

# 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<sup>™</sup>

[www.github.com/mjlshen/talks](https://www.github.com/mjlshen/talks)

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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





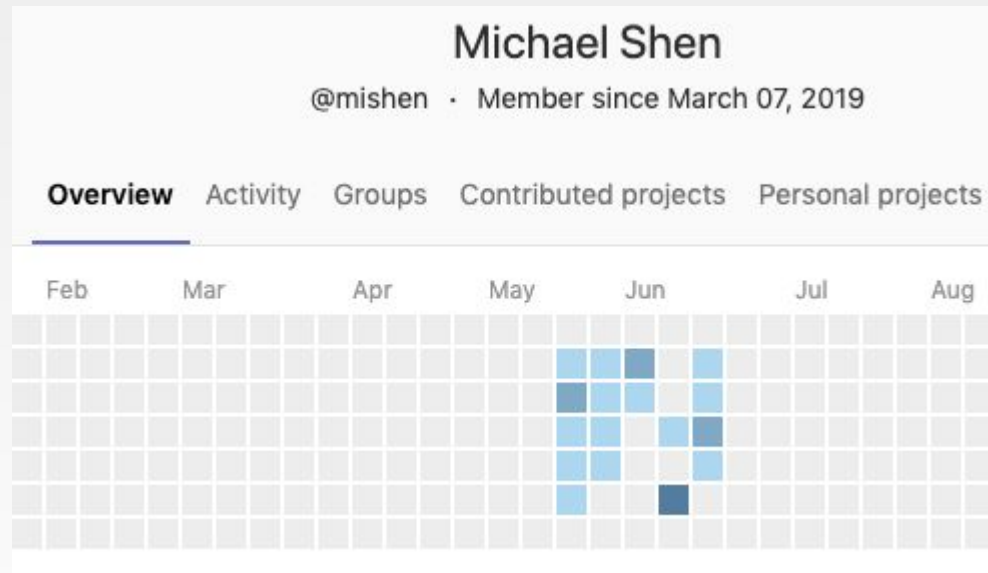
> whoami

- By May I learned enough to convince my manager to allow me 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~~

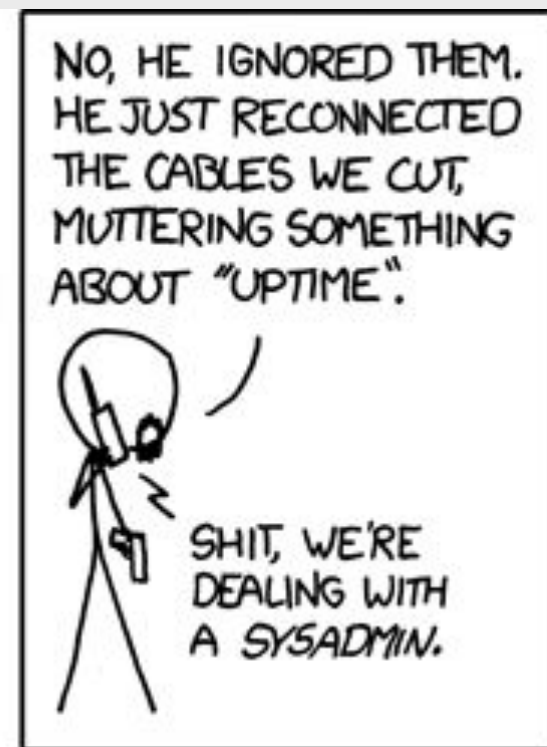
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\* <https://xkcd.com/2232/>



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# Threats to Our Configuration

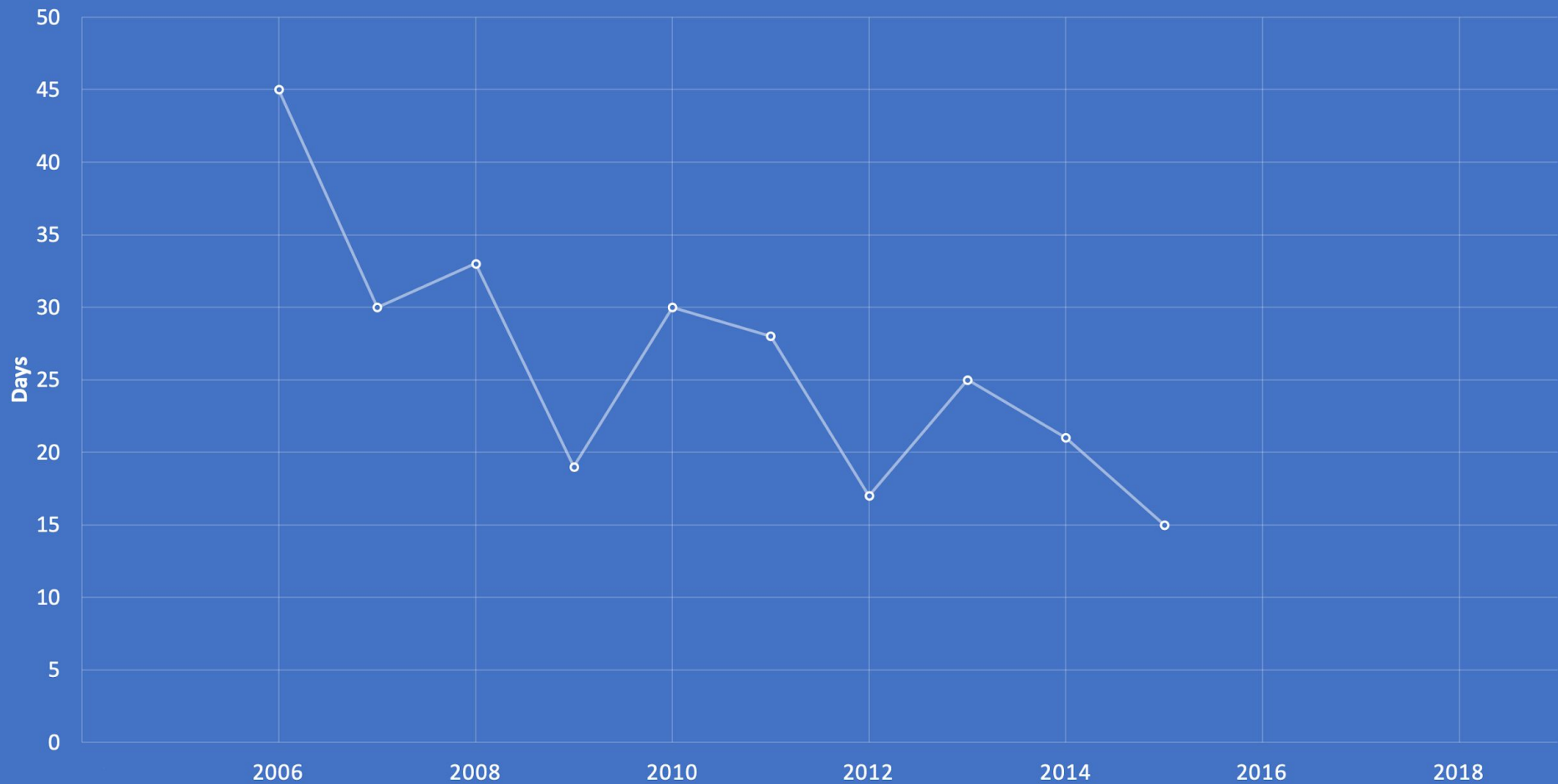
- The Software Changes
- The Environment Changes



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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



> molecule init role --role-name it\_symposium

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├── tasks
│   └── main.yml
└── vars
    └── main.yml
```

```
it_symposium
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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
```



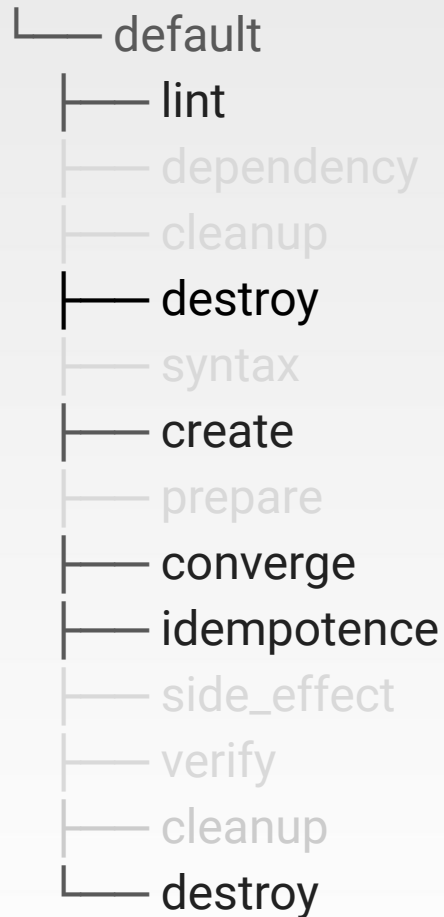
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# > molecule test

- └─ default
  - └─ lint
  - └─ dependency
  - └─ cleanup
  - └─ destroy
  - └─ syntax
  - └─ create
  - └─ prepare
  - └─ converge
  - └─ idempotence
  - └─ side\_effect
  - └─ verify
  - └─ cleanup
  - └─ destroy

# > molecule test



# 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





# 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!



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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 (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](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]'`

