



How to Teach Old Apps New Tricks with Ansible-based Operators: Part 1

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2019-05-08
@ChrisShort

PART ONE

- What is Kubernetes?
- Containers and State
- What's an Operator?
- Ansible-based Operators

WHAT IS KUBERNETES?

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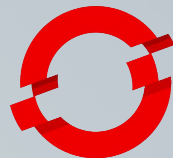
“Kubernetes (k8s) is an open-source system for automating deployment, scaling, and management of containerized applications.”

<https://kubernetes.io/>

ENTERPRISE KUBERNETES

Red Hat® OpenShift®
Container Platform
offers enterprises full
control over their
Kubernetes
environments, whether
they're on-premise or in
the public cloud.

<https://www.openshift.com/>



Red Hat
OpenShift

CONTAINERS AND STATE



STATELESS IS EASY

ORGANIZATIONS RUN ON STATE



STATELESS IS EASY, STATEFUL IS HARD

WHAT'S AN OPERATOR?

KUBERNETES OPERATORS



**OPERATOR
SDK**

Kubernetes Operators encode the human knowledge required to install, upgrade / patch, recover from failure, and tune applications and services.

<https://github.com/operator-framework/operator-sdk>

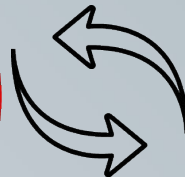
OPERATORS MANAGE STATE



Declare
operational
knowledge from
experts as code



Operator SDK



Deployments
StatefulSets
Autoscalers
Secrets
Config maps

ANSIBLE-BASED OPERATORS

YAML: YEAH YOU KNOW ME!

k8s-deployment.yaml

```
---
apiVersion: apps/v1
kind: Deployment
metadata:
  name: motd-operator
spec:
  replicas: 1
  selector:
    matchLabels:
      name: motd-operator
  template:
    metadata:
      ...
```

ansible-task.yml

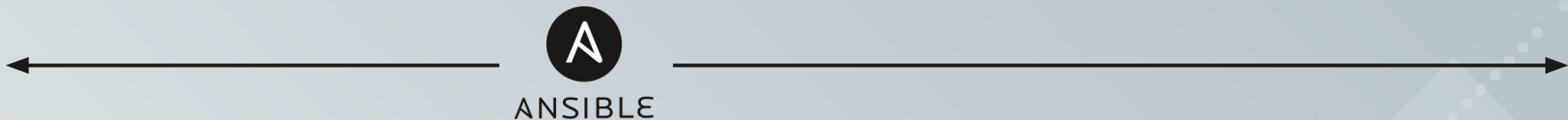
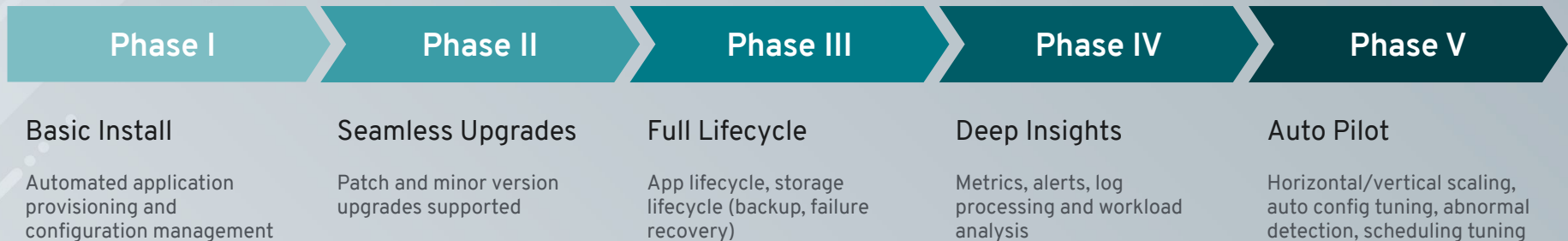
```
---
- name: Save the STATE
  copy:
    dest: /motd.timestamp
    src: /etc/motd
    owner: root
    group: root
    mode: 0644
    remote_src: true
...
```

OPERATOR SDK ANSIBLE


The [Ansible Kubernetes module](#) enables the Operator SDK to utilize Ansible and its ecosystem to manage applications inside Kubernetes and OpenShift



OPERATOR CAPABILITY LEVEL



ansible.com/operators

OVERVIEW ▾PRODUCTS ▾LEARN ▾COMMUNITY ▾TRY ANSIBLE TOWER

Building Operators with Ansible

[Request more info](#)

CHALLENGE

Operators are usually written in Go by software developers that are highly familiar with Kubernetes.

SOLUTION

Ansible® is a first class citizen in the Operator SDK. Ansible-based Operators provide a lower barrier to entry, faster iterations, and the power of Ansible and its ecosystem. Put more simply, an Operator is designed to watch and respond to the resources in your cluster to enable your application to run as desired. After the Operator SDK is invoked, it's Ansible code as opposed to a common approach of handling these events with Go code.

Learn the basics of Kubernetes

Key components, architecture, and how to get started

BUT WAIT THERE'S MORE
IN PART TWO



THANK YOU



[linkedin.com/company/Red-Hat](https://www.linkedin.com/company/Red-Hat)



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How to Teach Old Apps New Tricks with Ansible-based Operators: Part 2

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PART TWO

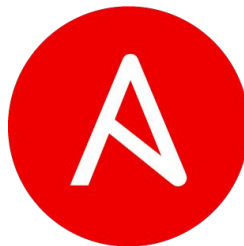
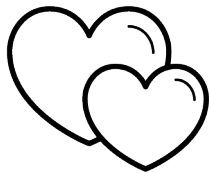
- Part One Recap
- Ansible-based Operators in Kubernetes
- How Can Ansible-based Operators Bring Apps To Openshift
- Resources

PART ONE RECAP

STATELESS IS EASY, **STATEFUL** IS HARD



OPERATOR
SDK



ANSIBLE-BASED OPERATORS IN KUBERNETES

ANSIBLE-BASED OPERATORS



**OPERATOR
SDK**

```
operator-sdk new  
motd-operator --type ansible  
--api-version  
motd.example.com/v1 --kind  
MOTD
```



Red Hat
Ansible
Automation

```
cd motd-operator/roles/motd
```

watches.yaml

- version: v1
group: motd.example.com
kind: MOTD
role: /opt/ansible/roles/motd

HOW CAN ANSIBLE-BASED OPERATORS BRING APPS TO KUBERNETES

ANSIBLE MANAGING STATE

The screenshot shows a GitHub repository page for 'chris-short / ansible-role-motd'. The repository has 1 Unwatch, 1 Unstar, and 0 Forks. The main navigation bar includes links for Code, Issues (0), Pull requests (0), Actions, Projects (0), Wiki, Insights, and Settings. The current view is the 'main.yml' file in the 'tasks' directory on the 'master' branch. The file was committed by 'chris-short' (Yak shaving) a minute ago. The file content is as follows:

```
1 ---
2 - name: Save the STATE
3   copy:
4     dest: /root/motd.{{ ansible_date_time.iso8601_micro }}
5     src: /etc/motd
6     owner: root
7     group: root
8     mode: 0644
9     remote_src: true
10
11 - name: Deploy Fresh MOTD
12   template:
13     src: motd.j2
14     dest: /etc/motd
```

The footer of the page includes copyright information for GitHub, Inc. (2019) and links to Terms, Privacy, Security, Status, Help, Contact GitHub, Pricing, API, Training, Blog, and About.

ANSIBLE GALAXY MANAGING STATE

The screenshot displays the Ansible Galaxy web interface. The top navigation bar includes links for Home, Search, Community, My Content, and My Imports. The main content area shows the details for the 'ansible_role_motd' collection, authored by 'chris-short'. The collection is described as an 'Opinionated MOTD'. It has a 5/5 score, 1 download, 1 watcher, and 1 star. The interface also shows a 'Details' tab and a 'Read Me' button. The 'Info' section lists the minimum Ansible version (2.4), installation command, last commit, last import, and tags (system). The 'Content Score' section shows a quality score of 5/5 and a community score of 0/5 based on 0 surveys. A feedback section titled 'Tell us about this collection' includes a survey with questions like 'Quality of docs?', 'Ease of use?', 'Does what it promises?', 'Works without change?', and 'Used in production?'.

Community Authors > [chris-short](#) > ansible_role_motd

ansible_role_motd
Opinionated MOTD

5 / 5 Score 1 Downloads 1 Watchers 1 Stars
0 Forks

[Follow Collection](#) [Issue Tracker](#) [GitHub Repo](#)

[Details](#) [Read Me](#)

Info

Minimum Ansible Version **2.4**

Installation `$ ansible-galaxy install chris-short.ansible_role_motd`

Last Commit a day ago

Last Import a day ago

Tags **system**

Content Score

Quality Score **5 / 5**
Last scored a day ago. [Show Details](#)

Community Score No Surveys **0 / 5**
Based on 0 surveys. [Show Details](#)

Tell us about this collection

Quality of docs? ☐ ☐ ☐ ☐ ☐

Ease of use? ☐ ☐ ☐ ☐ ☐

Does what it promises? ☐ Y ☐ N

Works without change? ☐ Y ☐ N

Used in production? ☐ Y ☐ N

RED HAT ANSIBLE TOWER MANAGING STATE

The screenshot displays the Red Hat Ansible Tower web interface. The left sidebar contains navigation menus for Views, Resources, and Administration. The main content area shows the details of a job run for the 'site.yml' playbook, which is marked as 'Successful'. The job was launched by 'admin' and completed at 5/3/2019 9:15:19 AM. The job template is 'MOTD' and the project is 'Opinionated MOTD'. The credential used is 'SSH Key (foghorn)'. The verbosity is set to '1 (Verbose)'. The extra variables section shows a single variable '1' with a value of '---'. The right pane displays the output of the job run, showing the execution of the 'MOTD' playbook. The output includes the following tasks and their results:

```
6 TASK [Gathering Facts] ***** 09:15:15
7 ok: [marvin]
8 ok: [speedy]
9
10
11 TASK [motd : Save the STATE] ***** 09:15:17
12 changed: [speedy] => {"changed": true, "checksum": "f5a0d84bd4273bfa3bd54a6360ea50c84a3f03a4", "dest": "/root/motd.2019-05-03T13:15:16.845867Z", "gid": 0, "group": "root", "md5sum": "dafec6c5584fe0e8a2f3445b256bbf34", "mode": "0644", "owner": "root", "size": 82, "src": "/etc/motd", "state": "file", "uid": 0}
13 changed: [marvin] => {"changed": true, "checksum": "b0bad81aa5e6cdcd642991d8a112f22198447c", "dest": "/root/motd.2019-05-03T13:15:16.839771Z", "gid": 0, "group": "root", "md5sum": "c00d8401f64447fc6dda5e8d0f09430d", "mode": "0644", "owner": "root", "size": 82, "src": "/etc/motd", "state": "file", "uid": 0}
14
15 TASK [motd : Deploy Fresh MOTD] ***** 09:15:18
16 ok: [marvin] => {"changed": false, "checksum": "b0bad81aa5e6cdcd642991d8a112f22198447c", "dest": "/etc/motd", "gid": 0, "group": "root", "mode": "0644", "owner": "root", "path": "/etc/motd", "size": 82, "state": "file", "uid": 0}
17 ok: [speedy] => {"changed": false, "checksum": "f5a0d84bd4273bfa3bd54a6360ea50c84a3f03a4", "dest": "/etc/motd", "gid": 0, "group": "root", "mode": "0644", "owner": "root", "path": "/etc/motd", "size": 82, "state": "file", "uid": 0}
18
19 PLAY RECAP ***** 09:15:19
20 marvin          : ok=3    changed=1    unreachable=0    failed=0
21 speedy          : ok=3    changed=1    unreachable=0    failed=0
22
```

BUILD ANSIBLE-BASED OPERATOR

```
# operator-sdk new motd-operator --type ansible  
--api-version motd.example.com/v1 --kind MOTD
```

```
# cd motd-operator
```

```
# oc create -f deploy/crds/motd_v1_motd_crd.yaml
```

BUILD ANSIBLE-BASED OPERATOR

```
# vi build/Dockerfile
```

```
RUN ansible-galaxy install  
chris-short.ansible_role_motd
```

```
# operator-sdk build  
quay.io/chrisshort/motd-operator:v0.0.1
```

```
# podman push  
quay.io/chrisshort/motd-operator:v0.0.1
```


DEPLOY ANSIBLE-BASED OPERATOR

```
# oc create -f deploy/service_account.yaml
```

```
# oc create -f deploy/role.yaml
```

```
# oc create -f deploy/role_binding.yaml
```

```
# oc create -f deploy/operator.yaml
```

ANSIBLE MANAGING STATE IN K8S

```
Context:
Cluster:
User:
K9s Rev: 0.6.2
K8s Rev: v1.13.3
CPU: n/a
MEM: n/a

<esc> Back
<c> Clear
<s> Toggle AutoScroll

time="2019-05-02T16:02:06Z" level=info msg="Go Version: go1.10.3"
time="2019-05-02T16:02:06Z" level=info msg="Go OS/Arch: linux/amd64"
time="2019-05-02T16:02:06Z" level=info msg="Version of operator-sdk: v0.4.0"
time="2019-05-02T16:02:06Z" level=info msg="Watching motd-operator namespace."
{"level":"info","ts":1556812926.1265817,"logger":"leader","msg":"Trying to become the leader."}
{"level":"info","ts":1556812926.2095914,"logger":"leader","msg":"No pre-existing lock was found."}
{"level":"info","ts":1556812926.2162108,"logger":"leader","msg":"Became the leader."}
{"level":"info","ts":1556812926.2177503,"logger":"proxy","msg":"Starting to serve","Address":"127.0.0.1:8888"}
{"level":"info","ts":1556812926.218173,"logger":"ansible-controller","msg":"Watching resource","Options.Group":"motd.example.com","Options.Version":"v1","Options.Kind":"MOTD"}
{"level":"info","ts":1556812926.2185175,"logger":"kubebuilder.controller","msg":"Starting EventSource","controller":"motd-controller","source":"motd.example.com/v1 Kind=MOTD"}
{"level":"info","ts":1556812926.3189704,"logger":"kubebuilder.controller","msg":"Starting Controller","controller":"motd-controller"}
{"level":"info","ts":1556812926.4192204,"logger":"kubebuilder.controller","msg":"Starting workers","controller":"motd-controller","worker count":1}
```

<https://github.com/derailed/k9s>

RESOURCES

ansible.com/operators

Why Build Operators with Ansible?

Ansible Fits naturally into a Kubernetes Environment. Both use YAML to describe the desired state of the world. Both [Ansible](#) and [OpenShift](#) have vibrant communities working to solve common problems. Combining Ansible and Kubernetes frees up application engineers to minimize the new skill sets required to maximize time to delivery.

The same tried and trusted Ansible tooling lets you Automate and Orchestrate your applications across both new and existing platforms allowing teams to transition without having to learn new skills. With the [k8s module](#), an Ansible user can manage applications on Kubernetes, on existing IT or across both with one simple language.



FEATURED WEBINAR

Operators for Ansible people

In this webinar Red Hat provides an overview of Ansible Operators. Highlights include:

- Why use Ansible with Kubernetes
- Extending Kubernetes API
- Advanced patterns

[Watch video](#)

SPEAKERS



Michael Hrivnak
Principal Software Engineer, Red Hat

ANSIBLE ECOSYSTEM



Red Hat
Ansible
Automation

Red Hat® Ansible®
Automation is a
universal language,
unraveling the mystery
of how work gets done.
Turn tough tasks into
repeatable playbooks.

A N S I B L E

Ansible is an open source
community project sponsored
by Red Hat, it's the simplest way
to automate IT. Ansible is the
only automation language that
can be used across entire IT
teams from systems and
network administrators to
developers and managers.

OPERATOR ECOSYSTEM

[OperatorHub.io](https://operatorhub.io): OperatorHub.io is a new home for the Kubernetes community to share Operators. Find an existing Operator or list your own today.

learn.openshift.com: Our Interactive Learning Scenarios provide you with a pre-configured OpenShift® instance, accessible from your browser without any downloads or configuration.

[Operator Framework](#): An open source toolkit to manage Kubernetes native applications, called operators, in an effective, automated, and scalable way.

ARTIFACTS

<https://github.com/chris-short/ansible-role-motd>: Ansible Role to manage /etc/motd to simulate managing state

https://galaxy.ansible.com/chris-short/ansible_role_motd: Above Ansible Role available from Ansible Galaxy

<https://github.com/chris-short/motd-operator>: Ansible-based Kubernetes Operator Using [ansible_role_motd](https://galaxy.ansible.com/chris-short/ansible_role_motd) from Ansible Galaxy as an example from managing state in a Kubernetes cluster

RED HAT
SUMMIT

THANK YOU



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