

AZURE [AZ900]

who is the AZ900 for?

- 1) sales & Management to help inform VPs for CEO's reasons for their company to utilize Microsoft Azure.
 - 2) Popular among Developers to show that they have familiar knowledge with cloud concepts.
- * Not recognized as an important certification for developers on their resume'

If you're Developer → 8 hrs of study.

15 - 25% → Cloud Concepts

30 - 35% → Azure Core Services

25 - 30% → Security, Privacy, Compliance and Trust.

20 - 25% → Pricing and Support.

Passing Grade → 70% or higher.

Total Questions → 40 - 60 Questions.

Format of Questions → MCQ, Multiple Answer,
Drag & Drop, Hot Area.

Duration - 60 mins.

seat Time - 90 mins (Total time).

Valid - 2 years.

Q) What is cloud computing?

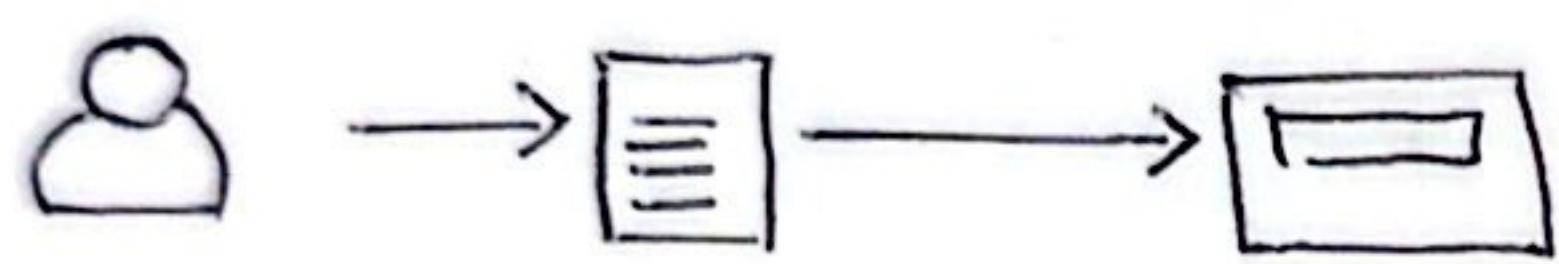
The practice of using a network of remote servers hosted on the Internet to store, manage, and process data, rather than a local server or a personal computer.

On Premise

- ① you own the server
- ② you hire the IT people
- ③ you pay/rent real estate
- ④ you take all the risks

Cloud Provider

- ① someone else own the servers
- ② someone else hires the IT people.
- ③ someone else pays or rents the real estate.
- ④ you are responsible for your config cloud services & code, someone else takes care of the rest.

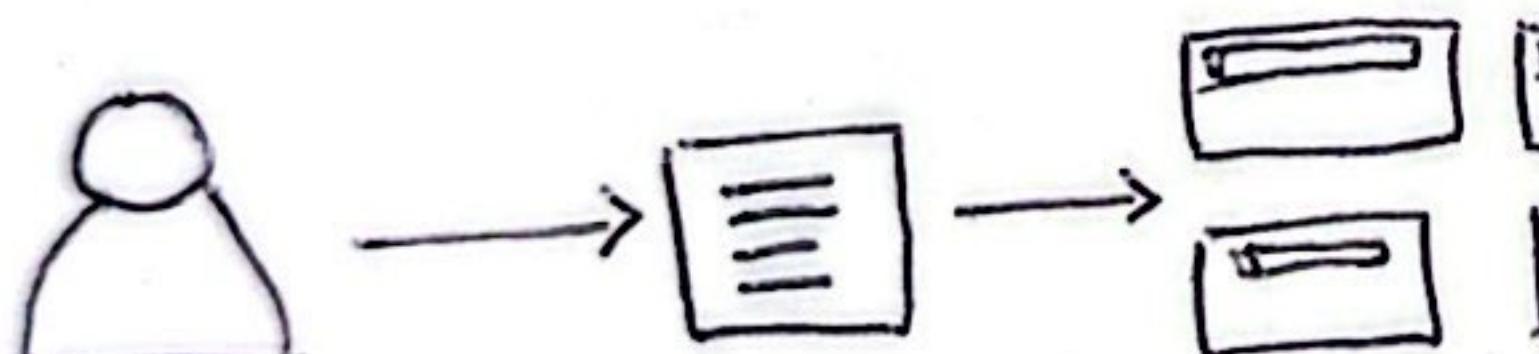


DEDICATED SERVER

One physical machine dedicated to a single business.

Runs a single web-app/site.

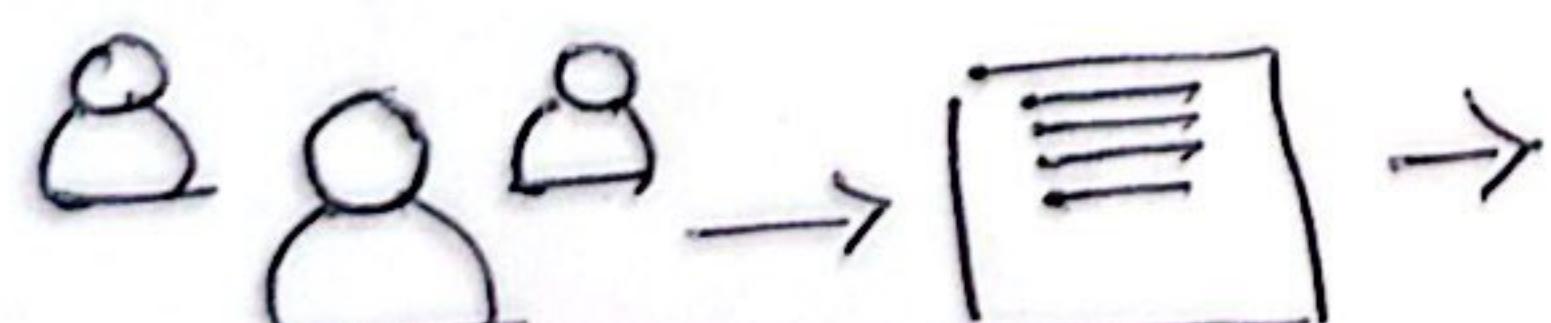
- ⊕ Very Expensive
- High Maintenance
- High security.



VIRTUAL PRIVATE SERVER

One physical machine dedicated to a single business. The physical machine is virtualized into sub machines.

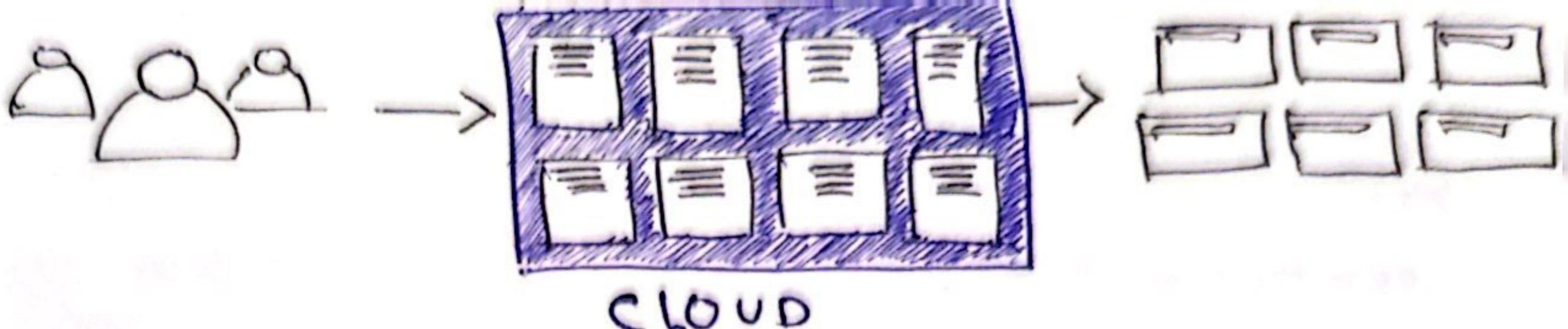
- ⊕ Runs Multiple Websites/Apps.



SHARED HOSTING

One physical machine shared by 100's of business. Relies on most tenants under utilizing their resources.

- ⊕ Very Cheap.
- ⊕ Very Limited.



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.

common cloud services

A cloud provider can have hundreds of cloud service that are grouped various types of services. The four most common type of services for IaaS (Infrastructure as a service) would be =>

compute => Having a virtual computer that can run application, programs and code.

Networking => Having a virtual network being able to define internet connections or network isolations.

storage => Having a virtual Hard drive that can store files.

Databases => Having a virtual database for storing, reporting data or a database for general purpose web application.

The term "cloud computing" can be used to refer to all categories, even though it has "compute" in the name.

2) what is Microsoft?

Microsoft - an American multinational computer technology corp headquartered in Redmond, Washington.

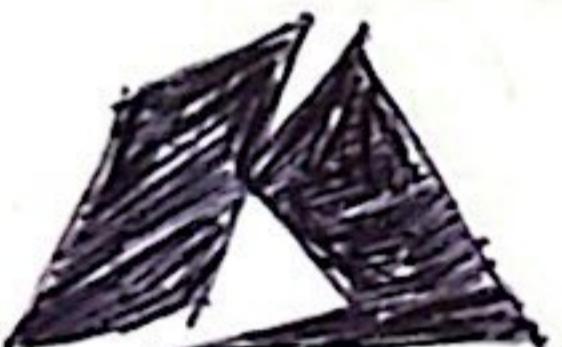
Microsoft makes \Rightarrow software, phones, tablets, game consoles, cloud services, search engine & more.

Microsoft is best known for their windows OS.

3) what is AZURE?

Microsoft calls their cloud provider service

MICROSOFT AZURE commonly referred to it as just AZURE.



AZURE \rightarrow Logo.

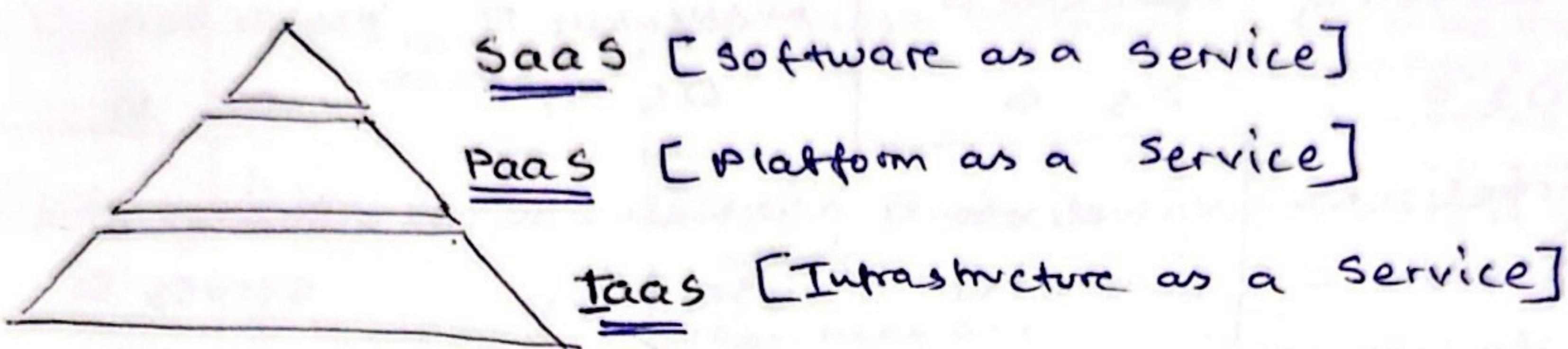
Means \rightarrow bright blue color of the cloudless sky.

Benefits of cloud computing services

- A) Cost Effective \Rightarrow we pay for what we consume, No upfront cost. Pay-As-You-Go (PAYG), thousands of customers sharing the cloud.
- B) Global \Rightarrow launch workloads anywhere in the world.
- C) secure \Rightarrow cloud provider takes care of physical activity. Cloud Services can be secure by default. We have the ability to configure access down to granular level.
- D) Reliable \Rightarrow Data backup, Disaster Recovery, Data Replication, Fault Tolerance.
- E) scalable \Rightarrow \uparrow or \downarrow resources / services based on demand.
- F) Elastic \Rightarrow Automate scaling during spikes and drop in demand.

Current \Rightarrow The underlying hardware and managed software is patched, upgraded and replaced by the cloud provider without interruption to you.

Types of cloud computing \Rightarrow



SaaS (For customers)

A product that is run and managed by the service provider. Dont worry about how the service is maintained. It just works and remains unavailable.

eg:- Salesforce / Gmail / Office 365.

PaaS (For Developers).

Focus on the deployment and management of your apps. Dont worry about provisioning, configuring or understanding the hardware or OS.

eg:- Heroku, Beanstalk, Google App Engine.

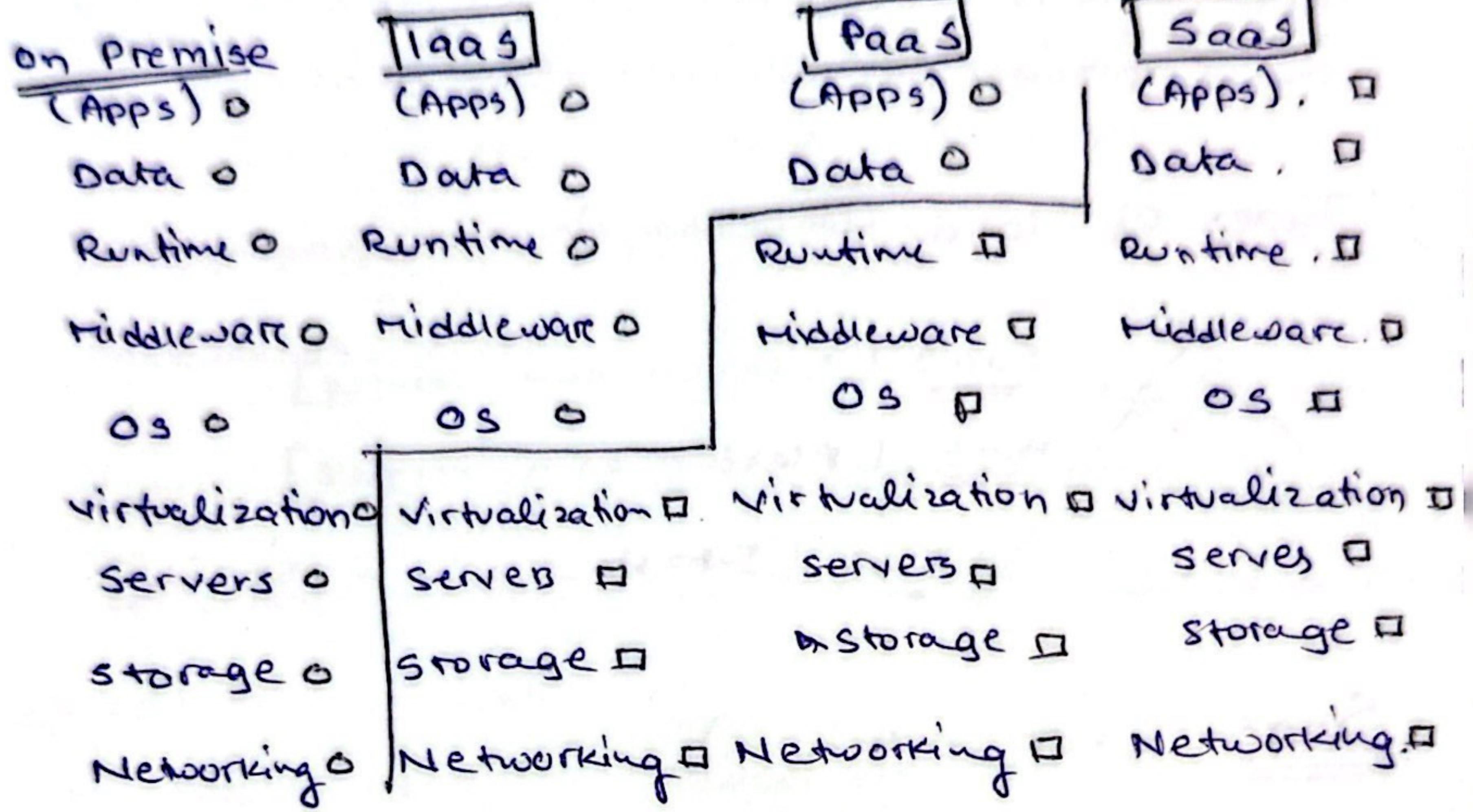
IaaS (For Administrators).

The basic building blocks of cloud IT. Provides access to networking features, computers & data storage spaces.

Dont worry about IT staff, data centers & Hardware.

eg:- Microsoft Azure, AWS, Oracle Cloud.

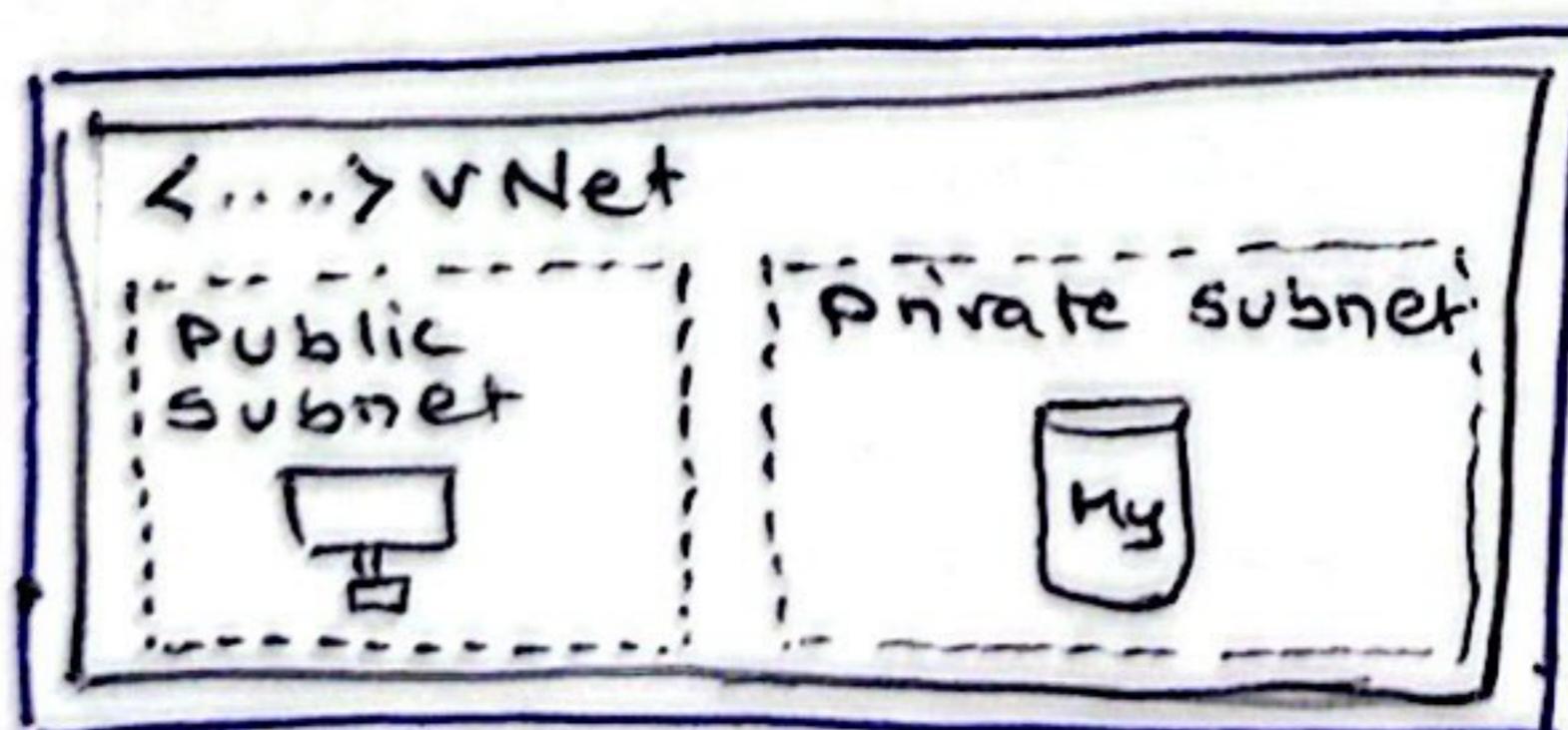
Types of Cloud Computing Requirements



Legend: Customer Responsible ○
CSP Responsible □

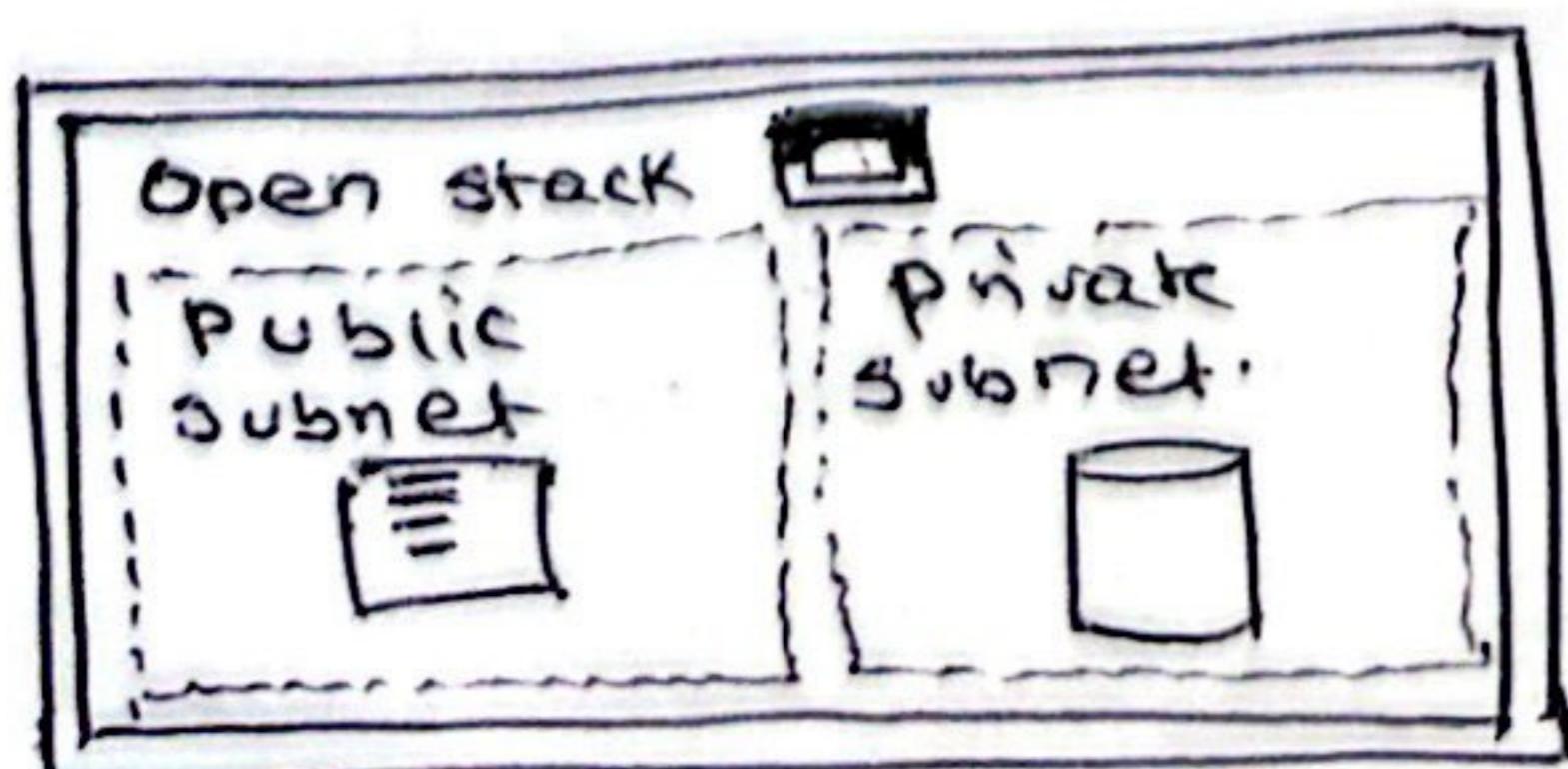
Azure Deployment Models

1) Public Cloud \Rightarrow Everything built on cloud provider.
Also known as cloud-Native.



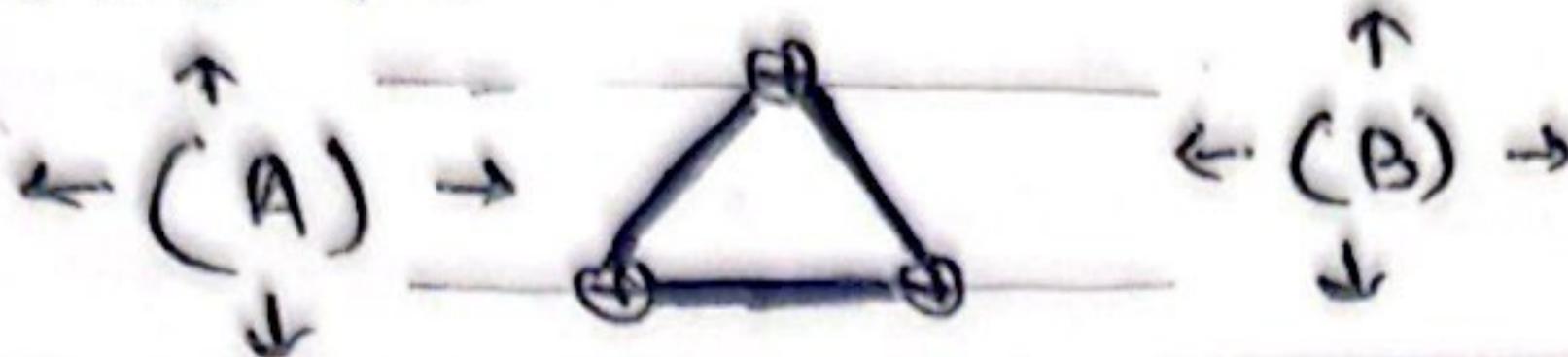
Azure Network.
(A)

2) Private Cloud \Rightarrow Everything built on company's datacentre.
Also known as on-premise.
The cloud could be Open stack.



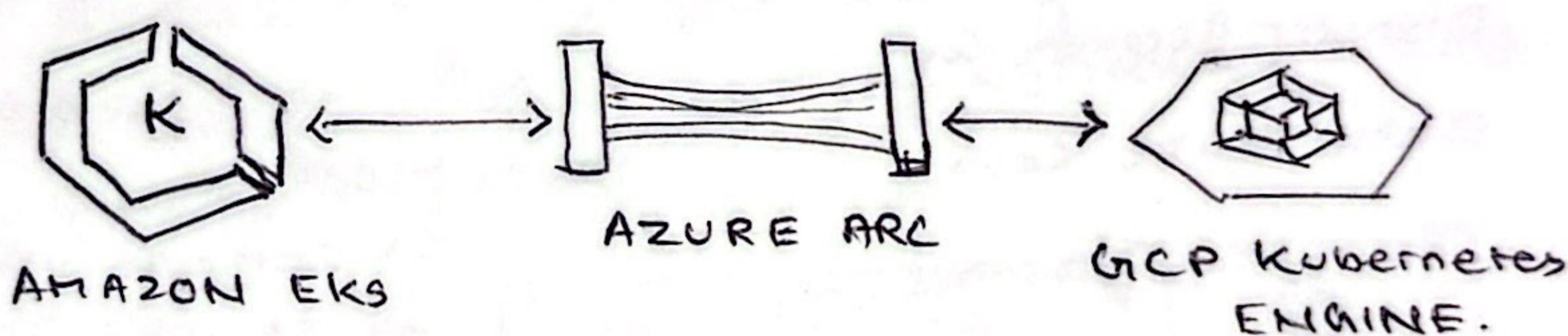
On premise
Data - centre
(B)

Hybrid \Rightarrow Using both on-premise and a cloud service provider.



	Public Cloud	Private Cloud	Hybrid.
Cost	Most cost effective.	Most Expensive	Could be more cost-effective based on what we offload.
Security	1) security by default 2) might not meet requirement.	1) No guarantee its secure. 2) can meet any requirement if we put in the work.	1) we have to secure our cloud connection 2) can meet all requirements
Level of Config	Limited (Based on what the CSP exposes to you)	We can config infra however we like.	We get the best of both worlds.

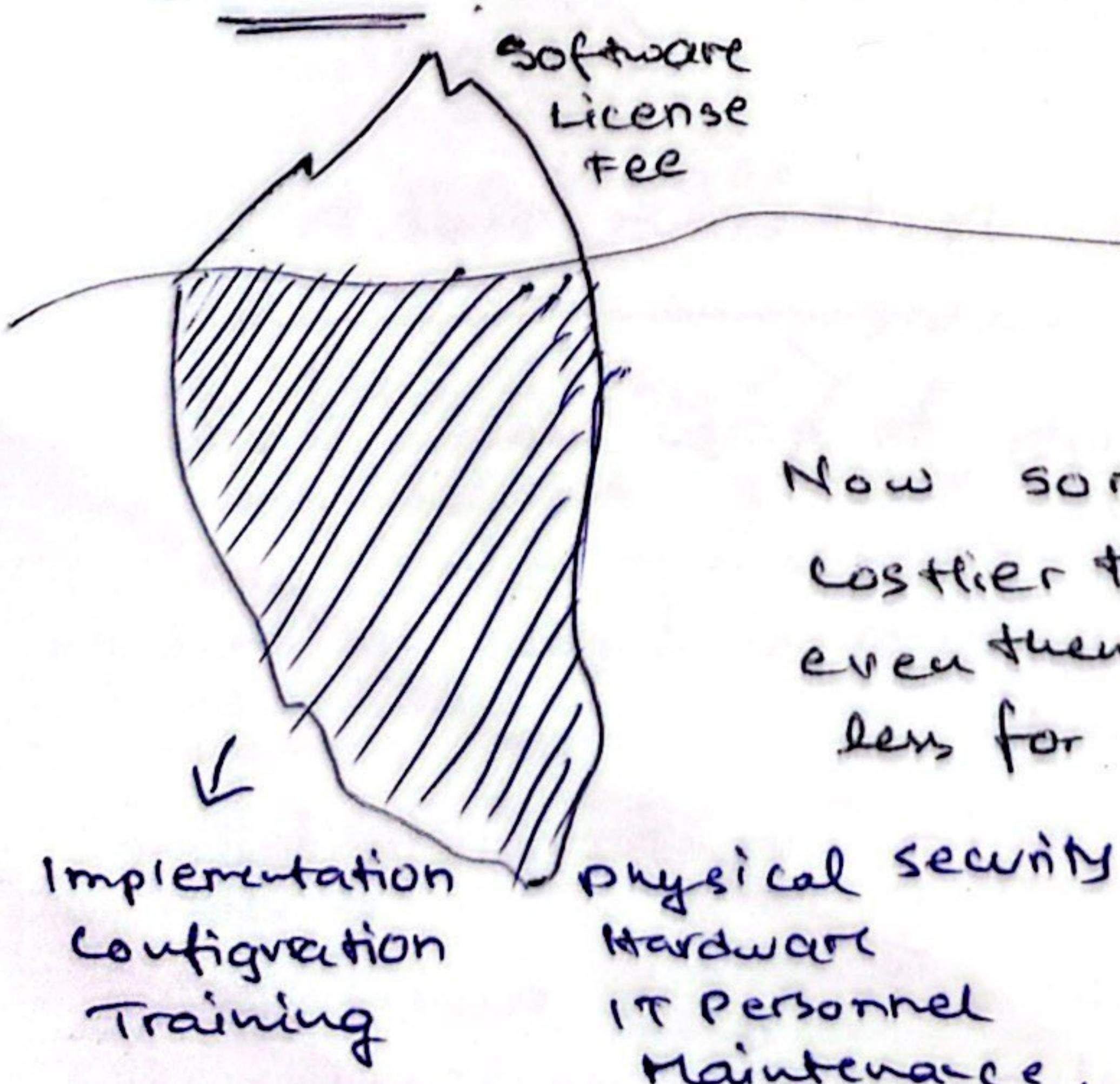
Cross cloud \Rightarrow Using multiple cloud providers.



Total Cost of Ownership \Rightarrow (TCO)

CAPEX

On Premise



OPEX

Azure

Subscription Fees.

Water.

Now sometime subscription fees is costlier than software license fee even then the total cost is much less for OPEX than in CAPEX.

Implementation Configuration Training.

when someone moves from CAPEX (Capital Expenditure) to OPEX (Operational Expenditure) then the cost is reduced by 75%.

Capital vs Operational Expenditure

Capital Expenditure (CAPEX)

1) Spending money upfront on physical infra, deducting that expense from your tax bill over time.

2) Server Costs

Storage Costs

Network Costs

Backup & Archive costs

Disaster Recovery Cost

Data Centre Costs

Technical Personnel.

Operational Expenditure (OPEX)

Customer only has to concerned with non physical costs.

- Leasing software & customizing features
- Training employees in cloud service.
- Paying for cloud support.
- Billing based on cloud metrics.
 - compute usage.
 - storage usage.

with capital expenses we have to guess upfront what we plan to spend.

Cloud Architecture Terminologies =>

Availability - Your ability to ensure that a service remains available.

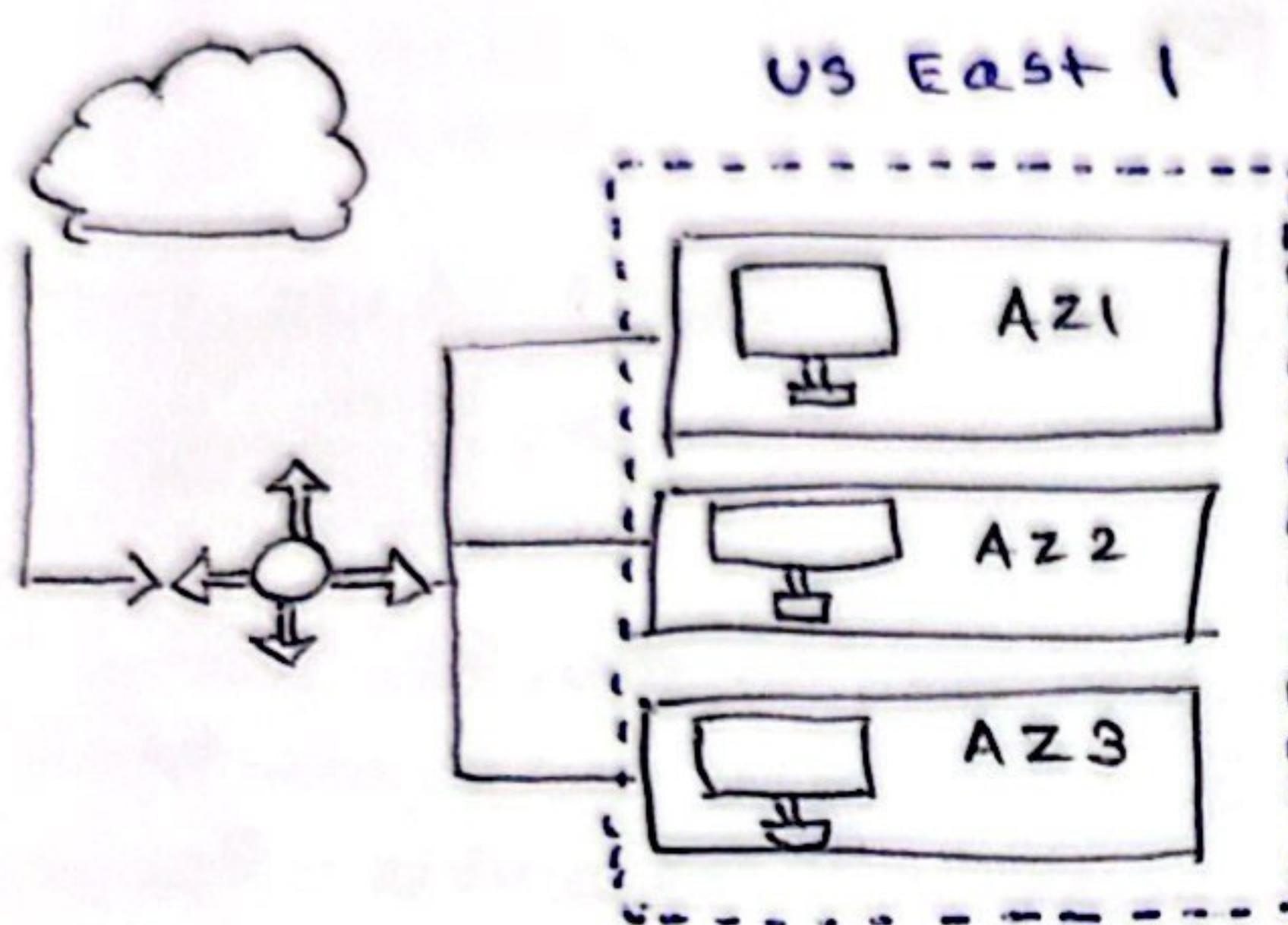
Scalability - Your ability to grow rapidly or unimpeded.

Elasticity - Your ability to shrink & grow to reflect demand.

Fault Tolerance - Your ability to prevent a failure.

Disaster Recovery - Your ability to recover from a failure.

High Availability \Rightarrow Your ability for your service to remain available by ensuring there is no single point of failure and/or ensure a certain level of performance.

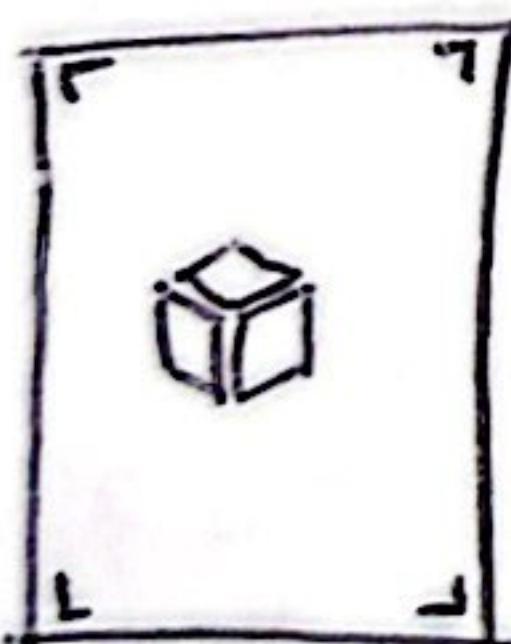


AZURE LOAD BALANCER

A load balancer allows you to evenly distribute traffic to multiple servers in one or datacentre. If a datacentre or server become unavailable, the load balancer will route the traffic to only available data centres with servers.

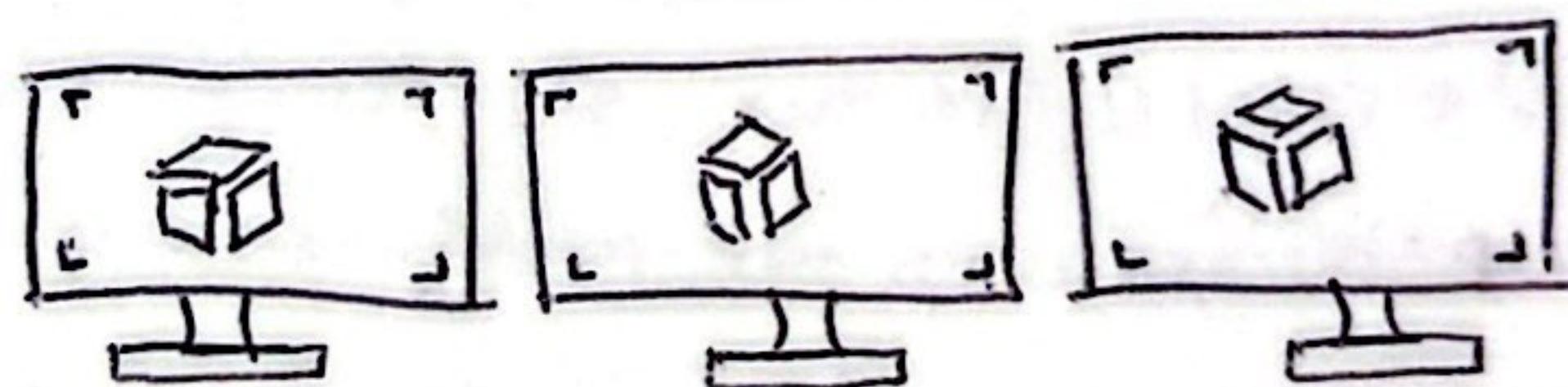
Running your workload across multiple Availability Zones ensures that if 1/2 AZ's become unavailable, your service/application remains available.

High Scalability \Rightarrow your ability to increase your capacity based on the increasing demand of traffic, memory & computing power.



VERTICAL SCALING (Scaling Up)

Upgrade to a bigger server



HORIZONTAL SCALING (Scaling Out)

Adding more servers of the same size.

High Elasticity \Rightarrow your ability to automatically increase/decrease your capacity based on the current demand of traffic, memory & computing power.

Horizontal Scaling

Scaling Out - Add more servers of the same size.

Scaling In - Removing more servers of the same size.

Vertical scaling is generally hard for managing with so you'll usually only see horizontal scaling described with Elasticity.

AZURE VM SCALE SETS

Automatically increase or decrease in response to demand or a defined schedule.

SQL SERVER STRETCH DB

Dynamically stretch warm & cold transactional data from Microsoft SQL Server 2016 to Microsoft Azure.

High Durability \Rightarrow Your ability to recover from a disaster and to prevent the loss of data solutions that recover from a disaster is known as Disaster Recovery.

- Do you have a backup?
- How fast can you restore that backup?
- Does your backup still work?
- How do you ensure current live data is not corrupt?

Fault Tolerance \Rightarrow is a process that enables an OS to respond to a failure in hardware/software. Fault Tolerance is the system's ability to continue operating despite failures or malfunctions.

Fault tolerance can be built into a system to remove the risk of it having a single point of failure. To do so, no the system must have no single component that, if it were to stop working effectively would result in entire system failing.

Evolution of Computing \Rightarrow .

\rightarrow Physical server,

[Dedicated] \Rightarrow VM's \Rightarrow Containers \Rightarrow Functions

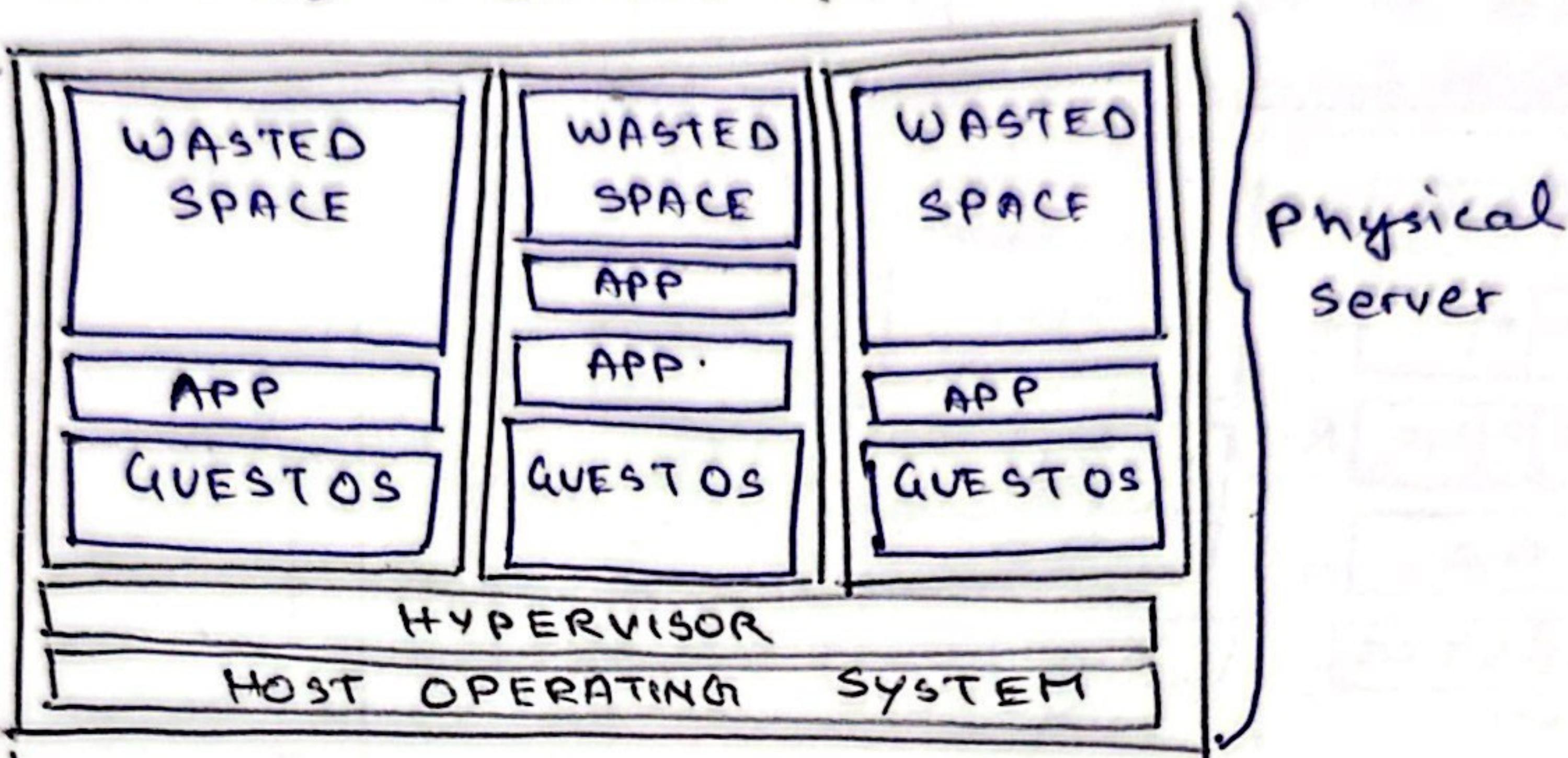
WASTED SPACE



- A physical server wholly utilized by a single customer.
- You have to guess your capacity you will overpay for an underutilized server.
- Upgrading beyond your capacity will be slow & expensive.
- You are limited by your OS.

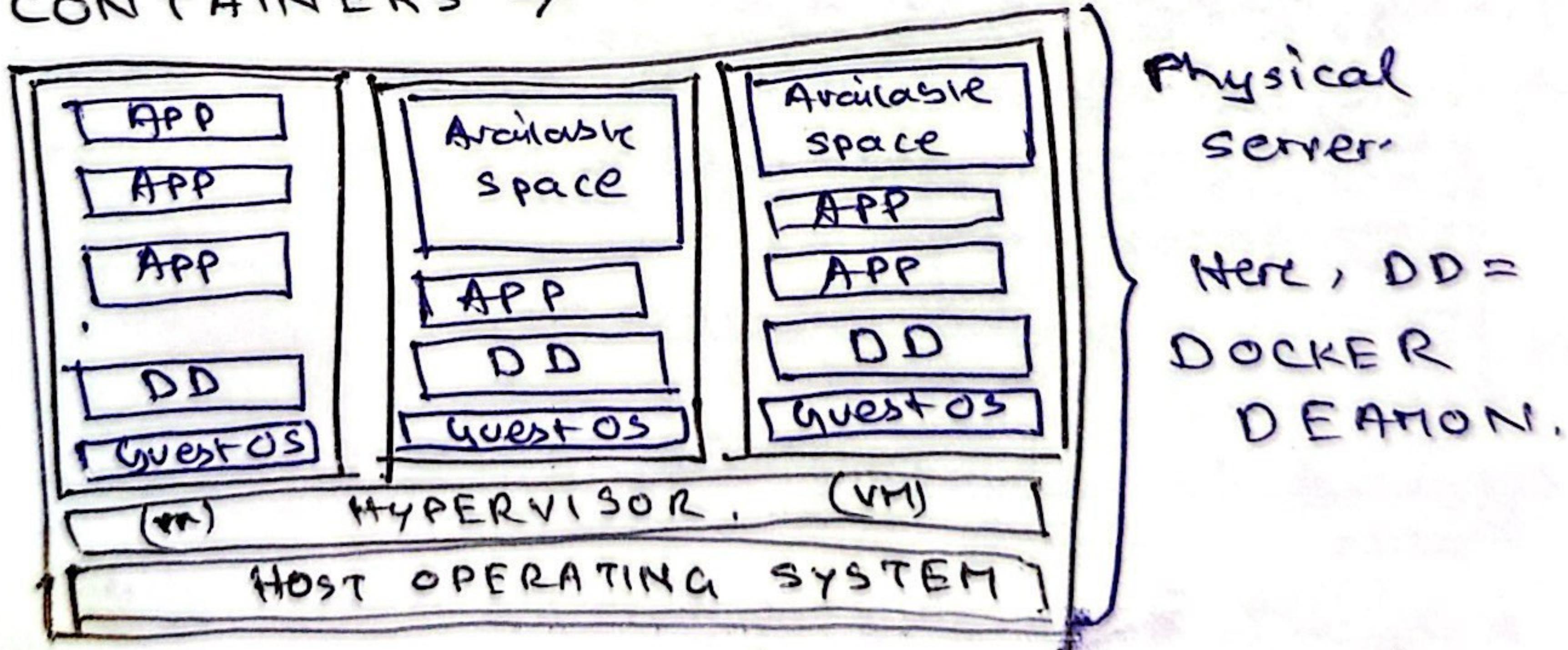
- Multiple apps can result in conflicts in resource sharing
- You have a guarantee of security, privacy & full utility of underlying resources.

VIRTUAL MACHINES =>



- ↳ You can run multiple Virtual Machines on one Machine.
- ↳ Hypervisor is the software layer that lets you run VM's.
- ↳ A physical server shared by multiple customers.
- ↳ You pay for a fraction of the server.
- ↳ You'll overpay for an underutilized VM.
- ↳ You are limited by your Guest OS.
- ↳ Multiple apps on a single VM can result in conflict in resource sharing.

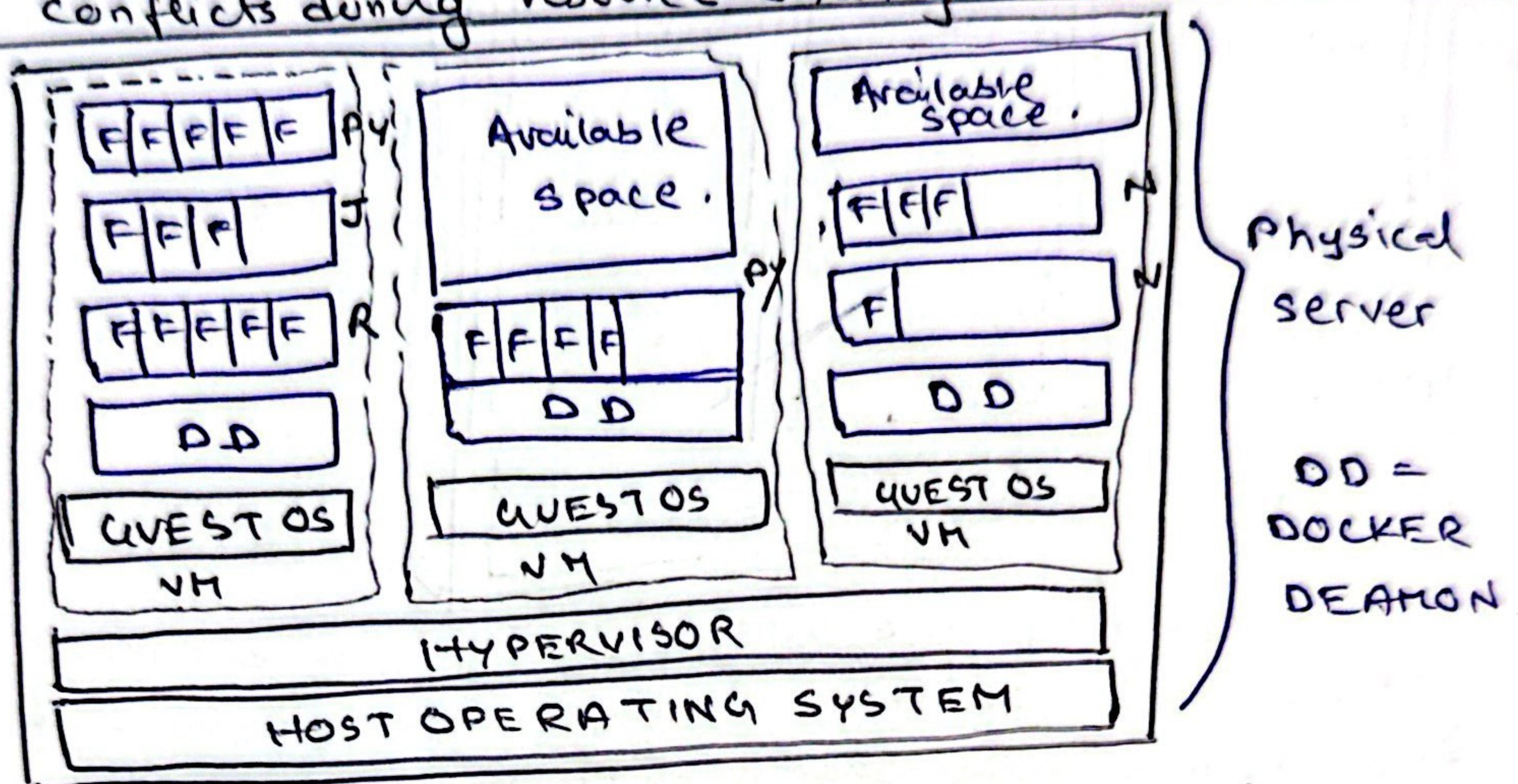
CONTAINERS =>



- ↳ Virtual Machine running Multiple containers.
- ↳ DOCKER DEAMON - is the name of the software layer that lets you run multiple containers.
- ↳ You can maximize the utilization of the available capacity which is more cost effective.

as the containers share the same underlying OS.

- ↳ Multiple apps can run side by side without being limited to the same OS requirements & will not cause conflicts during resource sharing.



FUNCTIONS =>

- ↳ A managed VM running managed containers
- ↳ known as Serverless Compute.
- ↳ you upload a piece of code, choose the amount of memory and duration.
- ↳ Only responsible for code & data, nothing else.
- ↳ Very cost effective, only pay for the time that the code is running. VM's only run when there is code to be executed.
- ↳ cold start is a side effect of this setup.

Global Infrastructure - Regions & Geographies

A region is a grouping of multiple data centers.
(Availability Zones).

AZURE has 58 regions available across 140 countries.

A Geography is a discrete market of two or more regions that preserve data residency and compliance boundaries.

AZURE GEOGRAPHIES

- 1) US 4) Brazil.
- 2) Azure Gov (US) 5) Mexico.
- 3) Canada

eg: if I am in Canada & I want a guarantee that data will remain within Canada, I can use Canada Azure Geographies.

Paired Regions

Each region is paired with another region 300 miles away. Only one region is updated at a time to ensure no outages.

Some Azure Services rely on paired regions for Disaster Recovery.

eg: Azure Geo-redundant Storage (GRS) replicates data to a secondary region automatically, ensuring that data is durable even in the event that the primary region isn't recoverable.

CANADA =>	Canada Central	Canada East
US =>	East + US	West + US
GERMANY =>	Germany Central	Germany NE.

Not all Azure cloud services are available in every region.

Recommended Region

Region that provides broadest range of service capabilities and is designed to support availability zones now or in the future.

Alternate Region

Region that extends Azure's footprint within a data residency boundary where a recommended region also exists. Not designed to support AZ's.

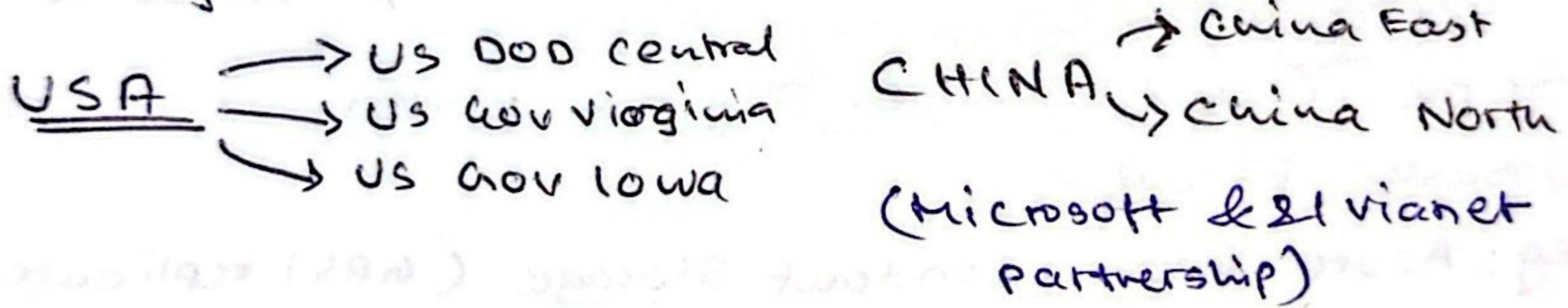
These regions are labeled as Other in the Azure Portal.

General Availability (GA) \Rightarrow is when a service is considered ready to be used publicly by everyone.

- * Azure Cloud services are grouped into three categories, (tier category determines when cloud service becomes available).
- 1) Foundational - when GA, immediately or in 12 months in Recommended & Alternate Regions.
 - 2) Mainstream - when GA immediately or in 12 months in Recommended Regions & may become available in Alt regions based on customer demand.
 - 3) Specialized - Available in recommended or Alt Region based on customer demand.

Special Regions \Rightarrow

Azure has specialized regions to meet compliance or legal reasons.



Availability Zones \Rightarrow (AZ)

An AZ is a physical location made up of one or more datacenter.

* DATA CENTER - secured building that contains hundreds of thousands of computers.

A region will generally contain 3 AZ's.

Data centers within a region will be isolated from each other (different buildings), but they will be close enough to provide low latency.

It's common practice to run workloads in at least 3 AZ's to ensure services remain available in case one or two datacenters fail.

(High Availability).

Availability Zone (AZ) Supported Regions ⇒

Not every region has support for AZ. These regions are known as Alt / other recommended regions are suppose to have atleast 3 AZ's.

Regions having a minimum of 3 AZs

- 1) Central US ↗ France Central
- 2) East US 2 ↗ North Europe
- 3) West US 2 ↗ SE Asia.
- 4) West Europe

Fault and Update Domain ⇒

AZ in Azure is a combination of both Fault & update domains.

FAULT DOMAIN

- 1) A logical grouping of hardware to avoid a single point of failure within an AZ.
- 2) Group of VM that share a common power source & network switch.

UPDATE DOMAIN

- 1) Azure may need to apply updates to the underlying hardware & software.
- 2) Update domains ensures your resources do not go offline.

AVAILABILITY SET

A logical grouping that you can use in Azure to ensure that the VM's you place in the Availability set are diff fault/update to avoid downtime.

AZURE VIA COMPUTING SERVICES ⇒.

AZURE VM

Windows / Linux VM. The most common type of compute. We choose our OS, Memory, CPU, storage. You share hardware with other customers.

AZURE CONTAINER INSTANCES

(Docker as a service) Run containerized apps on Azure without provisioning servers / VM's.

AZURE KUBERNETES SERVICE (AKS)

(Kubernetes as a service)

Easy to manage, deploy & scale containerized applications. Uses the open source Kubernetes (K8) software.

AZURE SERVICE FABRIC

(Tier 1 Enterprise Container as a service).

Distributed systems platform. Runs in Azure / On-Premises.

Easy to package, deploy, & manage scalable & reliable micro services.

AZURE FUNCTIONS

Event-driven, serverless compute (functions) run code without provisioning or managing servers. You pay only for the compute time you consume.

AZURE BATCH

Plans, schedules and executes your batch computer workflows across running 100+ jobs in parallel. Use spot VM's to save money (previously used low priority VM's to save on compute).

AZURE STORAGE SERVICES

AZURE BLOB STORAGE - (Object serverless storage)
store very large files and large amount of unstructured files.
Pay for what you store, unlimited storage, no resizing
volume, filesystem protocols.

AZURE DISK STORAGE -

A VM, choose SSD / HDD, encryption by default, attach
volume to VM's.

AZURE FILE STORAGE

A shared volume that we can access and manage like a
file server. eg SMB.

AZURE QUEUE STORAGE (*)

Messaging Queue - A data store for queuing and reliably
delivering messages b/w applications.

AZURE TABLE STORAGE (*)

wide column NO SQL DB - A NoSQL store that
hosts unstructured data independent of any schema.

AZURE DATABOX/ DATABOX HEAVY

A rugged briefcase computer and storage designed to
move terabytes/ petabytes of data.

AZURE ARCHIVE STORAGE