

Over Engineer Go in Kubernetes

Kris Nova



Kris Nova

About Me



Kris Nova



“I work in the cloud...”

Kris Nova



In my free time I help
run a Kubernetes SIG..

Kris Nova

..that brings an
open source



project..



Kris Nova

..to

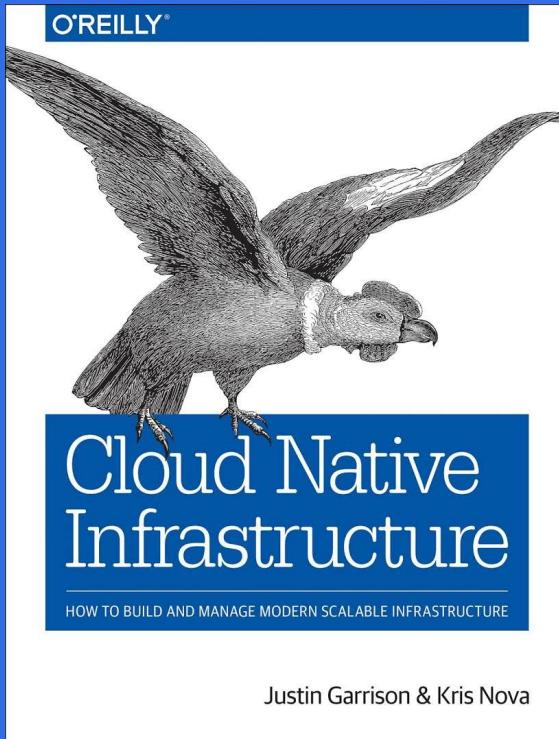


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Microsoft ACS



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go/AUTHORS

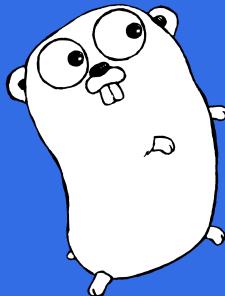


570

Kris Nova <kris@nivenly.com>

Kris Nova

r/golang



Thanks Renee French!

Kris Nova



“I speak for the software..”

?

So what did we
over engineer?

?



Kubernetes Kops

Kubernetes Operations



Kubernetes Kops

Kubernetes Operations

“Kops models a cluster then realizes it in a cloud”

- Kris Nova

Kubernetes Kops

Kubernetes Operations

Statically linked CLI tool
written in Go



Kubernetes Kops

Kubernetes Operations

import “k8s.io/kubernetes”

Kubernetes Kops

Kubernetes Operations

Cluster Model → Apply → Kubernetes

Kops Model

Kubernetes Operations

```
apiVersion: "kops/v1alpha2"
kind: "Cluster"
kubernetesVersion: "1.7.0"
networkCIDR: "172.20.0.0/16"
masterPublicName: "api.nivenly.com"
```





So how does it
work ?



Kops 1.4



Kops 1.4



We have to track our work

```
tasks := []*Task
```



Where do tasks
come from



Kops 1.4

```
# SSH is open to AdminCIDR set
{{ if IsTopologyPublic }}
{{ range $index, $cidr := AdminCIDR }}
securityGroupRule/ssh-external-to-master-{{ $index }}:
  securityGroup: securityGroup/masters.{{ ClusterName }}
  cidr: {{ $cidr }}
  protocol: tcp
  fromPort: 22
  toPort: 22
{{ end }}
{{ end }}
```



How do we parse them



Kops 1.4

embed in .go file

Kops 1.4

embed in .go file

import “text/template”

Kops 1.4

embed in .go file

import “text/template”

parse at runtime

?

How do we develop



?

?



Kops 1.4



Kops 1.4

We were **really** good at
dealing with YAML



Kops 1.4

And we had a lot of it..



Kops 1.4

\$: git checkout tags/v1.4.4

\$: cd upup/models/cloudup

\$: find . | xargs wc -l | grep

total

total 1076

A large, stylized clock face is positioned in the top-left corner, showing approximately 10:10. The numbers are Roman numerals, and the hands are dark blue.

The next release





Kops 1.5

wanted new features





Kops 1.5

wanted new features

brittle dev process



Kops 1.5

wanted new features

brittle dev process

falling behind



Kops 1.5

..also

Kops 1.5



..also

700 open GitHub issues

Kops 1.5

..also

We couldn't test our
“text/template” code

Kops 1.5

..also

We would still get panics at
runtime..

Kops 1.5

List of things we needed to fix:

1. Our shit

What did we do?



This slide contains several layers of text and graphics. In the foreground, there is a large white question mark. Behind it, the main title 'What did we do?' is displayed in a large, bold, white font. Further back, there is a faint, semi-transparent watermark-like text that reads: 'this cluster every availability zone has a public subnet for the private association to hold the instances'. At the very bottom right, there is a small white icon of a smartphone or tablet.

fed9837

YAML text/template

What did we remove?



(Availability zones)

(Availability zone)

(the private subnet

and Route Association to MRT to

the private subnet (to hold the instances)

(Availability zones))

```
(( if not SharedVPC ))
  dhcpcOptions/{{ ClusterName }};
    domainNameServers: AmazonProvidedDNS
    (( if eq Region "us-east-1" ))
      the
        domainName: ec2.internal
    (( else ))
      the
        domainName: {{ Region }}.{{ ClusterName }}.{{ VPCId }}.amazonaws.com
    (( end ))
    dhcpcOptions: dhcpcOptions/{{ ClusterName }}
  (( end ))
  (( if SharedZone $zone ))
    availabilityZone: $zone
    cidr: {{ $zone }}.{{ CIDR }}
```

((if not (SharedZone \$zone)))
 availabilityZone: \$zone

((if SharedZone \$zone))
 availabilityZone: \$zone

The programming language we invented!



Introducing the “text/template” Programming Language..

The “text/template” Programming Language



The “text/template” Programming Language

type FuncMap

FuncMap is the type of the map defining the mapping from names to functions. Each function must have either a single return value, or two return values of which the second has type error. In that case, if the second (error) return value evaluates to non-nil during execution, execution terminates and Execute returns that error.

When template execution invokes a function with an argument list, that list must be assignable to the function's parameter types. Functions meant to apply to arguments of arbitrary type can use parameters of type interface{} or of type reflect.Value. Similarly, functions meant to return a result of arbitrary type can return interface{} or reflect.Value.

```
type FuncMap map[string]interface{}
```

The “text/template” Programming Language

Calling arbitrary functions

The “text/template” Programming Language

Calling arbitrary functions

=

Turing complete language

`{{ nbd }}`





Go VS. text/template

Round 1 Errors

Go	text/template
1	0

Go:
enforced error
handling

text/template:
panic

Round 2 Compiling

Go	text/template
2	0

Go:
Won't compile on
invalid syntax

text/template:
Will compile on
invalid syntax

Round 3 Debugging

Go	text/template
3	0

Go:
**line numbers and
meaningful
output**

**text/template:
it broke**

Round 4

Developing

Go	text/template
4	0

Go:
wonderful IDE
support

nope

Round 5 Testing

Go	text/template
5	0

go test

uh...

Go	text/template
5	0



Winner: Go



So we moved our tasks into Go..



`{{ if isSomething }}` → `if isSomething() {`

`.yaml` .`go`

We wrote small Go
systems instead of
YAML systems



```
func (b *bigSystem) smallSystem(api api) error {  
    if isSomething(api.Value){  
        return b.ensureTask(&task{  
            Name: "myTask",  
            Data: "data",  
        })  
    }  
    return nil  
}
```

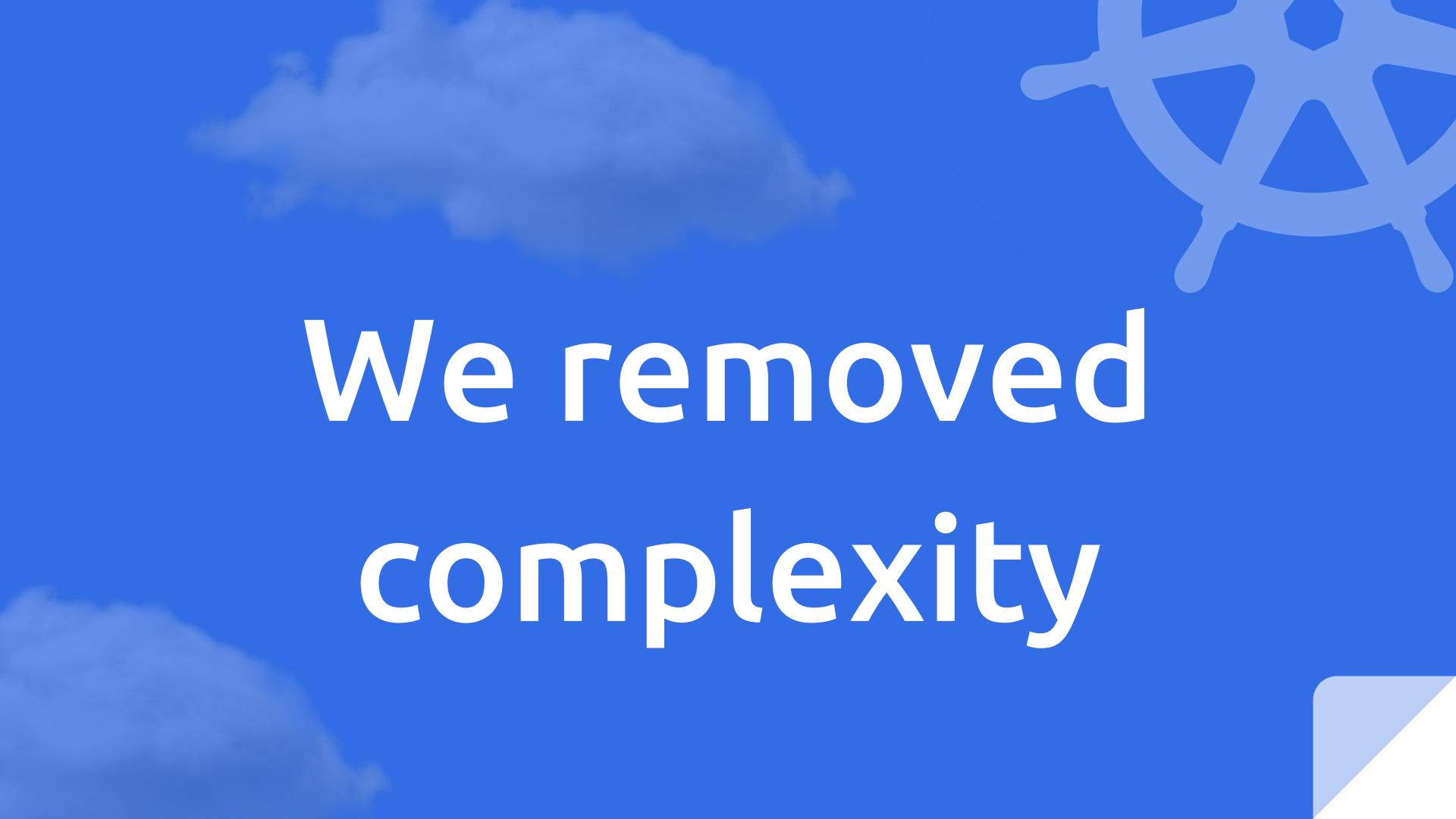
We turned 1,000
lines of yaml into
10 structs



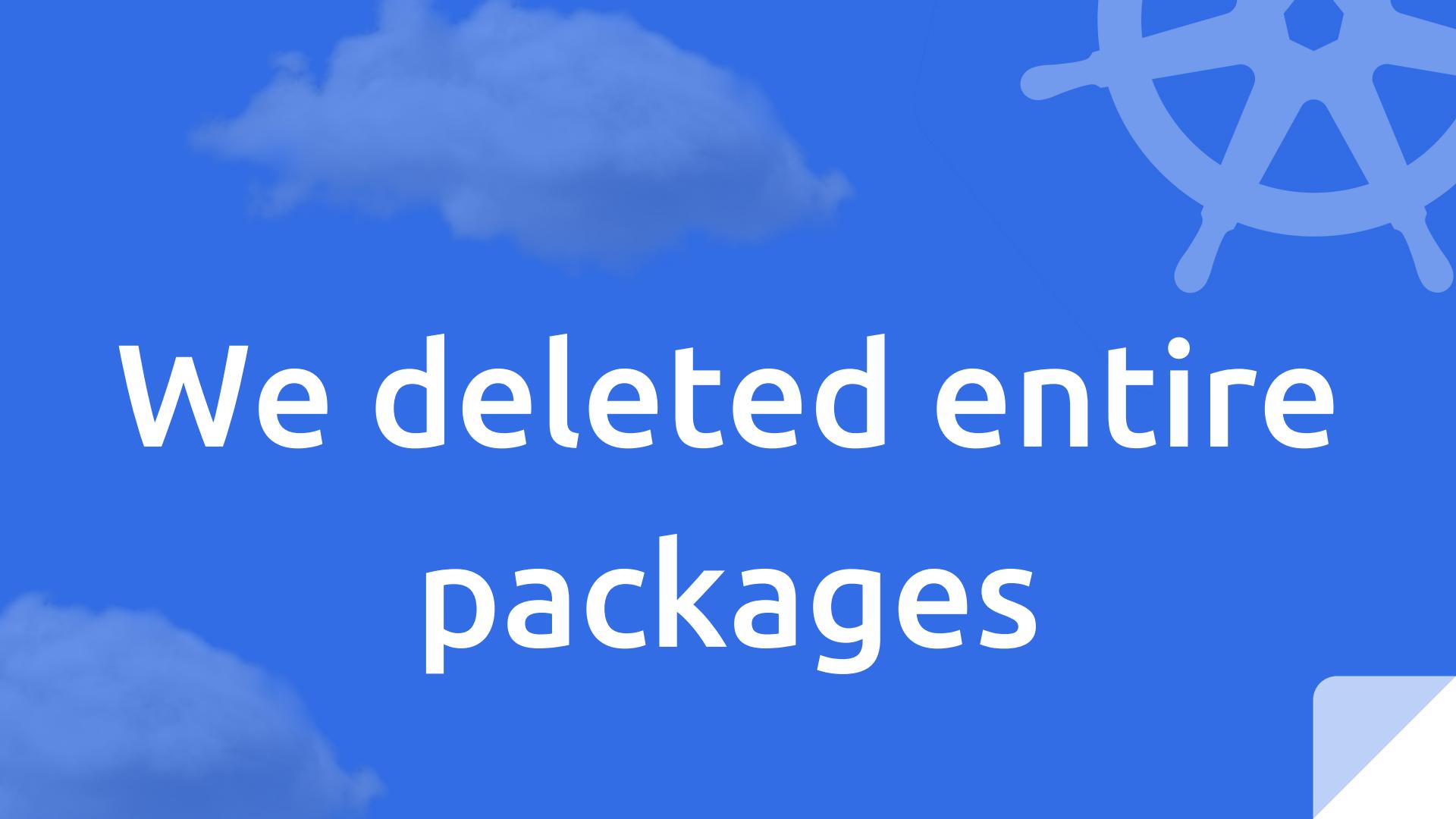


We wrote real
tests..

..that exercised real
code



We removed
complexity



We deleted entire
packages



We made it
exciting to develop



We fixed our shit



Simple
Go
wins.



Kris Nova

@kris_nova