



Bachelor Thesis

2015-05-12

System for automated verification of horizontal scaling actions for a distributed application

Context

To be able to manage growing workloads of an application, the application needs the ability to scale out when needed. There are languages to model rules and actions for the scaling of applications, e.g. the Scalability Rule Language (SRL). Here you can model situations of a system that indicate that executing a scaling action is beneficial.

For the definition of scaling rules is mostly a manual task, it is necessary to help the developer by providing feedback on whether the application of a rule had some positive effect. Also, the runtime system may use such information in order to for instance ignore the rule in the future or even automatically adapt it.

The Cloudiator tool provides mechanisms to configure and install SRL-based scalability rules. The contained SRL Engine further enacts the scaling actions once an SRL rule has matched. Also, the platform provides a high-level API in order to access the monitoring data and the rules executed.

Scope of the Thesis

This thesis aims at establishing a mechanism that validates the usefulness of a scalability rule based on comparing the performance of the application before and after scaling. In order to do that, the first step of this thesis comprises the selection of an example application. You may either select your own or build on earlier experiences we gathered with distributed databases such as Couchbase.

You then define scaling rules for this application based on its load. For the scope of this thesis, considering horizontal scaling only is sufficient, that is adding new instances (e.g. new databases) of application components.

Ideally, you base your scaling rules on at least one key performance indicator (KPI). This may for instance be the maximum processing time per request. In any case your KPI should be used to validate the quality of the scalability rule and whether the system remains in a state with stable performance.

The outcome of the thesis are as follows. You have created a benchmark-like tool, that allows dynamically increasing and decreasing the workload of the system. You have selected an application and defined a scaling rule as well as a service quality based on KPIs. You have identified missing capabilities of the SRL.

Requirements and Comments

If this thesis achieves good progress and outcome, its results are to be integrated in the PaaSage research project (<http://paasage.eu>) which is released under an OpenSource license. For that reason, we appreciate if you are ready to OpenSource your results.

If you are interested in this or similar theses, please contact Frank Griesinger either by mail or directly in his office.

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