Getting Started with Ansible & ServerSpec

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Half-day workshop, afternoon

tinyurl.com/OR17-AnsibleServerSpec

Getting Started with Ansible & ServerSpec

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Agenda

- 1/2 hour: Intro to ServerSpec
- 1 1/2 hours: Intro to Ansible
- 1/2 hour: Testing Strategies for Ansible
- 1/2 hour: questions and discussion

A word about cathedrals

- Ansible and ServerSpec are fantastic tools, and once you get into using them a bit, you will have grand plans on how to use them more
- You will have those ideas today
- We will not build any cathedrals today
- We may show you hints at the ways some cathedrals have been built, however…

We will not build cathedrals today

We are constantly learning more about our environment

- Developers shop jobs a lot
- Have you seen the mailing lists?
- We change jobs a lot
- We are always the newbie

Why Write ServerSpec Tests?

- Tests are documentation
- Your work group may or may not survive
- Provisioning tools come and go
- No matter what happens to the tools or your workforce, these tests will persist as documentation of your intentions and proof that the service is configured as you expected

ServerSpec

- Extension of RSpec
- Yep, it's a Ruby gem
- Is a great way to force yourself to think about your intentions before you provision a new service
- Is a great way to get to know your existing services

Installing ServerSpec

- It's a Ruby gem, you'll need Ruby 2.0.x+ installed
  ```
  sudo gem install serverspec
  ```
- You will need Rake installed, too:
  ```
  sudo gem install rake
  ```
- You'll also need SSH access to the servers you want to check
- For Ansible you'll probably need Sudo privileges on these servers

Start simple

```
require 'spec_helper'
describe package('httpd') do
 it { should be_installed }
end
describe service('httpd') do
 it { should be_enabled   }
 it { should be_running   }
end
describe port(80) do
 it { should be_listening }
end
```

Yes, there is an init script

```
$ serverspec-init
Select OS type:
 1) UN*X
 2) Windows
Select number: 1
Select a backend type:
 1) SSH
 2) Exec (local)
Select number: 1
Vagrant instance y/n: n
Input target host name: www.example.jp
+ spec/
+ spec/www.example.jp/
+ spec/www.example.jp/sample_spec.rb
+ spec/spec_helper.rb
+ Rakefile
+ .rspec
```

Run the tests

```
$ rake spec
/usr/bin/ruby -S rspec
spec/www.example.jp/sample_spec.rb
Package "httpd"
 should be installed
Service "httpd"
 should be enabled
 should be running
Port "80"
 should be listening
Finished in 0.21091 seconds (files took 6.37
seconds to load)
4 examples, 0 failures
```

What's next?

- Start simple, with the services you already know
- Consider writing tests before you deploy a new service
- As you use these tools, look for ways to consolidate your effort

Time for some Pair Programming!

- Form two lines:
  - Ever used Vagrant? You go on the left side.
  - New to Vagrant? You go on the right side.
  - Whomever is at the head of each line, you are now a team, you will work together for the rest of this workshop.
  - Keep forming teams until lines are empty.

Vagrant Up!

- The USB key has a Vagrant workspace and Virtualbox machine image in the folder named `HCTraining_start`
- Copy that folder to your notebook's hard drive
- -or-
- CD to that folder at its mount point, note down the path for later, e.g. /media/username/ANSIBLE
- From your command prompt, run `vagrant up`

Vagrant ssh

- When the vagrant up command completes successfully, run
  `vagrant ssh`
- We will now ensure everyone is able to complete this step, work together in teams, it's OK to help other teams if necessary
- We are all in this together

TDD time: let's run the ServerSpec init script

```
$ serverspec-init
Select OS type:

  1) UN*X
  2) Windows

Select number: 1

Select a backend type:

  1) SSH
  2) Exec (local)

Select number: 2

 + spec/
 + spec/localhost/
 + spec/localhost/sample_spec.rb
 + spec/spec_helper.rb
 + .rspec
```

TDD time: watch the tests fail

```
$ rake spec
...
Port "80"
  should be listening (FAILED - 1)

Failures:

  1) Port "80" should be listening
     On host `localhost'
     Failure/Error: it { should be_listening
}
...
```

TDD time: watch the tests fail

```
...
Finished in 0.00616 seconds (files took
0.40627 seconds to load)
1 example, 1 failure

Failed examples:

rspec ./spec/localhost/sample_spec.rb:27 #
Port "80" should be listening

# Cool, let’s fix this!
```

Getting Started with Ansible

- Based on Ansible for Hydra:

  https://tinyurl.com/DCE-Anisble4Hydra

- Slides will funcion as bookmarks, but do follow along with the wiki, it will be easier to copy/paste code samples from there.

Why Ansible?

- **Agentless**: no “puppetmaster,” no “client”
- **Simple and legible**
- **Sequentially executed**: devs will understand it
- **Well documented**: docs.ansible.com
- **Well integrated**: works with Vagrant, and anything you can SSH to
- **Well extended**: database and utility connections are in Ansible core, not add-ons or plugins

The Simplest Ansible Playbook

- Playbooks are YAML files
- Playbooks invoke modules
  - package
  - service

```
---
- name: simplest playbook
  hosts: web

  tasks:
    - name: restart web server
      become: yes
      service: name=apache2 state=restarted
```

Run the Simplest Playbook

```
$ ansible-playbook simplest_playbook.yml -i hosts

PLAY [simplest playbook] TODO: paste current output here
*******************************************************

TASK [setup]
*******************************************************
ok: [server1.domain.ext]

TASK [restart web server]
*******************************************************
changed: [server1.domain.ext]

PLAY RECAP
*******************************************************
server1.domain.ext : ok=2    changed=1    unreachable=0    failed=0
```

Oh no! Apache2 isn't installed!

```
---
- name: simpler playbook
  hosts: web

  tasks:
    - name: install & maintain web server
      become: yes
      package: name=apache2 state=latest

    - name: restart web server
      become: yes
      service: name=apache2 state=restarted
```

```
$ ansible-playbook simpler_playbook.yml -i hosts
```

Try running simpler_ twice

```
$ ansible-playbook simpler_playbook.yml -i hosts

PLAY [simple playbook]
**********************************************************************
**************************

TASK [Gathering Facts]
**********************************************************************
**************************
ok: [controller]

TASK [install & maintain web server]
**********************************************************************
************
ok: [controller]

TASK [restart web server]
**********************************************************************
**********************
changed: [controller]
...
```

Try running simpler_ twice

```
PLAY RECAP
*********************************************************************
*********************************
controller                 : ok=3    changed=1    unreachable=0
failed=0
```

... wait ... what?

```
TASK [restart web server]
*********************************************************************
************************
changed: [controller]
```

... every time we run this playbook, Apache will restart!

Wait! only restart Apache2 if it changes

- Notify a Handler

```
---
- name: simple playbook
  hosts: web

  tasks:
    - name: install & maintain web server
      become: yes
      package: name=apache2 state=latest
      notify:
        - restart web server

  handlers:
    - name: restart web server
      become: yes
      service: name=apache2 state=restarted

$ ansible-playbook simple_playbook.yml -i hosts
```

More Complex Playbooks

Use more modules!

- package
- file
- template
- cron
- postgresql_user
- copy
- shell

and {{variables}} ! (not a module, just a feature)

More Complex Playbooks: The Danger Zone

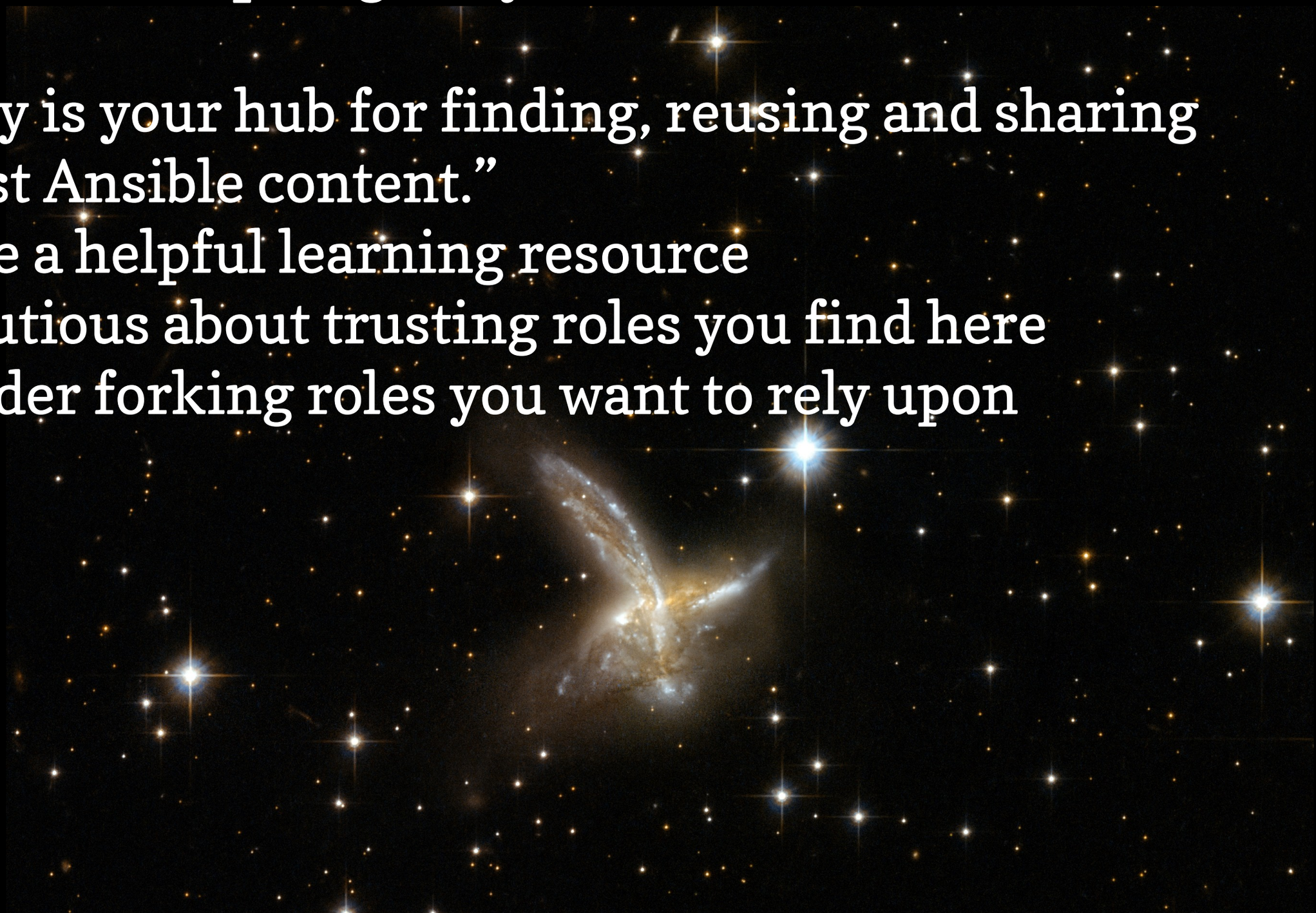
Ansible Roles

“Roles in Ansible build on the idea of include files and combine them to form clean, reusable abstractions – they allow you to focus more on the big picture and only dive down into the details when needed.” – Ansible Docs

- reusable
- abstraction
- keep your focus on the big picture

Ansible Galaxy

https://galaxy.ansible.com/



"Galaxy is your hub for finding, reusing and sharing the best Ansible content."

- can be a helpful learning resource
- be cautious about trusting roles you find here
- consider forking roles you want to rely upon

Multiple Hosts: Using an Inventory

- Ansible can run against many hosts
- Inventory files help specify which ones
- The default inventory lives at /etc/ansible/hosts
- You can specify a hosts file with the -i <path> option on the command line

Multiple Hosts: Using an Inventory

- Inventories are in INI format
- You can group servers together in [groups]

```
mail.example.com
[webservers]
foo.example.com
bar.example.com
[dbservers]
one.example.com
two.example.com
three.example.com
```

Multiple Hosts: Using an Inventory

- There are lots of options for inventory management (dynamic, cloud-based)
- Start simple, save this for later, after you have some playbooks of your own
- Here's the one we've been using this whole time:

```
[web]
controller ansible_connection=local
```

Ansible Testing

- As you create roles, you'll want to keep an eye on them to ensure they are still usable
- A simple syntax check in a .travis.yml file (using Travis CI) is a great place to start
- UCLA Library has an example role template you are welcome to borrow, that has this strategy built in:

github.com/UCLALibrary/uclalib_role_template

Ansible Testing

- Speaking of syntax checks, you have one available to you already

```
$ ansible-playbook simpler_playbook.yml -i hosts --syntax-check

playbook: simpler_playbook.yml
```

TDD time: watch the tests pass

```
$ rake spec
...
Package "apache2"
  should be installed
Service "apache2"
  should be enabled
  should be running
Port "80"
  should be listening
Finished in 0.05215 seconds (files took 0.28294 seconds to
load)
4 examples, 0 failures
```

Combining Ansible and ServerSpec

Save this for later
tinyurl.com/OR17-AnsibleServerSpecMashup

Ansible Best Practices

- ansible.com/blog/ansible-best-practices-essentials
- “Name” your plays and tasks
- Use prefixes and human meaningful names with variables
- Use native YAML syntax
  - key=value pairs are supported but they are hard for humans to read
- Use modules before run commands
- If a playbook is starting to get complicated, you need a role

Ansible Best Practices

- Be careful with the flexibility Ansible gives you
  - Variables can be in many places
    - vars files
    - vars directories
    - hosts file
    - include files
    - command line
    - ENVirоment variables
  - The order of precence will sneak up on you:
    - Too many options to fit on a slide
    - Look it up in the docs
    - Do not set a “default” in a vars file

Ansible Best Practices

- Put “become” (sudo) at the task level rather than the include or role level
- Minimize handler use (to keep sequence obvious)
- Make main.yml just for includes, so tasks are in usefully-named files (too many main.yml files!)

Ansible Inventory Best Practices

- Unless you have a great reason not to, stick to a single hosts file
- Use groups
  - Group vars are really handy
- Be careful when running a playbook on a new host, it's very easy to run a playbook on more hosts than you intend
- Use the `-l` option to specifically limit playbook runs to just the host you intend
- `--syntax-check` is easy to add and will save you grief

Questions? Discussion?

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Images

Sagrada Familia by pierpeter
https://www.flickr.com/photos/vespeter/228136258

Charlie Chaplin, Eating Machine
Still image from the 1936 movie Modern Times
http://www.imdb.com/title/tt0027977