

**CAPSTONE PROJECT REGISTER**

Class: SE Duration time: From 01/2025 to 04/2025

(\*) Profession: <Software Engineer> Specialty: <ES>□ <IS> □ <JS> 🗹

(\*) Kinds of person make registers: Lecturer □ Students 🗹

1. Register information for supervisor (if have)

|  | Full name | Phone | E-Mail | Title |
| --- | --- | --- | --- | --- |
| Supervisor 1 | Lê Nguyễn Sơn Vũ | 091 642 3938 | vulns@fe.edu.vn | Mr |
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2. Register information for students (if have)

| St | Full name | Student code | Phone | E-mail | Role in Group |
| --- | --- | --- | --- | --- | --- |
| 1 | Bùi Thế Tâm | SE171869 | 0961239341 | tambtse171869@fpt.edu.vn | Member |
| 2 | Huỳnh Phước Tấn | SE173453 | 0947652131 | tanhpse173453@fpt.edu.vn | Member |
| 3 | Lê Quang Dũng | SE171858 | 0886784257 | dunglqse171858@fpt.edu.vn | Member |
| 4 | Lưu Ái Giao | SE172586 | 0847514323 | giaolase172586@fpt.edu.vn | Member |

3. Register content of Capstone Project

(\*) 3.1. Capstone Project name

**a)** **English:** IPAS - **Intelligent Pomelo AgriSolutions** for pomelo farm management.

**b)** **Vietnamese:** IPAS -Giải pháp nông nghiệp thông minh cho quản lý trang trại bưởi.

**c)** **Abbreviation:** IPAS

**d)** **Problem Statement:**

In the process of managing and operating a farm, the lack of a centralized, accurate, and timely information system has made it difficult for farmers to optimize agricultural activities. Issues such as managing land area, dividing plots, tracking the number of plants in each row, and integrating climate and soil information from different regions have not been effectively addressed. This results in a lack of detailed data on crops and difficulties in making timely decisions for irrigation, fertilization, pest control, or disease management.

Manual tracking of plant status, including recording and handling abnormalities, managing seasonal plans, estimated yields, and harvests, has not been automated. Additionally, the process of crop care and task assignment for employees lacks a systematic and detailed approach, leading to delays or interruptions in work. The absence of regular updates on weather and environmental information, combined with limited use of advanced decision-support tools, hinders optimal crop care and farm management.

**e)** **Context:**

In the context of the agricultural industry facing increasing challenges due to climate change, crop yield variations, and the growing demand for safe food, the application of new technologies to improve farm management efficiency has become essential. Currently, most agricultural activities in Vietnam are still carried out manually or with tools that are not connected, leading to significant time and labor inefficiency for Vietnam farmers.

As farms grow and the area of cultivation expands, managing information about crops, seasonal plans, and employee tasks becomes more complex. Existing systems are unable to provide a comprehensive, making it difficult to make timely and accurate decisions.

Therefore, developing an integrated smart farm management system providing AI automated advice on crop care, workforce management, and optimizing care processes is necessary to enhance productivity and operational efficiency in farms.

**f)** **Solution:**

The platform provides an all-in-one solution for efficient farm management. It allows users to manage land areas, track crop details, and monitor soil and climate conditions based on location. Farmers can easily add, update, and delete crop information, detect abnormalities like pests or water shortages, and receive tailored care recommendations.

It also facilitates seasonal planning, tracking harvest schedules, yield estimates, and managing worker productivity. User management is streamlined with login options and task assignment features, while a reminder system ensures daily tasks like irrigation and pest control are completed on time.

Additionally, the platform offers AI-driven recommendations with two key features to support farmers: an image-based system that uses AI to analyze photos of crops, identify pests or diseases, and provide tailored treatment recommendations, and a Q&A feature where farmers can ask questions and receive responses from AI-powered chatbots, offering guidance on crop management, pest control, and other farming-related topics.

**g)** **Functional Requirements:**

### **Guest:**

* Preview the website and UI app to decide if they should be used or not.
* View the introduction of using app.
* Registration and payment for the owner and operator of the application to create an account.
* Authenticate to securely access the platform.

### **Super Admin:**

* **User Account Management:**
* Create, update, and delete user accounts (Owner, Manager, Employee).
* Set security permissions and access levels for each role.
* **Farm Information Management:** Access and manage high-level farm information and oversee all farm activities.

### **Owner, Manager, Employee:**

* **AI Real-time Consulting:** The AI provides advice on the optimal timing for watering, fertilizing, and pest control based on real-time conditions, along with recommended production methods and medicines. Additionally, the platform includes an image-based system that uses AI to analyze photos of crops, identify pests or diseases, and provide tailored recommendations for treatment and prevention.

### **Owner:**

* **General Farm Information Management**
* Provide and edit basic information about the farm, including: Location, Area, Soil type, Region and terrain, Water source, Climate

### **Owner, Manager:**

* **Management of Existing Cultivation Areas**
* Create cropping area sketches based on area and crop quantity
* Manage the number of crops in each existing crop area.
* **Plant Information Management**
* Update Plant Information: Enter and modify general plant data and attributes, with the flexibility to edit specific plants that have unique characteristics.
* **Plant Care and Cultivation Management**
* Set and Manage Procedures: Owners and Managers can set and oversee cultivation steps for each plot, including planting, watering, fertilizing, and pest control.
* Assign and Track Tasks: Managers can assign tasks, query plants by QR code or ID, and update plant status to track care activities.
* Monitor Care History: View detailed records of plant care and receive reminders for scheduled tasks.
* Task Completion and Reporting: Employees confirm task completion and report abnormalities. Owners and Managers can access overall cultivation status reports.
* **Manage crop yearly for each plot or row**
* Manage crop quantity (from which month to which month) include: harvest time, estimated yield of the whole plot, whole row and each plant, quality requirements when harvesting, set harvest status of each plant.
* **Employee Management**
* Manage daily and monthly employee work schedules.
* Assign and monitor tasks for employees, ensuring tasks like watering, fertilizing, and pest control are completed.
* **Employee:**

### **Task Management:**

* Access a schedule of daily and monthly tasks, including assigned duties like watering, fertilizing, and pest control.

### **Update work status:**

* Update the status of completed tasks and record any special notes or observations on plant health.

### **Notes and Anomalies:**

* Record observations such as signs of pests or specific plant requirements (e.g., special fertilization needs for weaker plants).

**h)** **Non-functional Requirements:**

* **Performance**:

Ensure that data retrieval and loading times for farm section information are under 2 seconds, even as the number of sections grows.

* **Security**:

Access to farm data should be restricted based on user roles, with administrators having broader access than regular workers.

* **Reliability**:

Ensure that farm section data is consistently backed up to prevent data loss in case of system failure.

* **Compatibility**:

The module should work seamlessly across different devices (desktop, mobile) and browsers, providing flexibility for field and office use.

* **Availability**:

Ensure 99.9% uptime for the module, with minimal disruption to essential farm operations.

(\*) 3.2. Main proposal content (including result and product)

**a)** **Theory and practice (document):**

● Students should apply the software development process and UML 2.0 in the modeling system.

● The documents include User Requirements, Software Requirement Specification, Architecture Design, Detail Design, System Implementation, source code (Github).

● Server-side technologies:

● Server: C# .NET 8.0

● Database System: SQL Server

● Client-side technologies:

● Web Client: React Typescript

● Mobile Client: React Native

**b)** **Products:**

● APIs for system

● Web application for Super Admin, Owner, Manager

● Mobile application for Owner, Manager, Farmer

● Database

4. Other comments (propose all relative things if have)

* The application has not yet determined the validity of information on warehouse products
* The application has not yet determined the correctness of information during the plant care process
* The application has not yet integrated employee timekeeping
* Integrating AI into plant care and management consulting solutions at the reference level
* IOT integration applications or use existing weather to respond to previously created activities to provide reference level alerts

All students are required to understand the reference documents thoroughly and may need to explain to the viva committee.

5. Link tham khảo:

<https://traceverified.com/service/tracefarm-phan-mem-quan-ly-trang-trai/>

<https://nextcrm.vn/phan-mem-quan-ly-trang-trai-va-nong-trai>

<https://www.croptracker.com/>

<https://fieldin.com/about/>

<https://www.farmbrite.com/demo>

| Supervisor (If have)  (Sign and full name) | HCMC, November 2024  On behalf of the Registers |
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