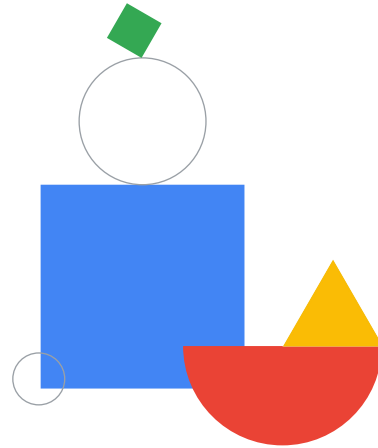



Preparing for Your Associate Cloud Engineer Journey

Module 1: Setting Up a Cloud Solution Environment



Welcome to Module 1: Setting Up a Cloud Solution Environment.



Module agenda

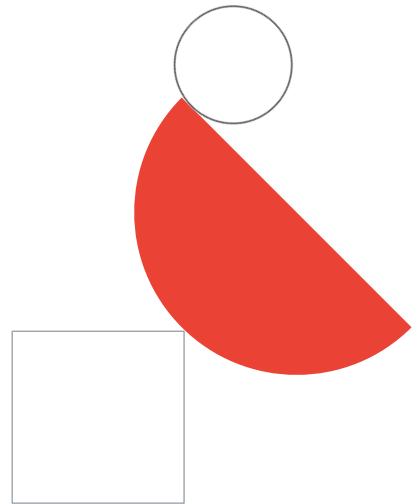
- 01 Setting up Cymbal Superstore's cloud environment
- 02 Diagnostic questions
- 03 Review and study planning



Google Cloud

In this module you'll explore the scope of tasks involved in setting up a cloud solution environment, which corresponds to the first section of the Associate Cloud Engineer Exam Guide. We'll start by discussing some considerations for how you would set up Cymbal Superstore's cloud environment. Next, you'll assess your skills in this section through 10 diagnostic questions. Then, we'll review these questions. Based on the areas you need to learn more about, you'll identify resources to include in your study plan.

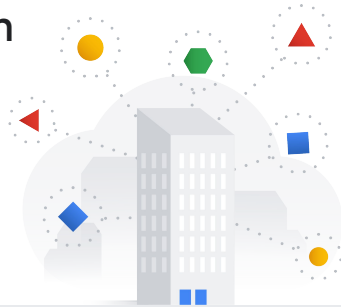
Setting up Cymbal Superstore's cloud environment



Google Cloud

Let's start with how to set up Cymbal Superstore's cloud environment.

Your role in setting up Cymbal Superstore's cloud solution environment



- Setting up cloud projects and accounts
- Managing billing configuration
- Installing and configuring the CLI

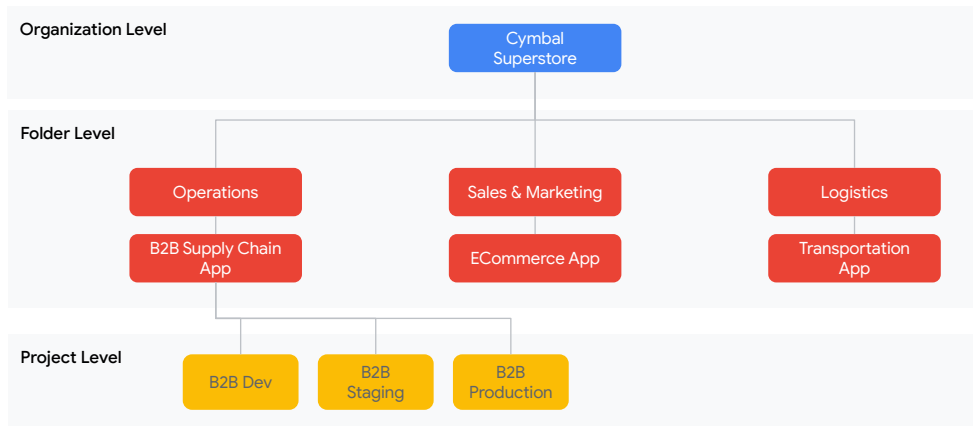


Cymbal Superstore is ready to start implementing the basic cloud infrastructure for their organization. As an Associate Cloud Engineer, you have been assigned to the team to help with this phase of the project. The team begins with a planning meeting to decide how Cymbal Superstore's cloud structure will be organized.

Outcomes of this phase of the migration journey include establishing a resource hierarchy, implementing organizational policies, managing projects and quotas, managing users and groups, and applying access management. Setting up billing and monitoring the use of your cloud resources are also things to consider. Finally, choosing how you interact with Google Cloud is an important decision as well. Different options include the graphical Google Cloud console, command line tools, and software development tools.

Let's take a closer look.

Cymbal Superstore's resource hierarchy



Google Cloud

How to set up a resource hierarchy on Google Cloud depends on the needs and structure of the organization.

Cymbal Superstore plans to migrate three applications to the cloud: its supply chain application, which will run on VMs; its containerized ecommerce application, which will use GKE; and its transportation management application, which will use Cloud Functions to track truck location.

These applications correspond to three different departments. Operations manages the B2B supply chain, Logistics oversees transportation, and Sales & Marketing manages the eCommerce application. The graphic shows a possible organizational hierarchy for Cymbal Superstore. The Cymbal Superstore organization is at the top, followed by optional folders underneath, one for each division and one for each application. There are multiple projects under the B2B supply chain app folder, one for each environment related to continuous integration/continuous delivery: a development, staging, and production environment. Other apps in the chart would have a similar project structure.

As you set up the hierarchy, you will also need to grant organizational policies. For example, marketing might need access to the data in the supply chain system to see if inventory levels affected recent marketing campaigns. Giving marketing viewer permissions on the supply chain production environment might be a good choice to give them the access they need.

An Associate Cloud Engineer could also be tasked with enabling Application Programming Interfaces (API's) within projects during setup. Cymbal Superstore's ecommerce project requires access to Google Kubernetes Engine and Cloud SQL as a database backend and you need to enable the APIs for those services.

Cymbal Superstore's identity and access roles



who — Data analyst



can do what — View data and run queries



on which resource — BigQuery datasets

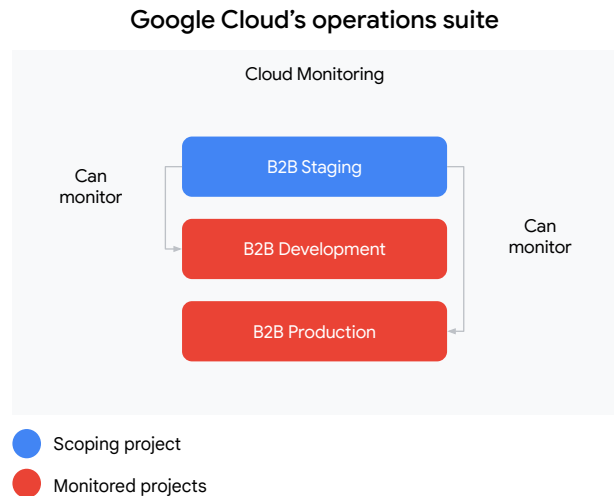
Google Cloud

Setting up the cloud environment also involves granting members IAM roles to ensure they have the right access to projects depending on their needs of their job and role at Cymbal Superstore.

For example, data analysts in the Marketing department will need access to historic sales data in the ecommerce system. This is a great use case for BigQuery, Google's cloud-based Data Warehouse solution. How would we go about giving the proper access? New data analysts would be added to a `data_analyst` group. Managing permissions and rules at a group level is easier than keeping track of permissions for individual users. Data analysts need access to the data in a dataset or table, so they would require `bigquery.dataViewer` role at the proper level. Queries in BigQuery are executed as an executable job. So to submit a query, a data analyst would also need the `bigquery.jobs.create` permission. This permission is included in the predefined `bigquery.user` role. You would give the `data_analyst` group access to this role in the Production project.

As a cloud engineer, you'll need to know how to manage Cymbal Superstore's users and groups in Cloud Identity, a service for managing users and groups if you are not doing so via Google Workspace.

Setting up products in Google Cloud's operations suite



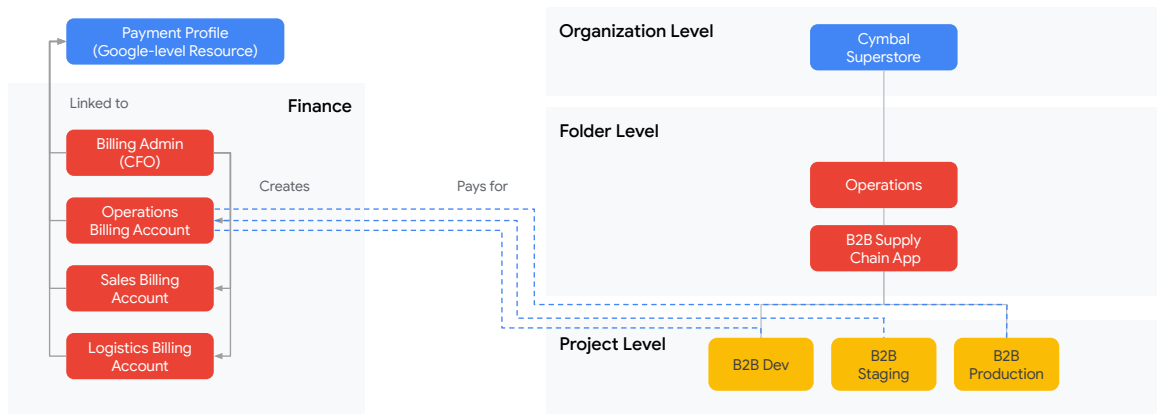
Google Cloud

Google Cloud's operations suite, which used to be called Stackdriver, provides metrics and logging services for all your services, resources, and projects in your cloud architecture.

To monitor metrics from multiple projects, you set up project scoping.

If Cymbal Superstore's Operations department decides to monitor metrics across all three supply chain projects in the staging environment project, you will set staging as a scoping project and then add dev and production as monitored projects.

Cymbal Superstore's billing accounts

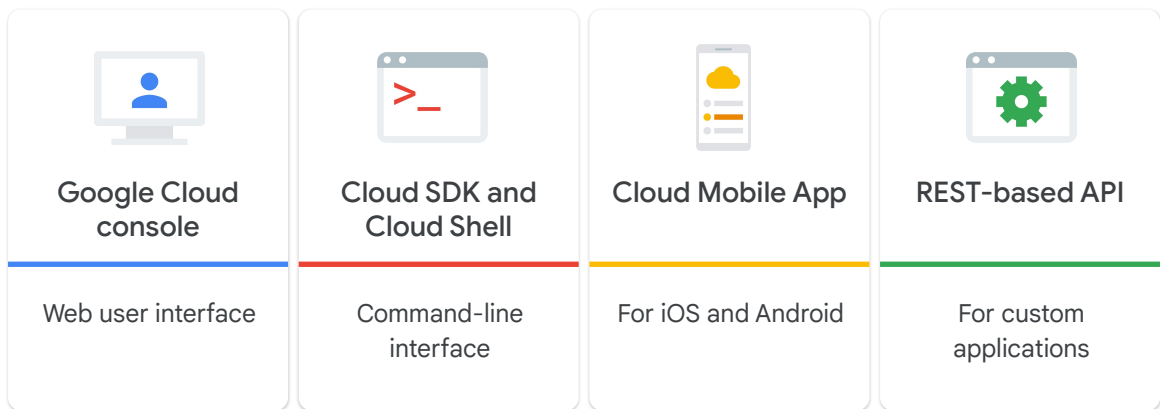


Google Cloud

While migrating to Google Cloud, Cymbal Superstore will be moving some of its IT expenditure to operational expenses, and the different departments associated with each application will be responsible for compute and storage costs. You'll need to create a different billing account for each group and link each project to the appropriate account.

The department lead in Sales and Marketing expresses particular concern about the cost of housing its data warehouse in BigQuery and how to optimize queries and storage. You'll need to set up custom billing budgets and alerts for this department. Each department will also need you to set up billing exports that can be used to track charges.

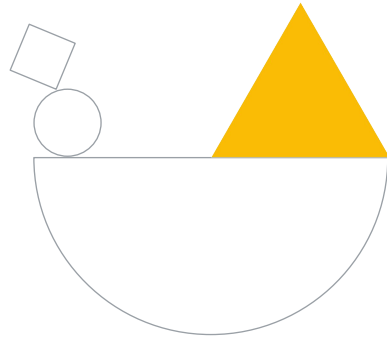
Interacting with Google Cloud



Google Cloud

As an IT administrator for Cymbal Superstore you can always set up resources in the graphical console. If you have a combination of tasks you need to do often you can automate resource management tasks on the command line. The Cloud SDK has a `gcloud` command set that allows configuration of Google Cloud resources as an executable script. You can use the “`gcloud config set`” to configure default options such as the project and compute region. If specific command arguments aren’t given it will use these defaults, which simplifies your code even more.

Diagnostic questions



Google Cloud

Now it's your turn to assess your experience and skills in this section with some diagnostic questions. Remember, these questions are intended to help you understand, or diagnose, which areas you'll want to focus on in your study plan, so we don't expect you to know all the answers yet.

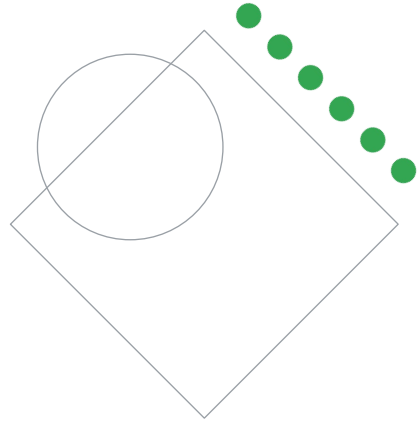
Please complete the diagnostic questions now

- You will find the link to the PDF version (Reading) for this module's diagnostic questions in the same section as this lesson.
- The diagnostic questions are also available in the workbook.



Please take 15 minutes to complete the diagnostic questions for this section.

Review and study planning



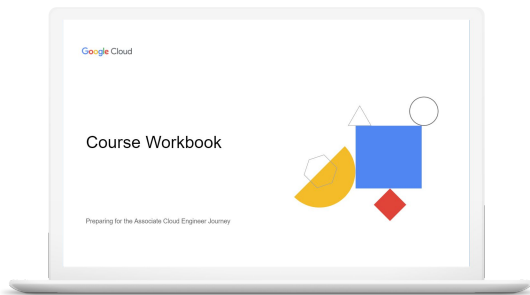
Google Cloud

Now let's review how to use these diagnostic questions to help you identify what to include in your study plan.

As a reminder - this isn't meant to be a crash course teaching you everything you need to know about setting up a solution in Google Cloud. Instead, it's meant to give you a better sense of the scope of the section and the different skills you'll want to develop as you prepare for the certification.

Your study plan:

Setting up a cloud solution environment



1.1

Setting up cloud projects and accounts

1.2

Managing billing configuration

1.3

Installing and configuring the command line interface (CLI), specifically the Cloud SDK (e.g., setting the default project)

Google Cloud

We'll approach this review by looking at the objectives of this exam section and the questions you just answered about each one. We'll introduce an objective, briefly review the answers to the related questions, then talk about where you can find out more in the learning resources and/or in Google Cloud documentation. As we go through each section objective, use the page in your workbook to mark the specific documentation, courses (and modules!), and skill badges you'll want to emphasize in your study plan.

1.1 | Setting up cloud projects and accounts

Activities include:

- Creating a resource hierarchy
- Applying organizational policies to the resource hierarchy
- Granting members IAM roles within a project
- Managing users and groups in Cloud Identity (manually and automated)
- Enabling APIs within projects
- Provisioning and setting up products in Google Cloud's operations suite

Google Cloud

At the start of this module we mentioned some of the tasks you'd undertake as an Associate Cloud Engineer to help set up Cymbal Superstore's cloud projects and accounts. This includes tasks such as creating a resource hierarchy related to the three applications migrating to the cloud and their associated departments, granting IAM roles, and the activities here.

Many of the questions you just answered relate to this area - these are key concepts for an Associate Cloud Engineer!

Question 1 tested your ability to assign users to IAM roles. Question 2 explored using organization resource hierarchies in Google Cloud, and question 3 tested your knowledge of the relationship between resources and projects to track resource usage, billing, or permissions. Question 4 examined concepts of permission hierarchy, and questions 5 and 6 tested your knowledge of roles in Google Cloud.

Let's review.

1.1 | Diagnostic Question 01 Discussion



Stella is a new member of a team in your company who has been put in charge of monitoring VM instances in the organization. Stella will need the required permissions to perform this role.

How should you grant her those permissions?

- A. Assign Stella a roles/compute.viewer role.
- B. Assign Stella compute.instances.get permissions on all of the projects she needs to monitor.
- C. Add Stella to a Google Group in your organization. Bind that group to roles/compute.viewer.
- D. Assign the “viewer” policy to Stella.

Google Cloud

Question:

Stella is a new member of a team in your company who has been put in charge of monitoring VM instances in the organization. Stella will need the required permissions to perform this role. How should you grant her those permissions?

1.1 Diagnostic Question 01 Discussion



Stella is a new member of a team in your company who has been put in charge of monitoring VM instances in the organization. Stella will need the required permissions to perform this role.

How should you grant her those permissions?

- A. Assign Stella a roles/compute.viewer role.
- B. Assign Stella compute.instances.get permissions on all of the projects she needs to monitor.
- C. Add Stella to a Google Group in your organization. Bind that group to roles/compute.viewer.
- D. Assign the "viewer" policy to Stella.



Google Cloud

Feedback:

A. Incorrect. You should not assign roles to an individual user. Users should be added to groups and groups assigned roles to simplify permissions management.

B. Incorrect. Roles are combinations of individual permissions. You should assign roles, not individual permissions, to users.

* C. Correct! Best practice is to manage role assignment by groups, not by individual users.

D. Incorrect. A policy is a binding that is created when you associate a user with a role. Policies are not "assigned" to a user.

Where to look:

<https://cloud.google.com/iam/docs/overview>

Content mapping:

- Google Cloud Fundamentals: Core Infrastructure (ILT and On-demand)
 - M2 Resources and Access in the Cloud
- Architecting with Google Compute Engine (ILT)
 - M4 Identity and Access Management
- Essential Google Cloud Infrastructure: Core Services (On-demand)
 - M1 Identity and Access Management
- Skill Badges
 - Create and Manage Cloud Resources

- (https://www.cloudskillsboost.google/course_templates/648)
- Perform Foundational Infrastructure Tasks in Google Cloud
(https://www.cloudskillsboost.google/course_templates/637)

Summary:

You assign members to roles through an IAM policy. Roles are combinations of permissions needed for a role. Members can be a Google account, a service account, a Google group, a Google Workspace domain, a Cloud Identity domain, all authenticated users, and all users. A service account is an account for an application instead of an end user.

Summary content continues on the next slide.

Identity and Access Management



who



can do what



on which resource

Google Cloud

IAM lets administrators authorize who can take action on specific resources. An IAM policy has a “who” part, a “can do what” part, and an “on which resource” part.

1.1 | Diagnostic Question 02 Discussion



How are resource hierarchies organized in Google Cloud?

- A. Organization, Project, Resource, Folder.
- B. Organization, Folder, Project, Resource.
- C. Project, Organization, Folder, Resource.
- D. Resource, Folder, Organization, Project.

Google Cloud

Question:

How are resource hierarchies organized in Google Cloud?

1.1 | Diagnostic Question 02 Discussion



How are resource hierarchies organized in Google Cloud?

- A. Organization, Project, Resource, Folder.
- B. Organization, Folder, Project, Resource.
- C. Project, Organization, Folder, Resource.
- D. Resource, Folder, Organization, Project.



Google Cloud

Feedback:

A: Incorrect. Folders are optional and come in between organizations and projects.

*B: Correct! Organization sits at the top of the Google Cloud resource hierarchy. This can be divided into folders, which are optional. Next, there are projects you define. Finally, resources are created under projects.

C: Incorrect. Organization is the highest level of the hierarchy.

D: Incorrect. Organization is the highest level of the hierarchy, followed by optional folders, projects, and then resources.

Where to look:

<https://cloud.google.com/resource-manager/docs/cloud-platform-resource-hierarchy#resource-hierarchy-detail>

Content mapping:

- Google Cloud Fundamentals: Core Infrastructure (ILT and On-demand)
 - M2 Resources and Access in the Cloud
- Skill Badge
 - Create and Manage Cloud Resources
(https://www.cloudskillsboost.google/course_templates/648)

Summary:

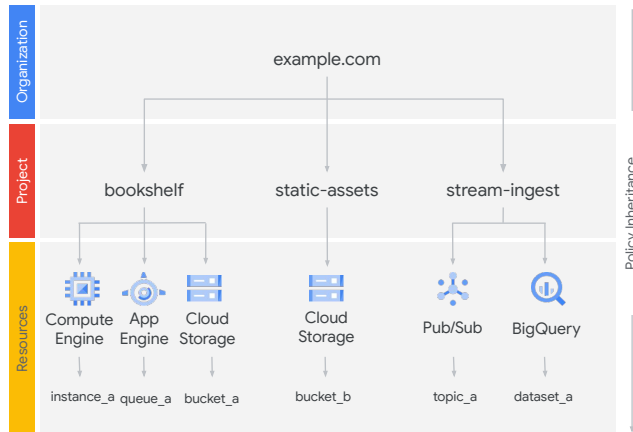
You may find it easiest to understand the Google Cloud resource hierarchy from the bottom up. All the resources you use--whether they're virtual machines, Cloud

Storage buckets, tables in BigQuery, or anything else in Google Cloud--are organized into projects. Optionally, these projects may be organized into folders; folders can contain other folders. All the folders and projects used by your organization can be brought together under an organization node. Projects, folders, and organization nodes are all places where policies can be defined. Some Google Cloud resources let you put policies on individual resources too, like Cloud Storage buckets.

Policies are inherited downwards in the hierarchy.

Summary content continues on the next slide.

On which resource: Users get roles on specific items in the hierarchy



Google Cloud

When you give a user, group, or service account a role on a specific element of the resource hierarchy, the resulting policy applies to the element you chose, as well as to elements below it in the hierarchy.

1.1 | Diagnostic Question 03 Discussion



What Google Cloud project attributes can be changed?

- A. The Project ID.
- B. The Project Name.
- C. The Project Number.
- D. The Project Category.

Google Cloud

Question:

What Google Cloud project attributes can be changed?

1.1 | Diagnostic Question 03 Discussion



What Google Cloud project attributes can be changed?

- A. The Project ID.
- B. The Project Name.
- C. The Project Number.
- D. The Project Category.



Google Cloud

Feedback:

A: Incorrect. Project ID is set by the user at creation time but cannot be changed. It must be unique.

*B: Correct! Project name is set by the user at creation. It does not have to be unique. It can be changed after creation time.

C: Incorrect. Project number is an automatically generated unique identifier for a project. It cannot be changed.

D: Incorrect. Project category isn't a valid attribute when setting up a Google Cloud project.

Where to look:

<https://cloud.google.com/resource-manager/docs/cloud-platform-resource-hierarchy#projects>

Content Mapping:

- Google Cloud Fundamentals: Core Infrastructure (ILT and On-demand)
 - M2 Resources and Access in the Cloud
- Skill Badge
 - Create and Manage Cloud Resources
(https://www.cloudskillsboost.google/course_templates/648)

Summary:

A project is required to use Google Cloud, and forms the basis for creating, enabling, and using all Google Cloud services, managing APIs, enabling billing, adding and removing collaborators, and managing permissions.

In order to interact with most Google Cloud resources, you must provide the identifying project information for every request. You can identify a project in either of two ways: a project ID, or a project number.

A project ID is the customized name you chose when you created the project. If you activate an API that requires a project, you will be directed to create a project or select a project using its project ID. (Note that the name string, which is displayed in the UI, is not the same as the project ID.)

A project number is automatically generated by Google Cloud. Both the project ID and project number can be found on the dashboard of the project in the Google Cloud console. For information on getting project identifiers and other management tasks for projects see [Creating and Managing Projects](#).

The initial IAM policy for the newly created project resource grants the owner role to the creator of the project.

1.1 | Diagnostic Question 04 Discussion



Jane will manage objects in Cloud Storage for the Cymbal Superstore. She needs to have access to the proper permissions for every project across the organization.

What should you do?

- A. Assign Jane the roles/storage.objectCreator on every project.
- B. Assign Jane the roles/viewer on each project and the roles/storage.objectCreator for each bucket.
- C. Assign Jane the roles/editor at the organizational level.
- D. Add Jane to a group that has the roles/storage.objectAdmin role assigned at the organizational level.

Google Cloud

Question:

Jane will manage objects in Cloud Storage for the Cymbal Superstore. She needs to have access to the proper permissions for every project across the organization. What should you do?

1.1 Diagnostic Question 04 Discussion



Jane will manage objects in Cloud Storage for the Cymbal Superstore. She needs to have access to the proper permissions for every project across the organization.

What should you do?

- A. Assign Jane the roles/storage.objectCreator on every project.
- B. Assign Jane the roles/viewer on each project and the roles/storage.objectCreator for each bucket.
- C. Assign Jane the roles/editor at the organizational level.
- D. Add Jane to a group that has the roles/storage.objectAdmin role assigned at the organizational level.



Google Cloud

Feedback:

A. Incorrect. Inheritance would be a better way to handle this scenario. The *roles/storage.objectCreator* role does not give the permission to delete objects, an essential part of managing them.

B. Incorrect. This role assignment is at too low of a level to allow Jane to manage objects.

C. Incorrect. *Roles/editor* is basic and would give Jane too many permissions at the project level.

*D. Correct! This would give Jane the right level of access across all projects in your company.

Where to look:

<https://cloud.google.com/resource-manager/docs/cloud-platform-resource-hierarchy>

Content mapping:

- Google Cloud Fundamentals: Core Infrastructure (ILT and On-demand)
 - M2 Resources and Access in the Cloud
- Skill Badge
 - Create and Manage Cloud Resources
(https://www.cloudskillsboost.google/course_templates/648)

Summary: Resource hierarchy is different from Identity and Access Management.

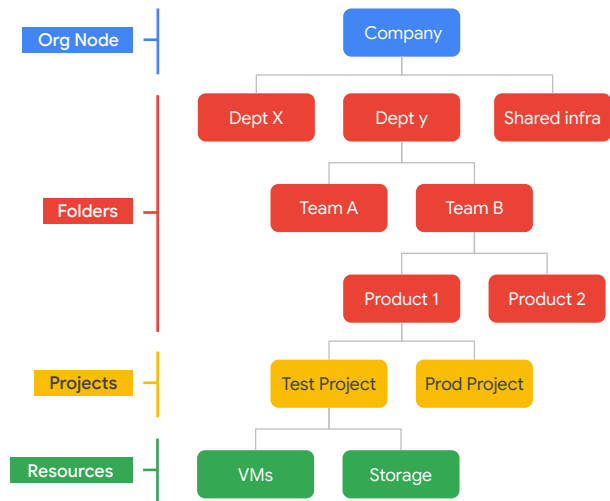
Identity and Access Management focuses on who, and lets the administrator authorize who can take action on specific resources based on permissions. Organization Policy focuses on what, and lets the administrator set restrictions on specific resources to determine how they can be configured. A constraint is a particular type of restriction against a Google Cloud service or a list of Google Cloud services. A constraint has a type, either list or boolean.

Summary continues on the next slide.

Resource hierarchy levels define trust boundaries

Group your resources according to your organization structure.

Levels of the hierarchy provide trust boundaries and resource isolation.



Google Cloud

When an organization policy is set on a resource hierarchy node, all descendants of that node inherit the organization policy by default. If you set an organization policy at the root organization node, then the configuration of restrictions defined by that policy will be passed down through all descendant folders, projects, and service resources.

When a child node inherits organization policies based on list constraints, the inherited policies are merged and reconciled with the node's organization policy. In list policy evaluation, DENY values always take precedence.

Organization policies that are derived from boolean constraints do not merge and reconcile policies. If a policy is specified on a resource node, that TRUE or FALSE value is used to determine the effective policy.

1.1 | Diagnostic Question 05 Discussion



You need to add new groups of employees in Cymbal Superstore's production environment. You need to consider Google's recommendation of using least privilege.

What should you do?

- A. Grant the most restrictive basic role to most services, grant predefined or custom roles as necessary.
- B. Grant predefined and custom roles that provide necessary permissions and grant basic roles only where needed.
- C. Grant the least restrictive basic roles to most services and grant predefined and custom roles only when necessary.
- D. Grant custom roles to individual users and implement basic roles at the resource level.

Google Cloud

Question:

You need to add new groups of employees in Cymbal Superstore's production environment. You need to consider Google's recommendation of using least privilege. What should you do?

1.1 Diagnostic Question 05 Discussion



You need to add new groups of employees in Cymbal Superstore's production environment. You need to consider Google's recommendation of using least privilege.

What should you do?

A. Grant the most restrictive basic role to most services, grant predefined or custom roles as necessary.

B. Grant predefined and custom roles that provide necessary permissions and grant basic roles only where needed.



C. Grant the least restrictive basic roles to most services and grant predefined and custom roles only when necessary.

D. Grant custom roles to individual users and implement basic roles at the resource level.

Google Cloud

Feedback:

A: Incorrect. Basic roles are too broad and don't provide least privilege.

*B: Correct! Basic roles are broad and don't use the concept of least privilege. You should grant only the roles that someone needs through predefined and custom roles.

C: Incorrect. Basic roles apply to the project level and do not provide least privilege.

D: Incorrect. You should see if a predefined role meets your needs before implementing a custom role.

Where to look:

https://cloud.google.com/iam/docs/understanding-roles#role_types

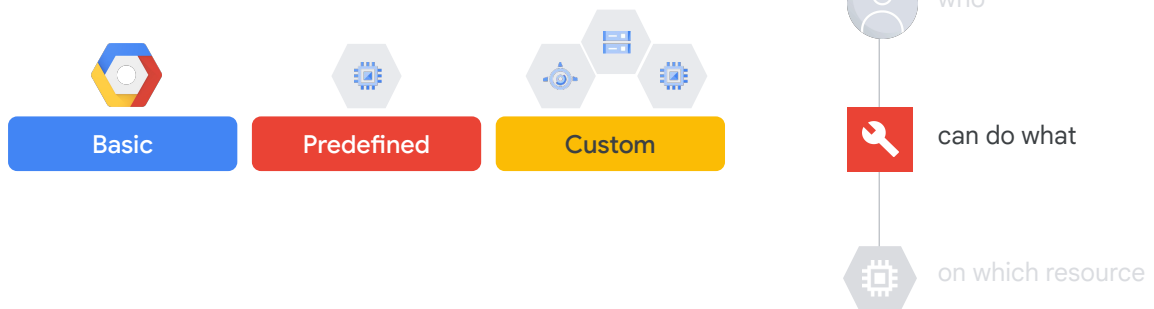
Content mapping:

- Google Cloud Fundamentals: Core Infrastructure (ILT and On-demand)
 - M2 Resources and Access in the Cloud
- Architecting with Google Compute Engine (ILT)
 - M4 Identity and Access Management
- Essential Google Cloud Infrastructure: Core Services (On-demand)
 - M1 Identity and Access Management
- Skill Badge
 - Create and Manage Cloud Resources
(https://www.cloudskillsboost.google/course_templates/648)

Summary:

See following slide.

Can do what: IAM roles are collections of related permissions



Google Cloud

The “can do what” part of an IAM policy is defined by a role. An IAM role is a collection of permissions, because, most of the time you need more than 1 permission to do meaningful work. For example, to manage virtual machine instances in a project, you have to be able to create, delete, start, stop and change virtual machines. So these permissions are grouped together into a role to make them easier to understand and easier to manage.

There are three types of roles in IAM:

- Basic roles, which include the Owner, Editor, and Viewer roles that existed prior to the introduction of IAM.
- Predefined roles, which provide granular access for a specific service and are managed by Google Cloud.
- Custom roles, which provide granular access according to a user-specified list of permissions.

Basic roles are the Owner, Editor, and Viewer.

Pre-defined roles bundle selected permissions up into collections that correlate with common job-related business needs.

1.1 Diagnostic Question 06 Discussion



The Operations Department at Cymbal Superstore wants to provide managers access to information about VM usage without allowing them to make changes that would affect the state. You assign them the Compute Engine Viewer role.

- A. `compute.images.list`
- B. `compute.images.get`
- C. `compute.images.create`
- D. `compute.images.setIAM`
- E. `compute.images.update`

Which two permissions will they receive?

Google Cloud

Question:

The Operations Department at Cymbal Superstore wants to provide managers access to information about VM usage without allowing them to make changes that would affect the state. You assign them the Compute Engine Viewer role. Which two permissions will they receive?

1.1 Diagnostic Question 06 Discussion



The Operations Department at Cymbal Superstore wants to provide managers access to information about VM usage without allowing them to make changes that would affect the state. You assign them the Compute Engine Viewer role.

Which two permissions will they receive?

- A. `compute.images.list`
- B. `compute.images.get`
- C. `compute.images.create`
- D. `compute.images.setIAM`
- E. `compute.images.update`



Google Cloud

Feedback:

- *A: Correct! Viewer can perform read-only actions that do not affect state.
- *B: Correct! Get is read-only. Viewer has this permission.
- C: Incorrect. This permission would change state.
- D: Incorrect. Only the Owner can set the IAM policy on a service.
- E: Incorrect. Only Editor and above can change the state of an image.

Where to look:

<https://cloud.google.com/iam/docs/understanding-roles#basic>

Content mapping:

- Google Cloud Fundamentals: Core Infrastructure (ILT and On-demand)
 - M2 Resources and Access in the Cloud
- Architecting with Google Compute Engine (ILT)
 - M4 Identity and Access Management
- Essential Google Cloud Infrastructure: Core Services (On-demand)
 - M1 Identity and Access Management
- Skill Badge
 - Create and Manage Cloud Resources
(https://www.cloudskillsboost.google/course_templates/648)

Summary: If you're a viewer on a given resource, you can examine it but not change

its state. If you're an editor, you can do everything a viewer can do plus change its state. And if you're an owner, you can do everything an editor can do plus manage roles and permissions on the resource.

1.1 Setting up cloud projects and accounts

Courses

[Google Cloud Fundamentals: Core Infrastructure](#)

- M2 Resources and Access in the Cloud

[Architecting with Google Compute Engine](#)

- M4 Identity and Access Management (IAM)

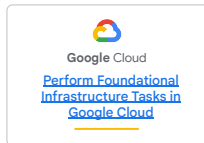
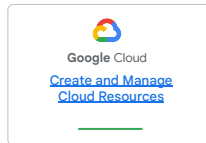


[Essential Google Cloud Infrastructure: Core Services](#)

- M1 Identity and Access Management (IAM)



Skill Badges



Documentation

[Overview | IAM Documentation](#)

[Resource hierarchy | Resource Manager Documentation](#)

[Understanding roles | IAM Documentation](#)

Now that we've reviewed the diagnostic questions related to Section 1.1 Setting up cloud projects and account, let's take a moment to consider resources that can help you build your knowledge and skills in this area.

The concepts in the diagnostic questions we just reviewed are covered in these modules, skill badges, and documentation. You'll find this list in your workbook so you can take a note of what you want to include later when you build your study plan. Based on your experience with the diagnostic questions, you may want to include some or all of these.

[Google Cloud Fundamentals: Core Infrastructure \(On-demand\)](#)

[Architecting with Google Compute Engine \(ILT\)](#)

[Essential Google Cloud Infrastructure: Core Services \(On-demand\)](#)

[Create and Manage Cloud Resources \(Skill Badge\)](#)

[Perform Foundational Infrastructure Tasks in Google Cloud \(Skill Badge\)](#)

<https://cloud.google.com/iam/docs/overview>

<https://cloud.google.com/resource-manager/docs/cloud-platform-resource-hierarchy>

<https://cloud.google.com/iam/docs/understanding-roles>

1.2 | Managing billing configuration

Activities include:

- Creating one or more billing accounts
- Linking projects to a billing account
- Establishing billing budgets and alerts
- Setting up billing exports

Google Cloud

Now let's focus on Section 1.2. An Associate Cloud Engineer needs to be able to manage the billing configuration for a cloud solution, which involves tasks such as setting up billing accounts, linking projects, establishing budget alerts, and setting up exports.

Question 7 tested your knowledge of billing accounts and the role of a billing administrator. Question 8 explored budget alerts.

1.2 | Diagnostic Question 07 Discussion



How are billing accounts applied to projects in Google Cloud? (Pick two.)

- A. Set up Cloud Billing to pay for usage costs in Google Cloud projects and Google Workspace accounts.
- B. A project and its resources can be tied to more than one billing account.
- C. A billing account can be linked to one or more projects.
- D. A project and its resources can only be tied to one billing account.
- E. If your project only uses free resources you don't need a link to an active billing account.

Google Cloud

Question:

How are billing accounts applied to projects in Google Cloud? (Pick two.)

1.2 Diagnostic Question 07 Discussion



How are billing accounts applied to projects in Google Cloud? (Pick two.)

A. Set up Cloud Billing to pay for usage costs in Google Cloud projects and Google Workspace accounts.

B. A project and its resources can be tied to more than one billing account.

C. A billing account can be linked to one or more projects.

D. A project and its resources can only be tied to one billing account.

E. If your project only uses free resources you don't need a link to an active billing account.



Google Cloud

Feedback:

A: Incorrect. Cloud Billing does not pay for charges associated with a Google Workspace account.

B: Incorrect. A project can only be linked to one billing account at a time.

*C: Correct! A billing account can handle billing for more than one project.

*D: Correct! A project can only be linked to one billing account at a time.

E: Incorrect. Even projects using free resources need to be tied to a valid Cloud Billing account.

Where to look:

<https://cloud.google.com/billing/docs/how-to/manage-billing-account>

Content mapping:

- Google Cloud Fundamentals: Core Infrastructure (ILT and On-demand)
 - M2 Resources and Access in the Cloud
- Architecting with Google Compute Engine (ILT)
 - M6 Resource Management
- Essential Google Cloud Infrastructure: Core Services (On-demand)
 - M3 Resource Management

Summary:

Cloud Billing accounts pay for usage costs in Google Cloud projects and Google Maps Platform projects. Cloud Billing accounts do not pay for Google Workspace

accounts. Google Workspace customers need a separate Google Workspace billing account.

A project and its service-level resources are linked to one Cloud Billing account at a time.

A Cloud Billing account operates in a single currency and is linked to a Google payments profile.

A Cloud Billing account can be linked to one or more projects.

Usage costs are tracked by Project and are charged to the linked Cloud Billing account.

Important: Projects that are not linked to an active Cloud Billing account cannot use Google Cloud or Google Maps Platform services. This is true even if you only use services that are free.

If you want to change the Cloud Billing account that you are using to pay for a project (that is, link a project to a different Cloud Billing account), see [Enable, disable, or change billing for a project](#).

You can manage your Cloud Billing accounts using the Google Cloud console. For more information about the console, visit [General guide to the console](#).

1.2 | Diagnostic Question 08 Discussion



Fiona is the billing administrator for the project associated with Cymbal Superstore's eCommerce application. Jeffrey, the marketing department lead, wants to receive emails related to budget alerts. Jeffrey should have access to no additional billing information.

What should you do?

- A. Change the budget alert default threshold rules to include Jeffrey as a recipient.
- B. Use Cloud Monitoring notification channels to send Jeffrey an email alert.
- C. Add Jeffrey and Fiona to the budget scope custom email delivery dialog.
- D. Send alerts to a Pub/Sub topic that Jeffrey is subscribed to.

Google Cloud

Question:

Fiona is the billing administrator for the project associated with Cymbal Superstore's eCommerce application. Jeffrey, the marketing department lead, wants to receive emails related to budget alerts. Jeffrey should have access to no additional billing information.

1.2 Diagnostic Question 08 Discussion



Fiona is the billing administrator for the project associated with Cymbal Superstore's eCommerce application. Jeffrey, the marketing department lead, wants to receive emails related to budget alerts. Jeffrey should have access to no additional billing information.

What should you do?

- A. Change the budget alert default threshold rules to include Jeffrey as a recipient.
- B. Use Cloud Monitoring notification channels to send Jeffrey an email alert. ✓
- C. Add Jeffrey and Fiona to the budget scope custom email delivery dialog.
- D. Send alerts to a Pub/Sub topic that Jeffrey is subscribed to.

Google Cloud

Feedback:

A. Incorrect. To add Jeffrey as a recipient to the default alert behavior you would have to grant him the role of a billing administrator or billing user. The qualifier in the questions states he should have no additional access.

*B. Correct! You can set up to 5 Cloud Monitoring channels to define email recipients that will receive budget alerts.

C. Incorrect. Budget scope defines what is reported in the alert.

D. Incorrect. Pub/Sub is for programmatic use of alert content.

Where to look:

<https://cloud.google.com/billing/docs/how-to/budgets>

Content Mapping:

- Google Cloud Fundamentals: Core Infrastructure (ILT and On-demand)
 - M2 Resources and Access in the Cloud

Summary:

To create a new budget, complete the following steps:

1. Create and name the budget
2. Set the budget scope
3. Set the budget amount
4. Set the budget threshold rules and actions
5. Click finish to save the new budget

Threshold rules define the triggering events used to generate a budget notification

email. Note that threshold rules are required for email notifications and are used specifically to trigger email notifications. Thresholds rules are not required for programmatic notifications, unless you want your programmatic notifications to include data about the thresholds you set.

Email notification settings can be either role-based, which sends alerts to the Billing account Administrator and Billing Account Users. This is the default behavior.

Or you can set up Cloud Monitoring notification channels to send alerts to email addresses of your choice.

1.2 Managing billing configuration

Courses

[Google Cloud Fundamentals: Core Infrastructure](#)

- M2 Resources and Access in the Cloud

[Architecting with Google Compute Engine](#)

- M6 Resource Management



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[Essential Google Cloud Infrastructure: Core Services](#)

- M3 Resource Management



Documentation

[Create, modify, or close your self-serve](#)

[Cloud Billing account](#)

[Create, edit, or delete budgets and budget alerts | Cloud Billing](#)

Let's take a moment to consider resources that can help you build your knowledge and skills in this area.

The concepts in the diagnostic questions we just reviewed are covered in these modules and in this documentation. You'll find this list in your workbook so you can take a note of what you want to include later when you build your study plan. Based on your experience with the diagnostic questions, you may want to include some or all of these.

[Google Cloud Fundamentals: Core Infrastructure \(On-demand\)](#)

[Architecting with Google Compute Engine \(ILT\)](#)

[Essential Google Cloud Infrastructure: Core Services \(On-demand\)](#)

<https://cloud.google.com/billing/docs/how-to/manage-billing-account>

<https://cloud.google.com/billing/docs/how-to/budgets>

1.3 | Installing and configuring the command line interface (CLI), specifically the Cloud SDK

(e.g., setting the default project)

Google Cloud

There are four ways you can interact with Google Cloud: the Google Cloud console, the Cloud SDK and Cloud Shell, the Cloud Mobile App, and the APIs. As an Associate Cloud Engineer you will have to be familiar with all of them.

Question 9 tested your knowledge of ways to interact with Google Cloud services, and question 10 asked you to differentiate between the main components of the Google Cloud SDK (gcloud, gcloud storage, and bq).

1.3 | Diagnostic Question 09 Discussion



Pick two choices that provide a command line interface to Google Cloud.

- A. Google Cloud console
- B. Cloud Shell
- C. Cloud Mobile App
- D. Cloud SDK
- E. REST-based API

Google Cloud

Question:

Pick two choices that provide a command line interface to Google Cloud.

1.3 Diagnostic Question 09 Discussion



Pick two choices that provide a command line interface to Google Cloud.

A. Google Cloud console

B. Cloud Shell



C. Cloud Mobile App

D. Cloud SDK



E. REST-based API

Google Cloud

Feedback:

A: Incorrect. The console is a graphical interface.

*B: Correct! Cloud Shell provides a cloud-based CLI environment.

C: Incorrect. The Cloud Mobile App allows you to interact graphically with your Google Cloud resources through an app on your mobile device.

*D: Correct! The Cloud SDK provides a local CLI environment.

E: Incorrect. This interface allows API access through CURL or client-based programming SDKs.

Where to look:

https://cloud.google.com/docs/overview#ways_to_interact_with_the_services

Content mapping:

- Google Cloud Fundamentals: Core Infrastructure (ILT and On-demand)
 - M2 Resources and Access in the Cloud
- Architecting with Google Compute Engine (ILT)
 - M1 Interacting with Google Cloud
- Essential Google Cloud Infrastructure: Foundation (On-demand)
 - M1 Interacting with Google Cloud
- Skill Badge
 - Create and Manage Cloud Resources
(https://www.cloudskillsboost.google/course_templates/648)

Summary:

The Google Cloud console provides a web-based, graphical user interface that you can use to manage your Google Cloud projects and resources.

The gcloud tool lets you manage development workflow and Google Cloud resources in a terminal window.

You can run gcloud commands by installing the Cloud SDK, which includes the gcloud tool. You use it by opening a terminal window on your own computer.

You can also access gcloud commands by using Cloud Shell, a browser-based shell that runs in the cloud.

Client libraries are also provided by the Cloud SDK. They provide access to API's for access to services, called application API's, and Admin API's which allow you to automate resource management tasks.

Summary content continues on the next slide.

The Cloud SDK and Cloud Shell

- The [Cloud SDK](#) includes CLI tools for Google Cloud products and services.
- gcloud, gcloud storage (Cloud Storage), bq (BigQuery)
- Available as a Docker image.
- Available via Cloud Shell.
- Containerized version of the Cloud SDK running on a Compute Engine instance.



Google Cloud

The Cloud SDK is a set of tools that you can use to manage resources and applications hosted on Google Cloud. These include the [gcloud tool](#), which provides the main command-line interface for Google Cloud Platform products and services, as well as [gcloud storage](#) and [bq](#). When installed, all of the tools within the Cloud SDK are located under the bin directory.

Cloud Shell provides you with command-line access to your cloud resources directly from your browser. Cloud Shell is a Debian-based virtual machine with a persistent 5-GB home directory, which makes it easy for you to manage your Google Cloud projects and resources. With Cloud Shell, the Cloud SDK gcloud command and other utilities you need are always installed, available, up to date, and fully authenticated when you need them.

For more information on the SDK command-line tools, see:
<https://cloud.google.com/sdk/cloudplatform>

Note: Currently, the App Engine SDKs are separate downloads. For more information, see: <https://cloud.google.com/appengine/downloads>

Cloud Shell provides the following:

- A temporary Compute Engine virtual machine instance running a Debian-based Linux operating system
- Command-line access to the instance from a web browser using terminal windows in the Google Cloud console

- 5 GB of persistent disk storage per user, mounted as your \$HOME directory in Cloud Shell sessions across projects and instances
- The Cloud SDK and other tools pre-installed on the Compute Engine instance
- Language support, including SDKs, libraries, runtime environments and compilers for Java, Go, Python, Node.js, PHP and Ruby
- Web preview functionality, which allows you to preview web applications running on the Cloud Shell instance through a secure proxy
- Built-in authorization for access to projects and resources

You can use Cloud Shell to:

- Create and manage Compute Engine instances.
- Create and access Cloud SQL databases.
- Manage Cloud Storage data.
- Interact with hosted or remote Git repositories, including Cloud Source Repositories.
- Build and deploy App Engine applications.

You can also use Cloud Shell to perform other management tasks related to your projects and resources, using either the `gcloud` command or other available tools.

1.3 | Diagnostic Question 10 Discussion



You want to use the Cloud Shell to copy files to your Cloud Storage bucket.

Which Cloud SDK command should you use?

- A. `gcloud`
- B. `gcloud storage`
- C. `bq`
- D. Cloud Storage Browser

Question:

You want to use the Cloud Shell to copy files to your Cloud Storage bucket. Which Cloud SDK command should you use?

1.3 Diagnostic Question 10 Discussion



You want to use the Cloud Shell to copy files to your Cloud Storage bucket.

Which Cloud SDK command should you use?

- A. `gcloud`
- B. `gcloud storage` ✓
- C. `bq`
- D. Cloud Storage Browser

Google Cloud

Feedback:

A: Incorrect. `gcloud` provides tools for interacting with resources and services in the Cloud SDK.

*B: Correct! Use `gcloud storage` to interact with Cloud Storage via the Cloud SDK.

C: Incorrect. `bq` is a way to submit queries to BigQuery.

D: Incorrect. Cloud Storage Browser is part of the Google Cloud console, not CLI-based.

Where to look:

<https://cloud.google.com/sdk/docs/components>

Content Mapping:

- Google Cloud Fundamentals: Core Infrastructure (ILT and On-demand)
 - M2 Resources and Access in the Cloud
- Skill Badges
 - Create and Manage Cloud Resources
(https://www.cloudskillsboost.google/course_templates/648)
 - Perform Foundational Infrastructure Tasks in Google Cloud
(https://www.cloudskillsboost.google/course_templates/637)

Summary:

[gcloud](#)

Default gcloud CLI Commands

Tool for interacting with Google Cloud. Only commands at the General Availability and Preview release levels are installed with this component. You must separately install the gcloud alpha Commands and/or gcloud beta Commands components if you want to use commands at other release levels.

[bg](#)

BigQuery Command-Line Tool

Tool for working with data in BigQuery

[gcloud storage](#)

Cloud Storage Command-Line Tool

Tool for performing tasks related to Google Cloud Storage.

1.3 Installing and configuring the command line interface (CLI), specifically the Cloud SDK

Courses

[Google Cloud Fundamentals: Core Infrastructure](#)

- M2 Resources and Access in the Cloud

[Architecting with Google Compute Engine](#)

- M1 Interacting with Google Cloud



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[Essential Google Cloud Infrastructure: Foundation](#)

- M1 Interacting with Google Cloud



Skill Badges



Google Cloud
[Create and Manage Cloud Resources](#)



Google Cloud
[Perform Foundational Infrastructure Tasks in Google Cloud](#)

Documentation

[Google Cloud overview | Overview](#)
[Managing Cloud SDK components | Cloud SDK Documentation](#)
[gcloud | Cloud SDK Documentation](#)
[Using the bq command-line tool | BigQuery](#)
[gcloud storage tool | Cloud Storage](#)

Let's take a moment to consider resources that can help you build your knowledge and skills in this area.

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[Google Cloud Fundamentals: Core Infrastructure \(On-demand\)](#)

[Architecting with Google Compute Engine \(ILT\)](#)

[Essential Google Cloud Infrastructure: Foundation \(On-demand\)](#)

[Create and Manage Cloud Resources \(Skill Badge\)](#)

[Perform Foundational Infrastructure Tasks in Google Cloud \(Skill Badge\)](#)

https://cloud.google.com/docs/overview#ways_to_interact_with_the_services

<https://cloud.google.com/sdk/docs/components>

<https://cloud.google.com/sdk/gcloud/reference>

<https://cloud.google.com/bigquery/bq-command-line-tool>

<https://cloud.google.com/sdk/gcloud/reference/storage>