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# Ansible Zero to Hero – Network Automation

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LTRPRG-1125

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# Agenda

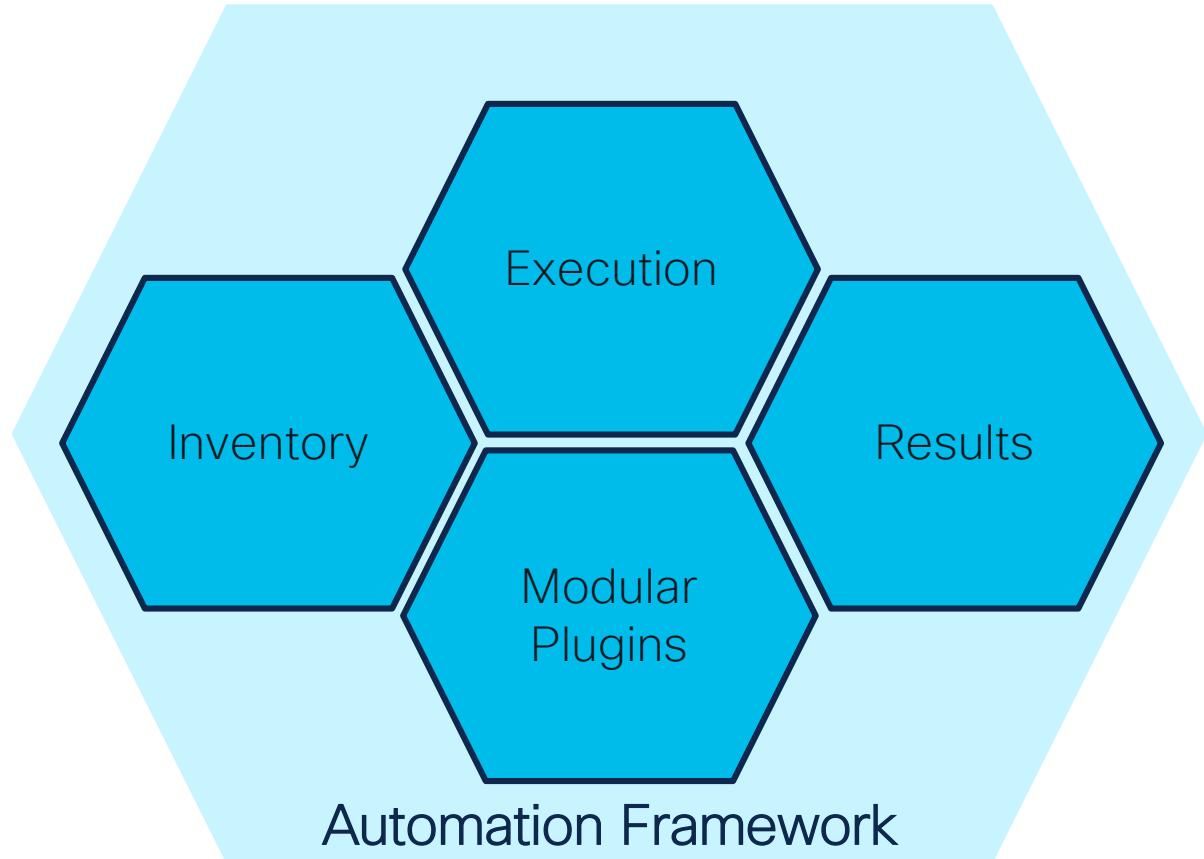
- What is Ansible
- Why Ansible
- Lab Introduction
- Lab Hands-on
  - Lab-1: Familiarize with Ansible Env
  - Lab-2: Basic Ansible Commands
  - Lab-3: Deep Dive
  - Lab-4: Advanced Topics
- Ansible vs other Tools Comparison
- Ansible vs NSO
- Conclusion

# What is Ansible?

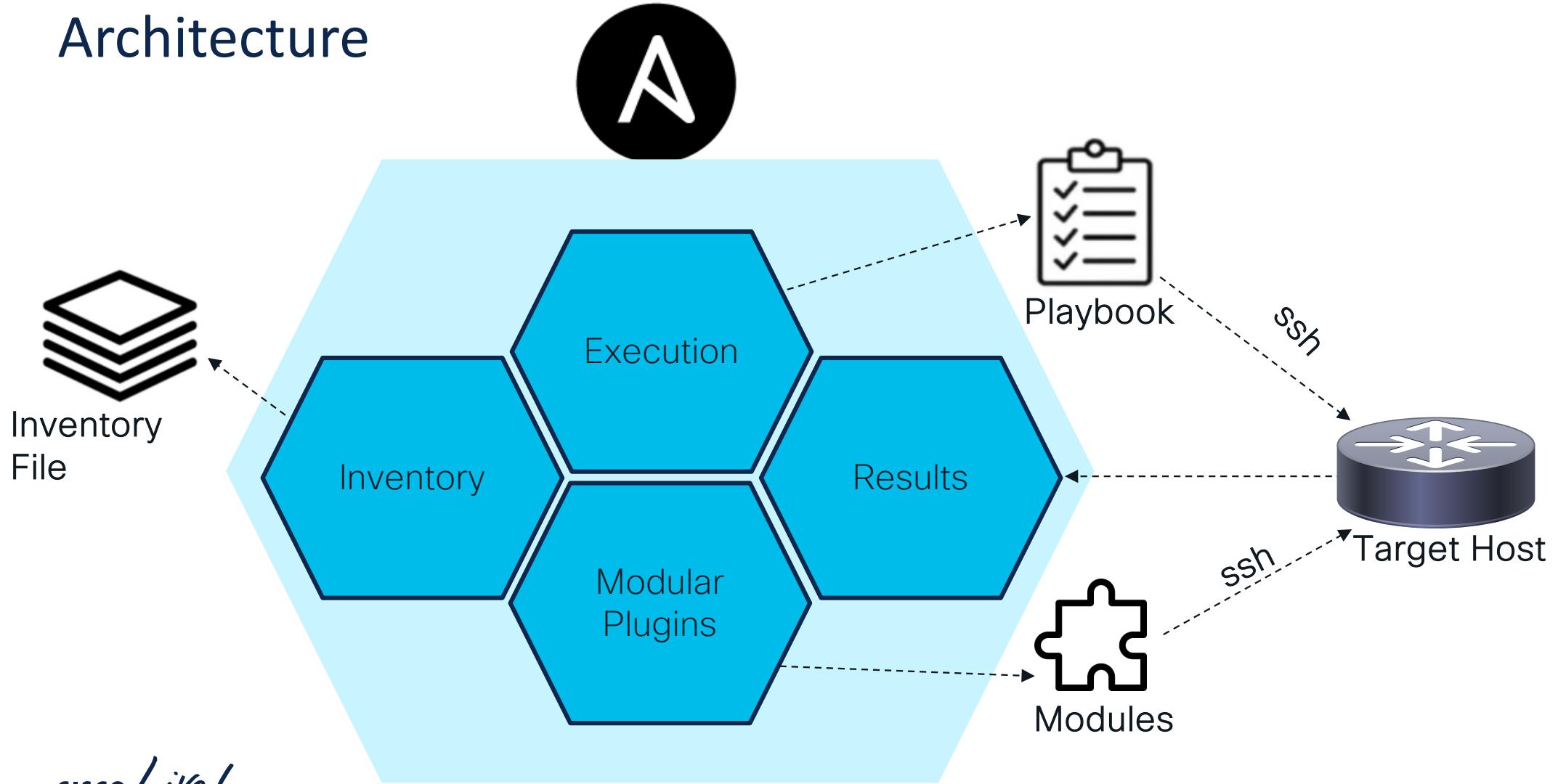
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# What is Ansible

- An [open-source](#)
- Automation [Framework](#)
- Founded in 2013, bought by Red Hat in 2015
- Controls all the target nodes/hosts from single machine([ansible controller](#))
- Uses standard [ssh](#) for communication



# Architecture



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# Ansible Packaging

Documentation:

[https://docs.ansible.com/ansible/latest/installation\\_guide/intro\\_installation.html](https://docs.ansible.com/ansible/latest/installation_guide/intro_installation.html)

- Ansible consists basically of 2 packages
  - ansible-core
  - ansible
- ‘ansible-core’
  - runtime
  - fundamental modules & plugins
- ‘ansible’
  - Community developed modules

# Ansible Installation

- On Fedora:

```
$ sudo dnf install ansible
```

- On RHEL and CentOS:

```
$ sudo yum install ansible
```

- Ubuntu

```
$ sudo apt update  
$ sudo apt install software-properties-common  
$ sudo apt-add-repository --yes --update ppa:ansible/ansible  
$ sudo apt install ansible
```

- MacOS:

```
$ pip3 install ansible
```

- Windows is not supported as controller

Documentation:

[https://docs.ansible.com/ansible/latest/installation\\_guide/intro\\_installation.html](https://docs.ansible.com/ansible/latest/installation_guide/intro_installation.html)

Upgrade from v2.9 and earlier not possible!  
pip3 uninstall ansible  
pip3 install ansible

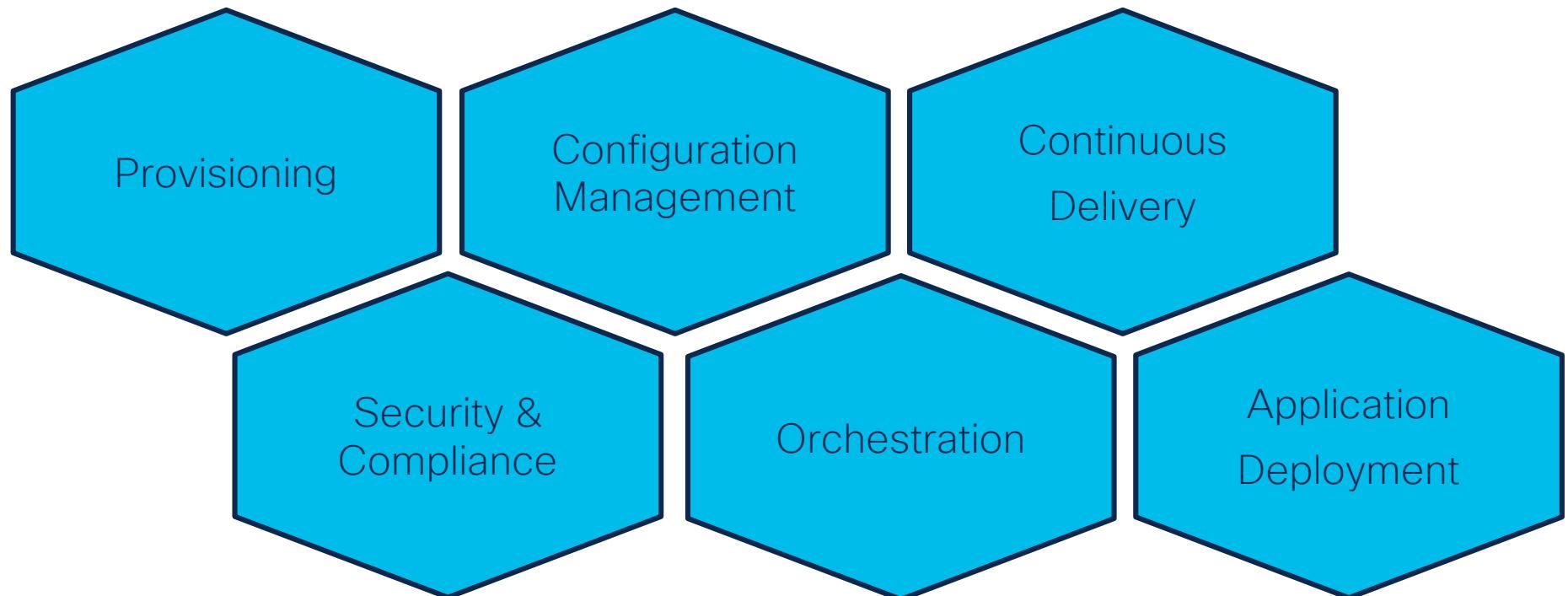
# Why Ansible?

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# Why Ansible

- **Simple**
  - Uses simple syntax written in YAML (YAML Ain't Markup Language)
  - ‘No Code Low’ Code philosophy, YAML is just enough
- **Agentless**
  - No Agents or software required to be installed on target hosts.
  - No special firewall ports needs to be opened as ansible uses ssh.
- **Powerful**
  - Features that enables to model even complex workflows.

# Use Cases

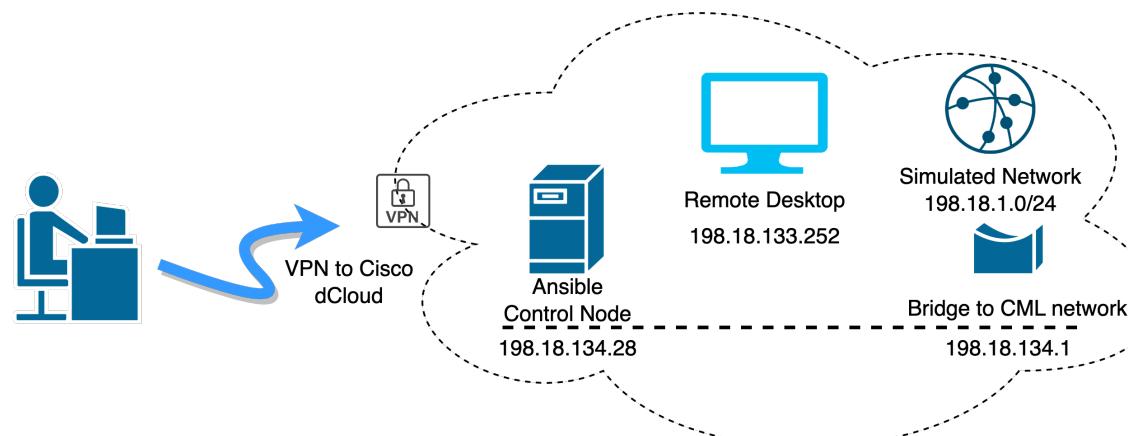


# Lab Introduction

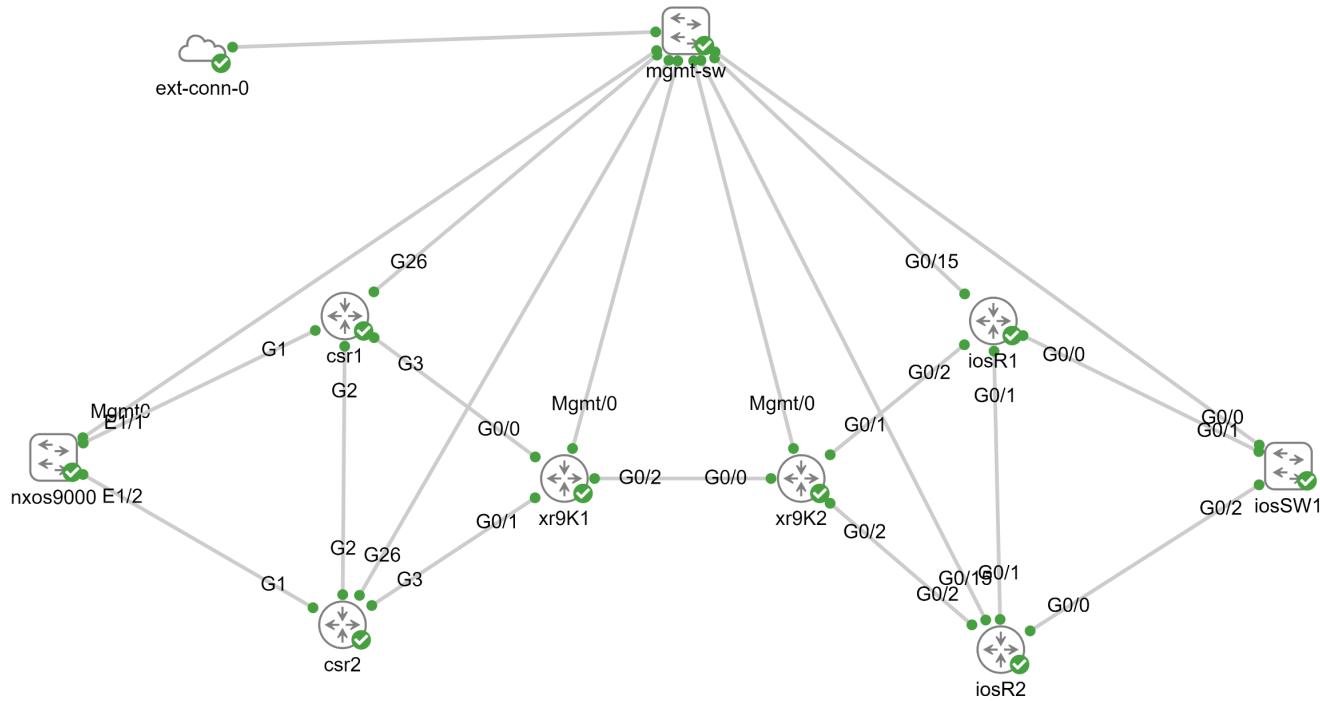
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# dCloud Lab Setup

- **Control node:** Ansible VM based on Ubuntu
- **Managed nodes:** 2 XRV9K core router, 2 IOS & CSR1kv branch routers each, 2 NX-OSv switches
- **Windows Jump host:** Windows with Visual Studio editor, Putty SSH client

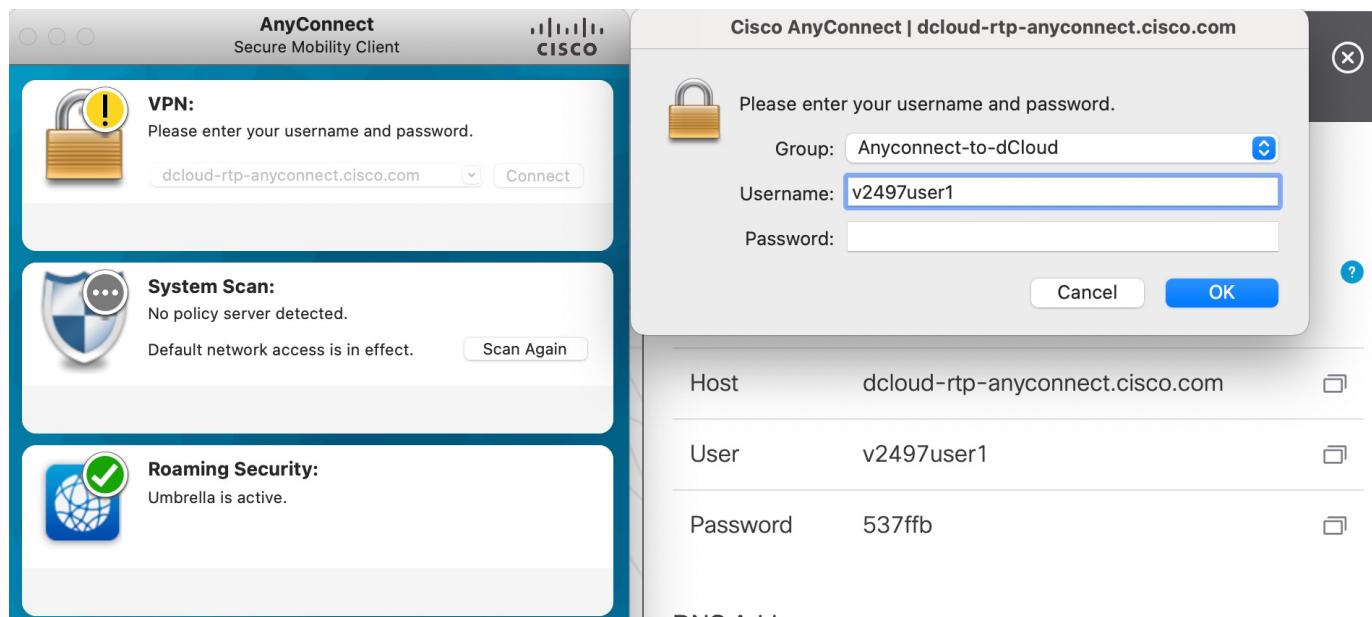


# Network Topology



# Lab Access

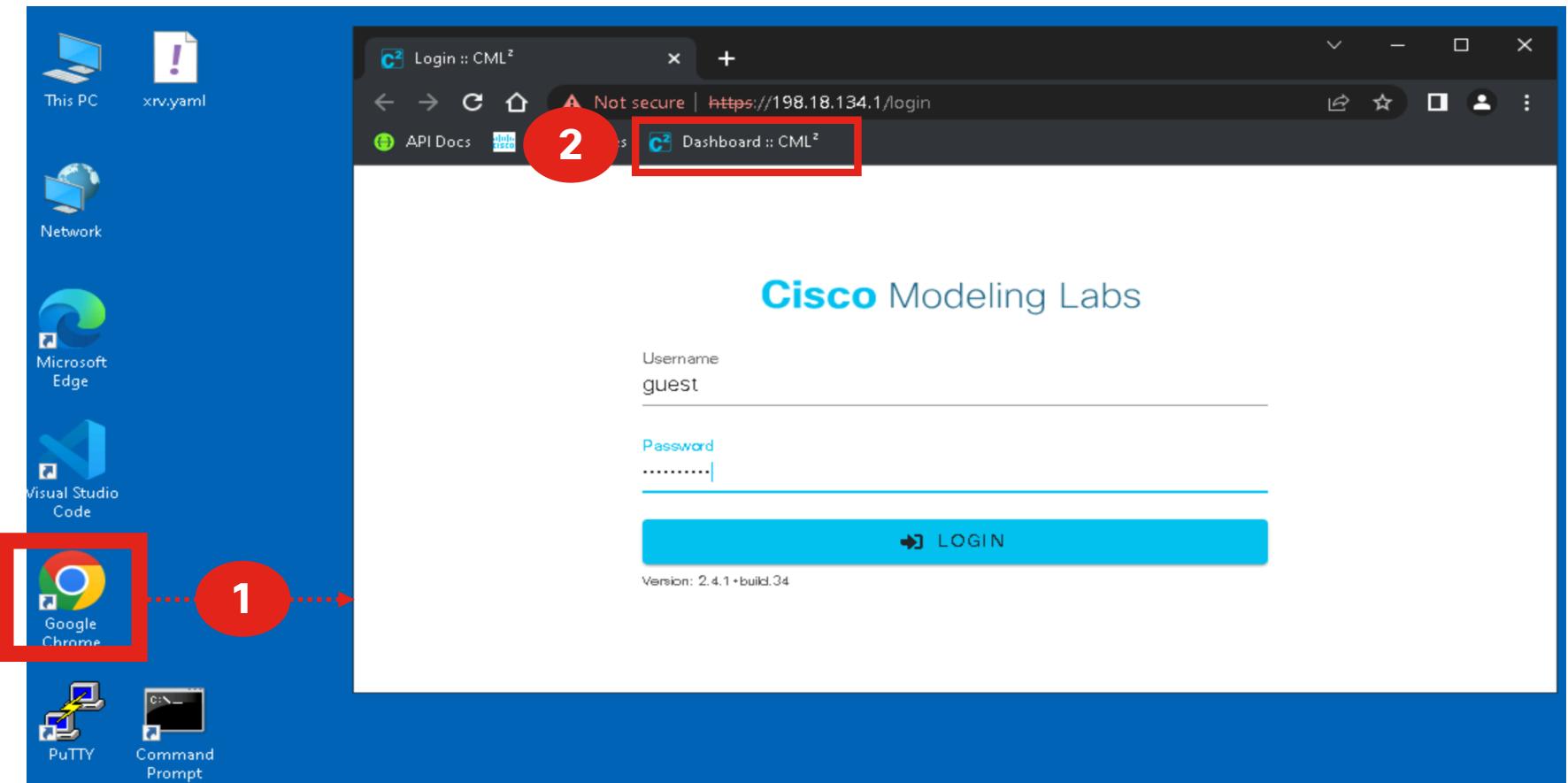
- Use the **Cisco AnyConnect Client** and your provided VPN username and password to connect to your lab instance



- Connect to the **Windows jump host** using **RDP client** to address **198.18.133.252**

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# Windows Jump host – CML

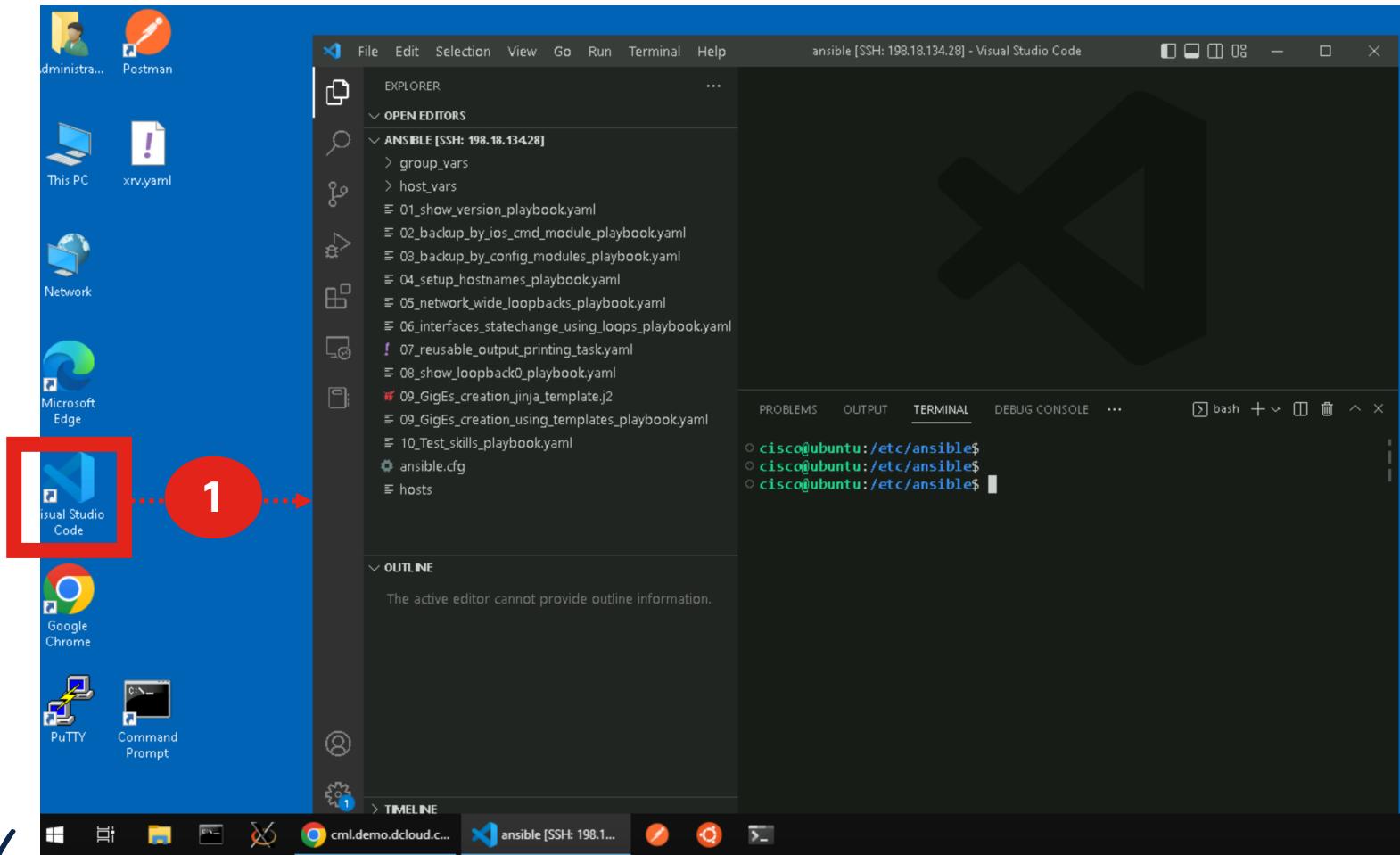


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# Windows Jump host – Visual Studio (Visio)



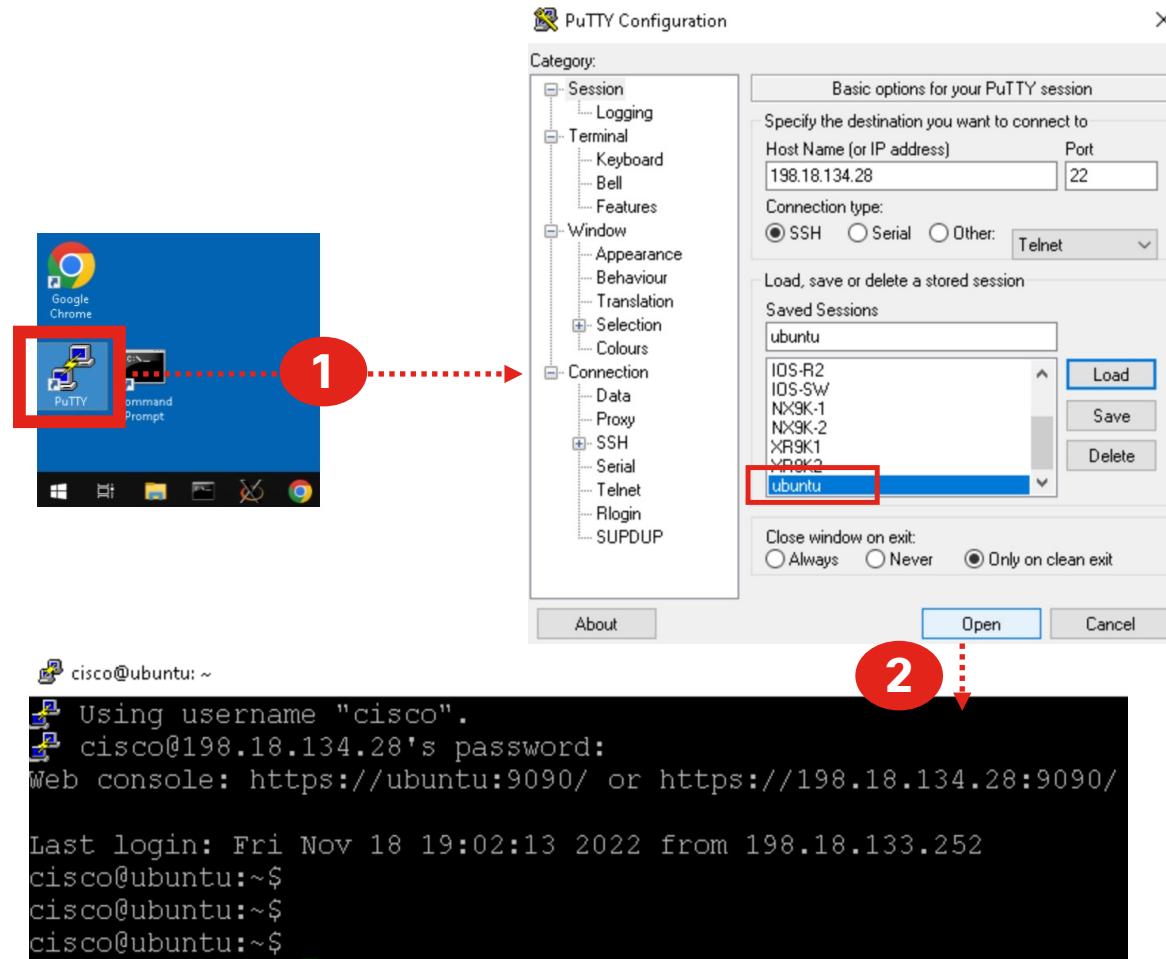
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# Windows Jump host – Ansible Controller (Ubuntu)



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# Hands-on Lab

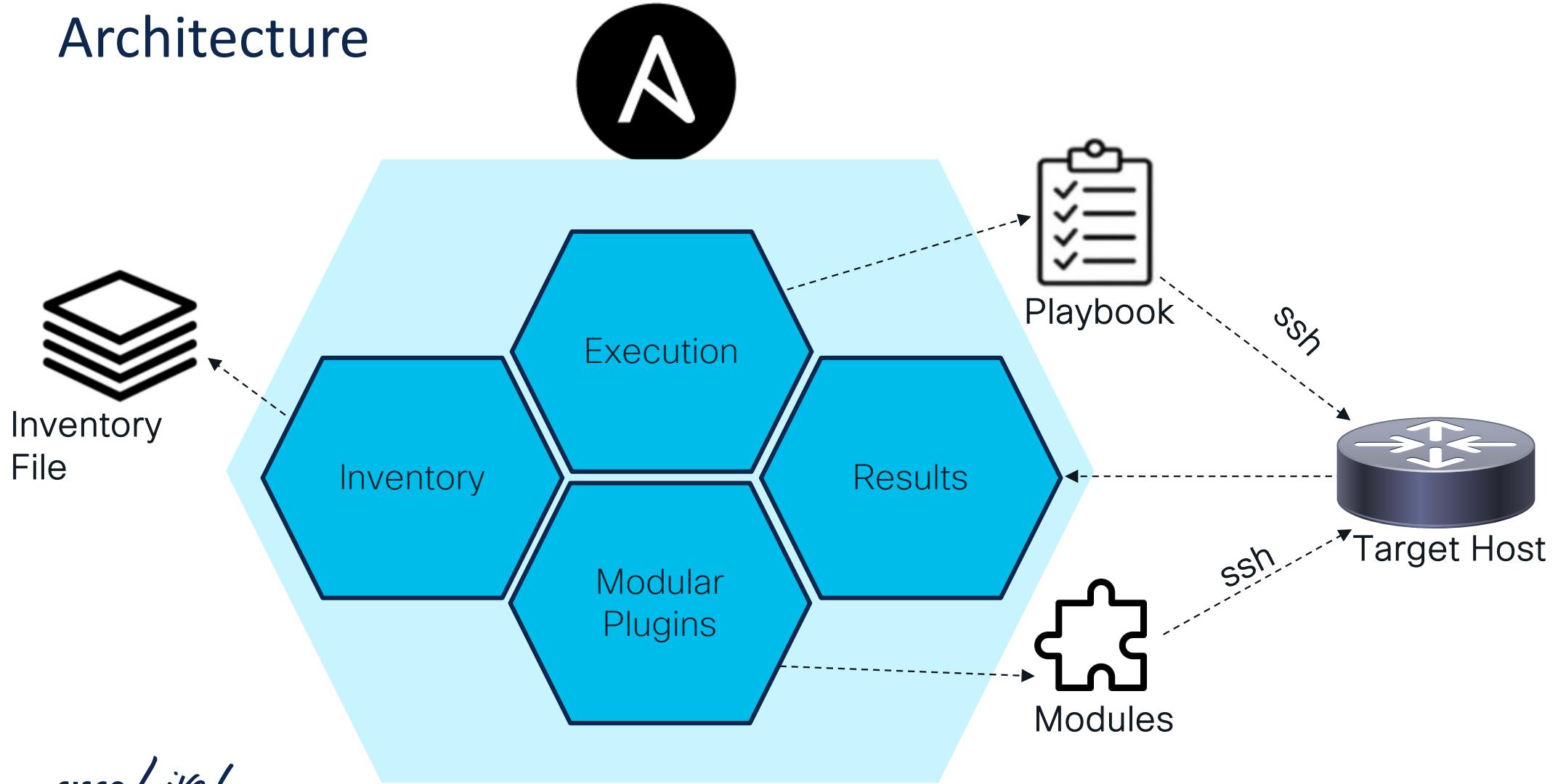
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# LAB1:

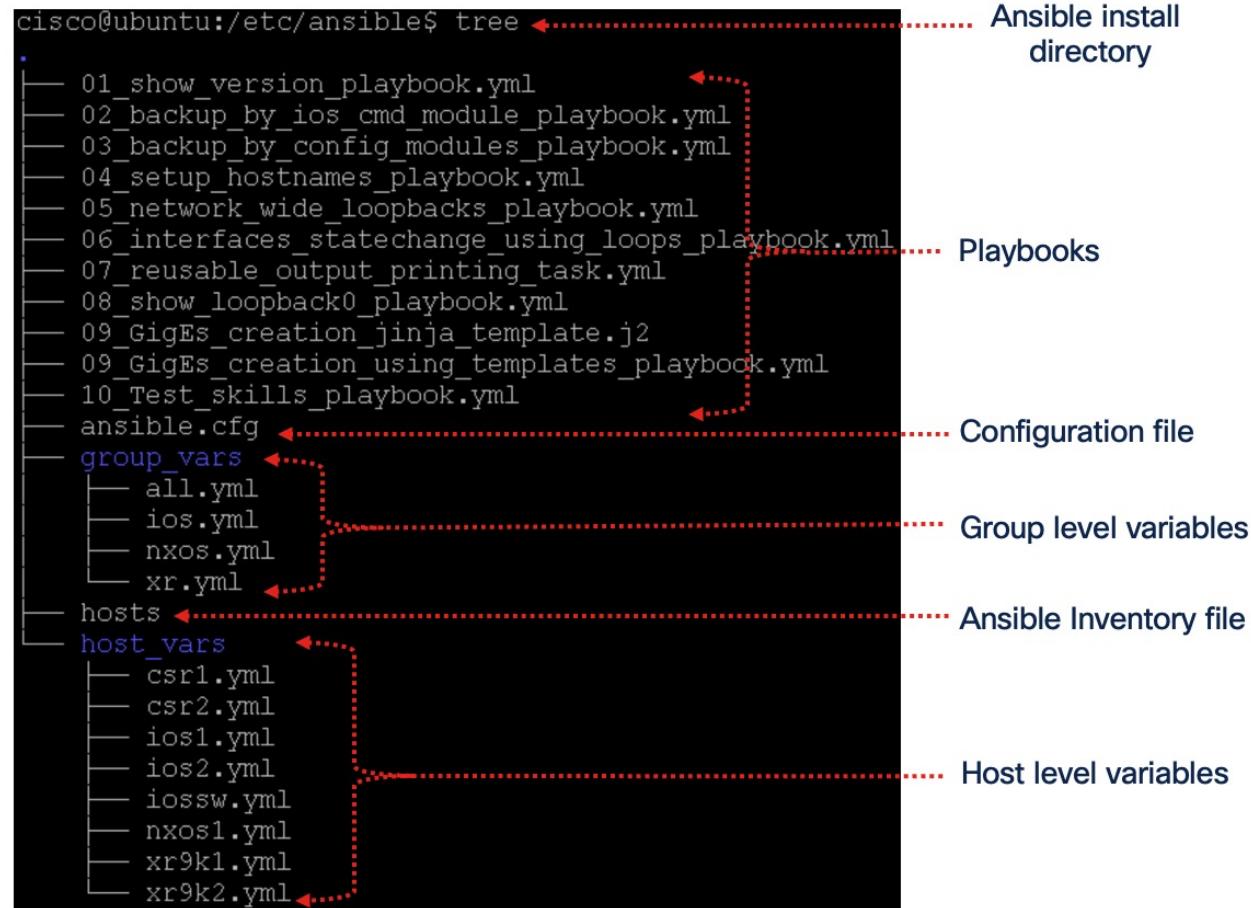
## Familiarize with Ansible Environment

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# Architecture



# Ansible Directory Structure (LAB)

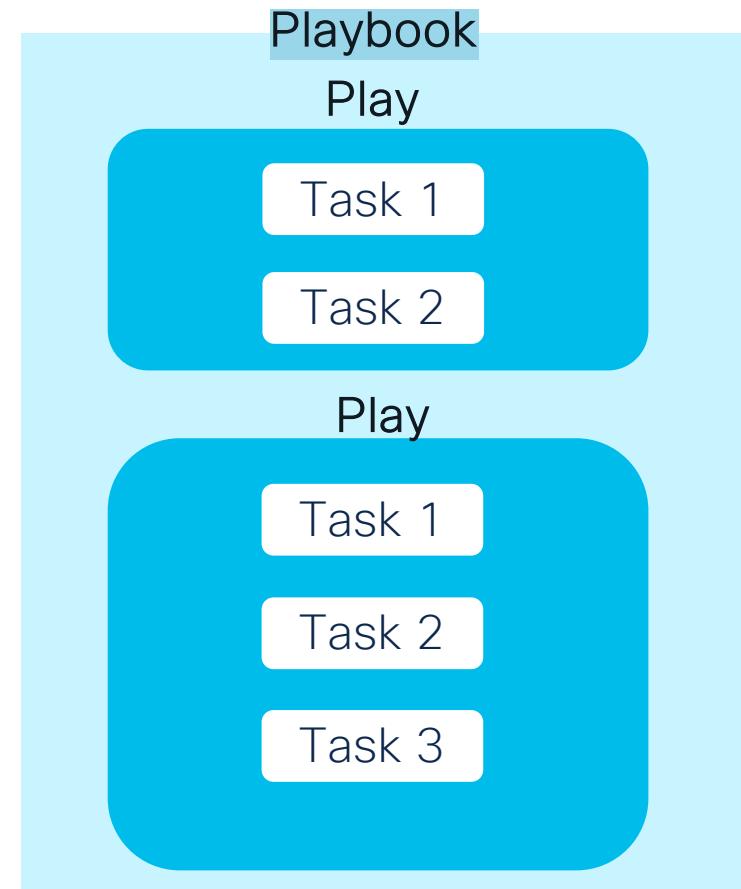


# Ansible Inventory

- Written in [INI](#) or [YAML](#).
- Default location [/etc/ansible/hosts](#)
  - Can be changed in [/etc/ansible/ansible.cfg](#)
- Contains [target hosts details](#) like hostname, IP, protocol, credentials
- Allows [Grouping](#) of target hosts for collative reference
  - Two default groups: all & ungrouped
- Can also stores [variables](#), specific per host or per group or for all.
- Separate file can also be used for variable, but this file must be located in subfolder [group\\_vars](#) or [host\\_vars](#) in same directory of inventory/host file

# Ansible Playbook

- Written in **YAML**.
- Contains one or multiple **plays** in a playbook
- Each play further contains one or multiple **tasks**.
- Task is a **single action** to be performed by ansible



# Ansible Modules

- Reusable or standalone script written in any programming language (usually python) that can return JSON in response.
- Modules expose functions with acceptable inputs and perform desired execution on target host
- Modules abstract the underlying complexity and simplify user tasks



ios\_command  
ios\_config  
nxos\_config



Junos\_command  
Junos\_config



eos\_command  
eos\_config

# Lab-2: Basic Ansible Commands

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# Ad-hoc Commands

Further reading:

[https://docs.ansible.com/ansible/latest/user\\_guide/intro\\_adhoc.html](https://docs.ansible.com/ansible/latest/user_guide/intro_adhoc.html)  
[https://docs.ansible.com/ansible/latest/modules/ping\\_module.html](https://docs.ansible.com/ansible/latest/modules/ping_module.html)

- Allows you to execute tasks quickly without saving steps
- Useful to understand the basics of how Ansible works
- `ansible -m <module> [-a <arguments>] <hosts_section>`
  - Default module is “command” (“`-m command`” can be omitted)
  - “`-m ping`” is the ‘Hello World’ of Ansible

```
$ ansible -a "date" all
localhost | SUCCESS | rc=0 >>
Wed Nov 25 05:52:52 CET 2022
$ ansible -m ping csr1
198.18.134.28 | SUCCESS => {
    "changed": false,
    "failed": false,
    "ping": "pong"
}
```

Further reading:

[https://docs.ansible.com/ansible/latest/user\\_guide/playbooks.html](https://docs.ansible.com/ansible/latest/user_guide/playbooks.html)

# Playbooks

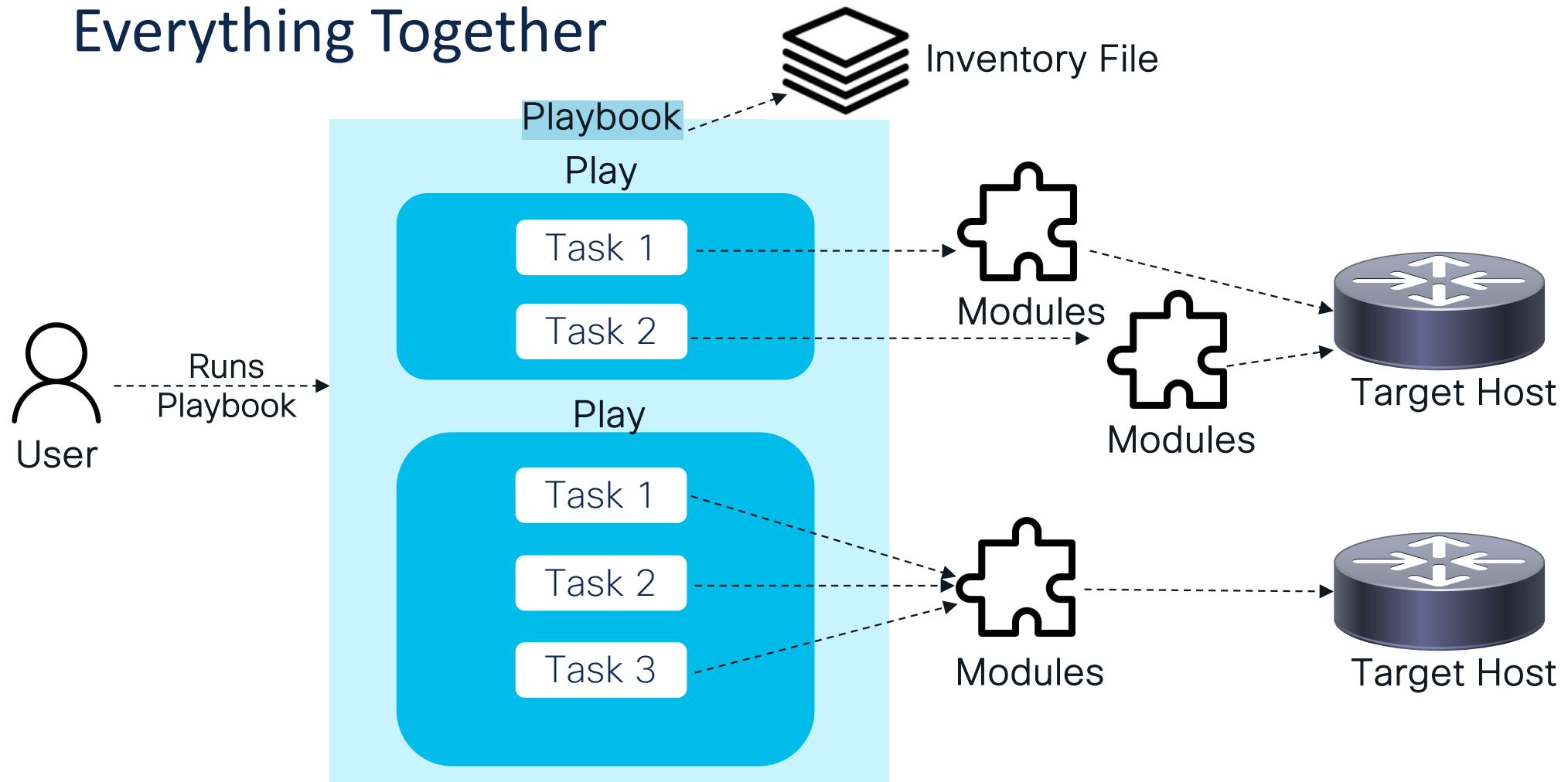
- Ansible's method of procedures (MoP)

```
1 ---           ← Starts with three “-”
2
3 # Play book to show version of all IOS & XRs ← "#" used for comments
4 - name: Get Device versions ← Name of Play
5 hosts: all,!nxos ← Target device/groups
6 tasks:
7   # First Task to get the versions from devices
8   - name: Running 'show version' command ← Task to run CLI on target
9     # Using ios_command module
10    ios_command: ← Network Module being used
11      commands: ← Function of network module
12        - show version ← Parameters to the function
13      # Saving the output of above CLI to a variable named show_ver_output
14      register: show_ver_output ← Saving task output to variable
15
16    # Second Task to parse returned JSON and extract only relevant information for user
17    - name: Extracting only relevant information from 'show version' response ← Task to parse CLI output
18      debug: ← Module to print to screen
19      # Extracting Only the first line for show version CLI output
20      var: show_ver_output.stdout_lines[0][0] ← Parameter to print
```

```
cisco@ubuntu:/etc/ansible$ ansible-playbook 01_show_version_playbook.yaml
```



# Everything Together



# Ansible Building Blocks

Inventory  
+  
Playbooks  
+  
Modules

1. Inventory of target hosts
2. Playbook to group the actions to be executed
3. Each action is a task
4. Each Task may or may not use modules.

# LAB-3 DEEP DIVE

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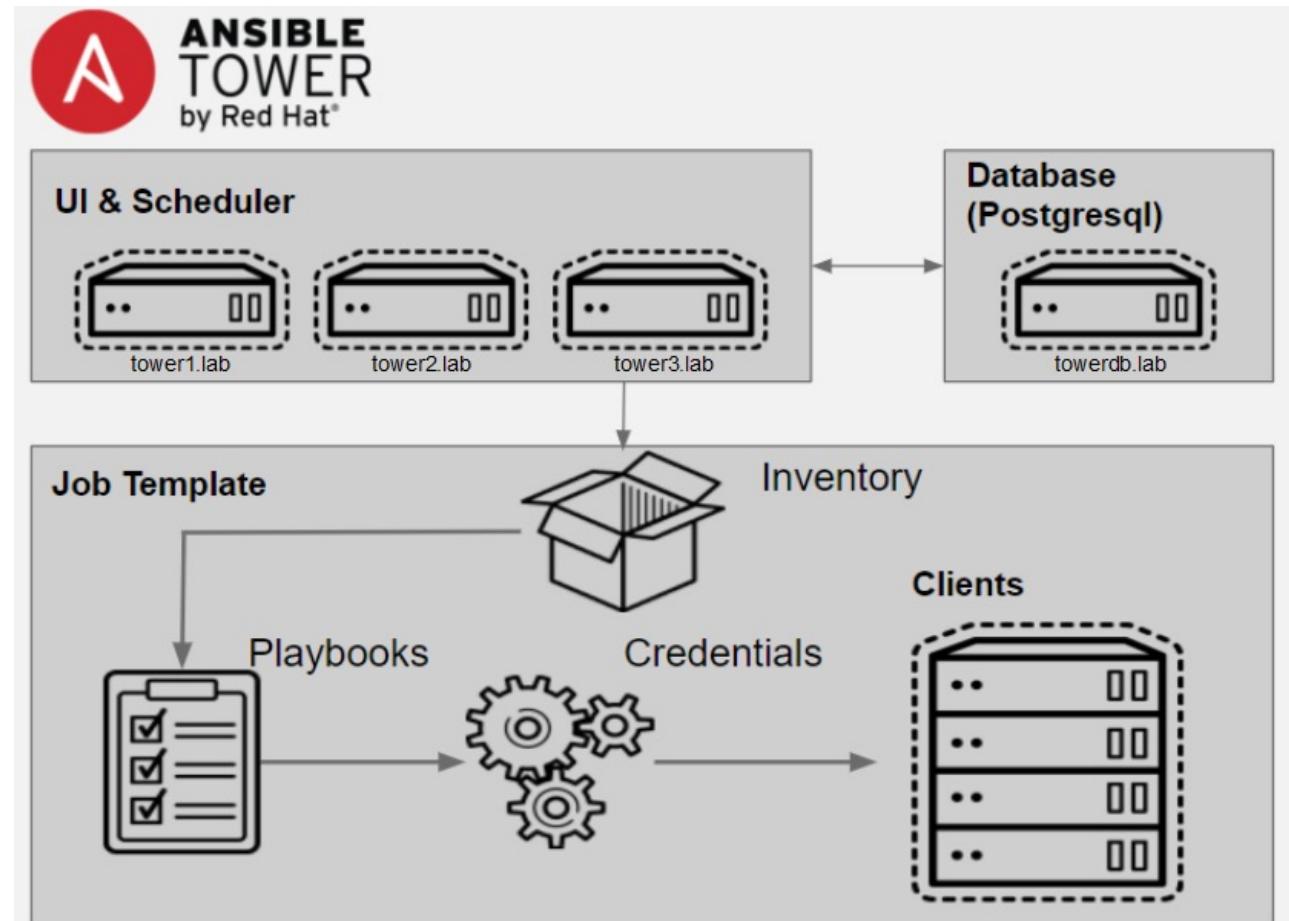
# LAB-4

## Advanced Topics

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# Ansible Tower/AWX

- Web Interface for ansible
  - Exposes Rest APIs
  - User control
  - Audit logs (\*\*Most important)
- 
- Ansible Tower is Paid & supported like RedHat Enterprise Linux
  - Ansible AWX is Community edition like Fedora upstream Linux



# Ansible & Other Tools Comparison

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# Ansible & Other Tools Comparison

Tools	Architecture	Agentless	Communication
Puppet	Master/Agent	No	Pull Mode
Chef	Master/Agent	No	Pull Mode
Salt	Master/Minion	No	Push Mode
NorNir	Python Automation Framework, Code Centric	<input checked="" type="checkbox"/>	SSH
NetPalm	REST APIs Broker for network automation	<input checked="" type="checkbox"/>	REST/SSH
Ansible	YAML based	<input checked="" type="checkbox"/>	SSH

# Ansible vs NSO

- Similarities:
  - Both are [Agentless](#), works in Push Mode
- Not so similar:

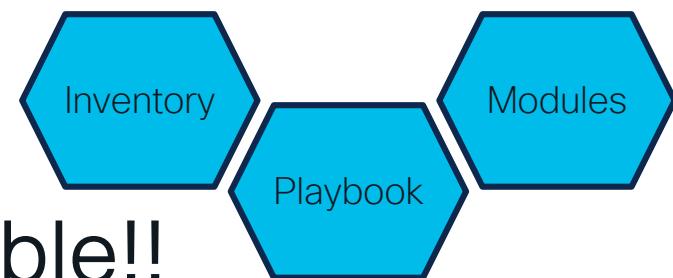
Criteria	Ansible	NSO
Protocols	Mainly SSH/ but increasing	NED based (CLI, Netconf, Rest, TAPI & ...)
Transactional	Run till Completion with Errors	All or Nothing
Rollback	Not supported	Built-in Rollback
Use cases Scope	<b>Device lifecycle, DevOps</b>	<b>Service Lifecycle Management (YANG based)</b>
North Bound Interfaces	CLI, REST (TOWER)	CLI, Rest, JSON RPC, Netconf

# Conclusion

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# Ansible + Cisco = Unlimited Potential

- Simple, Stateless, Powerful yet open-source automation Framework
- Quick Win scenarios for automation
- Best suited for large size automation teams than other dev-ops options like python, NorNir etc. YAML is the key.
- Limited desire or skills to adopt python programming
- Multi-vendor support utilizing vendor developed & maintained network modules.
- All that you need is a workstation/VM and start with



Happy Automating with Ansible!!



# Thank you

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## Questions?

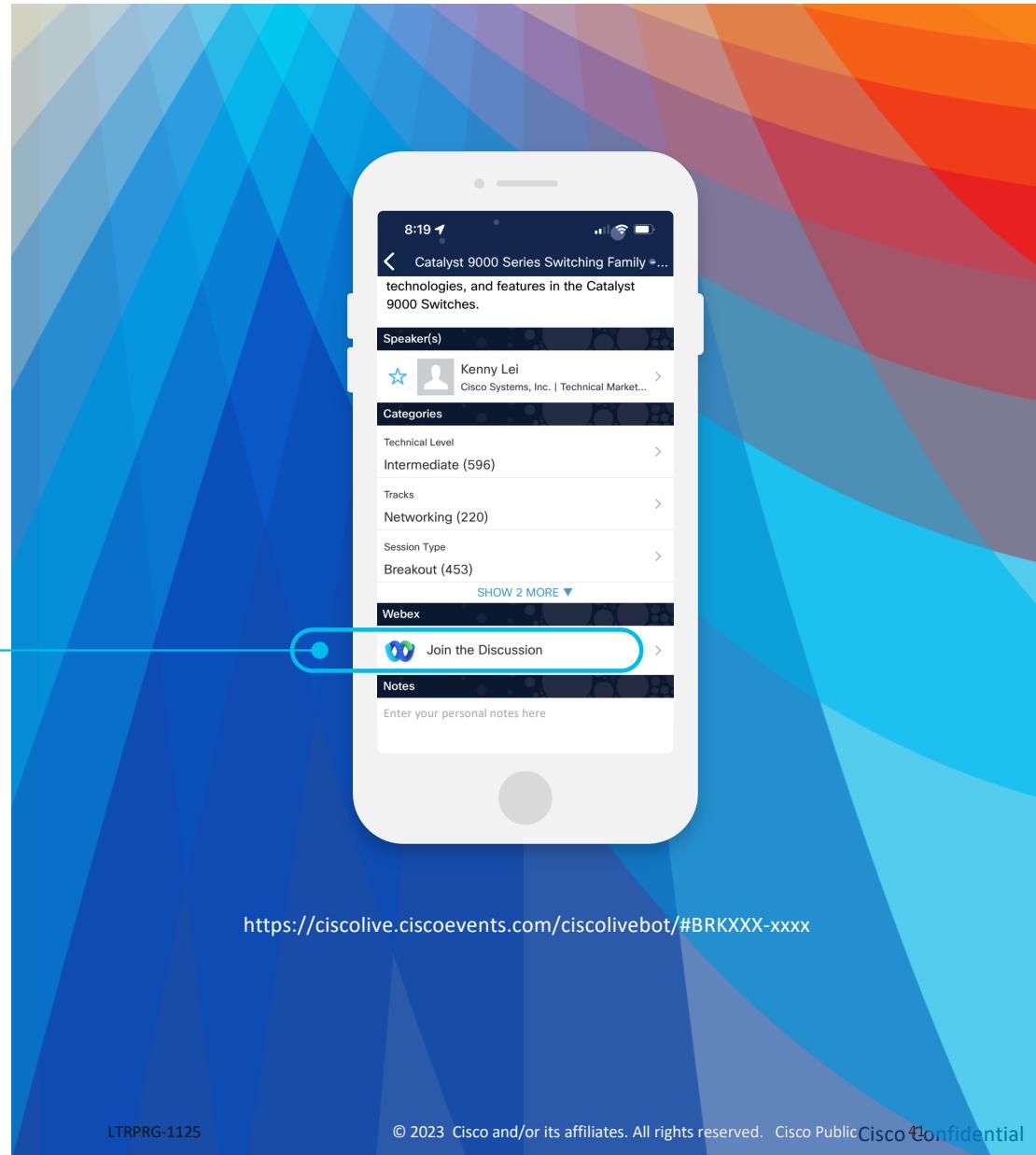
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