



Symbiosis Institute of Technology

PROJECT DOCUMENTATION

ON



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OVERVIEW OF DOCUMENT

This document gives detailed specifications for the VertiFarm system.
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1. PROBLEM STATEMENT

In India the traditional method of farming serves as livelihood for 58% of population. About 50% of India's 1.366 billion is dependent on production generated by traditional agricultural practices. These statistics are solid proof that India is heavily dependent on Agriculture. However, with the pace at which India's population is growing, it is a safe bet that traditional practices would cease to be of any relevance in the coming age.

The following reason points out the threats traditional farming is facing –

1. India's growing population can't be sustained by practicing traditional method of farming.
2. Rise in industrialization and urbanization is leading to more land consumption which means there will be scarcity of land resource to perform agriculture. As of reports provided by World Bank collection of development (2016), about 60.45% of land in India is used for agriculture which only shows how important land resource is for agriculture.
3. In India, about 38% crops are destroyed due to excessive rainfall or due to lack of rainfall. The irregular rainfall pattern in India continues to be harmful for farmers who invest time, efforts and money in farming.
4. Use of chemical fertilizers and deforestation is leading to soil erosion which heavily effects plant growth. The continuous action of cutting trees for developmental purposes is destroying soil quality.
5. Traditional practice of agriculture accounts (on average) for **70 percent** of all freshwater withdrawals globally and an even higher share of "consumptive water use" due to the evapotranspiration of crops. Water being one of the most important resource, its scarcity is going to be harmful for human population.

India ranks well in terms of technological development and with the rise of technology in India, it shouldn't be difficult to come across an alternate option which reduces our problems and can be a big factor for a safer future.

2. INTRODUCTION

Vertical farming is the practice of growing crops in vertically stacked layers. It often incorporates controlled environment agriculture, which aims to optimize plant growth. Vertical farming is clearly the future of food production. When compared with traditional farming, vertical farming provides a lot of solution to problems faced with earlier method –

Vertical farming can become the next big thing for India. There has been a growth in percentage of people making use of this practice and now would be the best time to start increasing awareness among individuals to learn and adopt the style of vertical farming.

As previously stated, land resource could become scarce in the near future. One of the biggest advantages of vertical farming is that it performed vertically i.e. in form of a stack. In easier terms farming is done in building shaped structure which consumes less land space. Statistically, if one has a 1000 sq ft plot of land, vertical farming on it yields a harvest which is equivalent to 3,000-4,000 sq ft of plot. Moreover, with a crop cycle of 3-4 times a year, the profits are substantial as compared to traditional farming. The climatic conditions have almost no impact on performance of vertical farming as it is performed in stacked shaped structure which is usually kept under a roof. Vertical farming does not make much use of soil for production which means that even though the chemicals used for growth are little more dangerous than the ones used in normal agricultural farming, it has zero impact on soil or land. The biggest factor which takes vertical farming ahead of normal farming is that it reduces the use of most important resource on earth i.e. Water. Vertical farming reduces water usage by 95% while generating a very good result which are all good signs towards a sustainable future.

VertiFarm provides a system to promote the application and usage of vertical farming which is the modern method of agriculture. VertiFarm is a website that provides users with a platform to learn about vertical farming. It gives an insight into what exactly vertical farming is, what it provides, why it is the future of food production along with information about how it is performed, what materials or equipment's are required. To promote the usage, VertiFarm provides the users with facility to buy item or rent them which allows user to understand practical approach towards vertical farming.

Vertical farming is on the rise and with more technological advancements it is only going to get better and yield better results. If more like minded individuals who realize how beneficial this practice is come together, it goes without saying that vertical farming will put India not only in a safer place for a sustainable future but also mark India's name among top countries that utilize their technology in best ways possible.

2.1. Motivation

The motivation behind building a system that promotes vertical farming and trades in its equipment is sustainable development. India, the fastest growing population in the world has an enormous demand of food, and in order to meet this demand a huge portion of the country's land is harvested at an accelerated rate. If the country keeps up with this trend it will lose its arable land in the foreseeable future. A feasible solution in today's growing technological industry is vertical farming, which aims to increase crop production while decreasing land consumption. Vertical farming as compared to the traditional method uses 95% less water and no pesticides, it incorporates heavy use of sensing technologies and data science, as well as machine vision and AI to grow crops better for both the environment and humanity. This system when implemented will act as an aid for people who have limited or no knowledge of vertical farming, and will provide them equipment and demonstrate its usage, to encourage the practice of this new method of farming.

2.2. Significance

The system, in addition to providing services to the ever-growing industry of agriculture, plays a significant role in spreading awareness about the field of vertical farming. The system also acts as a replacement to the existing websites which do not meet the increasing demand of the industry. The system will facilitate a boom in the sector of the vertical farming, decreasing the wastage of land while meeting food demands of a growing population.

2.3. Scope

2.3.1 Project Scope

The scope of this project is a web-based system that supports marketing of vertical farming through various articles and videos, and also allows the promotion and sale of products required to practice vertical farming.

The current websites either promote the idea of vertical farming or sell products required to practice it, whereas this website acts as a cumulation of all the existing websites providing a wide range of services from buying, renting to requesting machine demonstrations and in the process also spreads awareness about vertical farming.

In addition to creating informative web-pages, the creation of pages implementing a database system can be expected. This web-based system does not resolve issues of web security, other than providing password protection within the system. Backend services such as payment processing are not a part of this project. The system is also not responsible for inventory control.

2.3.2 Future scope

This project follows the Agile Model of Software Engineering, which means that it can increment features in every iteration. This makes the project highly adaptive of any changes made by the administrator in the future.

The potential additions that could be made to the current system are:

- ~ Creation of a mobile website and translation of webpages to increase reach of the system to rural areas.
- ~ Addition of backend services such as a payment processor and email notifier to ensure monetary transactions and customer reach.
- ~ Creation of a Chatbot to enhance customer support to a 24/7 timeline by registering and responding to any questions or complaints about the system.

2.4. System Purpose

2.4.1 Beneficiaries

- **Customers:**

After the implementation of this system, customers will be able to identify and purchase products used in vertical farming with ease. Customers will also be able to explore the field of vertical farming through articles and request practical demonstrations of a desired products.

- **Product Owners:**

Product Owners will be able to rent or sell their products while keep track of the purchases through the implementation of a database system.

- **Customer Service Department:**

The new system will facilitate working of the customer service department through feedbacks by customers and detailed information about products and helpline numbers displayed on the website.

- **Accounts and Shipping Department:**

Information about all the purchases will be recorded accurately by the system and stored in the database. This will simplify order processing and any request to change or cancel an order can be resolved without complications.

2.4.2 Location

The system will be available to all potential customers accessing internet on a desktop. Any user registered in the system will be able to request services with a password protected profile. The Administrator will also be able access the website from any location and make changes to the content of the website.

2.4.3 Responsibilities

The responsibilities of the system include:

- Provide customers with detailed information on the concept of vertical farming.
- Allow different access permissions based on type of user.
- Allow users to create profiles with personal information on website.
- Allow registered users to login through password protected scheme.
- Allow logged in users to request demonstrations, purchase or rent products through the website.
- Maintain information about orders and cater to any requests of editing or cancelling orders by users.

3. FUNCTIONAL REQUIREMENTS

3.1 HIGH PRIORITY

3.1.1 Login/Register

1. The system shall allow user to register and create a personalized profile on the website. This will allow the administrator to keep track of all the users.
2. The system shall provide a login page with two text fields, namely ID and Password, for users to access their profiles. This page will initiate a password checking action, and only users with valid passwords will be allowed to log in to the website.

3.1.2 Order Management

1. The system shall allow users to view, create and cancel orders from the admin panel.
2. If a user adds an item to the cart, the system shall check availability of that item in the inventory and add the item only when it's available. This will help keep the inventory in check and avoid any discrepancies in the items of the cart and the inventory database.

3.1.3 Checkout

1. The system shall display all the items in the cart available for purchase, alongside their prices and the total cost of the cart.
2. The system shall provide two different checkout methods, i.e. checkout with account and checkout without account. If a user does not have an account the system shall prompt the user to create one. If the user already has an account but is not logged in, the system shall request the user to log in to their account.

3.1.4 Payment

1. The system shall allow user to select the payment option and provide confirmation once payment is authorized.

3.2 MEDIUM PRIORITY

3.2.1 Catalog/Product browsing

1. The system shall showcase a catalog listing all the products and services provided by the website. This will help users choose their desired products.
2. Images of each product with its description and price must be listed by the system.

3.2.2 Site Management

1. The system shall reflect all the changes made by the Administrator, in the articles/videos section, within x minutes of website being updated.
2. All the updates in the product pricing and description must be resonated on the website by the system. This will decrease the possibility of incorrect information being displayed on the website.

3.2.3 Customer Accounts

1. The system shall allow users to view and update their profiles, and reflect changes in the database. This will help facilitate the process of buying or renting products.
2. The system shall display information about order status and history to customer. This will help the users keep track of the purchases made by them.
3. The system shall give updates on demonstration requests (if any), of the machinery requested by the users. Regular changes will keep the user posted about the demonstration they might have requested.
4. The system shall allow users to submit their feedback about the website, product or a service. This will help the admin incorporate changes and improve the website and its services.

4. NON-FUNCTIONAL REQUIREMENTS

4.1 Reliability

- ~ The system should have a consistent database monitored and updated by the admin.
- ~ The system shall not be non-operational for more than x hours of time.

4.2 Usability

- ~ A user new to the website should be able to distinguish between products and articles of vertical farming with ease.

4.3 Performance

- ~ The system should have superior component design to support x simultaneous users.
- ~ The mean time to check availability of a product should not exceed x seconds.

4.4 Security

- ~ The system shall provide password protected profiles, that can be viewed only by authenticated users.
- ~ Each user personal data should be abstracted from other users.
- ~ Transaction data must have secure access.

4.5 Supportability

- ~ Flexible service-based architecture is highly desirable to accommodate changes in website.
- ~ The system website shall be accessible across multiple web browsing platforms such as Google Chrome, IE, Firefox.

4.6 Online User Help

- ~ User should receive confirmation messages via web interface for processes such as successful login, completion of registration, placing orders and feedback submissions.
- ~ Every page must have contact information/helpline numbers for users help.

4.7 Interface

- ~ The system must interface with:
- ~ Current version of Hibernate to maintain database for: product and order information.
- ~ HTML CSS to create and design articles on vertical farming as well as product catalogs.

5. SDLC MODEL AND METHODOLOGY

Agile SDLC model is a combination of iterative and incremental process models with focus on process adaptability and customer satisfaction by rapid delivery of working software product. Agile Methods break the product into small incremental builds. These builds are provided in iterations.

So first we gather all the requirements of the website which will involve deciding the various features which make up our website. Then we create the sub-tasks for those features. For ex – If login/signup page is one of the features of my website then the subtask of this feature would be to decide what details the login/signup page would require.

Then we pick some features from it which we can cover in a sprint like a week. After that focus only on those features and nothing else, we do as the tasks in those features tell.

For ex – The login/signup page will consist of different details for logins and signups. Once we figure out these details, we work according to create the first complete feature of website that would be our login/signup page.

Once finished we display it to someone for assurance of quality, if it approves then pick more tasks from remaining features of website and complete it in next week. If it did not approve and consists of a few bug or changes, then we work out the bugs and include the changes.

There is no specific order in which we can build our features, we just pick one feature create our sub task and complete it in a sprint.

If later the client feels there needs to be change in some features then the change can be accommodated.

This method helps in following way:

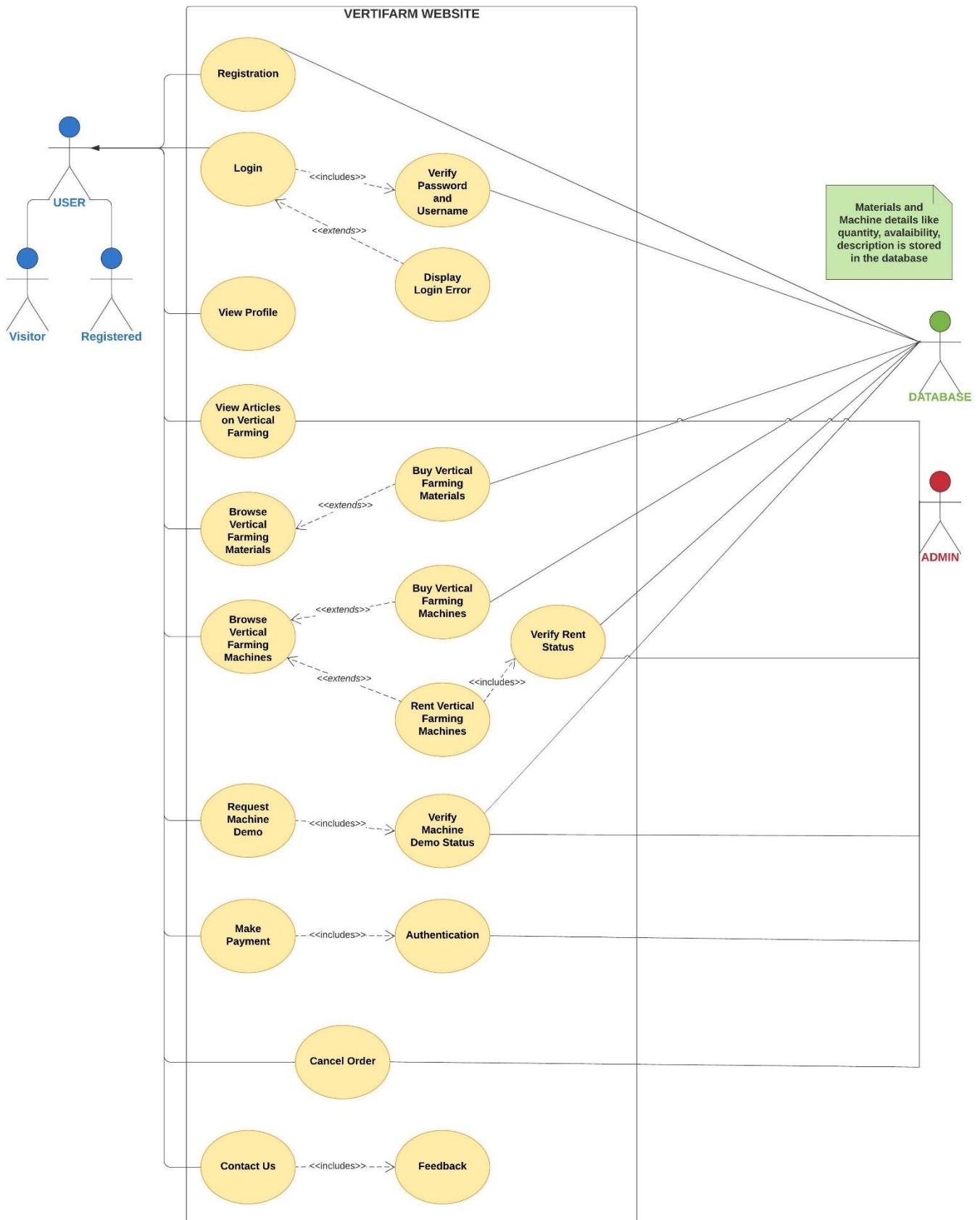
It tracks how much project is completed. After a sprint, the work is checked for quality assurance and need not to be changed unless there are bugs. The project is always completed in specified time for all sprints. It includes bug free code and changes made are easy.

The following features of AGILE makes it the ideal model for my project–

1. **Scrum** - is the most popular way of introducing Agility due to its simplicity and flexibility. The benefit includes increased visibility of project goals and how to achieve them. This clear characteristic of agile projects, inevitably contributes toward the even more significant goal of delivering software on time.
2. **Quality** - Testing is integrated throughout the lifecycle, enabling regular inspection of the working product as it develops. This allows the developer to make necessary adjustments and gives the product team early sight of any quality issues.
3. **Visibility** - Agile development principles encourage ‘user/client’ active involvement throughout the product’s development process. When developing a website, there are a lot of areas where client reviews becomes important like the look of the website, the various animations used in the website, types of forms used in website and much more. This model encourages the client to become active part of this entire developmental project.
4. **Iterative releases, Communication, continuous integration** - The active involvement of a user representative/product owner, the high visibility of the product and progress, and the flexibility to change when change is needed, creates better business engagement and customer satisfaction. This is an important benefit that can create much more positive and enduring working relationships. In agile development, the emphasis is absolutely on building the right product.
5. **Early and Predictable Delivery** - By using time-boxed, fixed schedule Sprints of 1-4 weeks, new features are delivered quickly and frequently, with a high level of predictability. This also provides the opportunity to release or beta test the software earlier than planned if there is sufficient business value.
6. **Predictable Costs and Schedule** - Because each Sprint is a fixed duration, the cost is predictable and limited to the amount of work that can be performed by the team in the fixed-schedule time box. Combined with the estimates provided to the client prior to each Sprint, the client can more readily understand the approximate cost of each feature, which improves decision making about the priority of features and the need for additional iterations.

6. UML DIAGRAMS

6.1 USE CASE DIAGRAM



USE CASES

1. Register

Use Case Name:	Register
Summary:	Users who are new to the website can register to create their profiles. Registration will allow them to get login credentials to access various site features.
Flow:	<ol style="list-style-type: none"> 1. The use case starts when a user indicates that he wants to register. 2. The system requests the user to fill form that requires name, gender, address, email, contact, city, state. 3. The user enters his details. 4. The system registers the details in the database
Extension Points:	None
Preconditions:	The user is new to website
Postconditions:	The user can now website features by logging in.

2. Login

Use Case Name:	Login
Summary:	In order to get personalized or restricted information, place orders or do other specialized transactions a user must login so that the system can determine his access level.
Flow:	<ol style="list-style-type: none"> 1. The use case starts when a user indicates that he wants to login. 2. The system requests the username and password. 3. The user enters his username and password. 4. The system verifies the username and password against records in database. 5. The system starts a login session and displays a welcome message based on the user's preferences.
Extension Points:	Display login error
Preconditions:	The user is registered.
Postconditions:	The user can now obtain data and perform functions according to his registered access level.

3. View Profile

Use Case Name:	View Profile
Summary:	The user after registration can access his/her profile containing the personal details. These details can be updated as per user convenience
Flow:	<ol style="list-style-type: none"> 1. The use case starts when a user login in to their account. 2. The system requests the username and password. 3. The user enters his username and password. 4. The system verifies the username and password against records in database. 5. The users go to profile page to check/update profile.
Extension Points:	None
Preconditions:	The user is registered/login.
Postconditions:	The user can update profile details as per requirements.

4. View Articles on Vertical Farming

Use Case Name:	View Articles on Vertical Farming
Summary:	The user can access all the related articles/information related to vertical farming. For this feature user account is not necessary, a user just visiting the website can access this feature.
Flow:	<ol style="list-style-type: none"> 1. The use case starts when a user access's the website. 2. The user lands on home page from where he can select different pages of information.
Extension Points:	None
Preconditions:	The user has to visit the website
Postconditions:	None

5. Browse Vertical Farming Materials

Use Case Name:	Browse Vertical Farming Materials
Summary:	The material section of website contains various materials such as Copper Sulphate pentahydrate, Calcium nitrate, Boric acid etc. These items can be added to cart for purchase.
Flow:	<ol style="list-style-type: none"> 1. The use case starts when a user access's the website. 2. The user lands on home page from where he goes to product page for more information on materials. 3. The users browse materials and can add to cart.
Extension Points:	Buy vertical farming material
Preconditions:	The user has to visit the website and browse materials
Postconditions:	Items can be added to shopping cart. For purchase login/registration is required.

6. Browse Vertical Farming Machines

Use Case Name:	Browse Vertical Farming Machines
Summary:	The machine section of website contains various machines of vertical farming such as clone cart, hydroponic kit, water timer pump etc. These items can be added to cart for purchase or can be rented on basis of availability.
Flow:	<ol style="list-style-type: none"> 1. The use case starts when a user access's the website. 2. The user lands on home page from where he goes to product page for more information on machines. 3. The users browse machines and can add to cart if available. 4. If user wishes to rent a machine, they can fill a rent form and wait for confirmation.
Extension Points:	Buy vertical farming machine, Rent machine
Preconditions:	The user has to visit the website and browse machines
Postconditions:	Items can be added to shopping cart. For rent or demo request a form needs to be filled which will be approved by admin. For purchase or rent -> login/registration is required.

7. Request machine demo

Use Case Name:	Request Machine Demo
Summary:	Users have a chance to request for demonstration of ordered product. This provides user with full understanding of how to use the ordered product and utilize it the right way.
Flow:	<ol style="list-style-type: none"> 1. The use case starts when a user access's the website. 2. The user lands on home page from where he goes to product page for more information on machines. 3. The users browse machines and can add to cart if available. 4. If user wishes to request for demo of a machine, they can fill a demo form and wait for confirmation. 5. User is redirected to checkout page. User has to login/register for this step.
Extension Points:	Checkout
Preconditions:	The user has to visit the website and browse machines. Also, users have to login/register to complete process.
Postconditions:	The user needs to complete payment process in-order to receive product for demo.

8. Make Payment

Use Case Name:	Make Payment
Summary:	This use case deals with user making payment for all materials or machine that users wants to purchase or rent.
Flow:	<ol style="list-style-type: none"> 1. The use case starts when a user access's the website. 2. The user lands on home page from where he goes to product page for more information on machines/materials. 3. The users browse machines/materials and can add to cart if available. 4. If user wishes to request for rent of a machine, they can fill a rent form and wait for confirmation. 5. User is redirected to checkout page where they will be redirected to login (if not logged in) or register (if new user) for total amount payment.
Extension Points:	Payment authentication
Preconditions:	The user has to visit the website and browse machines/materials and add to cart. User has to login.
Postconditions:	Provide correct payment details to receive order confirmation.

9. Cancel Order

Use Case Name:	Cancel Order
Summary:	User has the right to cancel any order placed for which a request is issued which needs to be approved by admin.
Flow:	<ol style="list-style-type: none"> 1. The use case starts when a user access's the website. 2. The user lands on home page from where he goes to product page for more information on machines/materials. 3. The users browse machines/materials and can add to cart if available. 4. If user wishes to request for rent of a machine, they can fill a rent form and wait for confirmation. 5. User is redirected to checkout page for total amount payment. 6. Order has to be placed. If users wish to cancel order, go to my orders and request for cancellation.
Extension Points:	None
Preconditions:	In-order to cancel previous order, user needs to provide order details and request cancellation.
Postconditions:	Cancellation has to be approved by admin.

10. Contact us

Use Case Name:	Contact Us
Summary:	This page is for users to contact the website officials for any enquiry/complaint/feedback. Users can provide all necessary details regarding their problems and submit them which will be received by the website and a response will be generated for received query.
Flow:	<ol style="list-style-type: none">1. The use case starts when a user access's the website.2. The user needs to login or register.3. User visits the contact us page.4. A small form needs to be filled which can contain feedback or any query from user.5. Submit the form and wait for response.
Extension Points:	Feedback
Preconditions:	User needs to have a verified account on the website.
Postconditions:	Feedback/query will be successfully submitted and response will be generated as soon as issue is resolved.

11. Verify Password and Username

Use Case Name:	Verify Password and Username
Summary:	This use case checks the validity of username and password.
Flow:	<ol style="list-style-type: none">1. The use case starts when user enters username and password.2. The system verifies the username and password.3. If the username is invalid, use case prompts user to enter username again. If the username is valid and password is invalid, the system requests user to re-enter the password. Once password is entered use case goes to step 2.4. If both username and password is valid, system starts login session.
Extension/ Inclusion Points:	None
Preconditions:	The user has entered the username and password.
Postconditions:	The system can customize a welcome message based on the validity of username and password.

12. Display Login Error

Use Case Name:	Display Login Error
Summary:	This use case displays error message if username or password is not verified.
Flow:	<ol style="list-style-type: none">1. The use case starts when user has entered incorrect username or password.2. Use case remains active unless user enters correct username and password.
Extension/ Inclusion Points:	None
Preconditions:	The user has entered incorrect username or password.
Postconditions:	The user has to re-enter details.

13. Buy Vertical Farming Materials

Use Case Name:	Buy Vertical Farming Materials
Summary:	This use case allows user to buy vertical farming materials.
Flow:	<ol style="list-style-type: none">1. The use case starts when a user clicks on the buy option of a vertical farming material after browsing catalog.2. The system checks availability of the material selected. If available material is added to cart awaiting payment.
Extension/ Inclusion Points:	none
Preconditions:	The user has selected a material for purchase after browsing catalog.
Postconditions:	The system adds material to cart and user can continue browsing catalog or make payment.

14. Buy Vertical farming Machinery

Use Case Name:	Buy Vertical Farming Machinery
Summary:	This use case allows user to buy vertical farming machinery.
Flow:	<ol style="list-style-type: none">1. The use case starts when a user clicks on the buy option of a vertical farming machinery after browsing catalog.2. The system checks availability of the machinery selected. If available material is added to cart awaiting payment.
Extension/ Inclusion Points:	none
Preconditions:	The user has selected a machine for purchase after browsing catalog.
Postconditions:	The system adds machinery to cart and user can continue browsing catalog or make payment.

15. Rent Vertical Farming Machinery

Use Case Name:	Rent Vertical Farming Machinery
Summary:	This use case allows user to rent vertical farming machinery.
Flow:	<ol style="list-style-type: none"> 1. The use case starts when a user clicks on the rent option of a vertical farming machinery after browsing catalog. 2. The system checks availability of the machinery selected. 3. If the machinery is available, request for rent is verified and item is added to cart.
Extension/ Inclusion Points:	Verify rent status.
Preconditions:	The user has selected a machine for rent after browsing catalog.
Postconditions:	The system adds machinery to cart and user can continue browsing catalog or make payment.

16. Verify Rent Status

Use Case Name:	Verify Rent Status
Summary:	This use case checks the rent status for vertical farming machinery.
Flow:	<ol style="list-style-type: none"> 1. The use case starts when an item selected for rent by user is available in stock. 2. The system stores the rent status in the database which can be reviewed by the administrator. 3. If the rent status is approved the, item is added to cart.
Extension/ Inclusion Points:	none
Preconditions:	The user has selected a machine for rent and machine is available in stock.
Postconditions:	The system verifies request status, and item is added if status is approved.

17. Checkout

Use Case Name:	Verify Machine Demo Status
Summary:	This use case verifies demonstration status of request machine.
Flow:	<ol style="list-style-type: none"> 1. The use case starts when a user requests demonstration of a desired machine. 2. The user request is stored in database and reviewed by administrator. 3. If request is approved user gets updated about the time of demonstration.
Extension/ Inclusion Points:	none
Preconditions:	The user has requested for demonstration of a machine.
Postconditions:	The system verifies the request status and stores details of demonstration in database.

18. Authentication

Use Case Name:	Authentication
Summary:	This use case verifies payment made by a user.
Flow:	<ol style="list-style-type: none">1. The use case starts when a user makes payment after selecting a payment method.2. The system stores payment and order details in the database.3. If the details are stored and verified payment is authenticated.
Extension/ Inclusion Points:	none
Preconditions:	The user makes payment for the orders in cart.
Postconditions:	The system stores order and payment details in the database.

19. Feedback

Use Case Name:	Feedback
Summary:	This use case allows user to get in touch with administrator via feedback textbox
Flow:	<ol style="list-style-type: none">1. The use case starts when a user clicks on the 'Contact Us' option on the website.2. The system displays a textbox on the website where user can fill in any complaints or queries.3. The feedback is registered once user click enter.
Extension/ Inclusion Points:	none
Preconditions:	The user has selected contact us option on the website.
Postconditions:	The system registers feedback which can be reviewed by administrator.

6.2 DATA FLOW DIAGRAM

A data-flow diagram is a way of representing a flow of data through a process or a system. The DFD also provides information about the outputs and inputs of each entity and the process itself.

DFD LEVEL 0

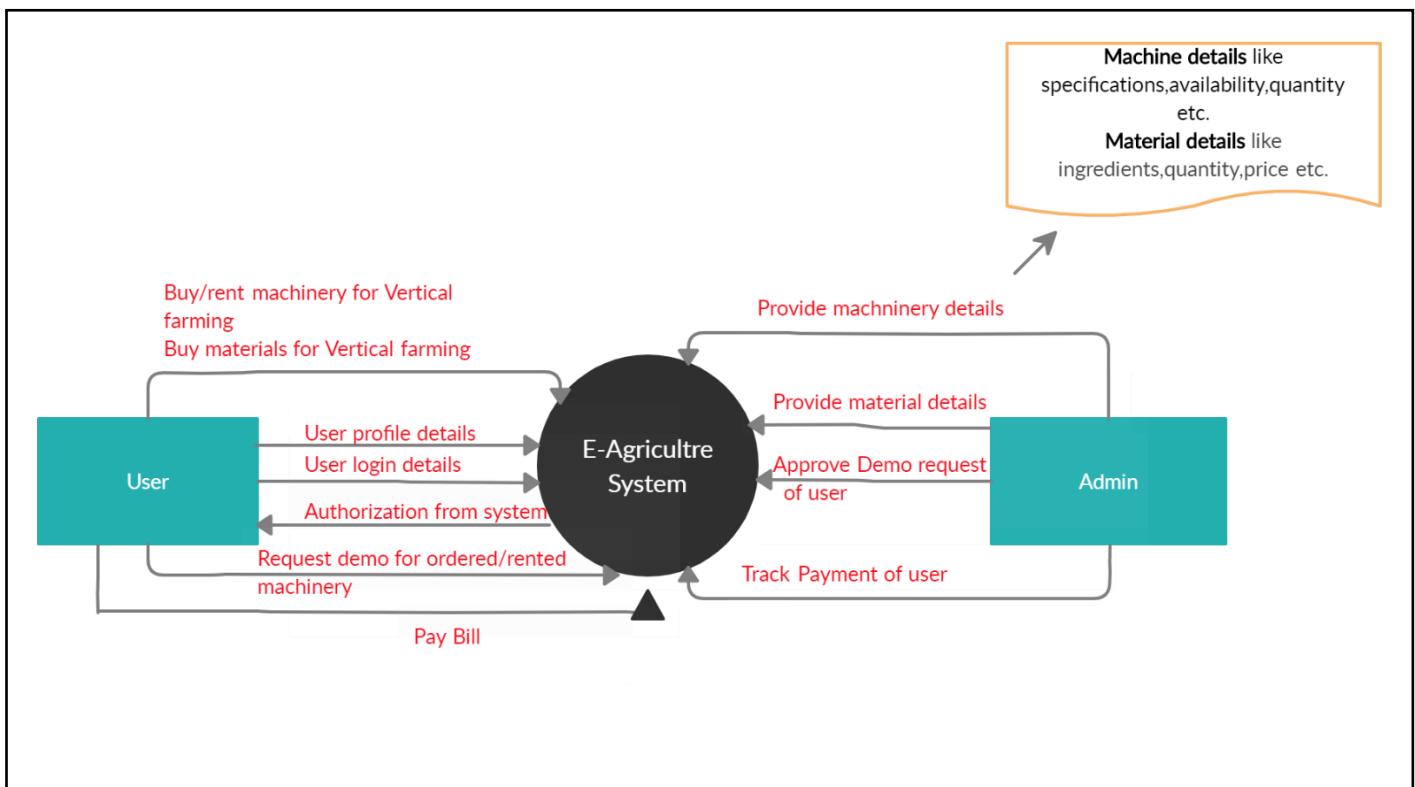
The above diagram consists of two entities – USER and ADMIN connected to the E-agriculture system.

User has the following facilities-

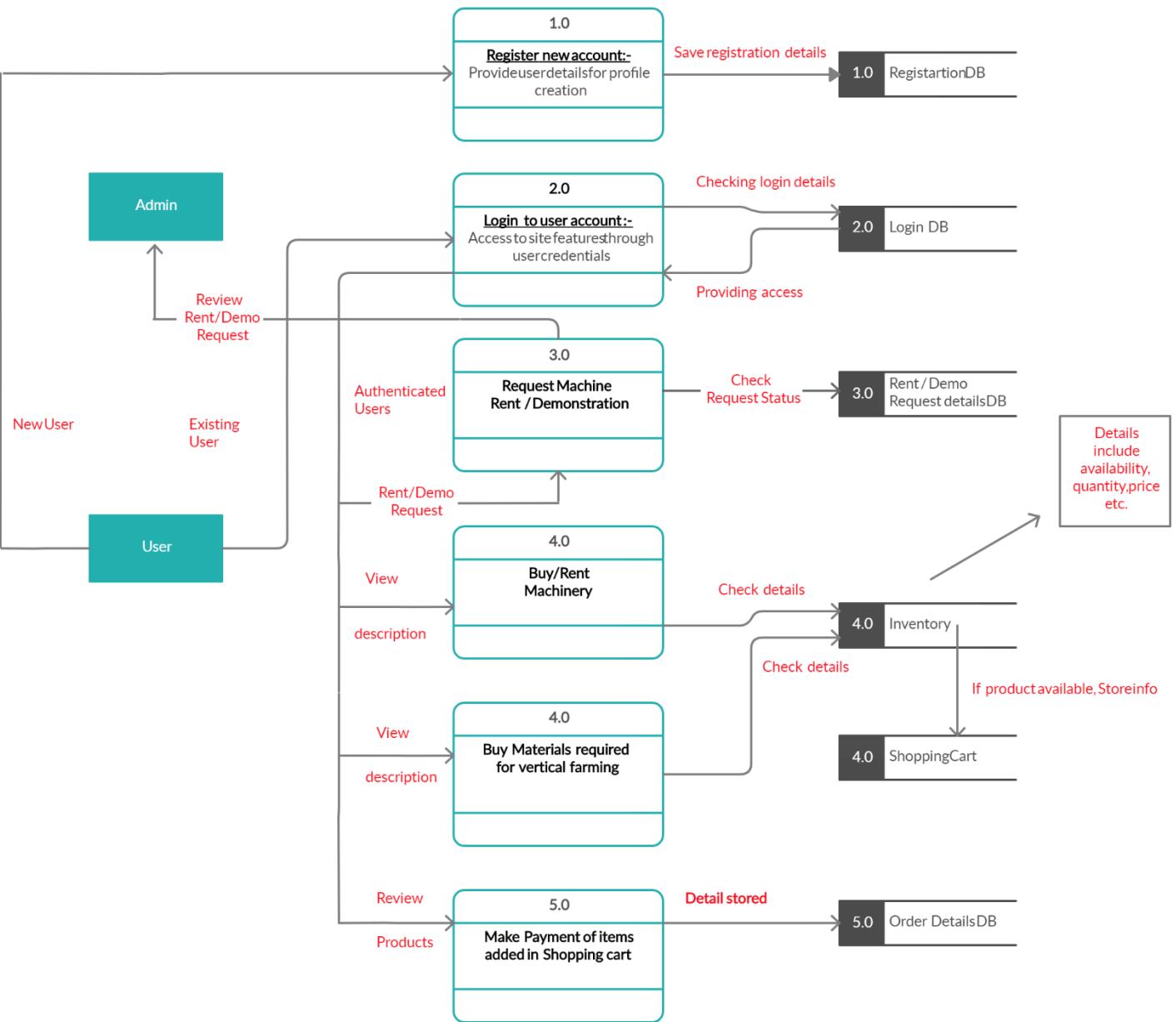
- Login to the system and create a profile
- Get access to articles / videos related Vertical farming
- To adopt the practices of Vertical Farming, user can buy or rent equipment's and also materials like chemicals used for production.

Admin has following responsibilities-

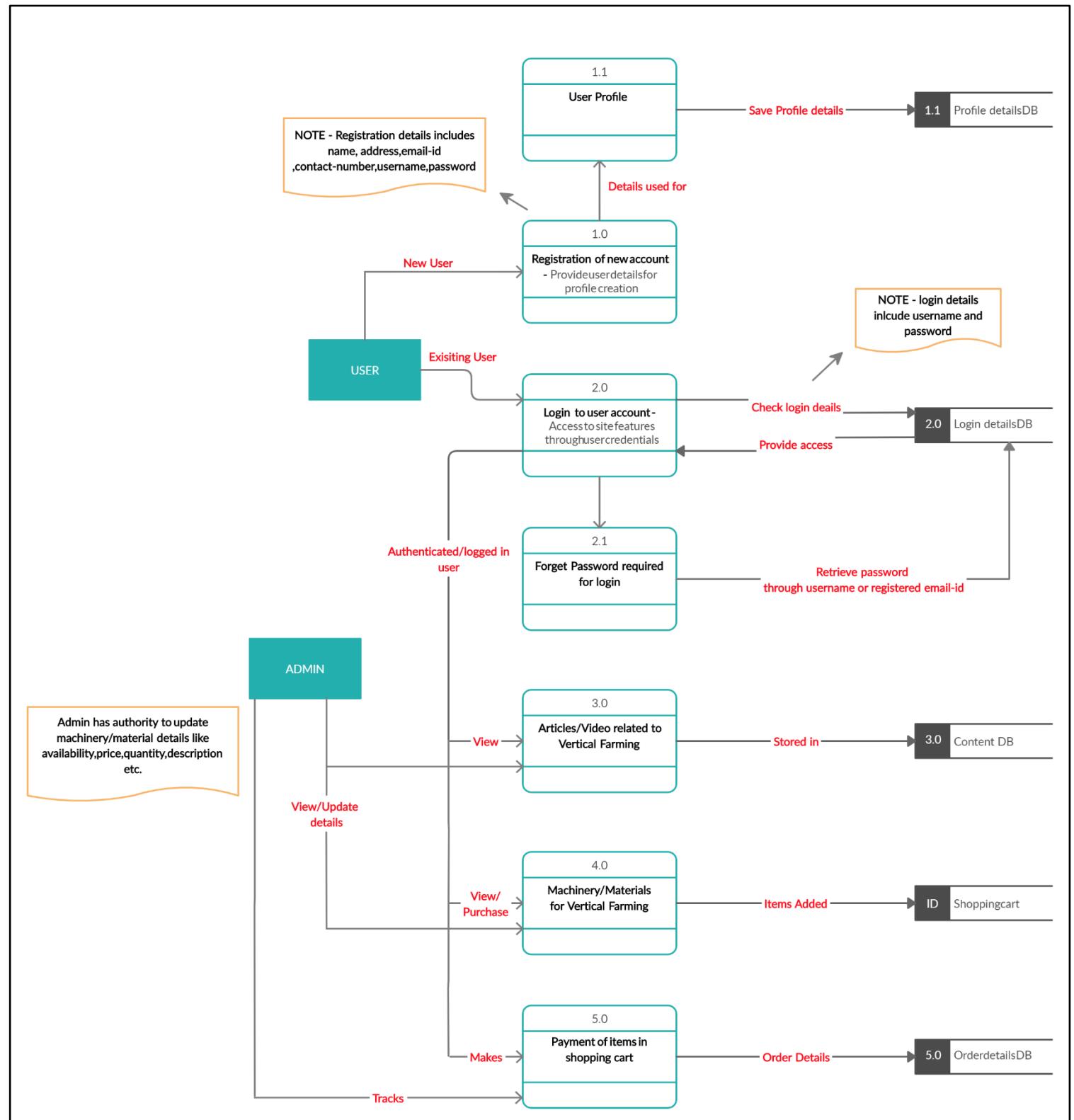
- View / update item details for users
- Provide approval to rent requests
- Track payment of user and provide refund if order cancelled by user



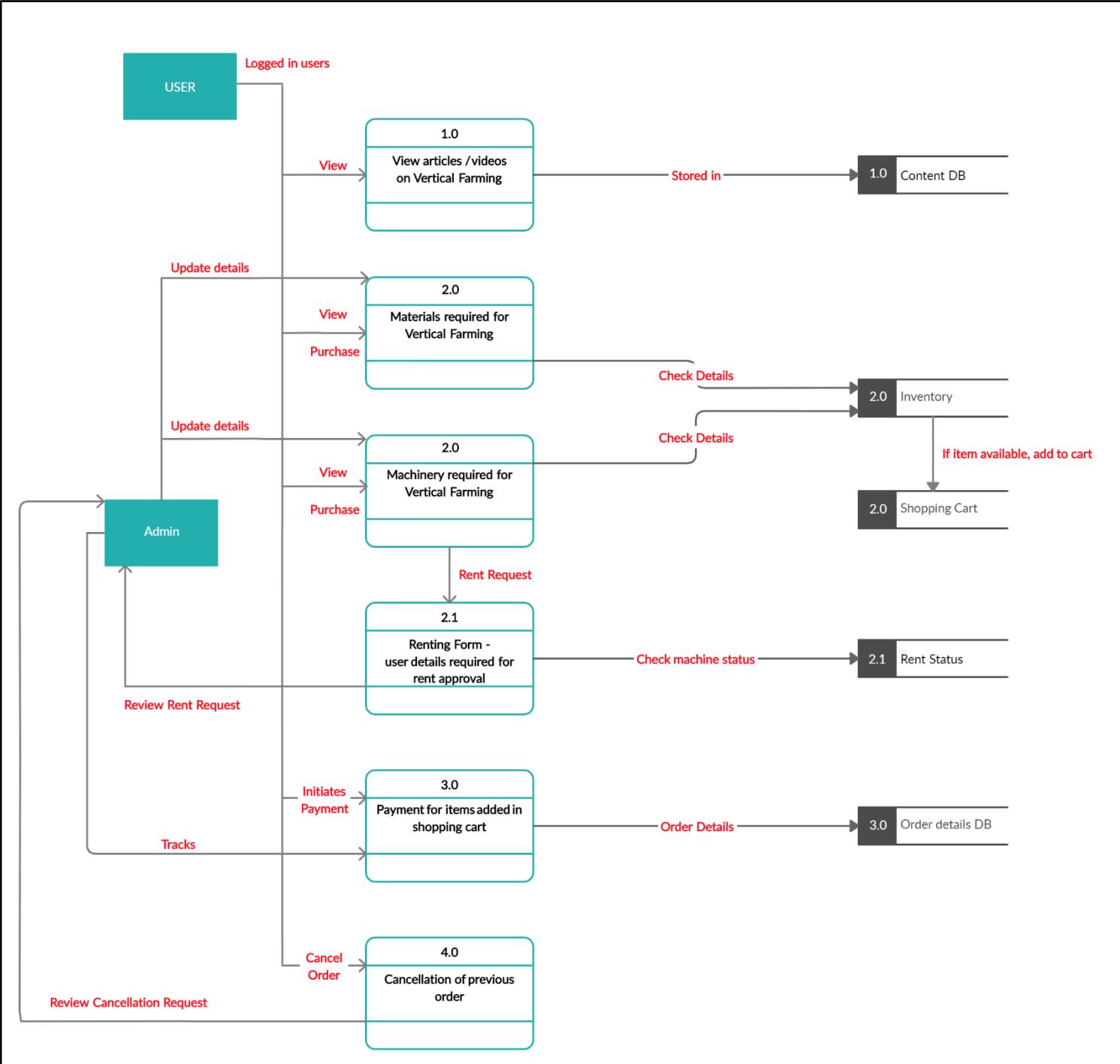
DFD LEVEL 1



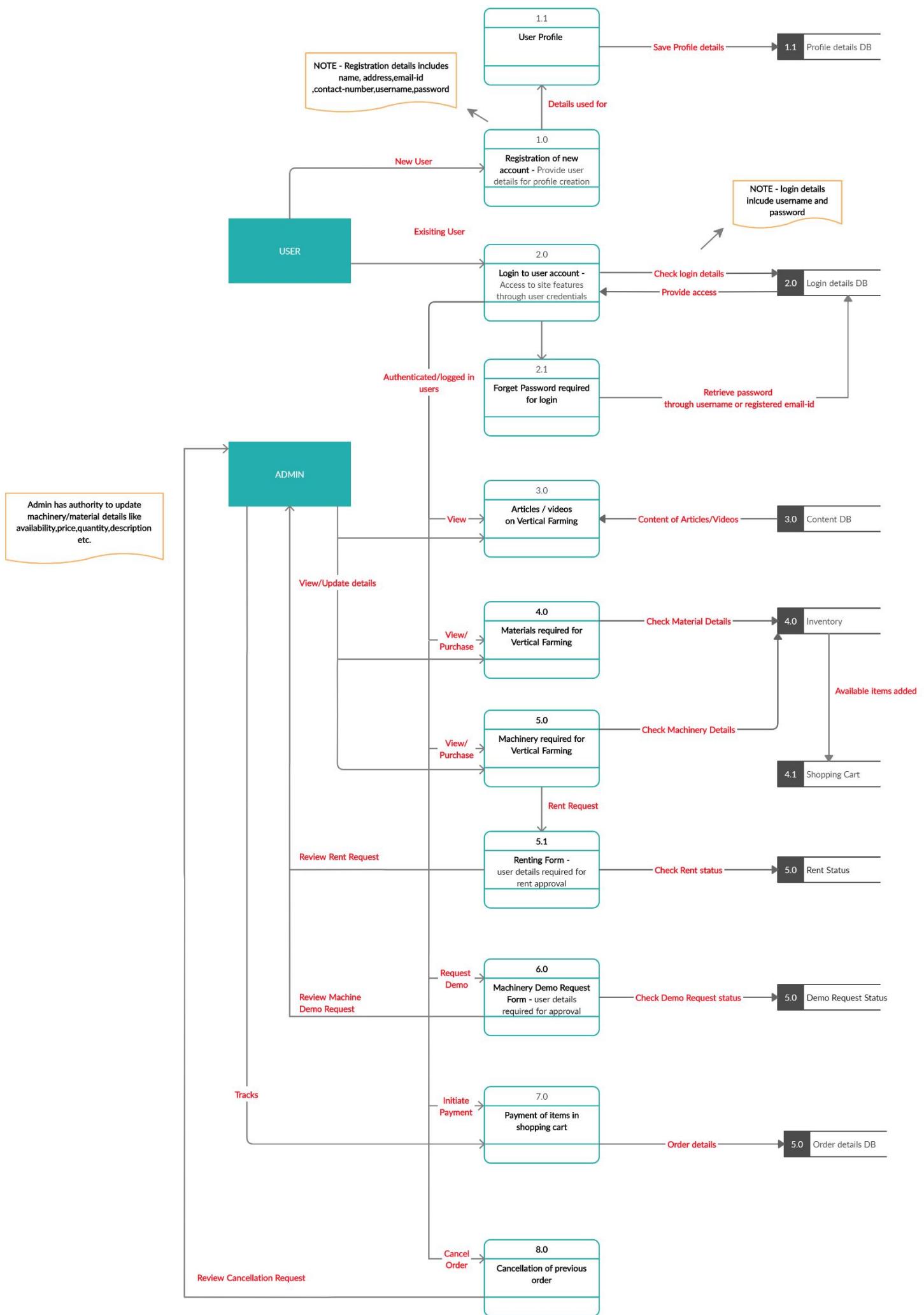
DFD LEVEL 2 FOR USER LOGIN



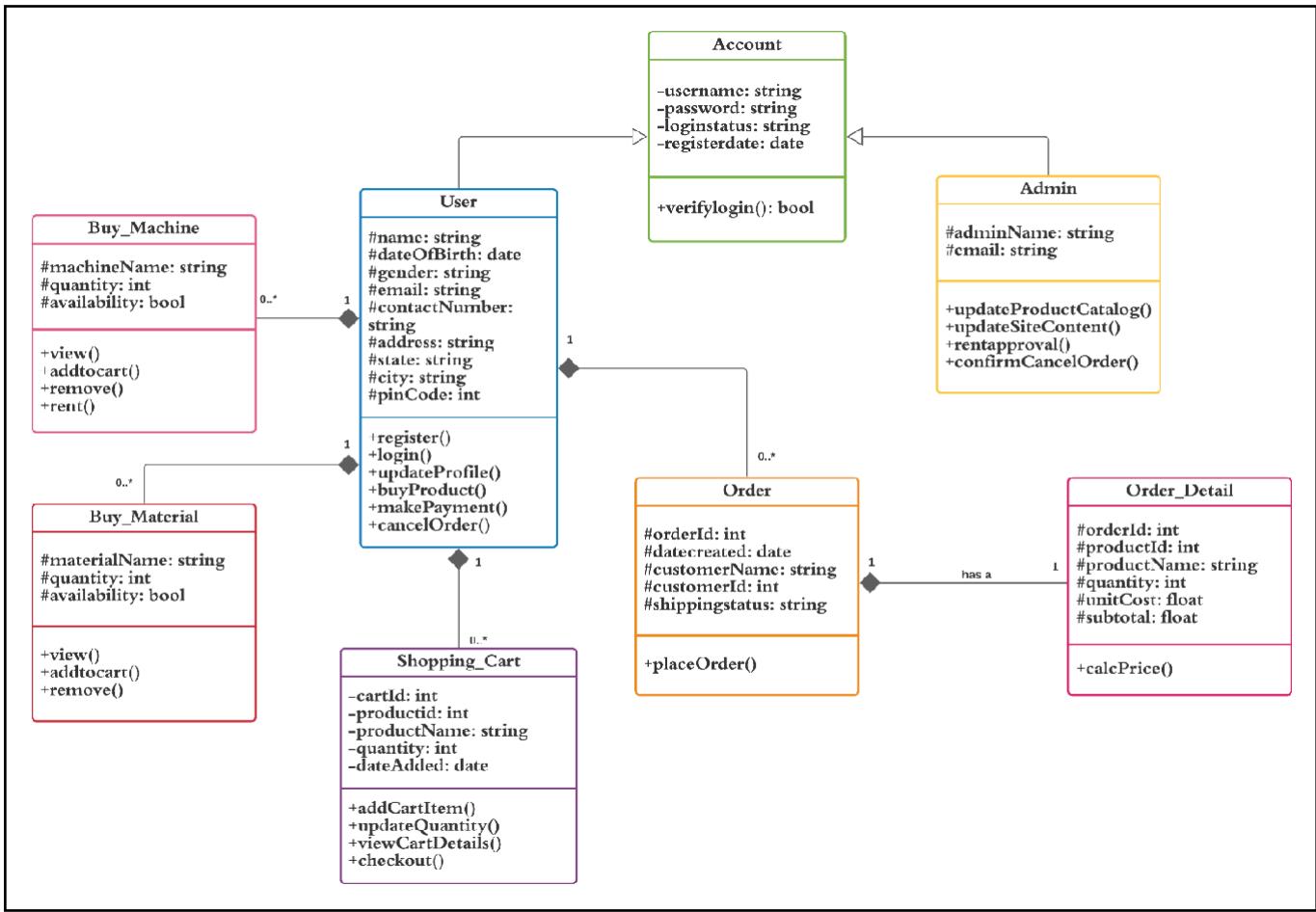
DFD LEVEL 2 FOR BUYING / RENTING PRODUCTS



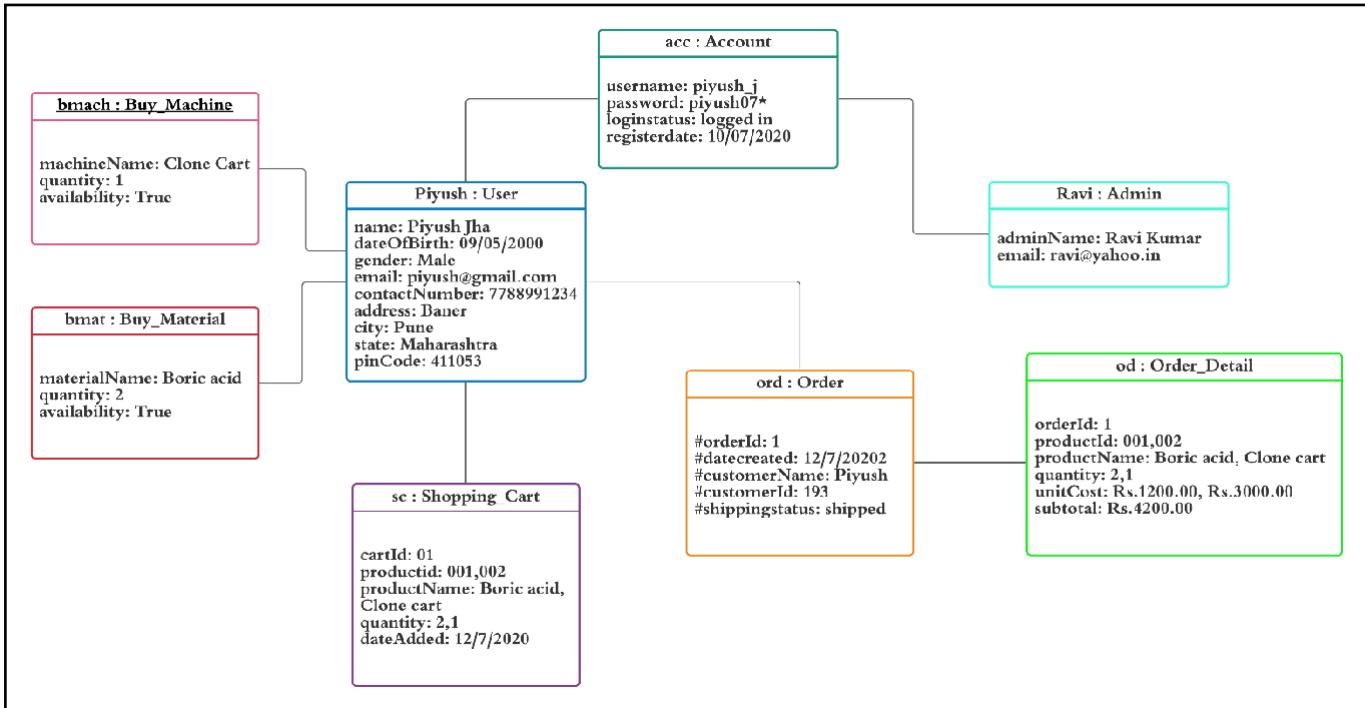
DFD LEVEL 3



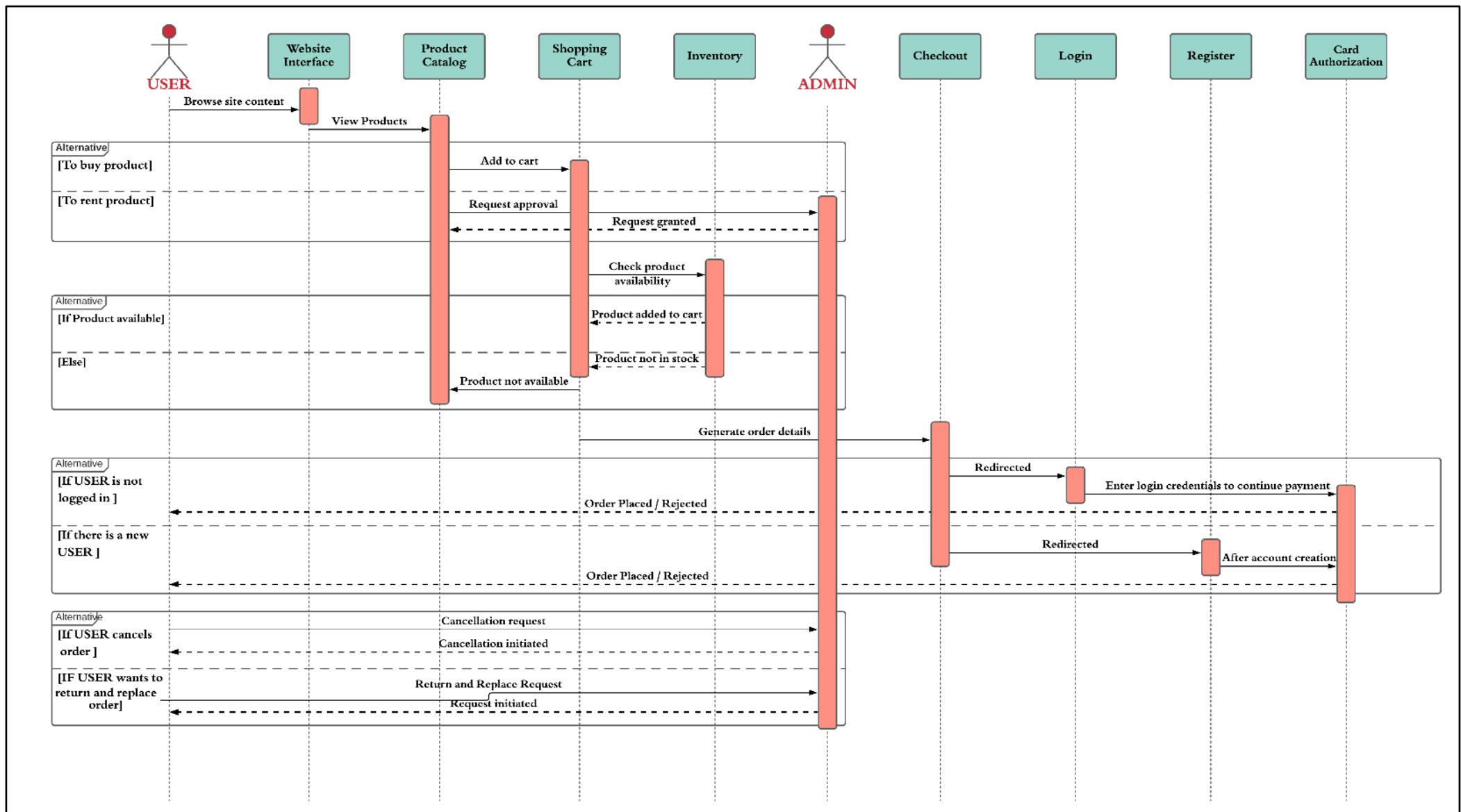
6.3 CLASS DIAGRAM



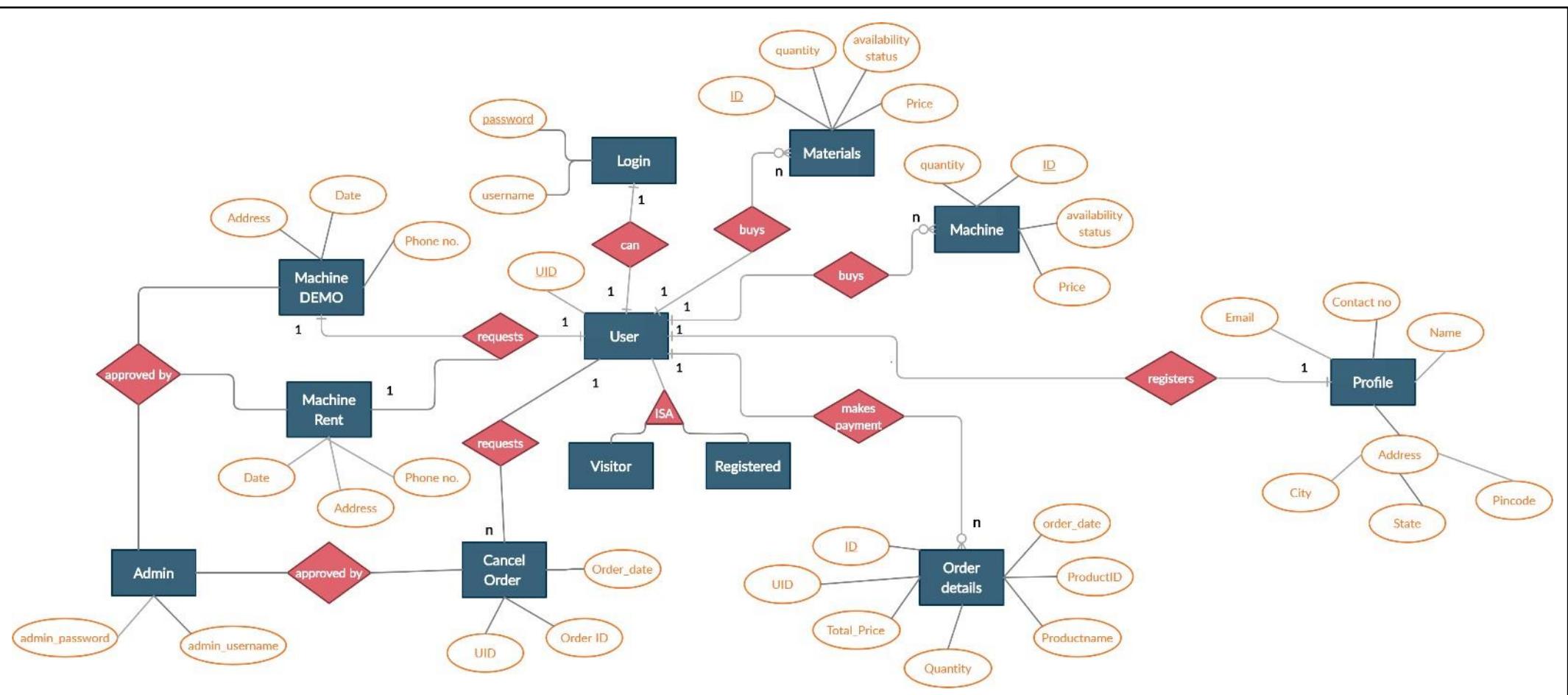
6.4 OBJECT DIAGRAM



6.5 SEQUENCE DIAGRAM



6.6 ER DIAGRAM



7. PLATFORM / TECHNOLOGY USED

Java and Hibernate

The entire project is made using JAVA programming language. To interact with database, hibernate is used. Hibernate ORM is an object-relational mapping tool for the Java programming language. It provides a framework for mapping an object-oriented domain model to a relational database. Hibernate not only takes care of the mapping from Java classes to database tables (and from Java data types to SQL data types), but also provides data query and retrieval facilities which means that all updates are also stored in database which can be retrieved as and when required.

SQLyog

SQLyog is a GUI tool for the RDBMS MySQL. SQLyog is an all-round Management Tool ('GUI', 'Frontend') for MySQL. All the database tables are visible through SQLyog.

XAMPP Server

XAMPP is an abbreviation where X stands for Cross-Platform, A stands for Apache, M stands for MYSQL, and the Ps stand for PHP and Perl, respectively. It is an open-source package of web solutions that includes Apache distribution for many servers and command-line executables along with modules such as Apache server, MariaDB, PHP, and Perl. XAMPP helps a local host or server to test its website and clients via computers and laptops before releasing it to the main server. It is a platform that furnishes a suitable environment to test and verify the working of projects based on Apache, Perl, MySQL database, and PHP through the system of the host itself.

Hardware Specification

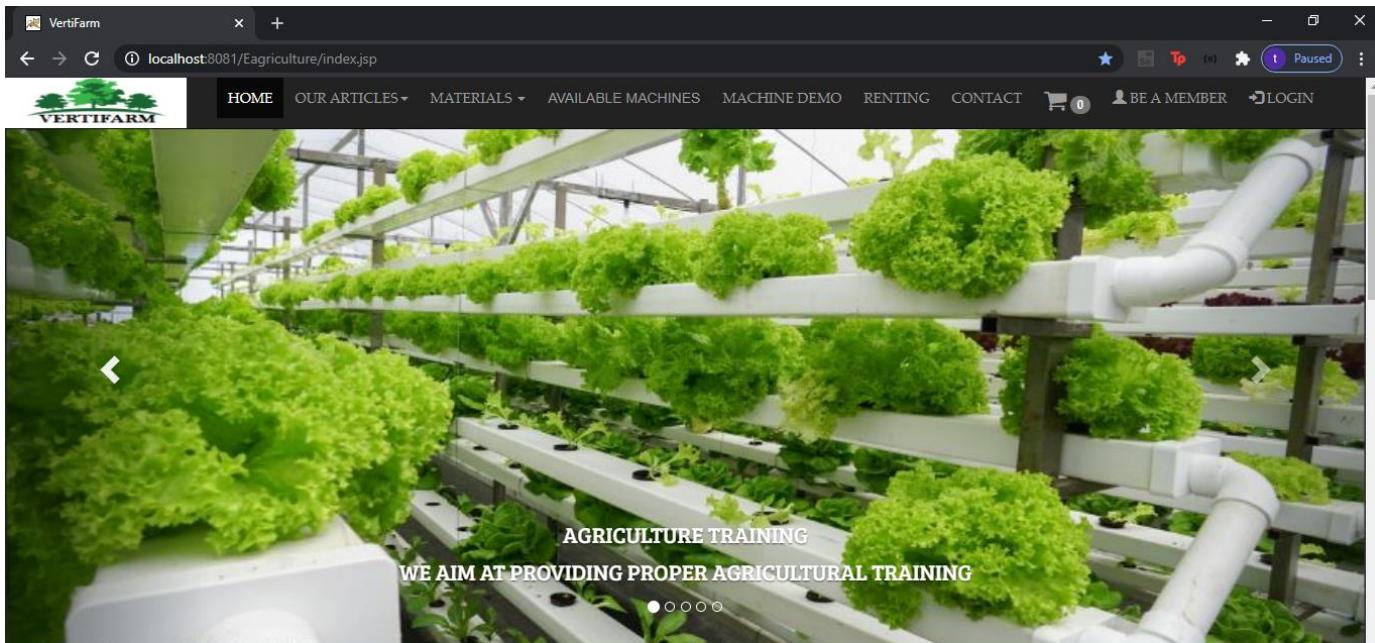
Processor	Pentium IV or above
Hard Disk	40GB or more
RAM	2GB (minimum)

Software Specification

Operating System	Windows or Linux
User Interface	HTML, CSS, Bootstrap, jQuery
Programming Language	Java
Web Applications	Hibernate/JSP/Servlet
Database	MySQL (through SQLyog)

8. SCREENSHOTS OF SYSTEM OUTPUT

8.1) HOME PAGE



Welcome To The Digital Vertical Farming Portal Of India

Agriculture is the backbone of the Indian Economy"- said Mahatma Gandhi six decades ago. Even today, the situation is still the same, with almost the entire economy being sustained by agriculture, which is the mainstay of the villages. It contributes 16% of the overall GDP and accounts for employment of approximately 52% of the Indian population.

Vertical farming or V-Farming is the future of agriculture in India. With advancement in technology, India has everything it needs to bring out the full potential of V-Farming.

With rise of young technology enthusiasts, Vertical farming is the right field to attract all those young and sharp minds who are ready to take control of the future of Indian agriculture.



Machinery



Materials



Rent machines



Mission

At Vertifarm, we are on a mission to promote the idea of vertical farming in communities across the globe. We aim to spread awareness about the importance of vertical farming and encourage people to take up the practice to use less space and fewer resources to grow fresh, healthy and clean produce. Vertifarm has ideas and products that will help improve the lives of plant, people and OUR PLANET.

Vision

By 2050, the world population is expected to grow another 2 billion, and India being the fastest growing population will soon face the challenge of feeding its people. To feed a billion mouths, land needs to be cultivated at an exponential rate which will in future lead to a total loss of arable lands. Increasing food demand and decreasing arable lands together, contribute to one of the biggest challenges faced by the human race. So, what is the answer to this challenge? There has to be a solution! What if we grow crops vertically? Wouldn't it save a lot of land while increasing produce? Farming vertically seems to be the need of the hour and the key to the future. It is the hero we both need and deserve!

SERVICES

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- [Our Articles](#)
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- [Gallery](#)
- [Machinery](#)
- [Renting](#)

OUR ARTICLE

- [Why V-Farm](#)
- [Hydroponics](#)
- [Aeroponics](#)
- [Aquaponics](#)
- [Other Related](#)
- [V-Farm Videos](#)

MATERIALS

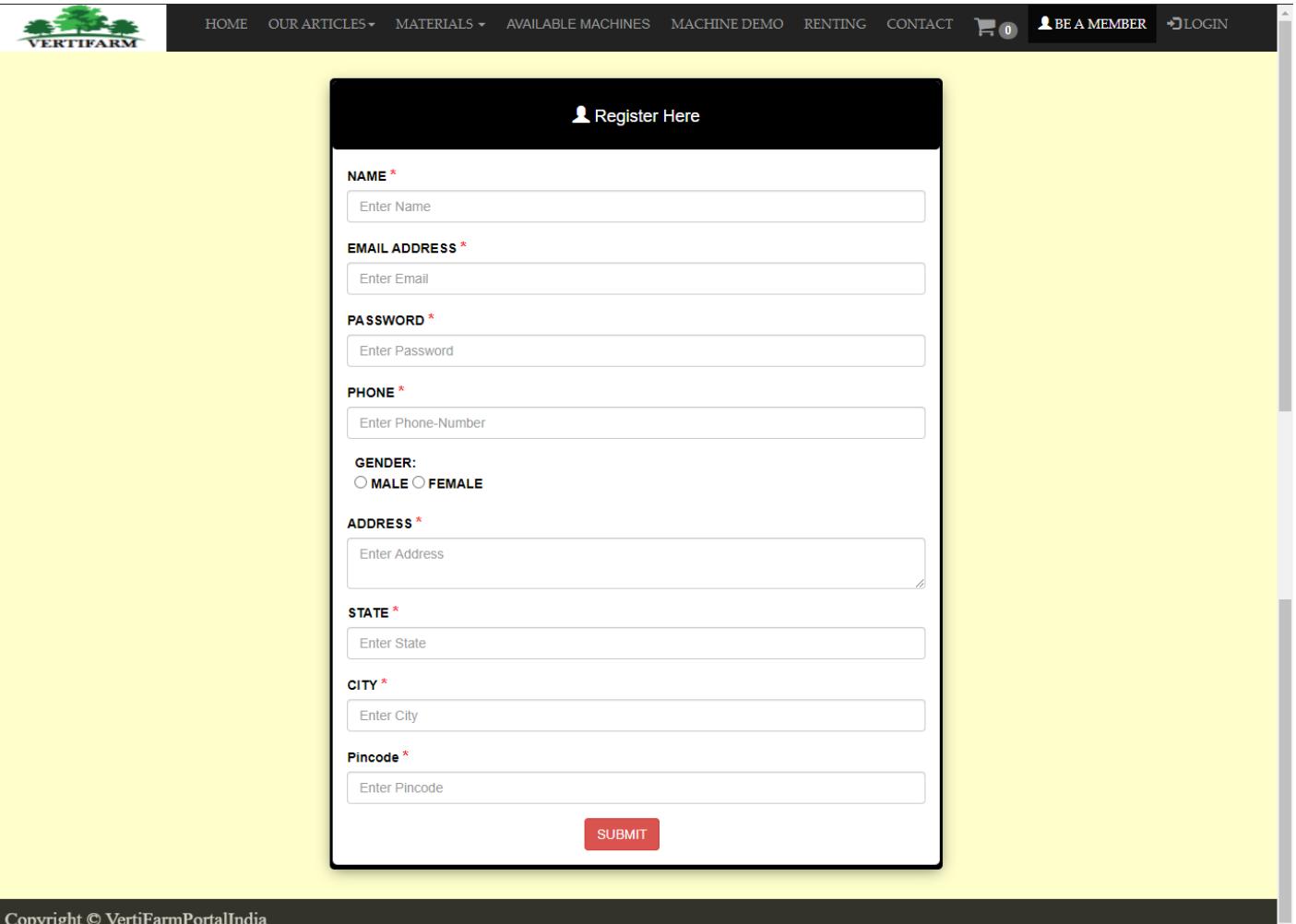
- [Chemicals](#)
- [Led Grow Lights and Lamps](#)
- [Greenhouse Plant Support](#)
- [Coir](#)

CONTACT

- [Flat no. 502, Sopan Complex](#)
- [Ingale colony](#)
- [Shivane](#)
- [Pune-23, Maharashtra-India](#)

[Go to Contact Page](#)

8.2) REGISTRATION FORM



The registration form is titled "Register Here" and includes fields for Name, Email Address, Password, Phone Number, Gender (Male or Female), Address, State, City, and Pincode. A "SUBMIT" button is at the bottom.

NAME *

EMAIL ADDRESS *

PASSWORD *

PHONE *

GENDER:

MALE FEMALE

ADDRESS *

STATE *

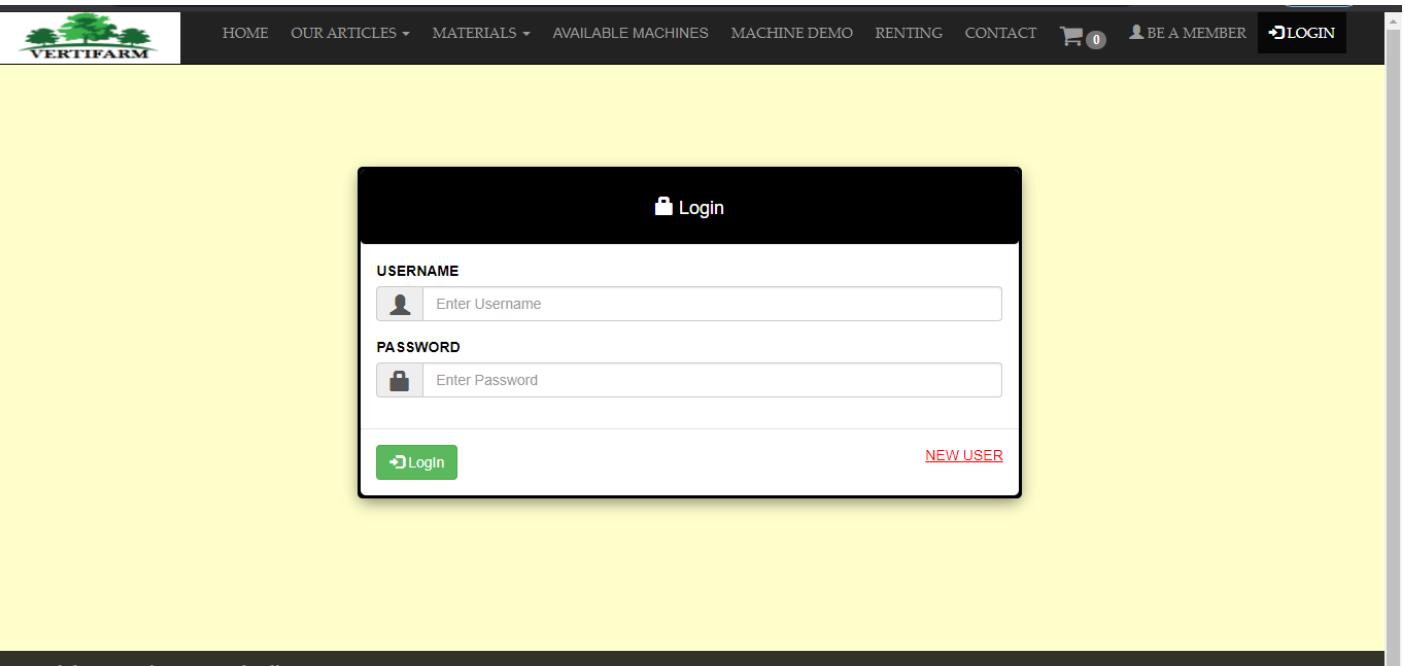
CITY *

Pincode *

SUBMIT

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8.3) LOGIN PAGE



The login page features fields for Username and Password, a "Login" button, and a "NEW USER" link.

USERNAME

PASSWORD

>Login

NEW USER

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8.4.1) OUR ARTICLE - WHY V-FARM

The screenshot shows a website for "V-FARM" with a navigation bar at the top. The sections visible include:

- What Is Vertical Farming?**: Discusses the projected world population growth and the challenge of losing arable land.
- How Vertical Farming Works**: Explains the four critical areas: physical layout, lighting, growing medium, and sustainability features.
- Advantages and Disadvantages of Vertical Farming**: Summarizes the promise and challenges of vertical farming.
- Advantages**: Lists three main advantages: preparation for future food demand, increased year-round crop production, and being human and environmentally friendly.
- Disadvantages**: Lists three main disadvantages: dependency on technology, labor costs, and difficulties with pollination.

Three images are displayed on the left side of the page:

- A woman working in a vertical farm with green plants.
- A futuristic vertical farm structure with multiple levels of plants.
- An interior view of a modern vertical farm with people working among the plants.

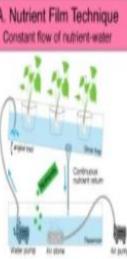
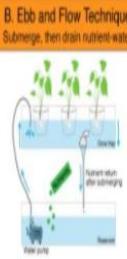
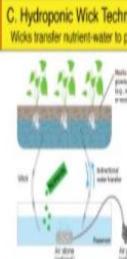
8.4.2) OUR ARTICLE – HYDROPOONICS

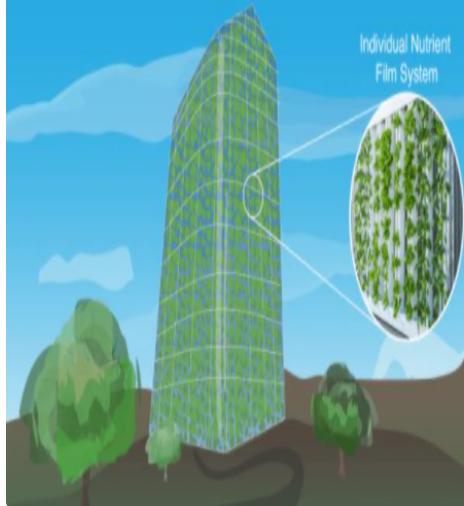
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Hydroponics

In the 19th century, a German botanist at the University of Wurzburg, Julius Sachs, dedicated his career to understanding the essential elements that plants need to survive. By examining differences between plants grown in soil and those grown in water, Sachs found that plants did not need to grow in soil but only needed the nutrients that are derived from microorganisms that live in the soil. In 1860, Sachs published the, nutrient solution, formula for growing plants in water, which set the foundation for modern day hydroponic technology.

Plants obtain 3 nutrients from the air carbon, hydrogen, and oxygen and 13 nutrients from supplemented water- nitrogen, phosphorous, potassium, calcium, magnesium, sulfur, iron, manganese, copper, zinc, boron, chlorine, and molybdate. Hydroponic systems today are very sophisticated, there are systems that will monitor the level of nutrients pH, and temperature of the water, and even the amount of light the plants are receiving. There are three main types of hydroponic systems- a nutrient film technique, an Ebb and Flow System, and a Wick system. A nutrient film hydroponic technique involves plants being grown in a grow tray that is slightly angled and positioned above a reservoir filled with the water-nutrient mix. This allows a thin stream of water to flow across plant roots, allowing the plants to have sufficient water, nutrients and aeration, and then drained back into the reservoir. The nutrient film technique is the most common hydroponic system used today. Plenty and Bowery, two of the largest hydroponic farms in the US, use nutrient film techniques to grow lettuce, spinach and other leafy greens. The Ebb and Flow technique allows plants to be flooded with the nutrient-rich water, and after the plant roots uptake nutrients, water is actively drained back into a reservoir to be reused. Finally, a hydroponic wick system is the simplest of all, as water reservoir. In this system, plants are grown in an inert growing medium such as sand, rock, wool or clay balls that help anchor the plant roots. These different systems are interchangeable, but some systems may be better for growing different types of plants.

A. Nutrient Film Technique
Constant flow of nutrient-water

B. Ebb and Flow Technique
Submerge, then drain nutrient-water

C. Hydroponic Wick Technique
Wicks transfer nutrient-water to plants




Hydroponics for a sustainable future

Given the need for more sustainable agriculture, there has been a rise in eco-friendly start-up companies around the world that are using hydroponic technology to produce crops on a large scale with a technique known as Vertical Farming. Vertical farms are buildings filled with countless levels of hydroponic systems (or nutrient film style planters), growing different crops in an indoor, controlled temperature environment. The largest vertical farm is being built in Dubai, covering 130,000 square feet of land and aiming to produce 6,000 pounds of food per day, using 1/2500th the amount of water as an equivalent soil operation. For a city that imports 85% of their food, this will greatly revolutionize the way the city eats.

Vertical Farming is the term for large-scale hydroponic systems that are engineered to house thousands of square feet of growing systems, across many floors in a skyscraper esque building. While vertical farms hold a lot of promise, they are expensive to implement, technically difficult on a large scale, and the food produced from these systems is generally more expensive than equivalent soil grown food because of the high energy costs of maintaining the systems. Even so, the Associated Press estimates that food produced by hydroponic technology in 2019 is worth \$32 billion USD, and this is projected to grow at a rate of 5% per year until 2025. While hydroponic technology may never replace conventional farming, it is breaking the paradigm of food production, we may see a new generation of modern farmers building green walls inside their houses or community centers to feed families with fresh produce grown all year round.

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8.4.3) OUR ARTICLE – AEROPONICS

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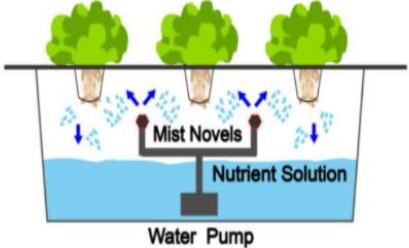


Aeroponics: A Key for Sustainability 

Aeroponics is certainly a major key to decreasing these statistics, but it takes more than one horticulturist to accomplish this goal. Its time for each of us to take action through aeroponics, whether its in the form of growing a vast farm or just planting a few crops- every seed matters.

Growing plants and produce out of the ground is so last 12,00 years ago, but you know what is environmentally friendly, efficient, and results in high-quality vegetation? The utilization of aeroponics. Now wait a second, what exactly does this process consist of?

To put it simply, aeroponics is growing without Earth. This is attainable (and actually very beneficial) because it consists of a gardening practice where plants are grown and nourished as their root structures are suspended in air and regularly sprayed with a water solution. A key component of how this system is so beneficial to the environment are the types of nutrients being incorporated into the plants routine. When common elements such as nitrogen, potassium, phosphorus, calcium, and magnesium are missing, the effects can be extremely hazardous to the growth of plants. For instance, a deficiency of potassium in the nutrient solution can result in the leaves turning yellow with scattered dark spots, followed by tissue death or a stunt in the plants growth and all foliage becoming yellow and curled. After many years of research, aeroponic horticulturists have proven the benefits of using aeroponic farming and provide notable reasoning behind it. One of which was an experiment administered on Asian beans by the National Aeronautics and Space Administration (NASA). Their experiment illustrated how aeroponics reduces the usage of water by 98 percent and plants can grow up to three times faster in zero gravity aeroponic systems. Their research consisted of seedlings being suspended in the air in closed frames while their leafy tips and roots were allowed to grow up and down, respectively. Enclosure of the roots aided in the efficiency of the plants growth because it allowed for the nutrient water mix to be used more since the solution can easily travel to other areas that the plant may not reach in traditional farming methods.





Creativity is certainly a notable factor of aeroponic farming, but another principal trend that should be taken into account is the implementation of pumps. They can automatically keep plants nourished without constant supervision as long as the system is sealed. Pumps allow for a substantial amount of nutrient mist to be consistently transported to the roots when necessary so an abundance of water is able to be conserved as well.

Is Aeroponics really that important?

Ok, wait a second. Maybe I hyped it up a bit too much- is aeroponics really such a big deal? Do we really need to have amazing produce, be efficient, and only utilize our resources when they are very necessary? YES!

A myriad of factors contribute to the urgent need of aeroponics and sustainability, but what is at the very root of the problem? Us. Our total population is expected to reach 8.6 billion in nearly a decade, and rather than focusing on using our land in a resourceful manner, many choose to constantly urbanize towns without integrating projects that conserve and/or increase our resources. Consequently, there are a multitude of perilous results that are close to taking numerous lives. One alarming example is how malnutrition has affected approximately 151 million children suffering from stunted growth and has taken nearly 3 million children alone. Aeroponics is certainly a major key to decreasing these statistics, but it takes more than one horticulturist to accomplish this goal. Its time for each of us to take action through aeroponics, whether its in the form of growing a vast farm or just planting a few crops- every seed matters.

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8.4.4) OUR ARTICLE – AQUAPONICS

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What Is Aquaponics?

Aquaponics is a sustainable method of raising both fish and vegetables. It is popular with individuals, entrepreneurs, educators, missions and governments. Furthermore, with this type of indoor farming, you grow substantially more food with less water, land and labor than traditional agriculture. What is aquaponics? a resilient farming system that provides wellness and better nutrition. Aquaponics is a form of agriculture that combines raising fish in tanks (recirculating aquaculture) with soilless plant culture (hydroponics). In aquaponics, the nutrient-rich water from raising fish provides a natural fertilizer for the plants and the plants help to purify the water for the fish. Aquaponics can be used to sustainably raise fresh fish and vegetables for a family, to feed a village or to generate profit in a commercial farming venture, year round, in any climate. Aquaponics is a great example of year round, indoor farming. It can be done anywhere, providing fresh local food that is free of pesticides, herbicides and chemical fertilizers. It is safe, easy and fresh!

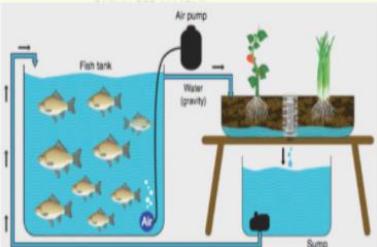
What Can You Grow?

The fish and plants that you select for your aquaponic system should have similar needs as far as temperature and pH. As a general rule, warm, fresh water fish and leafy crops, such as lettuce, greens and herbs will do the best. Most commercial growers raise leafy crops, but you can grow all kinds of plants in aquaponics. We can even grow tropical fruit trees in our aquaponic systems! Yes, we grow bananas, limes, oranges, lemons and pomegranates year round in aquaponics!

How Aquaponics Works

The main input to an aquaponic system is fish food. The fish eat the food and excrete waste. More than 50 percent of the waste produced by fish is in the form of ammonia secreted in the urine and, in small quantities, through the gills. The remainder of the waste, excreted as fecal matter, undergoes a process called mineralization which occurs when heterotrophic bacteria consume fish waste, decaying plant matter and uneaten food, converting all three to ammonia and other compounds. In sufficient quantities ammonia is toxic to plants and fish.

Nitrifying bacteria, which naturally live in the soil, water and air, convert ammonia first to nitrite and then to nitrate which plants consume. In an aquaponic system the heterotrophic and nitrifying bacteria will attach to the tank walls, underside of the rafts, organic matter, the growing medium (if used) and in the water column. The beneficial bacteria discussed here are natural and will inhabit an aquaponic system as soon as ammonia and nitrite are present. Essentially, you have three crops to keep alive in aquaponics; the fish, the plants and the beneficial bacteria. These three living entities each rely on the other to live. The bacteria consume the fish waste keeping the water clean for the fish. In the process, the bacteria provide the plants with a usable form of nutrients. In removing these nutrients through plant growth, the plants help to clean the water the fish live in. Aquaponics is a very efficient method of growing food that uses a minimum of water and space and utilizes waste, resulting in an end product of organic, healthful fish and vegetables. From a nutritional standpoint, aquaponics provides food in the form of both protein (from the fish) and vegetables.



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8.4.5) OTHER RELATED

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How hydroponic farmers of India are building businesses



In the middle of an industrial building in the Andheri East neighbourhood of Mumbai is a farm. It is spread across 1000 sq ft and grows 2500 plants. It is no ordinary farm. The hum of an air conditioner greets visitors into the room, tube lights replace sunlight, and there's no soil on the patch. Herbivore Farms is an example of a newly popular and successful type of urban farming- hydroponics. Simply put, it is growing plants in water. Soil is replaced by a water solution that is rich in macronutrients like nitrogen, potassium, phosphorous, calcium nitrate and micronutrients like manganese, zinc etc. A grow system controls the balance of nutrition, humidity and temperature, uses less water than soil based farming and increases yield without chemicals or pesticides. There are many advantages to urban farming. The land requirement is quite low, water consumption is 80 percent less, the water is recycled and saved, it is pesticide free and in cases of high tech farms there is no real dependency on the weather, says hydroponic farmer Ajay Naik of Letcetra Agritech in the Sattari district of Goa.



Hydroponic farming is setting up roots all across India. Sakina Rajkotwala and Joshua Lewis, of Herbivore Farms, have come into focus in the last year. In Manori, Linesh Pillai started Terra Farms as a pilot project before taking the idea countrywide. Delhi has Triton Foodworks, Noida has Natures Miracle, Chennai has Sriram Gopals Future Farms and Rahul Dhokas Aqua Farms, and Gurugram based company, Barton Breeze, has six farms across Haryana, Rajasthan, Uttar Pradesh, and Uttarakhand. Hydroponics and other soil less farming techniques can help us take our agriculture and farming industry to the next level, adds Naik.

Rajkotwala and Lewis' journey began after they quit their jobs at Magic Bus and Directi, respectively, and decided to seek out their purpose in life. The question of who we are? led them to examine what they eat and how to grow it, and a stint at an Auroville farm, and eating fresh produce, turned out to be the change they sought. It was a revelatory experience, as it opened our minds to the importance of food, says Lewis. We wanted to replicate that farm model pluck vegetables and eat them fresh in the urban space. Hydroponics made the most sense, and they started with a small farm on Rajkotwala's terrace in Juhu in 2017 and moved to Andheri in 2018.

Related Real Life Stories

[The vertical farming industry is growing deeper roots](#)

[Soil-less & Vertical, This Style of Farming Will Reduce Water Usage By 95%!](#)

[Growing crops vertically to feed the growing population](#)

[Read How These Indian Hydroponic Farmers are doing Profitable Businesses](#)

[Vertical farming in India: Misguided dream or a much-needed reality?](#)

[Delhi Engineer Turns Urban Kisan, Earns Rs 40K/Day From Organic Farming!](#)

[No Time, Space to Farm At Home? Hyderabad Hydroponics Firm Has a Doorstep Solution!](#)

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8.4.6) V-FARM VIDEO

VERTIFARM

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OUR COLLECTION

This Farm of the Future Uses No Soil and 95% Less Water

VERTICAL FARMING

How to make a Vertical Hydroponic System

Vertical Aeroponic Technology

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What is Aquaponics? How it Works?



Tokyo's Vertical Farms - The Future of Farming | WIRED



The High-Tech Vertical Farmer



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8.5.1) MATERIALS – CHEMICALS

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Boric Acid

Boron is a vital nutrient for plant growth, plant development and successful yields. Boron is needed in small concentrations in the form of boric acid fertilizer since large concentrations are often used for algaecides, herbicides, and other pesticides. Boron has various functions to plants, including: Maintaining the balance between starch and sugar. It does so by helping in the translocation of carbohydrates and sugar. Essential in the process of pollination and seed production - processes vital in increasing yields. Critical to the normal cell division, protein formation, and nitrogen metabolism. Supports water and nutrient transport throughout the plant. Although their requirements are small, plants are negatively affected by boron deficient soils. Boric acid is the primary source of boron in liquid fertilizers.

(Price in Rupees per kg)

Product Price: 1100

Product Stock: 100

[BUY NOW](#)



Calcium Nitrate

Calcium Nitrate is a colorless anhydrous salt and when combined with ammonium nitrate forms Calcium Ammonium Nitrate (CAN) used majorly as a fertilizer and also in cold packs. It is made up of 15.5% Nitrogen and 19% Calcium. Calcium Nitrate fertilizer enhances plants photosynthesis, reduces the soil acidity thus promoting the development of microorganisms in the soil that aid in the nitrogen fixation. Calcium Nitrate fertilizer 15.5-0-0 also helps in water regulation in plant tissues, improvement and enhancement in photosynthesis, and also protecting the plants from biochemical stresses. This helps plants like tomato and apple produce healthy fruits. Additionally, Calcium Nitrate fertilizer 15.5-0-0 is largely used in hydroponics growers who use it to dilute it into feeding tubes to nourish plants growing in water indoors.

(Price in Rupees per kg)

Product Price: 750

Product Stock: 90

[BUY NOW](#)



Manganese Sulfate Monohydrate

Manganese Sulfate is one of the most potent fertilizers on the market, over 99% pure and is a powder, it is perfect for palm plants and hydroponic applications. Manganese deficiency or "frizzle top" is a common problem in palms. Symptoms first begin to show on the newly emerging fronds (leaves). The fronds will appear chlorotic (yellow), small, and weak looking. As the deficiency progresses, fronds will emerge withered or scorched in appearance, dwarfed, and distorted. This is what gives "frizzle top" its name. If not corrected, the palm will stop growing and only small brown stubs will emerge, this is quickly followed by the death of the palm. All palms can benefit from regular applications of Manganese Sulfate. Some of the most susceptible palms to manganese deficiency are Queen Palms, Royal Palms, Pygmy Date Palms, Paurotic (Everglade Palms), and Coconut Palms.

(Price in Rupees per kg)

Product Price: 960

Product Stock: 100

[BUY NOW](#)



Zinc Sulfate

World Health Organization says about Zinc deficiency. According to them, 31% of the world populations suffers from Zinc deficiency and it causes problems ranging from hair loss and acne to severe neurological disorders. Zinc Sulfate fertilizer is very common for some plants such as Pecan trees but almost any plant would need some Zinc (Zn) to grow, bloom, and stay healthy. As mentioned above the Pecan Trees or green plants such as Lettuce need more Zinc (Zn) compared to others. However, you could add even more Zinc Sulfate fertilizer to your soil (if you're growing edible plants) than your plants require and this Zinc (Zn) will be stored in plants and after you pick your fruit, vegetables, nuts, etc. they would have excessive amount of Zinc (Zn), which your body would absorb when you consume these plants and this is a natural way of improving your Zinc (Zn) deficiency instead of taking expensive unnatural pills.

Product Price: 1110

Product Stock: 50

[BUY NOW](#)

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8.5.2) MATERIALS - LED LIGHTS AND LAMPS

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Led Grow Lights

LED grow lights applications include growth chambers, multi-level production of leafy greens and other crops, vertical farming, cut-flower production, cannabis production and strawberry production. It is well known that LED technology used in horticulture grow lights and hydroponic grow lights offer numerous benefits over traditional lighting sources for horticulture applications.

Specifications

- Part Number: Valoya BX120
- Dimensions: 46.3" L x 2.9" W x 2.3" H
- Input Voltage: 90 - 305 VAC
- Weight: 10lb
- Power Consumption: 132 watt

Product Price: 1800

Product Stock: 30

[BUY NOW](#)



High Pressure Sodium Grow Lights

Commercial growers using HPS 1000W fixtures as their light source will typically need to 're-lamp' every 16 months or so. HPS lamps lose their intensity and die over time and should be changed after 10,000 hours of use. The Philips Master GreenPower HPS 1000W DE lamp is the referenced leader in the industry for high quality and life longevity which makes it superior to other brands of HPS lamps.

Specifications

- Part Number: PH-HPS-100000-6
- Dimensions: 1.25" L x 15" W x 1.25" H
- Watts: 1000
- Voltage: 400
- Light Output: 2100 μ mol/s
- Light Style: Bulb

Product Price: 2000

Product Stock: 30

[BUY NOW](#)



Flowering Lamps

Our Pure Flowering 200 Lamp is the most efficient and effective solution for photoperiodic lighting to control the timing of flowering. The Pure Flowering 200 Lamp is used for growing Fruiting Plants and Ornamentals.

Specifications

- Part Number: TG1B-3A-1104
- Input Voltage: 100-240 VDC / 50-60 Hz
- Weight: 0.9lb
- Light Style: Bulb
- Power Consumption: 16 watt

Product Price: 1200

Product Stock: 25

[BUY NOW](#)

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8.5.3) MATERIALS – GREENHOUSE PLANT SUPPORT

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EBB-N-FLOW Table/Tray Cleaner

EBB-N-FLOW Table/Tray Cleaner is designed to be a daily cleaner for removing dirt, grime, mold, and algae from polystyrene and stainless steel tables and trays. This RTU formula requires no special handling or storage requirements.

Specifications

- Part Number: ZT-EBNF-RTU-032OZ-00
- Type: Ready To Use
- Size: 32 oz

Product Price: 750

Product Stock: 70

[BUY NOW](#)



Greenhouse Floor and Wall Wash

Our plant-based Greenhouse Floor & Wall Wash cleans and removes mold, algae, dirt and grime from concrete, acrylic, aluminum, glass, and stainless steel. This product works best when applied at full strength and is safe to use around plants, animals, and children. There are no toxic chemicals, bleach or any ingredients on the Proposition 65 list.

Specifications

- Part Number: ZT-GFWW-RTU-032OZ-00
- Type: Ready To Use
- Size: 32 oz

Product Price: 950

Product Stock: 70

[BUY NOW](#)



Clean the Green

Biodegradable, Safe for Plants & Livestock, Plant-Based Formula, Will Not Harm Plants, Won't Etch Surface, No Harsh Odor / No VOC's, No Phosphates or Chlorine, No Special Handling or Storage, No Toxic Chemicals or Bleach, Non-Corrosive and Non-Flammable.

Product Price: 1150

Product Stock: 70

[BUY NOW](#)

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8.5.4) MATERIALS – COIR

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Coconut Coir

RIOCOCO PCM Open Top Grow Bags are produced with a special blend of coconut fiber raw materials, which provides the ideal substrate characteristics to the plants. The selected raw materials are five times washed, blended without fine dust particles to make PCM bags for the required sizes. This Coir Open Top Grow Bag is specially designed to reach the optimum water holding capacity (WHC) and air-filled porosity (AFP).

Specifications

- Part Number: PCM-OTB-01
- Media: Coir
- Type: Grow Bag - Open Top
- Size: 1 Gallon

Product Price: 2000

Product Stock: 30

[BUY NOW](#)

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8.6) AVAILABLE MACHINES

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Hydroponic Air Pumps

Recirculating water & air pump designed with time proven magnetic drive technology for submersible or in-line use. Oil-free and energy efficient.

Specifications:

- Part Number: 40123
- Type: Submersible / Inline
- Flow Rate: 350 GPH
- Shut-Off Head: 10.5'
- PSI: 4.76

Product Price: 3500

Product Stock: 45

[BUY NOW](#)



Mobile Vertical Growing Racks

Mobile Vertical Grow Systems (racks) optimize indoor farming and growing facilities to make the most use of space, return a high yield harvest, ensure employee safety, and streamline processes. Every aisle is a missed opportunity to grow more. Our Vertical Mobile Racking Systems can exponentially increase your space by allowing growing racks to slide together on galvanized aluminium tracks mounted on top of existing concrete floors.

Specifications:

Aluminium Track with stainless steel bearing rails measures 6W x 1/2H. It is tapered on both sides. Forklifts, carts, manlifts, etc. easily roll over the track. Tracks mount on top of concrete Carriage manufactured of anti-corrosive stainless steel and aluminium Grow Racks manufactured of heavy-duty grade racking with a maximum 24 height in one piece. Rated for 20 pounds square foot growing area (upgraded material available for higher weight ratings)

Product Price: 19000

Product Stock: 25

[BUY NOW](#)



Expanded Metal Benchtop Panels

Expanded Metal Benchtop Panels are manufactured of 14 gauge hot-dipped galvanized steel to prevent rust and corrosion. The expanded metal tops are hot dip galvanized AFTER being expanded for a longer life. All expanded metal panels are custom manufactured with a diamond opening design. Depending on bench load and size, a stronger gauge steel may be required.

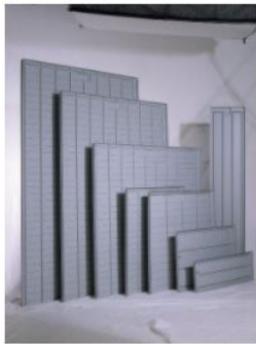
Specifications:

- Application: Agriculture Planting
- Length: Max 30 m
- Width: Max 2.5m
- Material: galvanized

Product Price: 800

Product Stock: 50

[BUY NOW](#)



EBB-N-FLOW Trays

An Ebb and Flow Tray (also known as a Flood and Drain Tray) is an economical way to conserve water. Whether using the Ebb and Flow trays in a true Ebb and Flow Table System or as a catch basin for a drip irrigation system to collect runoff for drainage and humidity control, our standard width Ebb and Flow Trays are easily inserted into your current grow table. The Flood and Drain Tray typically holds about $\frac{1}{2}$ gallon of water per square foot and can be filled with a maximum water depth of 1 inch.

Specifications:

- Application: Vegetable Fruits Flowers
- Length: Customized
- Width: 4ft, 5ft, 5.5ft

Product Price: 900

Product Stock: 50

[BUY NOW](#)



Multi-Tier Growing Benches

Multi-tier growing benches are typically found in propagation areas where cuttings (clones) are rooted, seedlings are grown and in Controlled Environmental Agriculture (CEA systems) growing crops such as herbs, leafy greens and micro-greens. It is an easy way to double your growing space and increase your production yield. The bottom of each tiered shelf provides a sturdy location for mounting grow lights.

Specifications:

- Application: propagating seedling and growing
- Frame Material: Aluminium Alloy
- Stand Material: Hot Dip Galvanized
- Inside height: 7.5cm

Product Price: 3250

Product Stock: 10

[BUY NOW](#)



NFT Kits

NFT Kits are an easy way to quickly get your NFT Hydroponic System Design up and running. Our kit includes everything you need except lighting. LED grow lights and HPS grow lights are sold separately. Our NFT Kits (nutrient film technique) comprise material to fit a 30 x 96 hydroponic system for lettuce, herb or other small leafy greens. Our NFT Kit includes all freight charges and is delivered directly to your door.

Specifications

- Part Number: NFTKit30x96
- 10' PVC Gutters: 348
- Freestanding Bench Legs and Support Bars: 4
- Drain Gutters/Fittings: 2
- Tank Size: 1,000 gal
- Float Switches: 1
- Acid / Fertilizer Injectors: 1
- Stainless-Steel Sump Pumps and Pits: 2

Product Price: 25000

Product Stock: 15

[BUY NOW](#)

Hydroponic Water Pump

Designed for submersible or in-line use and is suitable for Ebb & Flow (Flood and Drain) applications. Adjustable flow control if used submersed. Oil-Free and energy efficient.

Specifications:

- Part Number: 40327
- Type: Submersible / Inline
- Flow Rate: 400 GPH
- Shut-Off Head: 8.5'
- PSI: 3.859

Product Price: 2800

Product Stock: 25

[BUY NOW](#)

EBB-N-FLOW Benches

Inspired by nature, flood benches (also referred to as flood and drain systems, ebb and flow benches or sub-irrigation systems) mean no water logging and no dry periods. Are you interested in saving water, reducing your labour costs while improving your crop quality? Flood Benches are the answer. Water is applied to the bottoms of the plants and allowed to travel upwards to the roots and stems through capillary action.

Specifications:

- Application: Greenhouse for seed, flower
- Standard width: 1.60m or 1.76m
- Length: 36mm-2440mm
- Inside height: 5mm

Product Price: 3000

Product Stock: 20

[BUY NOW](#)

Rolling Greenhouse Benches

Rolling greenhouse benches remove non-efficient aisle ways and are designed so the table tops easily move to one side or the other creating access aisles when and where they are needed. Rolling benches increase growing space up to 30% by requiring only one 20 to 24 aisle in a bay. Its all about optimizing grow space for optimal crop yield.

Specifications:

- Application: propagating seedling and growing
- Length: adjustable
- Standard width: 1.22m, 0.9m
- Inside height: 7.5cm

Product Price: 2500

Product Stock: 20

[BUY NOW](#)

8.7) SHOPPING CART

The screenshot shows a shopping cart interface with the following details:

	Price	Quantity	Total
EBB-N-FLOW Trays	Rs 900	2	Rs 900
Hydroponic Air Pumps	Rs 3500	1	Rs 3500
EBB-N-FLOW Table/Tray Cleaner	Rs 750	1	Rs 750
Subtotal			Rs 5150.00
Tax (5%)			Rs 257.50
Shipping			Rs 15.00
Grand Total			Rs 5422.50

Proceed

8.8) MACHINE DEMO

The screenshot shows a "Machine Demo Request" form:

Demo Request Fill Up Form

DEMO REQUEST DATE: 2020/11/29

PHONE *: Enter Phone-Number

ADDRESS *: Enter Address

SELECT MACHINE: Select

SUBMIT

8.9) RENTING

The screenshot shows the 'RENT SERVICES' page. At the top, there's a navigation bar with links for HOME, OUR ARTICLE, MATERIALS, AVAILABLE MACHINES, MACHINE DEMO, RENTING (which is highlighted in red), CONTACT, a shopping cart icon with '0', BE A MEMBER, and LOGIN.

The main content area features a large button labeled 'RENT SERVICES'. Below it is a form titled 'Rent Request Fill Up Form' with fields for RENT DATE (set to 2020/11/29), PHONE (with placeholder 'Enter Phone-Number'), ADDRESS (with placeholder 'Enter Address'), and SELECT MACHINE NAME (a dropdown menu currently showing 'Select'). A red 'SUBMIT' button is at the bottom of the form.

8.10) CONTACT US

The screenshot shows the 'Contact Us' page. The top navigation bar is identical to the one in the previous section.

The main area has input fields for Name and Email, a larger text area for Comment, and a red 'Send' button.

Below this, there are three sections: 'CALL US ON' (with phone numbers +91 9711111111 and 020-6532891), 'ADDRESS' (listing Flat no .502 ,Sopan Complex, Ingale colony, Shivane, Pune, Maharashtra-India, 411023), and 'EMAIL' (with emails dk.8121@rediffmail.com and info@eagri.com).

A map of Pune is displayed, showing the location of 'VERTICAL GARDEN' with a red marker. The map includes labels for various towns and roads like Hinjawadi, Kothrud, Viman Nagar, and several smaller settlements.

At the bottom, there's a footer bar with the text 'Copyright © VertiFarmPortalIndia'.

8.11.1) MY PROFILE PAGE

HOME OUR ARTICLE MATERIALS AVAILABLE MACHINES MACHINE DEMO RENTING CONTACT   MY ACCOUNT 

Welcome Himank Jain

 MY PROFILE  RENT REQUEST  DEMO REQUEST  MY ORDERS


himankvijain@gmail.com

PERSONAL DETAILS

 Himank Jain
 7709891188
 male
 Flat no A-603 Shiva Heights-2 Pimple Saudagar
Pune
Maharashtra
411027

[Update Profile](#)

8.11.2) RENT RECORD

HOME OUR ARTICLE MATERIALS AVAILABLE MACHINES MACHINE DEMO RENTING CONTACT   MY ACCOUNT 

Welcome Himank Jain

 MY PROFILE  RENT REQUEST  DEMO REQUEST  MY ORDERS

RENT INFORMATION

Show 10 entries

Rent Date	Phone	Address	Machine Name
2020-11-30	7709891188	Flat no A-603 Shiva Heights Phase 2 Pimple Saudagar	EBB-N-FLOW Benches

Showing 1 to 1 of 1 entries

[Previous](#) [1](#) [Next](#)

8.11.3) DEMO RECORD

Welcome Himank Jain

 MY PROFILE  RENT REQUEST  DEMO REQUEST  MY ORDERS

DEMO REQUEST INFORMATION

Show 10 entries

Machine Name	Demo Request Date	Phone	Address
Rolling Greenhouse Benches	2020-11-30	7709891188	A-603 Shiva Heights Phase 2 Pimple Saudagar

Showing 1 to 1 of 1 entries

[Previous](#) [1](#) [Next](#)

8.11.4) MY ORDERS

Vertifarm

HOME OUR ARTICLE MATERIALS AVAILABLE MACHINES MACHINE DEMO RENTING CONTACT 0 MY ACCOUNT LOGOUT

Welcome Himank Jain

MY PROFILE RENT REQUEST DEMO REQUEST MY ORDERS

ORDER INFORMATION						
Show 10 entries			Search:			
Order Date	Phone	Address	Product	Quantity	Total Price	Cancel Order
2020-11-30	7709891188	Shiva Heights 2 Pimple Saudagar	Coconut Coir	1	2000.0	x
2020-11-30	7709891188	Shiva Heights 2 Pimple Saudagar	Hydroponic Air Pumps	1	3500.0	x

Showing 1 to 2 of 2 entries

Previous 1 Next

8.12.1) ORDER DETAILS FILL UP FORM

Vertifarm

HOME OUR ARTICLE MATERIALS AVAILABLE MACHINES MACHINE DEMO RENTING CONTACT 1 MY ACCOUNT LOGOUT

Order Information Form

ORDER DATE	2020/11/30
PHONE *	Enter Phone-Number
ADDRESS *	Enter Address
MODE OF PAYMENT	Credit/Debit Card

SUBMIT

8.12.2) ORDER CONFIRMATION

Vertifarm

HOME OUR ARTCILE MATERIALS AVAILABLE MACHINES MACHINE DEMO RENTING CONTACT 0 MY ACCOUNT LOGOUT

CONGRATULATIONS!!

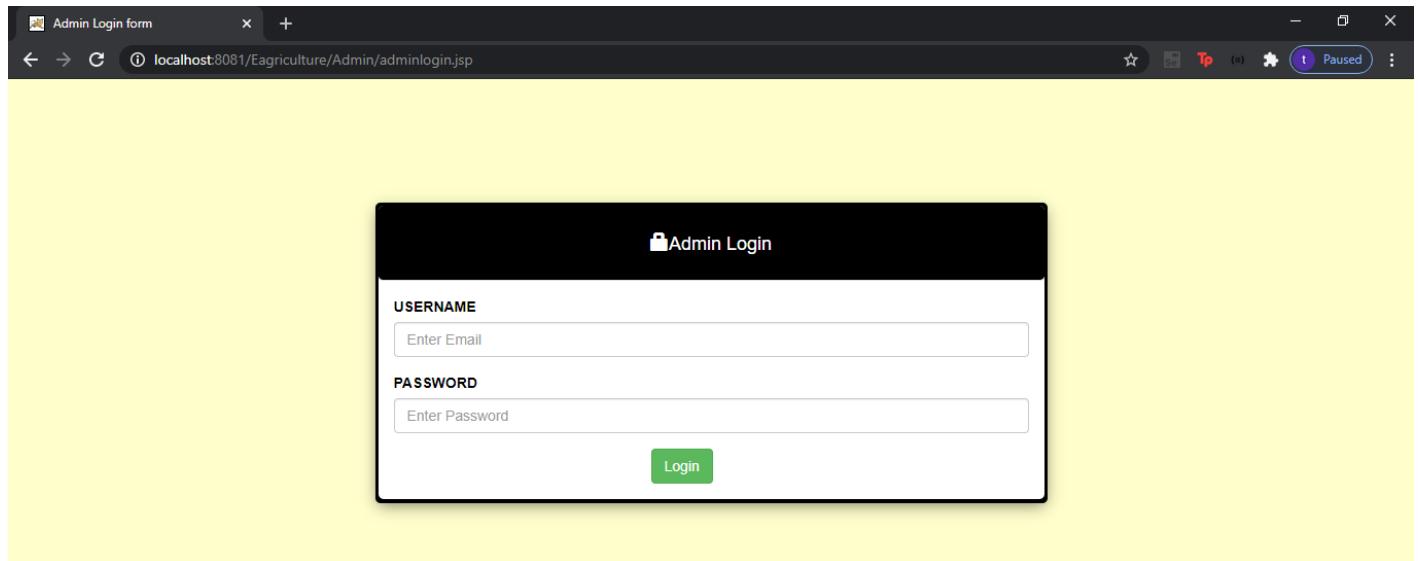
Your Order Has Been Placed

Order Details

ORDER DATE: Nov 30, 2020
GRAND TOTAL: Rs 5790.0
ESTIMATED DELIVERY DATE: Dec 10, 2020
YOU CAN CANCEL THE ORDER BY: Dec 5, 2020

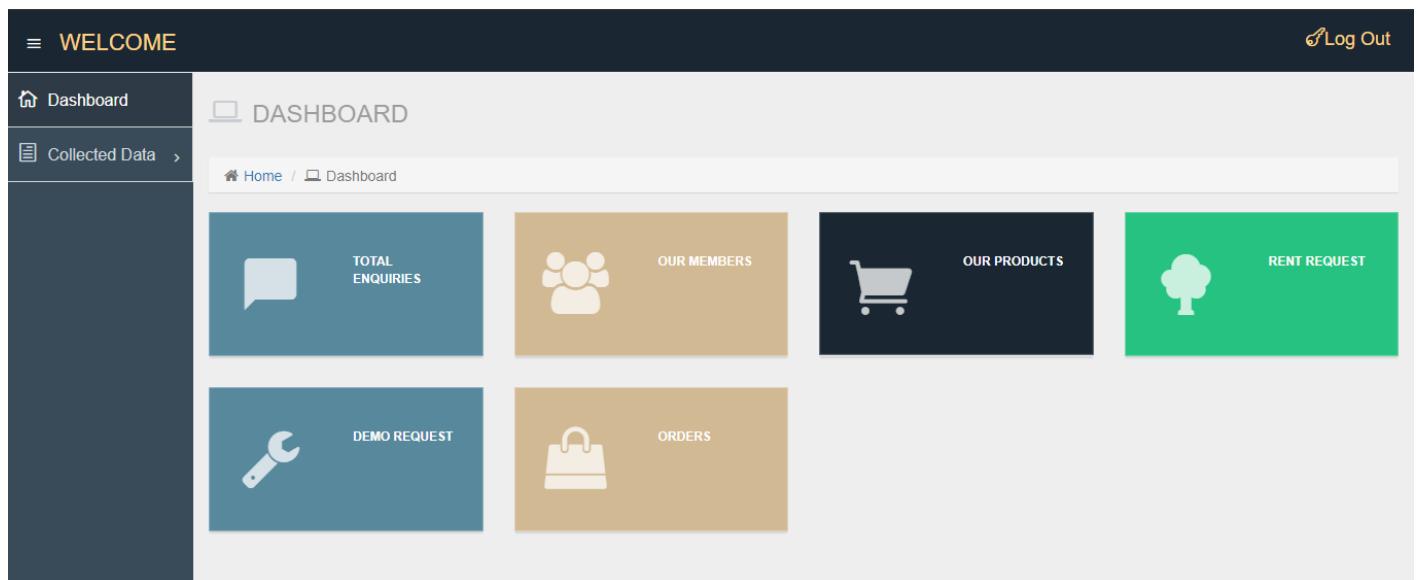
[CONTINUE SHOPPING](#)

8.13.1) ADMIN LOGIN



A screenshot of a web browser showing the 'Admin Login form' at localhost:8081/Eagriculture/Admin/adminlogin.jsp. The page has a black header bar with the title 'Admin Login'. Below it is a white login form with a black border. The form contains two input fields: 'USERNAME' with placeholder 'Enter Email' and 'PASSWORD' with placeholder 'Enter Password'. A green 'Login' button is centered below the inputs.

8.13.2) ADMIN PANEL



A screenshot of the Admin Panel dashboard. The top navigation bar includes a 'WELCOME' section, a 'Log Out' link, and a sidebar with 'Dashboard' and 'Collected Data' options. The main content area is titled 'DASHBOARD' and shows a breadcrumb path from 'Home' to 'Dashboard'. It features six cards arranged in a grid: 'TOTAL ENQUIRIES' (blue card), 'OUR MEMBERS' (tan card), 'OUR PRODUCTS' (dark blue card), 'RENT REQUEST' (green card), 'DEMO REQUEST' (blue card), and 'ORDERS' (tan card).

9. TESTCASES AND TESTING TECHNIQUES

9.1) TESTCASES

9.1.1) NAVIGATION LINKS TESTCASES

Test case Id	Objective	Input Data	Expected Result	Actual Result	Status
T1	To test functionality of Home page link.	Click on the link	Opens the Home page	Home page is opened	PASS
T2	To test functionality of 'Our Articles' page link.	Click on the link	Opens the 'Our Articles' page	Crop page is opened	PASS
T3	To test functionality of Material page link.	Click on the link	Opens the Materials page	Material page is opened	PASS
T4	To test functionality of Machine page link.	Click on the link	Opens the Machine page	Machine page is opened	PASS
T5	To test functionality of Machine Demo page link.	Click on the link	Opens the Machine Demo page	Machine Demo page is opened	PASS
T6	To test functionality of Machine Rent page link.	Click on	Opens the Machine Rent page	Machine Rent page is opened	PASS

		the link			
T7	To test functionality of Contact page link.	Click on the link	Opens the Contact page	Contact page is opened	PASS
T8	To test functionality of Cart page link.	Click on the link	Opens the Cart page	Cart page is opened	PASS
T9	To test functionality of Login page link.	Click on the link	Opens the Login page	Login page is opened	PASS
T10	To test functionality Registration page.	Click on the link	Opens the Registration page	Registration page is opened	PASS

9.1.2) USER REGISTRATION TESTCASES

Test case Id	Objective	Input Data	Expected Result	Actual Result	Status
T1	To test functionality of Registration page link.	Click on the Registration link	Opens the Register page	Register page is opened	PASS
T2	To test functionality of Submit button	Username: blank Email: blank Password: blank Mobile: blank Gender: blank State: blank City: blank Pin code: blank	User could not Register	User could not Register	PASS

T3	To test functionality of Submit button.	Username: Manoj Agarwal Email: blank Password: blank Mobile: blank Gender: blank State: blank City: blank Pin code: blank	User could not Register	User could not Register	PASS
T4	To test functionality of Submit button.	Username: Manoj Agarwal Email: manojaA Password: blank Mobile: blank Gender: blank State: blank City: blank Pin code: blank	User could not Register	User could not Register	PASS
T5	To test functionality of Submit button	Username: Manoj Agarwal Email: manojaA@ Password: blank Mobile: blank Gender: blank State: blank City: blank Pin code: blank	User could not Register	User could not Register	PASS
T6	To test functionality of Submit button	Username: Manoj Agarwal Email: manoja@gmail Password: blank Mobile: blank Gender: blank State: blank City: blank Pin code: blank	User could not Register	User could not Register	PASS
T7	To test functionality of Submit button	Username: Manoj Agarwal Email: manojA@gmail. Password: blank Mobile: blank Gender: blank State: blank City: blank Pin code: blank	User could not Register	User could not Register	PASS
	To test functionality of	Username: Manoj Agarwal Email:	User could not Register	User could not Register	PASS

T8	Submit button	manojA@gmail.com Password: manoj123 Mobile: blank Gender: blank State: blank City: blank Pin code: blank			
T9	To test functionality of Submit button	Username: Manoj Agarwal Email: manojA@gmail.com Password: manoj123 Mobile: 6512125 Gender: blank State: blank City: blank Pin code: blank	User could not Register	User could not Register	PASS
T10	To test functionality of Submit button	Username: Manoj Agarwal Email: manojA@gmail.com Password: manoj123 Mobile: 7757012160 Gender: blank State: blank City: blank Pin code: blank	User could not Register	User could not Register	PASS
T11	To test functionality of Submit button	Username: Manoj Agarwal Email: manojA@gmail.com Password: manoj123 Mobile: 7757012160 Gender: male State: blank City: blank Pin code: blank	User could not Register	User could not Register	PASS
T12	To test functionality of Submit button	Username: Manoj Agarwal Email: manojA@gmail.com Password: manoj123 Mobile: 7757012160 Gender: male State: Maharashtra City: blank Pin code: blank	User could not Register	User could not Register	PASS

T13	To test functionality of Submit button	Username: Manoj Agarwal Email: manojA@gmail.com Password: manoj123 Mobile: 7757012160 Gender: male State: Maharashtra City: Pune Pin code: blank	User could not Register	User could not Register	PASS
T14	To test functionality of Submit button	Username: Manoj Agarwal Email: manojA@gmail.com Password: manoj123 Mobile: 7757012160 Gender: male State: Maharashtra City: Pune Pin code: 411027	User could Register	User could Register	PASS

9.1.3) USER LOGIN TESTCASES

Test case Id	Objective	Input Data	Expected Result	Actual Result	Status
T1	To test functionality of Login page link.	Click on the link	Opens the Login page	Login page is opened	PASS
T2	To test functionality of Login button	Username: blank Password: blank	Displays Login Error	Login Error Displayed	PASS
T3	To test functionality of Login button.	Username: aahh@gmail.com Password: aaa	Displays Login Error	Login Error Displayed	PASS
T4	To test functionality of Login button.	Username: manojA@gmail.com Password: blank	Displays Login Error	Login Error Displayed	PASS
T5	To test functionality of Login button	Username: blank Password: manoj123	Displays Login Error	Login Error Displayed	PASS
T6	To test functionality of Login button	Username: manojA@gmail.com Password: manoj123	Login is Successful	Login is Success	PASS

9.1.4) UPDATE PROFILE TEST CASES

Test case Id	Objective	Input Data	Expected Result	Actual Result	Status
T1	To test functionality of My Account link.	Click on the link	Opens the profile tab	Profile tab is opened	PASS
T2	To test functionality of Rent request tab	Click on the tab	Opens the Rent request tab	Rent request tab is opened	PASS
T3	To test functionality of Demo request tab	Click on the tab	Opens the demo request tab	Demo request tab is opened	PASS
T4	To test functionality of Orders tab	Click on the tab	Opens the orders tab	Order tab is opened	PASS
T5	To test functionality of Update Profile button	Click on the Update Profile button	Opens the update profile page	Update Profile page is opened	PASS
T6	To test functionality Update Record in update profile page	Click on the Update Record button	Updations are performed	Records are updated successfully	PASS
T7	To test functionality of Update Password button	Click on the Update Password button	Opens the update password page	Update Password page is opened	PASS
T8	To test functionality Change Password in update password page	Current Password:Manoj12 New Password: ---- Confirm Password: ----	Password not changed	Password not changed	PASS
T9	To test functionality Change Password in update password page	Current Password: Manoj12 New Password: Manoj123 Confirm Password: Manoj1	Password not changed	Password not changed	PASS
T10	To test functionality Change Password in update password page	Current Password: Manoj12 New Password: Manoj123 Confirm Password: Manoj123	Password changed	Password changed successfully	PASS

T11	To test functionality of cancel order button within 5 days of order.	Click on the Cancel Order Button	Order is cancelled	Order is cancelled	PASS
T12	To test functionality of cancel order button after 5 days of order.	Click on the Cancel Order Button	Order cannot be cancelled	Order is not cancelled	PASS

9.1.5) ARTICLES AND VIDEOS TEST CASES

Test case Id	Objective	Input Data	Expected Result	Actual Result	Status
T1	To check the validity of “Why Vertical Farms?” Article	Click on the link	Opens the Article with heading “Why Vertical Farms?” and its corresponding content	Article with heading “Why Vertical Farms?” and its corresponding content is opened	PASS
T2	To check the validity of “Hydroponic Farming” Article	Click on the link	Opens the Article with heading “Hydroponic Farming” and its corresponding content	Article with heading “Hydroponic Farming” and its corresponding content is opened	PASS
T3	To check the validity of “Aeroponic Farming” Article	Click on the link	Opens the Article with heading “Aeroponic Farming” and its corresponding content	Article with heading “Aeroponic Farming” and its corresponding content is opened	PASS
T4	To check the validity of “Aquaponic Farming” Article	Click on the link	Opens the Article with heading “Aquaponic Farming” and its corresponding content	Article with heading “Aquaponic Farming” and its corresponding content is opened	PASS
T5	To test the functionality of ‘Videos’ page link	Click on the link	Open a page containing all the vertical farming videos	Page containing all the links to vertical farming videos is opened	PASS
T6	To test functionality of a video	Click on the play button of the video	Opens and starts playing the video	The video is opened and starts playing	PASS

9.1.6) PRODUCT ADD/PURCHASE TEST CASES

Test case Id	Objective	Input Data	Expected Result	Actual Result	Status
T1	To test functionality of Buy Now Button if product is in stock.	Click on the Buy now Button	Product in stock added to cart	Product in stock added to cart Successfully	PASS
T2	To test functionality of Buy Now Button if product is out of stock.	Click on the Buy now Button	Product is not added to cart and error message displays on screen	Product is not added to cart and error message is displayed	PASS
T3	To test functionality of Cart Button	Click on Cart Button	Cart page open successful	Cart page open successful	PASS
T4	To test function of update quantity button.	Click on the update quantity button on cart page.	Quantity updated Successfully	Quantity updated Successfully	PASS
T5	To test function of delete product button.	Click on the delete quantity button on cart page.	Product deleted Successfully	Product deleted Successfully	PASS
T6	To test functionality of checkout button after login.	Click on Checkout button	Goes to order details fill up form	Goes to order details fill up form	PASS
T7	To test functionality of checkout button before login	Click on Checkout button	Goes to login page	Login page is opened	PASS
T8	To test functionality of submit button in order fill up form.	Click on submit button in order fill up form.	Order is placed Successfully	Order is placed Successfully	PASS
T9	To test functionality of cancel order button after 5 days of placing order	Click on cancel order button after 5 days of placing order	Order Could not be cancelled	Order Could not be cancelled	PASS
T10	To test functionality of cancel order button before 5 days of placing order	Click on cancel order button before 5 days of placing order	Order Cancelled successfully	Order Cancelled successfully	PASS

9.1.7) RENT SERVICES TESTCASES

Test case Id	Objective	Input Data	Expected Result	Actual Result	Status
T1	To test functionality of Rent Services page link.	Click on the Rent Services link	Opens the Rent Services page and displays a form	Rent Services page is opened and form is displayed	PASS
T2	To test validity of “Rent Date” displayed in the form.	Current Date on the user’s machine	Displays Current date under Rent Date column	Current Date is displayed under Rent Date column	PASS
T3	To test functionality of drop-down menu under “Select Machine Name”.	Click on the drop-down arrow under “Select Machine Name”	Opens a menu with names of machines for selection.	A menu with names of machines for selection is opened.	PASS
T4	To test functionality of Submit button.	Rent Date: #Current Date Phone: blank Address: blank Select Machine Name: blank	User could not submit rent request	User could not submit rent request	PASS
T5	To test functionality of Submit button.	Rent Date: #Current Date Phone: 6512125 Address: blank Select Machine Name: blank	User could not submit rent request	User could not submit rent request	PASS
T6	To test functionality of Submit button.	Rent Date: #Current Date Phone: 7757012160 Address: blank Select Machine Name: blank	User could not submit rent request	User could not submit rent request	PASS
T7	To test functionality of Submit button.	Rent Date: #Current Date Phone: 7757012160 Address: 22 nd Street, Vasant-Vihar, Delhi Select Machine Name: blank	User could not submit rent request	User could not submit rent request	PASS

T8	To test functionality of Submit button.	Rent Date: #Current Date Phone: 7757012160 Address: 22 nd Street, Vasant-Vihar, Delhi Select Machine Name: Hydroponic air pump/ Mobile vertical growing racks/ Expanded metal benchtop panel/ Ebb-n-flow trays/ Multi-tier growing bench/ NFT kit/ Hydroponic water pump/ Ebb-n-flow bench/ Rolling greenhouse benches	User could submit rent request	User could submit rent request	PASS
----	---	---	--------------------------------	--------------------------------	------

9.1.8) MACHINE DEMO REQUEST TESTCASES

Test case Id	Objective	Input Data	Expected Result	Actual Result	Status
T1	To test functionality of Machine Demo Request page link.	Click on the Machine Demo Request link	Opens the Machine Demo Request page and displays a form	Machine Demo Request page is opened and form is displayed	PASS
T2	To test validity of “Demo Request Date” displayed in the form.	Current Date on the user’s machine	Displays Current date under Demo Request Date column	Current Date is displayed under Demo Request Date column	PASS
T3	To test functionality of drop-down menu under “Select Machine”.	Click on the drop-down arrow under “Select Machine”	Opens a menu with names of machines for selection.	A menu with names of machines for selection is opened.	PASS
T4	To test functionality of Submit button.	Rent Date: #Current Date Phone: blank Address: blank Select Machine: blank	User could not submit machine demo request	User could not submit machine demo request	PASS

T5	To test functionality of Submit button.	Rent Date: #Current Date Phone: 6512125 Address: blank Select Machine: blank	User could not submit machine demo request	User could not submit machine demo request	PASS
T6	To test functionality of Submit button.	Rent Date: #Current Date Phone: 7757012160 Address: blank Select Machine: blank	User could not submit machine demo request	User could not submit machine demo request	PASS
T7	To test functionality of Submit button.	Rent Date: #Current Date Phone: 7757012160 Address: 22 nd Street, Vasant-Vihar, Delhi Select Machine: blank	User could not submit machine demo request	User could not submit machine demo request	PASS
T8	To test functionality of Submit button.	Rent Date: #Current Date Phone: 7757012160 Address: 22 nd Street, Vasant-Vihar, Delhi Select Machine: Hydroponic air pump/ Mobile vertical growing racks/ Expanded metal benchtop panel/ Ebb-n-flow trays/ Multi-tier growing bench/ NFT kit/ Hydroponic water pump/ Ebb-n-flow bench/ Rolling greenhouse benches	User could submit machine demo request	User could submit machine demo request	PASS

9.1.9) FEEDBACK TESTCASES

Test case Id	Objective	Input Data	Expected Result	Actual Result	Status
T1	To test functionality of Contact page link.	Click on the Contact us link	Opens the Contact us page and displays a form with contact details	contact page is opened and form and contact details are displayed	PASS
T2	To test validity of contact details displayed on Contact page.	Click on the Contact link	Displays valid contact details including phone no., address, email and a location map.	Valid contact details including phone no, address, email and location map are displayed	PASS
T3	To test functionality of Send button.	Name: blank Email: blank Comment: blank	User could not send feedback	User could not send feedback	PASS
T4	To test functionality of Send button.	Name: Manoj Agarwal Email: blank Comment: blank	User could not send feedback	User could not send feedback	PASS
T5	To test functionality of Send button.	Name: Manoj Agarwal Email: manojA Comment: blank	User could not send feedback	User could not send feedback	PASS
T6	To test functionality of Send button.	Name: Manoj Agarwal Email: manojA@ Comment: blank	User could not send feedback	User could not send feedback	PASS
T7	To test functionality of Send button.	Name: Manoj Agarwal Email: manojA@gmail Comment: blank	User could not send feedback	User could not send feedback	PASS
T8	To test functionality of Send button.	Name: Manoj Agarwal Email: manojA@gmail. Comment: blank	User could not send feedback	User could not send feedback	PASS

T9	To test functionality of Send button.	Name: Manoj Agarwal Email: manojA@gmail.com Comment: blank	User could not send feedback	User could not send feedback	PASS
T10	To test functionality of Send button.	Name: Manoj Agarwal Email: manojA@gmail.com Comment: #Comment e.g. Service was good, Machine works well.	User could send feedback	User could send feedback	PASS

9.1.10) ADMIN LOGIN TEST CASES

Test case Id	Objective	Input Data	Expected Result	Actual Result	Status
T1	To test functionality of Login button	Id: blank Password: blank	Login error	Login error	PASS
T2	To test functionality of Login button.	Username: admin@gmail.com Password: blank	Login error	Login error	PASS
T3	To test functionality of Login button	Username: blank Password: admin	Login error	Login error	PASS
T4	To test functionality of Login button	Username: admin@gmail.com Password: admin	Login is successful	Login is successful	PASS

9.2) TESTING TECHNIQUES USED

9.2.1. BOUNDARY VALUE ANALYSIS TESTING:

It is used to find the errors at boundaries of input domain rather than finding those errors in the center of input. We used this testing to test the condition for phone numbers and pin code. A phone number should be of only 10 digits not less than that and not more than 10 digits. Similarly, the pin code must be of 6 digits only.

9.2.2. FUNCTIONAL TESTING:

This testing is used for checking all the links of the web pages. It also checks all the validations on each field. In this project, we checked whether all the links are properly redirected and also checked that the validation on each field are properly executed. I had performed validations in registration, demo request, soil test, order details forms.

9.2.3. CONTROL FLOW TESTING:

This testing is used to ensure that the flow of the project is correct. I used this testing to ensure that the flow of my project is correct. For this we performed all the functions from registration to purchasing of product.

9.2.4. DECISION TABLE TESTING:

Decision table testing is a testing technique used to test system behavior for different input combinations. This is a systematic approach where the different input combinations and their corresponding system behavior (Outputs) are captured in a tabular form. We performed this testing for all the modules of this project where we noted down the input, expected result and the actual outcome in tabular form.

9.2.5. USABILITY TESTING:

This testing checks the navigation and user friendliness of the web pages. Through this testing it is ensured whether the content is properly checked and is easily understandable to the users. In my project, we tested whether all the buttons and menu dropdowns are working properly. We also checked the content for grammatical errors, fonts, full stop etc. and also checked that the user finds the required pages easily.

9.2.6. DATABASE TESTING:

In this testing we ensured that the data integrity is maintained while creating, updating, deleting data in database. We also checked that the data retrieved from database is shown accurately on pages.

9.2.7. SECURITY TESTING:

In this we tested the security of the website that is the pages should not open if the user is not logged in. Some Internal pages should not open by pasting internal URL directly into browser address bar without login. Login should not happen with incorrect username or password and proper error messages should be displayed to the user.

10. CODING DETAILS

The coding of entire project is divided into 2 parts: -

- Frontend development which consists of HTML, CSS and JSP files
- Backend development which consists of JAVA file made of hibernate code
-

10.1) FRONTEND CODE DETAILS

The most important file in frontend code is the index.jsp file which is the project interface.

```
<!DOCTYPE html>
<%@page import="modal.GlobalMap"%>
<%@page import="com.pojo.Producttype"%>
<%@page import="java.util.List"%>
<%@page import="modal.BLManger"%>
```

The above code signifies the necessary imports which are used in most of the JSP files that make up the project. These imports are used by JSP to provide the user the desired content. These are backend files which will be discussed in backend code details section.

- 1.) GlobalMap – Used to add product to cart and get necessary details in our cart
- 2.) Producttype – Used to retrieve or assign an id or value to a product category
- 3.) List – All the products which are displayed on webpages are stored in a list
- 4.) BLManager – Main code where we check if user details are valid or not. Also, transaction creation is done here.

```

<link href="https://fonts.googleapis.com/css?family=Bree+Serif" rel="stylesheet">
<style type="text/css">
  <%@include file="css/style.css" %>
</style>

<meta charset="utf-8">
<meta name="viewport" content="width=device-width, initial-scale=1">
<link rel="stylesheet" href="https://cdnjs.cloudflare.com/ajax/libs/font-awesome/4.7.0/css/font-awesome.min.css">
<link rel="stylesheet" href="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/css/bootstrap.min.css">
<script src="https://ajax.googleapis.com/ajax/libs/jquery/3.3.1/jquery.min.js"></script>
<script src="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/js/bootstrap.min.js"></script>

```

In the above lines of code, we are linking required CSS, bootstrap and jQuery files required for better display of our content on the website. Also, we are specifying the encoding we are using i.e. UTF-8

```

<nav class="navbar navbar-inverse navbar-fixed-top">
<div class="container-fluid">
<div class="navbar-header">
<button type="button" class="navbar-toggle" data-toggle="collapse" data-target="#myNavbar">
<span class="icon-bar"></span>
<span class="icon-bar"></span>
<span class="icon-bar"></span>
</button>

<a class="navbar-brand navbar1"></a>
</div>
<div class="collapse navbar-collapse" id="myNavbar">
<ul class="nav navbar-nav">
<li class="active"><a class="link-1" href="index.jsp">HOME</a></li>

<li class="dropdown Link-1">
<a class="dropdown-toggle" data-toggle="dropdown" href="#">OUR ARTICLES<span class="caret"></span></a>
<ul class="dropdown-menu">
<li><a href="vfarm.jsp" class="dropdown1">WHY V-FARM</a></li>
<li><a href="hydroponics.jsp" class="dropdown1">HYDROPONICS</a></li>
<li><a href="aeroponics.jsp" class="dropdown1">AEROPONICS</a></li>
<li><a href="aquaponics.jsp" class="dropdown1">AQUAPONICS</a></li>
<li><a href="others.jsp" class="dropdown1">OTHER RELATED..</a></li>
<li><a href="videos.jsp" class="dropdown1">V-FARM VIDEOS</a></li>
</ul>
</li>

```

This part of code is visible on all the webpages as it represents our navbar. The list item ‘HOME’ is kept as active as it is the first page that opens when we run the project. Then we have another list item ‘OUR ARTICLES’ which is a drop down containing different articles all linked to their specific jsp files.

```

<li class="dropdown Link-1">
<a class="dropdown-toggle" data-toggle="dropdown" href="#">MATERIALS <span class="caret"></span></a>
<ul class="dropdown-menu">
<!-- <li><a href="" class="dropdown1">CHEMICALS</a></li> -->
<%for(int i=0;i<1;i++){ %>
<li><a class="link-1" href="DisplayProduct.jsp?id=<%list.get(i).getId() %>"><%list.get(i).getProducttype() %></a></li>
<%} %>
<!--<li><a href="ledandlamps.jsp" class="dropdown1">LED GROW LIGHTS AND LAMPS</a></li> -->
<%for(int i=1;i<2;i++){ %>
<li><a class="link-1" href="DisplayProduct.jsp?id=<%list.get(i).getId() %>"><%list.get(i).getProducttype() %></a></li>
<%} %>
<!--<li><a href="greenhouseplantsupport.jsp" class="dropdown1">GREENHOUSE PLANT SUPPORT</a></li> -->
<%for(int i=2;i<3;i++){ %>
<li><a class="link-1" href="DisplayProduct.jsp?id=<%list.get(i).getId() %>"><%list.get(i).getProducttype() %></a></li>
<%} %>
<!--<li><a href="coir.jsp" class="dropdown1">COIR</a></li> -->
<%for(int i=3;i<4;i++){ %>
<li><a class="link-1" href="DisplayProduct.jsp?id=<%list.get(i).getId() %>"><%list.get(i).getProducttype() %></a></li>
<%} %>

```

Our material list is divided into 4 categories – Chemicals, Led lights, Greenhouse plant support and Coir.

Each of these categories is associated with a particular ID in our database and each product of these categories is also associated with a unique ID. The above code retrieves data related to a particular product using its UNIQUE ID

```
><% String nm=(String)session.getAttribute("name");
if(nm==null)
{
%>
<li><a class="link-1" href="registration.jsp"><span class="glyphicon glyphicon-user"></span> BE A MEMBER</a></li>
<%}
else
{
%>
<li><a class="link-1" href="myaccount.jsp"><span class="glyphicon glyphicon-user"></span> MY ACCOUNT</a></li>
<%} %>

<% String name=(String)session.getAttribute("name");
if(name==null)
{
%>
<li><a class="link-1" href="Login.jsp"><span class="glyphicon glyphicon-log-in"></span> LOGIN</a></li>
<%}
else
{
%>
<li><a class="link-1" href="Logout"><span class="glyphicon glyphicon-log-in"></span> LOGOUT</a></li>
<%} %>
```

Now this part is used to identify if a user is logged in or not so that navbar is adjusted accordingly. If we identify a ‘name’ attribute, it means user is logged in and in the navbar user will see ‘MY ACCOUNT’ and ‘LOGOUT’. If user is not logged in, he/she will see ‘BE A MEMBER’ and ‘LOGIN’.

```
<!--*** FOOTER ***-->
<footer id="footer">
<div class="container-fluid footer1">
<div class="col-md-3 col-sm-6">
<h3 class="footer_title">SERVICES</h3>
<h4>
<a class="footer" href="index.jsp">Home</a><br>
<a class="footer" href="#">Our Articles</a><br>
<a class="footer" href="#">Materials</a><br>
<a class="footer" href="#">Machines</a><br>
<a class="footer" href="demo1.jsp">Demo</a><br>
<a class="footer" href="soiltest.jsp">Renting</a></h4>

<hr class="hidden-md hidden-lg hidden-sm">
</div>

<!-- /.col-md-3 -->

<div class="col-md-3 col-sm-6">
<h3 class="footer_title">OUR ARTICLE</h3>
<h4>
<a class="footer" href="vfarm.jsp">Why V-Farm</a><br>
<a class="footer" href="hydroponics.jsp">Hydroponics</a><br>
<a class="footer" href="aeroponics.jsp">Aeroponics</a><br>
<a class="footer" href="aquaponics.jsp">Aquaponics</a><br>
<a class="footer" href="others.jsp">Other Related</a><br>
<a class="footer" href="videos.jsp">V-Farm Videos</a>
</h4>
```

This part of code seems similar to our navbar but it is slightly different as it makes up the footer section of our Home Page. This part of code is only present on Home page.

OUR ARTICLE MODULE –

```
<div class="container-fluid" style="margin-top:-18px;">
<div class="row">
<div class="col-sm-4 img-responsive wheatimage1"><br />
<br /><br />

</div><br />

<div class="col-sm-8">
<h3 class="wheatheading1"><strong>What Is Vertical Farming?</strong> <span class="glyphicon glyphicon-grain"></span></h3>
<p class="wheatpara12">By 2050, the world population is expected to grow by another 2 billion people, and feeding it will be a huge challenge. Due to industrial development and urbanization, we are losing arable lands every day. Scientists say that the Earth has lost a third of its arable lands over the last 40 years. . . . .

```

All the CSS, bootstrap, jQuery files are copied directly along with code used for creating navbar. The above snippet of code shows how first section i.e. Why Vertical Farming of OUR ARTICLE is made. We can the use of `` tag for inserting images and `<p>` tag for inserting static data. This section of code is reused to build similar webpages that also belong to OUR ARTICLE i.e. Hydroponics, Aeroponics, Aquaponics etc.

VIDEOS

```
<center><h3 class="heading1"><strong> OUR COLLECTION </strong></h3></center>
<br><br>
<center><h4 class="heading1"><strong> This Farm of the Future Uses No Soil and 95% Less Water</strong></h4></center>
<center>
<iframe width="650" height="350" src="https://www.youtube.com/embed/-_tvJtUHnmU">
</iframe></center><br><br>
<center><h4 class="heading1"><strong> How to make a Vertical Hydroponic System</strong></h4></center>
<center>
<iframe width="650" height="350" src="https://www.youtube.com/embed/T55CbtJNr40">
</iframe></center><br><br>
```

The videos section of website also belongs to OUR ARTICLE; however, it consists of slightly different code. As seen in the code snippet, we use a `<iframe>` tag which consists of `src` attribute where we put the unique ID of the YouTube video we wish to display.

PRODUCTS

Now to display all the materials and machine we use one single code file which will retrieve the data required by user from the database.

```
BLManager bl=new BLManager();
int id=Integer.parseInt(request.getParameter("id"));
session.setAttribute("pid", id);
Producttype p=bl.getProductbyTypeID(id);
List<Product> prod=bl.getProductByType(p);
List<Producttype> list=bl.getAllProductType();
%
<%int size=GlobalMap.Cartvalue.size();%>
```

In above few lines of code we create a new transaction using object ‘bl’, and we generate a variable ‘id’ to get id’s of required product, after which we set ‘pid’ attribute as value of id. Producttype helps us get the category to which our product belongs to and two list below it consists of all product and product types. Again, we are using globalmap to store the size of total items which are going to be added in our shopping cart.

```

<%for(int i=0;i<prod.size();i++){ %>
<div class="container-fluid">
<div class="row">

<div class="col-sm-3"><br /><br />

</div>

<div class="col-sm-9"><br /><br />
<h3><strong><%=prod.get(i).getPname() %></strong></h3>
<p><%=prod.get(i).getDescription() %></p>
<p>Product Price: <%=prod.get(i).getPrice() %></p>
<%if(prod.get(i).getTotquantity()<1)
{%
<h2>Stock is not Available</h2>
%}
else
{ %
    <p>Product Stock: <%=prod.get(i).getTotquantity() %></p>
%}
%>
</div>

<br>
<div class="row">
<div class="col-sm-12">
<a href="AddToCart?id=<%=prod.get(i).getPid()%>" class="btn btn-danger">BUY NOW</a>
</div>

```

Here we use a for loop on prod list which contains products. We use getImage() method to display the image of product. Similarly, we use getPname(), getDescription(), getPrice() methods to display name, description and price of that particular product. We also use getTotquantity() methods to check available quantity of required product. If value of getTotquantity for a specific product is less than 1 then that product is considered out of stock. The product page also consists of a ‘buynow’ button next to each product and when clicked by user we will that unique ID of that product to our cart and size of cart is generated using globalmap.cartvalue.size() method.

RENTING / DEMO

```

Rent Request Fill Up Form</h4>
</div>

<div class="modal-body">
<form onsubmit="return valid()" action="SoilTest" method="post">

<div class="form-group">
<label for="farmer_date" style="color:black;">RENT DATE</label>
<%
Date date=new Date();
LocalDateTime now=LocalDateTime.now();
%>
<input type="text" class="form-control" id="farmer_date" name="soildate" readonly="readonly" value="<%= DateTimeFormatter.ofPattern("yyyy/MM/dd").format(date) %>">
</div>

<div class="form-group">
<label for="farmer_phone" style="color:black;">PHONE</label>
<b class="req_field" id="msg1">*</b>
<input type="text" class="form-control" placeholder="Enter Phone-Number" id="farmer_phone" name="phone"/>
</div>

<div class="form-group">
<label for="farmer_address" style="color:black;">ADDRESS</label>
<%
b class="req_field" id="msg2">*</b>
<textarea class="form-control" placeholder="Enter Address" id="farmer_address" name="address" rows="2"></textarea>
%>
</div>

```

This the code required to build rent form. The required fields are Date, Phone no., Address, Machine name. Using localDateTime.now() function the form automatically picks up the current date which is of the format YYYY/MM/DD. The validity of Phone no and address is checked using a valid function.

```

<div class="form-group">
  <label for="soiltype" style="color:black;">SELECT MACHINE NAME:</label>
  <select class="form-control" id="soiltype" name="soiltype">
    <option>Select</option>
    <option>Hydroponic Air Pump</option>
    <option>Mobile Vertical Growing Racks</option>
    <option>Expanded Metal Benchtop Panels</option>
    <option>EBB-N-FLOW Tray</option>
    <option>Multi-Tier Growing Benches</option>
    <option>NFT Kits</option>
    <option>Hydroponic Water Pump</option>
    <option>EBB-N-FLOW Benches</option>
    <option>Rolling Greenhouse Benches</option>
  </select>
</div>

```

Dropdown to select available machine names

```

function valid()
{
  var phone=document.getElementById("farmer_phone").value;
  if(phone=="" || phone==null || phone.length!=10 || isNaN(phone))
  {
    document.getElementById("msg1").innerHTML="Please Enter the 10 Digit Phone Number";
    return false;
  }
  else
  {
    document.getElementById("msg1").innerHTML="";
  }
  var address=document.getElementById("farmer_address").value;
  if(address=="" || address==null)
  {
    document.getElementById("msg2").innerHTML="Please Enter proper Address";
    return false;
  }
  else
  {
    document.getElementById("msg2").innerHTML="";
  }
}

```

Renting and Demo request are very similar as both these modules contain a form to be filled by user to generate requests. Hence both modules have similar code. There is a valid function which checks if phone number entered by user is valid or not. Phone number should not be null and its length should not be more than 10. Similarly, the address of a user in the form can't be null or else form can't be submitted.

The Demo module is similarly built and hence the code is reused.

LOGIN

```
<div class="form-group">
<label for="Login_name" style="color:black;">USERNAME</label>
<div class="input-group">
<span class="input-group-addon">
<span class="glyphicon glyphicon-user wfont"></span></span>
<input type="email" class="form-control" placeholder="Enter Username" name="email"/>
</div></div>

<div class="form-group">
<label for="Login_password" style="color:black;">PASSWORD</label>
<div class="input-group">
<span class="input-group-addon">
<span class="glyphicon glyphicon-lock wfont"></span></span>
<input type="password" class="form-control" placeholder="Enter Password" name="password"/>
</div></div>

</div>
<div class="modal-footer">
<button type="submit" class="btn btn-success pull-left" data-dismiss="modal">
<span class="glyphicon glyphicon-log-in"></span> LogIn</button>
<a class="ab" href="registration.jsp">NEW USER</a>
</div>
```

For login, user needs registered email-id and password. When user enters the details, it is checked against the database and if entered details are correct, user is logged in. For new users, click on ‘NEW USER’ button to get redirected to registration page.

REGISTRATION

```
<span class="glyphicon glyphicon-user"></span> Register Here</h4>
</div>

<div class="modal-body">
<form onsubmit="return valid()" action="First" method="post">

<div class="form-group">
<label for="register_name" style="color:black;">NAME</label>
<b class="req_field" id="msg0">*</b>
<input type="text" class="form-control" placeholder="Enter Name" id="register_name" name="name"/>
</div>

<div class="form-group">
<label for="register_email" style="color:black;">EMAIL ADDRESS
</label>
<b class="req_field" id="msg1">*</b>
<input type="email" class="form-control" placeholder="Enter Email" id="register_email" name="email"/>
</div>
```

The above code represents the registration form. The form consists of fields like – Name, Email, Password, Gender, Phone number, Address, State, City, Pin code. All this fields are mandatory and correct details need to be entered to register yourself as a user. A valid function is used to check to input data is following the required constraints, which are as follows –

```

function valid()
{
    var name=document.getElementById("register_name").value;
    if(name=="" || name==null)
    {
        document.getElementById("msg0").innerHTML="Please Enter the Name";
        return false;
    }
    else
    {
        document.getElementById("msg0").innerHTML="";
    }
    var email=document.getElementById("register_email").value;
    var atpos,dotpos;
    atpos=email.indexOf('@');
    dotpos=email.lastIndexOf('.');
    if(atpos<1 || atpos+2>dotpos || dotpos+2>email.length)
    {
        document.getElementById("msg1").innerHTML="Please Enter valid email";
        return false;
    }
    else
    {
        document.getElementById("msg1").innerHTML="";
    }
}

```

- Name field should not be null or empty.
- Email field should not be null or empty and should consist of ‘@’ and ‘.’ character.
- Password field should not be null or empty.
- Phone number should not be empty or null and length should be equal to 10.
- Address, State and City fields should not be empty or null.
- Pin code should not be empty or null and length should be equal to 6.

MY ACCOUNT

This webpage is only visible if user is logged in. It is made up of 4 Parts –

1.) Personal details

```

<li><strong>PERSONAL DETAILS</strong></li>
<li><i class="fa fa-user" style="margin-top:10px;font-size:24px"><%=r.getName()%></i> <%=r.getName()%></li>
<li><i class="fa fa-phone" style="margin-top:10px;font-size:24px"><%=r.getPhone()%></i> <%=r.getPhone()%></li>
<li><i class="fa fa-venus" style="margin-top:10px;font-size:24px"><%=r.getGender()%></i> <%=r.getGender()%></li>
<li><i class="fa fa-map-marker" style="margin-top:10px;font-size:24px"><%=r.getAddress()%></i> <%=r.getAddress()%></li>
<li>&nbsp;&nbsp;&nbsp;<%=r.getCity()%></li>
<li>&nbsp;&nbsp;&nbsp;<%=r.getState()%></li>
<li>&nbsp;&nbsp;&nbsp;<%=r.getPincode()%></li>

```

The above lines of code are used display the user details which were used for registration. Functions like getName(), getPhone(), getGender() etc are used with object ‘r’ to retrieve user details from database.

2.) Rent Records

```
<div id="soil" class="fade">
<br><br>
<div class="container">
<div class="panel panel-default">
<div class="panel-heading" style="font-size:18px;"><center><strong>RENT INFORMATION</strong></center></div>
<div class="panel-body">
<table id="mytable" class="table table-striped table-bordered table-hover">
<thead>
<tr>
<th>Rent Date</th>
<th>Phone</th>
<th>Address</th>
<th>Machine Name</th>
</tr>
</thead>
<tbody>
<%for(int i=0;i<list.size();i++){ %><tr>
<td><%=list.get(i).getdate() %></td>
<td><%=list.get(i).getPhone() %></td>
<td><%=list.get(i).getAddress() %></td>
<td><%=list.get(i).gettype() %></td>
</tr>
```

The Rent records are displayed in table format which has date, phone, Address and machine name as columns. The list which is associated with our database is used along with function like getdate(), getPhone(), getAddress() etc to get data related to product that was rented by user.

3.) Demo Records

```
<div class="container" >
<div class="panel panel-default" style="position:relative;bottom:650px;">
<div class="panel-heading" style="font-size:18px;"><center><strong>DEMO REQUEST INFORMATION</strong></center></div>
<div class="panel-body">
<table id="mytable1" class="table table-striped table-bordered table-hover">
<thead>
<tr>
<th>Machine Name</th>
<th>Demo Request Date</th>
<th>Phone</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<%for(int i=0;i<li.size();i++){ %><tr>
<td><%=li.get(i).getName()%></td>
<td><%=li.get(i).getDemodate()%></td>
<td><%=li.get(i).getPhone()%></td>
<td><%=li.get(i).getAddress()%></td>
```

This is very similar to Rent records. Again we use our list with functions like getName(), getdemodate(), getPhone(), getAddress() to get details of product for which demo request was issued.

4.) MY ORDERS

```
<div class="panel-heading" style="font-size:18px;"><center><strong>ORDER INFORMATION</strong><center></div>
<div class="panel-body">
<table id="mytable2" class="table table-striped table-bordered table-hover">
<thead>
<tr>
<th>Order Date</th>
<th>Phone</th>
<th>Address</th>
<th>Product</th>
<th>Quantity</th>
<th>Total Price</th>
<th>Cancel Order</th>
</tr>
</thead>
<tbody>
<%for(int i=0;i<listpur.size();i++){ %><tr>
<td><%=listpur.get(i).getPurdate() %></td>
<td><%=listpur.get(i).getPhone() %></td>
<td><%=listpur.get(i).getAddress() %></td>
<td><%=listpur.get(i).getProduct().getPname() %></td>
<td><%=listpur.get(i).getPquantity()%></td>
<td><%=listpur.get(i).getTotprice()%></td>
```

Order table has Order date, Phone, Address, Product name, Quantity, Total Price, Cancel order as its columns. ‘listpur’ is connected to our database and has order details which are retrieved using functions like getPhone(), getAddress, getTotprice() etc.

10.2) BACKEND CODE DETAILS

The imports which are used in almost all JSP file are all JAVA code which represents the backend side.

```
<!DOCTYPE html>
<%@page import="modal.GlobalMap"%>
<%@page import="com.pojo.Producttype"%>
<%@page import="java.util.List"%>
<%@page import="modal.BLManger"%>
```

GLOBALMAP

```
package modal;

import java.util.HashMap;

public class GlobalMap {
    public static Map<Product, Integer> Cartvalue=new HashMap<Product, Integer>();

    public static Map<Product, Integer> getCartvalue() {
        return Cartvalue;
    }

    public static void setCartvalue(Map<Product, Integer> cartvalue) {
        Cartvalue = cartvalue;
    }
}
```

This part of code is essential for working of our shopping cart. Here we use java map interface which represents a mapping between a key and a value. Hashmap provides basic implementation of map interface. It stores the data in (Key, Value) pairs, and you can access them by an index of another type (e.g. an Integer). So here our key = Product and value = Integer value which signifies that each product in cart is associated with a particular value.

BLMANAGER

```
public boolean isExistEmail(String email)
{
    Register r=searchByEmail(email);
    if(r!=null && r.getEmail().equals(email))
        return true;
    else
        return false;
}
public Register searchByEmail(String email)
{
    Session s=ses.openSession();
    Criteria c=s.createCriteria(Register.class);
    c.add(Restrictions.eq("email",email));
    Register r=(Register) c.uniqueResult();
    return r;
}
public boolean isExistPassword(String password)
{
    Register r=searchByPassword(password);
    if(r!=null && r.getPassword().equals(password))
        return true;
    else
        return false;
}
public Register searchByPassword(String password)
{
    Session s=ses.openSession();
    Criteria c=s.createCriteria(Register.class);
    c.add(Restrictions.eq("password",password));
    Register r=(Register) c.uniqueResult();
    return r;
}
```

As the name suggests, this code acts as a manager of all details on website. This code is used to check details entered when user logs in or registers. Also the use of above code is ensure that no users creates his/her account using same email or password that already exists in our database. This is done to make sure no fake accounts are created on the website and also for security purposes. The isExistEmail() is a Boolean function which returns true or false. It takes an email-id as input and passes that email to another function called searchByEmail(). This function will open a session and use a criteria object ‘c’ to check if the email it received exists in database or not. If email exists in database isExistEmail() will return true. Similar we have created two more functions to check if no new user creates a password or username that is matching with some other existing user.

```
public void insertdata(Register r)
{
    Transaction t=s.beginTransaction();
    s.save(r);
    t.commit();
    s.close();
}
```

BLMANAGER consists of a lot of small functions performing important function. The above code is to insert data which is stored in object ‘r’. So we create a transaction, save our object ‘r’, commit the changes to our database and then close that transaction. Similar functions are used to insert different data such as feedback, only the object passed to function changes.

```

public void updateProduct(Product p)
{
    Session s2=ses.openSession();
    Transaction t=s2.beginTransaction();
    s2.merge(p);
    t.commit();
    s2.disconnect();
}

public void updateRecord(Register r)
{
    if(!s.isOpen())
    {
        s=ses.openSession();
    }
    Transaction t=s.beginTransaction();
    s.update(r);
    t.commit();
    s.close();
}
...

```

The above codes are used for updation purposes. The initial steps are same, we open a session, we create a transaction. In updateProduct, our product is key which is associated with a value as seen above using Hashmap. To update product we use merge() function because when two same key(product) with different values(product details) are merged, hashmap will select the value that was recently updated. However for updaterecord we just use a normal update() function which is an inbuilt function and pass object 'r' which is our updated data. We commit the changes to database and close the transaction. Similar functions are used to update different data across the website.

PRODUCT TYPE

As mentioned earlier each product belongs to a particular product category and each category has its own unique ID. We are using a hashset to map tid(unique ID) to product type. The other functions created are used for creating new product type or retrieve an existing product type and its corresponding ID.

```

private Integer tid;
private String producttype;
private Set products = new HashSet(0);

public Producttype() {
}

public Producttype(String producttype) {
    this.producttype = producttype;
}

public Producttype(String producttype, Set product
    this.producttype = producttype;
    this.products = products;
}

public Integer getTid() {
    return this.tid;
}

public void setTid(Integer tid) {
    this.tid = tid;
}

public String getProducttype() {
    return this.producttype;
}

public void setProducttype(String producttype) {
    this.producttype = producttype;
}

```

NOTE – The code used for other modules like admin, cart, register or purchase is very similar to Product type, the only difference being the attributes for those modules.

ADMIN

```
private Integer aid;
private String username;
private String apassword;
private String fname;

public Admin() {
}

public Admin(String username, String apassword, String fname) {
    this.username = username;
    this.apassword = apassword;
    this.fname = fname;
}

public Integer getAid() {
    return this.aid;
}

public void setAid(Integer aid) {
    this.aid = aid;
}

public String getUsername() {
    return this.username;
}

public void setUsername(String username) {
    this.username = username;
}

public String getApassword() {
    return this.apassword;
}
```

As we can see this code looks similar to ProductType. For admin we have admin ID, admin username, admin password and admin's name as its attributes and the functions seen in snippet are used by assigning values to those attributes or retrieving data of admin.

CART

```
private Integer cartid;
private Register register;
private Product product;
private int totprice;
private int cquantity;

public Cart() {
}

public Cart(int totprice, int cquantity) {
    this.totprice = totprice;
    this.cquantity = cquantity;
}

public Cart(Register register, Product product, int totprice, int cquantity) {
    this.register = register;
    this.product = product;
    this.totprice = totprice;
    this.cquantity = cquantity;
}
```

Every cart created has its own cartID. To the cart we pass total price and current quantity along with object of Product class which has product details. Also, a register object is passed to check if user is registered or not. If user is not registered, from cart he/she will be redirected to login page.

ADD PRODUCT TO DATABASE

```
String pname=request.getParameter("pname");
String pdescription=request.getParameter("pdescription");
int price=Integer.parseInt(request.getParameter("price"));
int totquantity=Integer.parseInt(request.getParameter("totquantity"));
String type=request.getParameter("type");

Producttype producttype=bl.getProductBytype(type);

p.setPname(pname);
p.setPdescription(pdescription);
p.setPrice(price);
p.setTotquantity(totquantity);
p.setProducttype(producttype);
p.setTotalprice(price);
Part file=request.getPart("image");
InputStream filename=null;
filename=file.getInputStream();
```

These lines of code help us add a product to database. First, we get attributes of product i.e. name, description, price etc. and using Product object ‘p’ we set these attributes to object which is connected to our database.

CANCEL ORDER

```
Date currentDate= new Date();
System.out.println(currentDate);
int purid=Integer.parseInt(request.getParameter("id"));
Purchase pur=bl.getRecordByPurid(purid);
System.out.println(pur.getPurdate());
Date cancelDate = addDays(pur.getPurdate(), 6);
System.out.println(cancelDate);
if(currentDate.before(cancelDate))
{
    bl.deleteOrder(pur);
    Product p=bl.getRecordByPid(pur.getProduct().getPid());
    System.out.println("himank="+p.getPid());
    totalstock= (pur.getPQuantity()+pur.getProduct().getTotquantity());
    p.setTotquantity(totalstock);
    System.out.println(p.getTotquantity());
    bl.updateProduct(p);
```

Once an order has been placed by user, cancellation can only be placed within 5 days of order placed. That is exactly what the above code does, we generate current date and use addDays() function to get a date 5 days after our purchase date. Then we check if current date comes before our cancel date, if that’s true, order cancellation will be processed and product stock will be restored.

UPDATE CART

```
int id=Integer.parseInt(request.getParameter("id"));
int qty=Integer.parseInt(request.getParameter("qty"));
//Map<Product, Integer> product = (Map<Product, Integer>) session.getAttribute("product");
for(Map.Entry<Product, Integer> map:GlobalMap.Cartvalue.entrySet())
{
    if(map.getKey().getPid()==id)
    {
        total=map.getKey().getPrice()*qty;
        map.getKey().setTotalprice(total);
        GlobalMap.Cartvalue.put(map.getKey(), qty);
        ...
```

As we products are added or quantity of product is increase/decreased, our cart is updated accordingly. If we add a product to cart, we will need its ID and based on quantity and price a total amount is generated.

DELETE DEMO REQUEST

```
protected void doGet(HttpServletRequest request, HttpServletResponse response) throws ServletException, IOException
{
    BLManager bl=new BLManager();
    int did=Integer.parseInt(request.getParameter("id"));
    Demo d=bl.getRecordByDid(did);
    bl.deleteDemo(d);
    response.sendRedirect("Admin/viewdemo.jsp");
}
```

To delete any demo request all we need to do is get demo request id and delete that id from our records using delete() function. This code is reused multiple times – to delete order, to delete rent request, to delete a feedback etc.

ADMIN LOGIN

```
String username=request.getParameter("username");
String apassword=request.getParameter("apassword");

Admin a=new Admin();
BLManager bl=new BLManager();
HttpSession httpSession=request.getSession();
a.setUsername(username);
a.setPassword(apassword);
Admin a1=bl.searchByUsername(username);

if(bl.isExistUsername(username) && bl.isExistaPassword(apassword) )
{
    httpSession.setAttribute("username", a1.getUsername());
    httpSession.setAttribute("aname", a1.getAname());
    httpSession.setAttribute("aid", a1.getAid());
    response.sendRedirect("Admin/Home.jsp");
}
```

Login for admin is same as user login. Admin inputs his/her username and password. We will use isExistUsername(), isExistaPassword() to check existence of data in database, if details match then login is provided.

LOGOUT

```
HttpSession session=request.getSession();
session.invalidate();

out.print("<html><body>");
out.print("<b style='font-size:18px;color:red;position:relative;top:20px;left:520px;'>You have successfully logged out</b>");
out.print("</body></html>");
```

Each time a user logs in or admin logs in, a new session is created. When user wants to logout, all we have to do is close that particular session which is done through invalidate() function.

11. VALIDATION

At the beginning of the development phase, we laid down certain requirements that were supposed to be fulfilled by the system. It is important to check whether the system is up to the mark i.e. has high level requirements, to satisfy a user's need.

Validating the functionalities of the system:

1. The most important functionality provided by the system was allowing a user to “**Register and Login**” into the system. Based on this functionality the admin can keep track of a user’s activity on the system. Testing of this functionality proved to be a success, fulfilling an important requirement with ease.
2. Since, the primary purpose of the system is to provide users with a platform to purchase materials and machinery important for practicing vertical farming. The next most important set of functionalities included order management, checkout and payment. “**Order Management**” provided user with power to view, edit and cancel orders. This functionality interacted with the inventory database to check the availability of a product and updated the user about changes in the shopping cart. This shopping cart could be viewed when the user accessed the “**Checkout**” functionality. With the use of checkout, the user was able to check the products added to the cart with the quantities and prices of each product. Checkout also helped the system distinguish between a registered user and a visitor by prompting a visitor to register in to the system. The culmination of this process took place when the “**Payment**” functionality was triggered. Using the payment function, the user was able to select and authorize payment of products in the cart. Test cases proved that this set of functionalities were executed with success and covered every scenario to avoid failure of the system.
3. The next set of functionalities were secondary to functionalities mentioned above, they included an interface necessary to access the system. The first functionality was a “**Catalog**” for products, this comprised of a list of all the products alongside their images, descriptions and prices which enabled the user to search and locate a product of their choice as well as understand each product and its features. All the content present on the system including the catalog was kept under check using the “**Site Management**” functionality. Site Management allowed the system administrator to view and edit any and all data in the system, this included the articles/videos section which updated a user about the latest developments in the field of vertical farming. The catalog of products was also handled using site management, where any changes made by the administrator in the description, pricing or images for a product was reflected in the system. This system comprised of a set of users, but the “**My Accounts**” functionality provided individuality to each user registered on the system. My Accounts provided each user with the option of viewing and editing their profiles, any changes made by the user were reflected in the database. It also allowed a user to keep track of any rent or demonstration requests and provided a history of all the orders placed by the user. If the user desired to reach out to the administrator or file a feedback for the system or a product, it was achieved using My Accounts. While, testing these functionalities no discrepancies between the expected and actual outcome were registered, hence, validating these functions.

Validating the characteristics affecting user experience:

1. The system provided each user with password protected profiles and ensured access of profile only using an authenticated login. Users were not able to view the activity of other users registered on the database and each user’s transaction data was abstracted from others.
2. The system successfully managed all of its databases by maintaining consistent data in each data store. It also proved to be extremely reliable and did not crash or fail during access by a user or the administrator.
3. The system handled multiple users’ login without error and served each user with equality and optimality. While checking the inventory for the availability of a product, the system was able to return the correct response in a mean time.

4. Since, the system followed the agile model, any changes made to the existing system were incorporated with ease to the advantage of the administrator. The system proved to be operational across various web browsers like Chrome, Firefox and IE providing users with various options of access.
5. The system provided clarity in its structure, enabling a user to navigate through the system without the help of a guide. Users able to distinguish between sections of system like articles/videos or products, proving that the system was easy to reach and operate.

These functionalities and characteristics provided a validation to the developed system. They proved that the system was fulfilling its duties and, in the process, also optimizing the experience of both its users and administrator.

12. LIMITATIONS

VertiFarm offers a lot of user-friendly features to the users. However, the platform is nowhere near its potential. There is a lot of room for improvement which can be made in terms of features, efficiency and also trying to include more features which can make the use of this website easy for people from rural areas trying to educate themselves about vertical farming.

1. There is no backend service available for payment services as of now.
2. Farmers who belong to rural areas might find it difficult to access the website due to internet connectivity and also due to the fact that website is not available on smartphones.
3. Users who are not experienced with using websites might find difficult to register themselves onto the platform.
4. There needs to be a real payment gateway to give me more realistic feel to users.
5. Availability of website in different languages might help users from all across the country.
6. There is no 24x7 customer assistance service to provide any help to customers any time.

PROJECT TEAM CONTRIBUTION

HIMANK JAIN:

My contribution in VertiFarm project was to develop the following modules –

Home Page module – This is the first page that user sees when they visit the website. This is the central page that is connected to all the functionalities of the website like login/register, product catalogue, checkout etc.

User Registration module – This comprises of a registration form where user can sign-up and become member of the website. Only registered users are allowed to place orders on the website. All registered data is stored in a database. The module is developed in such a way that each user needs to have a unique username and password i.e. no two users can have same username or password.

Product Catalogue – The product section of website is divided into Materials and Machines. Materials consists of 4 categories namely Chemicals, LED lights, Greenhouse supports and Coir. All the product specification, price, stock etc. are stored in a database.

Machine Demo – A user can request for machine demonstration by filling up a machine demo form, the details of which will be saved in the database, monitored by admin. User can check demo requests in my account module

Shopping cart – Products are added to cart by user and based on quantity and price a total amount along with 5% tax is generated. Order can only be placed if a user is logged in. If user is not logged in then he/she will be redirected to login module.

Checkout – After reviewing products in cart user can place an order by filling up order confirmation form. Placed orders can be viewed in my account module. Also, order can be cancelled within 5 days of order confirmation.

AYUSH TIWARI:

My contribution in VertiFarm project was to develop the following modules –

Login – This module grants user access to his/her account. User enters his/her unique username and password which are checked against database and upon successful validation, user is logged in. This module also redirects new user to registration page.

Our Articles module – This module consists of 5 article pages and 1 video section. Each article page consists of information and images related to vertical farming. The purpose of this module is to educate user regarding vertical farming.

Renting – This module records user's request for renting a particular machine. It consists of a renting form and the details of the form are stored in our database. All rent request can be seen in user's My Account tab.

My Account – This module has 4 sections namely – Personal Details, Rent Requests, Demo Requests and My Orders. As per user's activity on the website these details are retrieved from the database and displayed in a user readable format.

Contact Us – This module displays contact details like number, address and email-id of company hosting the website. There is also a feedback form available for user to submit feedback or submit a query which can be viewed by admin.

CONCLUSION

In conclusion, this document offers an insight to the system by describing the software that is developed as well as the intention of developing the software. In addition, it also provides all the functional and non-functional requirements with UML diagrams that serve as a basis to understand the design of the system. Further, it presents the implementation of the system using screenshots of output with the coding details that describe the structure of the system based on various modules. Next, this document discusses testing the system, this includes various cases for testing as well as the techniques used for testing. Finally, the entire system is validated, making sure that the system developed caters to the needs of its users.

To summarize, the entire Software Development Life Cycle of this system can be represented by this one coherent piece of documentation.