USING NETWORK AUTOMATION TO REPLACE

POOR DOCUMENTATION



A TALK ABOUT...

- Autogenerating network documentation
- Best practices (that I didn't necessarily follow)



Who am I?



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- Network (automation) engineer
- AS12929, AS198309, AS25400
- blog.automate.network



ALTHOUGH I TALK ABOUT BAD DOCUMENTATION. IT IS NOT MY INTENTION TO SHAME ANY INDIVIDUAL WHO MAY HAVE WORKED ON THIS NETWORK OR THE DOCUMENTATION AT ANY PRIOR POINT









SO LONG! All the documentation is on the Network drive...

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RESOURCES ____ SERVICES



RESOURCES AND SERVICES ARE INHERENTLY DIFFERENT

- Resources are assigned, and have life cycles
- Resources can have pools, assignment policies
- Services include resources and connections between them
- Resources are owned by services
- Services are owned by products and customers (or infra)

RESOURCE DOCUMENTATION



THE GOAL

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SEARCHABLE SERVICE DOCUMENTATION





- 1. Write a Nokia SROS parser
- 2. Write a backend to store it in
- 3. Write a pretty front-end
- 4. ???
- 5. Profit!



THIS TOOK A FEW ATTEMPTS . . . (ACTUAL SCREENSHOT)



dyu2742@C02VM0DQHTDF: ~/Dev/timosparser

parse.py parser.fuckingfuck.py parser.py

FIRST VERSION

LOTS OF REGEX

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```
emacs -nw flat_parser.py
```

Elpy Flymake YASnippet Help 0-9]+)\s', line).group(1)

ts'] = list()

```
([0-9/]+)\s*$', line)
```

```
ts'].append(portres.group(1))
```

```
s[a-zA-Z0-9-]+)? ospf', line) is not None:
```

not None:

```
:\s[a-zA-Z0-9-]+)? ospf(?:\s[0-9]+)? area [0-9.]+ interface
```

```
nterfaces:
ame] = OSPFInterface()
.parse(line)
```

```
?:[a-zA-Z0-9-]+)? mpls', line) is not None:
outer\s?(?:[a-zA-Z0-9-]+)? mpls path "([^"]+)"', line)
```

vel (Python || Flymake[**53 3**] Elpy EditorConfig ivy emc Undo-Tree

BUT BECAME BETTER IN THE END

```
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                                                    emacs -nw flat_parser.py
File Edit Options Buffers Tools Python Virtual Envs Elpy Flymake YASnippet Help
     class RoutingOptions(GenericParser):
          Object for collecting various routing options for a node
         parsers = [
             ('autonomous_system', re.compile(
                 r'^/configure router(?:\s[a-zA-Z0-9]+)? bgp local-as ([0-9]+)\s*$')),
             ('bgp_afi_enabled', re.compile(
                 r'^/configure router(?:\s[a-zA-Z0-9]+)? bgp family (.+)\s*$')),
             ('router_id', re.compile(
                 r'^/configure router(?:\s[a-zA-Z0-9]+)? bgp router-id (\d+\.\d+\.\d+\.\d+)\s*$')),
    class Port(GenericParser):
         parsers = [
             ('name', re.compile(r'^/configure port ([0-9/]+)\s*')),
             ('description', re.compile(
                 r'^/configure port [0-9/]+ description "(.+)"\s*$')),
             ('admin_down', re.compile(r'^/configure port [0-9/]+ shutdown')),
             ('ethernet', re.compile(r'^/configure port [0-9/]+ ethernet\s*$')),
             ('ethernet_mode', re.compile(
                 r'^/configure port [0-9/]+ ethernet mode ([a-z0-9-]+)\s*$')),
             ('ethernet_encapsulation', re.compile(
                 r'^/configure port [0-9/]+ ethernet encap-type ([a-z0-9-]+)\s*$'))
    class Routed_interface(GenericParser):
        parsers = [
             ('name', re.compile(
                 r'interface "([^"]+)"\s*'
             )),
             ('ipv4_address', re.compile(
                <pr'interface "[^"]+" address (\d+\.\d+\.\d+\.\d+/\d+)\s*$')),</pre>
 105
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In: Routed_interface()
```

PROBABLY DON'T WRITE YOUR OWN Parser

TAKEAWAYS

POSSIBLY BETTER WAYS

Netconf/YANG models where supported

TextFSM

show configuration | display json



DJANGO

- Easy to write
- Simple ORM
- Django-Rest-Framework for easy REST
- Alternatives exist, but ease is king

SOME LESSONS

- Use natural keys when possible!
 - If hostname is unique, it's the key
- Beware of human input errors
 - Interface "int-1/2/3:10 " is not the same as "int-1/2/3:10"
- Beware of things that ought to be unique, but aren't
 - assigned how to resolve in a parser?

In SROS logical interfaces can exist twice if one has no physical interface

DEVELOPMENT STAGES



FINAL ARCHITECTURE



SOURCE OF TRUTH

- source of truth
- This piece of software is not yet capable of provisioning
- Maybe later...
- It's an excellent reference for the source of truth though

Unless you have very strict control over your data, your network is ALWAYS the



NEXT STEP

THE GUI



localhost	Ċ					<u> </u>	ð
Last Updated						Acti	ions
07/03/2020, 12:33:03		۲	VIEW NODE	۵	VIEW	CONFIG	
07/03/2020, 12:33:03		۲	VIEW NODE	۵	VIEW	CONFIG	
07/03/2020, 12:33:03		۲	VIEW NODE	۵	VIEW	CONFIG	
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07/03/2020, 12:33:03		۲	VIEW NODE	۵	VIEW	CONFIG	
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07/03/2020, 12:33:03		۲	VIEW NODE	8	VIEW	CONFIG	
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NEXT STEP

THE GUI



cript framework (Vue	VIEW NODE	VIEW CONFIG
07/03/2020, 12:33:03		VIEW CONFIG
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NODE OVERVIEW



localhost		Ċ			đ	0+
SYSTEM INTERFACES	STATIC ROUTES	OSPF	BGP	RSVP	VRFS	>
ription						- 1
core1.core						
core2.core						- 1
: White Atoms Technology C	orp					
: Blue Atoms Industries Inc.						
: Yellow Islands Services Cor	rp					
: Yellow Forks Consulting Inc	c.					
: Black Hill Medical Co						
: Green Clouds Systems Inc.						
: Magenta Arrow Consulting	Inc.					
: Magenta Lands Services In	с.					
: Brown Clouds Services Co						

SERVICE OVERVIEW



localhost		Ċ		<u></u>	ð +
	Search				٩
				```	,
	# In	terfaces	OSPF	BGP	
echnology Corp	15		No	Yes	
dustries Inc.	12		No	Yes	
Medical Corp	5		No	Yes	
Medical Ltd	12		No	Yes	
Services Corp	13		No	Yes	
onsulting Inc.	16		No	Yes	
ystems Corp	4		No	Yes	
roduction Inc.	8		No	Yes	
ical Co	7		No	Yes	
Nedical Co	6		No	Yes	
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DIAGRAMS

TEXT



Purple Islands Industries Ltd		
65452		
65123:800010		
65123:800010/65123:800010		
STATIC ROUTES	BGP	OSPF

# DIAGRAMS

- You can see an autogenerated diagram
- It shows nodes and interfaces for each VRF
- Ordered per site

Using Dagre-d3 library



**BGP CONFIG** 

• •			localhost		Ċ		
≡	Alcove Q 172.31.24	8.0/22					
₽	Nodes	VRF 800006					
0	VRFs	Description		В	lack Roads Systems Corp		
٩	L2VPNs	Autonomous System		6	5070		
	IPAM	Route Distinguisher		6	5123:800006		
		Route Target		6	5123:800006/65123:800006		
		DIAGRAM	INTERFACES	STATI	C ROUTES	BGP 05	SPF
		pe1.se-sto			pe1.jp-tyo		
		Group Name	800006		Group Name	800006	
		Description	BGP Peering with Black Roads Systems Corp		Description	BGP Peering with Bla Systems Corp	ck Roads
		Peer AS	65070		Peer AS	65070	
		Remove Private AS	Yes		Remove Private AS	Yes	
		Maximum Prefix Limit	10		Maximum Prefix Limit	10	
		Import Policies			Import Policies		
		RP_INBOUND_800006	~		RP_INBOUND_800006		~
© 20	20 Telia Company						

### **L2VPN DIAGRAMS**



## **L2VPN DIAGRAMS**

- L2VPNs are more complicated
- Graphing pseudowires between not
- Many sites become hard to read
- but it's "good enough"

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### **SEARCHING!**

			localhost	Ċ	▲ □
≡	Alcove Q 10.10	).254.181/30			
₽ 0	Nodes VRFs	L2VPN 900002			
>	L2VPNs	Description	Red Hill Sy	stems Corp	
	IPAM	Instance Type	vpls		
		Service Name			
		You entered a subnet. Do you want GENERATE REPORT 3Interfac int-1/1/6:1859 Cust: Black Atoms Production	to generate a usage report?	int-1/2/6:4038	
			pe2.dk-cph	int-1/2/6:4013	

### **SEARCHING!**

### You can search for either text strings or IP resources

### > IP subnets allow you to pull a list of all more specifics in use in the network.

IPAI

Instance Typ

Service Name

### Search Results

You entered a subnet. Do you want to GENERATE REPORT

3Interfac Ous

int-1/1/6:1859 Cust: Black Atoms Production Ir

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REPORTS

TEXT



localhost		C	1 0 +
0/22			
	Node	Object Name	VRF
	pe2.jp-tyo	PL_INBOUND_800000	
	pe2.it-fco	PL_INBOUND_800000	
	pe1.de-txl	PL_INBOUND_800000	
	pe1.no-osl	PL_INBOUND_800000	
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TEXT

### REPORTS

### This report shows all resources using more specifics from a supernet

Returns Interfaces, Prefix Lists, Static

Nodes

IPAM

Lists,	Static Rou	ıtes	Object Name	VRF
prefix_list	172.31.248.0/24	<u>pe2.jp-tyo</u>	PL_INBOUND_800000	
prefix_list	172.31.249.0/24	pe2.it-fco	PL_INBOUND_800000	
prefix_list	172.31.250.0/24	pe1.de-txl	PL_INBOUND_800000	
prefix_list	172.31.251.0/24	<u>pe1.no-osl</u>	PL_INBOUND_800000	
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localhost

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IP usage report for 172.31.248.0/22

### TAKEAWAYS

- You don't have to write the GUI as a standalone thing
- REST API is incredibly handy!
- Diagrams aren't that complicated if the target is "good enough"

### **REAL WORLD EXAMPLE OF REST USAGE**

```
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File Edit Options Buffers Tools Python Virtual Envs Elpy Flymake YASnippet Help
 #!/usr/bin/env python
from simple_rest_client.api import API
 def main():
 alcove = API(
 api_root_url="https://alcove.internal.url",
 json_encode_body=True
 alcove.add_resource(resource_name='nodes')
 response = alcove.nodes.retrieve('pe1.no-osl')
 nodes = response.body
 for interface in nodes["13interfaces"]:
 if interface["port_name"] == "1/1/2":
 print(f"service vprn {interface['vrf_name']}")
 print(f"interface {interface['name']}")
 print("ip-mtu 1500")
 if __name__ == '__main__':
 main()
-UU-:----F1 rest-example.py All L24 <N> (Python || Flymake[0 0] Elpy EditorConfig ivy emc Undo-Tree Wrap) ------
Mark set
```



emacs -nw rest-example.py

### CONCLUSIONS

- It is indeed possible to create service documentation automatically
- It can be done quite a lot simpler than I've done here as well
- This tool has become extremely useful for everyday operations
- I'm looking in to which components I can open source (if any)

# Thank you! **QUESTIONS?**