

2019 Michigan IT Symposium

Molecule



> whoami

- Been in Ann Arbor pretty much my entire life
- Studied Electrical Engineering and graduated in 2017, but found myself really enjoying my student jobs in IT
- Now a member of the DevOps team in HITS (*check out our poster!*)
- Ansible and Molecule (and Kubernetes) Contributor[™]

www.github.com/mjlshen/talks

mishen@umich.edu



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> whoami

- In March I knew practically nothing about Ansible

6. Integrating Ansible with RHEL Builds

Submitted by: Michael Shen, LSA Technology Services

Description:

We're transitioning away from Satellite and Ansible is one potential option, this just represents an initial foray of sorts into what kind of work would need to be done for a full-transition.

3-Minute Pitch

Skills needed: Developers, Desktop Support, Project Managers



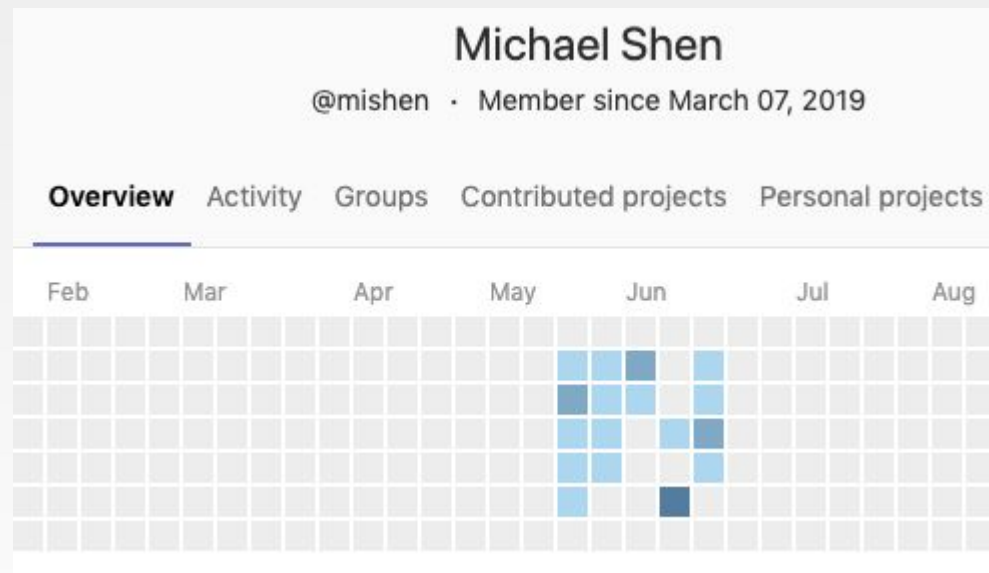
> whoami

- By May I learned enough to be convincing enough to attend the Red Hat Summit in Boston



```
> whoami
```

- By June I learned enough to convince HITS to hire me



Do you believe in the need for
configuration-as-code tools like
Ansible?



Four Things We Care About*

1. Security
2. Availability
3. Resource Management
4. Service Discovery

*2017 Kelsey Hightower: Kubernetes Federation



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Two Things Ansible Can Help With

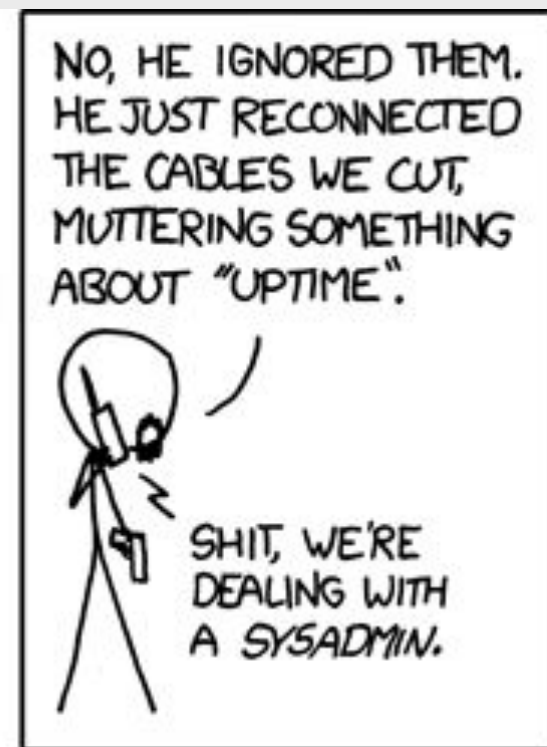
1. Security
2. Availability
- ~~3. Resource Management~~
- ~~4. Service Discovery~~

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* <https://xkcd.com/2232/>



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Threats to Our Configuration

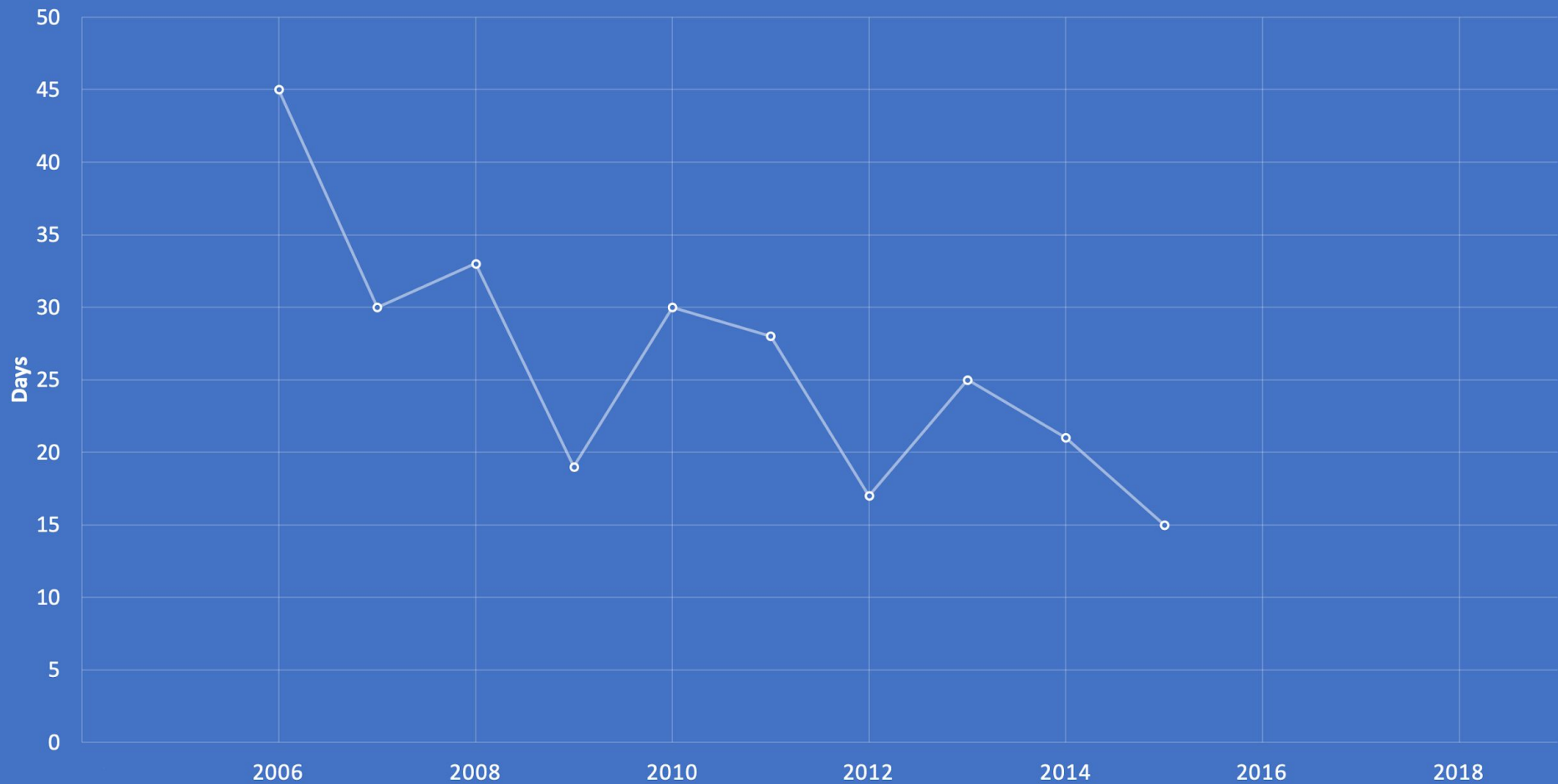
- The Software Changes
- The Environment Changes



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AVERAGE DAYS UNTIL EXPLOIT



*2016 IBM X-Force/Gartner Research



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Misconfigurations as a Security Risk

- Manual human configuration continues to be a major cybersecurity risk
- Ansible allows varying teams to use the same toolset
 - Consistent, repeatable, and secure environments can be collaboratively deployed and verified using Ansible



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Misconfigurations as a Security Risk

- Manual human configuration continues to be a major cybersecurity risk
- Ansible allows varying teams to use the same toolset
 - Consistent, repeatable, and secure environments can be collaboratively deployed and verified using Ansible
- The cloud environment is even more complex



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> molecule --help

“Molecule is designed to aid in the development and testing of Ansible roles.

Molecule provides support for testing with multiple instances, operating systems and distributions, virtualization providers, test frameworks and testing scenarios.

Molecule encourages an approach that results in consistently developed roles that are well-written, easily understood and maintained.”



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Demo

Deployment of a Web Application - Sonatype Nexus

> molecule converge

> molecule login



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```
driver:  
  name: vagrant  
  provider:  
    name: virtualbox  
platforms:  
  - name: centos7  
    box: centos/7  
    instance_raw_config_args:  
      - 'vm.network "forwarded_port", host_ip: "127.0.0.1",  
host: 8080, guest: 8081'  
    memory: 4096  
    cpus: 4
```




```
driver:  
  name: docker  
  
platforms:  
  - name: centos7  
    image: "geerlingguy/docker-centos7-ansible:latest"  
    command: "/lib/systemd/systemd"  
    volumes:  
      - /sys/fs/cgroup:/sys/fs/cgroup:ro  
    privileged: true  
    pre_build_image: true  
  
# ...Continued
```



```
driver:  
  name: docker  
  
platforms:  
  # ...from previous slide  
  - name: ubuntu1804  
    image: "geerlingguy/docker-ubuntu1804-ansible:latest"  
    command: "/lib/systemd/systemd"  
    volumes:  
      - /sys/fs/cgroup:/sys/fs/cgroup:ro  
    privileged: true  
    pre_build_image: true
```



What did we get?

- A local development environment!



Demo

Controlled Update of a Web Application - Sonatype Nexus

> molecule converge

> molecule login

> molecule destroy



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What do we now have?

- Repeatable, verifiable proof that our Ansible Role to initialize Sonatype Nexus works on CentOS 7.6
- Repeatable, verifiable proof that our Ansible Role can upgrade versions of Sonatype Nexus from 3.17.0 to 3.19.1

What happens when the next Nexus
or OS update is released?



What happens when a new team member is tasked with the upgrade?



Demo

molecule 101

> molecule test

> molecule lint



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> molecule init role --role-name it_symposium

```
it_symposium
├── README.md
├── defaults
│   └── main.yml
├── handlers
│   └── main.yml
├── meta
│   └── main.yml
├── tasks
│   └── main.yml
└── vars
    └── main.yml
```

```
it_symposium
├── molecule
│   └── default
│       ├── Dockerfile.j2
│       ├── INSTALL.rst
│       ├── molecule.yml
│       ├── playbook.yml
│       └── tests
│           ├── __pycache__
│           │   └── test_default.cpython-37.pyc
│           └── test_default.py
```

9 directories, 12 files

> molecule init role --role-name it_symposium

it_symposi

└─ READ

└─ defau

└─ m

└─ handl

└─ m

└─ meta

└─ m

└─ tasks

└─ m

└─ vars

└─ m

INIT



thon-37.pyc

9 directories, 12 files

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└── vars
    └── main.yml
```

```
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│       ├── molecule.yml
│       ├── playbook.yml
│       └── tests
│           ├── __pycache__
│           │   └── test_default.cpython-37.pyc
│           └── test_default.py
```

```
> cat molecule/default/molecule.yml
```

```
driver:
```

```
  name: docker
```

```
platforms:
```

```
- name: instance
```

```
  box: centos:7
```

```
provisioner:
```

```
- name: ansible
```

```
  lint:
```

```
    name: ansible-lint
```



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```
> cat molecule/default/playbook.yml
```

```
- name: Converge  
  hosts: all  
  roles:  
    - role: it_symposium
```



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> molecule test

- └─ default
 - └─ lint
 - └─ dependency
 - └─ cleanup
 - └─ destroy
 - └─ syntax
 - └─ create
 - └─ prepare
 - └─ converge
 - └─ idempotence
 - └─ side_effect
 - └─ verify
 - └─ cleanup
 - └─ destroy

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 - └─ idempotence
 - └─ side_effect
 - └─ verify
 - └─ cleanup
 - └─ destroy

What did we get?

- Walk-through of an Ansible role development workflow with Molecule
- Our configuration follows best-practice syntax guidelines
 - Ignored rules that we don't care about
- Proof that our Ansible role is safe to run over and over
 - Idempotence



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Limitations of Molecule

- Specialized hardware can be difficult/impossible to emulate in Docker containers or VMs
 - Network Infrastructure
 - Drivers
- That does not stop me from using Ansible to manage these objects though!



Benefits of Molecule

- Easy onboarding to existing Ansible roles
 - <https://gitlab.umich.edu/mishen/ansible-role-crashplan>
- Integration into CI/CD (Continuous Integration/Continuous Delivery) pipelines



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Benefits of Molecule

- Easy onboarding to existing Ansible roles
 - <https://gitlab.umich.edu/mishen/ansible-role-crashplan>
- Integration into CI/CD pipelines
 - The most important of all



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Research* Says...

- While maturity models are very popular in the industry, maturity models are not the appropriate tool to use or mindset to have
 - Encourages vanity metrics tied to maturity models without relating it to customer outcomes
 - A “mature” state that means something different for each team
- What is important is enabling teams to make changes to their products or services without depending on other teams or systems
 - Loosely coupled architecture enables scaling
 - Simplifying complex, painful deployments - key contributor to burnout

*2018 Accelerate by Nicole Forsgren



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Recommended Resources

- Books

- Ansible for DevOps by Jeff Geerling
- The Phoenix Project by Gene Kim (The Unicorn Project releasing soon)
- Accelerate by Nicole Forsgren
- Thinking in Systems by Donella Meadows

- Web Resources

- Ansible Best Practices:
https://docs.ansible.com/ansible/latest/user_guide/playbooks_best_practices.html
- Best Practices for Ansible Slide Deck:
<https://www.slideshare.net/GeorgeShuklin1/best-practices-for-ansible>
- Testing with Molecule:
<https://www.jeffgeerling.com/blog/2018/testing-your-ansible-roles-molecule>



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Questions?



Installation

- <https://molecule.readthedocs.io/en/stable/installation.html>
- For the tools you need to follow along here:
 - Python, Docker Desktop, Virtualbox, Vagrant
 - `pip3 install --user ansible molecule 'molecule[vagrant]' 'molecule[docker]'`

