



COS20007 Object-Oriented Programming

Research Project Plan

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Research Topic

Impact of OOP Design Patterns on Code Maintainability: Select a few commonly used design patterns (e.g., Singleton, Observer, Factory) and assess their impact on code maintainability and readability in a small software project.

Research Question

"What impact does the use of the Strategy design pattern have on code maintainability and adaptability when handling multiple algorithms in an application?"

Research Method: Mixed-Methods Approach

Experiment Design: Develop a small application that requires handling multiple algorithms for a specific task. Implement the application using two different approaches: one without using the Strategy design pattern (baseline) and another utilizing the Strategy pattern.

Code Metrics: Measure code maintainability using code readability, modularity, and flexibility metrics. Code duplication and adherence to OOP principles will also be assessed. Static code analysis tools will aid in quantifying these metrics.

Adaptability Evaluation: Introduce new algorithms to the application after both implementations are complete. Measure the effort and time required to integrate new algorithms in each case, highlighting the impact on code adaptability.

Conclusion and Recommendations: Summarize the findings, drawing conclusions about the Strategy pattern's effect on code maintainability and adaptability. Provide recommendations for developers on the appropriate use of the Strategy pattern to enhance code maintainability and adaptability when dealing with multiple algorithms in applications.

This research project is directly relevant to one of the unit's intended learning outcomes, specifically Learning Outcome 5: "Describe and explain the factors that contribute to a good object-oriented solution, reflecting on your own experiences and drawing upon accepted good practices (K6, A2)."

How the research project is relevant to Unit Learning Outcomes

By investigating the impact of the Strategy design pattern on code maintainability and adaptability in the context of handling multiple algorithms in an application, the research addresses the notion of a "good object-oriented solution." It provides insights into how design patterns can influence the quality of object-oriented code and how

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developers can make informed decisions when choosing design patterns to achieve better code maintainability and adaptability.

Through the comparison of two different implementations—one with the Strategy design pattern and another without—it allows students to reflect on their own experiences and the trade-offs involved in design pattern adoption. The project emphasizes the significance of accepted good practices, encouraging students to critically assess the effectiveness of the Strategy pattern in real-world scenarios and its potential impact on the long-term maintainability and flexibility of software systems.

By considering Learning Outcome 5, this research fosters a deeper understanding of design patterns as essential tools in object-oriented software development and equips students with valuable insights into designing robust, maintainable, and adaptable code solutions.