

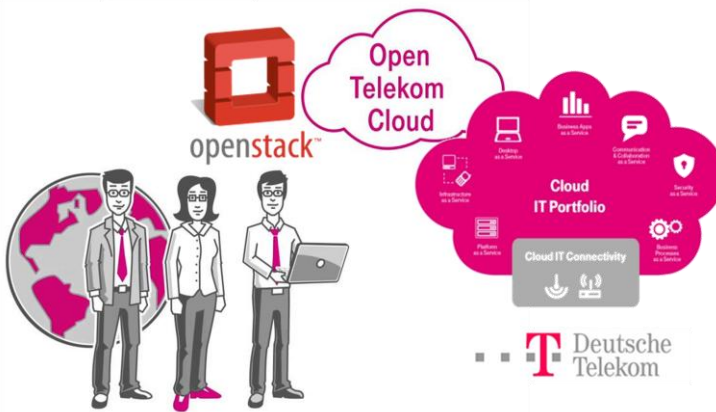
Reliable Cloud Computing with OpenStack

(Internship Position m/f)

OpenStack Cloud OS

OpenStack is a cloud operating system (Cloud OS) for building public and private clouds. It can control pools of compute, storage, and networking resources located in large data centres. It is supported by major IT players in the world which include IBM, HP, Intel, Huawei, Red Hat, AT&T, and Ericsson.

At Huawei Research we are currently developing the next generation of reliable cloud platforms for Deutsche Telekom. The Open Telekom Cloud¹ engineered by Huawei² and operated by T-Systems was launched at CeBIT 2016 and delivers flexible and convenient cloud services.



OpenStack Reliability

Reliability is a measure of the percentage uptime of OpenStack services to customers, considering the downtime due to faults. Many cloud providers are setting a reliability level of 99.95%. This means that if you provision a VM it will be available 99.95% of the time, with a possible downtime of 21.6 minutes per month. Reliability is an important

characteristic which enables platforms to adapt and recover under stress and remain functional from a customer perspective.

Project Goal: Fault Library for OpenStack

In this master project, we want to increase the reliability of OpenStack using **Fault Injection** techniques. Pioneers, such as Amazon, Google, and Netflix, have already developed mechanisms to improve their cloud platforms reliability (e.g., Game Day and Chaos Monkey).

We will approach our goal from two sides:

1. Develop a **Fault Model** to provide a common data structure for faults. It abstracts common characteristics such as when, how, and where should faults be injected. A fault model facilitates the reasoning and understanding of the types of faults (e.g., process-based, data-type based, components and services, deterministic vs. non-deterministic) and enables to develop automated solutions for high reliability.
2. Develop a **Fault Library** to store, access, and retrieve fault instances structured according to the fault model. At the moment, no fault library exists for OpenStack. As a result, generic fault libraries, such as OS and hardware libraries, are used to test OpenStack which are inadequate since they are agnostic to the inter- and intra-communication of OpenStack components and services.

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¹ <https://cloud.telekom.de/en/cloud-infrastructure/open-telekom-cloud/>

² <http://e.huawei.com/uk/products/cloud-computing-dc/cloud-computing/fusionsphere/fusionsphere>