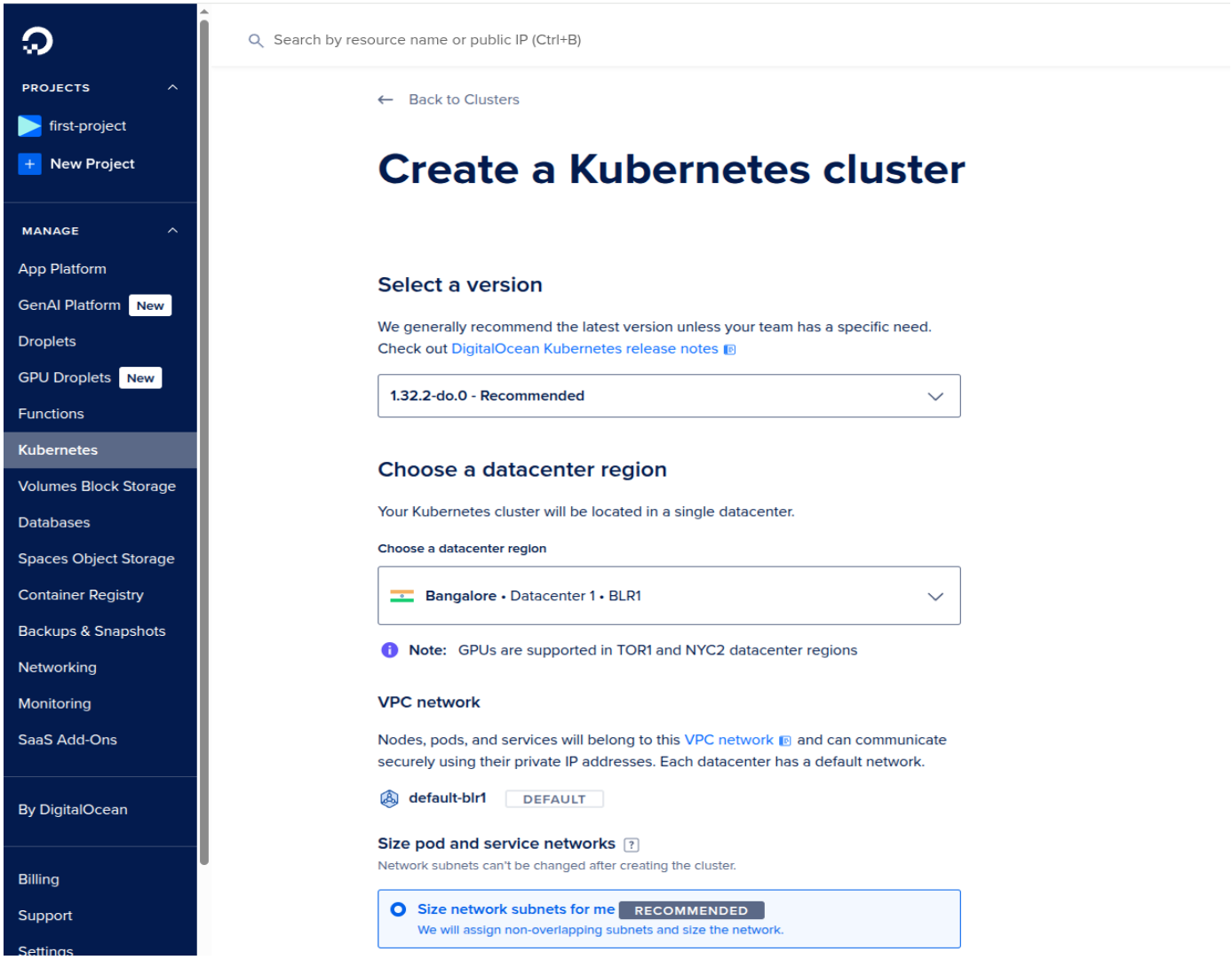
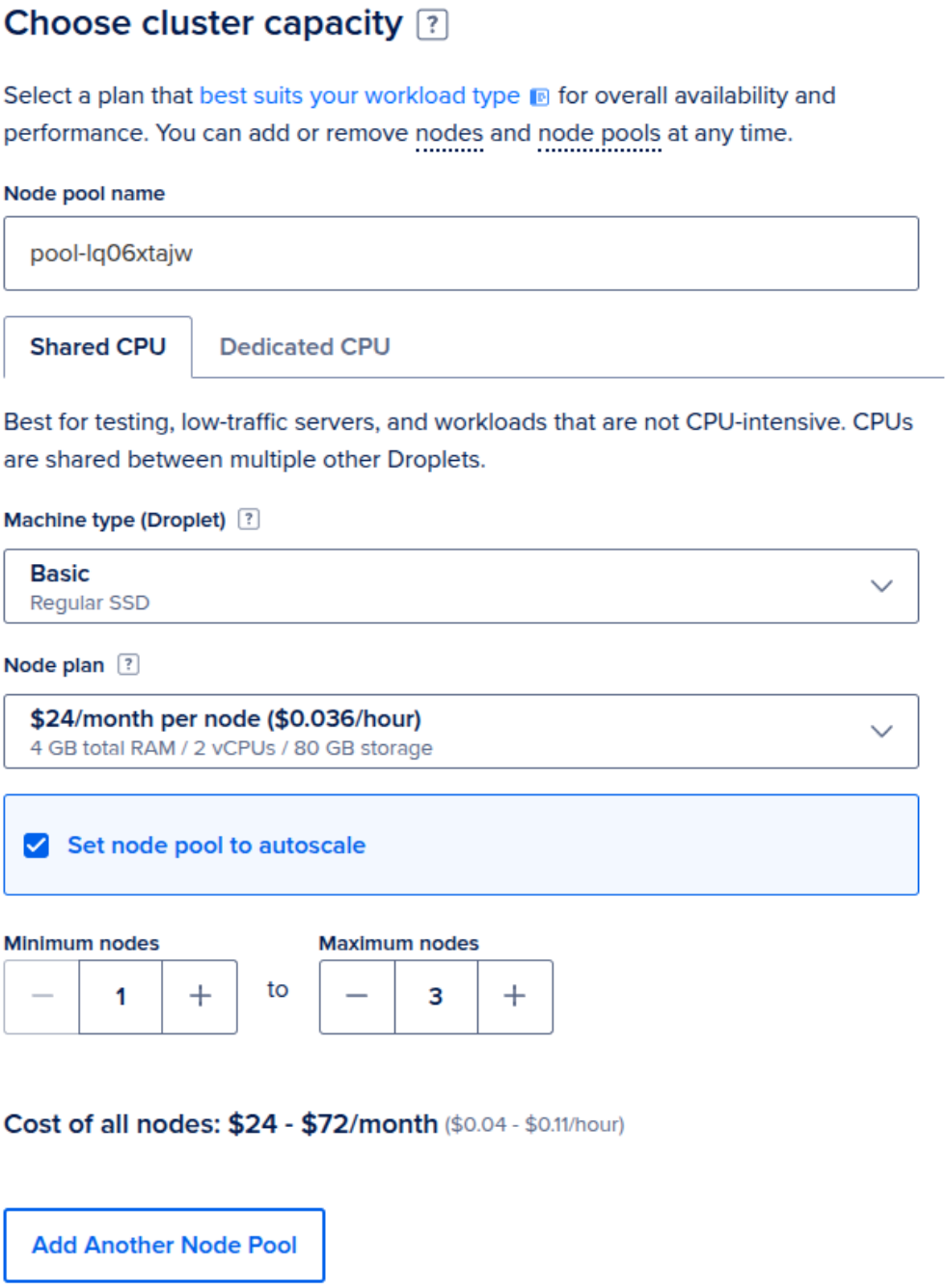
How to: Setup guide

1/ Log in to your DigitalOcean account. Navigate to the **Kubernetes** section and create a new Kubernetes cluster.



2/ Choose Cluster Capacity.

Select the Droplet, Node Plan and Min/Max nodes to configure cluster capacity settings.



3/ Make your cluster more resilient and remove any single point of failure situation.

Check "**Add High Availablity**" option, which will create replicas of kubernetes's control plane components.

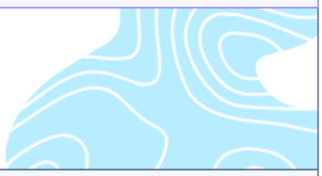
Select additional options

You can add these cluster upgrades at any time. They can't be removed from the cluster after they are added.

We recommend high availability to eliminate a single point of failure and increase peace of mind for production workloads.

Get extra reliability for critical workloads

A high availability control plane creates multiple replicas of control plane components to maximize cluster access and uptime with a 99.95% SLA.



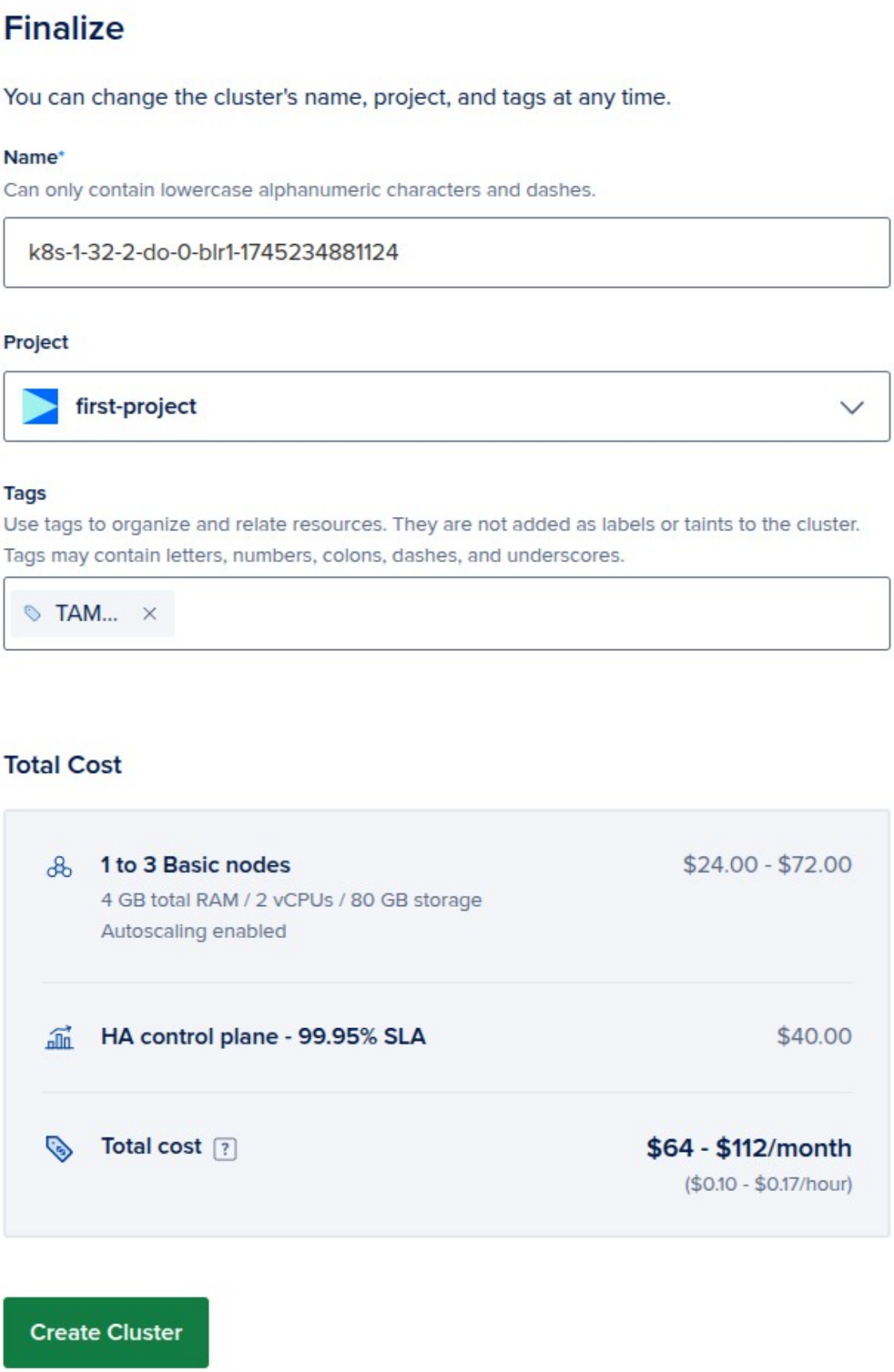
☑ Add high availability — **$40/month** ($0.06/hour)

Automate database management

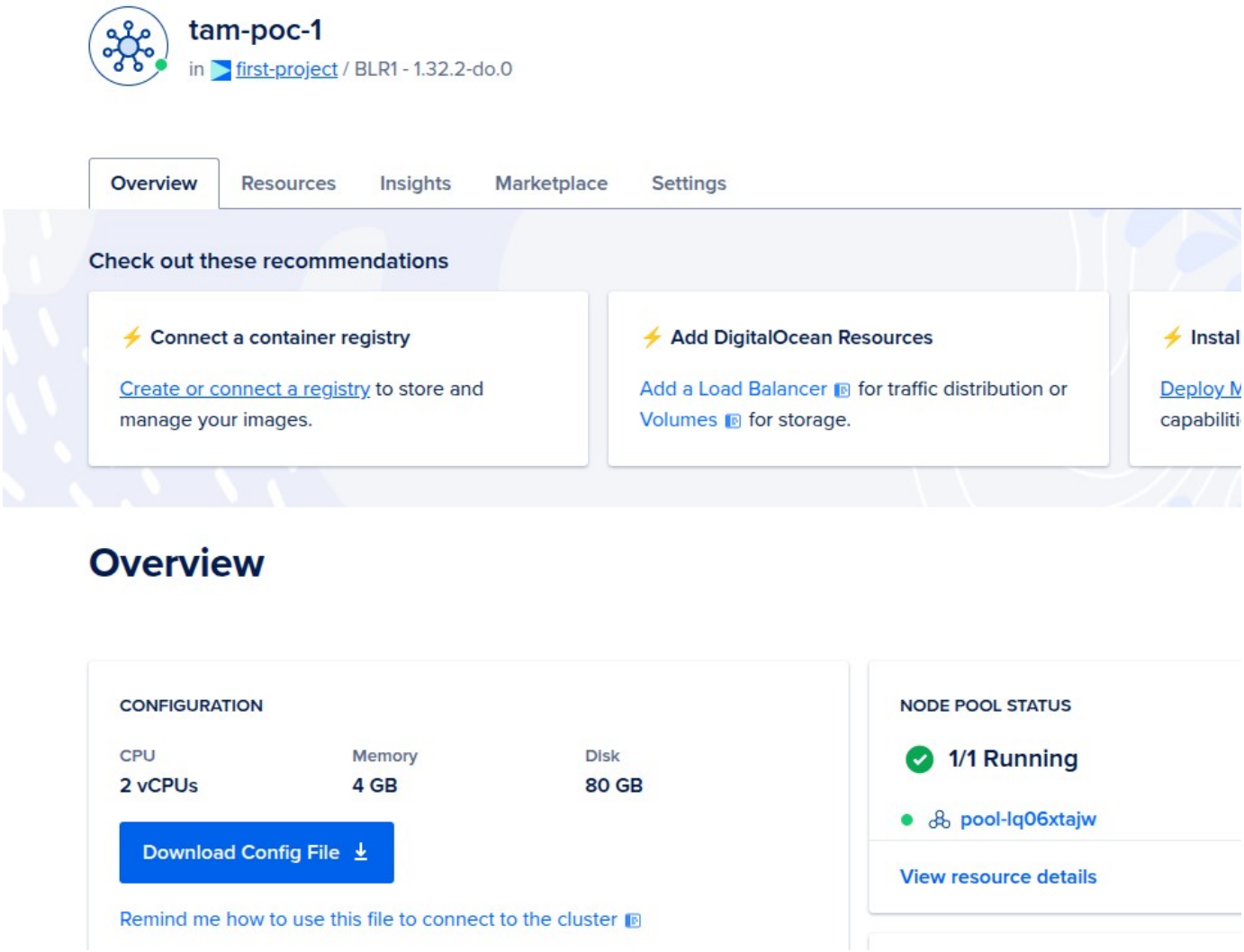
Create and automatically link managed databases to your cluster with the operator.

☐ Add database operator BETA — Free 🎉

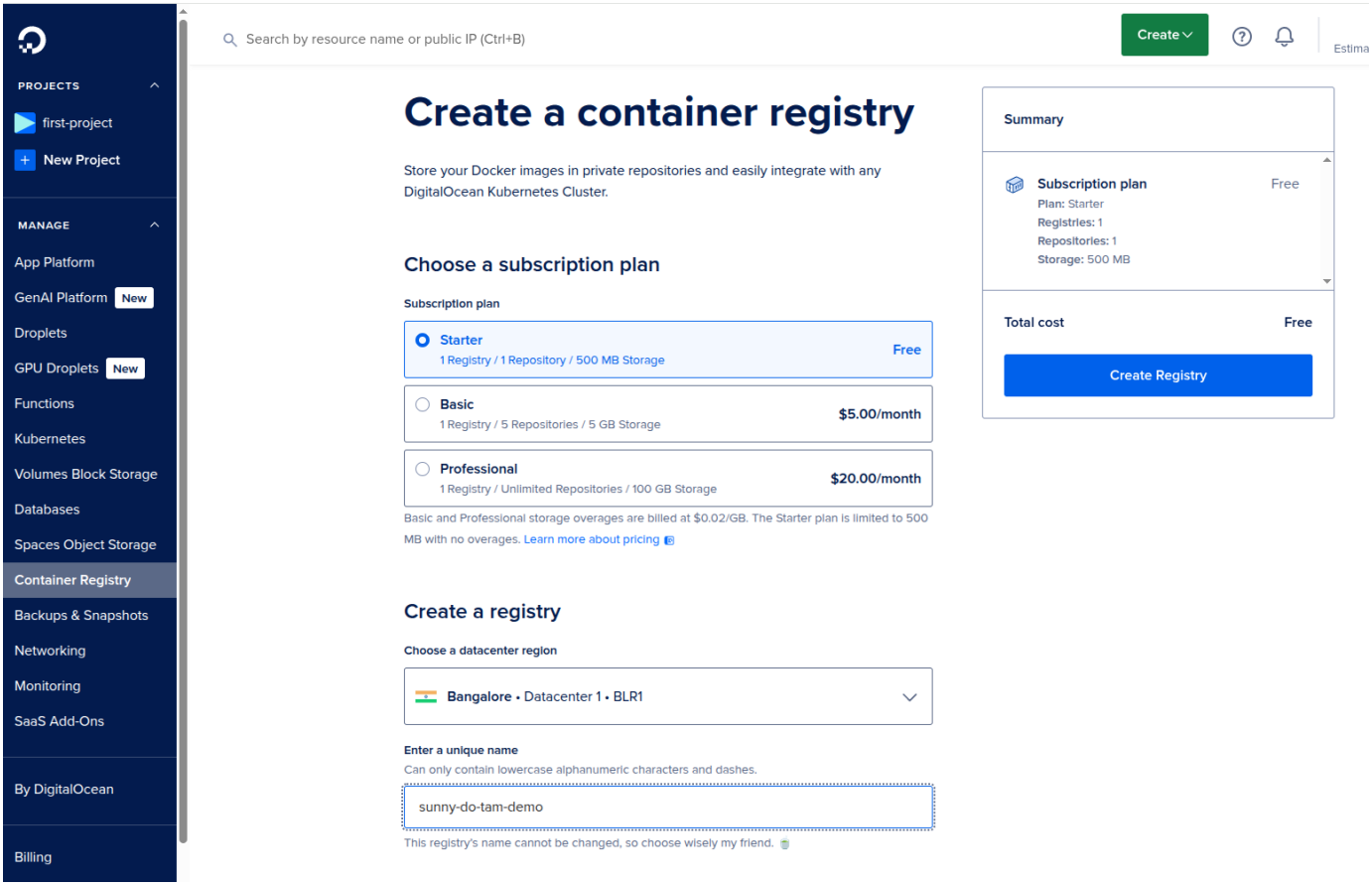
4/ Set name for cluster and Confirm pricing details. Click on “Create Cluster”



5/ Download the Kubernetes Config file



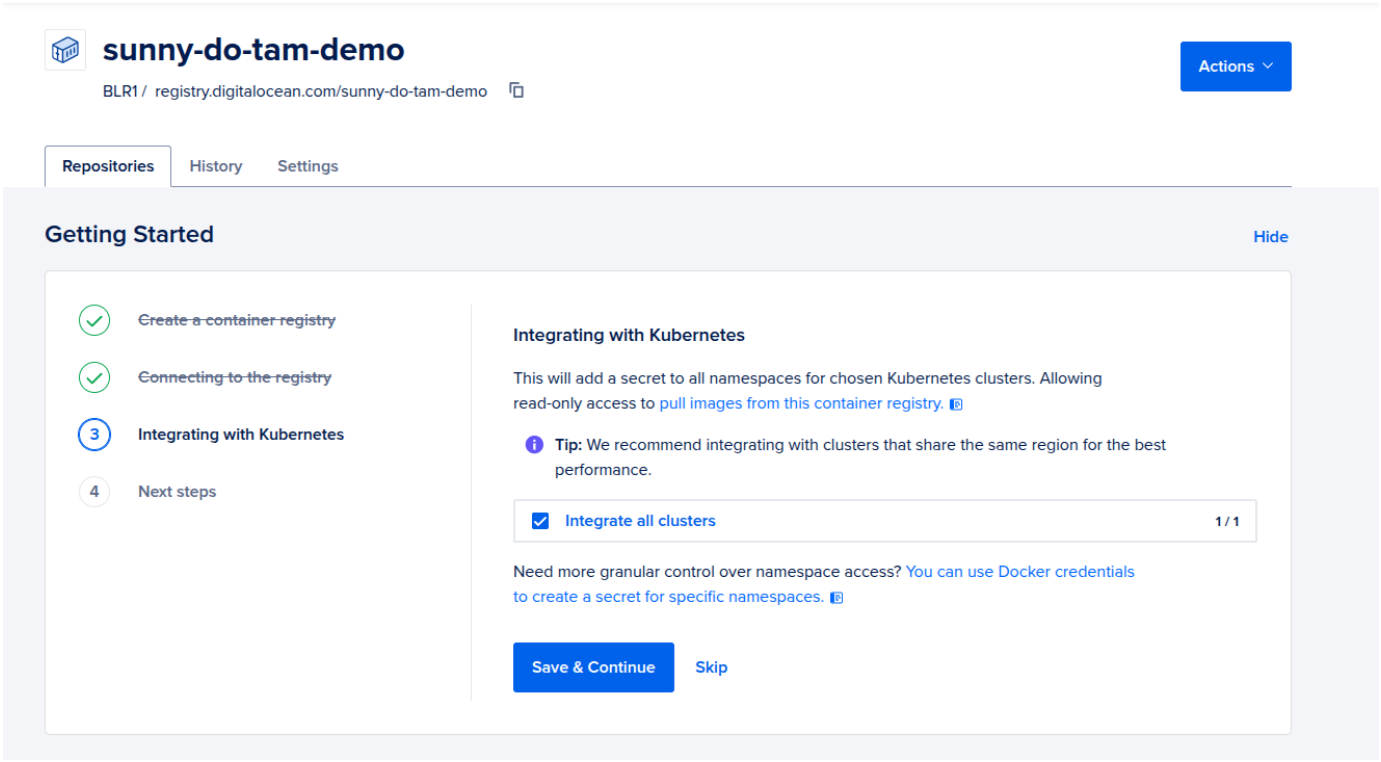
6/ Create Container registry



7/ Authenticate with registry with doclt.

saryas@iamsaryal:~/DO/docker/app$ doctl registry login --never-expire
Logging Docker in to registry.digitalocean.com

8/ Integrate registry with K8S cluster. This will add a secret to all namespaces for chosen Kubernetes clusters. Allowing read-only access to pull images from this container registry.



9/ Build and Push Docker Image, authenticate to container registry and push image to repository.

saryas@iamsaryal:~/DO/docker/app$ **sudo docker build -t registry.digitalocean.com/sunny-do-tam-demo/saas-app:latest ./**
[+] Building 2.3s (10/10) FINISHED docker:default
 => [internal] load build definition from dockerfile 0.0s
 => => transferring dockerfile: 177B 0.0s
 => [internal] load metadata for docker.io/library/python:3.9-slim 2.0s
 => [internal] load .dockerignore 0.0s
 => => transferring context: 2B 0.0s
 => [1/5] FROM docker.io/library/python:3.9-slim@sha256:9aa5793609640ecea2f06451a0d6f379330880b413f954933289cf3b27a78567
0.0s
 => [internal] load build context 0.0s
 => => transferring context: 128B 0.0s
 => CACHED [2/5] WORKDIR /app 0.0s
 => CACHED [3/5] COPY requirements.txt . 0.0s
 => CACHED [4/5] RUN pip install --upgrade -r requirements.txt 0.0s
 => CACHED [5/5] COPY . . 0.0s
 => exporting to image 0.0s
 => => exporting layers 0.0s
 => => writing image sha256:8747df5c35e5c2870aaa08b8b0924b4243307ee7000f78b9cea700f519d55fd0 0.0s
 => => naming to registry.digitalocean.com/sunny-do-tam-demo/saas-app:latest 0.0s

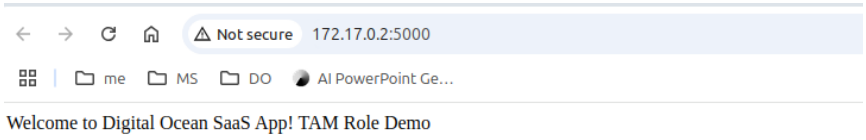
```
saryas@iamsaryal:~/DO/docker/app$ sudo docker login registry.digitalocean.com
Username: iamsaryal@gmail.com
Password:

WARNING! Your credentials are stored unencrypted in '/root/.docker/config.json'.
Configure a credential helper to remove this warning. See
https://docs.docker.com/go/credential-store/

Login Succeeded
saryas@iamsaryal:~/DO/docker/app$ sudo docker tag saas-app:latest registry.digitalocean.com/sunny-do-tam-demo/saas-app:latest
Error response from daemon: No such image: saas-app:latest
saryas@iamsaryal:~/DO/docker/app$ sudo docker tag registry.digitalocean.com/sunny-do-tam-demo/saas-app:latest registry.digitalocean.com/sunny-do-tam-demo/saas-ap
p:latest
saryas@iamsaryal:~/DO/docker/app$ sudo docker push registry.digitalocean.com/sunny-do-tam-demo/saas-app:latest
The push refers to repository [registry.digitalocean.com/sunny-do-tam-demo/saas-app]
c428e231e5e7: Pushed
afc96c6a8b4f: Pushed
32444e5ff190: Pushed
b84ec6a68e26: Pushed
7ad524989e4f: Pushed
e0cc49235ebd: Pushed
185439f46b41: Pushed
ea680fbff095: Pushed
latest: digest: sha256:366eb0043989915e96cfd45e74b9e09b500bfd5811966a3ae2ee49538d9dce64 size: 1990
saryas@iamsaryal:~/DO/docker/app$
```

10/ You can also test locally the image you've built.

```
saryas@iamsaryal:~/DO/docker/app$ sudo docker run registry.digitalocean.com/sunny-do-tam-demo/saas-app
 * Serving Flask app 'app'
 * Debug mode: off
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
 * Running on all addresses (0.0.0.0)
 * Running on http://127.0.0.1:5000
 * Running on http://172.17.0.2:5000
Press CTRL+C to quit
172.17.0.1 - - [21/Apr/2025 13:53:01] "GET / HTTP/1.1" 200 -
```



11/ Verify cluster setup and

$ Kubectl config view

```
saryas@iamsaryal:~/DO/docker/app$ k config view
apiVersion: v1
clusters:
- cluster:
    certificate-authority-data: DATA+OMITTED
    server: https://2f9e97ca-fc9d-46dd-b3d9-dbbc1369324a.k8s.ondigitalocean.com
  name: do-blr1-tam-poc-1
contexts:
- context:
    cluster: do-blr1-tam-poc-1
    user: do-blr1-tam-poc-1-admin
  name: do-blr1-tam-poc-1
current-context: do-blr1-tam-poc-1
kind: Config
preferences: {}
users:
- name: do-blr1-tam-poc-1-admin
  user:
    token: REDACTED
saryas@iamsaryal:~/DO/docker/app$
```

12/ Deploy Kubernetes Resources:

$ kubectl apply -f kubernetes/deployment.yaml
$ kubectl apply -f kubernetes/service.yaml
$ kubectl apply -f kubernetes/hpa.yaml

13/ Verify Deployment

$ kubectl get pods,svc,hpa

```
saryas@iamsaryal:~/DO/docker/app$ kubectl get pods -o=wide
NAME                     READY   STATUS    RESTARTS   AGE   IP             NODE                   NOMINATED NODE   READINESS GATES
saas-app-867c8488b-694bn   1/1     Running   0          25m   10.108.0.47    pool-lq06xtajw-6hidu   <none>           <none>
saas-app-867c8488b-ncwmm   1/1     Running   0          25m   10.108.0.124   pool-lq06xtajw-6hidu   <none>           <none>
saryas@iamsaryal:~/DO/docker/app$ k get svc,ep
NAME                 TYPE           CLUSTER-IP     EXTERNAL-IP                                  PORT(S)        AGE
service/kubernetes   ClusterIP      10.109.0.1     <none>                                       443/TCP        9h
service/saas-app-lb  LoadBalancer   10.109.19.76   2400:6180:100:d0::7179:c001,68.183.246.102   80:32738/TCP   10m

NAME                   ENDPOINTS                          AGE
endpoints/kubernetes   100.65.5.147:443                   9h
endpoints/saas-app-lb  10.108.0.124:5000,10.108.0.47:5000   10m
saryas@iamsaryal:~/DO/docker/app$
```

check service running fine inside pods.

root@**saas-app-867c8488b-694bn**:/app# **curl localhost:5000**

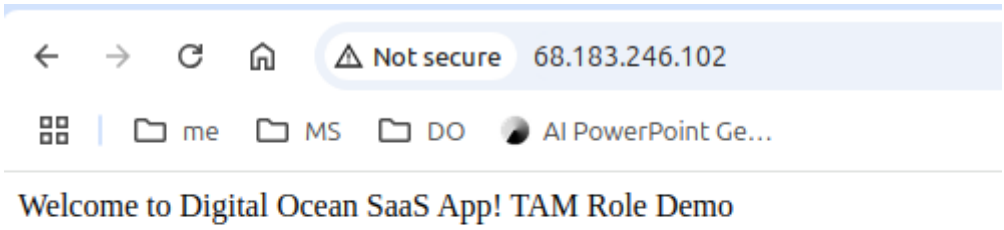
```
saryas@iamsaryal:~/DO/docker/app$ k exec -it pod/saas-app-867c8488b-694bn -- /bin/sh
# bash
root@saas-app-867c8488b-694bn:/app# apt-get install curl
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
curl is already the newest version (7.88.1-10+deb12u12).
0 upgraded, 0 newly installed, 0 to remove and 1 not upgraded.
root@saas-app-867c8488b-694bn:/app# curl localhost:5000
Welcome to Digital Ocean SaaS App! TAM Role Demoroot@saas-app-867c8488b-694bn:/app#
root@saas-app-867c8488b-694bn:/app#
```

Testing using service/Loadbalancer public endpoint also (**from CLI**)

saryas@iamsaryal:~/DO/docker/app$ **curl 68.183.246.102** ### Loadbalancer external IP
Welcome to Digital Ocean SaaS App! TAM Role Demo
saryas@iamsaryal:~/DO/docker/app$

```
saryas@iamsaryal:~/DO/docker/app$ kubectl get pods -o=wide
NAME                        READY   STATUS    RESTARTS   AGE   IP             NODE                   NOMINATED NODE   READINESS GATES
saas-app-867c8488b-694bn    1/1     Running   0          53m   10.108.0.47    pool-lq06xtajw-6hidu   <none>           <none>
saas-app-867c8488b-ncwmm    1/1     Running   0          53m   10.108.0.124   pool-lq06xtajw-6hidu   <none>           <none>
saryas@iamsaryal:~/DO/docker/app$ k get svc -o=wide
NAME          TYPE           CLUSTER-IP     EXTERNAL-IP                                  PORT(S)        AGE   SELECTOR
kubernetes    ClusterIP      10.109.0.1     <none>                                       443/TCP        9h    <none>
saas-app-lb   LoadBalancer   10.109.19.76   2400:6180:100:d0::7179:c001,68.183.246.102   80:32738/TCP   37m   app=saas-app
saryas@iamsaryal:~/DO/docker/app$
saryas@iamsaryal:~/DO/docker/app$
saryas@iamsaryal:~/DO/docker/app$
saryas@iamsaryal:~/DO/docker/app$ curl 68.183.246.102
Welcome to Digital Ocean SaaS App! TAM Role Demosaryas@iamsaryal:~/DO/docker/app$
```

Access LB external IP - From browser:



14/ Check and confirm that loadbalancing is working fine.

saryas@iamsaryal:~/DO/docker/app$ k get pods -o=wide
NAME READY STATUS RESTARTS AGE IP NODE NOMINATED NODE READINESS GATES
saas-app-867c8488b-694bn 1/1 Running 0 66m 10.108.0.47 pool-lq06xtajw-6hidu <none> <none>
saas-app-867c8488b-ncwmm 1/1 Running 0 66m 10.108.0.124 pool-lq06xtajw-6hidu <none> <none>

POD 1

saryas@iamsaryal:~/DO/docker/app$ **k logs --follow saas-app-867c8488b-694bn**
* Serving Flask app 'app'
* Debug mode: off
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
* Running on all addresses (0.0.0.0)
* Running on http://127.0.0.1:5000
* Running on http://10.108.0.47:5000
Press CTRL+C to quit
10.122.0.3 - - [21/Apr/2025 21:31:08] "GET / HTTP/1.1" 200 -
10.122.0.3 - - [21/Apr/2025 21:31:23] "GET / HTTP/1.1" 200 -
127.0.0.1 - - [21/Apr/2025 21:47:47] "GET / HTTP/1.1" 200 -

```
saryas@iamsaryal:~/DO/docker/app$ k logs --follow saas-app-867c8488b-694bn
 * Serving Flask app 'app'
 * Debug mode: off
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
 * Running on all addresses (0.0.0.0)
 * Running on http://127.0.0.1:5000
 * Running on http://10.108.0.47:5000
Press CTRL+C to quit
10.122.0.3 - - [21/Apr/2025 21:31:08] "GET / HTTP/1.1" 200 -
10.122.0.3 - - [21/Apr/2025 21:31:23] "GET / HTTP/1.1" 200 -
127.0.0.1 - - [21/Apr/2025 21:47:47] "GET / HTTP/1.1" 200 -
10.122.0.3 - - [21/Apr/2025 21:48:30] "GET / HTTP/1.1" 200 -
10.122.0.3 - - [21/Apr/2025 21:50:33] "GET / HTTP/1.1" 200 -
10.122.0.3 - - [21/Apr/2025 21:50:43] "GET / HTTP/1.1" 200 -
10.122.0.3 - - [21/Apr/2025 21:50:47] "GET / HTTP/1.1" 200 -
10.122.0.3 - - [21/Apr/2025 21:53:03] "GET / HTTP/1.1" 200 -
10.122.0.3 - - [21/Apr/2025 21:53:04] "GET / HTTP/1.1" 200 -
10.122.0.3 - - [21/Apr/2025 21:53:05] "GET / HTTP/1.1" 200 -
10.122.0.3 - - [21/Apr/2025 21:53:05] "GET / HTTP/1.1" 200 -
10.122.0.3 - - [21/Apr/2025 21:53:38] "GET / HTTP/1.1" 200 -
127.0.0.1 - - [21/Apr/2025 21:53:53] "GET / HTTP/1.1" 200 -
```

POD 2

saryas@iamsaryal:~/DO/docker/app$ **k logs --follow saas-app-867c8488b-ncwmm**
 * Serving Flask app 'app'
 * Debug mode: off
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
 * Running on all addresses (0.0.0.0)
 * Running on http://127.0.0.1:5000
 * Running on http://10.108.0.124:5000
Press CTRL+C to quit
10.122.0.3 - - [21/Apr/2025 21:22:15] "GET / HTTP/1.1" 200 -
10.122.0.3 - - [21/Apr/2025 21:22:53] "GET / HTTP/1.1" 200 -

```
saryas@iamsaryal:~/DO/docker/app$ k logs --follow saas-app-867c8488b-ncwmm
 * Serving Flask app 'app'
 * Debug mode: off
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
 * Running on all addresses (0.0.0.0)
 * Running on http://127.0.0.1:5000
 * Running on http://10.108.0.124:5000
Press CTRL+C to quit
10.122.0.3 - - [21/Apr/2025 21:22:15] "GET / HTTP/1.1" 200 -
10.122.0.3 - - [21/Apr/2025 21:22:53] "GET / HTTP/1.1" 200 -
10.122.0.3 - - [21/Apr/2025 21:50:44] "GET /favicon.ico HTTP/1.1" 404 -
10.122.0.3 - - [21/Apr/2025 21:50:47] "GET / HTTP/1.1" 200 -
10.122.0.3 - - [21/Apr/2025 21:50:48] "GET / HTTP/1.1" 200 -
```

15/ Install Metrics Server (refer: doc link)

saryas@iamsaryal:~/DO/docker$ h**elm install metrics-server metrics-server/metrics-server --version "$HELM_CHART_VERSION" --namespace metrics-server --create-namespace -f "Kubernetes-Starter-Kit-Developers/07-scaling-application-workloads/assets/manifests/metrics-server-values-v3.8.2.yaml"**
NAME: metrics-server
LAST DEPLOYED: Tue Apr 22 04:32:35 2025
NAMESPACE: metrics-server
STATUS: deployed
REVISION: 1
TEST SUITE: None
NOTES:

```
**********************************************************************
* Metrics Server                                                     *
**********************************************************************
  Chart version: 3.12.2
  App version:   0.7.2
  Image tag:     registry.k8s.io/metrics-server/metrics-server:v0.7.2
```

16/ Setup HorizontalPodAutoscaler (HPA)

saryas@iamsaryal:~/DO/docker/app$ **kubectl autoscale deployment saas-app --cpu-percent=20 --min=1 --max=5**
horizontalpodautoscaler.autoscaling/saas-app autoscaled

saryas@iamsaryal:~/DO/docker/app$ k**ubectl get hpa**

NAME	REFERENCE	TARGETS	MINPODS	MAXPODS	REPLICAS	AGE
saas-app	Deployment/saas-app	cpu: 1%/20%	1	5	0	8s