

A Formal Approach to Design Patterns

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The term 'design patterns' has been established in the lexicon of software design by Gamma, Helm, Johnson, and Vlissides' pioneering book: 'Design Patterns: Elements of Reusable Object- Oriented Software'. A design pattern is a recurring architectural theme that provides a solution to common design problems within a particular context. Each design pattern systematically names, explains, and evaluates an important design decision in object- oriented systems. It identifies the participating classes and instances, their roles and collaborations, and the distribution of responsibilities. Probably every experienced object-oriented designer uses these patterns in some form (mostly instinctively), but the well-documented design patterns clarify the decisive situations, and predict the consequences.

A formalization would give a more stable basis for these useful tools, it helps classifying the patterns and analyzing its properties. An algebraic description is very useful for code generating systems or CASE tools, also.

We try to work out a formal approach, which can give a better understanding of the design patterns, revealing the regularities and differences in the structures of the most frequently used patterns. Nevertheless our intention is not to loose the connection with the practical applicability.