Karlsruher Institut für Technologie

Institut für Angewandte Informatik und Formale Beschreibungsverfahren

Graduiertenkolloquium Angewandte Informatik

Modeling and Selection of Software Service Variants

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Abstract:
The development and delivery of software services rises the challenge to meet diverse consumer requirements and preferences. One approach to tackle this challenge is to the model, select, and realize service variants. Variants are alternative instances of a service's design, implementation, deployment, or operation. They bear potential for participation and increased reuse of artifacts in software development, and for delivering services to diverse or changing consumer needs. Existing approaches to deal with variability from software product line engineering, however, lack desirable capabilities regarding participation, collaboration, and representation of quality attributes. Further, they need extensions to address the delivery models, artifacts, and distinct roles in services.
This thesis presents service feature modeling, a novel approach consisting of a variability modeling language and a set of corresponding methods to model and select software service variants.
The service feature modeling language extends standard feature modeling from software product line engineering. A typology of feature types differentiates the semantics of features with the goal to utilize service feature models (SFMs) in novel ways. Attribute types represent concerns common to multiple attributes within an SFM to reduce modeling efforts and for attribute aggregation. A novel modeling method considers SFMs to be composed by services, addressing the collaboration of experts in modeling and the integration of software services to contribute parts of an SFM.
Making use of SFMs, a set of methods is flexibly combined for decision-makers to determine which variant to develop or deliver. A configuration set determination method, extending existing approaches with attribute aggregation, produces all valid service variants represented by an SFM. Determined configuration sets are narrowed down with a novel, fuzzy requirements filter. Skyline filtering, adapted from database systems, dismisses service variants that are dominated by others. Preference-based ranking applies a well-known multi-criteria decision making approach to rank service variants based on their fulfillment of preferences. Through abstractions, it aims to enable participation by involving non-technical decision-makers in service variant selection.
This thesis presents an evaluation of the outlined concepts, consisting of multiple parts. A proof- of-concept implementation and a performance evaluation of a SFM tool suite show the realizability and applicability of service feature modeling, including collaborative modeling and all outlined us- age methods. A first use case concerns the development of public services under consideration of service variants, whose selection was driven by citizen participation. A second use case concerns the modeling and selection of Infrastructure as a Service (IaaS) configurations and their automatic consumption and usage, illustrating how service feature modeling can drive the realization of selected service variants. Finally, an empirical evaluation indicates good acceptance, expressiveness, and usefulness and interpretability of service feature modeling.

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Zu diesem Vortrag lädt das Institut für Angewandte Informatik und Formale Beschreibungsverfahren alle Interessierten herzlich ein.

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