

Simulation-based resilience prediction of microservice architectures

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Abstract. Current software simulators are tailored towards one specific purpose of conservative software simulation. Given the success of these tools it would be useful to run these tools on microservice architectures. This paper will focus on the development of a simulator that can be used for microservice architectures.

1 Introduction

Hier werden wir beschreiben was wir erreicht haben und wie wir unser Projekt angegangen sind. Es wird außerdem erläutert wie wir in diesem Paper vorgehen und was für Themengebiete genauer betrachtet werden.

2 Research

2.1 Tools in Comparison

Spigo During our research on existing tools for microservice simulation we discovered a tool called spigo. It was written by Adrian Cockcroft a Amazon Web Services employee in the programming language go. Therefore the name spigo comes from Simulate Protocol Interactions in Go.

On the first view the tool looked very promising. Spigo contains a fairly simple JSON input and the structure of the parameters is intuitive. Each microservice architecture consists of multiple microservices. Each microservice has a name, a package inheritance a counter of the instances and dependencies to other microservices. The reason we like this tool is because it can simulate the occurrence of an error. Spigo uses the error monkeys from the simian army. But here lies already one of the biggest disadvantages. One can only simulate the failure of a single microservice during the execution.

Simulizar Simulizar is an extension of the Palladio Component Model. The tool is able to adapt to changes that the software under simulation does at runtime. This helps i.e. at observing on load-balancing.

- analyzing self-adaptive systems (cloud-computing)

- non functional property prediction (performance/reliability/maintenance/-cost)
- modeldriven architecture
- helps to find bottlenecks/load-/scalingproblems

GreenCloud With this tool we tried a different approach. Greencloud was desinged to calculate the energy consumption of datacenters[1, P.1]. Knowing that this was kind of a long shot we had the idea to take a simulator that simulates distributed objects and map microservice abilities and requirements to these objects. Since the simulator was written to overlook datacenters and their components a mapping would mean that the entire microservice system would be mapped to a datacenter in the current GreenCloud simulator. Instances of microservices would compare to a server [CITE S2] that gathers metrics. These metrics are currently power consumption, CPU- utilization and workload [CITE S3] should be changed or replaced to throughput whatever metrics we require from a microservice.

3 Simulatorspecification

4 Simulatordocumentation

5 Conclusions

These are my conclusions.

References

- [1] D. Kliazovich, P. Bouvry, Y. Audzevich, and S. U. Khan. Greencloud: A packet-level simulator of energy-aware cloud computing data centers. In *2010 IEEE Global Telecommunications Conference GLOBECOM 2010*, pages 1–5, Dec 2010. doi: 10.1109/GLOCOM.2010.5683561.