

# Azure Fundamentals

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- 1) Describe cloud Concepts 30y.
- 2) Describe Azure Architecture & Services 40y.
- 3) Describe Azure Management & Governance 30y.

## Cloud Concepts

- Cloud Computing
- Benefits of Cloud Services
- Cloud Service Types
  - IaaS
  - PaaS
  - SaaS

## Azure Architecture & Services

- Architectural Components of Azure
- Azure Compute & Networking Services
- Azure Storage Services
- Azure Identity, Access & Security.

## Azure Management & Governance

- Cost Management in Azure
- Features & tools in Azure for Governance & Compliance
- " " " " " For Managing & deploying Azure resources
- Monitoring tools in Azure

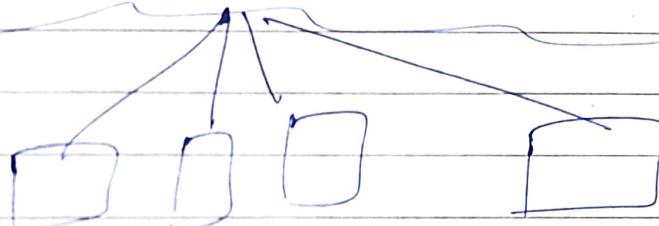
## # Cloud

- Traditional Approach
- Virtualization
- Cloud Computing

- 1) Pay only what you use
- 2) No Maintenance
- 3) Scaling

Cloud Computing.

Virtual Machine      Software Platform      Servers Data Apps  
 Machine      Platform      storage



Microsoft  
 Google  
 Amazon → cloud computing providers.

Services v/s Resources.

↓  
 only Microsoft hosts services.  
 ↗ 3rd Party App host on Azure or vendors.

Cloud shell → Command prompt (CLI)

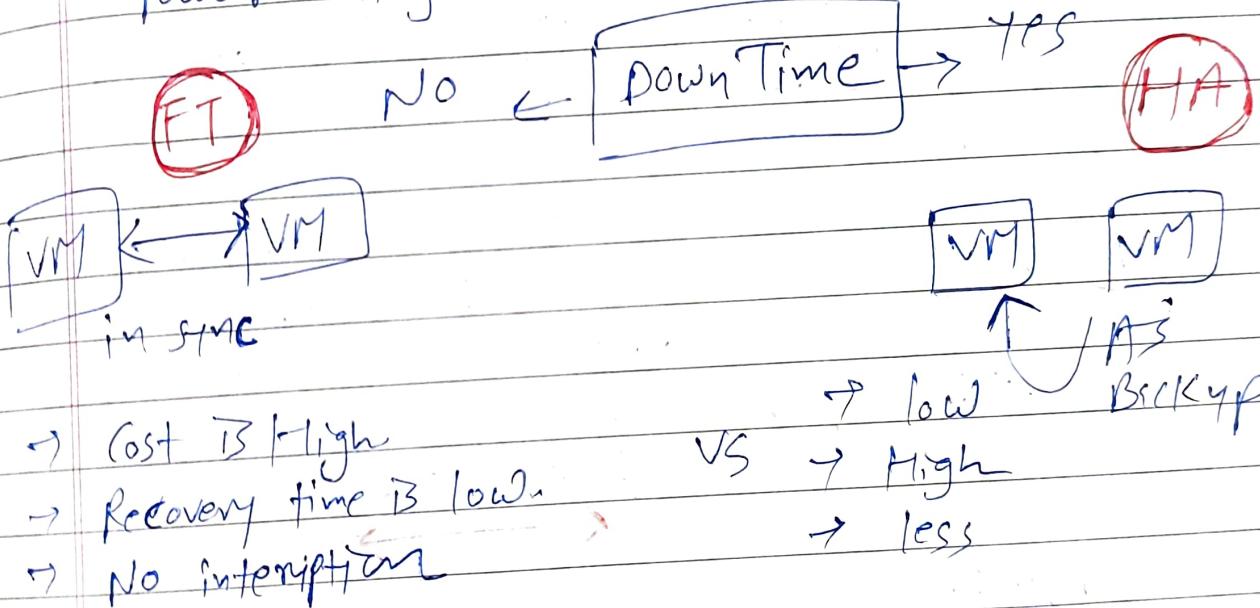
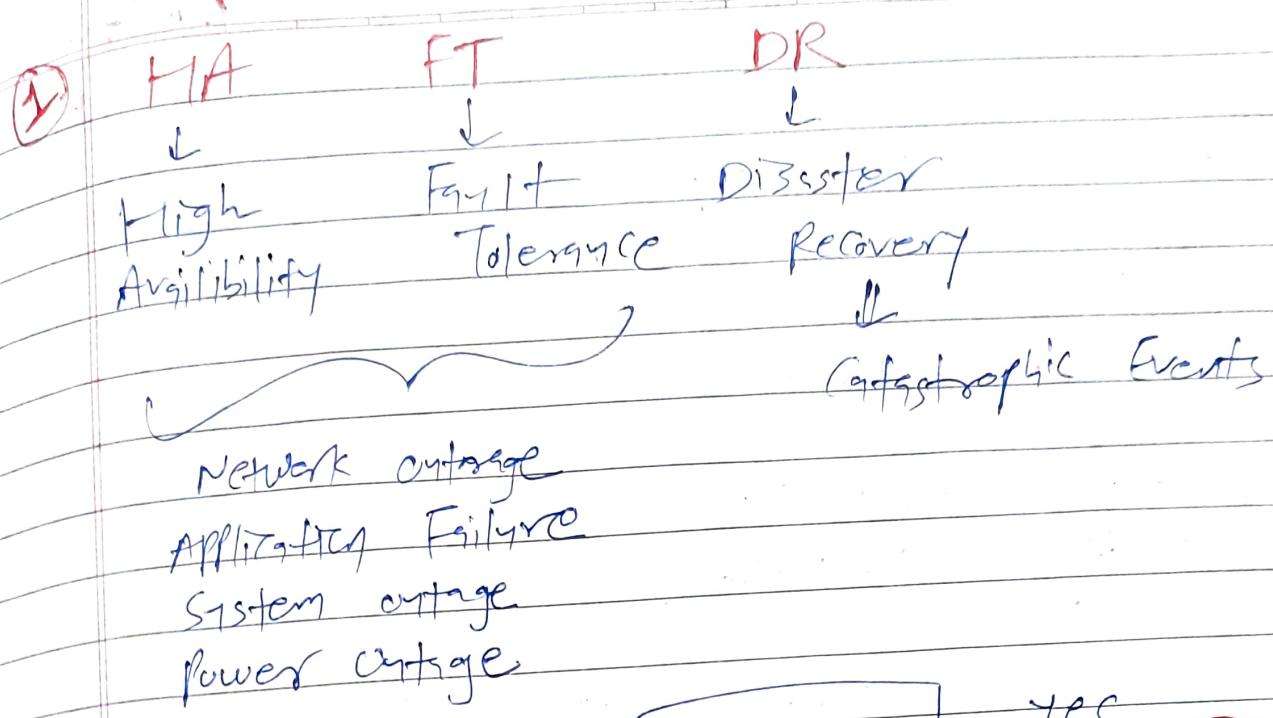
Linux → Bash  
 Windows → PowerShell

## # Azure Marketplace (Resources)

## ~~# Cloud Fundamental Concepts~~

Disaster Recovery

- ① High Availability, Fault Tolerance & Recovery.
- ② Scalability, Elasticity & Agility.
- ③ CapEx v/s OpEx
- ④ Economic benefits of cloud
- ⑤ Consumption based Model
- ⑥ Computing Models → SaaS  
→ PaaS  
→ IaaS
- ⑦ Deploying Models  
→ Public  
→ Private  
→ Hybrid
- ⑧ Cloud Pricing Model



Azure provides → Redundancy.  
 → Load balancing  
 → Auto scaling.  
 → AZ → Availability zone

SLA (Service level Agreement)



- Charged for disk space, CPU, Memory, bandwidth
- Minimize cost by Reducing Reserved YSe

**Scalable** → Ability to grow environment.

**Vertical Scalability**      **Horizontal Scalability**

Increasing the capacity of current Server → Deploying Multiple instances / database (of same config)

↓  
Still limit → it increase availability  
→ Need additional infrastructure  
    ↳ Load Balancer  
    ↳ Auto scaling Group.

**Elasticity** → Add / Remove Resources  
    Automatically

**Agility**

→ Rapidly deploy and configure cloud resources as your app's need changes.

Capital Expenditure

Operational Expenditure

### ③ CapEx vs OpEx

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→ Upfront cost.

→ Pay as you Go

→ Spending Money ahead on physical infra. and then deducting the cost over time from fix server, storage etc.

→ There is no up-front cost.

→ Ongoing cost.  
Support expenditure

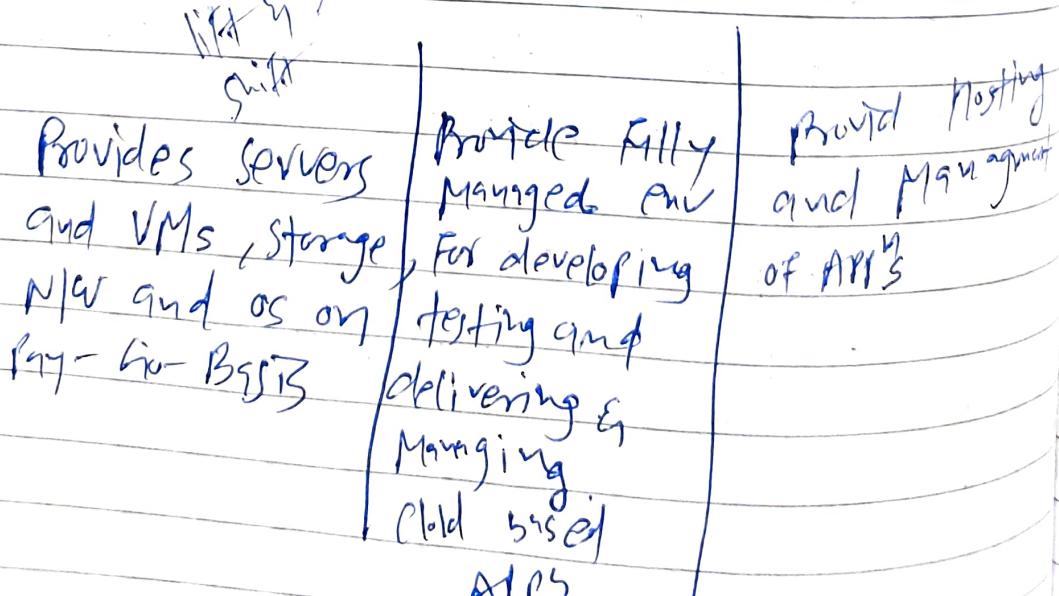
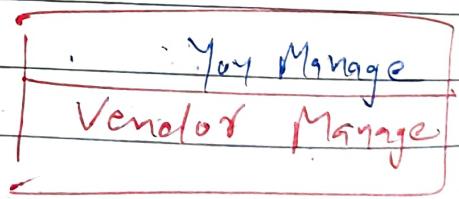
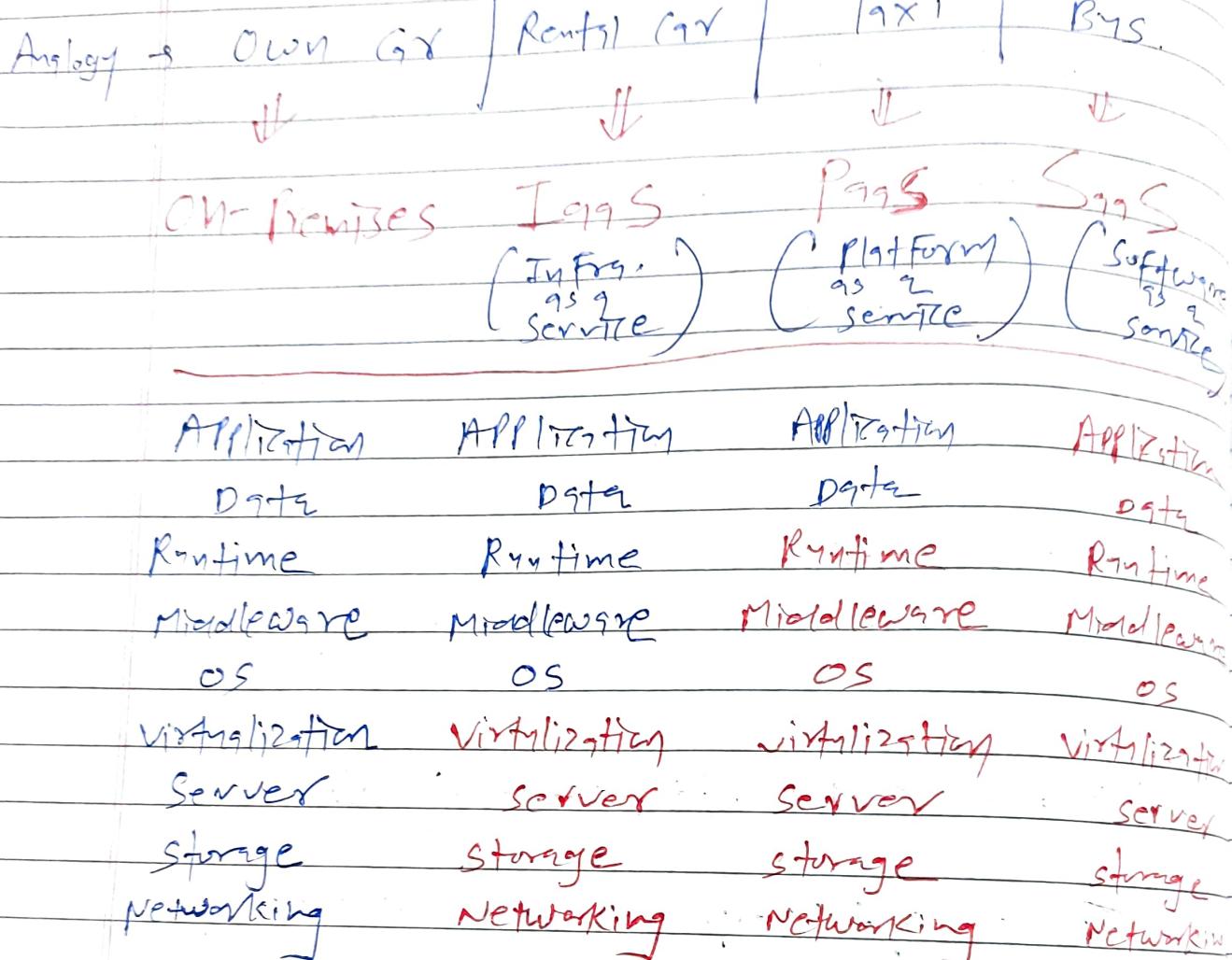
Bus. → Demand & Growth may be unexpected and exceed estimate  
Cloud services  
→ Consumption based Model

### ④ Economic Benefits of the Cloud

- Trade capital expense → As variable expense.
  - No initial investment
  - Pay as you Grow.
- Stop Guessing capacity.
- Increase speed and agility
- Benefits of massive economies scale.
- Go global in minutes.

### ⑤ Consumption Based Model (Pay-as-you-Go) vs Fixed cost Model

## ⑥ Computing Models



IaaS PaaS SaaS

Responsibility

	Information and Data	✓	✓	✓	✓
Cloud's customer perspective	Devices	✓	✓	✓	✓
Cloud's customer perspective	Accounts & Identity	✓	✓	✓	✓
Cloud's customer perspective	Identity & directory Inf.	✓	✓	✓	Shared
Cloud's customer perspective	Applications	✓	✓	✓	✓
Cloud's customer perspective	Network control	✓	✓	✓	✓
Cloud's customer perspective	Operating System	✓	[S h a r e d] cl	✓	✓
Cloud's customer perspective	Physical Host	✓	✓	✓	✓
Cloud's customer perspective	Physical Network	✓	✓	✓	✓
Cloud's customer perspective	Physical Data Center	✓	✓	✓	✓

(2) Deployment Models

Public cloud

Private cloud

Hybrid cloud.

## ⑥ cloud pricing Model

Factors.

- 1) Always Free
  - 2) Pay  $\rightarrow$  GIB → Database  
→ storage  
→ New Traffic
  - 3) Pay  $\rightarrow$  operations
  - 4) Pay  $\rightarrow$  Execution (serverless)
    - Other metrics → Premium Tier  
Active Directory
  - ↳ Regions / locations
  - ↳ support options.
  - ↳ programs & offers
- # Learning outcomes

(32)

Notes  
exam

(M → L)

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# Azure Architectural Components

- Data centers, Regions, Region Pairs
- Availability Zones
- Resource Groups.
- Azure Resource Manager (ARM)
- Subscription.
- Management Groups

# **Region**, which is a physical location around the world where we cluster Data centers.  
Better Scalability and Redundancy.

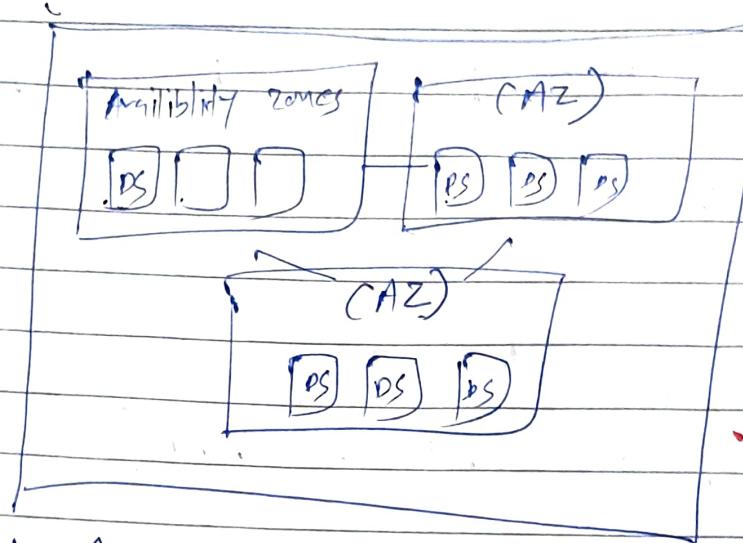
How to choose Region?  
→ Compliance  
→ Proximity.  
→ Available Service  
→ Pricing.

# **Region Pairs** connected via cables.  
300+ miles Apart.  
Automatic failover.

→ They don't update both the regions at the same point of time..

## # Availability Zones ↗

Region ↘

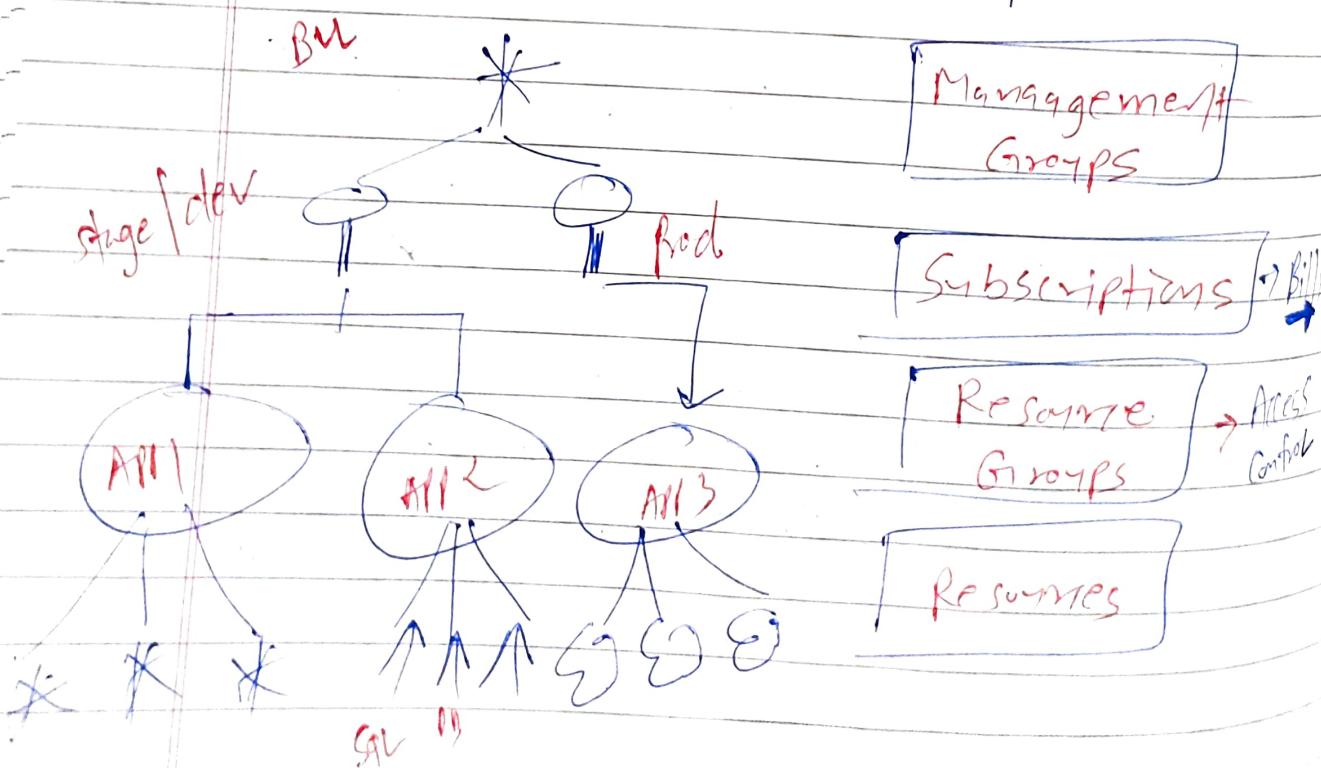


- ↳ Each AZ has independent power/cooling/N/W
- ↳ All AZ traffic is encrypted.
- ↳ ~100 km Away.

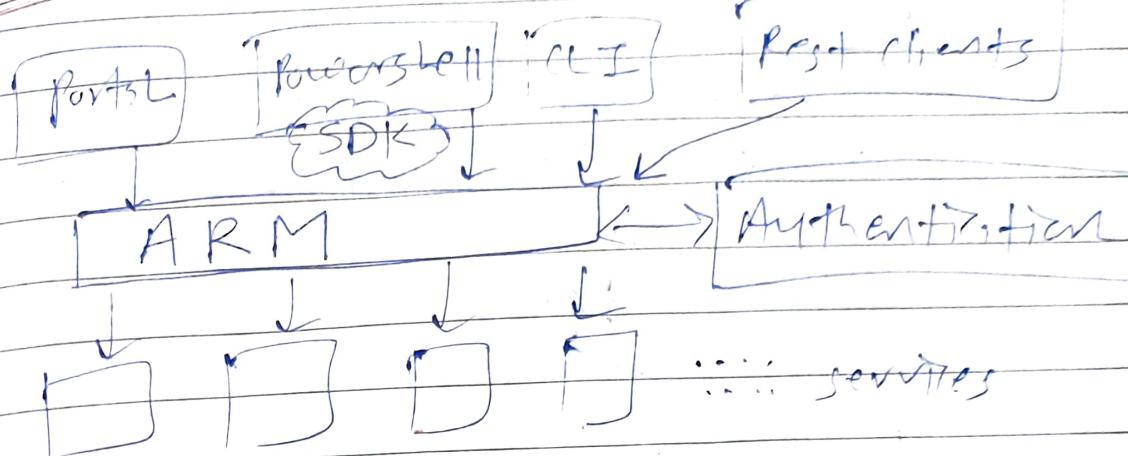
## # Resource Groups ↗

Logical containers of Resources

Resource is instance of any services.



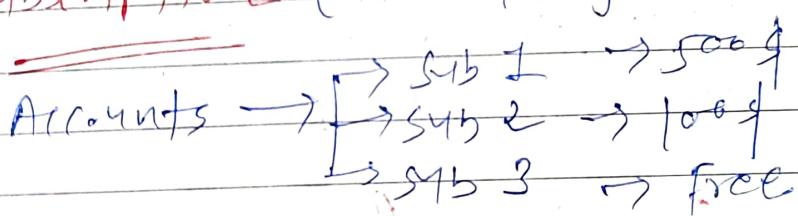
## # Azure Resource Manager (ARM).



Export Template To Move one RG to another Group.

↳ it's JSON code. Dev → Prod  
 ↳ anal then Deploy

## # Subscription (How you get billed?)



Also Access Control

→ free

Subscription  
for

→ Pay-per-use

→ Billing

→ Enterprise

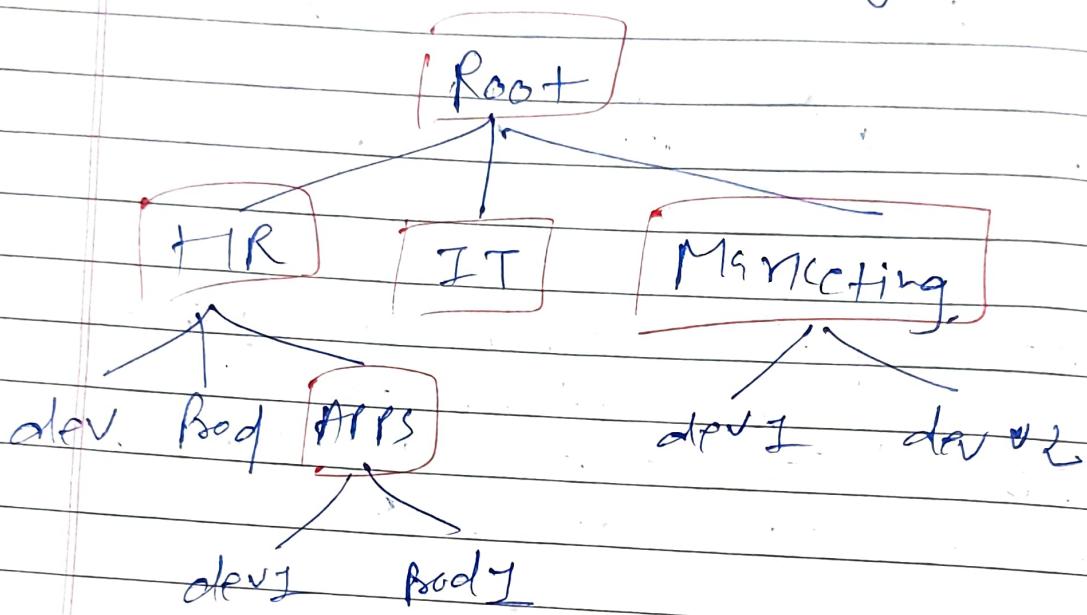
→ Access Control

→ Students

and Many More

## # Management Groups

Multiple Subscriptions as a single Management entity to facilitate easier Management.



→ each Subscription can only be part of one Management Group.

## # Azure Sovereign Regions

→ everything separate.

- Azure Government (only for US Govt)
- Azure China
  - ↳ (QIVine) Chinese companies
- physical reside in China

# ~~CH-3~~ Compute Services

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# Computing ↗

→ what is compute?

→ Azure Virtual Machine

↳ Demo → Deploy and Resize VMs

↳ Deploy Website on VM.

↳ Load Balancer.

↳ Deploy VMs ↗ → Availability Zones  
→ Availability Sets

↳ VM Scale Sets

↳ Azure App Services

↳ Containers

↳ ACI vs AKS

↳ Virtual Machine vs Containers.

↳ Azure Container Registry.

↳ Azure Virtual Desktop (Windows Virtual Desktop)

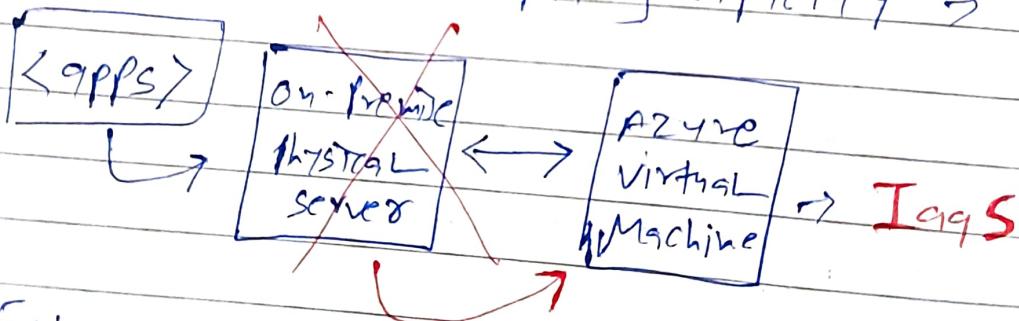
# Compute

Processing.

~~Services~~

- ① Azure Virtual Machine
- ② Azure APP Service
- ③ Azure Container Instances
- ④ Azure Kubernetes Service
- ⑤ Azure Functions
- ⑥ Azure Virtual Desktops

①

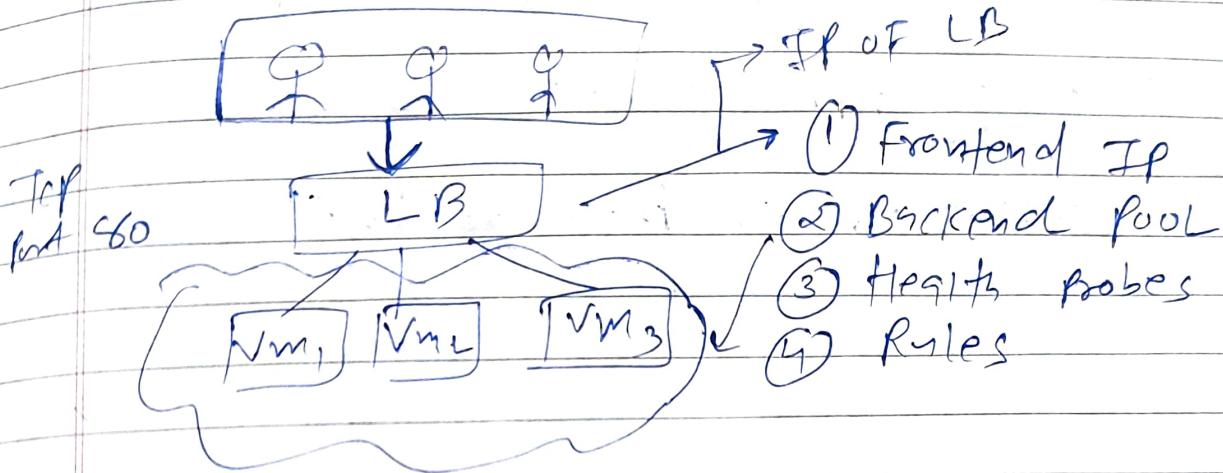
Azure Virtual MachineProvides Highly Flexible/scalable,  
cost effective,Quick computing capacity → Azure cloudFULL control like physical computer.↳ Also responsible for Configure, update & Maintain

Type of image → OS  
 Size of VM → CPU RAM Storage  
 Availability option

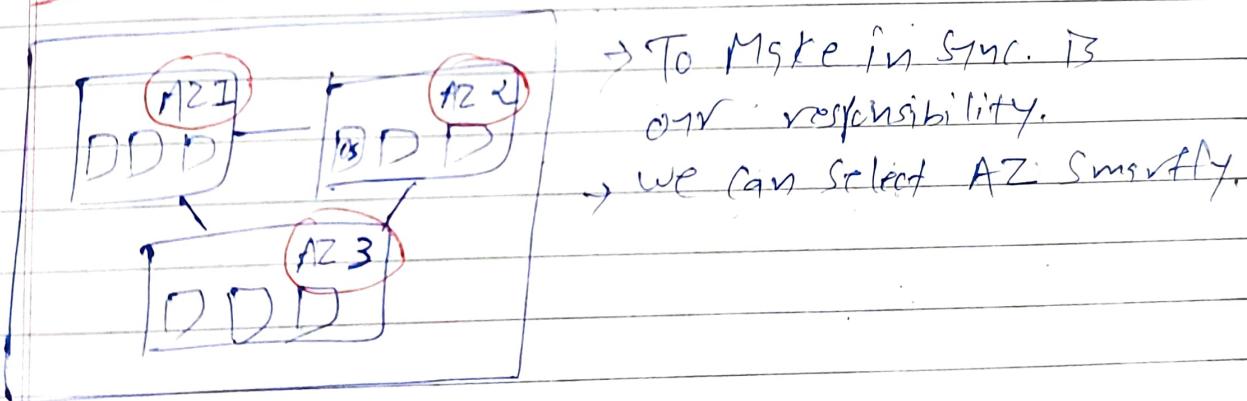
优势  
 →

## # Load Balancer

Deliver High Availability and Network Performance to your Apps.

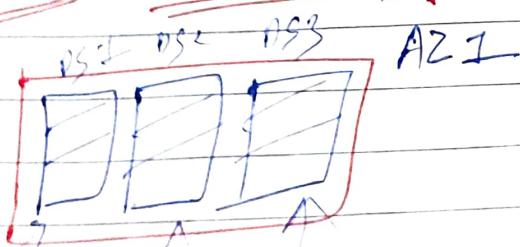


## # VM Availability Zone



## # Region

### VM Availability Set (For Business Continuity)



- ① Fault Domain
- ② Update Domain

① Power Off  
② Fault Domain  
③ Updated domain

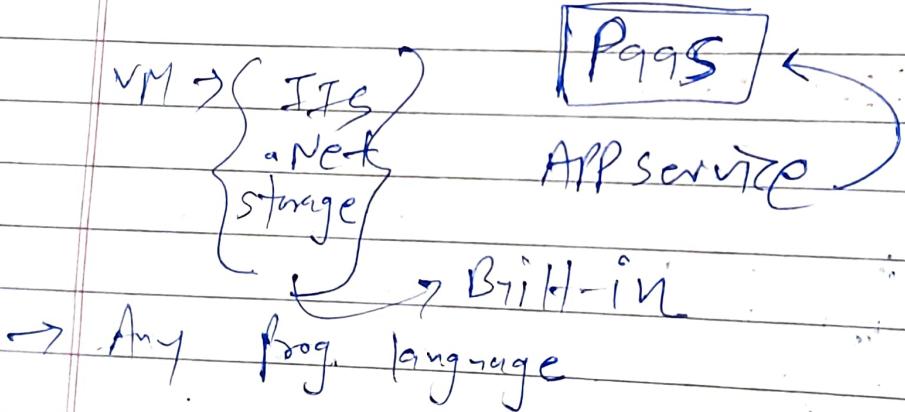
Microsoft will fix it  
in one go

## # VM Scale Set

Problem → Manually Add or Remove VMs  
 So, VM scale set can do automatically  
 → Base configuration (have to provide)

## (2) Azure App Services

enables you to build and host → Web Apps  
 background jobs  
 • Mobile backends and  
 RESTful APIs



# Web Apps.

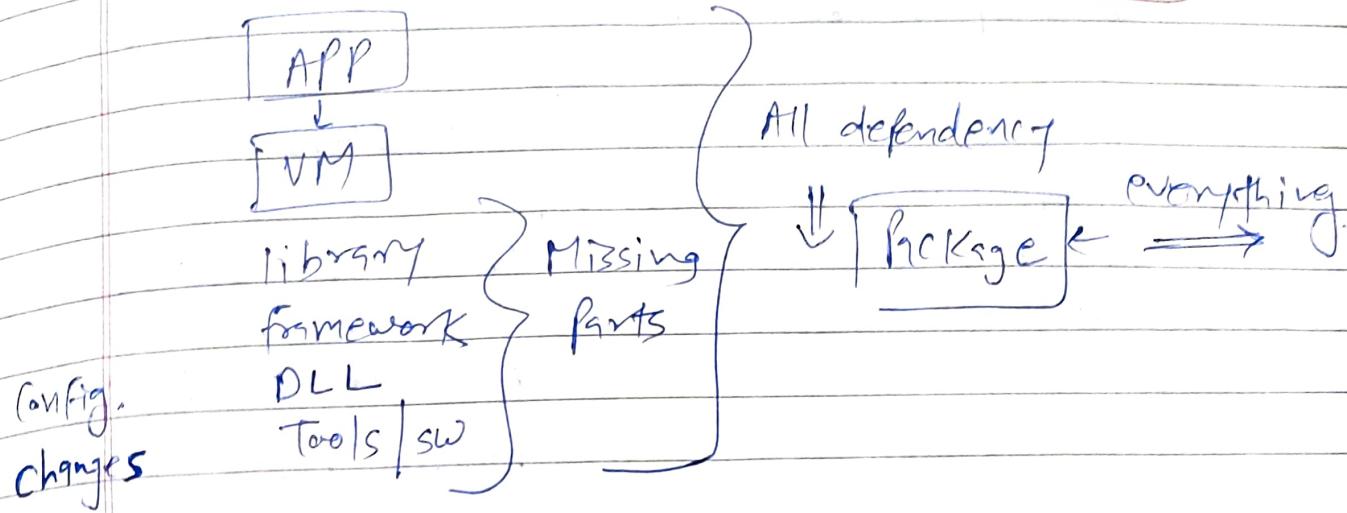


# API Apps

# Web Job

# Mobile Apps

(3) Containers → Wrap up an application into its own **isolated package**



Containers are Isolated and in one VM, Multiple containers are allowed. However, it will add Container Run Time

Azure → Azure Container Interface (ACI)

↓  
only for Dev/UAT

→ Azure Kubernetes Services (AKS)

↓  
For Prod

Template (Images)

↳ Runnable instance of this image

Container Registry → Docker

↳ Azure Container Registry

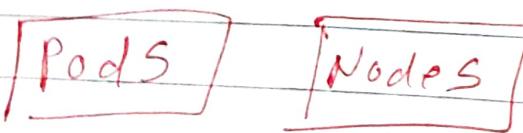
# ACI vs AKS

- To deploy container  $\Rightarrow$
- 1) local workstation
  - 2) on-premises servers
  - 3) VMs in Azure (IaaS)
  - 4) ACI or AKS (PaaS)
  - 5) Azure App Service

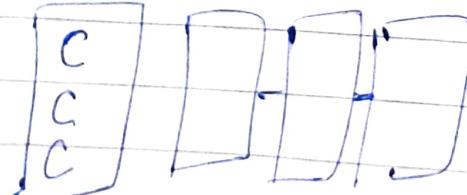
Azure Container Interface

- ACI**  $\rightarrow$  Lets you deploy containers on Azure without maintenance or patch the environment.
- $\rightarrow$  Basic web application, Dev/Test scenario, It's a perfect option.
  - $\rightarrow$  limited scalability & low availability

- AKS**  $\rightarrow$  Azure Kubernetes service  
For complex container designs.  
+/- containers, Monitor containers

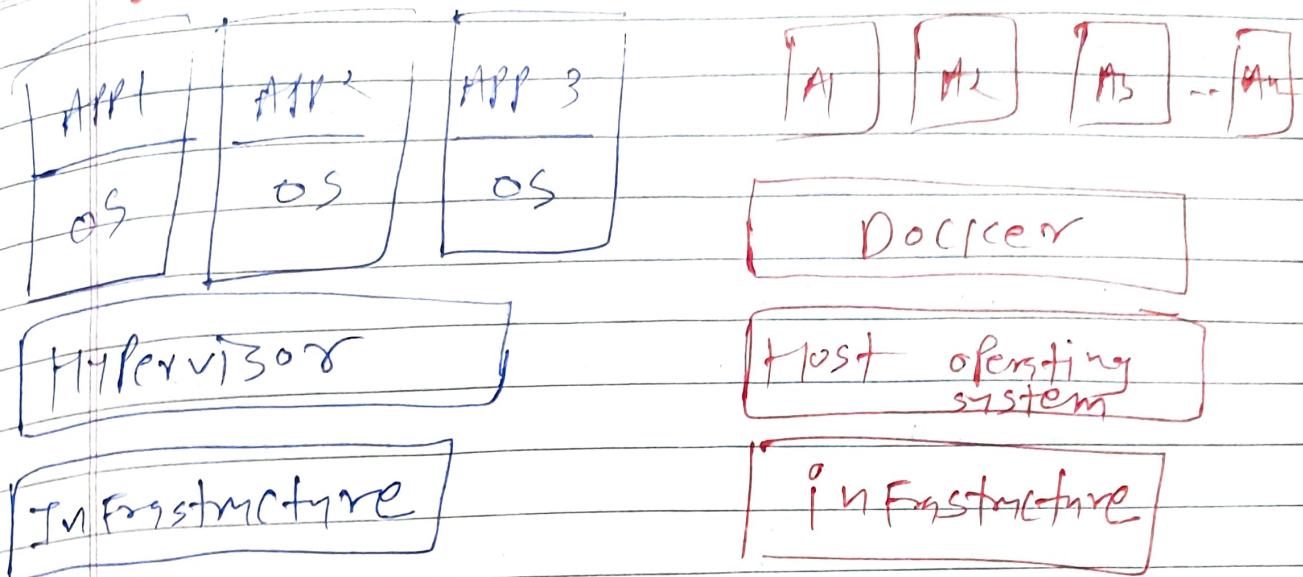


Pods



Nodes

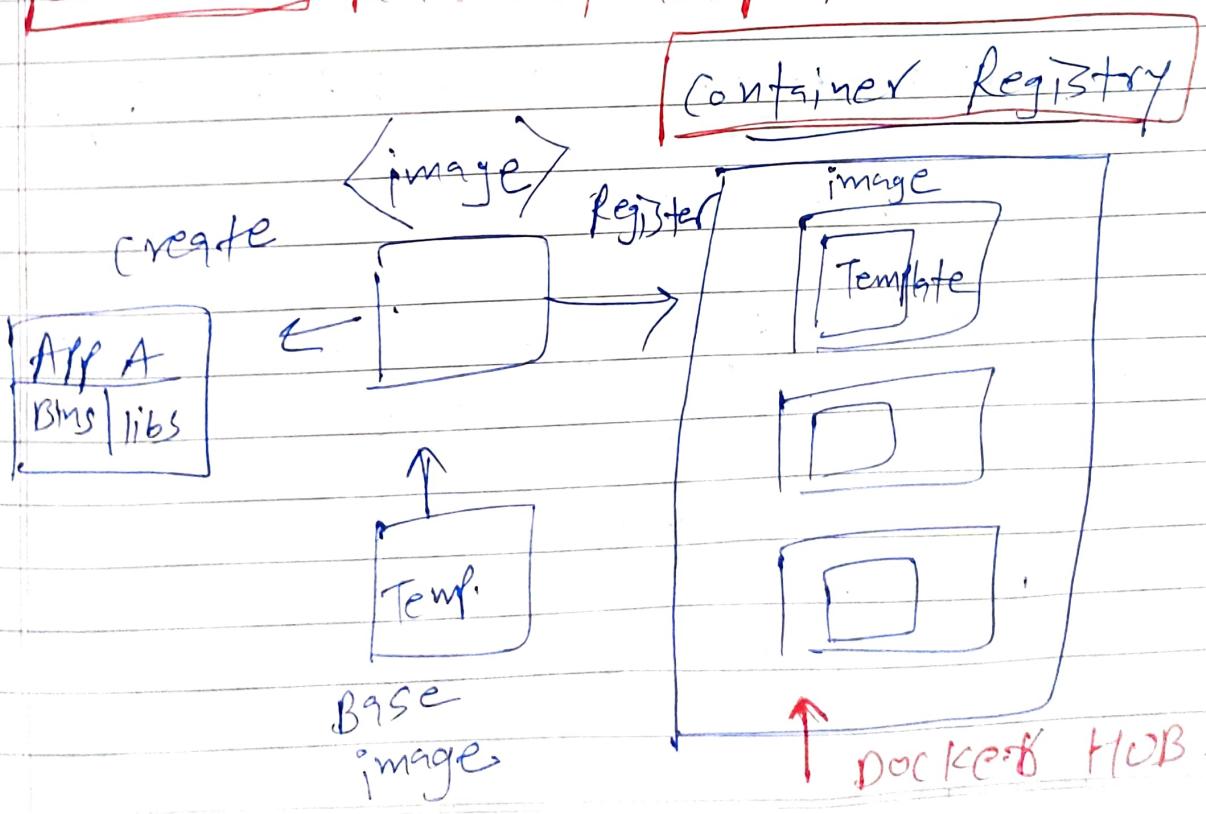
## Virtual Machine v/s Containers.



→ Contains full copy of OS.  
 → If virtualize underlying infra (Hardware, Memory, CPU, Storage) → **Virtualized operating system**

→ Small in size, so quicker to spin up

# **DOCKER** Read only Template



- A Docker Container is a standard that describes the format of containers and provides a runtime for docker containers.
- Docker is the open source project that automates the deployment of container that run in the cloud/on-premises.
- Docker is also company.  
Applications can deploy or undeploy faster  
start and stop faster  
change to another image faster.

## All services

↳ containers → Create container instance

(6)

## Azure Virtual Desktop

(RDS) Remote Desktop Service → But it's complex  
Single VM → Single OS

- Virtual Desktop supports windows 10 Multi-session.
- Host Pool can allot users to OS.

- Low Latency
- Fast user sign-in
- Secure

# Serverless Technology

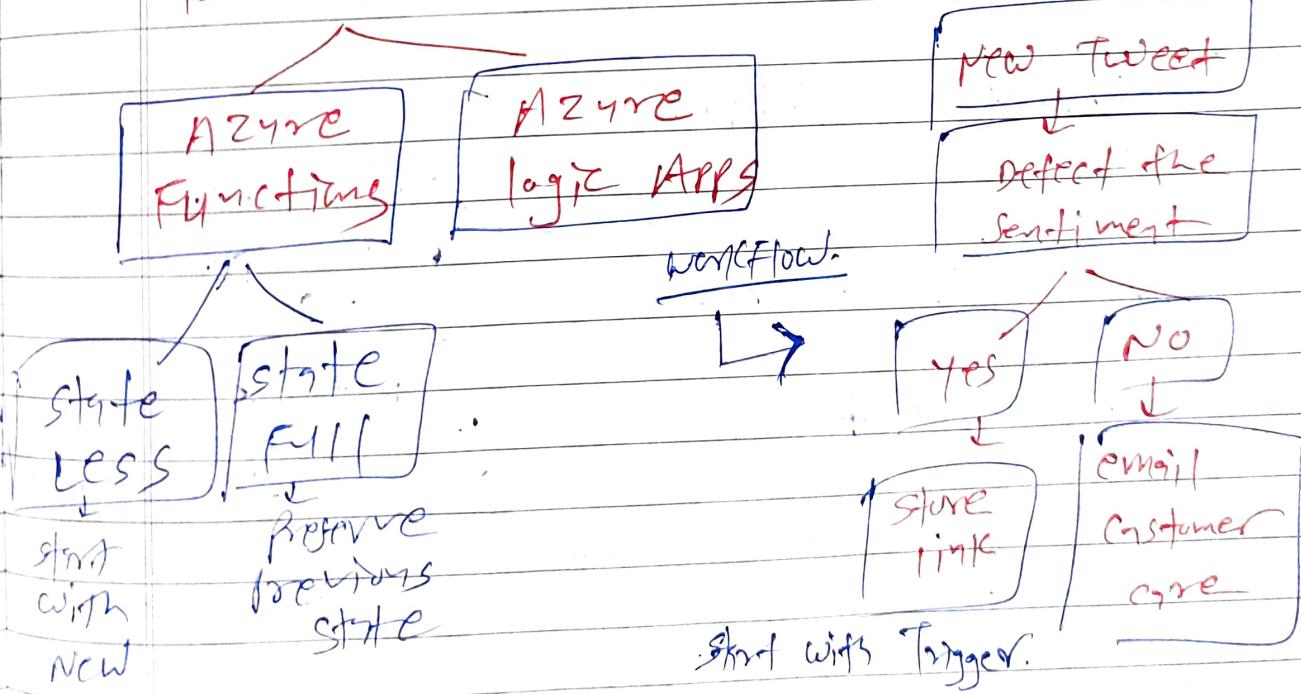
Maintain Infra. }  
 Pay → Month/year: }  
 ↓ talk cap of  
 infra

Serverless Tech. → Pay only if  
 ↓ it's used.

Azure Functions → Not used → No charge  
 (behind the scene)

- Micro-Billing. Auto scaling.
- No need to reserve capacity → scaling.
- Event-Driven.

Two Types.



~~CH 5~~

## Networking

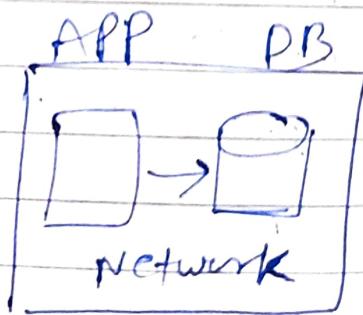
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- Virtual Network (Vnet) and Subnets
- VPN Gateway & Vnet Peering
- Load Balancer & Application Gateway
- Content Delivery Network (CDN) (edge)
- Express Route (no internet → virtual to other)
- Express Route V/S VPN Gateway
- Azure DNS
- Public and Private Endpoints.

### VNet & Subnet

#### Azure Virtual Network

Azure Vnet



→ Segregated internal Net

→ Our company owned Vnet

→ We can control

Vnet CIDR Range (Range of IP Address)  
IP Address

→ By default, Multiple Vnet don't talk with each other.

SybNet → Each resource has distinct access requirements.

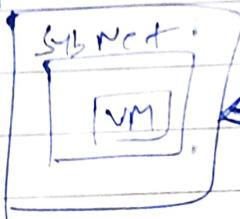
→ organize and group resources on SybNet

- ↗ Public SybNet (usually have internet access)
- ↘ Private SybNet (private)

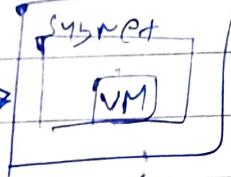
NSG → Network security group.

Vnet Peering → Connects Vnets from same or different regions.  
(Global Vnet Peering)

Vnet 1



Vnet 2

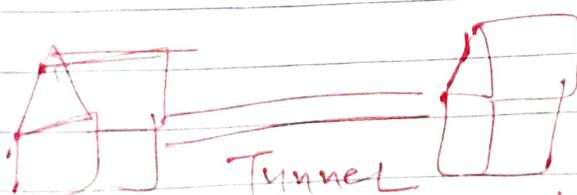


Peering

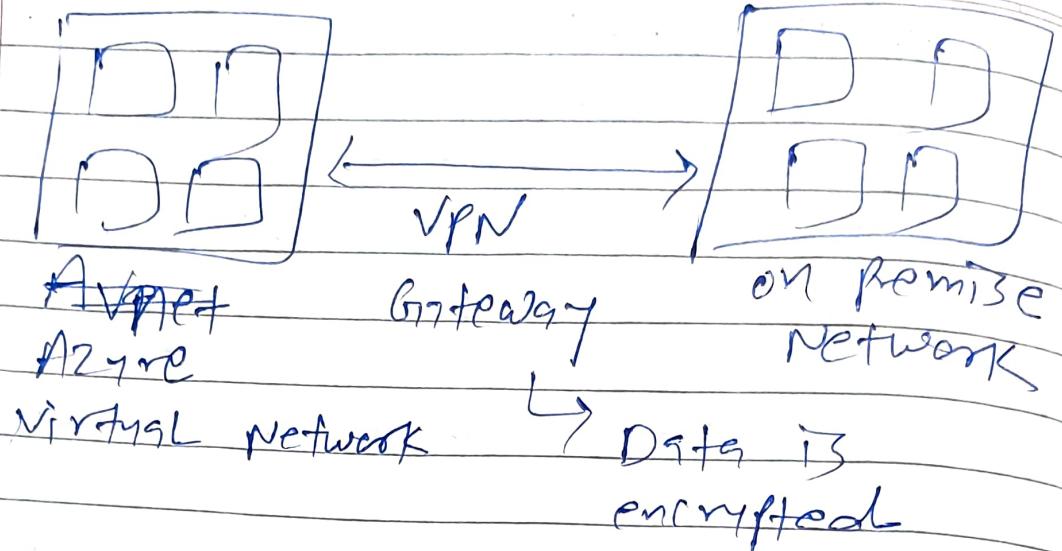
Secure Communication

Should not have overlap CIDR IP Range.

VPN Gateway →



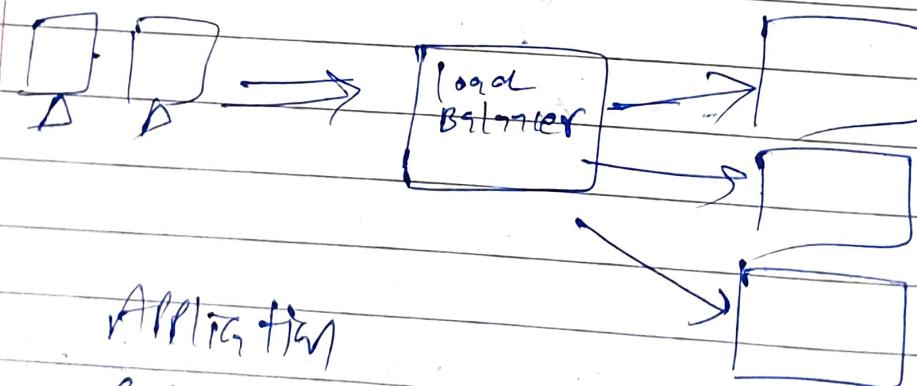
(VPN) It's secured.



- 1) Site to site connection.
- 2) Point to site connection.
- 3) Multi site connection
- 4) N/w to N/w connection.

Application Gateway → N/w Peering.

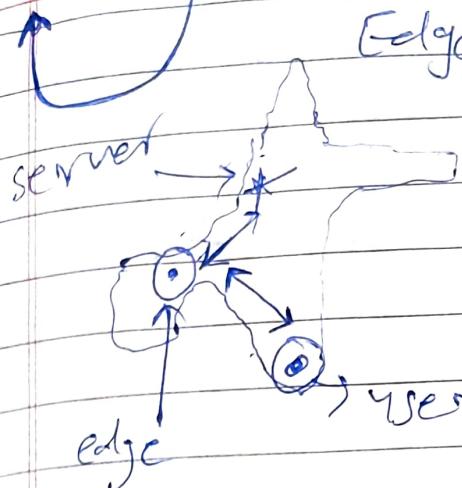
Advanced Load Balancing



Gateway → HTTP based Routing.

for ex. images  
Then VTE

## content delivery network (CDN)



Edge → physical server.

Closer Access with edge.

Copy Application to Edge server.

User → CDN Cache the content.

→ Large Scalability.

Pop → Point of presence

## Express Route

VPN Gateway → (through Tunnel)

(but) → Data traveled over internet

→ Encryption is Must

→ slow and expensive for large data.

To solve issue

Express Route → no internet

→ Virtual WAN ↔ on premise NW

→ speed is fast -

→ private connection.

→ low latency.

Need 3<sup>rd</sup> party for configuration.

## Azure DNS (Domain Name System)

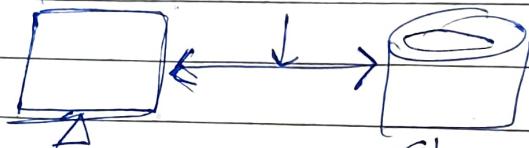
- ↳ Hosting service → Name Resolution
- ↳ For Record Management.

Billing = No. of DNS zones + No. of DNS queries received

→ Portal, Powershell, CLI

### Service End Points

service  
end point



Storage

Private connection

→ Secure and direct connectivity to Azure services.

→ Use optimized route over the Azure network.

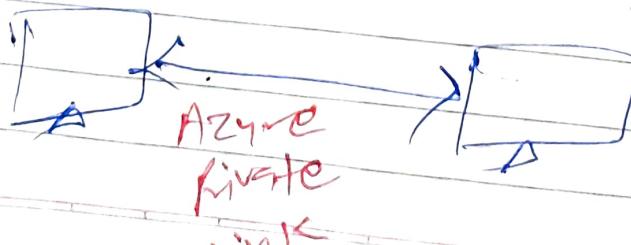
→ No public IP address needed

### Private End Points

→ Private Link Service

[Point all inbound access]

→ Private endpoint is a network interface that uses a private IP address from your virtual network.



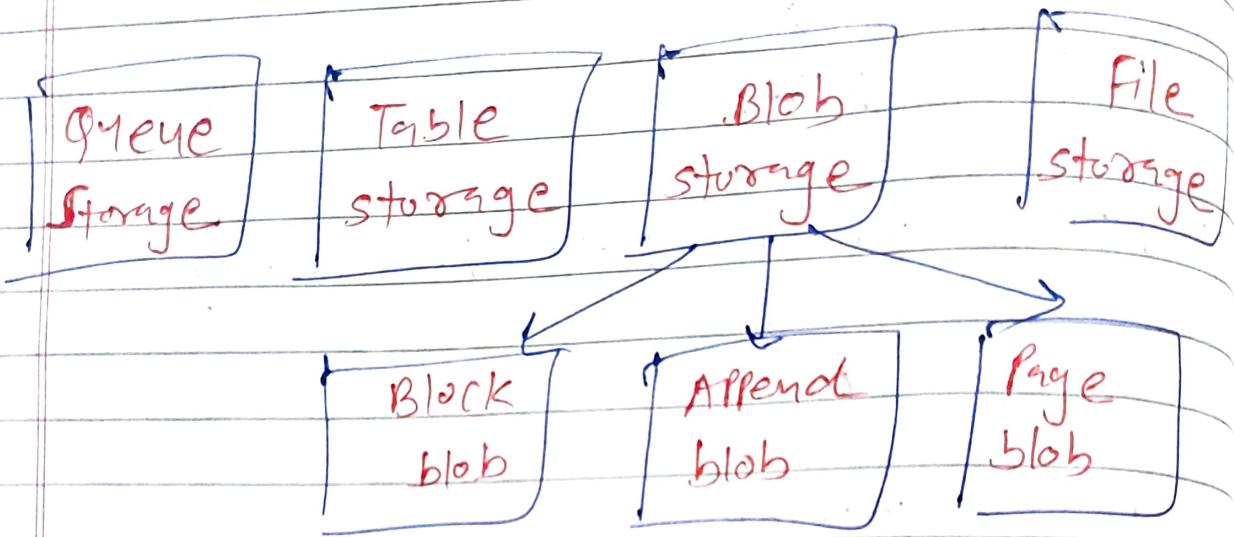
MICROSOFT  
Backbone  
NET

# Storage Services.

- (H 76)
- Azure storage service
    - ① → Table
    - ② → Queue
    - ③ → File → SMB Protocol
    - ④ → Blob
  - Azure storage Data Redundancy
  - Storage Access Tiers
  - Disk storage
  - Azure storage Explorer
  - Azure import/Export Service
  - File Sync Service
  - AzCopy Service
  - Azure Migrate service
  - Azure Data Box

# # Azure storage service

We have different types of Data  
and How will Manage Access different types



Queue → Messaging

BLOB → Binary Large Object.

Table → NoSQL [Cosmos DB]

Files → Managed File shares.

## Data redundancy option

Higher Availability and Durability.

- ① LRS → Locally Redundant Storage. (Same Data center)
- ② ZRS → Zone Redundant Storage. (Different AZ)
- ③ GRS → Geo Redundant storage (Different Region)
- ④ RA → GRS (Read only)
- ⑤ GZ RS → Geo Zone Redundant storage (Read only)

① Azure Blob Storage + storing Files  
Binary → Large object + video, Audio.  
+ storing Data Analysis  
+ For Recovery, Backup

→ Flat structure..

We can't create Containers under Containers  
It's like folder.

Change Access level → If wants to access from Internet.

Provides a unique name

Block storage → For large object that doesn't  
Blob use random read & write  
operations. From begin to write

Page storage → optimized for random  
Blob read & write operations.

→ provides durable disks for Azure Virtual Machines.

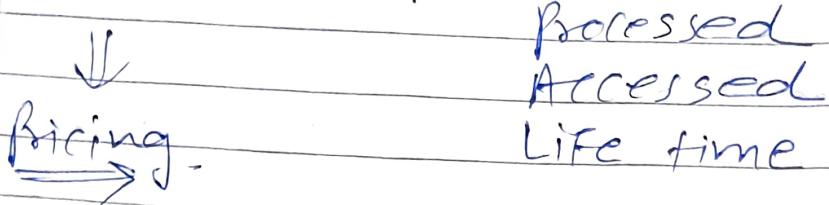
Append Blob → optimized for append operation  
for ex → Logs.



→ Updating or deleting of existing blocks is not supported.

## ⇒ Access Tiers ⇒

Data → How it's Generated.



→ Volumes.

→ Types of operations.

→ Data Transfer

→ Data Redundancy

You can save Money if you know.

HOT

Cool

Archive

low latency

Higher cost

ex:-

website

images

High Latency

lower cost

Stored → 30 Days

ex:- Invoice of customer

long term Backup

High Access Time

Stored → 180 Days

Policy / Compliance

## # Azure Data Box

May use this hardware when  
use this Database.

~40 TB

② Table storage  $\Rightarrow$  NoSQL  $\rightarrow$  Key-Value Pair

Key Fields / value

A/A				
A/B				
A/C				

(Semi Structured)

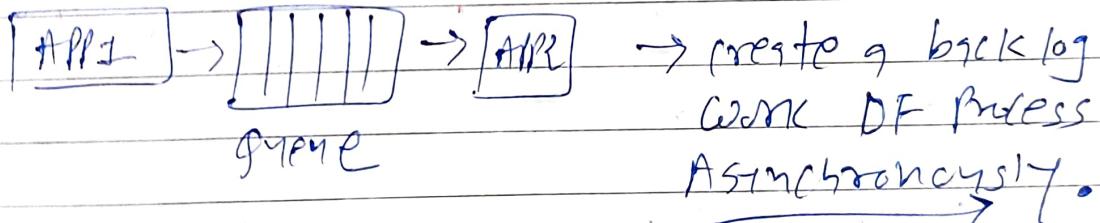
Not Relational Database.

- we have Partitions in Table Storage.
- used to store large volume Data.

Cosmos DB  $\Rightarrow$  Advanced Version of NoSQL

Use for logging purpose. No complex Joins & all.  
No Primary / Foreign key.

③ Queue storage  $\Rightarrow$  Large Number of Messages.



④ File share storage  $\Rightarrow$

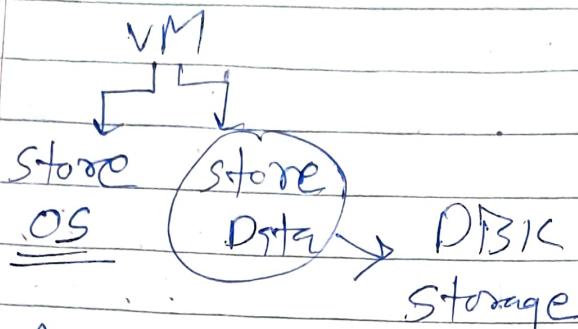
- enables you to create file share in the cloud, and access these files from anywhere in the internet connection. (Cloud) on-premises

SMB  $\Rightarrow$  Server Message Block Protocol (Encrypted)

NFS  $\Rightarrow$  Network File System. Before.

## # Disk Storage

→ OS  
→ Applications  
→ Data



Azure Storage Account → Finally stored.

Vhd File → Stored as page blob.

### Disk Types

- 1) Standard HDD → For Backup, Infrequent Access
- 2) Standard SSD → Lightly used Prod applications
- 3) Premium SSD → SuperFast & High Performance
- 4) Ultra DISK (SSD) → I/O intensive workloads

## #

### Azure Storage Explorer | Storage Browser

You can download

## #

### Import & Export Service (For Big-data)

Import → On-premises to Azure Storage

Export → Azure Storage to on-premises

Prob:

- 1) New is slow
- 2) New is costly.

~~Solution~~ ship disk drive physically.

Disk Drive  
owns ↗ SSD  
HSD

Microsoft → Azure Data Box



import large amount of data

Azure Blob  
Files storage

Export large amount of data ⇒ Azure Blob Storage

# Azure File Sync

Azure VM and on-premises server

in Sync

Replicate data b/w windows server &

**Cloud Tiering** → Frequently Accessed Files are Cached locally on the server.

→ lift and shift

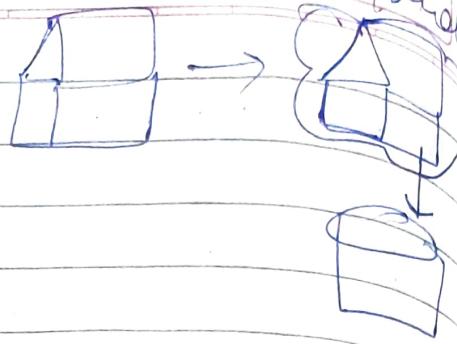
→ Backup & Disaster Recovery

→ FILE Archiving.

File Share is  
also folder.

Sync Group → end points.

## # Az-Copy



→ command line utility.

in-between storage.  
to/from Microsoft Azure blob & File stor

azcopy copy      ↗  
Path                  ↗ Destination.

recursive = True

## # Azure Migrate

- Need to discover what all need to shift
- Assess space in new place.
- Centralized hub to Assess and Migrate on-premises server, infrastructure, applications and data to Azure.

Provides  
→

- 1) Unified Migration Platform
- 2) Range of Tools.
- 3) Assessment & Migration.

→ Database

→ Web Application

→ Virtual Desktop

→ Servers, database & webapps

→ Data → Azure Data Box.

# Azure Identity, Access & Security

- Identity. (who) (what)
- ① Authentication v/s Authorization
  - ② Azure Active Directory.  
↳ windows server AD v/s  
Azure AD
  - ③ Azure B2B → External or Guest user
  - ④ Azure AD Free v/s Premium Licensing.
  - ⑤ Azure AD Groups.
  - ⑥ Azure AD Roles v/s RBAC Roles.
- Authentication method →
- ① Single sign on (SSO)
  - ② Multi Factor Authentication
  - ③ Conditional Access
  - ④ Passwordless Authentication.
- ⑦ Zero-Trust Principles.
  - ⑧ Defense in Depth
  - ⑨ Microsoft Defender for cloud  
(Azure security center)

①

## Authentication v/s Authorization



Verify Identity.

What kind of Access you have

~~Authentication  
Techniques~~

Give permission to access  
specific resources

- 1) + Password based
- 2) + Password less
- 3) + Multi Factor Authentication
- 4) + Single sign on
- 5) + Social Authentication

~~Authorization  
Techniques~~

- 1) Role-based Access Control
- 2) JSON web Token
- 3) SAML
- 4) OpenID Authorization
- 5) OAuth

②

## Azure Active Directory

Identity & Access Management Service

→ Alert from users, Applications also need to have proper Access to fill with other Apps.

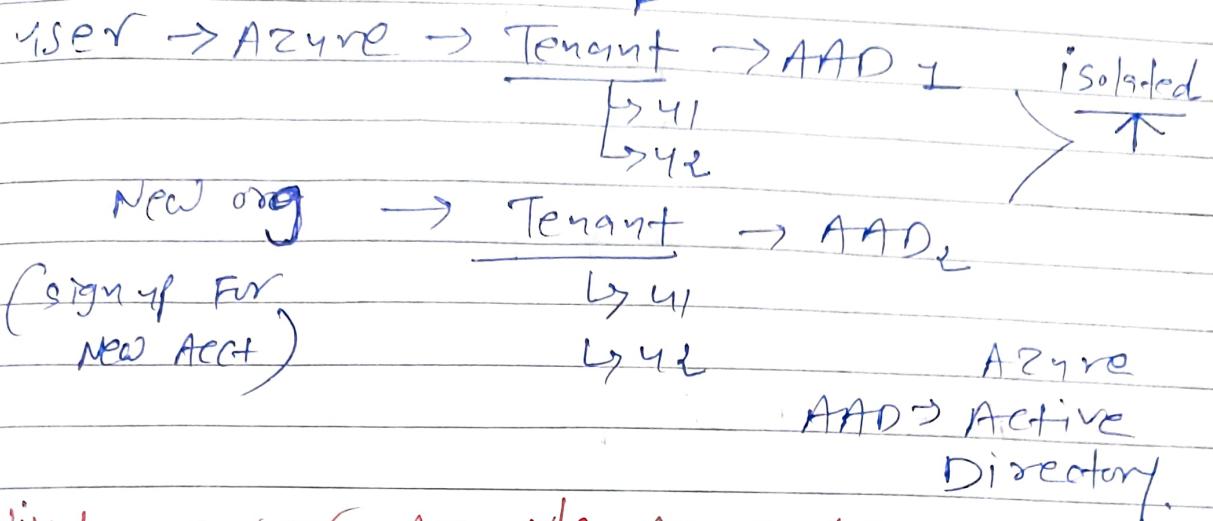
→ Users | Groups | Devices | Apps | Licences etc. etc.

→ Id, email, Pwd, Address etc. will be stored

→ Lx By identifies.

Tenant

1-1 Relationship.



### Windows Server AD v/s Azure AD

On-premise service

Cloud based service

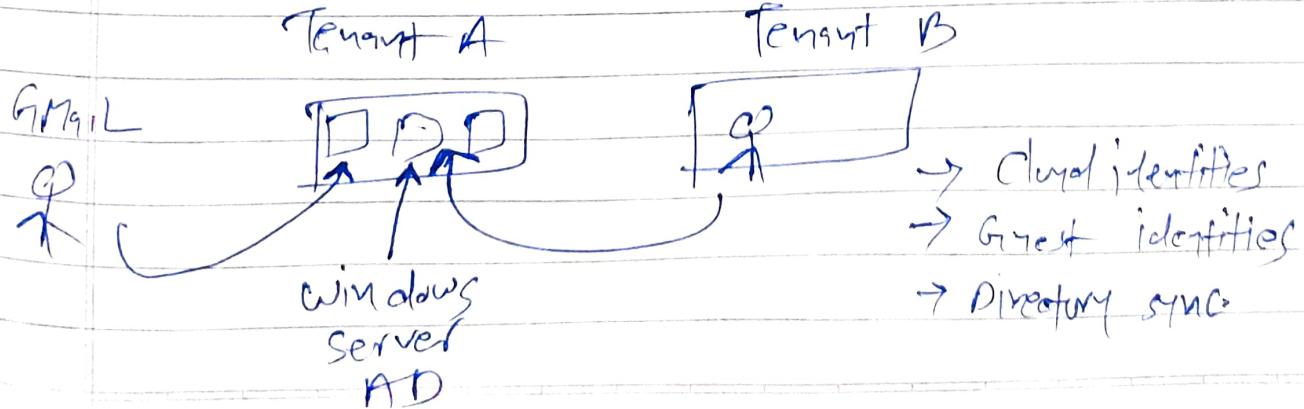
Use: → NTLM

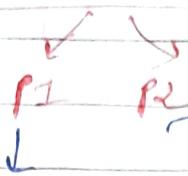
Used HTTP/HTTPS  
based Service.  
SAML/OAuth

Azure AD Connect Synchronized user identities  
between on-premise / Azure.

① Create New user in Azure AD.

② Create External or Guest user in Azure AD



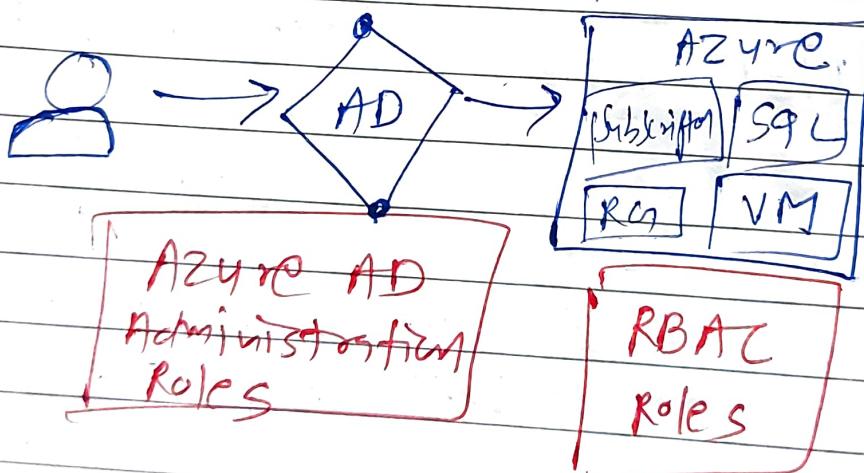
# Free v/s Premium licensing

- 1) conditional Access
- 2) Identity protection
- 3) Dynamic Groups

etc. etc.

# Azure AD Groups

Assign permission at Group level

# Azure AD Roles v/s RBAC Roles

→ Manage access to Azure directory resources

→ Manage access to Azure Resources

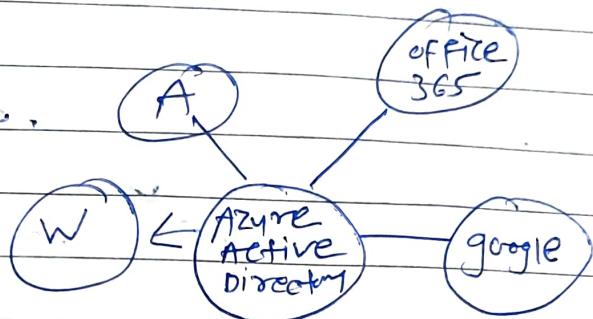
→ Scope is at tenant level

→ ex. Create diff file

## # Single Sign-on.

- When user leave org, finding all the device and identity and do then is difficult.
- SSO Allows user to sign-in once and access multiple resources and applications from multiple borders.

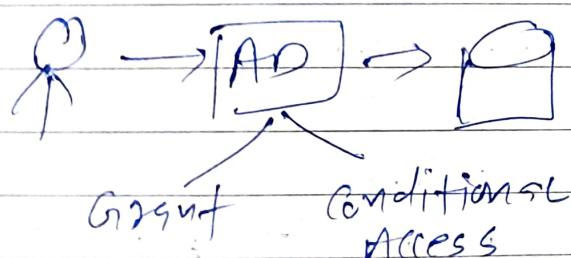
→ it's easy to Manage.



## # MultiFactor Authentication.

- Pswd + (OTP) | Bio Metric | Mobile Token
- Additional security for identities by requiring two or more elements to authenticate

## # Conditional Access



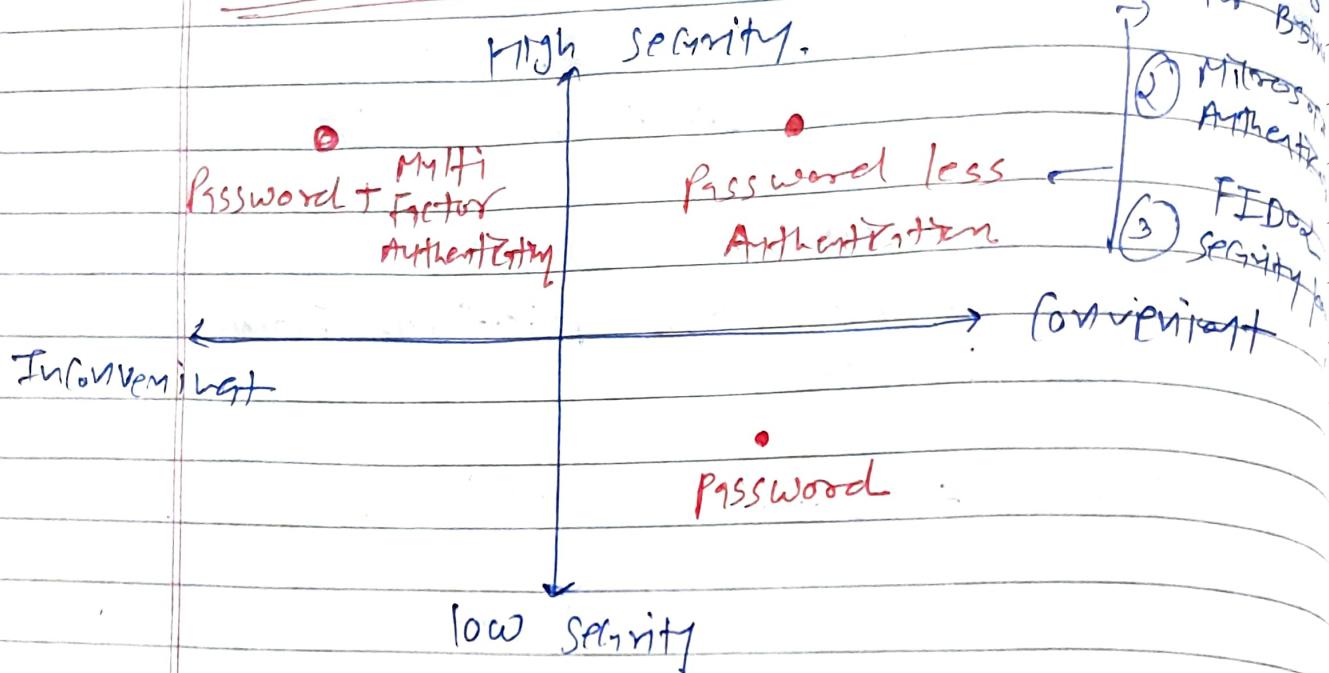
who  
Where  
What ?

Allow (or) More info  
→ required.  
→ Reset pswd.

## Signals.

- 1) location
- 2) user < normal Admins
- 3) device < Normal New
- 4) application

## # Password less Authentication



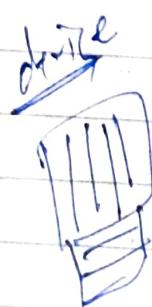
### ① Windows Hello for Business

- own dedicated PC
- Face
- ① Biometric (Fingerprint)
- ② 4 digit PIN

### ② Microsoft Authenticator

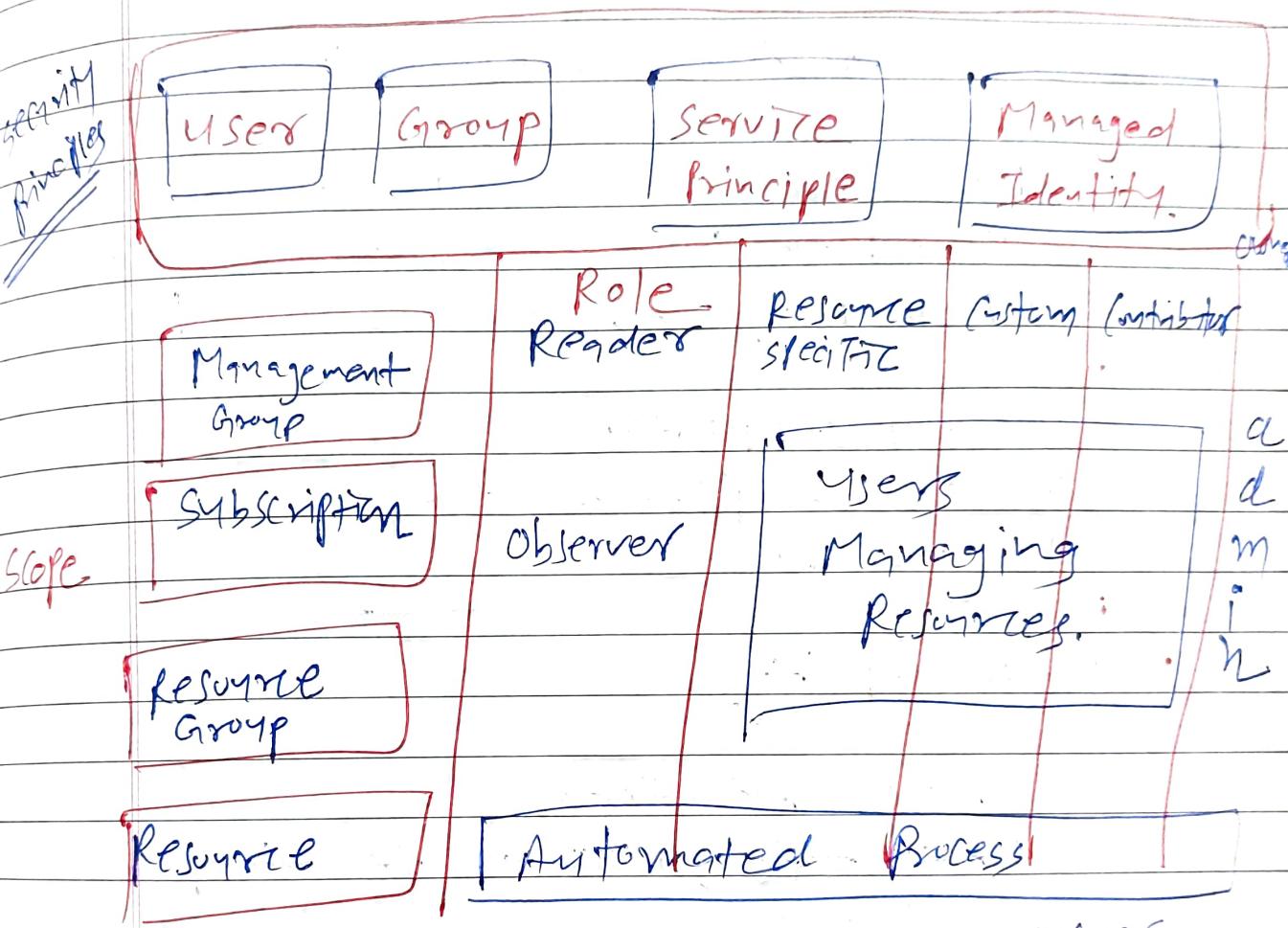
### ③ FIDO2 Security Key

- First Identify online
- Standard-based Passwordless Authentication
- WebAuthN and CTAP standards are final
- For AppSS or Public or shared devices



## # Role based Access control (RBAC)

→ It allows control over who has access to which Azure Resources, and what those people can do with those resources.



### 3 elements

(1) Who? → security principle

↳ user  
group  
service  
identity

(2) What? → role identification

↳ reader  
contributor  
owner

(3) Scope? →

where the permissions are applicable?

↳ Management group  
Subscription  
- RGT  
Resource

Azure Active Direct  
Assigned Roles.  $\Rightarrow$  (AD) Roles

Azure Role Assignments  $\Rightarrow$  Azure RBAC Roles

# Zero Trust Principles.  $\Rightarrow$  More Secure

- 1) Mobile Access  $\rightarrow$  Device
- 2) Cloud Migration  $\rightarrow$  Network / Users
- 3) Risk Mitigation  $\rightarrow$

\* \* \*

- ① Verify explicitly
- ② use least privileged Access
- ③ Assume Breach

① Verify explicitly.

- 1) Always Authenticate.
- 2) Authorize on all available data points
  - 1) User Identity
  - 2) Location
  - 3) Device Health
  - 4) Service
  - 5) Data classification.

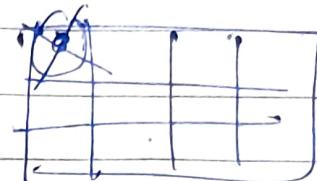
② Least Privileged Access  
limit user access

- 1) Just in time / Just enough Access.
- 2) Risk based Adaptive Policies.
- 3) Data Protection.

### ③ Assume breach

→ Prevent lateral movement by segmenting the Network | user | Device | App awareness

→ Verify all sessions are encrypted end to end.



→ use Analytics to → Get visibility.

- Drive threat detection
- Improve defenses

### # Defence in Depth

DDoS  
Protection



① Physical security.

② Identity and Access

③ Network Perimeter.

④ Compute

⑤ Application

⑥ Data

→ Confidentiality.  
→ Integrity.  
→ Availability.

## # Microsoft Defender for Cloud

Takes care →

- ↳ Pass and Tags (Azure Resources)
- ↳ Non-Azure cloud
- ↳ Hybrid Computing

Gives →

- ① Secure Score
- ② Recommendation
- ③ Alerts

- it's a set of security tools.
- it provides visibility of your security posture
- & solution
  - ↳ ① CSPM (Cloud Solution Posture Management)
  - ↳ ② CWP (Cloud workload Protection)
- identifies and fixes flaws.

Free Version

Paid Version (Full suit)

# Azure Management & Governance

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## Cost Management

→ cost Affecting Factor.

→ Pricing calculator.

→ Cost Reduction Methods.

→ TCO Calculator (Total cost of ownership)

→ Cost Management & Billing Tool/service

### # Cost affecting factors.

(1) Subscription → ① Free Trial

② Pay-As-You-Go

③ Member Offers.

(2) Azure service purchase options.

> Through enterprise Agreement

> From Azure portal

> Azure Marketplace - Third Party

> Through cloud solution provider

(3) Resource Types

→ VM → CPU Time, disk size, operations.

→ Functions

→ Storage

→ Logic App

→ Resource Group

(4) Usage Metrics

comple storage

(5) Location

(6) Bandwidth

# Riding Calculator

- Calculate Monthly estimated cost  
Yearly.
- Fill up Monthly configurations.

# Cost Reduction Methods(1) Reservations

- > Reserve resources for 1-3 years.
- > Save upto 7% compared to As-You-Go

(2) Save on licensing cost

- > choose OS more effectively.
- > Hybrid benefits

↳ you can take license from on-premises and use it in cloud.

(3) SPOT VM

- > leave the room if required.
- > use it when Azure capacity is available.

Final free space

↳ use ✓ if customer comes

↳ leave ↗

with 30 seconds notice ↙

(4) Azure service advisor.

- > Help how we can reduce the cost.

(5) Delete unused resources(6) Choose low cost locations

## # TCO Calculator (Total Cost of ownership)

it will tell you how much you'll save if you migrate from on-premises to Azure

### CPEX vs OPEX (Cloud)

→ Estimate the cost savings you can realize by migrating your workloads to Azure.

- (1) Define on-premise workload
- (2) " RAM / HDD / Database
- (3) " P/W + Assumption

→ You can see the report.

## # Azure Cost Management and Billing

→ Where are we spending money?

→ We can set Budget

→ Visibility

→ Accountability

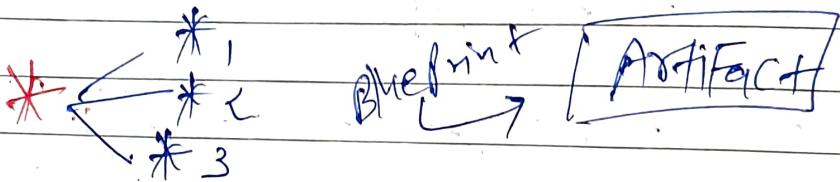
→ Optimization

# ~~Cloud Governance~~

- Refers to the process of establishing and enforcing rules and policies.
- ① Resource Lock
- ② Tags
- ③ Azure Policy
- ④ Azure Blueprints \*\*\*

# Azure Blueprint → Assigned AT Subscription Level

- Blueprint is a set of instructions, pattern or a design for creating anything



Create Blueprint from environment, and replicate the Blueprint in different env.

Company's Rules

Azure Blueprint

① Role Assignment

② Policy Assignment

③ Azure Resource Manager Template

④ Resource Groups

- First & without Manual error
- Versioning is allowed

To track  
Policy initiative

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## # Azure Policy.

- Tester → VM → Byd by mistake created with  
↓ higher size / config.  
So need policy / rules / restrictions  
on resources.

Policy → Assign →   
Subscription level  
Resource Group level

what policy?

- ① Locations →  Allowed locations.
- ② Sizes

→ Resource which are non-compliant, they'll list that. They'll not block it.

- Help you with control, restrict or Audit your resources.
- They'll show you Non-compliant resources.
- They'll inherit with all Group Members.

## # Azure Tags.

(Resource Groups are not enough)

I want to see all the Resources  
wrt > cost center.  
> High impact.

→ All Resources can have Tags.

- Azure Tags are Name-Value pairs that help to organize the Azure resources in the Azure Portal.
- Azure Tags are simply labels → Resources
- You can use Tags to easily Group and classify Resources and assets in Azure.
- Resources don't inherit any tags applied at the Resource Group Level.
- It's fundamental part of any well-managed environment. It's also a first step in establishing better governance of any environment.
- You can create Policy to enforce Tagging Rules and Conventions.

## # Azure Resource Locks

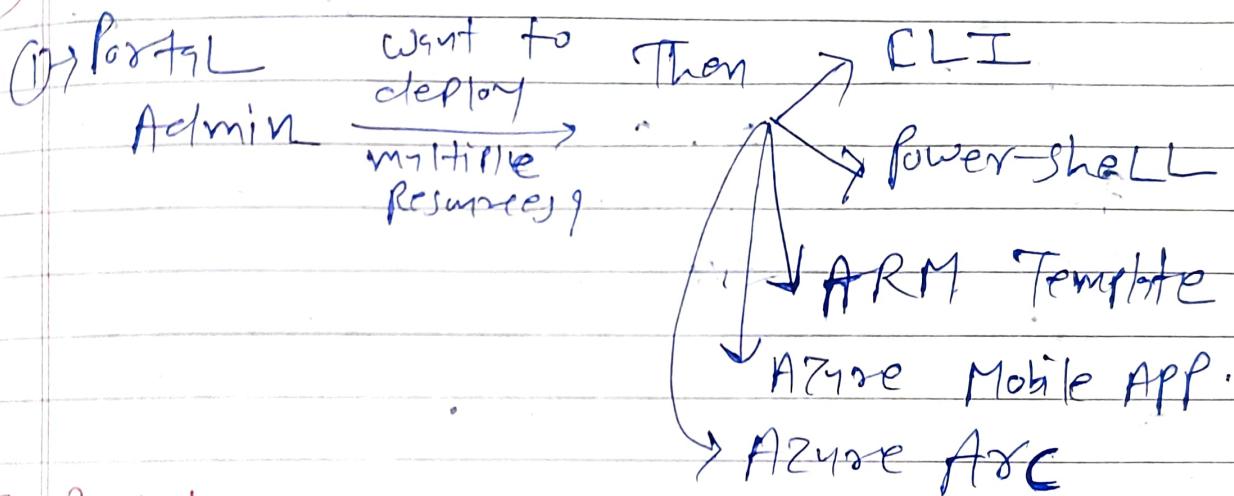
- Admin → Deleting unwanted Resources.  
but Ooops: Realized late that it was needed.
- Locks ↗ Read only → Do not change.  
Delete → No one can delete.  
Remove the lock, before deleting.  
Resource Group also.

## # Service Trust Portal (3rd Party)

it's like centralized portal to get  security 

- Compliance Manager | Trust Documents.
- Audit Reports

## Managing and Configuring Tools.



- (1) Portal
- Web based user interface
  - All services, config and Reports
  - single login.
  - ↳ occasionally Access and Manage

but what about Setup? Maintenance?

↓  
PowerShell | CLI

↓  
Script (To create 1000 Vms at once)

②

## Powershell v/s CLI vs Cloud shell

→ Can execute commands  
(cmdlets).

→ Commands call the  
Azure Rest API

→ Routine setup /

→ Script file

→ get  
set  
remove

↑  
Syntax is  
different

windows , Linux

→ Interactive shell  
that runs in the  
browsers for free

→ Pre-installed and  
Configured Azure Tools

→ Language support like  
PowerShell, Python

→ Dedicated storage to  
persist b/n sessions

→ Integrated  
File editor

⇒ When Resources have dependency in each other  
in this case we can use ARM

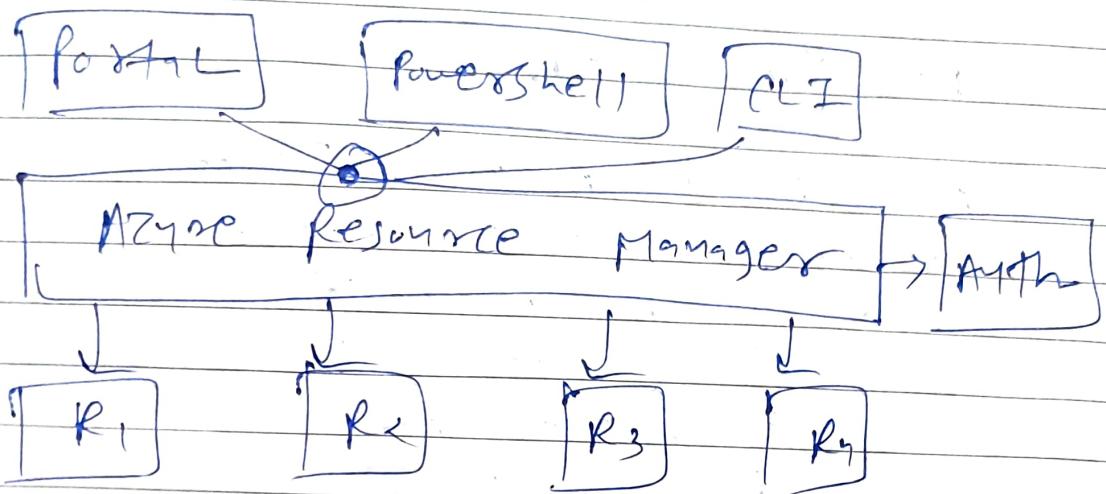
In Powershell/CLI we create one-by-one but in  
ARM we can do it in parallel.

ARM → Can manage the dependency b/w  
the resources.

# Infrastructural Deployment

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## ③ Azure Resource Manager (ARM)



- Deployment and Management Service for Azure.
- All Azure activities are handled via ARM.
- Describe the resources in a declarative JSON FILE
- ARM template is verified before any code is executed to ensure the resources will be created and connected correctly.
- Automatic rollback in failure
- Template then orchestrates the creation of the resources in parallel.
- Create all the dependencies in the correct order
- Can use for repeatable deployment

## (4) Azure: Mobile APP

Play store → APP.

- Access via iOS/Android/Tablet.
- Can do administrative task.
  - Can Monitor health
  - check Alerts → Diagnoses
  - Can Restart APP
  - Run CLI/Power shell

## (5) Azure ADC

Problem?

→ Company can use multiple cloud platform like AWS, GCP, Azure. also on-premises

ADC provides Azure service to manage any infrastructure.

→ Provides centralized and unified way to manage all diff platform.

- Servers
- Kubernetes clusters
- Azure Data Services
- SQL Server
- Virtual Machine

## ⑥ Monitoring

→ Help you to react quickly.

- research intermittent issue
- optimize your usage
- Pro-Active

① Azure Advisor

② Azure Monitor

③ Azure Service Health

① Azure Advisor (Personal Consultant)

- Advisor: → cost  
→ security  
→ reliability  
→ operational excellence  
→ performance

Advisor score

→ Pro-Active, Actionable, Personalized.

② Azure Service Health (Alerts & guidance)  
for Azure services

User → outage  
Azure

→ Keep you updated about issues at Azure side.

- issue → ① Azure status → all service | all regions  
Maintenance → ② Service Health → we ~~are~~ are  
Health → ③ Resource Health → your individual  
cloud resources.

Service  
Health

(1) Azure Status → All (entire Azure) View

(2) Service Health → Personalized for user

1) Service Issue

2) Planned Maintenance

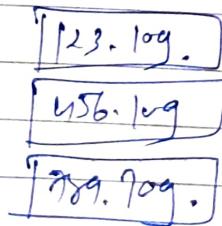
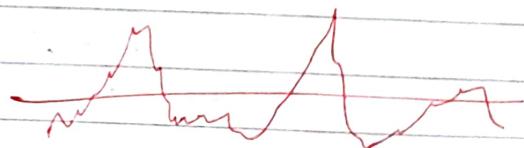
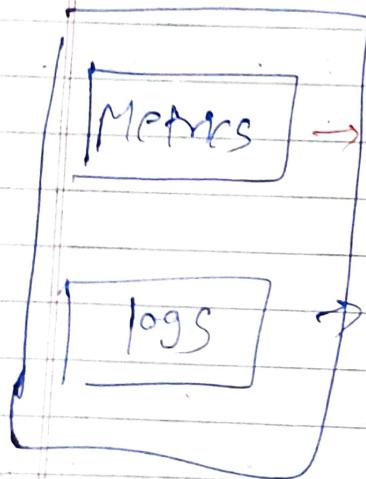
3) Health advisories

4) Security advisories

(3) Resource Health → Specific to individual cloud status.

(3) Azure Monitor → Applications  
 Full observe. → Infrastructure → Networks

→ Collect, analyze and visualize and take actions based on Metrics and Logging data.



Logs Analysis  
 → query → query → query

Azure  
monitors