# Ansible in a Devcontainer

Entire arista.avd ecosystem in a sealed bottle

Petr Ankudinov
Patrick Mathy

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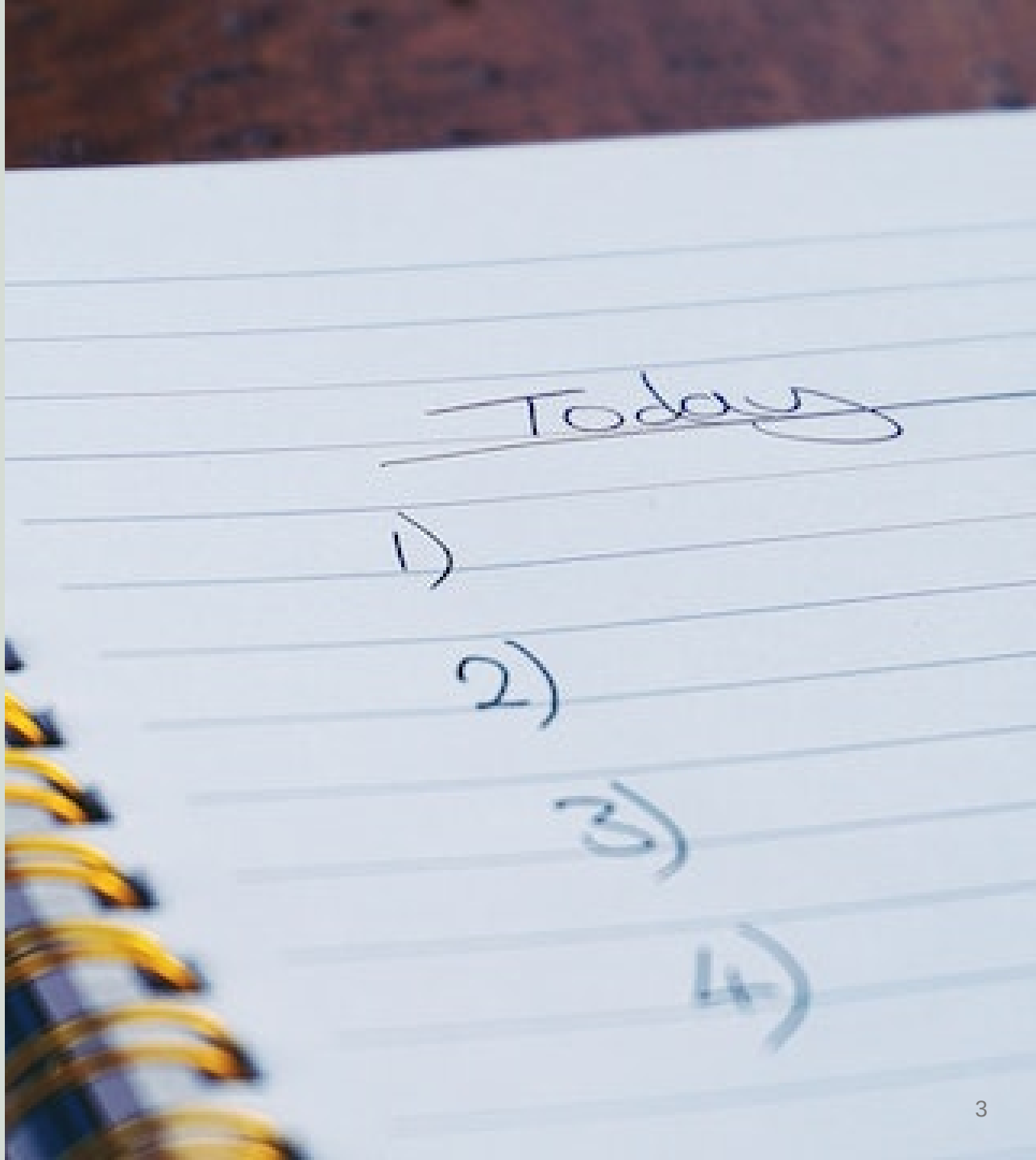
# $ whoami

- Petr Ankudinov github.com/ankudinov
  - Advanced Services Engineer at Arista Networks
  - Over 20 years of experience in IT with a bit of everything
  - ACE: L5, CCIE 37521
  - Passionate DC and network automation engineer
  - Daily (and nightly) user of Ansible, VSCode and more
- Patrick Mathy
  - Arista Systems Engineering at Arista Networks
  - Networking around since 2016
  - ACE: L5, CCIE 57751
  - R&S, DC, Python, Ansible, Terraform, DevNet

# Agenda

- Ansible AVD collection overview
- Common challenges when building Ansible environment
- Why devcontainers?
- Pre-building a devcontainer with arista.avd, docker-in-docker and Containerlab using Github devcontainers/ci@v0.3 action.
- How to run the container on any machine (with docker run or as devcontainer) or Github Codespaces



# Highlights

- This session is focused on the network automation with Ansible AVD collection, but same principles can be applied to **any other Ansible collection**.
- The focus is on the **development lifecycle**. The concept of using Dev Containers can be useful for some production use cases, but so is Ansible Automation Platform, etc. Your mileage may vary.
- Required technical level is **intermediate**. You should know some Ansible, VSCode, containers, Github, etc.
- There are not too many slides. The missing details are available in the repository.

> **Hint:** Treat this repository as a cookbook with recipes you can use in your projects.

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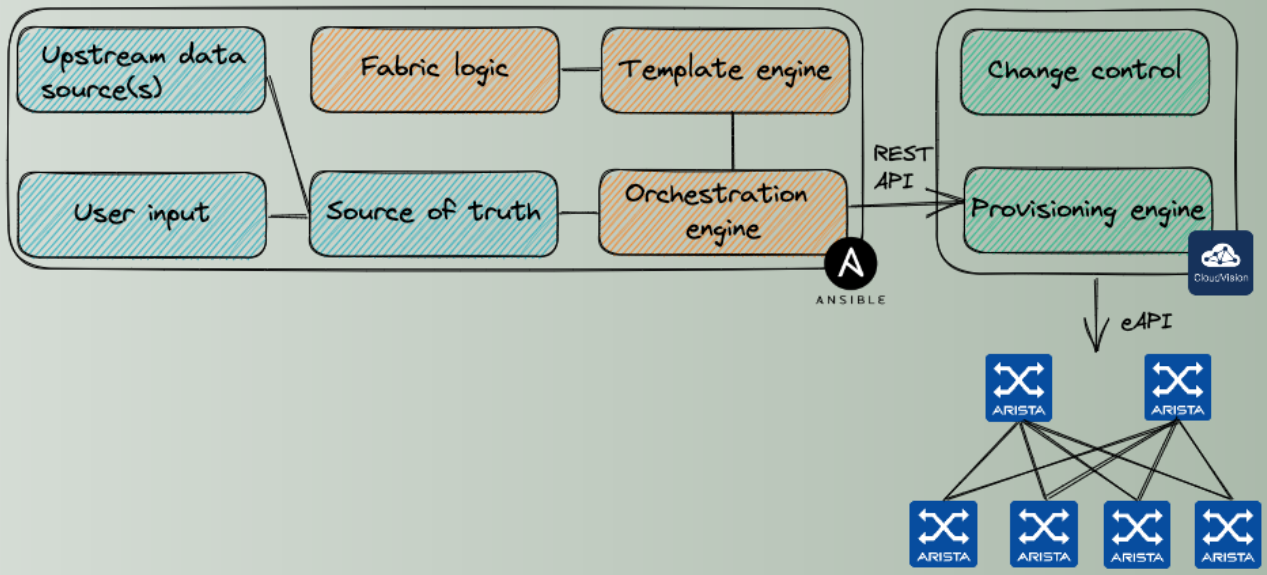
## Credits and References

This repository is based on many awesome open source repositories and some free/commercial Github features:

| Tool | Purpose |
| --- | --- |
| VS Code | create this repository code |
| DevContainers | our topic for today |
| Marpit | Markdown slide deck framework |
| Github Actions | build slides and containers |
| Github Pages | publish slides |
| Github Packages | publish containers |
| Github Codespaces | run the demo container |
| Carbon | code snippets |
| Pexels and Unsplash | Excellent free stock photos resources. It's not possible to reference every author individually, but their work is highly appreciated. |
| excalidraw, drawio, tldraw | VSCode plugins to create drawings |
| Containerlab | Orchestration tool for container based networking labs |
| Arista AVD Ansible Collection | Ansible collection used to build EVPN network |
| Ansible | Automation for everyone. Yes, we'll use it as well! 😎 |

# What is Ansible AVD?

- AVD stands for Arista Validated Design as it was based on the EVPN Deployment Guide
- A very successful community project used to deploy EVPN based Data Center fabrics
  - Over 200 stars on Github and 79 contributors as of Sep 2023
  - The most active Arista collection on Ansible Galaxy
- High level workflow:
  - Define abstracted group/host vars using AVD data model
  - Generate low level device specific variables (aka structured configs)
  - Parse templates, build plain text configs
  - Deliver configs to network devices using Ansible `arista.eos.eos_config`

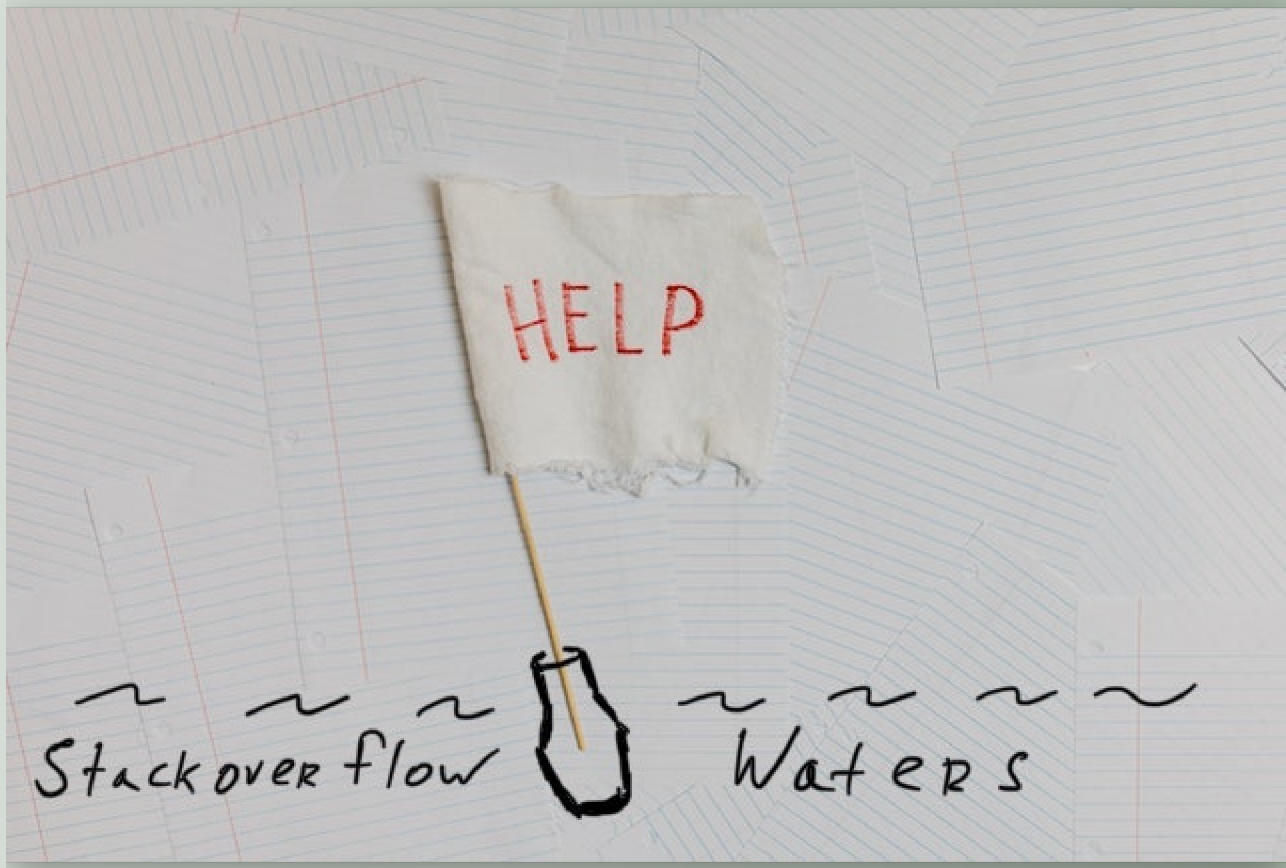


# Challenges When Building Ansible Environment

- The old story of "it works on my machine":
  - Different versions of Python and Ansible
  - Dependencies
  - Interpreter path issues
  - The famous very-very-very-**VERY** verbose only to find out that:
    `The error appears to be, but may be elsewhere` (c) Ansible 😅

    > The error handling and input validation is a very significant part of the `ansible.avd` collection.

- You can always cry for help and catch other people cries from the StackOverflow.



# Normal Containers and What It Takes to Build Them

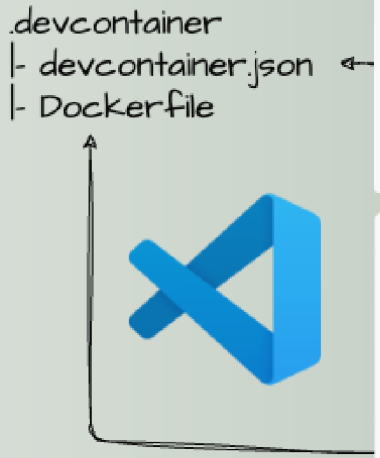
- Containers can help. But bring new challenges and building a good container is a journey:
  - Craft a Dockerfile with some essentials.
  - Add a non-root user, as root breaks permissions, breaks Ansible and ruins your work-life balance 😎.
  - Match user ID inside and outside of the container. Some operating systems like RHEL and the family are very strict about it. This is not a trivial task.
  - Create an entrypoint.
  - Take care of transferring Git credentials, keys, etc. into the container (if it's interactive).
  - Think about security and maintaining the container repository.
  - ... and it has to be multi-platform: amd64 and arm64 as a minimum.
- And now convince someone to run it. 🥷 ➡️


```
docker run --rm -it \
    --network host \
    --pid="host" \
    -w $(CURRENT_DIR) \
    -v $(CURRENT_DIR):$(CURRENT_DIR) \
    -e AVD_GIT_USER="$(shell git config --get user.name)" \
    -e AVD_GIT_EMAIL="$(shell git config --get user.email)" \
    $(AVD_CONTAINER_IMAGE) || true
```

# Dev Container - A Better Container

- A Dev Container is a container used as a fully featured development environment. Dev containers can be run locally or remotely, in a private or public cloud, in a variety of supporting tools and editors.
- Dev Container Specification was started by Microsoft and has strong community support.
- Dev Containers are powered by:
  - Prebuilt images
  - Features

> **Dev Container features** enable complex functionality at the cost a few lines added to `devcontainer.json`




```
FROM mcr.microsoft.com/devcontainers/python:0-3.9-bullseye
ARG _AVD_VERSION

USER vscode
ENV PATH=$PATH:/home/vscode/.local/bin
# install Ansible AVD collection
RUN pip3 install "ansible-core>=2.13.1,<2.14.0" \
    && ansible-galaxy collection install arista.avd:==${_AVD_VERSION} \
    && pip3 install -r /home/vscode/.ansible/collections/ansible_collections/arista/avd/requirements.txt
```

prebuilt image

```
{
    "name": "ansible-avd-devcontainer",
    "build": {
        "dockerfile": "Dockerfile",
        "args": {
            "_AVD_VERSION": "4.1.0"
        }
    },
    "features": {
        "ghcr.io/devcontainers/features/docker-in-docker:2.5.0": {
            "version": "latest"
        },
        // add sshd to support gh cli codespace cp
        "ghcr.io/devcontainers/features/sshd:1": {
            "version": "latest"
        }
    },
    "customizations": {
        "vscode": {
            "extensions": [
                // git essentials
                "piotrpalarz.vscode-gitignore-generator",
                "mhutchie.git-graph",
                "donjayamanne.githistory",
                // spell checker
                "streetsidesoftware.code-spell-checker"
            ]
        }
    }
}
```

d-in-d feature

# Prebuilt Dev Containers

- Local dev container builds are not always optimal:
  - They can be slow
  - Dependencies can change
  - Expertise required to troubleshoot a failed container build is not always available
  - Security restrictions can break local builds
  - ... 20 other reasons nobody was thinking about
- Solution: pre-build your own dev container and upload to any container registry.
- One of the best combos:
  - Github Container Registry
  - devcontainers/ci@v0.3 action

```yaml
jobs:
  build_image:
    runs-on: ubuntu-22.04
    steps:

    # more steps here
    # < ... >

    - name: Pre-build dev container image 🔨
      uses: devcontainers/ci@v0.3
      with:
        subFolder: avd-containers/${{ inputs.container_name }}
        imageName: ghcr.io/ankudinov/avd-devcontainer/${{ inputs.container_name }}
        imageTag: ${{ steps.build-tags.outputs.image_tags }}
        platform: ${{ inputs.platform }}
        push: always
```

# How to Run a Dev Container

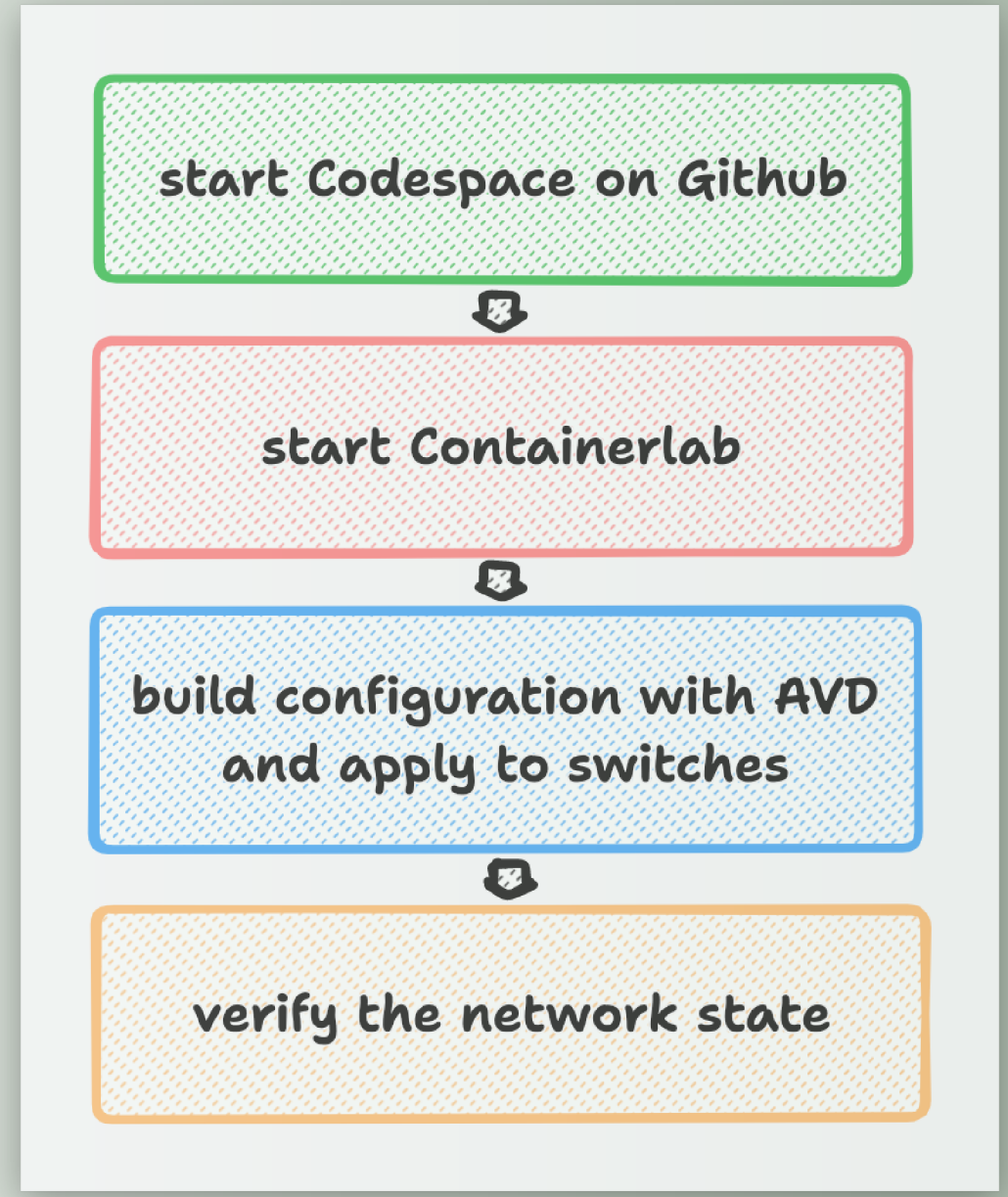
tbd

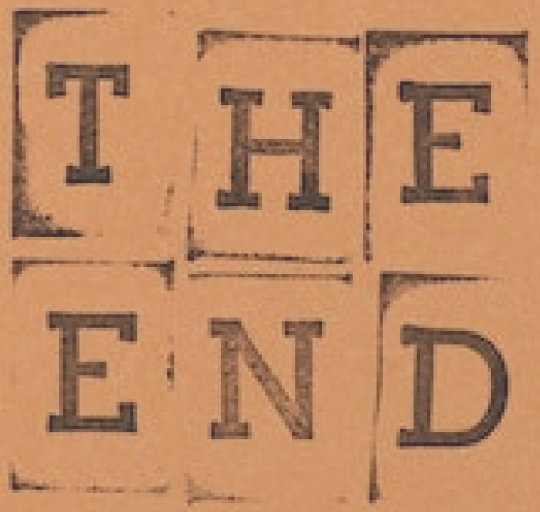
# The Lab

tbd

# The Demo

- The demo is showing a single use case of building a functional EVPN lab in a dev container with Ansible AVD
- The use cases are endless
- Dev containers are not intended to be used in prod theoretically, but in certain cases this can be very acceptable






# Q&A

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