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Software Engineering Conference Russia 2018

On declarative configuration management using Kubernetes and Helm

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First things first, what is DevOps?

- I will make a short break for you so you can ship a release
- And if your process is solid enough, you can ship while I talk
- Or even better, a release can ship itself when it's ready without even bothering you
- Do you need a couple of minutes just to check if something is shipping right now?

BTW, who are you?

- Are you a human being?
- Maybe a DevOps engineer?
- Maybe a cyborg?
- Maybe even a Jenkins node?
- If so, how many jobs you can run in parallel?

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- Infrastructure gets to the desired state!

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- We define a desired state declaratively
- We instruct a CM master tool to get a system to that state idempotently
- Some CM magic begins
- Midnight suddenly comes
- Infrastructure gets to the desired state!
- Sounds not too difficult, should be quite easy to implement

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A bit of history

- Are you familiar with Puppet CM system?
- Raise your hands if you like it! (But how on Earth is it possible?)

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A bit of history

- Are you familiar with Chef CM system?
- Raise your hands if you like it! (Please don't cry, SECR is a safe place and I'm your friend)

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A bit of history

- Are you familiar with Ansible CM system?
- Raise your hands if you like it!

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If you know Ansible, pls help me a bit

- I need to configure a cluster of something
- No, not a cluster yet, just a monitoring tool for a cluster

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Okay let's try

What's inside

```
107
108       - name: install make
109         apt: name=make state=present
110
111       - name: install cpanm
112         apt: name=cpanminus state=present
113
114       - name: install Net::Statsd::Server
115         cpanm: name=Net::Statsd::Server
116
117       - name: add a statsd user
118         user: name=statsd state=present
119
120       - name: put Net::Statsd::Server config
121         template: src=graphite/localConfig.js dest=/home/statsd/localConfig.js owner=statsd group=statsd mode=064
122
123       - name: put statsd service descriptor
124         template: src=graphite-supervisor/statsd.conf dest=/etc/supervisor/conf.d/statsd.conf owner=root group=rc
125         notify:
126         - restart supervisor
127
128     handlers:
129     - name: restart supervisor
130       service: name=supervisor state=restarted
```

What's wrong with it?

- Nothing, this module was just awesome
- Except that it was poorly written, not documented at all, hard to use, not supported and finally abandoned
- Still 7 stars on GitHub!

Let's try again

What's inside

```
22    - name: put carbon service descriptor
23      template: src=carbon-eye.rb dest=/etc/eye/carbon.rb owner=root group=root mode=0644
24      when: "not ((ansible_distribution == 'Debian' and (ansible_distribution_version|version_compare(8.0, '>='))) or (ansible_dis
25
26    - name: create {{ graphite_prefix }}/storage/
27      file: dest={{ graphite_prefix }}/storage/ state=directory
28
29    - name: load config in eye
30      command: bash -c "source /usr/local/rvm/scripts/rvm && eye l /etc/eye/apps.eye"
31      become: yes
32      when: "not ((ansible_distribution == 'Debian' and (ansible_distribution_version|version_compare(8.0, '>='))) or (ansible_dis
33
34    - name: put systemd unit file to its destination
35      template: src=carbon.service dest=/etc/systemd/system/graphite-carbon.service owner=root group=root mode=0644
36      when: "(ansible_distribution == 'Debian' and (ansible_distribution_version|version_compare(8.0, '>='))) or (ansible_distribu
37      notify: systemctl daemon-reload
38
39    - name: enable graphite-carbon service
40      service: name=graphite-carbon enabled=yes state=started
41      when: "(ansible_distribution == 'Debian' and (ansible_distribution_version|version_compare(8.0, '>='))) or (ansible_distribu
```
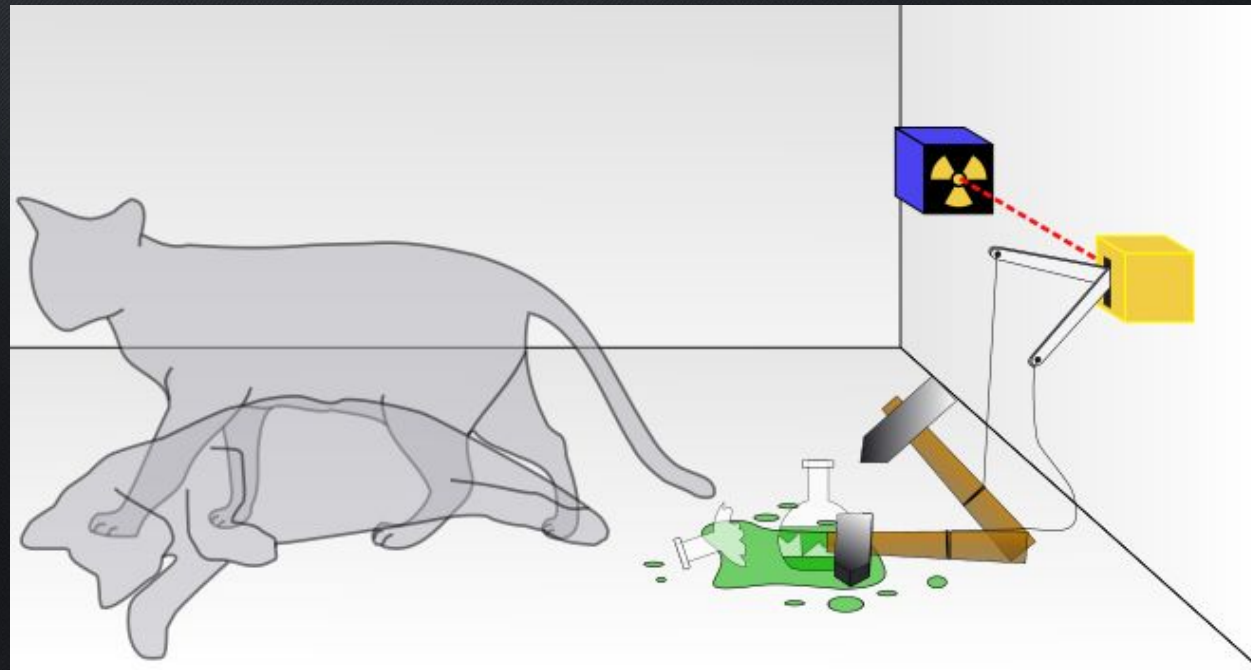
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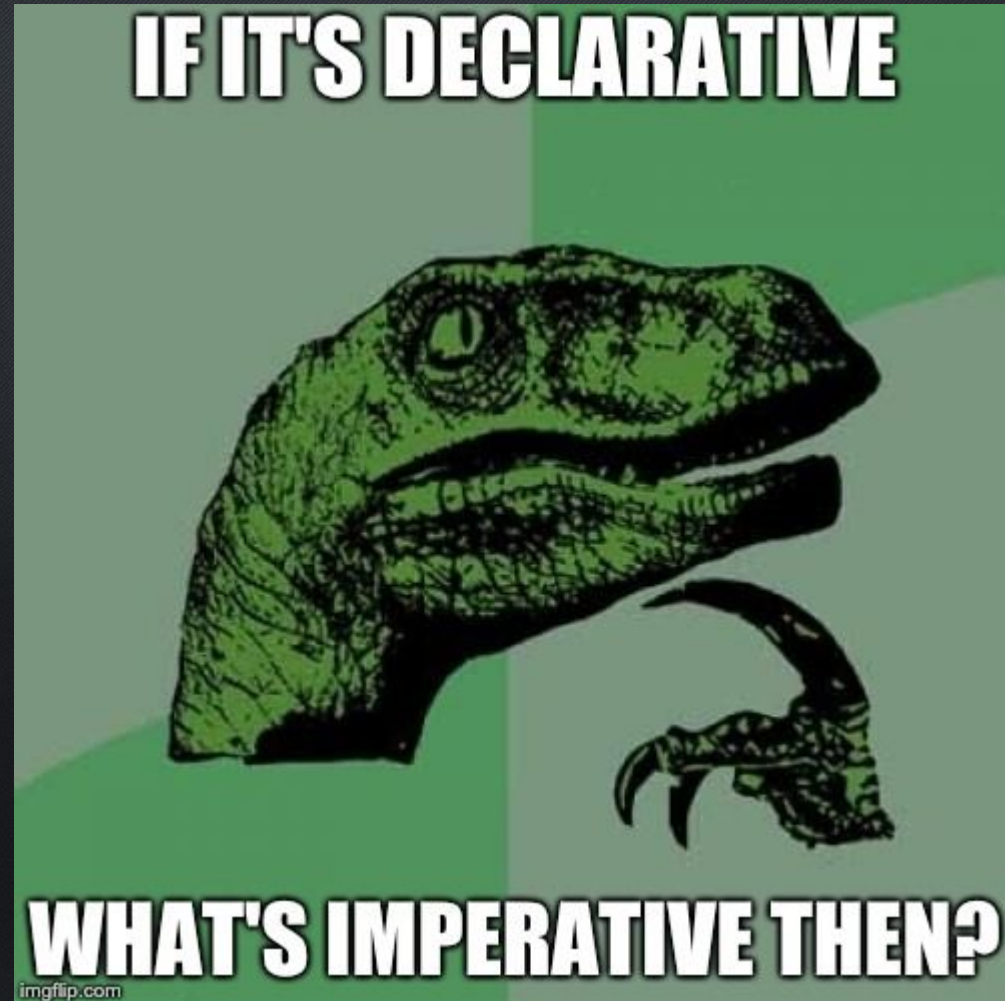
What's wrong with it?

What's terribly wrong with it?

- Can you tell for sure what is a status of the Carbon systemd service?
- And if you can, imagine a situation where you provide a service unit file and then use Ansible "notify" mechanism to call a handler which in turn enables the service

What's terribly wrong with it?

- It's hard to explain (not so hard to implement though), but people tend to be extremely proud implementing solutions like this
- Why on Earth does Ansible allow this?
- **Please note that Ansible handlers run at the end of script execution**

BETTER SAFE THAN SORRY

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Back to the CM process for a moment

- We want to run a set of microservices on top of a monolithic Linux kernel
- If this still makes sense, we can consider services as building blocks

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A dictionary for people from late 90s

- A microservice = a process
- A Docker image = a package
- Kubernetes = an operating system for microservices
- Helm = a package managing system (think apt in Debian or yum in RHEL) for Kubernetes

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Let's try

Overview   **Repositories** 91   Stars 852   Followers 113   Following 61

k8s--lab

Type: All ▾   Language: All ▾   📕 New

6 results for repositories matching **k8s--lab**   ✕ Clear filter

k8s-prometheus-grafana-lab

Prometheus/Grafana stack deployed to k8s

⚖ MIT License   Updated just now

k8s-percona-xtradb-cluster-lab

Percona XtraDB Cluster in Kubernetes

★ 1   ⚖ MIT License   Updated 10 days ago

k8s-freehck-efk-lab

An EFK stack deployed to freehck's k8s installation

⚖ MIT License   Updated 11 days ago

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I opened Vim in 1997 and still did not find a way to quit it.

Edit bio

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Organizations

What's inside a lab

- A Vagrant-based Ansible-provisioned K8s setup
- 3 Vagrant boxes
- Using Kubespray (https://github.com/kubernetes-incubator/kubespray) to set up Kubernetes (Kubespray is where Ansible meets K8s)
- Using Helm to provision Kubernetes apps

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What's inside a playbook


```
es (13 sloc)    503 Bytes                                    Raw   Blame   History

- hosts: all
  become: yes
  roles:
  - role: local-persistent-volumes

- import_playbook: ./kubespray/cluster.yml

- hosts: kube1
  become: yes
  roles:
  - role: helm
  - { role: k8s-namespace, k8s_namespace: "stolon" }
  - { role: k8s-stolon-cluster, stolon_helm_release: "stolon", k8s_namespace: "stolon" }
  - { role: postgresql-grafana }
  - { role: k8s-grafana, k8s_namespace: "stolon", grafana_helm_release: "grafana", k8s_grafana_admin_name: "test",
```

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Ansible calls Helm

```
s (4 sloc)    312 Bytes                                          Raw    Blame    History

- name: put values
  template: src=values.yml dest=/tmp/stolon-{{ stolon_helm_release }}.yml

- name: upgrade {{ stolon_helm_release }} release using a Helm chart
  shell: helm upgrade {{ stolon_helm_release }} stable/stolon --install --namespace {{ k8s_namespace }} -f /tmp/sto
```

Tired of dictionaries (the roads must roll!)

- Ansible = Helm
- Ansible role = Helm chart
- Python = Golang (this goes far beyond the scope of this session)
- Jinja templates = some custom templating engine
- ___ = tiller

How Helm works
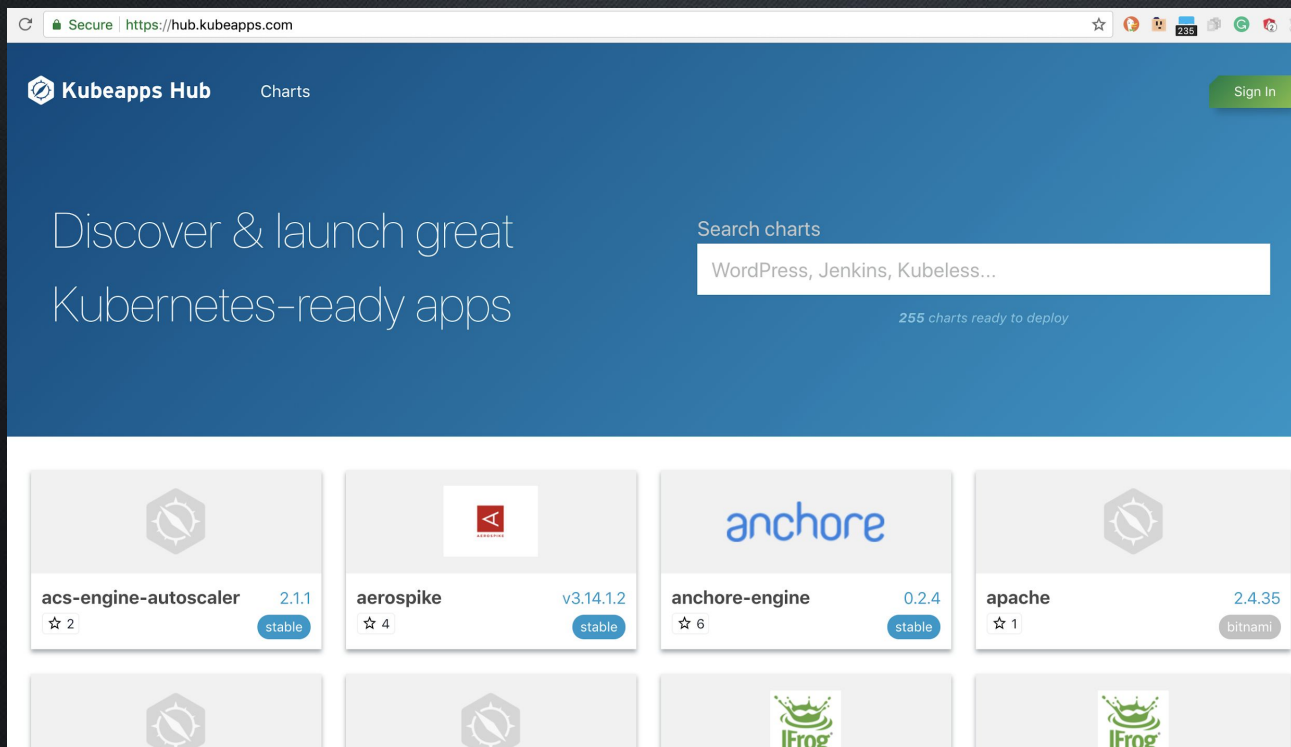
- Helm generated K8s YAML configs
- Helm transfers generated config files to the K8s cluster
- Tiller is an agent which runs in the cluster, effectively a cluster-side Helm service
- Tiller applies configuration files and labels a release
- Just like a Chef client 7 years ago but without a memory leak :)

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Helm charts repository

- It's centralised
- It's on GitHub (https://github.com/helm/charts)
- It grows very fast
- If you submit a patch it will be landed in about a month, which I consider quite fast

Helm charts repository

- https://hub.kubeapps.com (a nice landing page for non-kinesthetic people)

What's inside a chart

..		
📁 ci	[stable/stolon] Fix issue with secret deletion during helm upgrade (#...	4 months ago
📁 templates	[stable/stolon] Add option to force-disable stolon auto-cluster-creat...	2 months ago
📄 .helmignore	[stable/stolon] add stolon chart (#5490)	5 months ago
📄 Chart.yaml	[stable/stolon] Updated README (#7257)	a month ago
📄 README.md	[stable/stolon] Updated README (#7257)	a month ago
📄 values.yaml	[stable/stolon] Add option to force-disable stolon auto-cluster-creat...	2 months ago

📖 **README.md**

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Templates are just declarative configs

..		
NOTES.txt	[stable/stolon] add stolon chart (#5490)	5 months ago
_helpers.tpl	[stable/stolon] add stolon chart (#5490)	5 months ago
create-cluster-job.yaml	[stable/stolon] Add option to force-disable stolon auto-cluster-creat...	2 months ago
keeper-headless-service.yaml	[stable/stolon] add stolon chart (#5490)	5 months ago
keeper-statefulset.yaml	[stable/stolon] Add support for priorityClasses (#6607)	3 months ago
proxy-deployment.yaml	[stable/stolon] Add support for priorityClasses (#6607)	3 months ago
proxy-service.yaml	[stable/stolon] add stolon chart (#5490)	5 months ago
role.yaml	[stable/stolon] add stolon chart (#5490)	5 months ago
rolebinding.yaml	[stable/stolon] add stolon chart (#5490)	5 months ago
secret.yaml	[stable/stolon] Fix issue with secret deletion during helm upgrade (#...	4 months ago
sentinel-deployment.yaml	[stable/stolon] Add support for priorityClasses (#6607)	3 months ago
serviceaccount.yaml	[stable/stolon] add stolon chart (#5490)	5 months ago

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What's wrong with Helm?

- Unfamiliar templating syntax (if you are not a Lisper)

What's wrong with K8s and Helm?

- They are written in Golang
- Really, seriously, please stop using Golang for everything!
- We are humans not rodents, we already invented nuclear bombing, Haskell and even soccer, why Golang after all???

Conclusions

- Classical CM systems were never good
- Kubernetes and Helm are not good too, but we are just not fully aware yet
- And, frankly speaking, I don't care

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