Thesis M.Sc.

IDP, Guided Research

Benchmarking a P4 Software Target Using Synthetic, Composed and Realistic Tests

Motivation

P4 (www.p4.org) is a programming language intended to describe the behavior of packet processing systems. P4-enabled devices offer higher flexibility; they can be programmed to act as a switch or a router – but it does not stop there – the design of entirely new functions and devices becomes possible and gets as easy as just replacing a piece of software without the need to change any hardware.

P4 programming language

The P4 pipeline is modularized and can be broken into different compoenents: (de-)parser, match-action tables, . . . These components have further properties, e.g. header fields, size of header fields, . . . We want to analyse the impact of individual features on the device performance. Based on this, we want to analyse the combination of such features in composed tests, resulting in a platform-specific performance model. Finally, a real-world example (e.g. L2 learning switch) can be broken down to the analysed basic components and features. We want to analyse the performance of this example, compared to what the performance model based on the analysis of individual features would have predicted.

All measurements will be performed using the software-based t4p4s P4 switch.

Your Task

We will provide existing material to setup and perform measurements with t4p4s in our testbed.

- Familiarize yourself with P4 and t4p4s
- Break down example programs into components
- Analyse individual components and their features
- Analyse composed programs based on the individual components
- Derive performance model
- Analyse the example program and compare to performance model

Aside from programming in P4, parts of the switch, which is implemented in python and C, may have to be modified.

Contact

Dominik Scholz	scholz@net.in.tum.de
Henning Stubbe	stubbe@net.in.tum.de
Sebastian Gallenmüler	gallenmu@net.in.tum.de