

# What is Cloud Computing?

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## cloud com·put·ing

*noun*

the practice of using a network of remote servers hosted on the Internet to store, manage, and process data, rather than a local server or a personal computer.



### On-Premise

- You own the servers
- You hire the IT people
- You pay or rent the real-estate
- You take all the risk

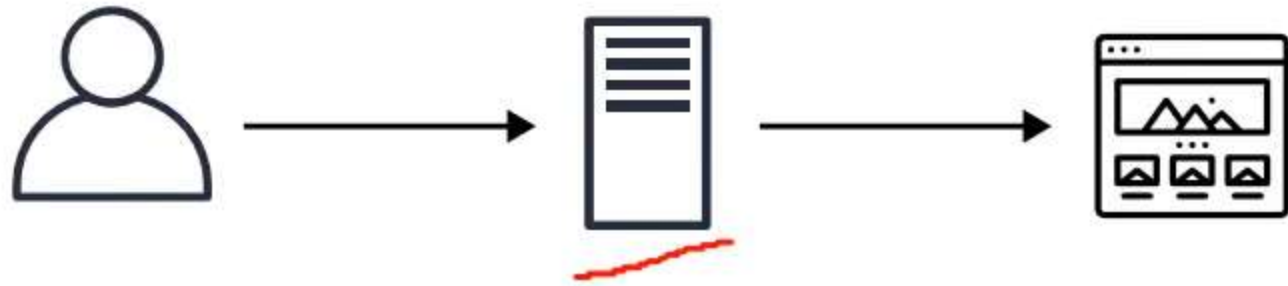
### Cloud Providers

- Someone else owns the servers
- Someone else hires the IT people
- Someone else pays or rents the real-estate
- You are responsible for your configuring cloud services and code, someone else takes care of the rest.



# The Evolution of Cloud Hosting

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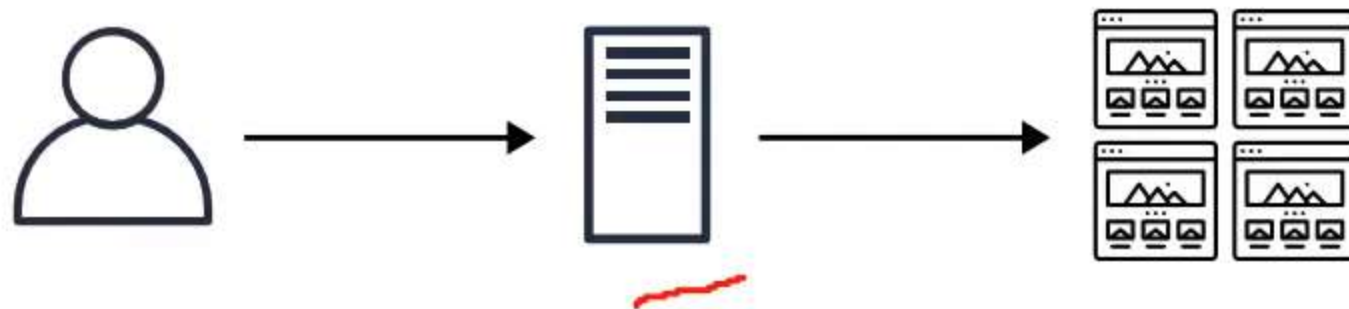


## Dedicated Server

**One physical machine** dedicated **to single a business**.

Runs a single web-app/site.

**Very Expensive, High Maintenance, \*High Security**



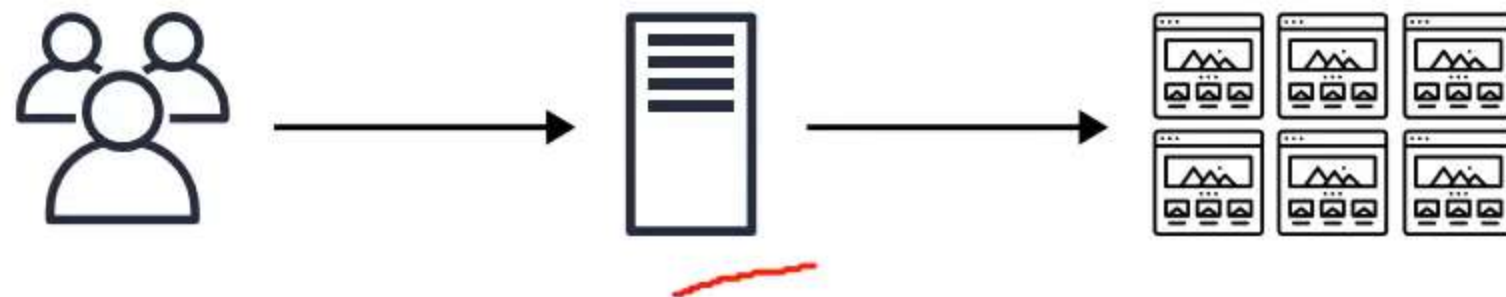
## Virtual Private Server (VPS)

**One physical machine** dedicated **to a single business**.

The physical machine is virtualized **into sub-machines**

Runs multiple web-apps/sites

**Better Utilization and Isolation of Resources**

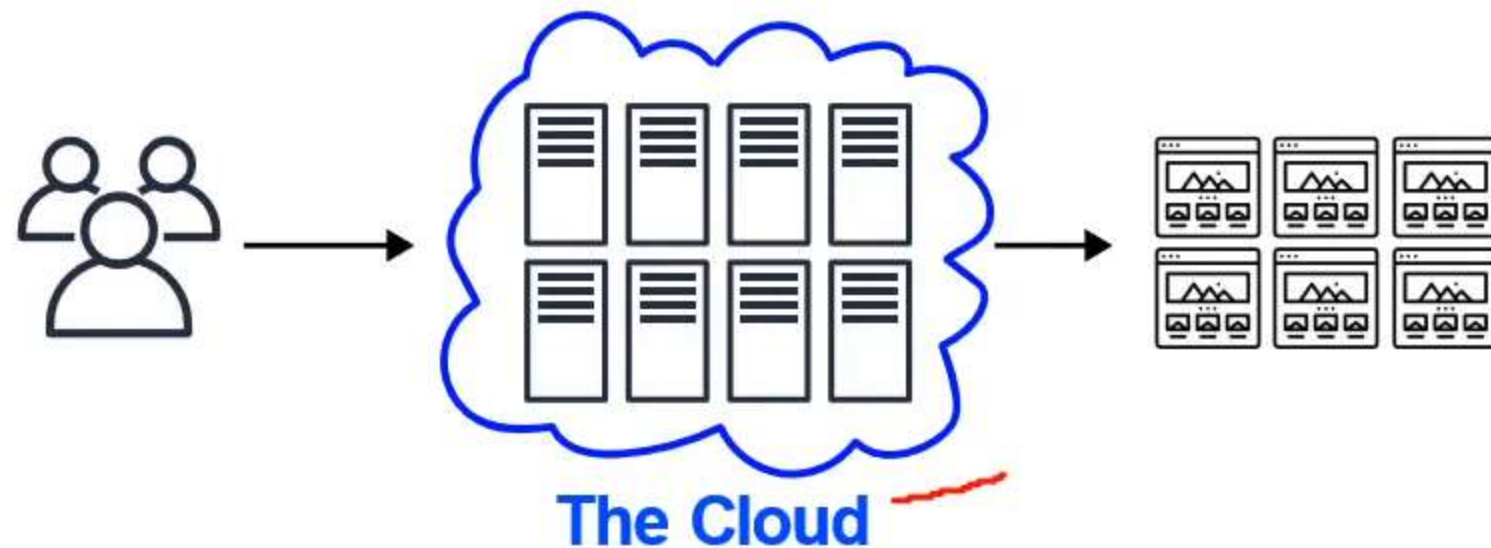


## Shared Hosting

**One physical machine**, shared by **hundred of businesses**

Relies on most tenants under-utilizing their resources.

**Very Cheap, Limited functionality, Poor Isolation**



## Cloud Hosting

**Multiple physical machines** that act as one system.

The system is abstracted into multiple **cloud services**

**Flexible, Scalable, Secure, Cost-Effective, High Configurability**



# What is Amazon?

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**amazon**

An American multinational computer technology corporation headquartered in **Seattle, Washington**



@timothyeberly on Unsplash

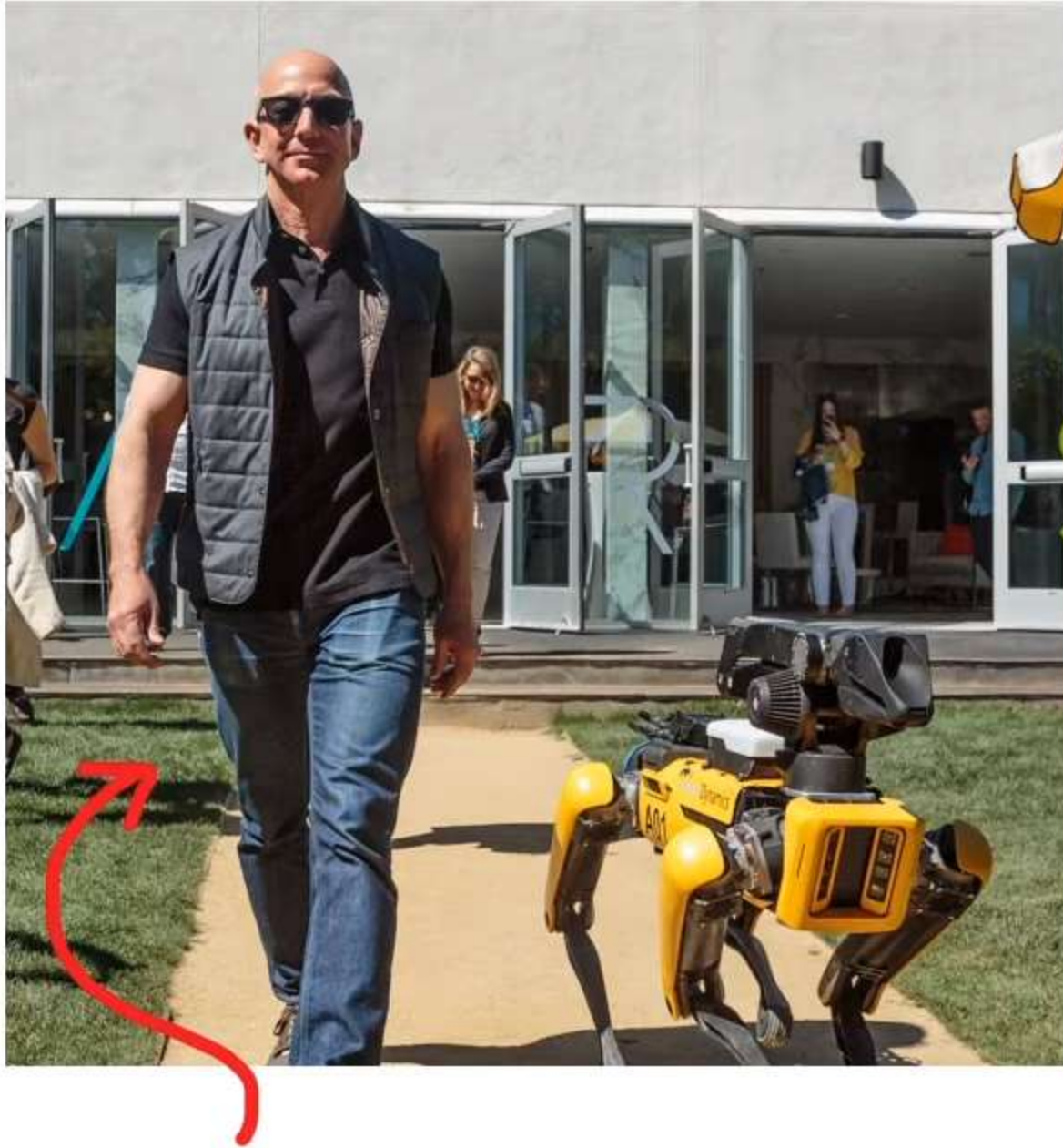


Amazon was founded in 1994 by **Jeff Bezos** and the company started as an online store for books and expanded to other products.



# What is Amazon?

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Jeff Bezos **today**

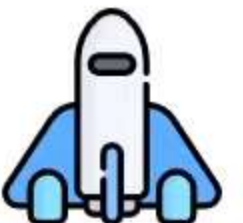
Amazon has expanded beyond just an online e-commerce store into:

- **cloud computing** (Amazon Web Services)
- digital streaming
  - Amazon Prime Video
  - Amazon Prime Music
  - Twitch.tv
- Grocery Stores (Whole Foods Market)
- artificial intelligence
- Low orbit satellites (Kuniper Systems)
- And more!



Andy Jassy is the current CEO of Amazon.  
Previously the CEO of AWS.

*So Jeff Bezos can focus on **space travel**.*





# What is Amazon Web Services (AWS)?

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Amazon calls their cloud provider service

## Amazon Web Services

Commonly referred to just **AWS**



Old Logo



New Logo

AWS was launched in \*2006 is the **leading cloud service provider** in the world.

Cloud Service Providers can be initialized as **CSPs**

# What is Amazon Web Services (AWS)?

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**Simple Queue Service (SQS)** was the first AWS service launched for public use in 2004



**Simple Storage Service (S3)** was launched in March of 2006



**Elastic Compute Cloud (EC2)** was launched in August of 2006



In November 2010, it was reported that all of Amazon.com's retail sites had migrated to AWS



To support industry-wide training and skills standardization, AWS began offering a certification program for computer engineers, on April, 2013



# What is Amazon Web Services (AWS)?

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**Adam Selipsky**

CEO of AWS

Former CTO of Tableau, spend a decade with AWS as VP of Marketing, Sales and Support

**Werner Vogels**

CTO of AWS

“Everything fails, all the time.”



**Jeff Barr**

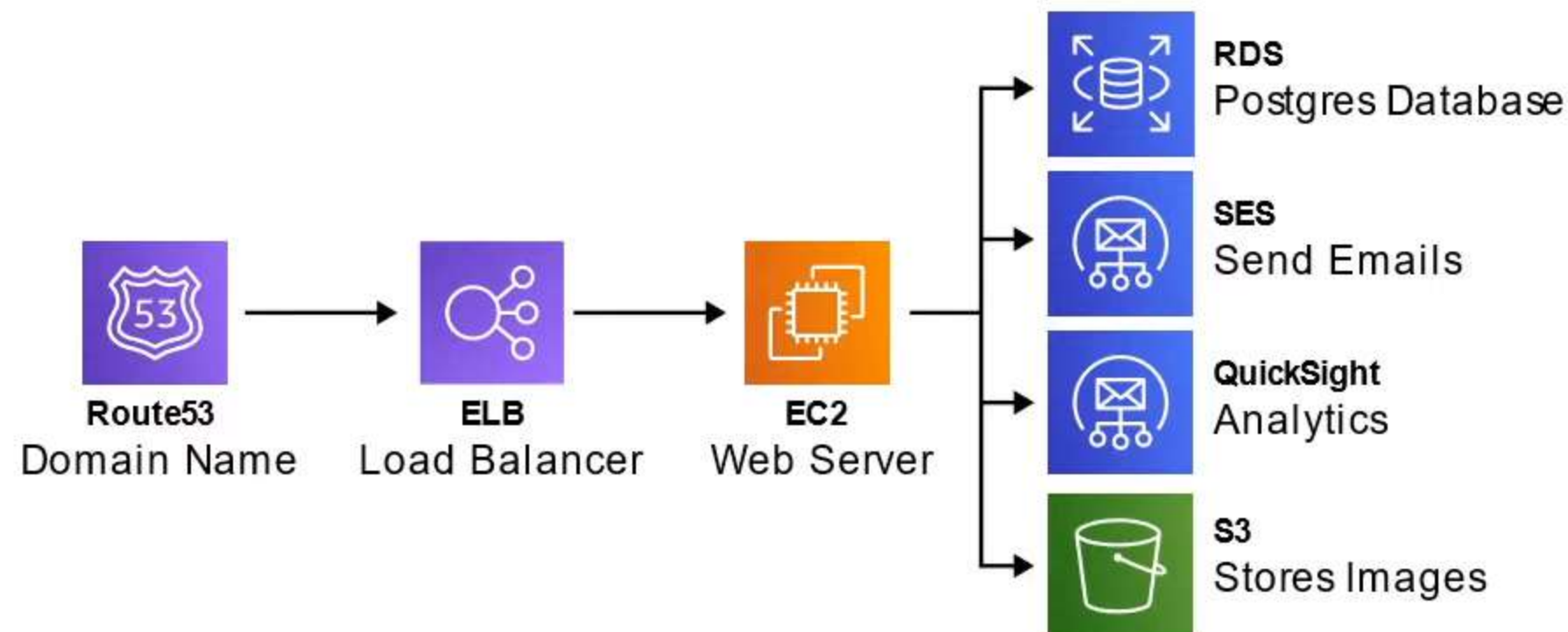
Chief Evangelist

# What is a Cloud Service Provider (CSP)?

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A **Cloud Service Provider (CSP)** is a company which

- provides multiple Cloud Services e.g. tens to hundreds of services
- those Cloud Services **can be chained together** to create cloud architectures
- those Cloud Services are accessible **via Single Unified API** eg. AWS API
- those Cloud Services utilized **metered billing** based on usage e.g. per second, per hour
- those Cloud Services have rich monitoring built in eg. AWS CloudTrail
- those Cloud Services have an Infrastructure as a Service (IaaS) offering
- Those Cloud Services offers **automation** via Infrastructure as Code (IaC)



If a company offers multiple cloud services under a single UI but do not meet most of or all of these requirements, it would be referred to as a Cloud Platform e.g. Twilio, HashiCorp, Databricks



# Landscape of CSPs

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**Tier-1 (Top Tier)** – Early to market, wide offering, strong synergies between services, well recognized in the industry



Amazon Web Services (AWS)



Microsoft Azure



Google Cloud Platform (GCP)



Alibaba Cloud

**Tier-2 (Mid Tier)** – Backed by well-known tech companies, slow to innovate and turned to specialization.



IBM Cloud



Oracle Cloud



Rackspace (OpenStack)

**Tier-3 (Light Tier)** – Virtual Private Servers (VPS) turned to offer core IaaS offering. Simple, cost-effective



Vultr



Digital Ocean



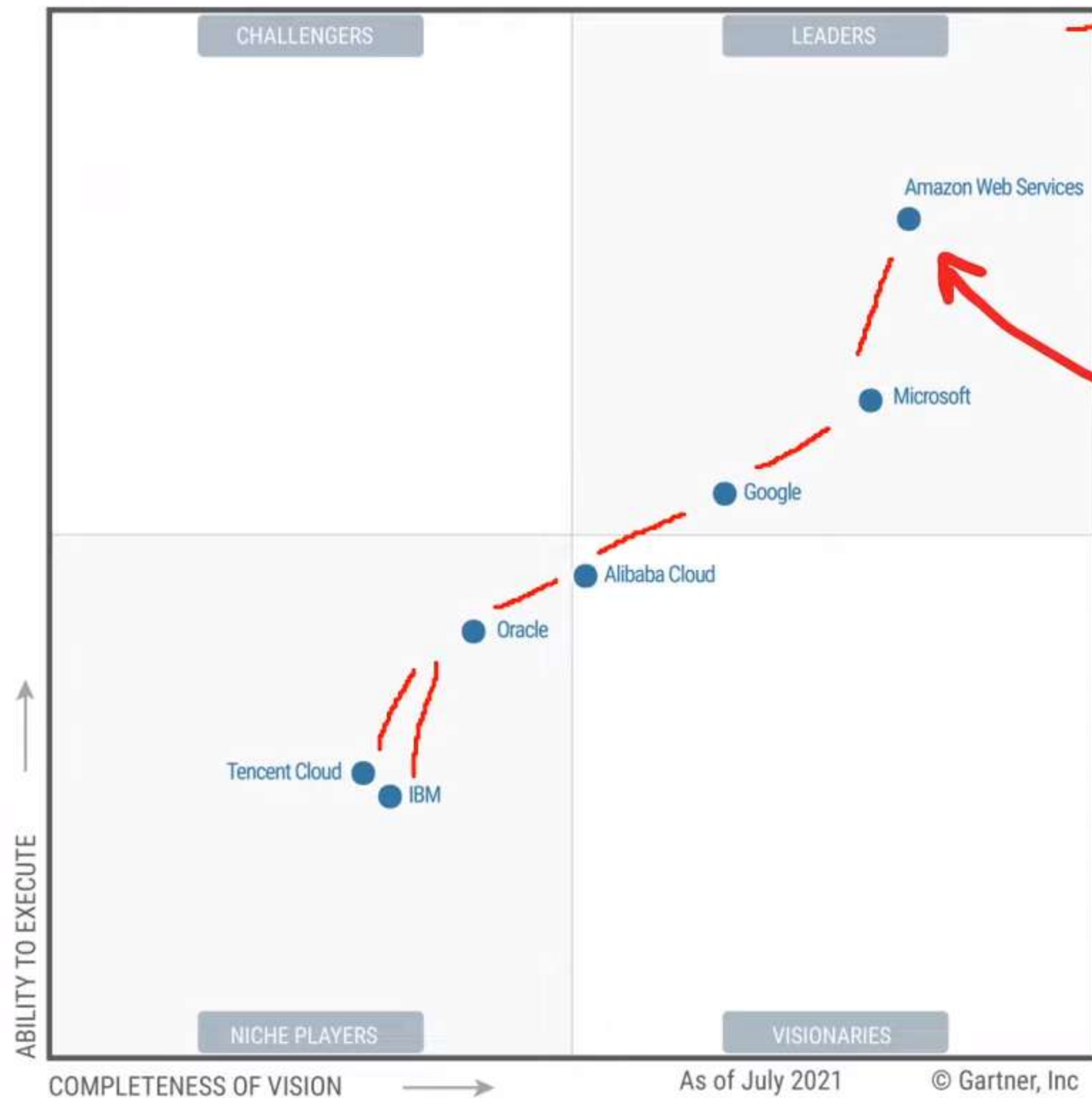
Linode



# Gartner Magic Quadrant for Cloud

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Figure 1: Magic Quadrant for Cloud Infrastructure and Platform Services



**Magic Quadrant (MQ)** is a series of market research reports published by IT consulting firm Gartner that rely on proprietary qualitative data analysis methods to demonstrate market trends, such as direction, maturity and participants.





# Common Cloud Services

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A cloud service provider **can have hundreds of cloud services** that are grouped into various types of services. The four most common types of cloud services (*the 4 core*) for Infrastructure as a Service (IaaS) would be:



## Compute

Imagine having a virtual computer that can run application, programs and code.



## Networking

Imagine having virtual network defining internet connections or network isolations between services or outbound to the internet



## Storage

Imagine having a virtual hard-drive that can store files



## Databases

Imagine a virtual database for storing reporting data or a database for general purpose web-application

AWS has over **200+** cloud services

The term “Cloud Computing” can be used to refer to all categories, even though it has “compute” in the name.

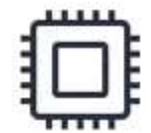




# Technology Overview

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Cloud Service Provider (CSPs) that are **Infrastructure as a Service (IaaS)** will always have **4 core cloud service** offerings:



Compute



EC2 Virtual Machines



Storage



EBS Virtual Hard drives



Database



RDS SQL databases



Networking and Content Delivery



VPC Private Cloud Network



Analytics



Application Integration



AR & VR



AWS Cost Management



Blockchain



Business Applications



Containers



Customer Engagement



Developer Tools



End User Computing



Game Tech



Internet of Things



Machine Learning



Management & Governance



Media Services



Migration & Transfer



Mobile



Quantum Technologies



Robotics



Satellites



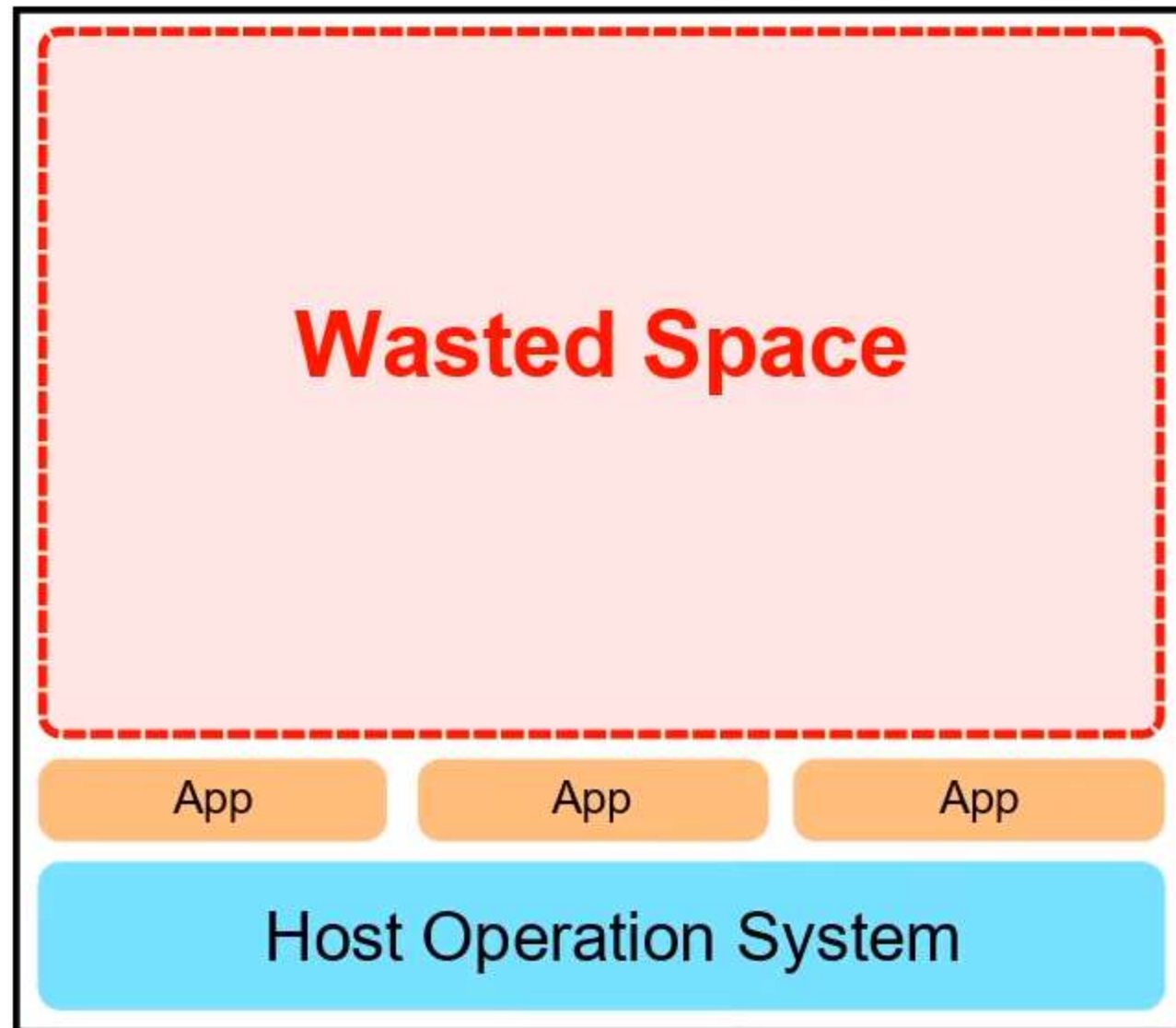
Security, Identity & Compliance



# The Evolution of Computing

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**\*Dedicated** 📌 **VMs** 📌 **Containers** 📌 **Functions**



physical server

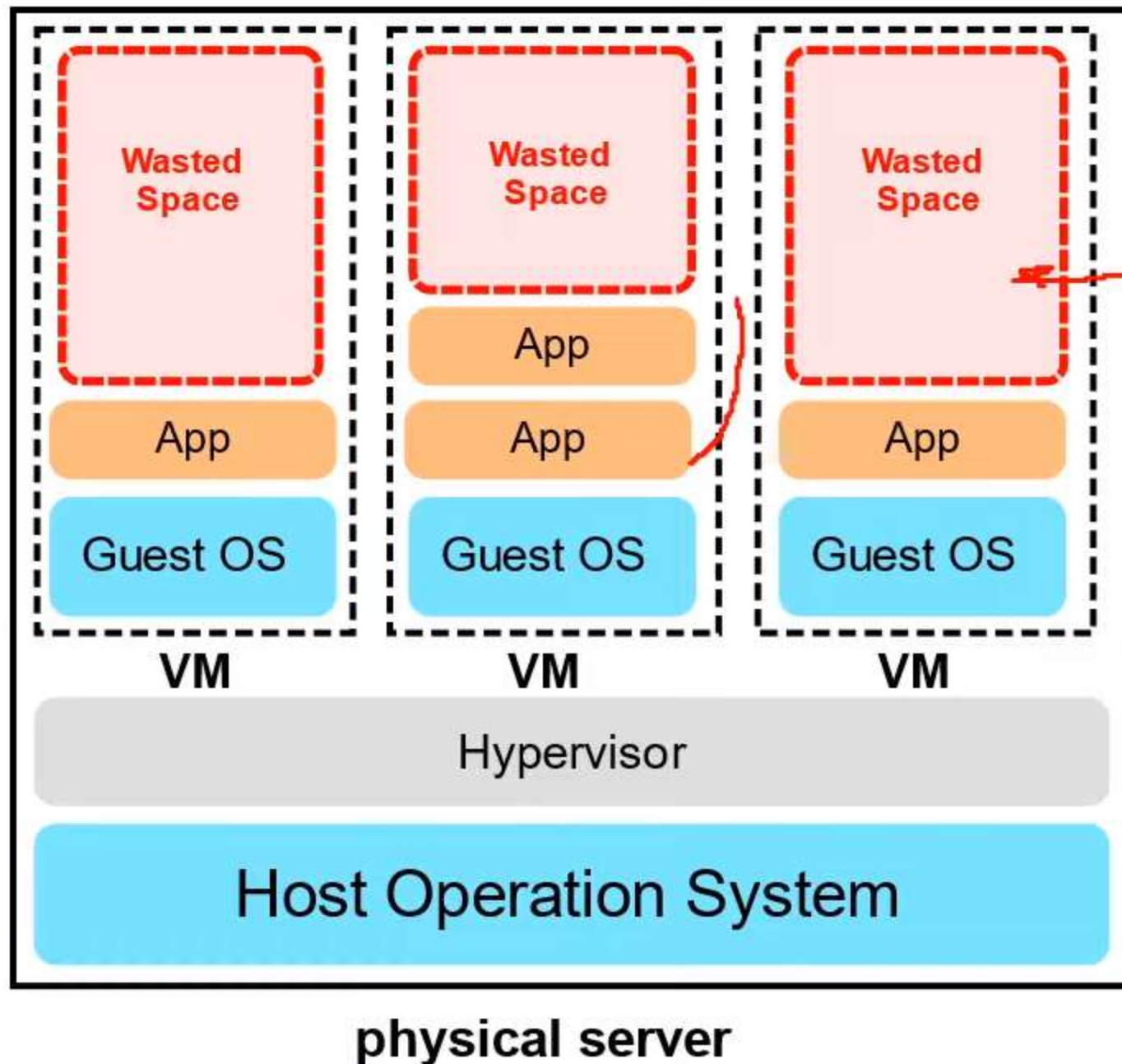
- A physical server **wholly utilized by a single customer.**
- You have to guess your capacity
- you'll overpay for an underutilized server
- You can't vertical scale, you need a manual migration
- Replacing a server is very difficult
- You are limited by your Host Operating System
- Multiple apps can result in conflicts in resource sharing
- You have a **\*guarantee of security, privacy, and full utility of underlying resources**



# The Evolution of Computing

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\*Dedicated 🖱️ VMs 🖱️ Containers 🖱️ Functions



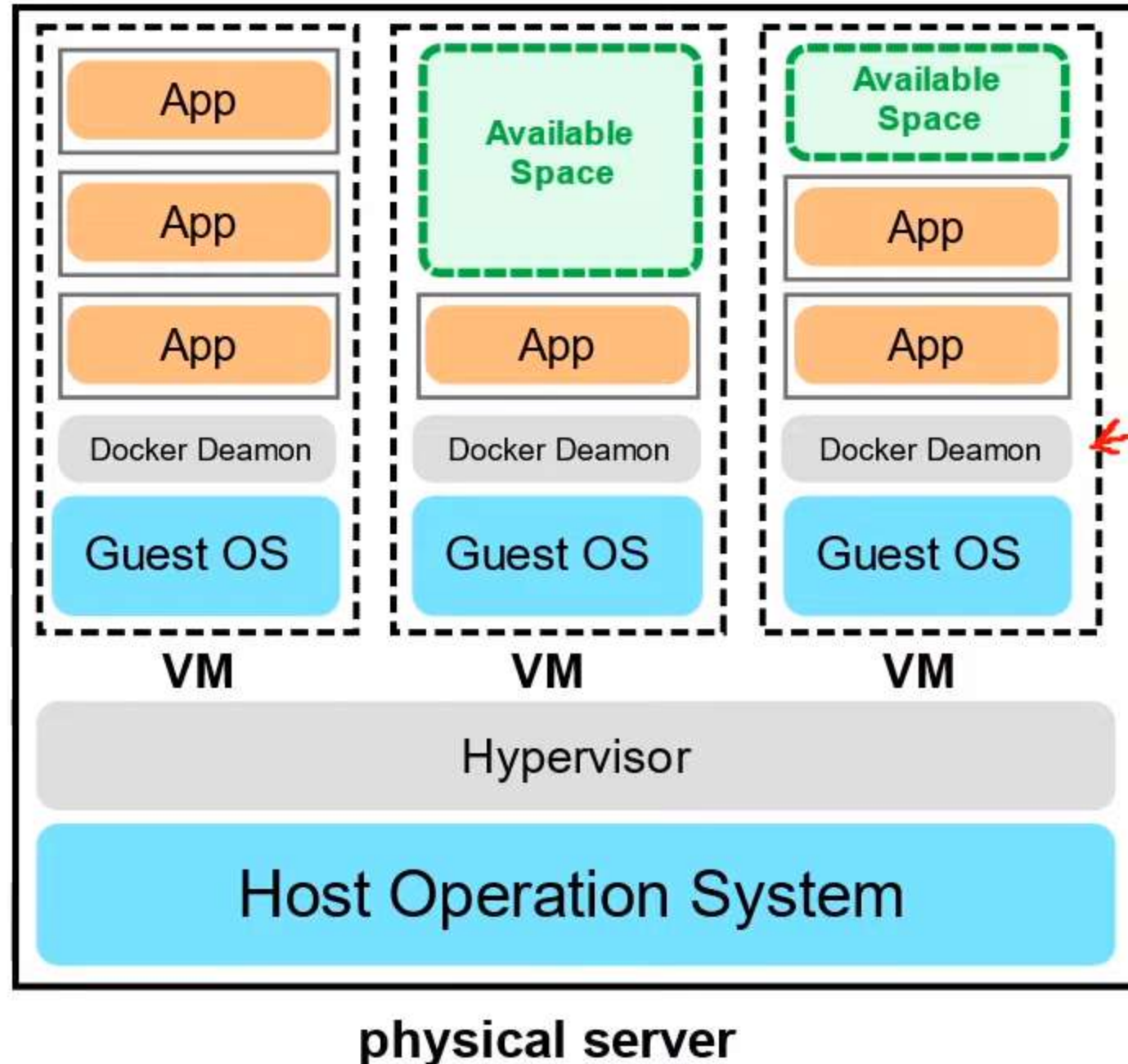
- You can run **multiple Virtual Machines on one machine**.
- **Hypervisor** is the software layer that lets you run the VMs
- A physical server shared by multiple customers
- You are to pay for a fraction of the server
- You'll overpay for an underutilized Virtual Machine
- You are limited by your Guest Operating System
- Multiple apps on a single Virtual Machine can result in conflicts in resource sharing
- Easy to export or import images for migration
- Easy to Vertical or Horizontal scale



# The Evolution of Computing

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\*Dedicated 📌 VMs 📌 Containers 📌 Functions



- Virtual Machine running multiple containers
- **Docker Deamon** is the name of the software layer that lets you run multiple containers.
- You can maximize the utilize of the available capacity which is more cost-effective
- Your containers share the same underlying OS so containers are more efficient than multiple VMs
- Multiple apps can run side by side without being limited to the same OS requirements and will not cause conflicts during resource sharing



# The Evolution of Computing

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\*Dedicated



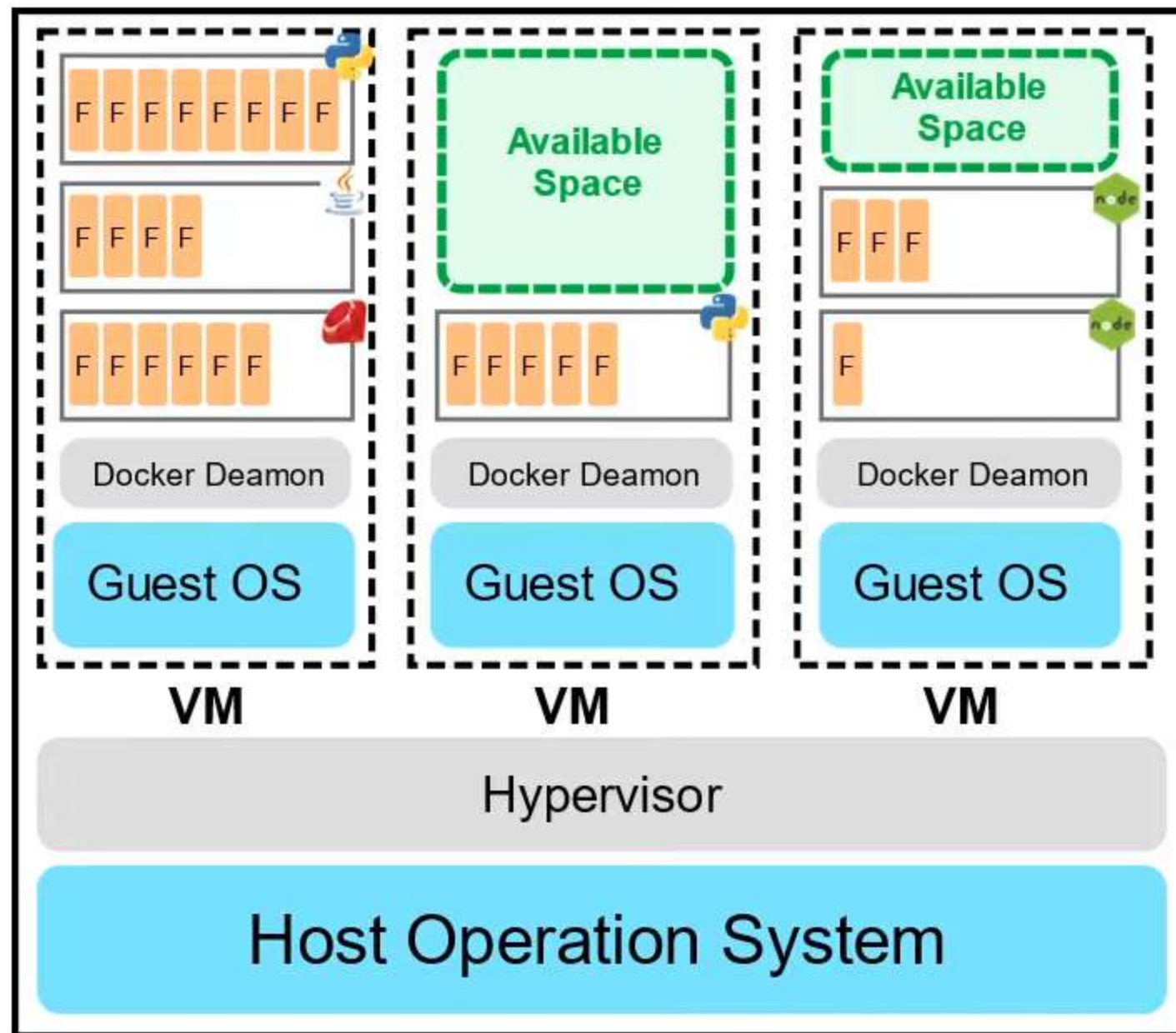
VMs



Containers



Functions



physical server

- Are managed VMs running managed containers.
- Known as **Serverless Compute**
- You upload a piece of code, choose the amount of memory and duration.
- Only responsible for code and data, nothing else
- Very cost-effective, only pay for the time code is running, VMs only run when there is code to be executed
- Cold Starts is a side-effect of this setup



# Types of Cloud Computing

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## SaaS Software as a Service For Customers

A product that is run and managed by the service provider  
*Don't worry about how the service is maintained.  
It just works and remains available.*



## PaaS Platform as a Service For Developers

Focus on the deployment and management of your apps.  
*Don't worry about, provisioning, configuring or  
understanding the hardware or OS.*



## IaaS Infrastructure as a Service For Admins

The basic building blocks for cloud IT. Provides access to networking features, computers and data storage space.  
*Don't worry about IT staff, data centers and hardware.*





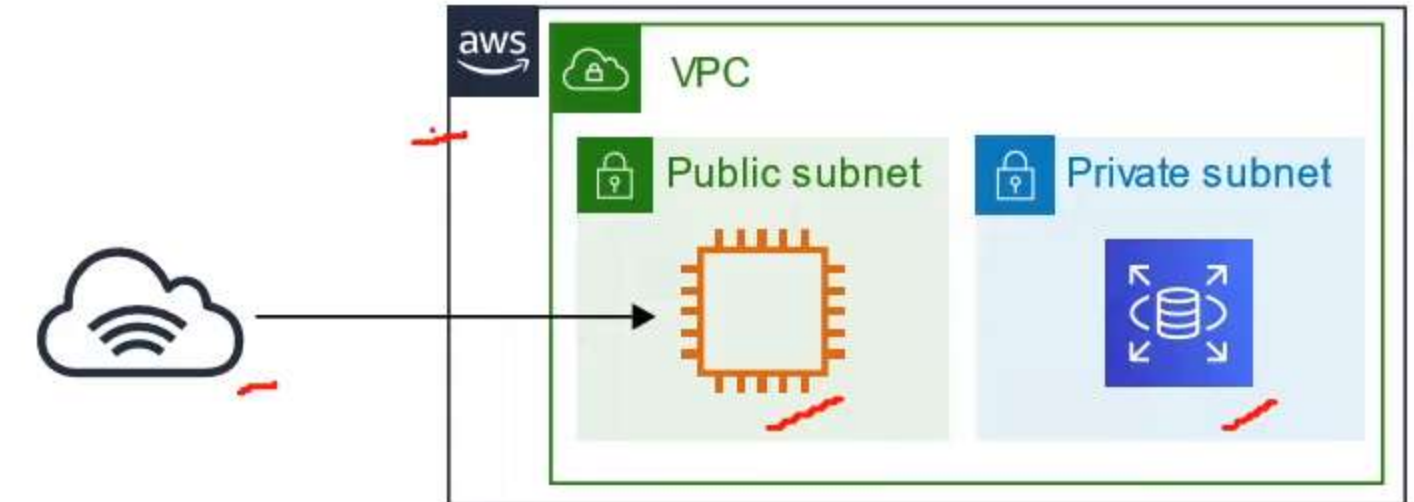
# Cloud Computing Deployment Models

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## Public Cloud

**Everything** (the workload or project) is built on the CSP

Also known as: \*Cloud-Native or Cloud First

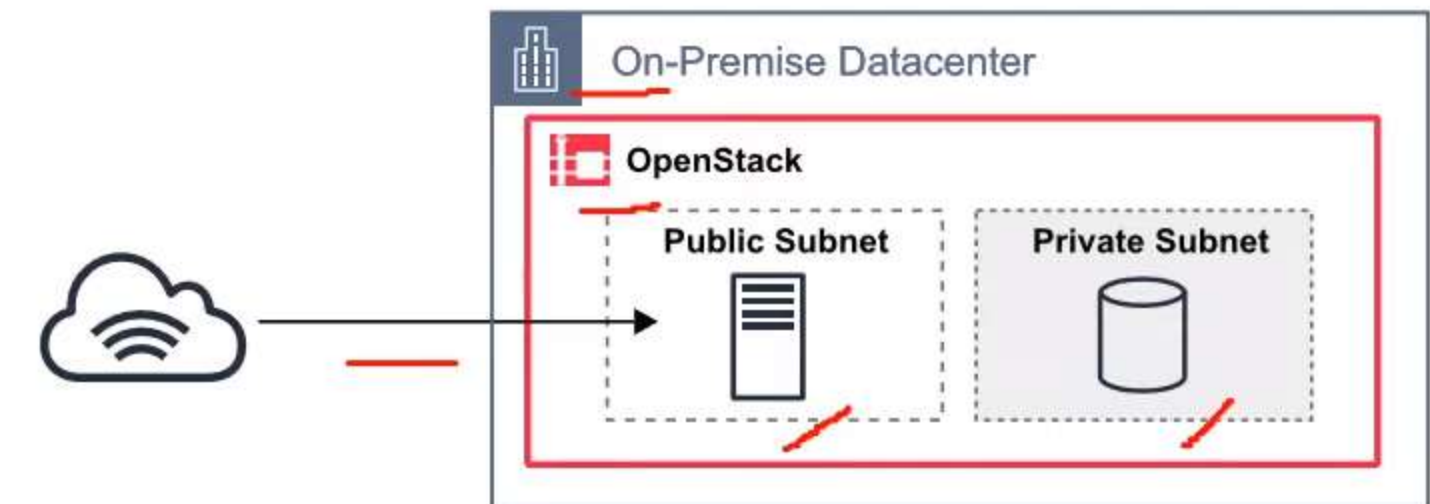


## Private Cloud

Everything built on company's datacenters

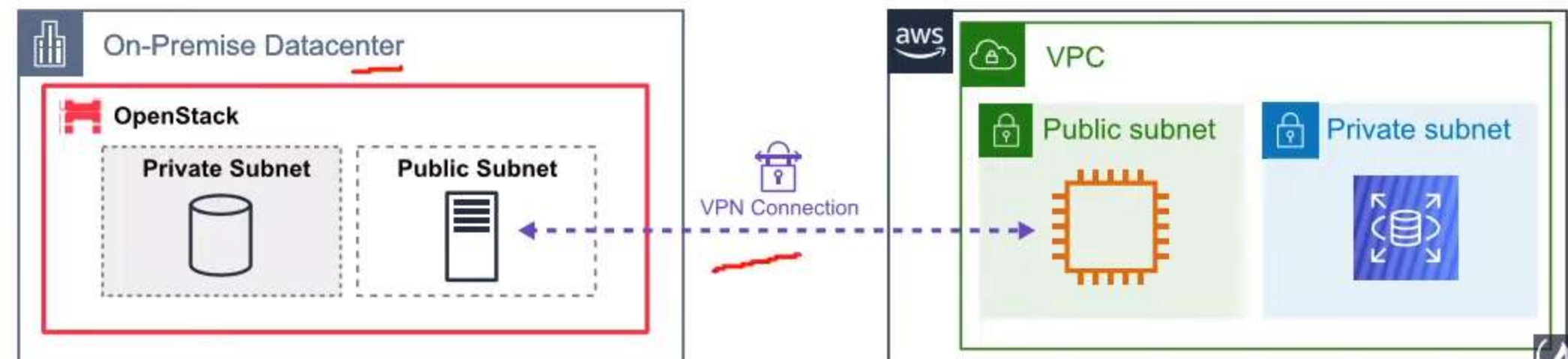
Also known as **On-Premise**

The cloud could be **OpenStack**



## Hybrid

Using both **On-Premise** and  
A **Cloud Service Provider**





# Cloud Computing Deployment Models

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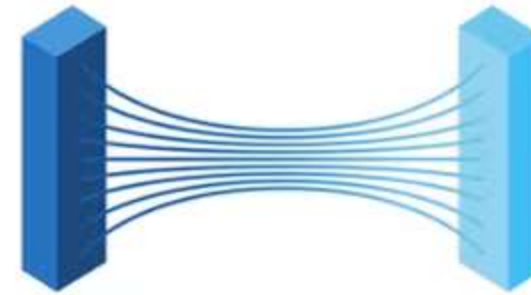
## Cross-Cloud

Using **Multiple Cloud Providers**

Aka multi-cloud, ~~“hybrid-cloud”~~



Amazon EKS



Azure Arc



GCP Kubernetes Engine



**Anthos** is GCP's offering for a control plane for compute across multiple CSPs and On-premise environments



# Cloud Computing Deployment Models

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## Cloud

Fully utilizing cloud computing



Companies that are starting out today, or are small enough to make the leap from a VPS to a CSP.

- Startups
- SaaS offerings
- New projects and companies

## Hybrid

Using both Cloud and On-Premise

**Deloitte.**



Organizations that started with their own datacenter, can't fully move to cloud due to effort of migration or security compliance

- Banks
- FinTech, Investment Management
- Large Professional Service providers
- Legacy on-premise

## On-Premise

Deploying resources on-premises, using virtualization and resource management tools, is sometimes called “private cloud”.



**Canada**

Organizations that cannot run on cloud due to strict regulatory compliance or the sheer size of their organization

- Public Sector eg. Government
- Super Sensitive Data eg. Hospitals
- Large Enterprise with heavy regulation eg. Insurance Companies

There really isn't reason to **be fully on-premise** 🔥

