Assignment 4: : Pattern for Maintenance

CS4213

Time Estimate: 8 Hours
Due: End of Week 15
Course: Design Patterns

Chapters Covered:
- 21.9

INSTRUCTION

This assignment focuses on improving an existing design by applying advanced **refactoring techniques**. You will refactor for greater **flexibility**, promote code **reuse**, enhance **testability**, and explore tool support for safe, efficient improvements.

TASK

a. Select a Design to Refactor (2 hours)

- Choose one system you previously designed or a system you know well.
- Briefly describe:
  - Its purpose and current design flaws.
  - Areas lacking flexibility, reuse, or testability.
- Provide a **UML Class Diagram** of the current design.

b. Refactor for Flexibility and Reuse (3 hours)

- Identify at least **3 refactorings**: MUST use either **Facade** or **Mediator** Pattern (You may use both if they fit.) :
  - 1 for **flexibility** (e.g., extract interface, remove conditionals, introduce strategy, apply Mediator to reduce object–object chatter).
  - 1 for **reuse** (e.g., extract class, eliminate duplication, consolidate logic behind a Facade).
  - 1 optional, based on design needs. (other patterns that improve the system)
- For each:
  - Describe the change.
  - Provide an updated **UML snippet** or class outline.

c. Refactor for Testability + Tools (2.5 hours)

- Suggest **2 specific refactorings** to improve testability (e.g. dependency injection, isolate logic).
- Research a **refactoring tool** (e.g., IntelliJ, Eclipse, ReSharper):
  - Describe its key features.
  - How it helps in safe refactoring.

d. Reflection on Refactoring Impact (0.5 hours)

- Write a short summary:
  - Which refactor had the greatest impact?
  - How did refactoring change your view of design improvement?

SUBMISSION DETAILS

- **Submit via:** Canvas LMS
- **File Naming Convention:**

  `StudentID_Assignment4_CS4213Fall2025`

- Submit:
  - Original and updated UML diagrams
  - Refactoring descriptions
  - Tool summary
  - Reflection write-up

Late work is subject to the standard course penalty. Peer review is not required for this assignment.