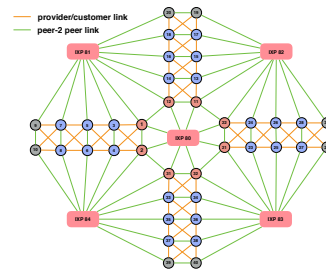


Network virtualization – creating arbitrary networks with one click

Semester thesis proposal

In the Communication Networks lecture^a we have two practical group projects. In the first one, the students build a “mini Internet” out of virtual Quagga routers [2]. The second project focuses on the transport layer and the students program simple sender and receiver applications to transmit data using Scapy [3] – a Python-based library.

^a<https://comm-net.ethz.ch/>



For the mini Internet project, the implemented topologies change from year to year. In addition, the number of students attending the lecture is increasing making it more challenging to run all the virtual components on a single server. It is therefore important to be able to define arbitrary network topologies and run them in the most resource-efficient way.

This semester thesis explores and compares different virtualization techniques. The best approach is then used to improve existing scripts with the end goal to release the entire mini Internet framework as an open source project. More precisely, the thesis can be divided into the following main work packages:

- **WP1:** Compare different virtualization techniques. There are multiple possibilities to run a virtual network, from “heavy” approaches, such as full-blown VMs, to lightweight container solutions (e.g. Docker-based [1]). How easy is it to access and configure the networks? How much resources are needed to run multiple networks at the same time?
- **WP2:** Improve existing code to easily build arbitrary networks based on the best virtualization technique found in WP1. In the end, we would like to publish the framework as an open source project.
- **WP3:** Add new features to the mini Internet project. Examples could be the possibility to connect the virtual networks with the “real” Internet or the addition of traffic-based billing between different ASes.

Requirements

- Attendance of the Communication Networks lecture.

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References

- [1] Docker. <https://www.docker.com/>.
- [2] Quagga routing suite. <https://www.quagga.net/>.
- [3] Scapy. <https://scapy.net/>.