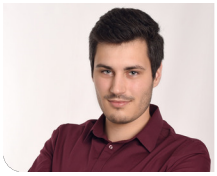
Measuring Software Architecture Quality

Elaborating Metrics to Compare Enterprise Application Architectures

Student



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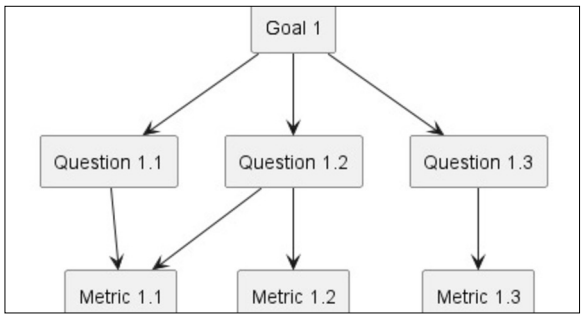
Introduction: The architecture of a software system has a strong impact on the design time and runtime qualities of this system. Hence, the advantages and disadvantages of any chosen architectural style and patterns must be considered to ensure that an architecture is adequate. Software architecture metrics can help with that. Practicing architects want to select and implement suited metrics and measure their system to continuously improve their architecture. This thesis investigated how objective, quantified metrics for the assessment of software architectures can be elaborated and used.

Approach: 1. The state-of-the-art in software architectures for distributed enterprise applications and in software architecture metrics was researched. The thesis reports on existing metrics and leverages the Goal-Question-Metric (GQM) approach to elaborate nine metrics containing multiple measurements; GQM guided the metrics and measurements elaboration process towards a meaningful goal. 2. An exemplary distributed enterprise application employing a service-oriented architecture was analyzed and additional non-functional requirements were specified for it. The existing application was redesigned and reimplemented as a modular monolith. 3. The elaborated metrics were put into practice: a subset of the elaborated metrics and measurements were applied to the existing service-oriented and the new monolithic variants of the sample system.

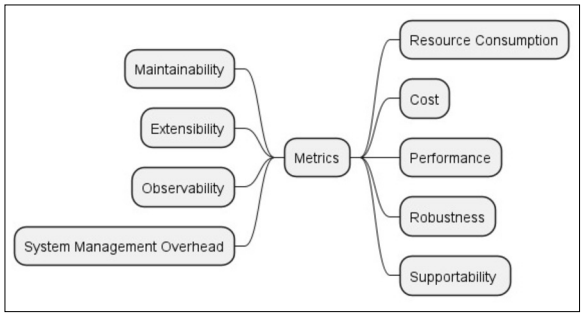
Result: The thesis yielded a software architecture metrics catalog, a systematic approach to elaborate additional metrics and an exemplary evaluation and comparison of selected metrics in the sample case. Furthermore, the conducted measurements were interpreted with respect to their validity and sensitivity.

The hypothesis that different architectures have an impact on the quality of the resulting application was confirmed. Additional metrics should be elaborated and applied to different architectures to investigate this hypothesis further.

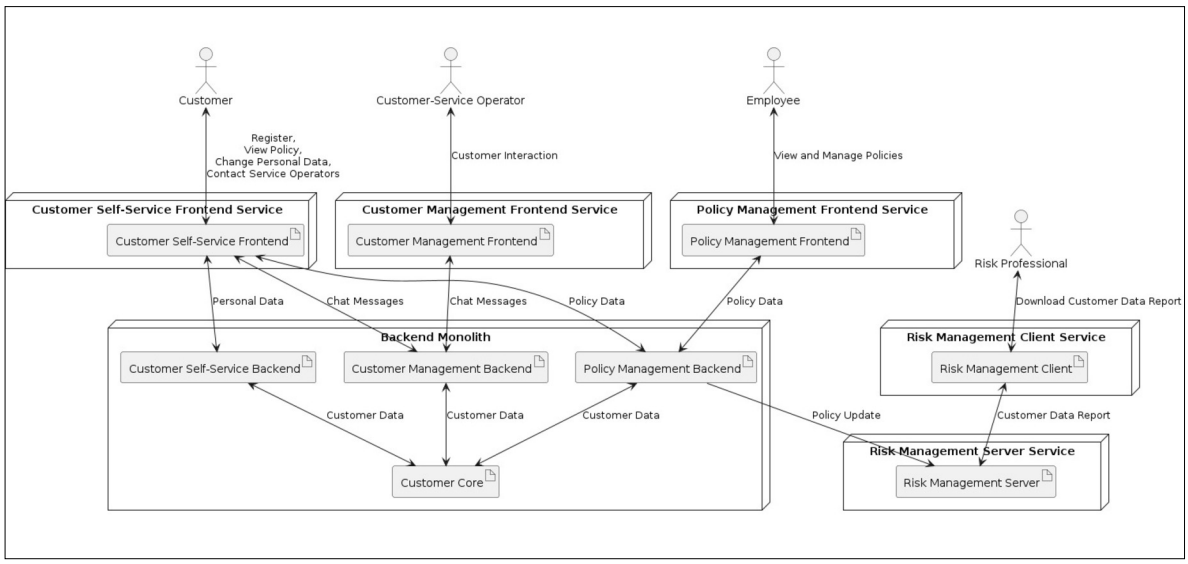
Goal-Question-Metric (GQM) approach: from goals to questions to metrics
Own presentment



Overview of the elaborated metrics
Own presentment



Deployment diagram of the LakesideMutual monolithic architecture
Own presentment



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Subject Area
Computer Science, Software and Systems