Intro to SoT & NetBox

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Sources of Truth

Understanding their role in your network

What is a Source of Truth?

Let’s say I want to build a house...

How do we build a house?

- **Gather requirements**
  - How many bedrooms? How many bathrooms? How many cars in the garage?
- **Draft a design**
  - General layout of floors and rooms
- **Create blueprints**
  - Submit design to an architect to generate detailed plans
- **Build it**
  - Hire a builder, source materials, and begin construction
- **Inspect the completed product** to check that it meets your specifications

How do we build a ~~house~~ network?

- **Gather requirements**
  - How many bedrooms? How many bathrooms? How many cars in the garage?
- **Draft a design**
  - General layout of floors and rooms
- **Create blueprints** source of truth
  - Submit design to an architect to generate detailed plans
- **Build it**
  - Hire a builder, source materials, and begin construction
- **Inspect the completed product** to check that it meets your specifications

monitoring

What is a Source of Truth?

The **functional** **authority** for a **domain** of data

- **Functional:** What people actually use (versus the official source)
- **Authority:** The single, definitive source for information
- **Domain:** The scope of information contained by the authority

A Source of Truth is Functional

- Where is it?
- Who is responsible for its maintenance?
- How do I authenticate to it?
- How can I extract data from it?
- How can I submit new data to it?

If you can't answer *all* of these questions,
it's **NOT** a source of truth!

A Source of Truth is Authoritative

- A SoT is the **single** authority for the data it contains
- Information may be replicated to multiple systems from the authority
  - Conflicts among multiple systems are resolved by referring to the SoT
- If two systems are considered authoritative for the same data, neither is
- Does that mean you can only have one SoT?

A Source of Truth has a Domain

- Each SoT must have a well-defined domain for which it serves as the authority
- Domains can cross-reference but **must not** overlap
  - Ex: Linking from an IPAM application to a DCIM database
- Domain size is arbitrary; some may be very small
- The mapping of individual solutions to domains depends on your organization's unique needs; there is no one-size-fits-all solution

Sources of Truth in Networking

What About Monitoring?

Source of Truth

- Represents *intended* state
- Defined by humans
- Stored statically in databases, files
- Changes to meet new requirements

Monitoring

- Represents *operational* state
- Defined by reality
- Exists as the aggregate state of all network devices
- Changes in response to both planned and unplanned events

Modeling Data

- A SoT needs a way to store data
- Can be anything from a collection of files to a relational database
- Different solutions for different roles (examples below)

Domain	Solution
IP address management (IPAM)	Web application w/SQL database
Configuration templates	Jinja2 files
Firewall rules	YAML files
Communication circuits	Spreadsheet

Review: Source of Truth

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NetBox

Using NetBox as a Network SoT

Search All Objects Search

Organization

Sites 21
Geographic locations

Tenants 4
Customers or departments

DCIM

Racks 1071
Equipment racks, optionally organized by group

Device Types 106
Physical hardware models by manufacturer

Devices 8316
Rack-mounted network equipment, servers, and other devices

Connections

- Cables 37138
- Interfaces 20566
- Console 5970
- Power 9754

IPAM

VRFs 7
Virtual routing and forwarding tables

Aggregates 64
Top-level IP allocations

Prefixes 15761
IPv4 and IPv6 network assignments

IP Addresses 50217
Individual IPv4 and IPv6 addresses

VLANs 2783
Layer two domains, identified by VLAN ID

Circuits

Providers 62
Organizations which provide circuit connectivity

Circuits 607
Communication links for Internet transit, peering, and other services

Virtualization

Secrets

Secrets 7891
Cryptographically secured secret data

Reports

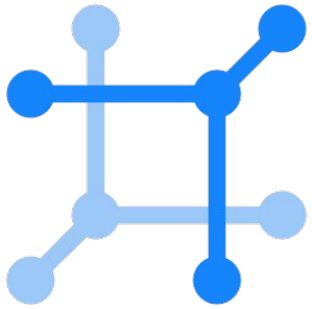
None found

Change Log

- Interface eth999
  jstretch - 2020-09-04 19:06
- Console Server Port CSP1
  jstretch - 2020-09-02 17:38
- Console Port Console
  jstretch - 2020-09-02 17:38
- Front Port FP1
  jstretch - 2020-09-02 17:37
- Rear Port RP1
  jstretch - 2020-09-02 17:36
- Interface ge-0/0/0

Why NetBox?

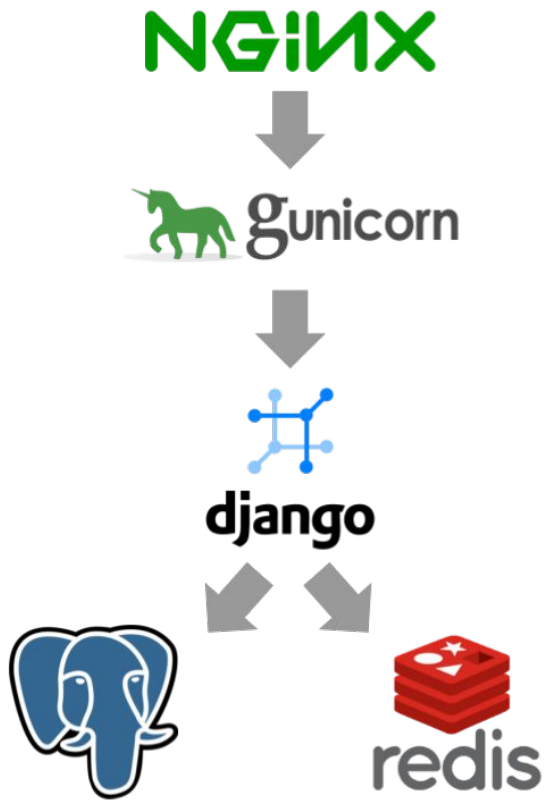
- Developed specifically to function as a general-purpose network SoT
  - Built-in data models for DCIM, IPAM, and more
- Rich feature set with numerous integrations
  - REST API, webhooks, custom scripts, export templates, etc.
- Extensibility supported through plugins
- Open source (Apache 2 license)



netbox

Application Architecture

HTTP daemon	**nginx or Apache** Handles HTTP requests
Application	**Django/Python** Framework for application logic
WSGI	**gunicorn or uWSGI** WSGI middleware
Database	**PostgreSQL** Relational database
Queuing/caching	**Redis** In-memory key-value store



Design Philosophy

- **Replicate the real world**
  - Data model is tightly coupled to real-world constraints
- **Function as a source of truth for the network**
  - Use NetBox to provision devices, not vice versa
- **Keep things simple**
  - High value and ease of maintenance are preferred over 100% complete solutions

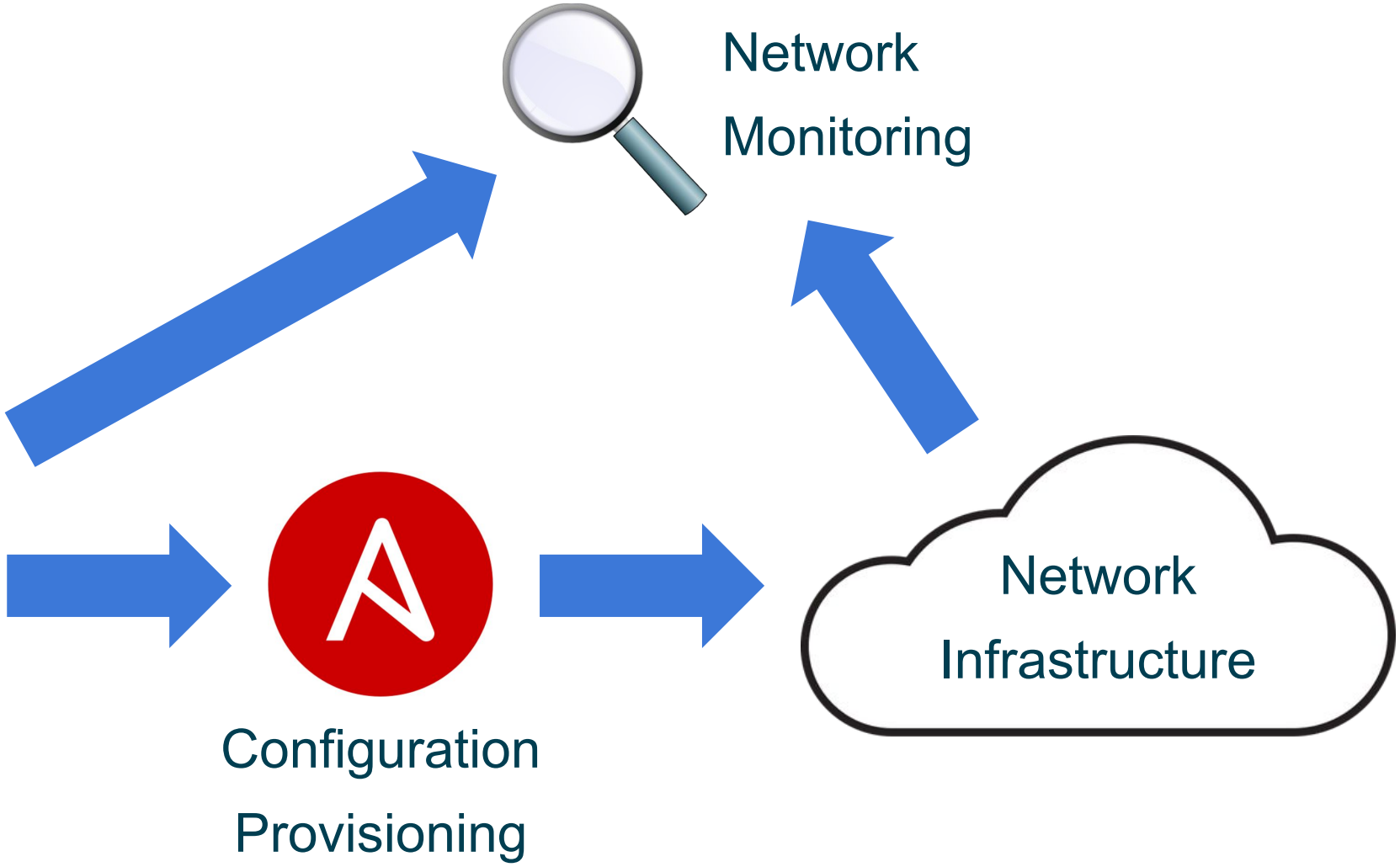
Where NetBox Fits In

Sources of Truth

netbox

Jinja

GitHub



Getting Started

github.com/netbox-community/netbox

Code

netbox.readthedocs.io

Documentation

#netbox on networktocode.slack.com

netbox-discuss@googlegroups.com

Community

Questions?