**Thesis B.Sc.**

Thesis M.Sc.

IDP

Icebears and bees - eBPF in P4

Motivation

P4 is a programming language that describes 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. Compilers exist for various targets (software, FPGA, SmartNIC, ASIC). One of these targets is the software target `t4p4s`, which builds upon the Dataplane Development Kit (DPDK), a high-performant framework for packet processing in the userspace.
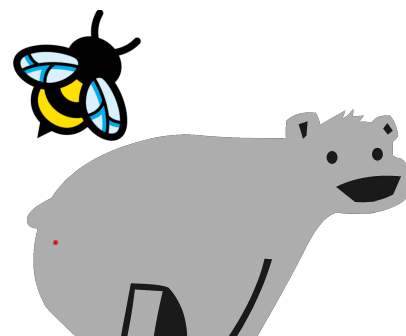
eBPF (extended Berkeley Packet Filters) allow a flexible way of writing extensions to the kernel processing path. These programs are run on a virtual machine and are either just-in-time compiled or interpreted. eBPF can be used, e.g., to filter packets. Its functionality is also used in current hardware network devices like the Netronome Agilio.

In this thesis, we want to combine the possibilities of P4 and eBPF by implementing an eBPF extern for `t4p4s`. The P4 pipeline can then call this, which further increases the capabilities of such data planes. During the thesis, different approaches can be compared and investigated for their performance implications and advantages. One possible implementation is the one coming along with DPDK.

Tasks

The thesis requires diving into *DPDK*, and *t4p4s*:

- Get familiar with involved technologies and programs
- Integrate (e)BPF into `t4p4s`
- Experiment with different approaches
- Systematically evaluate the implementation

Requirements

- Experience with C/C++ programming is recommended
- Experience with Linux is required
- Experience with P4 and eBPF is beneficial

Sources

- https://p4.org/
- https://ebpf.io/
- https://github.com/P4ELTE/t4p4s

Contact

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