



If (Network == Server)
{
 Magic happens
}

November 9th, 2017

Atilla de Groot | SE, HCIE #3494 | Cumulus Networks

Agenda

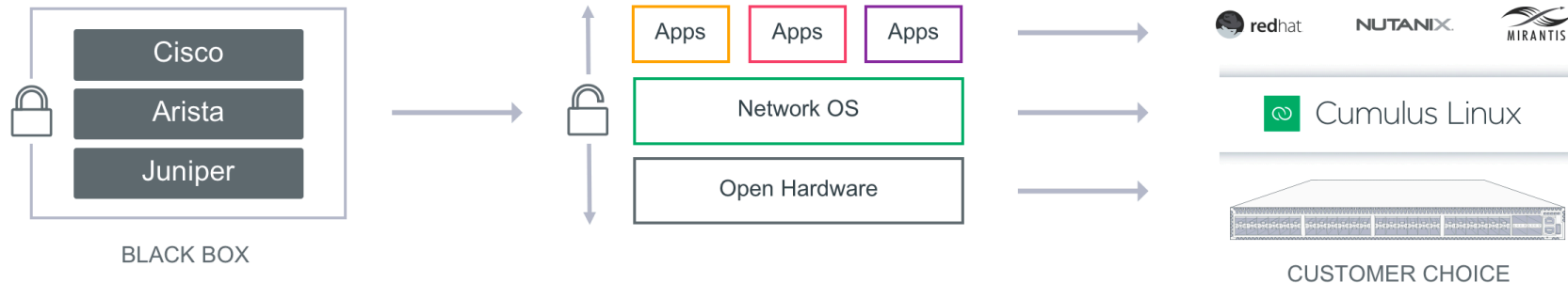
- Cumulus
- NetQ & Hostpack
- Network CI / CD
- Demo





Cumulus Networks brings Web-Scale Networking

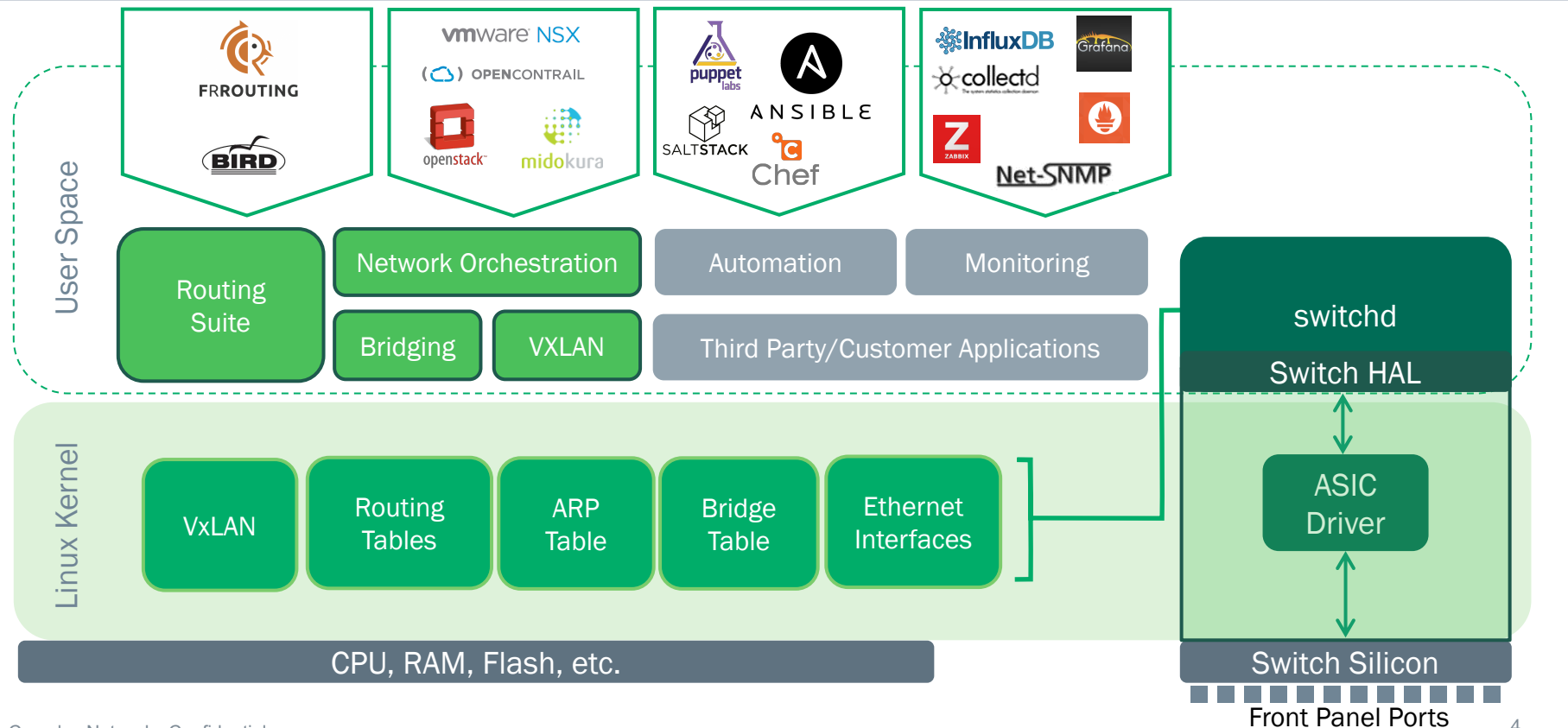
Unlocking the vertical network stack to build the modern data center





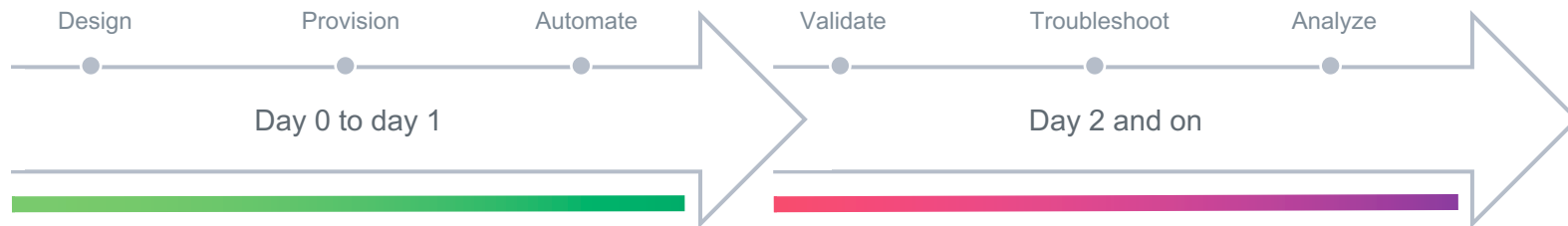
Cumulus Linux architecture

Uniform operating model – write any tools, use any apps





NetQ brings web-scale efficiencies to network operations



Cumulus Linux

Open Network Operating System

Open OS foundation of network
flexibility & choice of apps

Disaggregation of SW & HW
supply chain freedom

Speed of provisioning workloads
with automation at scale

Cumulus NetQ

Telemetry-Based Fabric validation application

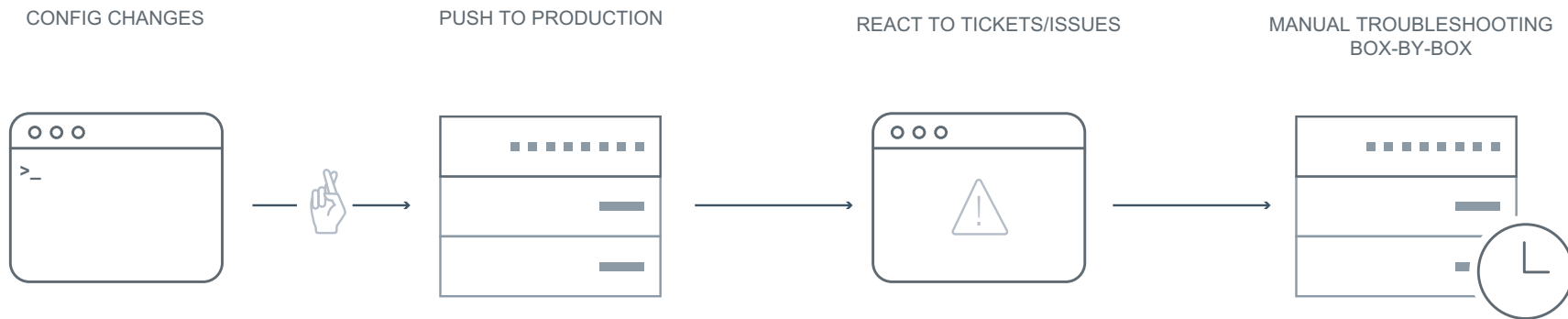
Validate changes
before & during production rollout

Precise fault location alerts
for rapid problem resolution

Time-machine diagnosis & troubleshooting



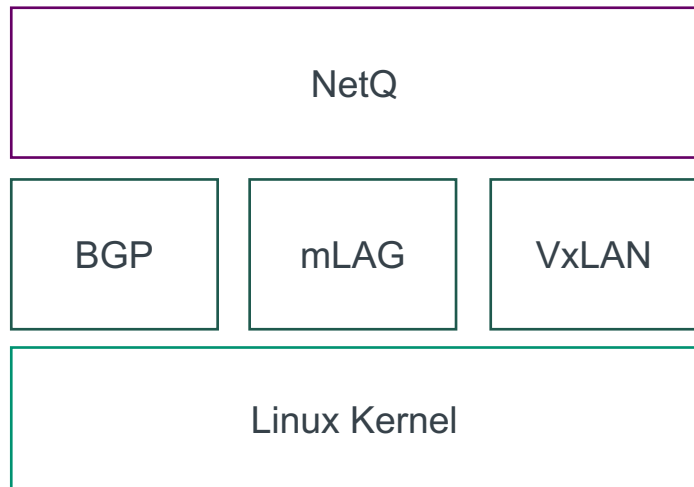
Can't keep up with the speed of automation



Existing tools do not offer closed-loop feedback



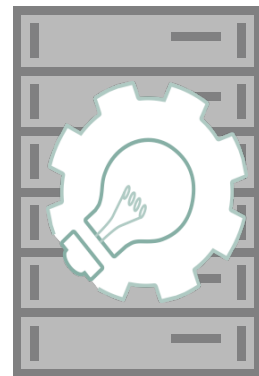
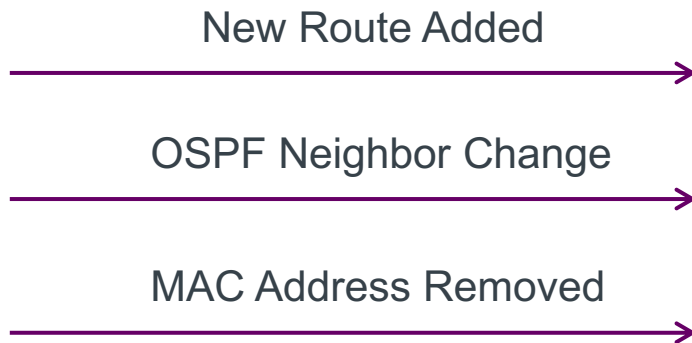
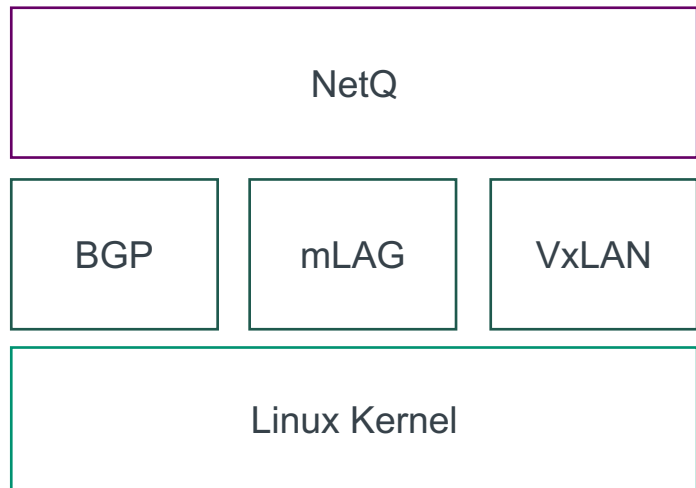
NetQ: How it Works



- **NetQ** Agent Subscribes to Linux Kernel Events
 - Interface State
 - MTU
 - Routes, MACs
- **NetQ** Agent Polls Routing Information
 - BGP and OSPF
 - Neighbor States
 - Error Conditions



NetQ: Fabric Change Log



See state now or any point in the past



NetQ: Advanced Notification

NetQ Notifier Service

Automatically Alert on Check Failures

- Syslog
- ChatOps (Slack)
- ELK
- Splunk

#netqmessage_ls

☆ | 4 | 0 | Add a topic



Today

changed from yes to no | Today at 11:58 AM
From netq-notifier running on cumulus | Today at 11:58 AM

💡 filter#default: @TS-LS: NTP: server02: NTP sync state
changed from no to yes
From netq-notifier running on cumulus | Today at 11:58 AM

⚠ filter#default: @TS-LS: NTP: server03: NTP sync state
changed from yes to no
From netq-notifier running on cumulus | Today at 12:01 PM

💡 filter#default: @TS-LS: NTP: server03: NTP sync state
changed from no to yes
From netq-notifier running on cumulus | Today at 12:01 PM



netq notifier APP 12:51 PM

⚠ filter#default: @TS-LS: NTP: server04: NTP sync state
changed from yes to no
From netq-notifier running on cumulus | Today at 12:51 PM






💡 filter#default: @TS-LS: NTP: server04: NTP sync state
changed from no to yes
From netq-notifier running on cumulus | Today at 12:51 PM



Message #netqmessage_ls





-  NetQ Agent
-  Network Fabric
-  Out-of-band
-  Cumulus Linux (switch)
-  Ubuntu / RHEL (server)



splunk>

pagerduty

elastic

slack



CLI

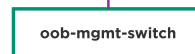
CHEF

puppet

ANSIBLE

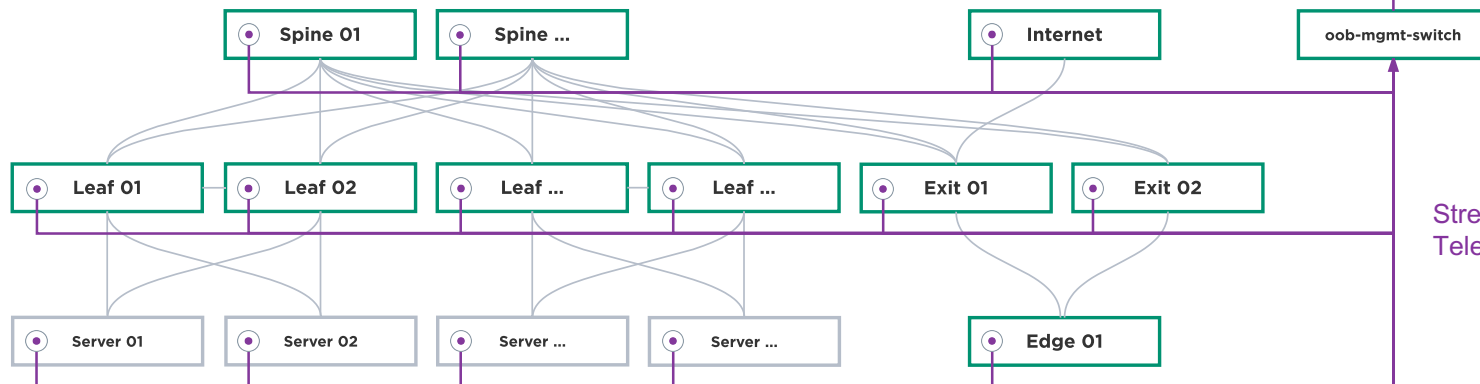


Analysis Engine



Streaming
Telemetry

NetQ Deployment





Question

Who recently made a network change?



Question

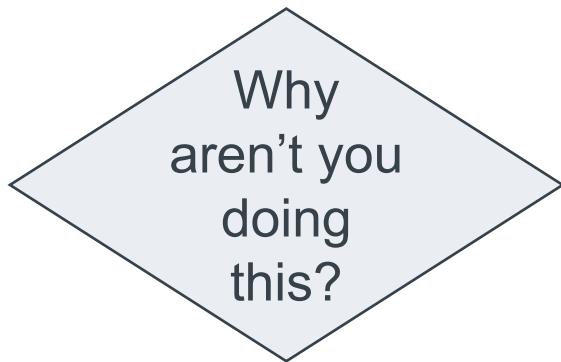
Who had no issues during that change?



What is CI / CD?

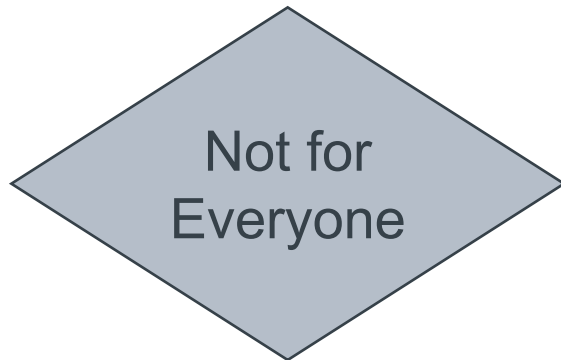
Continuous Integration (CI):

A system where all changes are automatically tested before being pushed to production or seen by others



Continuous Delivery (CD):

Built on a CI system where changes are automatically pushed to production after tests pass, often multiple times per day





Types of tests

Linting

- Basic syntax checking

Unit Test

- Testing specific functions or chunks of code

Systems Test

- End to end testing
- Did the program do what I want?



Linting tests

Great tools for software, not so much for network

Mainly test yaml (Ansible)

Enforce a style

Create good practices

Find dumb errors early

```
./.gitlab-ci.yml
6:4      error    wrong indentation: expected 2 but found 3 (indentation)
10:4     error    wrong indentation: expected 2 but found 3 (indentation)
12:7     error    wrong indentation: expected 5 but found 6 (indentation)
15:4     error    wrong indentation: expected 2 but found 3 (indentation)
17:7     error    wrong indentation: expected 5 but found 6 (indentation)
20:1     error    too many blank lines (1 > 0) (empty-lines)
```



Unit and system tests

Again, not a lot of great options

- Software light years ahead of us

Likely to be combined tests for networking

Multiple options, none perfect

- Stackstorm
- Roll your own (behave, python, ansible)
- Cumulus NetQ

Important to validate *state* not just config

- Is the interface up
- AND do I see an LLDP peer

Build tools

Build tools enable CI/CD Pipelines

- Magic duct tape

Common ones include

- Jenkins
- TravisCI
- Atlassian Bamboo
- GitLab CI





How it works

`git push` signals build tool

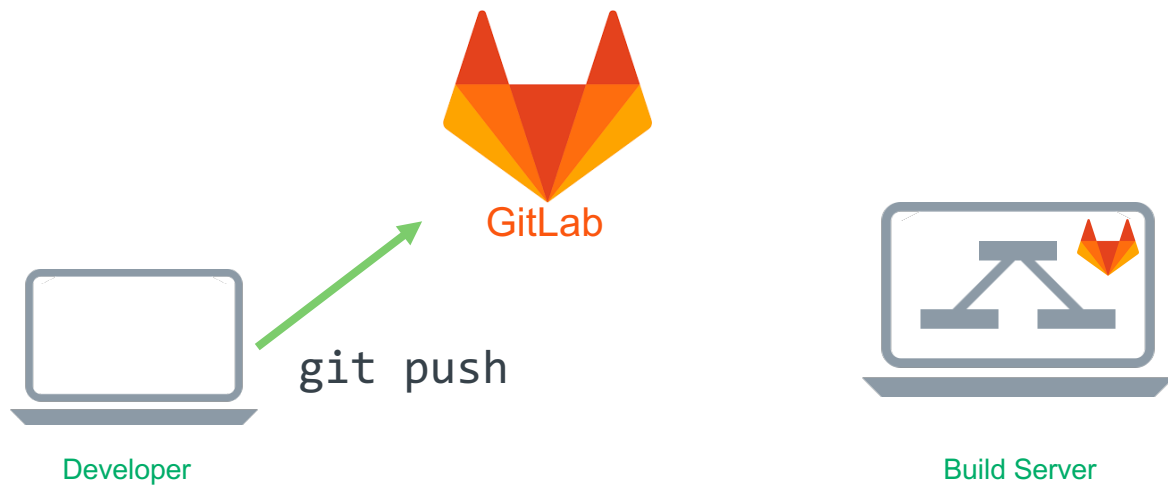
- Either github REST call (Jenkins) or agent (Gitlab)

Build tool runs things

- Some built in macros for programming languages
- Custom scripts for the rest (networking)

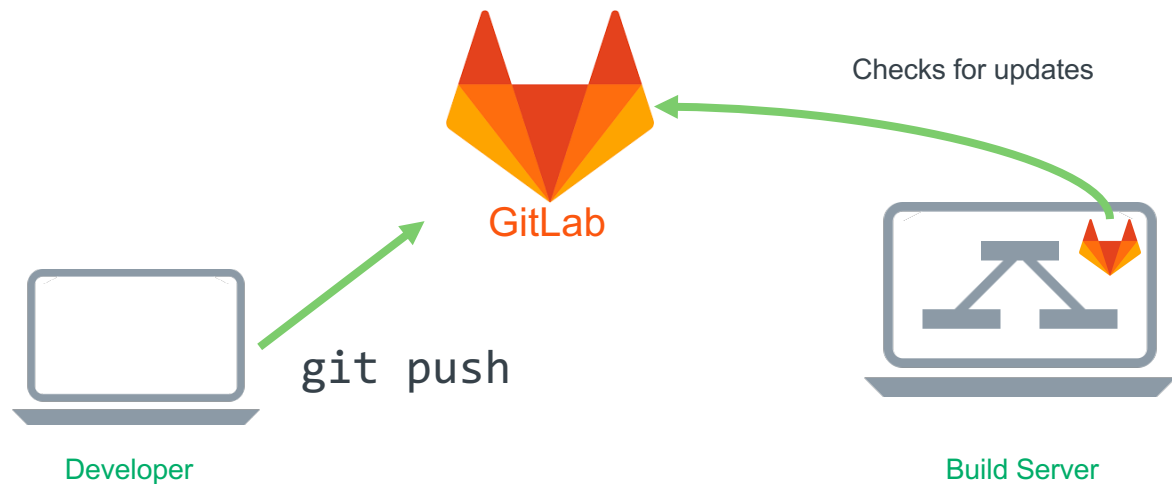


Gitlab build process

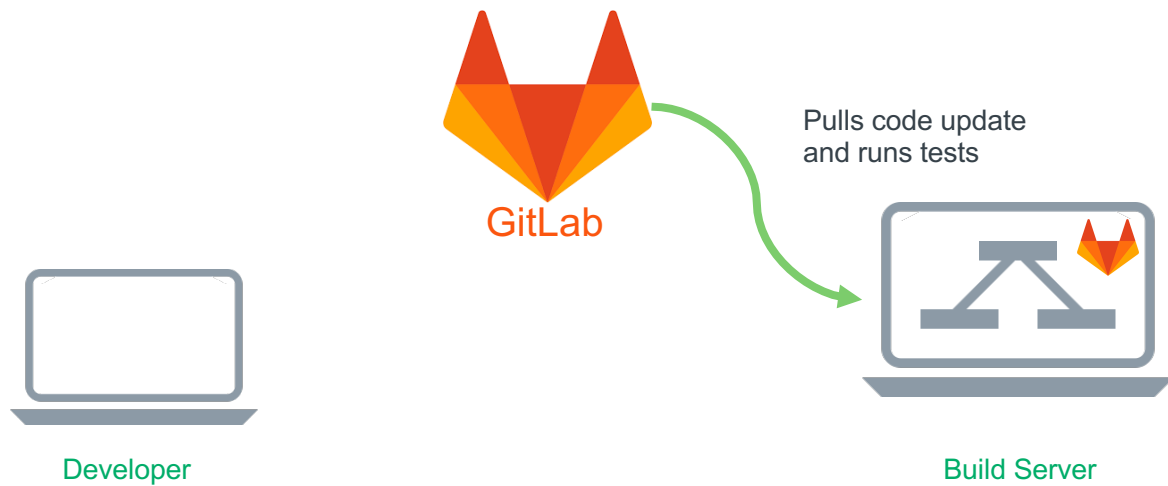




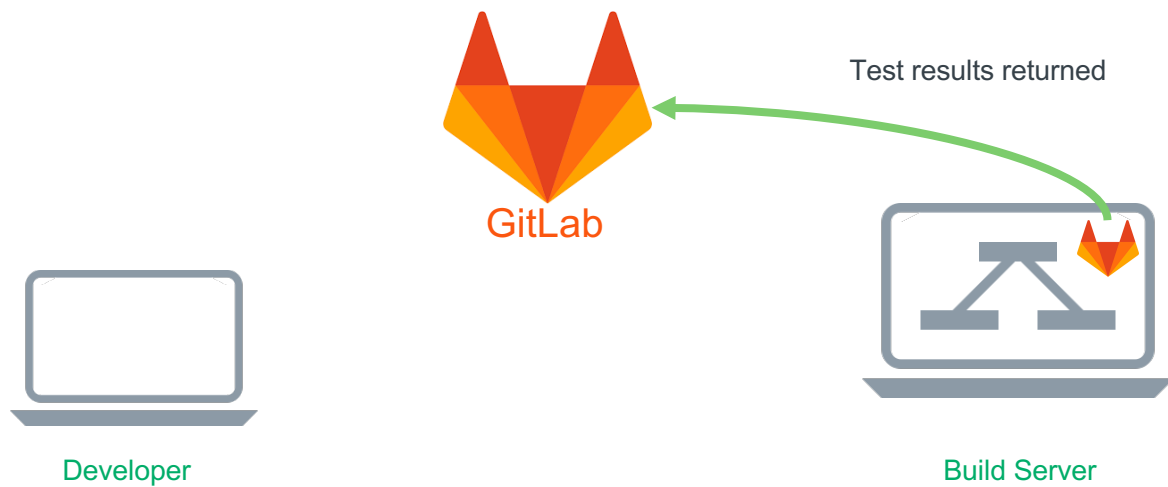
Gitlab build process



Gitlab build process



Gitlab build process





.gitlab-ci.yml

Virtualizing your network

Stages, before_script, after_script

- Stages run in order on success
- *_script run at each stage

Script defines things to do

- Each script step is run on the build server
- Each step is a unique session
- Simple bash scripts are like duct tape

Before/After scripts setup or cleanup

- vagrant destroy -f

```
---
stages:
  - staging
  - production

staging:
  tags:
    - staging
  before_script:
    - cd evpn
  stage: staging
  script:
    - 'ansible-playbook deploy.yml'
    - sleep 25
    - netq check bgp
    - netq check mtu
    - netq check vxlan

production:
  tags:
    - production
  before_script:
    - cd evpn
  stage: production
  when: manual
  script:
    - 'ansible-playbook deploy.yml'
    - sleep 10
    - netq check bgp
---
```

Testing and experimentation

Virtualizing your network

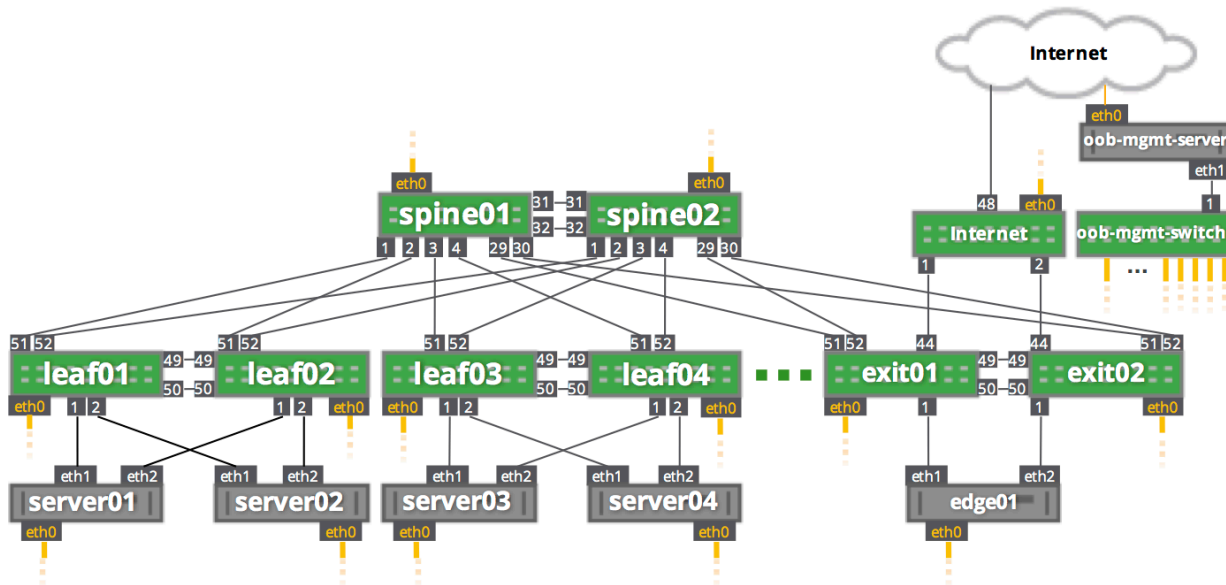


Virtual Environment

- Cumulus VX
- Familiarizing with the OS

Larger scale

- Vagrant
- Reference Topology
- Topology Generator



Cumulus in the Cloud



Choose your experience:



Mesos and Marathon both provide a platform as a service allowing you to explore how Cumulus Networks technology enhances a container deployment.

CHOOSE MESOS



OpenStack Pike is deployed in a virtual data center that leverages Cumulus technology and the SDN built into Neutron in an end-to-end IP fabric.

CHOOSE OPENSTACK



Create your own journey with an unconfigured virtual data center. Use automation playbooks from Cumulus or use the blank slate to build your own.

CHOOSE BLANK SLATE



Cumulus in the Cloud

Console

Guided tour

Topology

Docs

CUMULUS IN THE CLOUD CONSOLE

STATUS: RUNNING

TIME LEFT: 2:54:55

+ ADD TIME

* REBUILD

DELETE

```
ssh://cumulus@localhost:22

[Press Shift-F1 for help]

Host/IP or ssh:// URL [localhost]: ssh://cumulus@localhost:22
Connecting to ssh://cumulus@localhost:22

cumulus@localhost's password:
Welcome to Cumulus (R) NetQ Telemetry Server

Cumulus NetQ is a telemetry-based fabric validation system. Cumulus NetQ
agents on Cumulus Linux (R)
switches and Linux hosts push network telemetry to this VM, Cumulus NetQ
Telemetry Server, that can be
queried in preventative, proactive and diagnostic workflows to validate
network state.

Latest documentation for Cumulus NetQ is available at: https://docs.cumu
lusnetworks.com/display/NetQ
For support and online technical documentation, visit: http://www.cumulu
snetworks.com/support

The registered trademark Linux (R) is used pursuant to a sublicense from
LMI, the exclusive licensee of
Linus Torvalds, owner of the mark on a worldwide basis.

TIP: Type 'netq-shell' on this VM to access NetQ CLI.

Last login: Tue Nov  7 16:04:08 2017 from 178.41.197.104.bc.googleuserco
nment.com
cumulus@oob-mgmt-server:~$
```

ABOUT THIS ENVIRONMENT

Blank Slate

Your virtual data center infrastructure consists of two racks each with two servers connected in a fully redundant, fully IP fabric. The devices in this network have been left unconfigured to give you the opportunity to try configuring the network for yourself using NCLU or an automation playbook.

CONNECT TO UI

NetQ

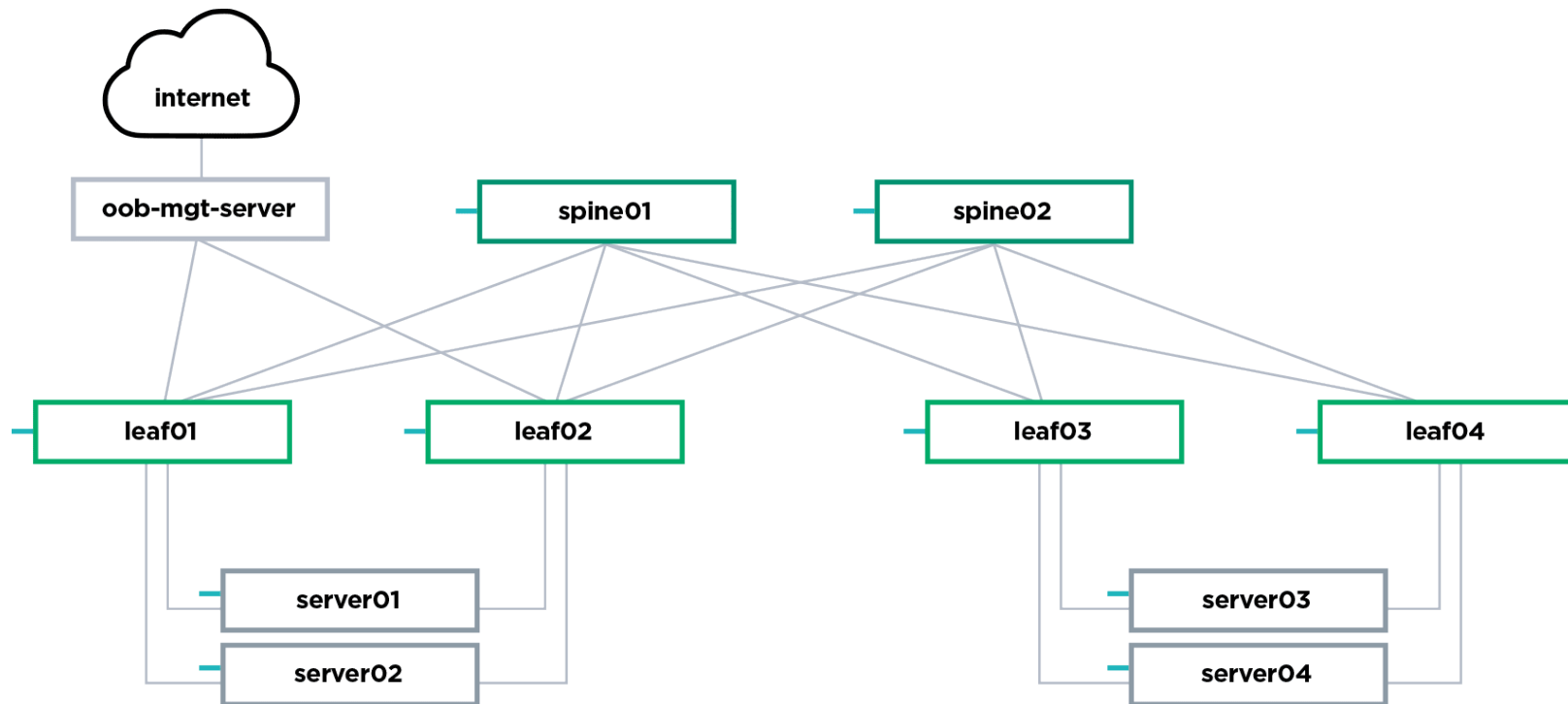
RESOURCES

Using the console +

SSH access +

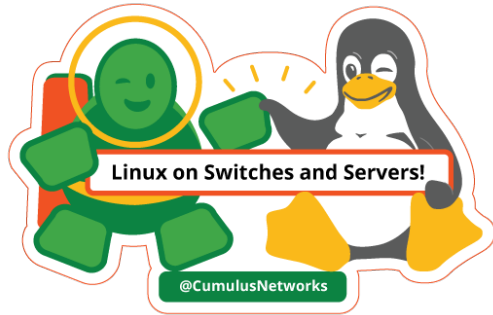


Cumulus in the Cloud





 CUMULUS



Thank you!