



Red Hat Ansible Automation Platform

Ansible Linux Automation Workshop

Introduction to Ansible for Red Hat Enterprise Linux Automation
for System Administrators and Operators



Red Hat Ansible Automation Platform

What you will learn

- ▶ Overview of public cloud provisioning
- ▶ Converting shell commands into Ansible Commands.
- ▶ Retrieving information from hosts
- ▶ Deploying applications at scale
- ▶ Self-service IT via surveys
- ▶ Overview of System Roles for Red Hat Enterprise Linux
- ▶ Overview of Red Hat Insights integration

Introduction

Topics Covered:

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



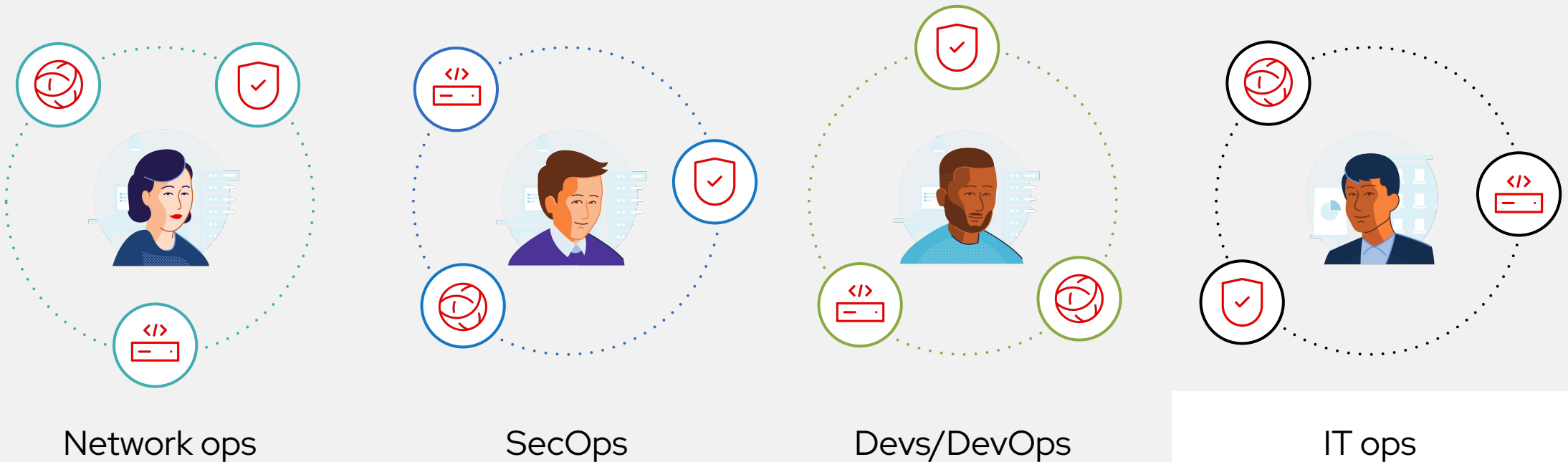
Red Hat
Ansible Automation
Platform



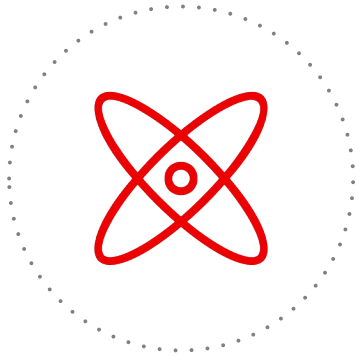
Automation happens when
one person meets a problem
they never want to solve again

Many organizations share the same challenge

Too many unintegrated, domain-specific tools

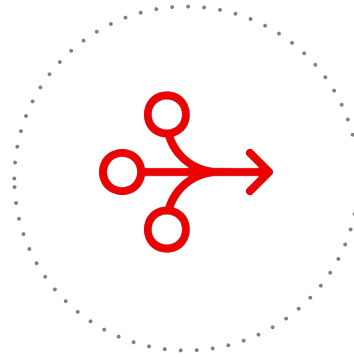


Why the Ansible Automation Platform?



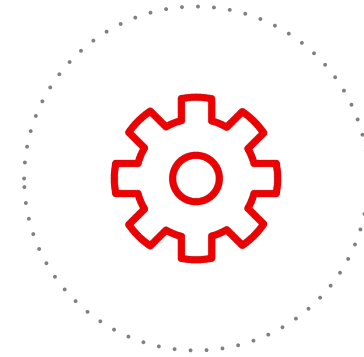
Powerful

Orchestrate complex processes at enterprise scale.



Simple

Simplify automation creation and management across multiple domains.



Agentless

Easily integrate with hybrid environments.

Automate the deployment and management of automation

Your entire IT footprint

Do this...

Orchestrate

Manage configurations

Deploy applications

Provision / deprovision

Deliver continuously

Secure and comply

On these...



Firewalls



Load balancers



Applications



Containers



Virtualization platforms



Servers



Clouds



Storage



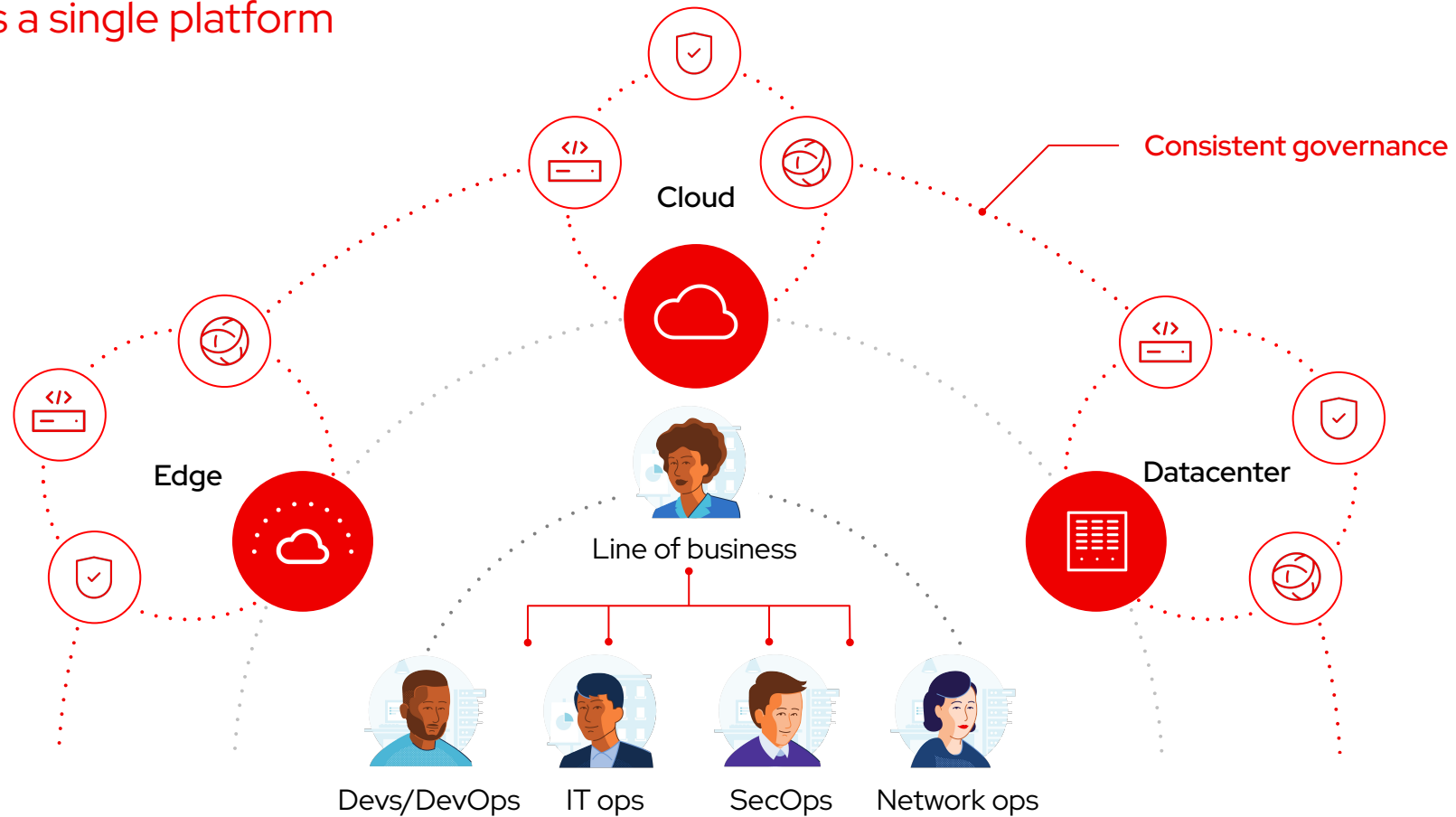
Network devices



And more ...

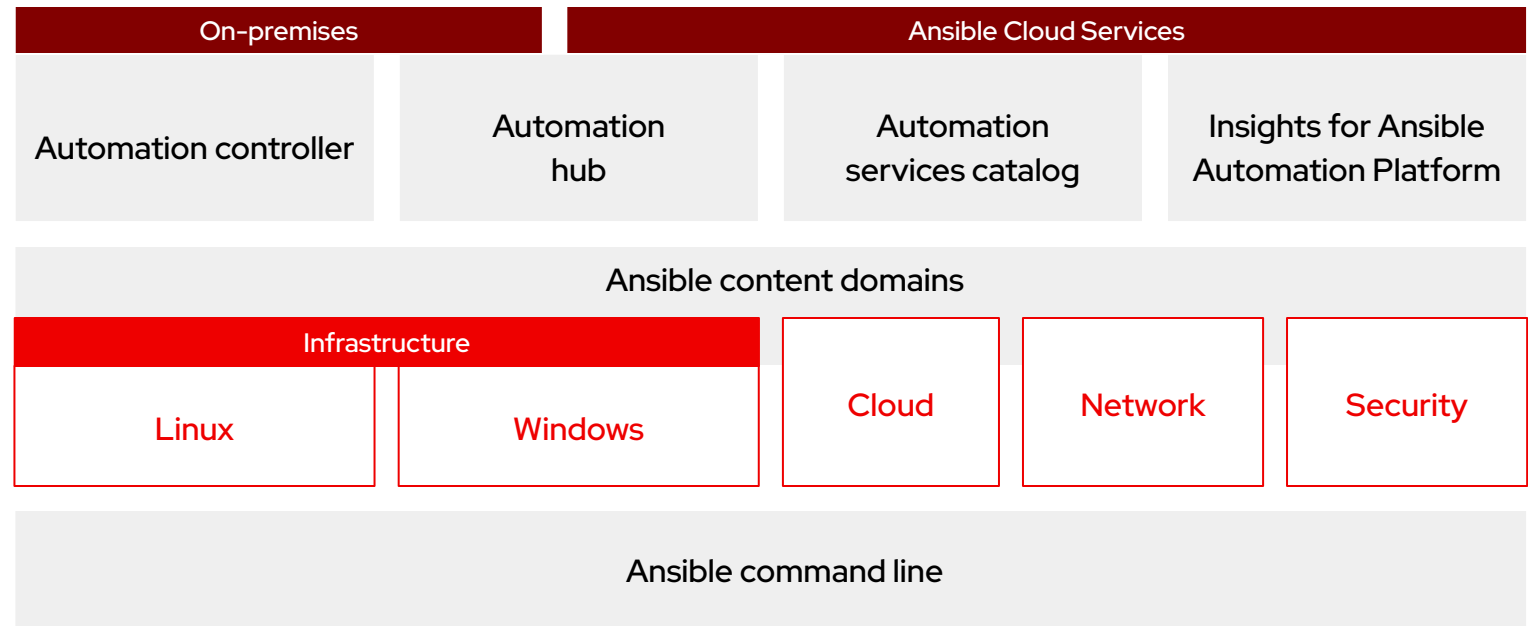
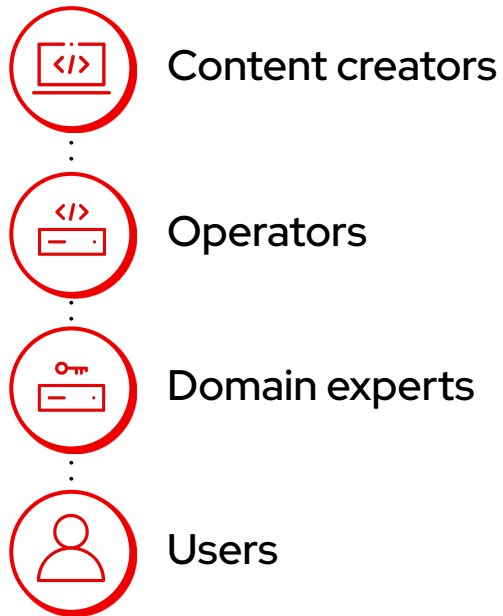
Break down silos

Different teams a single platform



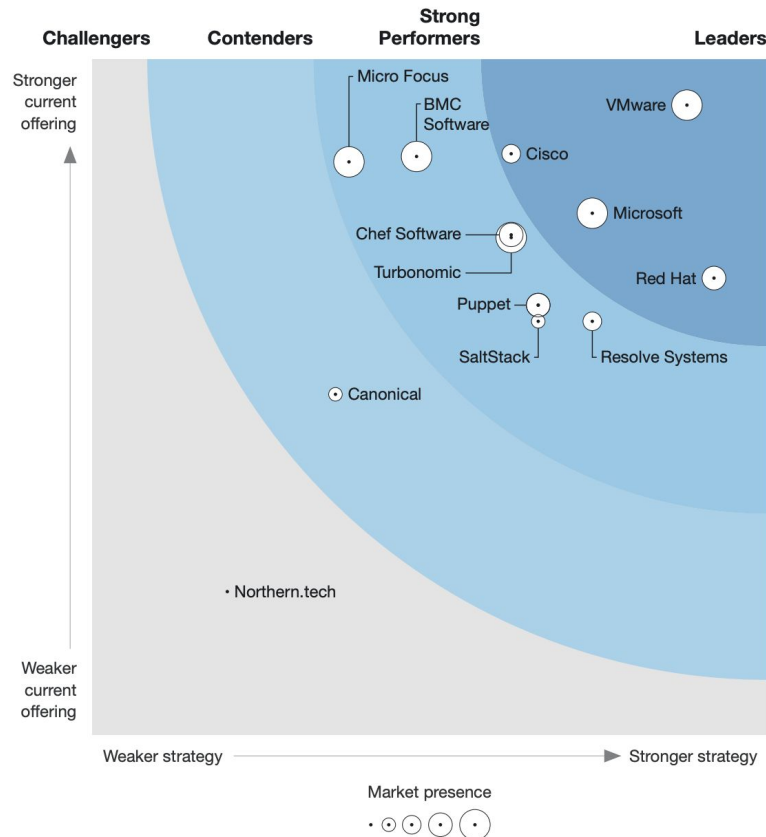
What makes a platform?

Red Hat Ansible Automation Platform



Fueled by an
open source community

THE FORRESTER WAVE™
Infrastructure Automation Platforms
Q3 2020



Red Hat named a Leader in The Forrester Wave™

Infrastructure Automation Platforms, Q3 2020



Received highest possible score in the criteria of:

- Deployment functionality
- Product Vision
- Partner Ecosystem
- Supporting products and services
- Community support
- Planned product enhancements

- ▶ “Ansible continues to grow quickly, particularly among enterprises that are automating networks. The solution excels at providing a variety of deployment options and acting as a service broker to a wide array of other automation tools.”
- ▶ “Red Hat’s solution is a good fit for customers that want a holistic automation platform that integrates with a wide array of other vendors’ infrastructure.”

Source:

Gardner, Chris, Glenn O'Donnell, Robert Perdonii, and Diane Lynch. "The Forrester Wave™: Infrastructure Automation Platforms, Q3 2020." Forrester, 10 Aug. 2020.

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Ansible automates technologies you use

Time to automate is measured in minutes

Cloud	Virt & Container	Windows	Network	Security	Monitoring
AWS	Docker	ACLs	A10	Checkpoint	Dynatrace
Azure	VMware	Files	Arista	Cisco	Datadog
Digital Ocean	RHV	Packages	Aruba	CyberArk	LogicMonitor
Google	OpenStack	IIS	Cumulus	F5	New Relic
OpenStack	OpenShift	Regedits	Bigswitch	Fortinet	Sensu
Rackspace	+more	Shares	Cisco	Juniper	+more
+more		Services	Dell	IBM	
Operating Systems	Storage	Configs	Extreme	Palo Alto	Devops
RHEL	Netapp	Users	F5	Snort	Jira
Linux	Red Hat Storage	Domains	Lenovo	+more	GitHub
Windows	Infinidat	+more	MikroTik		Vagrant
+more	+more		Juniper		Jenkins
			OpenSwitch		Slack
			+more		+more

Cloud

Topics Covered:

- Understanding the Ansible Infrastructure
- Check the prerequisites



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The lab environment today

- **Drink our own champagne.**

Provisioned by, configured by, and managed by Red Hat Ansible Automation Platform.

<https://github.com/ansible/workshops>

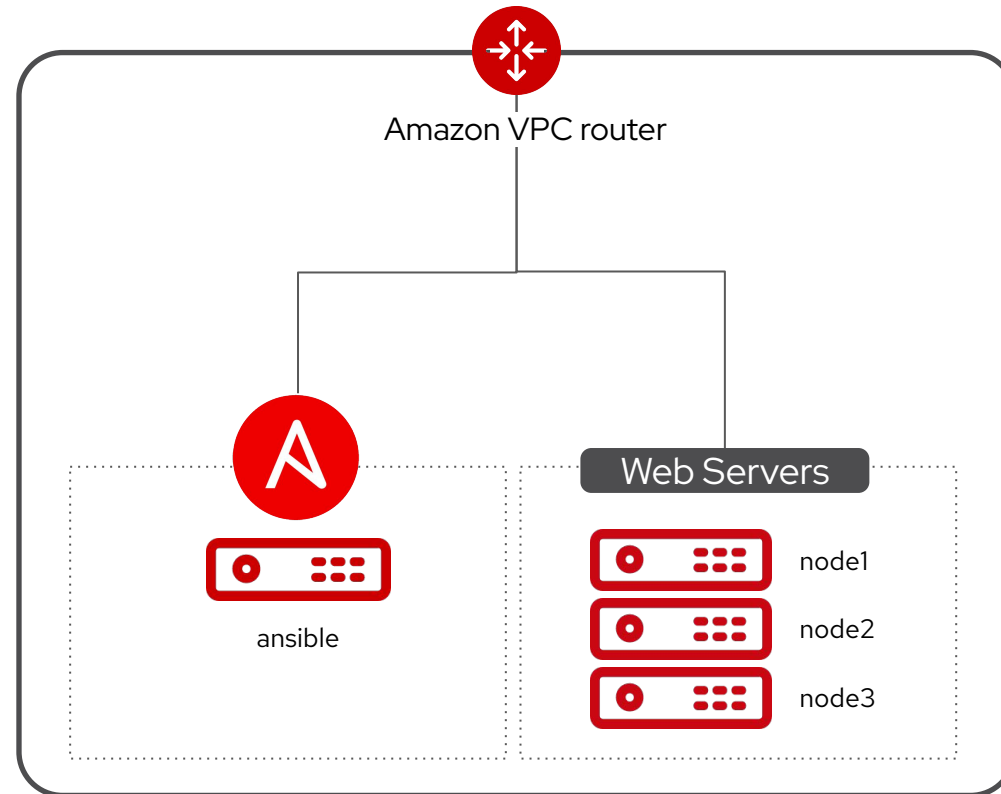
- **Learn with the real thing**

Every student will have their own fully licensed Red Hat Ansible Tower control node. No emulators or simulators here.

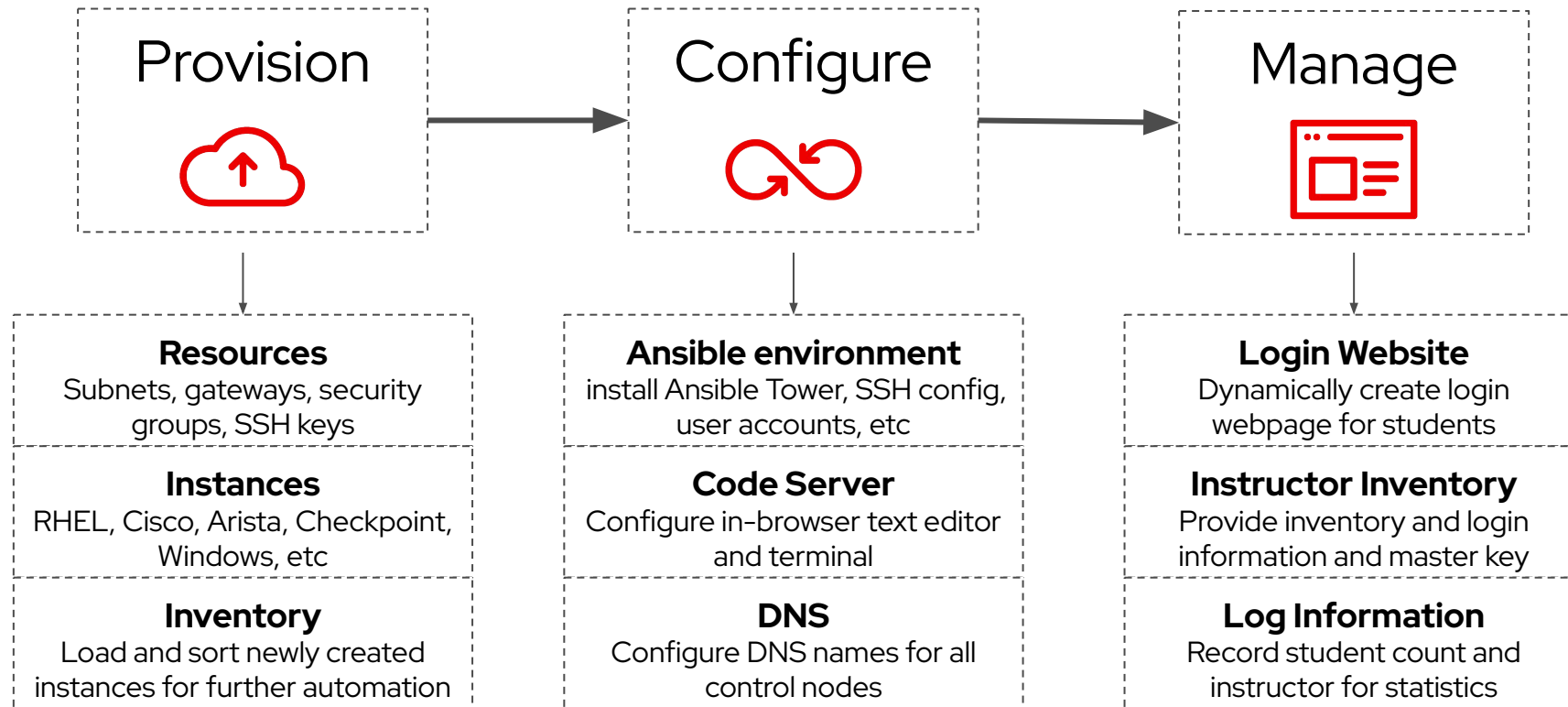
- **Red Hat Enterprise Linux**

All four nodes are enterprise Linux, showcasing real life use-cases to help spark ideas for what you can automate today.

Workbench Topology



How does it work?



Exercise 1

Topics Covered:

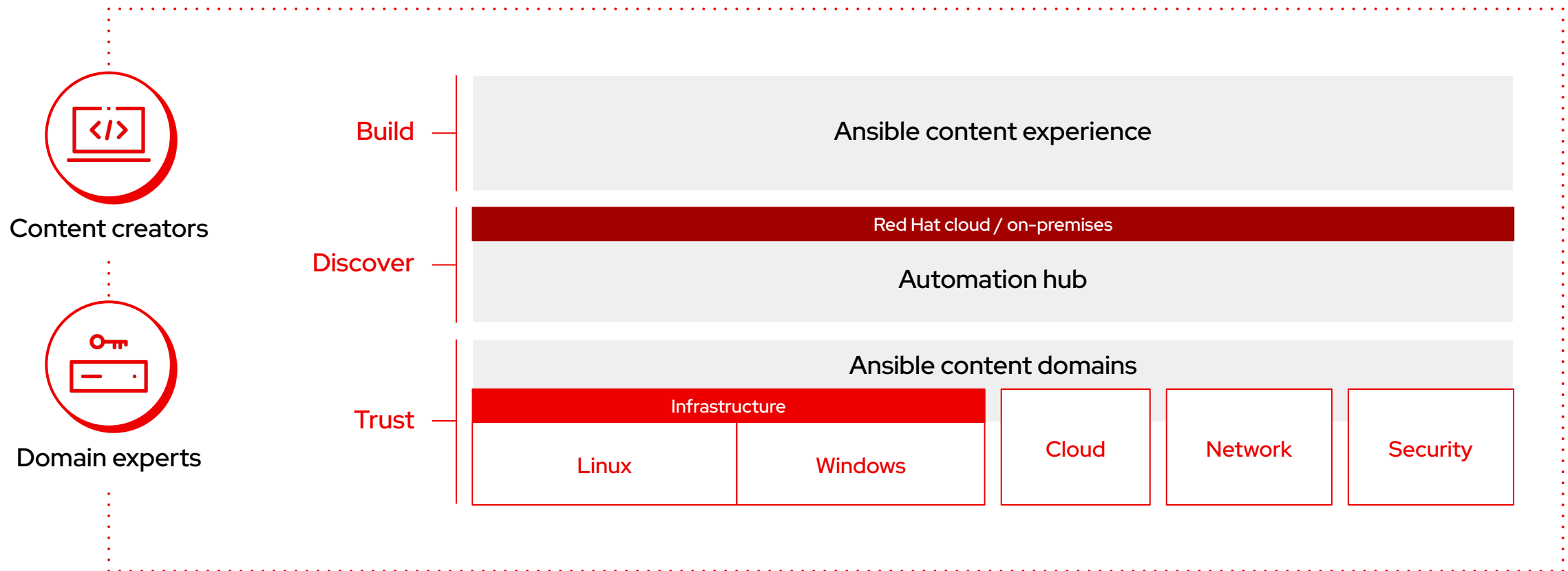
- Understanding the Ansible Infrastructure
- Check the prerequisites



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Create

The automation lifecycle





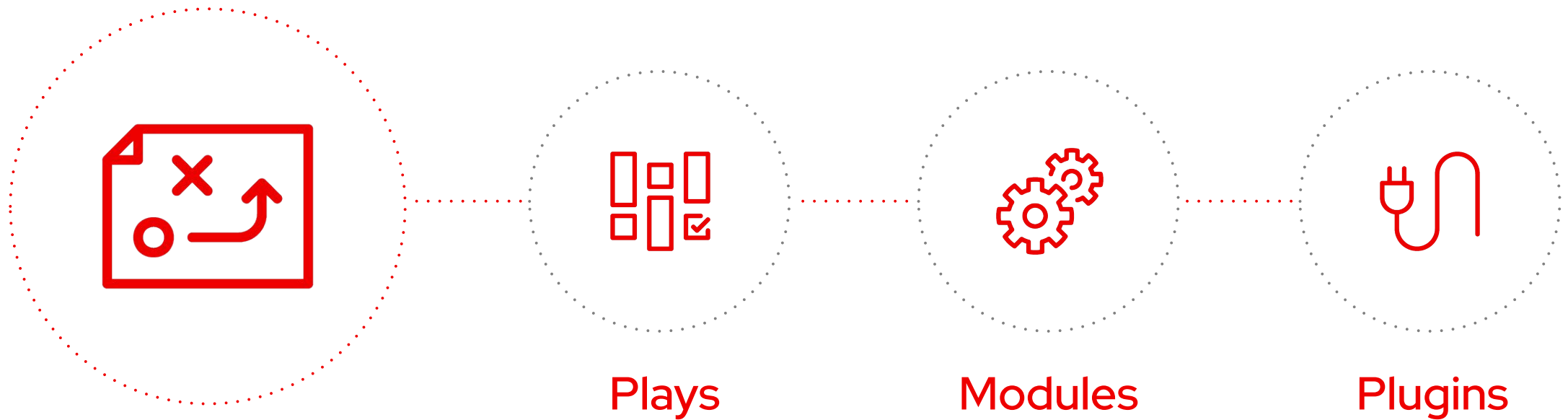
```
---
- name: install and start apache
  hosts: web
  become: yes

  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
```

What makes up an Ansible playbook?



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.

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

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.

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

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.

Example become plugin:

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

Example filter plugins:

```
{{ some_variable | to_nice_json }}  
{{ some_variable | to_nice_yaml }}
```

Ansible Inventory

The systems that a playbook runs against



What are they?

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
```

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.

```
---  
- name: install and start apache  
  hosts: web  
  roles:  
    - common  
    - webservers
```

Collections

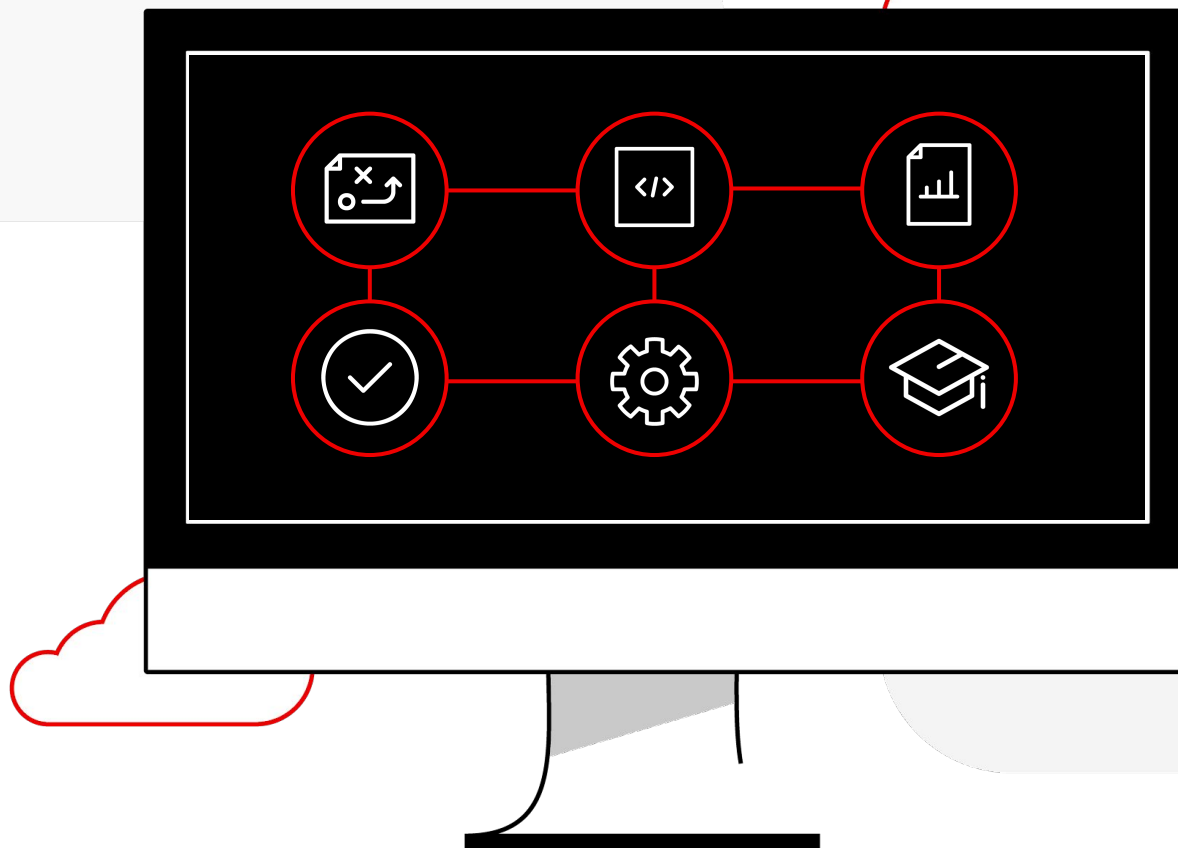
Simplified and consistent content delivery



What are they?

Collections are a data structure containing automation content:

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

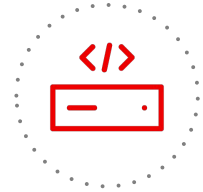




```
nginx_core
├── MANIFEST.json
├── playbooks
│   └── deploy-nginx.yml
│       └── ...
├── plugins
├── README.md
├── roles
│   ├── nginx
│   │   ├── defaults
│   │   ├── files
│   │   │   └── ...
│   │   ├── tasks
│   │   └── templates
│   │       └── ...
│   ├── nginx_app_protect
│   └── nginx_config
```

deploy-nginx.yml

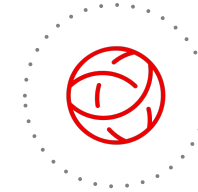
```
---
- name: Install NGINX Plus
  hosts: all
  tasks:
    - name: Install NGINX
      include_role:
        name: nginxinc.nginx
      vars:
        nginx_type: plus
    - name: Install NGINX App Protect
      include_role:
        name: nginxinc.nginx_app_protect
      vars:
        nginx_app_protect_setup_license: false
        nginx_app_protect_remove_license: false
        nginx_app_protect_install_signatures: false
```



Infrastructure



Cloud



Network



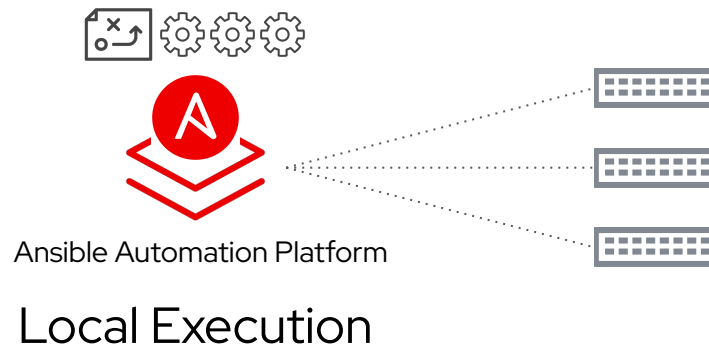
Security

90+
certified platforms

 Red Hat		ARISTA	 Check Point <small>SOFTWARE TECHNOLOGIES LTD</small>
 NetApp™		 CISCO™	 CYBERARK®
 IBM®	 Microsoft	 f5®	FORTINET®

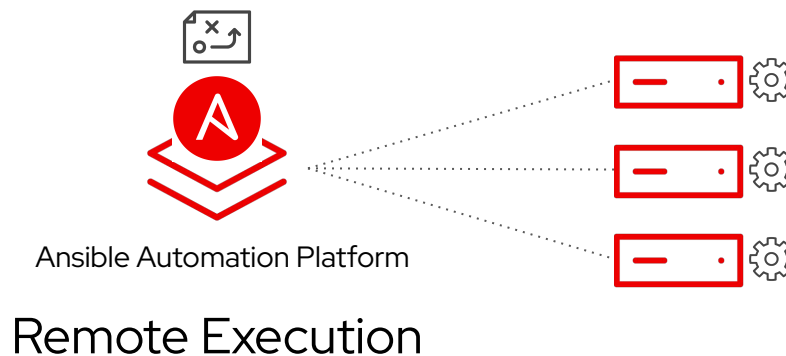
How Ansible Automation Works

Module code is executed locally on the control node



Network Devices /
API Endpoints

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



Linux / Windows
Hosts

Verify Lab Access

- Follow the steps in to access environment
- Use the IP provided to you, the script only has example IP
- Which editor do you use on command line?
If you don't know, we have a short intro



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Lab Time

Complete exercise **1-setup** now in your lab environment



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Exercise 2

Topics Covered:

- Ansible inventories
- Accessing Ansible docs
- Modules and getting help

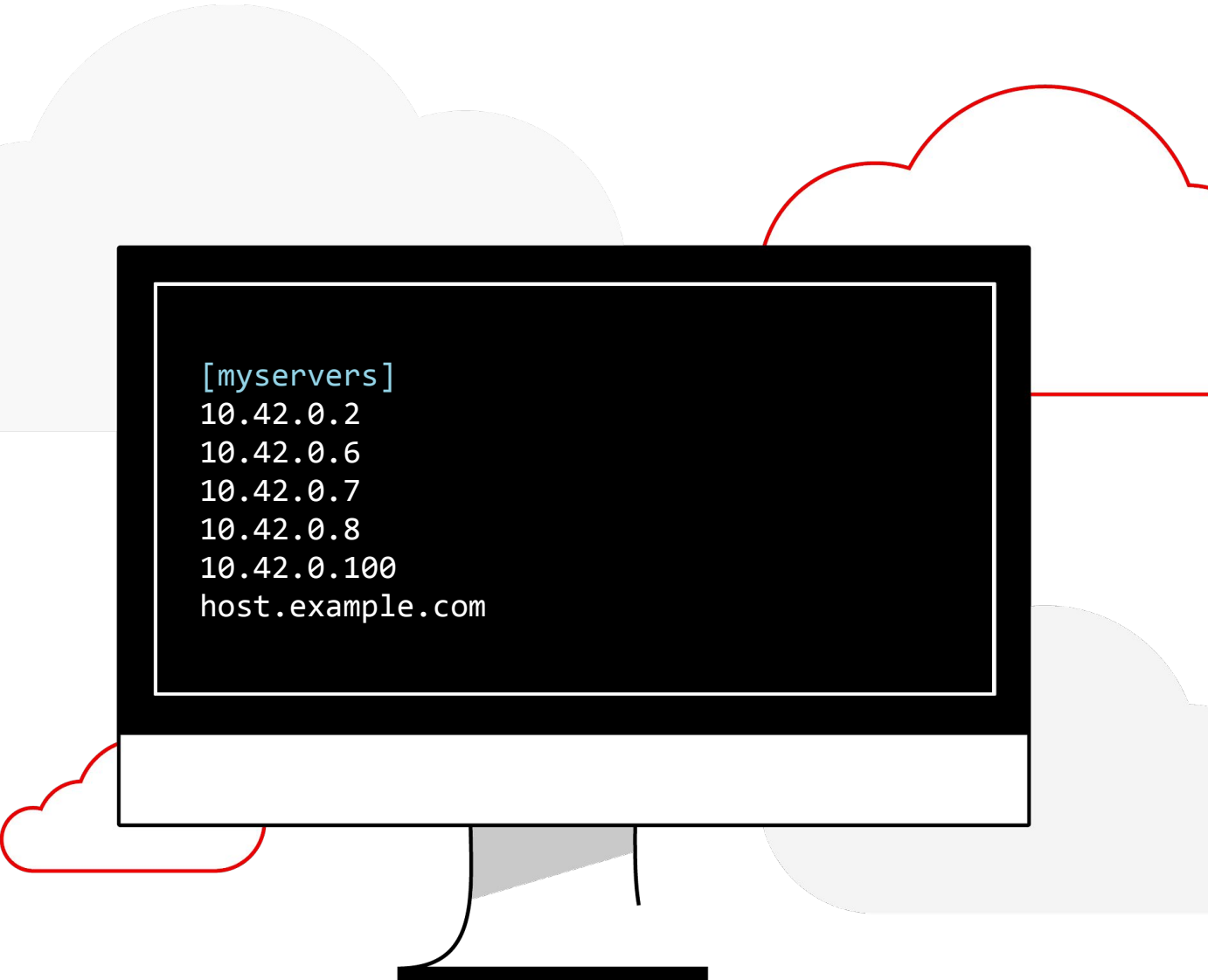
Inventory

- ▶ 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

Ansible Inventory

The Basics

An example of a static Ansible inventory including systems with IP addresses as well as fully qualified domain name (FQDN)



```
[myservers]
10.42.0.2
10.42.0.6
10.42.0.7
10.42.0.8
10.42.0.100
host.example.com
```




[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
```



```
[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
```



```
[nashville]
bnaapp01
bnaapp02

[atlanta]
atlapp03
atlapp04

[south:children]
atlanta
nashville
hsvapp05
```

Accessing the Ansible docs

With the use of the latest command utility `ansible-navigator`, one can trigger access to all the modules available to them as well as details on specific modules.

A formal introduction to `ansible-navigator` and how it can be used to run playbooks in the following exercise.

```
$ ansible-navigator doc -l -m stdout
add_host
amazon.aws.aws_az_facts
amazon.aws.aws_caller_facts
amazon.aws.aws_caller_info
.
.
.
.
.
```

Accessing the Ansible docs

Aside from listing a full list of all the modules, you can use `ansible-navigator` to provide details about a specific module.

In this example, we are getting information about the `user` module.

```
$ ansible-navigator doc user -m stdout
```

```
> ANSIBLE.BUILTIN.USER  
(/usr/lib/python3.8/site-packages/ansible/modules/user.py)
```

```
Manage user accounts and user attributes.  
For Windows targets, use the  
[ansible.windows.win_user] module  
instead.
```



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Lab Time

Complete exercise **2-thebasics** now in your lab environment

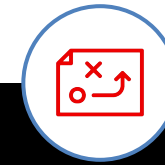
Exercise 3

Topics Covered:

- Playbooks basics
- Running a playbook



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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
```




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
```



A 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 Playbooks

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

A playbook run

Where it all starts

- ▶ A playbook is interpreted and run against one or multiple hosts - task by task. The order of the tasks defines the execution.
- ▶ In each task, the module does the actual work.

```
SEARCH [Q] [KEY]
-
1 Identity added: /tmp/awx_2896_5sdng51e/artifacts/2896/ssh_key_data (/tmp/awx_2896_5sdng51e/artifacts/2896/ssh_key_data)
2
3 PLAY [install and start apache] ***** 14:04:14
4
5 TASK [Gathering Facts] ***** 14:04:14
6 ok: [node1]
7 ok: [node3]
8 ok: [node2]
9
10 TASK [httpd package is present] ***** 14:04:16
11 changed: [node1]
12 changed: [node2]
13 changed: [node3]
14
15 TASK [latest index.html file is present] ***** 14:04:24
16 changed: [node1]
17 changed: [node2]
18 changed: [node3]
19
20 TASK [httpd is started] ***** 14:04:26
21 changed: [node1]
22 changed: [node2]
23 changed: [node3]
24
25 PLAY RECAP ***** 14:04:28
26 node1      : ok=4  changed=3  unreachable=0  failed=0  skipped=0  rescued=0  ignored=0
27 node2      : ok=4  changed=3  unreachable=0  failed=0  skipped=0  rescued=0  ignored=0
28 node3      : ok=4  changed=3  unreachable=0  failed=0  skipped=0  rescued=0  ignored=0
29
```

Running an Ansible Playbook

Using the latest `ansible-navigator` command



What is `ansible-navigator`?

`ansible-navigator` command line utility and text-based user interface (TUI) for running and developing Ansible automation content.

It replaces the previous command used to run playbooks "`ansible-playbook`".

A stylized illustration of a computer monitor with a black frame and a white base. The screen is black and displays a white terminal prompt and command. The background features light gray clouds and a red outline of another cloud.

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

ansible-navigator

Bye ansible-playbook, Hello ansible-navigator



How do I use ansible-navigator?

As previously mentioned, it replaces the ansible-playbook command.

As such it brings two methods of running playbooks:

- ▶ Direct command-line interface
- ▶ Text-based User Interface (TUI)

```
# Direct command-line interface method
$ ansible-navigator run playbook.yml -m stdout

# Text-based User Interface method
$ ansible-navigator run playbook.yml
```

ansible-navigator

Mapping to previous Ansible commands

ansible command	ansible-navigator command
<code>ansible-config</code>	<code>ansible-navigator config</code>
<code>ansible-doc</code>	<code>ansible-navigator doc</code>
<code>ansible-inventory</code>	<code>ansible-navigator inventory</code>
<code>ansible-playbook</code>	<code>ansible-navigator run</code>

ansible-navigator

Common subcommands

Name	Description	CLI Example	Colon command within TUI
collections	Explore available collections	<code>ansible-navigator collections --help</code>	<code>:collections</code>
config	Explore the current ansible configuration	<code>ansible-navigator config --help</code>	<code>:config</code>
doc	Review documentation for a module or plugin	<code>ansible-navigator doc --help</code>	<code>:doc</code>
images	Explore execution environment images	<code>ansible-navigator images --help</code>	<code>:images</code>
inventory	Explore and inventory	<code>ansible-navigator inventory --help</code>	<code>:inventory</code>
replay	Explore a previous run using a playbook artifact	<code>ansible-navigator replay --help</code>	<code>:replay</code>
run	Run a playbook	<code>ansible-navigator run --help</code>	<code>:run</code>
welcome	Start at the welcome page	<code>ansible-navigator welcome --help</code>	<code>:welcome</code>



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Lab Time

Complete exercise **3-playbooks** now in your lab environment

Exercise 4

Topics Covered:

- Working with variables
- What are facts?



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

  vars:
    var_one: awesome
    var_two: ansible is
    var_three: "{{ var_two }}" "{{ var_one }}"

  tasks:
    - name: print out var_three
      debug:
        msg: "{{ var_three }}"
```



```
---  
- name: variable playbook test  
  hosts: localhost  
  
  vars:  
    var_one: awesome  
    var_two: ansible is  
    var_three: "{{ var_two }} {{ var_one }}"  
  
  tasks:  
    - name: print out var_three  
      debug:  
        msg: "{{ var_three }}"
```

ansible is awesome

Ansible Facts

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

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



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

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



Ansible Navigator TUI

PLAY NAME	OK	CHANGED	UNREACHABLE	FAILED	SKIPPED	IGNORED	IN PROGRESS	TASK COUNT	PROGRESS
0 facts playbook	2	0	0	0	0	0	0	2	COMPLETE



RESULT	HOST	NUMBER	CHANGED	TASK	TASK ACTION	DURATION
0 OK	localhost	0	False	Gathering Facts	gather_facts	1s
1 OK	localhost	1	False	Collect all facts of host	setup	1s



PLAY [facts playbook:1]

TASK [Collect all facts of host]

OK: [localhost]

```
.
.
12 | ansible_facts:
13 |   ansible_all_ipv4_addresses:
14 |     - 10.0.2.100
15 |   ansible_all_ipv6_addresses:
16 |     - fe80::1caa:f0ff:fe15:23c4
```

Ansible Inventory - Managing Variables In Files

```
$ tree ansible-files/  
├── deploy_index_html.yml  
├── files  
│   ├── dev_web.html  
│   └── prod_web.html  
├── group_vars  
│   └── web.yml  
└── host_vars  
    └── node2.yml
```


Ansible Inventory - Managing Variables In Files

```
├──
├── deploy_index_html.yml
│   ├── files
│   │   ├── dev_web.html
│   │   └── prod_web.html
│   ├── group_vars
│   │   └── web.yml
│   └── host_vars
│       └── node2.yml
```

```
$ cat group_vars/web.yml
---
stage: dev
```

```
$ cat host_vars/node2.yml
---
stage: prod
```

```
- name: copy web.html
  copy:
    src: "{{ stage }}_web.html"
    dest: /var/www/html/index.html
```



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Lab Time

Complete exercise **4-variables** now in your lab environment

Exercise 5

Topics Covered:

- Surveys

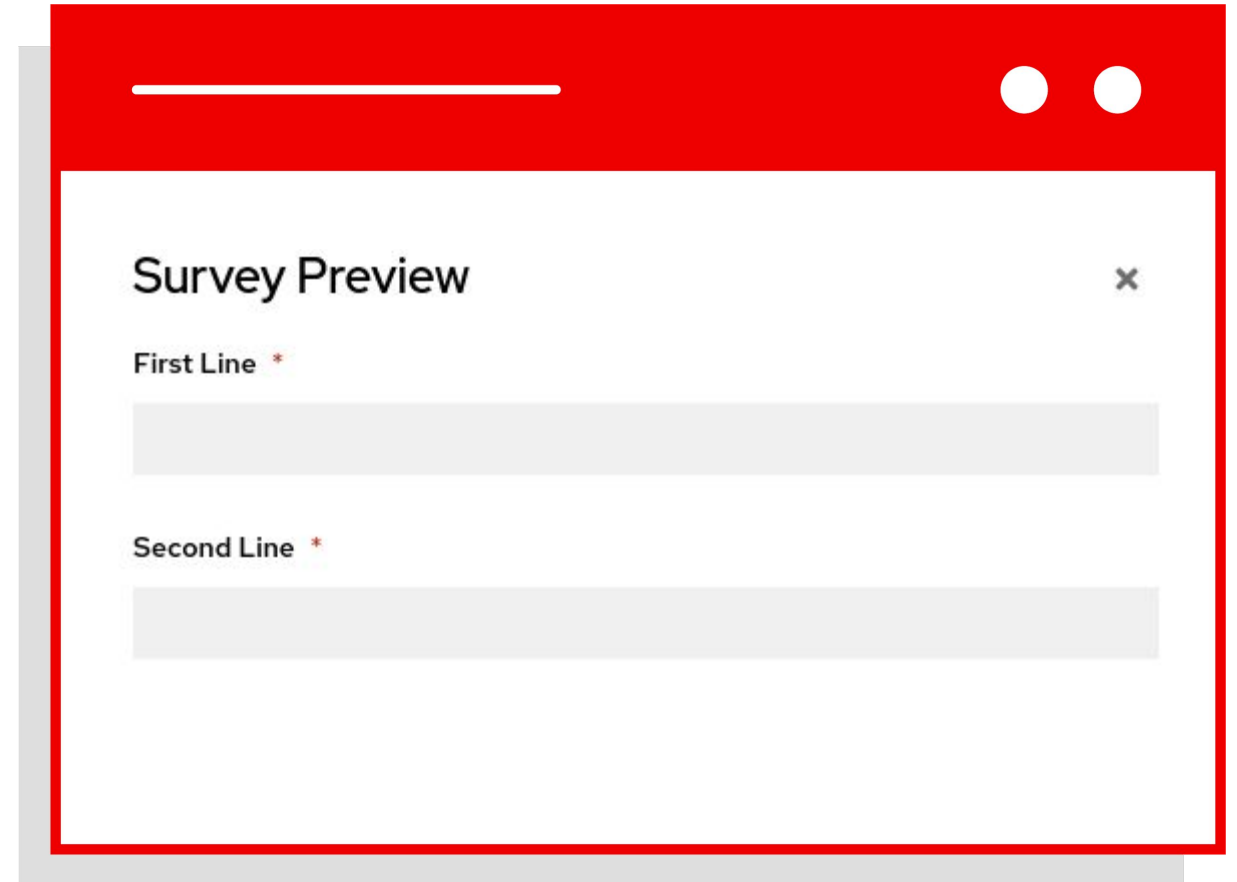


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Surveys

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.



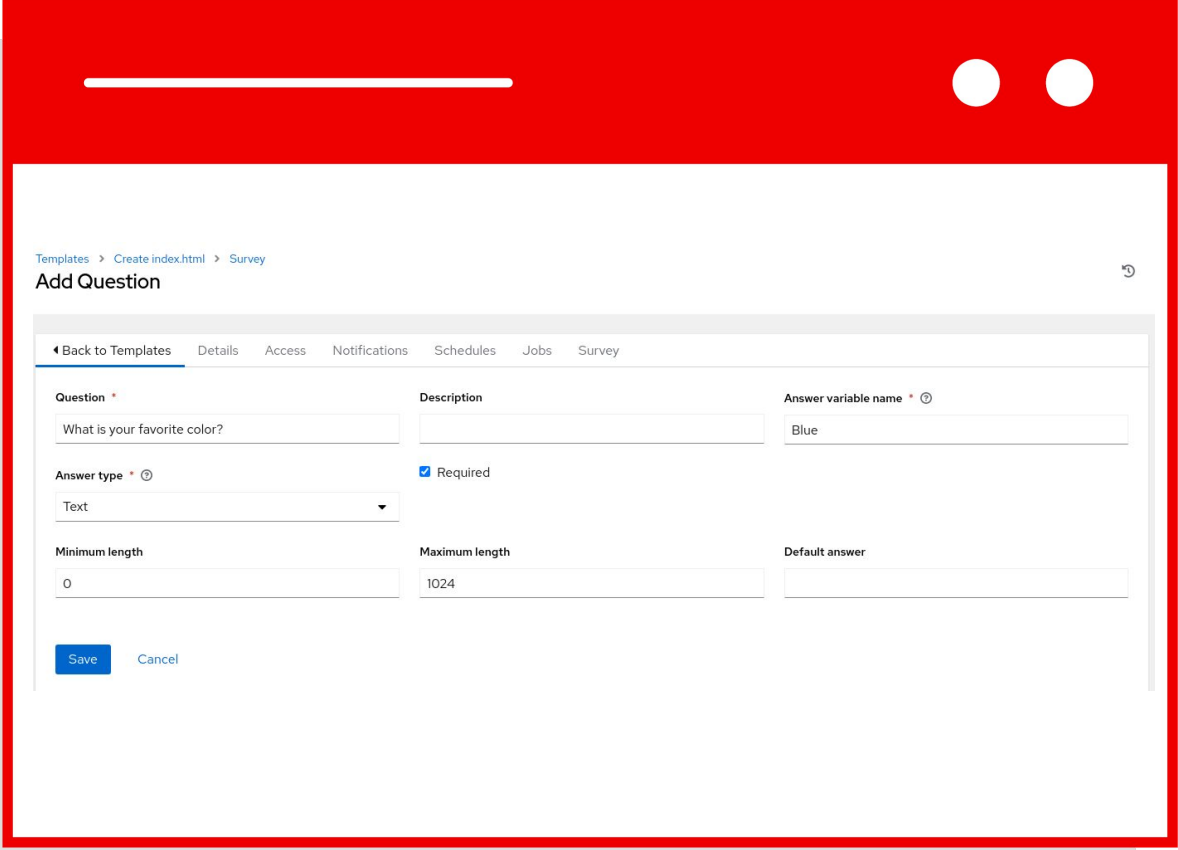
The image shows a screenshot of a web browser window with a red header bar. The browser title bar contains two white circles. The main content area is white and features a 'Survey Preview' window with a close button (an 'x') in the top right corner. The survey form consists of two text input fields. The first field is labeled 'First Line *' and the second is labeled 'Second Line *'. Both labels have a red asterisk indicating a required field. The input fields are currently empty and have a light gray background.

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.



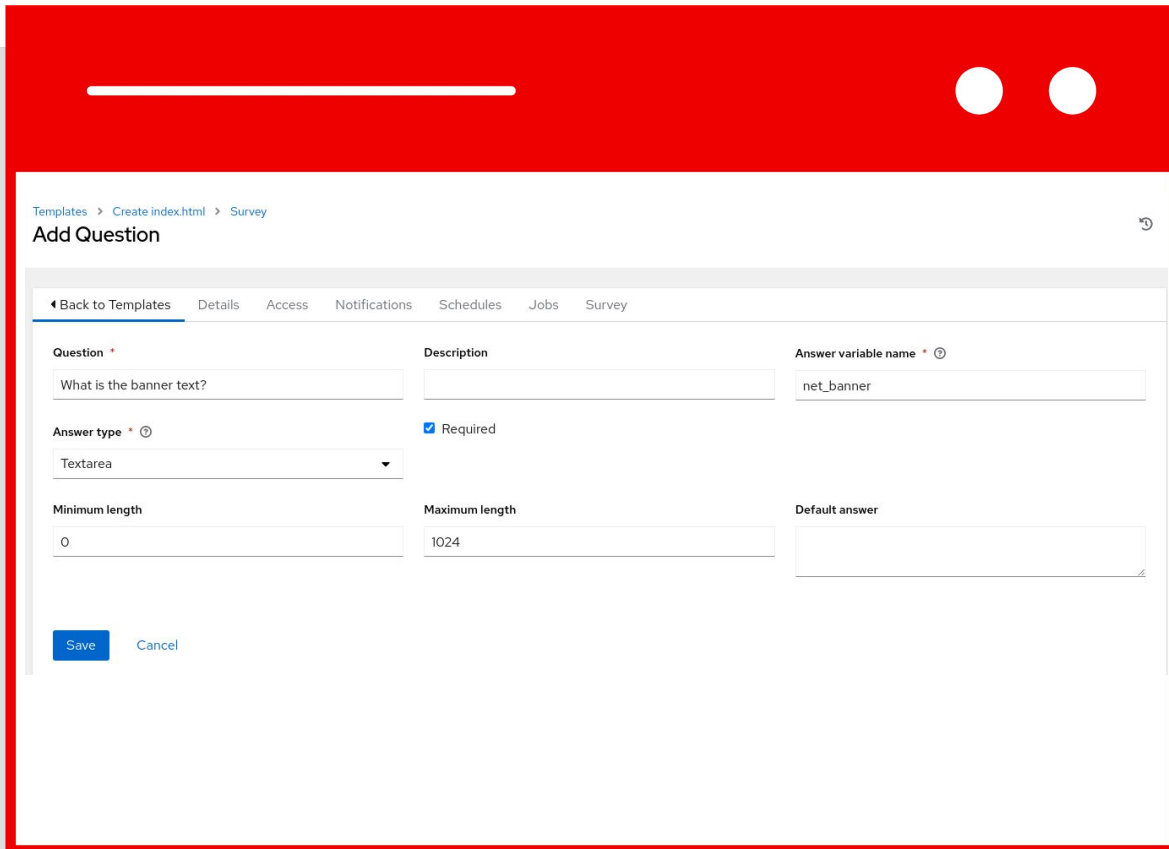
The screenshot shows a web interface for adding a question to a survey. The interface is titled "Add Question" and is part of a "Survey" menu. The form contains the following fields and options:

- Question:** A text input field containing "What is your favorite color?".
- Description:** An empty text input field.
- Answer variable name:** A text input field containing "Blue".
- Answer type:** A dropdown menu set to "Text".
- Required:** A checked checkbox.
- Minimum length:** A text input field containing "0".
- Maximum length:** A text input field containing "1024".
- Default answer:** An empty text input field.

At the bottom of the form, there are two buttons: "Save" (in blue) and "Cancel".

Creating a Survey (2/2)

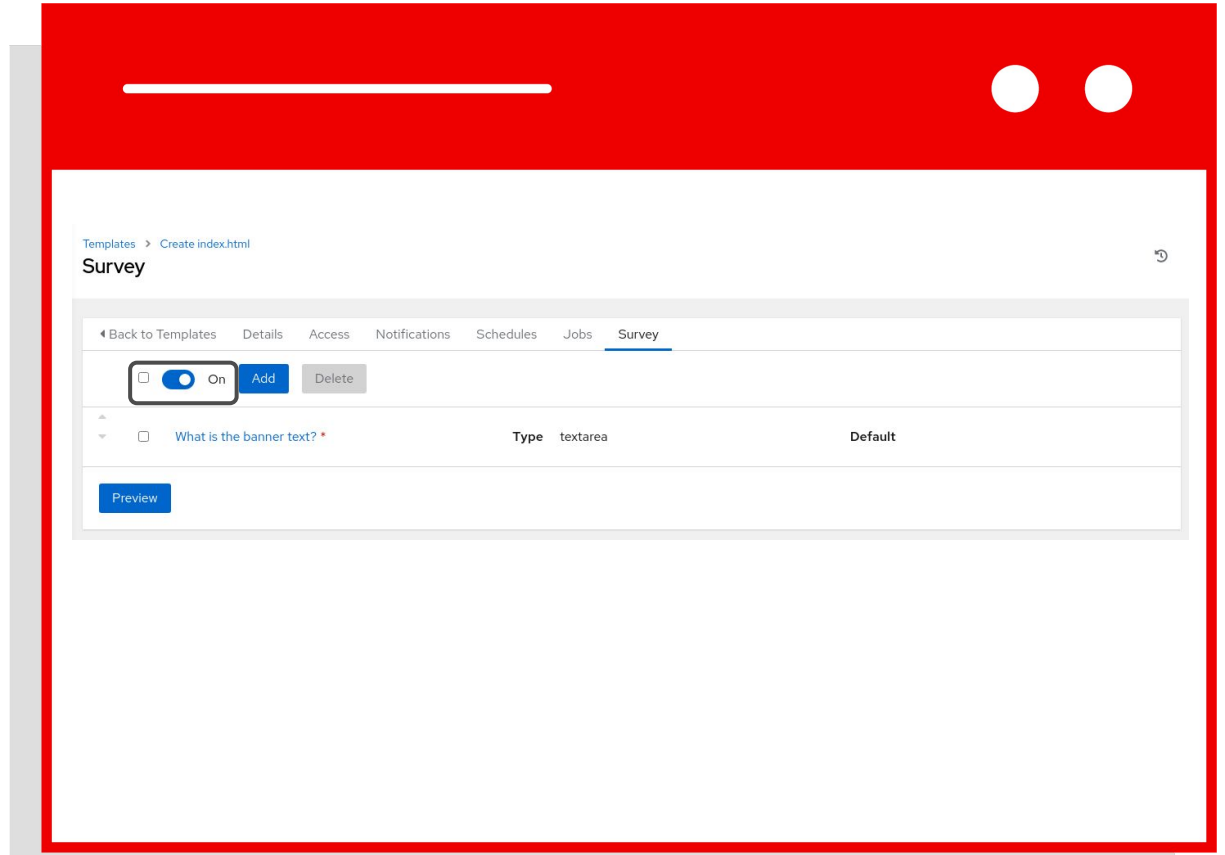
The Add Survey window allows the Job Template to prompt users for one or more questions. The answers provided become variables for use in the Ansible Playbook.



The screenshot shows the 'Add Question' form in the Ansible Tower interface. The breadcrumb trail is 'Templates > Create index.html > Survey'. The form title is 'Add Question'. The navigation tabs are 'Back to Templates', 'Details', 'Access', 'Notifications', 'Schedules', 'Jobs', and 'Survey'. The form fields are:

- Question ***: Text input with 'What is the banner text?'
- Description**: Text input (empty)
- Answer variable name ***: Text input with 'net_banner'
- Answer type ***: Dropdown menu with 'Textarea' selected
- Required**: Checked checkbox
- Minimum length**: Text input with '0'
- Maximum length**: Text input with '1024'
- Default answer**: Text input (empty)

Buttons: 'Save' (blue), 'Cancel' (grey).

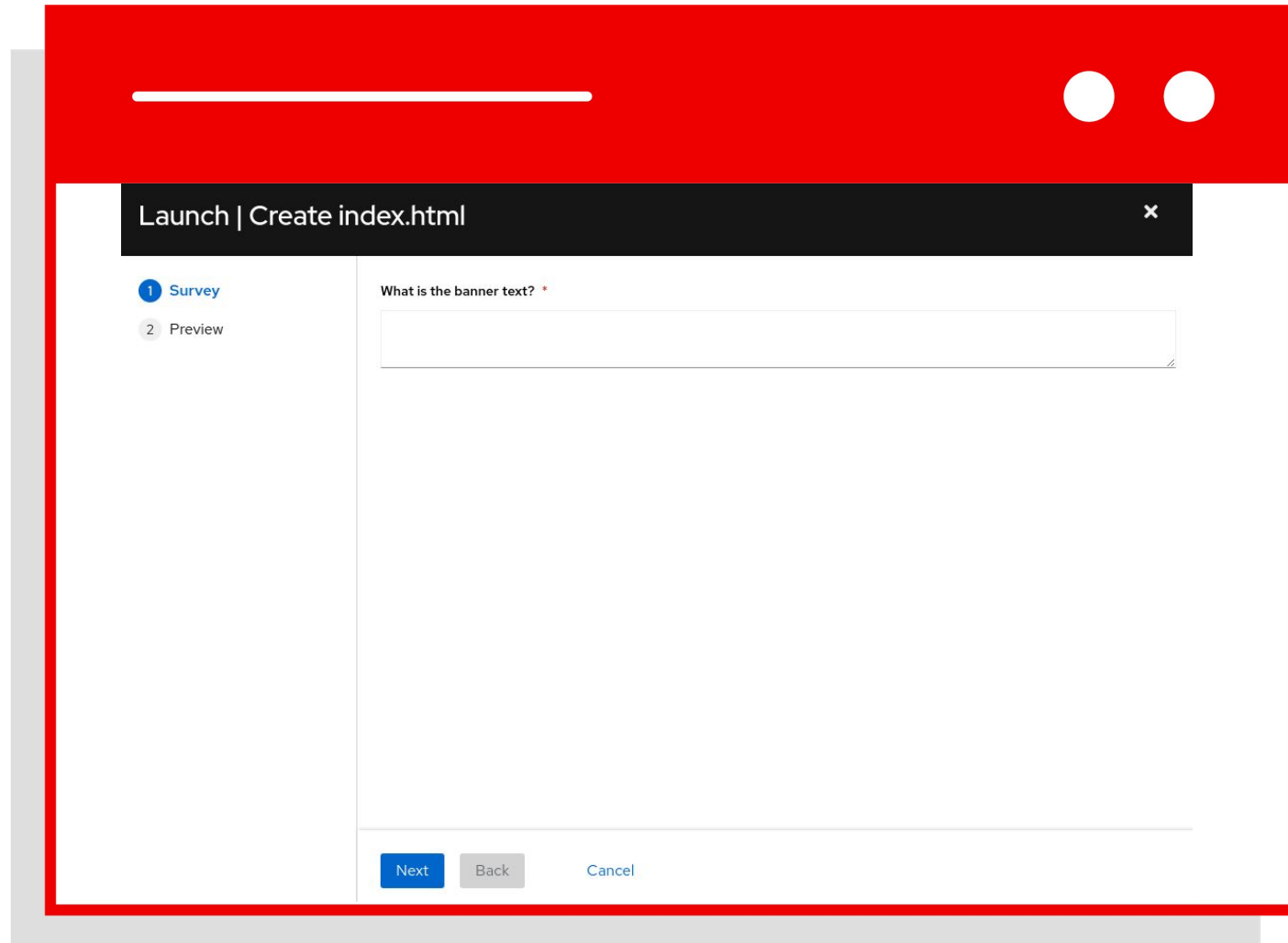


The screenshot shows the 'Survey' configuration page in the Ansible Tower interface. The breadcrumb trail is 'Templates > Create index.html'. The page title is 'Survey'. The navigation tabs are 'Back to Templates', 'Details', 'Access', 'Notifications', 'Schedules', 'Jobs', and 'Survey'. The configuration options are:

- On/Off**: Toggle switch set to 'On', with 'Add' (blue) and 'Delete' (grey) buttons.
- Questions List**: A table with one entry: 'What is the banner text? *' with 'Type: textarea' and 'Default'.
- Preview**: A blue button.

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.



The screenshot shows a dialog box with a red header bar. The title bar is black and contains the text "Launch | Create index.html" and a close button (X). The main content area is white and features a progress indicator on the left with two steps: "1 Survey" (highlighted in blue) and "2 Preview". The main area contains a question: "What is the banner text? *". Below the question is a large, empty text input field. At the bottom of the dialog, there are three buttons: "Next" (blue), "Back" (grey), and "Cancel" (grey).



Red Hat Ansible Automation Platform

Lab Time

Complete exercise **5-surveys** now in your lab environment



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Exercise 6

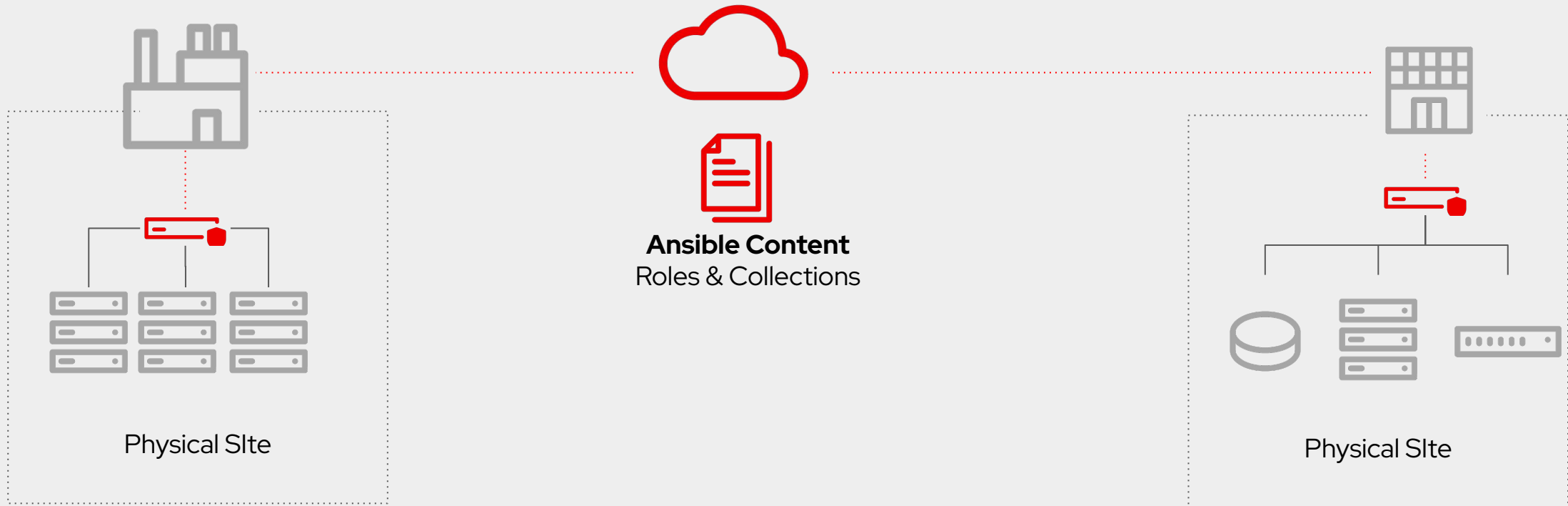
Topics Covered:

- Red Hat Enterprise Linux System Roles



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Automation Hub and Ansible Galaxy



Linux System Roles Collection

- Consistent user interface to provide settings to a given subsystem that is abstract from any particular implementation

Examples



kdump



network



selinux



timesync



```
---  
- name: example system roles playbook  
  hosts: web  
  
  tasks:  
  
    - name: Configure Firewall  
      include_role:  
        name: linux-system-roles.firewall  
  
    - name: Configure Timesync  
      include_role:  
        name: redhat.rhel_system_roles.timesync
```



timesync role is referenced from
the RHEL System Roles Collection



Red Hat Ansible Automation Platform

Lab Time

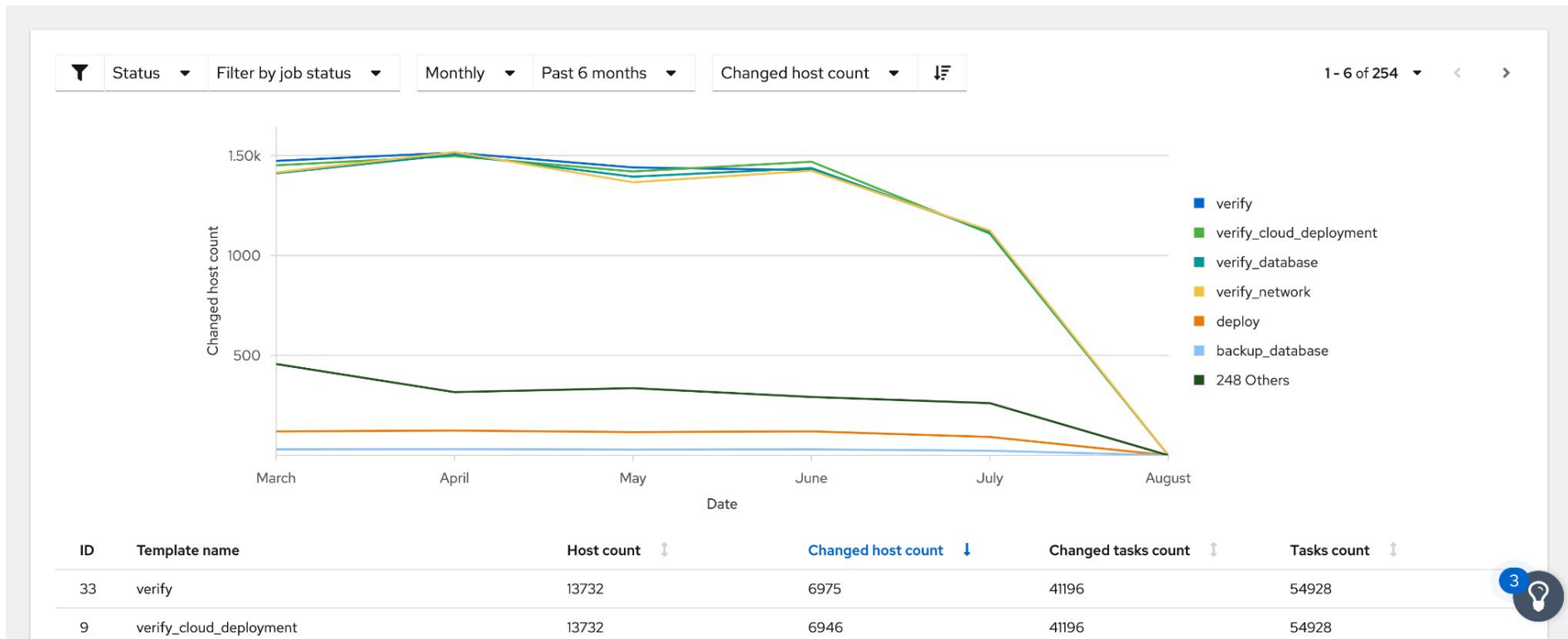
Complete exercise **6-system-roles** now in your lab environment

Reports: Provide executive summaries of automation across the organization

Reports

Changes made by job template

The total count of changes made by each job template in a specified time window. You can use this report to ensure the correct number of changes are made per hostname, as well as see which job templates are doing the most changes to your infrastructure.





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Where to go next

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