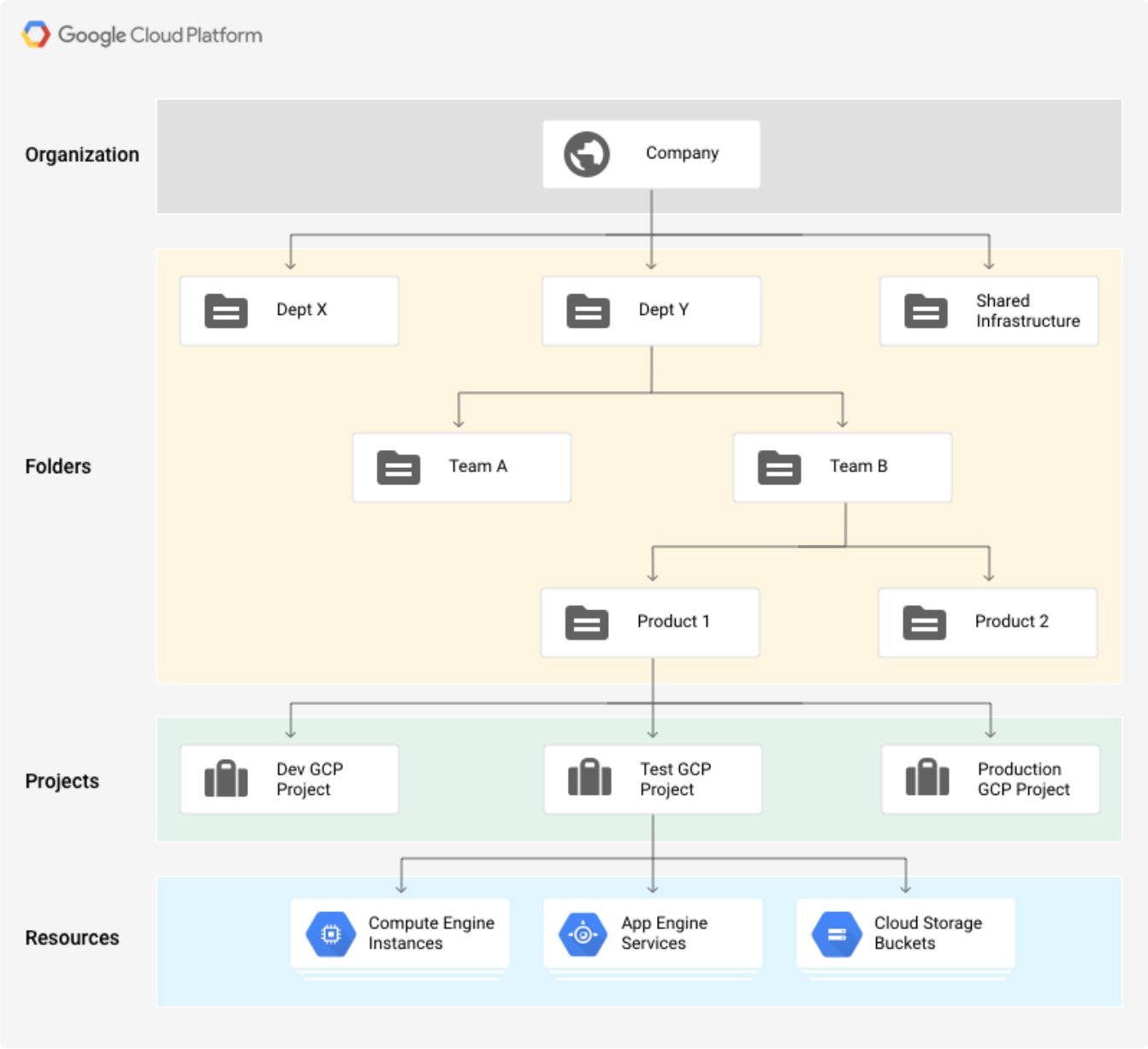
Creating and Managing Folders

Folders are nodes in the Cloud Platform Resource Hierarchy (https://cloud.google.com/resource-manager/docs/cloud-platform-resource-hierarchy). A folder can contain projects, other folders, or a combination of both. Organizations can use folders to group projects under the organization node in a hierarchy. For example, your organization might contain multiple departments, each with its own set of Google Cloud resources. Folders allow you to group these resources on a per-department basis. Folders are used to group resources that share common IAM policies. While a folder can contain multiple folders or resources, a given folder or resource can have exactly one parent.

In the diagram below, the organization, "Company", has folders representing two departments, "Dept X" and "Dept Y", and a folder, "Shared Infrastructure", for items that might be common to both departments. Under "Dept Y", they have organized into two teams, and within the team folders, they further organize by products. The folder for "Product 1" further contains three projects, each with the resources needed for the project. This provides them with a high degree of flexibility in assigning IAM policies an Organization policies at the right level of granularity.



You can use folder-level IAM policies to control access to the resources the folder contains. For example, if a user is granted the **Compute Instance Admin** role on a folder, that user has the **Compute Instance Admin** role for all of the projects in the folder.

Before you begin

Folder functionality is only available to G Suite and Cloud Identity customers that have an organization resource. For more information about acquiring an organization resource, see Creating and managing organizations (https://cloud.google.com/resource-manager/docs/creating-managing-organization#acquiring).

If you're exploring how to best use folders, we recommend that you:

1. Review Access Control for Folders Using IAM (https://cloud.google.com/resource-manager/docs/access-control-folders). The topic describes how you can control who has what access to folders and the resources they contain.
2. Understand how to set folder permissions (#folder-permissions). Folders support a number of different IAM roles. If you want to broadly set up permissions so users can see the structure of their projects, grant the entire domain the **Organization Viewer** and **Folder Viewer** roles at the organization level. To restrict visibility to branches of your folder hierarchy, grant the **Folder Viewer** role on the folder or folders you want users to see.
3. Create folders (#creating-folders). As you plan how to organize your Cloud resources, we recommend that you start with a single folder as a sandbox where you can experiment with which hierarchy makes the most sense for your organization. Think of folders in terms of isolation boundaries between resources and attach points for access and configuration policies. You may choose to create folders to contain resources that belong to different departments and assign Admin roles on folders to delegate administrator privilege. Folders can also be used to group resources that belong to applications or different environments, such as development, production, test. Use nested folders to model these different scenarios.

A common situation is to create folders that in turn contain additional folders or projects, as shown in the image above. This structure is referred to as a *folder hierarchy*. When creating a folder hierarchy, keep in mind the following:

- You can nest folders up to 10 (**ten**) levels deep.
- A parent folder cannot contain more than 300 folders. This refers to direct child folders only. Those child folders can, in turn, contain additional folders or projects.
- Folder display names must be unique within the same level of the hierarchy.

Setting permissions to manage folders

To access and manage folders, you need to assign folder-specific IAM roles to specific groups of users. To learn more about these roles, see Access Control for Folders using IAM (https://cloud.google.com/resource-manager/docs/access-control-folders). We also recommend you review our best practices

(https://cloud.google.com/resource-manager/docs/access-control-folders#best-practices-folders-iam) to help you identify the optimal configuration for your folder permissions.

> Tip: To manage folders for your entire Organization, you need the **Folder Admin** role. This role grants the user permission to create, edit, delete, move, and change IAM permissions on folders, as well as permission to move projects between folders.
>
> Initially, only the Organization Admin can assign the **Folder Admin** role for the Organization. Subsequent accounts that are assigned this role can grant it to other accounts.

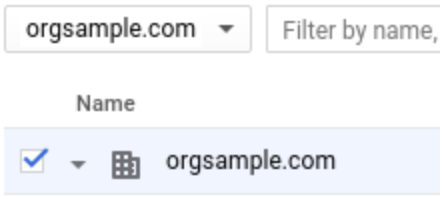
To set up folder permissions:

CONSOLE GCLOUD API

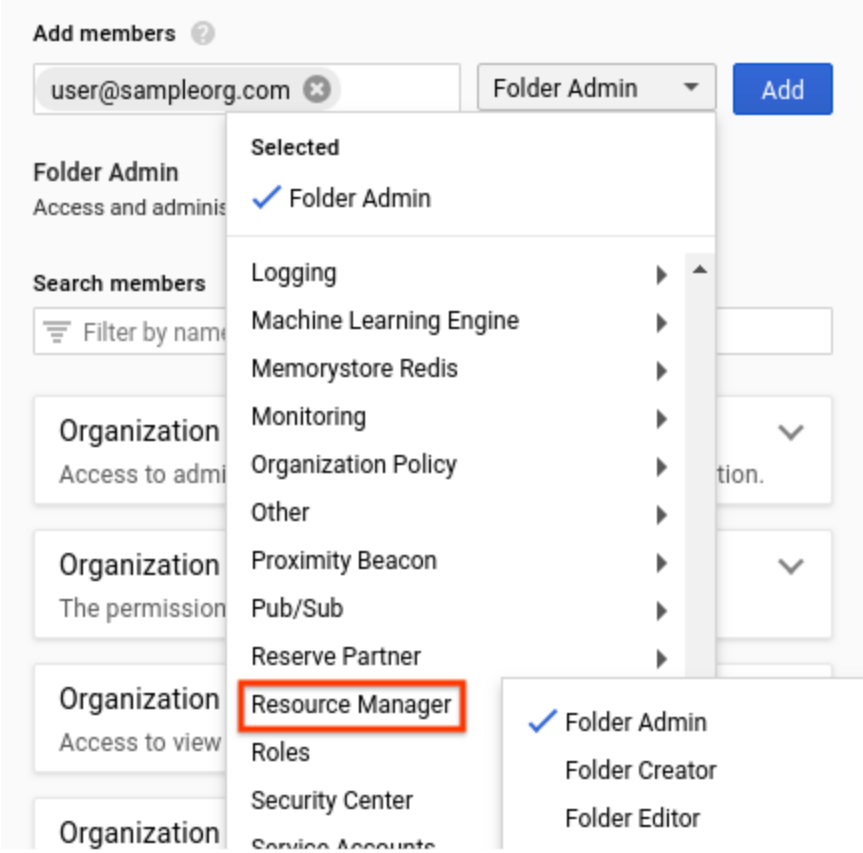
1. In the Google Cloud Console, open the **Manage resources** page.

   OPEN THE MANAGE RESOURCES PAGE (HTTPS://CONSOLE.CLOUD.GOOGLE.COM/CLOUD-RESOUR

2. Click the **Organization** drop-down list in the upper left and then select your Organization from the list of resources.



3. In the **Add members** text box on the right, enter your email address.
4. In the **Select a role** drop-down list box, go to the **Resource Manager** category, and select the **Folder Admin** role.



5. Click **Add** to grant the new role.

Creating folders

To create folders, you must have the **Folder Admin** or **Folder Creator** role at the parent level. For example, to create folders at the Organization level, you must have one of these roles at the Organization level.

As part of creating a folder, you must assign it a name. Folder names must meet the following requirements:

- The name may contain letters, digits, spaces, hyphens and underscores.
- The folder's display name must start and end with a letter or digit.
- The name must be 30 characters or less.
- The name must be distinct from all other folders that share its parent.

To create a folder:

CONSOLE GCLOUD API

Folders can be created in the UI using the "Manage Projects and Folders" section.

1. Go to the **Manage resources** page in the Cloud Console:

   OPEN THE MANAGE RESOURCES PAGE (HTTPS://CONSOLE.CLOUD.GOOGLE.COM/CLOUD-RESOUR

2. Make sure that your organization name is selected in the organization drop-down list at the top of the page.
3. Click **Create folder**.
4. In the **Folder name** box, enter your new folder's name.
5. Under **Destination**, click **Browse**, then select the organization node or folder under which you want to create your new folder.
   a. Click **Create**.

Configuring access to folders

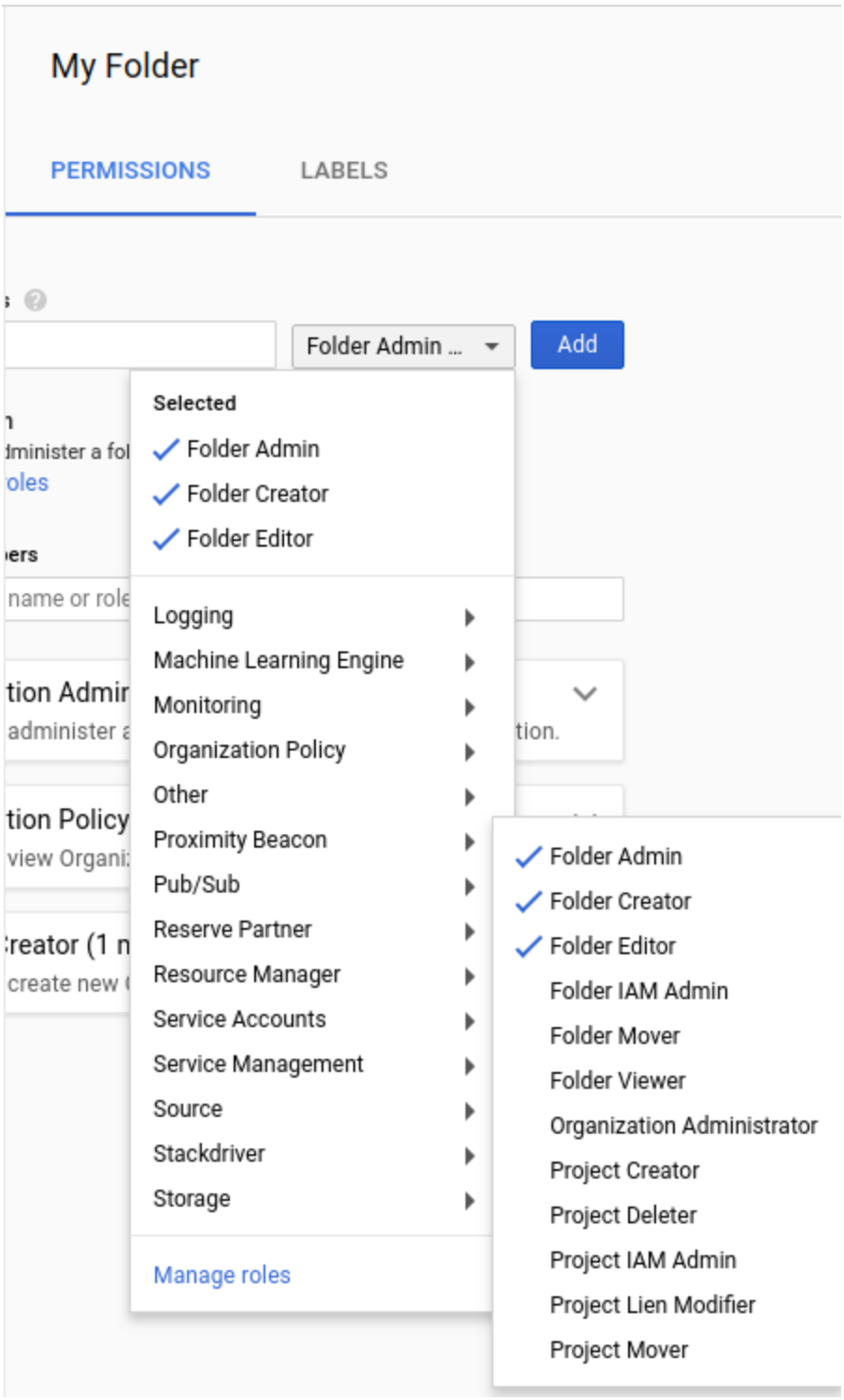
To configure access to folders, you must have the **Folder IAM Administrator** or **Folder Admin** role at the parent level.

CONSOLE GCLOUD API

1. In the Google Cloud Console, open the **Manage Resources** page.

   OPEN THE MANAGE RESOURCES PAGE (HTTPS://CONSOLE.CLOUD.GOOGLE.COM/CLOUD-RESOUR

2. Click the **Organization** drop-down list in the upper left and then select your organization.
3. Select the checkbox next to the project for which you want to change permissions.
4. On the right side **Info panel**, under **Permissions**, enter the email addresses of the members you want to add.
5. In the **Select a role** drop-down list, select the role you want to grant to those members.



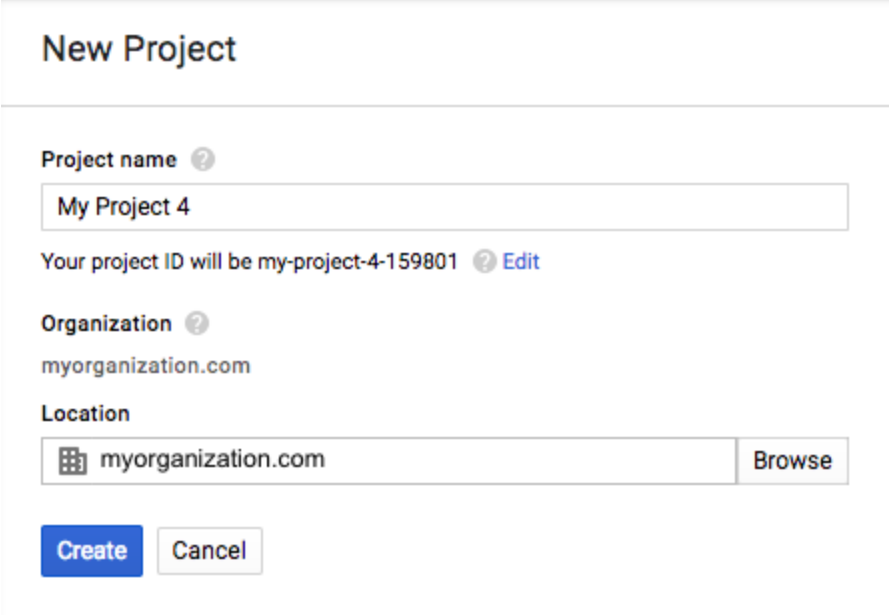
6. Click **Add**. A notification appears to confirm the addition or update of the members' new role.

Creating a project in a folder

To create a project in a folder, you must have the Project Creator role (`roles/resourcemanager.projectCreator`) on the folder. This role may be inherited from a parent folder.

CONSOLE GCLOUD API

1. In the Google Cloud Console, open the Manage Projects and Folders page.
   OPEN THE GOOGLE CLOUD CONSOLE (HTTPS://CONSOLE.CLOUD.GOOGLE.COM/)
2. Go to the Manage Projects and Folders page.
3. Select your organization from the **Organization** drop-down on the top left of the page.
4. Click **Create Project**.
5. Enter a **Project name**.
6. In the **Destination** box, click **Browse** to select the folder under which you want to create the project.



7. Click **Create**.

Moving a project into a folder

Note: Before you move a project into a folder, see the section, Policy considerations for moving projects into folders (#moving-folders-policy-considerations)

To move a project into a folder, you need specific IAM roles on the project, the source, and the destination folder. In particular, you must meet the following criteria:

1. Have the `resourcemanager.projects.update` permission on the project, which typically comes from having either the **Project Editor** or **Project Owner** roles on the project.
2. Have the `resourcemanager.projects.move` permission on both the source folder and the destination folder. This permission is typically part of the **Project Owner**, **Project Editor**, **Folder Admin**, or **Folder Mover** roles. If the resource is not in a folder, you will need this permission on the organization node.

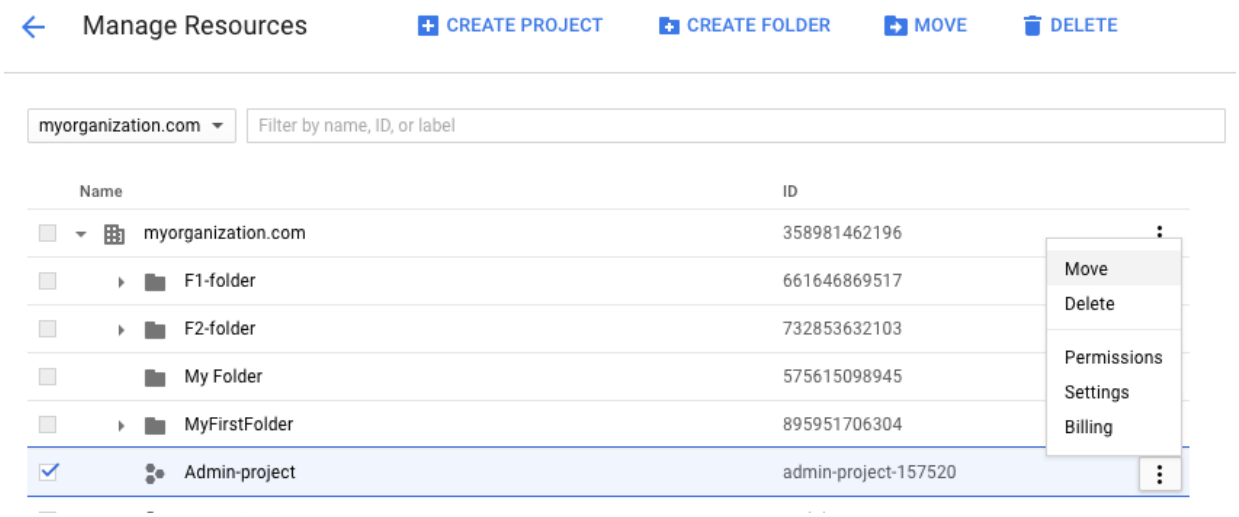
To move a project into the folder:

CONSOLE GCLOUD

1. In the Google Cloud Console, open the Manage Projects and Folders page.

   OPEN THE GOOGLE CLOUD CONSOLE (HTTPS://CONSOLE.CLOUD.GOOGLE.COM/CLOUD-RESOURC

2. Select your Organization from the **Organization** drop-down on the top left of the page.
3. Click on your project's row to select your project from the list of projects and folders. Note that you *must not* click on the name of the project, which takes you to the project's IAM page.
4. Click on the options menu (the vertical ellipsis) in the row and click **Move**.



5. Click **Browse** to select the folder to which you want to move the project.
6. Click **Move**.

Policy considerations for moving projects into folders

Important: It is your responsibility to make sure that all the necessary permissions and policies are defined at the source and destination folders.

You must carefully consider any policy implications before you move a project into or out of a folder because IAM policies that you define at the *project* level automatically move with the project, but policies that you define at the *source* or *destination* parent level do not.

This means that any users who had inherited access to the project may lose that access if the destination folder does not have the same policy. In addition, changes in IAM roles could cause some functionality to stop working until the proper permissions are reinstated.

For example, consider a service account has **Storage Object Creator** associated at Folder A. This folder has the appropriate permissions to upload data to Google Cloud Storage in any project in Folder A. Now, consider what happens when one of these projects moves to Folder B, which does not have the same permissions. The service account for that project loses the ability to upload data, resulting in a service outage.

These same considerations apply if Organization policies are defined at the source and destination folders. Like IAM policies, Organization policies are inherited. Consequently, you must ensure that your Organization policies are consistent between source and destination folders.

To learn more about Organization policies, see Introduction to the Organization Policy Service (https://cloud.google.com/resource-manager/docs/organization-policy/overview).

Moving a folder into another folder

To move a folder into another folder, you must have the **Folder Mover** role for both the source and destination folders.

CONSOLE GCLOUD API

The process of moving folders into other folders in the console is similar to moving projects.

1. In the Google Cloud Console, open the Manage Projects and Folders page.
   OPEN THE GOOGLE CLOUD CONSOLE (HTTPS://CONSOLE.CLOUD.GOOGLE.COM/CLOUD-RESOURC
2. Select your Organization from the **Organization** drop-down on the top left of the page.

3. Click on your folder's row to select your folder from the list of projects and folders.
4. Click on the options menu (the vertical ellipsis) in the row and click **Move**.
5. Click **Browse** to select the folder to which you want to move the folder.
6. Click **Move**.

Viewing or listing folders and projects

To view or list folders, you must have the **Organization Viewer** and **Folder Viewer** roles.

To view or list folders and projects:

CONSOLE GCLOUD API

1. In the Google Cloud Console, open the Manage Projects and Folders page.

   GO TO MANAGE PROJECTS AND FOLDERS PAGE (HTTPS://CONSOLE.CLOUD.GOOGLE.COM/CLOUD

2. Select your Organization from the **Organization** drop-down on the top left of the page. All projects and folders under the Organization are displayed on the page. Note that folders must be created before they will appear in this list.
3. Select any row in the **tree** to perform folder- or project-specific operations.

★ **Note:** the options menu (the vertical ellipsis) on the right column displays options for supported operations.

4. Enter the project or folder name/ID in the search to filter the list.

Using the gcloud command line interface

Commands for interacting with the Folders API with the `gcloud` command-line tool are available in the `gcloud resource-manager folders` command group.

Create

To create a new folder, use `gcloud resource-manager folders create` with flags setting the name of the folder and the ID of the Organization or folder in which you'd like it created.

```
gcloud resource-manager folders create \
  --display-name="Super Fantastic Folder" \
  --organization=2518

Created Folder 245321.
```

View

To view a folder, use `gcloud resource-manager folders describe` with the ID of the folder you wish to view.

```
gcloud resource-manager folders describe 245321
name: folders/245321
parent: organizations/2518
display_name: Super Fantastic Folder
lifecycle_state: ACTIVE
create_time: <timestamp info …>
update_time: <timestamp info …>
```

List

To list the folders underneath a folder, use `gcloud resource-manager folders list`, passing the folder ID in the `--folder` flag. This can also list the top-level folders under an Organization, using the `--organization` flag.

```
gcloud resource-manager folders list --folder 245321
<table output showing the folders underneath the folder with the specified ID>

gcloud resource-manager folders list --organization 2518
<table output showing folders in this Organization but not in any folder>
```

You can list projects using the `gcloud projects list` command, passing the parent folder or organization ID in the `--filter` flag.

```
gcloud projects list --filter=" parent.id: '245321' "
<table output showing the projects underneath the resource with the specified ID>
```

For more information about how permissions and filters interact with list commands, see Listing all Resources in your Hierarchy (https://cloud.google.com/resource-manager/docs/listing-all-resources).

Update

Folders can be updated with the `gcloud resource-manager folders update` command. Currently, only the `display_name` field of a folder can be updated.

```
gcloud resource-manager folders update \
  --display-name="Mega Incredible Folder" 245321
name: folders/245321
parent: organizations/2518
display_name: Mega Incredible Folder
lifecycle_state: ACTIVE
create_time: <timestamp info …>
update_time: <recent timestamp info …>
```

Delete

Folders can be deleted and undeleted from the command line. A user must possess either the Folder Admin or the Folder Editor role to have the permission to delete a folder. You can only delete a folder if it is empty.

```
gcloud resource-manager folders delete 245321
name: folders/245321
parent: organizations/2518
display_name: Mega Incredible Folder
lifecycle_state: DELETE_REQUESTED
create_time: <timestamp info …>
update_time: <recent timestamp info …>

gcloud resource-manager folders undelete 245321
name: folders/245321
parent: organizations/2518
display_name: Mega Incredible Folder
lifecycle_state: ACTIVE
create_time: <timestamp info …>
update_time: <recent timestamp info …>
```

Project Move

Projects can be created in folders and moved into folders using the existing **`gcloud projects create`** and **`gcloud beta projects move`** commands. Folders can also be moved, using **`gcloud resource-manager folders move.`**

```
gcloud projects create --folder=245321 fancy-folder-project
project_id: fancy-folder-project
project_number: 905283
parent:
  type: "folder"
  id: 245321
other fields …

gcloud beta projects move --folder=245321 soon-to-be-fancy-project
project_id: soon-to-be-fancy-project
project_number: 428714
parent:
  type: "folder"
  id: 245321
other fields …
```

Long-Running operations

Some folder operations such as creating folders can take a long time. To make it easier to multitask, some folder commands allow you to perform them asynchronously. These commands accept an **`--async`** flag to enable asynchronous behavior, causing them to return a Long-Running Operation immediately instead of waiting for the operation to complete. You can poll this operation yourself with the **`gcloud alpha resource-manager operations describe`** command. Currently, only the **`folders create`** and **`folders move`** commands allow asynchronous use.

```
gcloud resource-manager folders create \
  --display-name="Awe-Inspiring Async Folder" \
  --organization=2518 \
  --async

name: operations/fc.8572
metadata:
  operation_type: CREATE
  display_name: Awe-Inspiring Async Folder
```

```
  destination_parent: organizations/2518
done: false

[wait for some time …]

gcloud alpha resource-manager operations describe fc.8572
name: operations/fc.8572
metadata:
  operation_type: CREATE
  display_name: Awe-Inspiring Async Folder
  destination_parent: organizations/2518
done: true
response:
  name: folders/6428
  parent: organizations/2518
  display_name: Awe-Inspiring Async Folder
  lifecycle_state: ACTIVE
  create_time: <recent timestamp info …>
  update_time: <recent timestamp info …>
```

Except as otherwise noted, the content of this page is licensed under the Creative Commons Attribution 4.0 License (https://creativecommons.org/licenses/by/4.0/), and code samples are licensed under the Apache 2.0 License (https://www.apache.org/licenses/LICENSE-2.0). For details, see our Site Policies (https://developers.google.com/terms/site-policies). Java is a registered trademark of Oracle and/or its affiliates.

Last updated December 4, 2019.