goSDN
A model driven SDN controller for operations, research, and teaching

Opensource WG, RIPE 90 Meeting

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Why yet another SDN controller?

Prior Art

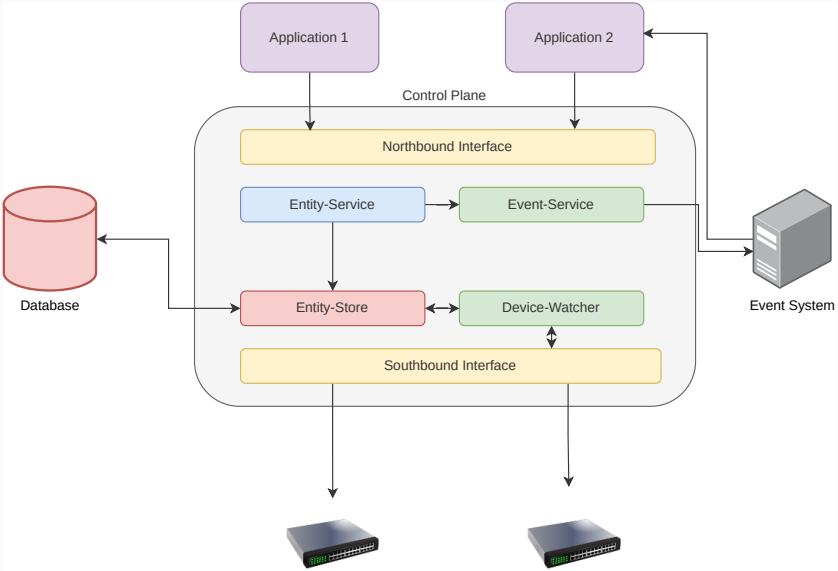
- A lot of existing SDN controllers ((μ)ONOS, OpenDayLight, etc.)
- Older ones of them are build around OpenFlow
  - it is one protocol, but not the only one, and outdated
- Too big ships
  - aim to support all imaginable SDN protocols
  - huge, incomprehensible code base
  - no or incomplete documentation
  - complex operations setup
  - guess why μONOS was started...
- Usable in Research, Operations, and Teaching?
  - not in our experience
  - other controllers spawned in the mean-time too

Why build yet another SDN controller?

- Our need for clean, well-documented code basis
  - in research projects and for our teaching
  - **we want to know how it works**
- Stable & well-understood SDN controller for our lab operations
- Build with state-of-the-art technologies
  - **model driven software engineering** with **YANG** models
  - gNMI/GRPC/TLS message transport
  - Go language, ygot YANG tools

Architecture of goSDN

Architecture

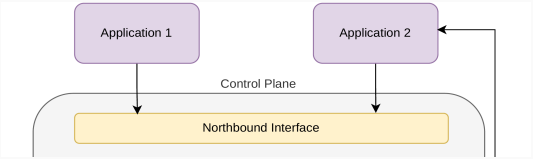


Key Facts

- Data model generated out of YANG data models with **ygot**
- Northbound protocol: **gRPC** and **HTTP**
- Southbound protocol: **gNMI**
- Persistence via **MongoDB** or **etcd**
- Events via **RabbitMQ**
- Currently the core and all apps are written in **Go**

Applications

- goSDN core is extremely lightweight
- All network/business logic should be provided as application
- Can subscribe on entity events
- Interact with device representation provided via **YANG**



Wrapping it up

Is goSDN used anyhow?

- All BSD-3 open-source – feel free to try it
  - see links to repos at the end
- Teaching (Master-level)
- Ongoing Bachelor & Master theses in da/net group
- SDN controller for Quantum Key Distribution Network (QKDN)
  - BMBF DemoQuanDT[1]
  - Darmstadt Quantum LAN (DaQLAN)

[1] www.forschung-it-sicherheit-kommunikationssysteme.de/projekte/demoquandt

Meta-Goals & Learnings

Do it yourself Enable students in network tech

- Teach well-understood pieces
- no $vendor academy
- *digital sovereignty*? -> **digital independence**

Evolve (Student) Abilities Combine Science & Engineering

- it's not only networking (protocols)
- software engineering
- coding skills
- what is my hardware doing here anyhow?
- international team work
- (customer) requirements engineering

Work Force and Commitment

Work Force Public Money – Public Code

- University's resources: limited man power & infrastructure
- student's contributions
- public research funding
- sometimes industry funding, too

Commitment use the code for teaching and keep improving

It's hard work time consuming, needs resources, getting funding isn't always easy, but it pays off

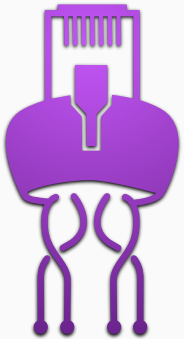
A Final Question...

Can something (a)like this help us in Europe to take-off and develop our own technological skills and products?

- it isn't as shiny as the **Euro Stack**[2] initiative
- but it has running and deployed code...
- though it is just one piece of a bigger tech picture.

[2] https://www.euro-stack.info/

Further Information



GoSDN

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