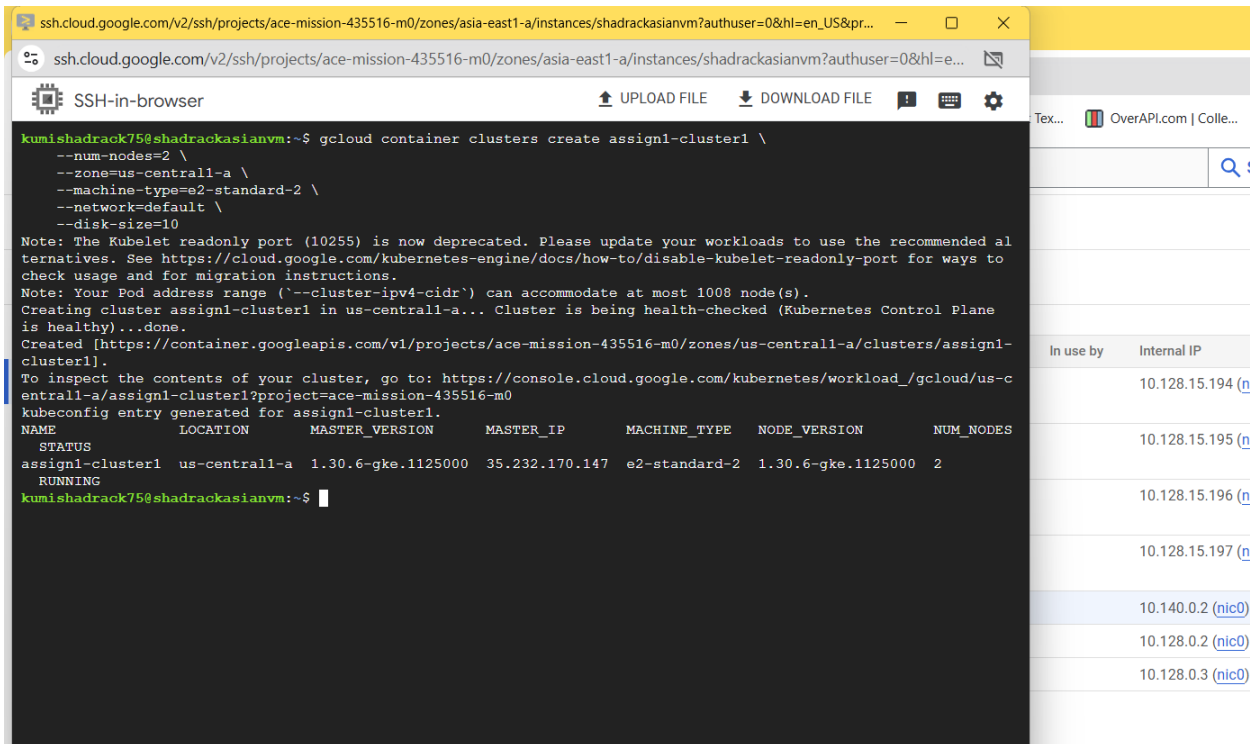# 1. Create a GKE Cluster

- **Create a New GCP Project**:
  Use the Google Cloud Console to create a new project and enable the Kubernetes Engine API.

- **Create the Cluster**: Use either the Console or the gcloud CLI. For example:

Cluster Name: assign1-cluster1

Region/Zone: us-central1-a

Node Configuration: e2-standard-2, 2 nodes.

Network Configuration: Default VPC with necessary firewall rules

2. Deploy the NTP Server Container

- **Choose a Container Image**: Use a pre-built image from Docker Hub like cturra/ntp. This image provides a simple and reliable NTP server setup.

- **Create Deployment and Service Manifests**: Example manifests:

- **Deployment Manifest** (ntp-deployment.yaml)

Service Manifest (ntp-service.yaml):

SSH-in-browser   ⬆ UPLOAD FILE   ⬇ DOWNLOAD FILE   ▣

```
  GNU nano 7.2                              ntp-service.yaml *
apiVersion: v1
kind: Service
metadata:
  name: ntp-service
spec:
  selector:
    app: ntp-server
  ports:
  - protocol: UDP
    port: 123
    targetPort: 123
  type: LoadBalancer
```

Deploy the manifests:

ssh.cloud.google.com/v2/ssh/projects/ace-mission-435516-m0/zones/asia-east1-a/instances/shadrackasianvm?authuser=0&hl=e...

SSH-in-browser   ⬆ UPLOAD FILE   ⬇ DOWNLOAD FILE   ▣ ⌨ ⚙

```
kumishadrack75@shadrackasianvm:~$ gcloud container clusters create assign1-cluster1 \
    --num-nodes=2 \
    --zone=us-central1-a \
    --machine-type=e2-standard-2 \
    --network=default \
    --disk-size=10
Note: The Kubelet readonly port (10255) is now deprecated. Please update your workloads to use the recommended al
ternatives. See https://cloud.google.com/kubernetes-engine/docs/how-to/disable-kubelet-readonly-port for ways to
check usage and for migration instructions.
Note: Your Pod address range (`--cluster-ipv4-cidr`) can accommodate at most 1008 node(s).
Creating cluster assign1-cluster1 in us-central1-a... Cluster is being health-checked (Kubernetes Control Plane
is healthy)...done.
Created [https://container.googleapis.com/v1/projects/ace-mission-435516-m0/zones/us-central1-a/clusters/assign1-
cluster1].
To inspect the contents of your cluster, go to: https://console.cloud.google.com/kubernetes/workload_/gcloud/us-c
entral1-a/assign1-cluster1?project=ace-mission-435516-m0
kubeconfig entry generated for assign1-cluster1.
NAME              LOCATION        MASTER_VERSION     MASTER_IP        MACHINE_TYPE    NODE_VERSION        NUM_NODES
  STATUS
assign1-cluster1  us-central1-a   1.30.6-gke.1125000 35.232.170.147   e2-standard-2   1.30.6-gke.1125000  2
  RUNNING
kumishadrack75@shadrackasianvm:~$ nano ntp-deployment.yaml
kumishadrack75@shadrackasianvm:~$ nano ntp-service.yaml
kumishadrack75@shadrackasianvm:~$ kubectl apply -f ntp-deployment.yaml
kubectl apply -f ntp-service.yaml
deployment.apps/ntp-server created
service/ntp-service created
kumishadrack75@shadrackasianvm:~$
```

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	In use by	Internal IP	External IP
		10.128.15.194 (nic0)	34.56.211.52 (
		10.128.15.195 (nic0)	35.239.212.19
		10.128.15.196 (nic0)	34.58.28.187 (
		10.128.15.197 (nic0)	34.59.93.245 (
		10.140.0.2 (nic0)	34.81.113.24 (
		10.128.0.2 (nic0)	
		10.128.0.3 (nic0)	

Monitor VMs   ≡ Explore V

3. Configure the NTP Server (Optional)

- Configure the container to use specific NTP pools or restrict access via environment variables or additional commands (if supported by the image).

4. Test the NTP Server

- Retrieve the external IP address:

Use a client machine to query the NTP server. Example using ntpdate

```
Setting up python3-ntp (1.2.2+dfsg1-1+deb12u1) ...
Setting up ntpsec-ntpdig (1.2.2+dfsg1-1+deb12u1) ...
Setting up ntpsec-ntpdate (1.2.2+dfsg1-1+deb12u1) ...
Setting up ntpdate (1:4.2.8p15+dfsg-2~1.2.2+dfsg1-1+deb12u1) ...
Processing triggers for man-db (2.11.2-2) ...
kumishadrack75@shadrackasianvm:~$ sudo ntpdate -q 34.29.223.163
2024-12-18 15:50:56.608280 (+0000) +0.004951 +/- 0.088304 34.29.223.163 s4 no-leap
kumishadrack75@shadrackasianvm:~$
```

Release Notes   recovery   billing

VM instance started

GET NODES:

```
kumishadrack75@shadrackasianvm:~$ ntpdate -q 34.29.223.163
-bash: ntpdate: command not found
kumishadrack75@shadrackasianvm:~$ kubectl get nodes
NAME                                          STATUS   ROLES    AGE   VERSION
gke-assign1-cluster1-default-pool-4f09259b-1z9p   Ready    <none>   10m   v1.30.6-gke.1125000
gke-assign1-cluster1-default-pool-4f09259b-pk2w   Ready    <none>   10m   v1.30.6-gke.1125000
kumishadrack75@shadrackasianvm:~$
```

Release Notes   recovery   billing

Summary: Deploying an NTP Server on GKE

1. **Set Up My GCP Environment**
   First, I logged into my Google Cloud Platform (GCP) account and created a new project specifically for this assignment. I made sure to enable the Kubernetes Engine API so I could create and manage a GKE cluster.

2. **Created the GKE Cluster**
   Using the gcloud CLI, I created a Kubernetes cluster named assign1-cluster1 in the us-central1-a zone. I configured it with two nodes using the e2-standard-2 machine type. The cluster was connected to the default VPC network, and I ensured the necessary firewall rules were in place to allow UDP traffic on port 123, which is required for NTP servers.

Selected an NTP Server Container Image
After setting up the cluster, I decided to use the pre-built cturra/ntp container image from Docker Hub. This image is a lightweight, reliable implementation of an NTP server.

Created Kubernetes Manifests
Next, I wrote two Kubernetes manifest files: one for the Deployment and one for the Service.

- The **Deployment Manifest** defined the number of replicas (2), the container image, and the UDP port (123) for the NTP server.

- The **Service Manifest** exposed the NTP server externally using a LoadBalancer Service and also ensured the NTP service was accessible on port 123.

I saved these files as ntp-deployment.yaml and ntp-service.yaml respectively.

Deployed the NTP Server
Using kubectl, I deployed the manifests to my GKE cluster:

kubectl apply -f ntp-deployment.yaml

kubectl apply -f ntp-service.yaml

I confirmed the deployment and verified the external IP address of the Service by running:

kubectl get svc ntp-service

Installed ntpdate on My Client Machine
When it was time to test the NTP server, I tried using the ntpdate command to query the server. However, I encountered an error stating that ntpdate was not found on my machine. To fix this, I installed ntpdate as follows:

- On my Ubuntu machine, I updated the package list and installed ntpdate:

sudo apt update

sudo apt install ntpdate

Tested the NTP Server
With ntpdate installed, I queried the NTP server using its external IP address. Here's the command I ran:

sudo ntpdate -q <external-ip>

This command successfully returned the time data from the NTP server, proving that the server was functioning as expected and synchronizing time correctly.