Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Prof. Laurent Vanbever
Networked Systems Group

Networkd-Wide Configuration Fuzzing

Semester/Master Thesis Proposal

Computer networks researcher often face the problem of data scarcity: One develops a new configuration analysis or verification system, but is lacking a broad set of real (or realistic) network-wide configurations to systematically evaluate and benchmark that system. This is mostly due to the fact that network operators are reluctant to make their configurations public because of business and security concerns.

The goal of this thesis is to develop a system that automatically generates a wide range of realistic, network-wide configurations. Several tools already exist that allow to synthesise configurations from high-level policies [1–3]. However, these configurations are highly homogeneous and lack variability: The configurations only rely on a single protocol or only employ the same features all the time.

One way to introduce more heterogeneity could be to use a technique called fuzzing [4]. Fuzzing is heavily used in software engineering to thoroughly test a computer program. Its main principle is to automatically generate random inputs and then to observe the behavior of the program (e.g., whether it crashes or not). Through its randomness, it adds variability to the tests and is therefore especially effective at exposing corner cases that are not covered by the traditional hand-written tests.

In this thesis, you will build a configuration fuzzer that automatically generates a wide set of network configurations for a given topology using different protocols and features.

There are many applications and use-cases for such a configuration fuzzing tool beyond generating configs to better evaluate networked systems. We are happy to discuss them with you.

Contact

- Rüdiger Birkner, rbirkner@ethz.ch
- Prof. Dr. Laurent Vanbever, lvanbever@ethz.ch

References

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