TEKsystems Global Services

WORKFORCE DEVELOPMENT

Content Usage Parameters

Content refers to material including instructor guides, student guides, lab guides, lab or hands-on activities, computer programs, etc. designed for use in a training program

1

Content is subject to copyright protection

2

Content may only be leveraged by students enrolled in the training program

3

Students agree not to reproduce, make derivative works of, distribute, publicly perform and publicly display in any form or medium outside of the training program

4

Content is intended as reference material only to supplement the instructor-led training

Automation Developer

Lab page

https://jruels.github.io/automation-dev/

Rolling Updates

Batch size:

By default, Ansible will try to manage all the machines referenced in a play in parallel. For a rolling update use case, you can define how many hosts Ansible should manage at a single time by using the `serial` keyword:

Rolling Updates

Example playbook utilizing `serial` keyword.

```
- name: test play
  hosts: webservers
  serial: 2
  gather_facts: False

  tasks:
  - name: task one
    command: hostname
  - name: task two
    command: hostname
```

With 4 hosts in the group 'webservers', 2 would complete the play before moving onto the next 2 hosts.

Rolling Updates

In the previous example, if we had 4 hosts in the group 'webservers', 2 would complete the play before moving on to the next 2 hosts:

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

TASK [task one] *****************************************
changed: [web2]
changed: [web1]

TASK [task two] *****************************************
changed: [web1]
changed: [web2]


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

Rolling Updates

Now that web1 & web2 are complete Ansible continues with web3 & web4

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

TASK [task one] *****************************************
changed: [web3]
changed: [web4]

TASK [task two] *****************************************
changed: [web3]
changed: [web4]

PLAY RECAP **********************************************
web1 : ok=2 changed=2 unreachable=0 failed=0
web2 : ok=2 changed=2 unreachable=0 failed=0
web3 : ok=2 changed=2 unreachable=0 failed=0
web4 : ok=2 changed=2 unreachable=0 failed=0
```

Rolling Updates

The `serial` keyword can also be specified as a percentage, which will be applied to the total number of hosts in a play, in order to determine the number of hosts per pass:

```
- name: test play
  hosts: webservers
  serial: 30%
```

If the number of hosts does not divide equally into the number of passes, the final pass will contain the remainder.

Rolling Updates

The batch size can be specified as a list with integer, or percent:

```
- name: test play
  hosts: webservers
  serial:
    - 1
    - 5
    - 10
```

Above the first batch would contain a single host, next 5, and if any left, each would have 10 until complete.

Rolling Updates

The batch size can be specified as a list with integer, or percent:

```
- name: test play
  hosts: webservers
  serial:
    - "10%"
    - "20%"
    - "100%"
```

Rolling Updates

Maximum Threshold Percentage:
Ansible executes tasks on all hosts in the defined group unless `serial` is defined.

In some situations, such as with the rolling updates, it may be desirable to abort the play when a certain threshold of failures have been reached. To achieve this, you can set a maximum failure percentage on a play as follows:

```
- hosts: webservers
  max_fail_percentage: 30
  serial: 10
```

Ansible Vault

Ansible Vault

Ansible Vault encrypts variables and files so you can protect sensitive content such as passwords or keys rather than leaving it visible as plaintext in playbooks or roles.

To use Ansible Vault you need one or more passwords to encrypt and decrypt content.

Use the passwords with the `ansible-vault` command-line tool to create and view encrypted variables, create encrypted files, encrypt existing files, or edit, re-key, or decrypt files. You can then place encrypted content under source control and share it more safely.

Ansible Vault

Ansible Vault can prompt for a password every time, or you can configure it to use a password file.

```
#ansible.cfg
      [defaults]
        vault_password_file = ~/.vault_pass
```

Ansible Vault

Each time you encrypt a variable or file with Ansible Vault, you must provide a password. When you use an encrypted variable or file in a command or playbook, you must provide the same password that was used to encrypt it.

POP QUIZ: DISCUSSION

Things to consider:

- Do you want to encrypt all your content with the same password, or use different passwords for different needs?
- Where do you want to store your password(s)?

Ansible Vault

Small teams can use a single password for everything encrypted. Store the vault password securely in a file or secret manager.

If you have a large team or many sensitive values to manage it is recommended to use multiple passwords.

You can use different passwords for different users or different levels of access. Depending on your needs, you might want a different password for each encrypted file, for each directory, or for each environment.

Ansible Vault

You might have a playbook that includes two vars files, one for the dev environment and one for the production environment, encrypted with two different passwords.

When you run the playbook, select the correct vault password for the environment you are targeting, using a vault ID.

Vault Id

A vault ID is an identifier for one or more vault secrets.

Vault IDs provide labels to distinguish between individual vault passwords.

To use vault IDs, you must provide an ID label of your choosing and a source to obtain its password (either `prompt` or a file path):

```
--vault-id label@source
```

This switch is available for all commands that interact with vaults:

- ansible-vault
- ansible-playbook
- etc.

Ansible Vault

Create a new encrypted data file

```
ansible-vault create foo.yml
```

Prompt for vault password

```
ansible-playbook --ask-vault-pass myplay.yml
```

Use password file

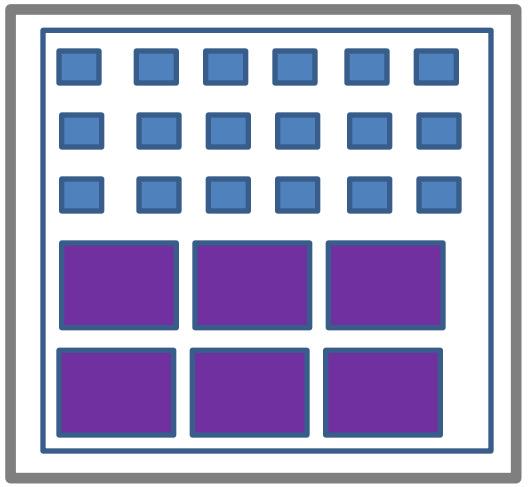
```
ansible-playbook --vault-password-file pass myfile.yml
```

Ansible Vault

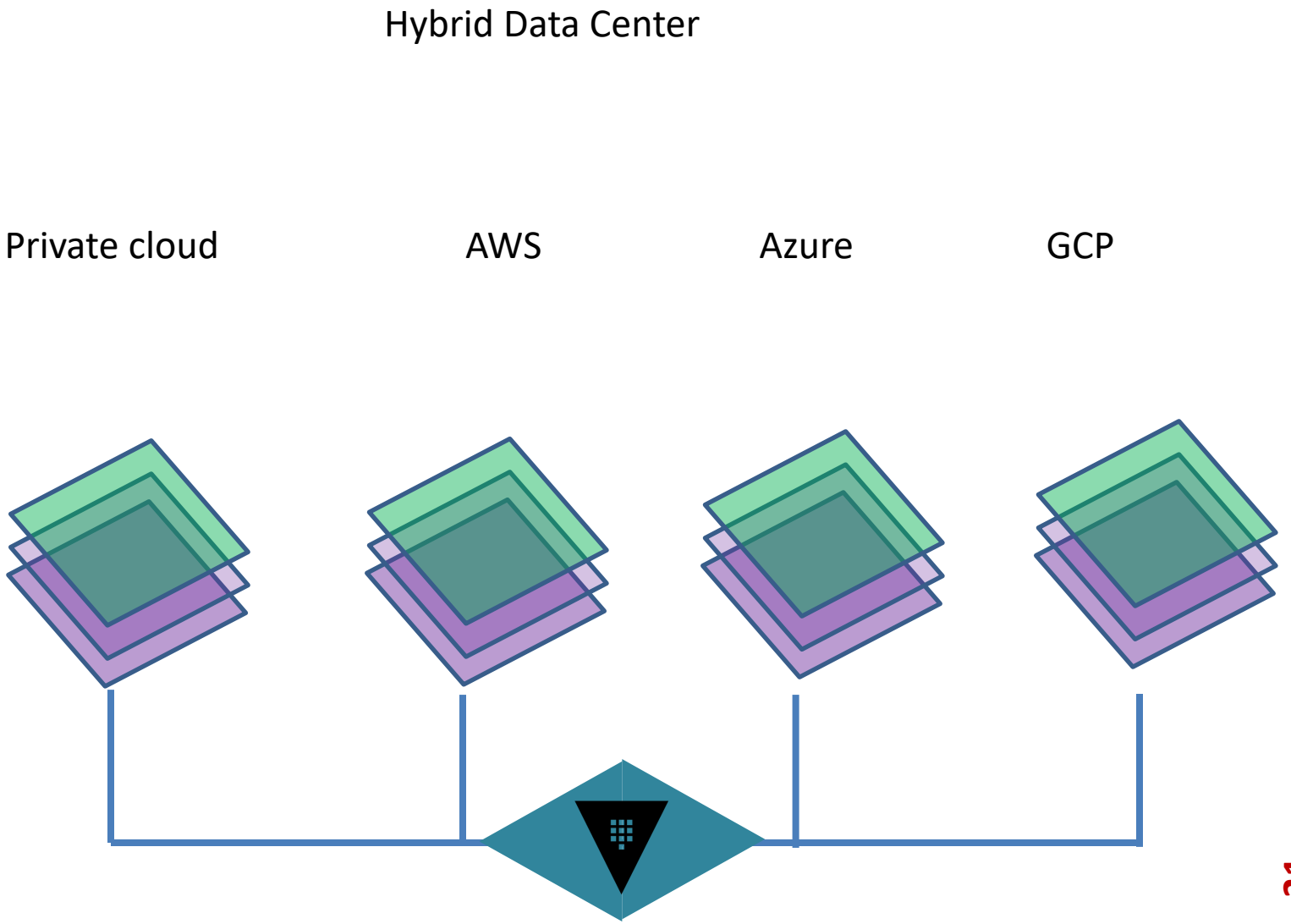
Common vault commands

```
# Edit encrypted files
ansible-vault edit playbook.yml

# Rekeying
ansible-vault rekey play.yml task.yml report.yml

# Encrypt existing files
ansible-vault encrypt foo.yml bar.yml baz.yml

# Decrypting files
ansible-vault decrypt task.yml run.yml play.yml

# View encrypted files
ansible-vault view break.yml fix.yml fun.yml
```

Secure Infrastructure using Vault

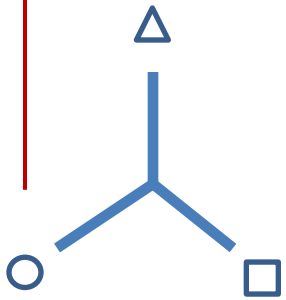


With each new cloud, network topologies become more complex.



Vault Objectives

- Provide single source of secrets for humans and machines .
- Scale to meet security needs of largest organizations.
- Allow for complete secret lifecycle management.



Eliminate Secret Sprawl

Securely Store any Secret

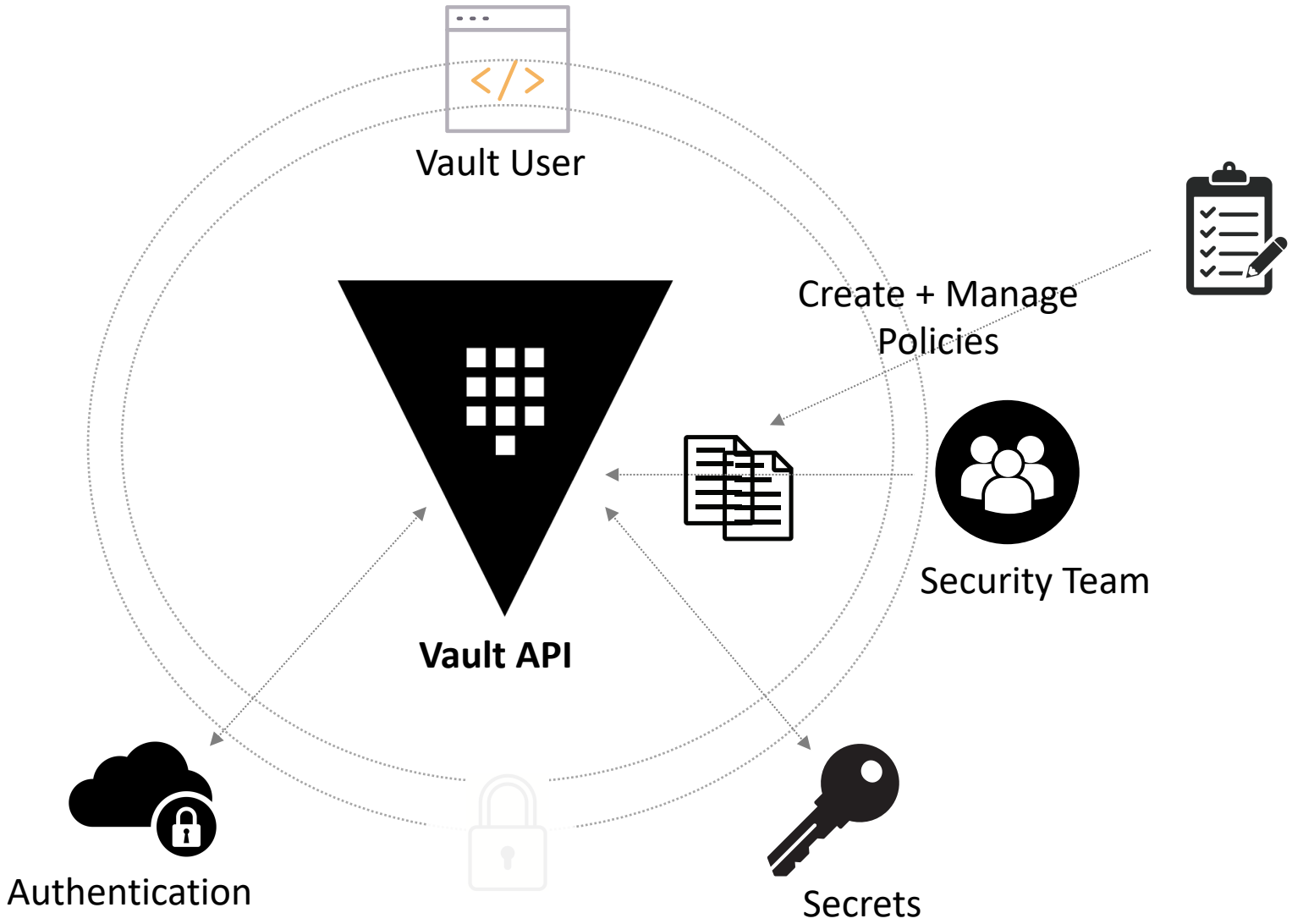
Secret Governance

Use Cases

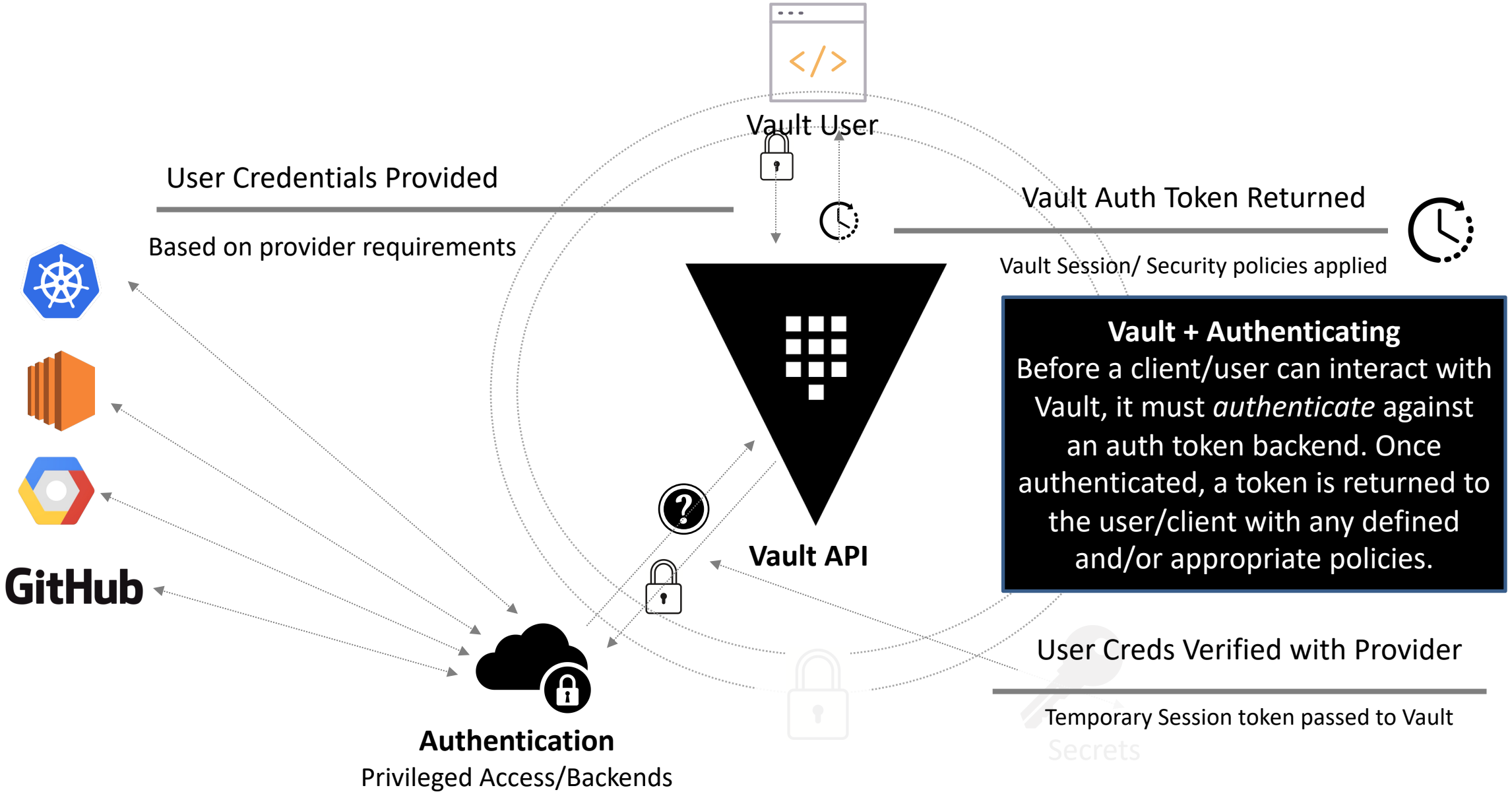
Secrets Management	Encryption as a Service	Identity Access Management
Secrets, identity, and access policy management workflow to secure any infrastructure and application resources.	One workflow to create and control the keys used to encrypt your data	Empower developers and operators to securely make application and infrastructure changes.

Vault - Security Policies

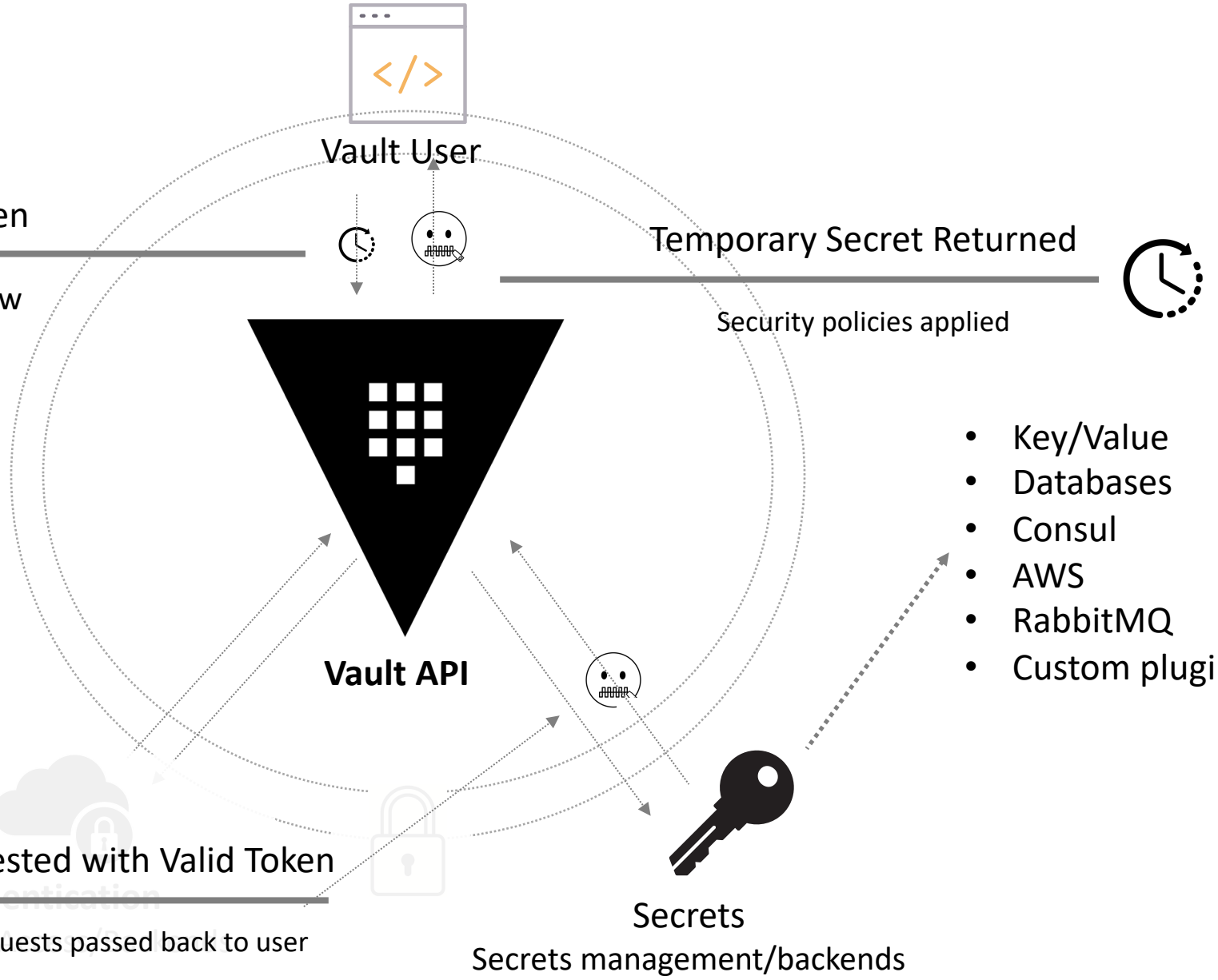
Policies with Vault
Vault uses policies to manage and safeguard access and secret distribution to applications and infrastructure. Policies provide a declarative way to **grant** and **deny** access to operations and paths.



Authentication Workflow



Secrets Workflow

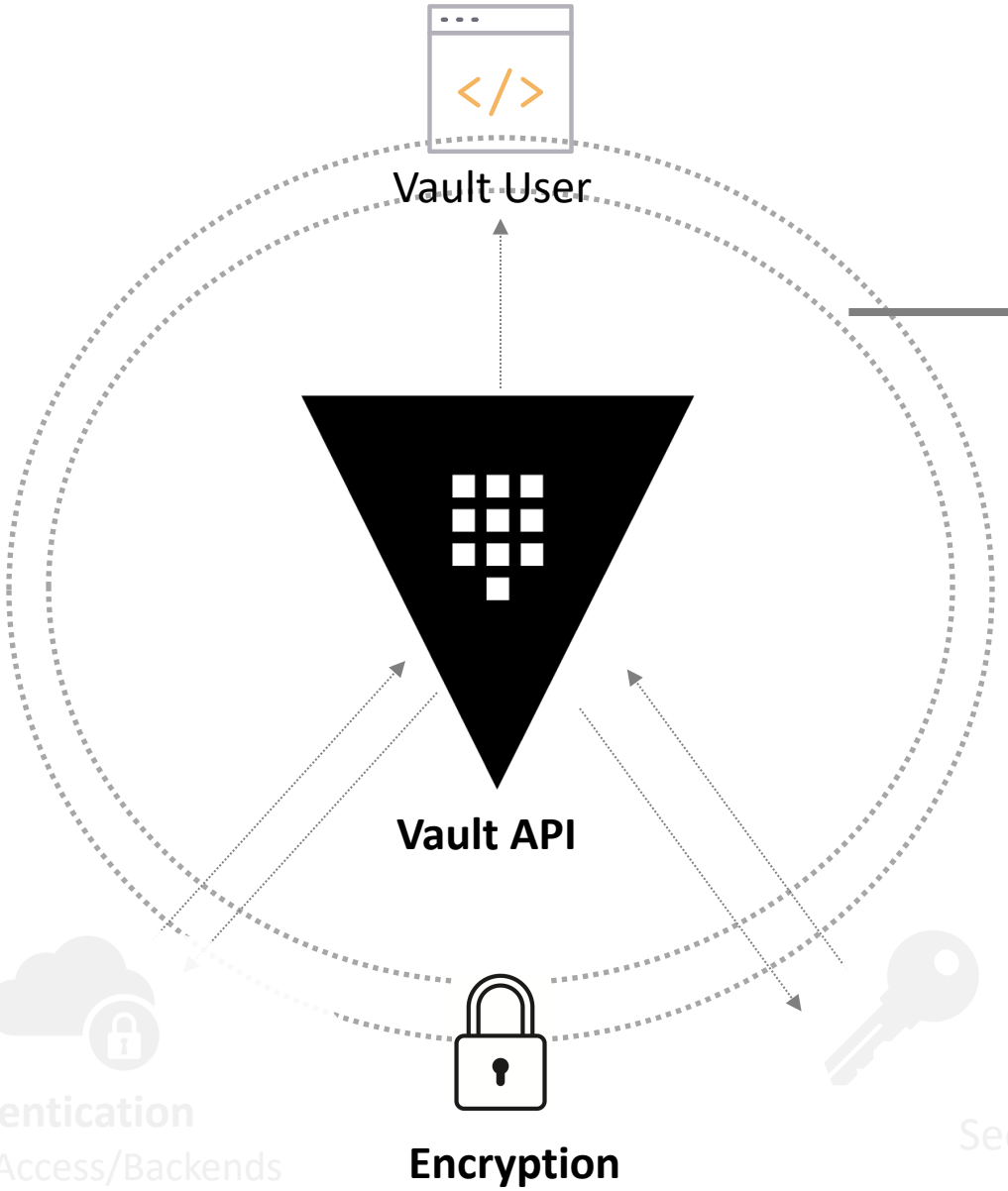


Vault + Secrets

Authentication Token Required

Secrets can be stored and generated. Some secrets can be generated dynamically, while others are verbatim. Secrets are returned to the user/client with any defined and/or appropriate policies.

Encryption(as a Service)



Full Data Encryption

Data is encrypted in-flight and at rest.

Encrypt everything

Vault believes that everything should always be encrypted. Vault uses ciphertext wrapping to encrypt all data at rest and in-flight. This minimizes exposure of secrets and sensitive information.

Ansible Tags

Tags

If you have a large playbook, it may become useful to be able to run only a specific part of it rather than running everything in the playbook. Ansible supports a `tags` attribute for this reason.

Tags can be applied at multiple levels including:

- Tasks
- Roles
- Plays
- Blocks

Tags

At the simplest level, you can apply one or more tags to an individual task. You can add tags to tasks in playbooks, in task files, or within a role.

It is also possible to add the same tag to multiple tasks.

Tags

Here's an example showing tasks to install and configure software. Using tags, it is possible to specify which task runs.

```
tasks:
- name: Install
  yum:
    name:
    - httpd
    - memcached
    state: present
  tags:
  - packages
  - webservers
- name: Configure
  template:
    src: templates/src.j2
    dest: /etc/foo.conf
  tags:
  - configuration
```

Tags

This example shows the 'ntp' tag

```
- name: Install ntp
  yum:
    name: ntp
    state: present
  tags: ntp

- name: Install nslookup
  yum:
    name: nslookup
    state: present
```

If you ran these tasks in a playbook with `--tags ntp`, Ansible would run the one tagged `ntp` and skip the other.

Tags

Inheritance:
No one wants to add the same tag to multiple tasks. To avoid repeating code you can tag the play, block, or role. Ansible applies the tags down the dependency chain to all child tasks.

Blocks are useful for applying a tag to many, but not all, of the tasks in your play.

Plays are better suited if every task in the play should have the same tags.

Adding tags to roles allows you to run specific roles.

Tags

Define tags at the block level

```
- name: ntp tasks
  tags: ntp
  block:
  - name: Install ntp
    yum:
      name: ntp
      state: present

  - name: Enable and run ntp
    service:
      name: ntpd
      state: started
      enabled: yes
  tags: ntp

- name: Install utils
  yum:
    name: ntf-utils
    state: present
```

Ansible Galaxy

Ansible Collections

You can extend Ansible by adding custom modules or plugins. You can create them from scratch or copy existing ones for local use.

A simple way to share plugins and modules with your team or organization is by including them in a collection and publishing the collection on Ansible Galaxy.

Ansible Collections

Modules:

Modules are reusable, standalone scripts that can be used by the Ansible API, the `ansible` command, or the `ansible-playbook` command. Modules provide a defined interface. Each module accepts arguments and returns information to Ansible by printing a JSON string to stdout before exiting. Modules execute on the target system (usually that means on a remote system) in separate processes.

Plugins:

Plugins extend Ansible's core functionality and execute on the control node within the `/usr/bin/ansible` process. Plugins offer options and extensions for the core features of Ansible - transforming data, logging output, connecting to inventory, and more

Ansible Galaxy

Use ansible-galaxy to install collection or role

```
ansible-galaxy (collection|role) install
```

You can install from the community, or any .tar.gz file.

```
ansible-galaxy collection install azure.azcollection
```

Use new collection (full namespace, collection, `collections` element)

```
- name: Azure collection
  hosts: localhost
  collections:
    - azure.azcollection
  tasks:
    - azure_rm_storageaccount:
        resource_group: myRG
        name: myStorageAccount
        account_type: Standard_LRS
```

Ansible Galaxy

Use ansible-galaxy to install role

```
ansible-galaxy role install
```

You can install from the community, or any .tar.gz file.

```
ansible-galaxy role install weareinteractive.users
```

Use new role:

```
- name: Create user
  hosts: all
  roles:
    - weareinteractive.users
  vars:
    users:
    - username: newuser
      append: yes
      password: $6$paD7LIRYpWiv7
```

Lab: Ansible Roles

Ansible Facts

- Just like variables, really...
- ..but: coming from the host itself!
- Check them out with the setup module

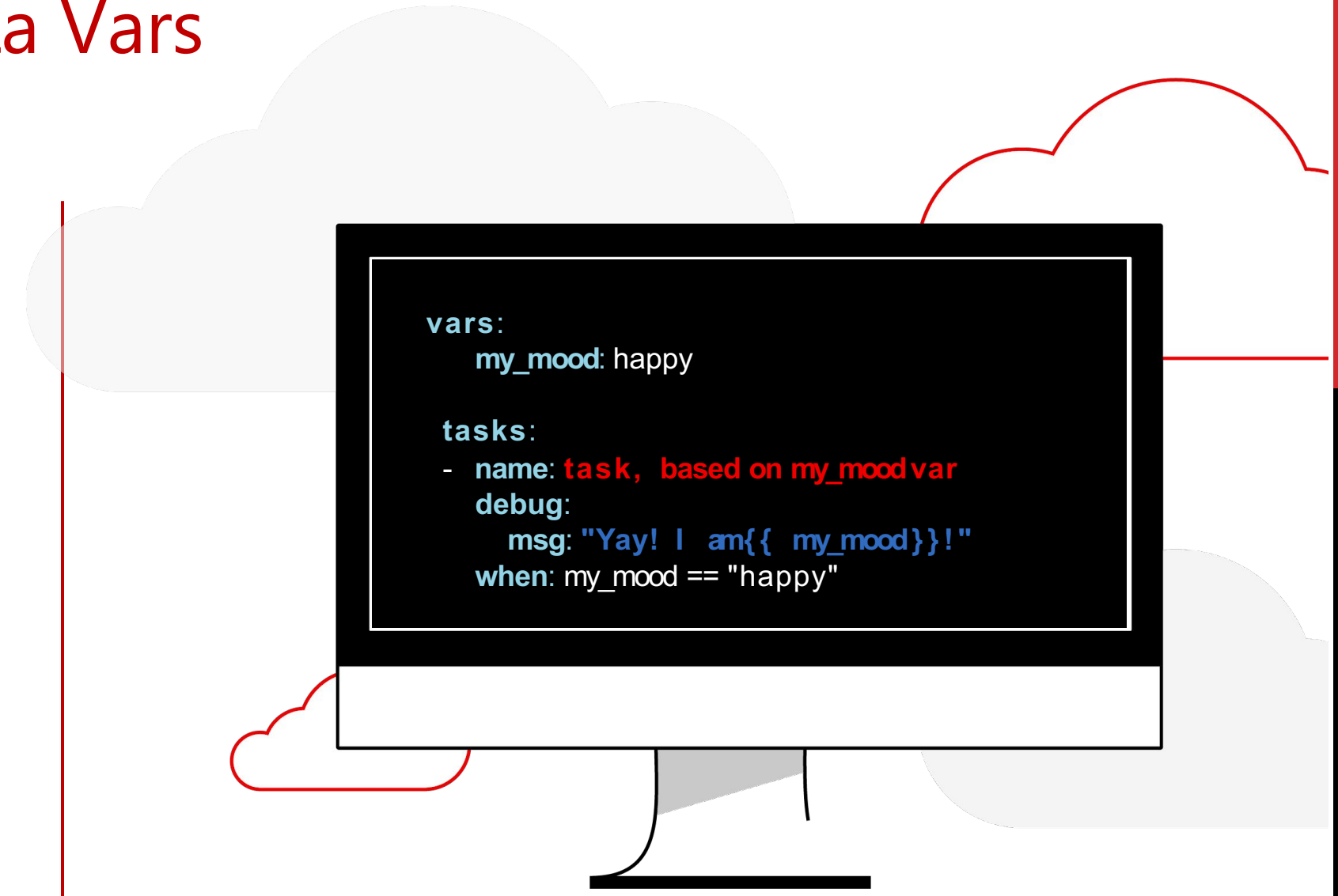
Ansible Facts


```yaml
---
- name: facts playbook
  hosts: localhost

  tasks:
    - name: Collect all facts of host
      setup:
        gather_subset:
          - 'all'
```

```
$ ansible-navigator run playbook.yml
```

Conditionals Via Vars

Example of using a variable labeled *my_mood* and using it as a conditional on a particular task.



Conditionals Via Vars


```
---
- name: variable playbook test
  hosts: localhost

  vars:
    my_mood: happy

  tasks:
    - name: task, based on my_mood var
      debug:
        msg: "Yay! I am {{ my_mood }}!"
      when: my_mood == "happy"
```

Alternatively

```
    - name: task, based on my_mood var
      debug:
        msg: "Ask at your own risk. I'm {{ my_mood }}!"
      when: my_mood == "grumpy"
```

Conditionals With Facts

Ansible Conditionals w/ Facts

```
---
- name: variable playbook test
  hosts: localhost

  tasks:
  - name: Install apache
    apt:
      name: apache2
      state: latest
    when: ansible_distribution == 'Debian' or
          ansible_distribution == 'Ubuntu'

  - name: Install httpd
    yum:
      name: httpd
      state: latest
    when: ansible_distribution == 'RedHat'
```

Task State

Using Previous Task State

```
---
- name: variable playbook test
  hosts: localhost

  tasks:
  - name: Ensure httpd package is present
    yum:
      name: httpd
      state: latest
    register: http_results

  - name: Restart httpd
    service:
      name: httpd
      state: restart
    when: httpd_results.changed
```

Variables And Loops

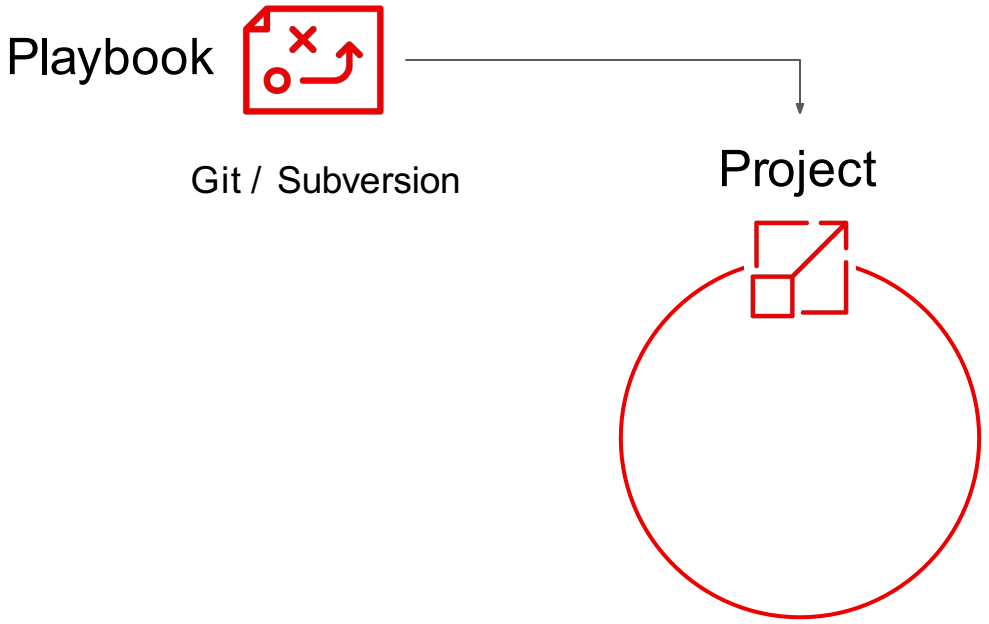

```yaml
---
- name: Ensure users
  hosts: node1
  become: yes

  tasks:
    - name: Ensure user is present
      user:
        name: dev_user
        state: present

    - name: Ensure user is present
      user:
        name: qa_user
        state: present

    - name: Ensure user is present
      user:
        name: prod_user
        state: present
```

Variables And Loops

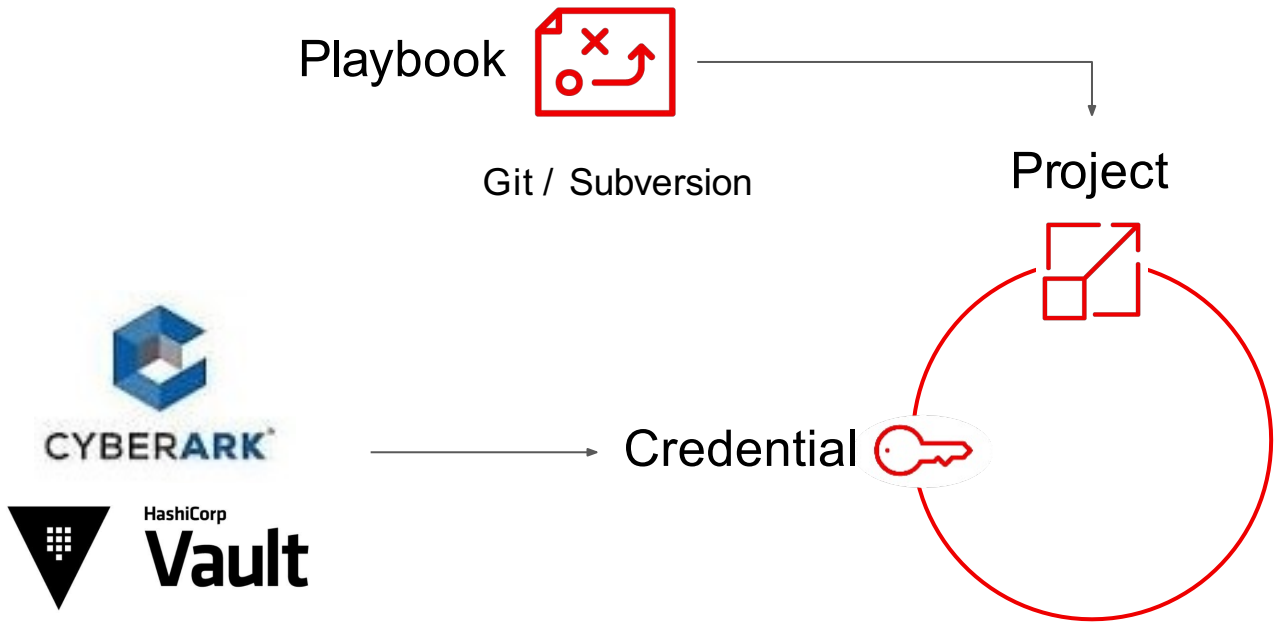

```
---
- name: Ensure users
  hosts: node1
  become: yes

  tasks:
    - name: Ensure user is present
      user:
        name: "{{item}}"
        state: present
      loop:
        - dev_user
        - qa_user
        - prod_user
```

Automation Controller

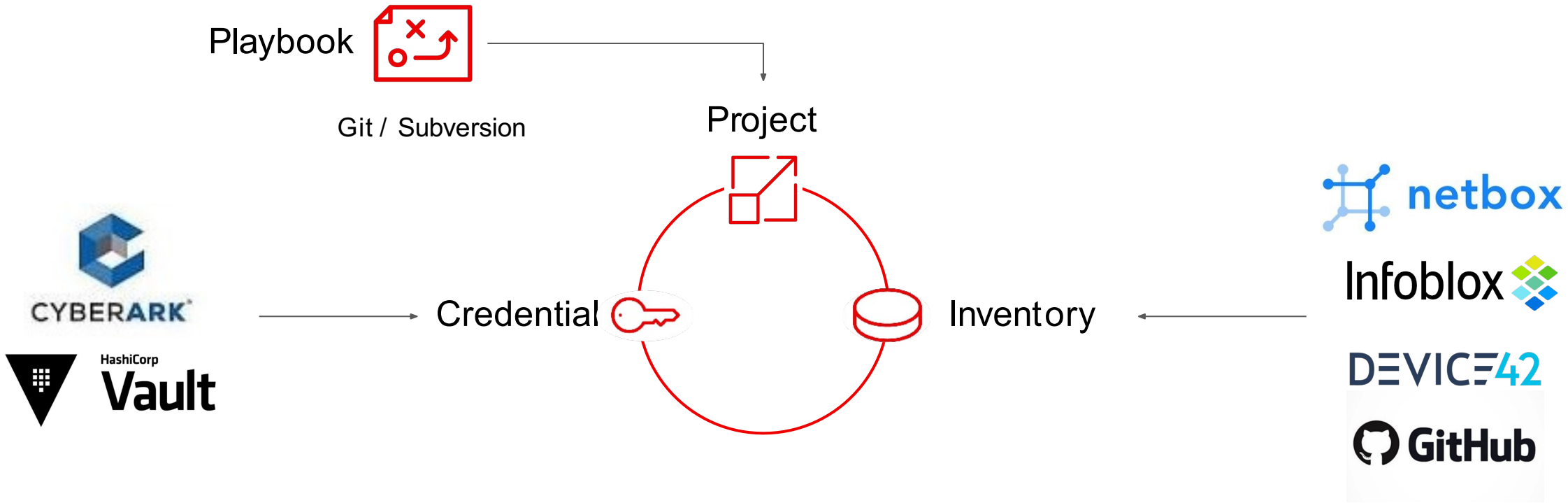
Anatomy of An Automation Job



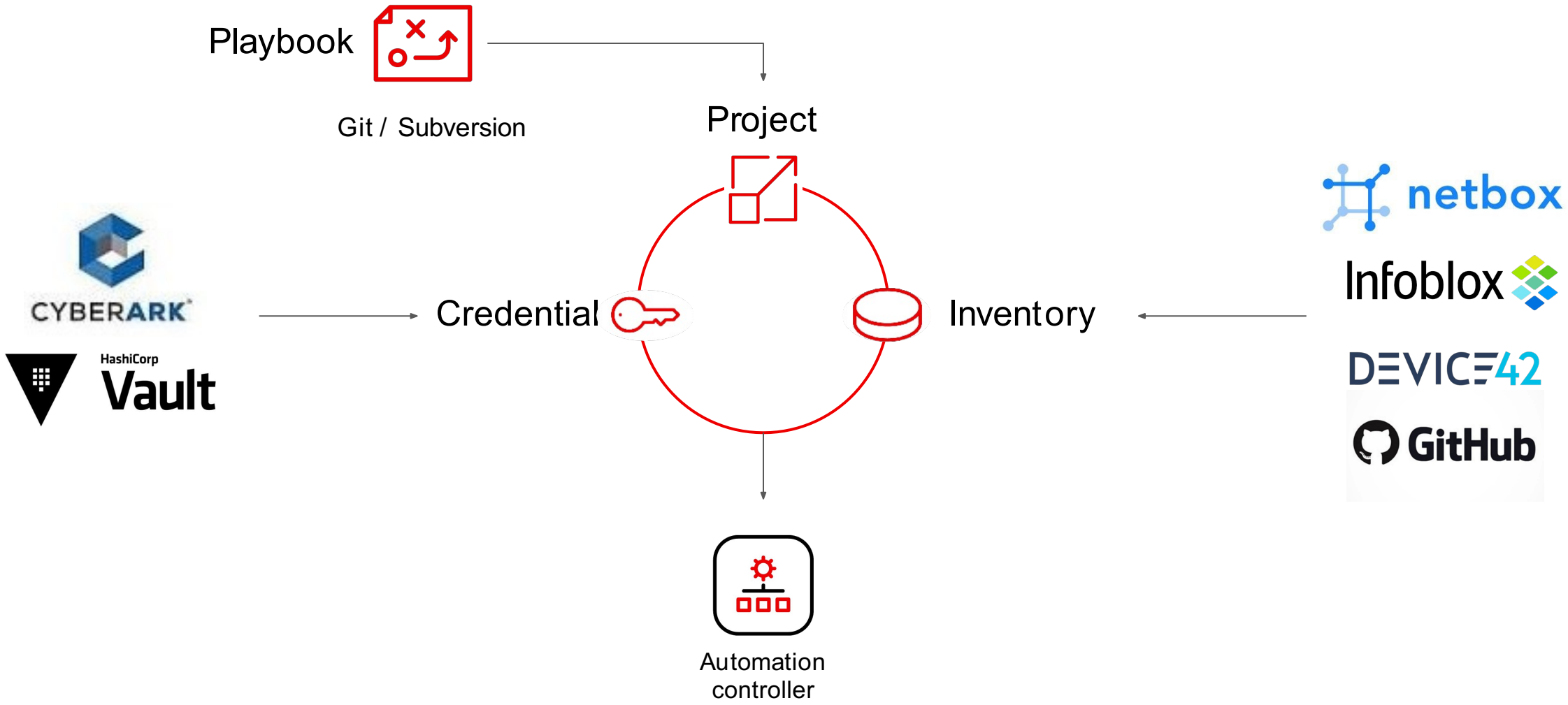
Anatomy of An Automation Job



Anatomy of An Automation Job

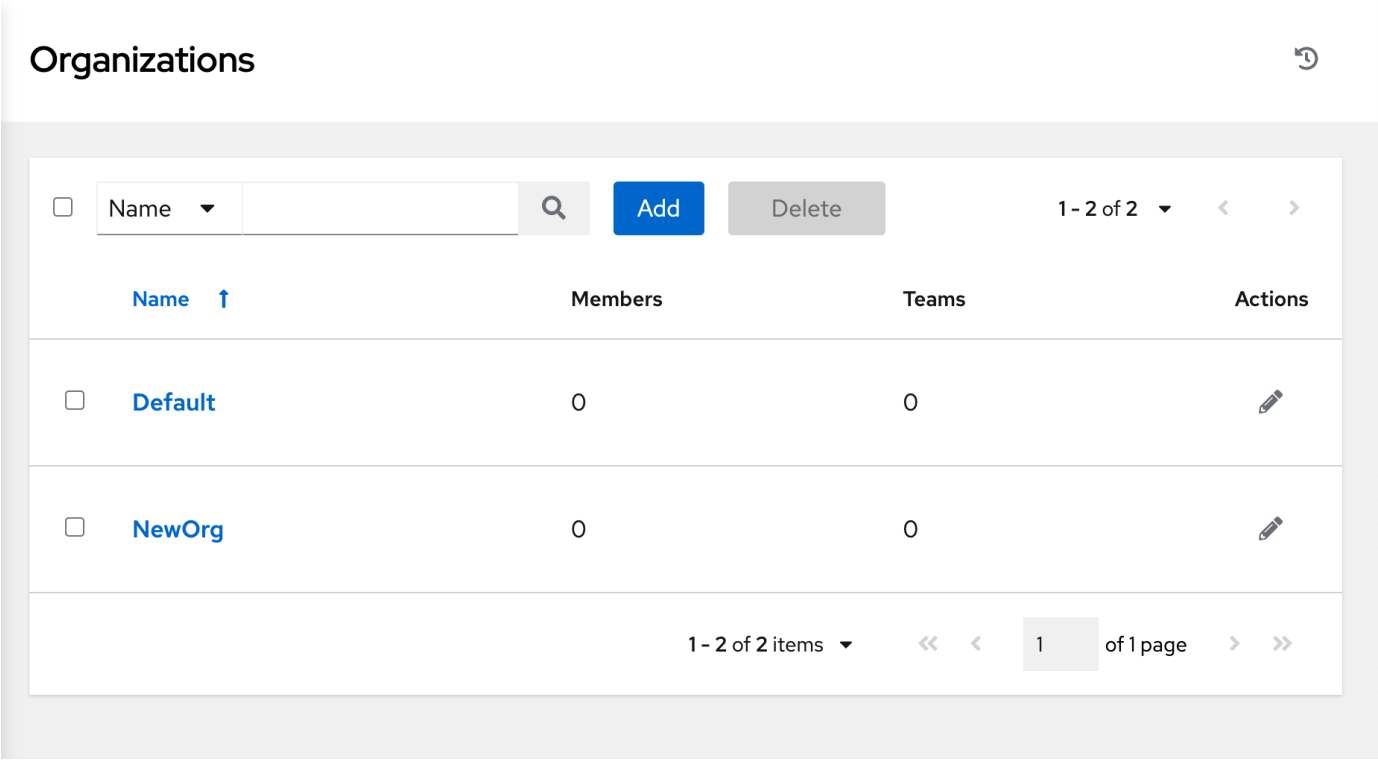


Anatomy of An Automation Job



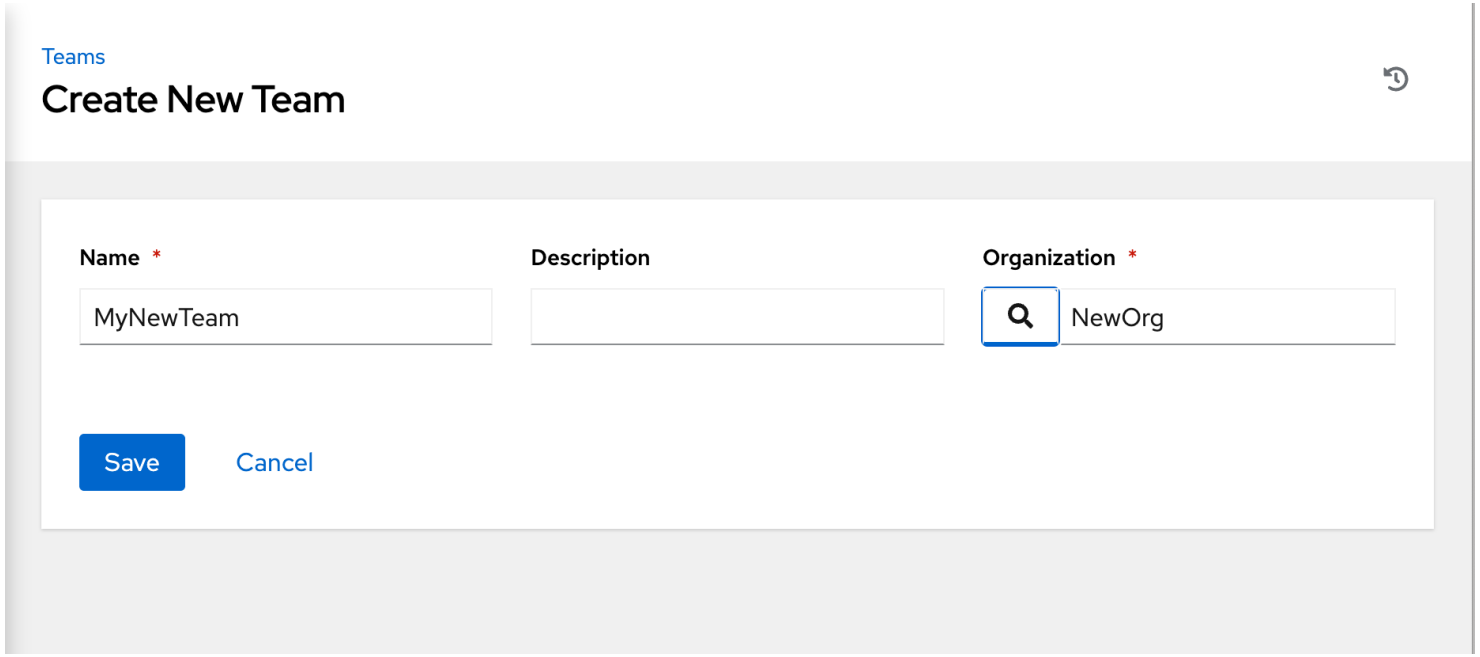
Organization

- Newly created users inherit specific roles from their organization based on their user type.
- Assign additional roles to a user after creation to grant permissions to view, use, or change other Ansible Platform objects.



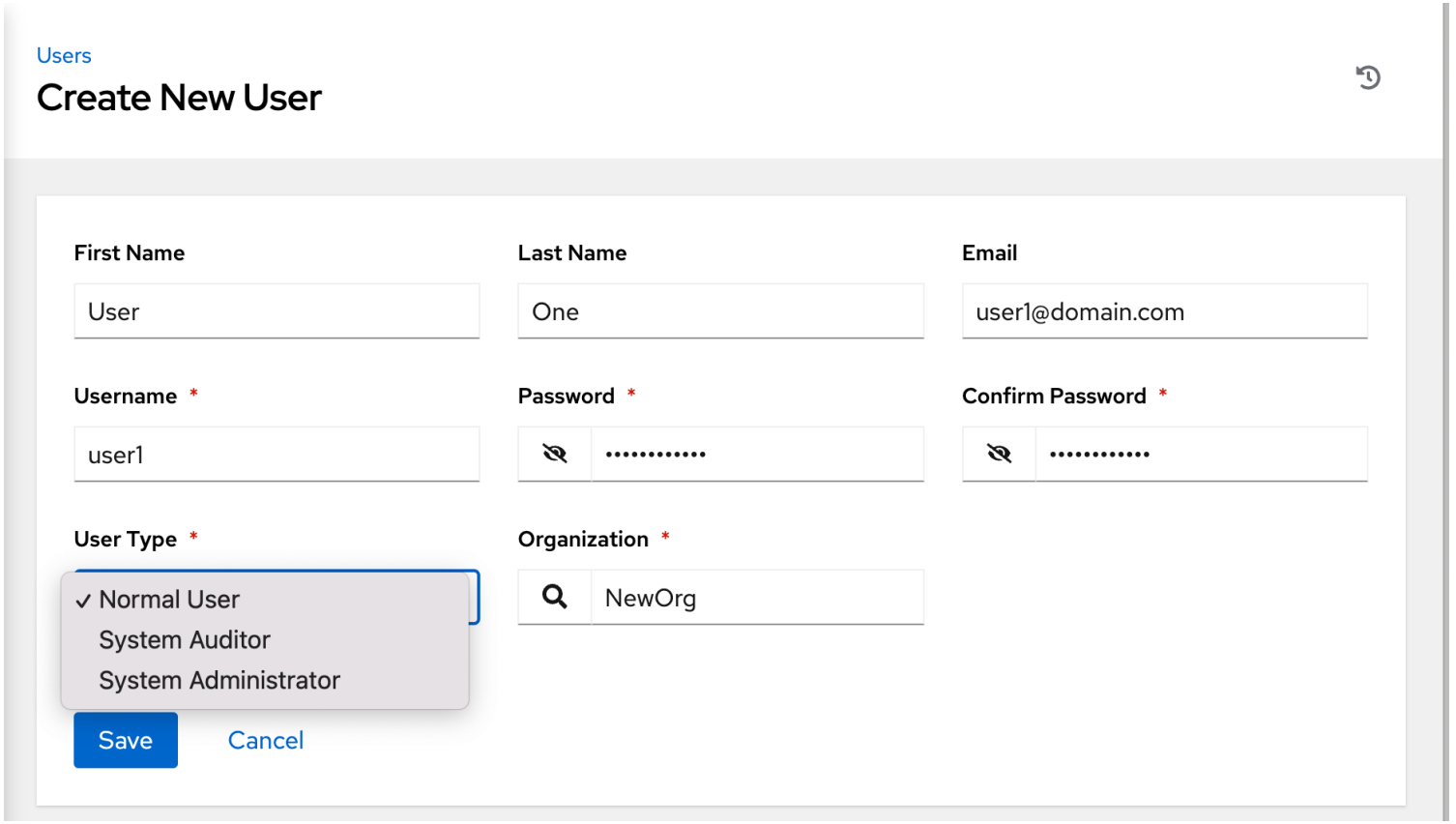
Team

- You can apply permissions at the team level.



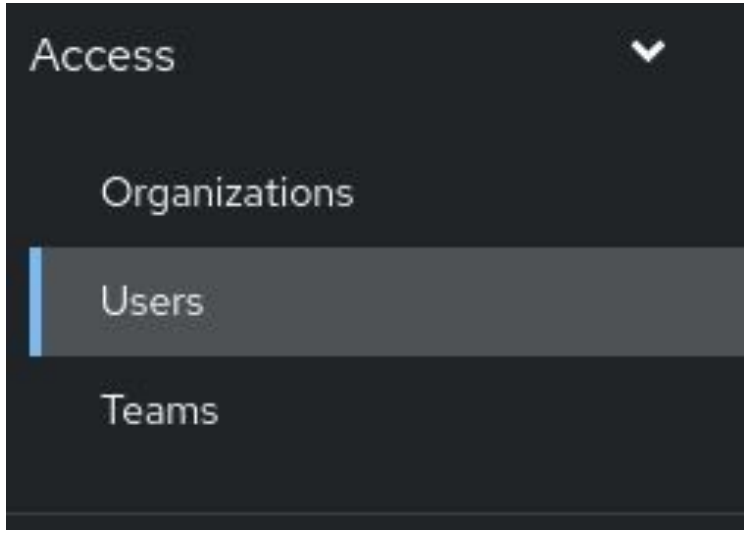
User Roles

- An organization is also one of these objects.
- There are three roles that users can be assigned:
- Admin
- Auditor
- User



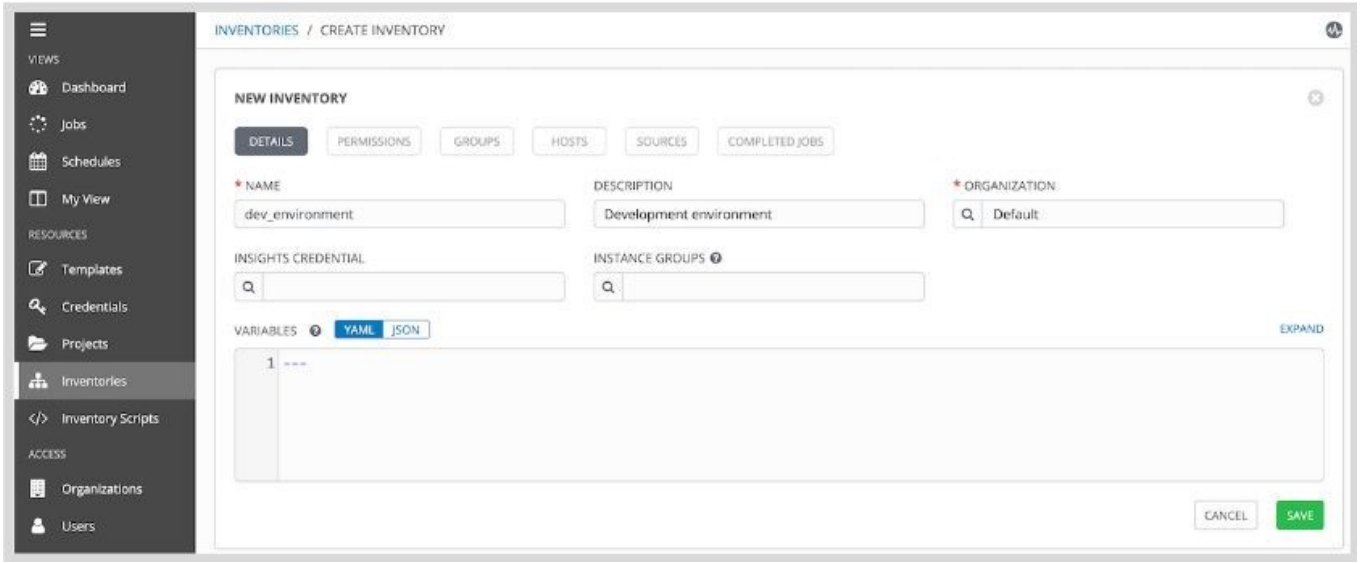
User Management

- 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 Automation Controller 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.



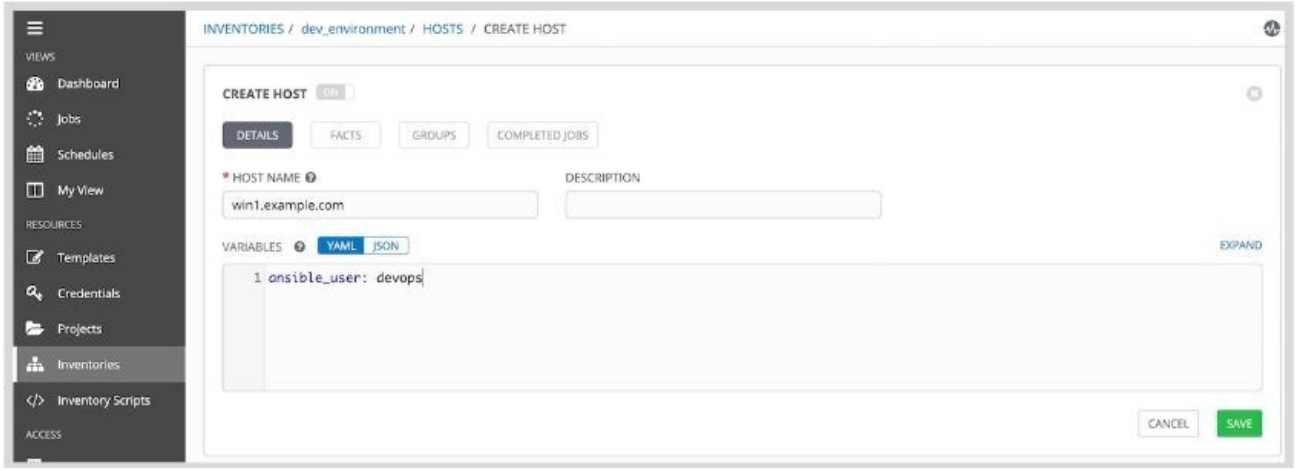
Inventory

- Log into Ansible Platform (the admin user will work for this example).
- Click on **Inventories**.
- In the INVENTORIES window, click the **+** button.
- Enter a NAME for the inventory and its ORGANIZATION (often “Default”)



Inventory

- In the Ansible Platform GUI, click the **Inventories** menu, then click on the name of the inventory.
  - Click the **HOSTS** button, then click on **+**. This displays the “Create a new host” tooltip.
  - In the HOST NAME field enter the hostname or IP address of the managed host.
  - In the VARIABLES text box, you can set values for variables that apply only to this host.
  - Click **SAVE**.

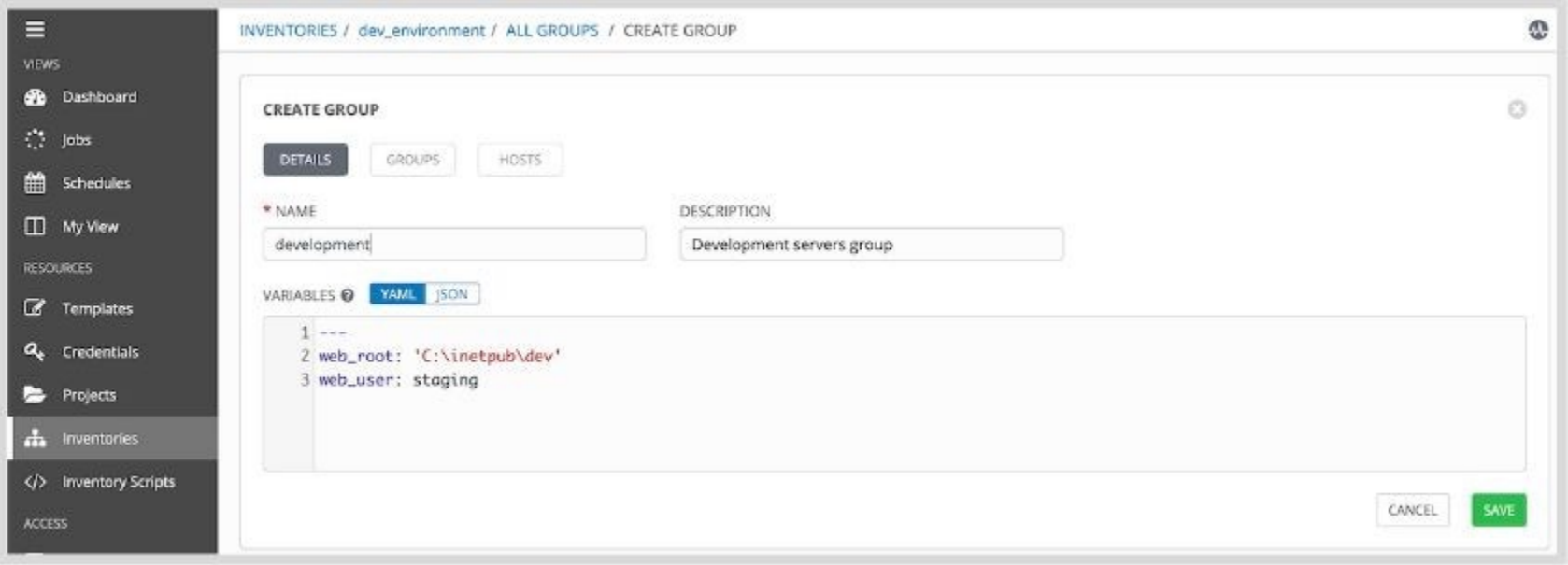


Inventory Groups

- Groups allow you to organize hosts into a set that can be managed together
- Hosts may be in multiple groups at the same time
  - All hosts that are in a particular data center
  - All hosts that have a particular purpose
  - Dev / Test / Prod hosts can be grouped
- Groups can be nested
  - The *europe* group might include a *paris_dc* group and a *london_dc* group
- This allows you to run playbooks on particular groups
- This allows you to set a variable to a specific value for all hosts in a group

Inventory Groups

- In the Ansible Platform GUI, click the **Inventories** menu, and click on the inventory to edit.
- Click the **GROUPS** button, then click on **+**. This will open the “Create a new group” tooltip.
- In the NAME field, enter the name of the group.
- Define any values for variables
- Click **SAVE**.

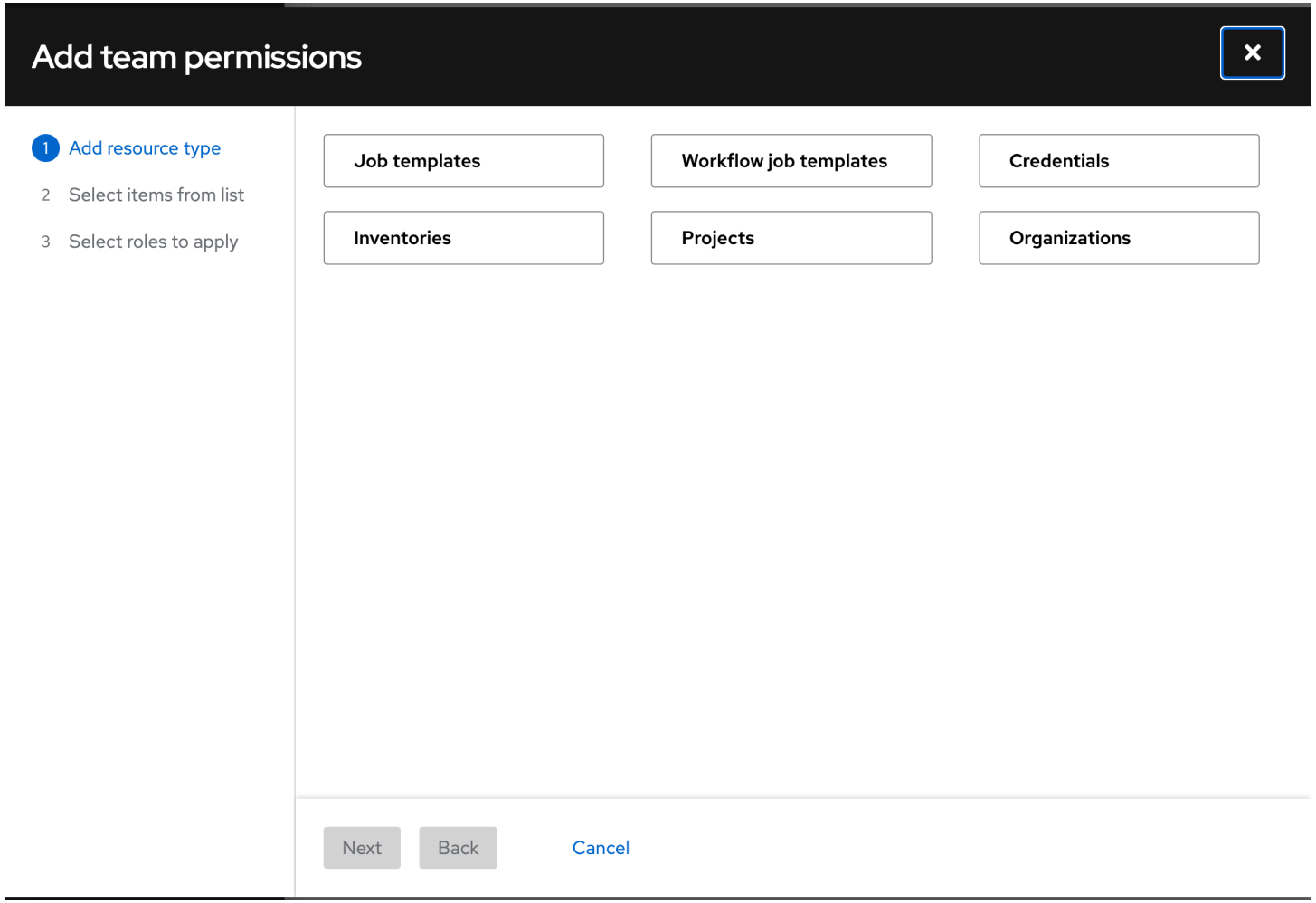


Inventory Groups

- In the Ansible Platform GUI, click the **Inventories** menu, and click on the inventory to edit.
- Click the **GROUPS** button, then click on the group to edit.
- Click the **HOSTS** button, then click on **+**. This will open the “Add a host” tooltip. Select “New Host”.
- In the HOST NAME field, enter the hostname or IP address of the managed host to add.
- Define any values for variables that affect only that host (overriding any group variables).
- Click **SAVE**.

Roles

- Create custom roles with specific permissions.



Inventory Roles

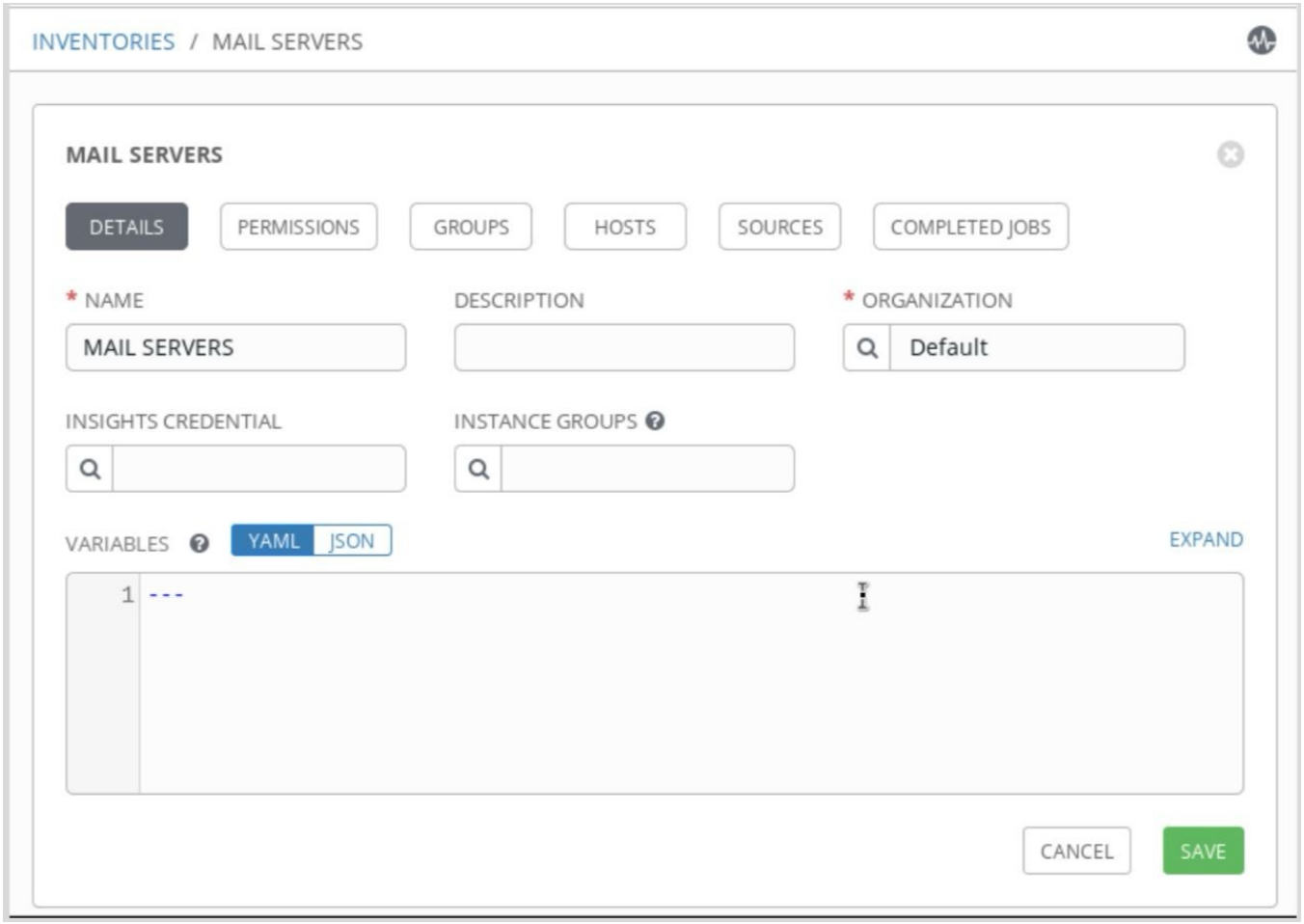
Role	Description
Admin	The inventory **Admin** role grants users full permissions over an inventory. These permissions include deletion and modification of the inventory. In addition, this role also grants permissions associated with the inventory roles **Use**, **Ad Hoc**, and **Update**.
Use	The inventory **Use** role grants users the ability to use an inventory in a job template resource. This controls which inventory is used to launch jobs using the job template's playbook.
Ad Hoc	The inventory **Ad Hoc** role grants users the ability to use the inventory to execute ad hoc commands.
Update	The inventory **Update** role grants users the ability to update a dynamic inventory from its external data source.
Read	The inventory **Read** role grants users the ability to view the contents of an inventory.

Inventory Variables

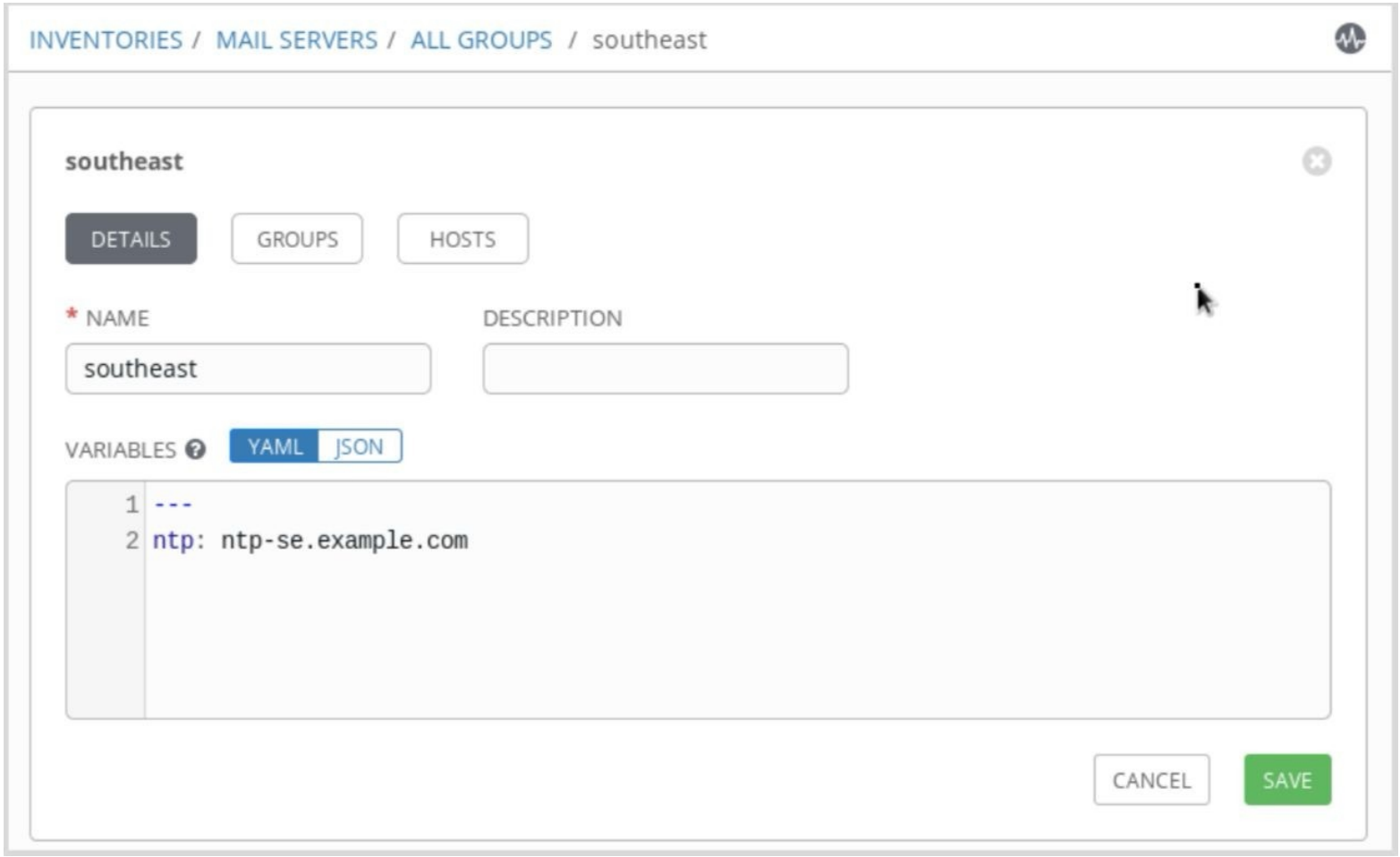
When you manage a static inventory in the Ansible Platform web UI, you may define inventory variables directly in the inventory objects.

- Variables set in the inventory details affect all hosts in the inventory.
- Variables set in a group's details are the equivalent of **`group_vars`**.
- Variables set in a host's details are the equivalent of **`host_vars`**.

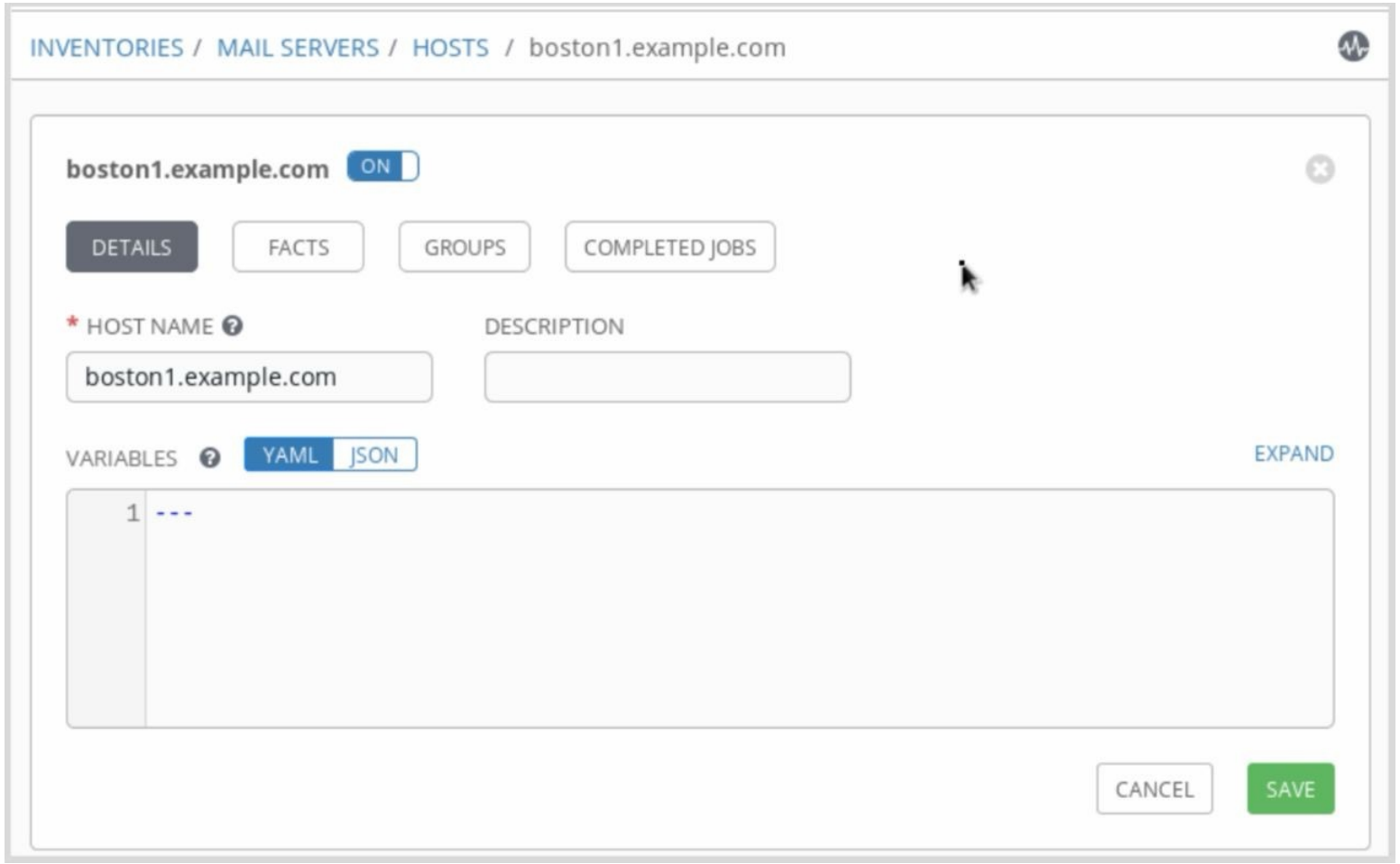
Inventory Variables



Inventory Group Variables



Inventory Host Variables

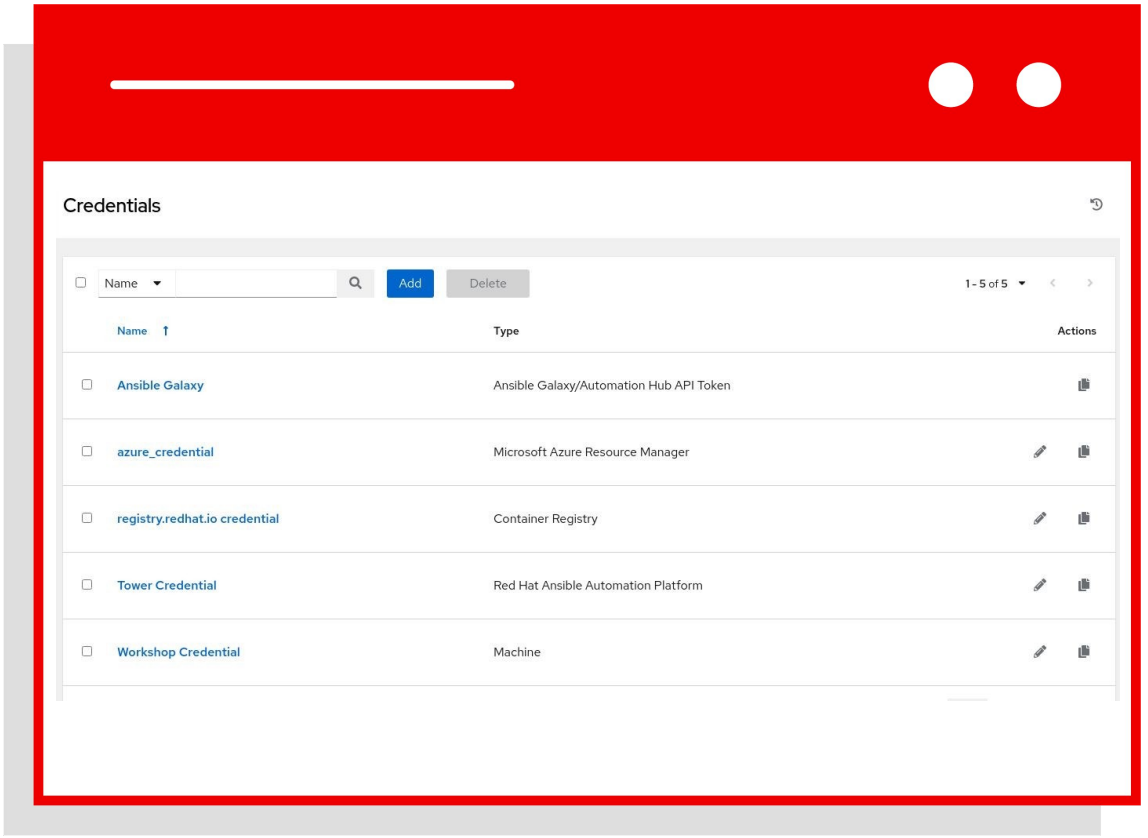


Credentials

Credentials are utilized by Automation Controller for authentication with various external resources:

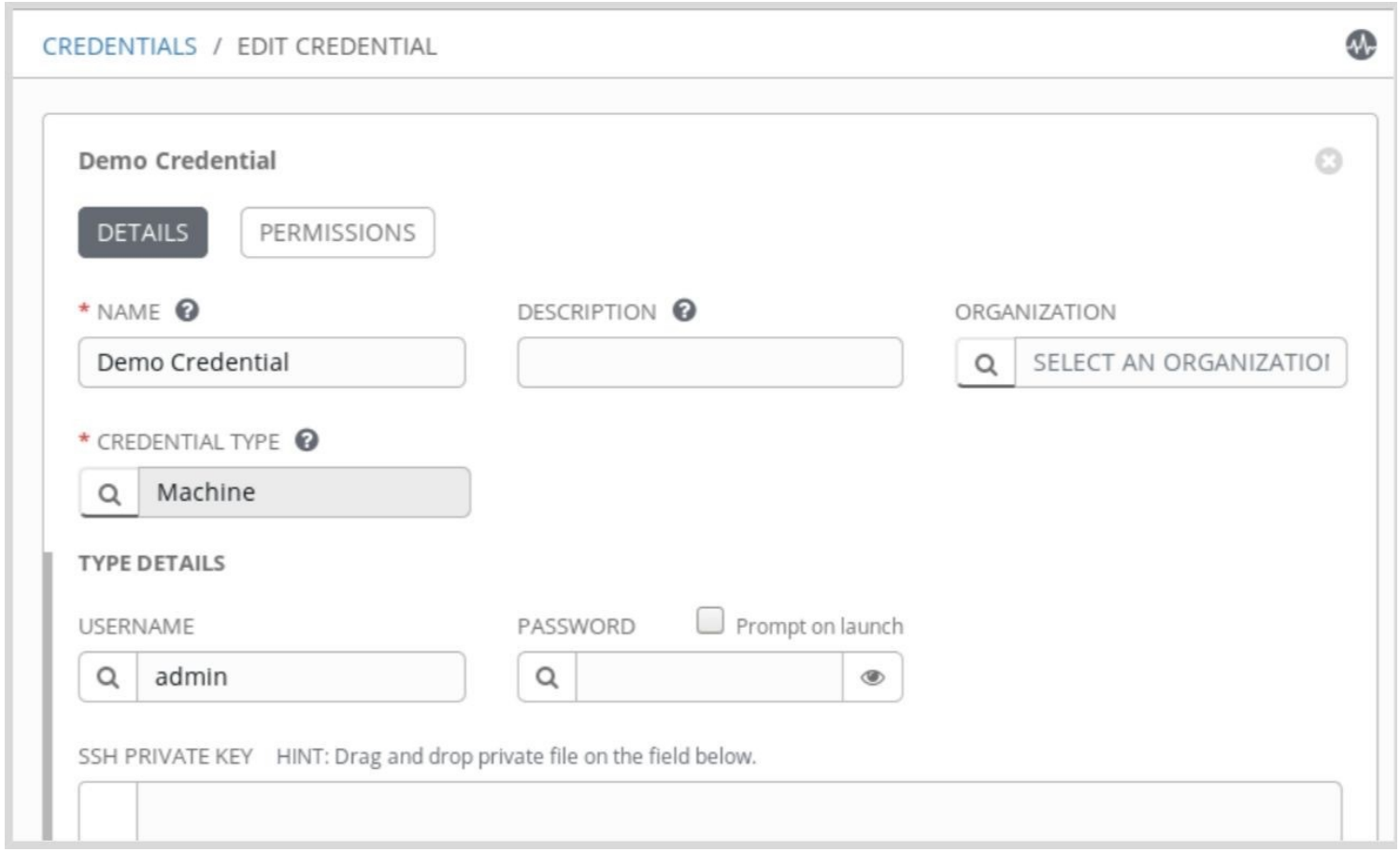
- Connecting to remote machines to run jobs
- Syncing with inventory sources
- Importing project content from version control systems
- Connecting to and managing network devices

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



Credentials

- Create credentials in the UI
- This credential contains information that is used to access managed hosts in the **Inventory**.

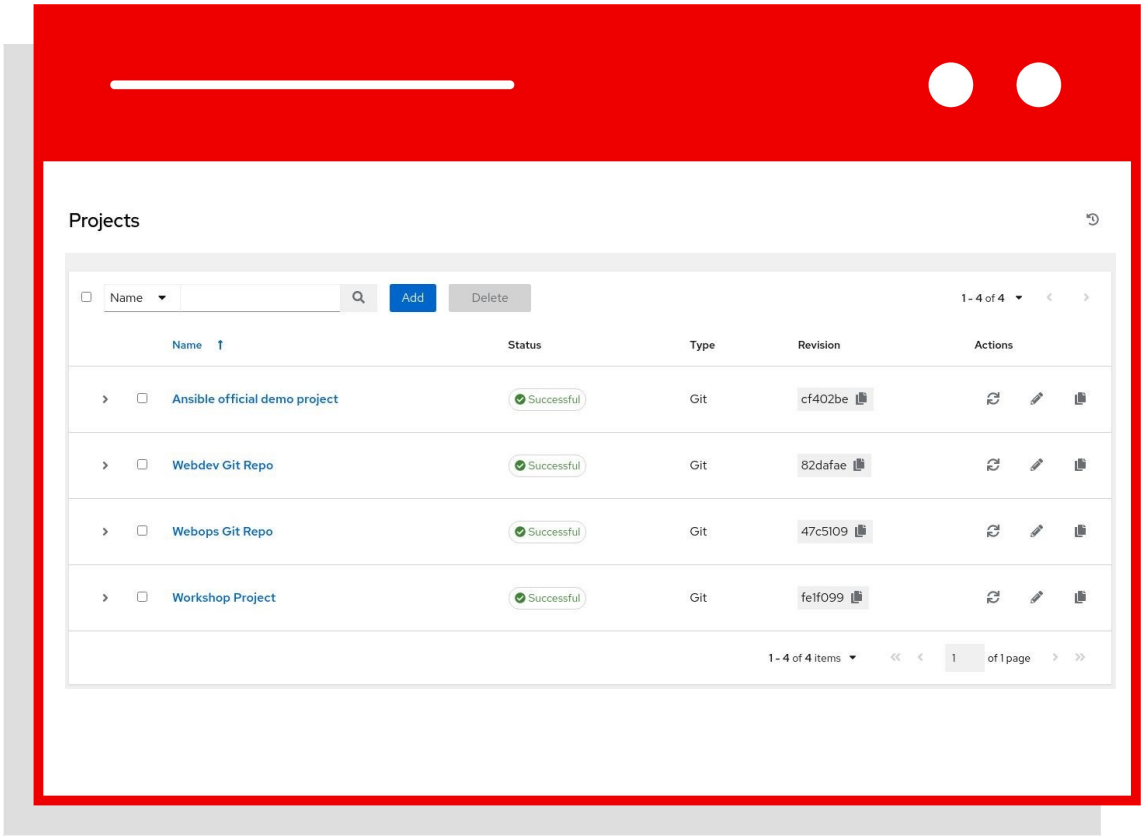


Lab: AAP Inventories, credentials, and ad-hoc commands

PROJECT

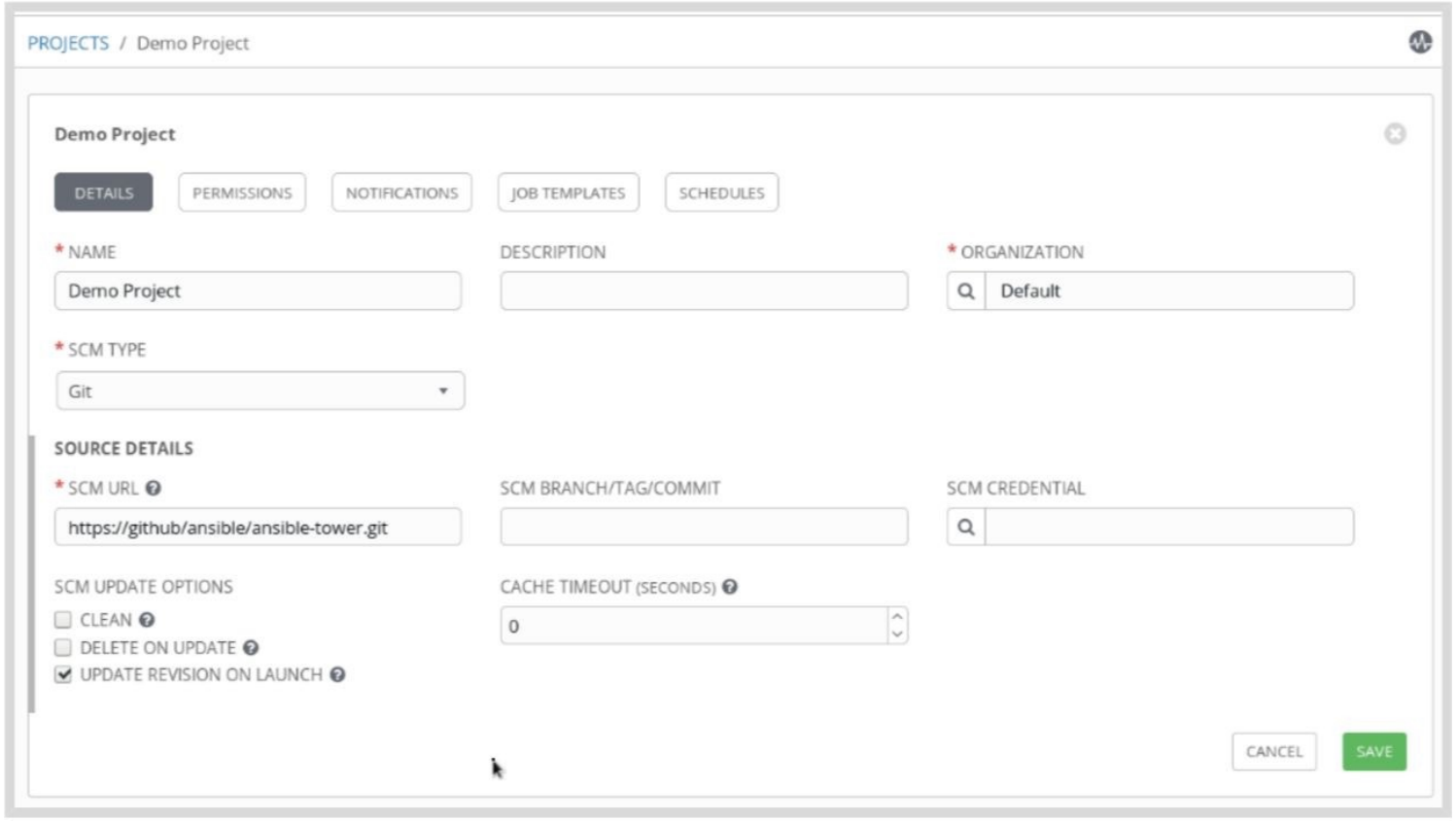
A project is a logical collection of Ansible Playbooks, represented in Ansible Automation Controller.

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.



PROJECT

- Under **Projects** in the left navigation bar, an example project named **Demo Project** is displayed.
- This project is configured to get Ansible project materials, including a playbook, from a public Git repository.
- You can also prepare a credential so you can access a private Git repository that needs authentication.



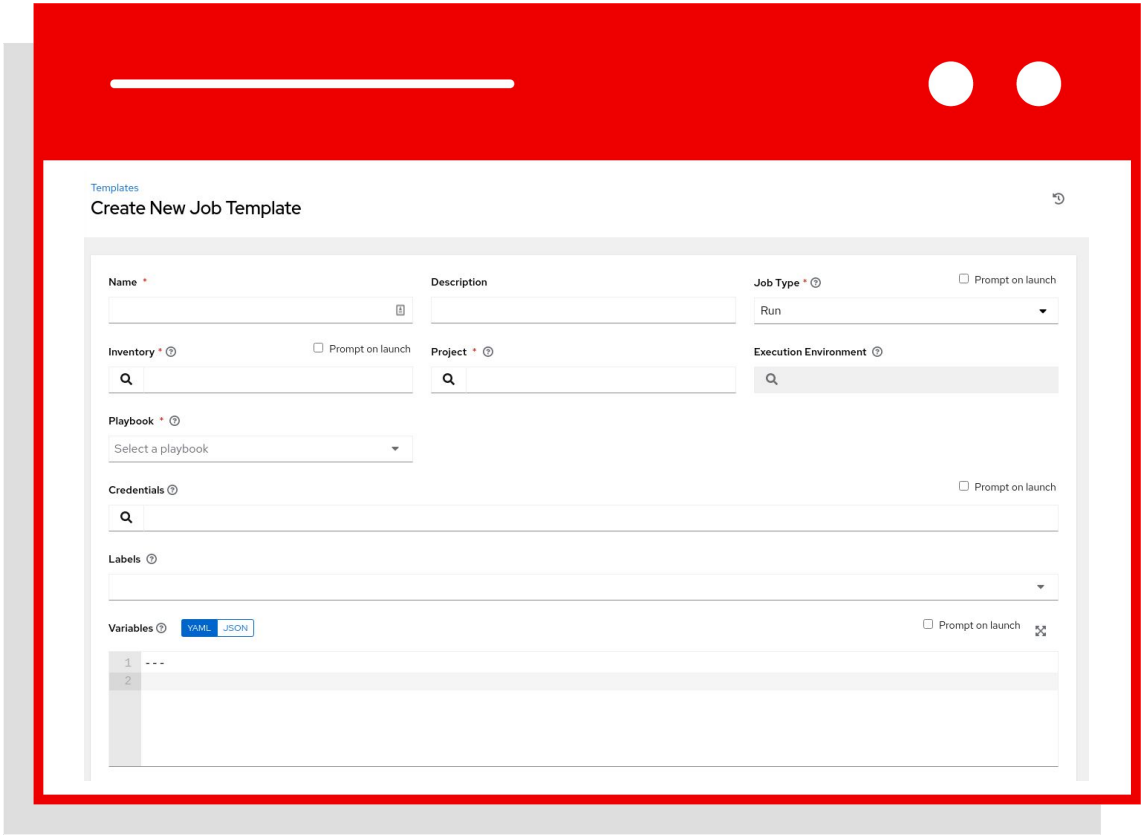
JOB TEMPLATES

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.

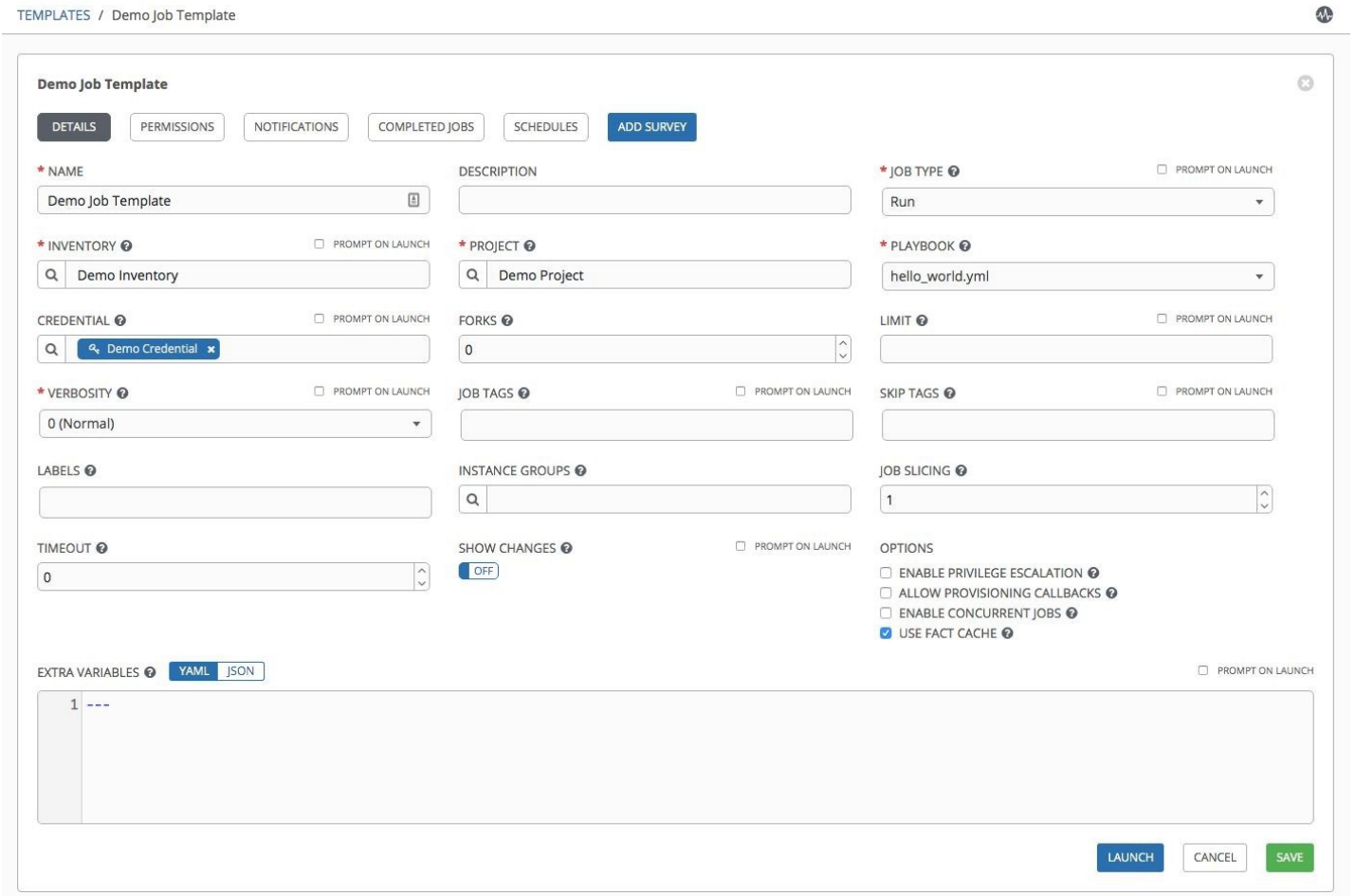
A **Job Template** requires:

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



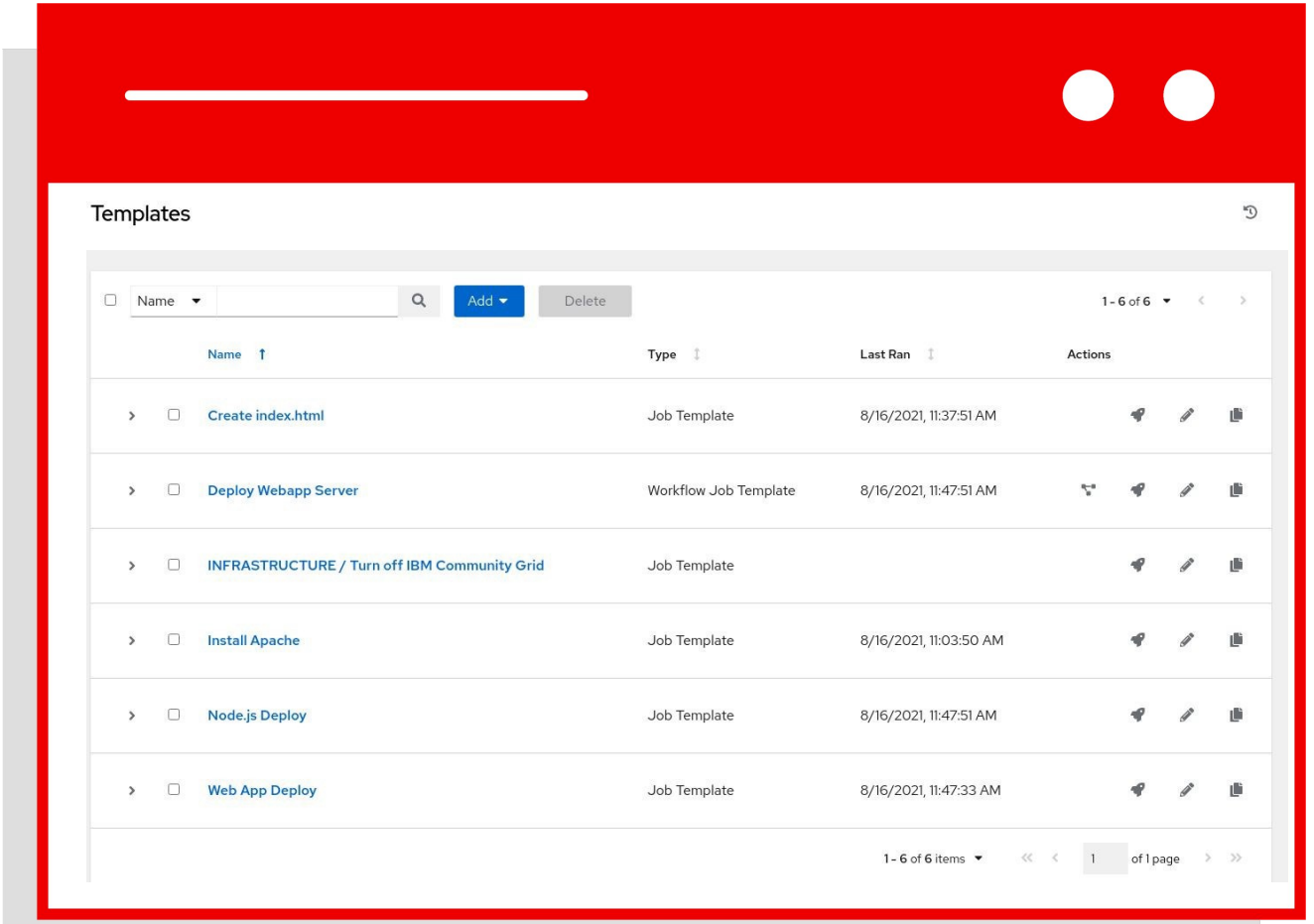
JOB TEMPLATES

- Under **Templates** in the left navigation bar, an example template called **Demo Job Template** is displayed.
- This job template runs the hello_world.yml playbook from **Demo Project** on the hosts in **Demo Inventory**, using **Demo Credential** to authenticate access.
- This initial job template can be used to test Ansible Tower.



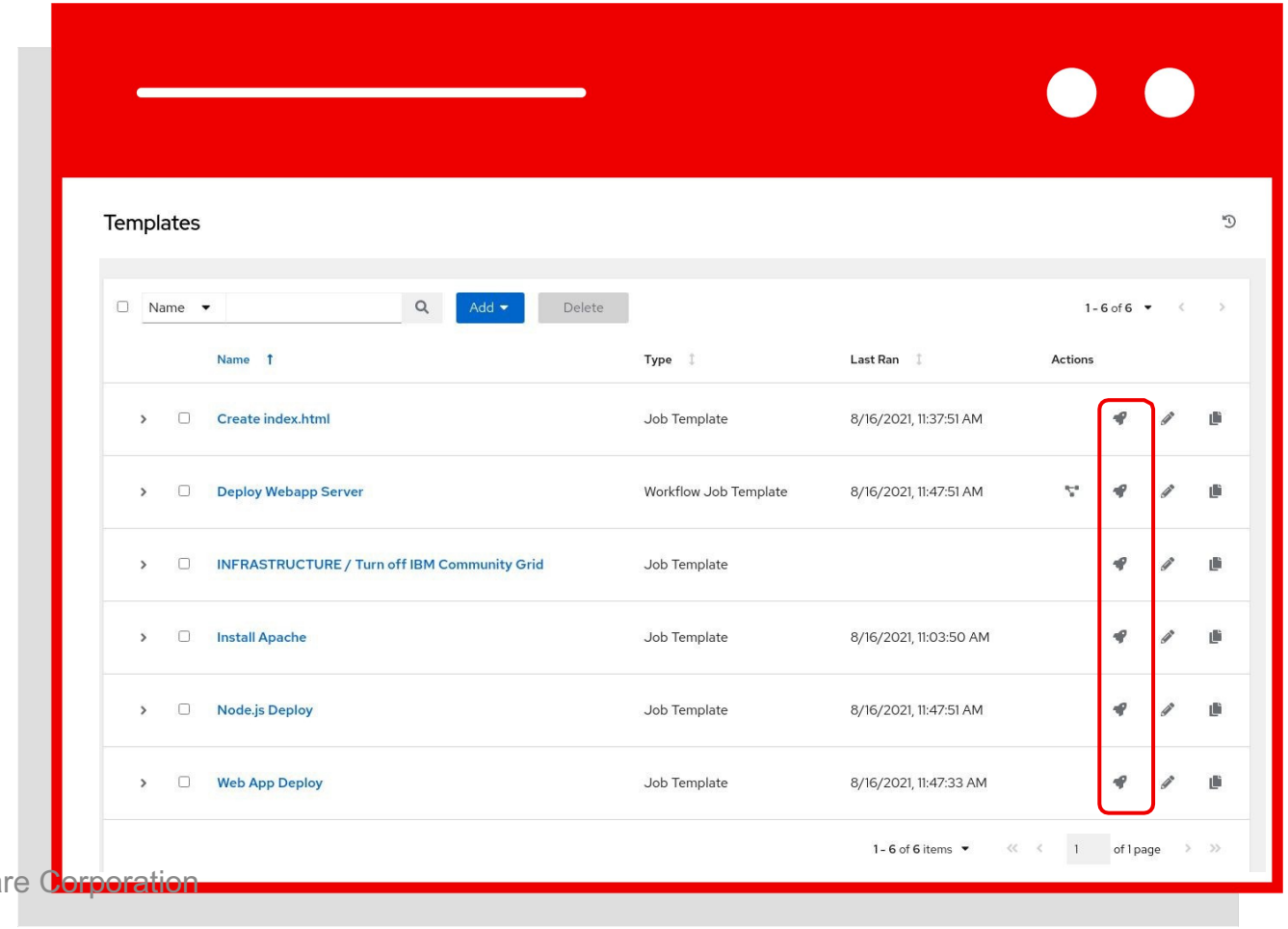
EXPANDING JOB TEMPLATES

Job Templates can be found and created by clicking the **Templates** button under the *Resources* section on the left menu.



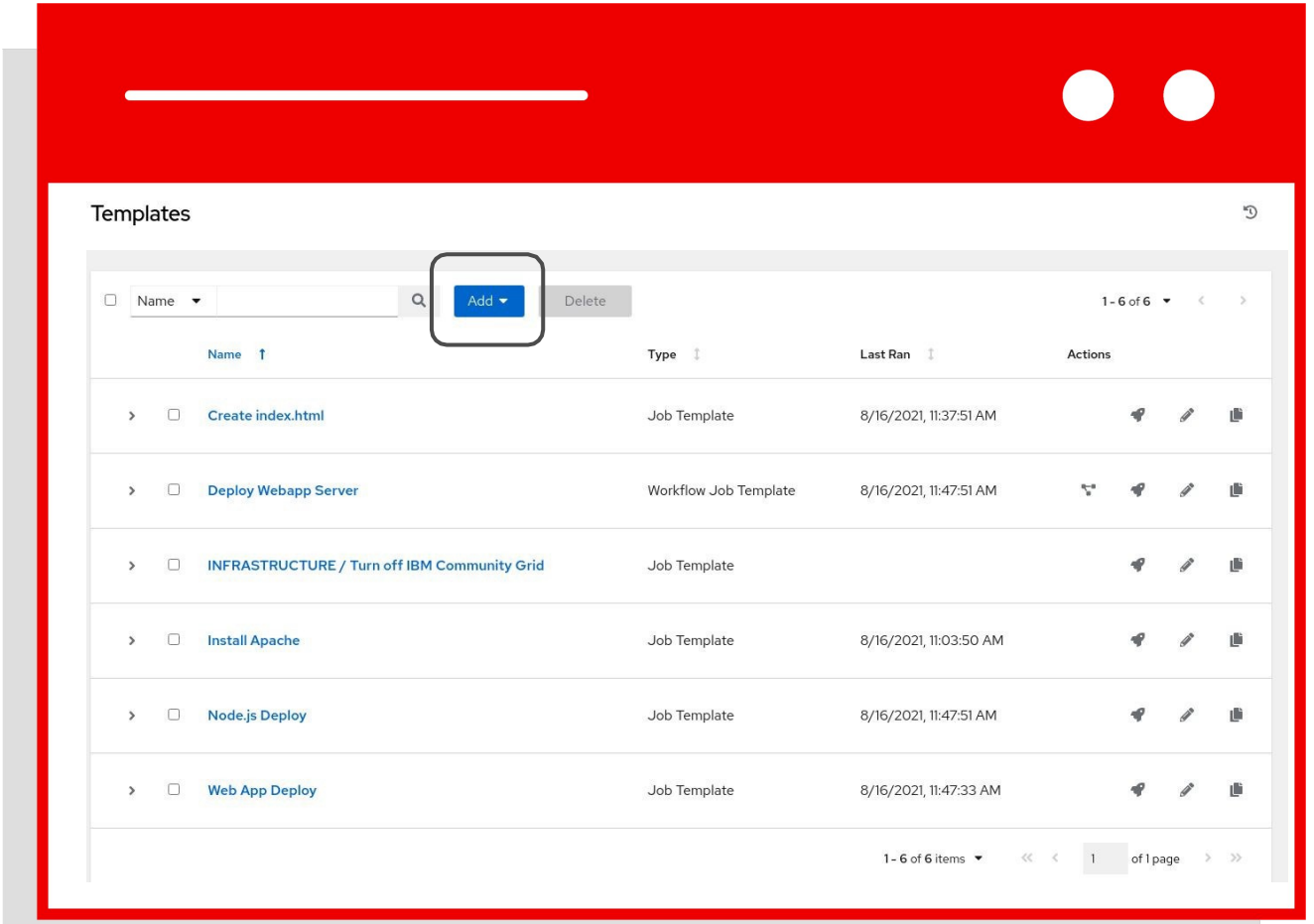
EXECUTING AN EXISTING JOB

Job Templates can be launched by clicking the **rocketship button** for the corresponding Job Template



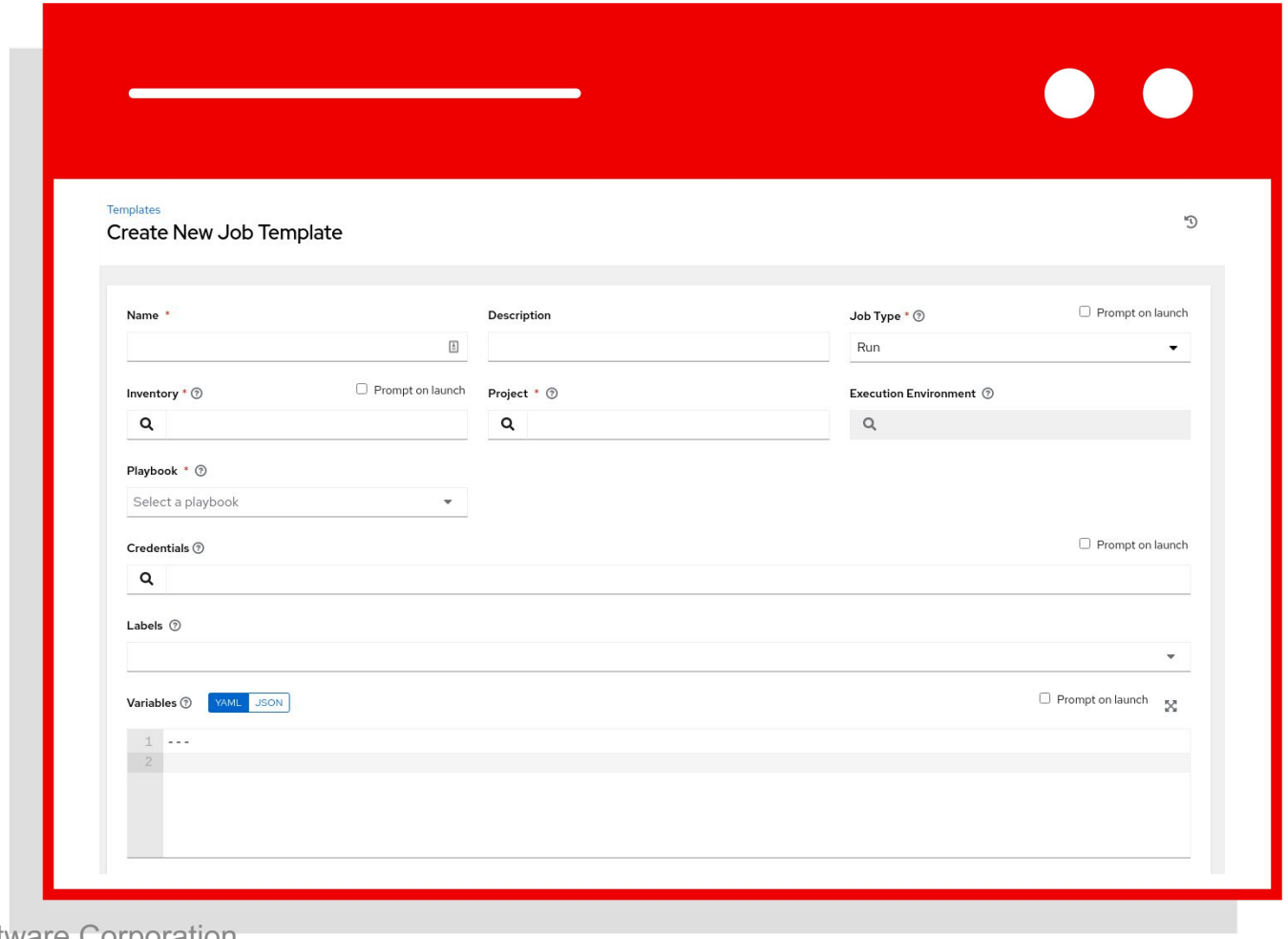
CREATING A NEW JOB TEMPLATE (1/2)

New Job Templates can be created by clicking the **Add button**



CREATING A NEW JOB TEMPLATE (2/2)

This **New Job Template** window is where the inventory, project and credential are assigned. The red asterisk * means the field is required .

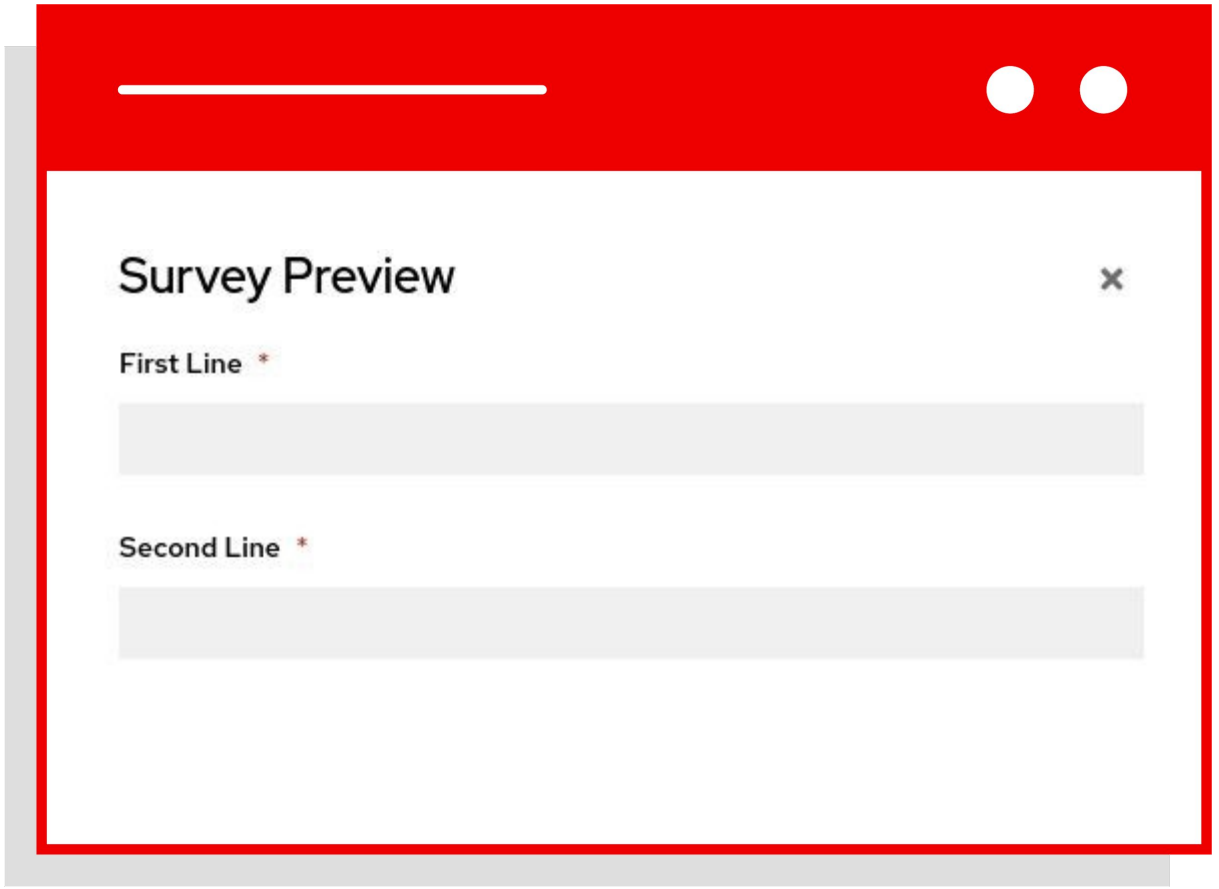


SURVEYS

Controller surveys allow you to configure how a job runs via a series of questions, making it simple to customize your jobs in a user-friendly way.

An Ansible Controller survey is a simple question-and-answer form that allows users to customize their job runs.

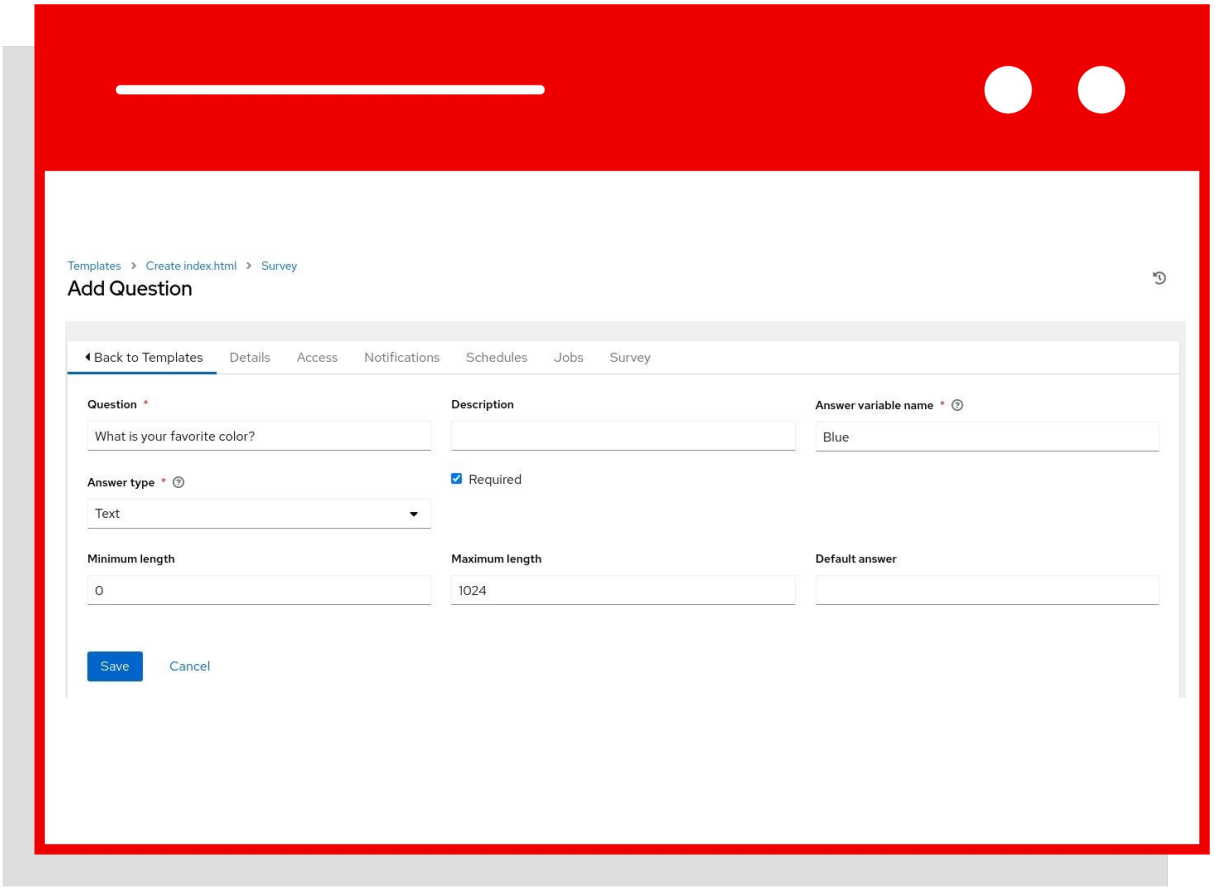
Combine that with Controller's role-based access control, and you can build simple, easy self-service for your users.



CREATING A SURVEY (1/2)

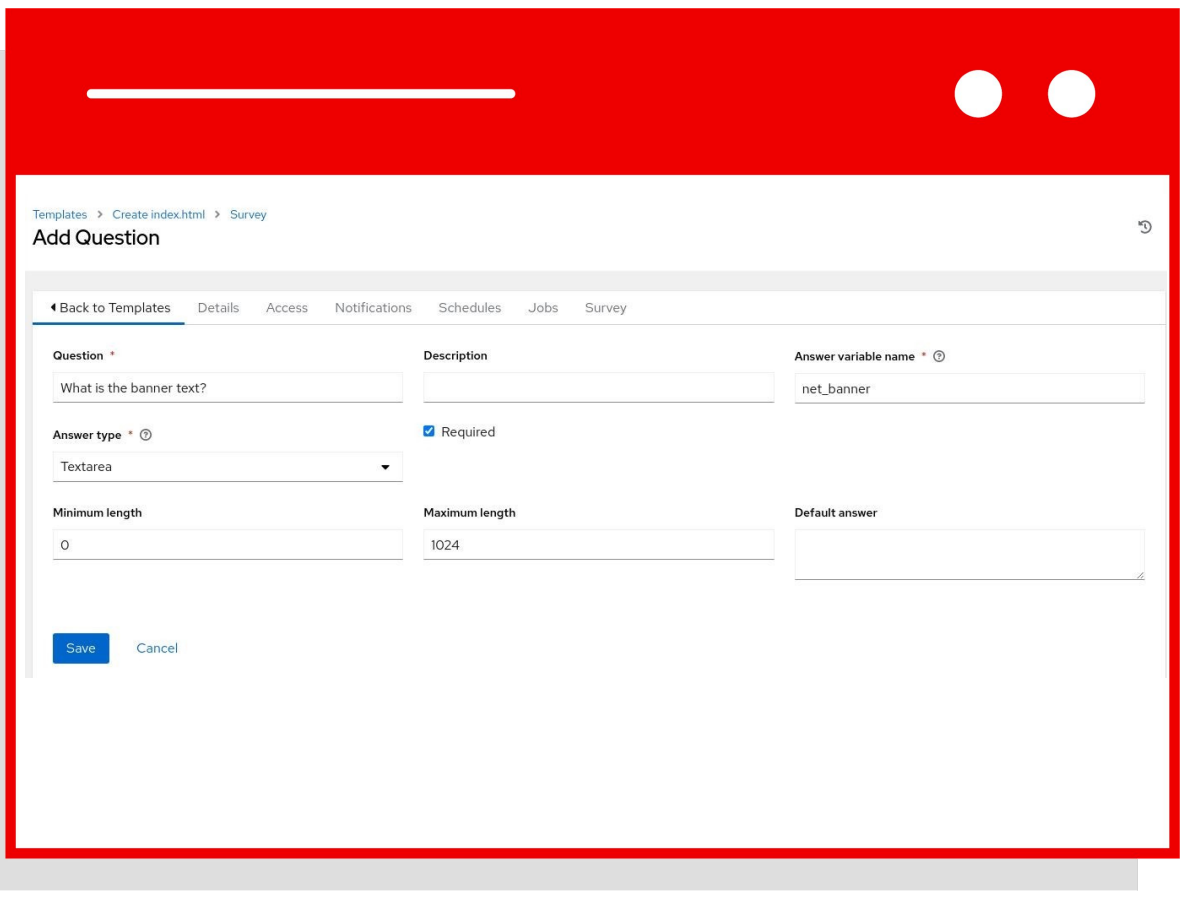
Once a Job Template is saved, the Survey menu will have an **Add Button**

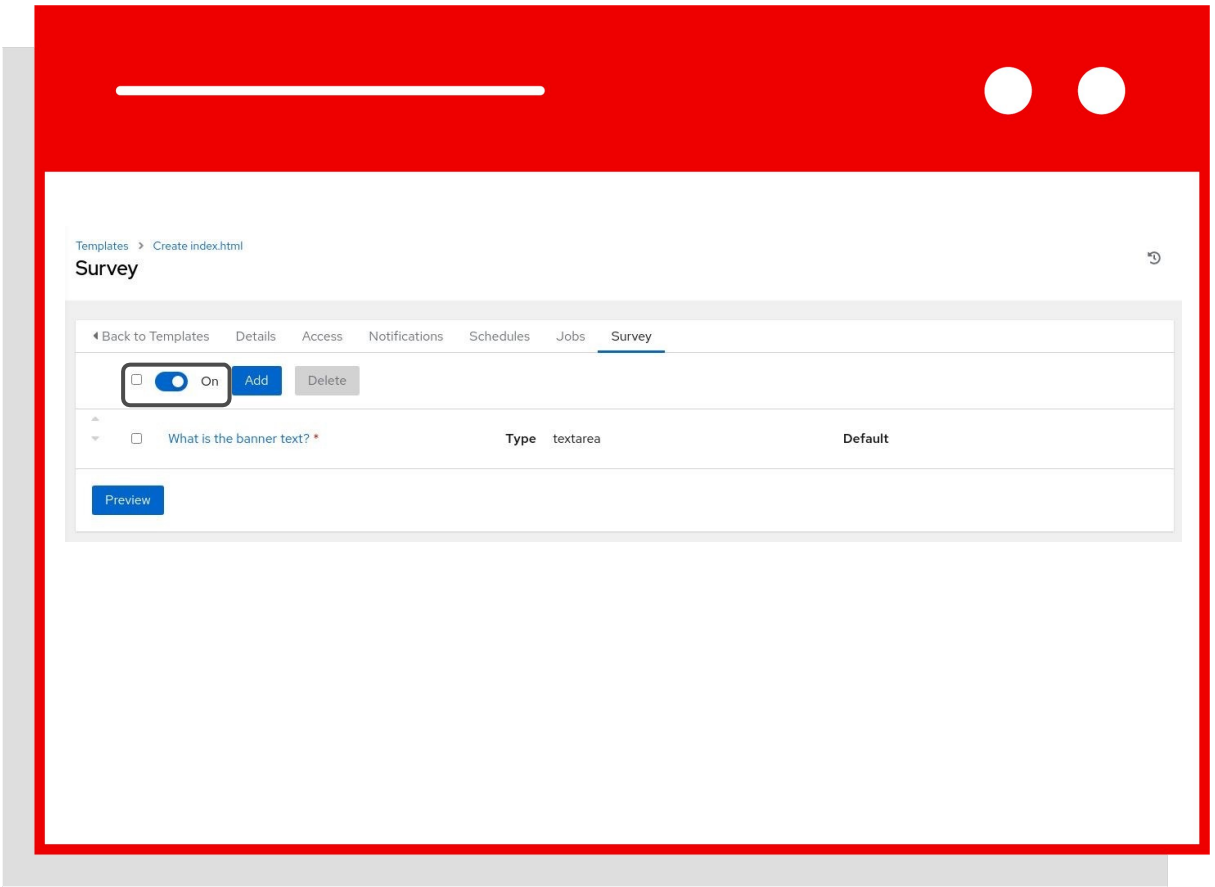
Click the button to open the Add Survey window.



CREATING A SURVEY (2/2)

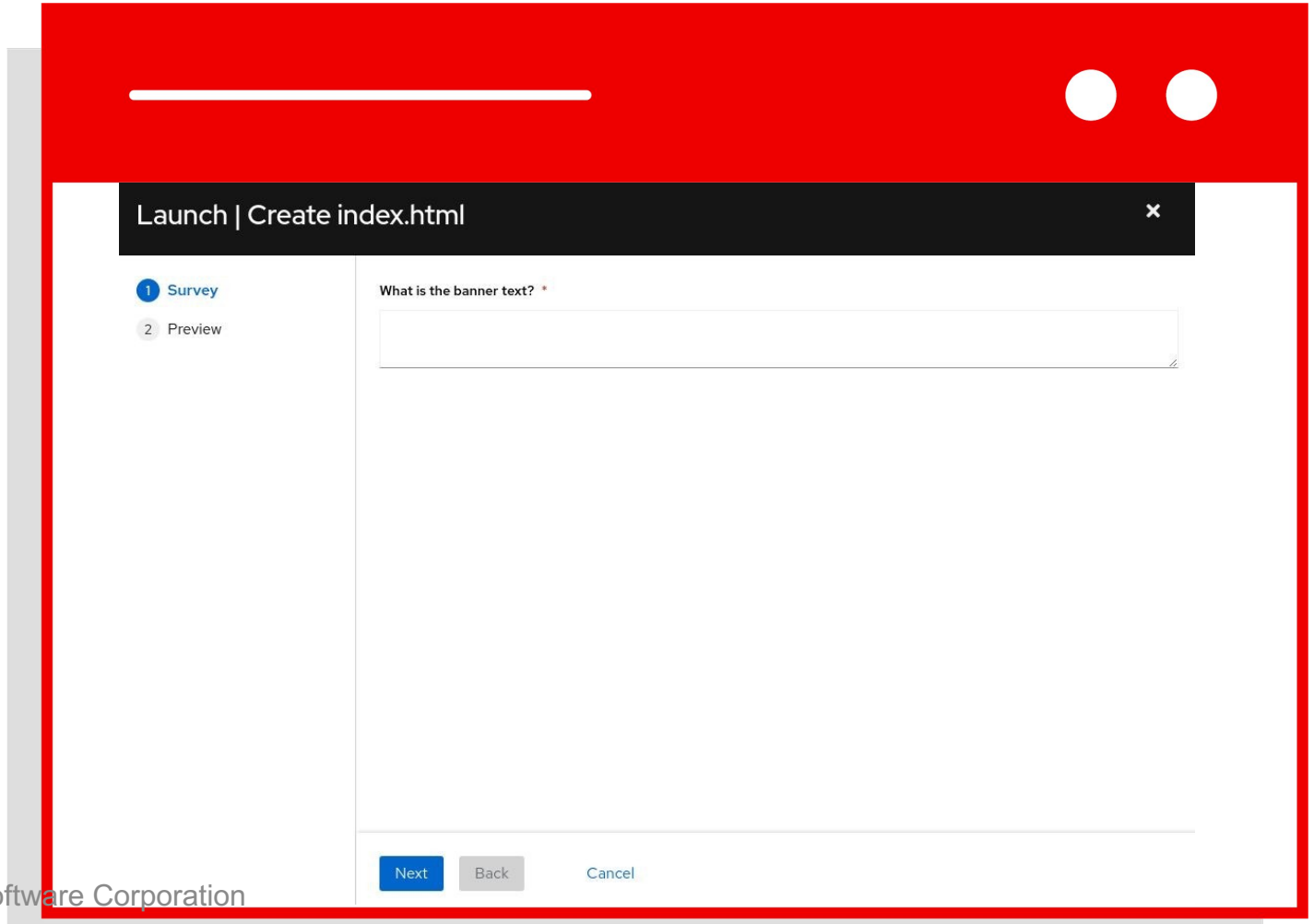
The Add Survey window allows the Job Template to prompt users for one or more questions. The answers provided become variables for use in the Ansible Playbook.





USING A SURVEY

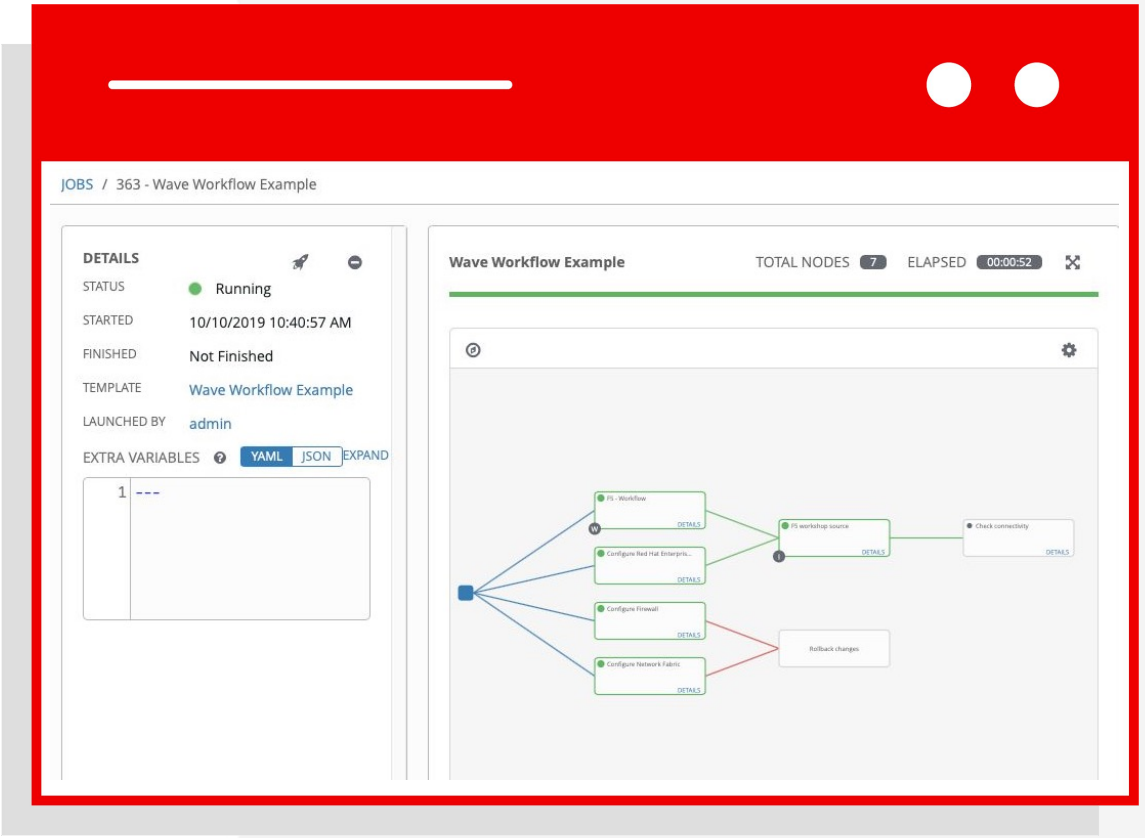
When launching a job, the user will now be prompted with the Survey. The user can be required to fill out the Survey before the Job Template will execute.



WORKFLOWS

Combine automation to create something bigger

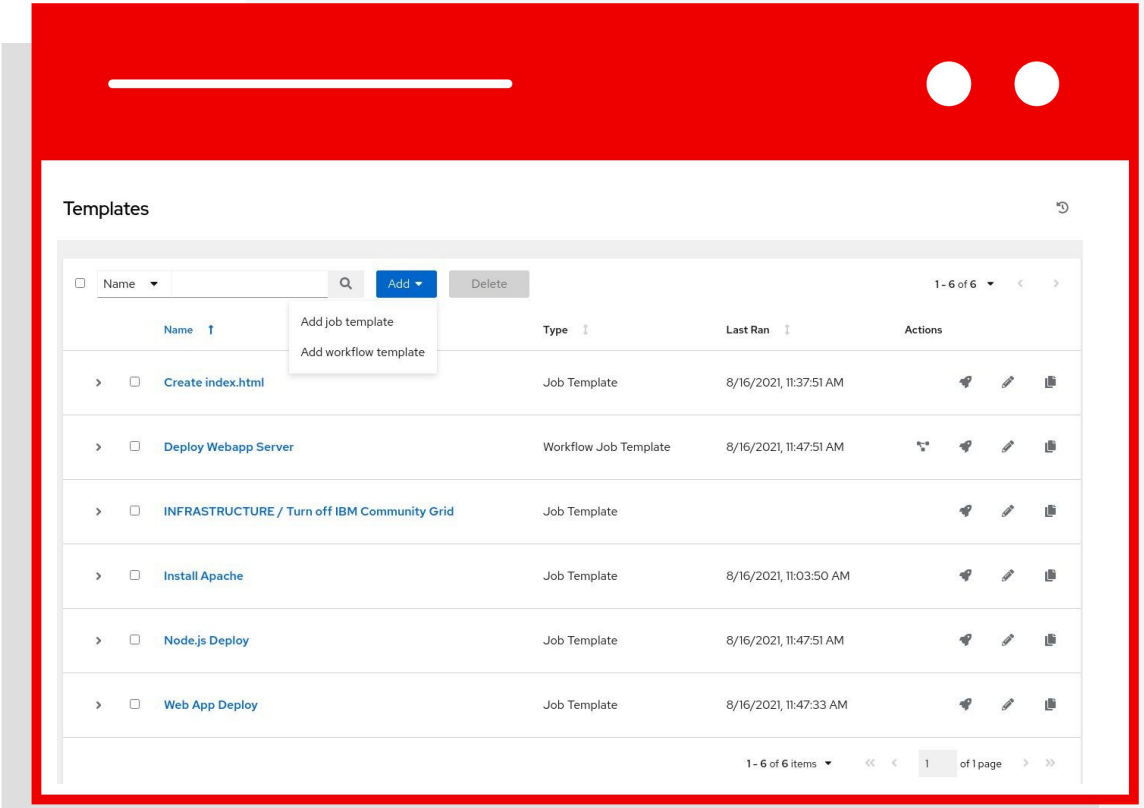
- Workflows enable the creation of powerful holistic automation, chaining together multiple pieces of automation and events.
- Simple logic inside these workflows can trigger automation depending on the success or failure of previous steps.



ADDING A NEW TEMPLATE

- To add a new **Workflow** click on the **Add** button.

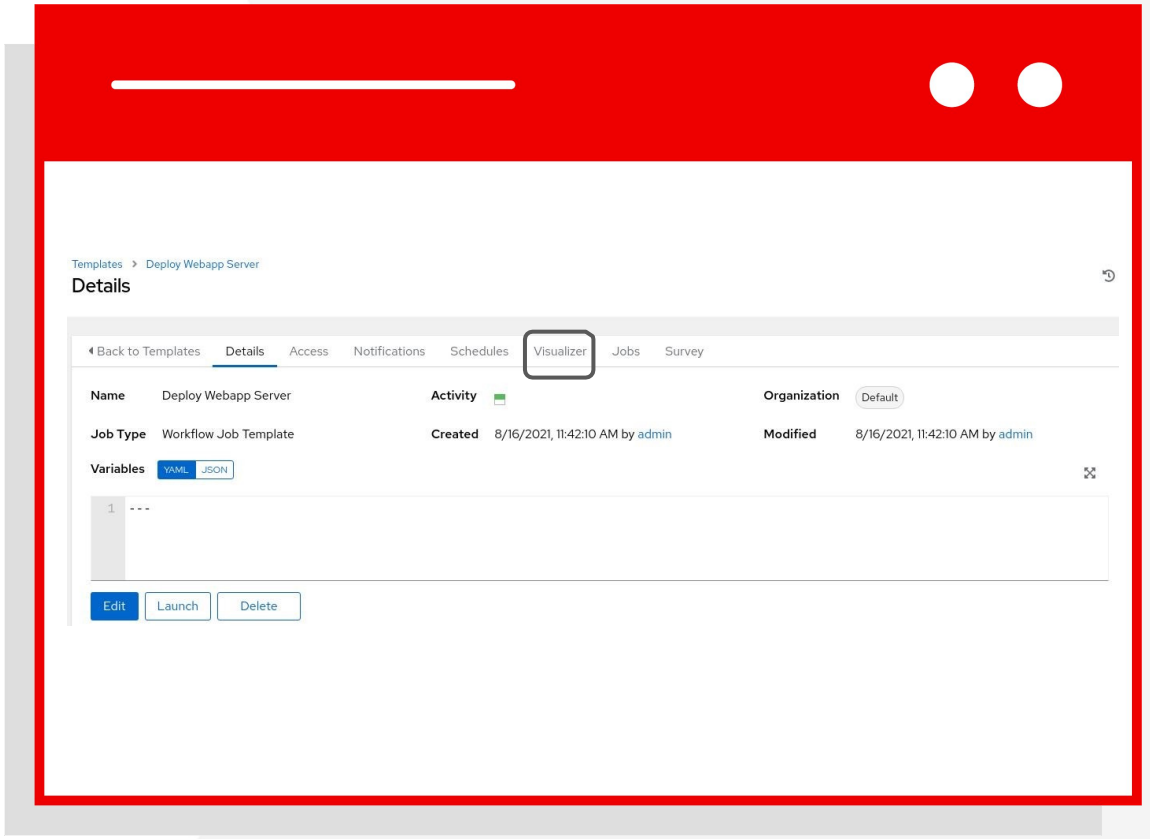
  This time select the **Add workflow template**



CREATING THE WORKFLOW

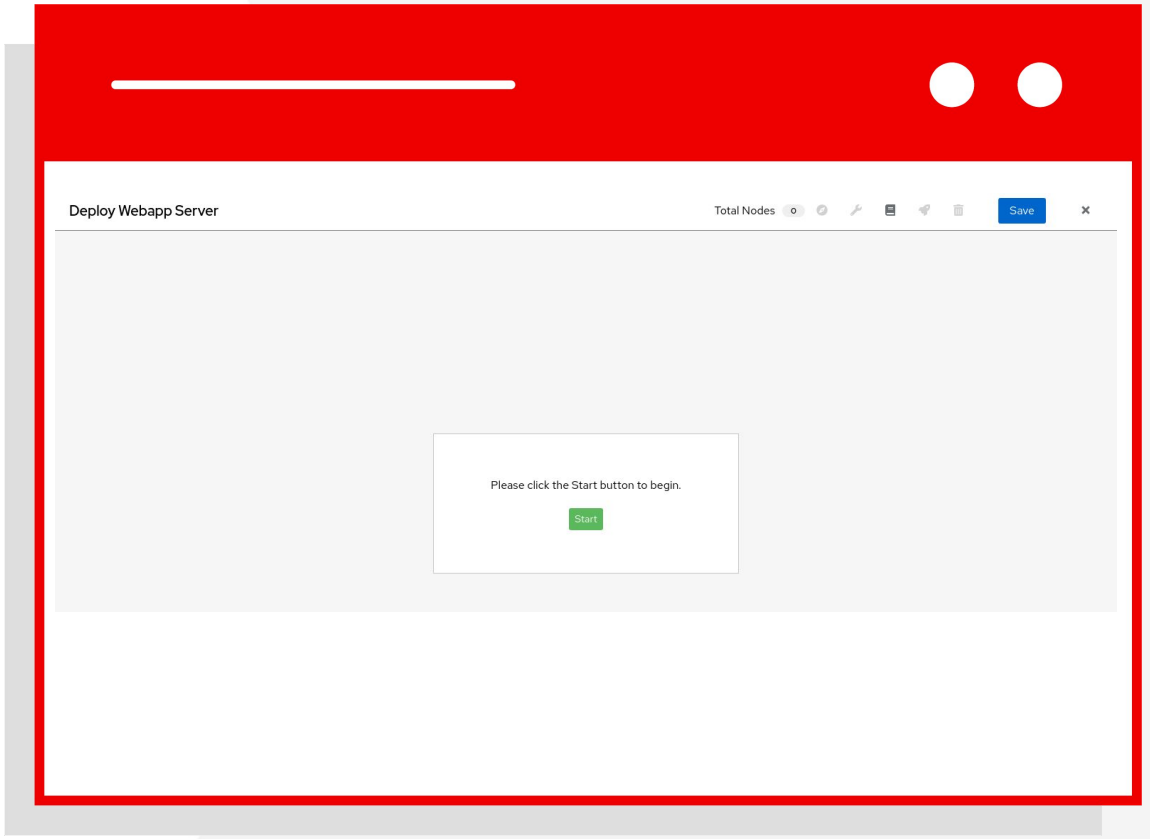
- Fill out the required parameters and click **Save.**

  As soon as the Workflow Template is saved the Workflow Visualizer will open.



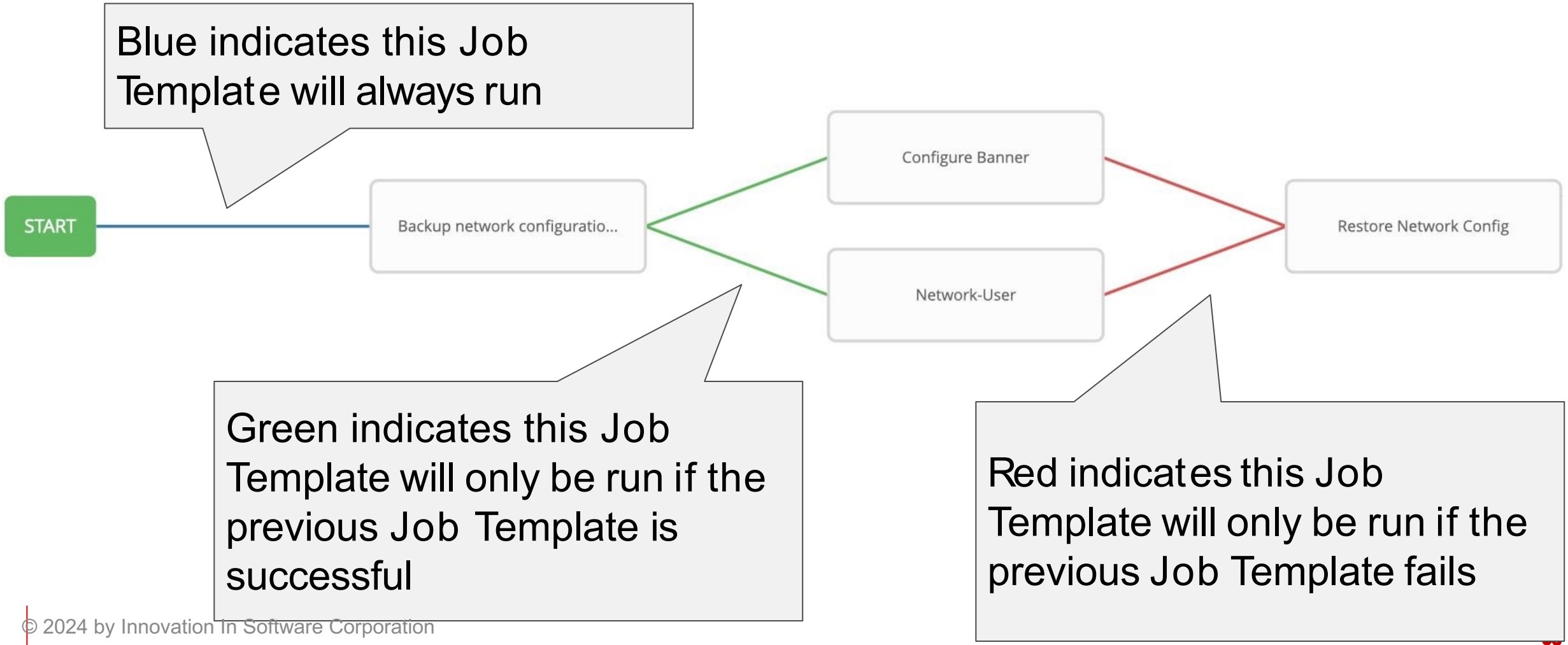
WORKFLOW VISUALIZER

- The Workflow Visualizer will start as a blank canvas.
- Click the green Start button to start building the workflow.



VISUALIZING A WORKFLOW

Workflows can branch out, or converge in.



Lab: AAP Projects and job templates

Developing a module

A module is a reusable, standalone script that Ansible runs on your behalf, either locally or remotely. Modules interact with your local machine, an API, or a remote system to perform specific tasks like changing a database password or spinning up a cloud instance.

```
- name: Install ntp
  package:
    name:
      - ntp
      - nslookup
    state: present
  tags: utils
```

Developing a module

A module provides a defined interface, accepts arguments, and returns information to Ansible by printing a JSON string to stdout before exiting.

module.yml

```
def main():

    fields = {
        "github_auth_key": {"required": True, "type": "str"},
        "username": {"required": True, "type": "str"},
        "name": {"required": True, "type": "str"},
        "description": {"required": False, "type": "str"},
        "private": {"default": False, "type": "bool"},
        "has_issues": {"default": True, "type": "bool"},
        "has_wiki": {"default": True, "type": "bool"},
        "has_downloads": {"default": True, "type": "bool"},
        "state": {
            "default": "present",
            "choices": ['present', 'absent'],
            "type": 'str'
        },
    }
```

Developing a module

To create a module:

1. Create a library directory in your workspace. Your test play should live in the same directory.
2. Create your new module file:
    - `library/my_test.py`.
3. Start writing your module.

Developing a module

All modules require documentation. Python docstrings should include examples of how to use the module.

module.yml

```
#!/usr/bin/python3

from __future__ import (absolute_import, division,
print_function)
__metaclass__ = type

DOCUMENTATION = r'''
---
module: github_repo

short_description: This module manages GitHub repositories
'''

EXAMPLES = r'''
- name: Create a github Repo
  github_repo:
    github_auth_key: "..."
    name: "Hello-World"
    description: "This is your first repository"
    private: yes
    has_issues: no
    has_wiki: no
    has_downloads: no
  register: result

- name: Delete that repo
  github_repo:
    github_auth_key: "..."
    name: "Hello-World"
    state: absent
  register: result
'''
```

Developing a module

This code defines a function that creates a new GitHub repository using the GitHub API. It extracts the GitHub authentication key from the provided data, sends a POST request to the /user/repos endpoint with the repository details.

The function returns different outcomes based on the response: success with changes (201), no changes due to an existing repository (422), or a default response indicating an error with the status code and response metadata for debugging.

module.yml

```
from ansible.module_utils.basic import *
import requests

api_url = "https://api.github.com"


def github_repo_present(data):

    api_key = data['github_auth_key']

    del data['state']
    del data['github_auth_key']

    headers = {
        "Authorization": "token {}" . format(api_key)
    }
    url = "{}{}" . format(api_url, '/user/repos')
    result = requests.post(url, json.dumps(data), headers=headers)

    if result.status_code == 201:
        return False, True, result.json()
    if result.status_code == 422:
        return False, False, result.json()

    # default: something went wrong
    meta = {"status": result.status_code, 'response': result.json()}
    return True, False, meta
```

Developing a module

This function deletes a specified GitHub repository by interacting with the GitHub API. It constructs the request URL using the repository's name and the user's username, authenticates using the provided GitHub token, and sends a DELETE request.

The function returns success with changes (204), no changes if the repository does not exist (404), or a default response indicating an error with the status code and response metadata for debugging.

module.yml

```
def github_repo_absent(data=None):
    headers = {
        "Authorization": "token {}" . format(data['github_auth_key'])
    }
    url = "{}/repos/{}/{}" . format(api_url, data['username'],
data['name'])
    result = requests.delete(url, headers=headers)

    if result.status_code == 204:
        return False, True, {"status": "SUCCESS"}
    if result.status_code == 404:
        result = {"status": result.status_code, "data":
result.json()}
        return False, False, result
    else:
        result = {"status": result.status_code, "data":
result.json()}
        return True, False, result
```

Developing a module

The main function serves as the entry point for an Ansible module to manage GitHub repositories. It defines a schema for input fields using fields, including parameters like github_auth_key, username, name, and other repository properties.

Based on the state parameter, it maps to either github_repo_present or github_repo_absent to create or delete a repository. The function processes the action, and based on the outcome, it either exits successfully with the result or fails with an error message, providing the necessary feedback to Ansible.

The if __name__ == '__main__': condition ensures that the code inside the block is executed only when the script is run directly. If the module is imported elsewhere, this block will not run.

It allows the module to define functions or classes that can be imported without executing the script's main logic.

module.yml

```yaml
def main():

    fields = {
        "github_auth_key": {"required": True, "type": "str"},
        "username": {"required": True, "type": "str"},
        "name": {"required": True, "type": "str"},
        "description": {"required": False, "type": "str"},
        "private": {"default": False, "type": "bool"},
        "has_issues": {"default": True, "type": "bool"},
        "has_wiki": {"default": True, "type": "bool"},
        "has_downloads": {"default": True, "type": "bool"},
        "state": {
            "default": "present",
            "choices": ['present', 'absent'],
            "type": 'str'
        },
    }

    choice_map = {
        "present": github_repo_present,
        "absent": github_repo_absent,
    }

    module = AnsibleModule(argument_spec=fields)
    is_error, has_changed, result = choice_map.get(
        module.params['state'])(module.params)

    if not is_error:
        module.exit_json(changed=has_changed, meta=result)
    else:
        module.fail_json(msg="Error deleting repo", meta=result)


if __name__ == '__main__':
    main()
```

Lab: Write a module