ANSIBLE

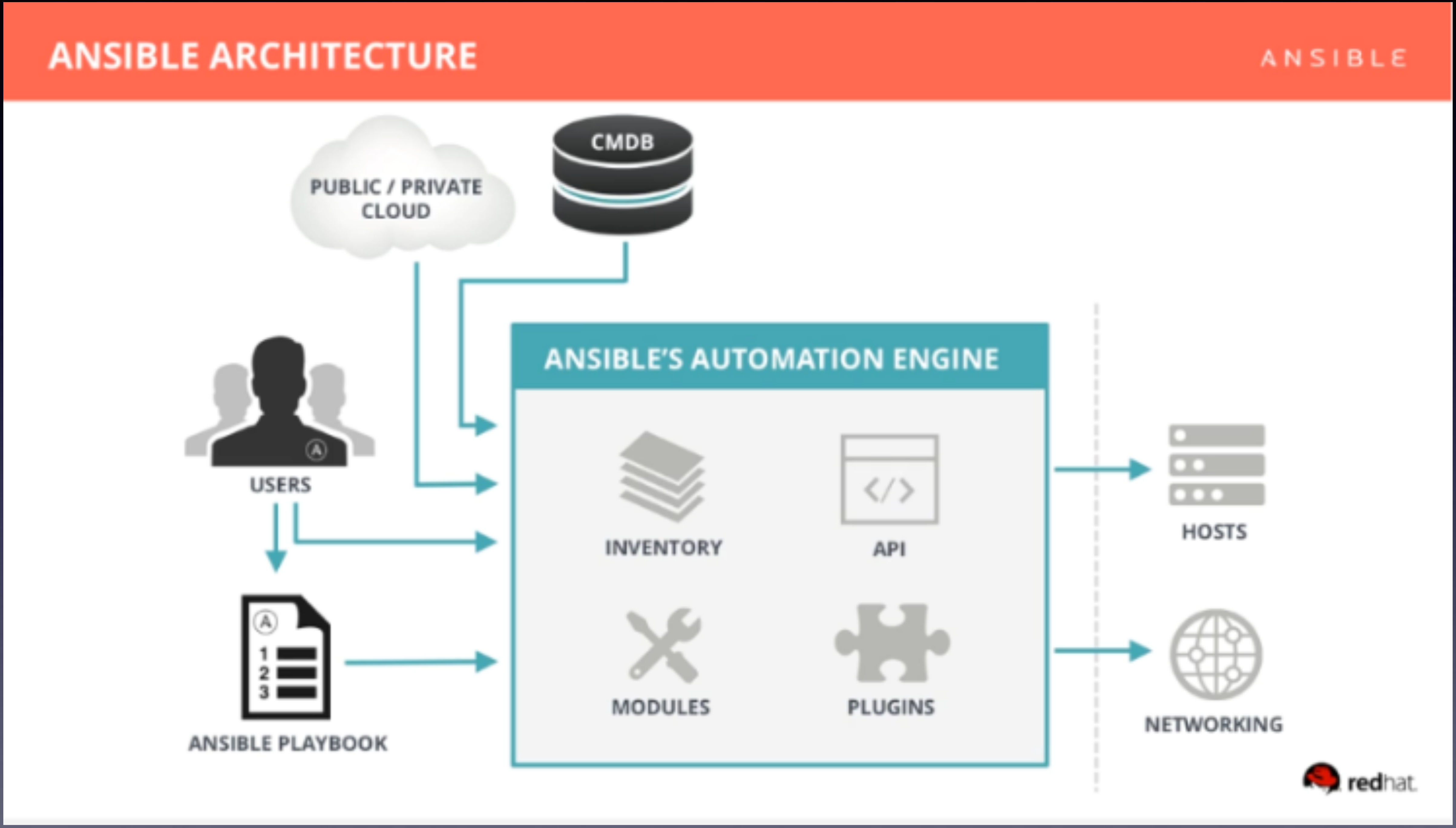
What is covered

- What is Ansible
- How Ansible works
- Adhoc commands
- Playbooks
- Variable loops and handlers
- Roles

What is Ansible

- Ansible is an open source configuration management tool.
- Automates software provisioning, configuration management, and application deployment
- Redhat acquired Ansible in 2015.
- Playbooks are written in simple human readable yaml files. No special coding skills needed.
- Agent-less architecture. Uses open SSH for connection.
- Can also orchestrate resources.

- Tasks executed in order.
- Playbooks can be version controlled.
- Idempotent
- It plays well with others. Lot of other tools supports ansible. ex. AWS SSM, Jenkins, packer etc.
- Modular architecture. You can use standard modules or create your own modules using python.


ANSIBLE ARCHITECTURE
ANSIBLE
PUBLIC / PRIVATE CLOUD
CMDB
USERS
ANSIBLE'S AUTOMATION ENGINE
INVENTORY
API
MODULES
PLUGINS
HOSTS
NETWORKING
ANSIBLE PLAYBOOK
redhat

Modules

- Modules are libraries that perform actual work.
- They are called using ad-hoc command mode or through playbooks in form of tasks.
- They take certain inputs and return in JASON format.
- Typically they return following info:
    - Changed
    - failed
    - msg
    - skipped
    - ansible_facts
    - exception

Who Manages Module

- Core modules are maintained by the Ansible Engineering Team. These modules are integral to the basic foundations of the Ansible distribution

- Network modules are maintained by the Ansible Network Team. Please note there are additional networking modules that are categorized as Certified or Community not maintained by Ansible

- Certified modules are part of a future planned program currently in development

- Community modules are submitted and maintained by the Ansible community. These modules are not maintained by Ansible, and are included as a convenience

Modules example

- service
- file
- copy
- cron
- mount
- timezone
- In absence of module you can use run command module. There is no concept of desired state and idempotent.
  - Command
  - Shell
  - Script

Ansible inventory file

- Generally consists of Server name or IP address of hosts where ansible connects and performs tasks.

- It is in form of hosts and groups

```
mail.example.com

[webservers]
foo.example.com
bar.example.com

[dbservers]
one.example.com
two.example.com
three.example.com
```

Ansible

```
ansible web -m command -a "uptime" -o

ansible web -m yum -a "name=httpd state=present" -b

ansible web -m service -a "name=httpd state=started" -b
```

```yaml
---
- name: Install and start apache web server
  hosts: web

  tasks:
    - name: install apache
      yum:
        name: httpd
        state: present
    - name: start apache
      service:
        name: httpd
        state: started
```

Inventory

```
mail.example.com

[web]
foo.example.com
bar.example.com

[dbservers]
one.example.com
two.example.com
three.example.com
```

Ansible configuration file

- It has all the adjustable ansible settings.
- ANSIBLE_CONFIG (an environment variable)
- ansible.cfg (in the current directory)
- .ansible.cfg (in the home directory)
- /etc/ansible/ansible.cfg

Tools

- Ansible: Runs ansible tasks in ad-hoc fashion
- Ansible-playbook: Runs a playbook. Playbooks is collection of tasks executed in sequential manner.
- ansible-valut: an encrypt any structured data file used by Ansible.
- ansible-galaxy: command to manage Ansible roles in shared repositories
- ansible-doc: Displays information on modules installed in Ansible libraries. It displays a terse listing of plugins and their short descriptions, provides a printout of thei

Ansible Vault

- allows keeping sensitive data such as passwords or keys in encrypted files, rather than as plaintext in your playbooks or roles.
- These vault files can then be distributed or placed in source control.
- Command is ansible-valut. It will ask for password and encrypt using password.
- You can:
    - Create encrypt a file
    - Decrypt a file
    - Edit an encrypted file
    - Rekey an encrypted file
    - view and encrypted file

Ansible Tower

- Ansible Tower (formerly ‘AWX’) is a web-based solution that makes Ansible even more easy to use for IT teams of all kinds. It’s designed to be the hub for all of your automation tasks

- Tower allows you to control access to who can access what, even allowing sharing of SSH credentials without someone being able to transfer those credentials

- It logs all of your jobs, integrates well with LDAP, and has an amazing browsable REST API. Command line tools are available for easy integration with Jenkins as well

Ad-hoc command

Single task, no desired state, for quick check etc.

```
# check all my inventory hosts are ready to be
$ ansible all -m ping

# collect and display the discovered facts
# for the localhost
$ ansible localhost -m setup

# run the uptime command on all hosts in the
# web group
$ ansible web -m command -a "uptime"
```

Lab 1

# Ping module check if node is responsive.

```
ansible web -m ping
```

# Command module:

```
ansible web -m command -a "uptime" -o
```

# setup module to get information about the target node

```
ansible web -m setup
```

# install apache using yum module. Use -b flag to su to root user.

```
ansible web -m yum -a "name=httpd state=present" -b
```

# Start Apache server using service module

```
ansible web -m service -a "name=httpd state=started" -b
```

# Now Stop and remove apache server

Ansible playbook

- Written in YAML
- One or more plays
- Plays consists of tasks (call to ansible module)
- One playbook can have multiple plays

```yaml
---
- name: Install and start apache web server
  hosts: web
  become: yes
  gather_facts: false

  tasks:
    - name: install apache
      yum:
        name: httpd
        state: present
    - name: start apache
      service:
        name: httpd
        state: started
```

```yaml
---
- name: Install and start apache web server
  hosts: webservers
  become: yes
  gather_facts: false

  tasks:
  - name: ensure apache is at the latest version
    yum:
      name: httpd
      state: latest
  - name: start apache
    service:
      name: httpd
      state: started

- name: Update and Start Postgres database
  hosts: databases
  remote_user: root

  tasks:
  - name: ensure postgresql is at the latest version
    yum: name=postgresql state=latest
  - name: ensure that postgresql is started
    service: name=postgresql state=started
```

Lab 2

- Create file install_apache.yml
- ansible-playbook install_apache.yml
- Create playbook to remove apache

Variables

Variables can be defined in vars section

```
  vars:
    httpd_packages: httpd
```

Can be single variable or an array or list.

```
  vars:
    httpd_packages:
      - httpd
      - vim
      - wget
```

Can also be in a separate file and ref in vars_files section

```
  vars_files:
    - external_vars.yml
```

Lab 3a Variables

```yaml
---
- name: Install and start apache web server
  hosts: web
  become: yes
  gather_facts: false
  vars:
    httpd_packages: httpd

  tasks:
    - name: install apache
      yum:
        name: "{{ httpd_packages }}"
        state: present

    - name: start apache
      service:
        name: httpd
        state: started
```

Loops

```yaml
---
- name: Install and start apache web server
  hosts: web
  become: yes
  gather_facts: false
  vars:
    httpd_packages:
      - httpd
      - vim
      - wget

  tasks:
    - name: install apache
      yum:
        name: "{{ item }}"
        state: present
      with_items: "{{ httpd_packages }}"
```

Lab 3b

Conditionals

```yaml
---
- name: Install and start apache web server
  hosts: web
  become: yes
  gather_facts: false
  vars:
    should_update_index: "yes"

  tasks:
    - name: install apache
      yum:
        name: httpd
        state: present

    - name: start apache
      service:
        name: httpd
        state: started

    - name: Populate index file
      shell: echo "Hello world `date`" >> /var/www/html/index.html
      changed_when: false
      when: should_update_index == "yes"
```

Lab 3c

Handlers

```yaml
---
- name: Install and start apache web server
  hosts: web
  become: yes
  gather_facts: false
  vars:
    httpd_packages: httpd

  tasks:
    - name: install apache
      yum:
        name: httpd
        state: present
      notify: restart apache service

    - name: Populate index file
      shell: echo "Hello world `date`" > /var/www/html/index.html
      notify: restart apache service
      changed_when: false

  handlers:
    - name: restart apache service
      service:
        name: httpd
        state: restarted
```

Lab 3d

EC2 instance using Ansible

```yaml
---
- name: Create AWS EC2 instance
  hosts: localhost
  connection: local
  gather_facts: False
  vars:
    instance_type: t2.micro
    image: ami-1853ac65
    keypair: iaccpk.pem
    #my_iam_aws_access_key: XXXXXXXXXXXXXXXXXXX
    #my_iam_aws_secret_key: XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
    region: us-east-1
  tasks:
    - name: Create an EC2 instance
      ec2:
        #aws_access_key: "{{ my_iam_aws_access_key }}"
        #aws_secret_key: "{{ my_iam_aws_secret_key }}"
        key_name: "{{ keypair }}"
        instance_type: "{{ instance_type }}"
        image: "{{ image }}"
        region: "{{ region }}"
        wait: yes
        count: 1
        instance_tags:
          Name: iacc-test1
      register: ec2_info
    - name: Display EC2 properties
      debug: var=ec2_info.instances
```

Lab 5a/b