How to deploy .NET8 WebAPI Docker Image stored in Google Cloud Artifact Registry to Google Kubernetes Engine (GKE)

To create and upload the .NET8 WebAPI Docker image to Google Cloud Artifact Registry repo, see this github repo:

https://github.com/luiscoco/GoogleCloud_Sample10-Artifact-Registry

1. Set up Google Cloud SDK

Make sure you have the Google Cloud SDK installed and initialized on your local machine

```
gcloud init
```

2. Authenticate with GCP

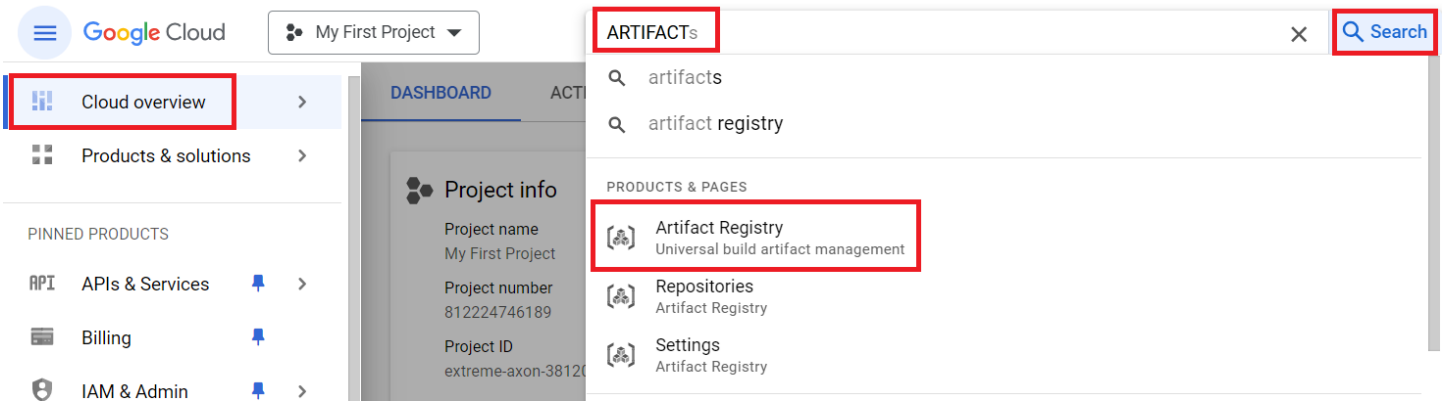
Use the gcloud auth login command to authenticate with Google Cloud

Configure Docker to use gcloud as a credential helper:

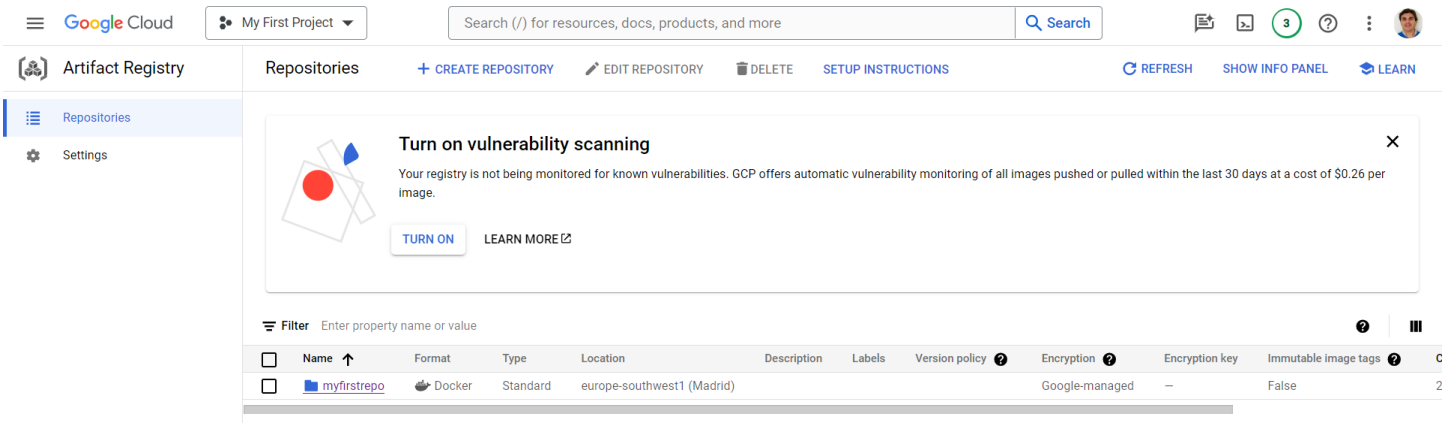
```
gcloud auth configure-docker
```

3. Pull the Docker Image from Artifact Registry

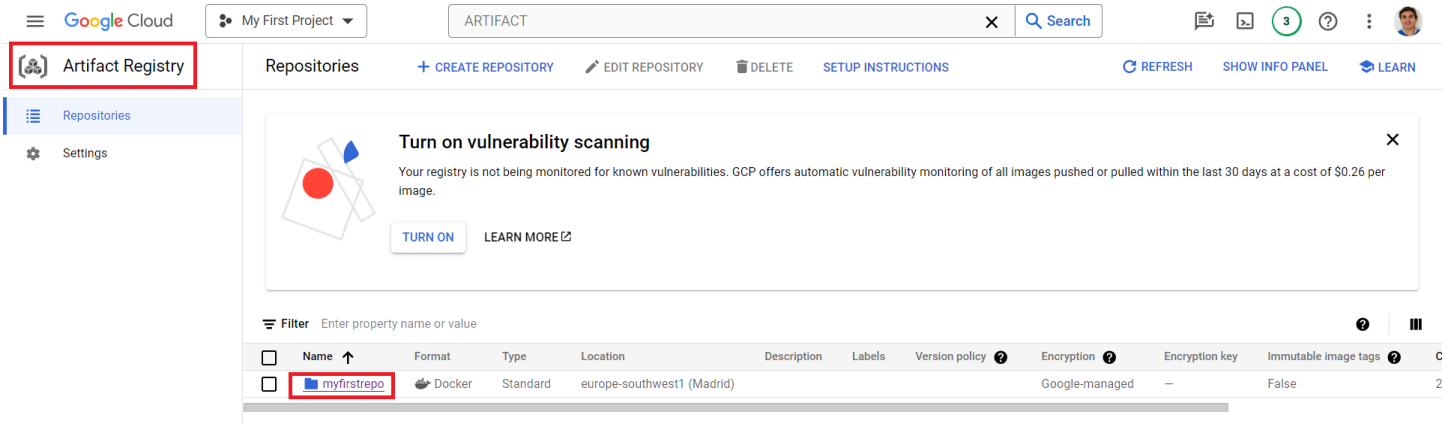
Navigate to Google Cloud Artifact Registry list



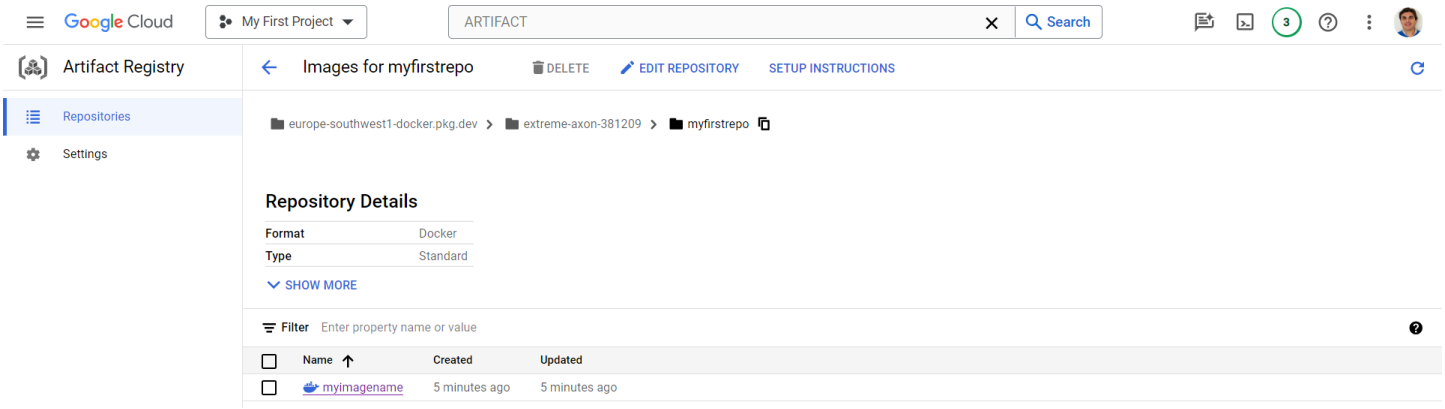
See the repos list



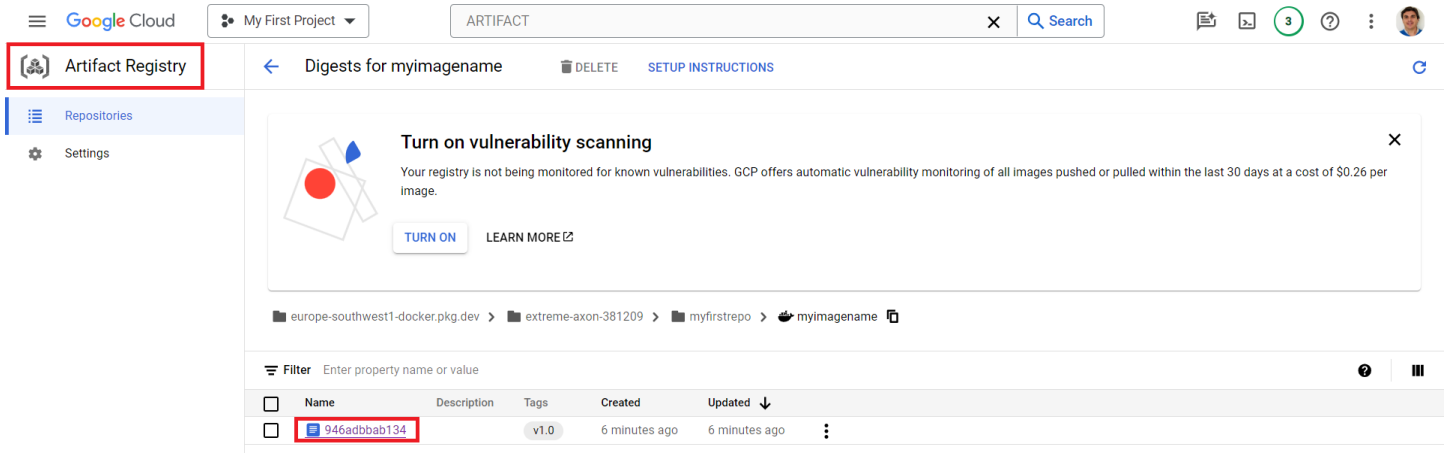
We click on our repo



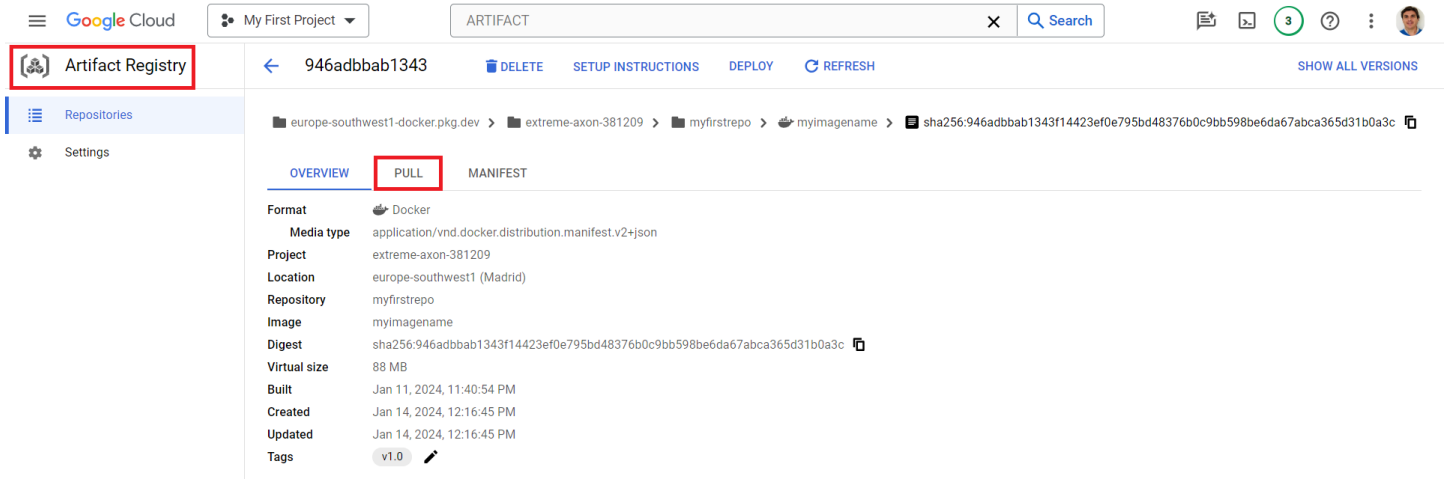
Then we click on myimagename



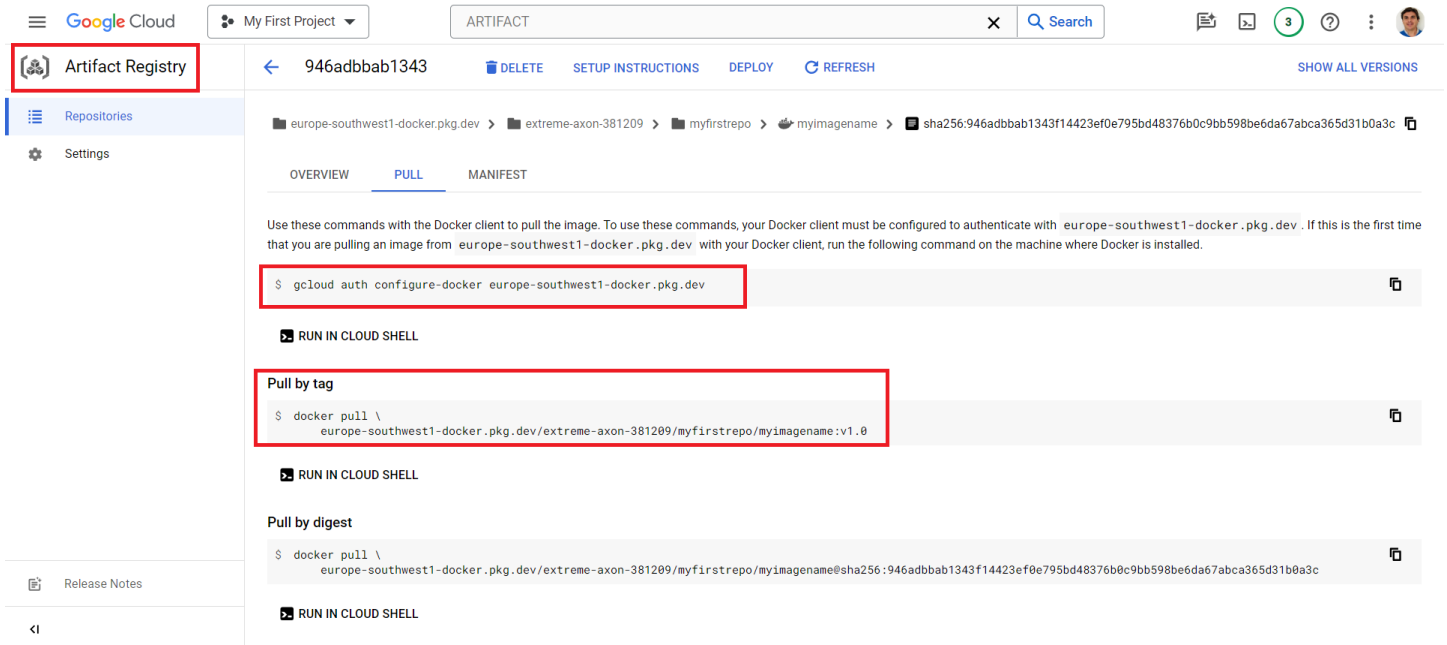
We also the image



Finally we click on the Pull tab



We copy the command to authenticate and pull the image from the repo

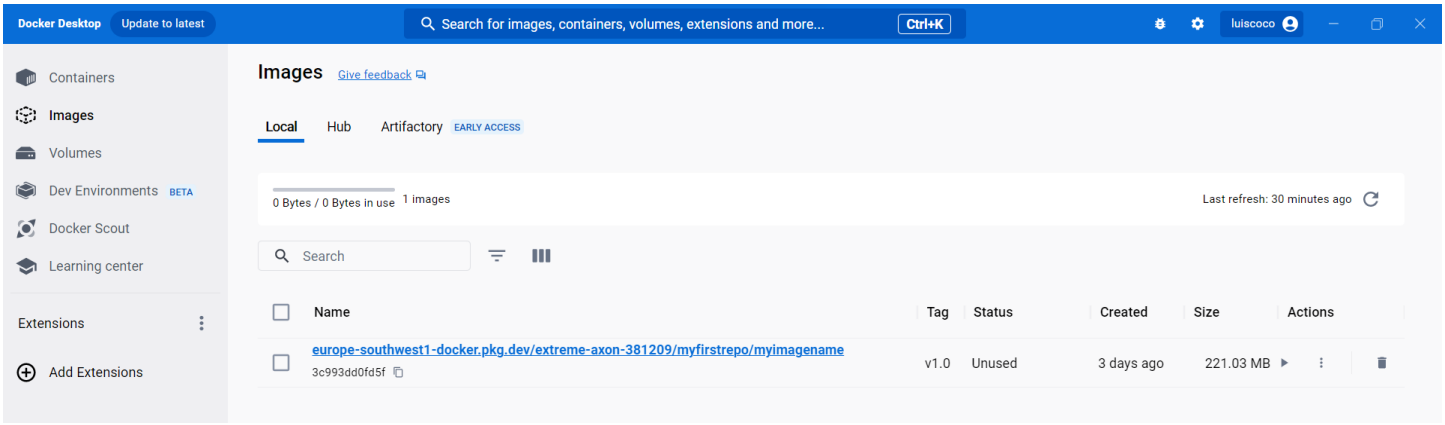



```
gcloud auth configure-docker europe-southwest1-docker.pkg.dev
```

```
docker pull LOCATION-docker.pkg.dev/PROJECT-ID/REPOSITORY/IMAGE:TAG
```

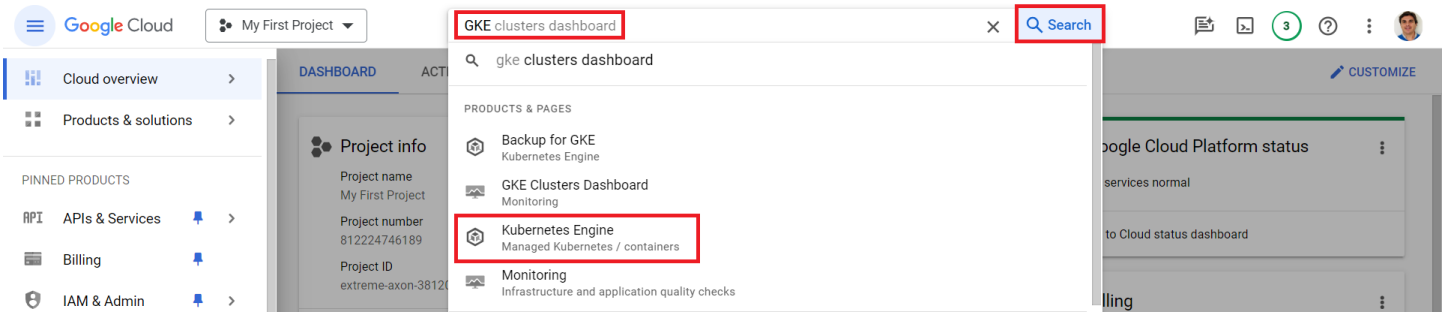
Replace LOCATION, PROJECT-ID, REPOSITORY, IMAGE, and TAG with your specific details

```
docker pull europe-southwest1-docker.pkg.dev/extreme-axon-381209/myfirstrepo/myimagename:v1.0
```

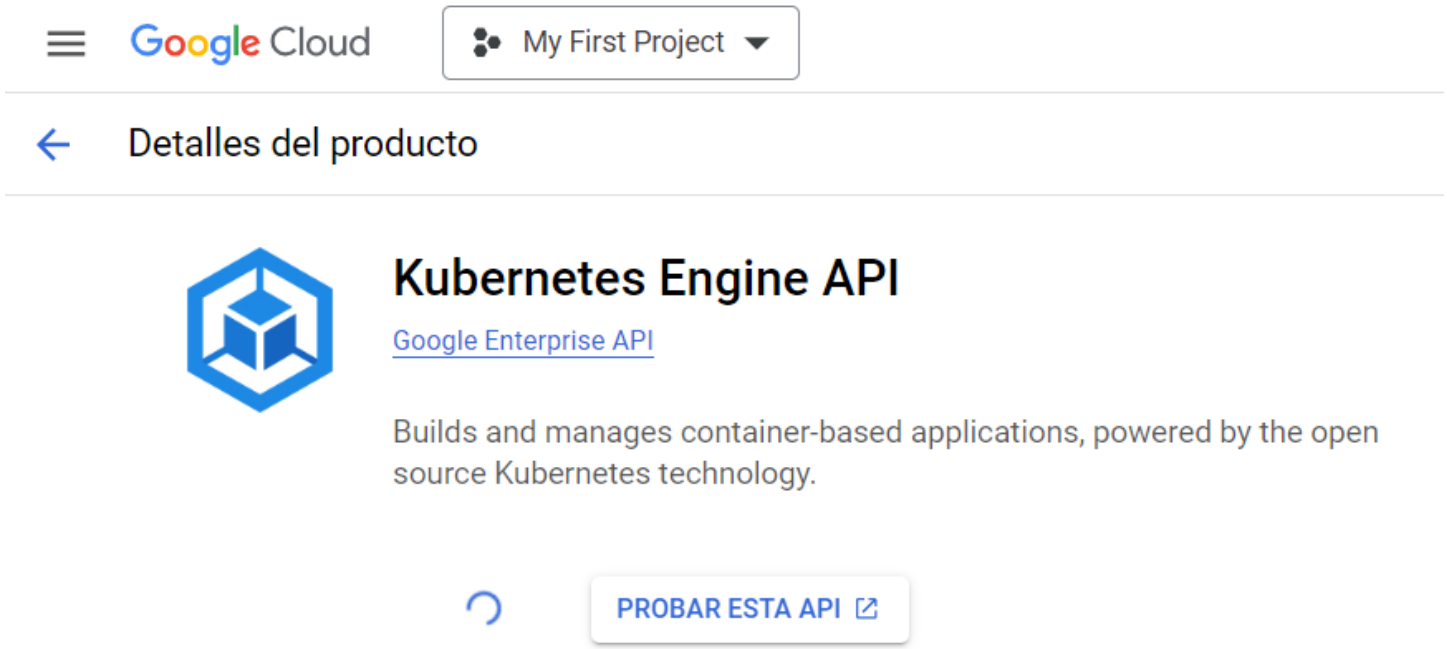


4. Set up your Kubernetes cluster

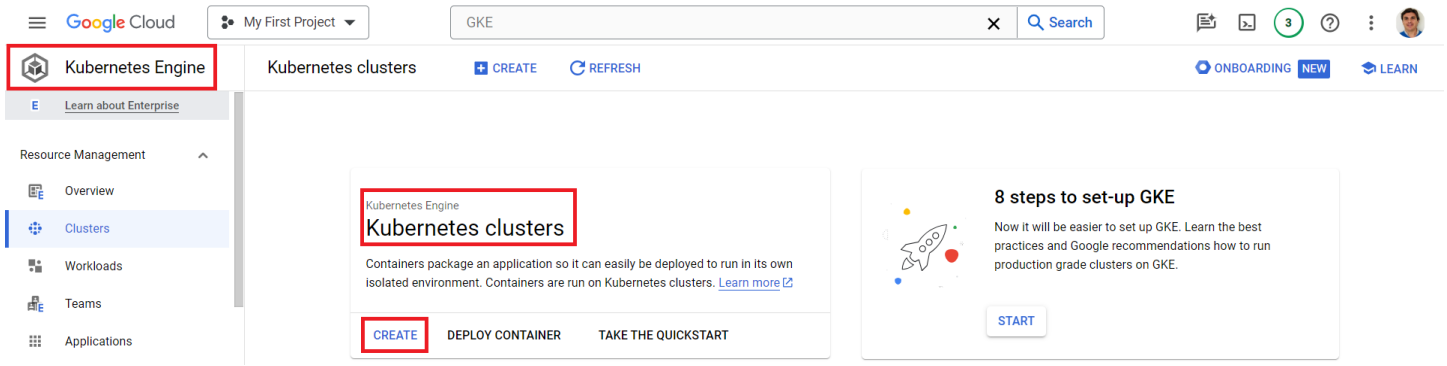
Search for GKE

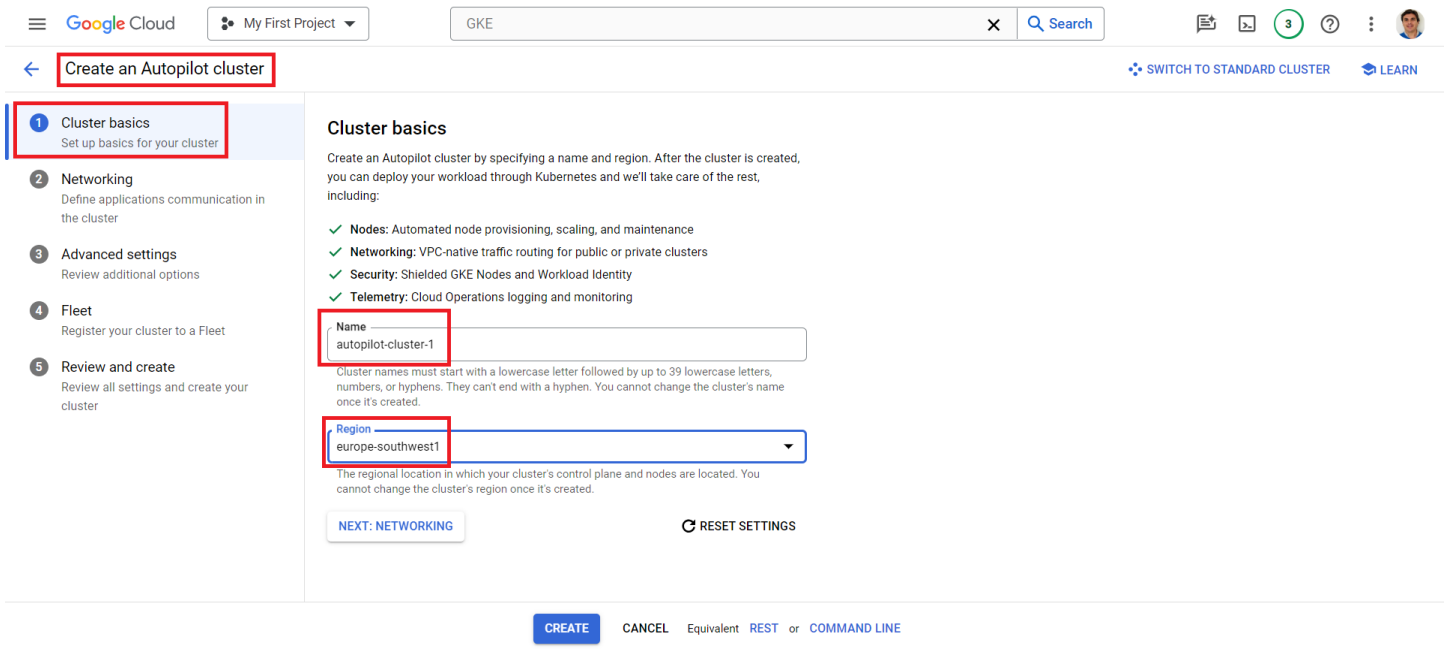


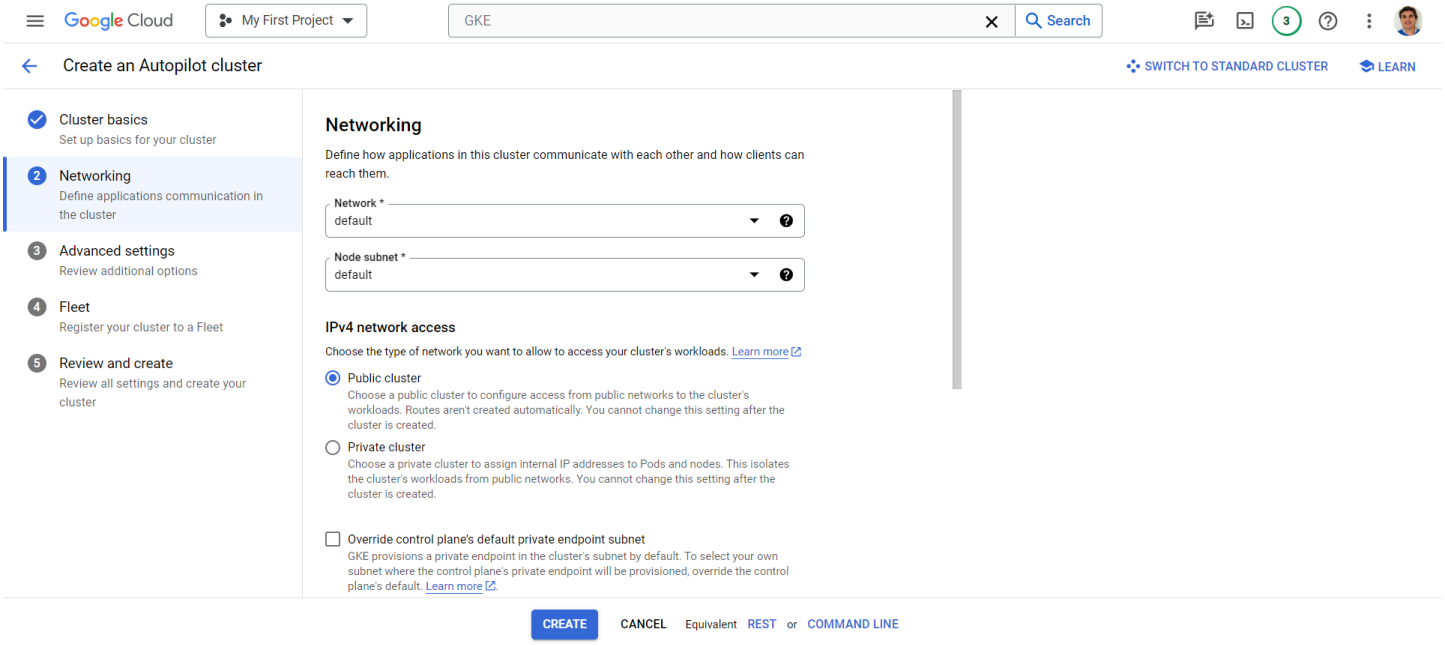
Enable GKE API



If you haven't already, create a Kubernetes cluster in GKE



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Set up basics for your cluster
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Define applications communication in the cluster
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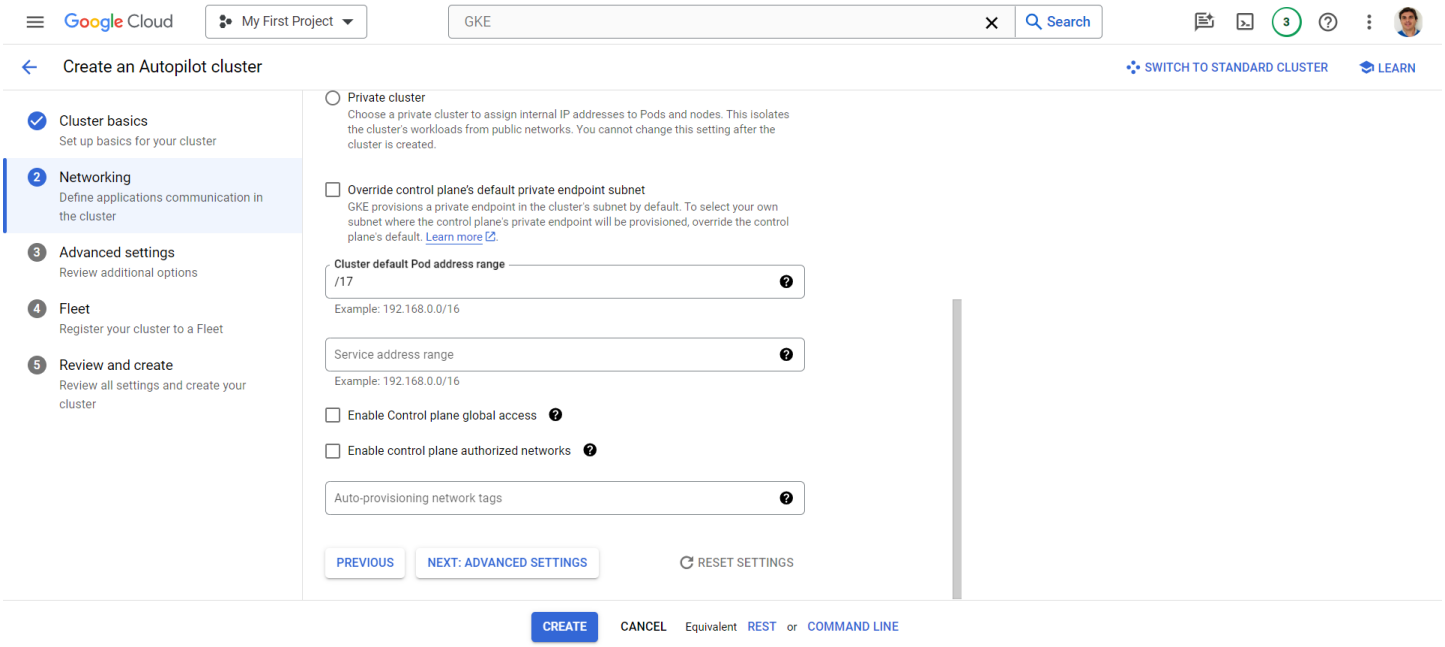
Review additional options
Fleet
Register your cluster to a Fleet
Review and create
Review all settings and create your cluster
Networking
Define how applications in this cluster communicate with each other and how clients can reach them.
Network *
default
Node subnet *
default
IPv4 network access
Choose the type of network you want to allow to access your cluster's workloads. Learn more
Public cluster
Choose a public cluster to configure access from public networks to the cluster's workloads. Routes aren't created automatically. You cannot change this setting after the cluster is created.
Private cluster
Choose a private cluster to assign internal IP addresses to Pods and nodes. This isolates the cluster's workloads from public networks. You cannot change this setting after the cluster is created.
Override control plane's default private endpoint subnet
GKE provisions a private endpoint in the cluster's subnet by default. To select your own subnet where the control plane's private endpoint will be provisioned, override the control plane's default. Learn more
CREATE
CANCEL
Equivalent REST or COMMAND LINE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GKE provisions a private endpoint in the cluster's subnet by default. To select your own subnet where the control plane's private endpoint will be provisioned, override the control plane's default. Learn more
Cluster default Pod address range
/17
Example: 192.168.0.0/16
Service address range
Example: 192.168.0.0/16
Enable Control plane global access
Enable control plane authorized networks
Auto-provisioning network tags
PREVIOUS
NEXT: ADVANCED SETTINGS
RESET SETTINGS
CREATE
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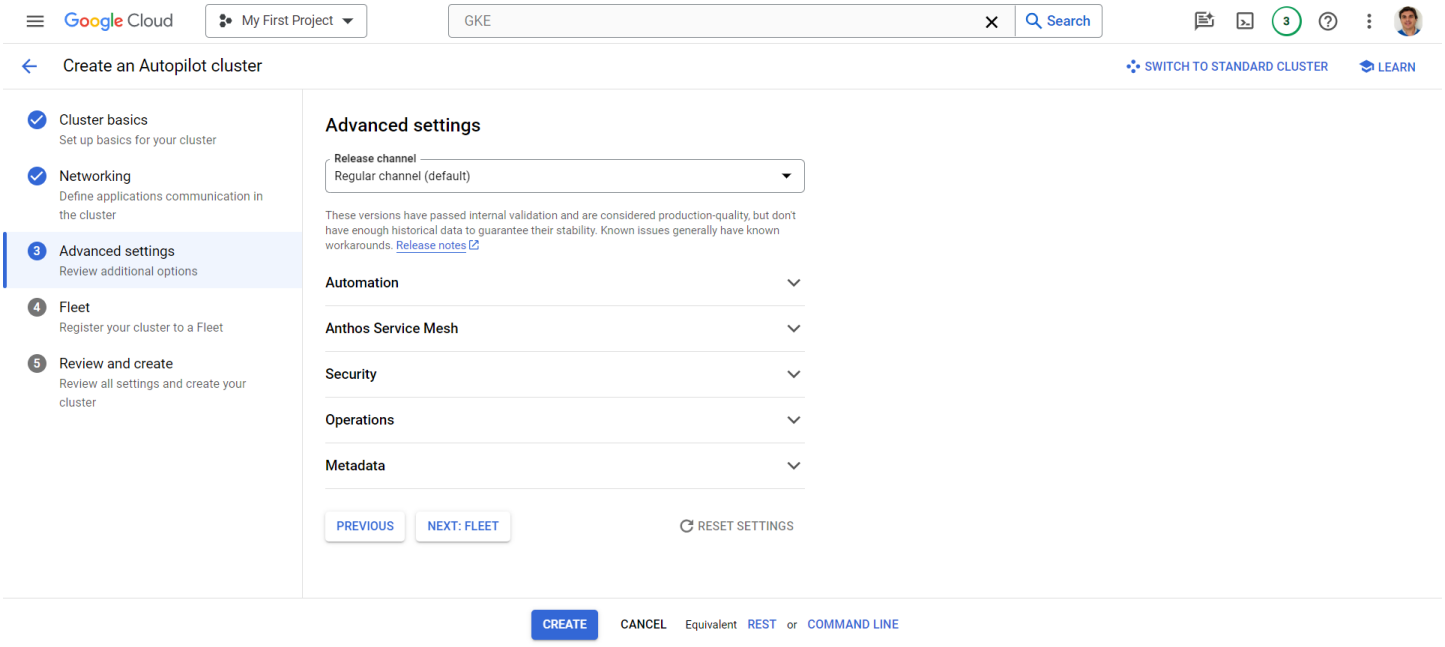
Equivalent REST or COMMAND LINE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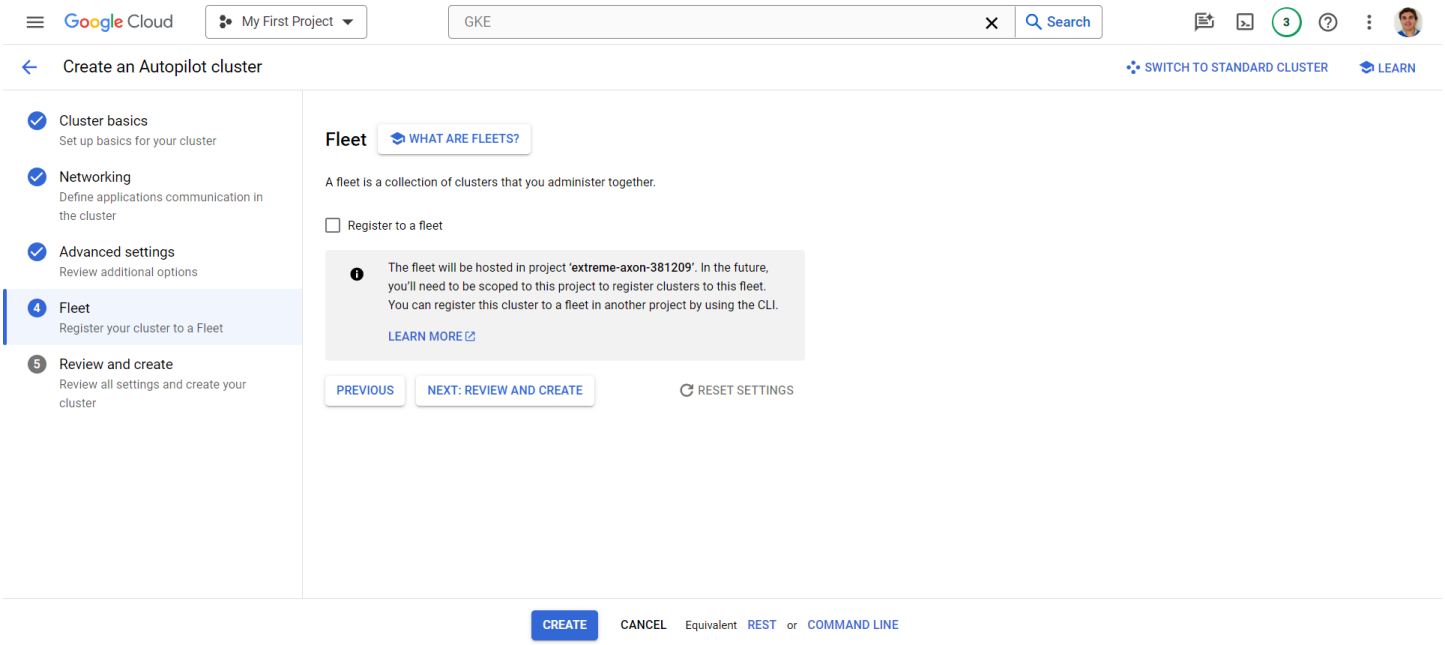
Advanced settings
Release channel
Regular channel (default)
These versions have passed internal validation and are considered production-quality, but don't have enough historical data to guarantee their stability. Known issues generally have known workarounds. Release notes
Automation
Anthos Service Mesh
Security
Operations
Metadata
PREVIOUS
NEXT: FLEET
RESET SETTINGS
CREATE
CANCEL
Equivalent REST or COMMAND LINE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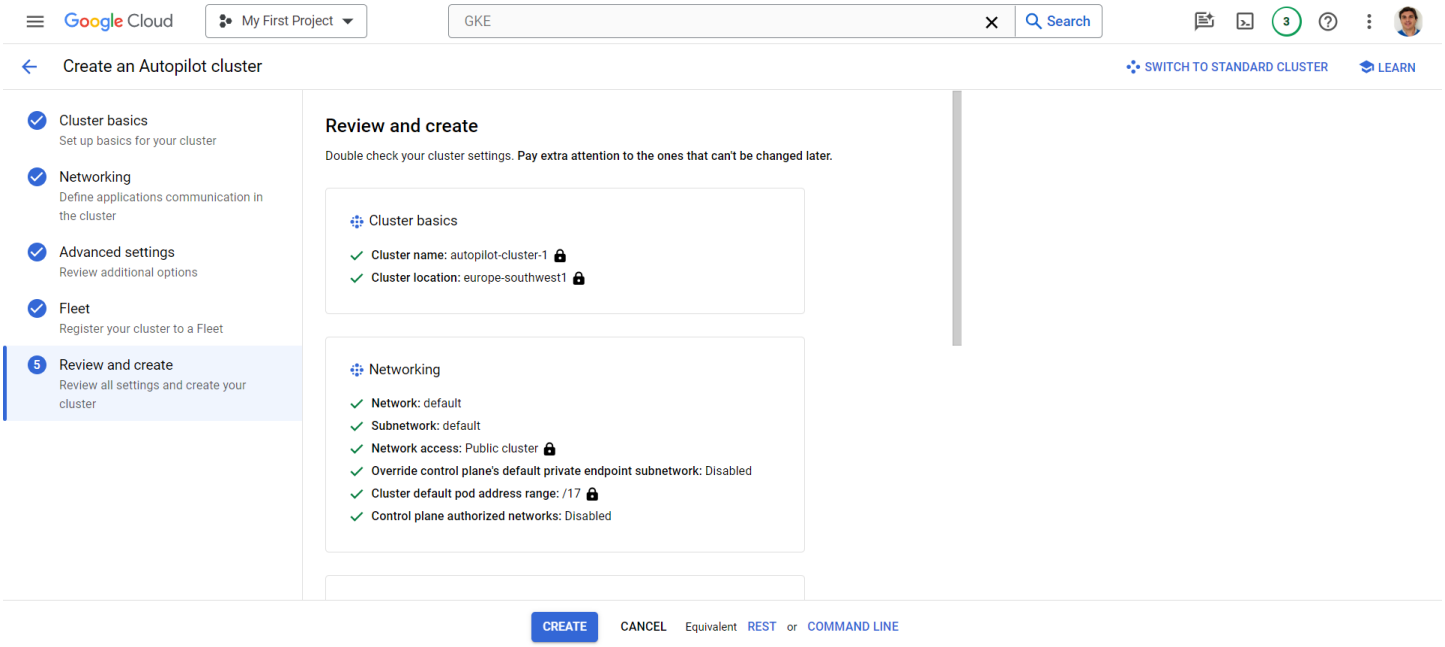
4 Fleet
Register your cluster to a Fleet
5 Review and create
Review all settings and create your cluster
Fleet
WHAT ARE FLEETS?
A fleet is a collection of clusters that you administer together.
Register to a fleet
The fleet will be hosted in project 'extreme-axon-381209'. In the future, you'll need to be scoped to this project to register clusters to this fleet. You can register this cluster to a fleet in another project by using the CLI.
LEARN MORE
PREVIOUS
NEXT: REVIEW AND CREATE
RESET SETTINGS
CREATE
CANCEL
Equivalent REST or COMMAND LINE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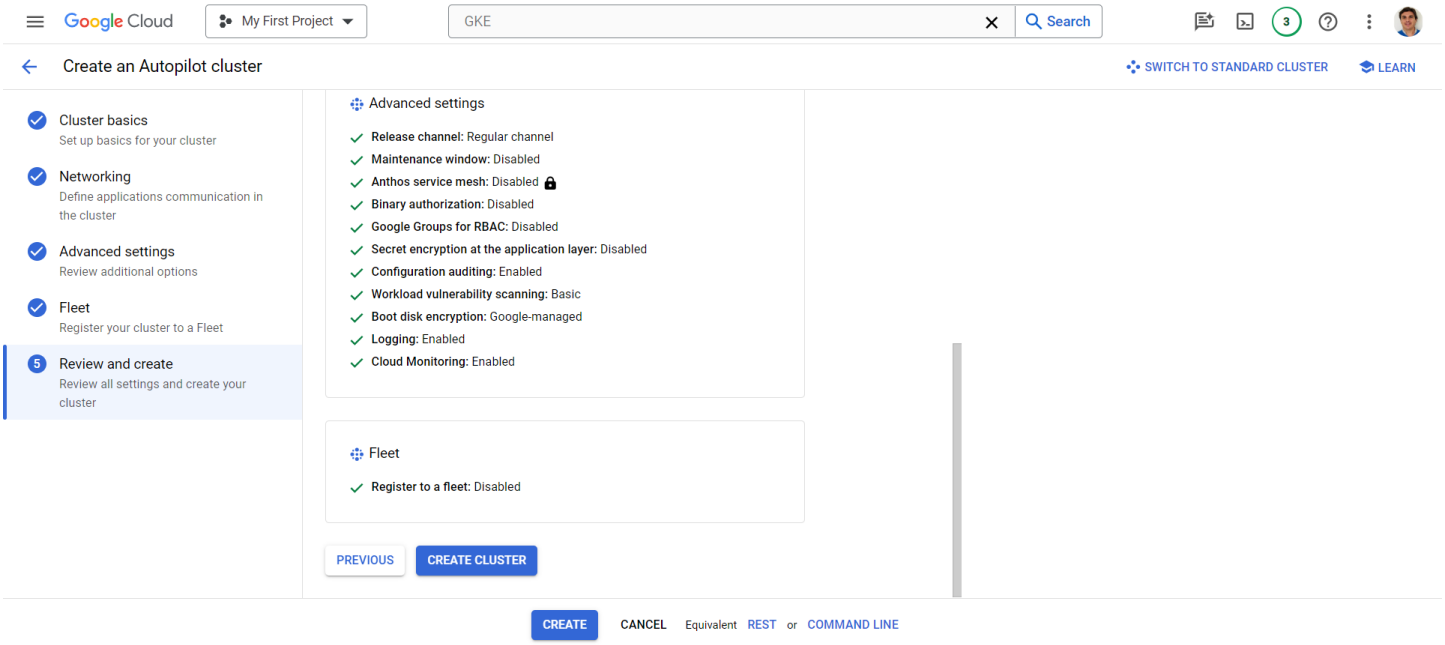
Review all settings and create your cluster
Review and create
Double check your cluster settings. Pay extra attention to the ones that can't be changed later.
Cluster basics
Cluster name: autopilot-cluster-1
Cluster location: europe-southwest1
Networking
Network: default
Subnetwork: default
Network access: Public cluster
Override control plane's default private endpoint subnetwork: Disabled
Cluster default pod address range: /17
Control plane authorized networks: Disabled
CREATE
CANCEL
Equivalent REST or COMMAND LINE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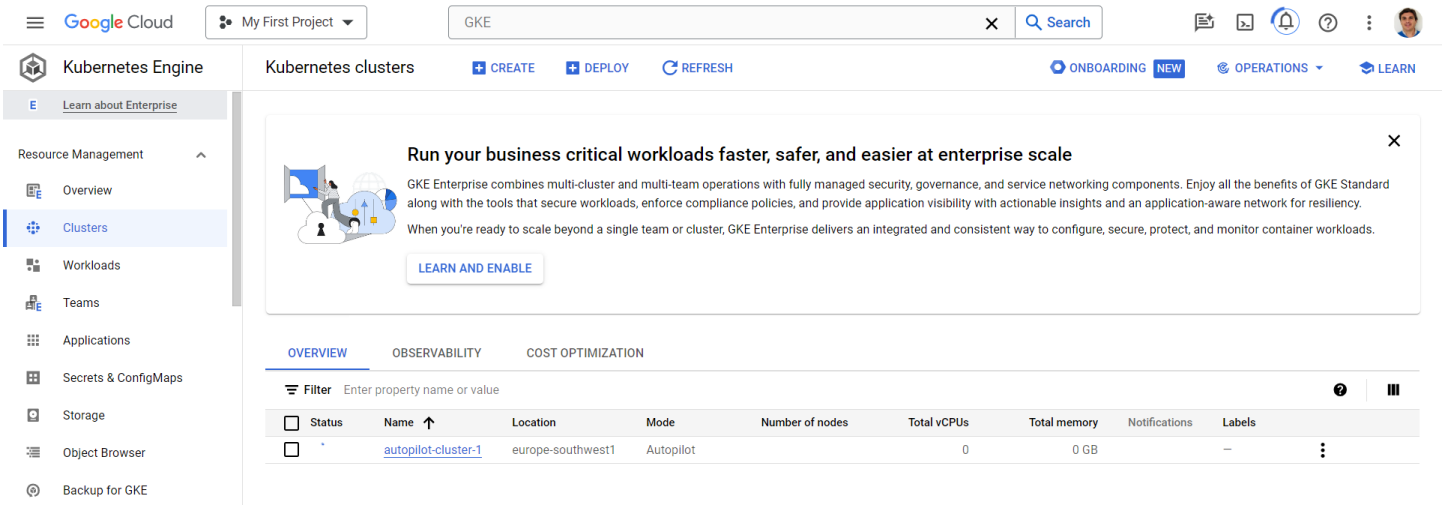
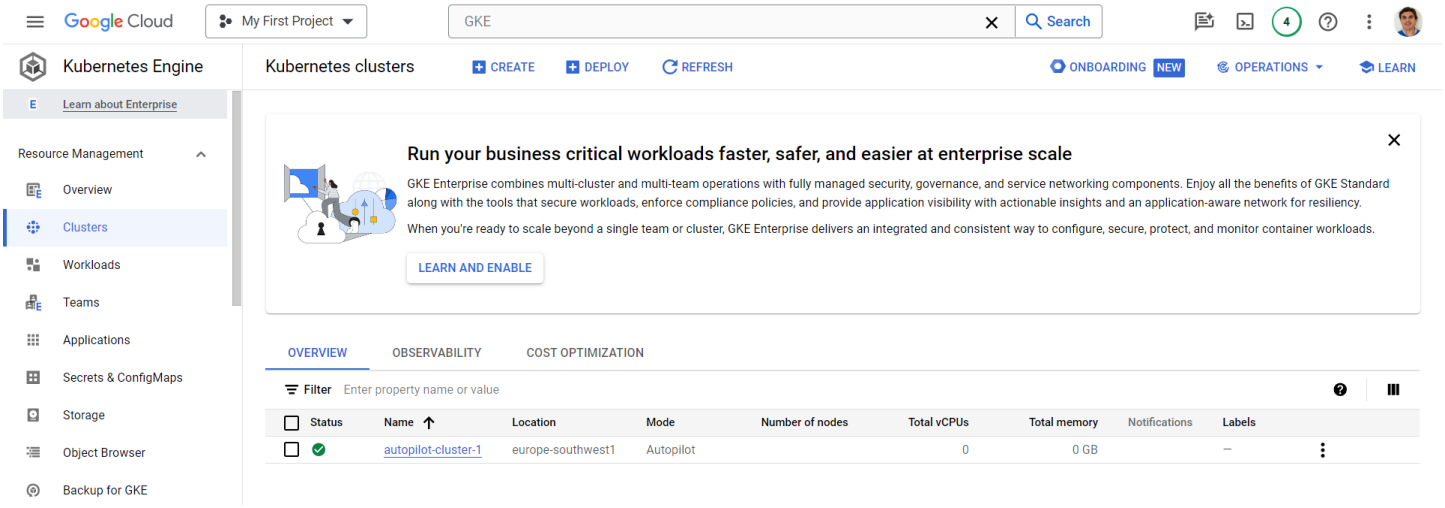
Advanced settings
Release channel: Regular channel
Maintenance window: Disabled
Anthos service mesh: Disabled
Binary authorization: Disabled
Google Groups for RBAC: Disabled
Secret encryption at the application layer: Disabled
Configuration auditing: Enabled
Workload vulnerability scanning: Basic
Boot disk encryption: Google-managed
Logging: Enabled
Cloud Monitoring: Enabled
Fleet
Register to a fleet: Disabled
PREVIOUS
CREATE CLUSTER
CREATE
CANCEL
Equivalent REST or COMMAND LINE





5. Configure kubectl to use your GKE cluster

We first follow the Kubectl authentication plugin installation instructions

We enter in this web page:

https://cloud.google.com/blog/products/containers-kubernetes/kubectl-auth-changes-in-gke

and we run this command:

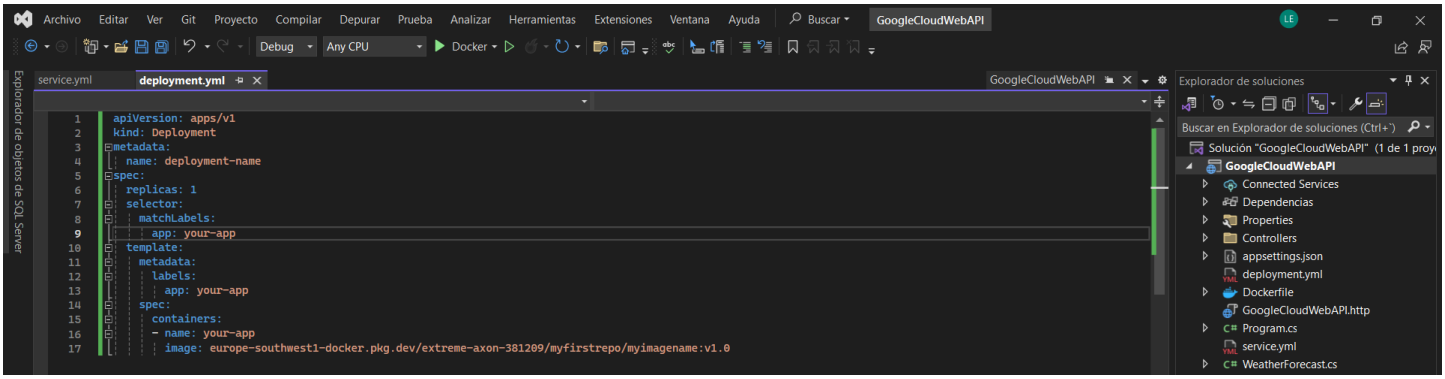
```
gcloud components install gke-gcloud-auth-plugin
```

We configure the KBE cluster to use it

```
gcloud container clusters get-credentials autopilot-cluster-1 ^
--region europe-southwest1 ^
--project extreme-axon-381209
```

6. Deploy the image to GKE

You can use a Kubernetes deployment YAML file to deploy the image



deployment.yml

```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: deployment-name
spec:
  replicas: 1
  selector:
    matchLabels:
      app: your-app
  template:
    metadata:
      labels:
        app: your-app
    spec:
      containers:
      - name: your-app
        image: europe-southwest1-docker.pkg.dev/extreme-axon-381209/myfirstrepo/myimagename:v1.0
```

service.yml

```yaml
apiVersion: v1
kind: Service
metadata:
  name: your-app-service
spec:
  selector:
    app: your-app
  ports:
    - protocol: TCP
      port: 80
      targetPort: 8080
  type: LoadBalancer
```

We can run these commands to apply the manifest files

```
kubectl apply -f deployment.yml
```

```
kubectl apply -f service.yml
```

7. Apply this configuration and very the running application

We run this command to apply the Kubernetes manifest file

```
kubectl apply -f deployment.yaml
```

Verify the Deployment: Check that your deployment is running as expected.

```
kubectl get deployments
```

We can verify the deployment and service data with the command:

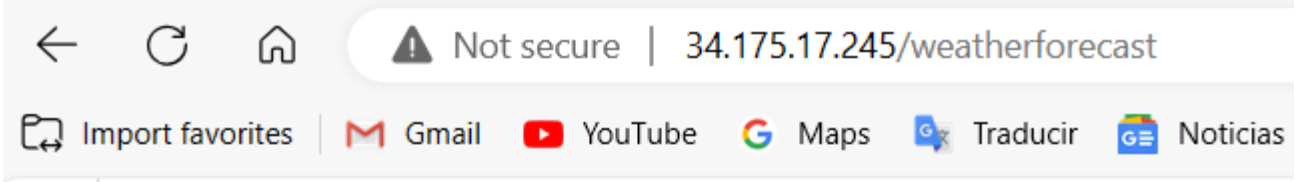
```
kubectl get all
```

```
PS C:\GoogleCloud WebAPI\GoogleCloudWebAPI> kubectl get all
NAME                                  READY   STATUS    RESTARTS   AGE
service/your-app-service   LoadBalancer   34.118.230.151   <pending>     80:30632/TCP   31s
NAME                              READY   UP-TO-DATE   AVAILABLE   AGE
NAME                         TYPE           CLUSTER-IP       EXTERNAL-IP     PORT(S)        AGE
service/kubernetes           ClusterIP      34.118.224.1     <none>          443/TCP        7h
service/your-app-service     LoadBalancer   34.118.230.151   34.175.17.245   80:30632/TCP   43s

NAME                                READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/deployment-name     1/1     1            1           6m2s

NAME                                           DESIRED   CURRENT   READY   AGE
replicaset.apps/deployment-name-65ff64b78      1         1         1       6m1s
```

We can connect to the application with this URL: http://34.175.17.245/weatherforecast




```
[
    {
        "date": "2024-01-15",
        "temperatureC": 35,
        "temperatureF": 94,
        "summary": "Sweltering"
    },
    {
        "date": "2024-01-16",
        "temperatureC": -11,
        "temperatureF": 13,
        "summary": "Scorching"
    },
    {
        "date": "2024-01-17",
        "temperatureC": -16,
        "temperatureF": 4,
        "summary": "Sweltering"
    },
    {
        "date": "2024-01-18",
        "temperatureC": 23,
        "temperatureF": 73,
        "summary": "Mild"
    },
    {
        "date": "2024-01-19",
        "temperatureC": -17,
        "temperatureF": 2,
        "summary": "Cool"
    }
]
```