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|  | **Namal University Mianwali**  **Department of Computer Science** |

**Assignment 2**

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| Course | Software Engineering | | |
| Instructor | **Miss. Asiya Batool** | **Session / Semester** | 2023-2027 (3rd) |

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| Topic | Ant Farm Simulation System with Design Patterns |
| Name | **Rayan Badar 18** |

This repository contains the implementation of **Assignment 2** for the **Software Engineering** course. The project demonstrates the use of Creational, Structural, and Behavioral Design Patterns in C++ to build an Ant Farm Simulation System. Additionally, it includes certificates from completed LinkedIn Learning courses on C++ Design Patterns.

**Features**

* **Singleton Pattern**: Ensures a single Meadow.
* **Builder Pattern**: Builds ant farms.
* **Factory Pattern**: Creates different ant types.
* **Decorator Pattern**: Tracks ant attributes.
* **Mediator Pattern**: Implements tick-based simulation.

**Functional Highlights**

* Simulation of ant colonies with species-specific bonuses.
* Command-line interface for controlling colonies:
  + **spawn: Create new colonies.**
  + **give: Allocate resources or ants to colonies.**
  + **tick: Progress the simulation.**
  + **summary: Display colony details.**
* Template-based implementation for flexible ant types.

**Repository Contents**

* **Source Code**: All C++ code files for the simulation.
* **Certificates**: Completion certificates for LinkedIn courses:
  + **C++ Design Patterns: Structural**
  + **C++ Design Patterns: Behavioral**
  + **C++ Design Patterns: Creational**
* **Documentation**: This README and additional cpp files.