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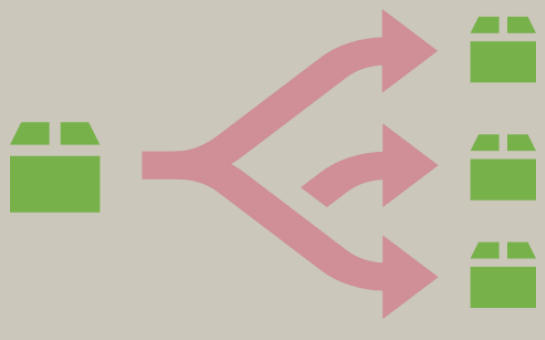

OPEN DAYLIGHT

Master Thesis

2015-04-27

Fault-tolerant TCP Connections (with SDN)

Context

Modern large-scale distributed software systems are mostly designed such that all components are only loosely coupled and hence do not depend on each other too much. This enables tolerating failing components and providing a sufficient quality of service for day-to-day applications. The weak spot of such applications, however, is that their service is exposed over non-fault-tolerant protocols such as HTTP and TCP to the outside world (i.e. users with browsers). In particular, the failure of central entry points into a network such as gateways and load balancers yield the risk of disconnecting clients.

Software-defined Networking is a sort of network abstraction technique. It is realized by decoupling the system that takes the decision of where traffic is sent (control plane) from the systems that actually forward the data to the receivers (data plane). One mechanism of how control plane and data plane can communicate is the OpenFlow protocol, e.g. configurable through the OpenDaylight platform.

Scope of the Thesis

The goal of this thesis is to evaluate and implement the feasibility of protecting TCP connections against server failures in a way transparent to the clients. This solution may be based on SDN, but not necessarily has to.

In any case, the connections shall be made both available and reliable. In a first step, the TCP protocol shall be re-visited and potential hooks for establishing reliability shall be identified – also in agreement with related work. In a second step a prototypical implementation for a Linux-based system shall be designed and finally realised as the third step. The final task is to evaluate the overhead of the fault-tolerance implementation under various connection properties (short vs long connections, high vs low load, much vs little traffic) and compare it to non-fault-tolerant connections. In addition, the reasons for the overhead shall be identified and optimisations be proposed.

Requirements and Comments

If this thesis achieves good progress and outcome, its results are to be integrated in the Virtual Nodes project (http://www.uni-ulm.de/in/omi/projekte/virtualnodes.html) 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 Jörg Domaschka either by mail or in directly in his office.

mail: joerg.domaschka@uni-ulm.de
office: Uni West, 43.2.217

Faculty of Engineering and Computer Science

Institute of Information Resource Management