

Customizing Charts with Helm Templates



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Helm Templates



Why Helm Templates ?

How does Helm Template engine work ?

When does Template engine run ?

Playing with Helm Template Data

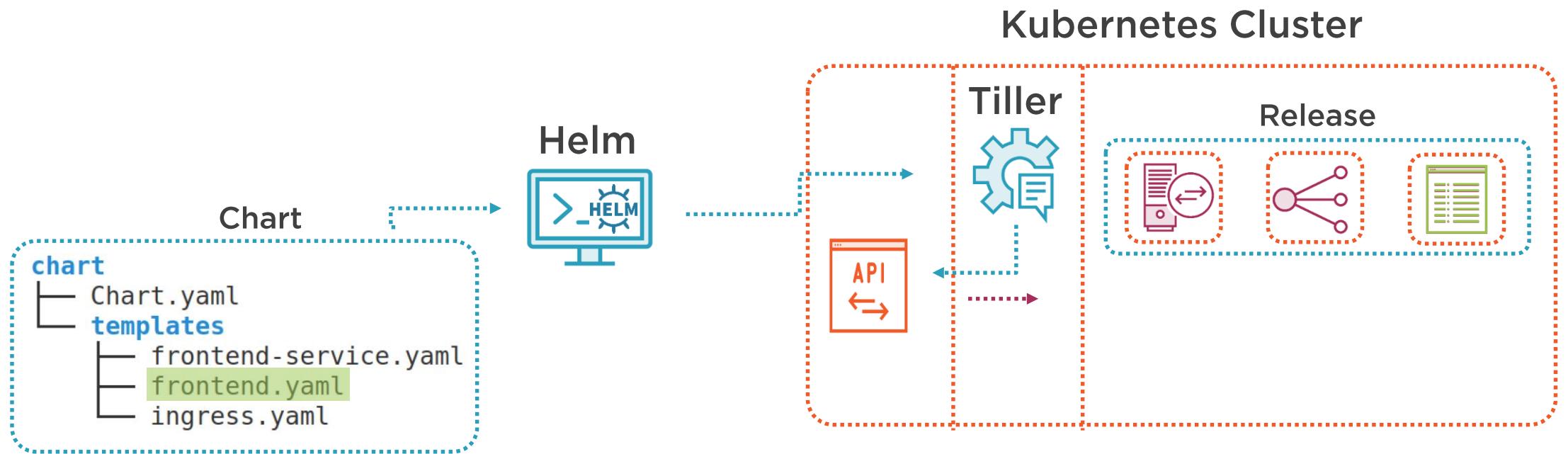
Adding Logic to Helm Template



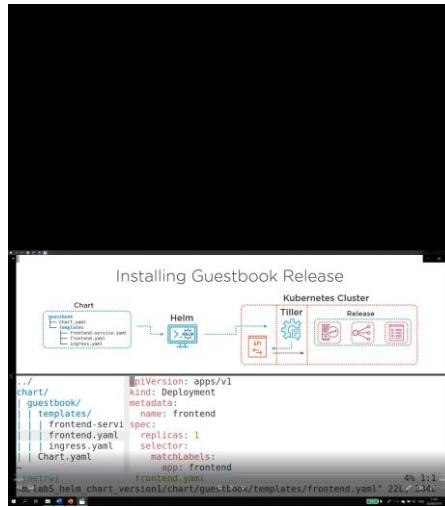
Why Helm Templates ?



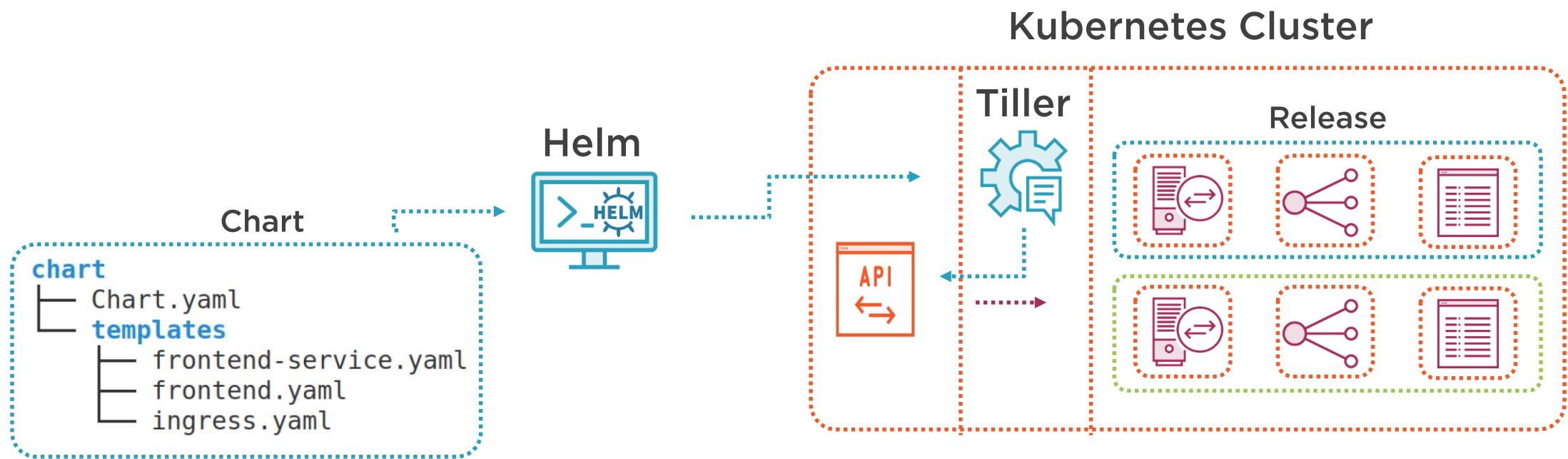
Release revision



Release revision



Helm Release



Helm Releases

"dev" Release

```
apiVersion: v1
kind: Service
metadata:
  labels:
    name: dev-frontend
  name: dev-frontend
spec:
  type: ClusterIP
  ports:
    - port: 80
      targetPort: 3000
  selector:
    app: dev-frontend
```

"test" Release

```
apiVersion: v1
kind: Service
metadata:
  labels:
    name: test-frontend
  name: test-frontend
spec:
  type: ClusterIP
  ports:
    - port: 80
      targetPort: 3000
  selector:
    app: test-frontend
```



Helm Template Engine



Analogy with other template engines

	Template engine	Directives
System {	bash	<code> \${ENV_VAR}</code>
	bat	<code> %ENV_VAR%</code>
Web dev {	Php	<code><?php echo \$title ?></code>
	Jsp, Asp, EJS	<code><%= title %></code>
Code generator {	Velocity	<code>\$var</code>
	Yeoman	<code><%= var %></code>
	Go Templates	<code>{{ var }}</code>



Go Template Engine

Template

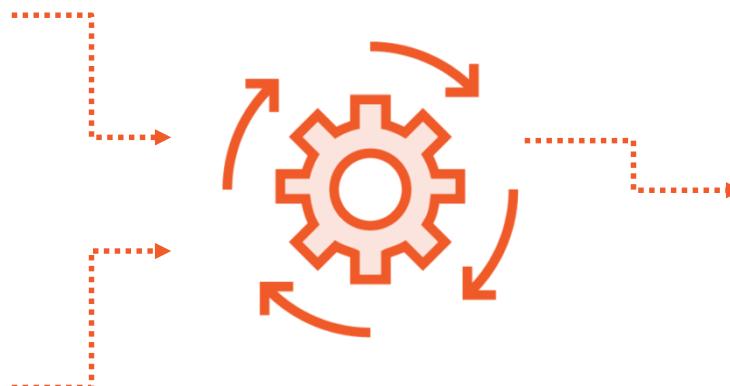
```
apiVersion: v1
kind: Service
metadata:
  name: {{ .name }}
```

```
type: NodePort
name: myservice
port: 80
```

Object

Manifest

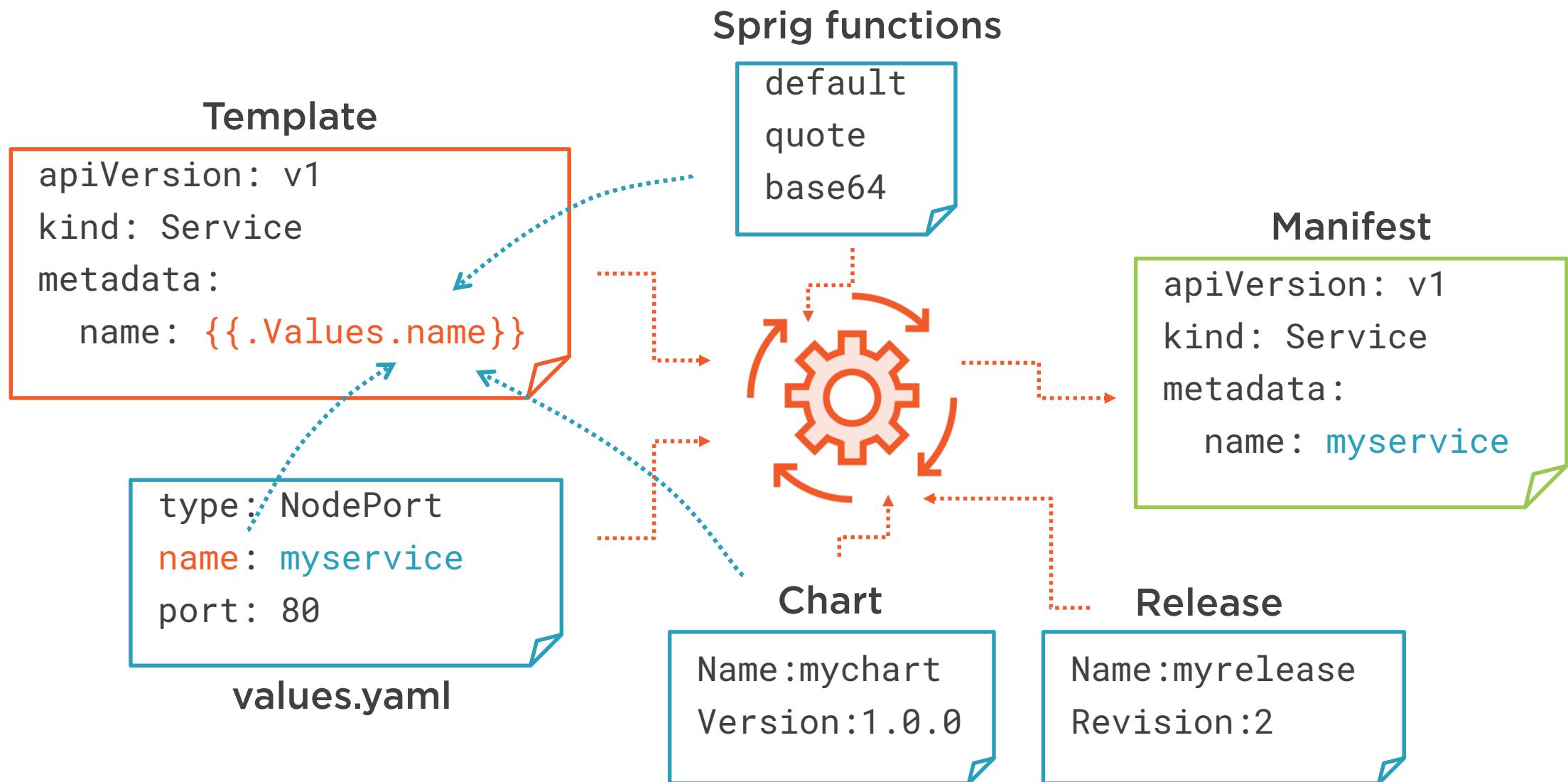
```
apiVersion: v1
kind: Service
metadata:
  name: myservice
```



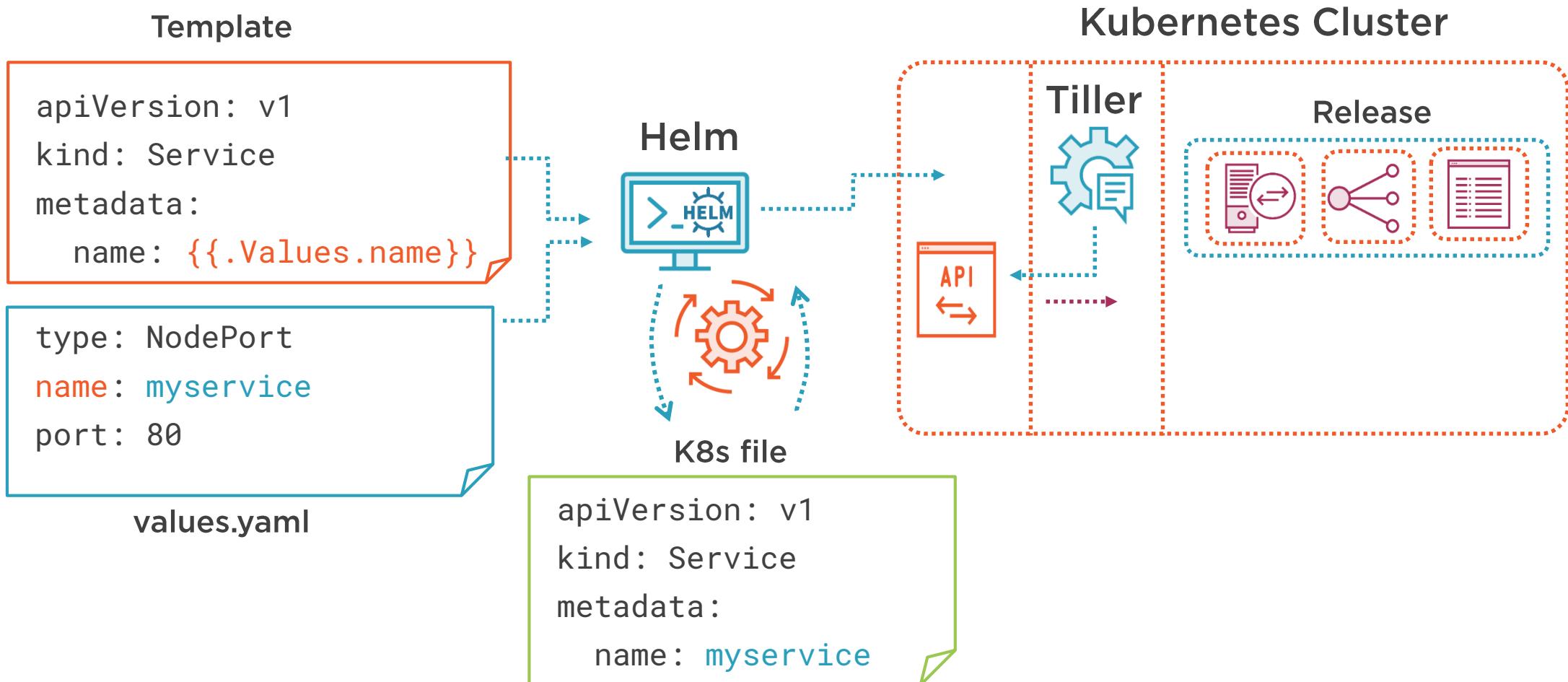
[https://github.com/phcollignon/
Go-Template](https://github.com/phcollignon/Go-Template)



Helm Template Engine



Helm Template Execution



hardy-moose.v1 - Kubernetes

127.0.0.1:37663/api/v1/namespaces/kube-system/services/http:kubernetes-dashboard:/proxy/#!/configmap/kube-system/hardy-moose.v1?name=hardy-moose.v1

kubernetes

Search

+ CREATE

Config and storage > Config Maps > hardy-moose.v1

EDIT DELETE

Daemon Sets

Deployments

Jobs

Pods

Replica Sets

Replication Controllers

Stateful Sets

Discovery and Load Balancing

Ingresses

Services

Config and Storage

Config Maps

Persistent Volume Claims

Secrets

Settings

Details

Name: hardy-moose.v1

Namespace: kube-system

Labels: MODIFIED_AT: 1560011651 NAME: hardy-moose OWNER: TILLER STATUS: DELETED VERSION: 1

Creation Time: 2019-06-08T15:56 UTC

Data

> helm get hardy-moose

release: H4sIAAAAAAAAC/+Ra248cR9XXzsqyXV8ePgYEyBKh6GAIfNzM463kUX24l0Wey6ZXxtI7Sq6a7ZaW/f0l09zsTep0jkNUhc3hBSXojCK+IFKw8x8MQLSPwFSKAEv4QnJFB1dfVU93TP9Fw2duR5mumqOnX0r06f8zunBvxH7nasGTatoeL66Bwr1B84dyvf/uvv5/5/ydv//JXhQuxX9IL5956TH/97c0P3lm59LktbGci2xZUbdMxMMEXfr4Bvgv0H/nYI13bPpb0V0WaXL304jr8PjZMqPaRS2DPduE0nwJrcqVTGFTvr9bkyoWPvgDwwdkuUo+xpfHV35iweoNNhVUupSpXiu8UwBcJNh0DEeyVD/vYcLDrycQxip+sPHxYghru6RaGUriR3PMNw0Im1mDp5ATQGXoPyreR4WMvGmwNs0vqGo7mZE54BInrWyq8Ug++6uae3+vpb0CpNNoAG95IkuPqFu1B6aJXuuhJU05gAyMPy01kYihvUrvZ91ySLW3se/G9VfCVESh3SUPqy4m8hCZRvHtVeTot7Hr6ba1wEEVHOuWpsC9YAowMUEaIkgeBEFJbFfjwIdQt1fC1VBxleHISioeALzRt68jWuiXf1YP1D3TSj1AMdQnnHPquHmg0xz7UrpcFyC56ykXv1QA6Cp4US1DKZQnKvoddqhGEsoM874HtahB+PQGw1mWuJSm1VyrV8qR/34P+aS/Z/uu1q8hzdQtCX4LPoLdK5expcJH8HXfJhimaMmxPzkBL43bPcFkelb/KIAx087KHeqqZof1uJBxWMGc2GkZqIsNTwlUzHtyMxwy8BysUulk60CEdUxh0sBk0rZLQk2oz9vEVm1DgdL+ZlsKIaRTUqXQgRHsBL1HmLSDyfVKpQIg9LCBVWK7TD5ynFzaF5+cEWMFnxWA/JczIsjIcbxyhPQWdgx7aGJrv1cjQs3FjqGryIvZHD7ctH0rtDlunImI2r8pnGtueyE9qNDaUJagPf0YMbh5gaRzuVH0o9oWQbqF3UhWCeoM0or7SPCE2mt70rHdITw5UcaGCToS37HgYds3jLZt60pQgevGAzT0ovEZnHzkc4LFpVBC

Test Helm template before Helm install

Static

`helm template`

works without tiller

static release-name

Dynamic

`helm install --dry-run --debug`

real helm install but without commit

generated release-name

```
> helm template mychart
```

```
> helm template mychart -x templates/service.yaml
```

```
> helm install mychart --debug --dry-run
```

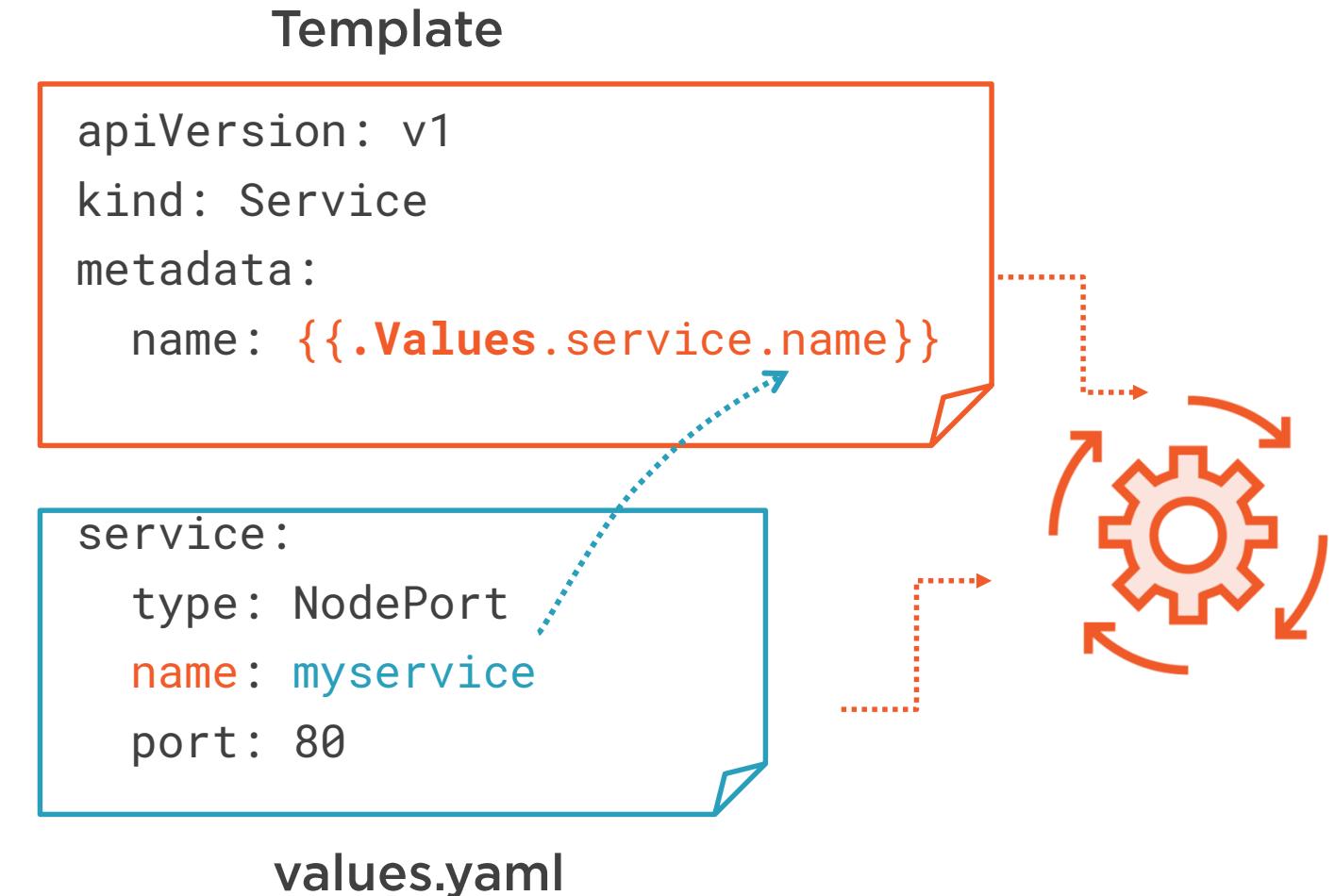
```
> helm install mychart --debug --dry-run 2>&1 | less
```

Playing with Helm Template Data



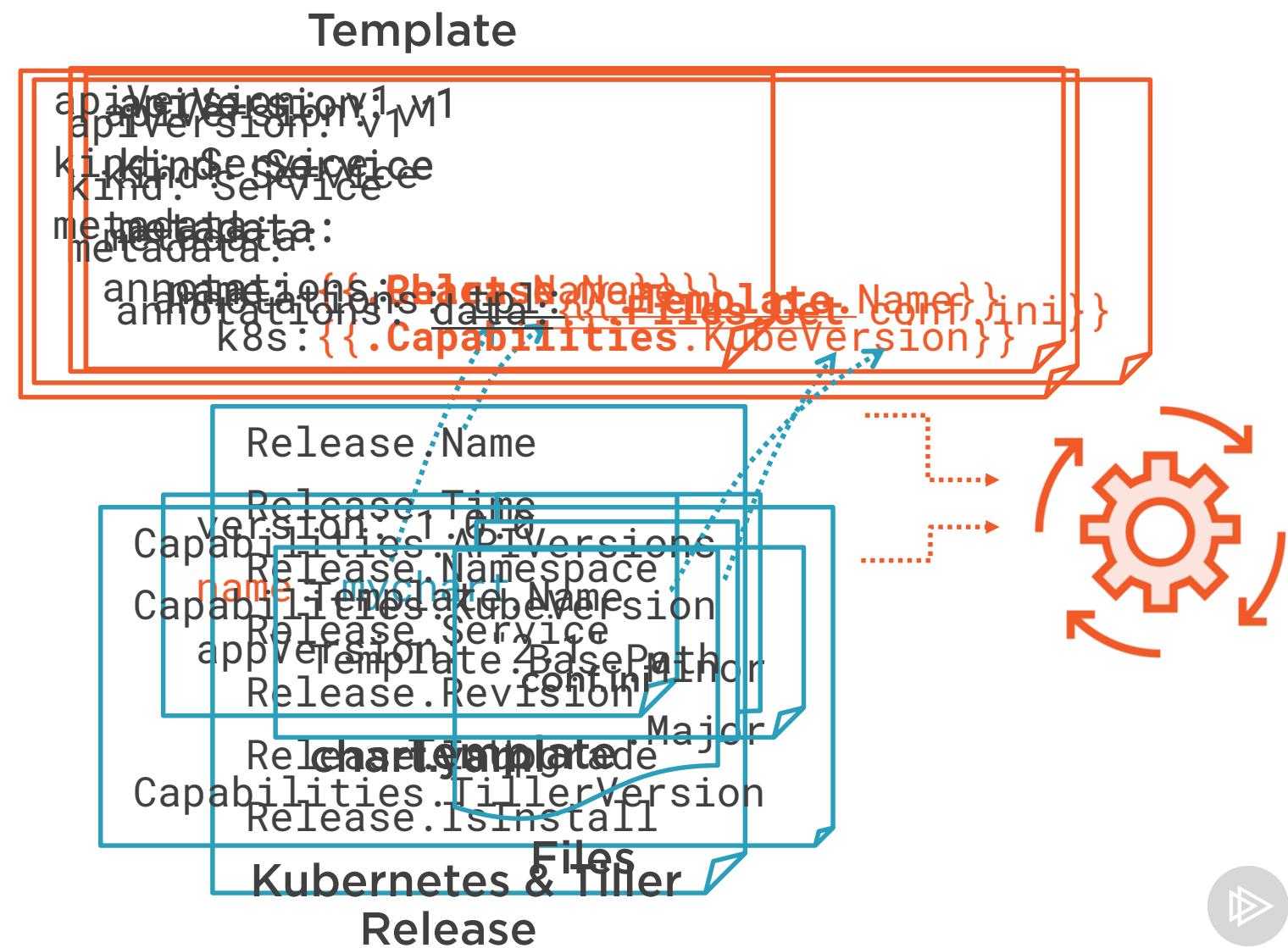
Helm Template Values

values.yaml
other-file.yaml
helm install -f file
variables
helm install -- set foo=bar
Hierarchically organized

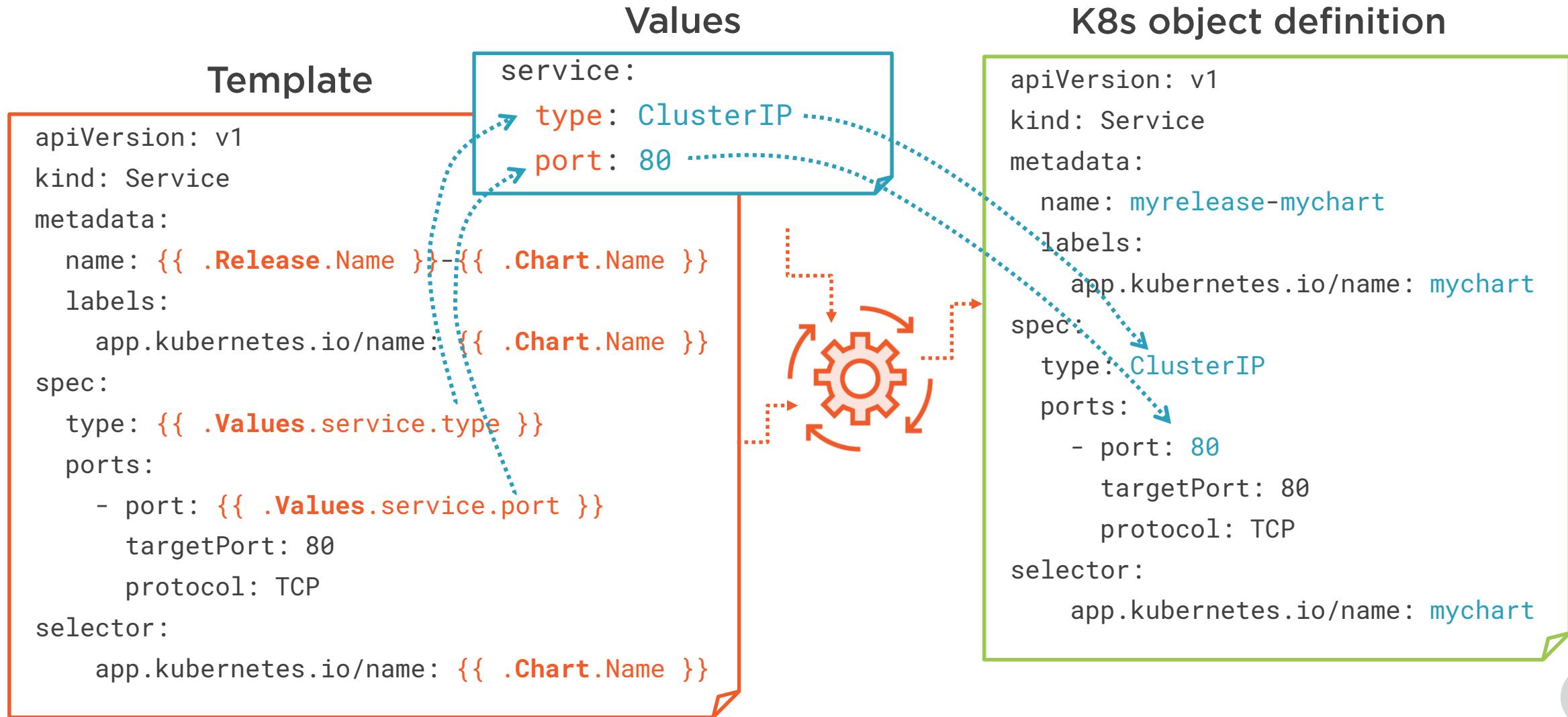


Helm Template Built-in Objects

Chart data
Release data
Kubernetes data
File data
Template data

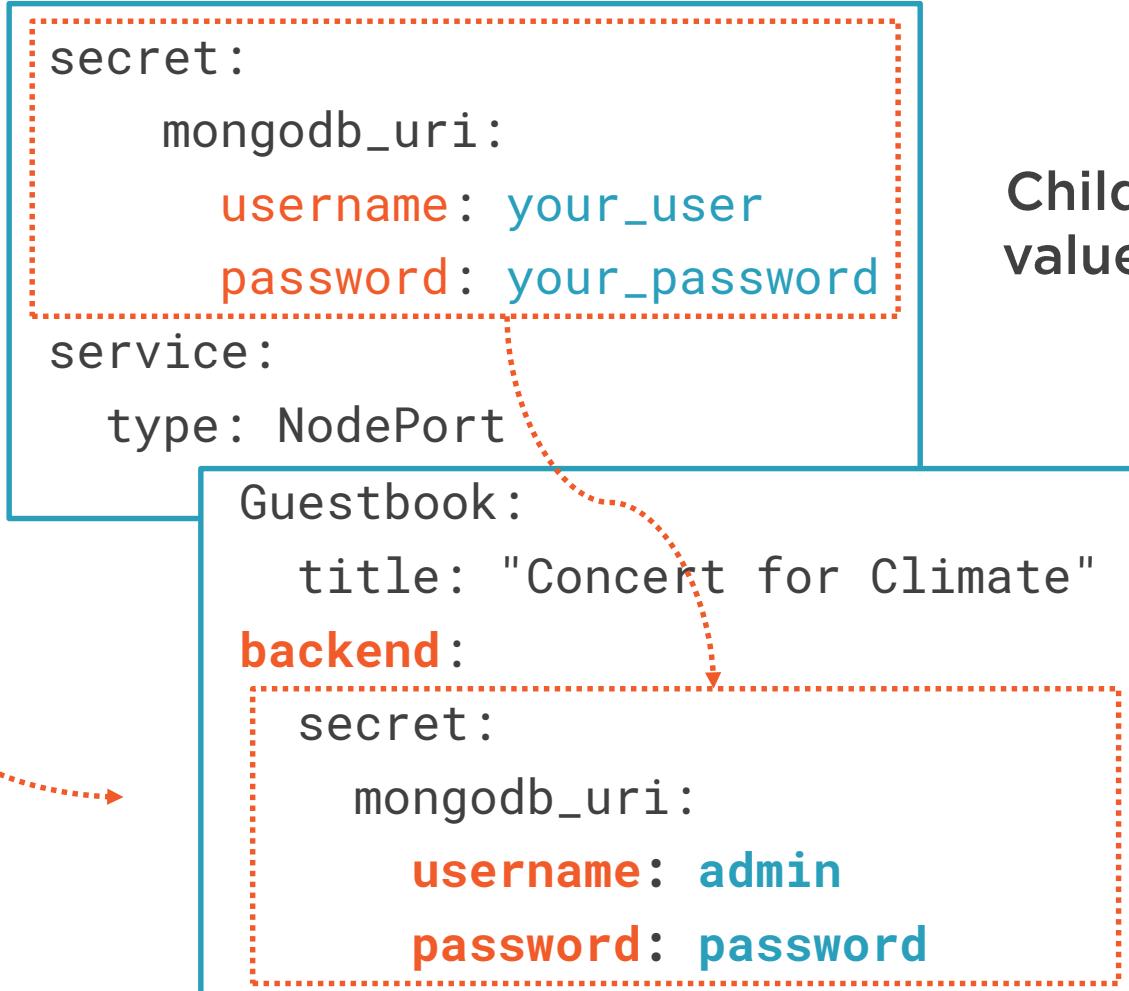


Helm Template Example



Values and sub charts

```
guestbook/  
| charts/  
| | backend/  
| | | templates/  
| | | Chart.yaml  
| | | values.yaml  
| database/  
| frontend/  
| Chart.yaml  
| values.yaml
```



Child Chart
`values.yaml`

Parent Chart
`values.yaml`



COMPUTED VALUES:

```
backend:  
  global: {}  
  image:  
    repository: phico/backend  
    tag: "2.0"  
  ingress:  
    enabled: false  
    host: backend.minikube.local  
replicaCount: 1  
secret:  
  mongodb_uri:  
    dbchart: your_db_chart  
    password: password  
    username: admin  
service:  
  port: 80  
  type: ClusterIP  
database:  
  global: {}  
  secret:  
    mongodb_password: password  
    mongodb_username: admin  
  service:  
    port: 80
```



Global values

```
guestbook/
| charts/
| | backend/
| | | templates/
| | | Chart.yaml
| | | values.yaml
| database/
| frontend/
| | Chart.yaml
| | values.yaml
```

```
secret:
  mongodb_uri:
    username: your_user
    password: your_password
```

```
service global:
  type: "Id<AcB123FDx23>"
```

```
metadata:
  labels:
    app.id : {{ .Values.global.id}}
```

```
username: admin
password: password
```

Child Chart
values.yaml

Parent Chart
values.yaml



Adding Logic to Helm Template



Adding Logic to Helm Template

Using Functions & Pipelines

Modifying Scope using "with"

Controlling whitespace & indent

Logical operators in Helm Templates

Flow control (conditions & loops)

Using variables

Calling Helper functions & Sub-templates



Using Functions and Pipelines



Functions and Pipeline

Function

quote value

quote(value)

Pipeline

value | quote



default default_value value

default (default_value, value)

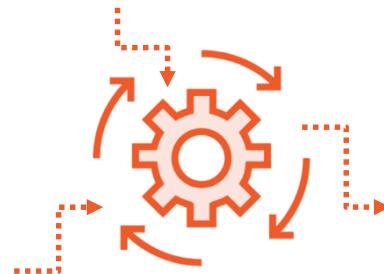
value | default default_value



default

```
apiVersion: v1
kind: Service
metadata:
  labels:
    app.kubernetes.io/name: {{ .Values.service.name | default .Chart.Name }}
```

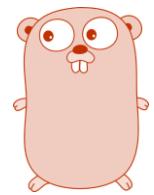
```
service:
  type: NodePort
  name: myservice
  port: 80
```



```
apiVersion: v1
kind: Service
metadata:
  labels:
    app.kubernetes.io/name: myservice
```



Functions and Pipelines



Go text/template package (<http://golang.org/pkg/text/template/>)



Sprig functions project (<http://masterminds.github.io/sprig/>)

Helm project (<http://helm.sh>)



No Go custom functions support (use helper functions)



Functions and Pipelines

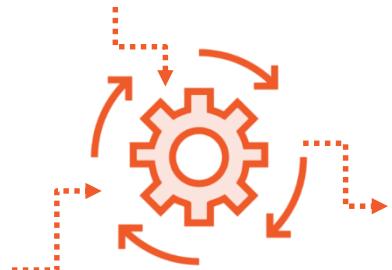
Function	Pipeline
default default_value value	value default default_value
quote value	value quote
upper value	value upper
trunc value 63	value trunc 63
trimSuffix "-" value	value trimSuffix "-"
b64enc value	value b64enc
randAlphaNum 10	value randAlphaNum 10
toYaml value	value toYaml
printf format value ...	list value ... join " -"



trunc & trimSuffix

```
apiVersion: v1
kind: Service
metadata:
  labels:
    app.kubernetes.io/name: {{ .Values.service.name | trunc 63 | trimSuffix "-" }}
```

```
service:
  type: NodePort
  name: myservice-
  port: 80
```



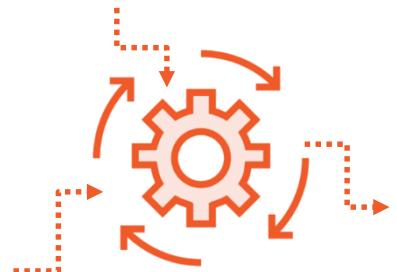
```
apiVersion: v1
kind: Service
metadata:
  labels:
    app.kubernetes.io/name: myservice
```



b64enc & quote

```
apiVersion: v1
kind: Secret
[...]
data:
  mongodb-root-password: {{ .Values.mongodbRootPassword | b64enc | quote }}
```

mongodbRootPassword : T9rYGFAMGE



```
apiVersion: v1
kind: Secret
[...]
data:
  mongodb-root-password: "VDlyWUdGQU1HRQ=="
```



Modifying Scope using "With"



Modifying scope using With

```
spec:  
  type: {{ .Values.service.type }}  
  ports:  
    - port: {{ .Values.service.port }}  
      targetPort: 80
```

```
spec:  
  {{ with .Values.service }}  
    type: {{ .type }}  
    ports:  
      - port: {{ .port }}  
        targetPort: 80  
  {{ end }}
```

```
service:  
  type: ClusterIP  
  port: 80
```

```
spec:  
  type: ClusterIP  
  ports:  
    - port: 80  
      targetPort: 80
```

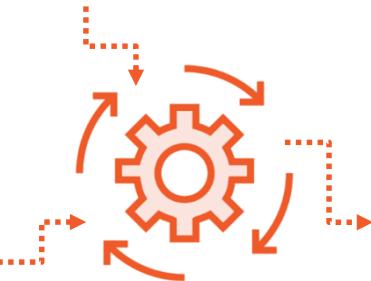


Controlling whitespaces and indent



Removing extra carriage returns

```
spec:  
  {{- with .Values.service }}  
    type: {{ .type }}  
    ports:  
      - port: {{ .port }}  
        targetPort: 80  
  {{- end -}}  
{{- end -}}
```



```
service:  
  type: ClusterIP  
  port: 80
```

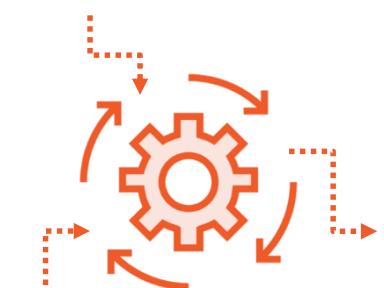
```
spec:  
  type: ClusterIP  
  ports:  
    - port: 80  
      targetPort: 80
```



Removing extra carriage returns

```
spec:  
  type: ClusterIP  
  ports:  
    - port: ↵  
      {{- with .Values.service -}} ↵  
        {{ .port }}  
      {{- end -}} ↵  
    targetPort: 80
```

```
service:  
  port: 80
```



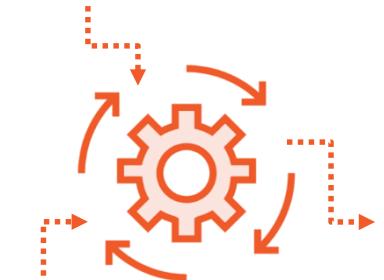
```
spec:  
  type: ClusterIP  
  ports:  
    - port: 80 ↵  
      targetPort: 80  
    80  
    ↵  
    targetPort: 80
```



Indent by Template

```
spec:  
  type: ClusterIP  
  ports:  
    - port: 80  
      targetPort: 80  
{{ indent6tcp }}  
  {{ indent6tcp }}  
  {{ indent6tcp }}
```

```
service:  
  port: 80  
  tcp: "protocol: TCP"
```



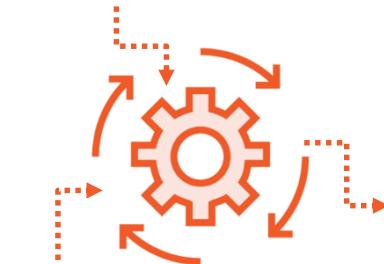
```
spec:  
  type: ClusterIP  
  ports:  
    - port: 80  
      targetPort: 80  
  protocol: TCP
```



Printing with format

```
apiVersion: v1
kind: Service
metadata:
  labels:
    app.kubernetes.io/name: {{- printf "%s-%s" .Release.Name .Values.service.name -}}
```

```
service:
  type: NodePort
  name: myservice
  port: 80
```



```
apiVersion: v1
kind: Service
metadata:
  labels:
    app.kubernetes.io/name: myrelease-myservice
```



Logical operators



Logical operators are functions

Operator	Function	Example
Equal to	eq	or .Val1 .Val2
Not equal to	ne	ne .Val1 .Val2
Greater than	gt	gt .Val1 .Val2
Lower than	lt	lt .Val1 .Val2
Or	or	or .Val1 .Val2
And	and	and .Val1 .Val2
Not	not	not .Val1



Example of logical operators

```
{ {- if and .adminEmail (or .serviceAccountJson  
.existingSecret) }}
```

(Cf. oauth2-proxy : deployment.yaml)

```
{ {- if (and (eq .Values.service.type "NodePort") (not (empty  
.Values.service.nfsNodePort))) }}
```

(Cf. nfs-server-provisioner : service.yaml)

```
{ {- if or .Values.rbac.pspEnabled (and .Values.rbac.namespaced  
(or .Values.sidecar.dashboards.enabled  
.Values.sidecar.datasources.enabled)) }}
```

(Cf. grafana : role.yaml)



Flow control



Conditions

```
{ {- if Values.ingress.enabled } }
apiVersion: extensions/v1beta1
kind: Ingress
metadata:
  labels:
    app.kubernetes.io/name:
{ {- if .Values.service.name -} }
{ {{ .Values.service.name | trimSuffix "-" } }
{ {- else -} }
{ {{ .Chart.Name } }
{ {- end -} }
{ {- end } }
```

```
ingress:
  enabled: true
  name: myingress
```

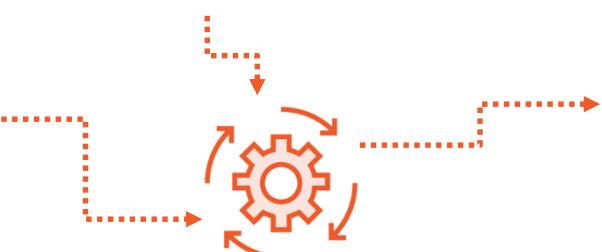
```
apiVersion: extensions/v1beta1
kind: Ingress
metadata:
  labels:
    app.kubernetes.io/name: myingress
```



Loops

```
apiVersion: extensions/v1beta1
kind: Ingress
[...]
spec:
{{- range .Values.ingress.hosts --}}
  - host: {{ .hostname | quote }}
    http:
      paths:
        {{- range .paths --}}
          - path: {{ .path }}
            backend:
              serviceName: {{ .service }}
              servicePort: http
        {{- end }}
    {{- end }}
```

```
ingress:
hosts:
  - hostname: frontend.local
    paths:
      - path: "/public"
        service: "frontend"
      - path: "/admin"
        service: "admin"
  - hostname: backend.local
    paths: []
```



```
apiVersion: extensions/v1beta1
kind: Ingress
[...]
spec:
  rules:
    - host: "frontend.local"
      http:
        paths:
          - path: /public
            backend:
              serviceName: frontend
              servicePort: http
          - path: /admin
            backend:
              serviceName: admin
              servicePort: http
    - host: "backend.local"
      http:
        paths:
```



Using variables



Why variables ?

```
spec:  
  {{ with .Values.service }}  
    type: {{ .type }}  
    ports:  
      - port: {{ .port }}  
        targetPort: 80  
        name {{ .Values.defaultPortName }}  
    {{ end }}
```



Why variables ?

```
apiVersion: extensions/v1beta1
kind: Ingress
[...]
spec:
{{- range .Values.ingress.hosts -}}
  - host: {{ .hostname | quote }}
    http:
      paths:
        {{- range .paths -}}
          - path: {{ .path }}-{{ .hostname }}
            backend:
              serviceName: {{ .Release.Name }} {{ .service }}
              servicePort: http
        {{- end -}}
{{- end -}}
```



Using a variable

```
{{ $defaultPortName := .Values.defaultPortName }}
```

```
spec:
```

```
  {{ with .Values.service }}
```

```
    type: {{ .type }}
```

```
    ports:
```

```
      - port: {{ .port }}
```

```
        targetPort: 80
```

```
        name {{ $defaultPortName }}
```

```
  {{ end }}
```



Using variable and Global variable

```
apiVersion: extensions/v1beta1
kind: Ingress
[...]
spec:
{{- range $currentHosts := .ingress.hosts -}}
{{- $chosenHost := .hostname | quote -}}
- host: {{ .hostname | quote }}
  http:
    paths:
      {{- range .paths -}}
        {{- path := .path }}-{{ $currentHost.suffix }}
        - backend{{ .path }}-{{ $currentHost.suffix }}
          backendName: {{ $.Release.Name }} {{ .service }}
          serviceName: {{ $.Release.Name }} {{ .service }}
        {{- end }}}
        servicePort: http
      {{- end }}}
{{- end }}
```

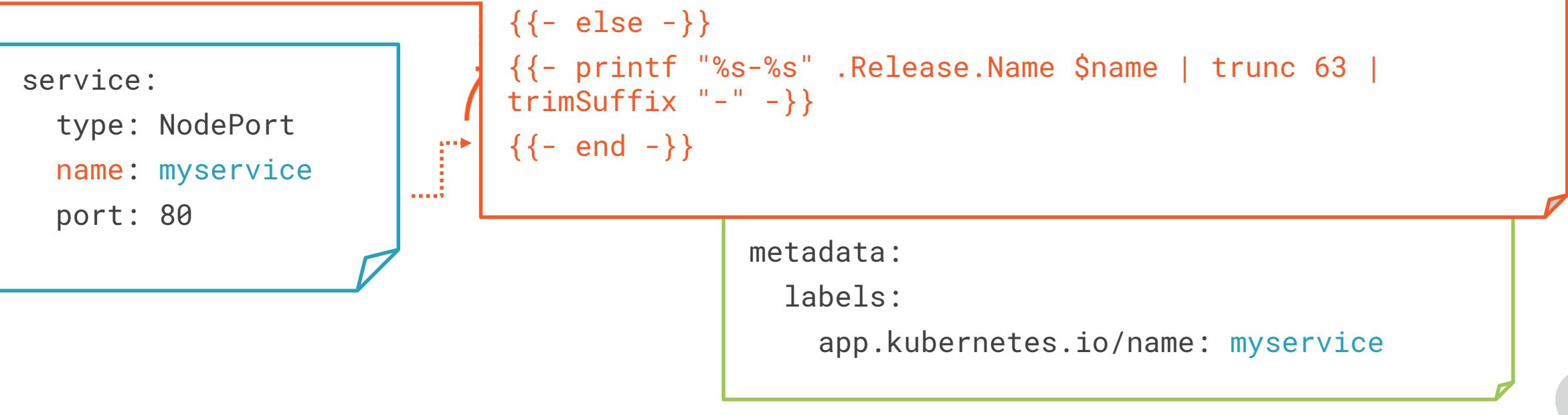


Calling Helper functions and Sub-templates



Why using helper functions

```
apiVersion: v1
kind: Service
metadata:
  labels:
    app.kubernetes.io/name: {{- if .Values.fullnameOverride -}}
      {{- .Values.fullnameOverride | trunc 63 | trimSuffix "-" -}}
    {{- else -}}
      {{- printf "%s-%s" .Release.Name $name | trunc 63 | trimSuffix "-" -}}
    {{- end -}}
  metadata:
    labels:
      app.kubernetes.io/name: myservice
```



Using a sub-template

_helpers.tpl

```
{{- define "mychart.fullname" -}}
{{- if .Values fullnameOverride -}}
{{- .Values.fullnameOverride | trunc 63 | trimSuffix "-" -}}
{{- else -}}
{{- printf "%s" . -}}
{{- end -}}
{{- end -}}
```

```
apiVersion: v1
kind: Deployment
metadata:
  labels:
    app.kubernetes.io/name: {{ include "mychart.fullname" . }}
  [...]
spec:
  selector:
    matchLabels:
      app.kubernetes.io/name: {{ include "mychart.fullname" . }}
```



_helpers.tpl

```
mychart/
| charts/
| templates/
| | tests/
| | NOTES.txt
| | _helpers.tpl
| | deployment.yaml
| | ingress.yaml
| | service.yaml
| .helmignore
| Chart.yaml
| values.yaml
```

Where is _helpers.tpl file ?

**Files prefixed by ‘_’ are not rendered as
Kubernetes objects**

.helmignore



Indenting a sub-template

```
apiVersion: v1
kind: Deployment
metadata:
  labels:
    app.kubernetes.io/name: {{ include "mychart.fullname" . }}
    {{ include "mychart.myfunnylabel" . }}
    {{ template "mychart.myfunnylabel" . }}
  [...]
spec:
  selector:
    matchLabels:
      app.kubernetes.io/name: {{ include "mychart.fullname" . }}
```



NOTES.txt

1. Get the application URL by running these commands:

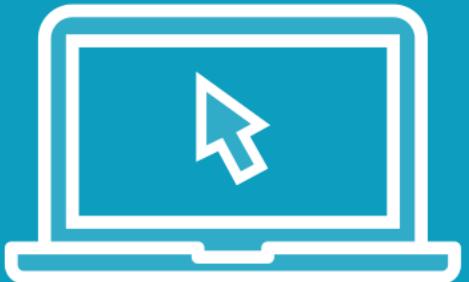
```
{{- if .Values.ingress.enabled }}  
{{- range $host := .Values.ingress.hosts }}  
{{- range .paths }}  
http{{ if $.Values.ingress.tls }}s{{ end }}://{{ $host.host }}{{ .path }}  
{{- end }}  
{{- end }}
```

NOTE: It may take a few minutes for the LoadBalancer IP to be available.

```
You can watch the status of by running 'kubectl get --namespace {{ .Release.Namespace }} svc -w {{ include "mychart.fullname" . }}'  
export SERVICE_IP=$(kubectl get svc --namespace {{ .Release.Namespace }} {{ include "mychart.fullname" . }} -o jsonpath='{.status.loadBalancer.ingress[0].ip}')  
echo http://$SERVICE_IP:{{ .Values.service.port }}
```



Demo

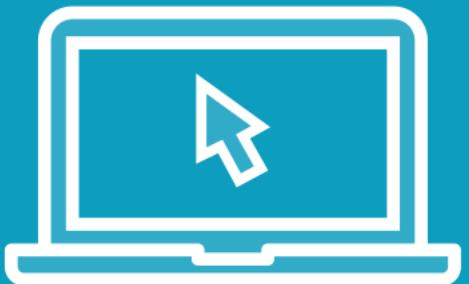


Customizing Guestbook Helm Chart : Frontend Chart values

[http://github.com/phcollignon/helm/
lab7_helm_template_begin](http://github.com/phcollignon/helm/lab7_helm_template_begin)
[lab7_helm_template_final](http://github.com/phcollignon/helm/lab7_helm_template_final)



Demo



Customizing Guestbook Helm Chart : Adding logic

[http://github.com/phcollignon/helm/
lab8_helm_template_begin](http://github.com/phcollignon/helm/lab8_helm_template_begin)
[lab8_helm_template_final](http://github.com/phcollignon/helm/lab8_helm_template_final)



Demo

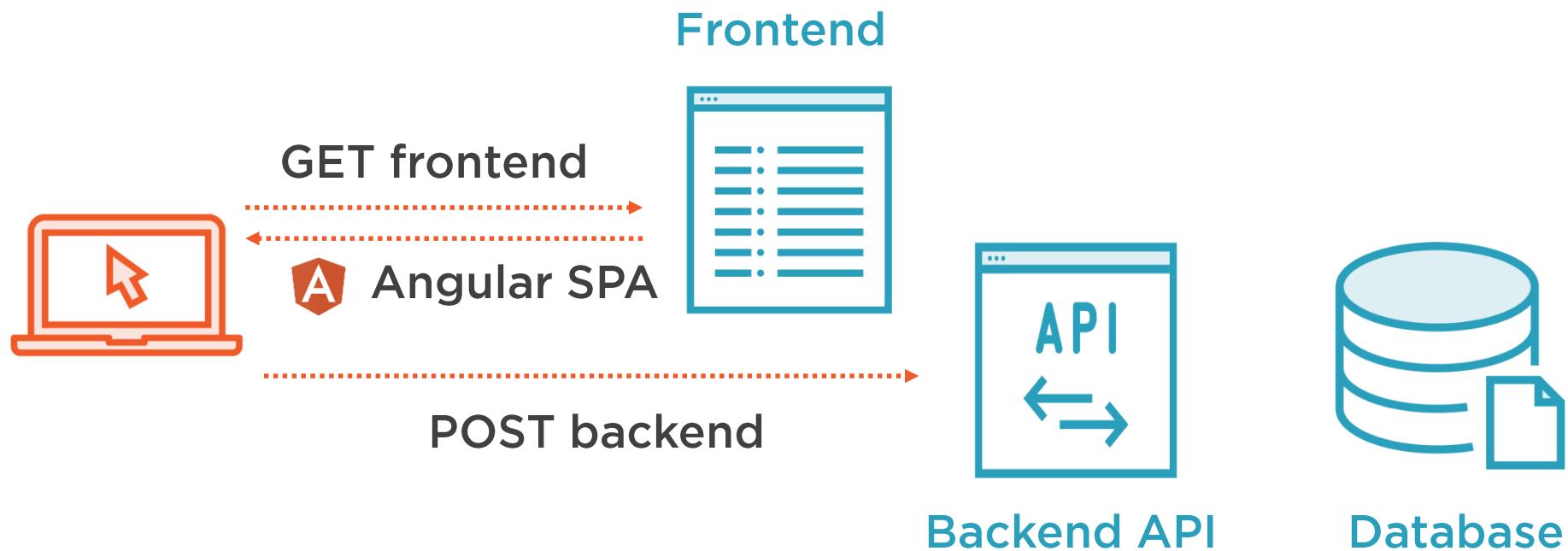


Customizing Guestbook Helm Chart : Installing Dev & Test Releases

[http://github.com/phcollignon/helm/
lab9_helm_template_begin](http://github.com/phcollignon/helm/lab9_helm_template_begin)
[lab9_helm_template_final](http://github.com/phcollignon/helm/lab9_helm_template_final)



GuestBook application : Angular SPA + API



Helm Templates



Helm Template engine ?

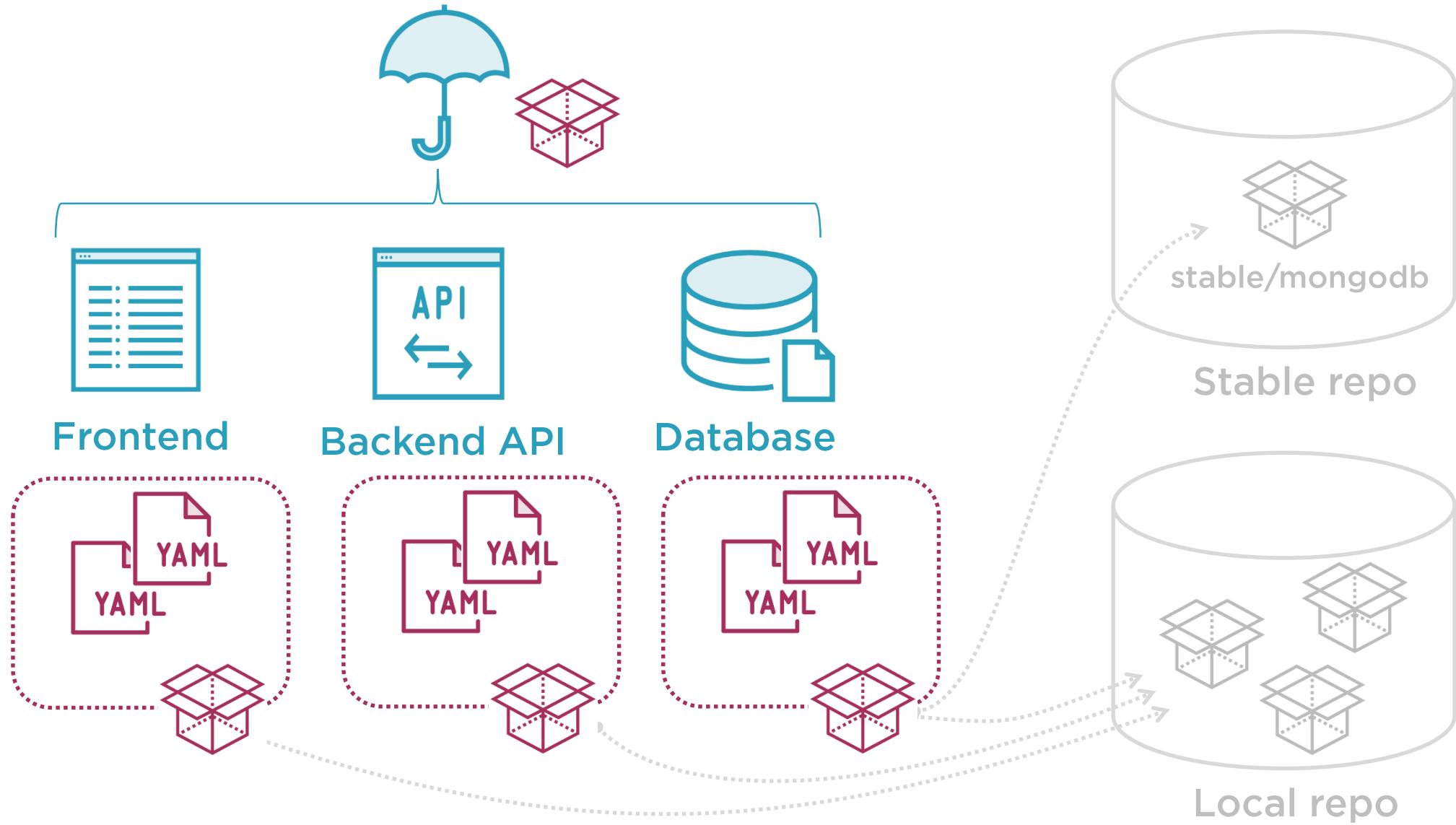
Helm Template Data

Adding Logic to Helm Template

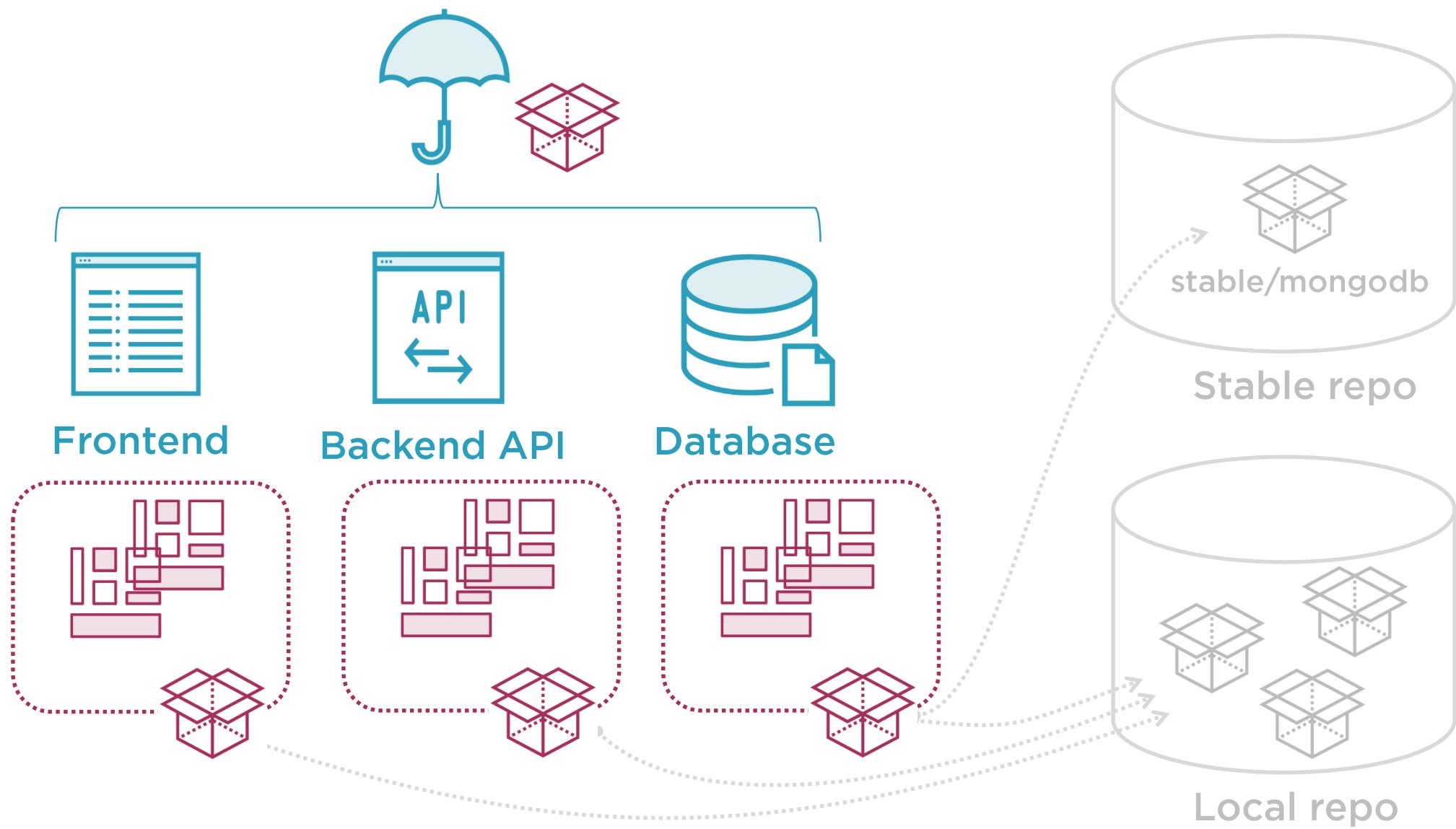
- Functions and Pipelines
- Scope with “width”
- Controlling whitespaces
- Logical operators
- Flow controls
- Variables
- Sub-templates



Guestbook application



Guestbook application



Guestbook application

