



The bridge to possible

Integrating Cisco Catalyst Center with NetBox and Ansible as part of a modern Network Automation Architecture

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Agenda

- Introducing NetBox and NetBox Cloud
- A reference architecture for modern network automation
- Extending the NetBox data model to integrate with Cisco Catalyst Center
- NetBox integration with Ansible for dynamic inventory
- Demo – Putting it all together

NetBox Labs

“We make it easier to build and manage complex networks.”

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

Network Automation Requires a Network Source of Truth (NSoT)

- NSoT: representation of the **intended configuration and state of the devices, connections, and services** of the network
- Captures **intended state** - different than operational state
- **Structured, cohesive, comprehensive data model** for network intent - forces completeness & correctness in design, planning, configuration management, operations

NetBox – Your Network Source of Truth

- Your system of record for network management & automation:
- Eliminate spreadsheets
- Break down DCIM & IPAM data silos
- Accelerate network automation (REST API, GraphQL, Webhooks etc)
- Everything is in NetBox and everything is correlated

The screenshot displays the NetBox web interface for a specific site named 'DM-Scranton'. The interface is organized into several sections:

- Left Sidebar:** A navigation menu with categories like SITES, RACKS, TENANCY, CONTACTS, and DEVICES, each containing sub-items with expand/collapse icons.
- Top Header:** Includes the NetBox logo, a search bar, and a user profile dropdown for 'dwight'.
- Breadcrumbs:** Shows the path 'Sites > North America > United States > Pennsylvania'.
- Main Content Area:**
 - DM-Scranton:** The title of the selected site, with a note 'Created 12/19/2020 midnight · Updated 0 minutes ago'.
 - Site Details:** A table listing attributes such as Region (North America / United States / Pennsylvania), Group (Customer Sites / Branch Offices), Status (Active), Tenant (Customers / Dunder-Mifflin, Inc.), Facility (DM101), Description (Scranton Office and PA Warehouse), Time Zone (US/Eastern), Physical Address (1725 Slough Avenue, Suite 200, Scranton, PA, 18540), Shipping Address (13927 Satcoy Street, Scranton, PA, 18540), and GPS Coordinates (41.370173, -75.637626). Each entry has a 'Map It' button.
 - Tags:** A section showing tags like 'Golf', 'Juliett', and 'X-ray'.
 - Comments:** A section titled 'Parking Notice' with the text: 'Do not park in visitor parking spots. This is enforced by building management and you may be ticketed or towed.'
- Right Sidebar:**
 - Related Objects:** A list of related objects with counts: Locations (1), Racks (2), Devices (16), Virtual Machines (20), Prefixes (5), VLAN Groups (1), VLANs (3), ASNs (1), and Circuits (2).
 - Non-Racked Devices:** A section with a 'None' status and a '+ Add a Non-Racked Device' button.
 - Contacts:** A table listing contacts with columns for Name, Role, Priority, Phone, and Email. The contacts listed are Dwight Schrute, Pamela Halpert, and Michael Scott, each with a status icon.

NetBox is Powered by a Massive Community

5000+ Networking pros building, helping, sharing - 24x7

10K+ Global deployments





13k+ GitHub  Widely loved by networking teams



11k+ Software commits. Feature complete, battle tested

NetBox Cloud Accelerates & De-risks Network Operations



NetBox Cloud Instances



3

✓ Started





Instance	Version	Region
NetBox DevOps	3.7.1	  AWS Dublin, IE



Secrets

Admin Username  



Admin Password  



bitter-mountain-5851.cloud.netboxapp.com

✓ Started





Instance	Version	Region
webinar	3.6.9	  AWS Dublin, IE


Secrets

Admin Username  



Admin Password  



ozpu4920.cloud.netboxapp.com

✓ Started

Instance	Version	Region
Guided Demo	3.7.1	 AWS North Virginia, US

Secrets

Admin Username  

Admin Password  

spring-paper-9469.cloud.netboxapp.com

Go Faster

- Eliminate overhead with push-button lifecycle operations
- Enjoy hassle free automatic upgrades
- Quickly build your network model with turn-key network discovery from our partners
- Implement event-driven, real-time automations with Cloud Event Stream (coming soon)

The screenshot shows the 'Overview' page of the NetBox Cloud application. At the top, it displays the service name 'NetBox Cloud', the current version '3.6.9', and the deployment region 'AWS Dublin, Ireland'. Below this is a 'Version Upgrade' section. It features a table with columns for 'Version', 'Released', 'Status', 'Plugins Compatibility', and 'Release Notes'. The 'Recommended Version' section highlights version 3.7.1, released on Jan 17, 2024, with a status of 'recommended'. A button indicates an upgrade from NetBox BGP 0.11.1 to 0.12.0. Below the recommended version, there is a section for 'Other Versions'. At the bottom, there is a button labeled 'UPGRADE VERSION 3.6.9'.

Version	Released	Status	Plugins Compatibility	Release Notes
Recommended Version				
3.7.1	Jan 17, 2024	recommended	NetBox BGP 0.11.1 -> 0.12.0	
Other Versions				

Go Safely

- Rock-solid, highly available platform configured your way
- Cloud Firewall with IP Allow Lists, mTLS & a dedicated IP address
- Automated backups, Single-Sign On (SSO) and Two-Factor Authentication
- Simplified Plugin management, no compatibility worries

The screenshot displays the 'Overview' page of the NetBox Cloud application. At the top, it shows the service name 'NetBox Cloud', version '3.6.9', and deployment region 'AWS Dublin, Ireland'. Below this, there are several expandable sections: 'Version Upgrade' with a 'Need Help?' link, 'Secrets', 'IP Allow List' (showing 1 entry) with 'Publish' and 'Add' buttons, 'Plugins' (showing 1 plugin installed), 'Logs' (showing 1 pod) with a 'Last updated: 4 minutes ago' timestamp and refresh icon, and 'Backup And Restore' (showing last backup 37 minutes ago) with 'See Restore History' and 'Back Up Now' buttons.

Overview ozpu4920.cloud.netboxapp.com		
Service	Version	Deployment Region
NetBox Cloud	3.6.9	AWS Dublin, Ireland

Version Upgrade Need Help?

Secrets

IP Allow List Entries: 1 Publish Add

Plugins 1 plugin installed

Logs 1 pod Last updated: 4 minutes ago

Backup And Restore Last Backup: 37 minutes ago See Restore History Back Up Now

Go Farther

- 100s of plugins extend NetBox's functionality to every use case
- Seamless integration with major automation platforms
- Built-in device configuration generation
- Highly extensible and customizable data model

The screenshot displays the NetBox web interface for a device named 'ceos-sw-1'. The breadcrumb navigation shows 'Devices > ContainerLab'. The page title is 'ceos-sw-1 - Config', with a status 'Created 2023-08-01 19:20 - Updated 1 week ago'. Action buttons include '+ Add Components', 'Bookmark', 'Clone', 'Edit', and 'Delete'. The top right corner shows 'dcim.device:1'. The main navigation tabs are 'Device', 'Interfaces 3', 'Config Context', 'Render Config', 'Contacts', 'Journal', and 'Changelog'. The 'Config Context' tab is active, showing a 'Config Template' section with fields for 'Config Template' (cSEOSLab), 'Data Source' (webinar), and 'Data File' (config_templates/cEOSLab.j2). To the right is a 'Context Data' section with a dropdown arrow. Below these is the 'Rendered Config' section, which contains a code block with the following configuration:

```
!
no aaa root
!
username admin privilege 15 role network-admin secret sha512 $6$Nfus.CLqubtUkR/5$RMXV7ErzvU2M1UeycFsgIZx5rAQoyp5WsfvUXH6u4xM6bT0AKNhpB.MqBhL1AbBj3PI4Cue8w2hC1nM.Zw/
!
transceiver qsfp default-mode 4x10G
!
service routing protocols model multi-agent
!
hostname ceos-sw-1
!
spanning-tree mode mstp
!
vlan 100
 name Data
!
vlan 200
 name Voice
!
```

A 'Download' button is located to the right of the rendered configuration code.

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

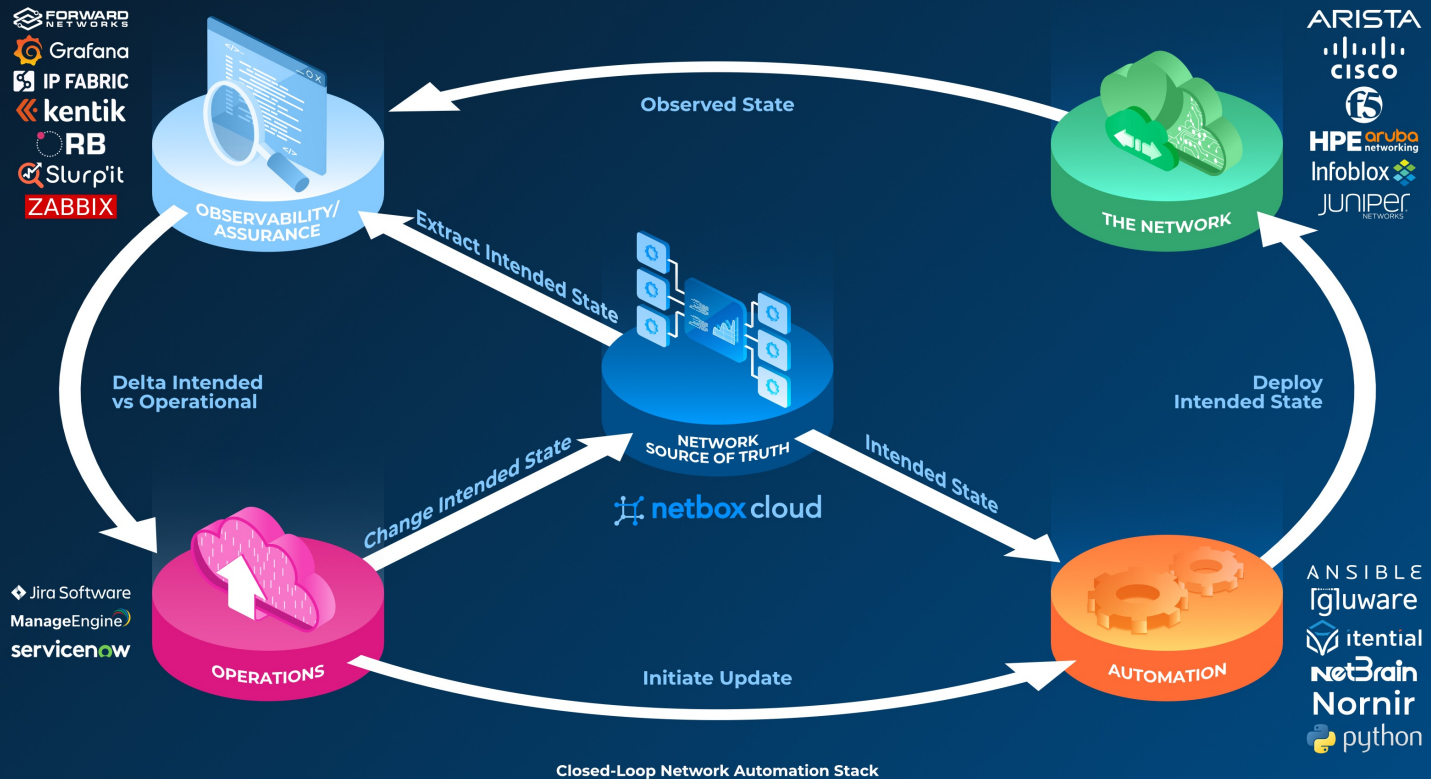
Implement change management starting with NSoT / intent

Generate configs from model data

Drive automations from dynamic inventory

Assurance to identify/resolve operational drift

Modern Network Automation Architecture

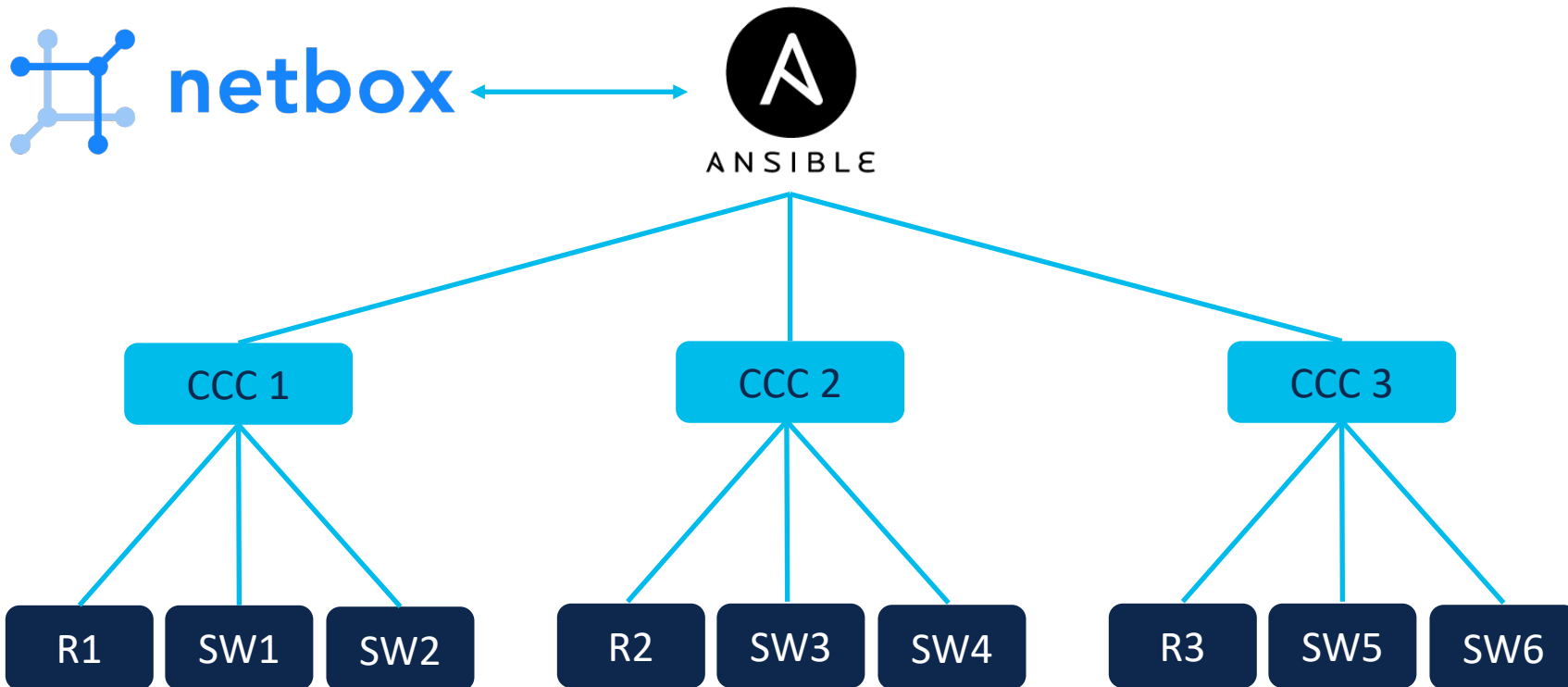


Ansible NetBox Inventory Plugin

Just one example of NetBox
extensibility.

- Dynamic retrieval of NetBox device and VM inventory data
- Update NetBox = updated Ansible inventory
- `group_vars` and `host_vars` can still be used alongside data from NetBox
- Very flexible & well maintained

Automating Against Multiple Catalyst Center Controllers



Extending the Data Model - NetBox Custom Fields

NetBox administrators can extend NetBox's built-in data model by adding custom fields to most object types.

(Did we mention NetBox is flexible and extensible?)

The screenshot shows the NetBox web interface for a device named 'sw1'. The interface includes a top navigation bar with 'Devices > Cisco DevNet' and a breadcrumb trail. Below the breadcrumb, there are buttons for '+ Add Components', 'Bookmark', 'Clone', 'Edit', and 'Delete'. The main content area is divided into several sections: 'Device', 'Management', 'Services', and 'Images'. The 'Device' section contains a table with fields like Region, Site, Location, Rack, Position, GPS Coordinates, Tenant, Device Type, Description, Airflow, Serial Number, Asset Tag, and Config Template. The 'Management' section contains a table with fields like Status, Role, Platform, Primary IPv4, Primary IPv6, and Out-of-band IP. The 'Services' section contains a table with fields like Name, Parent, Protocol, Ports, and Description. The 'Images' section contains a table with fields like Content Type, Parent, Image, Name, Size (Bytes), and Created. A red box highlights the 'Custom Fields' section at the bottom, which contains a table with two rows: 'Ccc device id' with value '32446e0a-032b-4724-93e9-acbbab47371b' and 'Cisco catalyst center' with value 'sandboxdnac.cisco.com'.

Devices > Cisco DevNet

sw1

Created 2024-01-05 10:30 · Updated 3 days, 18 hours ago

dcim.device:35

+ Add Components Bookmark Clone Edit Delete

Device Interfaces 10 Config Context Render Config Contacts Journal Changelog

Device

Region	—
Site	Cisco DevNet
Location	—
Rack	—
Position	—
GPS Coordinates	—
Tenant	—
Device Type	Cisco C9KV-UADP-8P (1U)
Description	—
Airflow	—
Serial Number	9SB9FYAFA20
Asset Tag	—
Config Template	—

Custom Fields

Ccc device id ⓘ	32446e0a-032b-4724-93e9-acbbab47371b
Cisco catalyst center ⓘ	sandboxdnac.cisco.com

Management

Status	Active
Role	DISTRIBUTION
Platform	ios-xe
Primary IPv4	10.10.20.175 ⓘ
Primary IPv6	—
Out-of-band IP	—

Services

Name	Parent	Protocol	Ports	Description
— No services found —				

+ Add a service

Images

Content Type	Parent	Image	Name	Size (Bytes)	Created
— No image attachments found —					

+ Attach an image



Demo

Continue your education

CISCO *Live!*

- Code and slides:
<https://github.com/netboxlabs/netbox-ansible-cisco-cc>



- NetBox Zero to Hero course – coming very soon to Cisco U
- NetBox Cloud Free 14-Day Trial:
<https://netboxlabs.com/trial/>

Fill out your session surveys!



Attendees who fill out a minimum of four session surveys and the overall event survey will get Cisco Live-branded t-shirt (while supplies last)!

All surveys can be taken in the Cisco Events Mobile App or by logging in to the Session Catalog and clicking the "Attendee Dashboard" at

<https://www.ciscolive.com/emea/learn/sessions/session-catalog.html>





The bridge to possible

Thank you

CISCO *Live!*

