A CASE-BASED REASONING APPROACH TO QUALITY ASSURANCE IN MICROSERVICE SOFTWARE SYSTEMS

Tkachuk M.V., Zinoviev D.V.
V.N. Karazin Kharkiv National University, Kharkiv

The usage of microservice architectures (MSA) becomes one of the main trends in the recent development of distributed software systems (DSS), and that is why the design of new approaches to ensuring an appropriate level of quality in MSA is an actual scientific and technical problem. The difficulty of its solution is that each MSA is a multi-level software configuration developed using such sophisticated technologies as the containerization (e.g., Docker, Vagrant, etc.) to combine effectively the separate microservices, and the orchestration (Kubernetes, Istio, etc.) to automate an interaction between several containers. The target goal of using all these tools is to ensure a certain level of DSS quality attributes, especially, a productivity and a maintainability, which in turn depend on such MSA properties as the level of its services granularity, and their functional complexity. Due to the multidimensionality of MSA parameters, and its complex operation environment, the task of a quality attributes identification is weakly formalized, and therefore for its solution it is reasonable to use not analytical, but expert methods to find effective design solutions.

In [1] the algorithmic model (AM) was proposed for the assessing the MSA quality in the form of the tuple *AM = <InfoBase, Workflows (ExpMethods), QM>*, where: the *InfoBase* is the information base of the AM, which contains data to be used for the expert methods (*ExpMethods*); the *Workflows (ExpMethods)* is a set of algorithms to implement these methods, and the *QM* is a collection of MSA quality metrics. To continue this approach, we propose to apply the methods of case-based reasoning (CBR) [2], that allow to provide an appropriate MSA quality level via a search for some already existing effective solutions (or precedents) in the similar application area for a target DSS. Each such a precedent *c* is given in the following form $c = (\vec{p}, \vec{s})$, where: $\vec{p}$ is a parameters vector of a target MSA configuration to be defined, and $\vec{s}$ is a parameters vector of a suitable design solution that was already elaborated and applied successfully by DSS development, and the similarity of these vectors has to be measured using some metrics, e.g., the Euclidean distance [2]. The specific parameter values of both vectors $\vec{p}$ and $\vec{s}$ should be defined depending on which MSA quality attributes have to be ensured in the target DSS, and the elaboration of the appropriate design patterns is our further work to be done in this research.

References:

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