

# Formal Patterns for Web and Cloud Computing

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Many web and cloud computing systems are real-time, safety-critical systems with strong qualitative and quantitative formal requirements. They often need to be reflective and adaptive, and may be probabilistic in their algorithms and/or their operating environments. All this makes these systems quite complex and therefore hard to design, build and verify. To drastically reduce such system complexity I propose the use of formal patterns, that is, formally specified solutions to frequently occurring distributed system problems, in particular those used in web and cloud computing, that are generic, executable, and come with strong formal guarantees. I will explain the semantics of such patterns as theory transformations in rewriting logic; and will give a representative collection of useful patterns to ground all the key concepts and show their effectiveness.