



Implementing Cloud FinOps on Google Cloud - Part 1



Google Cloud Learning Services

In this session...

- 01. Cloud pricing model
- 02. Billing accounts
- 03. IAM roles and permissions
- 04. Pricing Calculator
- 05. Reporting
- 06. Budget, alert, quota and health checks

Cloud Pricing Model

01

Cost optimization for GCE

Custom Machines

Use the right-sizing for your workload to avoid extra charge

Sustained Use Discount

Up to 30% completely automatic discount

Preemptible VMs

Up to 80% discount for preemptible machines on specific workloads (e.g. GKE clusters, Dataproc clusters)

Committed Use Discount

Up to 55% discount when committing for 1 year or 3 years

Commit Deal

% of discount depending on the commit amount

Commit - on an amount of resources/\$ with no upfront costs

Discounts

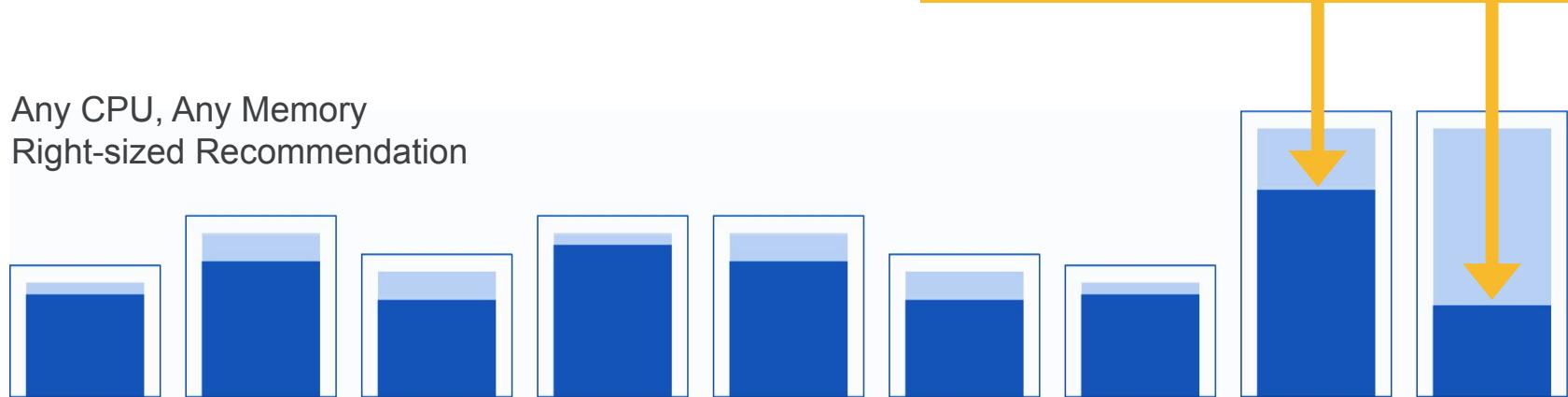
	Custom Machines	Sustained Use Discount (SUD)	Preemptible VMs (PVM)	Committed Use Discount (CUD)	Commit deal
Commitment	No	No	No	Yes	Yes
Features	<p>Create virtual machines with optimal amount of CPU & RAM</p> <p>Machine types: 1 vCPU up to 96 vCPUs</p> <p>Up to 8 GB of memory per vCPU or more with Extended Memory</p>	<p>Automatic discounts for running specific compute resources for a significant portion of the billing month per project/region</p>	<p>Same machine types and options as regular compute instances</p> <p>Available on demand for up to 24 hours</p>	<p>Commit to a number of vCPUs and RAM</p> <p>Commitment via the portal per project/region</p> <p>Can be used for any GCE & GKE VMs and changed over time</p>	<p>Commit to a certain volume of spending over 1 to 5 years or more</p> <p>Billed monthly according to actual consumption</p> <p>Minimum deal size</p>
Ideal for	Specific workloads	General purpose workloads	Batch computing Fault-tolerant workloads	Predictable, steady-state workloads	Invest on Google Cloud for the future
Benefits	Average saving of 19%	<p>Effective saving of 30% for usage 100% of the month</p> <p>Average saving of 24%</p>	Up to 80% cheaper for short-lived instances	<p>1 year term - up to 40%-off</p> <p>3 year term - up to 57%-off</p>	<p>Migration credits</p> <p>Specific incremental discounts</p>

Custom machine types

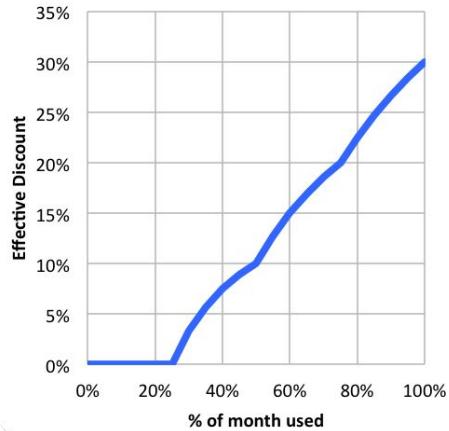
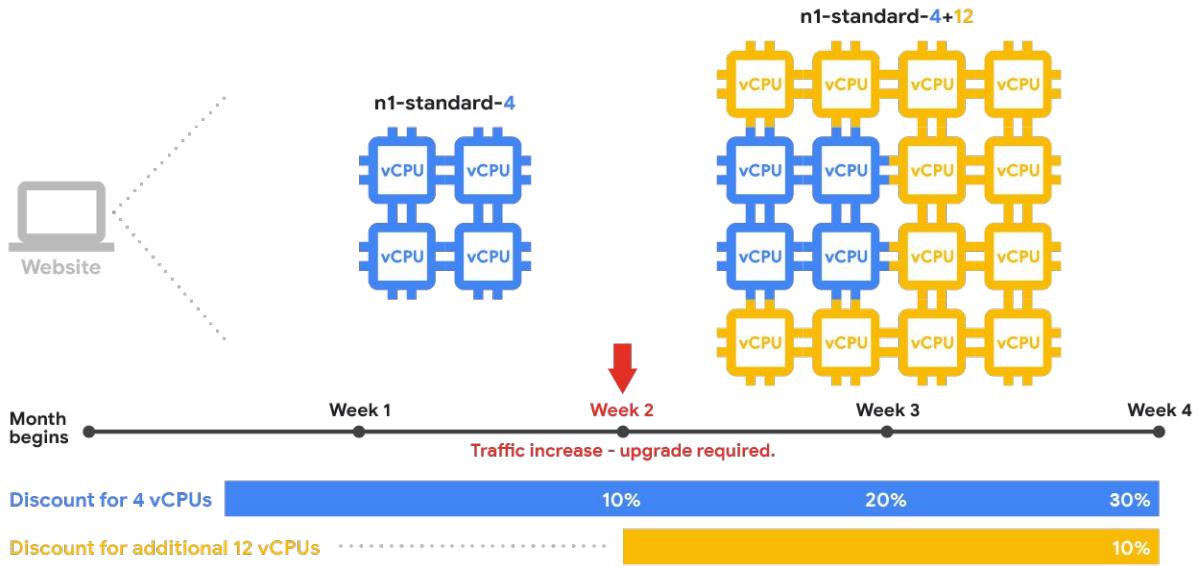
2 instances could be resized to
save an estimated \$33 per month



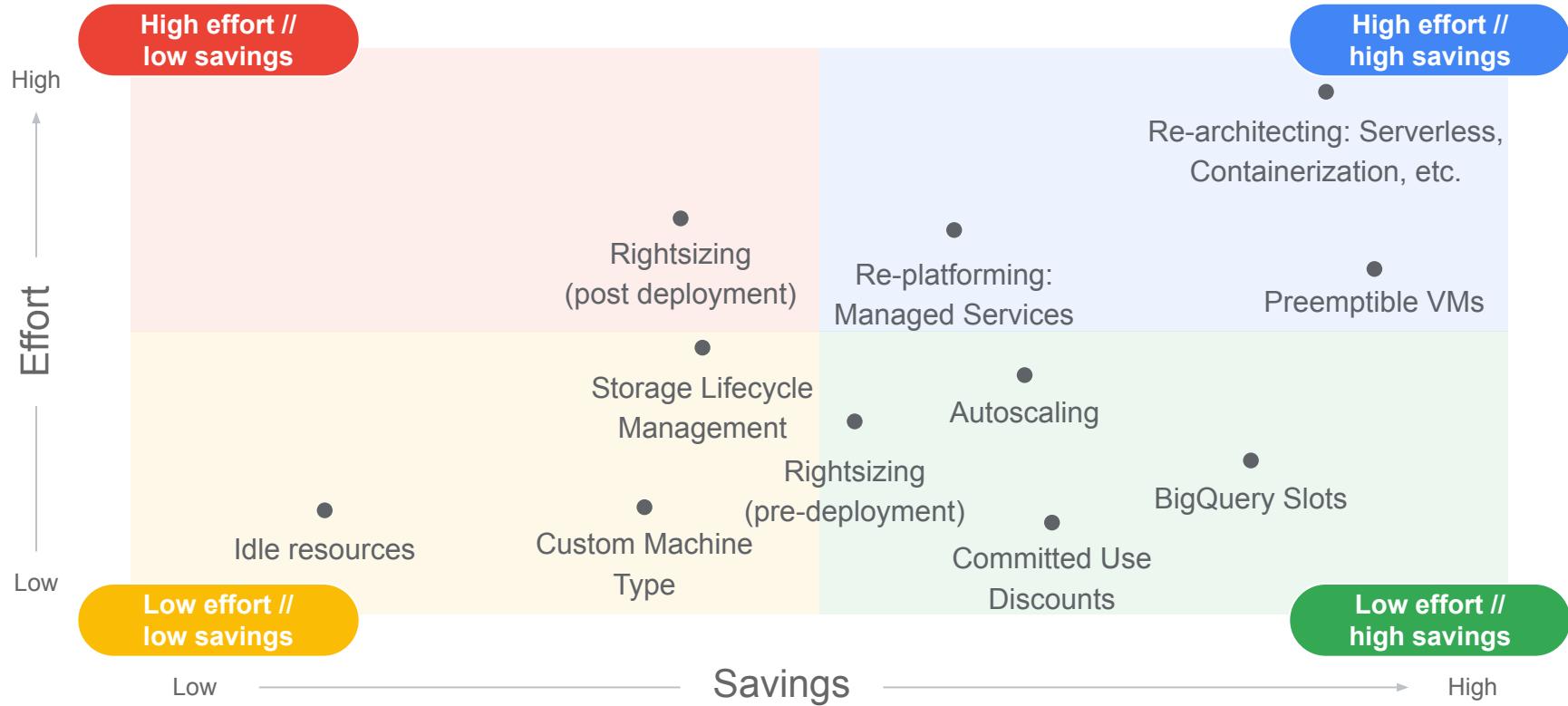
Any CPU, Any Memory
Right-sized Recommendation



Sustained Use Discounts (SUD)



Cost Optimization Matrix

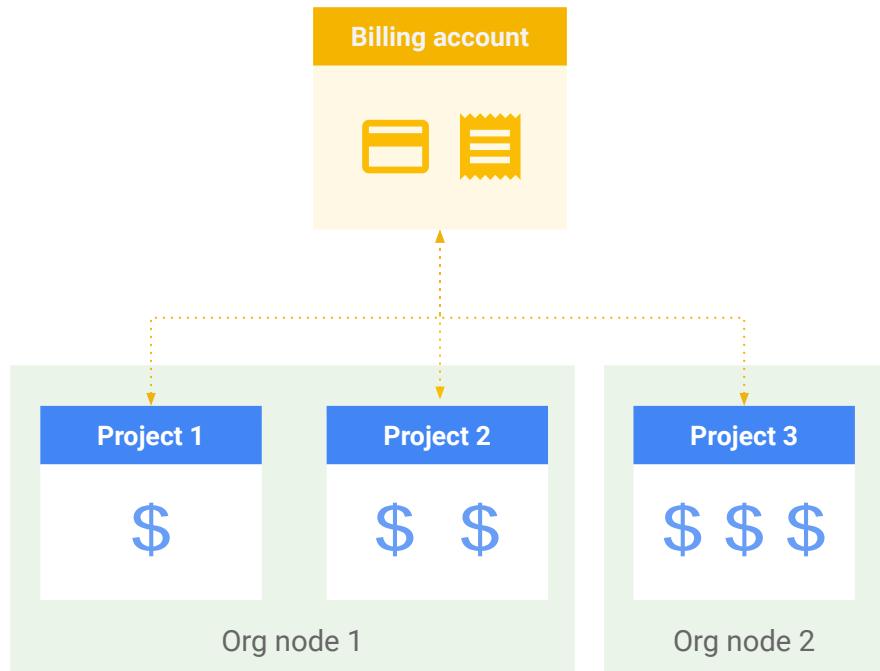


02

Billing Accounts

What are billing accounts?

- A **billing account** stores a customer's payment information and billing address. It's where costs accrue to and charges are raised.
- **Projects** can be linked to a **billing account**. This linkage makes the project **billing enabled**, and costs from that project will be charged to the linked account. Projects may be in separate Org nodes.
- **Disabling billing** on a project is equivalent to the removal of this link. All charged activity stops when this happens (i.e., resources stop functioning)



How to Manage Billing for GCP



Payment Methods

Traditional payment methods include credit card, debit card, & bank account

Invoice billing may be available

Payments vs. Console



Billing Roles

Roles allow different users to access information necessary for their function

Controlled through IAM



Billing Structure

An organization can leverage structures to manage allocation of charges

Structure also impacts IAM and resource allocation



Budgets & Alerts

Budgets give visibility to the utilization of resources

Alerts can notify appropriate stakeholders based on the current period's utilization

Billing Roles



Billing Roles

Roles allow different users to access information necessary for their function

Controlled through IAM

Cloud Billing Roles

roles/billing.admin	Billing Account Administrator	Provides access to see and manage all aspects of billing accounts.	Organization Billing Account
roles/billing.projectManager	Project Billing Manager	Provides access to assign a project's billing account or disable its billing.	Organization Project
roles/billing.user	Billing Account User	Provides access to associate projects with billing accounts.	Organization Billing Account
roles/billing.creator	Billing Account Creator	Provides access to create billing accounts.	Organization Project

Billing Roles

- ▶ Billing roles can be managed at the organization level using the Org Billing Account Admin/Creator/User roles
- ▶ Day to day

Billing account admin Admin privileges to make any/all changes to account

Billing account viewer Can only view costs, cannot make any changes

Billing account user Can link projects to account

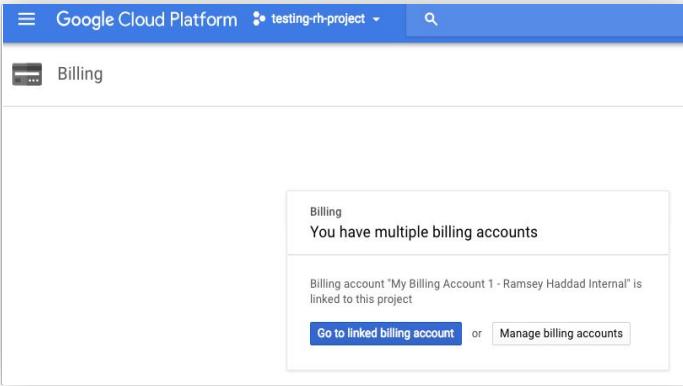
- ▶ Organization-related roles

Billing account creator Initial bill setup for an organization

Project billing manager Can attach/remove projects to account

Payments contacts Separate contacts defined in Payments profile who receive billing information

Accessing billing accounts in the cloud console



1. **Found at:** <https://console.cloud.google.com/billing>
2. **Account:** At the organizational level, you have the ability to view “Linked Billing Accounts” or “Manage Billing Accounts”
 - a. Linked Billing Account will allow you to see **ALL** associated with this billing account
 - b. Manage Billing Account will allow you to see **ALL** billing account associated with the organization

Projects linked to the billing account

The screenshot shows the Google Cloud Platform Billing Overview page. The left sidebar has links for Overview, Budgets & alerts, Transactions, Billing export, Payment settings, and Reports. The main content area shows the Billing account ID: 0032F4-B3D25F-715822 and a section for Credits with a note: "No credits to display". Below that is a section titled "Projects linked to this billing account" with a table:

Project name	Project ID	⋮
testing-rh-project	testing-rh-project	⋮
CP200wampwamp	cp200wampwamp	⋮
CP0200testing	cp0200testing	⋮

A yellow box highlights the three dots next to the Project ID for each row. A larger yellow box encloses the "⋮" column header and the three rows, containing the options "Disable billing" and "Change billing account".

- GCP Overview page shows all projects associated with a single billing account
- To remove or change billing account for a given project, you can do so clicking the three dots next to the *project_id* and making your selection

Viewing monthly project costs

The screenshot shows the Google Cloud Platform Billing Overview page. The left sidebar has 'Overview' selected. The main area displays the 'My Billing Account 1 - Ramsey Haddad Internal' account. It shows a billing account ID: 0032F4-B3D25F-715822. Under 'Credits', it says 'No credits to display'. Under 'Projects linked to this billing account', there are three entries:

Project name	Project ID
testing-rh-project	testing-rh-project
CP200wampwamp	cp200wampwamp
CP0200testing	cp0200testing

A green box highlights the first row ('testing-rh-project'). A tooltip at the bottom right of this row contains two options: 'Disable billing' and 'Change billing account'.

The screenshot shows the Google Cloud Platform Billing Charges this month page. The left sidebar has 'Charges this month' selected. The main area displays the 'Charges this month' section. It includes a 'Go to billing' button and a table of charges:

Product	Resource	Usage	Amount
Compute Engine	Standard Intel N1 1 VCPU running in Americas	6,015.32 Minute	\$4.76
Compute Engine	Standard Intel N1 2 VCPU running in APAC	1,995.80 Minute	\$3.66
Compute Engine	Licensing Fee for RedHat Enterprise Linux 7 running on Instance Core with 1 to 4 VCPU	1,995.80 Minute	\$2.00
Compute Engine	Static Ip Charge	4,011.30 Minute	\$0.66

A small note at the bottom states: '*Estimated charges before taxes, updated daily' and 'Total: \$11.08'.

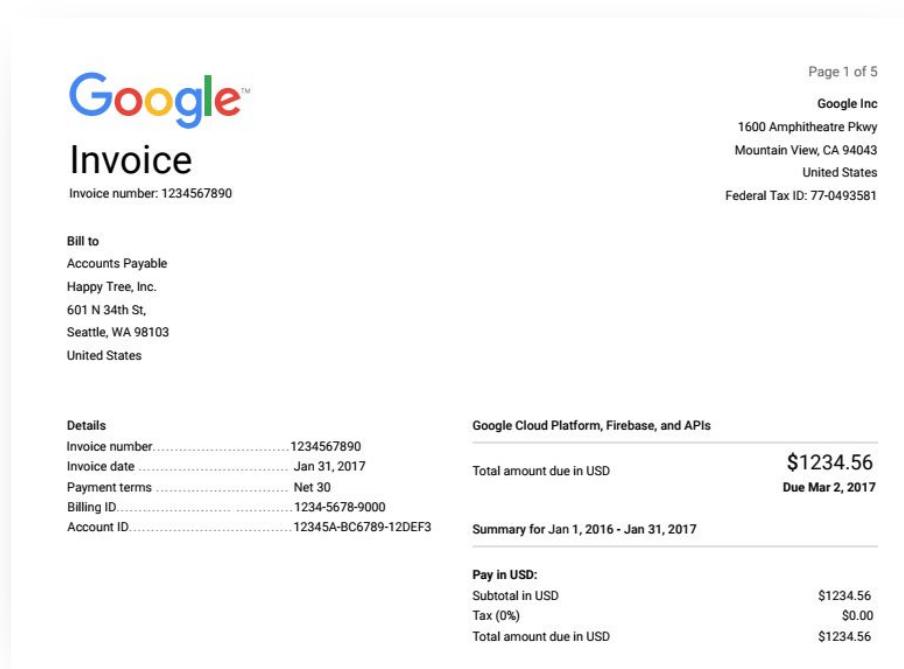
- ▶ By selecting individual projects, detailed monthly charges can be displayed

Billing invoices

- Customer will receive a monthly invoice with details of their consumption in a billing account

► Front page of GCP invoice

- Company information
- Billing account ID
- Usage range
- Includes any GCP credits
- Sum of all project associated with GCP billing account



A screenshot of a Google Cloud invoice. At the top right, it says "Page 1 of 5", "Google Inc", "1600 Amphitheatre Pkwy", "Mountain View, CA 94043", "United States", and "Federal Tax ID: 77-0493581". The main title is "Invoice" with "Google™" above it. Below the title, it shows the "Invoice number: 1234567890". The "Bill to" section lists "Accounts Payable", "Happy Tree, Inc.", "601 N 34th St, Seattle, WA 98103", and "United States". The "Details" section includes:

	Google Cloud Platform, Firebase, and APIs
Invoice number	1234567890
Invoice date	Jan 31, 2017
Payment terms	Net 30
Billing ID	1234-5678-9000
Account ID	12345A-BC6789-12DEF3

Total amount due in USD \$1234.56 Due Mar 2, 2017

Summary for Jan 1, 2016 - Jan 31, 2017

Pay in USD:

	\$1234.56
Subtotal in USD	\$1234.56
Tax (0%)	\$0.00
Total amount due in USD	\$1234.56

Project costs



Project resource costs

- Reported on an hourly basis
- By product and resource type (GCE + instance type)
- Included licensing fees
- Network charges (static IP, Egress, etc.)
- Sustained usage discounts

Google Invoice

Page 2 of 3
Invoice number: 1234567890

Source: Pro-Beta-Non-Prod[pro-beta-non-prod]

Product	Resource Type	Interval	Usage	Amount(\$)
Compute Engine	Standard Intel N1 2 VCPU running in Americas	Jan 1 - Jan 31	10176.2 Hours	17.62
Compute Engine	Storage PD Capacity	Jan 1 - Jan 31	6881.888 Gibibyte-months	172.71
Compute Engine	Standard Intel N1 4 VCPU running in Americas	Jan 1 - Jan 31	1239.3 Hours	247.86
Compute Engine	Licensing Fee for Windows Server 2012 R2 Datacenter Edition running on Instance Core	Jan 1 - Jan 31	4464 Hours	178.56
Compute Engine	Custom instance Core running in Americas	Jan 1 - Jan 31	3797.4 Hours	132.61
Compute Engine	Small instance with 1 VCPU running in Americas	Jan 1 - Jan 31	4256.917 Hours	114.94
Compute Engine	Licensing Fee for Windows Server 2016 Datacenter Edition running on Instance Core	Jan 1 - Jan 31	1487.967 Hours	59.52
Compute Engine	Custom instance Ram running in Americas	Jan 1 - Jan 31	10795.45 Gibibyte-hours	50.52
Compute Engine	SSD backed PD Capacity	Jan 1 - Jan 31	242.922 Gibibyte-months	39.96
Compute Engine	Vpn Tunnel	Jan 1 - Jan 31	744.128 Hours	37.21
Compute Engine	Micro instance with burstable CPU running in Americas	Jan 1 - Jan 31	1452.417 Hours	11.62
Compute Engine	Static Ip Charge	Jan 1 - Jan 31	682.961 Hours	6.82
Compute Engine	Network Load Balancing: Forwarding Rule Minimum Service Charge in Americas	Jan 1 - Jan 31	186.14 Hours	4.65
Compute Engine	Network Inter Region Egress from Americas to Americas	Jan 1 - Jan 31	102.525 Gibibytes	1.03
BigQuery	Active Storage	Jan 1 - Jan 31	37.057 Gibibyte-months	0.72
Cloud Storage	Multi-Regional Storage US	Jan 1 - Jan 31	26.033 Gibibyte-months	0.65
Compute Engine	Network Internet Egress from Americas to Americas	Jan 1 - Jan 31	4561 Mebibytes	0.53
Compute Engine	Network Vpn Internet Egress from Americas to Americas	Jan 1 - Jan 31	3994 Mebibytes	0.47

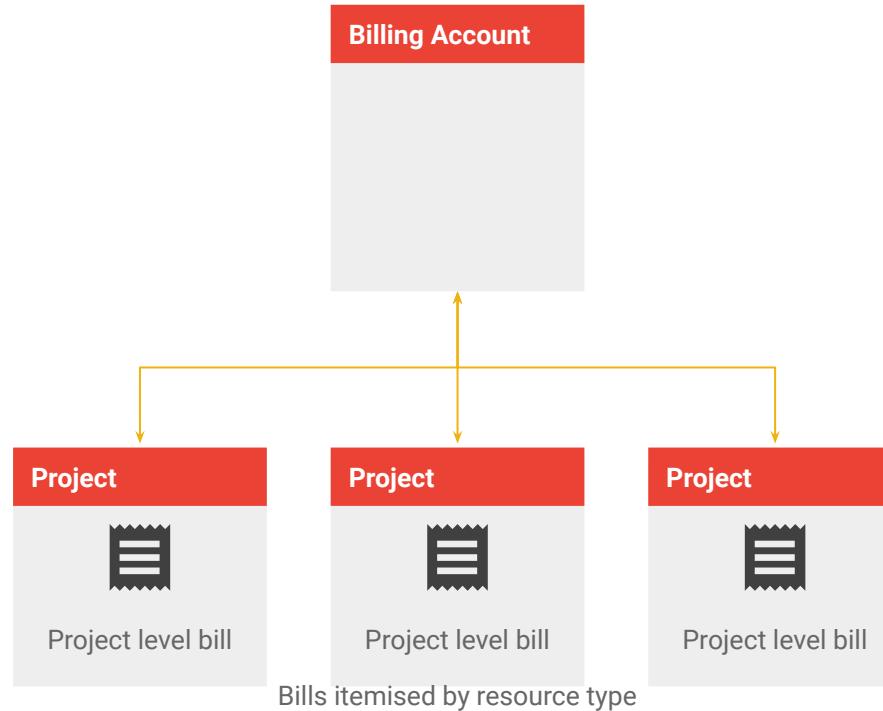
How to Manage Billing for GCP: Billing Structure



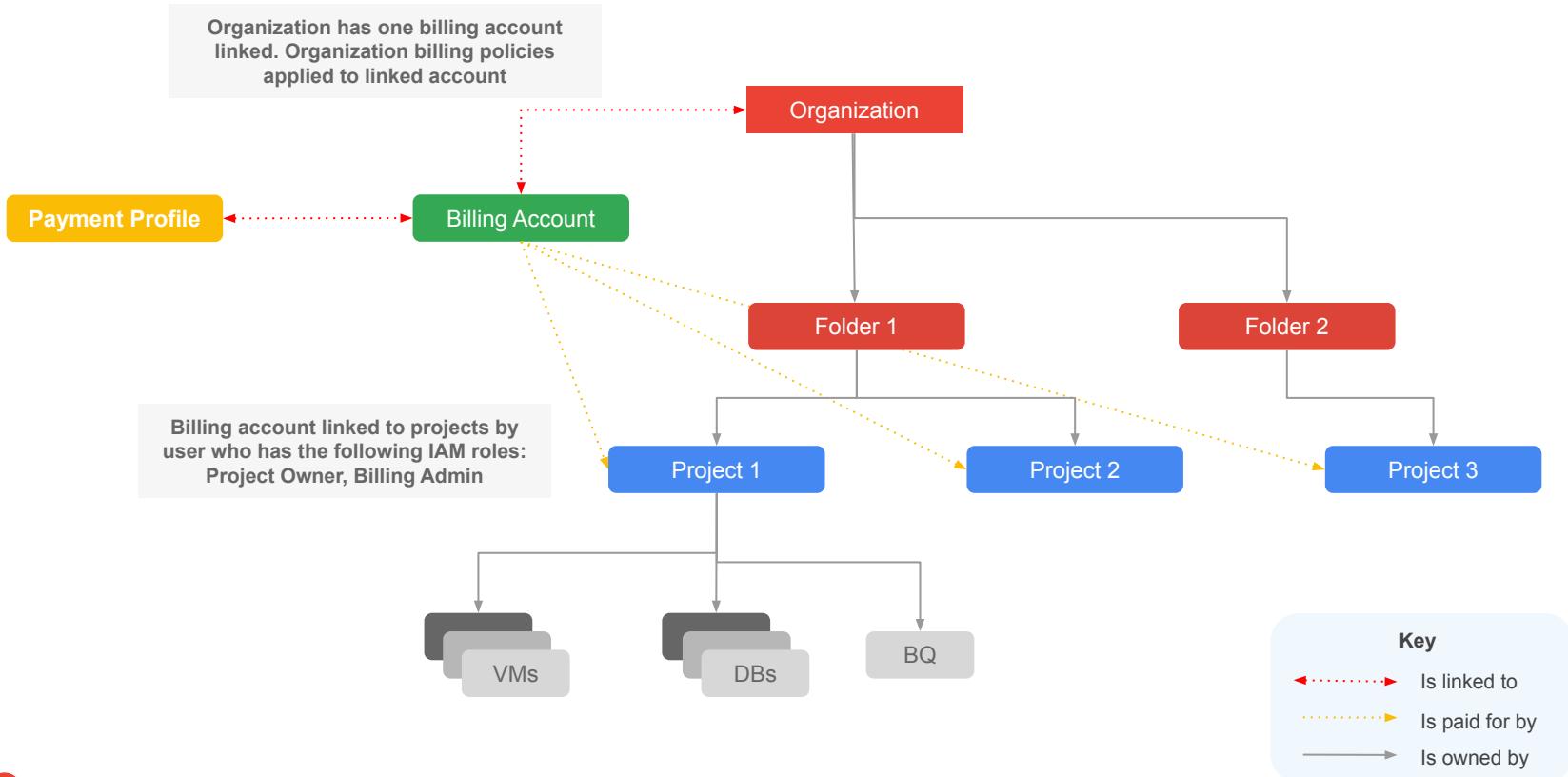
Billing Structure

An organization can leverage structures to manage allocation of charges

Structure also impacts IAM and resource allocation



Single Billing Resource Hierarchy



Multiple billing accounts

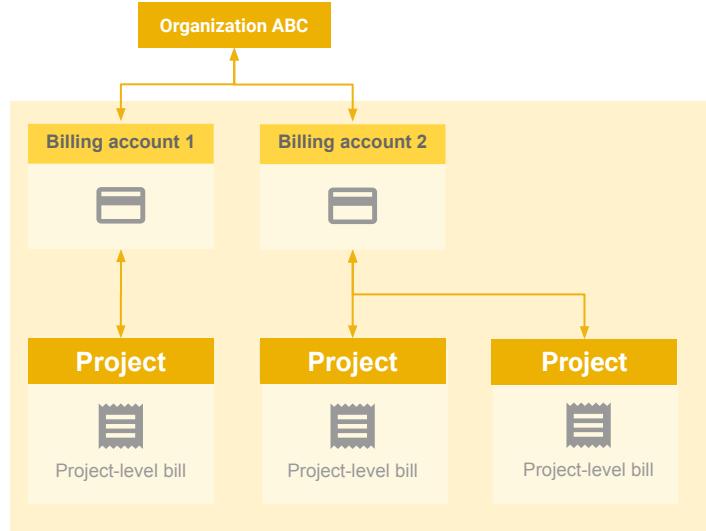
- Multiple billing accounts can be set up per GCP org
- One billing account can be used across multiple orgs

Before setting up multiple billing accounts, the following should be considered:

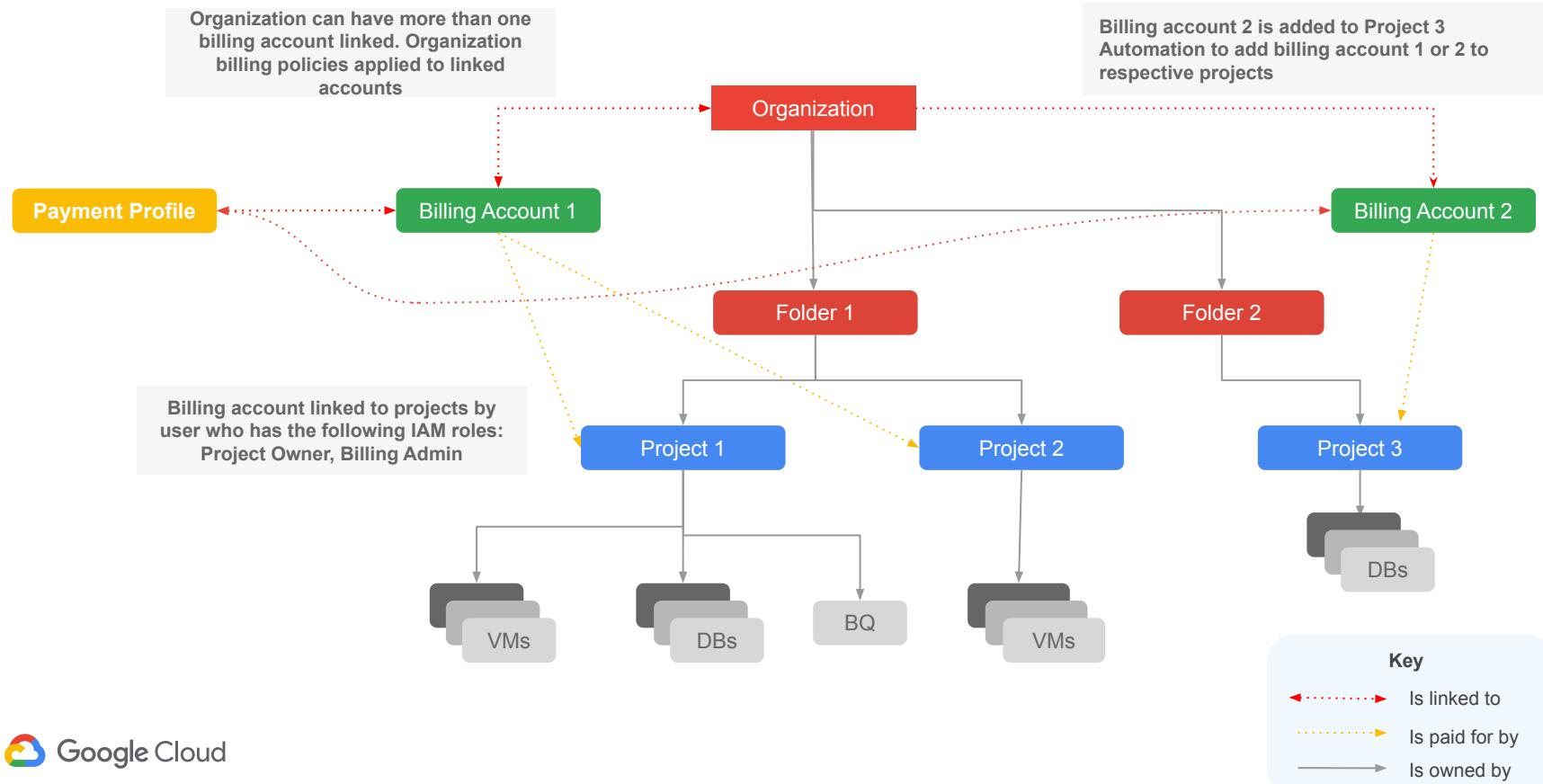
- Do you require **very strong fiscal isolation for legal or administrative purposes?**
- Can the necessary isolation be achieved in another way?

Typical use cases for multiple billing accounts:

- Large multinational organizations with very distinct divisions
- Organization with multiple affiliates/subsidiaries
- Using resources which require payment in a different currency
- Customer is a GCP re-seller



Multiple Billing Resource Hierarchy



How to Manage Billing for GCP: Budgets & Alerts

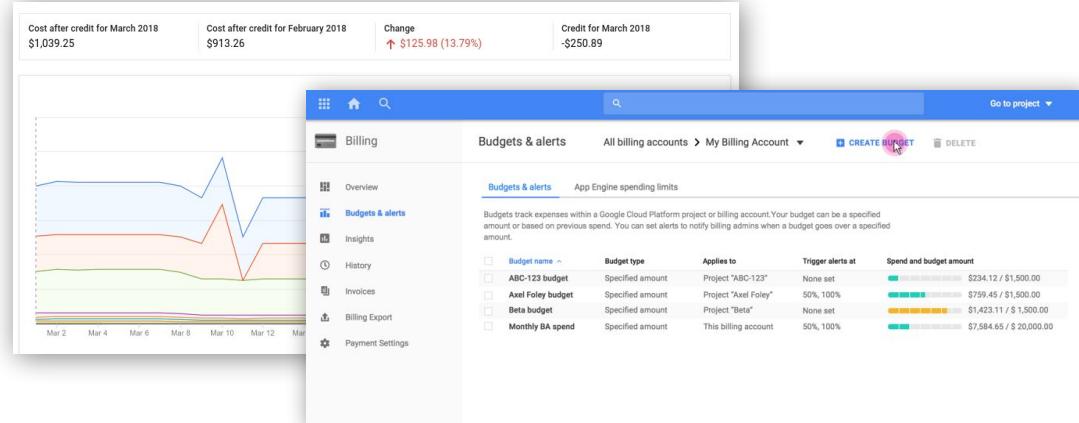


Budgets & Alerts

Budgets give visibility to the utilization of resources

Alerts can notify appropriate stakeholders based on the current period's utilization

Built in capability



Customized solutions using labels, exports, or BigQuery

[Using labels to organize Google Cloud Platform resources](#)

[Billing Export to BigQuery Query Examples](#)

[Export Billing Data to a File](#)

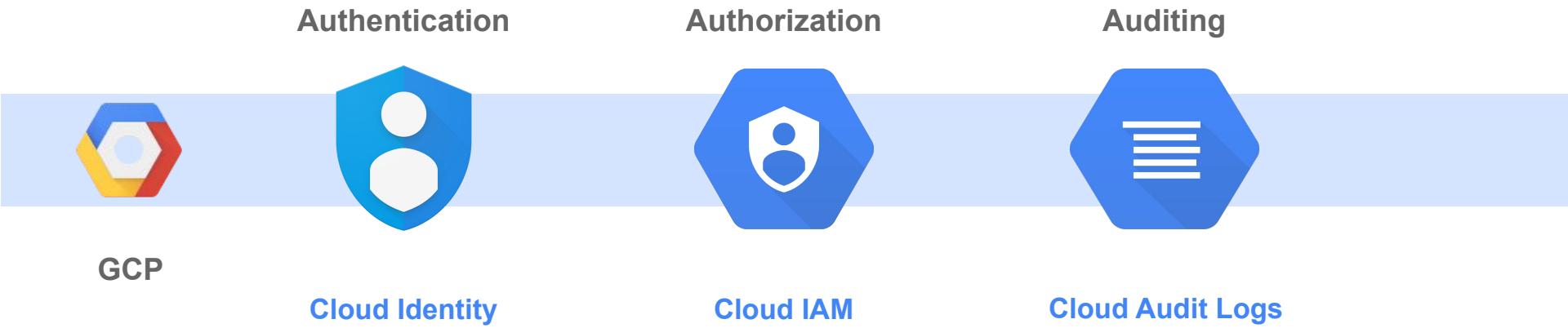


[Demo] Cloud Billing & Budgets

IAM Roles & Permissions

03

Controlling access - Google Cloud Platform (GCP)



Controlling access - Cloud Identity

Authentication

Authorization

Auditing



Cloud Identity

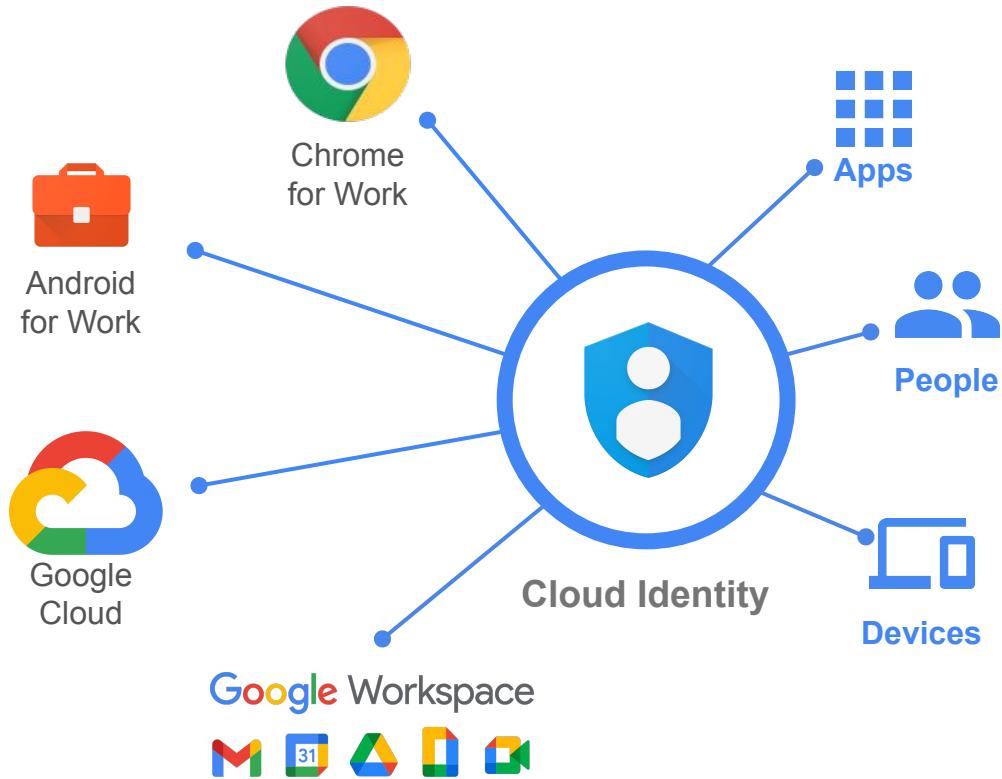
Cloud Identity

Admin Roles

Reports API

What is Cloud Identity?

- Cloud Identity is an Identity as a Service (IDaaS) solution that **allows you to centrally manage users and groups** who can access enterprise resources, such as Google Cloud & Google Workspace
- It is the same identity service that powers Google Workspace (formerly G Suite) and can also be used for 3rd party applications





Cloud Identity Provides

Single pane of glass



User/group lifecycle
management



Account
security



Single
sign-on



Cloud
Directory



Device
management



Reporting
and analytics



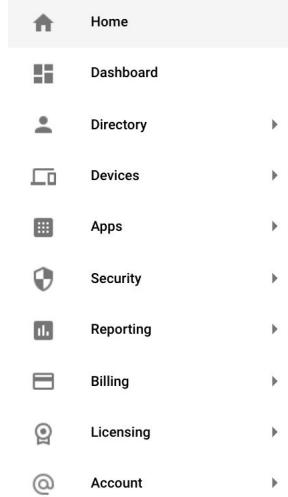
App
management



Extensible
through APIs

Two consoles

Google Admin



Search for users, groups or settings

Users | Showing users from all organizational units

Users

Groups

Target audiences **BETA**

Organizational units

Buildings and resources

Directory settings

Billing Viewer

Billing Account User

CRM User Datalake

Engineering Developer

Google Cloud Platform

hatv.fr

Search products and resources

Home

VPC network

Compute Engine

Kubernetes Engine

Storage

Composer

BigQuery

PRODUCTS

Marketplace

Billing

APIs & Services

Support

IAM & Admin

IAM

Identity & Organization

Policy Troubleshooter

Policy Analyzer

Organization Policies

Service Accounts

Labels

Settings

Privacy & Security

Identity-Aware Proxy

Roles

Audit Logs

Manage Resources

Create a Project

Essential Contacts

Groups

Support

Early Access Center

Quotas

Name	Role	Assume
serviceaccount.com	Asset Inventory	Cloud Asset Inventory
	Billing Account User	Org Project Billing Account User
	Engineering Developer	Engineering Developer
Europe1-1	Engineering Developer1.2	Engineering Developer1.2
	Engineering Developer	Engineering Developer
	Network Admin	Compute Engine Network Admin
		Organization Admin
		Assume



Google Admin (admin.google.com)

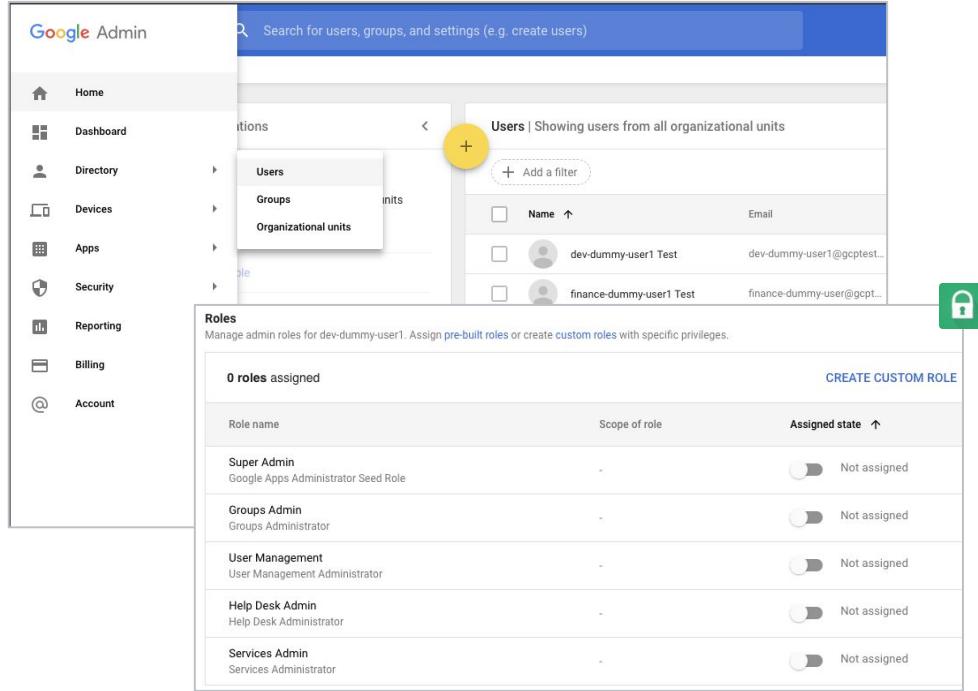
Managing Users, Groups, and Authentication settings



Cloud Console (console.cloud.google.com)

Roles & Authorization for GCP

Users & Groups



The screenshot shows the Google Admin console interface. On the left, the navigation menu includes Home, Dashboard, Directory, Devices, Apps, Security, Reporting, Billing, and Account. The main area is titled "Users | Showing users from all organizational units". A search bar at the top says "Search for users, groups, and settings (e.g. create users)". Below it, there's a list of users: "dev-dummy-user1 Test" and "finance-dummy-user1 Test". A yellow circle highlights the "+" button in the top-left corner of the user list. To the right of the user list is a green lock icon. At the bottom, there's a section titled "Roles" with a sub-section for "Super Admin". The table lists several roles with their descriptions and status:

Role name	Scope of role	Assigned state
Super Admin Google Apps Administrator Seed Role	-	Not assigned
Groups Admin Groups Administrator	-	Not assigned
User Management User Management Administrator	-	Not assigned
Help Desk Admin Help Desk Administrator	-	Not assigned
Services Admin Services Administrator	-	Not assigned



- Users and groups created in Cloud Identity are the **Google Identities** that can be assigned **IAM roles** in the GCP Cloud Console
- The **Google Admin roles** only manage aspects of Cloud Identity such as user/group management, **and are different from GCP roles** which manage permissions to cloud resources

Two key admin functions



	(Cloud Identity) Super Admin	(Cloud Platform) Organization Admin
Scope	Cloud Identity (Super Admin) Cloud Platform (implicit Org. Admin)	Cloud Platform (can add/assume any IAM roles)
Manages	Domain/user/group lifecycle and authentication settings	IAM policies and Resource Manager hierarchy
Delegates	Cloud Platform Org. Admin role Cloud Identity Admin roles	Cloud Platform IAM roles to users and groups
Managed in	Admin console admin.google.com	GCP console console.cloud.google.com

Super Admin Best Practices

- Powerful set of permissions that are not necessary for day to day
 - Discourage use of super admin account as a regular account
- Limit the number of Super Admin accounts, but assign more than one
- Implement security policies
 - Multi-factor authentication (w/ physical authentication device)
 - Backup security key in a secure location
 - Give super-admin accounts a separate account than their day-to-day account
 - Apply the principle of least privilege with management delegation



Super Admin always bypasses SSO

User provisioning options

Method	Effort	Staff involved	Notes
Manual provisioning	High	Google Admin admin	Easiest method, but not scalable
CSV upload via Google Admin	Medium	Google Admin admin	More flexibility, but not scalable
Google Cloud Directory Sync (GCDS)	Medium	LDAP Admin	Integrates with LDAP, scalable, requires no programming
Third party tools (Okta, Ping, etc.)	Medium	LDAP admin	Scalable, may incur additional cost
Admin SDK Directory API	High	LDAP Admin Development staff	Scalable, flexible, requires in-depth programming

04

Pricing Calculator



[Demo] Pricing Calculator

Google Cloud

Reporting

05

Detailed billing information

GCS export

Set up .csv daily exports to a Google Cloud Storage bucket. These exports may then be used for more detailed reporting.

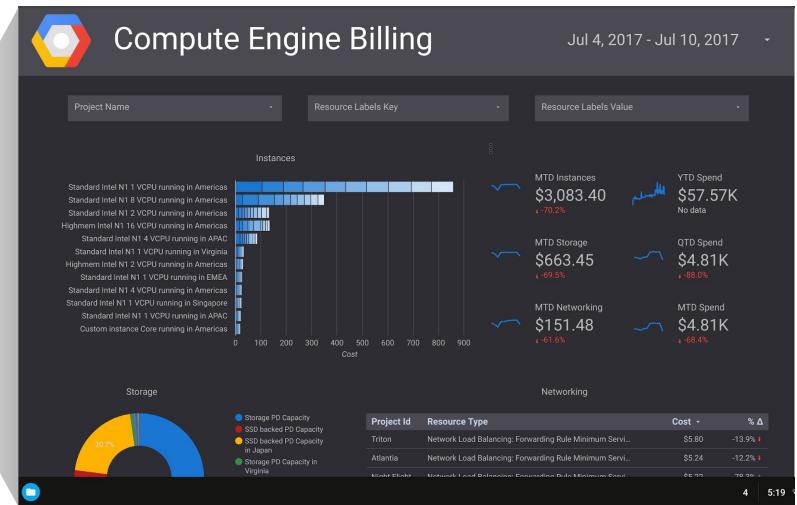
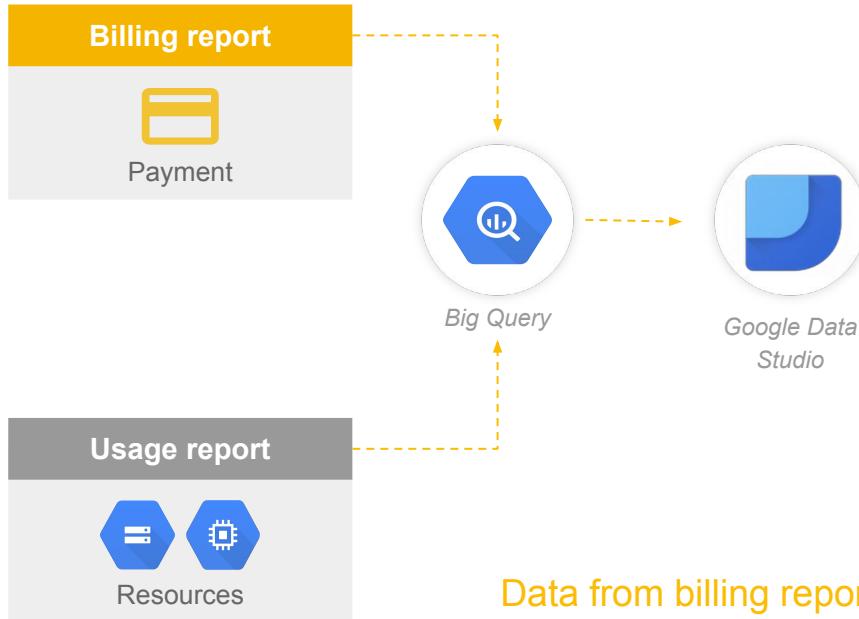
Billing reports

Billing reports are available in the GCP console and have the ability to query a specific timeline, product

BigQuery export

Billing information will be loaded into BigQuery and used for detailed reporting, visual representation, and exporting to other formats (e.g., .csv)

Exporting to BigQuery



Data from billing reports and usage reports can be exported to analytics tools in order to analyze spending patterns and predict future spending.

Exporting to BigQuery

► Setup

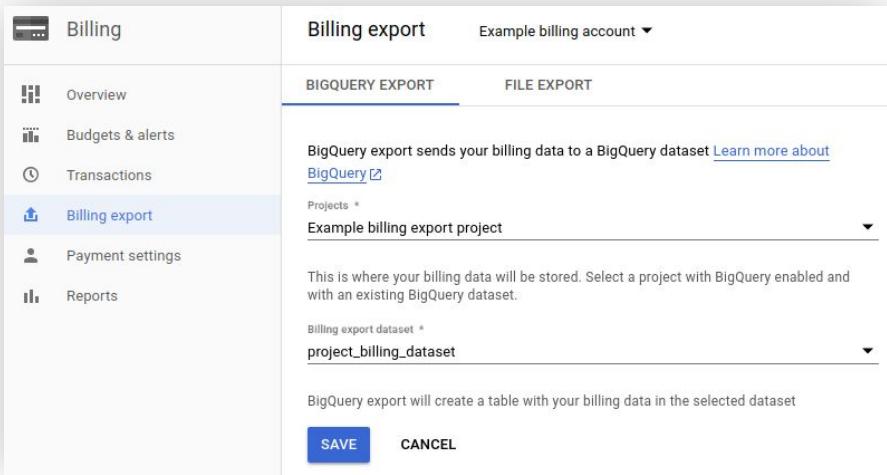
- Simple one-time setup

► Project

- Project to host the BQ dataset

► Billing export dataset

- Dataset where table will be created
- If none exist, you can create one



Example BigQuery query

- BigQuery uses a SQL-like structure
- Multitude of information to view data such as project, label, dates, product
- Sample query:

```
SELECT project.labels.key, project.labels.value, sum(cost) as cost_total, sum(usage.amount) as usage_total  
FROM BILLINGTABLE  
WHERE Start_Time >= '2018-06-01 00:00:00' AND Start_Time < '2018-07-01 00:00:00'  
GROUP BY project.labels.key, project.labels.value
```

Row	project_labels_key	project_labels_value	cost_total	usage_total	
1	pubsub	metric	40.88075199999999	3.2135524418585517E17	
2	team	sales	2.905382	1.1376485747702972E16	
3	gce-enforcer-fw-opt-out	testing-customer-use-cases	187.70291399999994	2.07529806639022797E18	
4	testprojectlabel		44.522840999999985	1.0482929879316314E16	
5	null	null	5272.94248	2.7390326190994706E19	
6	team	marketing	44.522840999999985	1.0482929879316314E16	
7	cost_center	34910481	2.905382	1.1376485747702972E16	

Billing export example

Number	ID	Name	Measurement	Consumption	Units	Cost	Description
1234	abc	HR department records project	.../DatastoreStorage	1467763200	byte-seconds	\$	Datastore storage
5678	xyz	R&D division machine learning project	.../DatastoreStorage	7913462400	byte-seconds	\$	Datastore storage
9012	aaa	E-commerce customer frontend	.../NetworkInternetEgressNaApac	575284	bytes	\$	Network internet egress from Americas to APAC
34566	aaa	E-commerce customer frontend	..VmimageN1Standard_1	518400	seconds	\$	Standard Intel N1 1 VCPU running in Americas

Exporting to Cloud Storage

Setup

- Must create a GCS bucket prior to setting up

Format

- Can export in .json and CSV

Pros

- Easy to store monthly bill and .json/CSV format allows easy integration with other tools/systems

Cons

- No resource label data
- Difficult to visualize and analyze usage
- Hard for non GCP users in an organization to access

The screenshot shows the 'Billing' section of the Google Cloud console. On the left, there's a sidebar with links: Overview, Budgets & alerts, Transactions, Billing export (which is selected and highlighted in blue), Payment settings, and Reports. The main content area is titled 'Billing export' under 'My Billing Account 1 - Ramsey Haddad Internal'. It has tabs for 'BigQuery export' and 'File export' (which is selected). Below the tabs, there's a description: 'Enable billing export to automatically publish daily billing data in a CSV or JSON file. The file will be stored in a Cloud Storage bucket that you specify. To allow this, a Google-owned service account will automatically be granted write access to the bucket when you enable billing export.' There are fields for 'Bucket name' (set to 'sample_billing'), 'Report prefix' (set to 'monthly_spend'), and 'Format' (set to 'CSV'). A large blue button at the bottom right says 'Enable billing export'.

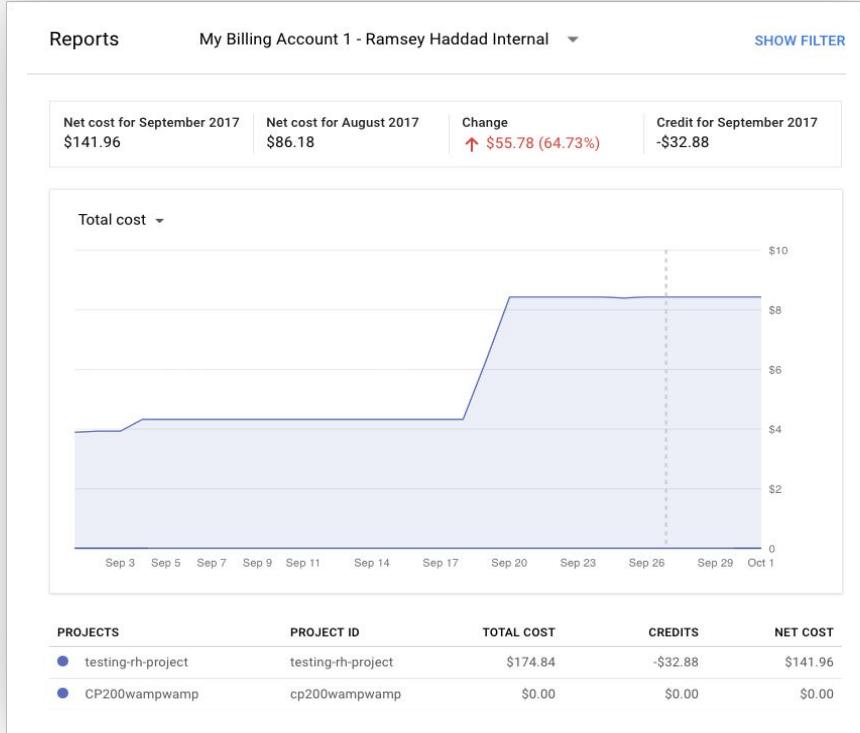
Reports

Setup

- No setup required accessible in the Cloud Console

Dashboard

- Shows an aggregate of project cost per billing account
- Displays net cost per project



Report filters

- Reports can be filtered by a date range, project, product, and SKU (# of SKUs based on usage)
- Has the ability to filter by label
 - Must have labels attached to resources to filter against

Time range
Usage data is only available since January 2017 during alpha

Last month ▾

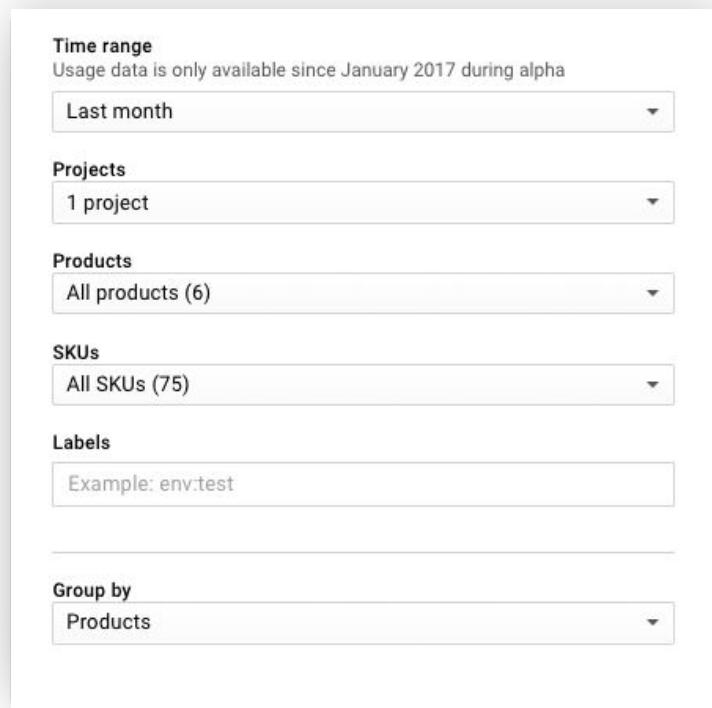
Projects
1 project ▾

Products
All products (6) ▾

SKUs
All SKUs (75) ▾

Labels
Example: env:test

Group by
Products ▾



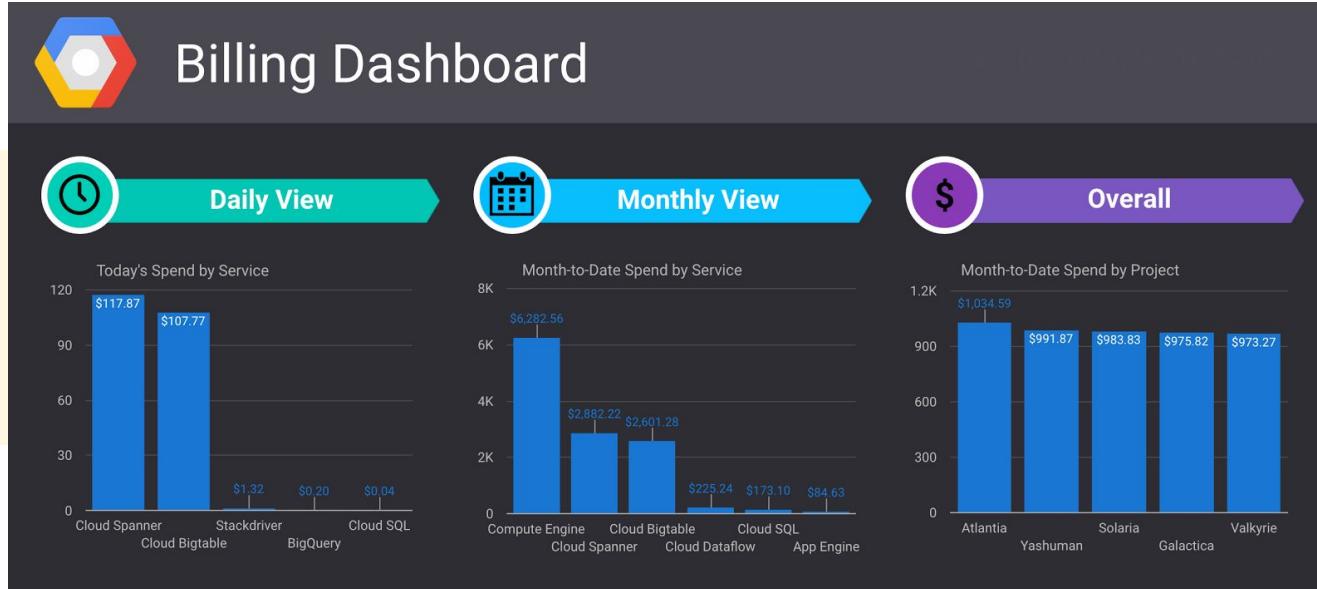
Cost visibility

- What are our costs, aggregate and unitized?
 - By environment, project, region, description, family, group, sku, project label, system label, SKU label
 - By usage type: preemptible, on demand, committed use
 - GKE usage metering

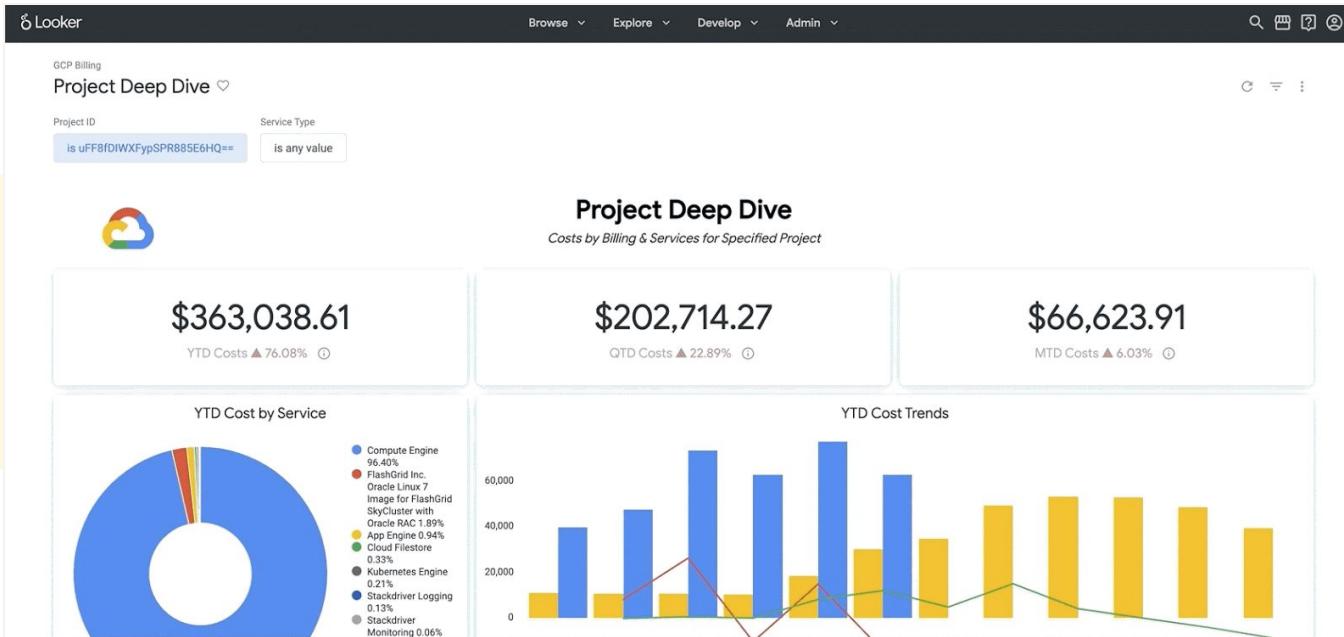


Data Studio for visual representation

Google blog post with detailed setup instructions for [Data Studio with BQ Billing](#)



Looker for visual representation





[Demo] Reporting

06

Budgets, Alerts, Quotas & Health Checks

Budgets and spending limits



Budgets

- Set for projects or billing accounts
- Does not stop resource usage when budget amount is reached
- Can generate spending alerts



Spending limits

- App Engine standard only
- Stops traffic when the limit is reached

Billing alerts

- A **budget** can be set for a project to send alerts
- Budgets may be set for a billing account or for a project. After the monthly budget is set, custom thresholds for alerts may be set (e.g., 50%, 75%, 100%)
- Reaching a budget or threshold has no resource restriction implications. All GCP resources continue to function normally.

Set budget

Your budget can be a specified amount or based on previous spend. Budget spend resets the first day of each month to \$0.00.

Budget name

Project or billing account

Select a project or billing account for your budget to track

Budget amount

Select a budget by entering a specified amount or by selecting last month's spend

\$ 100

Include credit as a budget expense (?)

Set budget alerts

Send email alerts to billing admins after spend exceeds a percent of the budget or a specified amount. Alerts are based on estimated expenses, so actual expenses may be greater.

Percent of budget	Amount	X
50	% \$ 50.00	X
75	% \$ 75.00	X
90	% \$ 90.00	X
100	% \$ 100.00	X

[+ Add item](#)

Spending limits

A **spending limit** may be set for App Engine standard environments. A spending limit will stop resource usage, unlike a budget that alerts, but resources are kept online. Note, limits are applicable to only App Engine and must be set from the App Engine Settings page.

Settings

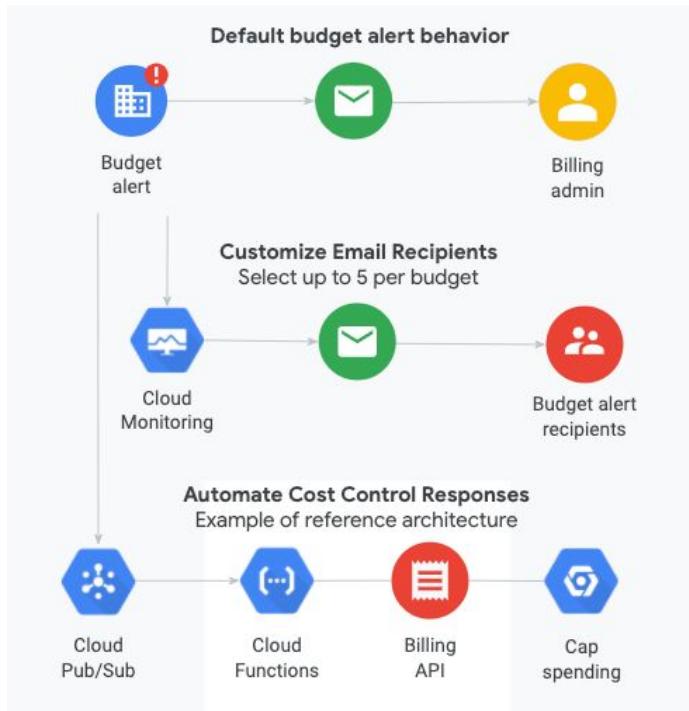
Application settings Custom domains SSL Certificates Google Settings

ⓘ Spending limits are not supported in the Flexible environment.

Edit

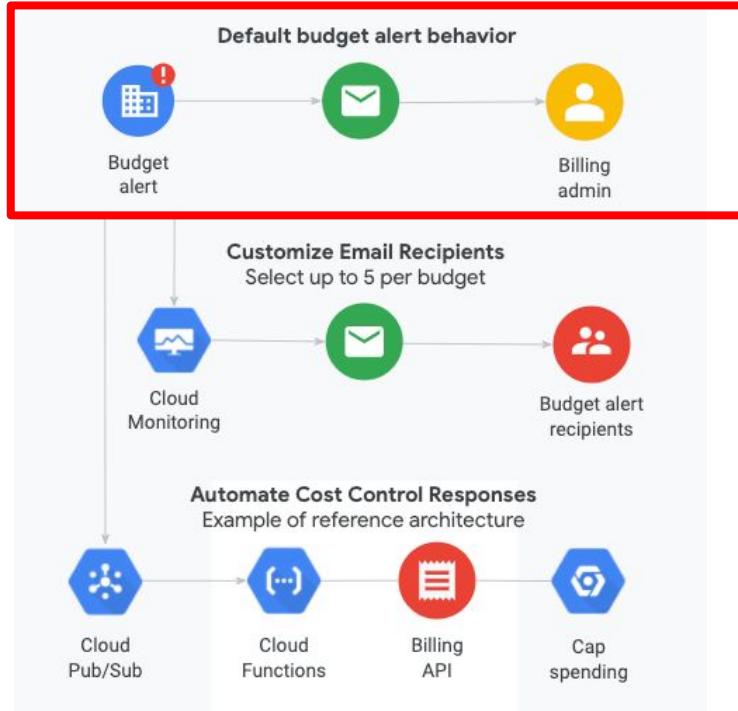
Daily spending limit	\$500.00
Google login cookie expiration	Default (1 day)
Referrers	Google Accounts API
Email API authorized senders	None

Budgets



Budget alerts help you **stay informed** about how your spend is tracking against your budget

Budgets



Budget alert emails help you stay informed about how your spend is tracking against your budget

Budgets

Scope — Amount — 3 Actions

Set alert threshold rules

Send email alert notifications to billing admins and users after the actual or forecasted spend exceeds a percent of the budget or a specified amount. [Learn more.](#)

Percent of budget	Amount	Trigger on
100 %	\$ 1000	Forecasted ▾
80 %	\$ 800	Actual ▾

[+ ADD THRESHOLD](#)

**Set up alerts against
forecasted or actual
costs**

Budgets

[← Create Budget](#)

- 1 Scope — 2 Amount — 3 Actions

A budget enables you to track your actual spend against your planned spend.

Name *
Dev Team Budget

A budget can be scoped to focus on a specific set of resources.

Projects

Type to filter

1 of 18 selected

All Is Well App Dev

All Is Well App Prod

Scope your budgets to
**your projects, products,
or labels**

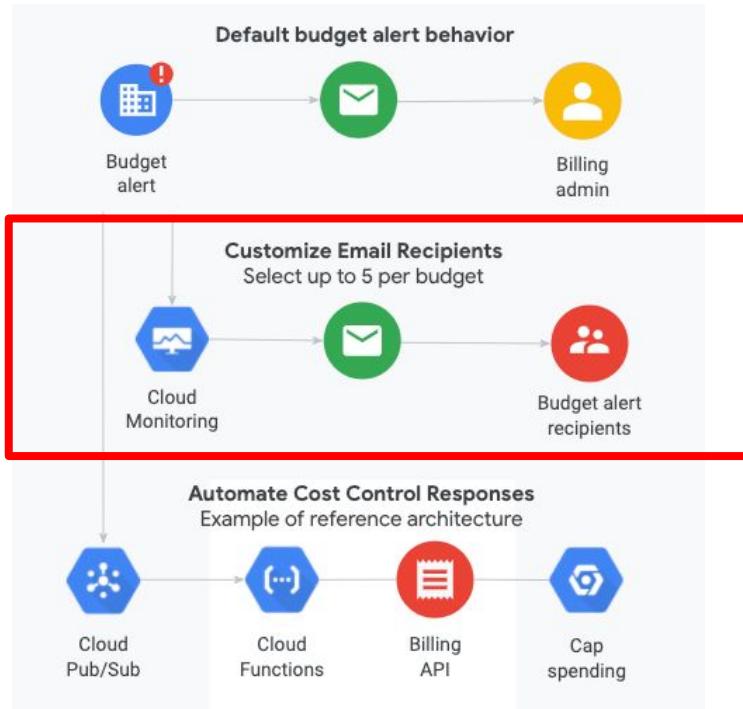
Budgets

JSON representation

```
{  
  "name": string,  
  "displayName": string,  
  "budgetFilter": {  
    object (Filter)  
  },  
  "amount": {  
    object (BudgetAmount)  
  },  
  "thresholdRules": [  
    {  
      object (ThresholdRule)  
    }  
  ],  
  "allUpdatesRule": {  
    object (AllUpdatesRule)  
  },  
  "etag": string  
}
```

Use the **Cloud Billing Budget API** to view, create, and manage budgets programmatically. If you have a large team, **spend the time** to set this up.

Budgets



Budgets

Manage notifications

Allow Monitoring email notification channels to receive alerts when this budget reaches thresholds.

Link Monitoring email notification channels to this budget

Select a Monitoring workspace and maximum 5 Monitoring email notification channels.

Select workspace

Budget Demo Project (budget-demo-project)

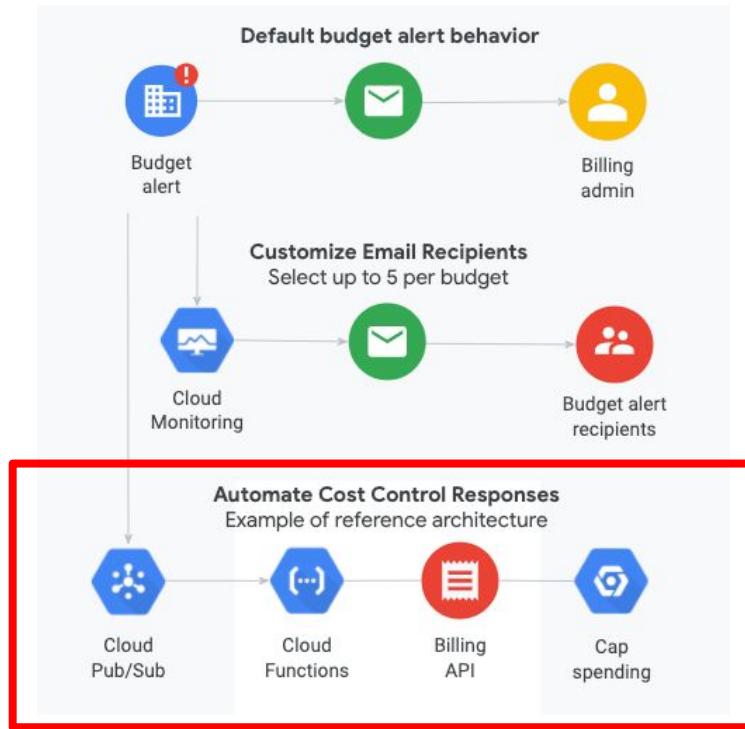
Notification Channels

mmirchandani@google.com

Set up additional **email notifications** through Cloud Monitoring

- 1) Create a Cloud Monitoring Workspace
- 2) Add emails as notification channels
- 3) Edit budgets and choose which emails get notified

Budgets



Budgets

Manage notifications

Allow Monitoring email notification channels to receive alerts when this budget reaches thresholds.

Link Monitoring email notification channels to this budget

Select a Monitoring workspace and maximum 5 Monitoring email notification channels.

Use Pub/Sub notifications to programmatically receive spend updates about this budget.

Connect a Pub/Sub topic to this budget

Select a project and Pub/Sub topic. Anyone who can view this budget will also be able to view the project ID and the topic name.

Budget ID: af8cab03-11b5-47a1-9ae4-044dd96a69b3 

Select a Cloud Pub/Sub topic *

projects/committed-to-good-dev/topics/budget-alerts

Send budget alerts to a **Pub/Sub topic**, then take action with the **Cloud Billing API**

Quotas are helpful limits



Rate quota

GKE API: 1,000 requests per
100 seconds

Allocation quota

5 networks per project

Many quotas are changeable



[Demo] Quotas & Budgets



Thank you.

Google Cloud