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Structural Degradation Experiment: Basic Concepts

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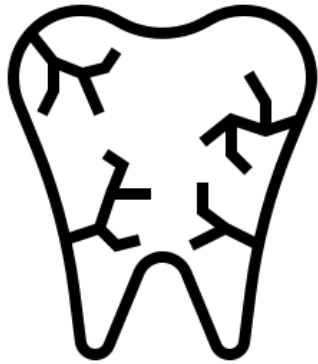
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The **structural quality** of a software is determined by how well it meets **quality attributes** such as readability, modifiability, and extensibility.



Structural Degradation



Structural degradation occurs when changes or new implementations negatively impact quality attributes, leading to significant maintenance effort or the complete redesign of the software structure.



Two Categories of Degradation

In this experiment, we consider two categories of degradation:

- ◆ Implementation-level degradation
- ◆ Architecture and design level degradation



Implementation-Level Degradation



The **implementation-level degradation** is a category of degradation that occurs when a single code element is impacted.



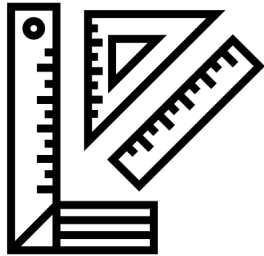
Architecture and Design Level Degradation



The **architecture and design level degradation** is a category of degradation that negatively impacts multiple code elements and the relationships between them.



Metrics - Degradation Indicators



Source code metrics are measures that can be used to assess the structural quality of the source code.

Examples:

- Cyclomatic Complexity (CC)
- Lines of Code (LOC)



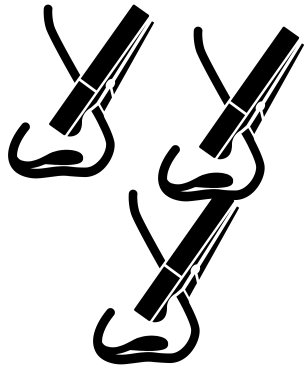
Code Smells - Symptoms of Degradation



Code smells are source code symptoms of **structural degradation**



Use of Multiple Code Smells



There is evidence that structural degradation problems are often identified through the occurrence of **multiple code smells**.



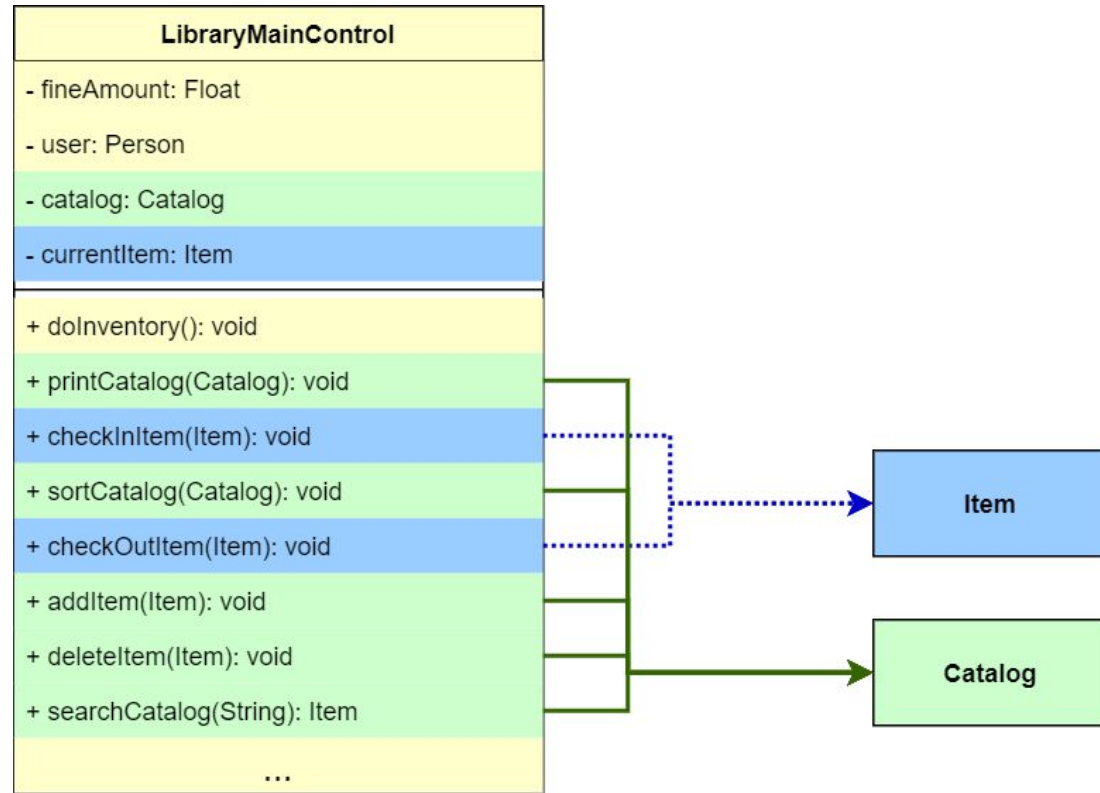
Example of Multiple Code Smells

God Class:

- ◆ Is excessively large
- ◆ Has low cohesion

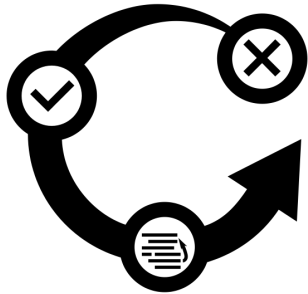
Feature Envy:

- ◆ A (part of a) method depends more on data from another class





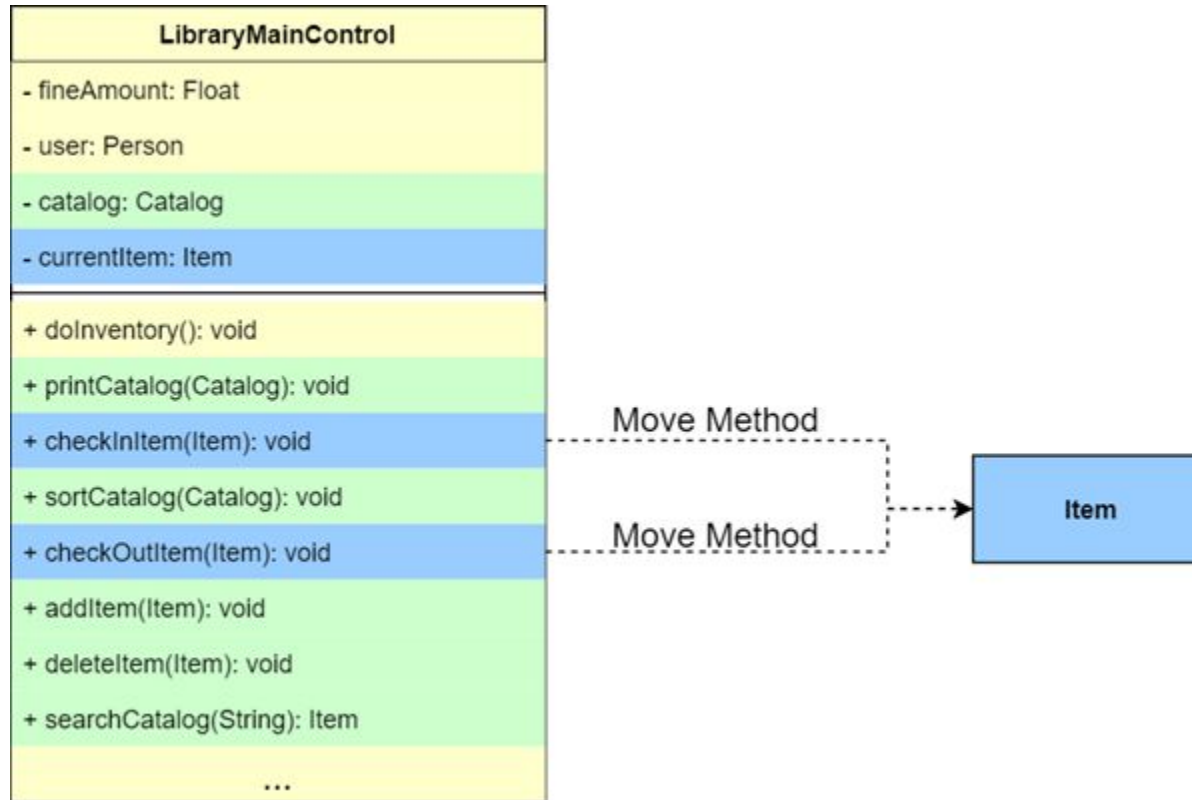
Refactoring - Removal of Degradation



Micro transformations in the source code to improve the structural quality of the system



Example - Move Method





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