Agriculture Adviser

Software Requirements Specification

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Revision History

Name	Date	Reason For Changes	Version	Date of Approval
Abhishek Yadav, Ripudaman Singh, Vighnesh Sharma, Meghna Reddy	21st Jan, 2020	Creation of SRS	1.0.0	29th Jan, 2020

1.   Introduction

The introduction of SRS document provides an overview of the entire document with purpose, document conventions, intended audience and reading suggestions, product scope, and references of the SRS. The point of this document is to gather, analyze and give an in-depth insight of the Agriculture Adviser software system by defining the problem statement in detail. It also considers the requirement capabilities by stakeholders and their needs while defining high-level product features. The requirements of the Agriculture Adviser are provided in this document in detail

1.1   Purpose

The purpose for this SRS report is to give a point by point review of our Agriculture Adviser software, its parameters and objectives. This document portrays the project's intended interest group and its UI, hardware and software prerequisites. It characterizes how our customer, group and audience see the product and its usefulness. Regardless, it helps any developer and designer to aid software delivery lifecycle processes.

1.2   Document Convention

Abbreviations and conventions used in this document are given below:

SRS	Software Requirement Specifications
pH	potential of hydrogen (used for measuring acidity)
Q/A	Question/Answer
GPS	Global Positioning System
Privileged user	Privileged user has access to a specific information that is not available to everyone, although this information can be accessed by other privileged users like admin
Unprivileged user	An unprivileged user does not have access to any special/sensitive information

Changes in this document are marked with color *(changes, additions)* or crossed (~~deleting~~).

1.3   Intended Audience and Reading Suggestions

While the software requirement specification (SRS) document is written for a more general audience, this document is intended for individuals directly involved in the development of Agriculture Adviser. This includes software developers, project consultants, and team managers. This document need not be read sequentially, users are encouraged to jump to any section they find relevant. Below is a brief overview of each section of the document:

1. **Introduction:-** This section offers a summary of the Agriculture Adviser project, including purpose, document conventions, intended audience, product scope, and references associated with the intended product.
2. **Overall Description:-** This section describes the about the problem and product perspective
3. **External Interface Requirements**:- This section gives an idea about how the product will look like
4. **Domain Model**:- Represents a tentative class diagram for the project.
5. **System Features (Use Cases):-** Contains possible use cases which might occur while using the application.
6. **Other Nonfunctional Requirements:-** This section talks about system attributes such as security, reliability, performance, maintainability, scalability, and usability.

ID	Stakeholder	Description
S-1	Development team	Forming the accurate vision of the project, detailed functional and nonfunctional requirements.
S-2	Customer	Checking correspondence of business goals and functionality requirements to the expectations from implementing the product.
S-3	End User	End Users are the ones who will be using the application at the end of the day.

1.4   Product Scope

This project is a prototype for the Agricultural Advisor System and it is restricted within the college premises. This is implemented under the guidance of Dr. Balwinder S Sodhi. The goal of this project is to develop a Web Application to help farmers in their farming. The prime objective of this application is to provide information about different variety of crops suitable

with respect to type of soil, weather conditions, new methods and technologies, disease prevention techniques. This information can be utilized to get good or atleast better results.

1.5   References

[1] Agricultural Mission Mode Project Ministry of Agriculture Govt. of India
[2]https://krazytech.com/projects/sample-software-requirements-specificationsrs-report-airline-database
[3] SRS Paper for "Amazing Lunch Indicator"

2.   Overall Description

2.1   Product Perspective

This project explores how web application services can help farmers in their farming activities. This application provides maximum information to the farmers about agriculture and it reduces the brokerage system. It provides all the information related to agriculture in a single system. It is mainly considered on the various types of diseases of crops and how and which fertilizers to be used to get more benefits and also equipment should be used such as tractors, plows, etc. A major goal of our envisioned software system is to be able to eliminate the dependency on such experts.

It is mainly a web-based application. It takes various queries from the farmers as input and provides a solution based on the knowledge it acquired from various sources such as the Department of Agriculture, India. The data needs to be stored to acquire from some inferences from it. Since this is a data-centric product it will need somewhere to store the data. For this purpose, a database is to be used. The web portal uses the database to answer the queries raised by the farmers.
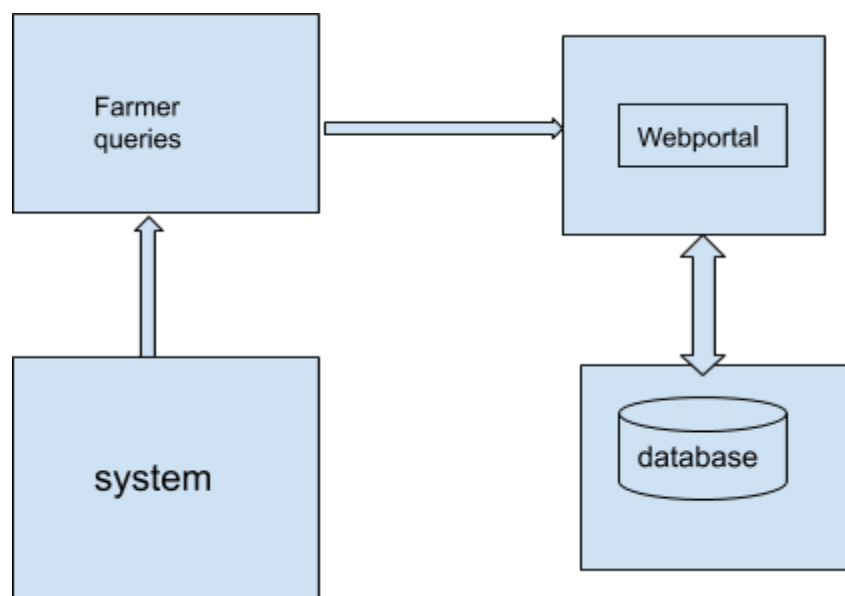
Product Functions

The application environment requires authentication of following users:

Farmer, Contributor, Admin authentication:
Authentication of all users is based on the username and password. The password and the username are checked with the database to ensure the user validation. The admin has the highest privileges. Admin is allowed to create, edit, update the accounts of any user. Rest of the users have limited access.

Options to select:
The farmer can select the following options:
- **Crop recommendation:**
  It can be done in two ways. The first method is to use the location of the farmer as input and thereby determine the type of soil present in that area and the amount of water present in that area and climatic factors. The second method is to take the input manually from the farmer about the type of soil and irrigation facilities and suggest a crop based on that.

- **Fertilizers Needed:**
  The application helps to recommend the farmer the amount of fertilizer and what form of fertilizer and when to apply fertilizers to the soil to benefit the growth of a plant or crop. This again can be done in two ways. The first is to use the location of the farmer and find the type of soil present in that location, get its PH value, nitrogen phosphorus levels and

potassium content. The other way is to take the same input from the farmers directly in a Q/A form. Based on input the recommendations are made.

- **Dealing with weeds, insects, and diseases:**
  - Due to the regulations of organic farming, few options remain for organic farmers to manage pests and diseases in their crops compared to conventional farming. Pest management in organic farming is achieved by using appropriate cropping techniques, biological control, and natural pesticides (mainly extracted from plant or animal origins). Weed control, the main problem for organic growers, can be managed through cultural practices including mechanic cultivation, mulching, and flaming. Some of the questions that can be answered are:
    - What are the main weeds in the crop?
    - When and where do these weeds cause problems in the different stages of the lifecycle of the crop like pre-plant, preemergence, early or later in crop development?
    - What kind of agents needed for weed control?
    - How to avoid the occurrence of the disease and reduce the risks associated to a crop by selecting a season or a site where the environment is unfavorable for the infection?
    - How to protect the crop from the disease by means of toxicants or some other barrier for the infection?
  - Crop yields decreases when the plants are repeatedly sown in the same beds this is because of the pest present in the soil such as wireworms maggots. Plans to rotate plant families can decrease the pests in a crop. Recommending farmers about the rotation of crops and suggesting them about the type of crop be sown after a particular crop helps to reduce the pest.
  - Attracting beneficial Predators can also help in overcoming pests. The farmers can know which predator can help their plant and which can become a problem. Attracting predators such as bees, ladybugs, spiders, etc for different types of crops.

- **What are the types of equipment needed for a crop**
  - The farm machinery should be suggested based on the crop acreage, as larger-scale machinery is required for big crop acreage to ensure that planting and harvesting are completed in a timely fashion.
  - The equipment can be suggested based on the labour supply
  - The machinery selection should be based on the long term weather predictions in a particular area. The weather patterns determine the number of days suitable for fieldwork in a given period each year.

2.2   User Classes and Characteristics

There are four classes of users that can interact with the system a) administrator, b) farmer, c) contributor, d) general(unprivileged) user. All the users use the system in different ways so that they satisfy their own requirements. All the users have to login to website before

accessing or manipulating their corresponding privileged information except the unprivileged user.

The characteristics of user classes are:-

1. The *administration* interacts with the database and updates the data of the crops and new technologies for crops. The admin authenticates the new users. The admin is responsible for maintaining all the use cases.
2. The *farmers* will use the web application to know about the different types of crop recommendations, disease prevention techniques based on his GPS location or by manually typing the soil types and weather conditions. The farmer can also get the answer for the query asked to be displayed on the web portal.
3. The *contributor* will login on the web portal and can add new content, remove old content, archive content.
4. A *general user* can visit the website without login and can see the public information available there. Generally this type of users are those users who are visiting the website for the first time. They can get acquainted with some of the general features of the website.

ID	User classes	Description
U-1	Administrator	The Administrator can add a user, delete a user or edit the details of a user manually. Admin will also feed the database with data (in a text file) that will be used to make the Knowledge Model
U-2	Farmer	The farmer will get recommendations for crop and right proportion of fertilizers for crop every season based on his/her location, soil pH, weather conditions. The farmer can also search for disease prevention techniques for a particular disease to a crop. Suggestions about the right equipment to use so that the land resource can be used effectively will be also shown to the user
U-3	Contributor	Contributor can contribute, edit or modify the content, remove the old content
U-4	General(unprivileged) user	General users can be anyone including above users. This type of users can navigate through the website and are able to view unprivileged information that is available on the website without login

2.3 Operating Environment

The web application will work well on Firefox, Chrome and Microsoft Edge as the application will be tested on them. To run the application need of resources such as the memory,

processor speed, cores, will be limited. The amount of memory required by the system to store the database will not be no more than half 1 GB. Since its a web portal there are no specific restrictions to the hardware as long as the hardware is able to run a web browser.

2.4   Design and Implementation Constraints

The language used is python, HTML, CSS and for the database part we will be using Mysql and Neo4j. The memory used in this application will be upto 1 GB. The application will support around 500 user logins at a time with the response time of less than 3s. Since simultaneous users logins are less so there is no need of multithreading. The software will be maintained from time to time by updating its content. The communications protocols of the application will be HTTP, TCP/IP protocol.

Security is given for the software by the authentication and authorisation. Generally a strong password of 8 to 13 characters is recommended. Encryption will also be implemented on later versions of the application.

2.5   User Documentation

Along with the web-application a complete use manual will be provided which will describe how to use the web-application and take advantage of all the provided features to get the desired end results.

2.6   Assumptions and Dependencies

1.) Content generation and updation will be done timely by the content manager
2.) Portal Management Framework will be devised and user will play an active role in it.
3.) User will provide content in local languages.

3.   External Interface Requirements

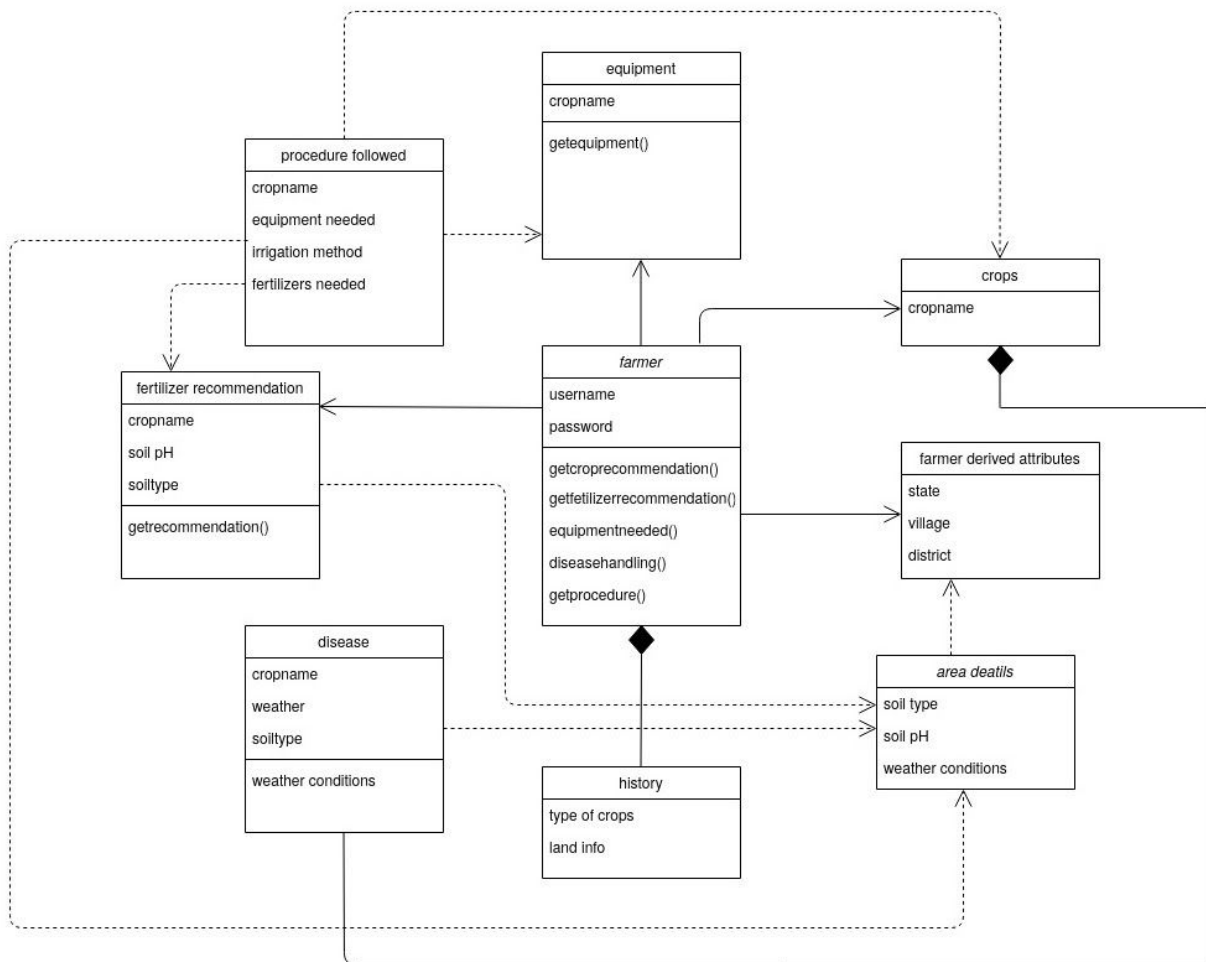## 3.1   User Interfaces
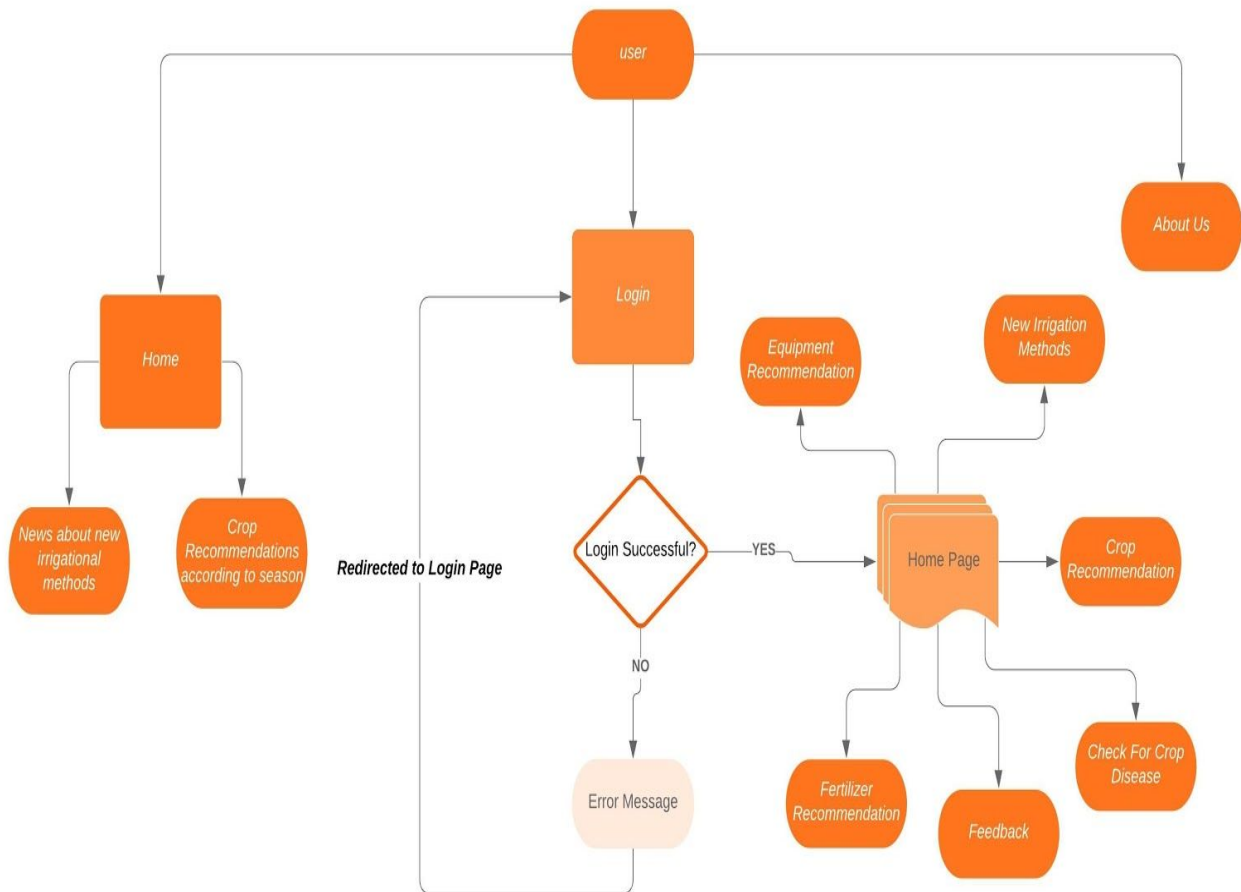
Hardware Interfaces

This web-application will be hosted on a remote server therefore the server should be up 24x7. On server side the application will run on linux OS. Since its a remote server therefore reliable internet access is necessary.

On client side, user will access the application through the web browser. Therefore the client also needs reliable internet service. The application will run on any device that can support the web browser.

3.2   Software Interfaces

Operating System	Linux
Database	MySQL, Neo4j
Front End Development	HTML, CSS, JavaScript
Back End Development	Python

4. Domain Model

5.   System Features (Use Cases)

5.1   Use Case Login

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Brief Description:	The purpose of this use case is to Login user into the web-app or view website as a General user.
Preconditions:	The actor is not logged into the website and the actor is viewing the website.
Trigger:	The actor clicks the login button

Normal Flow:	1. The system displays four different options
	    a. Login as Farmer
	    b. Login as Contributor
	    c. Login as Admin
	    d. Continue as General User
	2. If actor selects one of the options from a. b. c.
	3. Username and Password is asked
	4. If Username and Password is correct then the home page is displayed according to the option selected.

Alternate Flow:	1. If the actor selects Option d. The actor can continue viewing website as a general user
Exceptions:	**If the user enters invalid user which is not registered** The system will show an error message saying that user is invalid please register. **If the user enters wrong password for a registered user** The system will show an error message saying that the password is wrong. **If the user doesn't enter anything** An error message will be displayed saying to enter username/password.
Post condition:	The user will be able to login successfully

5.2 Use Case Administrator

Basic Description:	The administrator can add a user , delete a user ,edit user details and can access the database
Preconditions:	The administrator should login to do the operations
Trigger:	The event will be triggered when the admin clicks the required button

Normal flow:	1.When the user logins, below options will be displayed
	    a. Add user
	    b. Delete user
	    c. Edit user
	    d. Access the database
	    e. Add Data
	2. When the user clicks the add user option a set options will be displayed from the farmers who requested for the signup
	3. When he clicks delete user option a set of options will be displayed from the farmers who have signed up
	4. When he clicks edit user options he can edit the user details among the existing users

Alternative flow:	If he did not perform any of the options from add user, delete user,and edit user he can just check out the database
Exceptions:	If admin tries to change the edit the details of the user like location it is not allowed and the farmer can edit those details.
Non functional:	usability

Use Case Diagram for Administrator

5.3 Use Case for contributor

Basic Description:	The contributor can upload the content ,delete the content,edit the content.
Preconditions:	The contributor must login to perform the actions
Trigger:	The event will be triggered when he clicks the required button

Normal Flow:	1. When the contributor logins the below options will be displayed
	    a.upload content
	    b.delete content

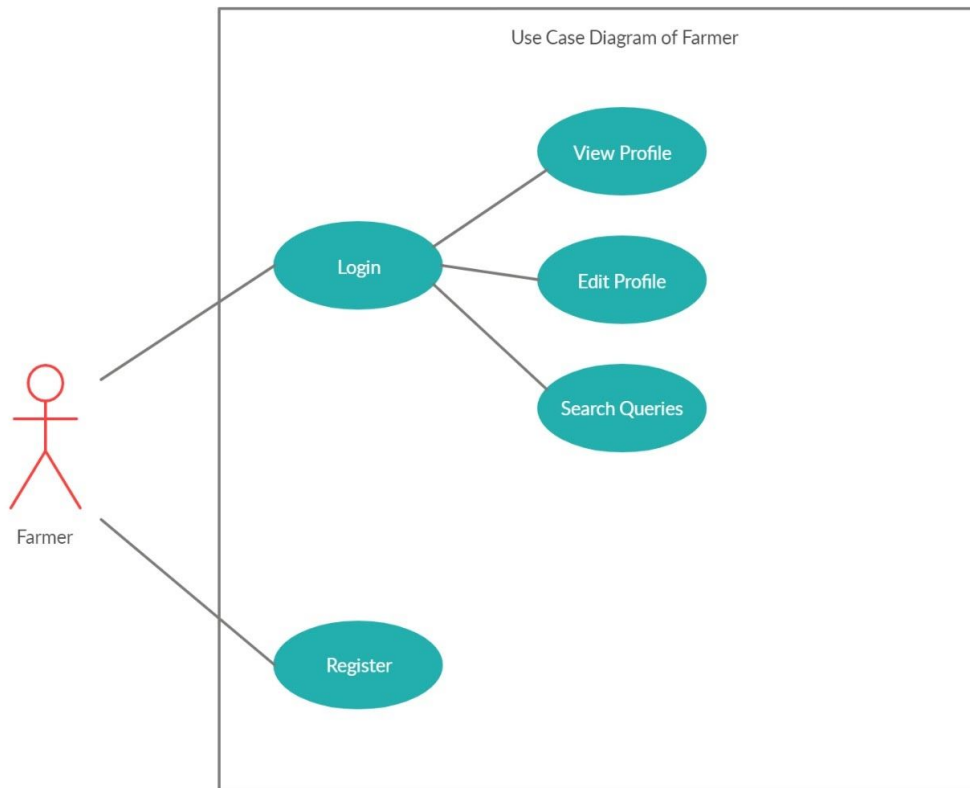|	
	c.edit content 2. The contributor can upload the content the content and based on the NLP techniques the information will be extracted from the document and a knowledge model is formed 3. The content which is uploaded a long time ago and that may not be helpful will be deleted
Alternative flow:	Without performing any action he can browse and logout
Non functional:	Maintainability

Use Case Diagram for Contributor
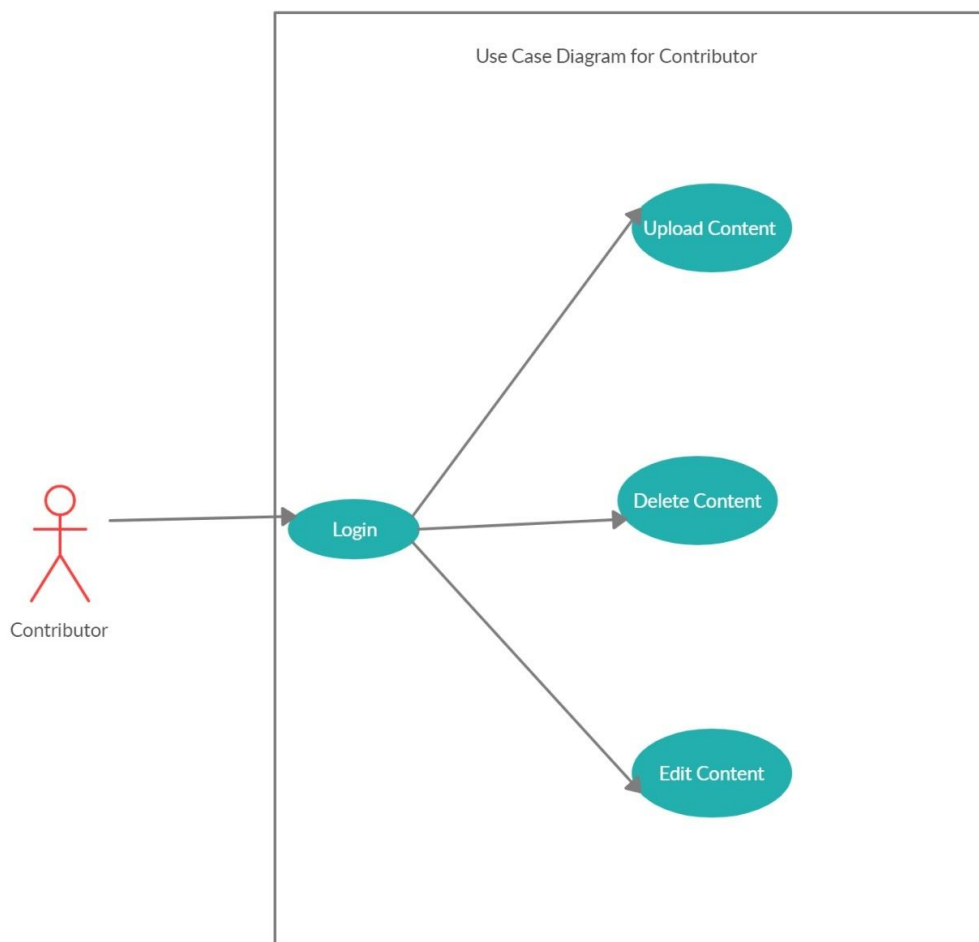
5.4 Use case for farmers :

Basic Description:	The farmer can edit his profile or view his profile or search for the queries

Preconditions:	The farmer must register for performing any of the actions
Trigger:	The event will be triggered when he clicks the required button

Normal Flow:	1.When the farmer logins he gets the following options:
	    a.View Profile
	    b.Edit Profile
	    c. Search for queries
	2.When the clicks the view profile option he can see his profile details and when he clicks edit profile option he can edit his profile
	3.When he clicks the search for queries options he can he gets the following options
	    a. Get the recommendation for the crop
	    b. Get the fertilizer details
	    c. Get the disease prevention and cure techniques
	    d. Get the details of equipment needed for the crop

Non functional:	Usability ,correctness and responsiveness

Use Case Diagram of Farmer

5.5   Use case for farmers crop recommendation:

Basic Description:	The farmer can get the crop recommendation
Preconditions:	The farmer must login
Trigger:	The options will be displayed once the farmer clicks the crop recommendation option
Normal Flow:	When he clicks for the crop recommendation he asked to enter the details of the area where the crop needs to be planted or we can get those details from the farmer profile info . From the area we can get soil type ,Ph and the weather conditions in that area and the most preferred crop in that area is suggested
Post condition:	Farmer will be able to get the correct recommendation for the crop
Non functional:	Usability ,correctness and responsiveness

5.6   Use case for fertilizer recommendation :

Basic Description:	The farmer can get the fertilizer recommendation based on the type of crop he is sowing and the weather conditions in the area
Preconditions:	The farmer must login
Trigger:	The options will be displayed once the farmer clicks the fertilizer recommendation option
Normal Flow:	The farmer is requested to enter the following details 1.Type of crop 2.weather conditions in the area 3.PH of the soil Based on the data collected he gets the details of the fertilizer
Post condition:	Farmer will be able to get the correct fertilizer recommendation
Non functional:	Usability ,correctness and responsiveness

5.7   Use case for equipment recommendation :

Basic Description:	The farmer can get the equipment recommendation based on the type of crop he is sowing and size of the land area
Preconditions:	The farmer must login
Trigger:	The options will be displayed once the farmer clicks the equipment recommendation option
Normal Flow:	The farmer is requested to enter the following details 1.Type of crop 2.area of the land Based on the data collected he gets the details of the equipment needed
Post condition:	Farmer will be able to get the correct equipment recommendation
Non functional:	Usability , correctness and responsiveness

5.8   Use case for Disease prevention and cure:

Basic Description:	The farmer can get the disease prevention and cure techniques based on the type of crop and on the environment in which it is growing .
Preconditions:	The farmer must login
Trigger:	The options will be displayed once the farmer clicks the Disease prevention and cure option
Normal Flow:	The farmer is requested to enter the following details 1.Type of crop 2. Weather and environmental conditions Based on the data collected he gets the details for disease prevention and cure

Post condition:	Farmer will be able to get the correct disease prevention techniques
Non functional:	Usability ,correctness and responsiveness

6.   Other Nonfunctional Requirements

6.1   Performance Requirements

Performance is defined as the responsiveness. The Agricultural Portal should manage the user load and response time. Loading of static pages of the web portal should not take much time and the page should be rendered immediately within few seconds. It will take less time (in seconds) for database access/update transactions as well. If the user gives the right input to the system then the system will generate the required output. If the user does not give the right input then the system does not respond. The system must be interactive and the delays involved must be less.

6.2   Safety Requirements

Information transmission should be securely transmitted to the server without any changes in information. The solution suggested by the application should be reliable.

6.3   Security Requirements

Agricultural Portal being a web-based system should be secure. The portal should be secure in terms of authorization and authentication. Authentication is about validating the user credentials like username and password to verify your identity. Authorization determines your ability to access the system and up to what extent the user can access the resources after the successful login.

6.4   Software Quality Attributes

6.4.1 Availability:
The web-portal will be available for all the users who register in it and it can be easily operated by the farmers. Since its a web application can be accessed from all the devices with internet facility and also, since the portal will not be very graphic intensive it can be loaded and used by a weak internet connection that might be available to farmers and other agriculturists.

6.4.2 Correctness:

The web-portal should give recommendation to the farmer correctly for his various queries like the type of the crop, fertilizer recommendation, Disease prevention techniques, equipment to be used.

6.4.3 Maintainability:

The content manager updates the new content and removes the old content and the software will be maintained with the correct content and new features can be added when required.

6.4.4 Usability:

The web-portal should satisfy the customer with the recommendations made and can encourage more farmers to use this application by registering . The Web-Portal will also be available in three languages which are English, Punjabi and Hindi.