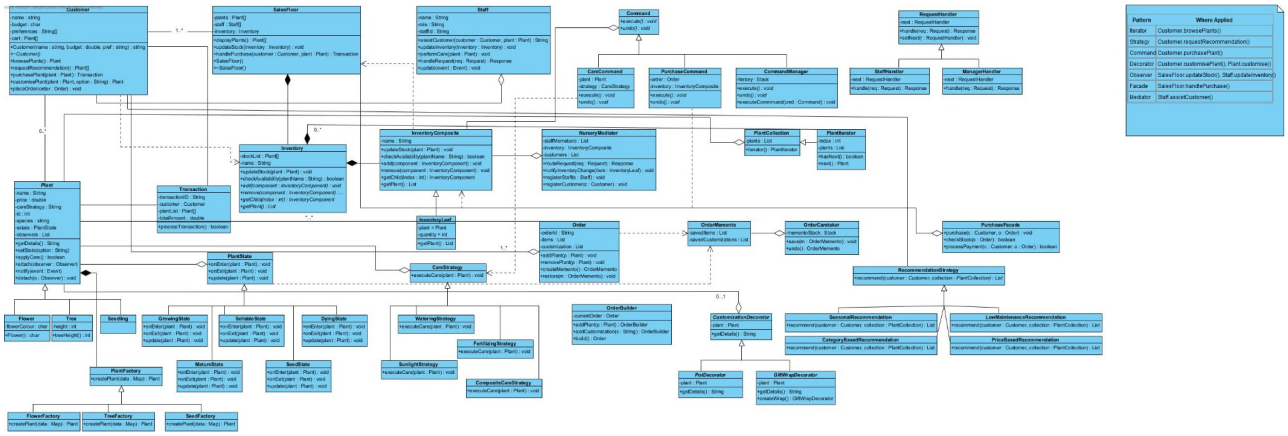
COS214 Project Document

Introduction

This document explains the final class diagram for the Plant Nursery Management System. The system has been divided into three main categories of actors and responsibilities: **Staff**, **Greenhouse**, and **Customers**. The class diagram models structure, responsibilities, and design pattern usage across these categories.

Class Diagram

Below is the final class diagram for the system:



1. Staff

The Staff classes handle plant care, customer interactions, and coordination tasks. Staff are modeled as observers in the **Observer** pattern, reacting to changes in plant states. They also execute care routines using **Strategy** (e.g., watering, fertilizing) and encapsulate actions through the **Command** pattern. Extensions to staff roles are supported via the **Decorator** pattern, allowing dynamic addition of responsibilities such as delivery or management.

2. Greenhouse

The Greenhouse category models plants, their lifecycle, and inventory. Plants follow the **State** pattern, transitioning between seedling, growing, mature, and sellable states. They also act as subjects in the **Observer** pattern, notifying staff when care is needed. The inventory is implemented as a **Composite**, with categories grouping different plants. New plant types are introduced through the **Abstract Factory**, enabling flexibility in stock creation.

3. Customers

Customers interact with the system to browse plants, place orders, and receive recommendations. The **Iterator** pattern supports browsing collections of plants. Recommendations are powered by **Strategy** algorithms (e.g., seasonal, low-maintenance). Orders are customizable using the **Builder** pattern, with optional features added by **Decorator**. Undo/redo for order customization is managed with the **Memento** pattern. Finally, the **Facade** pattern simplifies the purchase process, providing a

single entry point for customers while hiding underlying complexities.

Relationships

The three categories are interconnected: Staff update the Inventory and assist Customers, Plants notify Staff of their state changes, and Customers rely on both Staff and the Inventory to complete purchases. The **Mediator** pattern ensures decoupled communication between these entities, coordinating requests and responses without direct dependencies.

Design Patterns Mapping

Pattern	Classes Involved	Purpose
Strategy	PlantCareStrategy, WateringStrategy, PruningStrategy	Flexible plant care routines
Observer	Plant (subject), Staff (observer)	Notify staff of plant state changes
Mediator	NurseryMediator, Customer, Staff, Inventory	Decoupled communication
Command	CareCommand, PurchaseCommand, UndoRedoManager	Encapsulation of tasks
Memento	Order, OrderMemento, HistoryManager	Undo/redo of customizations
Composite	Inventory, PlantCategory, Plant	Hierarchical inventory structure
Abstract Factory	PlantFactory, FlowerFactory, TreeFactory	Easily add new stock types
Facade	PurchaseFacade	Simplify purchase process

Conclusion

The class diagram demonstrates how design patterns structure the system into Staff, Greenhouse, and Customer categories. This modular design supports flexibility, easier maintenance, and scalability while fulfilling all functional requirements of the nursery system.