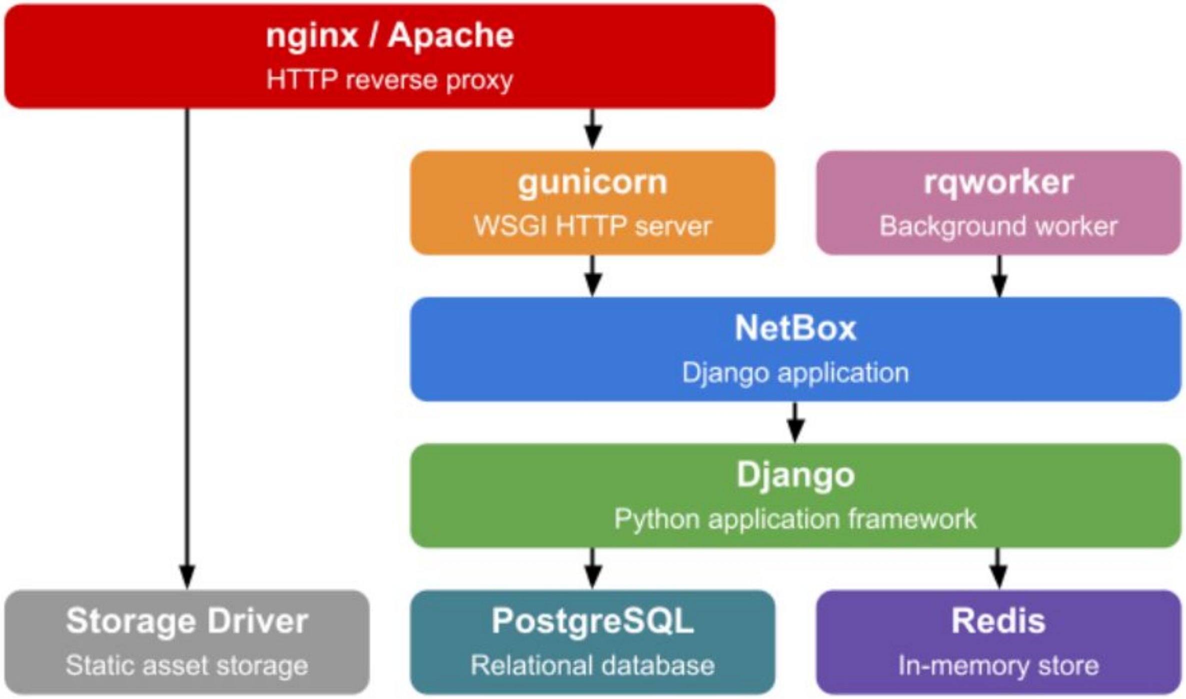
NetBox For Newbies

NetSIG Presentation

What is NetBox?

- Network inventory solution
- **Goal**: Be the network **"Source of Truth"**
    - … And drive network automation
- Provides a physical and logical model of your entire network
    - Represents the desired state (not necessarily the operational state)
    - Purpose-built for IPAM and DCIM
    - Caters to network engineers and operators
- Easy to Extend
    - Plugins, custom data modeling, and APIs (REST, GraphQL)
- Open Source
    - No vendor lock-in
    - Community-driven
- Python-Based
    - Built on Django

NetBox Architecture



nginx / Apache
HTTP reverse proxy

gunicorn
WSGI HTTP server

rqworker
Background worker

NetBox
Django application

Django
Python application framework

Storage Driver
Static asset storage

PostgreSQL
Relational database

Redis
In-memory store

Key Features

- Physical inventory management
  - Devices, power, cabling, etc.
- Logical inventory management
  - IPs, VRFs, VLANs, VPNs, and ASNs, etc.
- IPAM and automated IP provisioning
- Customizability
  - Custom fields for data model extension
  - Custom validation & protection rules
  - Community supported plugin framework to add custom functionality
- Event-driven scripts & webhooks
- Network device configuration rendering
- Global search

NetBox is Not

- Network monitoring
- DNS server
- RADIUS server
- Configuration management
- However, NetBox can be **used to drive these external systems**

Demo - Local Docker Setup

- Note - Requires **docker** and **docker compose**

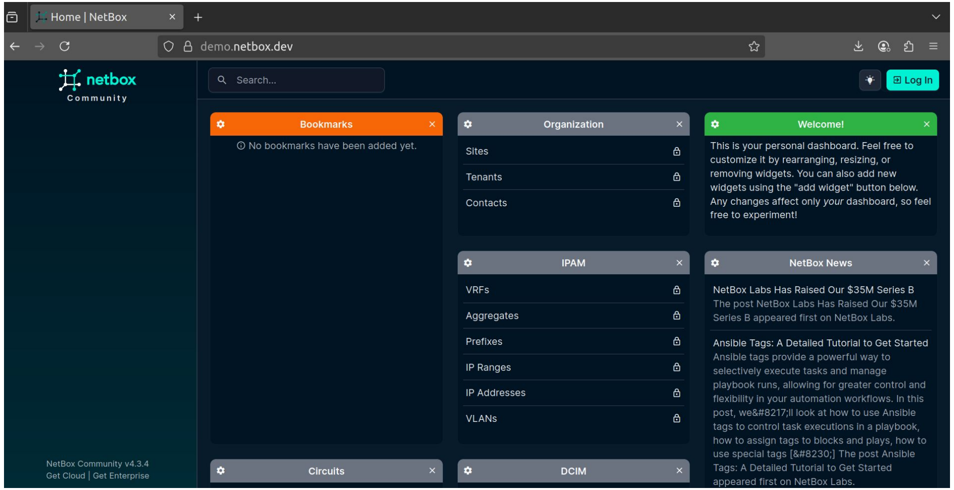
```
$ git clone https://github.com/netbox-community/netbox-docker.git
$ cd netbox-docker/
$ docker compose up -d
```

- Browse to http://localhost:8000
  - Username: **admin**
  - Password: **admin**
  - If you are having authentication issues, try this:

```
$ docker compose exec netbox \
    /opt/netbox/netbox/manage.py changepassword admin
```

Demo - Alternate Setup

- Public NetBox demo site available on the Internet
- https://demo.netbox.dev/login/
    - Username: **admin**
    - Password: **admin**



Bookmarks

No bookmarks have been added yet.

Organization

- Sites
- Tenants
- Contacts

Welcome!

This is your personal dashboard. Feel free to customize it by rearranging, resizing, or removing widgets. You can also add new widgets using the "add widget" button below. Any changes affect only *your* dashboard, so feel free to experiment!

IPAM

- VRFs
- Aggregates
- Prefixes
- IP Ranges
- IP Addresses
- VLANs

NetBox News

NetBox Labs Has Raised Our $35M Series B
The post NetBox Labs Has Raised Our $35M Series B appeared first on NetBox Labs.

Ansible Tags: A Detailed Tutorial to Get Started
Ansible tags provide a powerful way to selectively execute tasks and manage playbook runs, allowing for greater control and flexibility in your automation workflows. In this post, we&#8217;ll look at how to use Ansible tags to control task executions in a playbook, how to assign tags to blocks and plays, how to use special tags [&#8230;] The post Ansible Tags: A Detailed Tutorial to Get Started appeared first on NetBox Labs.

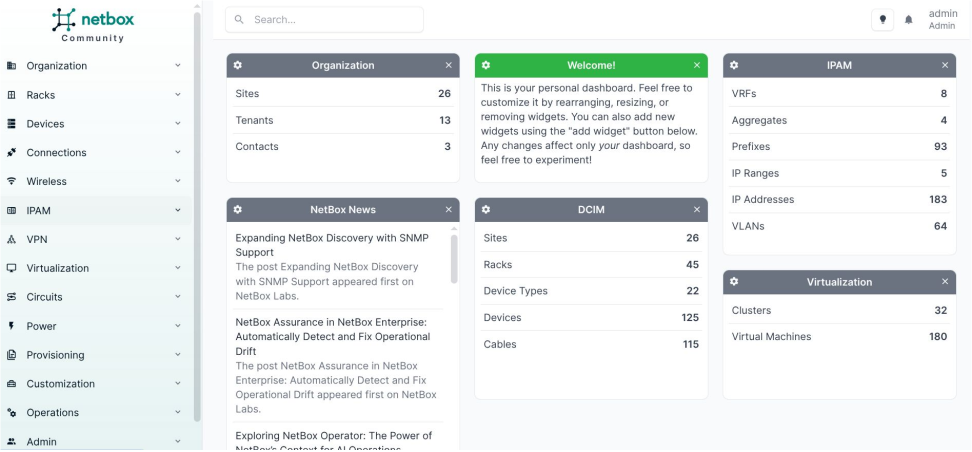
Circuits

DCIM

NetBox Community v4.3.4
Get Cloud | Get Enterprise

Demo - Manual Provisioning

- NetBox documents both physical and logical components of your network
    - Physical: Racks, Devices, Connections, etc.
    - Logical: IPs, VPNs, VMs, etc.
    - http://localhost:8000/



Organization

Sites	26
Tenants	13
Contacts	3

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IPAM

VRFs	8
Aggregates	4
Prefixes	93
IP Ranges	5
IP Addresses	183
VLANs	64

NetBox News

Expanding NetBox Discovery with SNMP Support
The post Expanding NetBox Discovery with SNMP Support appeared first on NetBox Labs.

NetBox Assurance in NetBox Enterprise: Automatically Detect and Fix Operational Drift
The post NetBox Assurance in NetBox Enterprise: Automatically Detect and Fix Operational Drift appeared first on NetBox Labs.

Exploring NetBox Operator: The Power of NetBox's Context for AI Operations

DCIM

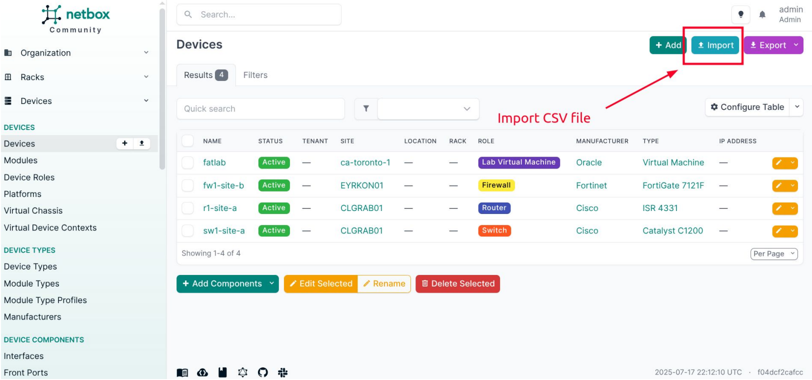
Sites	26
Racks	45
Device Types	22
Devices	125
Cables	115

Virtualization

Clusters	32
Virtual Machines	180

Demo - CSV Imports

- CSV file imports are supported
- Try importing a list of devices:
  - http://localhost:8000/dcim/devices/
- Can be used to bulk load multiple inventory objects
- However, more complex load jobs should be scripted



Devices

Import CSV file

NAME	STATUS	TENANT	SITE	LOCATION	RACK	ROLE	MANUFACTURER	TYPE	IP ADDRESS
fatlab	Active	—	ca-toronto-1	—	—	Lab Virtual Machine	Oracle	Virtual Machine	—
fw1-site-b	Active	—	EYRKON01	—	—	Firewall	Fortinet	FortiGate 7121F	—
r1-site-a	Active	—	CLGRAB01	—	—	Router	Cisco	ISR 4331	—
sw1-site-a	Active	—	CLGRAB01	—	—	Switch	Cisco	Catalyst C1200	—

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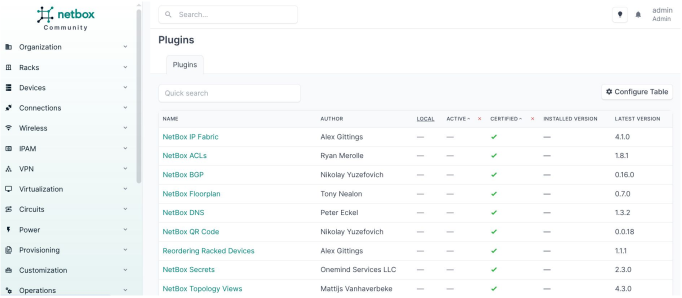
Demo - Plugins

- Packaged Django apps that can be installed alongside NetBox
- Provides custom functionality not present in core NetBox application
- Plugin Architecture allows for:
  - New data models
  - New URLs and forms in the webapp
  - New navigation menu items for plugin content
- Plugins Available:
  - http://localhost:8000/core/plugins/



Plugins

NAME	AUTHOR	LOCAL	ACTIVE	CERTIFIED	INSTALLED VERSION	LATEST VERSION
NetBox IP Fabric	Alex Gittings	—	—	✓	—	4.1.0
NetBox ACLs	Ryan Merolle	—	—	✓	—	1.8.1
NetBox BGP	Nikolay Yuzefovich	—	—	✓	—	0.16.0
NetBox Floorplan	Tony Nealon	—	—	✓	—	0.7.0
NetBox DNS	Peter Eckel	—	—	✓	—	1.3.2
NetBox QR Code	Nikolay Yuzefovich	—	—	✓	—	0.0.18
Reordering Racked Devices	Alex Gittings	—	—	✓	—	1.1.1
NetBox Secrets	Onemind Services LLC	—	—	✓	—	2.3.0
NetBox Topology Views	Mattijs Vanhaverbeke	—	—	✓	—	4.3.0

Feature - Configuration Rendering

- Render network configurations on the fly using jinja2 templating
- Use inventory updates to push network device configurations
- Example:

```
! Basic Cisco IOS config for {{ device.name }}

hostname {{ device.name }}

{% for iface in device.interfaces.all() %}
interface {{ iface.name }}
  description {{ iface.description or "Interface for " ~ device.name }}
  {%- for ip in iface.ip_addresses.all() %}
    {%- if ip.family == 4 %}
  ip address {{ ip.address }}
    {%- elif ip.family == 6 %}
  ipv6 address {{ ip.address }}
    {%- endif %}
  {%- endfor %}
{% endfor %}
```

Demo - Data Extraction

- NetBox supports a simple REPL (CLI)
- This can be used for ad-hoc queries, reports, scripts, etc.
- Example:

```
$ docker exec -it netboxdemo-netbox-1 python3 manage.py nbshell

…
>>> from dcim.models import Site
>>> all_sites = Site.objects.all()
>>> for site in all_sites:
...     print(site.name)
```

- Syntax also supported using the NetBox API

Demo - Ansible Inventory

- NetBox supports seamless ansible integration

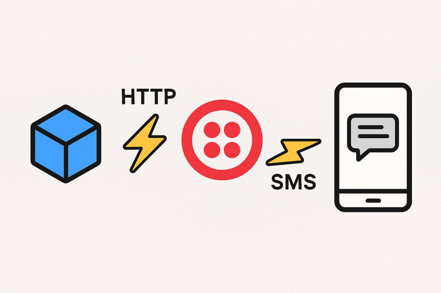
```
$ ansible-galaxy collection install netbox.netbox
$ ansible-galaxy collection list | grep netbox

$ cat netbox_inventory.yml
plugin: netbox.netbox.nb_inventory
api_endpoint: https://your-netbox-url.com
token: YOUR_NETBOX_API_TOKEN

$ ansible-inventory -i netbox_inventory.yml --graph
$ ansible all -i netbox_inventory.yml -m ping
```

Feature - Custom Scripts

- Allows users to execute custom logic from within the NetBox UI
- Used to accomplish tasks such as:
  - Fetching data from an external source and import it to NetBox
  - Updating objects with invalid or incomplete data
  - Validating the integrity of data
  - Automatically populating new devices and device attributes
- GUI interface to drive custom scripts:
  - http://localhost:8000/extras/scripts/

Demo - Event Rules

- Offers a powerful way to automate tasks
- "Events" in NetBox can be processed by Event Rules
- These Event Rules can trigger webhooks, notifications or scripts
- Benefits
  - **Automation**: Trigger configuration jobs in Ansible, Nornir, etc.
  - **ChatOps**: Push real-time change alerts to Slack, G-Chat, etc.
  - **Data Sync**: Keep other systems like DNS instantly updated.
- http://localhost:8000/extras/event-rules/



NetBox Pros & Cons

Pros

- ✔ One single inventory database - Clears up spreadsheet sprawl
- ✔ Integration and automation are made easy
- ✔ Self-hosting is trivial

Cons

- ✖ Documentation is light - detective work required
- ✖ Challenging to troubleshoot custom script issues
- ✖ Overkill for most hobbyists

Summary

- NetBox is the single source of truth for your network infrastructure
- It models physical assets - racks, devices, cables
- It also models logical resources - IP addresses, VLANs
- It offers features that drive network automation
  - Keeps your live network synchronized with the desired state

Resources

- **Main NetBox Site** - https://netboxlabs.com/
- **NetBox on GitHub** -https://github.com/netbox-community/netbox
- **NetBox Docs** - https://NetBoxlabs.com/docs/NetBox/
- **Public NetBox Demo** - https://demo.NetBox.dev/
- **NetBox Video Series** - https://www.youtube.com/@NetBoxLabs
- **NetBox Community Slack** - https://netdev.chat/
- **Presentation Slides & Demo** - https://github.com/netserf/netsig-presentation-netbox-for-newbies

Questions

netbox

NetSig

Possible Future Discussions

- Monitoring
  - Prometheus / Grafana
  - Loki
  - osquery
- CI / CD
  - GitHub Actions
  - Woodpecker CI
- Workflow Automation
  - n8n
- Pub-Sub
  - Kafka
  - RabbitMQ