FernUniversität in Hagen

Faculty of Mathematics and Computer Science

Software Engineering

Software Engineering Group

Checking Reference Architecture Conformance

Call for Proposals

In software engineering reference models are used as a guidance for implementing potential solutions to recurring problems, e.g., as reference architecture models, reference data models or patterns in object oriented development. Reference models specify properties that must hold for specific models, e.g., which model elements may or must exist and how they interrelate. Specific architectures, e.g., can then be checked for conformance with an architecture reference model to address organizational needs such as standardization of development efforts or qualitative constraints such as the use of security gateways or REST interfaces. The conformance of data models to a reference model helps, e.g., to align system interfaces, or to ensure that data can be mapped to reference data models, such as industry standards. Pattern compliance increases the understandability and robustness of code, alongside the qualities that the patterns provide.

A major benefit of using reference models is that specific models can be compared to the reference models, and that reference models can be the basis for developing specific models. In [KMR24] we defined reference modeling, conformance checking and incarnation for making it actionable. In [KRS+24] we refined our definitions and implemented conformance checks for class diagrams, feature diagrams, and state charts based on MontiCore languages. The Eclipse Modeling Framework (EMF) [1] is a widespread open source framework for modelling, including the Ecore meta-modelling language for creating your own modeling language.

In this **bachelor's thesis** you will develop a concept for specifying reference model mappings between architecture models made by the architecture specification language employed by the codeling tool [2]. You will conceptualize and implement a conformance checker for class diagrams. You will evaluate your implementation in application use cases to identify the functional correctness and suitable quality. With your work you will enable developers and analysts to define reference architectures, and checking the conformance of concrete architecture models to improve on software quality and time to market.

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[1] https://www.eclipse.org/modeling/emf
[2] https://codeling.org

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References

[KMR24] Marco Konersmann, Judith Michael, and Bernhard Rumpe. *Towards Reference Models with Conformance Relations for Structure*, pages Jürgen Jung; Berlin : Logos Berlin 247–269 (2024). RWTH Aachen University, 2024.

[KRS+24] Marco Konersmann, Bernhard Rumpe, Max Stachon, Sebastian Stüber, and Valdes Voufo. Towards a semantically useful definition of conformance with a reference model. *The Journal of Object Technology*, 23(3):1, 2024.