Start Lab 02:15:00

Configuring IAM Permissions with gCloud - Azure

Lab 1 hour 30 minutes No cost Intermediate

GSP1119

Overview

As a cloud professional, one of the most fundamental concerns in setting up your cloud environment is how you configure access to your resources following the principle of least privilege. Some key questions include:

- What are the best ways to manage access to resources in your cloud environment?
- How can you give users access to only the resources they actually need?
- How can you allow applications and services to authenticate to your cloud resources?

This lab delves into the fundamentals of Identity and Access Management (IAM) within Google Cloud. You'll learn how to strategically configure access to cloud resources, ensuring adherence to the principle of least privilege. The focus is on using command-line tools to manage user permissions, granting only necessary access, and setting up secure authentication mechanisms for applications and services.

If you're familiar with Azure IAM, this lab will translate those concepts to the Google Cloud environment. You'll explore Google Cloud IAM's unique approach to roles and permissions. The lab emphasizes hands-on practice with the gcloud command-line tool, covering its installation, configuration, and the management of multiple configurations and service accounts.

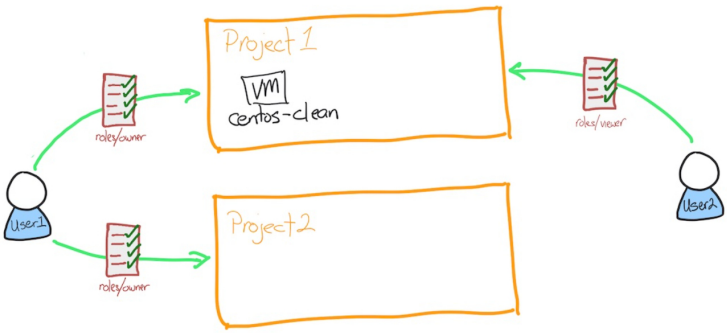
Objectives

In this lab, you will learn how to:

- Install and configure the `gcloud` client
- Create and switch between multiple IAM configurations
- Identify and assign correct IAM permissions
- Create and use a service account

Starting environment

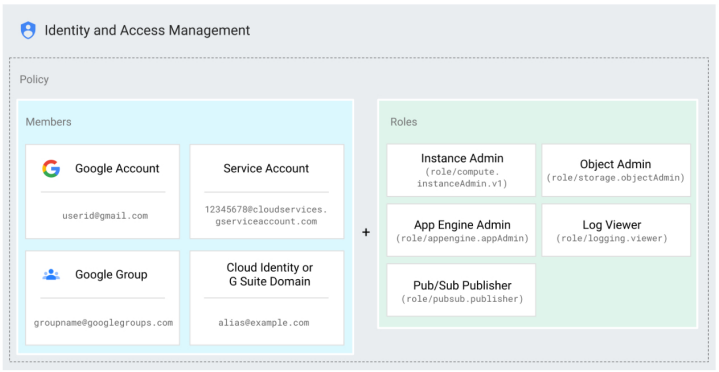
You start with two user accounts and two projects; `user1` is the "owner" of both projects and `user2` is the "viewer" of only the first project. There is a Linux virtual machine (vm) running in the first project.



What is IAM?

Google Cloud offers Cloud Identity and Access Management (IAM), which lets you manage access control by defining who (identity) has what access (role) for which resource.

With Cloud IAM you can grant granular access to specific Google Cloud resources and prevent unwanted access to other resources. Cloud IAM lets you adopt the security principle of least privilege, so you grant only the necessary access to your resources.



Identities

In Cloud IAM, you grant access to members. Members can be of the following types:

- Google account
- Service account
- Google group
- G Suite domain
- Cloud Identity domain

Learn more about these identity types from the Concepts related to identity Guide.

In this lab, you use Google accounts, service accounts, and Cloud Identity domain groups.

Roles

A role is a collection of permissions. You cannot assign a permission to the user directly; instead you grant them a role. When you grant a role to a user, you grant them all the permissions that the role contains.

There are three kinds of roles in Cloud IAM:

- **Basic roles**: The roles historically available in the Cloud Console will continue to work. These are the Owner, Editor, and Viewer roles.
- **Predefined roles**: Predefined roles are the Cloud IAM roles that give finer-grained access control than the basic roles. For example, the predefined role Pub/Sub Publisher (roles/pubsub.publisher) provides access to only publish messages to a Cloud Pub/Sub topic.
- **Custom roles**: Roles that you create to tailor permissions to the needs of your organization when predefined roles don't meet your needs.

Learn more about roles from the Roles Guide.

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What is gcloud?

Check my progress

Test the new account

This new account has viewer only access to the project, so you can test that you are indeed using this account by trying to view and then create some resources.

1. Check that you can view details in the first project. Inside the SSH session run:

```
gcloud compute instances list
```

The second user account has viewer access so you see `centos-clean` and `lab-1` instances listed.

2. Check that you cannot create an instance in the first project, as your assigned role is basic viewer. Inside the SSH session run:

```
gcloud compute instances create lab-2 --zone "Zone2"
```

Because the second user account has only viewer access, they are not allowed to create an instance, so this command will fail. It will take a little time to fail.

3. Change back to your first user's configuration (**default**). Inside the SSH session run:

```
gcloud config configurations activate default
```

You are now back to using your original user account credentials. Later you need to switch between these two accounts as you learn about roles and permissions.

When running a gcloud command, how do you override the configured zone for just that one time?

- ○ Add the switch --zone DIFFERENT_ZONE to the command
- ○ run the command `gcloud config set zone DIFFERENT_ZONE` before you run the command.
- ○ Add the switch --project YOUR_PROJECT_ID to the command
- ○ Add the switch -zone DIFFERENT_ZONE to the command

Submit

Task 3. Identify and assign correct IAM

Task 3. Identify and assign correct IAM permissions

You have been provided two user accounts for this project. The first user has complete control of both projects and can be thought of as the admin account. The second user has viewer only access to the two projects. Call the second user a devops user and that user identity represents a typical devops level user.

Next you use `gcloud` to configure access to one project for the devops user by creating a custom role for the project that permits creation of buckets and instances.

Examine roles and permissions

1. To view all the roles, run the following inside the SSH session run:

```
gcloud iam roles list | grep "name:"
```

The list of roles is returned. The addition of `grep "name:"` to the command reduces the amount of data returned to just the names of the roles.

Inspect one of these roles to see the permissions assigned to the role. To view the permissions use `gcloud iam roles describe`. Try looking at the simple role **roles/compute.instanceAdmin**.

2. Examine the `compute.instanceAdmin` predefined role. Inside the SSH session run:

```
gcloud iam roles describe roles/compute.instanceAdmin
```

You can see **roles/compute.instanceAdmin** has many permissions, but these are the minimum needed for later:

- compute.instances.create
- compute.instances.delete
- compute.instances.start
- compute.instances.stop
- compute.instances.update
- compute.disks.create
- compute.subnetworks.use
- compute.subnetworks.useExternalIp
- compute.instances.setMetadata
- compute.instances.setServiceAccount

To review the full list of roles and the permissions assigned, refer to the IAM permissions reference Guide.

Assign the viewer role to the second user, in the second project

Now that you know that roles contain permissions, how do you assign a role (and therefore all the associated permissions), to a user account?

There are two ways to attach a role:

- To the user and an organization
- To a user and a project

Next you attach the basic role of "viewer" to the second user onto the second project.

Test that the second user doesn't have access to the second project.

1. Switch `gcloud` configuration back to the second user (**user2**). Inside the SSH session run:

```
gcloud config configurations activate user2
```

Now you're back to `user2`.

2. Inside the SSH session run the following command to set **PROJECTID2** to the second project:

```
echo "export PROJECTID2=Project ID 2" >> ~/.bashrc
```

```
. ~/.bashrc
gcloud config set project $PROJECTID2
```

Note: This command appends the `bashrc` file, so be careful.

You get a warning: `WARNING: You do not appear to have access to project [your 2nd project id] or it does not exist.`

Note: When prompted, *Do you want to continue (Y/n)?*, type `N` and press ENTER.

This means that you don't have access to the PROJECTID2 project, which you fix shortly.

3. Switch back to the **default** gcloud configuration. Inside the SSH session run:

```
gcloud config configurations activate default
```

```
. ~/.bashrc
gcloud config set project $PROJECTID2
```

Note: This command appends the `bashrc` file, so be careful.

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3. Switch back to the **default** gcloud configuration. Inside the SSH session run:

```
gcloud config configurations activate default
```

Task 4. Test that user2 has access

1. Switch your gcloud configuration to **user2**. Inside the SSH session run:

```
gcloud config configurations activate user2
```

2. Change the configuration for user2 to the second project. Inside the SSH session run:

```
gcloud config set project $PROJECTID2
```

You should not see an error message this time.

3. Verify you have viewer access. Inside the SSH session run:

```
gcloud compute instances list
```

You see 0 instances in this project.

4. Try to create an instance in the second project as the second user. Inside the SSH session run:

```
gcloud compute instances create lab-2 --zone "Zone2"
```

This command will fail because user2 only has viewer access to the project.

5. Switch your gcloud configuration to **default**. Inside the SSH session run:

```
gcloud config configurations activate default
```

You are now back to using your original user account credentials.

Create a new role with permissions

Next, create the new role with the set of permissions needed for the devops team.

- Create a custom role called `devops` that has the permissions to create an instance. Inside the SSH session run:

```
gcloud iam roles create devops --project $PROJECTID2 --permissions
```

This command creates a custom role in the project called `devops` with the permissions to create and manage instances.

The full name of the role is listed, note the role is in the project so the path is in the pattern of `projects/PROJECT/roles/ROLENAME`

pattern of `projects/PROJECT/roles/ROLENAME`.

Create a new role with permissions for the devops team

Check my progress

Bind the role to the second account to both projects

You now have the role created and need to bind the user and the role to the project. You use `gcloud projects add-iam-policy-binding` to perform the binding. To make this command easier to execute, set a couple of environment variables first; the project id and the user account.

1. Bind the role of `iam.serviceAccountUser` to the second user onto the second project. Inside the SSH session run:

```
gcloud projects add-iam-policy-binding $PROJECTID2 --member user:$U
```

You need permissions to create an instance with a service account attached. The role `iam.serviceAccountUser` has those permissions, so use this pre-defined role.

Check user2 is bound to project2 and the role roles/iam.serviceAccountUser

Check my progress

2. Bind the custom role `devops` to the second user onto the second project. You can find the second user account on the left of this page. Make sure you set USERID to the second user account.

Inside the SSH session run:

```
gcloud projects add-iam-policy-binding $PROJECTID2 --member user:$U
```

Once you have run the command you see (you might need to scroll up), the text that looks something like the example below:

```
Updated IAM policy for project [qwiklabs-gcp-336e4f5b8affxxxx].
bindings:
- members:
  - user:gcpstaginguser80_student@qwiklabs.net
  role: projects/qwiklabs-gcp-336e4f5b8affxxxx/roles/devops
```

Bound Username 2 to devops role

Check my progress

Test the newly assigned permissions.

1. Switch your gcloud configuration to **user2**. Inside the SSH session run:

```
gcloud config configurations activate user2
```

Now you're back to user2.

2. Try to create an instance called lab-2. Inside the SSH session run:

```
gcloud compute instances create lab-2 --zone "Zone2"
```

Now the instance creation works for user2.

Create an instance with name as lab-2 in Project 2

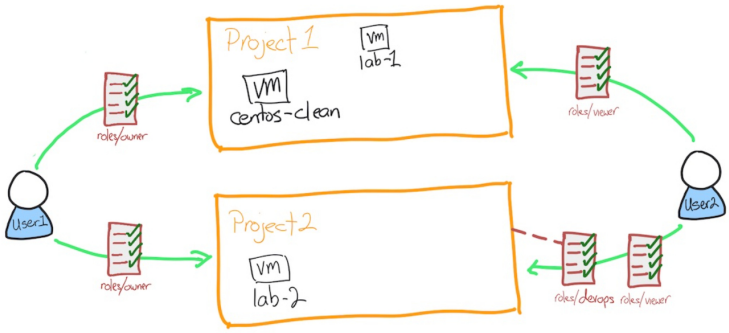
Check my progress

3. Verify the instance exists. Inside the SSH session run:

```
gcloud compute instances list
```

Your environment

After these last changes your environment will look like this.



What are two of the three items you need to provide when binding an IAM role to a project?

- [ ] network
- [ ] account
- [ ] zone
- [ ] project id
- [ ] service identifier

Submit

Task 5. Using a service account

You have seen how to authenticate and use `gcloud` to access Google Cloud services with roles. Now you'll look at a typical approach.

You have an application that will use the Application Programming Interfaces (APIs) to read and write to Cloud Storage buckets. You don't want to have to authenticate every time you launch a new server, that would be both painful and not in the spirit of using the cloud! So, you use *service accounts*.

A service account is a special Google account that belongs to your application or a virtual machine (VM) instead of to an individual end user. Your application uses the service account to call the Google API of a service so that the users aren't directly involved.

Learn more about service accounts from the Service accounts Guide.

Now you create a service account, use that service account with a compute instance, then test that the service account allows the access you need.

Create a service account

1. Switch your gcloud configuration to **default**, `user2` doesn't have the rights to set up and configure service accounts. Inside the SSH session run:

```
gcloud config configurations activate default
```

2. Set the project to `PROJECTID2` in your configuration. Inside the SSH session run:

```
gcloud config set project $PROJECTID2
```

Make sure you are targeting the right project.

3. Create the service account. Inside the SSH session run:

```
gcloud iam service-accounts create devops --display-name devops
```

Check the created devops service account

Check my progress

4. Get the service account email address. Inside the SSH session run:

```
gcloud iam service-accounts list  --filter "displayName=devops"
```

Note: The filter shows only the line you are interested in. Notice that the email address contains the role name and the project id.

5. Put the email address into a local variable called `SA`. Inside the SSH session run:

```
SA=$(gcloud iam service-accounts list --format="value(email)" --fil
```

This command sets the SA local variable to the email address of the service account. Pretty useful right?

6. Give the service account the role of `iam.serviceAccountUser`. Inside the SSH session run:

```
gcloud projects add-iam-policy-binding $PROJECTID2 --member service
```

This role allows the service account to assign a service account to a compute instance.

Check devops service account is bound to project2 and the role roles/iam.serviceAccountUser

Check my progress

Task 6. Using the service account with a compute instance

1. Give the service account the role of `compute.instanceAdmin`. Inside the SSH session run:

```
gcloud projects add-iam-policy-binding $PROJECTID2 --member service
```

This role allows the service account to manage compute instances.

Check devops service account is bound to project2 and the role roles/compute.instanceAdmin

Check my progress

2. Create an instance with the devops service account attached. You also have to specify an access scope that defines the API calls that the instance can make. Inside the SSH session run:

```
gcloud compute instances create lab-3 --zone "Zone2" --service-accc
```

Access scopes are the legacy method of specifying permissions for your instance. Access scopes are not a security mechanism. Instead, they define the default OAuth scopes used in requests from the `gcloud` tool or the client libraries. They have no effect when making requests not authenticated through OAuth, such as gRPC or the SignBlob APIs.

You must set up access scopes when you configure an instance to run as a service account.

A best practice is to set the full cloud-platform access scope on the instance, then securely limit the service account's API access with IAM roles.

Access scopes apply on a per-instance basis. You set access scopes when creating an instance and the access scopes persist only for the life of the instance.

Access scopes have no effect if you have not enabled the related API on the project that the service account belongs to. For example, granting an access scope for Cloud Storage on a virtual machine instance allows the instance to call the Cloud Storage API only if you have enabled the Cloud Storage API on the project.

Check lab-3 has the service account attached

Check my progress

Task 7. Test the service account

1. Connect to the newly created instance using `gcloud compute ssh`. Inside the SSH session run:

```
gcloud compute ssh lab-3 --zone "Zone2"
```

Press ENTER when asked if you want to continue.

Press ENTER twice to skip making a password.

2. The default image used already contains `gcloud` configuration. Inside the SSH session run:

```
gcloud config list
```

You see the configuration has the service account

3. Create an instance. This tests that you have the necessary permissions via the service account:

```
gcloud compute instances create lab-4 --zone "Zone2"
```

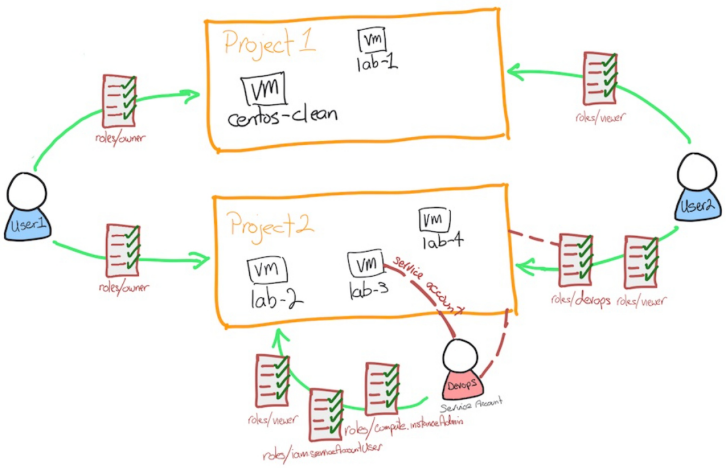
You can press **ENTER** to accept the default zone for this VM.

4. Check roles attached are working. Inside the SSH session run:

```
gcloud compute instances list
```

Because the service account has permissions, you can see the instances listed.

Your environment now looks like this



What is NOT true about service accounts?

- Service accounts always provide full admin rights to the project.
- Service accounts can be assigned only the rights necessary for the access required.
- It allows automated deployments of resources.
- It prevents a user from directly getting involved in setting up access on the instance.

Submit

Congratulations!

Using the Cloud SDK tool (`gcloud`), you've successfully installed and configured the gcloud client, managed multiple IAM configurations, assigned appropriate IAM permissions, and worked with a service account. These tasks demonstrate the similarities between Google Cloud IAM and Azure IAM when using command-line tools for access control. Both interfaces allow you to provision accounts/roles, create service accounts/roles, and switch users.

While there are similarities between Azure IAM and Google Cloud IAM with respect to role-based access control (RBAC), there are differences as well. One key difference you explored in the lab is the process for service account creation, because you do not register accounts and create service principal names in Google Cloud. Projects in Google Cloud work like tenants in Azure. You used the gcloud command line tool to provision accounts across multiple projects similar to how you would use the Azure CLI to provision access across multiple tenants.

Next steps / Learn more

- Check out the documentation for Cloud Identity and Access Management

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