
Google Cloud Platform

Traditional E-commerce Scenario

Traditional E-commerce Scenario

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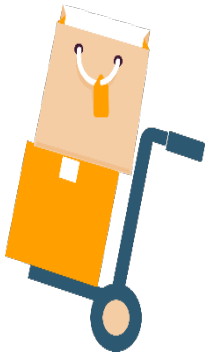


Traditional E-commerce Scenario

Traditional E-commerce Scenario

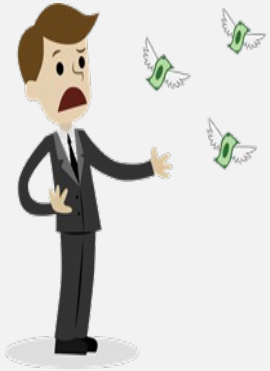
Traditional E-commerce Scenario

Increased Website Traffic

Problems Faced

Database & Security

Managing Servers

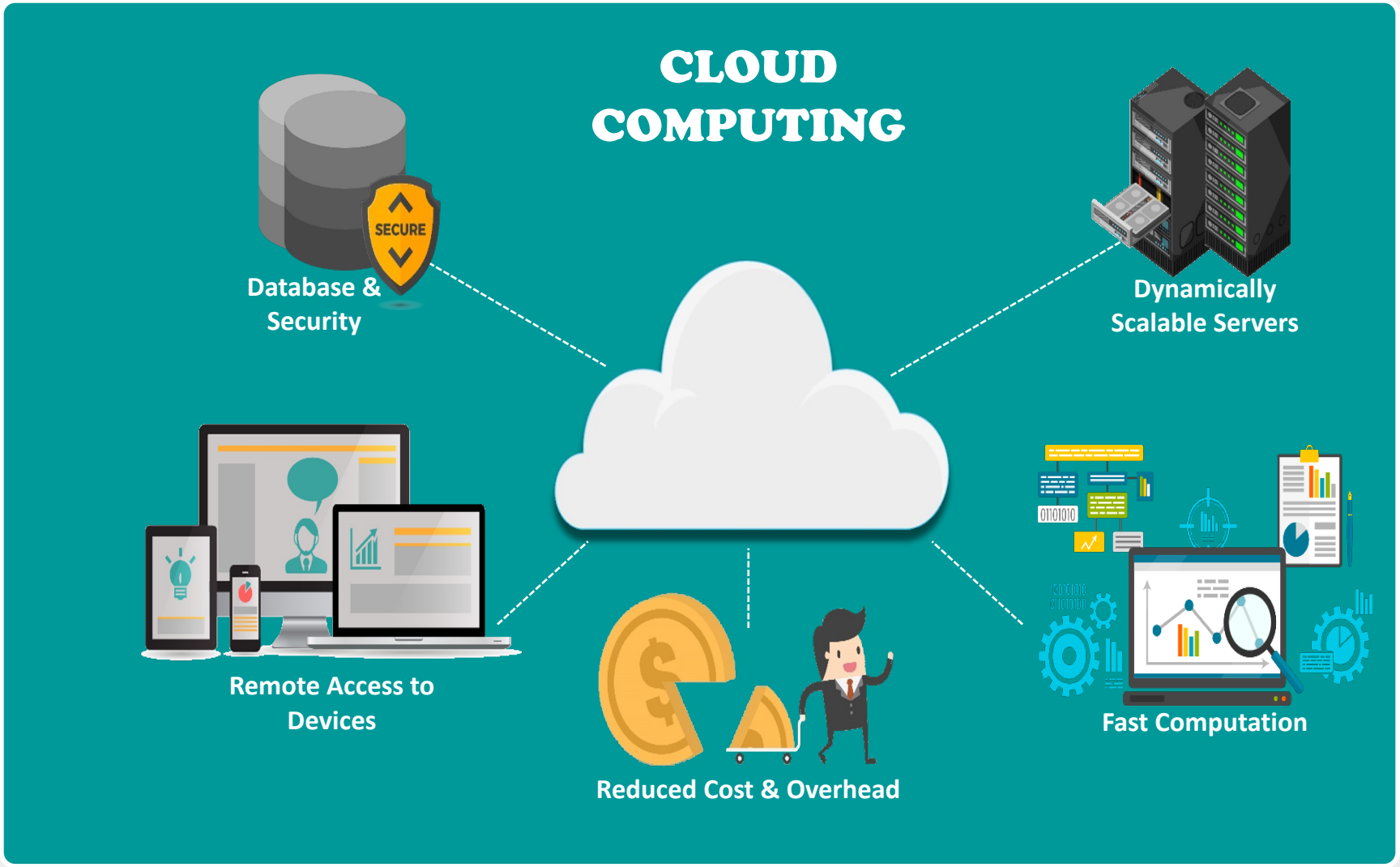


Increasing Cost

Scalability Issue

Fast & Fault Tolerant

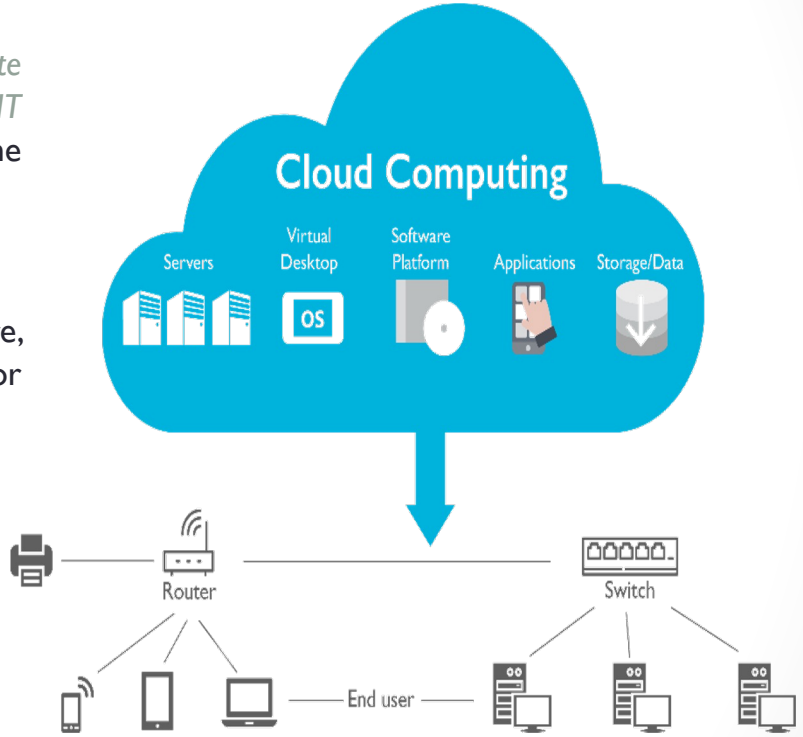
Solution


CLOUD COMPUTING
SECURE
Database & Security
Dynamically Scalable Servers
Remote Access to Devices
Fast Computation
Reduced Cost & Overhead

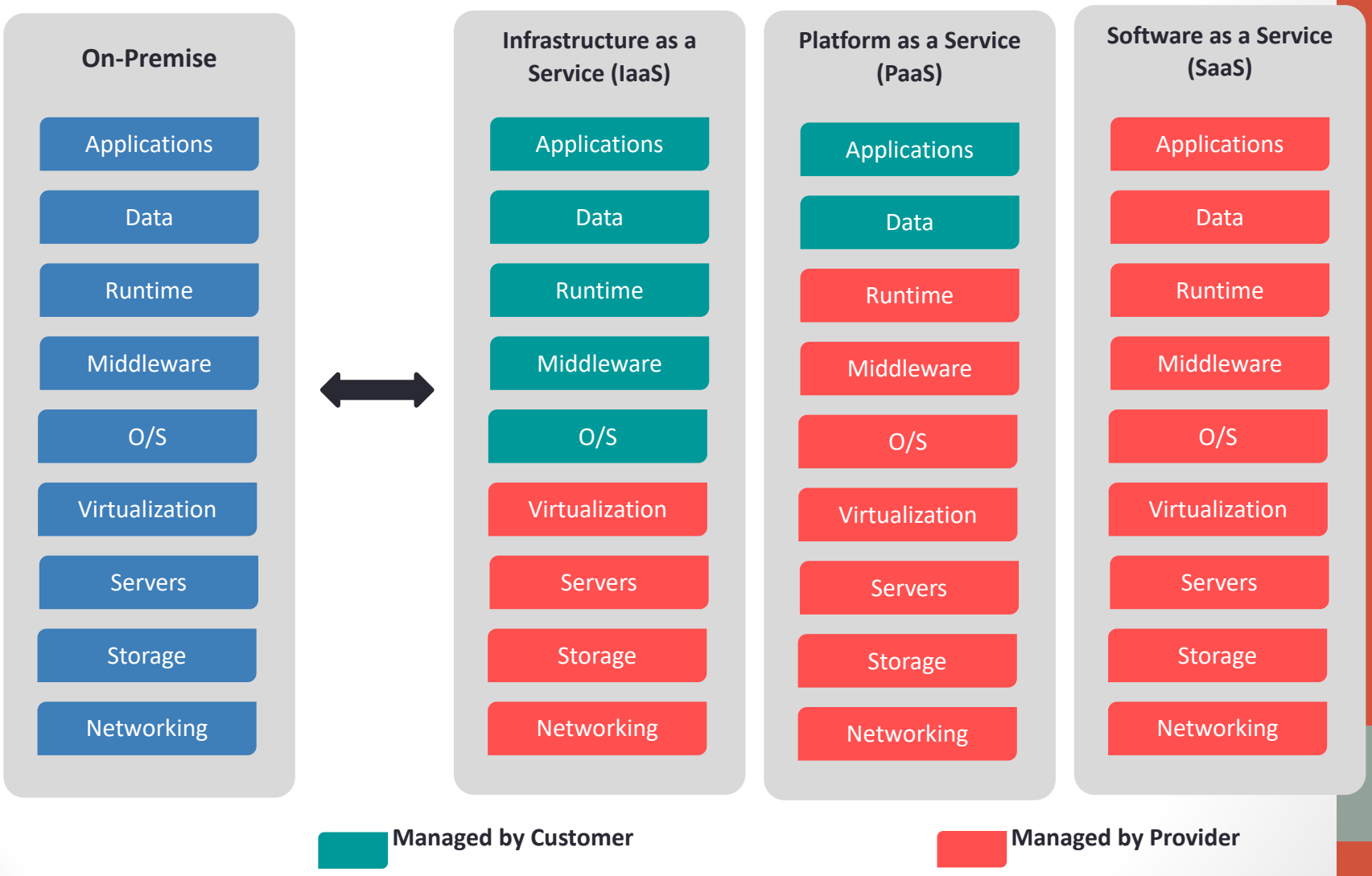
Cloud Computing

- Cloud computing is the on-demand delivery of *compute power, database storage, applications, and other IT resources* through a *cloud services platform* via the internet with pay-as-you-go pricing

- It is the *use of remote servers on the internet* to store, manage and process data rather than a local server or your personal computer



Cloud Services



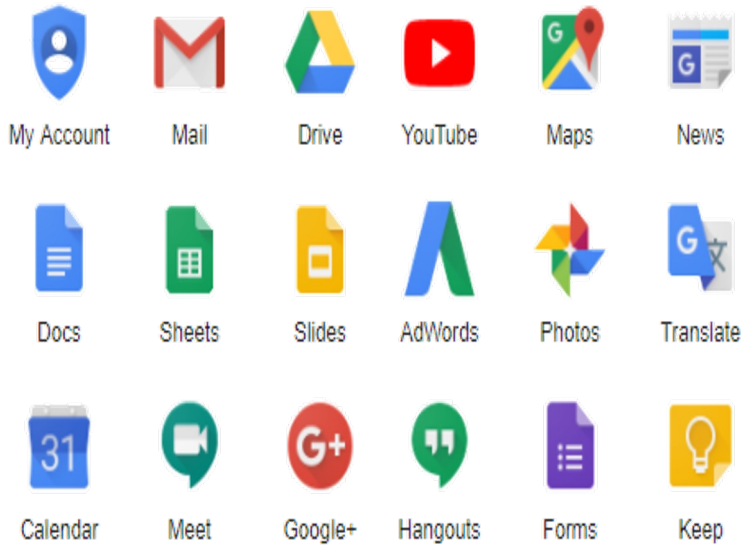
Various Cloud Providers

Cloud Providers

Why go for Google Cloud Platform?

Why GCP?

Google Cloud Platform, is a suite of cloud computing services *that runs on the same infrastructure that Google uses internally* for its end-user products, such as Google Search, Gmail, Google Photos and YouTube



Run on Google's Infrastructure

- Build on the same infrastructure that allows Google to return billions of search results in milliseconds,
- serve 6 billion hours of YouTube video per month and
- provide storage for 425 million Gmail users.

- ✓ Global Network
- ✓ Redundancy
- ✓ Innovative Infrastructure

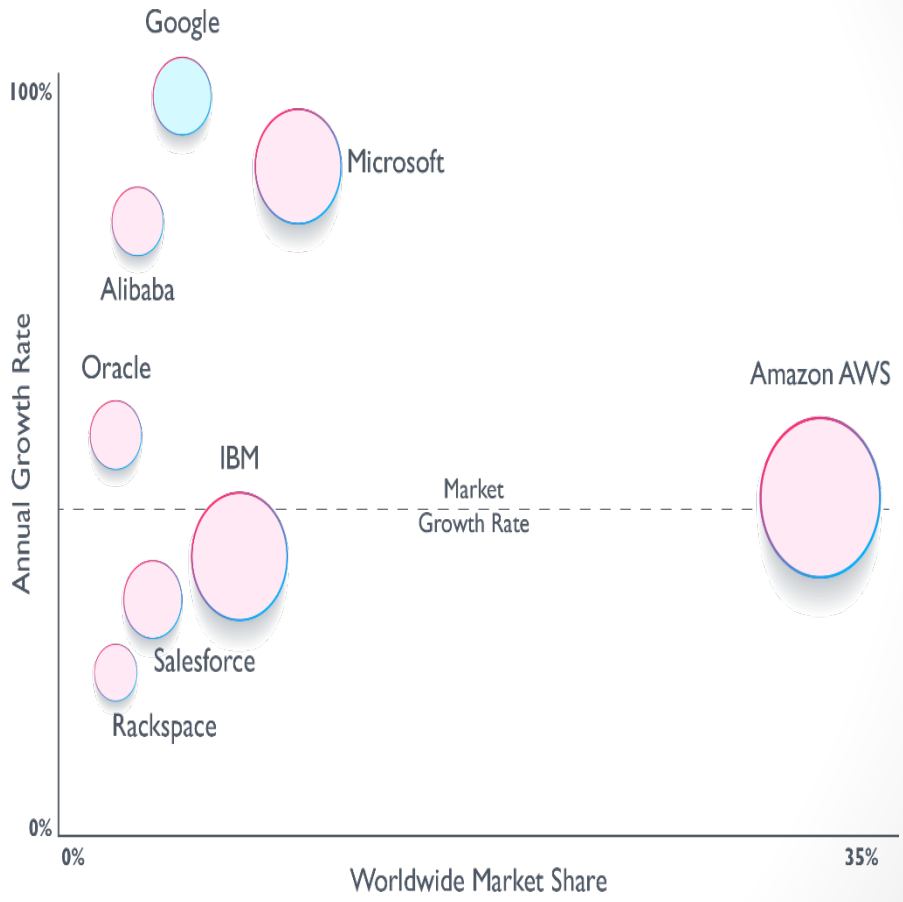
Why GCP?


Cost Effective
Serverless
Highly Scalable
Google Cloud Platform
Cloud AI
Custom Machine Types
Big Data Analytics
IoT
Internet of Things
API Platform and Ecosystem

Why GCP?

Cloud Provider Competitive Positioning

(Iaas, Paas, Hosted Private Cloud - Q3 2017)



Source: Synergy Resource Group

Why Google Cloud Platform?

- **Scale to millions of users**
- Applications hosted on Cloud Platform can automatically scale up to handle the most demanding workloads and scale down when traffic subsides. You pay only for what you use.
- Scale-up:
  - Cloud Platform is designed to scale like Google's own products, even when you experience a huge traffic spike. Managed services such as App Engine or Cloud Datastore give you auto-scaling that enables your application to grow with your users.
- Scale-down:
  - Just as Cloud Platform allows you to scale-up, managed services also scale down. You don't pay for computing resources that you don't need.

Why Google Cloud Platform?

- **Focus on your product**
- Rapidly develop, deploy and iterate your applications without worrying about system administration. Google manages your application, database and storage servers so you don't have to.

✓ Managed services

✓ Developer Tools and SDKs

✓ Console and Administration

What is Google Cloud Platform?

What is GCP?

Google Cloud Platform, is a suite of *cloud computing services* and *management tools* offered by Google

Alongside a set of management tools, it provides a *series of modular cloud services including computing, data storage, data analytics and machine learning*

Google Cloud Platform Services

Compute

Storage & Database

Networking

Big Data

Developer Tools

Identity & Security

Internet of Things

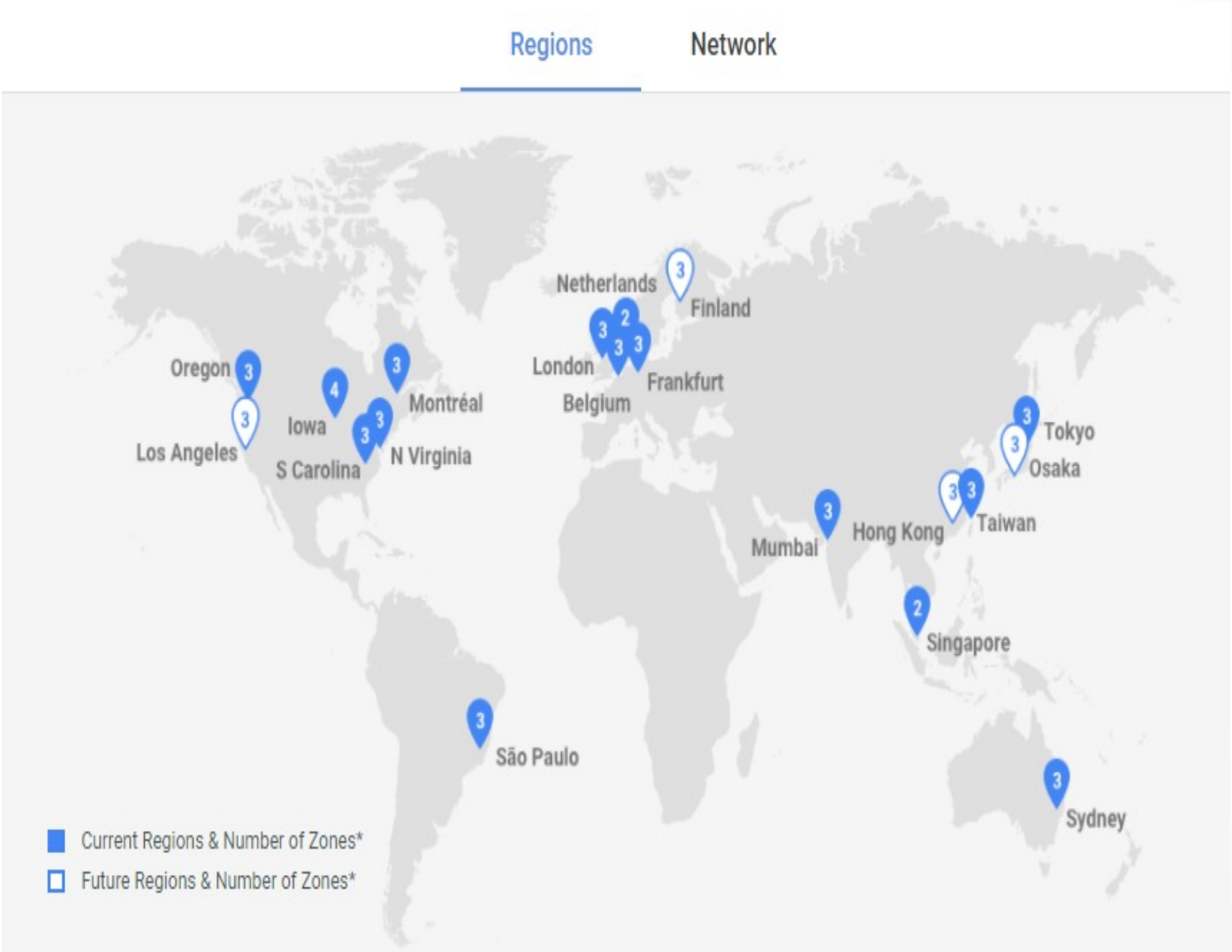
Cloud AI

Management Tools

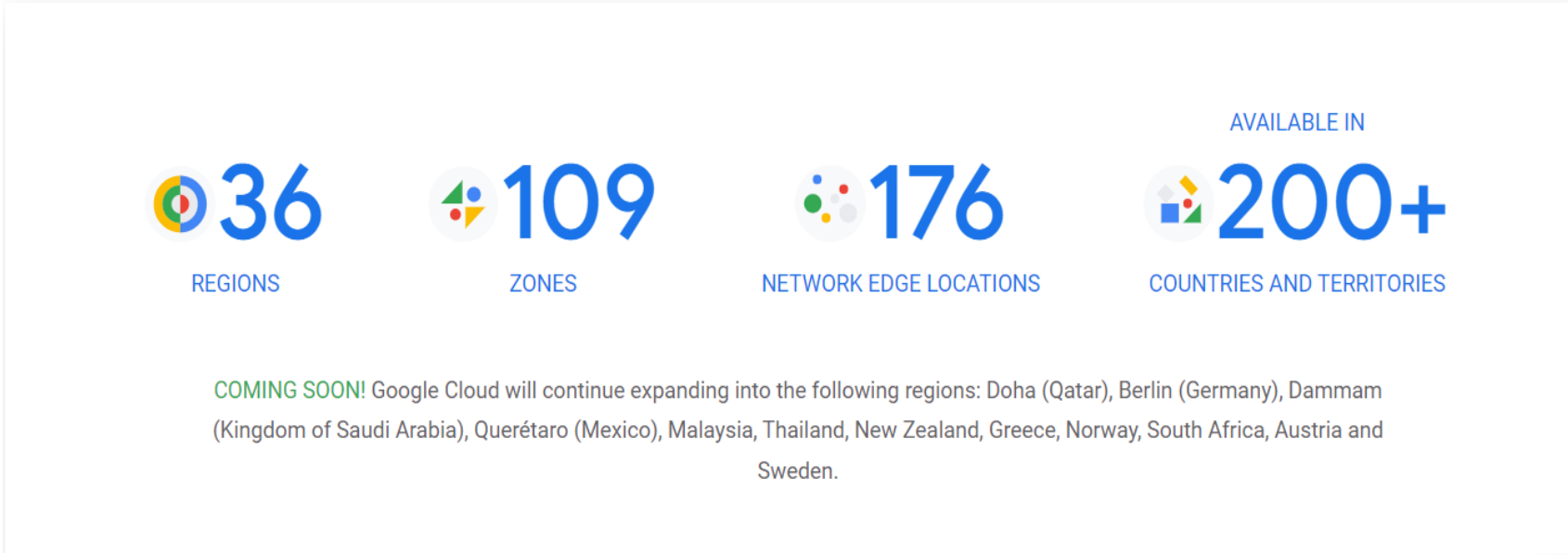
Data Transfer

GCP Regions and Zones

GCP Regions and Zones



Google Cloud Regions & Zones



Google Cloud Regions & Zones

- Compute Engine resources are hosted in multiple locations worldwide. These locations are composed of regions and zones.

Google Cloud Regions & Zones

- A region is a specific geographical location where you can host your resources.
- Regions have three or more zones.

Google Cloud Regions & Zones

- For example, the us-west1 region denotes a region on the west coast of the United States that has three zones: us-west1-a, us-west1-b, and us-west1-c.

Zones ▾	Location	Machine types	CPUs	Resources	CO_2 emissions
asia-east1-a	Changhua County, Taiwan, APAC	E2, N2, N2D, T2D, N1, M1, C2, C2D	Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, AMD EPYC Rome, AMD EPYC Milan	GPUs	
asia-east1-b	Changhua County, Taiwan, APAC	E2, N2, N2D, T2D, N1, M1, C2, C2D	Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	GPUs	
asia-east1-c	Changhua County, Taiwan, APAC	E2, N2, N2D, T2D, N1, M1, C2, C2D	Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, AMD EPYC Rome, AMD EPYC Milan	GPUs	

Google Cloud Regions & Zones

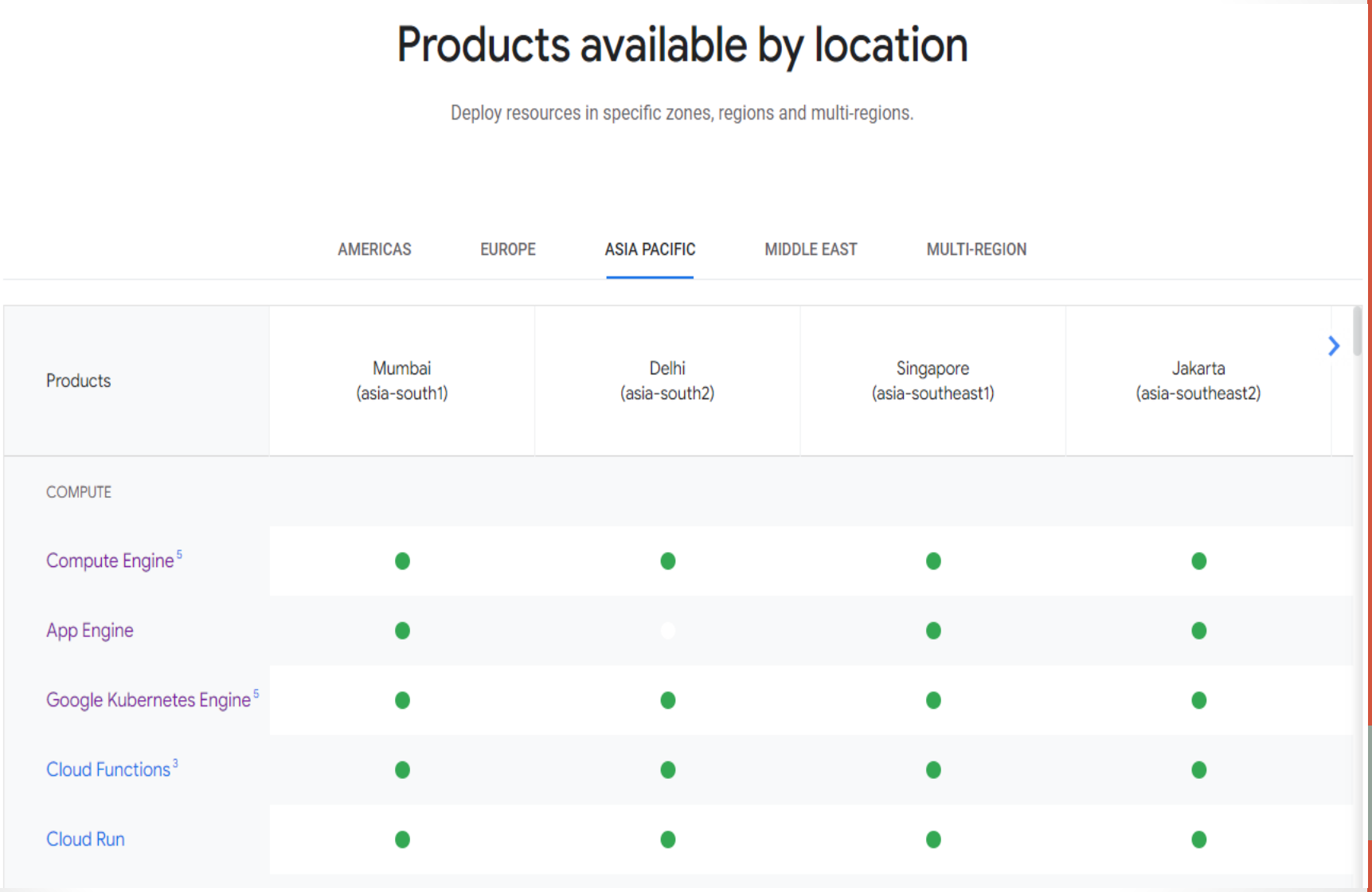
- Resources that live in a zone, **such as virtual machine instances or zonal persistent disks, are referred to as zonal resources.**
- Other resources, **like static external IP addresses, are regional.**

Google Cloud Regions & Zones

- **Regional resources can be used by any resource in that region, regardless of zone, while zonal resources can only be used by other resources in the same zone.**

- For example, to attach a zonal persistent disk to an instance, both resources must be in the same zone.
- Similarly, if you want to assign a static IP address to an instance, the instance must be in the same region as the static IP address.

Google Cloud Regions & Zones



Products available by location

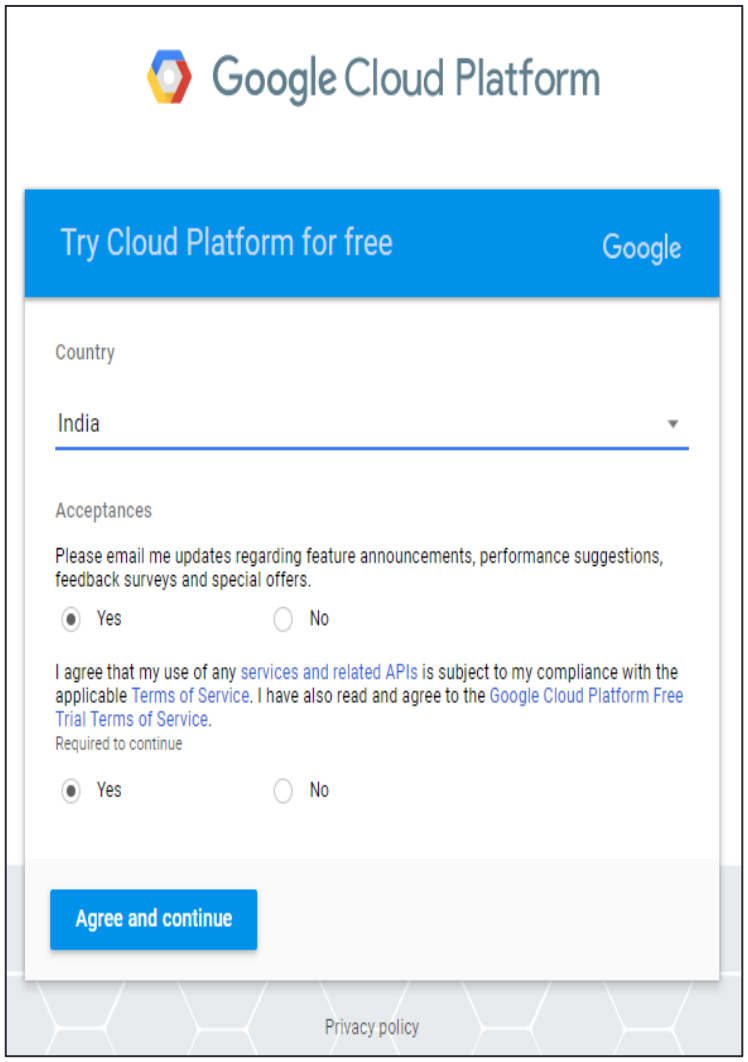
Deploy resources in specific zones, regions and multi-regions.

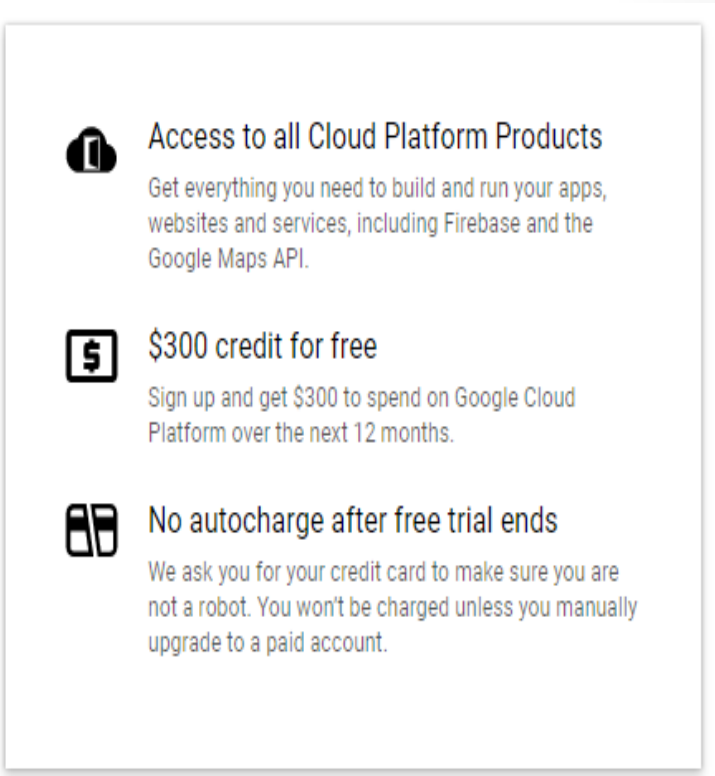
AMERICAS | EUROPE | ASIA PACIFIC | MIDDLE EAST | MULTI-REGION

Products	Mumbai (asia-south1)	Delhi (asia-south2)	Singapore (asia-southeast1)	Jakarta (asia-southeast2)
COMPUTE				
Compute Engine[5]	●	●	●	●
App Engine	●		●	●
Google Kubernetes Engine[5]	●	●	●	●
Cloud Functions[3]	●	●	●	●
Cloud Run	●	●	●	●

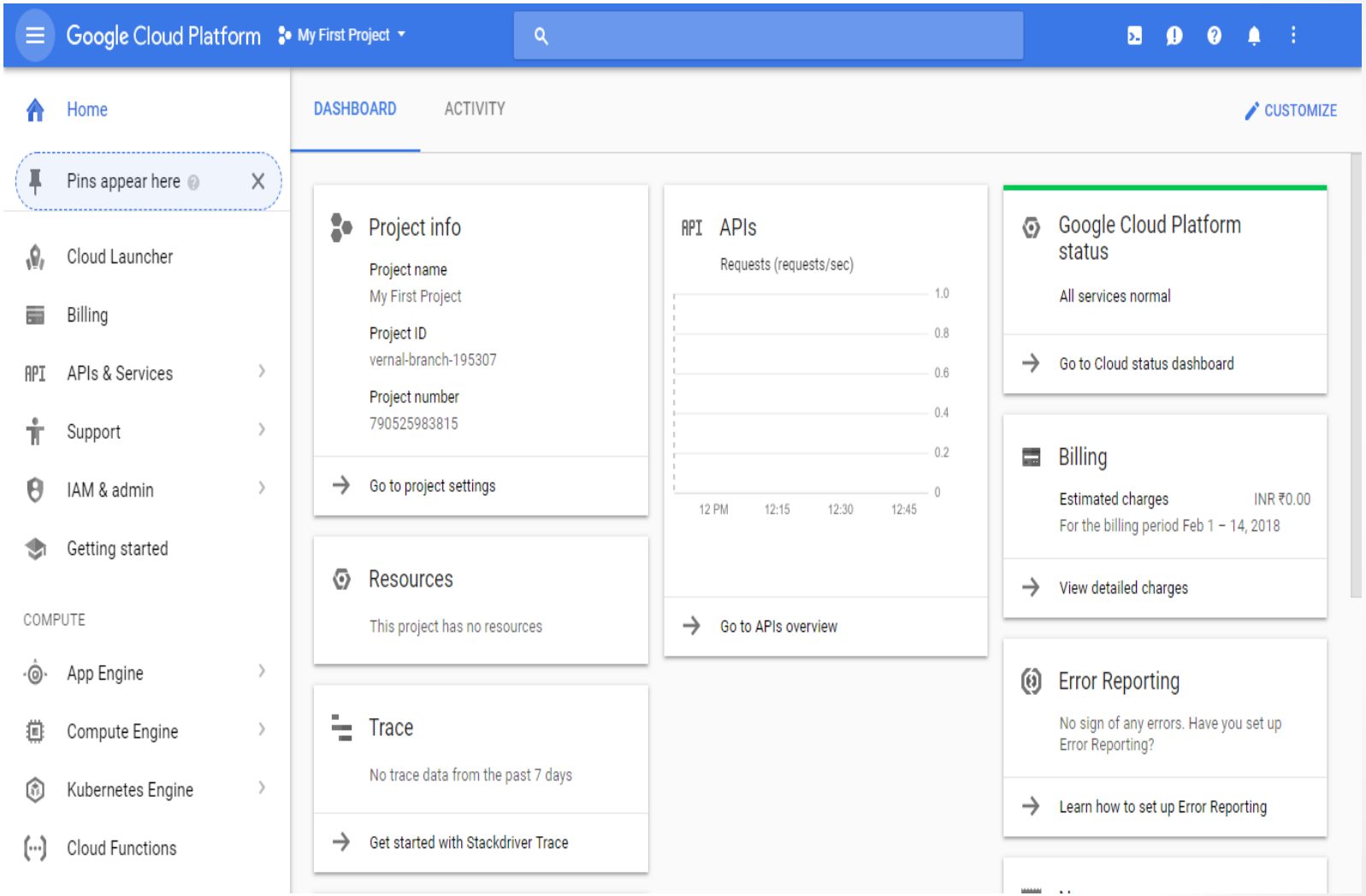
Creating account on GCP

Creating Free Account



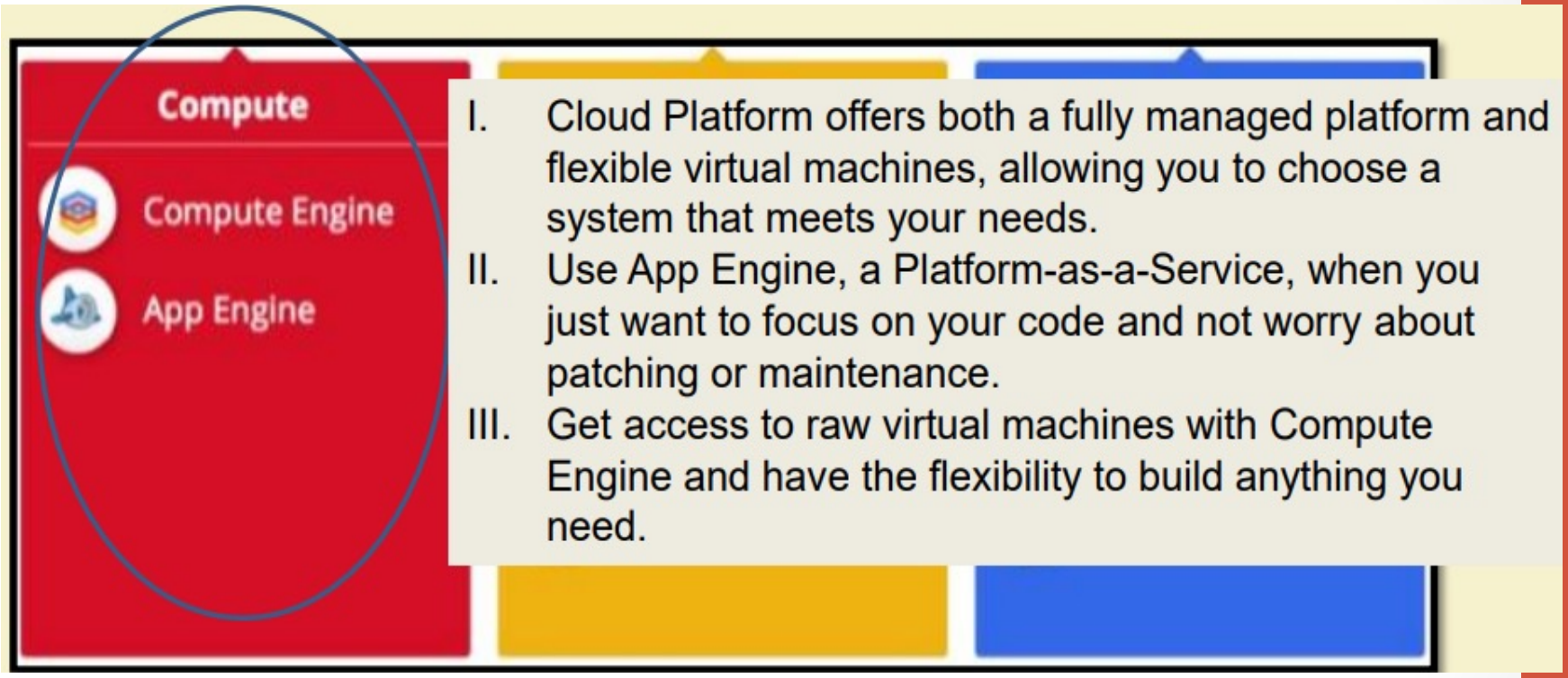


GCP Home

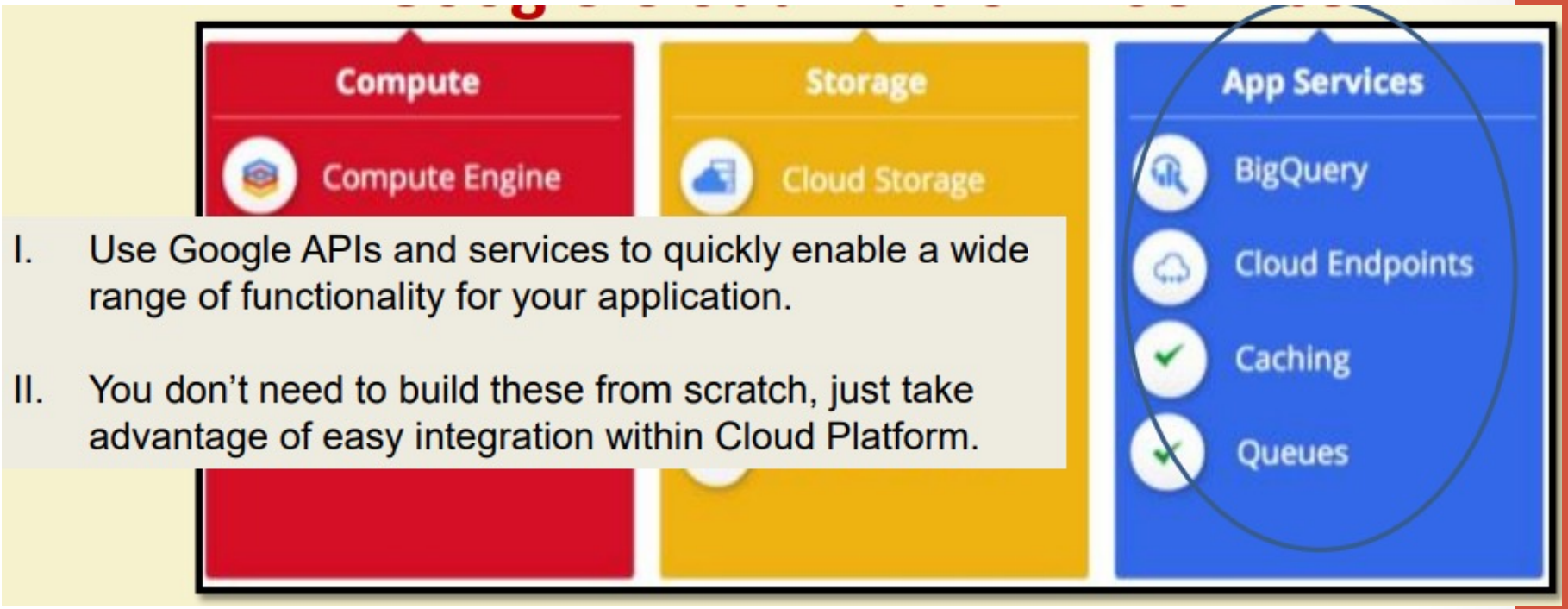

Google Cloud Platform
My First Project
Home
Pins appear here
Cloud Launcher
Billing
APIs & Services
Support
IAM & admin
Getting started
COMPUTE
App Engine
Compute Engine
Kubernetes Engine
Cloud Functions
DASHBOARD
ACTIVITY
CUSTOMIZE
Project info
Project name
My First Project
Project ID
vernal-branch-195307
Project number
790525983815
Go to project settings
Resources
This project has no resources
Trace
No trace data from the past 7 days
Get started with Stackdriver Trace
APIs
Requests (requests/sec)
1.0
0.8
0.6
0.4
0.2
0
12 PM
12:15
12:30
12:45
Go to APIs overview
Google Cloud Platform status
All services normal
Go to Cloud status dashboard
Billing
Estimated charges
INR ₹0.00
For the billing period Feb 1 – 14, 2018
View detailed charges
Error Reporting
No sign of any errors. Have you set up Error Reporting?
Learn how to set up Error Reporting

GCP Services in Depth

Google Cloud Platform Services



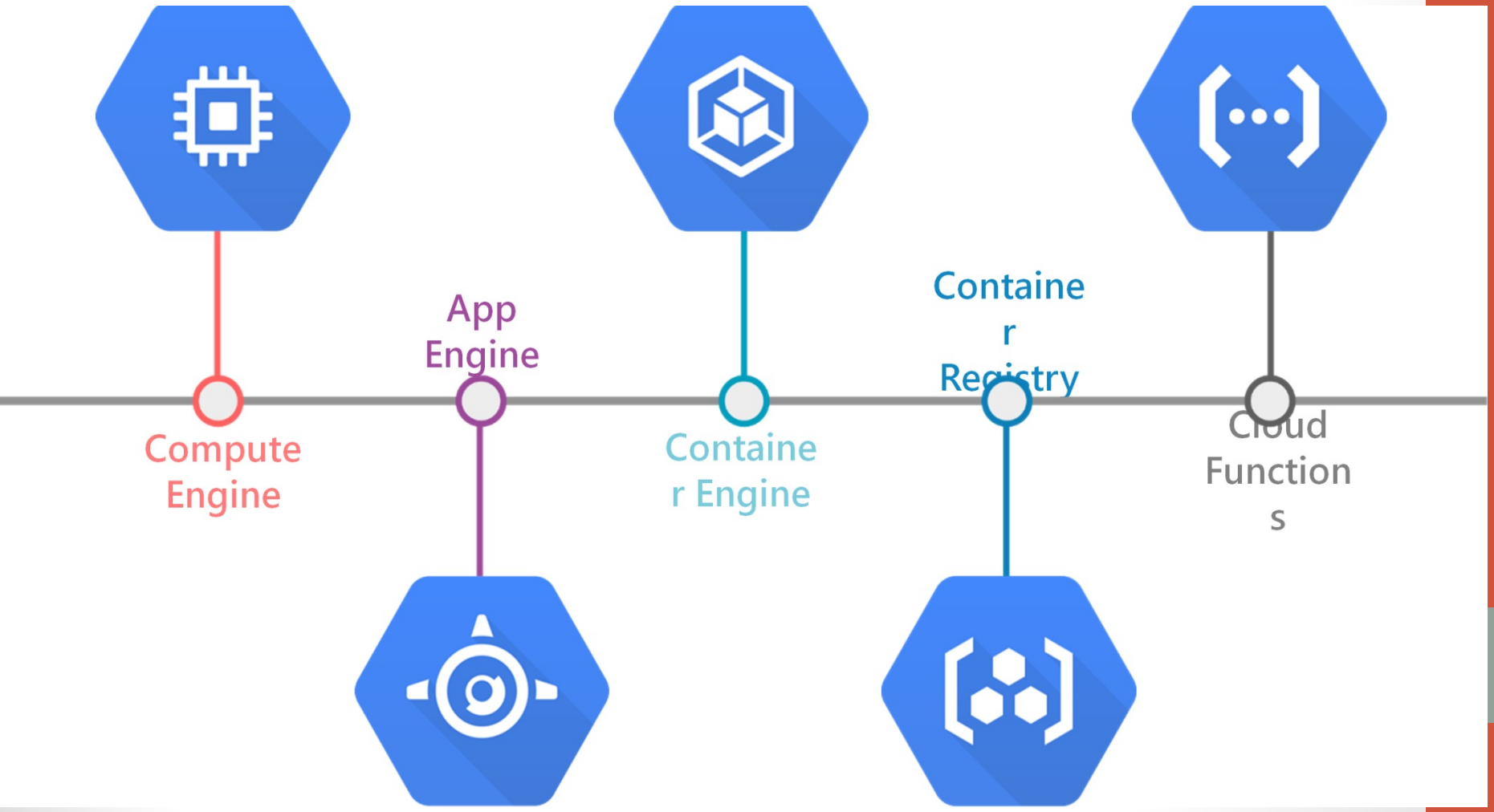
Google Cloud Platform Services



I. Use Google APIs and services to quickly enable a wide range of functionality for your application.

II. You don't need to build these from scratch, just take advantage of easy integration within Cloud Platform.

Compute


Compute Engine
App Engine
Container Engine
Container Registry
Cloud Functions

Google Cloud Platform Services

Compute Engine

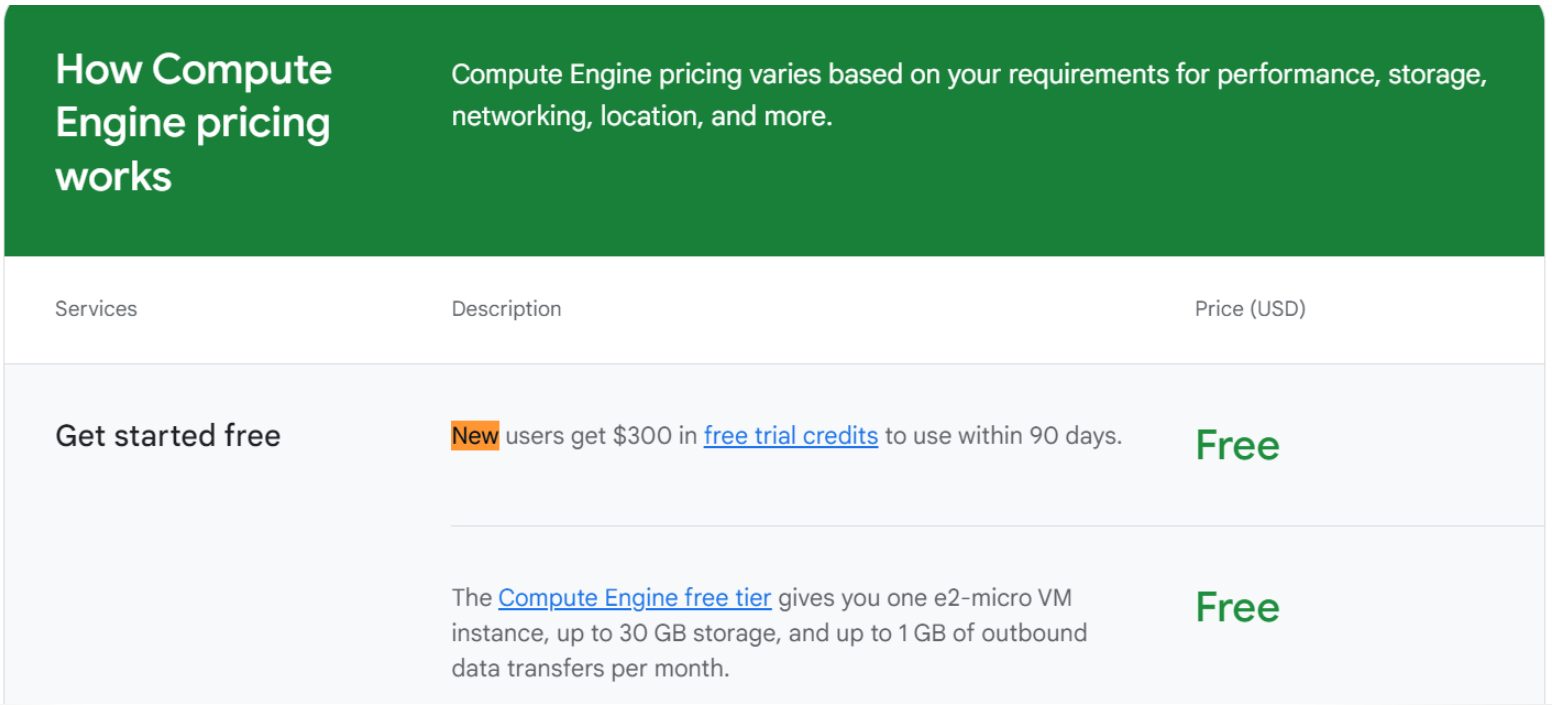
- Secure and customizable compute service that **lets you create and run virtual machines on Google's infrastructure.**

- **Virtual machines for any workload**
  - Easily create and run online VMs on high-performance, reliable cloud infrastructure.

Google Cloud Platform Services

Compute Engine

- New users get $300 in free trial credits to use within 90 days.
- The Compute Engine free tier gives you one e2-micro VM instance, up to 30 GB storage, and up to 1 GB of outbound data transfers per month, **not charged against your credits.**



How Compute Engine pricing works

Compute Engine pricing varies based on your requirements for performance, storage, networking, location, and more.

Services	Description	Price (USD)
Get started free	New users get $300 in free trial credits to use within 90 days.	Free
	The Compute Engine free tier gives you one e2-micro VM instance, up to 30 GB storage, and up to 1 GB of outbound data transfers per month.	Free

Networking

Cloud Virtual Network

Cloud Load Balancing

Cloud CDN

Cloud Interconnect

Cloud DNS

Google Cloud Platform Services

Cloud VPC

- **Network of 38 regions, 115 zones in 200+ countries and territories with uptime of 99.99%**

- Use a single VPC to span multiple regions **without communicating across the public internet**

Google Cloud Platform Services

Cloud VPC

- Global virtual network that spans all regions.
- Single VPC for an entire organization, isolated within projects.
- **Increase IP space with no downtime.**
- **New customers get $300 in free credits to spend on VPC.**

Google Cloud Platform Services

Cloud CDN

- Content Delivery Network
- Uses Google's global edge network to serve content closer to users, **which accelerates your websites and applications.**
- Fast, reliable web and video content delivery with global scale and reach.
- New customers get $300 in free credits to spend on Cloud CDN.

What is a CDN?

- A content delivery network (CDN) is **a network of interconnected servers that speeds up webpage loading** for data-heavy applications.
- CDN can stand for content delivery network or content distribution network.

https://aws.amazon.com/what-is/cdn/

What is a CDN?

- When a user visits a website, data from that website's server has to travel across the internet to reach the user's computer. **If the user is located far from that server, it will take a long time to load a large file, such as a video or website image.**
- Instead, the **website content is stored on CDN servers geographically closer to the users and reaches their computers much faster.**

https://aws.amazon.com/what-is/cdn/

Why is a CDN important?

- The primary purpose of a content delivery network (CDN) is to **reduce latency, or reduce the delay in communication created by a network's design**.
- Because of the global and complex nature of the internet, **communication traffic between websites (servers) and their users (clients) has to move over large physical distances**.
- The communication is also two-way, with requests going from the client to the server and responses coming back.

https://aws.amazon.com/what-is/cdn/

Why is a CDN important?

- A CDN improves efficiency by introducing **intermediary servers between the client and the website server.**
- These CDN servers manage some of the client-server communications. **They decrease web traffic to the web server, reduce bandwidth consumption,** and improve the user experience of your applications.

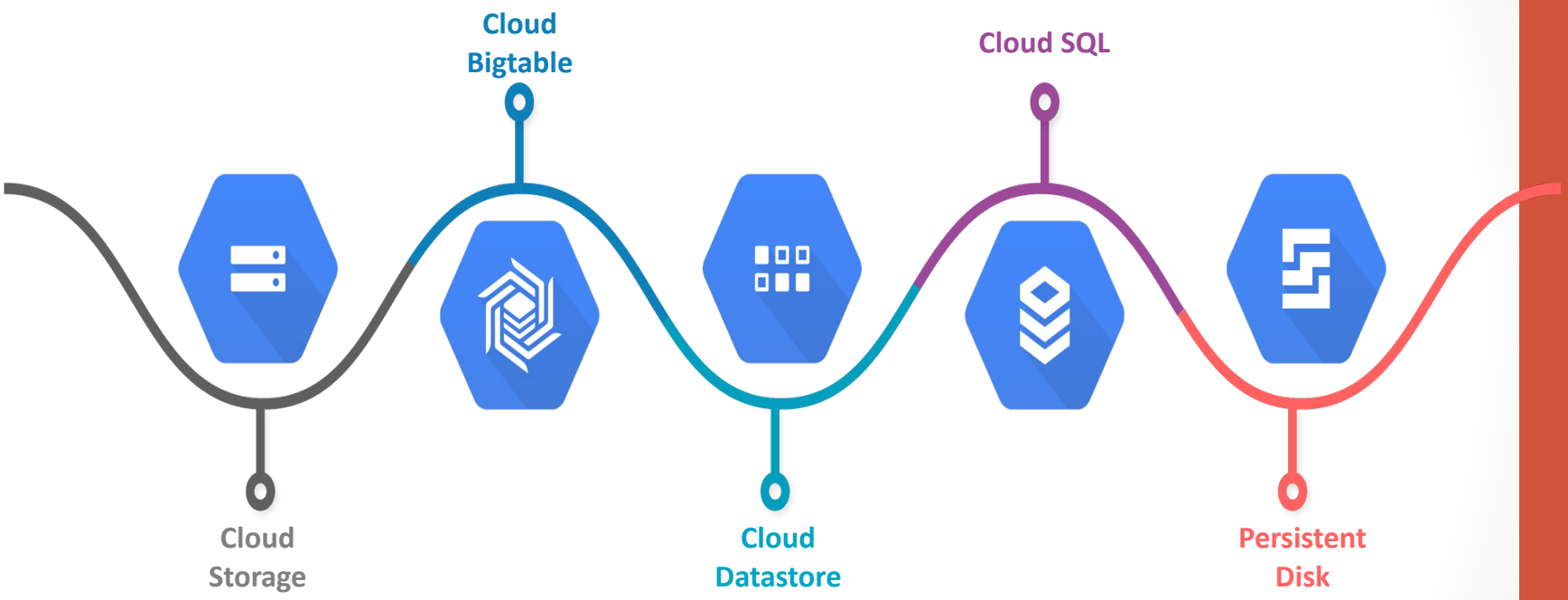
https://aws.amazon.com/what-is/cdn/

CDN?

- You could think of a CDN like an ATM.
- Having a cash machine on practically every corner makes it fast and efficient to get money. **There's no wait time in long bank lines, and the ATMs are placed in many convenient locations for immediate access.**

https://www.akamai.com/our-thinking/cdn/what-is-a-cdn

Storage and Databases



Google Cloud Platform Services

Cloud Storage

- **Object storage for companies of all sizes**
- Cloud Storage is a managed service for storing unstructured data. Store any amount of data and retrieve it as often as you like.

- To use Cloud Storage, you'll first create a bucket, a basic container that holds your data in Cloud Storage. You'll then upload objects into that bucket—where you can download, share, and manage objects.

Google Cloud Platform Services

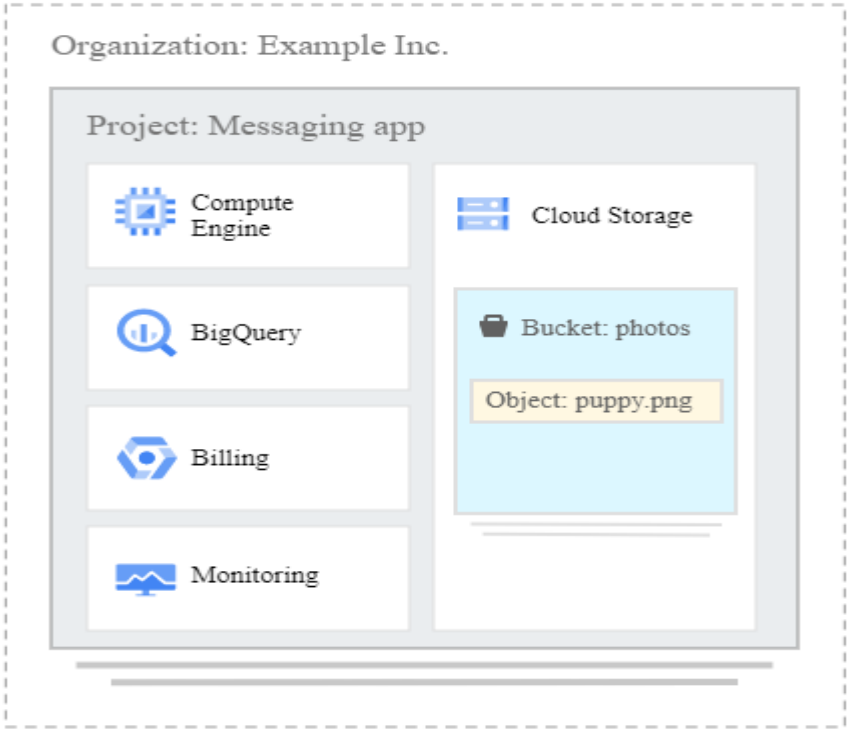
Cloud Storage

- Cloud Storage is a service for storing your objects in Google Cloud. An object is an immutable piece of data consisting of a file of any format.

Google Cloud Platform Services

Cloud Storage

- You store objects in containers called buckets. All buckets are associated with a project, and you can group your projects under an organization.
- Each project, bucket, and object in Google Cloud is a resource in Google Cloud



Google Cloud Platform Services

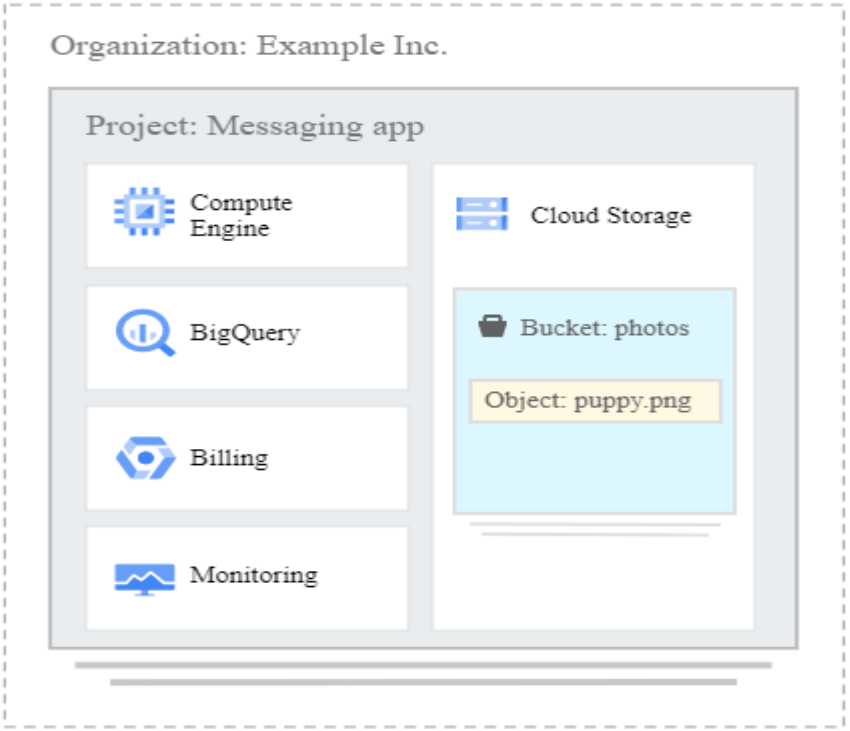
Cloud Storage

- After you create a project, you can create Cloud Storage buckets, upload objects to your buckets, and download objects from your buckets.
- You can also grant permissions to make your data accessible to principals you specify, or - for certain use cases such as hosting a website - accessible to everyone on the public internet.

Google Cloud Platform Services

Cloud Storage

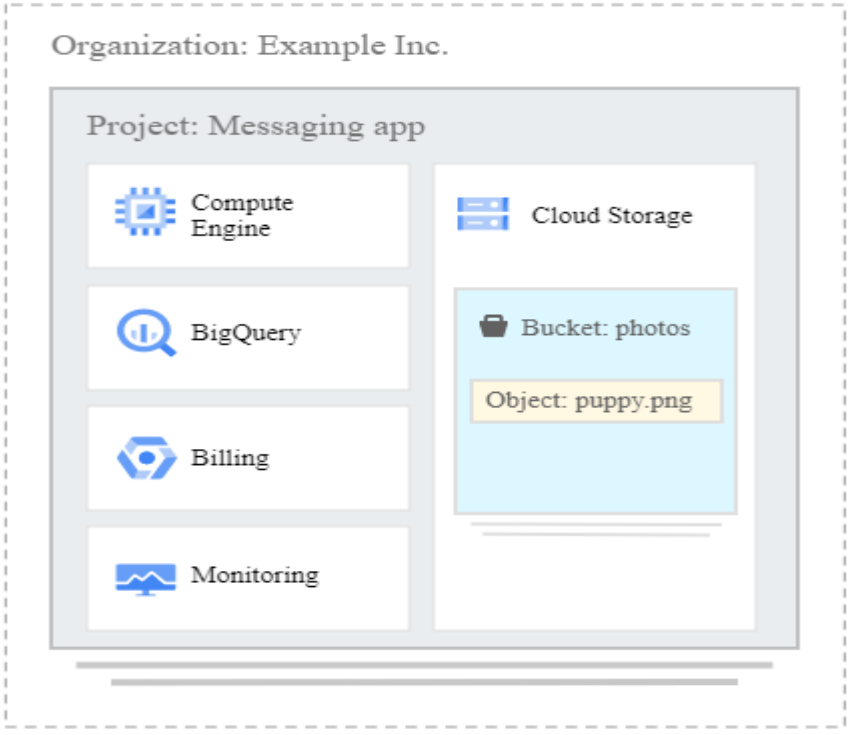
- **Organization**: Your company, called Example Inc., creates a Google Cloud organization called exampleinc.org.
- **Project**: Example Inc. is building several applications, and each one is associated with a project. Each project has its own set of Cloud Storage APIs, as well as other resources.



Google Cloud Platform Services

Cloud Storage

- **Bucket**: Each project can contain multiple buckets, which are containers to store your objects. For example, you might create a photos bucket for all the image files your app generates and a separate videos bucket.
- **Object**: An individual file, such as an image called puppy.png.



Google Cloud Platform Services

Cloud Storage

Storage type	Description	Best for
Standard storage	Storage for data that is frequently accessed ("hot" data) and/or stored for only brief periods of time.	"Hot" data, including websites, streaming videos, and mobile apps.
Nearline storage	Low cost, highly durable storage service for storing infrequently accessed data.	Data that can be stored for 30 days.
Coldline Storage	A very low cost, highly durable storage service for storing infrequently accessed data.	Data that can be stored for 90 days.
Archival storage	The lowest cost, highly durable storage service for data archiving, online backup, and disaster recovery.	Data that can be stored for 365 days.

Google Cloud Platform Services

Cloud SQL

- Fully managed relational database service for MySQL, PostgreSQL, and SQL Server with rich extension collections, configuration flags, and developer ecosystems.
- New customers get $300 in free credits to spend on Cloud SQL. You won't be charged until you upgrade.

Cloud SQL

Google Cloud Platform Services

Datastore

- Datastore is a highly scalable NoSQL database for your web and mobile applications.
- **Datastore automatically handles sharding and replication,** providing you with a highly available and durable database that scales automatically to handle your applications' load.
- Datastore provides a **myriad of capabilities such as ACID transactions,** SQL-like queries, indexes, and much more.

What is Sharding?

- The word "**Shard**" means "**a small part of a whole**". Hence Sharding means dividing a larger part into smaller parts.
- **In DBMS, Sharding is a type of DataBase partitioning in which a large database is divided or partitioned into smaller data and different nodes.**
- These shards are not only smaller, but also faster and hence easily manageable.

Need for Sharding:

- Consider a very large database whose sharding has not been done. For example, let's take a DataBase of a college in which all the student's records (present and past) in the whole college are maintained in a single database. So, it would contain a very very large number of data, say 100, 000 records.
- Now when we need to find a student from this Database, each time around 100, 000 transactions have to be done to find the student, which is very very costly.
- Now consider the same college students records, divided into smaller data shards based on years. Now each data shard will have around 1000-5000 students records only.
- So not only the database became much more manageable, but also the transaction cost each time also reduces by a huge factor, which is achieved by Sharding. Hence this is why Sharding is needed.

How does Sharding work?

- In a sharded system, the data is partitioned into shards based on a predetermined criterion. For example, a sharding scheme may divide the data based on geographic location, user ID, or time period.
- Once the data is partitioned, it is distributed across multiple servers or nodes. Each server or node is responsible for storing and processing a subset of the data.

How does Sharding work?

- To query data from a sharded database, the system needs to know which shard contains the required data.
- **This is achieved using a shard key, which is a unique identifier** that is used to map the data to its corresponding shard and then sends the query to the appropriate server or node.

Google Cloud Platform Services

Firestore

- Firestore is the next generation of Datastore
- Firestore is the newest version of Datastore and introduces several improvements over Datastore.
- Existing Datastore users can access these improvements by creating a new Firestore in Datastore mode database instance. In the future, all existing Datastore databases will be automatically upgraded to Firestore in Datastore mode.

Google Cloud Platform Services

Cloud Bigtable

- HBase-compatible, enterprise-grade NoSQL database service with single-digit millisecond latency, limitless scale, and 99.999% availability for large analytical and operational workloads.
- New customers get $300 in free credits to spend on Bigtable

- **HBase** is a column-oriented non-relational database management system that runs on top of Hadoop Distributed File System (HDFS)..

Google Cloud Platform Services

Persistent Disk

- Reliable, high-performance block storage for virtual machine instances.
- Enterprise scale, limitless flexibility, and competitive price for performance.
- New customers get $300 in free credits to spend on Persistent Disk.

GCP Persistent Disk

Big Data

BigQuery

Dataproc

Pub/Sub

Dataflow

Datalab

Genomics

Google Cloud Platform Services

Big Query

- **Cloud data warehouse to power your data-driven innovation**
- BigQuery is a **completely serverless and cost-effective enterprise data warehouse** that works across clouds and scales with your data**, with BI, machine learning and AI built in.**

Google BigQuery

Google Cloud Platform Services

Dataproc

- Dataproc is a fully managed and highly scalable service for running Apache Hadoop, Apache Spark, Apache Flink, Presto, and 30+ open source tools and frameworks.
- **Run open source data analytics software at scale**, with enterprise grade security
- **Fully managed and automated big data open source software**

Google Cloud Platform Services

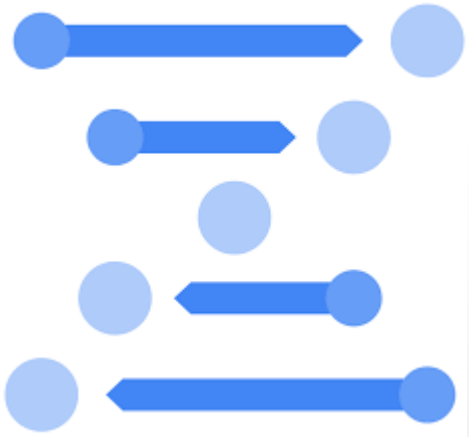
Dataflow

- Dataflow is a managed service for executing a wide variety of data processing patterns.
- **Batch and streaming data processing using Dataflow,**
- Unified stream and batch data processing that's serverless, fast, and cost-effective.
- New customers get $300 in free credits to spend on Dataflow.

Google Cloud Platform Services

Cloud Life Sciences[BETA]

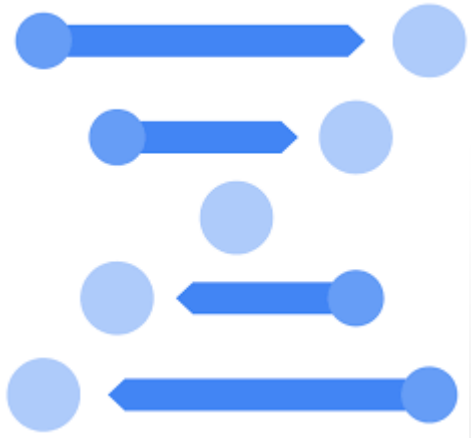
- From Genomics to Life Sciences
- **Cloud Life Sciences enables the life sciences community to process biomedical data at scale.**
- Process, analyze, and annotate genomics and biomedical data at scale using containerized workflows.



Google Cloud Platform Services

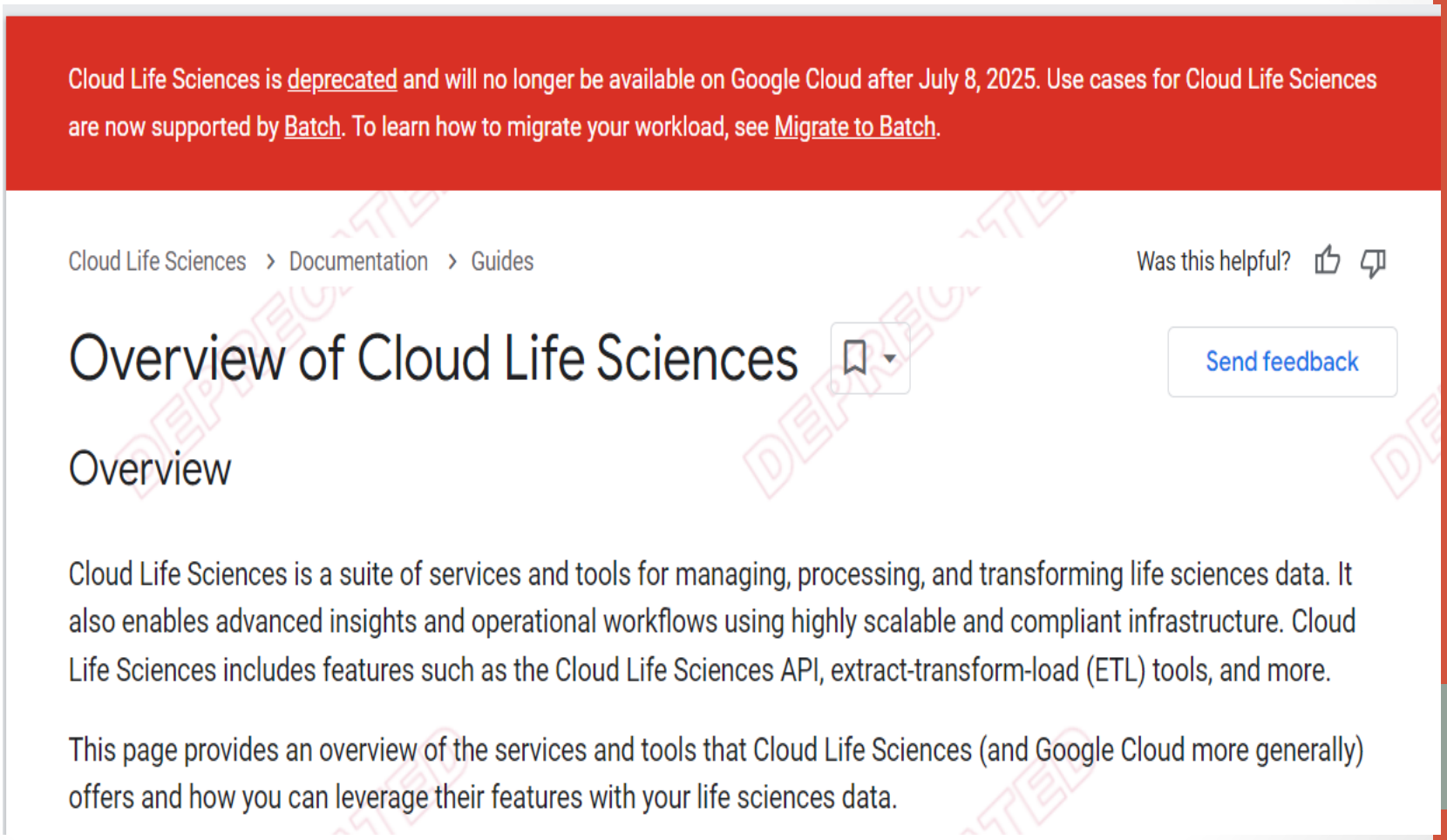
Cloud Life Sciences[BETA]

- Cloud Life Sciences is a **suite of services and tools for managing, processing, and transforming life sciences data. It also enables advanced insights and operational workflows** using highly scalable and compliant infrastructure.
- Cloud Life Sciences includes features such as **the Cloud Life Sciences API, extract-transform-load (ETL) tools, and more.**



Google Cloud Platform Services

- **Cloud Life Sciences**[BETA]



Cloud Life Sciences is deprecated and will no longer be available on Google Cloud after July 8, 2025. Use cases for Cloud Life Sciences are now supported by Batch. To learn how to migrate your workload, see Migrate to Batch.

Cloud Life Sciences › Documentation › Guides

Was this helpful?

Overview of Cloud Life Sciences

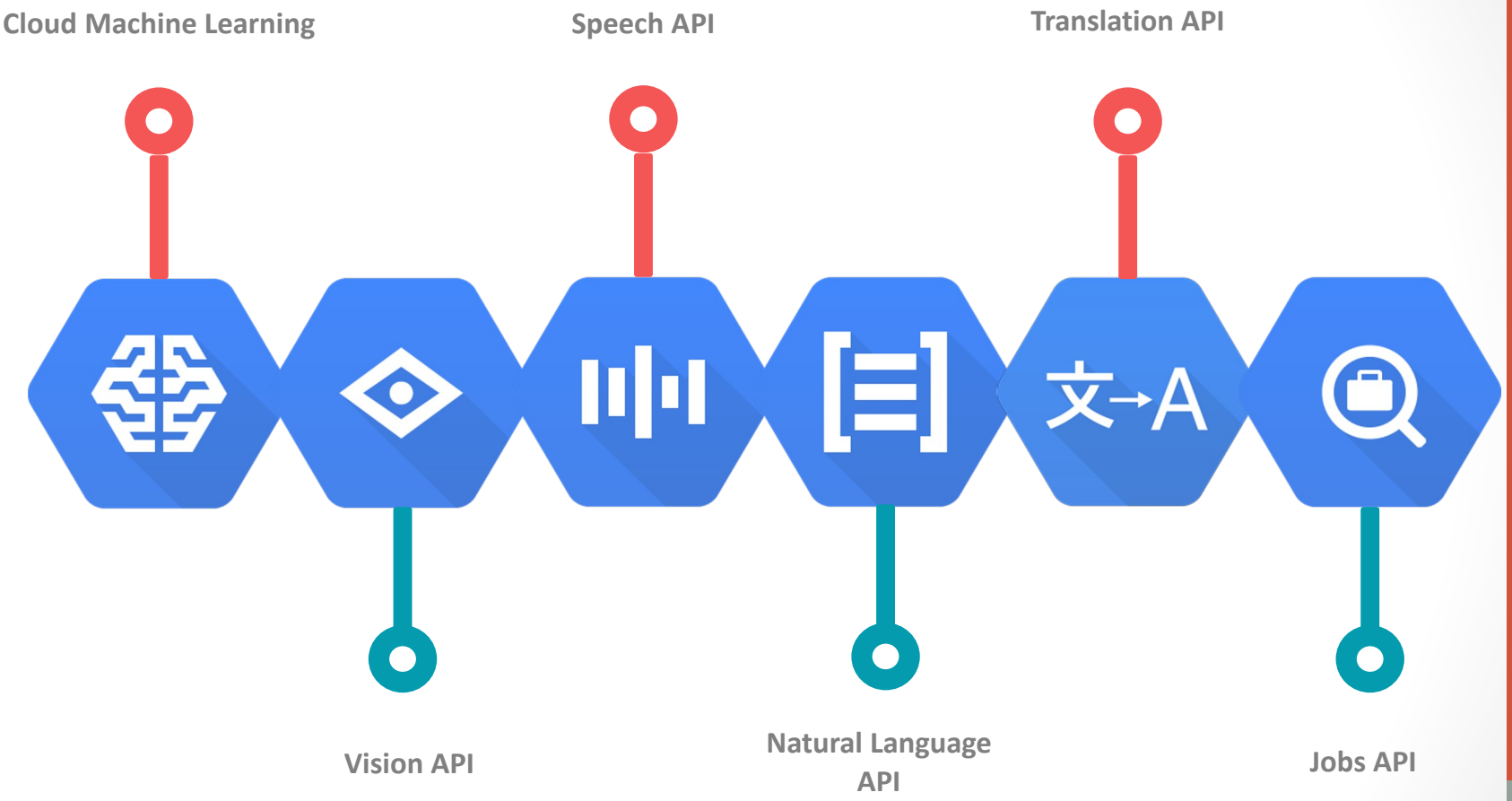
Send feedback

Overview

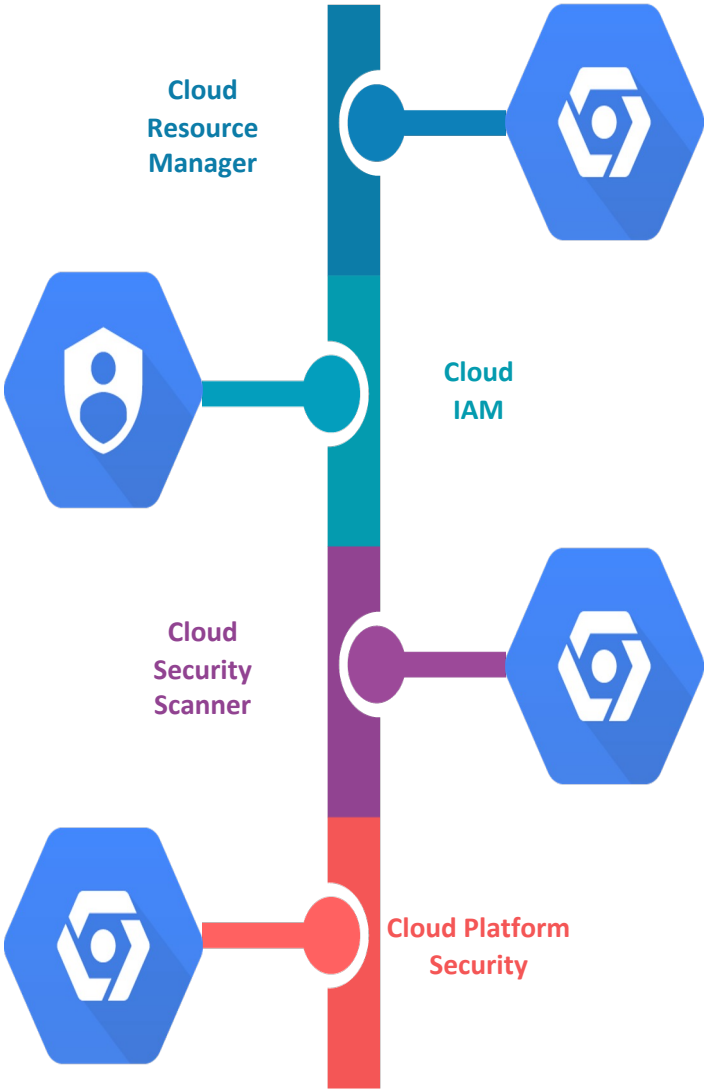
Cloud Life Sciences is a suite of services and tools for managing, processing, and transforming life sciences data. It also enables advanced insights and operational workflows using highly scalable and compliant infrastructure. Cloud Life Sciences includes features such as the Cloud Life Sciences API, extract-transform-load (ETL) tools, and more.

This page provides an overview of the services and tools that Cloud Life Sciences (and Google Cloud more generally) offers and how you can leverage their features with your life sciences data.

Machine Learning



Identity & Security



Management and Developer Tools