Exploring the Red Hat Ansible Certified Collection for NetBox

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Agenda

- NetBox Labs
- NetBox as a Network Source of Truth (NSoT)
- Network Automation Reference Architecture
- Ansible Automation Platform (AAP)
- Ansible Certified Collection for NetBox
- Use Cases + Demos
- Q & A

Commercial Stewards

Defining Community & Tech

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- Founded in 2023 in NYC
- Commercial steward of NetBox OSS
- World class team built & lead NS1, founded the NetBox project
- World Class investors & customers

FLYBRIDGE · Grafana Labs · Notable. · salesforce ventures · TWO SIGMA VENTURES · FOUNDER COLLECTIVE · ENTRÉE CAPITAL · MANGO CAPITAL · IBM

Virtuous Circle

NetBox Labs leverages open source to generate commercial value and revenue, and reinvests in the community to create open source sustainability and scalability.

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- **15K+** Github ⭐ - Widely loved by networking teams
- **11K+** Software commits - feature complete + rapid development
- **~290** Contributors - core, plugins + integrations
- **1000s** of companies run NetBox in production

What is a Network Source of Truth (NSoT)?

- Defines the ***intended*** state of the network represented as ***structured data***
- Should act as a single consistent data set
- Adopting an NSoT requires a significant mental shift for network engineers away from describing the network in design documents and diagrams
- NSoT becomes the authoritative reference for the network and its data ***drives network automation***

Inventory

DCIM

IPAM

Configuration

Network Properties

Circuits

The journey to network automation starts with implementing a NSoT

Document

- Converge legacy sources of truth
- Discovery or manual capture of additional network data
- Change operational processes to start with documentation

Model

- Connect network data through cohesive models
- Enforce consistency across models

Automate

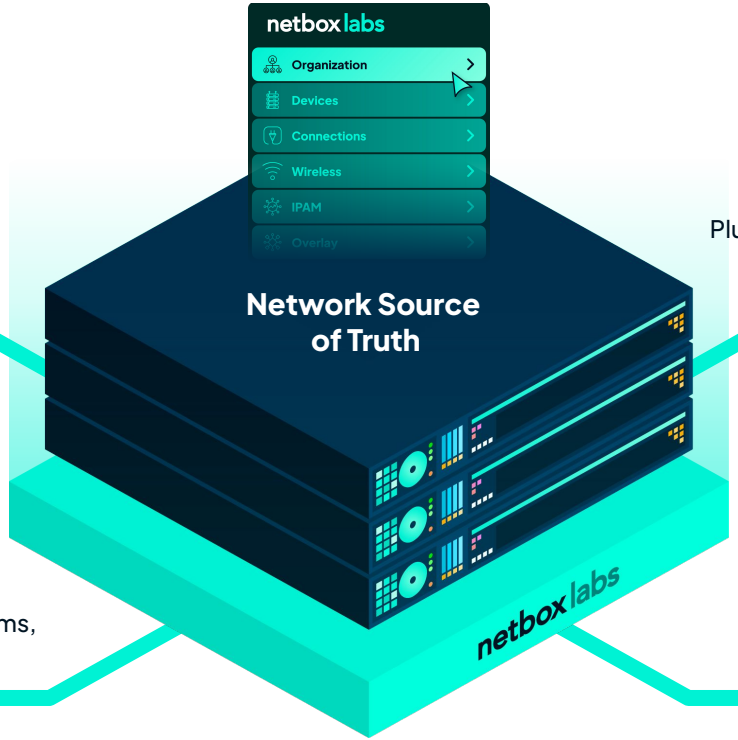
- Implement change management starting with NSoT / intent
- Generate configs from model data
- Drive automations from dynamic inventory
- Assurance to identify/resolve operational drift

1 2 3

72% of organizations are within these two phases.*

Only 28% of organizations have fully executed their network automation strategy.*

NetBox is the world's most popular Network Source of Truth (NSoT)



Comprehensive network data model

From ASNs to VPNs, and everything between

API & integration first

REST, GraphQL, Event Streams, Webhooks

Massive extensibility

Plugins, Device Types, Custom Scripts & Fields, ...

Enormous ecosystem

Everything works with NetBox

Which NetBox Is Right For You?

NetBox Community

Open source network source of truth powered by our massive community

- Most widely used Network Source of Truth - by far
- Massive & active community = product & ecosystem velocity

NetBox Enterprise

Self-managed enterprise grade NetBox, fully supported, advanced integrations & features

- All capabilities of NetBox OSS
- Deploy on your own infrastructure
- Enterprise class features
- Integrate your IT stack
- NetBox experts in your corner
- NetBox Labs supported plugins

NetBox Cloud

Cloud-managed, secure, reliable: all the features of Enterprise, with turn-key operations and scaling

- All capabilities of NetBox OSS and Netbox Enterprise
- SaaS edition of NetBox
- Fully-hosted on NetBox Lab's rock-solid platform
- Secure, easy to use, and ready for scale.
- Customizable cloud isolation, redundancy and performance
- Push button lifecycle operations
- Zero administrative overhead

Which NetBox Cloud Plan Is Right For You?

NetBox Cloud – Free Plan

Perfect for small networks, lab environments, and targeted use cases

✅100 devices, 500 IP addresses, 10k API requests/month

✅Eliminate operational burden

✅Get started instantly

✅Fully hosted & secure

✅Single tenant isolated deployment

✅Push button backup & lifecycle operations

Available Now!

NetBox Cloud – Paid Plans

Production scale, fully supported, with a host of enterprise-grade features and benefits

✅Plans for every network, starting at 2k devices, 10k IP addresses, 40k API requests/month

✅Vast array of security & convenience features – SSO, custom isolation, connectivity options & controls, backup management, lifecycle operations & validation

✅Tuned for reliability & performance – seamless redundancy & scalability

✅Support for dozens of NetBox Labs certified plugins

✅Advanced features for automation & data management

✅Supported integrations – ServiceNow, network discovery, and many more

✅24×7 Support

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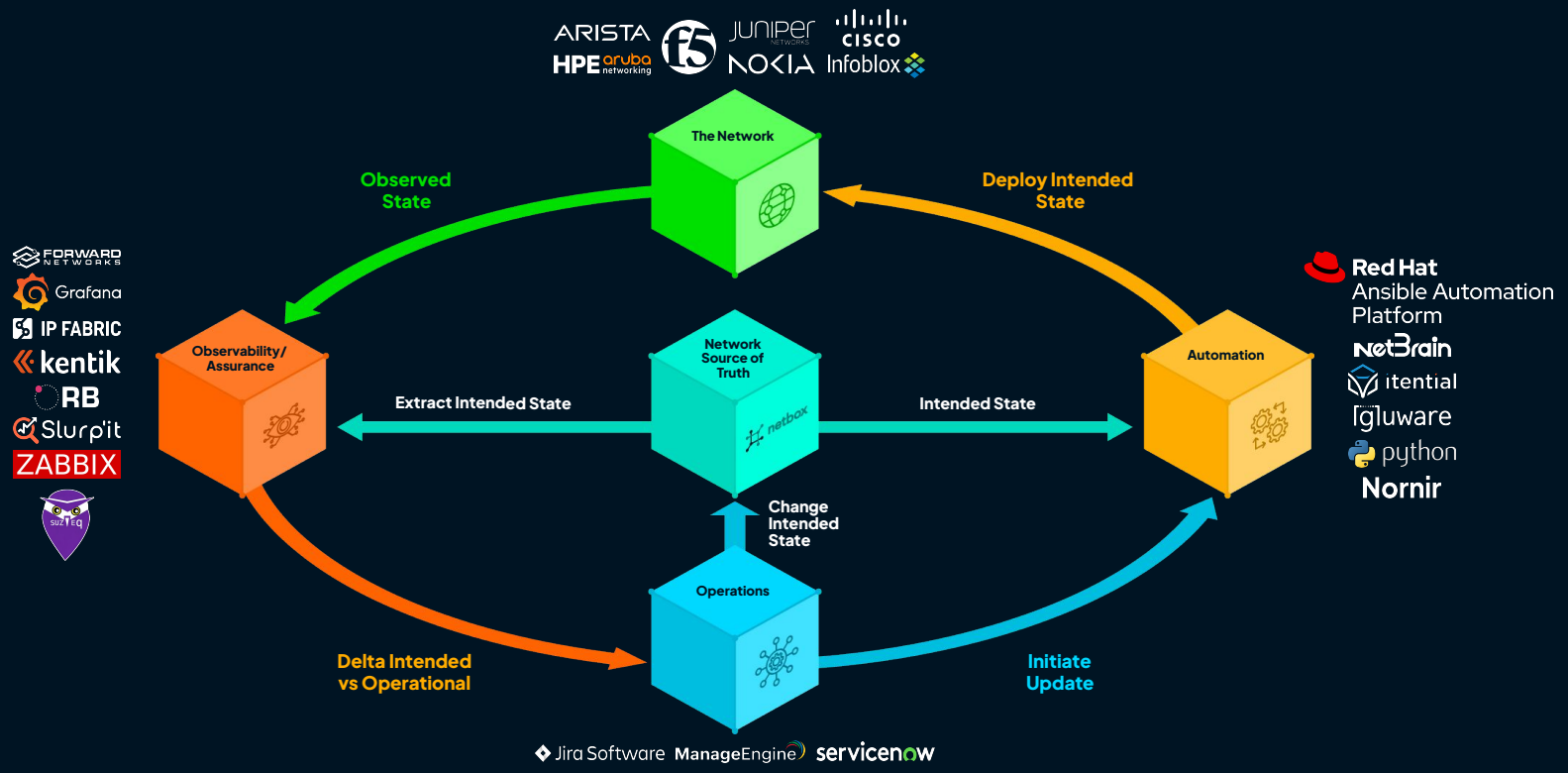
Modern Network Automation Architecture



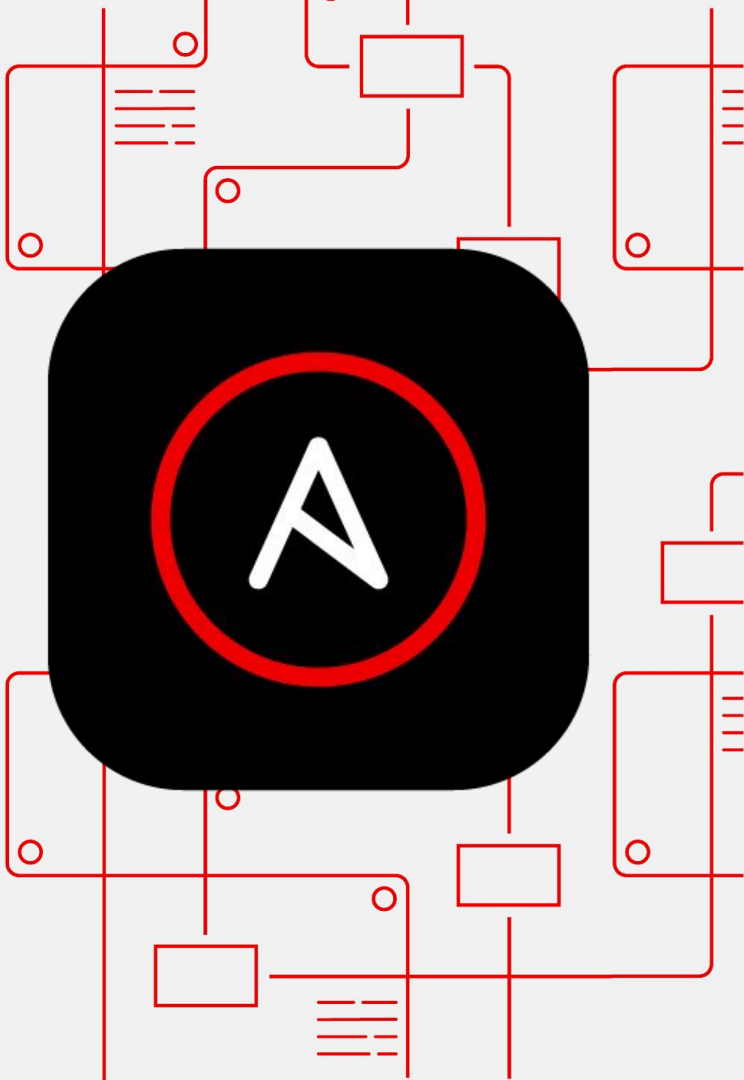
What is Ansible?

- Ansible is an open-source IT automation framework to configure systems, deploy software, and orchestrate workflows, ranging from simple to more complex tasks. It is primarily written in Python.

- **Agentless.** Supports SSH/NETCONF/API/winrm access
- **Simple.** Human readable declarative language (YAML)
- **Extensible.** Collections, roles, modules and plugins

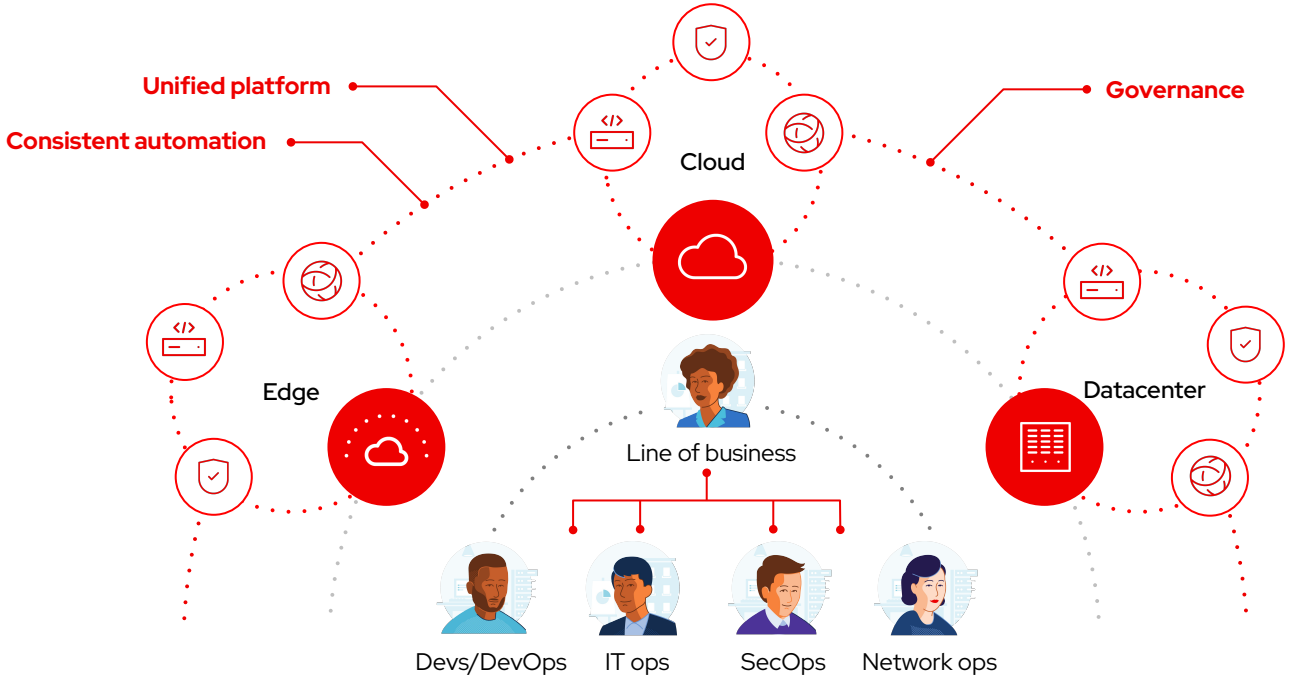
- Ansible is especially popular for network automation due to its low barrier to entry and broad support for networking equipment.

What is Red Hat® Ansible® Automation Platform?



Red Hat
Ansible Automation
Platform

The solution? Break down the silos



Collaborative automation across your ecosystem

150+ Certified content collections

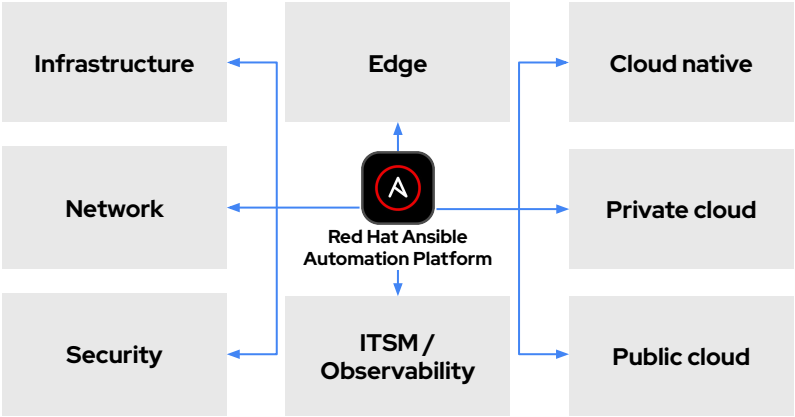
55+ Certified technology partners

100+ Systems integrators and resellers

60k GitHub stars

1,000+ Active open source contributors

20+ Projects as part of the product

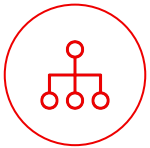


Ansible network ecosystem

Switches

Routers

Firewalls

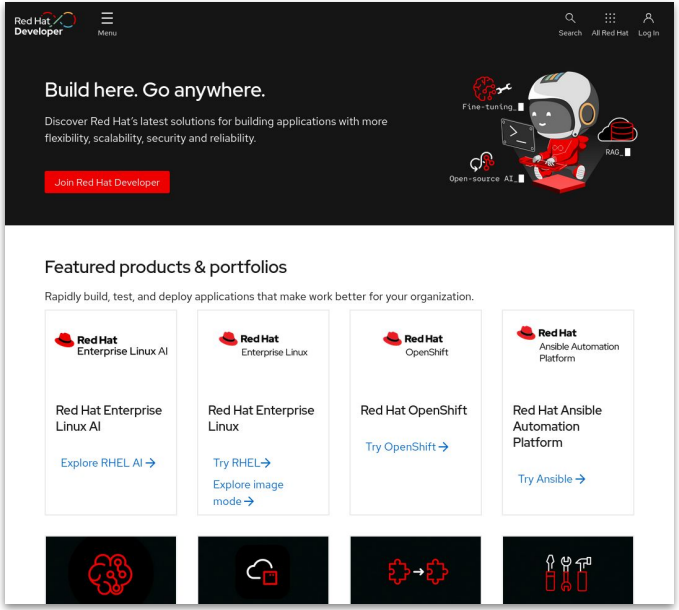

Load balancers

Controllers

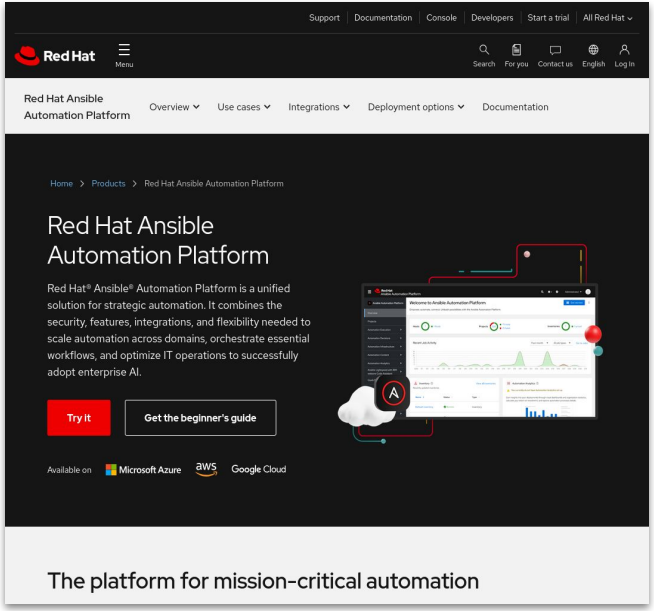
Network management

IPAM

How to try Ansible Automation Platform?



Red Hat Developer
Membership (Individuals)



Ansible Automation Platform
60 Days Trial (Enterprise)

Red Hat
Ansible Automation
Platform

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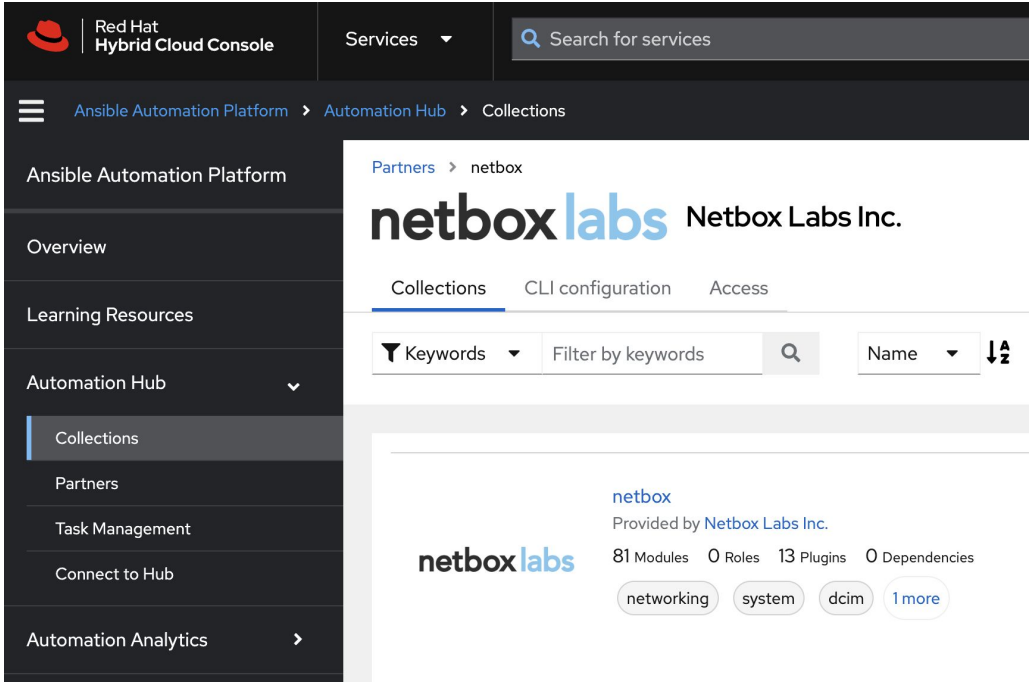
Ansible Certified Collection for NetBox

- **Official support** from NetBox Labs and Red Hat for customers
- Available from Ansible Automation Hub **(certified collection)**
- Modules to define the **intended network state** in NetBox
- Plugins to **drive automation of the network** using data from NetBox



Red Hat
Ansible Automation
Platform

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Use Cases

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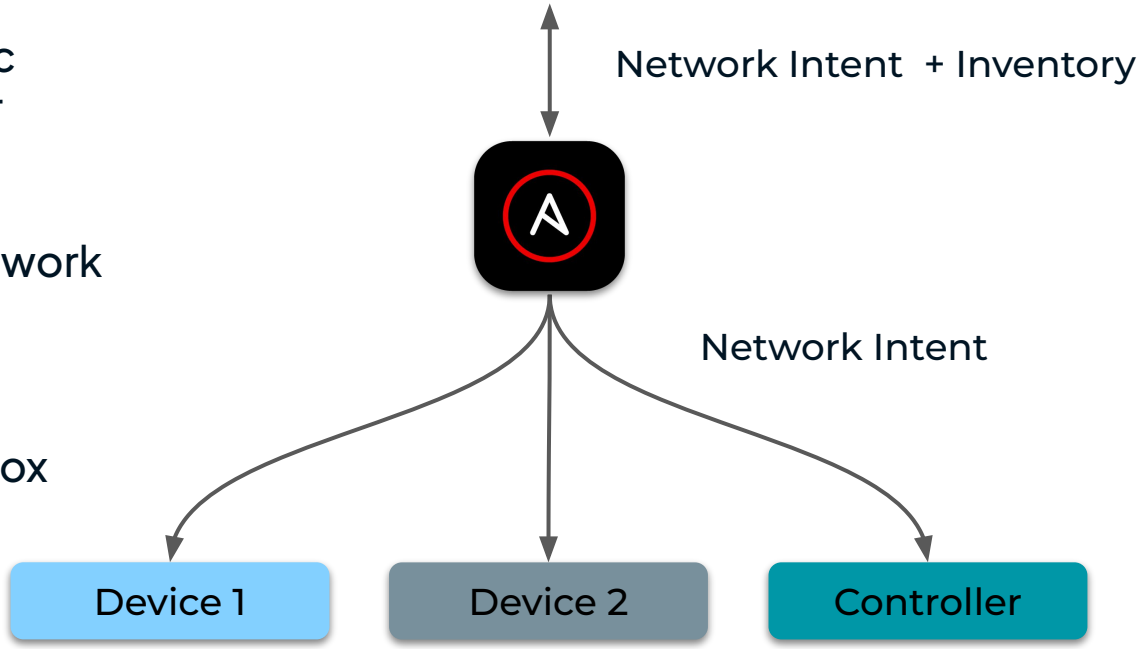
- NetBox as a Dynamic Inventory Source for Ansible
- Define Intended Network State in NetBox
- Query and Return Elements from NetBox



Use Case 1 – NetBox as a Dynamic Inventory Source for Ansible Automation Platform

Why Use NetBox as a Dynamic Inventory Source ?

- Inventory is one of the main building blocks of an Ansible solution
- Contains managed nodes (hosts) and associated data
- Static Inventory files are OK when starting out but do not scale well and are prone to error
- NetBox eliminates the need to maintain inventory files
- Red Hat Ansible builds inventory dynamically and directly from NetBox using the NetBox REST API.
- Inventory is always up to date with no risk of incorrect devices being targeted

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What Else Can I do With the Dynamic Inventory?

- Filter Hosts

```
query_filters:
  - role: network-edge-router
device_query_filters:
  - has_primary_ip: 'true'
  - manufacturer_id: 1
```

- Set Host Variables

```
compose:
  foo: last_updated
  bar: display_name
```

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Running Playbooks Using the Dynamic Inventory Plugin

- Target hosts or groups from the inventory in your playbook

```
---
- name: Playbook using NetBox Inventory Plugin
  hosts: device_roles_access_switch
```

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Demo

Use Case 2 – Define Intended Network State in NetBox

Defining Intended State Using the Ansible Collection for NetBox

- Interact with the NetBox database to define objects and their intended state:
  - Make sure objects exit
  - Update objects if they do exist
  - Remove objects if they do not not exist
- Over 80 modules (and counting)
- Aggregates >> Wireless Link Modules

- netbox_aggregate module – Creates or removes aggregates from NetBox
- netbox_asn module – Create, update or delete ASNs within NetBox
- netbox_cable module – Create, update or delete cables within NetBox
- netbox_circuit module – Create, update or delete circuits within NetBox
- netbox_circuit_termination module – Create, update or delete circuit terminations within NetBox
- netbox_circuit_type module – Create, update or delete circuit types within NetBox
- netbox_cluster module – Create, update or delete clusters within NetBox

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Defining Intended State Using the Ansible Collection for NetBox

- Example Ansible playbook using the netbox_aggregate module to make sure the 192.168.0.0/16 aggregate network prefix exists in NetBox:

```
tasks:
    - name: Create aggregate in NetBox
      netbox.netbox.netbox_aggregate:
        netbox_url: http://netbox.local
        netbox_token: thisIsMyToken
        data:
          prefix: 192.168.0.0/16
          rir: Test RIR
        state: present
```

Demo

Use Case 3 – Query and Return Elements from NetBox

Introducing the NetBox Lookup Plugin

- Plugin for the collection, called netbox.netbox.nb_lookup
- Allows Red Hat Ansible to query NetBox via its API to return virtually any information
- Example playbook returns a list of all devices whose role is that of firewall and then report the manufacturer of each device:

```
 tasks:
  - name: "Query NetBox for all sites"
    debug:
      msg: >
        "Device {{ item.value.name }} (ID: {{ item.key }})
was
        manufactured by {{
item.value.device_type.manufacturer.name }}"
    loop: "{{ query('netbox.netbox.nb_lookup', 'devices',
api_filter='role=firewall', api_endpoint=netbox_url,
token=netbox_token)}}"
```

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Demo

How Do I Get Started?

Blog Series - Exploring the Red Hat Ansible Certified Collection for NetBox:
https://netboxlabs.com/blog/exploring-the-red-hat-ansible-certified-collection-for-netbox-part-one/

Git Repository:
https://github.com/netboxlabs/netbox-learning/tree/develop/netbox-ansible-collection-quick-start

Network automation with Red Hat Ansible Automation Platform:
https://www.redhat.com/en/technologies/management/ansible/network-automation

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Q & A