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Let's go
#CiscoLive

The bridge to possible

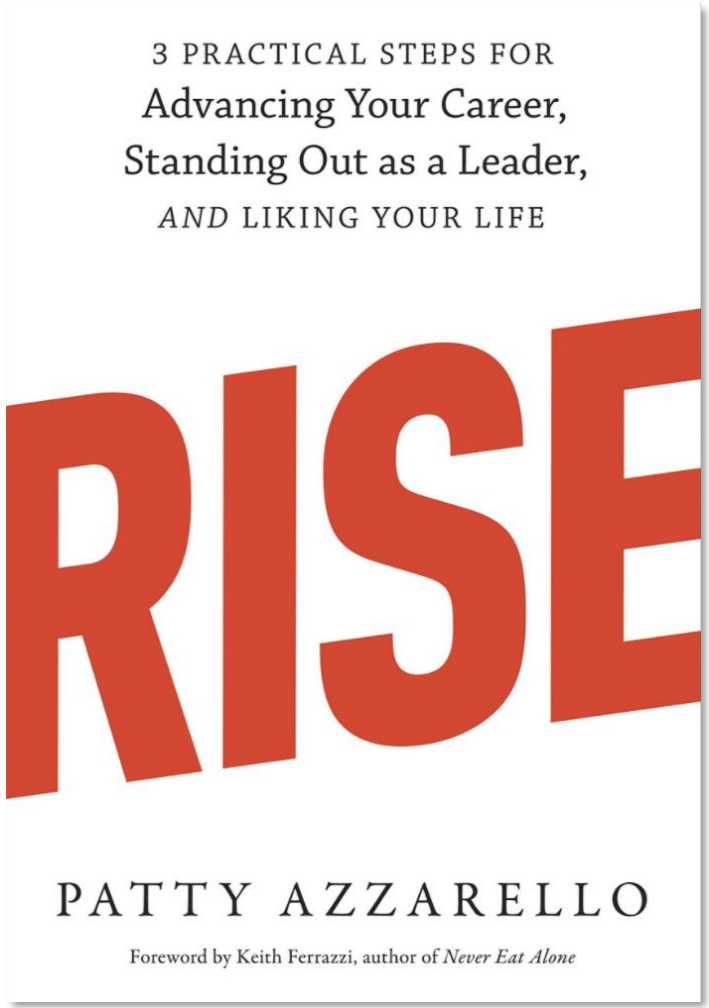
Network Automation

Start Here

Mel Delgado, Developer Advocate
@ComputeMel

DEVNET-1076

Rise Above the Work



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Agenda

- Introduction
- Why Automate
- Available Tools
- How to Start
- Conclusion

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“Network automation adoption in the enterprise lags that of server automation, as more than 65% of enterprise networking activities are performed manually.”

Hype Cycle for Enterprise Networking 2022

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Why Automate?

Why Automate?

- Eliminates toil
- Quickly deploy environments/configurations
- Deployments are repeatable
- Infrastructure components become fungible
- You accomplish more in less time
- State is declared in files and version controlled

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Toil

Noun
1. hard and continuous work; exhausting labor or effort
2. a laborious task
3. Archaic. battle; strife; struggle

- dictionary.com

Quickly Deploy Environments/Configurations

- Let the machines to the do the work
- Automated deployments/configurations at scale deploy quickly
- Quicker than humans in the loop
- Automation is reviewable and shareable with peers
  - Peer review
  - Others contribute

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Deployments are Repeatable

- Idempotent
  - Automation applied multiple times without changing the results
- Develop a known state

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Infrastructure Components Become Fungible

- Pets vs cattle
- Easily and quickly replace components
  - Rebuild a server (virtual or physical)
  - Redeploy a network device
  - Redeploy application server backend

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State is Declared and Version Controlled

- Treat your infrastructure as a coding problem to solve
- Automation is implemented as code
- Infrastructure as code (IaC)
- The desired state of your environment is written and maintained as code
- Version controlled with Git
- Shared with your team on GitHub

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State is Declared and Version Controlled

- Imperative vs Declarative
  - Imperative approach involves running a series of commands describing *how* you want the computer/device to do something.
  - Declarative approach describes what the result should be.
    - Not *how* but *what*.
    - Written in one or more files
    - Files are stored in version control (GitHub)

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People solve problems.
Machines do repetitive work

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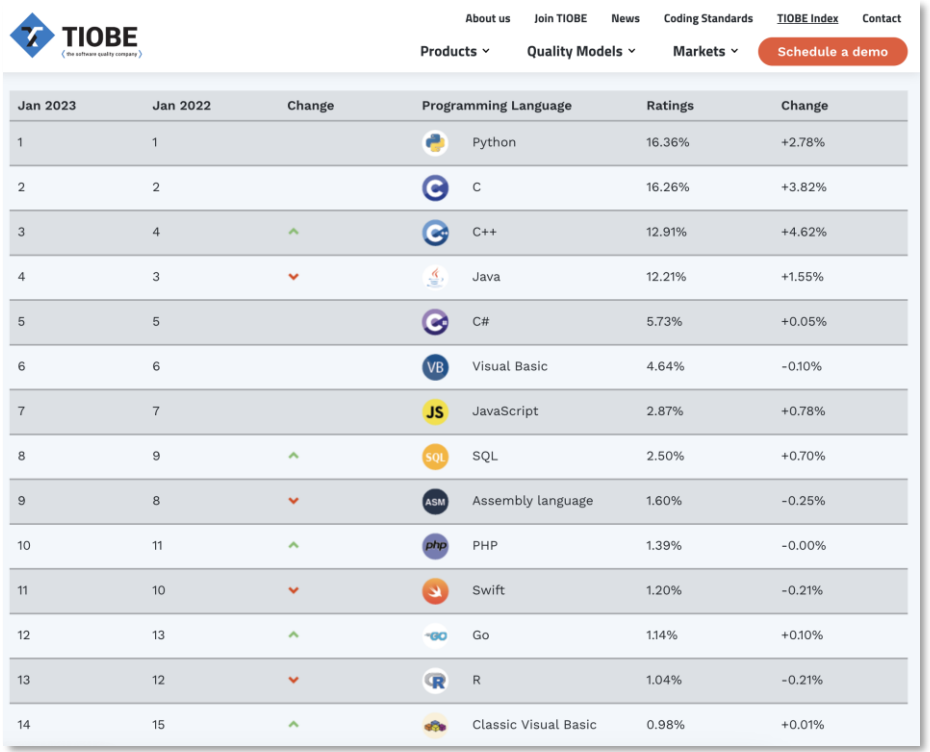
Tools

Programming Languages

- Python
  - #1 in the TIOBE Index for January 2023
  - Easy to learn
  - Many resources available
- Go
  - #12 in the TIOBE Index and growing in popularity



TIOBE

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Jan 2023	Jan 2022	Change	Programming Language	Ratings	Change
1	1		Python	16.36%	+2.78%
2	2		C	16.26%	+3.82%
3	4	↑	C++	12.91%	+4.62%
4	3	↓	Java	12.21%	+1.55%
5	5		C#	5.73%	+0.05%
6	6		Visual Basic	4.64%	-0.10%
7	7		JavaScript	2.87%	+0.78%
8	9	↑	SQL	2.50%	+0.70%
9	8	↓	Assembly language	1.60%	-0.25%
10	11	↑	PHP	1.39%	-0.00%
11	10	↓	Swift	1.20%	-0.21%
12	13	↑	Go	1.14%	+0.10%
13	12	↓	R	1.04%	-0.21%
14	15	↑	Classic Visual Basic	0.98%	+0.01%

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Programming Languages

Pros

- You write exactly what you are looking to accomplish and nothing more
- In some cases, it is more performant
- There is a large developer talent pool

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Programming Languages

Cons

- You may write many lines of code to accomplish what a configuration management tool could do with a few lines
- You may need to write the logic to support:
  - Idempotency
  - Inventory management
  - Security (managing certificates, etc)

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Configuration Management Tools

- Make deployments and changes faster
- Reduces human error (as compared to imperative approach)
- Makes system/device management
  - Scalable
  - Predictable
  - Repeatable

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Popular Configuration Management Tools

- **Ansible**
  - Suite of software tools enabling infrastructure as code
  - Written in Python
  - Agentless
  - Open-source
- **Terraform**
  - An open-source infrastructure-as-code software tool created by HashiCorp.
  - Written in Go
  - Manages external resources

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How to Start

Knowing what to automate is just as important as knowing how

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Start Small – Networking

- Learn enough about Ansible to:
  - Make an unimpactful change
  - Apply the change to one device
    - Physical network device
    - Virtual network device using CML
  - Apply the same change to more than one device

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Start Small – Networking

- Configurations to consider
  - Get a copy of the running configuration and store it as a local file
  - Add NTP
  - Add a VLAN
  - Add an MOTD

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Ansible
Copy Running Config

- Two tasks
  - Copy running configuration to a variable named `backup`
  - Copy the content to a file named after the hostname of the device
    - `<hostname>.backup`

```
tasks:

    - name: Copy the running configuration to
a variable

      cli_command:

        command: show run

      register: backup

      tags: backup


    - name: Create a file with the running
configuration before we get started.

      copy:

        content: "{{backup.stdout}}"

        dest: "{{inventory_hostname}}.backup"
```


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Ansible
Set NTP

- Two tasks
  - Define a `provider`
  - Add the NTP settings to all switches in inventory

```
tasks:

  - name: Define provider as required by nxos
modules as part of configuring NTP

    set_fact:

      provider:

        host: "{{ nexus_switch }}"

        username: "{{ nexus_username }}"

        password: "{{ nexus_password }}"


  - name: Add NTP settings to all switches

    nxos_ntp:

      provider: "{{ provider }}"

        server: "{{ ntp_server }}"

        vrf_name: management

        source_int: mgmt0
```


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Ansible
Set MOTD

- Two tasks
  - Define a `provider`
  - Add the NTP settings to all switches in inventory

```
tasks:

  - name: Define provider as required by
nxos modules as part of configuring MOTD

    set_fact:

      provider:

        host: "{{ nexus_switch }}"

        username: "{{ nexus_username }}”

        password: "{{ nexus_password }}"


-   name: configure the exec banner

      nxos_banner:

        provider: "{{ provider }}”

          banner: motd

          text: "{{ banner_text }}”

          state: present
```


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Ansible
Add VLANs

- Two tasks
  - Define a `provider`
  - Add the NTP settings to all switches in inventory

```
- name: Define provider as required by
nxos modules

  set_fact:

    provider:

      host: "{{ nexus_switch }}"

      username: "{{ nexus_username }}"

      password: "{{ nexus_password }}"


- name: Ensure vlans exist onboard all
switches

  nxos_vlan:

    provider: "{{ provider }}"

    vlan_id: "{{ item.id }}"

    name: "{{ item.name }}"

    state: present

  with_items: "{{ vlans }}"
```


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Getting Started Kit

Starter Kit

- Visual Studio Code
- Ansible
- Network device
  - Physical (start with 1 then add more)
  - Virtual (CML)

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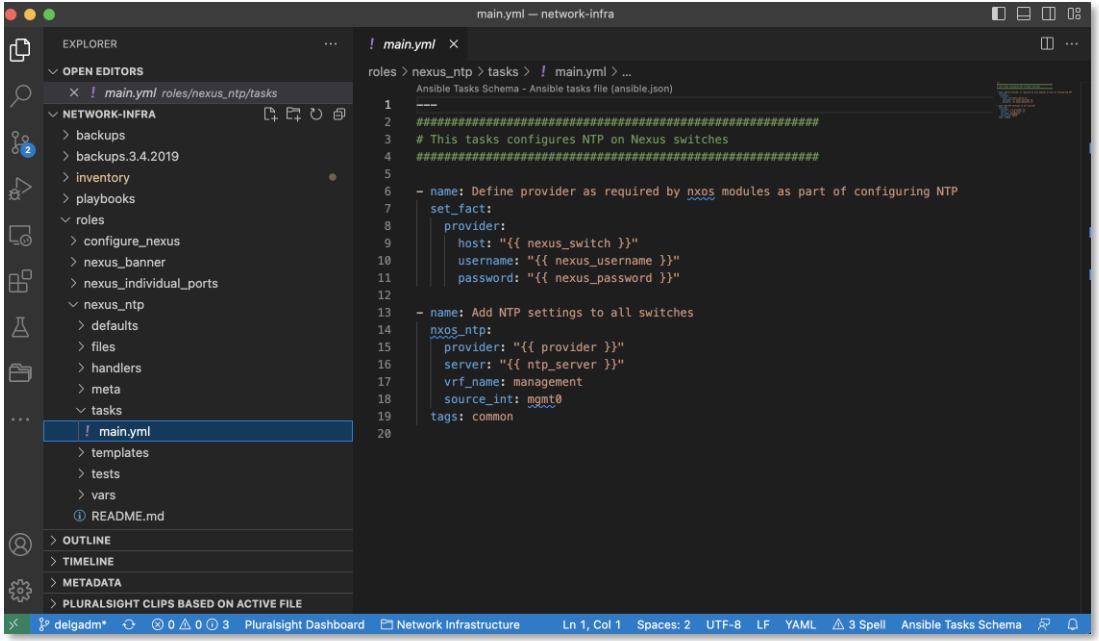
Starter Kit – Visual Studio Code

- IDE – Integrated Development Environment
- Free download



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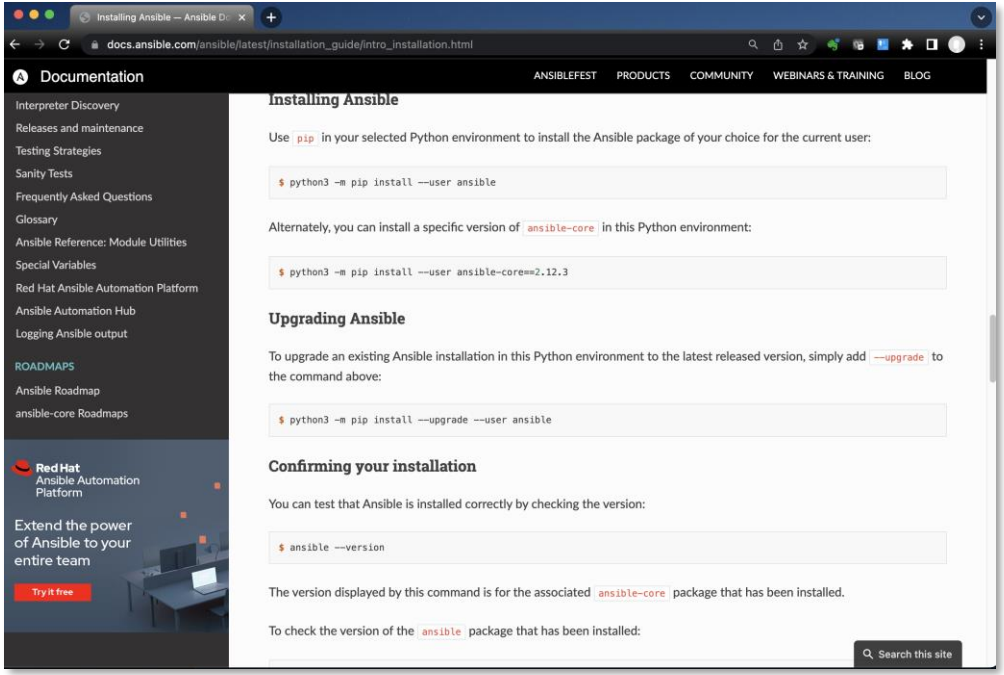
Starter Kit – Ansible

- Open Source
- Download for free
- DEVWKS 1759
  - Ansible in 45 minutes
  - Wednesday 1p
- DevNet Learning Labs



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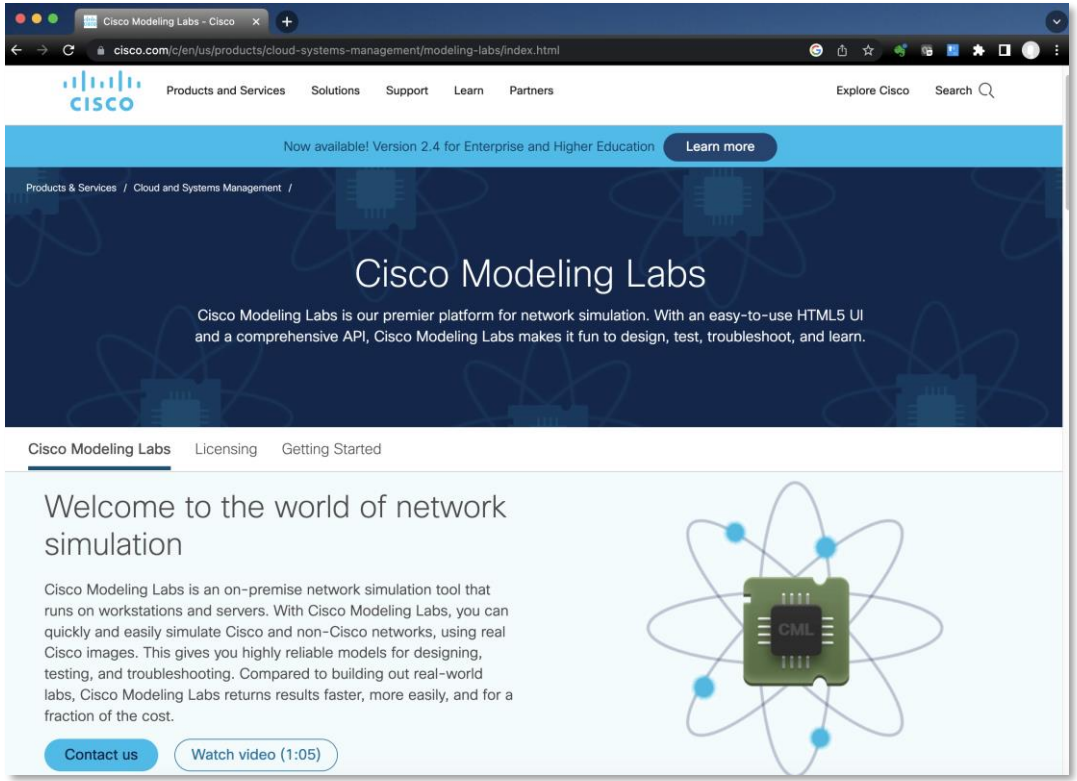
Starter Kit – CML

- Ask your account manager about options
- Simulates Cisco devices
- Use virtual devices as your endpoint
- Available in the Devnet Sandbox



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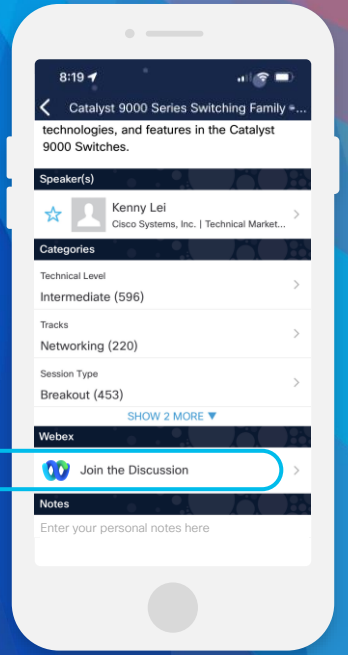
Questions?

Use Cisco Webex App to chat
with the speaker after the session

How

1. Find this session in the Cisco Live Mobile App
2. Click “Join the Discussion”
3. Install the Webex App or go directly to the Webex space
4. Enter messages/questions in the Webex space

Webex spaces will be moderated by the speaker until June 9, 2023.



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The bridge to possible

Thank you

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Cisco Live
Challenge

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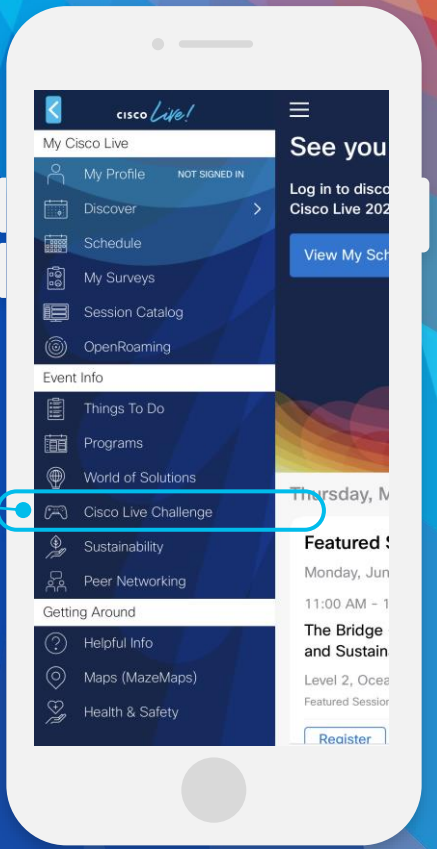
4. Click the + at the bottom of the screen and scan the QR code:



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