BAYER ZONE - Ecommerce Website

A PROJECT REPORT

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SIVASANKAR S (TKM21MCA-2034)

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DECLARATION

I undersigned hereby declare that the project report on **BAYER ZONE - Ecommerce Website**, submitted for partial fulfillment of the requirements for the award of degree of Master of Computer Applications of the APJ Abdul Kalam Technological University, Kerala is a bonafide work done by me under supervision of **Prof. Jasmin M R**. This submission represents my ideas in my own words and where ideas or words of others have been included,I have adequately and accurately cited and referenced the original sources. I also declare that I have adhered to ethics of academic honesty and integrity and have not misrepresented or fabricated any data or idea or fact or source in our submission. I understand that any violation of the above will be a cause for disciplinary action by the institute and/or the University and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been obtained. This report has not previously served as the basis for the award of any degree, diploma, or similar title by any other University.

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16-05-2023

SIVASANKAR S

DEPARTMENT OF COMPUTER APPLICATION

TKM COLLEGE OF ENGINEERING

KOLLAM

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CERTIFICATE

This is to certify that the report entitled **BAYER ZONE - Ecommerce Website** submitted by **SIVASANKAR S** (TKM21MCA-2034) to the APJ Abdul Kalam Technological University in partial fulfillment of the Masters degree in Computer Application is a bonafide record of the project work carried out by him under our guidance and supervision. This report, in any form, has not been submitted to any other University or Institute for any reason.

Internal Supervisor Head of the Department External Examiner

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ABSTRACT

BAYER ZONE - Ecommerce Website is an innovative online platform that aims to revolutionize the way people engage with agriculture and crop research. The website offers a comprehensive online catalogue of agricultural goods and services, including seeds, crop protection products, and agronomic solutions. It is designed to be user-friendly and easy to use, providing users with a smooth browsing experience.

In addition to offering useful instructional tools to assist farmers and producers in making educated decisions about their crop management practises, the initiative intends to meet the expanding demand for easy and effective sales channels in the agricultural business. The website sells a variety of agricultural goods and services, including as seeds, crop protection products, and agronomic solutions, all of which can be ordered online immediately through a quick and secure checkout procedure.

The potential effects of Bayer Zone on the ag and e-commerce sectors are significant. The website has the potential to disrupt the traditional agricultural supply chain by providing farmers with a direct online channel to purchase products. Additionally, Bayer Zone could help to increase the efficiency of crop research by providing researchers with access to a vast database of agricultural data.

Overall, Bayer Zone is a groundbreaking platform that has the potential to transform the way people engage with agriculture and crop research. The website is a valuable resource for farmers, researchers, and anyone else interested in learning more about agriculture.

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Chapter 1

Introduction

BAYER ZONE - Ecommerce Website is a revolutionary online platform that seeks to transform how people engage with agriculture and crop research. The goal of this project report is to give a general overview of the BayerZone website, its features, and any potential effects it may have on the ag and e-commerce sectors.

A complete online catalogue of agricultural goods and services, including seeds, crop protection products, and agronomic solutions, is available on the website. It is made to be user-friendly and simple to use, giving users a smooth browsing experience.

Customers may instantly buy things from the website thanks to its sturdy ecommerce infrastructure. The platform offers convenient checkout choices and secure payment alternatives to make sure customers have a hassle-free buying experience.

In order to assist farmers and producers in making knowledgeable choices regarding their crop management practises, BayerZone also offers helpful information and tools. The website has both community forums where growers may interact and exchange expertise as well as instructional tools like articles and videos.

The technologies employed in the creation of Bayer Zone will also be included in the project report. React, Spring boot, and MYSQL are just a few of the technologies that were used to build the website. These technologies were chosen for the website's capacity to manage high levels of traffic and deliver a smooth user experience. They were chosen for their scalability, performance, and ease of use.

The research will also go through BayerZone's possible effects on the agricultural sector. BayerZone has the potential to dramatically increase the effectiveness and profitability of farming operations by offering a convenient and user-friendly platform for buying agricultural supplies and getting access to educational materials.

In general, the agriculture and e-commerce sectors have advanced significantly as a result of the BayerZone initiative. BayerZone has the ability to change how farmers connect with crop science and agriculture by utilising the most recent technology and offering producers

beneficial tools and services.

1.1 Company Profile

Bayer CropScience is a global leader in the development, production, and marketing of crop protection products. Bayer CropScience operates at the intersection of science, technology, and agriculture, aiming to enhance crop productivity, protect crops from pests and diseases, and promote sustainable farming practices. The company's diverse product portfolio encompasses seeds, crop protection solutions, digital farming tools, and agricultural services, making it a holistic provider of solutions across the entire agricultural value chain.

With a presence in over 120 countries, Bayer CropScience serves farmers across the globe, catering to diverse cropping systems and agricultural practices. The company's commitment to innovation is evident through its extensive research and development efforts, which focus on developing cutting-edge technologies, traits, and formulations to address emerging challenges in agriculture.

1.1.1 Products

- **FarmRise**

  FarmRise is a digital platform for Android mobile devices. It provides agronomic information and advice relevant to smallholder farmers, helping you make informed decisions to reduce costs, increase yield and get better price for your output. FarmRise provides you with agriculture information in multiple languages that is timely, trusted and accurate.

  Aspects of Farmrice:

  1. Market Pricing of each crops
  2. Agronomic Advice by crop
  3. Information on Government Schemes
  4. Wheather Information
  5. Agricultural News and Events

- **FieldView**

  Bayer's FieldView is a digital platform that combines field-level data, satellite imagery, and weather information to provide farmers with actionable insights for precision farming. It enables farmers to monitor crop health, analyze field variability, and make informed decisions regarding planting, irrigation, fertilization, and crop protection.

- **Xarvio**

  Xarvio digital farming solutions are designed to empower farmers with actionable insights, enabling them to make data-driven decisions and adopt more precise and sustainable farming practices. These tools contribute to improved efficiency, optimized resource utilization, and enhanced profitability in modern agriculture.

1.1.2 Services

- **Data to Drive Decisions**

  What we at Bayer call digital farming is the same farming humans have done for millenia, but better. Farmers combine on-the-ground insights into their own operations, aggregated data from satellites and third parties, and cutting-edge machine learning techniques to understand what's happening in their fields better than ever before. And they have the flexibility to integrate tools that drive even better ways to manage their operations, from remote sensors that detect and diagnose yield-impacting field issues, to unmanned aerial vehicles (UAVs, commonly referred to as "drones"), that help image and treat those issues. And innovative science pipelines are continually developing new ways to understand and partner with farmers to provide the solutions they need, when they're needed.

- **Developing precision agriculture technologies**

  Precision agriculture technologies use sensors and other data to collect information about crops, such as their health, growth, and nutrient levels. This information can then be used to make decisions about things like when to plant, water, and fertilize crops. Precision agriculture can help farmers to reduce their use of pesticides and fertilizers, while also increasing their yields.

- **Agronomy Service**

  Agronomy services are a range of services that are provided to farmers to help them

improve their crop production. These services can include soil testing, crop planning, pest and disease management, and irrigation management. Agronomy services can help farmers to increase their yields, reduce their costs, and improve the sustainability of their operations all through analysis and using of existing and newly collected data.

1.2 Existing System

Existing systems are sometimes intricate and challenging to comprehend and manage. They could not fulfil the demands of the users and be ineffective or obsolete. Traditional brick-and-mortar stores, agricultural supply businesses, and trade exhibits make up the current agriculture industry structure. Agricultural goods and services are often purchased by farmers and growers either directly from manufacturers or through direct sales agents. Due to the fact that farmers sometimes have to travel a great distance in order to get the goods and services they require, the conventional sales model can be ineffective and time-consuming.

Additionally, the conventional sales strategy does not make it simple to access a wide range of goods and services or learning materials. Farmers must rely on their own knowledge or ask sales staff for help, which might take time and not necessarily produce the greatest results.

Additionally, the traditional sales model has a limited capacity to promote cooperation and information exchange among producers. It's possible that farmers won't have the chance to network, exchange best practises, and study emerging technology and market developments.

Overall, the agriculture industry's current structure has drawbacks in terms of accessibility, effectiveness, and collaboration. By offering a practical and effective ecommerce platform with a complete catalogue of agricultural goods and services, as well as useful instructional materials and a community forum for producers, the BayerZone initiative seeks to solve these restrictions.

1.3 Proposed System

A system that is suggested is one that is intended to replace or enhance an existing system. Usually, it is based on what the organisation requires and what the users' needs are. The suggested system should be built to be effective, safe, and simple to use. The requirements of the organisation as well as the demands of the users should be met by it. The impact on users and the organisation should be as little as possible throughout the development of the suggested system. Additionally, it needs to be designed in a way that is economical and effective.The proposed system should be assessed to see if it satisfies the demands of the organisation and the needs of the users. Additionally, it has to be assessed to see if it is effective, secure, and user-friendly. The impact of implementing the suggested system on users and the organisation should be kept to a minimum. It should be put into practise in a way that is both economical and effective. To make sure the suggested system satisfies both the demands of the users and the needs of the organisation, it should be monitored and maintained. In order to keep it effective, safe, and user-friendly, it should also be checked and maintained.

Here are some of the benefits of a proposed system:

- Efficiency gain: By automating operations and procedures, the suggested system can help an organisation become more efficient.
- Productivity gains: By making it simpler for staff to perform tasks, the suggested system can help an organisation become more productive.
- Reduced expenses: By doing away with the requirement for manual procedures and duties, the suggested system can assist in lowering an organization's costs.
- Increased accuracy: By lowering the chance of human mistake, the suggested method can enhance an organization's accuracy.
- Increased security: By preventing unauthorised access to data and systems, a suggested solution might contribute to an organization's increased security.
- Improved compliance: By automating operations and procedures, the suggested system can assist an organisation in complying with rules.

1.4 Problem Statement

In the fields of agriculture and healthcare, Bayer is a world leader. The firm sells a wide variety of goods to customers and companies all around the world. But Bayer doesn't have an exclusive online store for its goods. This implies that finding and purchasing Bayer goods requires consumers and corporations to visit various websites. It can take a lot of time and be irritating.

A dedicated Bayer Zone Ecommerce website would make it simple for customers and companies to locate and buy Bayer items. The website would have a range of features, including product details, customer reviews, and it would be made to be user-friendly. Customers and organisations would find it simpler to locate and buy the things they want as a result.

1.5 Objectives

Project deliverable includes:

- To create a comprehensive online catalog of agricultural products and services that is easily accessible to farmers and growers.
- to create an online shopping platform that enables people to purchase goods while offering a simple and easy experience.
- To provide farmers with a wide range of agricultural products and services, including seeds, crop protection products, and agronomic solutions.
- To provide farmers with access to information and resources that can help them improve their yields and quality.
- By offering a practical and user-friendly platform for buying agricultural supplies and getting access to educational materials, we want to increase the productivity and profitability of farming operations.
- Can provide a platform for farmers, researchers, and other stakeholders to collaborate on agricultural research and development. This can help to accelerate the development of new and innovative agricultural solutions.

Chapter 2

Literature Survey

A literature survey, also known as a literature review, involves analyzing scholarly sources related to a particular subject. Examining the available literature, it provides a comprehensive overview of the state of the field, allowing you to identify relevant theories, approaches, and gaps in the existing body of knowledge. When conducting a literature review from an audit perspective, the main focus is on evaluating the relevant literature. This process covers information that has been published in a specific field of study and sometimes includes information published within a specific time frame. The literature review is an indispensable tool for conducting research and is frequently used as a starting point for delving into a specific subject area. In addition to identifying important theories and concepts, a literature review can also pinpoint gaps in current knowledge and draw attention to areas where further research is necessary. By scrutinizing multiple sources, a literature review can provide a more comprehensive understanding of a given topic or issue. A well-crafted literature review can also enhance the credibility and authority of the author, as it demonstrates their familiarity with the current research and debates in the field. In certain cases, a literature review may include a meta-analysis, which involves analyzing the findings of numerous studies to uncover common patterns or trends. It is important to keep in mind that a literature review is distinct from a research paper or an argumentative essay; it is instead a focused examination of the existing research and literature on a specific topic.

2.1 Purpose of the Literature Review

1. The purpose of a literature review is to provide an overview and analysis of existing research and literature on a particular topic.

2. It aims to identify key theories, concepts, and findings, as well as to evaluate the strengths and weaknesses of previous studies.

3. A literature review can help to identify gaps in the current knowledge and highlight areas

where further research is needed.

4. By examining multiple sources, a literature review can provide a more comprehensive understanding of a particular topic or issue.

5. Additionally, a well-written literature review can help to establish the credibility and authority of the author, as it demonstrates their familiarity with the current research and debates in the field.

6. A literature review can be a standalone piece or part of a larger research project such as a thesis, dissertation, or research paper.

2.2 Related Works

2.2.1 E-Commerce

E-commerce, also known as electronic commerce or internet commerce, refers to the exchange of money and data for the purpose of business operations through the internet. The term "ecommerce" is commonly used to refer to the online sale of tangible goods, but it may also refer to any type of commercial transaction made possible via the internet. It is nowadays one of the most important components of the internet. Electronic commerce is the process of conducting business using computer networks. An individual sitting in front of a computer may use all of the Internet's resources to purchase or sell things. E-commerce, which began in the early 1990s, has made enormous strides in the world of computers. B2B e-commerce is used to increase the usage of ecommerce in developing nations by enhancing access to global markets for enterprises in developing countries. Regardless of the rapid growth of technology, e-commerce has reached its apex. This article proposes a novel application concept. It describes the public's needs for M-Commerce, as well as the analysis and literacy survey of essential components of mobile devices that use such apps. The design and security of the application are both carefully studied. This study examines the characteristics and possibilities of a mobile E-app for selling and purchasing fresh vegetables. The outcomes demonstrate how the application has impacted the public, employment, and long-term growth.[1].

Social e-commerce, as a new concept of e-commerce, uses social media as a new prevalent platform for online shopping. Users are now able to view, add to cart, and buy products within a single social media app. In this paper, I address the problem of cross-platform recommendation for social ecommerce, i.e., recommending products to users when they are shopping through social media. To the best of our knowledge, this is a new and important problem for all e-commerce companies (e.g., Amazon, Alibaba), but it has never been studied before. Existing cross-platform and social-related recommendation methods cannot be applied directly to this problem since they do not co-consider the social information and the cross-platform characteristics together.To study this problem, I collect two real-world datasets from social e-commerce services. I first investigate the heterogeneous shopping behaviors between traditional e-commerce app and social media. Based on these observations from data, I propose CROSS (Cross-platform Recommendation for Online Shopping in Social Media), a

recommendation framework utilizing not only user-item interaction data on both platforms, but also social relation data on social media. The framework is general, and I propose two variants, CROSS-MF and CROSS-NCF. Extensive experiments on two real-world social e-commerce datasets demonstrate that our proposed CROSS significantly outperforms existing state-of-the-art methods.Social e-commerce is a new concept of e-commerce that uses social media as a platform for online shopping.Cross-platform recommendation is the problem of recommending products to users when they are shopping through social media. Existing cross-platform and social-related recommendation methods cannot be applied directly to this problem since they do not co-consider the social information and the cross-platform characteristics together.I propose CROSS, a recommendation framework that utilizes both user-item interaction data on both platforms and social relation data on social media.I conduct extensive experiments on two real-world social e-commerce datasets and show that CROSS significantly outperforms existing state-of-the-art methods.[2].

Currently, booking airline tickets through online platforms is more popular than buying from travel agents, especially for Indonesian Gen Z, who were born and grew up with technology. However, research on the adoption of online platforms has been conducted separately for e-commerce and airline applications. This study aims to analyze both.This study found that UTAUT 2 is a successful model for analyzing consumer adoption behavior. The results showed that the adoption value for e-commerce was higher than airline applications, at 4.38 and 1.62, respectively. However, all respondents had used both types of platforms, albeit with different frequencies.The descriptive analysis of each instrument showed that the ”Price Value” factor is the most prominent for airline applications, and the ”Habit” factor is the most powerful for e-commerce. These results can be used by stakeholders to improve the quality of their services. UTAUT 2 is a successful model for analyzing consumer adoption behavior. UTAUT 2 is a theory of acceptance and use of technology that was developed in 2009. It is a comprehensive model that takes into account a variety of factors that influence consumer adoption of technology, including performance expectancy, effort expectancy, social influence, facilitating conditions, and behavioral intention. The results of this study support the validity of UTAUT 2 as a model for understanding consumer adoption of online platforms.The adoption value for e-commerce was higher than airline applications. This finding suggests that consumers are more likely to adopt e-commerce platforms than airline applications. There are a number of possible explanations for this finding. One possibility is that e-commerce

platforms offer a wider range of products and services than airline applications. Another possibility is that e-commerce platforms are easier to use than airline applications. Finally, it is also possible that consumers are more familiar with e-commerce platforms than airline applications.All respondents had used both types of platforms, albeit with different frequencies. This finding suggests that consumers are using both online platforms and travel agents to book airline tickets. This is likely due to the fact that each type of platform has its own advantages and disadvantages. For example, online platforms may offer lower prices, while travel agents may offer more personalized service.The ”Price Value” factor is the most prominent for airline applications. This finding suggests that price is a key factor in consumers' decision to use airline applications. This is likely due to the fact that airline tickets can be expensive. Consumers may be more likely to use an airline application if it offers lower prices.The ”Habit” factor is the most powerful for e-commerce. This finding suggests that habit is a key factor in consumers' decision to use e-commerce platforms. This is likely due to the fact that e-commerce platforms are often used for everyday purchases. Consumers may be more likely to use an e-commerce platform if they are already familiar with it and if they have a positive experience using it.[3].

2.2.2 Mobile e-Commerce Technology

With the evolution of mobile networks from 2.5G to 3G, the development of e-commerce to mobile e-commerce has contributed to the fact that mobile e-commerce will be an important part of future mobile applications. This paper introduces in detail the advantages and disadvantages of core technologies that have appeared in recent years that support the development of mobile e-commerce, and analyzes the mobile e-commerce system based on the J2ME development platform, which provides Internet Protocol support such as HTTP and TCP and ensures that communication terminals can steadily and reliably access all information on the Internet. Further studies will focus on the security problems that generally exist in the mobile e-commerce system and the solutions to these problems. Mobile e-commerce is becoming increasingly important as mobile networks evolve.There are a number of core technologies that support the development of mobile e-commerce.The J2ME development platform is a popular choice for developing mobile e-commerce applications.Mobile e-commerce systems face a number of security challenges.Further research is needed to address these security challenges.[4].

Due to the rapid increase of mobile users and the in-depth development of mobile communication technology, mobile e-commerce has developed rapidly. A hundred billion industry ecosystem is becoming visible. It is one of the hottest applications for transactions in today's retail industry. In this paper, I mainly describe some important issues in the mobile commerce ecosystem. First, I explain what is mobile e-commerce ecosystem, then analyze its participants, elaborate on the hierarchical relationship beyond the participants, and finally analyze the growth model of mobile e-commerce from the perspective of the ecological angle that launches its evolution path. The purpose is to understand how mobile e-commerce evolves.Mobile e-commerce is a rapidly growing industry.Mobile e-commerce has a significant impact on the retail industry.The mobile e-commerce ecosystem is complex and has many participants.The growth of mobile e-commerce is driven by a number of factors, including the increasing number of mobile users and the development of mobile communication technology.The future of mobile e-commerce is promising and has the potential to revolutionize the retail industry.[5].

2.2.3 Rest Api

A REST API (Representational State Transfer API) is an application programming interface (API) that conforms to the constraints of the REST architectural style. REST stands for representational state transfer and was created by computer scientist Roy Fielding.REST APIs are used to expose functionality of a software application or web service to other software applications. They are typically used to transfer data between clients and servers.REST APIs are based on the following principles which are resources, Everything in a REST API is a resource. A resource can be a physical object, such as a customer or an order, or it can be an abstract concept, such as a transaction or a report.URIs, Each resource is identified by a unique URI (Uniform Resource Identifier). URIs are used to access resources in a REST API.HTTP verbs,REST APIs use HTTP verbs to define the actions that can be performed on resources. The most common HTTP verbs are GET, POST, PUT, and DELETE.Hypermedia, REST APIs use hypermedia to allow clients to navigate between resources. Hypermedia is typically provided in the form of links in the response body.The DREST architectural style has become a popular choice for distributed resources, such as the northbound API of software-defined networking (SDN). However, as services often change and update frequently, the corresponding REST APIs need to change and update accordingly. This can be a challenge,

as it can break clients that are expecting a specific API structure.To address this issue, this paper proposes a new approach to designing REST APIs that are more flexible and extensible. The proposed approach uses a Petri-Net-based framework called REST Chart to describe the structure of the API. REST Chart makes it easy to add new resources and relationships to the API without breaking existing clients.The proposed approach also includes a client-side differential cache mechanism to reduce the overhead of hypertext-driven navigation. The cache mechanism stores a copy of the API structure on the client, which can be used to quickly look up resources and relationships. This reduces the number of requests that need to be made to the server, which can improve performance.The proposed approach has been evaluated in a number of SDN applications. The results show that the proposed approach can reduce the overhead of hypertext-driven navigation by up to 66 percentage, while still maintaining the desired flexibility and extensibility of the REST API.Flexibility: REST Chart makes it easy to add new resources and relationships to the API without breaking existing clients. Extensibility: REST Chart is a general-purpose framework that can be used to design REST APIs for a wide variety of distributed resources. Performance: The client-side differential cache mechanism can reduce the overhead of hypertext driven navigation by up to 66 percentage.[6].

2.2.4 RestAPI Authentication

REST API authentication is the process of verifying the identity of a user or client before granting access to an API. Authentication is typically done by requiring the user to provide some form of credentials, such as a username and password,token.There are a variety of authentication methods that can be used with REST APIs. Some of the most common methods include:Basic authentication,Basic authentication is the simplest form of authentication. It requires the user to provide a username and password in the HTTP request header.API keys, API keys are a more secure form of authentication than basic authentication. They are typically generated by the API provider and assigned to each user or client. API keys are used to identify the user or client in the HTTP request header.OAuth, OAuth is a popular authorization framework that can be used to grant access to REST APIs. OAuth allows users to grant access to an API without having to share their username and password.Mobile applications that use a client-server system need an Application Programming Interface (API) to communicate with each other. Security is important for communication over a network, and encryption methods can be used to provide security. Message Digest 5 (MD5) and Secure Hashing Algorithm

1 (SHA1) are two encryption algorithms that are often used in this case. This study aims to compare the performance of these two algorithms. The Wireshark application as used to retrieve authentication data. The authentication data was then encrypted and tested using the Hashcat tools' brute force attack. The time it took for the REST API Authentication process to complete was also measured for each algorithm using the Postman application. The SHA1 encryption algorithm has the advantage of being stronger, but it takes longer to encrypt data than the MD5 algorithm. However, the difference in encryption time is only 37.1 milliseconds, so SHA1 is still considered a viable option for implementing security systems and REST API authentication in mobile applications.MD5 is faster than SHA1, but SHA1 is more secure.The difference in encryption time between MD5 and SHA1 is only 37.1 milliseconds.SHA1 is still considered a viable option for implementing security systems and REST API authentication in mobile applications.[7].

2.2.5 Springboot

Spring Boot is a popular Java framework for building web and enterprise applications. It makes it easy to create and deploy stand-alone, production-grade Spring applications with very little Spring configuration. Spring Boot also offers simpler dependency management and a range of additional features that are common across many projects. This paper discusses how the Atmospheric Radiation Measurement (ARM) Data Center (ADC) at Oak Ridge National Laboratory is using Spring Boot to create a SOA-based REST service API. This API bridges the gap between frontend user interfaces and backend databases. Using this API, ARM scientists are now able to submit reports via a user form or a command line interface. This captures the same data quality or other important information about ARM data. The paper begins by providing an overview of Spring Boot and SOA. It then discusses how ARM is using Spring Boot to create a REST service API. The paper concludes by discussing the benefits of using Spring Boot for SOA development. Here are some of the key benefits of using Spring Boot for SOA development:

- Ease of use: Spring Boot makes it easy to create and deploy SOA applications with very little Spring configuration.
- Flexibility: Spring Boot is a flexible framework that can be used to create a wide variety of SOA applications.

- Scalability: Spring Boot is a scalable framework that can be used to create SOA applications that can handle a large number of requests.
- Security: Spring Boot provides a number of security features that can be used to protect SOA applications from unauthorized access.

Overall, Spring Boot is a powerful and versatile framework that can be used to create SOA applications that are easy to use, flexible, scalable, and secure.[8].

The Bureau of Retired Veteran Cadres (BRVC) is a government agency that serves and manages retired veteran cadres. The BRVC faces challenges such as complex management processes and low efficiency in work execution. The application of Internet technology to the BRVC can effectively solve these challenges. This paper proposes to use the SpringBoot framework to develop a customized information system for the BRVC. The system will be based on the microservice architecture and will use Mybits, Redis, and other technologies. The system will effectively solve the problem of the difficulty of refined management of BRVC information. It will also meet the requirements of multi-terminal access, front end separation, multi-function, low coupling, high cohesion, and easy scalability. The proposed system will have a number of benefits, including:Increased efficiency: The system will automate many of the BRVC's manual processes, which will free up staff to focus on more strategic tasks.

- Improved accuracy: The system will reduce the risk of errors by automating data entry and validation.
- Improved transparency: The system will provide real-time data access to BRVC staff, which will help them to make better decisions.
- Improved customer service: The system will make it easier for retired veteran cadres to access services and information.

The proposed system is a valuable tool that will help the BRVC to improve its efficiency, accuracy, transparency, and customer service. The system will be developed using the Spring-Boot framework, which is a popular framework for developing Java-based microservices. The system will use Mybits, a popular NoSQL database, to store data. The system will use Redis, a popular in-memory data store, to cache data.The system will be designed to be scalable, so that it can be easily adapted to meet the changing needs of the BRVC.[9].

2.2.6 Java

Java is a general-purpose, class-based, object-oriented programming language that is designed to have as few implementation dependencies as possible. It is a compiled language and not an interpreted language. Java applications are typically compiled to bytecode that can run on any Java Virtual Machine (JVM) regardless of the underlying computer architecture. The syntax of Java is similar to C and C++, but has fewer low-level facilities than either of them.Java was originally developed by James Gosling at Sun Microsystems. It was released in May 1995 as a core component of Sun Microsystems' Java platform. Java is one of the most popular programming languages in the world. It is used to develop a wide variety of applications, including web applications, mobile applications, desktop applications, and enterprise applications.Optimizing the performance of Java programs is an important task for developers. By minimizing the time and space complexity of a program, developers can improve the performance of their applications.There are a number of techniques that can be used to optimize the performance of Java programs. Some of these techniques include:

- Using efficient algorithms and data structures
- Avoiding unnecessary object creation
- Reducing the number of method calls caching Optimizing the garbage collector

The proposed model in the paper is a tool that can help developers to optimize the performance of their Java programs. The tool provides a number of features that can help developers to identify and fix performance bottlenecks. The paper also presents the results of an experiment that was conducted to evaluate the effectiveness of the proposed model. The experiment showed that the model was able to significantly improve the performance of the Java programs that were tested. The proposed model is a valuable tool that can help developers to optimize the performance of their Java programs. The tool is easy to use and can be used to improve the performance of a wide variety of Java programs. The model is a Java application that can be used to analyze Java programs. The model provides a number of features that can help developers to identify and fix performance bottlenecks. The model was evaluated by using it to analyze a number of Java programs. The results of the evaluation showed that the model was able to significantly improve the performance of the Java programs that were tested.[10].

JVM-based processors used in embedded systems are often scaled-back versions of the standard JVM, which means they do not support the full set of Java bytecodes and native methods. As a result, code bases such as Java libraries must be migrated in order to make them suitable for execution on the embedded JVM-based processor.Monarch is a high-assurance Java-to-Java (J2j) source code migrator that is being developed to assist with such code migrations. Monarch is designed to be highly accurate and reliable, and it can be used to migrate code bases of any size.Monarch works by first analyzing the Java code to be migrated. It then generates a new Java source code that is compatible with the embedded JVM-based processor. The new Java source code is then compiled and executed on the embedded system. Monarch has been evaluated on a number of Java code bases, and it has been shown to be highly accurate and reliable. Monarch is a valuable tool for developers who need to migrate Java code to embedded systems.

- High accuracy: Monarch is designed to be highly accurate, and it can be used to migrate code bases of any size.
- Reliability: Monarch is designed to be reliable, and it has been evaluated on a number of Java code bases.
- Ease of use: Monarch is easy to use, and it can be used by developers of all skill levels.

Monarch is a valuable tool for developers who need to migrate Java code to embedded systems. Monarch is highly accurate, reliable, and easy to use.[11].

2.2.7 MySQL

MySQL is a relational database management system (RDBMS) that runs as a server. It is a popular choice for web applications, as it is fast, reliable, and scalable. MySQL is also open source, which means that it is free to use and modify. MySQL was originally developed by Michael Widenius and David Axmark in 1995. It was acquired by Sun Microsystems in 2009, and then by Oracle Corporation in 2010. MySQL is now one of the most popular RDBMSs in the world, with over 6 million active installations.MySQL is a powerful and versatile database. It supports a wide range of data types, including integers, floats, strings, and dates. MySQL also supports a variety of features, such as stored procedures, triggers, and views. MySQL is a reliable database. It has been tested and certified by a number of independent organizations.

MySQL is also scalable, and can be used to support a large number of users and transactions. MySQL is an open source database. This means that it is free to use and modify. MySQL is also supported by a large community of developers. MySQL is a popular choice for web applications. It is fast, reliable, scalable, and open source. If you are looking for a database for your web application, MySQL is a good option to consider.The rapid development of data has led to a need for efficient data management solutions. One such solution is the use of databases. The biggest decision in selecting a database is whether to use a SQL or NoSQL database. MySQL is a SQL database that uses tables to store data in the form of columns and rows. NoSQL databases, on the other hand, are designed to handle large amounts of data in a variety of formats. Neo4j is one of the most popular NoSQL databases. It is a graph database that stores data in the form of nodes that are connected by edges. This paper compares the performance of MySQL and Neo4j databases in terms of memory usage, execution time, and flexibility. The results show that MySQL has a faster execution time than Neo4j, although both databases have the same time complexity. Neo4j, on the other hand, has a higher memory usage than MySQL. However, Neo4j has better flexibility than MySQL. The results of this study suggest that MySQL is a better choice for applications that require fast execution time, while Neo4j is a better choice for applications that require flexibility.The study was conducted using a benchmark dataset of 100,000 records. The performance of the two databases was measured in terms of memory usage, execution time, and flexibility. The results of the study showed that MySQL had a faster execution time than Neo4j, but Neo4j had a higher memory usage than MySQL. The study also showed that Neo4j was more flexible than MySQL. The results of this study can be used to help developers choose the right database for their applications.[12].

This paper discusses the importance of data backup and recovery for MySQL databases. The paper takes the China Agricultural University website as an example, and proposes a backup and recovery strategy based on MySQL master-slave replication technology and logical backup technology. The proposed strategy ensures the high availability and high reliability of the MySQL database by: Real-time synchronization of data between the master and slave database servers. Automatic switching between the master and slave database servers in case of a failure of the master database server. Full recovery of data in case of data misuse.The proposed strategy is a valuable tool for ensuring the normal and efficient operation of information systems and websites based on MySQL databases. Data backup and recovery is essential for MySQL databases.MySQL master-slave replication technology can be used to

ensure the high availability of databases. Logical backup technology can be used to ensure the high reliability of databases. The proposed strategy combines MySQL master-slave replication technology and logical backup technology to ensure the high availability and high reliability of MySQL databases.MySQL master-slave replication technology is a technique that allows data to be replicated from one database server (the master) to another database server (the slave). This ensures that there is always a backup copy of the data in case the master database server fails. Logical backup technology is a technique that allows data to be backed up without having to shut down the database server. This is important for ensuring that the database is always available. The proposed strategy combines MySQL master-slave replication technology and logical backup technology to ensure the high availability and high reliability of MySQL databases. The strategy works as follows:

- The master database server is responsible for storing the main copy of the data.
- The slave database server is responsible for storing a backup copy of the data.
- The data is replicated from the master database server to the slave database server in real time.
- In case the master database server fails, the slave database server can be automatically switched to become the new master database server.
- The logical backup technology is used to back up the data on the master database server on a regular basis.
- In case of data misuse, the logical backup technology can be used to restore the data from the backup.

The proposed strategy is a valuable tool for ensuring the normal and efficient operation of information systems and websites based on MySQL databases. It helps to protect the data from loss or damage, and it ensures that the database is always available.[13].

2.2.8 Difference between MySQL and MongoDB

MySQL and MongoDB are two of the most popular database management systems (DBMSs) in the world. They are both open source and have a large community of users and developers. However, there are some key differences between the two systems. MySQL is a relational

database management system (RDBMS). RDBMSs store data in tables, which are made up of rows and columns. Each row represents a single record, and each column represents a single piece of data about that record. MySQL is a very popular RDBMS, and it is used by a wide range of organizations, including small businesses, large enterprises, and government agencies.MongoDB is a document-oriented database management system (NoSQL). NoSQL databases store data in documents, which are similar to JSON objects. Documents can contain any type of data, and they can be nested within each other. MongoDB is a popular choice for storing large amounts of unstructured data, such as social media data, log files, and sensor data.The world has evolved to a point of advancement where technology, industry standards, gadgets, and devices produce enormous amounts of data. This data requires an essential data management and manipulation system. The data acquired from various input and output sources that are used to provide a certain infrastructure are also susceptible to damage if not treated well, which may result in data loss. To overcome this loss, various strategies are being used to prevent such loss. One such example is the NoSQL database MongoDB.

MongoDB is a cross-platform, document-oriented database that provides high performance and easy scalability, ensuring effective data management with its prominent feature of auto sharding. Sharding splits the database across multiple servers, increasing the capacity and scalability as required. This feature handles the distribution of data in different nodes to maximize disk space and dynamically load balance queries. Partitioning the databases appropriately is a major step that determines the efficiency of sharding. This involves choosing an index of the MongoDB, competently as a shared key for further horizontal scaling of the database. Our current research involves the study of this load balancer. This paper intends to ascertain the need for NoSQL databases in the present situation and emphasize the advancement of document-oriented database - MongoDB in particular by describing with a quantitative example that SQL databases are prone to deterioration when data is overloaded and MongoDB comes with an inbuilt load balancer which makes it a better solution in applications with high data load. I describe the technology of sharding - auto load balancing feature of MongoDB and hope to provide a comprehensive insight of the process. NoSQL databases are becoming increasingly popular as they offer a number of advantages over traditional SQL databases, such as scalability, flexibility, and performance. MongoDB is a leading NoSQL database that is known for its high performance, scalability, and flexibility. MongoDB's auto sharding feature allows it to scale horizontally, which means that it can add more servers as needed

to handle increased load. MongoDB's auto load balancing feature ensures that queries are distributed evenly across all shards, which helps to improve performance.The paper concludes by discussing the benefits of using MongoDB for applications with high data load.[14].

2.2.9 React

React is a JavaScript library for building user interfaces. It is used by a wide range of companies, including Facebook, Instagram, and Netflix. React is known for its speed, flexibility, and scalability. React is based on the concept of components. A component is a small, reusable piece of code that can be used to build a user interface. Components are declarative, which means that they describe what the user interface should look like, not how it should be rendered. This makes React code easy to read and understand. React is also highly performant. It uses a virtual DOM, which means that it only updates the DOM when necessary. This can lead to significant performance improvements, especially on large and complex user interfaces.React is a powerful tool for building user interfaces. It is fast, flexible, and scalable. If you are looking for a JavaScript library for building user interfaces, React is a good option to consider.Declarative, React components describe what the user interface should look like, not how it should be rendered. This makes React code easy to read and understand. Virtual DOM, React uses a virtual DOM, which means that it only updates the DOM when necessary. This can lead to significant performance improvements, especially on large and complex user interfaces.Reusable components, React components are small, reusable pieces of code that can be used to build a user interface. This makes it easy to create consistent and maintainable user interfaces.Large community,React has a large and active community of developers. This means that there are many resources available to help you learn React and build user interfaces.The world has become increasingly data-driven, and the amount of data being generated is growing exponentially. This data needs to be managed and manipulated effectively in order to be useful. Traditional database management systems (DBMSs) are not well-suited for managing large amounts of unstructured data. NoSQL databases, such as MongoDB, are a better choice for managing this type of data. MongoDB is a cross-platform, document-oriented database that provides high performance and easy scalability. It is a good choice for storing large amounts of unstructured data, such as social media data, log files, and sensor data.

The Networked Control System Laboratory (NCSLab) is a remote laboratory that was created in 2006 in the UK. It is a good solution to the problems of limited experimental

environment and shortage of laboratory equipment. However, some of the technologies used in NCSLab are not up-to-date and some of them have even lost support. In order to improve the long-term development of NCSLab, it is necessary to update the technologies used. This paper proposes a solution to update the NCSLab system by using the React user interface framework. React is a modern JavaScript library that is used to create user interfaces. It is a good choice for creating dynamic and interactive user interfaces.The proposed solution has been implemented in NCSLab and it has been shown to be effective. The response speed of the web pages has been significantly improved and the scalability, interactivity, and user-friendliness of the system have been enhanced. The proposed solution is a valuable contribution to the field of remote laboratories. It provides a way to update and improve existing remote laboratories using modern technologies. This will make remote laboratories more accessible and useful to a wider range of users.MongoDB is a good choice for storing large amounts of unstructured data. React is a modern JavaScript library that is used to create dynamic and interactive user interfaces. The proposed solution has been implemented in NCSLab and it has been shown to be effective. The proposed solution is a valuable contribution to the field of remote laboratories.[15].

Chapter 3

Methodology

BAYER ZONE - Ecommerce Website aids farmers in seeing all of the items that Bayer offers. The Bayer Zone also provides us with all relevant product-related information, including product descriptions, characteristics, and instructions for using the products on crops. It demonstrates that the product is suitable for use with all crops.

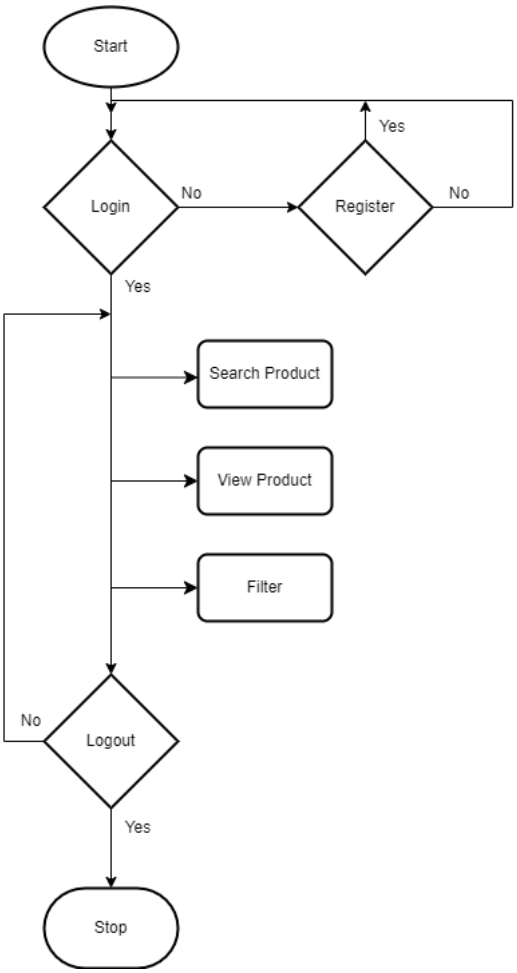

Figure 3.1: User Functionalities

The user must first register with the system by providing their name, email address, password, and mailing address. The user is then sent to the system's login page. The user should next enter their email address and password to log into the system. After logging in, the

user receives a JWT token and is then forwarded to the Product Catalogue page, which lists all of the company's categories and top products.

When the User click any of the categories the system passes the id of the Categories and redirect to the category page where all the product of the same category is shown. When the user click on the product taking the product id it will be redirected to the product page where it will shows all the details of the products like ml, description, features, how to apply like details.

3.1 Key Features of Bayer Zone

- Login page functionality.
- Registration functionality.
- Home Page:
    1. Top Rated Product.
    2. Category Wise.
    3. Product Page.
- User Management:
    1. Change Password Functionality.
    2. Edit Profile.
    3. Logout
- Scheduler

3.2 Module Description

3.2.1 Login Module

The login module contains a login page where the user can login.When a user makes a POST request containing their email address and password in the request body to the /login endpoint, the login flow begins. The user's credentials are then validated by the server using the userLoginService.authenticateUser() function. A JWT token is produced and sent back to the user if the credentials are legitimate. By adding it in the request headers, the user can utilise this token to access restricted resources.

There are numerous exceptions that might happen during the authentication procedure. For instance, if the user's email address cannot be retrieved in the database. Similar to this, if the supplied password does not match the stored password.To let the user know what kind of issue has occurred, these exceptions give detailed error messages.

When authentication fails, the server may react with helpful error messages by handling these exceptions using the proper exception handlers. When a user's login attempt fails due to an incorrect email address or password, this makes sure they get pertinent feedback.

The login process comprises checking the user's credentials, creating a JWT token after successful authentication, and providing suitable error handling for various authentication circumstances.

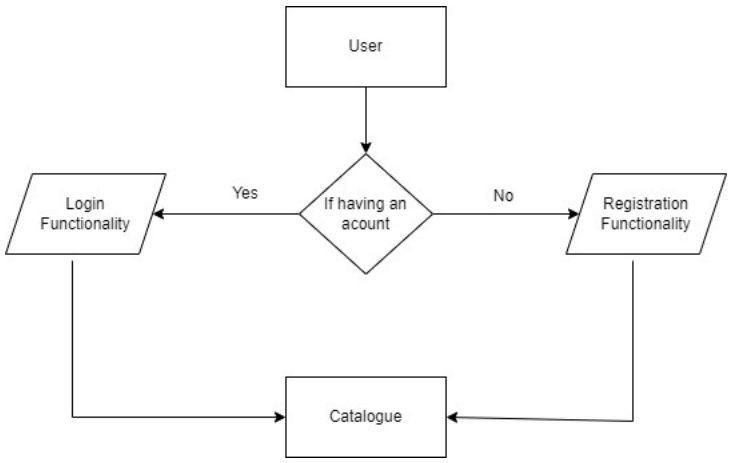

Figure 3.1: Login Functionalities

3.2.2 Registration Functionality

The user requests to register by sending a POST request to the /registration endpoint. The method checks if the user's email address is a valid email address. The method also checks if the user's password is at least 8 characters long and contains at least one lowercase letter, one uppercase letter, one digit, and one special character.

Email, password, name, and phone number are all entered into the createUser() function. The database then receives a brand-new user account. Prior to being saved in the database, the user's password is hashed.

Using the user's email address as a search parameter, the createUser() function determines whether the user already exists in the database. Exceptions are fired if the user is already present.The user's database account is established and they are registered if they don't already have one. A redirect to the login page follows. Exceptions are fired if the user is already present. The statement "The system already has a user registered with the input details" is found in the exception.

3.2.3 Home Page

The Home Page contains main page where it shows about the company, and also it will show the categories, Top rated product, All the product details

Top rated Product

This modules shows top 5 highly rated products in the database. when a user requests a list of highly rated items via the /highly-ranked-products endpoint. This endpoint's retrieveTopRatedProducts() function is invoked whenever a request is made. The function retrieves the whole list of items from the product database.The goods are then arranged in descending order according to the average rating they have received. The top 5 items with the best reviews are chosen. An object is produced for each product, comprising details like the product's ID, picture URL, name, category, and average rating. A list is expanded with new items. The information about the highly rated items is contained in the list that is returned.

Category Wise

This Module shows all the category of the system that are available to the user.This function uses the category id that is supplied as a parameter to fetch goods from the database. In the event that no goods are discovered for the requested category, the procedure throws a exception. The process supplied the category id of the category we clicked, then verified the id against the items in the database that had the same category id, and then returned every one of those products to a list. The list of items is then brought back and shown on the front end.

Product page

whenever a user accesses the category page and views every item under that category. when a user clicks on an item in a category. The procedure requires a product id. Using that ID, the procedure searches the database for the corresponding product. The product's name, description, features, images, and usage instructions are all retrieved from the database, and all of that information is then returned to the front end.

3.2.4 Account Management

In this functionality the user can manages the his account like change password and change details and logout.

Change Password functionality

In this module, it is first checked to see if the user has authenticated or not; if not, an exception is thrown. then requests that the user input both their old and new passwords. if the previous password and the authorised user's password are identical. The user-provided A new password was then used to set up the password.

Change the details

Users can edit their personal information in the module, including their address and phone number. Users can add new information using the module's user interface and submit it for processing. The module then verifies the data and changes the user's database record. Additionally, the module aids in ensuring that user data is current and correct.The module is protected against unauthorised users altering user data.

Logout

The user's session is then invalidated by the module, which then leads them to the login page. Once logged in, a user can log out of the system by using the logout module. A crucial security component is the logout module. It aids in preventing unauthorised access to user accounts. A user's session is invalidated, and their account is no longer available after they log out of a system. This makes it more difficult for unauthorised individuals to access the user's account and data.

3.2.5 Scheduler

The Details of the products are obtained from a Agrosmart Api. So the job of the Scheduler is to Consume the AgroSmart Api. After Consuming the Api Values are stored in the Dto. From the Dto it is stored in to the Database. The Scheduler Also check frequently if there is a new product is added or not.

3.3 System Specifications

The software and hardware specifications recognized for the system on the basis of their requirements are specified in this section.

3.3.1 Hardware Requirements

- Processor: Minimum 1 GHz (Recommended 2GHz or more)
- Hard Drive: Minimum 4 MB (Recommended 6 GB or more)
- Memory (RAM): Minimum 1 GB (Recommended 4 GB or above)
- Internet connection

3.3.2 Software Requirements

- React - Front End
- Spring Boot - Back End
- Tomcat - Web Server
- Mysql - Database
- Windows, Mac, Linux, Any - OS
- Mozilla Firefox, Microsoft Edge, Any - Browser

3.3.3 Software Description

- React: React is a popular JavaScript library used for building user interfaces for web applications. It was developed by Facebook and is widely adopted in the industry.React follows a component-based architecture, where the UI is divided into reusable components. Each component encapsulates its own logic and rendering, making it easier to build complex UIs.React supports a declarative programming style. Developers can describe how the UI should look based on the current state, and React takes care of updating the actual DOM to match that description. This simplifies the development process and improves code maintainability.React utilizes a virtual DOM

(Document Object Model) to efficiently update and render components. When there are changes in the component's state or props, React updates the virtual DOM and efficiently determines the minimal number of actual DOM manipulations needed to reflect those changes.React can be used with other libraries and frameworks, allowing developers to integrate React into existing projects easily. It is commonly used in conjunction with tools like Redux for state management and React Router for handling routing in single-page applications.

- Spring Boot: Spring Boot is a Java-based framework that simplifies the development of standalone, production-ready applications. It is built on top of the popular Spring framework and provides a streamlined approach to building Java applications with minimal configuration. Spring Boot aims to accelerate application development by providing a convention-over-configuration approach. It eliminates the need for boilerplate code and XML configurations, allowing developers to focus more on business logic and less on infrastructure setup. Spring Boot comes with sensible default configurations for various components and frameworks, reducing the need for manual setup. It automatically configures many aspects of the application, such as database connections, web servers, and security, based on sensible conventions and best practices. Spring Boot includes an embedded servlet container (e.g., Tomcat, Jetty) that allows you to run your application as a standalone executable JAR file. This feature simplifies deployment and makes it easy to build self-contained, portable applications.Spring Boot provides automatic configuration based on classpath dependencies. It detects the presence of specific libraries and automatically configures them, saving developers from writing boilerplate code. Additionally, custom configurations can be easily overridden or extended as needed. Spring Boot integrates with the powerful Maven or Gradle build systems and provides dependency management capabilities. It resolves and manages dependencies, ensuring compatibility and simplifying version management.

- Mysql: MySQL is an open-source relational database management system (RDBMS) that is widely used for storing and managing structured data. It is one of the most popular databases in the world and is known for its performance, scalability, and ease of use.It organizes data into tables with rows and columns.It supports the SQL (Structured Query Language) standard for interacting with the database and performing

operations such as querying, inserting, updating, and deleting data. MySQL is an open-source database, which means it is freely available and can be used, modified, and distributed by anyone. This makes it accessible to a wide range of developers and organizations and has contributed to its popularity. Follows a client-server architecture, where the database server handles the storage and management of data, and clients (applications or tools) interact with the server to access and manipulate the data. Clients can communicate with the server using various protocols, such as TCP/IP or named pipes. It is optimized for handling large datasets and can efficiently handle concurrent read and write operations. It includes features like caching, indexing, and query optimization techniques to improve performance. Ensures data integrity by enforcing referential integrity constraints and providing support for transactions. It follows the ACID (Atomicity, Consistency, Isolation, Durability) properties, which guarantee that database transactions are processed reliably and consistently.

- RestApi: A RESTful API (Representational State Transfer API) is an architectural style and set of guidelines for building web services that allow different systems to communicate with each other over the internet. RESTful APIs are widely used for creating scalable and interoperable applications. RESTful APIs are centered around resources, which can be any entity or concept that needs to be represented and manipulated. Resources are identified by unique URLs (Uniform Resource Locators), also known as endpoints. RESTful APIs follow a stateless communication protocol, meaning that each request from a client to a server is independent and self-contained. The server doesn't maintain any client state between requests, and each request must include all the necessary information for the server to understand and process it. RESTful APIs provide a set of standard operations, often referred to as CRUD (Create, Read, Update, Delete), to perform actions on resources. These operations map to the standard HTTP methods: POST (create), GET (read), PUT/PATCH (update), and DELETE (delete).

3.4 System Design

The system design phase effectively bridges the gap between the issue area and the current system, addressing the solution area - specifically, ”how to implement?” During this stage, the SRS documentation is converted into an effective implementation format that also outlines the system’s operation. The complex task of system development is broken down into manageable sub-activities that work together to achieve the ultimate goal of system development. A good design enables the production of efficient code and minimizes implementation size based on the application and project requirements.

System design comprises two levels: logical design and physical design. Logical design provides an abstract illustration of the system’s inputs, outputs, and data flow, meeting user needs in describing inputs (sources), outputs (destinations), databases (data storage), and processes (data flows). Logical design is crucial for the successful implementation of a corporate database. An inadequate logical design may require costly modifications to data collection, storage, and security later on. A sound preliminary design simplifies database development and evaluation, contributing to successful execution. The system analyst specifies user requirements in detail, essentially dictating the information flow into and out of the system and the necessary data sources during logical system design.

When developing a system’s logical design, the system analyst specifies user needs with enough detail to determine how information enters and leaves the system and the required data sources. Diagrams of data flow and E-R diagram modeling are used. Additionally, the input/output media is specified, the database is designed, and backup procedures are established. Finally, system implementation is planned.

3.4.1 System Architecture

Users interact with the e-commerce website using a web browser on the client-side to view items. For the purpose of displaying the information and user interface for the products, the client-side sends HTTP requests to the server-side and gets replies. Between the client-side and server-side applications, the web server serves as a middleman. It responds to incoming client-side HTTP requests and sends them to the server-side application for processing. The web server is also responsible for sending static files to the client-side, including HTML, CSS, and JavaScript files.A Java framework called Spring Boot offers a more straightforward method for

developing standalone, production-ready Spring-based apps.Request routing, data processing, and the execution of business logic are all handled by Spring Boot.The MySQL database is used to store product data, which includes details like the product name, description, price, and availability. The server-side application provides a set of RESTful APIs that the client-side may use to access product information.

3.4.2 Module Design

The **BAYER ZONE - Ecommerce Website** designed to first register with the system by providing their name, email address, password, and mailing address. The user is then sent to the system's login page. The user should next enter their email address and password to log into the system. After logging in, the user receives a JWT token and is then forwarded to the Product Catalogue page, which lists all of the company's categories and top products.

- Login Module: To login using username and password.
- Registration Module: To register as a new user in the system
- User Management: User can manage the account like change details and password
- Schedulers: consume the api and store value to the database.

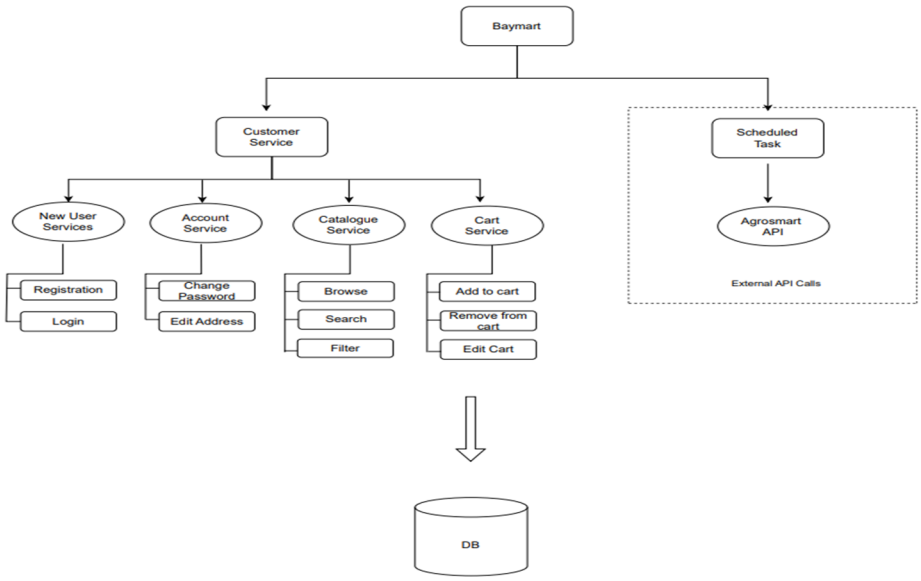

Figure 3.2: Login Functionalities

3.4.3 Data Flow Diagram

Data flow inside a system is graphically represented by a data flow diagram (DFD). It is a modelling approach used to show the flow of data through a system or process at each stage—input, processing, and output. DFDs are frequently used in systems analysis and software engineering to comprehend and record the data flow and interactions between various system components.

Four primary symbols are employed in a DFD to represent the various components of the data flow:

- The symbol representing a function or transformation that accepts inputs, processes them, and creates outputs is called a ”process” and it looks like a rectangle with rounded corners. It might be a logical operation, a software module, or a physical procedure. Action verbs are used to explain the functions of processes on their labels.

- Data Flow (arrow): The movement of data between various processes, data repositories, or external entities is denoted by this symbol. It demonstrates how information is shared and moved across the system. To characterise the data being delivered, data flows are labelled.

- Data Store (two parallel lines): The system's permanent data storage location is represented by this symbol. It might be a file, a database, or some other kind of storage. The type of data that each data storage holds is shown on the label.

- External Entity (rectangle): This symbol denotes an outside, uncontrollable entity that interacts with the system. It may be a user, another system, or an outside company. Labels are applied to external entities to identify or characterise their function.

Context level/ Level 0

The context level data flow diagram (dfd) is describe the whole system. The (o) level dfd describe the all user module who operate the system. Below data flow diagram of Baymart site shows the user can operate the system.

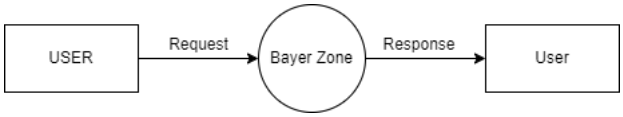

Figure 3.3: Level 0

Process Decomposition/ level 1

A Level 1 Data Flow Diagram (DFD) provides an overview of the system's major processes and how they interact with external entities. It represents the high-level flow of data within the system and shows the main data inputs, outputs, and processes involved.

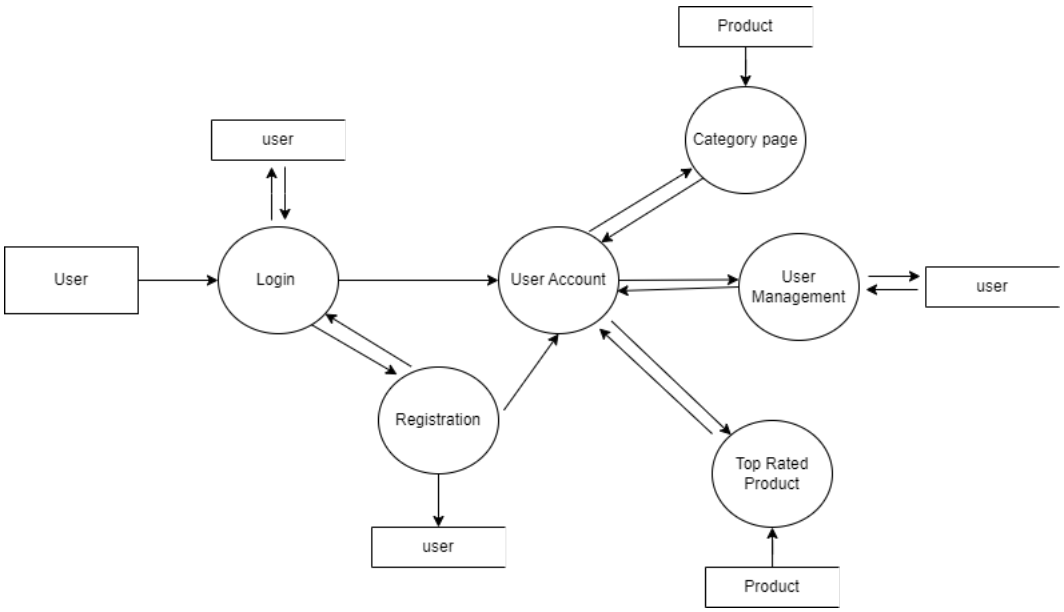

Figure 3.4: Level 1

Chapter 4

Result and Discussion

React, Spring Boot, and MySQL were effectively used in the creation and implementation of the **BAYER ZONE - Ecommerce Website**. The platform aims to give consumers a smooth experience when exploring products. The following outcomes were obtained:

- User authentication: Users were able to log in using both Google login and regular login thanks to the authentication module. It offered a convenient and safe identification process.
- Product Listing: The product list module swiftly collected and showed a detailed list of the items that were available. The frontend interface rendered the product cards with the necessary details, such as the name, image, and rating.
- Product Details: The product detail module offered comprehensive details on specific goods. Product details, features, reviews, and similar goods were all successfully obtained and presented.
- Search functionality: Using several criteria, like name, category, or keywords, the search module allowed users to look for specific goods. It efficiently processed users' search requests and returned pertinent search results.
- Sorting and Filtering: The filter and sorting module let customers customise their experience while looking through products. Users may sort goods by popularity, or rating and add filters based on rating. The module successfully used these filters and gave users ordered product listings.

4.1 Testing Methods

Testing ensures that the system is error-free based on criteria that are anticipated by the user or by the organization. A system may have high-end or low-end performance based on the environment in which it operates.

4.1.1 Functionality Testing

These tests check if the part of the system that is supposed to do something actually works well or not. The QA team makes some tests based on what needs to be checked, and then they test them out. QA team tests the functionalities according to the requirements of the product.

- Login Functionality: This test verifies that users can log in using the login page and also register as a new user in the system.
- Session Management: This test verifies that users are automatically logged out of the system after 24 hours of inactivity. It should also test that users who try to access the system after being logged out are redirected to the login page.
- Data Security: This test verifies that only authorized users have access to the platform and that user data is secured. It also tests that the system prevents unauthorized access attempts and that user data is encrypted during storage.
- Error Handling: This test verifies that the system provides appropriate error messages for various scenarios, such as incorrect login credentials or attempting to access restricted features. It should also test that the system logs errors for debugging purposes.

4.1.2 Unit Testing

In this project, unit testing is an important aspect of validation testing, aimed at identifying defects in individual sections of the project. Unit testing is used to evaluate the functionality and performance of each system unit or component in isolation. This testing helps developers to identify and resolve issues early on, thereby minimizing the risk of encountering problems during deployment or integration. A successful validation test confirms that the system meets the requirements, while a failed test indicates that modifications are necessary. Unit testing is

a critical step in the validation process, enabling developers to ensure that the system performs as expected and meets the needs of all stakeholders.

The portal is tested against multiple test cases during validation testing. Logging in to the system is one of the important part of the system. valid credentials needs to given in order to access the system. password is matched against a regex structure which must have 8 alphanumeric characters. Both the data is tested and validated using the data available in the database. Also check the encryption of password is working or not.Then the generated data is used for validation with the database information.

4.1.3 User Acceptance Testing

The success of any system depends largely on user acceptance. To ensure this, the system must undergo continuous evaluation and testing throughout the development phase. This entails maintaining open communication with potential end-users and incorporating their feedback into the system's design. In this project, a menu-driven system, input screen design, and output screen design were carefully considered and implemented to achieve user approval. User-centered design is the process of involving users in the design and development of the system, ensuring that their needs and preferences are met. This leads to higher levels of user satisfaction and system adoption.

To describe the acceptability testing procedure used on the Bayer Zone online store. The goal of the acceptance testing was to confirm the usability, aesthetic appeal, and responsiveness of the user interface (UI) across a variety of devices and browsers. The paper also emphasises how users are involved in UI development and how UI improvements are iterated depending on user feedback.

Test Scenarios:

- Test the registration form with invalid or missing inputs to ensure appropriate error messages are displayed.
- Test the user login functionality using valid credentials and verify that the user is logged in successfully.
- Simulate a device going offline by disabling its network connection. Wait for the system to detect the device's offline status and generate a notification.

- Test the product listing page and verify that all products are displayed correctly with their respective details (e.g., name, price, image).
- Test the product search functionality by entering valid keywords and ensure that the relevant products are displayed.
- Verify that the pagination feature works correctly, allowing the user to navigate through multiple pages of products.

4.2 Output Screens and Results

1. Catalog Page

   A page for viewing the categories in the system

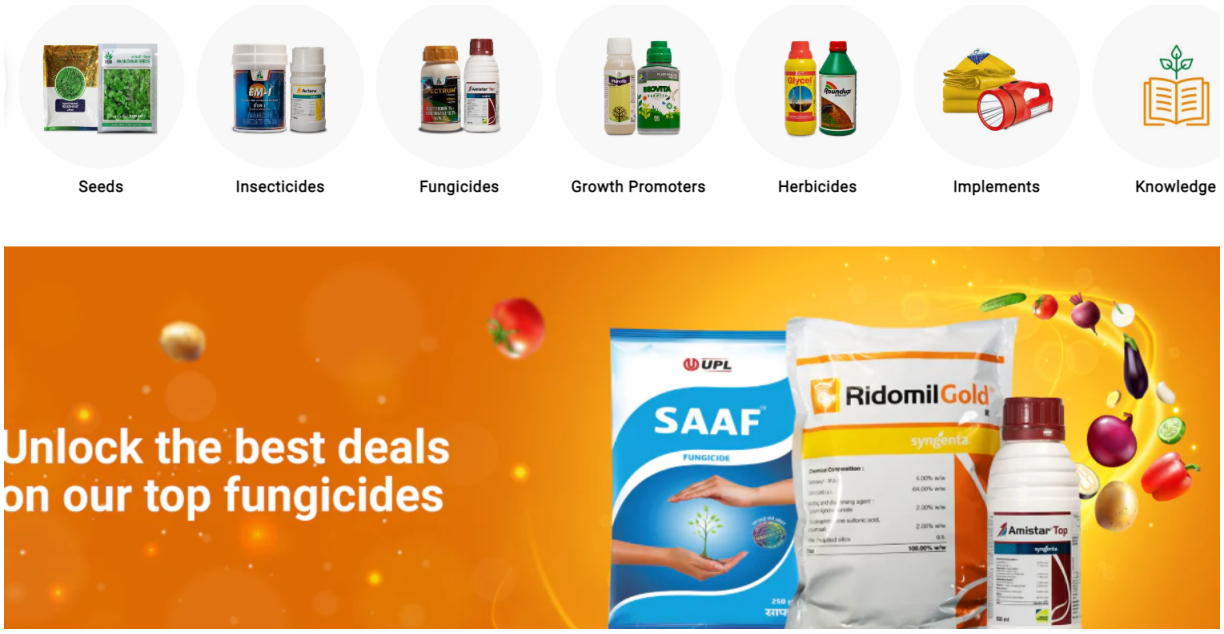

Figure 3.1: Viewing Category

2. Category wise Page

   A page for viewing the products of same categories in the system

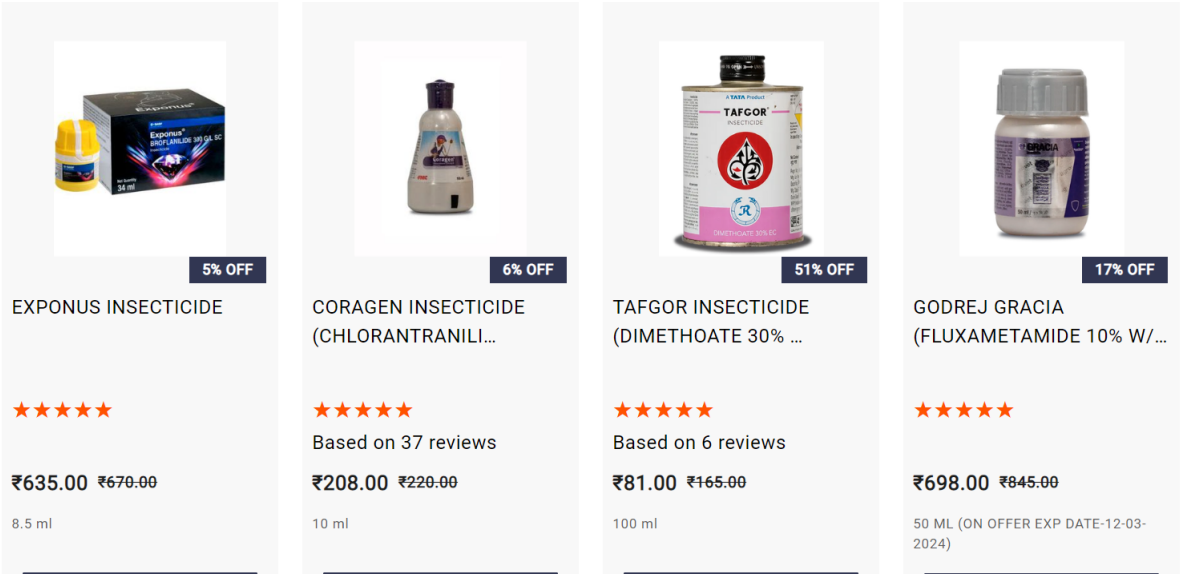

Figure 3.2: Viewing Category

3. Product Page

   A page for viewing the details of product in the system

Figure 3.3: Viewing Product

Chapter 5

Conclusion

In conclusion, the **BAYER ZONE - Ecommerce Website** offers customers a convenient and attractive platform to browse and buy items. React for the front-end, Spring Boot for the back-end, and MySQL for data storage have all been used in the system's development. Iterative customer input has been included in the development process to guarantee an intuitive user interface.To provide a seamless user experience, the website's user registration and login operations have undergone extensive testing. Users may quickly register for an account, log in using their credentials, and remain signed in while moving between sites. Users may browse items using the function that allows them to search for products, read comprehensive product information,

The BayerZone team paid close attention to issues like correct error handling, user input validation, and browser compatibility throughout the development and testing phases. These actions guarantee that the website will operate consistently and reliably.Overall, the BayerZone online store is effective in giving customers a quick and pleasurable buying experience. A reliable and user-centric platform has been produced via the usage of React, Spring Boot, and MySQL technologies, together with user input and iterative development. To maintain the system's high standards of usability and functionality as it develops and new features are added, continuous testing and improvement will be necessary.

5.1 Future Enhancement

In the future, the system can be incorporated with more advanced analytics capabilities like Add a function that enables customers to give feedback on the goods they've purchased. As a result, the platform administrators and other users will receive insightful input that will help them make better overall product choices and customer experiences.

Introduce a wishlist option that allows users to bookmark items they are interested in for later reference. Users will be able to simply keep track of the things they want and get alerts when they go on sale or come back into stock thanks to this.

Implementing advanced search and filtering tools will improve the experience of looking through products. Products should be able to be filtered by users according to a number of factors, including price range, brand, category, and customer reviews.

Include social media integration to let people share things on their social media profiles that they enjoy. This might help spread the word about the company and draw new users to the site.

Utilise the browsing and purchase history of the customer to provide personalised product suggestions. Utilising a recommendation engine can assist consumers in finding new goods according to their tastes and interests.

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Appendix

Screenshots

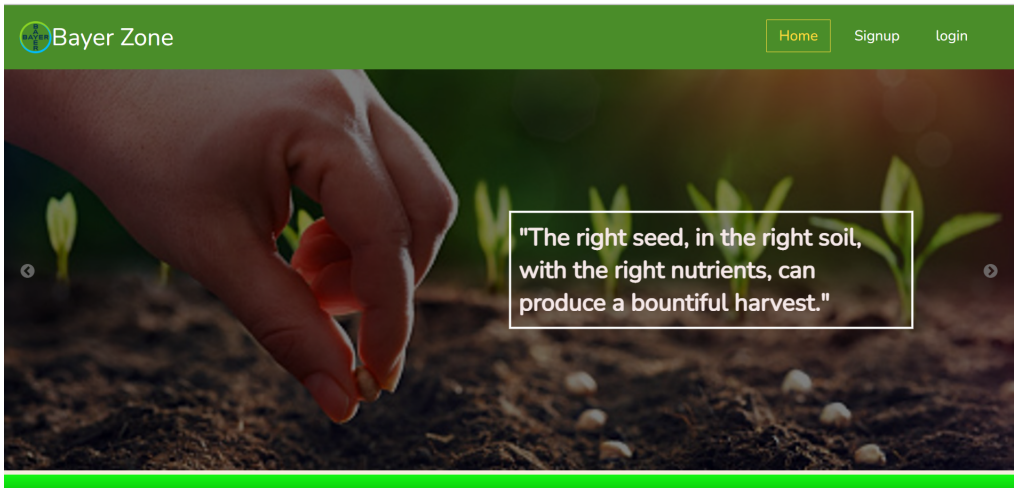

Figure A.1: Home Page

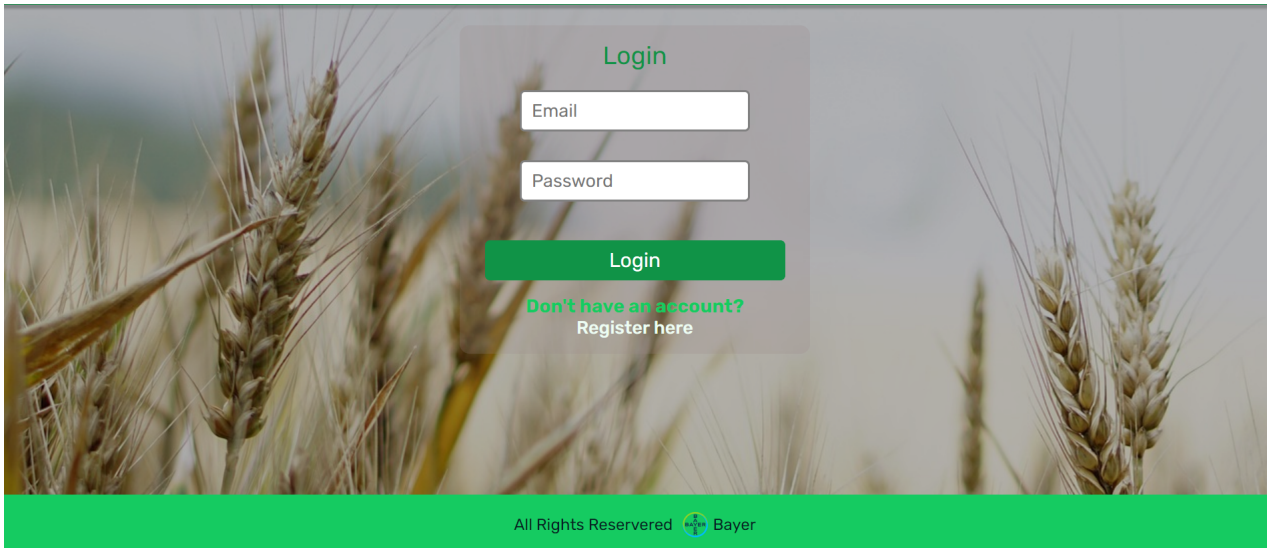

Figure A.2: Login Page

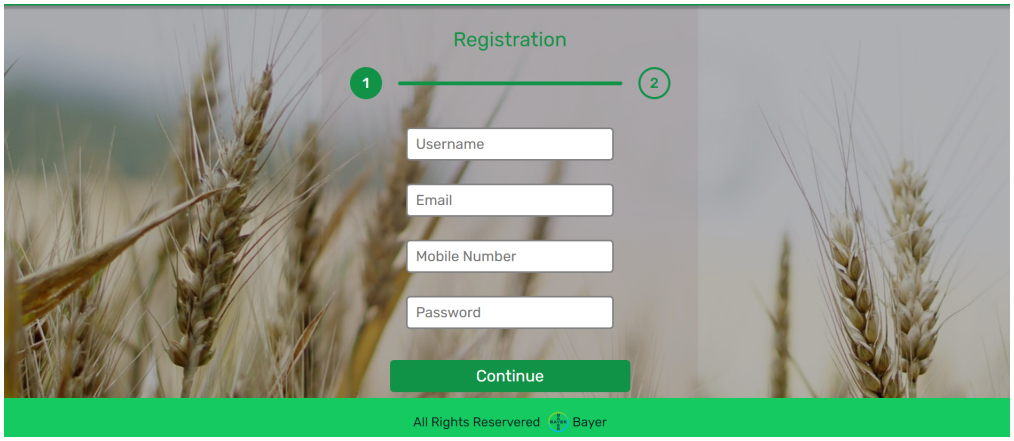

Figure A.3: Registration Page

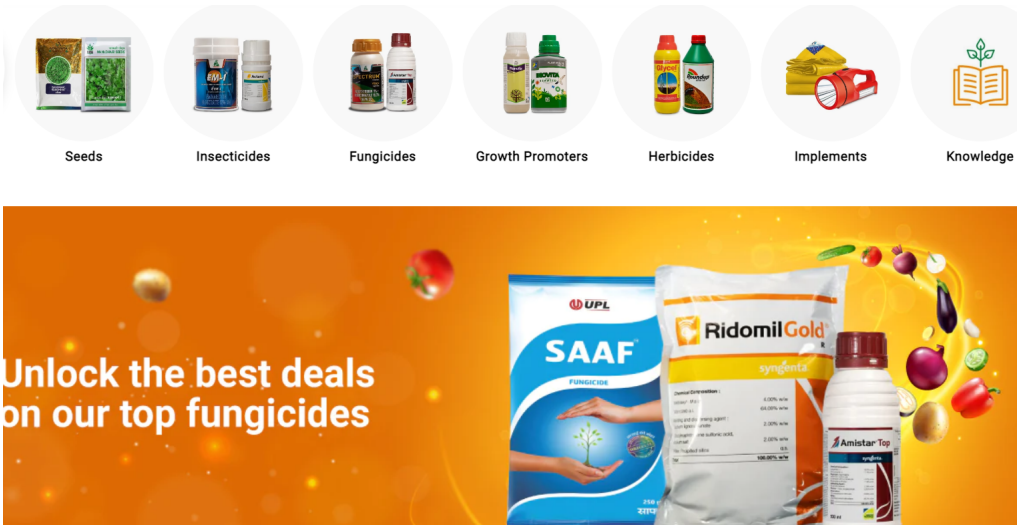

Figure A.4: Catalog page

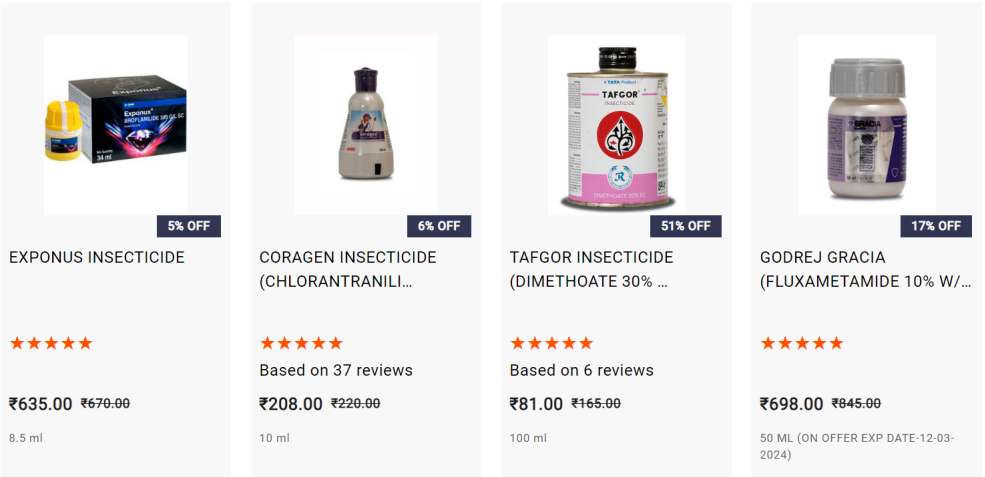

Figure A.5: Category View

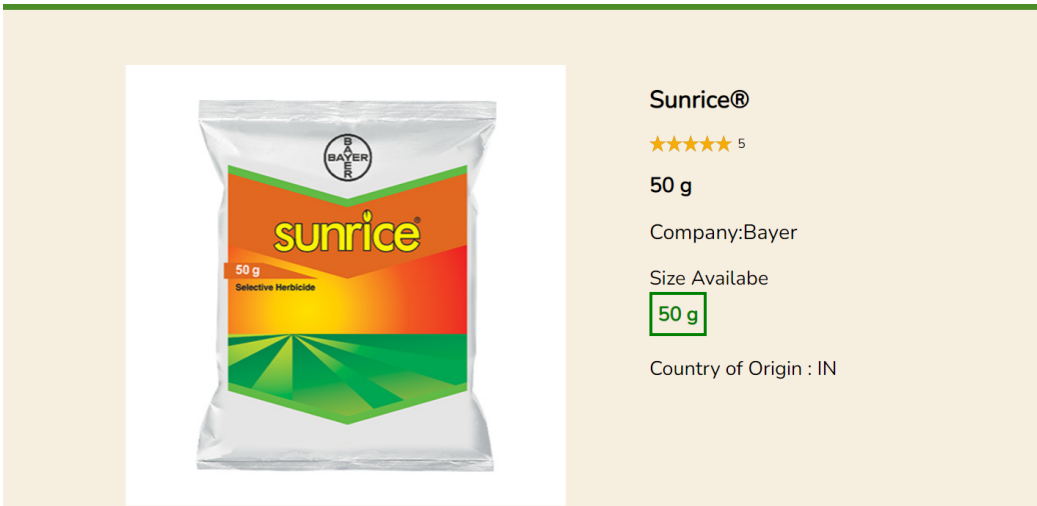

Figure A.6: Product Page