



NATIONAL CENTER FOR SUPERCOMPUTING APPLICATIONS

RESTful ain't Stressful
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NCSA | National Center for
Supercomputing Applications

I get to ask the questions first!

- How many folks here :
 - Have a network source of truth? (DCIM, IPAM, DB, spreadsheets)
 - Have spent countless hours auditing or updating manually ?

Agenda

- What is REST or REST API?
- How does it work?
- I am a network operator and why should I care?
- How to use RESTful interfaces and API endpoints?
 - Examples and hands-on exercises with Python
- RESTful interaction with network systems (real life scenarios)
 - Workflow based automation

Disclaimer - The “E” word

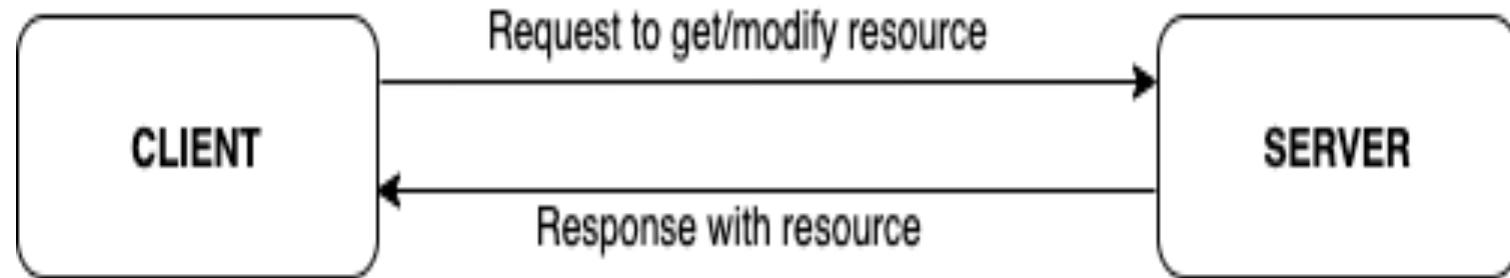
- Just an **Engineer**, not an **Expert**.
- Please correct me if I say something wrong!

REST - Representational State Transfer

- Architectural design of a web service
 - Client <<=>> Server architecture
- Web services offer “resources” (some information) over the web
- Clients send a request to the server to retrieve/modify resources
- Servers send responses (resource information) back to the client to these requests
- Designed to work on top of other existing protocols (HTTP/HTTPS)
- Stateless protocol (just like HTTP)
- REST != HTTP

What is a REST API?

- Programmable Interface to interact with a web service
- GET, PUSH, PUT, DELETE operations



REST and HTTP

- REST rides on top of http/https
- Follows same error codes as http/https

1xx – Informational

2xx – Operational success

3xx – Redirection

4xx – Client Error

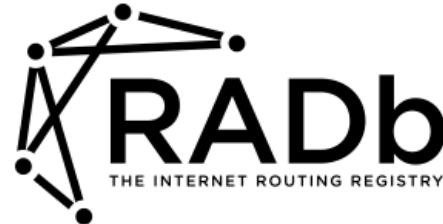
5xx – Server error

- REST URL comprises of : **BASE_URL + RESOURCE**

<http://whois.arin.net/rest/poc/KOSTE-ARIN>

I am a network operator and why should I care ?

Networking services/tools supporting REST API endpoints



(Almost every web service these days comes with a REST api)

Nagios®

Great! But how is this useful?

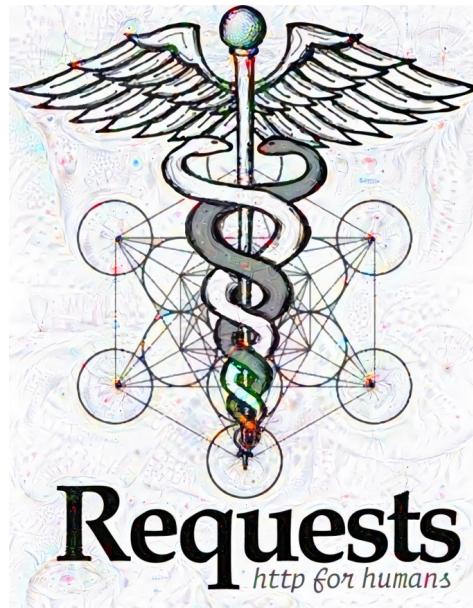
- REST API's are super handy for **Network Automation!**
- Scripts to pull/push data into a network management system

OR

- Automate things in general as a part of a larger workflow

How to use REST API endpoints?

- curl command
- Python ‘requests’ library



Examples – ARIN “Whois”

Go to this URL on your web browser:

<https://www.arin.net/resources/registry/whois/rws/api/>

search for “ARIN’s RESTful Resources” on the page

Point your browser to..

Online Python IDE :

<https://repl.it/languages/python3>

Github link for today's exercises and examples :

<https://github.com/netops2devops/rest-techx-2019>

Objective for the day

TODAY's OBJECTIVE

Extract AS-NAME for any given ASN using ARIN's REST API

Example-1a.py

```
1 # objective : To extract AS-NAME for any given ASN
2 # This script pulls info from whois records for ASN 1224
3
4 import requests
5
6 response = requests.get("https://whois.arin.net/rest/asn/AS1224")
7 print(response.text)
8 print()
9 print('WHAT A MESS')
```

Example-1b.py

```
1 # Objective : To extract AS-NAME for a given ASN
2
3 import requests
4
5 # Request server to send JSON formatted output
6 response = requests.get("https://whois.arin.net/rest/asn/AS1224.json")
7
8 # RESPONSE OUTPUT
9 print("-- JSON based output --\n")
10 print(response.text)
11 print("")
12 print("Ew! WHAT A MESS!")
```

Example-1c.py

```
1 # Objective : To extract AS-NAME for a given ASN  
2  
3 import requests  
4 import json  
5  
6 # Request server to send JSON formatted output  
7 response = requests.get("https://whois.arin.net/rest/asn/AS1224.json")  
8  
9 # LOAD response output as JSON | Let's make it look more readable  
10 data = json.loads(response.text)  
11 json_data = json.dumps(data, indent=4, sort_keys=True)  
12  
13 print("-- JSON formatted readable output --\n")  
14 print(json_data)
```

Example-1d.py

```
1 # Goal : To extract AS-NAME for a given ASN  
2  
3 import requests  
4 import json  
5  
6 response = requests.get("https://whois.arin.net/rest/asn/AS1224.json")  
7 data = json.loads(response.text)  
8 formatted_data = json.dumps(data, indent=4, sort_keys=True)  
9  
10 # Extracting relevant data and storing in variables  
11 asnum = data['asn']['endAsNumber']['$']  
12 asname = data['asn']['orgRef']['@name']  
13  
14 print("{0} => {1}".format(asnum, asname))
```

Example-1e.py

```
1 # Goal : To extract AS-NAME for ANY given ASN
2 |
3 import requests
4 import json
5 import sys
6
7 def GetASName(asn):
8     response = requests.get("https://whois.arin.net/rest/asn/AS{0}.json".format(asn))
9     data = json.loads(response.text)
10
11    asnum = data['asn']['endAsNumber']['$']
12    asname = data['asn']['orgRef']['@name']
13
14    #Formatted output
15    print("{0} => {1}".format(asnum, asname))
16
17 if __name__ == '__main__':
18     if len(sys.argv) != 2:
19         print("Invalid arguments")
20         exit()
21
22     else:
23         GetASName(sys.argv[1])
```

DIY exercise!

Go to the github repo :

<https://github.com/netops2devops/rest-techx-2019/>

Find the exercises folder and

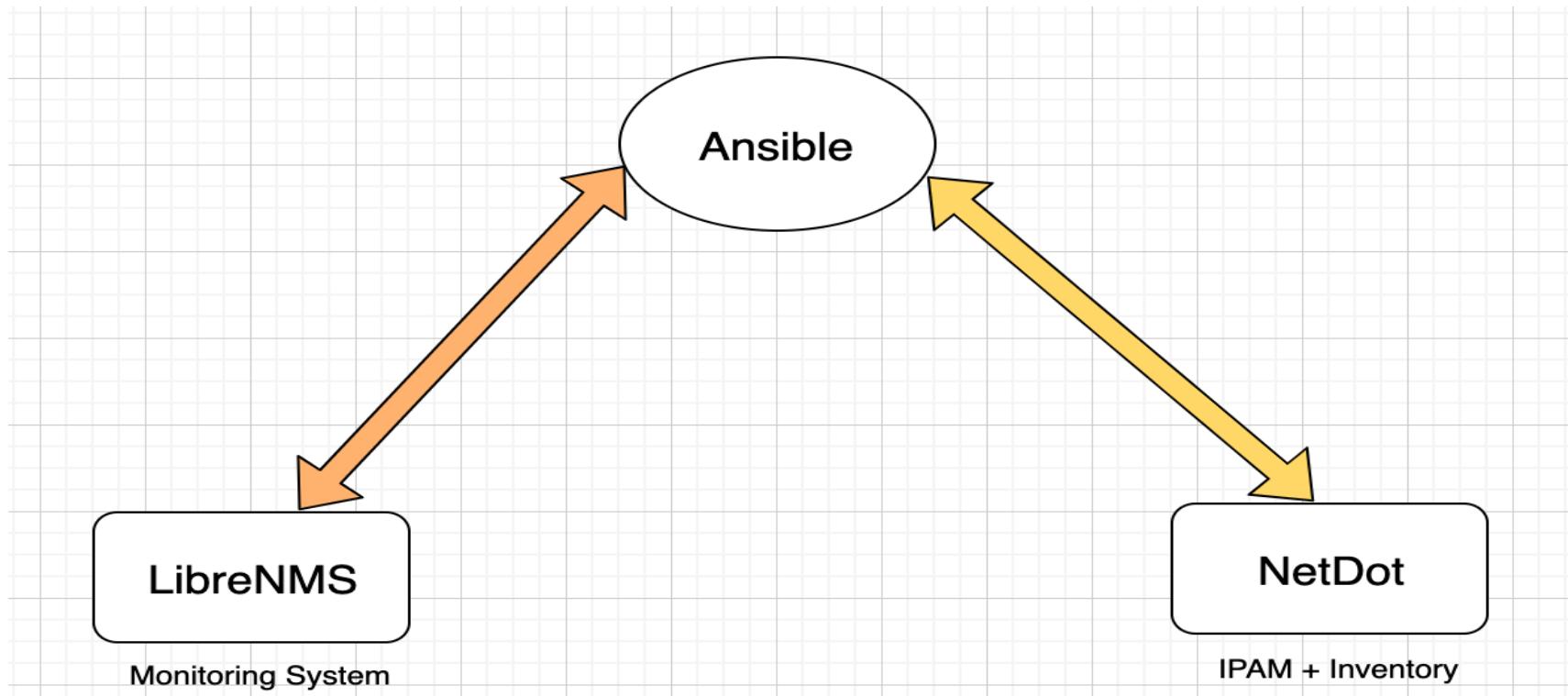
Look for your objective under **exercise-1.py**

What's next?

- Extracted some info => cleaned/readable data
- What to do with this data ? How to use it ?
 - **Depends on your use case**
 - Populate a circuit db
 - Report generation
 - Audits
 - Maintain a “Source of Truth”
 - Some form of Orchestration workflow
 - Example : push this collected data into Netbox!

Example workflow scenario @ncsa

- Auto-provisioning with Ansible
 - Triggers code to push devices into LibreNMS & Netdot
 - Uses the exposed REST API



QUESTIONS ?

Resources/Contact



<https://github.com/netops2devops/rest-techx-2019>



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THANK YOU!



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