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Code Camp

Ansible Introduction

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Agenda

1. APIs and CLIs
2. Ansible Intro
3. Use Cases
4. Installing Ansible
5. Using Ansible

APIS and CLIs

Device Provision Time

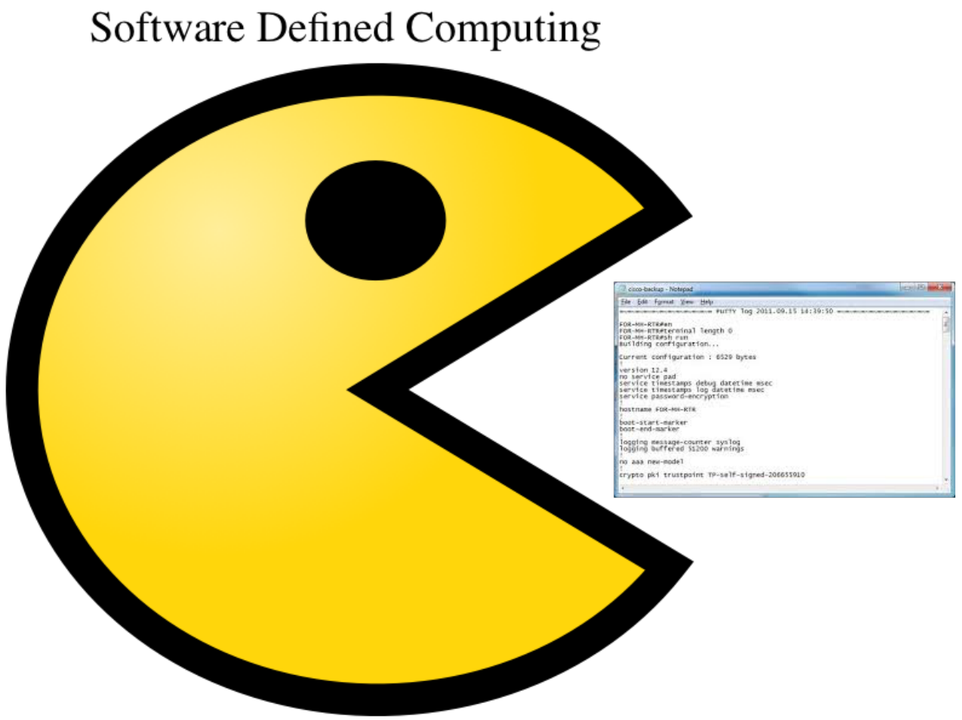
Servers - Instant, full automation possible.
Network - Create vlans, interfaces, routing, manual. *SLOW.*

Traditional Networking **CANNOT** keep up with the pace of today's technology.
* But we can't replace it all overnight.

Network Device Programmability

- Wait - did you mean SDN?
- Is that Cisco ACI? ... NSX maybe?

SDN requires networking to be automated



A tale of two worlds
IOS CLI telnet / SSH

- Huge install base.
- Will be around for for many years to come.

Cisco Networking APIs

- APIC-EM - REST controller for IOS Routers
- ACI - API controller for true SDN networking
- DNA/Panda/Yang - ISR4ks, 3850 Switches (Denali)
- NX-OS - REST API built into Nexus OS.
- Meraki - Cloud Controlled API controller

Network Automation is the future

It's OK to use telnet/ssh tooling while we cross that bridge.

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Ansible

- Automate all the 'things'
- Open Source project. Free.
- Red Hat backed - "Ansible Tower" - Commercial addon for Ansible.

"SOLVE IT. AUTOMATE IT. SHARE IT."

Sounds Complicated. Who needs this anyway...

250,000+ downloads per **month**.
2200 contributors to the project
750+ modules/plugins
100+ modules for Amazon
Modules for every major networking manufacturer.

But... what does it do for me?

"Ansible is a radically simple IT automation engine that automates cloud provisioning, configuration management, application deployment, intra-service orchestration, and many other IT needs."

– Ansible.com

What about Chef/Puppet/other tool?

Ansible is agent-less.
Many other tools require a bootstrap agent on the destination machine.

Discovering Ansible

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What can Ansible do for Network Engineers?

1. Template IOS Configurations - HSRP, Vlans, ACLs
2. Standardize commands accross wide inventory
3. Reset security or passwords
4. Audit configurations
5. Backup Configurations on schedule or before/after changes.
6. Per-host Ping tests - Network Testing
7. Trigger API calls
8. Network Assessments/Inventory

What can Ansible do for Storage and Virtualization Guys?

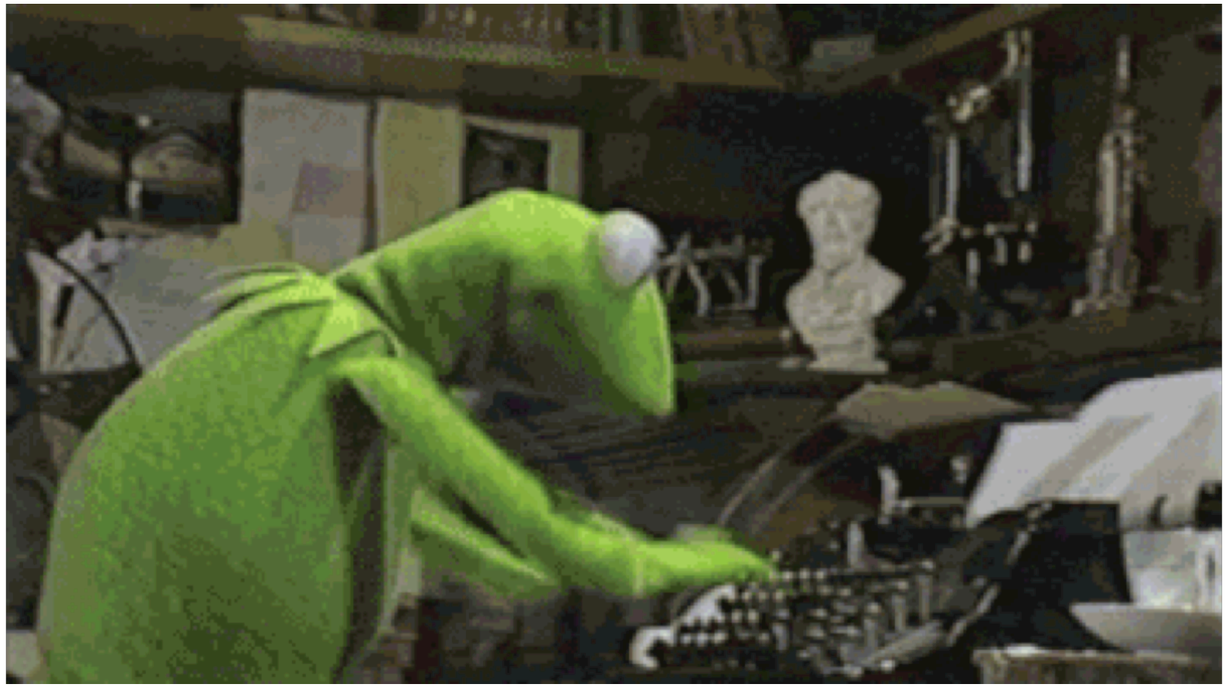
1. Build servers automatically in Vmware or Cloud
    1. more than 100 AWS modules built in
    2. Vmware, OpenStack, etc
2. Automate installation packages
    1. Support for Windows, Linux, etc
3. Per host status checks or ping testing
    1. Deeper testing
4. Inventory data of all your servers

Real world stuff

- Security Audit Remediation
  - Update the IOS
  - Disable telnet, generate keys, turn on SSH, disable http, ssh version 2...
  - ACL standardization

Traditional way - Copy and Paste

Fix one device, get your "plan" of commands and action, repeat.



Or maybe there's a better way

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Install Ansible - Windows

Download "Babun" as a Cygwin Shell - http://babun.github.io/

```
Loads Everything you need - copy/paste

curl -s https://raw.githubusercontent.com/tiangolo/ansible-babun-bootstrap/master/install.sh | source /dev/stdin

pact install python-yaml
pact install python-setuptools python-ming
pact install libxml2-devel libxslt-devel libyaml-devel
curl -skS https://bootstrap.pypa.io/get-pip.py | python
pip install virtualenv
curl -skS https://raw.githubusercontent.com/mitsuhiko/pipsi/master/get-pipsi.py | python
pip install napalm

If you get errors running Ansible later-
you might have to exit and "rebaseall" - run this if you get errors about child processes
cmd /c %SYSTEMDRIVE%\Users\%USERNAME%\.babun\cygwin\bin\dash.exe -c '/usr/bin/rebaseall -v'
then Babun again
```

Install Continued

Ubuntu

```
sudo apt-get install ansible
```

Fedora

```
yum install ansible
```

Mac

```
xcode-select --install
easy_install --user pip
```

Install PIP Libraries

Jinja2
MarkupSafe
jtextfsm
requests
psutil
python-slugify
ciscoconfparse
netmiko
lxml
napalm
ntc-ansible
pyntc

Ok you lost me. That is way too much work.

Vagrant & Ansible

Let's make some instant ~~Cof...~~ Ansible

- Vagrant launches a VM, then installs Ansible
- Instant Ansible/Python Dev Box anytime, with virtualbox and Ansible.

How do I use it?

Vagrant installed Ubuntu, all the requirements and you can use it.

`Vagrant up`
- installs and provisions.

`Vagrant ssh`
- connects to your VM Shell

It mapped a shared folder within the VM - /vagrant
so within your Vagrant VM - any edits you make to your Ansible folder are mapped

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YAML Syntax

Inventory files and Tasks use YAML Syntax

Syntax looks like this-

```
---
# A list of tasty fruits
fruits:
    - Apple
    - Orange
    - Strawberry
    - Mango
```

Inventory - Simple Example

- Group Name
- Hostname (variable=value)

```
[routers]
192.168.1.1 (site=Birmingham)
```

Inventory - Group Variables

```
[all:vars]
domain=mydomain.org
admin_user=admin
admin_password=secretsauce
enable_password=secretsauce
netmask=255.255.255.0
gateway=192.168.1.1
name_server1=8.8.8.8

[ROUTERS:vars]
interface=gi0/0

[ROUTERS]
Router1 ipaddress=192.168.1.2
```

Template Files - Jinja2

```
enable secret {{enable_password}}
hostname {{inventory_hostname}}
ip domain name {{domain}}
aaa new-model
username {{admin_user}} secret {{admin_password}}
line vty 0 15
logging synchronous
transport input telnet ssh
privilege level 15
ntp server {{ntp_server}}
```

Playbooks - Templating playbook

```
- name: Build Router Templates
  hosts: all
  connection: local
  gather_facts: no

  tasks:
    - name: Build Router configs
      template:
        src=templates/routers.j2
        dest=configs/{{inventory_hostname}}.conf
```

Playbook - Show Version

```
---
  - name: Task Name - Show Version
    hosts: routers
    gather_facts: yes
    connection: local

vars:
  cli:
    host: "{{ inventory_hostname }}"
    username: cisco
    password: cisco
    transport: cli

tasks:
  - name: run show version on remote devices
    ios_command:
      commands: show version
      provider: "{{ cli }}"
```

Playbooks Logic

Can have
* loops
* waits
* when conditionals
* if

Playbooks - Roles

example

```
- hosts: SSHRouters
  roles:
      - common
      - SSHOnly

- hosts: oldrouters
  roles:
      - common
```

Will pull from subfolders to build tasks
* roles/common/tasks/main.yml
* roles/SSHOnly/tasks/main.yml

IOS Update

Let's explore what an IOS update process might look like

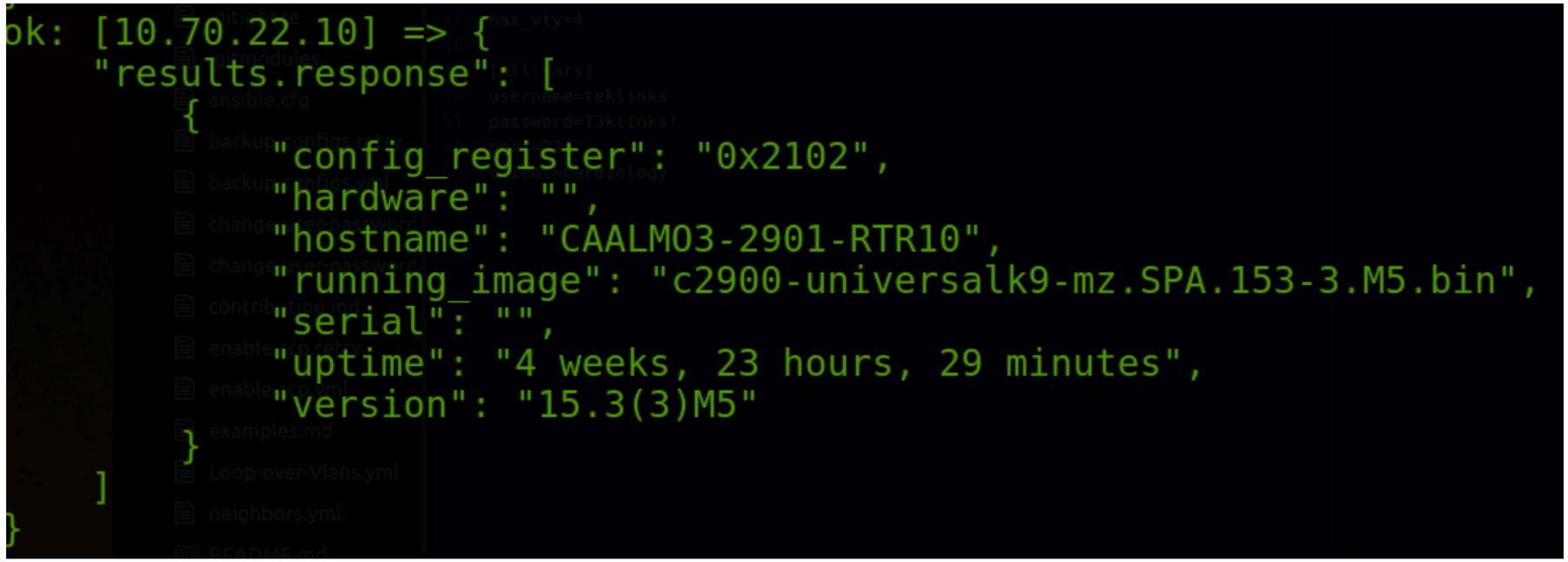
IOS Updates

- First we need info, a playbook to gather details.

```
---
  - name: Show Versions
    hosts: routers
    gather_facts: yes
    connection: local

    tasks:

      - ntc_show_command:
          connection: ssh
          platform: cisco_ios_ssh
          port: 22
          command: 'show version'
          host: "{{ inventory_hostname }}"
          username: "{{ username }}"
          password: "{{ password }}"
        register: results

      - debug: var=results.response
```

IOS Updates

We get some useful data, we can filter on, dump it to files, run it through an API



IOS Transfer

Now we can transfer the image.

```
- name: Upgrade IOS
  hosts: routers
  gather_facts: yes
  connection: local

  tasks:

    - cisco_file_transfer:
        source_file=c2900-universalk9-mz.SPA.155-3.M4a.bin
        dest_file=c2900-universalk9-mz.SPA.155-3.M4a.bin
        enable_scp=true
        host={{ inventory_hostname }}
        username={{ username }}
        password={{ password }}
        overwrite=true
```

IOS Update

Changing boot to the new IOS

```
---
  - name: Set Username and Passwords
    hosts: routers
    gather_facts: yes
    connection: local

    tasks:

      - ntc_config_command:
          connection: ssh
          platform: cisco_ios_ssh
          port: 22
          commands:
            - no boot system
            - boot system flash:c2900-universalk9-mz.SPA.155-3.M4a.bin
            - boot system flash{{ ":" }}
          host: "{{ inventory_hostname }}"
          username: "{{ username }}"
          password: "{{ password }}"
```

IOS Update

But did it work? Sanity check

```
- ntc_show_command:
    connection: ssh
    platform: cisco_ios_ssh
    port: 22
    command: 'show run | inc boot system'
    host: "{{ inventory_hostname }}"
    username: "{{ username }}"
    password: "{{ password }}"
  register: results

- debug: var=results.response
```

IOS Update

Yep. 👍

```
ok: [10.70.22.10] => {
    "results.response": [
        "boot system flash:c2900-universalk9-mz.SPA.155-3.M4a.bin"
    ]
}
ok: [10.70.23.10] => {
    "results.response": [
        "boot system flash:c2900-universalk9-mz.SPA.155-3.M4a.bin"
    ]
}
ok: [10.70.21.10] => {
    "results.response": [
        "boot system flash:c2900-universalk9-mz.SPA.155-3.M4a.bin"
    ]
}
```

IOS Updates
Words of Caution

- Library Issues
- Transfer timeouts
- Verify the IOS

Review

- Our demos today are around CLI devices, and Vagrant.
- Ansible is much more, and has 750+ modules. It will automate anything.

Ideas Beyond the Cisco World

M&CS Networking

Modules for Logic Monitor - can discover networks and add them to Logic Monitor.

```
#example of adding a list of hosts into monitoring

tasks:
  - name: Deploy LogicMonitor Host
    # All tasks except for target=collector should use delegate_to: localhost
    logicmonitor:
      target: host
      action: add
      collector: mycompany-Collector
      company: '{{ company }}'
      user: '{{ user }}'
      password: '{{ password }}'
      groups: /servers/production,/datacenter1
      properties:
        snmp.community: secret
        dc: 1
        type: prod
    delegate_to: localhost
```

Test the entire network

Can everything ping what it needs?

Can all XX devices/branches reach critical services?

```
$ ansible cisco-devices -u cisco -m raw -a "traceroute 10.0.0.4"
R1 | success | rc=0 >>

Type escape sequence to abort.
Tracing the route to 10.0.0.4
VRF info: (vrf in name/id, vrf out name/id)
  1 14.14.14.4 0 msec *  0 msec

R2 | success | rc=0 >>

Type escape sequence to abort.
Tracing the route to 10.0.0.4
VRF info: (vrf in name/id, vrf out name/id)
  1 12.12.12.1 0 msec 0 msec 0 msec
  2  *  *
    14.14.14.4 0 msec

R3 | success | rc=0 >>

Type escape sequence to abort.
Tracing the route to 10.0.0.4
VRF info: (vrf in name/id, vrf out name/id)
  1 34.34.34.4 0 msec 0 msec *

R4 | success | rc=0 >>

Type escape sequence to abort.
Tracing the route to 10.0.0.4
VRF info: (vrf in name/id, vrf out name/id)
  1 10.0.0.4 0 msec 0 msec *
```

Vmware - Create VMWare Guests

```
- vsphere_guest:
    vcenter_hostname: vcenter.mydomain.local
    username: myuser
    password: mypass
    guest: newvm001
    state: powered_on
    vm_extra_config:
      vcpu.hotadd: yes
      mem.hotadd:  yes
      notes: This is a test VM
      folder: MyFolder
    vm_disk:
      disk1:
        size_gb: 10
        type: thin
        datastore: storage001
    vm_nic:
      nic1:
        type: vmxnet3
        network: VM Network
        network_type: standard
    vm_hardware:
      memory_mb: 2048
      num_cpus: 2
      osid: centos64Guest
      scsi: paravirtual
      vm_cdrom:
        type: "iso"
        iso_path: "DatastoreName/cd-image.iso"
    esxi:
      datacenter: MyDatacenter
      hostname: esx001.mydomain.local
```

Microsoft - Updates

Install all security, critical, and rollup updates

```
- win_updates:
    category_names:
      - SecurityUpdates
      - CriticalUpdates
      - UpdateRollups
```

Wrapping up

- Experiment with Ansible
  - Wrap up a project - backup all the configs
  - Security remediation or other bulk changes
  - Network Inventory/Audit tasks
  - Bulk Command output or Testing
- **Actively Seek billable work where you can add value doing automation.**
  - Engage myself or Jeremy in a project to help, or just have us run the project.
- Don't settle for a copy paste lifestyle. Automate all the things.

Thank you.

Questions?