

# High Level Design

Soil Farming Agent

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## Document Control

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## Abstract

The Soil Farming Agent is a comprehensive web-based project aimed at providing a user-friendly platform for accessing crucial soil-related information and connecting distributors with potential customers. Leveraging the power of Node.js, Express.js, and MongoDB, this project facilitates seamless data management and efficient communication between stakeholders in the agricultural ecosystem.

With the increasing importance of sustainable agriculture practices and the need for accurate soil data, the Soil Farming Agent acts as a central repository of soil-related information. Users can access detailed soil characteristics, fertility reports, and recommended crops based on the analysis of soil samples. The platform also offers insightful visualizations and interactive tools for better data comprehension.

The project's core features include a robust user authentication system, allowing farmers, researchers, and agricultural enthusiasts to register and personalize their profiles. Distributors can register and showcase their products, making it easier for potential customers to find and purchase suitable soil products or fertilizers.

To ensure the accuracy and reliability of the data, the system incorporates MongoDB as the database, enabling efficient data storage and retrieval. Node.js and Express.js provide the necessary backend support for handling user requests, managing data interactions, and delivering a smooth user experience.

In summary, the Soil Farming Agent project strives to bridge the gap between soil data availability and users by providing a modern, data-driven website. By leveraging cutting-edge web technologies and MongoDB's flexibility, the platform offers a valuable resource for the agricultural community, promoting sustainable practices and fostering connections between soil distributors and consumers.

# 1 Introduction

## 1.1 Why this High-Level Design Document?

The purpose of this High-Level Design (HLD) Document is to add the necessary detail to the current project description to represent a suitable model for coding. This document is also intended to help detect contradictions prior to coding, and can be used as a reference manual for how the modules interact at a high level.

The HLD will:

- Present all of the design aspects and define them in detail
- Describe the user interface being implemented
- Describe the hardware and software interfaces
- Describe the performance requirements
- Include design features and the architecture of the project
- List and describe the non-functional attributes like:
  - Security
  - Reliability
  - Maintainability
  - Portability
  - Reusability
  - Application compatibility
  - Resource utilization
  - Serviceability

## 1.2 Scope

The HLD documentation presents the structure of the system, such as the database architecture, application architecture (layers), application flow (Navigation), and technology architecture. The HLD uses non-technical to mildly-technical terms which should be understandable to the administrators of the system.

## 2 General Description

### 2.1 Product Perspective

The Soil Farming agent is a web platform using Node.js, Express.js, and MongoDB, Centralizing soil data, promoting sustainable agriculture, and connecting distributors with customers.

### 2.2 Problem statement

The soil Farming Agent faces the challenge of providing a user-friendly platform to efficiently connect consumers and soil distributors with a focus on soil data accessibility, the platform needs to centralize detailed soil information while enabling admins to manage distributors profiles effectively. The project's objective is to bridge the gap between users and soil data, fostering sustainable agriculture practices and promoting seamless communication within the agriculture ecosystem.

### 2.3 PROPOSED SOLUTION

The proposed solution for the Soil farming Agent project entails developing a user- friendly web-based platform using Node.js, Express.js, and MongoDB. The platform will cater to two user roles: common consumers and admins. Consumers will access comprehensive soil data and browse soil products from distributors, while admins will manage soil information and distributor's profiles. Key features include a user-friendly interface, centralized soil data, efficient admin management, data security, and streamlined communication between consumers and distributors. The solution aims to bridge the gap between users and soil data, promoting sustainable agriculture practices and enhancing communication within the agriculture community.

### 2.4 FURTHER IMPROVEMENTS

The Soil Farming Agent can be further Improved by implementing advanced data analysis techniques for detailed insights, real-time updates, geospatial integration for location-specific recommendations, user reviews, a mobile app for enhanced accessibility and collaboration with agriculture experts to enhance data accuracy and agronomic insights.

## 2.5 Technical Requirements

The Soil Farming Agent is a web-based platform designed to revolutionize the agricultural ecosystem by providing crucial soil-related information to consumers and enabling efficient communication with soil product distributors. Leveraging Node.js, Express.js, and MongoDB, the platform aims to bridge the gap between users and soil data, promoting sustainable agriculture practices and empowering stakeholders with informed decision making.

1. **Web Technologies:** The platform shall be built using Node.js and Express.js to ensure a robust and scalable web application, facilitating seamless data management and user interactions.
2. **Database Management:** MongoDB will be utilized as the database to efficiently store and retrieve soil data, ensuring data accuracy and reliability.
3. **User Authentication:** Implementing JSON Web Token (JWT) will provide a secure and efficient user authentication system, ensuring data privacy and personalized profiles for consumers and admins.
4. **Mobile Responsiveness:** The platform shall be developed with mobile responsiveness in mind, enabling users to access soil data and features seamlessly on various devices.

By meeting these technical requirements, the Soil Farming Agent will be a powerful tool, providing an intuitive user experience and valuable insights for the agricultural community, driving positive change towards sustainable land management practices.

## 2.6 Data Requirements

1. **Soil Characteristics:** The platform shall store and present comprehensive data on soil characteristics, including pH levels, nutrient content, moisture, and texture.
2. **Distributor Information:** The platform shall maintain an updated database of soil product distributors, including their contact details, product offerings, and location.
3. **User Profiles:** User profiles for consumers and admins shall be stored, capturing relevant information for personalized experiences and secure data access.

By fulfilling these data requirements, the Soil Farming Agent will offer a comprehensive and valuable resource, empowering users with reliable soil information, facilitating efficient connections with distributors, and promoting sustainable agriculture practices.

## 2.7 Tools used

The tools used in the Soil Farming Agent project are :

1. **Node.js:** A server-side JavaScript runtime that enables running JavaScript code on the server, facilitating the development of scalable and efficient web applications.



2. **Express.js:** A web application framework for Node.js that simplifies the process of building robust and RESTful APIs, making it easier to handle HTTP requests and responses.



3. **MongoDB:** A NoSQL database that provides flexible and scalable data storage capabilities, making it suitable for managing soil-related information efficiently.





4. **HTML (HyperText Markup Language):** HTML provides the structure and layout for the web pages, allowing the platform to present the soil-related information, forms, and other user interface elements.
5. **CSS (Cascading Style Sheets):** CSS is used to style and customize the appearance of the web pages, ensuring a visually appealing and consistent user interface design.



6. **JavaScript:** JavaScript is employed to add interactivity and dynamic functionality to the frontend, enabling features like form validation, interactive visualizations, and user interactions

## JavaScript



## 2.8 Constraints

1. Data privacy and security: Ensure user information is protected and confidential.
2. Scalability: Design platform to accommodate future growth in users and data.
3. Cross-browser compatibility: Ensure website functions correctly across different web browsers.
4. Mobile responsiveness: Optimize platform for seamless use on various mobile devices.
5. Data accuracy: Provide reliable and up-to-date soil information to users.
6. User experience (UX): Prioritize intuitive interface and user-friendly interactions.
7. Development timeline: Complete project within specified time constraints.
8. Regulatory compliance: Adhere to relevant agricultural and environmental regulations.
9. Maintenance & support: Establish ongoing support to address issues and updates.

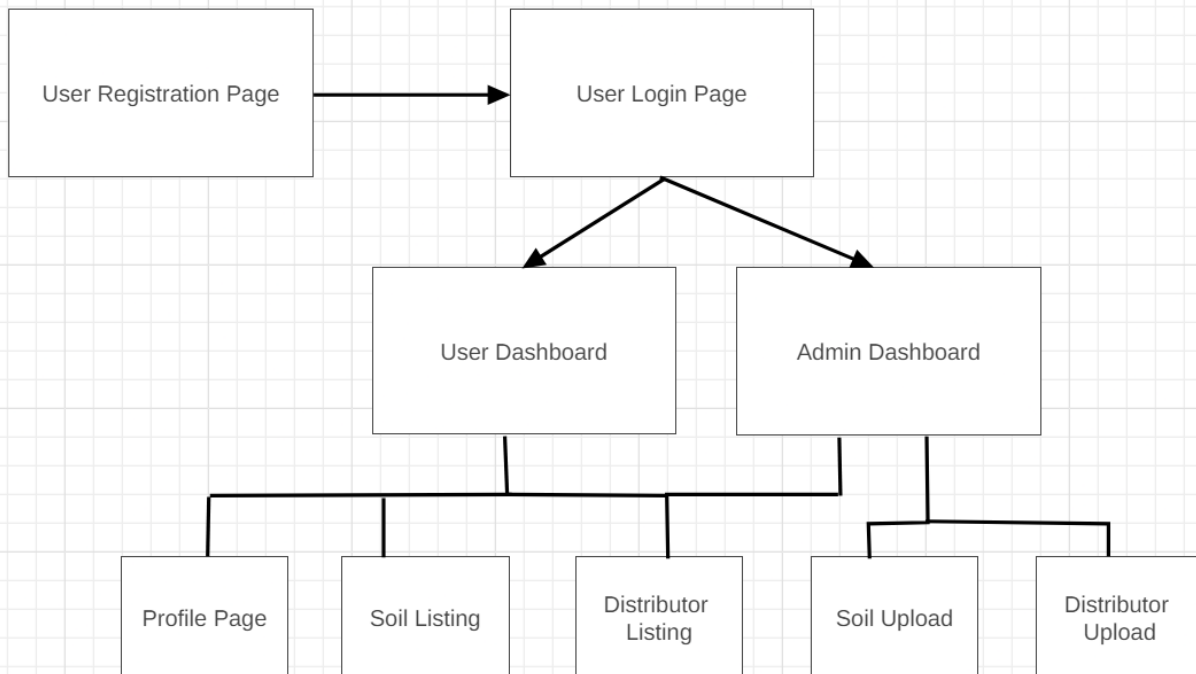
## 2.9 Assumptions

1. Users have reliable internet access to use the web-based platform.
2. Soil data provided by admins is accurate and regularly updated.
3. Distributors provide genuine and up-to-date information about their products.
4. Users are familiar with basic web navigation and form interactions.
5. The platform complies with relevant data privacy and agricultural regulations.

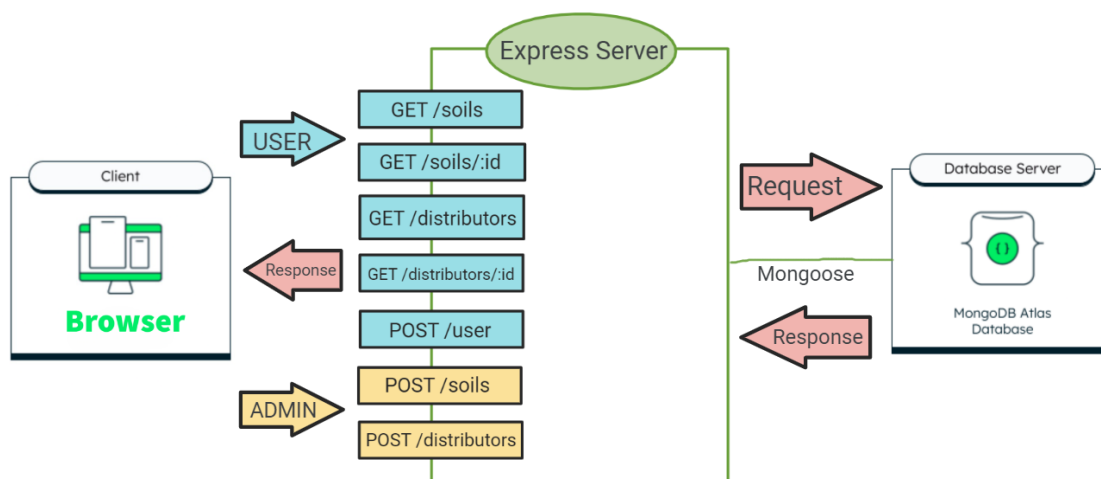
## 3 Design Details

### 3.1 Process Flow

For Identifying the overall Process Flow from browser to the Database through backend



### Browser-Database Interaction with Express.js



## 3.2 Event log

1. **User Registration:** Records user registration events, capturing user details like name, email, and role (consumer or admin).
2. **User Login:** Logs user login events, verifying credentials for secure access to the platform.
3. **Soil Data Upload:** Tracks soil data uploads by admins, storing soil characteristics, fertility reports, and product information.
4. **User Profile Updates:** Logs events related to user profile updates, including personal information and preferences.
5. **Distributor Data Upload:** Logs events when admins upload data about distributors, including contact information and product offerings.

## 3.3 Performance

The Soil Farming Agent is a critical platform for accurate detection and efficient communication between users and distributors. Its performance is of utmost importance to ensure reliable information for users, preventing misleading information. Regular model retraining will be implemented to continuously improve performance, enabling the platform to promote sustainable agriculture practices effectively.

## 3.4 Reusability

The Soil Farming Agent is built to be easily reused and expanded. It uses small building blocks that can be combined for new features, making it more efficient, scalable, and compatible with other agricultural systems.

## 3.5 Application Compatibility

The Soil Farming Agent components will seamlessly interact with each other, leveraging Node.js, Express.js, and MongoDB for efficient data transfer and task execution, ensuring optimal performance throughout the platform.

## 3.6 Resource Utilization

The Soil Farming Agent optimizes data handling with MongoDB, ensuring efficient server-side operations, memory management, and responsive scalability for enhanced performance.

## 4 Conclusion

The Soil Farming Agent is a user-friendly web platform, powered by Node.js, Express.js, and MongoDB. It centralizes crucial soil data, connects distributors with customers, and fosters sustainable agriculture. Efficient resource utilization, model retraining, and compatibility promote optimal performance, ensuring a valuable resource for modern agriculture practices.