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# Self-Adaptable Languages

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## Résumé

Over recent years, self-adaptation has become a concern for many software systems that have to operate in complex and changing environments. At the core of self-adaptation, there is a feedback loop and associated trade-off reasoning to decide on the best course of action. However, existing software languages do not abstract the development and execution of such feedback loops for self-adaptable systems. Developers have to fall back to ad-hoc solutions to implement self-adaptable systems, often with wide-ranging design implications (e.g., explicit MAPE-K loop). Furthermore, existing software languages do not capitalize on monitored usage data of a language and its modeling environment. This hinders the continuous and automatic evolution of a software language based on feedback loops from the modeling environment and runtime software system. To address the aforementioned issues, this paper introduces the concept of Self-Adaptable Language (SAL) to abstract the feedback loops at both system and language levels. We propose L-MODA (Language, Models, and Data) as a conceptual reference framework that characterizes the possible feedback loops abstracted into a SAL. To demonstrate SALs, we present emerging results on the abstraction of the system feedback loop into the language semantics. We report on the concept of Self-Adaptable Virtual Machines as an example of semantic adaptation in a language interpreter and present a roadmap for SALs.

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