Thesis B.Sc.

Thesis M.Sc.

IDP, Guided Research

P4: **P**rogramming **P**rotocol-Independent **P**acket **P**rocessing

Motivation

P4 is a programming language intended to describe the behavior of packet processing systems. P4 was introduced in 2014 and can be used to define entirely new networks with new protocols which behave differently from the networks we currently use.

P4 programming language

This is possible because P4 allows to program P4-enabled forwarding devices. Currently forwarding devices like switches or routers can only be configured or programmed in a rather restrictive way. For instance, only certain protocols with pre-defined functions can be used. 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.

Software implementations of P4 (www.p4.org) are already available, which can be used for development of P4-based protocols. Of particular interest are the capabilities of P4 to implement packet scheduling which is used to implement different service qualities on a network. While initially scheduling is not supported by P4, new methods have been developed that potentially allow to extend P4. This in combination with other possible extensions opens the doors for metering, multicast, time constraints, quality of service, ..., making P4 a powerful language for future networks.

Currently only software implementations exist, but a hardware switch directly supporting P4 is currently under development and expected to be available in 2017. Integrating a P4-capable device into our chairs testbed for automated and reproducilbe measurements would allow for even more tasks.

Tasks

This topic offers manifold tasks: low-level C programming, compiler design/optimization, . . . ; but also high level implementation of a protocol or switch/router design.

- Performance drill-down/improvement of existing implementations of P4

- Extending the functionality of existing implementations of P4

- Implementing and evaluating new protocols with P4

- Do you have a concrete idea? Contact us!

Contact

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