Master Thesis

Making the Cloud Self-Stabilizing

Motivation

The Cloud is envisioned as a platform that simplifies deployment and development in the datacenter, as well as delivery of flexible services. Such increased usability and scalability should encourage wider utilization of the cloud computing model. The next generation cloud platform hence addresses important pain points of both developers and datacenter managers. At the heart of the Cloud lie two main ideas: automation and distributed control. Together, they provide an attractive and flexible abstraction, offering a high efficiency and resiliency.

Challenge

With this project, we aim to contribute a main feature to the Cloud: self-stabilization, a very strong notion of fault-tolerance. In a nutshell, a self-stabilizing system ensures that after the occurrence of an arbitrary combination of failures (either arbitrary failures or due to an attack), the distributed system will eventually recover to a desirable state.

The Cloud relies on a high degree of decentralization, and cloud operating systems and services are distributed, in which resources belong to the resource manager rather than the services. Self-configuration is a key principle underlying since it eliminates the role of centralized components (e.g., databases), which can be a single point of failure.

Our approach revolves around the following:

**Automation of scaling and recovery:** It is required fully decentralized service deployments that has no single points of failure and yet allow automated and incremental scaling up (or down) the system redundancy degree, e.g., the number of virtual machines.

**Adaptiveness:** One of the key expectation from the Cloud is to have a system support for the dynamic needs of the system. This includes responding to the changing demands of the application as well as the system agile needs to recover from any failure.

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**Background & Requirements**

- Computer Science or related programs
- Courses in computer networks, distributed systems, or related ones
- Solid experience in C or C++
- Experience with Linux

**Contact**

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