Automating Multi-Vendor Networks

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Arista Networks
The “Crosshead” screw

- Credited to John P. Thompson in 1932
- Sold to Henry F. Phillips in 1935
- Thompson struggled to get into manufacturing and gain industry support
- Granted the first patent in 1932 for the screw and in 1933 for the screwdriver
Why Did We Need Another?

- The slot varied by screw size and required a closely matched bit on the driver.
- Alignment with the bit to the screw aperture is difficult.
- The bit often slips out since both ends are open.
The Right Tool For the Job

- The Phillips screw overcomes the problems of the slotted screw

However....

- Single slot screws (aka flat head) are still quite prevalent

- In certain applications, one may be better than the other

- Hardware stores sell both along with many other types
How’s this tie into Multi-Vendor Network Automation?

- Lots of choices when it comes to automation
  - Choose the one that’s right for you

- Ansible, Puppet, Chef, Salt etc are all great and very powerful

So what/where to start?
"The first rule of any technology used in a business is that automation applied to an efficient operation will magnify the efficiency. The second is that automation applied to an inefficient operation will magnify the inefficiency - Bill Gates"
- Napalm simplifies the communication to network devices
- Uses modern API’s for interaction
- Simply provide the credentials and transport and you’re off!
Napalm
Network Automation and Programmability Abstraction Layer with Multivendor support
Why not netmiko or paramiko?

Goes back to the
Nornir - Formally Brigade

- Written completely in Python
- Purpose built for network automation
- Easy to debug - use Python tools!
- Manages inventory of devices
Parallel Task Execution

- Allows you to define how many “workers” you’d like (default is 20)
- 1 worker means everything is processed serially
- Tasks create more tasks which then run in serial
```yaml
core:
  num_workers: 100

inventory:
  plugin: nornir.plugins.inventory.simple.SimpleInventory
  options:
    host_file: "inventory/hosts.yaml"
    group_file: "inventory/groups.yaml"
    defaults_file: "inventory/defaults.yaml"
```
Inventory consists of three items:

- Hosts - Individual devices
- Groups - Groups of devices
- Defaults - Default values for all devices

SimpleInventory (default) uses YAML
- Network Source of Truth (NSOT)
- Netbox
- Ansible
Sample inventory/hosts.yaml

```yaml
[teren@nornir:~/nornir$ cat inventory/hosts.yaml
---
arista-eos.all:
  hostname: 192.168.3.61
  port: 443
  platform: eos
  groups:
    - eos
  data:
    role: leaf

cisco-nxos.all:
  hostname: 192.168.3.62
  port: 443
  platform: nxos
  groups:
    - nxos
  data:
    role: leaf

juniper-qfx.all:
  hostname: 192.168.3.63
  platform: junos
  groups:
    - junos
  data:
    role: leaf
```
Putting Nornir and Napalm together

- Napalm is a plugin for Nornir
  - Could use netmiko or paramiko instead

- Nornir uses Napalm to handle all device communication
Putting Nornir and Napalm together

```python
[teren@nornir:~/nornir]$ cat facts.py
from nornir import InitNornir
from nornir.plugins.functions.text import print_result

nr = InitNornir(config_file="config.yaml")

from nornir.plugins.tasks.networking import napalm_get

leafs = nr.filter(role="leaf")

r = leafs.run(name="Get facts", task=napalm_get, getters=["facts"])

print_result(r)
```
Demo Time

Configuration/state auditing and a few changes
Arista (eos), Cisco (nxos) and Juniper (junos)
Getting basic info like model from the devices
Running the 'show version' command on all devices
Adding a vlan to all devices
Show arp across all devices
Additional Resources

- https://github.com/dravetech/nornir-workshop - Start here!
- https://github.com/nornir-automation/nornir
- https://github.com/napalm-automation/napalm

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