Innovating in Your Network with OpenFlow: A Hands-on Tutorial

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Abstract. *OpenFlow is an open interface for remotely controlling the forwarding tables in network switches, routers, and access points. Upon this low-level primitive, researchers can build networks with new high-level properties. For example, OpenFlow enables more secure default-off networks, wireless networks with smooth handoffs, scalable data center networks, host mobility, more energy-efficient networks and new wide-area networks – to name a few. This tutorial is your opportunity to gain hands-on experience with the platforms and debugging tools most useful for developing network control applications on OpenFlow. Following an introduction, each participant will turn the provided hub controller into an Ethernet switch, then a flow-based switch, and finally a firewall or router - you get to choose. Along the way, you'll learn the full suite of OpenFlow debugging tools: you'll view flow tables with dpctl, dissect packets with Wireshark, visualize with LAVI, slice with FlowVisor, and simulate a multi-switch, multi-host network with Mininet on your laptop. After the tutorial, you can apply what you've learned to physical networks based on software switches, NetFPGAs, or even hardware switches at line rate.*

The only requirement is to bring a laptop; no experience is required.

References

McKeown, N. et al. (2008) "OpenFlow: enabling innovation in campus networks" In: ACM SIGCOMM Computer Communication Review, 38(2):69–74, April 2008.

Biographies

Brandon Heller is a third-year Ph.D. student in Computer Science at Stanford University, with research interests in data center networks and energy efficiency. Brandon currently maintains the OpenFlow specification. His most recent work was ElasticTree, a system to dynamically optimize the energy consumption of data center networks, while taking care to respect performance and fault tolerance considerations (see the NSDI 2010 ElasticTree paper). Other projects include powernet.stanford.edu, a measurement infrastructure for understanding IT-related power consumption at the

scale of an entire building, and Ripcord, a modular platform for building data center networks.

Masayoshi Kobayashi received his Bachelor's and Master's engineering degrees from Kyoto University, Japan in 1995 and 1997, respectively. In 1997, he joined NEC and became involved in research including high-speed routers, TCP congestion control and network measurements. Since 2007, he has been with Prof. Nick McKeown's group at Stanford as a visiting researcher from System Platforms Research Laboratories, NEC Corporation, Japan. Masa was one of the first to be involved in the OpenFlow project, leading the mixed wired and wireless production deployment at Stanford, in addition to contributing to award-winning OpenFlow demos at SIGCOMM in 2008 and 2009.