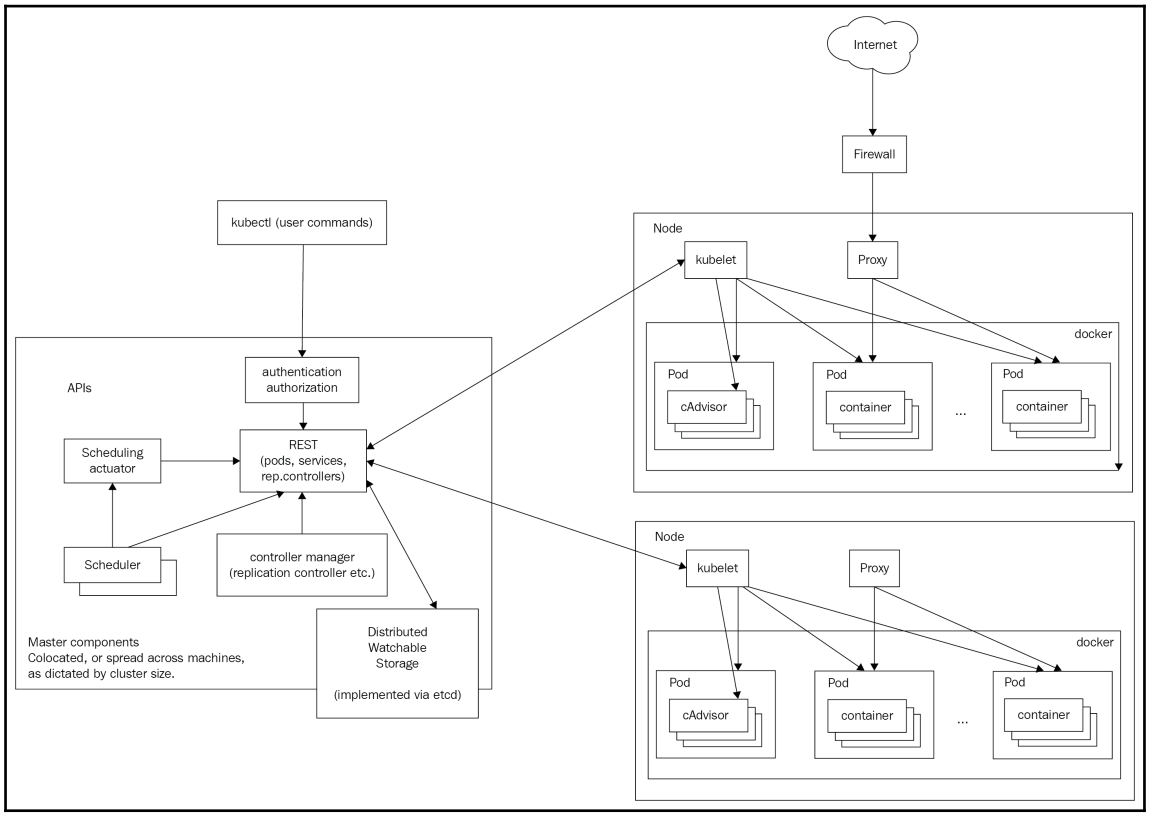
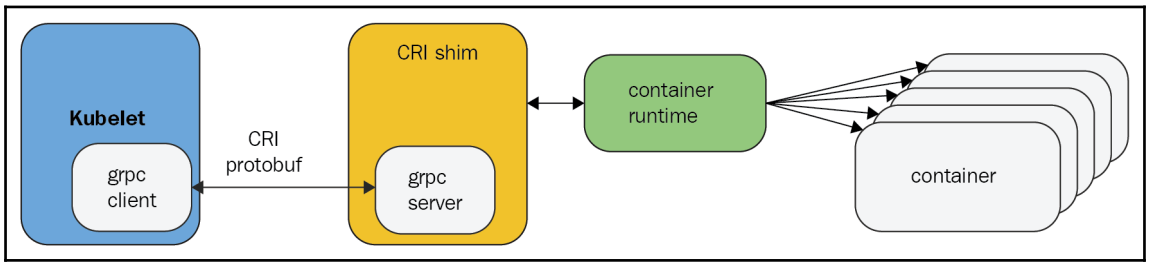
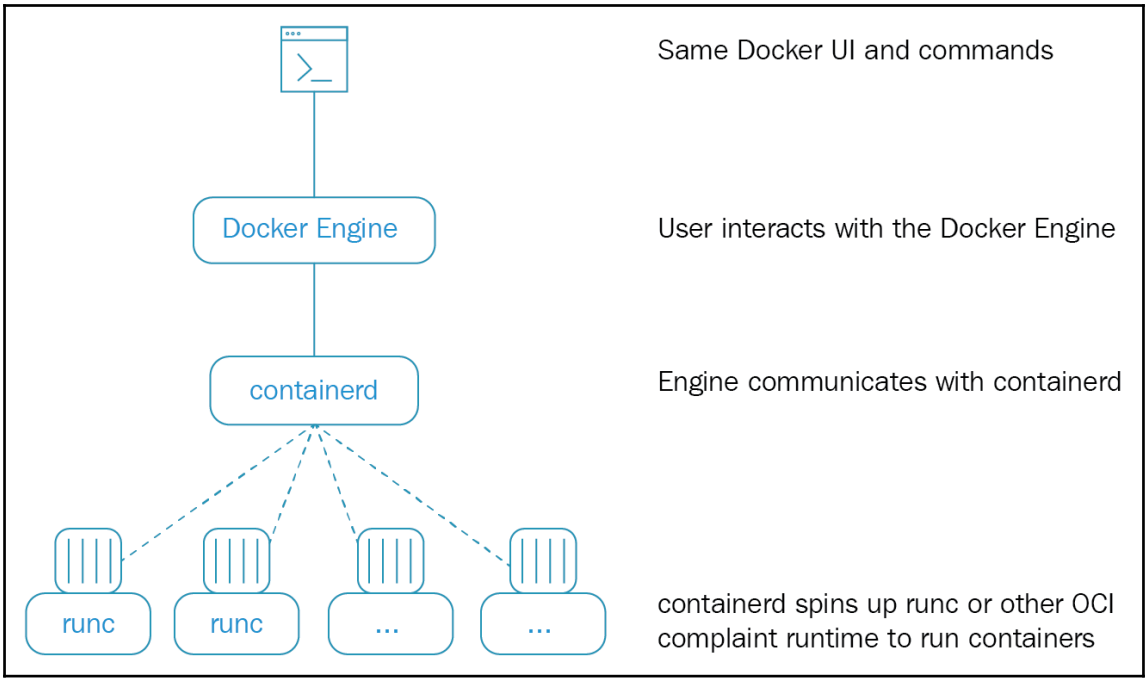
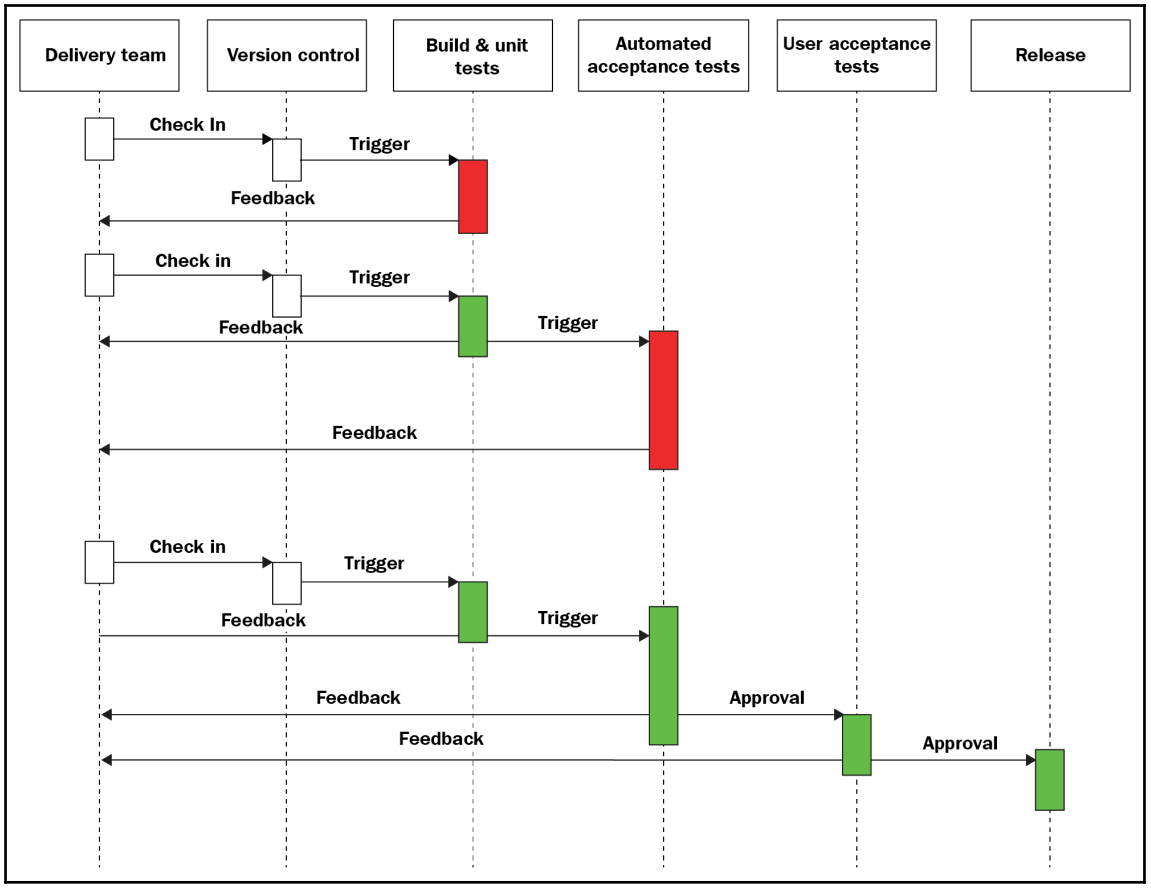
Chapter 1: Understanding Kubernetes Architecture

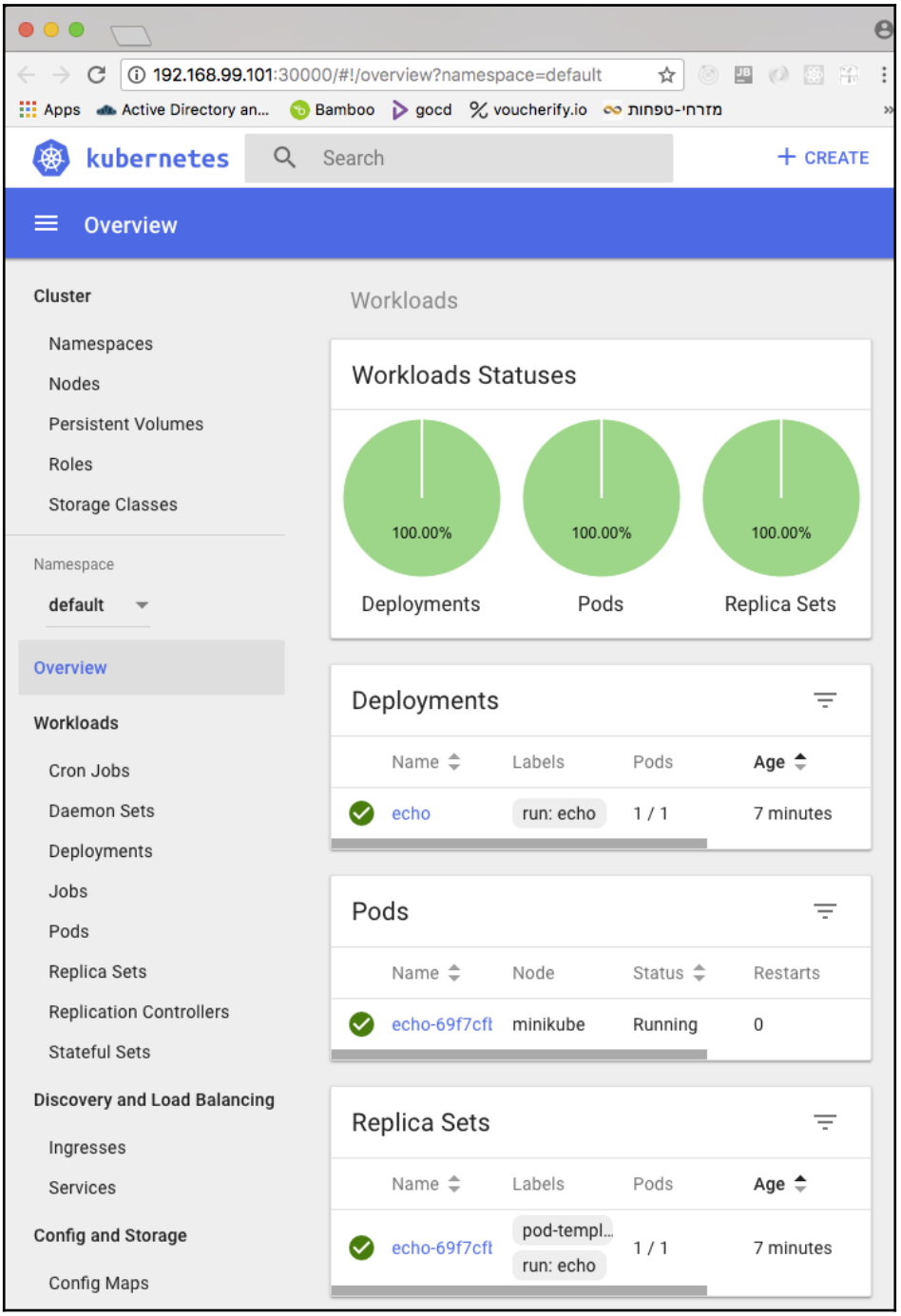




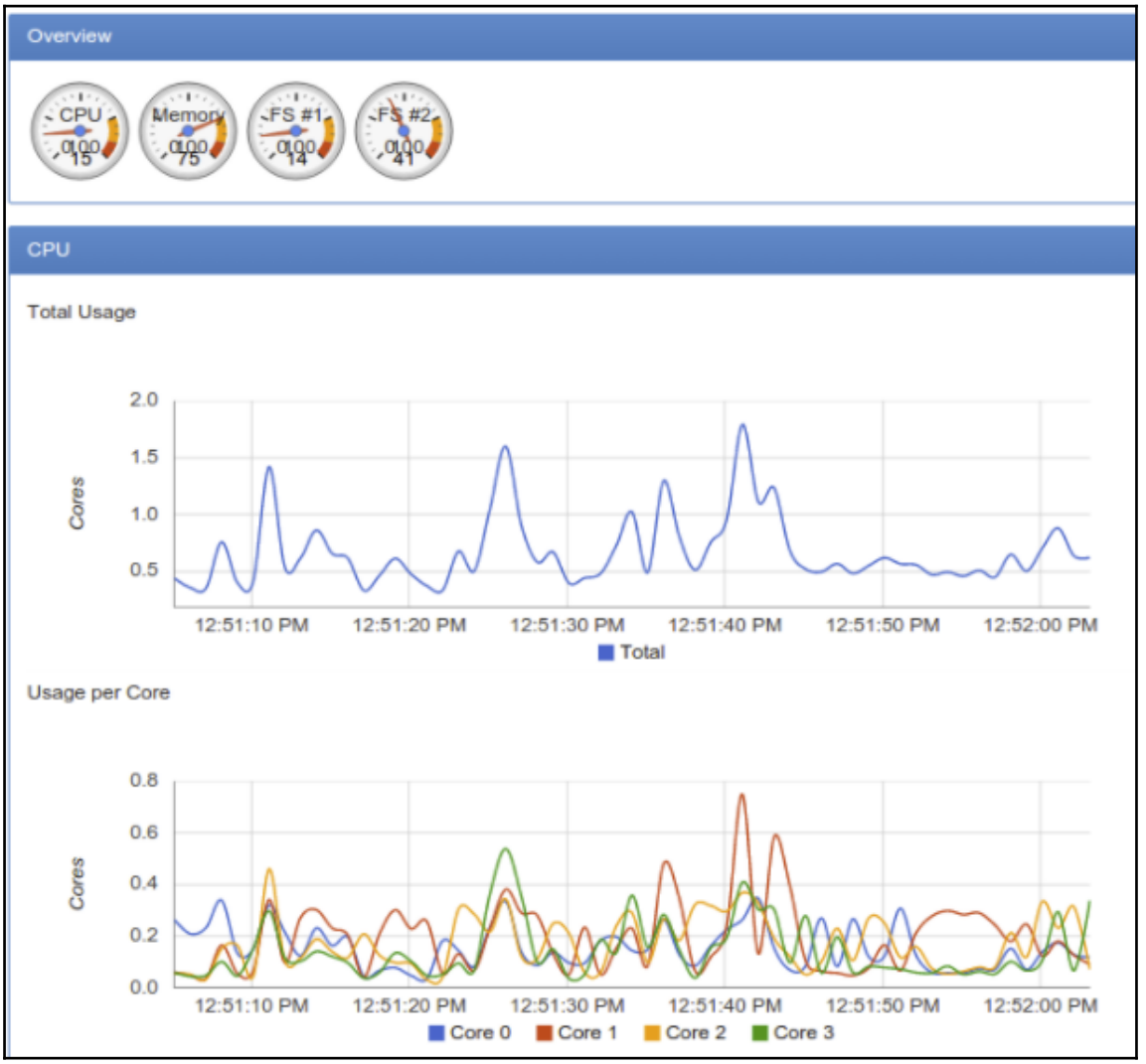

Same Docker UI and commands
Docker Engine
User interacts with the Docker Engine
containerd
Engine communicates with containerd
runc
runc
...
...
containerd spins up runc or other OCI complaint runtime to run containers

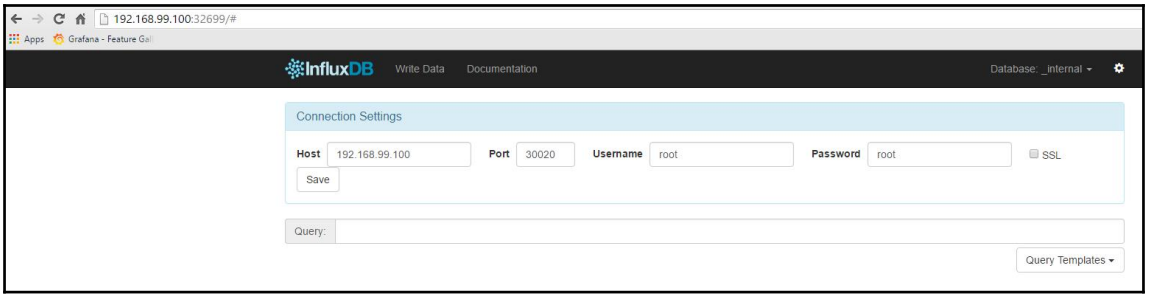

Delivery team
Version control
Build & unit tests
Automated acceptance tests
User acceptance tests
Release
Check In
Trigger
Feedback
Check in
Trigger
Feedback
Trigger
Feedback
Check in
Trigger
Feedback
Trigger
Feedback
Approval
Feedback
Approval

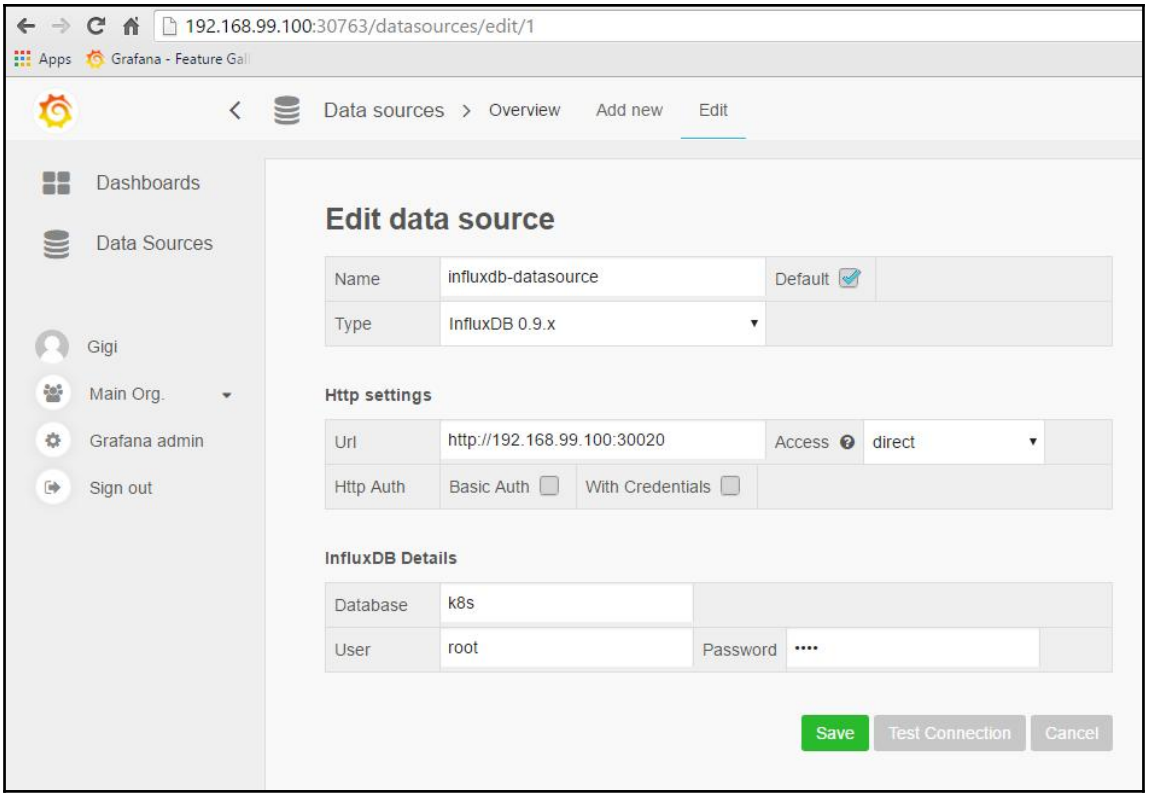
Chapter 2: Creating Kubernetes Clusters

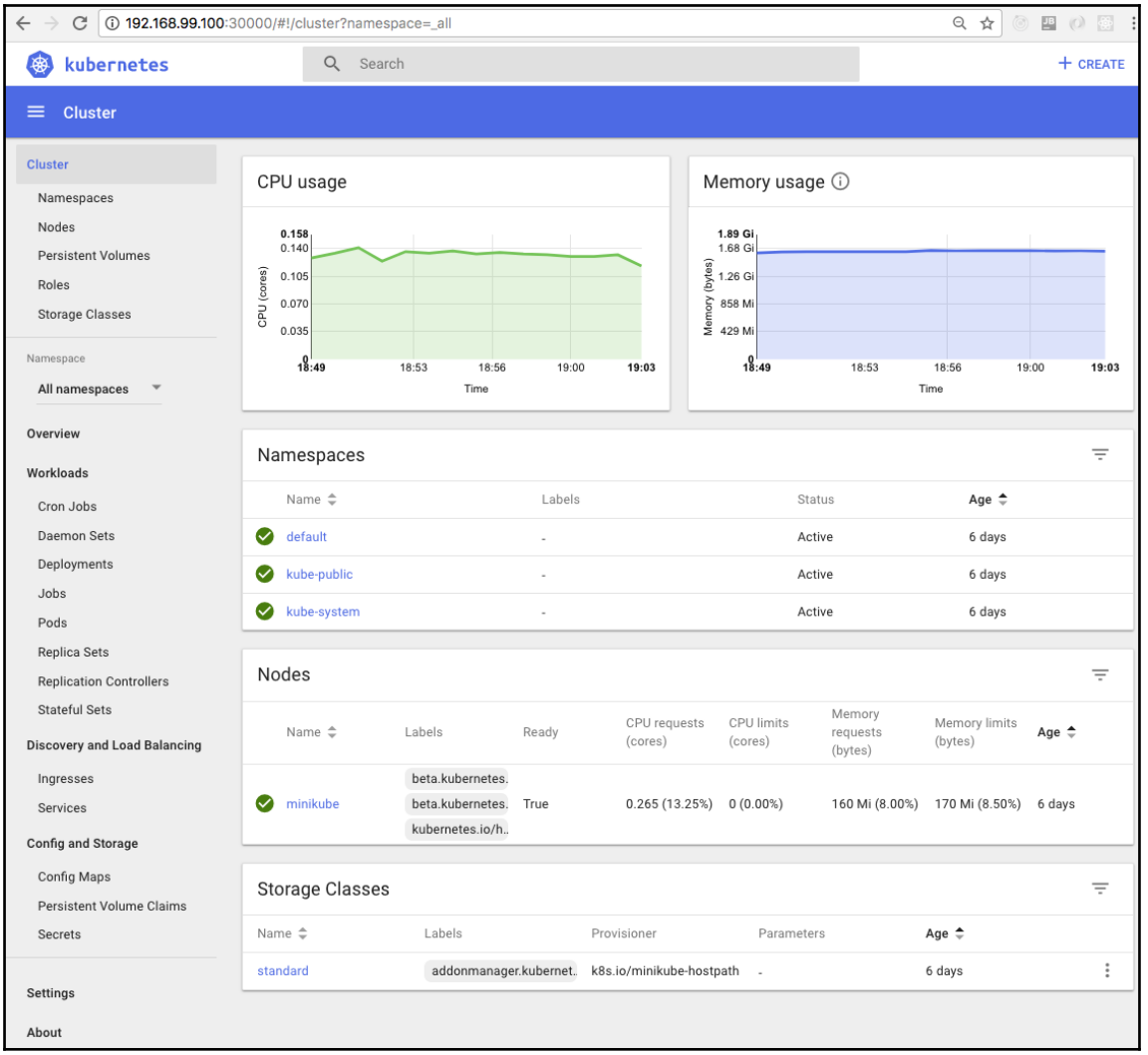

192.168.99.101:30000/#!/overview?namespace=default
Apps
Active Directory an...
Bamboo
gocd
voucherify.io
מזרחי-טפחות
kubernetes
Search
+ CREATE
Overview
Cluster
Namespaces
Nodes
Persistent Volumes
Roles
Storage Classes
Namespace
default
Overview
Workloads
Cron Jobs
Daemon Sets
Deployments
Jobs
Pods
Replica Sets
Replication Controllers
Stateful Sets
Discovery and Load Balancing
Ingresses
Services
Config and Storage
Config Maps
Workloads
Workloads Statuses
100.00%
100.00%
100.00%
Deployments
Pods
Replica Sets
Deployments
Name
Labels
Pods
Age
echo
run: echo
1 / 1
7 minutes
Pods
Name
Node
Status
Restarts
echo-69f7cfl
minikube
Running
0
Replica Sets
Name
Labels
Pods
Age
echo-69f7cfl
pod-templ...
run: echo
1 / 1
7 minutes

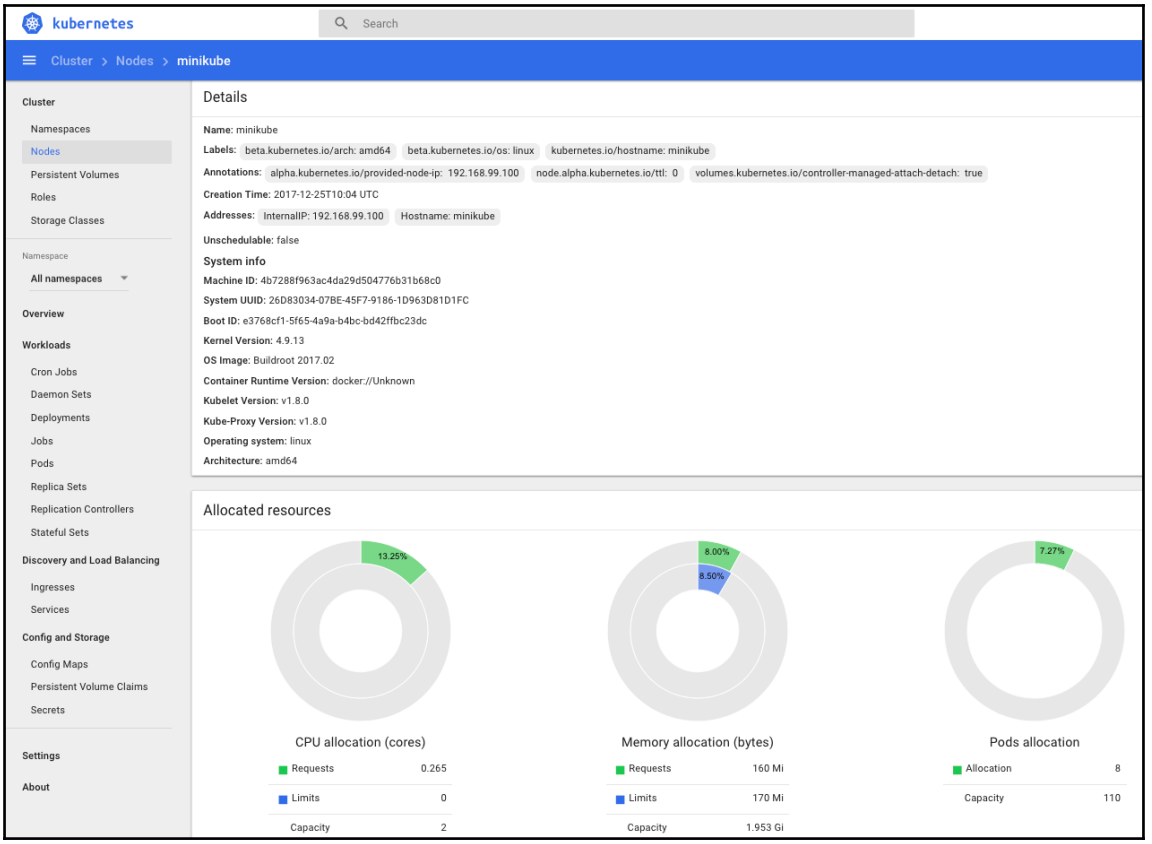
Chapter 3: Monitoring, Logging, and Troubleshooting




192.168.99.100:32699/#
Apps
Grafana - Feature Gal
InfluxDB
Write Data
Documentation
Database: _internal
Connection Settings
Host
192.168.99.100
Port
30020
Username
root
Password
root
SSL
Save
Query:
Query Templates


192.168.99.100:30763/datasources/edit/1
Apps
Grafana - Feature Gal
Data sources
Overview
Add new
Edit
Dashboards
Data Sources
Gigi
Main Org.
Grafana admin
Sign out
Edit data source
Name
influxdb-datasource
Default
Type
InfluxDB 0.9.x
Http settings
Url
http://192.168.99.100:30020
Access
direct
Http Auth
Basic Auth
With Credentials
InfluxDB Details
Database
k8s
User
root
Password
Save
Test Connection
Cancel


192.168.99.100:30000/#!/cluster?namespace=_all
kubernetes
Search
CREATE
Cluster
Cluster
Namespaces
Nodes
Persistent Volumes
Roles
Storage Classes
Namespace
All namespaces
Overview
Workloads
Cron Jobs
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
About
CPU usage
0.158
0.140
0.105
0.070
0.035
0
CPU (cores)
18:49
18:53
18:56
19:00
19:03
Time
Memory usage
1.89 Gi
1.68 Gi
1.26 Gi
858 Mi
429 Mi
0
Memory (bytes)
18:49
18:53
18:56
19:00
19:03
Time
Namespaces
Name
Labels
Status
Age
default
-
Active
6 days
kube-public
-
Active
6 days
kube-system
-
Active
6 days
Nodes
Name
Labels
Ready
CPU requests (cores)
CPU limits (cores)
Memory requests (bytes)
Memory limits (bytes)
Age
minikube
beta.kubernetes.
beta.kubernetes.
kubernetes.io/h..
True
0.265 (13.25%)
0 (0.00%)
160 Mi (8.00%)
170 Mi (8.50%)
6 days
Storage Classes
Name
Labels
Provisioner
Parameters
Age
standard
addonmanager.kubernet..
k8s.io/minikube-hostpath
-
6 days

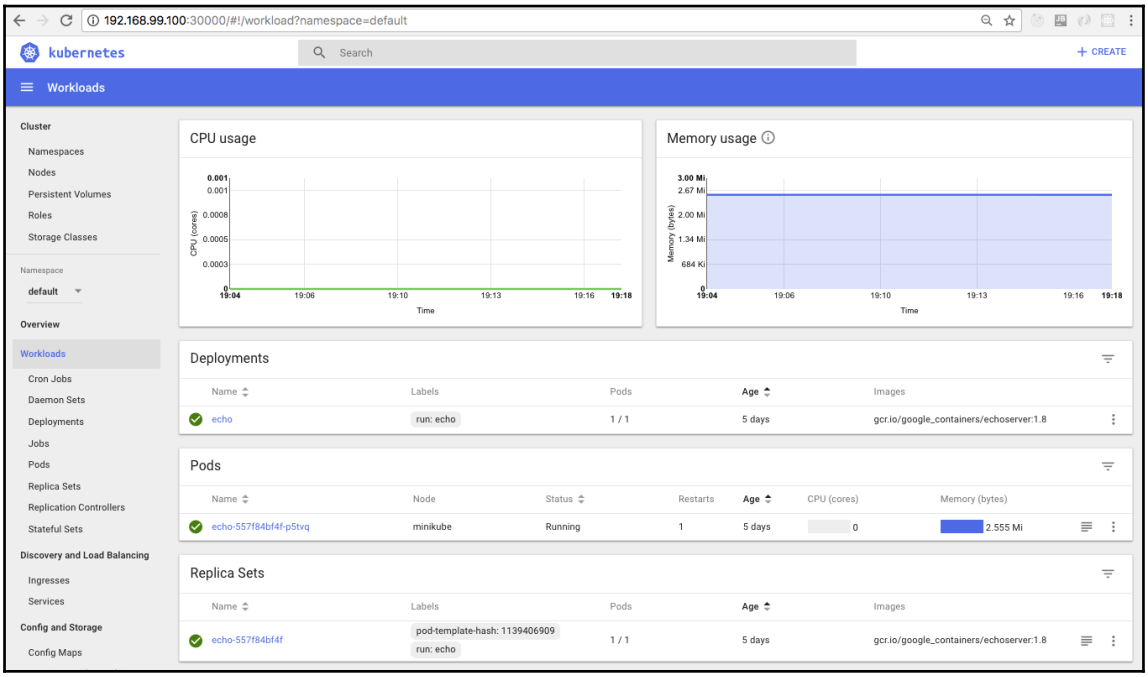

kubernetes
Search
Cluster › Nodes › minikube
Cluster
Namespaces
Nodes
Persistent Volumes
Roles
Storage Classes
Namespace
All namespaces
Overview
Workloads
Cron Jobs
Daemon Sets
Deployments
Jobs
Pods
Replica Sets
Replication Controllers
Stateful Sets
Discovery and Load Balancing
Ingresses
Services
Config and Storage
Config Maps
Persistent Volume Claims
Secrets
Settings
About
Details
Name: minikube
Labels: beta.kubernetes.io/arch: amd64 beta.kubernetes.io/os: linux kubernetes.io/hostname: minikube
Annotations: alpha.kubernetes.io/provided-node-ip: 192.168.99.100 node.alpha.kubernetes.io/ttl: 0 volumes.kubernetes.io/controller-managed-attach-detach: true
Creation Time: 2017-12-25T10:04 UTC
Addresses: InternalIP: 192.168.99.100 Hostname: minikube
Unschedulable: false
System info
Machine ID: 4b7288f963ac4da29d504776b31b68c0
System UUID: 26D83034-07BE-45F7-9186-1D963D81D1FC
Boot ID: e3768cf1-5f65-4a9a-b4bc-bd42ffbc23dc
Kernel Version: 4.9.13
OS Image: Buildroot 2017.02
Container Runtime Version: docker://Unknown
Kubelet Version: v1.8.0
Kube-Proxy Version: v1.8.0
Operating system: linux
Architecture: amd64
Allocated resources
13.25%
CPU allocation (cores)
Requests 0.265
Limits 0
Capacity 2
8.00%
8.50%
Memory allocation (bytes)
Requests 160 Mi
Limits 170 Mi
Capacity 1.953 Gi
7.27%
Pods allocation
Allocation 8
Capacity 110

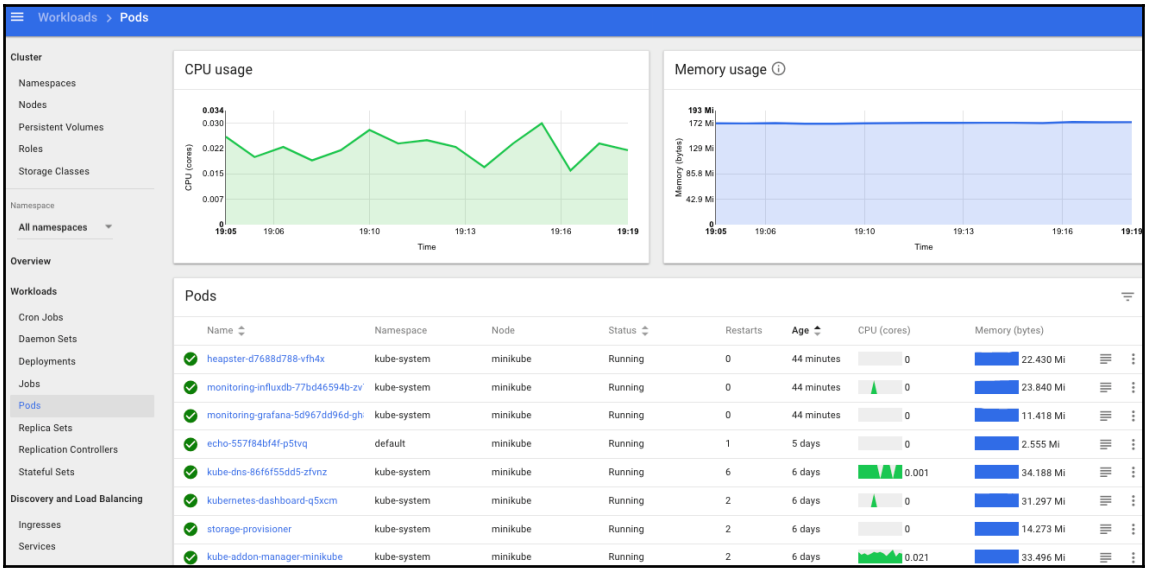
Conditions

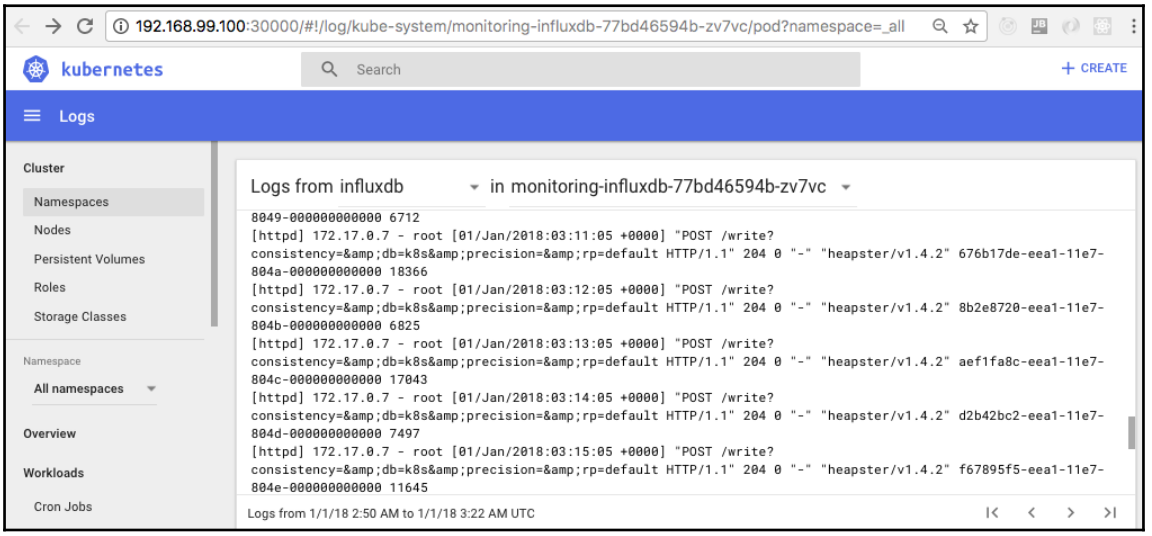
Type	Status	Last heartbeat time	Last transition time	Reason	Message
OutOfDisk	False	7 seconds	6 days	KubeletHasSufficientDisk	kubelet has sufficient disk space available
MemoryPressure	False	7 seconds	6 days	KubeletHasSufficientMemory	kubelet has sufficient memory available
DiskPressure	False	7 seconds	6 days	KubeletHasNoDiskPressure	kubelet has no disk pressure
Ready	True	7 seconds	4 hours	KubeletReady	kubelet is posting ready status

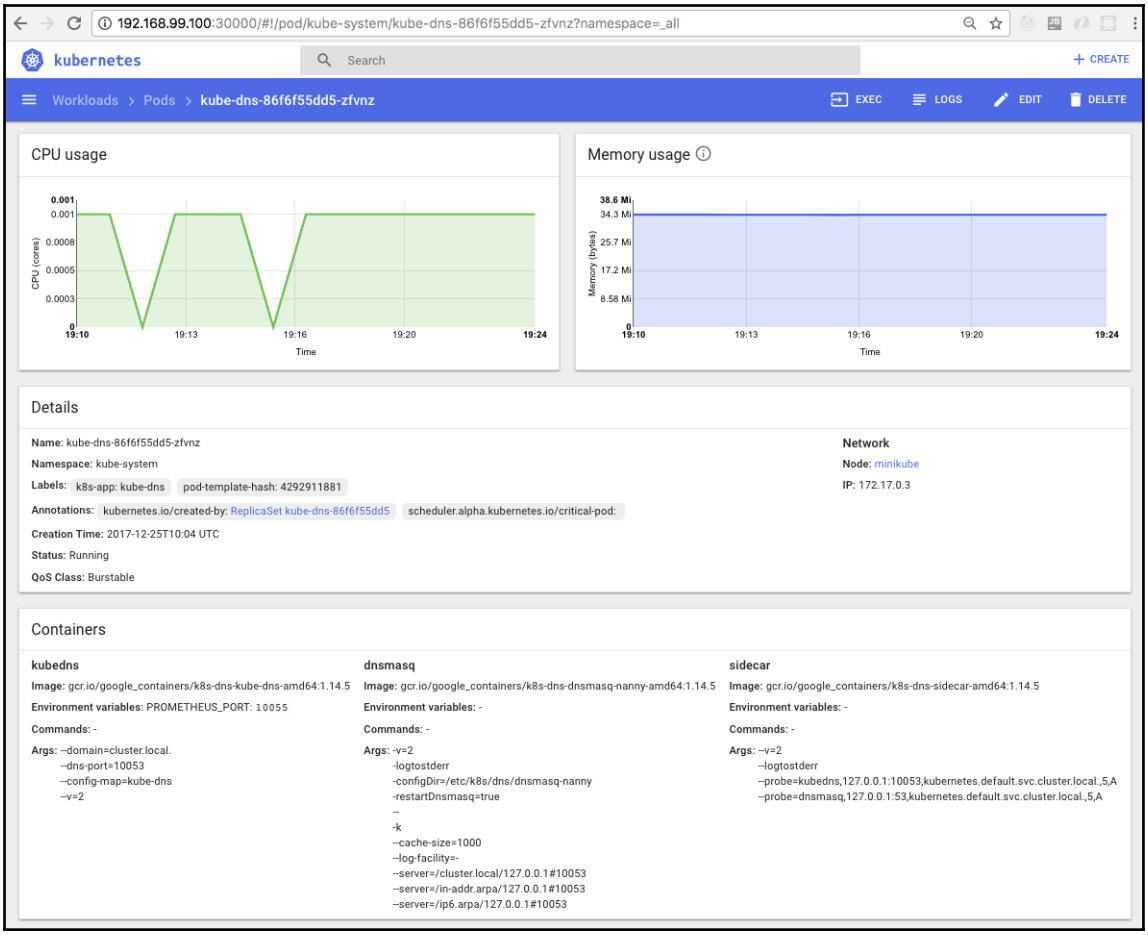
Pods

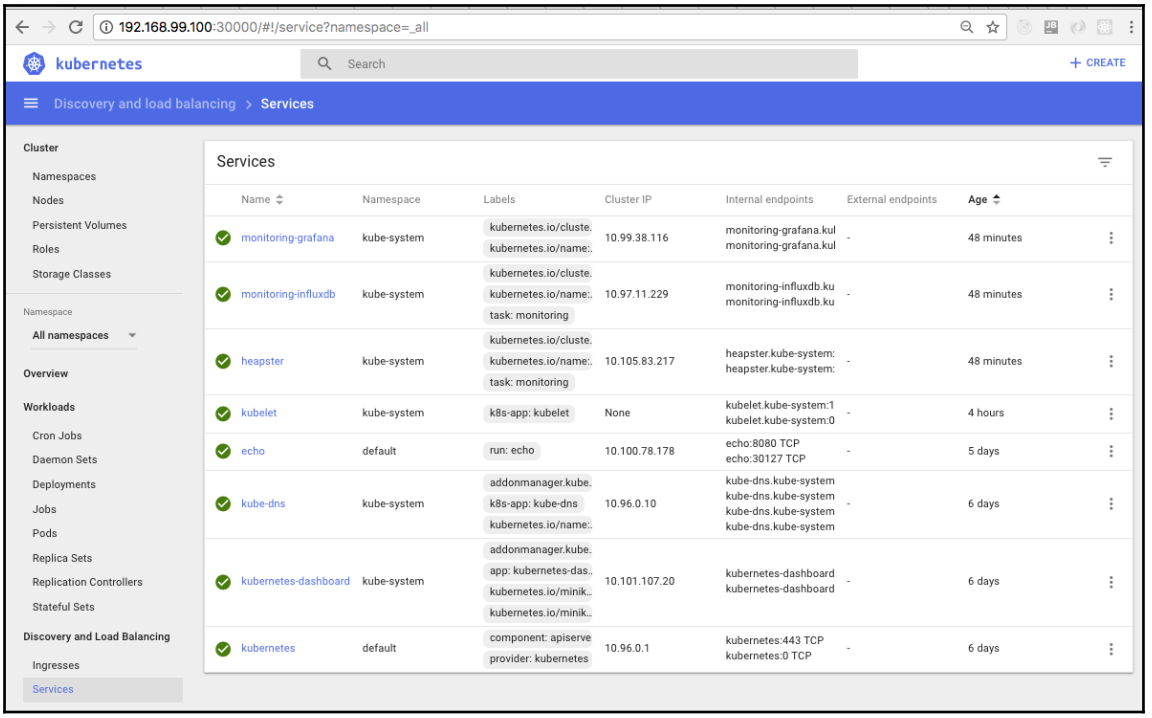
Name	Namespace	Node	Status	Restarts	Age	CPU (cores)	Memory (bytes)
heapster-d7688d788-vfh4x	kube-system	minikube	Running	0	34 minutes	0	21.012 Mi
monitoring-influxdb-77bd46594b-zv	kube-system	minikube	Running	0	34 minutes	0	22.719 Mi
monitoring-grafana-5d967dd96d-gh	kube-system	minikube	Running	0	34 minutes	0	11.426 Mi
echo-557f84bf4f-p5tvq	default	minikube	Running	1	5 days	0	2.555 Mi
kube-dns-86f6f55dd5-zfvnz	kube-system	minikube	Running	6	6 days	0.001	34.215 Mi
kubernetes-dashboard-q5xcm	kube-system	minikube	Running	2	6 days	0	31.180 Mi
storage-provisioner	kube-system	minikube	Running	2	6 days	0	14.281 Mi
kube-addon-manager-minikube	kube-system	minikube	Running	2	6 days	0.021	33.398 Mi

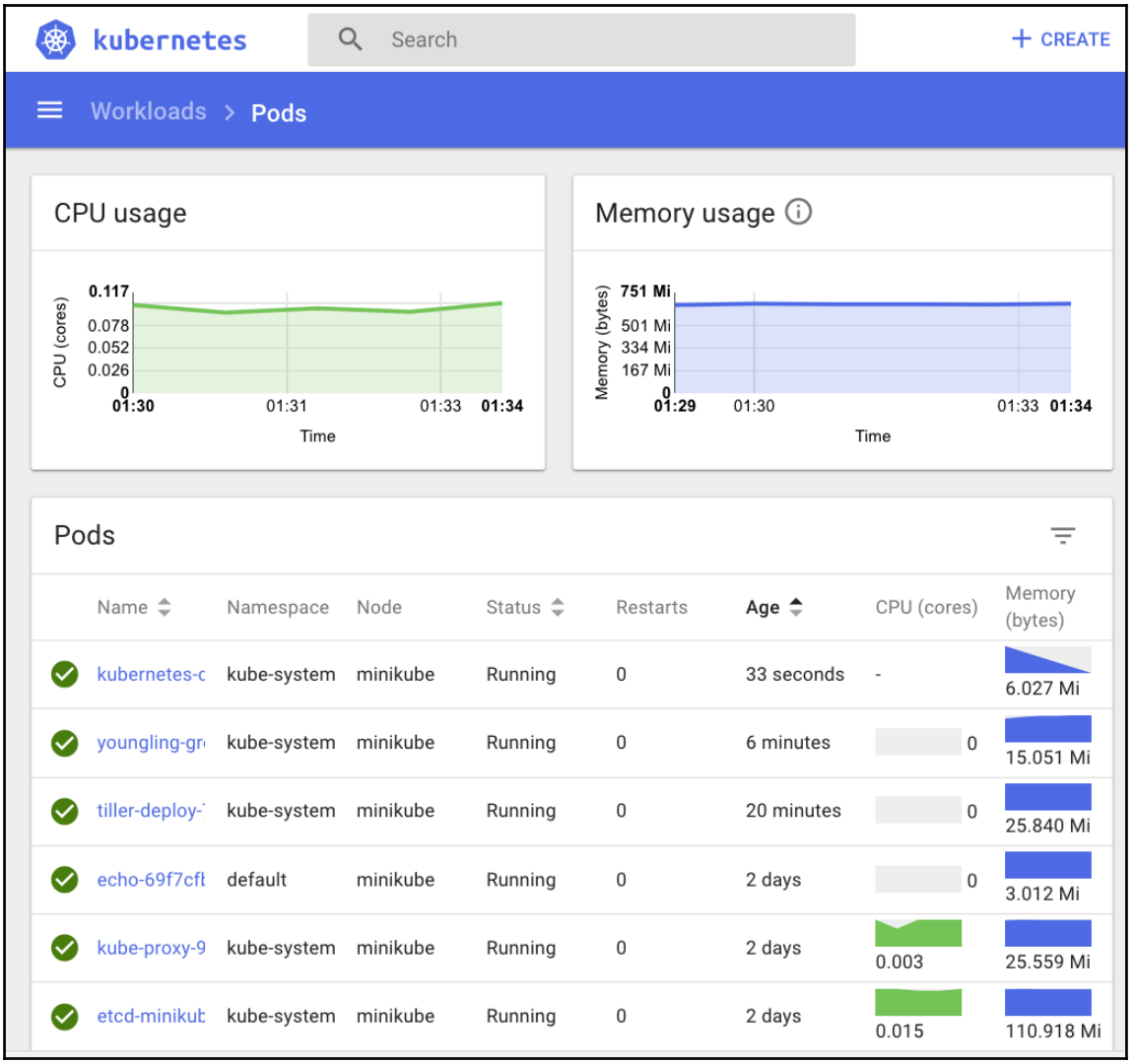


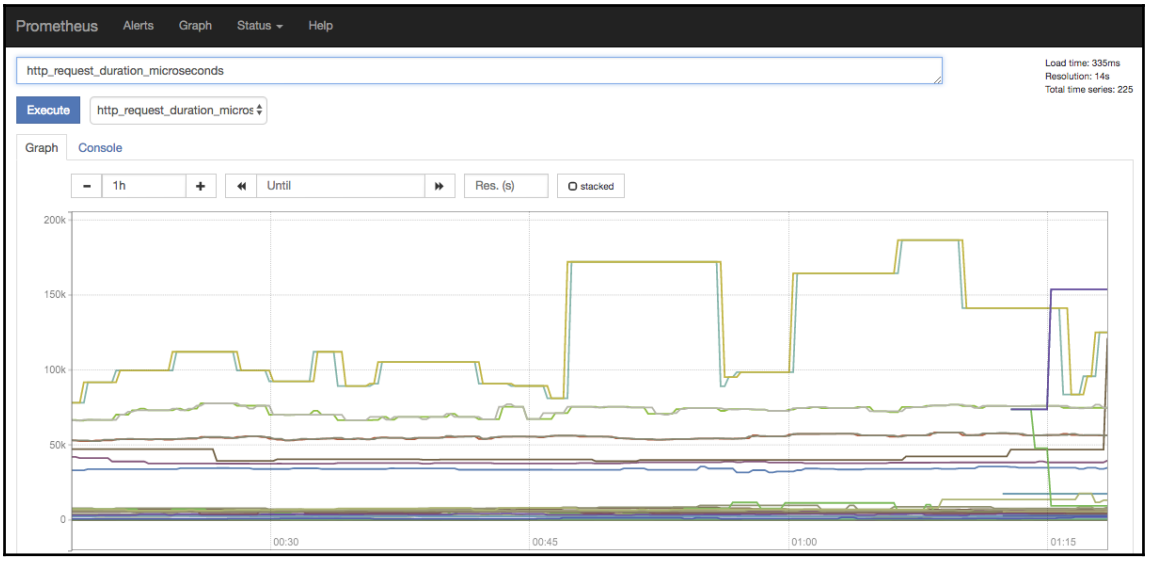

Workloads > Pods
Cluster
Namespaces
Nodes
Persistent Volumes
Roles
Storage Classes
Namespace
All namespaces
Overview
Workloads
Cron Jobs
Daemon Sets
Deployments
Jobs
Pods
Replica Sets
Replication Controllers
Stateful Sets
Discovery and Load Balancing
Ingresses
Services
CPU usage
CPU (cores)
0.034
0.030
0.022
0.015
0.007
0
19:05
19:06
19:10
19:13
19:16
19:19
Time
Memory usage
Memory (bytes)
193 Mi
172 Mi
129 Mi
85.8 Mi
42.9 Mi
0
Pods
Name
Namespace
Node
Status
Restarts
Age
CPU (cores)
Memory (bytes)
heapster-d7688d788-vfh4x kube-system minikube Running 0 44 minutes 0 22.430 Mi
monitoring-influxdb-77bd46594b-zv kube-system minikube Running 0 44 minutes 0 23.840 Mi
monitoring-grafana-5d967dd96d-gh kube-system minikube Running 0 44 minutes 0 11.418 Mi
echo-557f84bf4f-p5tvq default minikube Running 1 5 days 0 2.555 Mi
kube-dns-86f6f55dd5-zfvnz kube-system minikube Running 6 6 days 0.001 34.188 Mi
kubernetes-dashboard-q5xcm kube-system minikube Running 2 6 days 0 31.297 Mi
storage-provisioner kube-system minikube Running 2 6 days 0 14.273 Mi
kube-addon-manager-minikube kube-system minikube Running 2 6 days 0.021 33.496 Mi

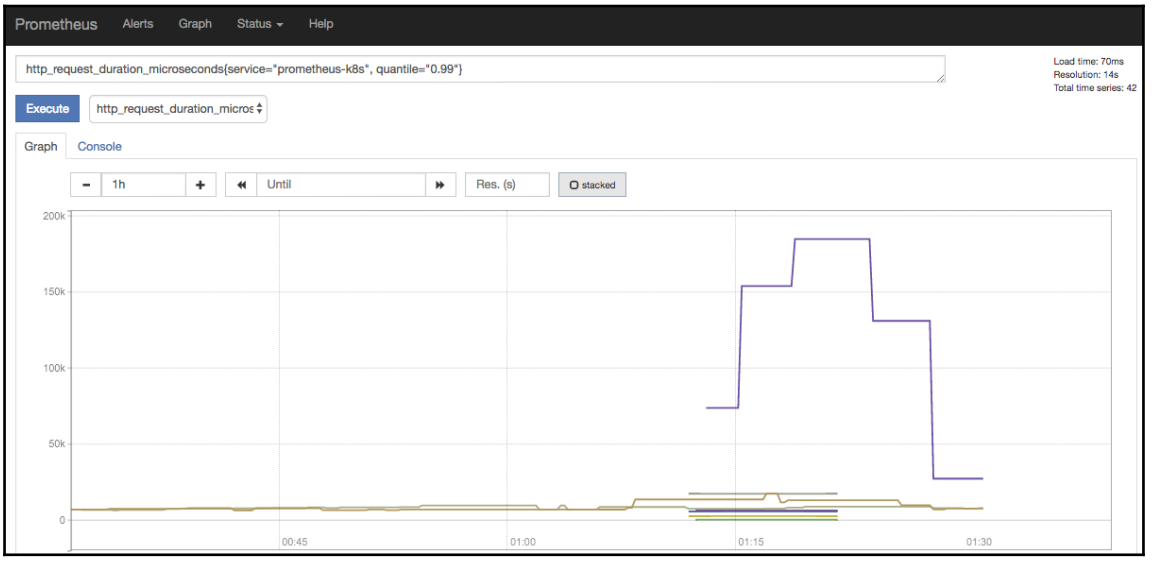

192.168.99.100:30000/#!/log/kube-system/monitoring-influxdb-77bd46594b-zv7vc/pod?namespace=_all
kubernetes
Search
+ CREATE
Logs
Cluster
Namespaces
Nodes
Persistent Volumes
Roles
Storage Classes
Namespace
All namespaces
Overview
Workloads
Cron Jobs
Logs from influxdb
in monitoring-influxdb-77bd46594b-zv7vc
8049-000000000000 6712
[httpd] 172.17.0.7 - root [01/Jan/2018:03:11:05 +0000] "POST /write?
consistency=&db=k8s&precision=&rp=default HTTP/1.1" 204 0 "-" "heapster/v1.4.2" 676b17de-eea1-11e7-
804a-000000000000 18366
[httpd] 172.17.0.7 - root [01/Jan/2018:03:12:05 +0000] "POST /write?
consistency=&db=k8s&precision=&rp=default HTTP/1.1" 204 0 "-" "heapster/v1.4.2" 8b2e8720-eea1-11e7-
804b-000000000000 6825
[httpd] 172.17.0.7 - root [01/Jan/2018:03:13:05 +0000] "POST /write?
consistency=&db=k8s&precision=&rp=default HTTP/1.1" 204 0 "-" "heapster/v1.4.2" aef1fa8c-eea1-11e7-
804c-000000000000 17043
[httpd] 172.17.0.7 - root [01/Jan/2018:03:14:05 +0000] "POST /write?
consistency=&db=k8s&precision=&rp=default HTTP/1.1" 204 0 "-" "heapster/v1.4.2" d2b42bc2-eea1-11e7-
804d-000000000000 7497
[httpd] 172.17.0.7 - root [01/Jan/2018:03:15:05 +0000] "POST /write?
consistency=&db=k8s&precision=&rp=default HTTP/1.1" 204 0 "-" "heapster/v1.4.2" f67895f5-eea1-11e7-
804e-000000000000 11645
Logs from 1/1/18 2:50 AM to 1/1/18 3:22 AM UTC

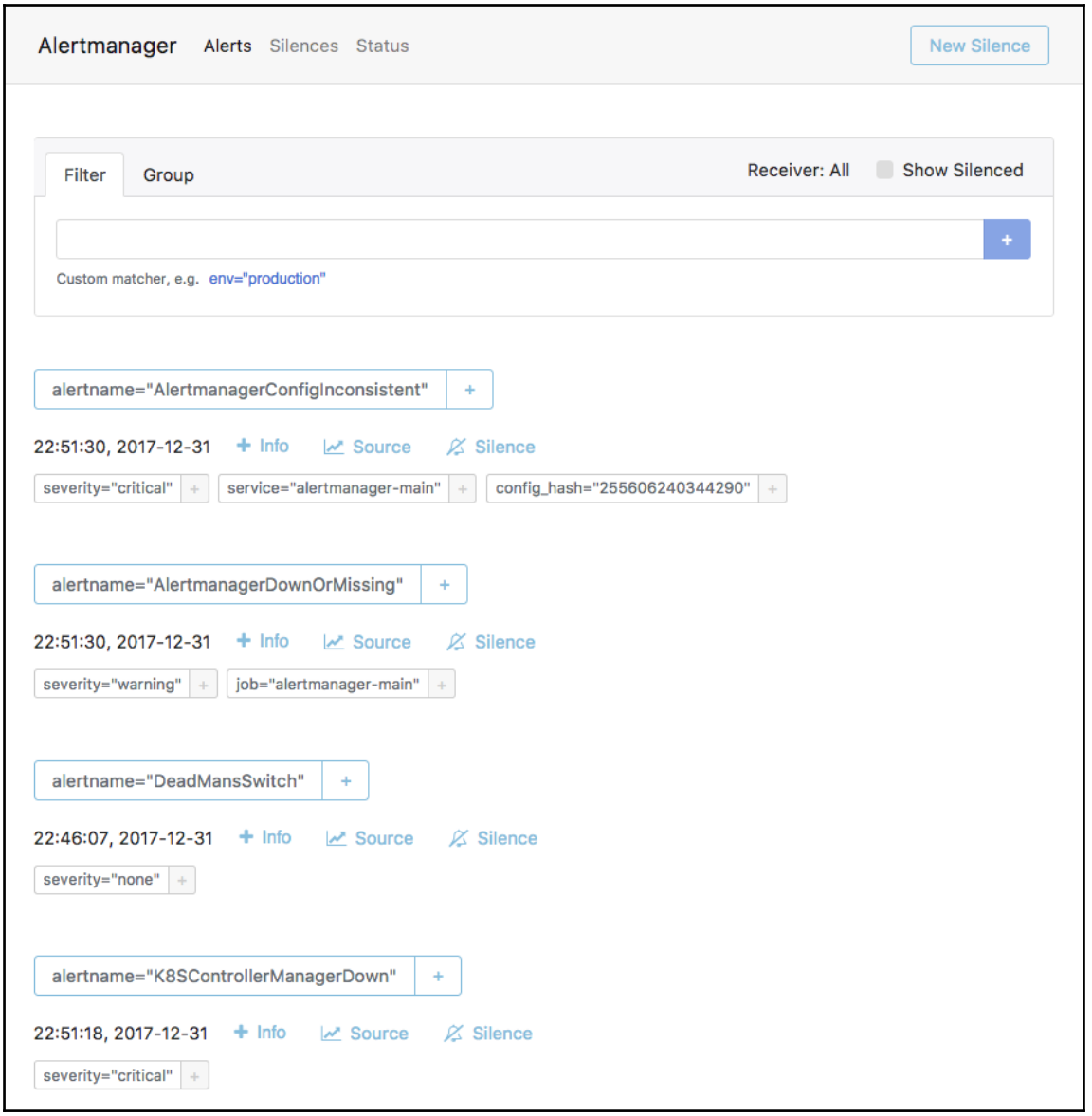

192.168.99.100:30000/#!/pod/kube-system/kube-dns-86f6f55dd5-zfvnz?namespace=_all
kubernetes
Search
+ CREATE
Workloads > Pods > kube-dns-86f6f55dd5-zfvnz
EXEC
LOGS
EDIT
DELETE
CPU usage
0.001
0.001
0.0008
0.0005
0.0003
0
CPU (cores)
19:10
19:13
19:16
19:20
19:24
Time
Memory usage
38.6 Mi
34.3 Mi
25.7 Mi
17.2 Mi
8.58 Mi
0
Memory (bytes)
19:10
19:13
19:16
19:20
19:24
Time
Details
Name: kube-dns-86f6f55dd5-zfvnz
Namespace: kube-system
Labels: k8s-app: kube-dns pod-template-hash: 4292911881
Annotations: kubernetes.io/created-by: ReplicaSet kube-dns-86f6f55dd5 scheduler.alpha.kubernetes.io/critical-pod:
Creation Time: 2017-12-25T10:04 UTC
Status: Running
QoS Class: Burstable
Network
Node: minikube
IP: 172.17.0.3
Containers
kubedns
Image: gcr.io/google_containers/k8s-dns-kube-dns-amd64:1.14.5
Environment variables: PROMETHEUS_PORT: 10055
Commands: -
Args: --domain=cluster.local.
--dns-port=10053
--config-map=kube-dns
--v=2
dnsmasq
Image: gcr.io/google_containers/k8s-dns-dnsmasq-nanny-amd64:1.14.5
Environment variables: -
Commands: -
Args: -v=2
-logtostderr
-configDir=/etc/k8s/dns/dnsmasq-nanny
-restartDnsmasq=true
--
-k
--cache-size=1000
--log-facility=-
--server=/cluster.local/127.0.0.1#10053
--server=/in-addr.arpa/127.0.0.1#10053
--server=/ip6.arpa/127.0.0.1#10053
sidecar
Image: gcr.io/google_containers/k8s-dns-sidecar-amd64:1.14.5
Environment variables: -
Commands: -
Args: --v=2
--logtostderr
--probe=kubedns,127.0.0.1:10053,kubernetes.default.svc.cluster.local.,5,A
--probe=dnsmasq,127.0.0.1:53,kubernetes.default.svc.cluster.local.,5,A


192.168.99.100:30000/#!/service?namespace=_all
kubernetes
Search
+ CREATE
Discovery and load balancing > Services
Cluster
Namespaces
Nodes
Persistent Volumes
Roles
Storage Classes
Namespace
All namespaces
Overview
Workloads
Cron Jobs
Daemon Sets
Deployments
Jobs
Pods
Replica Sets
Replication Controllers
Stateful Sets
Discovery and Load Balancing
Ingresses
Services
Services
Name
Namespace
Labels
Cluster IP
Internal endpoints
External endpoints
Age
monitoring-grafana
kube-system
kubernetes.io/cluste.
kubernetes.io/name:.
10.99.38.116
monitoring-grafana.kul
monitoring-grafana.kul
-
48 minutes
monitoring-influxdb
kube-system
kubernetes.io/cluste.
kubernetes.io/name:.
task: monitoring
10.97.11.229
monitoring-influxdb.ku
monitoring-influxdb.ku
-
48 minutes
heapster
kube-system
kubernetes.io/cluste.
kubernetes.io/name:.
task: monitoring
10.105.83.217
heapster.kube-system:
heapster.kube-system:
-
48 minutes
kubelet
kube-system
k8s-app: kubelet
None
kubelet.kube-system:1
kubelet.kube-system:0
-
4 hours
echo
default
run: echo
10.100.78.178
echo:8080 TCP
echo:30127 TCP
-
5 days
kube-dns
kube-system
addonmanager.kube.
k8s-app: kube-dns
kubernetes.io/name:.
10.96.0.10
kube-dns.kube-system
kube-dns.kube-system
kube-dns.kube-system
kube-dns.kube-system
-
6 days
kubernetes-dashboard
kube-system
addonmanager.kube.
app: kubernetes-das..
kubernetes.io/minik..
kubernetes.io/minik..
10.101.107.20
kubernetes-dashboard
kubernetes-dashboard
-
6 days
kubernetes
default
component: apiserve
provider: kubernetes
10.96.0.1
kubernetes:443 TCP
kubernetes:0 TCP
-
6 days

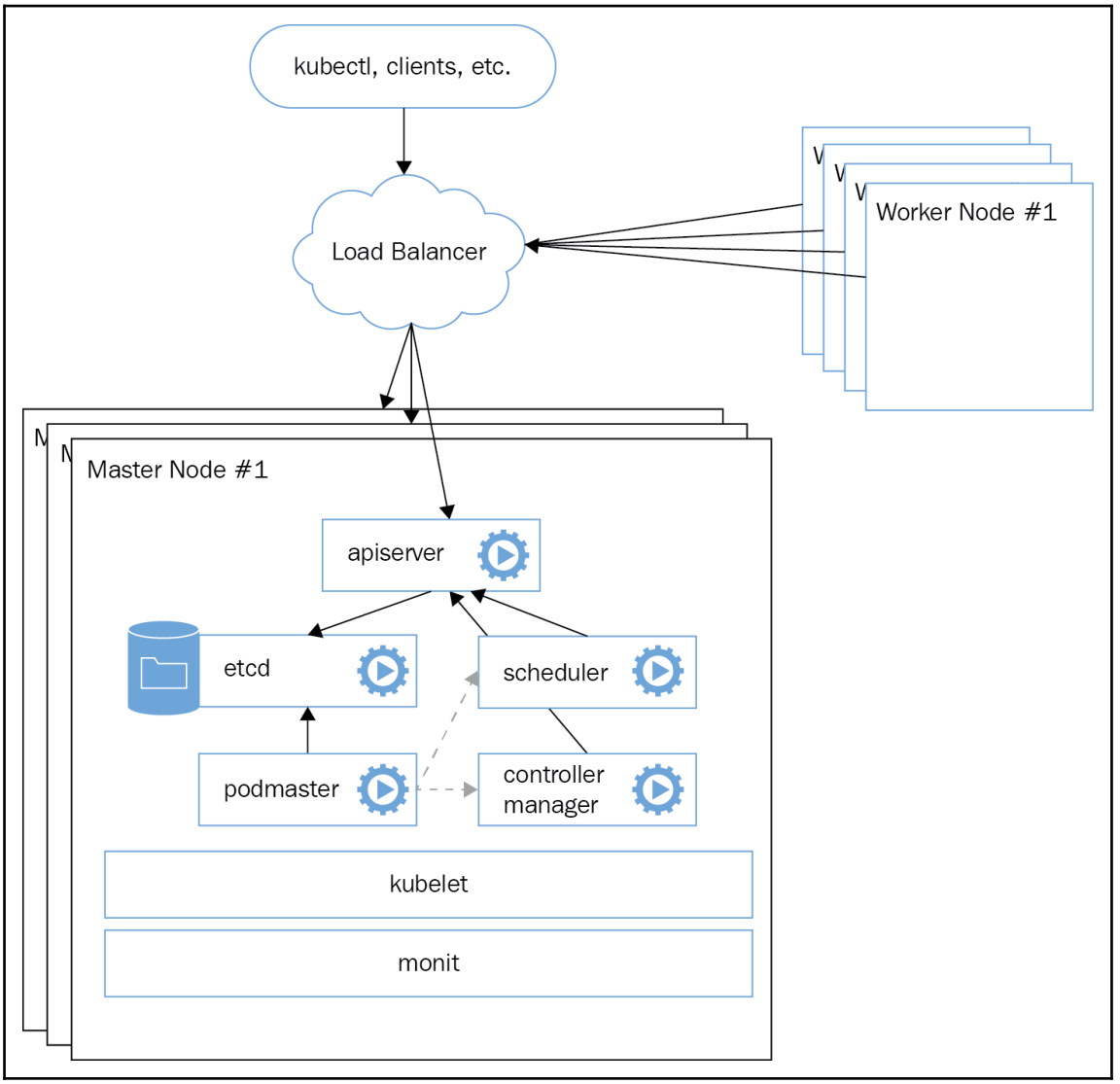

kubernetes
Search
+ CREATE
Workloads > Pods
CPU usage
0.117
0.078
0.052
0.026
0
CPU (cores)
01:30
01:31
01:33
01:34
Time
Memory usage
751 Mi
501 Mi
334 Mi
167 Mi
0
Memory (bytes)
01:29
01:30
01:33
01:34
Time
Pods
Name
Namespace
Node
Status
Restarts
Age
CPU (cores)
Memory (bytes)
kubernetes-c kube-system minikube Running 0 33 seconds - 6.027 Mi
youngling-gr kube-system minikube Running 0 6 minutes 0 15.051 Mi
tiller-deploy- kube-system minikube Running 0 20 minutes 0 25.840 Mi
echo-69f7cfl default minikube Running 0 2 days 0 3.012 Mi
kube-proxy-9 kube-system minikube Running 0 2 days 0.003 25.559 Mi
etcd-minikub kube-system minikube Running 0 2 days 0.015 110.918 Mi


Prometheus
Alerts
Graph
Status
Help
http_request_duration_microseconds
Load time: 335ms
Resolution: 14s
Total time series: 225
Execute
http_request_duration_micros
Graph
Console
1h
Until
Res. (s)
stacked
200k
150k
100k
50k
0
00:30
00:45
01:00
01:15


Prometheus
Alerts
Graph
Status
Help
http_request_duration_microseconds{service="prometheus-k8s", quantile="0.99"}
Load time: 70ms
Resolution: 14s
Total time series: 42
Execute
http_request_duration_micros
Graph
Console
1h
Until
Res. (s)
stacked
200k
150k
100k
50k
0
00:45
01:00
01:15
01:30

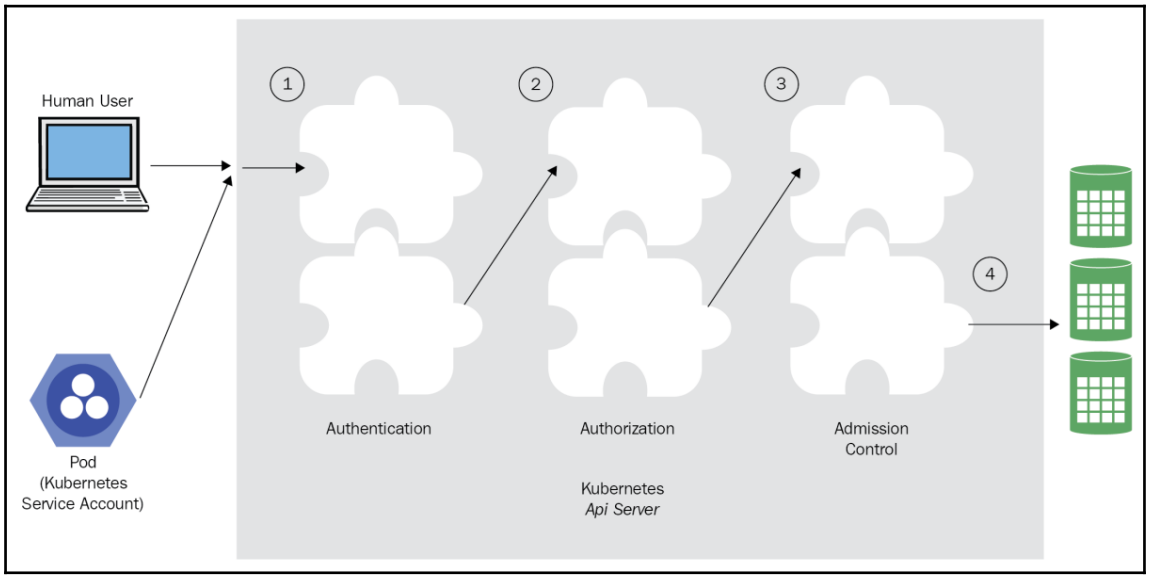

Alertmanager
Alerts
Silences
Status
New Silence
Filter
Group
Receiver: All
Show Silenced
Custom matcher, e.g. env="production"
alertname="AlertmanagerConfigInconsistent"
22:51:30, 2017-12-31
Info
Source
Silence
severity="critical"
service="alertmanager-main"
config_hash="255606240344290"
alertname="AlertmanagerDownOrMissing"
22:51:30, 2017-12-31
Info
Source
Silence
severity="warning"
job="alertmanager-main"
alertname="DeadMansSwitch"
22:46:07, 2017-12-31
Info
Source
Silence
severity="none"
alertname="K8SControllerManagerDown"
22:51:18, 2017-12-31
Info
Source
Silence
severity="critical"

Chapter 4: High Availability and Reliability

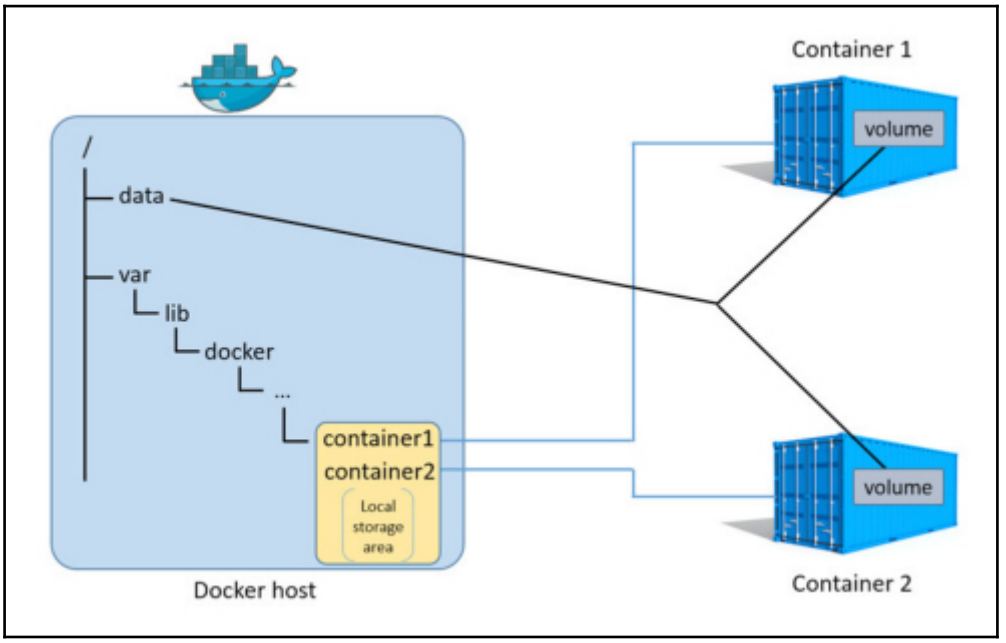


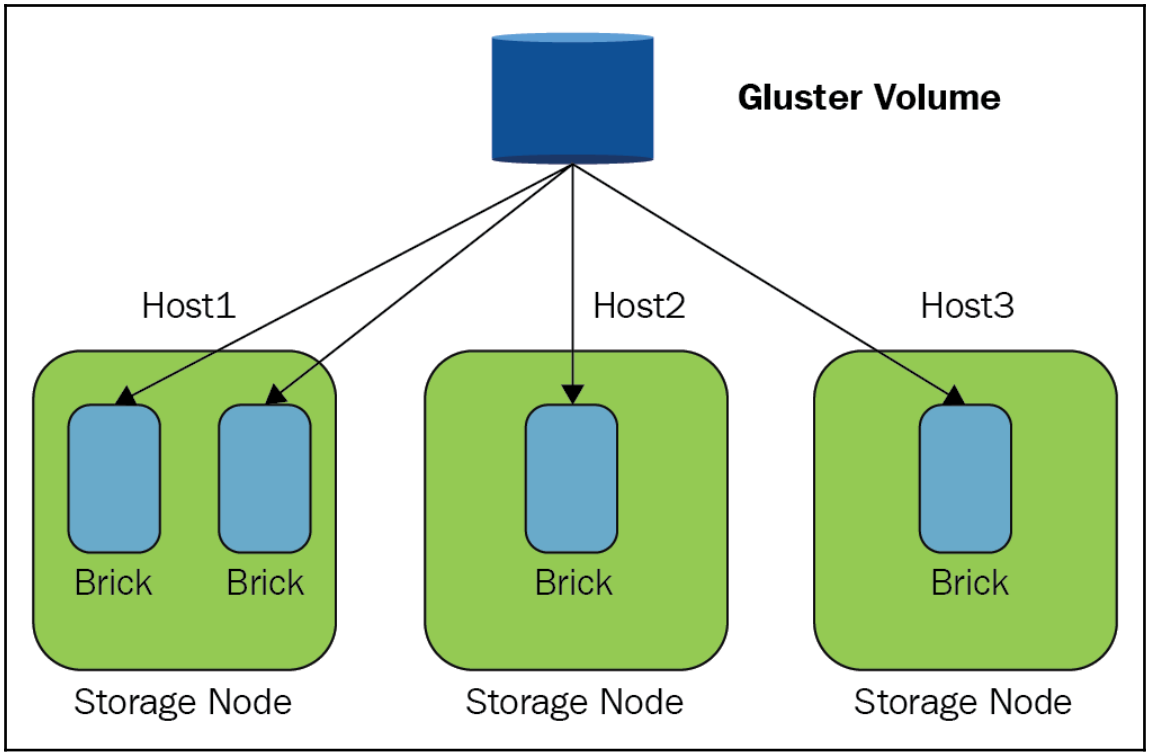
kubernetes
OPERATOR
etcd

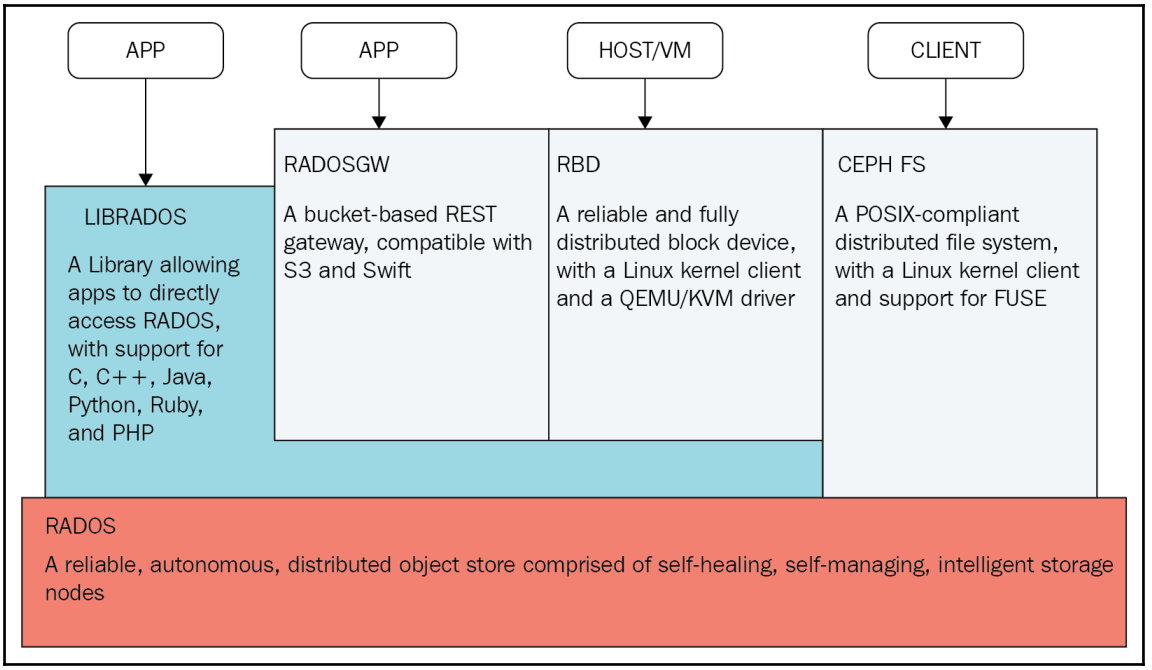
Chapter 5: Configuring Kubernetes Security, Limits, and Accounts

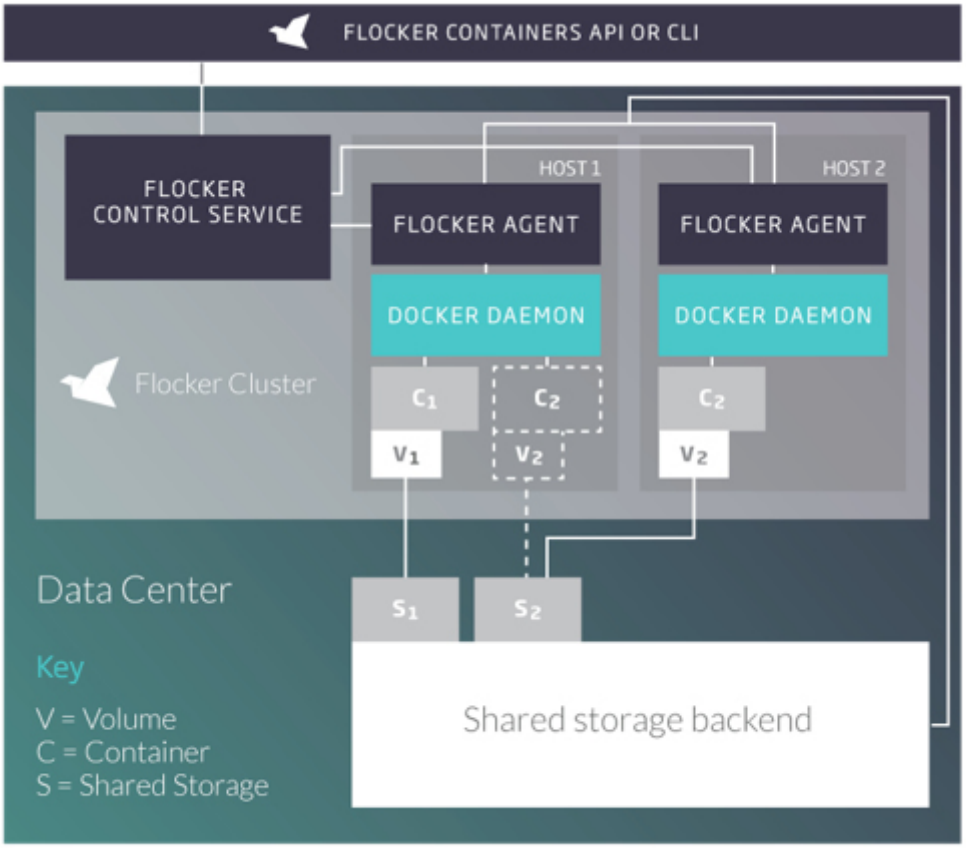


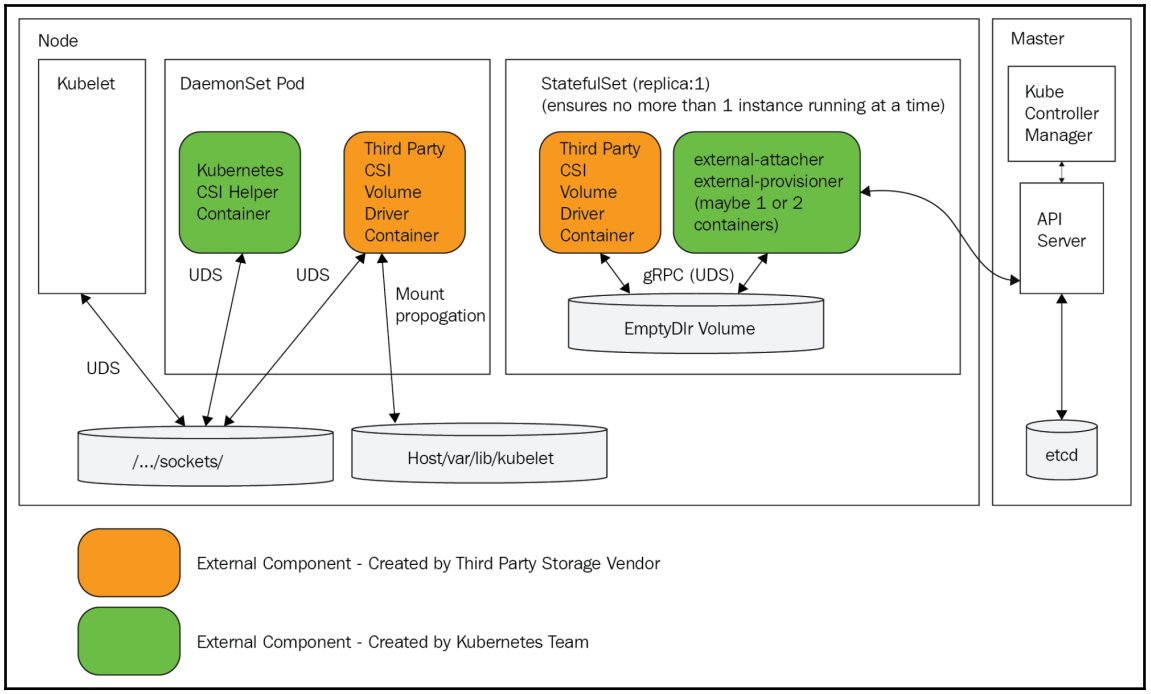
Chapter 7: Handling Kubernetes Storage



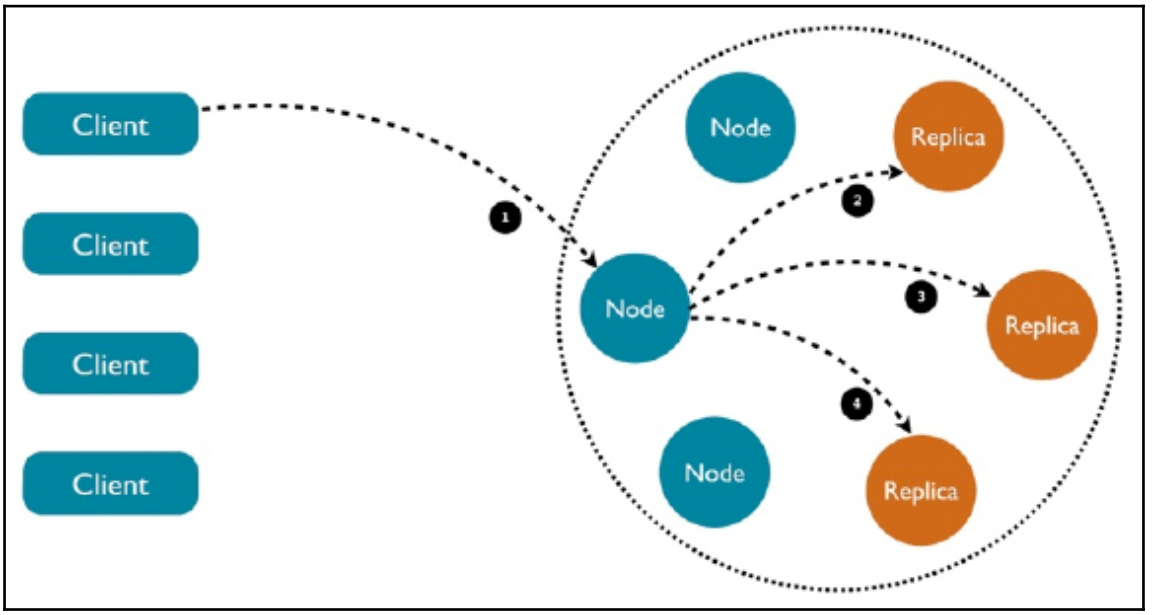

Gluster Volume
Host1
Host2
Host3
Brick
Brick
Brick
Brick
Storage Node
Storage Node
Storage Node


APP
APP
HOST/VM
CLIENT
LIBRADOS
A Library allowing apps to directly access RADOS, with support for C, C++, Java, Python, Ruby, and PHP
RADOSGW
A bucket-based REST gateway, compatible with S3 and Swift
RBD
A reliable and fully distributed block device, with a Linux kernel client and a QEMU/KVM driver
CEPH FS
A POSIX-compliant distributed file system, with a Linux kernel client and support for FUSE
RADOS
A reliable, autonomous, distributed object store comprised of self-healing, self-managing, intelligent storage nodes

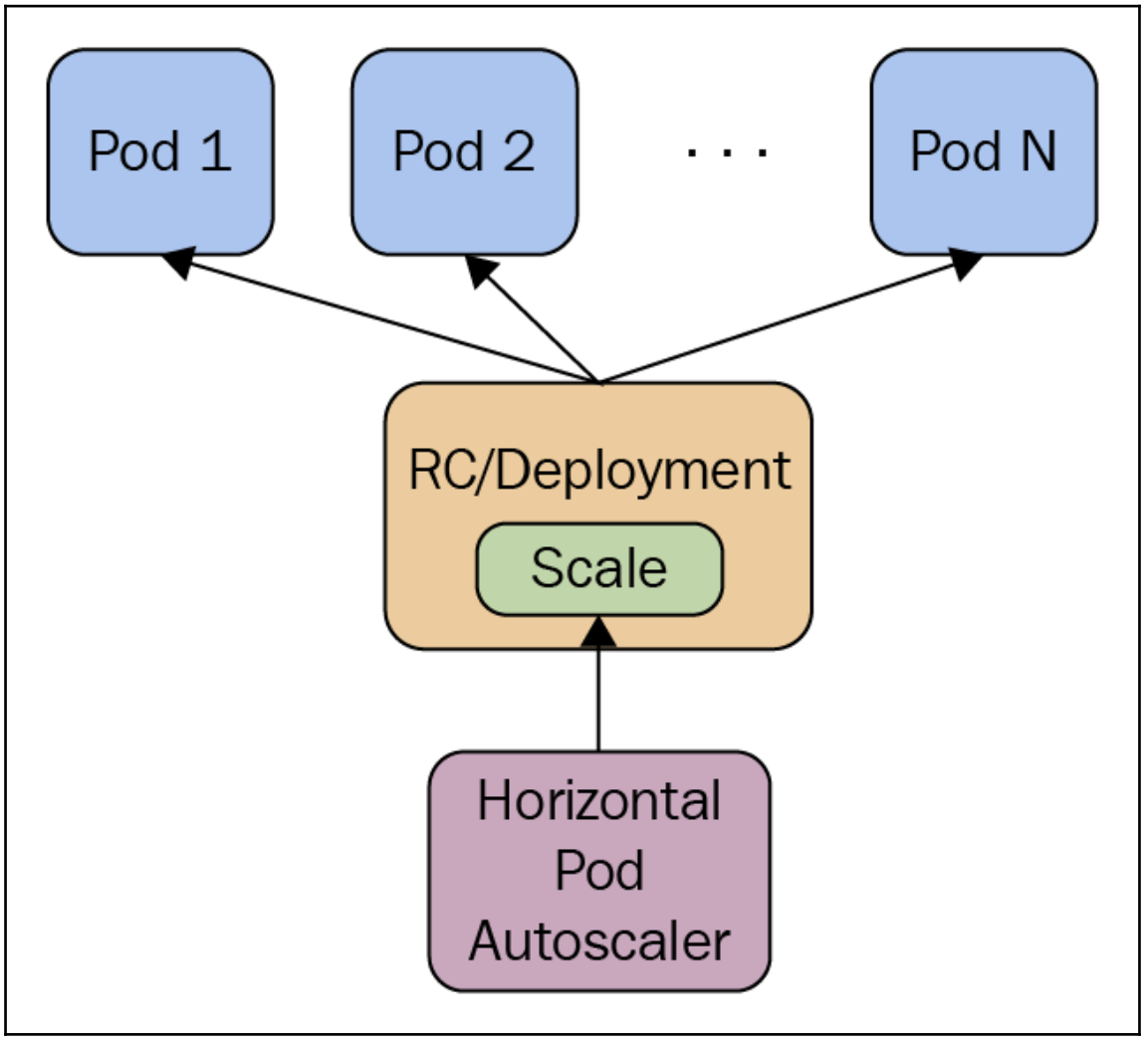

FLOCKER CONTAINERS API OR CLI
FLOCKER CONTROL SERVICE
HOST 1
HOST 2
FLOCKER AGENT
FLOCKER AGENT
DOCKER DAEMON
DOCKER DAEMON
Flocker Cluster
C1
C2
C2
V1
V2
V2
Data Center
S1
S2
Key
V = Volume
C = Container
S = Shared Storage
Shared storage backend

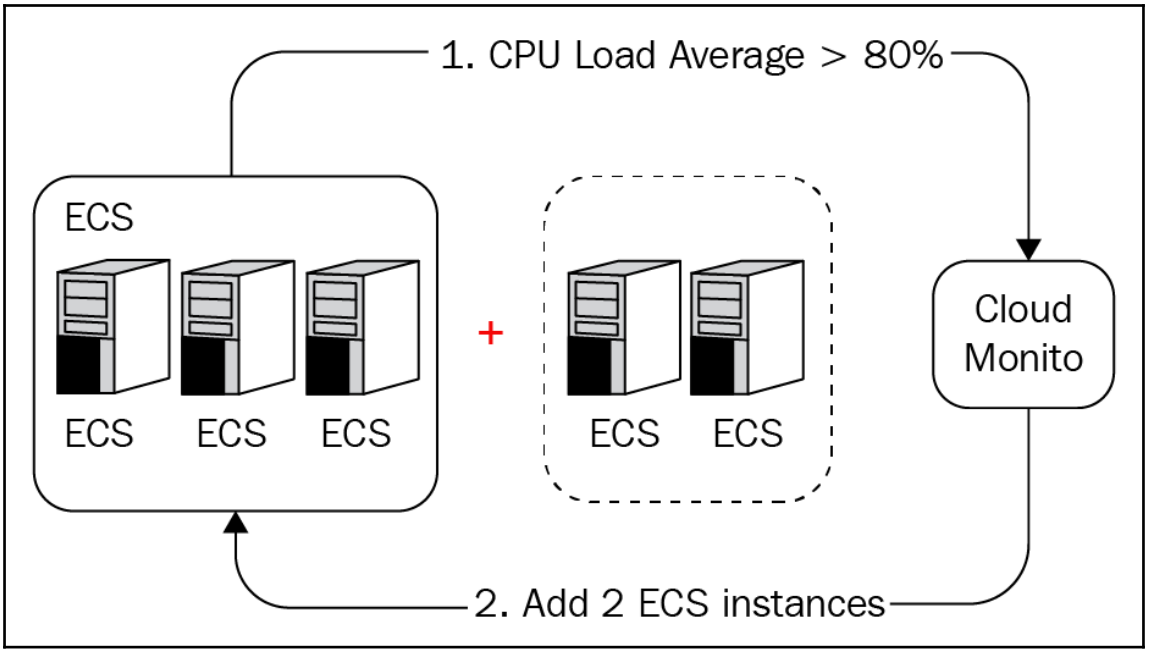

Node
Kubelet
DaemonSet Pod
Kubernetes CSI Helper Container
Third Party CSI Volume Driver Container
UDS
UDS
Mount propogation
UDS
/.../sockets/
Host/var/lib/kubelet
StatefulSet (replica:1)
(ensures no more than 1 instance running at a time)
Third Party CSI Volume Driver Container
external-attacher external-provisioner (maybe 1 or 2 containers)
gRPC (UDS)
EmptyDir Volume
Master
Kube Controller Manager
API Server
etcd
External Component - Created by Third Party Storage Vendor
External Component - Created by Kubernetes Team

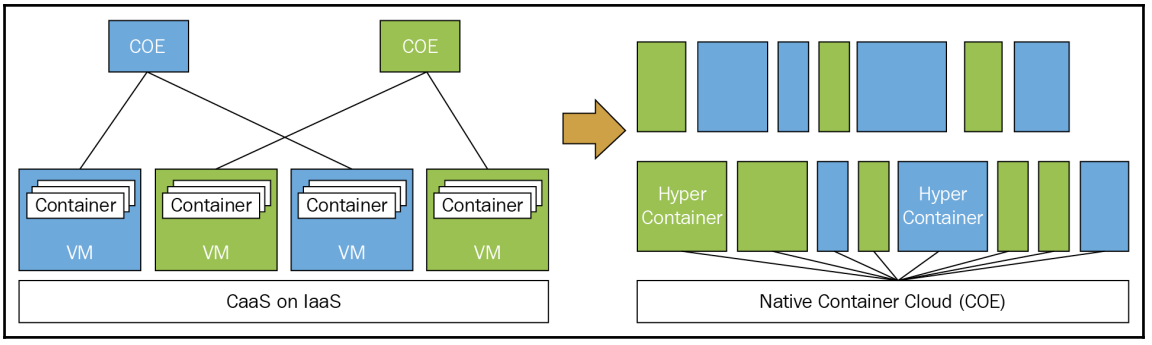
Chapter 8: Running Stateful Applications with Kubernetes

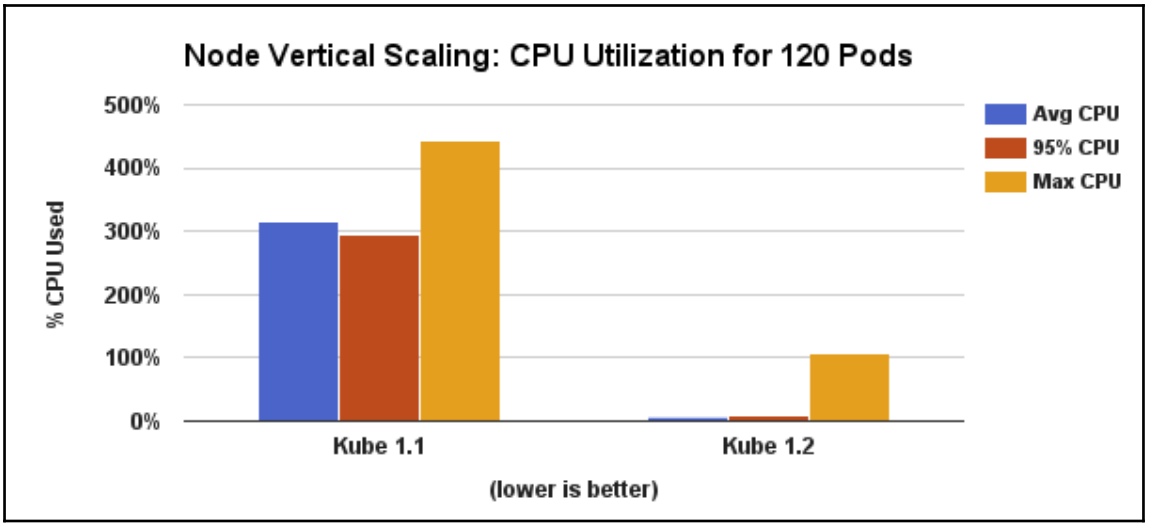


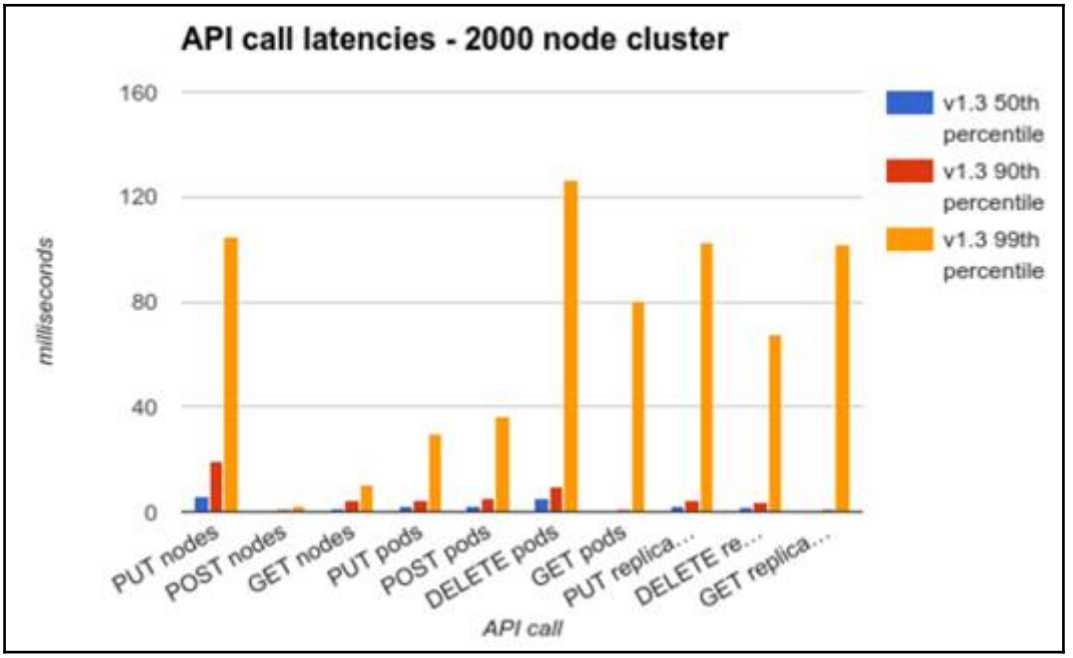
Chapter 9: Rolling Updates, Scalability, and Quotas

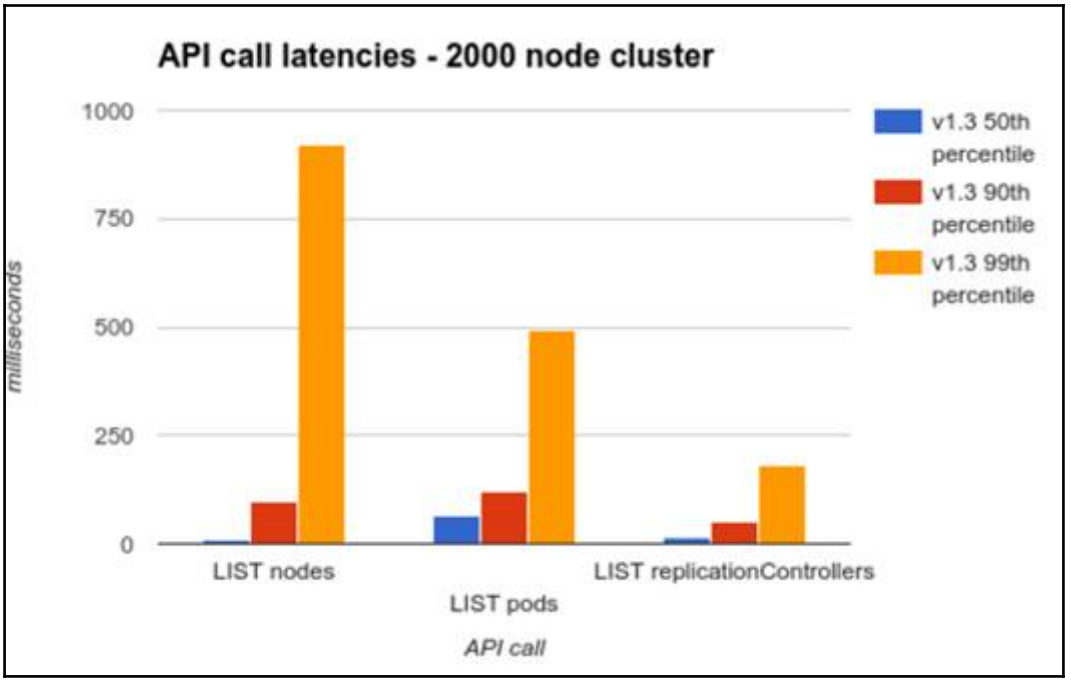


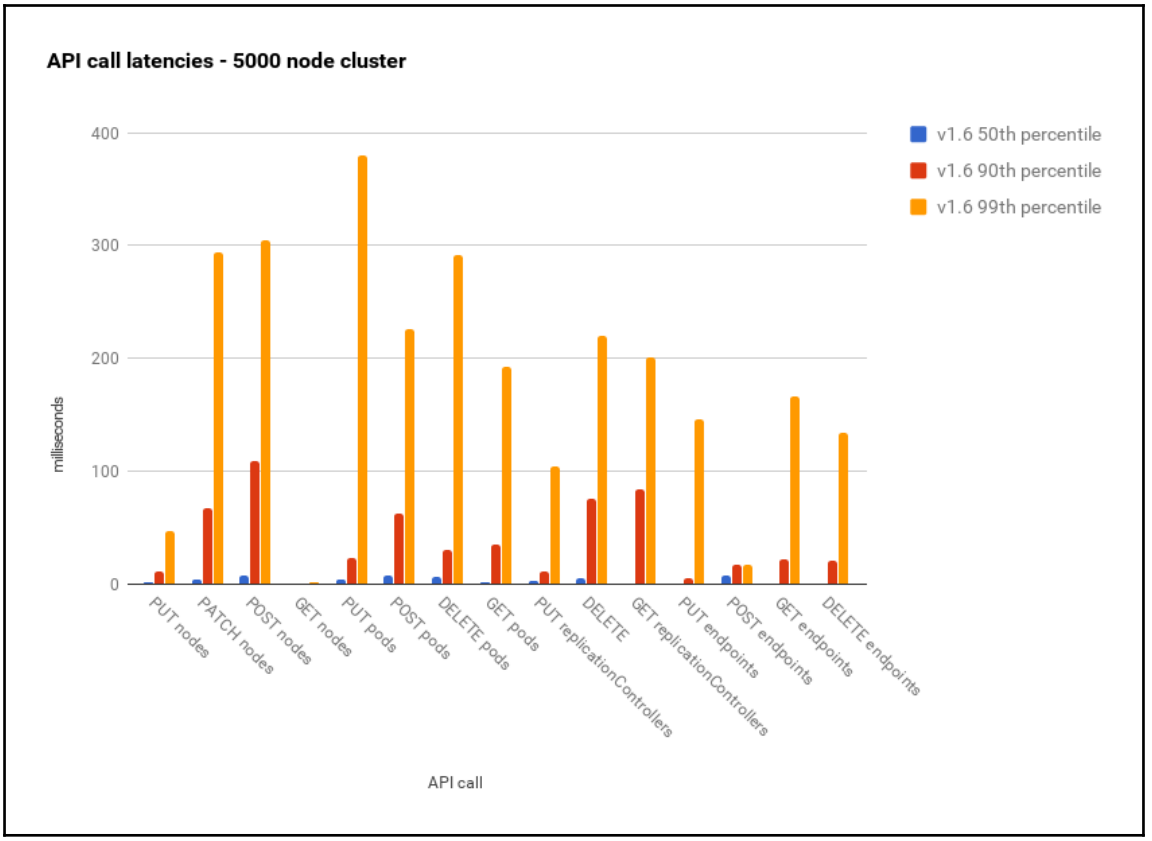

1. CPU Load Average > 80%
ECS
ECS
ECS
ECS
+
ECS
ECS
Cloud
Monito
2. Add 2 ECS instances

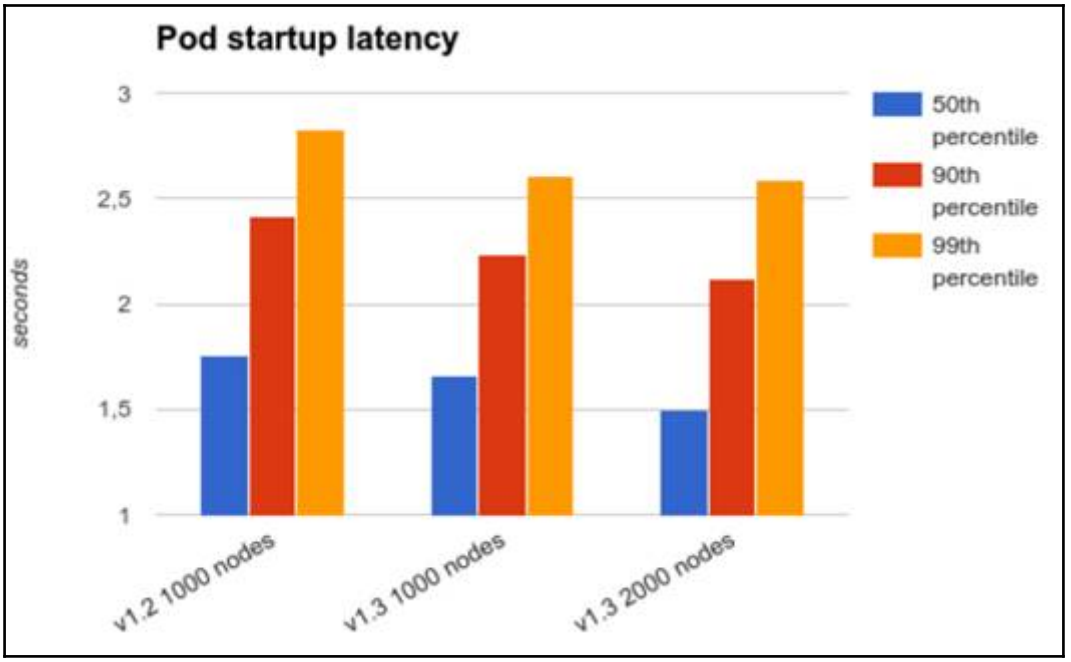

COE
COE
Container
VM
Container
VM
Container
VM
Container
VM
CaaS on IaaS
Hyper
Container
Hyper
Container
Native Container Cloud (COE)

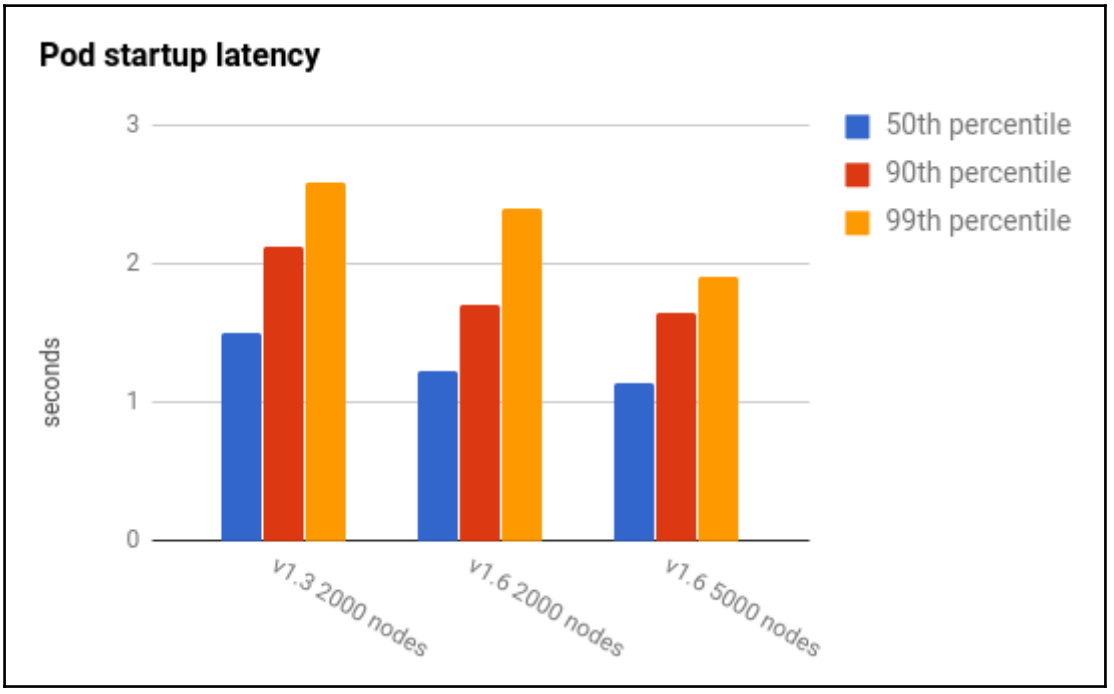

Node Vertical Scaling: CPU Utilization for 120 Pods
500%
400%
300%
200%
100%
0%
% CPU Used
Kube 1.1
Kube 1.2
(lower is better)
Avg CPU
95% CPU
Max CPU


API call latencies - 2000 node cluster
160
120
80
40
0
milliseconds
PUT nodes
POST nodes
GET nodes
PUT pods
POST pods
DELETE pods
GET pods
PUT replica...
DELETE re...
GET replica...
API call
v1.3 50th percentile
v1.3 90th percentile
v1.3 99th percentile

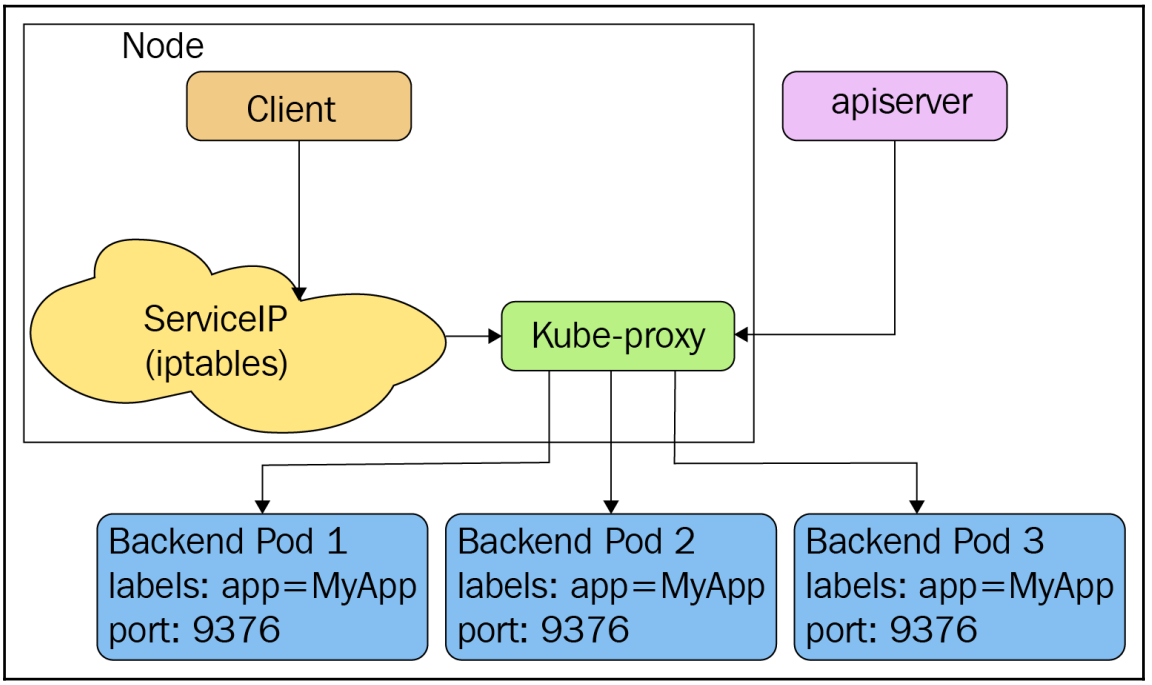

API call latencies - 2000 node cluster
1000
750
500
250
0
milliseconds
v1.3 50th percentile
v1.3 90th percentile
v1.3 99th percentile
LIST nodes
LIST pods
LIST replicationControllers
API call

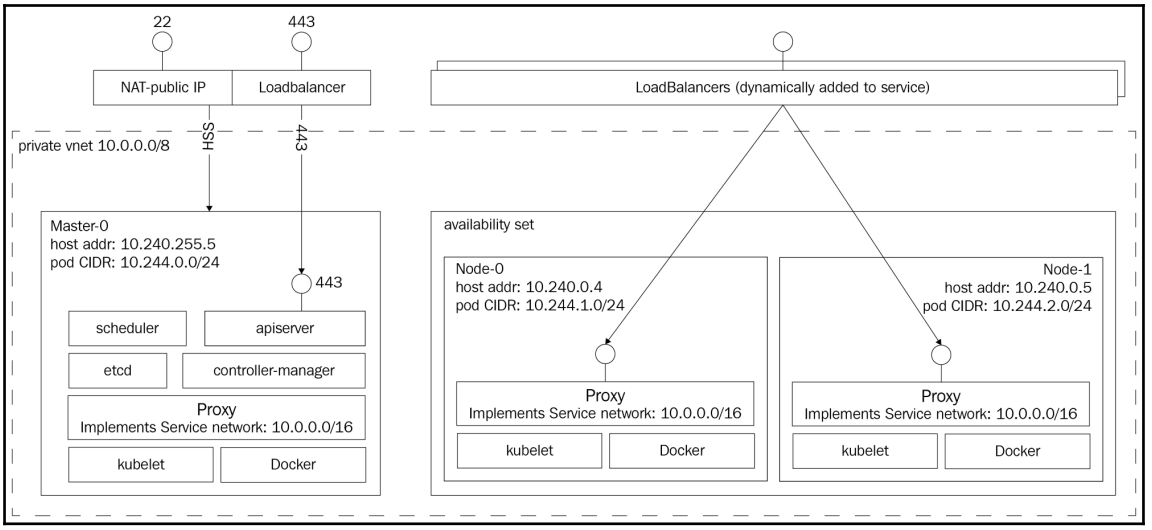

API call latencies - 5000 node cluster
v1.6 50th percentile
v1.6 90th percentile
v1.6 99th percentile
400
300
200
100
0
milliseconds
PUT nodes
PATCH nodes
POST nodes
GET nodes
PUT pods
POST pods
DELETE pods
GET pods
PUT replicationControllers
DELETE
GET replicationControllers
PUT endpoints
POST endpoints
GET endpoints
DELETE endpoints
API call

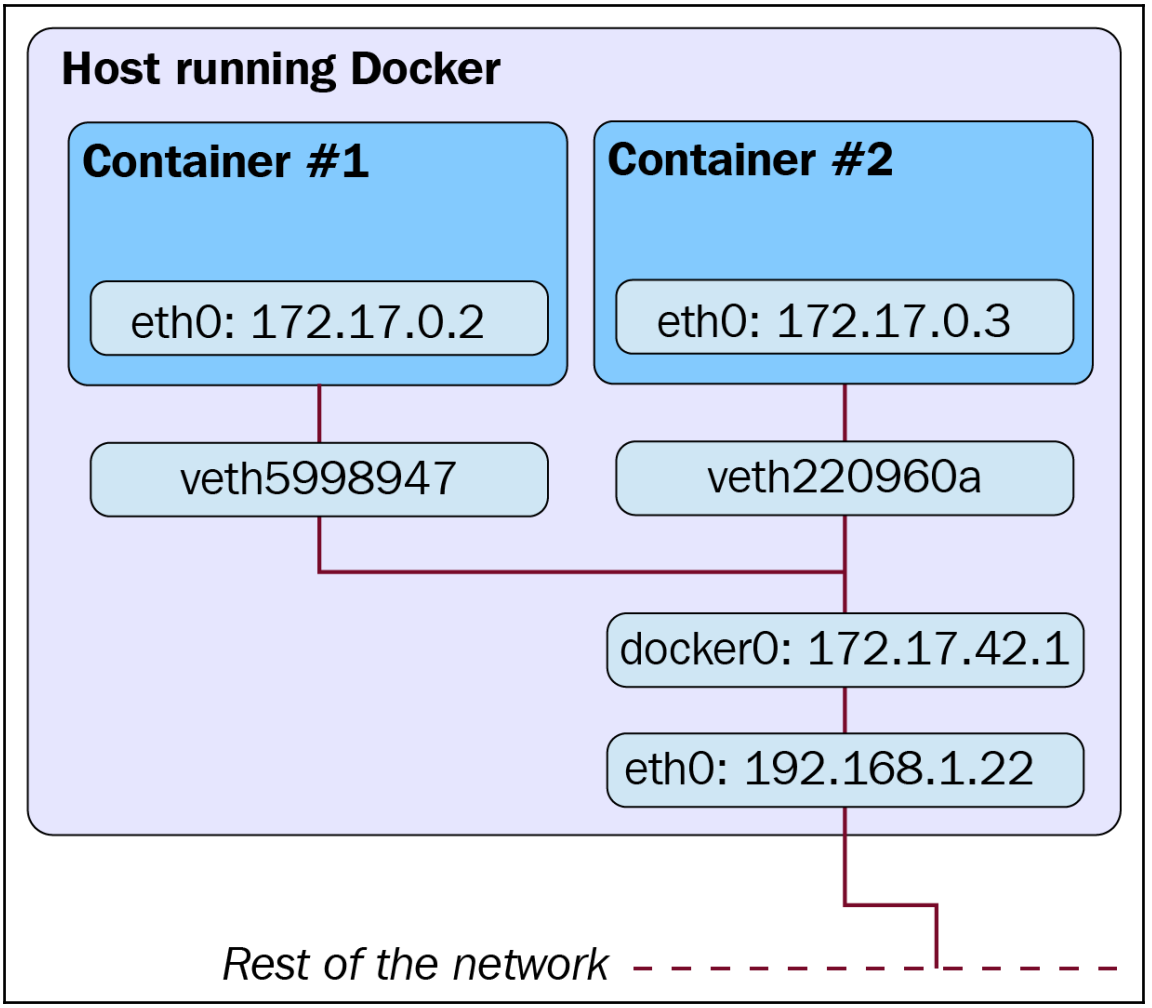

Pod startup latency
3
2,5
2
1,5
1
seconds
50th percentile
90th percentile
99th percentile
v1.2 1000 nodes
v1.3 1000 nodes
v1.3 2000 nodes

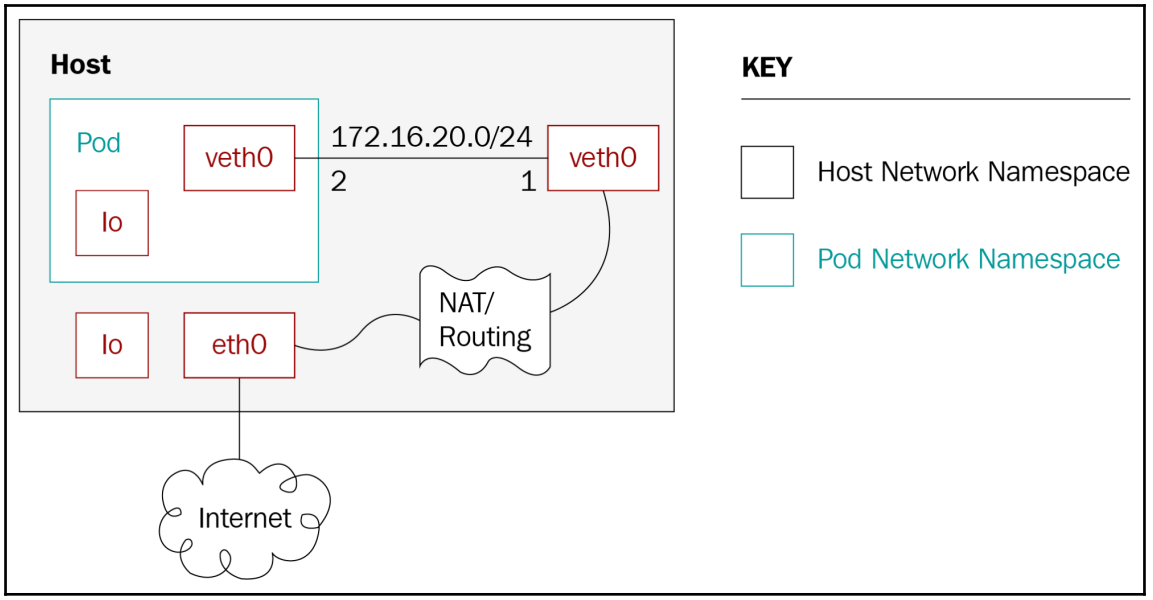

Pod startup latency
3
2
1
0
seconds
50th percentile
90th percentile
99th percentile
v1.3 2000 nodes
v1.6 2000 nodes
v1.6 5000 nodes

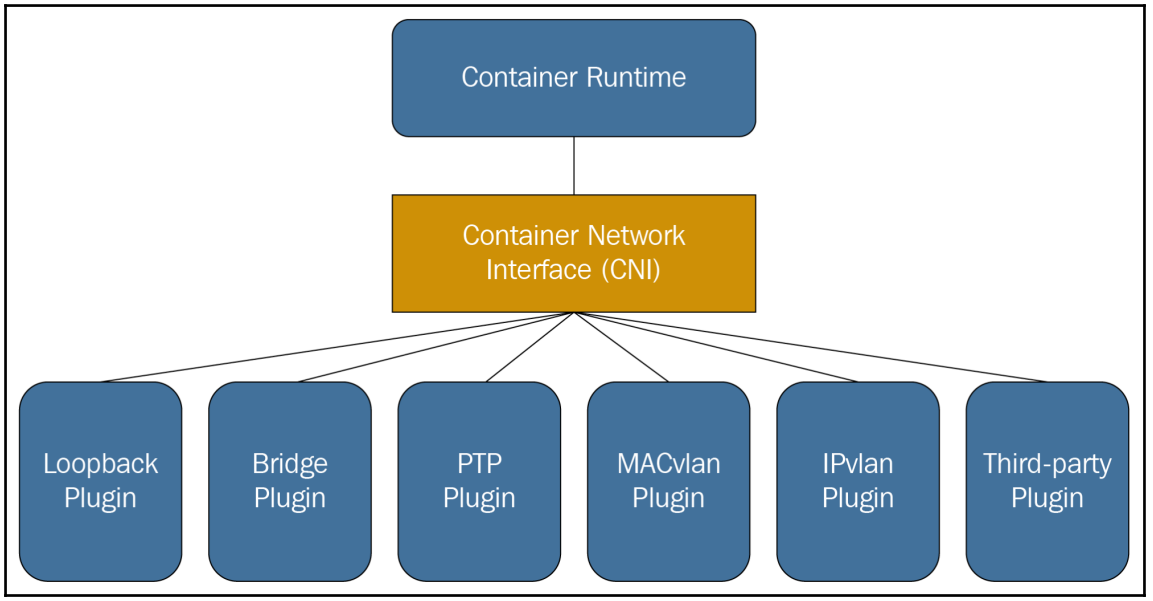
Chapter 10: Advanced Kubernetes Networking

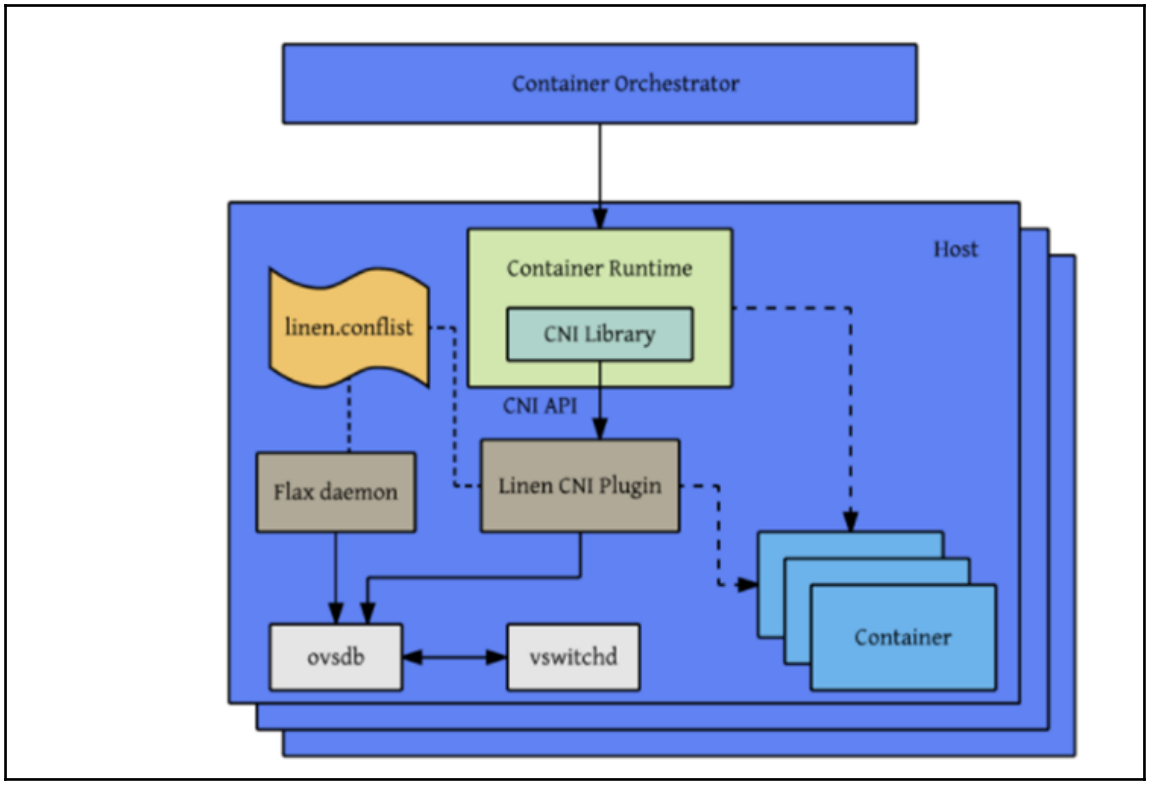


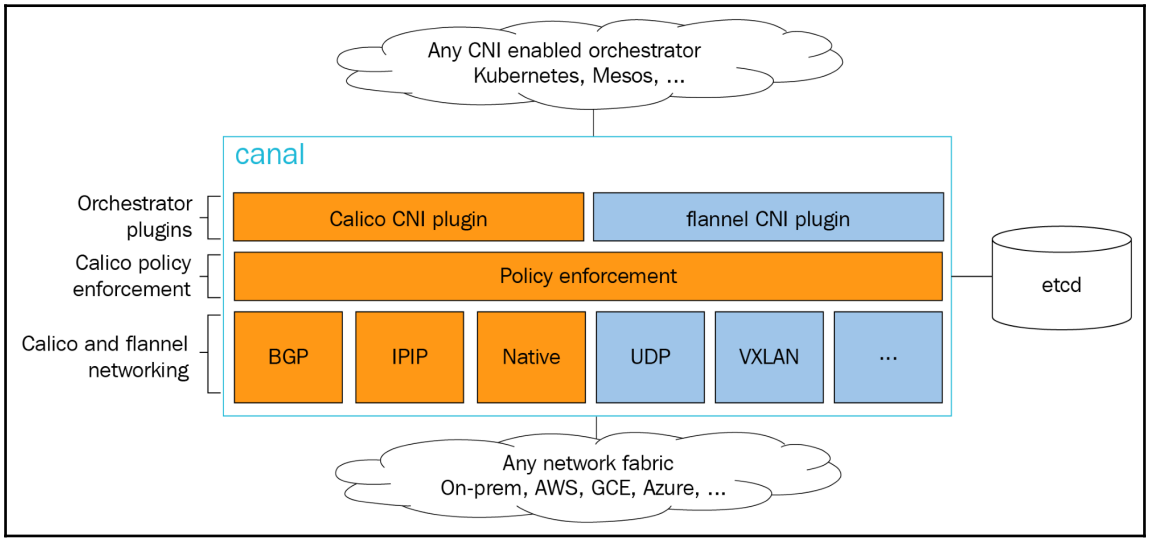

22
443
NAT-public IP
Loadbalancer
LoadBalancers (dynamically added to service)
private vnet 10.0.0.0/8
SSH
443
Master-0
host addr: 10.240.255.5
pod CIDR: 10.244.0.0/24
443
scheduler
apiserver
etcd
controller-manager
Proxy
Implements Service network: 10.0.0.0/16
kubelet
Docker
availability set
Node-0
host addr: 10.240.0.4
pod CIDR: 10.244.1.0/24
Proxy
Implements Service network: 10.0.0.0/16
kubelet
Docker
Node-1
host addr: 10.240.0.5
pod CIDR: 10.244.2.0/24
Proxy
Implements Service network: 10.0.0.0/16
kubelet
Docker

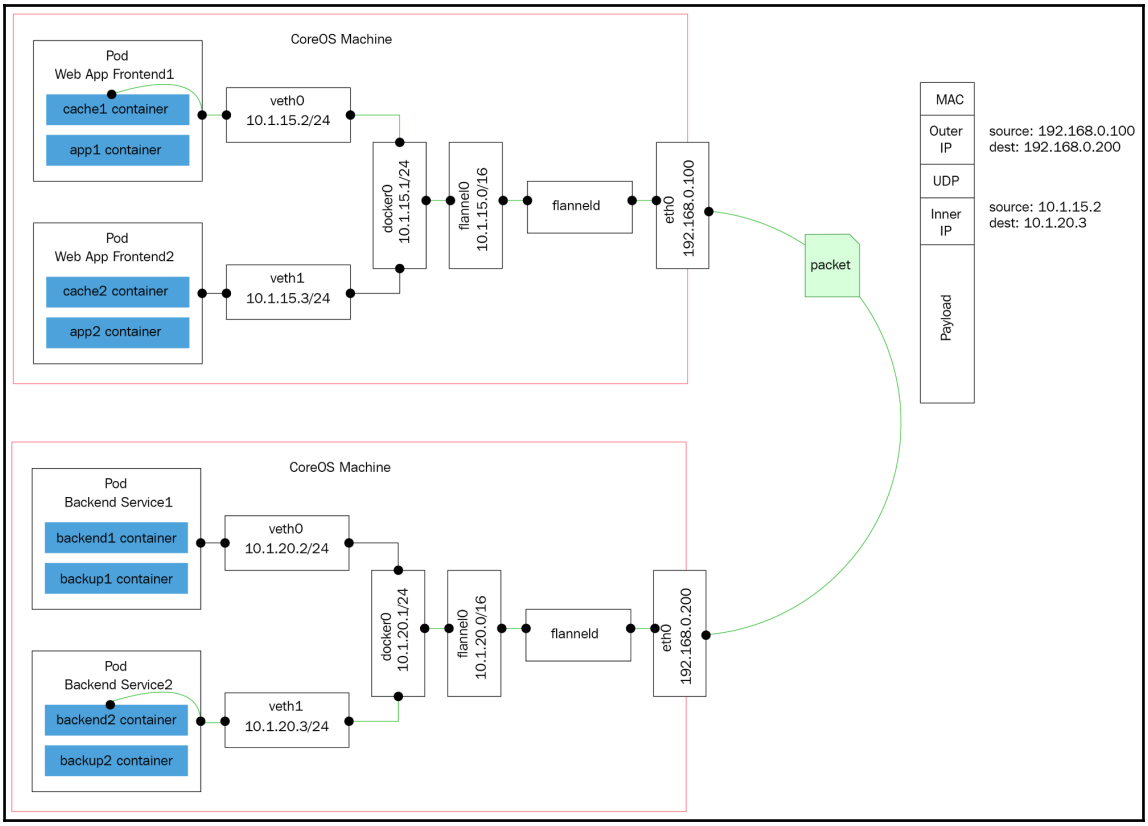

Host running Docker
Container #1
eth0: 172.17.0.2
Container #2
eth0: 172.17.0.3
veth5998947
veth220960a
docker0: 172.17.42.1
eth0: 192.168.1.22
Rest of the network


Host
Pod
veth0
172.16.20.0/24
2
1
veth0
lo
NAT/
Routing
lo
eth0
Internet
KEY
Host Network Namespace
Pod Network Namespace


Container Runtime
Container Network
Interface (CNI)
Loopback
Plugin
Bridge
Plugin
PTP
Plugin
MACvlan
Plugin
IPvlan
Plugin
Third-party
Plugin


Container Orchestrator
Host
Container Runtime
CNI Library
linen.conflist
CNI API
Flax daemon
Linen CNI Plugin
ovsdb
vswitchd
Container


Any CNI enabled orchestrator
Kubernetes, Mesos, ...
canal
Orchestrator plugins
Calico CNI plugin
flannel CNI plugin
Calico policy enforcement
Policy enforcement
etcd
Calico and flannel networking
BGP
IPIP
Native
UDP
VXLAN
...
Any network fabric
On-prem, AWS, GCE, Azure, ...

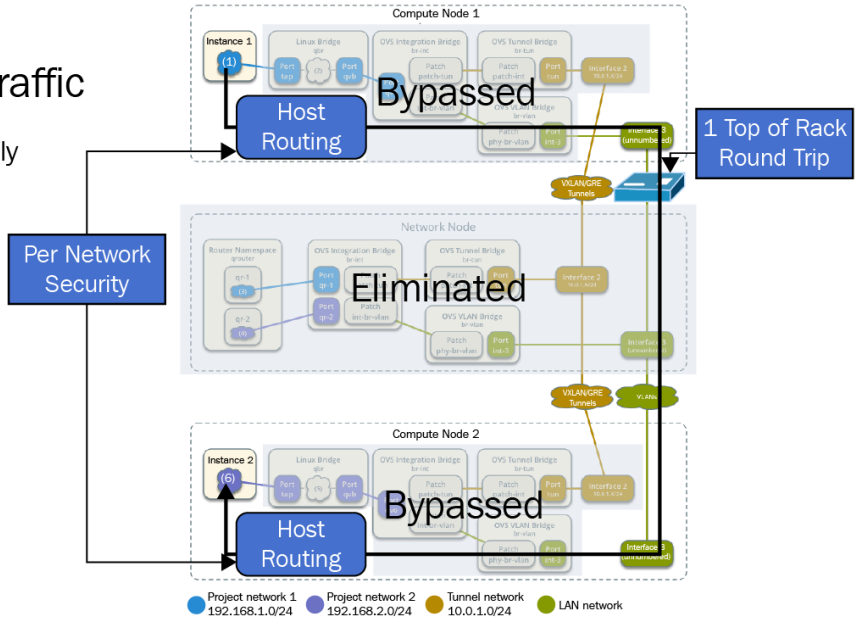

CoreOS Machine
Pod
Web App Frontend1
cache1 container
app1 container
Pod
Web App Frontend2
cache2 container
app2 container
veth0
10.1.15.2/24
veth1
10.1.15.3/24
docker0
10.1.15.1/24
flannel0
10.1.15.0/16
flanneld
eth0
192.168.0.100
packet
MAC
Outer IP
source: 192.168.0.100
dest: 192.168.0.200
UDP
Inner IP
source: 10.1.15.2
dest: 10.1.20.3
Payload
CoreOS Machine
Pod
Backend Service1
backend1 container
backup1 container
Pod
Backend Service2
backend2 container
backup2 container
veth0
10.1.20.2/24
veth1
10.1.20.3/24
docker0
10.1.20.1/24
flannel0
10.1.20.0/16
flanneld
eth0
192.168.0.200

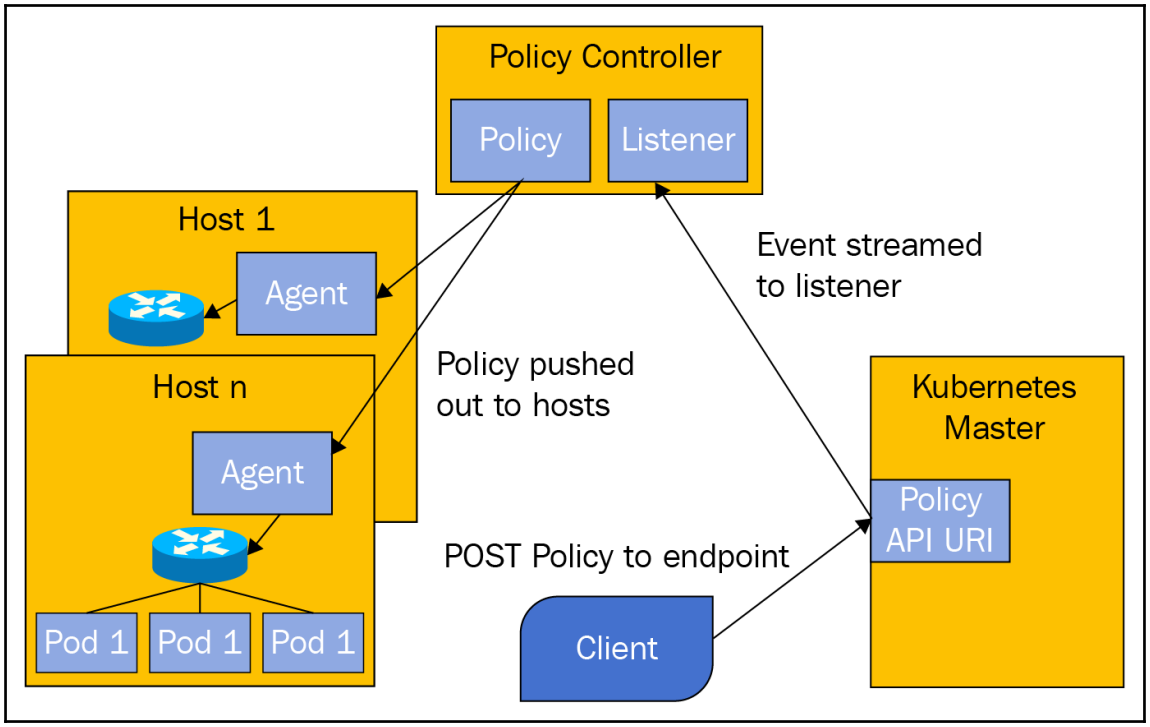
North/South Traffic

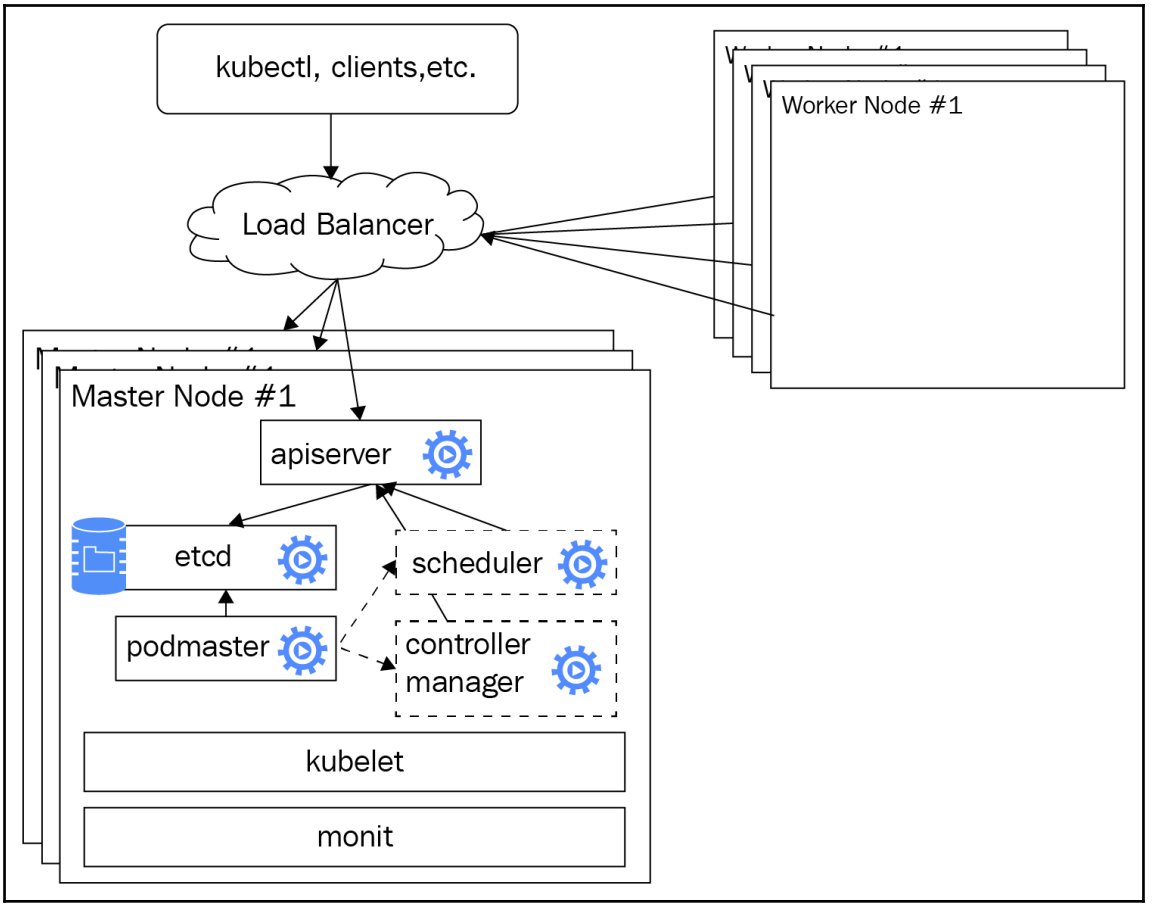
- Latency dramatically reduced
  - No Network node
  - No encap
- Identical path for East/West traffic

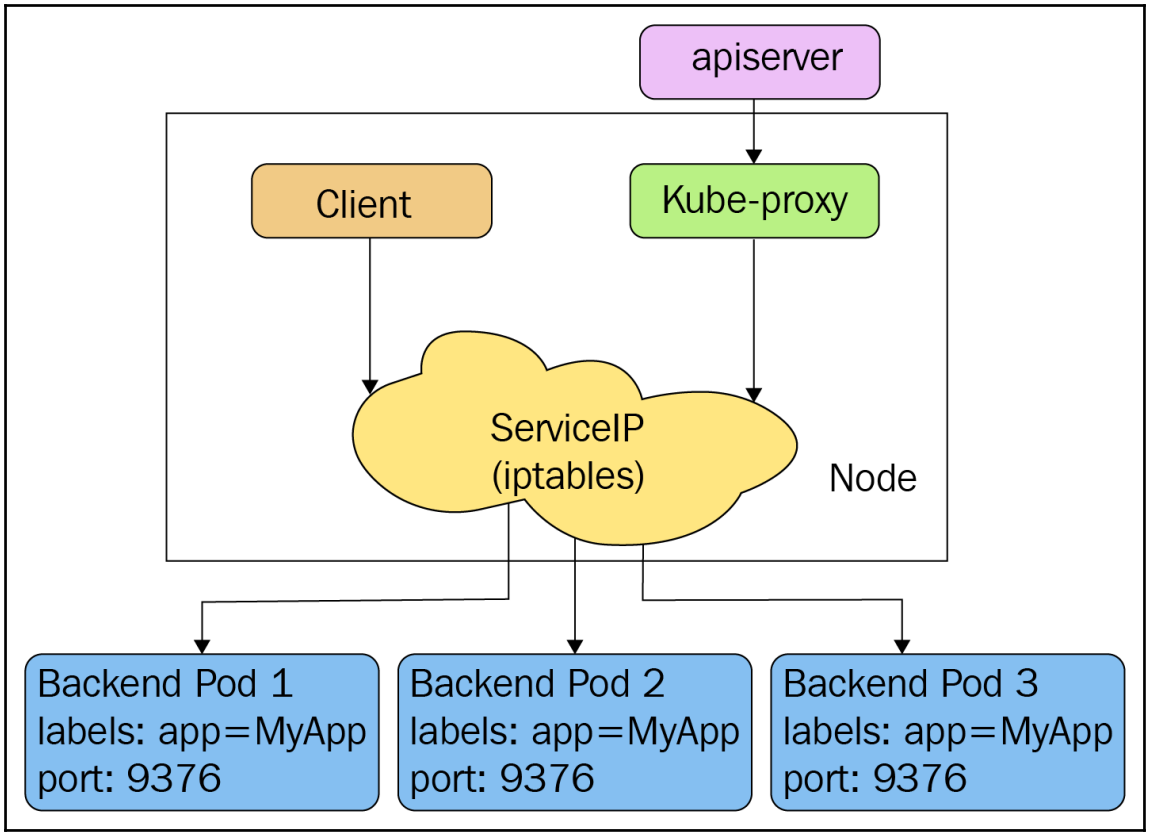
North Traffic Flow-East/West

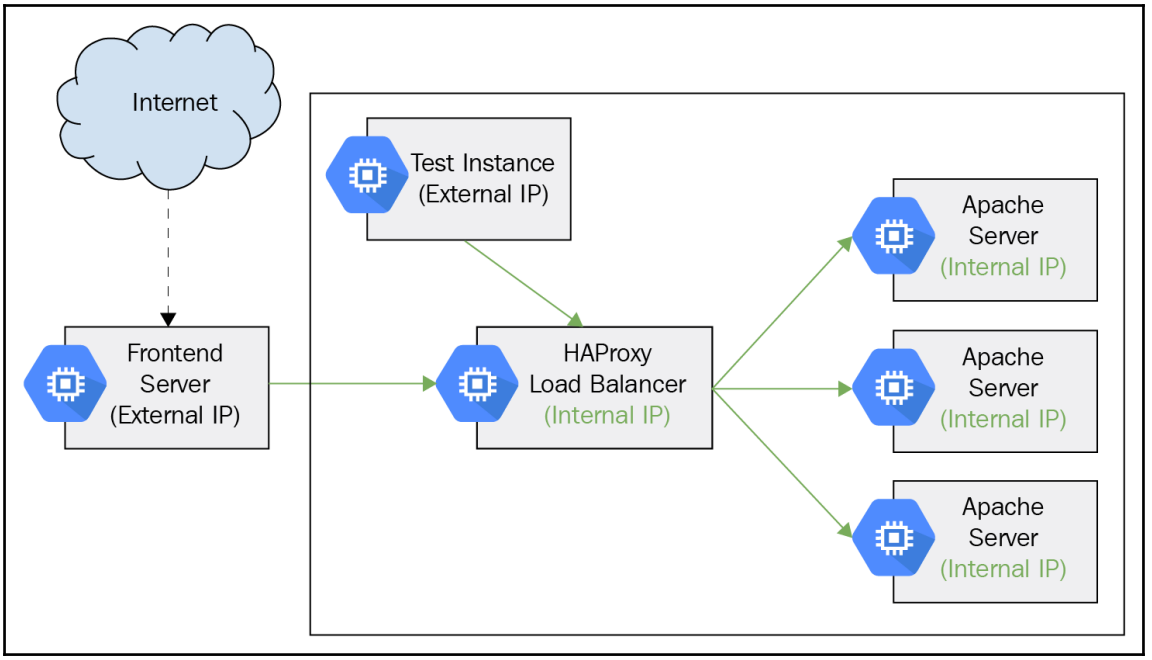
Instances on different networks



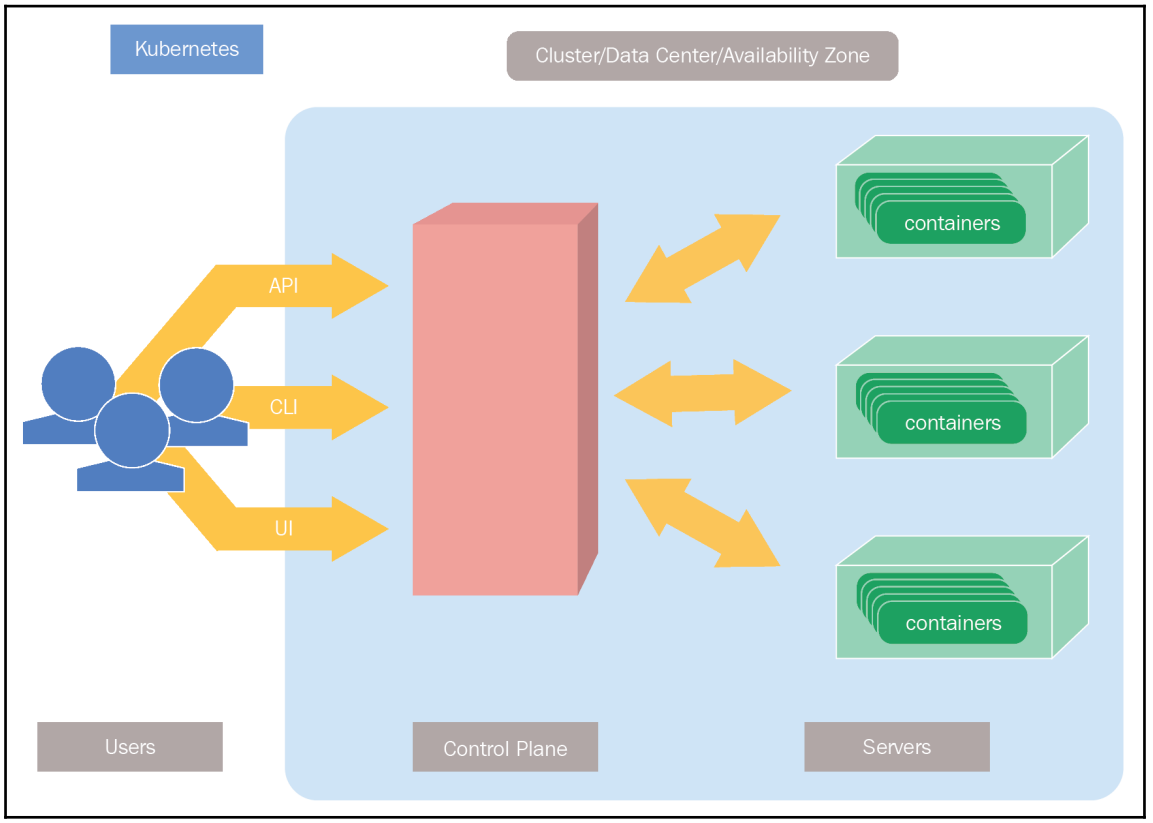

Policy Controller
Policy
Listener
Host 1
Agent
Host n
Agent
Pod 1
Pod 1
Pod 1
Policy pushed
out to hosts
Event streamed
to listener
Kubernetes
Master
Policy
API URI
POST Policy to endpoint
Client

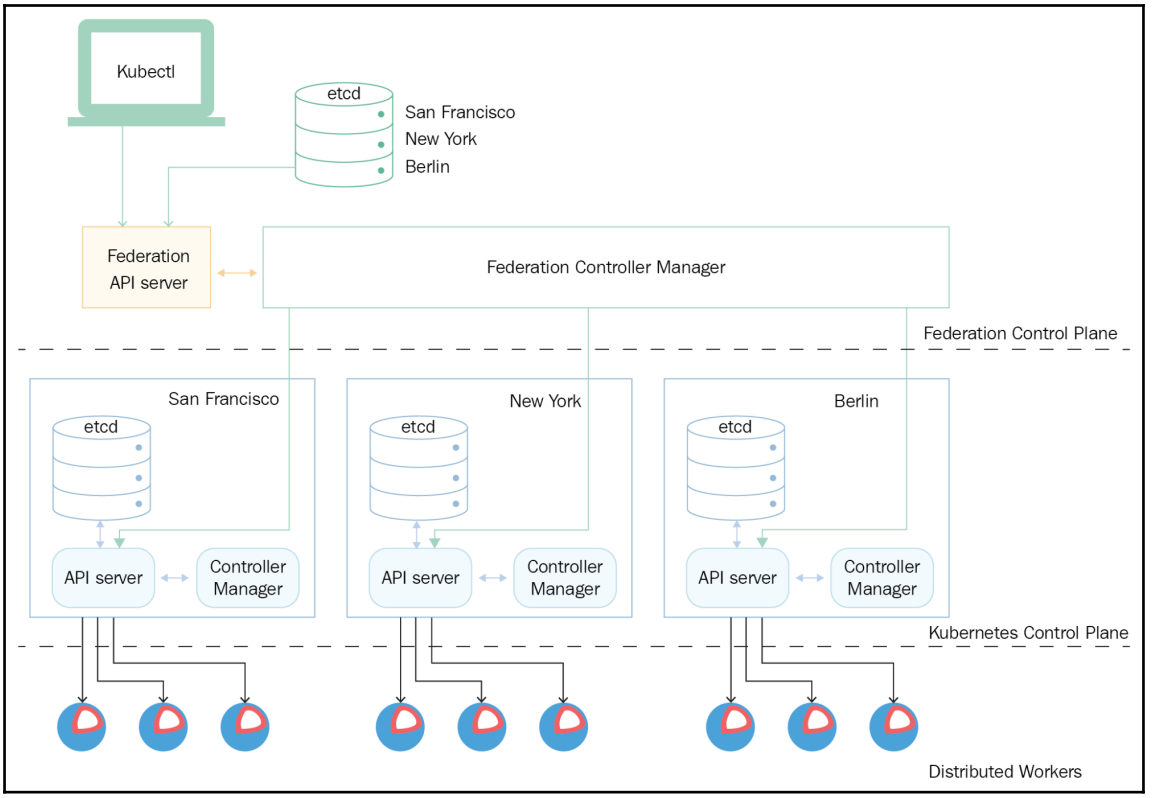

kubectl, clients,etc.
Load Balancer
Worker Node #1
Master Node #1
apiserver
etcd
scheduler
podmaster
controller
manager
kubelet
monit

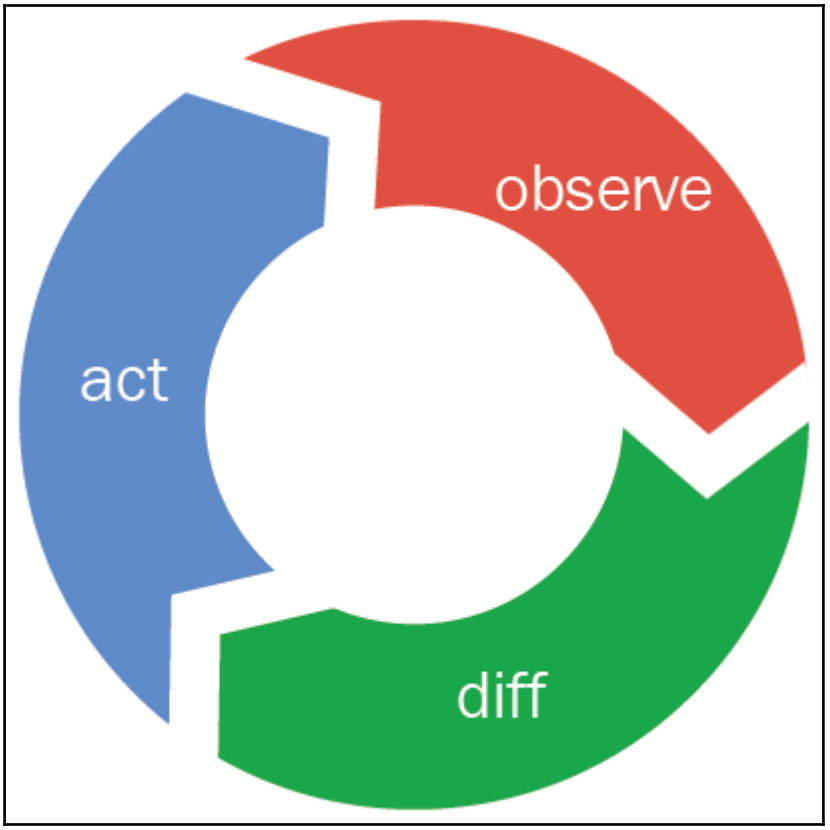

apiserver
Client
Kube-proxy
ServiceIP
(iptables)
Node
Backend Pod 1
labels: app=MyApp
port: 9376
Backend Pod 2
labels: app=MyApp
port: 9376
Backend Pod 3
labels: app=MyApp
port: 9376

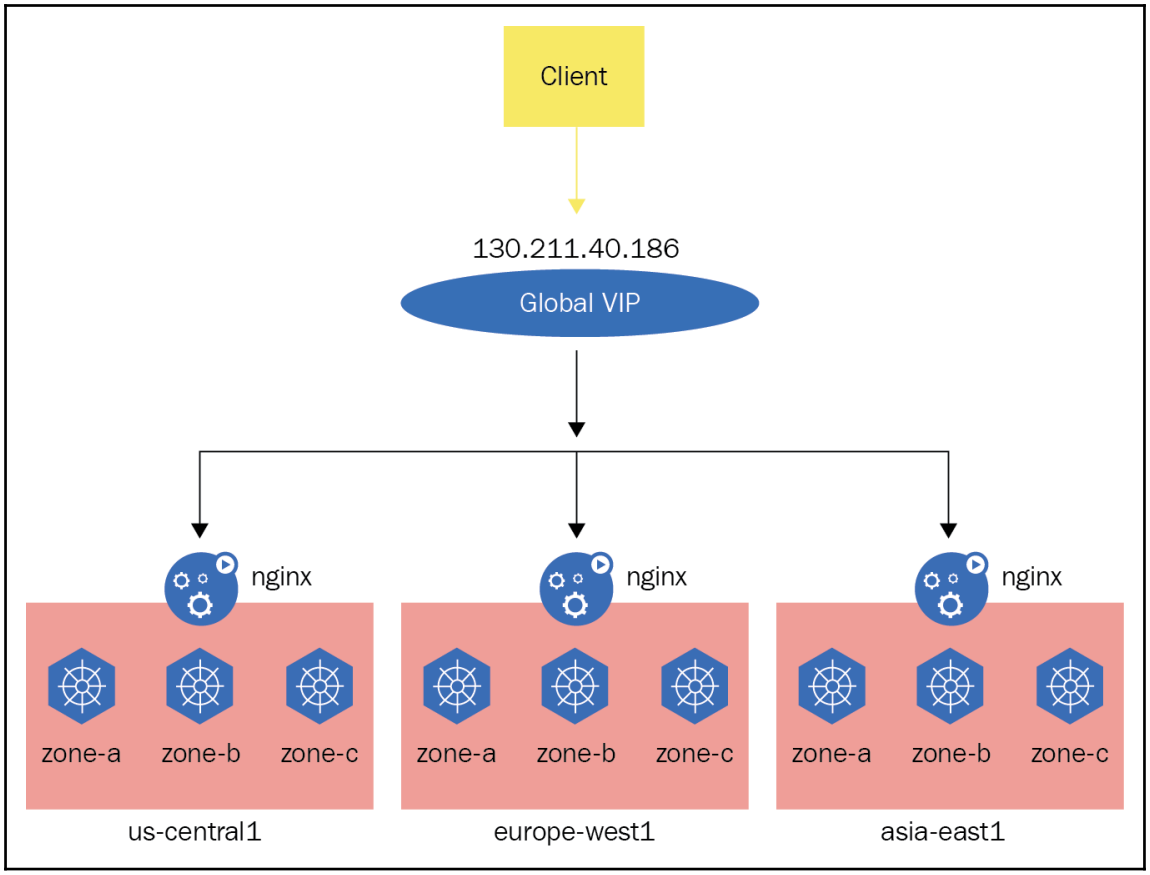

Internet
Test Instance
(External IP)
Frontend
Server
(External IP)
HAProxy
Load Balancer
(Internal IP)
Apache
Server
(Internal IP)
Apache
Server
(Internal IP)
Apache
Server
(Internal IP)

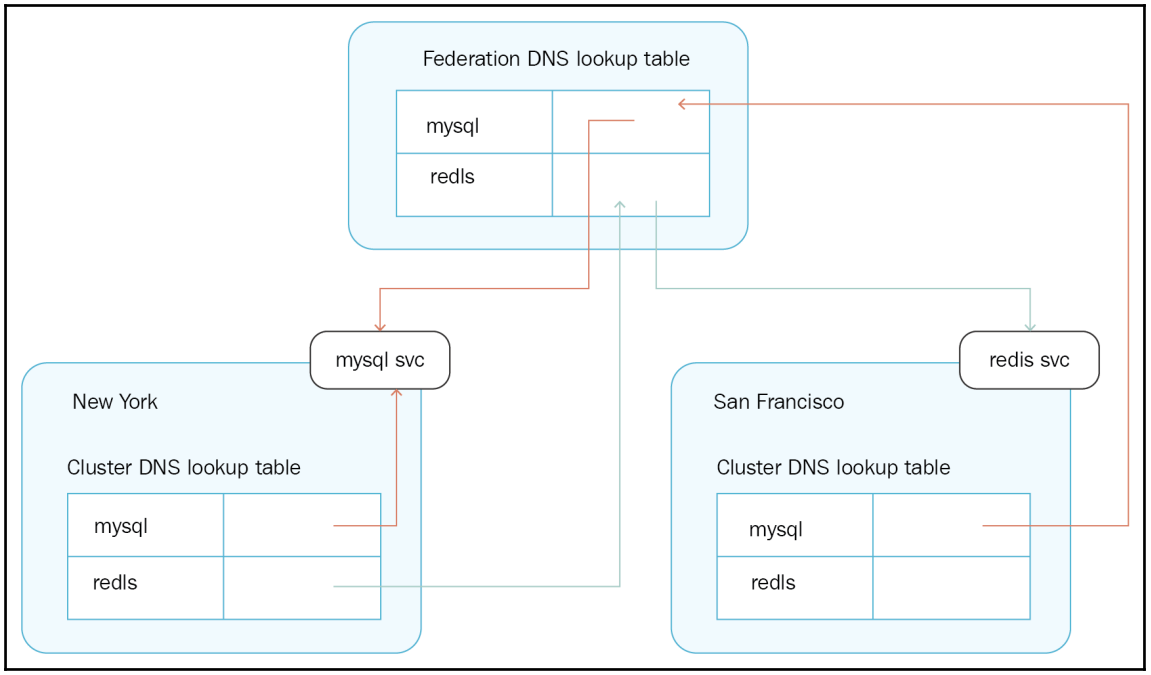
Chapter 11: Running Kubernetes on Multiple Clouds and Cluster Federation



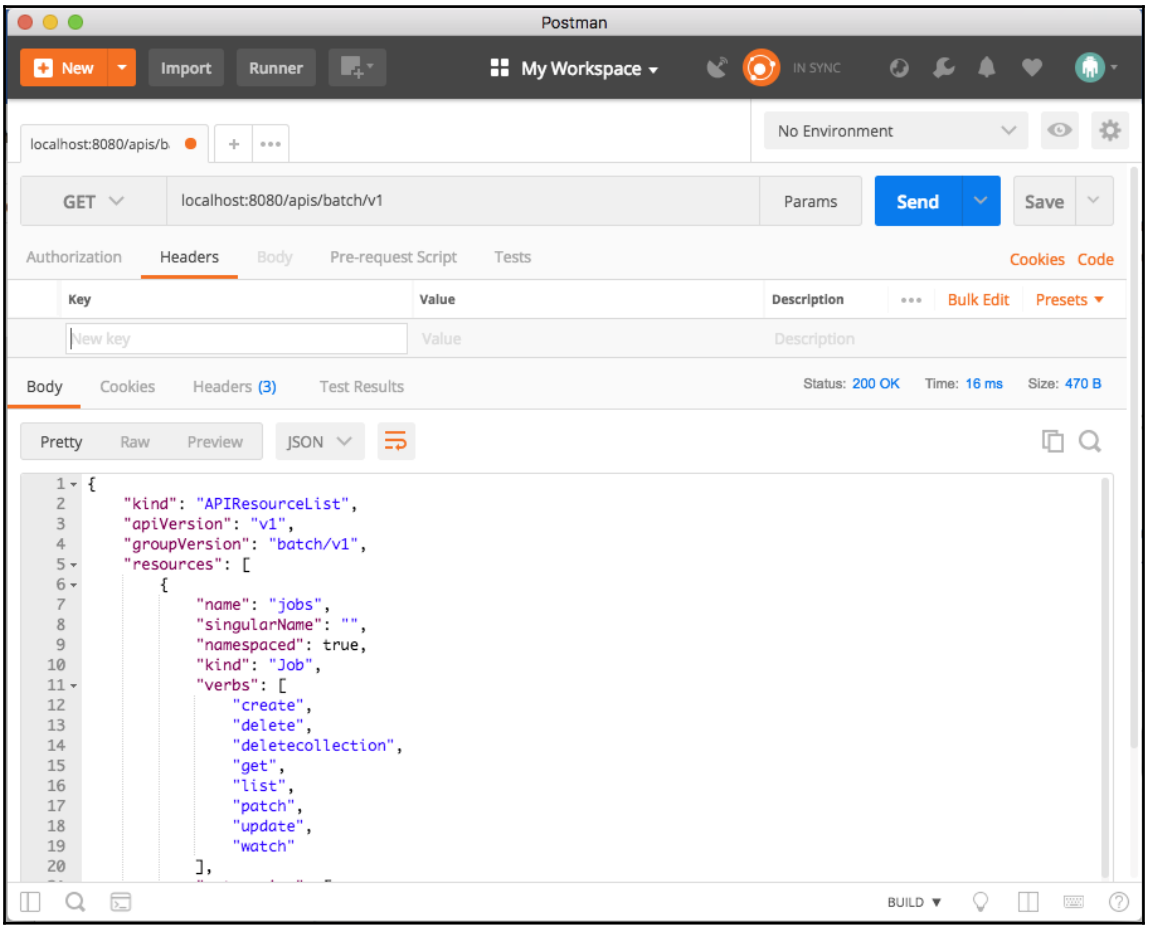

Kubectl
etcd
San Francisco
New York
Berlin
Federation API server
Federation Controller Manager
Federation Control Plane
San Francisco
etcd
API server
Controller Manager
New York
etcd
API server
Controller Manager
Berlin
etcd
API server
Controller Manager
Kubernetes Control Plane
Distributed Workers


observe
act
diff

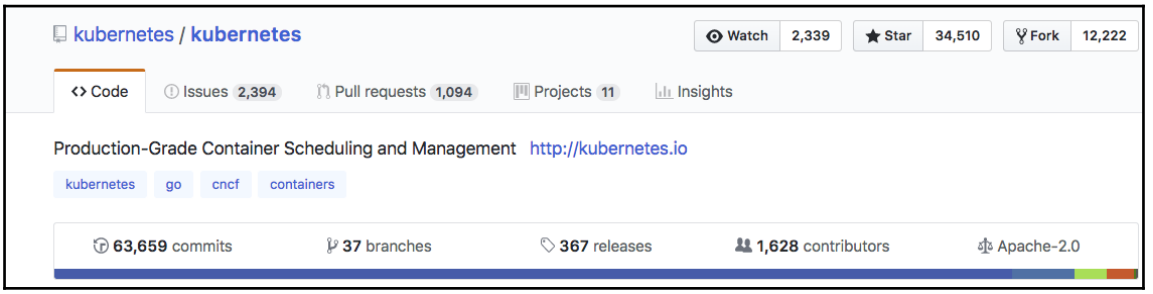

Client
130.211.40.186
Global VIP
nginx
nginx
nginx
zone-a
zone-b
zone-c
zone-a
zone-b
zone-c
zone-a
zone-b
zone-c
us-central1
europe-west1
asia-east1

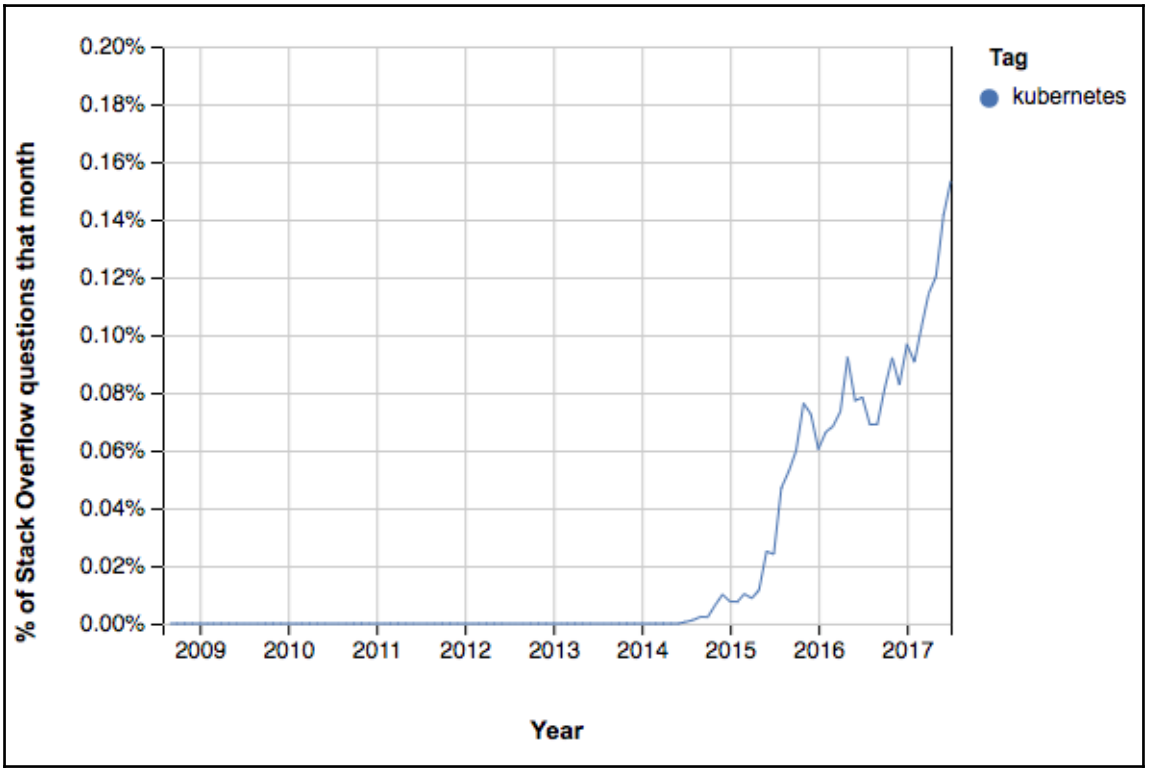

Federation DNS lookup table
mysql
redls
mysql svc
redis svc
New York
Cluster DNS lookup table
mysql
redls
San Francisco
Cluster DNS lookup table
mysql
redls

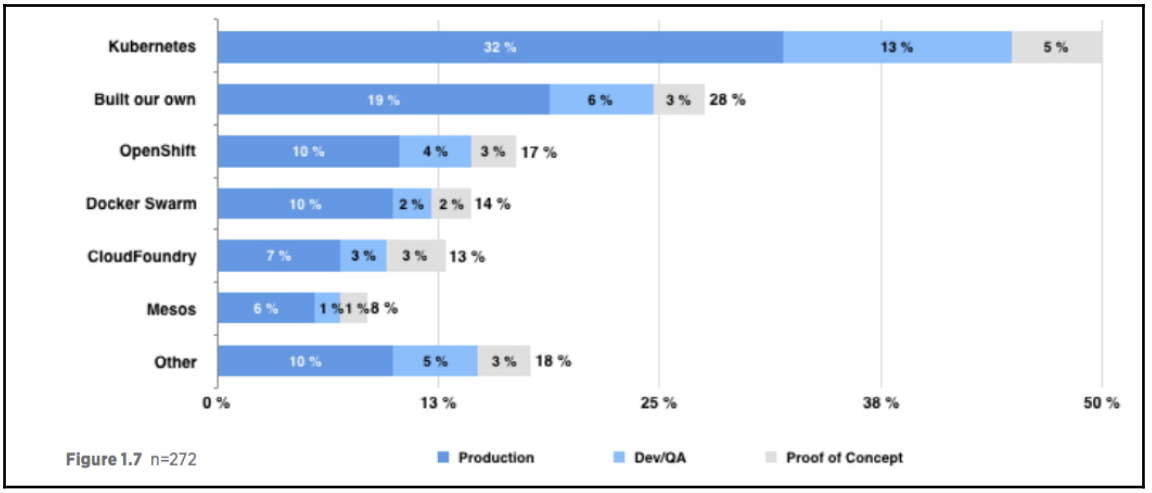
Chapter 12: Customizing Kubernetes – API and Plugins



Chapter 14: The Future of Kubernetes







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