# Setting Up a Standard GKE Cluster and Compute Engine Instance on Google Cloud Platform (GCP)

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## Introduction

This guide demonstrates the process of setting up a Google Kubernetes Engine (GKE) cluster and a Compute Engine instance, configuring them to interact seamlessly. You'll also install essential tools such as the gCloud SDK and kubectl.

## **Prerequisites**

## 1. Google Cloud Platform (GCP) Account:

- Ensure you have an active GCP account.
- o Billing enabled on the project.

#### 2. Project Setup:

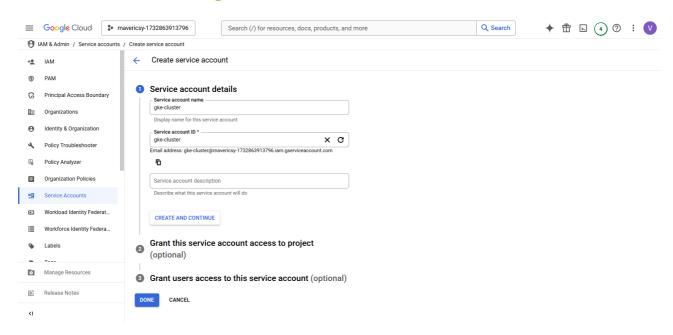
- Create or use an existing GCP project.
- Enable the following APIs in your project:
  - Kubernetes Engine API
  - Compute Engine API
  - Cloud Build API
  - IAM Service Account Credentials API

#### 3. **Tools:**

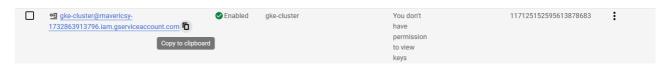
- Access to a terminal or Cloud Shell.
- Basic familiarity with GCP Console and CLI.

# **Step 1: Create a Service Account**

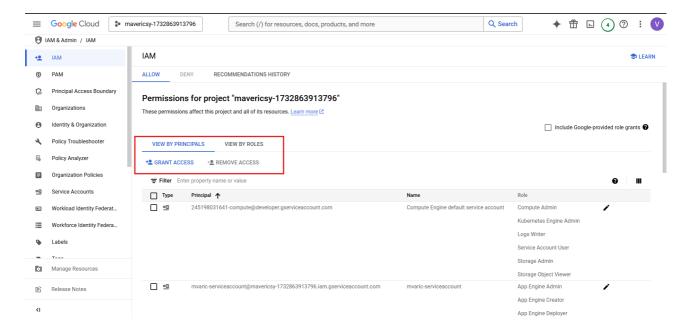
- 1. Navigate to IAM & Admin > Service Accounts in the GCP Console.
- 2. Click Create Service Account.
  - Service Account Name: gke-cluster



- 3. Click Create and Continue and click Done.
- 4. Copy the service account name



5. Navigate to IAM and select GRANT ACCESS



6. Make sure you add service account name in new principals.

## Grant access to "mavericsy-1732863913796"

Grant principals access to this resource and add roles to specify what actions the principals can take. Optionally, add conditions to grant access to principals only when a specific criteria is met. Learn more about IAM conditions 🖸

#### Resource

navericsy-1732863913796

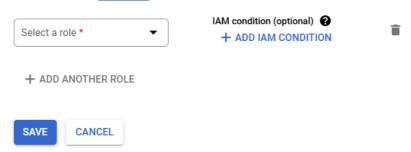
### Add principals

Principals are users, groups, domains, or service accounts. <u>Learn more about principals</u> in IAM [2]



## Assign roles

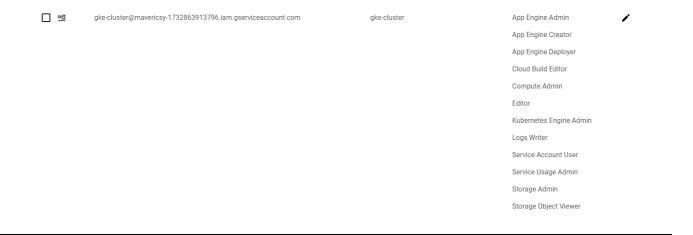
Roles are composed of sets of permissions and determine what the principal can do with this resource. Learn more  $\square$ 



## 7. Add the following roles to the service account:

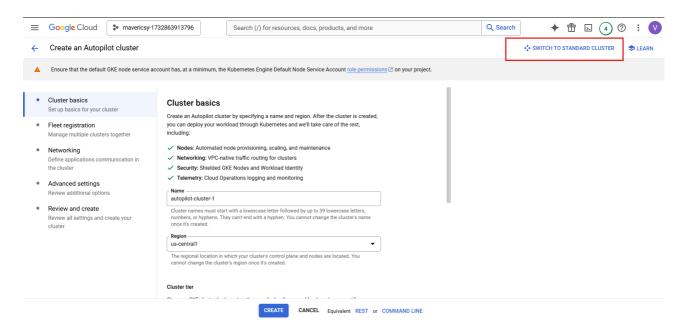
- Compute Admin
- o Kubernetes Engine Admin
- Logs Writer
- Service Account User
- Storage Admin
- Storage Object Viewer
- App Engine Admin
- App Engine Creator
- App Engine Deployer
- Cloud Build Editor
- Editor
- Service Usage Admin

## 8. Click Save.



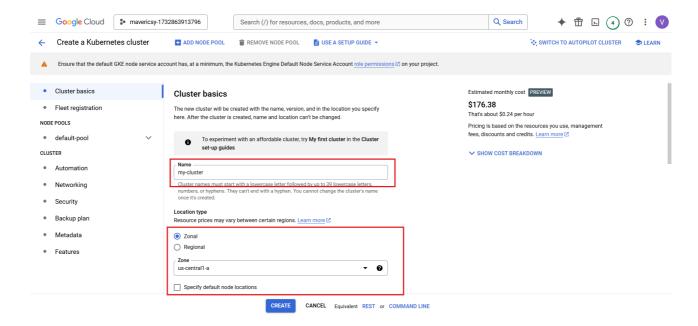
# **Step 2: Create a Standard GKE Cluster**

- 1. Navigate to **Kubernetes Engine > Clusters**.
- 2. Click Create and select Standard Cluster.



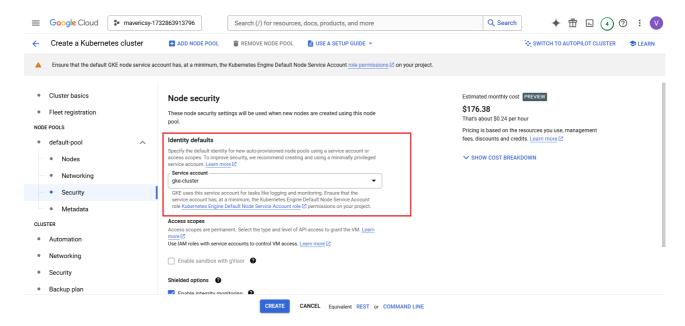
Cluster Name: my-cluster

Location Type: ZonalZone: us-central1-a



## 3. In the **Node Pool -> Security** section:

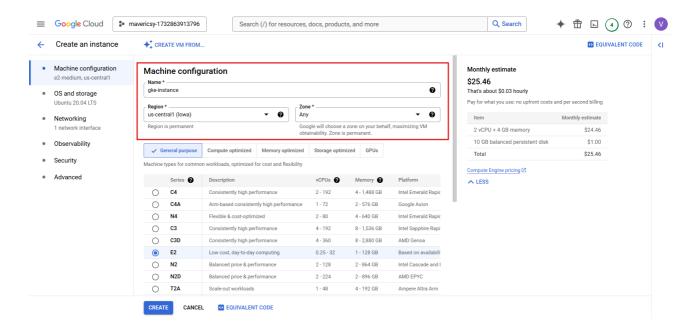
Select the service account: gke-cluster



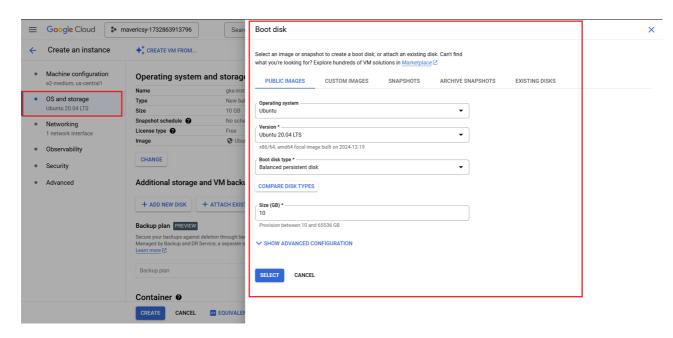
4. Click **Create** to provision the cluster. Wait until the cluster is ready.

# **Step 3: Create a Compute Engine Instance**

- 1. Navigate to Compute Engine > VM Instances.
- 2. Click Create Instance.
  - Name: gke-instance
  - Region: us-central1 (Iowa)
  - **Zone:** Select any zone within the region.
  - Machine Type: Choose the desired configuration (default is fine).

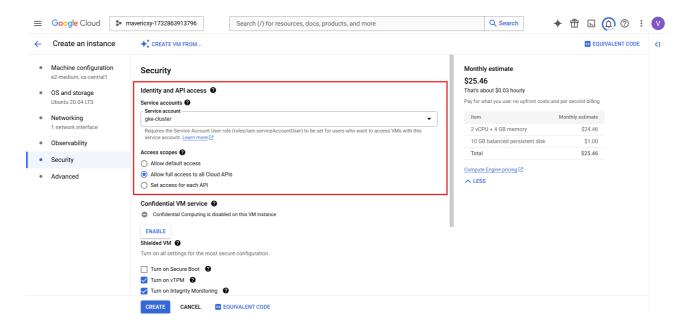


#### 3. OS: Ubuntu 20.04 LTS



## 4. Under **Security > Access Scopes**:

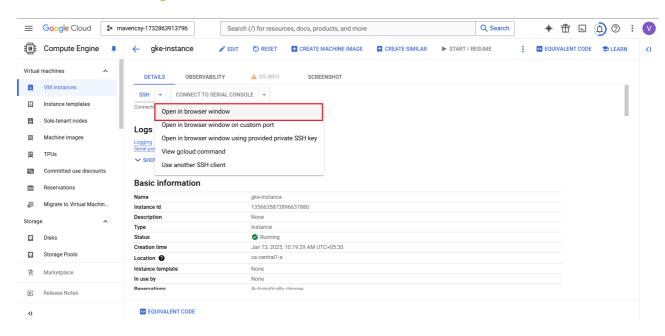
- Select Allow full access to all Cloud APIs.
- Choose the service account: gke-cluster.



5. Click **Create** to provision the VM.

# Step 4: Connect to the VM and Install gCloud SDK

- 1. Connect to the VM using SSH:
  - Go to Compute Engine > VM Instances.
  - Click **SSH** in the gke-instance.



2. Update the package list:

sudo apt update

```
rijay_1bf28e8a_ed99_431d_a5a3_a7@gke-instance:~$ sudo apt update
Hit:1 http://us-centrall.gce.archive.ubuntu.com/ubuntu focal InRelease
Get:2 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-updates InRelease [128 kB]
Get:3 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-backports InRelease [128 kB]
Get:4 http://security.ubuntu.com/ubuntu focal-security InRelease [128 kB]
Get:5 http://us-central1.gce.archive.ubuntu.com/ubuntu focal/universe amd64 Packages [8628 kB]
Get:6 http://us-central1.gce.archive.ubuntu.com/ubuntu focal/universe Translation-en [5124 kB]
Get:7 http://us-central1.gce.archive.ubuntu.com/ubuntu focal/universe amd64 c-n-f Metadata [265 kB]
Get:8 http://us-central1.gce.archive.ubuntu.com/ubuntu focal/multiverse amd64 Packages [144 kB] Get:9 http://us-central1.gce.archive.ubuntu.com/ubuntu focal/multiverse Translation-en [104 kB]
Get:10 http://us-central1.gce.archive.ubuntu.com/ubuntu focal/multiverse amd64 c-n-f Metadata [9136 B]
Get:11 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-updates/main amd64 Packages [3742 kB]
Get:12 http://us-centrall.gce.archive.ubuntu.com/ubuntu focal-updates/main Translation-en [571 kB]
Get:13 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-updates/restricted amd64 Packages [3504 kB]
Get:14 http://us-centrall.gce.archive.ubuntu.com/ubuntu focal-updates/restricted Translation-en [490 kB]
Get:15 http://us-centrall.gce.archive.ubuntu.com/ubuntu focal-updates/universe amd64 Packages [1253 kB]
Get:16 http://us-centrall.gce.archive.ubuntu.com/ubuntu focal-updates/universe Translation-en [300 kB]
Get:17 http://us-centrall.gce.archive.ubuntu.com/ubuntu focal-updates/universe amd64 c-n-f Metadata [28.3 kB]
Get:18 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-updates/multiverse amd64 Packages [27.9 kB]
Get:19 http://us-centrall.gce.archive.ubuntu.com/ubuntu focal-updates/multiverse Translation-en [7968 B]
Get:20 http://us-centrall.gce.archive.ubuntu.com/ubuntu focal-updates/multiverse amd64 c-n-f Metadata [612 B]
Get:21 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-backports/main amd64 Packages [45.7 kB]
Get:22 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-backports/main Translation-en [16.3 kB]
Get:23 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-backports/main amd64 c-n-f Metadata [1420 B]
Get:24 http://us-centrall.gce.archive.ubuntu.com/ubuntu focal-backports/restricted amd64 c-n-f Metadata [116 B]
Get:25 http://us-centrall.gce.archive.ubuntu.com/ubuntu focal-backports/universe amd64 Packages [25.0 kB]
Get:26 http://us-centrall.gce.archive.ubuntu.com/ubuntu focal-backports/universe Translation-en [16.3 kB]
Get:27 http://us-centrall.gce.archive.ubuntu.com/ubuntu focal-backports/universe amd64 c-n-f Metadata [880 B]
Get:28 http://us-centrall.gce.archive.ubuntu.com/ubuntu focal-backports/multiverse amd64 c-n-f Metadata [116 B]
Get:29 http://security.ubuntu.com/ubuntu focal-security/main amd64 Packages [3364 kB]
Get:30 http://security.ubuntu.com/ubuntu focal-security/main Translation-en [491 kB]
Get:31 http://security.ubuntu.com/ubuntu focal-security/restricted amd64 Packages [3357 kB]
Get:32 http://security.ubuntu.com/ubuntu focal-security/restricted Translation-en [470 kB]
Get:33 http://security.ubuntu.com/ubuntu focal-security/universe amd64 Packages [1031 kB]
Get:34 http://security.ubuntu.com/ubuntu focal-security/universe Translation-en [218 kB]
Get:35 http://security.ubuntu.com/ubuntu focal-security/universe amd64 c-n-f Metadata [21.4 kB]
Get:36 http://security.ubuntu.com/ubuntu focal-security/multiverse amd64 Packages [24.8 kB]
Get:37 http://security.ubuntu.com/ubuntu focal-security/multiverse Translation-en [5968 B]
Get:38 http://security.ubuntu.com/ubuntu focal-security/multiverse amd64 c-n-f Metadata [540 B]
```

#### 3. Install prerequisites:

```
sudo apt install apt-transport-https ca-certificates gnupg curl
```

```
ijay 1bf28e8a ed99 431d a5a3 a7@gke-instance:~$ sudo apt install apt-transport-https ca-certificates gnupg curl
Reading package lists... Done
Building dependency tree
Reading state information... Done
ca-certificates is already the newest version (20240203\sim20.04.1).
ca-certificates set to manually installed.
curl is already the newest version (7.68.0-1 \text{ubuntu} 2.25).
curl set to manually installed.
gnupg is already the newest version (2.2.19-3 \text{ubuntu} 2.2). gnupg set to manually installed.
The following NEW packages will be installed:
  apt-transport-https
0 upgraded, 1 newly installed, 0 to remove and 6 not upgraded.
Need to get 1704 B of archives.
After this operation, 162 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-updates/universe amd64 apt-transport-https all 2.0.1
0 [1704 B]
Fetched 1704 B in 0s (59.6 kB/s)
Selecting previously unselected package apt-transport-https.
(Reading database ... 62257 files and directories currently installed.)
Preparing to unpack .../apt-transport-https_2.0.10_all.deb ...
Unpacking apt-transport-https (2.0.10) ...
Setting up apt-transport-https (2.0.10) ... vijay 1bf28e8a ed99 431d a5a3 a7@gke-instance:~$
```

#### 4. Add the Cloud SDK distribution URI:

```
echo "deb [signed-by=/usr/share/keyrings/cloud.google.gpg]
http://packages.cloud.google.com/apt cloud-sdk main" | sudo tee -a
/etc/apt/sources.list.d/google-cloud-sdk.list
```

```
vijay 1bf28e8a ed99 431d a5a3 a7@gke-instance:~$ echo "deb [signed-by=/usr/share/keyrings/cloud.google.gpg] http:
//packages.cloud.google.com/apt cloud-sdk main" | sudo tee -a /etc/apt/sources.list.d/google-cloud-sdk.list
deb [signed-by=/usr/share/keyrings/cloud.google.gpg] http://packages.cloud.google.com/apt cloud-sdk main
vijay 1bf28e8a ed99 431d a5a3 a7@gke-instance:~$
```

5. Import the Google Cloud public key:

```
curl https://packages.cloud.google.com/apt/doc/apt-key.gpg | sudo gpg --
dearmor -o /usr/share/keyrings/cloud.google.gpg
```

6. Update the package list:

```
sudo apt update
```

```
vijay_lbf28e8a_ed99_43ld_a5a3_a7@gke-instance:~$ sudo apt update
Hit:1 http://us-central1.gce.archive.ubuntu.com/ubuntu focal InRelease
Hit:2 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-updates InRelease
Hit:3 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-backports InRelease
Get:4 http://packages.cloud.google.com/apt cloud-sdk InRelease [1618 B]
Hit:5 http://security.ubuntu.com/ubuntu focal-security InRelease
Get:6 http://packages.cloud.google.com/apt cloud-sdk/main all Packages [1606 kB]
Get:7 http://packages.cloud.google.com/apt cloud-sdk/main amd64 Packages [3500 kB]
Fetched 5107 kB in 1s (5133 kB/s)
Reading package lists... Done
Building dependency tree
Reading state information... Done
6 packages can be upgraded. Run 'apt list --upgradable' to see them.
vijay_lbf28e8a_ed99_43ld_a5a3_a7@gke-instance:~$ [
```

7. Install the Cloud SDK:

```
sudo apt install google-cloud-sdk
```

```
vijay 1bf28e8a ed99 431d a5a3 a7@gke-instance:~$ sudo apt install google-cloud-sdk
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  google-cloud-cli google-cloud-cli-anthoscli
Suggested packages:
  {\tt google-cloud-cli-app-engine-java} \ \ {\tt google-cloud-cli-app-engine-python} \ \ {\tt google-cloud-cli-pubsub-emulator}
google-cloud-cli-bigtable-emulator google-cloud-cli-datastore-emulator kubectl The following NEW packages will be installed:
  google-cloud-cli google-cloud-cli-anthoscli google-cloud-sdk
0 upgraded, 3 newly installed, 0 to remove and 6 not upgraded.
Need to get 110 MB of archives.
After this operation, 634 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Getil http://packages.cloud.google.com/apt cloud-sdk/main amd64 google-cloud-cli amd64 505.0.0-0 [84.9 MB]
Get:2 http://packages.cloud.google.com/apt cloud-sdk/main amd64 google-cloud-cli-anthoscli amd64 505.0.0-0 [24.9
MB1
Get:3 http://packages.cloud.google.com/apt cloud-sdk/main all google-cloud-sdk all 467.0.0-0 [1706 B] Fetched 110 MB in 2s (65.6 MB/s)
Selecting previously unselected package google-cloud-cli.
(Reading database ... 62261 files and directories currently installed.)
Preparing to unpack .../google-cloud-cli_505.0.0-0_amd64.deb ...
Unpacking google-cloud-cli (505.0.0-0) ...
Selecting previously unselected package google-cloud-cli-anthoscli.
Preparing to unpack .../google-cloud-cli-anthoscli_505.0.0-0_amd64.deb ...
Unpacking google-cloud-cli-anthoscli (505.0.0-0) ...
Selecting previously unselected package google-cloud-sdk.
Preparing to unpack .../google-cloud-sdk_467.0.0-0_all.deb ... Unpacking google-cloud-sdk (467.0.0-0) ...
Setting up google-cloud-cli (505.0.0-0) ...
Setting up google-cloud-sdk (467.0.0-0)
Setting up google-cloud-cli-anthoscli (505.0.0-0) ...
Processing triggers for man-db (2.9.1-1) ...
Processing triggers for libc-bin (2.31-0ubuntu9.1\underline{6}) ...
vijay_1bf28e8a_ed99_431d_a5a3_a7@gke-instance:~$
```

#### 8. Initialize the Cloud SDK:

```
gcloud init
```

```
vijay_1bf28e8a_ed99_431d_a5a3_a7@gke-instance:~$ gcloud init
Welcome! This command will take you through the configuration of gcloud.
Your current configuration has been set to: [default]
You can skip diagnostics next time by using the following flag:
 gcloud init --skip-diagnostics
Network diagnostic detects and fixes local network connection issues.
Checking network connection...done.
Reachability Check passed.
Network diagnostic passed (1/1 checks passed).
Choose the account you want to use for this configuration.
To use a federated user account, exit this command and sign in to the gcloud CLI with your login configuration
file, then run this command again.
[1] gke-cluster@mavericsy-1732863913796.iam.gserviceaccount.com
 [2] Sign in with a new Google Account
 [3] Skip this step
Please enter your numeric choice: 1
You are signed in as: [gke-cluster@mavericsy-1732863913796.iam.gserviceaccount.com].
Pick cloud project to use:
[1] mavericsy-1732863913796
 [2] Enter a project ID
 [3] Create a new project
Please enter numeric choice or text value (must exactly match list item): 1
Your current project has been set to: [mayericsy-1732863913796].
Do you want to configure a default Compute Region and Zone? (Y/n)? y
```

# **Step 5: Install kubectl and Configure Cluster Access**

1. Verify the cloud-sdk repository:

```
grep -rhE ^deb /etc/apt/sources.list* | grep "cloud-sdk"

vijay_lbf28e8a_ed99_431d_a5a3_a7@gke-instance:~$ grep -rhE ^deb /etc/apt/sources.list* | grep "cloud-sdk"
deb [signed-by=/usr/share/keyrings/cloud.google.gpg] http://packages.cloud.google.com/apt_cloud-sdk main
```

If not listed, install the Cloud SDK as described above.

vijay 1bf28e8a ed99 431d a5a3 a7@gke-instance:~\$

2. Install kubect1:

```
sudo apt-get update
sudo apt-get install -y kubectl
```

```
1bf28e8a ed99 431d a5a3 a7@gke-instance:~$ sudo apt-get update
Hit:1 http://us-central1.gce.archive.ubuntu.com/ubuntu focal InRelease
Hit: 2 http://us-centrall.gce.archive.ubuntu.com/ubuntu focal-updates InRelease
Hit:3 http://us-central1.gce.archive.ubuntu.com/ubuntu focal-backports InRelease
Hit:4 http://packages.cloud.google.com/apt cloud-sdk InRelease
Hit:5 http://security.ubuntu.com/ubuntu focal-security InRelease
Reading package lists... Done
vijay 1bf28e8a ed99 431d a5a3 a7@gke-instance:~$ sudo apt-get install -y kubectl
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
 kubectl
0 upgraded, 1 newly installed, 0 to remove and 6 not upgraded.
Need to get 75.2 MB of archives.

After this operation, 366 MB of additional disk space will be used.
Get:1 http://packages.cloud.google.com/apt cloud-sdk/main amd64 kubectl amd64 1:505.0.0-0 [75.2 MB]
Fetched 75.2 MB in 1s (71.6 MB/s)
Selecting previously unselected package kubectl.
(Reading database ... 110579 files and directories currently installed.)
Preparing to unpack .../kubectl_1%3a505.0.0-0_amd64.deb ...
Unpacking kubectl (1:505.0.0-0) ...
Setting up kubectl (1:505.0.0-0) ...
vijay_1bf28e8a_ed99_431d_a5a3_a7@gke-instance:~$ [
```

3. Verify the installation:

```
kubectl version --client

vijay_lbf28e8a_ed99_43ld_a5a3_a7@gke-instance:~$ kubectl version --client
Client Version: v1.30.8-dispatcher
Kustomize Version: v5.0.4-0.20230601165947-6ce0bf390ce3
vijay_lbf28e8a_ed99_43ld_a5a3_a7@gke-instance:~$ []
```

# **Step 6: Install Required Plugins**

1. Install the GKE authentication plugin:

```
sudo apt-get install google-cloud-sdk-gke-gcloud-auth-plugin
```

```
vijay 1bf28e8a ed99 431d a5a3 a7@gke-instance:~$ sudo apt-get install google-cloud-sdk-gke-gcloud-auth-plugin
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
 google-cloud-cli-gke-gcloud-auth-plugin
The following NEW packages will be installed:
 google-cloud-cli-gke-gcloud-auth-plugin google-cloud-sdk-gke-gcloud-auth-plugin
0 upgraded, 2 newly installed, 0 to remove and 6 not upgraded.
Need to get 3233 kB of archives.
After this operation, 11.1 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://packages.cloud.google.com/apt cloud-sdk/main amd64 google-cloud-cli-gke-gcloud-auth-plugin amd64 505
.0.0-0 [3228 kB]
Get:2 http://packages.cloud.google.com/apt cloud-sdk/main all google-cloud-sdk-gke-gcloud-auth-plugin all 467.0.0
-0 [5018 B]
Fetched 3233 kB in 0s (13.2 MB/s)
Selecting previously unselected package google-cloud-cli-gke-gcloud-auth-plugin.
(Reading database ... 110594 files and directories currently installed.
Preparing to unpack .../google-cloud-cli-gke-gcloud-auth-plugin_505.0.0-0_amd64.deb ...
Unpacking google-cloud-cli-gke-gcloud-auth-plugin (505.0.0-0) .
{\tt Selecting \ previously \ unselected \ package \ google-cloud-sdk-gke-gcloud-auth-plugin.}
Preparing to unpack .../google-cloud-sdk-gke-gcloud-auth-plugin_467.0.0-0_all.deb ...
Unpacking google-cloud-sdk-gke-gcloud-auth-plugin (467.0.0-0) ...
Setting up google-cloud-cli-gke-gcloud-auth-plugin (505.0.0-0) ... Setting up google-cloud-sdk-gke-gcloud-auth-plugin (467.0.0-0) ... vijay_lbf28e8a_ed99_43ld_a5a3_a7@gke-instance:~$
```

2. Verify the plugin installation:

```
gke-gcloud-auth-plugin --version
```

```
vijay_1bf28e8a_ed99_431d_a5a3_a7@gke-instance:~$ gke-gcloud-auth-plugin --version
Kubernetes v1.28.2-alpha+2291a60496d419da95186fa76128c72fa8e3410d
vijay_1bf28e8a_ed99_431d_a5a3_a7@gke-instance:~$ []
```

3. Update the kubectl configuration:

```
gcloud container clusters get-credentials my-cluster --zone us-central1-a --
project mavericsy-1732863913796
```

**Note:** Ensure that you change your project id

```
vijay_lbf28e8a_ed99_43ld_a5a3_a7@gke-instance:~$ gcloud container clusters get-credentials my-cluster --zone us-c
entral1-a --project mavericsy-1732863913796
Fetching cluster endpoint and auth data.
kubeconfig entry generated for my-cluster.
vijay_lbf28e8a_ed99_43ld_a5a3_a7@gke-instance:~$ []
```

## Verification

1. List all available namespaces:

```
kubectl get namespaces
```

```
vijay_1bf28e8a_ed99_431d_a5a3_a7@gke-instance:~$ kubectl get namespaces
NAME
                          STATUS
                                      AGE
default
                         Active
                                      26m
gke-managed-cim Active gke-managed-system Active
                                    26m
                                     26m
gmp-public Active
gmp-system Active
kube-node-lease Active
kube-public Active
                                     25m
                                    25m
                                      26m
kube-public
kube-system
                                      26m
                         Active
                                      26m
vijay 1bf28e8a ed99 431d a5a3 a7@gke-instance:~$
```

2. Ensure you can interact with the cluster resources.