

Getting Started with Kustomize

Introducing Kustomize



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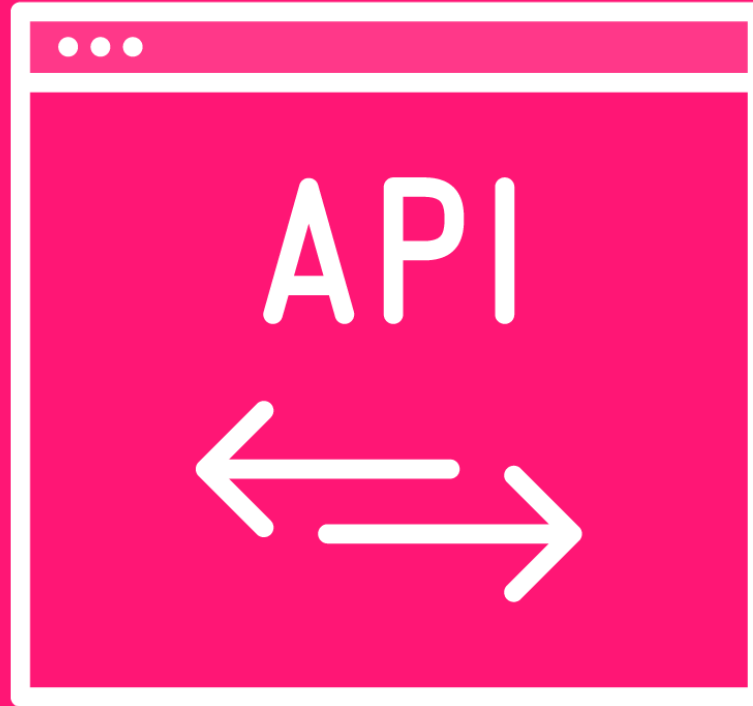
Module Outline



Coming up:

- Managing Kubernetes configuration
- The DRY Principle
- Kustomize





Kubernetes API Objects

Everything in Kubernetes is represented by an object, accessible through a corresponding API resource or endpoint.



Kubernetes Object Types



Deployment



NetworkPolicy



Role



Job



Service



ConfigMap

Declarative Configuration

ingress.yaml

```
apiVersion: networking.k8s.io/v1
kind: Ingress
metadata:
  name: todo-app
spec:
  ingressClassName: nginx
  rules:
    - host: 172-18-255-200.nip.io
      http:
        paths:
          - backend:
              service:
                name: server
                port:
                  number: 3000
            path: /
            pathType: ImplementationSpecific
```



YAML is Verbose



Joe Beda 
@jbeda · [Follow](#)



Thinking of writing a talk called "I'm sorry about the YAML" where I talk about how we got here and where it is all going. What do y'all think?

11:23 PM · Sep 16, 2020



[Read the full conversation on Twitter](#)



906



Reply

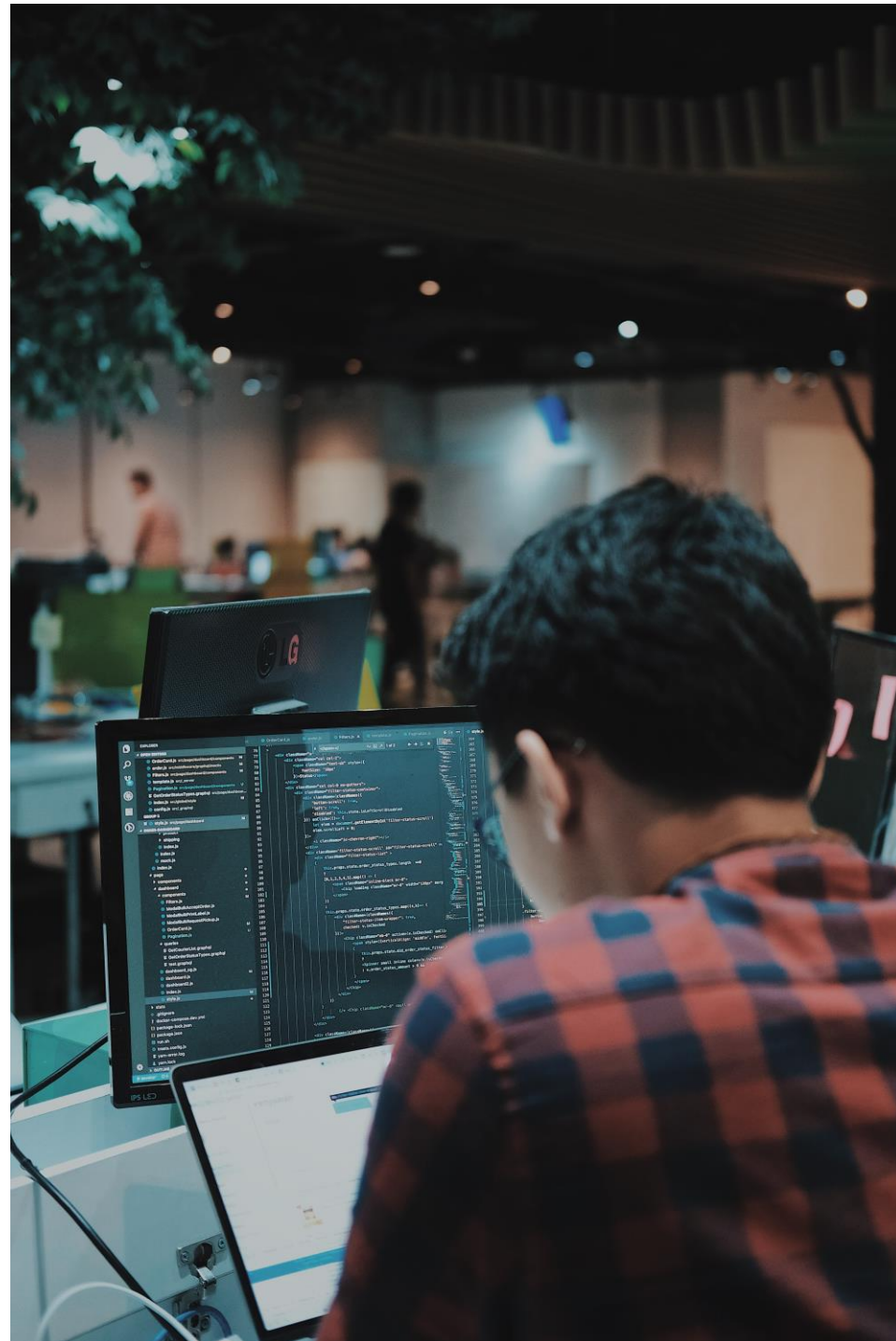


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Software Delivery Environments



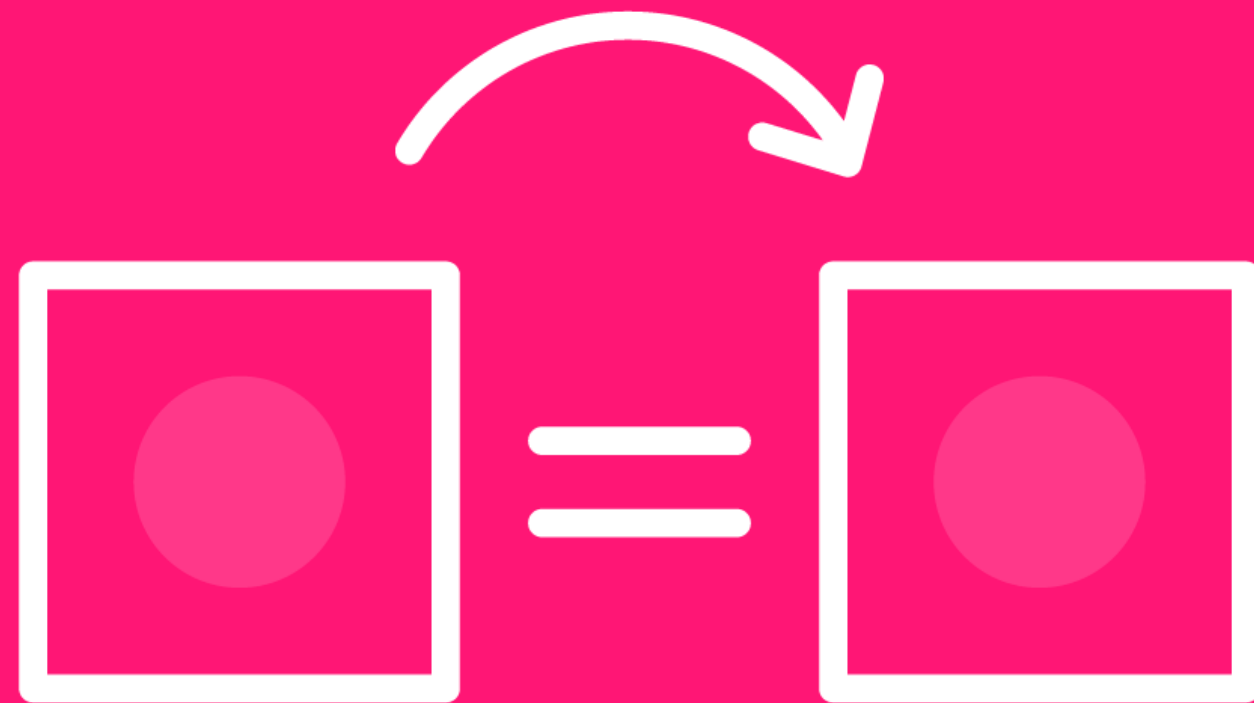
Apps run in multiple environments

- Apps traverse different stages of the SDLC
- Dev → testing → staging → production

Majority of configuration stays the same

- But environments necessitate 'tweaks'
- e.g., client connections use TLS in prod





Duplication

Having multiple environments necessitates small configuration differences, but also results in unnecessary duplication.

Demo



Defining Kubernetes Configuration for an App

- Introducing simple task list app
- Building a Docker image for the app
- Inspect the Kubernetes configuration
- Deploying the app to a cluster





Options

Label objects based on the environment?

Run the workload as a non-privileged user?

Swap SQLite for MySQL?

Expose the application with an ingress?



DRY Principle

Every piece of knowledge must have a single, unambiguous, authoritative representation within a system.





DRY and Configuration

DRY is applicable to Kubernetes configuration

Mitigates the danger of configuration drift

Ensures a more reliable app delivery pipeline





Configuration Management for Kubernetes

A plethora of tools, domain specific languages, and techniques are available for managing Kubernetes configuration.



Helm Package Manager



De-facto app package manager

- Apps packaged as charts
- Particularly useful for app publishers
- Manages the lifecycle of app's deployment
- Parameterization allows for config variants



Helm Templates

```
{{- if .Values.alertmanager.enabled }}
apiVersion: monitoring.coreos.com/v1
kind: Alertmanager
metadata:
  name: {{ template "kube-prometheus-stack.alertmanager.crname" . }}
  namespace: {{ template "kube-prometheus-stack.namespace" . }}
  labels:
    app: {{ template "kube-prometheus-stack.name" . }}-alertmanager
{{ include "kube-prometheus-stack.labels" . | indent 4 }}
{{- if .Values.alertmanager.annotations }}
  annotations:
{{ toYaml .Values.alertmanager.annotations | indent 4 }}
{{- end }}
spec:
{{- if .Values.alertmanager.alertmanagerSpec.image }}
```

...



Helm Templates

```
{{- if .Values.alertmanager.enabled }}
apiVersion: monitoring.coreos.com/v1
kind: Alertmanager
metadata:
  name: {{ template "kube-prometheus-stack.alertmanager.crname" . }}
  namespace: {{ template "kube-prometheus-stack.namespace" . }}
  labels:
    app: {{ template "kube-prometheus-stack.name" . }}-alertmanager
  {{ include "kube-prometheus-stack.labels" . | indent 4 }}
  {{- if .Values.alertmanager.annotations }}
  annotations:
    {{ toYaml .Values.alertmanager.annotations | indent 4 }}
  {{- end }}
spec:
  {{- if .Values.alertmanager.alertmanagerSpec.image }}
```

...





Templating Can Be Tough

However, not everyone buys into the templating approach for defining configuration variants.



Kustomize

Kustomize lets you customize raw, template-free YAML files for multiple purposes, leaving the original YAML untouched and usable as is.

Kustomize targets kubernetes; it understands and can patch Kubernetes style API objects.



Layering Transformations

Bases

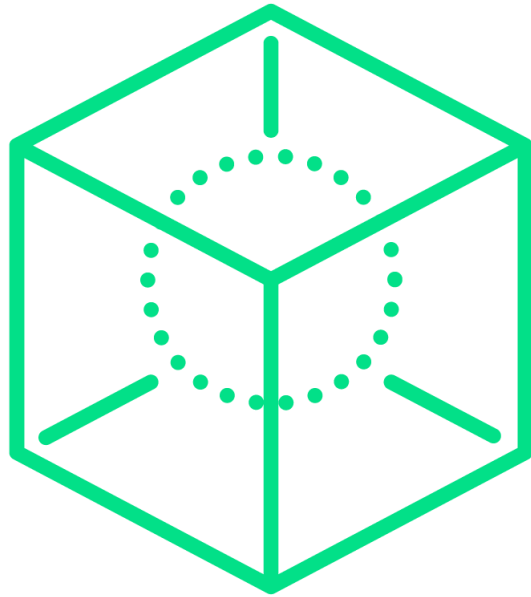
A set of Kubernetes object definitions, used as the basis for creating alternative variants

Overlays

A set of transformations applied to bases in order to mutate configuration into variants

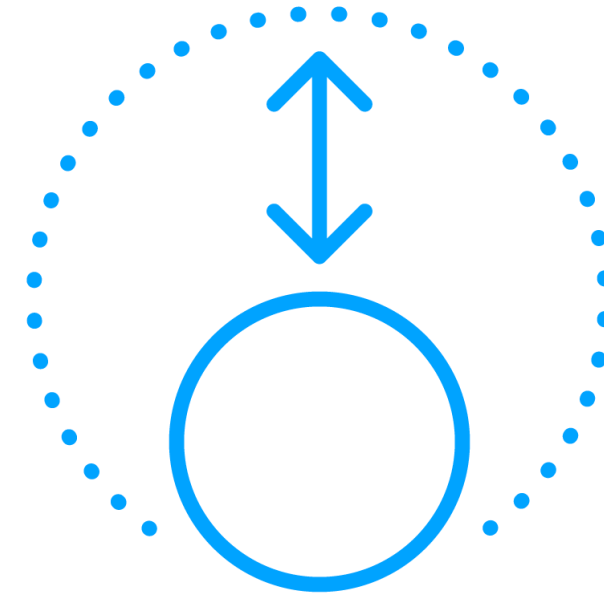


How Kustomize Works



Generators

Functions that create new
Kubernetes objects from external
canonical sources

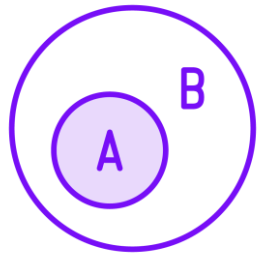


Transformers

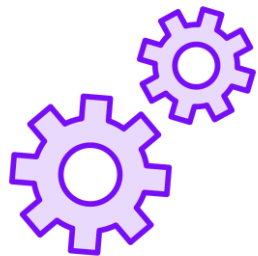
Functions that transform parts of
existing or generated Kubernetes
objects



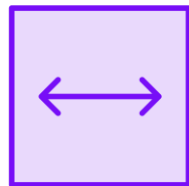
Kustomize – Key Facts



Originating from Google, Kustomize is a sub-project of the Kubernetes community CLI SIG (SIG-CLI)



Kustomize is both, a standalone binary, and also an integral part of the Kubernetes CLI (kubectl)



The schema used to specify transformations is not yet at v1, but Kustomize is still widely used across organizations



Kustomize has many features, but if a required feature is missing this can be provided using a plugin



Getting Kustomize

▼ Assets

11

 checksums.txt	824 Bytes	Mar 14
 kustomize_v5.0.1_darwin_amd64.tar.gz	10.4 MB	Mar 14
 kustomize_v5.0.1_darwin_arm64.tar.gz	9.98 MB	Mar 14
 kustomize_v5.0.1_linux_amd64.tar.gz	5.61 MB	Mar 14
 kustomize_v5.0.1_linux_arm64.tar.gz	5.13 MB	Mar 14
 kustomize_v5.0.1_linux_ppc64le.tar.gz	5.04 MB	Mar 14
 kustomize_v5.0.1_linux_s390x.tar.gz	5.39 MB	Mar 14
 kustomize_v5.0.1_windows_amd64.tar.gz	5.72 MB	Mar 14
 kustomize_v5.0.1_windows_arm64.tar.gz	5.23 MB	Mar 14
 Source code (zip)		Mar 14
 Source code (tar.gz)		Mar 14

<https://github.com/kubernetes-sigs/kustomize/releases/latest>



Up Next:

Kustomize Principles



Module Summary



What we covered:

- It's hard to manage the definition of Kubernetes API object definitions
- Configuration templates are powerful, but they cost in terms of complexity
- Kustomize provides a template-free way of managing Kubernetes configuration

