APIs are Everywhere... but what are they?

A Network Programmability Basics Presentation

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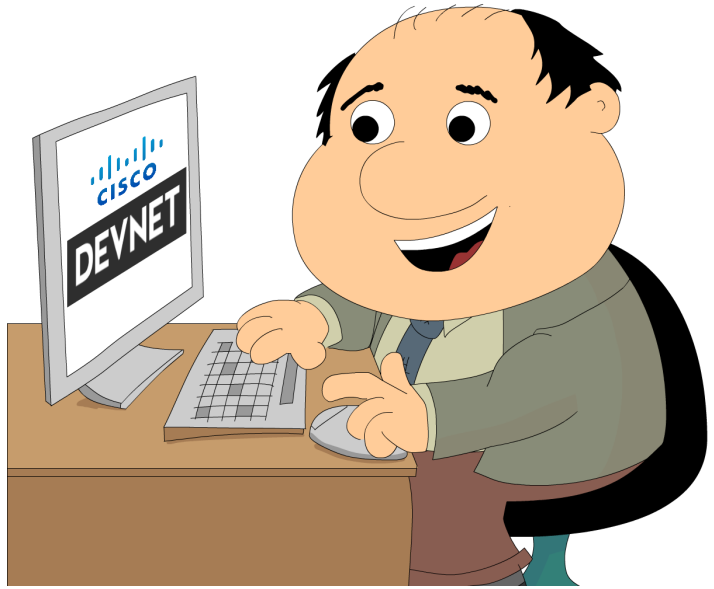
Network Programmability Basics Modules

- Introduction: How to be a Network Engineer in a Programmable Age
- **Programming Fundamentals**
- Network Device APIs
- Network Controllers
- Application Hosting and the Network
- NetDevOps



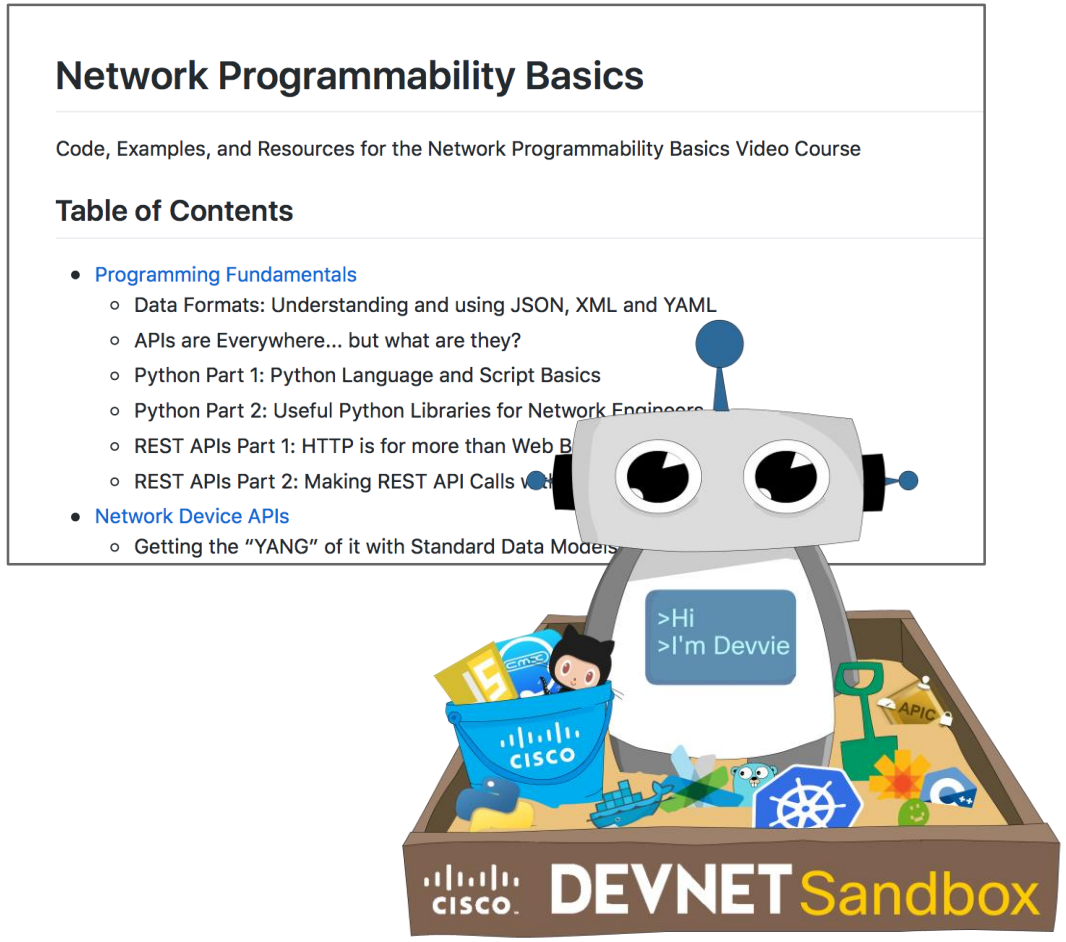
Network Programmability Basics: The Lessons

Module: Programming Fundamentals

- Data Formats: Understanding and using JSON, XML and YAML
- **APIs are Everywhere… but what are they?**
- REST APIs Part 1: HTTP is for more than Web Browsing
- REST APIs Part 2: Making REST API Calls with Postman
- Python Part 1: Python Language and Script Basics
- Python Part 2: Working with Libraries and Virtual Environments
- Python Part 3: Useful Python Libraries for Network Engineers

Code and Develop Along

- Get the Code!
  - github.com/CiscoDevNet/netprog_basics
- Setup Lab Prerequisites
  - Each lab includes a README with details
- Access to Infrastructure
  - DevNet Sandbox
  - Specifics in lab README



Topics to Cover

- What is an API?
- APIs aren't scary… you already use them
- Other APIs out there

What is an API?

”It’s a way for two pieces of software to talk to each other”

Application Programming Interface (API)

For a long time.. Humans were the only users

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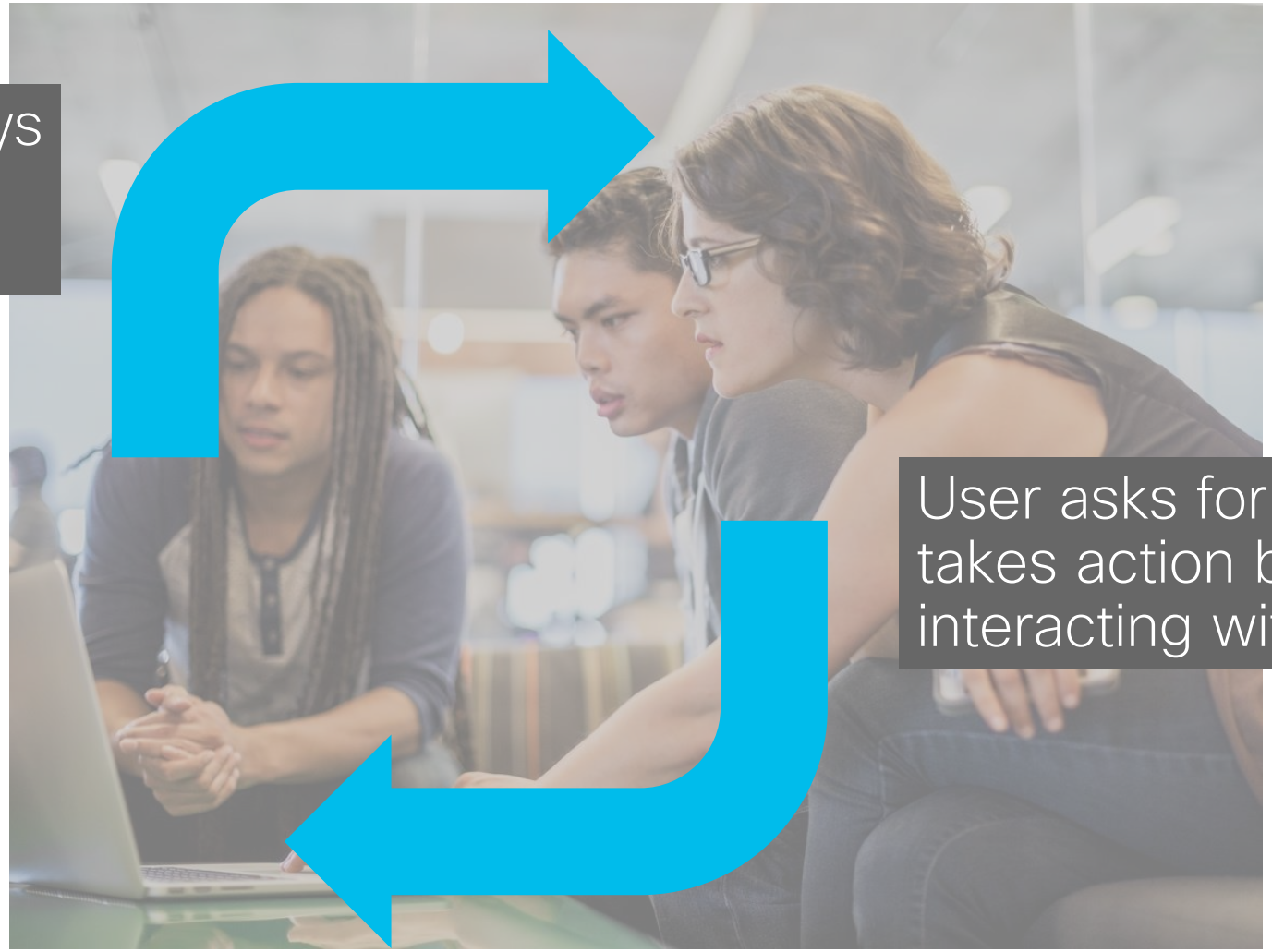
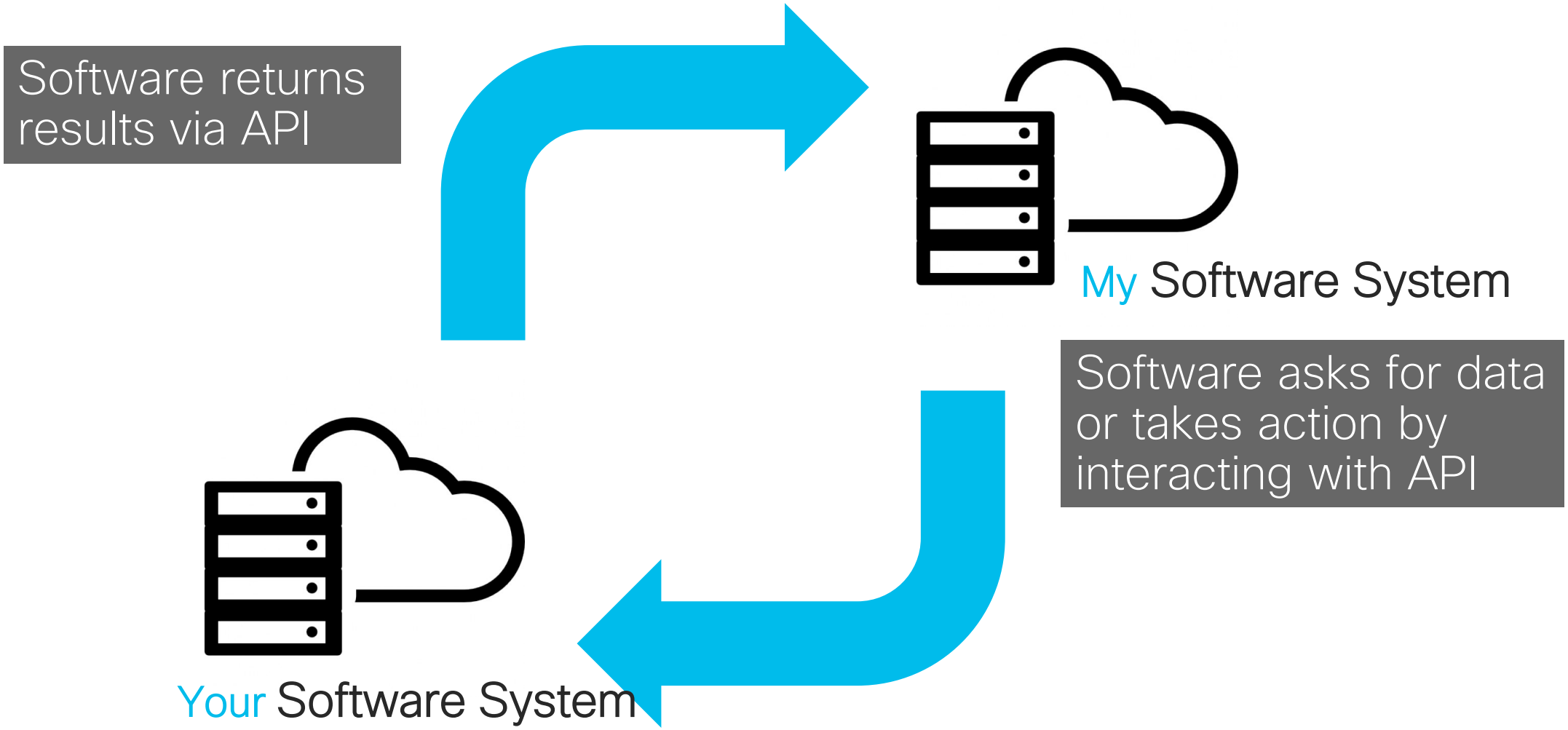
Software displays results in User Interface (UI)



User asks for data or takes action by interacting with UI

But what about when the user is another software system….



The API is the User Interface for software systems

APIs are sets of requirements that govern how one application can talk to another.

An API is like an electrical outlet.

What would it be like to power an hair dryer without an outlet?

- Open wall
- Strip wires
- Splice wires together
- Understand all the wires in the wall

The outlet is a service that conforms to specifications.

- Sockets deliver 120 volts of alternating current (AC) operating at 60Hz
- Sets expectation on behalf of consuming devices and provider.

An API is like …

An API (Application Programming Interface) is best thought of as a contract provided by one piece of computer software to another.

APIs help developers create apps that benefit the end user.

Google Maps returns map data via API

Google Maps

Yelp asks for Map Data

yelp

Users sees list of restaurants close to them

APIs are often referred to as "an engine of innovation."

-- Programmable Web

APIs aren’t scary… you already use them

Command Line Interface (CLI)

Designed for Humans… so more a UI than API

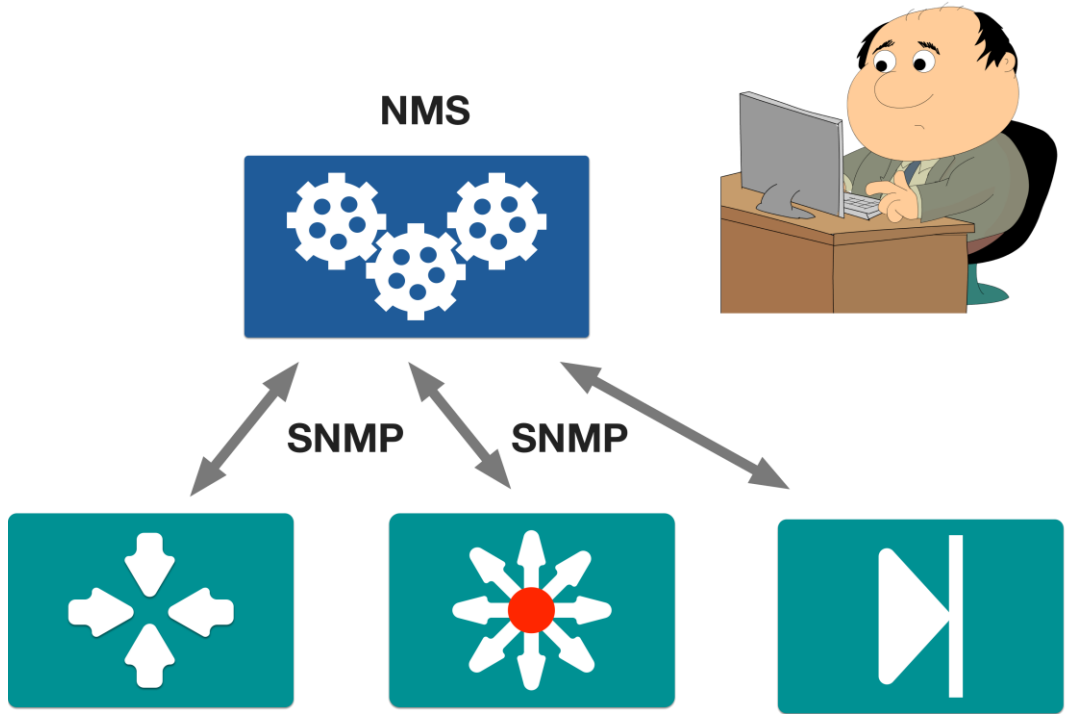
but…

- Network Management Systems
- Expect Scripts
- Paramiko/Netmiko
- NAPALM

```
#!/usr/bin/expect -f

send "conf t\n"
expect "(config)#"

send ”hostname my_switch\n"
expect "(config)#"
send "ntp server 10.10.10.101\n"
expect "(config)#"
send "ip domain-name domain.intra\n"
expect "(config)#"

send "end\n"
expect "#"
send "write mem\n"
expect "#"
```

Simple Network Management Protocol (SNMP)

- *"designed as a programmatic interface between management applications and devices"**
- Widely used for monitoring
- Limited use for configuration
- Network Management Systems primary consumer

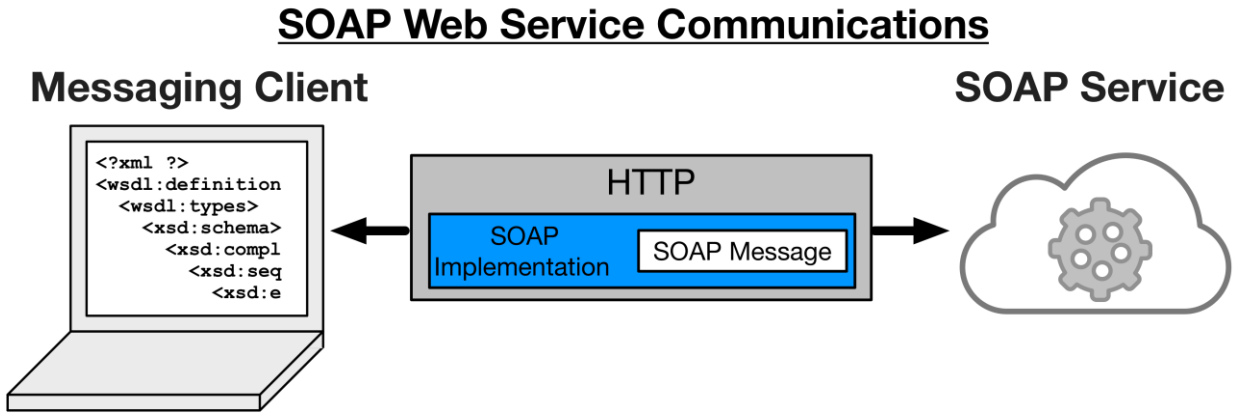


* https://tools.ietf.org/html/rfc3535

Other APIs out there

Simple Object Access Protocol (SOAP)

- Mature standard designed by Microsoft
- Used to build “Web Services” (software available over the internet)
- Typically uses HTTP, and dependent on XML
- Sometimes considered complex and rigid



Representational State Transfer (REST)

- API framework intended to build simpler web services than SOAP
- Another use for the HTTP protocol
- Popular due to performance, scale, simplicity, and reliability
- Technically an API framework

** More detailed coverage in later lessons*

XML-RPC and JSON-RPC

- Simple frameworks for communicating over HTTP
- RPC = Remote Procedure Call
  - When one system requests another system to execute code
- Offer XML and JSON data formats respectively

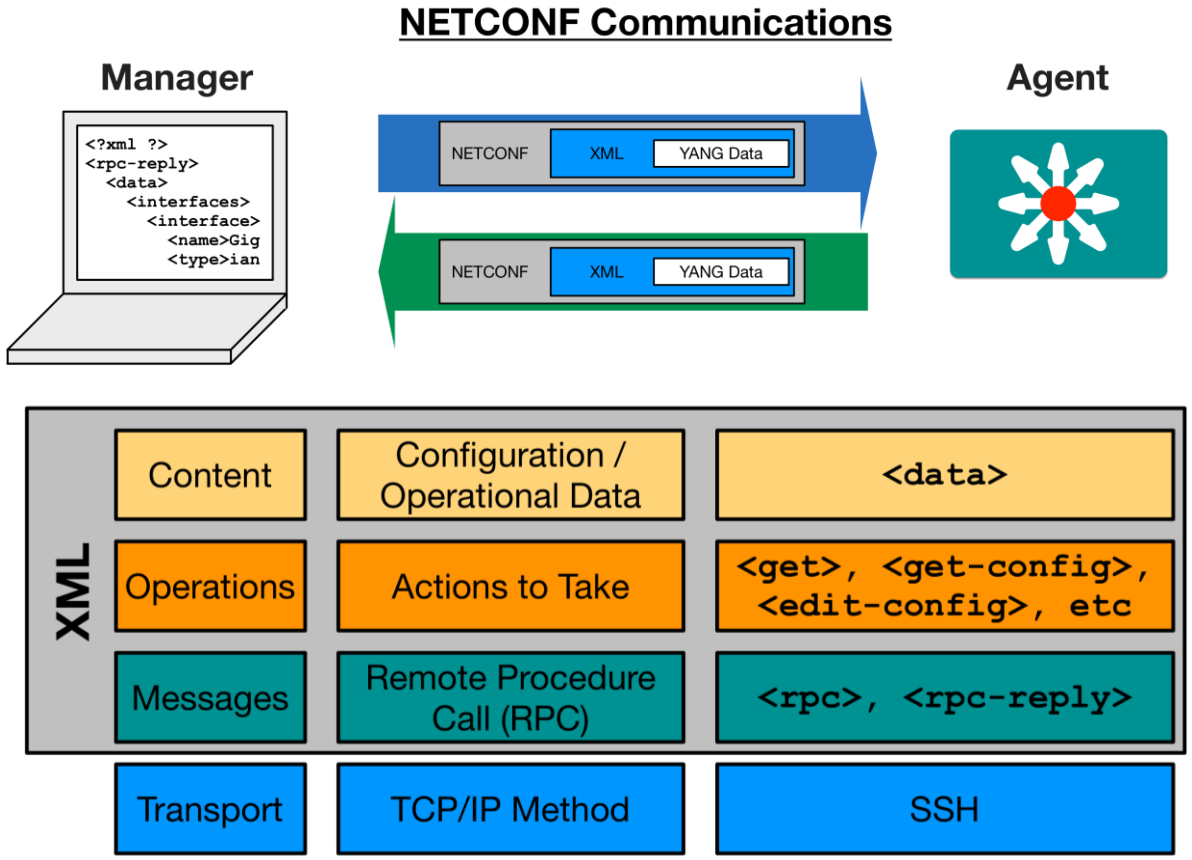
HTTP POST
REQUEST BODY:

```
[
 {
  "jsonrpc": "2.0",
  "method": "cli",
  "params":
  {
   "cmd": "show version",
   "version": 1
  },
  "id": 1
 }
]
```

NETCONF (NETwork CONFiguration) Protocol

- Designed as replacement for SNMP
- Standardized in 2006 / Updated 2011
- Leverages SSH and XML
- Defines transport and communication
  - Titled coupled to YANG for data

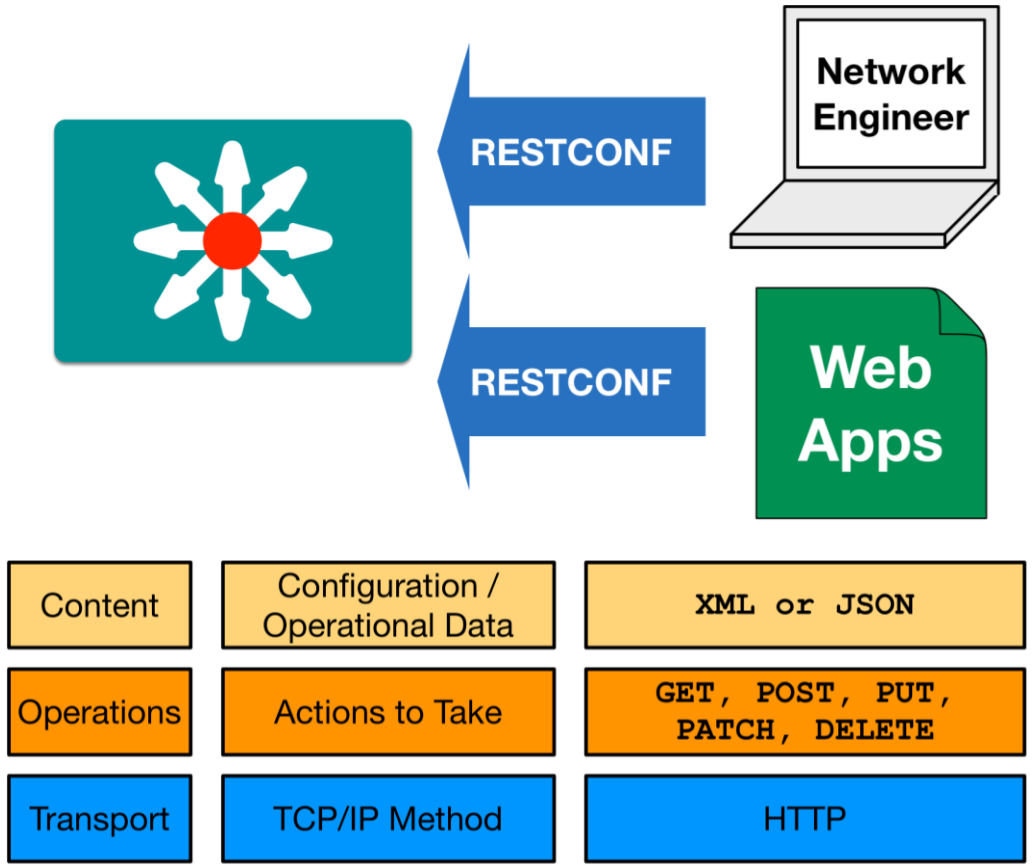
** More detailed coverage in later lessons*



RESTCONF Protocol

- Provide REST API like interface to network
- Standardized in 2017
- Supports XML and JSON
- Defines transport and communication
  - Titled coupled to YANG for data

    ** More detailed coverage in later lessons*



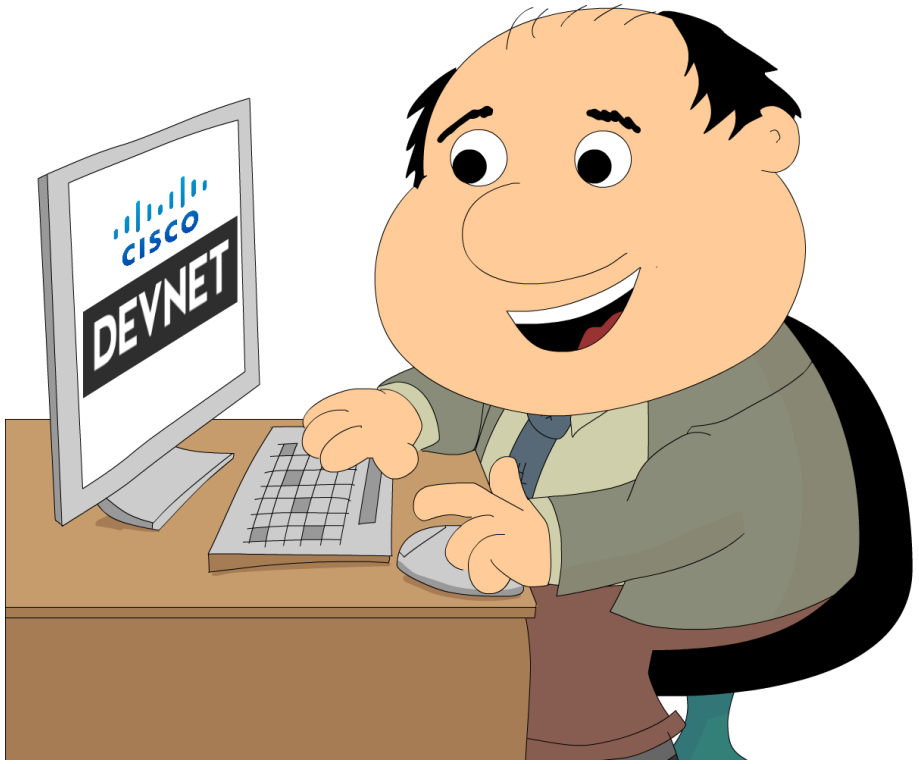
Summing up

Review

- What is an API?
- APIs aren't scary… you already use them
- Other APIs out there

Call to Action!

- Complete the full **Network Programmability Basics** Course
- Join DevNet for so much more!
  - Learning Labs
  - Development Sandboxes
  - Code Samples and API Guides



Got more questions? Come find me!

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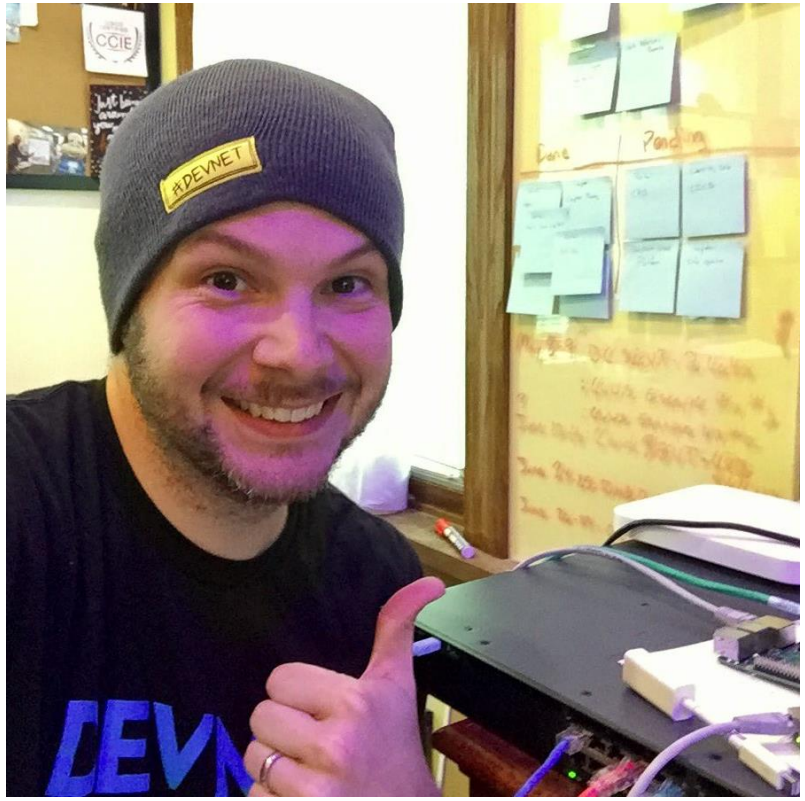


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