Chair of Network Architectures and Services
Department of Informatics
Technical University of Munich

Thesis B.Sc.

Thesis M.Sc.

Large virtualized network measurements

Motivation

Using SR-IOV, it is possible to share hardware network interfaces with multiple virtual machines using passthrough with bypassing the hypervisor reducing the virtualization overhead. Using SR-IOV for setting up a complete measurement infrastructure will lead to improved measurement results compared to complete virtualized solutions by mitigating the overhead of providing large network topologies using hardware hosts especially with setting them up in a flexible way [2]. SR-IOV is used in our Scenario with the IOMMU for direct memory access. We want to use the proposed setup for experiments on larger networks [1]. We developed a possibility to setup an arbitrary topology using SR-IOV and the chair's testbed orchestrator, but as of now it is not possible to expand the topology over multiple hardware hosts and automatically assign the Virtual machines and connections. This is required as complete cores are necessary for the virtual machines to reduce interferece with the hypervisor, but this reduces the available resources. Without spanning over multiple hardware machines our limit at the moment are 20 virtual machines in the topology simulating hosts, routers and switches.
Therefore, the aim of this thesis is to evaluate the existing approach, extend it to span over multiple hosts and evaluate the best placements for various topologies using our Chair's testbed resources.

Your Profile

- General interest in computer networks
- Experience with Linux and Python programming
- Experience with virtualization Solutions
- Interest in Optimization problems is beneficial

Your Tasks

- Conducting research on single-root I/O-virtualization
- Analyze the currently existing solution
- Extend it to build topologies over multiple hardware hosts
- Evaluate and discuss the results

Literature

[1] L. Breslau, D. Estrin, K. Fall, S. Floyd, J. Heidemann, A. Helmy, P. Huang, S. McCanne, K. Varadhan, Y. Xu, et al. Advances in network simulation. *Computer*, 33(5):59–67, 2000.

[2] S. Gallenmüller, J. Naab, I. Adam, and G. Carle. 5G QoS: Impact of Security Functions on Latency. In *2020 IEEE/IFIP Network Operations and Management Symposium (NOMS 2020)*, Budapest, Hungary, Apr. 2020.

Contact

Florian Wiedner wiedner@net.in.tum.de
Benedikt Jaeger jaeger@net.in.tum.de