

**NOKIA**



CONTAINERlab

# DevOps approach to network labs

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LINX117



# Network labs

A right, not a privilege

1

Test config changes before pushing to production

2

Prototype solutions

3

Learn new technologies

# Declarative domination

A de-facto standard in infra/service provisioning

IT Infrastructure/Workloads



**kubernetes**

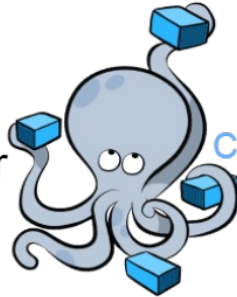


HashiCorp  
**Vagrant**



**Pulumi**

Docker



Compose



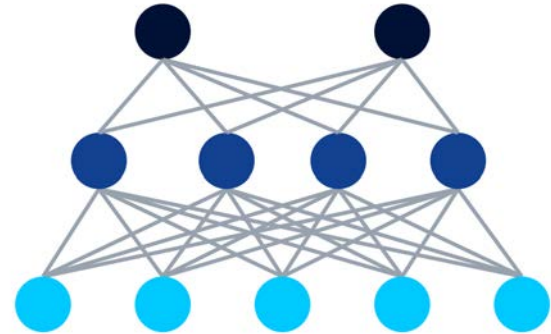
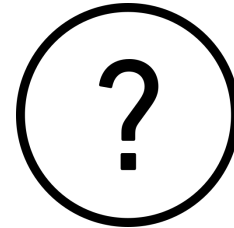
HashiCorp

**Terraform**



ANSIBLE

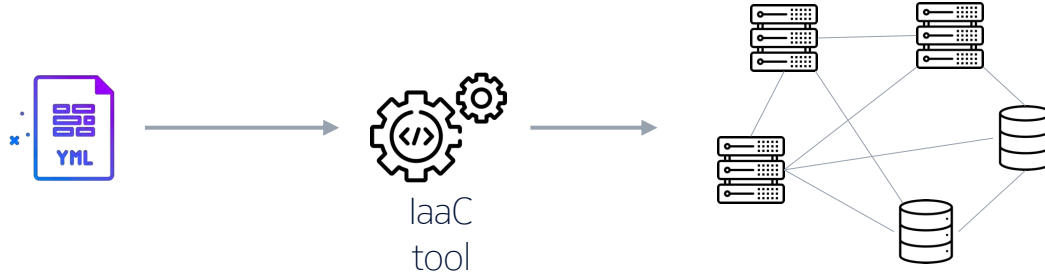
Network labs



# Containerlab

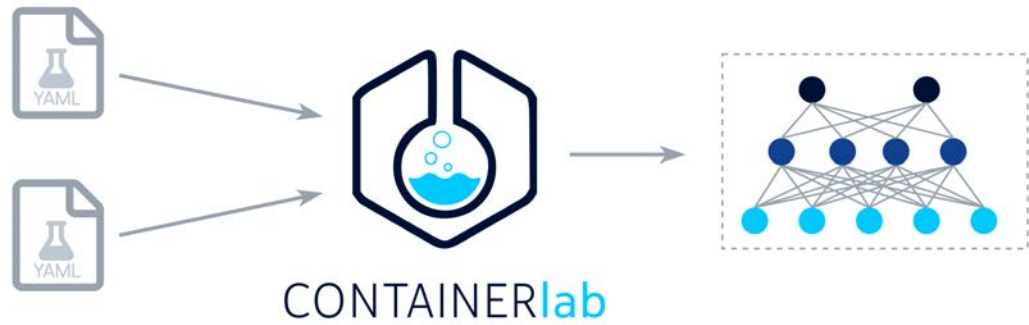
Bringing declarativeness to networking labs

IT



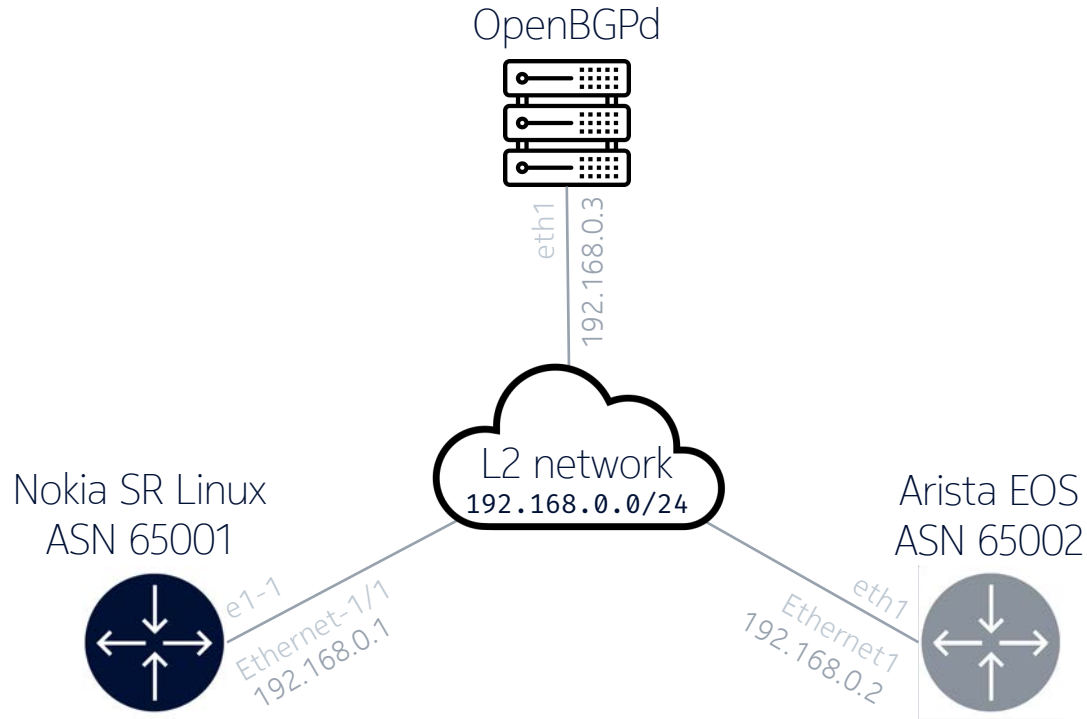
Network Labs

```
name: mylab
topology:
  nodes:
    [blue box] : [green box]
    [blue box] : [green box]
  links:
    - [blue box] : [green box]
```



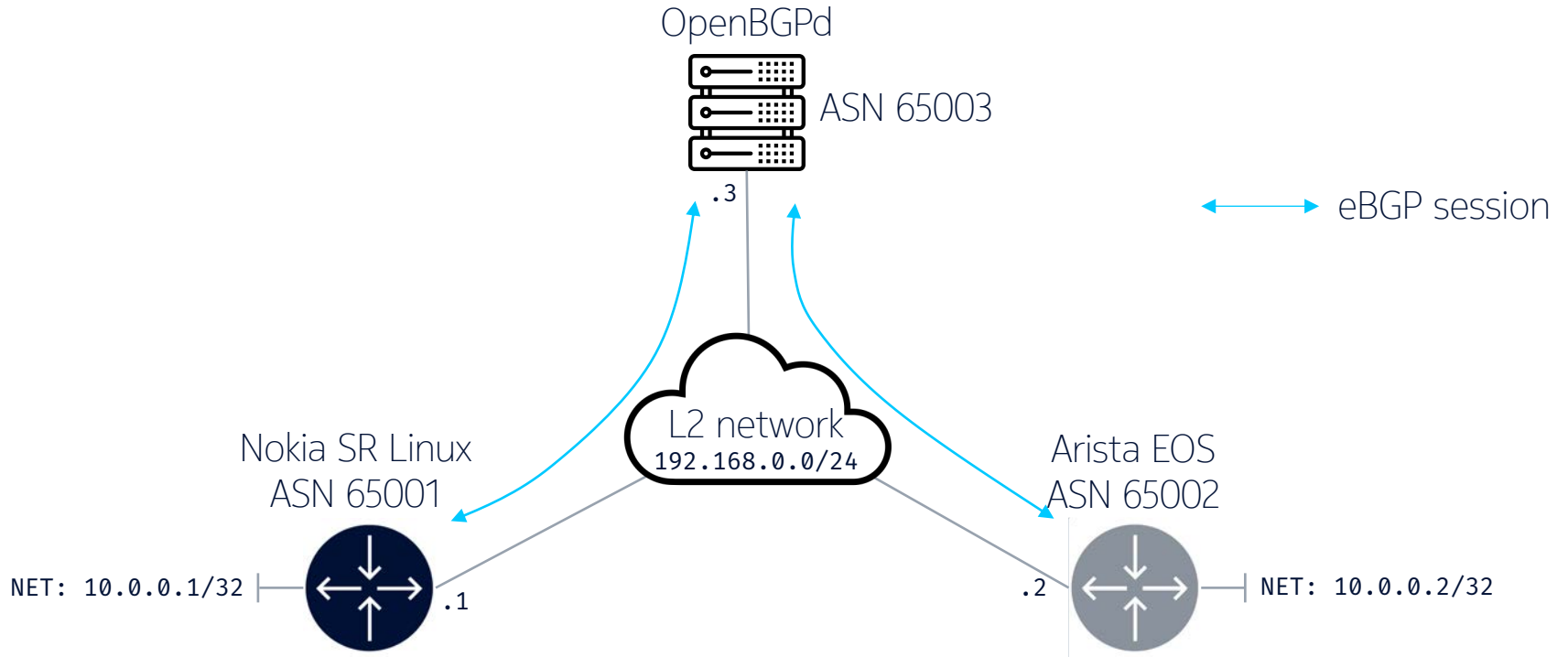
# Learn by doing

## IXP basic topology with OpenBGPd Route Server



# Learn by doing

## IXP basic topology with OpenBGPd Route Server



# Installation

Just a single command



Refer to docs for other installation options:  
<https://containerlab.dev/install/>

```
# download and install the latest release
bash -c "$(curl -sL https://get-clab.srlinux.dev)"

Setting up containerlab (0.16.2) ...

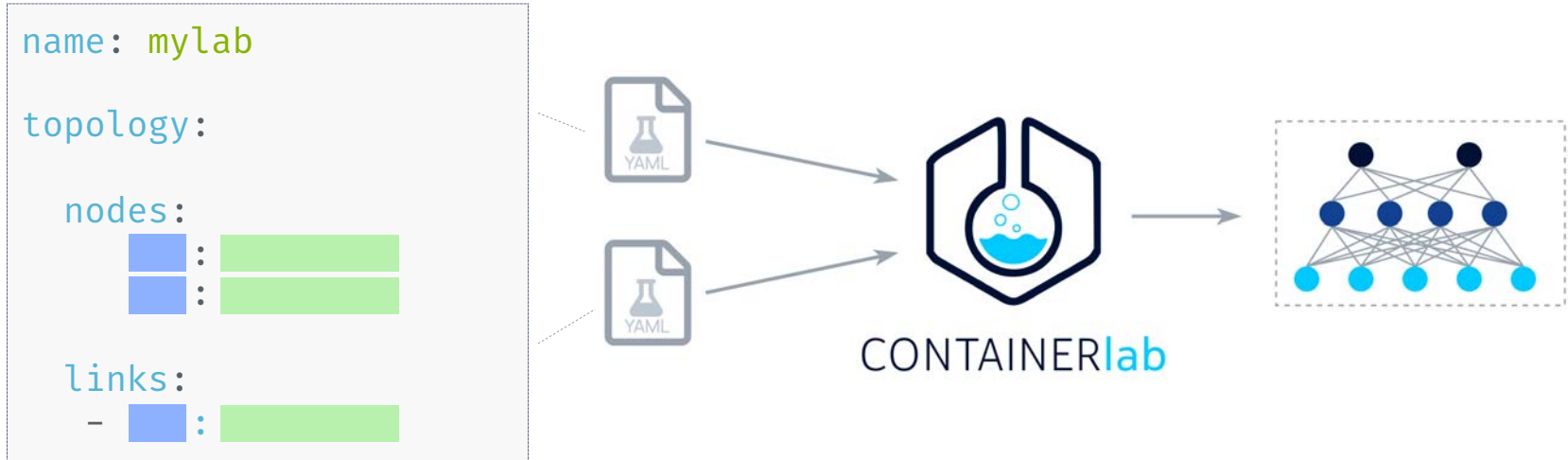
      ( )
  /_/_/  \_/_/  \_/_/  \_/_/  \_/_/  \_/_/  \_/_/  \_/_/  \_/_/
 /_/_/  \_/_/  \_/_/  \_/_/  \_/_/  \_/_/  \_/_/  \_/_/  \_/_/
 \_/_/  \_/_/  \_/_/  \_/_/  \_/_/  \_/_/  \_/_/  \_/_/  \_/_/

version: 0.16.2
commit: 3087f30
date: 2021-08-11T06:22:45Z
source: https://github.com/srl-labs/containerlab
rel. notes: https://containerlab.srlinux.dev/rn/0.16/#0162
```



# Topology file

Declarative way to define a lab



<https://containerlab.dev>



# Building IXP lab

## Adding SR Linux node

### topology definition

```
name: obgpd
topology:
  nodes:
    srlinux:
      kind: nokia_srlinux
      image: ghcr.io/nokia/srlinux:22.6.4
```

obgpd.clab.yml

### logical view

srlinux



# Building IXP lab

## Adding EOS node

### topology definition

```
name: obgpd
topology:
  nodes:
    srlinux: {...}
    ceos:
      kind: arista_ceos
      image: ceos:4.28.0F
```

obgpd.clab.yml

### logical view



# Building IXP lab

## Adding OpenBGPd node

### topology definition

```
name: obgpd
topology:
  nodes:
    srlinux: {...}
    ceos: {...}

  openbgpd:
    kind: linux
    image: quay.io/openbgpd/openbgpd:7.7
    binds:
      - openbgpd.conf:/etc/bgpd/bgpd.conf
```

obgpd.clab.yml

### logical view

openbgpd



bgpd.conf

srlinux



ceos

# Building IXP lab

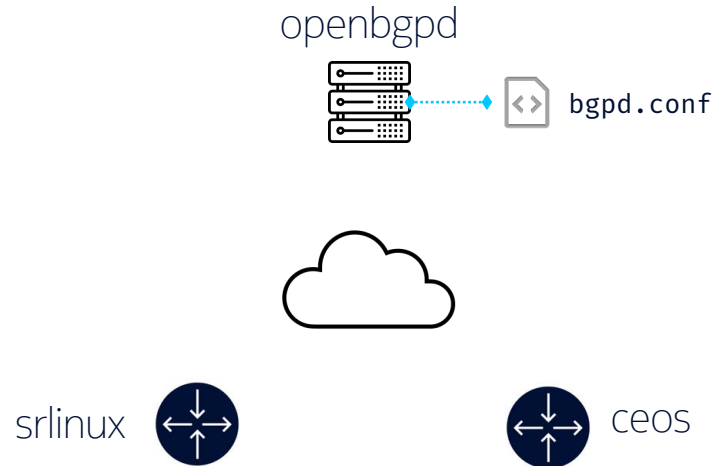
## Adding IXP network

### topology definition

```
name: obgpd
topology:
  nodes:
    srlinux: {}
    ceos: {}
    openbgpd: {}
  ixp:
    kind: bridge
```

obgpd.clab.yml

### logical view



# Building IXP lab

## Adding IXP network

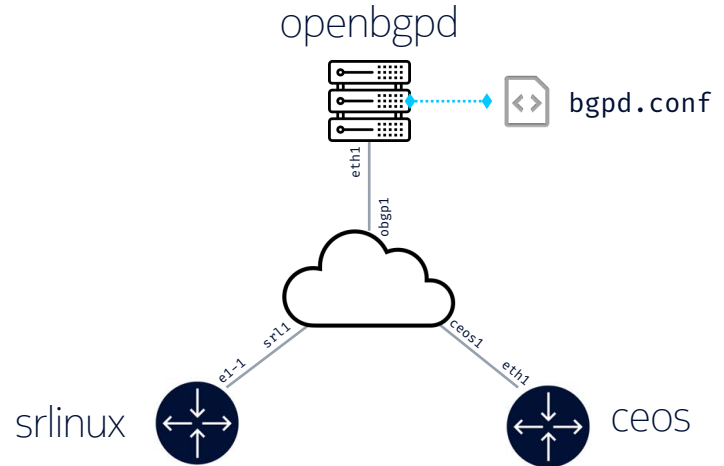
### topology definition

```
name: obgpd obgpd.clab.yml

topology:
  nodes:
    srlinux: {}
    ceos: {}
    openbgpd: {}
    ixp: {}

  links:
    - endpoints: ["srlinux:e1-1", "ixp:srl1"]
    - endpoints: ["ceos:eth1", "ixp:ceos1"]
    - endpoints: ["openbgpd:eth1", "ixp:obgp1"]
```

### logical view



# Containerlab

## Deploying the lab

### \$ containerlab deploy

```
INFO[0000] Containerlab v0.32.3 started
INFO[0000] Creating container: "openbgpd"
INFO[0000] Creating container: "ceos"
INFO[0000] Creating container: "srlinux"
INFO[0001] Creating virtual wire: ceos:eth1 <--> ixp:ceos1
INFO[0001] Creating virtual wire: srlinux:e1-1 <--> ixp:srl1
INFO[0001] Creating virtual wire: openbgpd:eth1 <--> ixp:obgp1
```

| # | Name                | Container ID | Image                         | Kind        | State   | IPv4 Address   | IPv6 Address         |
|---|---------------------|--------------|-------------------------------|-------------|---------|----------------|----------------------|
| 1 | clab-obgpd-ceos     | 55d3f8a7732e | ceos:4.28.0F                  | arista_ceos | running | 172.20.20.2/24 | 2001:172:20:20::2/64 |
| 2 | clab-obgpd-openbgpd | 7a81be30079a | quay.io/openbgpd/openbgpd:7.7 | linux       | running | 172.20.20.3/24 | 2001:172:20:20::3/64 |
| 3 | clab-obgpd-srlinux  | a18372bf9308 | ghcr.io/nokia/srlinux:22.6.4  | srl         | running | 172.20.20.4/24 | 2001:172:20:20::4/64 |

# Containerlab

## Connecting to the nodes

### SSH

```
ssh admin@clab-obgpd-srlinux
```

```
Welcome to the srlinux CLI.
```

```
Type 'help' (and press <ENTER>) if you need  
any help using this.
```

```
--{ running }--[ ]-
```

```
A:srlinux#
```

### Docker exec

```
docker exec -it clab-obgpd-openbgpd ash
```

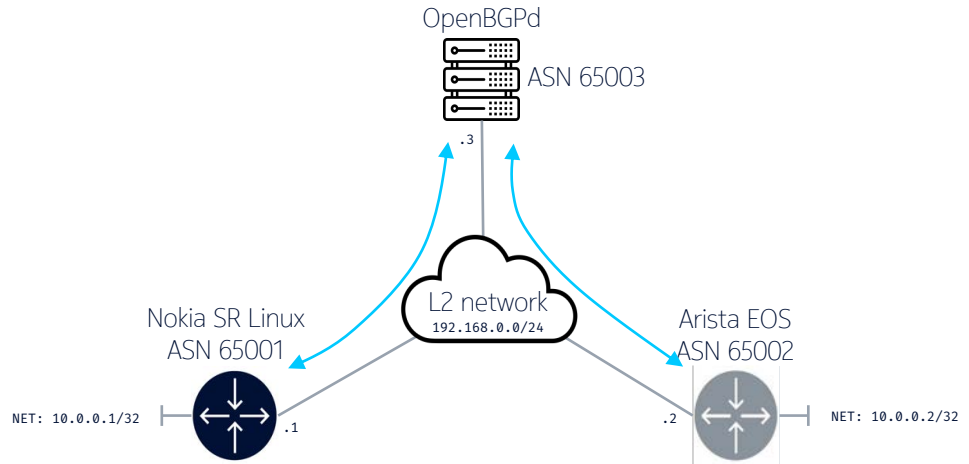
```
/ #
```



# Lab time

What do I do next?

- Configure & validate the use case
  - Interfaces
  - BGP peering
  - OpenBGPd configuration
  - ACL filtering
  - MAC filtering
  - BUM filtering
  - RPKI validation
  - EVPN control/dataplane



[hellt/openbgpd-lab](https://github.com/hellt/openbgpd-lab)

# Lab lifecycle

## Inspect

### \$ containerlab inspect

INFO[0000] Parsing & checking topology file: obgpd.clab.yml

| # | Name                | Container ID | Image                         | Kind        | State   | IPv4 Address   | IPv6 Address         |
|---|---------------------|--------------|-------------------------------|-------------|---------|----------------|----------------------|
| 1 | clab-obgpd-ceos     | 55d3f8a7732e | ceos:4.28.0F                  | arista_ceos | running | 172.20.20.2/24 | 2001:172:20:20::2/64 |
| 2 | clab-obgpd-openbgpd | 7a81be30079a | quay.io/openbgpd/openbgpd:7.7 | linux       | running | 172.20.20.3/24 | 2001:172:20:20::3/64 |
| 3 | clab-obgpd-srlinux  | a18372bf9308 | ghcr.io/nokia/srlinux:22.6.4  | srl         | running | 172.20.20.4/24 | 2001:172:20:20::4/64 |

- Refresh yourself on what is running?
- Pull the container' names and addresses.

# Lab lifecycle


## Destroy

```
$ containerlab destroy --cleanup  
INFO[0000] Parsing & checking topology file: obgpd.clab.yml  
INFO[0000] Destroying lab: obgpd  
INFO[0000] Removed container: clab-obgpd-srlinux  
INFO[0001] Removed container: clab-obgpd-openbgpd  
INFO[0001] Removed container: clab-obgpd-ceos  
INFO[0001] Removing containerlab host entries from /etc/hosts file
```


- Destroy the lab and clean up all its artifacts
- Want to keep your saved configs? Remove the --cleanup flag.

# Supported systems


**NOKIA**

 srl  
vr-sros

**JUNIPER**  
NETWORKS

 crpd  
vr-vmx  
vr-vqfx

**ARISTA**

 ceos  
vr-veos

  
**CISCO**

vr-xrv9k  
vr-csr  
vr-n9kv

  
**SONIC**

 sonic-vs  
 frr

  
**NVIDIA**

 CVX

  
**paloalto**  
NETWORKS

vr-pan

  
**DELL**

vr-ftosv

**ixia**

 keysight\_ixia-c

**MikroTik**

vr-ros

**ipinfusion**

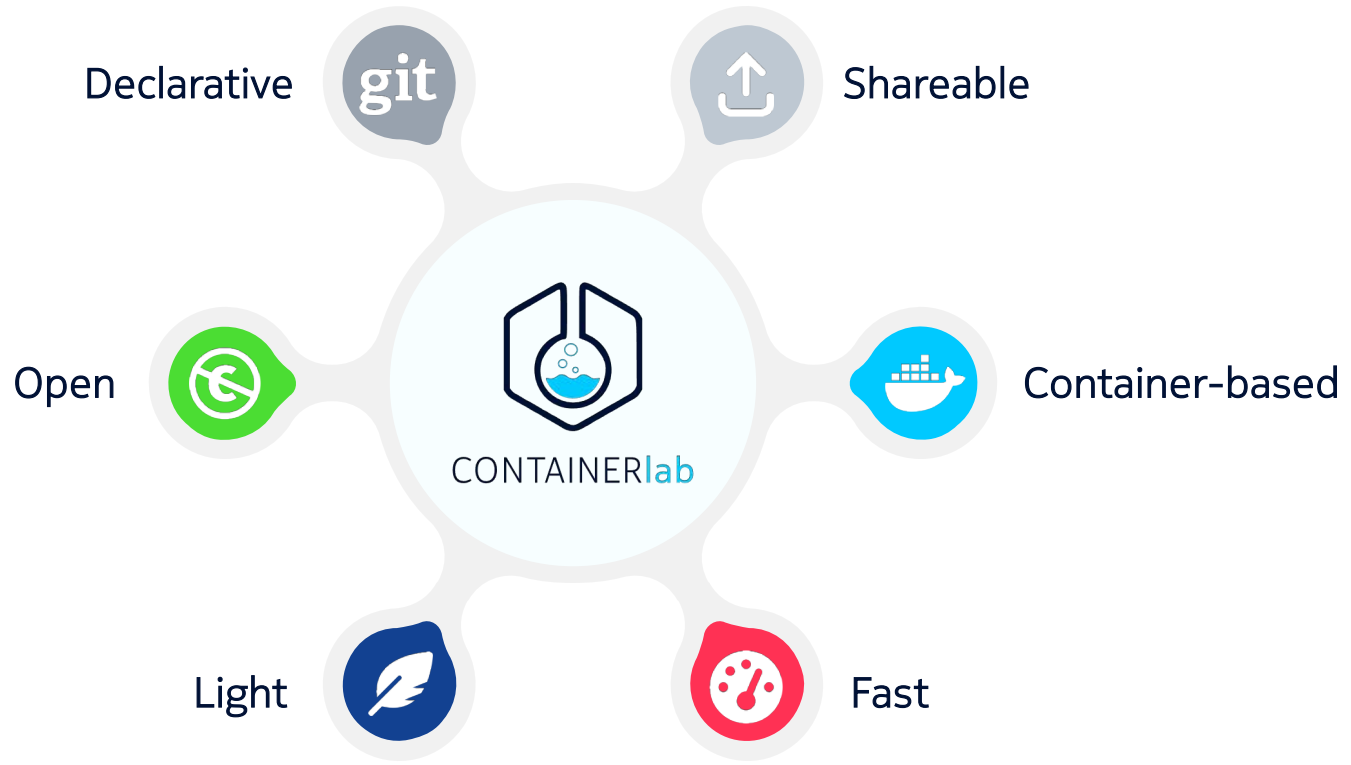
ipinfusion\_ocnos

 **CHECK POINT**

checkpoint\_cloudguard

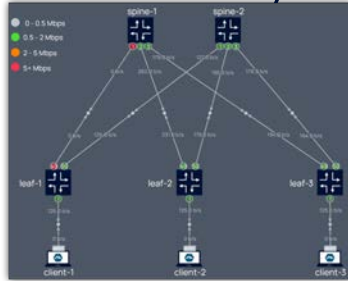
# Containerlab

## Key benefits



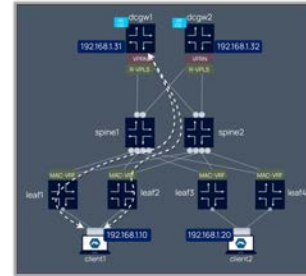
# Our labs built for community

## SR Linux Telemetry



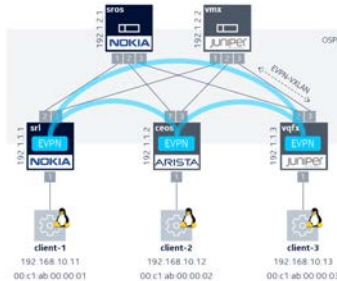
 [srl-labs/srl-telemetry-lab](https://github.com/srl-labs/srl-telemetry-lab)

## Nokia EVPN Interop



 [srl-labs/nokia-evpn-lab](https://github.com/srl-labs/nokia-evpn-lab)

## Multivendor EVPN



21 © 2022 Nokia  [srl-labs/multivendor-evpn-lab](https://github.com/srl-labs/multivendor-evpn-lab)

## Segment Routing



 [srl-labs/nokia-segment-routing-lab](https://github.com/srl-labs/nokia-segment-routing-lab)

# Containerlab

Get in touch



CONTAINERlab

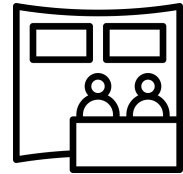
<https://containerlab.dev>



[Discord server](#)



[srl-labs/containerlab](https://github.com/srl-labs/containerlab)



I am here today!