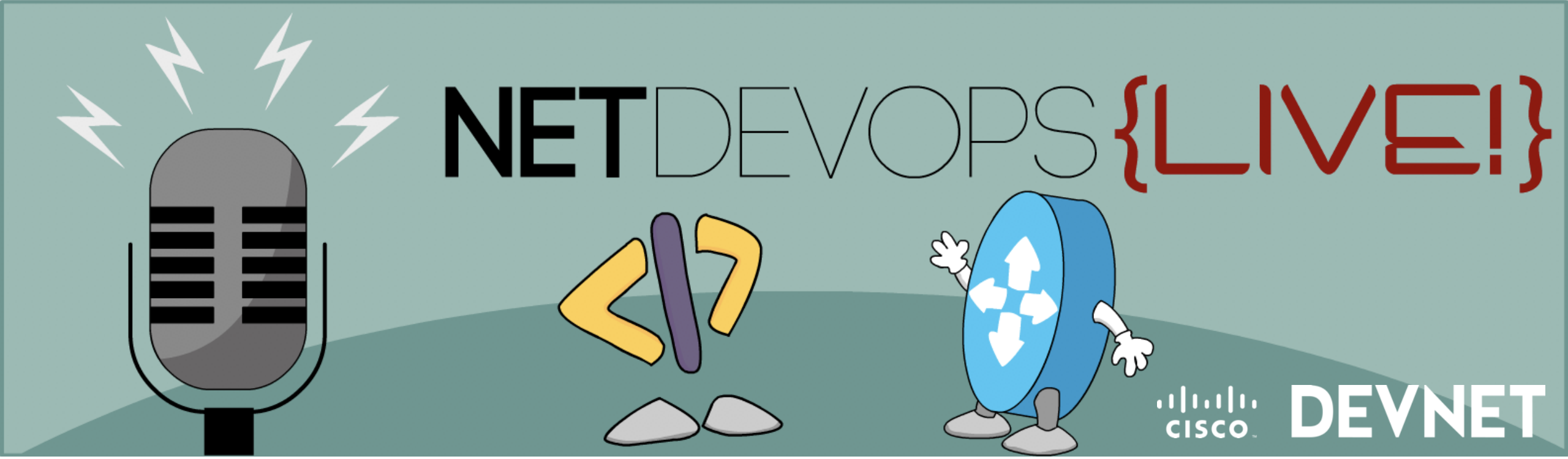


Managing network configurations with Python automation frameworks Napalm and Nornir

Stuart Clark

Network Automation Evangelist

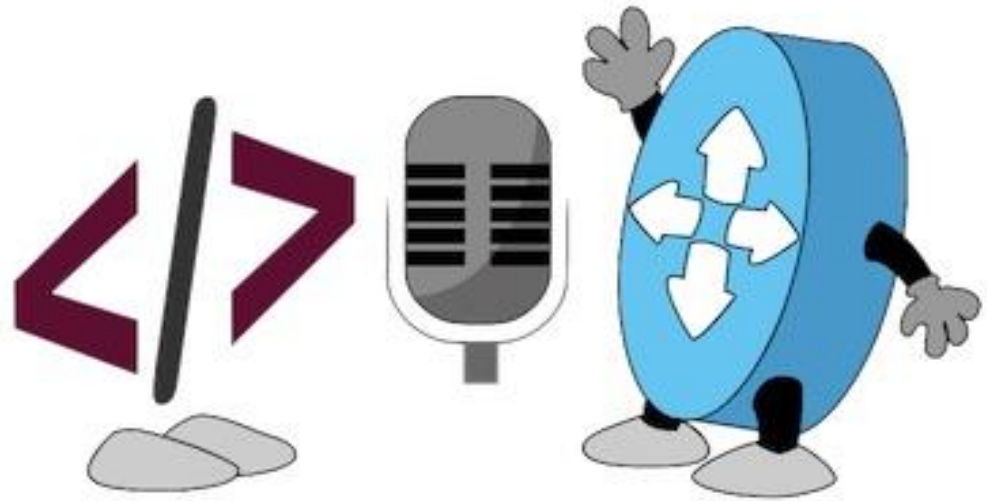
Twitter: @bigevilbeard

Season 1, Talk 9

https://developer.cisco.com/netdevops/live

What are we going to talk about?

- What is Napalm
- How Napalm can be used on our network devices
- Gathering facts and configuring our network with Napalm
- What is Nornir
- Driving Nornir through Python code
- Nornir example



About Napalm

Napalm (Network Automation and Programmability Abstraction Layer with Multivendor support) is a Python library that implements a set of functions to interact with different network device Operating Systems using a unified API.

Napalm Installation

- Napalm is published to PyPI and can be installed like most other Python packages using the pip tool.
- You can verify that you have pip installed by typing:

```
(venv) STUACLAR-M-R6EU:~ stuaclar$ pip --version
pip 18.0 from /Users/stuaclar/venv/lib/python3.6/site-packages/pip (python 3.6)


(venv) STUACLAR-M-R6EU:~ stuaclar$ pip install napalm
Collecting napalm
  Downloading
https://files.pythonhosted.org/packages/5f/39/da646ec49c2f99b153ebeff3a764b4f59e02a38650f1b638bde23966f58f/napalm-
2.3.2.tar.gz (152kB)
[...]
[...]
Successfully installed MarkupSafe-1.0 asn1crypto-0.24.0 bcrypt-3.1.4 cffi-1.11.5 cryptography-2.3.1 future-0.16.0
idna-2.7 jinja2-2.10 junos-eznc-2.2.0 lxml-4.2.4 napalm-2.3.2 ncclient-0.6.2 netaddr-0.7.19 netmiko-2.2.2 paramiko-
2.4.1 pyIOSXR-0.53 pyYAML-3.13 pyasn1-0.4.4 pycparser-2.18 pyeapi-0.8.2 pynacl-1.2.1 pynxos-0.0.3 pyserial-3.4 scp-
0.11.0 selectors2-2.0.1 setuptools-40.2.0 textfsm-0.4.1
```

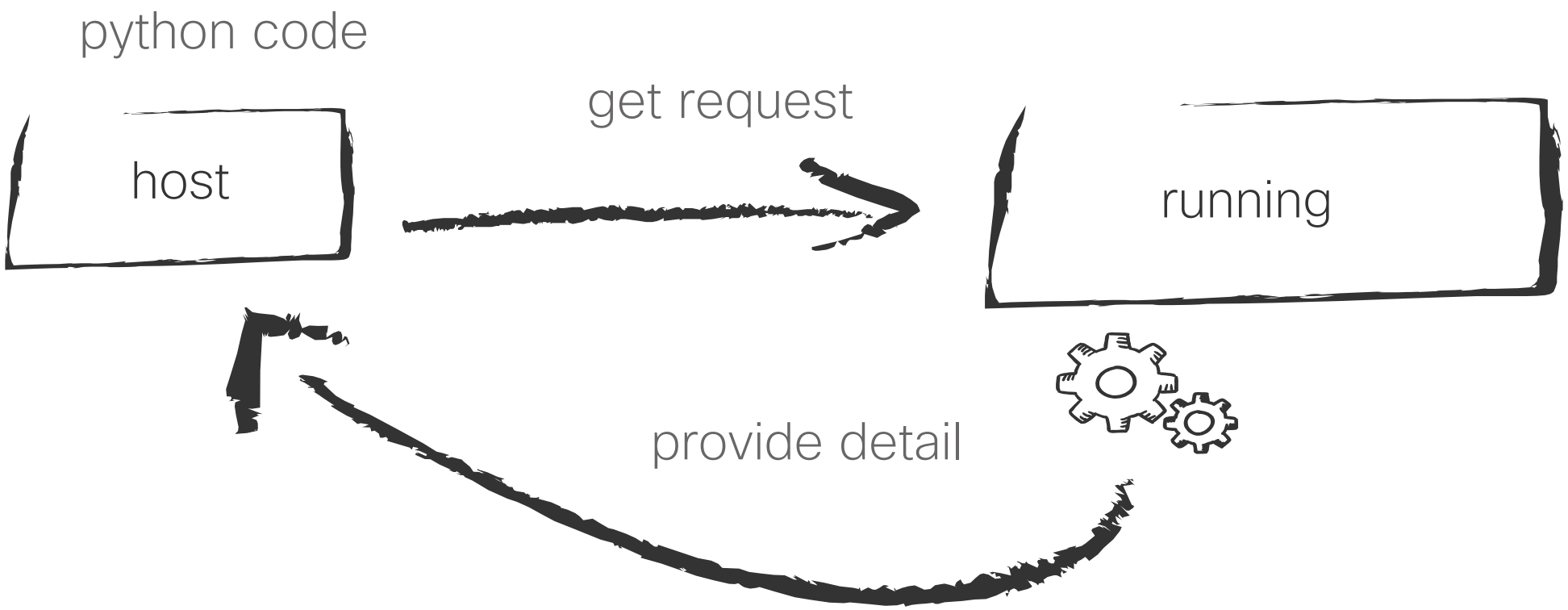
Content edited for presentation brevity and clarity

Napalm Support Matrix

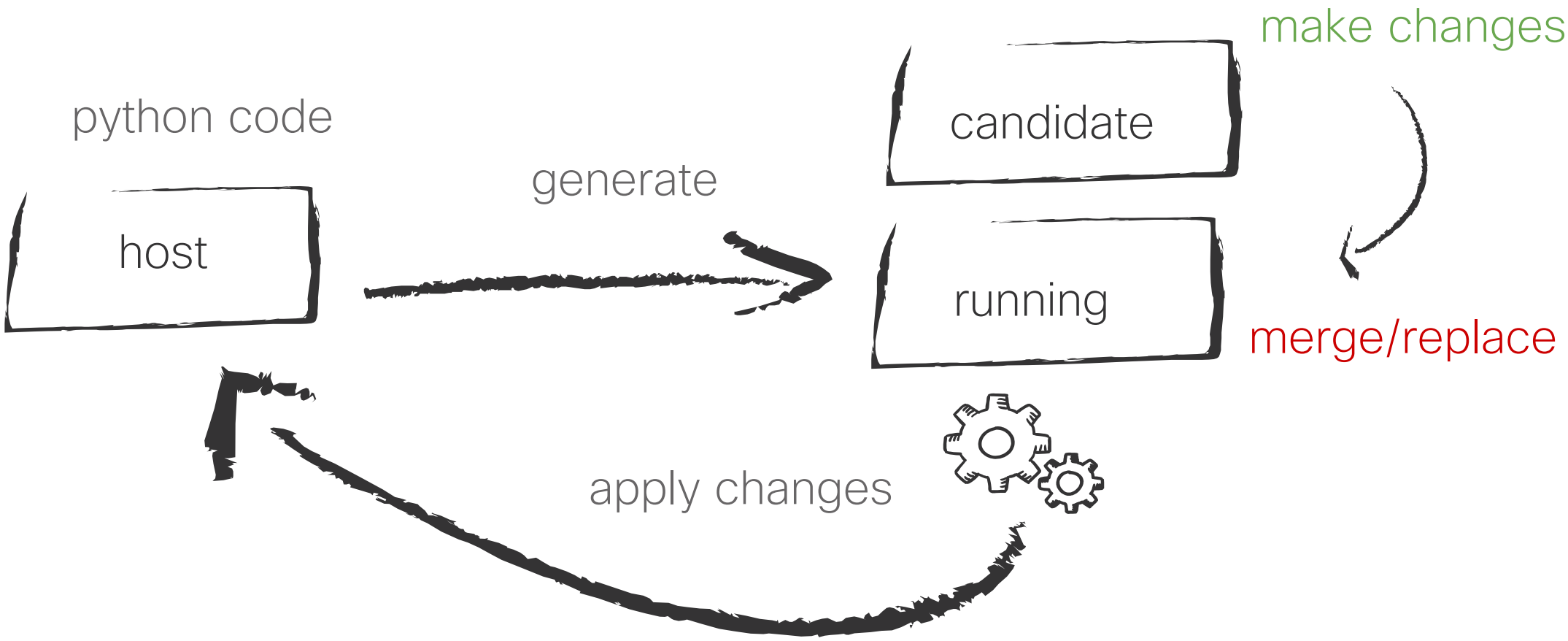
	IOS-XR	NXOS	NX-OS SSH	IOS	EOS	Junos
Driver Name	iosxr	nxos	nxos_ssh	ios	eos	junos
Structured data	no	Yes	No	No	Yes	Yes
Minimum version	5.1.0	6.1		12.4(20)T	4.15.0F	12.1
Backend library	pylOSXR	pynxos	netmiko	netmiko	pyeapi	junos-eznc

NX-API support on the Nexus 5k, 6k and 7k families was introduced in version 7.2 NX-OS.
SSH driver will support earlier versions of NX-OS and uses unstructured data

Napalm Data Gathering



Napalm Deployment Operations



What can you do with Napalm? (part 1)

- Configuration replace
  - Replace the entire running-configuration with a completely new configuration

or

- Configuration merge
  - Merge a set of changes from a file into the running-configuration
- Configuration compare
  - Compare your new proposed configuration file with the running-configuration.(This only applies to configuration replace operations; it does not apply to merge operations)

What can you do with Napalm? (part 2)

- Discard
  - Revert the candidate configuration file back to the current running-configuration; reset the merge configuration file back to an empty file
- Commit
  - Deploy the staged configuration. This can be either an entire new file (for replace operations) or a merge file
- Rollback
  - Revert the running configuration back to a file that was saved prior to the previous commit

Napalm Demo

Introduction to Nornir

- Nornir is an automation framework written in Python.
- What makes Nornir different is that you write Python code in order to use Nornir.
- This is to be compared to other frameworks which typically use their own configuration language.

Nornir Installation

- Nornir is published to PyPI and can be installed like most other Python packages using the pip tool.
- You can verify that you have pip installed by typing:

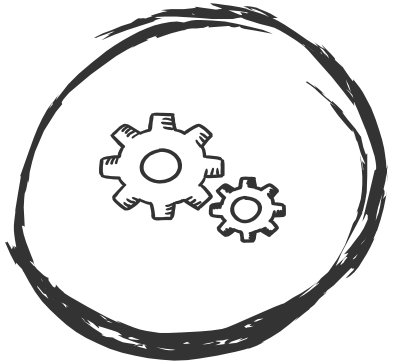
```
(venv) STUACLAR-M-R6EU:~ stuaclar$ pip --version
pip 18.0 from /Users/stuaclar/venv/lib/python3.6/site-packages/pip (python 3.6)


(venv) STUACLAR-M-R6EU:~ stuaclar$ pip install nornir
Collecting nornir
  Downloading
https://files.pythonhosted.org/packages/f0/d4/7fff83e24f7c51916a71405b23b2accd6d8c883ed73e32dbacf3d7c2
9d14/nornir-1.1.0.tar.gz
Collecting colorama (from nornir)
[...]
[...]
Successfully installed colorama-0.3.9 netmiko-2.2.2 nornir-1.1.0 ruamel.yaml-0.15.72
```

Content edited for presentation brevity and clarity

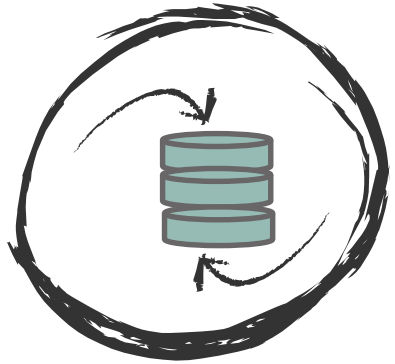
Inventory Files

Nornir has a *SimpleInventory* plugin which uses two YAML files

- hosts.yaml
- groups.yaml



Retrieving Real Time Device Data



Retrieve Additional Information

The Nornir Inventory Files

Groups

```
---
routers:
    nornir_username: vagrant
    nornir_password: vagrant
    nornir_nos: iosxr
    nornir_ssh_port: 2221
```

Hosts

```
---
rtr1:
    groups:
        - routers
    nornir_host: 127.0.0.1
```

Nornir Demo

How to contribute to Napalm and Nornir

- Spread the word about Napalm and Nornir
- Suggest great features
- Report bugs
- Fix typos
- Write documentation
- Contribute your plugins
- Improve the Napalm and Nornir core

What did we Talk about?

- What is Napalm
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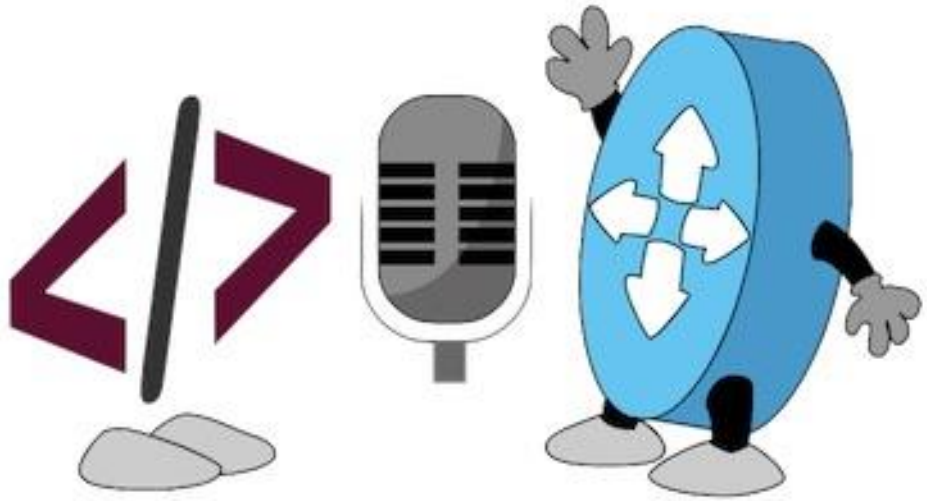
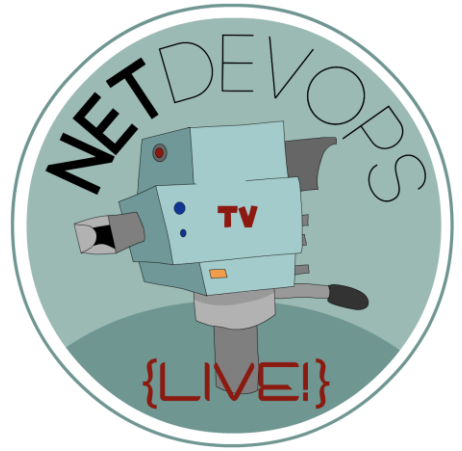
- Nornir example

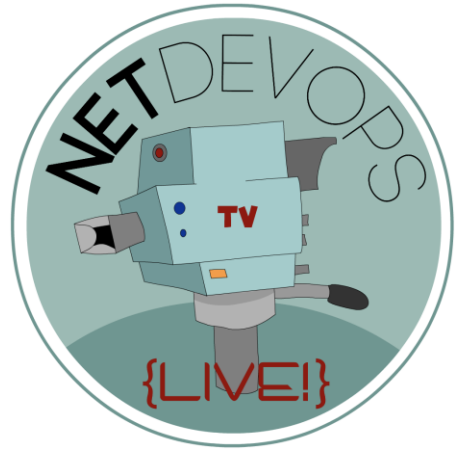


Webinar Resource List



- Napalm Resources
  - GitHub - https://github.com/napalm-automation/napalm
  - Docs - https://napalm.readthedocs.io
- Nornir Resources
  - GitHub - https://github.com/nornir-automation/nornir
  - Docs - https://nornir.readthedocs.io

Webinar Resource List

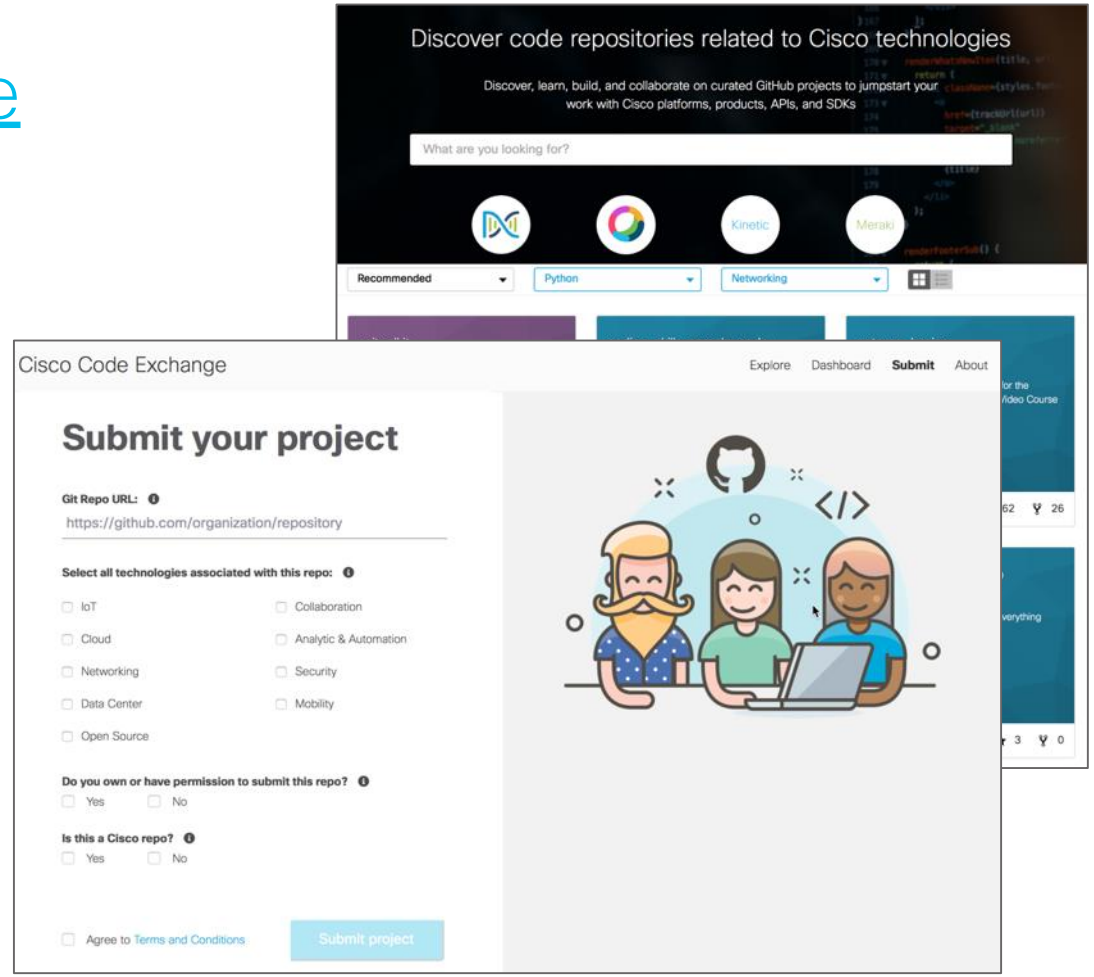


- Docs and Links
  - https://developer.cisco.com/python
- Learning Labs
  - Laptop Setup http://cs.co/lab-dev-setup
  - Intro to Coding Fundamentals http://cs.co/lab-coding-fundamentals
- DevNet Sandboxes
  - IOS Always On http://cs.co/sbx-iosxe
  - NX-OS Always On http://cs.co/sbx-nxos
  - IOS XR Programmability http://cs.co/sbx-iosxr
- Code Samples
  - https://github.com/bigevilbeard/netdevops_napalm_nornir

NetDevOps Live! Code Exchange Challenge

developer.cisco.com/codeexchange

Create python scripts using Napalm and Nornir.



Example: Create interfaces, routing, NTP configurations or ACL's, validate your configurations!

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- NetDevOps Blogs
  blogs.cisco.com/tag/netdevops
- Network Programmability Basics Video Course
  developer.cisco.com/video/net-prog-basics/

Got more questions? Stay in touch!

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http://github.com/bigevilbeard

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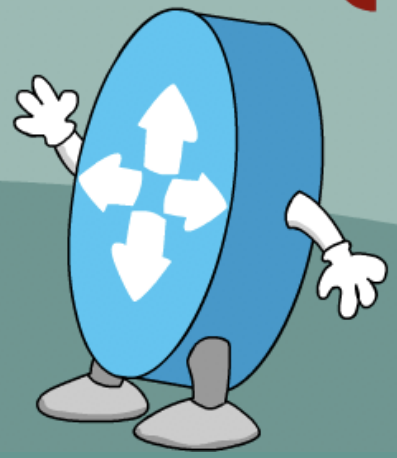

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