# A Fuzzy Quality Model to Measure the Maintainability of Microservice Architectures

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***Abstract*—** Microservice architecture (MSA) is a type of software and systems architecture that is based on the modularization principle. It proposes designing systems employing small-scaled, loosely coupled, and independently deployable microservices. There are several benefits of microservices architecture in terms of maintainability, scalability, and productivity which have led to rise in its popularity. Even though there are several studies about development in MSA, the studies on the quality of the microservice-based systems are limited. In this study, we propose a quality model based on fuzzy logic to measure and assess quality attributes of systems in MSA that can be used by software architects, developers, and project managers. We focus on maintainability of microservices because it is one of the most important quality attributes of software systems. We identified sub characteristics and properties of microservices that affect maintainability, and constructed a hierarchical quality model based on ISO/IEC 250xy standard SQuaRE (System and Software Quality Requirements and Evaluation). Our fuzzy model measures maintainability of microservices in three levels, i.e., low, medium, and high. We provided a basis for the development and application of quality models in industrial practice as well as a basis for further extension. To demonstrate and evaluate our methodology, we used open-source applications designed in MSA. The results show that our method can assess maintainability of microservices realistically.

***Keywords*—***Microservices; Microservice Quality; Quality Model; Quality Measurement; Maintainability*