(Demo) MACSAD: An Exemplar Realization of Multi-Architecture P4 Pipelines

Abstract

Despite having received less attention compared to the control and application plane aspects of Software Defined Networking (SDN), datapaths are critical to achieve full network programmability as envisioned by ongoing efforts like P4. This demo presents our efforts towards SDN dataplans concurrently offering three contending characteristics, namely, programmability, portability, and performance. Our proposal called Multi-Architecture Compiler System for Abstract Dataplanes (MACSAD) combines the high-level protocol-independent programmability of P4 with low-level cross-platform (HW & SW) APIs brought by the OpenData Plane Project (ODP). The focus and main contributions of this activity are on portability and performance of MACSAD pipelines. We consider different packet I/Os (DPDK, Netmap, Socket_mmap) and target platforms (x86, ARM) with 10G, 40G and 100G interfaces while exploring different pipelines of varied degree of complexity written in P4

Our initial work showed the first proof of concepts [1,2] towards Portable Dataplane Applications which can seamlessly work on different target platforms including bare-metal switches, x86 servers, ARM based servers and also the ability a possibility to embrace use cases around Virtual Network Functions (VNFs) too. P4 and ODP were the obvious choices for us despite these two projects just started showing their mantle recently and brought lots of challenges due to their unique and fresh approach to solve dataplane programmability obstacles. P4 helped us to define different use cases using very high level network abstractions while ODP laid down a strong foundation for portability. We contributed into bringing P4 abstractions on to the level of ODP and implementing a simple PISA style packet pipeline.

Going forth we started exploring 3 new directions [3]. First, we focused on performance improvement to be able to leverage higher throughput systems. Second, being determined to stay updated with P4 language development, we added support for P4

In this demo, we present our MACSAD compiler system capable of creating various dataplanes written with P4

References


2. MACSAD: High performance dataplane applications on the move [Accepted: IEEE HPSR’17]

3. MACSAD: Multi-Architecture Compiler System for Abstract Dataplanes (Aka Partnering P4 with ODP) [Accepted: ACM SIGCOMM’16 Demo and Poster Session]

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