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Optimizing Kubernetes deployments with Helm

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github.com/erwindeg

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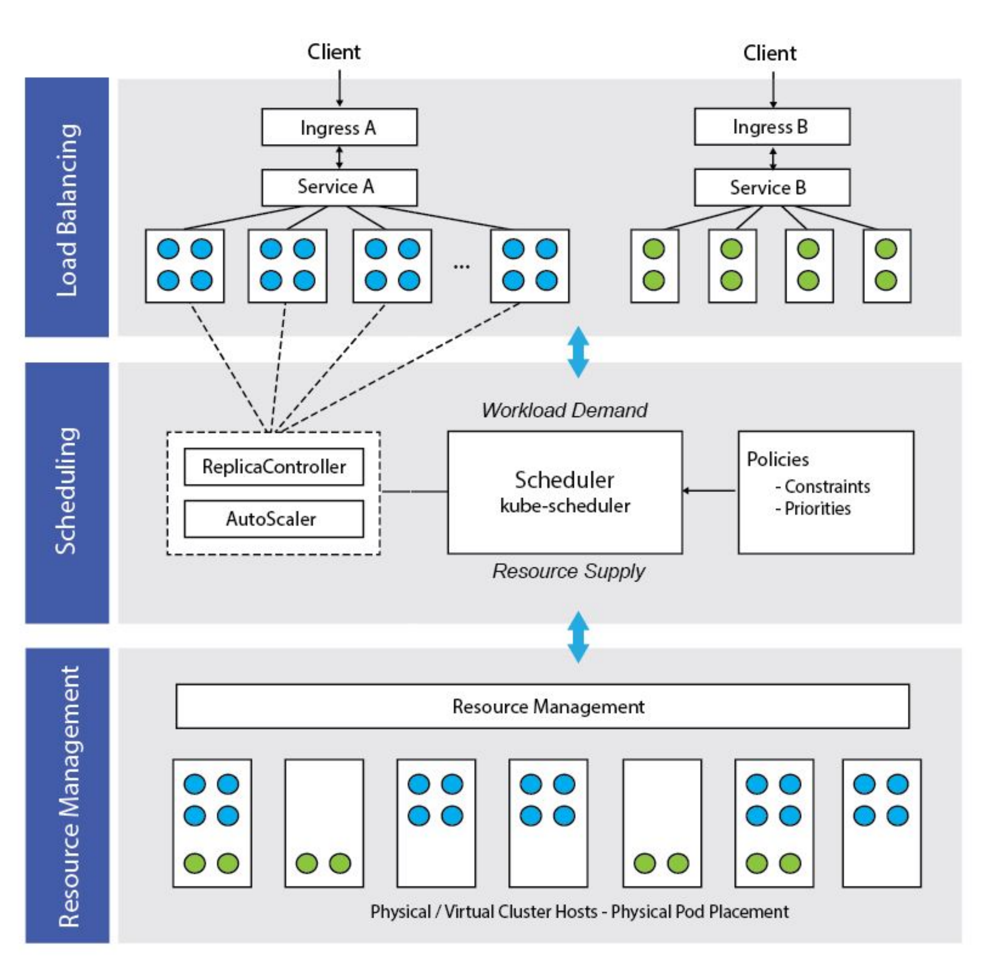
Kubernetes


Client
Client
Load Balancing
Ingress A
Service A
Ingress B
Service B
...
Scheduling
Workload Demand
ReplicaController
AutoScaler
Scheduler
kube-scheduler
Policies
- Constraints
- Priorities
Resource Supply
Resource Management
Resource Management
Physical / Virtual Cluster Hosts - Physical Pod Placement

The package manager for Kubernetes

Helm is the best way to find, share, and use software built for Kubernetes.

source: http://helm.sh

Prerequisites

- Connection to a Kubernetes Cluster
  - Docker app with Kubernetes
  - Mini-Kube
  - Hosted Kubernetes (GKE, AWS)
- Installation of Helm (homebrew / download)

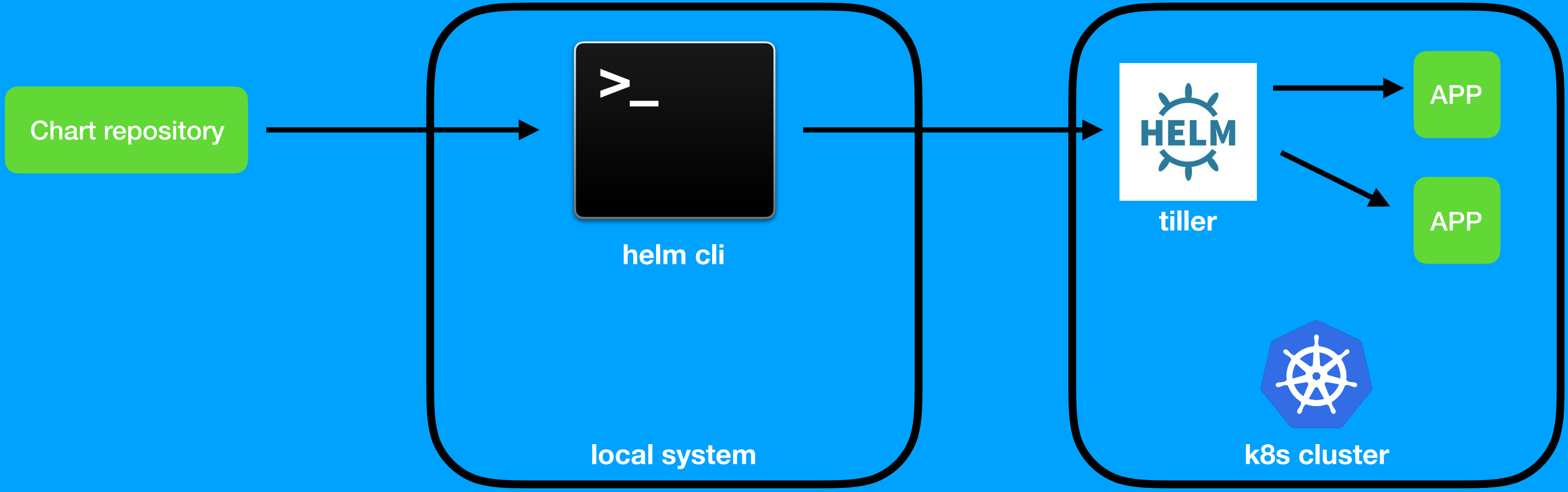
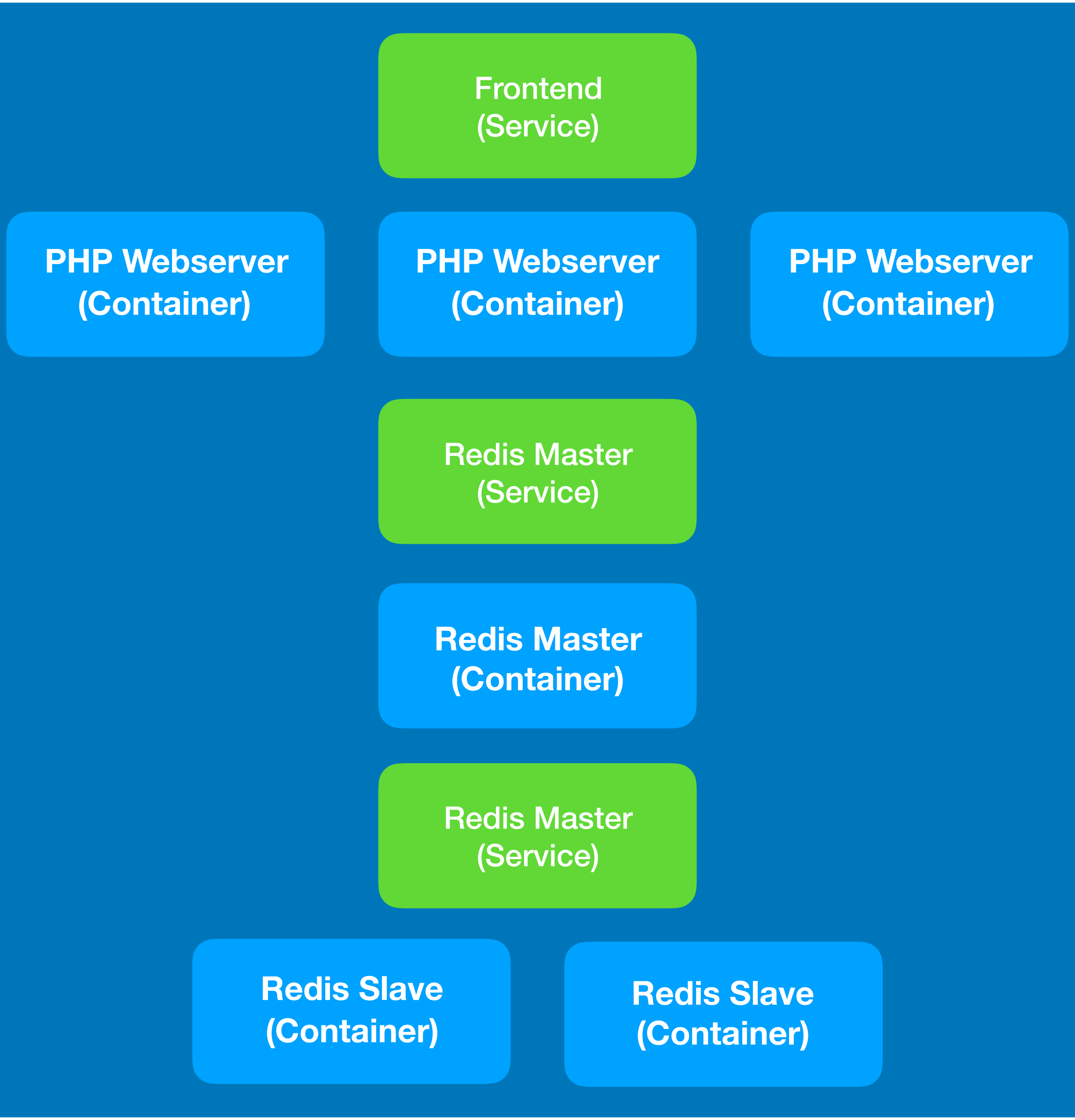


Chart repository
>_
helm cli
local system
HELM
tiller
APP
APP
k8s cluster



Frontend
(Service)

PHP Webserver
(Container)

PHP Webserver
(Container)

PHP Webserver
(Container)

Redis Master
(Service)

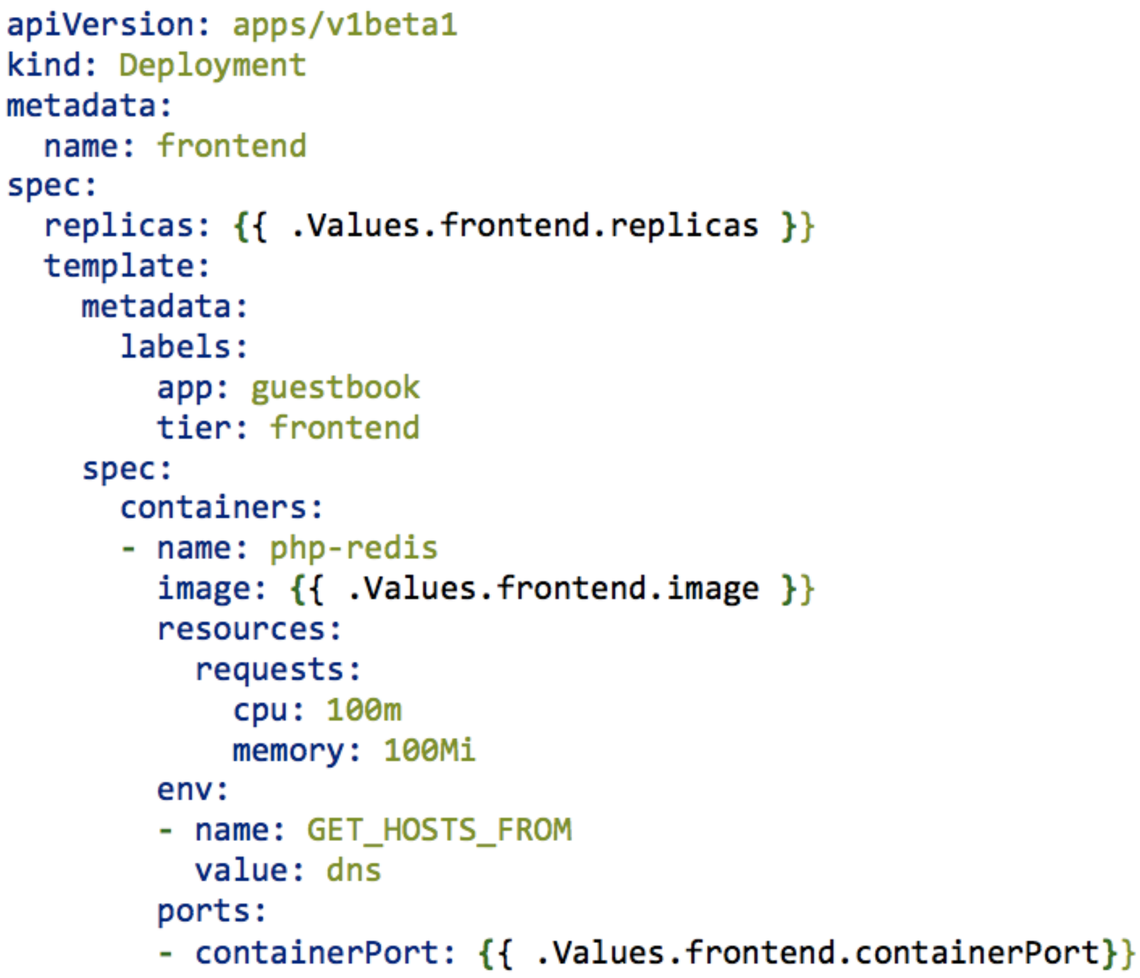
Redis Master
(Container)

Redis Master
(Service)

Redis Slave
(Container)

Redis Slave
(Container)

```yaml
apiVersion: apps/v1beta1
kind: Deployment
metadata:
  name: frontend
spec:
  replicas: 3
  template:
    metadata:
      labels:
        app: guestbook
        tier: frontend
    spec:
      containers:
      - name: php-redis
        image: gcr.io/google_samples/gb-frontend:1.0
        ports:
        - containerPort: 80
```

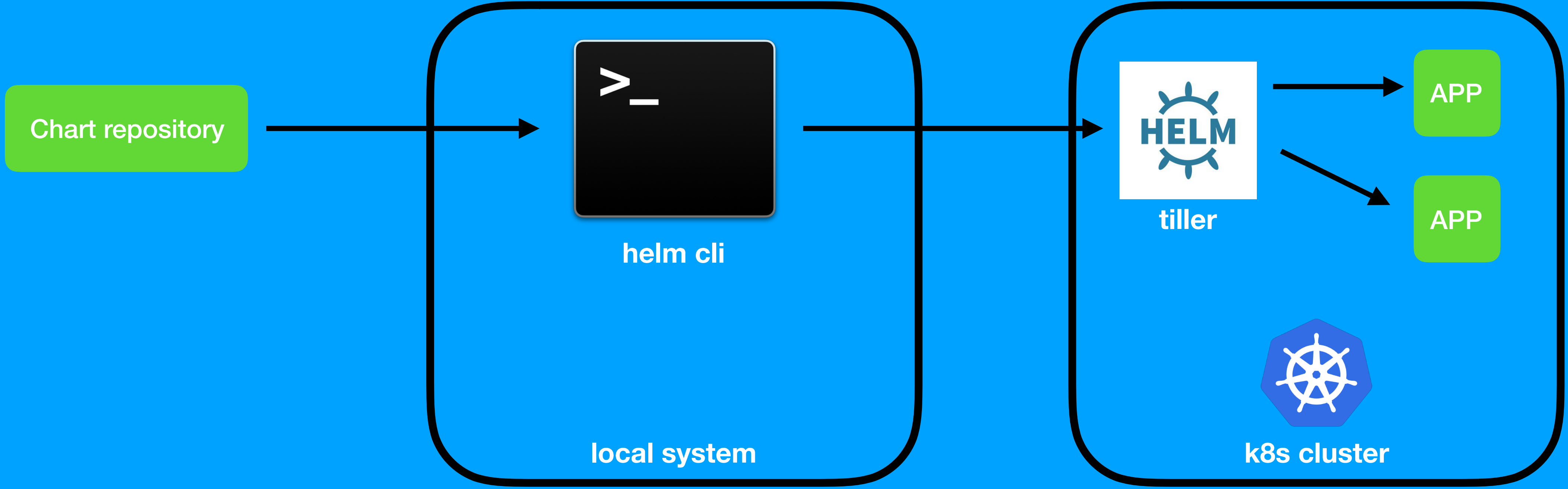


```
apiVersion: apps/v1beta1
kind: Deployment
metadata:
  name: frontend
spec:
  replicas: {{ .Values.frontend.replicas }}
  template:
    metadata:
      labels:
        app: guestbook
        tier: frontend
    spec:
      containers:
      - name: php-redis
        image: {{ .Values.frontend.image }}
        resources:
          requests:
            cpu: 100m
            memory: 100Mi
        env:
        - name: GET_HOSTS_FROM
          value: dns
        ports:
        - containerPort: {{ .Values.frontend.containerPort}}
```

Chart package

```
templates/guestbook-services.yaml
templates/guestbook-deployments.yml
Chart.yml
values.yml
```

source: https://github.com/erwindeg/k8s-helm/tree/master/helm_chart_guestbook



Helm chart repository: https://github.com/kubernetes/charts

Public chart repository

- App Store for Kubernetes deployments
- Stable charts for jenkins, sonar, postgres, rabbit mq etc.
- Backed by github.com/helm/charts

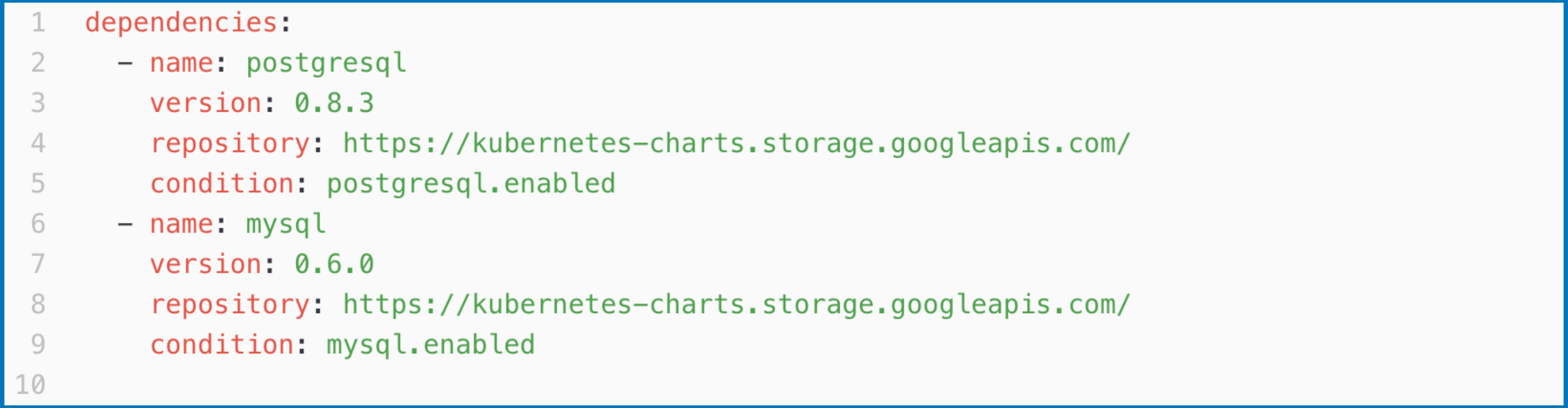
Chart config

- Chart values.yml
- Supplying a yml: “-f values.prod.yml”
- Command line variables: “--set frontend.image=”
- Command line file: “—set-file”

```
helm install stable/sonarqube --namespace sonarqube --set
service.externalPort=9001
```

Dependencies

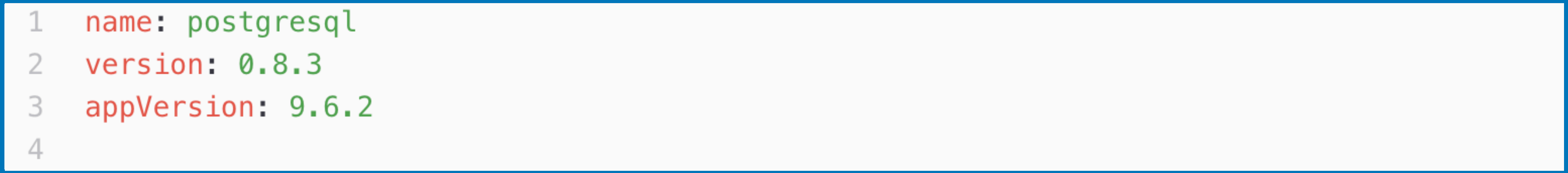
sonarqube/requirements.yaml



```yaml
dependencies:
  - name: postgresql
    version: 0.8.3
    repository: https://kubernetes-charts.storage.googleapis.com/
    condition: postgresql.enabled
  - name: mysql
    version: 0.6.0
    repository: https://kubernetes-charts.storage.googleapis.com/
    condition: mysql.enabled

```

postgresql/Chart.yaml



```yaml
name: postgresql
version: 0.8.3
appVersion: 9.6.2

```

Security considerations

- Tiller runs in privileged mode
- RBAC
  - helm init --service-account <NAME>
  - restricting namespaces

Alternatives

- Kubectl
- jsonnet templates: Ksonnet, Kapitan
- Declarative: Terraform Kubernetes provider, Kustomize
- Service-mesh approach: Istio
- Build-push-deploy: draft, gitkube, metaparticle, skaffold

Conclusion

- Manage complex applications
- Versioning and updates
- Rollback
- Sharing