ANSIBLE

by Red Hat®

Ansible Hands-on Introduction

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What is Ansible?

It's a **simple automation language** that can perfectly describe an IT application infrastructure in Ansible Playbooks.

It's an **automation engine** that runs Ansible Playbooks.

Ansible Tower is an **enterprise framework** for controlling, securing and managing your Ansible automation with a **UI and RESTful API**.

Ansible Is...

SIMPLE

Human readable automation

No special coding skills needed

Tasks executed in order

Get productive quickly

POWERFUL

App deployment

Configuration management

Workflow orchestration

Orchestrate the app lifecycle

AGENTLESS

Agentless architecture

Uses OpenSSH & WinRM

No agents to exploit or update

More efficient & more secure

Community

THE MOST POPULAR OPEN-SOURCE AUTOMATION COMMUNITY ON GITHUB

- 13,000+ stars & 4,000+ forks on GitHub
- 2000+ GitHub Contributors
- Over 900 modules shipped with Ansible
- New contributors added every day
- 1200+ users on IRC channel
- Top 10 open source projects in 2014
- World-wide meetups taking place every week
- Ansible Galaxy: over 18,000 subscribers
- 250,000+ downloads a month
- AnsibleFests in NYC, SF, London

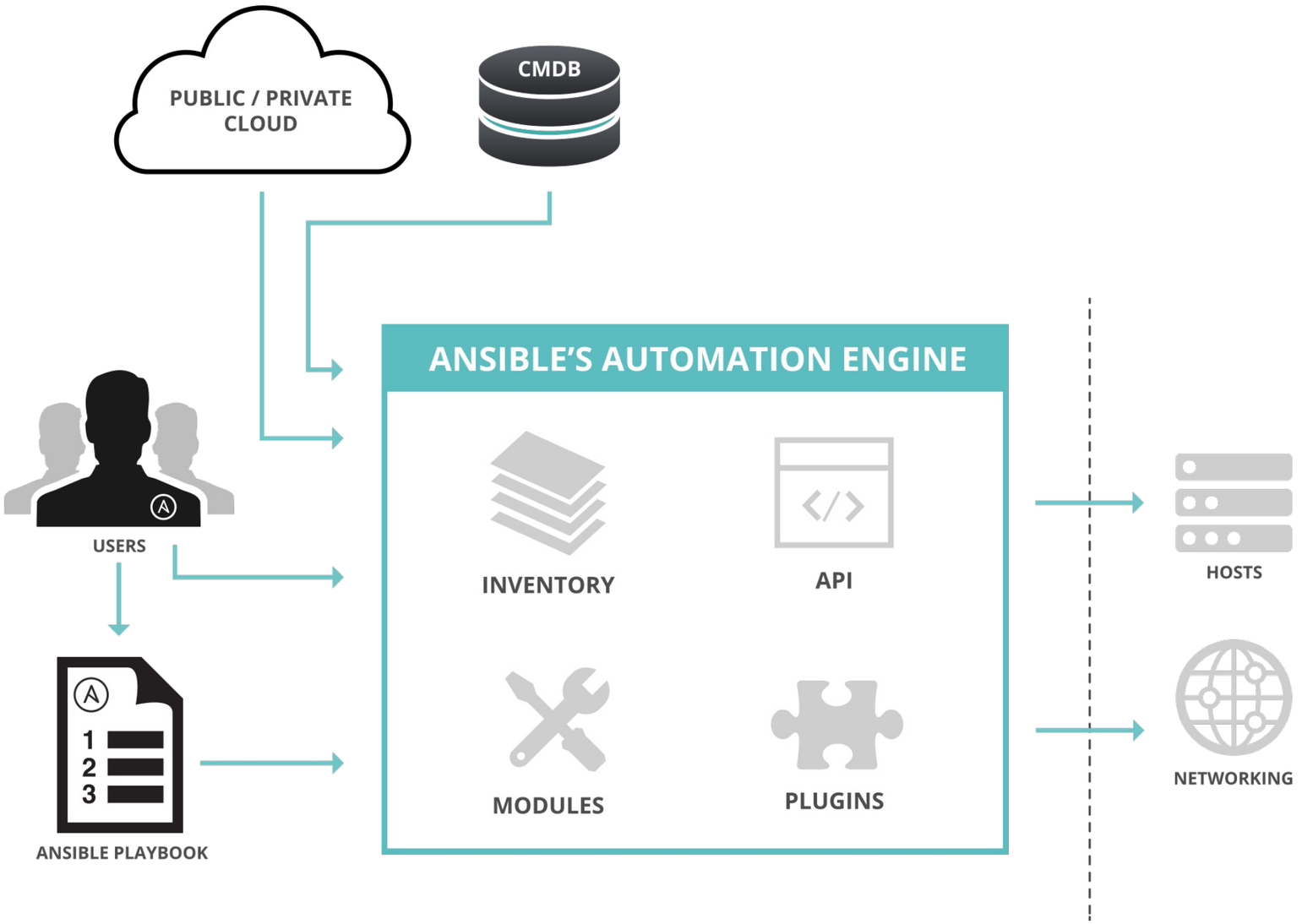
http://ansible.com/community

Installing Ansible

```
# Install with yum (Example RHEL 7)
$ wget http://dl.fedoraproject.org/pub/epel/7/x86_64/e/epel-release-7-9.noarch.rpm
$ yum localinstall epel-release-7-9.noarch.rpm
$ yum --enablerepo=epel install ansible

# Install using pip
$ pip install ansible
```

How Ansible Works



Modules

Modules are bits of code transferred to the target system and executed to satisfy the task declaration. Ansible ships with several hundred today!

- apt/yum
- copy
- file
- get_url
- git
- ping
- debug
- service
- synchronize
- template

Modules Documentation

http://docs.ansible.com/

Docs » Module Index

Module Index

- All Modules
- Cloud Modules
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service - Manage services.

- Synopsis
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Synopsis

- Controls services on remote hosts. Supported init systems include BSD init, OpenRC, SysV, Solaris SMF, systemd, upstart.

Options

parameter	required	default	choices	comments
arguments	no			Additional arguments provided on the command line aliases: args
enabled	no		• yes • no	Whether the service should start on boot. **At least one of state and enabled are required.**
name	yes			Name of the service.
pattern	no			If the service does not respond to the status command, name a substring to look for as would be found in the output of the *ps* command as a stand-in for a status result. If the string is found, the service will be assumed to be running.
runlevel	no	default		For OpenRC init scripts (ex: Gentoo) only. The runlevel that this service belongs to.
sleep (added in 1.3)	no			If the service is being `restarted` then sleep this many seconds between the stop and start command. This helps to workaround badly behaving init scripts that exit immediately after signaling a process to stop.
state	no		• started • stopped • restarted • reloaded	`started` / `stopped` are idempotent actions that will not run commands unless necessary. `restarted` will always bounce the service. `reloaded` will always reload. **At least one of state and enabled are required.** Note that reloaded will start the service if it is not already started, even if your chosen init system wouldn't normally.
use (added in 2.2)	no	auto		The service module actually uses system specific modules, normally through auto detection, this setting can force a specific module. Normally it uses the value of the 'ansible_service_mgr' fact and falls back to the old 'service' module when none matching is found.

Modules Documentation

```
# List out all modules installed
$ ansible-doc -l
...
copy
cron
...

# Read documentation for installed module
$ ansible-doc copy
> COPY

  The [copy] module copies a file on the local box to remote locations. Use the [fetch] module to copy files from remote locations to the local
  box. If you need variable interpolation in copied files, use the [template] module.

  * note: This module has a corresponding action plugin.

Options (= is mandatory):
```

Modules: Run Commands

If Ansible doesn't have a module that suits your needs there are the "run command" modules:

- **command**: Takes the command and executes it on the host. The most secure and predictable.
- **shell**: Executes through a shell like /bin/sh so you can use pipes etc. Be careful.
- **script**: Runs a local script on a remote node after transferring it.
- **raw**: Executes a command without going through the Ansible module subsystem.

NOTE: Unlike standard modules, run commands have no concept of desired state and should only be used as a last resort.

Inventory

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

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

Static Inventory Example

```
10.42.0.2
10.42.0.6
10.42.0.7
10.42.0.8
10.42.0.100
host.example.com
```

Static Inventory Example

```
[control]
control ansible_host=10.42.0.2

[web]
node-[1:3] ansible_host=10.42.0.[6:8]

[haproxy]
haproxy ansible_host=10.42.0.100

[all:vars]
ansible_user=vagrant
ansible_ssh_private_key_file=~/.vagrant.d/insecure_private_key
```

Ad-Hoc Commands

An ad-hoc command is a single Ansible task to perform quickly, but don’t want to save for later.

```
# check all my inventory hosts are ready to be
# managed by Ansible
$ 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"
```

Sidebar: Discovered Facts

Facts are bits of information derived from examining a host systems that are stored as variables for later use in a play.

```
$ ansible localhost -m setup
localhost | success >> {
  "ansible_facts": {
      "ansible_default_ipv4": {
          "address": "192.168.1.37",
          "alias": "wlan0",
          "gateway": "192.168.1.1",
          "interface": "wlan0",
          "macaddress": "c4:85:08:3b:a9:16",
          "mtu": 1500,
          "netmask": "255.255.255.0",
          "network": "192.168.1.0",
          "type": "ether"
      },
```

Lab # 1:
Ad-Hoc Commands

Variables

Ansible can work with metadata from various sources and manage their context in the form of variables.

- Command line parameters
- Plays and tasks
- Files
- Inventory
- Discovered facts
- Roles

Tasks

Tasks are the application of a module to perform a specific unit of work.

- **file**: A directory should exist
- **yum**: A package should be installed
- **service**: A service should be running
- **template**: Render a configuration file from a template
- **get_url**: Fetch an archive file from a URL
- **git**: Clone a source code repository

Example Tasks in a Play

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

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

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

Handler Tasks

Handlers are special tasks that run at the end of a play if notified by another task when a change occurs.

If a configuration file gets changed notify a service restart task that it needs to run.

Example Handler Task in a Play

```
tasks:
- name: httpd package is present
  yum:
    name: httpd
    state: latest
  notify: restart httpd

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

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

Plays & Playbooks

Plays are ordered sets of tasks to execute against host selections from your inventory. A playbook is a file containing one or more plays.

Playbook Example

```
---
- name: install and start apache
  hosts: web
  become: yes
  vars:
    http_port: 80

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

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

Human-Meaningful Naming

```
---
- name: install and start apache
  hosts: web
  become: yes
  vars:
    http_port: 80

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

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

Host Selector

```
---
- name: install and start apache
  hosts: web
  become: yes
  vars:
    http_port: 80

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

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

Privilege Escalation Tăng quyền truy cập

```
---
- name: install and start apache
  hosts: web
  become: yes
  vars:
    http_port: 80

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

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

Play Variables

```
---
- name: install and start apache
  hosts: web
  become: yes
  vars:
    http_port: 80

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

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

Tasks

```
---
- name: install and start apache
  hosts: web
  become: yes
  vars:
    http_port: 80

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

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

Lab # 2:
A Simple Playbook

Doing More with Playbooks

Here are some more essential playbook features that you can apply:

- Templates
- Loops
- Conditionals
- Tags
- Blocks

Templates

Ansible embeds the Jinja2 templating engine that can be used to dynamically:

- Set and modify play variables
- Conditional logic
- Generate files such as configurations from variables

Loops

Loops can do one task on multiple things, such as create a lot of users, install a lot of packages, or repeat a polling step until a certain result is reached.

```
- yum:
    name: "{{ item }}"
    state: latest
  with_items:
  - httpd
  - mod_wsgi
```

Conditionals

Ansible supports the conditional execution of a task based on the run-time evaluation of variable, fact, or previous task result.

```
- yum:
    name: httpd
    state: latest
  when: ansible_os_family == "RedHat"
```

Tags

Tags are useful to be able to run a subset of a playbook on-demand.

```
- yum:
    name: "{{ item }}"
    state: latest
  with_items:
  - httpd
  - mod_wsgi
  tags:
    - packages

 - template:
     src: templates/httpd.conf.j2
     dest: /etc/httpd/conf/httpd.conf
  tags:
    - configuration
```

Blocks

Blocks cut down on repetitive task directives, allow for logical grouping of tasks and even in play error handling.

```
- block:
  - yum:
      name: "{{ item }}"
      state: latest
    with_items:
    - httpd
    - mod_wsgi

  - template:
      src: templates/httpd.conf.j2
      dest: /etc/httpd/conf/httpd.conf
  when: ansible_os_family == "RedHat"
```

Roles

Roles are a packages of closely related Ansible content that can be shared more easily than plays alone.

- Improves readability and maintainability of complex plays
- Eases sharing, reuse and standardization of automation processes
- Enables Ansible content to exist independently of playbooks, projects -- even organizations
- Provides functional conveniences such as file path resolution and default values

Project with Embedded Roles Example

```
site.yml
roles/
   common/
     files/
     templates/
     tasks/
     handlers/
     vars/
     defaults/
     meta/
   apache/
     files/
     templates/
     tasks/
     handlers/
     vars/
     defaults/
```

Project with Embedded Roles Example

```
# site.yml
---
- hosts: web
  roles:
     - common
     - apache
```

Ansible Galaxy

http://galaxy.ansible.com

Ansible Galaxy is a hub for finding, reusing and sharing Ansible content.

Jump-start your automation project with content contributed and reviewed by the Ansible community.

Lab #3:
A Playbook Using Roles

Lab #4:
Using an Ansible Galaxy Role

Next Steps

- **It's easy to get started**
  ansible.com/get-started
- **Join the Ansible community**
  ansible.com/community
- **Would you like to learn a lot more?**
  redhat.com/en/services/training/do407-automation-ansible