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The bridge to possible

Ansible Zero to Hero – Network Automation

Vishal Kakkar – Solution Architect
Sanjeewa Alahakone - Solutions Architect

LTRPRG-1125

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"Reconciliation"- Dustin Koa Art

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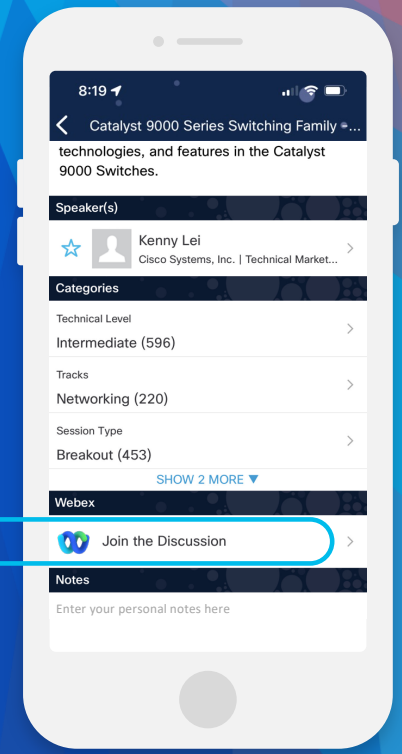

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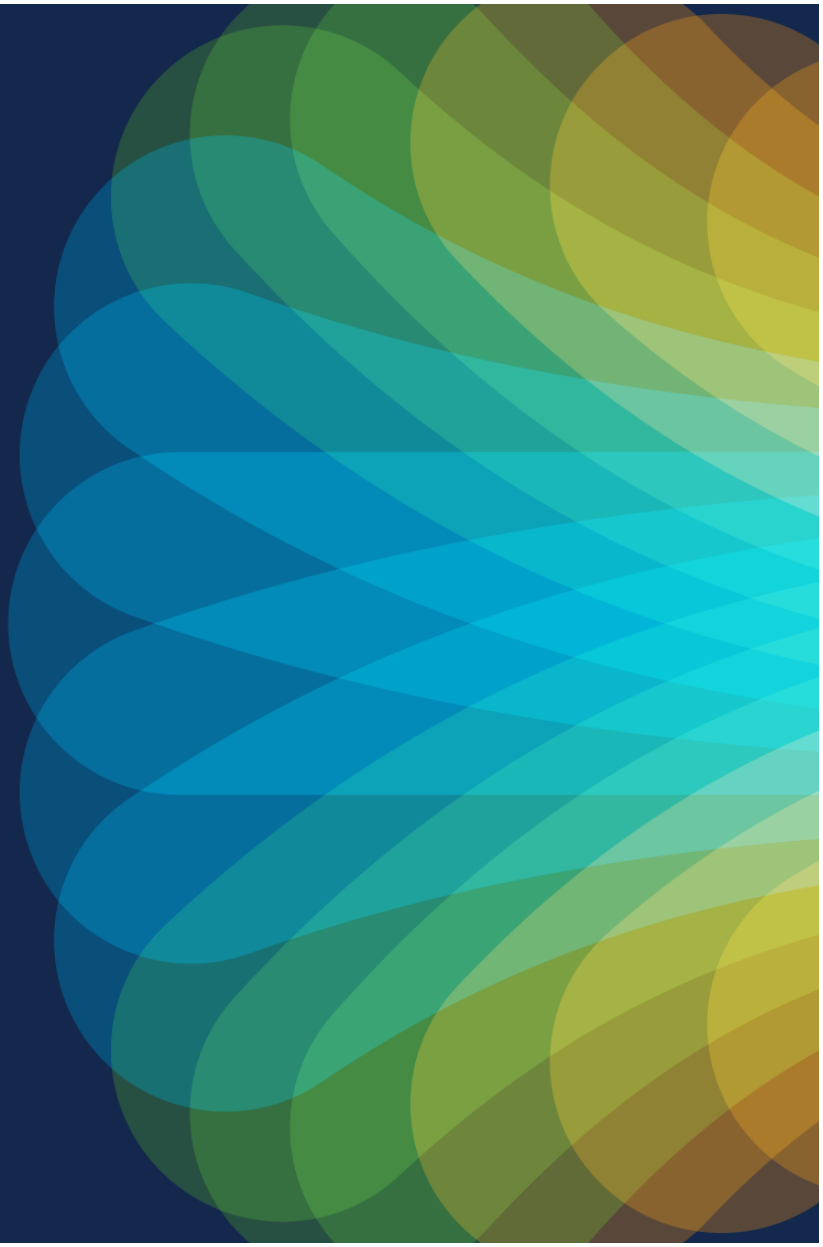
Agenda

- 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

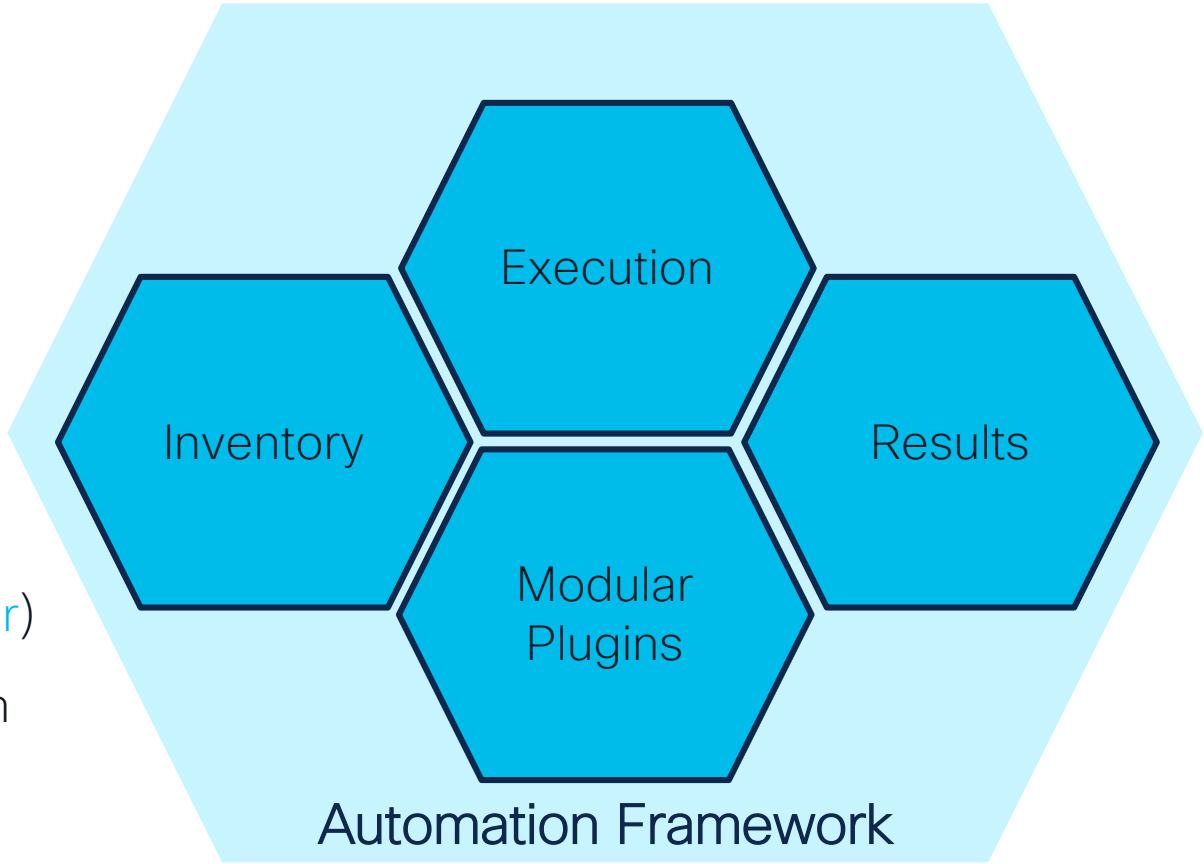
What is Ansible?



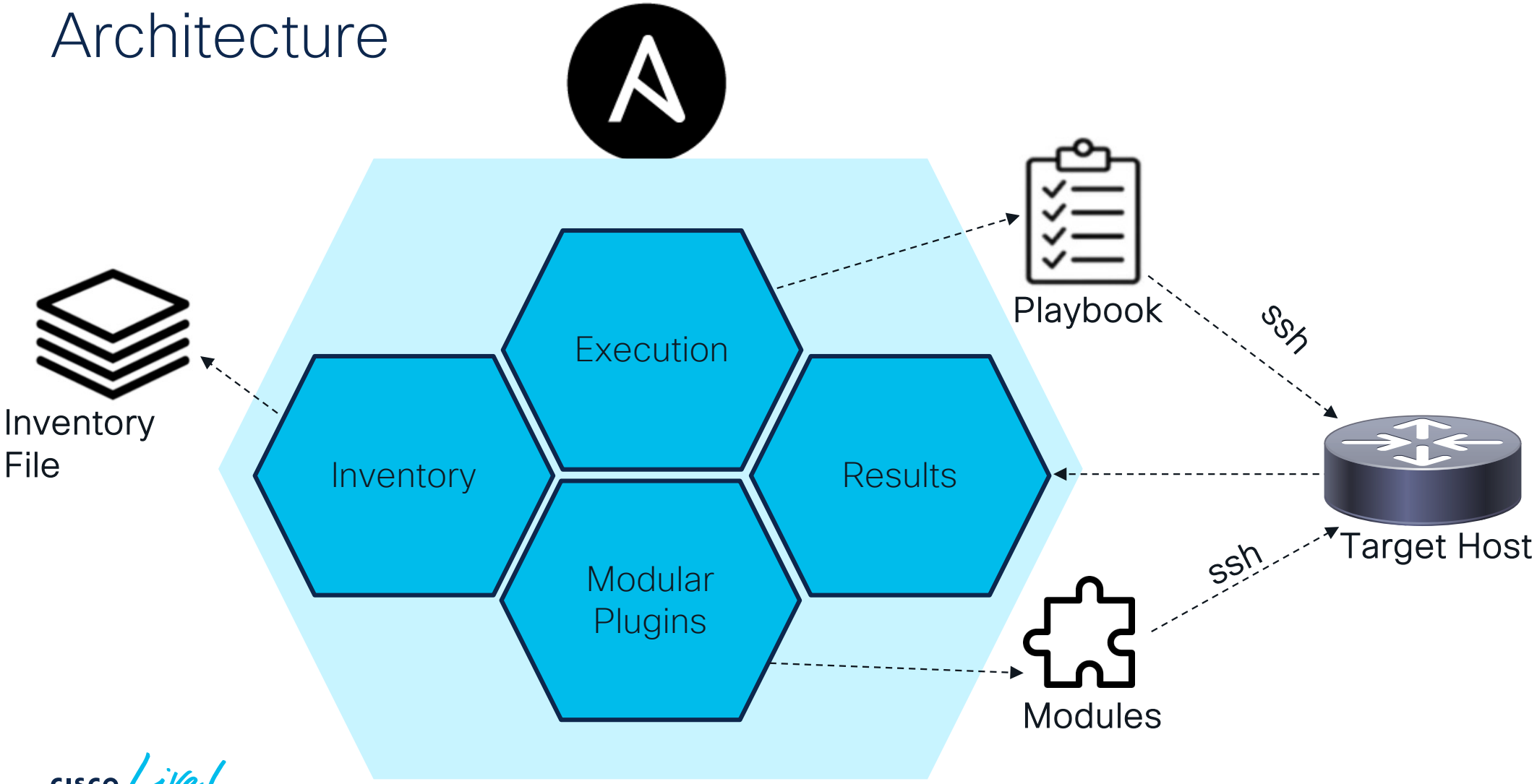
What is Ansible

- 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



Documentation:
https://docs.ansible.com/ansible/latest/installation_guide/intro_installation.html

Ansible Packaging

- Ansible consists basically of 2 packages
  - ansible-core
  - ansible

- ‘ansible-core’
  - runtime
  - fundamental modules & plugins
- ‘ansible’
  - Community developed modules

Documentation:
https://docs.ansible.com/ansible/latest/installation_guide/intro_installation.html

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:

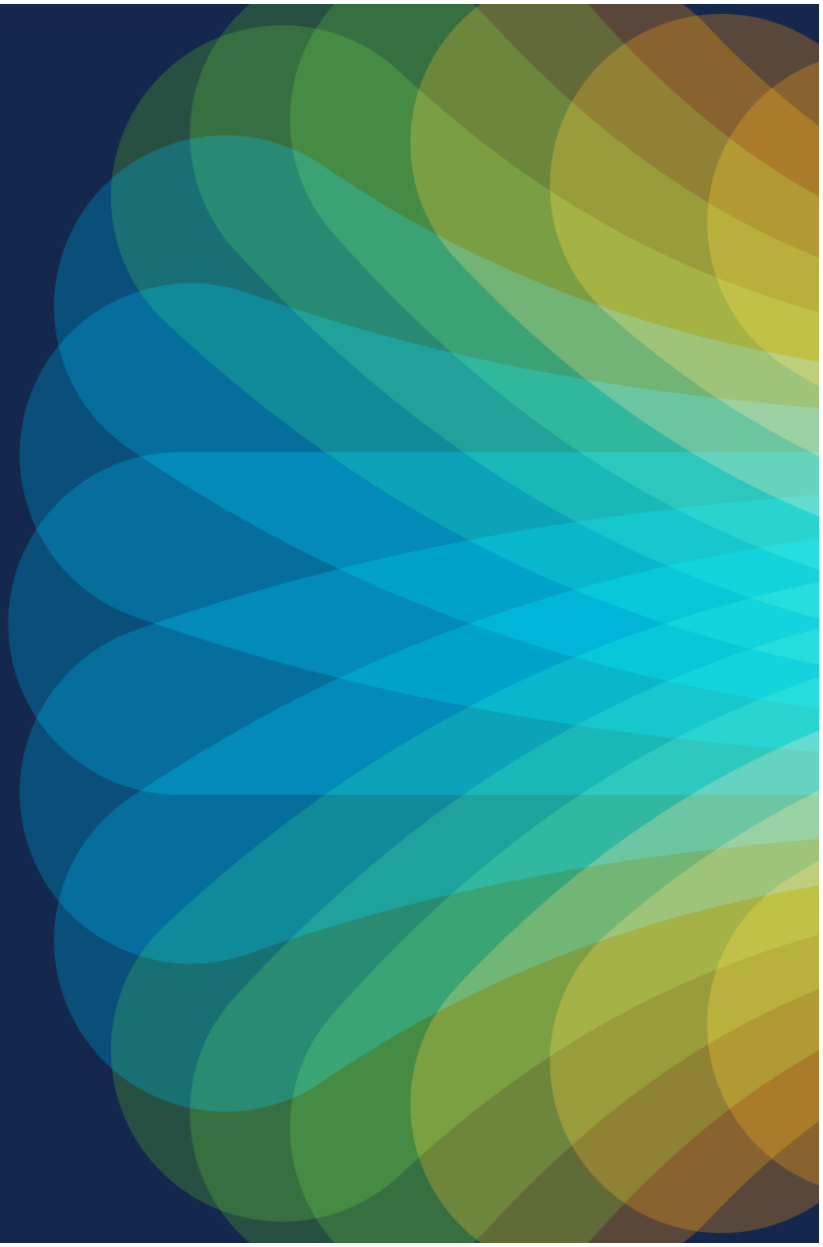
```
$ pip3 install ansible
```

Upgrade from v2.9 and earlier not possible!

```
pip3 uninstall ansible
pip3 install ansible
```

- Windows is not supported as controller

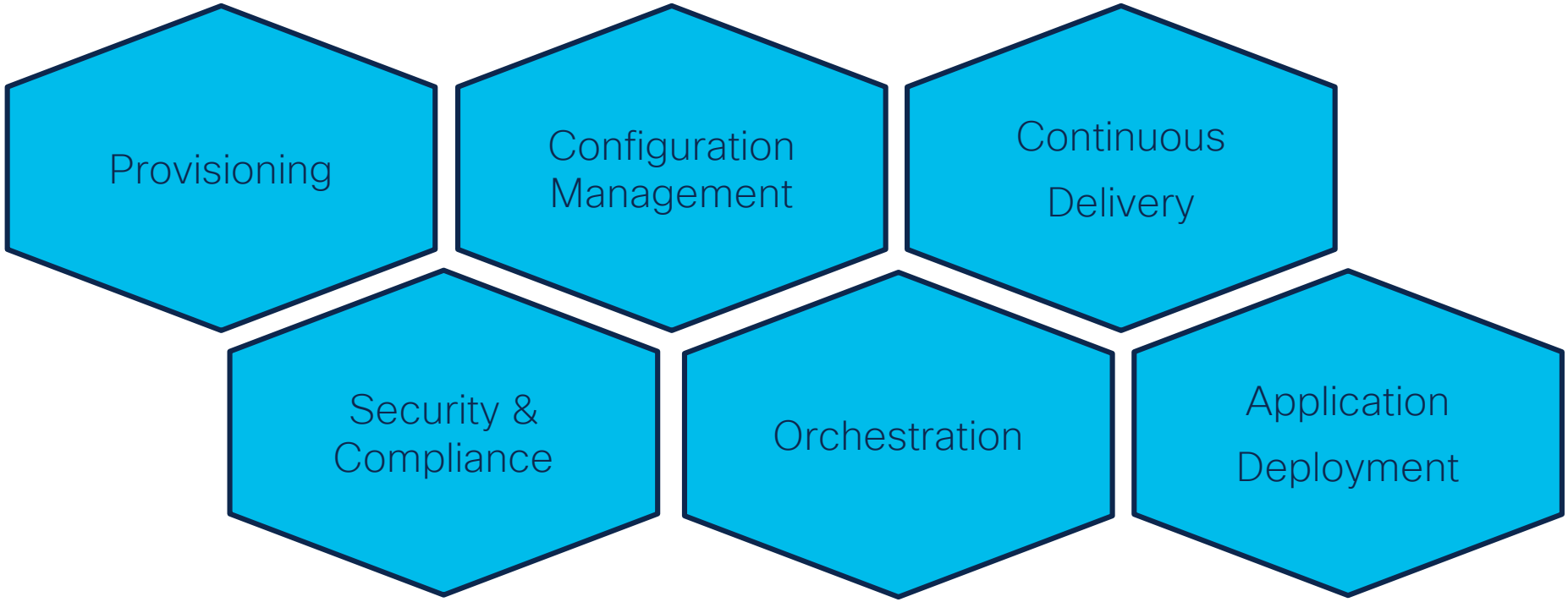
Why Ansible?



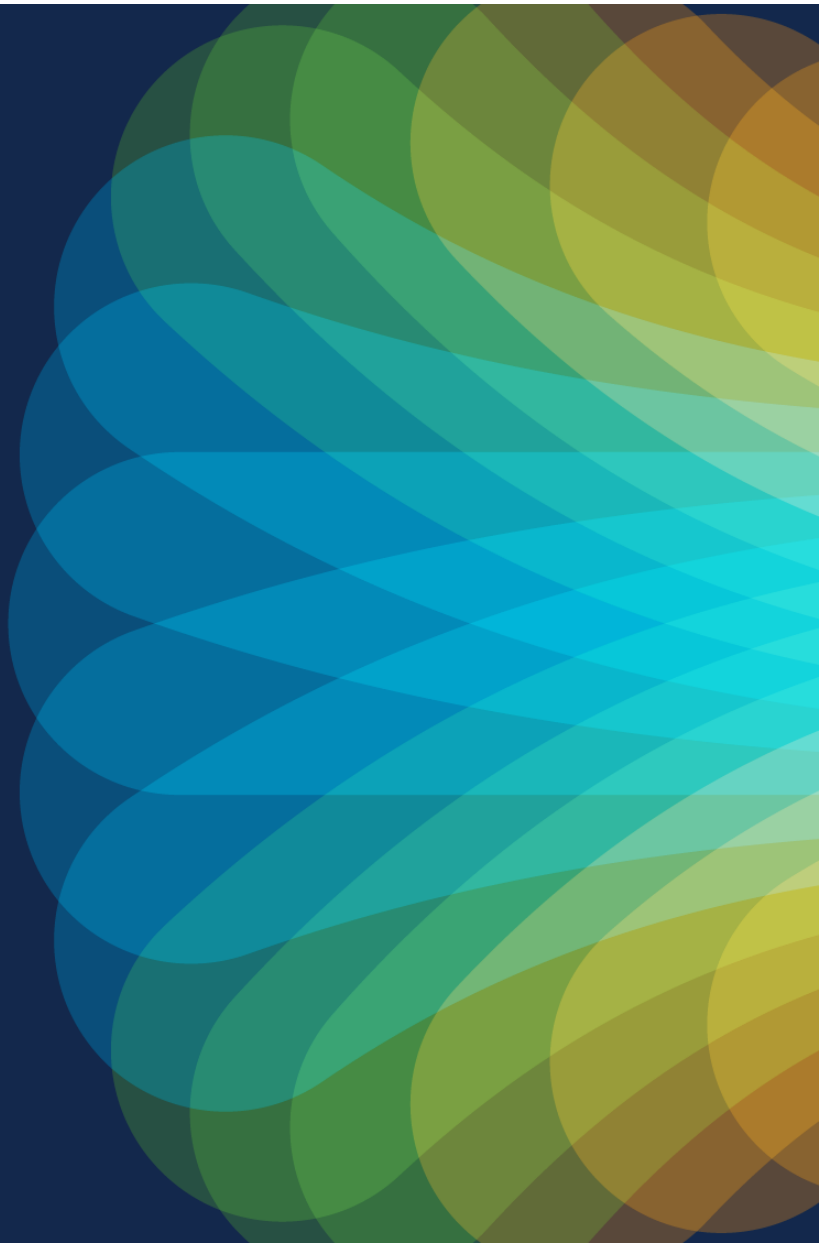
Why Ansible

- 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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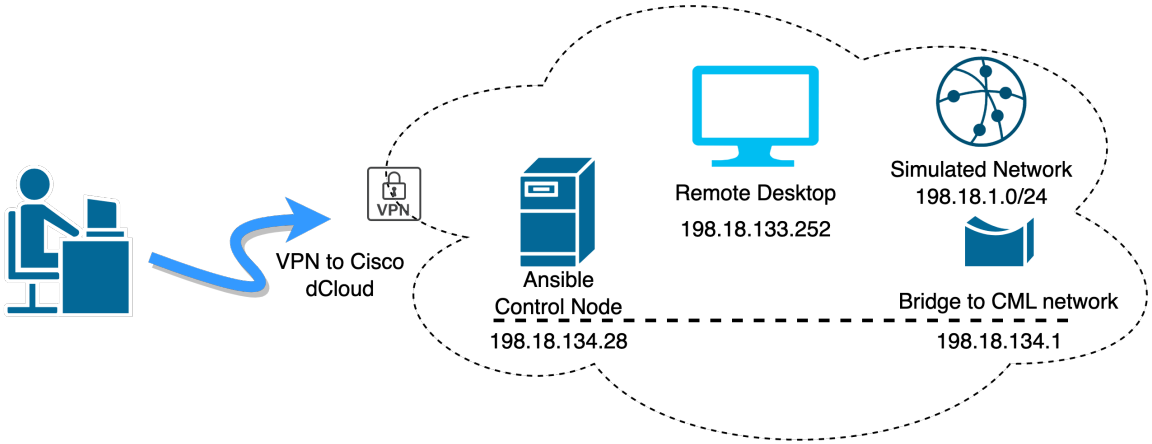
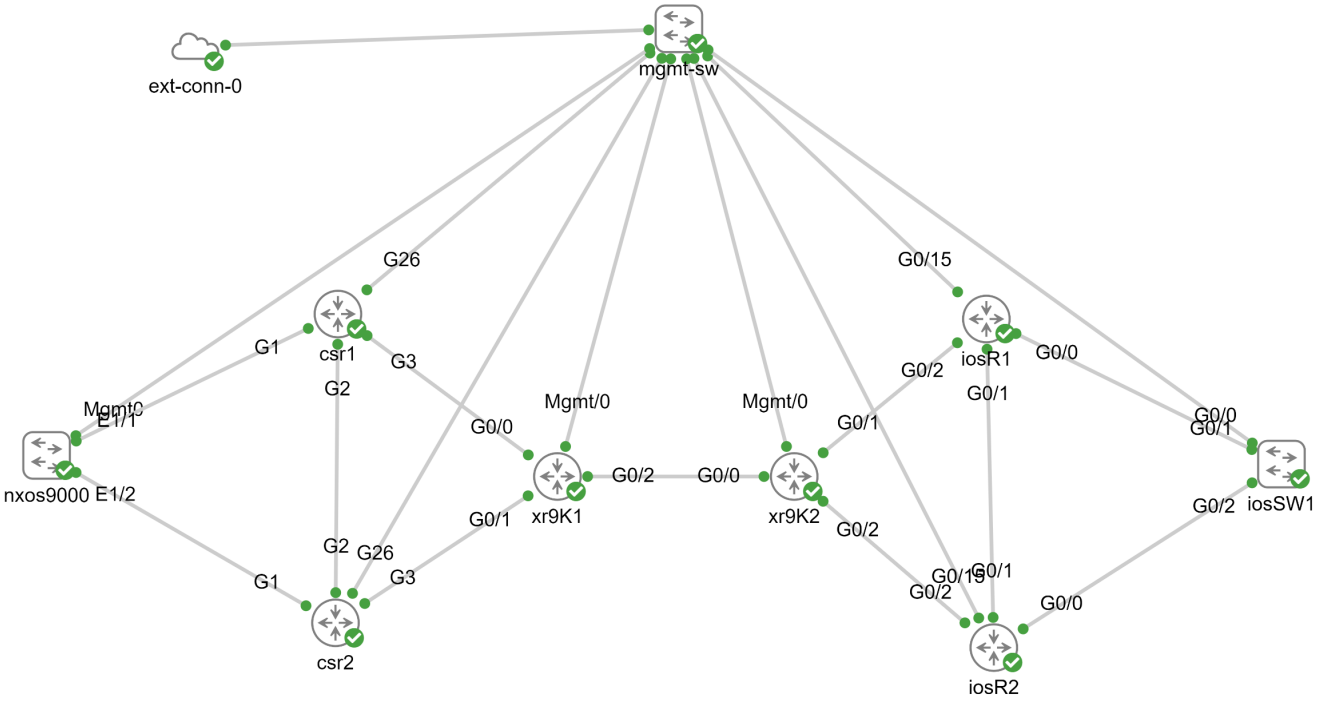
dCloud Lab Setup

- **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

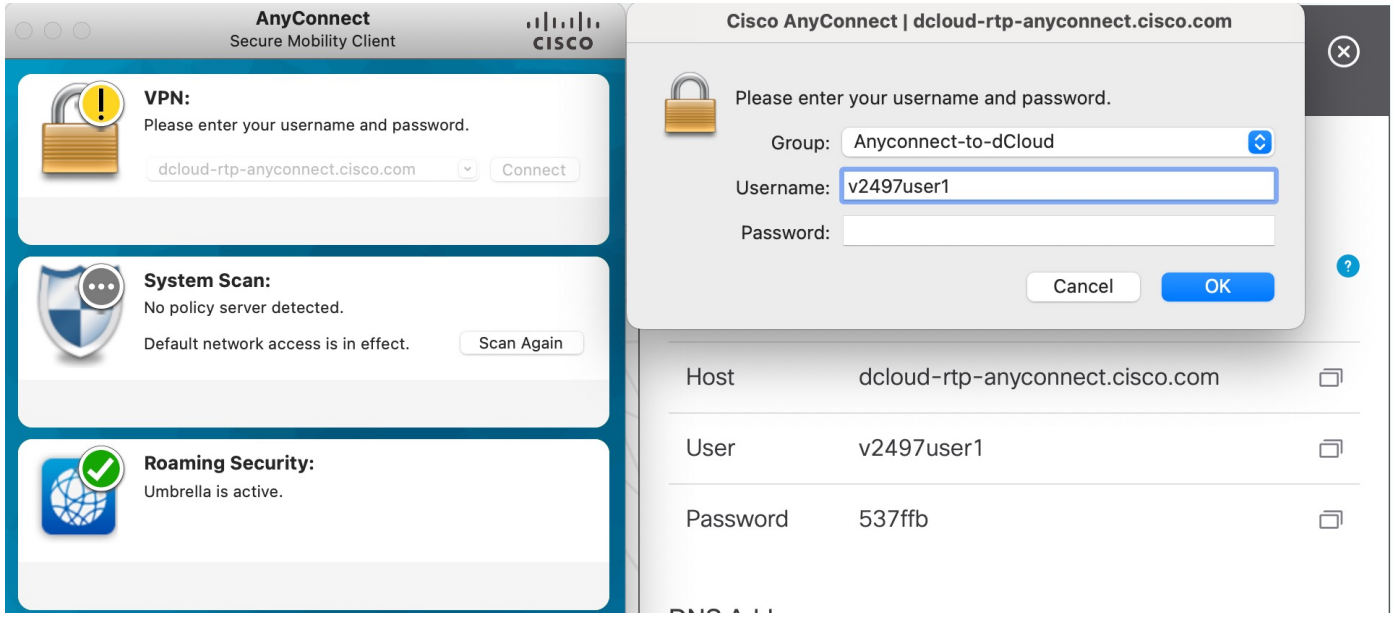


Network Topology



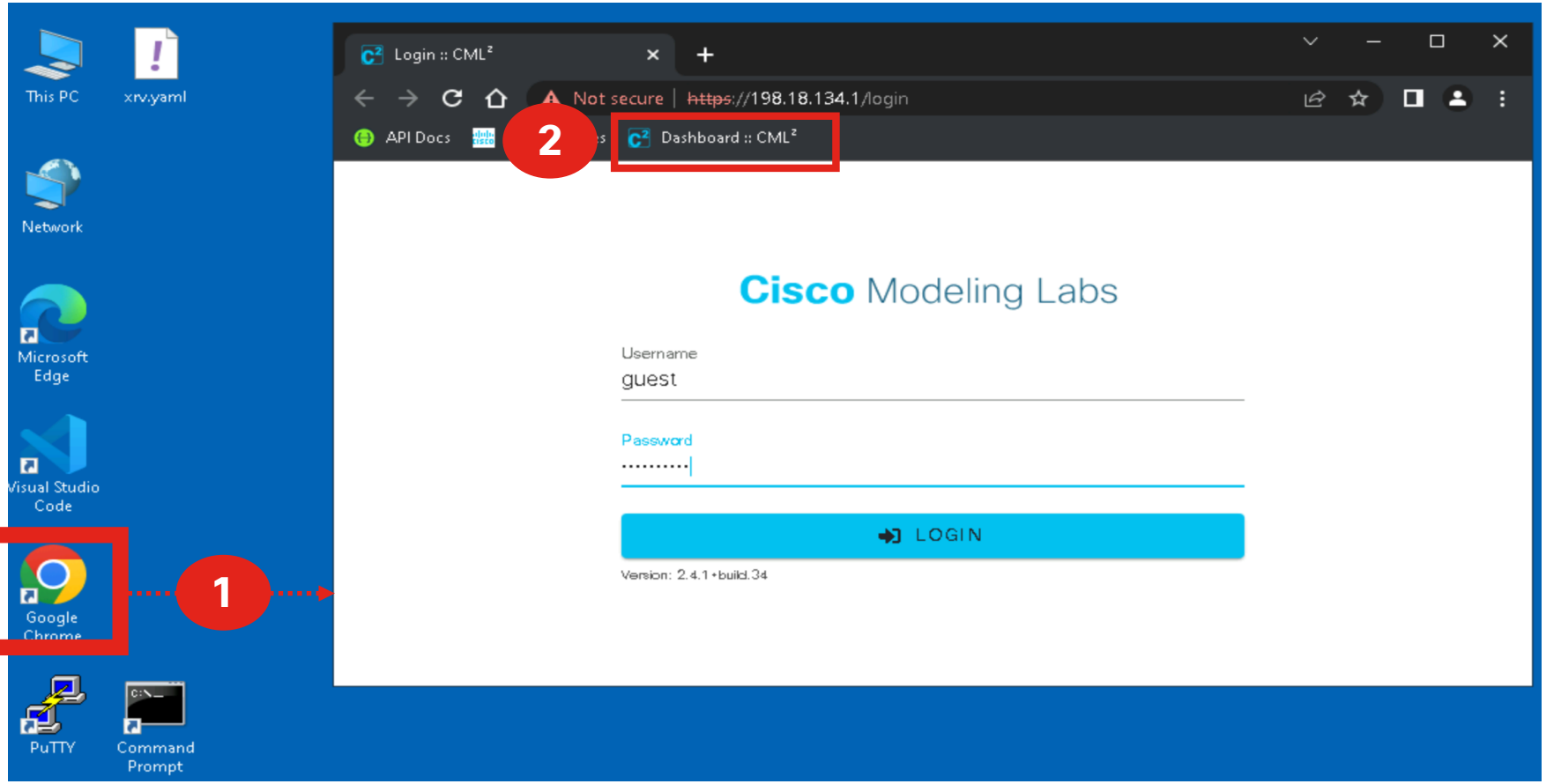
Lab Access

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

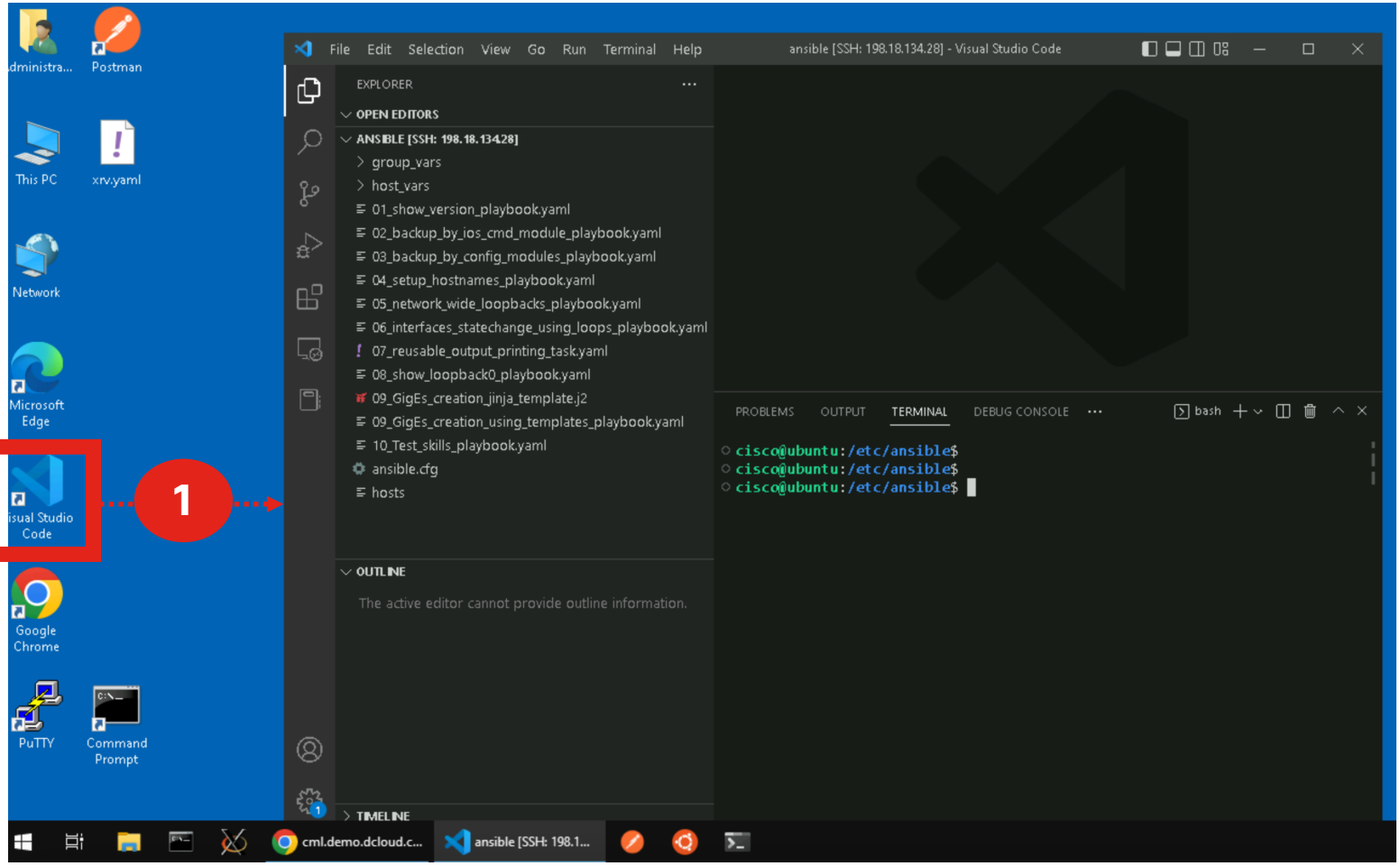


- Connect to the **Windows jump host** using **RDP client** to address198.18.133.252

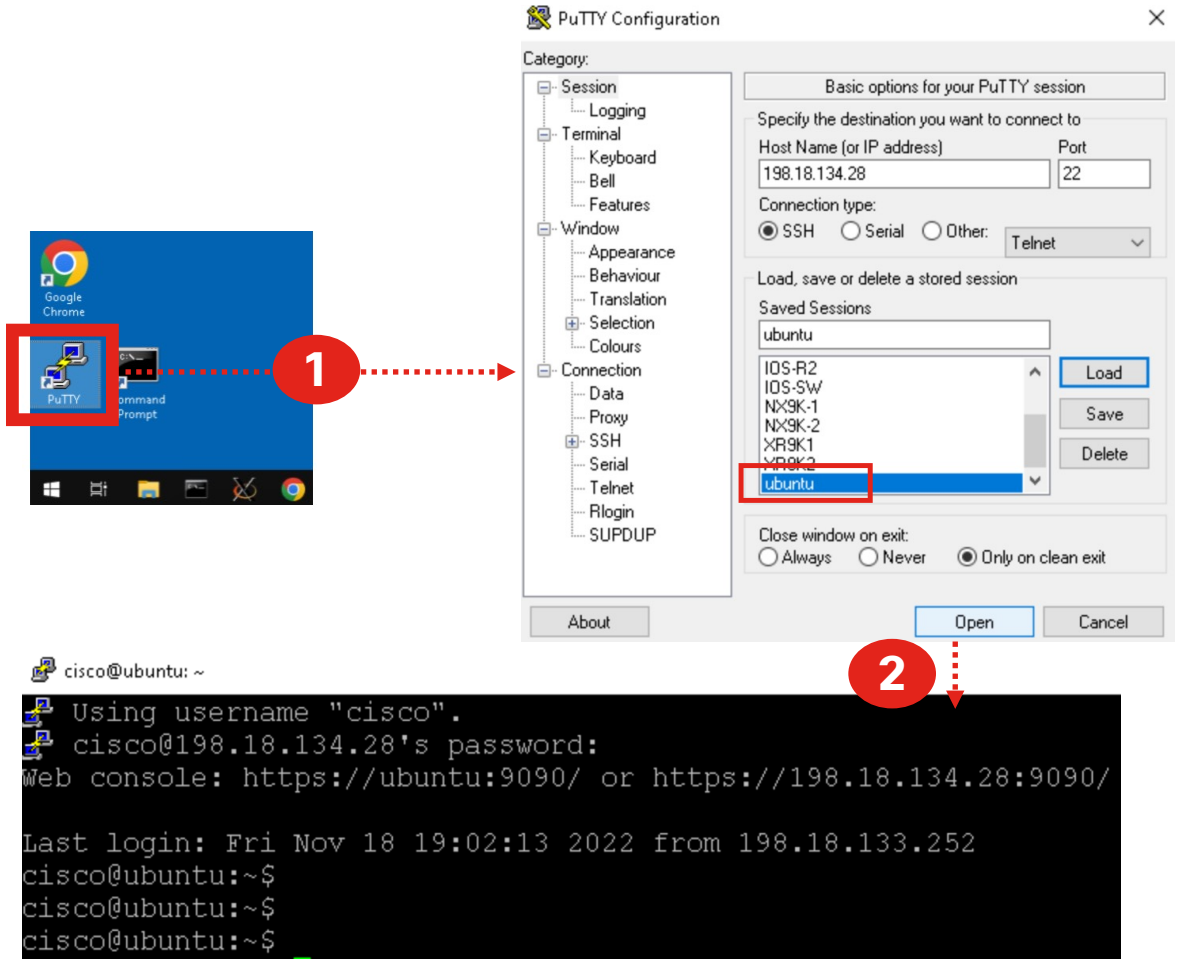
Windows Jump host – CML



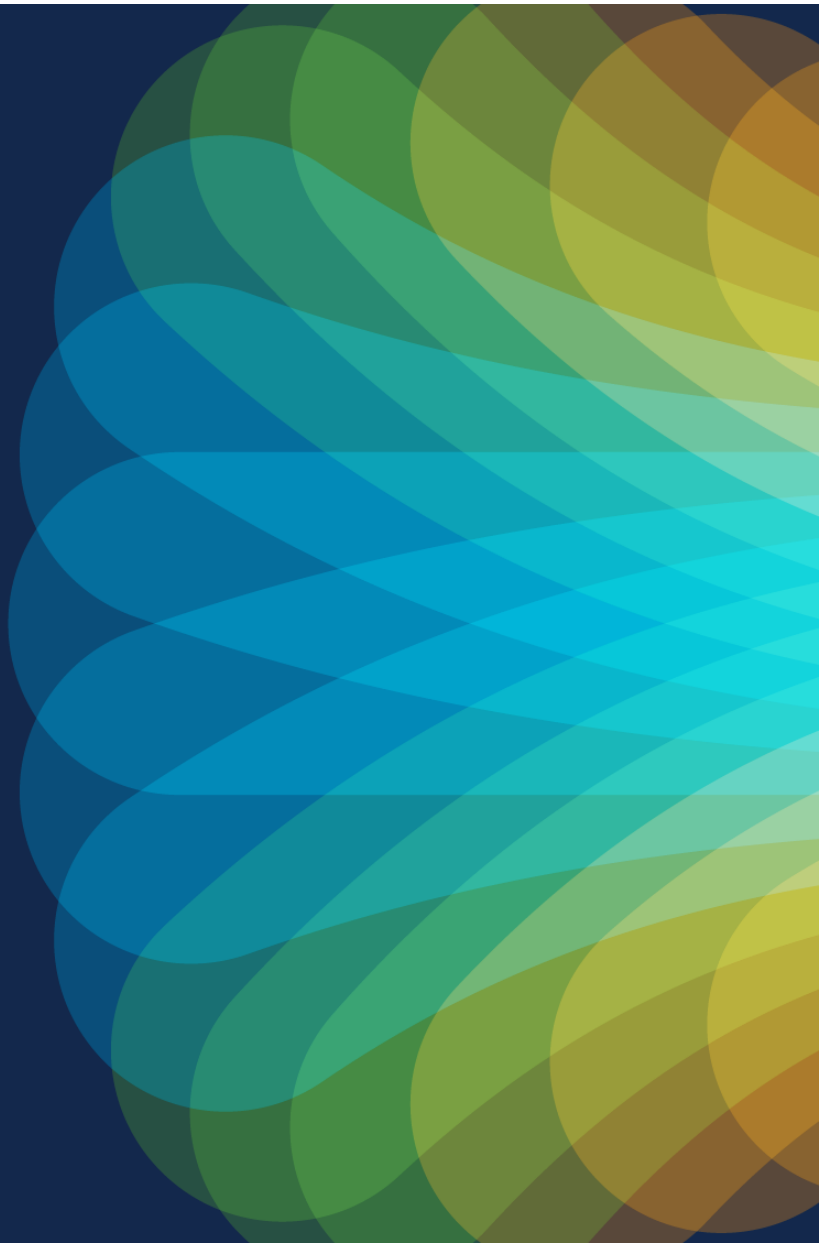
Windows Jump host – Visual Studio (Visio)



Windows Jump host – Ansible Controller (Ubuntu)



Hands-on Lab



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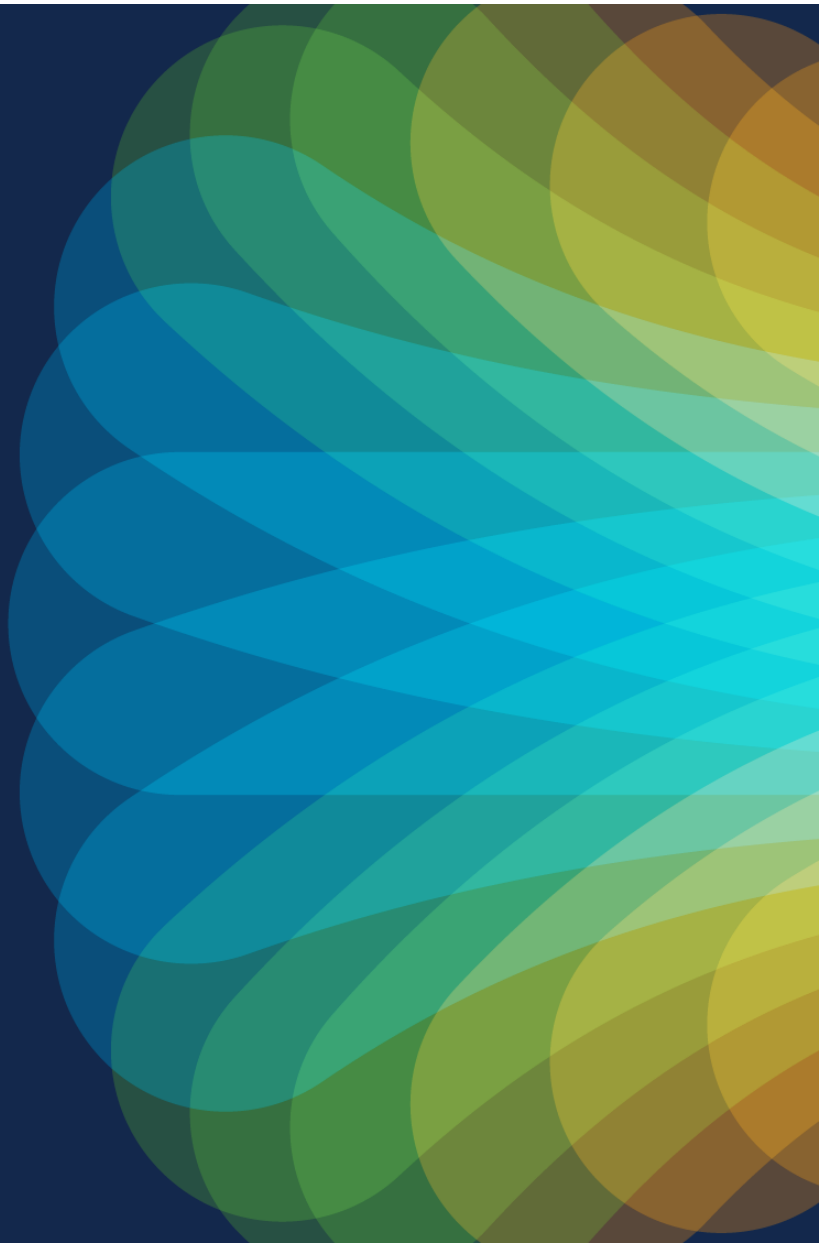
LAB1:
Familiarize with Ansible Environment



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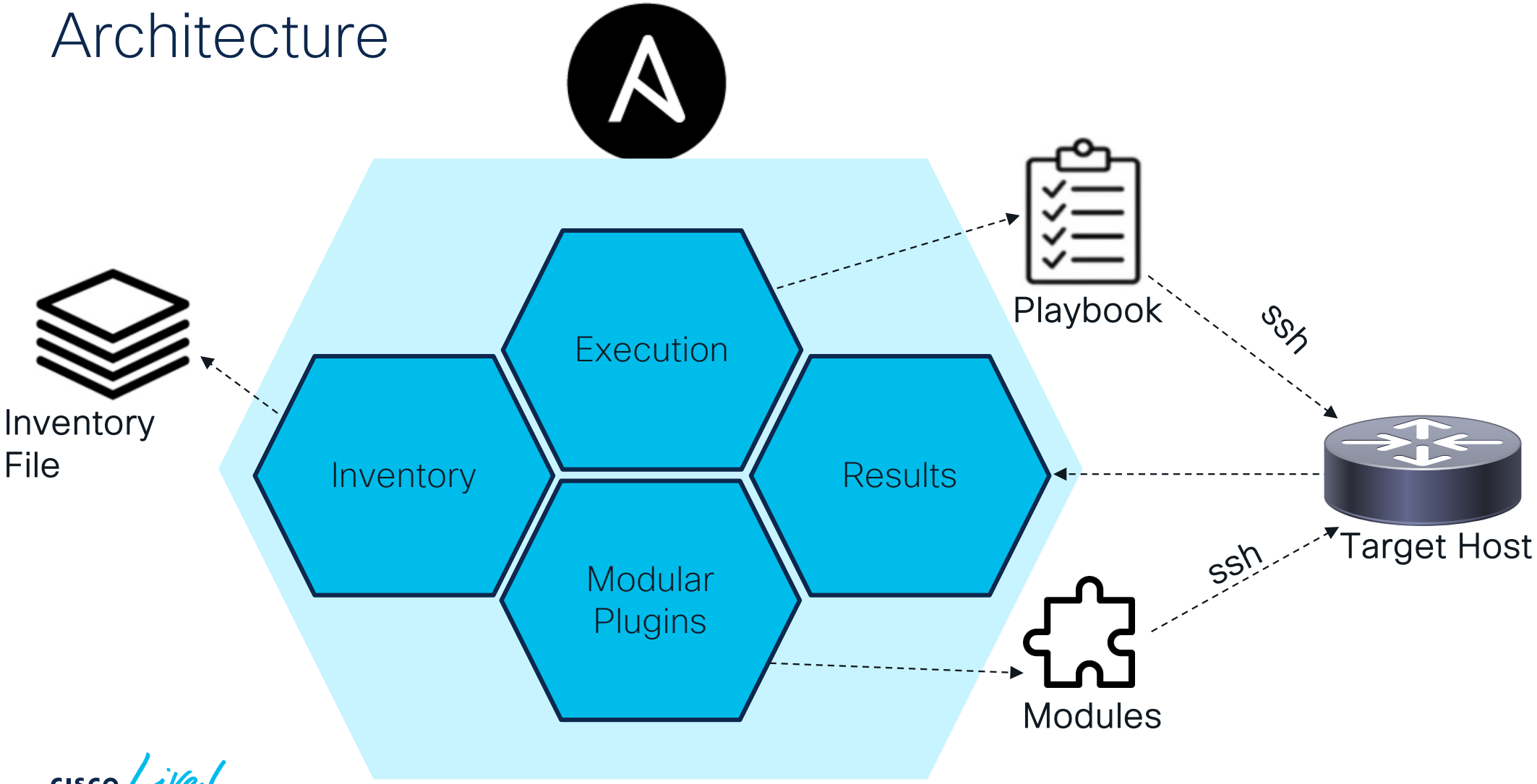
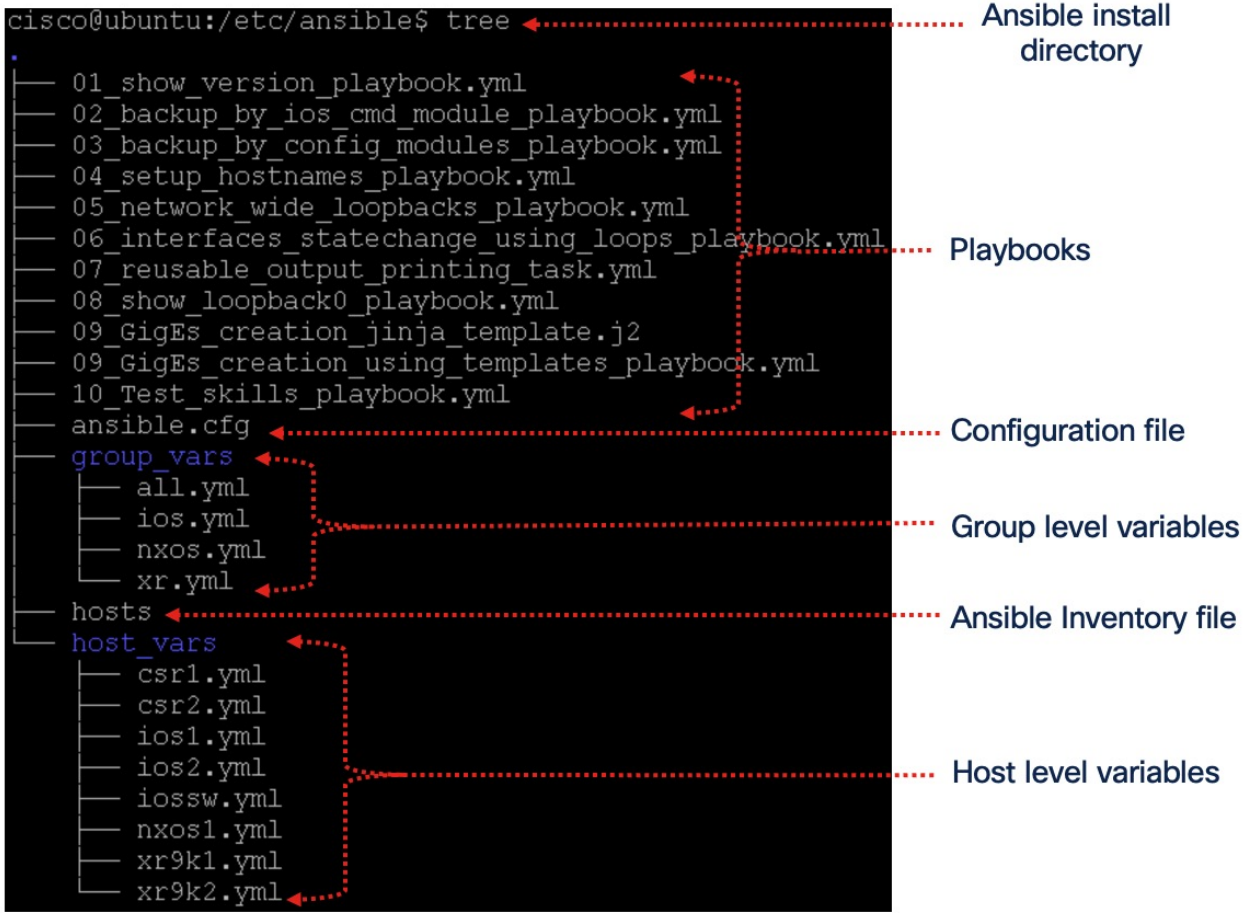
Architecture



Ansible Directory Structure (LAB)

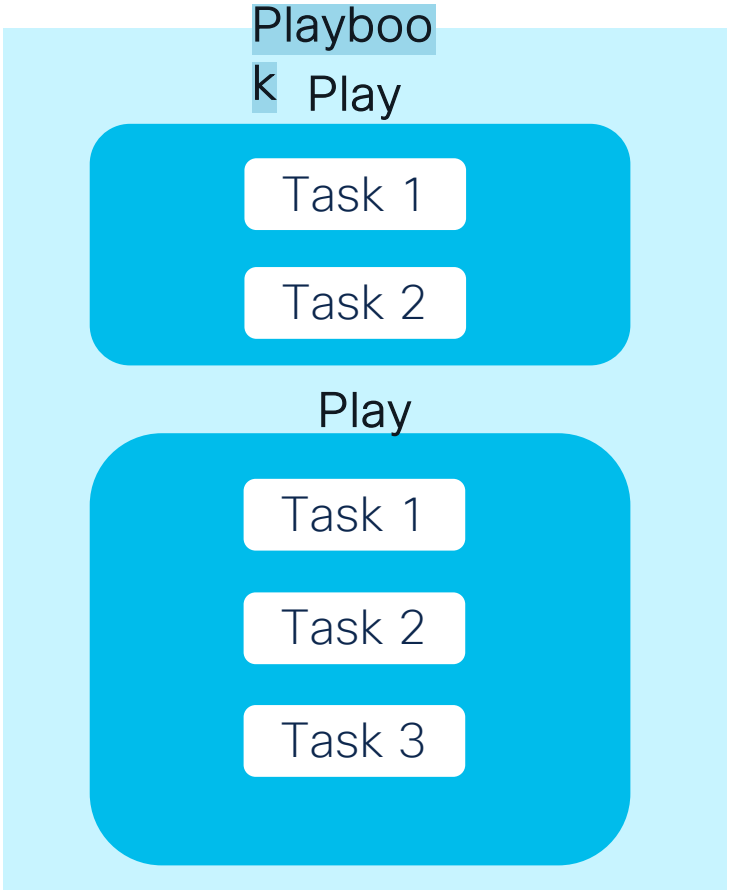


Ansible Inventory

- 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 programing 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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Further reading:
https://docs.ansible.com/ansible/latest/user_guide/intro_adhoc.html
https://docs.ansible.com/ansible/latest/modules/ping_module.html

Ad-hoc Commands

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

Further reading:
https://docs.ansible.com/ansible/latest/user_guide/playbooks.html

Playbooks

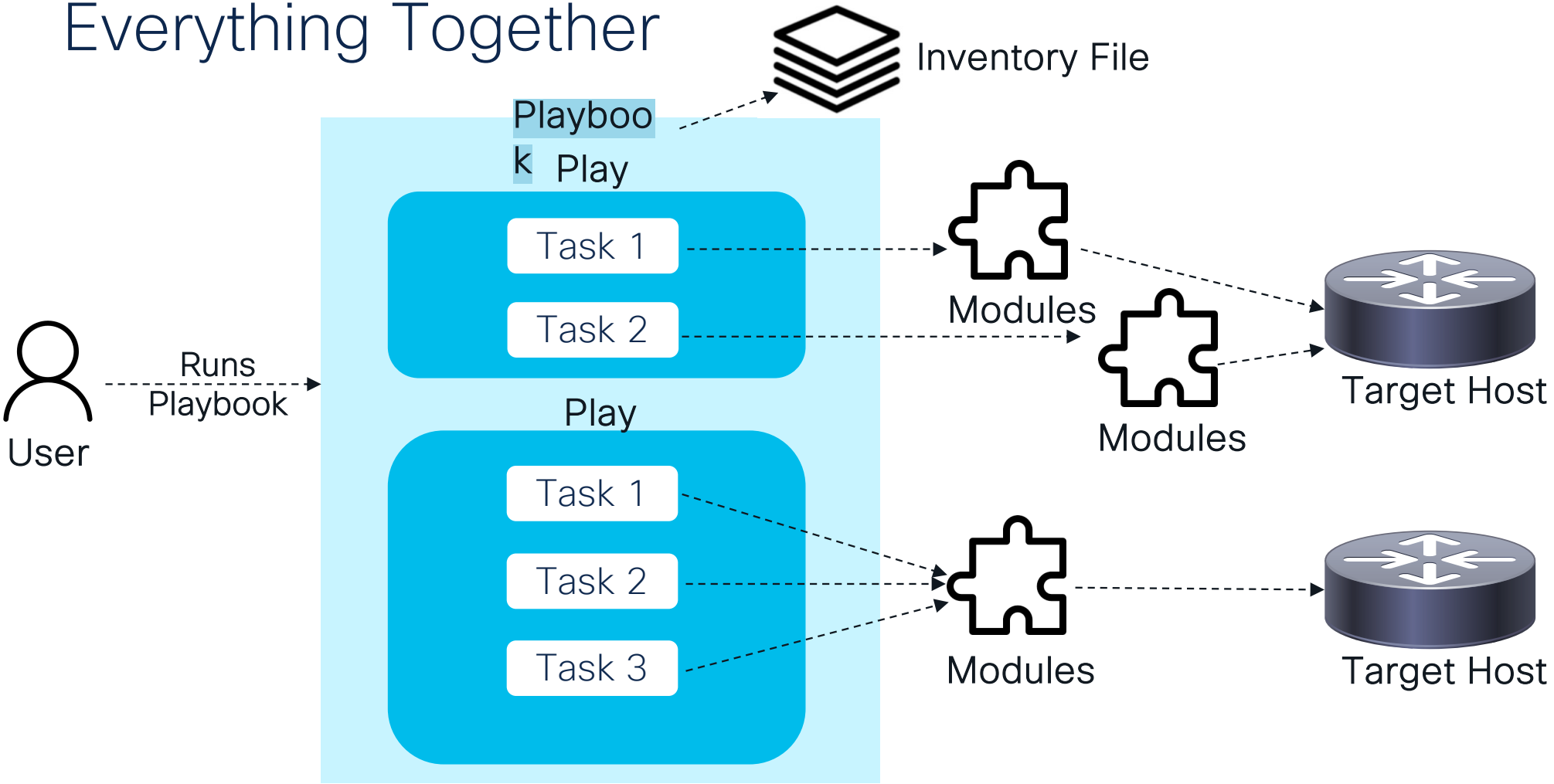
- Ansible's method of procedures (MoP)

```
1   ---
2
3   # Play book to show version of all IOS & XRs
4   - name: Get Device versions
5     hosts: all,!nxos
6     tasks:
7       # First Task to get the versions from devices
8       - name: Running 'show version' command
9         # Using ios_command module
10        ios_command:
11          commands:
12            - show version
13        # Saving the output of above CLI to a variable named show_ver_output
14        register: show_ver_output
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
18        debug:
19          # Extracting Only the first line for show version CLI output
20          var: show_ver_output.stdout_lines[0][0]
```

Starts with three "-"
"#" used for comments
Name of Play
Target device/groups
Task to run CLI on target
Network Module being used
Function of network module
Parameters to the function
Saving task output to variable
Task to parse CLI output
Module to print to screen
Parameter to print

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

Everything Together

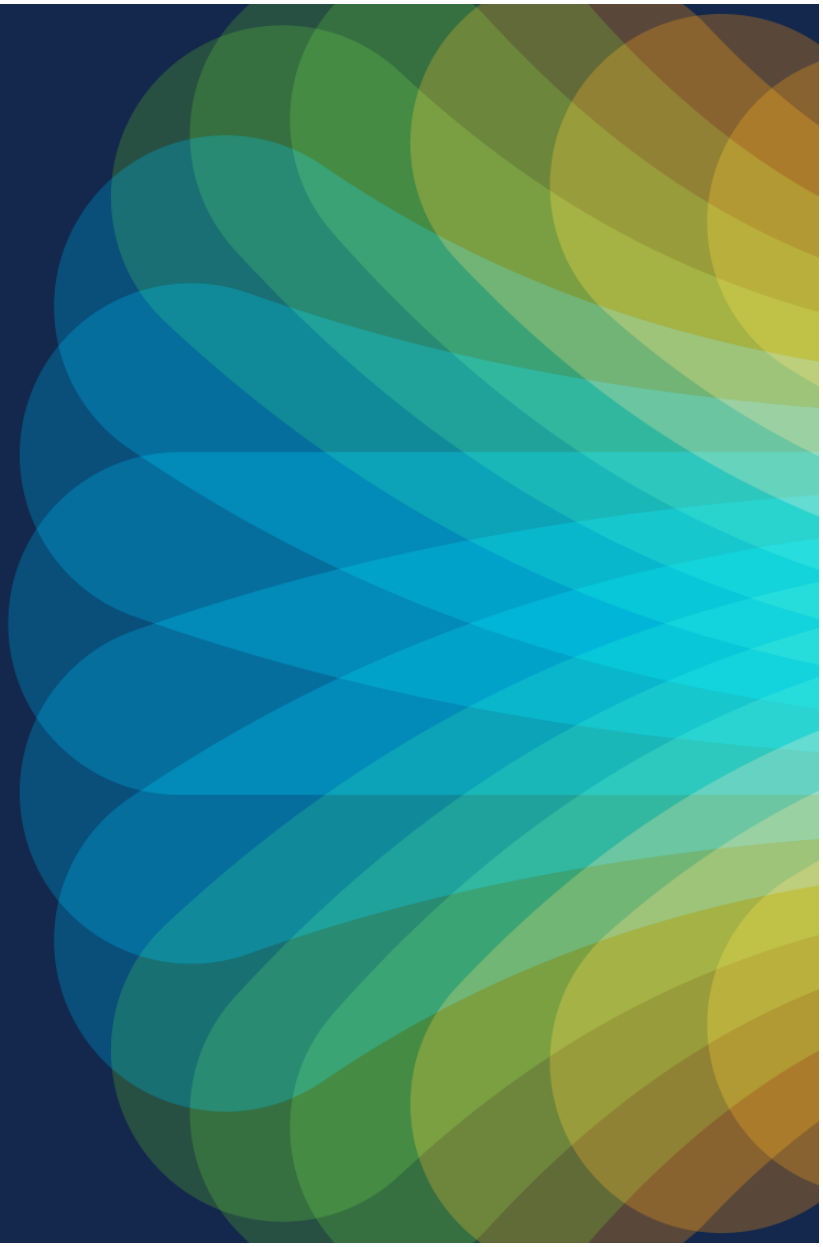


Ansible Building Blocks

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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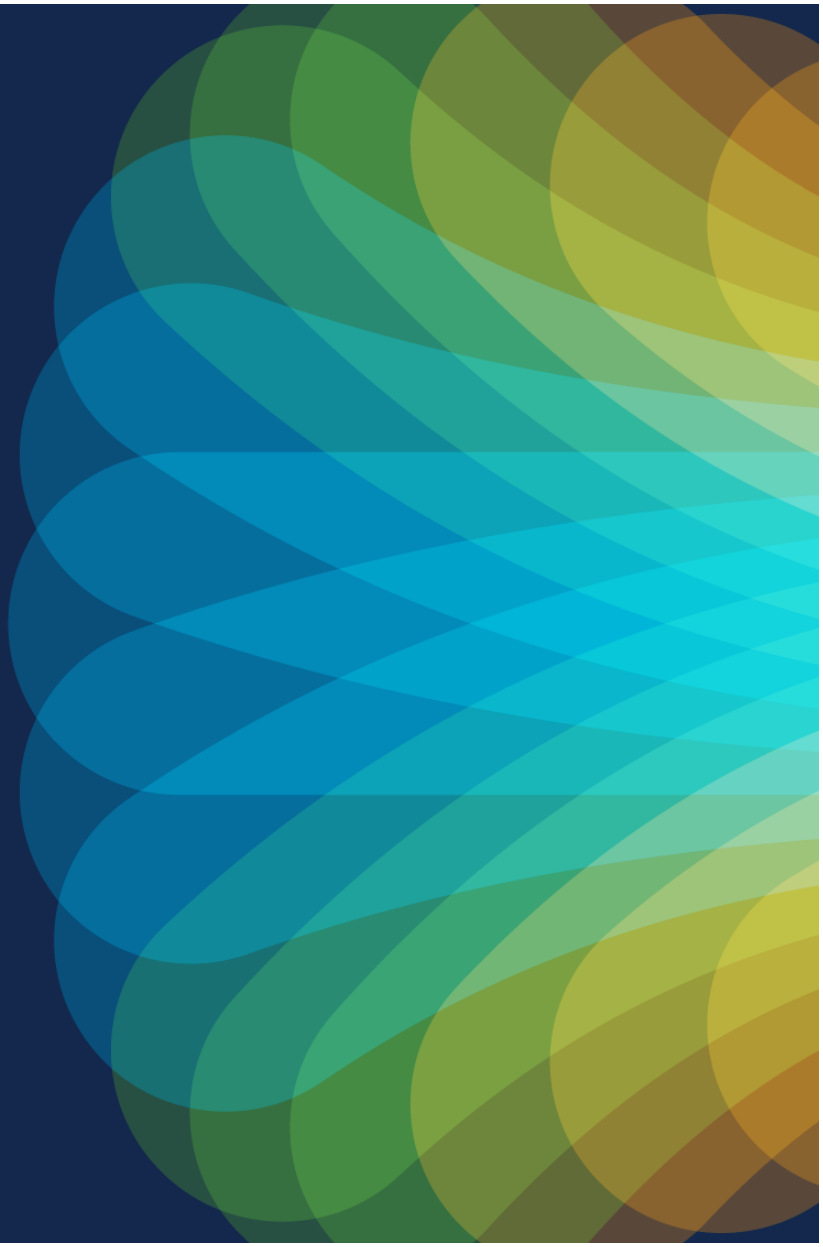
LAB-4
Advanced Topics



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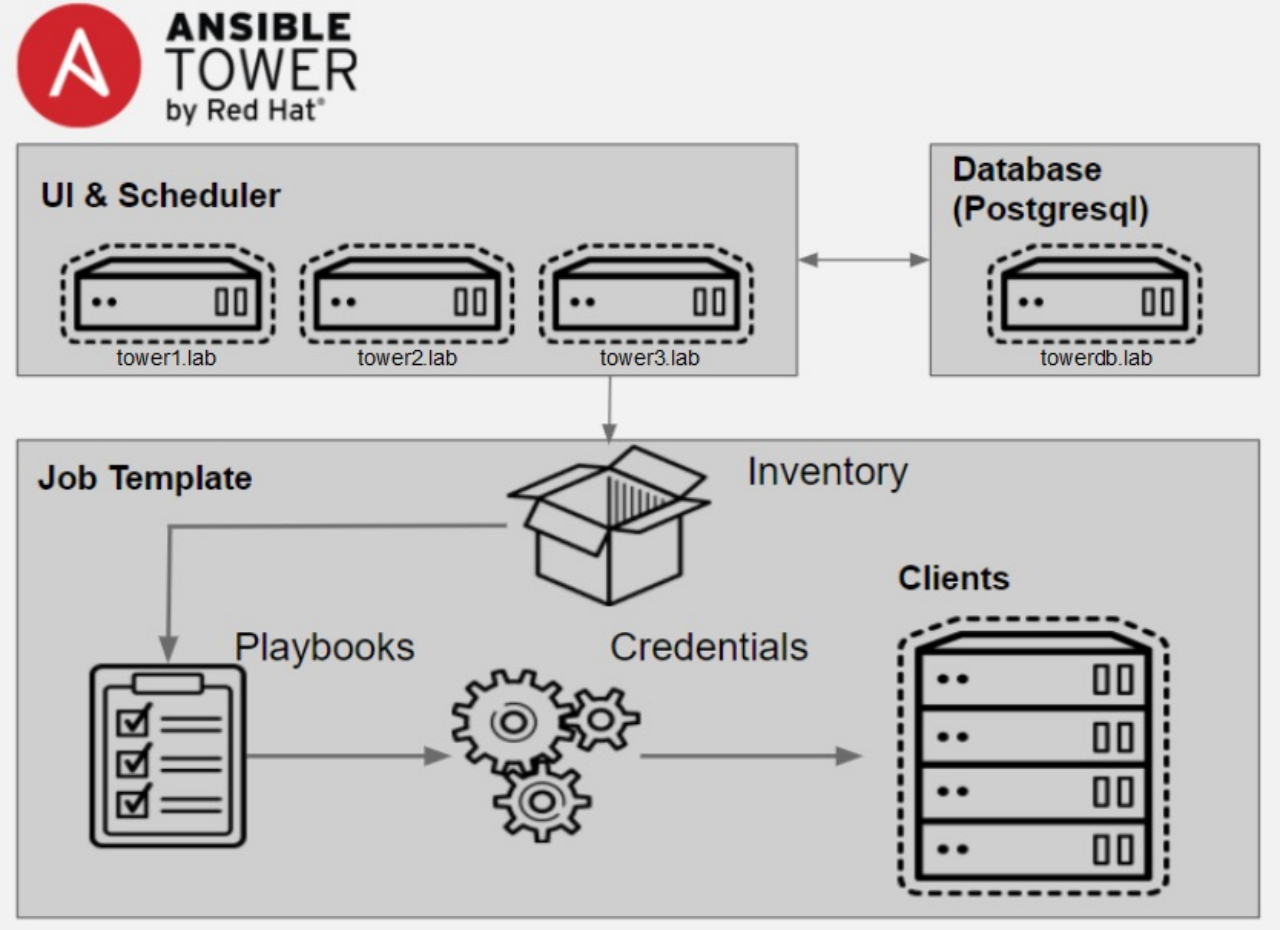
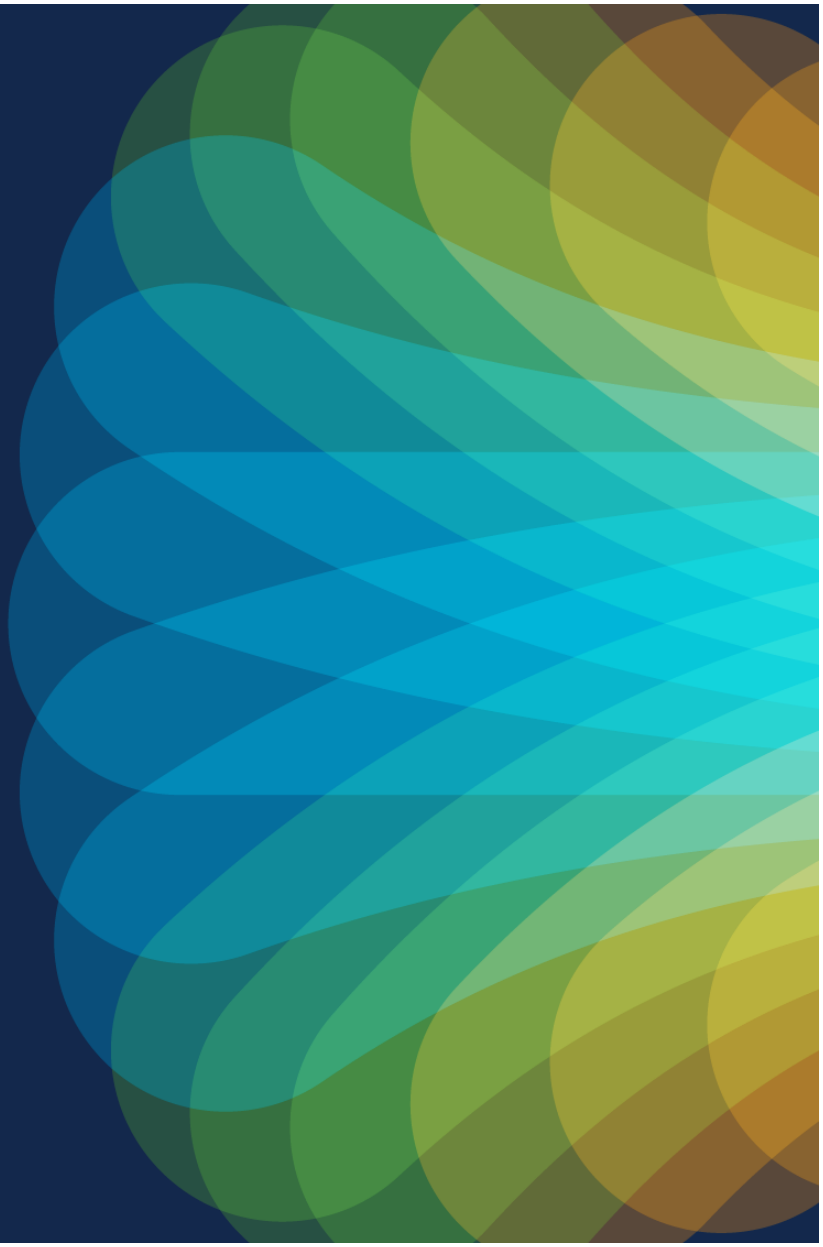
Ansible Tower/AWX

- 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

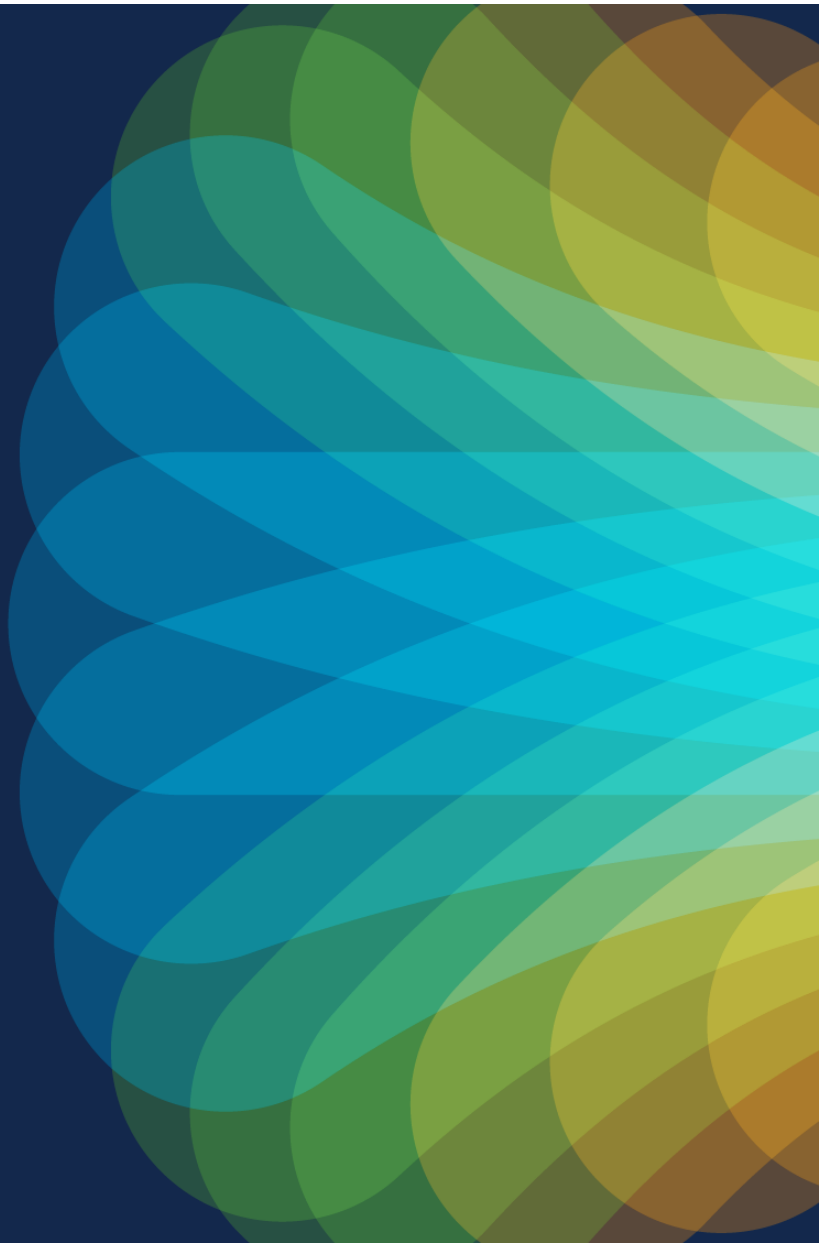
Tools	Architecture	Agentless	Communication
Puppet	Master/Agent	No	Pull Mode
Chef	Master/Agent	No	Pull Mode
Salt	Master/Minion	No	Push Mode
NorNir	Python Automation Framework, Code Centric	☑	SSH
NetPalm	REST APIs Broker for network automation	☑	REST/SSH
Ansible	YAML based	☑	SSH

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	**Device lifecycle, DevOps**	**Service Lifecycle Management (YANG based)**
North Bound Interfaces	CLI, REST (TOWER)	CLI, Rest, JSON RPC, Netconf

Conclusion



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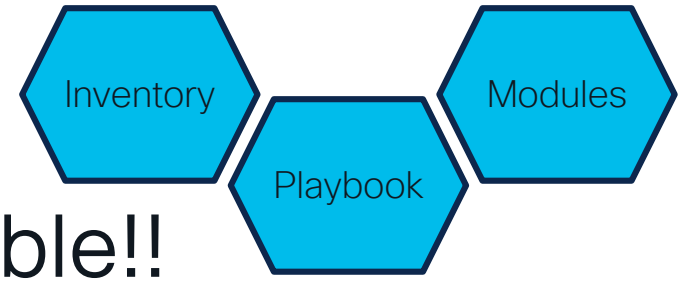
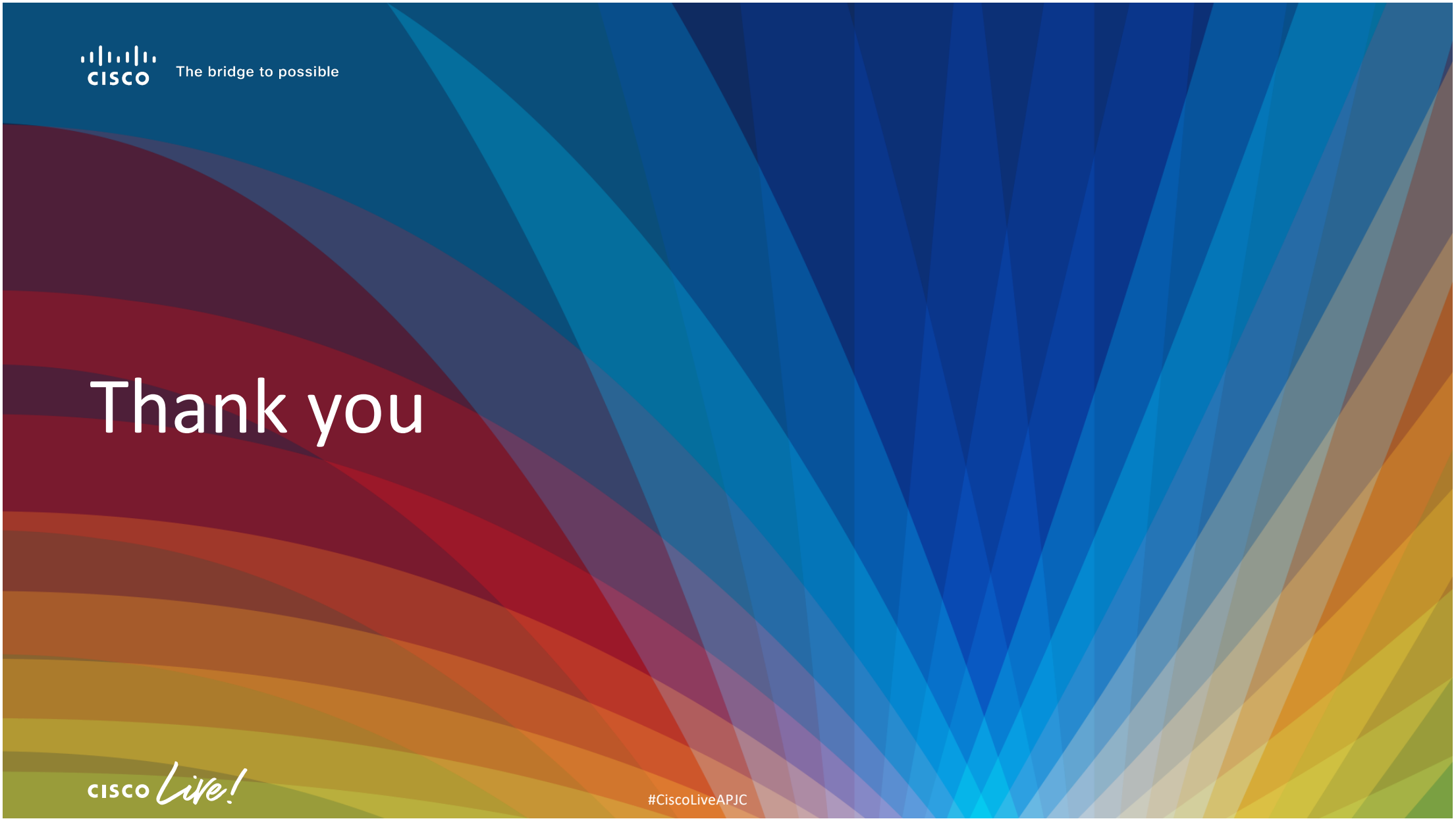
Ansible + Cisco = Unlimited Potential

- 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!!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