

Pearson

Higher Nationals in **Computing**

Unit 30: Application Development

Assignment Brief Number: 1



**Higher National
Certificate/Diploma
in Computing**

Assignment Brief

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Unit Number and Title	30: Application Development.
Academic Year	2022
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Assignment Title	Agricultural Management System for Divisional Offices
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Introduction

Problem Statement

The main reason for many of the current problems in Sri Lanka is the lack of proper management of agriculture and all related activities. As a result, Sri Lanka is rapidly heading towards an economic and food crisis. This system is not a big complex system. Because it is not possible to introduce a complex system or technology to the people engaged in agricultural activities at once. Therefore, the management of the work is carried out by taking the technology to the farmers through the regional agricultural service office systems controlled through the Ministry of Agriculture, which is directly involved in the agricultural activities.

Farmers also suffer losses due to middlemen. Farmers complain that the value of farmers has been lost due to the fact that they come between businessmen and farmers and get more profit. Difficulties in storing crops and protecting them from sudden disasters are also present difficulties.

All over Sri Lanka, most of the public sector offices work by writing in manual books. Due to that method, the amount of data damage is high and it is more difficult to update them. Due to the method of using data by manual writing method, data protection also incurs more cost.

Due to such problems, we created this software for the use of agricultural service offices.

The proposed solution

The President, Prime Minister and Cabinet of the Democratic Socialist Republic of Sri Lanka have passed a resolution with a very quick plan to alleviate the current situation in the country. This proposal has introduced the creation of a new system to regional agricultural service offices as a simple strategy used to identify and alleviate the main problems in the country's agriculture. Therefore, the Ministry of Agriculture has chosen us, the company "January" for that.

The proposed solution was decided to solve the problems faced due to the existing systems and processes, provide effective supervision, generate reports and facilitate the connectivity of offices spread across the island. The Falcon team, the best project team in the company, was entrusted with the responsibility of designing and developing this system.

Justifying solution with business related problem

By comparing the proposed solution with the problem statement, it is possible to solve current problems very quickly by creating an application suitable for use in offices.

- Productivity of Employee

Staff who are unmotivated, untalented, inattentive, or unprofessional. For instance, a retail store with poor customer satisfaction as a result of poor management and unhelpful, unreliable personnel

- Trustworthiness of the server

In general, while an agricultural software is operating, no web host can manage 100% efficiency or guarantee 100% uptime. At some time, the majority of the server might malfunction, crashing our agriculture application along with it. Whether the web host or agricultural application crashes as a result of high traffic or bandwidth utilization, a script that the agricultural software dislikes, or both, the agricultural application may be to fault. It can also be described as a web host issue. The best solution to this issue is to utilize a web server with a high uptime dependability and to regularly backup our agriculture program to a local computer or external storage.

- Technical issues

It happens frequently for a company's technological systems to malfunction. We observe a lot of problems when an online firm is just getting started. If the owner of the agriculture application attempts to execute script-coded data, such as a form submission or programs, but the host provider's server aren't compatible, there can be a compatibility problem. The code or script programming for the farm application may also be problematic. If additional information about the owner and webmaster of the agriculture application is accessible, it will be simpler to discover and fix these problems.

- Problems of intermediaries

We identified this as the simplest and easiest technical method that the government can take to solve the problems between farmers and businessmen more quickly.

Through this system, the registered farmers in the area can directly connect the harvest of the products with the businessman. Since it is impractical to take this application to farmers and businessmen at once, we have introduced this to take the technology step by step.

As a example,

We have linked this application to the agricultural office for the farmers in Rajanganaya area of Anuradhapura district. Suppose they use it. Within a few days after going to the villages in this area, the farmers are registered and they are given a WhatsApp number in the office and the necessary awareness is also done. After that, the awareness of the businessmen all over the island is done from the agricultural service offices, and through this information is

made that you can get information about the farmers who have harvested the products and crops you need. Ads are used for that. Businessmen are also directly connected with farmers by providing necessary information with or without registration. It can sell the produce and harvest at the right price without the interference of the middleman.

It is also easier to study the progress of agricultural activities in the region on a monthly, quarterly or yearly basis. This is because information about the yield of farmland is also stored in a data warehouse through this system.

The commitment of the government and officials is essential for these quick methods. A more efficient, accurate and secure system than the current manual writing system can provide better services than ever before.

Simply put, technology is being brought into agriculture step by step so that everyone involved will be comfortable and they will fully support it.

Purpose

This software is designed by us for the regional agricultural service offices and the district agriculture department. Here more attention is given to regional agricultural service offices. This provides facilities for identifying the farmers in the area, identifying the farmlands, tracking their expansion and growth, identifying the farmers' products and selling or distributing the agricultural materials and equipment distributed by the government. Farmers in the area can register in the system and get all their information. Thus, it is easier to study the development of agricultural activities locally.

And as an aim of this, efforts have been made to break the system of getting farmers' products at a very low price through middlemen. During those seasons, a report on various crops or animal products is obtained and necessary arrangements are made to give it to the businessmen of that area or another area.

The obtained data will be displayed in the systems of the offices all over the island. Businessmen in the areas are also registered in this system. Therefore, by informing them about the data of these results or businessmen can get details through a phone call to the office. These tasks are more convenient because farmers and businessmen are registered in the system. And with this, even agricultural land is registered. They are being updated. It can more easily study the changes that have happened in the agricultural activities in the area.

Most of the activities that are done by hand writing are done electronically. There are facilities in the system for conducting sales transactions. By doing so, the fertilizer, plants and other sales materials received by the office can be billed easily. All this data is entered into a database so that automatic bill calculation and printing can be done.

Apart from these activities, the system is designed for many office uses. It has been designed with the aim of ease of data updating, ease of data protection and ease of study.

Scope

The main reason for many of the current problems in Sri Lanka is the lack of proper management of agriculture and all related activities. As a result, Sri Lanka is rapidly heading towards an economic and food crisis. This system is not a big complex system. Because it is not possible to introduce a complex system or technology to the people engaged in agricultural activities at once. Therefore, the management of the work is carried out by taking the technology to the farmers through the regional agricultural service office systems controlled through the Ministry of Agriculture, which is directly involved in the agricultural activities.

One of the objectives of this is to break the middlemen in the sale of farmers' produce. By giving the right value to the farmers and giving them the opportunity to develop it further. The excessive amount of work and high cost of selling goods should be minimized. Arrangements are being made to deliver the products of the farmers registered through this system to the businessman in the farmland itself. Apart from that, the office only has to make phone calls. Farmers provide information a few weeks before harvesting the products and they are systematized and placed in the hands of businessmen through agricultural service offices throughout the island. In this way, instead of working through middlemen, a better price is given to the farmers by the intervention of the government. This can reduce storage problems and sun protection problems for farmers. Because this makes it possible to sell the farmers' harvest or produce to the businessman very quickly.

Currently, the hand writing method is used in these offices. That method is really a difficult process. Due to the difficulty of protecting that data, there is a risk of data destruction. By this method, all data is entered electronically into an electronic database. All work in the office can be done easily and accurately.

Reasons of gathering data

Before beginning any project, we must collect all the information we'll need. Only then can we decide on our project's budget and other key factors. Additionally, gathering all relevant information before the job begins helps us save time. because we cannot continue to implement the project while we are working on it. As an illustration, if we begin our project without gathering data, we can carry out the project's tasks as we want. However, we cannot contest that if the customer is told they do not require that feature after we have shown them the produced component. This is because we began working on our project

before gathering any data and since our project was not approved. So, both time and money are being wasted. We must acquire all the data required for our project and receive project approval if we are to avoid these issues. Both the project's cost and completion time are rising as a result.

Used data gathering techniques

For this we used interviews and questionnaires. First of all, some people from the Ministry of Agriculture were used for this purpose. No matter where this is implemented, the Ministry is responsible for it. Questionnaires were presented to the heads of agricultural service offices across the island to be given to the employees working there and interviews were conducted through zoom and MS Teams while studying them. It takes a lot of time and money to carry out research in each province. Therefore, several rounds of discussions were held with the office heads of offices across the island through online interviews.

But we took 2 agricultural service offices each from one province to cover the name of the province all over the island and went to those places to collect data. We were able to gain an understanding of the current system, how data is used, facilities and employees' knowledge.

Not stopped by that, we went among the farmers in some of the most difficult areas and conducted a study on how they are currently dealing with government institutions. The necessary questionnaires were also presented and data was collected and they were given some understanding about how the work we are going to do will be important to them in the future.

Based on the findings from those discussions, the technologies, functions and application features of the system we are creating are below.

Must be a role-based system

- ✓ Different user roles should exist in the system.
- ✓ Administrators should be able to control all those user roles.
- ✓ Roles should be given different privileges separately.
- ✓ The management of the data shall be owned by the administrator.
- ✓ The head of the office should be able to monitor the data of the cashier section.
- ✓ Transactions should be able to check bills.
- ✓ The telephone department should be able to monitor the information of businessmen and farmers.

App Features

- ❖ Registration facilities
- ❖ Search facilities
- ❖ Report generate facilities
- ❖ Billing system available
- ❖ Password change available

Functional Requirements

- access to practically any detail in the system and the ability to Add, Update, Delete, and View it.
- Individual user roles (depending on the role the information that is shown should be limited)
- Information about the Product & Client should be Clearly Visible
- Present-day UI/UX Interface

About Our Company

January (Pvt) Ltd is one of the fastest growing companies in Sri Lanka. As a company that successfully provides software solutions, it has conquered the Sri Lankan market as well as the international market. The company was founded in the year 2010 by S K D Tharindu Madhusanka, a software engineer and successful entrepreneur. R.M. This company, which was started with Kavindu and several other software engineers, has now opened several branches all over the island. Our company's head office is located at 413 R. A. De Mel Avenue, Colombo.

Our company has developed software solutions, mobile applications, web applications, websites and many other services for several local and foreign leading companies and even now several companies are working with us. By the year 2021, according to the survey conducted by the SLTMOBTEL company, it has managed to get the leading position among emerging companies. And the web browser named "JBrowser" which we created became the best application among those companies.

The Ministry of Agriculture has chosen the January company to create a system with quick and simple solutions, which is a great success for the problems they need.

Current tools and techniques for this application

Front end development

- Java – Java is used to develop front-end of our system

Back end development

- Java – Java is used to develop back-end of our system

database development

- MYSQL – MySQL is used to create Database of our system
- Workbench – Workbench is used to create ER-diagram and to create physical database using forward engineering tool.

Integrated Development Environment (IDE)

- Netbeans - This IDE is used to code the java and other technologies

Risk Analysis

ID	Risk	Impact	Probability	Control measure
01	A team member may develop unanticipated limitations or fail to contribute as planned.	There will be a delay in project delivery.	40%	Redistribute the tasks of any team member whose contribution has failed to the remaining team members.
02	The team leader does not assign tasks based on the abilities and strengths of the team members. The entire project may then be impacted.	There will be poor project quality.	35%	Prior to assigning responsibilities to team members, each member must be aware of their strengths and capabilities. The team leader can

				then assign work based on the skills of each member.
03	Failure of a project owing to a lack of abilities based on programming language knowledge	There will be poor project quality.	65%	The team leader must motivate the team to continually improve their talents.
04	Web applications might not adhere to quality control standards.	Low project quality is what the clients may anticipate. The acceptance of the final project will be failed.	70%	Create the software in accordance with the standards for quality assurance.
05	Lack of constructive attitude and not making equal commitment towards the project.	It will have an impact on the entire project and might prevent it from being finished on time.	20%	The team leader must discuss the significance of the project.

System Architecture

Architectural Design

It is designed for the processes of Administrators, Cashiers, Field Officers, and Heads of Agricultural Service Offices. That is, they are the users of this system. Registration and login facilities are primarily provided by this system to the above users.

First time users need to register with him and successful registration is done by admin. Then the user comes directly to the home page. From there you have to select your user type and you can access the system only by verifying your username and password. After that the user can monitor his account. The work of this system is completely maintained by the system administrator. He can experience report viewing, account maintenance, report generation, billing, registration and all the facilities available here. For other users, there are only tasks reserved for them. They are discussed below.

The following application has been developed to consolidate these activities.

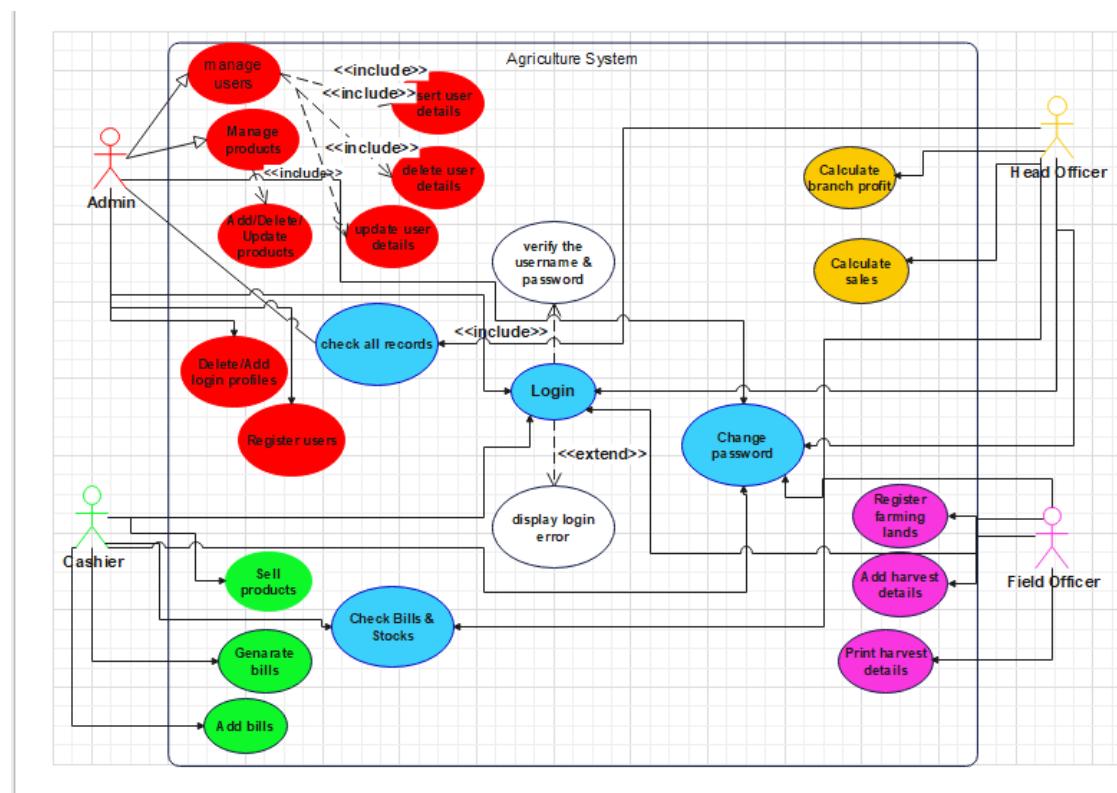
It has a front end, back end and a database. But here both front end and back end remain one. The front and back end is the stand-alone application and a server system acts as the database end. The data is stored in one of the servers. A website is not involved so the system architecture is as follows.

The application tier is built entirely using Java. Since Java is not used, the most suitable IDE should be selected as the IDE. Because if the IDE does not contribute well to JSP, it is a problem.

Finally, we have chosen MYSQL for the data system section. MYSQL workbench provides ER diagram drawing facility. It helps us to create the physical database without manually creating it and it helps us to create a flawless database for our stand-alone application.

Decomposition Description

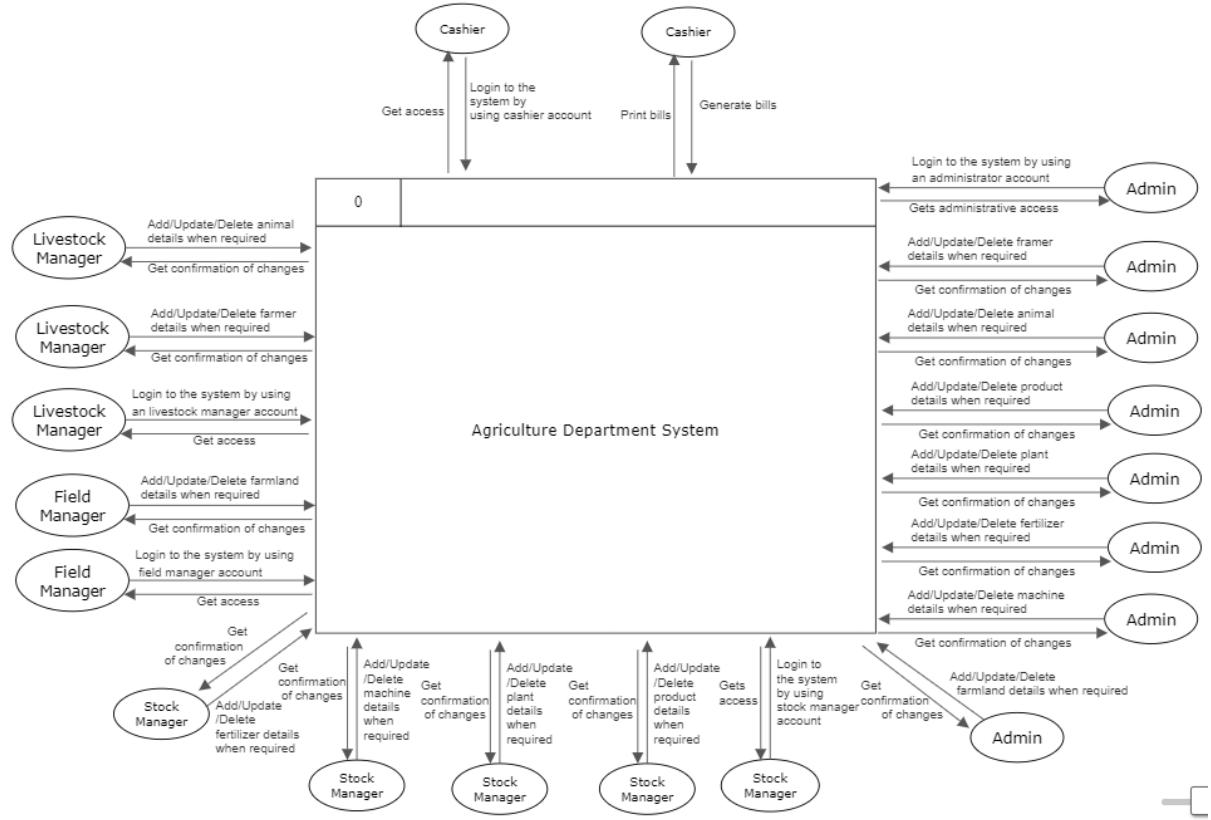
Use Case Diagram



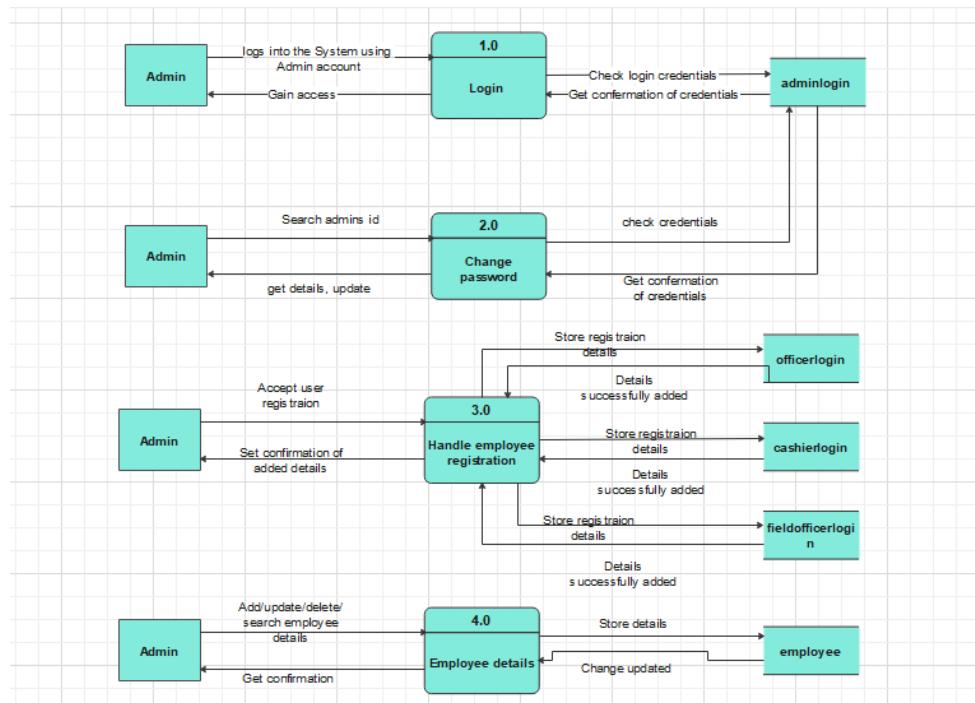
User and System requirements

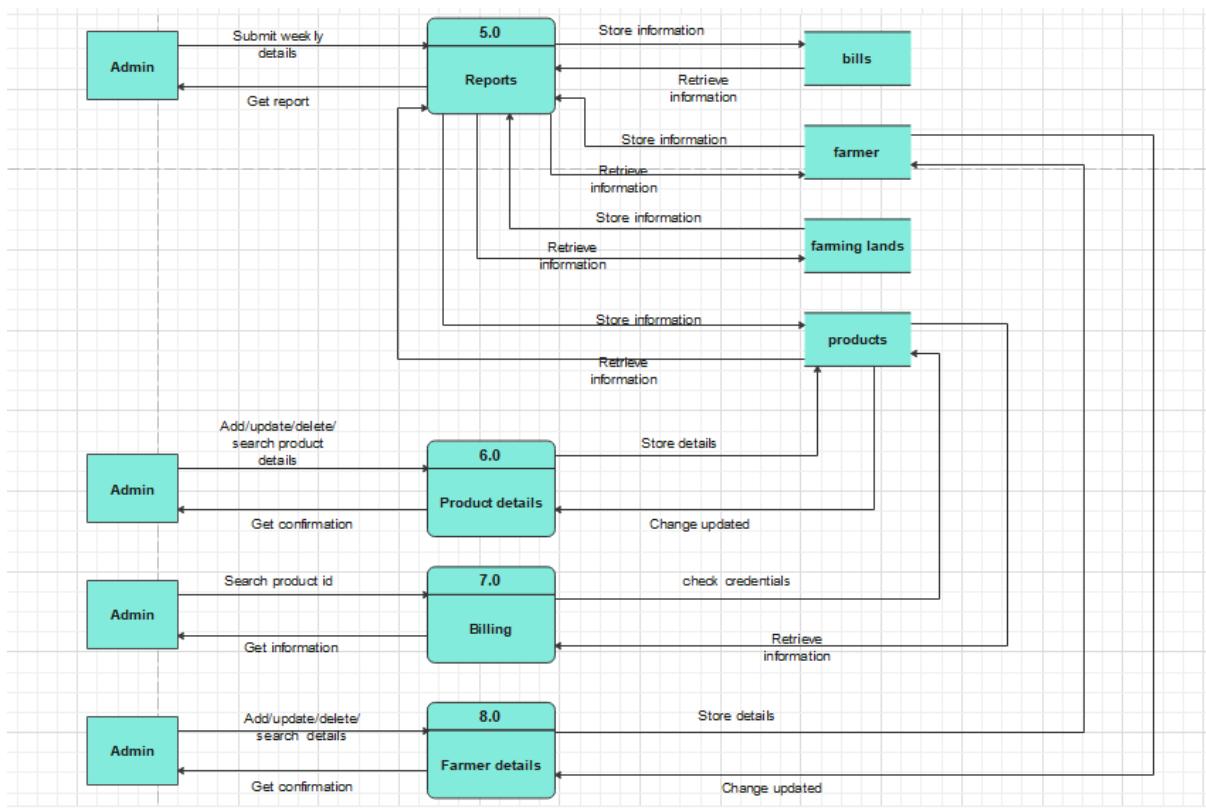
- Admin can:
 - ✓ Login and logout the system
 - ✓ Add, delete, update, search farmers
 - ✓ Add, delete, update and search employees
 - ✓ User account create
 - ✓ Billing System
 - ✓ Add, delete, update products
 - ✓ View all records of system
- Cashier can:
 - ✓ Login and logout the system
 - ✓ Work with billing system
 - ✓ Add bills
 - ✓ Check bills
 - ✓ Check products
- Head officer can:
 - ✓ Login and logout the system
 - ✓ Check all reports of system
 - ✓ Check all records of system (profit, sales, employees...etc)
- Field Officer can:
 - ✓ Login and logout the system
 - ✓ Add, delete, and update farmers
 - ✓ Add, delete and update farming lands
 - ✓ Add reports of farming develop
 - ✓ Add, delete, and update harvest information

Context Diagram

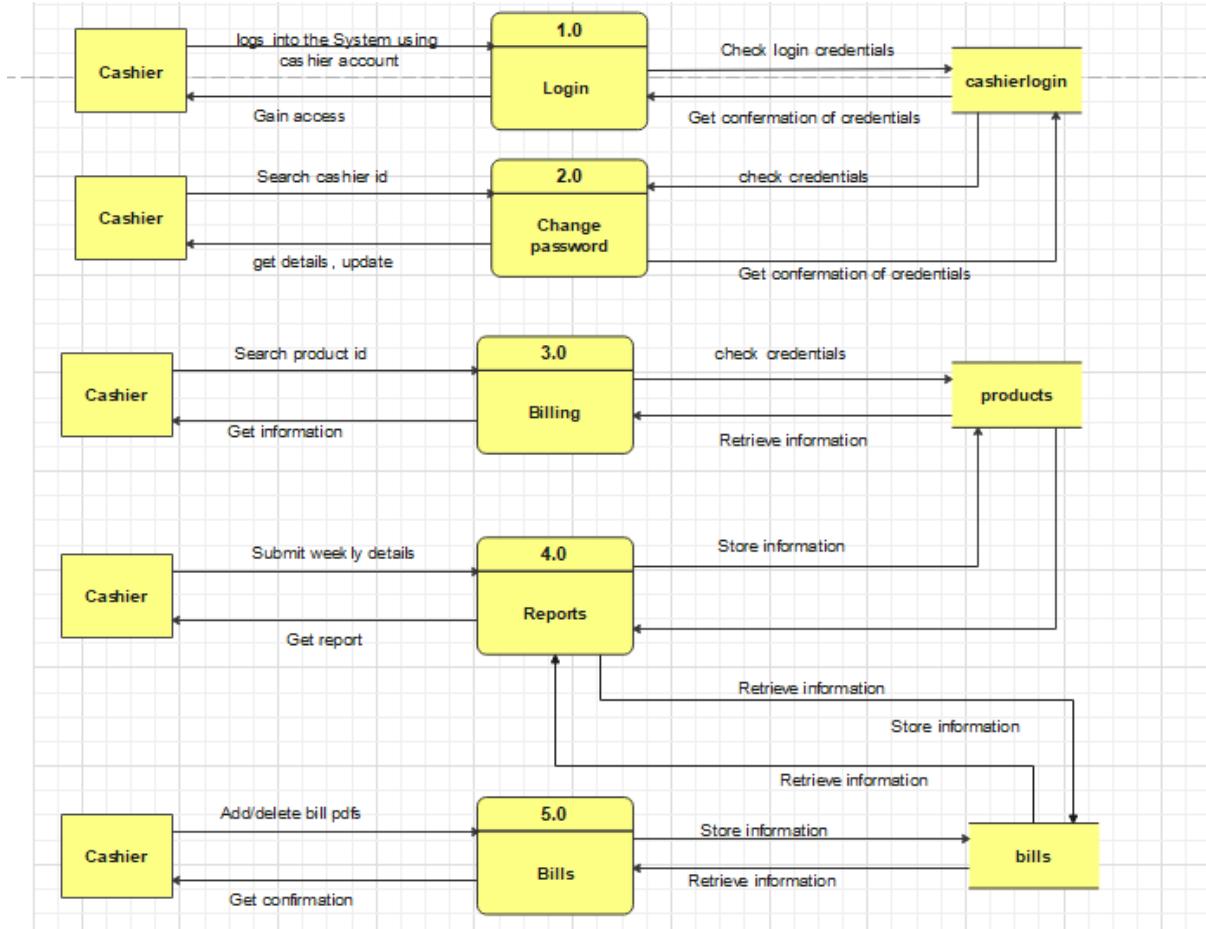


DFD level 01 for Admin

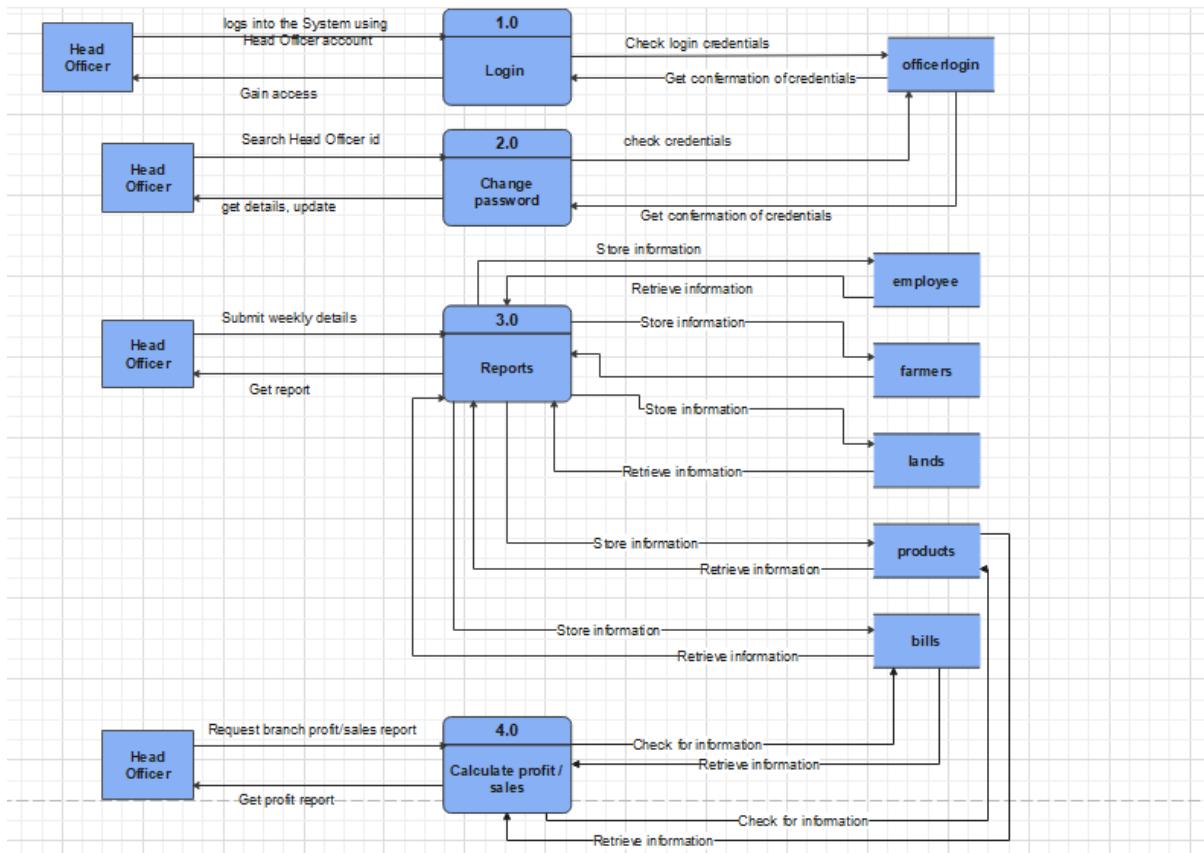




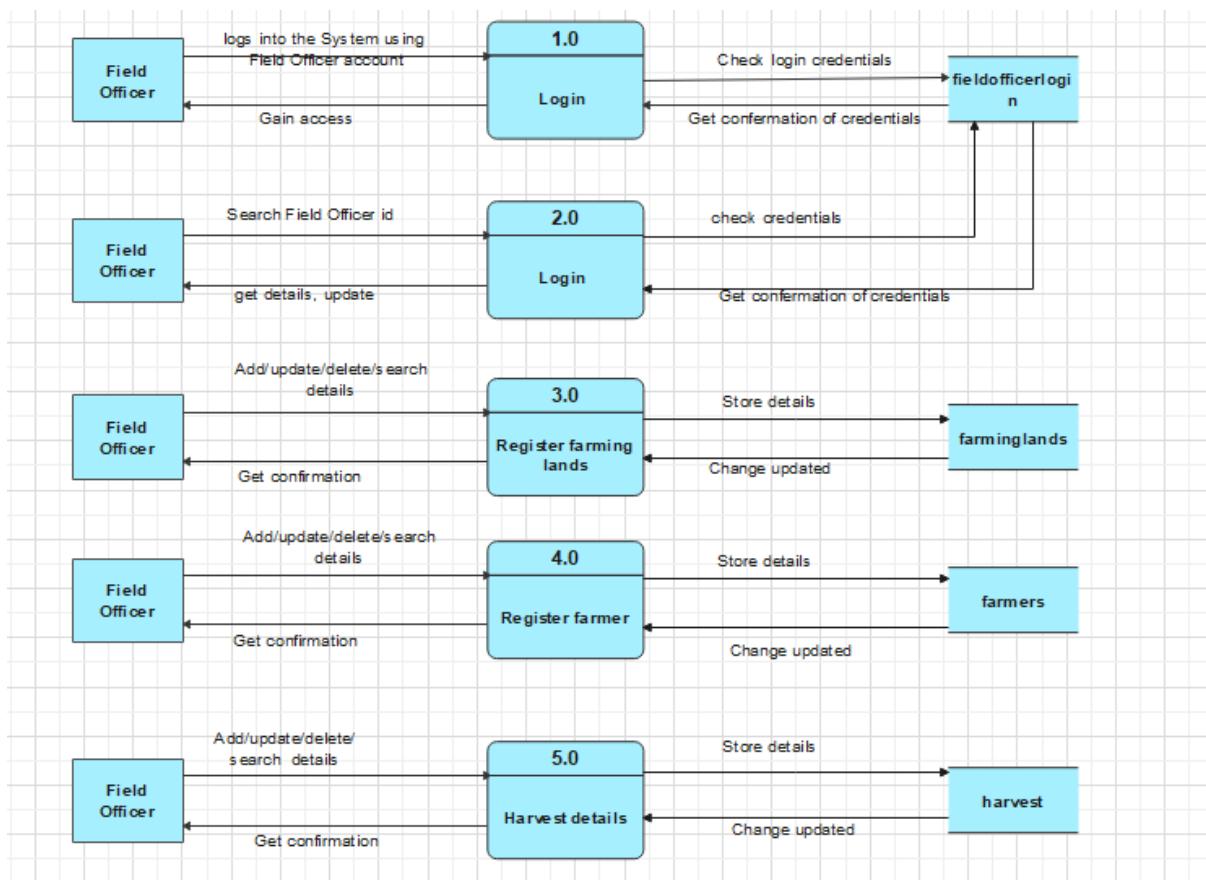
DFD level 01 for Cashier



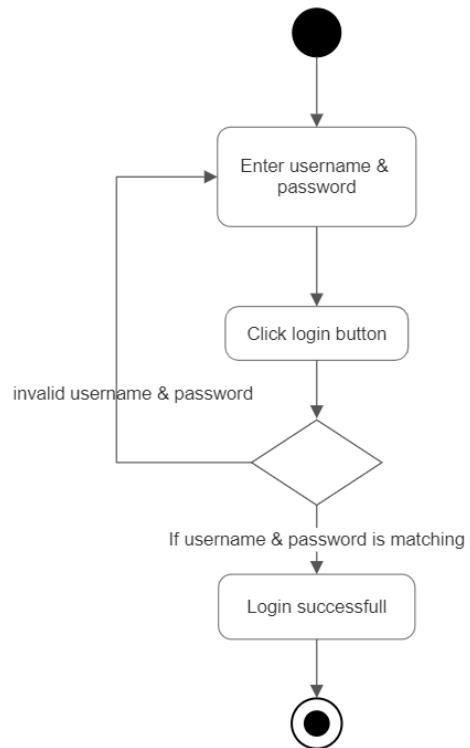
DFD level 01 for Office Head



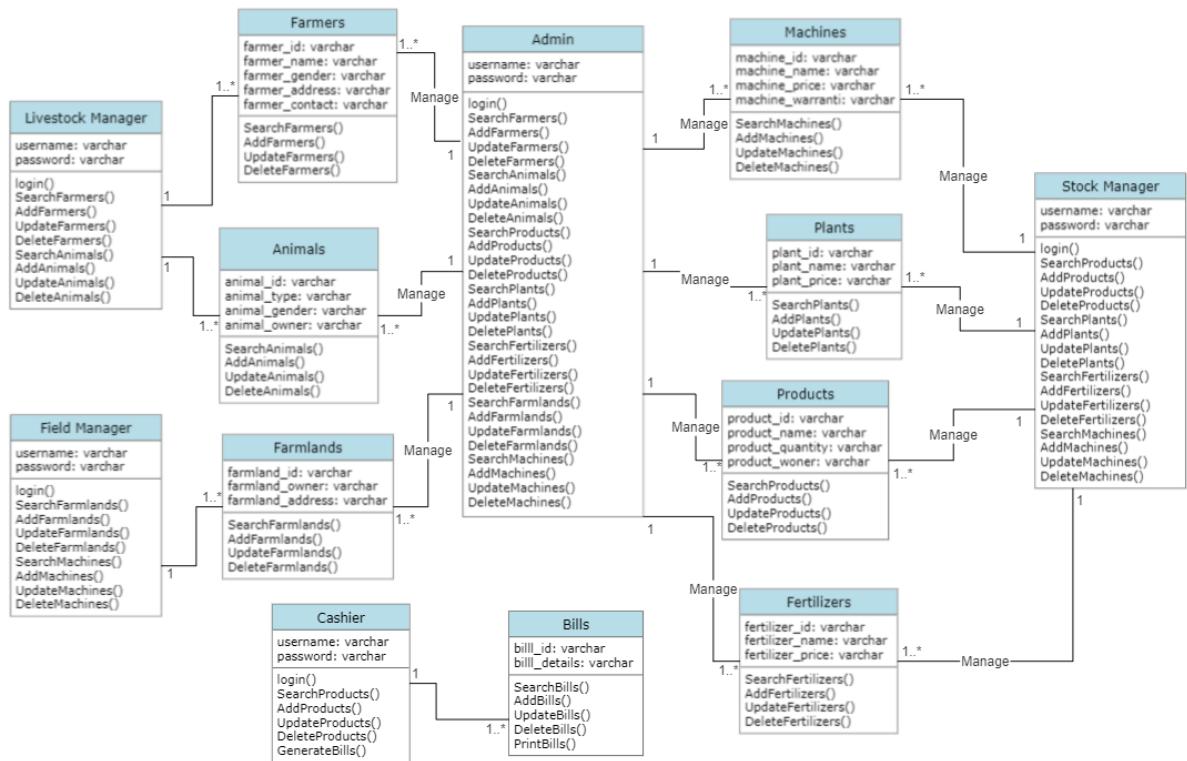
DFD level 01 for Field Officer



Activity Diagram

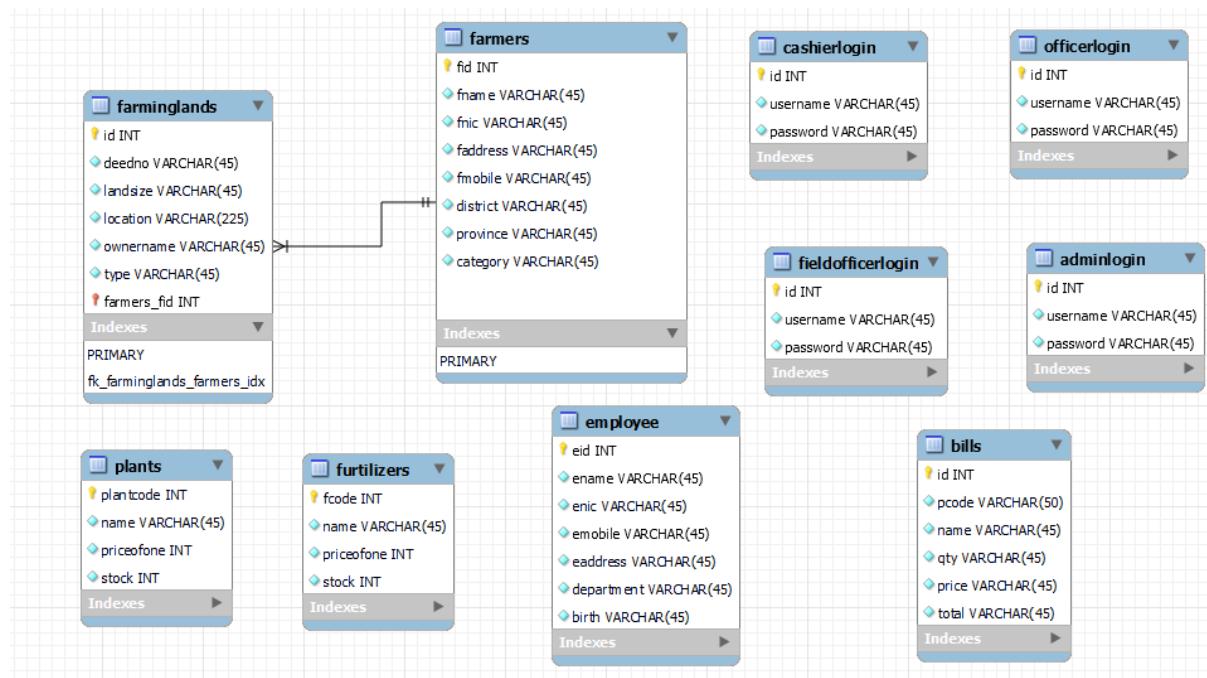


Class Diagram



Data Design

Data Description



Data Dictionary

Database Name	Field	Type	Null	Default
adminlogin	id	INT	No	
	username	VARCHAR	No	
	password	VARCHAR	No	
cashierlogin	id	INT	No	
	username	VARCHAR	No	
	password	VARCHAR	No	
fieldofficerlogin	id	INT	No	
	username	VARCHAR	No	
	password	VARCHAR	No	
officerlogin	id	INT	No	
	username	VARCHAR	No	
	password	VARCHAR	No	
employee	eid	INT	No	
	ename	VARCHAR	No	
	enic	VARCHAR	No	
	emobile	VARCHAR	No	
	eaddress	VARCHAR	No	
	department	VARCHAR	No	
	birth	VARCHAR	No	
farmers	fid	INT	No	
	fname	VARCHAR	No	
	fnic	VARCHAR	No	
	faddress	VARCHAR	No	
	fmobile	VARCHAR	No	
	district	VARCHAR	No	
	province	VARCHAR	No	
	category	VARCHAR	No	
farminglands	Id	INT	No	

	deedno	VARCHAR	No	
	landszie	VARCHAR	No	
	location	VARCHAR	No	
	ownername	VARCHAR	No	
	type	VARCHAR	No	
plants	plantcode	INT	No	
	name	VARCHAR	No	
	priceofone	VARCHAR	No	
	stock	VARCHAR	No	
fertilizers	fcode	INT	No	
	name	VARCHAR	No	
	priceofone	VARCHAR	No	
	stock	VARCHAR	No	
bills	id	INT	No	
	pcode	VARCHAR	No	
	name	VARCHAR	No	
	qty	VARCHAR	No	
	price	VARCHAR	No	
	total	VARCHAR	No	

Component Design

Login Functionality

When comes login function admin and other user account details are checking in there and if entered login details are match to the admin details or other user details, it will redirect to the relevant pagers. If entered login data is not equals to the user database details, it will display a error message.

Pseudocode for Login Function

If admin and other users filled all required input fields and match to the front-end validation

Login function will work

If admin and other users entered login information are match with the database

information

User will be Redirected to the index page

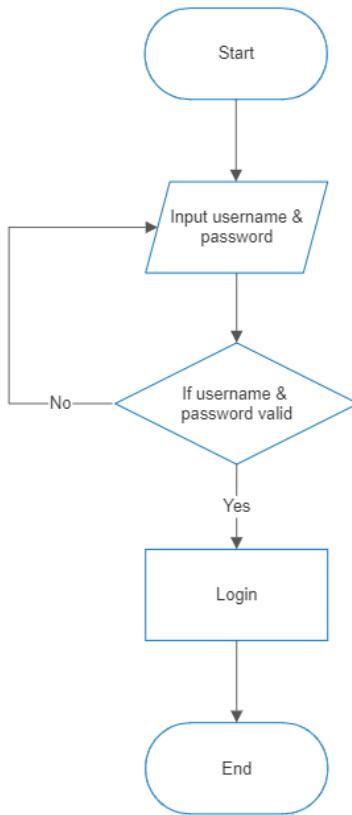
Else

Display error message on login page

Else

Required input fields will be show an error and ask admin and other users to fill empty fields and reenter invalid data

Flowchart for Login Function



Search Functionality

Pseudocode for Search Function

If admin or other users click search button and search input filed is not empty

 Search function will work

 If search input matches

 User will see the search results

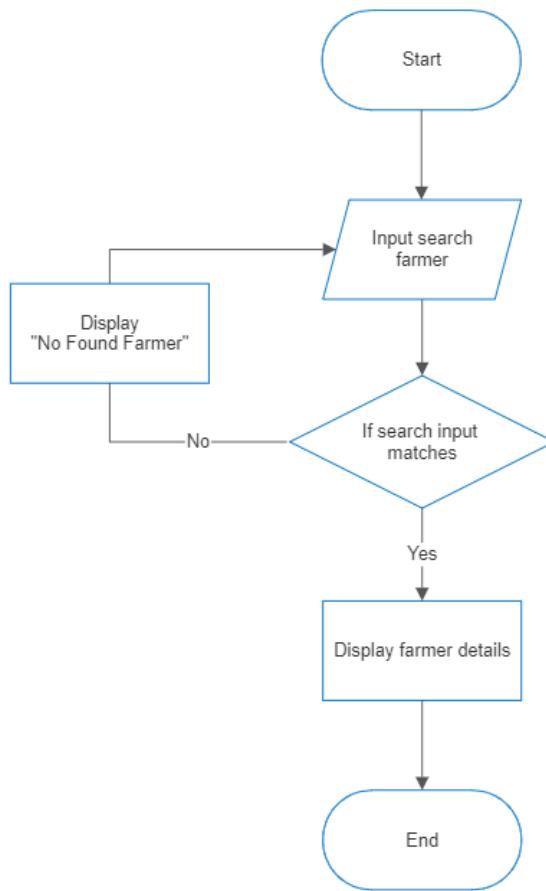
 Else

 'No Found' message will be displayed

 Else

 'Filed Empty' message will be displayed

Flowchart for Search Function



Registering Farmer Function

Pseudocode for Add Farmer Function

If admin clicks Add farmer tab on farmers dashboard in admin panel

 Display add farmer window

 If admin filled all required input fields and match to the front-end validation

 Add farmer function will be worked

 If add farmer function able to successfully add farmer into database

 Display successful message will be displayed.

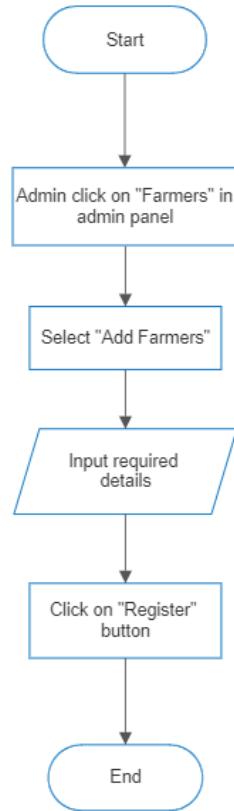
 Else

 Error message will be displayed

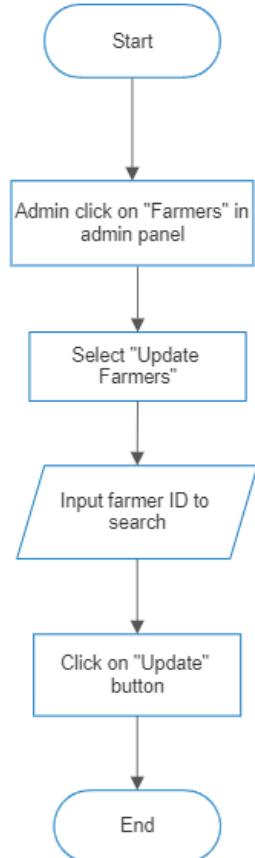
 Else

 Required input fields will be show an error and ask user to fill empty fields and reenter invalid data

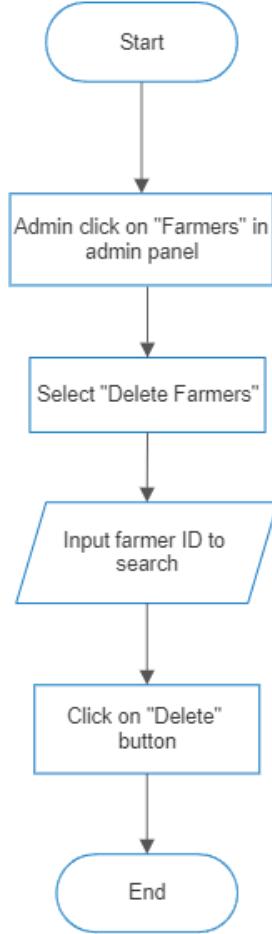
Flowchart for Add Farmer Function



Flowchart for Update Farmer Function



Flowchart for Delete Farmer Function



Human Interface Design

Overview of User Interface

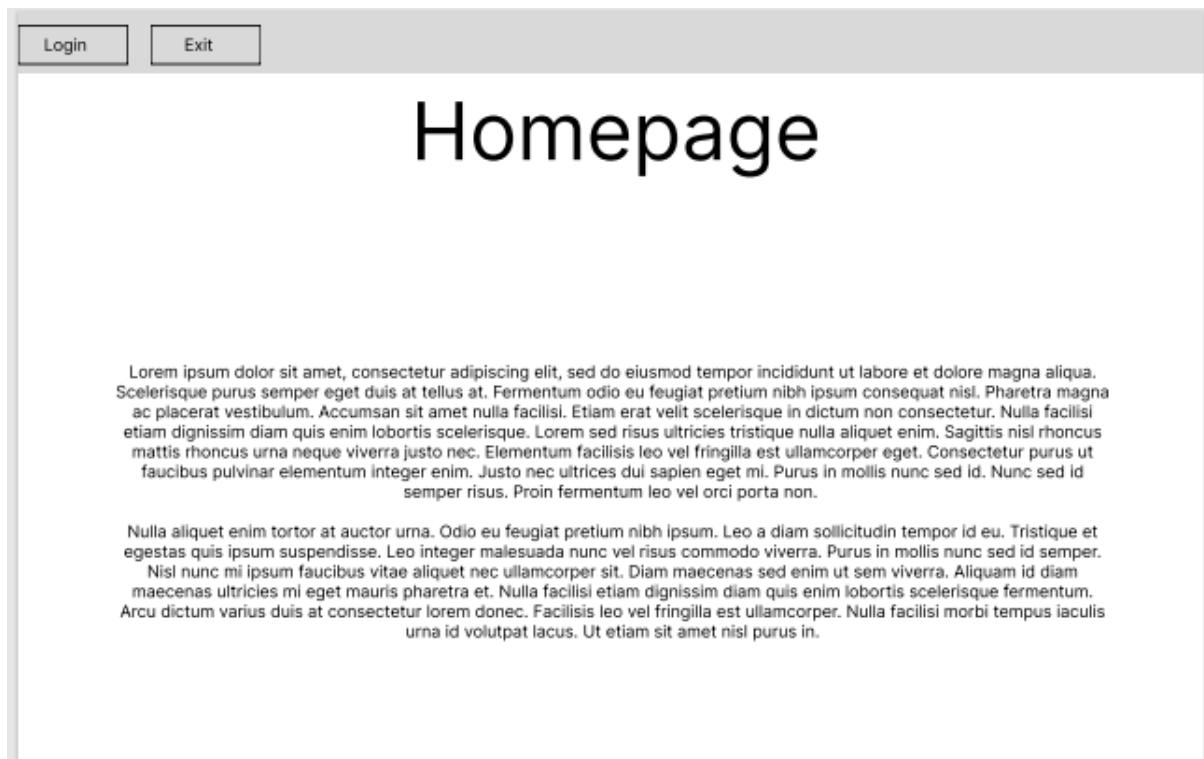
This stand-alone application is designed for use in Agricultural Service Offices throughout the island. We didn't focus 100% on the attractive appearance here, as there is no public web application attached to it. But if the app users do not have some attractiveness in the app, it is also difficult to use it. So we develop this to be moderately attractive. All procedures and categories should be properly organized and attractive to all pagers.

JFrame Forums need to adapt to current GUI and computer preferences. Then in some way the efficiency of the employees who use this can be increased. Designing user interfaces in a user-friendly manner is very important for users and thus can minimize mistakes or errors. Here we have decided to use icons for some parts instead of buttons. Those icons will give the app some appeal rather than just clicking a button.

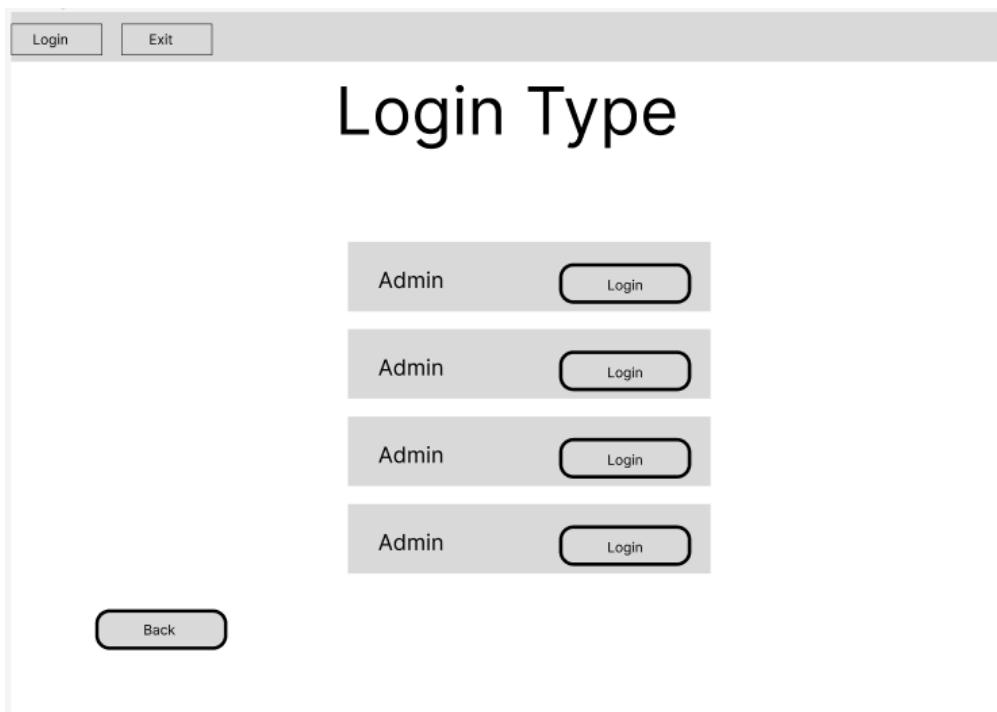
- ✓ Users can log into the system using their account username and password.
- ✓ Allows the user to change his password and username.
- ✓ User's account details can be changed

Screen Images

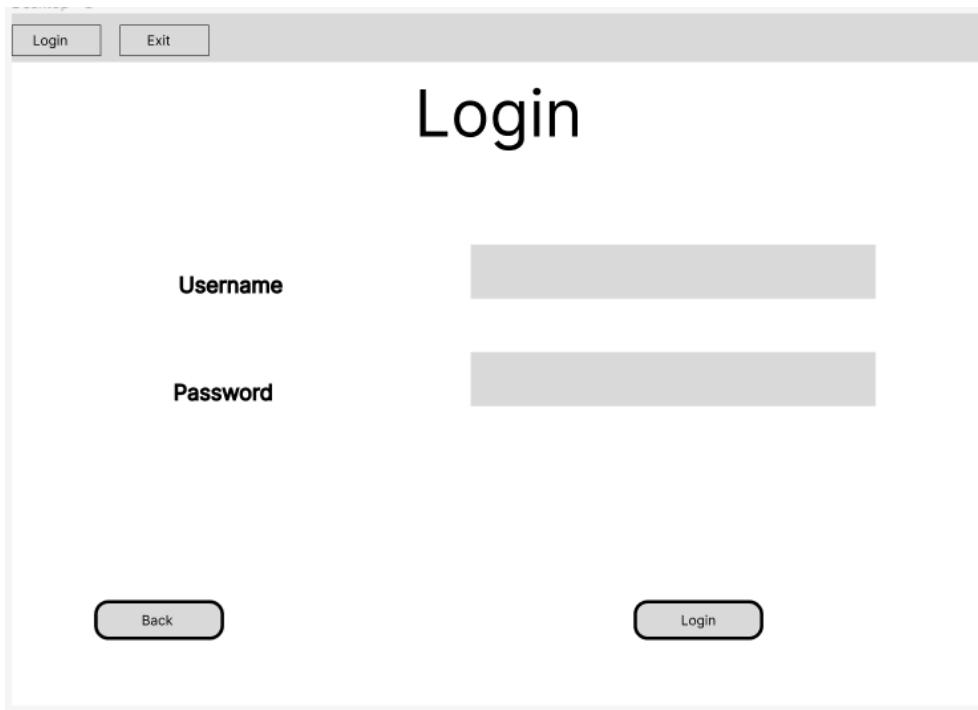
➤ **Homepage**



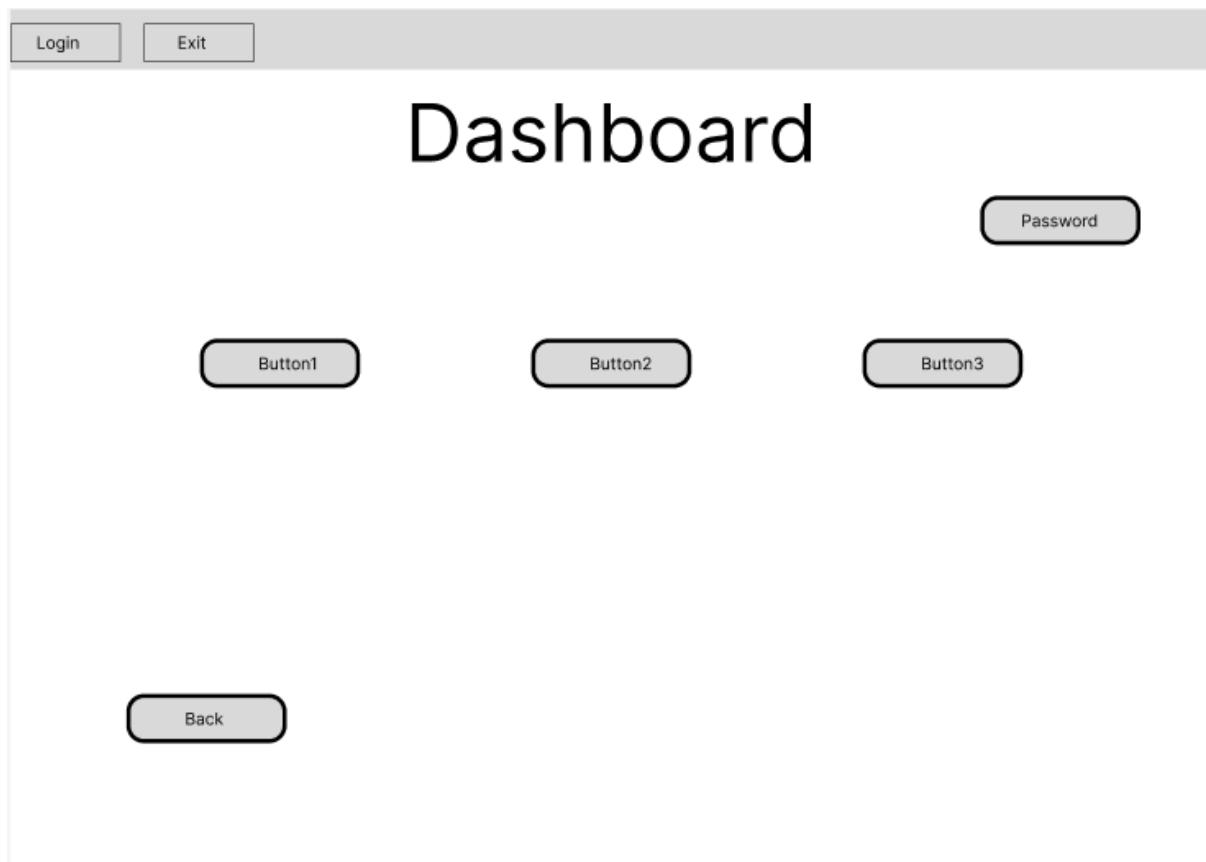
➤ **User type select Interface**



➤ **Login Interface**



➤ Dashboards



➤ Farmer Registration Interface

A screenshot of a registration form. At the top left are 'Login' and 'Exit' buttons. The main title is 'Registration Form'. Below the title are five input fields with placeholder text: 'Name', 'NIC', 'Address', 'Mobile', and 'Category'. At the bottom left is a 'Search ID' input field and a 'Search' button. Below these are four buttons: 'Back', 'Insert', 'Update', and 'Delete'.

➤ **Table Interface**

The screenshot shows a user interface titled "Tables". At the top, there are "Login" and "Exit" buttons. Below the title is a table with six columns labeled "Column1" through "Column6". Each column is represented by a light gray rectangular box. At the bottom of the interface are "Back" and "Update" buttons.

➤ **Account Add Interface**

The screenshot shows a user interface titled "Account Create". At the top, there are "Login" and "Exit" buttons. The main area contains two input fields: one for "Name" and one for "Password", both represented by light gray rectangular boxes. At the bottom are "Back" and "Create" buttons.

Other Non-functional Requirements

Performance & Safety Requirements

This application should have high performance and low failure rates. All activities through this application and the entire system should be designed to be more precise.

Any delay may be due to system errors. It is the responsibility of the admin or field officer to enter the information of the farmers in the system and register them. If both of them do this process at the same time, it should be possible to do it without any problem. And there is a sales process here. The cashier should always update the data system and take care of the product stock. Security is not much of a problem here. Because a web application is not used, it is difficult to commit data theft. But care must be taken when using the Internet from office devices or connecting employees' personal devices to office computers or routers, etc.

Security Requirements

Adding two or more firewalls to the server is necessary when it comes to the server side. In order to shield the server from hackers, a fake firewall must also be added. More secure than other DBMSs is MySQL.

Consequently, the server is also benefiting from another benefit. Additionally, the system must be given priority both internally and publicly. For this reason, we must create privileges for each employee when we design the DBMS. We may then protect our system from illegal access.

Software Quality Attributes

The robustness, reusability, flexibility and maintainability of the Agricultural POS system should be maximized by enabling users to apply custom settings to the application.

Requirement ID	Requirement Description	Test Case ID	Test Description	UAT test req?	Test Design	Test Designer	Test Execution			Defects?	Requirement Coverage Status
							Test Env	UAT Env	Prod Env		
1	Login to the Application	TC 01	Login without entering username and password	No	Completed	Tharindu	Passed	No run	No run	None	Completely
		TC 02	Login with only entering username	No	Completed		Passed	No run	No run	None	Completely
		TC 03	Login with only entering password	No	Completed		Passed	No run	No run	None	Completely
		TC 04	Login with invalid username and valid password	No	Completed		Passed	No run	No run	None	Completely
		TC 05	Login with valid username and invalid password	No	Completed		Passed	No run	No run	None	Completely
		TC 06	Login with both invalid username and password	No	Completed		Passed	No run	No run	None	Completely
		TC 07	Login with both valid username and password	No	Completed		Passed	Passed	No run	None	Completely
2	Register Farmer	TC 08	Registration without entering any data	No	Completed	Tharindu	Passed	No run	No run	None	Completely
		TC 09	Registration without entering name only	No	Completed		Passed	No run	No run	None	Completely
		TC 10	Registration without entering NIC only	No	Completed		Passed	No run	No run	None	Completely

		TC 11	Registration without entering Mobile number only	No	Completed		Passed	No run	No run	None	Completely
		TC 12	Registration without entering Address only	No	Completed		Passed	No run	No run	None	Completely
		TC 13	Registration without entering District only	No	Completed		Passed	No run	No run	None	Completely
		TC 14	Registration without entering Province only	No	Completed		Passed	No run	No run	None	Completely
		TC 15	Registration without entering Category only	No	Completed		Passed	No run	No run	None	Completely
		TC 16	Registration with entering all data	Yes	Completed		Passed	Passed	No run	None	Completely
3	Register Employee	TC 17	Registration without entering any data	No	Completed		Passed	No run	No run	None	Completely
		TC 18	Registration without entering name only	No	Completed		Passed	No run	No run	None	Completely
		TC 19	Registration without entering NIC only	No	Completed		Passed	No run	No run	None	Completely
		TC 20	Registration without entering Mobile number only	No	Completed		Passed	No run	No run	None	Completely
		TC 21	Registration without entering Address only	No	Completed		Passed	No run	No run	None	Completely
		TC 22	Registration without entering Job only	No	Completed		Passed	No run	No run	None	Completely
		TC 23	Registration with entering all data	Yes	Completed		Passed	Passed	No run	None	Completely

4	Change Password and Username	TC 24	Change Username only	Yes	Completed		Passed	Passed	No run	None	Completely
		TC 25	Change Password only	Yes	Completed		Passed	Passed	No run	None	Completely
		TC 26	Change both Username and Password	Yes	Completed		Passed	Passed	No run	None	Completely

Conclusion

This report includes well-structured Software Design Documents (SDD). This report was created for the Agriculture Systems Project. This SDD document contains everything required to develop this application.

I have discussed the current system of agricultural service offices and how to solve the existing problems and quickly move to the development process to create solutions through this application. In January company, as a member of this project team, I have collected the basic requirements through the data collection method by conducting interviews through zoom and MS Teams platforms as well as several other methods.

After gathering all the information and getting a proper understanding of the applications to be developed, we have selected the tools and technologies for this application. We also conducted small-scale research on the tools and technologies used.

After that we have created all important diagrams for these applications to get a clear understanding about how to develop these applications. Moreover we have also designed graphical user interfaces to show the graphical representation of this application to the client.

L02

Introduction

These documents mainly contain software development tools and techniques that can be used to create an "Agricultural System". Also, the most suitable and relevant tools and technologies for this stand-alone application are defined here.

Additionally, I will make a brief comparison of the differences between the various application development tools and techniques, along with the justification of the chosen tools and technologies, as well as our preferred software development methodology, when choosing the best tools and technologies for stand-alone applications. There will be discussion of our advantages, the reasons behind our decision to use particular tools and technology, and how well each of them fits the given situation.

Tools and Techniques for Application

Due to the current situation in the country, the government is bringing quick solutions to solve the problems in various sectors. As a result, our company was entrusted with the responsibility of developing this application.

The tools and technology you choose for your app should be the first thing you think about in your strategy before you start developing it. You should take your application's demands into consideration while selecting tools and technologies. Depending on your needs, you should think about the tools and technology for your application. There, you must take numerous factors into account, including security, functionality, dependability, and expressiveness. The option we choose will rely on our demands because each instrument and approach has advantages and disadvantages.

What are the available tools and techniques

The majority of the UI code that interacts with users is handled by the front-end, while server-side coding is handled by the back-end. The audience can see the front end, but not the back end. Its internal operations are consequently also its responsibility.

It states that we must respect all facets of Object-Oriented Programming Languages when it comes to our problem description. Consequently, we must rigorously adapt the OOP paradigm when we develop our web application. There are a variety of tools that may be employed to implement the agricultural system application in this scenario.

Requirements for build Stand-Alone Application

Languages

A programming language is an instruction set made up of words, phrases, and grammatical rules for PCs and other computing devices. Among the high-level languages that may be used to create computer code are BASIC, C++, Pascal, and COBOL. High-level and low-level languages are the two main divisions of programming languages.

Programming languages known as low-level languages are those that are compatible with a computer's hardware and its limitations. It typically maintains a computer's operational semantics and has no relational abstraction to a computer. A computer's native language is frequently referred to as the low-level programming language. Low-level languages include, but are not limited to, machine language and assembly language.

You can construct programs that are mostly independent of the specific type of computer you are using by utilizing a high-level programming language. They differ from computer speech in that they are "high-level languages," since they are more similar to human speech. High-level languages are far simpler to learn and master than lower-level languages.

The benefit of low-level languages is that they are simpler to comprehend, write, and maintain. A compiler or interpreter must ultimately translate every program written in a high-level language into machine code.

Examples: PHP, C++, Python, Swift, Java, Pascal

We have chosen Java language for this project. The following points were considered for that.

- Independence from the platform.

The main benefit of Java is that it can run on any platform owing to the Java Virtual Machine (JVM) feature. It is easier to design software for various devices when it is written on a single computer and then translated into the local operating system's machine code.

- OOP Concepts

Because Java is an object-oriented language, it is simple to scale, extend, and modify any corporate application written in Java. Java programmers may leverage predefined design patterns to create feature-rich programs. Additionally, reusable code and modular projects are available to developers. They may easily make modifications to the application code using the source code.

- It is open source

It is an open-source programming language. The Java community regularly updates it with new releases and versions, and it is free to use. A new version that offers improvements and even better functionality for Java programming occasionally becomes

available. Because it is open-source, the price of development is greatly reduced. Additionally, the open-source libraries hasten the creation of apps, which helps businesses acquire a competitive edge.

➤ It is secure

Because Java application development services are extremely safe and dependable, businesses choose them. The programming language has built-in security features to guard the application from phishing scams, dangers, SQL injections, and other weaknesses. Java offers libraries that provide the program with additional security measures.

The problems that might represent specific hazards to data security are immediately recognized by developers. Java programming makes it easier to create safe programs for several platforms.

➤ More development tools

For creating reliable and scalable applications, Java frameworks, libraries, and tools are incredibly powerful. Some of the frameworks for creating software solutions include Apache, Spark, and Grails. Companies employ Angular, a new framework, in conjunction with Java to create excellent apps. There are several libraries that make programming easier and quicker. There is a library for practically every function, including app integrations and testing.

Database Management Tools

The software that encodes data for storage in databases and provides access to it through data retrieval techniques is known as the Database Management System (DBMS). Through command line SQL, it is challenging to acquire a broad picture of your data. You can examine the state of your database much more effectively with a graphical user interface, and you can manage it more effectively with improved visibility.

DBM (database management) solutions help database administrators and system administrators do maintenance-related activities efficiently and quickly. Most DBAs had to build, modify, and remove databases via the command line until these tools became widely used. Use a database software or tool to create, update, and manage data documents and records. Users of this kind of software can store data in the form of arranged tables, columns, and fields that can then be accessed directly or through programming.

Examples:

➤ Microsoft SQL Server Management Studio

A free tool from Microsoft that makes the administration of SQL Server database easier.

➤ MySQL Workbench

A free tool produced by Oracle to help manage and tune MySQL databases.

➤ phpMyAdmin

A free tool to manage MySQL and MariaDB databases for Windows and Linux.

➤ Sequel Pro

Sequel Pro, an accessible MySQL database administration front-end application, is a favorite choice for Mac OS users. You can quickly browse the app thanks to its sleek and user-friendly GUI, which keeps things simple. Check out Sequel Pro's documentation page to get start with it.

➤ RazorSQL

An Oracle database query tool with syntax highlighting and management features is called RazorSQL. The user may run queries and edit SQL and PL/SQL scripts using the SQL editor. There are more than 20 languages supported, including SQL, Java, PHP, XML, and others.

Information may be browsed, sorted, estimated, reported, and shared using these database apps. Databases may also contain code for numerical and statistical analysis of the information shown on the internet in order to facilitate searches. Typical examples of data management solutions include RazorSQL, Oracle, MySQL, and phpMyAdmin.

Contrasting options and choosing the finest IDE for our software system.

We must choose the RDBMS that would work well for our standalone application based on top-ranked RDBMSs. You now know that we choose a back-end programming language and front-end technology for our application. We must now choose an RDBMS. It's crucial to select the appropriate Relational Database Management System. To do that, we must contrast their qualities, advantages, and disadvantages.

Which is the finest RDBMS when it comes to Oracle databases. the object-relational approach it employs, which enables the storage of complicated business models in relational databases. Therefore, that is its finest attribute overall. SQL is being used in database language. SQL is the most robust and secure database language, hence. Oracle Database is thus a suitable RDBMS for us. In contrast to MySQL RDBMS, nevertheless. It has the same functionalities as are present in the Oracle.

everything save the object-relational model feature. However, the open-source relational database management system is MySQL. So, we chose MySQL as our RDBMS after taking into account all of these qualities and other factors in addition to these two databases. as it uses the same database language as SQL. Therefore, MySQL is the RDBMS of choice for the majority of complex and large-scale online applications since it is extremely lightweight,

quick, safe, and open-source. like Twitter, Facebook, Flickr, and YouTube. Because it was open-source and we couldn't afford to purchase it, MySQL was picked as our database.

Integrated Development Environment

A piece of software called the Integrated Development Environment (IDE) offers a variety of assistance to programmers. A source code editor, automated tool builder, and debugger are the core components of an IDE. Others, like Sharp Development and Lazarus, do not. Some IDEs, like Eclipse and NetBeans, come with the necessary translators, compilers, or both. IDEs are also referred to as programming environments (PDEs).

Which IDE is the best for JSP?

based on our project. For our back-end development, we selected Java in the programming selection section. As a result, we must use an IDE that supports Java Server Pages (JSP). Because utilizing Java to create web applications directly is not possible. It has a special technology for that called JSP. which employs Java as its primary programming language. We may utilize Java for our application based on it. You may find a list of IDEs that can implement JSP applications in the table below.

- ❖ Net beans
- ❖ IntelliJ IDEA
- ❖ Eclipse

NetBeans

An open-source Integrated Development Environment for PHP, Java, C++, and other programming languages is called NetBeans. Additionally, it facilitates the creation of any sort of Java application, including Java ME, Java SE, EJB, web, and mobile applications. Another name for NetBeans is a platform for building modular Java desktop applications. Windows, Linux, Solaris, and macOS all support NetBeans. It encompasses not just Java development but also that of Js, HTML5, C++, C, and PHP.

Features

- Code editor
- User interface management
- Data and presentation management
- Setting management
- Graphical Editing
- The Wizard framework
- Internet-based update delivery

- Multiple language support
- Visual debugger

Eclipse

Software development kit called Eclipse SDK is open-source and cost-free. The Eclipse is the greatest IDE for computer programming. The majority of programmers use this IDE, because it has a base workspace for customizing the environment and an extensible plug-in framework. This IDE is primarily used for creating Java applications and is primarily written in Java. However, it is also used to create applications in other programming languages. There are several of them, including Java, C, Fortran, C++, Python, PHP, JavaScript, ABAP, and so on.

Features

- API
- Code Development
- Debugging
- Deployment Management
- Graphical User Interface
- Web App Development
- Web/Mobile App Development

Contrasting options and choosing the finest IDE for our software system

A crucial step in the development process is choosing an IDE. When choosing an IDE, it should be able to compile and execute the programming language of our choice. For instance, if we choose Java, not all IDEs are supported. Think about Visual Studio Code.

Therefore, we should have to choose which supports the chosen back-end programming language when choosing an IDE. For that, we've listed the best 3 IDEs that support the implementation of JSP. Eclipse, NetBeans, and IntelliJ IDEA are the three.

We should also verify an IDE's license to see if it is open source before choosing it. Because we cannot employ track versions at the industrial level, as it is a requirement of a company license. If any business utilizes paid IDEs by including track versions, IDE ownership may file a lawsuit against that particular business. These two IDEs, Eclipse and NetBeans, are open source. It may be utilized without having to pay anything. However, it isn't IntelliJ IDEA. This IDE is closed source. The IDE is compensated. The ideal IDE for our project is IntelliJ IDEA. But it is a paid IDE. Due to budgetary constraints, we must choose a different course of action.

Typically, web applications and software are developed using netbeans. The greatest IDE for development work is this one. It also supports the drag and drop functionality for UI components while developing user interfaces. It aids in launching a server locally, deploying our application to it, and testing the applications.

In comparison to other tools, it operates quite smoothly. It's not the netbeans IDE's fault that projects need to be restarted and imported again. The features for front-end development are good. One of the nicest things that allows us to fully integrate the Netbeans IDE with the Google Chrome browser is the Netbeans connector.

By using Netbeans the following advantages can be better achieved.

- ✓ facilitate development
- ✓ Good unit testing tools
- ✓ The Netbeans connection is highly practical.
- ✓ aspects of development
- ✓ establishing and deploying servers
- ✓ tools for UI development
- ✓ Unit testing capabilities
- ✓ Integration of servers
- ✓ tools for development
- ✓ Ui drag and drop functionality

So, due to these facts, Netbeans IDE was selected for this project.

Diagramming Tools

As mentioned previously, MySQL has been chosen as our RDBMS. For our project, we must now choose the ER-Diagram diagramming tool.

As a result, MySQL Workbench is the greatest diagramming tool when it comes to designing ER-Diagrams. since MySQL is the source. Similar to the MySQL database, it is also an open-source diagramming tool. You may find additional details about MySQL Workbench below.

MySQL Workbench

For database administrators, developers, and architects, MySQL Workbench offers a single visual interface. Additionally, which offers forward and reverse engineering, SQL programming, data modelling and management, user administration, backup, extensive administration tools for server setup, and much more. As a result, it has all the components needed to create complicated entity relationship diagrams.

Additionally, it is more than just an ER-diagram drafting tool. It has the ability to administer all database functions, access online database servers, and manage databases. For instance, we can execute SQL queries using Workbench. Furthermore, which may be used with Windows, Linux, and Mac OS.

Features:

- Designing database

It gives us access to a wide range of tools that may be used for designing and modeling, including the ability to build sophisticated ER models, do reverse and forward engineering, and easily manage changes and documents. These features can be used by administrators, developers, and architects to create their database.

- Administration

The MySQL Workbench has a visual terminal that database admins and developers may use to see the whole database environment. Other tools may be used for server configuration, user management, data auditing and inspection, examining the state of the database and backup, and data restoration. Visual tools may be used to do all of this.

- Development

The MySQL workbench's visual tools may be used to build and optimize SQL queries before they are further performed. Autocompletion, syntax highlighting with different colours, the availability of query execution histories, and reuse of SQL snippets are further features that aid and simplify the job of building and running queries. The connection panel allows users to save and manage various database connections for databases, including MySQL fabric. With the use of the object browser, the database's schema and objects may be easily accessible.

- data movement into and out of the database

With the help of the workbench tool, we may migrate data across and among several platforms, including Microsoft Access, Sybase ASE, Microsoft SQL Server, PostgreSQL, and other entities, data, and relational database tables to MySQL. The database administrators may utilize workbench to quickly port existing programs to run on any other platform, like Windows, Linux, etc. The workbench may also be used to migrate data from an earlier version of MySQL to a more recent one.

We chose MySQL workbench as the finest management and diagramming tool instead of using another database management program or ER-diagram drawing tool. Because it satisfies all of our database and diagramming needs. As a result, we chose MySQL as the best-suited diagramming and management solution.

Software Development Methodology

Waterfall Model

The SDLC's oldest model is the waterfall model. In this approach, development moves on to the subsequent stage when the development phase is complete. There is thus no reversal, as a true waterfall. The waterfall model is so named for this reason. Additionally, under this paradigm, each criterion must be thoroughly examined. No reverse means no customer contact, and the consumer will only view the finished result. Therefore, the entire project will be squandered if the client rejects it. If the project is really large and the needs are complicated, this paradigm is not ideal. because failure is possible. In this method, consumer acceptance may fail.

Advantages

- ✓ This model is clear-cut and simple to comprehend.
- ✓ simple to control since acquiring all the criteria is the first step.
- ✓ simple to organize a task.
- ✓ All steps, inputs, outputs, processes, outcomes, and documentation are completely disclosed.
- ✓ There are no phases of growth that overlap, making it simple to control with little outside influences. Because only when you have completed that step will you go on to the next.

Disadvantages

- ✓ Up to the very end, the product is not usable. Because the consumer should wait until all of these phases are finished and the project is finished.
- ✓ No internal interaction exists.
- ✓ The most dangerous model is this one. because alteration cannot be done in reverse.
- ✓ Unsuitable for complicated projects. since there are several needs to gather.

RAD Model

Only small projects use the RAD model, which is a quick and limited development process. It is a brief module for creating and implementing the system. focuses on streamlining the creation of applications and coding more quickly than conventional development techniques.

Let's then wait and observe how these RAD are implemented. taking on the assignment. The project will be divided into smaller teams and components. One component is being developed by one team. Another group is working on a different component. A RAD model is used to create components. Each element in the RAD model is distinct. Here, application

creation and testing will take place. Once one component is finished, the other components are usable.

Advantages

- ✓ The project did not end in failure. as the client is always involved in the project.
- ✓ It is adaptable to changing demands.
- ✓ promotes client feedback
- ✓ Integration is dealt with right away.

Disadvantages

- ✓ Many resources are required.
- ✓ It's challenging to employ modern technologies.
- ✓ high reliance on modeling abilities.
- ✓ must carefully assess the information.
- ✓ The complexity of management is great.

Agile with Scrum Framework

Agile technique was developed as a result of frustration with the waterfall model. This method was developed in response to the need for software that could be produced more quickly and could adapt to change. Agile is far more suited to handle the complex and variety that come with development projects than waterfall is. Agile places a strong emphasis on team effectiveness and input from clients and internal departments.

Selected Development Methodology

We must conduct study on the many development approaches that are accessible before choosing one for our project. We have chosen three development approaches for our project after conducting research. They are the RAD development model, the Agile with Scrum framework, and the waterfall development approach. We must choose the development approach that is most appropriate for our project from among the ones that have been chosen.

Let's first determine whether the waterfall paradigm works with our development process. When it comes to the waterfall model, the software development process is carried out in a sequential manner. Only the subsequent process will start when a process is finished. There is no going back in time. But there are many advantages, such how simple it is to organize and handle work. It is simple to handle with few external influences because it begins with gathering all the criteria, there is no overlap in the development process. Because after you have completed that step, you can only move on to the next stage and beyond. Additionally,

it has a number of drawbacks, including a lack of functional product until the very end and minimal client involvement.

We must thus consider another paradigm for our work. Let's check to see whether the RAD paradigm works with our development strategy now. It is a quick and short-term development process when it comes to the RAD paradigm. Additionally, it allows customers to modify their requirements at any time during the development process. Additionally, it may provide stakeholders with functional prototypes during the prototyping phase. As a result, RAD raises the likelihood that the delivery will succeed in the end. On the other hand, it also has a number of drawbacks, including the necessity for constant evaluation of feedback when there are a lot of team members who are challenging to handle with the shifting demands of clients. Due to the interaction with prototypes, high dependence on modeling abilities, requirement for accurate information analysis, significant management complexity, and more. As a result, it is also appropriate for smaller projects rather than for larger ones.

We must thus consider another paradigm for our endeavor. Let's finally examine how the Agile with Scrum methodology functions throughout our development cycle. When it comes to the Agile approach, the customer does not invest time on paperwork; instead, they just want to express their opinions regarding the outcomes. The development team will then create it. Customer satisfaction will be very high if this strategy is used. Moreover, those have been extensively applied globally in several sectors. Changer customers are always welcome here. Additionally, this architecture allows for project changes in the past.

We picked Agile with the Scrum framework as the development technique for our project after analyzing the aforementioned methodologies. Because large-scale projects do not suit the waterfall and RAD models. The product owner in a scrum development team is also a client party agent; as a result, he represents the client's vision and organizes the "wish list" of tasks at the start of each sprint. Because of this, the initiative did not fail. as the client is always involved in the project. In light of this, Agile using the Scrum framework has been chosen as our project's development technique.

Conclusion

I've included the tools and strategies that are accessible for developing standalone applications in this report. Therefore, I covered the fundamental prerequisites for developing stand-alone applications there. for our application, and front-end technology. After researching the most well-liked back-end development technologies, I decided to choose Java and JSP as our back end programming language. In that section, I discussed in-depth arguments, comparisons of software tools, hardware, front-end and back-end tools, as well as programming and development processes. After that, I chose MySQL as our database by comparing the top-ranked RDBMSs.

LO3

Introduction

This document gives proof that we employed certain tools and procedures in accordance with LO1's software design specification. It also contains a formal presentation that analyzes our application problem description statement, suggested solution, and development strategies. Additionally, by reading this documentation, you can discover fresh perspectives, creative suggestions, or prospective enhancements to our application. In addition, the justifications we provided for our inclusion will become clearer.

Organize your business application, problem defining statement, suggested solution, and development plan into a formal presentation that is successful. Use this presentation as a component of a peer review and keep track of any comments made.



Members of Team Falcon

- ▶ Tharindu Madusanka
- ▶ Kavindu Chamod
- ▶ Nabil Nabawi
- ▶ Hashith Kaumina

Problem Statement

- ▶ Many public sector offices throughout Sri Lanka work by writing in manuals. Agriculture service offices are also one of them. That method increases data loss and makes updating them more difficult. Data security also incurs higher costs due to manual data usage.

The Proposed Solution

- ▶ the Ministry of Agriculture has chosen us, the company "January" for that. The proposed solution was decided to solve the problems faced due to the existing systems and processes, provide effective supervision, generate reports and facilitate the connectivity of offices spread across the island. The Falcon team, the best project team in the company, was entrusted with the responsibility of designing and developing this system.

Introduction to Agriculture Department System

Our Initial Plan for the Project

- ▶ In order to officially start the project, we gathered as a team on the 20 of May, 2022
- ▶ Started officially planning by discussing the key requirements on 22nd of May
- ▶ Began design, development & Agile testing in iterations on 24th of May
- ▶ Conduct evaluations on 23rd of June
- ▶ System release on 6th of July

Tools & Technologies used

- ▶ Front-End
 - Java
- ▶ Back-End
 - Java
- ▶ Database
 - MySQL
- ▶ IDE
 - NetBeans

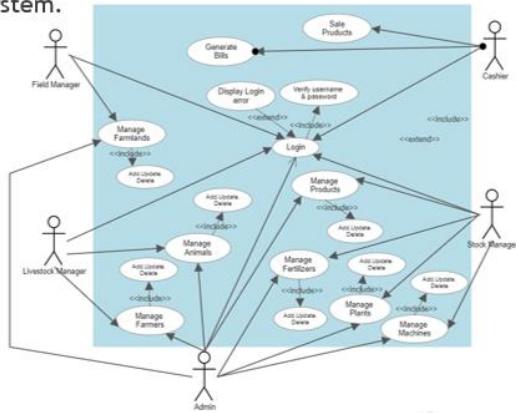
Development Strategy

- ▶ In order for team A to successfully complete the undertaken project on time, we chose to follow the Agile(Scrum) development strategy to design and develop the system. The reason for this choice is because Agile - Scrum allows us to analysis, design, develop and test within iterations which provides us with the flexibility of being able to accurately plan and complete every phase of the project much faster. In addition to that, by effectively following this strategy, it allowed us to easily review and fix the errors which arose during the testing process.

System Design Diagram

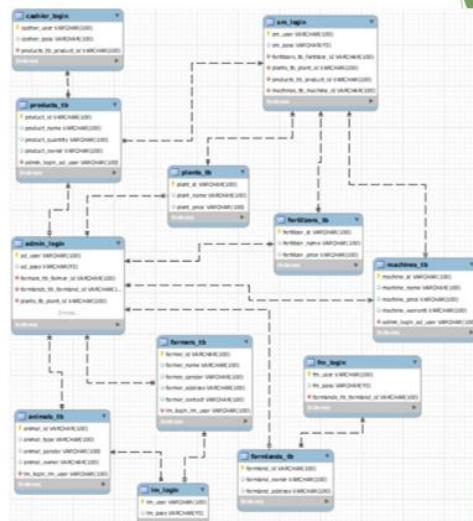
► Use Case Diagram

By looking of the Use Case diagram, we will be able to understand how the users will interact with the system.



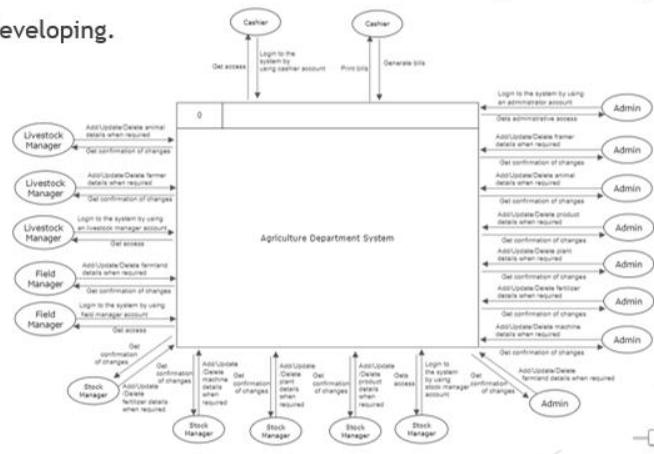
► ER Diagram

The RE diagram provides a visual and structural representation of all the key entities within our system, including the attributes of each entity and the relationships they have with one another.



► Context Diagram

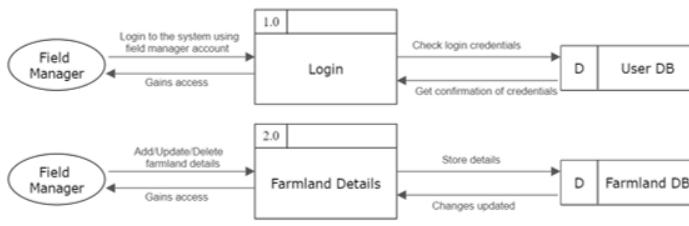
Creating the context diagram has helped us and our clients have a broader overview, as well as show us the boundaries and scope of the system we planned on developing.



► DFD Level 01 for Field Manager

The process of the 5 main elements showcased with the context diagram(Admin, Livestock Manager, Stock Manager, Field Manager, Cashier) will be further broken down individually in the level 1 stage DFD, in order to have a much more deeper look into their daily process and interaction with the system.

The Field Manager will able to perform these functions and the input of that will be stored into the relevant table of the database.



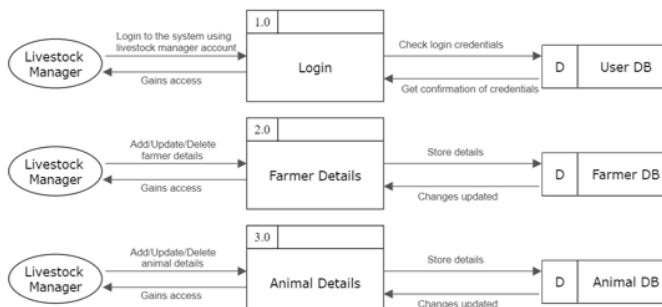
► DFD Level 01 for Admin

The Admin have full access of every feature and functionality of system and database. After login to the system by privileged administrative account, Administrator can handle farmer details, animal details, farmland details, product details, machine details, plant details and fertilizer details with the system.



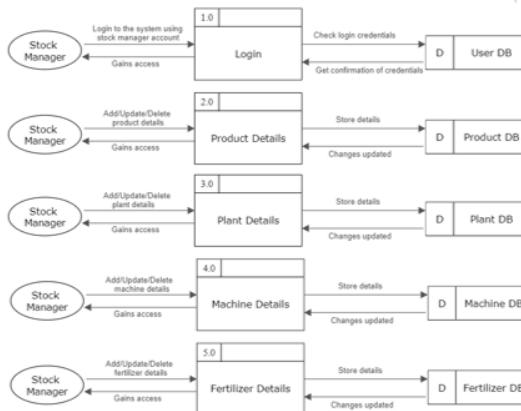
► DFD Level 01 for Livestock Manager

After login livestock manager can access only with farmer details and animal details.



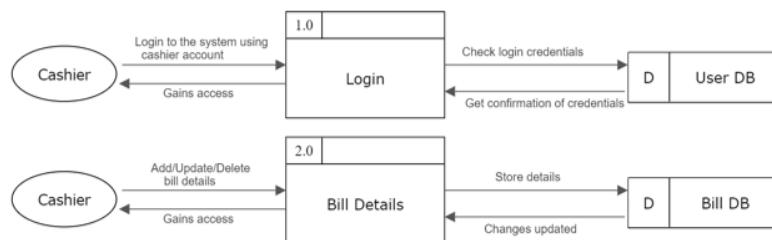
► DFD Level 01 for Stock Manager

In this system stock manager can manage warehouse product details, plant details, machine details and fertilizer details.



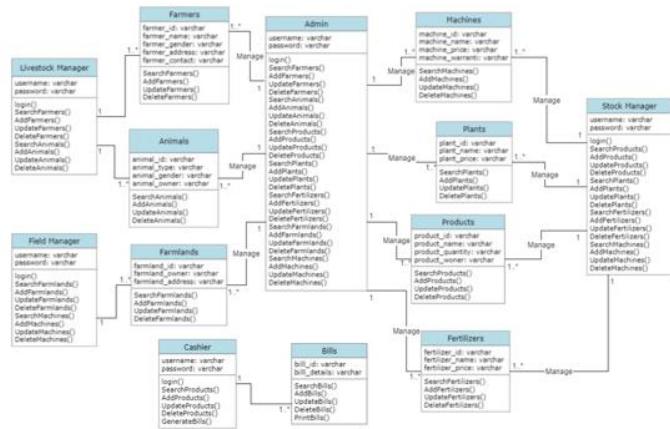
► DFD Level 01 for Cashier

The cashier of the agriculture department system will login to the system after their email and password have verified. The role of cashier is to generate bills for plant, fertilizer and machines.



► Class Diagram

The Class diagram of Agriculture Department System will provide us with high-level view of the system.



Flowcharts

- We incorporated the creation of Flowcharts for the sole purpose of gaining a visual, step-by-step description of the process performed within the Agriculture Department System from start to the end.

The following flowchart have been created to showcase some of the most important processes

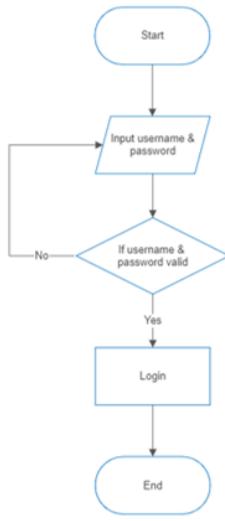
- Login
- Search
- Add, Update and Delete farmers

► Login

□ Start

- The Admin, Livestock manager, Stock manager, Field manager and Cashier will log in to their accounts based on their role and user privileges.
- If the username and password was entered is valid, the admin panel will be displayed. If not, they will have to try logging in again.

□ End

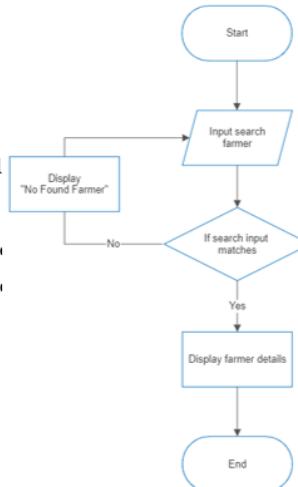


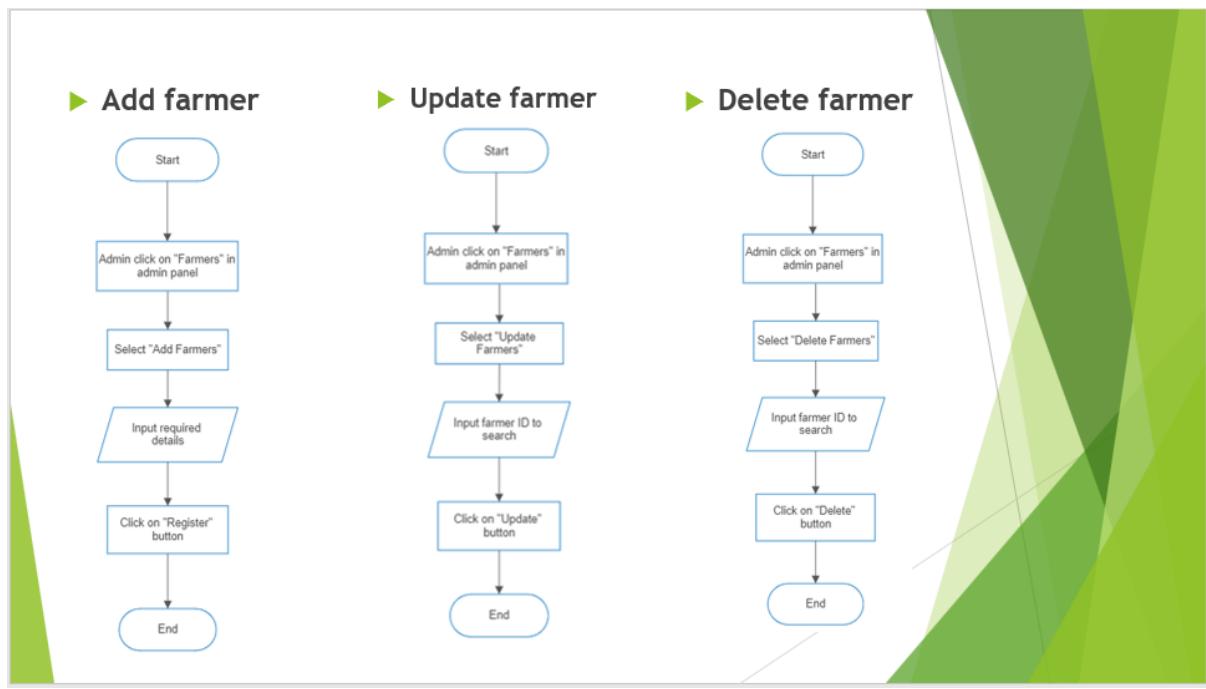
► Search

□ Start

- The Admin can search for the farmer detail by entering farmer ID.
- If the entered farmer Id matched to the database, farmer details will show. If not “No Found Farmer” will be displayed.

□ End





UI Mock-Up of Agriculture Department System

► Home

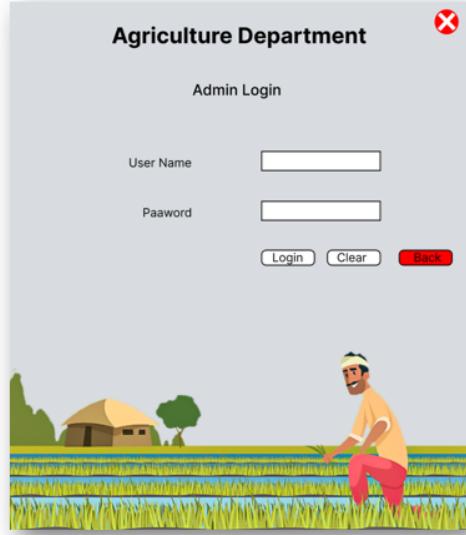
Creating a set of mock-up will provide to have an understanding as to how the final output of the system will visually look like.

The mock-up shows a navigation menu with the following options:

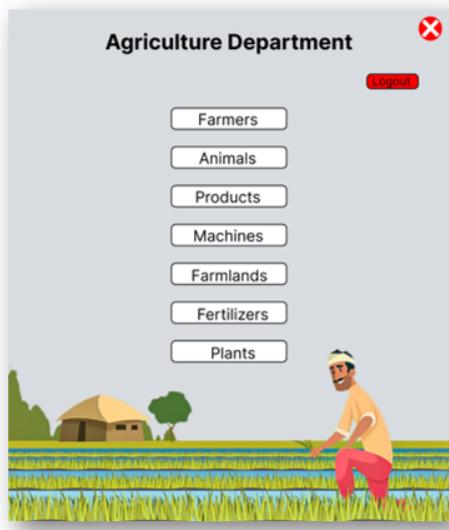
- Livestock Manager
- Stock Manager
- Field Manager
- Admin
- Cashier

The background features a stylized illustration of a person working in a field with a hut in the background.

► Admin Login



► Admin Dashboard



► Farmer Panel

Agriculture Department

Farmers

Back

Farmer ID	<input type="text"/>	Search
Farmer Name	<input type="text"/>	
Gender	<input type="text"/>	
Address	<input type="text"/>	
Contact	<input type="text"/>	

Add Update Delete Clear



► Animal Panel

Agriculture Department

Animals

Back

Animal ID	<input type="text"/>	Search
Type	<input type="text"/>	
Gender	<input type="text"/>	
Owner	<input type="text"/>	

Add Update Delete Clear



► Product Panel

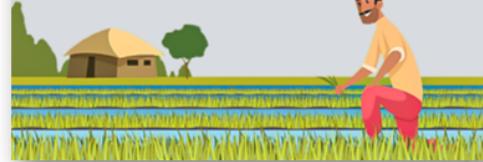
Agriculture Department

Products

Back

Product ID	<input type="text"/>	Search
Name	<input type="text"/>	
Quantity	<input type="text"/>	
Owner	<input type="text"/>	

Add Update Delete Clear



► Machine Panel

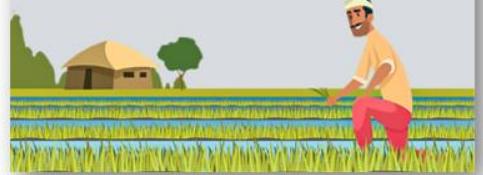
Agriculture Department

Machines

Back

Machine ID	<input type="text"/>	Search
Machine Name	<input type="text"/>	
Price	<input type="text"/>	
Warranty	<input type="text"/>	

Add Update Delete Clear



► Farmland Panel

Agriculture Department

Farmlands

Back  Farmland ID Search
Owner
Address

Add Update Delete Clear



► Plant Panel

Agriculture Department

Plants

Back  Plants ID Search
Plants Name
Price

Add Update Delete Clear



► Fertilizer Panel

Agriculture Department



[Back](#)

Fertilizers

Fertilizer ID		Search
Fertilizer Name		
Price		

[Add](#) [Update](#) [Delete](#) [Clear](#)

► Billing Panel

Agriculture Department

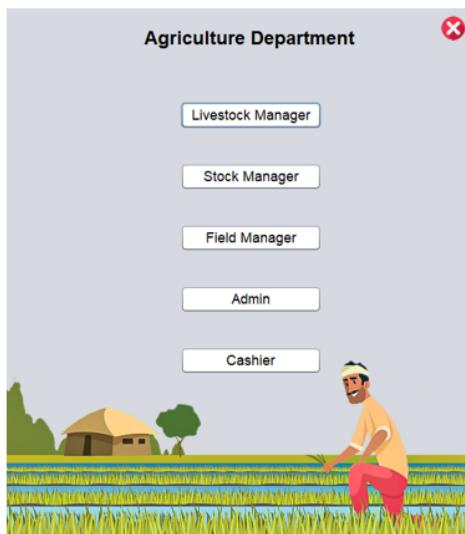
X

Bill For Plants				
Plants ID	Plants Name	Price	Quantity	Amount
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Plants Name	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Price	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Quantity	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Amount	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="button" value="Add"/>			
Total	<input type="text"/>			
Pay	<input type="text"/>			
Balance	<input type="text"/>			

The Completion Phase of the Project

- ▶ After closely working on completing each Agile iterative development phase of the undertaken project, we were able to easily break-down larger and complex tasks into a much smaller and manageable set of tasks that can be refined, repeated and researched throughout the lifecycle of our project.
- ▶ As we have reached the final phase, it was necessary to conduct a full evaluation of our system by making sure each requirement has been fulfilled and be able to deliver the final output to the Agriculture Department.

The Final Output of the undertaken Project





THANK YOU

Problems of application

Every company aspires to improve its operations and accomplish its goals faster, cheaper, and more effectively. After achieving these objectives, a business acquires an edge over its rivals and receives funding for additional development.

Businesses use a range of technology, such as websites, mobile applications, and cloud services, to accomplish their goals. Applications are the most effective tool for doing particular activities, although they aren't as often utilized as other possibilities.

- Budget Changes

Budget adjustments are frequent occurrences in software development initiatives. Scope creep is a typical culprit in this. As a project draws to a close, so many requirements are added or removed that the finished output appears to be a disorganized mess. This behavior is referred to as scope creep. If your engineers don't fully comprehend the project's requirements, they can attempt to improvise a new version of the original project by including extra features. Whether or whether the consumer requested it, they are left with a better product that is more expensive. What choices do you have?

Make certain that the project's specifics are understood by everyone on your team. They should be informed of the change control procedure, and they should only execute changes that have received approval. The list of requirements keeps expanding, so we need to stand back and assess whether or not we're making the correct choices. Maintain the project's original goals and objectives, but do not skimp on the quality of the final product.

- Poor Management

In many situations, this should go without saying, but it is occasionally forgotten. Contrary to common belief, bad management is almost always to blame when software projects fail rather than budget overruns and schedule delays. An skilled project manager's duties include developing and implementing strategies that lower project risks. Additionally, by adopting thorough documentation procedures, creating a strong organizational structure, and maintaining effective team communication, the failure rate of projects may be significantly reduced.

- Technical Difficulties

Large-scale system development, software integration, and regulatory compliance may all encounter unforeseen problems.

How can you help?

Good risk management is important in situations like these. The identification, mitigation, and management of technical risks are the most important considerations in software development endeavors. The procedures currently in place to address the risks that have been identified might serve as a good place to start. You must be careful to account for all potential threats—often referred to as residual risks—when developing your plan. This specific type of technique is known as a risk reduction strategy.

Paying for the risk, assigning it to a third party, striving to avoid it entirely, or just accepting it are all examples of risk reduction. Risks may be reduced to a level that is more manageable by having the proper risk management procedures in place. Last but not least, the goal of this project is to reduce the risks to the degree where doing so is advantageous compared to inflicting harm.

- Lack of good schedule

Project managers are under a lot of pressure nowadays to complete projects more quickly than anticipated. This might be brought on by a lack of funding, bad planning, or even technical difficulties.

What options are there for you? It is not always essential to increase our riches. The practice of adding more team members to the project's critical paths is referred to in project management as "crashing the timeline." Even if the amount of time required is drastically decreased, if not handled appropriately, this might cause chaos. On the other hand, finding skilled engineers could be challenging. Certain businesses may outsource software development to outside vendors for all or a portion of the project's duration.

The contribution of each member to the team in creating our agriculture application.

On May 20, 2022, we gathered as a team to formally launch our endeavor. Each project participant was given a project position that day by our Scrum Master. On May 22, we discussed the main criteria and officially started planning. On May 24th, design, development, and Agile testing started after that. Every Friday, each team member received a briefing on their contributions to their respective project tasks. Our major plan as a group was this.

Let's now examine the roles in our project and the people that are in charge of them.

- Tharindu Madusanka => Java Developer
- Kavindu Chamod => UI Designer
- Nabil Nabawi => Database and Diagrams Developer
- Hashith Kaumina => Tester

Everyone provided their best effort to our team from the start of this project. However, after a short while, our team's contributions from tester Hashith Kaumina and database and diagram developer Nabil Nabawi began to drop. Therefore, in order to resolve that issue, we had to adhere to the recommendations in our risk analysis study. Then, in accordance with the risk analysis report, our scrum master presented the significance of this project to them in order for them to take appropriate action. It didn't, though. So, we had to proceed with our next strategy. We dispersed Nabil and Hashith's project duties among other team members in accordance with our next strategy from our risk analysis report.

Let's now examine our revised project responsibilities and the individuals in charge of each position.

- Tharindu Madusanka => Java Developer, Tester and Diagrams Developer
- Kavindu Chamod => UI Designer, Database Developer

There were just three team members remaining after revising this position to help us finish our project. Only Tharindu and Kavindu are present. We had to labour hard and without relaxation as a result. A few days later, Kavindu encountered a serious issue. His laptop's display abruptly quit functioning. Even his laptop repair skills fell short. Luckily for us, he was able to get his sister's laptop at that time. Therefore, he was able to create the database without difficulty.

I had to design the entire application by myself, which meant that I had to work on it nonstop for the entire day. I developed all of the UI, designed and developed the ER-diagram, and finished the backward development of our program on my own via perseverance.

locating the opportunities using comments from peer reviews.

Our instructor provided feedback after we finished our group presentation. The remarks that our instructor made for us in his feedback are listed below. The peer reviews are included below.

- ✓ Increase the attractiveness of existing pages. Increase the size of icons used instead of buttons.
- ✓ In addition to crops and fertilizers, it is best to include other sales items.
- ✓ Further advantages can be gained by improving all the tables to be able to print and take pdf or excel sheets.
- ✓ Make it more complicated to change the password.
- ✓ Add forget password function

We as a team have received several feedbacks on the application. We received helpful comments from our instructor in this feedback and were given chances to enhance the application as a result. Let's now look at the opportunities we have to make our application better.

According to the first idea of our lecturer, she increases the attractiveness of the existing pages. Increase the size of icons used instead of the buttons. " Said. I realized that this app was a greater attraction. Also, using an icon is just a mere use of icon.

Since we were not currently included in other substances, she was given such a similar reference. But there was something that we missed here. It is the program for free distribution program. We have considered about it and then arranged for it.

In fact, when she was saying it, we also moved to the complexity of the password and username. It will protect the app. If you forget the password, an employee cannot be included in the app. Therefore, the lecturer was instructed to enter it. We were admitted to it by acting. Her feedback was much better helped us to include that part.

Create a workable business application based on a given business issue.

➤ Prototype

A prototype is an early version of a product that has been built to test a theory or technique before it is made public. The term has a wide range of applications, including programming, electronics, design, and semantics. Prototypes are routinely used by system analysts and end users to evaluate new ideas before they are put into production.

➤ Admin Roles

- ✓ Login and logout
- ✓ Manage farmer registration
- ✓ Manage farming lands registration
- ✓ Manage employee registration
- ✓ Add, delete, update and view the information of employee, lands, and farmers
- ✓ Add, delete, update and view the information of selling items
- ✓ Create an accounts for cashier, manager and field officers.
- ✓ View bills, profit, stocks
- ✓ Manage POS system

Functional Description

1. Login

- Admin login – Username: Tharindu, Password: 200202110034
- Cashier login – Username: Madusanka, Password: 200202110034
- Officer login – Username: Tharindu, Password: 200202110034
- Field Officer login: Username: Madusanka, Password: 200202110034

Use case name	User Login into system
Actor	User (Admin, Cashier, Officer, Field Officer)
Description	User login into system and used it
Pre-conditions	The user has entered the systems.
Post-conditions	actor successfully logs in and can utilize system
Basic flow	The user enters a valid username The user enters a valid password After click “Login button”

Logout

Use case name	Logout the system
Actor	User (Admin, Cashier, Officer, Field Officer)
Description	Logging out after finishing his work.
Pre-conditions	User has logout the system
Post-conditions	Successfully logout
Basic flow	Click the logout button

2. Employee Registration

Use case name	Registration of employees
Actor	Admin
Description	Registration of employees working at the workplace and entering their data.
Pre-conditions	Register employee
Post-conditions	Employee registration successfully finished
Basic flow	Admin select the employee registration icon Fill the form Click insert button

3. Farmer registration

Use case name	Registration of employees
Actor	Admin, Field Officer
Description	Registration of farmers in the area
Pre-conditions	Register farmers
Post-conditions	Farmers registration successfully finished
Basic flow	Admin select the farmers registration icon Fill the form Click insert button

4. Farming Lands registration

Use case name	Registration of Farming Lands
Actor	Admin, Field Officer
Description	Registration of Farming Lands in the area
Pre-conditions	Register Farming Lands
Post-conditions	Farming Lands registration successfully finished
Basic flow	Admin select the Farming Lands registration icon

	Fill the form Click insert button
--	--------------------------------------

5. Create an Account

Use case name	Create a new account
Actor	Admin
Description	New worker want to create account
Pre-conditions	User login as Admin
Post-conditions	Creating the account that suits the employee's job.
Basic flow	Admin select the role of new worker's job icon Fill the form Click insert button

Important codes of Agricultural System Application

As a front-end and back-end developer, I employed a variety of different codes to design the Agricultural System application to meet user needs. Not just users need graphical user interfaces. Only when the front end and back end are combined can we design applications that are both user-friendly and aesthetically pleasing.

So, you can see what extremely crucial codes I used to construct the Agricultural System application in the list below.

1. Homepage

```

private void jMenuItem1ActionPerformed(java.awt.event.ActionEvent evt) {
    // TODO add your handling code here:
    new LoginType().setVisible(true);
    dispose();
}

private void jLabel2MouseClicked(java.awt.event.MouseEvent evt) {
    // TODO add your handling code here:
    new LoginType().setVisible(true);
    dispose();
}

private void jLabel1MouseClicked(java.awt.event.MouseEvent evt) {
    // TODO add your handling code here:
    System.exit(0);
}

```

This is the domestic homepage is a few cords. The first code section is traveling to the existing interface to choose the role needed to be login. The second cord is also the same. But the first one is in the menu bar and use the second town through a baton. The current

code will help you remove you from the whole system. You can use the code part by clicking on the close icon.

2. Login type

```
private void jLabel2MouseClicked(java.awt.event.MouseEvent evt) {  
    // TODO add your handling code here:  
    new AdminLogin().setVisible(true);  
    this.dispose();  
}  
  
private void jLabel3MouseClicked(java.awt.event.MouseEvent evt) {  
  
    new DivisionalHeadLogin().setVisible(true);  
    this.dispose();  
}  
  
private void jLabel4MouseClicked(java.awt.event.MouseEvent evt) {  
  
    new CashierLogin().setVisible(true);  
    this.dispose();  
}  
  
private void jLabel5MouseClicked(java.awt.event.MouseEvent evt) {  
  
    new Homepage().setVisible(true);  
    this.dispose();  
}  
  
private void jLabel6MouseClicked(java.awt.event.MouseEvent evt) {  
  
    new FieldOfficer().setVisible(true);  
    this.dispose();  
}
```

Click here and clicks login here. The first one of these code shares can go to the other page in the "Adam". The CASH, Head of the Regional Office, the Cord to Login has remanded for login. The jLabel5mousegked event is used to go back homepage again.

3. Login

```
private void jButton1ActionPerformed(java.awt.event.ActionEvent evt) {  
  
    String username = usertxt.getText();  
    String password = passtxt.getText();  
  
    try {  
        Statement stml = conn.createStatement();  
        String insertQuery = ("SELECT * FROM adminlogin WHERE username= '"+username+"' AND password ='" +password+"');  
        ResultSet rest = stml.executeQuery(insertQuery);  
  
        if(rest.next())  
  
        {  
            new AdminDashboard().setVisible(true);  
            this.dispose();  
        }  
  
        else{  
            JOptionPane.showMessageDialog(null, "Incorrect Username Or Password", "Login Failed", 2);  
        }  
        stml.close();  
  
    } catch (SQLException ex) {  
        Logger.getLogger(AdminLogin.class.getName()).log(Level.SEVERE, null, ex);  
    }  
}
```

Once you have chosen your room, it can come to the Interface and enter the system and log in to the system. If either of the two username or password, you will receive the message "Incorrect Username or Password", "Login Failed".

4. Dashboard

```
private void jButton1ActionPerformed(java.awt.event.ActionEvent evt) {  
    // TODO add your handling code here:  
    new Employee_Register().setVisible(true);  
    this.dispose();  
}  
  
private void jButton3ActionPerformed(java.awt.event.ActionEvent evt) {  
  
    new AdminPasswordChange().setVisible(true);  
    this.dispose();  
}  
  
private void jButton2ActionPerformed(java.awt.event.ActionEvent evt) {  
    new FarmersTable().setVisible(true);  
}
```

If logged correctly, the user enters the dashboard directly. It is the work that he can be done, and this is the Interface that helps to manage, registration, reporting, and duty to the user.

5. Database Connection

```
public class DBConnect2 {
    public static Connection connect()
    {
        Connection con=null;
        try {
            Class.forName("com.mysql.cj.jdbc.Driver");
            con=DriverManager.getConnection("jdbc:mysql://localhost:3306/agriculture","root","1234567890tm");
            System.out.println("Success!!!");
        }
        catch (ClassNotFoundException | SQLException e)
        {
            System.out.println("inter.DBConnect.connect()");
        }
        return con;
    }
}
```

The application connects the database. This is why security database includes the data that includes.

6. Employee registration

```
private void insertBtnActionPerformed(java.awt.event.ActionEvent evt) {

    String name = nameTxt.getText();
    String uid = nictxt.getText();
    String mobile = mobiletxt.getText();
    String address = addresstxt.getText();
    String department = protxt.getText();
    String birth = combotxt.getText();
    try {

        Statement stmt = con.createStatement();
        String inserQuery = ("INSERT INTO employee (ename, enic, eaddress, emobile, department, birth) VALUES ('"+name+"', "
        + "'"+uid+"', '"+address+"', '"+mobile+"', '"+department+"', '"+birth+"')");
        stmt.execute(inserQuery);
        stmt.close();
        JOptionPane.showMessageDialog(this, "Add Successfully!!!");
        new Employee_Register().setVisible(true);
        this.dispose();

    } catch (SQLException ex) {
        Logger.getLogger(Employee_Register.class.getName()).log(Level.SEVERE, null, ex);
        JOptionPane.showMessageDialog(this, "Try Again!!!");
    }
}
```

There is a cod required for registration of employees. Filling the form and clicks the "insert" button enters the database.

```
private void clearBtnActionPerformed(java.awt.event.ActionEvent evt) {

    nameTxt.setText(" ");
    nictxt.setText(" ");
    mobiletxt.setText(" ");
    addresstxt.setText(" ");
    distxt.setText(" ");
    protxt.setText(" ");
    combotxt.setText(" ");
}
```

If the form is filled, there is a complete form if there is something wrong. The "Clear" button should be used.

```

    private void updateBtnActionPerformed(java.awt.event.ActionEvent evt) {
        try {
            Statement stmt = con.createStatement();
            String updatedq = ("UPDATE employee SET ename='"+nameTxt.getText()+"', enic ='"+nictxt.getText()+"', "
                + "emobile ='"+mobiletxt.getText()+"', eaddress='"+addresstxt.getText()+"', "
                + "department='"+protxt.getText()+"', birth='"+combotxt.getText()+"' "
                + "WHERE eid='"+Integer.parseInt(ID.getText())+"'");
            stmt.executeUpdate(updatedq);
            stmt.close();
            JOptionPane.showMessageDialog(this, "Update Successfully!!!");
            new Employee_Register().setVisible(true);
            this.dispose();
        } catch (SQLException ex) {
            Logger.getLogger(Employee_Register.class.getName()).log(Level.SEVERE, null, ex);
            JOptionPane.showMessageDialog(this, "Something Went Wrong! Try Again!!!");
        }
    }
}

```

These are the codes that are used to update data on an employee, farmer, or what registered.

```

private void searchbtnActionPerformed(java.awt.event.ActionEvent evt) {
    // TODO add your handling code here:
    String reg_no = ID.getText();

    Statement stmt;
    try {
        stmt = con.createStatement();
        ResultSet rs = stmt.executeQuery("SELECT * FROM employee WHERE eid = '"+reg_no+"'");

        if(rs.next()){
            nameTxt.setText(rs.getString("ename"));
            nictxt.setText(rs.getString("enic"));
            mobiletxt.setText(rs.getString("emobile"));
            addresstxt.setText(rs.getString("eaddress"));
            //distxt.setText(rs.getString("district"));
            protxt.setText(rs.getString("department"));
            combotxt.setText(rs.getString("birth"));

        }
    } catch (SQLException ex) {
        Logger.getLogger(Employee_Register.class.getName()).log(Level.SEVERE, null, ex);
    }
}

```

This is used to instantly find out what to update or delete. Enter the ID on its Text Box on the Text Box, clicking the Search icon can be found.

7. Password Change

```
private void jButton1ActionPerformed(java.awt.event.ActionEvent evt) {
    // TODO add your handling code here:
    String pass = searchtxt.getText();
    Statement stmt;
    try {
        stmt = con.createStatement();
        ResultSet rs = stmt.executeQuery("SELECT * FROM adminlogin WHERE password = '"+pass+"'");|
        if(rs.next()){
            unametxt.setText(rs.getString("username"));
            passtxt.setText(rs.getString("password"));
            idtxt.setText(rs.getString("id"));
        }
    } catch (SQLException ex) {
        Logger.getLogger(AdminPasswordChange.class.getName()).log(Level.SEVERE, null, ex);
    }
}

private void jButton2ActionPerformed(java.awt.event.ActionEvent evt) {
    try {
        // TODO add your handling code here:
        Statement stmt = con.createStatement();
        String quaery = ("UPDATE adminlogin SET username='"+unametxt.getText()+"', "
                + "password ='"+passtxt.getText()+"' WHERE id='"+Integer.parseInt(idtxt.getText())+"'");
        stmt.executeUpdate(quaery);
        stmt.close();
        JOptionPane.showMessageDialog(this, "Update Successfully!!!");|
        new AdminPasswordChange().setVisible(true);
        this.dispose();
    } catch (SQLException ex) {
        Logger.getLogger(AdminPasswordChange.class.getName()).log(Level.SEVERE, null, ex);
    }
}
```

Once a user logged into his account, he is able to change his username and password. First you need to list your ID and get the data. It can then be updated.

8. Check billing records

```
private void jButton1ActionPerformed(java.awt.event.ActionEvent evt) {
    // TODO add your handling code here:

    String sql1 = "SELECT sum(total), count(*) from bills";
    try {
        PreparedStatement pst1 = conn2.prepareStatement(sql1);
        ResultSet rst = pst1.executeQuery();
        DefaultTableModel model = (DefaultTableModel) tickettable.getModel();
        model.setRowCount(0);
        while(rst.next()){
            model.addRow(new String[] {rst.getString(1),rst.getString(2)});|
        }
    } catch (SQLException ex) {
        Logger.getLogger(EmployeeTable.class.getName()).log(Level.SEVERE, null, ex);
    }
}
```

Head Officer can view the details of all the things that sold here. The total profit that obtained is calculated and available. The "View" button should be clicked.

Evidence of development based on selected tools, techniques and methodologies.

Here, we'll demonstrate that we employed certain tools, technologies, and methodologies for the development process described in the software design documentation by providing proof for those tools, techniques, and processes. You can see what tools, methods, and processes we utilized to construct the Agricultural System application in the list below. Let's look at the tools, approaches, and processes that we have chosen for software design documentation before delving too far (SDD).

Selected Tools and Technologies for this application in SDD

Application development

- Java

Database development

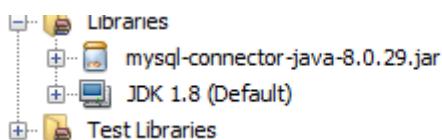
- SQL
- MYSQL
- Workbench

Integrated development environment

1. Netbeans 8.2

Used tools, technologies and methodologies for application.

Java



```
package agricultural_system;

//import library_app.*;
import java.sql.Connection;
import java.sql.DriverManager;
import java.sql.ResultSet;
import java.sql.SQLException;
import java.sql.Statement;
import java.util.logging.Level;
import java.util.logging.Logger;
import javax.swing.JOptionPane;
import javax.swing.table.DefaultTableModel;

public class Employee_Register extends javax.swing.JFrame {

    Connection con;
    public Employee_Register() {
        initComponents();
        createConnection();
    }
}
```

Here you can find that JDK or Java Development Kit is used. And the existing code section contains Java import statements. They are used in Java programs to support the following.

The import statement in Java is used to make specific classes or whole packages visible. A class can be directly referred to by using just its name once it has been imported. The import statement is a programming convenience; it is not strictly necessary to construct a full Java application.

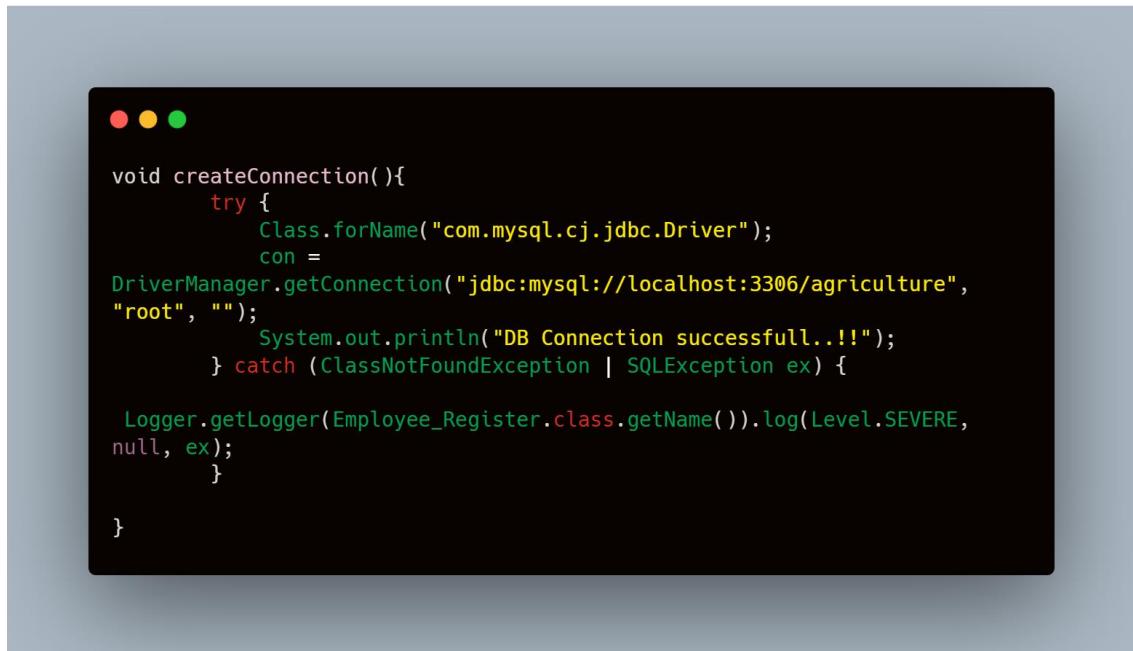
SQL

```
Statement stmt = con.createStatement();
String inserQuery = ("INSERT INTO employee (ename, enic, eaddress, emobile, department, birth) VALUES ('"+name+"', "
+ "'"+uid+"', '"+address+"', '"+mobile+"', '"+department+"', '"+birth+"')");
stmt.execute(inserQuery);
stmt.close();
JOptionPane.showMessageDialog(this, "Add Successfully!!!");
new Employee_Register().setVisible(true);
this.dispose();

} catch (SQLException ex) {
Logger.getLogger(Employee_Register.class.getName()).log(Level.SEVERE, null, ex);
JOptionPane.showMessageDialog(this, "Try Again!!!");
}
```

In order to enter, remove, and update selected data in the database in a safe manner, SQL database language is utilized. In order to protect user data from SQL injection attacks, we haven't directly attached values into the SQL code; instead, we've used a question mark and assumed values into local variables that are related to the prepared statement. The screenshots shown above demonstrate how we developed our back end using SQL.

MYSQL



The image above shows how our application's MySQL database connection class works. We can demonstrate that we utilized MySQL as our database by utilizing this image. Since you can see, we connected to our database using the MySQL driver in that snapshot. We can only access the MySQL database from there.

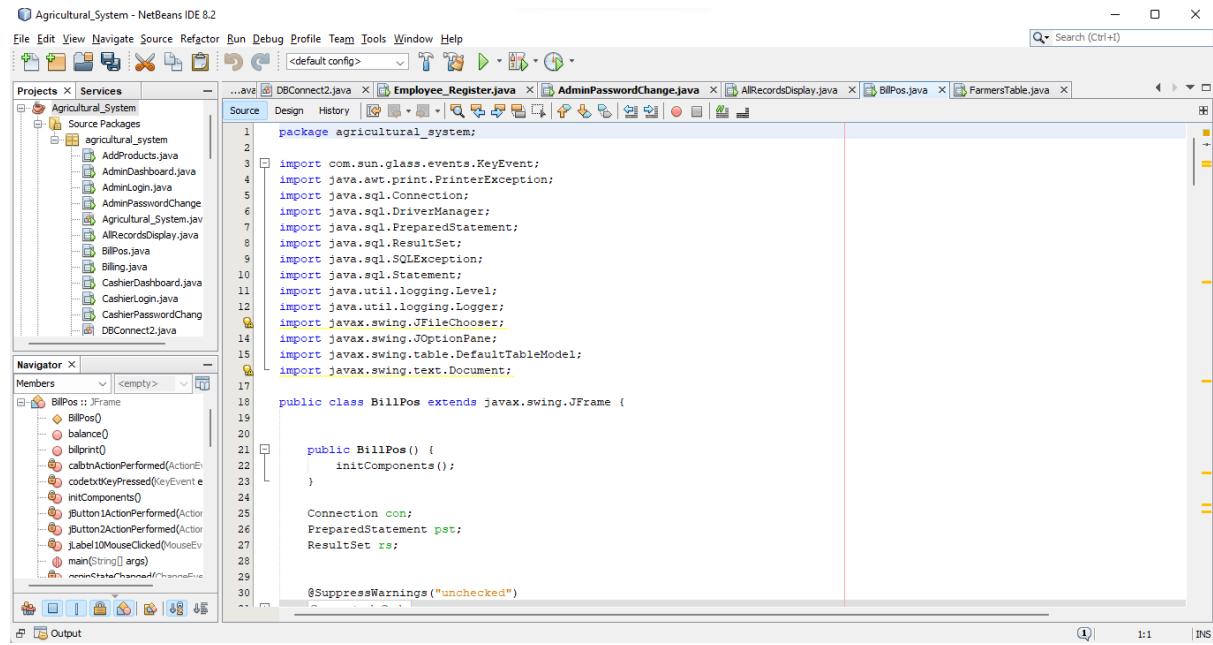
Workbench

The top screenshot shows the MySQL Workbench interface. The left sidebar displays the 'SCHEMAS' tree, which includes the 'agriculture' schema containing tables like 'farmers', 'fertilizers', and 'plants'. The central area shows a query editor with the SQL command 'SELECT * FROM agriculture.farmers;' and a result grid displaying data for four farmers. The bottom part of the interface shows the 'Object Info' and 'Session' tabs.

The bottom screenshot shows the MySQL Workbench Model tab, where an Entity-Relationship (ER) diagram is being created. The diagram consists of several entities: 'cashierlogin', 'farminglands', 'officerlogin', 'fieldofficerlogin', 'plants', 'fertilizers', 'farmers', 'employee', 'adminlogin', and 'bills'. Relationships are shown between 'farmers' and 'fertilizers', 'farmers' and 'plants', and 'farmers' and 'bills'. Each entity has its own detailed properties and indexes section.

On the MySQL server, a physical database was created using the MySQL Workbench 8.0 version. You can see the MySQL workbench and how we created our ER-diagram by utilizing MySQL workbench in the screenshot up top.

NetBeans IDE 8.2



You can view the project file for our application on the NetBeans IDE by glancing at this screenshot. As a result, we can demonstrate that we created our program using the NetBeans IDE.

Object Oriented Programming Methodology

A screenshot of the NetBeans IDE 8.2 interface showing the "Display.java" source code. The code defines a class "Display" with private final fields for fid, uname, unic, umobile, uaddress, district, province, and category. It has a constructor "Display(int id, String name, String nic, String mobile, String address, String disct, String prov, String cate)" and a getter method "int getFid()".

```
1 package agricultural_system;
2
3 public class Display {
4
5     private final int fid;
6     private final String uname;
7     private final String unic;
8     private final String umobile;
9     private final String uaddress;
10    private final String district;
11    private final String province;
12    private final String category;
13
14    Display(int id, String name, String nic, String mobile, String address, String disct, String prov, String cate) {
15
16        this.fid = id;
17        this.uname = name;
18        this.unic = nic;
19        this.umobile = mobile;
20        this.uaddress = address;
21        this.district = disct;
22        this.province = prov;
23        this.category = cate;
24    }
25
26    public int getFid() {
27        return fid;
28    }
29 }
```

The aforementioned excerpt illustrates how we developed using the Object-Oriented Programming Methodology. In this application, we have utilized classes and methods for various purposes. Additionally, we used parameterized methods to send the data across. As a result, we can demonstrate that we developed our application using OOP programming paradigm.

Agile with Scrum Framework Development Methodology

User Manual for Admins

How to add employee

1. Utilize the admin login information to log in to the system first.
2. After that select and click on “Employee” icon on Admin Dashboard.
3. Fill the employee registration form.
4. And click insert button.

How to add products

1. Utilize the admin login information to log in to the system first.
2. After that select and click on “Products” icon on Admin Dashboard.
3. Select product type and click check box
4. Fill the products registration form.
5. And click insert button.

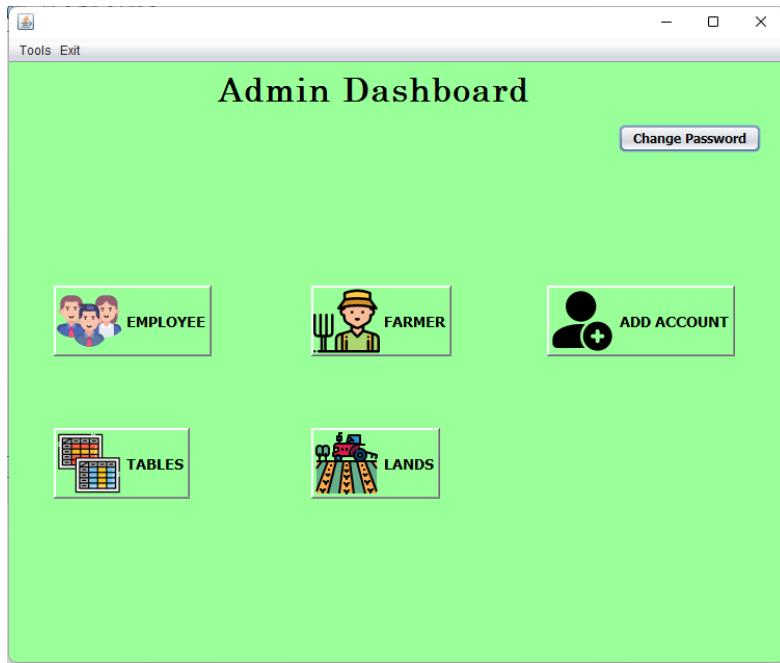
How to create account

1. Utilize the admin login information to log in to the system first.
2. After that select and click on “Accounts” icon on Admin Dashboard.
3. Select account type (Cashier, Head Officer, Field Officer)
4. Give username and password as “root”.
5. Click insert button
6. And The password and username as "root" should also be instructed to change the password and username.

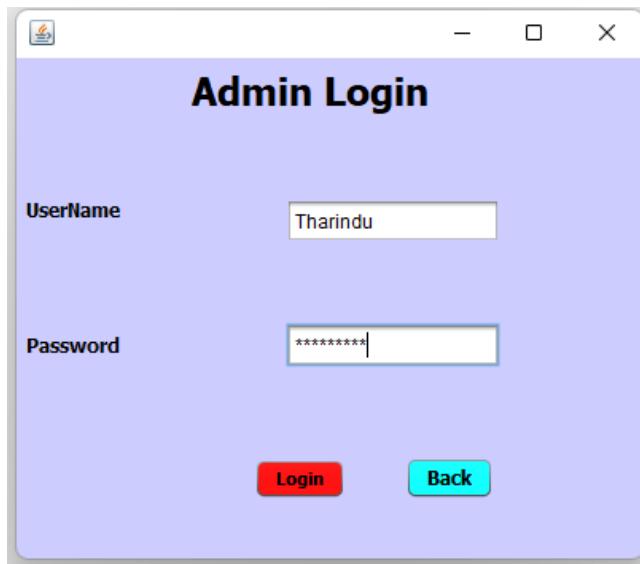
How to search, update or delete data

1. Utilize the admin login information to log in to the system first.
2. Go to the table with the information you need to find.
3. Enter the required ID in the Search Text Box.
4. Click the Search button.
5. You can watch the data in the other Text Boxes.
6. If you need **update** some data, add that data and click update button. Or if you need **delete** user or registered data, click delete button for delete searched data.

Evaluation of new potential improvements of our application



Some Batons did not even, and icons were replaced. The size of the number of icons had been enlarged.



Previously, we had not used the security method as above to give the password. It was then used and prepared as above.

Conclusion

As a scrum team, we worked independently to create a new application for Regional Agricultural Service Offices in accordance with the original SDD software design. Following, we developed a formal presentation for our lecturer and other team members that effectively examines our built application, problem defining statement, suggested solution, and development approach.

I then went on to describe how the crucial codes and algorithms employed in our program for this project worked. Afterward, we provided proof to show that we had employed the tools, technologies, and techniques according to SDD. Finally, I reviewed our developed application, provided additional prospective enhancements, and explained the rationale behind my decision to do so.

LO4

Introduction

This report evaluates how well our application performed in comparison to the initial requirements and problem definition statement. Additionally, we will analyze our application's design, development, and testing phases critically after evaluating the variables that affect a business application's success. A check list and quality assurance report will also be supplied. Finally, I'll reflect on the hazards I mentioned previously to wrap off this section of my evaluation.

Finally, the advantages for improvement and further development are properly justified and the strengths and flaws of our application are examined critically.

Review the performance of our web application against the Problem

Definition Statement and initial requirements.

The main problem with this project was that it was a government project that expected quicker results. Their aim was to solve the existing problems using this application. We didn't get much time to study those issues either. Because Sri Lanka is going through a severe economic crisis, quick and appropriate decisions should be taken to resolve and mitigate this crisis.

Due to this situation, we have chosen January Company to create a new application with the aim of getting a mandate to develop Sri Lanka's agriculture and the related environment more effectively by the Department of Agriculture. We can provide better service to the customer in relation to the stand-alone application.

Our main objective was to establish a fully functional position for regional agricultural service offices. It will make the current manual system an automatic system. Through this application, many of the existing actions in the office can be automated. Better service can also be provided to customers who contact the office. Finding out about the harvest of the farmers engaged in agricultural activities in the area, selling them without the intervention of middlemen, study of agricultural land and other development also gave great support.

In the developed application we have developed underground based application for agricultural offices. This system includes four different roles. They are Administrator, Chief Office Officer, Field Officer, and Cashier. An administrator is unlimited for all system tasks. But other users are allowed to use with restrictions.

Other users are added to the system by the administrator. First, they are registered under employee registration and then based on their data the system gets privileges as users. The

password and username required for first login will be provided by the admin. It can then be modified by the user.

Cashier POS system, Bill entry and scanning are allowed. All the reports are designed so that the chief officer of the office can monitor them. Field Officers go to the districts and implement information systems for farmer registration, land registration and harvest. Finally looking at the user interfaces the entire application user and admin interfaces are designed according to modern UI/UX technologies. So they can experience a user-friendly application.

Factors that have an impact on how well our application performs

The following are the industry's factors that impact application performance:

➤ Lack of testing

Applications are thoroughly tested to see how they operate in various scenarios in their actual production environment. It's critical for testers and developers to comprehend non-functional performance requirements. The inability to sufficiently and regularly check the development process is one issue that many individuals experience. Although pre-testing might add to an already demanding schedule, it is crucial to keep in mind that it is simpler (and less expensive) to prevent an issue from arising in the first place than to remedy it after it has already happened.

➤ The Capability to Identify Issues

Many businesses are still unable to identify if their application performance issues are caused by network, server, or application-specific problems. Organizations are working harder than ever to enhance the end-user experience, yet the majority of them are still unable to pinpoint the specific components of their enterprise infrastructure that are hindering application performance.

➤ Integration

Compared to standalone apps, integrated applications are substantially more sensitive, network-dependent, multi-level, and integrated middleware accessible. Numerous applications, heterogeneous platforms, and software can be used in transactions, resulting in literally hundreds of "hops". Due to their level of complexity, many modern applications can't be effectively handled by just using human labour.

➤ User Behaviour

How many users will be using your program simultaneously, and what sort of transactions? In order to eliminate performance obstacles during the most significant peak use times, it is essential to understand the flow of real user transactions and activities. Therefore, it is necessary to plan and conduct performance testing to ensure that a software system satisfies its performance requirements and to observe how it handles spikes in performance.

➤ Lack of supervision

Another aspect affecting application performance is the state of the program, its availability, and the difficulty in obtaining a comprehensive picture of real-time usage. To guarantee that essential business applications are constantly accessible and operating at peak efficiency, organizations require management solutions that offer a clear view of all their IT resources and workload.

The corporate infrastructure components that are generating the difficulties are known to IT teams working on end-user complaints about application performance issues. They are also aware of the steps that need to be performed to find the underlying causes of the performance issues. how to promptly address performance issues. It makes them possible.

Reviewing the Design, Development, and Testing Stages Critically Using the Analyze Factors

❖ Design

Designing stages is the most important part in application development. if design stage of entire web site will be failed. Therefore, having well qualified and well experienced designer is much important to success your project.

We even conducted tests to select the tools and techniques used for the development of the application. Because a problem with those components can cause special obstacles to the project. And this application should be usable with best performance. Therefore, it was discussed while designing to minimize the possible effects of various factors.

Since this is a desktop application, the finishing should be done accordingly. For that, the design part was done as follows.

NetBeans was chosen as the best IDE for the design with desktop interface and since this program is created using Java, NetBeans can be called as an IDE that gives maximum support to it. Since this is a standalone application, it cannot have much impact on data systems from outside. Even a website was discussed to make the output so that the system could be integrated at the time of need. The data systems are currently running using MYSQL server and the necessary arrangements have been made to be able to connect with any required server system. If a device, i.e. a laptop or a PC crashes, it should be built so that the entire system is not damaged.

And this was a user-friendly app. Employees who are used to the manual system currently in use will have to get used to this new automated system. It is our main responsibility, the developers, to complete the system so that it is convenient for them. Icons and forms are used to make it easy to understand. A better user manual is also provided to them. If it is not user friendly then this application cannot be used properly to solve existing problems. Then this project will be fruitless. An application with a user-friendly interface was created to avoid it.

❖ Development

While developing stand-alone applications we have designed it according to the design documentation. The following design documents are not enough to create an application of this kind of structure. Therefore, it is imperative to have good coding standards during the development phase. Also, looking at the factors mentioned above, we should follow the best practices while coding.

Increasing the security and validity of information and data in the application is paramount. For this, bad behaviour had to be prevented using existing validation methods. Especially it will affect the performance of the system.

The next important thing is to code correctly and follow coding standards. In the development phase we have used Java as the programming language to build the complete system. Therefore, the best standard methods were definitely used for coding. Since NetBeans was used as the IDE for building, this made it easier to use coding standards. Where conditional statements were used in various parts of applications. It is a better coding method and enables easy error handling. Without error handling we cannot create a user - friendly application. If an error occurs, we need to know what the error is as the language of user understanding. Database messages or canned error messages from Java cannot be displayed to the user. Error handling is mandatory during the development phase as the user is also unable to understand these error messages.

❖ Testing

After the development process, testing is a crucial step. It aids developers in providing clients with applications that are error-free and completely functional. Let's look at the approach we used to test our application and how we managed to make it error-free in this section.

Our application is thoroughly tested in its actual production environment and how it impacts performance under various circumstances. It's critical for testers and developers to comprehend non-functional performance requirements. The inability to sufficiently and regularly check the development process is one issue that many individuals experience. Although pre-testing might add more time to an already demanding schedule, it is crucial to keep in mind that it is simpler and less expensive to avoid an issue before it arises than to address it as soon as it does.

Additionally, mistakes may arise if the system is not monitored. Application health, availability, and the inability to fully understand real-time utilization are therefore additional factors affecting application performance. In order to guarantee that crucial business applications are constantly accessible and operating at peak efficiency, we require management solutions that offer a clear picture of all their IT resources and workload.

User behaviour is another essential factor that has to be examined in a variety of ways. Here, we need to have a solid grasp of how many users will be utilizing your web application simultaneously and for what kinds of transactions. In order to eliminate performance obstacles during the most significant peak use times, it is essential to understand the flow of real user transactions and activities. Therefore, it is necessary to plan and conduct performance testing to ensure that a software system satisfies its performance requirements and to observe how it handles spikes in performance.

Test Case

- **Project Name:** Agricultural System Application
- **Test Case ID:** TC01
- **Test Design by:** Tharindu Madusanka
- **Test Design date:** 01/10/2022
- **Test Executed by:** Tharindu Madusanka
- **Test Execution date:** 12/10/2022

Module Name: Sign in module

Function: Admin sign in

Test case ID: TC01

Test case: Verification of Sign in with accurate username and password

Pre-condition:

- The login page ought to have loaded and be accessible.
- Admin must use a legitimate account and password.

Test steps:

1. Admin clicks on login icon
2. Enter valid username
3. Enter valid password
4. Click on “login” button

Test data:

- Username: Tharindu
- Password: 200202110034

Expected result:

- ✓ Admin has logged in successfully.
- ✓ The admin panel's dashboard will appear.

Actual result: The expected result is the actual result

Status (Pass/Fail): PASS

Module Name: Add employee details

Function: Admin add employee

Test case ID: TC02

Test case: Checking the result after clicking on “Employee Details” icon

Pre-condition:

- The application should run.
- Admin should be already signed in

Test steps:

1. Admin select and click on “Employee” icon on Admin Dashboard.
2. Fill the employee registration form.
3. And click insert button.

Test data:

- Name: Tharindu
- NIC: 200202110034
- Mobile: 0764256746
- Address: 125/H/01/A, Mirigama
- Department: Cashier
- Birth date: 2002/01/21

Expected result:

- ✓ Employee's details adding successfully

Actual result: The expected result is the actual result

Status (Pass/Fail): PASS

Module Name: Farmer registration

Function: Admin or Field Officer add Farmer

Test case ID: TC03

Test case: Checking the result after clicking on “Farmer” icon

Pre-condition:

- The application should run.
- Admin or Field Officer should be already signed in

Test steps:

1. Admin select and click on “Farmer” icon on Admin or Field Officer Dashboard.
2. Fill the farmer registration form.
3. And click insert button.

Test data:

- Name: Nidula Nuwansith
- NIC: 200134567890
- Mobile: 0763687269
- Address: Mirigama
- District: Gampaha
- Province: Western
- Category: Intensive Farming

Expected result:

- ✓ Farmer’s details adding successfully

Actual result: The expected result is the actual result

Status (Pass/Fail): PASS

Module Name: Land registration

Function: Admin or Field Officer add Land

Test case ID: TC04

Test case: Checking the result after clicking on “Land” icon

Pre-condition:

- The application should run.
- Admin or Field Officer should be already signed in

Test steps:

1. Admin select and click on “Land” icon on Admin or Field Officer Dashboard.
2. Fill the Land registration form.
3. And click insert button.

Test data:

- Deed No: 123456AD
- Land size: 5acre
- Location: Mirigama
- Owner name: Nidula Nuwansith
- Type: paddy
- Farmer's id: 2

Expected result:

- ✓ Land's details adding successfully

Actual result: The expected result is the actual result

Status (Pass/Fail): PASS

Module Name: update, delete, and search data

Function: user update, delete, and search data

Test case ID: TC05

Test case: Checking the result after click “Update”, “Delete” and “Search” buttons

Pre-condition:

- The application should run.
- User should be already signed in

Test steps:

1. Utilize the user login information to log in to the system first.
2. Go to the table with the information you need to find.
3. Enter the required ID in the Search Text Box.
4. Click the Search button.
5. You can watch the data in the other Text Boxes.
6. If you need **update** some data, add that data and click update button. Or if you need **delete** user or registered data, click delete button for delete searched data.

Expected result:

- ✓ Search, Update or Delete is successfully

Actual result: The expected result is the actual result

Status (Pass/Fail): PASS

Module Name: add product

Function: admin or Cashier add product

Test case ID: TC06

Test case: Checking the result after click “Insert” button

Pre-condition:

- The application should run.
- User should be already signed in

Test steps:

1. Admin or Cashier select and click on “Product” icon on Admin or Cashier Dashboard.
2. Select product type
3. Fill the product adding form.
4. And click insert button.

Test data:

- Name: Basmati rice seeds
- Price of one kg: 5000
- Stock: 300

Expected result:

- ✓ Product details adding successfully

Actual result: The expected result is the actual result

Status (Pass/Fail): PASS

Module Name: Billing the products

Function: Cashier bill the product

Test case ID: TC07

Test case: Checking the results of using POS

Pre-condition:

- The application should run.
- User should be already signed in

Test steps:

1. Cashier select and click billing icon.
2. Select product type
3. Enter product code and click enter button of keyboard
4. Add quantity
5. Click the “Add” button
6. Add amount of paid and click “Calculate” button
7. Finally, click the print button

Expected result:

- ✓ Get a bill successfully

Actual result: The expected result is the actual result

Status (Pass/Fail): PASS

Module Name: check billing records and profit records

Function: Head officer check the records

Test case ID: TC08

Test case: Checking the results of after clicking “view” button

Pre-condition:

- The application should run.
- Head officer should be already signed in

Test steps:

1. Head Officer select and click on “Records” icon on Head Officer Dashboard
2. After go to interface, must need click the “View” button
3. Officer can check records

Expected result:

- ✓ Check the records successfully

Actual result: The expected result is the actual result

Status (Pass/Fail): PASS

Conclude the review using the previously identified risks

It's crucial to identify any project-specific hazards before starting any endeavor. For our application project, we also created a risk management report. We were able to complete our project substantially ahead of schedule because we carefully considered all project-related hazards before they materialized. You might recall that I briefly outlined the hazards we encountered while developing the project above. for instance, frequently experiencing power outages. Therefore, we asked for a laptop of other people and when the charge of one ran out, the other one worked. Trying to make up for lost time by doing so.

Furthermore, there were several hazards in the beginning. They were project failures brought on by a lack of programming language knowledge-based abilities, risk, a lack of a positive mindset, and unequal contributions to the project. As a result, we had to operate in accordance with previously examined risk management documents. Due to its adaptation to Agile and the scrum methodology, the work of each member was also continuously monitored and updated by following that report. In order to avoid application failure, quality assurance was considered during the development of the application.

Critically evaluate the strengths and weaknesses of our application.

The application we created has several advantages. They are; this online application provides more protection for the private information of users. such as usernames and passwords, financial information, and others.

Additionally, only administrators have access to the full features of this stand-alone application. Administrator accounts cannot be managed by anybody. Staff employees can therefore personalize their job by remaining at home during a lockdown. Clients are not permitted to make administrative modifications to the application due to their job, therefore administrators will be able to administer the system effectively. Users may make payments, change their information, upload data to a database, and access their accounts.

Additionally, any device may be accessed and managed by this program. Almost any computer or laptop may use the software. The software may grow along with the operations of the office thanks to the newer server's increased flexibility, including capacity augmentation, and ease of upgrading. Additionally, only managers and administrators have access to consolidated data.

There are not many flaws in this application. The admin panel does not allow them to alter the application's structure. Therefore, they will need an application developer to make any changes if they wish to modify the structure of the program. Since this application was made in accordance with fundamental user needs.

The only other weakness here is that the password can be known by the admin. Merely registering an employee does not entitle him to an account in the system. The password and username for the account is entered by the admin to match the employee's job to the system account.

Opportunities for further Development

I must discuss the strengths and weaknesses of my project, as well as the areas that still have room for growth and development. I should be aware that creating and disseminating my application—which I created for controlling an agricultural system—will not be the ideal choice for application. The program should be displayed on a screen, and as the designer, it is my responsibility to keep making advancements and improvements.

1. We need to make the program I developed for administering an agricultural system available on all platforms and devices even if it is currently only a desktop application. I will thus need to write them for platforms like web apps, mobile versions for Android and IOS, and so on in order to continue working on the project.
2. We must also take into account what would happen if the produced application were to be disseminated through the internet or used to transport vast volumes of data. Therefore, we need to make sure that the application we build can respond to the enormous quantity of data that will be supplied to it and that the application foundation can handle all linked web browsers of devices like mobile, desktop tabs, and so on.
3. It is my expectation to create a web app for this. Then the section can be taken to farmers and the other involved in this app. Then the farmers have the ability to share data from their farm and yield data from home.
4. To be more precise, I must integrate the program with both mobile and cloud platforms, enhancing their security when it comes to application opening and granting access to the administrations that apps need, such as Cleanser or REST, SQL databases, JMS message transports, and so on.

Discussions have been taken as a team of development opportunities. So, some were the same

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