Analyzing and Visualizing Resource Usage Using the Google Cloud Billing APIs

GETTING STARTED WITH CLOUD BILLING

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Overview

Getting started with Cloud Billing

Types of billing accounts: self-serve and invoiced

Billing cycles: Monthly billing and threshold billing
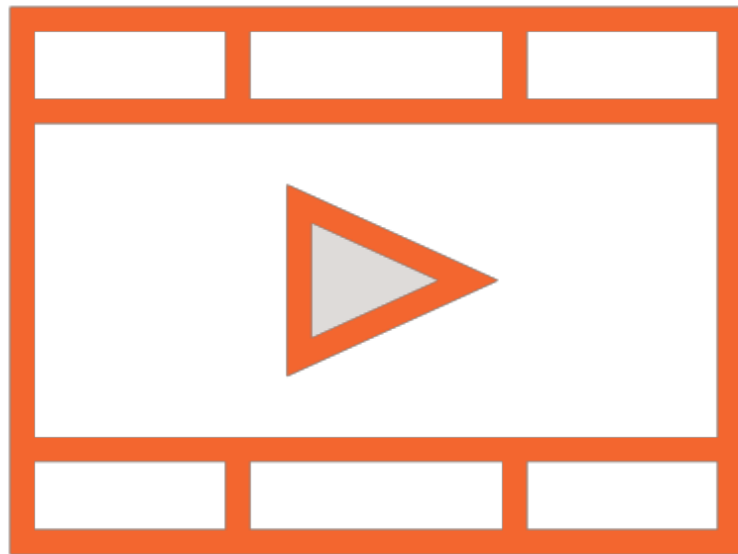
Understanding predefined billing roles

Interacting with Cloud Billing using the web console

Interacting with Cloud Billing using the cloud shell

Prerequisites and Course Outline

Prerequisites: Basic Cloud Computing

Choosing and Implementing Google Cloud Compute Solutions

Architecting Google Cloud Storage Configurations

Course Outline

Getting started

Analyzing and visualizing billing data

Working with the Cloud Billing API

Scenarios: SpikeySales.com

Hypothetical online retailer
- Flash sales of trending products
- Spikes in user traffic

SpikeySales on the GCP
- Cloud computing fits perfectly
- Pay-as-you-go
- No idle capacity during off-sale periods

Resource Hierarchy on the GCP

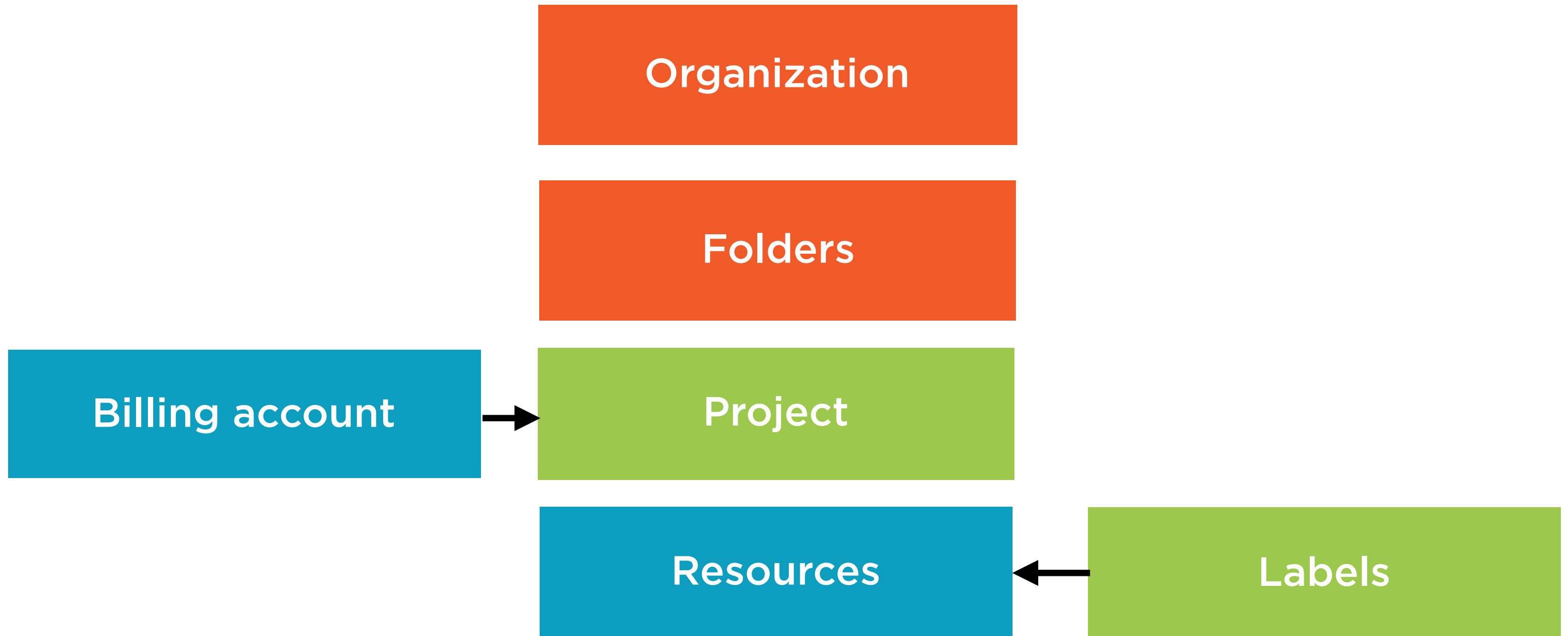# Resource Hierarchy Components

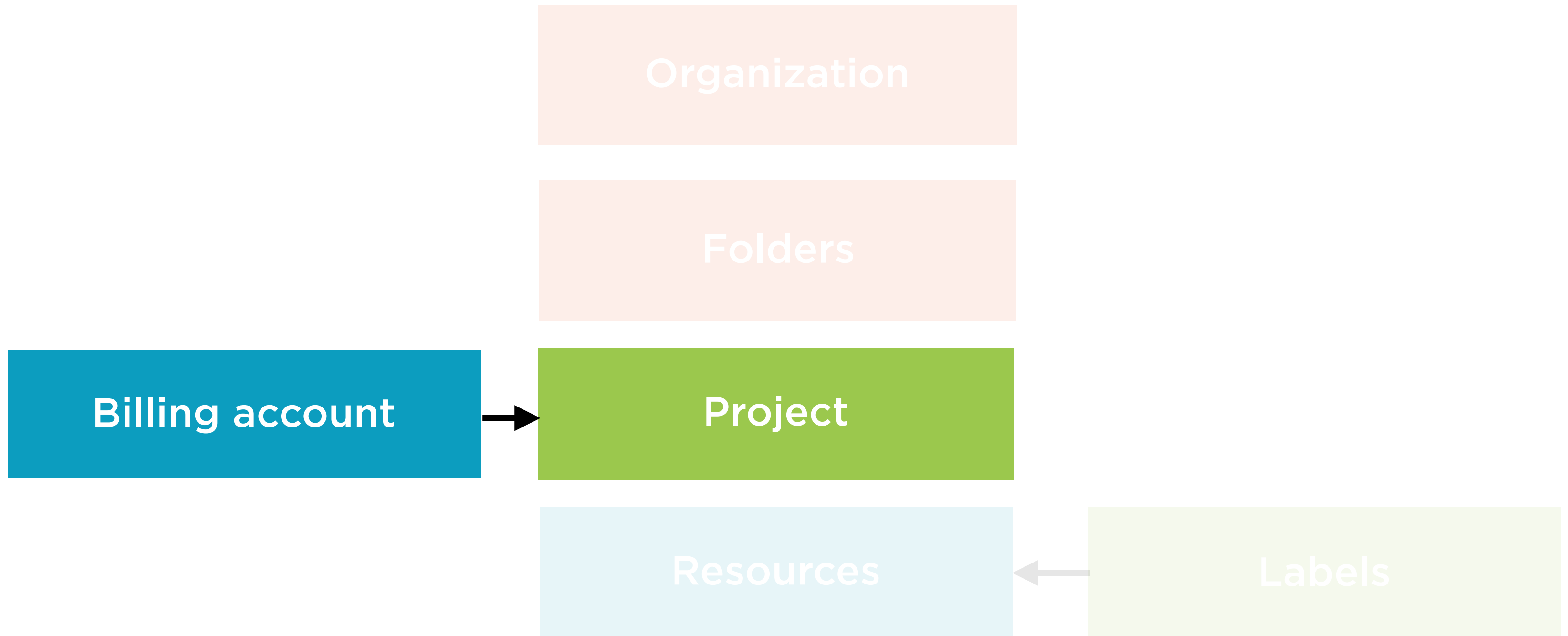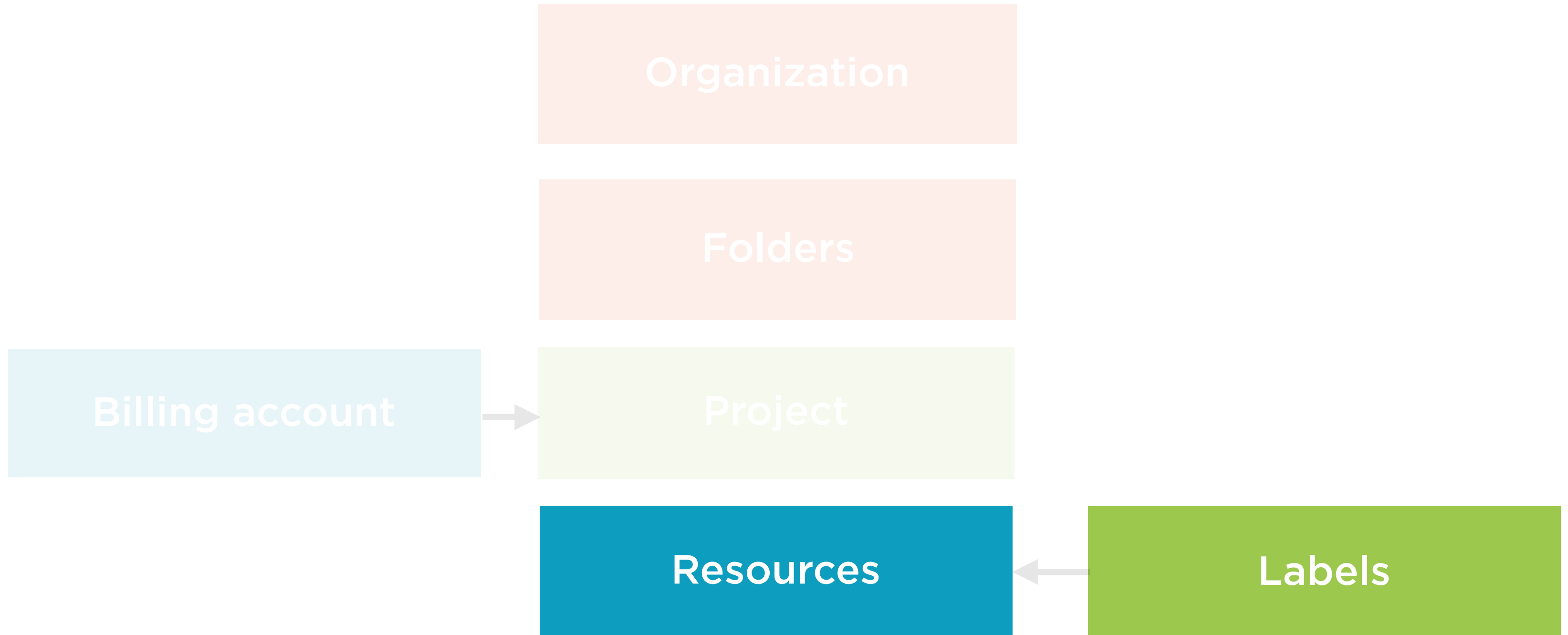| Organization	Billing account	Project
Folders	Resources	Labels

Resource Hierarchy Components

Billing Accounts Are Associated with Projects

Organization

Folders

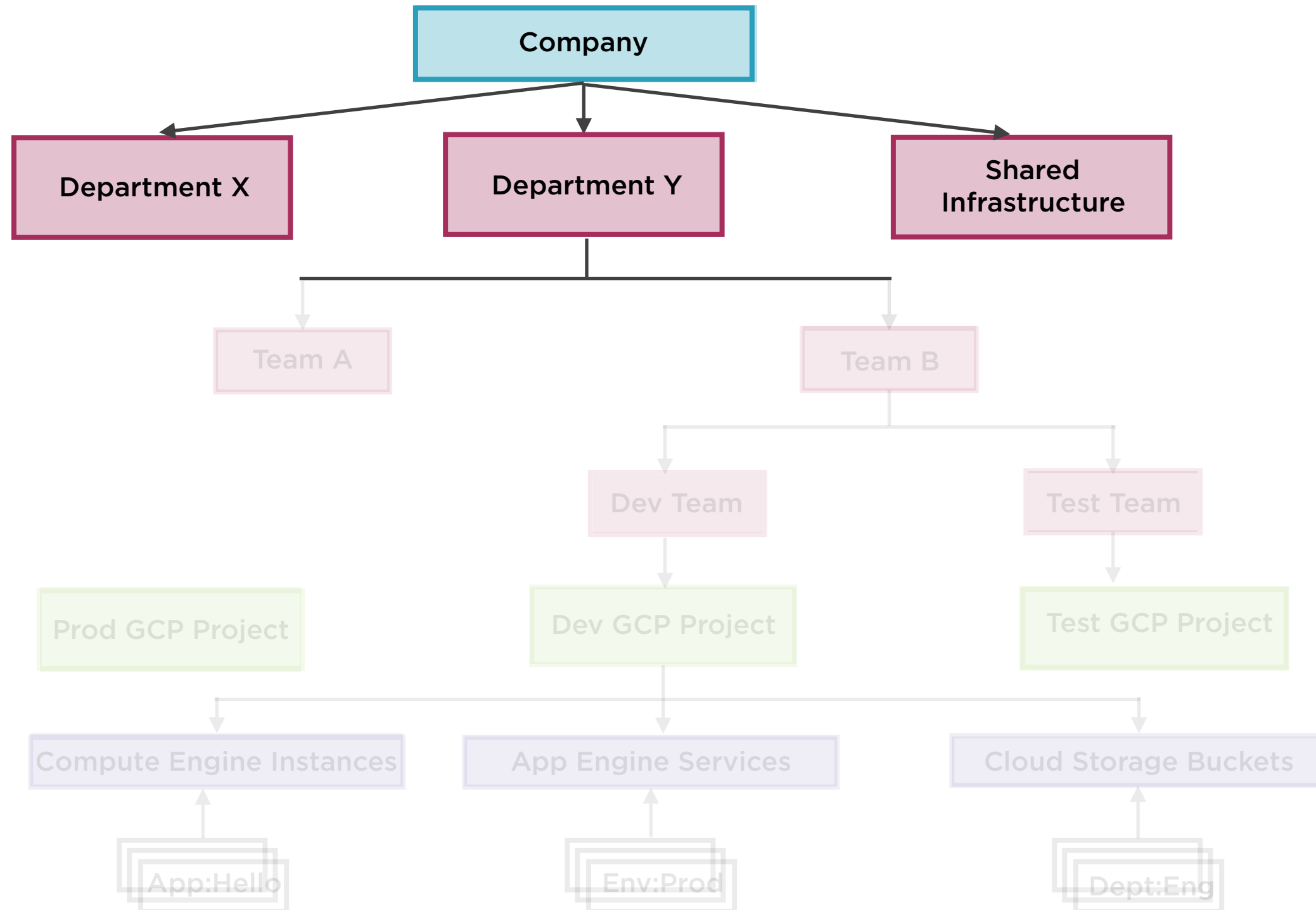**Billing account** → **Project**

Resources ← Labels
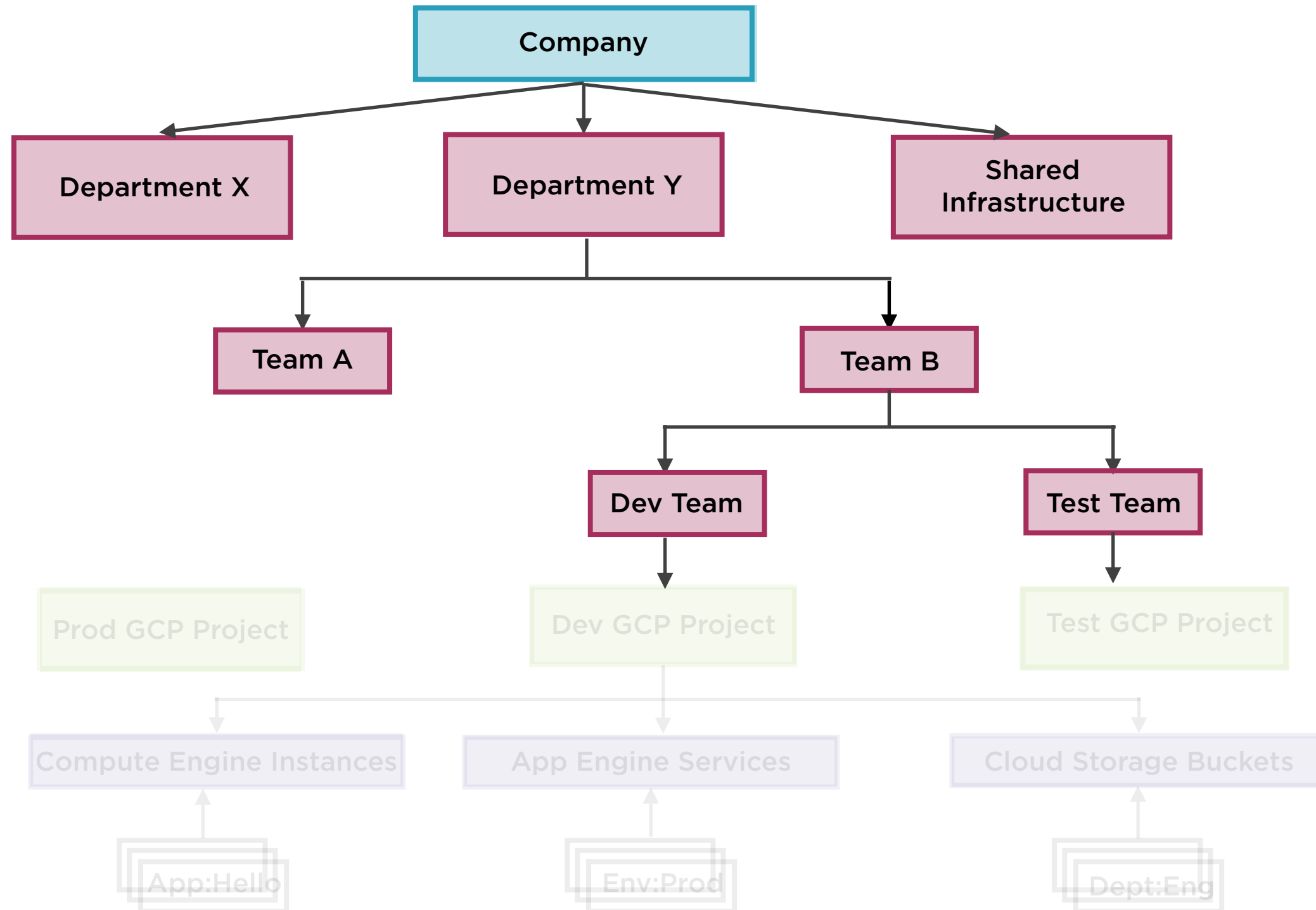
Labels Are Applied to Resources

Resource Hierarchy
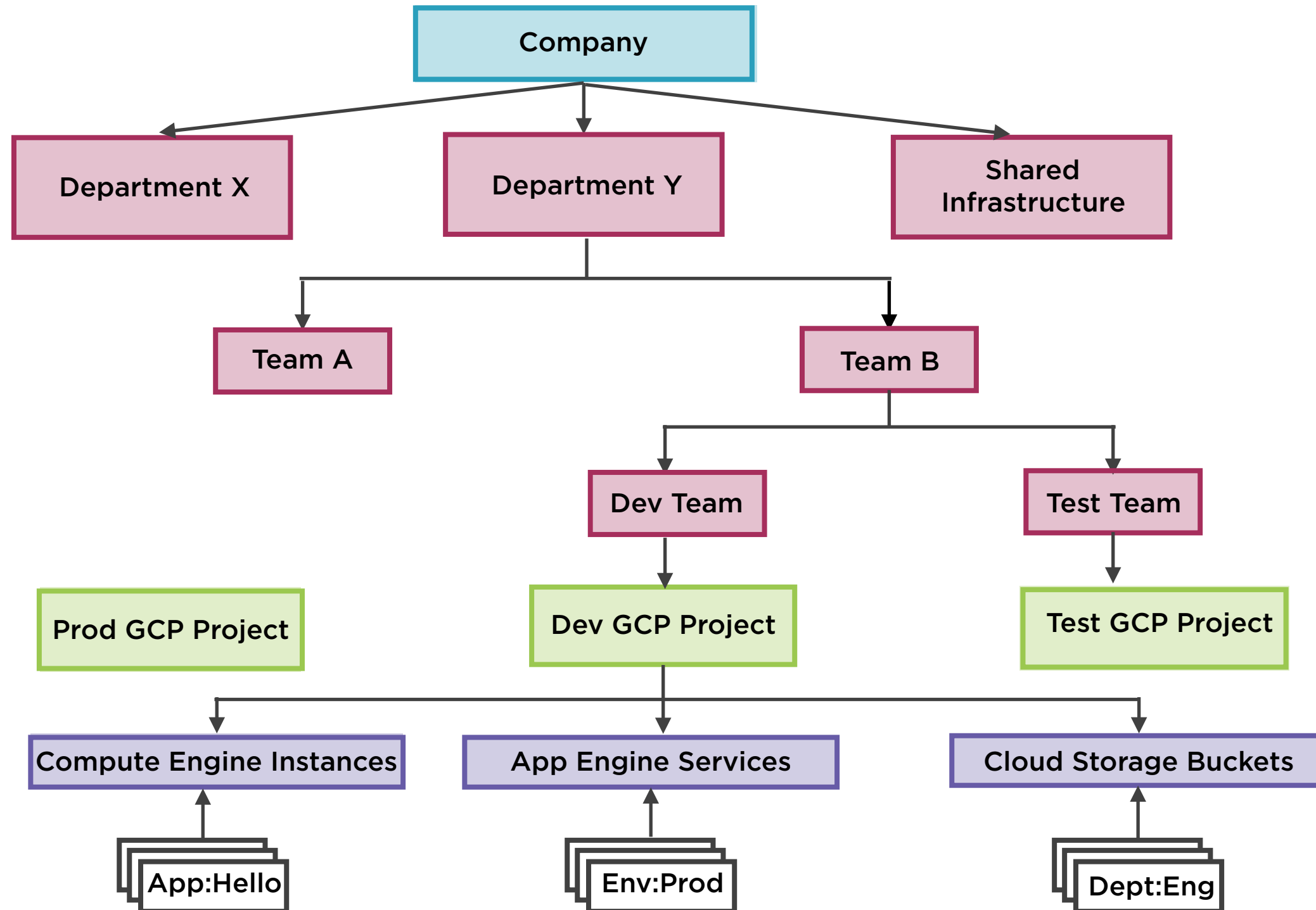
Multiple Departments in a Company

Multiple Teams in Each Department

Teams Work Within Projects
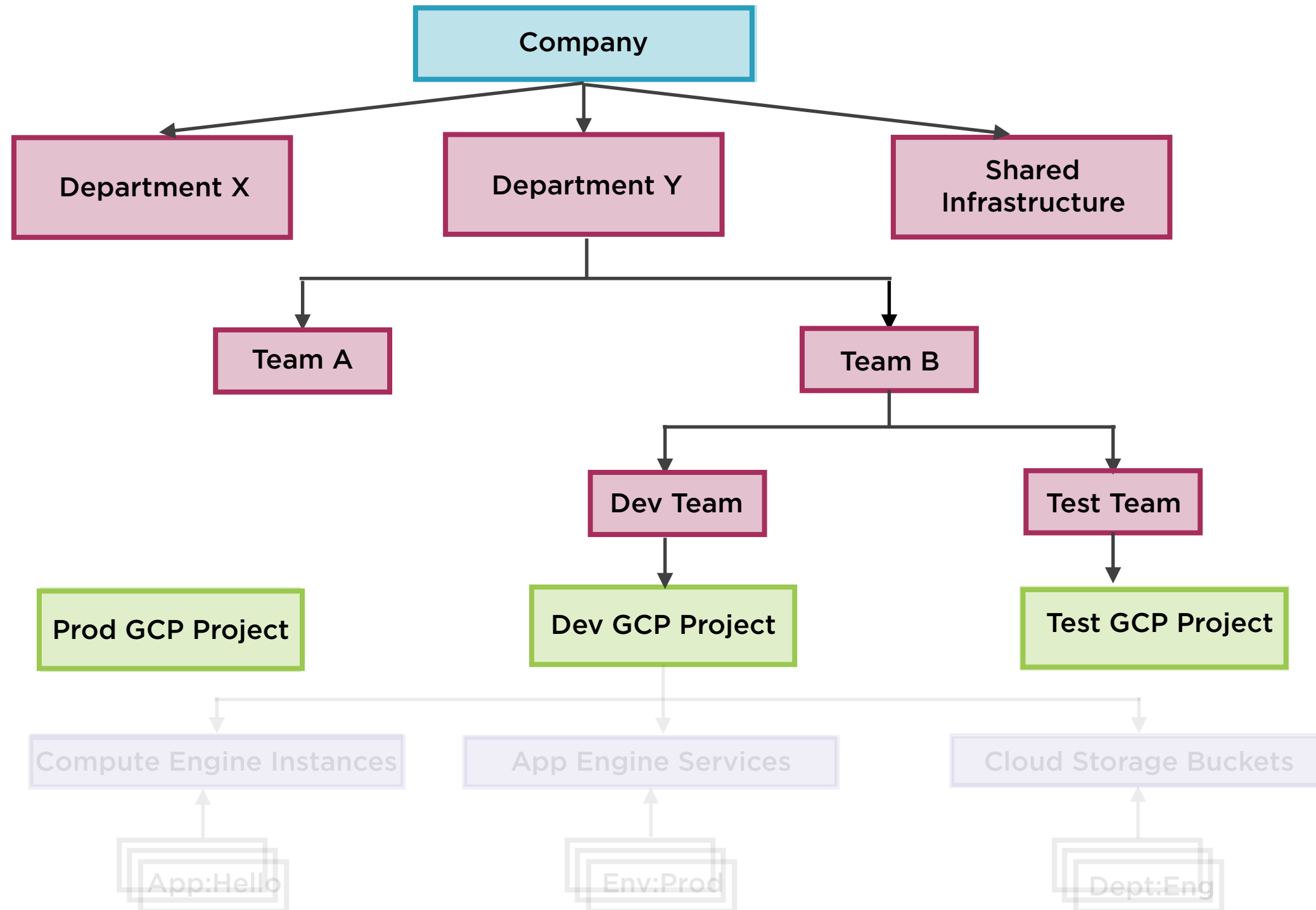
Resources Provisioned in Each Project
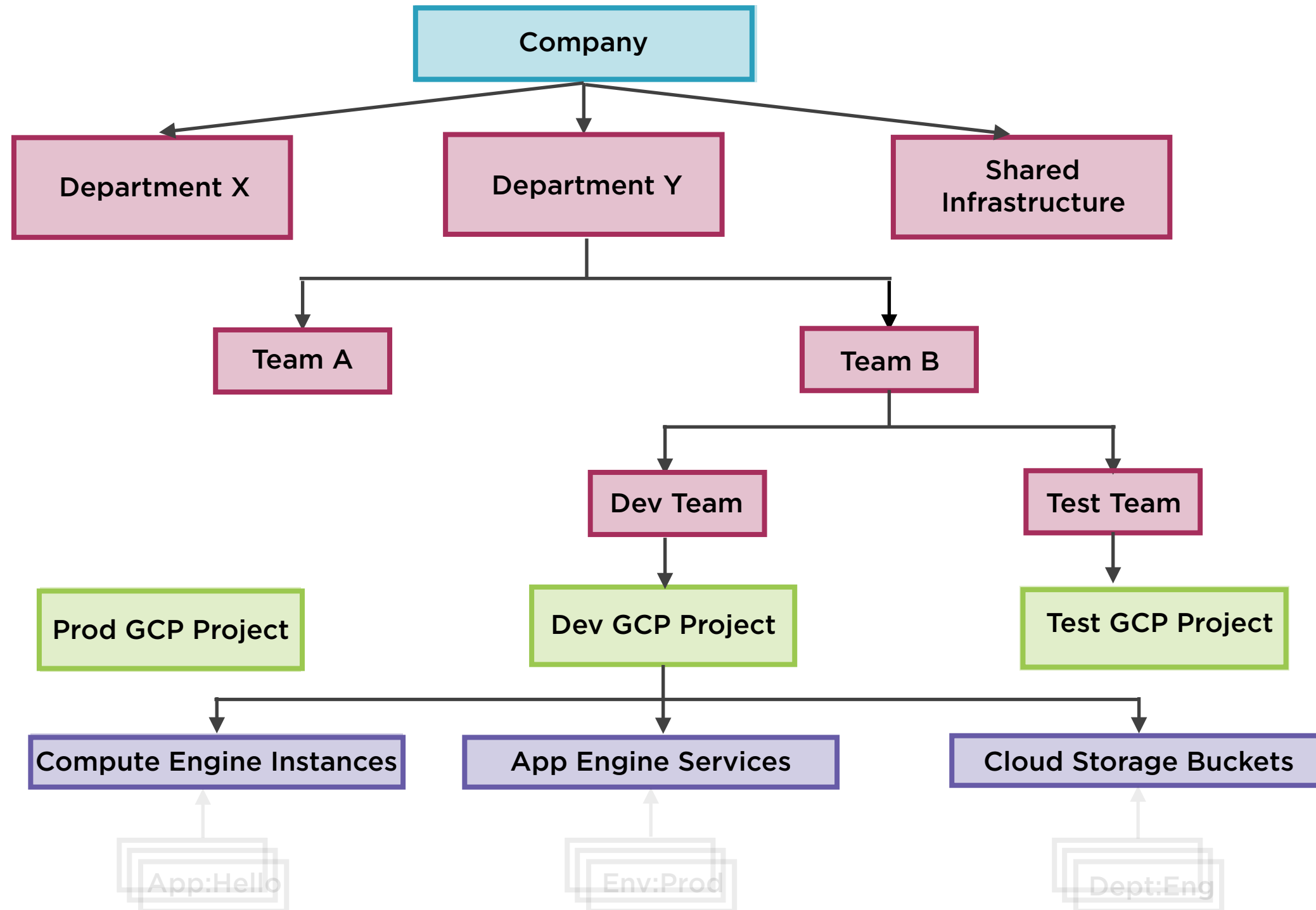
Labels Applied to Group Resources
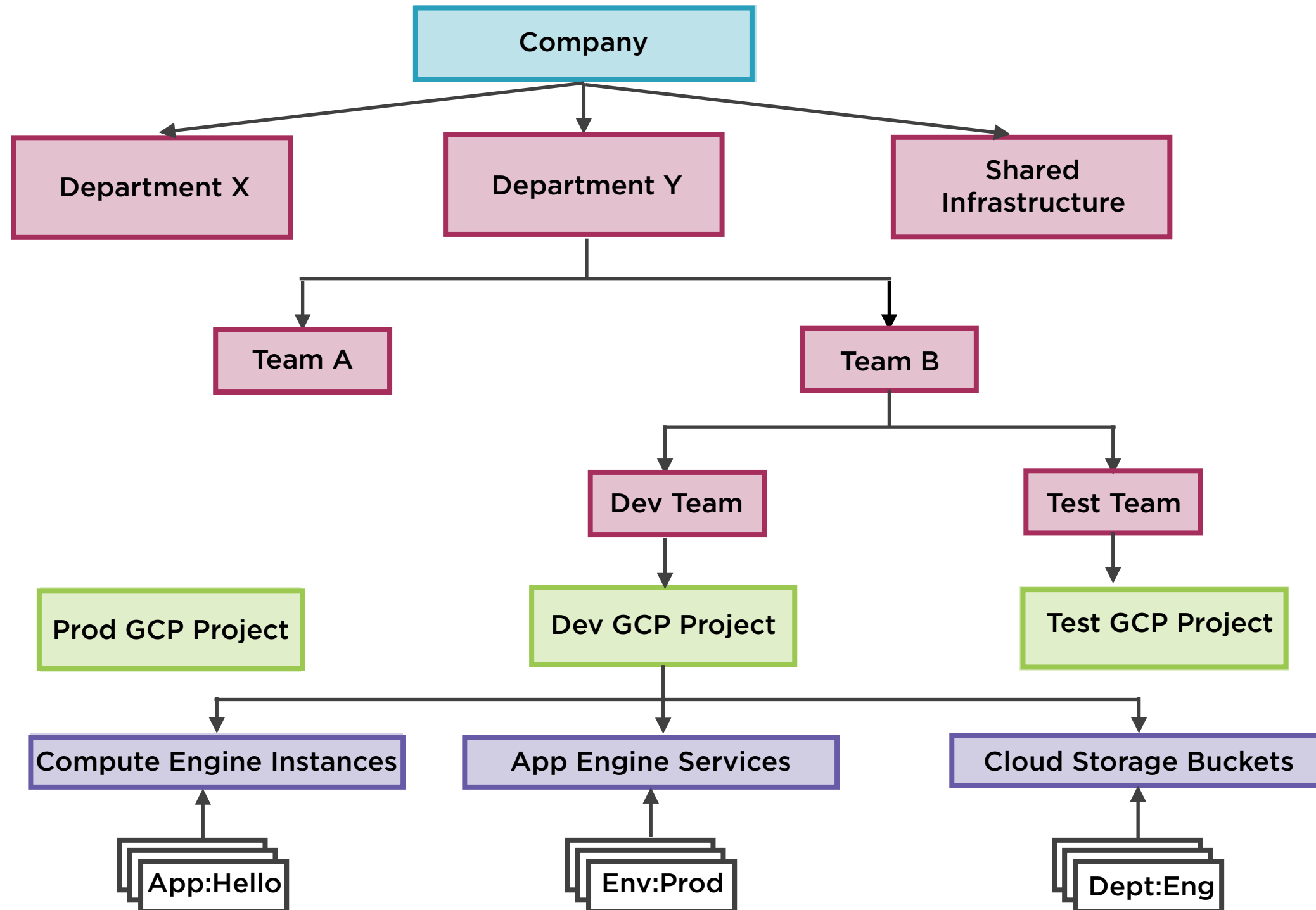
Organization

Top of resource hierarchy

Contains projects and folders

Identities come from G Suite

IAM policies are inherited down into projects and resources

Folders

Grouping mechanism within an organization

Logical group of projects

Can set IAM policies to administer multiple projects

Projects
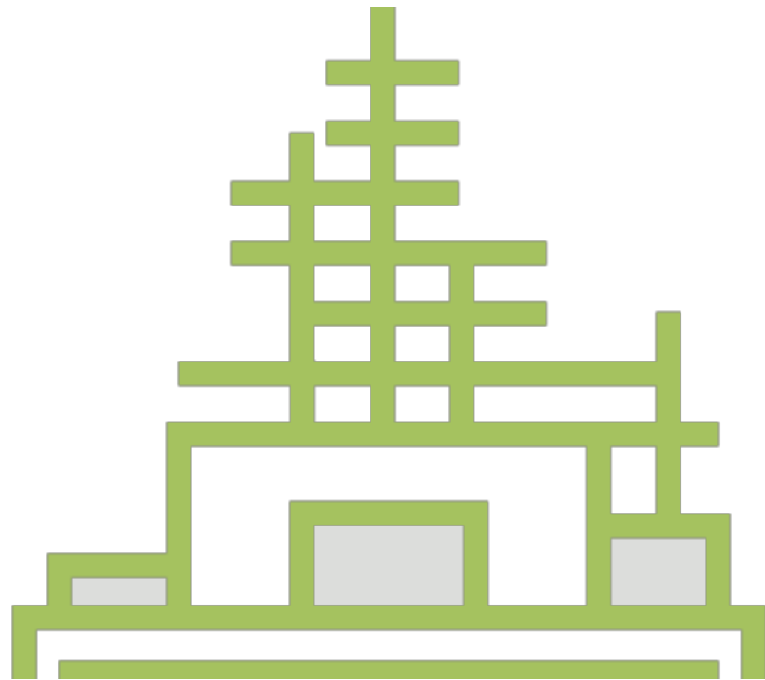
Container for billable resources

Some resources can be used for free

For all others, billing account needs to be linked

Resources
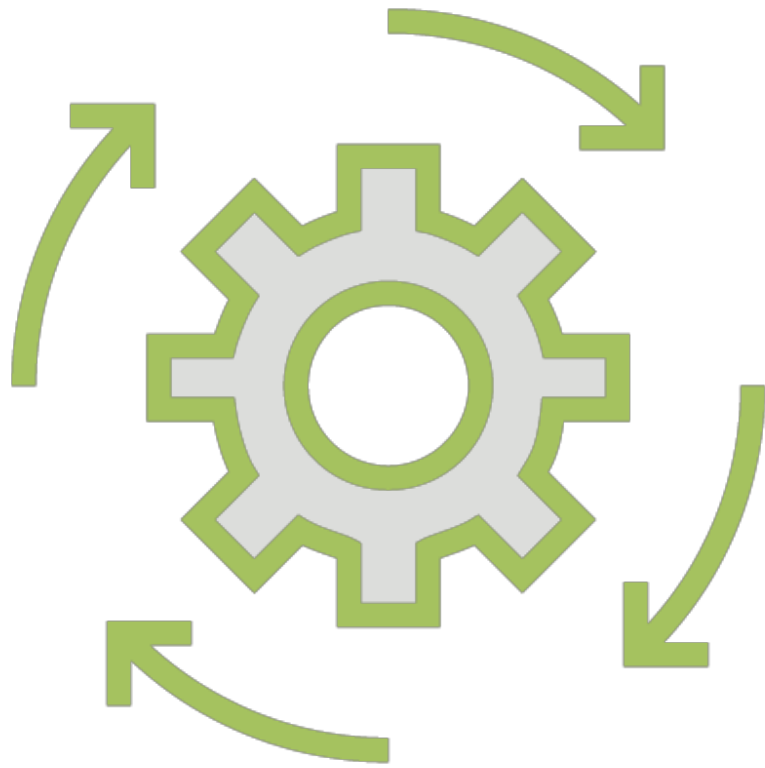
Any component that incurs billing

Must exist within project

Can set resource-level IAM

Additional IAM policies inherited from organization, folder, project

Lowest level of the hierarchy

Labels

Key-value pairs

Resource metadata

Can use to organize billing

Can break down billing by label

Billing Account
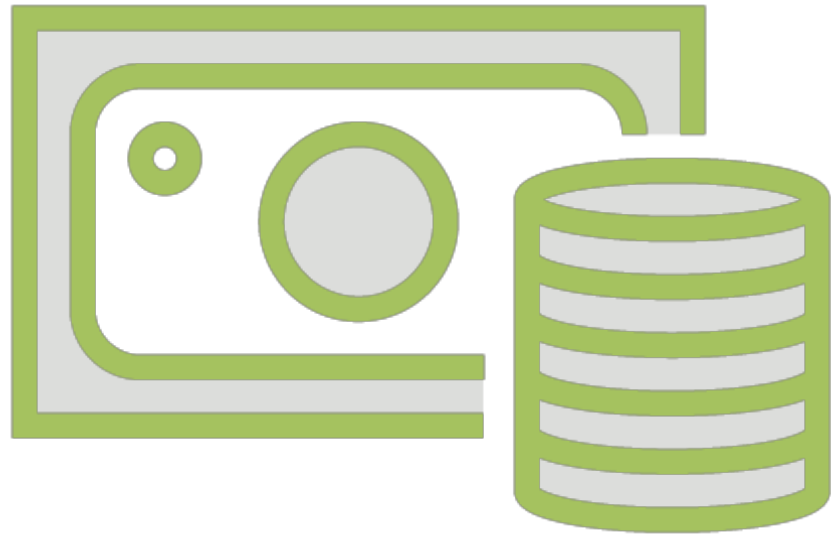
Connected to payment instrument

Can be linked to multiple projects

Billing Accounts and Projects
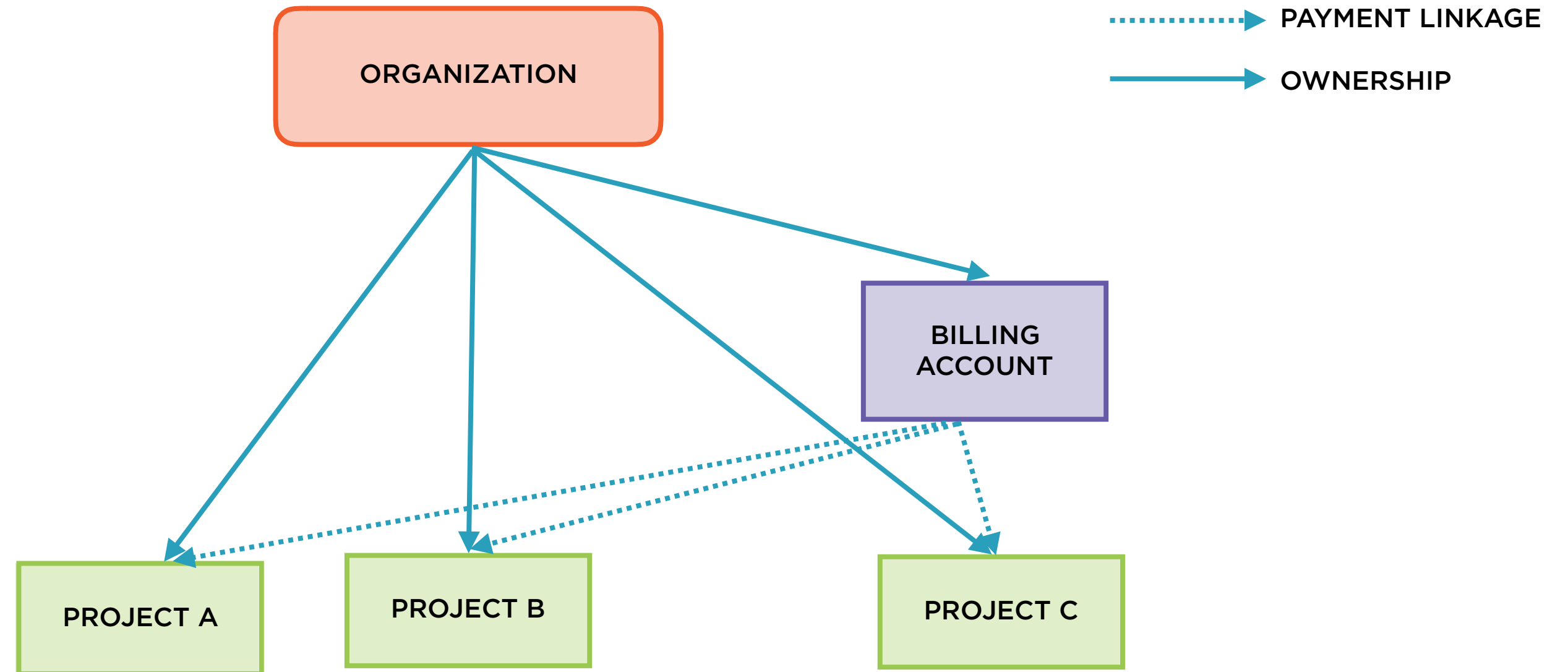
Billing Accounts Are Linked to Projects
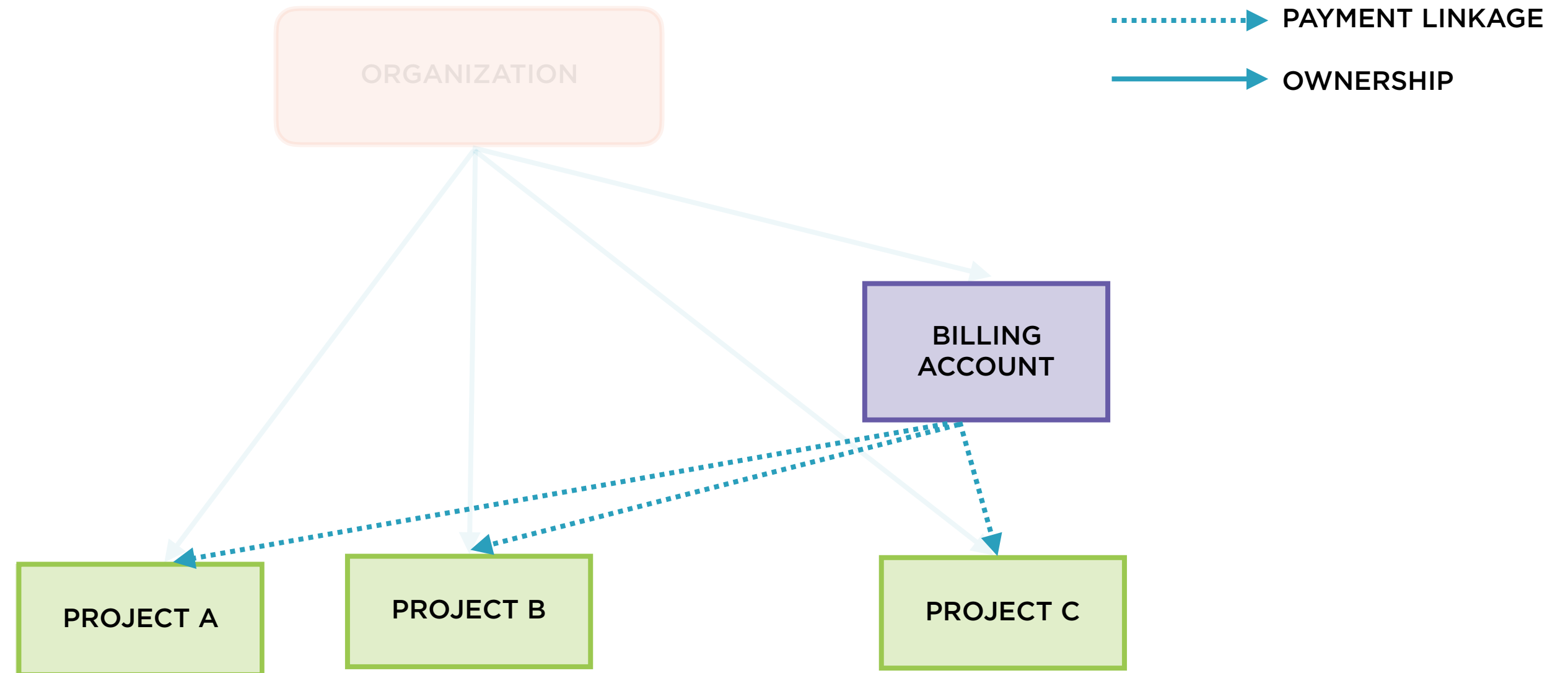
Two Types of Billing Accounts
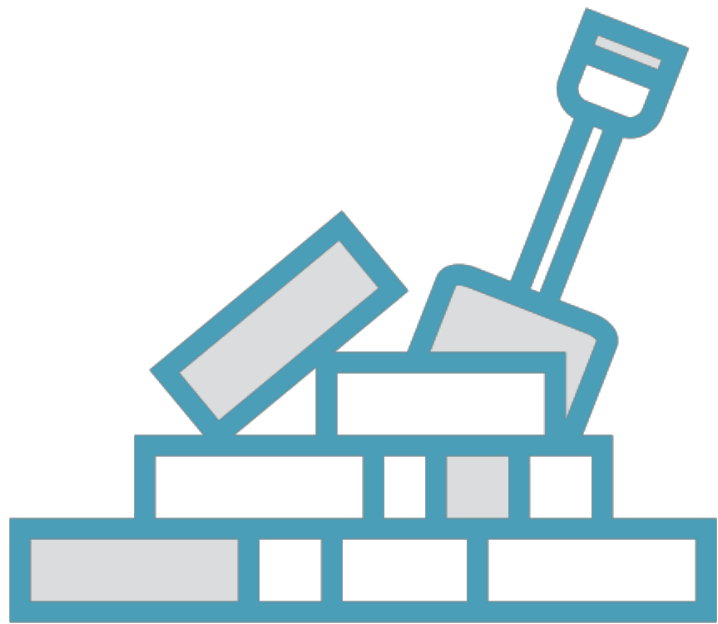
Self-serve

Invoiced

Two Charge Cycles

Monthly billing

Threshold billing

Self-serve Billing

Self-serve billing accounts link to payment instrument

- Debit card

- Credit card

- ACH direct debit

Costs charged automatically

Either monthly or threshold billing

Available via online sign up

Invoiced Billing

Invoiced accounts are paid via check or wire transfer

Monthly billing only

Invoices sent by mail or electronically

Check with Google about eligibility

Subaccounts
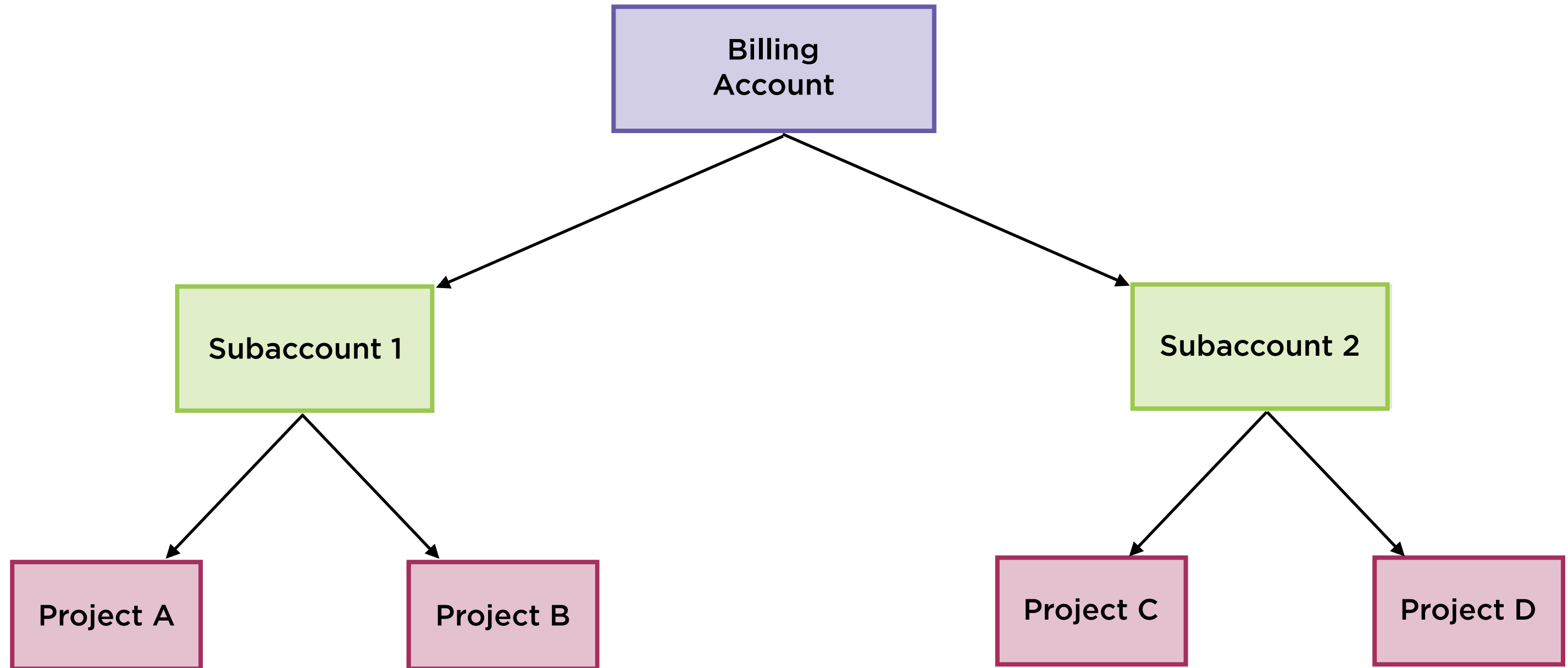
Subaccounts

Subaccounts are a type of billing account used by resellers

Reseller has master billing account

Customers have subaccounts

Way to group charges from projects in separate section of invoice

Important Billing IAM Roles

Important Billing IAM Roles

Billing user	Billing account admin	Payments profile admin
Project creator	Organization admin	Domain super admin

Domain Roles Managed by Cloud IAM

Billing user	Billing account admin	Payments profile admin
Project creator	Organization admin	Domain super admin

Part of the Google Payments Center

Billing user	Billing account admin	**Payments profile admin**
Project creator	Organization admin	Domain super admin

This is a single location where you can manage your payments for all of Google's products and services

Manages Accesses at a High Level

Billing user	Billing account admin	Payments profile admin
Project creator	Organization admin	Domain super admin

Can recover accounts at the domain level, can grant Organization Admin roles

Billing Account Related Roles

Billing user	**Billing account admin**	Payments profile admin
Project creator	Organization admin	Domain super admin

Billing user

Can link a project to a billing account

Can not unlink project from billing account

Usually goes with Project Creator role

Billing account admin

Can enable billing export

View costs and spends

Set budgets and alerts

Can both link and unlink projects from billing accounts

Someone who manages finances in the organization

Project creator

Can create projects

Inherently can consume any resources

Could be service accounts too

Organization admin

Can grant any role within organization

Most important executive role

Can administer any resource

Usually held by Lead IT Administrator

Controlled by Domain Super Admin

Domain super admin

Can grant or revoke Organization Admin role

Usually held by G Suite Administrator

G Suite and GCP are different platforms

Payments profile admin

Payments profiles are managed outside of the Cloud Organization

Google Payments Center for all Google products and services

View and manage payment methods

Make payments

View invoices and accounts

Pricing of GCE VM Instances

Pricing

Instance Up-time	Always Free Usage Limits	Sustained Use Discounts
Committed Use Discounts	Premium Images	Other Costs

Instance Up-time

Number of seconds that an instance is running

Per-second billing

(After minimum of 1 minute)

Always Free Usage Limits

1 f1-micro VM instance / month

30 GB standard persistent disk / month

5 GB snapshot storage / month

1 GB egress from North America / month

Sustained Use Discounts

The more your VM runs, the lower the rate

Predefined machine types

- Group all instance of same type in same zone and same project

Custom machine types

- Separately group memory and CPU for all instances in same zone and same project

Committed Use Discounts

Upfront commitment in return for price reduction

Commitment of 1-3 years

Discount of 57-70%

Premium Images

Cost varies on image as well as machine type

- e.g. SQL Server (Enterprise): $0.399 / core/hour

- Exact calculations quite involved

Other Costs

Network pricing

- ingress free, egress charges vary

Image storage

- about 9 cents/GB/month

Unused IP addresses

- about 1 cent/hour for unused static IP

GPU pricing

- expensive! $100 - $550 /GPU/month

Sizing Recommendations

GCE provides machine type recommendations to help optimize resource utilization; these recommendations are generated automatically from Stackdriver Monitoring data
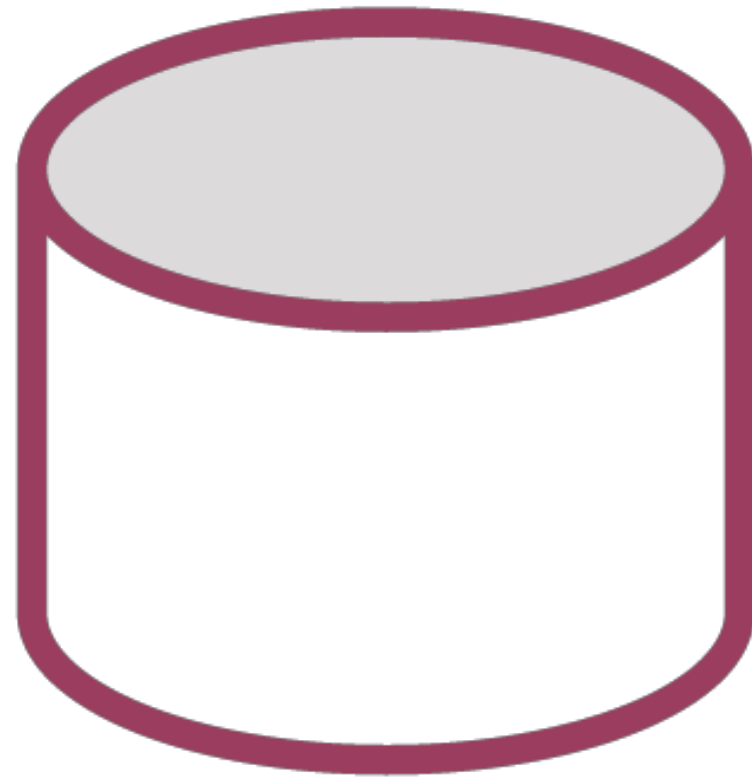
Pricing of GCS Buckets

GCS Pricing

Free tier

- no charges below a limit

Beyond that, charges for

- data storage

- retrieval and early deletion

- operations performed

- network usage

Storage Pricing

Storage Class	Storage Cost (cents/GB/month)
Multi-regional	2.6
Regional	2.0
Nearline	1.0
Coldline	0.7

Retrieval Pricing

Storage Class	Storage Cost (cents/GB/month)
Multi-regional	2.6
Regional	2.0
Nearline	1.0
Coldline	0.7

Early-deletion Pricing
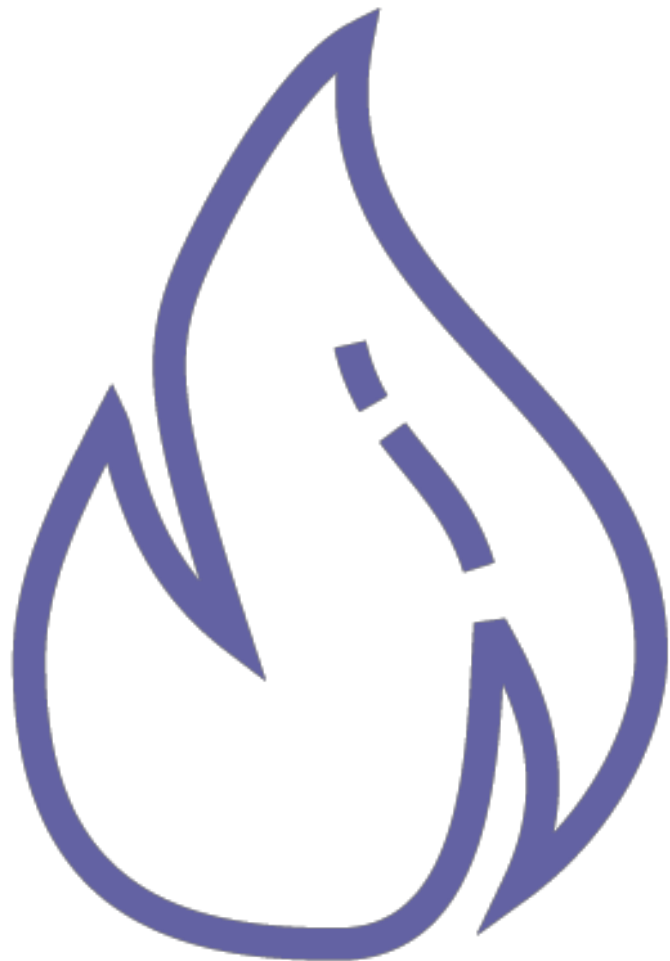
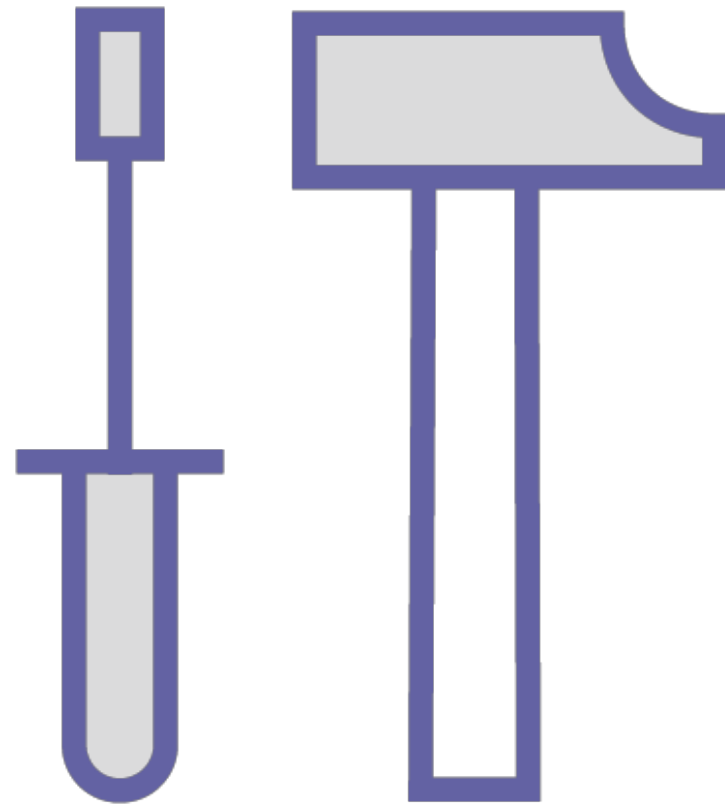| Storage Class	Minimum Commitment
Multi-regional	None
Regional	None
Nearline	30 days
Coldline	90 days

Operations Performed
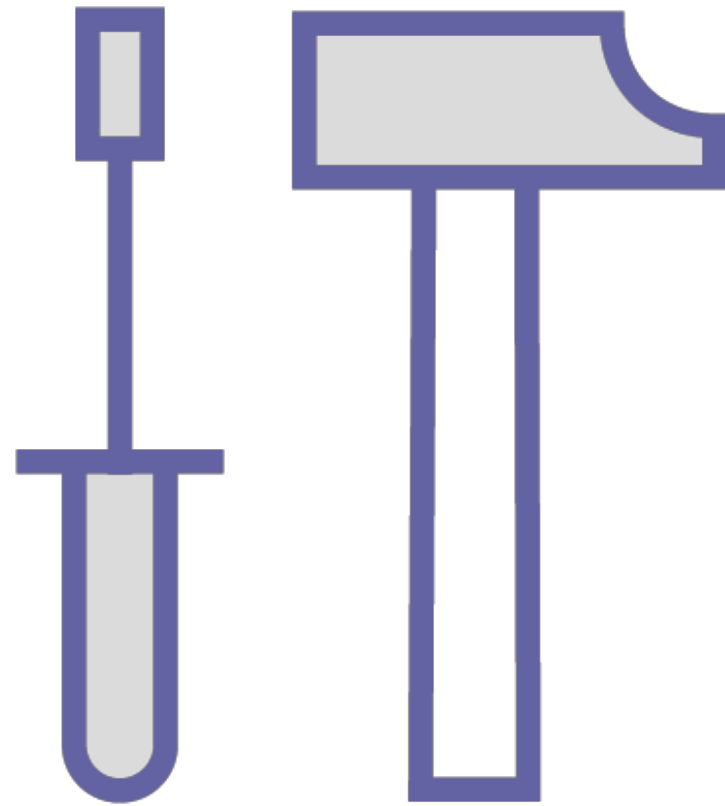
Class A operations

- Priced at 5-10 cents for 10 K operations

Class B operations

- Priced at 0.4 - 5 cents for 10 K operations

Operations Performed

Many common operations are Class A

- gsutil insert, update, copy, list

Object lifecycle management is Class A

Read the docs for exact lists

Network Pricing
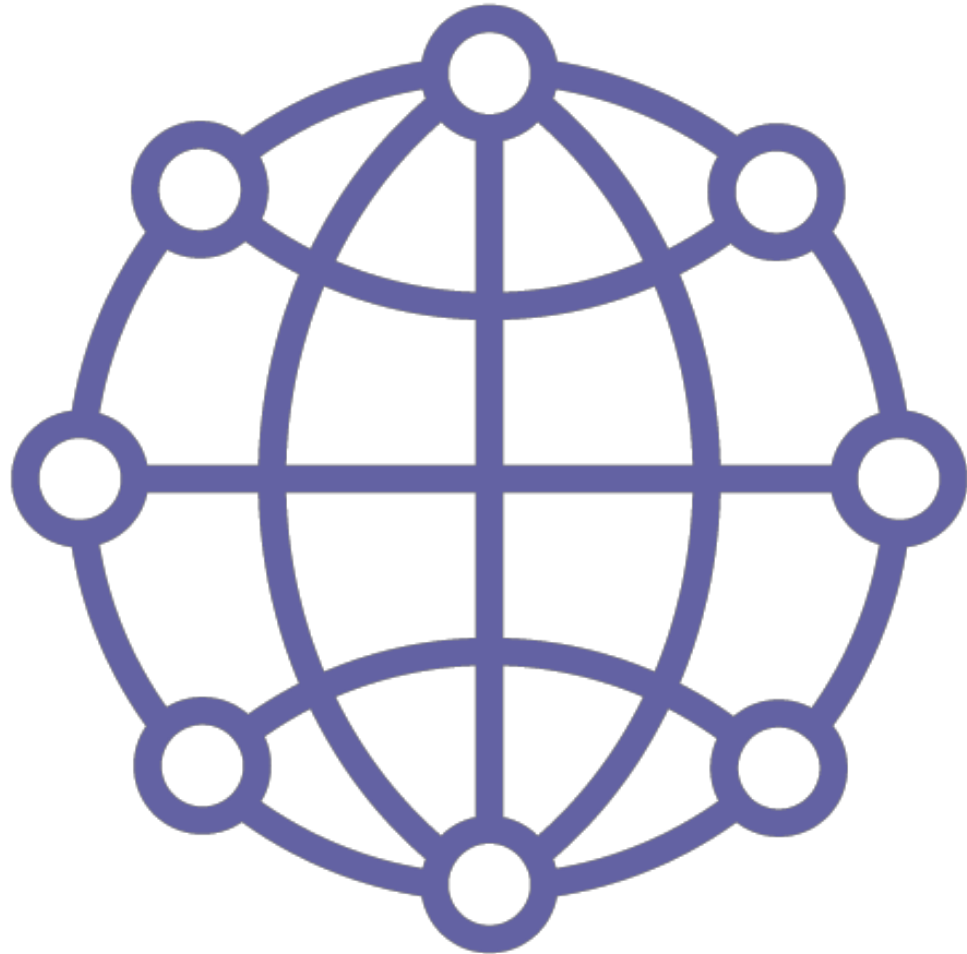
Some operations are free

- e.g. GCP service accesses bucket in same regional/multi-regional location

Bucket-to-bucket network usage

- applies to copying or moving objects

Specialty network services

- CDN, CDN Interconnect etc.

General network pricing

- egress charges as usual

Free Tier

No charges for

- regional storage of 5 GB-months

- 5,000 Class-A operations

- 50,000 Class-B operations

- 1 GB network egress from North America

BigQuery Pricing

BigQuery Pricing

Storage costs

Query costs

Free operations

BigQuery Pricing

Storage costs

Query costs

Free operations

BigQuery Costs

Storage Costs

- Active Data
- Long-term Data

Query Costs

- On-demand
- Flat-rate

BigQuery Costs

Storage Costs

- Active Data
- Long-term Data

Query Costs

- On-demand
- Flat-rate
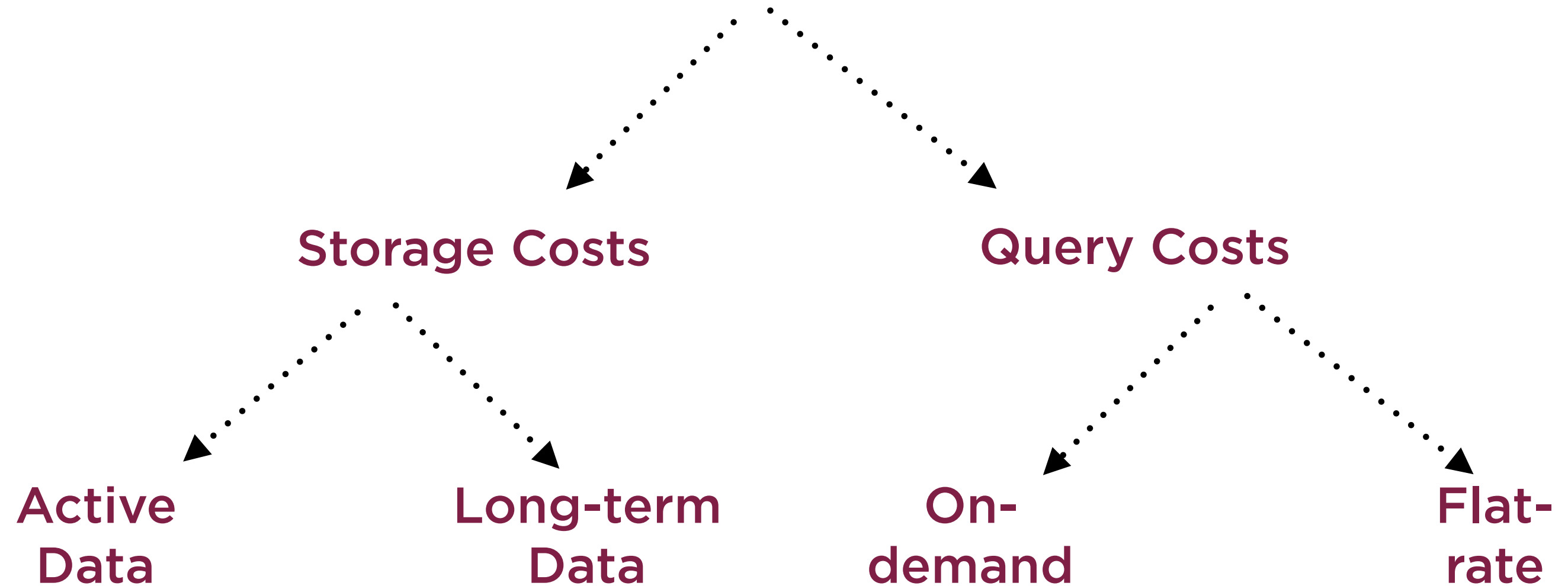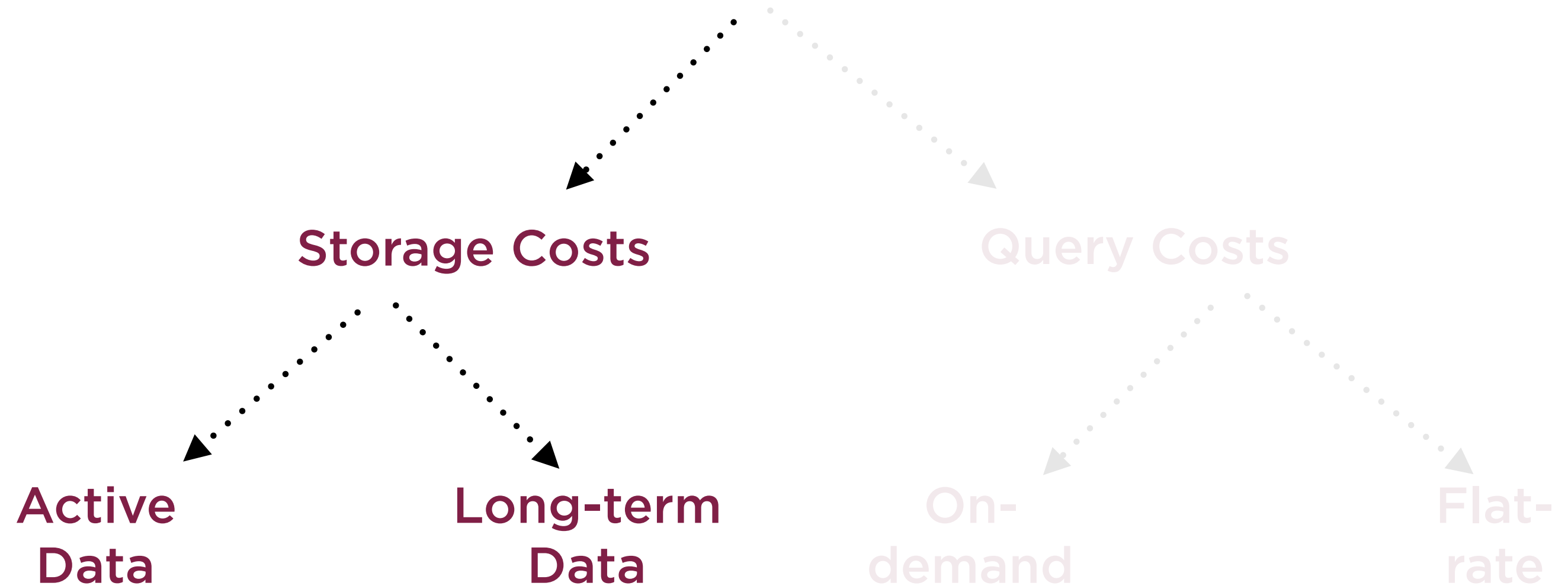
Storage Costs

Active

Data in tables modified in last 90 days

Currently approximately 2 cents/GB/month

First 10 GB is free

When table is edited, pricing reverts to active

Long-term

Data in tables not modified in last 90 days

About 50% lower; currently about 1 cent/GB/month

First 10 GB is free

When table is not edited, pricing automatically drops to long-term

BigQuery Costs

Storage Costs

Active Data **Long-term Data**

Query Costs

On-demand Flat-rate

BigQuery Costs

Storage Costs

Query Costs

Active Data

Long-term Data
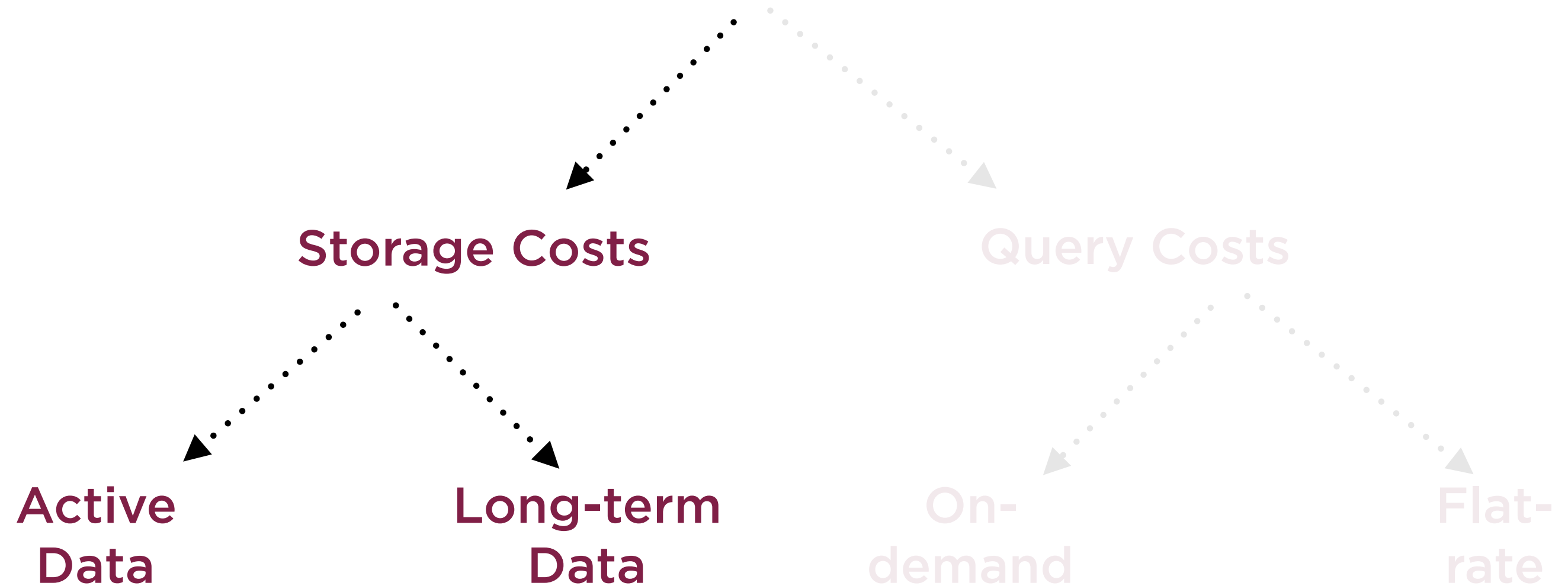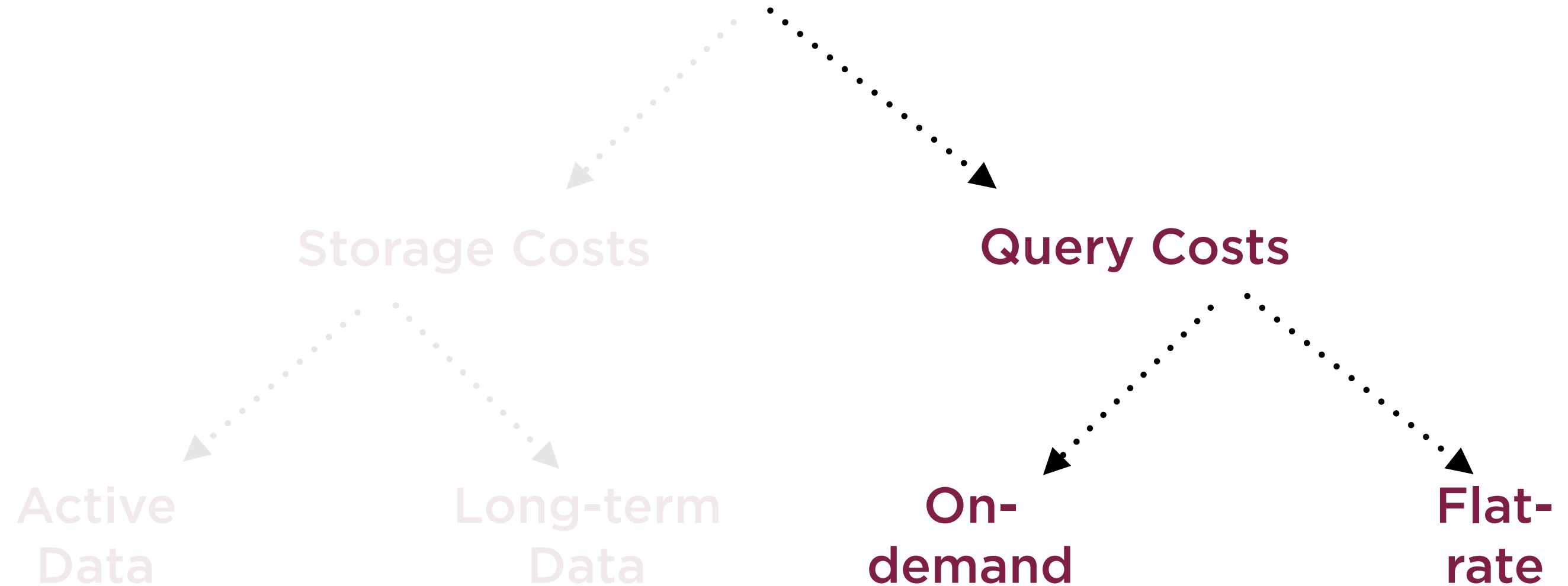
On-demand

Flat-rate

Query Costs

On-demand

Based solely on usage

$5 per TB/month; First 1 TB/month free

Flat-rate

Predictable, fixed monthly costs

$40,000/month for 2000 slots*; $10,000 per 500 additional slots

BigQuery Slot

Unit of computational capacity required to execute SQL queries. BigQuery automatically calculates how many slots are required by each query, depending on query size and complexity.

BigQuery Pricing

Storage costs

Query costs

Free operations

BigQuery Pricing

Storage costs

Query costs

Free operations

Free Operations

Loading data

- (Streaming inserts not free)

Copying data

Exporting data

Deleting datasets

Deleting tables, views, partitions

Metadata operations

Streaming Inserts

1 cent/200 MB

Only successfully inserted rows are charged

Minimizing Costs

Query only columns you need

- Under the hood, BigQuery is columnar

- Each column stored separately in encrypted, replicated file

Minimizing Costs

Use table preview to explore data

- Don't run queries just to explore

Minimizing Costs

Calculate query price before running

- dry_run flag in CLI

- query validator in UI

- GCP pricing calculator

Bigtable Pricing

Total Price ~ (# Nodes, Storage Used, Network Bandwidth Used)

Cost Depends on Three Variables

Three components of pricing

Total Price ~ (**# Nodes**, Storage Used, Network Bandwidth Used)

Node Cost

Every hour, maximum number of nodes in existence in that hour x hourly rate

Node cost varies by region, about $0.65 - $0.75 /node/hour

Total Price ~ (# Nodes, **Storage Used**, Network Bandwidth Used)

Storage Cost

SSD storage at about $0.15 - $0.2 /GB/Month

HDD storage at about $0.026 - $0.03 /GB/Month

(Compare to GCS multi-regional bucket: $0.026 /GB/month)

Total Price ~ (# Nodes, Storage Used, **Network Bandwidth Used**)

Networking Cost

Lots of fine print; ingress is always free, egress at standard rates

Cloud Spanner Pricing

Total Price ~ (# Nodes, Storage Used, Network Bandwidth Used)

Cost Depends on Three Variables

Three components of pricing

Total Price ~ (# Nodes, Storage Used, Network Bandwidth Used)

Node Cost

Every hour, maximum number of nodes in existence in that hour x hourly rate

Effectively, each node is billed for minimum of 1 hour

Total Price ~ (**# Nodes**, Storage Used, Network Bandwidth Used)

Node Cost

Hourly rate for regional configuration: $0.9 - $1.17 /node/hour

Hourly rate for multi-regional configuration: $3 - $9 /node/hour

Total Price ~ (# Nodes, **Storage Used**, Network Bandwidth Used)

Storage Cost

Billed for space used for tables, secondary indices, overhead for indices

Total Price ~ (# Nodes, Storage Used, Network Bandwidth Used)

Storage Cost

Regional configurations: $0.3 - $0.39 /GB/month

Multi-regional configurations: $0.5 - $0.9 /GB/month

(Compare to GCS multi-regional bucket: $0.026 /GB/month)

Total Price ~ (# Nodes, Storage Used, **Network Bandwidth Used**)

Networking Cost

Lots of fine print; ingress is always free, egress varies from $0.01/GB to $0.23/GB

Dataproc Pricing

Dataproc Pricing: Compute Engine VMs + small additional charge

Dataproc Pricing

Main cost ~ GCE VMs for cluster

Additional fee per vCPU/hour

Ranges from 1 cent to 64 cents

Dataproc Pricing

To understand Dataproc pricing...

...Understand GCE VM pricing

Dataproc Pricing

Charges for data in storage buckets is completely separate

So are charges for any other GCP services consumed

- Stackdriver

Demo

Exploring billing on the web console

Demo

Using the gcloud command-line utility to query billing information

Pricing

Google Cloud Billing APIs Pricing

No extra charge

Summary

Getting started with Cloud Billing

Types of billing accounts: self-serve and invoiced

Billing cycles: Monthly billing and Threshold billing

Understanding predefined billing roles

Interacting with Cloud Billing using the web console

Interacting with Cloud Billing using the cloud shell