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The bridge to possible

Ansible Network Automation,

GitOps for NetOps

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BRKATO-2106

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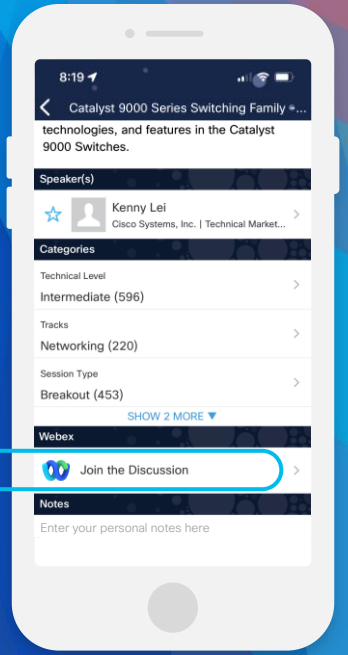


https://ciscolive.ciscoevents.com/ciscolivebot/#BRKATO-2106

Who am I?
Sean Cavanaugh

Work History:

Red Hat	2017-Now
Cumulus Networks	2014-2017
Cisco Systems	2010-2014

Personal

Live with my wife, three kids, one border collie and two cats in Chapel Hill, North Carolina

Hobbies

Home automation, electric bikes, soccer, Y-Guides, piano, 5Ks

Who am I?
Adrian Iliesiu

Work History:

Cisco System	2014-Now
Radialpoint	2012-2014
Ajilon Consulting	2010-2012

Personal

Worked and lived in 5 countries over the past 15 years.
Currently residing in San Jose, California

Hobbies

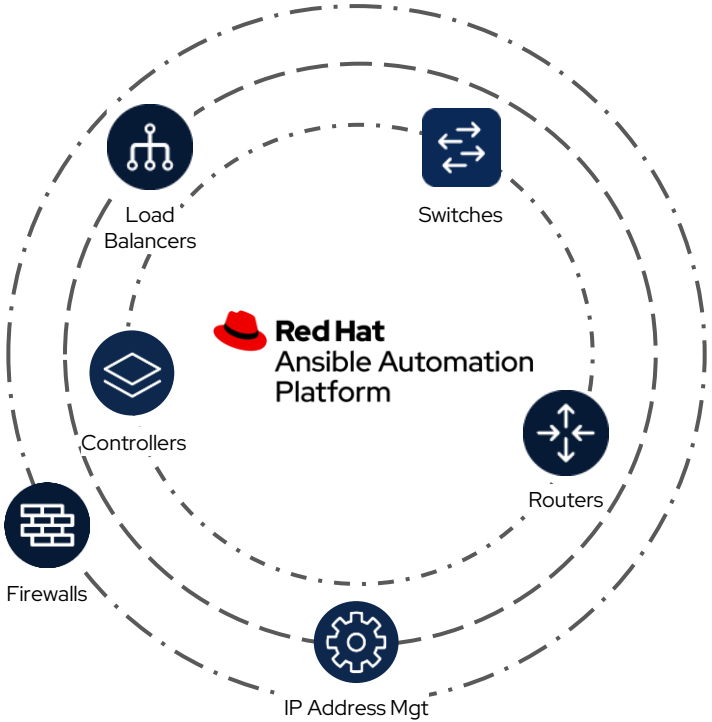
Fast cars, tennis, movies, reading

Agenda

- What is Ansible Network Automation?
- Automated NetOps
- Expanding on GitOps
- ansible.scm
- GitLab
- Demo
- Next Steps

What is Ansible Network Automation?

What is Ansible Network Automation?

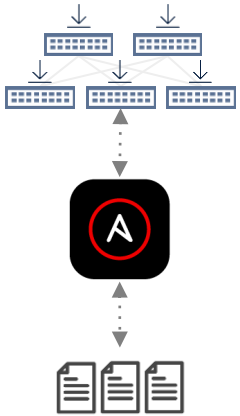


Ansible network automation provides network teams with the tools and an operational framework to implement **next-generation network operations**, manage network **infrastructure-as-code**, and better support digital transformation by connecting teams across the IT organization.

Ansible network automation is a set of Certified Content Collections designed to streamline and operationalize network operations across multiple platforms and vendors.

Start Small

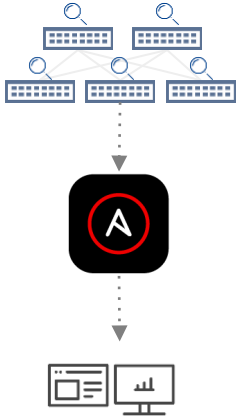
Quick automation victories for network engineers



Config Backup and Restore

Ubiquitous first touch use case

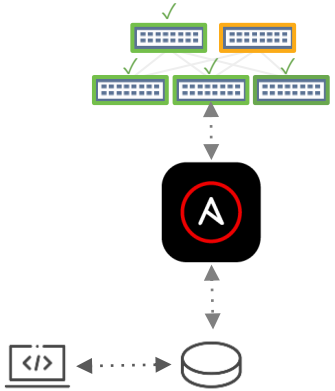
- Gain confidence in automation quickly
- First steps towards network as code
- Quickly recover network steady state



Dynamic Documentation

Use Ansible facts to gain information

- Read-only, no production config change
- Dynamic Documentation and reporting
- Understand your network



Scoped Config Management

Focus on high yield victories

- Automate VLANs, ACLs and SNMP config
- Introduce source of truth concepts
- Enforce Configuration policy

Think Big

Institutionalizing automation into your organization

Network Compliance

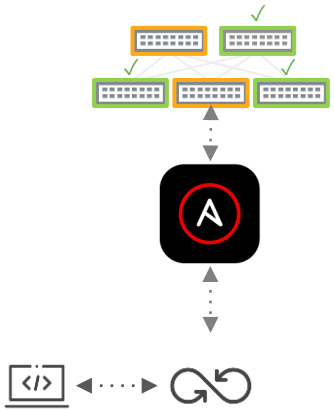
Respond quickly and consistently

- Security and config compliance for network
- Remove human error from security responses
- Enforce Configuration policies and hardening

Operational State Validation

Going beyond config management

- Parsing operational state to structured values
- Schema validation and verification
- Enhance operational workflows

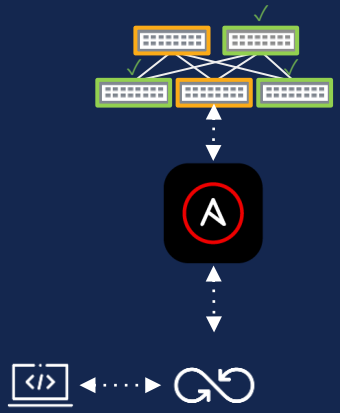


Automated NetOps

Infrastructure as code

- Data centric automation
- Deploy configuration pipelines
- GitOps for Network Automation

Automated NetOps



Automated NetOps

Infrastructure as code

- Data centric automation
- Deploy configuration pipelines
- GitOps for Network Automation

But first

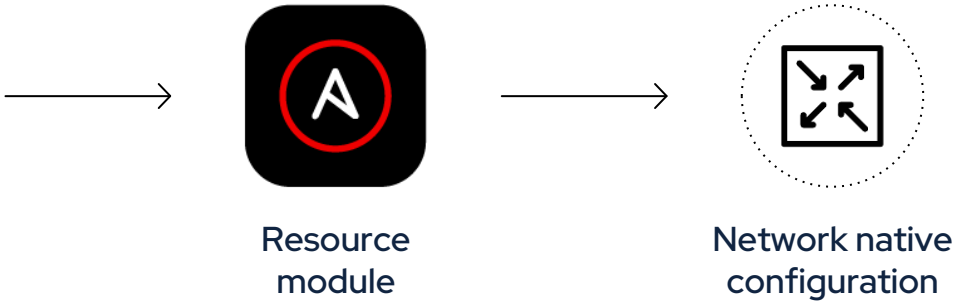
some terminology breakdowns

- Infrastructure as code?
- Source of Truth?
- Data centric automation?
- Pipelines?
- DevOps?
- CI/CD?
- GitOps?
- NetDevOps?

Infrastructure as code

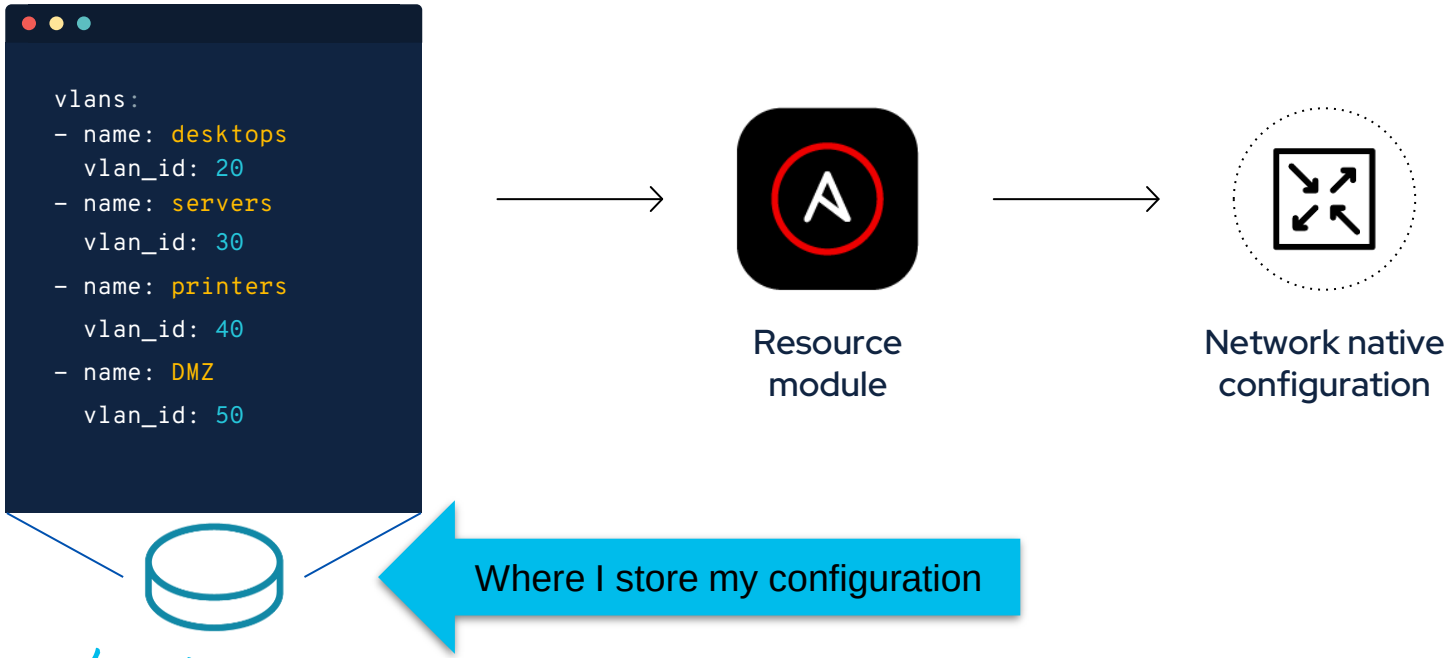
manage IT infrastructure through definition files rather than physical hardware configuration or interactive configuration tools

```
vlans:
- name: desktops
  vlan_id: 20
- name: servers
  vlan_id: 30
- name: printers
  vlan_id: 40
- name: DMZ
  vlan_id: 50
```



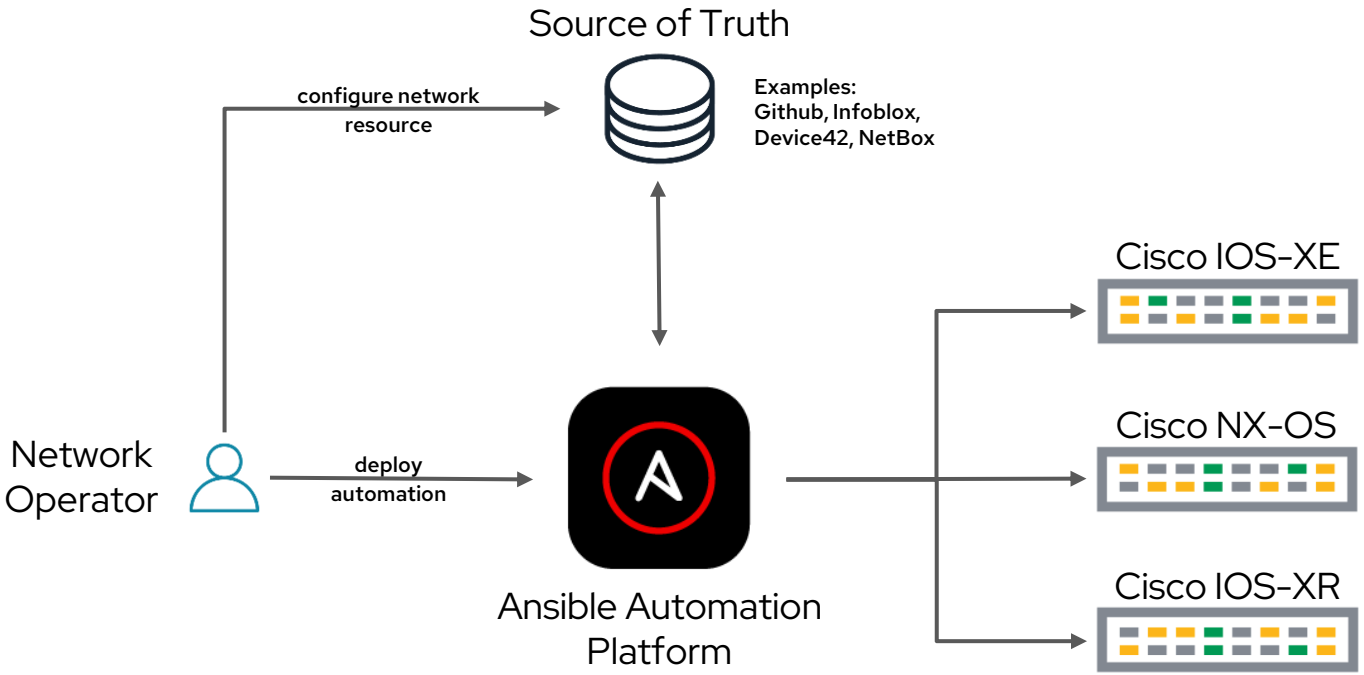
Source of Truth (SoT) 1/2

approach that ensures every piece of information is stored and updated in only one location



Source of Truth (SoT) 2/2

approach that ensures every piece of information is stored and updated in only one location



Data centric automation

focus on important data, not the implementation

```
vlans:
- name: desktops
  vlan_id: 20
- name: servers
  vlan_id: 30
- name: printers
  vlan_id: 40
- name: DMZ
  vlan_id: 50
```

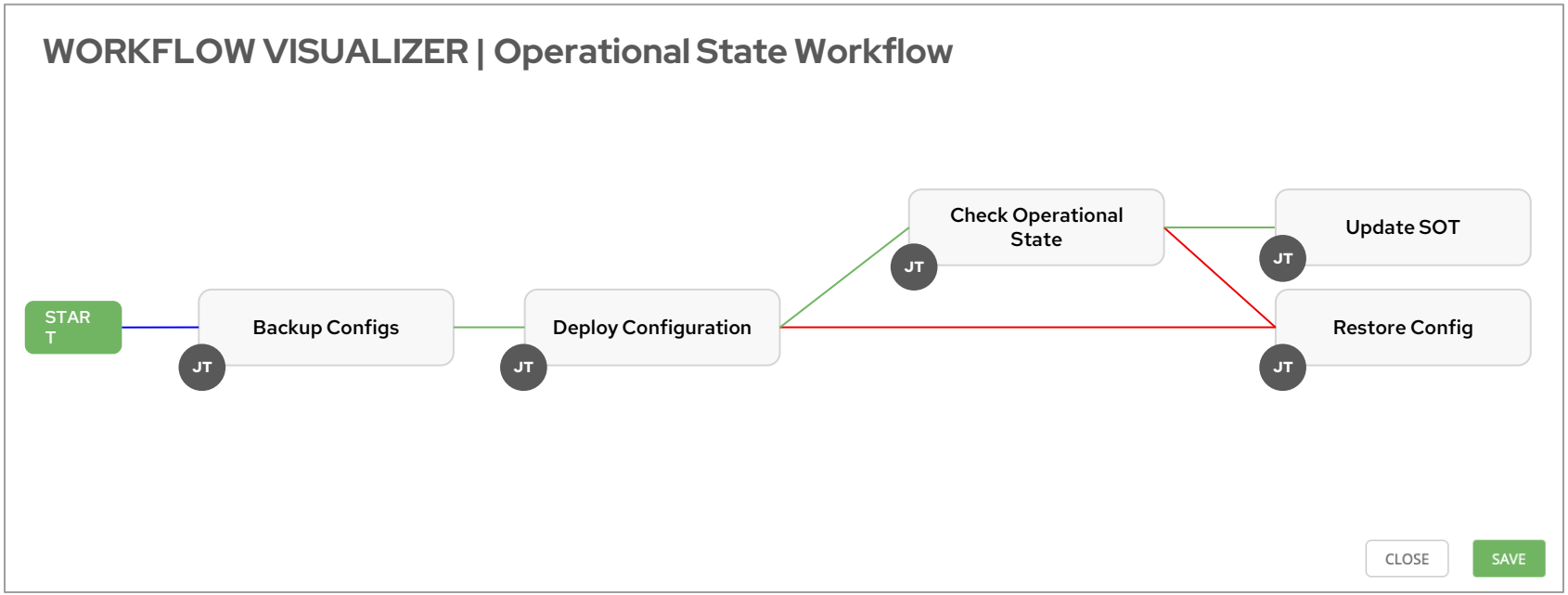
data

```
switch(config)# vlan 20
switch(config-vlan-20)#
switch(config-vlan-20)# vlan 30
switch(config-vlan-30)# name servers
switch(config-vlan-20)# vlan 40
switch(config-vlan-40)# name printers
switch(config-vlan-40)# vlan 50
switch(config-vlan-50)# name DMZ
```

implementation

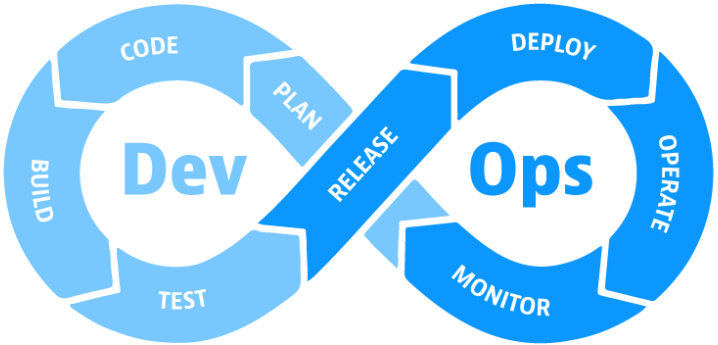
Pipelines

sequence of automated tasks or processes that work together to achieve a specific outcome or goal.



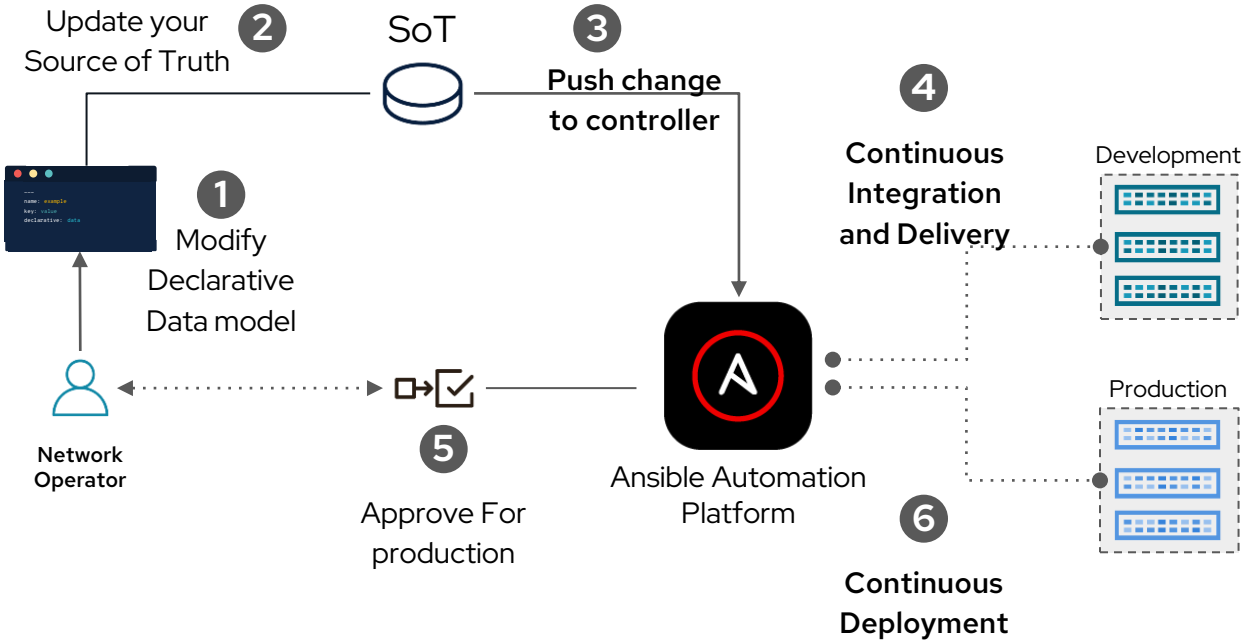
DevOps

breaking down the traditional silos between development and operations teams and promoting a culture of collaboration, shared responsibility, and continuous improvement.



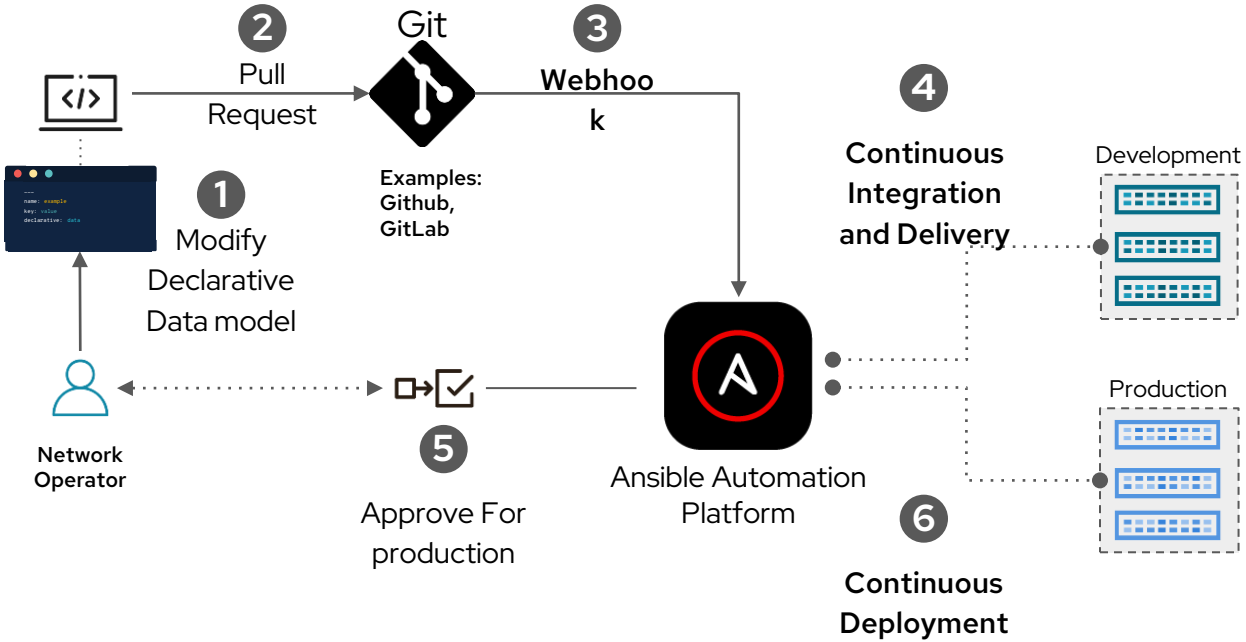
CI/CD

Continuous Integration and Continuous Delivery/Deployment. It is a set of practices and principles that aim to automate and streamline the process of building, testing, and deploying software applications.



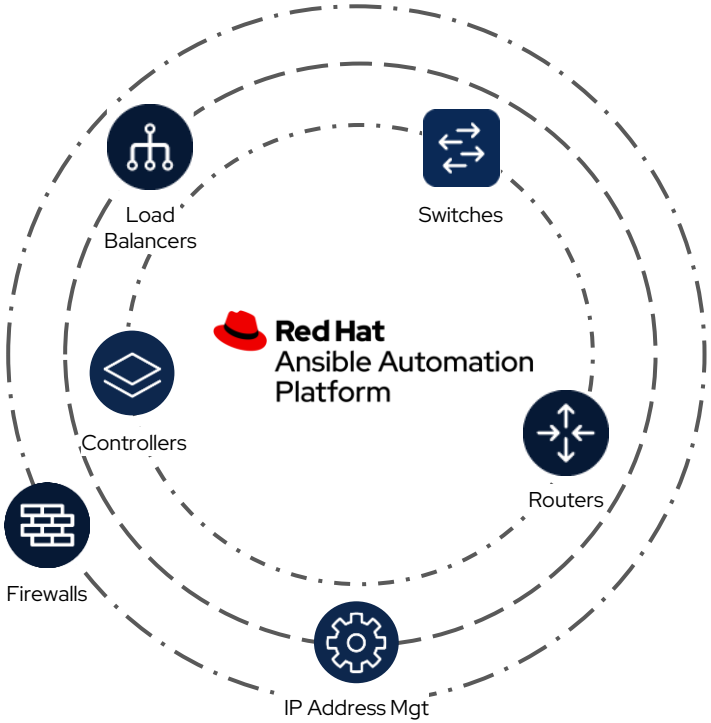
GitOps

GitOps enables a declarative, version-controlled approach to managing infrastructure and applications



NetDevOps

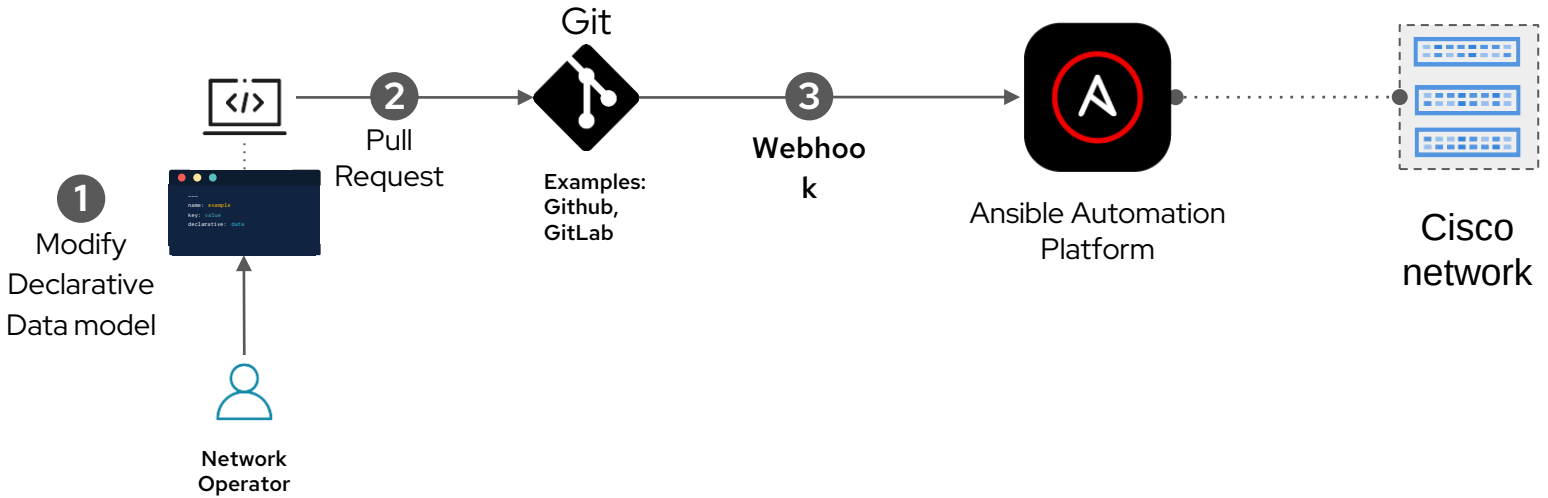
practices and principles that applies DevOps methodologies to network infrastructure operations



Expanding on GitOps

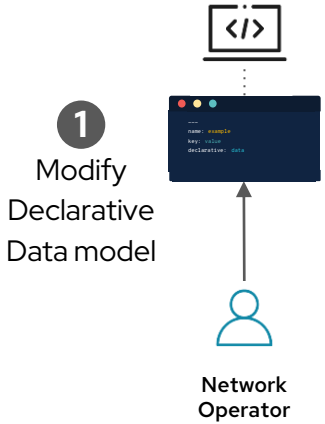
GitOps

What does an Ansible Automation solution look like?



GitOps

What does an Ansible Automation solution look like?

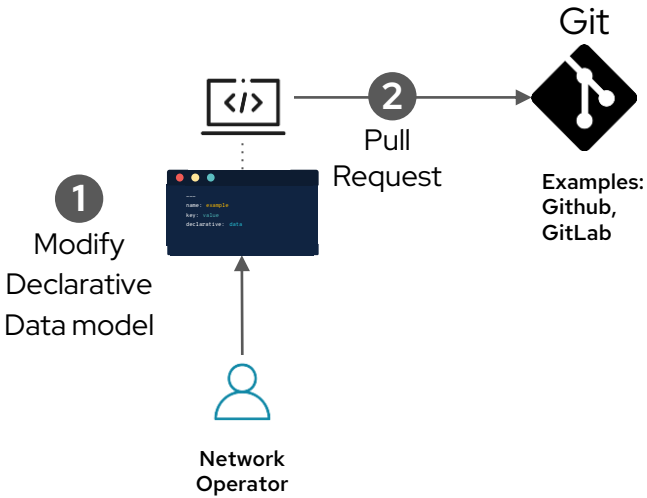


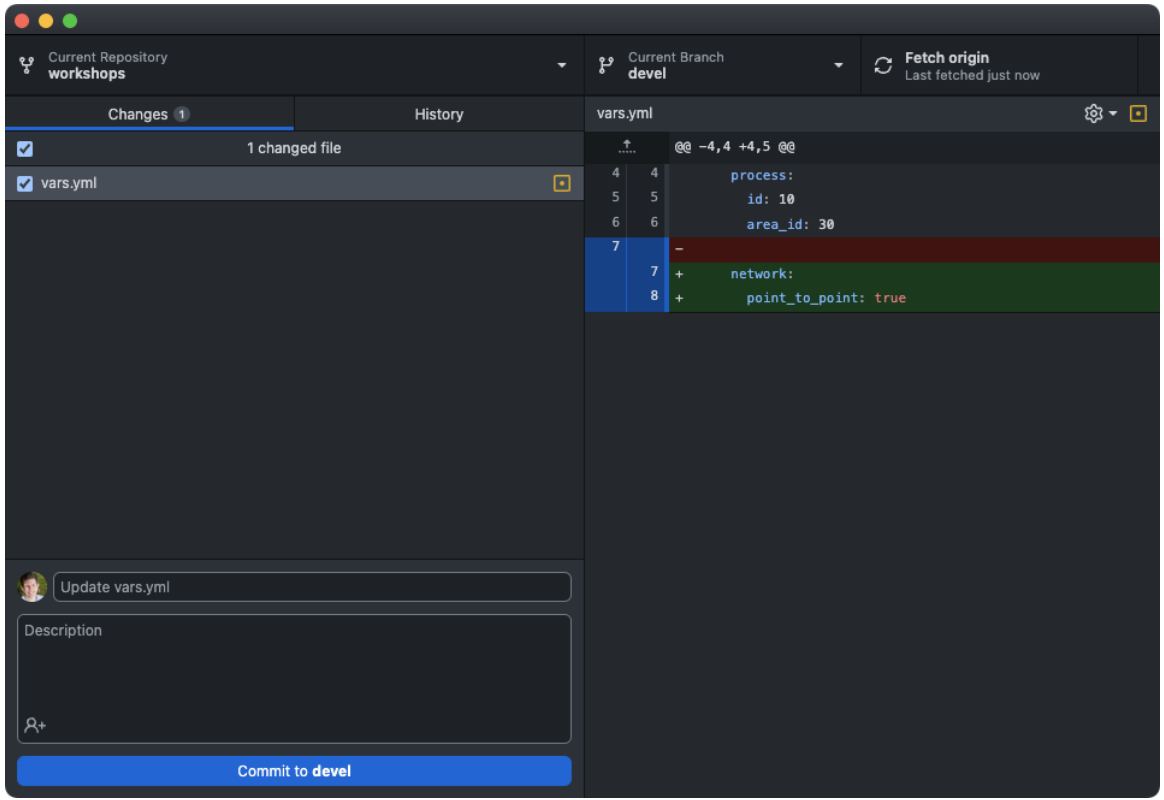

```
- name: GigabitEthernet0/1
  address_family:
    - afi: ipv4
      process:
        id: 10
        area_id: 30
      network:
        point_to_point: true
```

Added by user to the data model

GitOps

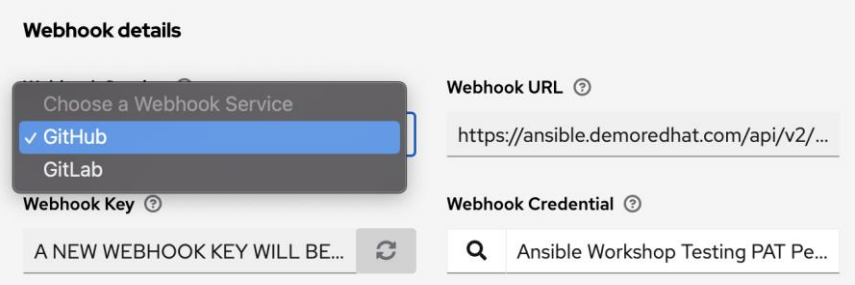
What does an Ansible Automation solution look like?

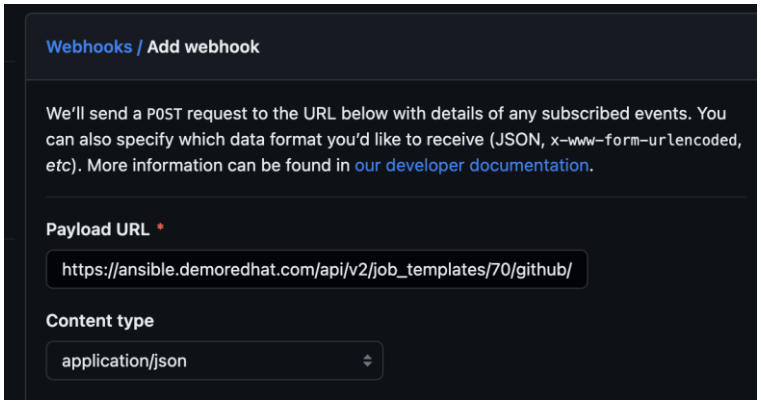


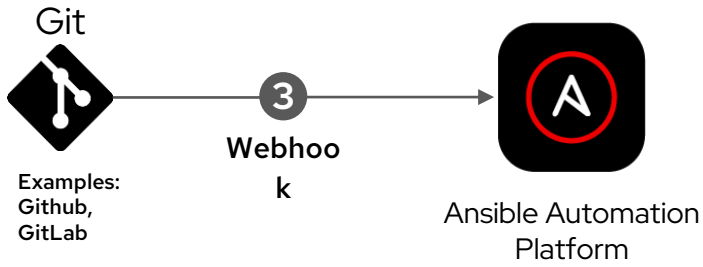


GitOps

What does an Ansible Automation solution look like?







Overview: As soon as you push changes to git**,** Ansible Automation Platform will automatically kick off specified automation

GitOps

What does an Ansible Automation solution look like?

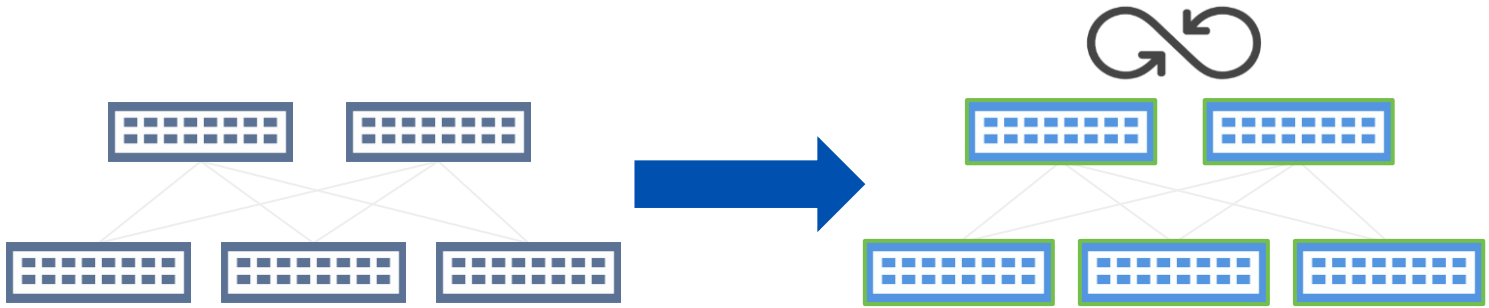
cisco.**aci**
cisco.**mso**
cisco.**iosxr**
cisco.**ios**
cisco.**nxos**
cisco.**dcnm**
cisco.**asa**
cisco.**ise**
cisco.**dnac**
cisco.**nae**

```
- name: OSPF Interfaces configuration
  cisco.ios.ios_ospf_interfaces:
    config: "{{ config }}"

- name: OSPF Interfaces configuration
  cisco.iosxr.ios_ospf_interfaces:
    config: "{{ config }}"
```

Certified Collections found on:
https://console.redhat.com/ansible/automation-hub/repo/published/cisco/

What about brown field?

How do I convert an existing network into a GitOps methodology?



Introducing ansible.scm

ansible.scm

Ansible content collection for retrieving and publishing to Git repositories

Retrieve and Publish with any Git repository

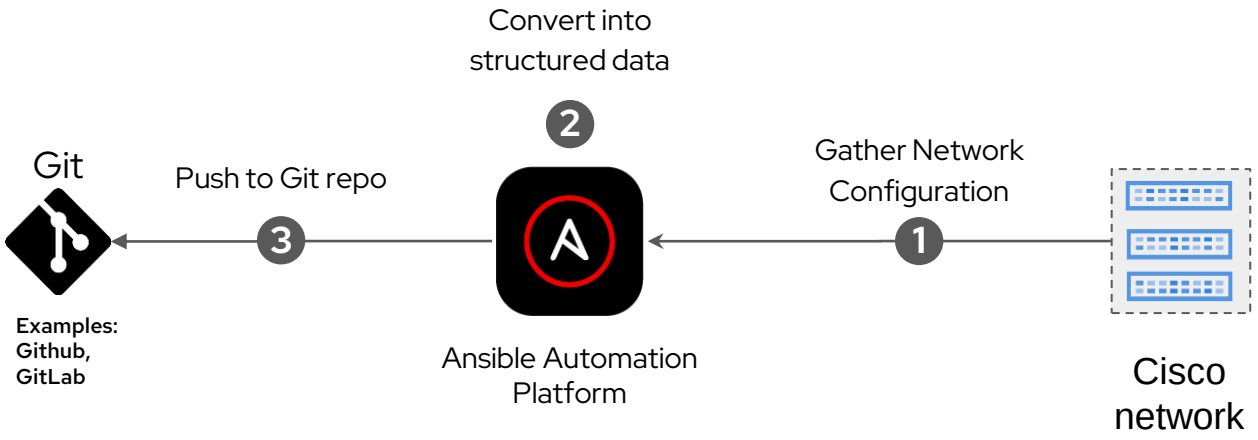
Easy way to work with Git repositories including Github and Gitlab

```
---
- hosts: localhost
  tasks:
    - name: Retrieve a repository
      ansible.scm.git_retrieve:
        origin:
          url: git@github.com:network/repo.git
      register: repository
```

```
---
- hosts: localhost
  tasks:
 - name: Publish a repo
      ansible.scm.git_publish:
        path: "/my/local/directory"
```

Brownfield Strategy

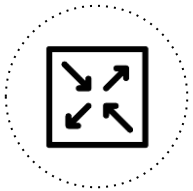
How to quickly make a GitOps solution in your existing network infrastructure



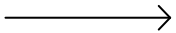
From existing network to Git

Ansible Automation Platform facts

Network automation begins and ends with facts



Network native configuration



Convert to structured data


```
"ansible_facts": {
  "ansible_net_iostype": "IOS-XE",
  "ansible_net_version": "16.09.02",
  "ansible_net_serialnum": "9L8KQ482JFZ",
  "ansible_net_model": "CSR1000V",

<<rest of output removed for brevity>>
```

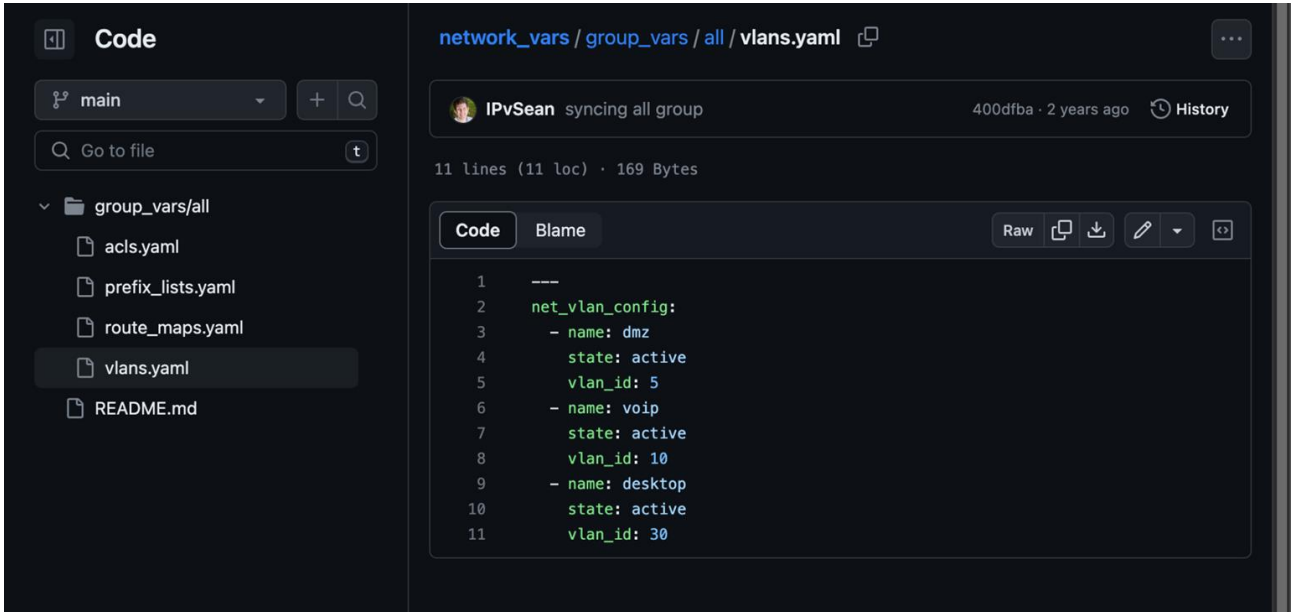
State Gathered

Retrieve any resource (or all of them)

```
- name: Gather OSPF Interfaces configurations
  cisco.ios.ios_ospf_interfaces:
    state: gathered

- name: Gather VLANs configurations
  cisco.ios.ios_vlans:
    state: gathered
```

Infrastructure as code

Brownfield are now variables (vars) in your Git repository



GitLab

GitLab

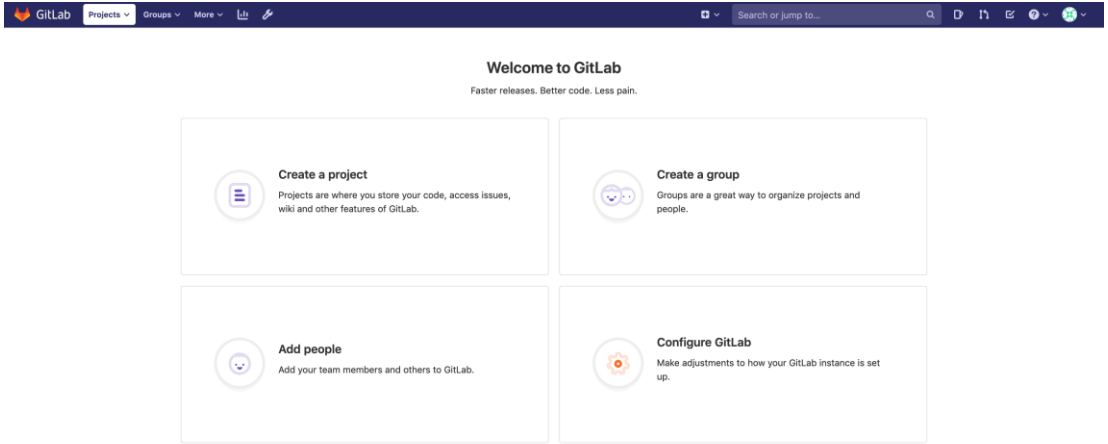
Overview

- Complete DevOps platform
- Project Management
- Hosted Git repositories
- Built-in CI/CD

GitLab

Projects

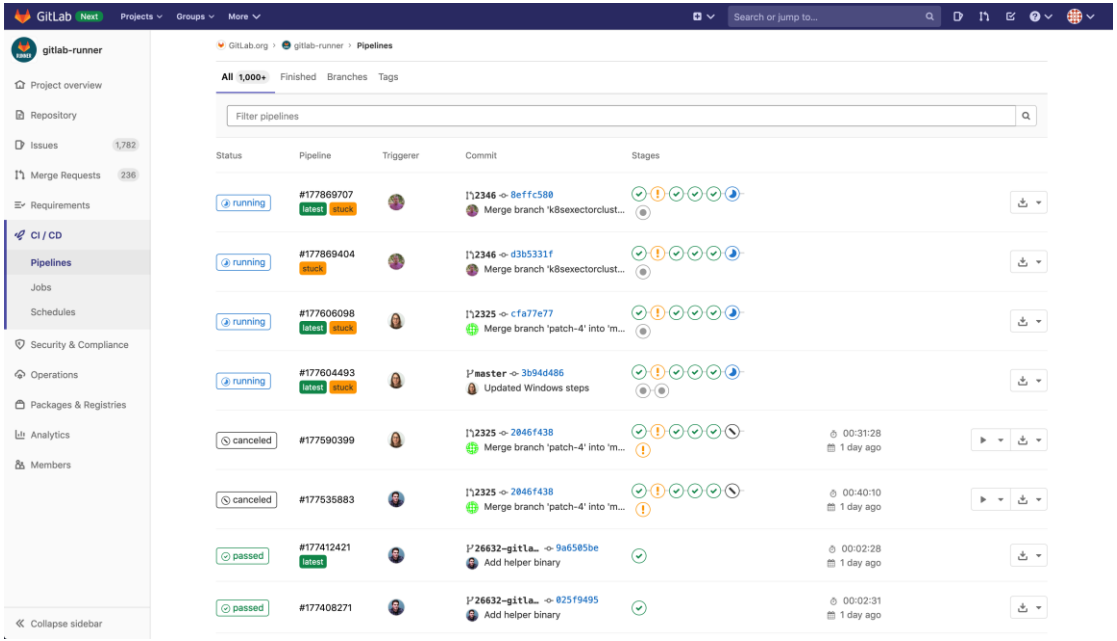
- Code, issues, wikis, etc. are organized into projects



GitLab

Pipelines

- Fundamental building blocks for CI/CD



GitLab

Pipelines

- Composed of:
  - Jobs – What to do
  - Stages - When to run jobs
- A typical pipeline would contain four stages
  - Build (compile)
  - Test (unit-tests)
  - Staging (deploy-to-stage, integration-tests)
  - Production (deploy-to-prod)

GitLab

Runners

- Used to run the jobs and send results back to GitLab
- When a pipeline is triggered, a Runner will `git clone` the repo and then execute the instructions inside of `.gitlab-ci.yml`
- Implements a variety of executors
  - Jobs can run in different scenarios
  - SSH, Shell, Parallels, VirtualBox, Docker, Kubernetes, Custom

GitLab

.gitlab-ci.yml

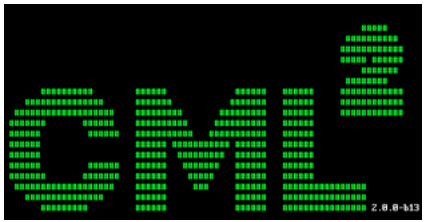
```yaml
stages:
  - build
  - test
  - deploy

image: alpine

compile_a:
  stage: build
  script:
    - echo "This job builds something."

compile_b:
  stage: build
  script:
    - echo "This job builds something else."

unit_test_a:
  stage: test
  script:
    - echo "This job tests something. It will only run when all jobs in the"
    - echo "build stage are complete."

unit_test_b:
  stage: test
  script:
    - echo "This job tests something else. It will only run when all jobs in the"
    - echo "build stage are complete too. It will start at about the same time as test_a."

deploy_a:
  stage: deploy
  script:
    - echo "This job deploys something. It will only run when all jobs in the"
    - echo "test stage complete."

deploy_b:
  stage: deploy
  script:
    - echo "This job deploys something else. It will only run when all jobs in the"
    - echo "test stage complete. It will start at about the same time as deploy_a."
```

Demo

Test environment

Dev Workstation

Hosting Server



Network Simulation

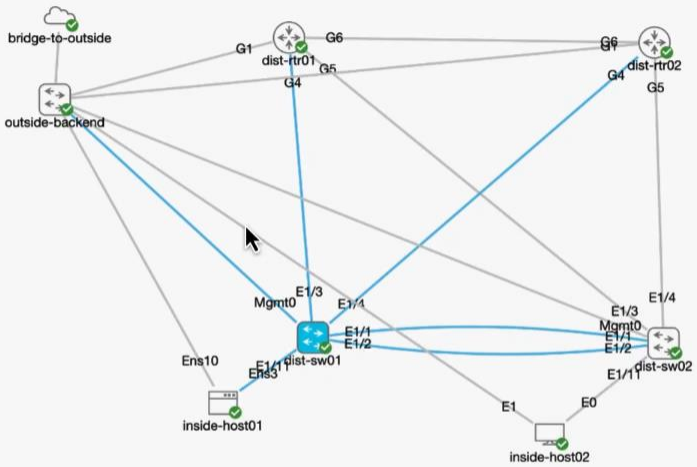
Infrastructure as Code

Source Control

Testing Framework

Cisco Modeling Labs Workbench NXOS/IOSXE Network

DASHBOARD TOOLS ADMIN



NODE INFO SIMULATE CONNECTIVITY CONSOLE VNC EDIT CONFIG INTERFACES

CLONE NODE DELETE NODE

NX-OS 9000

Node Name:
dist-sw01

CPU 28.56% MEMORY 18.82% DISK 8.38% Notifications 0 Status OK

Next Steps

Learning resources

Continue your automation journey with Red Hat® Ansible® Network Automation

Red Hat
Ansible Automation
Platform

Networking Labs

https://red.ht/ansible-labs

E-Books

1. Modernize Your Network with Red Hat
   red.ht/network-book1
2. Network Automation Guide
   red.ht/Net_Auto_Guide
1. Automate Your Network with Red Hat
   red.ht/network-book2

Red Hat Certification
Ansible for Network Automation (DO457)

red.ht/network-training

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These points help you get on the leaderboard and increase your chances of winning daily and grand prizes

Continue your education

- Visit the Cisco Showcase for related demos
- Book your one-on-one Meet the Engineer meeting
- Attend the interactive education with DevNet, Capture the Flag, and Walk-in Labs
- Visit the On-Demand Library for more sessions at www.CiscoLive.com/on-demand

The bridge to possible

Thank you

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Challenge

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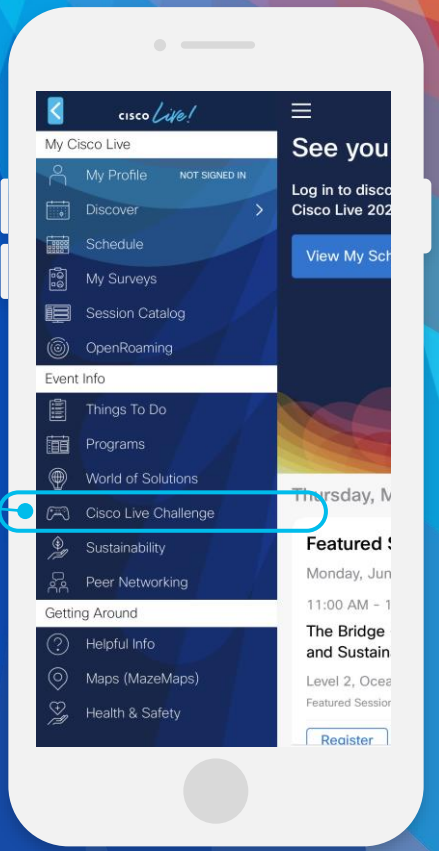
How:

1. Open the Cisco Events App.
2. Click on 'Cisco Live Challenge' in the side menu.
3. Click on View Your Badges at the top.
4. Click the + at the bottom of the screen and scan the QR code:

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