# How to use this deck

### Name:

Network Automation Workshop Deck

### Purpose:

This slide deck is part of a training course designed as an introduction to Ansible for network engineers and operators. The slides are meant to be taught in conjunction with hands-on exercises with a lab topology of Automation controller + 4 network devices.

### Last updated:

Sep 21, 2021 (check history for older versions)

### What this deck is for?

This deck corresponds to the prescriptive exercises available on https://ansible.github.io/workshops/exercises/ansible_network/

The upstream source for exercises and provisioner are provided on https://github.com/ansible/workshops

### What this deck is not for?

This is not a replacement for Red Hat training. This is a small “taste” of Ansible Automation Platform and meant to help people understand what is possible for network engineers with automation. Please refer to https://www.redhat.com/en/services/training-and-certification for official training

### Google Slides source link (Red Hat internal):

https://docs.google.com/presentation/d/1PIT-kGAGMVEEK8PsuZCoyzFC5CIzLBwdnftnUsdUNWQ/edit?usp=sharing

Red Hat
Ansible Automation
Platform

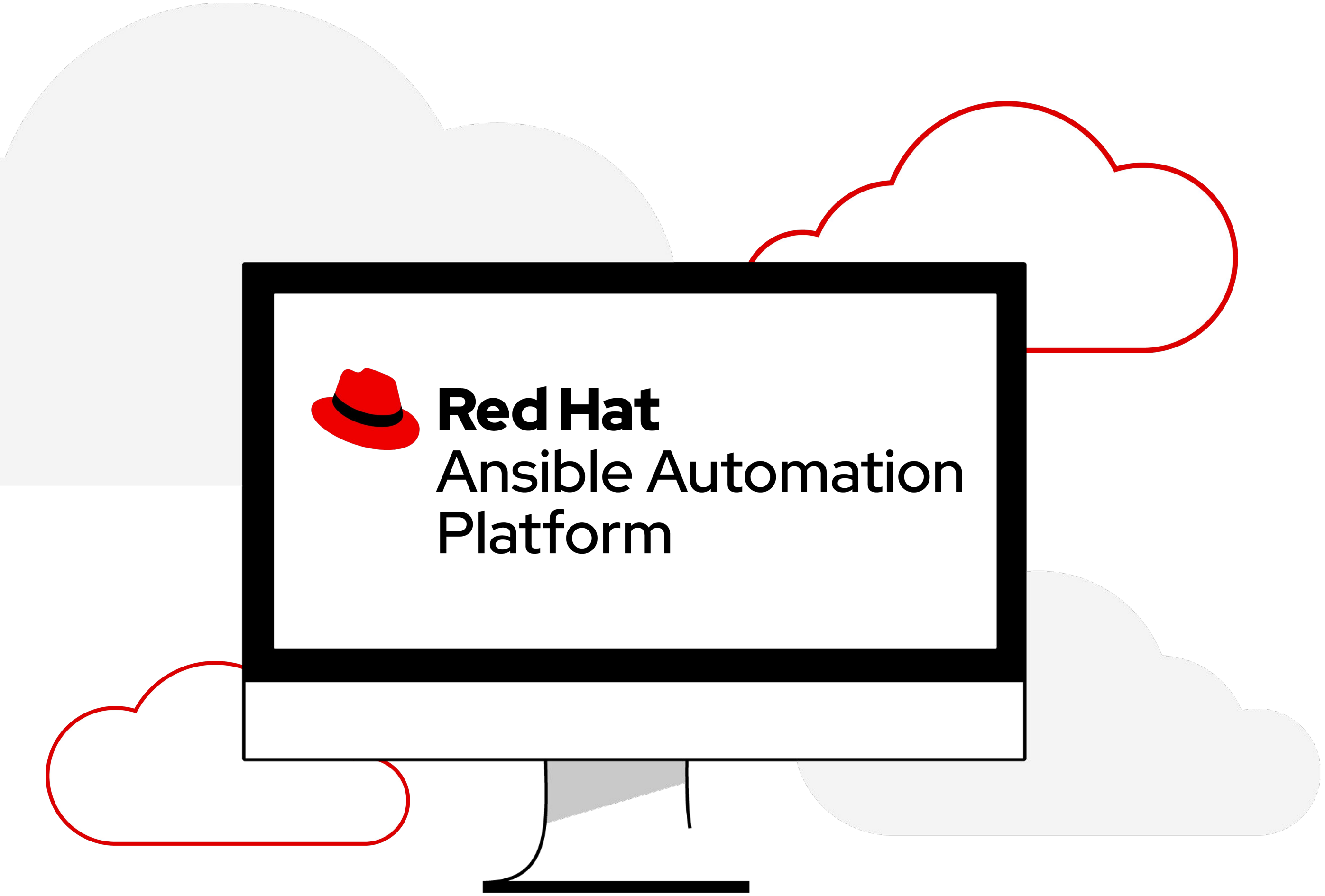
# Network Automation Workshop

Introduction to Ansible for
network engineers and operators

# Housekeeping

Understanding the format of this class

- Timing
- Breaks
- Takeaways



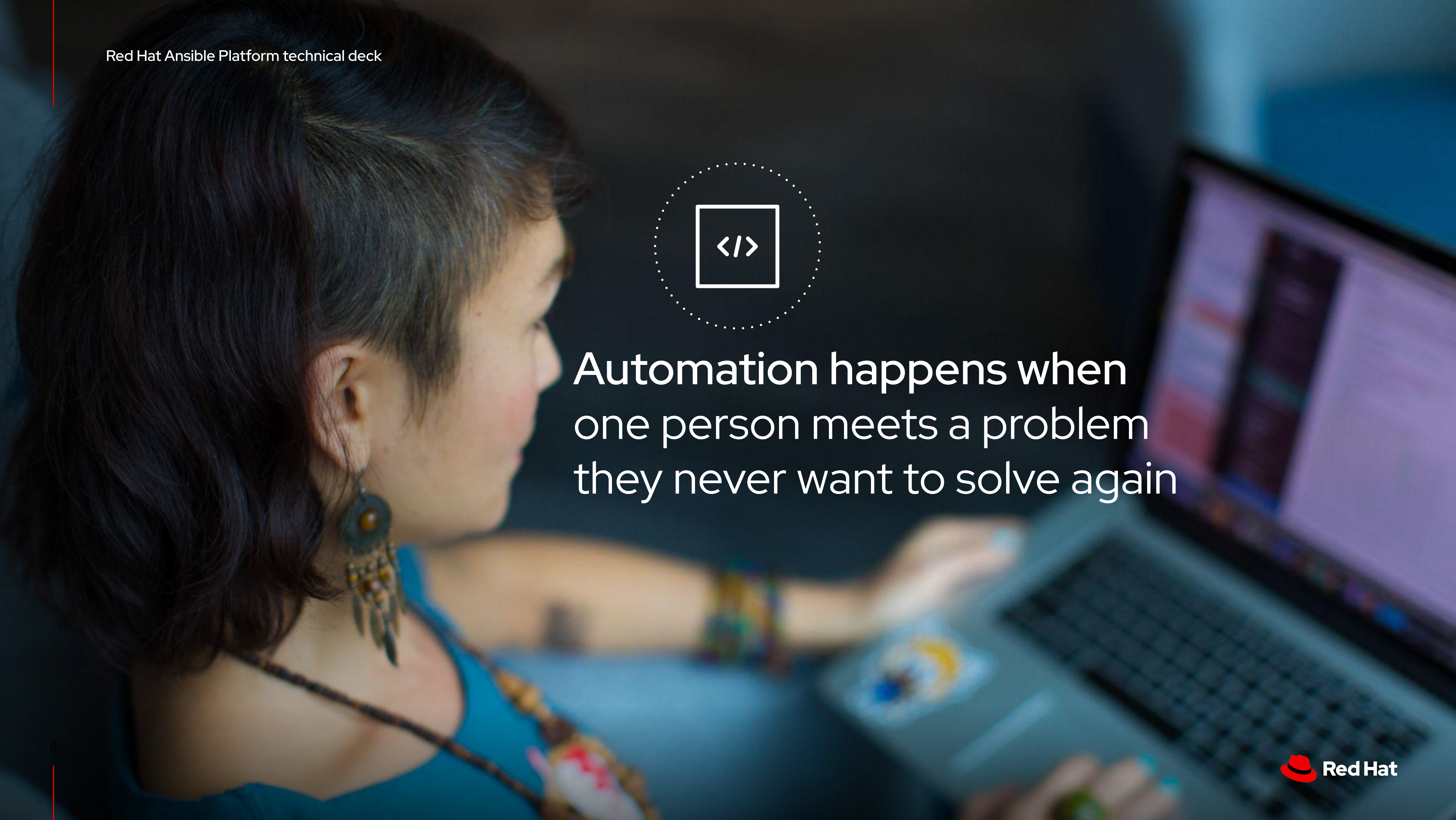
# What you will learn

- Introduction to Ansible automation
- How Ansible works for network automation
- Understanding Ansible modules and playbooks
- Executing Ansible playbooks to make configuration changes
- Gather information (Ansible facts)
- Network Resource Modules
- Using Automation controller to operationalize automation for your enterprise
- Major Automation controller features – RBAC, workflows

# Introduction

Topics Covered:

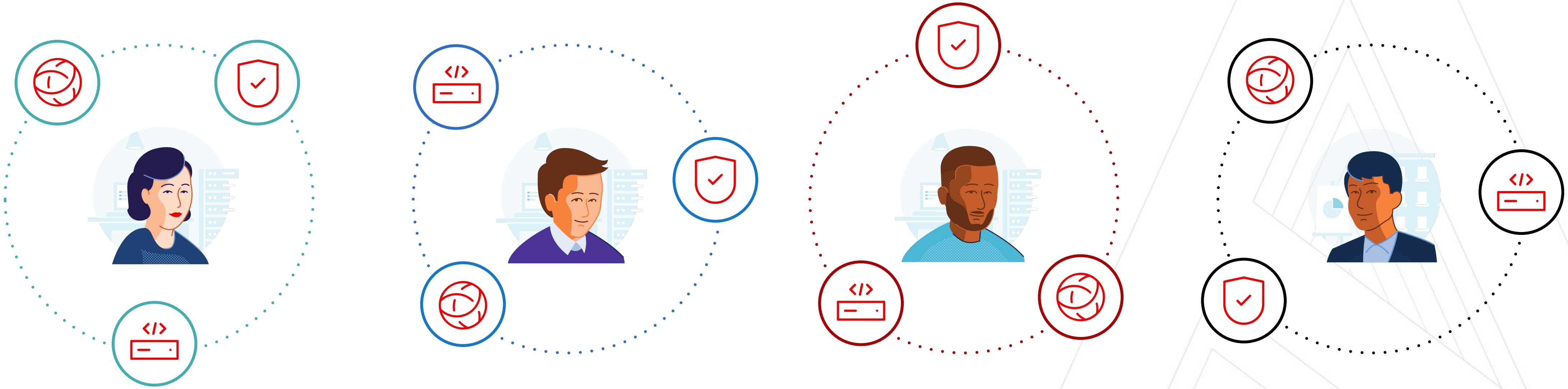
- What is the Ansible Automation Platform?
- What can it do?
- Why Network Automation?
- How Ansible Network Automation works



# Automation happens when one person meets a problem they never want to solve again

# Many organizations share the same challenge

## Too many unintegrated, domain-specific tools



Network ops

SecOps

Devs/DevOps

IT ops

# Why the Ansible Automation Platform?

## Powerful

Orchestrate complex processes at enterprise scale.

## Simple

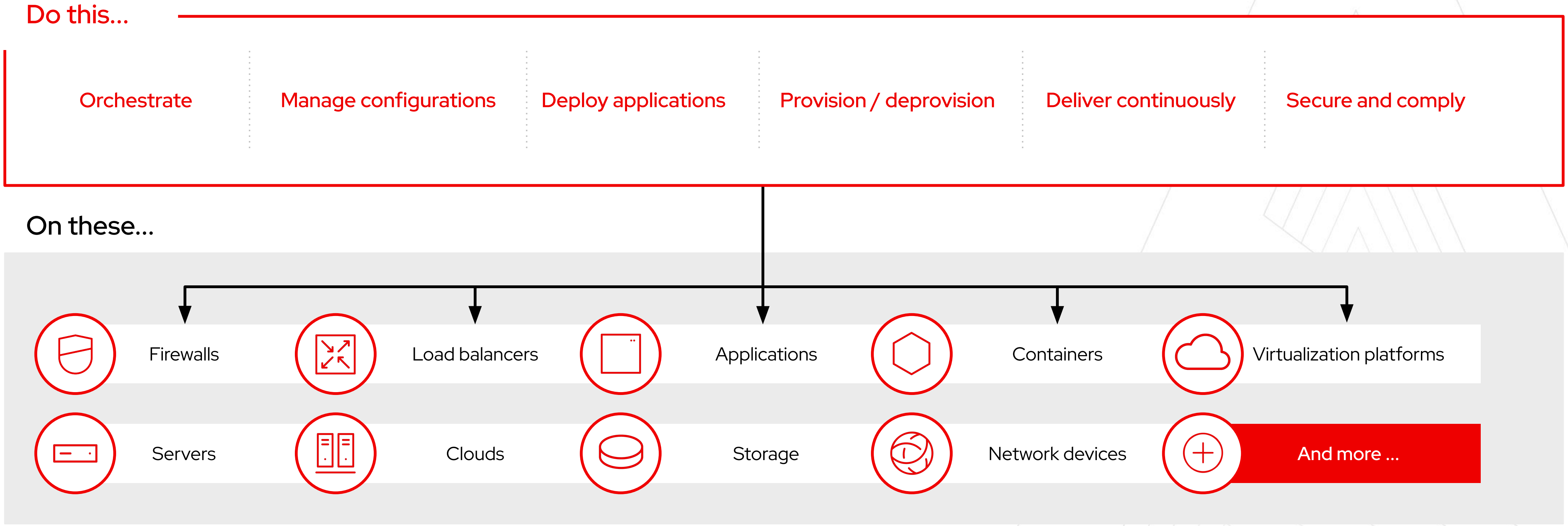
Simplify automation creation and management across multiple domains.

## Agentless

Easily integrate with hybrid environments.

# Automate the deployment and management of automation

## Your entire IT footprint



Do this...

Orchestrate

Manage configurations

Deploy applications

Provision / deprovision

Deliver continuously

Secure and comply

On these...

Firewalls

Load balancers

Applications

Containers

Virtualization platforms

Servers

Clouds

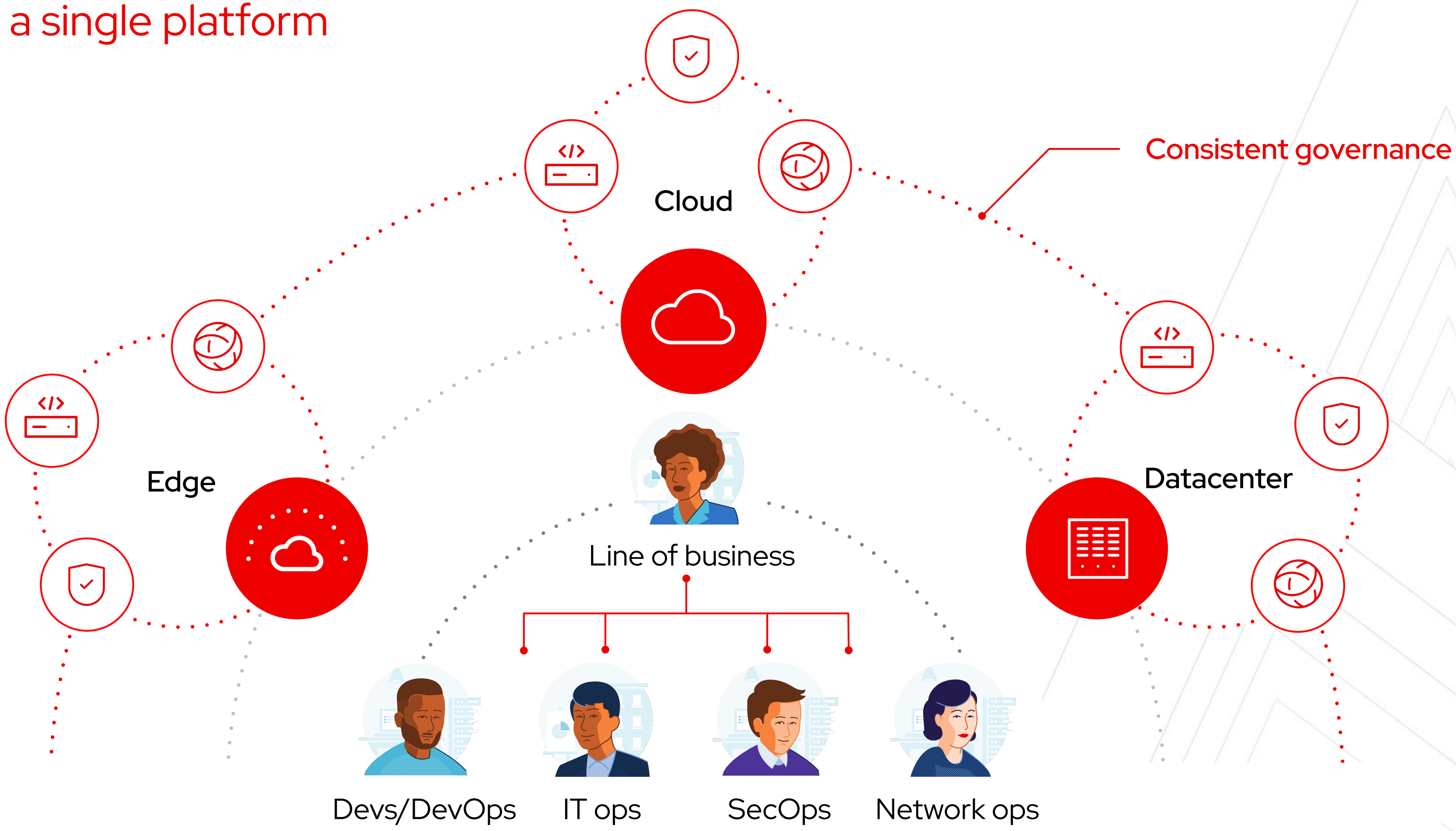
Storage

Network devices

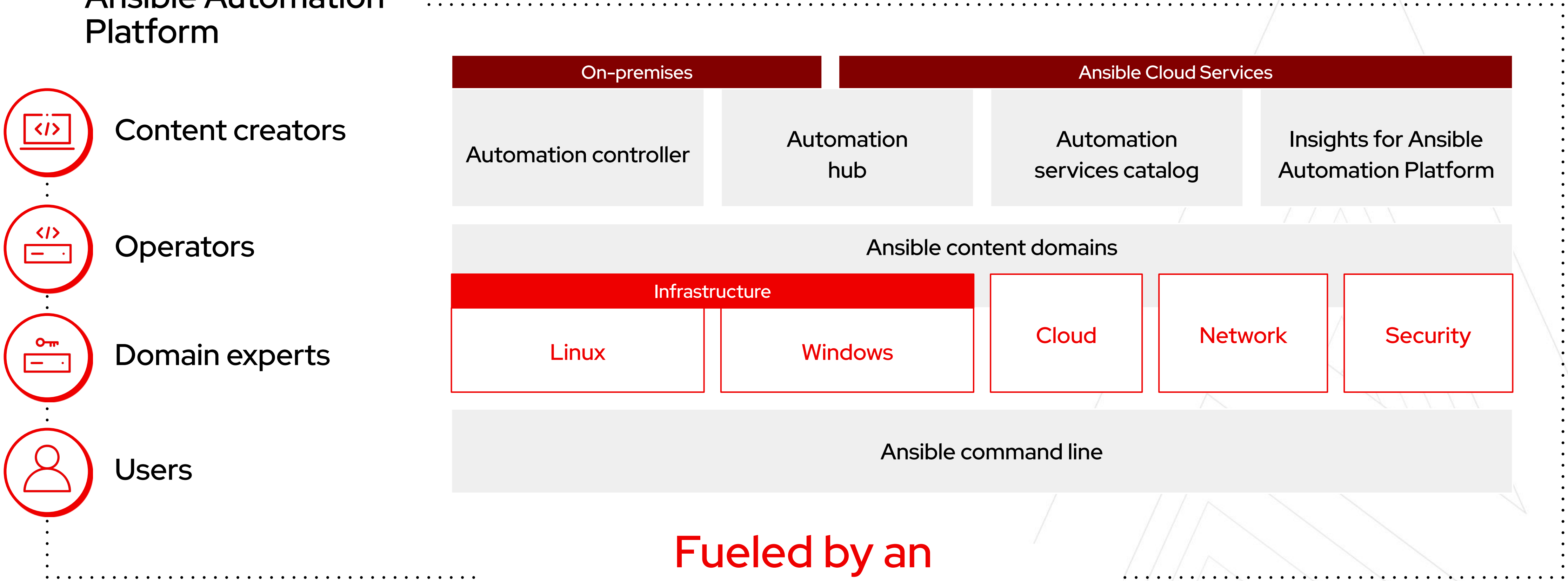
And more ...

# Break down silos

## Different teams a single platform



# Red Hat Ansible Automation Platform



Content creators

Operators

Domain experts

Users

On-premises

Ansible Cloud Services

Automation controller

Automation hub

Automation services catalog

Insights for Ansible Automation Platform

Ansible content domains

Infrastructure

Linux

Windows

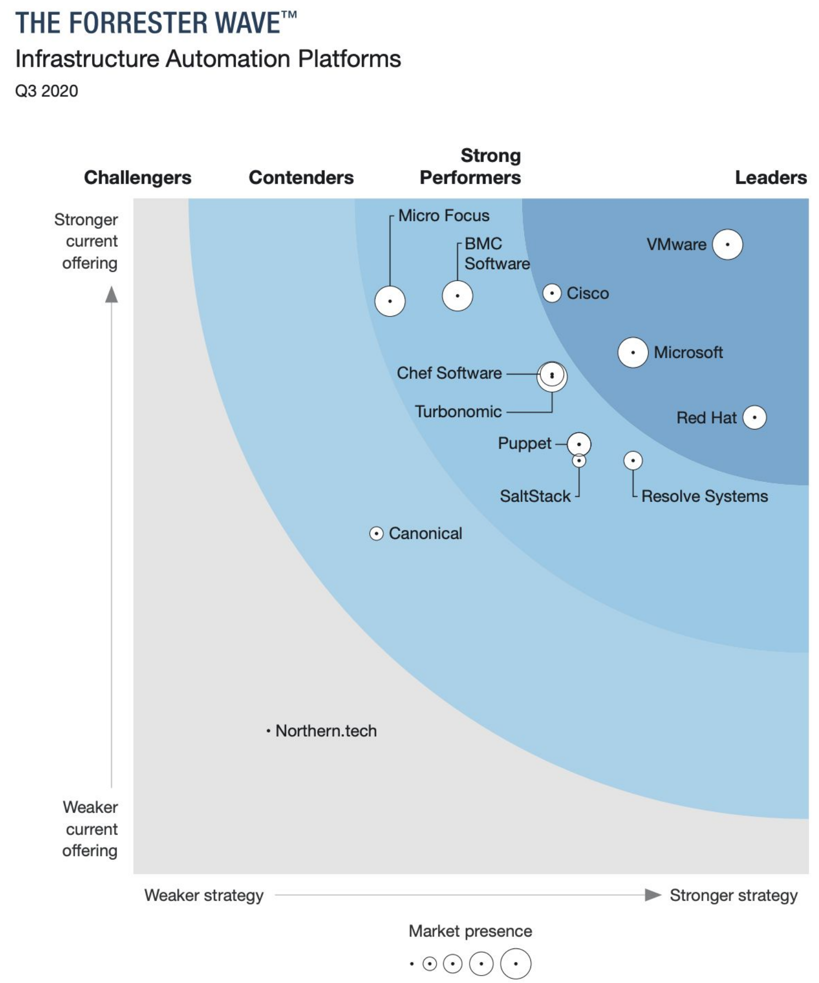
Cloud

Network

Security

Ansible command line

## Fueled by an open source community


THE FORRESTER WAVE™

Infrastructure Automation Platforms

Q3 2020

# Red Hat named a Leader in The Forrester Wave™

Infrastructure Automation Platforms, Q3 2020

Received highest possible score in the criteria of:

- Deployment functionality
- Product Vision
- Partner Ecosystem
- Supporting products and services
- Community support
- Planned product enhancements

- "Ansible continues to grow quickly, particularly among enterprises that are automating networks. The solution excels at providing a variety of deployment options and acting as a service broker to a wide array of other automation tools."
- "Red Hat's solution is a good fit for customers that want a holistic automation platform that integrates with a wide array of other vendors' infrastructure."

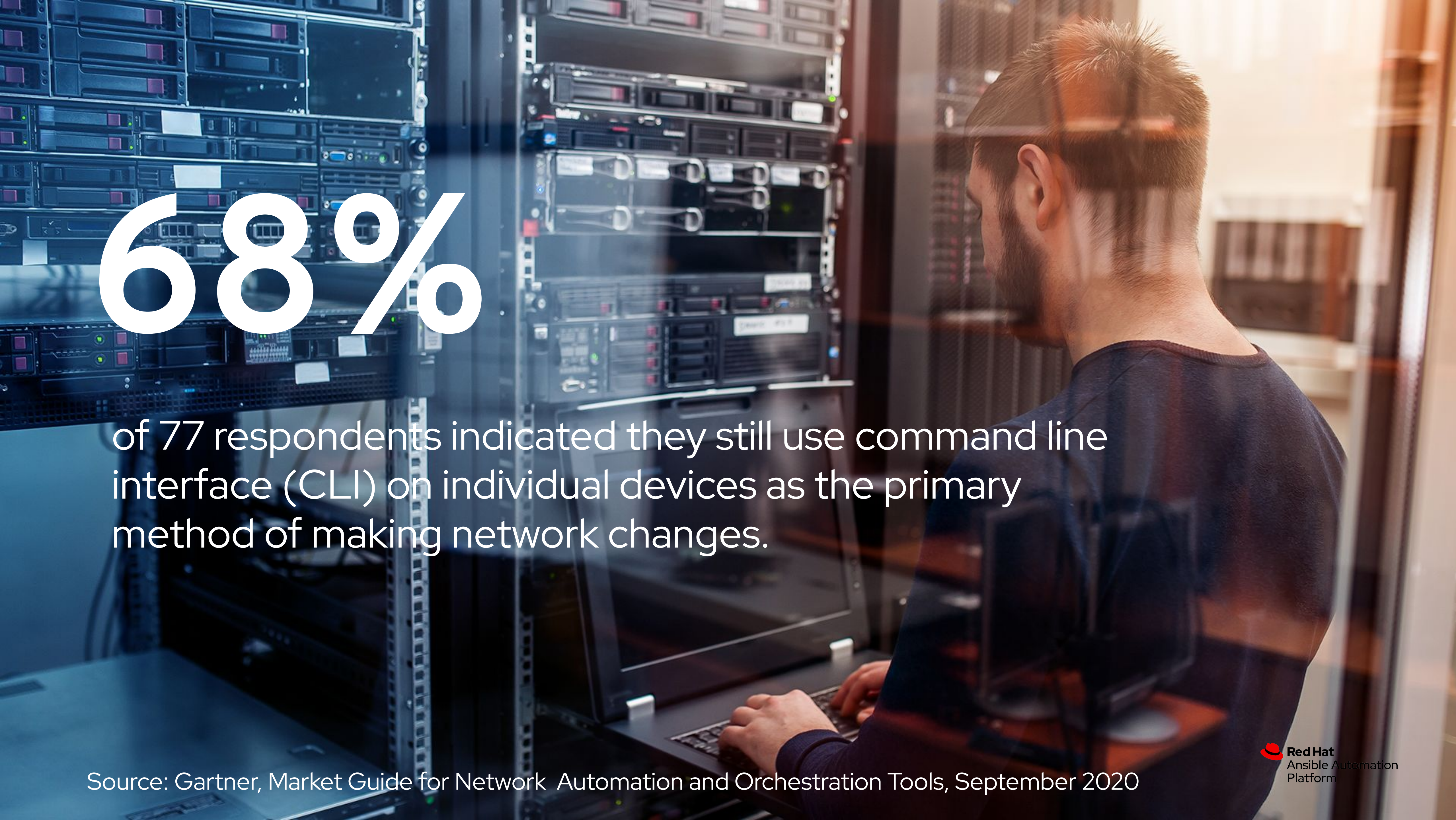
Source:

Gardner, Chris, Glenn O'Donnell, Robert Perdonii, and Diane Lynch. "The Forrester Wave™: Infrastructure Automation Platforms, Q3 2020." *Forrester*, 10 Aug. 2020.

DISCLAIMER: The Forrester Wave™ is copyrighted by Forrester Research, Inc. Forrester and Forrester Wave™ are trademarks of Forrester Research, Inc. The Forrester Wave™ is a graphical representation of Forrester's call on a market and is plotted using a detailed spreadsheet with exposed scores, weightings, and comments. Forrester does not endorse any vendor, product, or service depicted in the Forrester Wave™. Information is based on best available resources. Opinions reflect judgment at the time and are subject to change.

# Use-Case

- Network Automation



# 68%

of 77 respondents indicated they still use command line interface (CLI) on individual devices as the primary method of making network changes.

Source: Gartner, Market Guide for Network  Automation and Orchestration Tools, September 2020

Red Hat
Ansible Automation
Platform

# Why hasn’t networking changed?

Networking vendors are the trusted advisors

## PEOPLE

- Domain specific skill sets
- Vendor oriented experience
- Siloed organizations
- Legacy operational practices

## PRODUCTS

- Infrastructure-focused features
- CLI-based interfaces
- Siloed technologies
- Monolithic, proprietary platforms

# Next generation networking

Automation to effectively manage increasing diversity and scope

## Edge / IoT Devices

New device types entering networks at scale, with distributed computing.

## Hybrid cloud

Numerous deployment forms across the globe

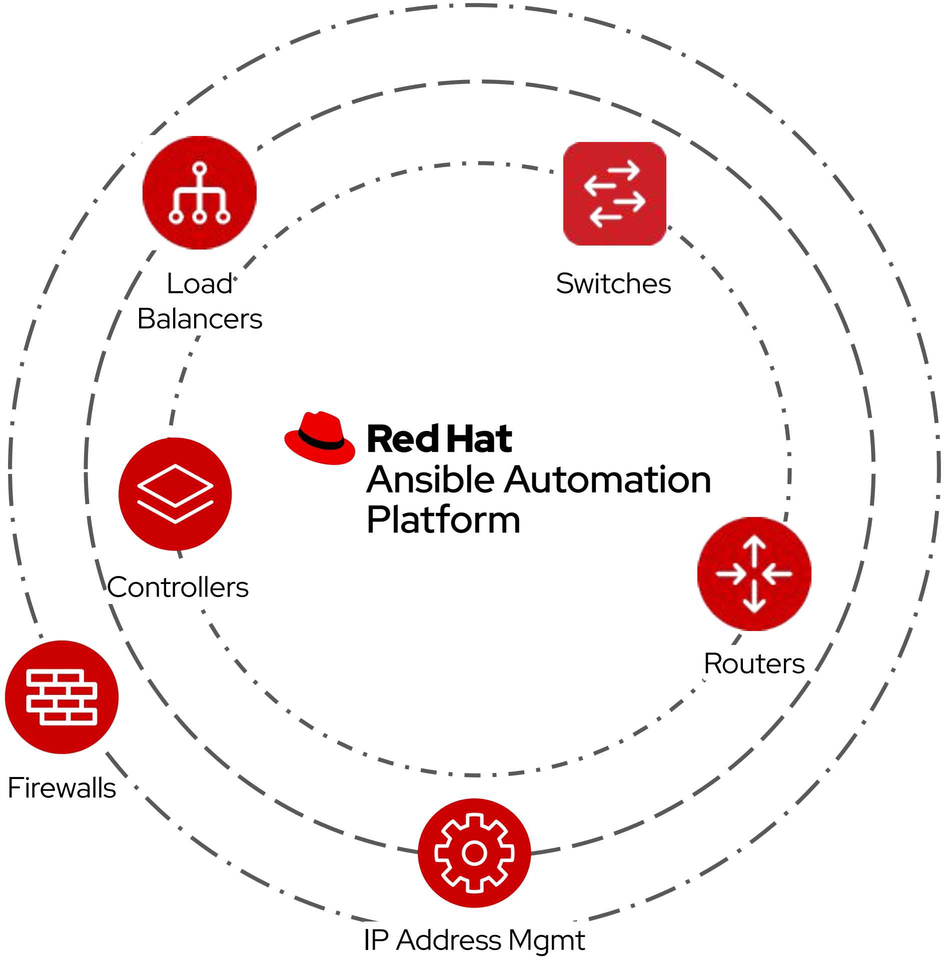
## Digital transformation

Responding with new applications is only as fast as the slowest process

## Data-intensive computing

Artificial intelligence, digital applications and growing data driving connectivity

# What is Ansible Network Automation?



Ansible network automation is our content domain focused on networking use cases.  The goal is to provide 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.

# Modernize and scale network operations

Choose what network tasks to automate at your own pace

## TRADITIONAL NETWORK OPERATIONS

- Traditional culture
- Risk averse
- Proprietary solutions
- Siloed from others
- “Paper” practices, MOPs
- “Artisanal” networks

**Red Hat**
Ansible Automation
Platform

## NEXT-GEN NETWORK OPERATIONS

- Community culture
- Risk-aware
- Open solutions
- Teams of heroes
- Infrastructure as code
- Virtual prototyping / DevOps

# What does it do?

Automate your network with a single tool

### Configuration Management

Platform agnostic configuration management to standardize and enforce best-practices.

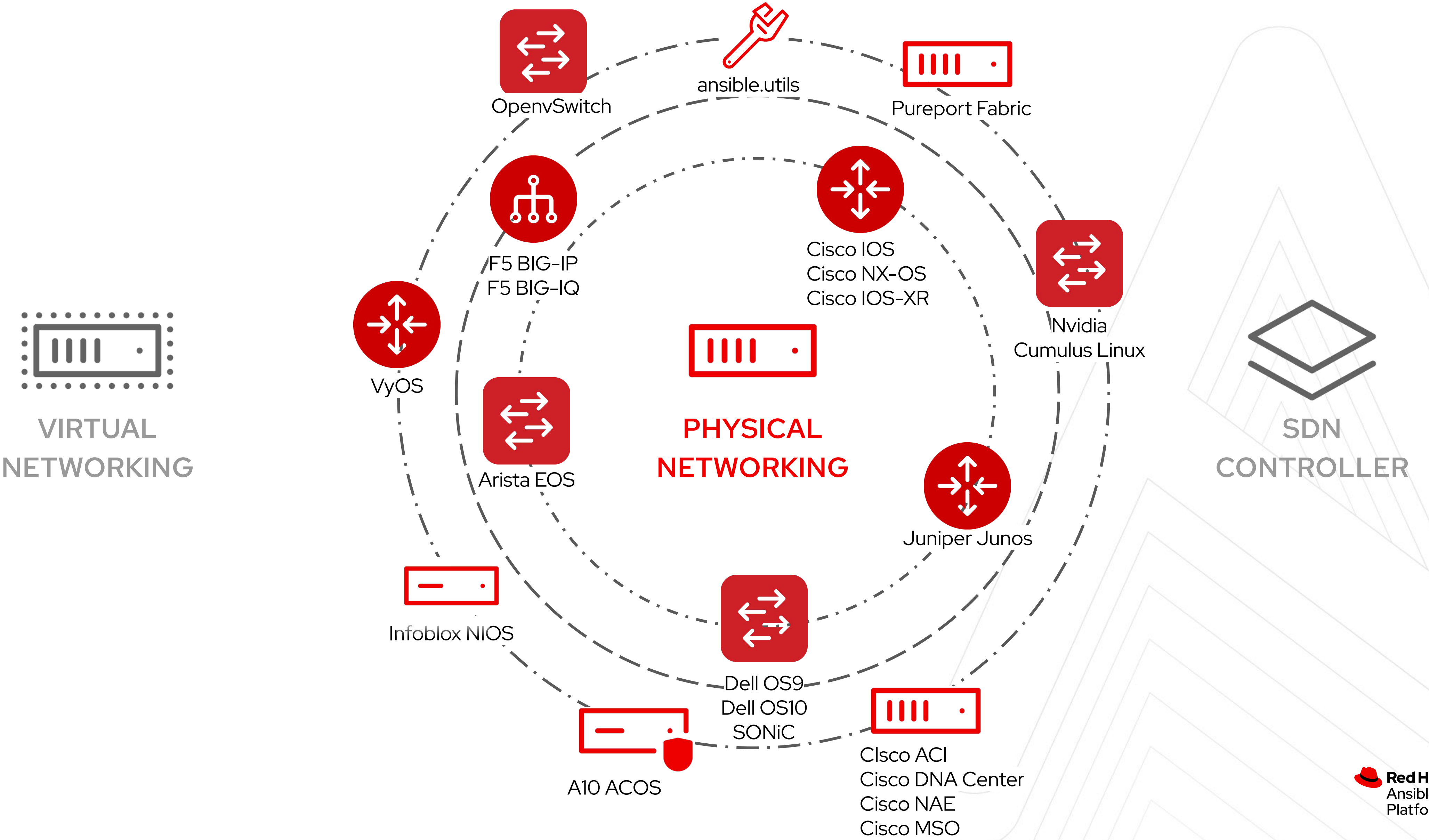
### Infrastructure Awareness

Track network resources through facts gathering, to perform preventive maintenance, reducing outage risks and costs of unnecessary hardware-refresh.

### Network Validation

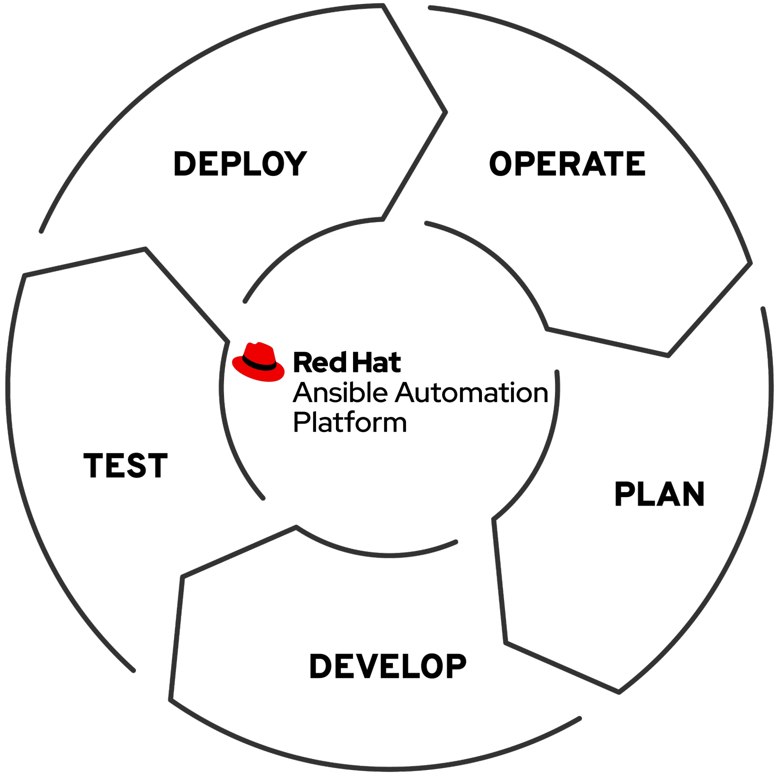
Examine operational state to to check network connectivity and protocols and enhance operational workflows to help measure network intent.

# What is it for?



# Start Small, Think Big

## Three high-level benefits for successful network operations



### Configuration Management

- Automate backup & restores
- Scoped Config Management

### Infrastructure Awareness

- Dynamic Documentation
- Compliance and traceability

### Network Validation

- Validate operational steady-state
- Roll back if configuration changes don’t meet goals

# Ansible Network Ecosystem

SWITCHES

ROUTERS

ENTERPRISE FIREWALLS

LOAD BALANCERS

CONTROLLERS

IP ADDRESS MGMT

A10

ARISTA

aruba NETWORKS

Check Point SOFTWARE TECHNOLOGIES LTD

CISCO

DELL EMC

Infoblox NEXT LEVEL NETWORKING

f5

Open Switch

JUNIPER NETWORKS

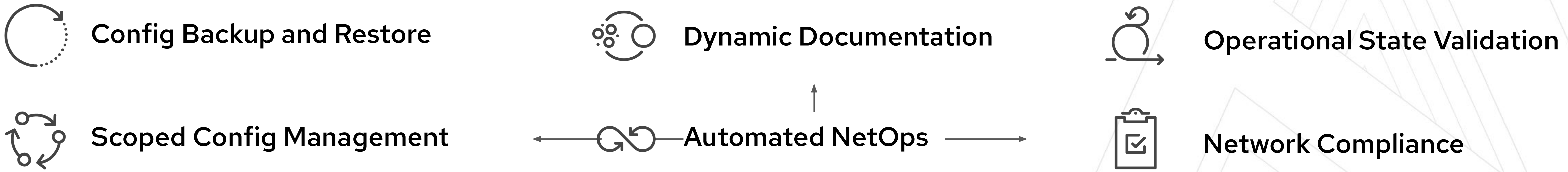
VyOS

# Deep diving on use-cases

Configuration Management

Infrastructure Awareness

Network Validation



Config Backup and Restore

Scoped Config Management

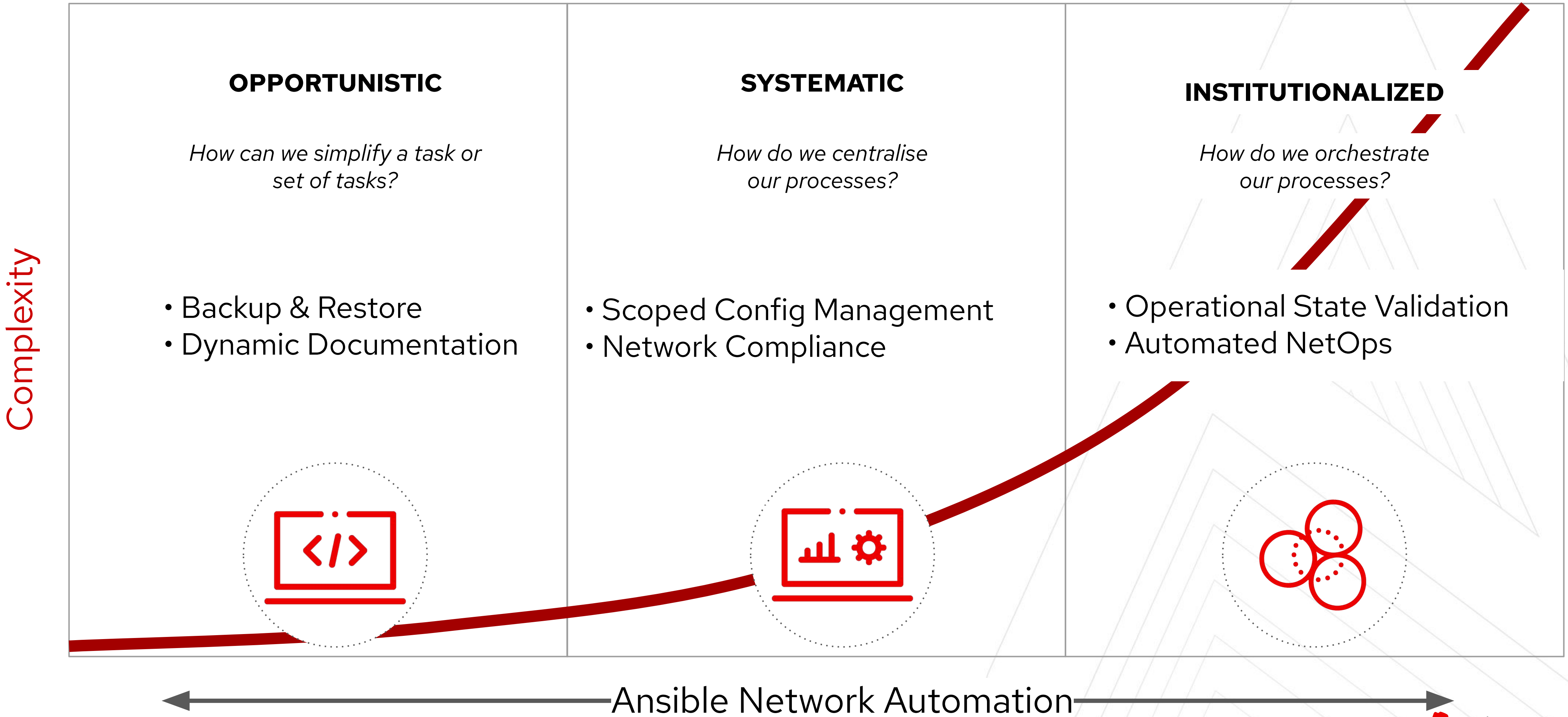
Dynamic Documentation

Automated NetOps

Operational State Validation

Network Compliance

# Network Automation Journey



Complexity

**OPPORTUNISTIC**

*How can we simplify a task or set of tasks?*

- Backup & Restore
- Dynamic Documentation

**SYSTEMATIC**

*How do we centralise our processes?*

- Scoped Config Management
- Network Compliance

**INSTITUTIONALIZED**

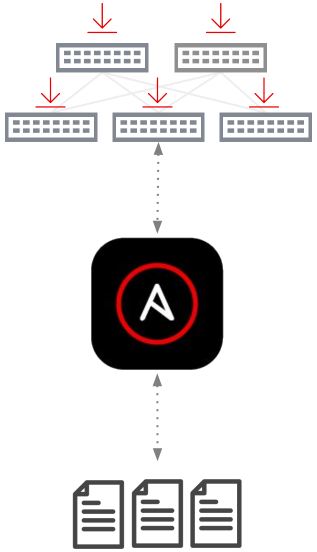
*How do we orchestrate our processes?*

- Operational State Validation
- Automated NetOps

Ansible Network Automation

# Start Small

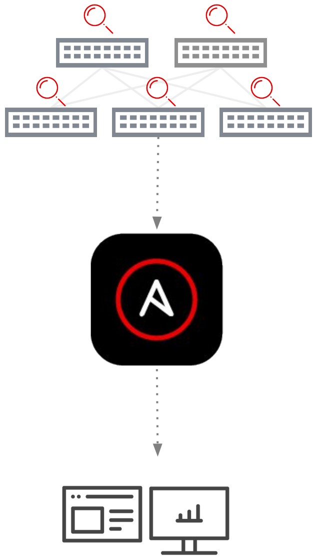
## Quick automation victories for network engineers



### Config Backup and Restore

**Ubiquitous first touch use case**

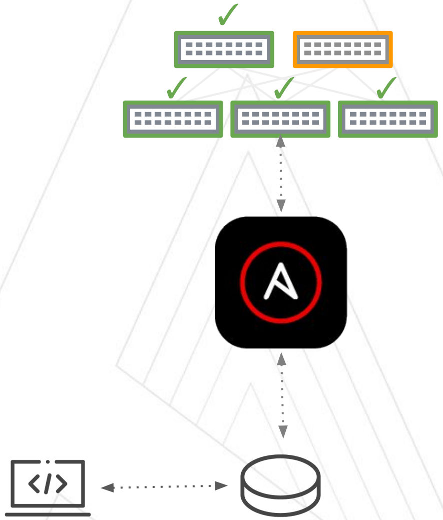
- Gain confidence in automation quickly
- First steps towards network as code
- Quickly recover network steady state



### Dynamic Documentation

**Use Ansible facts to gain information**

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



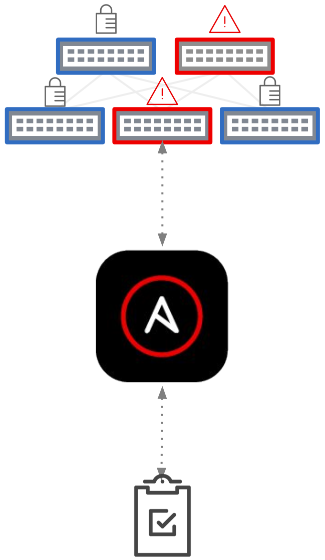
### Scoped Config Management

**Focus on high yield victories**

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

# Think Big

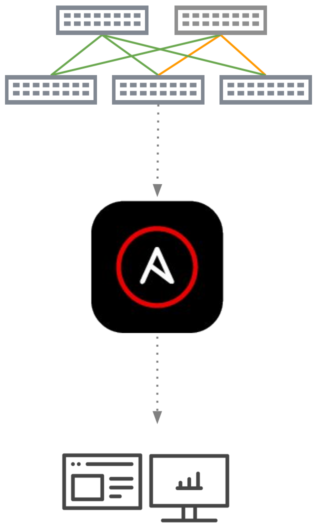
## Institutionalizing automation into your organization



### Network Compliance

**Respond quickly and consistently**

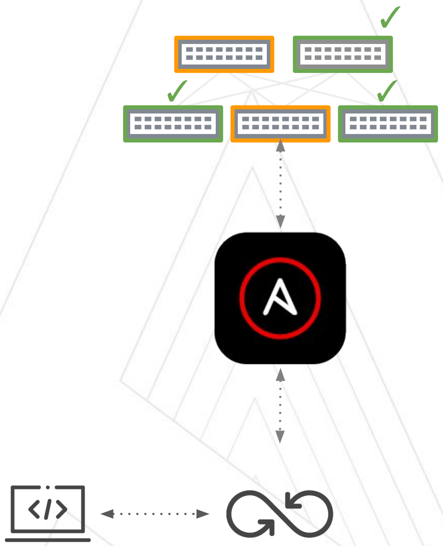
- Security and config compliance for network
- Remove human error from security responses
- Enforce Configuration policies and hardening



### 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

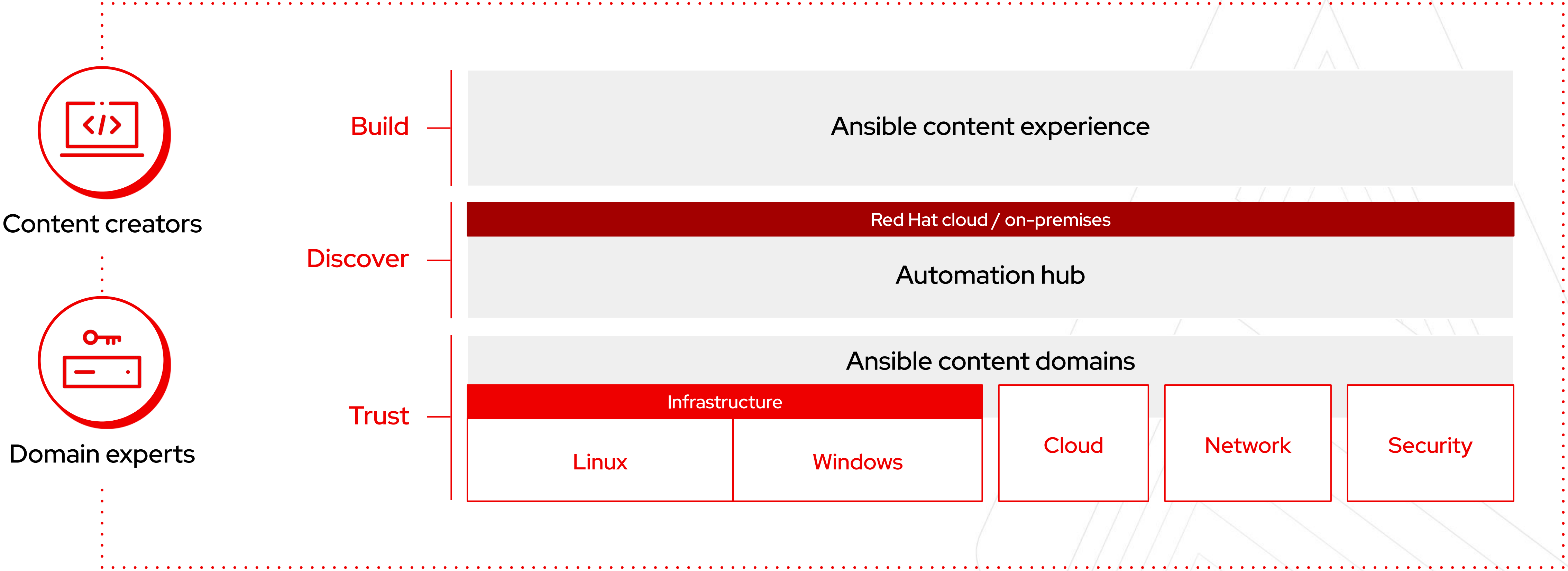
# Section 1
# Ansible Basics

Topics Covered:

- Understanding Inventory
- An example Ansible Playbook

# Create

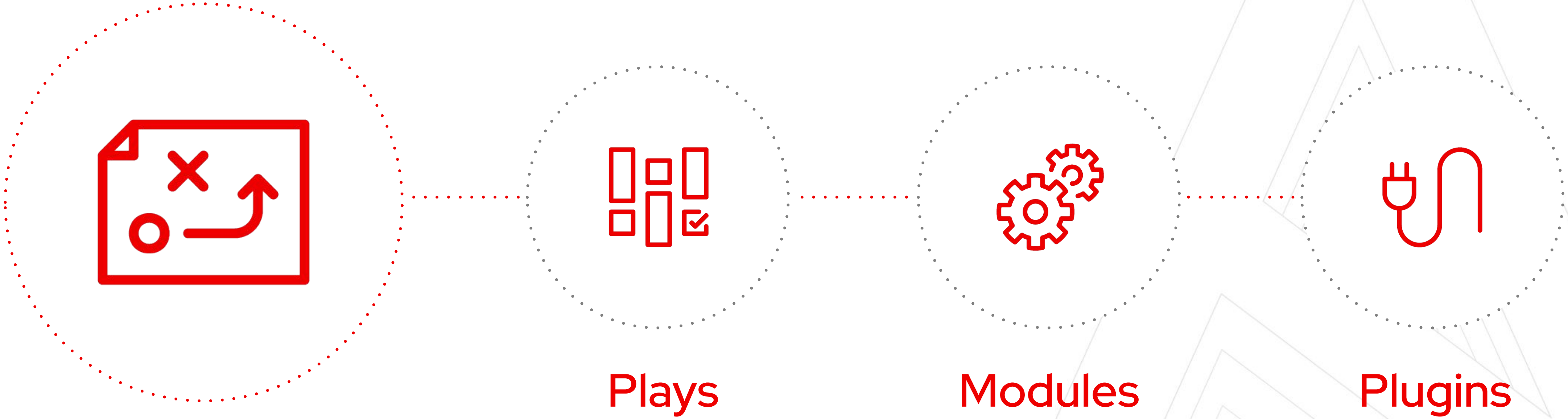
## The automation lifecycle



# Ansible playbooks

```yaml
---
- name: install and start apache
  hosts: web
  become: yes

  tasks:
    - name: httpd package is present
       yum:
         name: httpd
         state: latest

    - name: latest index.html file is present
      template:
        src: files/index.html
        dest: /var/www/html/

    - name: httpd is started
      service:
        name: httpd
        state: started
```

# What makes up an Ansible playbook?



Plays

Modules

Plugins

# Ansible plays

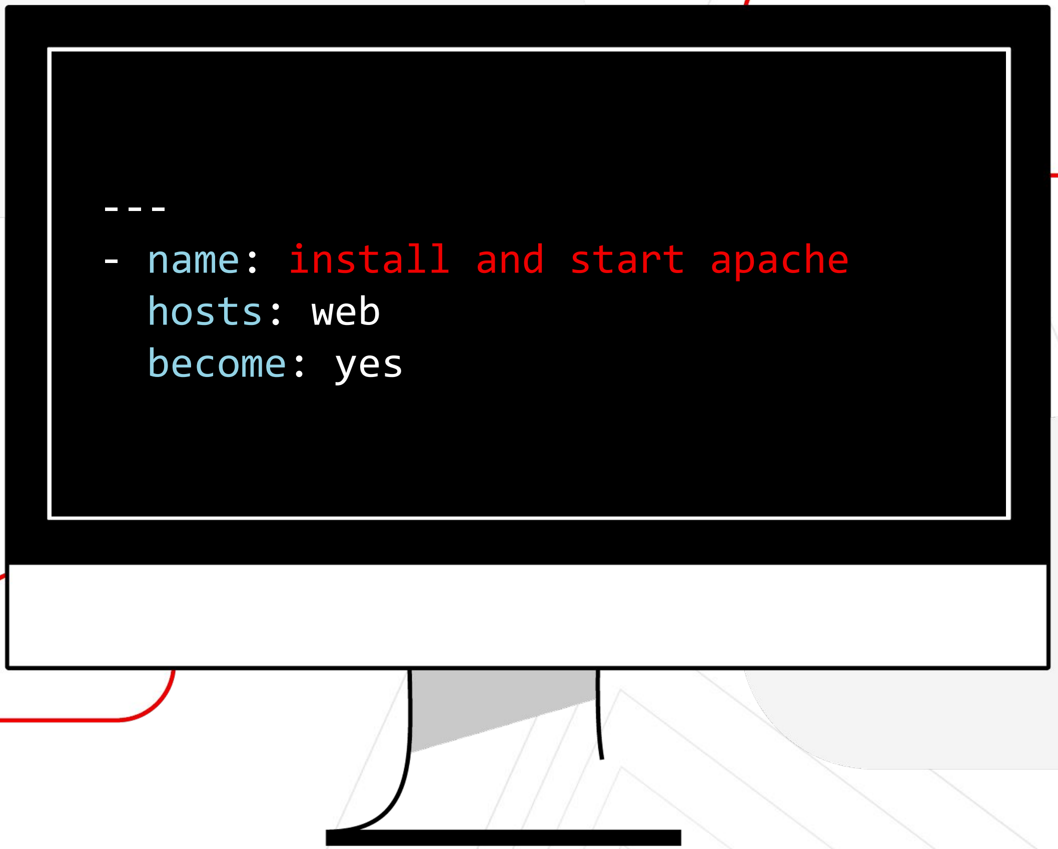
## What am I automating?

### What are they?

Top level specification for a group of tasks. Will tell that play which hosts it will execute on and control behavior such as fact gathering or privilege level.

### Building blocks for playbooks

Multiple plays can exist within an Ansible playbook that execute on different hosts.



```
---
- name: install and start apache
  hosts: web
  become: yes
```

# Ansible modules

## The “tools in the toolkit”

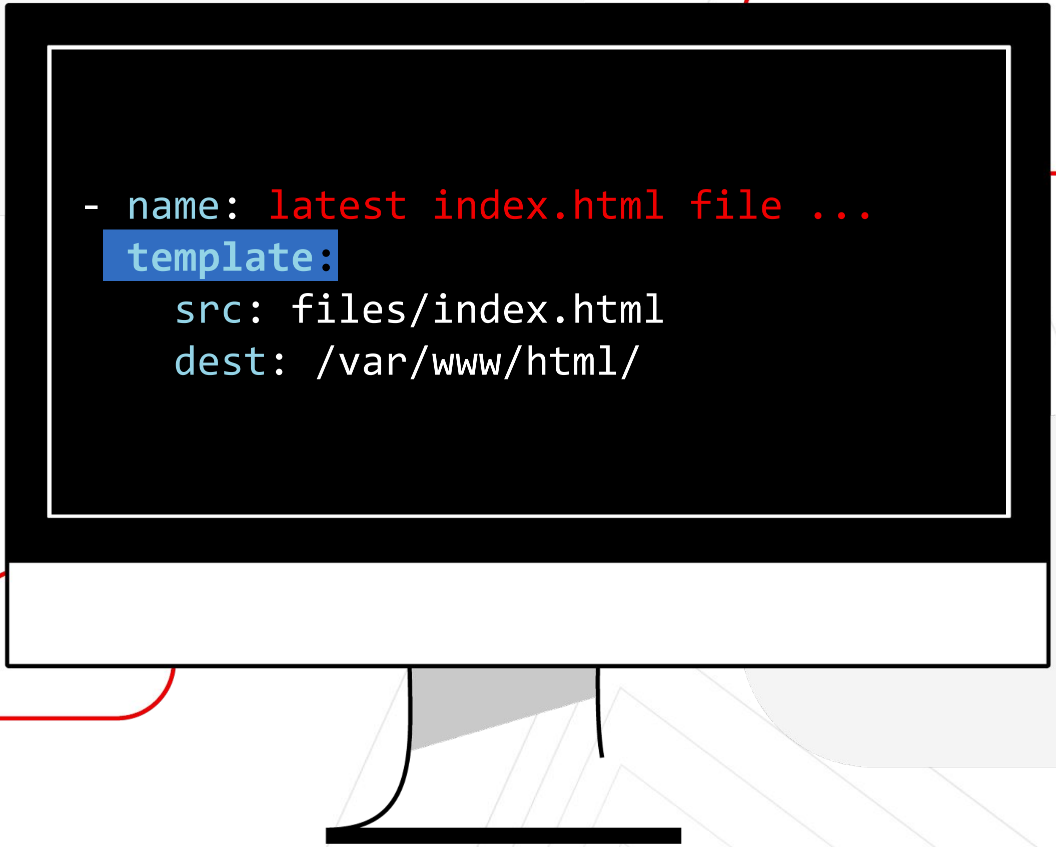
### What are they?

Parametrized components with internal logic, representing a single step to be done.

The modules “do” things in Ansible.

### Language

Usually Python, or Powershell for Windows setups. But can be of any language.



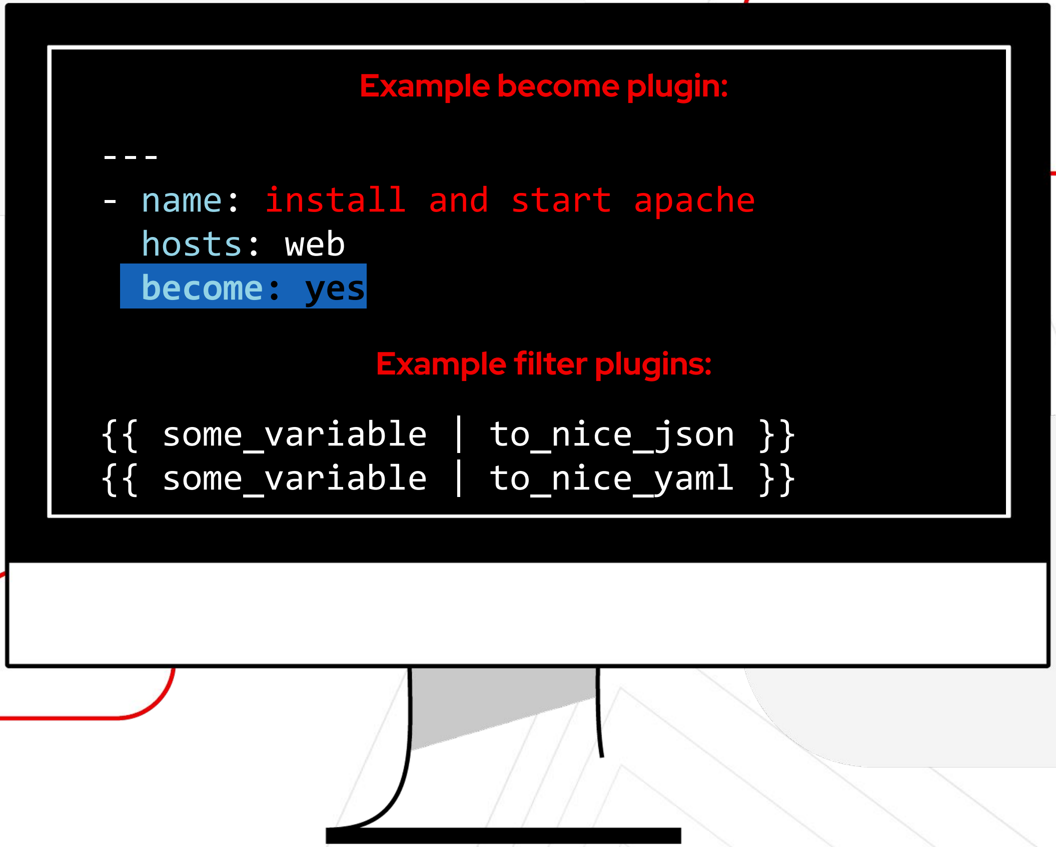
```
- name: latest index.html file ...
  template:
    src: files/index.html
    dest: /var/www/html/
```

# Ansible plugins

## The “extra bits”

### What are they?

Plugins are pieces of code that augment Ansible’s core functionality. Ansible uses a plugin architecture to enable a rich, flexible, and expandable feature set.



Example become plugin:

```
---
- name: install and start apache
  hosts: web
  become: yes
```

Example filter plugins:

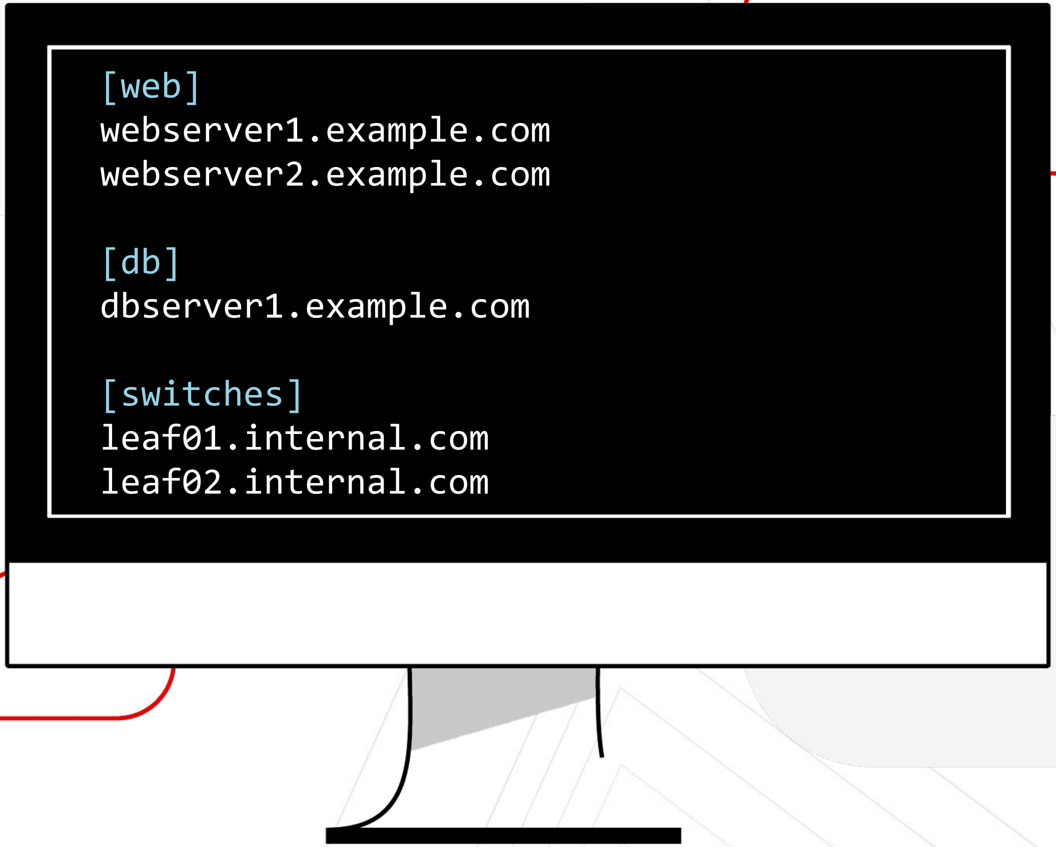
```
{{ some_variable | to_nice_json }}
{{ some_variable | to_nice_yaml }}
```

# Ansible Inventory

## The systems that a playbook runs against

### What are they?

List of systems in your infrastructure that automation is executed against



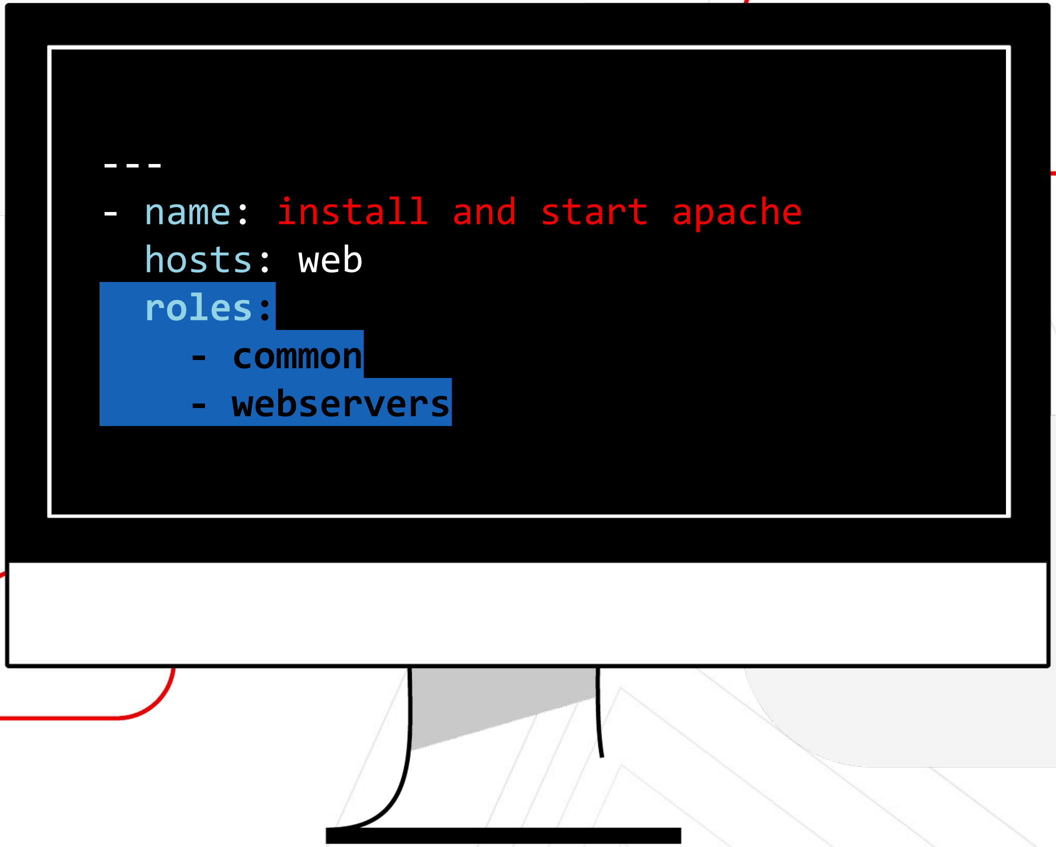
```
[web]
webserver1.example.com
webserver2.example.com

[db]
dbserver1.example.com

[switches]
leaf01.internal.com
leaf02.internal.com
```

# Ansible roles

## Reusable automation actions

### What are they?

Group your tasks and variables of your automation in a reusable structure. Write roles once, and share them with others who have similar challenges in front of them.



```
---
- name: install and start apache
  hosts: web
  roles:
    - common
    - webservers
```

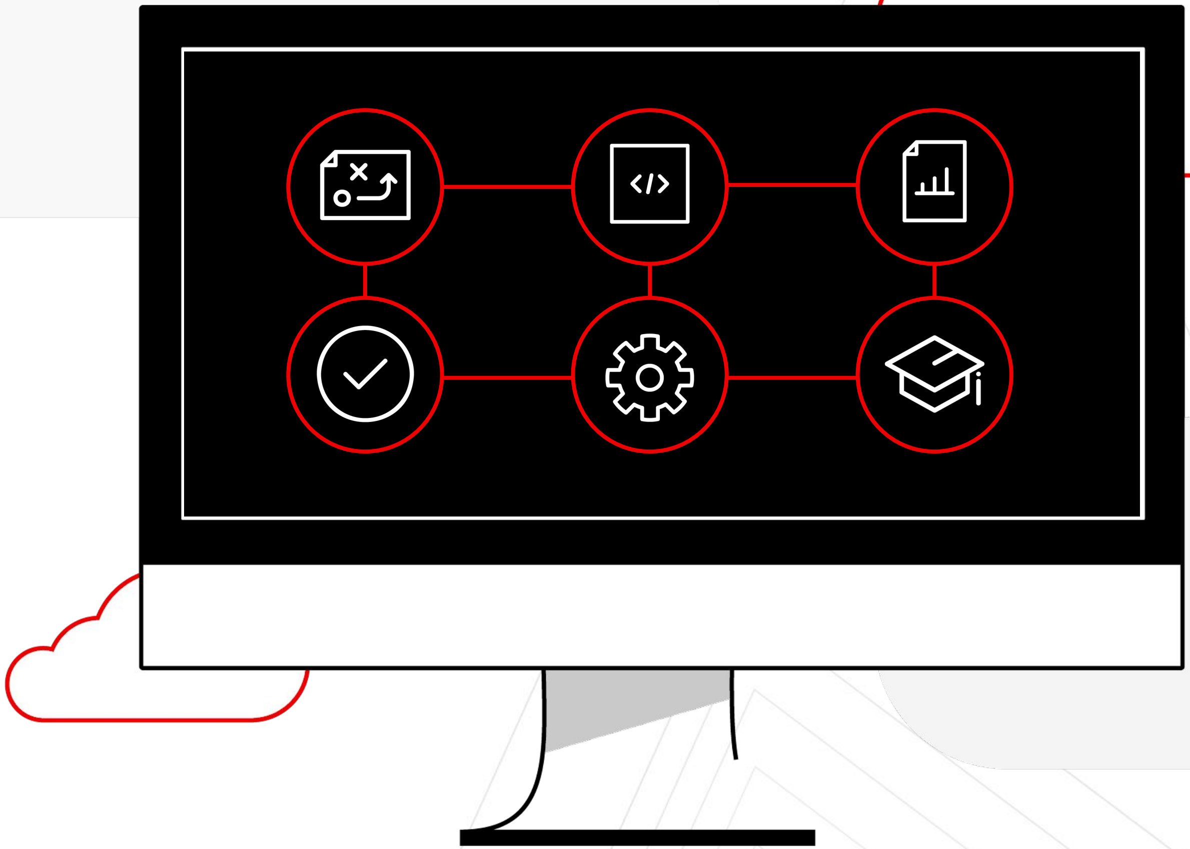
# Collections

## Simplified and consistent content delivery

### What are they?

Collections are a data structure containing automation content:

- Modules
- Playbooks
- Roles
- Plugins
- Docs
- Tests



```
nginx_core
├── MANIFEST.json
├── playbooks
│   ├── deploy-nginx.yml
│   └── ...
├── plugins
├── README.md
└── roles
    ├── nginx
    │   ├── defaults
    │   ├── files
    │   │   └── ...
    │   ├── tasks
    │   └── templates
    │       └── ...
    ├── nginx_app_protect
    └── nginx_config
```

deploy-nginx.yml

```yaml
---
- name: Install NGINX Plus
  hosts: all
  tasks:
    - name: Install NGINX
      include_role:
        name: nginxinc.nginx
      vars:
        nginx_type: plus

    - name: Install NGINX App Protect
      include_role:
        name: nginxinc.nginx_app_protect
      vars:
        nginx_app_protect_setup_license: false
        nginx_app_protect_remove_license: false
        nginx_app_protect_install_signatures: false
```

# 90+

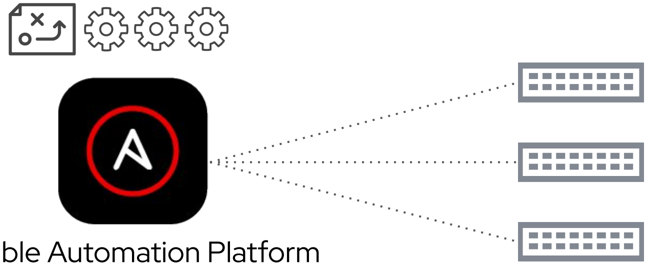
certified platforms

| Infrastructure | Cloud | Network | Security |
|---|---|---|---|
| Red Hat | aws | ARISTA | Check Point<br>SOFTWARE TECHNOLOGIES LTD |
| NetApp™ | Google | CISCO™ | CYBERARK® |
| IBM® | Microsoft | f5® | FORTINET® |

# How is network automation different?

# Network Automation compared to servers

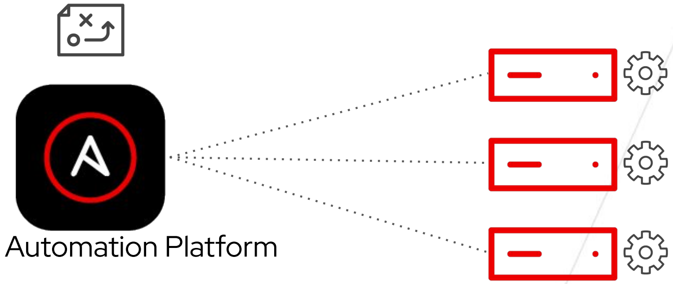
Module code is executed locally on the control node



Local Execution

Network Devices / API Endpoints

Module code is copied to the managed node, executed, then removed



Remote Execution

Linux / Windows Hosts

# Network Connection Plugins

Use your vendor connection of choice

**`ansible_connection`**

- **`netconf`** – XML over netconf

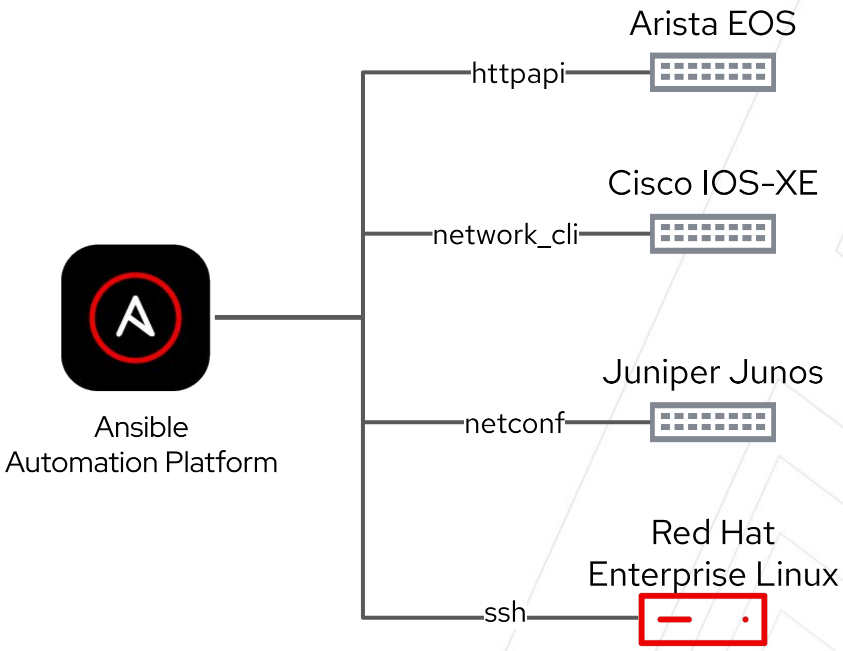
  example: Juniper Junos

- **`network_cli`** – command line over SSH

  example: Cisco IOS-XE, Arista EOS

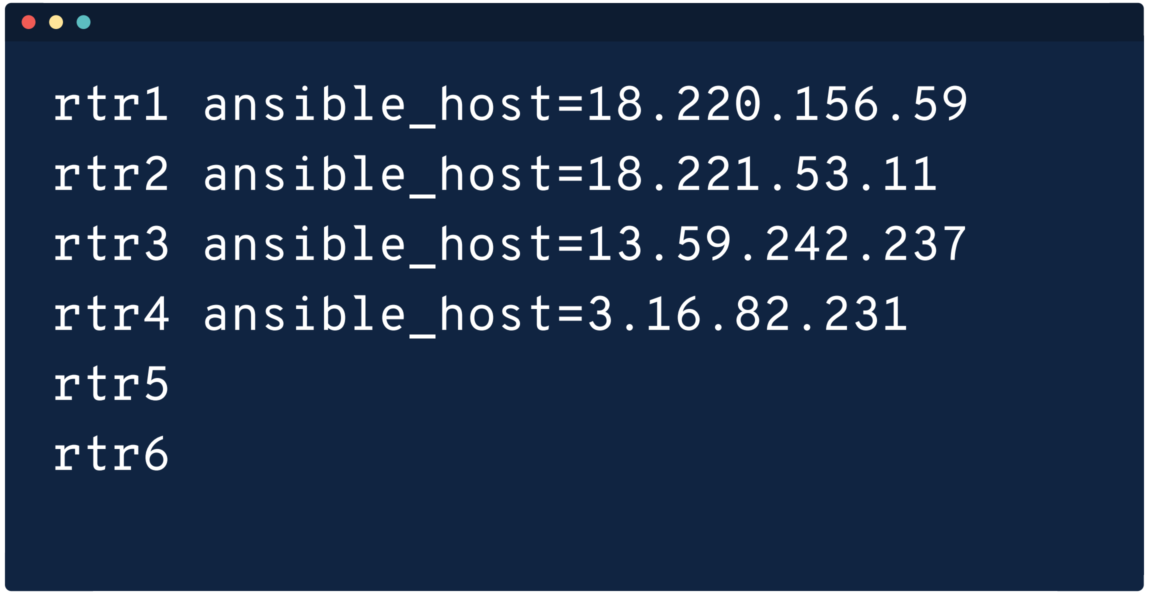
- **`httpapi`** – vendor API

  example: Arista eAPI, Cisco NX-API



https://docs.ansible.com/ansible/latest/plugins/connection.html

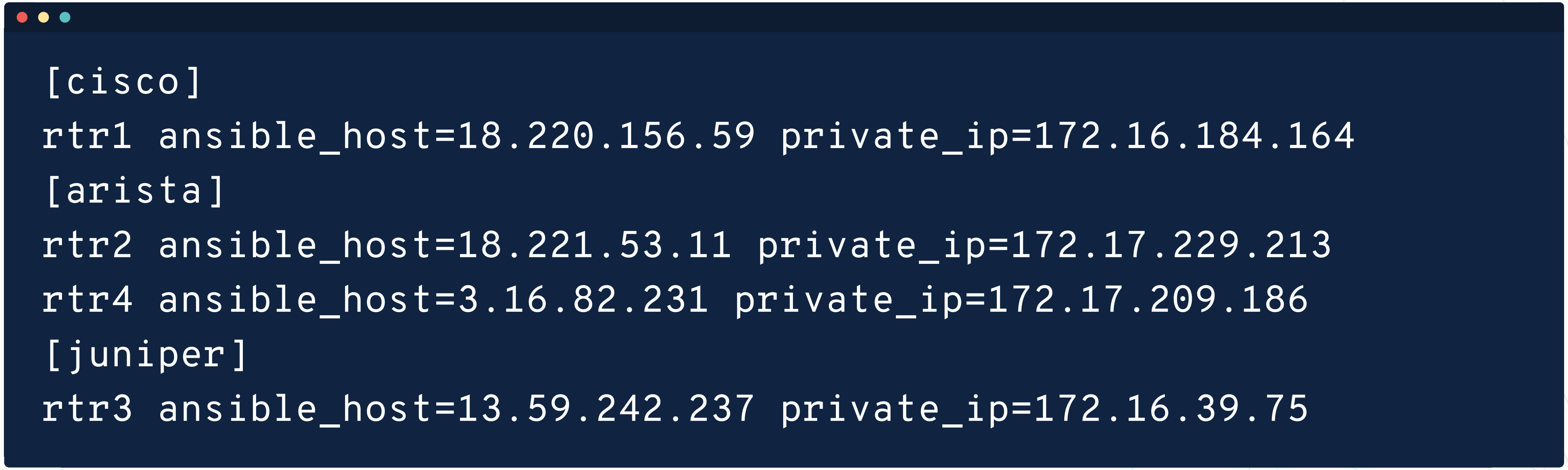
# Understanding Inventory



```
rtr1 ansible_host=18.220.156.59
rtr2 ansible_host=18.221.53.11
rtr3 ansible_host=13.59.242.237
rtr4 ansible_host=3.16.82.231
rtr5
rtr6
```

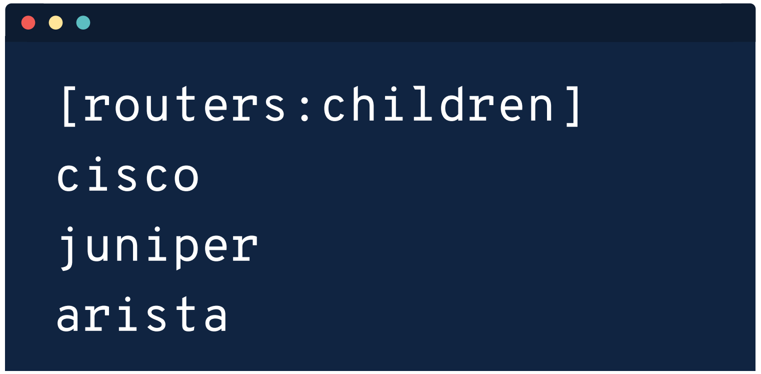
# Understanding Inventory - Groups

There is always a group called **"all"** by default



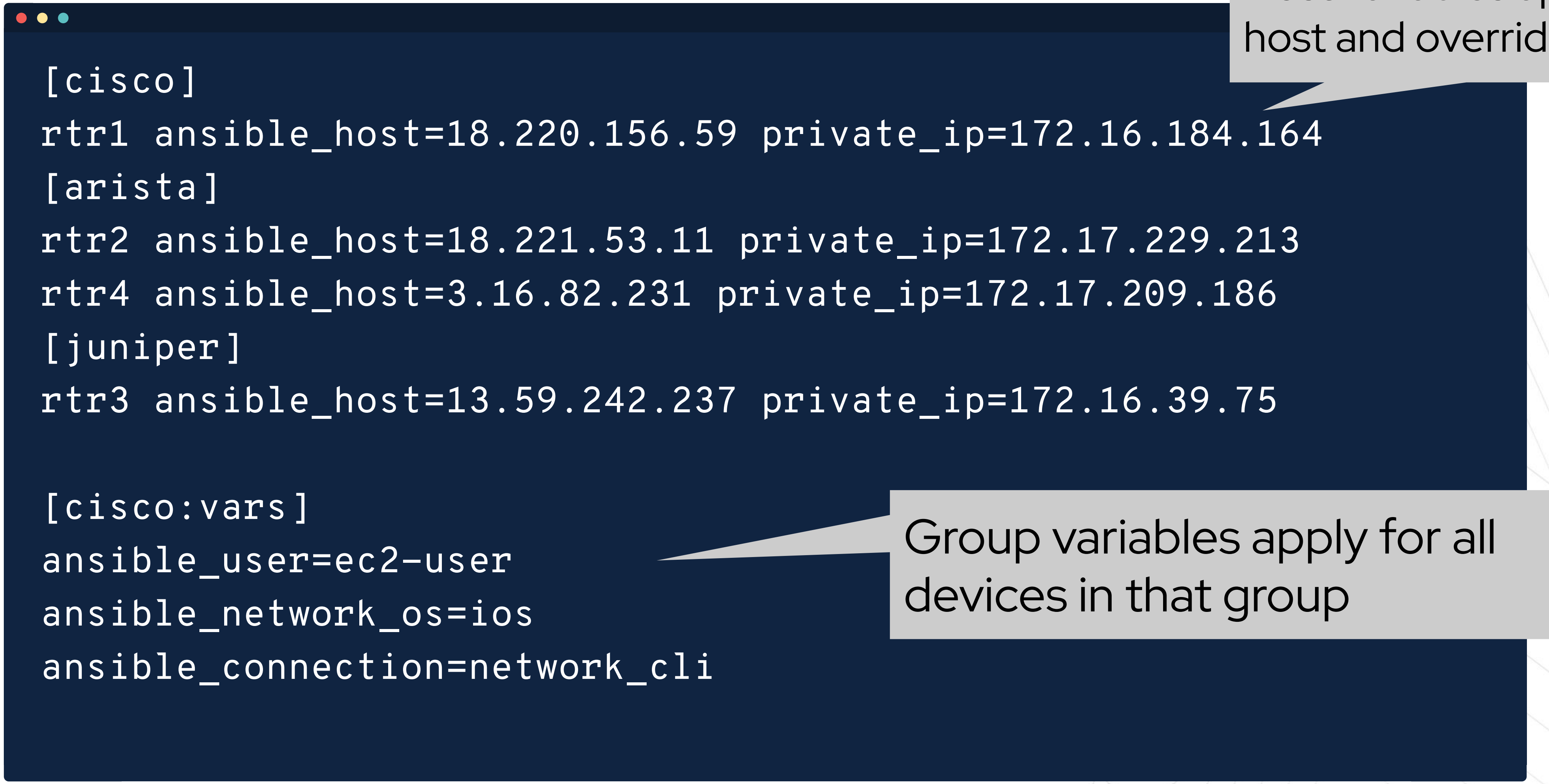
```
[cisco]
rtr1 ansible_host=18.220.156.59 private_ip=172.16.184.164
[arista]
rtr2 ansible_host=18.221.53.11 private_ip=172.17.229.213
rtr4 ansible_host=3.16.82.231 private_ip=172.17.209.186
[juniper]
rtr3 ansible_host=13.59.242.237 private_ip=172.16.39.75
```

Groups can be nested



```
[routers:children]
cisco
juniper
arista
```

# Understanding Inventory - Variables

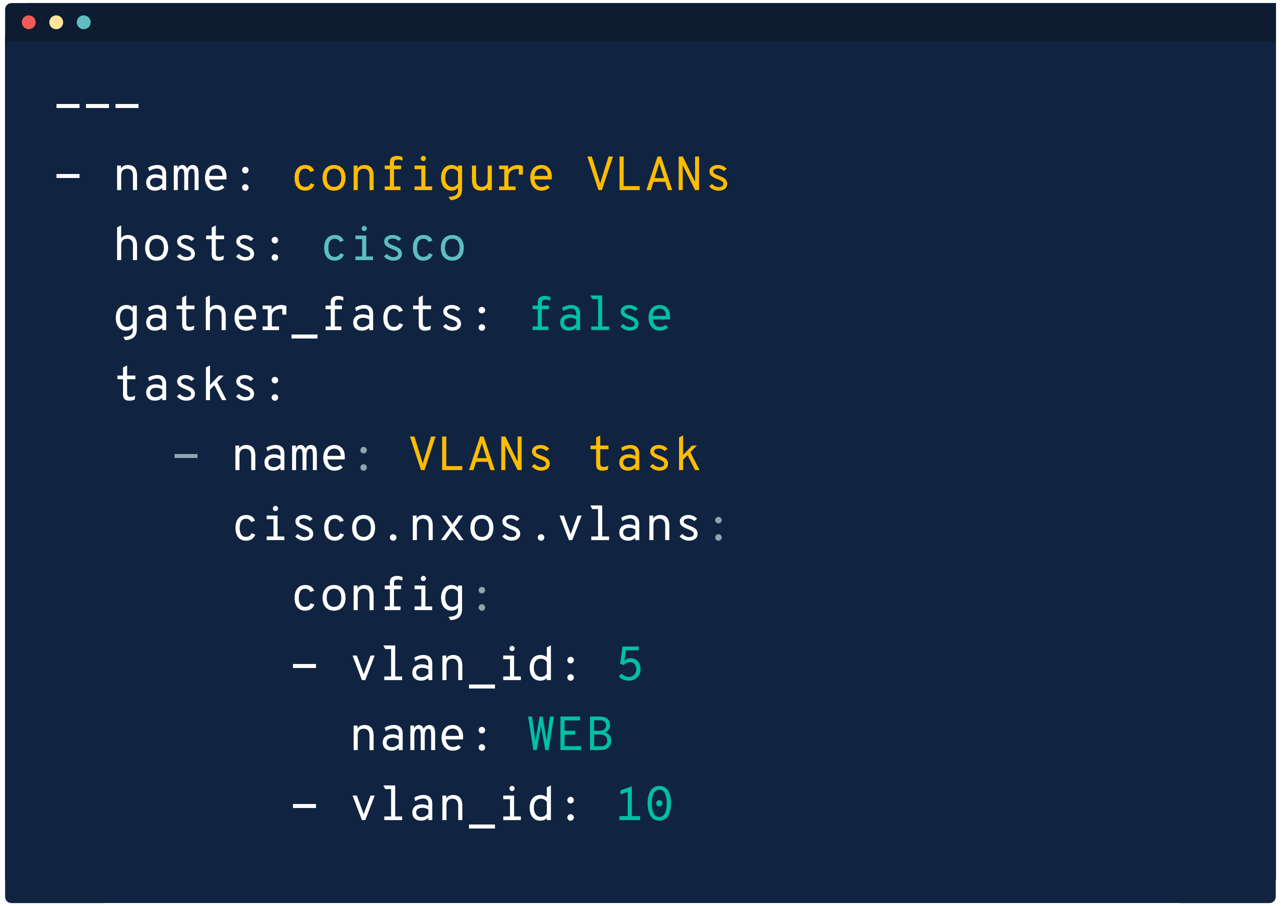


```
[cisco]
rtr1 ansible_host=18.220.156.59 private_ip=172.16.184.164
[arista]
rtr2 ansible_host=18.221.53.11 private_ip=172.17.229.213
rtr4 ansible_host=3.16.82.231 private_ip=172.17.209.186
[juniper]
rtr3 ansible_host=13.59.242.237 private_ip=172.16.39.75

[cisco:vars]
ansible_user=ec2-user
ansible_network_os=ios
ansible_connection=network_cli
```

Host variables apply to the host and override group vars

Group variables apply for all devices in that group

# A Sample Ansible Playbook



```
---
- name: configure VLANs
  hosts: cisco
  gather_facts: false
  tasks:
    - name: VLANs task
      cisco.nxos.vlans:
        config:
        - vlan_id: 5
          name: WEB
        - vlan_id: 10
```

- A playbook is a list of plays.
- Each play is a list of tasks.
- Tasks invoke modules.
- A playbook can contain more than one play.

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# Lab Time

## Exercise 1 - Exploring the lab environment

🔗 red.ht/network-workshop-1

In this lab you will explore the lab environment and build familiarity with the lab inventory.

Approximate time: 10 mins

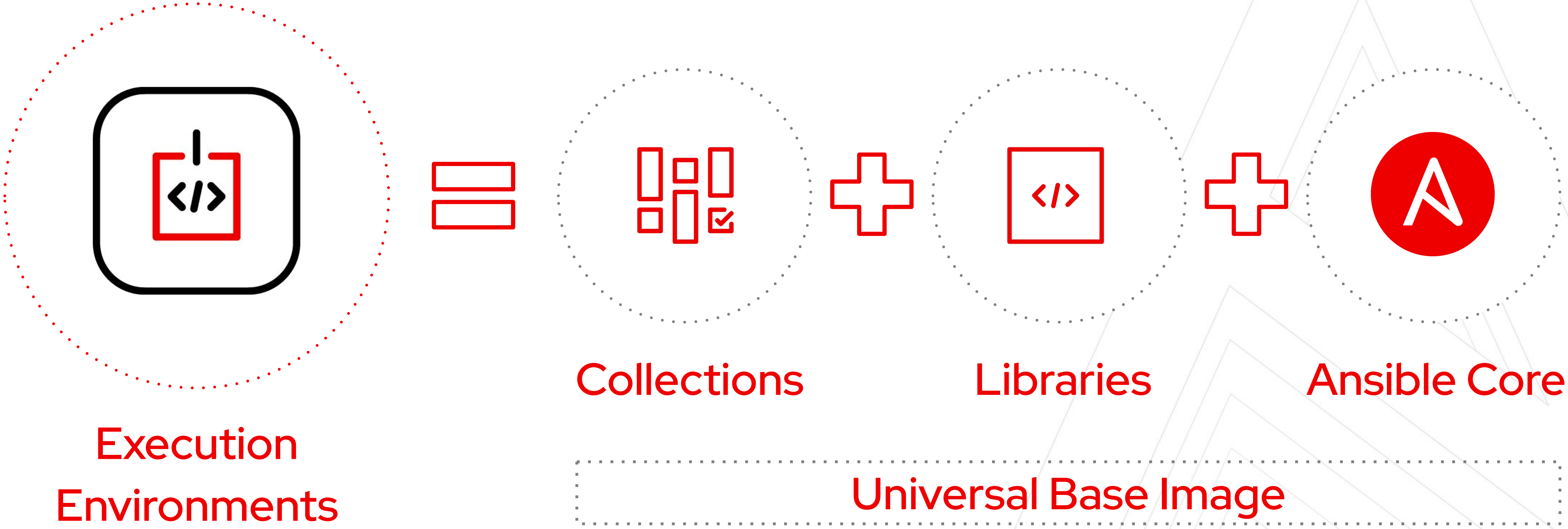
# Section 2
# Executing Ansible

Topics Covered:

- An Ansible Play
- Ansible Modules
- Execution Environments
- Running an Ansible Playbook

# Automation Execution Environments

Components needed for automation, packaged in a cloud-native way

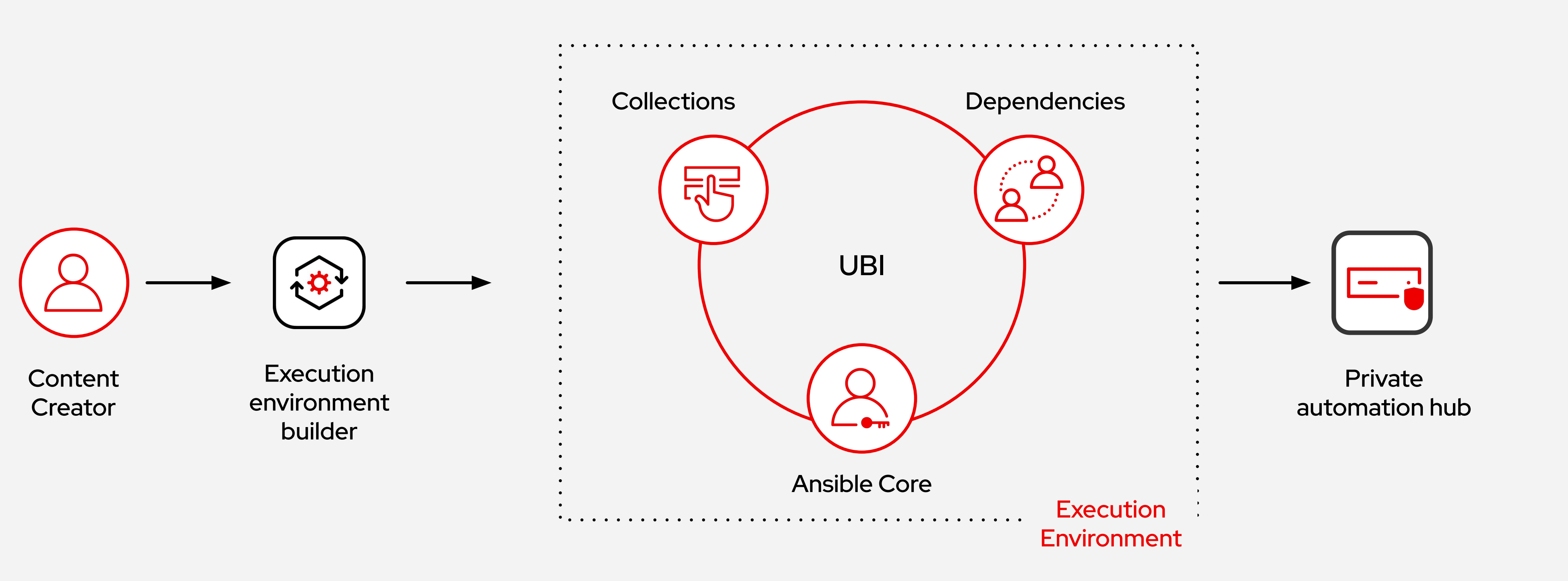


Execution Environments = Collections + Libraries + Ansible Core

Universal Base Image

# Build, create, publish

## Development cycle of an automation execution environment



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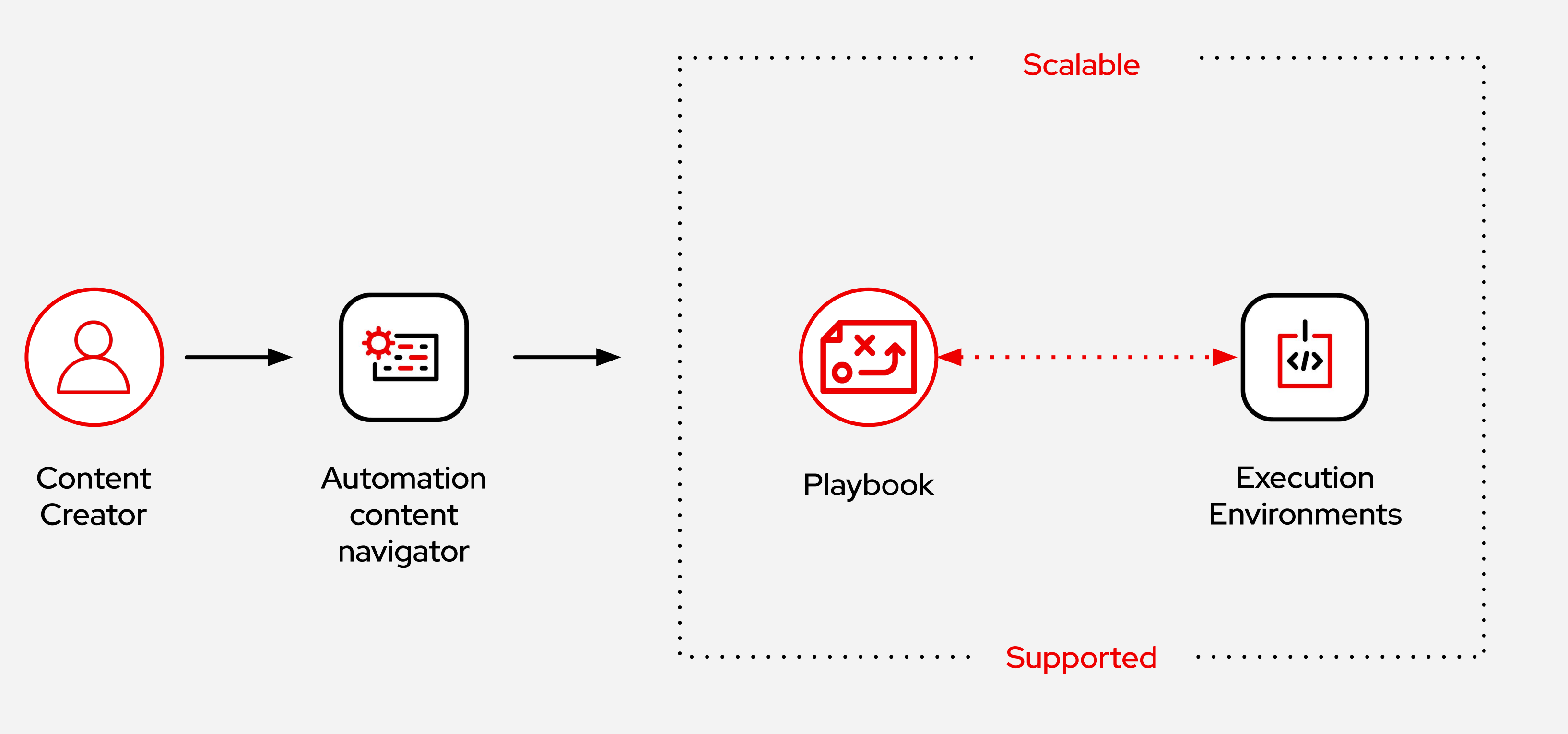
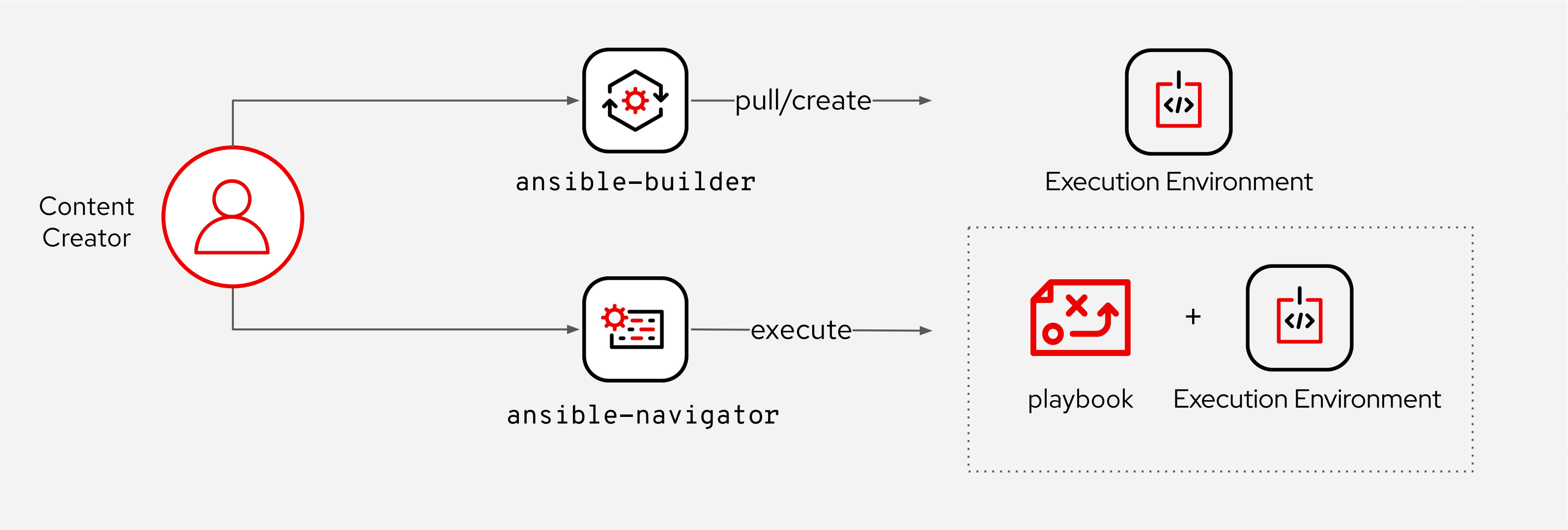
# Develop, test, run

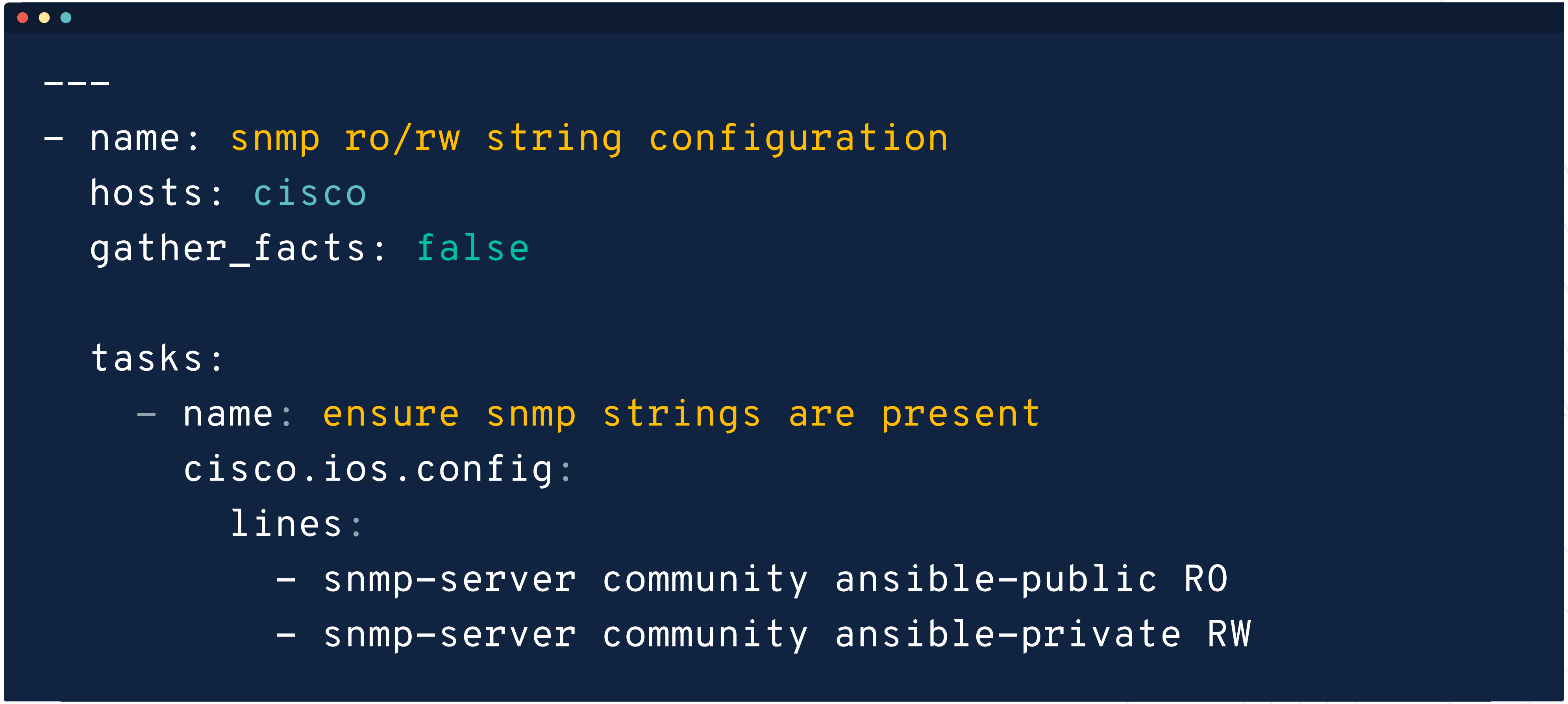
## How to develop, test and run containerized Ansible content



# Builder and Navigator



# Another Ansible Playbook Example

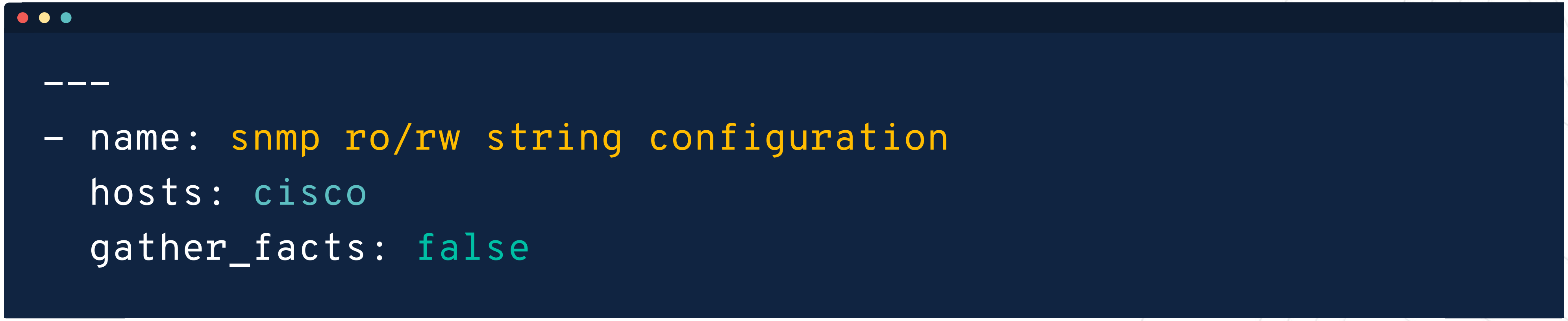


```
---
- name: snmp ro/rw string configuration
  hosts: cisco
  gather_facts: false

  tasks:
    - name: ensure snmp strings are present
      cisco.ios.config:
        lines:
          - snmp-server community ansible-public RO
          - snmp-server community ansible-private RW
```

# Ansible Playbook - Play definition

- The **name** parameter describes the Ansible Play
- Target devices using the **hosts** parameter
- Optionally disable **gather_facts**

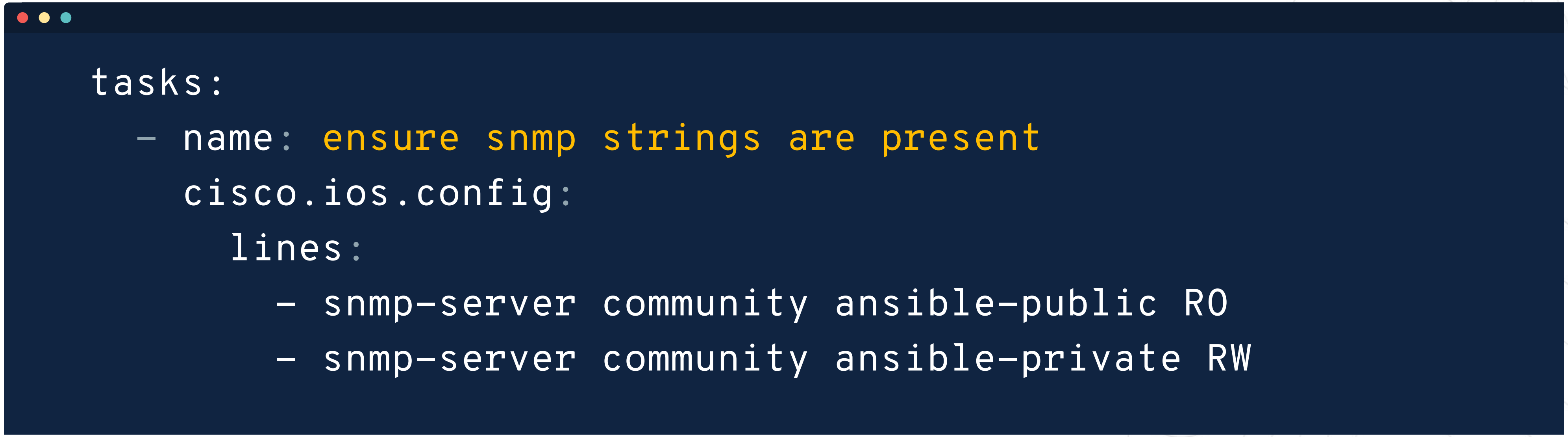


```
---
- name: snmp ro/rw string configuration
  hosts: cisco
  gather_facts: false
```

# Modules

Modules do the actual work in Ansible, they are what gets executed in each playbook task.

- Typically written in Python (but not limited to it)
- Modules can be idempotent
- Modules take user input in the form of parameters



```
tasks:
  - name: ensure snmp strings are present
    cisco.ios.config:
      lines:
        - snmp-server community ansible-public RO
        - snmp-server community ansible-private RW
```

# Network modules

Ansible modules for network automation typically references the vendor OS followed by the module name.

- namespace.collection.facts
- namespace.collection.command
- namespace.collection.config
- namespace.collection.resource

More modules depending on platform

Arista EOS = arista.eos.

Cisco IOS/IOS-XE = cisco.ios

Cisco NX-OS = cisco.nxos

Cisco IOS-XR = cisco.iosxr

F5 BIG-IP = f5networks.f5_bigip_bigip.

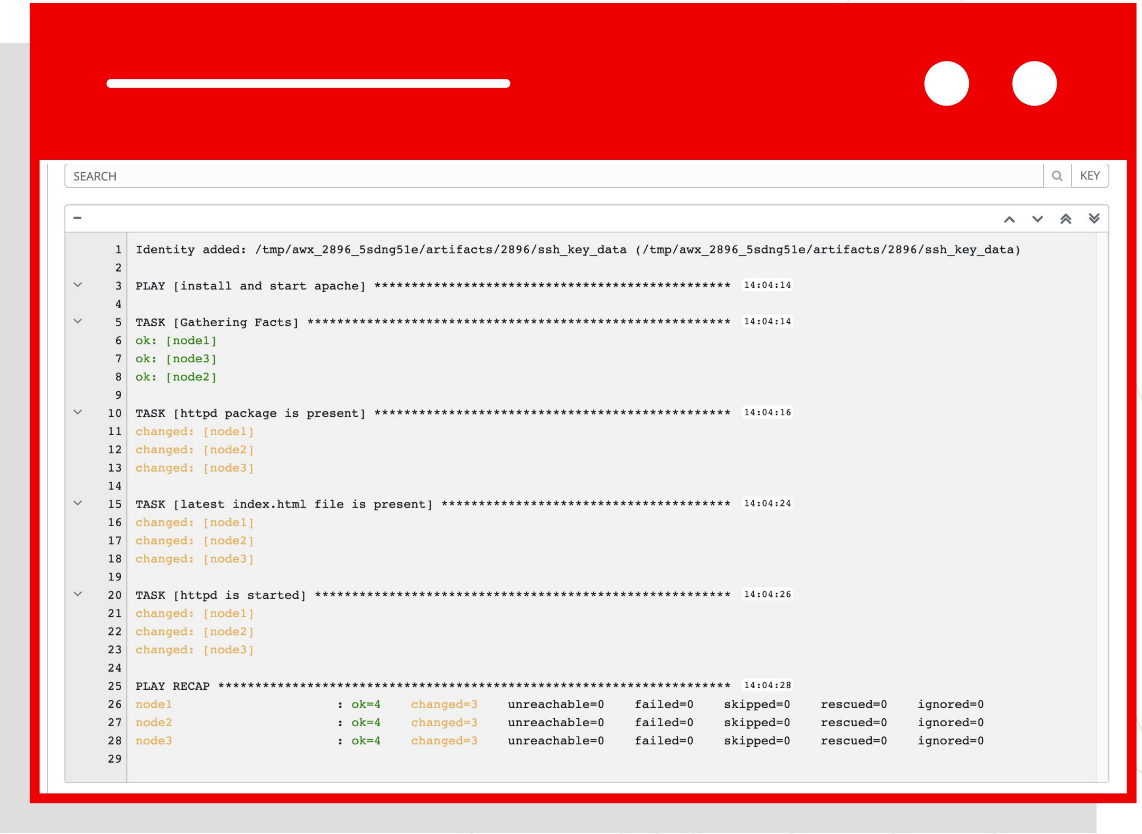
Juniper Junos = junipsnetworks.junos.

VyOS = vyos.vyos.

# A playbook run

## Where it all starts

- A playbook is interpreted and run against one or multiple hosts - task by task. The order of the tasks defines the execution.
- In each task, the module does the actual work.



```
Identity added: /tmp/awx_2896_5sdng51e/artifacts/2896/ssh_key_data (/tmp/awx_2896_5sdng51e/artifacts/2896/ssh_key_data)

PLAY [install and start apache] ******************************* 14:04:14

TASK [Gathering Facts] **************************************** 14:04:14
ok: [node1]
ok: [node3]
ok: [node2]

TASK [httpd package is present] ******************************* 14:04:16
changed: [node1]
changed: [node2]
changed: [node3]

TASK [latest index.html file is present] ********************** 14:04:24
changed: [node1]
changed: [node2]
changed: [node3]

TASK [httpd is started] *************************************** 14:04:26
changed: [node1]
changed: [node2]
changed: [node3]

PLAY RECAP **************************************************** 14:04:28
node1                 : ok=4   changed=3   unreachable=0   failed=0   skipped=0   rescued=0   ignored=0
node2                 : ok=4   changed=3   unreachable=0   failed=0   skipped=0   rescued=0   ignored=0
node3                 : ok=4   changed=3   unreachable=0   failed=0   skipped=0   rescued=0   ignored=0

```

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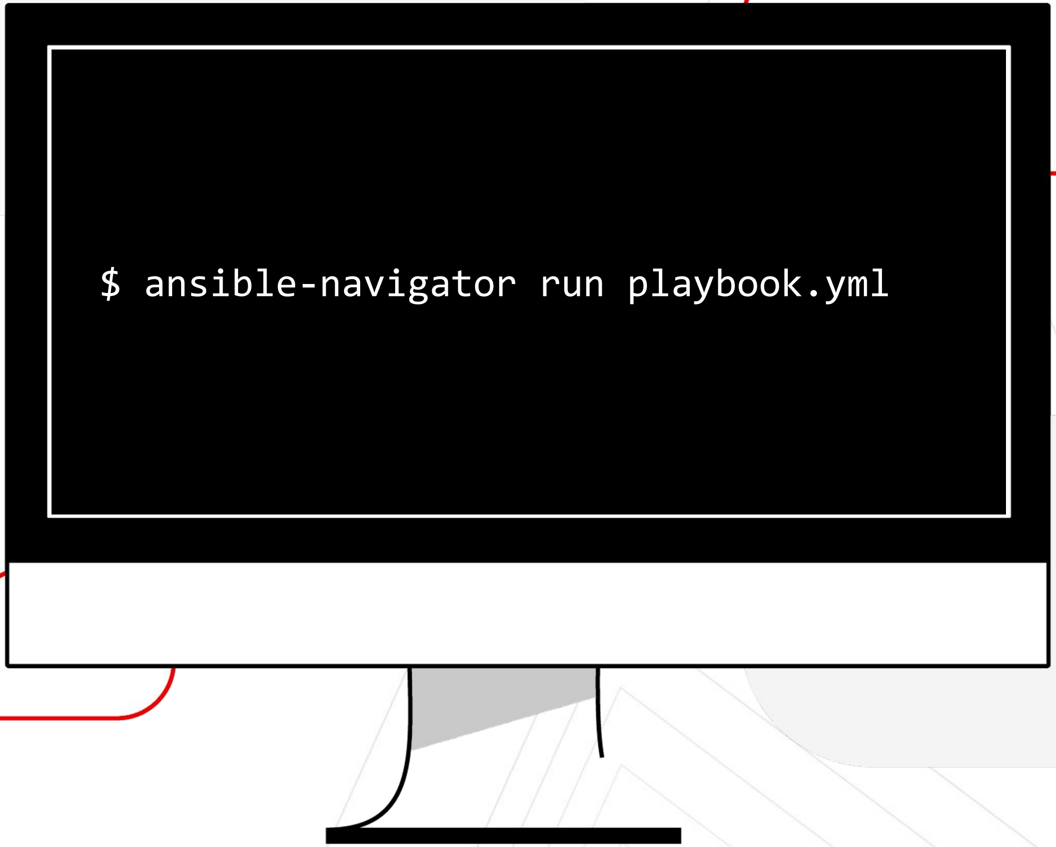
# Running an Ansible Playbook

## Using the latest ansible-navigator command

### What is ansible-navigator?

ansible-navigator command line utility and text-based user interface (TUI) for running and developing Ansible automation content.

It replaces the previous command used to run playbooks “ansible-playbook”.



```
$ ansible-navigator run playbook.yml
```

# ansible-navigator

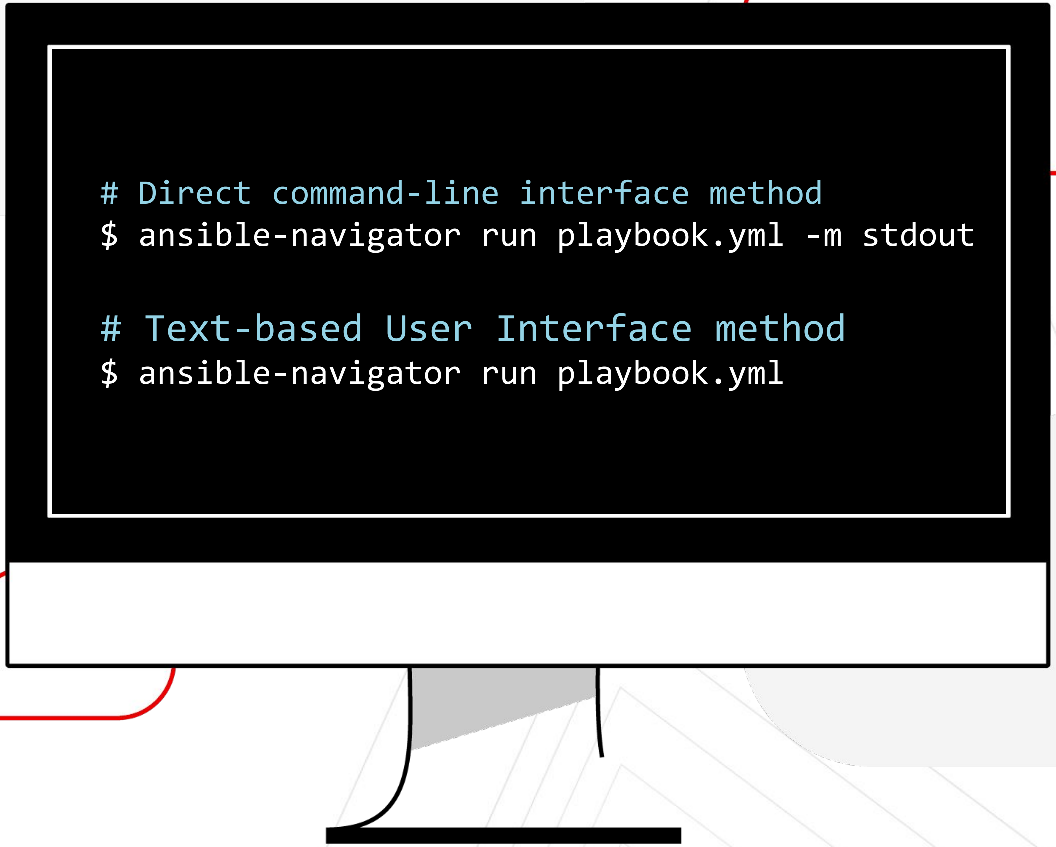
## Bye ansible-playbook, Hello ansible-navigator

### How do I use ansible-navigator?

As previously mentioned, it replaces the ansible-playbook command.

As such it brings two methods of running playbooks:

- Direct command-line interface
- Text-based User Interface (TUI)



```
# Direct command-line interface method
$ ansible-navigator run playbook.yml -m stdout

# Text-based User Interface method
$ ansible-navigator run playbook.yml
```

# ansible-navigator

## Mapping to previous Ansible commands

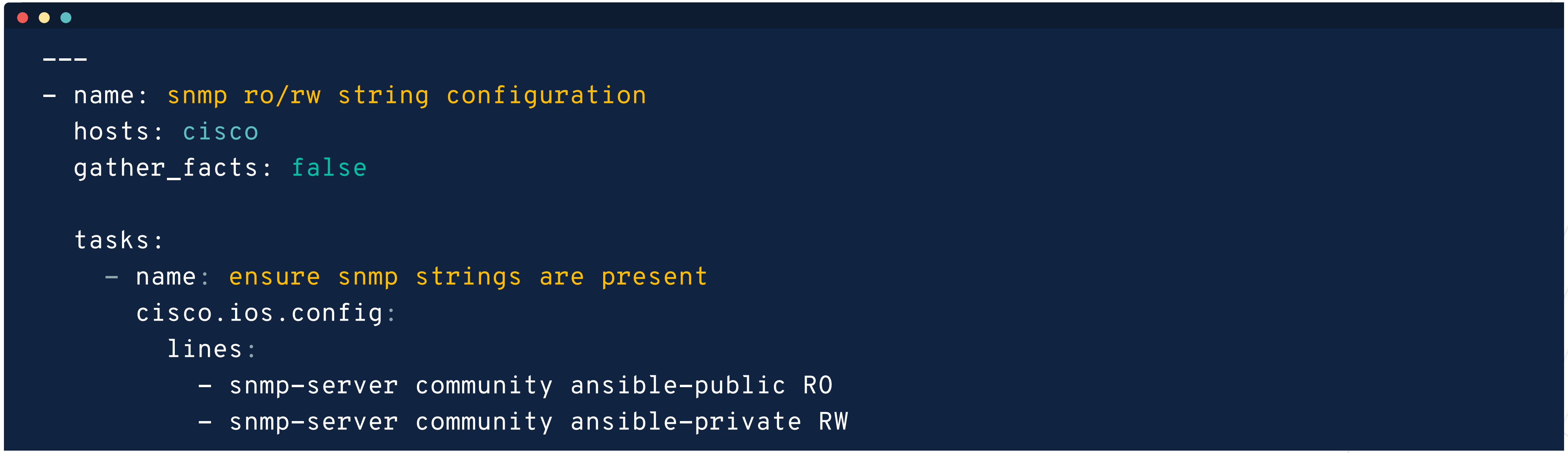
| ansible command | ansible-navigator command |
|---|---|
| `ansible-config` | `ansible-navigator config` |
| `ansible-doc` | `ansible-navigator doc` |
| `ansible-inventory` | `ansible-navigator inventory` |
| `ansible-playbook` | `ansible-navigator run` |

# ansible-navigator

## Common subcommands

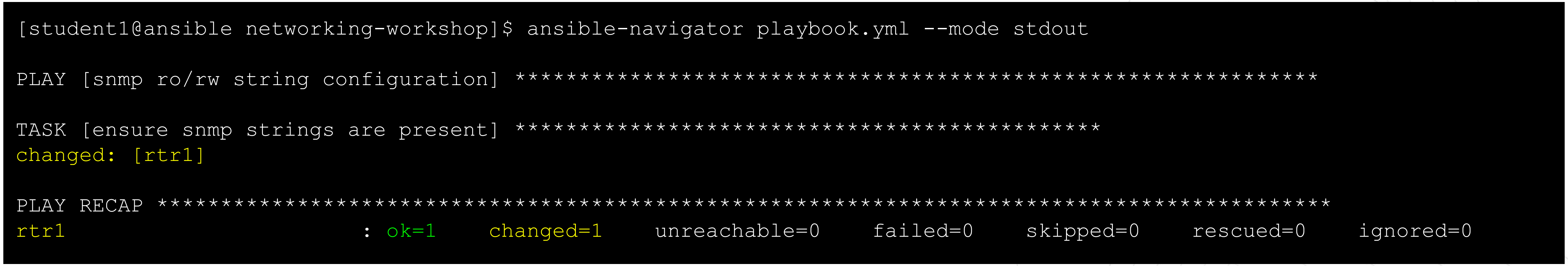
| Name | Description | CLI Example | Colon command within TUI |
|---|---|---|---|
| collections | Explore available collections | ansible-navigator collections --help | :collections |
| config | Explore the current ansible configuration | ansible-navigator config --help | :config |
| doc | Review documentation for a module or plugin | ansible-navigator doc --help | :doc |
| images | Explore execution environment images | ansible-navigator images --help | :images |
| inventory | Explore and inventory | ansible-navigator inventory --help | :inventory |
| replay | Explore a previous run using a playbook artifact | ansible-navigator replay --help | :replay |
| run | Run a playbook | ansible-navigator run --help | :run |
| welcome | Start at the welcome page | ansible-navigator welcome --help | :welcome |

# Running a playbook



```
---
- name: snmp ro/rw string configuration
  hosts: cisco
  gather_facts: false

  tasks:
    - name: ensure snmp strings are present
      cisco.ios.config:
        lines:
          - snmp-server community ansible-public RO
          - snmp-server community ansible-private RW
```



```
[student1@ansible networking-workshop]$ ansible-navigator playbook.yml --mode stdout

PLAY [snmp ro/rw string configuration] ***************************************************************

TASK [ensure snmp strings are present] **********************************************
changed: [rtr1]

PLAY RECAP ********************************************************************************************
rtr1                       : ok=1    changed=1    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
```

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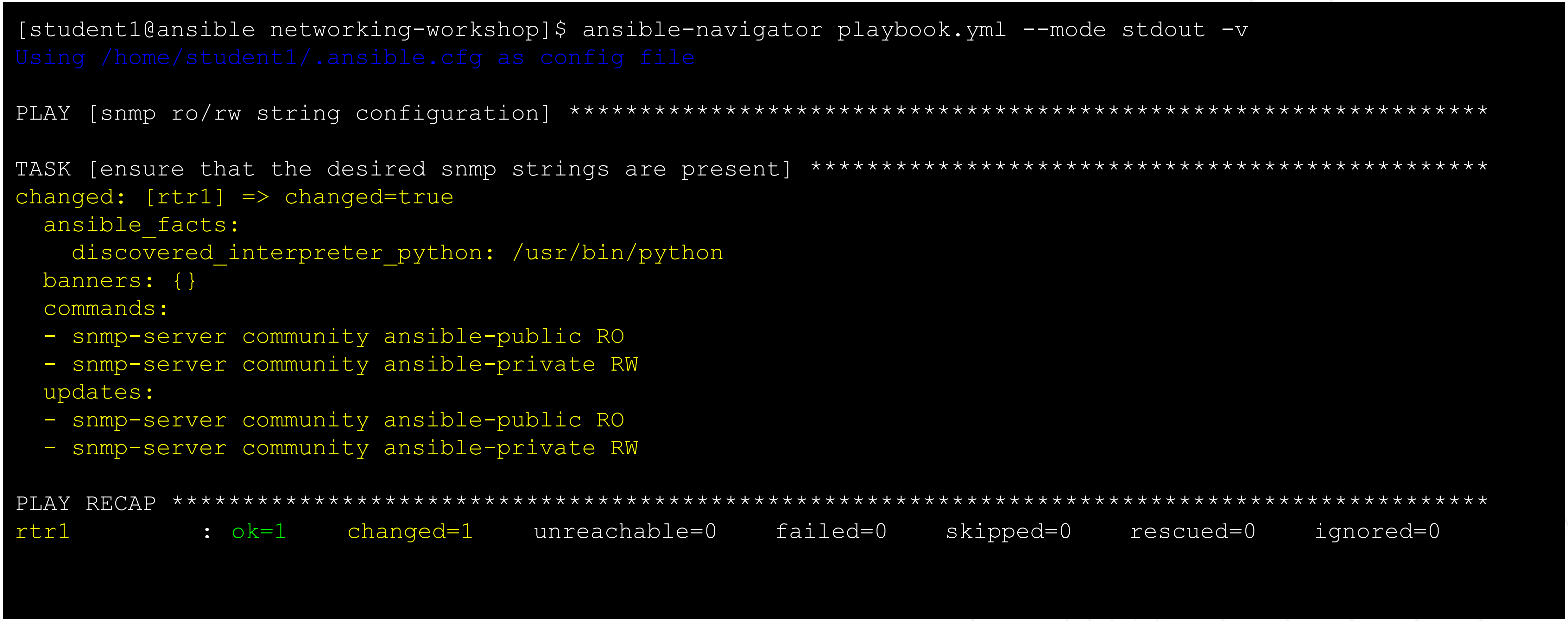
# Displaying output



```
[student1@ansible networking-workshop]$ ansible-navigator playbook.yml --mode stdout -v
Using /home/student1/.ansible.cfg as config file

PLAY [snmp ro/rw string configuration] *****************************************************************

TASK [ensure that the desired snmp strings are present] ************************************************
changed: [rtr1] => changed=true
  ansible_facts:
    discovered_interpreter_python: /usr/bin/python
  banners: {}
  commands:
  - snmp-server community ansible-public RO
  - snmp-server community ansible-private RW
  updates:
  - snmp-server community ansible-public RO
  - snmp-server community ansible-private RW

PLAY RECAP *********************************************************************************************
rtr1         : ok=1    changed=1    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
```

**Increase the level of verbosity by adding more "v's" -vvvv**

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# Lab Time

## Exercise 2 - Execute your first network automation playbook

🔗 red.ht/network-workshop-2

In this lab you will use Ansible to update the configuration of routers. This exercise will not have you create an Ansible Playbook; you will use an existing one.

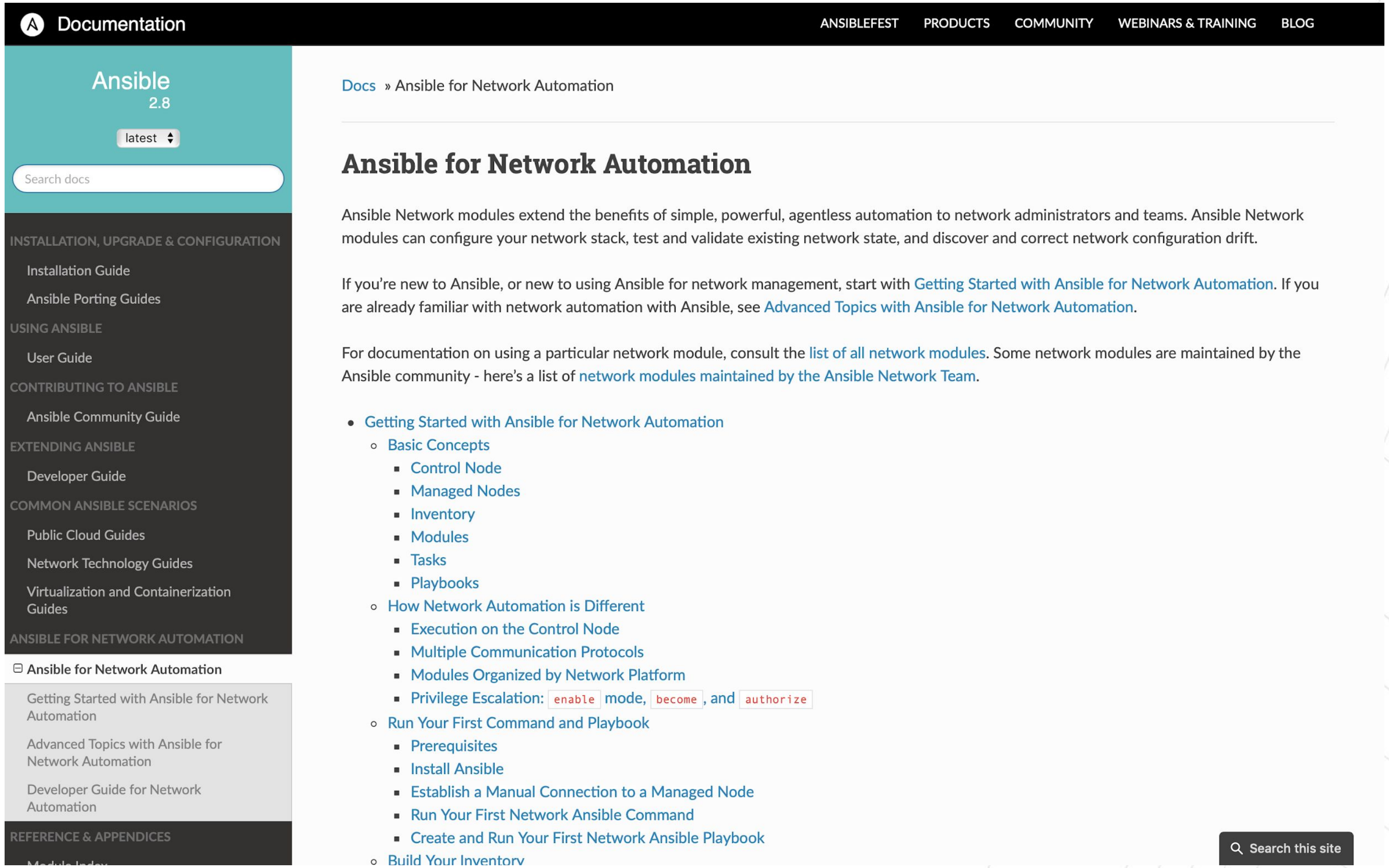
Approximate time: 15 mins

# Section 3
# Network Facts

Topics Covered:

- Ansible Documentation
- Facts for Network Devices
- The debug module

# “Ansible for Network Automation” Documentation



Docs » Ansible for Network Automation

## Ansible for Network Automation

Ansible Network modules extend the benefits of simple, powerful, agentless automation to network administrators and teams. Ansible Network modules can configure your network stack, test and validate existing network state, and discover and correct network configuration drift.

If you’re new to Ansible, or new to using Ansible for network management, start with Getting Started with Ansible for Network Automation. If you are already familiar with network automation with Ansible, see Advanced Topics with Ansible for Network Automation.

For documentation on using a particular network module, consult the list of all network modules. Some network modules are maintained by the Ansible community - here’s a list of network modules maintained by the Ansible Network Team.

- Getting Started with Ansible for Network Automation
  - Basic Concepts
    - Control Node
    - Managed Nodes
    - Inventory
    - Modules
    - Tasks
    - Playbooks
  - How Network Automation is Different
    - Execution on the Control Node
    - Multiple Communication Protocols
    - Modules Organized by Network Platform
    - Privilege Escalation: `enable` mode, `become`, and `authorize`
  - Run Your First Command and Playbook
    - Prerequisites
    - Install Ansible
    - Establish a Manual Connection to a Managed Node
    - Run Your First Network Ansible Command
    - Create and Run Your First Network Ansible Playbook
  - Build Your Inventory

red.ht/NetworkDocs

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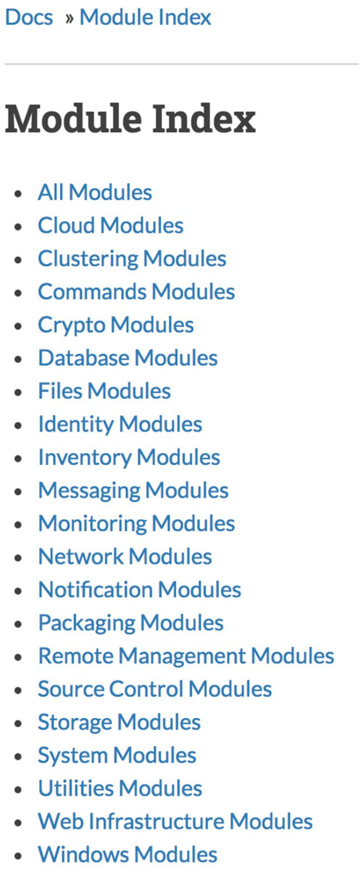
# Module Documentation

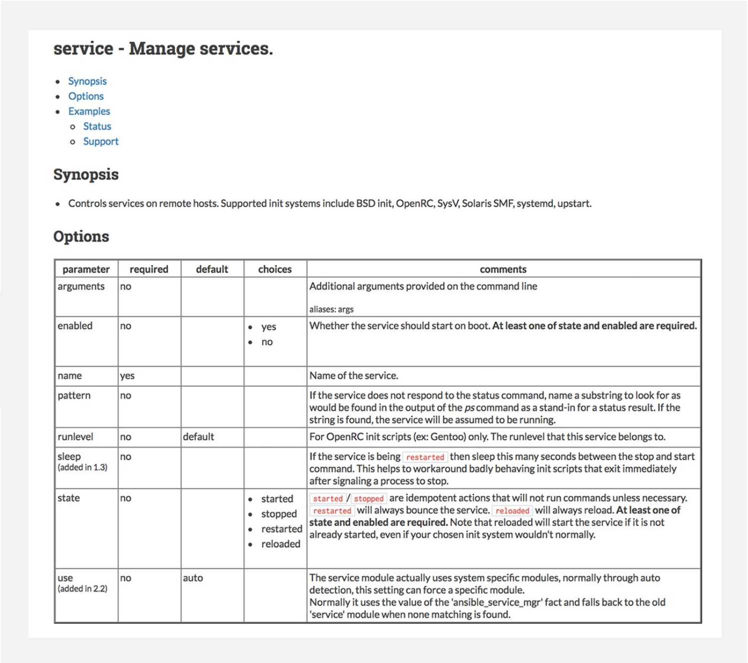
- Documentation is required as part of module submission
- Multiple Examples for every module
- Broken into relevant sections



Docs » Module Index

## Module Index

- All Modules
- Cloud Modules
- Clustering Modules
- Commands Modules
- Crypto Modules
- Database Modules
- Files Modules
- Identity Modules
- Inventory Modules
- Messaging Modules
- Monitoring Modules
- Network Modules
- Notification Modules
- Packaging Modules
- Remote Management Modules
- Source Control Modules
- Storage Modules
- System Modules
- Utilities Modules
- Web Infrastructure Modules
- Windows Modules



### service - Manage services.

- Synopsis
- Options
- Examples
  - Status
  - Support

### Synopsis

- Controls services on remote hosts. Supported init systems include BSD init, OpenRC, SysV, Solaris SMF, systemd, upstart.

### Options

| parameter | required | default | choices | comments |
|---|---|---|---|---|
| arguments | no | | | Additional arguments provided on the command line<br>aliases: args |
| enabled | no | | • yes<br>• no | Whether the service should start on boot. **At least one of state and enabled are required.** |
| name | yes | | | Name of the service. |
| pattern | no | | | If the service does not respond to the status command, name a substring to look for as would be found in the output of the *ps* command as a stand-in for a status result. If the string is found, the service will be assumed to be running. |
| runlevel | no | default | | For OpenRC init scripts (ex: Gentoo) only. The runlevel that this service belongs to. |
| sleep<br>(added in 1.3) | no | | | If the service is being `restarted` then sleep this many seconds between the stop and start command. This helps to workaround badly behaving init scripts that exit immediately after signaling a process to stop. |
| state | no | | • started<br>• stopped<br>• restarted<br>• reloaded | `started` / `stopped` are idempotent actions that will not run commands unless necessary. `restarted` will always bounce the service. `reloaded` will always reload. **At least one of state and enabled are required.** Note that reloaded will start the service if it is not already started, even if your chosen init system wouldn't normally. |
| use<br>(added in 2.2) | no | auto | | The service module actually uses system specific modules, normally through auto detection, this setting can force a specific module.<br>Normally it uses the value of the 'ansible_service_mgr' fact and falls back to the old 'service' module when none matching is found. |

https://docs.ansible.com/

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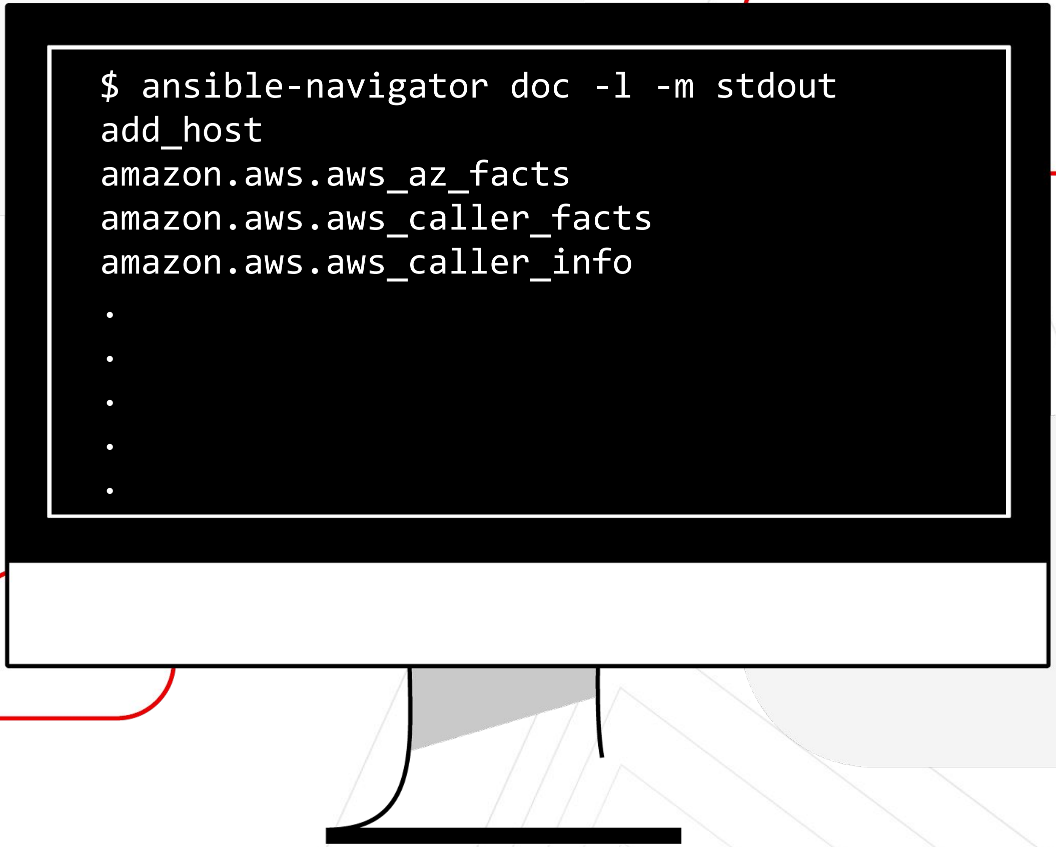
# Accessing the Ansible docs

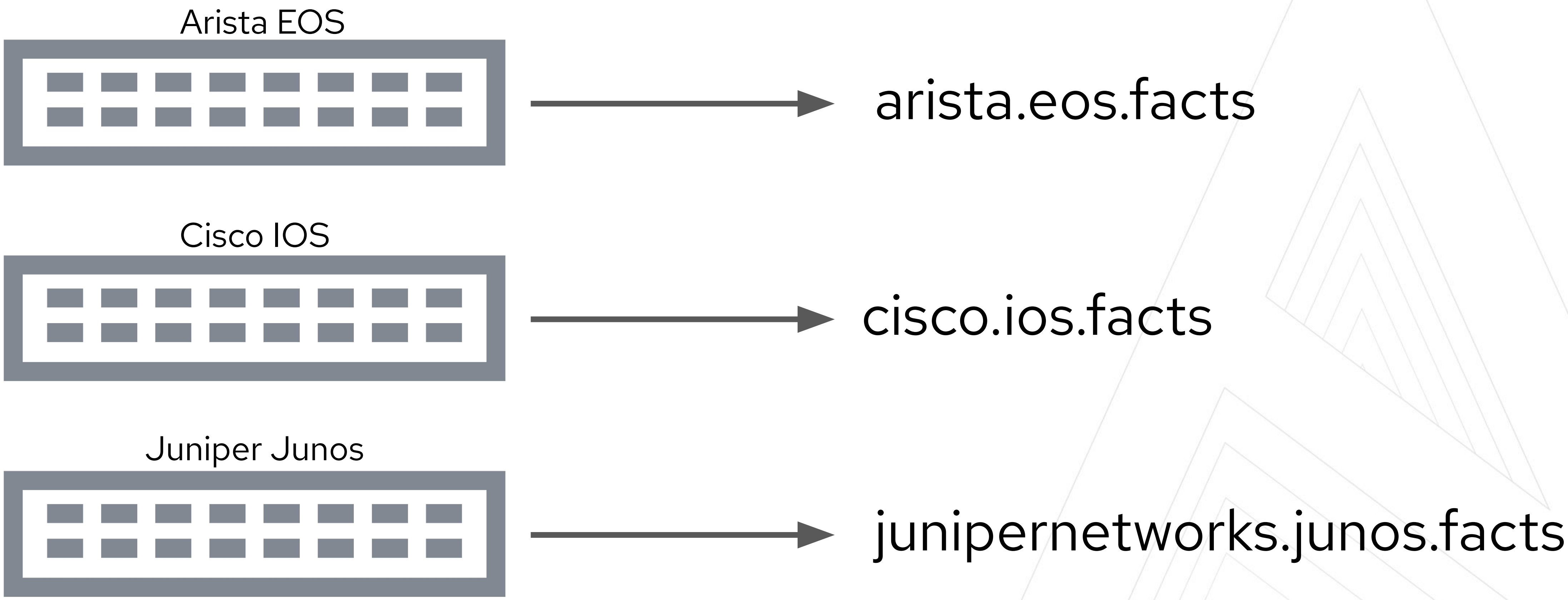
With the use of the latest command utility ansible-navigator, one can trigger access to all the modules available to them as well as details on specific modules.

A formal introduction to ansible-navigator and how it can be used to run playbooks in the following exercise.



```
$ ansible-navigator doc -l -m stdout
add_host
amazon.aws.aws_az_facts
amazon.aws.aws_caller_facts
amazon.aws.aws_caller_info
.
.
.
.
.
```

# Fact modules



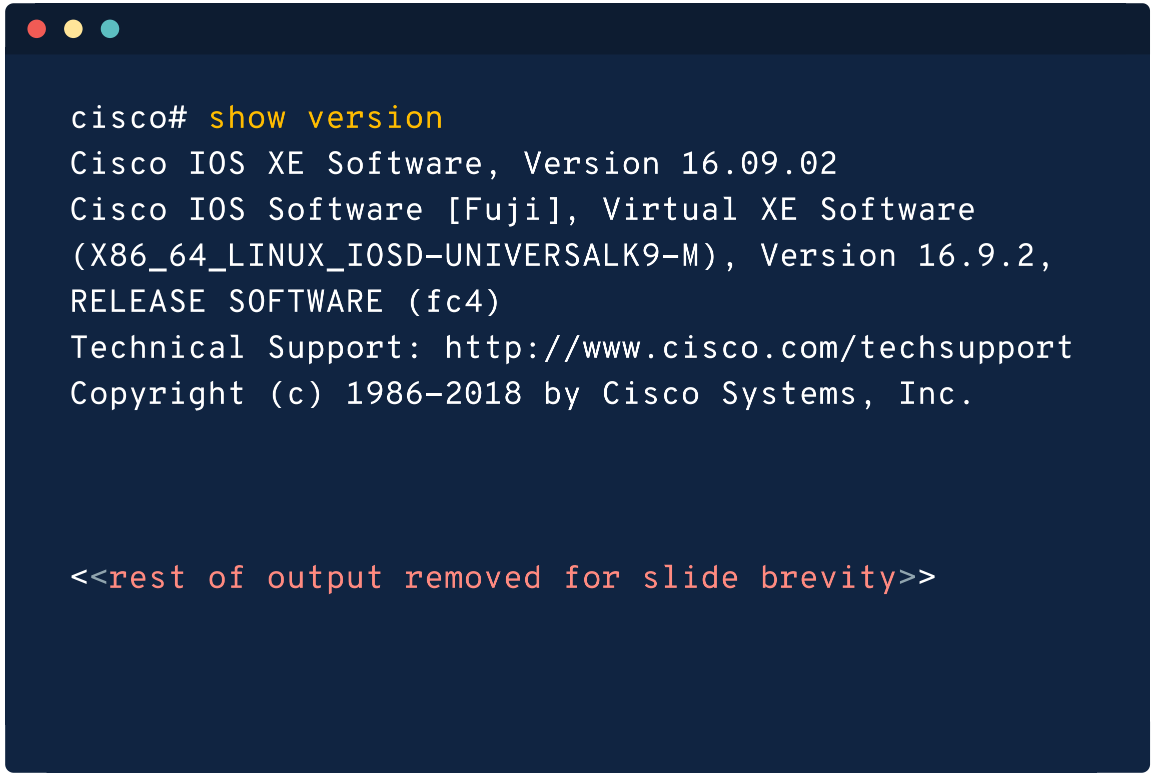
Arista EOS → arista.eos.facts

Cisco IOS → cisco.ios.facts

Juniper Junos → junipernetworks.junos.facts

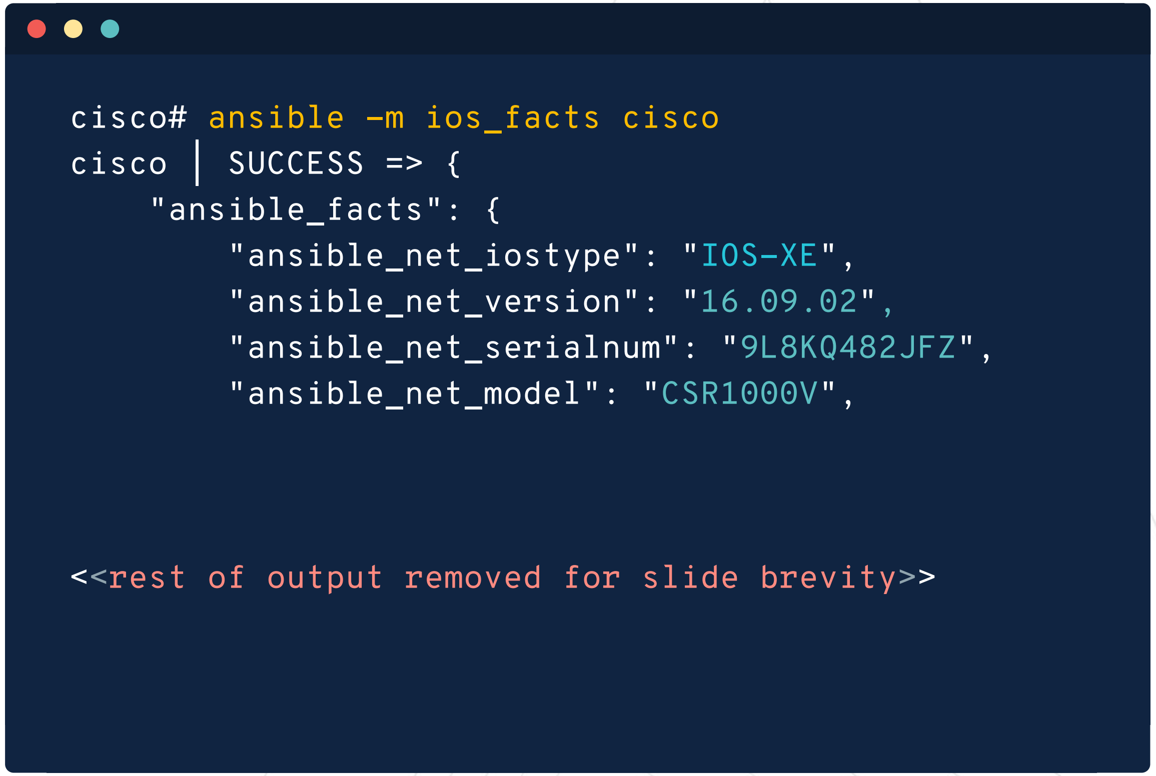
# What are facts?

Structured data, the Ansible way



```
cisco# show version
Cisco IOS XE Software, Version 16.09.02
Cisco IOS Software [Fuji], Virtual XE Software
(X86_64_LINUX_IOSD-UNIVERSALK9-M), Version 16.9.2,
RELEASE SOFTWARE (fc4)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2018 by Cisco Systems, Inc.



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

Cisco IOS output

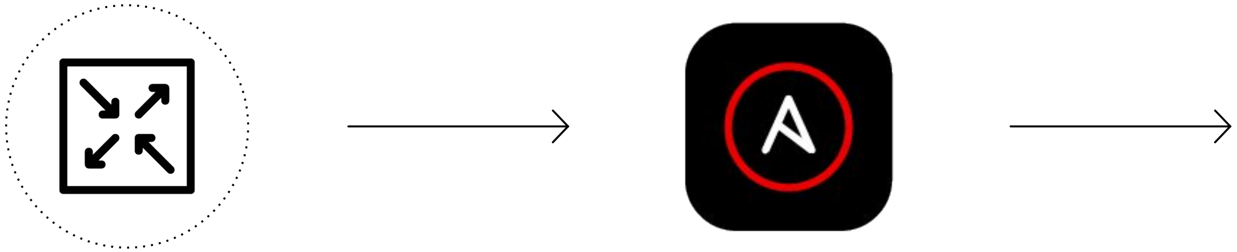


```
cisco# ansible -m ios_facts cisco
cisco | SUCCESS => {
    "ansible_facts": {
        "ansible_net_iostype": "IOS-XE",
        "ansible_net_version": "16.09.02",
        "ansible_net_serialnum": "9L8KQ482JFZ",
        "ansible_net_model": "CSR1000V",



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

Ansible output

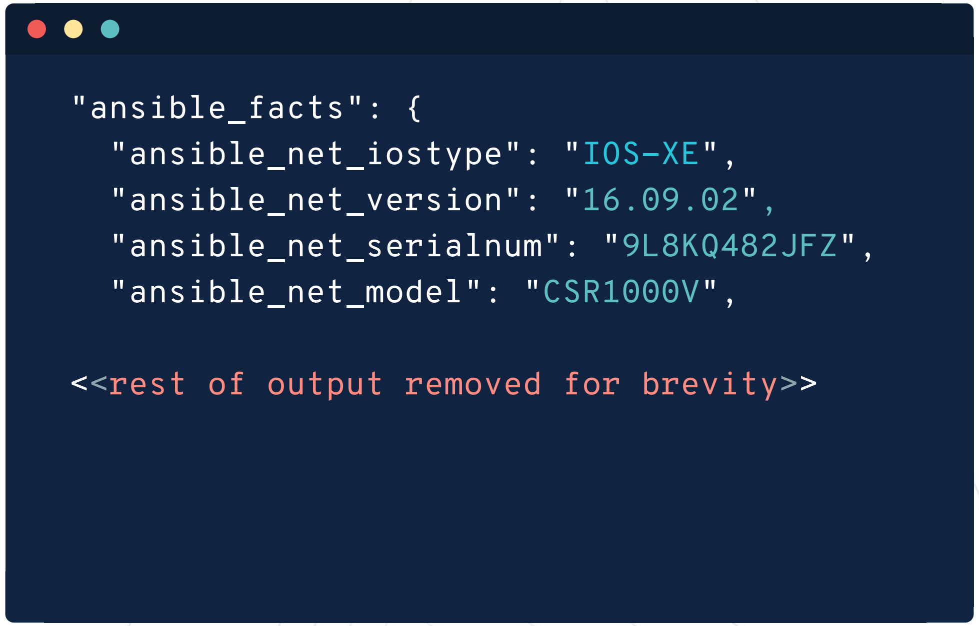
# Ansible Automation Platform facts

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>>
```

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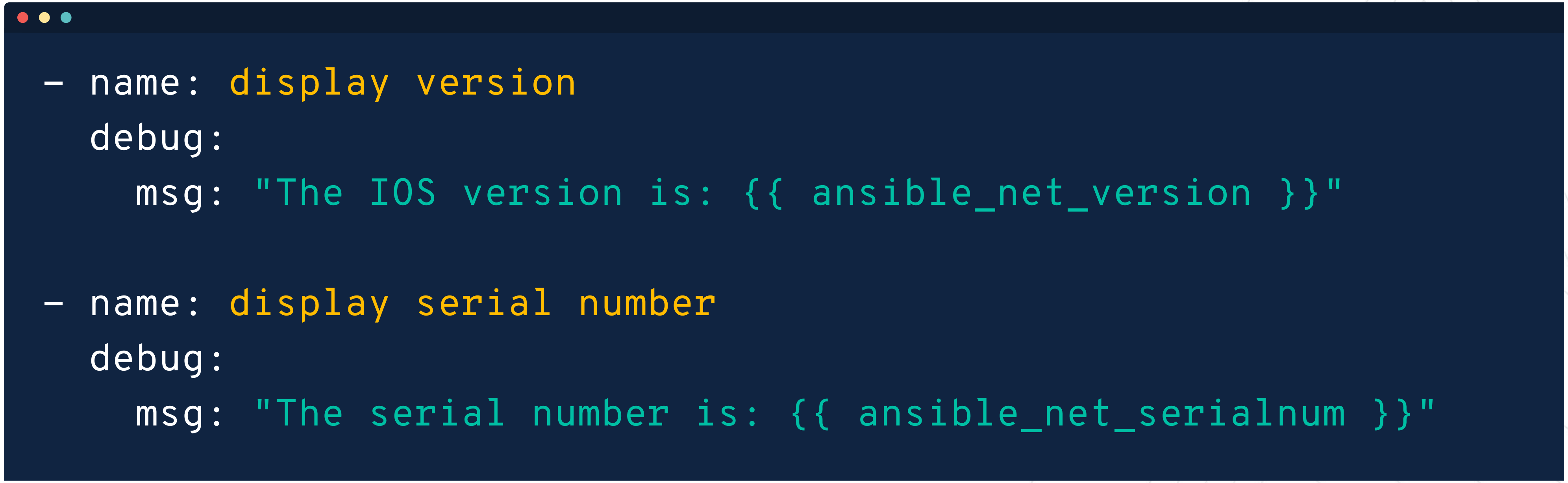
# Displaying output - The “debug” module

The **debug** module is used like a "print" statement in most programming languages. Variables are accessed using "{{ }}" - quoted curly braces

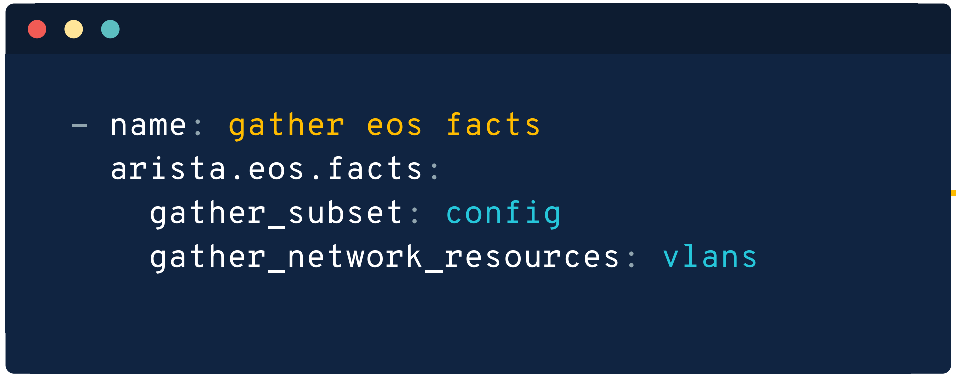


```
- name: display version
  debug:
    msg: "The IOS version is: {{ ansible_net_version }}"

- name: display serial number
  debug:
    msg: "The serial number is: {{ ansible_net_serialnum }}"
```

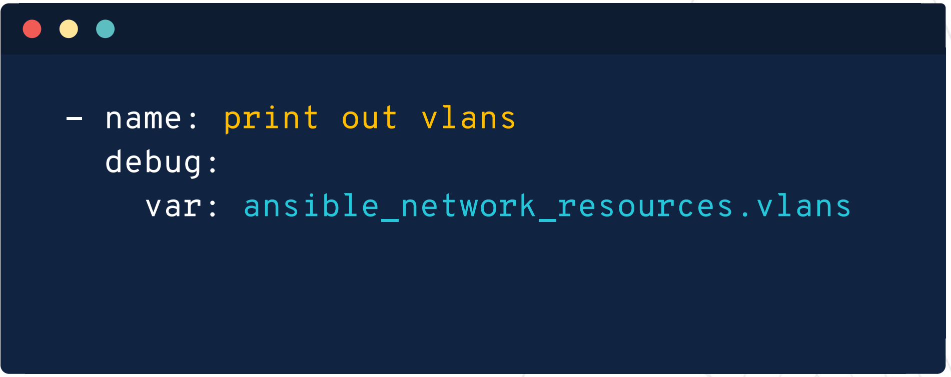
# Working with Ansible facts

## 1. Gather facts



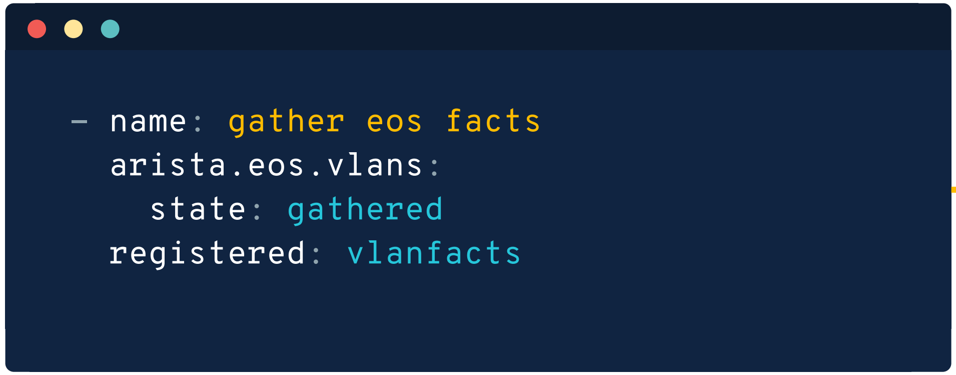
```
- name: gather eos facts
  arista.eos.facts:
    gather_subset: config
    gather_network_resources: vlans
```

## 2. Use facts

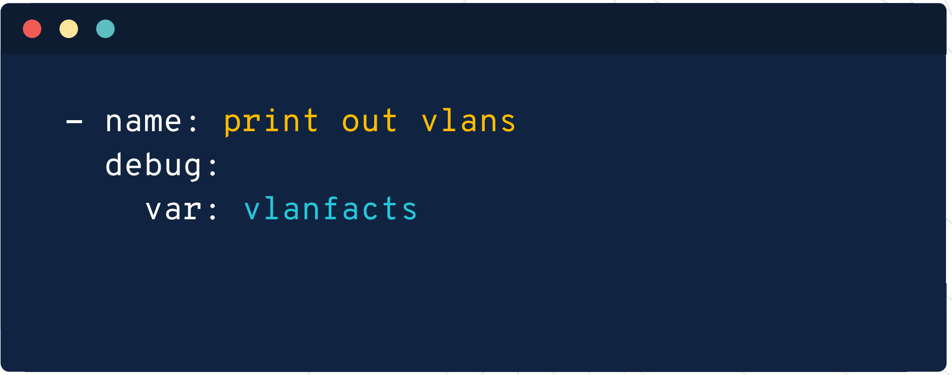


```
- name: print out vlans
  debug:
    var: ansible_network_resources.vlans
```

or



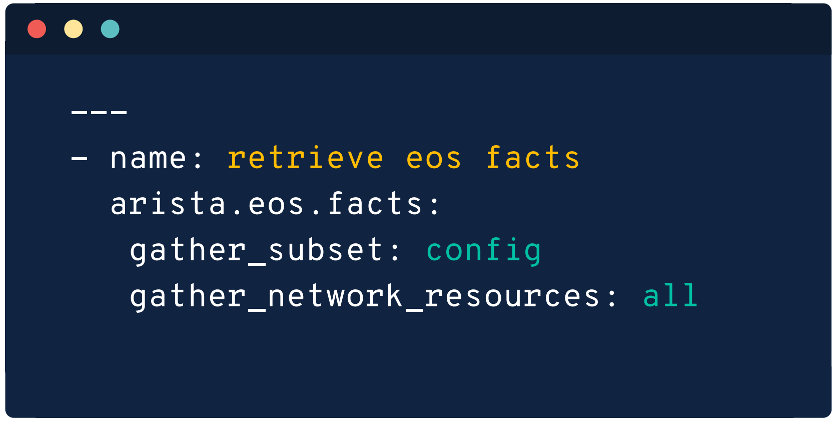
```
- name: gather eos facts
  arista.eos.vlans:
    state: gathered
  registered: vlanfacts
```



```
- name: print out vlans
  debug:
    var: vlanfacts
```

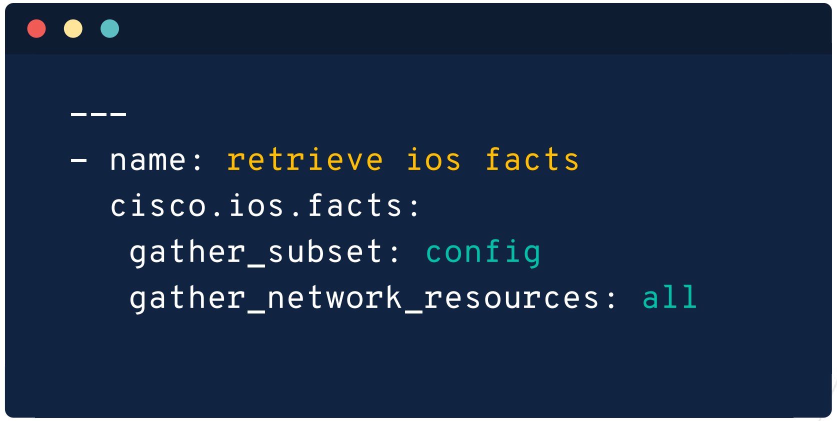
# Simple and common approach

## Arista EOS



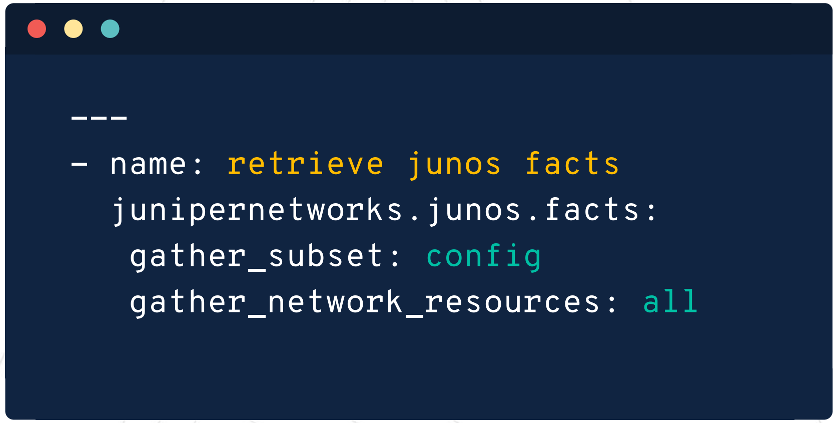
```yaml
---
- name: retrieve eos facts
  arista.eos.facts:
   gather_subset: config
   gather_network_resources: all
```

## Cisco IOS-XE



```yaml
---
- name: retrieve ios facts
  cisco.ios.facts:
   gather_subset: config
   gather_network_resources: all
```

## Juniper Junos



```yaml
---
- name: retrieve junos facts
  junipernetworks.junos.facts:
   gather_subset: config
   gather_network_resources: all
```

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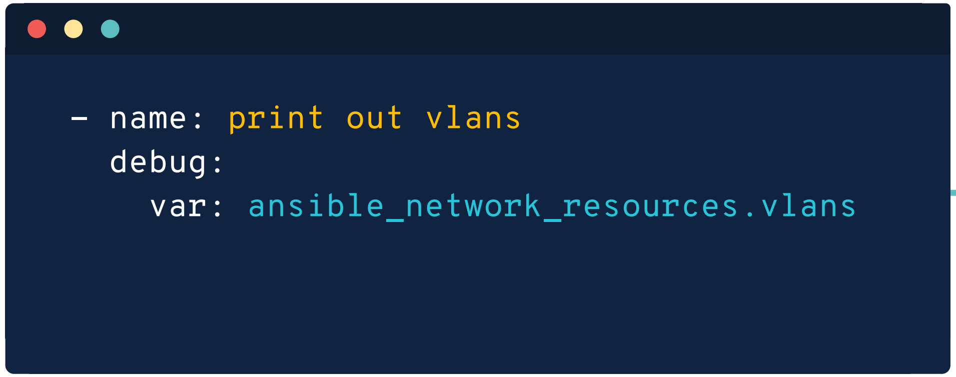
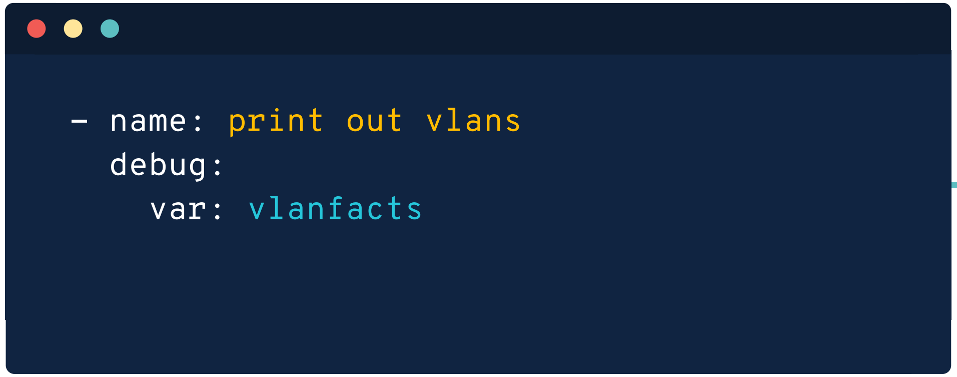
# Working with Ansible facts

## 2. Use facts



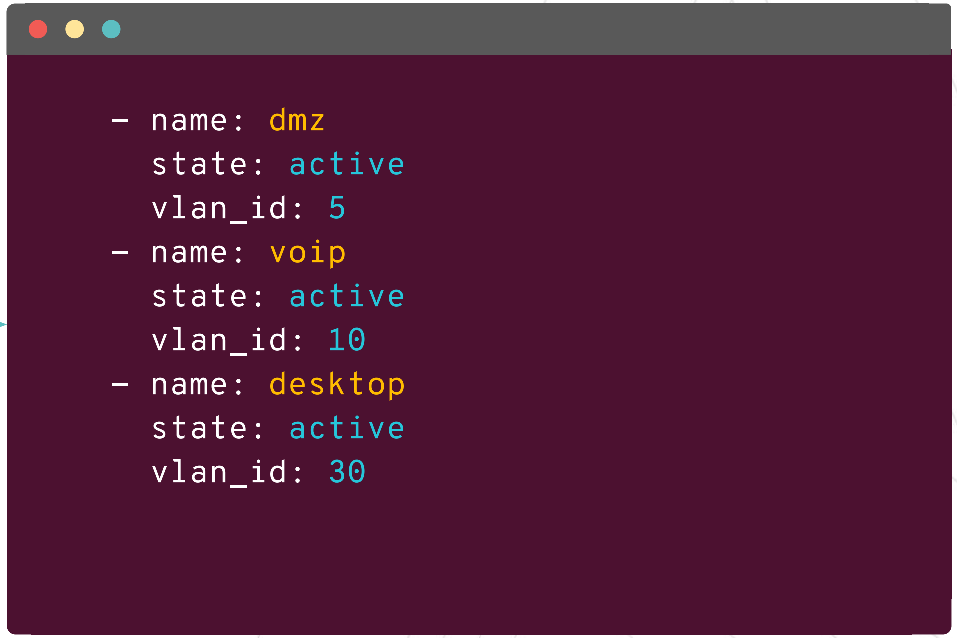
```
- name: print out vlans
  debug:
    var: ansible_network_resources.vlans
```

or



```
- name: print out vlans
  debug:
    var: vlanfacts
```

## 3 Displayed Results

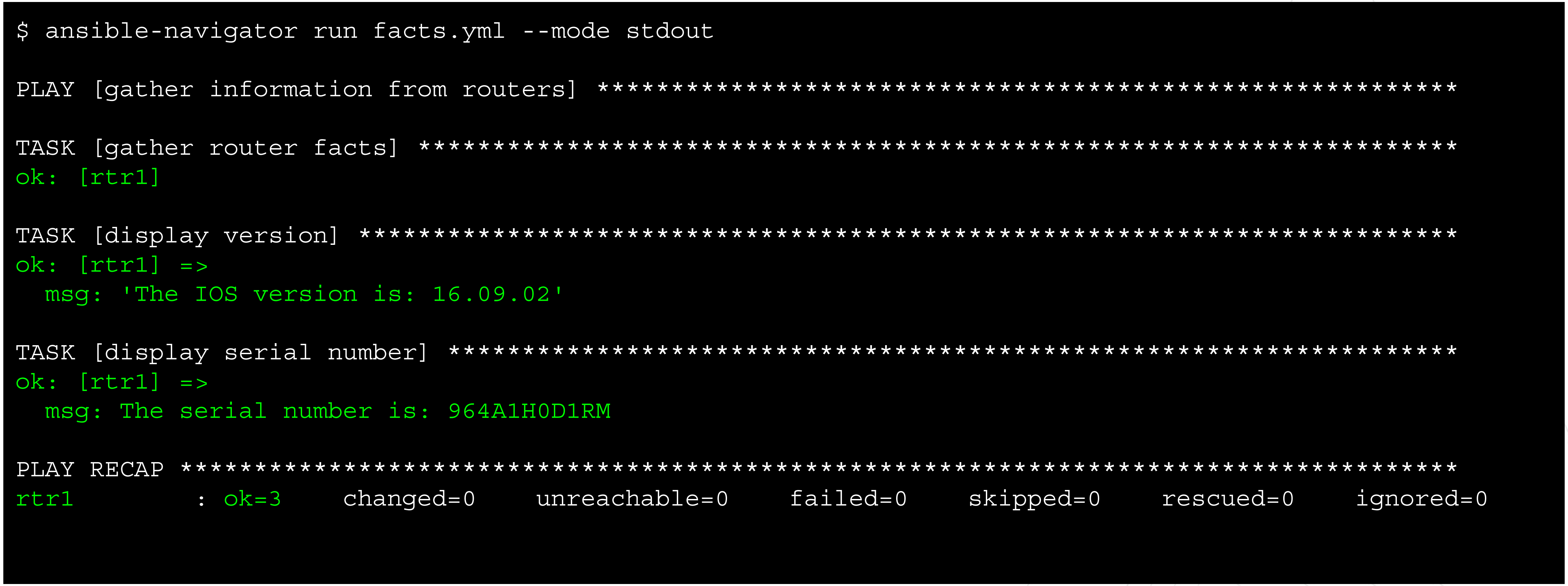


```
- name: dmz
  state: active
  vlan_id: 5
- name: voip
  state: active
  vlan_id: 10
- name: desktop
  state: active
  vlan_id: 30
```

🟦 playbook

🟥 terminal output window

# Running the Ansible Playbook with verbosity



```
$ ansible-navigator run facts.yml --mode stdout

PLAY [gather information from routers] **********************************************************

TASK [gather router facts] **********************************************************************
ok: [rtr1]

TASK [display version] **************************************************************************
ok: [rtr1] =>
  msg: 'The IOS version is: 16.09.02'

TASK [display serial number] ********************************************************************
ok: [rtr1] =>
  msg: The serial number is: 964A1H0D1RM

PLAY RECAP **************************************************************************************
rtr1        : ok=3    changed=0    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
```

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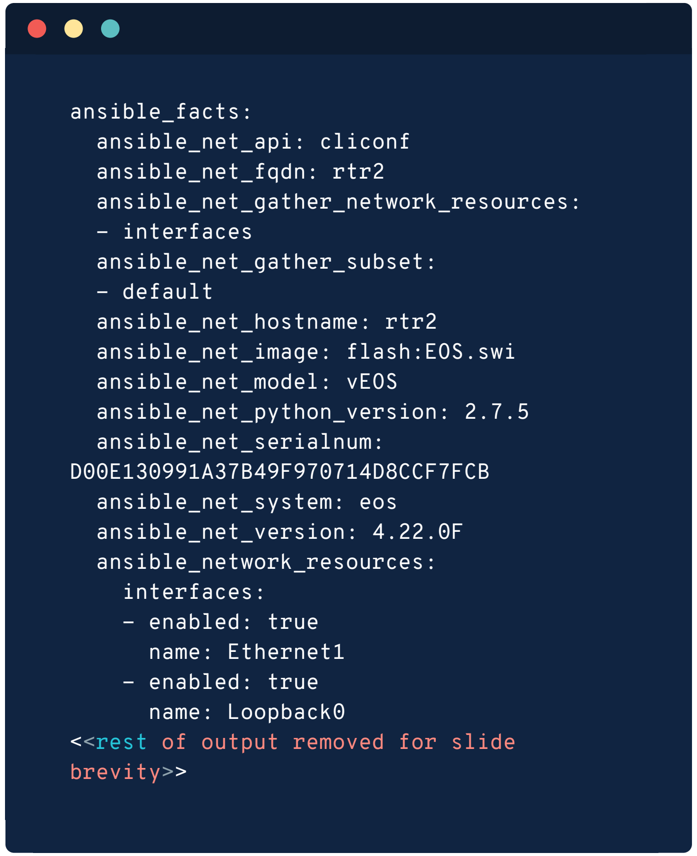
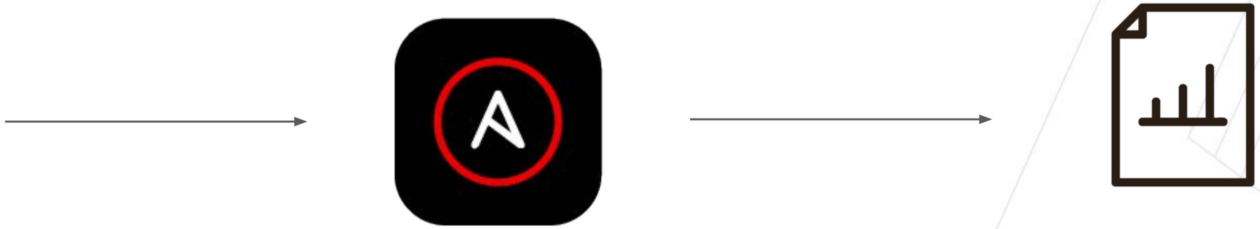
# Structured data is malleable

## Create customized network reports



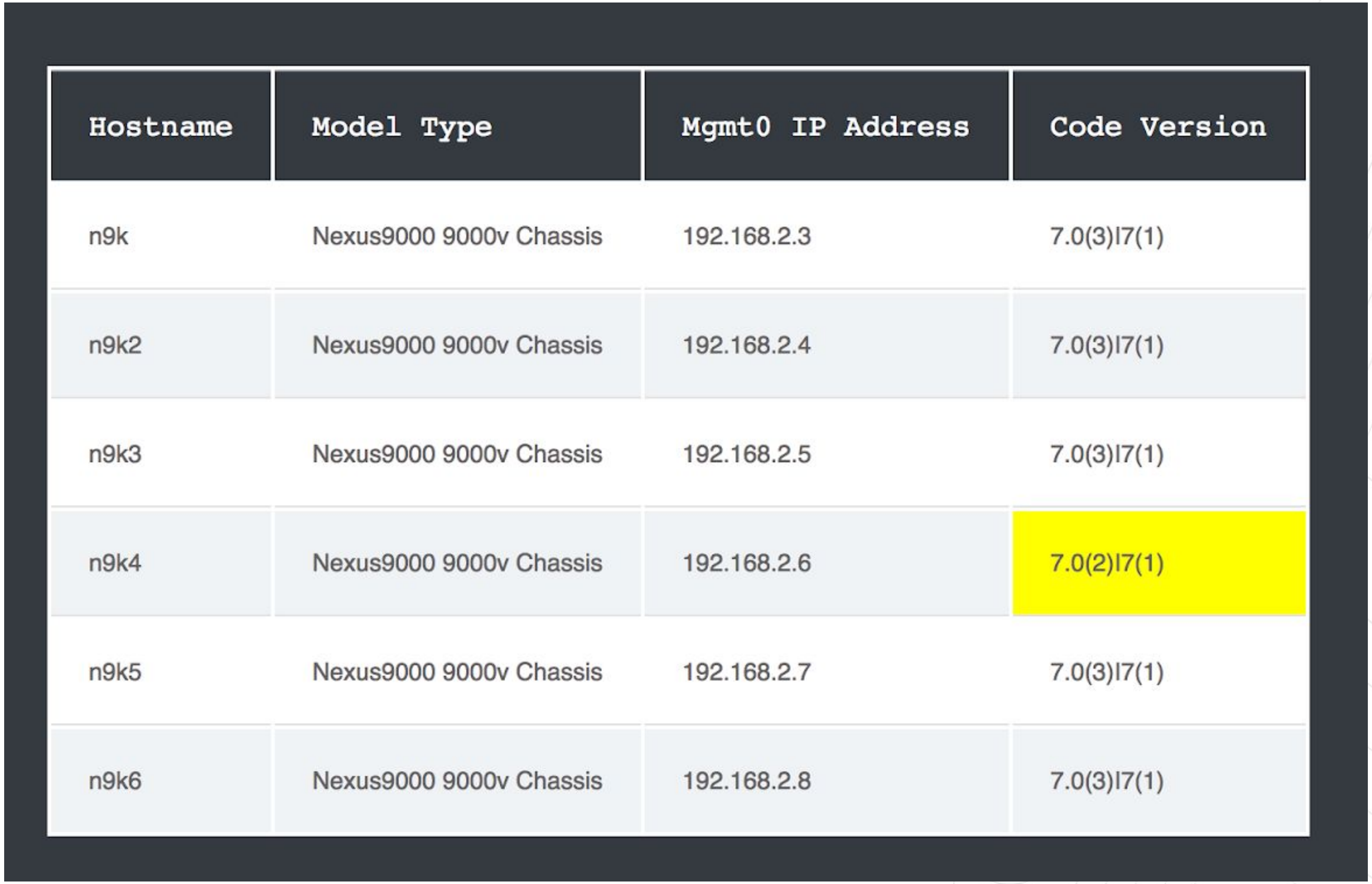
```
ansible_facts:
  ansible_net_api: cliconf
  ansible_net_fqdn: rtr2
  ansible_net_gather_network_resources:
  - interfaces
  ansible_net_gather_subset:
  - default
  ansible_net_hostname: rtr2
  ansible_net_image: flash:EOS.swi
  ansible_net_model: vEOS
  ansible_net_python_version: 2.7.5
  ansible_net_serialnum:
D00E130991A37B49F970714D8CCF7FCB
  ansible_net_system: eos
  ansible_net_version: 4.22.0F
  ansible_network_resources:
    interfaces:
    - enabled: true
      name: Ethernet1
    - enabled: true
      name: Loopback0
<<rest of output removed for slide
brevity>>
```



Ansible Automation Platform

Customized Report

# Build reports with Ansible Facts



| Hostname | Model Type | Mgmt0 IP Address | Code Version |
|---|---|---|---|
| n9k | Nexus9000 9000v Chassis | 192.168.2.3 | 7.0(3)I7(1) |
| n9k2 | Nexus9000 9000v Chassis | 192.168.2.4 | 7.0(3)I7(1) |
| n9k3 | Nexus9000 9000v Chassis | 192.168.2.5 | 7.0(3)I7(1) |
| n9k4 | Nexus9000 9000v Chassis | 192.168.2.6 | 7.0(2)I7(1) |
| n9k5 | Nexus9000 9000v Chassis | 192.168.2.7 | 7.0(3)I7(1) |
| n9k6 | Nexus9000 9000v Chassis | 192.168.2.8 | 7.0(3)I7(1) |

# Lab Time

## Exercise 3 - Ansible Facts

red.ht/network-workshop-3

Demonstration use of Ansible facts on network infrastructure.

Approximate time: 15 mins

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# Section 4
# Resource Modules

Topics Covered:

- Resource modules
- state: merged
- state: gathered

# Network Automation Modules

## How do we interact with network devices?

| | |
|---|---|
| command | run arbitrary commands |
| facts | retrieve information |
| config | generic catch-all configuration and templating |
| resource | read and configure specific network resources |

# Network Automation Modules

How do we interact with network devices?

command

namespace.collection.**command**
Cisco IOS -> `cisco.ios.command`

facts

namespace.collection.**facts**
Arista EOS -> `arista.eos.facts`

config

namespace.collection.**config**
Juniper Junos-> `junipernetworks.junos.config`

resource

namespace.collection.**module**
Cisco IOS-XR-> cisco.iosxr.acls

# Network resource modules

Managing device state across different devices and types

## Configuration to code

- Built-in logic with commands and orchestration
- Vendor-agnostic data model
- Bidirectional with configuration to facts and facts to configuration

# Lab Time

## Exercise 4 - Ansible Network Resource Modules

red.ht/network-workshop-4

This exercise will cover configuring VLANs on Arista EOS by building an Ansible Playbook using the arista.eos.vlans module.

Approximate time: 15 mins

# Section 5
# Automation controller

Topics Covered:

- What is Automation controller?
- Enterprise Features

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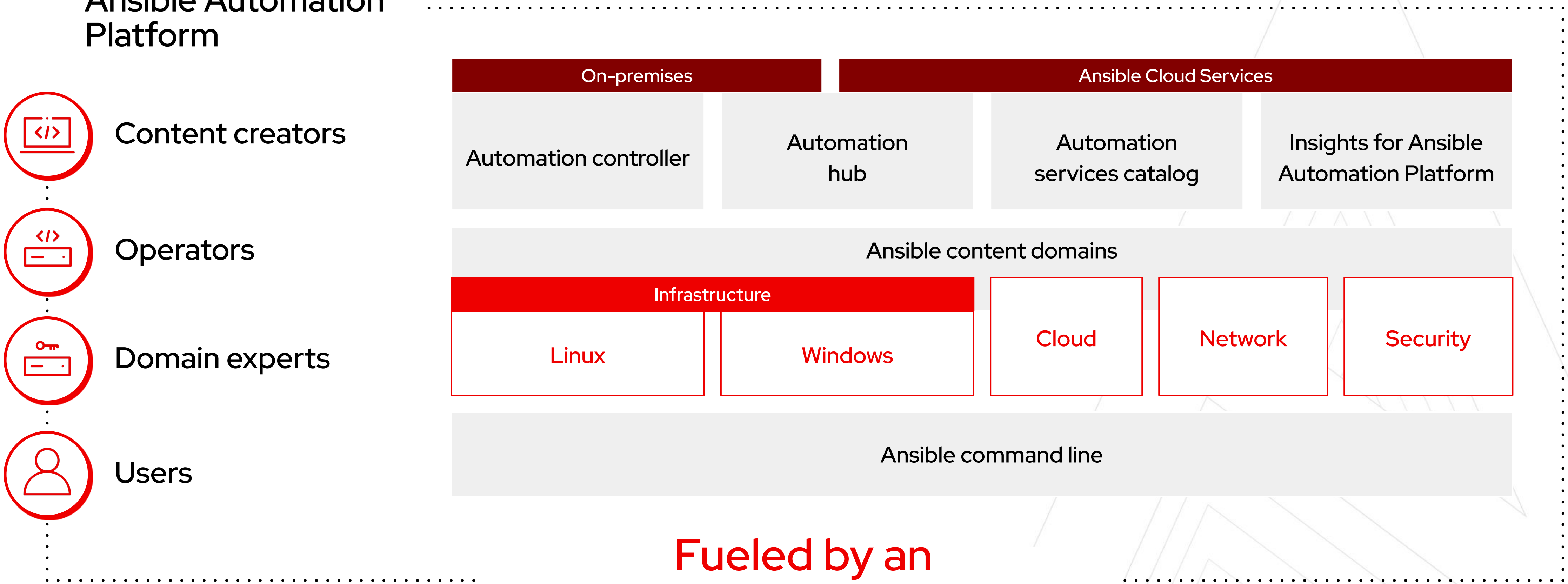


Content creators

Operators

Domain experts

Users

On-premises

Automation controller

Ansible Cloud Services

Automation hub

Automation services catalog

Insights for Ansible Automation Platform

Ansible content domains

Infrastructure

Linux

Windows

Cloud

Network

Security

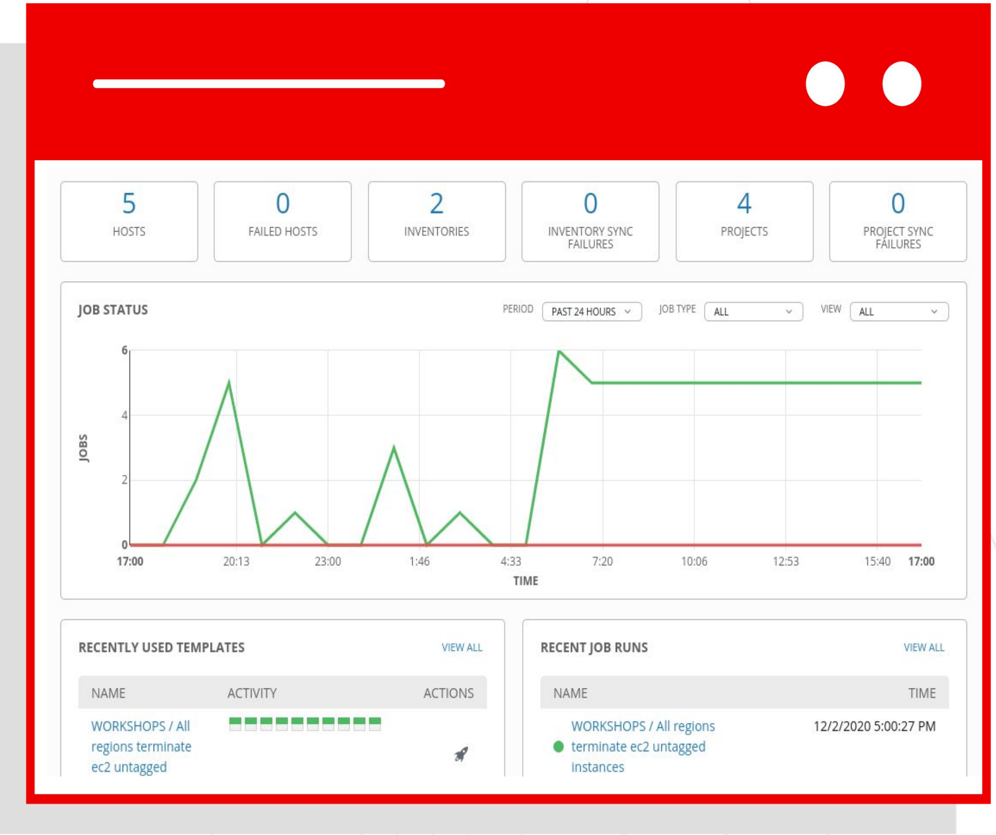
Ansible command line

## Fueled by an open source community

# What is Ansible Automation Controller?

Ansible Automation Controller is a UI and RESTful API allowing you to scale IT automation, manage complex deployments and speed productivity.

- Role-based access control
- Deploy entire applications with push-button deployment access
- All automations are centrally logged
- Powerful workflows match your IT processes



| 5 | 0 | 2 | 0 | 4 | 0 |
|---|---|---|---|---|---|
| HOSTS | FAILED HOSTS | INVENTORIES | INVENTORY SYNC FAILURES | PROJECTS | PROJECT SYNC FAILURES |

JOB STATUS

PERIOD: PAST 24 HOURS · JOB TYPE: ALL · VIEW: ALL

RECENTLY USED TEMPLATES · VIEW ALL

| NAME | ACTIVITY | ACTIONS |
|---|---|---|
| WORKSHOPS / All regions terminate ec2 untagged | 🟩🟩🟩🟩🟩🟩🟩🟩🟩🟩 | |

RECENT JOB RUNS · VIEW ALL

| NAME | TIME |
|---|---|
| ● WORKSHOPS / All regions terminate ec2 untagged instances | 12/2/2020 5:00:27 PM |

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# Automation controller

## Push button

An intuitive user interface experience makes it easy for novice users to execute playbooks you allow them access to.

## RESTful API

With an API first mentality every feature and function of controller can be API driven. Allow seamless integration with other tools like ServiceNow and Infoblox.

## RBAC

Allow restricting playbook access to authorized users. One team can use playbooks in check mode (read-only) while others have full administrative abilities.

## Enterprise integrations

Integrate with enterprise authentication like TACACS+, RADIUS, Azure AD. Setup token authentication with OAuth 2. Setup notifications with PagerDuty, Slack and Twilio.

## Centralized logging

All automation activity is securely logged. Who ran it, how they customized it, what it did, where it happened - all securely stored and viewable later, or exported through Automation controllers API.

## Workflows

Automation controller's multi-playbook workflows chain any number of playbooks, regardless of whether they use different inventories, run as different users, run at once or utilize different credentials.

# Lab Time

## Exercise 5: Explore Automation controller

🔗 red.ht/network-workshop-5

Explore and understand the Automation controller lab environment.

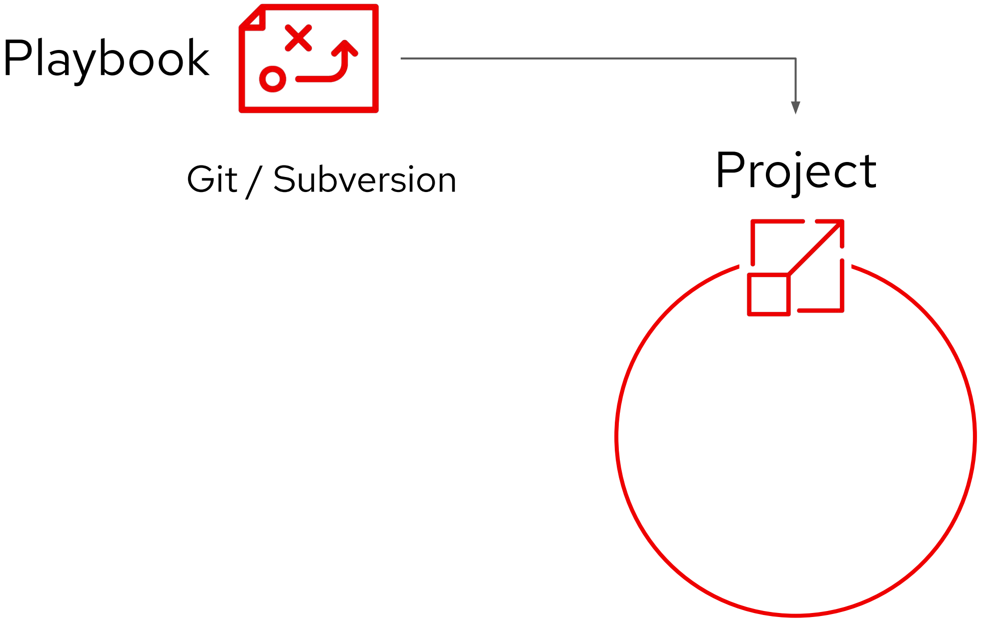
Approximate time: 15 mins

# Section 6
# Job Templates

Topics Covered:

- Job Templates
  - Inventory
  - Credentials
  - Projects

# Anatomy of an Automation Job

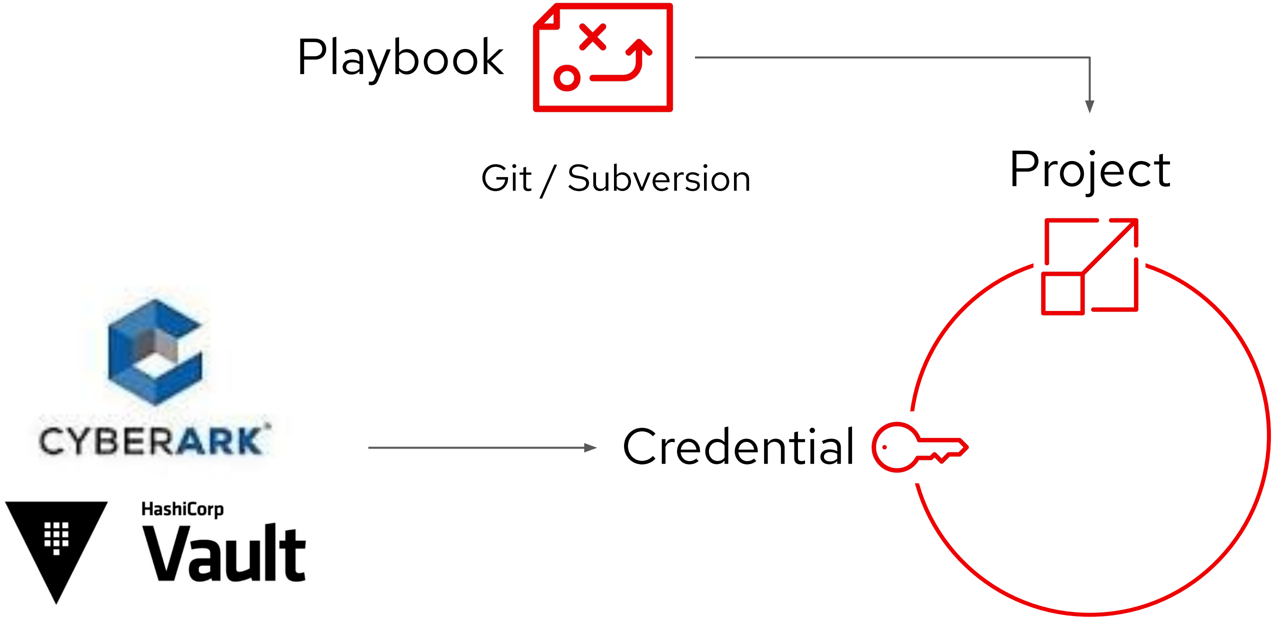


Playbook

Git / Subversion

Project

# Anatomy of an Automation Job



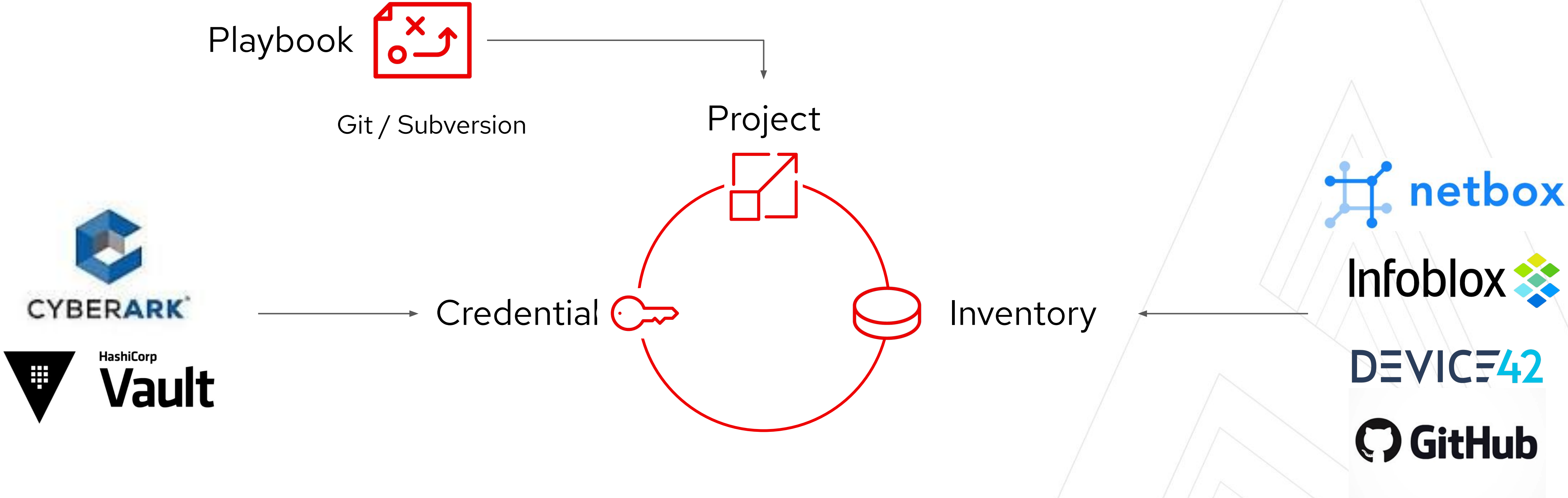
Playbook

Git / Subversion

Project

Credential

# Anatomy of an Automation Job



Playbook

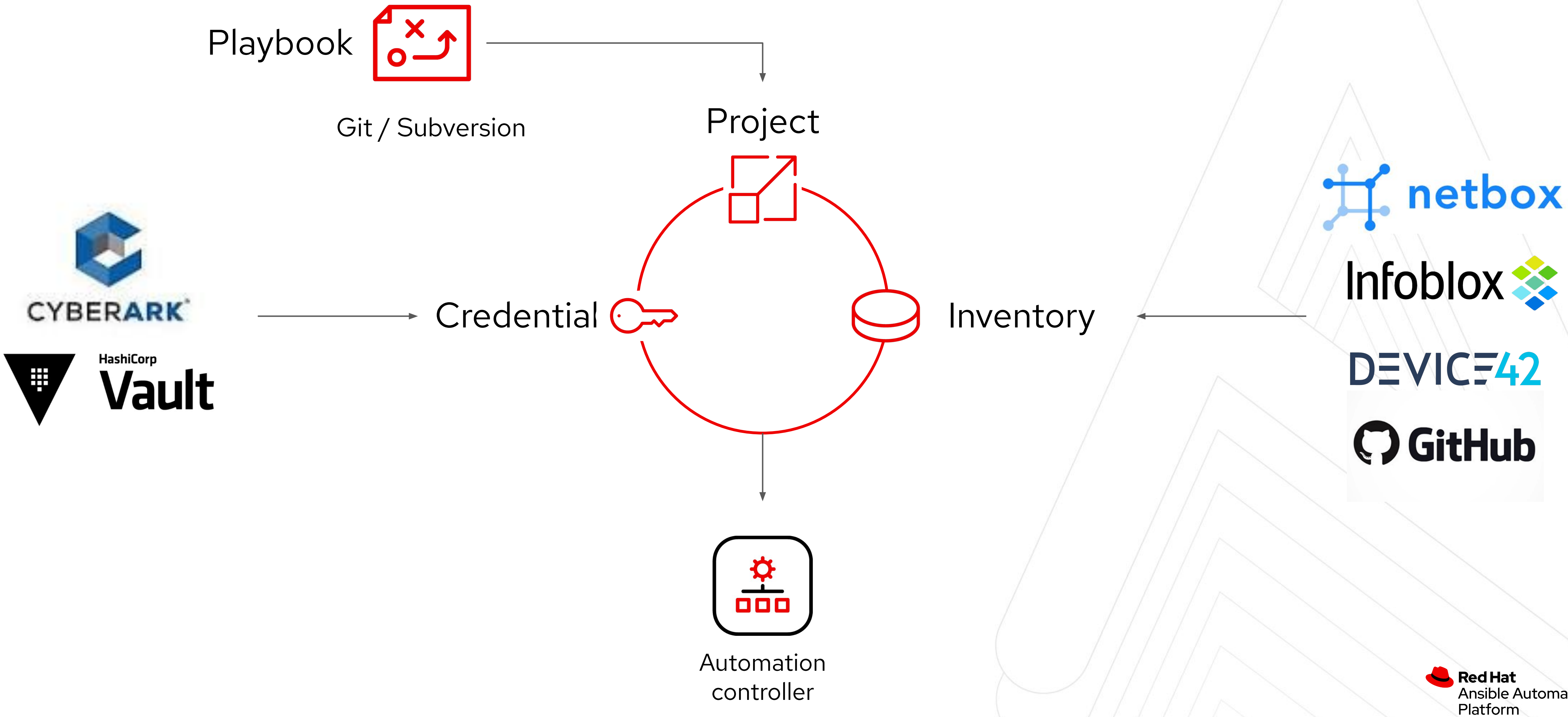
Git / Subversion

Project

Credential

Inventory

# Anatomy of an Automation Job



Playbook

Git / Subversion

Project

Credential

Inventory

Automation controller

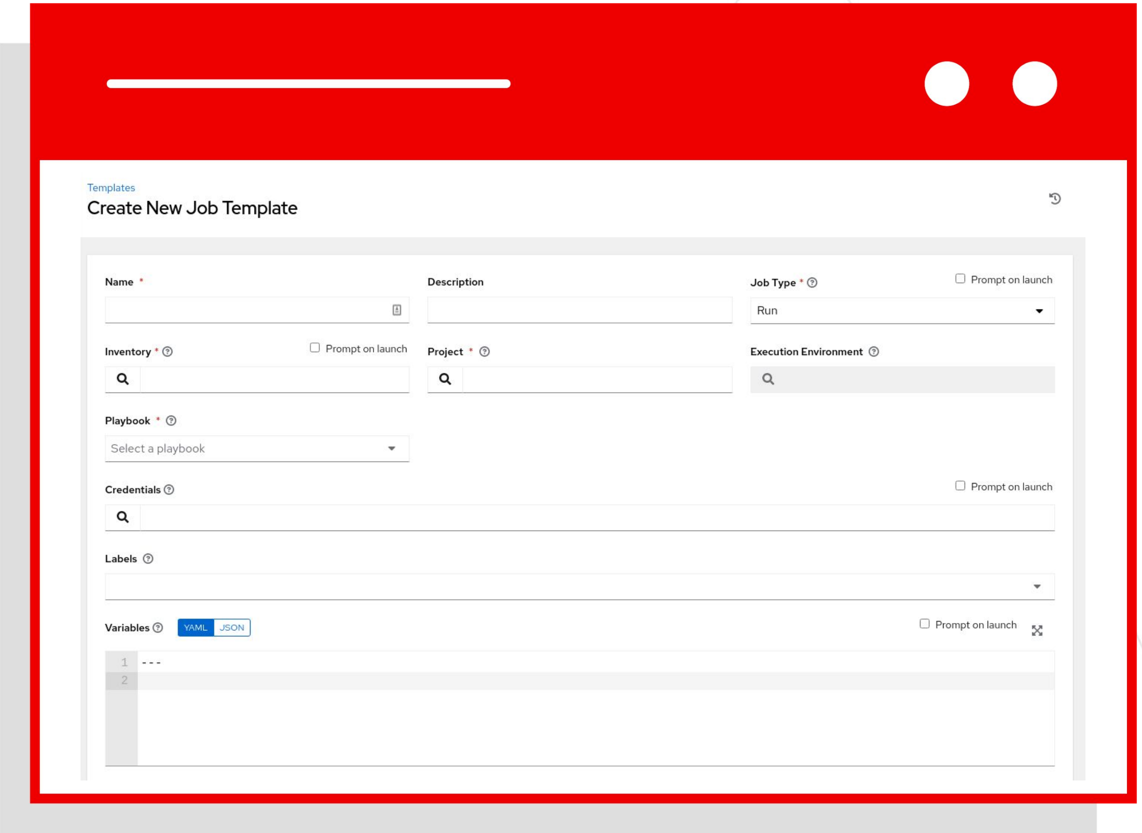
# Job Templates

Everything in Automation Controller revolves around the concept of a **Job Template**. Job Templates allow Ansible Playbooks to be controlled, delegated and scaled for an organization.

Job templates also encourage the reuse of Ansible Playbook content and collaboration between teams.

A **Job Template** requires:

- A **Project** which contains Ansible Playbooks
- An **Inventory** to run the job against
- A **Credential** to login to devices.



Templates

Create New Job Template

Name *

Description

Job Type * □ Prompt on launch

Run

Inventory * □ Prompt on launch

Project *

Execution Environment

Playbook *

Select a playbook

Credentials □ Prompt on launch

Labels

Variables YAML JSON □ Prompt on launch

```
---
```

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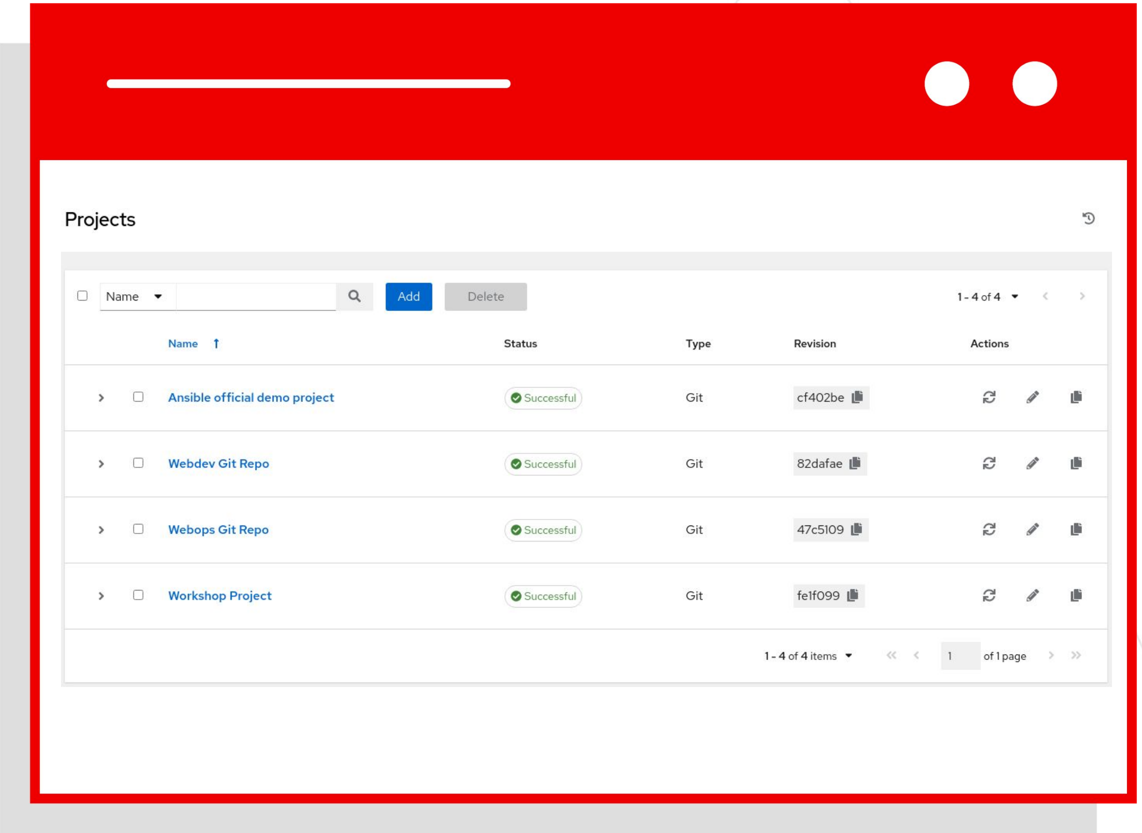
# Project

A project is a logical collection of Ansible Playbooks, represented in Ansible Automation Controller.

You can manage Ansible Playbooks and playbook directories by placing them in a source code management system supported by Automation controller including Git, and Subversion.



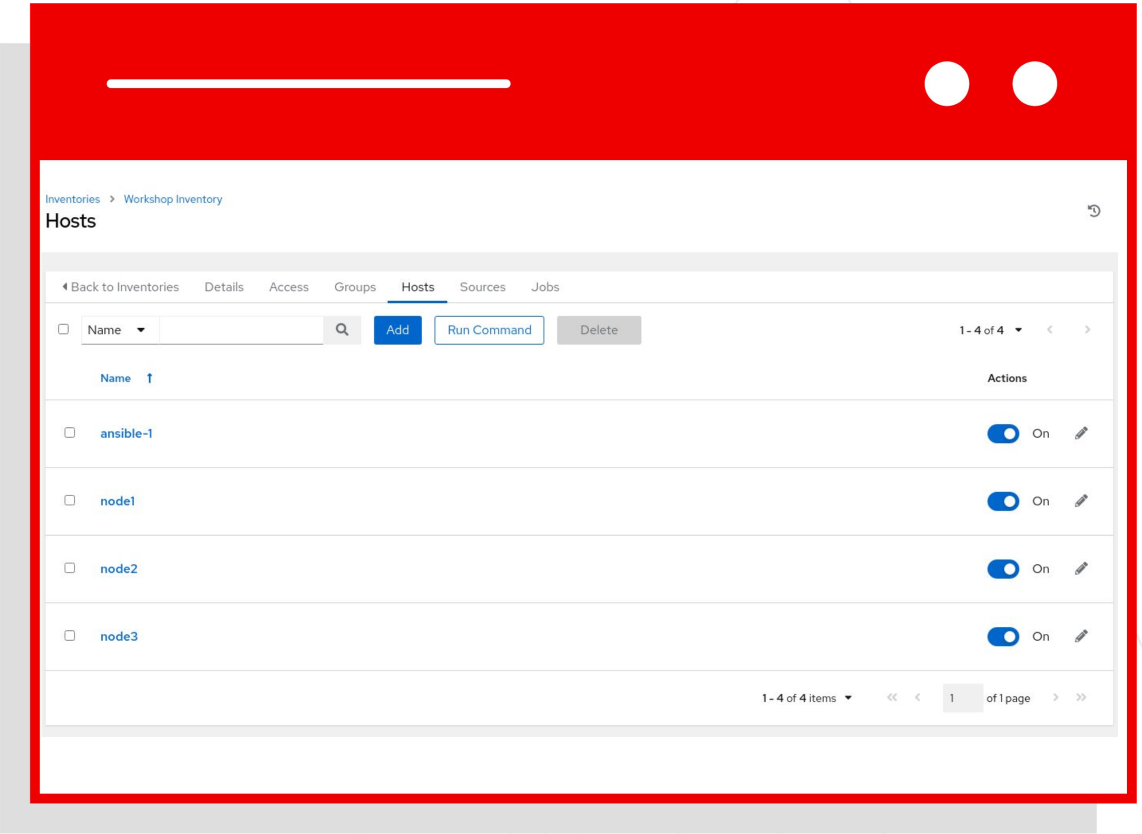
Projects

| Name | Status | Type | Revision |
|---|---|---|---|
| Ansible official demo project | Successful | Git | cf402be |
| Webdev Git Repo | Successful | Git | 82dafae |
| Webops Git Repo | Successful | Git | 47c5109 |
| Workshop Project | Successful | Git | fe1f099 |

# Inventory

Inventory is a collection of hosts (nodes) with associated data and groupings that Automation Controller can connect to and manage.

- Hosts (nodes)
- Groups
- Inventory-specific data (variables)
- Static or dynamic sources



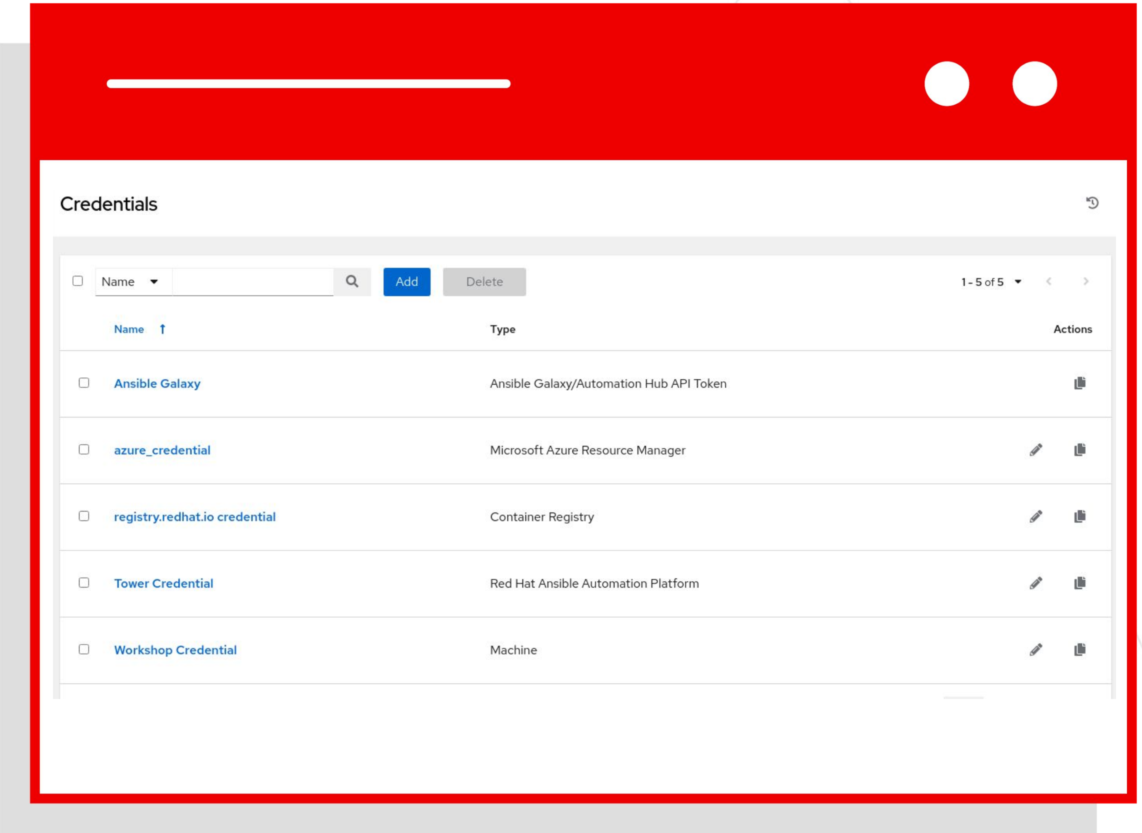
| | Name ↑ | Actions |
|---|---|---|
| □ | ansible-1 | On |
| □ | node1 | On |
| □ | node2 | On |
| □ | node3 | On |

# Credentials

Credentials are utilized by Automation Controller for authentication with various external resources:

- Connecting to remote machines to run jobs
- Syncing with inventory sources
- Importing project content from version control systems
- Connecting to and managing network devices

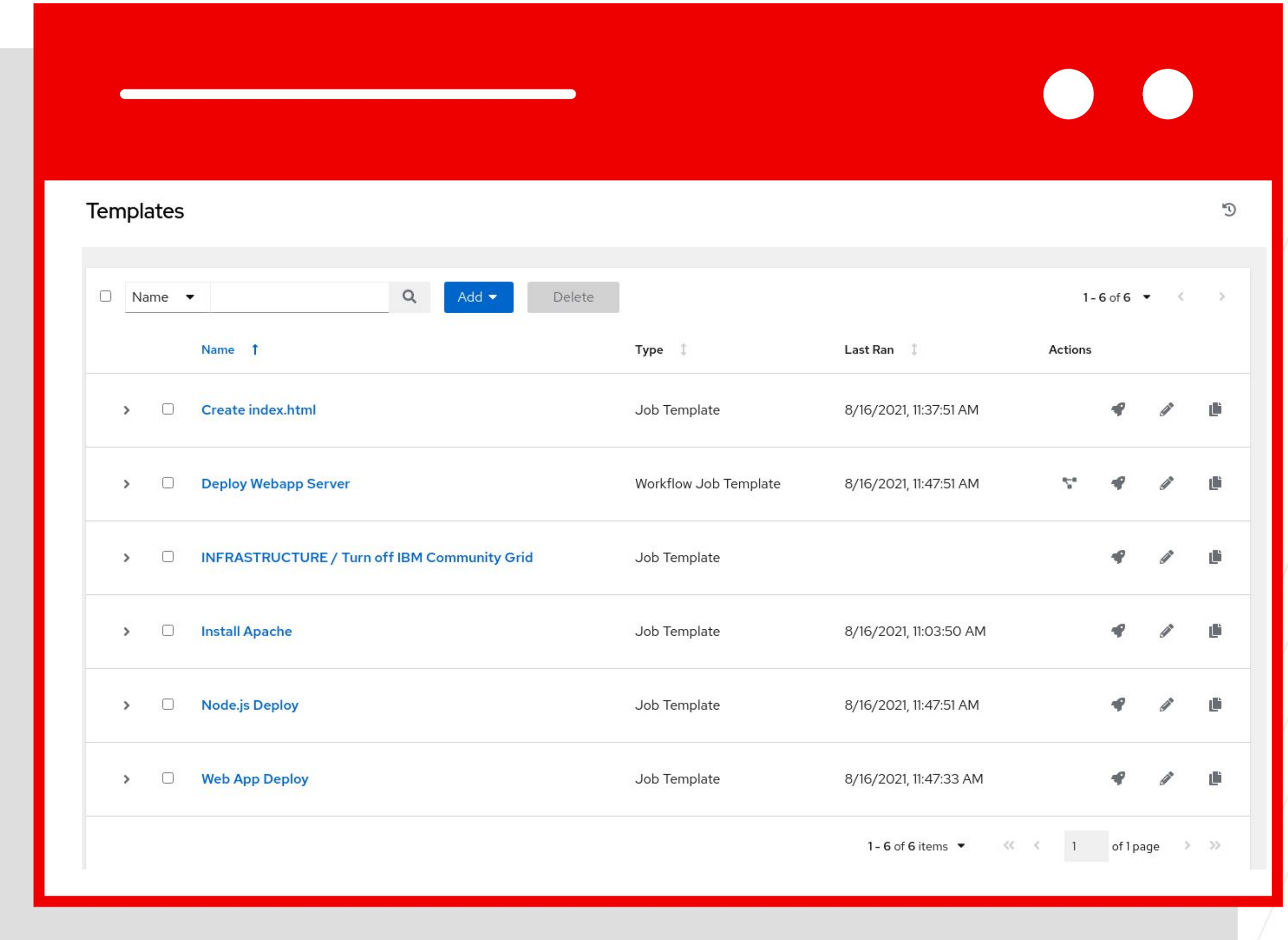
Centralized management of various credentials allows end users to leverage a secret without ever exposing that secret to them.



| | Name ↑ | Type | Actions |
|---|---|---|---|
| □ | Ansible Galaxy | Ansible Galaxy/Automation Hub API Token | |
| □ | azure_credential | Microsoft Azure Resource Manager | |
| □ | registry.redhat.io credential | Container Registry | |
| □ | Tower Credential | Red Hat Ansible Automation Platform | |
| □ | Workshop Credential | Machine | |

# Expanding on Job Templates

Job Templates can be found and created by clicking the **Templates** button under the *Resources* section on the left menu.



Templates

| Name | Type | Last Ran | Actions |
|---|---|---|---|
| Create index.html | Job Template | 8/16/2021, 11:37:51 AM | |
| Deploy Webapp Server | Workflow Job Template | 8/16/2021, 11:47:51 AM | |
| INFRASTRUCTURE / Turn off IBM Community Grid | Job Template | | |
| Install Apache | Job Template | 8/16/2021, 11:03:50 AM | |
| Node.js Deploy | Job Template | 8/16/2021, 11:47:51 AM | |
| Web App Deploy | Job Template | 8/16/2021, 11:47:33 AM | |

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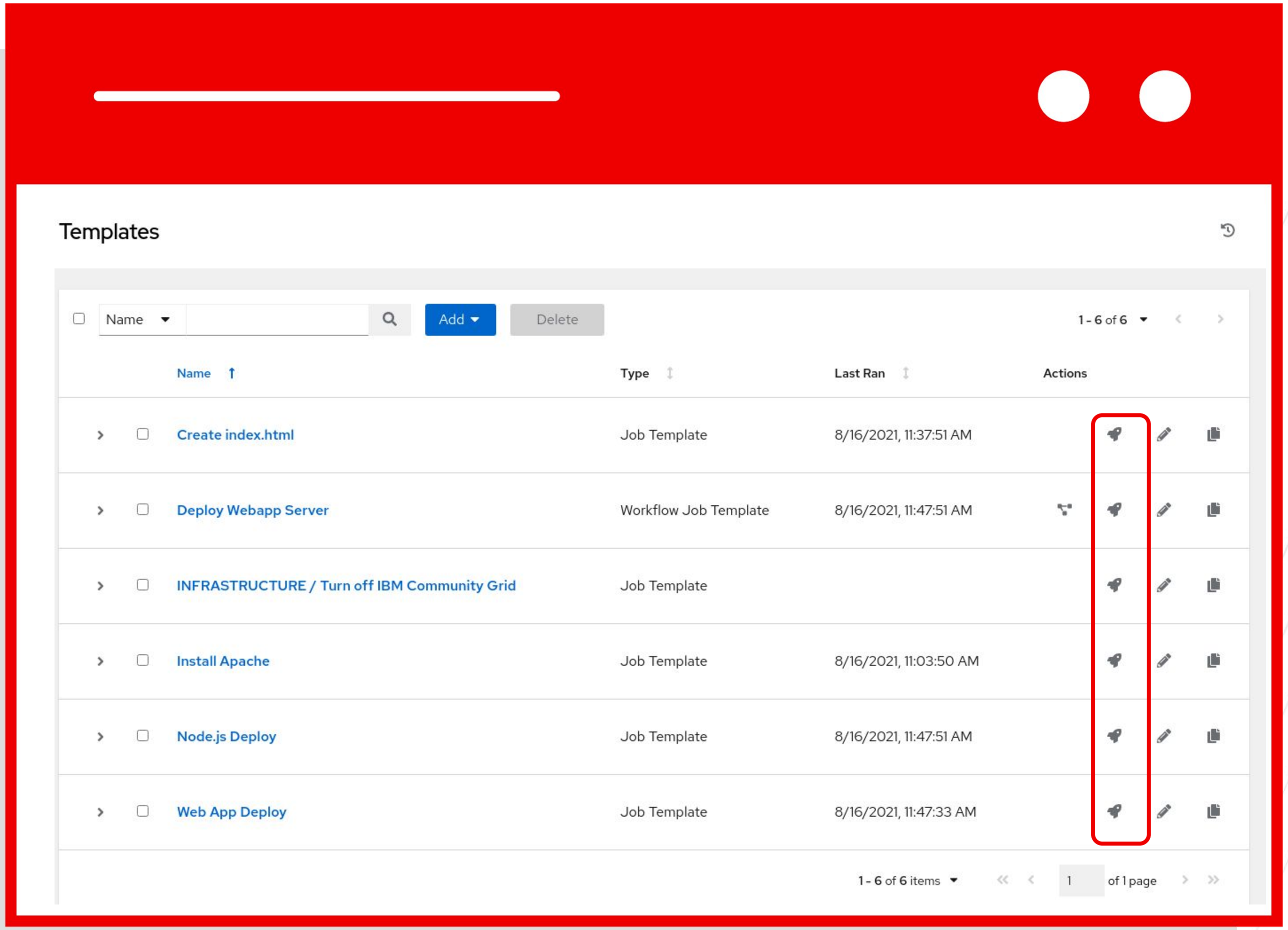
# Executing an existing Job Template

Job Templates can be launched by clicking the **rocketship button** 🚀 for the corresponding Job Template



Templates

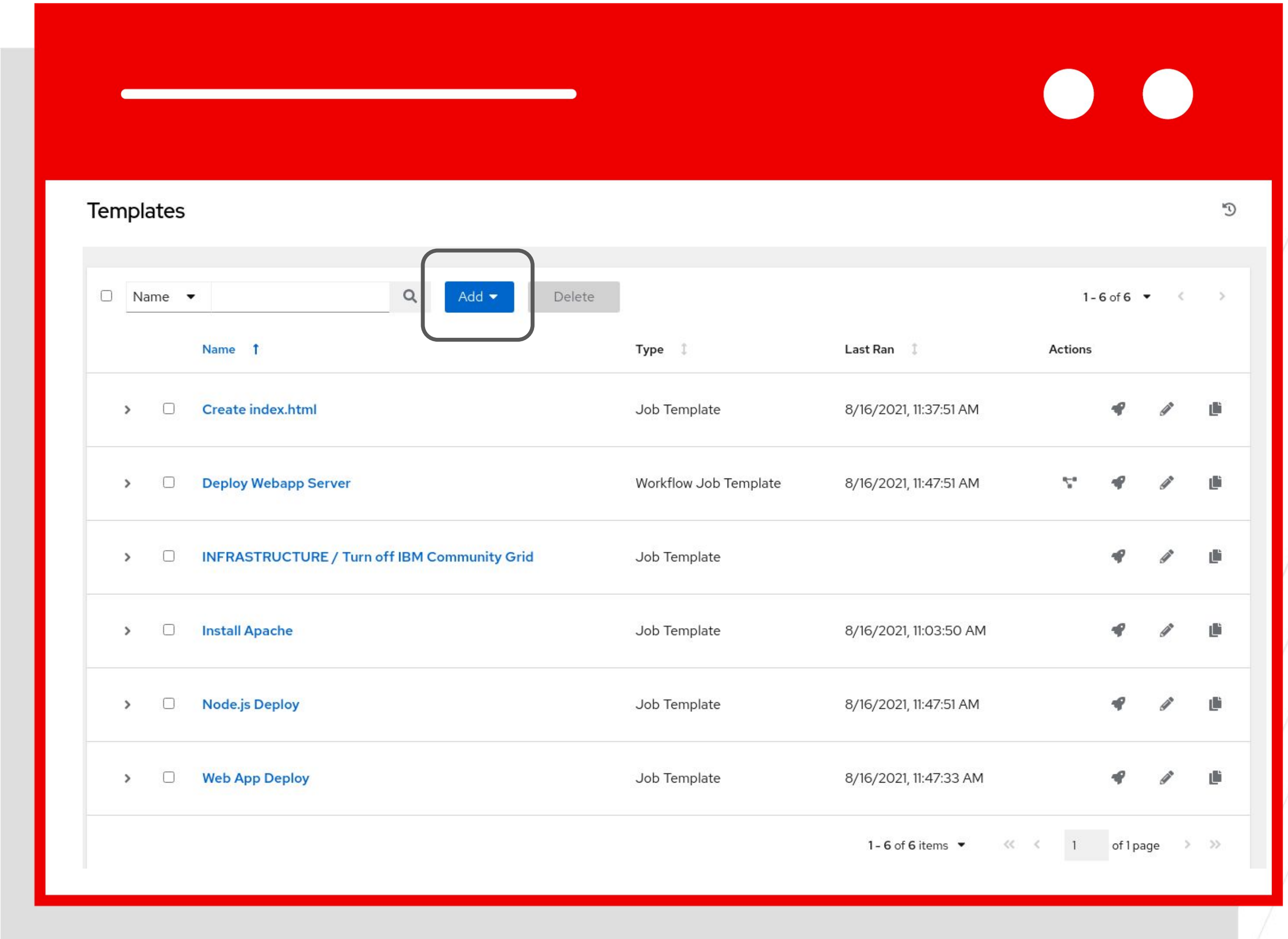
☐ Name ▾ | Add ▾ | Delete | 1 - 6 of 6 ▾

| | | Name ↑ | Type | Last Ran | Actions |
|---|---|---|---|---|---|
| › | ☐ | Create index.html | Job Template | 8/16/2021, 11:37:51 AM | 🚀 ✎ ⎘ |
| › | ☐ | Deploy Webapp Server | Workflow Job Template | 8/16/2021, 11:47:51 AM | 🚀 ✎ ⎘ |
| › | ☐ | INFRASTRUCTURE / Turn off IBM Community Grid | Job Template | | 🚀 ✎ ⎘ |
| › | ☐ | Install Apache | Job Template | 8/16/2021, 11:03:50 AM | 🚀 ✎ ⎘ |
| › | ☐ | Node.js Deploy | Job Template | 8/16/2021, 11:47:51 AM | 🚀 ✎ ⎘ |
| › | ☐ | Web App Deploy | Job Template | 8/16/2021, 11:47:33 AM | 🚀 ✎ ⎘ |

1 - 6 of 6 items ▾ « ‹ 1 of 1 page › »

# Creating a new Job Template (1/2)

New Job Templates can be created by clicking the **Add button**



Templates

|  |  | Name ↑ | Type | Last Ran | Actions |
|---|---|---|---|---|---|
| › | □ | Create index.html | Job Template | 8/16/2021, 11:37:51 AM |  |
| › | □ | Deploy Webapp Server | Workflow Job Template | 8/16/2021, 11:47:51 AM |  |
| › | □ | INFRASTRUCTURE / Turn off IBM Community Grid | Job Template |  |  |
| › | □ | Install Apache | Job Template | 8/16/2021, 11:03:50 AM |  |
| › | □ | Node.js Deploy | Job Template | 8/16/2021, 11:47:51 AM |  |
| › | □ | Web App Deploy | Job Template | 8/16/2021, 11:47:33 AM |  |

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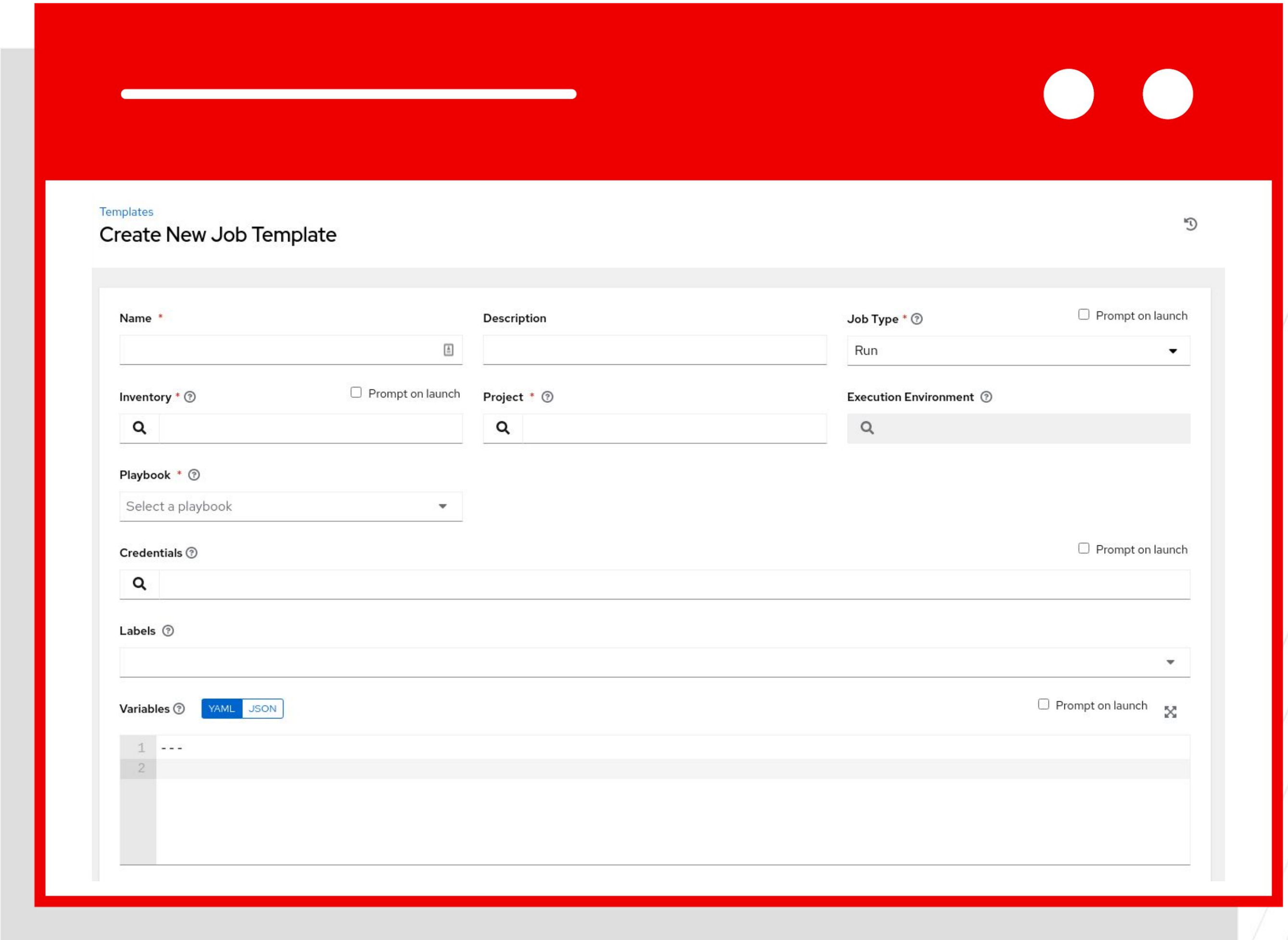
# Creating a new Job Template (2/2)

This **New Job Template** window is where the inventory, project and credential are assigned.  The red asterisk * means the field is required .



Templates

Create New Job Template

Name *

Description

Job Type * ⓘ □ Prompt on launch

Run

Inventory * ⓘ □ Prompt on launch

Project * ⓘ

Execution Environment ⓘ

Playbook * ⓘ

Select a playbook

Credentials ⓘ □ Prompt on launch

Labels ⓘ

Variables ⓘ YAML JSON □ Prompt on launch

```
---

```

# Lab Time

## Exercise 6: Creating an Automation controller Job Template

red.ht/network-workshop-6

Demonstrate a network backup configuration job template with Automation controller.

Approximate time: 15 mins

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# Section 7
# Survey

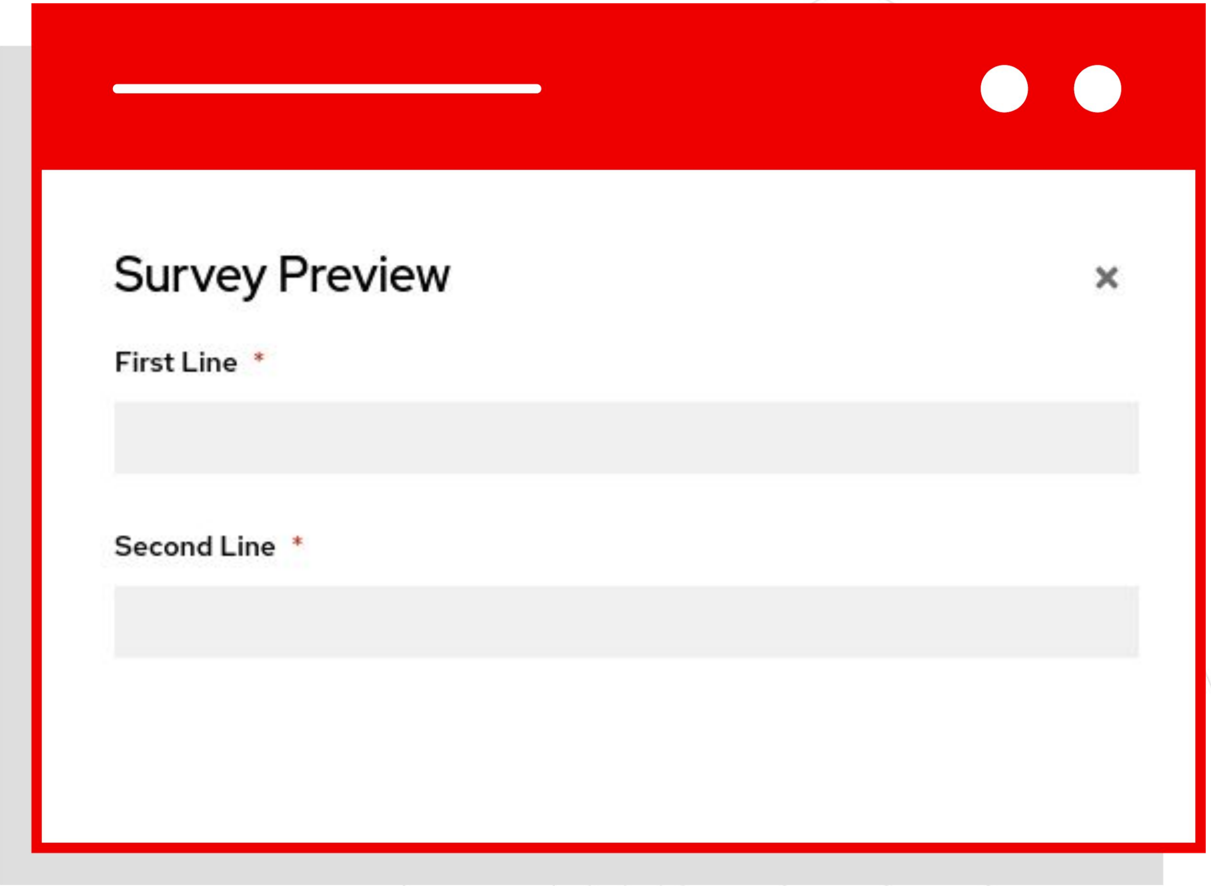
Topics Covered:

- Understanding Extra Vars
- Building a Survey
- Self-service IT with Surveys

# Surveys

Controller surveys allow you to configure how a job runs via a series of questions, making it simple to customize your jobs in a user-friendly way.

An Ansible Controller survey is a simple question-and-answer form that allows users to customize their job runs. Combine that with Controller's role-based access control, and you can build simple, easy self-service for your users.



Survey Preview

First Line *

Second Line *

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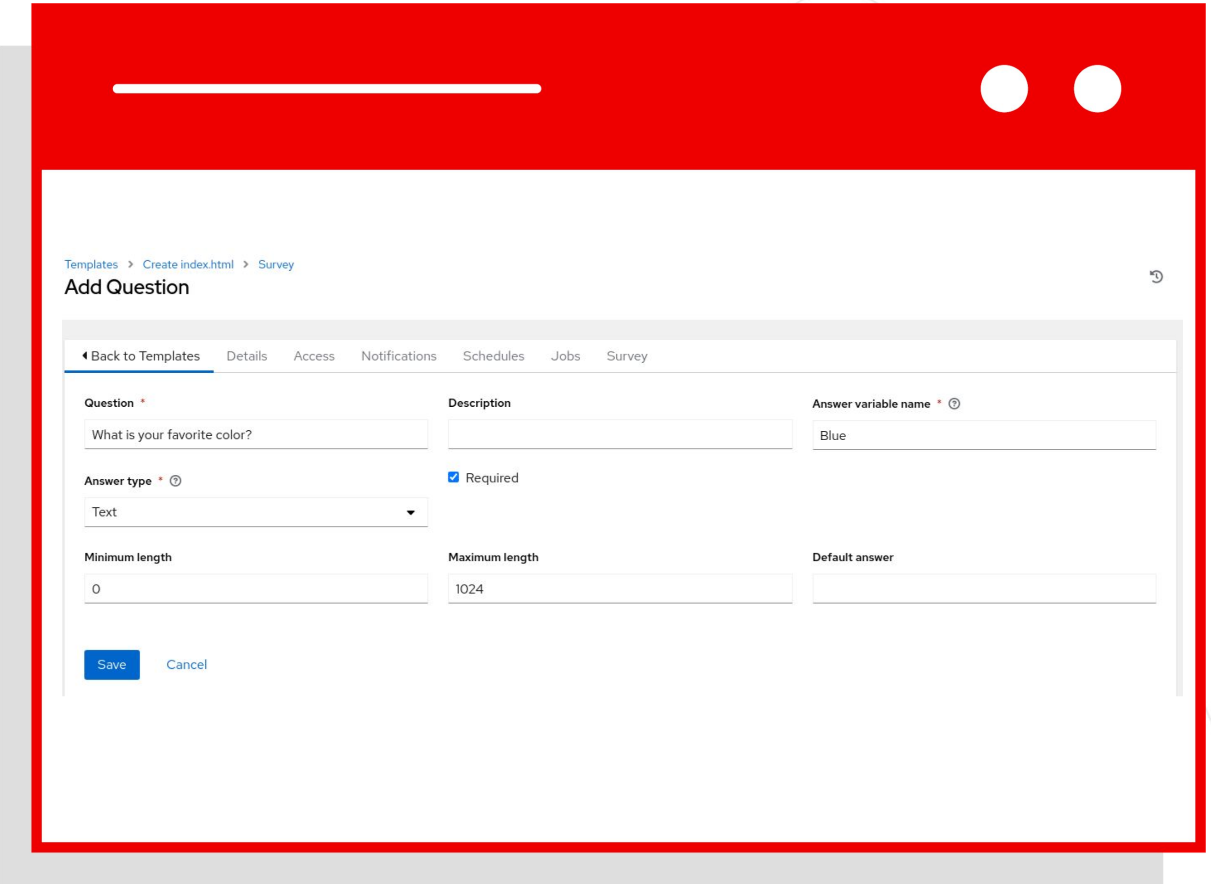
# Creating a Survey (1/2)

Once a job template is saved, the survey menu will have an **Add** button

Click the button to open the **Add Survey** window.

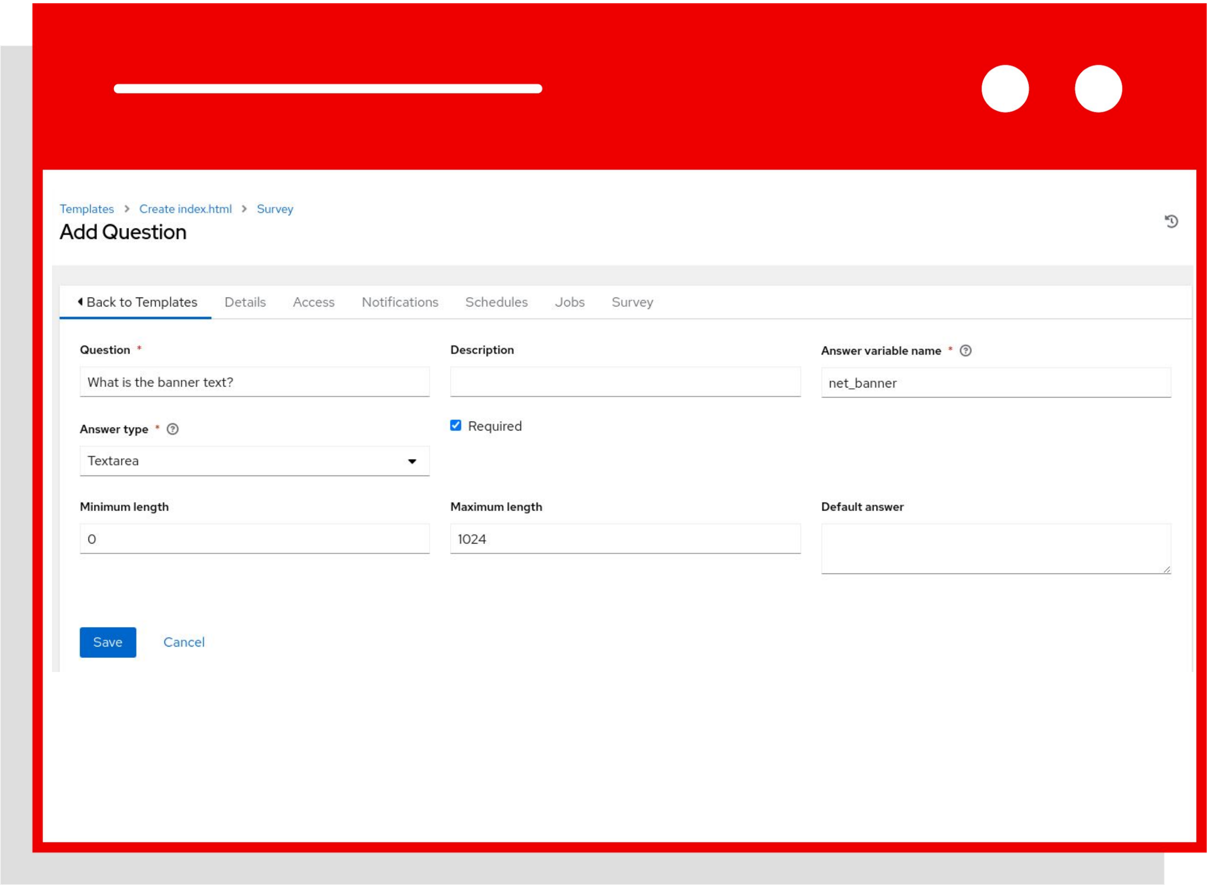


Add Question

| | | |
|---|---|---|
| Question * | Description | Answer variable name * |
| What is your favorite color? | | Blue |
| Answer type * | ☑ Required | |
| Text | | |
| Minimum length | Maximum length | Default answer |
| 0 | 1024 | |

# Creating a Survey (2/2)

The **Add Survey** window allows the job template to prompt users for one or more questions.  The answers provided become variables for use in the Ansible Playbook.



Templates > Create index.html > Survey

Add Question

Question *: What is the banner text?

Description:

Answer variable name * ⓘ: net_banner

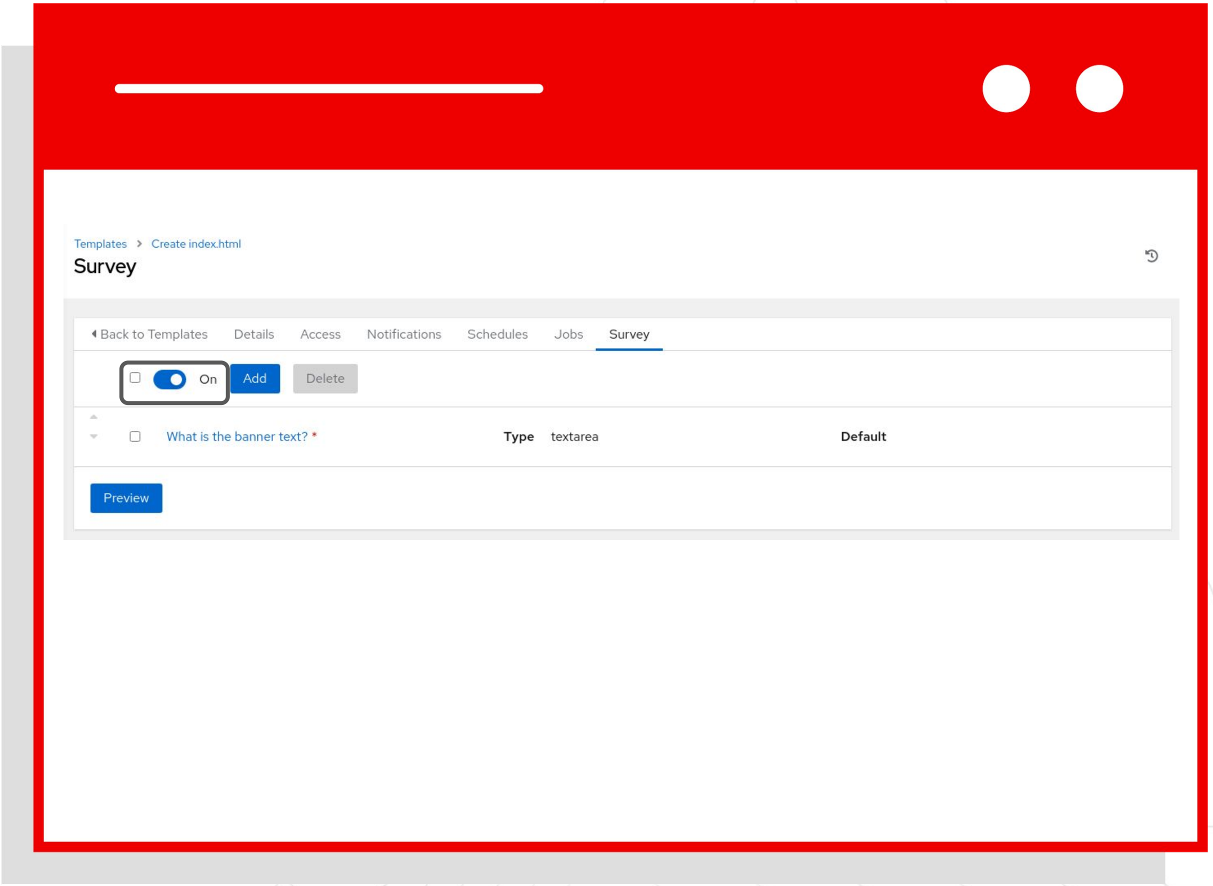
Answer type * ⓘ: Textarea

☑ Required

Minimum length: 0

Maximum length: 1024

Default answer:



Templates > Create index.html

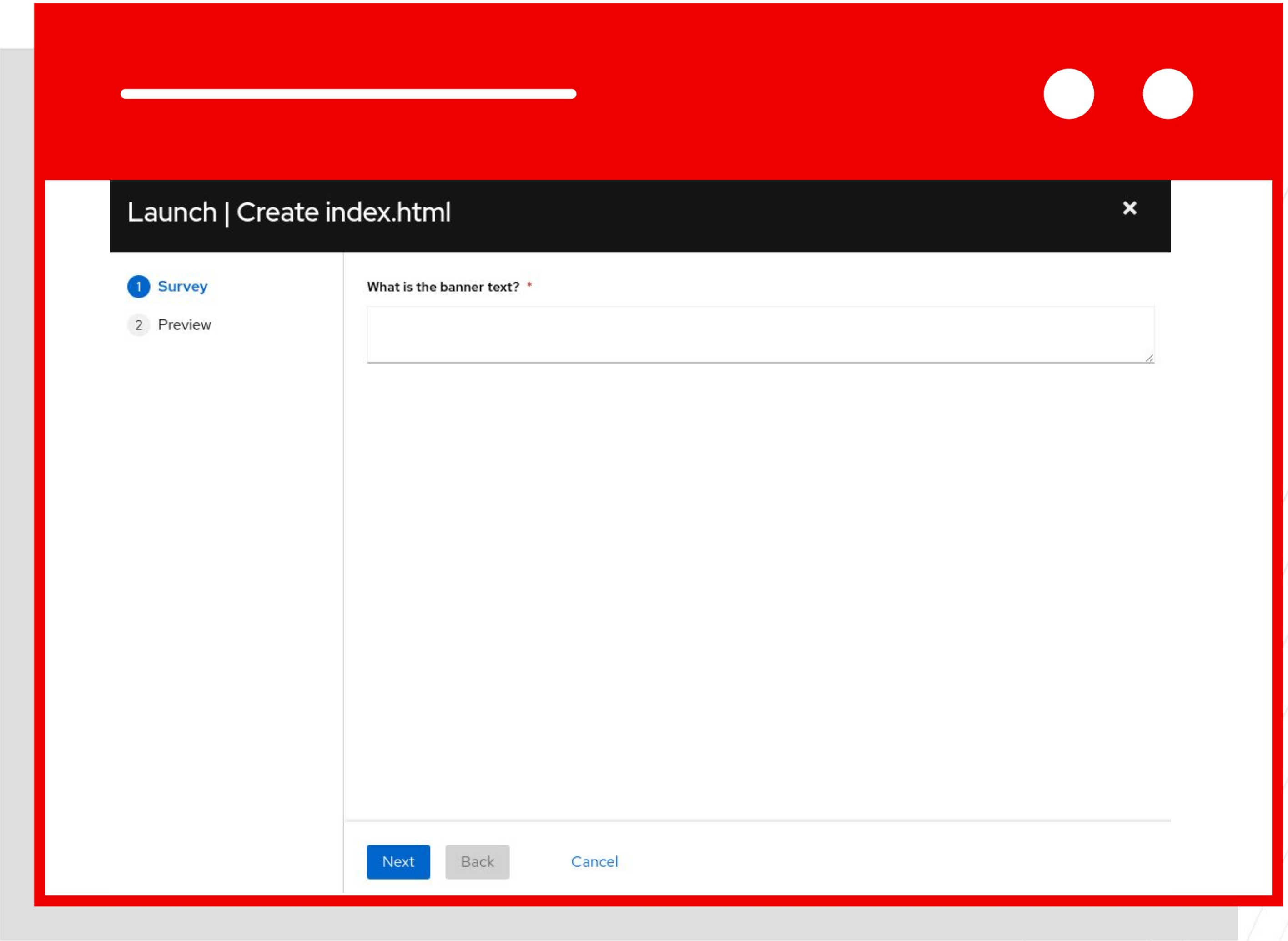
Survey

□ On

| | | | | |
|---|---|---|---|---|
| □ | What is the banner text? * | Type | textarea | Default |

# Using a Survey

When launching a job, the user will now be prompted with the survey.  The user can be required to fill out the survey before the job template will execute.



Launch | Create index.html

What is the banner text? *

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# Lab Time

## Exercise 7: Creating a Survey

🔗 red.ht/network-workshop-7

Demonstrate the use of Automation controller survey feature.

Approximate time: 15 mins

# Section 8
# RBAC

Topics Covered:

- Understanding Organizations
- Understanding Teams
- Understanding Users

# Role-based access control

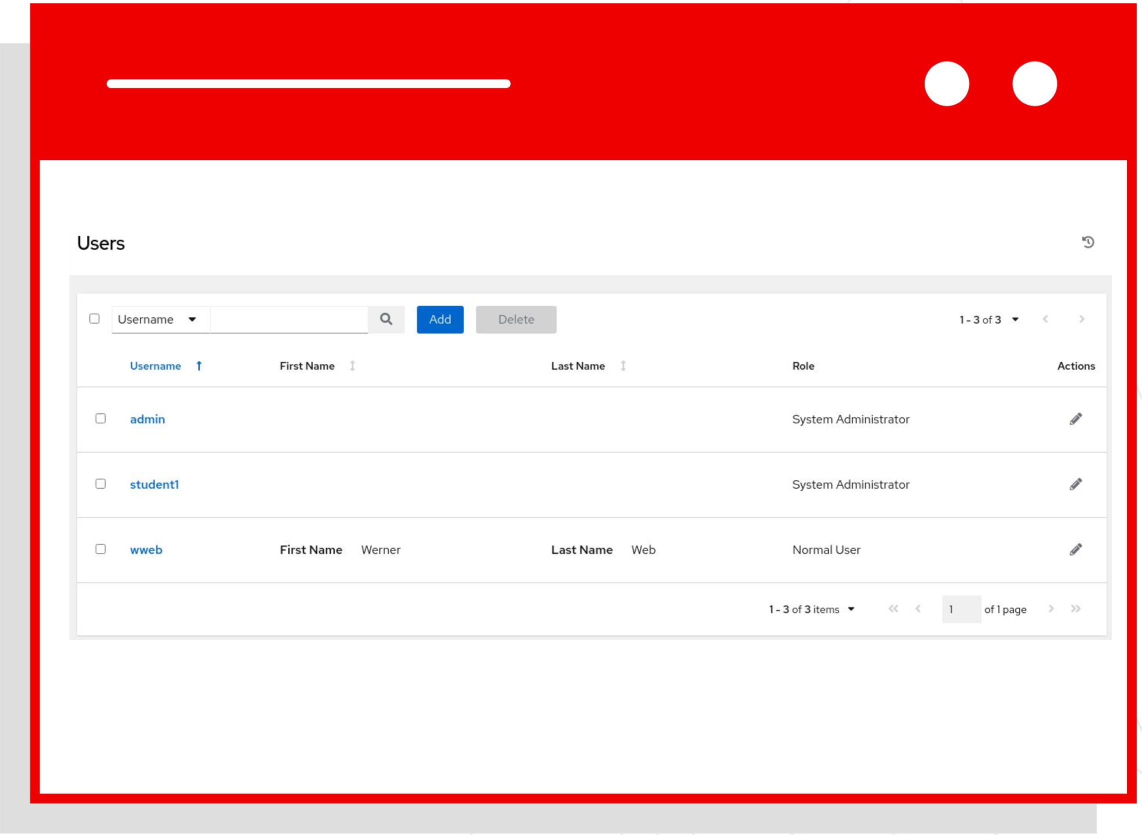
## How to manage access

- Role-based access control system:

  Users can be grouped in teams, and roles can be assigned to the teams.

- Rights to edit or use can be assigned across all objects.

- All backed by enterprise authentication if needed.



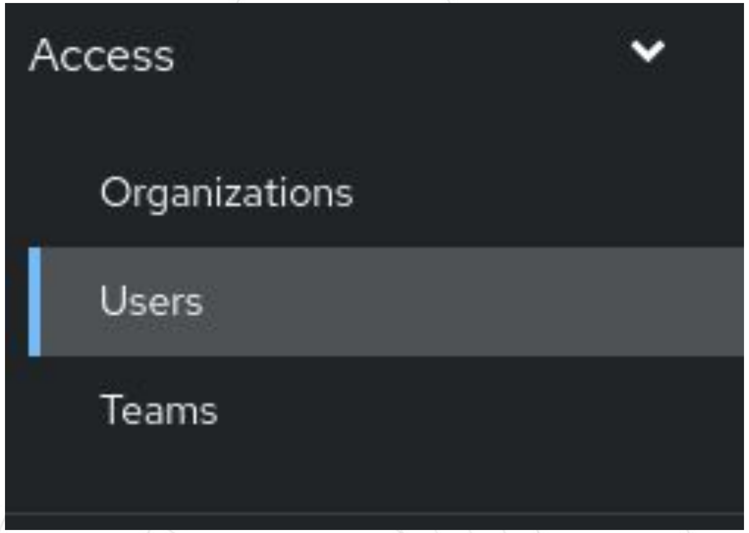
| | Username | First Name | Last Name | Role | Actions |
|---|---|---|---|---|---|
| □ | admin | | | System Administrator | ✎ |
| □ | student1 | | | System Administrator | ✎ |
| □ | wweb | First Name Werner | Last Name Web | Normal User | ✎ |

# User Management

- An **organization** is a logical collection of users, teams, projects, inventories and more. All entities belong to an organization.

- A **user** is an account to access Ansible Automation Controller and its services given the permissions granted to it.

- **Teams** provide a means to implement role-based access control schemes and delegate responsibilities across organizations.



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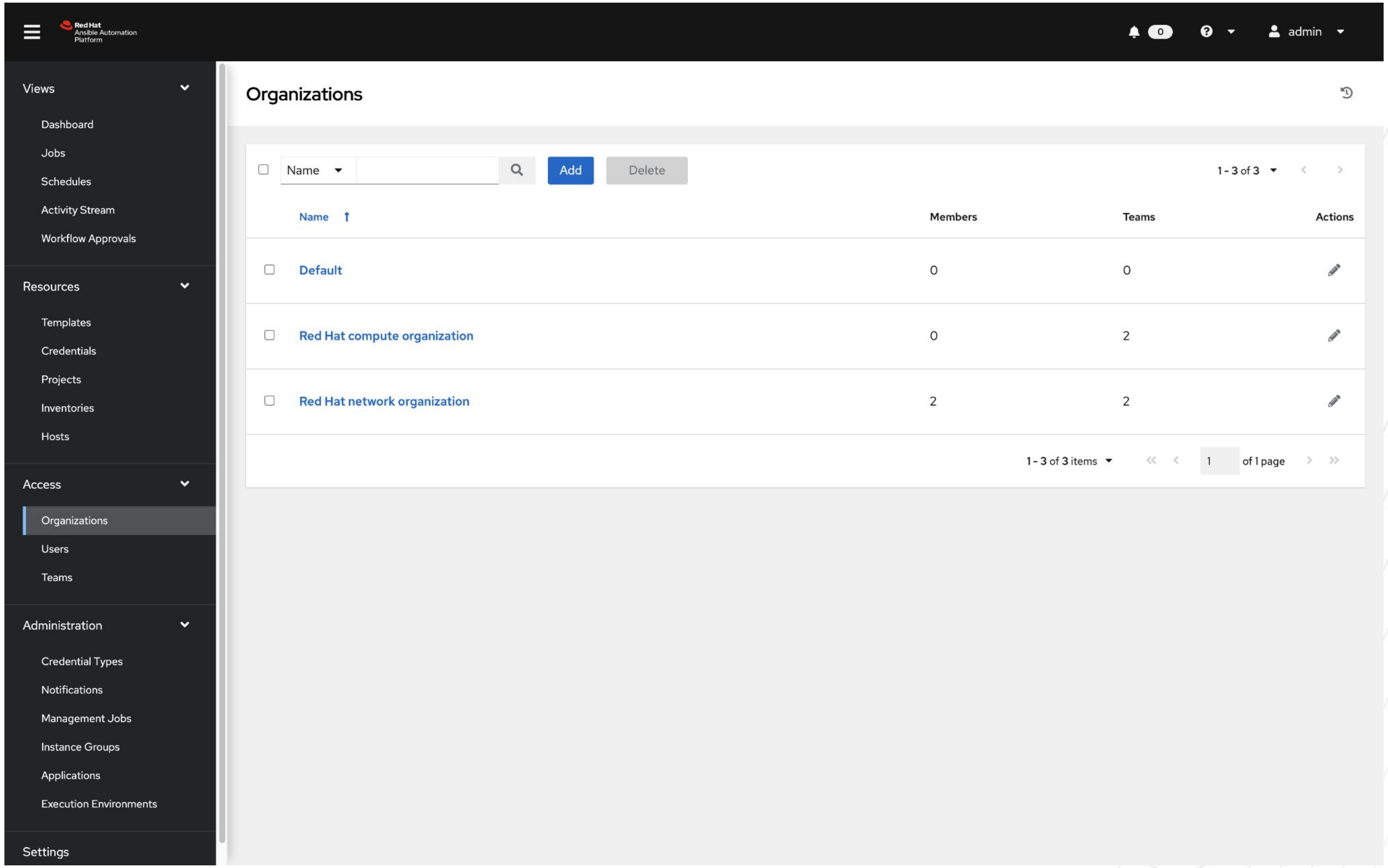
# Viewing Organizations

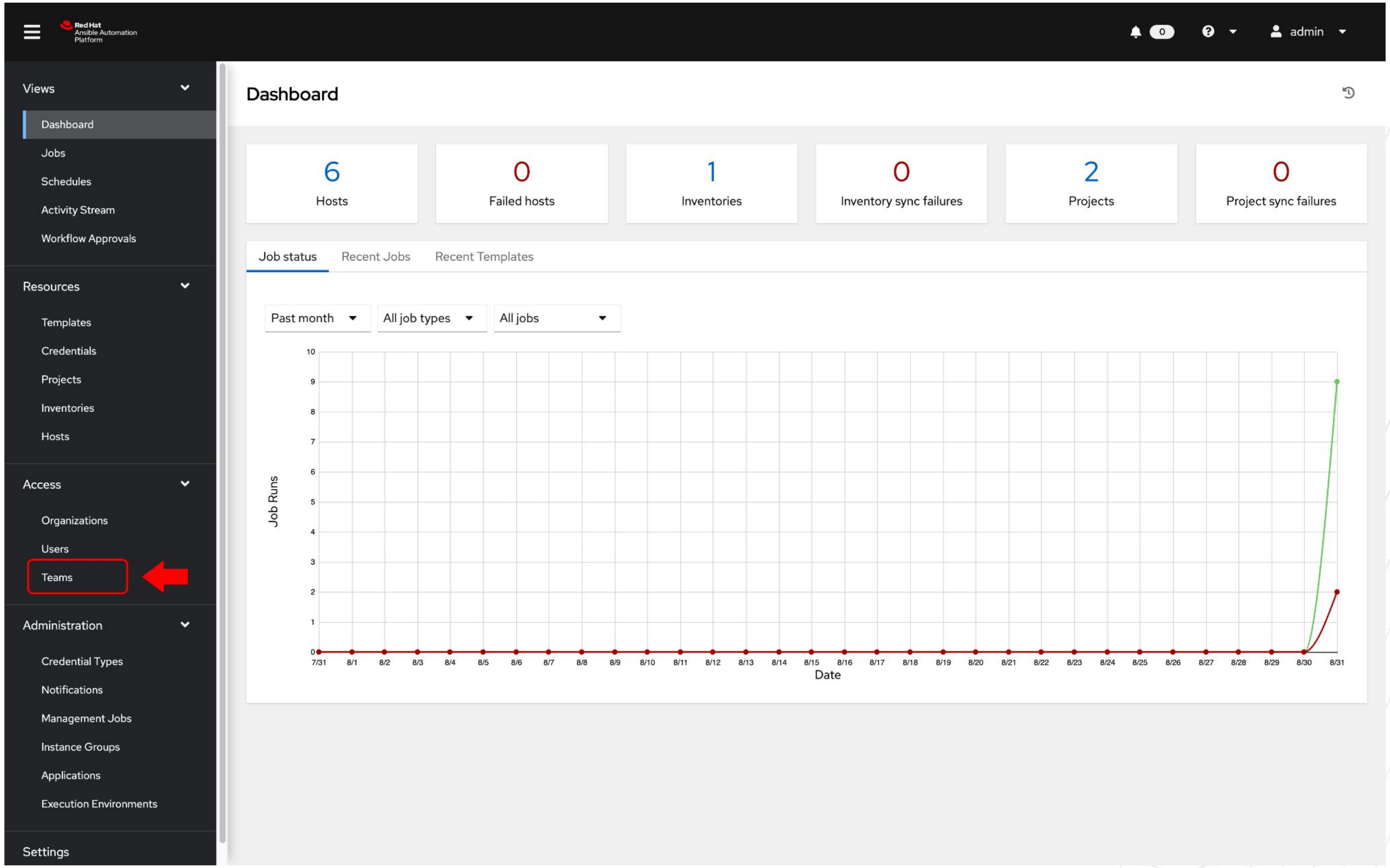
Clicking on the **Organizations** button in the left menu will open up the Organizations window



| | Name | Members | Teams | Actions |
|---|---|---|---|---|
| □ | Default | 0 | 0 | ✎ |
| □ | Red Hat compute organization | 0 | 2 | ✎ |
| □ | Red Hat network organization | 2 | 2 | ✎ |

# Viewing Teams

Clicking on the **Teams** buttons in the left menu will open up the Teams window



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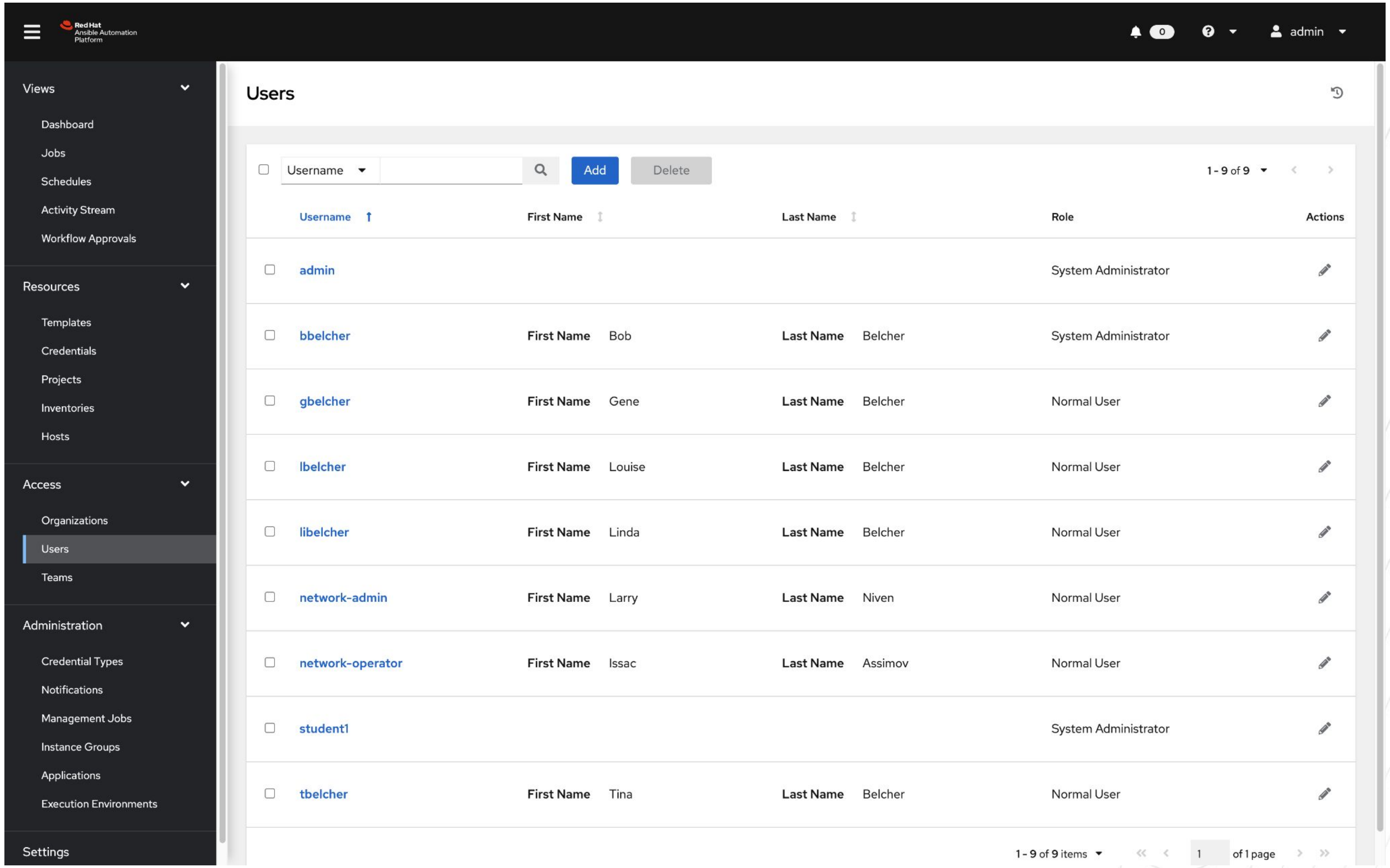
# Viewing Users

Clicking on the **Users** button in the left menu will open up the Users window



| □ | Username | First Name | Last Name | Role | Actions |
|---|---|---|---|---|---|
| □ | admin | | | System Administrator | ✎ |
| □ | bbelcher | Bob | Belcher | System Administrator | ✎ |
| □ | gbelcher | Gene | Belcher | Normal User | ✎ |
| □ | lbelcher | Louise | Belcher | Normal User | ✎ |
| □ | libelcher | Linda | Belcher | Normal User | ✎ |
| □ | network-admin | Larry | Niven | Normal User | ✎ |
| □ | network-operator | Issac | Assimov | Normal User | ✎ |
| □ | student1 | | | System Administrator | ✎ |
| □ | tbelcher | Tina | Belcher | Normal User | ✎ |

# Lab Time

## Exercise 8: Understanding RBAC in Automation controller

red.ht/network-workshop-8

Demonstrate the use of role based access control on Automation controller.

Approximate time: 15 mins

# Section 9
# Workflows

Topics Covered:

- Understanding Workflows
- Branching
- Convergence / Joins
- Conditional Logic

# Lab Time

## Exercise 9: Creating a Workflow

red.ht/network-workshop-9

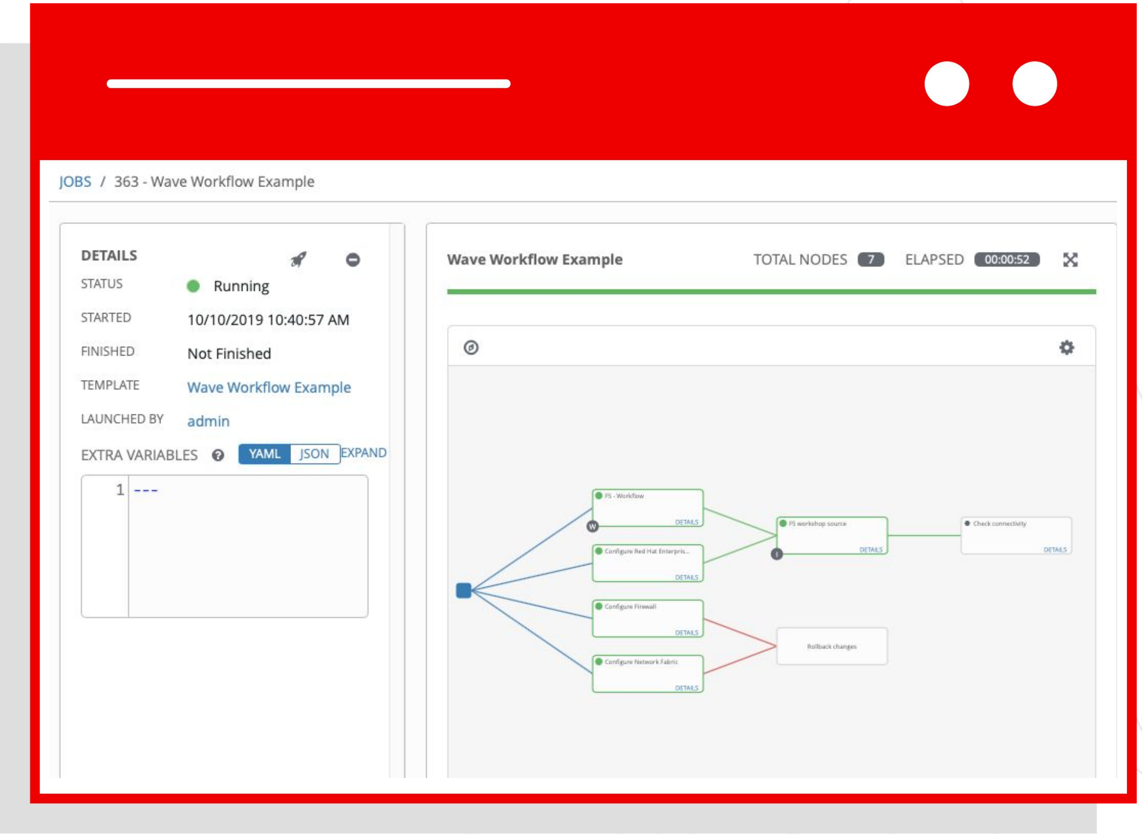
Demonstrate the use of Automation Controller workflow. Workflows allow you to configure a sequence of disparate job templates (or workflow templates) that may or may not share inventory, playbooks, or permissions.

Approximate time: 15 mins

# Workflows

## Combine automation to create something bigger

- Workflows enable the creation of powerful holistic automation, chaining together multiple pieces of automation and events.
- Simple logic inside these workflows can trigger automation depending on the success or failure of previous steps.



JOBS / 363 - Wave Workflow Example

DETAILS

STATUS ● Running

STARTED 10/10/2019 10:40:57 AM

FINISHED Not Finished

TEMPLATE Wave Workflow Example

LAUNCHED BY admin

EXTRA VARIABLES YAML JSON EXPAND

```
---
```

Wave Workflow Example TOTAL NODES 7 ELAPSED 00:00:52

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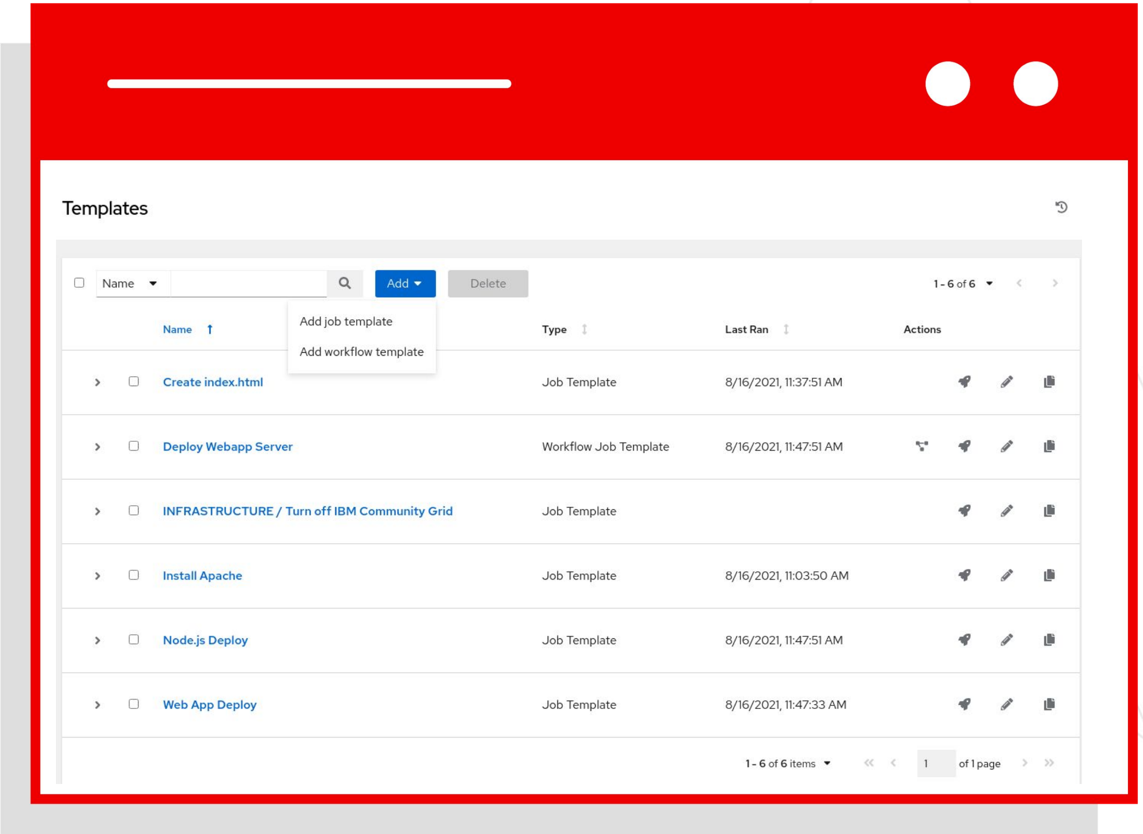
# Adding a New Template

- To add a new **Workflow** click on the **Add** button.

  This time select the **Add workflow template**



| Name | Type | Last Ran | Actions |
|---|---|---|---|
| Create index.html | Job Template | 8/16/2021, 11:37:51 AM | |
| Deploy Webapp Server | Workflow Job Template | 8/16/2021, 11:47:51 AM | |
| INFRASTRUCTURE / Turn off IBM Community Grid | Job Template | | |
| Install Apache | Job Template | 8/16/2021, 11:03:50 AM | |
| Node.js Deploy | Job Template | 8/16/2021, 11:47:51 AM | |
| Web App Deploy | Job Template | 8/16/2021, 11:47:33 AM | |

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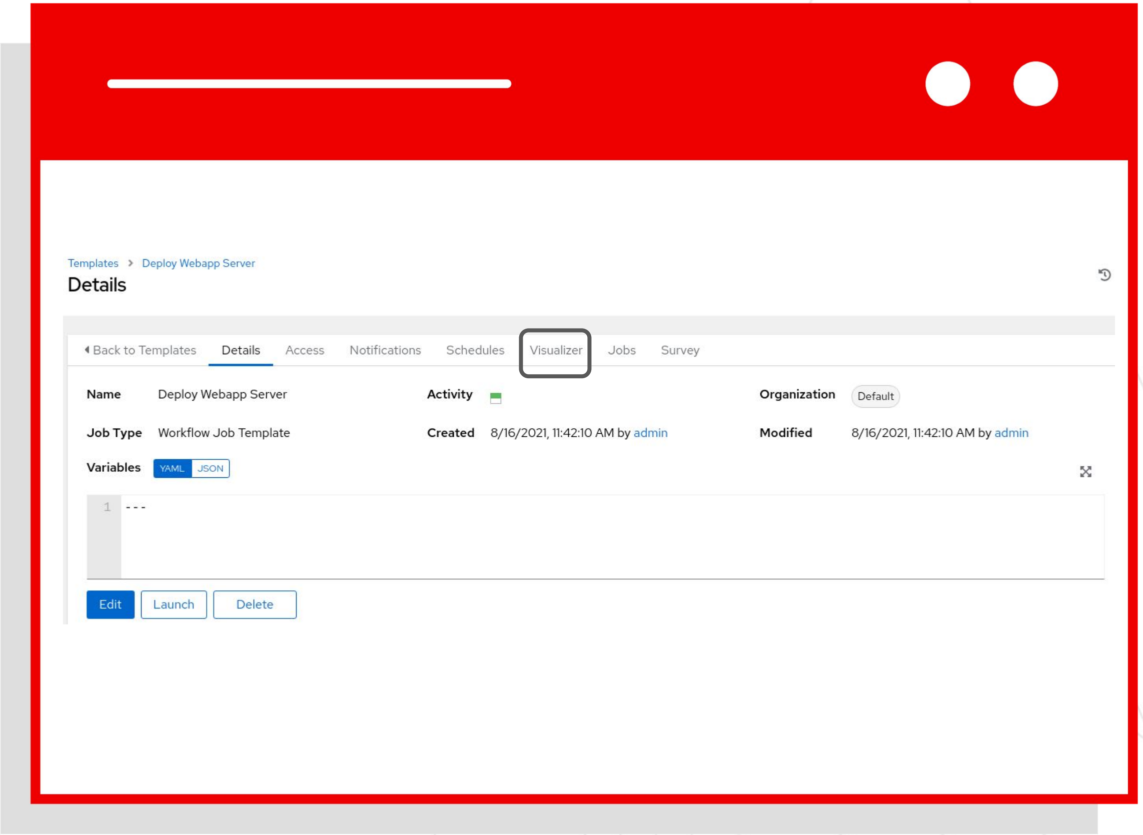
# Creating the Workflow

- Fill out the required parameters and click **Save.** As soon as the Workflow Template is saved the Workflow Visualizer will open.



Name Deploy Webapp Server
Activity
Organization Default
Job Type Workflow Job Template
Created 8/16/2021, 11:42:10 AM by admin
Modified 8/16/2021, 11:42:10 AM by admin
Variables YAML JSON

```
---
```

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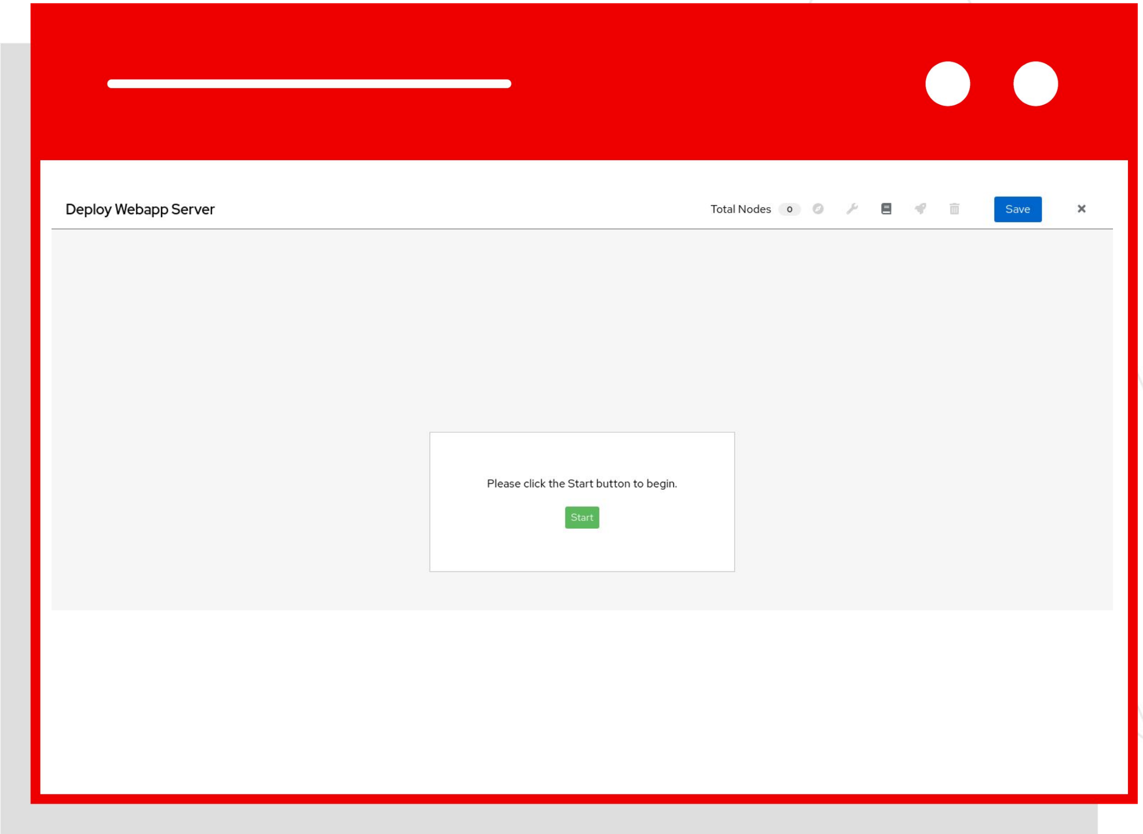
# Workflow Visualizer

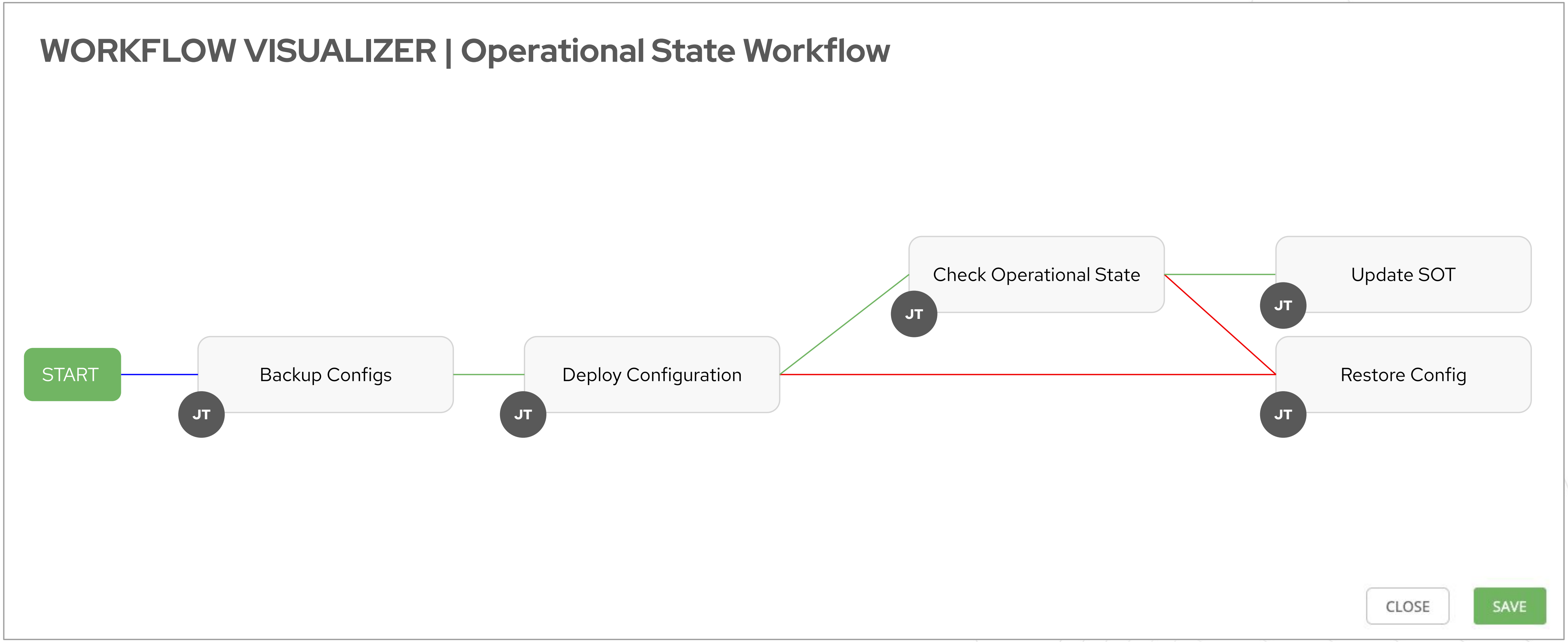
- The Workflow Visualizer will start as a blank canvas.
- Click the green Start button to start building the workflow.



Please click the Start button to begin.

# Ansible Automation Platform

## Using workflows to enhance your automation



### WORKFLOW VISUALIZER | Operational State Workflow

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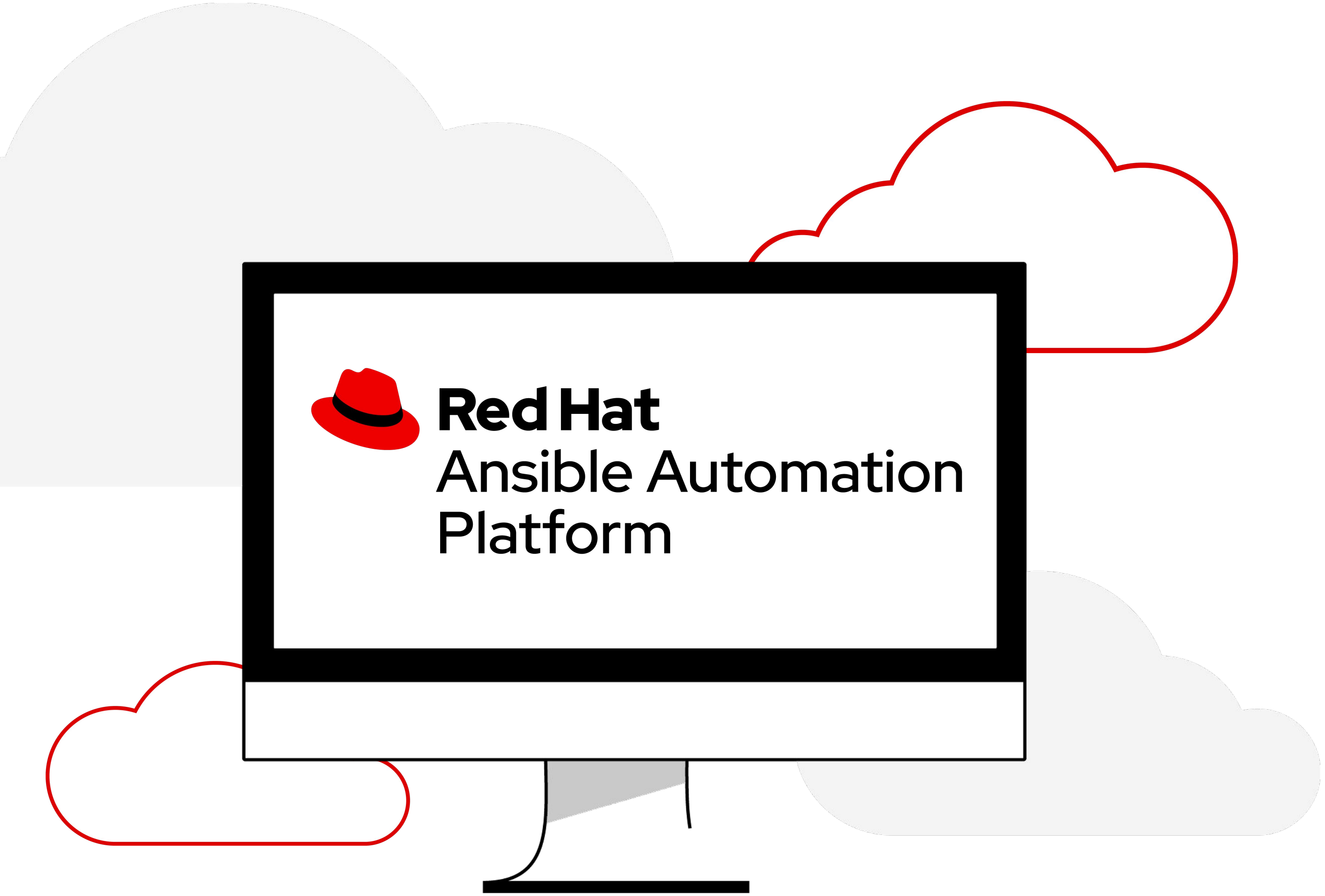
# Wrapping up

Topics Covered:

- Next Steps
- Chat with us
- Consulting Services



# Where to go next

**Learn more**

- Workshops
- Documents
- Youtube
- Twitter

**Get started**

- Evals
- cloud.redhat.com

**Get serious**

- Red Hat Automation Adoption Journey
- Red Hat Training
- Red Hat Consulting

# Chat with us

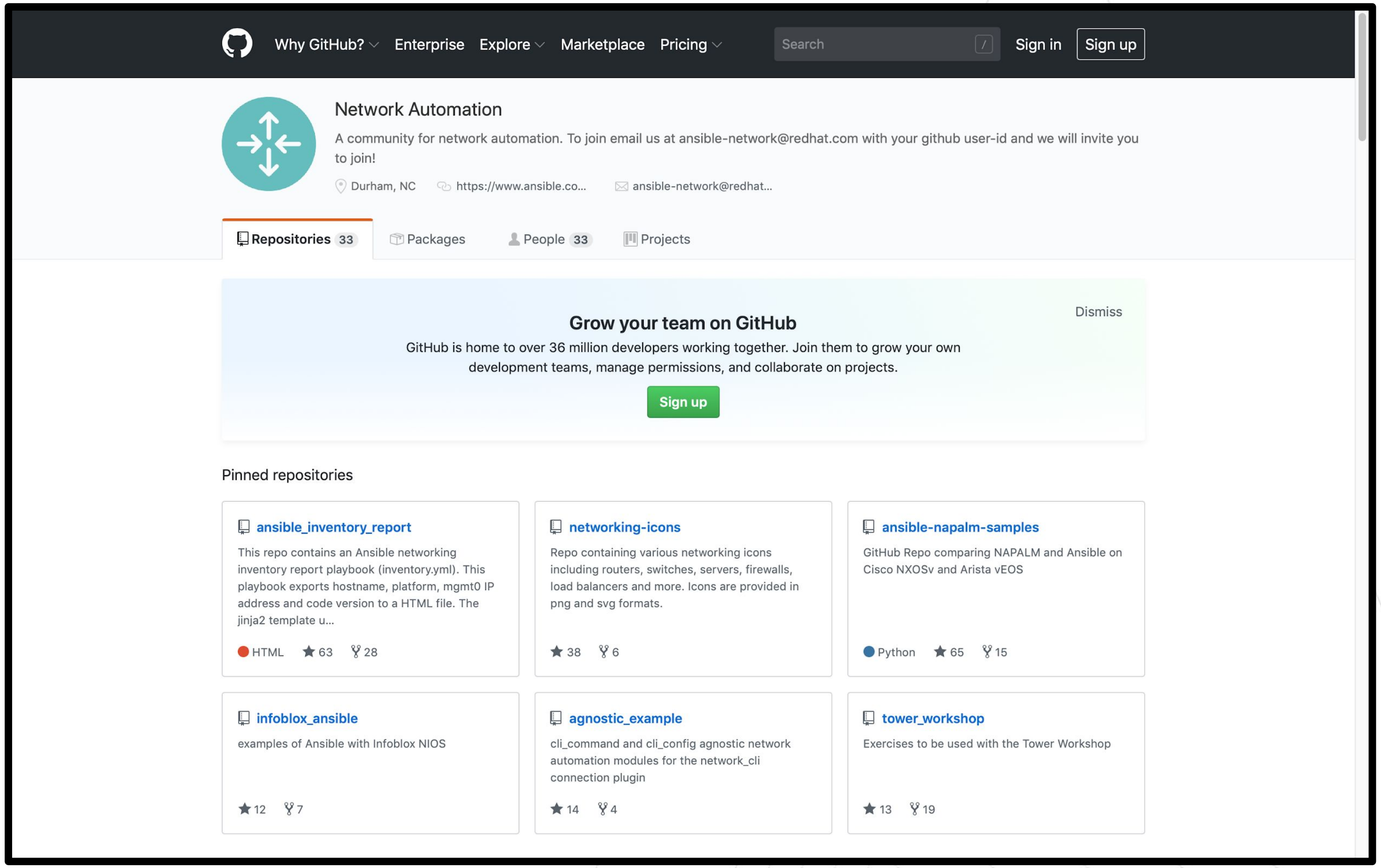
- **Slack**
  https://ansiblenetwork.slack.com
  Join by clicking here http://bit.ly/ansibleslack

- **IRC**
  #ansible-network on freenode
  http://webchat.freenode.net/?channels=ansible-network

# Bookmark the Github organization

- Examples, samples and demos

- Run network topologies right on your laptop



Network Automation

A community for network automation. To join email us at ansible-network@redhat.com with your github user-id and we will invite you to join!

Durham, NC https://www.ansible.co... ansible-network@redhat...

Grow your team on GitHub

GitHub is home to over 36 million developers working together. Join them to grow your own development teams, manage permissions, and collaborate on projects.

Pinned repositories

**ansible_inventory_report**
This repo contains an Ansible networking inventory report playbook (inventory.yml). This playbook exports hostname, platform, mgmt0 IP address and code version to a HTML file. The jinja2 template u...
HTML ★ 63 28

**networking-icons**
Repo containing various networking icons including routers, switches, servers, firewalls, load balancers and more. Icons are provided in png and svg formats.
★ 38 6

**ansible-napalm-samples**
GitHub Repo comparing NAPALM and Ansible on Cisco NXOSv and Arista vEOS
Python ★ 65 15

**infoblox_ansible**
examples of Ansible with Infoblox NIOS
★ 12 7

**agnostic_example**
cli_command and cli_config agnostic network automation modules for the network_cli connection plugin
★ 14 4

**tower_workshop**
Exercises to be used with the Tower Workshop
★ 13 19

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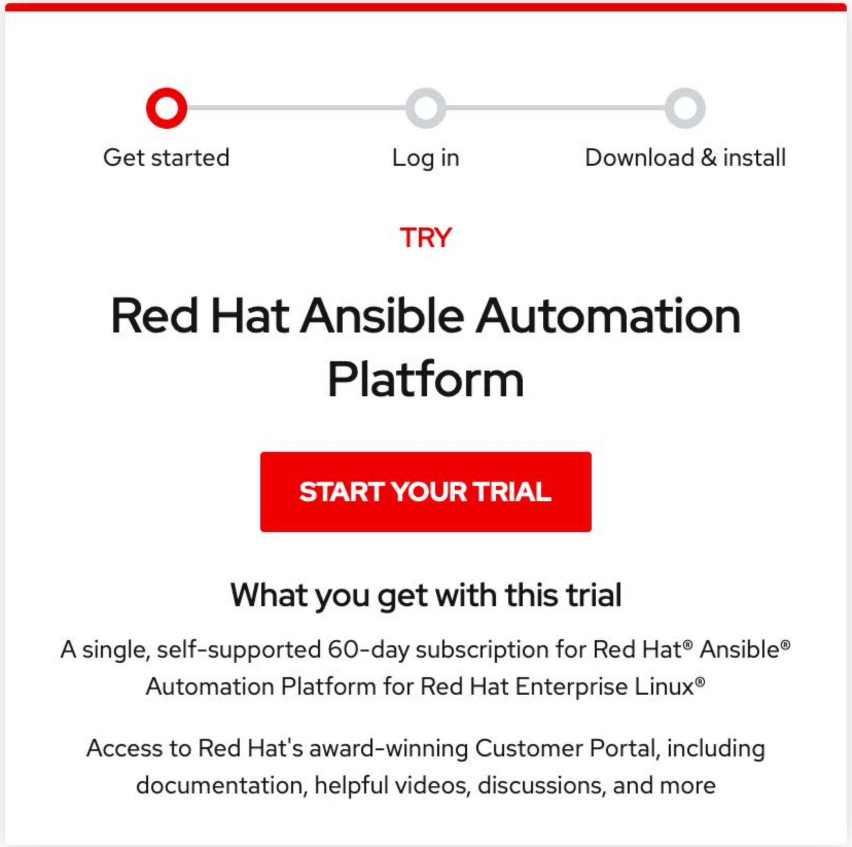
# Red Hat Services

## Accelerate standardization and automation of network configuration

| Challenge | Approach | Benefits |
|---|---|---|
| Slow<br>Time consuming, labor intensive procedures to propagate network changes | Automate<br>Encode and execute procedures with human-readable Ansible playbooks | Speed<br>Reduce changes from days to hours and drive simultaneous config across 100s of endpoints |
| Chaos<br>Rising number of devices, environments, and vendor-specific tooling create sprawl and skills gaps | Standardize<br>Automate common tasks using Ansible modules to abstract vendor-specific details | Efficiency<br>Easily combine and execute complex configuration procedures across environments |
| Errors<br>Over time, vulnerabilities, patches, and mistakes undermine known-good configurations. | Test<br>Iteratively refine and validate provisioning and configuration pre-PROD | Reliability<br>Eliminate human error in production changes |
| Mystery<br>No living source of truth for which patches, packages, or configurations are deployed where | Catalog<br>Automate configuration reporting, inventory, and change tracking across all environments | Manageability<br>Centrally track and manage configuration rollout, drift, patching, and compliance |

# Resources

- Network automation for everyone (Overview)
- Automate your network with Red Hat (Technical)
- Online training: Red Hat Ansible for Network Automation
- Network Automation web page
- Red Hat Ansible Automation Platform blog



TRY

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**red.ht/ansible_trial**

# Thank you

linkedin.com/company/red-hat

youtube.com/AnsibleAutomation

facebook.com/ansibleautomation

twitter.com/ansible

github.com/ansible

# Supplemental

Topics Covered:

- Understand group variables
- Understand Jinja2
- cli_config module

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# Group variables

Group variables are variables that are common between two or more devices. Group variables can be associated with an individual group (e.g. “cisco”) or a nested group (e.g. routers).

Examples include

- NTP servers
- DNS servers
- SNMP information

Basically network information that is common for that group

# Inventory versus group_vars directory

Group variables can be stored in a directory called **group_vars** in YAML syntax. In exercise one we covered **host_vars** and **group_vars** with relationship to inventory. What is the difference?

## inventory

Can be used to set variables to connect and authenticate **to the device**.

Examples include:

- Connection plugins (e.g. network_cli)
- Usernames
- Platform types (**ansible_network_os**)

## group_vars

Can be used to set variables to configure **on the device**.

Examples include:

- VLANs
- Routing configuration
- System services (NTP, DNS, etc)

# Examining a group_vars file

At the same directory level as the Ansible Playbook create a folder named **group_vars.** Group variable files can simply be named the group name (in this case **all.yml**)

```
$ cat group_vars/all.yml

nodes:
  rtr1:
    Loopback100: "192.168.100.1"
  rtr2:
    Loopback100: "192.168.100.2"
  rtr3:
    Loopback100: "192.168.100.3"
  rtr4:
    Loopback100: "192.168.100.4"
```

# Jinja2

- Ansible has native integration with the Jinja2 templating engine
- Render data models into device configurations
- Render device output into dynamic documentation

Jinja2 enables the user to manipulate variables, apply conditional logic and extend programmability for network automation.

# Network Automation config modules

**cli_config** (agnostic)

ios_config:

nxos_config:

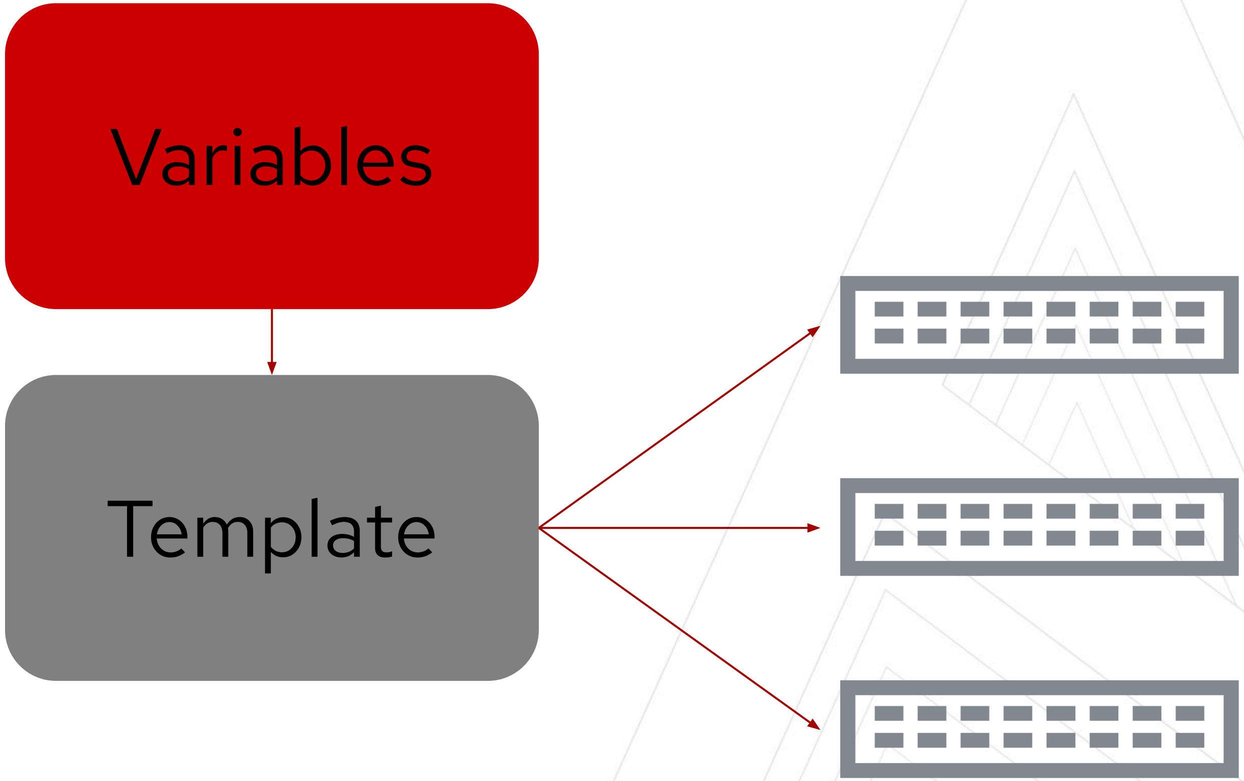
iosxr_config:

eos_config

.

.

*os_config:



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# Jinja2 Templating Example (1/2)

## Variables

```
ntp_server: 192.168.0.250
name_server: 192.168.0.251
```

## Jinja2 Template

```
!
ntp server {{ntp_server}}
!
ip name-server {{name_server}}
!
```

## Generated Network Configuration

### rtr1

```
!
ip name-server 192.168.0.251
!
ntp server 192.168.0.250
!
```

### rtrX

```
!
ip name-server 192.168.0.251
!
ntp server 192.168.0.250
!
```

# Jinja2 Templating Example (2/2)

## Variables

```
nodes:
  rtr1:
    Loopback100: "192.168.100.1"
  rtr2:
    Loopback100: "192.168.100.2"
  rtr3:
    Loopback100: "192.168.100.3"
  rtr4:
    Loopback100: "192.168.100.4"
```

## Jinja2 Template

```
{% for interface,ip in nodes[inventory_hostname].items() %}
interface {{interface}}
  ip address {{ip}} 255.255.255.255
{% endfor %}
```

## Generated Network Configuration

rtr1

```
interface Loopback100
  ip address 192.168.100.1
!
```

rtr2

```
interface Loopback100
  ip address 192.168.100.2
!
```

rtrX

```
interface Loopback100
  ip address X
!
```

# The cli_config module

Agnostic module for network devices that uses the network_cli connection plugin.

```
---
- name: configure network devices
  hosts: rtr1,rtr2
  gather_facts: false
  tasks:
    - name: configure device with config
       cli_config:
         config: "{{ lookup('template', 'template.j2') }}"
```