INTRO TO KUBERNETES AND SERVERLESS

TWO SIDES OF THE DEPLOYMENT COIN

WES ROLNICK, NICK PRUSKO

INTRODUCTION

- Who this talk is intended for

INTRODUCTION

- If you want to follow along:
  - Create a free Google Cloud account
  - Log into: https://labs.play-with-k8s.com/

INTRODUCTION

- How we used to deploy
- The container revolution

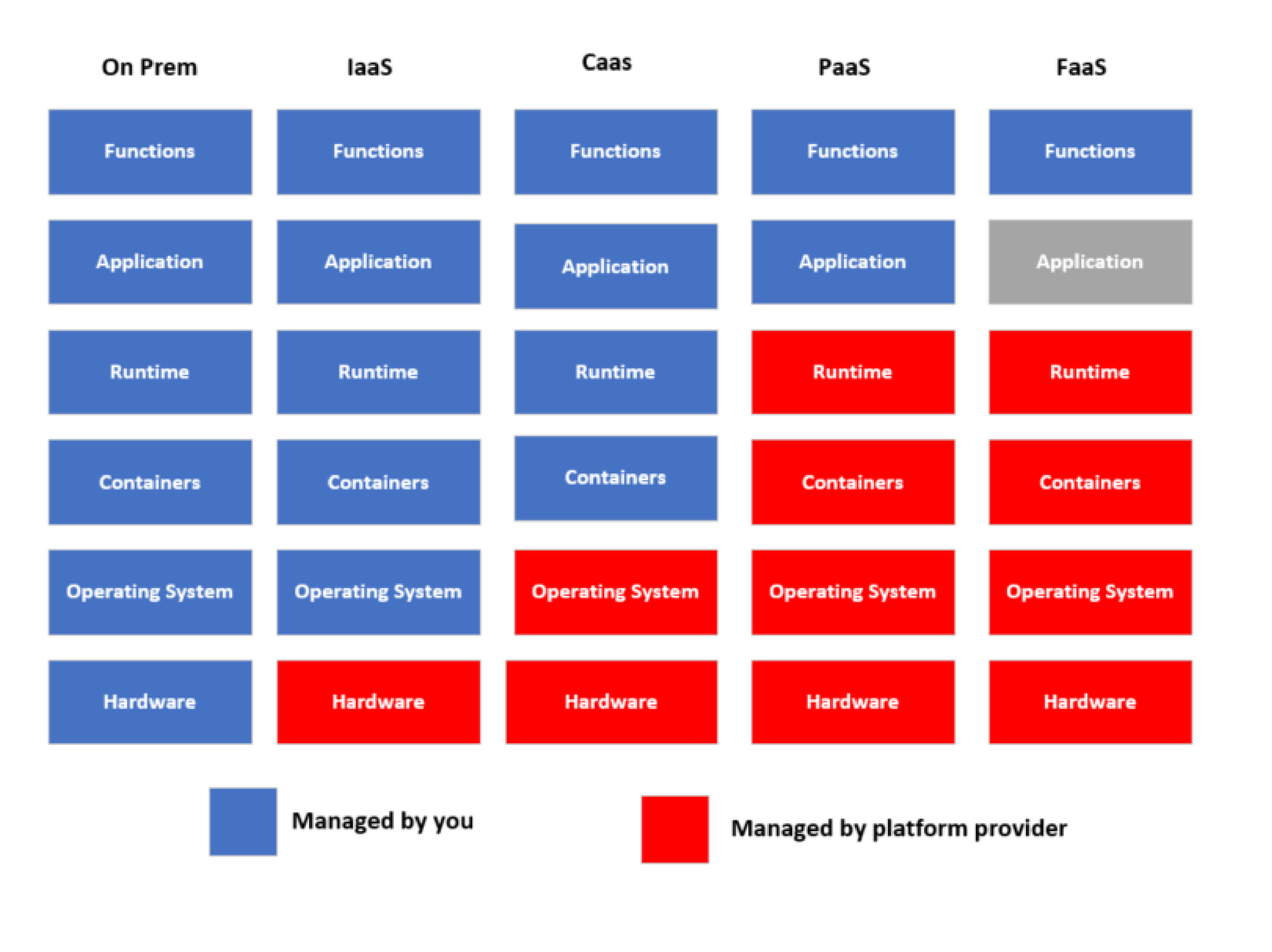
INTRODUCTION

- Kubernetes: Deploy containerized applications across managed infrastructure

- Serverless: Deploy code to cloud infrastructure which will handle resource management

KUBERNETES AND SERVERLESS

Kubernetes	Serverless
+ Highly configurable	+ Quick Implementation
+ Complete control of data	+ Low cost start
+ Control of resources	+ Scales easily
- Implementation Complexity	- May be more expensive at scale
- High up-front cost	- Platform dependent



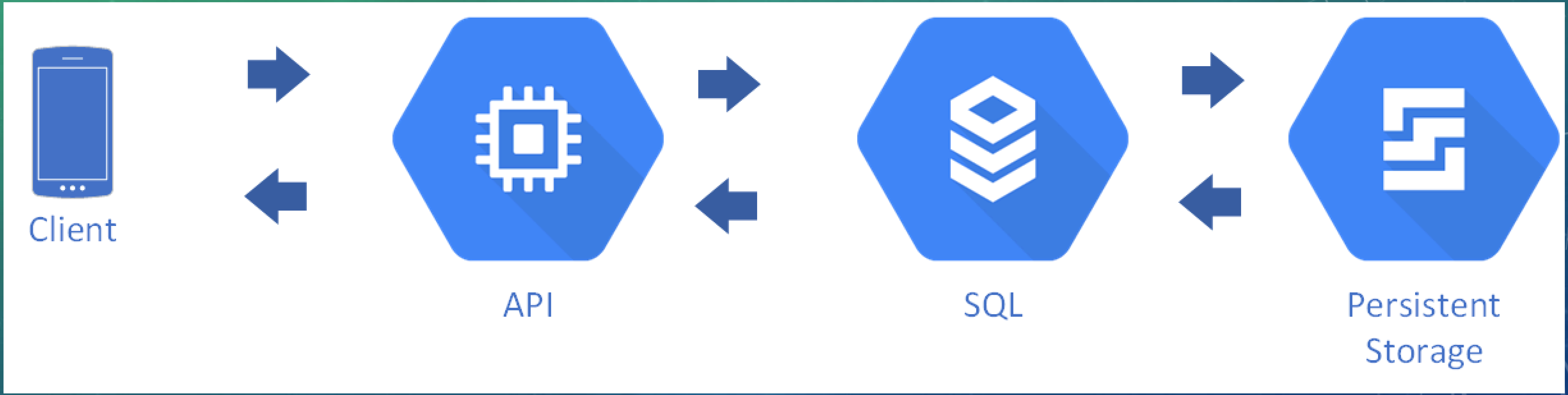
On Prem	IaaS	Caas	PaaS	FaaS
🟦 Functions	🟦 Functions	🟦 Functions	🟦 Functions	🟦 Functions
🟦 Application	🟦 Application	🟦 Application	🟦 Application	▨ Application
🟦 Runtime	🟦 Runtime	🟦 Runtime	🟥 Runtime	🟥 Runtime
🟦 Containers	🟦 Containers	🟦 Containers	🟥 Containers	🟥 Containers
🟦 Operating System	🟦 Operating System	🟥 Operating System	🟥 Operating System	🟥 Operating System
🟦 Hardware	🟥 Hardware	🟥 Hardware	🟥 Hardware	🟥 Hardware

🟦 Managed by you

🟥 Managed by platform provider

THE DEMO PROJECT

- We will be using a simple Python REST API.
- MySQL database for storing data.
- Google Cloud Serverless for serverless deployment (sign up for a trial account if you want to follow along)
- http://sharksareawesome.com is the demo site.
- Also log into https://labs.play-with-k8s.com/
- Code is available on Github: https://github.com/syncrisis/kubernetesdemo


Client
API
SQL
Persistent Storage

WHAT IS KUBERNETES

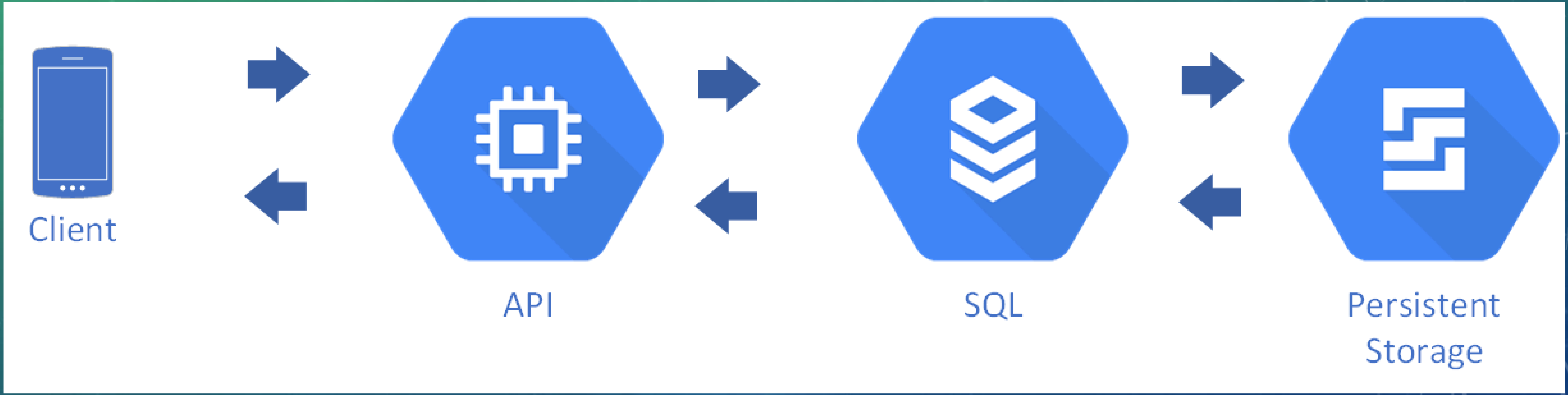
- Production ready container management
- Manages container lifecycles
- Manages updates and deployments

KUBERNETES TERMS

- Cluster: A collection of nodes that are being managed by Kubernetes
- Node: A VM or physical machine that contains one or more containers
- Master Node: The node that coordinates everything in the cluster.

KUBERNETES OBJECTS

- Pod: A running process on the cluster. Can be an application container (sometimes multiple containers).
- Service: Defines policies for accessing Pods.
- Deployment: Describes the desired state for how pods should be deployed across a cluster.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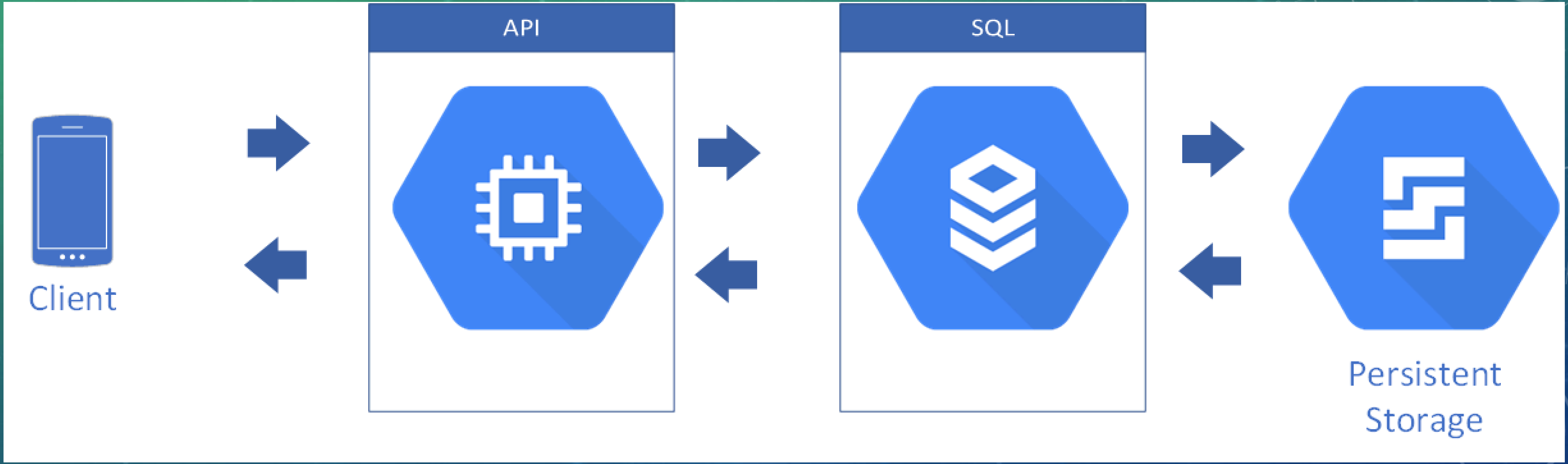
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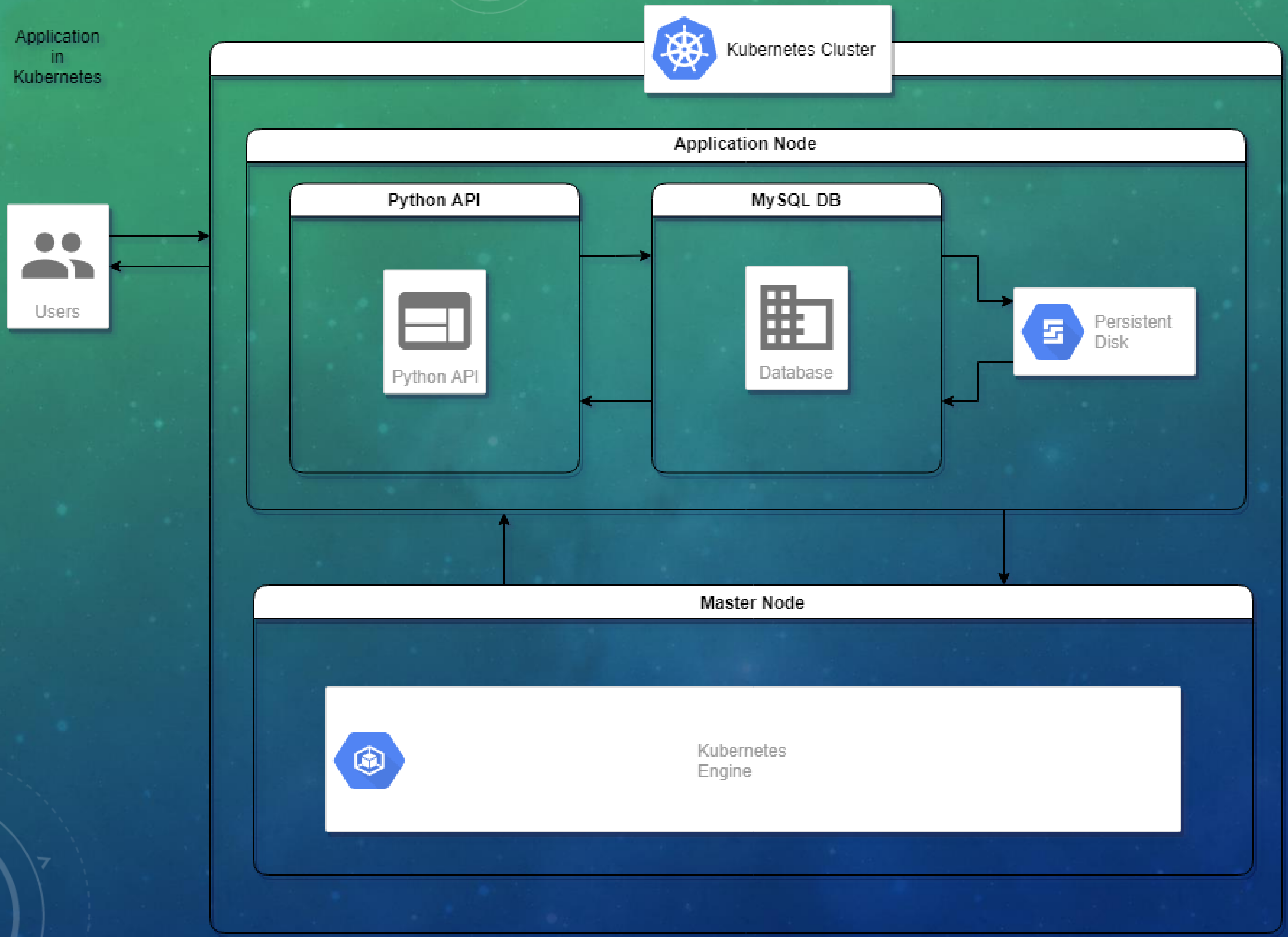
Application in Kubernetes



Kubernetes Cluster

Users

Application Node

Python API

Python API

My SQL DB

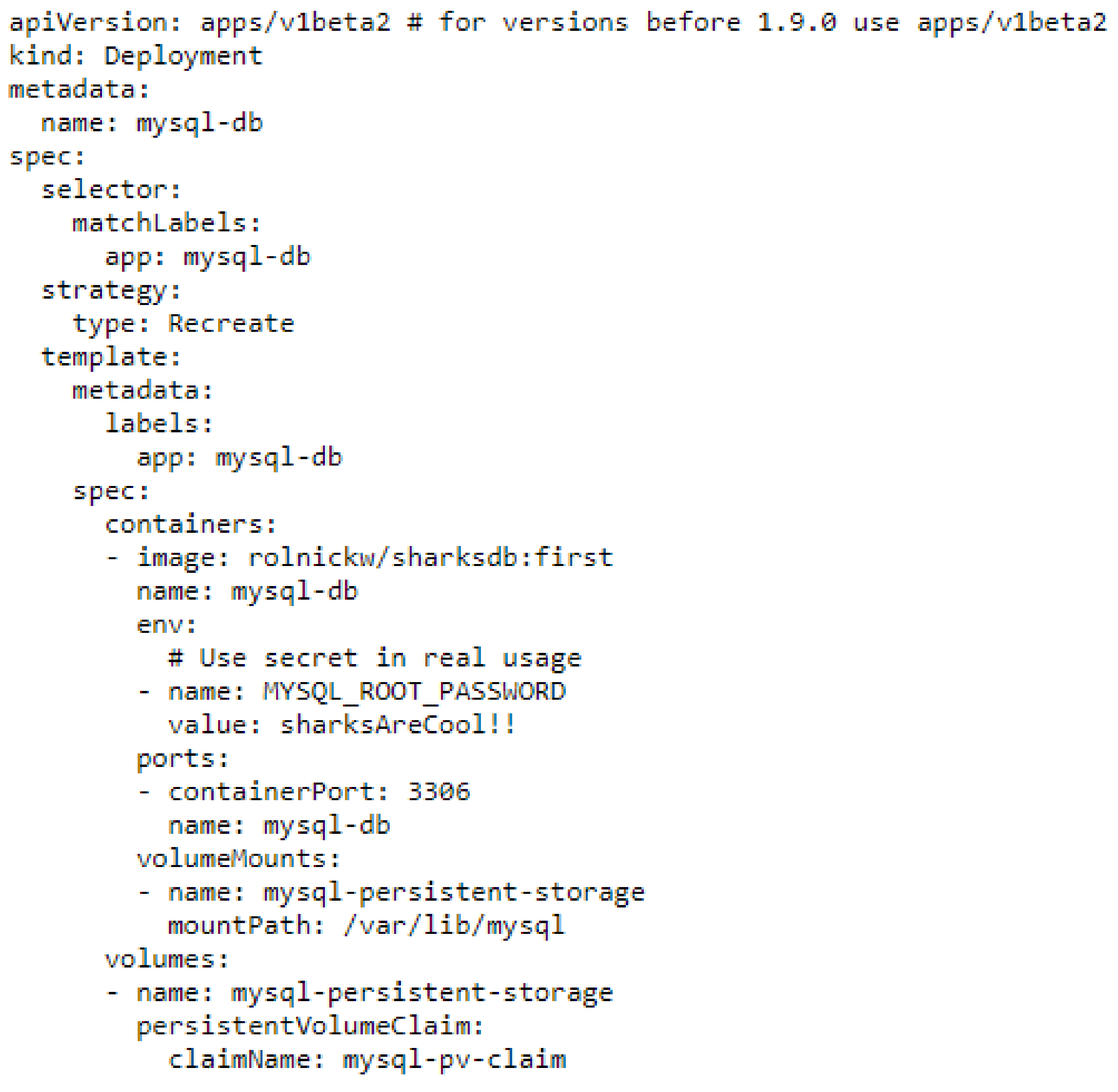
Database

Persistent Disk

Master Node

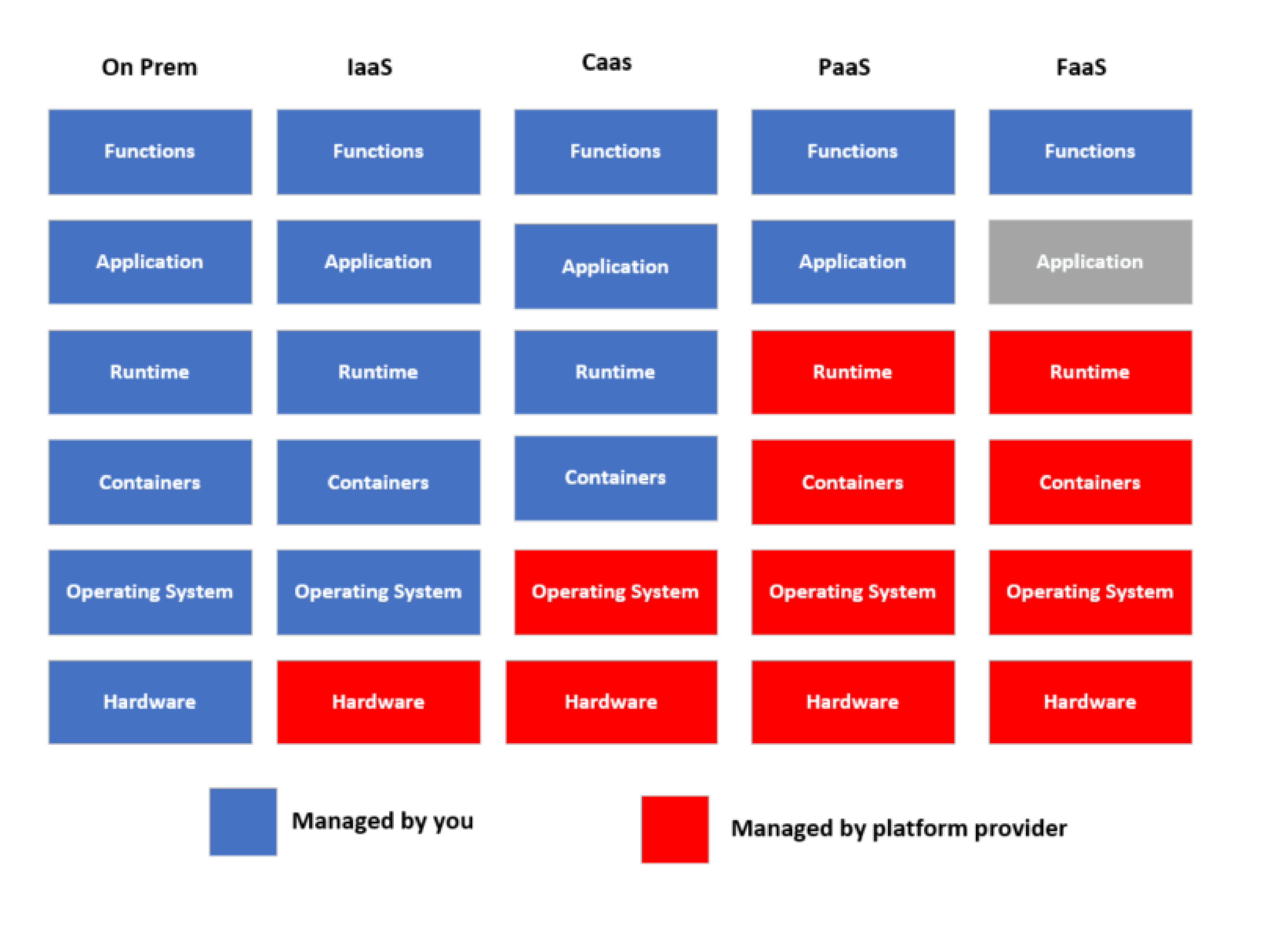
Kubernetes Engine

YAML!



```yaml
apiVersion: apps/v1beta2 # for versions before 1.9.0 use apps/v1beta2
kind: Deployment
metadata:
  name: mysql-db
spec:
  selector:
    matchLabels:
      app: mysql-db
  strategy:
    type: Recreate
  template:
    metadata:
      labels:
        app: mysql-db
    spec:
      containers:
      - image: rolnickw/sharksdb:first
        name: mysql-db
        env:
          # Use secret in real usage
        - name: MYSQL_ROOT_PASSWORD
          value: sharksAreCool!!
        ports:
        - containerPort: 3306
          name: mysql-db
        volumeMounts:
        - name: mysql-persistent-storage
          mountPath: /var/lib/mysql
      volumes:
      - name: mysql-persistent-storage
        persistentVolumeClaim:
          claimName: mysql-pv-claim
```

DEMO



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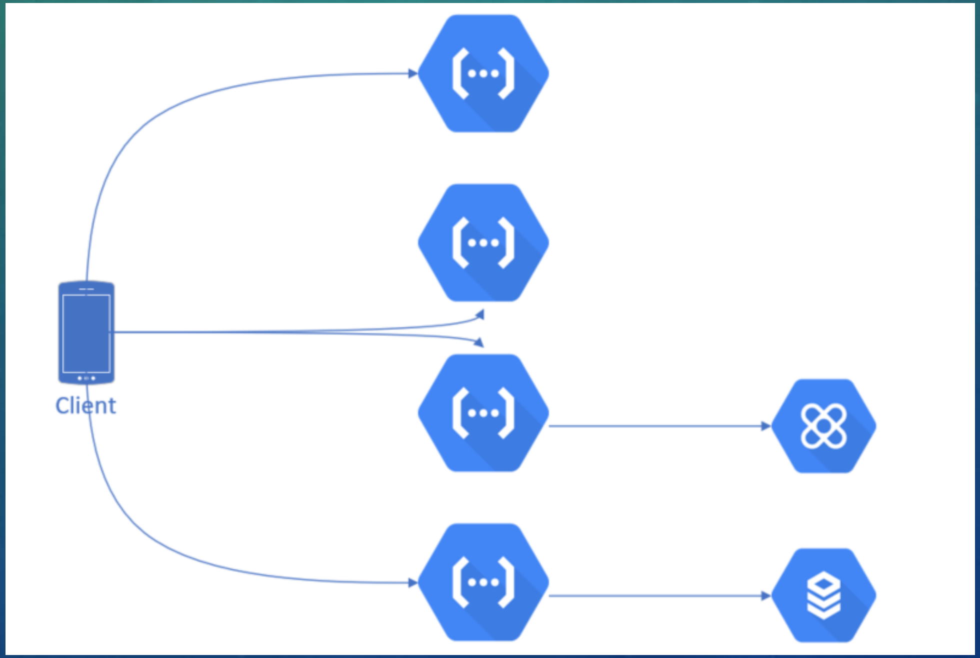
WHAT IS SERVERLESS?

- Allows your code to run without the headache of server management, maintenance, scaling strategies. Back end infrastructure becomes invisible



WHY WOULD I?

- Allows developers to focus on development rather than infrastructure, small teams can do big things
- Speeds up timelines to bring ideas to market
- Reduction in cost

LANGUAGES

Google Cloud

node JS®

python™

amazon web services™

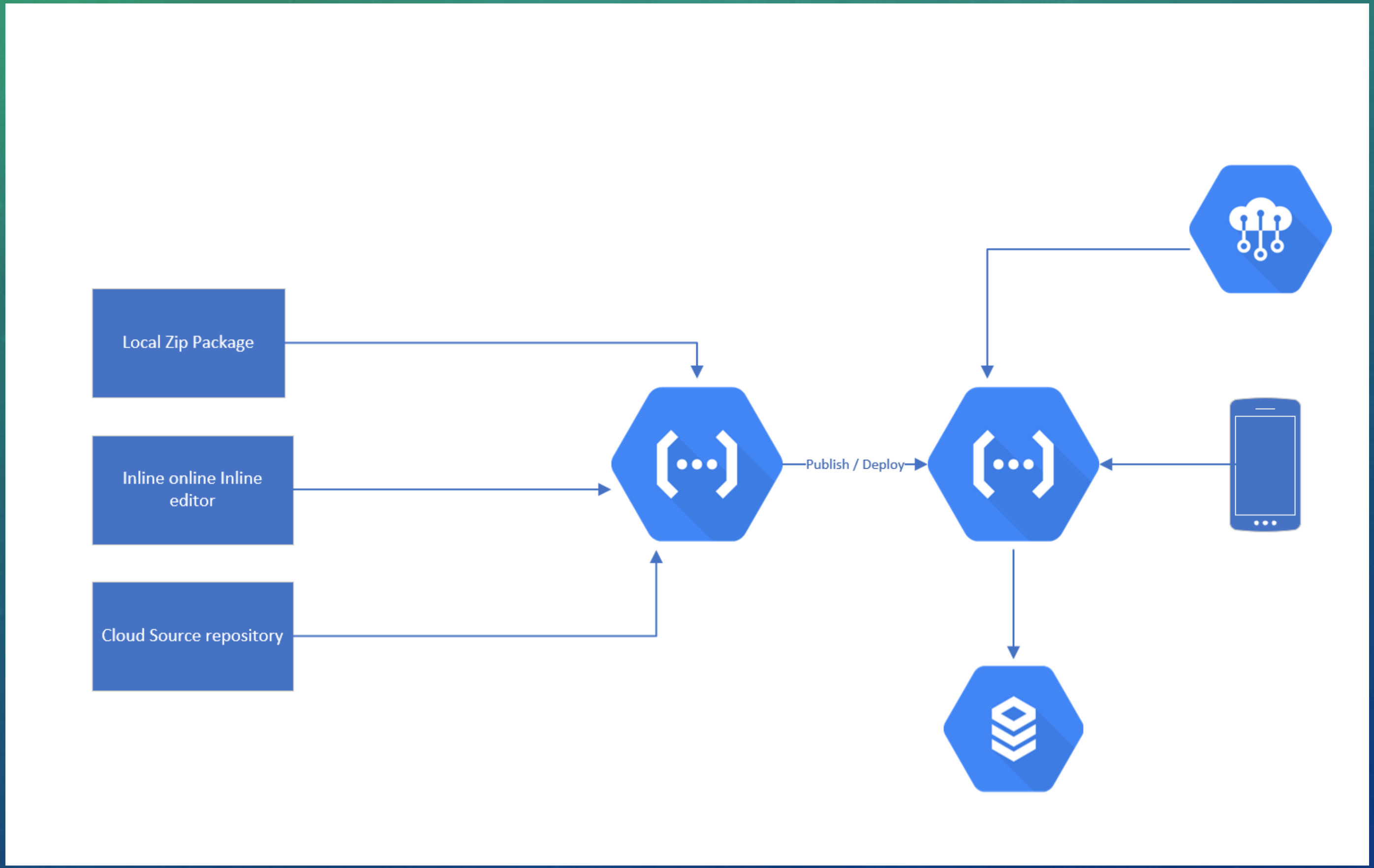
Java™

C#

EVENTS & TRIGGERS

- Events & triggers provide hooks into your cloud environment
  - HTTP – GET / POST / PUT / PATCH / DELETE
  - Storage – Event Driven functions from your platform
  - Pub / Sub -
  - Firebase events

HOW DOES IT ALL WORK?



DEMO

THE FUTURE

- Kubernetes + Serverless!

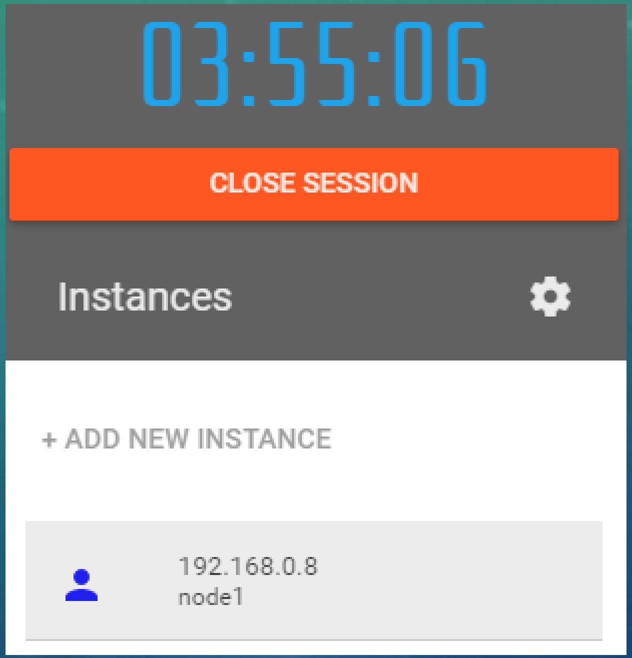
CONCLUSION

- It really depends…

KUBERNETES PLAYGROUND DEMO

GO TO HTTPS://LABS.PLAY-WITH-K8S.COM/

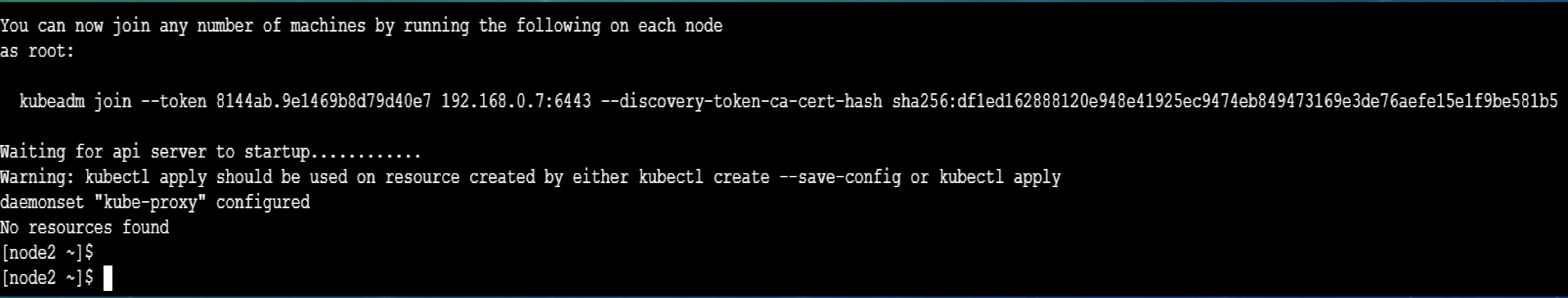
1. Click Add New Instance:



HTTPS://LABS.PLAY-WITH-K8S.COM/

2. Copy the “Initializes cluster master node:” line:

   kubeadm init --apiserver-advertise-address $(hostname -i)



```
You can now join any number of machines by running the following on each node
as root:

  kubeadm join --token 8144ab.9e1469b8d79d40e7 192.168.0.7:6443 --discovery-token-ca-cert-hash sha256:df1ed162888120e948e41925ec9474eb849473169e3de76aefe15e1f9be581b5

Waiting for api server to startup............
Warning: kubectl apply should be used on resource created by either kubectl create --save-config or kubectl apply
daemonset "kube-proxy" configured
No resources found
[node2 ~]$
[node2 ~]$
```

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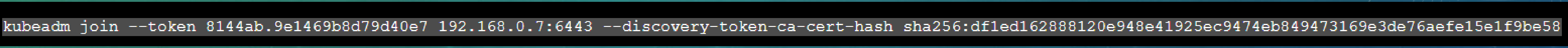
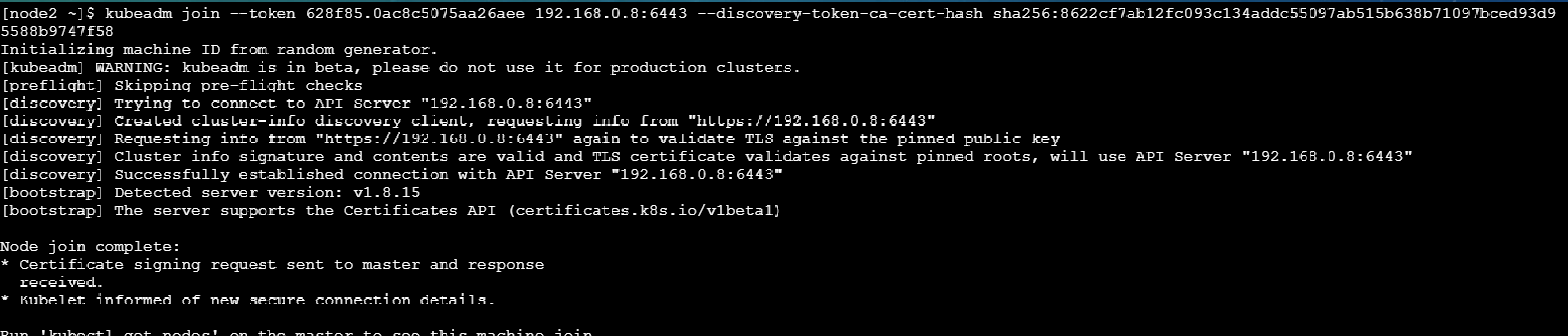
3. Copy the entire line that starts kubeadm join –token dkfjkldjfkdj



```
kubeadm join --token 8144ab.9e1469b8d79d40e7 192.168.0.7:6443 --discovery-token-ca-cert-hash sha256:df1ed162888120e948e41925ec9474eb849473169e3de76aefe15e1f9be58
```

4. Click Add New Instance Again

5. In the second instance paste the copied kubeadm join line:



```
[node2 ~]$ kubeadm join --token 628f85.0ac8c5075aa26aee 192.168.0.8:6443 --discovery-token-ca-cert-hash sha256:8622cf7ab12fc093c134addc55097ab515b638b71097bced93d9
5588b9747f58
Initializing machine ID from random generator.
[kubeadm] WARNING: kubeadm is in beta, please do not use it for production clusters.
[preflight] Skipping pre-flight checks
[discovery] Trying to connect to API Server "192.168.0.8:6443"
[discovery] Created cluster-info discovery client, requesting info from "https://192.168.0.8:6443"
[discovery] Requesting info from "https://192.168.0.8:6443" again to validate TLS against the pinned public key
[discovery] Cluster info signature and contents are valid and TLS certificate validates against pinned roots, will use API Server "192.168.0.8:6443"
[discovery] Successfully established connection with API Server "192.168.0.8:6443"
[bootstrap] Detected server version: v1.8.15
[bootstrap] The server supports the Certificates API (certificates.k8s.io/v1beta1)

Node join complete:
* Certificate signing request sent to master and response
  received.
* Kubelet informed of new secure connection details.

Run 'kubectl get nodes' on the master to see this machine join.
```

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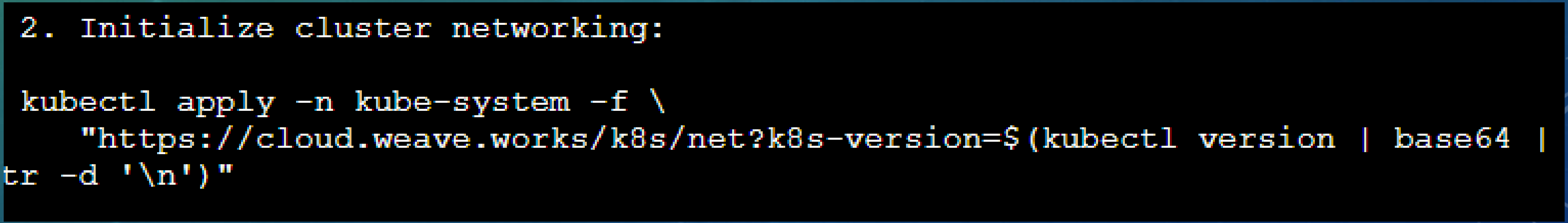
6. Switch back to your first instance (the master)
7. Copy the “Initialize cluster networking command:



```
 2. Initialize cluster networking:

 kubectl apply -n kube-system -f \
    "https://cloud.weave.works/k8s/net?k8s-version=$(kubectl version | base64 |
tr -d '\n')"
```

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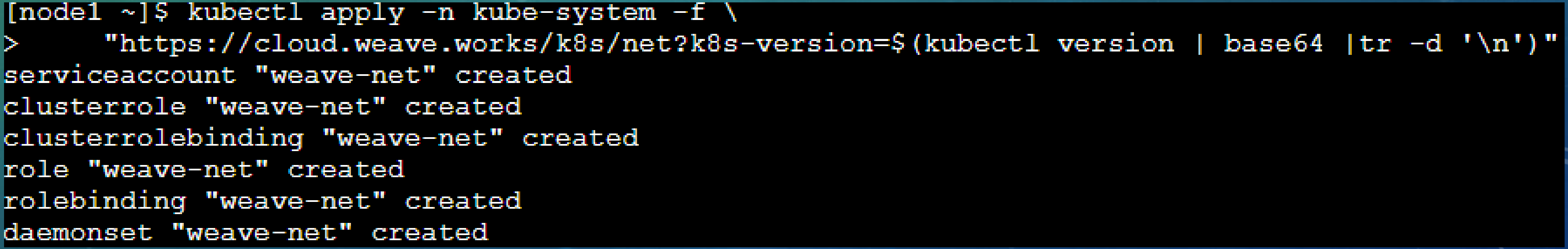
8. Paste and run this in the master instance (the first instance):

   Kubectl apply –n kube-system –f \

   “https://cloud.weave.works/k8s/net?k8s-version=$(kubectl version | base64 |tr -d ‘\n’)”



```
[node1 ~]$ kubectl apply -n kube-system -f \
>     "https://cloud.weave.works/k8s/net?k8s-version=$(kubectl version | base64 |tr -d '\n')"
serviceaccount "weave-net" created
clusterrole "weave-net" created
clusterrolebinding "weave-net" created
role "weave-net" created
rolebinding "weave-net" created
daemonset "weave-net" created
```

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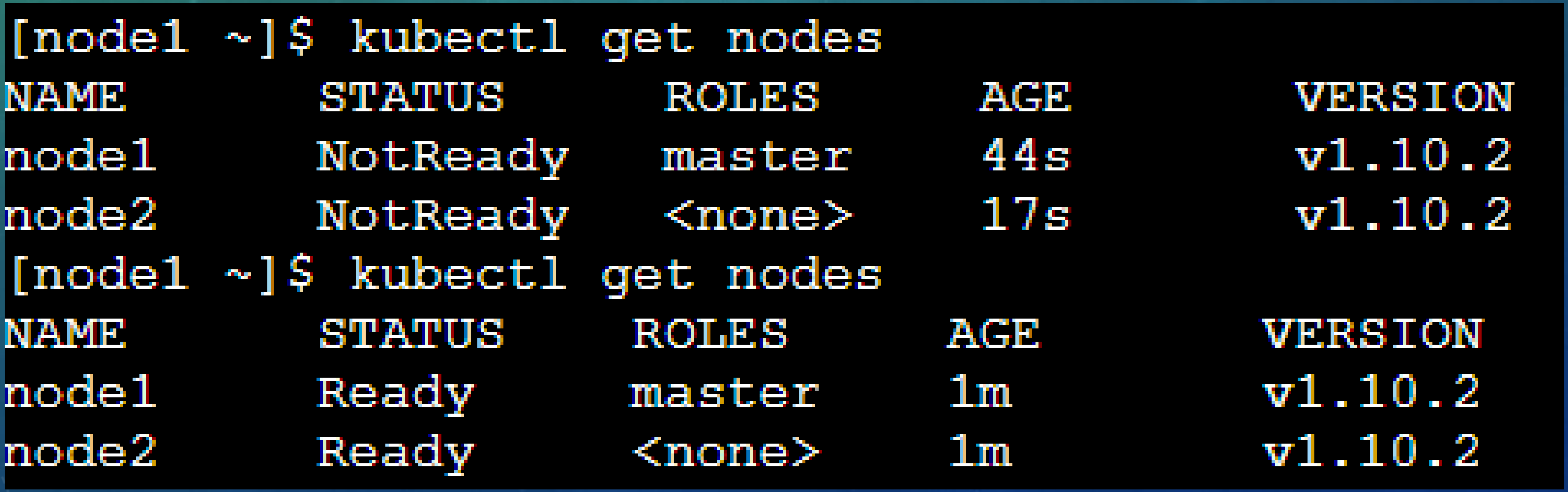
9. Verify that the nodes are configured and “Ready” by running:

   Kubectl get nodes



```
[node1 ~]$ kubectl get nodes
NAME     STATUS     ROLES     AGE       VERSION
node1    NotReady   master     44s      v1.10.2
node2    NotReady   <none>     17s      v1.10.2
[node1 ~]$ kubectl get nodes
NAME     STATUS    ROLES     AGE       VERSION
node1    Ready     master    1m        v1.10.2
node2    Ready     <none>    1m        v1.10.2
```

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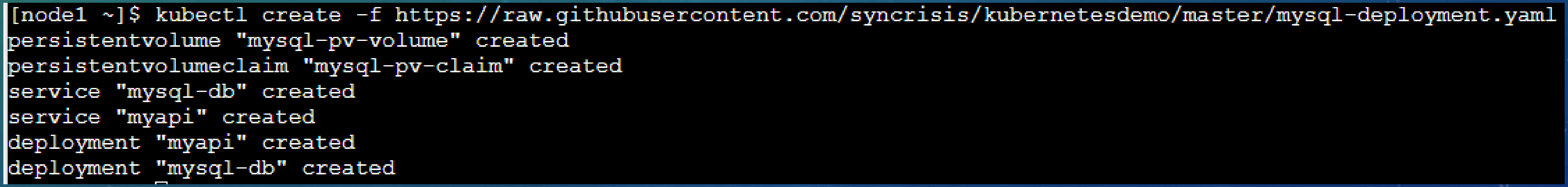
10. In the master node enter:

kubectl create –f https://raw.githubusercontent.com/syncrisis/kubernetesdemo/master/mysql-deployment.yaml

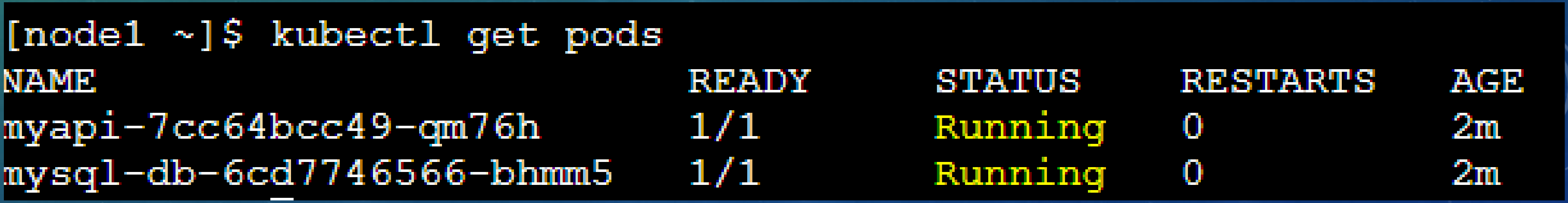


```
[node1 ~]$ kubectl create -f https://raw.githubusercontent.com/syncrisis/kubernetesdemo/master/mysql-deployment.yaml
persistentvolume "mysql-pv-volume" created
persistentvolumeclaim "mysql-pv-claim" created
service "mysql-db" created
service "myapi" created
deployment "myapi" created
deployment "mysql-db" created
```

HTTPS://LABS.PLAY-WITH-K8S.COM/

11. Wait for the pods to finish creating and run

```
kubectl get pods
```



```
[node1 ~]$ kubectl get pods
NAME                          READY     STATUS    RESTARTS   AGE
myapi-7cc64bcc49-qm76h        1/1       Running   0          2m
mysql-db-6cd7746566-bhmm5     1/1       Running   0          2m
```

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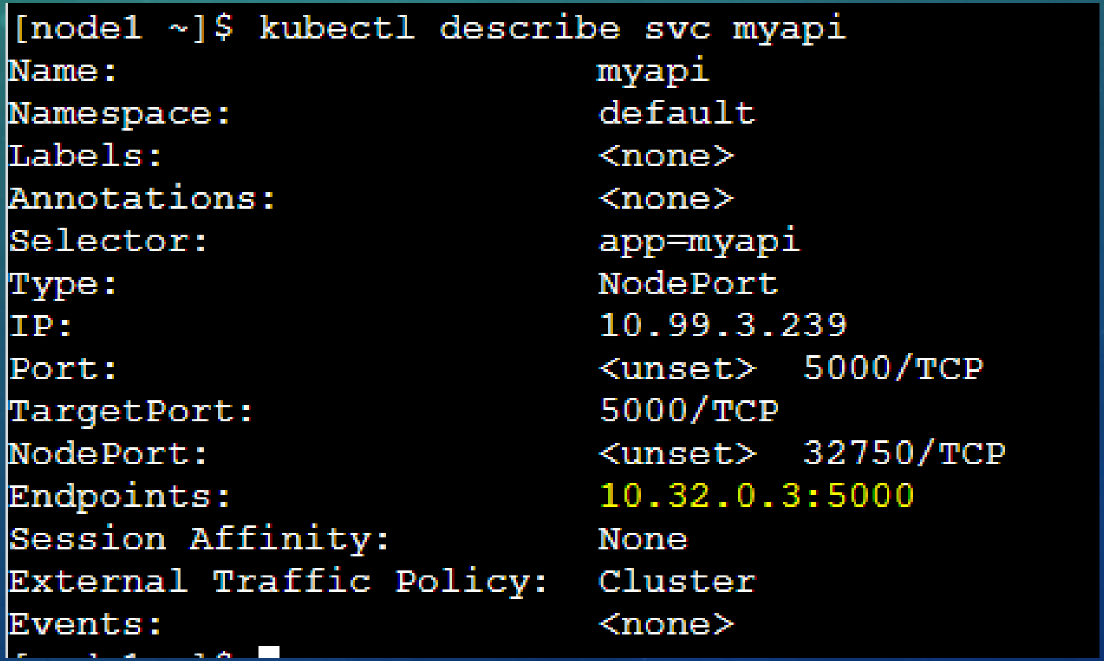
12. Find the exposed API port by typing:

    kubectl describe svc myapi



```
[node1 ~]$ kubectl describe svc myapi
Name:                     myapi
Namespace:                default
Labels:                   <none>
Annotations:              <none>
Selector:                 app=myapi
Type:                     NodePort
IP:                       10.99.3.239
Port:                     <unset>  5000/TCP
TargetPort:               5000/TCP
NodePort:                 <unset>  32750/TCP
Endpoints:                10.32.0.3:5000
Session Affinity:         None
External Traffic Policy:  Cluster
Events:                   <none>
[node1 ~]$ 
```

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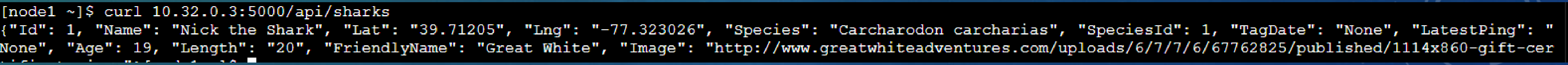
13. Send a curl request to the API at the endpoint:

    curl 10.32.0.3:5000/**api/sharks** **(the service endpoint for the IP address)**



```
[node1 ~]$ curl 10.32.0.3:5000/api/sharks
{"Id": 1, "Name": "Nick the Shark", "Lat": "39.71205", "Lng": "-77.323026", "Species": "Carcharodon carcharias", "SpeciesId": 1, "TagDate": "None", "LatestPing": "
None", "Age": 19, "Length": "20", "FriendlyName": "Great White", "Image": "http://www.greatwhiteadventures.com/uploads/6/7/7/6/67762825/published/1114x860-gift-cer
```