Choose Your Own Automation Adventure

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CHOOSE YOUR OWN ADVENTURE®
20
YOU'RE THE STAR OF THE STORY!
CHOOSE FROM 27 POSSIBLE ENDINGS.
ESCAPE
BY R.A. MONTGOMERY
ILLUSTRATED BY RALPH REESE
A BANTAM BOOK

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Intro

You stumble into the office, surprised that you've been called in on a Friday.

Your hangover from the AusNOG social is still pounding in the back of your brain.

What even happened on Thursday?

You boss looks at you over the the video conference. 'Did you complete that design for the important project we talked about?'

• Tell your boss you'll do it tomorrow	Turn to page 48
• Log onto your trusty lab device	Turn to page 103
• Labs? Test it in production!	Turn to page 87

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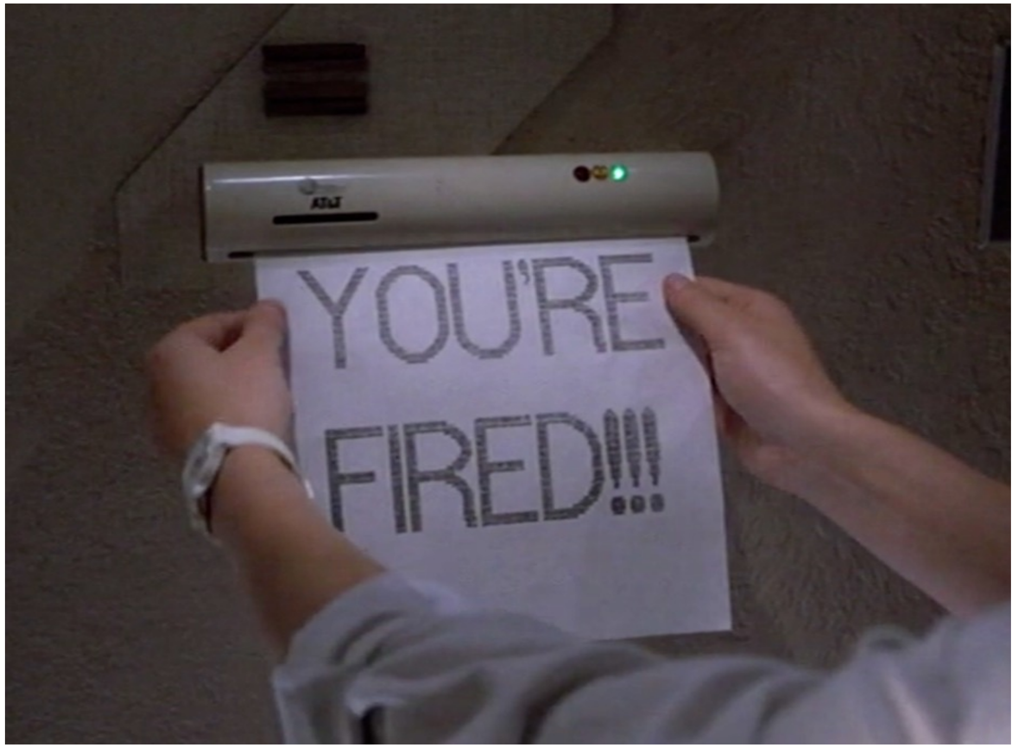
Page 48 - Delay

“I’ll get it done tomorrow” you blurt out before realizing tomorrow was the weekend.

Suddenly the fax machine on your desk starts printing…

The End



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Page 103 – Lab Device

Your ssh session sits there, nothing happens.
Ping doesn't work either.

'Anyone know why my lab device isn't responding' you type into slack?

'Oh, we had to put that into production due to the current lead-times' is the reply

The only thing you have to test is a US power-cord.

The End

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Page 87 – Test it in production

Who needs labs when you have a nation-wide network that you can run your own tests on.

You quickly cut and paste some config into a small node in the corner of the network. What could go wrong…

…The next morning you wake up and open up the newspaper.

The End

USA TODAY

SLAMBALL PLAYOFFS BEGIN

CUBS SWEEP SERIES IN 5

MARSHALL RUNS 3 MINUTE MILE

3D BILLBOARDS: FREE SPEECH OR TRAFFIC HAZARDS?

HILL VALLEY EDITION

NEWSLINE

NETWORK OUTAGE CAUSES OUTRAGE

Youth Gang Denies Complicity

Cholesterol may be cancer cure

3 injured when mom re-hydrates pizza slices

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Goals

- Don’t get fired
- Don’t get work on the weekend
- Don’t wait for equipment
- Don’t make the news

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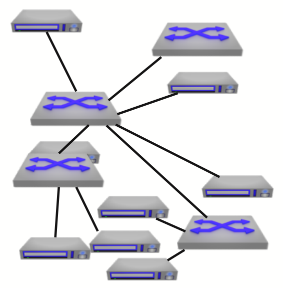
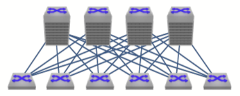
Network Operations Maturity Model

Legacy Operations → Modern Operations → Cloud Operations

Anti-Pattern



Patterns

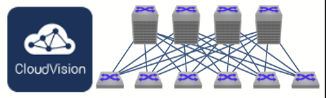


Repeatable design patterns

Runbooks/ITSM

Multi-Vendor/ Open Protocols

ITSM-Led



Monitoring / Telemetry / Observability

Read-Only Automation

Automated

Deployment and Workflow Automation

Testing environments

SW Defined

Database driven Source of Truth

Network CI Pipeline w/ pre-deployment testing

Proactive

Predictive and Proactive Fault detection and correction

Network Simulation Environments

Years → Quarters → Weeks → Days → Hours → Real-Time

CLI-Led Operations | CLI Enhanced with CV | Infrastructure-as-Code / Network CI

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… But let’s start smaller

Goals:

- ❑ Get a github account (or a gitlab account)
- ❑ Build a lab environment
- ❑ Automate configuration

Bonus Round:

- ❑ Automate keeping track of IPs, VLANs and AS numbers
- ❑ Validate changes
- ❑ Build a workflow to manage all the things

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The Components You Pick Is Up To You

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Testing Outcomes Will Vary

Containers

Validate:
Designs
Device APIs
Protocols
Interfaces

Virtual

Validate:
+ ZTP
+ SW Upgrades

Physical

Validate:
+ Scale
+ Performance
+ Data Plane Encap

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Resource Requirements Also Vary

Containers	Virtual	Physical
Single VM	**Multiple (Nested) VM** **+Memory** **+Storage**	**Multiple Devices** **+Space** **+Power** **+Cooling** **+Noise**

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Moving to a Software Workflow

- What Version of OS?
- What Updates?
- How to Overcome default security?
- Change Management?
- Repeatability?
- Sanity?

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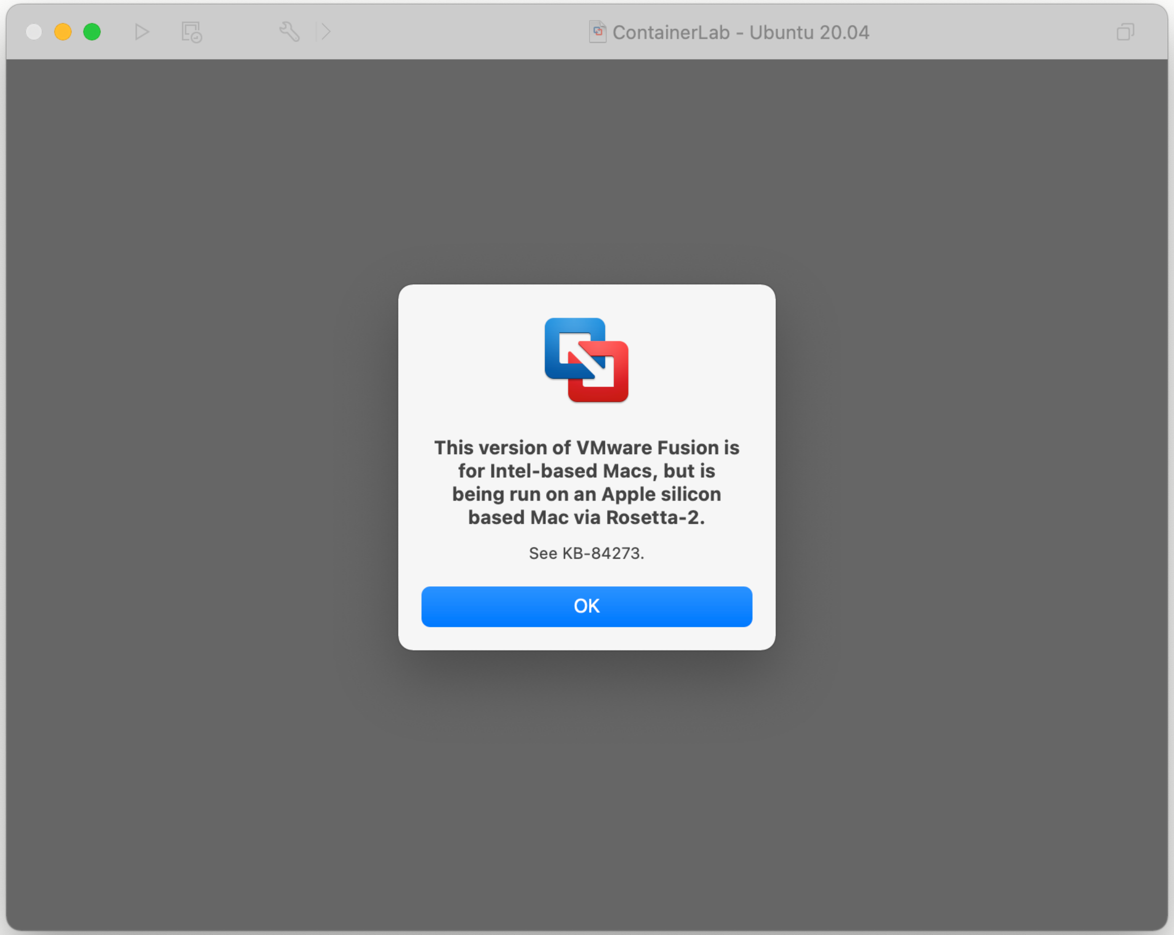
…And sometimes you're going to need to start from scratch



This version of VMware Fusion is for Intel-based Macs, but is being run on an Apple silicon based Mac via Rosetta-2.

See KB-84273.

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…Multiple Times

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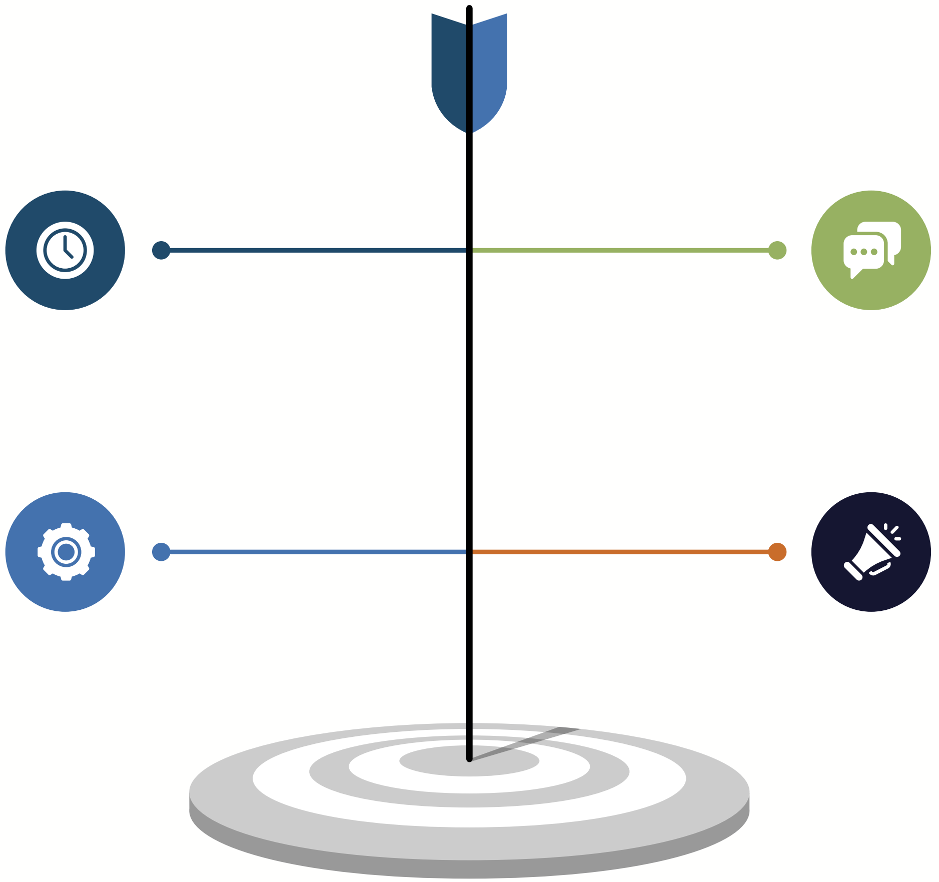
Rethinking Configuration / CI Goals



Infra-as-Code

Treat network changes and deployments as software - apply SDLC models to infrastructure

Source of Truth

Deploy and derive configurations from a flexible authoritative source of truth

Unit/System Testing

Buy-down risk by executing extensive pre and post-deployment testing and validation

Configuration Patterns

Enable large-scale pattern-based deployments. Manage network(s) as version-controlled entitites.

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Multipass

- `multipass launch --name AusNOG21`

- `multipass delete AusNOG21`
- `multipass purge AusNOG21`

- `multipass launch --name AusNOG21 --cpus 10 --mem 128G --disk 100G`

- `mulitpass list`

- `multipass shell <VM Name>`

- `multipass copy-files <filename> <VM Name>:`

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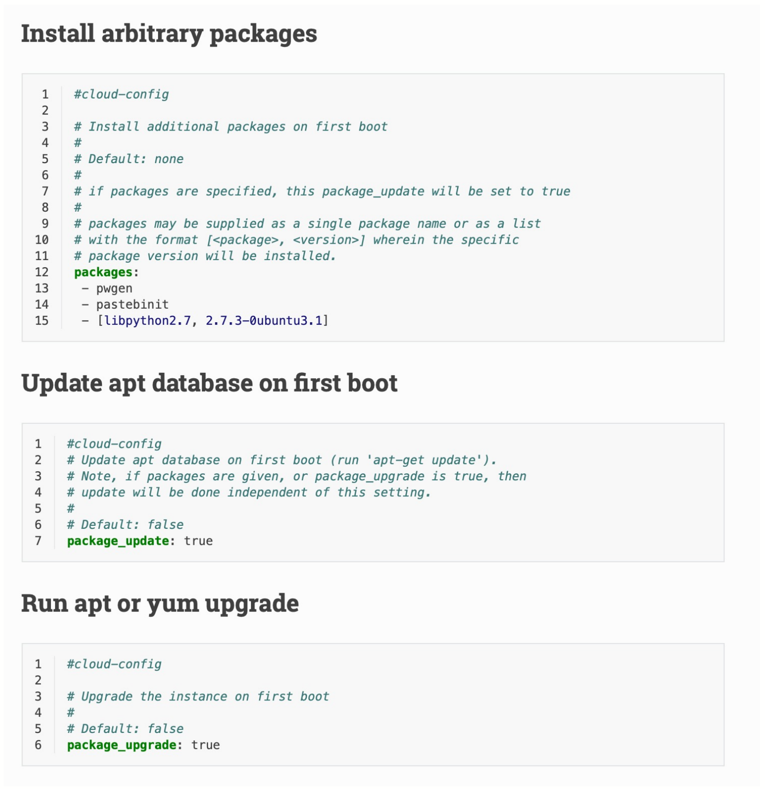
Setting up the environment

- sudo apt update
- sudo apt upgrade
- sudo apt install docker
  - sudo chmod 666 /var/run/docker.sock
- sudo apt install docker-compose
- sudo apt install ansible
- sudo apt install make
- sudo apt install python3-pip
- <set up git>

http://cloudinit.readthedocs.io/en/latest/topics/examples.html



Install arbitrary packages

```
#cloud-config

# Install additional packages on first boot
#
# Default: none
#
# if packages are specified, this package_update will be set to true
#
# packages may be supplied as a single package name or as a list
# with the format [<package>, <version>] wherein the specific
# package version will be installed.
packages:
 - pwgen
 - pastebinit
 - [libpython2.7, 2.7.3-0ubuntu3.1]
```

Update apt database on first boot

```
#cloud-config
# Update apt database on first boot (run 'apt-get update').
# Note, if packages are given, or package_upgrade is true, then
# update will be done independent of this setting.
#
# Default: false
package_update: true
```

Run apt or yum upgrade

```
#cloud-config

# Upgrade the instance on first boot
#
# Default: false
package_upgrade: true
```

```
multipass launch -n AusNOG21 --cloud-init cloud-config.yaml
```

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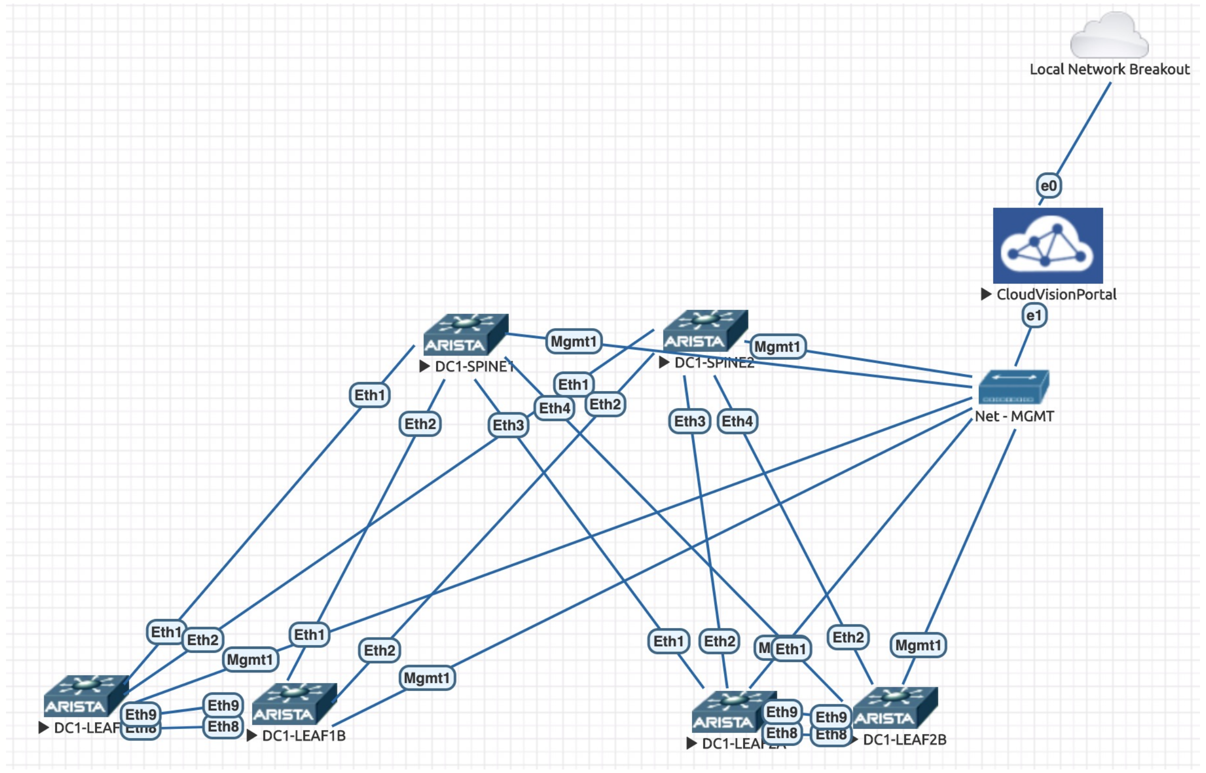
Eve-NG and Containerlab

EVE-NG



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Eve-NG and Containerlab

Containers

```
ubuntu@AusNOG21:~$ bash -c "$(curl -sL https://get-clab.srlinux.dev)"
Downloading https://github.com/srl-labs/containerlab/releases/download/v0.25.1/containerlab_0.25.1_linux_arm64.deb
Preparing to install containerlab 0.25.1 from package
Selecting previously unselected package containerlab.
(Reading database ... 113009 files and directories currently installed.)
Preparing to unpack .../containerlab_0.25.1_linux_arm64.deb ...
Unpacking containerlab (0.25.1) ...
Setting up containerlab (0.25.1) ...

                           _                   _       _
                 _        (_)                 | |     | |
 ____ ___  ____ | |_  ____ _ ____   ____  ____| | ____| | _
/ ___) _ \|  _ \|  _)/ _  | |  _ \ / _  )/ ___) |/ _  | || \
( (__| |_|| | | | |_( ( | | | | | ( (/ /| |   | ( ( | | |_) )
\____)___/|_| |_|\___)_||_|_|_| |_|\____)_|   |_|\_||_|____/

    version: 0.25.1
     commit: 2f68fb3d
       date: 2022-03-22T09:49:14Z
     source: https://github.com/srl-labs/containerlab
 rel. notes: https://containerlab.dev/rn/0.25/#0251
ubuntu@AusNOG21:~$
```

bash -c "$(curl -sL https://get-clab.srlinux.dev)"

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Copying files with multipass is easy

- multipass copy-files cEOS-lab-4.27.3F.tar.xz AusNOG21:
- docker import cEOS-lab-4.27.3F.tar.xz ceosimage:4.27.3F

```
ubuntu@AusNOG21:~$ docker import cEOS-lab-4.27.3F.tar.xz ceosimage:4.27.3F
sha256:5be1eb0551a4f01f99f70e2e4c63a1649d5ca42ff8f666a8b07f08067bca9e5e
ubuntu@AusNOG21:~$ docker images
REPOSITORY   TAG       IMAGE ID       CREATED          SIZE
ceosimage    4.27.3F   5be1eb0551a4   28 seconds ago   1.83GB
ubuntu@AusNOG21:~$
```

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How to Get Started?

- git clone https://github.com/arista-netdevops-community/avd-cEOS-Lab

```
ubuntu@AusNOG21:~$ git clone https://github.com/arista-netdevops-community/avd-cEOS-Lab
 Cloning into 'avd-cEOS-Lab'...
 remote: Enumerating objects: 309, done.
 remote: Counting objects: 100% (309/309), done.
 remote: Compressing objects: 100% (163/163), done.
 remote: Total 309 (delta 169), reused 250 (delta 121), pack-reused 0
 Receiving objects: 100% (309/309), 4.57 MiB | 3.13 MiB/s, done.
 Resolving deltas: 100% (169/169), done.
 ubuntu@AusNOG21:~$ ls
 avd-cEOS-Lab  cEOS-lab-4.27.3F.tar.xz
 ubuntu@AusNOG21:~$ cd avd-cEOS-Lab/
 ubuntu@AusNOG21:~/avd-cEOS-Lab$ ls
 LICENSE  README.md  alpine_host  ceos_lab_template  images  labs
 ubuntu@AusNOG21:~/avd-cEOS-Lab$
```

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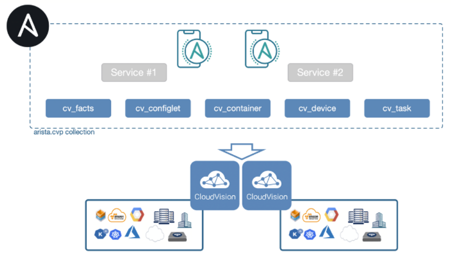
How to Get Started? AVD.SH



docker-avd-base

Ansible CVP Collection

Standard runner

Continuous Integration building blocks

Cloudvision integration

Community content
TOIs and ATD
Education

CloudVision
Build
Deploy
ARISTA
AVD
Document
Validate
open source

Ansible AVD Collection

GitHub Actions

Molecule

action-molecule-avd

Adam Mack - Solution Architect - RedHat Ansible:
*“This is outstanding as **we can reduce the mean time to production with the AVD** roles for our customers and let them rest easier knowing most of **the heavy lifting was done for them**.”*

NetDevOps Community

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Verifying Containerlab

sudo containerlab deploy -t topology.yaml

```
ubuntu@AusNOG21:~/avd-cEOS-Lab/labs/evpn/avd_sym_irb$ sudo containerlab inspect -t topology.yaml
INFO[0000] Parsing & checking topology file: topology.yaml
+----+---------------------+--------------+-------------------+-------+---------+-------------------+------------------------+
| #  |        Name         | Container ID |       Image       | Kind  |  State  |   IPv4 Address    |      IPv6 Address      |
+----+---------------------+--------------+-------------------+-------+---------+-------------------+------------------------+
|  1 | clab-avdirb-client1  | b59eaeabb43c | alpine-host       | linux | running | 172.100.100.10/24 | 2001:172:100:100::5/80 |
|  2 | clab-avdirb-client2  | 71bf0f15089f | alpine-host       | linux | running | 172.100.100.11/24 | 2001:172:100:100::7/80 |
|  3 | clab-avdirb-client3  | 605c73b4f7fc | alpine-host       | linux | running | 172.100.100.12/24 | 2001:172:100:100::c/80 |
|  4 | clab-avdirb-client4  | 3b1af6360ce9 | alpine-host       | linux | running | 172.100.100.13/24 | 2001:172:100:100::b/80 |
|  5 | clab-avdirb-l2leaf2a | d7b5cc7fa1e8 | ceosimage:4.27.3F | ceos  | running | 172.100.100.8/24  | 2001:172:100:100::9/80 |
|  6 | clab-avdirb-l2leaf2b | 6cbad990d4fe | ceosimage:4.27.3F | ceos  | running | 172.100.100.9/24  | 2001:172:100:100::6/80 |
|  7 | clab-avdirb-leaf1a   | 568ae8d39be7 | ceosimage:4.27.3F | ceos  | running | 172.100.100.4/24  | 2001:172:100:100::4/80 |
|  8 | clab-avdirb-leaf1b   | 061cde001e42 | ceosimage:4.27.3F | ceos  | running | 172.100.100.5/24  | 2001:172:100:100::d/80 |
|  9 | clab-avdirb-spine1   | 62698619a5a7 | ceosimage:4.27.3F | ceos  | running | 172.100.100.2/24  | 2001:172:100:100::3/80 |
| 10 | clab-avdirb-spine2   | e2d207dd0ea4 | ceosimage:4.27.3F | ceos  | running | 172.100.100.3/24  | 2001:172:100:100::8/80 |
| 11 | clab-avdirb-svc2a    | 9af21f685121 | ceosimage:4.27.3F | ceos  | running | 172.100.100.6/24  | 2001:172:100:100::2/80 |
| 12 | clab-avdirb-svc2b    | ac0290080e47 | ceosimage:4.27.3F | ceos  | running | 172.100.100.7/24  | 2001:172:100:100::a/80 |
+----+---------------------+--------------+-------------------+-------+---------+-------------------+------------------------+
ubuntu@AusNOG21:~/avd-cEOS-Lab/labs/evpn/avd_sym_irb$
```

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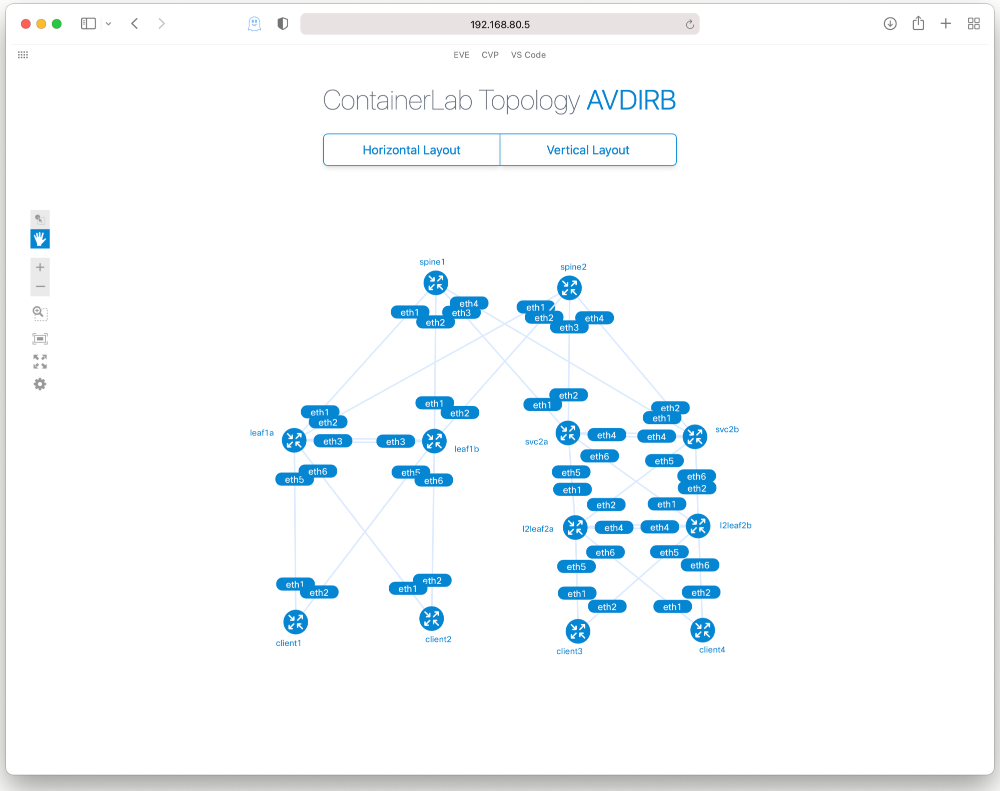
Verifying Containerlab Environment



```
sudo containerlab graph -t topology.yaml
```

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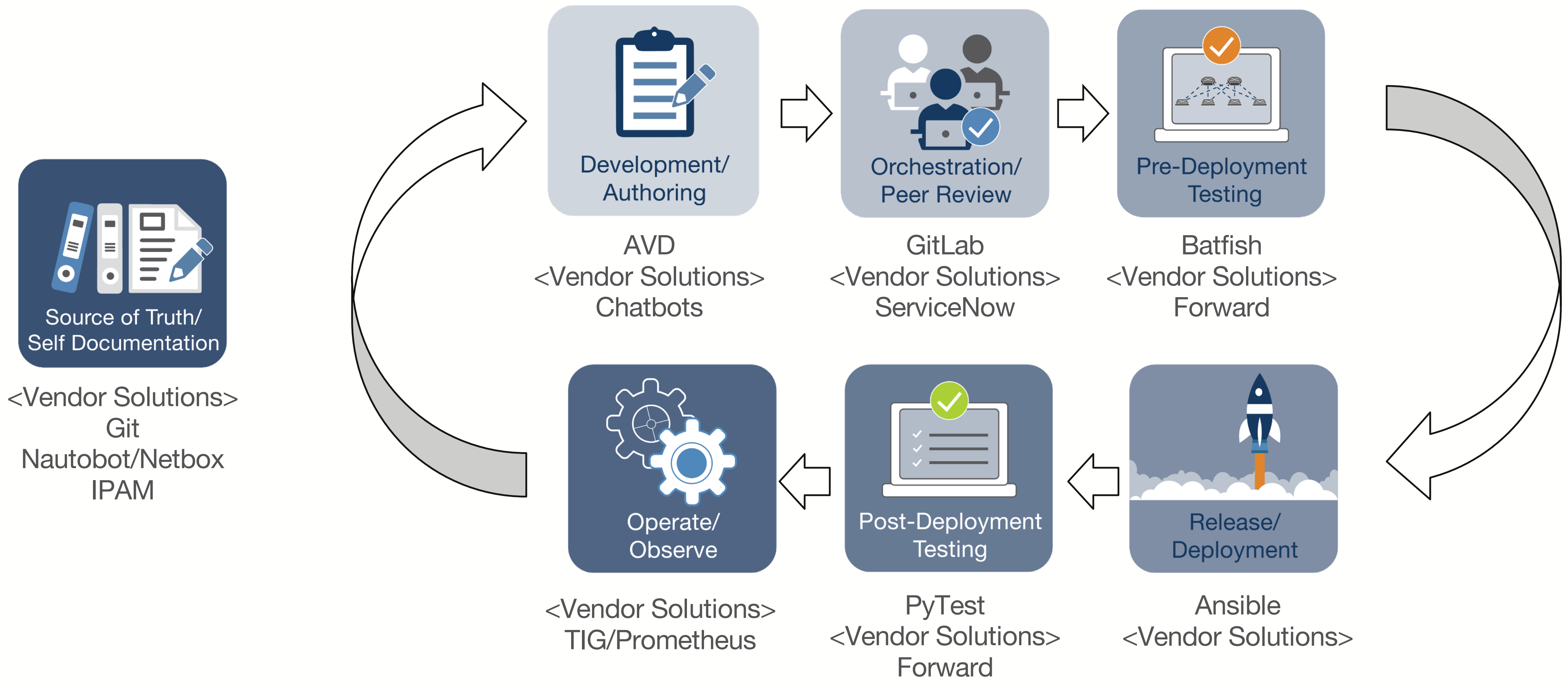
Summary: Automation / CI Workflow



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Thank You

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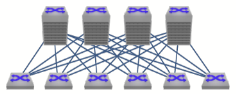
Arista CI Pipeline Reference Architecture

Arista Validated Designs

AVD



L3LS - EVPN | L3LS | L2LS | Border Leaf | Campus MDF/IDF

Development / Authoring / Review

Intelligent tools to reduce input errors.

Peer review, ‘quorum or M-of-N’ rules for high risk changes.

CloudVision — GUI/API via Studios

Code Editor

Declarative Provisioning

Change Mgmt / Orchestration

Create, Submit, Approve Change Request.

Workflow orchestrator to run the pipeline.

now — Change Management

GitLab — Code repos and workflow pipeline

Pre-Deployment Testing

Test and evaluate changes before putting them into production.

De-risk deployments

Network modeling and config testing

ACT ARISTA CLOUD TEST — Virtual twin

Release / Deploy

Rollout changes with knowledge of network state and topology. Apply this to inform and guide deployment.

Multi-vendor configuration deployment

CloudVision — Arista configuration deployment

Operate / Observe

Validate changes had desired effect. Monitor and observe to develop future changes.

Packet capture and monitoring

CloudVision — Telemetry and analysis for closed-loop change control

Source of Truth / Self Documenting

n ⟷ CloudVision