Simply Ansible: Getting Started

> Getting started with Ansible

David M. Lee, II

@leedm777 GitHub

@leedm777 Twitter

leedm777@yahoo.com

`new Ansible()`

> Ansible is an IT automation tool. It can configure systems, deploy software, and orchestrate more advanced IT tasks such as continuous deployments or zero downtime rolling updates.

Why?

Codifying infrastructure allows you to take advantage of software development principles and techniques.

- Automation: do more with less
- Improve reliability: it happens the same way every time
- Peer review; revision control; automated validation; ...

Ansible basics

- Ansible uses YAML for pretty much everything
  - Except for the occasional INI format
- Templates are written in Jinja2 template language
  - Can show up in `.yml` files. Much fun!
- Requires Python 2.x, on both control machine and managed nodes
  - No agent required on managed nodes
  - Modules may require certain libraries/apps to be installed

Using Ansible

`ansible` - ad hoc commands

Handy, but use sparingly. Changes to systems should be done through playbooks.

```
$ ansible all \
>  --module-name command \
>  --args "uname -a"
services | SUCCESS | rc=0 >>
Linux services 3.2.0-107-virtual #148-Ubuntu SMP Mon Jul

mariadb | SUCCESS | rc=0 >>
Linux mariadb 3.2.0-107-virtual #148-Ubuntu SMP Mon Jul 1

pdns | SUCCESS | rc=0 >>
Linux pdns 3.10.0-327.22.2.el7.x86_64 #1 SMP Thu Jun 23 1
```

`ansible-playbook` - what you really want

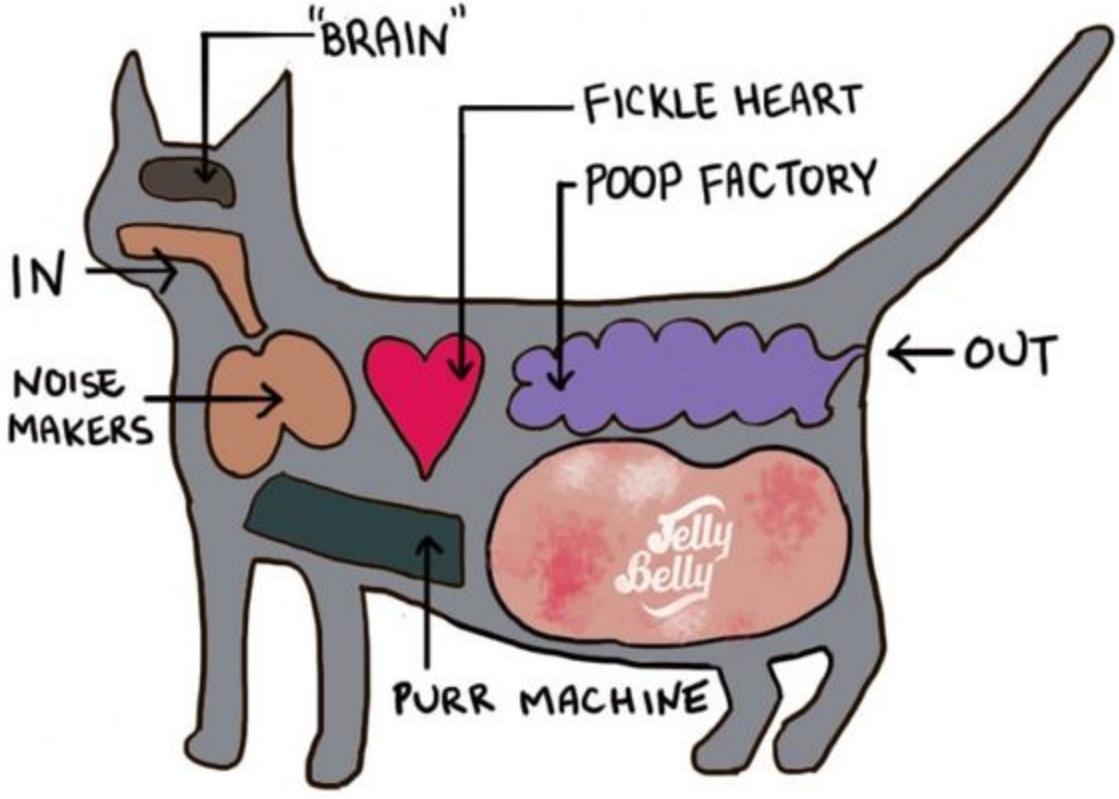
The `ansible-playbook` command executes the tasks specified in the playbook, in order, against the managed hosts.

```
$ ansible-playbook site.yml
PLAY [Do the thing] ************************************************

TASK [setup] *******************************************************
ok: [mariadb]
ok: [services]
ok: [pdns]

TASK [The thing] ***************************************************
ok: [mariadb]
ok: [services]
skipped: [pdns]
```

Anatomy of an Ansible project



Inventory

The list of managed hosts

Can be static (in a `.ini` file) or dynamic (results of a `.py` inventory script).

```
# ./inventory/vagrant.ini
[services]
services ansible_host=192.168.98.100

[mariadb]
mariadb ansible_host=192.168.98.200
```

Variables

- Values that may vary per system
  - About a zillion different places to specify vars
  - Please don't use *all* of them
- Vaults: encrypted vars file

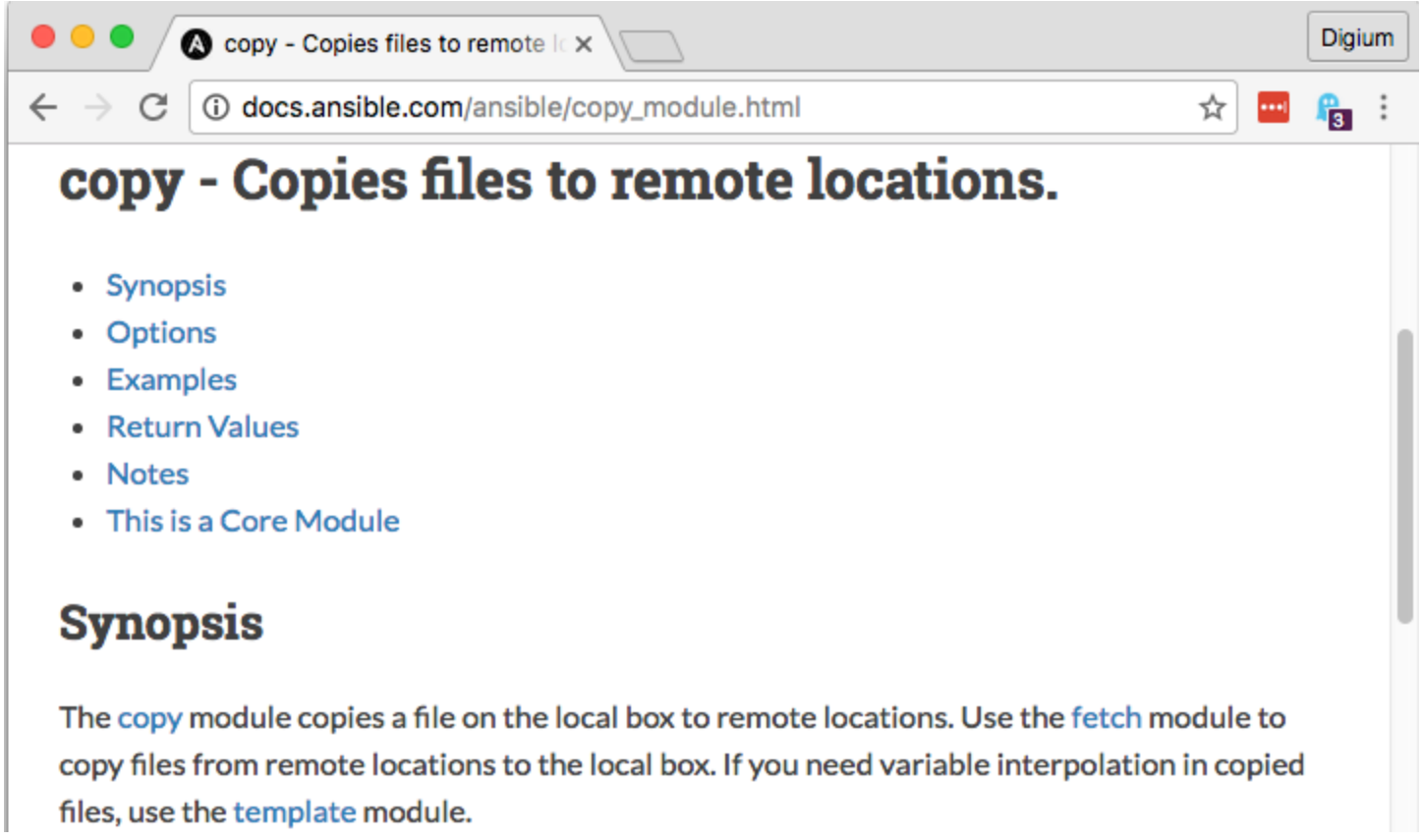
```
# ./group_vars/all/main.yml
---
# default to direct mail delivery.
# if you have a relay, set it here.
smtp_relay_host: ''

# Use for NODE_ENV, RAILS_ENV, RACK_ENV, etc.
app_env: development
```

Modules

Programs that Ansible executes directly on remote hosts.

- Ansible ships with >600 modules.
- Custom modules can be loaded in the `./library` directory.
- Very well documented on ansible.com



Tasks

A task specifies a module and the parameters to invoke it with.

```
- name: perform an action
  # args can be name=value
  copy: src=blink.conf dest=/etc/angels

- name: perform another action
  # or args can be an object
  copy:
    src: blink.conf
    dest: /etc/angels
```

Blocks

A block can used anywhere you can use a task. It allows you to more easily apply settings to a group of tasks. It also adds `rescue` blocks for error handling. New in Ansible 2.x.

```
- when: doctor == 10
  block:
   - name: Copy rose.conf to /etc/doctor/companions.d/
     copy: src=rose.conf dest=/etc/doctor/companions.d/
   - name: Set catchphrase to allons-y
     copy: src=allons-y.conf dest=/etc/doctor/catchphrase
```

Roles

A role is a list of tasks, which are executed sequentially, in order. Plus some other stuff.

```
site.yml
roles/
   some-role/
     tasks/
       main.yml # tasks go in here
     defaults/
       main.yml # role-specific vars go in here
     handlers/
       main.yml # tasks that are triggered optionally
                #   i.e. service restarts
     files/
       ...      # content for copy/script tasks
     templates/
       ...      # content for template tasks
                #   always append .j2 to filenames
```

Plays

A play specifies which roles (in order) to run on which hosts. The host list has an elaborate syntax which can specify pretty much anything you want.

```
- name: Some play
  hosts: some-hosts:!not-these-hosts
  roles:
   - some-role
   - some-other-role
```

Playbooks

A playbook is a list of plays, which are executed sequentially, in order.

```
# ./site.yml
---
- name: First play
  hosts: some-hosts
  roles:
   - some-role

- name: Second play
  # ...
```

Templates

Jinja2 syntax is used in `.j2` template files, or in task definitions.

```
- name: perform an action
  action:
    some_param: '{{ some_var }}'
    #           ^             ^
    #           in YAML, quotes are
    #           usually necessary to
    #           avoid yaml/j2 confusion
```

Custom Jinja2 filters

In addition to the standard Jinja2 filters, Ansible defines a number of custom filters.

Jinja2 filters

Topics

Handlers

Handlers allow you to perform actions on change.

- If handler isn't notified, it isn't run
- If it's notified multiple times, it only runs once
- When run, handlers run at the end of the play
- Caution: Be sure to set `force_handlers = true` in `ansible.cfg`
    - Otherwise errors between notify and end of play cause handlers to be skipped

```
# ./some-role/tasks/main.yml
- copy: src=missy.conf dest=/etc/master
  notify: restart master

# ./some-role/handlers/main.yml
- name: restart master
  service: name=master state=restarted
```

Parameterized Roles

A role may be parameterized, meaning that it expects certain variables to be set.

```
- role: rvm_io.rvm1-ruby
  rvm1_autolib_mode: 4 # automatically install deps
  rvm1_rubies: ['ruby-2.3.1', 'ruby-2.2.5']
```

Sharing roles

- Common roles can be shared via Ansible galaxy or git repo
- BUT... they tend to be very small, poorly versioned, and so poorly maintained, this is rarely useful
    - Don't use a role from Galaxy unless it has tagged versions
    - AND it looks like someone loves and cares for it
    - Otherwise, learn what you can from it and write your own

Tags and limits

Tags specify which tasks to run. Limits specifies which hosts to run those tasks on.

```
# run entire playbook on single machine
$ ansible-playbook site.yml --limit strax

# run everything task tagged with sontaran
$ ansible-playbook site.yml --tags sontaran

# run sil and ood on the webservers not in San Diego
$ ansible-playbook site.yml --tags sil,ood \
>   --limit webservers:!san-diego
```

Secret Variables: Ansible Vault

The `ansible-vault` command can be used to manage encrypted files. Put any secrets for a given environment in a `vault.yml` file in that environment's `group_vars`.

```
# create a vault
$ ansible-vault create group_vars/${ENV}/vault.yml
# edit a vault
$ ansible-vault edit group_vars/${ENV}/vault.yml
```

Usable vaults: `ansible-vault-tools`

Problem: vaults are just blobs of hex. `ansible-vault-tools` to the rescue!

- `ansible-vault-merge` - magical vault merging
- `ansible-vault-textconv` - magical vault diffing
  - And `git grep --textconv` can search in vaults!
- `gpg-vault-password-file` - encrypt your vault password file

```
$ANSIBLE_VAULT;1.1;AES256
deaddeaddeaddeaddeaddeaddeaddeaddeaddeaddead
deaddeaddeaddeaddeaddeaddeaddeaddeaddeaddead
```

Task attributes

Task attributes can also be applied to blocks, roles and plays.

- `no_log` - omit output when running the play
- `become` - control which user runs the task(s)
- `when` - conditionally runs the task(s)
- `delegate_to`, `run_once`, `serial` - control task execution

`no_log` : keep it secret, keep it safe

Adding `no_log` to a task ensures that any secrets don't get printed to the console when you run the playbook.

```
- copy: content={{ doctors_name }} dest=/etc/doctor/name
  no_log: True
```

To `become`, or not `become`

By default, Ansible runs modules as the unprivileged user. The `become` setting changes that.

- Can be specified in `ansible.cfg`, on a play, on a task, on the command line
- Can specify `become_user` to become a user other than `root`

Conditionals

On tasks, block, roles or plays, you can add a `when` clause to conditionally do something.

```
- when: ansible_distribution == 'Ubuntu'
  apt: name=postfix

- when: ansible_distribution == 'CentOS'
  yum: name=postfix
```

Task execution control

- `delegate_to` - run the task once, on the specified host
- `run_once` - run the task once, on the first host in the group
  - useful for running database migrations
- `serial` - run the task on batches of servers
  - `1` - run on one host at a time
  - `20%` - run on 20% of the hosts at a time

Questions

Thanks!

David M. Lee, II

@leedm777 GitHub

@leedm777 Twitter

leedm777@yahoo.com