

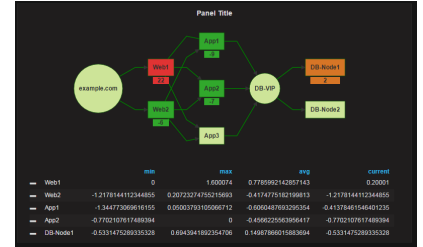
Thesis
M.Sc.

IDP

A Framework for Visualization of Network Metrics

Motivation

Performing network experiments often results in huge loads of data being generated that need to be visualized. In many cases, this data is about certain metrics per node (processing time, ...) or link (bandwidth utilisation, ...). In the past years lots of research and new techniques on how to extract this information in a timely manner have been developed, most notably In-band telemetry (INT) using the P4 language and capable devices in recent years [0]. The obvious benefit of such mechanisms is to better understand a network, its current state, error cases and how to improve/react to them in a timely ("live") manner (e.g. overloaded links/nodes, ...). This work focuses not on the gathering of such data, but rather on how to visualize them in a generic and automated manner.



<https://bit.ly/2zucEjq>

The framework should be generic to be useful for different scenarios and projects: **Input:** a network topology (e.g. matrix of hosts and links) and a set of metrics (per node and/or per link).

Output: a database scheme to store the metrics over time and browser-based time series visualization of the metrics. Optional - for live visualization - a live view of the current state as network weather map.

Tasks

- Create a simple topology and measurement scenario in Mininet [1]
- Extract the topology and metrics as input for your framework
- Develop the visualization framework
 - Setup a database for data storage over time for the topology
 - Integrate Grafana [2] for time series visualization of the metrics
 - Optional: Integrate a network weathermap (e.g. [3]) for live visualization

The setup of the framework should be automated (e.g. ansible [4]). Basic knowledge working with a database (e.g. postgres or graphite) required. Live visualization is optional (requires knowledge in Javascript), alternative is focusing on data acquisition, i.e., determining a network topology using e.g. LLDP and capturing metrics e.g. using INT with P4.

Sources

- [0] <https://p4.org/specs/>
- [1] <http://mininet.org/>
- [2] <https://grafana.com/>
- [3] <http://otm.github.io/networkmap.js/>
- [4] <https://www.ansible.com/>

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