Google Cloud Platform (GCP)
For Cloud Architects

THINKNYX
TECHNOLOGIES

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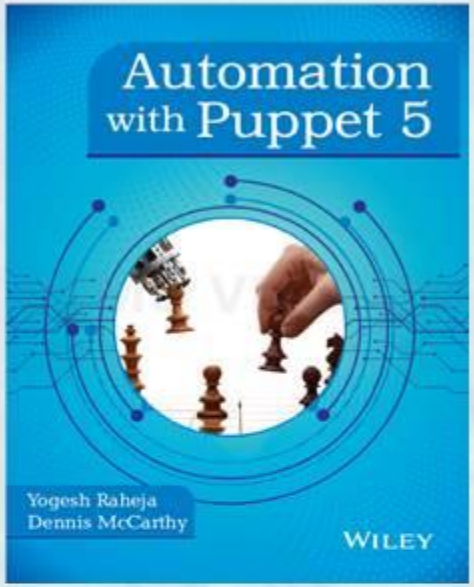
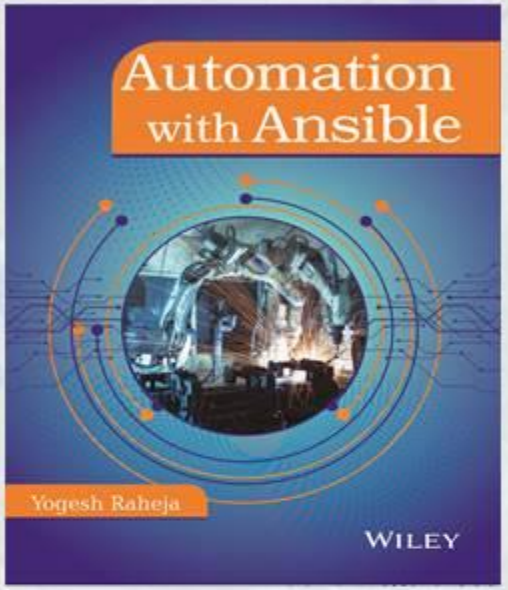
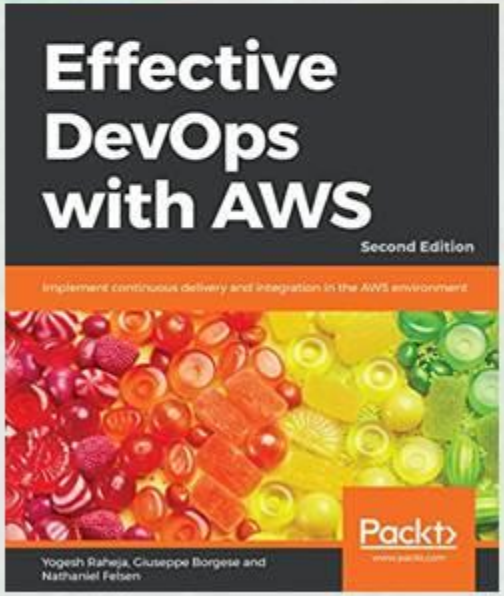
WHO AM I

Thinknyx







YOGESH RAHEJA

GCP Certification Roadmap

Professional Cloud Architect

Demonstrate your proficiency to design, build and manage solutions on Google Cloud Platform.

REGISTER DETAILS

Professional Data Engineer

Demonstrate your proficiency to design and build data processing systems and create machine learning models on Google Cloud Platform.

REGISTER DETAILS

https://cloud.google.com/certification/

What is cloud?

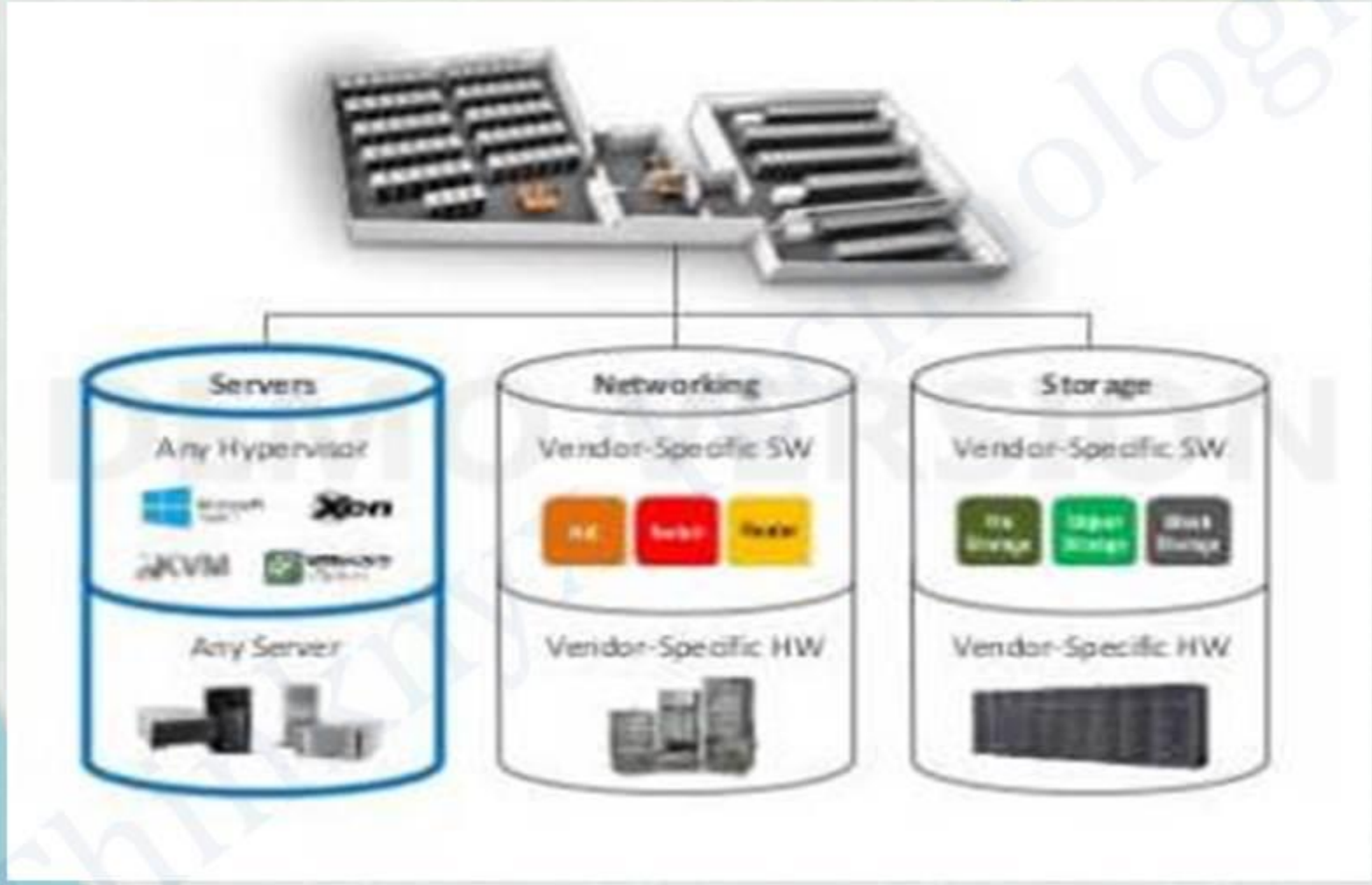
- "Cloud Computing is the delivery of Computing as a service rather than a Product."

- But how?..

- Any cloud model is composed of:

- five essential characteristics
- three service models
- four deployment models

Traditional DC and why cloud?



Traditional DC and why cloud?

- Main issues with Traditional IT Infrastructure.

- Infrastructure is not a core business
- Hard to Scale
- Dedicated Infrastructure teams
- Dedicated Datacenters
- Dependency on vendors (servers, switches, cables etc.)
- Underutilized Resources
- High Cost

Traditional DC and why cloud?

- To overcome all of the discussed challenges, IT infrastructure domain drifted towards Service based model which is a real "cloud computing"

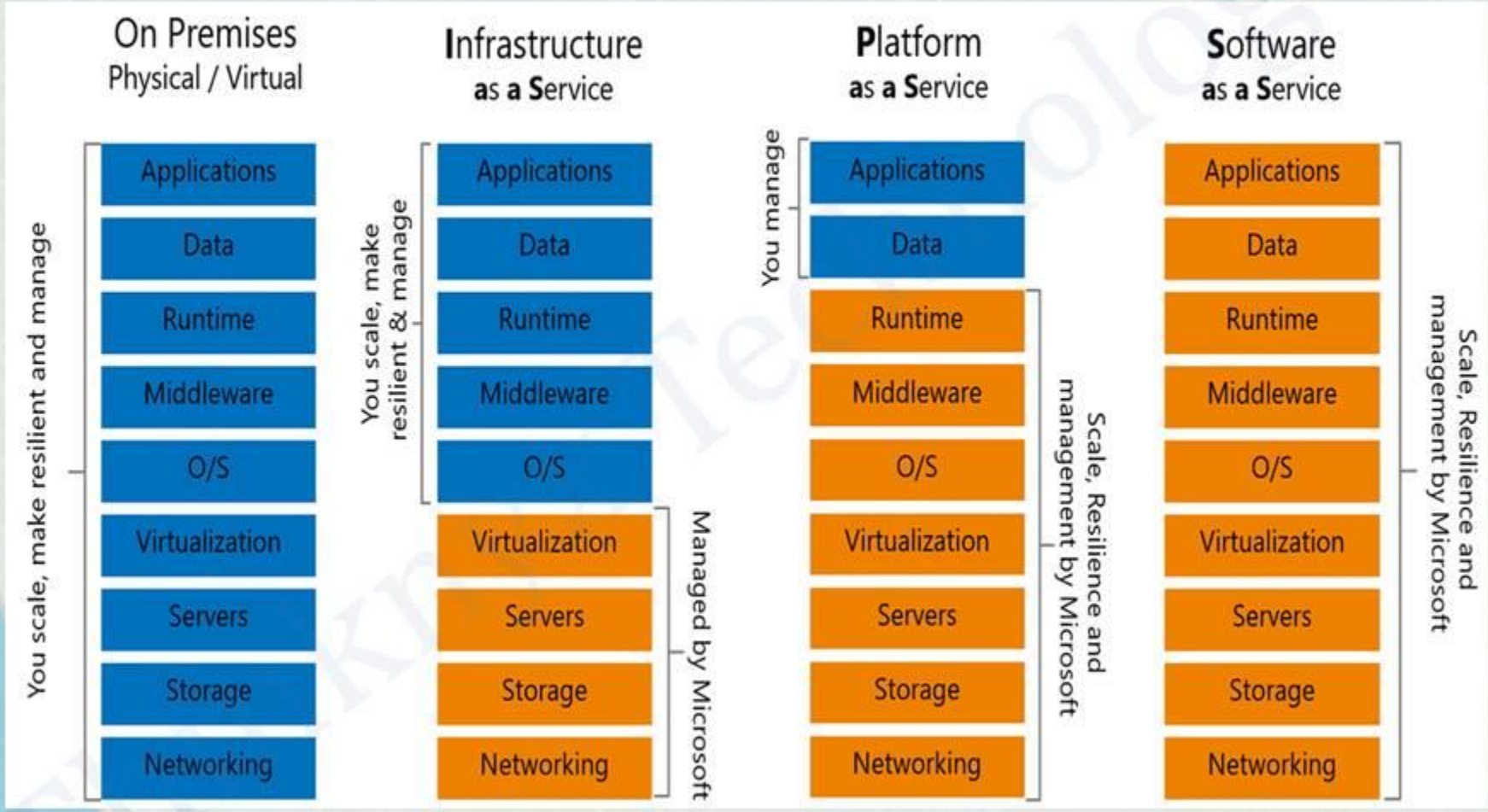
- No Dedicated Datacenter
- No Different Infrastructure Teams
- Higher/Faster Scalability
- Elasticity
- Pay per use model
- Option to adopt high availability
- Better performance
- Different storage options
- Optimized use of resources

Cloud Service Models

- There are three Cloud Computing Service Models:

- Infrastructure as a Service (IaaS)
- Platform as a Service (PaaS)
- Software as a Service (SaaS)

Responsibility- Who owns What?

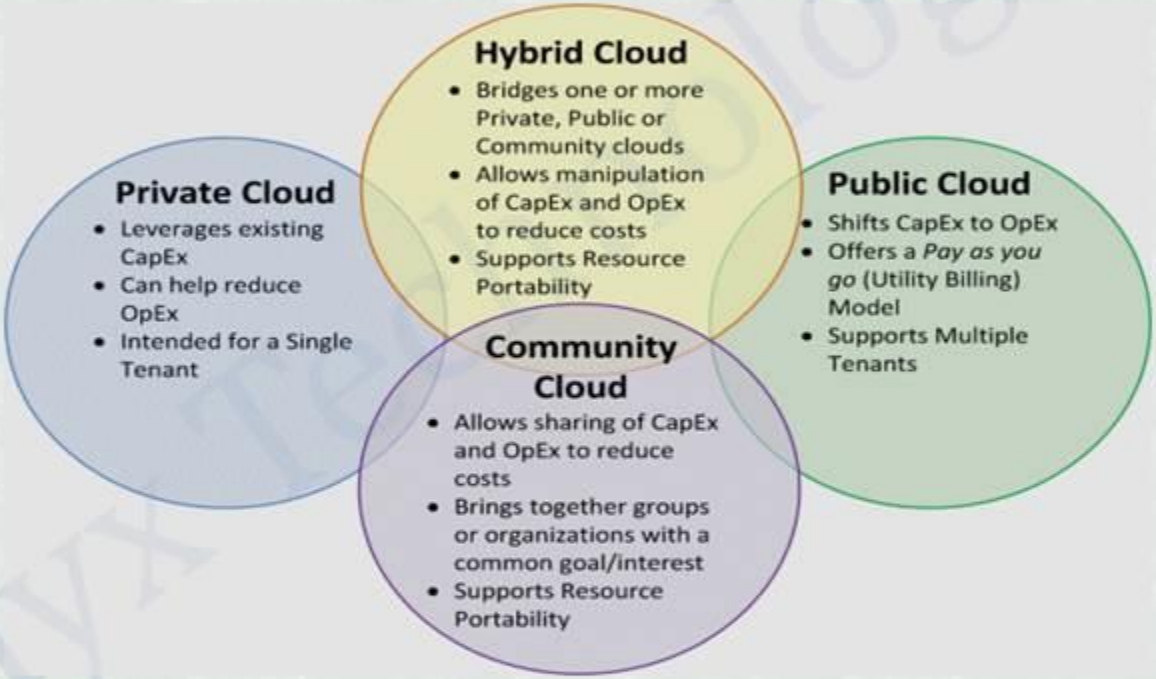


Cloud Essentials Characteristics

- On-demand self-service
- Broad network access
- Resource Pooling
- Rapid Elasticity
- Measured Services

Cloud Deployments Types

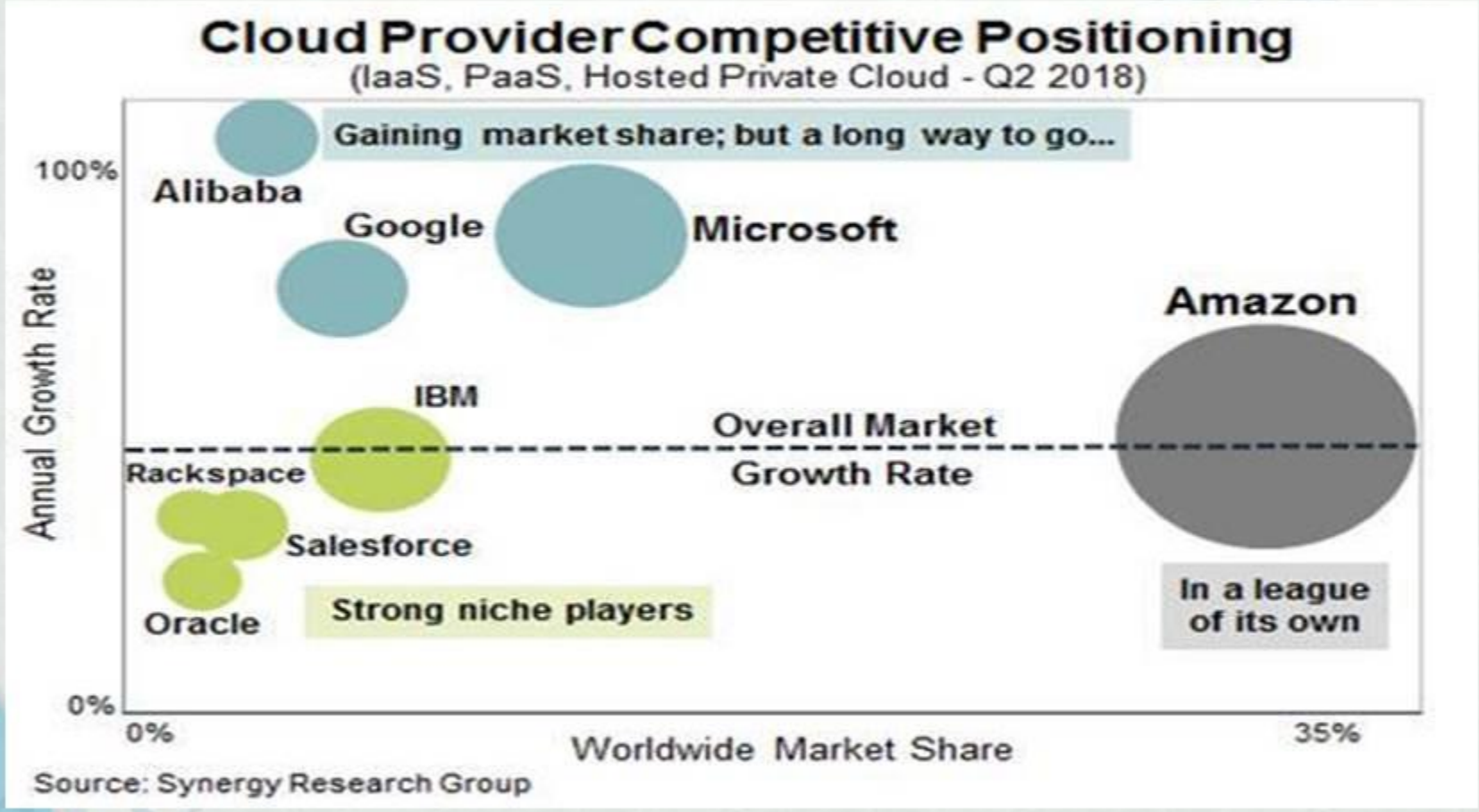
- Public Cloud
- Private Cloud
- Hybrid Cloud
- Community Cloud



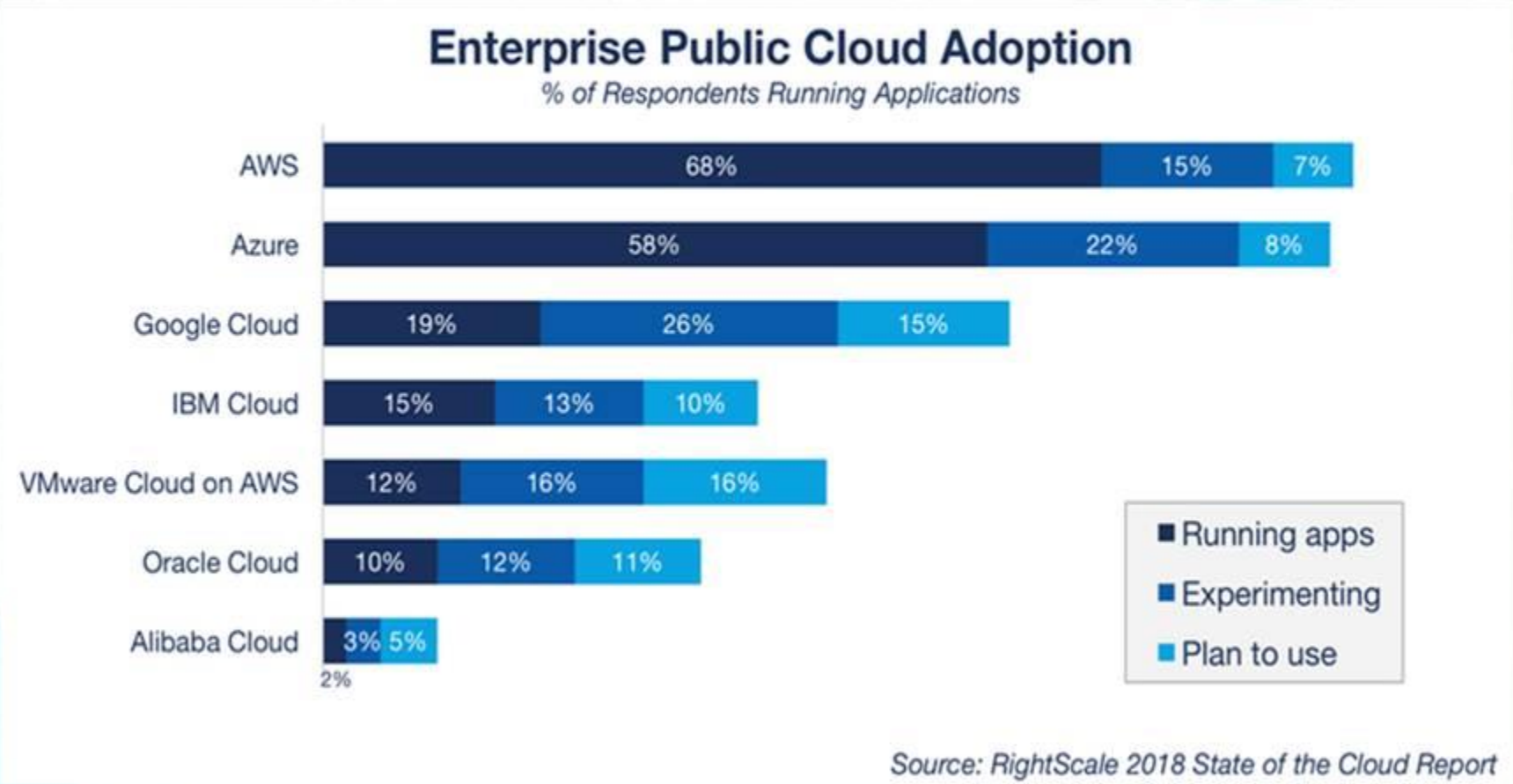
Cloud Vendors

- AWS
- Microsoft Azure
- GCP
- DigitalOcean
- RackSpace
- IBM Bluemix
- Oracle Cloud
- PackStack
- Pivotal CloudFoundary

Who stands where?



Who stands where?



What is GCP

- GCP (Google Cloud Platform) is a group of web services (also known as cloud services) provided by Google.
- GCP provide IT infrastructure like CPU, Storage as a service, which means there is no need for any hardware procurement.
- 100's of instances can be build and use in few minutes as and when required, which saves ample amount of hardware cost for any organizations and make them efficient to focus on their core business areas.
- Currently GCP is present and providing cloud services many countries and is expanding in IaaS, CaaS and Machine Learning services.

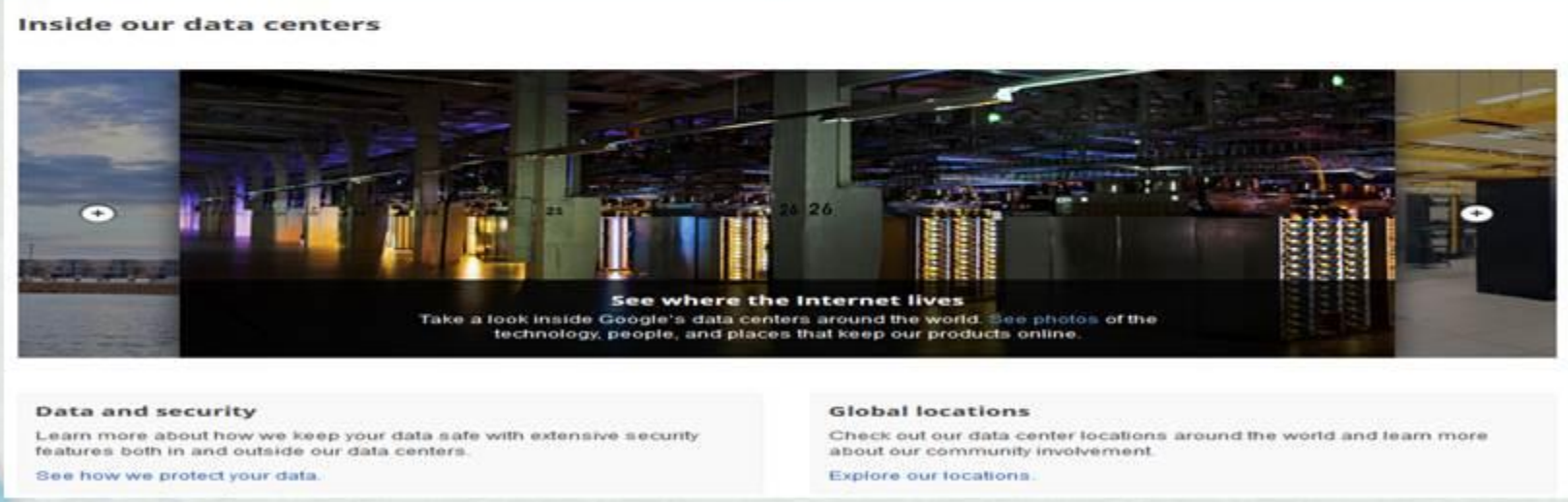
GCP Core Benefits

- **Low Cost:** GCP offers, pay as you go pricing. GCP models are usually cheapest among other service providers in the market.
- **Instant Elasticity:** You need 1 server or 1000's of severs, GCP has a massive infrastructure at backend to server almost any kind of infrastructure demands with pay for what you use policy.
- **Scalability:** Facing some resource issues, no problem within in seconds you can scale up the resources and improve your application performance. This cannot be compared with traditional IT datacenters.
- **Multiple OS's:** Choice and use any supported Operating systems.
- **Multiple Storage Options:** Choice of high I/O storage, low cost storage. All is available in AWS, use and pay what you want to use with almost any scalability.
- **Secure:** GCP is ISO 27001, SOC 2/3, and PCI DSS 3.0 passed. Infact systems based on GCP are usually more secure than inhouse IT infrastructure systems.

GCP Global Infrastructure

- **Do you really want to see us:**

https://cloud.google.com/about/data-centers/



GCP Global Infrastructure

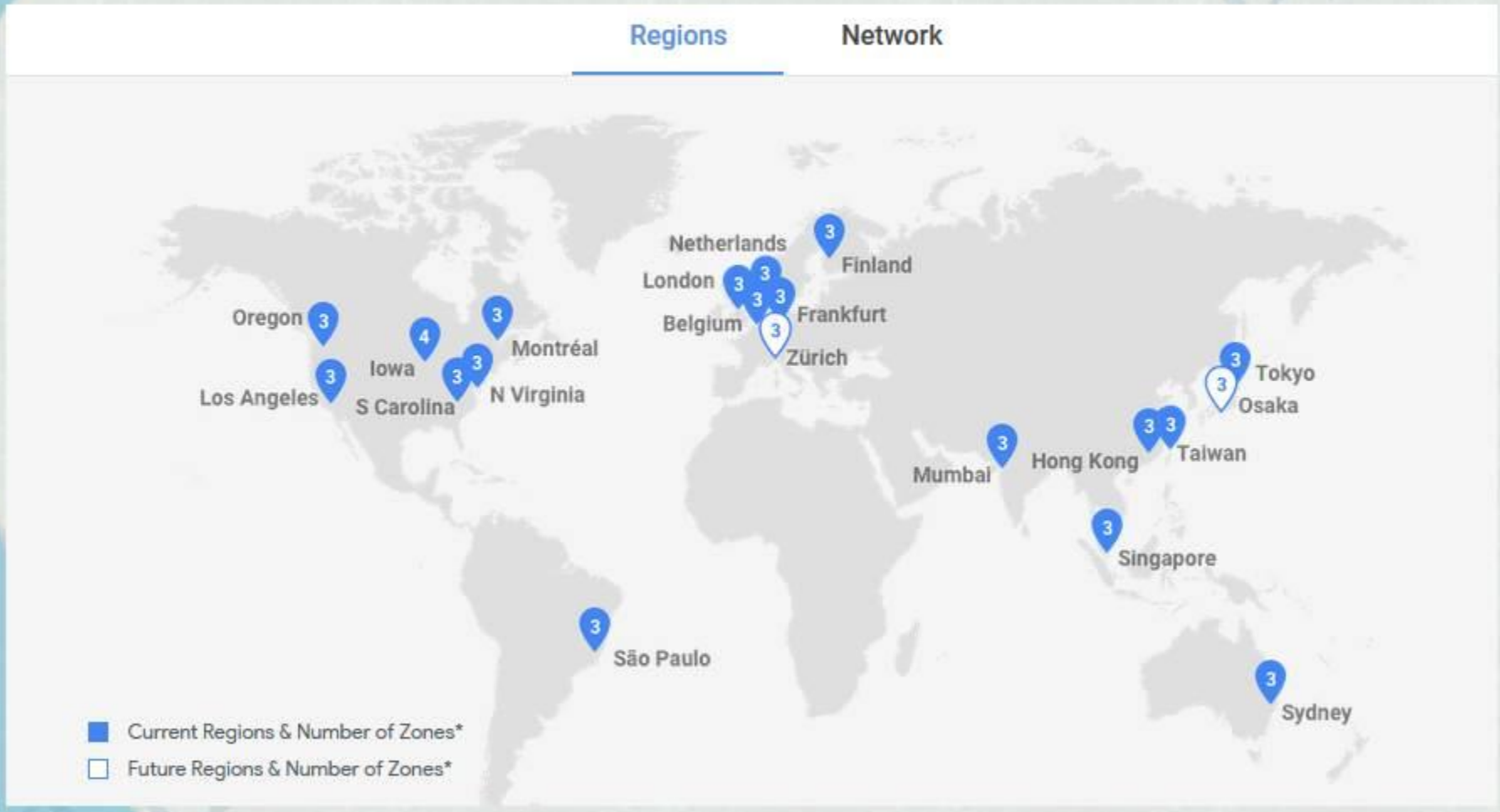
- **GCP Regions:**
- Geographic Locations
- Consists of at least three GCP Zones(AZs)
- All of the regions are independent of each other with separate Power Sources, Colling and Internet connectivity.
- *Regions* actually consists of *zones*

- **GCP Zones**
- Zones in GCP is a distinct location within a region
- Each zone is insulated (with low-latency links) from other to support single point of failures
- Each Region has minimum two or more AZ's

Dec-2018, GCP has 18 regions, 55 zones, over 100 points of presence across 35 countries, and a well-provisioned global network with 100,000s of miles of fiber optic cable.

Source: https://cloud.google.com/about/locations/

GCP Global Infrastructure



Source: https://cloud.google.com/about/locations/

GCP Cloud Computing Platform

Source: https://cloud.google.com/products/

Accessing GCP Platform

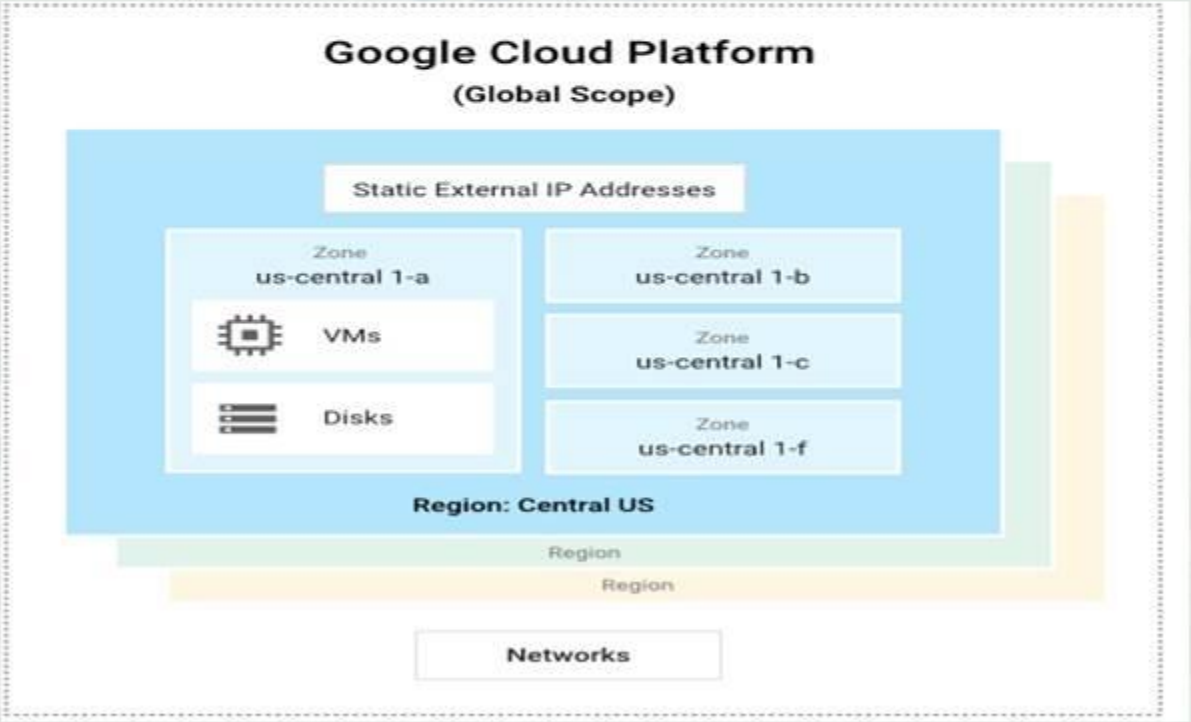
- GCP Management Console
- GCP Command line interface (gcloud utility)
- GCP Software Development Kit's

GCP Resources

- Everything in GCP is a resources, started from Physical hardware to Regions to Zones.

- Broadly GCP resources are categorized into three parts:

- Global Resource
- Regional Resource
- Zonal Resource



GCP Projects

- Project is one of the critical Object in GCP, you can think Projects as Tenants in any other cloud environment.

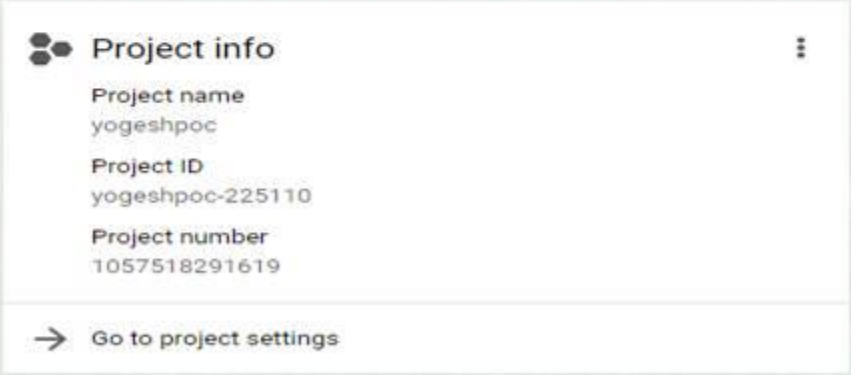
- Any GCP resources that you allocate and use must belong to a project.

- Each GCP project has:

- A project name, which you provide.

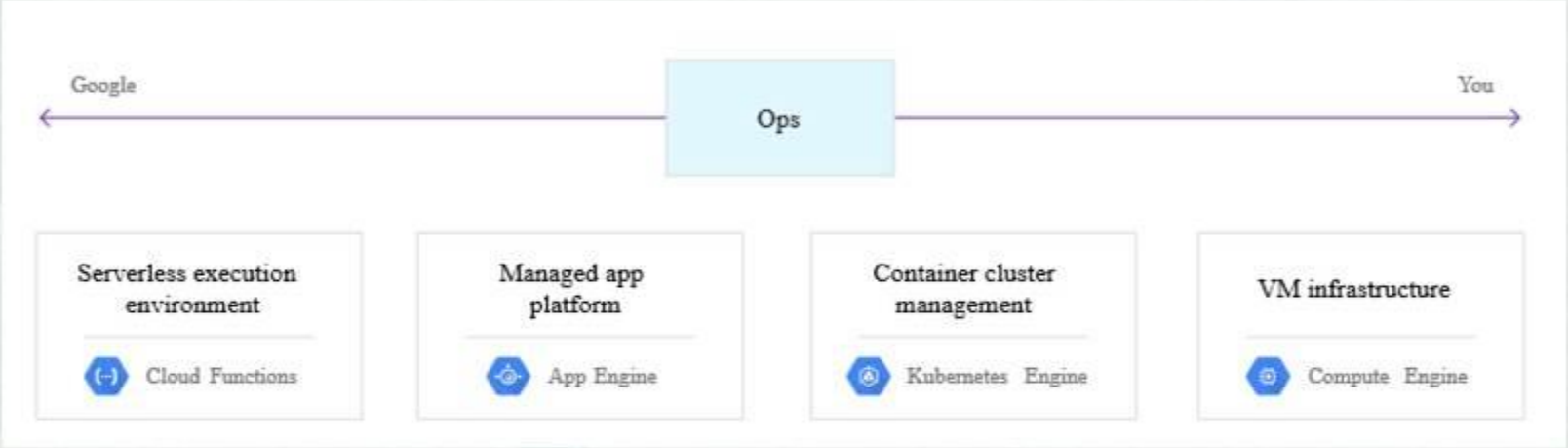
- A project ID, which you can provide or GCP can provide for you. - Each project ID is unique across GCP

- A project number, which GCP provides.



Most Commonly used GCP services

- **Computing and Hosting Services**



- Compute Engine: Exactly like your VM machines
- Kubernetes Engine: Next layer of virtualization in IT
- App Engine: Google App Engine is GCP's *platform as a service* (PaaS). With App Engine, Google handles most of the management of the resources for you
- Serverless Computing: GCP's *functions as a service* (FaaS) offering, provides a serverless execution environment for building and connecting cloud services

Most Commonly used GCP services

- **Storage Services**

- Persistent Disks: Block level storage for VM's
- Cloud Storage: Object level storage for global access
- Cloud Storage for Firebase: Storage for Mobile apps
- Cloud Filestore: A managed file storage service for applications (NAS)

Most Commonly used GCP services

- **Databases Services**

- Cloud sql: MySQL and PostgreSQL database service.
- Cloud Bigtable: NoSQL wide-column database service.
- Cloud Spanner: Mission-critical, scalable, relational database service.
- Cloud Datastore: NoSQL document database service.
- Cloud Memorystore: Fully managed in-memory data store service.

Most Commonly used GCP services

- **Networking Services**

- VPC: VPC networking for GCP resources.
- Cloud Load Balancing: High-performance, scalable load balancing.
- Cloud CDN: Content delivery on Google's global network.
- Cloud Interconnect: Connect directly to GCP's network edge.
- Cloud VPN: Securely connect to your GCP VPC via the public internet.
- Cloud DNS: Reliable, resilient, low-latency DNS serving.

Most Commonly used GCP services

- **Transfer and Migration Services**

- Cloud Data Transfer: Command line tools for developers to transfer data over the network.

- Transfer Appliance: Rackable storage server for shipping large volumes of data to Google Cloud.

- Cloud Storage Transfer Service: Transfer data between cloud storage services such as AWS S3 and Google Cloud Storage.

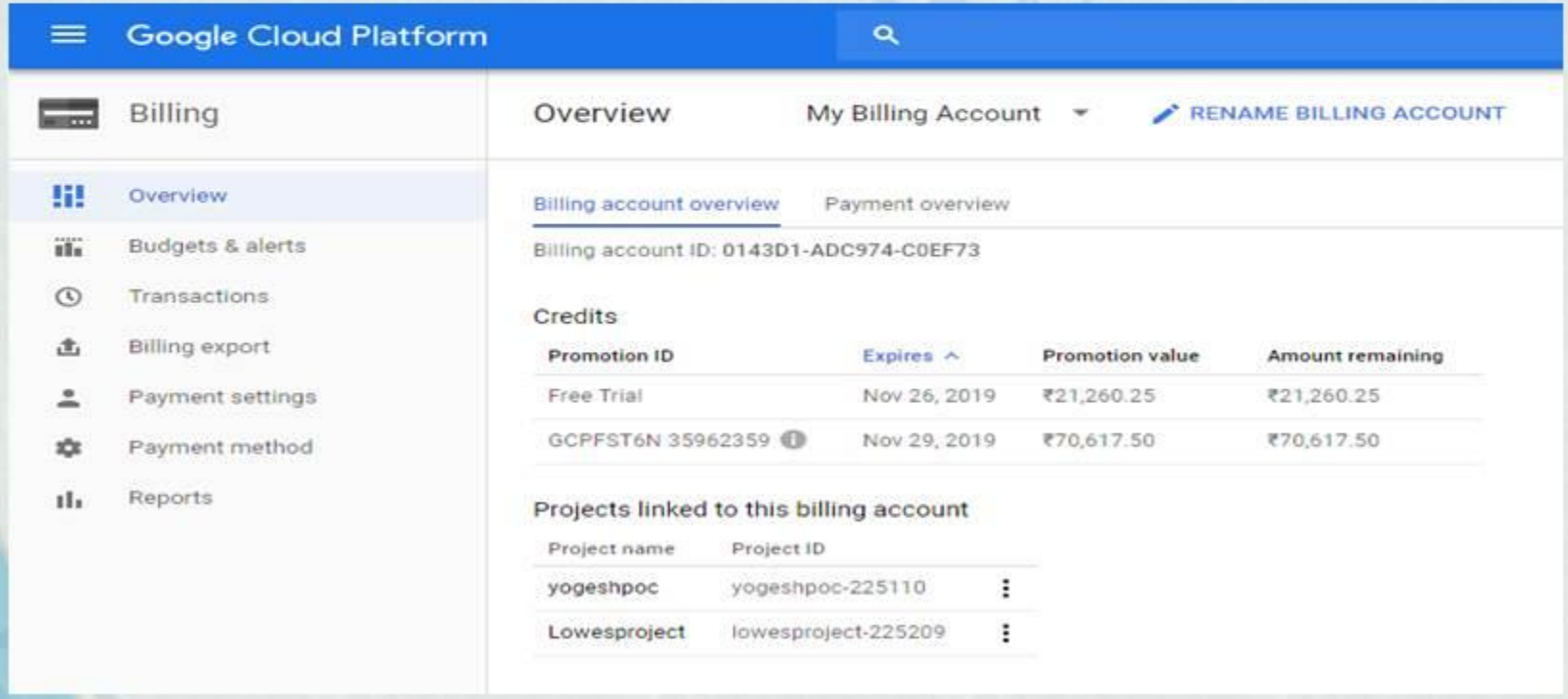
- BigQuery Data Transfer Service: Fully managed data import service for BigQuery.

Most Commonly used GCP services

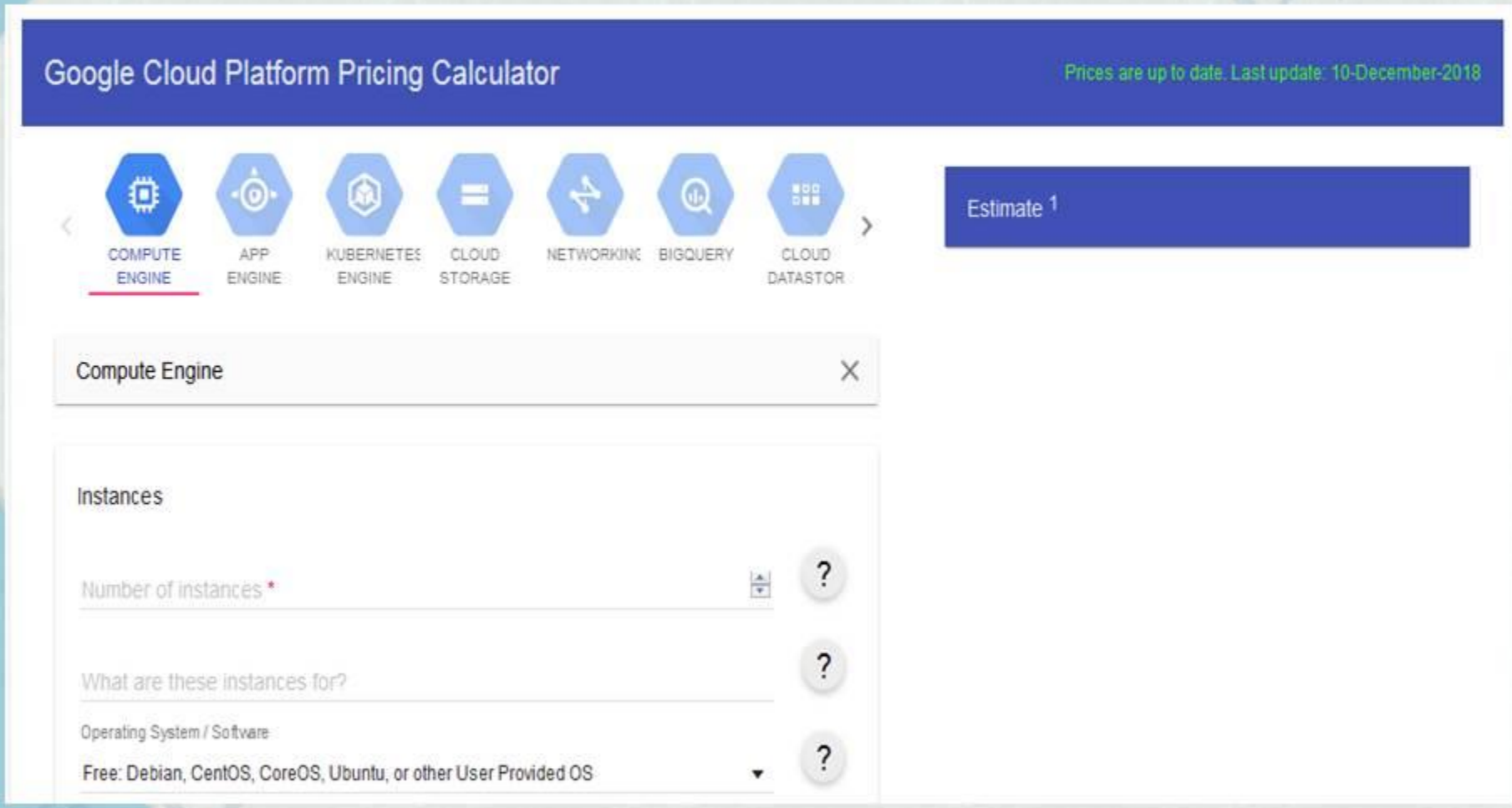
- Management tools for logging and Monitoring
- Developer tools for assisting development
- API management tools
- Internet of things platform
- ML/AI and Data analytics and much more in progress…

GCP Billing

GCP Billings history, Previous payments, Current month cost, Budget fixing, Setting usage alarms etc, can be managed from GCP billing page :



GCP Billing Calculator



Official Link: https://cloud.google.com/products/calculator/

GCP Cloud Terminologies

- What all are the bare minimum infrastructure requirements for any application?

- Hardware (RAM, Processor, Processor type, HBA's, etc.)
- OS Images
- Storage (Internal Drives, External Drives)
- Network
- Security (Firewall, Networking, Access Mechanism)

GCP Compute Services

- GCP VM stands for Google Cloud Platform Virtual Machines, and is the Primary GCP web service.
- Provides Resizable compute capacity
- **Reduces the time required** to obtain and boot new server instances to minutes
- There are two key concepts to Launch instances in GCP:
  - **Images**
  - **Machine Type**

GCP VM's Facts:

- Automatic Live Migration in case of Zonal issues
- Scale capacity as your computing requirements change
- Pay only for capacity that you actually use
- Choose Linux or Windows OS as per need
- Deploy across GCP Regions and Availability Zones for reliability

Images

- Images are used to create boot disks for your instances.
- Image is a template for the root volume for the instance (example: an OS image, a webserver, an application server etc.)
- Its contains a block device mapping that specifies the volume to attach to the instance whenever it's launched.
- Two types – "Public" and "Custom"
- All Images are based on x86 OSs, either Linux or Windows.
- Source: https://cloud.google.com/compute/docs/images

Machine Types

- A machine type is a collection of "virtualized hardware resources available to a virtual machine (VM) instance, including the system memory size, virtual CPU (vCPU) count, and maximum persistent disk capability."

- Google Offers two categories of Machine types:

- Predefined machine types

- Standard machine types
- High-memory machine types
- High-CPU machine types
- Shared-core machine types (A special type with Bursting CPU capabilities)
- Memory-optimized machine types

- Custom machine types: Customize as per need

CPU on GCP Platform

CPU Platform	Supported Machine Types	Base Frequency (GHz)	All-Core Turbo Frequency (GHz)	Single-Core Max Turbo Frequency (GHz)
Intel Xeon Scalable Processor (Skylake)	• Standard machine types • High-memory machine types • High-CPU machine types • Memory-optimized machine types (`n1-megamem` only) • Custom machine types	2.0	2.7	3.5
Intel Xeon E7 (Broadwell E7)	• Memory-optimized machine types (`n1-ultramem` only)	2.2	2.6	3.3
Intel Xeon E5 v4 (Broadwell E5)	• Standard machine types up to `n1-standard-64` • High-memory machine types up to `n1-highmem-64` • High-CPU machine types up to `n1-highcpu-64` • Custom machine types with up to 64 vCPUs and 416 GB of memory or 455 GB when using extended	2.2	2.8	3.7

Source: https://cloud.google.com/compute/docs/cpu-platforms

Lets create our First GCP Instance

- Console Walk Through for First GCP Instance

GCP Persistent Disk

- Persistent disk are block level disks in GCP which are sitting on top of Physical Hard drives.
- **Persistent block level storage** volumes offering consistent and low-latency performance
- Can be replicated within Zones for high availability
- Snapshots stored durably in GCP cloud storage

Persistent Disk Facts

- Durable: Persistent Disk is designed for high durability. It stores data redundantly to ensure data integrity.
- Independent Volumes: Your storage is located independently from your virtual machine instances, so you can detach or move your disks to keep your data even after you delete your instances.
- Volume Size: Each persistent disk can be up to 64 TB in size, so there is no need to manage arrays of disks to create large logical volumes.
- **Online Resize: Online growth allows volumes to grow on-demand without the need to restart virtual machines or reattach volumes.**

Persistent Disk Use Cases

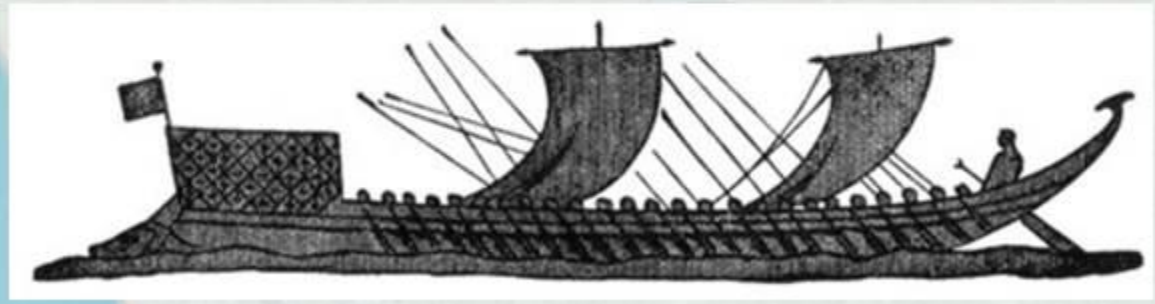
- OS – Use for boot/root volume, secondary volumes
- Databases – Scales with your performance needs
- Enterprise applications – Provides reliable block storage to run mission-critical applications
- Business continuity – Minimize data loss and recovery time by regularly backing up using Snapshots
- Applications – Install and persist any application

Source: https://cloud.google.com/persistent-disk/?utm_source=medium&utm_medium=unpaidsocial&utm_campaign=grw-20180914-gcp-cheat-sheet

What Does "Kubernetes" Mean?

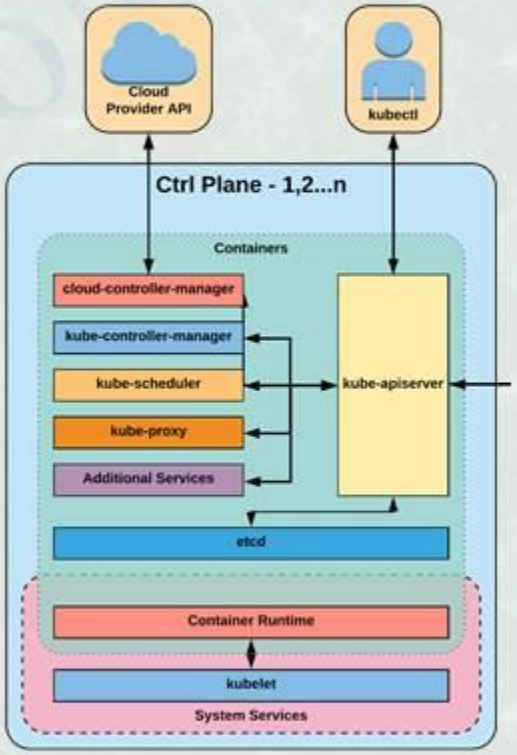
Greek for "pilot" or

"Helmsman of a ship"



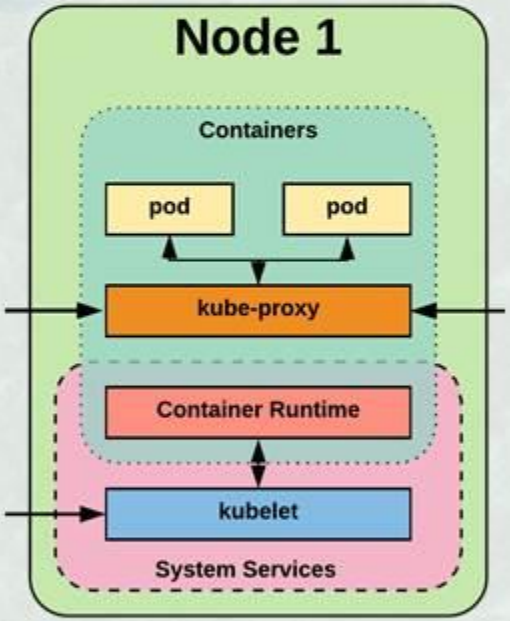
Master Components

- kube-apiserver
- etcd
- kube-controller-manager
- kube-scheduler



Node Components

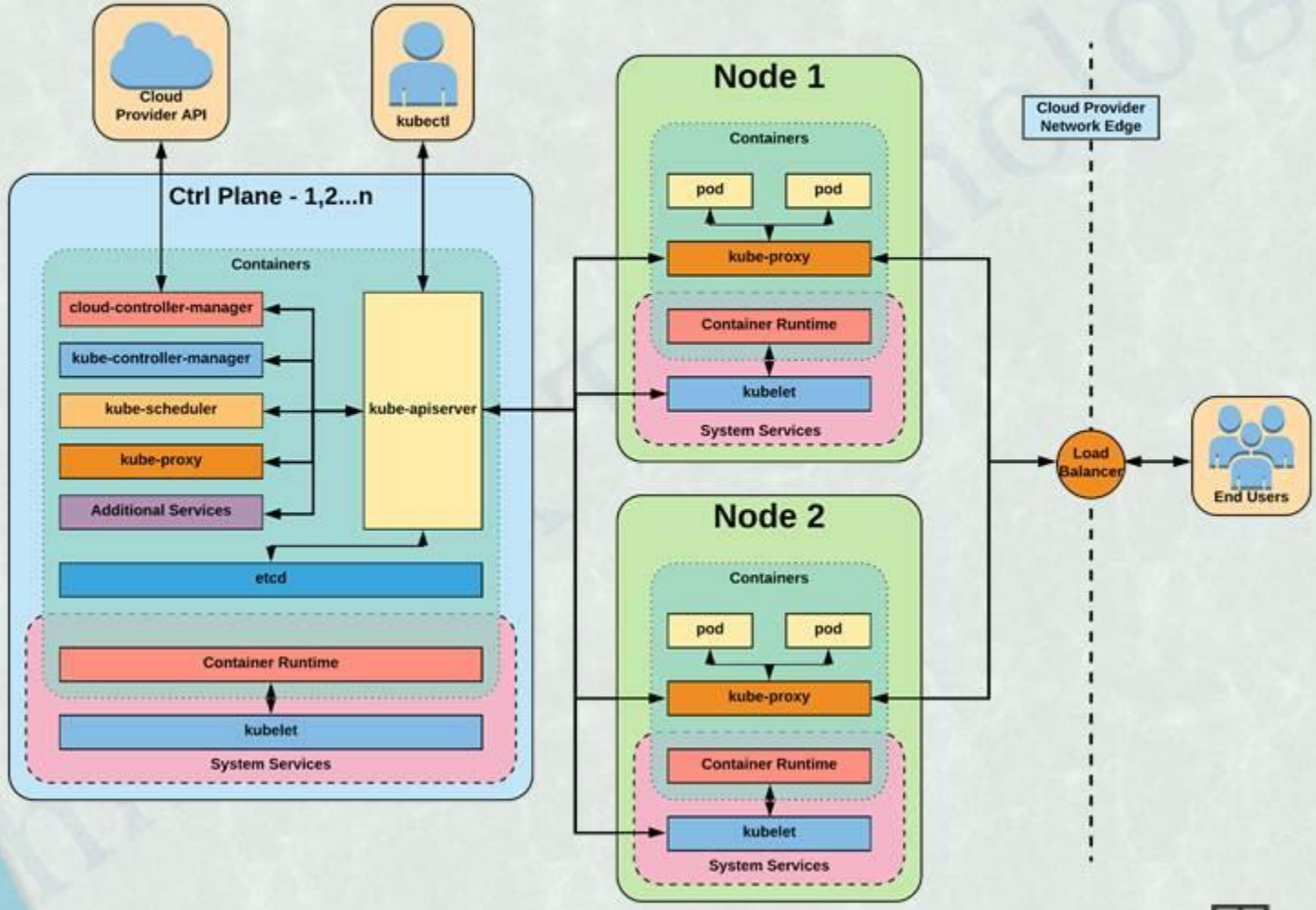
- kubelet
- kube-proxy
- Container Runtime Engine



K8S Terminologies

- Pod
- ReplicaSet/Replication Controller
- Deployments
- Services
- Node Selector
- Secrets
- Persistent Volumes
- And so on….

K8S Architecture



GKE

- Google Kubernetes Engine is a managed, production-ready environment for deploying containerized applications.
- Launched in 2015.
- Kubernetes Engine builds on Google's experience of running services like Gmail and YouTube in containers for over 12 years.
- Kubernetes Engine allows you to get up and running with Kubernetes in no time.
- Eliminates the need to install, manage, and operate your own Kubernetes clusters.

GKE Cluster Deployment

- Create a cluster using GCP Console
- Get the credentials for your created cluster to generate kubconfig configuration by running:
- gcloud container clusters get-credentials <CLUSTER-NAME> --zone <ZONENAME> --project <PROJECTNAME>
- Now let perform an webapplication deployment by creating kubernetes deployments
- kubectl run yogeshwebapp --image=httpd
- Check the workload now (pods, replicasets and deployments)
- Its time to expose our application outside, lets us create a service now.
- kubectl expose deployment yogeshweb --type=LoadBalancer --port 80
- Confirm our webserver is running on container.

GKE Cluster Deployment

- A test:
- Let us delete our container and see what will happen (delete pod and see the magic)
- Let us scale our container by creating more replicas
- kubectl scale deployment yogeshwebapp --replicas=3
- Note: I will be demonstrating the whole setup using GCP console.

Questions & Answers

THANK YOU

For any queries or questions, please contact:

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