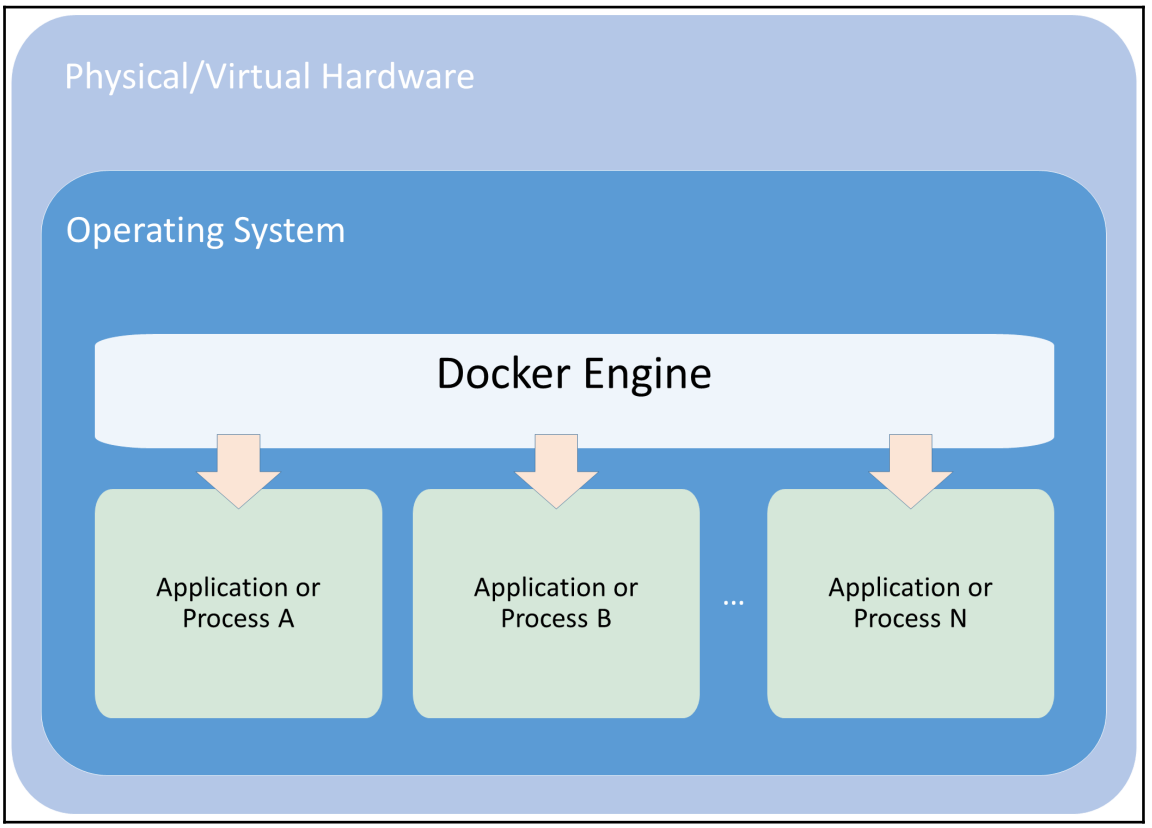
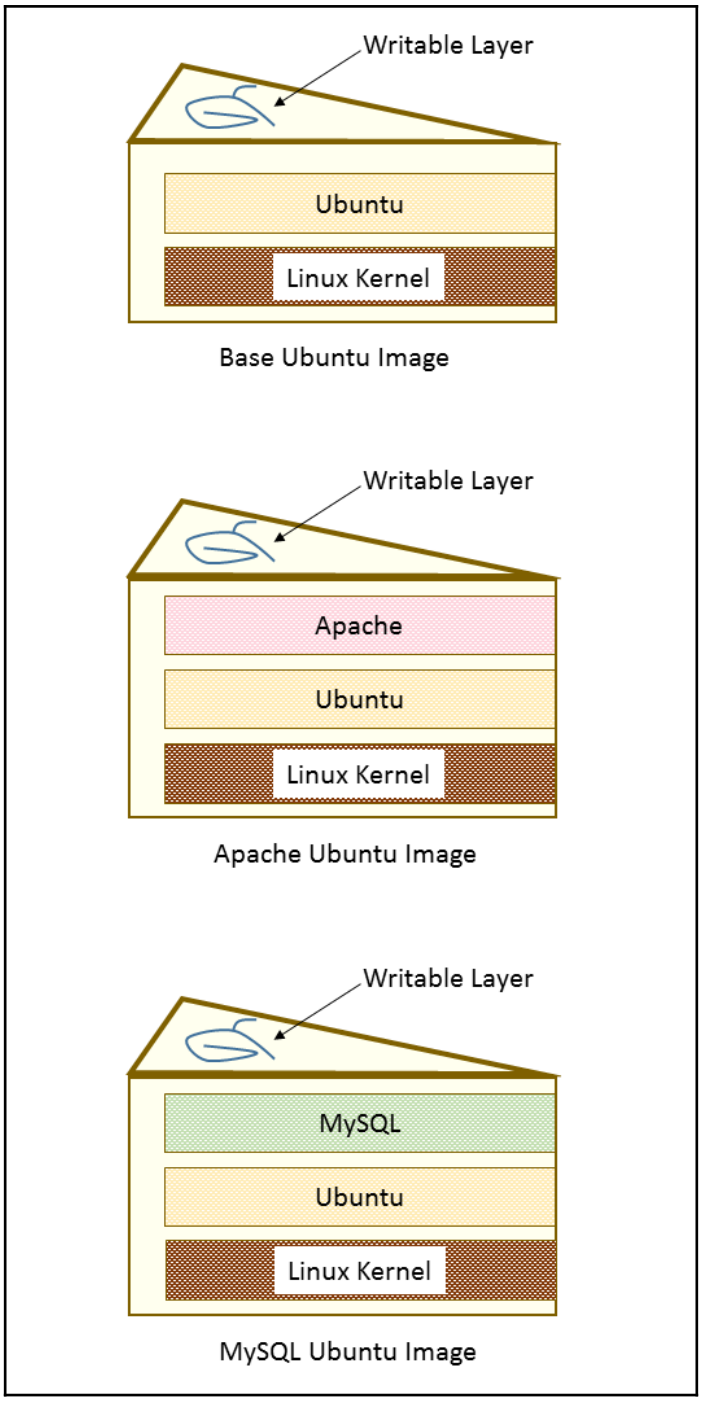
Chapter 1: Introduction to Kubernetes




Writable Layer
Ubuntu
Linux Kernel
Base Ubuntu Image
Writable Layer
Apache
Ubuntu
Linux Kernel
Apache Ubuntu Image
Writable Layer
MySQL
Ubuntu
Linux Kernel
MySQL Ubuntu Image

```
... Starting cluster in us-central1-b using provider gce
... calling verify-prereqs

All components are up to date.

All components are up to date.

All components are up to date.
```

```
... calling kube-up
Your active configuration is: [default]

Project: dynamic-nomad-152102
Zone: us-central1-b
gs://kubernetes-staging-549d6b8d9c/kubernetes-devel/
+++ Staging server tars to Google Storage: gs://kubernetes-staging-549d6b8d9c/kub
ernetes-devel
+++ kubernetes-server-linux-amd64.tar.gz uploaded (sha1 = 5df19e3745bbc8c7d1a5bf6
d61d9e1b0d189db64)
+++ kubernetes-salt.tar.gz uploaded (sha1 = 95e855d893e4549b935aed8736f3a2372ae7c
cd3)
+++ kubernetes-manifests.tar.gz uploaded (sha1 = e9c52530a14612c91f45e017743925a0
dba6dcc8)
INSTANCE_GROUPS=
NODE_NAMES=
```

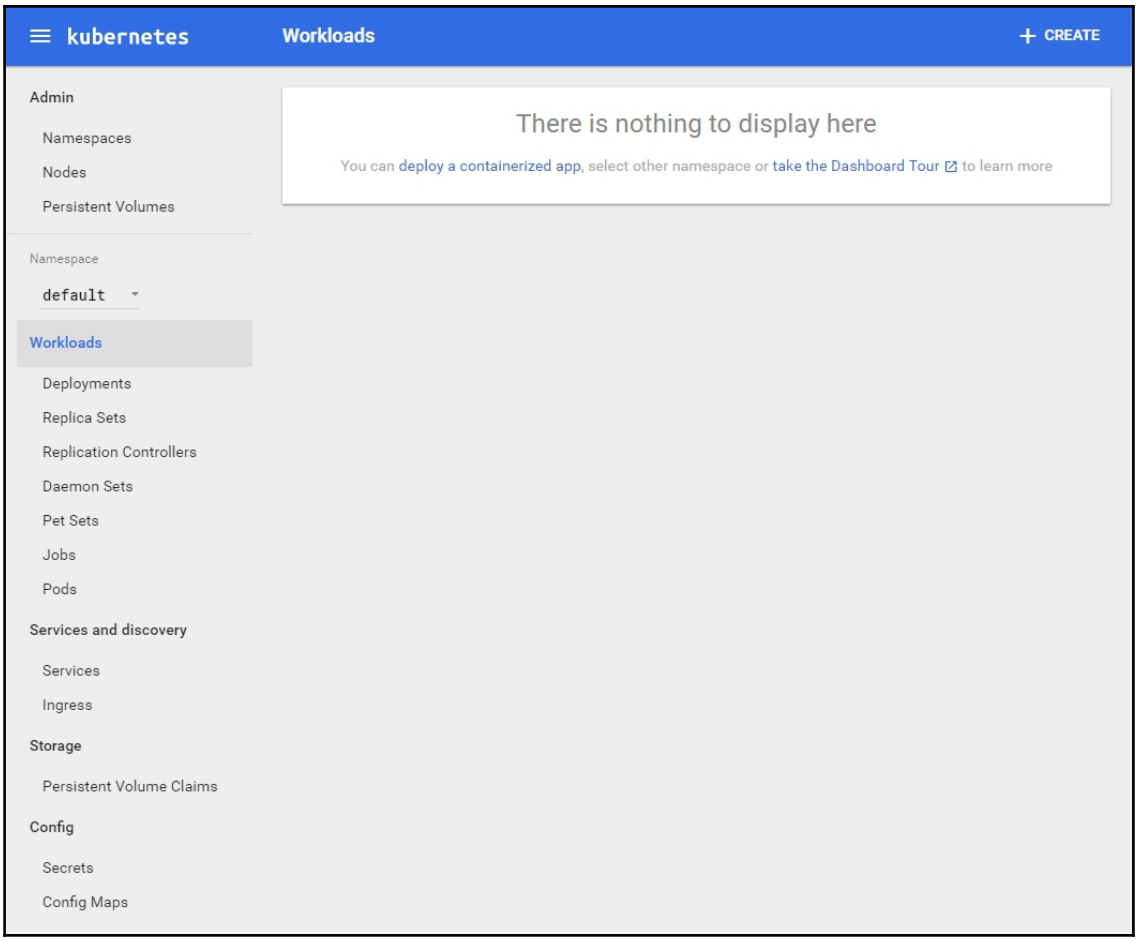
```
Looking for already existing resources
Starting master and configuring firewalls
Created [https://www.googleapis.com/compute/v1/projects/dynamic-nomad-152102/zon
es/us-central1-b/disks/kubernetes-master-pd].
NAME                  ZONE           SIZE_GB  TYPE    STATUS
kubernetes-master-pd  us-central1-b  20       pd-ssd  READY

New disks are unformatted. You must format and mount a disk before it
can be used. You can find instructions on how to do this at:

https://cloud.google.com/compute/docs/disks/add-persistent-disk#formatting

Created [https://www.googleapis.com/compute/v1/projects/dynamic-nomad-152102/glo
bal/firewalls/kubernetes-master-https].
NAME                     NETWORK  SRC_RANGES  RULES    SRC_TAGS  TARGET_TAGS
kubernetes-master-https  default  0.0.0.0/0   tcp:443            kubernetes-mast
er
Created [https://www.googleapis.com/compute/v1/projects/dynamic-nomad-152102/reg
ions/us-central1/addresses/kubernetes-master-ip].
Generating certs for alternate-names: IP:23.251.158.223,IP:10.0.0.1,DNS:kubernet
es,DNS:kubernetes.default,DNS:kubernetes.default.svc,DNS:kubernetes.default.svc.
cluster.local,DNS:kubernetes-master
```

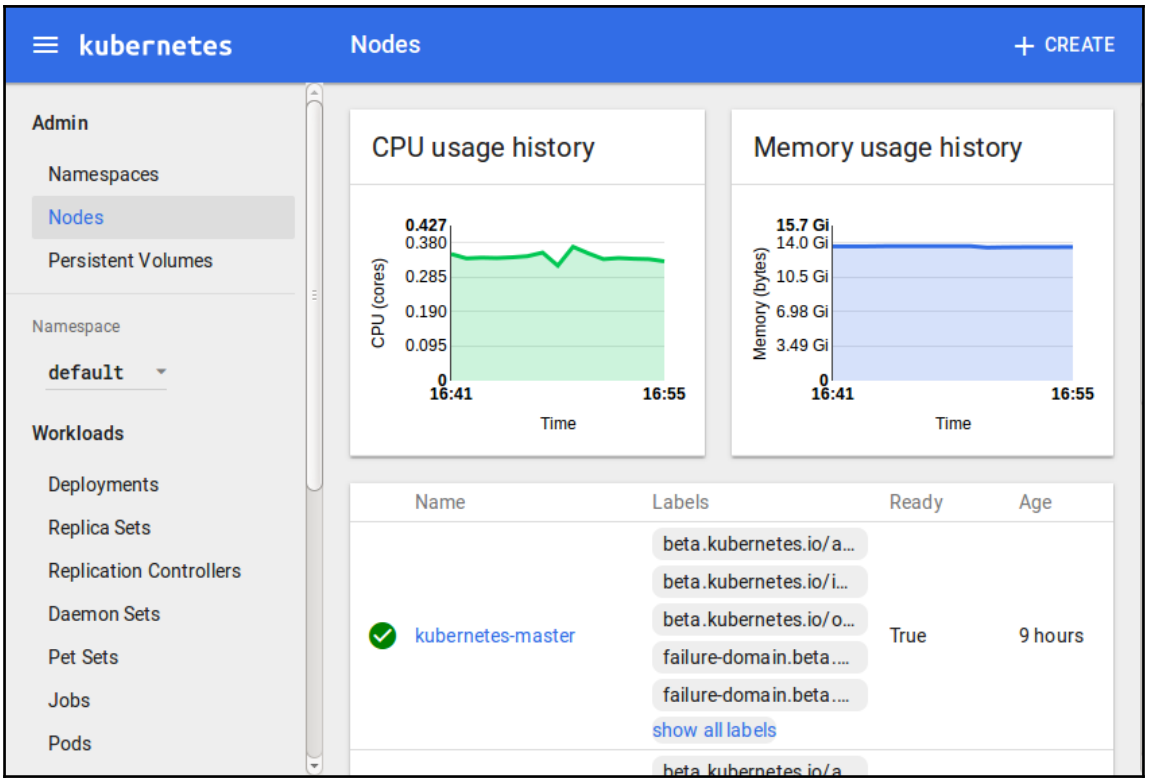
```
+++ Logging using Fluentd to gcp
WARNING: You have selected a disk size of under [200GB]. This may result in poor
 I/O performance. For more information, see: https://developers.google.com/compu
te/docs/disks#pdperformance.
Created [https://www.googleapis.com/compute/v1/projects/dynamic-nomad-152102/glo
bal/firewalls/kubernetes-minion-all].
NAME                    NETWORK  SRC_RANGES     RULES                     SRC_TAG
S  TARGET_TAGS
kubernetes-minion-all  default  10.244.0.0/14  tcp,udp,icmp,esp,ah,sctp
   kubernetes-minion
Created [https://www.googleapis.com/compute/v1/projects/dynamic-nomad-152102/zon
es/us-central1-b/instances/kubernetes-master].
NAME               ZONE           MACHINE_TYPE   PREEMPTIBLE  INTERNAL_IP  EXTER
NAL_IP     STATUS
kubernetes-master  us-central1-b  n1-standard-1               10.128.0.2   23.25
1.158.223  RUNNING
Creating minions.
Attempt 1 to create kubernetes-minion-template
WARNING: You have selected a disk size of under [200GB]. This may result in poor
 I/O performance. For more information, see: https://developers.google.com/compu
te/docs/disks#pdperformance.
Created [https://www.googleapis.com/compute/v1/projects/dynamic-nomad-152102/glo
bal/instanceTemplates/kubernetes-minion-template].
NAME                         MACHINE_TYPE   PREEMPTIBLE  CREATION_TIMESTAMP
kubernetes-minion-template  n1-standard-2               2016-12-10T04:25:37.527-
08:00
Created [https://www.googleapis.com/compute/v1/projects/dynamic-nomad-152102/zon
es/us-central1-b/instanceGroupManagers/kubernetes-minion-group].
NAME                     LOCATION       SCOPE  BASE_INSTANCE_NAME       SIZE  TA
RGET_SIZE  INSTANCE_TEMPLATE           AUTOSCALED
kubernetes-minion-group  us-central1-b  zone   kubernetes-minion-group  0     3
           kubernetes-minion-template  no
Waiting for group to become stable, current operations: creating: 3
Waiting for group to become stable, current operations: creating: 3
Waiting for group to become stable, current operations: creating: 1
Group is stable
```

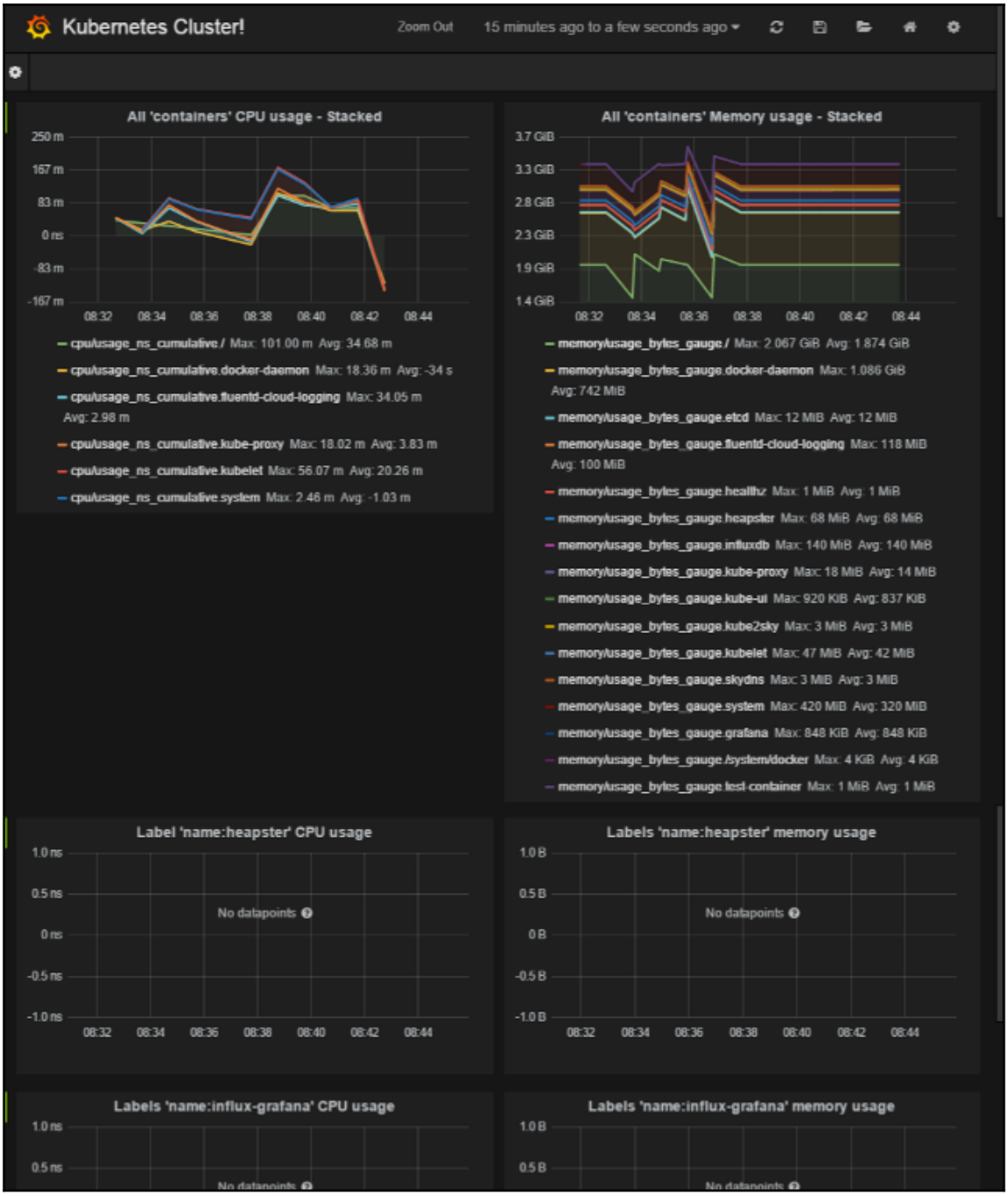
```
INSTANCE_GROUPS=kubernetes-minion-group
NODE_NAMES=kubernetes-minion-group-41wq kubernetes-minion-group-7vh1 kubernetes-
minion-group-oyos
Trying to find master named 'kubernetes-master'
Looking for address 'kubernetes-master-ip'
Using master: kubernetes-master (external IP: 23.251.158.223)
Waiting up to 300 seconds for cluster initialization.

  This will continually check to see if the API for kubernetes is reachable.
  This may time out if there was some uncaught error during start up.

..................Kubernetes cluster created.
cluster "dynamic-nomad-152102_kubernetes" set.
user "dynamic-nomad-152102_kubernetes" set.
context "dynamic-nomad-152102_kubernetes" set.
switched to context "dynamic-nomad-152102_kubernetes".
user "dynamic-nomad-152102_kubernetes-basic-auth" set.
Wrote config for dynamic-nomad-152102_kubernetes to /home/grizz/.kube/config

Kubernetes cluster is running.  The master is running at:

  https://23.251.158.223

The user name and password to use is located in /home/grizz/.kube/config.
```

```
... calling validate-cluster
Waiting for 4 ready nodes. 1 ready nodes, 1 registered. Retrying.
Waiting for 4 ready nodes. 1 ready nodes, 4 registered. Retrying.
Waiting for 4 ready nodes. 1 ready nodes, 4 registered. Retrying.
Waiting for 4 ready nodes. 3 ready nodes, 4 registered. Retrying.
Found 4 node(s).
NAME                          STATUS                     AGE
kubernetes-master             Ready,SchedulingDisabled   1m
kubernetes-minion-group-41wq  Ready                      53s
kubernetes-minion-group-7vh1  Ready                      1m
kubernetes-minion-group-oyos  Ready                      52s
Validate output:
NAME                 STATUS    MESSAGE              ERROR
controller-manager   Healthy   ok
scheduler            Healthy   ok
etcd-0               Healthy   {"health": "true"}
etcd-1               Healthy   {"health": "true"}
Cluster validation succeeded
```

```
Done, listing cluster services:

Kubernetes master is running at https://23.251.158.223
GLBCDefaultBackend is running at https://23.251.158.223/api/v1/proxy/namespaces/k
ube-system/services/default-http-backend
Heapster is running at https://23.251.158.223/api/v1/proxy/namespaces/kube-system
/services/heapster
KubeDNS is running at https://23.251.158.223/api/v1/proxy/namespaces/kube-system/
services/kube-dns
kubernetes-dashboard is running at https://23.251.158.223/api/v1/proxy/namespaces
/kube-system/services/kubernetes-dashboard
Grafana is running at https://23.251.158.223/api/v1/proxy/namespaces/kube-system/
services/monitoring-grafana
InfluxDB is running at https://23.251.158.223/api/v1/proxy/namespaces/kube-system
/services/monitoring-influxdb

To further debug and diagnose cluster problems, use 'kubectl cluster-info dump'.
```


kubernetes
Workloads
+ CREATE
Admin
Namespaces
Nodes
Persistent Volumes
Namespace
default
Workloads
Deployments
Replica Sets
Replication Controllers
Daemon Sets
Pet Sets
Jobs
Pods
Services and discovery
Services
Ingress
Storage
Persistent Volume Claims
Config
Secrets
Config Maps
There is nothing to display here
You can deploy a containerized app, select other namespace or take the Dashboard Tour to learn more


kubernetes
Nodes
+ CREATE
Admin
Namespaces
Nodes
Persistent Volumes
Namespace
default
Workloads
Deployments
Replica Sets
Replication Controllers
Daemon Sets
Pet Sets
Jobs
Pods
CPU usage history
CPU (cores)
0.427
0.380
0.285
0.190
0.095
0
16:41
16:55
Time
Memory usage history
Memory (bytes)
15.7 Gi
14.0 Gi
10.5 Gi
6.98 Gi
3.49 Gi
0
16:41
16:55
Time
Name
Labels
Ready
Age
kubernetes-master
beta.kubernetes.io/a...
beta.kubernetes.io/i...
beta.kubernetes.io/o...
failure-domain.beta....
failure-domain.beta....
show all labels
True
9 hours

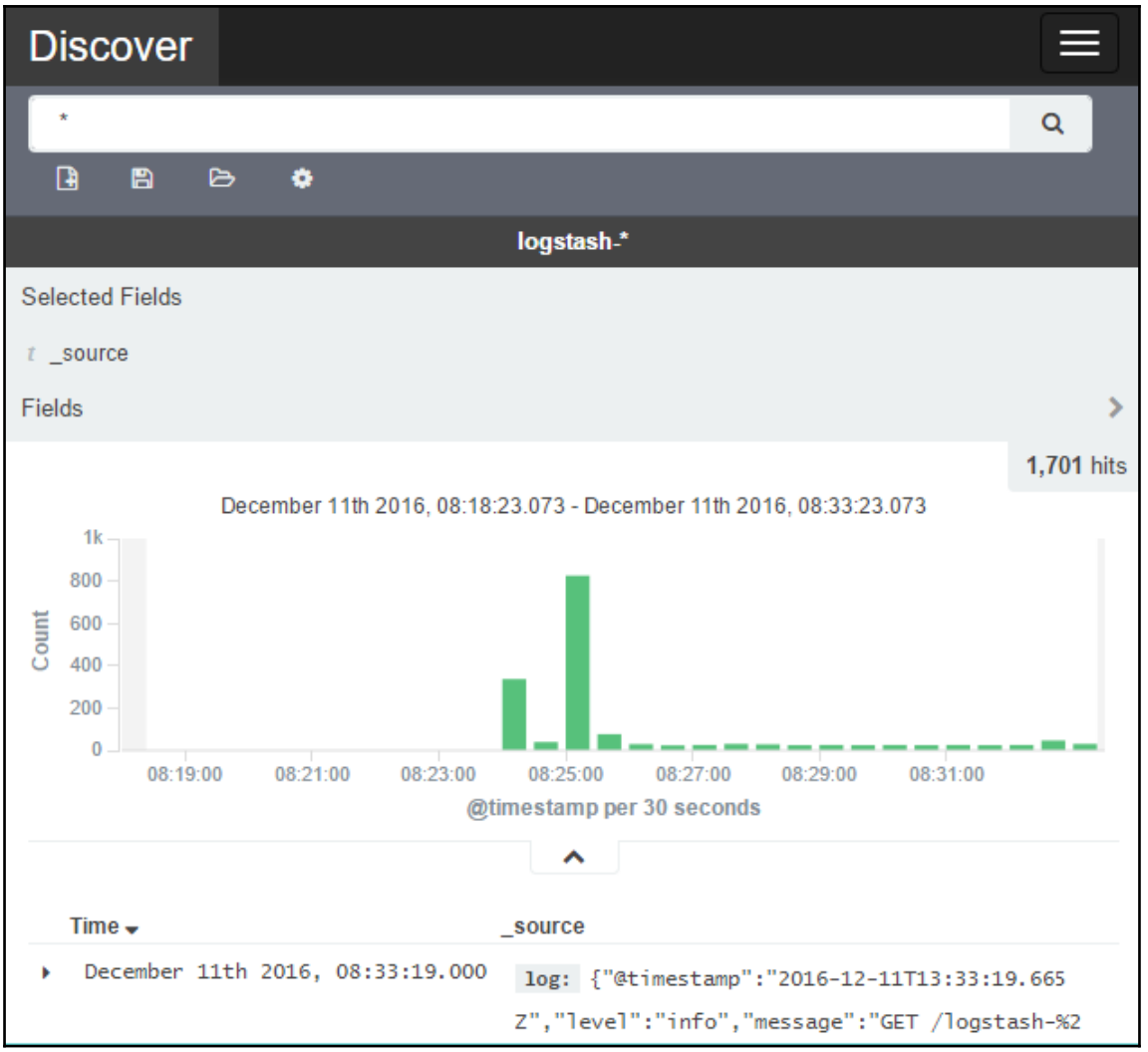

Kubernetes Cluster!
Zoom Out
15 minutes ago to a few seconds ago
All 'containers' CPU usage - Stacked
250 m
167 m
83 m
0 ns
-83 m
-167 m
08:32
08:34
08:36
08:38
08:40
08:42
08:44
cpu/usage_ns_cumulative./ Max: 101.00 m Avg: 34.68 m
cpu/usage_ns_cumulative.docker-daemon Max: 18.36 m Avg: -34 s
cpu/usage_ns_cumulative.fluentd-cloud-logging Max: 34.05 m Avg: 2.98 m
cpu/usage_ns_cumulative.kube-proxy Max: 18.02 m Avg: 3.83 m
cpu/usage_ns_cumulative.kubelet Max: 56.07 m Avg: 20.26 m
cpu/usage_ns_cumulative.system Max: 2.46 m Avg: -1.03 m
All 'containers' Memory usage - Stacked
3.7 GiB
3.3 GiB
2.8 GiB
2.3 GiB
1.9 GiB
1.4 GiB
memory/usage_bytes_gauge./ Max: 2.067 GiB Avg: 1.874 GiB
memory/usage_bytes_gauge.docker-daemon Max: 1.086 GiB Avg: 742 MiB
memory/usage_bytes_gauge.etcd Max: 12 MiB Avg: 12 MiB
memory/usage_bytes_gauge.fluentd-cloud-logging Max: 118 MiB Avg: 100 MiB
memory/usage_bytes_gauge.healthz Max: 1 MiB Avg: 1 MiB
memory/usage_bytes_gauge.heapster Max: 68 MiB Avg: 68 MiB
memory/usage_bytes_gauge.influxdb Max: 140 MiB Avg: 140 MiB
memory/usage_bytes_gauge.kube-proxy Max: 18 MiB Avg: 14 MiB
memory/usage_bytes_gauge.kube-ui Max: 920 KiB Avg: 837 KiB
memory/usage_bytes_gauge.kube2sky Max: 3 MiB Avg: 3 MiB
memory/usage_bytes_gauge.kubelet Max: 47 MiB Avg: 42 MiB
memory/usage_bytes_gauge.skydns Max: 3 MiB Avg: 3 MiB
memory/usage_bytes_gauge.system Max: 420 MiB Avg: 320 MiB
memory/usage_bytes_gauge.grafana Max: 848 KiB Avg: 848 KiB
memory/usage_bytes_gauge./system/docker Max: 4 KiB Avg: 4 KiB
memory/usage_bytes_gauge.test-container Max: 1 MiB Avg: 1 MiB
Label 'name:heapster' CPU usage
1.0 ns
0.5 ns
0 ns
-0.5 ns
-1.0 ns
No datapoints
Labels 'name:heapster' memory usage
1.0 B
0.5 B
0 B
-0.5 B
-1.0 B
Labels 'name:influx-grafana' CPU usage
Labels 'name:influx-grafana' memory usage

```
IMAGE                                                                        STATUS
gcr.io/google_containers/node-problem-detector:v0.1                          Up 13 hours
gcr.io/google_containers/pause-amd64:3.0                                     Up 13 hours
gcr.io/google_containers/fluentd-gcp:1.21                                    Up 13 hours
gcr.io/google_containers/kube-apiserver:fa481b6112db7dcce46bfc8cfbf149a2     Up 13 hours
gcr.io/google_containers/etcd:2.2.1                                          Up 13 hours
gcr.io/google_containers/etcd:2.2.1                                          Up 13 hours
gcr.io/google_containers/rescheduler:v0.2.1                                  Up 13 hours
gcr.io/google_containers/glbc:0.8.0                                          Up 13 hours
gcr.io/google-containers/kube-addon-manager:v5.1                             Up 13 hours
gcr.io/google_containers/etcd-empty-dir-cleanup:0.0.1                        Up 13 hours
gcr.io/google_containers/kube-controller-manager:9b1fc8f7afac597ccb49e34778214c49   Up 13 hours
gcr.io/google_containers/kube-scheduler:67b73a442b6a6f362a086ea4ab8dc1cd     Up 13 hours
gcr.io/google_containers/pause-amd64:3.0                                     Up 13 hours
gcr.io/google_containers/pause-amd64:3.0                                     Up 13 hours
gcr.io/google_containers/pause-amd64:3.0                                     Up 13 hours
gcr.io/google_containers/pause-amd64:3.0                                     Up 13 hours
gcr.io/google_containers/pause-amd64:3.0                                     Up 13 hours
gcr.io/google_containers/pause-amd64:3.0                                     Up 13 hours
gcr.io/google_containers/pause-amd64:3.0                                     Up 13 hours
gcr.io/google_containers/pause-amd64:3.0                                     Up 13 hours
gcr.io/google_containers/pause-amd64:3.0                                     Up 13 hours
gcr.io/google_containers/pause-amd64:3.0                                     Up 13 hours
```

```
IMAGE                                                                   STATUS
gcr.io/google_containers/exechealthz-amd64:1.2                          Up 13 hours
gcr.io/google_containers/kube-dnsmasq-amd64:1.4                         Up 13 hours
gcr.io/google_containers/heapster_grafana:v3.1.1                        Up 13 hours
gcr.io/google_containers/kubedns-amd64:1.8                              Up 13 hours
gcr.io/google_containers/heapster_influxdb:v0.7                         Up 13 hours
gcr.io/google_containers/defaultbackend:1.0                             Up 13 hours
gcr.io/google_containers/pause-amd64:3.0                                Up 13 hours
gcr.io/google_containers/pause-amd64:3.0                                Up 13 hours
gcr.io/google_containers/pause-amd64:3.0                                Up 13 hours
gcr.io/google_containers/fluentd-gcp:1.25                               Up 13 hours
gcr.io/google_containers/node-problem-detector:v0.1                     Up 13 hours
gcr.io/google_containers/kube-proxy:b87ffd2bf726a72a00bbc021970cb855    Up 13 hours
gcr.io/google_containers/pause-amd64:3.0                                Up 13 hours
gcr.io/google_containers/pause-amd64:3.0                                Up 13 hours
gcr.io/google_containers/pause-amd64:3.0                                Up 13 hours
```

```
... calling validate-cluster
Waiting for 4 ready nodes. 0 ready nodes, 2 registered. Retrying.
Waiting for 4 ready nodes. 2 ready nodes, 2 registered. Retrying.
Waiting for 4 ready nodes. 2 ready nodes, 4 registered. Retrying.
Waiting for 4 ready nodes. 2 ready nodes, 4 registered. Retrying.
Found 4 node(s).
NAME                                         STATUS    AGE
ip-172-20-0-129.us-west-2.compute.internal   Ready     37s
ip-172-20-0-130.us-west-2.compute.internal   Ready     1m
ip-172-20-0-131.us-west-2.compute.internal   Ready     1m
ip-172-20-0-132.us-west-2.compute.internal   Ready     34s
Validate output:
NAME                 STATUS    MESSAGE              ERROR
controller-manager   Healthy   ok
scheduler            Healthy   ok
etcd-0               Healthy   {"health": "true"}
etcd-1               Healthy   {"health": "true"}
Cluster validation succeeded
Done, listing cluster services:

Kubernetes master is running at https://35.161.9.65
Elasticsearch is running at https://35.161.9.65/api/v1/proxy/namespaces/kube-system/serv
ices/elasticsearch-logging
Heapster is running at https://35.161.9.65/api/v1/proxy/namespaces/kube-system/services/
heapster
Kibana is running at https://35.161.9.65/api/v1/proxy/namespaces/kube-system/services/ki
bana-logging
KubeDNS is running at https://35.161.9.65/api/v1/proxy/namespaces/kube-system/services/k
ube-dns
kubernetes-dashboard is running at https://35.161.9.65/api/v1/proxy/namespaces/kube-syst
em/services/kubernetes-dashboard
Grafana is running at https://35.161.9.65/api/v1/proxy/namespaces/kube-system/services/m
onitoring-grafana
InfluxDB is running at https://35.161.9.65/api/v1/proxy/namespaces/kube-system/services/
monitoring-influxdb

To further debug and diagnose cluster problems, use 'kubectl cluster-info dump'.
```

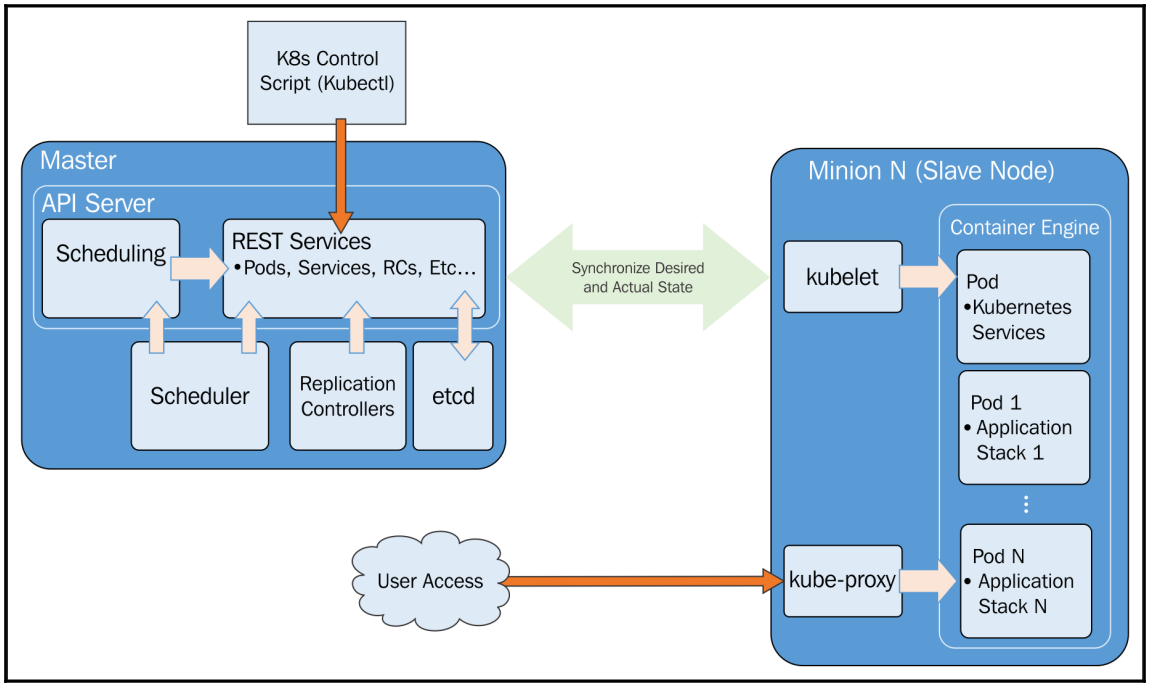
```
IMAGE                                                                                  STATUS
gcr.io/google_containers/kube-apiserver:fa481b6112db7dcce46bfc8cfbf149a2               Up 47 minutes
gcr.io/google_containers/kube-scheduler:67b73a442b6a6f362a086ea4ab8dc1cd                Up 47 minutes
gcr.io/google_containers/kube-controller-manager:9b1fc8f7afac597ccb49e34778214c49      Up 47 minutes
gcr.io/google_containers/etcd:2.2.1                                                    Up 47 minutes
gcr.io/google_containers/etcd:2.2.1                                                    Up 47 minutes
gcr.io/google-containers/kube-addon-manager:v5.1                                       Up 47 minutes
gcr.io/google_containers/pause-amd64:3.0                                               Up 47 minutes
gcr.io/google_containers/pause-amd64:3.0                                               Up 47 minutes
gcr.io/google_containers/pause-amd64:3.0                                               Up 48 minutes
gcr.io/google_containers/pause-amd64:3.0                                               Up 48 minutes
gcr.io/google_containers/pause-amd64:3.0                                               Up 48 minutes
gcr.io/google_containers/pause-amd64:3.0                                               Up 48 minutes
```

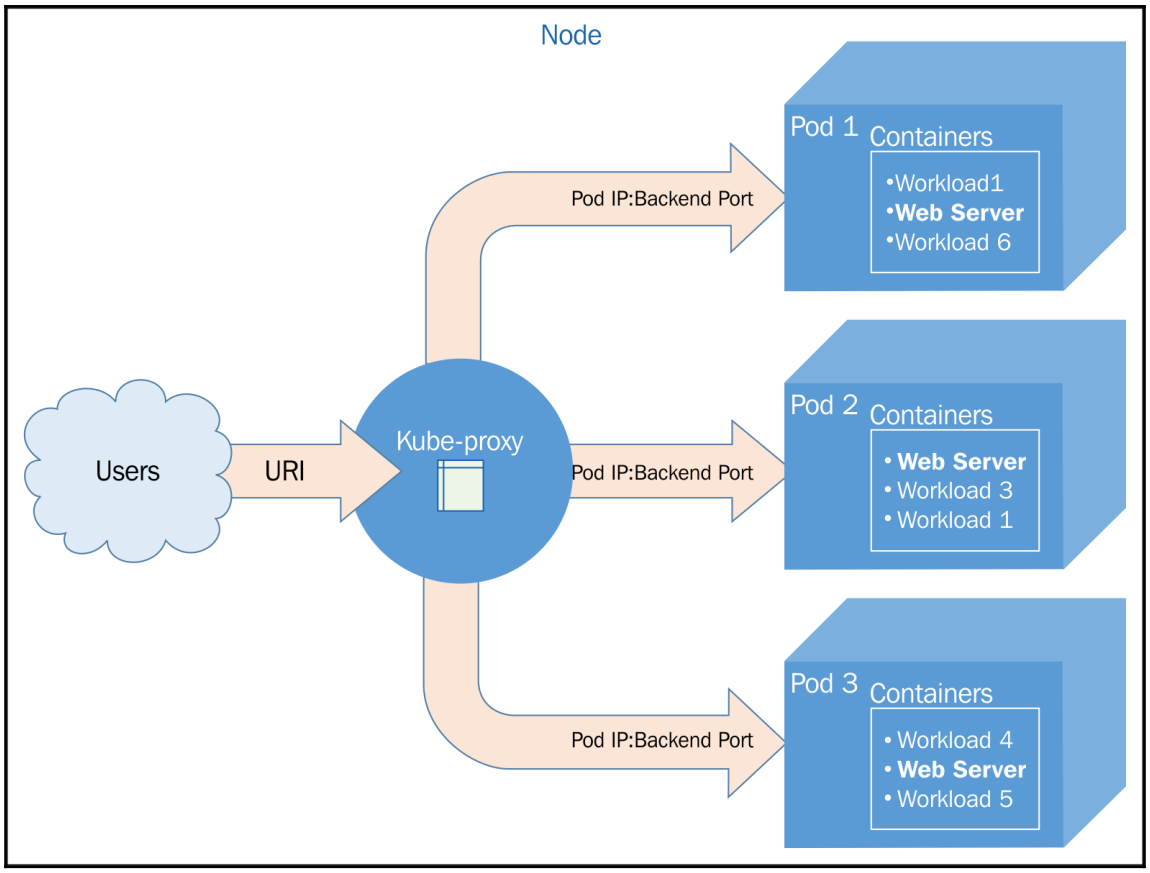

Discover
*
logstash-*
Selected Fields
_source
Fields
1,701 hits
December 11th 2016, 08:18:23.073 - December 11th 2016, 08:33:23.073
1k
800
600
400
200
0
Count
08:19:00
08:21:00
08:23:00
08:25:00
08:27:00
08:29:00
08:31:00
@timestamp per 30 seconds
Time
_source
December 11th 2016, 08:33:19.000
log: {"@timestamp":"2016-12-11T13:33:19.665
Z","level":"info","message":"GET /logstash-%2

```
NAME                                    READY     STATUS    RESTARTS   AGE
calico-etcd-7ckip                       1/1       Running   0          43s
calico-node-em917                       2/2       Running   0          43s
calico-policy-controller-i43ct          1/1       Running   0          43s
dummy-2088944543-efrgw                  1/1       Running   0          2m
etcd-ip-172-30-0-26                     1/1       Running   0          1m
kube-apiserver-ip-172-30-0-26           1/1       Running   0          2m
kube-controller-manager-ip-172-30-0-26  1/1       Running   0          2m
kube-discovery-1150918428-1kntn         1/1       Running   0          2m
kube-dns-654381707-6u52r                2/3       Running   0          1m
kube-proxy-00wu7                        1/1       Running   0          1m
kube-scheduler-ip-172-30-0-26           1/1       Running   0          1m
  info: 1 completed object(s) was(were) not shown in pods list. Pass --show-all
to see all objects.
```

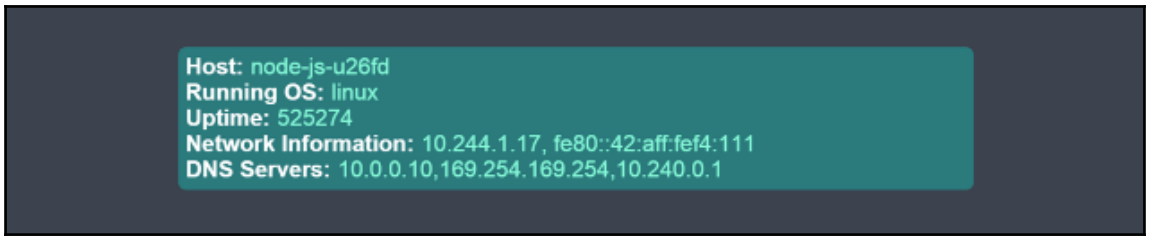
```
NAME              STATUS         AGE
ip-172-30-0-22    Ready          6m
ip-172-30-0-26    Ready,master   8m
ip-172-30-0-28    Ready          6m
ip-172-30-0-8     Ready          6m
```

Chapter 2: Pods, Services, Replication Controllers, and Labels



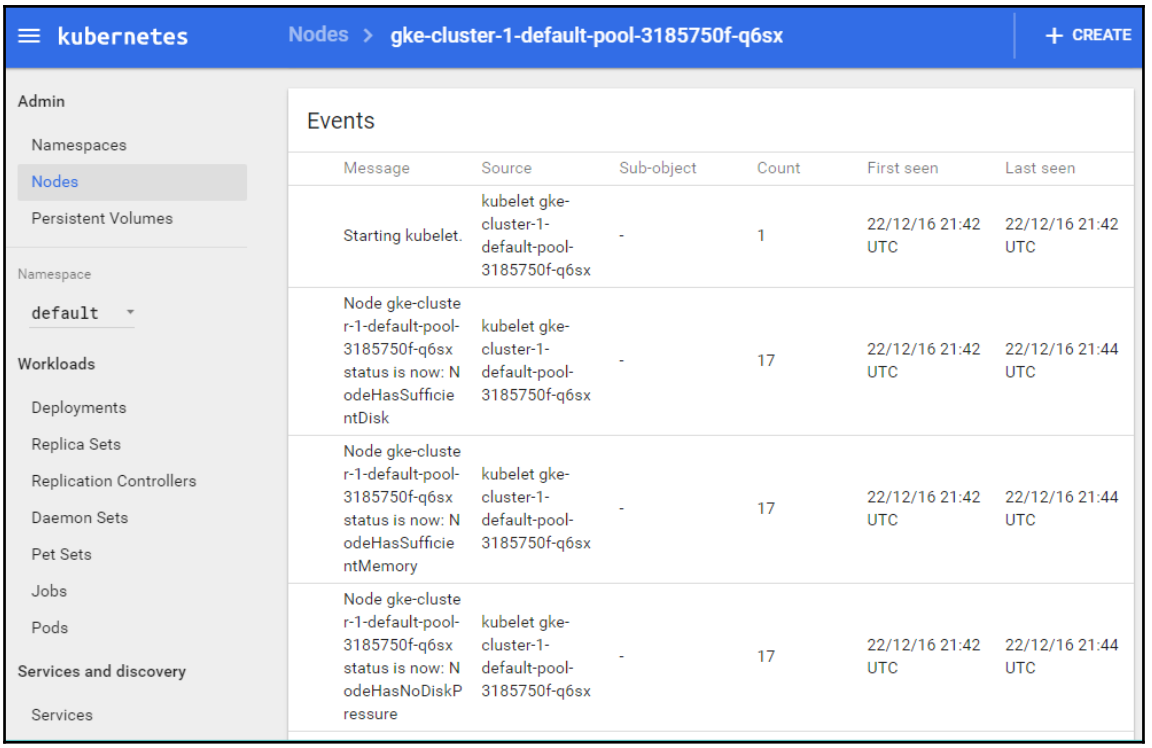



```
NAME         CLUSTER-IP      EXTERNAL-IP     PORT(S)          AGE
kubernetes   10.0.0.1        <none>          443/TCP          11m
node-js      10.0.200.192    35.184.181.18   80:30874/TCP     4m
```



```
NAME            READY     STATUS    RESTARTS   AGE
node-js-1fxoy   1/1       Running   0          1d
node-js-m4w4a   1/1       Running   0          1d
node-js-sjc03   1/1       Running   0          1d
```

```
Name:                           node-js-sjc03
Namespace:                      default
Image(s):                       petegoo/node-express-sample:latest
Node:                           kubernetes-minion-aqdf/10.240.142.178
Labels:                         name=node-js
Status:                         Running
Reason:
Message:
IP:                             10.244.0.10
Replication Controllers:        node-js (3/3 replicas created)
Containers:
  node-js:
    Image:      petegoo/node-express-sample:latest
    Limits:
      cpu:              100m
    State:              Running
      Started:          Tue, 28 Jul 2015 16:57:33 -0400
    Ready:              True
    Restart Count:      0
Conditions:
  Type          Status
  Ready         True
No events.
```

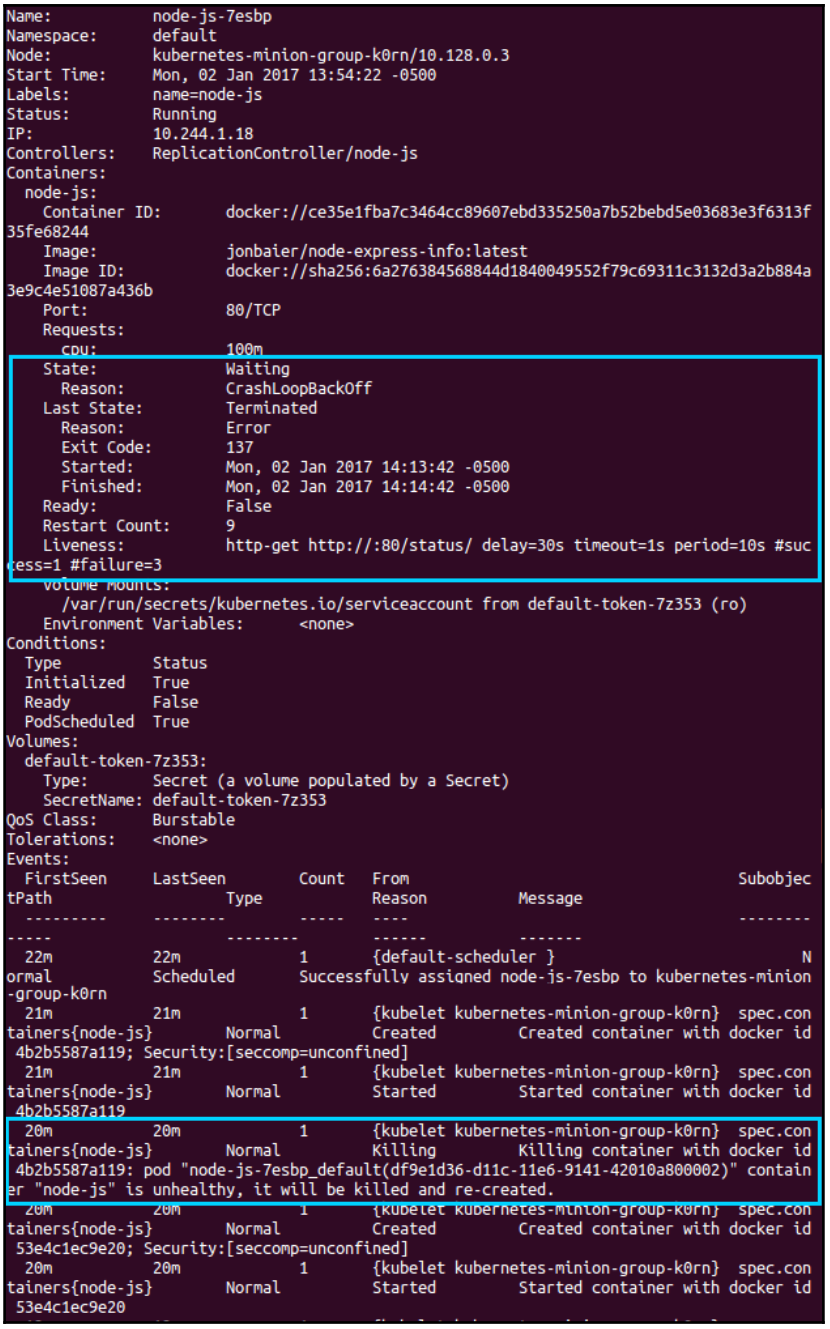


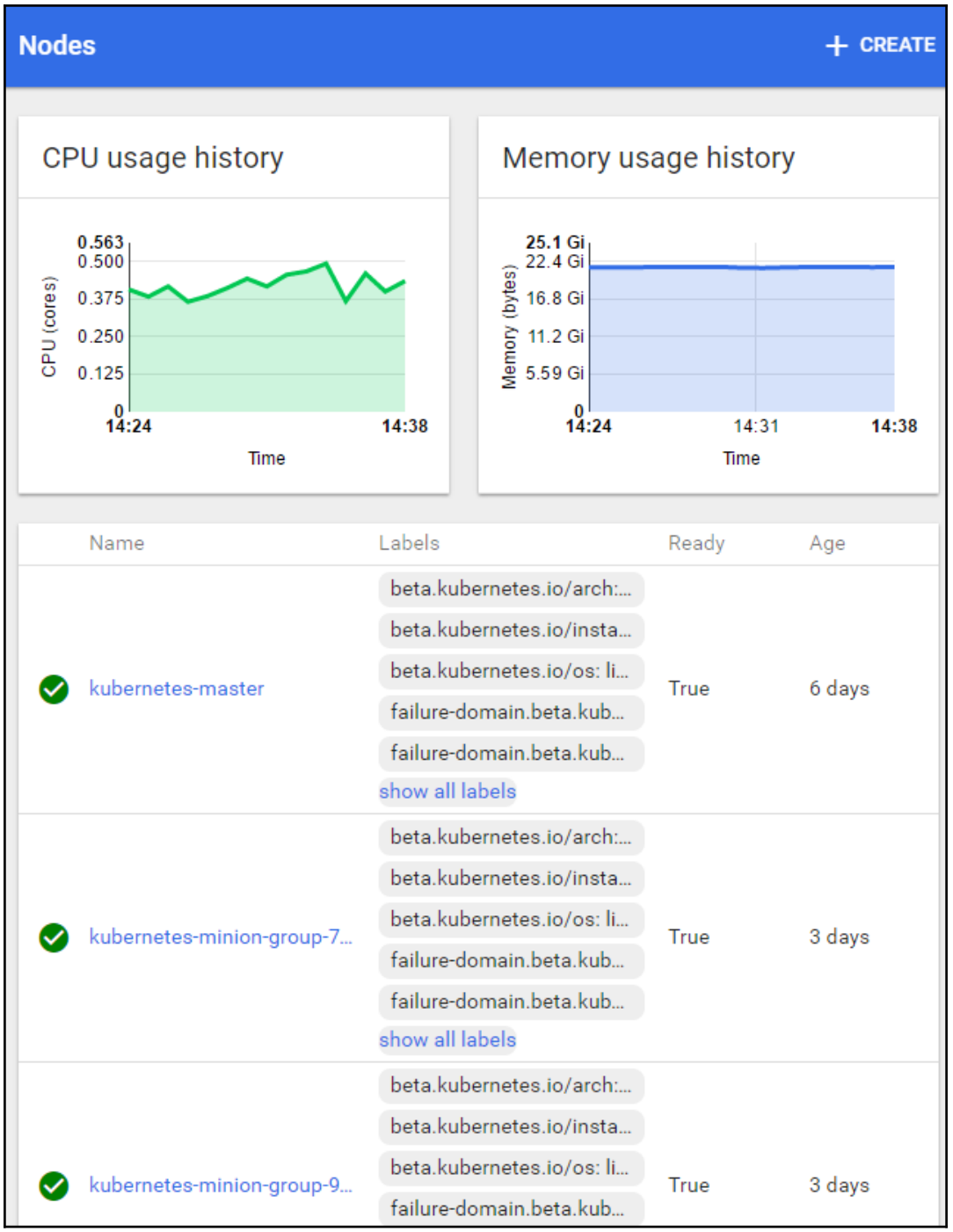

```
NAME            DESIRED   CURRENT   READY     AGE
node-js-labels  3         3         3         46s
```

```
NAME         CLUSTER-IP   EXTERNAL-IP   PORT(S)   AGE
kubernetes   10.0.0.1     <none>        443/TCP   5d
```

```
NAME              CLUSTER-IP     EXTERNAL-IP        PORT(S)          AGE
node-js           10.0.13.62     104.197.124.230    80:30798/TCP     14h
node-js-labels    10.0.207.25    104.154.54.104     80:31315/TCP     1m
```

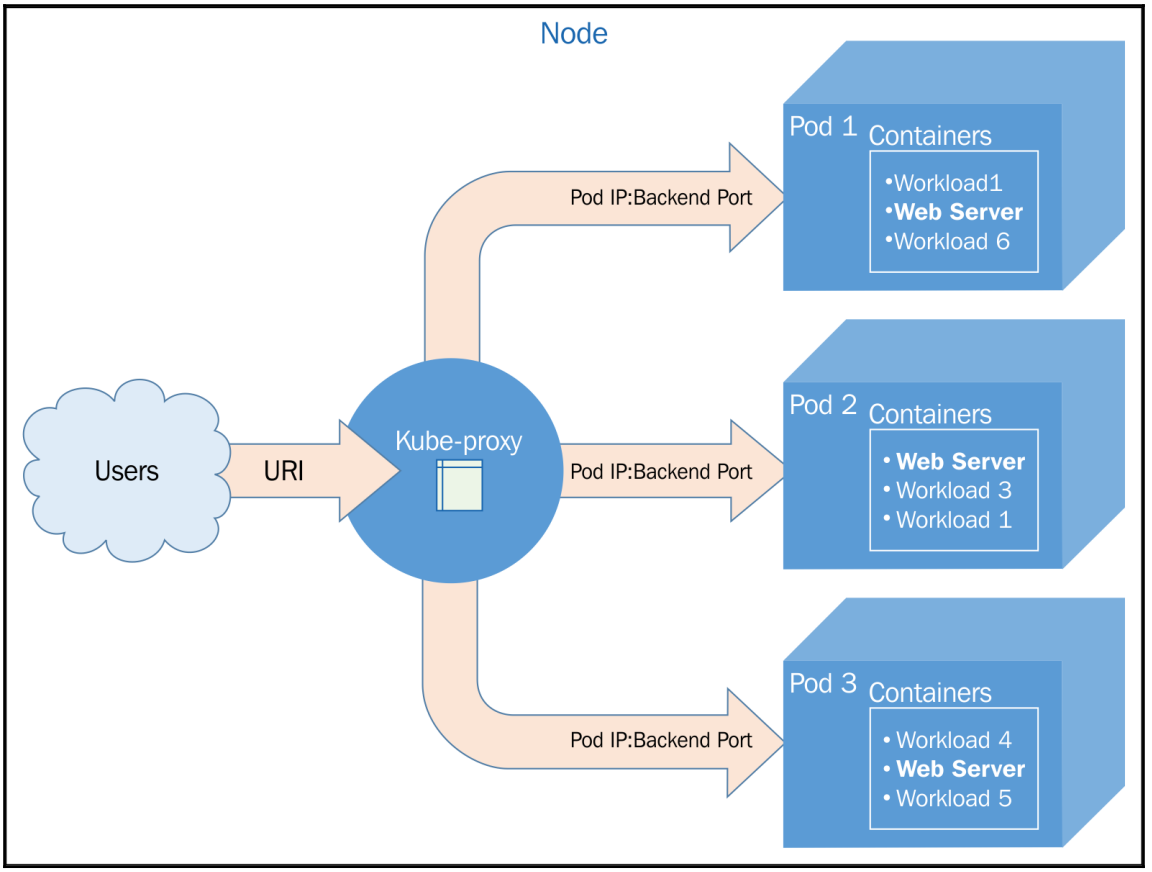
```
Name:           node-js
Namespace:      default
Image(s):       jonbaier/node-express-info:latest
Selector:       name=node-js
Labels:         name=node-js
Replicas:       3 current / 3 desired
Pods Status:    3 Running / 0 Waiting / 0 Succeeded / 0 Failed
No volumes.
Events:
  FirstSeen     LastSeen        Count   From                        SubobjectPath   Type
 Reason                 Message
  ---------     --------        -----   ----                        -------------   ------
--      ------                  -------
  42s           42s             1       {replication-controller }                   Normal
SuccessfulCreate        Created pod: node-js-7esbp
  42s           42s             1       {replication-controller }                   Normal
SuccessfulCreate        Created pod: node-js-istu0
  42s           42s             1       {replication-controller }                   Normal
SuccessfulCreate        Created pod: node-js-im7jw
```


Name: node-js-7esbp
Namespace: default
Node: kubernetes-minion-group-k0rn/10.128.0.3
Start Time: Mon, 02 Jan 2017 13:54:22 -0500
Labels: name=node-js
Status: Running
IP: 10.244.1.18
Controllers: ReplicationController/node-js
Containers:
node-js:
Container ID: docker://ce35e1fba7c3464cc89607ebd335250a7b52bebd5e03683e3f6313f35fe68244
Image: jonbaier/node-express-info:latest
Image ID: docker://sha256:6a276384568844d1840049552f79c69311c3132d3a2b884a3e9c4e51087a436b
Port: 80/TCP
Requests:
cpu: 100m
State: Waiting
Reason: CrashLoopBackOff
Last State: Terminated
Reason: Error
Exit Code: 137
Started: Mon, 02 Jan 2017 14:13:42 -0500
Finished: Mon, 02 Jan 2017 14:14:42 -0500
Ready: False
Restart Count: 9
Liveness: http-get http://:80/status/ delay=30s timeout=1s period=10s #success=1 #failure=3
/var/run/secrets/kubernetes.io/serviceaccount from default-token-7z353 (ro)
Environment Variables: <none>
Conditions:
Type Status
Initialized True
Ready False
PodScheduled True
Volumes:
default-token-7z353:
Type: Secret (a volume populated by a Secret)
SecretName: default-token-7z353
QoS Class: Burstable
Tolerations: <none>
Events:
FirstSeen LastSeen Count From Subobjectpath Type Reason Message
22m 22m 1 {default-scheduler } Normal Scheduled Successfully assigned node-js-7esbp to kubernetes-minion-group-k0rn
21m 21m 1 {kubelet kubernetes-minion-group-k0rn} spec.containers{node-js} Normal Created Created container with docker id 4b2b5587a119; Security:[seccomp=unconfined]
21m 21m 1 {kubelet kubernetes-minion-group-k0rn} spec.containers{node-js} Normal Started Started container with docker id 4b2b5587a119
20m 20m 1 {kubelet kubernetes-minion-group-k0rn} spec.containers{node-js} Normal Killing Killing container with docker id 4b2b5587a119: pod "node-js-7esbp_default(df9e1d36-d11c-11e6-9141-42010a800002)" container "node-js" is unhealthy, it will be killed and re-created.
20m 20m 1 {kubelet kubernetes-minion-group-k0rn} spec.containers{node-js} Normal Created Created container with docker id 53e4c1ec9e20; Security:[seccomp=unconfined]
20m 20m 1 {kubelet kubernetes-minion-group-k0rn} spec.containers{node-js} Normal Started Started container with docker id 53e4c1ec9e20


Nodes
+ CREATE
CPU usage history
0.563
0.500
0.375
0.250
0.125
0
CPU (cores)
14:24
14:38
Time
Memory usage history
25.1 Gi
22.4 Gi
16.8 Gi
11.2 Gi
5.59 Gi
0
Memory (bytes)
14:24
14:31
14:38
Time
Name
Labels
Ready
Age
kubernetes-master
beta.kubernetes.io/arch:...
beta.kubernetes.io/insta...
beta.kubernetes.io/os: li...
failure-domain.beta.kub...
failure-domain.beta.kub...
show all labels
True
6 days
kubernetes-minion-group-7...
beta.kubernetes.io/arch:...
beta.kubernetes.io/insta...
beta.kubernetes.io/os: li...
failure-domain.beta.kub...
failure-domain.beta.kub...
show all labels
True
3 days
kubernetes-minion-group-9...
beta.kubernetes.io/arch:...
beta.kubernetes.io/insta...
beta.kubernetes.io/os: li...
failure-domain.beta.kub...
True
3 days

```
Name:           node-js-constraints-n9dlx
Namespace:      default
Node:           /
Labels:         name=node-js-constraints
Status:         Pending
IP:
Controllers:    ReplicationController/node-js-constraints
Containers:
  node-js-constraints:
    Image:      jonbaier/node-express-info:latest
    Port:       80/TCP
    Limits:
      cpu:      1500m
      memory:   512Mi
    Requests:
      cpu:      1500m
      memory:   512Mi
    Volume Mounts:
      /var/run/secrets/kubernetes.io/serviceaccount from default-token-7z353 (ro)
    Environment Variables:      <none>
Conditions:
  Type          Status
  PodScheduled  False
Volumes:
  default-token-7z353:
    Type:       Secret (a volume populated by a Secret)
    SecretName: default-token-7z353
QoS Class:      Guaranteed
Tolerations:    <none>
Events:
  FirstSeen     LastSeen        Count   From                    SubobjectPath   Type    R
eason                  Message
  ---------     --------        -----   ----                    -------------   --------
------                 -------
  1m            1m              3       {default-scheduler }                    WarningF
ailedScheduling pod (node-js-constraints-n9dlx) failed to fit in any node
fit failure on node (kubernetes-minion-group-9zf7): Insufficient cpu
fit failure on node (kubernetes-minion-group-k0rn): Insufficient cpu
fit failure on node (kubernetes-minion-group-7th4): Insufficient cpu

  1m    1m      3       {default-scheduler }            Warning FailedScheduling       p
od (node-js-constraints-n9dlx) failed to fit in any node
fit failure on node (kubernetes-minion-group-7th4): Insufficient cpu
fit failure on node (kubernetes-minion-group-9zf7): Insufficient cpu
fit failure on node (kubernetes-minion-group-k0rn): Insufficient cpu

  1m    41s     2       {default-scheduler }            Warning FailedScheduling       p
od (node-js-constraints-n9dlx) failed to fit in any node
fit failure on node (kubernetes-minion-group-k0rn): Insufficient cpu
fit failure on node (kubernetes-minion-group-7th4): Insufficient cpu
fit failure on node (kubernetes-minion-group-9zf7): Insufficient cpu
```

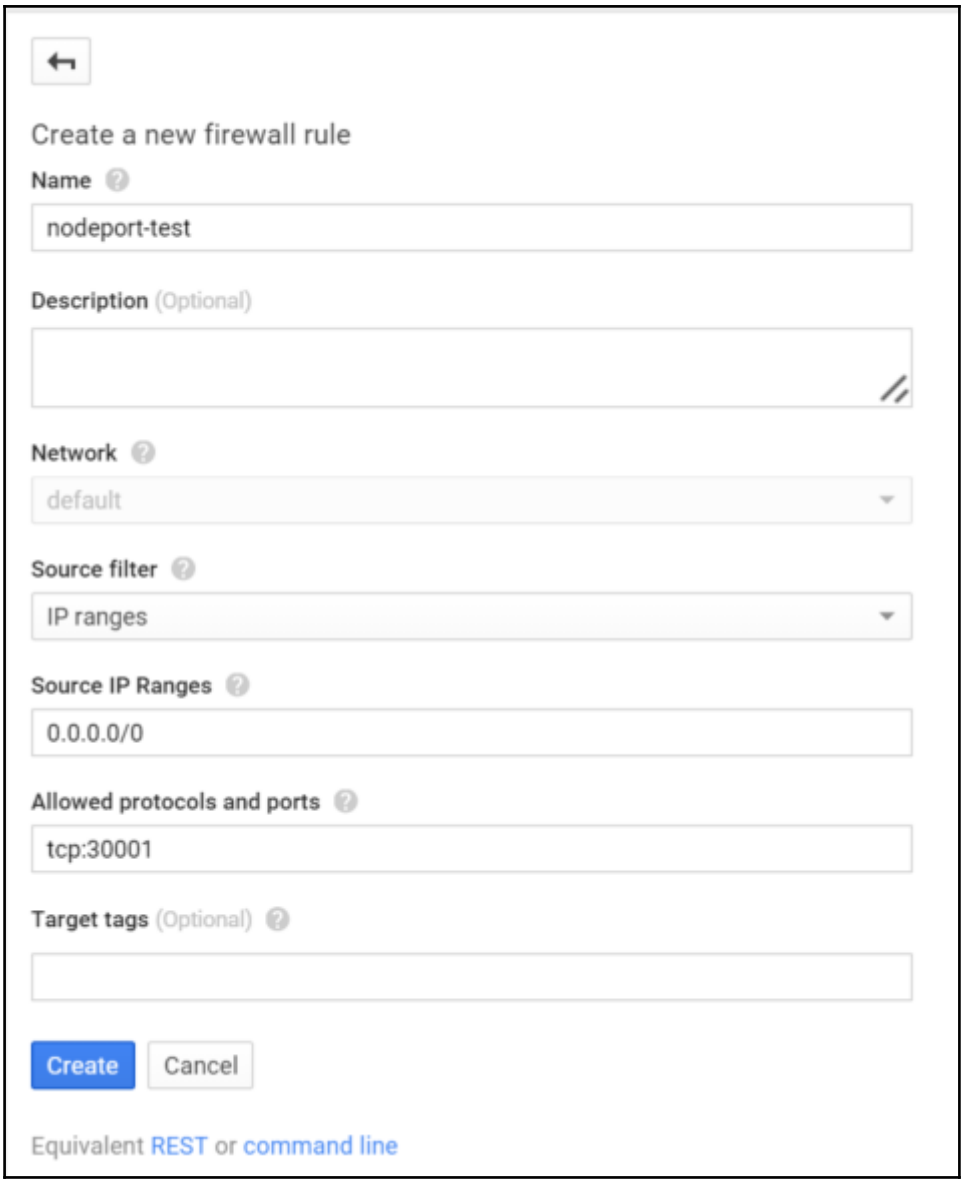
Chapter 3: Networking, Load Balancers, and Ingress

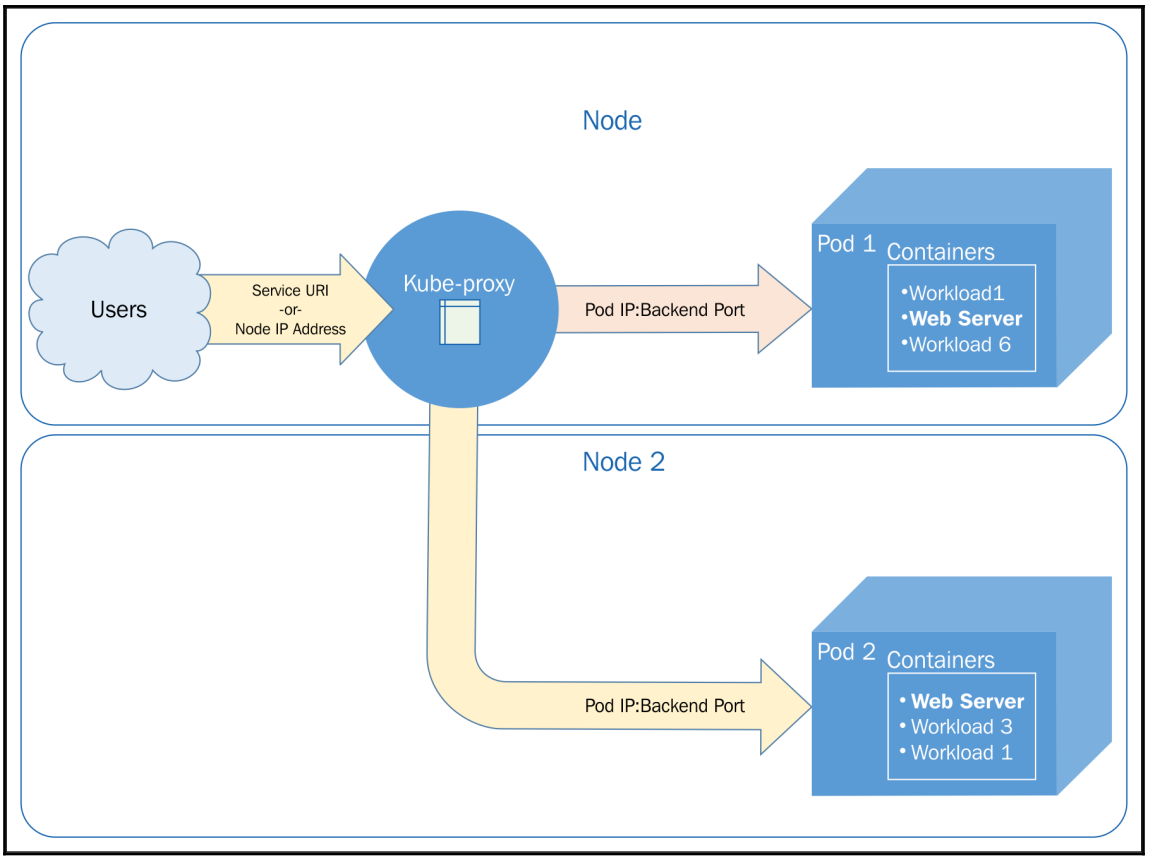


```
Name:                   node-js-labels
Namespace:              default
Labels:                 app=node-js-express,deployment=test,name=node-js-labels
Selector:               app=node-js-express,name=node-js-labels
Type:                   LoadBalancer
IP:                     10.0.115.200
LoadBalancer Ingress:   146.148.56.25
Port:                   <unnamed>       80/TCP
NodePort:               <unnamed>       30237/TCP
Endpoints:              10.244.0.29:80,10.244.2.34:80,10.244.2.35:80
Session Affinity:       None
No events.
```

```
NAME              LABELS                  SELECTOR       IP(S)        PORT(S)
node-js-internal  name=node-js-internal  name=node-js   10.0.5.134   80/TCP
```

```
You have exposed your service on an external port on all nodes in your
cluster.  If you want to expose this service to the external internet,
you may
need to set up firewall rules for the service port(s) (tcp:30001) to se
rve traffic.

See http://releases.k8s.io/HEAD/docs/user-guide/services-firewalls.md f
or more details.
services/node-js-nodeport
```


Create a new firewall rule
Name
nodeport-test
Description (Optional)
Network
default
Source filter
IP ranges
Source IP Ranges
0.0.0.0/0
Allowed protocols and ports
tcp:30001
Target tags (Optional)
Create
Cancel
Equivalent REST or command line




```
NAME                          DESIRED   CURRENT   READY     AGE
kube-dns-v20                  1         1         1         8d
kubernetes-dashboard-v1.4.0   1         1         1         8d
l7-default-backend-v1.0       1         1         1         8d
monitoring-influxdb-grafana-v4   1         1         1         8d
```

```
NAME            HOSTS                   ADDRESS          PORTS     AGE
whale-ingress   a.whale.hey,b.whale.hey   130.211.24.177   80        3h
```


<html>
<head>
<title>HTTP Whalesay</title>
</head>
<body>
<pre>
<code>
Whale Type A, Here.
\
\
\
##
.
##
==
##
===
/"""""""""""""""""___/ ===
~~~ {~~ ~~~~ ~~~ ~~~~ ~~ ~ / ===- ~~~
_____ o __/
\ \ __/
_________/
</code>
</pre>
<body/>
</html>
~~~

```
<html>
    <head>
        <title>HTTP Whalesay</title>
    </head>
    <body>
        <pre>
                <code>
      Hey man, It's Whale B, Just Chillin'.
             \
              \
                \
                                                ##         .
                                          ## ## ##        ==
                                       ## ## ## ##       ===
                                   /""""""""""""""""___/ ===
        ~~~ {~~ ~~~~ ~~~ ~~~~ ~~ ~ /  ===- ~~~
                                   \_____ o           __/
                                     \    \         __/
                                      \____\_______/
      </code>
      </pre>
    <body/>
</html>
```

```
Name:   test
Labels: <none>
Status: Active

No resource quota.

No resource limits.
```

```
Name:   test
Labels: <none>
Status: Active

Resource Quotas
 Resource                Used    Hard
 ---                     ---     ---
 pods                    0       3
 replicationcontrollers  0       1
 services                0       1

No resource limits.
```

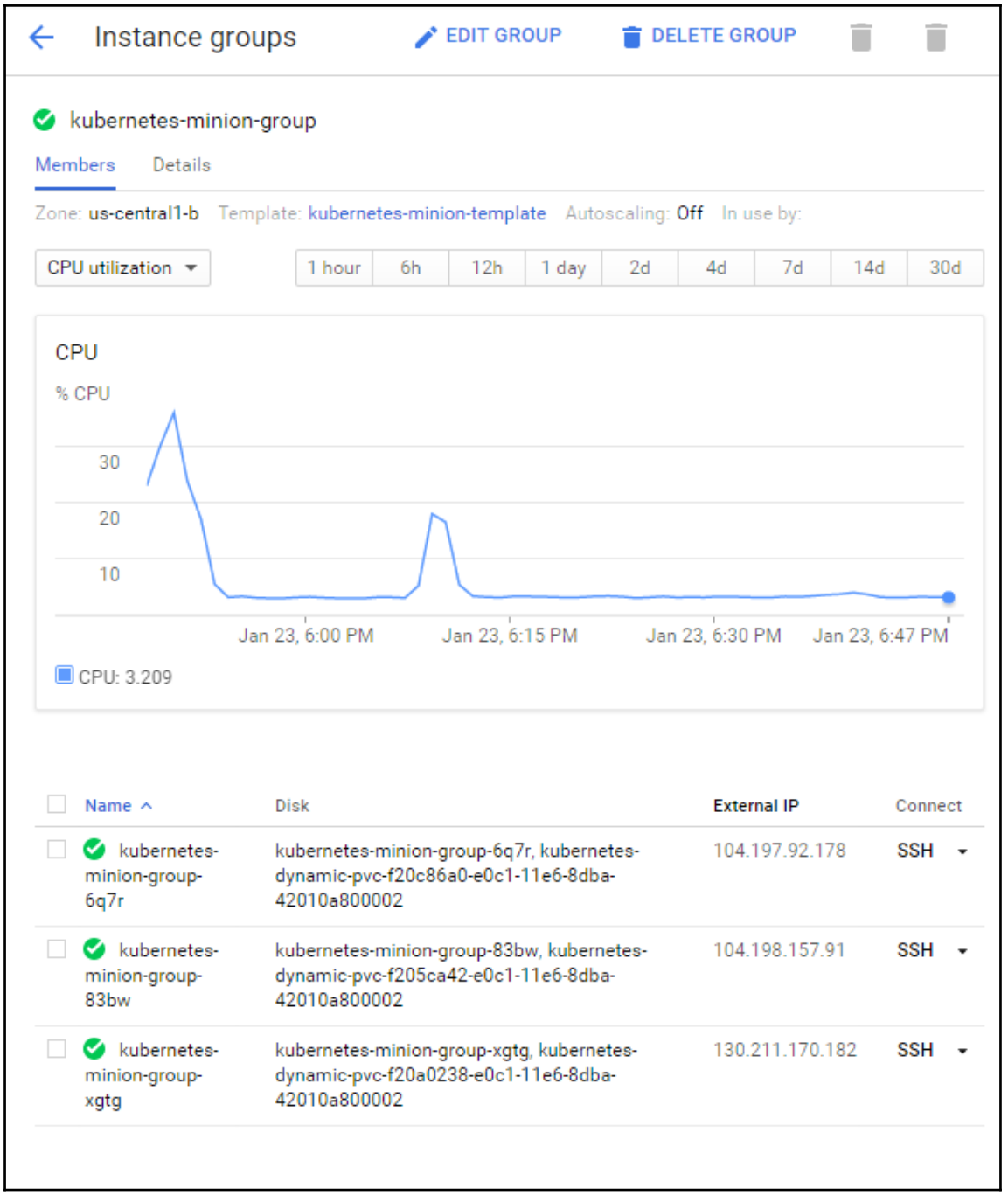
```
Name:           busybox-ns
Namespace:      test
Image(s):       busybox
Selector:       name=busybox-ns
Labels:         name=busybox-ns
Replicas:       3 current / 4 desired
Pods Status:    3 Running / 0 Waiting / 0 Succeeded / 0 Failed
Events:
  FirstSeen                             LastSeen                        Count   F
rom                           SubobjectPath   Reason                  Message
  Mon, 17 Aug 2015 16:29:43 -0400       Mon, 17 Aug 2015 16:29:43 -0400 1       {
replication-controller }                        successfulCreate        Created p
od: busybox-ns-spfrn
  Mon, 17 Aug 2015 16:29:43 -0400       Mon, 17 Aug 2015 16:29:43 -0400 1       {
replication-controller }                        successfulCreate        Created p
od: busybox-ns-xjf6q
  Mon, 17 Aug 2015 16:29:43 -0400       Mon, 17 Aug 2015 16:29:43 -0400 1       {
replication-controller }                        successfulCreate        Created p
od: busybox-ns-zeuuy
  Mon, 17 Aug 2015 16:29:44 -0400       Mon, 17 Aug 2015 16:33:01 -0400 18      {
replication-controller }                        failedCreate            Error cre
ating: Pod "busybox-ns-" is forbidden: Limited to 3 pods
```

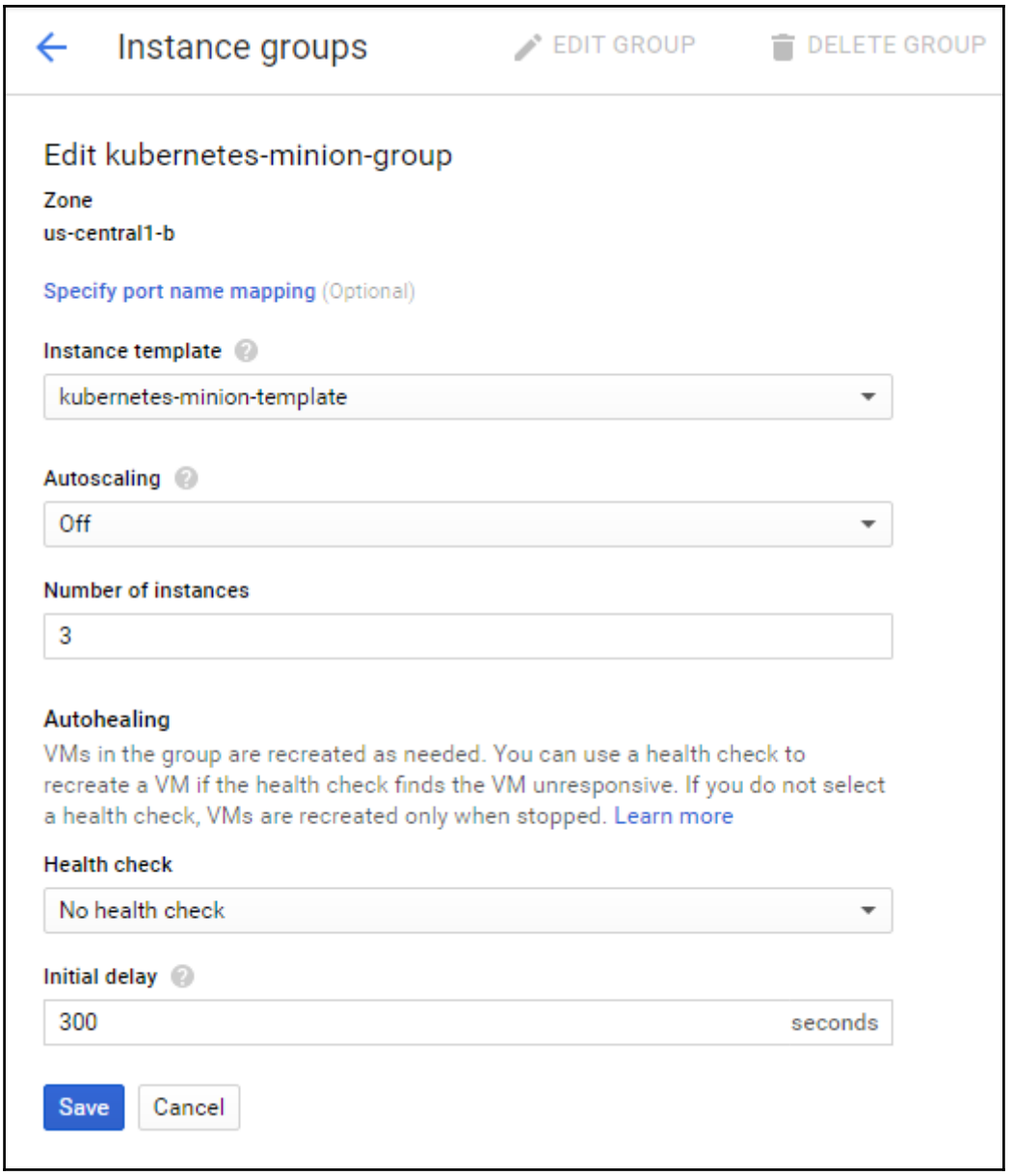
Chapter 4: Updates, Gradual Rollouts, and Autoscaling

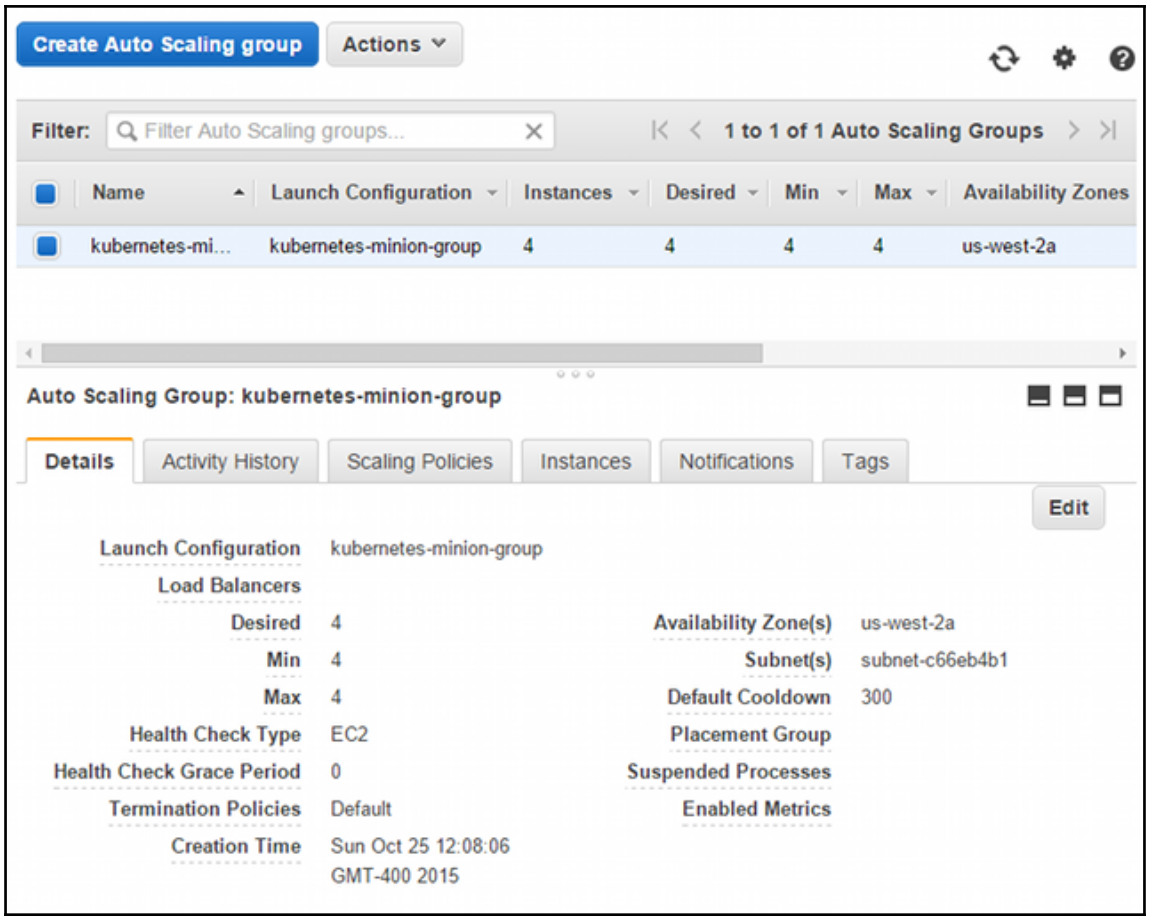
```
Creating node-js-scale-10ea08ff9a118ac6a93f85547ed2d8f6
At beginning of loop: node-js-scale replicas: 2, node-js-scale-10ea08ff9a118ac6a
93f85547ed2d8f6 replicas: 1
Updating node-js-scale replicas: 2, node-js-scale-10ea08ff9a118ac6a93f85547ed2d8
f6 replicas: 1
At end of loop: node-js-scale replicas: 2, node-js-scale-10ea08ff9a118ac6a93f855
47ed2d8f6 replicas: 1
At beginning of loop: node-js-scale replicas: 1, node-js-scale-10ea08ff9a118ac6a
93f85547ed2d8f6 replicas: 2
Updating node-js-scale replicas: 1, node-js-scale-10ea08ff9a118ac6a93f85547ed2d8
f6 replicas: 2
At end of loop: node-js-scale replicas: 1, node-js-scale-10ea08ff9a118ac6a93f855
47ed2d8f6 replicas: 2
At beginning of loop: node-js-scale replicas: 0, node-js-scale-10ea08ff9a118ac6a
93f85547ed2d8f6 replicas: 3
Updating node-js-scale replicas: 0, node-js-scale-10ea08ff9a118ac6a93f85547ed2d8
f6 replicas: 3
At end of loop: node-js-scale replicas: 0, node-js-scale-10ea08ff9a118ac6a93f855
47ed2d8f6 replicas: 3
Update succeeded. Deleting old controller: node-js-scale
Renaming node-js-scale-10ea08ff9a118ac6a93f85547ed2d8f6 to node-js-scale
node-js-scale
```


```
NAME            REFERENCE                                TARGET    CURRENT
   MINPODS   MAXPODS   AGE
node-js-scale   ReplicationController/node-js-scale   30%       0%
   1         3         2d
```

```
NAME            REFERENCE                                TARGET    CURRENT
   MINPODS   MAXPODS   AGE
node-js-scale   ReplicationController/node-js-scale   30%       49%
   1         3         2d
```


Instance groups
EDIT GROUP
DELETE GROUP
kubernetes-minion-group
Members
Details
Zone: us-central1-b
Template: kubernetes-minion-template
Autoscaling: Off
In use by:
CPU utilization
1 hour
6h
12h
1 day
2d
4d
7d
14d
30d
CPU
% CPU
30
20
10
Jan 23, 6:00 PM
Jan 23, 6:15 PM
Jan 23, 6:30 PM
Jan 23, 6:47 PM
CPU: 3.209
Name
Disk
External IP
Connect
kubernetes-minion-group-6q7r
kubernetes-minion-group-6q7r, kubernetes-dynamic-pvc-f20c86a0-e0c1-11e6-8dba-42010a800002
104.197.92.178
SSH
kubernetes-minion-group-83bw
kubernetes-minion-group-83bw, kubernetes-dynamic-pvc-f205ca42-e0c1-11e6-8dba-42010a800002
104.198.157.91
SSH
kubernetes-minion-group-xgtg
kubernetes-minion-group-xgtg, kubernetes-dynamic-pvc-f20a0238-e0c1-11e6-8dba-42010a800002
130.211.170.182
SSH


Instance groups
EDIT GROUP
DELETE GROUP
Edit kubernetes-minion-group
Zone
us-central1-b
Specify port name mapping (Optional)
Instance template
kubernetes-minion-template
Autoscaling
Off
Number of instances
3
Autohealing
VMs in the group are recreated as needed. You can use a health check to recreate a VM if the health check finds the VM unresponsive. If you do not select a health check, VMs are recreated only when stopped. Learn more
Health check
No health check
Initial delay
300
seconds
Save
Cancel

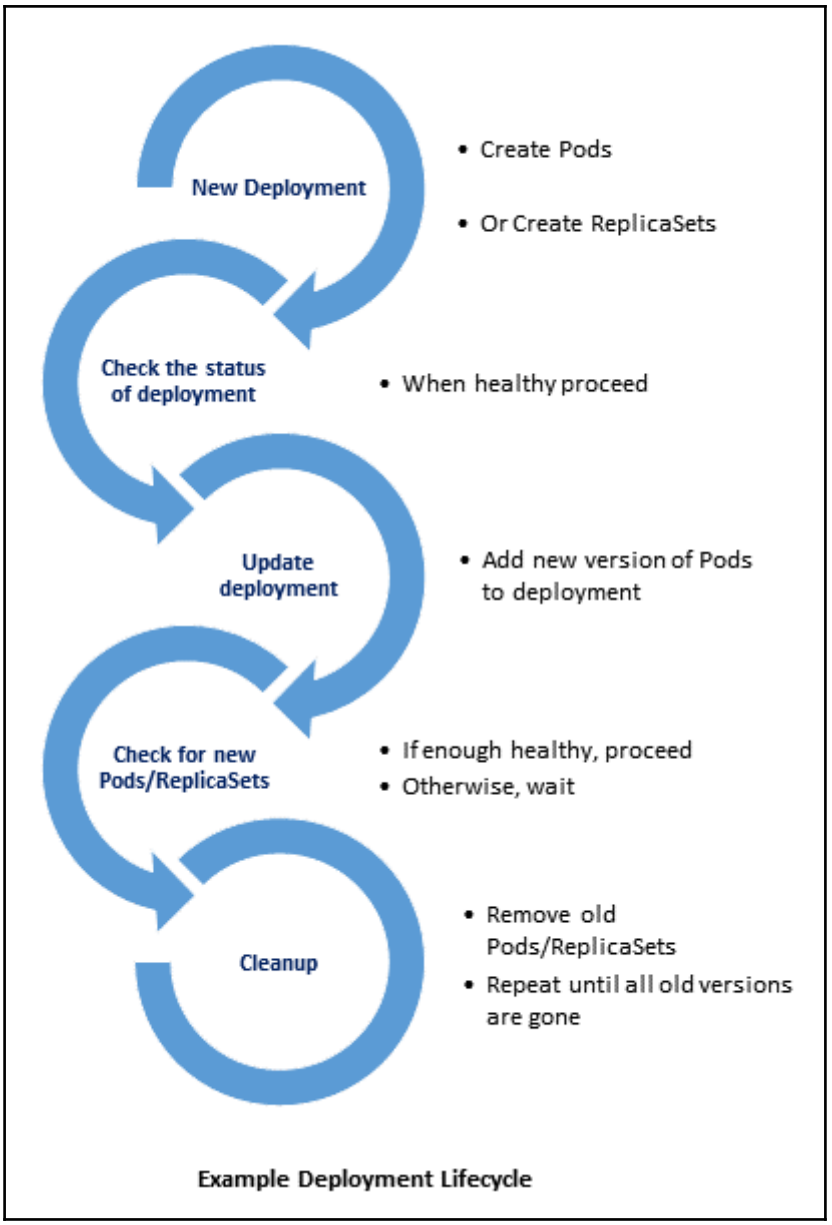

Create Auto Scaling group
Actions
Filter:
Filter Auto Scaling groups...
1 to 1 of 1 Auto Scaling Groups
Name
Launch Configuration
Instances
Desired
Min
Max
Availability Zones
kubernetes-mi...
kubernetes-minion-group
4
4
4
4
us-west-2a
Auto Scaling Group: kubernetes-minion-group
Details
Activity History
Scaling Policies
Instances
Notifications
Tags
Edit
Launch Configuration
kubernetes-minion-group
Load Balancers
Desired
4
Min
4
Max
4
Health Check Type
EC2
Health Check Grace Period
0
Termination Policies
Default
Creation Time
Sun Oct 25 12:08:06 GMT-400 2015
Availability Zone(s)
us-west-2a
Subnet(s)
subnet-c66eb4b1
Default Cooldown
300
Placement Group
Suspended Processes
Enabled Metrics

Chapter 5: Deployments, Jobs, and DaemonSets

```
NAME                                READY     STATUS    RESTARTS   AGE
node-js-deploy-1713031517-itnwi     1/1       Running   0          6m
node-js-deploy-1713031517-nx8vs     1/1       Running   0          6m
node-js-deploy-1713031517-uge5y     1/1       Running   0          6m
```

```
Image:                jonbaier/pod-scaling:0.1
```

```
NAME                                READY     STATUS    RESTARTS   AGE
node-js-deploy-1794296158-5wivi     1/1       Running   0          5m
node-js-deploy-1794296158-b2any     1/1       Running   0          5m
node-js-deploy-1794296158-y2tx3     1/1       Running   0          5m
```



Example Deployment Lifecycle

```
REVISION        CHANGE-CAUSE
1               kubectl scale deployment node-js-deploy --replicas 3
2               kubectl set image deployment/node-js-deploy node-js-
deploy=jonbaier/pod-scaling:0.2
3               kubectl set image deployment/node-js-deploy node-js-
deploy=jonbaier/pod-scaling:0.3
```

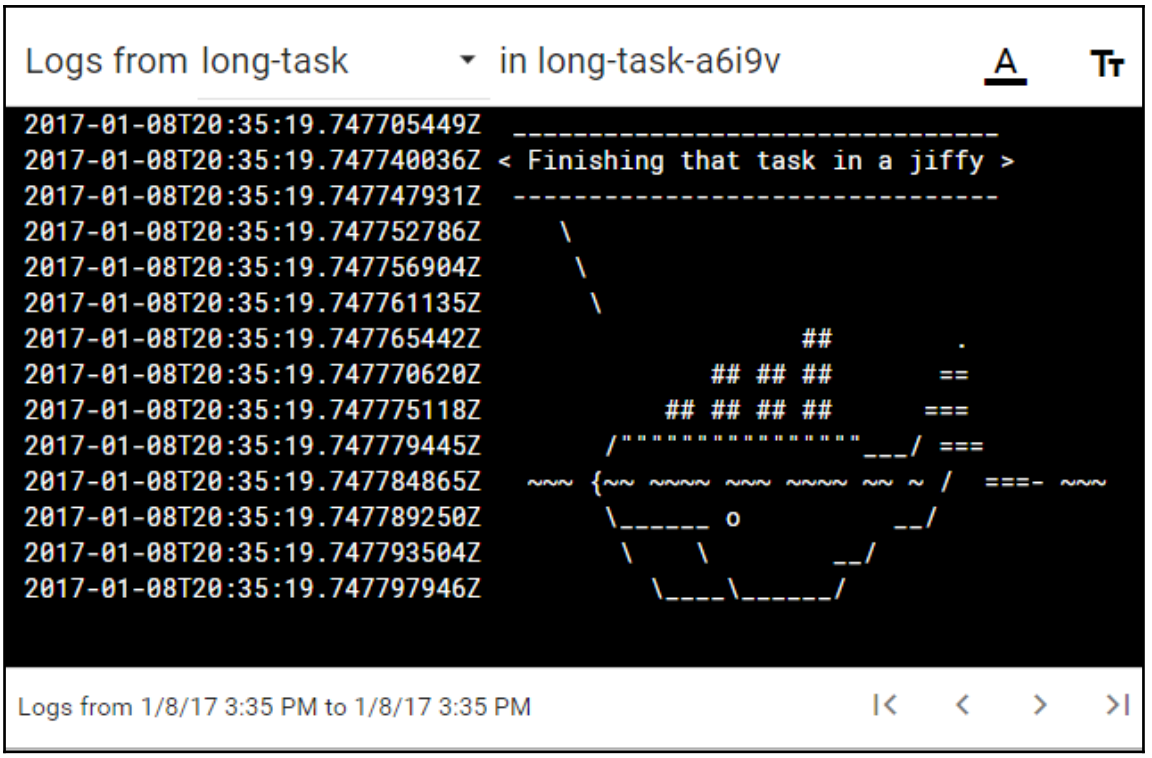
```
NAME                             READY     STATUS         RESTARTS   AGE
node-js-deploy-1875560799-ehi0o  1/1       Running        0          40m
node-js-deploy-1875560799-tqset  1/1       Running        0          40m
node-js-deploy-1907673490-cadw2  0/1       ErrImagePull   0          1m
node-js-deploy-1907673490-qvc9w  0/1       ErrImagePull   0          1m
```

```
REVISION        CHANGE-CAUSE
1               kubectl scale deployment node-js-deploy --replicas 3
2               kubectl set image deployment/node-js-deploy node-js-de
ploy=jonbaier/pod-scaling:0.2
4               kubectl set image deployment/node-js-deploy node-js-de
ploy=jonbaier/pod-scaling:42.0
5               kubectl set image deployment/node-js-deploy node-js-de
ploy=jonbaier/pod-scaling:0.3
```

```
NAME              REFERENCE                                TARGET    CURRENT   MIN
PODS    MAXPODS   AGE
node-js-deploy    Deployment/node-js-deploy                10%       0%        3
        6         3h
node-js-scale     ReplicationController/node-js-scale      30%       0%        1
        3         10d
```

```
$ kubectl get hpa
NAME              REFERENCE                                TARGET    CURRENT   MIN
PODS    MAXPODS   AGE
node-js-deploy    Deployment/node-js-deploy                10%       20%       3
        6         8m
node-js-scale     ReplicationController/node-js-scale      30%       0%        1
        3         9d
$ kubectl get deploy
NAME              DESIRED   CURRENT   UP-TO-DATE   AVAILABLE   AGE
boomload-deploy   1         1         1            1           4m
node-js-deploy    6         6         6            6           10d
```

```
Name:           long-task
Namespace:      default
Image(s):       docker/whalesay
Selector:       controller-uid=eff2fcd2-d5e1-11e6-90ee-42010a800002
Parallelism:    1
Completions:    1
Start Time:     Sun, 08 Jan 2017 15:35:05 -0500
Labels:         <none>
Pods Statuses:  0 Running / 1 Succeeded / 0 Failed
No volumes.
Events:
  FirstSeen     LastSeen        Count   From                    SubobjectPath   Type
Reason                  Message
  ---------     --------        -----   ----                    -------------   ---------
-----                   -------
  4m            4m              1       {job-controller }                       Normal
SuccessfulCreate        Created pod: long-task-a6i9v
```

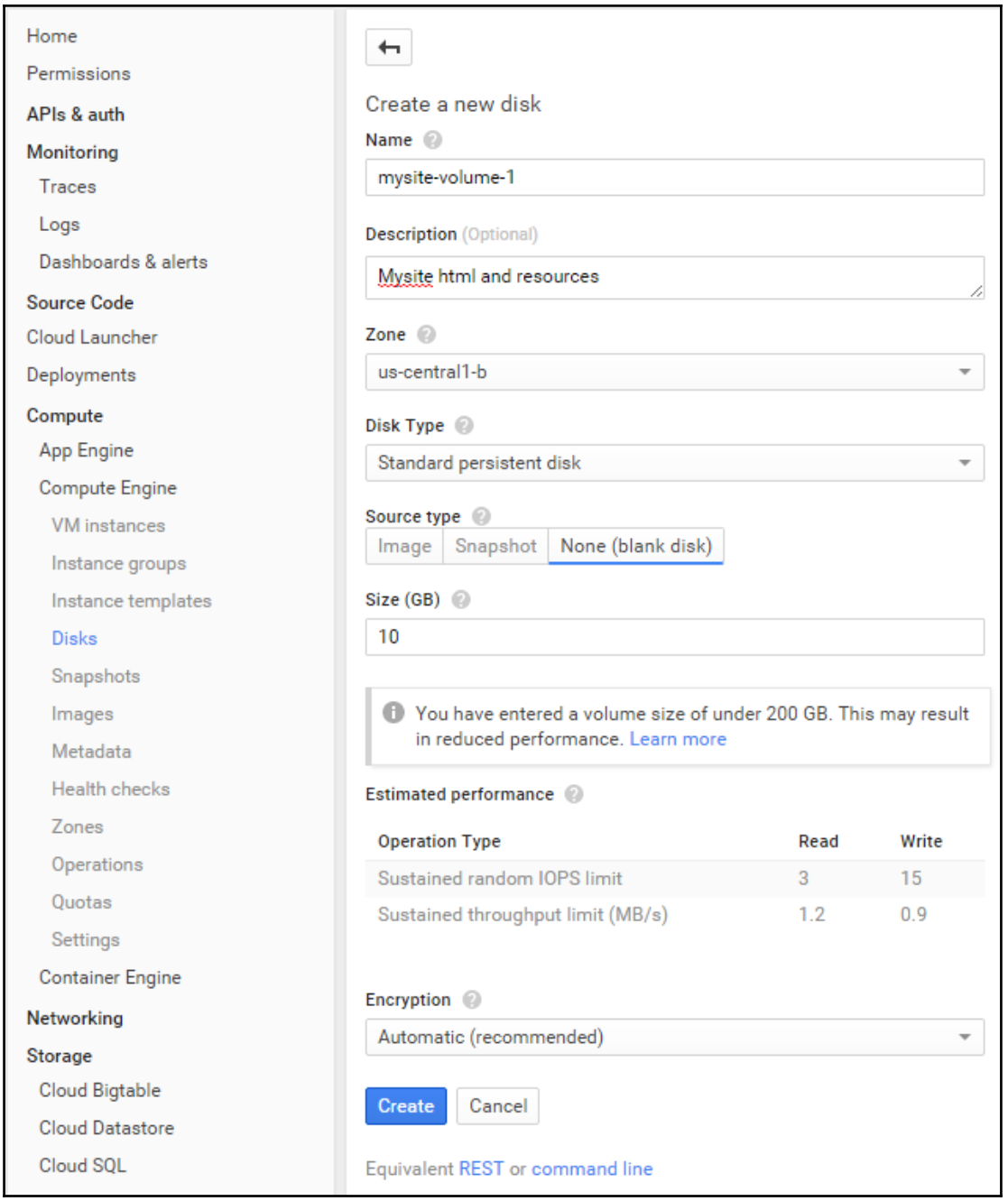



```
NAME                          DESIRED   CURRENT   NODE-SELECTOR   AGE
node-problem-detector-v0.1    4         4         <none>          13d
```

```
Name:                   kubernetes-minion-group-1l6g
Labels:                 beta.kubernetes.io/arch=amd64
                        beta.kubernetes.io/instance-type=n1-standard-2
                        beta.kubernetes.io/os=linux
                        failure-domain.beta.kubernetes.io/region=us-central1
                        failure-domain.beta.kubernetes.io/zone=us-central1-b
                        kubernetes.io/hostname=kubernetes-minion-group-1l6g
Taints:                 <none>
CreationTimestamp:      Wed, 11 Jan 2017 07:48:16 -0500
Phase:
Conditions:
```

Chapter 6: Storage and Running Stateful Applications

```
/home/k8s/nodejs# kubectl.sh exec memory-pd -- ls -lh | grep memory
drwxrwxrwt  2 root root   40 Oct 24 15:21 memory-pd
```


Home
Permissions
APIs & auth
Monitoring
Traces
Logs
Dashboards & alerts
Source Code
Cloud Launcher
Deployments
Compute
App Engine
Compute Engine
VM instances
Instance groups
Instance templates
Disks
Snapshots
Images
Metadata
Health checks
Zones
Operations
Quotas
Settings
Container Engine
Networking
Storage
Cloud Bigtable
Cloud Datastore
Cloud SQL
Create a new disk
Name
mysite-volume-1
Description (Optional)
Mysite html and resources
Zone
us-central1-b
Disk Type
Standard persistent disk
Source type
Image
Snapshot
None (blank disk)
Size (GB)
10
You have entered a volume size of under 200 GB. This may result in reduced performance. Learn more
Estimated performance
Operation Type
Read
Write
Sustained random IOPS limit
3
15
Sustained throughput limit (MB/s)
1.2
0.9
Encryption
Automatic (recommended)
Create
Cancel
Equivalent REST or command line

```
Name:           test-gce
Namespace:      default
Node:           kubernetes-minion-group-zwpm/10.128.0.4
Start Time:     Sun, 15 Jan 2017 16:51:02 -0500
Labels:         <none>
Status:         Running
IP:             10.244.4.5
Controllers:    <none>
Containers:
  test-gce:
    Container ID:       docker://15871d81eb72557cc230df70a5c724617289d710a550da66e4dfaf7083
    Image:              nginx:latest
    Image ID:           docker://sha256:01f818af747d88b4ebca7cdabd0c581e406e0e790be72678d25
    Port:               80/TCP
    Requests:
      cpu:              100m
    State:              Running
      Started:          Sun, 15 Jan 2017 16:53:00 -0500
    Ready:              True
    Restart Count:      0
    Volume Mounts:
      /usr/share/nginx/html from gce-pd (rw)
      /var/run/secrets/kubernetes.io/serviceaccount from default-token-728d1 (ro)
    Environment Variables:      <none>
Conditions:
  Type          Status
  Initialized   True
  Ready         True
  PodScheduled  True
Volumes:
  gce-pd:
    Type:       GCEPersistentDisk (a Persistent Disk resource in Google Compute Engine)
    PDName:     mysite-volume-1
    FSType:     ext4
    Partition:  0
    ReadOnly:   false
  default-token-728d1:
    Type:       Secret (a volume populated by a Secret)
    SecretName: default-token-728d1
QoS Class:      Burstable
Tolerations:    <none>
```

```
Name:                   http-pd
Namespace:              default
Labels:                 name=http-pd
Selector:               name=http-pd
Type:                   LoadBalancer
IP:                     10.0.118.195
LoadBalancer Ingress:   130.211.186.84
Port:                   http    80/TCP
NodePort:               http    32429/TCP
Endpoints:              10.244.2.15:80,10.244.2.16:80,10.244.3.5:80
Session Affinity:       None
No events.
```

```
NAME        DESIRED   CURRENT   AGE
whaleset    3         3         46s
```

```
NAME          READY     STATUS              RESTARTS   AGE
whaleset-0    1/1       Running             0          54s
whaleset-1    1/1       Running             0          29s
whaleset-2    0/1       ContainerCreating   0          11s
```

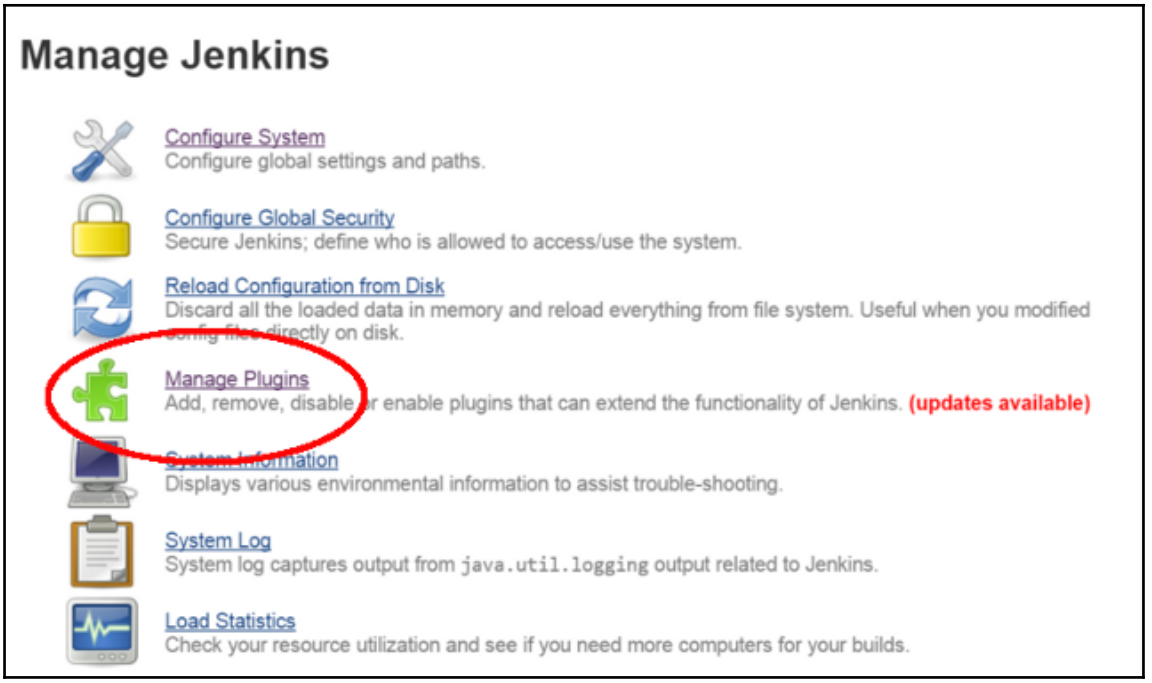
```
NAME             STATUS    VOLUME                                     CAPACITY   ACCESSMODES
 AGE
www-whaleset-0   Bound     pvc-43346a3d-e024-11e6-af6d-42010a800002   1Gi        RWO
 4m
www-whaleset-1   Bound     pvc-43381dc9-e024-11e6-af6d-42010a800002   1Gi        RWO
 4m
www-whaleset-2   Bound     pvc-433a3864-e024-11e6-af6d-42010a800002   1Gi        RWO
 4m
```

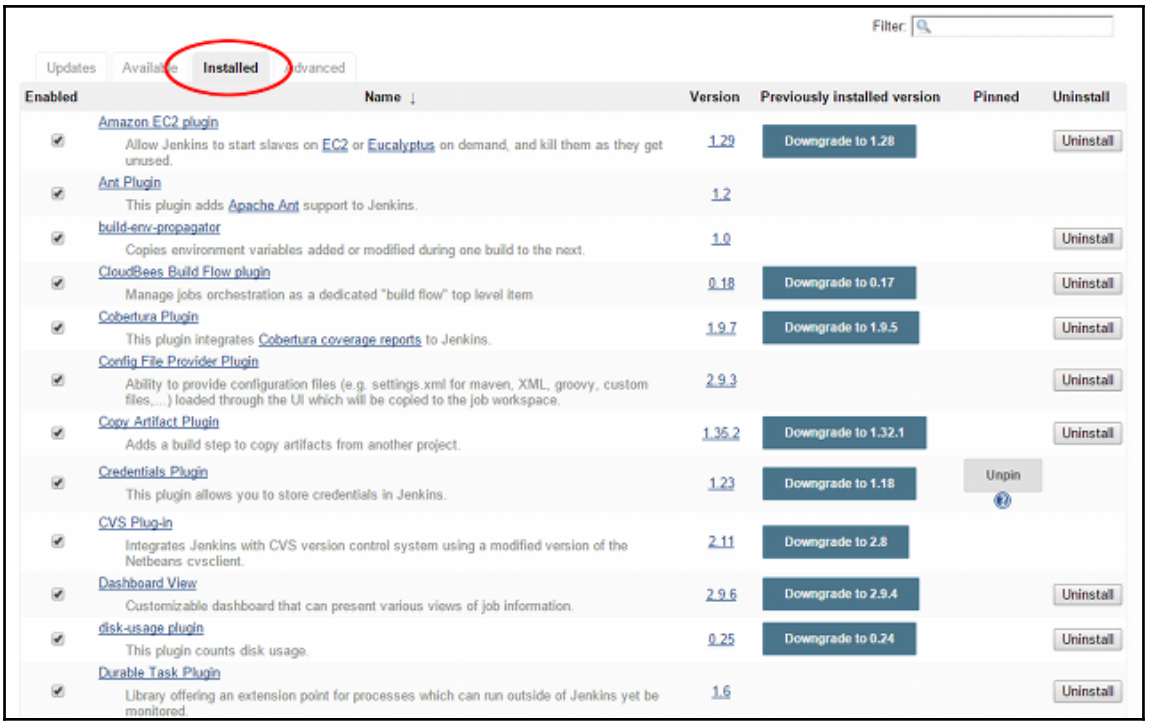
```
NAME                                       CAPACITY   ACCESSMODES   RECLAIMPOLICY   STATUS
CLAIM                     REASON   AGE
pvc-43346a3d-e024-11e6-af6d-42010a800002   1Gi        RWO           Delete          Bound
default/www-whaleset-0               4m
pvc-43381dc9-e024-11e6-af6d-42010a800002   1Gi        RWO           Delete          Bound
default/www-whaleset-1               4m
pvc-433a3864-e024-11e6-af6d-42010a800002   1Gi        RWO           Delete          Bound
default/www-whaleset-2               4m
```

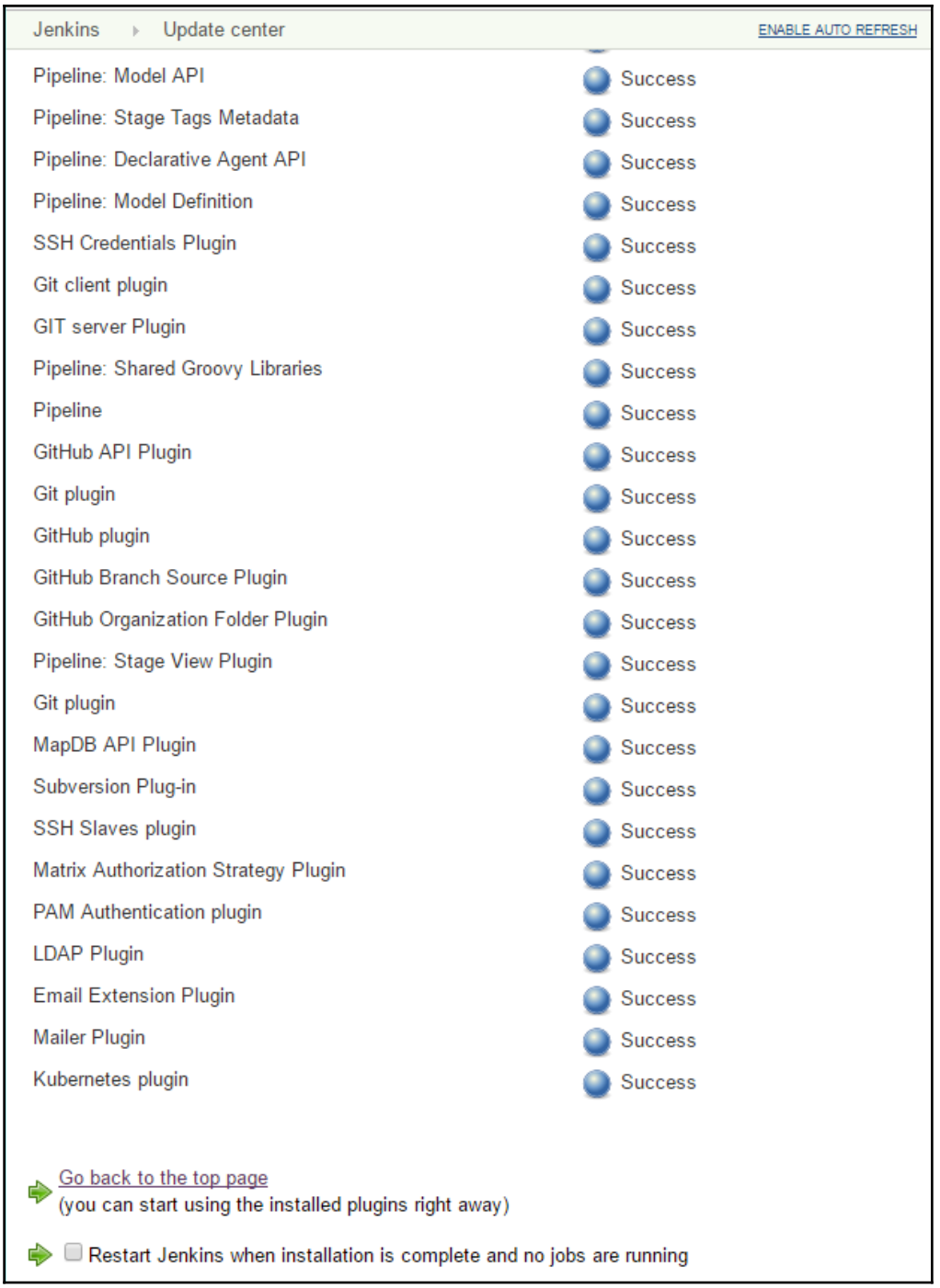

<html>
<head>
<title>HTTP Whalesay</title>
</head>
<body>
<pre>
<code>
| Whale it up!. --Sent from whaleset-0 |
</code>
</pre>
<body/>
</html>

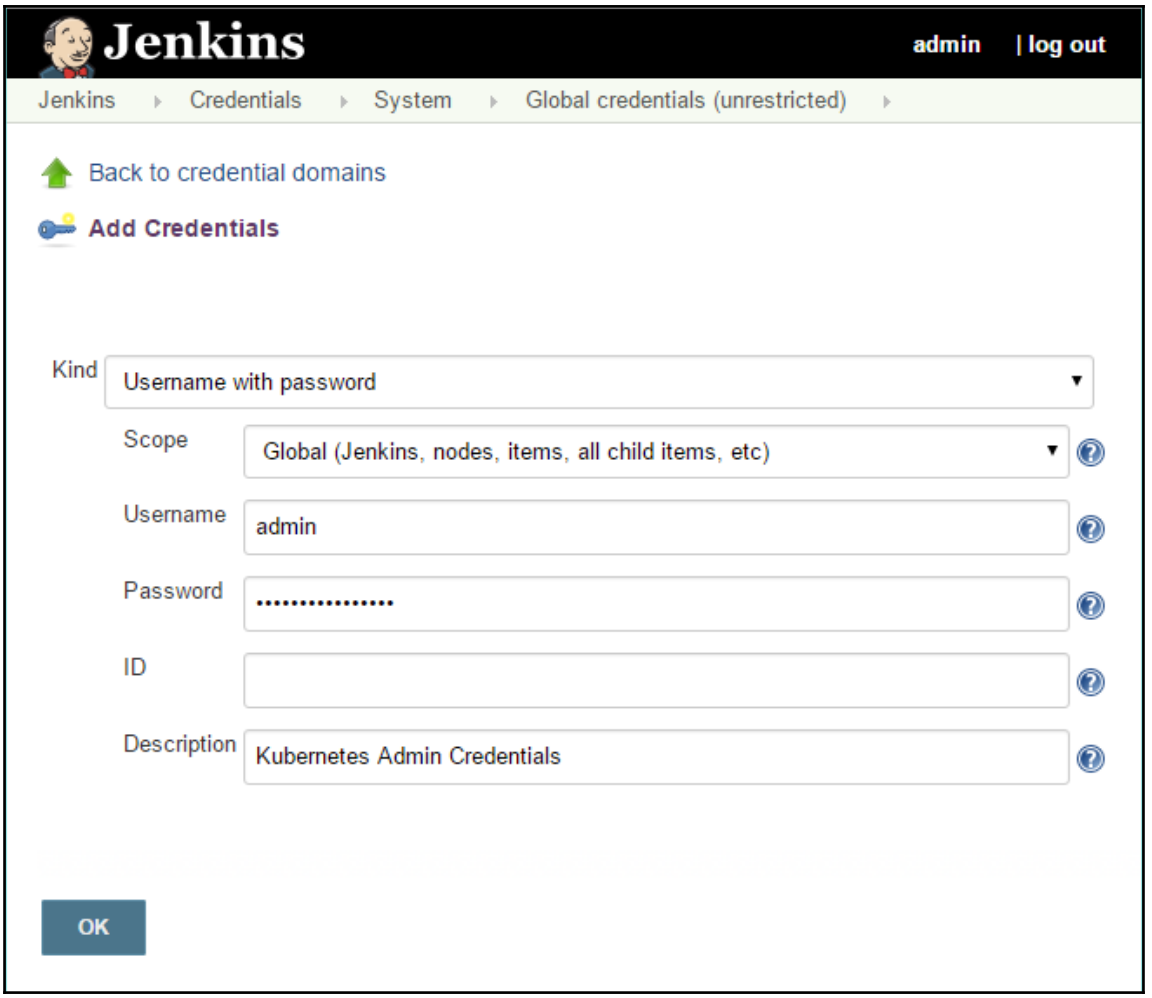

<html>
<head>
<title>HTTP Whalesay</title>
</head>
<body>
<pre>
<code>
| Whale it up!. --Sent from whaleset-1 |
</code>
</pre>
<body/>
</html>

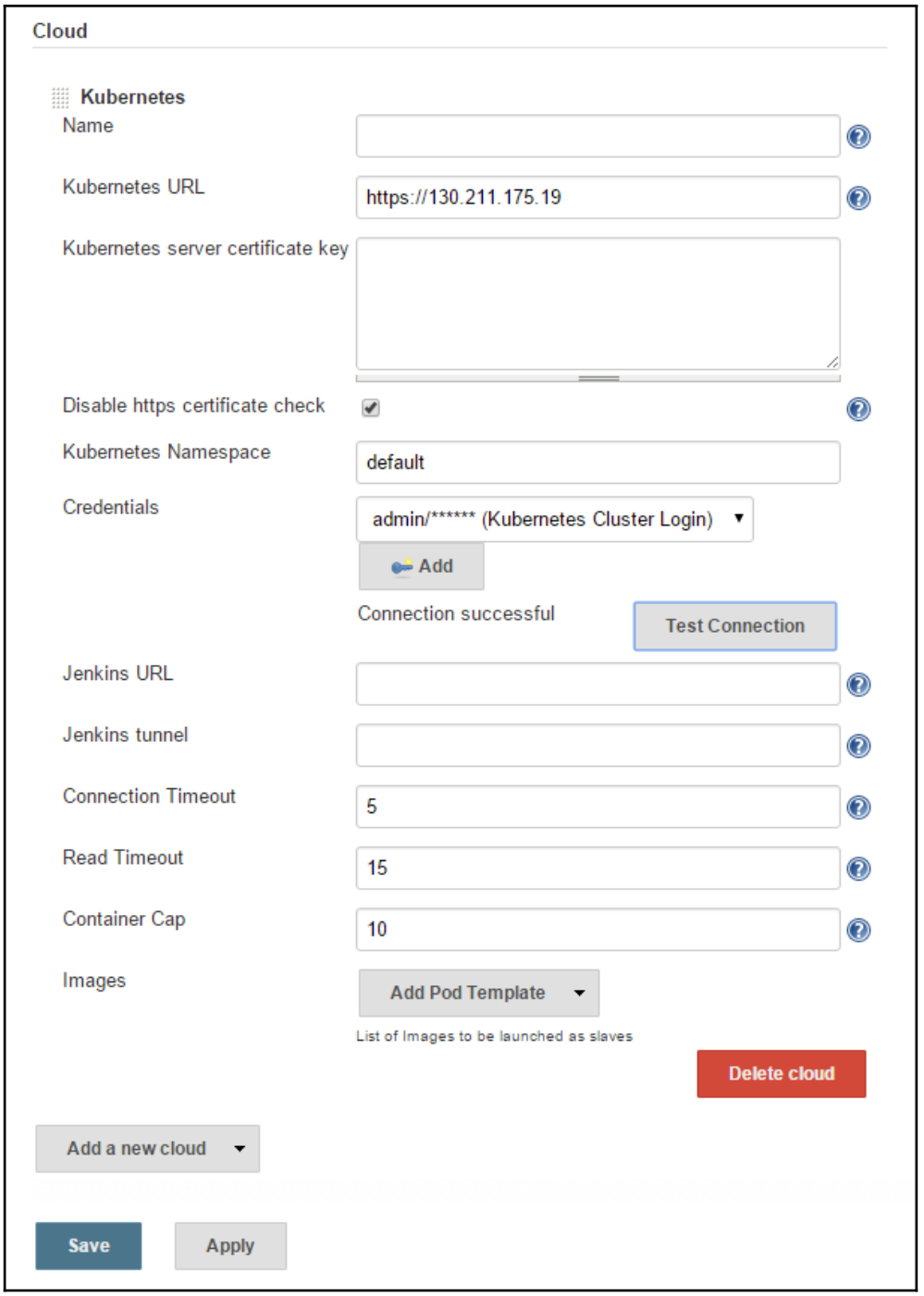
Chapter 7: Continuous Delivery

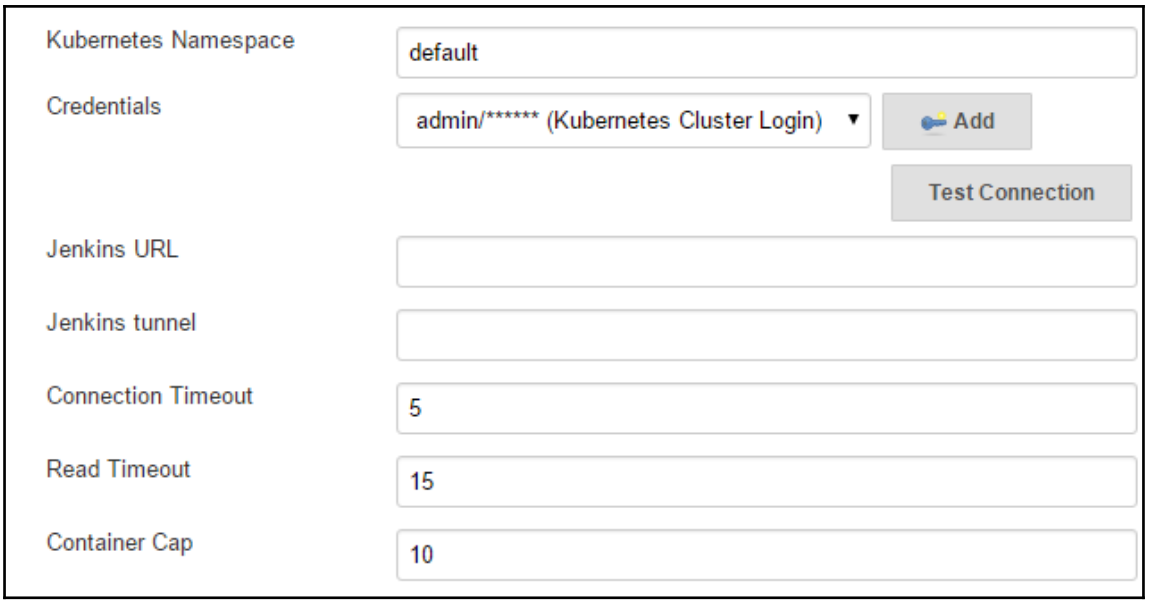


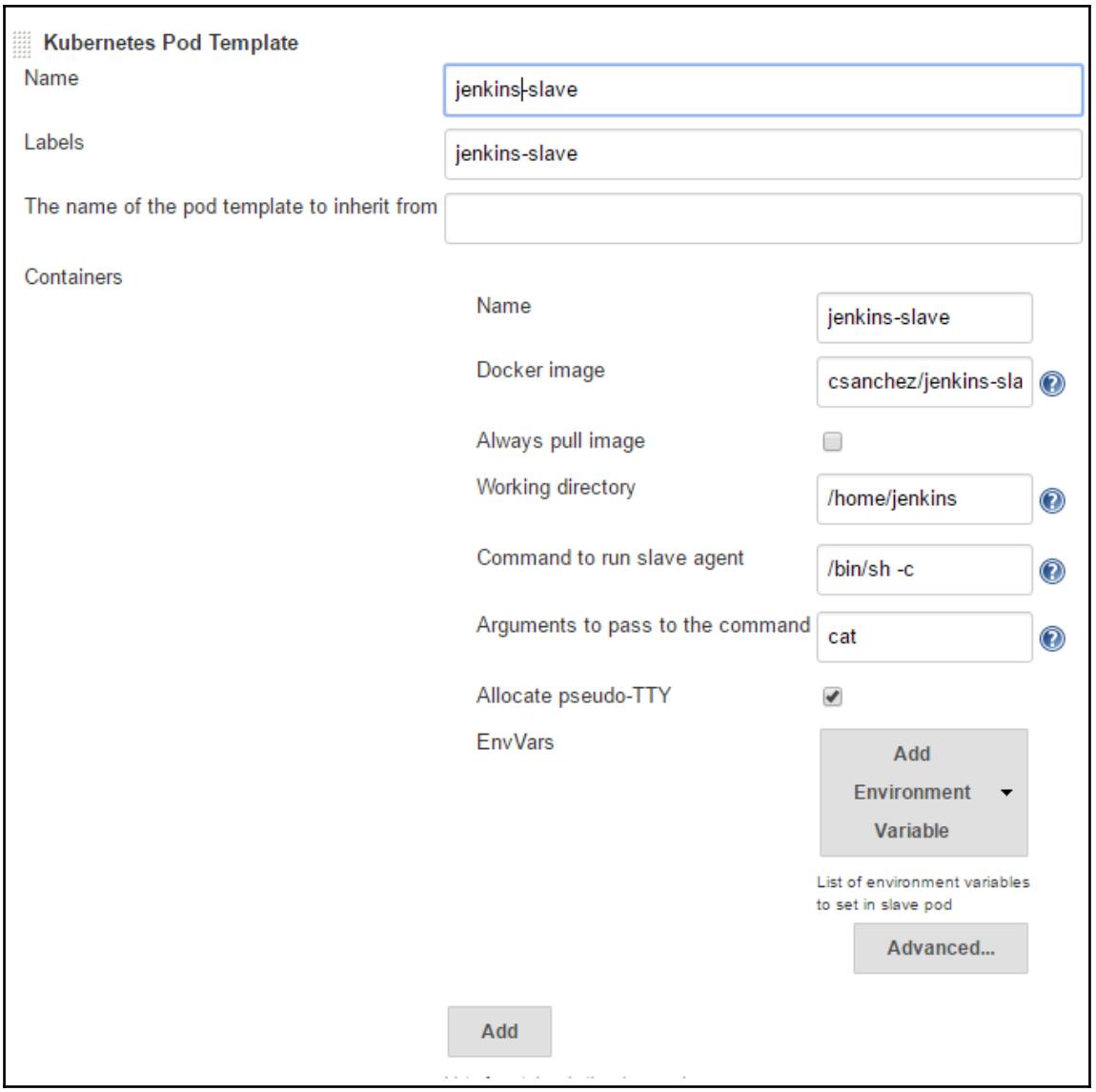

Filter:
Updates
Available
Installed
Advanced
Enabled
Name ↓
Version
Previously installed version
Pinned
Uninstall
Amazon EC2 plugin
Allow Jenkins to start slaves on EC2 or Eucalyptus on demand, and kill them as they get unused.
1.29
Downgrade to 1.28
Uninstall
Ant Plugin
This plugin adds Apache Ant support to Jenkins.
1.2
build-env-propagator
Copies environment variables added or modified during one build to the next.
1.0
Uninstall
CloudBees Build Flow plugin
Manage jobs orchestration as a dedicated "build flow" top level item
0.18
Downgrade to 0.17
Uninstall
Cobertura Plugin
This plugin integrates Cobertura coverage reports to Jenkins.
1.9.7
Downgrade to 1.9.5
Uninstall
Config File Provider Plugin
Ability to provide configuration files (e.g. settings.xml for maven, XML, groovy, custom files,...) loaded through the UI which will be copied to the job workspace.
2.9.3
Uninstall
Copy Artifact Plugin
Adds a build step to copy artifacts from another project.
1.35.2
Downgrade to 1.32.1
Uninstall
Credentials Plugin
This plugin allows you to store credentials in Jenkins.
1.23
Downgrade to 1.18
Unpin
CVS Plug-in
Integrates Jenkins with CVS version control system using a modified version of the Netbeans cvsclient.
2.11
Downgrade to 2.8
Dashboard View
Customizable dashboard that can present various views of job information.
2.9.6
Downgrade to 2.9.4
Uninstall
disk-usage plugin
This plugin counts disk usage.
0.25
Downgrade to 0.24
Uninstall
Durable Task Plugin
Library offering an extension point for processes which can run outside of Jenkins yet be monitored
1.6
Uninstall


Jenkins ▸ Update center
ENABLE AUTO REFRESH
Pipeline: Model API Success
Pipeline: Stage Tags Metadata Success
Pipeline: Declarative Agent API Success
Pipeline: Model Definition Success
SSH Credentials Plugin Success
Git client plugin Success
GIT server Plugin Success
Pipeline: Shared Groovy Libraries Success
Pipeline Success
GitHub API Plugin Success
Git plugin Success
GitHub plugin Success
GitHub Branch Source Plugin Success
GitHub Organization Folder Plugin Success
Pipeline: Stage View Plugin Success
Git plugin Success
MapDB API Plugin Success
Subversion Plug-in Success
SSH Slaves plugin Success
Matrix Authorization Strategy Plugin Success
PAM Authentication plugin Success
LDAP Plugin Success
Email Extension Plugin Success
Mailer Plugin Success
Kubernetes plugin Success
Go back to the top page
(you can start using the installed plugins right away)
Restart Jenkins when installation is complete and no jobs are running


Jenkins
admin
| log out
Jenkins
Credentials
System
Global credentials (unrestricted)
Back to credential domains
Add Credentials
Kind
Username with password
Scope
Global (Jenkins, nodes, items, all child items, etc)
Username
admin
Password
ID
Description
Kubernetes Admin Credentials
OK


Cloud
Kubernetes
Name
Kubernetes URL
https://130.211.175.19
Kubernetes server certificate key
Disable https certificate check
Kubernetes Namespace
default
Credentials
admin/****** (Kubernetes Cluster Login)
Add
Connection successful
Test Connection
Jenkins URL
Jenkins tunnel
Connection Timeout
5
Read Timeout
15
Container Cap
10
Images
Add Pod Template
List of Images to be launched as slaves
Delete cloud
Add a new cloud
Save
Apply

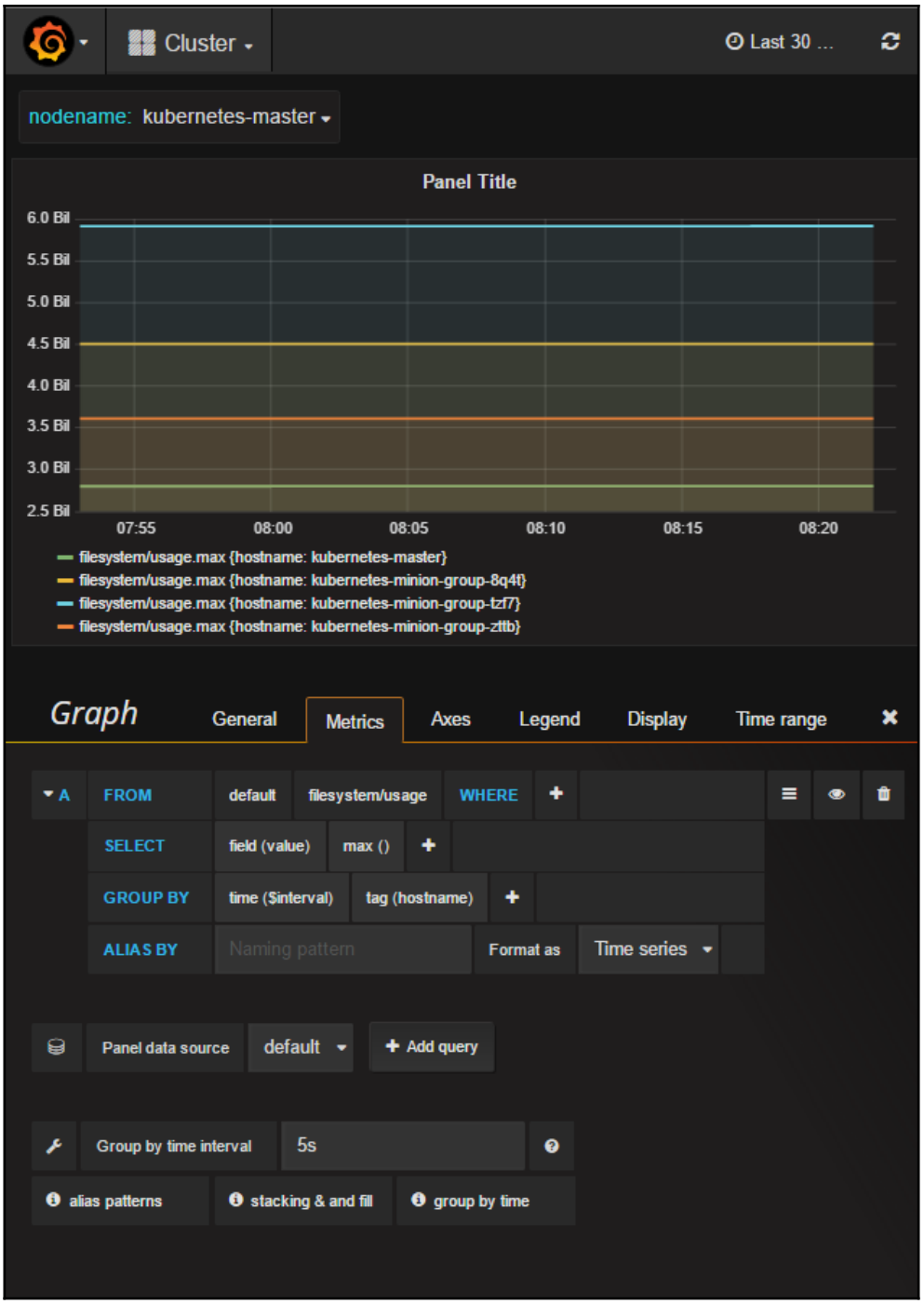

Kubernetes Namespace
default
Credentials
admin/****** (Kubernetes Cluster Login)
Add
Test Connection
Jenkins URL
Jenkins tunnel
Connection Timeout
5
Read Timeout
15
Container Cap
10

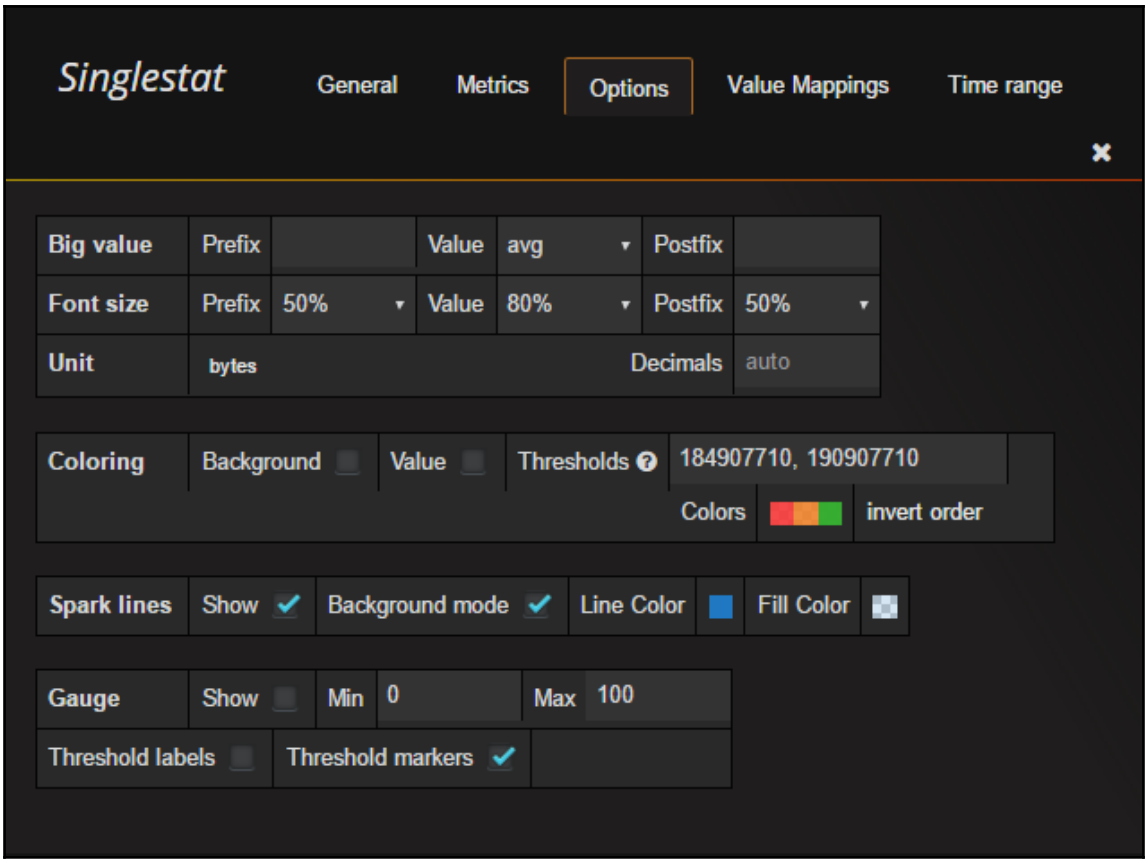

Kubernetes Pod Template
Name
jenkins-slave
Labels
jenkins-slave
The name of the pod template to inherit from
Containers
Name
jenkins-slave
Docker image
csanchez/jenkins-sla
Always pull image
Working directory
/home/jenkins
Command to run slave agent
/bin/sh -c
Arguments to pass to the command
cat
Allocate pseudo-TTY
EnvVars
Add Environment Variable
List of environment variables to set in slave pod
Advanced...
Add

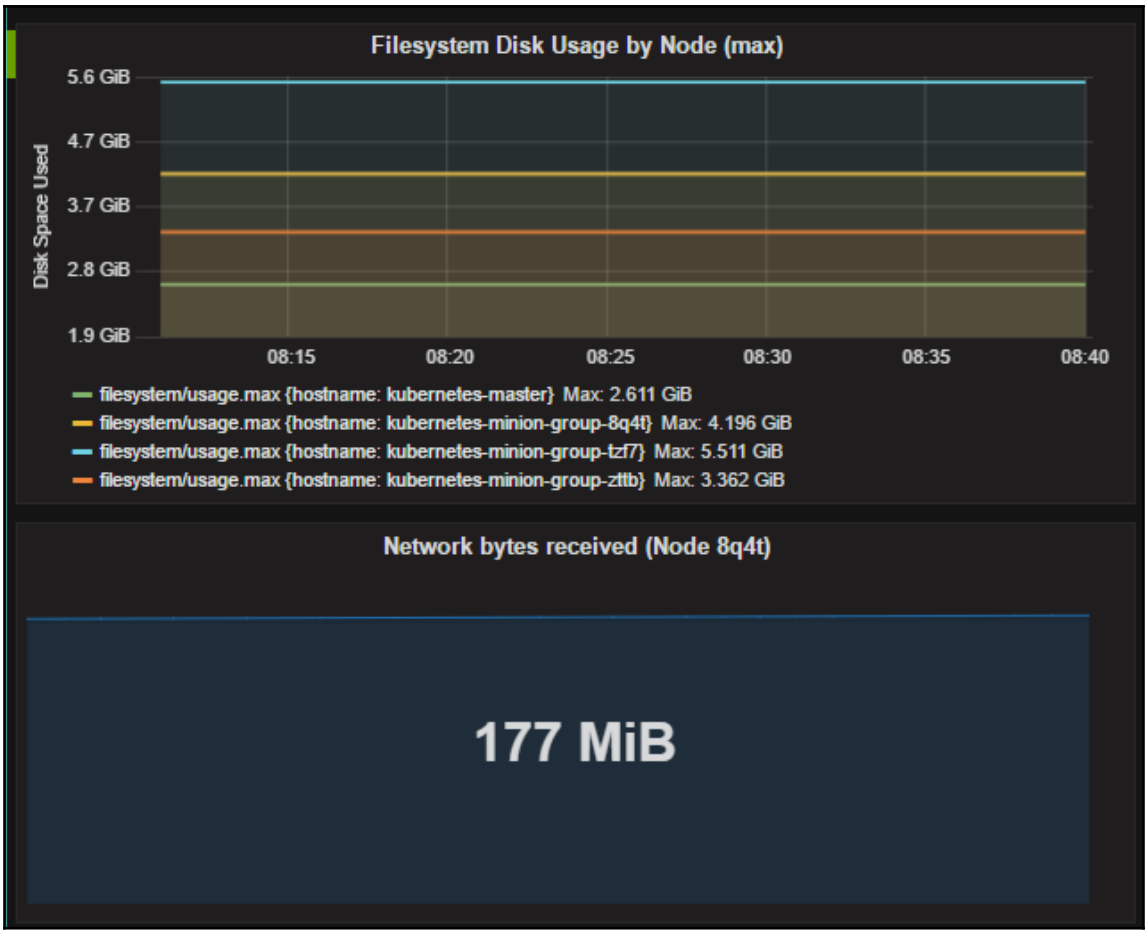
Chapter 8: Monitoring and Logging

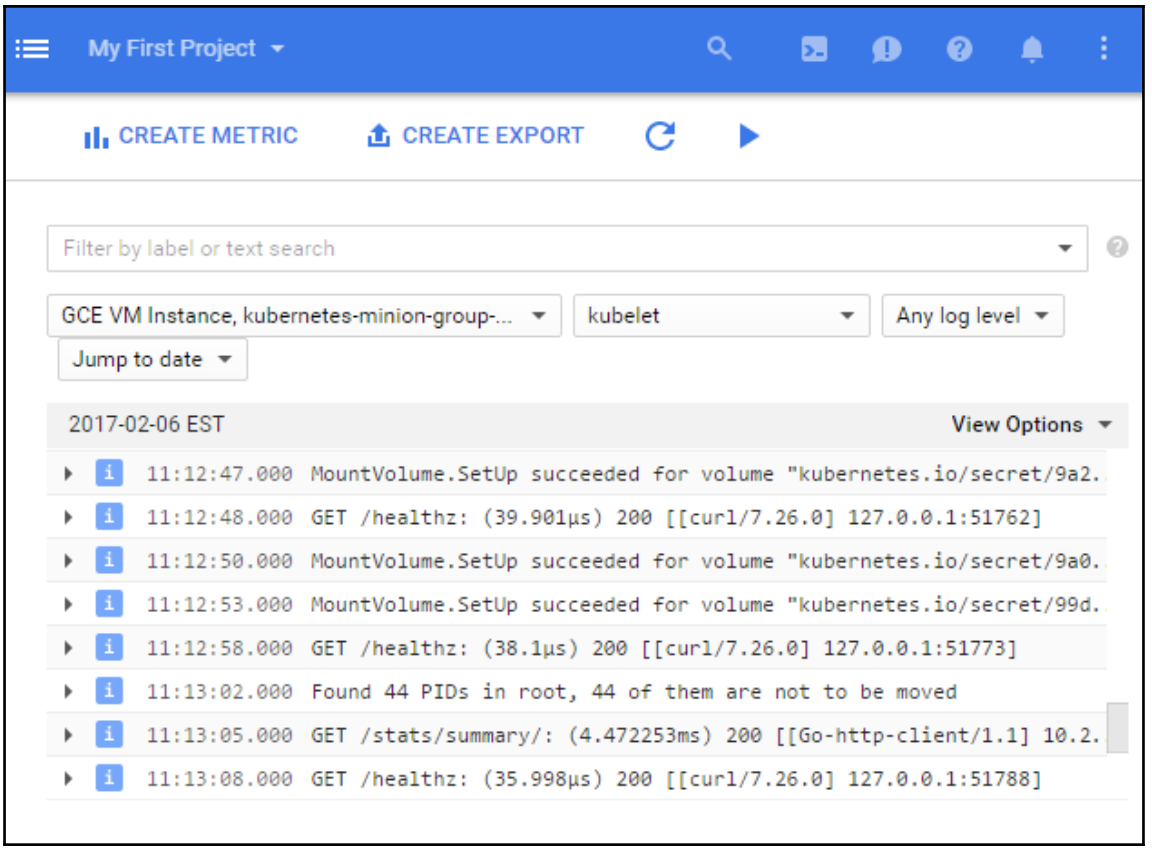
```
NAME                                                READY     STATUS    RESTARTS   AGE
etcd-empty-dir-cleanup-kubernetes-master            1/1       Running   2          2d
etcd-server-events-kubernetes-master                1/1       Running   2          2d
etcd-server-kubernetes-master                       1/1       Running   2          2d
fluentd-cloud-logging-kubernetes-master             1/1       Running   2          2d
fluentd-cloud-logging-kubernetes-minion-group-rh7t  1/1       Running   0          3m
fluentd-cloud-logging-kubernetes-minion-group-s345  1/1       Running   0          3m
fluentd-cloud-logging-kubernetes-minion-group-tp2h  1/1       Running   0          3m
heapster-v1.2.0-2805816975-80mjc                    4/4       Running   0          20h
kube-addon-manager-kubernetes-master                1/1       Running   2          2d
kube-apiserver-kubernetes-master                    1/1       Running   4          2d
kube-controller-manager-kubernetes-master           1/1       Running   2          2d
kube-dns-4101612645-bwsd4                           4/4       Running   0          20h
kube-dns-autoscaler-2715466192-gt3r7                1/1       Running   0          20h
kube-proxy-kubernetes-minion-group-rh7t             1/1       Running   0          4m
kube-proxy-kubernetes-minion-group-s345             1/1       Running   0          4m
kube-proxy-kubernetes-minion-group-tp2h             1/1       Running   0          3m
kube-scheduler-kubernetes-master                    1/1       Running   2          2d
kubernetes-dashboard-3543765157-65g1m               1/1       Running   0          20h
l7-default-backend-2234341178-g4wct                 1/1       Running   0          20h
l7-lb-controller-v0.8.0-kubernetes-master           1/1       Running   2          2d
monitoring-influxdb-grafana-v4-7x0n0                2/2       Running   0          20h
node-problem-detector-v0.1-1zfml                    1/1       Running   0          4m
node-problem-detector-v0.1-cjrtz                    1/1       Running   0          4m
node-problem-detector-v0.1-f87pp                    1/1       Running   2          2d
node-problem-detector-v0.1-vj001                    1/1       Running   0          4m
rescheduler-v0.2.1-kubernetes-master                1/1       Running   2          2d
```

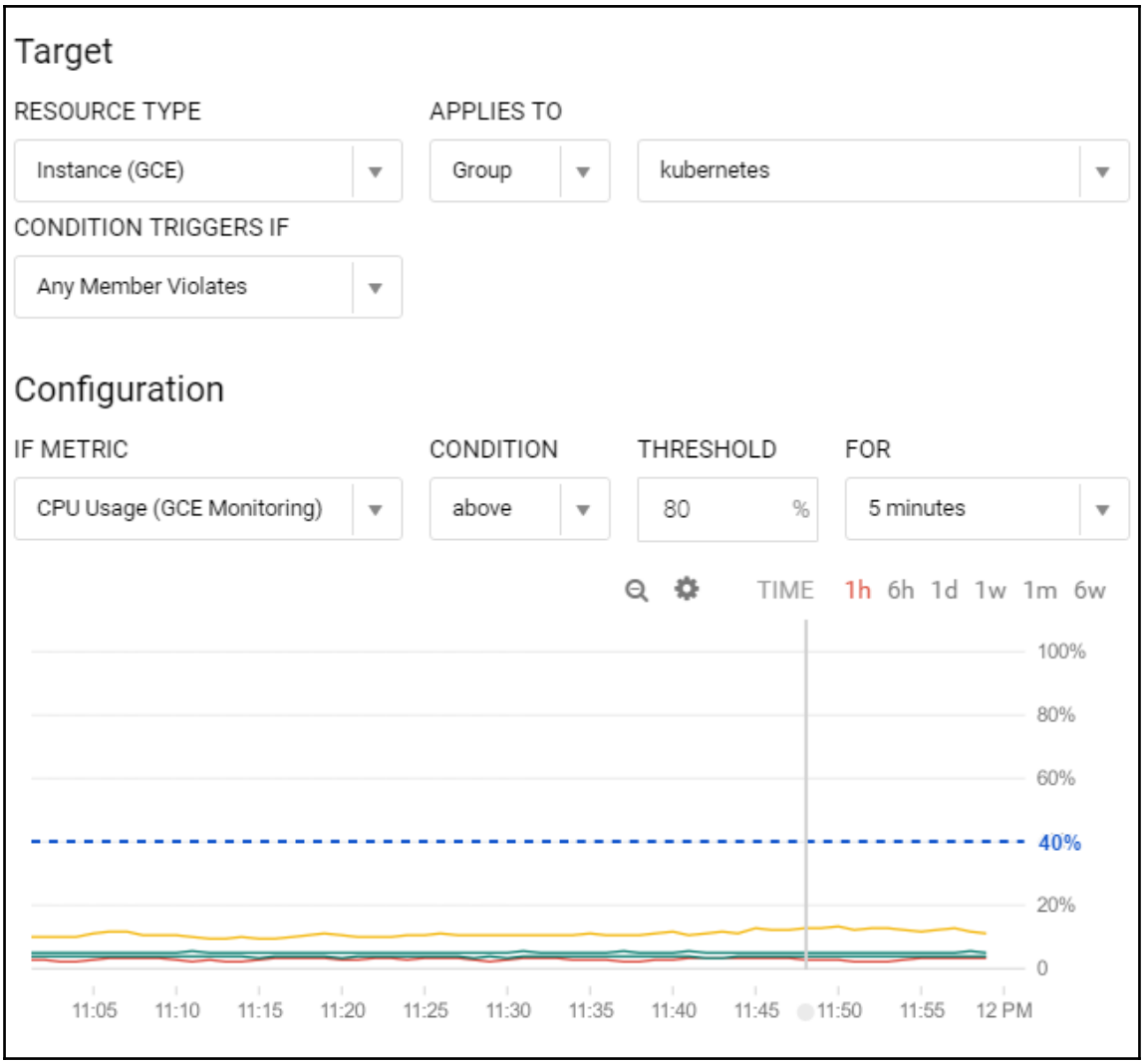
```
Name:           heapster-v1.2.0-2805816975-80mjc
Namespace:      kube-system
Node:           kubernetes-minion-group-rh7t/10.128.0.4
Start Time:     Thu, 02 Feb 2017 19:56:50 +0000
Labels:         k8s-app=heapster
                pod-template-hash=2805816975
                version=v1.2.0
Status:         Running
IP:             10.244.7.5
Controllers:    ReplicaSet/heapster-v1.2.0-2805816975
```

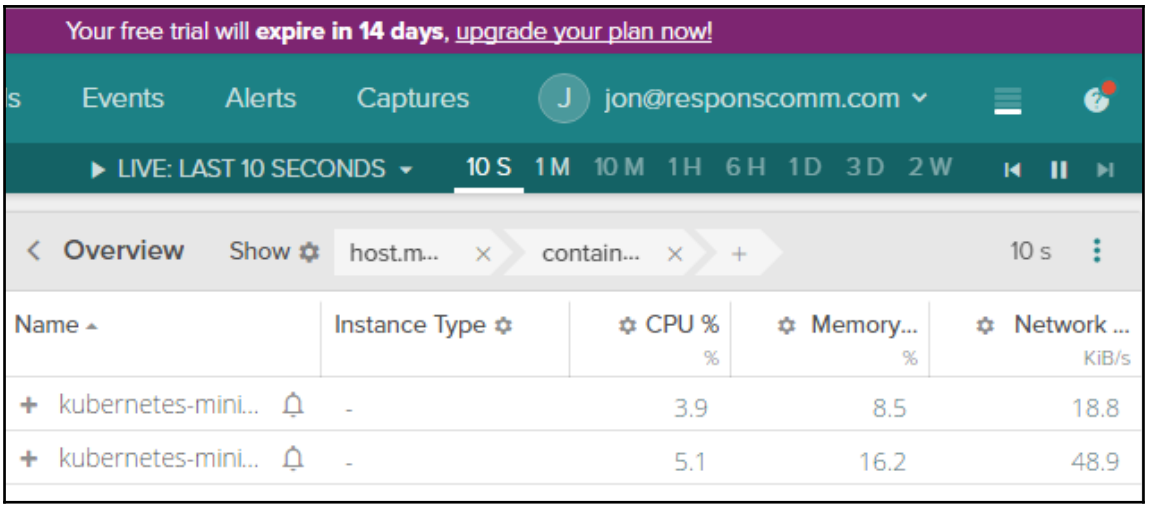

Cluster
Last 30 ...
nodename: kubernetes-master
Panel Title
6.0 Bil
5.5 Bil
5.0 Bil
4.5 Bil
4.0 Bil
3.5 Bil
3.0 Bil
2.5 Bil
07:55
08:00
08:05
08:10
08:15
08:20
filesystem/usage.max {hostname: kubernetes-master}
filesystem/usage.max {hostname: kubernetes-minion-group-8q4t}
filesystem/usage.max {hostname: kubernetes-minion-group-tzf7}
filesystem/usage.max {hostname: kubernetes-minion-group-zttb}
Graph
General
Metrics
Axes
Legend
Display
Time range
A
FROM
default
filesystem/usage
WHERE
SELECT
field (value)
max ()
GROUP BY
time ($interval)
tag (hostname)
ALIAS BY
Naming pattern
Format as
Time series
Panel data source
default
Add query
Group by time interval
5s
alias patterns
stacking & and fill
group by time

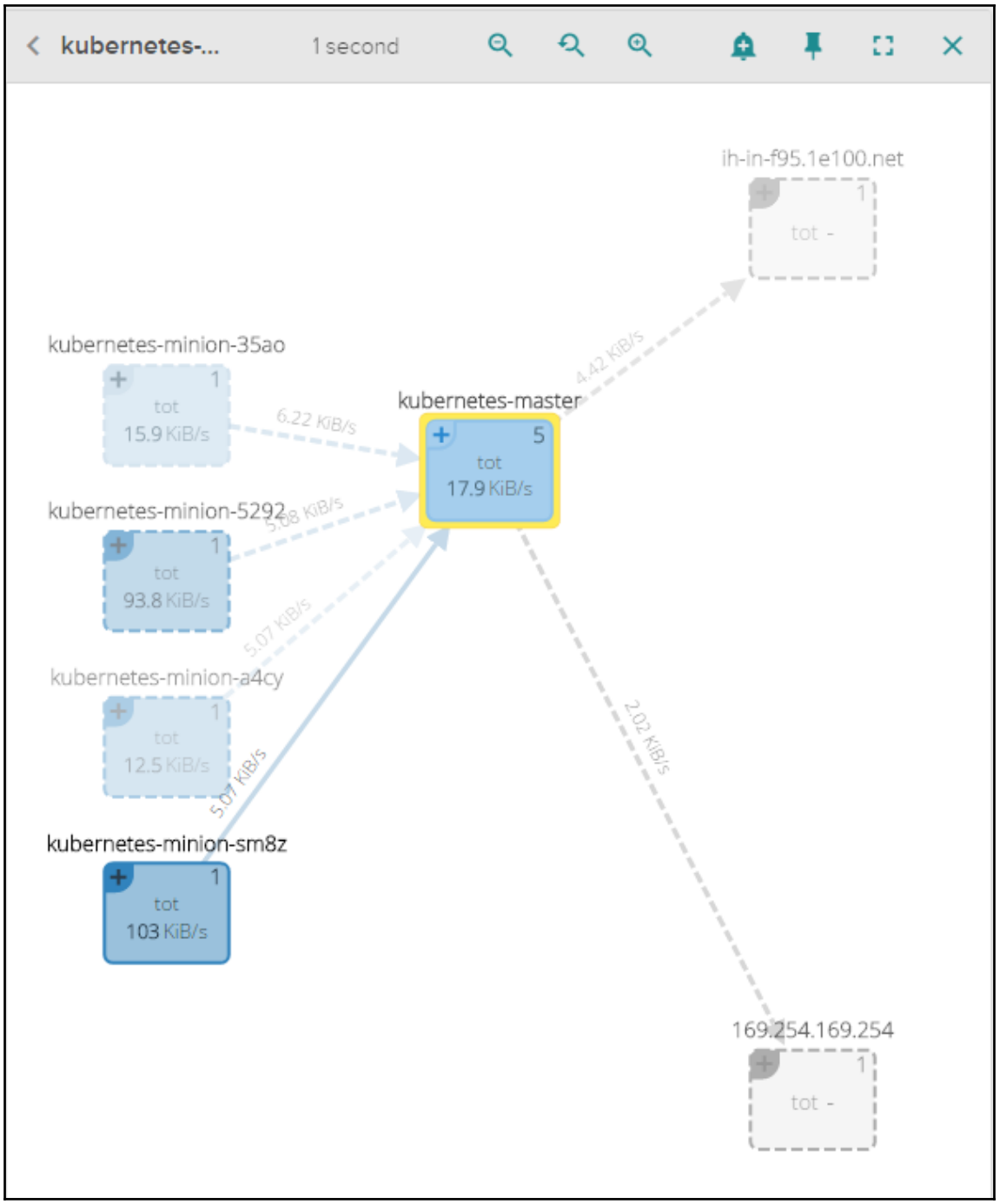

Singlestat
General
Metrics
Options
Value Mappings
Time range
Big value
Prefix
Value
avg
Postfix
Font size
Prefix
50%
Value
80%
Postfix
50%
Unit
bytes
Decimals
auto
Coloring
Background
Value
Thresholds
184907710, 190907710
Colors
invert order
Spark lines
Show
Background mode
Line Color
Fill Color
Gauge
Show
Min
0
Max
100
Threshold labels
Threshold markers

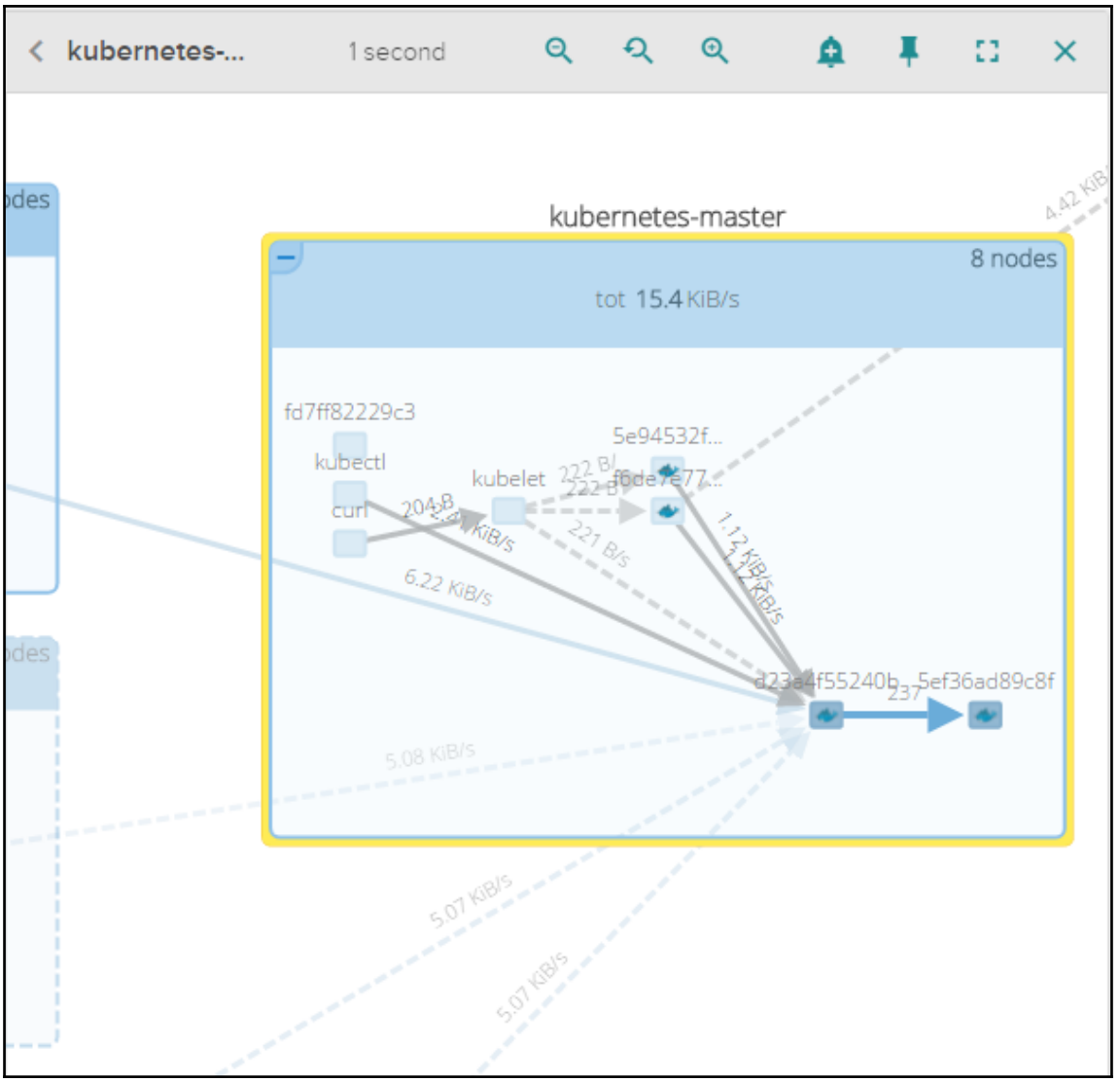

Filesystem Disk Usage by Node (max)
Disk Space Used
5.6 GiB
4.7 GiB
3.7 GiB
2.8 GiB
1.9 GiB
08:15
08:20
08:25
08:30
08:35
08:40
filesystem/usage.max {hostname: kubernetes-master} Max: 2.611 GiB
filesystem/usage.max {hostname: kubernetes-minion-group-8q4t} Max: 4.196 GiB
filesystem/usage.max {hostname: kubernetes-minion-group-tzf7} Max: 5.511 GiB
filesystem/usage.max {hostname: kubernetes-minion-group-zttb} Max: 3.362 GiB
Network bytes received (Node 8q4t)
177 MiB

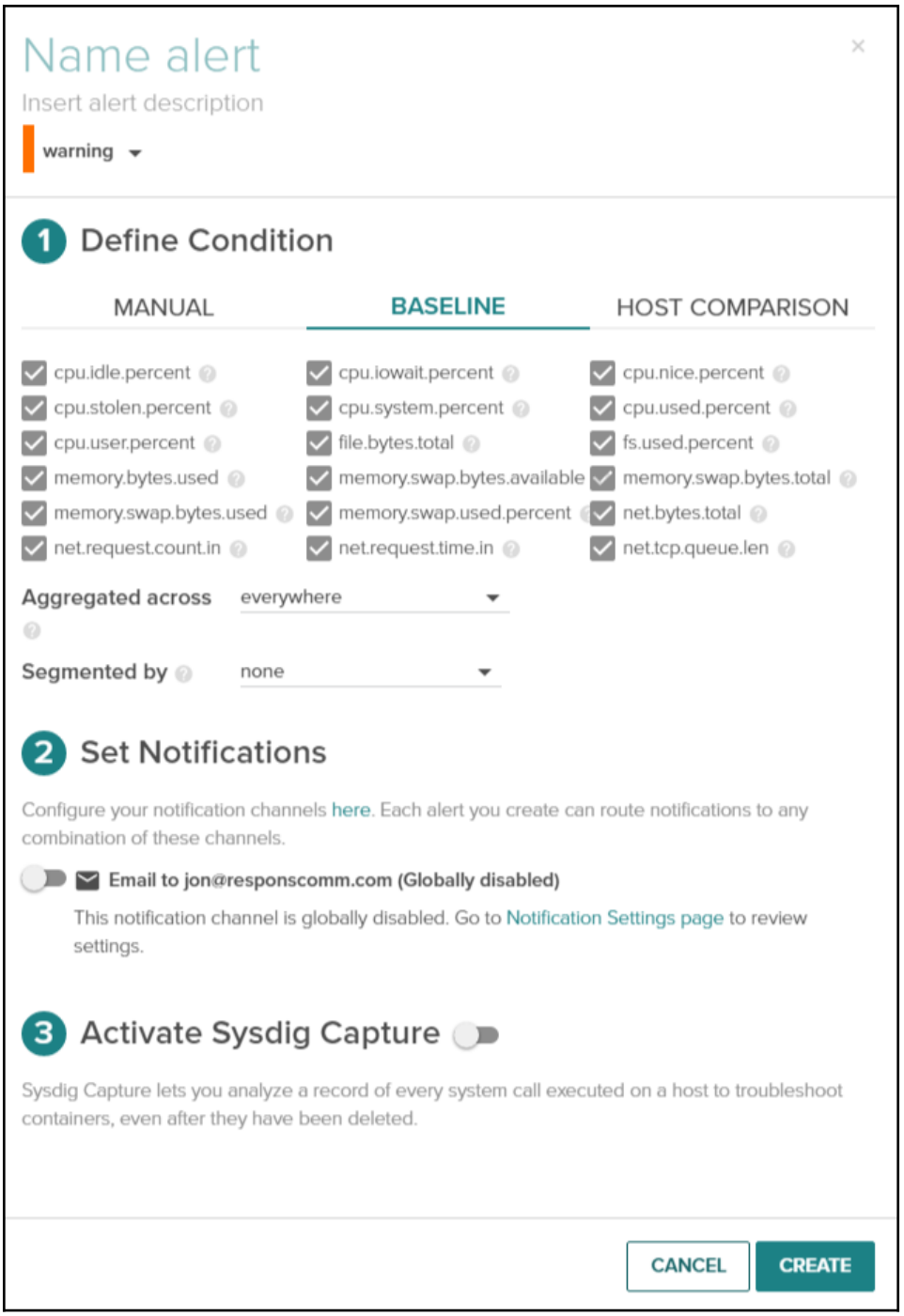

My First Project
CREATE METRIC
CREATE EXPORT
Filter by label or text search
GCE VM Instance, kubernetes-minion-group-...
kubelet
Any log level
Jump to date
2017-02-06 EST
View Options
11:12:47.000 MountVolume.SetUp succeeded for volume "kubernetes.io/secret/9a2.
11:12:48.000 GET /healthz: (39.901µs) 200 [[curl/7.26.0] 127.0.0.1:51762]
11:12:50.000 MountVolume.SetUp succeeded for volume "kubernetes.io/secret/9a0.
11:12:53.000 MountVolume.SetUp succeeded for volume "kubernetes.io/secret/99d.
11:12:58.000 GET /healthz: (38.1µs) 200 [[curl/7.26.0] 127.0.0.1:51773]
11:13:02.000 Found 44 PIDs in root, 44 of them are not to be moved
11:13:05.000 GET /stats/summary/: (4.472253ms) 200 [[Go-http-client/1.1] 10.2.
11:13:08.000 GET /healthz: (35.998µs) 200 [[curl/7.26.0] 127.0.0.1:51788]


Target
RESOURCE TYPE
Instance (GCE)
APPLIES TO
Group
kubernetes
CONDITION TRIGGERS IF
Any Member Violates
Configuration
IF METRIC
CPU Usage (GCE Monitoring)
CONDITION
above
THRESHOLD
80
%
FOR
5 minutes
TIME
1h
6h
1d
1w
1m
6w
100%
80%
60%
40%
20%
0
11:05
11:10
11:15
11:20
11:25
11:30
11:35
11:40
11:45
11:50
11:55
12 PM


Your free trial will expire in 14 days, upgrade your plan now!
ls
Events
Alerts
Captures
J
jon@responscomm.com
LIVE: LAST 10 SECONDS
10 S
1 M
10 M
1 H
6 H
1 D
3 D
2 W
Overview
Show
host.m...
contain...
10 s
Name
Instance Type
CPU %
%
Memory...
%
Network ...
KiB/s
kubernetes-mini...
-
3.9
8.5
18.8
kubernetes-mini...
-
5.1
16.2
48.9


kubernetes-...
1 second
ih-in-f95.1e100.net
1
tot -
kubernetes-minion-35ao
1
tot
15.9 KiB/s
6.22 KiB/s
kubernetes-master
5
tot
17.9 KiB/s
4.42 KiB/s
kubernetes-minion-5292
1
tot
93.8 KiB/s
5.08 KiB/s
5.07 KiB/s
kubernetes-minion-a4cy
1
tot
12.5 KiB/s
5.07 KiB/s
kubernetes-minion-sm8z
1
tot
103 KiB/s
2.02 KiB/s
169.254.169.254
1
tot -


kubernetes-...
1 second
kubernetes-master
8 nodes
tot 15.4 KiB/s
fd7ff82229c3
kubectl
curl
kubelet
5e94532f...
f6de7e77...
204 B
2.4 KiB/s
222 B/
222 B
221 B/s
1.12 KiB/s
1.12 KiB/s
6.22 KiB/s
d23a4f55240b
237
5ef36ad89c8f
5.08 KiB/s
5.07 KiB/s
5.07 KiB/s
4.42 KiB


Name alert
Insert alert description
warning
1 Define Condition
MANUAL
BASELINE
HOST COMPARISON
cpu.idle.percent
cpu.iowait.percent
cpu.nice.percent
cpu.stolen.percent
cpu.system.percent
cpu.used.percent
cpu.user.percent
file.bytes.total
fs.used.percent
memory.bytes.used
memory.swap.bytes.available
memory.swap.bytes.total
memory.swap.bytes.used
memory.swap.used.percent
net.bytes.total
net.request.count.in
net.request.time.in
net.tcp.queue.len
Aggregated across
everywhere
Segmented by
none
2 Set Notifications
Configure your notification channels here. Each alert you create can route notifications to any combination of these channels.
Email to jon@responscomm.com (Globally disabled)
This notification channel is globally disabled. Go to Notification Settings page to review settings.
3 Activate Sysdig Capture
Sysdig Capture lets you analyze a record of every system call executed on a host to troubleshoot containers, even after they have been deleted.
CANCEL
CREATE

```
Bytes          Process         Host_pid        Container_pid   container.name
--------------------------------------------------------------------------------
79.06KB        kube-apise      5152            15              host
58.10KB        etcd            5211            10              host
6.29KB         dragent         19284           19292           host
4.52KB         kube-contr      5164            11              host
4.11KB         etcd            5211            11              host
1.95KB         kube-sched      5227            13              host
1.72KB         sshd            18963           18963           host
```

```
Viewing: Threads For: whole machine
Source: Live System Filter: evt.type!=switch
    PID     TID     CPU    FILE     NET Command
   5152    5152    1.00  560.50  63.68K /usr/local/bin/kube-apiserver --address=127.0.0.
   5152    5153    0.50    0.00    0.00 /usr/local/bin/kube-apiserver --address=127.0.0.
   5152    5154    0.00    0.00    0.00 /usr/local/bin/kube-apiserver --address=127.0.0.
   5152   28713    0.00    0.00    0.00 /usr/local/bin/kube-apiserver --address=127.0.0.
   5152    5161    0.00    0.00    0.00 /usr/local/bin/kube-apiserver --address=127.0.0.
   5152   13254    0.00  191.00   6.75K /usr/local/bin/kube-apiserver --address=127.0.0.
   5152   15161    0.00  100.50    2.50 /usr/local/bin/kube-apiserver --address=127.0.0.

F1Help  F2Views  F4FilterF5Echo  F6Dig  F7LegendCTRL+FSearchp Pause          1/7(14.3%)
```

Chapter 9: Cluster Federation

```
CURRENT   NAME          CLUSTER       AUTHINFO      NAMESPACE
          awsk8s        awsk8s        awsk8s
*         gcek8s        gcek8s        gcek8s
```

```
CURRENT   NAME          CLUSTER       AUTHINFO      NAMESPACE
          awsk8s        awsk8s        awsk8s
*         gcek8s        gcek8s        gcek8s
          master-control   master-control   master-control
```

```
NAME                                                READY     STATUS
RESTARTS   AGE
master-control-apiserver-3595964982-s61x9           2/2       Running
0          8m
master-control-controller-manager-516854663-r8m37   1/1       Running
0          8m
```

```
the server doesn't have a resource type "pods"
```

```
Name:                   node-js-deploy
Namespace:              default
CreationTimestamp:      Fri, 10 Mar 2017 22:15:11 +0000
Labels:                 name=node-js-deploy
Selector:               name=node-js-deploy
Replicas:               0 updated | 3 total | 3 available | 0 unavailable
StrategyType:           RollingUpdate
MinReadySeconds:        0
RollingUpdateStrategy:  1 max unavailable, 1 max surge
Events:
  FirstSeen     LastSeen        Count   From
SubObjectPath   Type            Reason          Message
  ---------     --------        -----   ----
-------------   --------        ------          -------
  4m            4m              1       {federated-deployment-controller }
Normal          CreateInCluster Creating deployment in cluster gcek8s
  4m            4m              1       {federated-deployment-controller }
Normal          CreateInCluster Creating deployment in cluster awsk8s
```

```
LASTSEEN   FIRSTSEEN   COUNT     NAME            KIND         SUBOBJECT   TYPE
    REASON             SOURCE                                MESSAGE
10m        10m         1         node-js-deploy  Deployment               Normal
  CreateInCluster  {federated-deployment-controller }  Creating deployment in
 cluster gcek8s
10m        10m         1         node-js-deploy  Deployment               Normal
  CreateInCluster  {federated-deployment-controller }  Creating deployment in
 cluster awsk8s
```

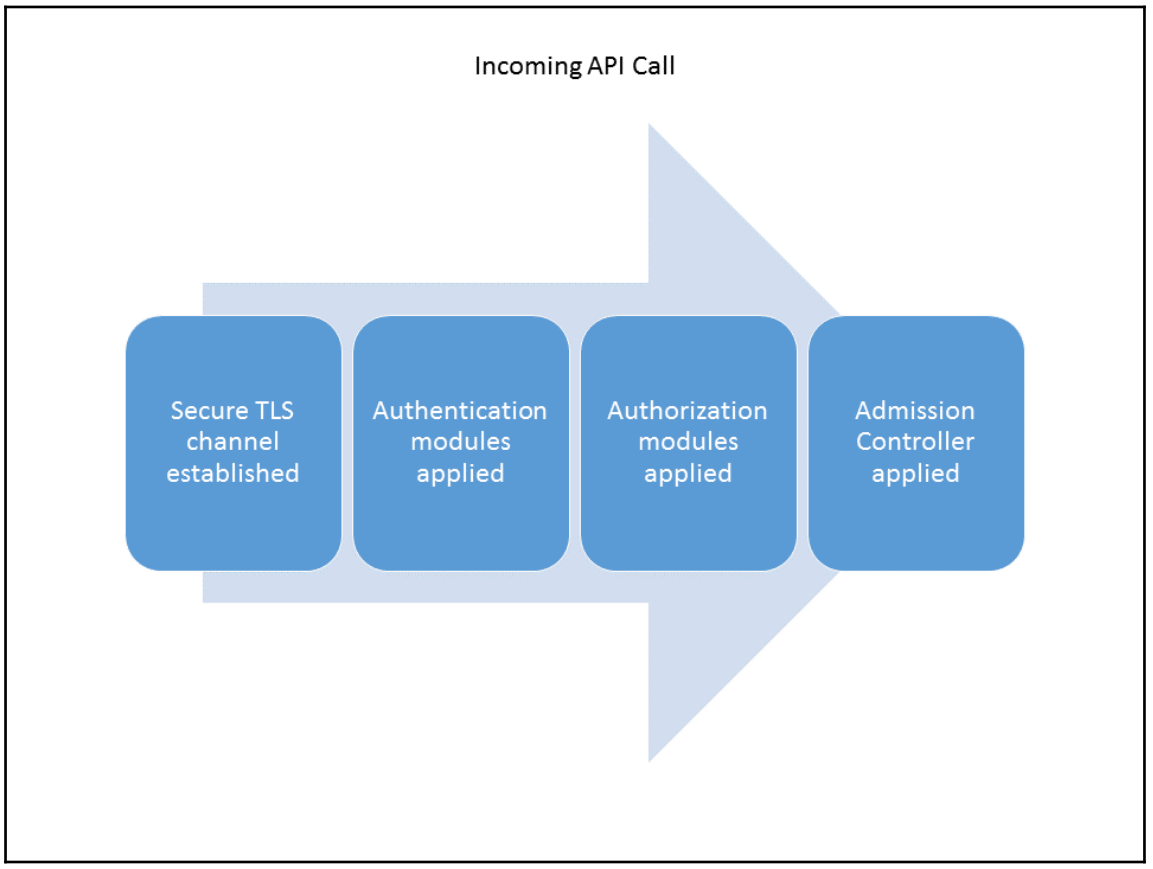
```
NAME                                READY     STATUS    RESTARTS   AGE
node-js-deploy-1713031517-1661z     1/1       Running   0          7m
```

```
NAME                                READY     STATUS    RESTARTS   AGE
node-js-deploy-1713031517-bvdmf     1/1       Running   0          7m
node-js-deploy-1713031517-jnfnr     1/1       Running   0          7m
```

```
apiVersion: v1
data:
  backend-service.url: my-backend-service
kind: ConfigMap
metadata:
  creationTimestamp: 2017-03-10T22:28:38Z
  name: my-application-config
  namespace: default
  resourceVersion: "1959"
  selfLink: /api/v1/namespaces/default/configmaps/my-application-config
  uid: e85a0028-05e0-11e7-bdf8-42010a800002
```

```
NAME                                READY     STATUS    RESTARTS   AGE
node-js-deploy-1713031517-cmd7q     1/1       Running   0          39m
node-js-deploy-1713031517-zncxr     1/1       Running   0          39m
node-js-rs-6g7nj                    1/1       Running   0          9m
node-js-rs-f4w7b                    1/1       Running   0          9m
```

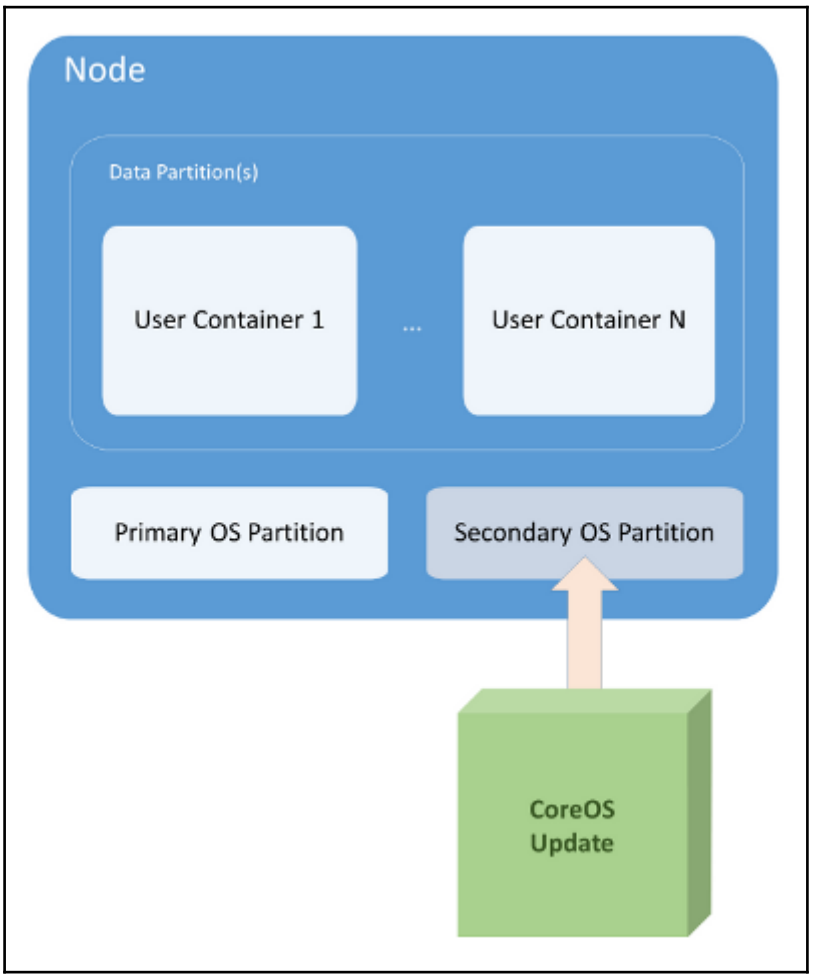
Chapter 10: Container Security

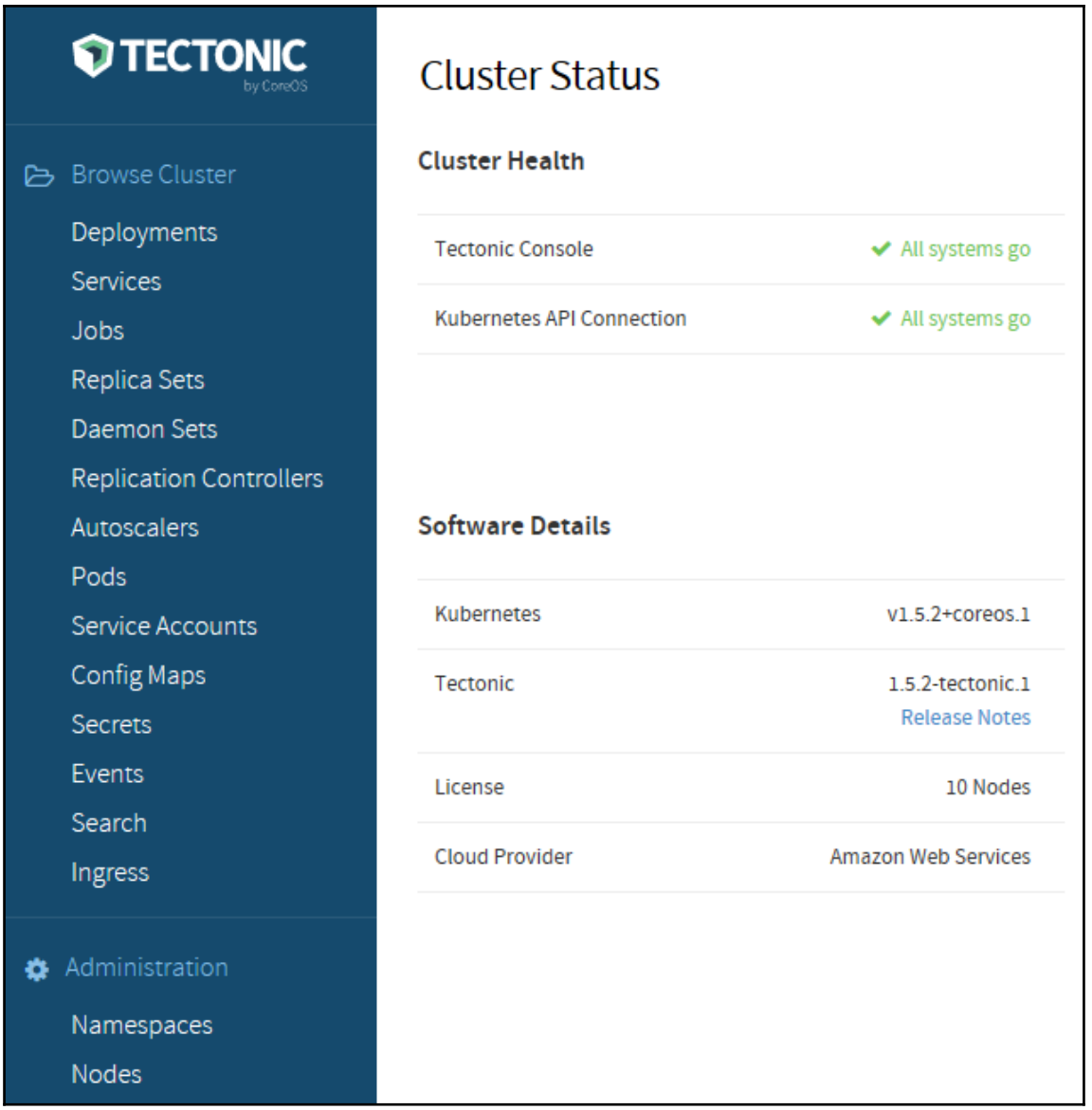


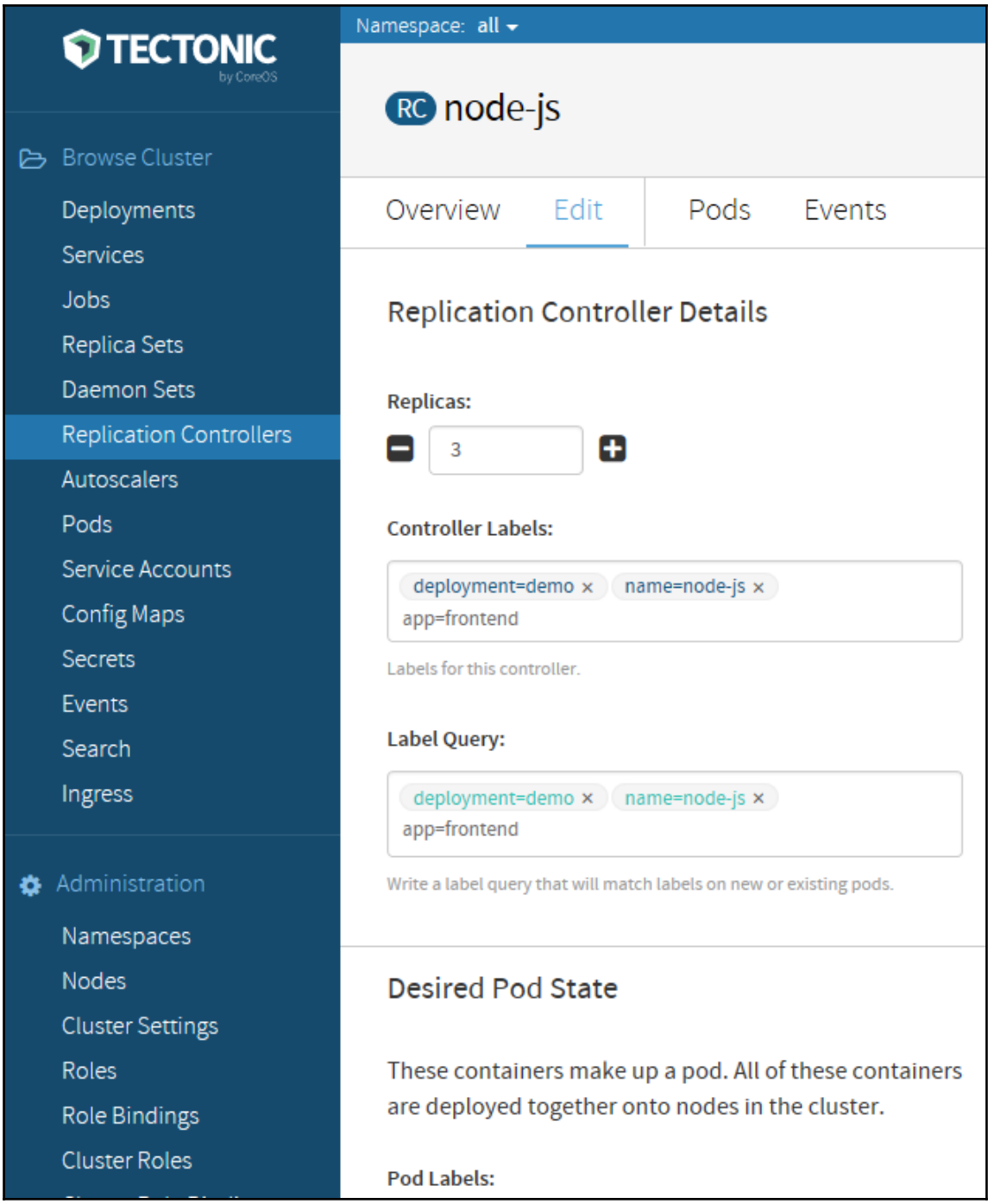
```
Error from server (Forbidden): error when creating "nodejs-pod-nopsc.yaml": pods
 "node-js-nopsc" is forbidden: no providers available to validate pod request
```

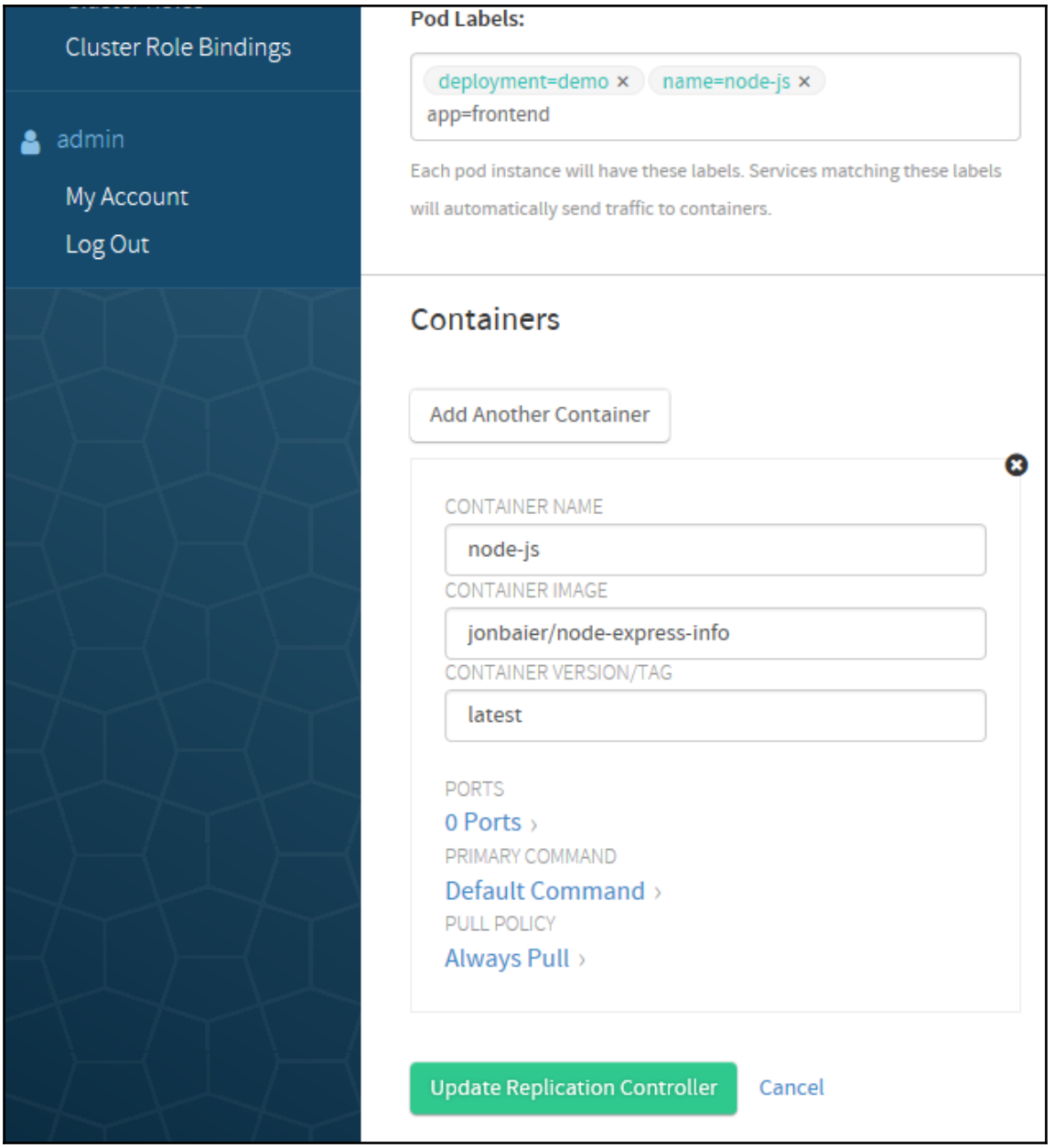
```
NAME                READY     STATUS                RESTARTS   AGE
node-js-4zk2s       1/1       Running               0          1h
node-js-77gq7       1/1       Running               0          1h
node-js-g3pvq       1/1       Running               0          1h
node-js-pod         0/1       VerifyNonRootError    0          36s
node-js-rs-852pj    1/1       Running               0          1h
node-js-rs-9zh42    1/1       Running               0          1h
node-js-rs-cnp7b    1/1       Running               0          1h
```

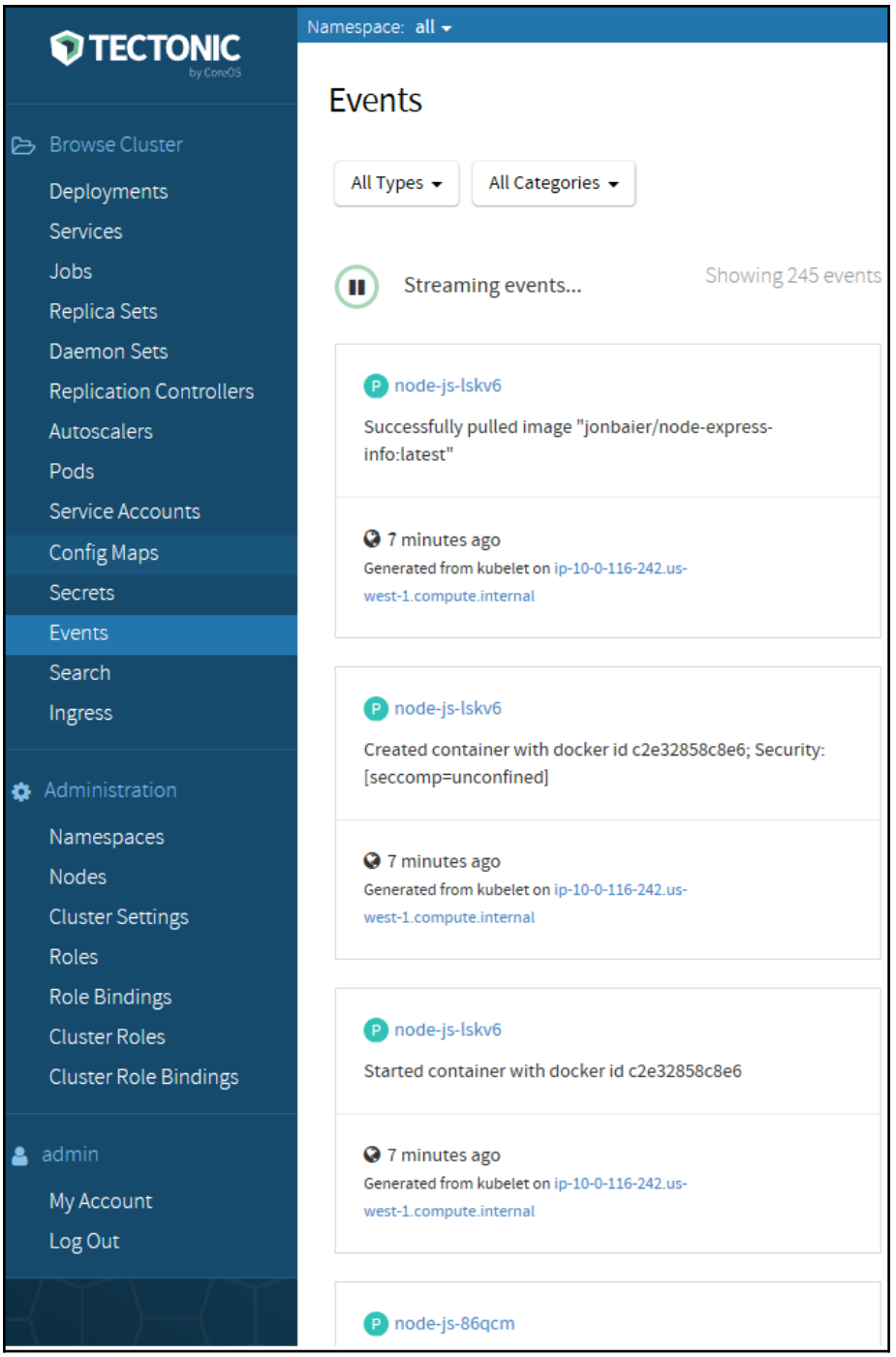
Chapter 11: Extending Kubernetes with OCP, CoreOS, and Tectonic

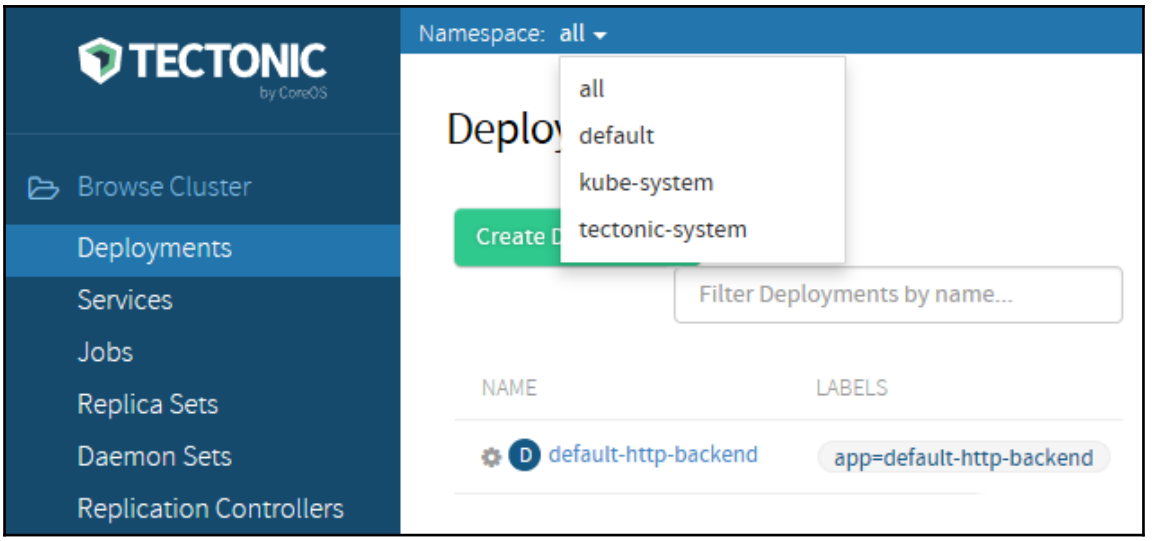



TECTONIC
by CoreOS
Browse Cluster
Deployments
Services
Jobs
Replica Sets
Daemon Sets
Replication Controllers
Autoscalers
Pods
Service Accounts
Config Maps
Secrets
Events
Search
Ingress
Administration
Namespaces
Nodes
Cluster Status
Cluster Health
Tectonic Console
All systems go
Kubernetes API Connection
All systems go
Software Details
Kubernetes
v1.5.2+coreos.1
Tectonic
1.5.2-tectonic.1
Release Notes
License
10 Nodes
Cloud Provider
Amazon Web Services

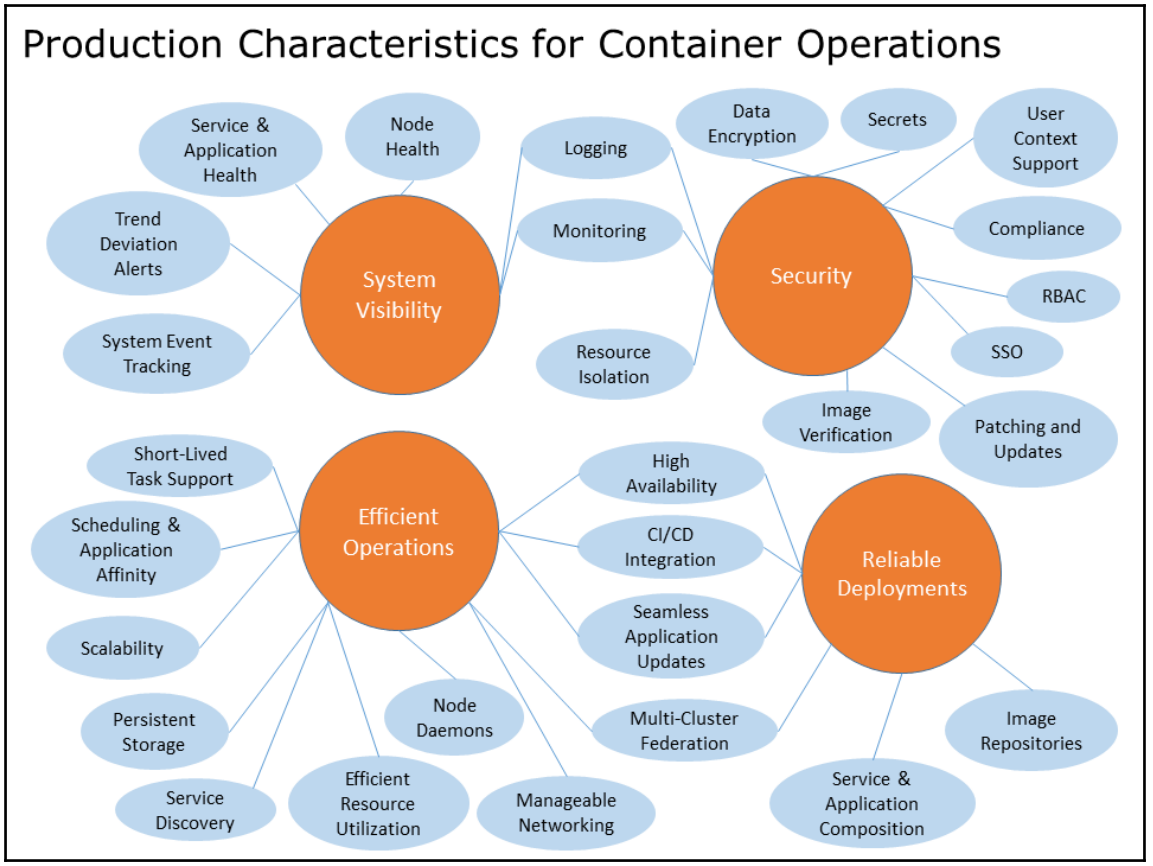

TECTONIC
by CoreOS
Namespace: all
Browse Cluster
Deployments
Services
Jobs
Replica Sets
Daemon Sets
Replication Controllers
Autoscalers
Pods
Service Accounts
Config Maps
Secrets
Events
Search
Ingress
Administration
Namespaces
Nodes
Cluster Settings
Roles
Role Bindings
Cluster Roles
RC node-js
Overview
Edit
Pods
Events
Replication Controller Details
Replicas:
3
Controller Labels:
deployment=demo ×
name=node-js ×
app=frontend
Labels for this controller.
Label Query:
deployment=demo ×
name=node-js ×
app=frontend
Write a label query that will match labels on new or existing pods.
Desired Pod State
These containers make up a pod. All of these containers are deployed together onto nodes in the cluster.
Pod Labels:

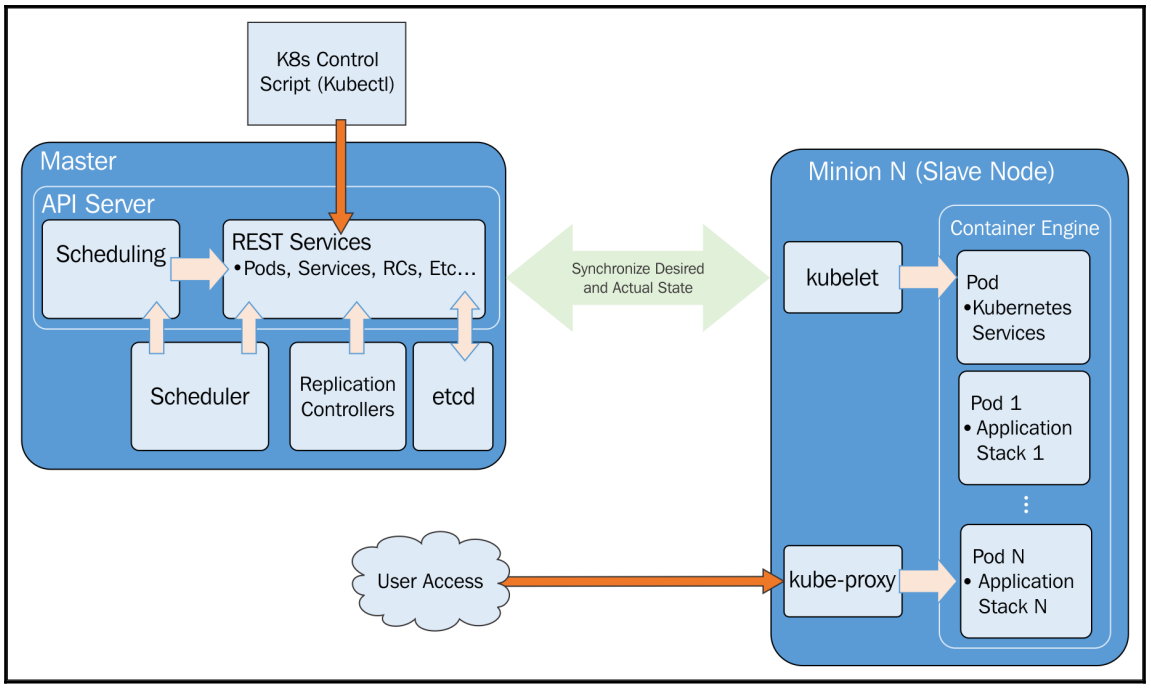

Cluster Role Bindings
admin
My Account
Log Out
Pod Labels:
deployment=demo ×
name=node-js ×
app=frontend
Each pod instance will have these labels. Services matching these labels will automatically send traffic to containers.
Containers
Add Another Container
CONTAINER NAME
node-js
CONTAINER IMAGE
jonbaier/node-express-info
CONTAINER VERSION/TAG
latest
PORTS
0 Ports ›
PRIMARY COMMAND
Default Command ›
PULL POLICY
Always Pull ›
Update Replication Controller
Cancel

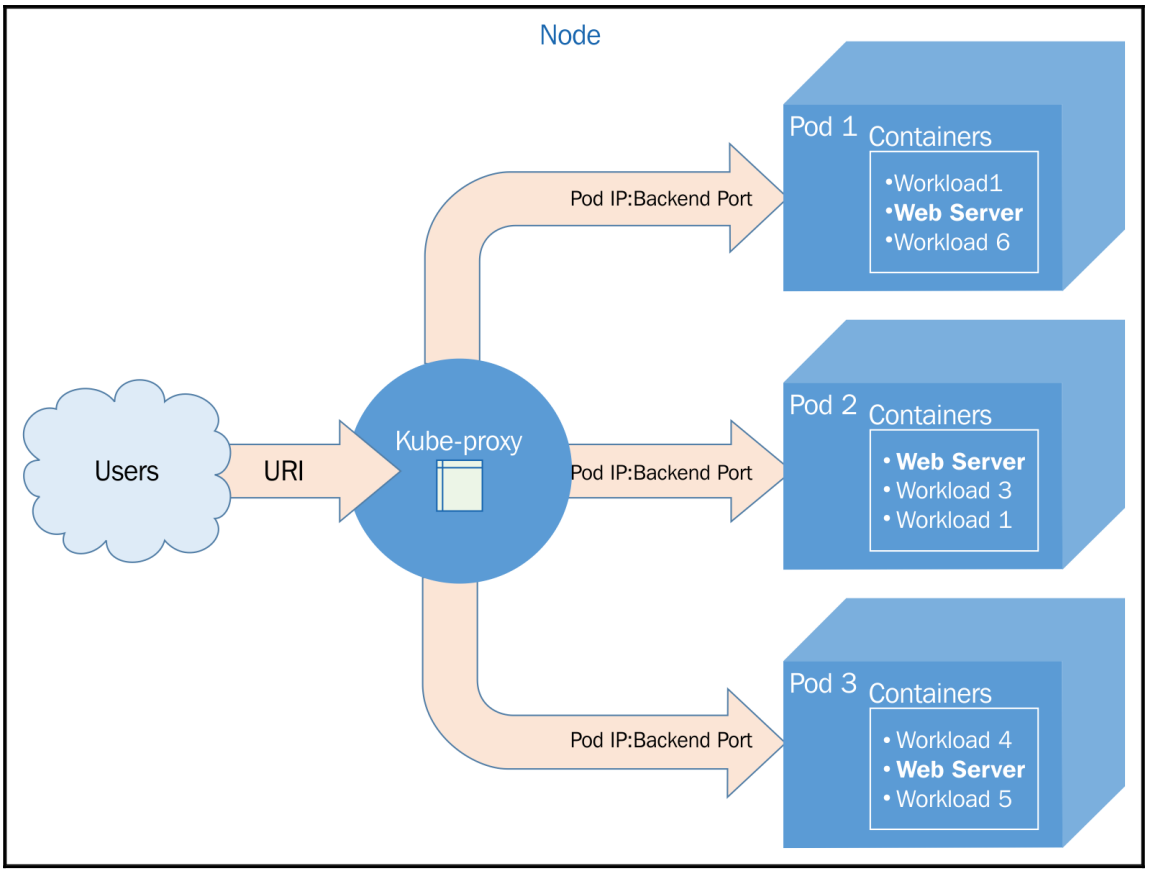

TECTONIC
by CoreOS
Namespace: all
Browse Cluster
Deployments
Services
Jobs
Replica Sets
Daemon Sets
Replication Controllers
Autoscalers
Pods
Service Accounts
Config Maps
Secrets
Events
Search
Ingress
Administration
Namespaces
Nodes
Cluster Settings
Roles
Role Bindings
Cluster Roles
Cluster Role Bindings
admin
My Account
Log Out
Events
All Types
All Categories
Streaming events...
Showing 245 events
node-js-lskv6
Successfully pulled image "jonbaier/node-express-info:latest"
7 minutes ago
Generated from kubelet on ip-10-0-116-242.us-west-1.compute.internal
node-js-lskv6
Created container with docker id c2e32858c8e6; Security: [seccomp=unconfined]
7 minutes ago
Generated from kubelet on ip-10-0-116-242.us-west-1.compute.internal
node-js-lskv6
Started container with docker id c2e32858c8e6
7 minutes ago
Generated from kubelet on ip-10-0-116-242.us-west-1.compute.internal
node-js-86qcm

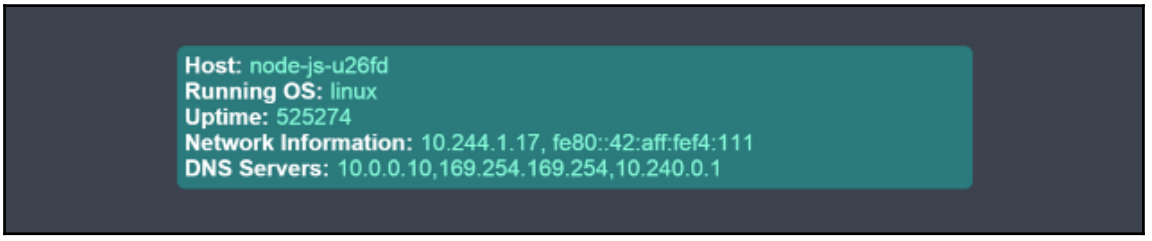

TECTONIC
by CoreOS
Browse Cluster
Deployments
Services
Jobs
Replica Sets
Daemon Sets
Replication Controllers
Namespace: all
all
default
kube-system
tectonic-system
Deploy
Create D
Filter Deployments by name...
NAME
LABELS
D
default-http-backend
app=default-http-backend

Chapter 12: Towards Production Ready




K8s Control
Script (Kubectl)
Master
API Server
Scheduling
REST Services
•Pods, Services, RCs, Etc…
Scheduler
Replication
Controllers
etcd
Synchronize Desired
and Actual State
Minion N (Slave Node)
Container Engine
kubelet
Pod
•Kubernetes
Services
Pod 1
• Application
Stack 1
Pod N
• Application
Stack N
kube-proxy
User Access


Node
Pod 1
Containers
•Workload1
•Web Server
•Workload 6
Pod IP:Backend Port
Users
URI
Kube-proxy
Pod IP:Backend Port
Pod 2
Containers
• Web Server
• Workload 3
• Workload 1
Pod 3
Containers
• Workload 4
• Web Server
• Workload 5
Pod IP:Backend Port


Host: node-js-u26fd
Running OS: linux
Uptime: 525274
Network Information: 10.244.1.17, fe80::42:aff:fef4:111
DNS Servers: 10.0.0.10,169.254.169.254,10.240.0.1

```
NAME            READY     STATUS    RESTARTS   AGE
node-js-1fxoy   1/1       Running   0          1d
node-js-m4w4a   1/1       Running   0          1d
node-js-sjc03   1/1       Running   0          1d
```

```
Name:                           node-js-sjc03
Namespace:                      default
Image(s):                       petegoo/node-express-sample:latest
Node:                           kubernetes-minion-aqdf/10.240.142.178
Labels:                         name=node-js
Status:                         Running
Reason:
Message:
IP:                             10.244.0.10
Replication Controllers:        node-js (3/3 replicas created)
Containers:
  node-js:
    Image:      petegoo/node-express-sample:latest
    Limits:
      cpu:              100m
    State:              Running
      Started:          Tue, 28 Jul 2015 16:57:33 -0400
    Ready:              True
    Restart Count:      0
Conditions:
  Type          Status
  Ready         True
No events.
```