowing farmers to sell their produce directly to consumers, eliminating middlemen and ensuring fairer prices. This project is justified by the need for a comprehensive and accessible solution that empowers farmers, promotes sustainable agriculture, and connects them with a wider market.

2.2. Literature Review

In our search for farming and agriculture website platforms, we have discovered a variety of options, both domestically and internationally, tailored to the requirements of farmers, agricultural businesses, and enthusiasts alike. Each of these platforms offers distinct features that enrich the agricultural industry's online presence and functionality.

GeoKrishi:

GeoKrishi is an innovative digital agriculture platform designed to address the challenges faced by farmers and agricultural service providers in Nepal. GeoKrishi transforms knowledge into actionable warnings that are suited to the individual needs of users along the whole agricultural value chain by utilizing a data-driven system approach. With real-time access to data on bio-physical, meteorological, and agro-economic aspects, the platform seeks to empower farmers, local service providers, and agribusinesses. GeoKrishi facilitates tailored suggestions to farmers through its district-level agriculture advisory services center, allowing extension workers to make well-informed decisions and increase agricultural output. Through the creation of an agricultural data infrastructure and the removal of cultural and technological hurdles, GeoKrishi aims to create green jobs, expedite the development of sustainable agriculture, and form a network of the next generation of agri-preneurs. [1]

Krishi Network:

Krishi Network is an expert advice network for farmers that is situated in Delhi, India and was launched in 2018. It is accessible via an internet app. Krishi Network is a multipurpose tool that helps agricultural communities become more powerful. It does this by providing a combination of material and community involvement that solves problems and promotes the adoption of new farming techniques. [2]

Smart Krishi:

Smart Krishi, established in 2017 and headquartered in Kathmandu, Nepal, represents a pivotal advancement in the agricultural landscape, offering a comprehensive online platform tailored to the needs of farmers. Through its app-based interface, Smart Krishi serves as a one-stop solution, providing farmers with access to a wealth of agriculture-related information and resources.

At its core, Smart Krishi functions as a digital hub for farmers, enabling them to connect with experts, access market data, and obtain real-time weather updates, among other pertinent information. By leveraging the ubiquity of mobile technology, Smart Krishi extends its reach to farmers across Nepal, empowering them with actionable insights and facilitating informed decision-making. [3]

Conclusion:

Inspired by the user interface of GeoKrishi and the services offered by Krishi Network and Smart Krishi, the vision for Digital Krishi emerges as a holistic platform that integrates the best features of these existing platforms. Digital Krishi aims to provide farmers with easy access to agricultural information such as seeds, diseases, pesticides, and fertilizers, while also offering a marketplace for buying and selling agricultural products. Additionally, it will incorporate community features such as forums or posts where farmers can interact, share knowledge, and seek advice from experts and peers alike.

By combining the user-friendly interface of GeoKrishi with the expert advice network of Krishi Network and the comprehensive resources of Smart Krishi, Digital Krishi seeks to empower farmers with the tools and knowledge they need to make informed decisions, improve their agricultural practices, and ultimately enhance their livelihoods.

Chapter 3: System Analysis and Design

3.1. System Analysis

We carefully looked at different ways to develop our Digital Krishi project and decided to switch things up. Instead of going with the Waterfall model, we've chosen the Agile model for its unique benefits that suit our project needs.

As students, we frequently encounter projects where our initial plans lack clarity. Agile development offers a powerful solution for these situations. In contrast to prototyping, which centers around a singular, early model, Agile empowers us to test smaller, more manageable portions of the project iteratively. This iterative approach is particularly advantageous as it allows for the identification and rectification of errors or unforeseen challenges at an early stage, preventing them from snowballing into larger issues later in the development process. This emphasis on continuous evaluation and adaptation makes Agile an ideal methodology for Digital Krishi characterized by evolving ideas and the need for course correction as we gain new knowledge.

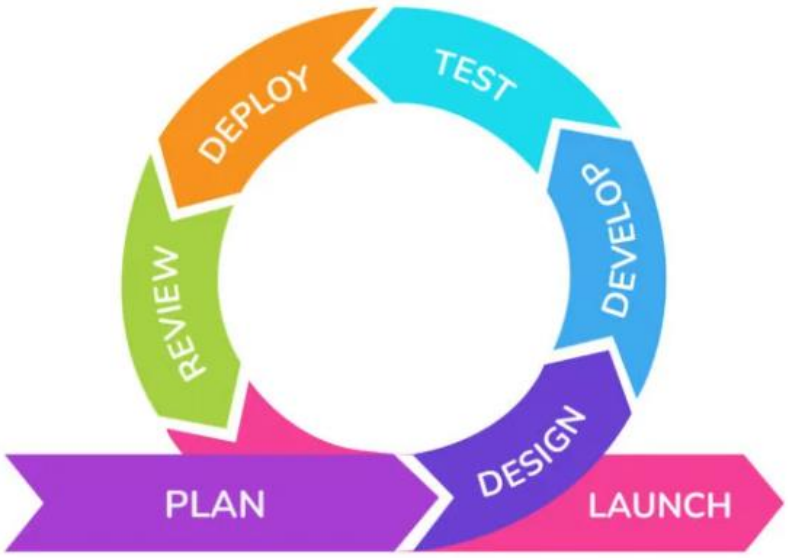

Figure 1. Agile Methodology of Digital Krishi

s3.1.1. Requirement Analysis

As we move into the requirement analysis phase, we need to identify and prioritize the functional and non-functional requirements that the website must address and solves the problem of users.

3.1.1.1 Functional Requirements

The features and capabilities that the website provide to satisfy users' needs are mentioned below:

Frontend

- **Information portal UI and responsive design:** A centralized repository of agricultural knowledge covering seeds, fertilizers, pesticides, disease management, and best practices.
- **E-commerce UI and responsive design:** A marketplace for farmers to buy, sell and rent essential farming equipment.
- **Community Forum UI and responsive design:** A platform for farmers to connect, share experiences, and collaboratively address issues faced by farmers.

Backend

- User Authorization and Authentication
- Information Portal module
- Admin Dashboard
- Farmer Dashboard
- Users' dashboard
- E-commerce module
- Community forum module

3.1.1.2. Non-Functional Requirements

The characteristics that website possess in order to function effectively are mentioned below:

- **Security:** Laravel offers a robust security foundation out-of-the-box. Features like user authentication, authorization, input validation, and protection against Cross-Site Scripting (XSS) and SQL Injection vulnerabilities help safeguard your application. which will help to increase security throughout the application.
- **Performance:** React's virtual DOM allows for highly efficient updates to the user interface. It only re-renders the necessary components, minimizing browser overhead and improving responsiveness. Laravel's caching mechanisms can significantly improve application performance. It can cache frequently accessed data or entire pages to reduce server load and response times which will greatly increase performance of our application.
- **Reliability:** The website can be able to handle a reasonable volume of traffic.
- **Accessibility:** The website will be accessible to users having internet and contains clear information.

3.1.2. Feasibility Study

To ensure the success of our proposed website, we have conducted a feasibility study covering various aspects, including technical feasibility, financial feasibility, and legal feasibility.

- **Technical feasibility:** After in-depth analysis of the technical requirements. We possess the technical skills and resources required for web development, including front-end and back-end development. The website's user interface is natural and user-friendly. We have ensured that the website is technically feasible.

SN	Hardware Used	Specification
1	monitor	15.6
2	Hard drive	216 SSD
3	RAM	8
4	processor	Intel i5
5	Graphics	RTX 3050

- **Economic feasibility:** In evaluating our project, we've carefully considered the expenses involved in developing the Digital Krishi website. We're pleased to confirm that there are no additional costs. With our two-person team equipped with the necessary technical skills, and a willingness to learn if our current skills fall short, there won't be any expenses related to bringing in additional developers. The only development costs will be for printing hard copies of documentation and hosting our website. To sum it up, the "Digital Krishi" website is a cost-effective project for our two-person team, both in terms of development and maintenance.
- **Legal feasibility:** We have researched the legal requirements for operating E-commerce/Social Media website in Nepal, including data privacy laws. We have taken steps to ensure that the website will be obedient with these laws and regulations.
- **Schedule feasibility:** Schedule feasibility is analysis of different time periods estimated to complete the full project. The project would be divided into different phases to be done in different time frames. The study of time feasibility is done to maintain the work divided into certain time frame to be completed within that time frame.

A	B	C	D	E	F	G	H
	Gantt chart of Digital Krishi						
Sprint	**Feature**	**Start**	**End**	planning	designing	coding	testing
sprint 1	Project planning	*23-Dec-23*	*27-Dec-23*	4 days			
sprint 2	UI with responsive design	*28-Dec-23*	*12-Jan-24*	1 day	4days	7 days	2 days
sprint 3	Information Portal (seeds,fertilizer,pesticides, common Dissease)	*13-Jan-24*	*1-Feb-24*	1 day	5 days	12 days	4 days
sprint 4	Admin Dashboard	*2-Feb-24*	*24-Feb-24*	2 days	5 days	10 days	6 days
sprint 5	User Dashboard	*25-Feb-24*	*9-Mar-24*	1 day	3 days	6 days	4 days
sprint 6	Community Forum	*10-Mar-24*	*23-Mar-24*	1 day	2 days	7 days	4 days
sprint 7	Backend Integration	*25-Mar-24*	*6-Apr-24*	1day	3 days	7 days	3 days
sprint 8	testing and bug fixes	*7-Apr-24*	*7-May-24*		12 days	8 days	4 days
				Documentation			

Figure 2. Gantt Chart of Digital Krishi

3.1.3. ER Diagram

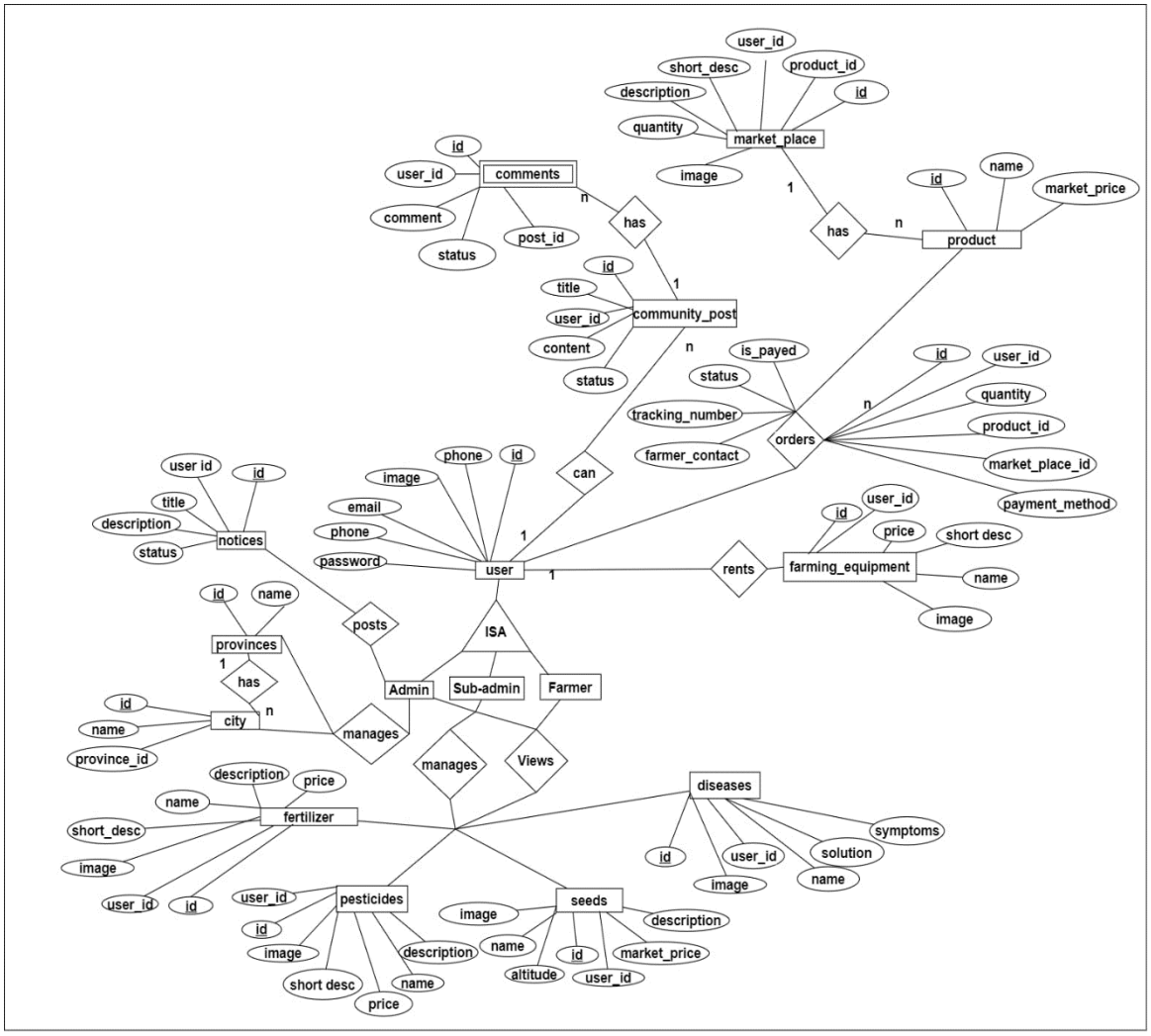

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Figure 3. ER Diagram of Digital Krishi

3.1.4. Process Modelling (DFD)

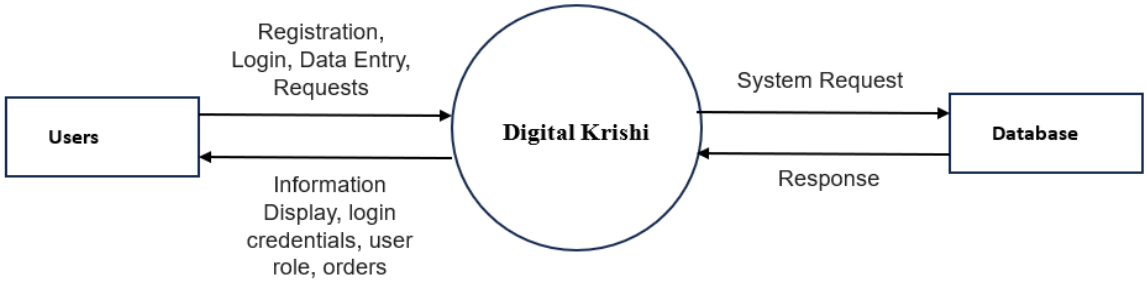


Figure 4. Level 0/Context Diagram

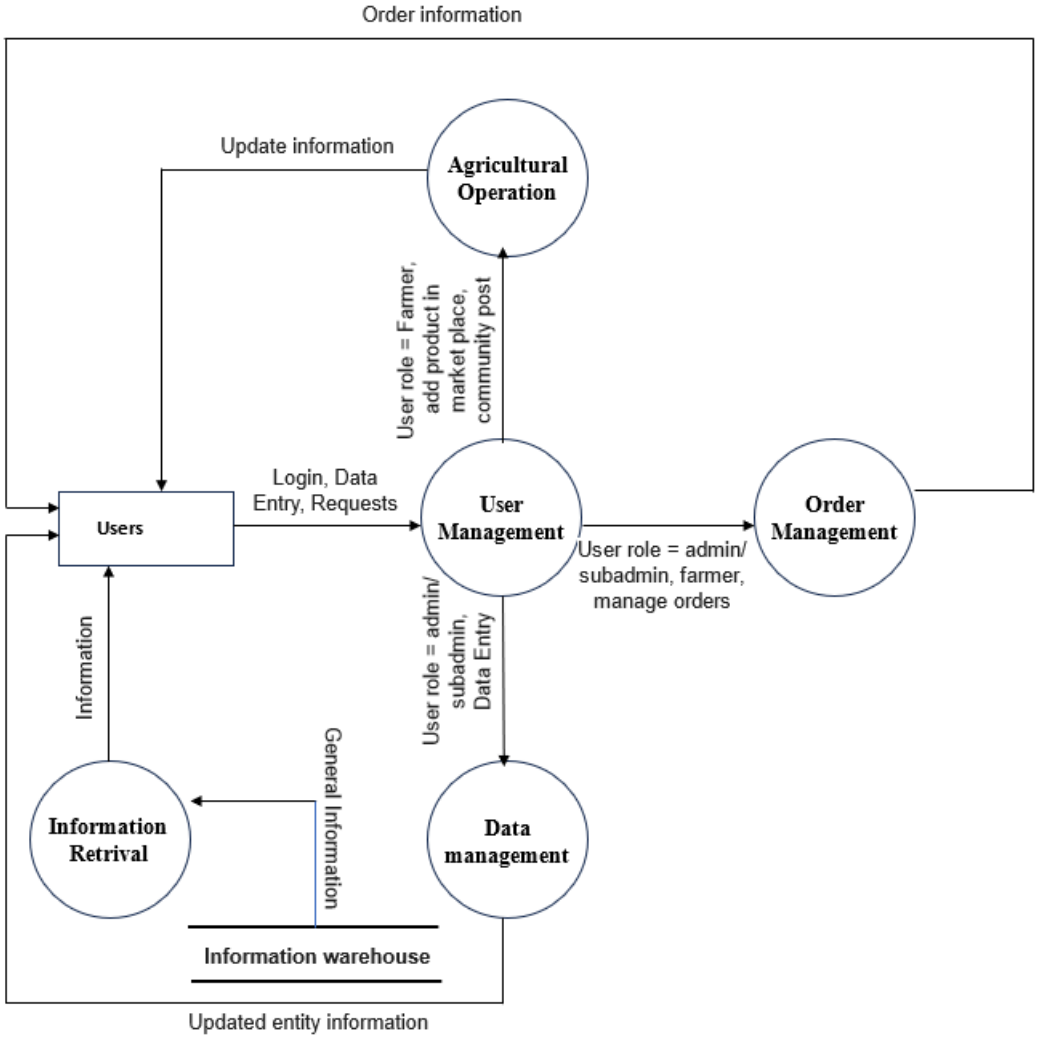
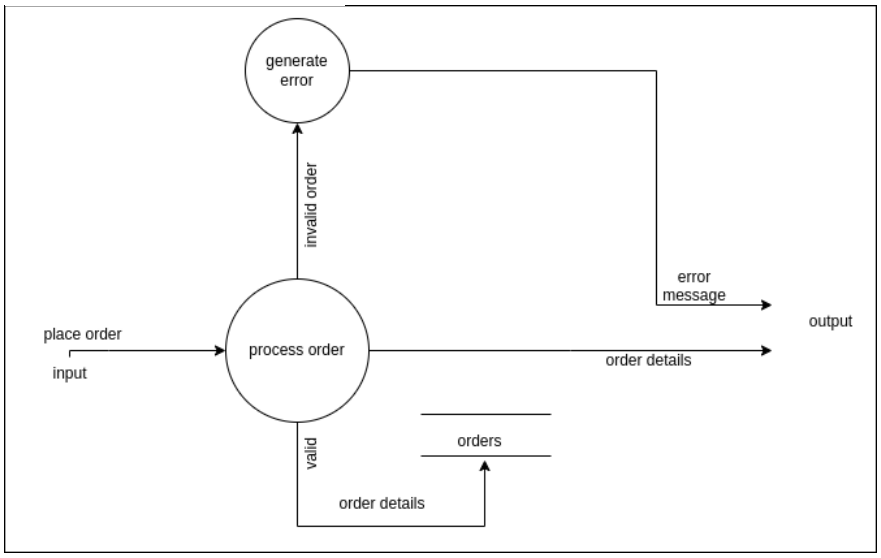
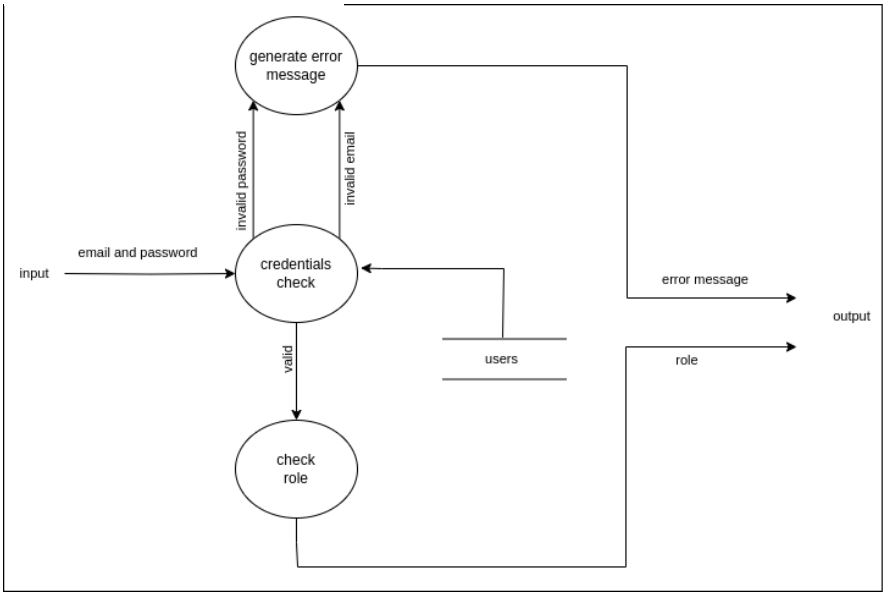


Figure 5. DFD Level 1 Diagram

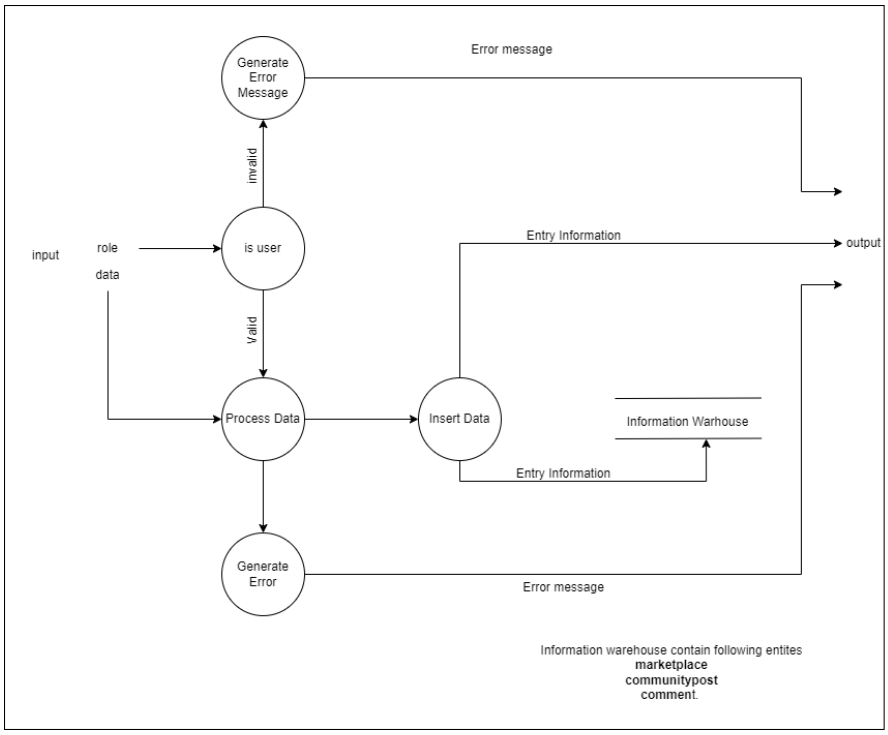
Order management



User management



Agricultural Operation



Data Management

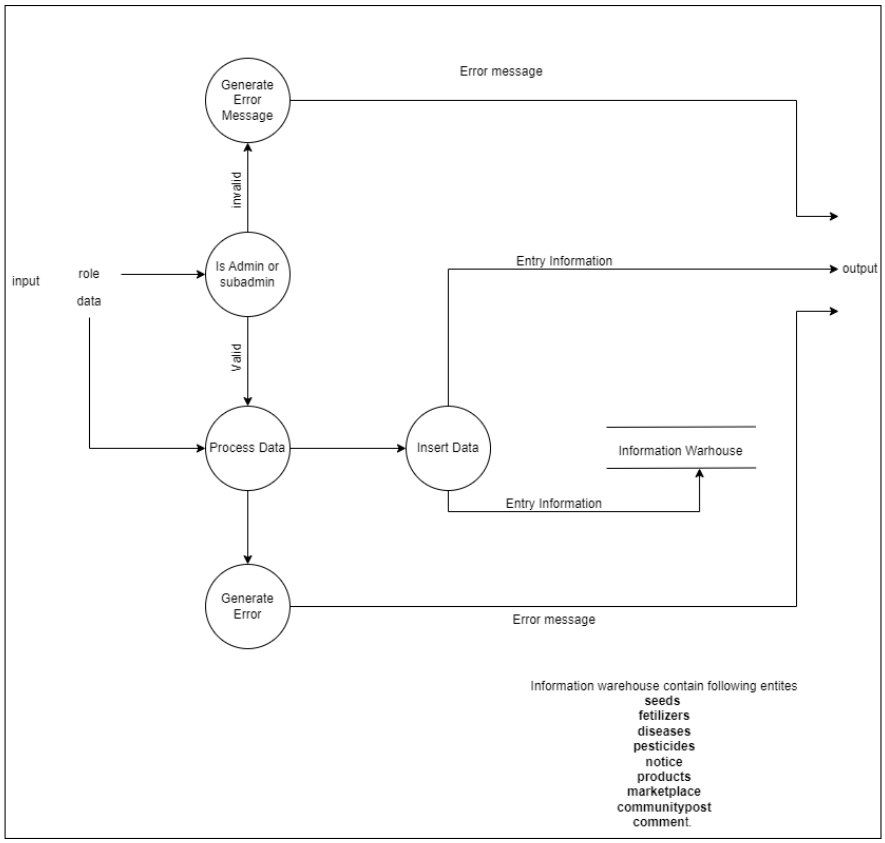


Figure 6. DFD Level 2 Diagram

3.2. System Design

We're sketching the detail plan that explains how the site will work and how the user will use it. Our goal is to build a website that is easy to use and meets everyone's needs.

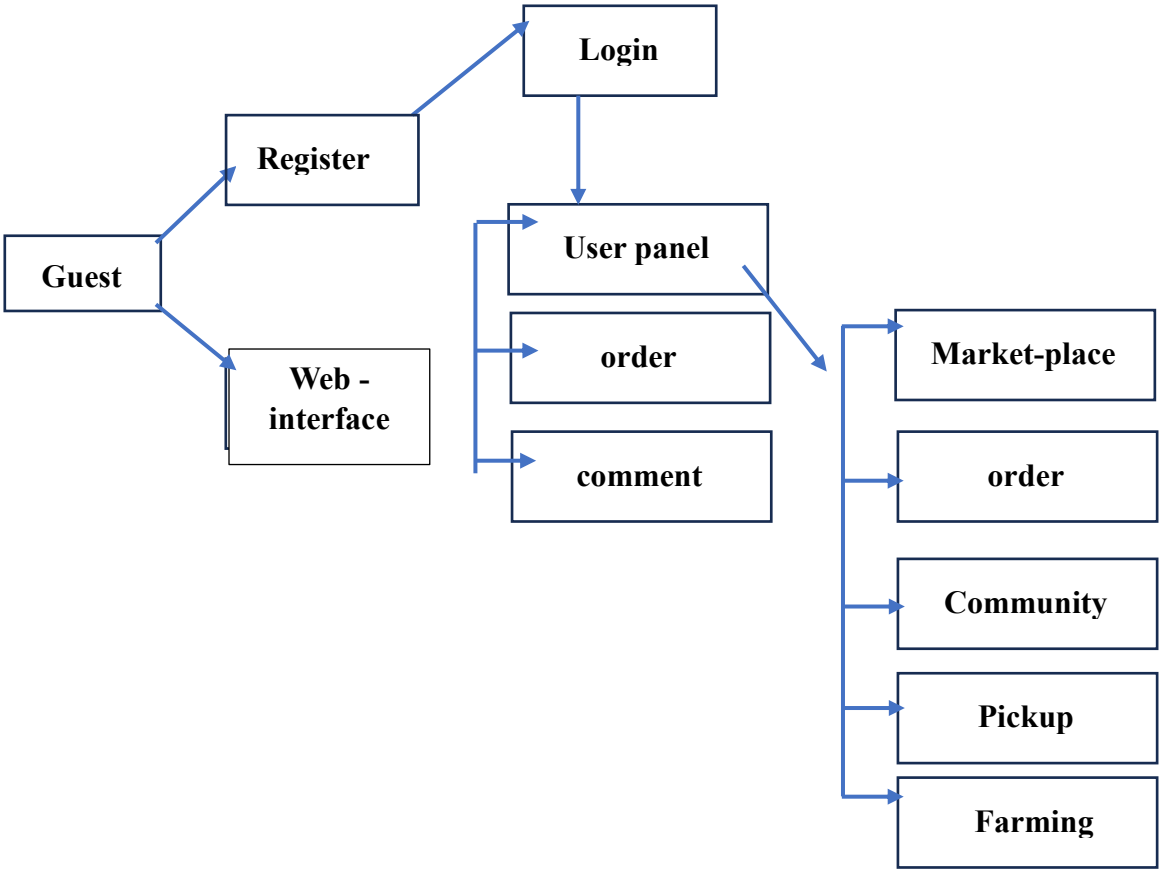


Figure 7. Use Case Diagram of Guest User

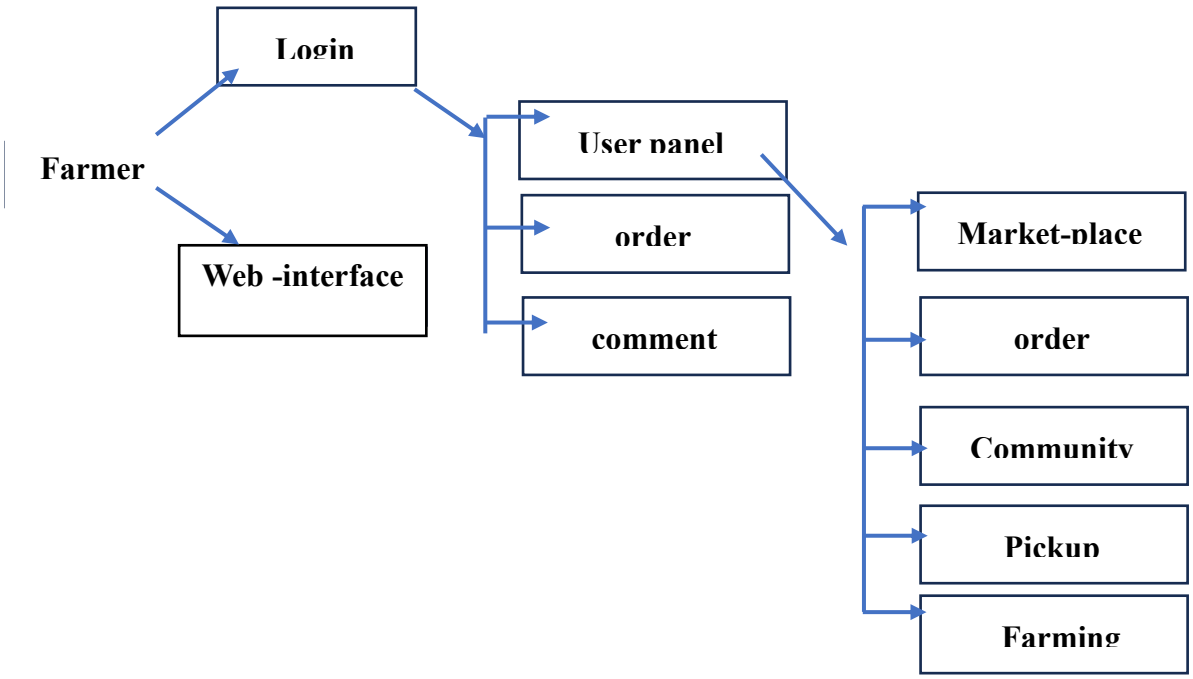


Figure 8. Use Case Diagram of Farmer

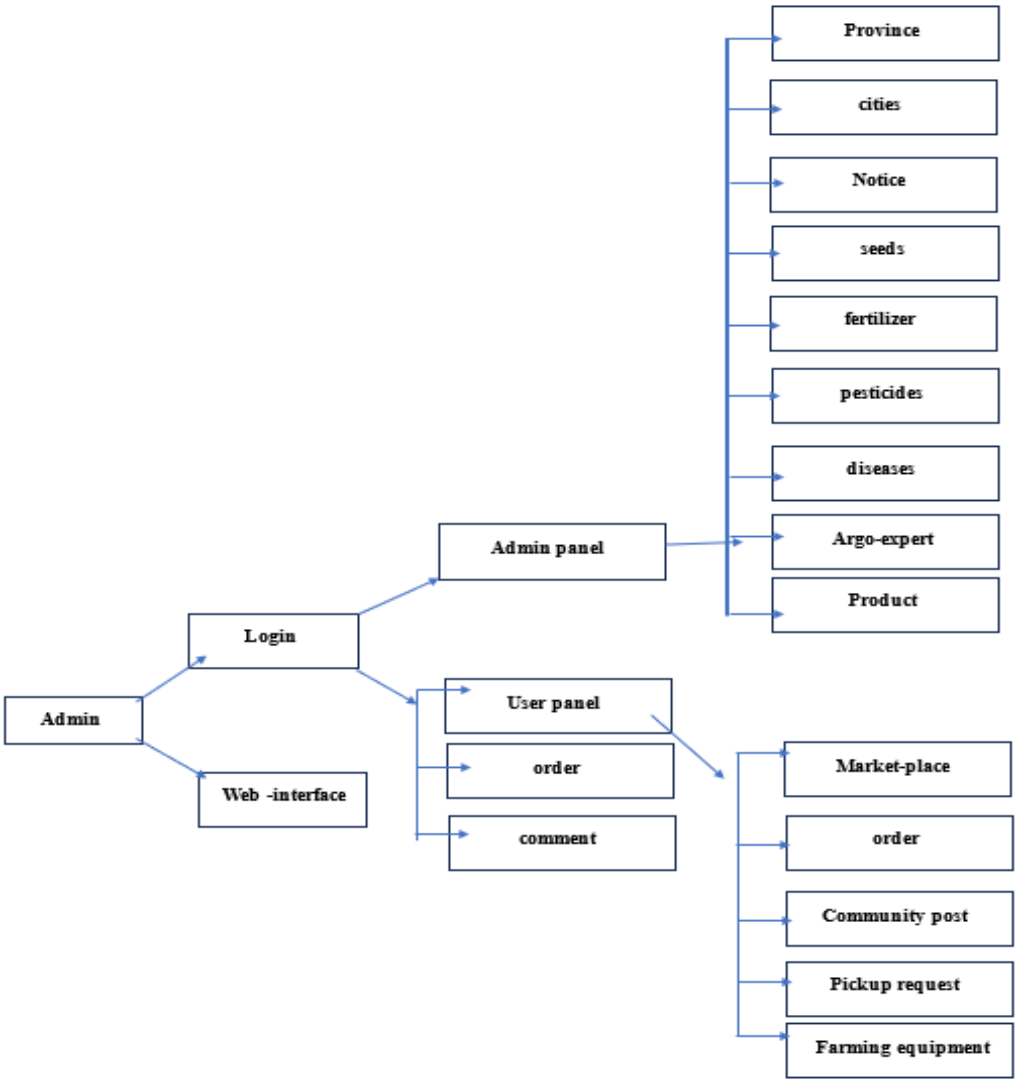


Figure 9. Use Case Diagram of Admin

3.2.1. Architectural Design

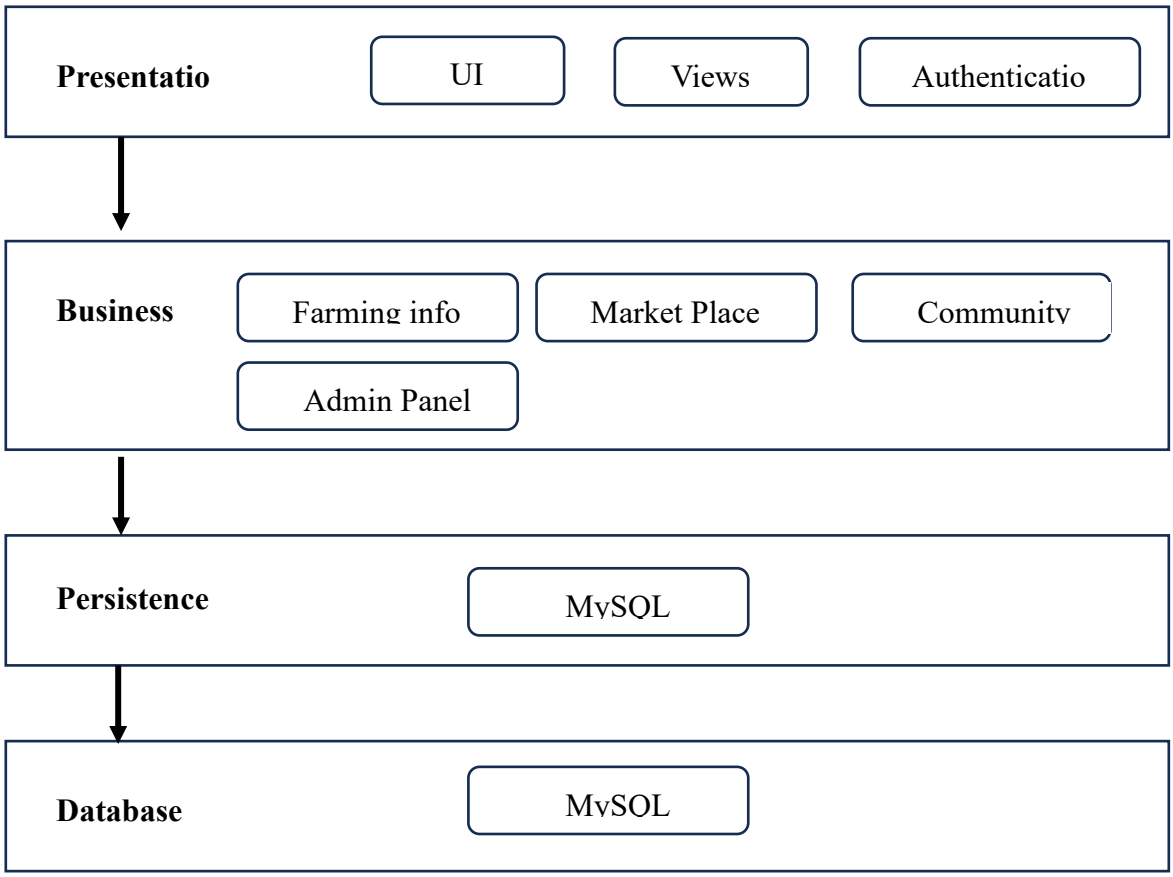


Figure 10. Architectural Design

3.2.2. Database Schema

Figure 11. Database Schema of information module of Digital Krishi

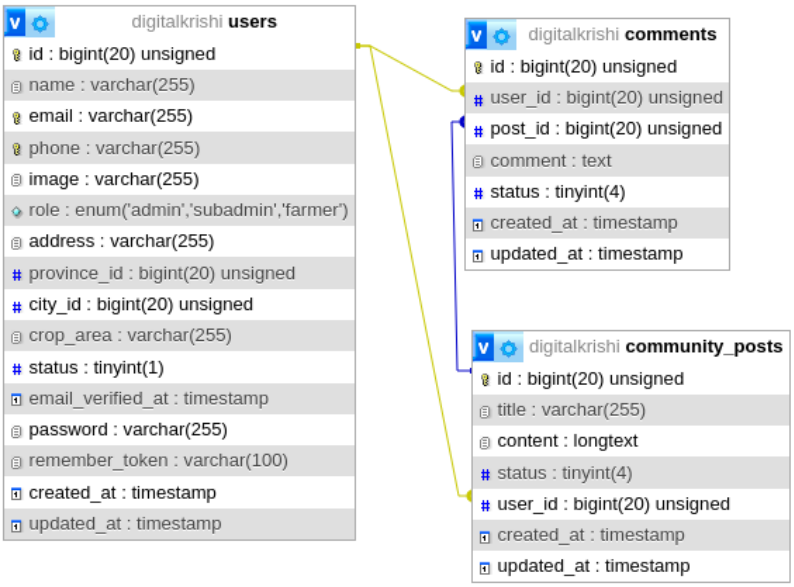


Figure 12. Database Schema of Community Forum of Digital Krishi

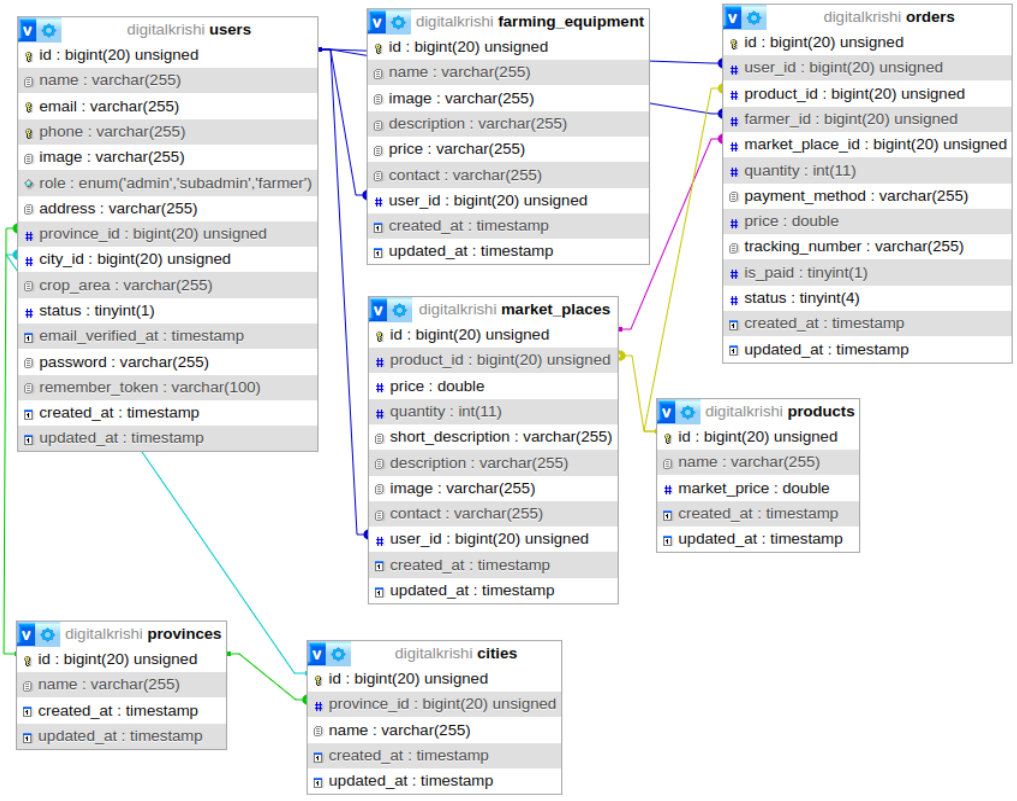


Figure 13. Database Schema of Ecommerce module of Digital Krishi

3.2.3. Interface Design

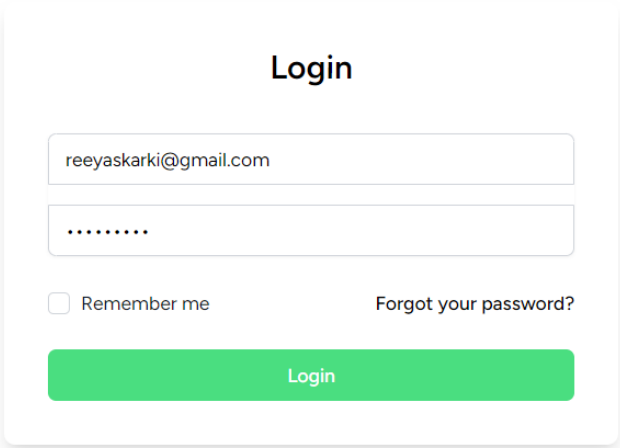


Figure 14. Login Form

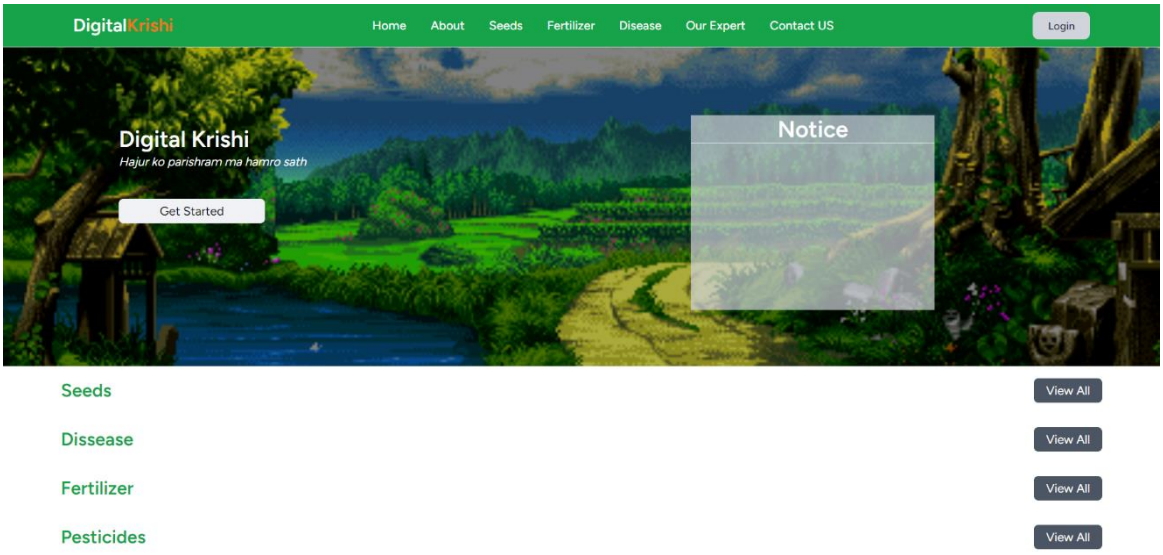


Figure 15. Home Page

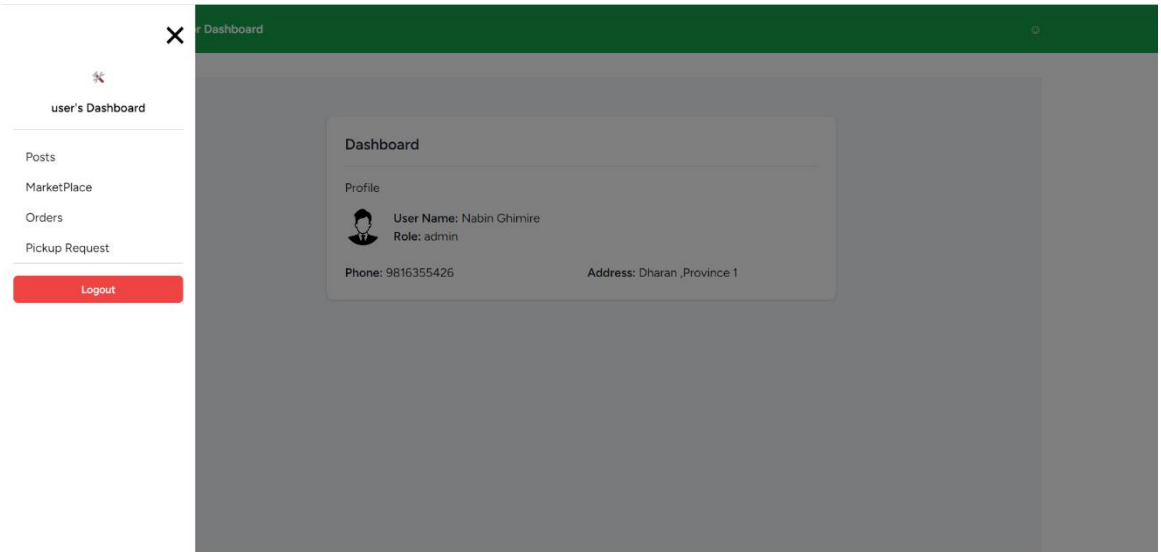


Figure 16. User Dashboard

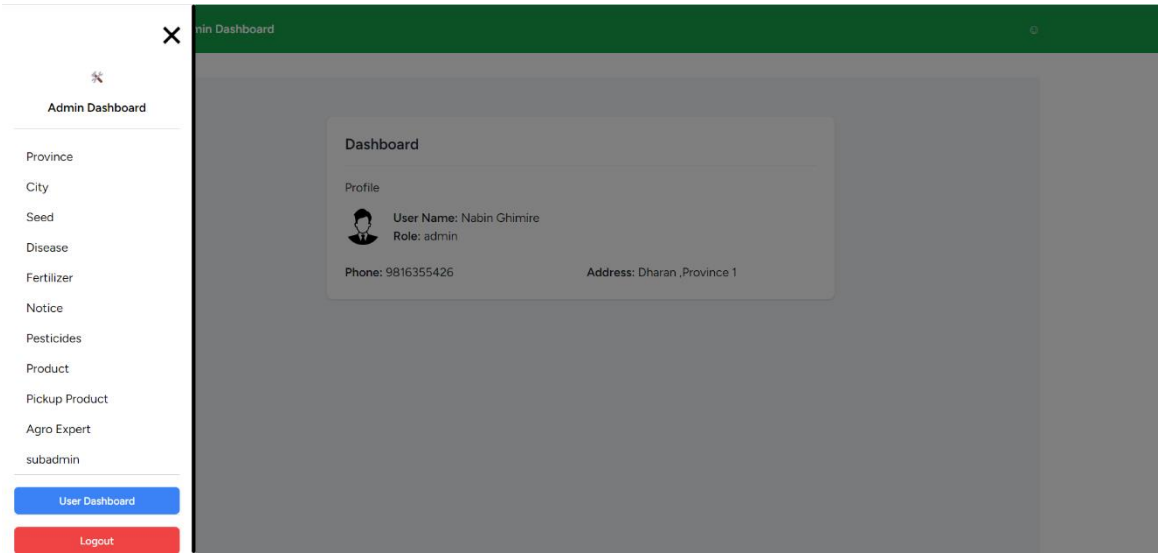


Figure 17. Admin Dashboard

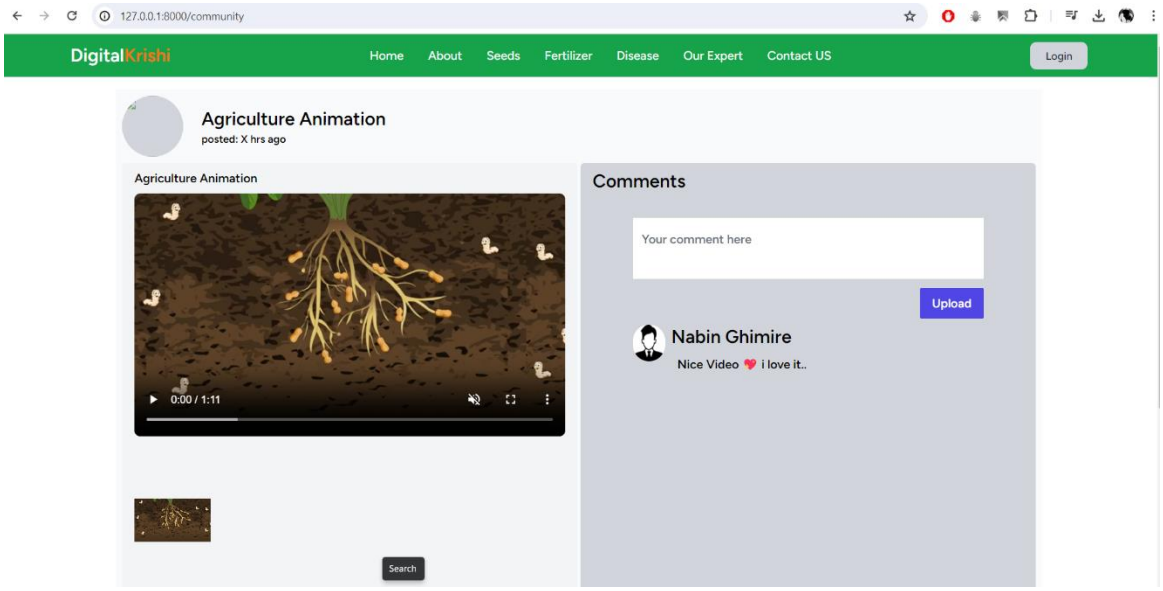


Figure 18. Community Forum

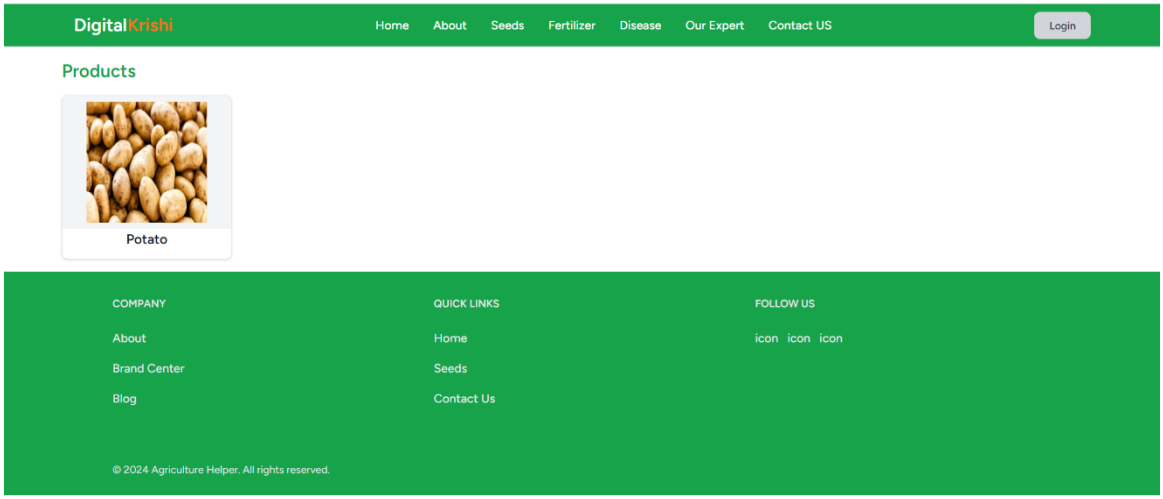


Figure 19. Product Page

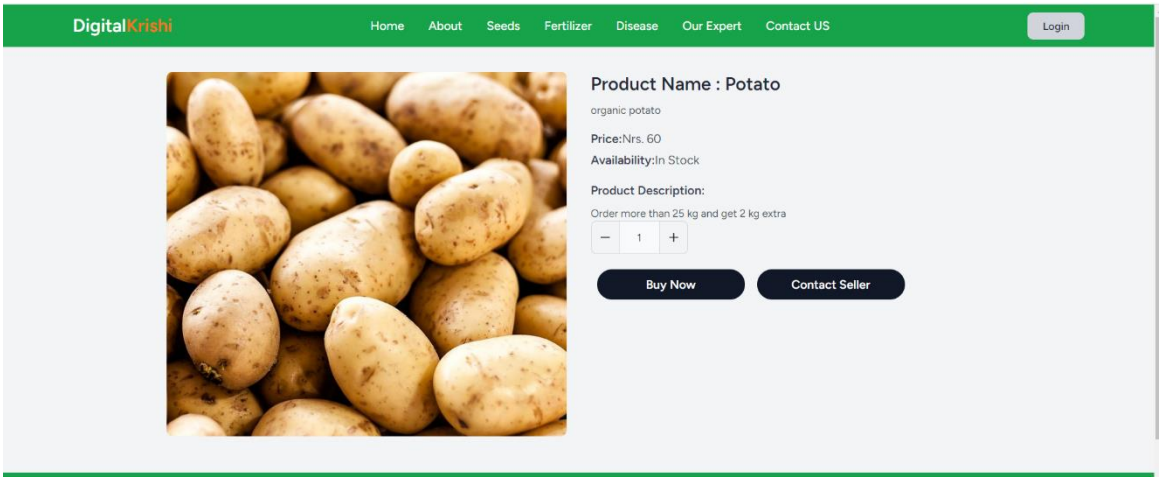


Figure 20. Order section

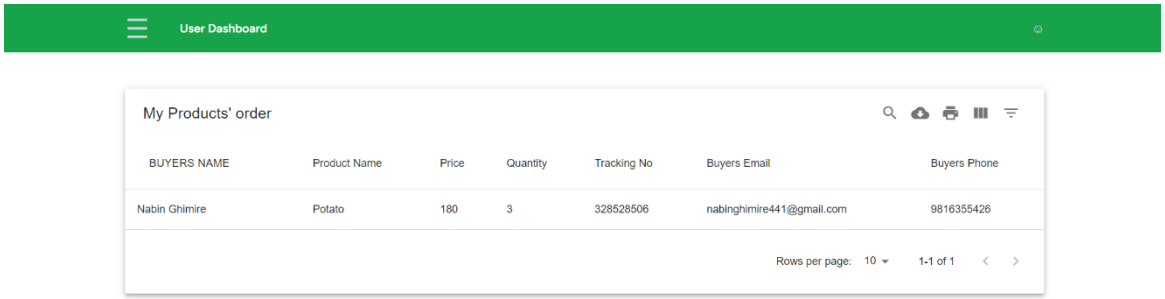


Figure 21. Oder Detail

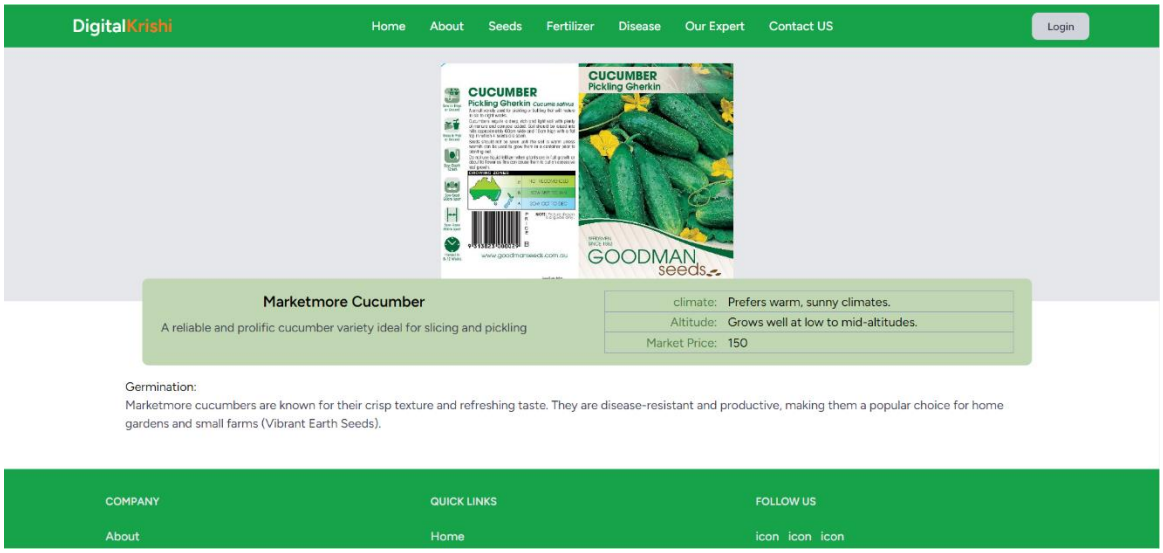


Figure 22. Seed Detail

Chapter 4: Implementation Design and Testing

4.1. Tools and Implementation

- **Front-end development**: There are various tool to develop the front-end of the website, including the user interface, job search functionality, and resource center.

I. HTML

ii. CSS

iii. JavaScript

iv. React

v. Tailwind CSS

- **Back-end development:** PHP, Laravel will be used to develop the back-end of the website.

- **Database management:** MySQL will be used to manage the website's database.

In general, VS Code can be used to write and edit the front-end and back-end code, while XAMPP can be used to set up a local development environment and manage the website's database.

- **IDE**: Visual Studio code

In the development of Digital Krishi, we utilized a combination of technologies and methodologies to create a robust and user-friendly platform. For the backend, we employed Laravel, a PHP framework known for its efficiency and scalability, while react was chosen for the frontend to deliver a dynamic and responsive user interface. MySQL served as our database management system, enabling us to organize and store essential information regarding seeds, fertilizers, pesticides, diseases, user accounts, and marketplace listings. Throughout the development process, we relied on Git for version control, facilitating seamless collaboration and code management between team members. User authentication and authorization were implemented to ensure secure access to features, while responsive design principles were applied to ensure a consistent user experience across various devices. Throughout the development process, we followed an agile methodology, allowing for iterative development and adaptation to evolving requirements, ensuring that Digital Krishi meets the needs of farmers effectively.

4.2. Testing

4.2.1. Test Case for Unit Testing

Introduction

Unit testing for the "Digital Krishi" website involves testing individual units or components of the application, such as models, controllers, and services. The objective is to ensure the correctness and reliability of these units, ultimately contributing to the overall quality of the website.

Test Scenarios

Below are the test scenarios designed for unit testing of the “Digital Krishi” website:

Table 1: Unit Testing of Digital Krishi

Test Case	Description	Pass/Fail
1.	Test creation, deletion, update of seed	Pass
2.	Test creation, deletion and update of fertilizer	Pass
3.	Test creation, deletion, and update of diseases	Pass
4.	Test marketplace controller	Pass
5.	Test community post controller	Pass

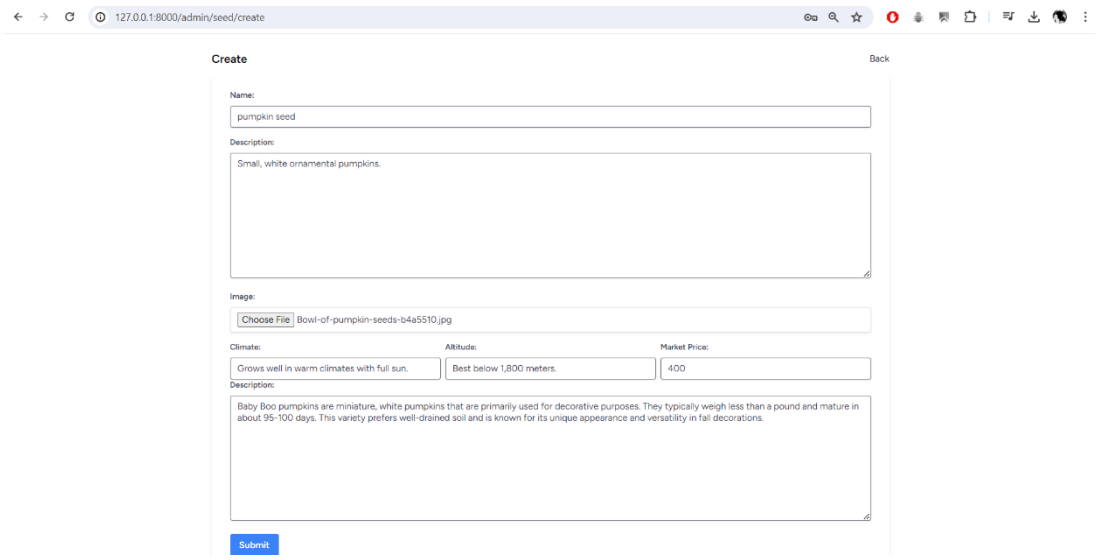


Figure 23. Inserting Seeds

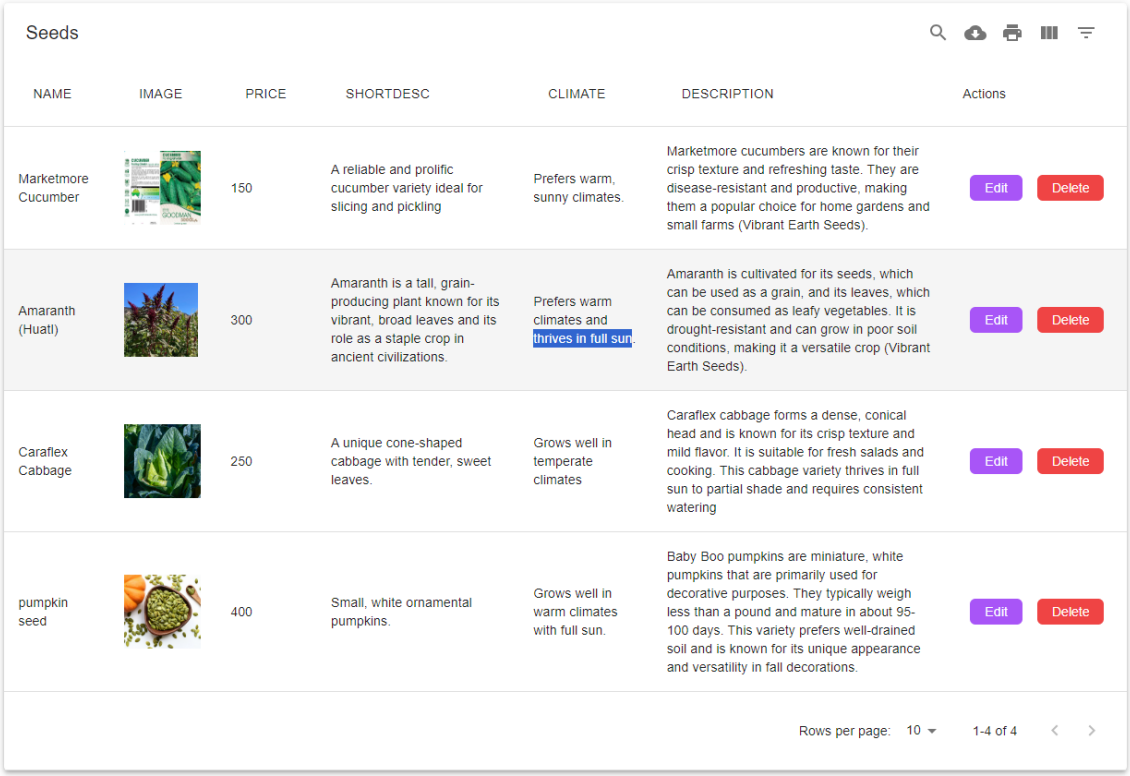


Figure 24. Table After Inserting Seed

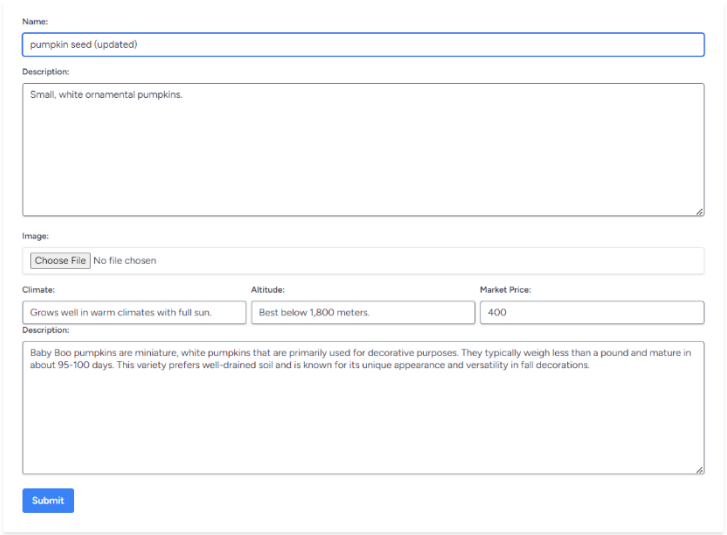


Figure 25. Updating Seed

pumpkin seed (updated)		400	Small, white ornamental pumpkins.	Grows well in warm climates with full sun.	Baby Boo pumpkins are miniature, white pumpkins that are primarily used for decorative purposes. They typically weigh less than a pound and mature in about 95-100 days. This variety prefers well-drained soil and is known for its unique appearance and versatility in fall decorations.	Edit Delete

Figure 26. After Updating Seed

Seeds

NAME	IMAGE	PRICE	SHORTDESC	CLIMATE	DESCRIPTION	Actions
Marketmore Cucumber		150	A reliable and prolific cucumber variety ideal for slicing and pickling	Prefers warm, sunny climates.	Marketmore cucumbers are known for their crisp texture and refreshing taste. They are disease-resistant and productive, making them a popular choice for home gardens and small farms (Vibrant Earth Seeds).	Edit Delete
Amaranth (Huatl)		300	Amaranth is a tall, grain-producing plant known for its vibrant, broad leaves and its role as a staple crop in ancient civilizations.	Prefers warm climates and thrives in full sun.	Amaranth is cultivated for its seeds, which can be used as a grain, and its leaves, which can be consumed as leafy vegetables. It is drought-resistant and can grow in poor soil conditions, making it a versatile crop (Vibrant Earth Seeds).	Edit Delete
Caraflex Cabbage		250	A unique cone-shaped cabbage with tender, sweet leaves.	Grows well in temperate climates	Caraflex cabbage forms a dense, conical head and is known for its crisp texture and mild flavor. It is suitable for fresh salads and cooking. This cabbage variety thrives in full sun to partial shade and requires consistent watering	Edit Delete

Rows per page: 10 1-3 of 3

Figure 27. Table After deleting Seed

Conclusion

The unit testing conducted for the "Digital Krishi" website successfully validated the functionality of key components such as models, controllers, and services. All test scenarios passed, ensuring the correctness and reliability of these units. Unit testing contributes to the overall quality and stability of the website, laying a strong foundation for further testing and development efforts.

4.2.1. Test Case for System Testing

Introduction

The system testing phase of Digital Krishi involved evaluating the entire system as a whole to ensure that all components function correctly together and meet the specified requirements. This phase focused on testing the integrated system to validate its functionality, usability, reliability, and performance.

Test Scenarios

Below are the test scenarios designed for system testing of the “Digital Krishi” website:

Table 2: System testing of Digital Krishi

Test Case	Description	Pass/Fail
1.	Test user registration	Pass
2.	Test market place functionality	Pass
3.	Test community post functionality	Pass
4.	Test order placement functionality	Pass
5.	Test admin panel functionality	Pass
6.	Test user panel functionality	Pass
7.	Test information fetch properly	pass

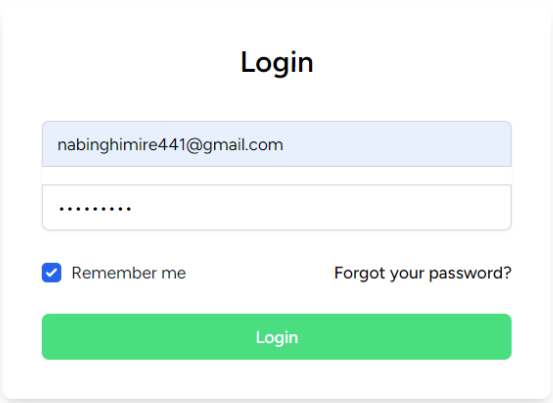


Figure 28. Testing Login

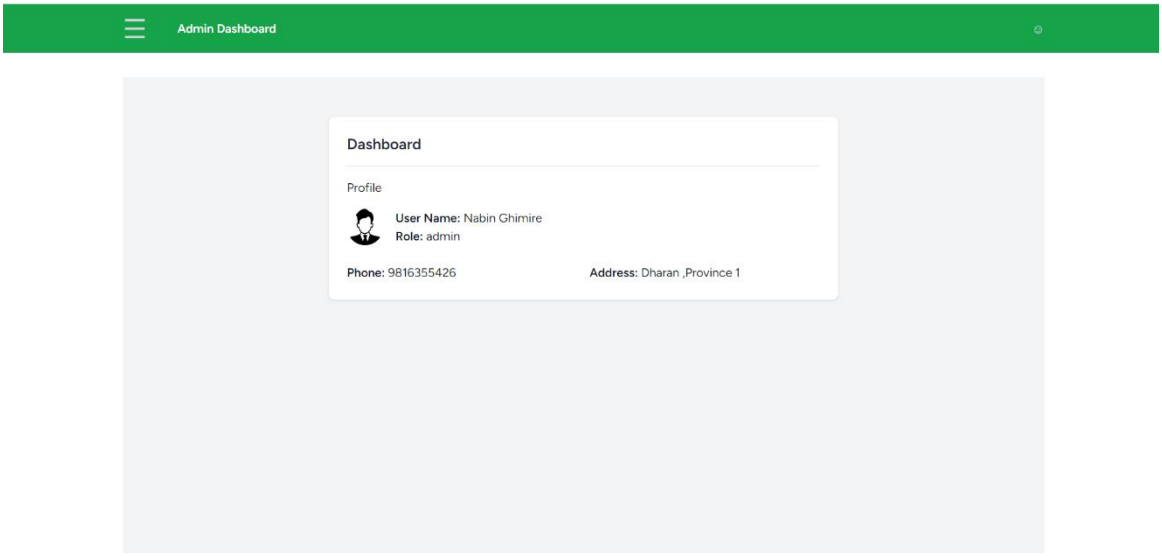


Figure 29. After Logging in successfully

Conclusion

In conclusion, the system testing of Digital Krishi has been successfully conducted, with all test cases passing and demonstrating the system's readiness for deployment. Through rigorous testing of key functionalities such as user registration, marketplace features, community posts, and admin dashboard functionalities, we have verified that Digital Krishi meets the specified requirements and delivers a seamless user experience.

Chapter 5: Conclusion and Future Recommendation

5.1. Lesson Learnt/ Outcome

Throughout our work on Digital Krishi, we learned a lot about building websites using Laravel for the backend and React for the frontend. We got better at managing our project by setting clear goals and communicating effectively. Understanding what farmers in Nepal needed from our website was tough, but by listening to their feedback, we made the site more helpful. We kept improving the site based on what users told us. Figuring out how to connect Laravel with React was a challenge, but we worked together to find solutions. Testing with users helped us make the website better. We believe Digital Krishi can make a real difference for farmers, and we plan to keep making it even better by adding more features in the future. Overall, working on this project taught us a lot about building websites, listening to users, and solving problems together as a team.

5.2. Conclusion

In conclusion, Digital Krishi is a helpful platform for farmers. It gives them all the info they need about seeds, fertilizers, pesticides, and crop diseases, so they can make smart choices and improve their farming. Plus, it's a place where farmers can connect, share stories, and help each other out. By keeping farmers in the loop about new farming methods and challenges, Digital Krishi helps them stay flexible and strong in a changing farming world.

5.3. Future Recommendation

Looking ahead, there are several ways Digital Krishi can continue to grow and serve farmers even better. Firstly, expanding the platform's marketplace feature could provide farmers with more opportunities to sell their products and access a wider range of buyers. Additionally, incorporating more interactive tools and resources, such as tutorials or virtual workshops, could further enhance farmers' knowledge and skills. Furthermore, exploring partnerships with agricultural experts or organizations could enrich the platform's content and ensure its relevance to farmers' evolving needs. Lastly, considering the widespread use of mobile devices among farmers, developing a mobile application version of Digital Krishi could improve accessibility and usability, reaching even more farmers in remote areas. By implementing these future recommendations, Digital Krishi can continue to be a valuable asset to farmers, empowering them with information and support for sustainable farming practices.