



Bachelor Thesis

2017-06-12

Analyse the implementation scopes of P4 language

Context

Programming Protocol-Independent Packet Processors (P4) is a programming language, mainly used for designing packet-processing functionalities of forwarding-plane devices such as NICs, hardware or software switches, routers, firewalls etc. It was first presented in SIGCOMM conference in 2014.

Programs written in P4 language are independent of implementation. This means that the programs can be compiled and executed in different types of machines, for example : FPGAs, general-purpose CPUs, system(s)-on-chip, ASICs, network processors etc. These machines are called P4 targets and they should provide a compiler. The P4 source code will be executed by the compiler and will be mapped into a switch model.

One can design the entire network system with the help of P4. The language provides full flexibility on adding or reducing protocols on the network. The customization of packet-processing functionalities is independent of the underlying hardware. The language can not be used to modify the control plane of a packet-processing device, rather it can be used to define the packet-handling behaviour of the data plane. The compiler creates an API between the control plane and data plane.

Scope of the Thesis

The goal of this thesis is to realize a P4 language based switch design that is treating different traffic types (e.g. bulk traffic and low latency traffic) differently giving priority in processing to the low latency traffic. Beside a functional qualitative evaluation (using the mininet emulation), the ability to produce instantiation for different hardware environments and a quantitative analysis of their performance are part of the evaluation.

Related research work can be found in the official website of P4 (www.p4.org) and in particular the specification document contains examples for switch specifications.

Requirements and Comments

1. Knowledge on fundamentals of data-forwarding devices (switch, router etc.)
2. Knowledge on data centre networks
3. Skills in a functional or object oriented programming language

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