Chair of Network Architectures and Services
Department of Informatics
Technical University of Munich

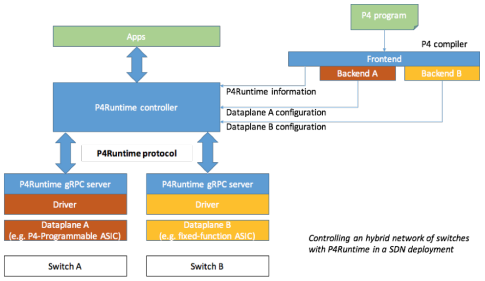
Thesis M.Sc.

IDP, Guided Research

A Framework for Automated Analysis of P4Runtime

Motivation

P4 (www.p4.org) is a programming language intended to describe the behavior of packet processing systems. It allows to program the data plane behavior of the switch or router by parsing packets, applying match+action tables to them and deparsing packets before sending them.
How the data plane objects (table entries, switch program, external functionality, . . .) can be managed from the control plane at runtime is an open problem. The problem is that different hardware vendors propose custom control plane interfaces to access their device with P4 capabilities. The P4 API working group has proposed *P4Runtime* to solve this problem [1]. This protocol-independent API is based on Protobuf and gRPC and allows to manage P4 runtime objects.
We want to implement a framework that can evaluate performance indicators similar to for instance OFLOPS [3] in an automated and platform-independent fashion. Considering that other platforms will implement P4Runtime, we can then apply our framework to these platforms and analyse and model the runtime behavior.



P4Runtime Architecture

Your Task

Introductory material regarding P4 and P4Runtime is available form the recent P4 developer day [2].

- Familiarize yourself with P4Runtime and related concepts e.g. for OpenFlow
- Design and implement a toolchain/framework to analyse different aspects of P4Runtime
- Extend framework to analyse interesting aspects (rule update latency, . . .)
- Evaluate and model performance for Mininet P4 bmv2 target

Programming in P4 is not required. P4 target (bmv2) is based on Mininet (python knowledge required), P4Runtime is programmed in C/C++.

Sources

- [1] https://p4.org/api/announcing-p4runtime-a-contribution-by-the-p4-api-working-group.html
- [2] https://p4.org/events/2018-06-06-p4-developer-day/
- [3] Rotsos, Charalampos, et al. ”OFLOPS: An open framework for OpenFlow switch evaluation.” International Conference on Passive and Active Network Measurement. 2012.

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