Sri Lanka Institute of Information Technology

Potato Harvest Prediction System

Software Requirement Specification

Practicing Business Analyst 2022

Project ID: PBA- 2022-008

Submitted by:

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Submitted to:

(Supervisor's signature)

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(Name of the lecturer)

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(Date of submission)

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1. Introduction

1.1 Purpose

This Software Requirements Specification document specifies about the automated potato harvest prediction system; which will be created in order to fulfill the requirement of a computerized information system. This resort management system will be able to use for the tasks related to reservation management, food and beverage management, financial management and employee management

1.2 Document Conventions

Times New Roman is used as the font.

Each topic has been separated to the several subtopics.

Font size 18 is used for the topics.

Font size 14 is used for the subtopics.

Font size is 12 is used for the content.

1.3 Intended Audience and Reading Suggestions

Intended Audience	**Reading Suggestions**
User	All section included in the SRS Document
Employees	Product scope, user interface
System Developers	All sections included in the SRS Document

1.4 Product Scope

The system "Potato harvest prediction system", has been built for the use of potato farmers as potato farmers are the only end users of the system.
The system has its main functions as,

- Get harvesting date and the expected harvest quantity.
- Receive weather prediction details and weather forecasting details related to the registered location.
- Detection of diseases that infected to the potato harvest and the detection of pests that can be harmful for the potato harvest.
- Identification of daily prices for the potato harvest.
- Identification of best markets for the potato harvest.

In general, most of the farmers have a low literacy level. Hence, this system has been developed using a flow which can be followed easily also for the users who do not have a higher literacy level.
Considering about the objectives of the system, they can be divided in to two sections as general objectives and specific objectives.

General Objectives

- Develop a platform for the potato farmers for the prediction of harvest.
- Provide an easy method for the farmers to get early awareness about the day which they can harvest potatoes and how much of a potato quantity can be expected as the harvest.
- Provide an opportunity for the farmers to be aware about best market suggestions.
- Provide ability to be aware about the daily market prices for the harvest without making any effort to search them in manual ways.

Specific Objectives

- With this mobile application, potato farmers will be able to easily identify best markets which they can sell their harvest to get a more profit than the current profit.
- Also, the farmers will be able to be aware about the best location suggestions which they can work on planting potatoes to get a high quantity of a harvest.
- And the system provides what are the risk factors for the diseases and pests which will be helpful to get early prevention methods for the infection of those to the entire harvest and for the next potato plantation.
- Since the mobile application has been created with user friendly interfaces, even a farmer with a very lower literacy level can be able to work with the system.

Considering about the benefits of the system for the users,

- Early awareness of weather conditions.
- Receive best market suggestions.
- Get solution on how to manage diseases and pests.
- Ability to get all the primarily required information necessary for the potato harvest from a one individual system with several functions.

Considering about the goals of the system are,

- Help potato farmers to increase their harvest and the profit.
- Provide a mobile application platform for the farmers to manage their tasks related to the potato harvesting properly.

1.5 References

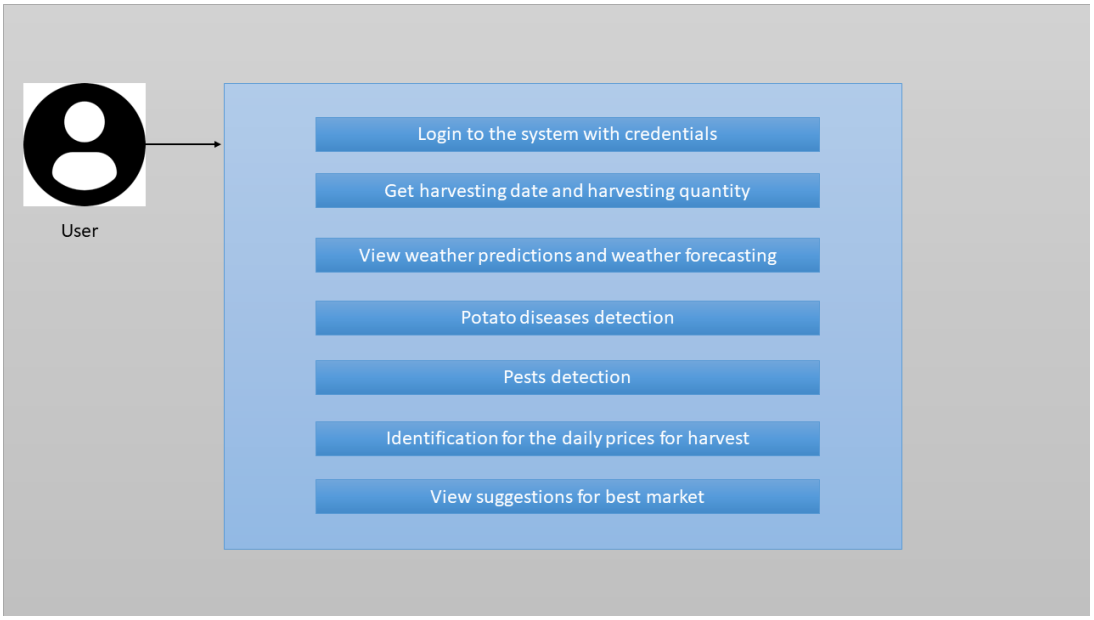
1. https://www.figma.com/file/kQnmgH56Hn3I8w4OQ7gdZ6/Solution-2?node-id=0%3A1

2. Overall Description

2.1 Product Perspective

This potato harvest prediction system is a new, self-contained product. The product has been developed for the farmers who cultivate potatoes.

The software assists the farmers with predicting how much of harvest can be expected according to the date of the plantation and the amount planted and the harvesting date. And also, the software assists with the prediction of whether condition, temperature, humidity and rainfall with the use of IoT, prediction of potato diseases and pest infections and also provides with best market suggestions.



2.2 Product Functions

This potato harvest prediction system has below mentioned functions which make farmers to get the maximum benefit of using the system for the harvesting purposes and to increase the efficiency of the system.

- Identification of the area of the farm using length and width.
- Prediction of harvesting date.
- Prediction of expected harvest quantity.
- Display actual temperature, humidity and rainfall values related to the located area of the farm using the data in real time database taken from the devices which has been built using sensors.

- Display temperature, humidity, rainfall, and wind speed using open weather API data for the location.
- Display location suggestions for the cultivation.
- Identification of diseases for plants using uploaded images.
- Identification of pests for plants using uploaded images.
- Calculation of total price for the harvest according to the daily price for 1 Kg.
- Identification of the best market.

2.3 User Classes and Characteristics

Farmers are the end users of this product, “potato harvest prediction system”. They are the only users who are using the system.

- Considering about the characteristics of the users,
- Register to the system.
- Login to the system using login credentials.
- Enter required inputs to the system and receive the service accurately.
- Provide correct measurements to the system like the length and width of the premises and how many plants that planted in the premises.
- Upload suitable images to the system for the performance of predicting diseases and pests.

2.4 Operating Environment

This potato harvest prediction system has been developed as a mobile application. It requires the below operating systems.

Hardware Requirements	Smart phone Temperature and humidity sensor Raindrop sensor Arduino UNO board Router 8GB RAM
Software Requirements	Android operating system Open weather API Flutter technology Real time database (Firebase) MySQL database

2.5 Design and Implementation Constraints

- The users of the system are potato farmers.
- Interfaces of the system should be user friendly for the users.
- Since most of the farmers have a low literacy level, the flow of the system and the organization of the functions should be arranged according to a proper order.
- Users need to enter login credentials while login to the system.
- Each password needs to contain lowercase letters, uppercase letters, digits and the length of a password should be at least eight characters.
- Location of the mobile should be activated.
- The location that required to enter should be the same location which the farmer provide while registering to the system, where the potato farm is located at.
- In whatever the measurement that the length or width is given, such as meters, acres or hectares, the area should be calculated in meters.
- Temperature and humidity sensor, raindrop sensor has been connected to Arduino UNO board and by combination of these components a device has been created for to get real time data for temperature, humidity and rainfall and data needs to be stored in the real time database.
- Get next four days weather forecasting using open weather API.
- All the interfaces should be connected together.

2.6 User Documentation

Potato farmers are the users of the system and most of them have a low literacy level. Hence it is required to give them a proper understanding about the system such as what is the system, what are the functions available, what are the tasks done by the functions, what is the flow of the system, how often do they need to use the system, what are the time limitations, how they should enter data as inputs, what are the internal processes of the system, how the data will be stored.

Hence the user manual has been created for the farmers to get the idea on how to work with this system. And video tutorial will be provided for the farmers to get more awareness about the system. In addition, support email has been provided for them to get the help to clarify issues raising while they are working on the system.

2.7 Assumptions and Dependencies

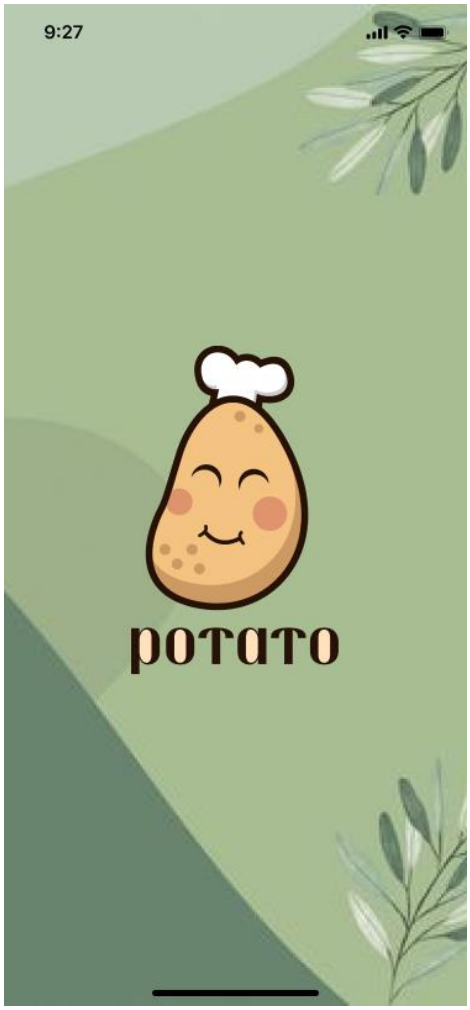
- Farmers need to know the accurate measurements of the premises size.
- Farmers need to give the exact plantation dates and the plantation quantity.

- A separate device needs to be built by combining all the sensors to send temperature, humidity and rainfall data to the real time database.
- Farmers need to have the ability of using a smart phone and android mobile applications.

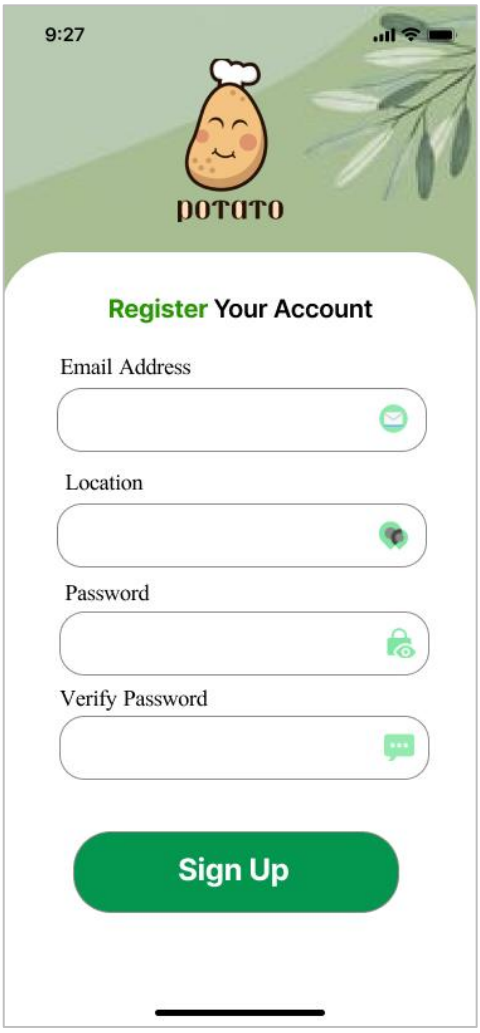
3. External Interface Requirements

3.1 User Interfaces

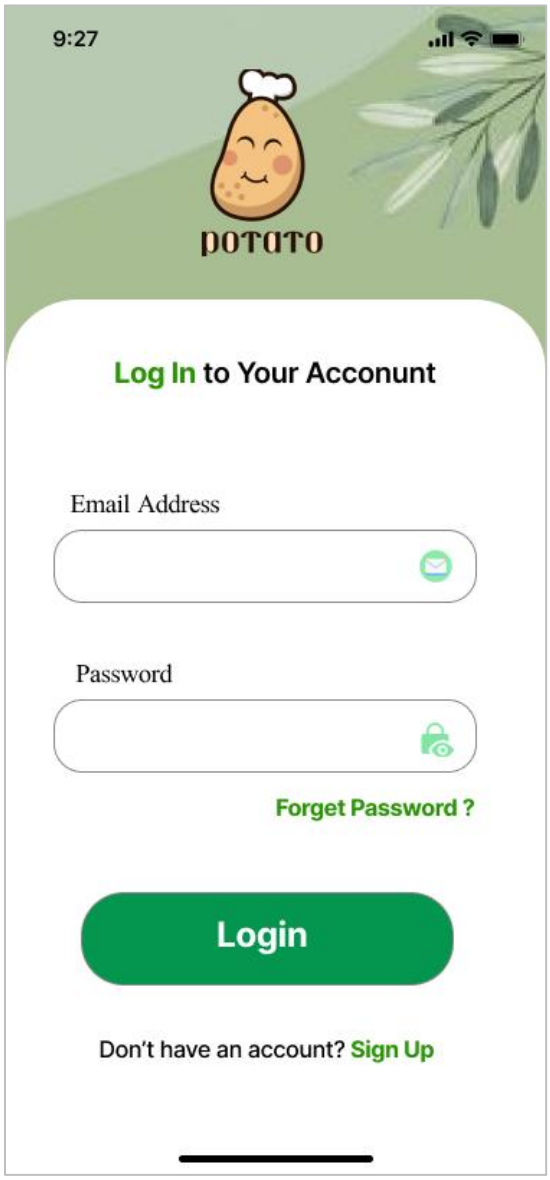
- Welcome page



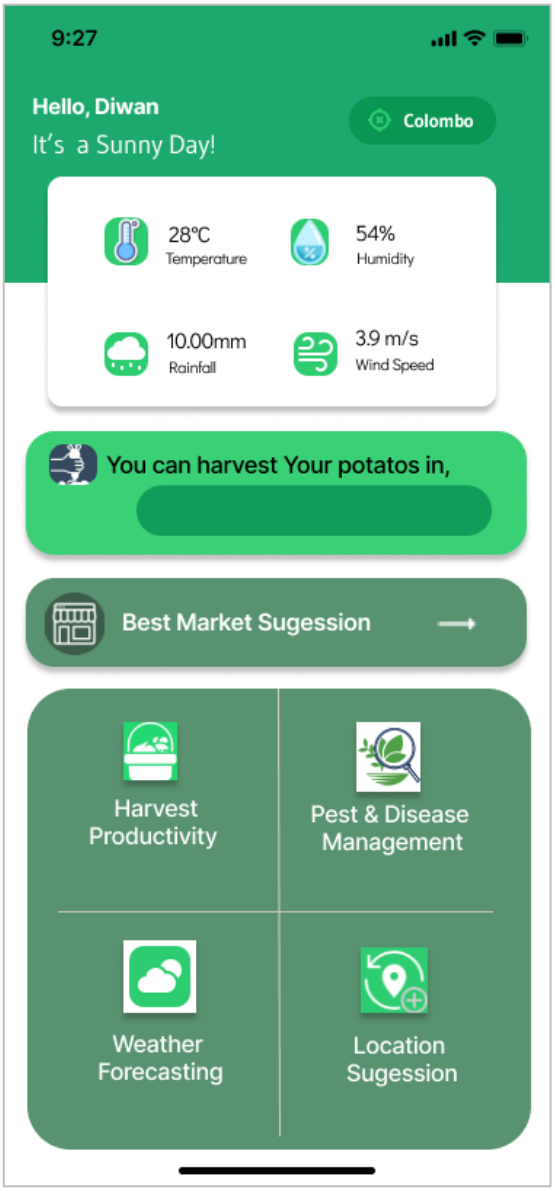
- Sign Up page


9:27
potato
Register Your Account
Email Address
Location
Password
Verify Password
Sign Up

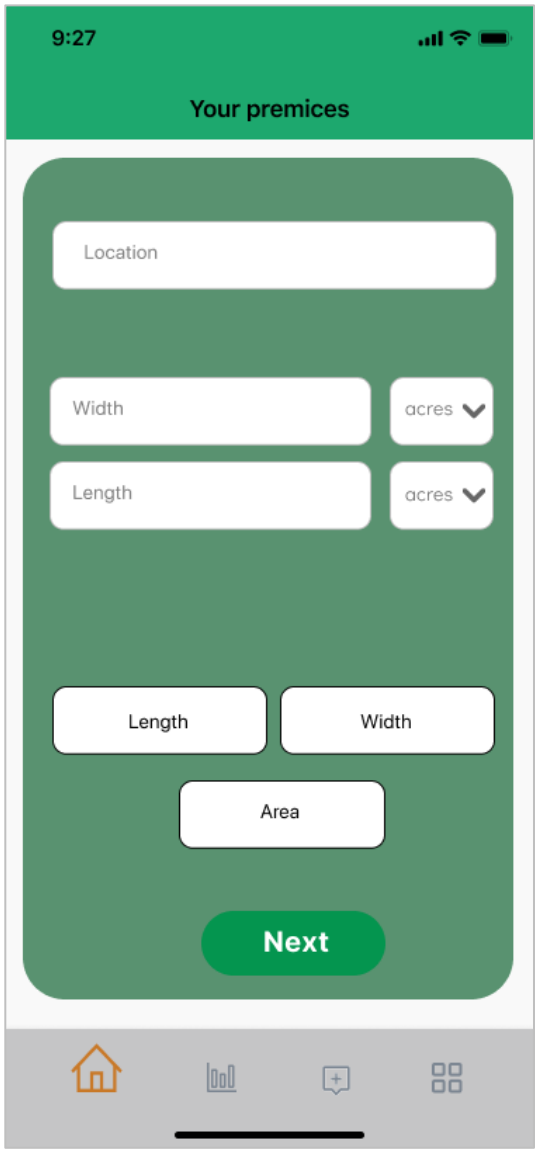
- Login page


9:27
potato
Log In to Your Acconunt
Email Address
Password
Forget Password ?
Login
Don't have an account? Sign Up

- Home page

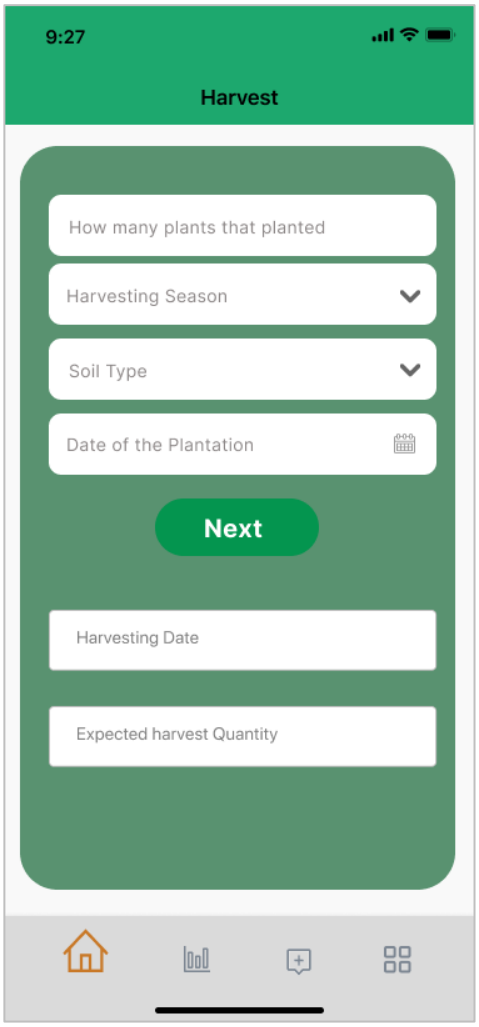

9:27
Hello, Diwan
It's a Sunny Day!
Colombo
28°C
Temperature
54%
Humidity
10.00mm
Rainfall
3.9 m/s
Wind Speed
You can harvest Your potatos in,
Best Market Sugession
Harvest Productivity
Pest & Disease Management
Weather Forecasting
Location Sugession

- Harvest Prediction – Your premises page



- User need to enter the location, width, and length of your premises in acres or hectare.
- By entering those required fields user the application should be calculate those measurements and provide the premises size in area box.

- Harvest prediction – Harvest page

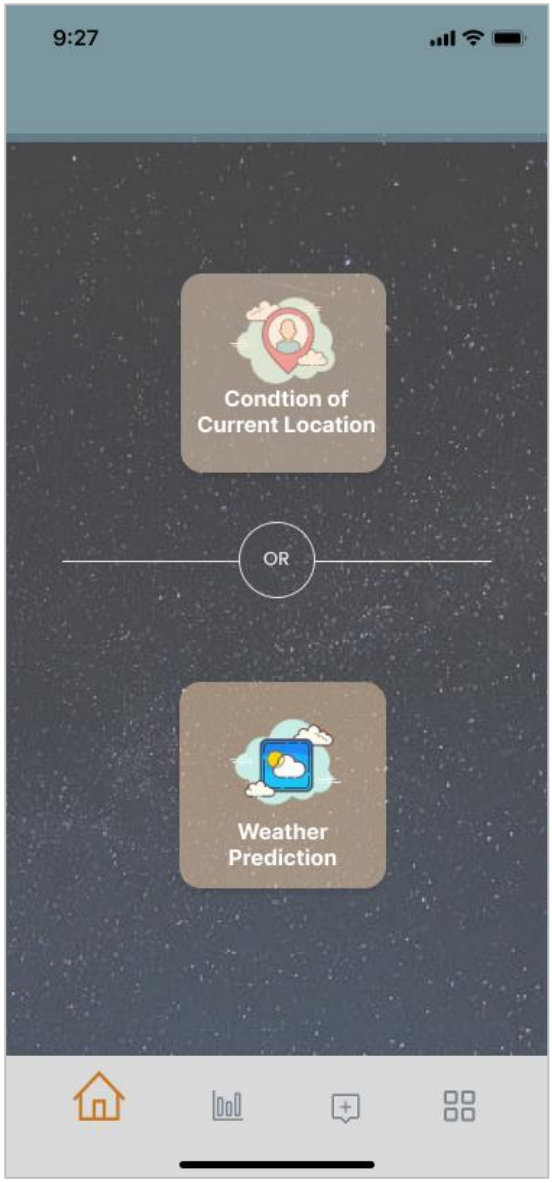


- User needs to enter the quantity of the plants that planted in their premises.
- As harvesting seasons there has two types, Yala and Maha. User needs to select one of those season.
- As soil type below soil names should have be the selection,

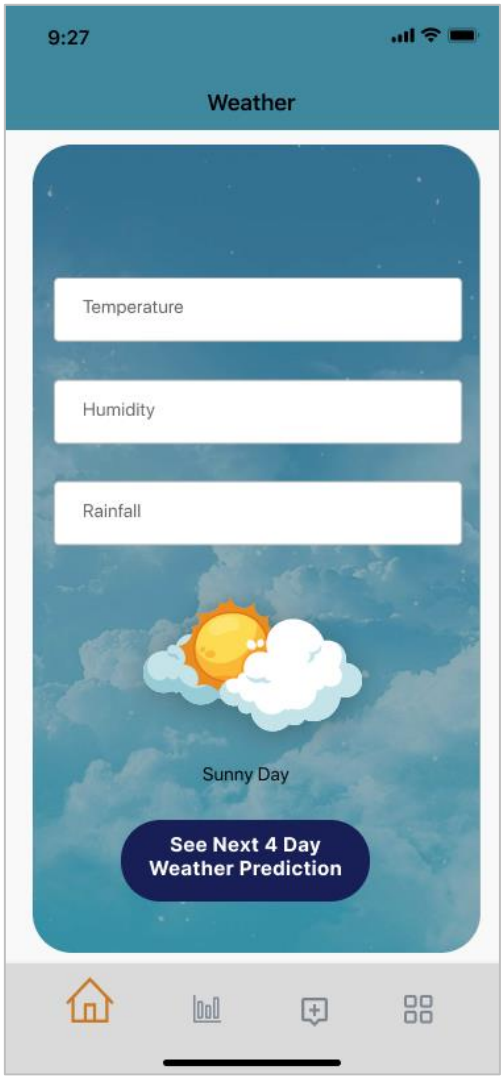
- Raddish brown earth soil
- Non- calcic brown soil
- Reddish brown lateritic soil
- Red yellow podzolic soil
- Red yellow latosols
- Immature brown laomy soil
- Rendzina soil
- Grumosols soil

When clicking next button all measurements should be calculated and show the harvesting date and expected harvest quantity.

- Weather main page

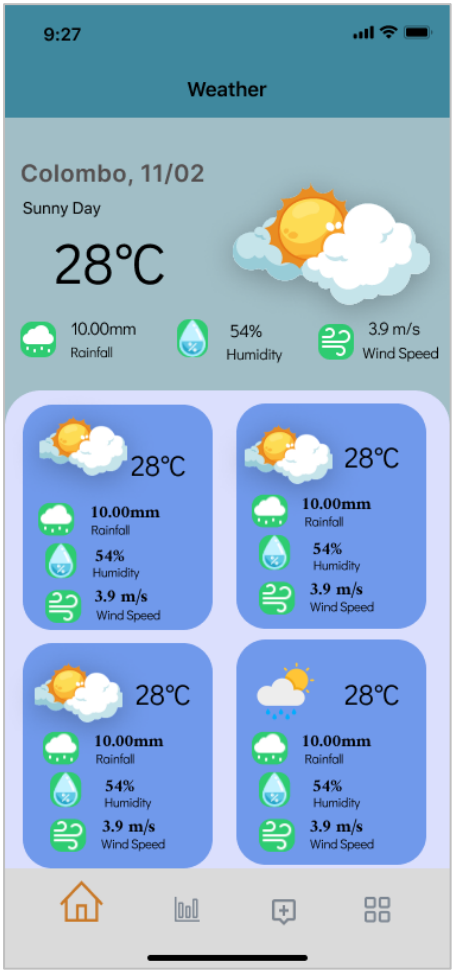


- Weather prediction – Current location weather page



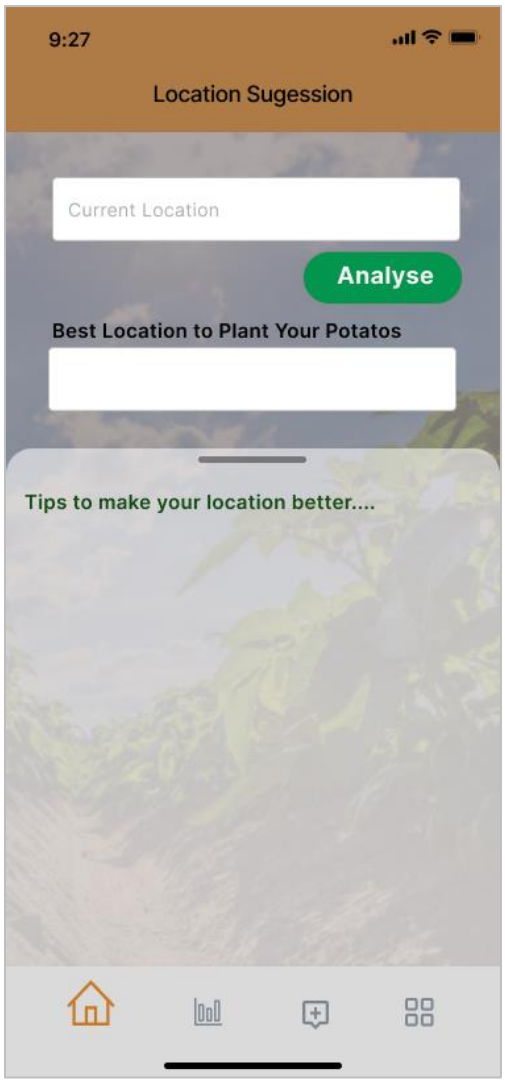
➢ Temperature, humidity, and rainfall measurements will be get from IoT sensors.

- Weather prediction – Next 4 days' weather prediction page



➢ 4-day weather prediction will be getting from open weather map API.

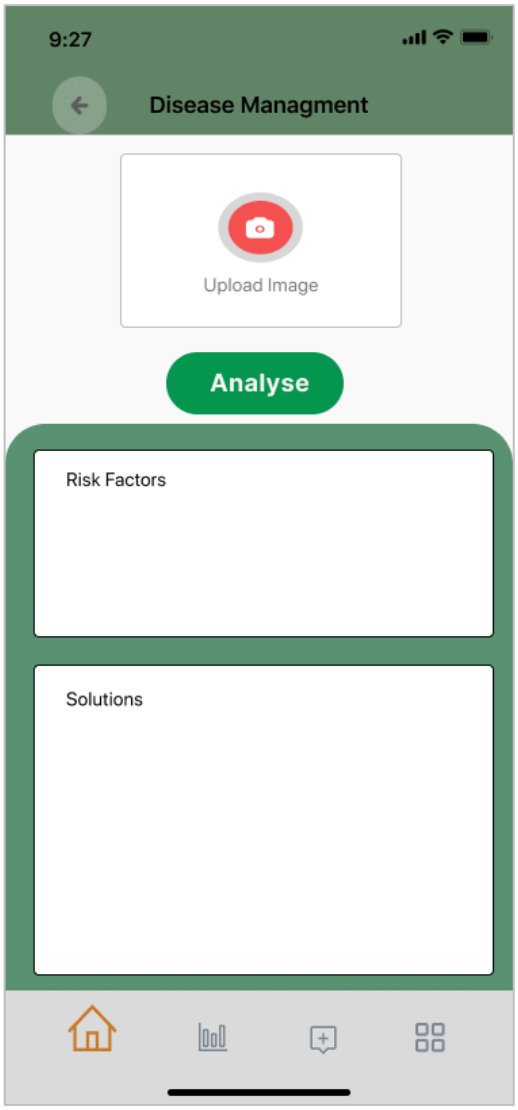
- Location Suggestion page



➢ By clicking analyze button with providing current location, user can be able to get the idea about the best location to plant their potatoes and also need to give knowledge to make user's location into better condition.

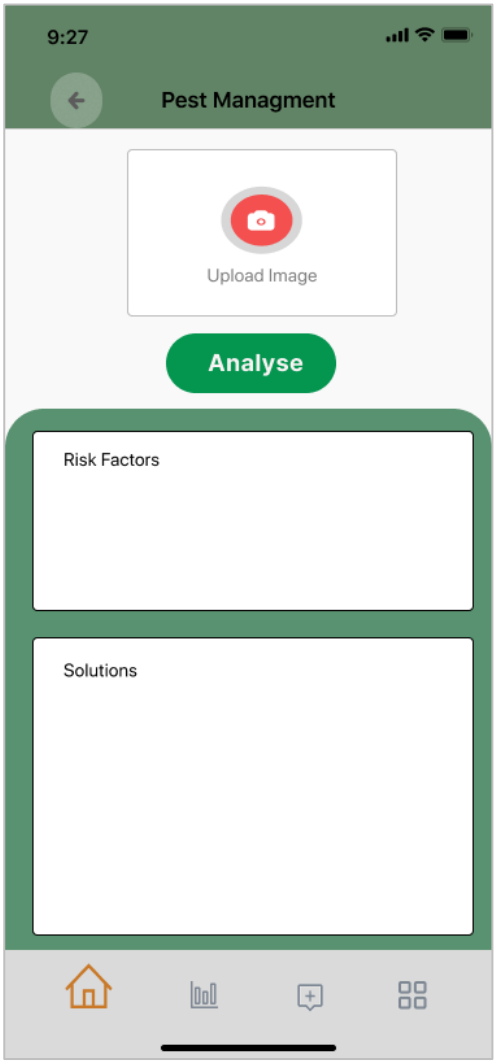
- Pest and disease management main page

- Disease management page



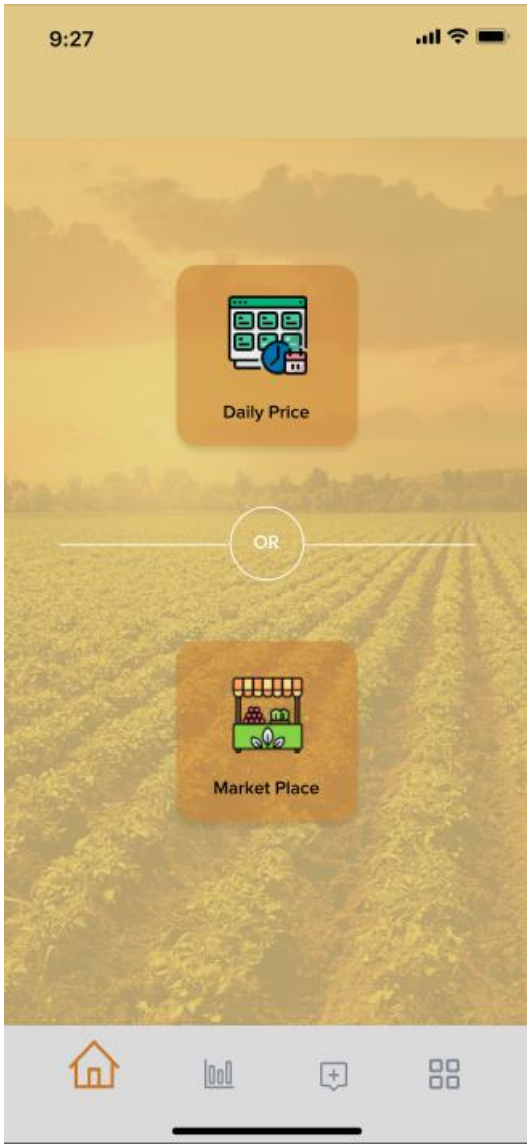
- User can be able to upload the image or capture image.
- By clicking analyze button the diseases name, risk factors, solutions need to be filled.

- Pest management page

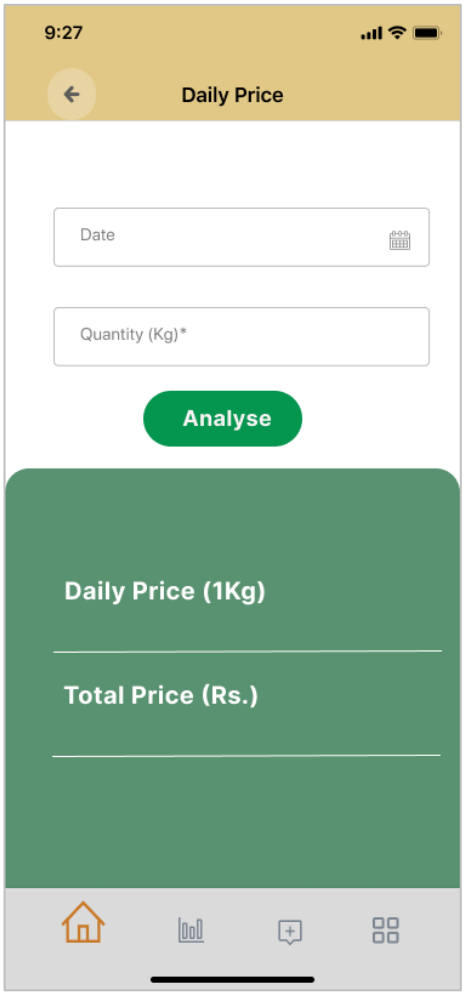


- ➢ User can be able to upload the image or capture image.
- ➢ By clicking analyze button the pest name, risk factors, solutions need to be filled.

- Market main page

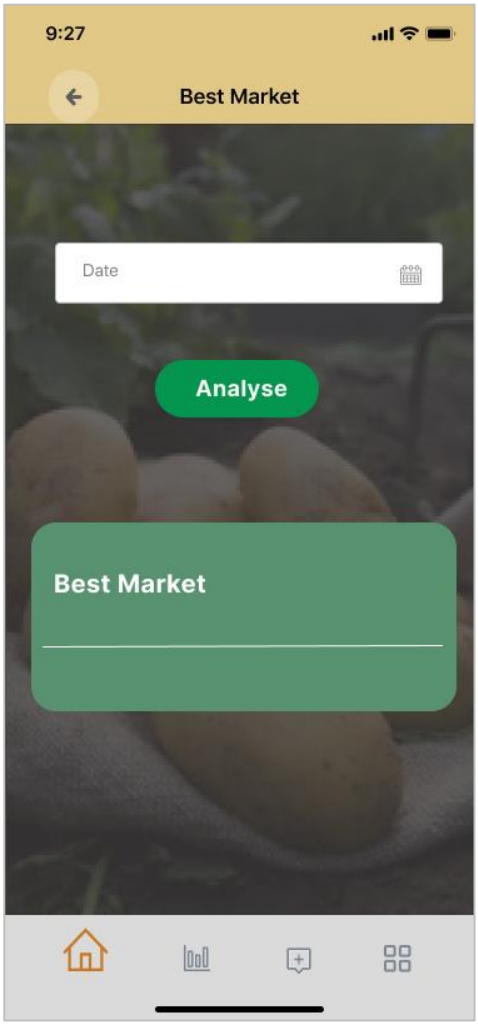


- Daily market prices page



➢ By selecting date and entering quantity user can be able to see daily price for 1Kg and also total price for all harvest quantity that get.

- Best market suggestion page



3.2 Hardware Interfaces

Our customer needs to have any android mobile phone in order to gain the maximum benefit from the system in an efficiently.
Weather forecasting, location suggestions functions needs to have good stable internet connection. So there is a need of broadband internet connection.

3.3 Software Interfaces

The mobile phone on which this application will be installed must have an Android mobile platform of version 5 or higher. The harvest mobile application will be installed on that phone. In order to obtain the user's current location, those mobile applications must have the location service function activated. The user will need to use sensors to obtain humidity and temperature information.

3.4 Communications Interfaces

When the user's potato harvest date approaches, an email will be sent to the users logged in email address. A stable internet connection is required to enable that functionality. Typically, a mobile or broadband internet connection via the user's mobile device.

4. System Features

4.1 System Feature 1

Use case name	View Harvest Predictions
Primary actor	User
Pre-condition	Login into the system
Main Scenario	
1. User login in to the system 2. Open the interface of Harvest Productivity 3. Enter the required details 4. Click the 'Next' button 5. Get the calculated harvest date & expected harvest quantity	
Extensions	
1.a If the login is incorrect • Display error message • Ask to login again	

Use case name	View Weather Forecasting
Primary actor	User
Pre-condition	Login into the system
Main Scenario	
1. Open the interface of Weather Forecasting 2. View automatically generated temperature, humidity and rainfall values using sensors 3. Click the 'see Next 4 Day Weather Prediction' button 4. See next 4 day's weather condition	

Use case name	Identify diseases in potatoes
Primary actor	User
Pre-condition	Login into the system
Main Scenario	
1. Open the Pest & Disease Management interface 2. Select Disease Management 3. Upload the image to the system 4. Click the ‘Analyze’ button 5. The system suggests risk factors and solutions for them	

Use case name	Identify the pests of potatoes
Primary actor	User
Pre-condition	Login into the system
Main Scenario	
1. Open the Pest & Disease Management interface 2. Select Pest Management 3. Upload the image to the system 4. Click the ‘Analyze’ button 5. The system suggests risk factors and solutions for them	

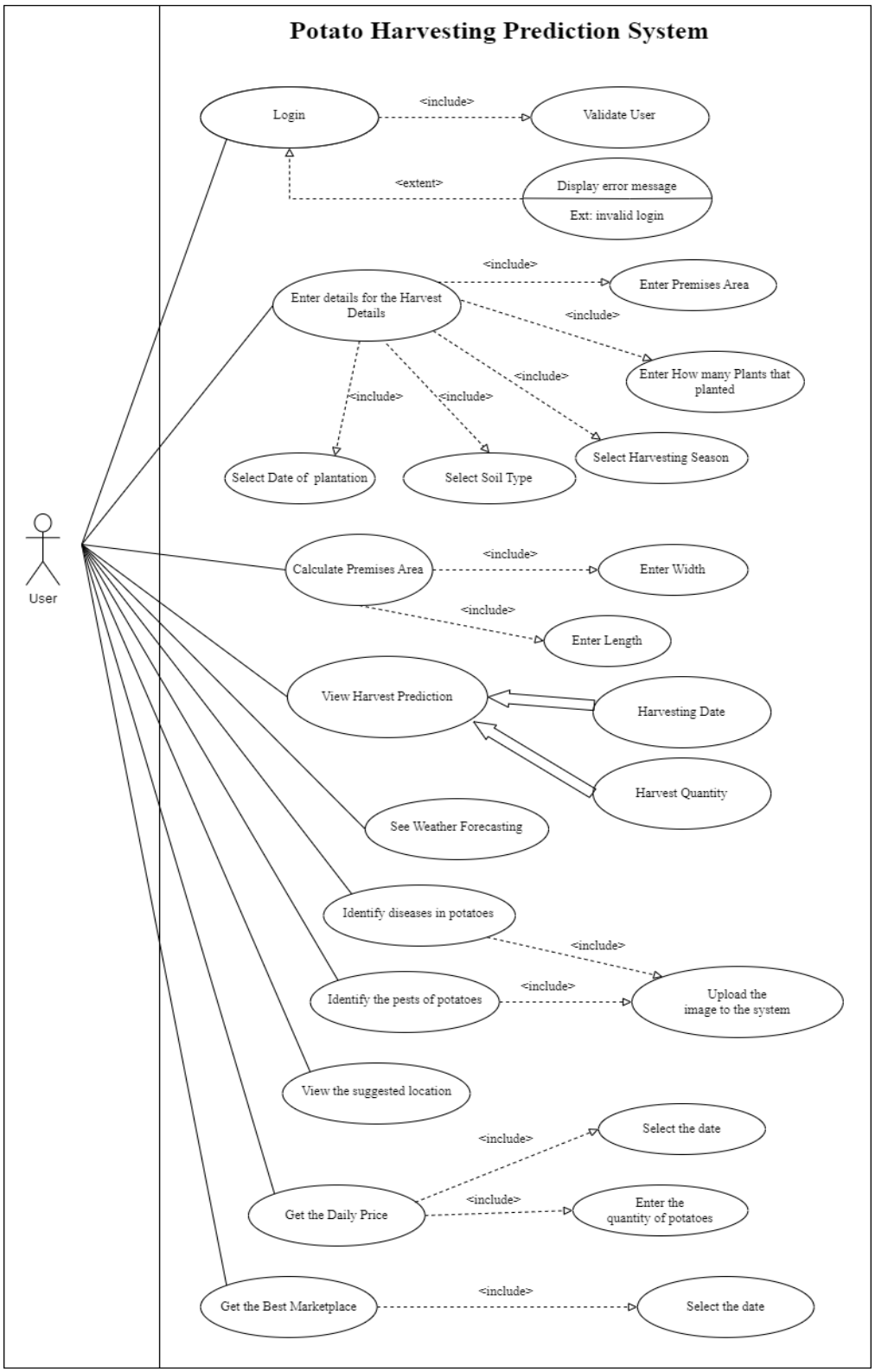
Use case name	View the suggested location
Primary actor	User
Pre-condition	Login into the system
Main Scenario	
1. Open the Location Suggestion interface 2. Automatically shows the current location 3. Click the ‘Analyze’ button 4. The system suggests the best place to plant your potatoes or tips to make the user's location better	

Use case name	Get the Daily Price
Primary actor	User
Pre-condition	Login into the system
Main Scenario	
1. Open the interface of Best Market Suggestion 2. Go to the Daily Price page 3. Enter the required details 4. Click the ‘Analyze’ button 5. Get the calculated Daily & Total price for the harvest	

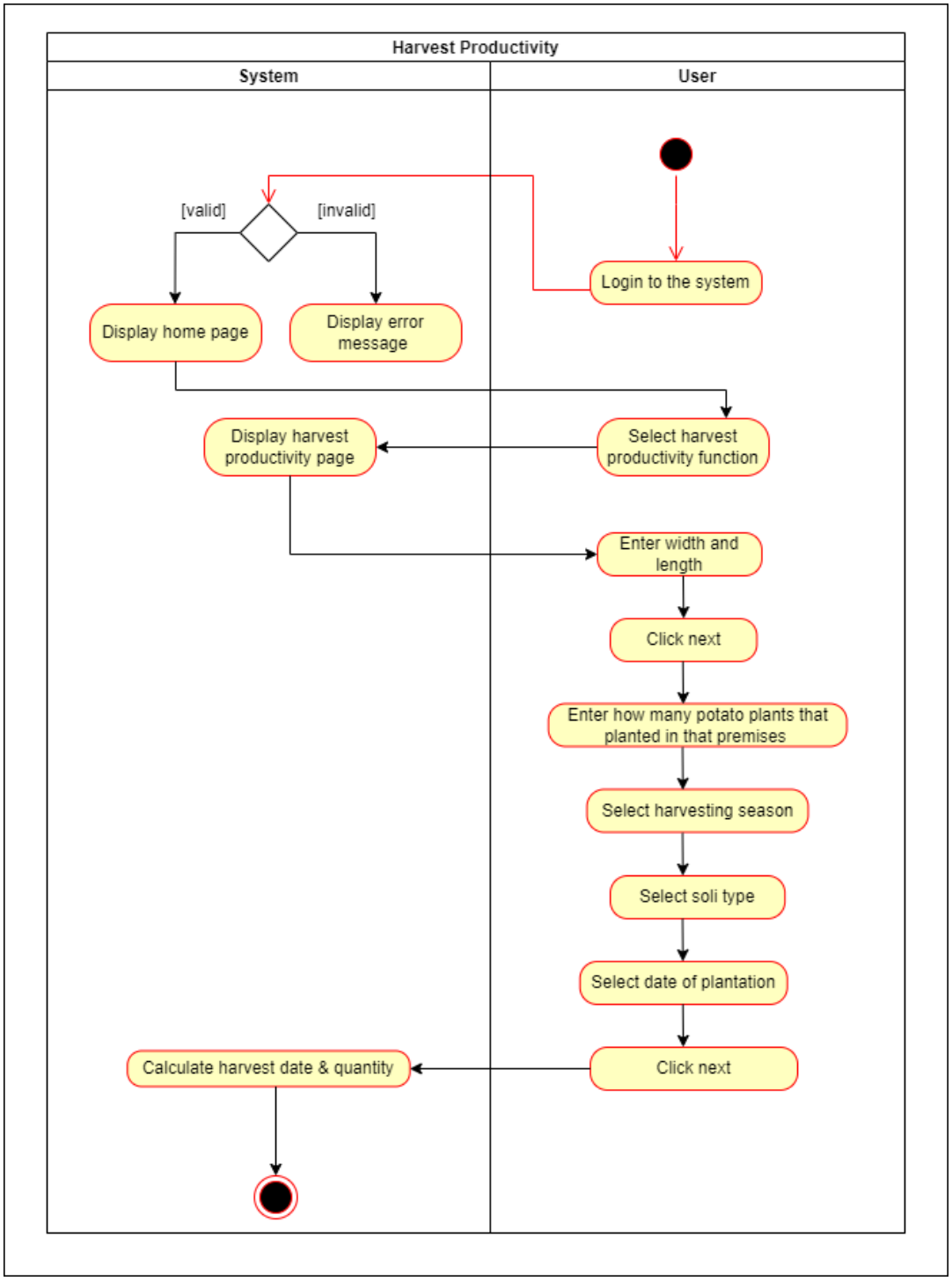
Use case name	Get the Market Place
Primary actor	User
Pre-condition	Login into the system
Main Scenario	
1. Open the interface of Best Market Suggestion 2. Go to the Market page 3. Select the date 4. Click the ‘Analyze’ button 5. The system suggests the Best Marketplace	

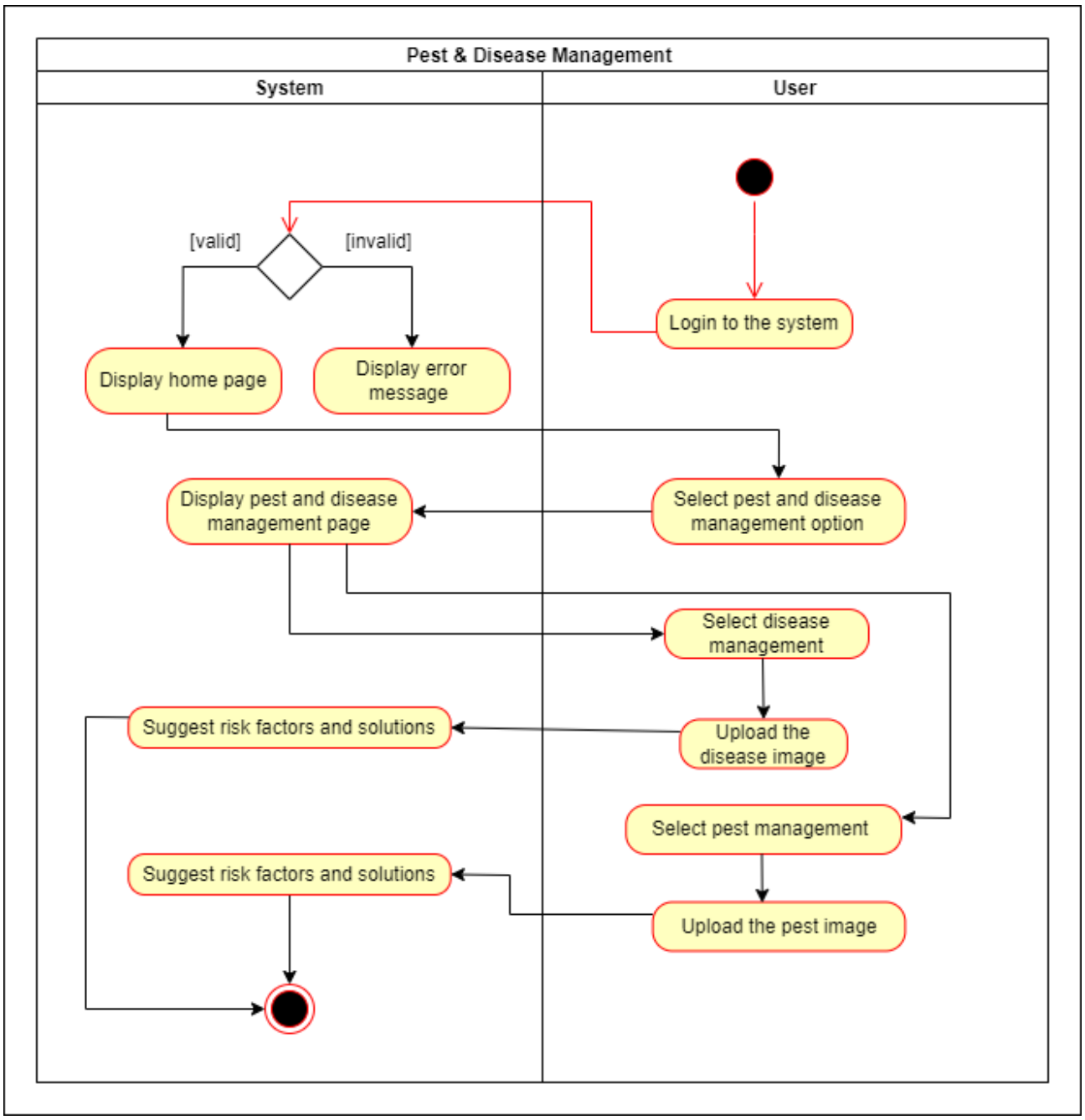
4.2 System Feature 2 (and so on)

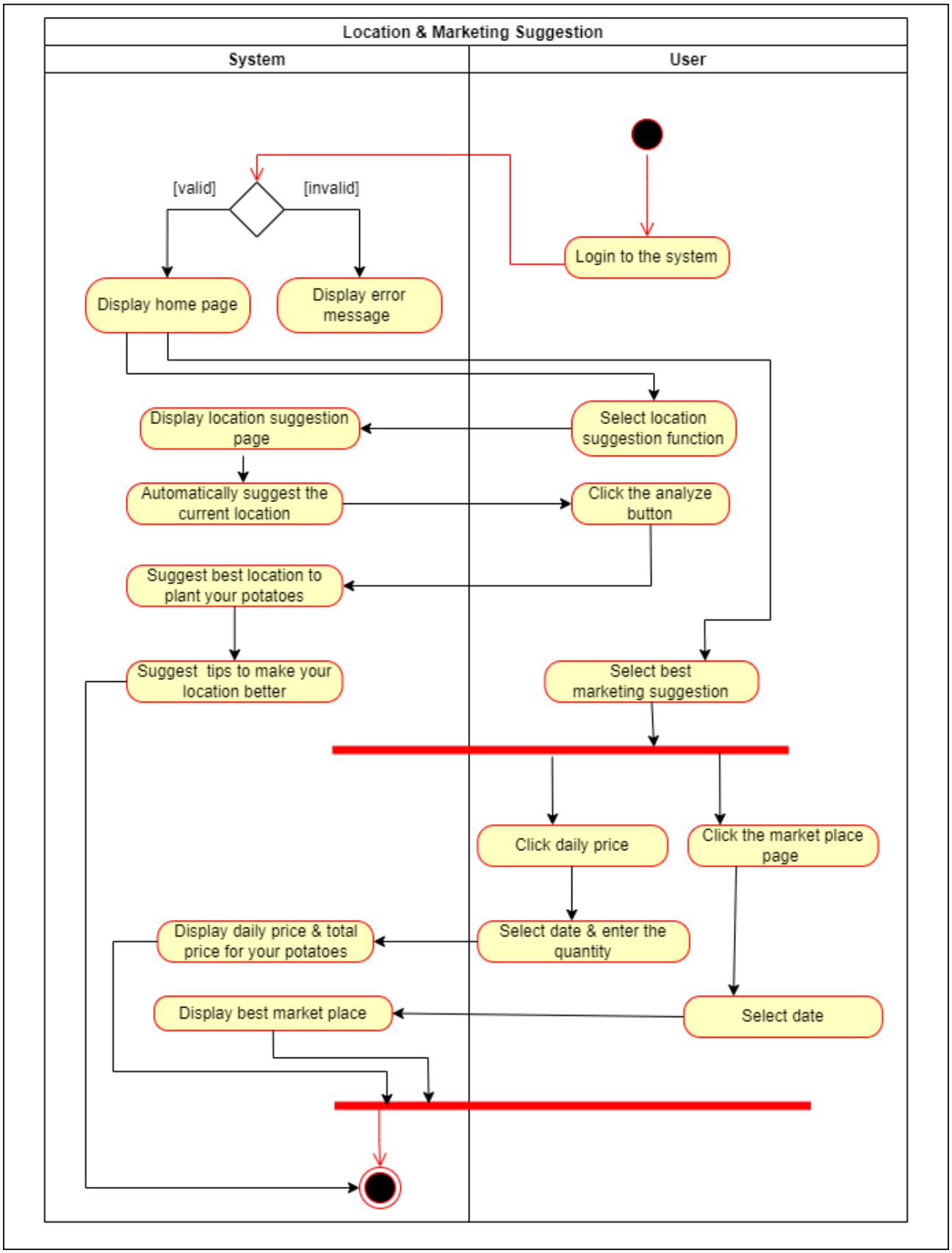
Use Case Diagram

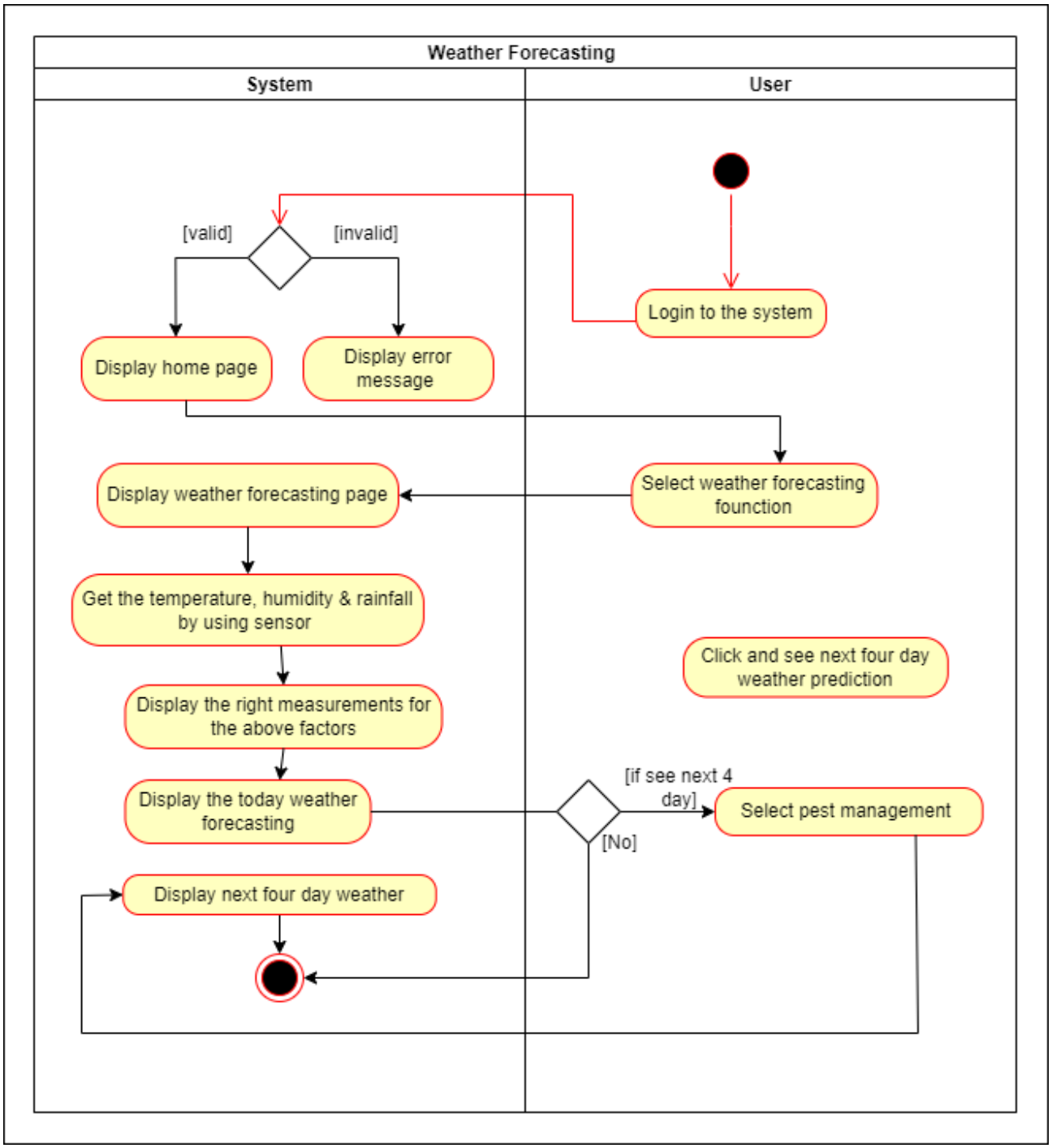


Activity Diagram




Pest & Disease Management
System
User
[valid]
[invalid]
Login to the system
Display home page
Display error message
Display pest and disease management page
Select pest and disease management option
Select disease management
Suggest risk factors and solutions
Upload the disease image
Select pest management
Suggest risk factors and solutions
Upload the pest image


Location & Marketing Suggestion
System
User
[valid]
[invalid]
Login to the system
Display home page
Display error message
Display location suggestion page
Select location suggestion function
Automatically suggest the current location
Click the analyze button
Suggest best location to plant your potatoes
Suggest tips to make your location better
Select best marketing suggestion
Click daily price
Click the market place page
Display daily price & total price for your potatoes
Select date & enter the quantity
Display best market place
Select date


Weather Forecasting
System
User
[valid]
[invalid]
Login to the system
Display home page
Display error message
Display weather forecasting page
Select weather forecasting founction
Get the temperature, humidity & rainfall by using sensor
Click and see next four day weather prediction
Display the right measurements for the above factors
[if see next 4 day]
Display the today weather forecasting
Select pest management
[No]
Display next four day weather

5. Other Non-Functional Requirements

5.1 Performance Requirements

System should be available within 24 hours of the day to do all operations including data entering, updating, generating reports and each and every operation, which the system will perform should be completed within 5 seconds.

5.2 Safety Requirements

Potato Harvest Prediction System a high performance database that has the ability to maintain backups accurately and in any case, any adverse condition the system can restore data from the backups hence data will not be harmed for any circumstance.

5.3 Security Requirements

All the app data should be secured and be encrypted with minimum needs so that it's protected from outside environment also from internal attack. Use login credentials

- Maintainability – In any case the system generates any bugs the system should be able to rectify those bugs immediately according to the coding conventions.

- Reliability – All the information provided by the Potato Harvest Prediction System should be precise and accurately.

- Availability – Potato Harvest Prediction System is allowing the access to the system to all users 24/7 hours.

- Operability – The system will be providing user-friendly interfaces to all users to access the system and the database. The system features are more learnable to user

- Usability – Ease of use interface that allow users to seamlessly interact with the product. First time users can follow the app without any extra effort.

5.4 Software Quality Attributes

- Availability – This characteristic tells us if an application will carry out the responsibilities that have been given to it. Additionally, availability encompasses ideas related to software performance, integrity, dependability, and secrecy.

- Interoperability – To complete some tasks, software-driven systems may need to collaborate and interact with one another. The capacity of two systems to communicate information through certain interfaces is referred to as interoperability. The interoperability characteristic must thus be examined in terms of both syntactic and semantic interoperability by Software Quality Assurance engineers.

- Performance – This characteristic relates to a software-driven system's capacity to adhere to timing specifications. It indicates that from the perspective of testing, software testing engineers must determine if the system reacts to various events within predetermined time frames. These occurrences might take the shape of clock events, process interruptions, notifications, user requests, and more.

- Testability – Software testing measures how effectively a software-driven system enables testers to do tests in accordance with predetermined criteria. This characteristic evaluates how simple it is for software quality assurance engineers to create test specifications for a given system and all of its constituent parts. Developers can evaluate a system's testability using a variety of methods, including encapsulation, interfaces, patterns, reduced dependency, and more.

- Security – This characteristic evaluates how well a system can detect and prevent nefarious or illegal acts that can endanger the system. The quality takes significance since security refers to a system's capacity to safeguard data and defend information against unwanted access.

- Functionality – With the use of this feature, software-driven systems may be compared to genuine requirements and specifications to see how well they adhere. The majority of software testing experts believe that this quality is essential and a top criterion for a contemporary application, and they would thus advise doing tests that gauge the system's intended functionality early on in software testing projects.

5.5 Business Rules

- Login passwords can only change with the permission of user
- User can use productivity summery, weather, disease and pest management only for Rs.250.00 and as addition they need to pay Rs.400.00 for these two functions, daily price and best market for the harvest.

6. Other Requirements

The following keyboard shortcut functions must work with the system.

- Ctrl + A: Select all
- Ctrl + X: Cut
- Ctrl + C: Copy
- Ctrl + V: Paste
- Shift + any letter: Case change

In the left mouse button click following functions should be contains.

- Copy
- Cut
- Paste
- Select all

7. Budget

Resources	**Price (Rs.)**
Project Management • Business Analyst • Software development team • IoT developers • TOTAL	 67,000.00 100,000.00 120,000.00 287,000.00
Software • Licensed software • Open weather API • TOTAL	 40,000.00 600.00 40,600.00
Hardware • Temperature and humidity sensor • Raindrop sensor • Arduino UNO • TOTAL	 500.00 500.00 5400.00 6,400.00
Server Cost (MySQL Database)	15,000.00
Other	1000.00
TOTAL	**350,000.00**

Appendix A: Glossary

Term	Description
SRS	Software Requirements Specification
Use Case Diagram	Graphical representation of a functions in a system
Use Case Scenario	Formal description of the flow of events that occur during the execution of a Use Case instance.
Activity diagram	A graphical method that can use to represent the flow of an activity

Appendix B: To Be Determined List

- System development
- Database development
- Testing the system