IT313 - Software Engineering

Software Requirements Specifications

Warehouse Management System

Group No. 5

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1. Introduction

The Software Requirements Specification (SRS) introduction overviews the entire SRS, including its purpose, scope, definitions, acronyms, abbreviations, references, and a general overview of the SRS. This document aims to thoroughly analyze and provide a detailed understanding of the **Warehouse Management System** by defining the problem statement. Additionally, the document focuses on the capabilities required by stakeholders and their needs while outlining the high-level features of the product. More detailed requirements for the **Warehouse Management System** are provided later in the document.

1.1 Purpose

This document aims to gather and analyze various ideas for defining the system and its customer requirements. It also aims to predict and organize the product's usage to understand the project better. This document outlines concepts that may be developed later and documents ideas that are being considered but may still need to be implemented.

This SRS document provides a detailed overview of our software product, including its parameters and goals. It describes the target audience, user interface, software requirements, and how the client, team, and audience perceive the product and its functionality. This document also aids designers and developers in the software delivery lifecycle (SDLC) processes.

1.2 Introduction to the Warehouse Management System

1.2.1 Description of Problem

As we know India is majorly dependent on farming and storing those crops is a real challenge. As uncertain weather affects the life of crops too. And if farmers do not have broad knowledge of warehouses in his vicinity. They will not be able to arrange their crops which can be considered as a big loss. So, we tried to make an intermediate platform which can be used by both farmers and warehouse owners. Farmers can see warehouses available in the vicinity and the warehouse owner can see current statistics of his warehouse. Not only that, a farmer can pre-book a warehouse according to his need and planning on crop harvesting.

1.2.2 Features of the Project (Solution)

- Authorized access
- Advanced reservation for goods' storage
- Track of storage process
- Stores the necessary details of the warehouse - location, capacity, etc.

1.3 Scope

The scope of this project includes a system between farmers and warehouse owners to simplify the process of storing the crops, addressing that there is no centralized online system available for this certain purpose. This SRS outlines the requirements necessary to meet these objectives, offering a roadmap for the design, development, testing, and deployment phases.

1.4 Abbreviation

Throughout the document **Warehouse Management System** will be denoted as **WMS**.

2. Specific Requirements

2.1 Functional Requirements

1. User Registration and Authentication:

- Farmers and warehouse operators should be able to register and log in securely.
- User authentication ensures data privacy and access control.

2. Warehouse Management:

- The system should allow warehouse operators to input and update warehouse details, including location, storage capacity, and available amenities.
- Warehouse operators can mark a warehouse as available, reserved, or full for specific time periods.

3. Crop Reservation System:

- Farmers should be able to reserve storage space in a specific warehouse for their crops in advance.

- The system should provide available storage space recommendations based on the farmer's crop type, quantity, and duration.

4. Goods Storage Process Tracking:
- Farmers should have real-time visibility into the status of their stored crops.

5. Warehouse Search and Nearby Warehouses:
- Farmers should be able to search for nearby warehouses based on their location.
- The system should provide a list of available warehouses, their distances from the farmer's location, and relevant details.

6. Integration and Scalability:
- Ensure scalability to accommodate a growing number of farmers and warehouses.
- Consider integration with mapping services for location-based search.

2.2 Non-functional Requirements

1. Performance: The system should respond quickly to user queries and load data efficiently.

2. Reliability: Ensure high uptime and data reliability to avoid disruptions in crop storage and retrieval.

3. Scalability: The system should be able to accommodate more users and warehouses as the platform grows.

4. Usability: The user interface should be intuitive and user-friendly for both farmers and warehouse owners.

5. Data Privacy: Protect user information and comply with applicable data privacy laws.

6. Availability: Ensure that the system is available 24/7, with minimal downtime for maintenance.

7. Data Backup: Regularly backup data to prevent data loss in case of system failures.

8. Scalable Database: Use a scalable and robust database system to store user and inventory data.

9. Mobile Accessibility: Ensure that the system is accessible and user-friendly on mobile devices.

10. Cost-Effective: Develop and maintain the system in a cost-effective manner to minimize operational expenses.

3. User Stories

User Stories	
Front of the card	Back of the Card
1. As a Farmer, I want login functionality so that I can book a warehouse for storing my goods:	● **Success:** -There is a login page with fields for entering the username/email and password. Upon successful login, the user is redirected to the dashboard. ●**Failure:** - If the login credentials are incorrect, the user receives an error message, and it is redirected back to the login page.
2. As a Farmer, I want a list of all warehouses so that I can find the nearest warehouse:	●**Success:** -The system provides a page showing a list of all warehouses where each warehouse entry includes its name, distance, available storage space, and capacity. -Warehouses are listed in ascending order based on distance. ●**Acceptance Criteria:** -User should be registered first.
3. As a Farmer, I want to reserve space in a warehouse, so that I can store my crops:	●**Acceptance Criteria:** -On the warehouse page, there should be an option to reserve space. ● **Success:** -The user can select the warehouse, specify the crop type, quantity, and reservation dates. -After successful reservation, the user receives a confirmation message.

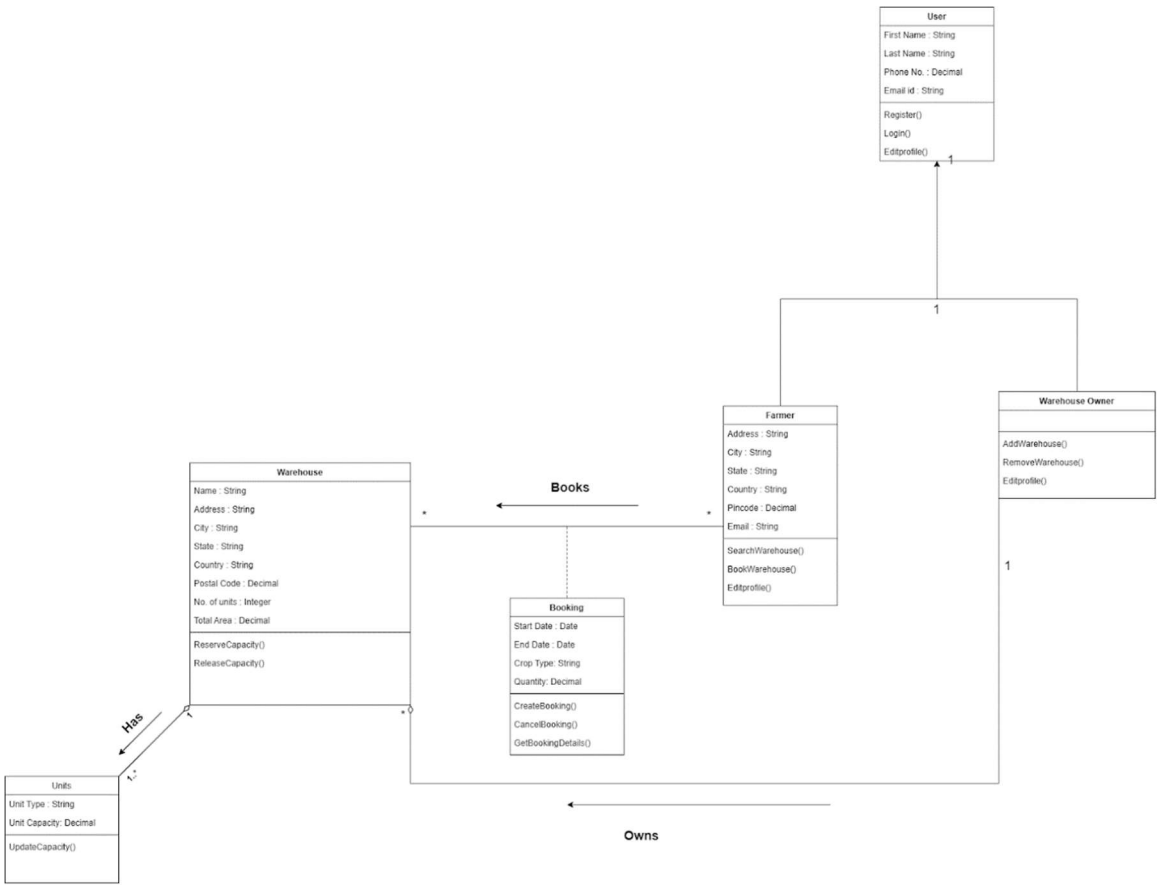
4. As a Farmer, I want a rate and review functionality so that I can give my review regarding my experience:	● **Success:** - Clicking the button opens a form where the user can give a rating (1 to 5 stars) and provide a written review. - After submission, the review is displayed alongside the warehouse details ●**Failure:** - The review submitted hasn't reached the admin, in that case, the farmer is asked to again review the following.
5. As a Farmer, I want to be alerted when my stored crops are close to their shelf life or when my reservation is coming to an end so that I know when to move the crop out of the warehouse.	● **Success:** - The user receives a notification when the stored crops are within a specified timeframe from their shelf life expiration. - The user receives a notification when the reservation is approaching its end date. ● **Failure:** - If crop life and related details are uncertain, notify the farmer of the same and suggest reviewing the crops personally, before the booking ends.
6. As a Farmer, I want to view past reservation details so that I can book in my desired warehouse:	● **Success:** - On the dashboard, there is a section showing the user's past reservation history. - Each reservation entry includes the warehouse name, crop type, quantity, reservation dates, and status. ● **Acceptance Criteria:** - The user should have booked a warehouse previously.
7. As a Warehouse Owner, I want an option to update warehouse details, including storage capacity, available space, and crop storage life so that farmers know how much space is available in the warehouse:	● **Success:** - There is a section in the warehouse management interface for updating warehouse details. - The user can edit and save changes to storage capacity, available space, and crop storage life. ● **Acceptance Criteria:** - The warehouse owner should be a registered one.
8. As a Warehouse Manager, I want to get notification of reservation from farmers, so that I know the no. of units booked and the details of the booking	● **Success:** - The user receives a notification whenever a farmer makes a reservation. - The notification includes the farmer's details, reserved warehouse, crop type, quantity, and reservation dates.

9. As a Warehouse Manager, I want to generate reports on warehouse occupancy, so that I can use it for documentation purposes:	● **Success:** - There is a "Generate Report" option in the warehouse management interface. - The user can select a time period and generate a report detailing warehouse occupancy, including reserved and available space.
10. As a farmer, I need to get crop recommendations for future storage purposes.	● **Acceptance Criteria:** -Farmers can request crop recommendations based on goods already stored, future reservations, and warehouse eviction rates. ● **Success:** -The system provides crop recommendations based on the specified criteria. ● **Failure:** -If recommendations cannot be generated, provide an error message or alternative suggestions.
11. As a farmer, I need access to FAQs to find answers to frequently asked queries.	● **Acceptance Criteria:** - Farmers can access a support section and frequently asked questions (FAQs) to find answers to common queries. ● **Success:** - Farmers can find relevant information and solutions to their questions. ● **Failure:** - If the support section or FAQs are inaccessible or do not provide the needed information, provide an error message.
12.As a warehouse manager, I need to be notified about the expiry of the crops too, so as to make the warehouse available as and when the crops are taken out.	● **Acceptance Criteria:** -Warehouse owners receive notifications when goods are about to expire. ● **Success:** - Timely notifications are sent, allowing owners to take appropriate action.
13.As a warehouse owner, I need to accept payments from the user.	● **Acceptance Criteria:** - Warehouse owners can accept payment for space reservations, given they have registered valid bank details. ● **Success Criteria:** - Payments are processed successfully, and reservations are confirmed. ● **Failure Criteria:** - If payment processing fails or reservations cannot be confirmed, provide an error message.

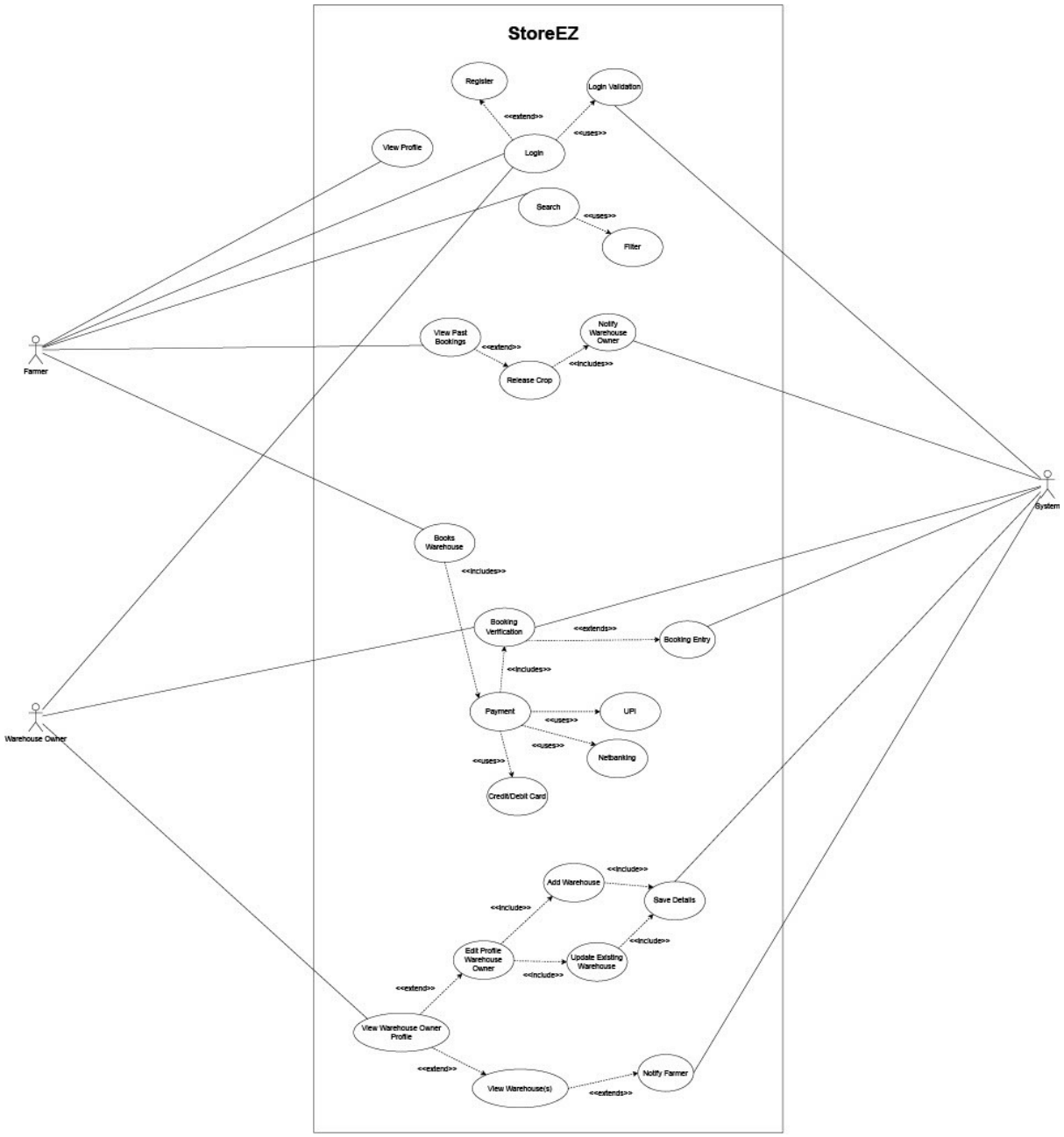
14. As a warehouse owner, I need access to FAQs and queries block, so as to answer upcoming queries from farmers.	● **Acceptance Criteria:** - Warehouse owners can access a support section and FAQs for assistance with system-related issues. ● **Success Criteria:** - Warehouse owners can find relevant information and solutions to their questions. ● **Failure Criteria:** - If the support section or FAQs are inaccessible or do not provide needed information, display an error message.
15. As a farmer, I need to receive weather results, so as to have a keen knowledge on the crops stored.	● **Acceptance Criteria:** - Farmers can subscribe to receive weather alerts and forecasts relevant to their crop planning. ● **Success Criteria:** - Weather alerts and forecasts are sent to farmers based on their preferences. ● **Failure Criteria:** - If weather alerts cannot be subscribed to or are not delivered, display an error message.

4. System Behavior

4.1 Class Diagram

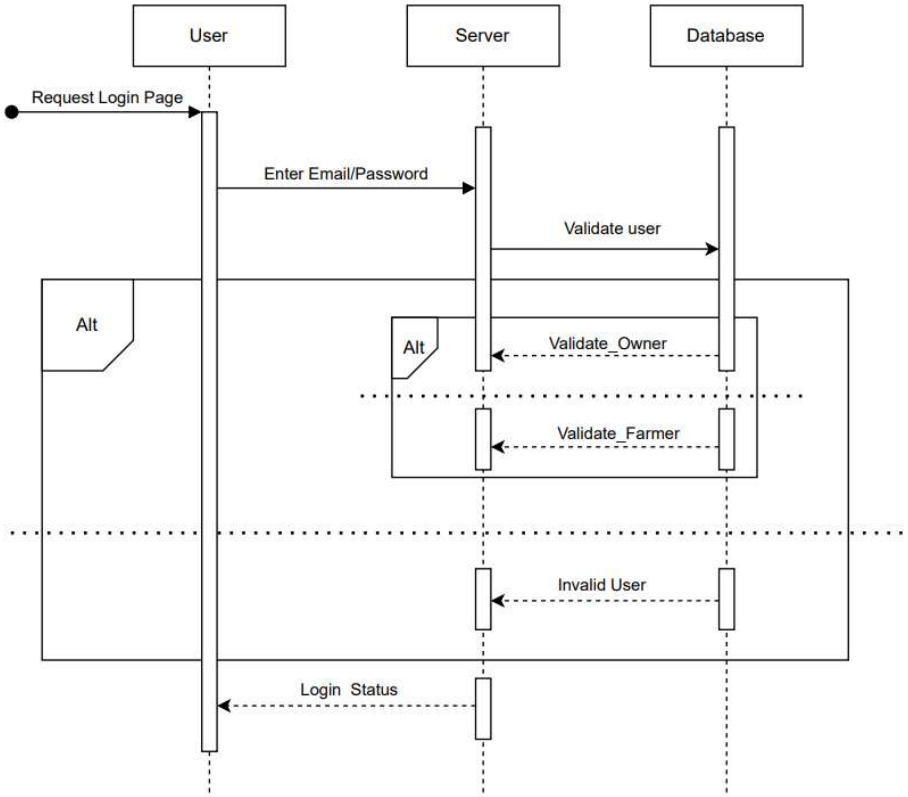


4.2 Use Case Diagram

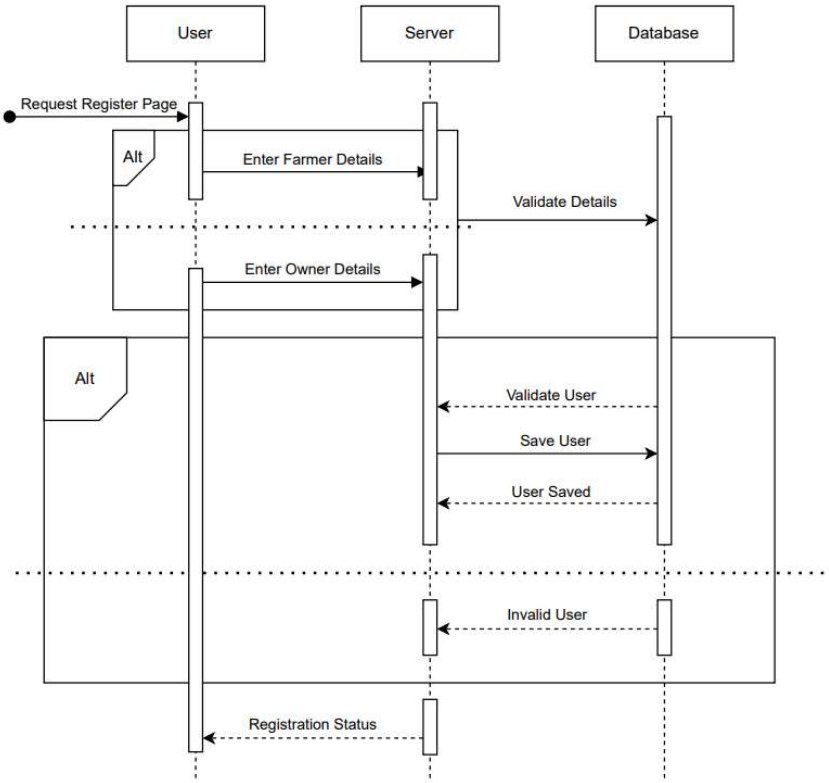


4.3 Sequence Diagram

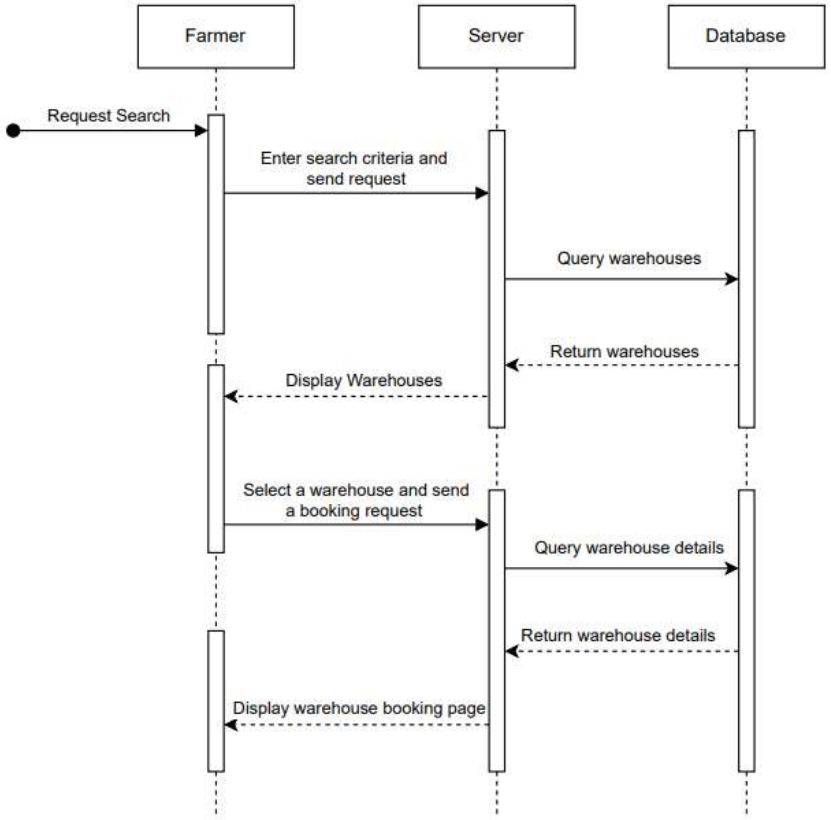
LOGIN



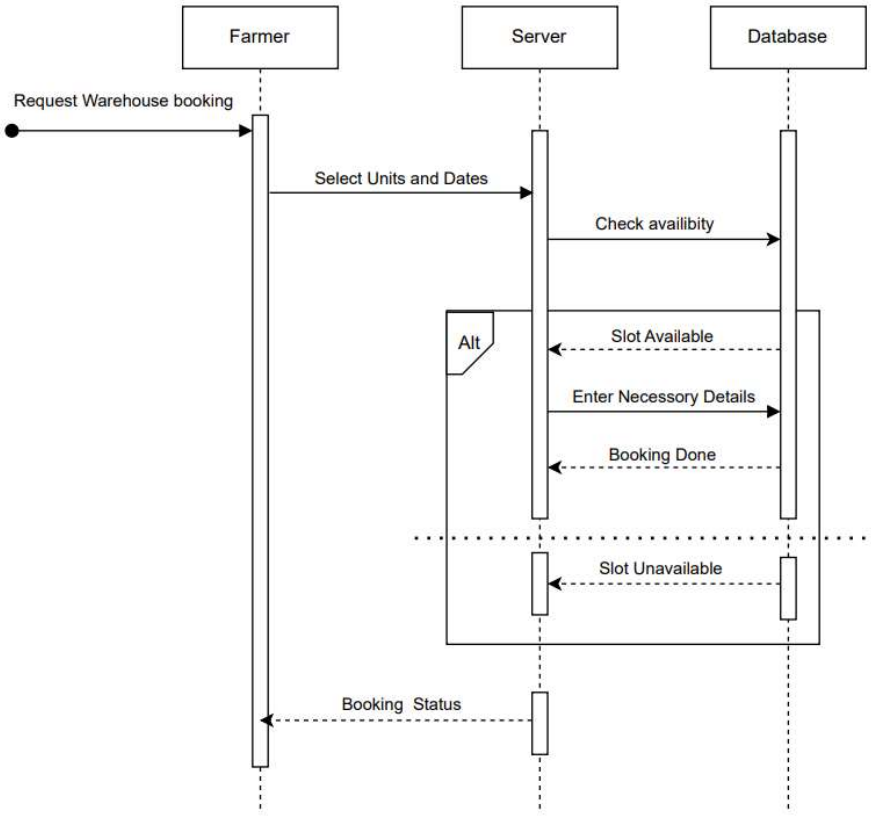
Register

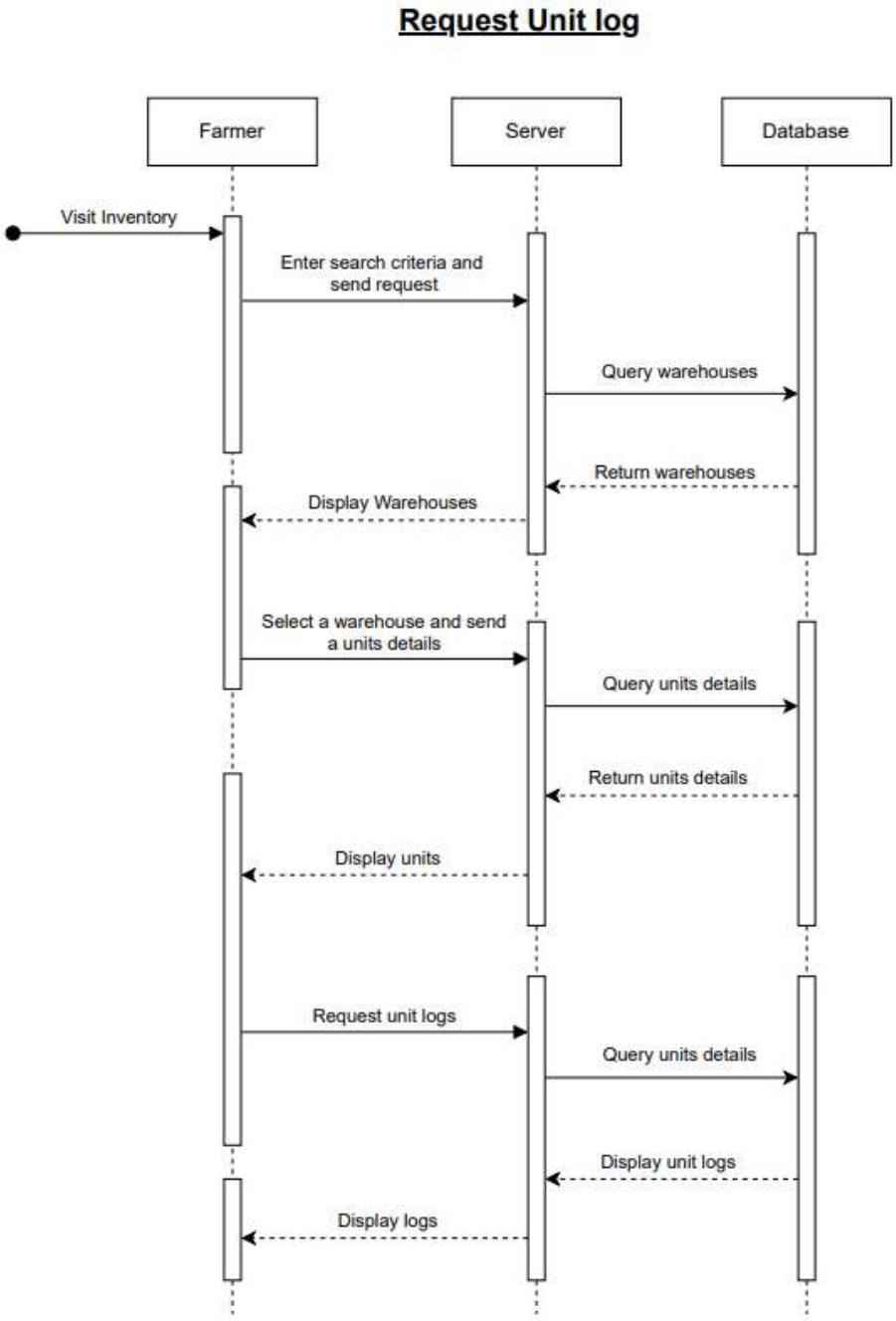


Search Warehouse



Book Warehouse





5. Product Backlog

Sprint 1:

Login and Registration of Farmer and Warehouse

1. As a warehouse owner, I should be able to register into the system with details such as name, location, number of units, storage capacity, type of Storage units so that the farmer can find and see details of the warehouse

2. As a warehouse owner, I should be able to login to the system so that I can manage and update my warehouse details.
3. As a farmer, I should be able to register into the system with details such as name, email, and number so that I can utilize the system to store crops and find and book warehouses for storage.
4. As a farmer, I should be able to login into the system so that I can access the system and do the needful tasks.

Sprint 2:
Edit Profile

1. As a farmer, I should be able to change my profile information so I can be contacted.
2. As a warehouse owner, I should be able to change my profile information so I can be contacted.

Sprint 3:
Warehouse and Farmer storage updates

1. As a warehouse owner, I want to update the status of my warehouse as crops are added or removed in real time so that the farmers can know about the storage space that is available in the warehouse.
2. As a warehouse owner I should be able to generate reports of warehouse current goods storage so that I can be able to know the current status of the warehouse.
3. As a farmer I should be able to keep track of the goods that I have stored so that I can get a better understanding of it.

Sprint 4:
Book a warehouse

1. As a warehouse owner, I should be able to provide a booking system for the farmers so that they can book storage space in advance.
2. As a farmer I should be able to book about the storage space in advance so that I do not need to worry about getting space for my goods when I reach the warehouse.
3. As a farmer, I should be able to cancel or modify my reservation so that I can manage my crops storage.

Sprint 5:
Search a nearby warehouse

1. As a farmer, I should be able to find nearby warehouses so that I can find warehouses to store my goods.
2. As a farmer, I should be able to get recommendations from the system about the types of crops to grow so that I can optimize my yield and minimize wastage.

Sprint 6:
Adding live location

1. As a farmer, it would be easier to have a live location so I can get shown warehouses near me.
2. As a warehouse owner, it would be beneficial to show the exact location of the warehouse.

6. Domain Analysis

The domain for the system is Providing warehouse information to farmers. The motive behind developing such a system is the food being wasted annually is due to lack of proper storage facilities. This number keeps on increasing and something needs to be done to control this, so using this system we can decrease the wastage of food.

Boundary objects:

1. Login / Registration Page

- Login Page eventually provides users to log in/ register and manage their personal information and manage their content, So In some sense Login Page is providing a visual boundary between user and system.
- Users and warehouse managers will have separate Login / Registration pages to create boundaries between users and managers.

Entity objects:

1. Farmer: Farmers can utilize the system for tracking of crops and finding warehouses for storage.
2. Warehouse manager: Warehouse manager can update the status of their warehouse as crops are added or removed in real time so that the farmers can know about the storage space that is available in the warehouse.
3. Warehouse: A warehouse is used to store the crops, so that farmers can store their crops and make more profit from that and decrease the wastage of crops.
4. Reservation: It contains information about farmer's advance reservation for their crops in particular warehouses.

Control objects:

1. Registration as farmer: It controls the flow of registration data to the database.
2. Login as farmer: It controls the flow of validation of user information from the database.
3. Reservation: It controls the flow of reservation while reserving the warehouse space.
4. Reservation into warehouse: It controls the flow of user information to the database.

7. Proposed Model for Development

Agile (Waterfall Incremental) software development is a model that emphasizes collaboration, flexibility, and rapid iteration. It's well suited to the problem statement of designing a system for warehouses and farmers, as the requirements may change and evolve as the development progresses. Here's how the agile model can be used for this problem statement:

- Requirements Gathering: The development team will work closely with stakeholders, such as farmers and warehouse managers, to gather requirements and understand the needs of the system. This may involve conducting user interviews, creating prototypes, and conducting user testing.
- Sprint Planning: The development team will break down the requirements into small, manageable tasks and prioritize them based on importance and dependencies. These tasks will be organized into sprints, or short development cycles, that typically last two to four weeks.
- Development and Testing: During each sprint, the development team will work on completing the tasks assigned to them. This may involve writing code, conducting unit tests, and performing integration testing. The development team will also regularly conduct code reviews to ensure the quality of the code and catch any potential issues early on.
- Sprint Review: At the end of each sprint, the development team will present their progress to stakeholders and receive feedback. This is an opportunity for stakeholders to provide feedback and suggest any changes that need to be made.
- Sprint Retrospective: After the sprint review, the development team will reflect on the sprint and identify areas for improvement. This may involve changes to processes, tools, or the development team's composition.

- Repeat: The process will repeat, with the development team using the feedback and insights from the sprint review to make improvements and move forward. This iteration continues until the system is fully developed and meets the requirements of the stakeholders.

Fig. Agile Model

The agile model allows for frequent feedback and iteration, making it ideal for the problem statement of designing a system for warehouses and farmers. By breaking down the development into small sprints and working closely with stakeholders, the development team can ensure that the system is developed to meet the needs of the users and is delivered in a timely and efficient manner.

8. Technology Used

The WMS is crafted to enhance and streamline warehouse operations. Developed using modern technologies, it leverages HTML, CSS, and ReactJS for an intuitive and responsive frontend. The backend is powered by Python, Django, and SQLite, ensuring robust functionality and data management.

In the WMS, Visual Studio Code (VSCode) serves as the integrated development environment (IDE). VSCode's features, including debugging and source control integration, accelerate development. Github is employed for version control, enhancing collaboration.

9. Assumptions

- All farmers and warehouse owners have access to compatible smartphone with proper, stable internet connection.
- All the users do have email ID.
- All the invoice generated have their transactions get done between warehouse owner and farmers and so transaction is not fraudulent.
- All the information shown by warehouse owner are correct and up-to-date.

10. References

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