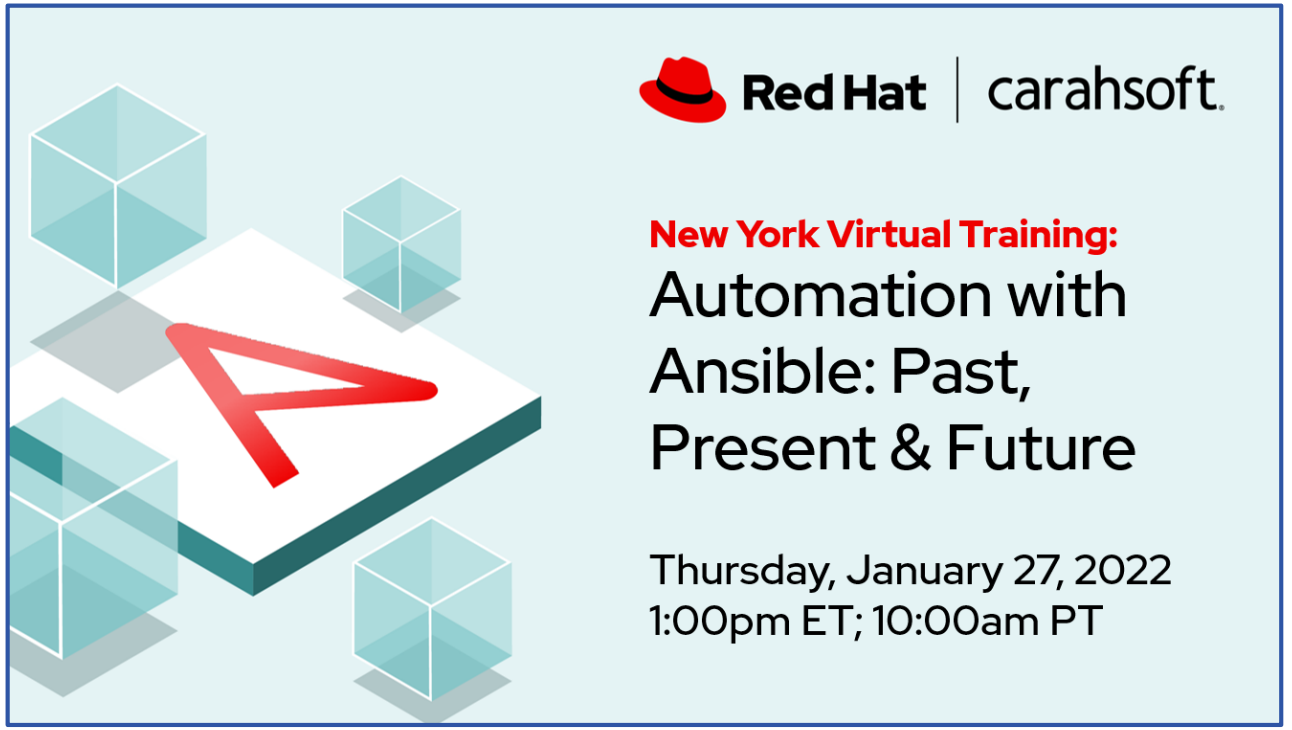
Red Hat

Automation with Ansible: Past, Present & Future

Red Hat Virtual Training



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New York Virtual Training:

Automation with Ansible: Past, Present & Future

Thursday, January 27, 2022
1:00pm ET; 10:00am PT

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Connor Murray

Red Hat Account Manager

703-230-7583

Connor.Murray@carahsoft.com

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About Carahsoft

Carahsoft is The Trusted Public Sector IT Solutions Provider®, supporting Federal, State and Local Government and Education and Healthcare organizations with IT products, services and training through our partners and contracts.

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Red Hat Ansible

Simple, powerful, agentless IT automation

Red Hat Ansible Automation Platform provides a foundation for building and operating IT automation, at scale.

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Featured Expert:

Travis Michette
Principal Instructor,
Red Hat

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Ansible Automation
Platform

Ansible Automation Workshop
Ansible: Past, Present, and Future

An overview of Ansible from Ansible Engine to Ansible Automation Platform 2.x

Travis Michette

Principal Instructor

Red Hat
Training

Housekeeping

- Timing
- Breaks
- Takeaways
- Materials: https://red.ht/aap2x
  - RHLS Subscribers - DO374EA

What you will learn

- Introduction to Ansible Automation
- How it works
- Understanding modules, tasks & playbooks
- How to execute Ansible commands & Playbooks
- Evolution of Ansible
  - Ansible Playbooks and Ad-Hoc Commands
  - Ansible Roles
  - Ansible Collections
  - Ansible Execution Environments
- Ansible Content Navigator, Ansible Automation Hub, and Ansible Controller (High-Level Overview)

Agenda

- Introduction
- Ansible Engine (Past)
- Ansible Automation Platform 1.x (Present)
- Break (10 min)
- Ansible Automation Platform 2x (Future)
- Ansible Automation Training

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Ansible Automation
Platform

Introduction

Topics Covered:

- What is the Ansible Automation Platform?
- What can it do?

Why Ansible?

Simple

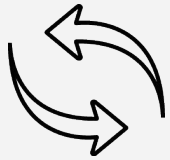
Human readable automation

No special coding skills needed

Tasks executed in order

Usable by every team

Get productive quickly



Powerful

App deployment

Configuration management

Workflow orchestration

Network automation

Orchestrate the app lifecycle

Agentless

Agentless architecture

Uses OpenSSH & WinRM

No agents to exploit or update

Get started immediately

More efficient & more secure

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What can I do using Ansible?

Automate the deployment and management of your entire IT footprint.

Do this...

Orchestration	Configuration Management	Application Deployment	Provisioning	Continuous Delivery	Security and Compliance

On these...

Firewalls	Load Balancers	Applications	Containers	Clouds
Servers	Infrastructure	Storage	Network Devices	**And more...**

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Ansible automates technologies you use

Time to automate is measured in minutes

Cloud

AWS
Azure
Digital Ocean
Google
OpenStack
Rackspace
+more

Operating Systems

RHEL
Linux
Windows
+more

Virt & Container

Docker
VMware
RHV
OpenStack
OpenShift
+more

Storage

Netapp
Red Hat Storage
Infinidat
+more

Windows

ACLs
Files
Packages
IIS
Regedits
Shares
Services
Configs
Users
Domains
+more

Network

A10
Arista
Aruba
Cumulus
Bigswitch
Cisco
Dell
Extreme
F5
Lenovo
MikroTik
Juniper
OpenSwitch
+more

Security

Checkpoint
Cisco
CyberArk
F5
Fortinet
Juniper
IBM
Palo Alto
Snort
+more

Monitoring

Dynatrace
Datadog
LogicMonitor
New Relic
Sensu
+more

Devops

Jira
GitHub
Vagrant
Jenkins
Slack
+more

Section 1
Ansible Engine

Past

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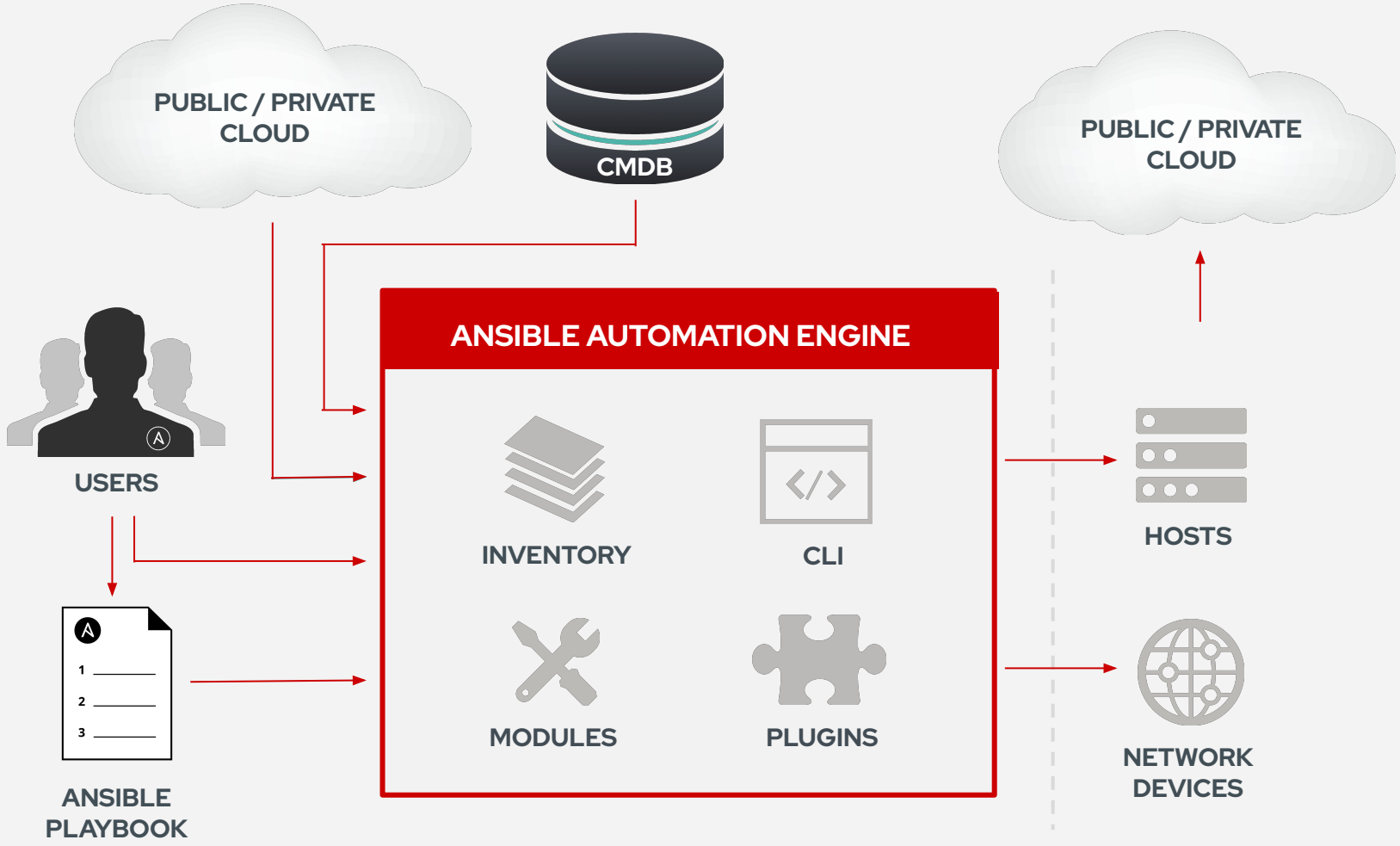
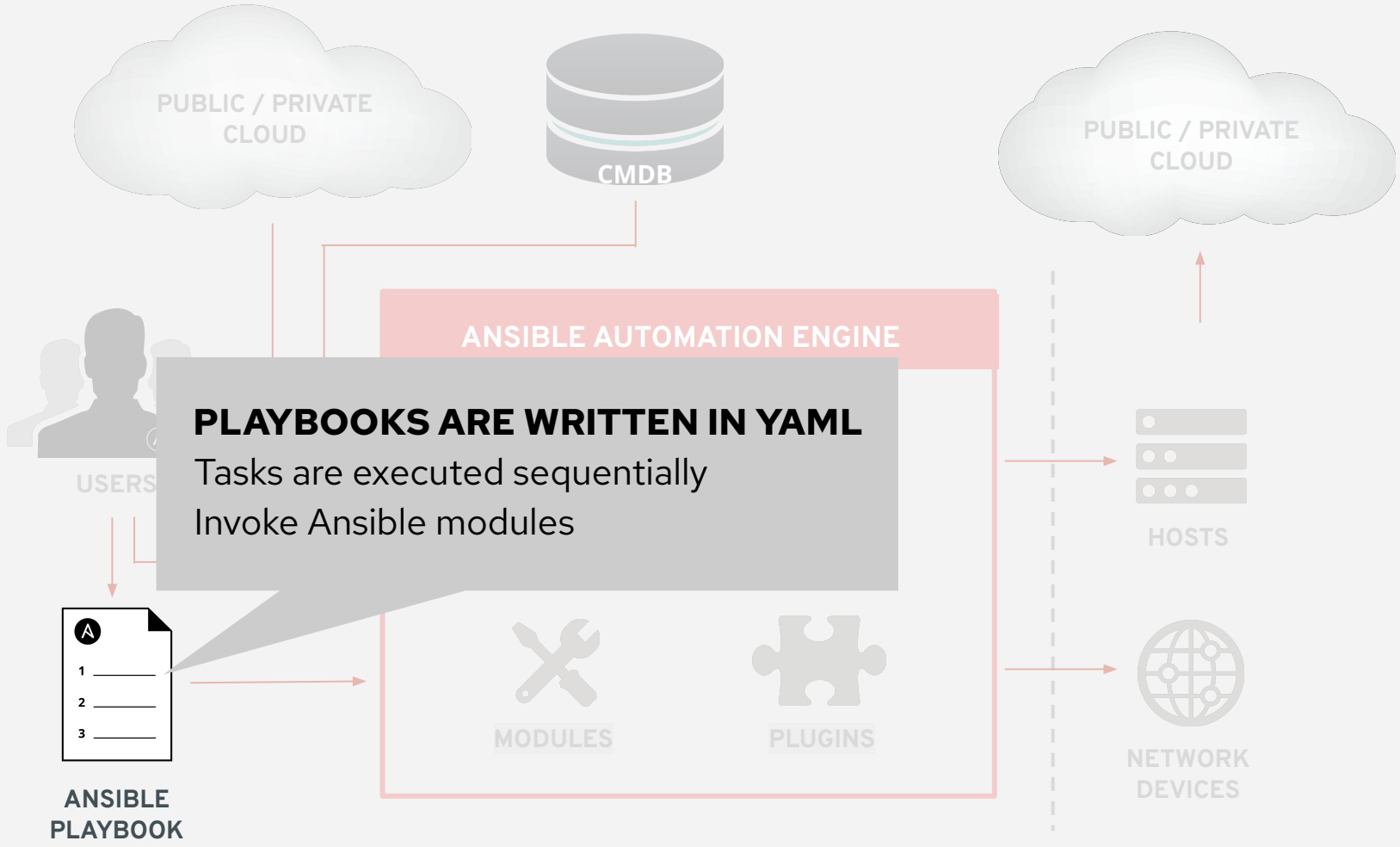
Section 1.1

Topics Covered:

- Understanding the Ansible Infrastructure
- Ansible Tower (Enterprise Solutions)


PUBLIC / PRIVATE CLOUD
CMDB
PUBLIC / PRIVATE CLOUD
ANSIBLE AUTOMATION ENGINE
USERS
INVENTORY
CLI
HOSTS
MODULES
PLUGINS
NETWORK DEVICES
1
2
3
ANSIBLE PLAYBOOK

Red Hat


PUBLIC / PRIVATE CLOUD
CMDB
PUBLIC / PRIVATE CLOUD
ANSIBLE AUTOMATION ENGINE
USERS
PLAYBOOKS ARE WRITTEN IN YAML
Tasks are executed sequentially
Invoke Ansible modules
HOSTS
1
2
3
MODULES
PLUGINS
NETWORK DEVICES
ANSIBLE PLAYBOOK

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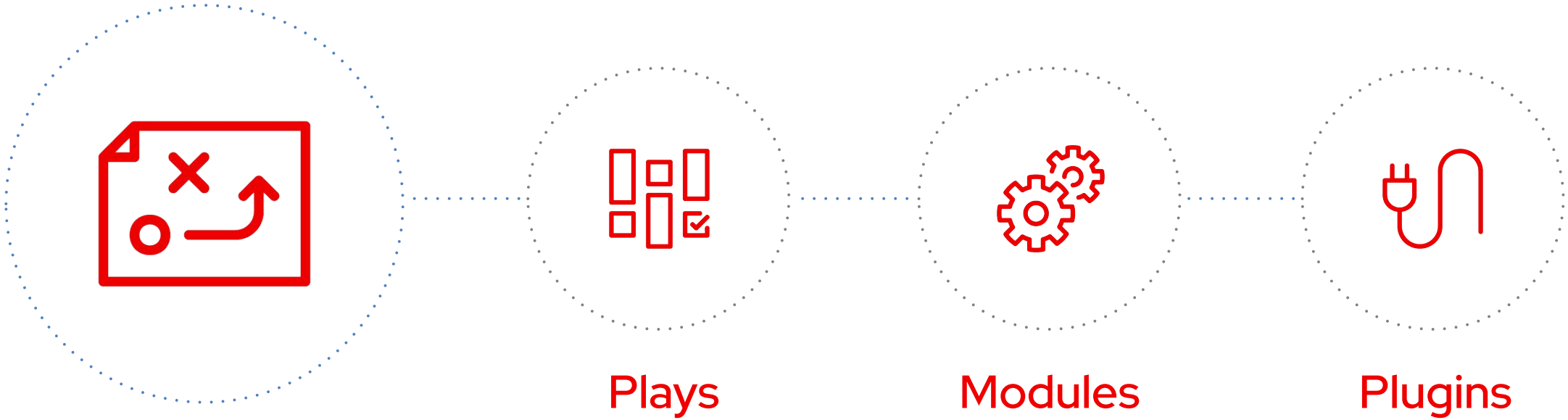
What makes up an Ansible playbook?



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Ansible plays

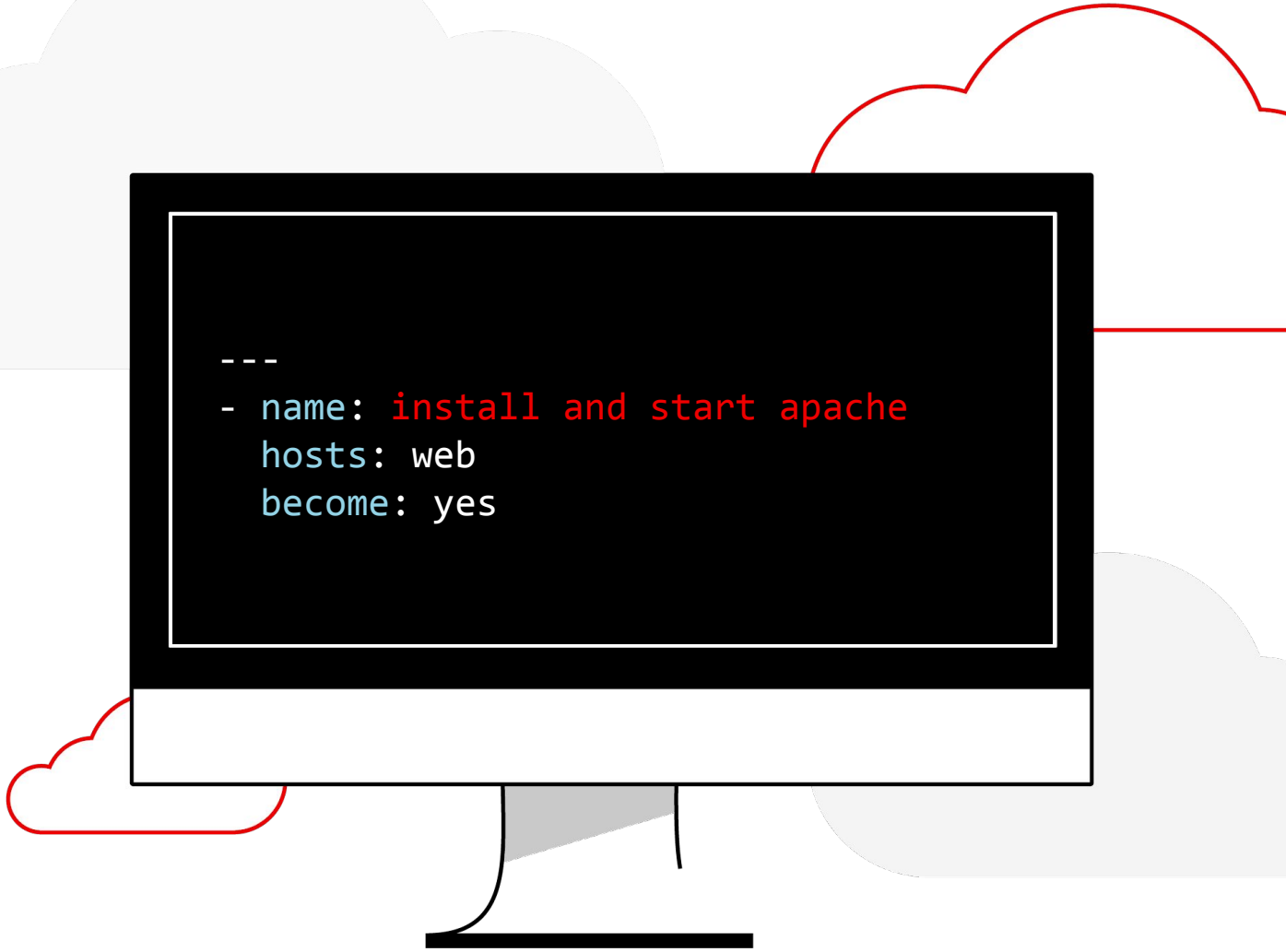
What am I automating?

What are they?

Top level specification for a group of tasks. Will tell that play which hosts it will execute on and control behavior such as fact gathering or privilege level.

Building blocks for playbooks

Multiple plays can exist within an Ansible playbook that execute on different hosts.



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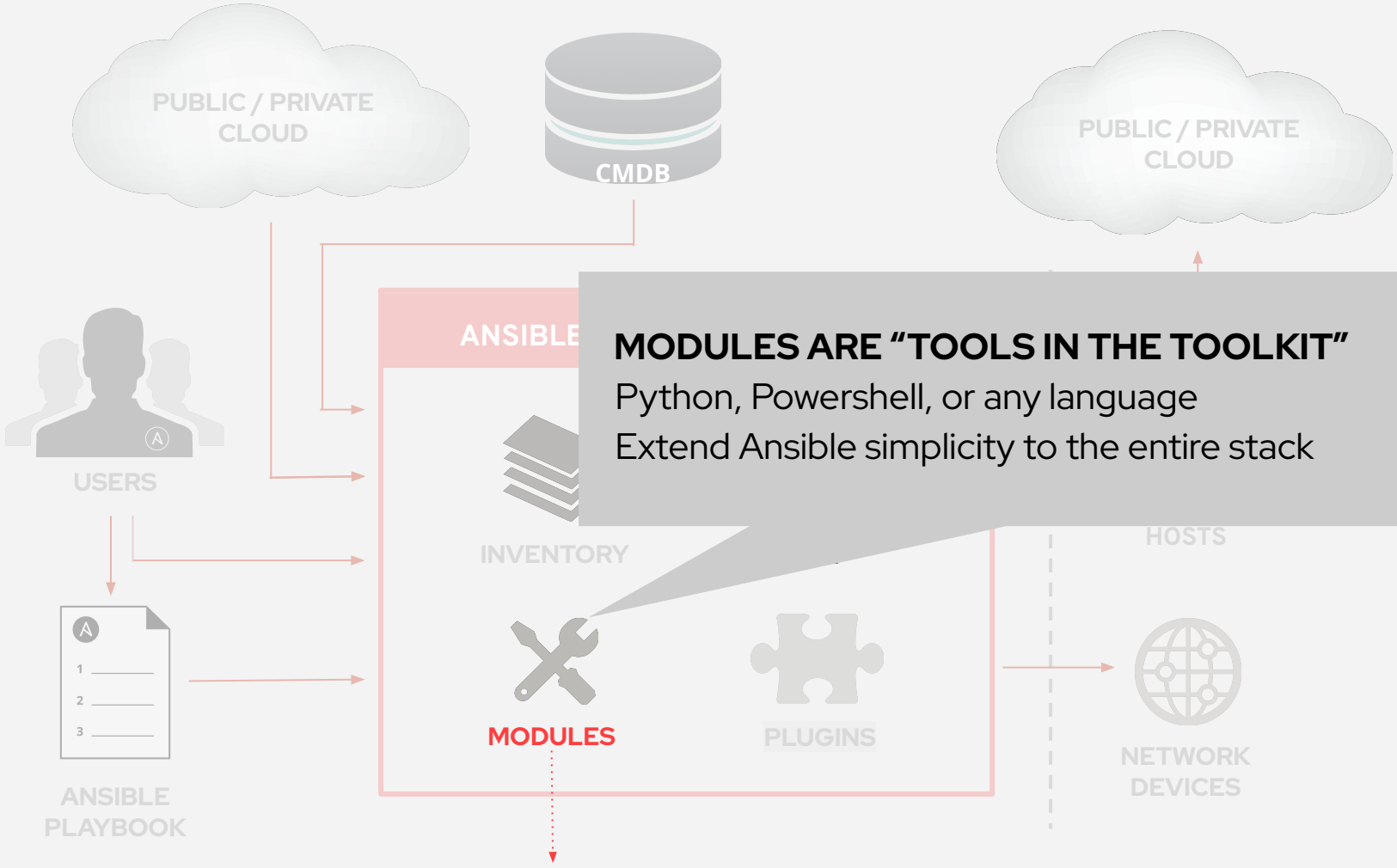
```
---
- name: install and start apache
  hosts: web
  become: yes

  tasks:
    - name: httpd package is present
      yum:
        name: httpd
        state: latest

    - name: latest index.html file is present
      template:
        src: files/index.html
        dest: /var/www/html/

    - name: httpd is started
      service:
        name: httpd
        state: started
```



MODULES ARE "TOOLS IN THE TOOLKIT"

Python, Powershell, or any language

Extend Ansible simplicity to the entire stack

```
- name: latest index.html file is present
  template:
    src: files/index.html
    dest: /var/www/html/
```

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Ansible modules

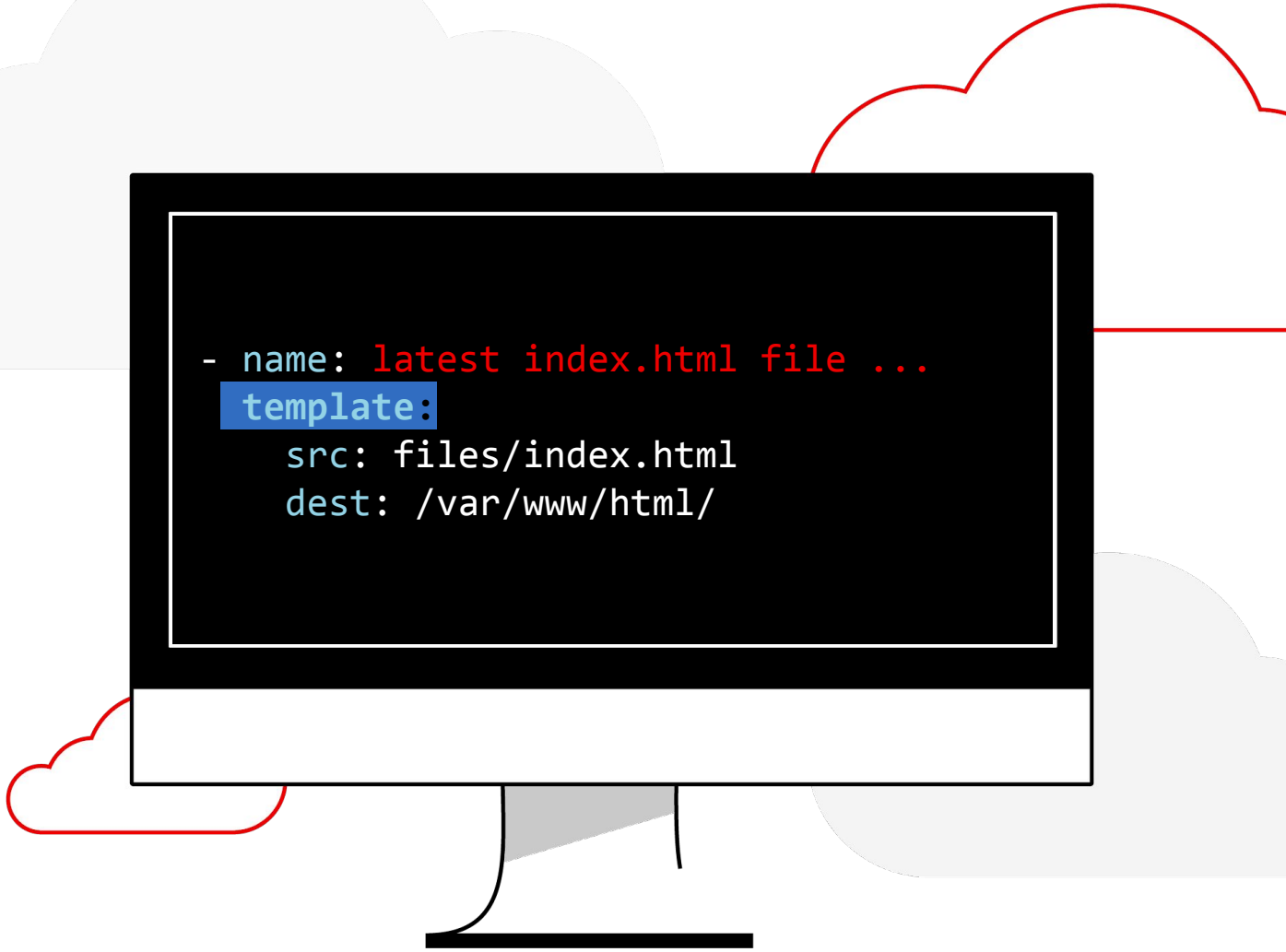
The “tools in the toolkit”

What are they?

Parametrized components with internal logic, representing a single step to be done.
The modules “do” things in Ansible.

Language

Usually Python, or Powershell for Windows setups. But can be of any language.



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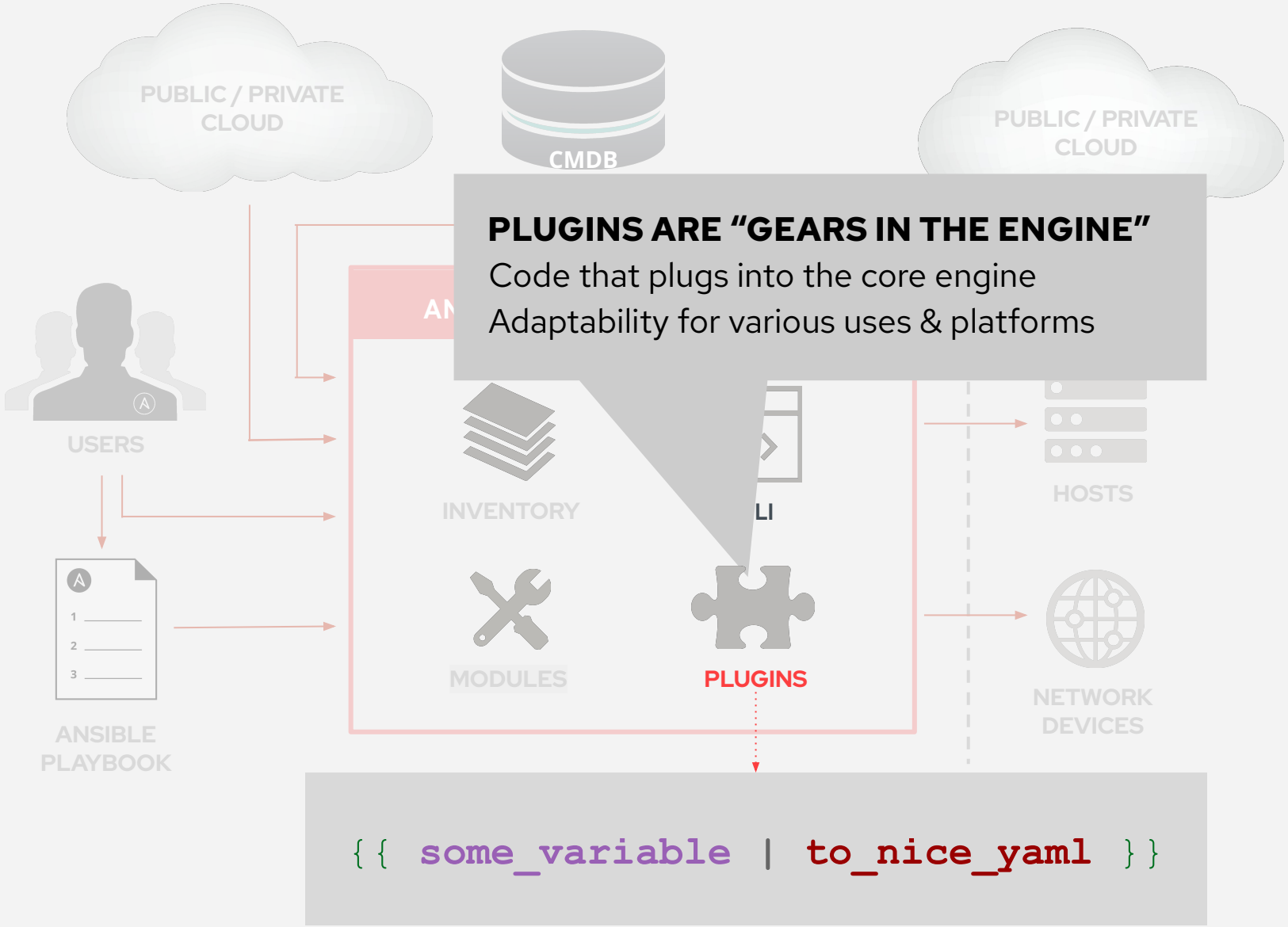
PUBLIC / PRIVATE CLOUD
CMDB
PUBLIC / PRIVATE CLOUD
PLUGINS ARE "GEARS IN THE ENGINE"
Code that plugs into the core engine
Adaptability for various uses & platforms
USERS
INVENTORY
HOSTS
MODULES
PLUGINS
NETWORK DEVICES
ANSIBLE PLAYBOOK
{{ some_variable | to_nice_yaml }}

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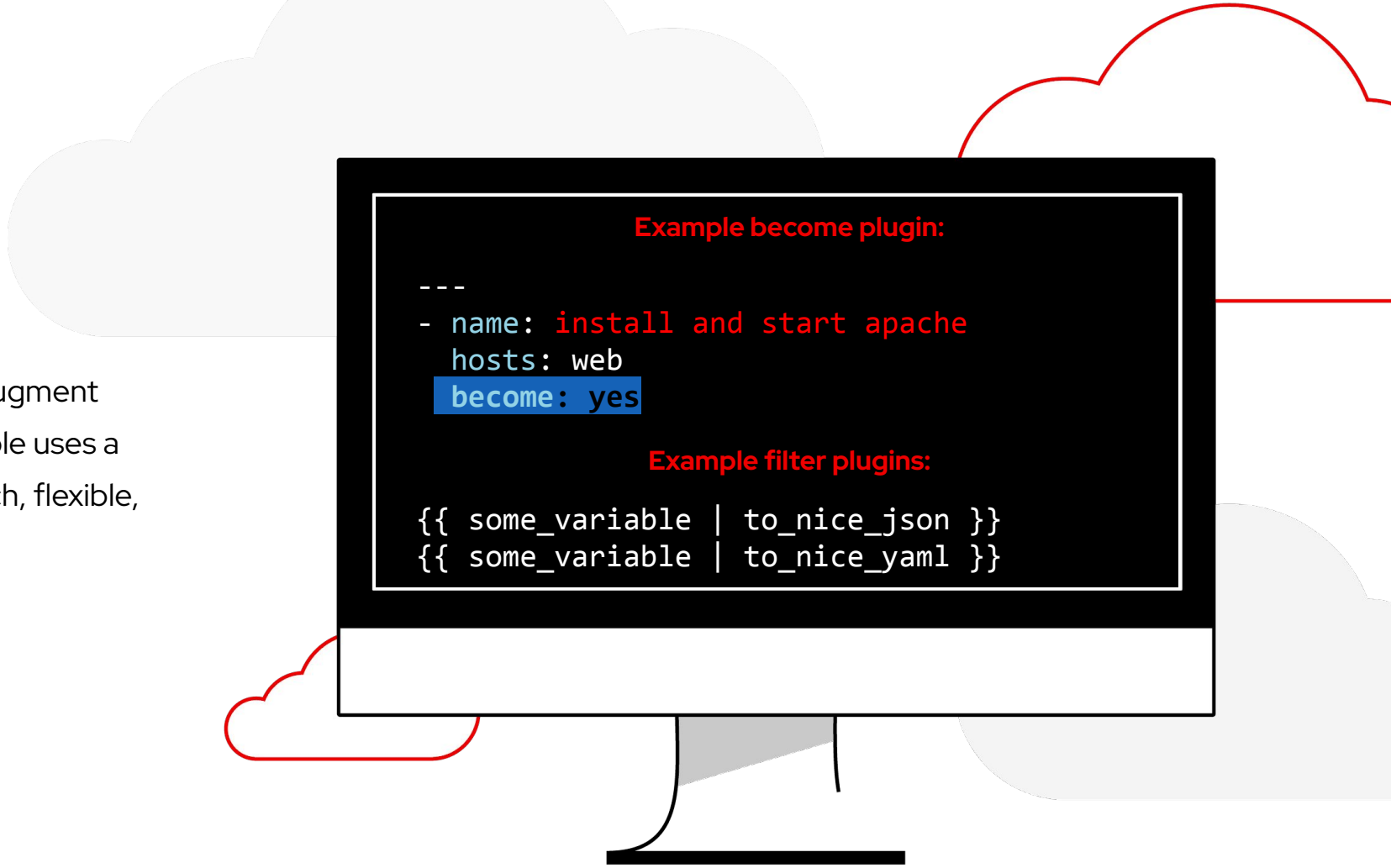
Ansible plugins

The “extra bits”

What are they?

Plugins are pieces of code that augment Ansible’s core functionality. Ansible uses a plugin architecture to enable a rich, flexible, and expandable feature set.



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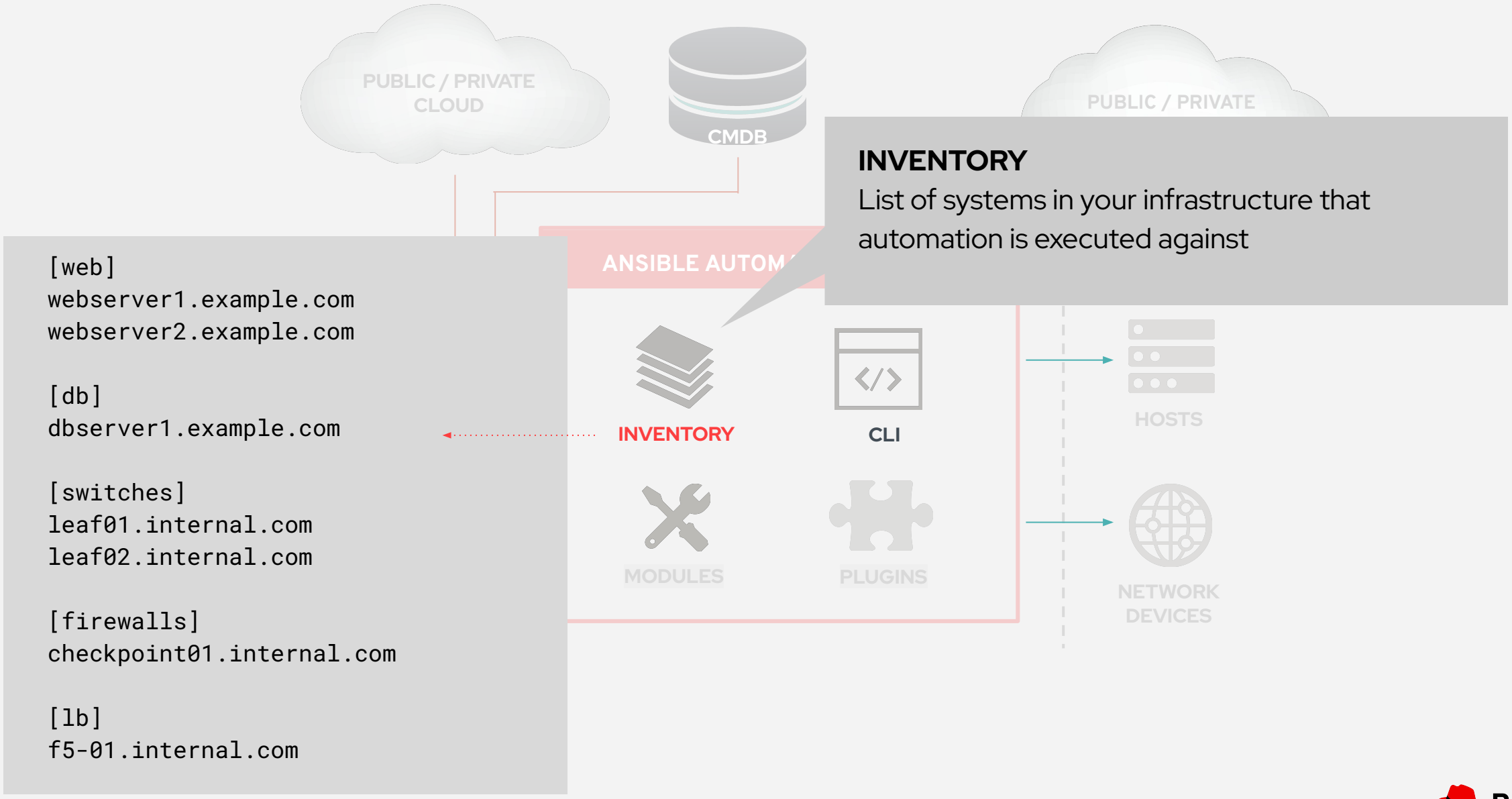
PUBLIC / PRIVATE CLOUD
CMDB
PUBLIC / PRIVATE
INVENTORY
List of systems in your infrastructure that automation is executed against
[web]
webserver1.example.com
webserver2.example.com
[db]
dbserver1.example.com
[switches]
leaf01.internal.com
leaf02.internal.com
[firewalls]
checkpoint01.internal.com
[lb]
f5-01.internal.com
ANSIBLE AUTOM
INVENTORY
CLI
MODULES
PLUGINS
HOSTS
NETWORK DEVICES

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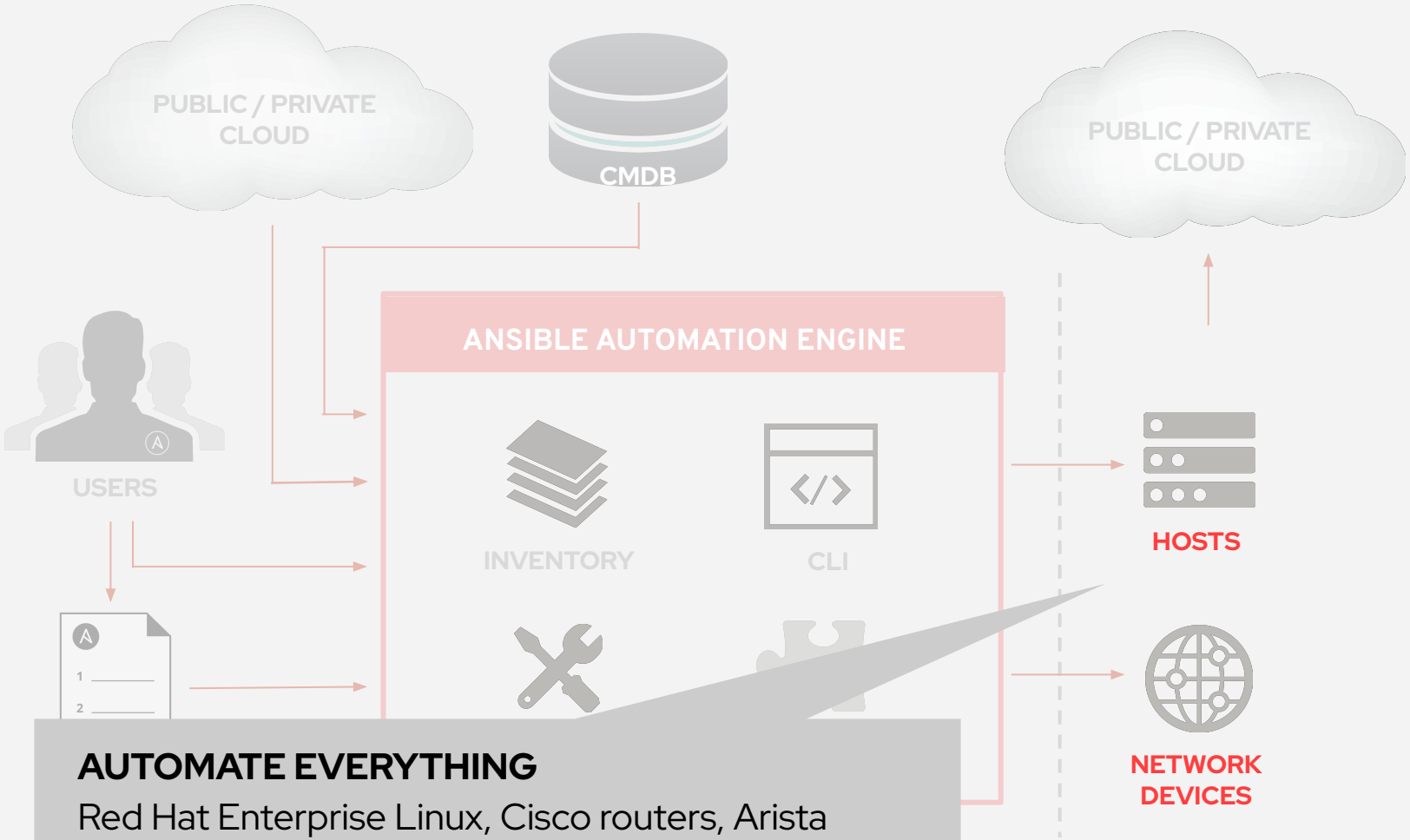
PUBLIC / PRIVATE CLOUD
CMDB
PUBLIC / PRIVATE CLOUD
ANSIBLE AUTOMATION ENGINE
USERS
INVENTORY
CLI
HOSTS
NETWORK DEVICES
AUTOMATE EVERYTHING
Red Hat Enterprise Linux, Cisco routers, Arista switches, Juniper routers, Windows hosts, Check Point firewalls, NetApp storage, F5 load balancers and more

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LINUX AUTOMATION

150+

Linux Modules

AUTOMATE EVERYTHING LINUX

Red Hat Enterprise Linux, BSD, Debian, Ubuntu and many more!

ONLY REQUIREMENTS:
Python 2 (2.6 or later)
***or* Python 3 (3.5 or later)**

ansible.com/get-started

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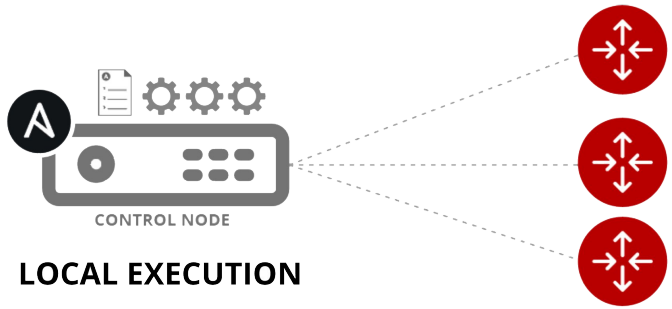
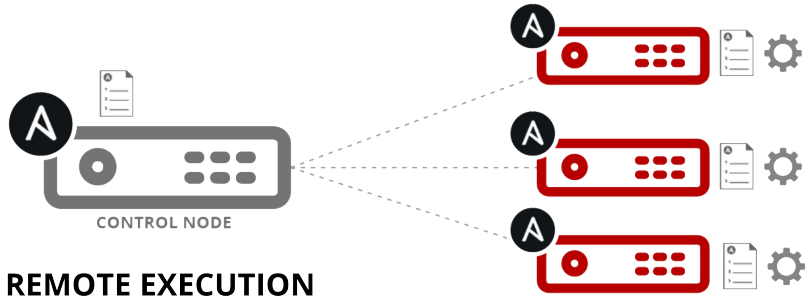
How Ansible Automation works

Module code is executed locally on the control node



NETWORKING DEVICES

Module code is copied to the managed node, executed, then removed



LINUX/WINDOWS HOSTS

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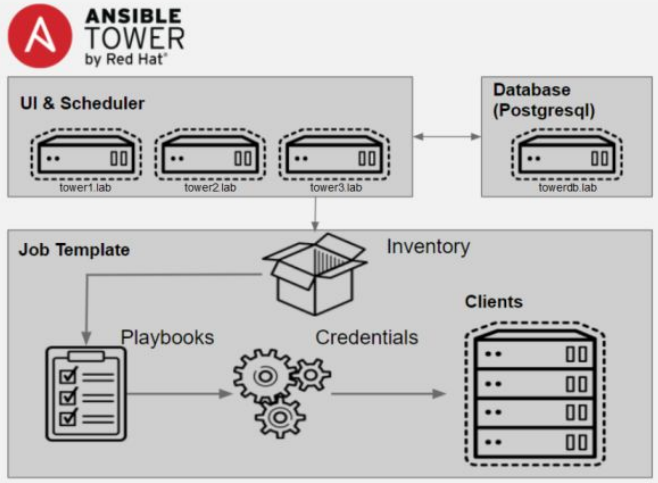
Ansible Tower



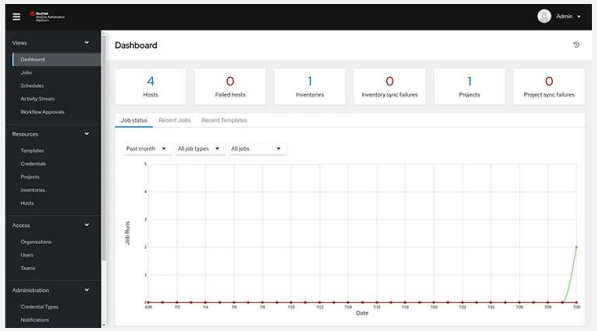
Integrated

Manage Projects and Jobs

No CLI Administration skills needed

Automated

Single Management Point



Simple

Environment Overview

Configuration management

Workflow orchestration

Logging and System Management

Manage Access & Files

Streamlined

Web Interface / WebUI

Rest API

Plugins

User Management

Users / Roles / Credentials

More Efficient & More Secure

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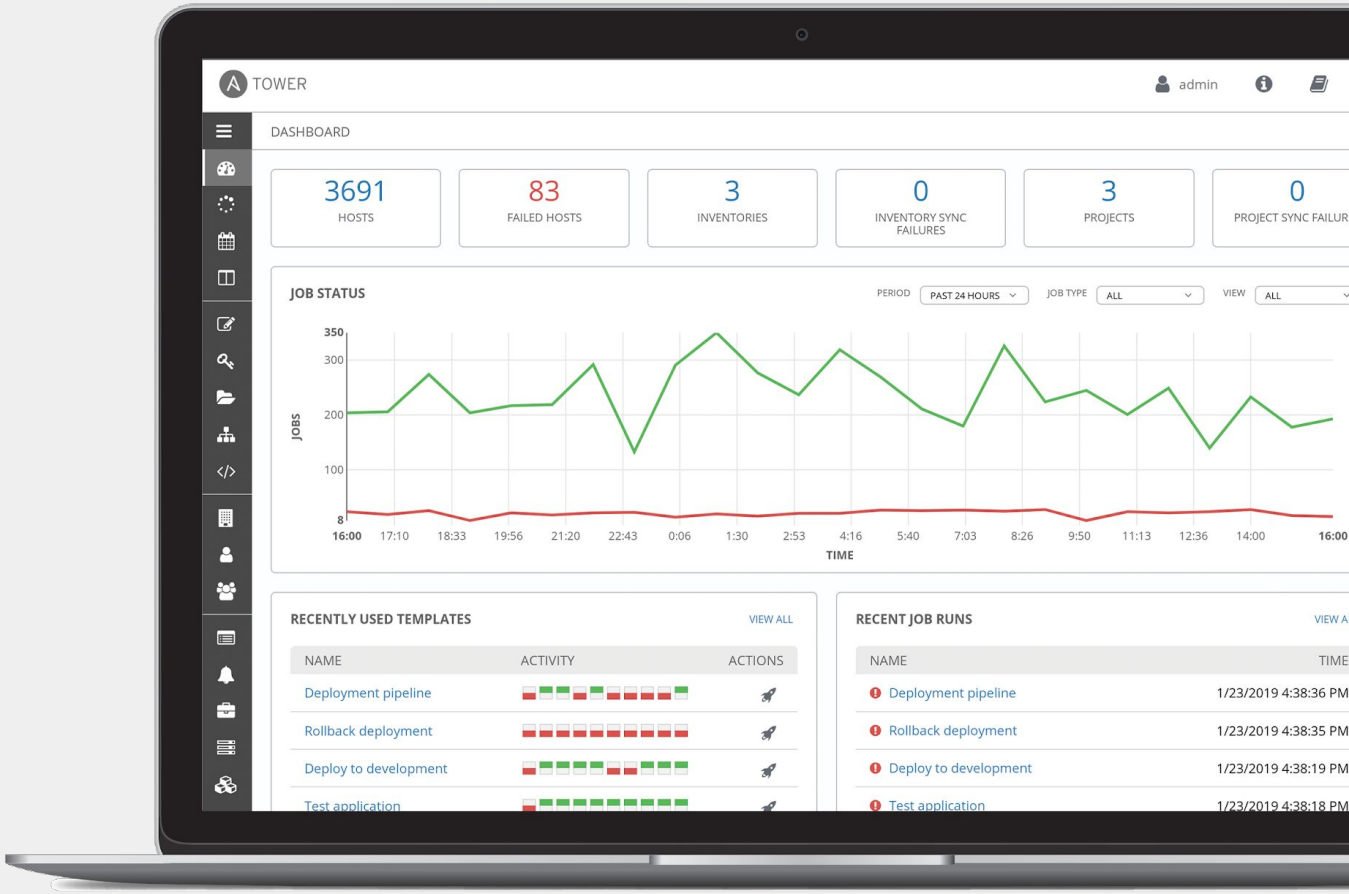
What is Ansible Tower?

Ansible Tower is a UI and RESTful API allowing you to scale IT automation, manage complex deployments and speed productivity.

- Role-based access control
- Deploy entire applications with push-button deployment access
- All automations are centrally logged
- Powerful workflows match your IT processes



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Red Hat Ansible Tower

Push button

An intuitive user interface experience makes it easy for novice users to execute playbooks you allow them access to.

RESTful API

With an API first mentality every feature and function of Tower can be API driven. Allow seamless integration with other tools like ServiceNow and Infoblox.

RBAC

Allow restricting playbook access to authorized users. One team can use playbooks in check mode (read-only) while others have full administrative abilities.

Enterprise integrations

Integrate with enterprise authentication like TACACS+, RADIUS, Azure AD. Setup token authentication with OAuth 2. Setup notifications with PagerDuty, Slack and Twilio.

Centralized logging

All automation activity is securely logged. Who ran it, how they customized it, what it did, where it happened - all securely stored and viewable later, or exported through Ansible Tower's API.

Workflows

Ansible Tower's multi-playbook workflows chain any number of playbooks, regardless of whether they use different inventories, run as different users, run at once or utilize different credentials.

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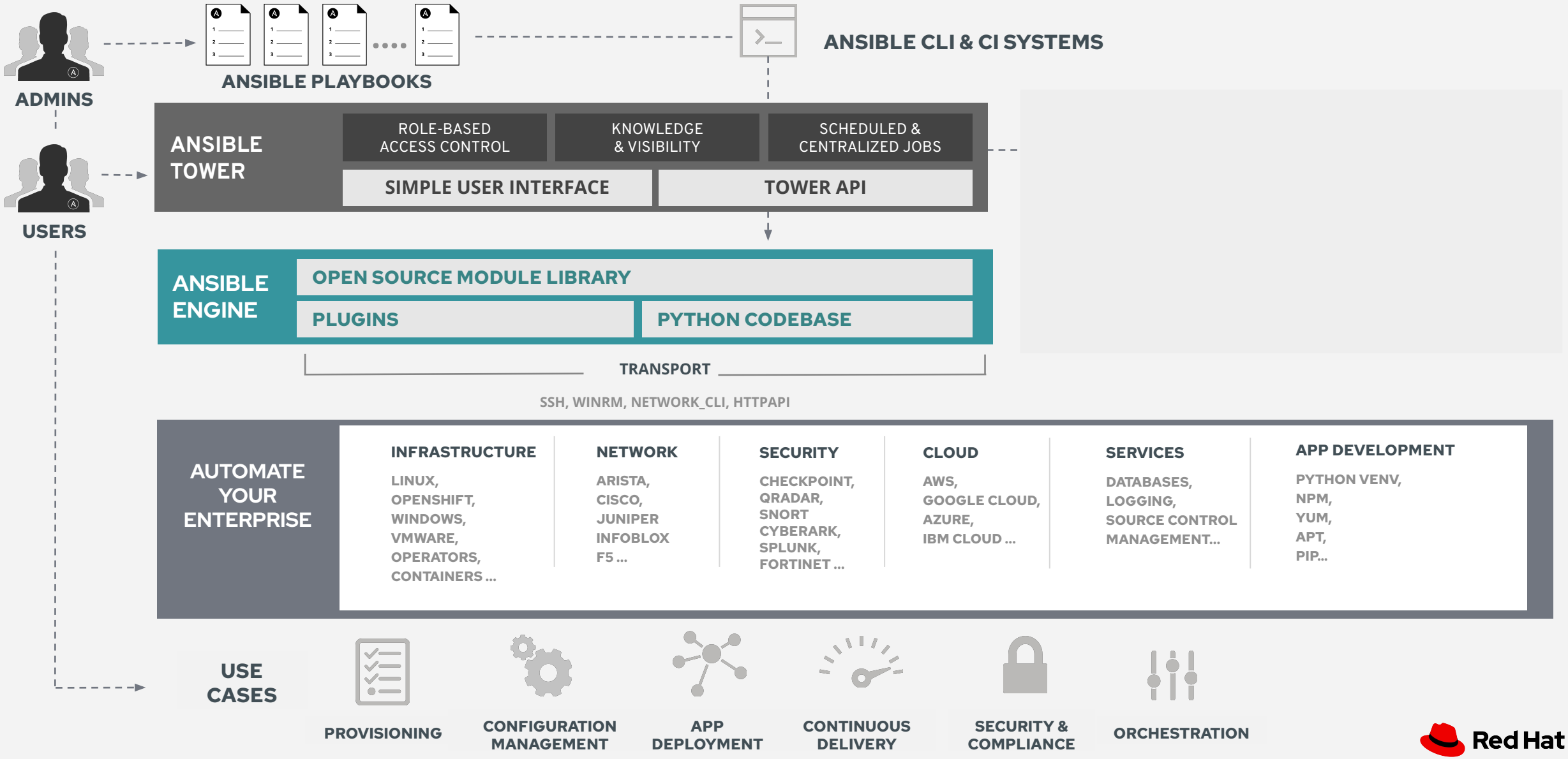
Ansible Automation Engine



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Section 1.2

Topics Covered:

- Ansible inventories
- Main Ansible config file
- Modules and ad-hoc commands

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Inventory

- Ansible works against multiple systems in an inventory
- Inventory is usually file based
- Can have multiple groups
- Can have variables for each group or even host

Understanding Inventory - (Simple Inventory)

```
# Static inventory example:
[myservers]
10.42.0.2
10.42.0.6
10.42.0.7
10.42.0.8
10.42.0.100
host.example.com
```

Understanding Inventory - Hosts

```
[app1srv]
appserver01 ansible_host=10.42.0.2
appserver02 ansible_host=10.42.0.3

[web]
node-[1:30] ansible_host=10.42.0.[31:60]

[web:vars]
apache_listen_port=8080
apache_root_path=/var/www/mywebdocs/

[all:vars]
ansible_user=kev
ansible_ssh_private_key_file=/home/kev/.ssh/id_rsa
```

- Inventory can be written in short format and expanded using **[x:y]** syntax

```
[web]
Node-1 ansible_host=10.42.0.31
Node-2 ansible_host=10.42.0.32

...

Node-30 ansible_host=10.42.0.60
```

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Understanding Inventory - Variables

```
[app1srv]
appserver01 ansible_host=10.42.0.2
appserver02 ansible_host=10.42.0.3

[web]
node-[1:30] ansible_host=10.42.0.[31:60]

[web:vars]
apache_listen_port=8080
apache_root_path=/var/www/mywebdocs/

[all:vars]
ansible_user=ender
ansible_ssh_private_key_file=/home/ender/.ssh/id_rsa
```

Understanding Inventory - Groups

```
[nashville]
bnaapp01
bnaapp02

[atlanta]
atlapp03
atlapp04

[south:children]
atlanta
nashville
hsvapp05
```

Configuration File

- Basic configuration for Ansible
- Can be in multiple locations, with different precedence
- Here: `.ansible.cfg` in the home directory
- Configures where to find the inventory

Ansible Configuration

Configuration files will be searched for in the following order (Highest Precedence to Lowest):

- ANSIBLE_CONFIG (environment variable if set)
- ansible.cfg (in the current directory)
- ~/.ansible.cfg (in the home directory)
- /etc/ansible/ansible.cfg (installed as Ansible default)

The Ansible Configuration File: **ansible.cfg**

```
[user@ansible] $ cat ansible.cfg

[defaults]
inventory = inventory
remote_user = devops
```

First Ad-Hoc Command: ping

- Single Ansible command to perform a task quickly directly on command line
- Most basic operation that can be performed
- Utilizes a single Ansible Module with options and arguments
- Here: an example Ansible ping - not to be confused with ICMP

```
$ ansible all -m ping
```

Ad-Hoc Commands `ping`

```
# Check connections (submarine ping, not ICMP)
[user@ansible] $ ansible all -m ping

web1 | SUCCESS => {
    "ansible_facts": {
        "discovered_interpreter_python":
"/usr/bin/python"
    },
    "changed": false,
    "ping": "pong"
}
```

The Ansible Command

Some basics to keep you from getting stuck
--help (Display some basic and extensive options)

```
[user@ansible ~]$ ansible --help
Usage: ansible <host-pattern> [options]

Define and run a single task 'playbook' against a set of hosts

Options:
  -a MODULE_ARGS, --args=MODULE_ARGS
                        module arguments
  --ask-vault-pass      ask for vault password
  -B SECONDS, --background=SECONDS
<<<snippet, output removed for brevity>>>
```

Ad-Hoc Commands

Here are some common options you might use:

`-m MODULE_NAME, --module-name=MODULE_NAME`
Module name to execute the ad-hoc command

`-a MODULE_ARGS, --args=MODULE_ARGS`
Module arguments for the ad-hoc command

`-b, --become`
Run ad-hoc command with elevated rights such as sudo, the default method

`-e EXTRA_VARS, --extra-vars=EXTRA_VARS`
Set additional variables as key=value or YAML/JSON

Ad-Hoc Commands

Here are some common options you might use:

```
# Check connections to all (submarine ping, not ICMP)
[user@ansible] $ ansible all -m ping

# Run a command on all the hosts in the web group
[user@ansible] $ ansible web -m command -a "uptime"

# Collect and display known facts for server “web1”
[user@ansible] $ ansible web1 -m setup
```

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Demo Time

Ansible - Ad-Hoc Command to Test Environment (Ansible Ping)
Ansible - Ad-Hoc Command to Create User and Sudoers File

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Section 1.3

Topics Covered:

- Playbooks basics
- Running a playbook

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An Ansible Playbook

A play

```
---
- name: install and start apache
  hosts: web
  become: yes

  tasks:
    - name: httpd package is present
      yum:
        name: httpd
        state: latest

    - name: latest index.html file is present
      template:
        src: files/index.html
        dest: /var/www/html/

    - name: httpd is started
      service:
        name: httpd
        state: started
```

An Ansible Playbook

A task

```
---
- name: install and start apache
  hosts: web
  become: yes

  tasks:
    - name: httpd package is present
      yum:
        name: httpd
        state: latest

    - name: latest index.html file is present
      template:
        src: files/index.html
        dest: /var/www/html/

    - name: httpd is started
      service:
        name: httpd
        state: started
```

An Ansible Playbook

module

```
---
- name: install and start apache
  hosts: web
  become: yes

  tasks:
    - name: httpd package is present
      yum:
        name: httpd
        state: latest

    - name: latest index.html file is present
      template:
        src: files/index.html
        dest: /var/www/html/

    - name: httpd is started
      service:
        name: httpd
        state: started
```

Running an Ansible Playbook:

The most important colors of Ansible

```
A task executed as expected, no change was made.

A task executed as expected, making a change

A task failed to execute successfully
```

Running an Ansible Playbook

```
[user@ansible] $ ansible-playbook apache.yml

PLAY [webservers] ***************************************************************

TASK [Gathering Facts] **********************************************************
ok: [web2]
ok: [web1]
ok: [web3]

TASK [Ensure httpd package is present] ******************************************
changed: [web2]
changed: [web1]
changed: [web3]

TASK [Ensure latest index.html file is present] *********************************
changed: [web2]
changed: [web1]
changed: [web3]

TASK [Restart httpd] ************************************************************
changed: [web2]
changed: [web1]
changed: [web3]

PLAY RECAP **********************************************************************
web2                       : ok=1    changed=3 unreachable=0   failed=0
web1                       : ok=1    changed=3 unreachable=0   failed=0
web3                       : ok=1    changed=3 unreachable=0   failed=0
```


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Ansible Automation
Platform
Demo Time
Ansible Engine - Running a Playbook to Create User and Sudoers File
Ansible Engine - Running a Playbook to Deploy Webserver (Failure - AAP)
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Platform

Section 1.4

Topics Covered:

- What are roles?
- What is the structure of a Role?
- Ansible Galaxy

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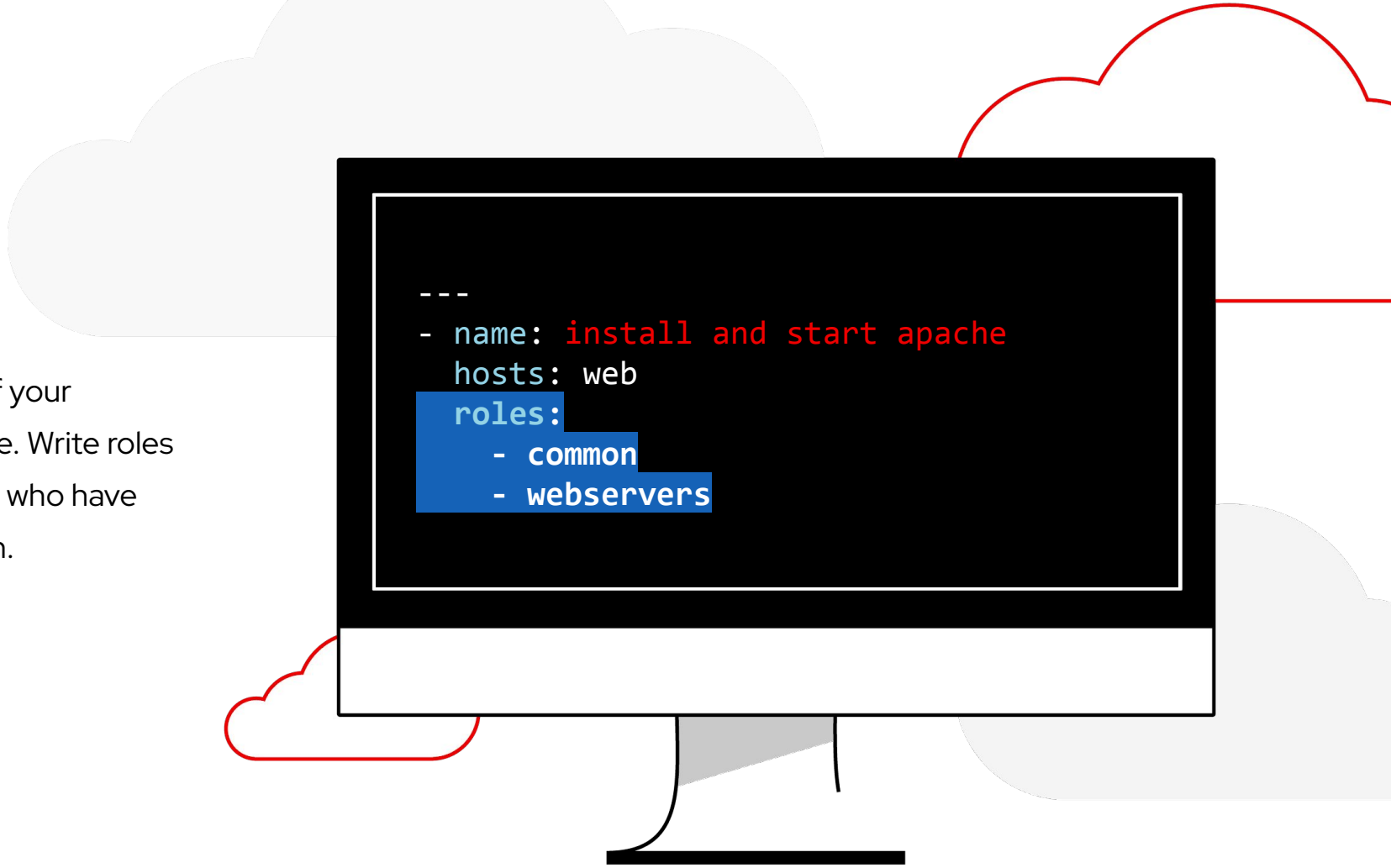
Ansible roles

Reusable automation actions

What are they?

Group your tasks and variables of your automation in a reusable structure. Write roles once, and share them with others who have similar challenges in front of them.



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Ansible Roles

- Ansible roles provide a way to reuse Ansible code generically and more effectively and have the following benefits:
  - Groups content for easy sharing of code with others
  - Make large projects manageable
  - Developed in parallel by different parties
  - Written generically and can be placed in version control
- Ansible roles can be shared via SCM or publicly through Ansible Galaxy

Installing and Using a Role

```
$ ansible-galaxy install tmichett.deploy_packages
```

Playbook using a Role

```
---
- name: Install Packages
  hosts: web
  become: yes
  roles:
    -  tmichett.deploy_packages
```

Creating an Ansible Role (beyond scope)

- Use the **ansible-galaxy init <RoleName>** command to create a Role
- Empty directories or unused directories can be deleted to clean up the Role
- Populate the various Role structures
  - Must have the following components (at minimum):
    - README.md
    - meta/main.yaml
    - tasks/main.yaml

Role structure

- **Defaults**: default variables with lowest precedence (e.g. port)
- **Files**: contains files that are deployed
- **Handlers**: contains all handlers
- **Meta**: role metadata including dependencies to other roles.

  TIP: Used to construct some of the Ansible Galaxy automated documentation

- **README**: contains the README for the role and used for Galaxy README
- **Tasks**: plays or tasks
  TIP: It's common to include tasks in main.yml with "when" (e.g. OS == xyz)
- **Templates**: templates to deploy
- **Tests**: place for playbook tests
- **Vars**: variables (e.g. override port)

```
role_name/
├── defaults
│   └── main.yml
├── files
├── handlers
│   └── main.yml
├── meta
│   └── main.yml
├── README.md
├── tasks
│   └── main.yml
├── templates
├── tests
│   ├── inventory
│   └── test.yml
└── vars
```

Ansible Galaxy

Sharing Content

Community

Roles, and more

Red Hat
Ansible Automation
Platform

Demo Time

Ansible Engine - Playbook with Roles (Warning - Uses Collections from Newer Ansible)

Red Hat

Red Hat
Ansible Automation
Platform

Section 2
Ansible Automation Platform 1.2

Present

Red Hat

Red Hat
Ansible Automation
Platform

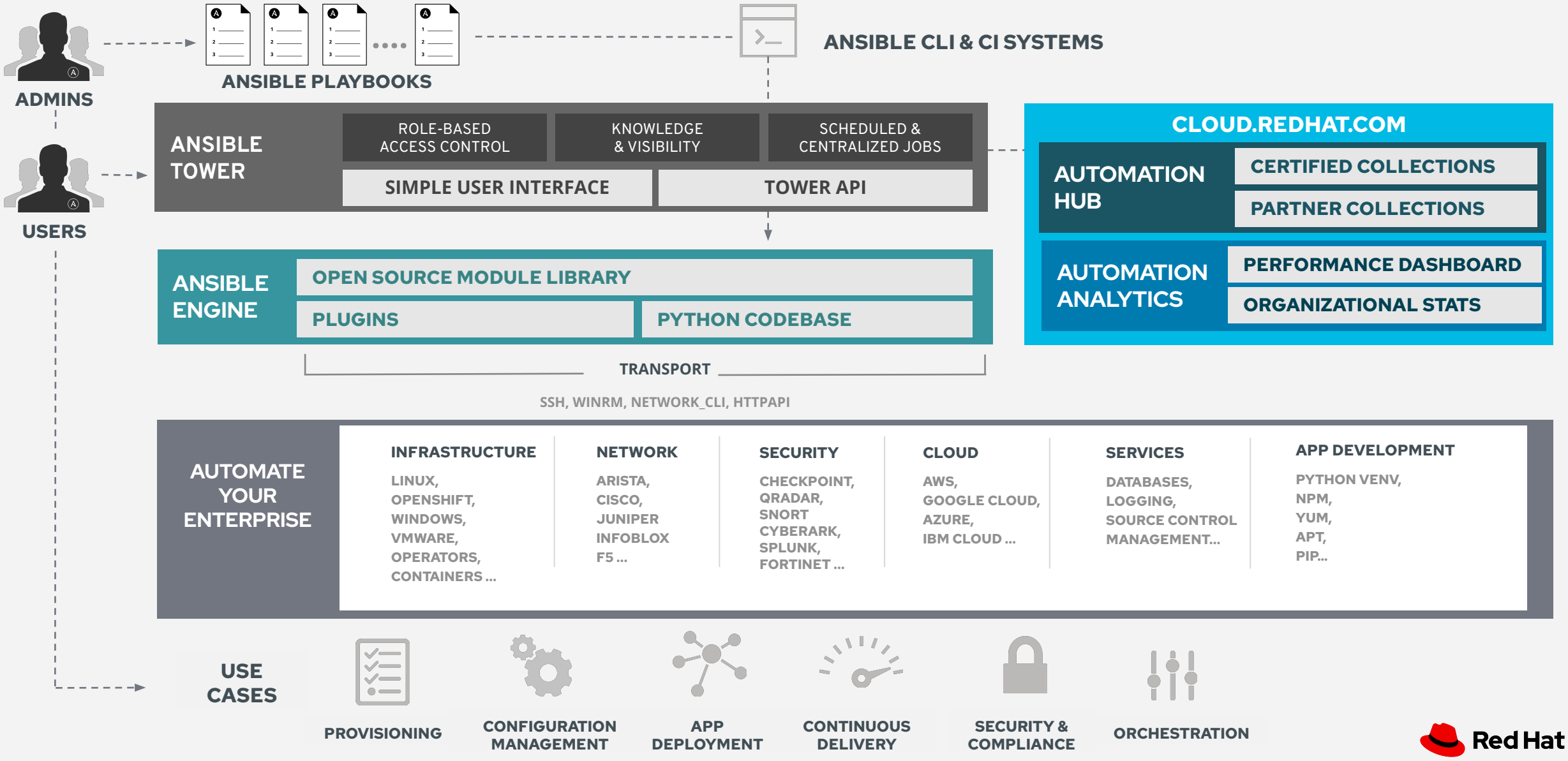
Section 2.1

Topics Covered:

- Ansible Automation Hub
- Ansible Collections

Red Hat

Ansible Automation Platform



Red Hat

Ansible Automation Hub

Trusted source

Customer controlled

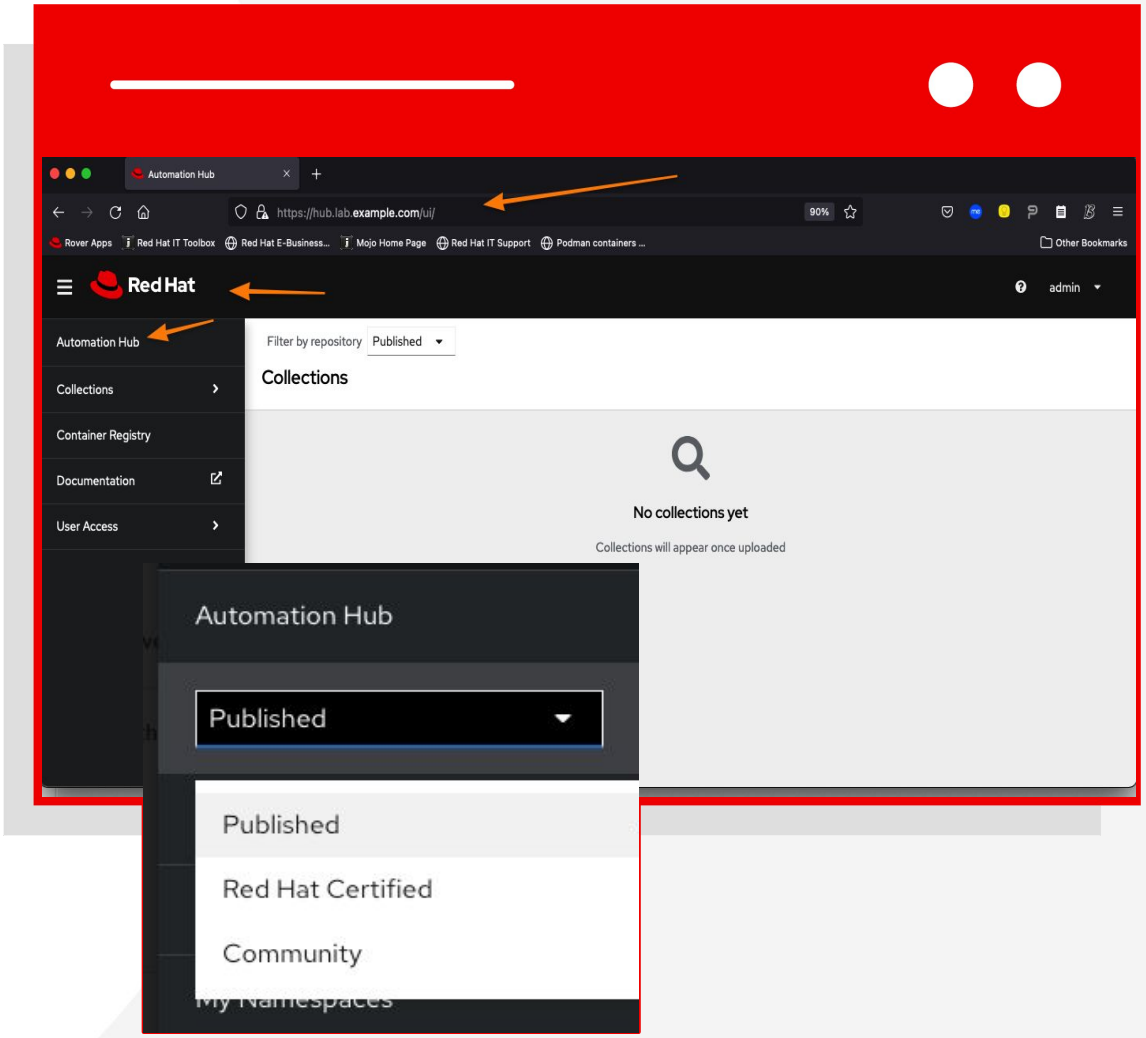
Deploying either on-prem or to a cloud, customers can run their own private instances of Automation Hub integrated into Red Hat Ansible Automation Platform.

Private content

Manage the lifecycle and internal distribution of in-house Ansible content within.

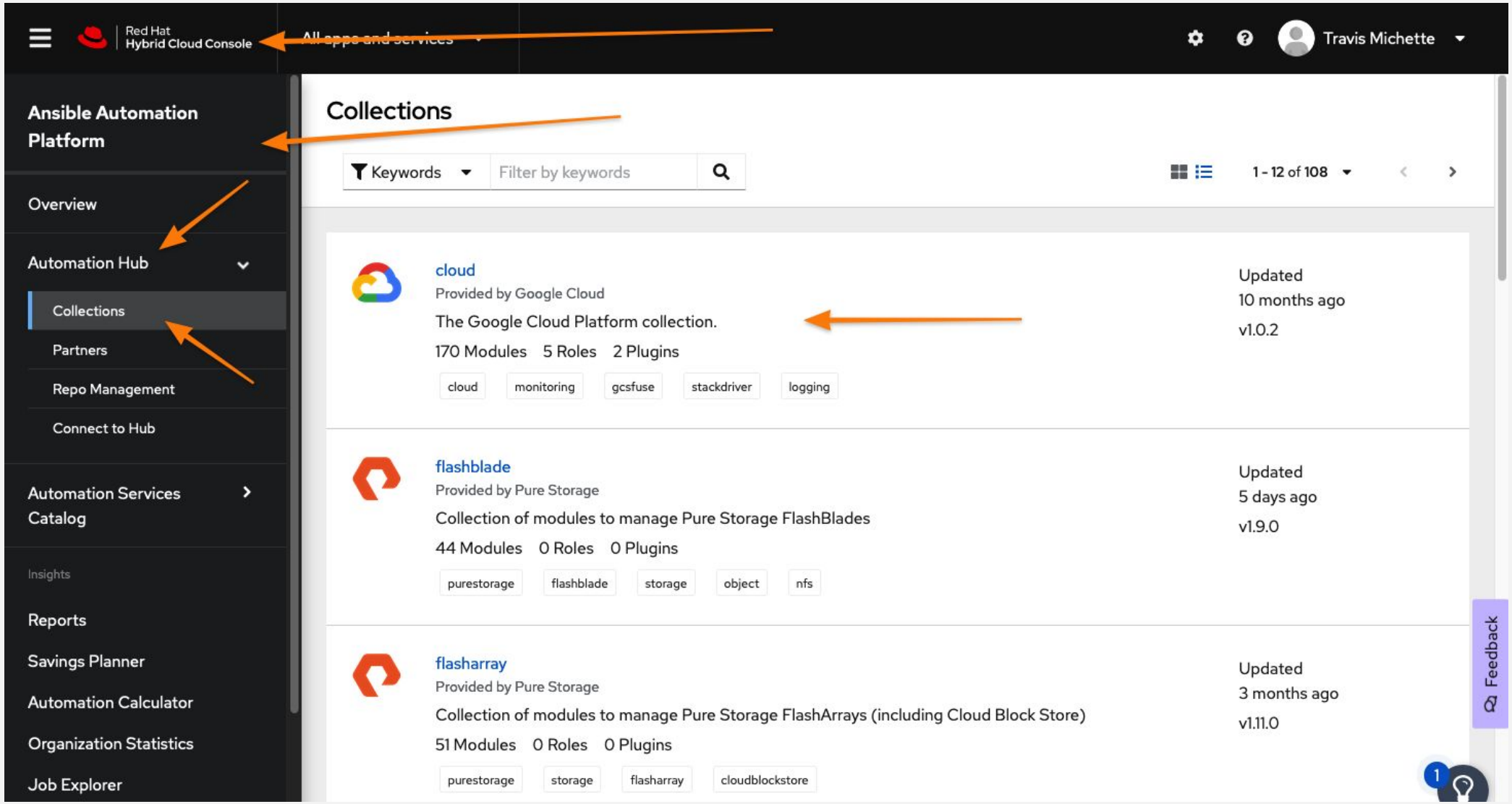
Customizable Content Catalog

Via sync from community (Galaxy) and supported (Automation Hub) sources, customers can supply internal users with approved content in one controlled location.



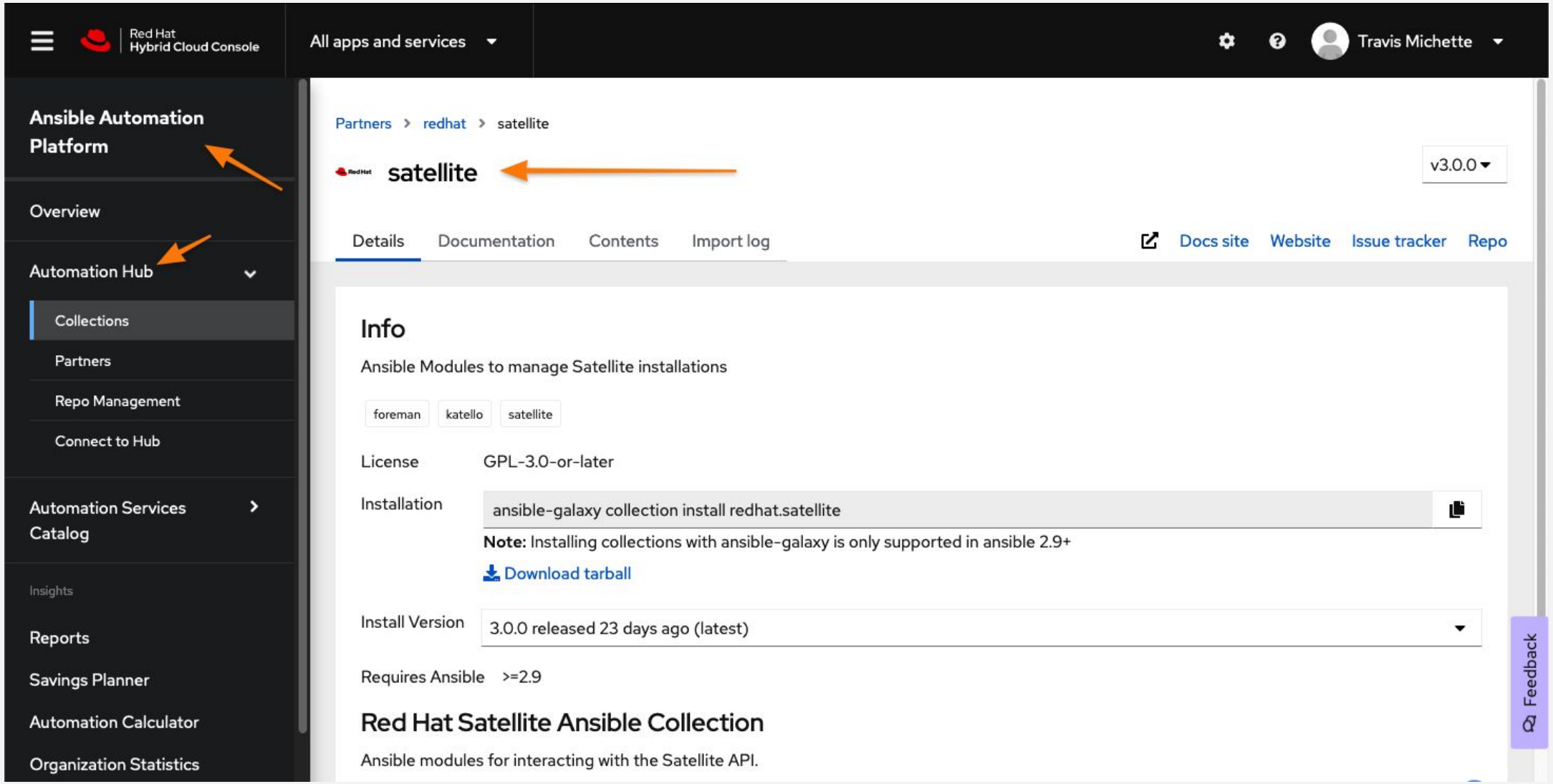
Red Hat

Ansible Automation Hub



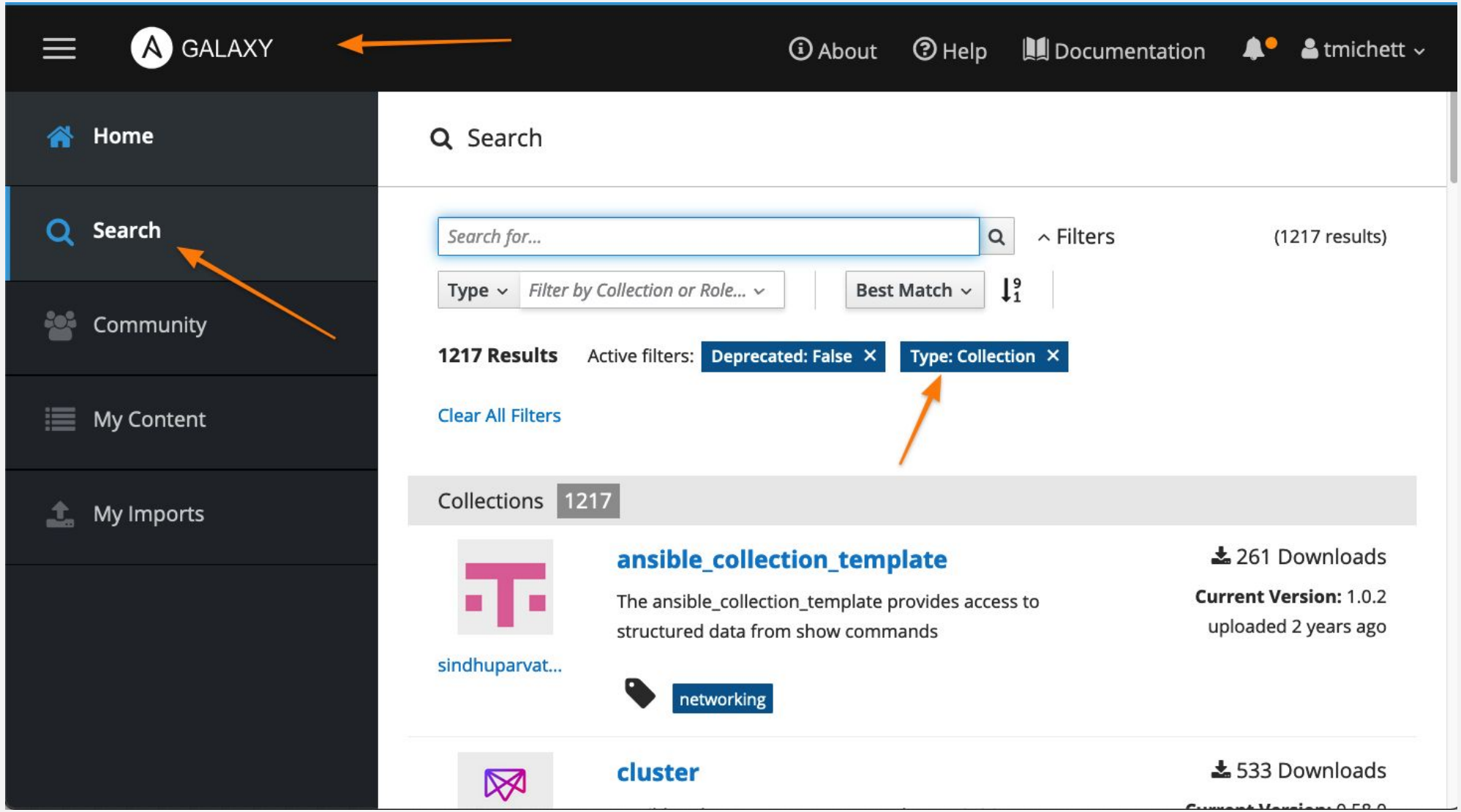
Red Hat

Ansible Automation Hub Collections



Red Hat

Ansible Galaxy Collections



Red Hat

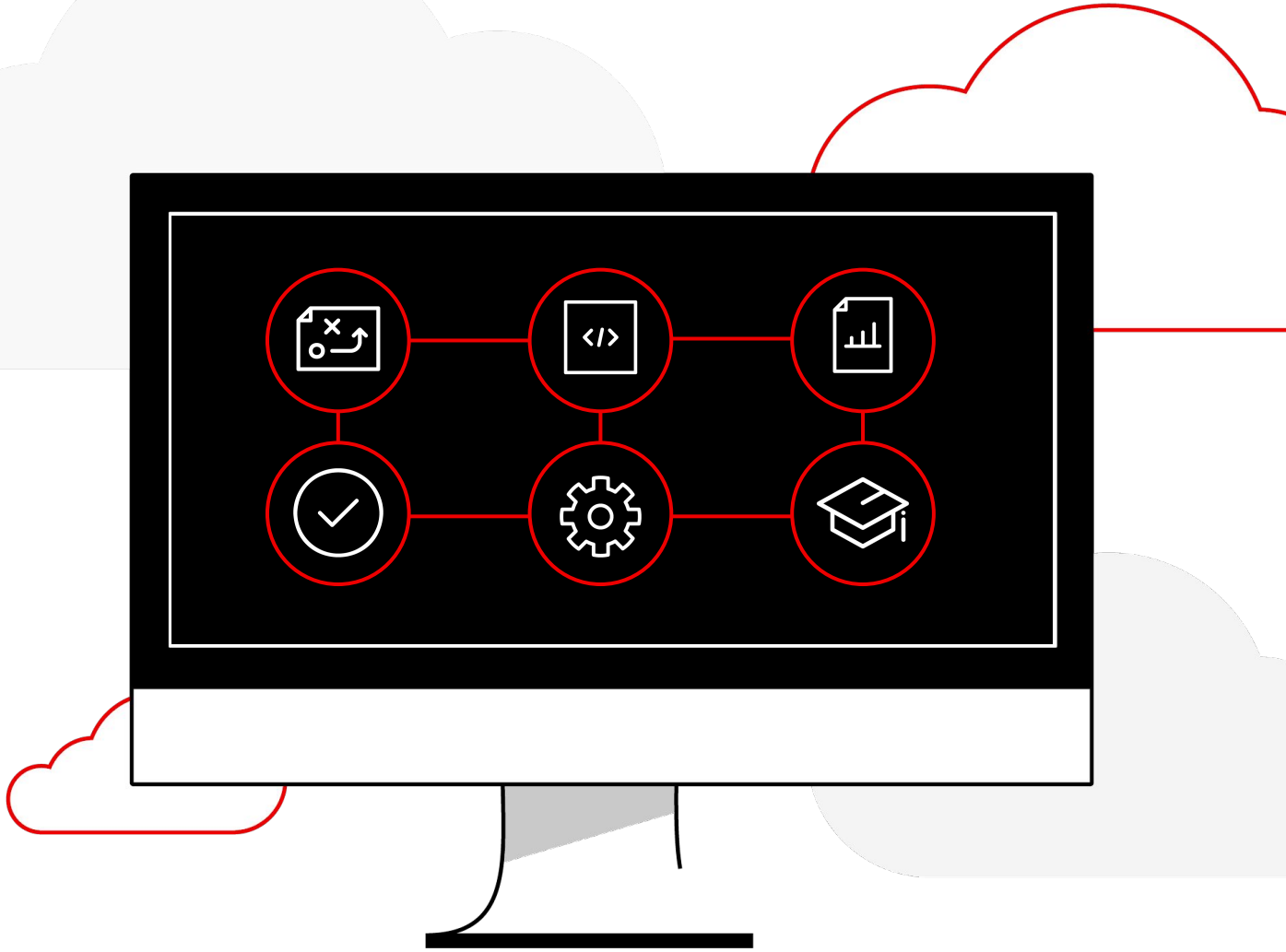
Collections

Simplified and consistent content delivery

What are they?

Collections are a data structure containing automation content:

- Modules
- Playbooks
- Roles
- Plugins
- Docs
- Tests



Ansible Collections - Why?

- Ansible 2.9 introduced the concept of collections and provided mapping for Ansible modules that were moved into a collection namespace.
- Collections allowed development of Ansible core components to be separated from module and plug-in development.
- Upstream Ansible unbundled modules from Ansible core code beginning with Ansible Base 2.10/2.11.
- Never versions of Ansible require collections to be installed in order for modules to be available for Ansible
- Ansible 2.9 provides a mapping to the Fully Qualified Collection Name (FQCN)
  - https://github.com/ansible/ansible/blob/devel/lib/ansible/config/ansible_builtin_runtime.yml
- Playbooks should be developed using the FQCNs when referring to modules in tasks.
  - AAP requires older playbooks to be refactored to a degree to conform to new modules and component names
- Collections must be installed for modules to be available for Ansible playbooks
  - **ansible-galaxy collection install -r collections/requirements.yml -p collections/**

Collections and Changes to Ansible Modules

```
2  # GNU General Public License v3.0+ (see COPYING or https://www.gnu.org/licenses/gpl-3.0.txt)
3  plugin_routing:
4    connection:
5      # test entries
6      redirected_local:
7        redirect: ansible.builtin.local
8      buildah:
9        redirect: containers.podman.buildah
10     podman:
11       redirect: containers.podman.podman
12     aws_ssm:
13       redirect: community.aws.aws_ssm
14     chroot:
15       redirect: community.general.chroot
16     docker:
17       redirect: community.docker.docker
18     funcd:
19       redirect: community.general.funcd
20     iocage:
21       redirect: community.general.iocage
22     jail:
23       redirect: community.general.jail
24     kubectl:
25       redirect: kubernetes.core.kubectl
```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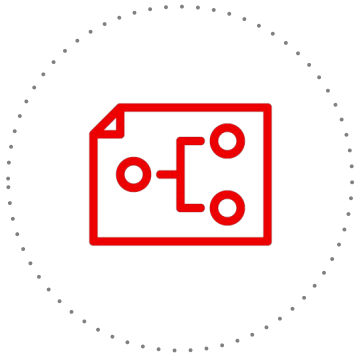
https://github.com/ansible/ansible/blob/devel/lib/ansible/config/ansible_builtin_runtime.yml

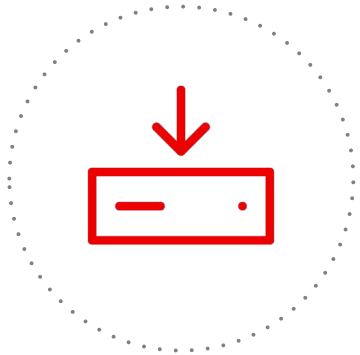
Accessing collections

How to get them



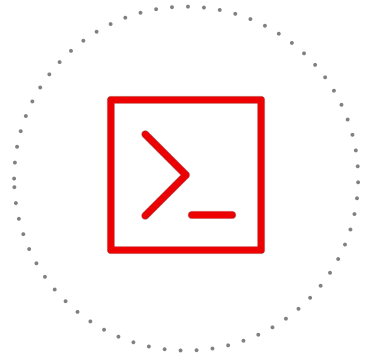
Requirements file

Requirements file defines the required collections for a playbook



Pull via controller

Automation controller pulls the collections from Automation Hub automatically



Command line

CLI access is also possible via ansible-galaxy command

Collections and Playbooks

Older Playbooks

- **podman_container** was a module that was able to be leveraged by the short module name in Ansible < 2.9.
- Ansible versions > 2.9 require that the FQCN be specified to that tasks can reference modules.
- It is possible to define collections at the top of a playbook similar to roles **(1)**.
  - This enables short **module** names to be used versus using the FQCN **(2)**.
- Not recommended as best practice.

1

2

```
[user@ansible] $ cat playbook.yml

---
- name: Deploy HTTPD Server Demo
  hosts: localhost
  vars_files:
    - vars/registry_login.yml
  collections:
    - containers.podman

  tasks:

## Start and Run the HTTPD Container
    - name: Start the Webserver Container
      podman_container:
        name: Website_Demo
        image: quay.io/redhattraining/httpd-parent:2.4
        state: started
        restart: yes
        ports:
          - "7080:80"
        volume:
          - "/Webhosting:/var/www/html:Z"
```

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Ansible Playbook with Collections

```
---
- name: Playbook to Fully Setup and Configure a
Webserver
  hosts: servera
  tasks:
    - name: Install Packages for Webserver
      yum:
        name:
          - httpd
          - firewalld
        state: latest

    - name: Create Content for Webserver
      copy:
        content: "I'm an awesome webserver\n"
        dest: /var/www/html/index.html

    - name: Firewall is Enabled
      systemd:
        name: firewalld
        state: started
        enabled: true
```

```
    - name: HTTP Service is Open on Firewall
      ansible.posix.firewalld: (1)
        service: http
        state: enabled
        permanent: true
        immediate: yes

    - name: httpd is started
      systemd:
        name: httpd
        state: started
        enabled: true
```

- **firewalld** was a module that was able to be leveraged by the short module name in Ansible <= 2.9, moved to the **Posix** collection using FQCN **(1)** above.

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Platform

Demo Time

Ansible Automation Platform 1.2 - Ansible Collections to Deploy Webserver

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Break Time

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Section 3
Ansible Automation Platform 2.x

Future

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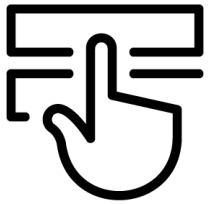
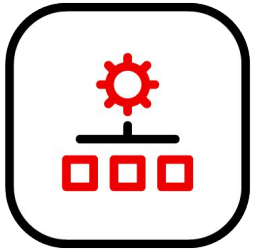
New in Ansible Automation Platform 2.X

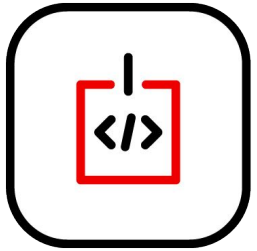
What changes?



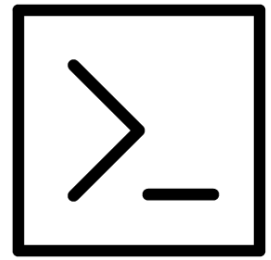
Updated Private Automation Hub
Hosting of private content, container registry



Automation controller
Replaced *Ansible Tower*



Automation execution environments
Replaced *Ansible Engine*



`ansible-builder` and **`ansible-navigator`**
New tools for enterprise automation developers

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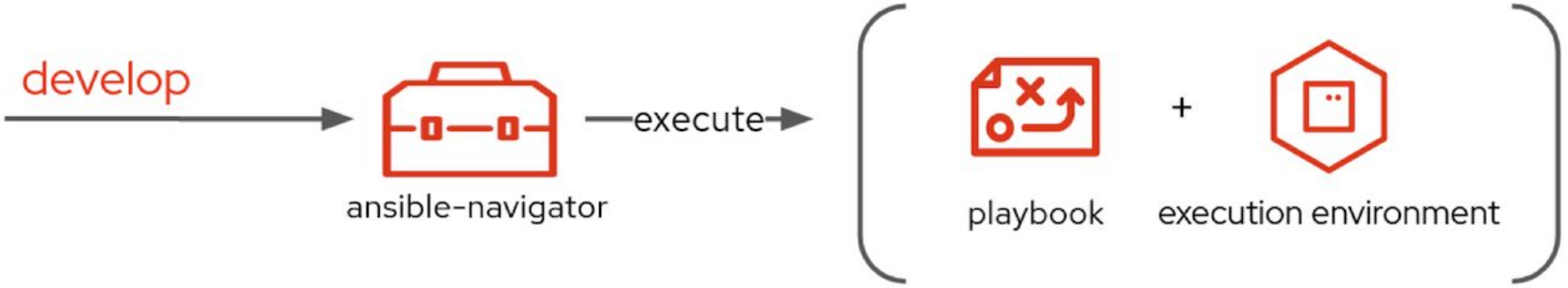
Platform

Section 3.1

Topics Covered:

- Introduction to AAP 2.x Components
  - Ansible Content Navigator
  - Ansible Execution Environments

Ansible Content Navigator



- ✓ Supported tooling
- ✓ Portable
- ✓ Scalable

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Ansible Content Navigator

Ansible Command	Automation Content Navigator Subcommands
ansible-config	ansible-navigator config
ansible-doc	ansible-navigator doc
ansible-inventory	ansible-navigator inventory
ansible-playbook	ansible-navigator run

```
# Running Navigator Interactively
[user@ansible] $ ansible-navigator run Playbook.yml -m interactive
```

```
# Running Navigator Non-Interactively (Similar to ansible-playbook output)
[user@ansible] $ ansible-navigator run Playbook.yml -m stdout
```

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ansible-navigator.yml

```
---
ansible-navigator:
 execution-environment: (1)
  enabled: true
  environment-variables:
    set:
      ANSIBLE_CONFIG: ansible.cfg (2)
  image: hub.lab.example.com/ee-29-rhel8:latest (3)
 logging:
  level: critical
    mode: stdout (4)
```

- **Execution Environment** - Configures Ansible Navigator to use an Execution Environment (EE). **(1)**
- Specifies where Ansible Navigator and the Ansible EE will receive Ansible configuration settings. **(2)**
  - Provides **ansible.cfg** file for the container runtime environment
- Specifies Ansible EE to use for Ansible Navigator. **(3)**
  - Defines container image and registry to be used for Ansible Navigator
- Specified Mode, in this case, we are using **STDOUT** so that the output will look like it does with the **ansible-playbook** command. **(4)**

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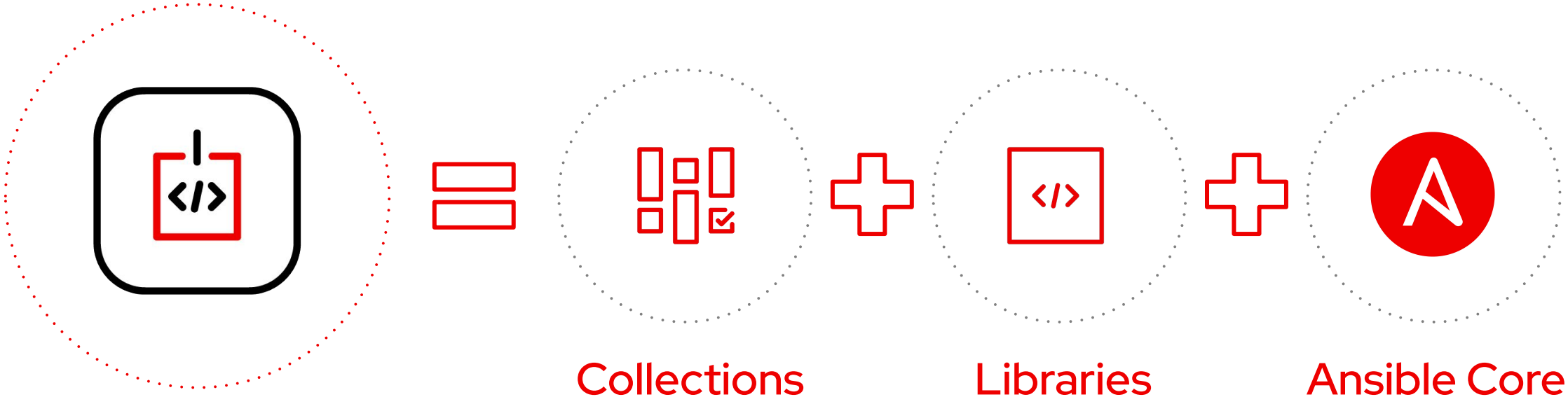
Automation Execution Environments

Components needed for automation, packaged in a cloud-native way



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Ansible Execution Environments

	EE-29-RHEL8:LATEST (PRIMARY)	DESCRIPTION
0	Image information	Information collected from image inspection
1	General information	OS and python version information
2	Ansible version and collections	Information about ansible and ansible collections
3	Python packages	Information about python and python packages
4	Operating system packages	Information about operating system packages
5	Everything	All image information

EE-29-RHEL8:LATEST (PRIMARY) (OS AND PYTHON VERSION INFORMATION)

```
0 | ---
1 | friendly:
2 |   details: |-
3 |     Red Hat Enterprise Linux release 8.5 (Ootpa)
4 | os:
```

EE-29-RHEL8:LATEST (PRIMARY) (INFORMATION ABOUT ANSIBLE AND ANSIBLE COLLECTIONS)

```
0 | ---
1 | ansible:
2 |   collections:
3 |     details: {}
4 |     errors:
5 |     - |-
6 |       usage: ansible-galaxy collection [-h] COLLECTION_ACTION ...
7 |       ansible-galaxy collection: error: argument COLLECTION_ACTION: invalid choice:
8 |   version:
9 |     details: .9.2
```

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Ansible Execution Environments - SSH Keys

- **Execution Environment** - Leverages containers to run Ansible Playbooks
  - **Contains**
    - Ansible Core
    - Ansible Collections
    - Python Environment
  - **Requires**
    - Configuration Files
    - Inventory
    - SSH
      - SSH Keys must be provided through the SSH-Agent service

```
[student@workstation ~]$ eval $(ssh-agent)
```

```
[student@workstation ~]$ ssh-add ~/.ssh/lab_rsa
```

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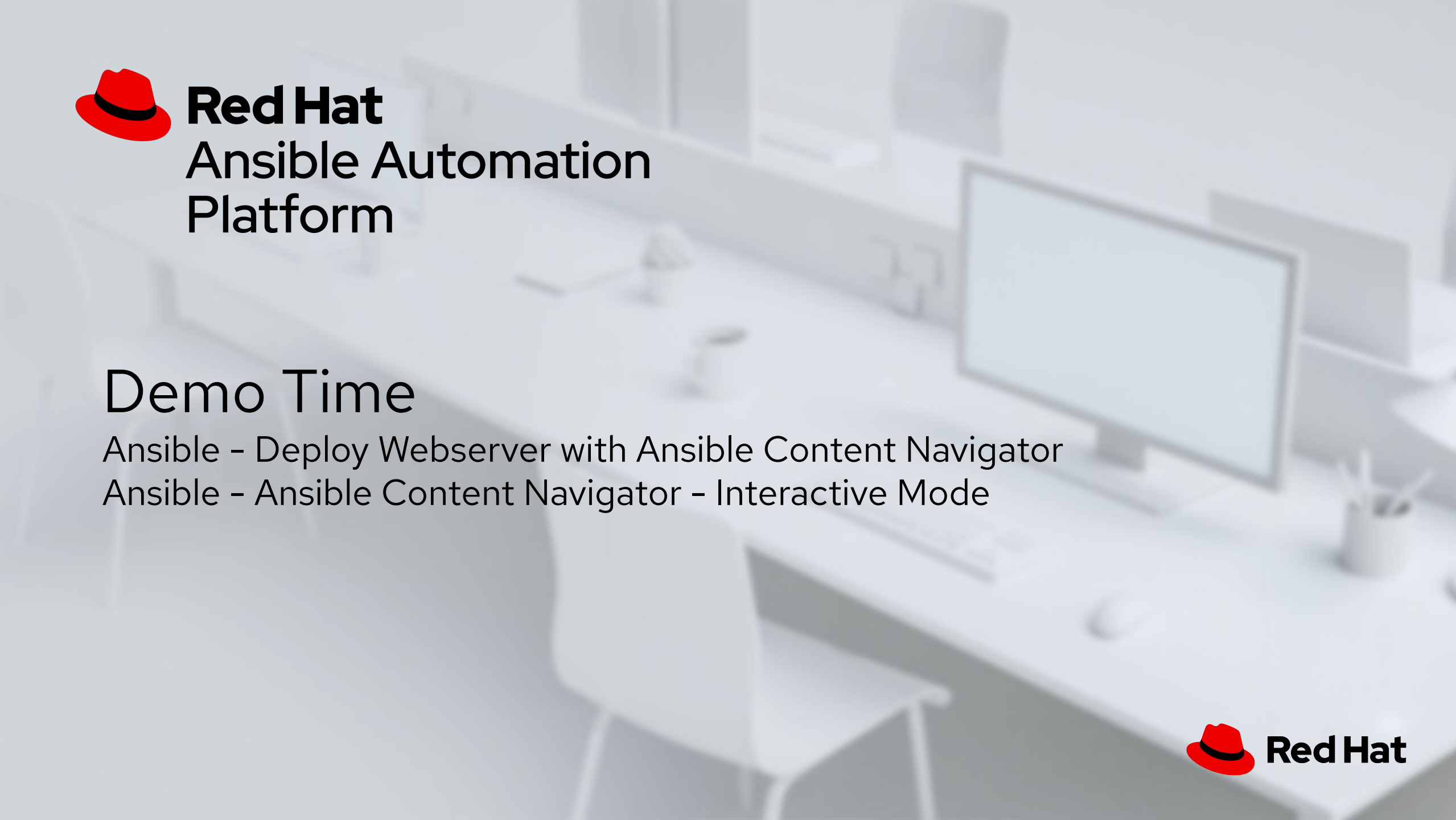

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Ansible Automation
Platform

Demo Time

Ansible - Deploy Webserver with Ansible Content Navigator
Ansible - Ansible Content Navigator - Interactive Mode

Red Hat

Section 3.2

Topics Covered:

- Introduction to AAP 2.x - Ansible Automation Hub
  - Private Automation Hub
  - Custom Execution Environments

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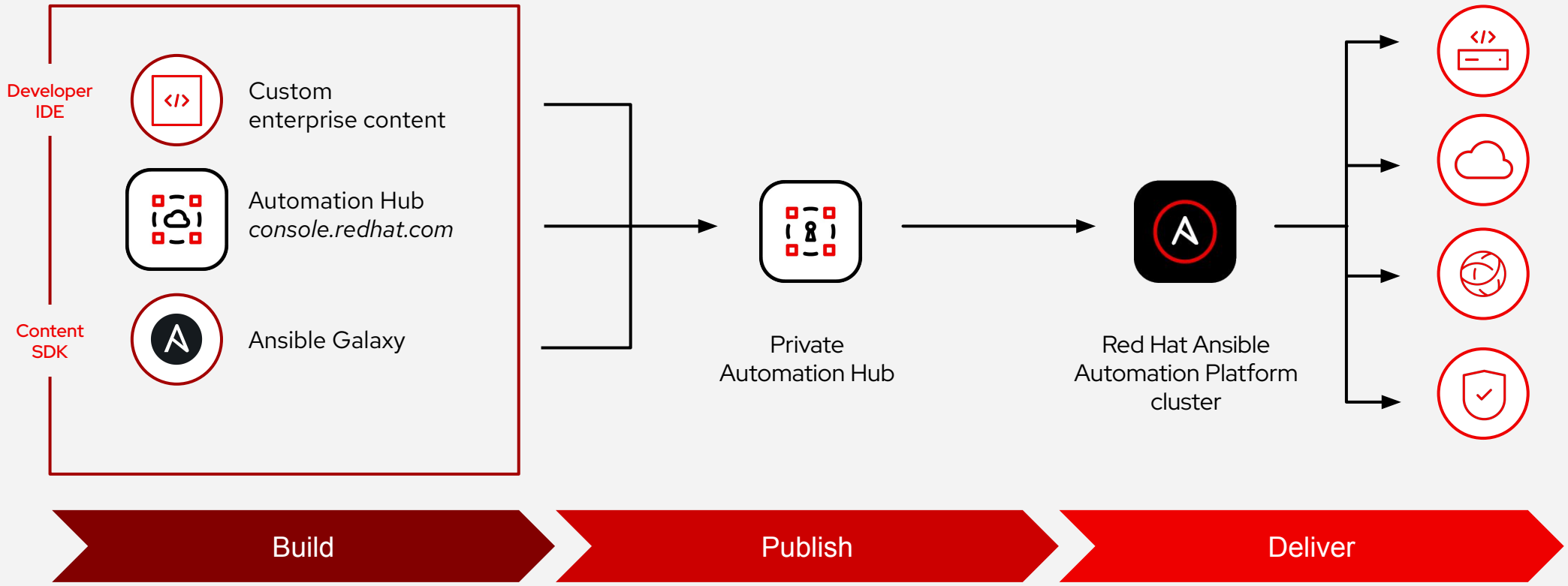
Platform

Private Automation Hub

Value of Private Automation Hub



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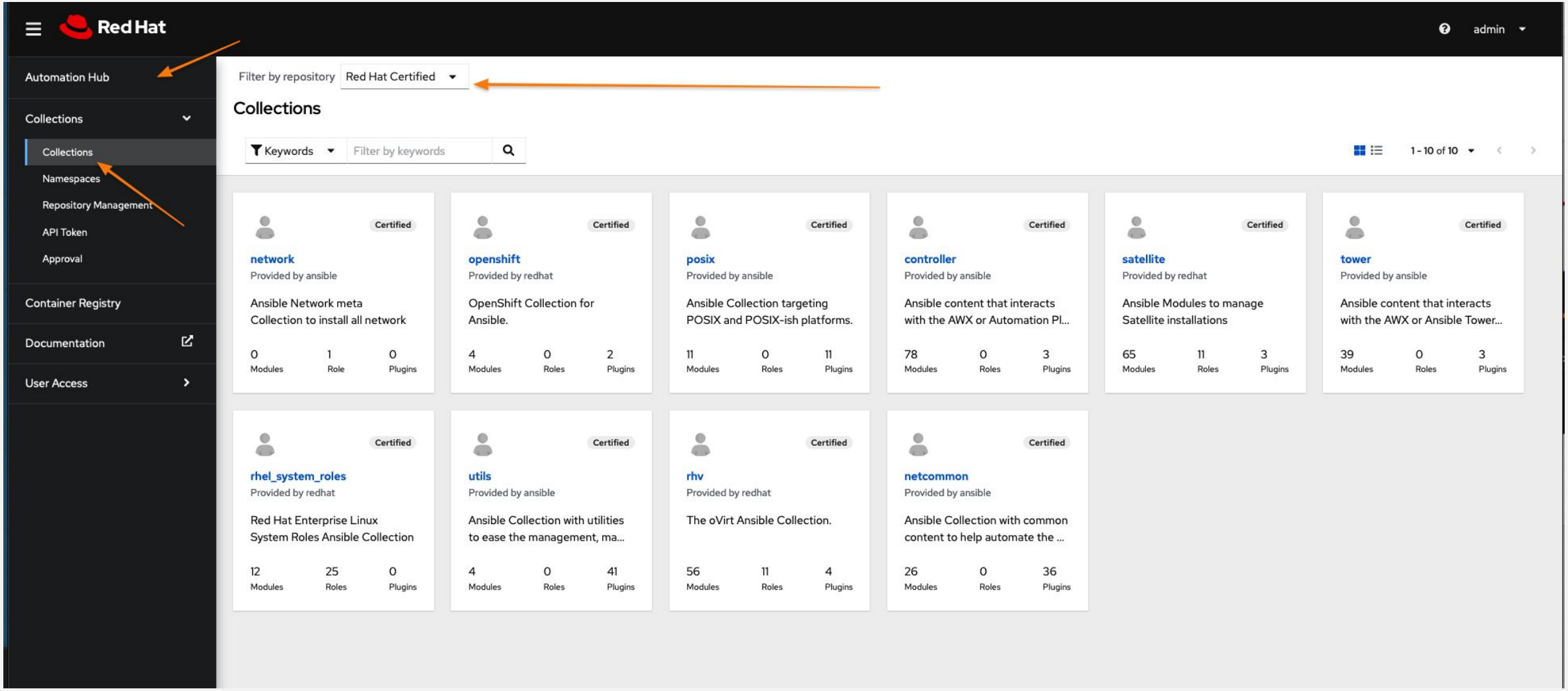
Automation Hub - Collections



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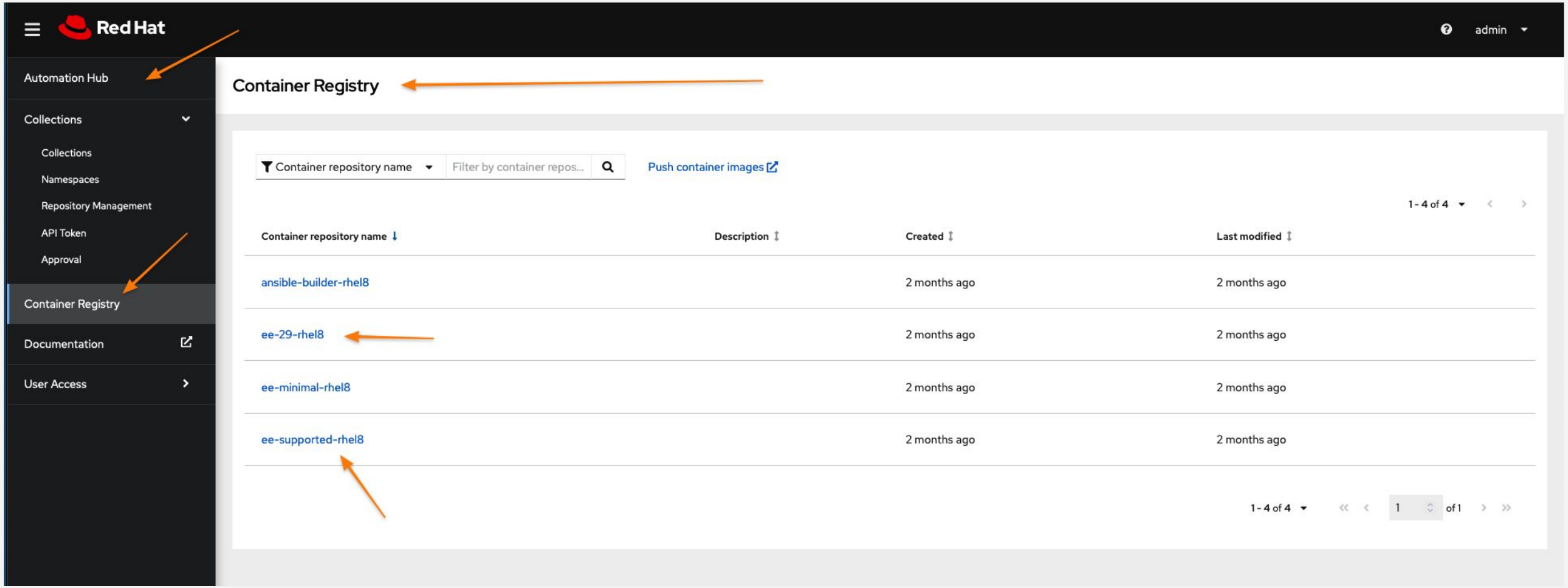
Automation Hub - Execution Environments



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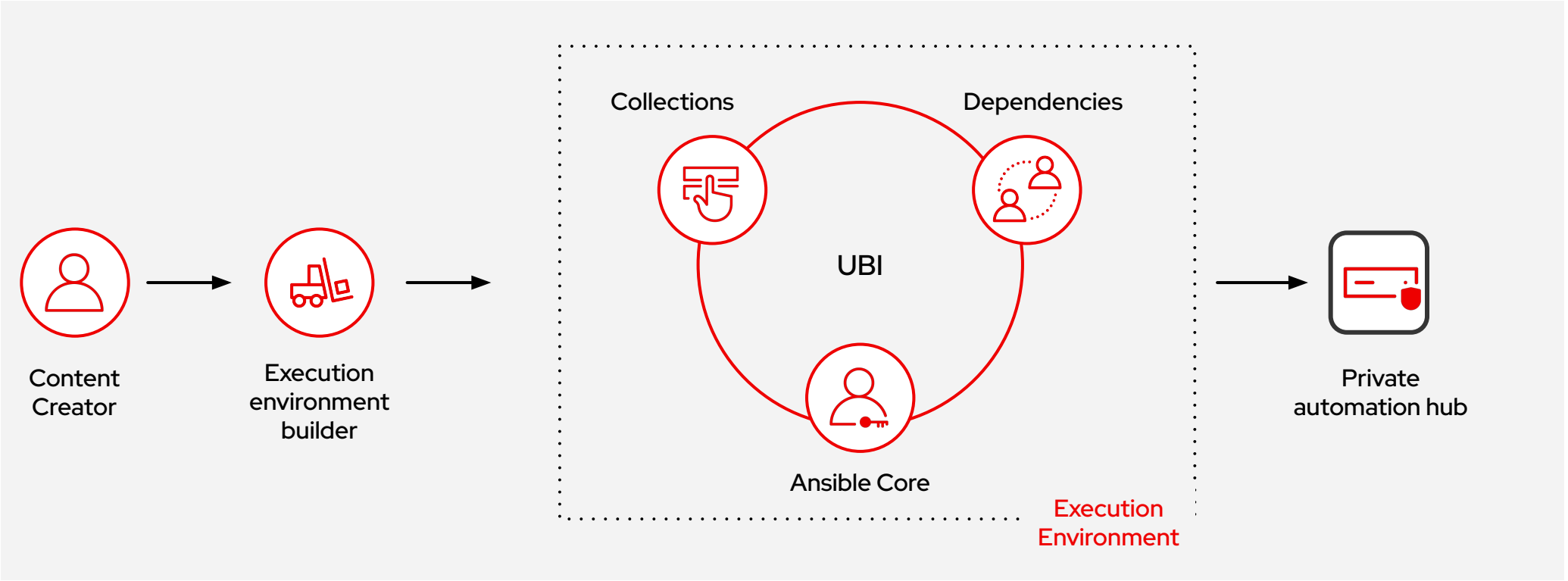
Build, create, publish

Development cycle of an automation execution environment



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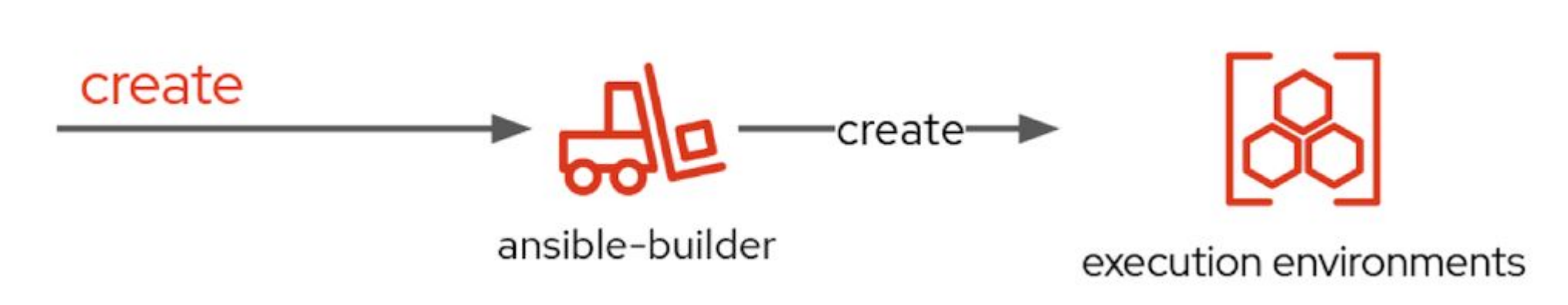
Ansible Execution Environments - Building/Customizing




```
# Running ansible-builder to Create Structure
[user@ansible] $ ansible-builder create
```

```
# Running ansible-builder to Build Execution Environment
[user@ansible] $ ansible-builder build -t ee-motd-minimal-demo:1.0
```

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Ansible Execution Environments - Building/Customizing

execution-environment.yml (1)

```
---
version: 1
Build_arg_defaults:
  EE_BASE_IMAGE: 'hub.lab.example.com/ee-minimal-rhel8:2.0' (1a)
  EE_BUILDER_IMAGE: 'hub.lab.example.com/ansible-builder-rhel8:2.0' (1b)
dependencies:
  galaxy: requirements.yml (1c)(2)
  python: requirements.txt (1d)(3)
  system: bindep.txt (1e)(4)
```

requirements.yml (1c)(2)

```
---
collections:
  - name: /build/exercise.motd.tar.gz (2a)
    type: file
```

requirements.txt (3)

```
# Python dependencies
funmotd (3a)
```

bindep.txt (4)

```
# System-level dependencies
hostname (4a)
```

1. **execution-environment.yml** - Defines parameters and definitions for building the execution environment (EE) including the base image, and builder image along with all Ansible dependencies.
   a. Defines base container image to be used for creating the EE
   b. Defines the builder image to be used for the EE
   c. Points to file containing the Collections and Roles to be installed and included in the EE
   d. Points to file containing the required Python components to be installed and included in the EE
   e. Points to file containing the system applications to be installed in the EE
2. **requirements.yml** - Defines the collections and roles to be used as part of the Ansible Execution Environment.
   a. Listing of collections to be installed in the EE
3. **requirements.txt** - Defines the python dependencies and requirements needed by the Ansible Execution Environment and the included Ansible Collections.
   a. List of Python tools to be installed in the EE
4. **bindep.txt** - Defines the system packages needed in the Ansible Execution Environment to run effectively and support the installed Ansible Collections and Python modules.
   a. List of system packages needed installed in the EE

IMPORTANT
Remember that Ansible Execution Environments are based on containers and container images. The **ansible-builder** command will build and create a new container image based on the **execution-environment.yml** file specifications.

```
# Building an Execution Environment with ansible-builder
[student@workstation EE]$ ansible-builder build -t ee_aap_demo:latest
```

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Ansible Execution Environments - Publishing

```
# Using podman to Tag Image for Upload to Private Automation Hub
[user@ansible] $ podman tag localhost/aap-demo:latest
hub.lab.example.com/aap-demo:latest
```

```
# Using podman to Push Image to Private Automation Hub
[user@ansible] $ podman push hub.lab.example.com/aap-demo:latest
```

```
# Using ansible-navigator to test image from Private Automation Hub
[user@ansible] $ ansible-navigator run --pp always --eei
hub.lab.example.com/aap-demo:latest -m stdout
Custom_EE_Playbook.yml -b
```

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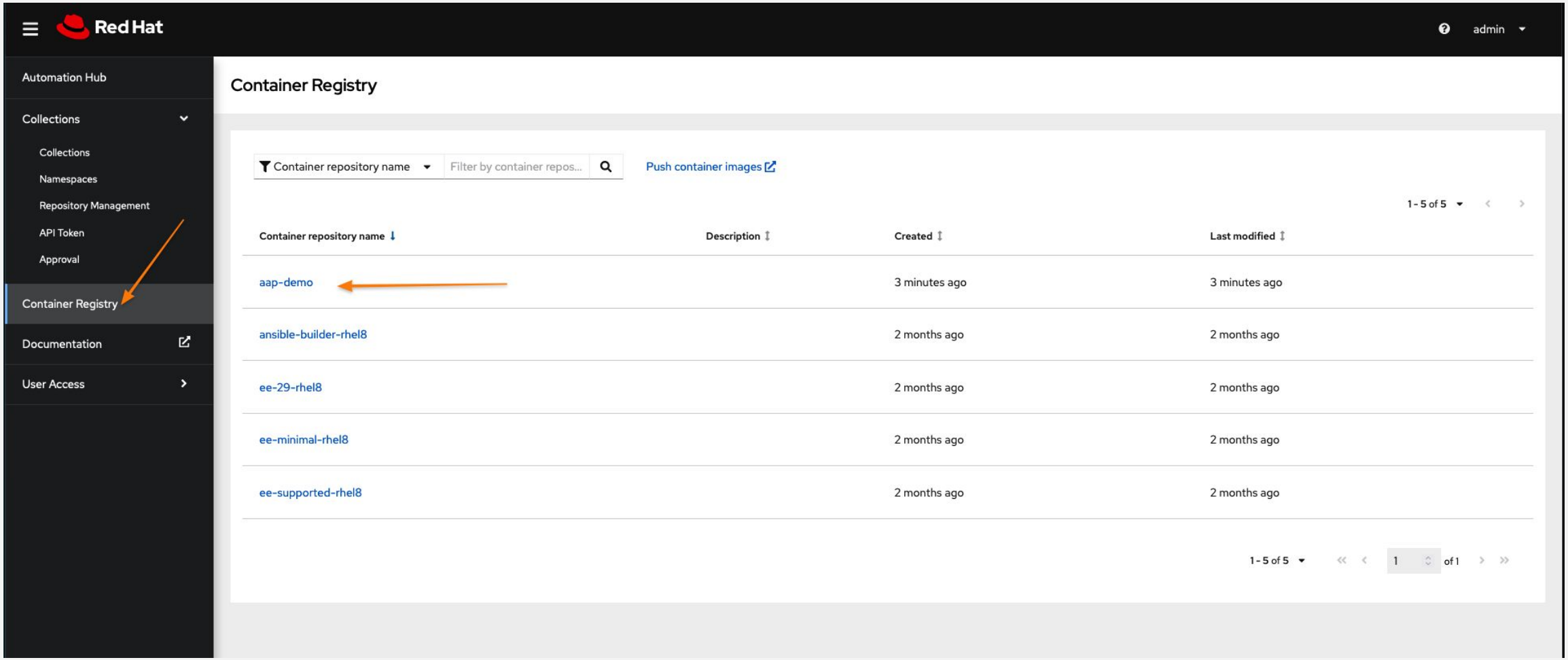
Ansible Execution Environments - Publishing Cont.



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Platform

Demo Time

Ansible Automation Platform - Create Custom Execution Environment (EE)
Ansible Automation Platform - Run a Playbook with Custom Execution Environment
Ansible Automation Platform - Publish EE to Private Automation Hub

Red Hat

Section 3.3

Topics Covered:

- Introduction to AAP 2.x - Ansible Controller
  - Organizations, Teams, and RBAC
  - Inventories and Credentials
  - Projects and Job Templates
  - Workflows

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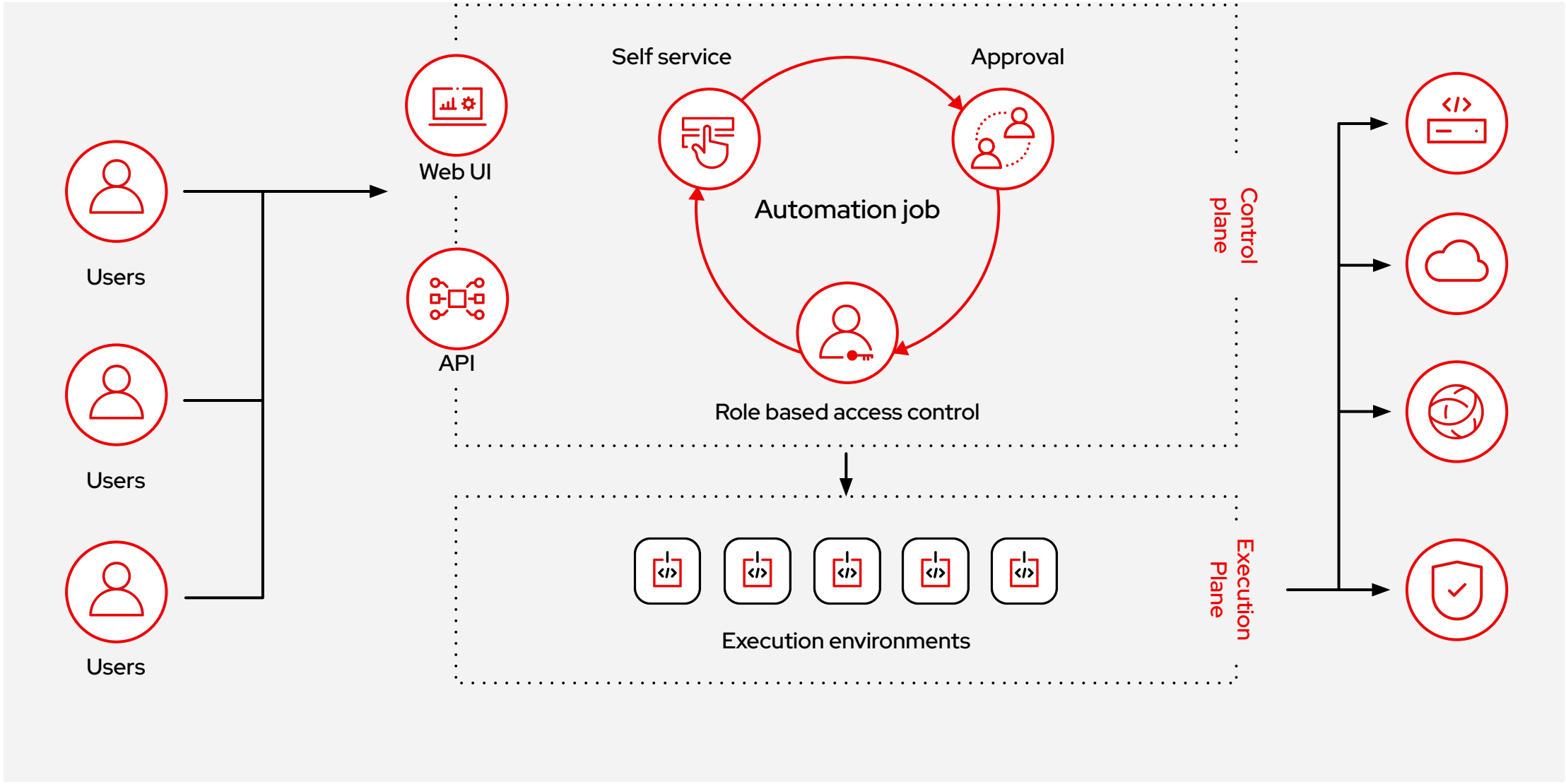
Platform

Ansible Controller



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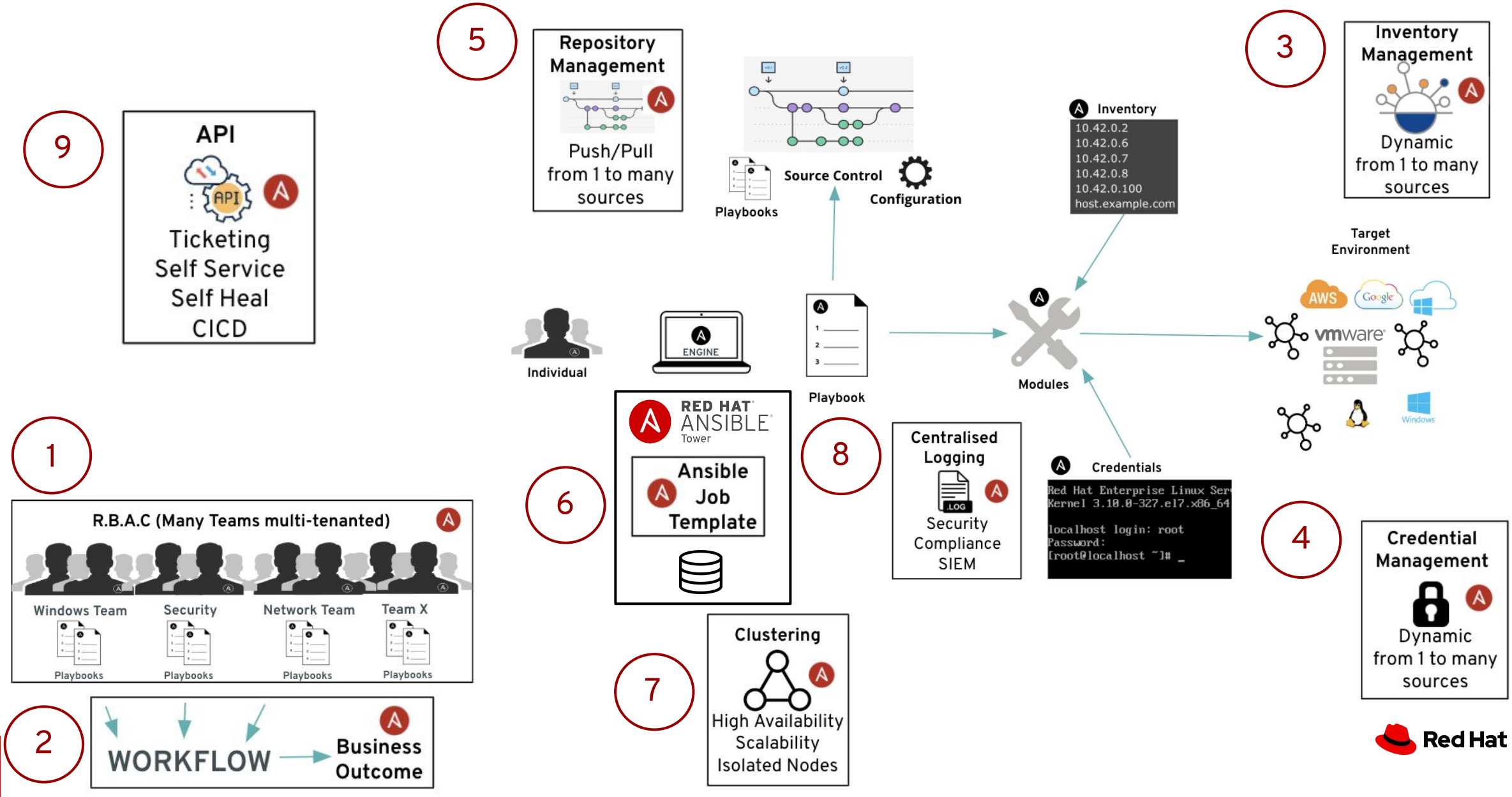
How Ansible Works - Ansible Controller



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Role Based Access Control (RBAC)

Role-Based Access Controls (RBAC) are built into Ansible Tower and allow administrators to delegate access to inventories, organizations, and more. These controls allow Ansible Tower to help you increase security and streamline management of your Ansible automation.

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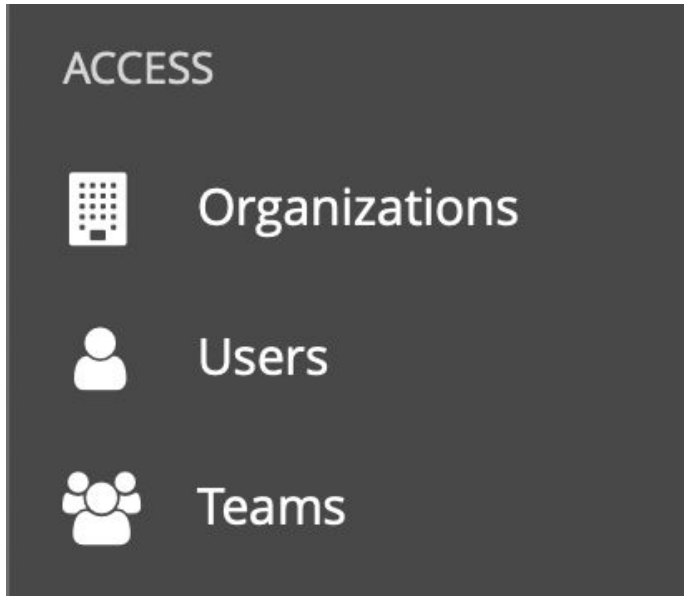
User Management

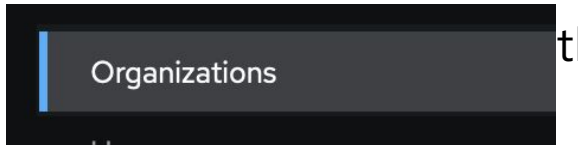
- An **Organization** is a logical collection of users, teams, projects, inventories and more. All entities belong to an organization.
- A **User** is an account to access Ansible Tower and its services given the permissions granted to it.
- **Teams** provide a means to implement role-based access control schemes and delegate responsibilities across organizations.



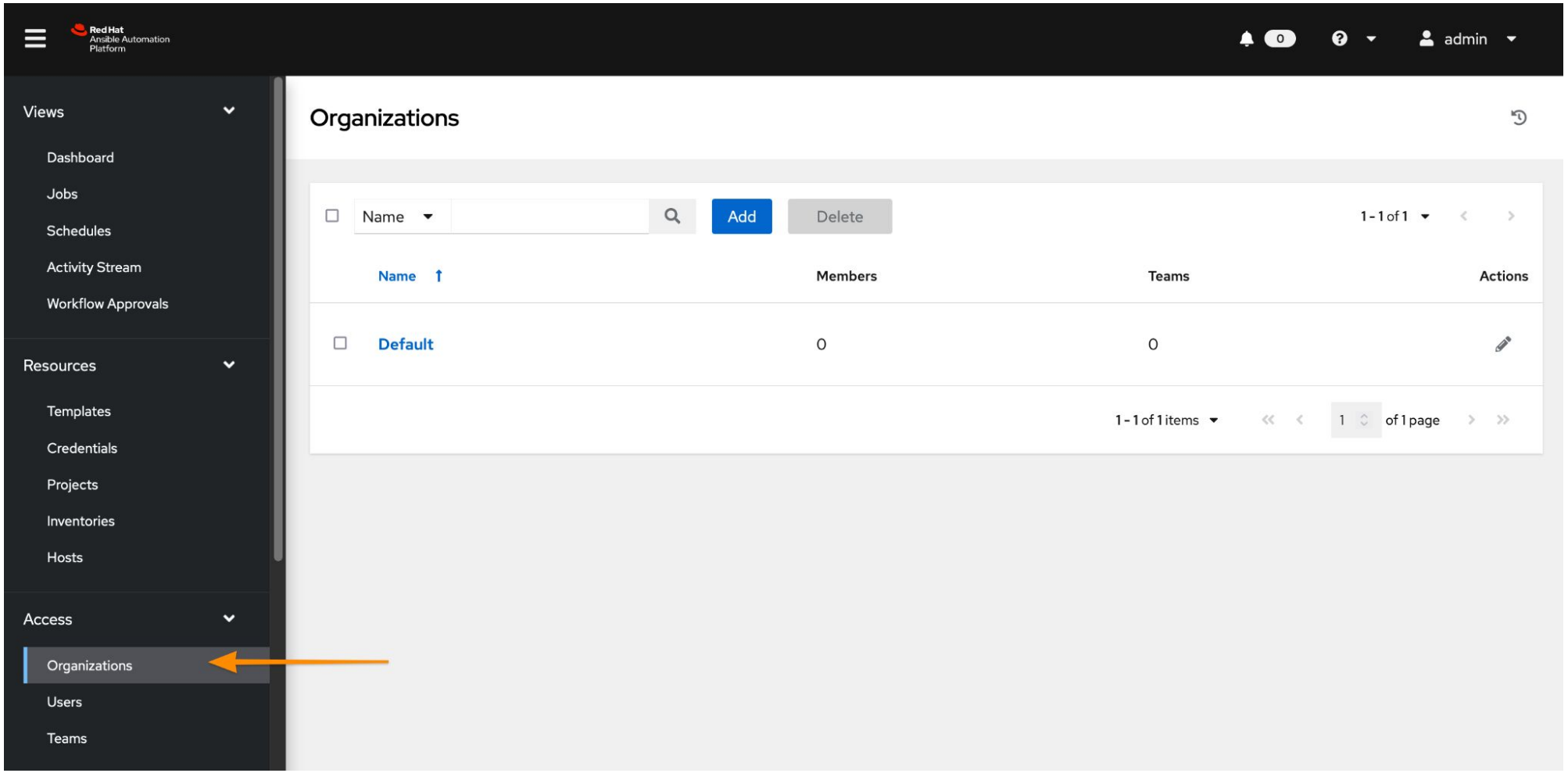
Red Hat

Viewing Organizations

Clicking on the **Organizations** button



the left menu will open up the Organizations window

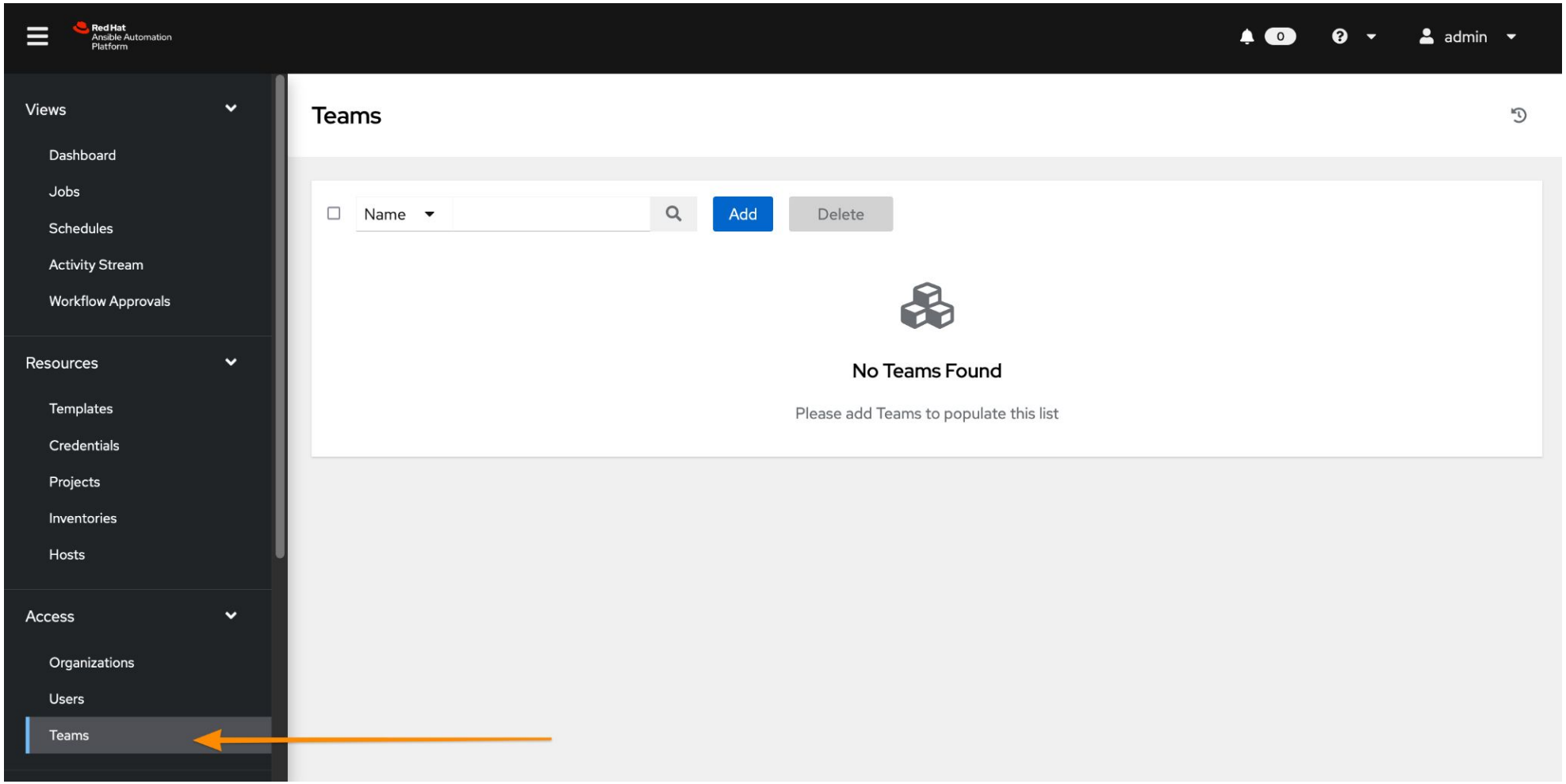


Red Hat

Viewing Teams

Clicking on the **Teams** button will open up the Teams window

in the left menu



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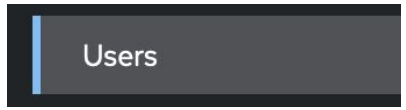
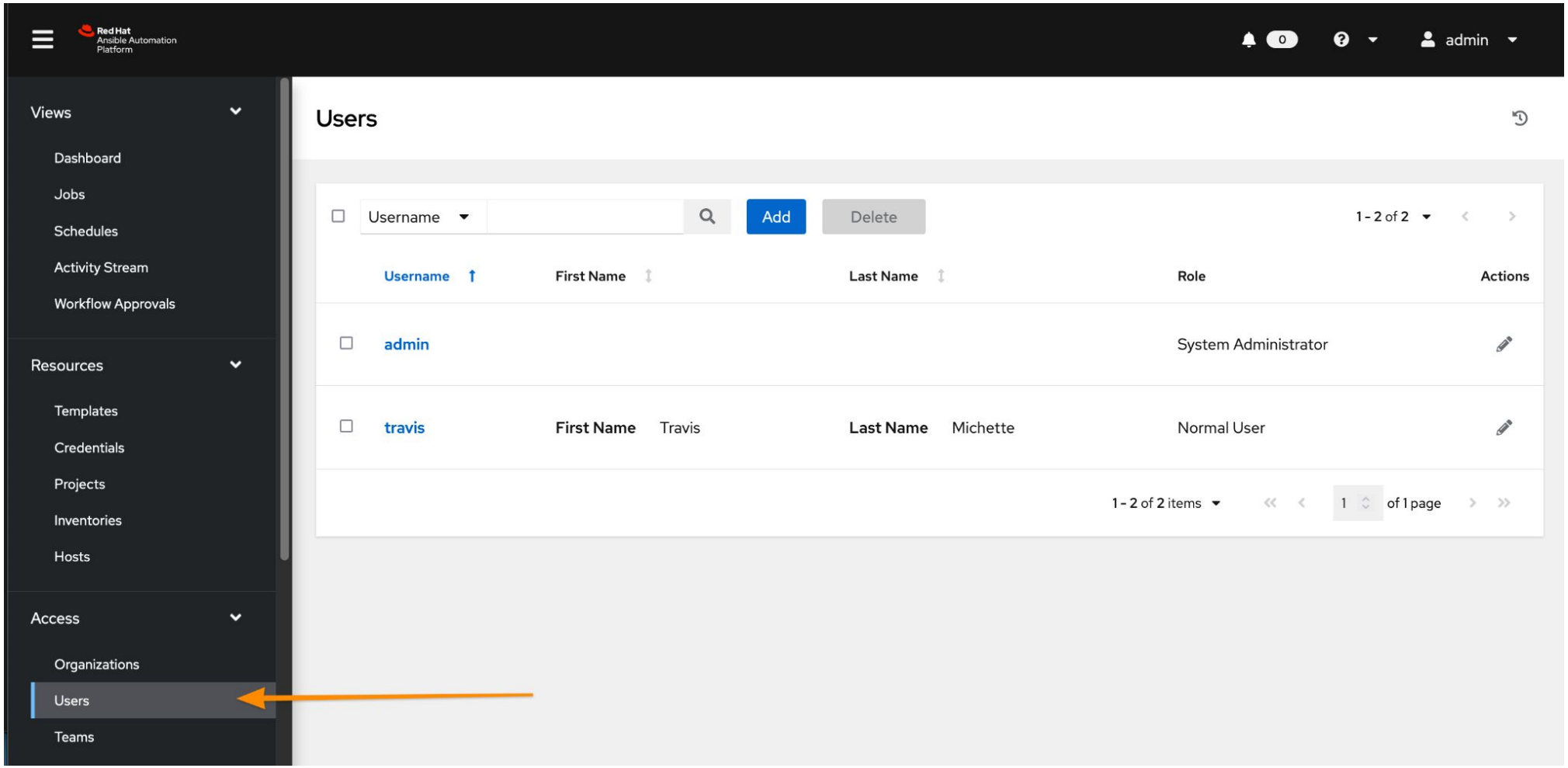
Viewing Users

Clicking on the **Users** button 

in the left menu will open up the Users window



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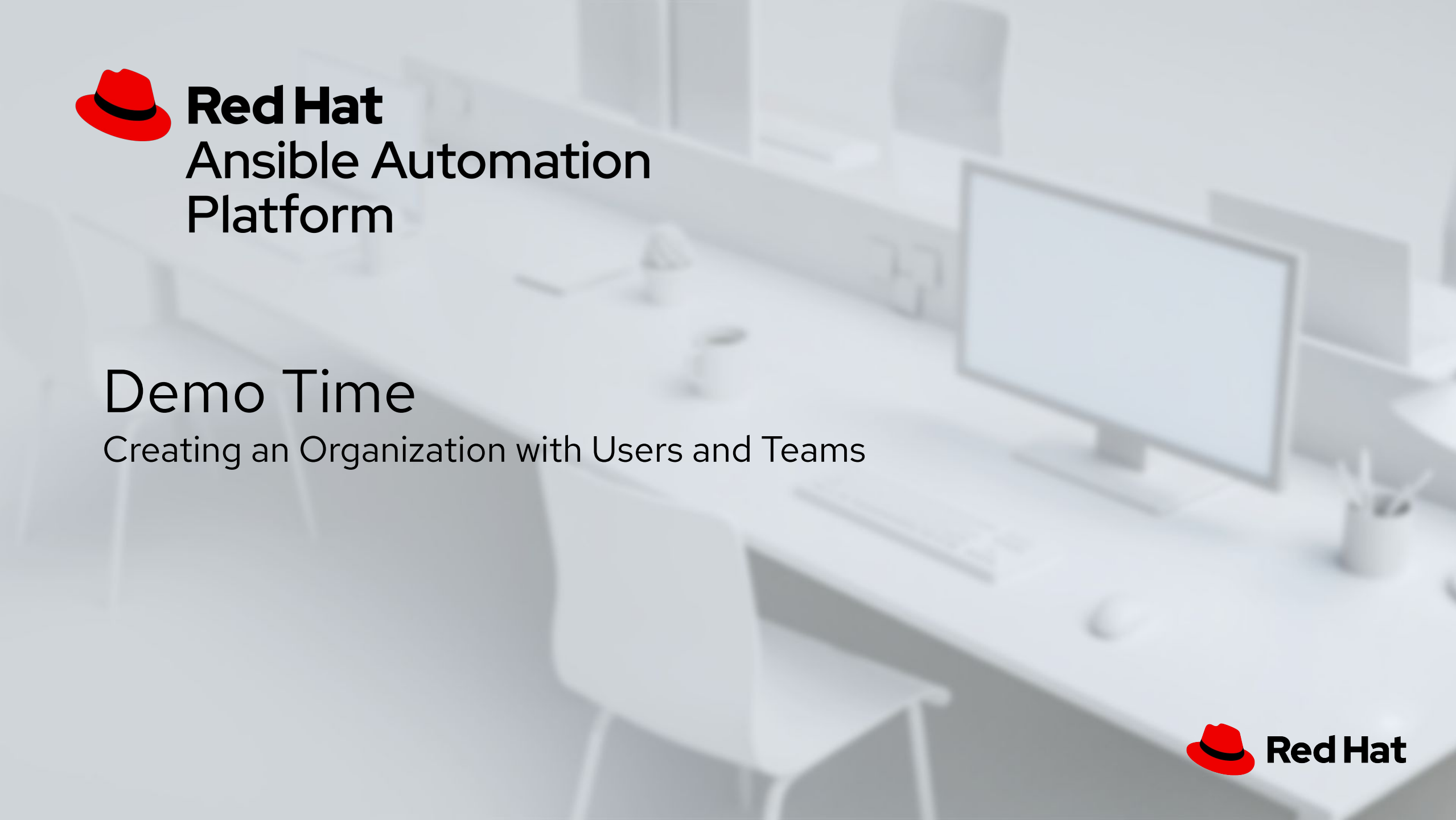
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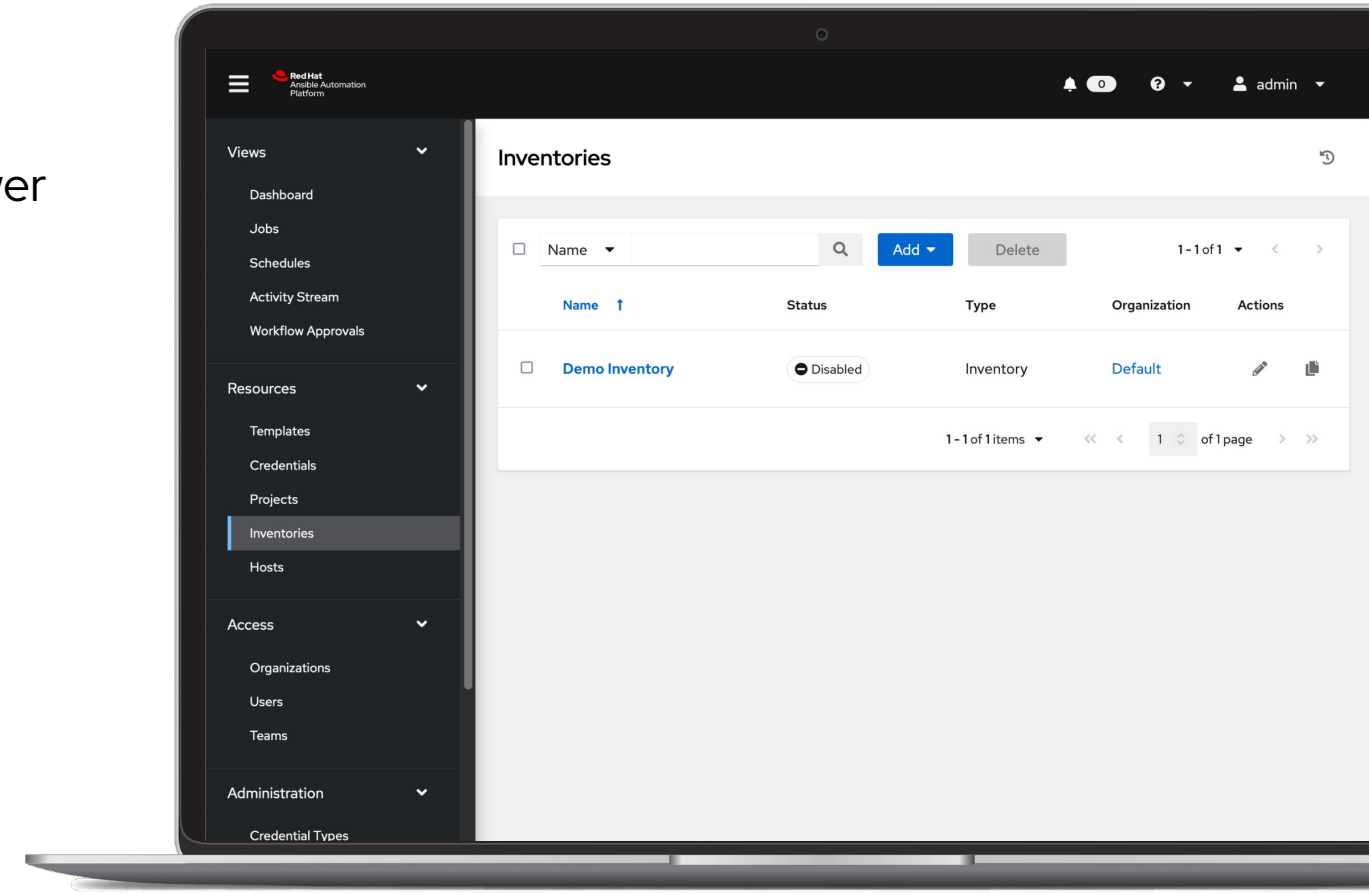
Inventory

Inventory is a collection of hosts (nodes) with associated data and groupings that Ansible Tower can connect to and manage.

- Hosts (nodes)
- Groups
- Inventory-specific data (variables)
- Static or dynamic sources

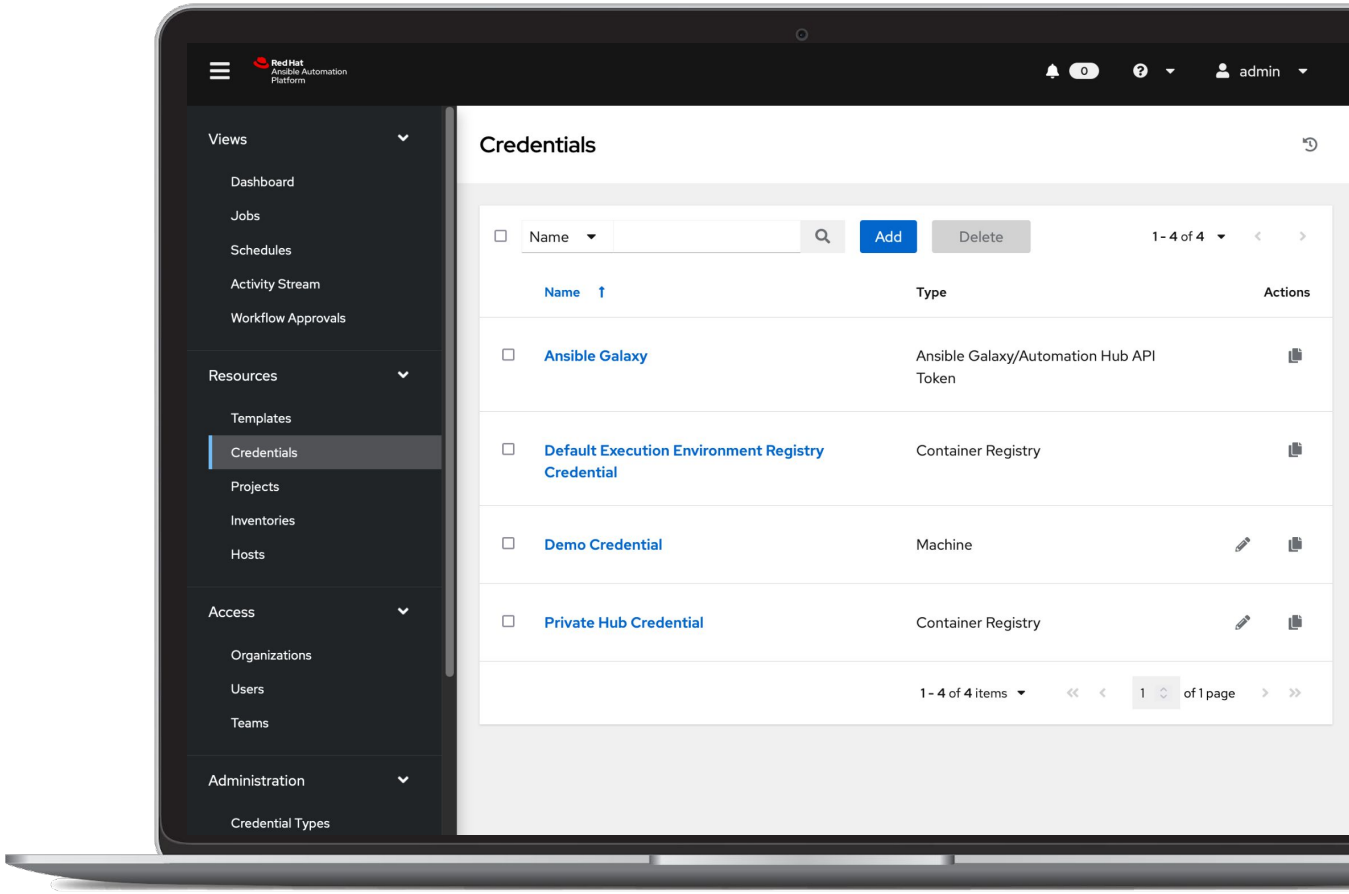


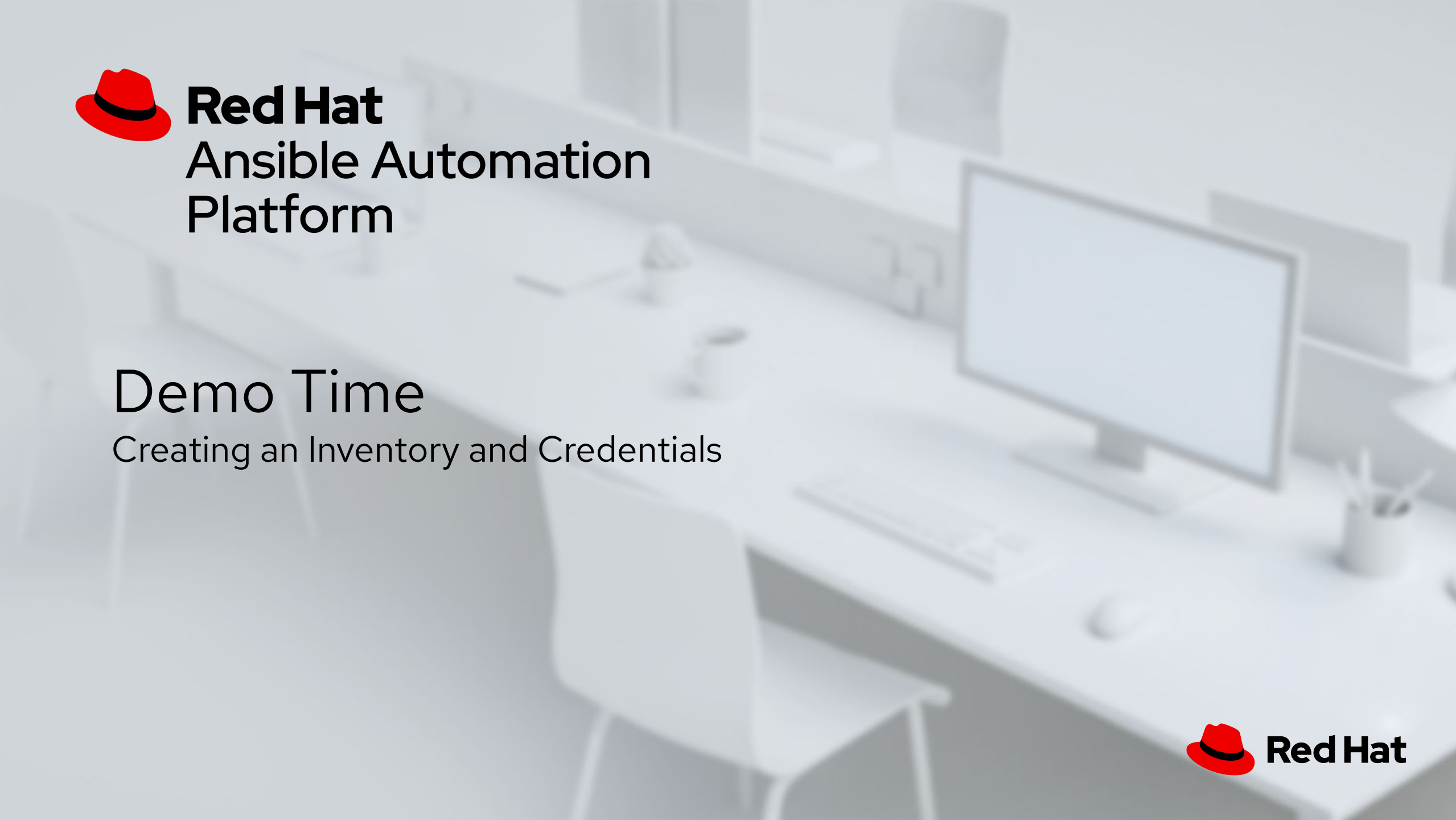
Credentials

Credentials are utilized by Ansible Tower for authentication with various external resources:

- Connecting to remote machines to run jobs
- Syncing with inventory sources
- Importing project content from version control systems
- Connecting to and managing network devices

Centralized management of various credentials allows end users to leverage a secret without ever exposing that secret to them.

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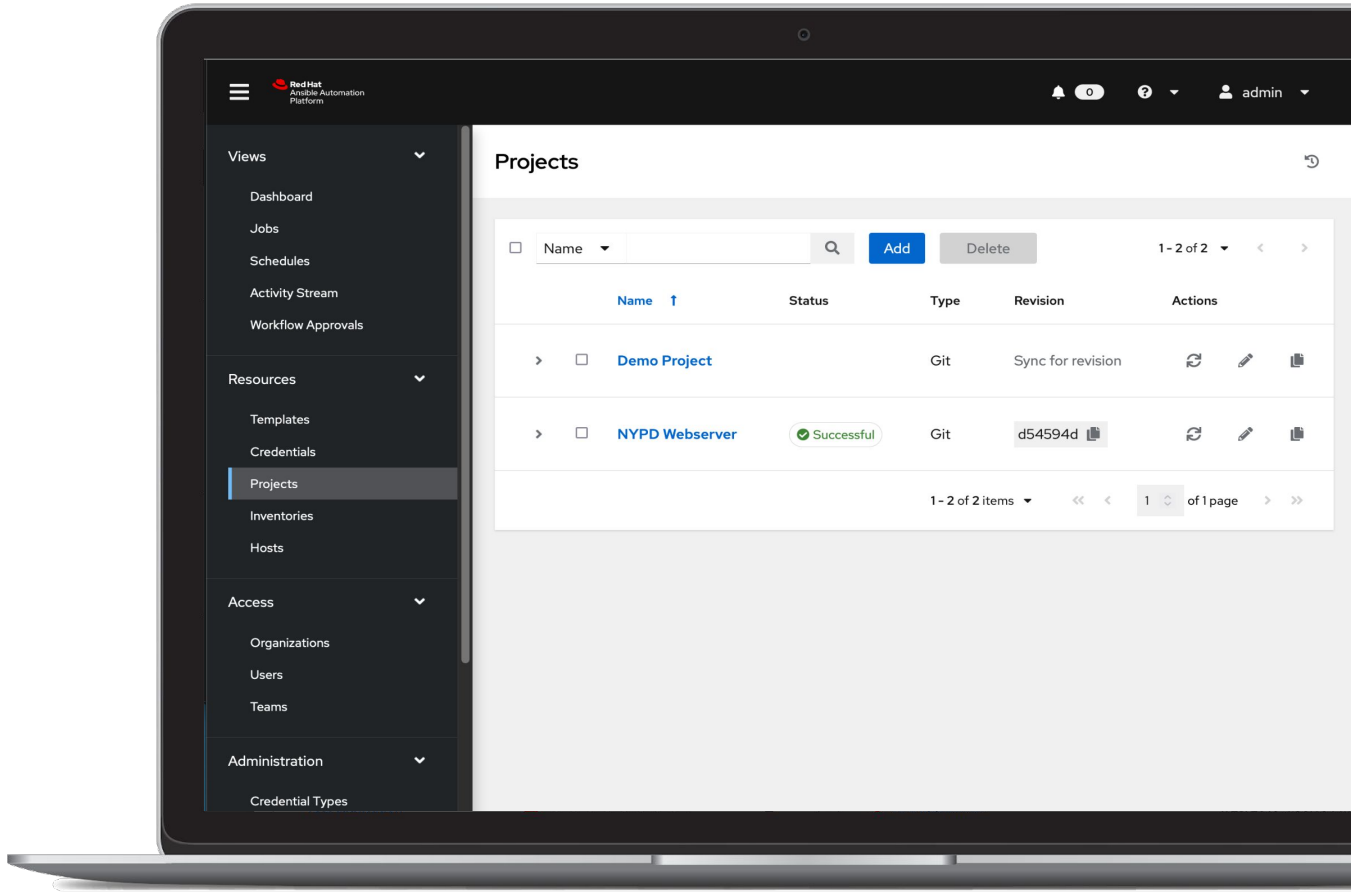
Project

A project is a logical collection of Ansible Playbooks, represented in Ansible Tower.

You can manage Ansible Playbooks and playbook directories by placing them in a source code management system supported by Ansible Tower, including Git, Subversion, and Mercurial.



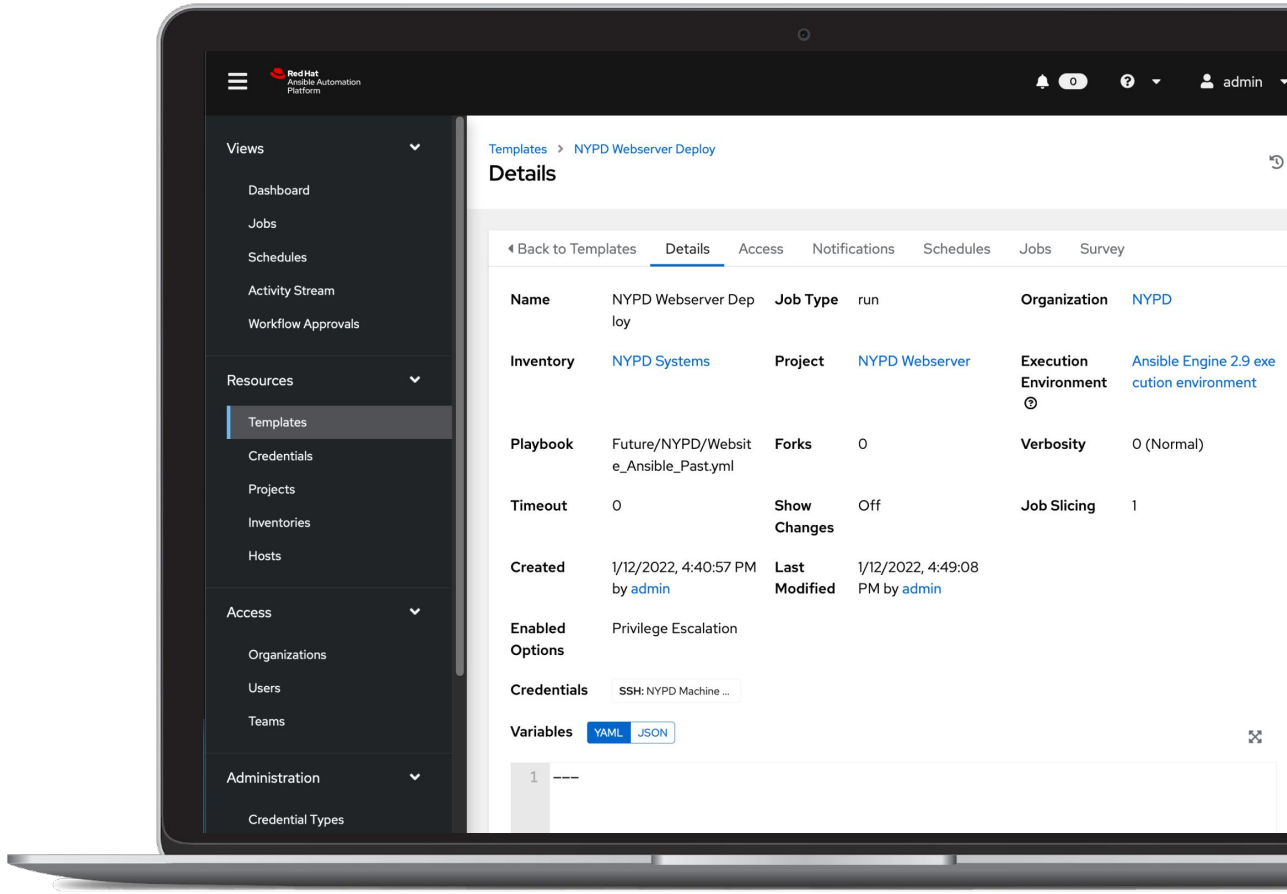
Job Templates

Everything in Ansible Tower revolves around the concept of a **Job Template**. Job Templates allow Ansible Playbooks to be controlled, delegated and scaled for an organization.

Job templates also encourage the reuse of Ansible Playbook content and collaboration between teams.

A **Job Template** requires:

- An **Inventory** to run the job against
- A **Credential** to login to devices.
- A **Project** which contains Ansible Playbooks

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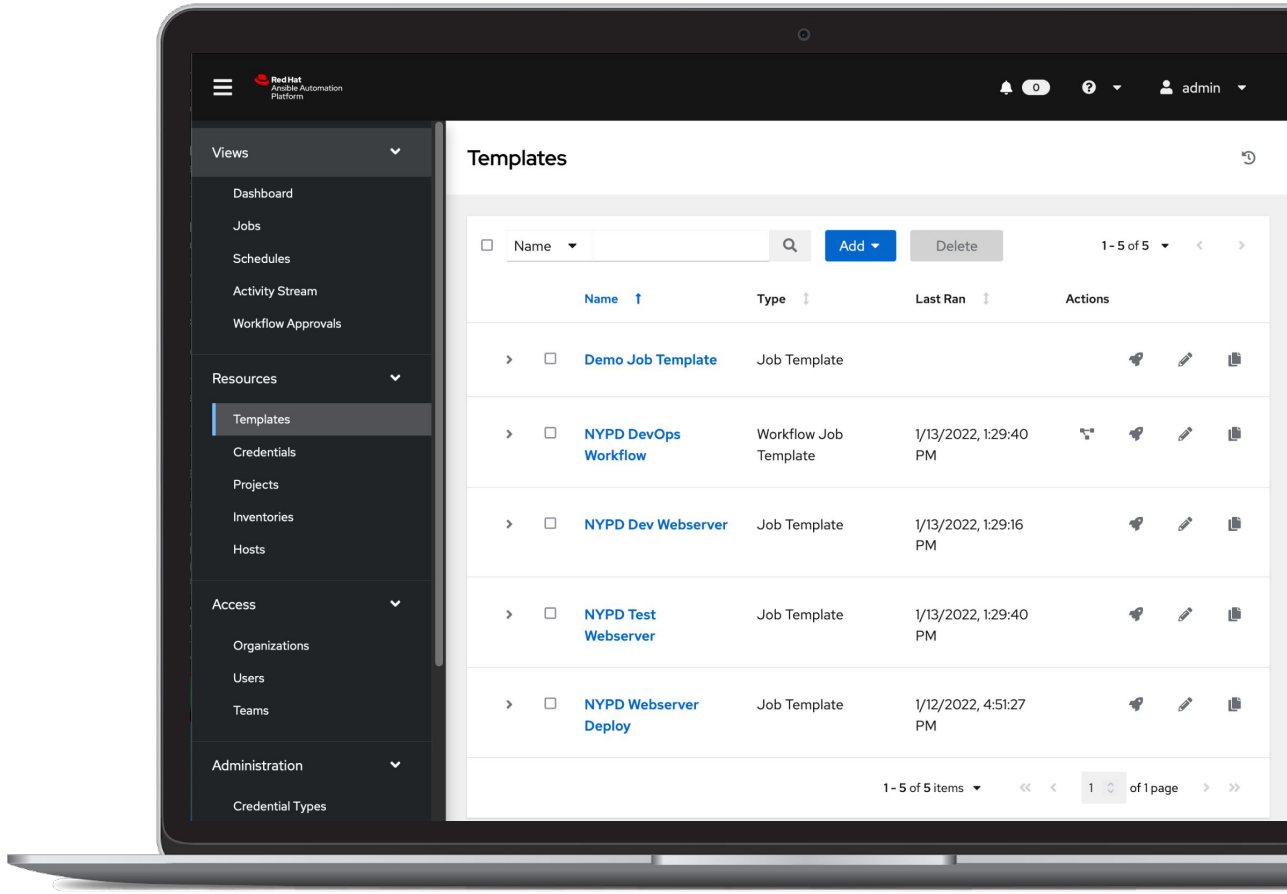
Workflows

Recall that everything in Ansible Tower revolves around the concept of a Job Template. **Job Workflows** allow multiple Job Templates to be controlled, delegated and scaled for an organization.

Job workflows allow building Ansible pipelines to execute multiple job templates and other functions depending on if the running Job Template succeeds or fails.

A **Job Workflow** requires:

- An **Inventory** to run the job against
- A **Credential** to login to devices.
- A **Project** which contains Ansible Playbooks
- Existing **Job Templates** to execute



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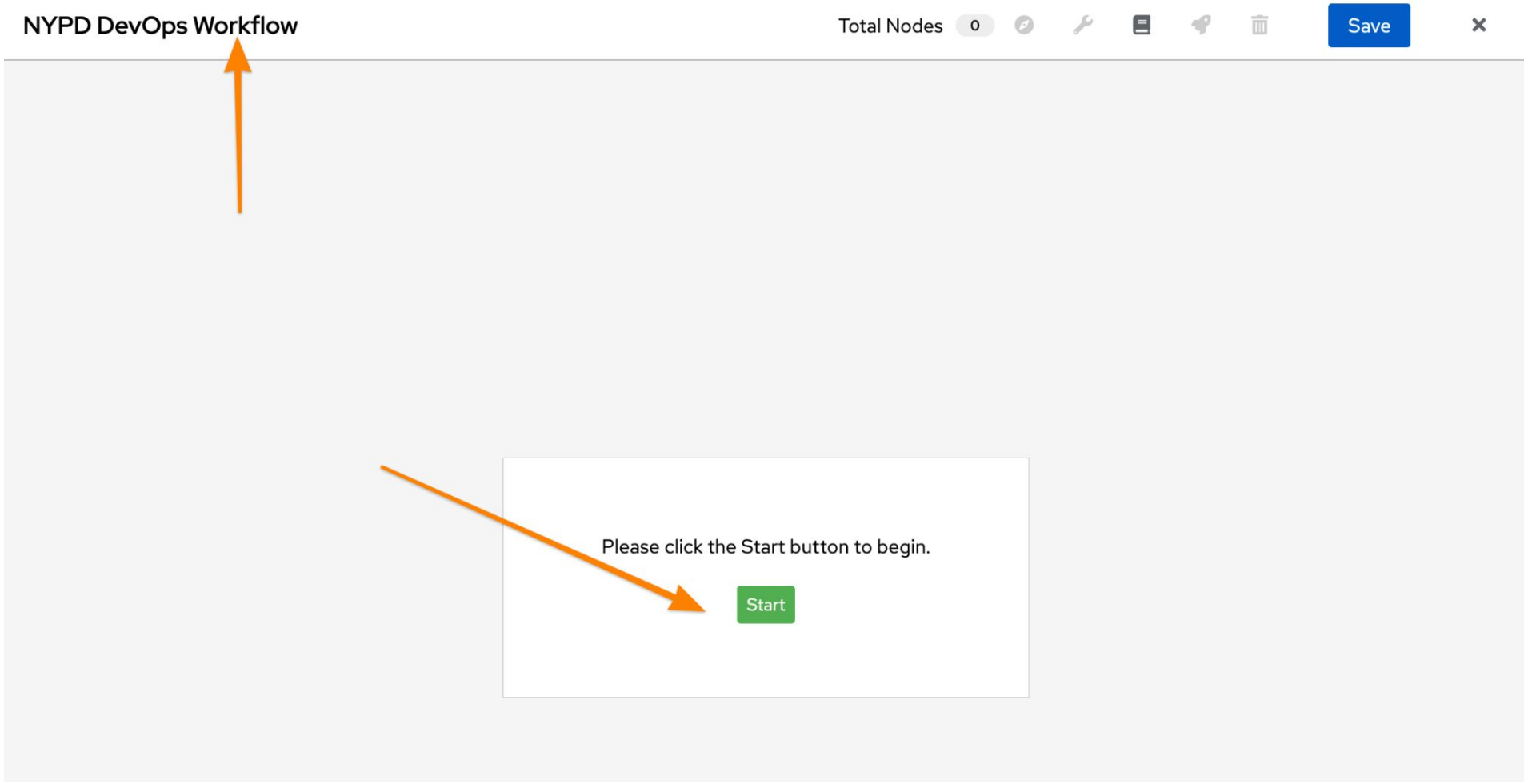
Workflow Visualizer

The workflow visualizer will start as a blank canvas.



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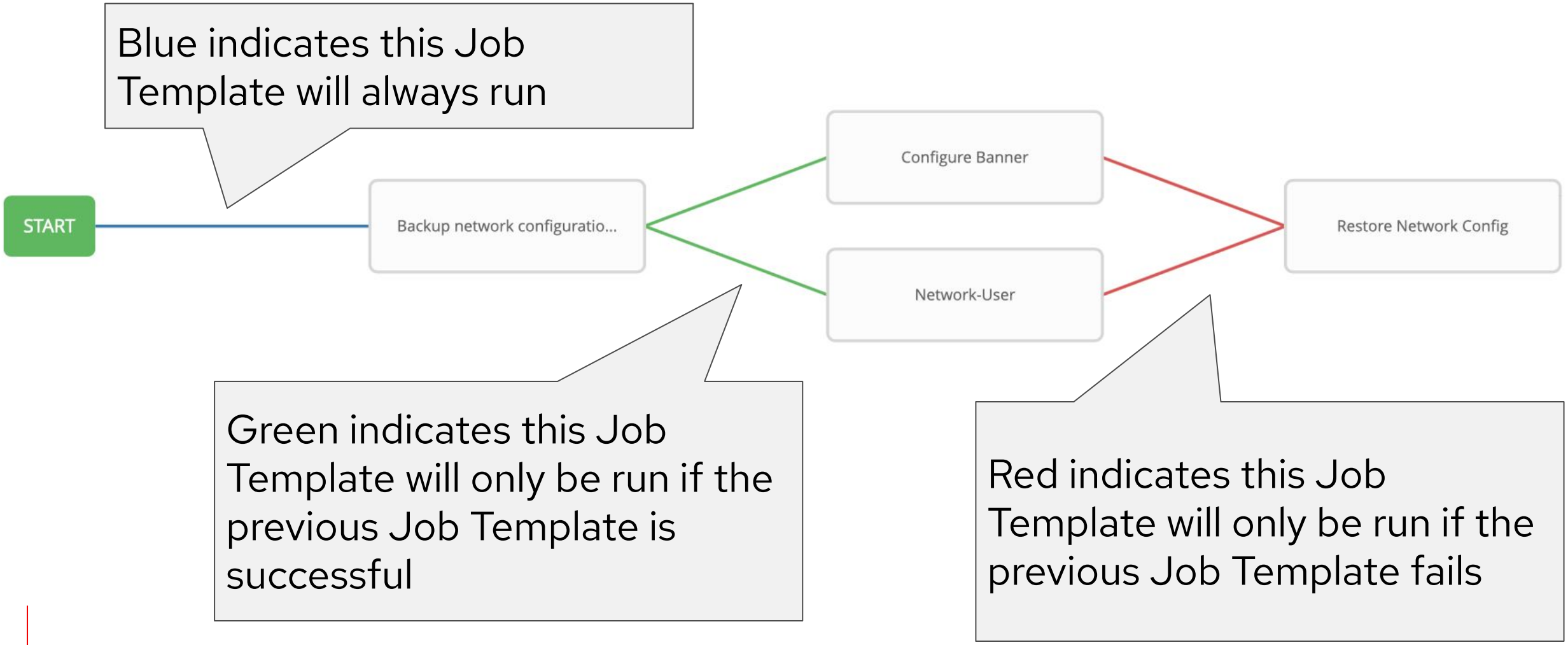
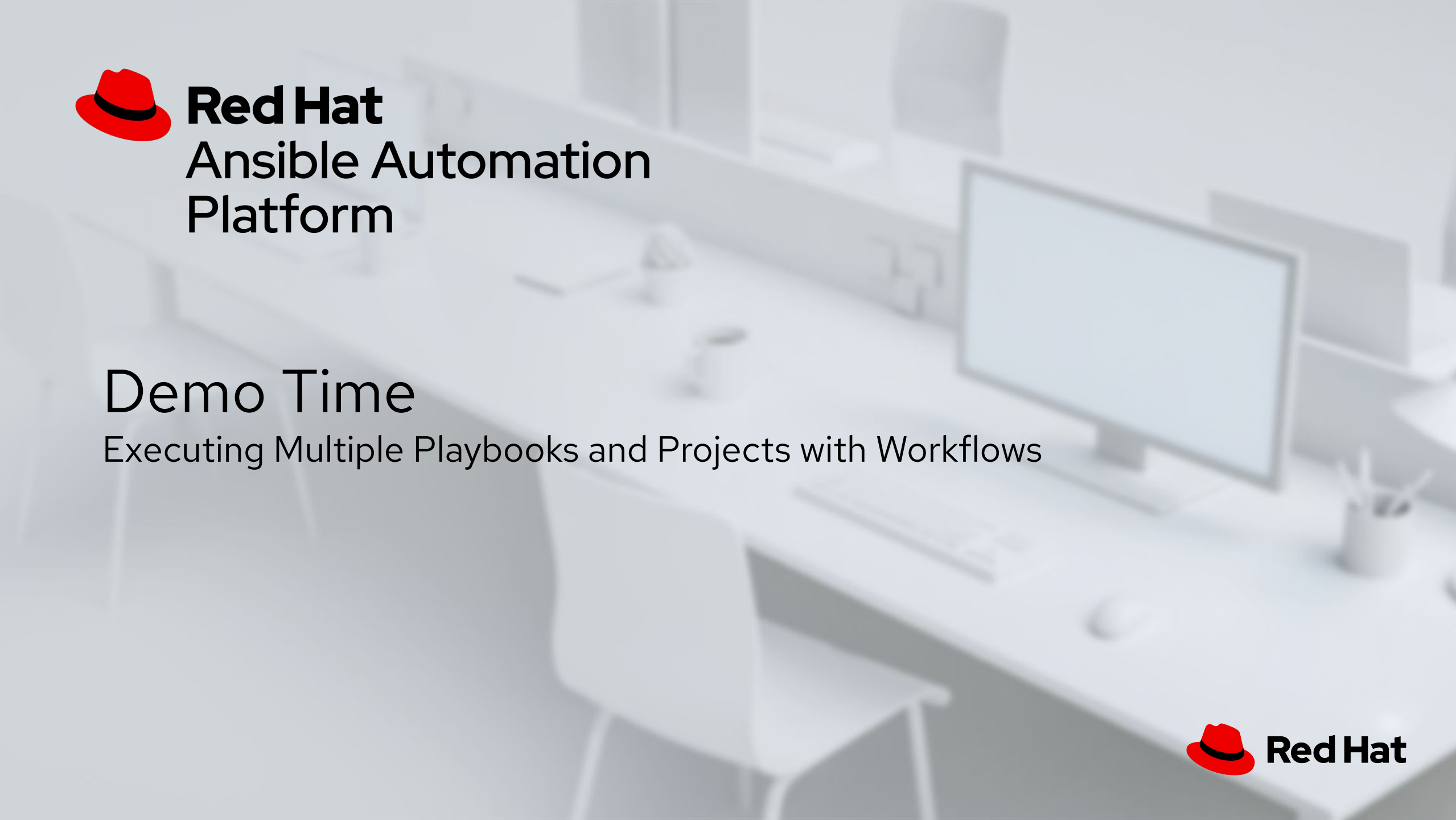
Visualizing a Workflow

Workflows can branch out, or converge in.

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Section 4
Ansible Automation

Training

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Training at Red Hat

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Customer return on investment from training

365% 3-year ROI

IDC conducted a study to explore how Red Hat® training courses impacted the skills, performance, and productivity levels of customers. They found that training for impacted IT professionals and developers consistently increases both individual capability and the ultimate business value of the supported technology.

Other key findings include:

- **44%** higher DevOps team productivity
- **34%** more efficient IT infrastructure teams
- **59%** faster to deploy new IT resources
- **76%** faster to full productivity, new hires already trained

IDC

Source: IDC Business Value White Paper, sponsored by Red Hat. Doc. #US46999720, December 2020
(*per employee trained numbers based on average of 130 staff members trained per year discussed during IDC interviews)

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Improve productivity with training in Ansible automation

Scale people, processes, and infrastructure

Red Hat
Ansible Automation Platform

A powerful foundation to build and operate automation across organizations. Prepare your teams with the right skills to make the most out of new technology investments.

59% faster
deployment of new IT resources

"Red Hat Training shows our DevOps team how to automate a repeatable task. They can write one playbook to execute a set of tasks that would have taken hours or days of time."

"With Red Hat Training it doesn't matter which engineer is engaged on a project. They are all using Ansible for automating tasks, allowing them collectively to be **five times as productive** … This was not possible previously. As a result, they've definitely picked up the pace of productivity."

IDC

Source: IDC Business Value White Paper, sponsored by Red Hat. Doc. #US46999720, December 2020
(*per employee trained numbers based on average of 130 staff members trained per year discussed during IDC interviews)

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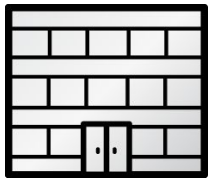
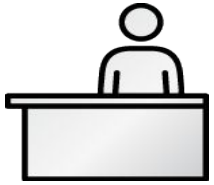
WAYS TO TRAIN



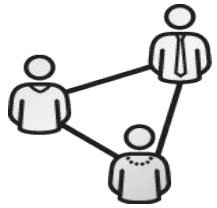
Onsite Training

Private On-site training and exams delivered at your location or at one of our training centers



Classroom Training

Training and test in a professional classroom environment led by Red Hat Certified Instructors



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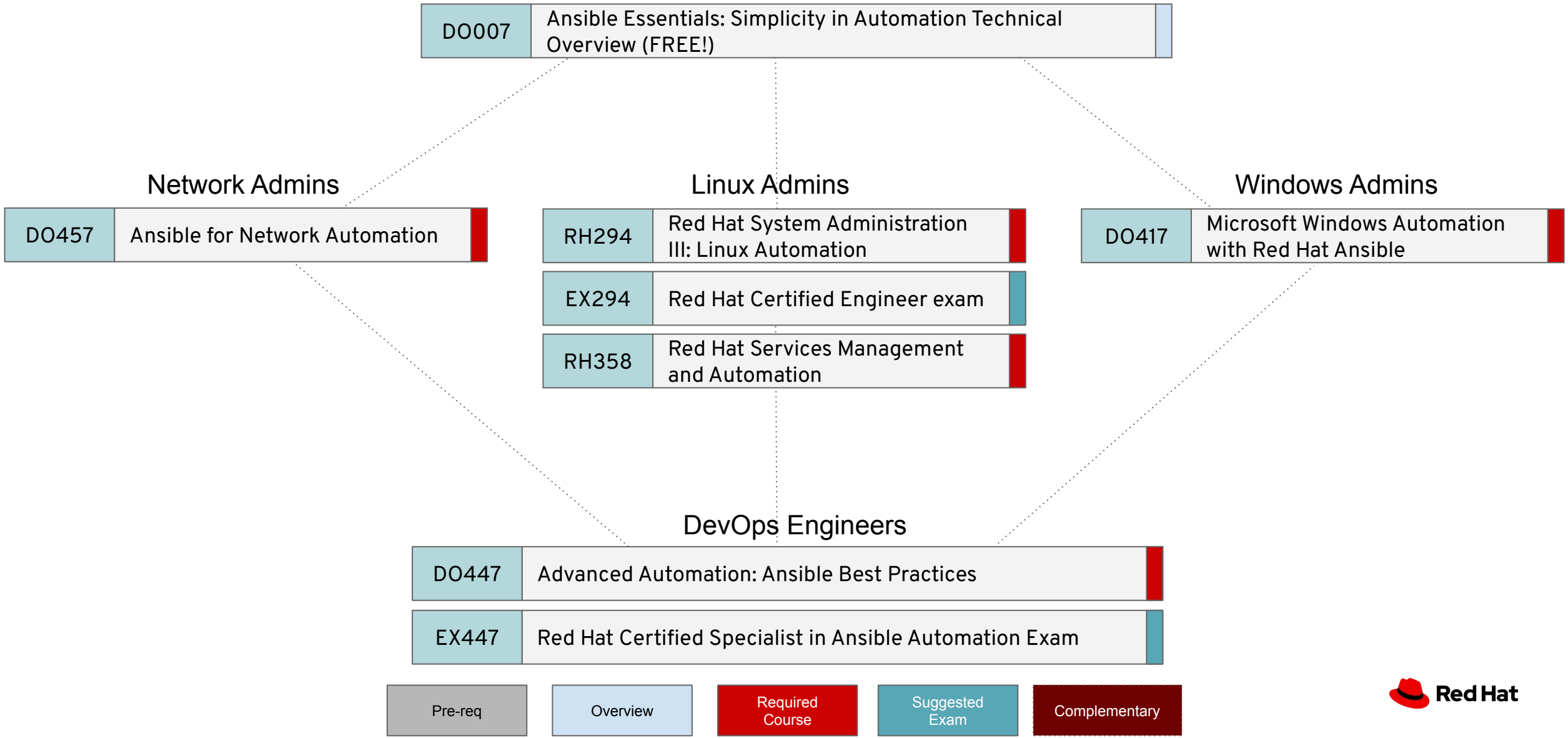
Ansible Curriculum (current as of January 1, 2022)



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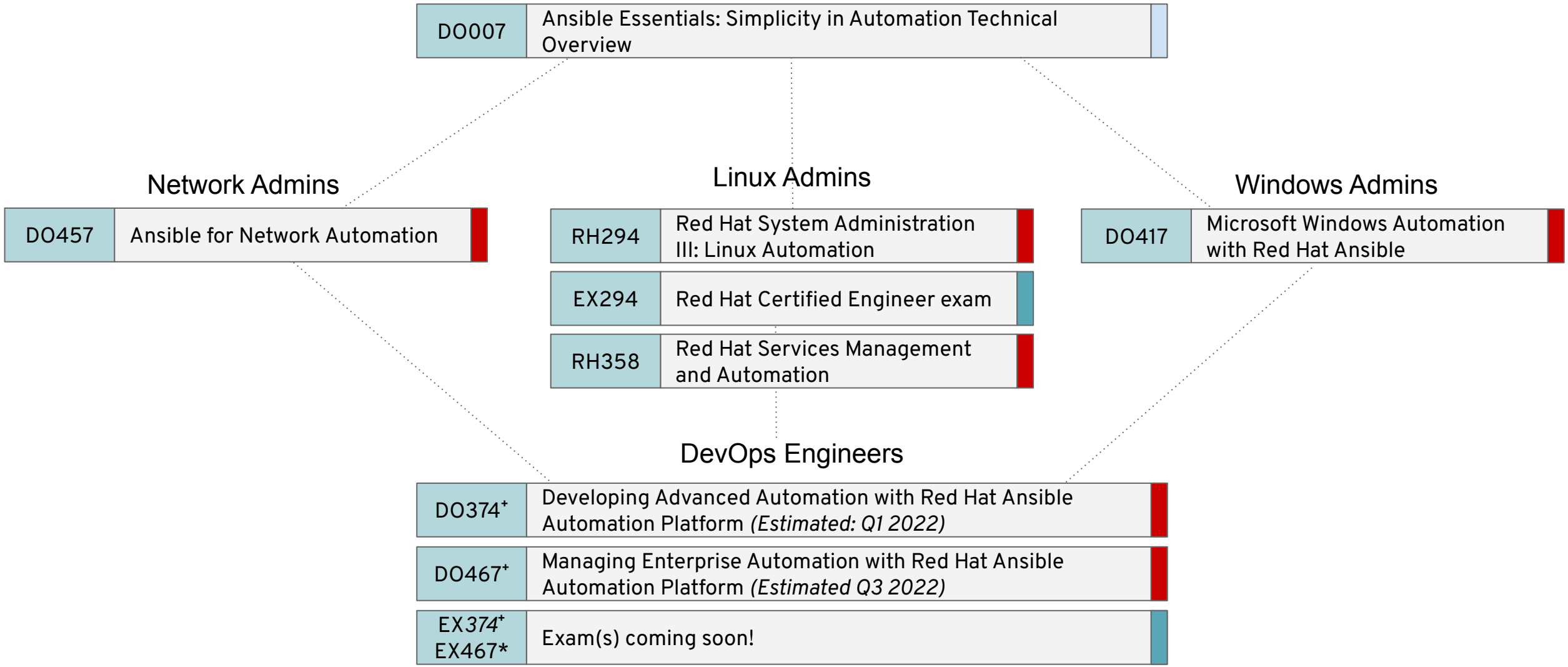
Ansible Curriculum (Future as of Q2/Q3Y22)



+Release windows and course details subject to change

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Thank you for attending!

Please contact us with questions.

Connor Murray

703-230-7583

877-RHAT-GOV (Team)

Connor.Murray@carahsoft.com

https://carah.io/redhatsled

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