A Rule-based Toolkit for Automated Generation of Microservices Architecture

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Abstract

Software applications play a critical role in current business world; hence it is necessary to design a quality and a sound architecture which facilitates it to become a scalable, extensible and highly available solution. In terms of designing and developing software applications, software engineering community has started shifting towards serverless-microservices instead of building large monolith applications.

It requires high experience and expertise to understand each business scenario along with considering non-functional requirements too to design a high-level software architecture which would be the ground point for a software application. The traditional manual process of doing the above is tedious as well as can be error prone when architecture designing is done without proper experience and expertise, which could eventually degrade the quality of the software application.

We introduce TheArchitect, a rule-based system providing a tool-based support in order to design the best fitted high-level architecture containing serverless microservices, preserving the identified non-functional requirements too, for any given application. Furthermore, TheArchitect provides the ability to a software engineer also to generate a high-quality high-level architecture even without an experienced software architect. Considering the increasing tendency within the software engineering community to move away from monolith application development towards microservices-serverless based application development, TheArchitect has also been developed focusing on generating high-level application architecture designs based on serverless-microservices.

TheArchitect was used to generate architecture designs for restaurant management domain. System generated architecture designs for two real world applications and how experienced architects' modifications are incorporated as modified rules for future designs have been discussed. Further a performance evaluation is conducted on TheArchitect to provide an analysis on the time it takes to process the requirements and design the architecture for various real-world systems along with an industry user study is presented evaluating the usability of TheArchitect.

Keywords: Software Architecture, Microservices Architecture, Serverless Architecture, Domain Driven Design, Architecture Evaluation

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HTTP	Hyper Text Transfer Protocol
API	Application Programming Interface
AWS	Amazon Web Services
ADL	Architecture Description Language
DDD	Domain Driven Design
DSSA	Domain Specific Software Architecture
BAAS	Backend-as-a-Service
MBAAS	Mobile Backend-as-a-Service
FAAS	Function-as-a-Service
BFF	Backend-for-Frontend
SOA	Service Oriented Architecture