

## Azure Cloud Computing

- Decentralized server.

Utility of Compute Server.

Storage, Servers, databases, networking, Software, analytics & Intelligence.

Scale up & down instantly

Pay as you need

Consumption based mode

On demand delivery of Compute Service on Internet

Shared Responsibility → Cloud provider  
→ Customer.

IaaS → Datacenter, Network, hosts

PaaS → Operating System, Shared Network Controls

Application Identity

CapEx → Capital Expenditure

OpEx → Operational Expenditure.

① IaaS → hypervisor (VMs) → Physical Host

PaaS → Serverless = further abstraction = Extreme PaaS

SaaS → Fully functional Application (Zoom, 365, email)

Defense in Depth → Protection layers to secure Data  
7 layers of defense.

Availability → Instantly creates more servers

Scaling → Traffic demand

Horizontal & Vertical Scaling.

Add VMs

Automatic

More resources (CPU, Disk Space)

down time

Reliability Predictable Cons → Binary calculation

→ No single pt of failure, Disaster recovery.

Standards & compliance enforcement

Management

Of the cloud → Automatic control of Cloud resources.

In the cloud → Integrate with Cloud resources.

Identity → who/what I am

Authentication → proof of who I am. Validates Identity

Authorization → what can I do, where can I go.

Active Active Directory → provides all three

Microsoft Entra  
(Product family)

① Assume AD

Tenant

② Permission Grant

Subscription

③ Verified Id

User

Zero trust → Trusted identities, not location

MFA → Something You Know (Old & pwd)

implanted card. Something that you have (phone)

Conditional Access → Policy → Conditions (signals)  
applied to Users/groups.

Password less Authentication.

Microsoft Authenticator App.

Increase confidence being secure Window Hello

Entra External ID for partners (B2B) & FIDO2 Security key

External Authentication ↗ Customers (B2C) ↘ (Hardware Key)

Org. authentication.

(new) / Arc

For legacy Application that needs AD.

Azure AD Connect → Sync External ID to on-premises AD  
AD Server on Azure VM

Azure ADDS - Managed Service for legacy AD Service  
2 VMs work behind the screen inside Az

RBAC → Role based Access Control

Built-in & Custom roles.

Defense in Depth

ARM → Azure Resource Manager.

for resource deployment & Management.  
through Postman

Azure Portal → Web based Interface.

Azure CLI → Command line Interface

Built in to Az Cloud Shell & Local terminal Install  
bash & PowerShell

Az PowerShell

Az Cloud Shell → Az PowerShell & CLI built-in.  
access to Az storage.

both accessed via Az Postman.

Az ARM Template → JSON files vs Bicep format  
for deployment for resource config.

~~for global~~ → 2 or more DCs, not too far apart. Got Regions

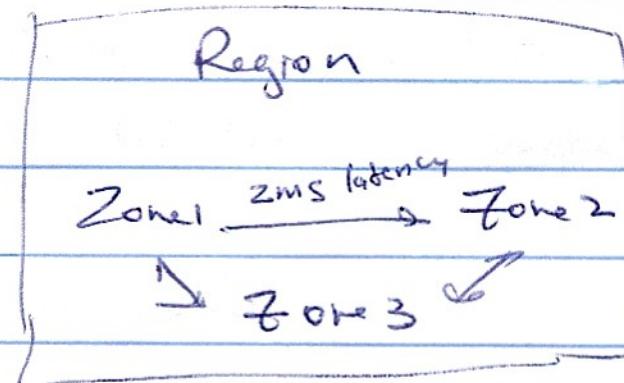
Design of deployment → Location, feature & Price

Region Pairs → Regions are paired at least 300 miles apart.

Sovereign Regions → for Government compliance (Isolated)

Availability Zones.

Zone Redundancy / Replication  
of data



Zonal Service → Deploy to single zone

Zone Redundancy Service → replicated across zones

} Resource Group can span multiple regions

Subscription → All RG are tied to a Substr-2 for Billing

Management Apps → Optional. Manage multiple subscriptions  
can be nested.

Amazon Compute. → The Engine for code / Applications

VMS → Hosted as underlying Hypervisor

Windows or Linux OS (SSH) NIC - Network Interface Card  
(P2P)

Vnets → Virtual network

- Private, public IP

Pricing CPU / Ram by minute OS.

Disk → charged all time

IP addm → by hour Dynamic - when on  
Static - always charge

Vm → higher cost, more memory

Scalesets → Automatic scaling, with Load Balancer  
+ No extra price burst

Availability sets → unique VMs not running on same host  
for Non Identical VMs on hypervisor with different OS  
on same zones or Data Centers. ① Maintenance schedule. 20 Update Domains  
② Server Racks 3 Fault Domains.

## PaaS App Services

Web Apps Deploy with CI/CD  
Web Jobs GitHub, Bitbucket, local GIT, A2 Rep.  
API apps  
Mobile Apps.

Serverless functions. Event driven, ~~sets~~ only runs when needed  
Save Money Serverless compute form.

Containers → Additional layer of virtualization over VM  
It's Virtualized OS unlike VM (Virtualized hardware)  
A2 Container Instances → No scaling or load balancer.  
A2 Kubernetes Service → Auto scaling, more \$  
A2 Container Apps → Auto scaling, simple but less powerful than AKS.

## A2 Network

### Software Defined Networking.

VNet → Address Spaces [Subnets] Subnet [..]

IP Address → Private Static

Public (optional) Dynamic

VNet belongs to a Region & Subscription.

NSG → free Firewall → Paid

✓ Azure Bastion → Connects to VMs with no public IP applied to subnets

Network Peering → Connect private Vnets across Region

Subscription & Tenant

Assume DNS (Domain Name System)

translates domain names to IP Address

DNS Host → Az DNS Zone, Az Private DNS Zone

Global section not tied to resource

VPN Gateway Subnet is created.

Hybrid Network → Connects beyond Az Vnets.

① Site-to-site VPN ② Point-to-site ③ Express Route

Public Encrypted Network

Private network.

Assume VPN Types.

on premises connn

Policy based More backward compatible, No P2S VPN

route based less " ", Yes

VPN Gateway is Public & encrypted, has latency

Peering is Private, not encrypted, less latency

Storage Accounts

BLOB → Binary Large Object . Large file in container changed by storage.

Storage Account → Blob Containers (Multiple) → Files

has unique https , private by default.

Type → Block (4TB) Append (logging) Page (8TB of hard

Tier → Hot, cool, cold, Archive (offline) driv

Usage cost, cheap storage. ↘ Rehydration

Min. Retention days 30 day, 90 day, 180 day <sup>Not managed</sup> for getting online

Disk Managed. HDD → St, premium, Ultra → No premium HDD  
→ attached to VM → Performance, cost only " SSD

Az files can run on-prem AD, Hybrid with on-prem or lift & shift

Data → Assume Own → Assume Function  
→ Storage Location

Redundancy → At least 3 copies of data.

Single/Multi Region Redundancy → 2nd data

CRS → Locally redundant storage → Single Zone

ZRS → Zone → Single Region

GRS → Geo

→ 2 different Regions, single zone

GZRS → Geo Zone

→ 2 regions in a multi zone

Data Transfer ① Az Copy → Command line blocked file

② Storage Explorer → GUI

③ Az File Sync → Az file with on-prem file

Az Data Box → Transfer lot of data, offload data storage

Az Migrate → Migrate on-prem data & App to Az

Premium perform storage → works with CRS & ZRS only  
high perf, low latency

Az TCO → Estimate before deployment by TCO Calculator

Prime Cost Calculator → Estimate for Az services before Deploy

Az Budget → Spend threshold & monitor for future cloud spend

Az Cost Mgmt & Billing → Analyze & Manage Cost Spendings

Tags → to assign cost to dept/projects.

Az policy → policies for Az resources → JSON file

Az Advisor → recommendation for cost optimization

Az Monitor → Performance & health monitoring

Az Cost Analyzer → cloud spending & usage patterns

Resource locks → Restrict access to resource.

Read only, Delete

Applied at any level, and inherited by resources.

Resource, Resource group & Subscription

Microsoft Purview → data governance tool

across all data sources including other cloud/on-prem

Microsoft Defender for Cloud resources. → all clouds & on-prem

Az Blueprint → Automate resource deployment based on templates.

Assure Automation → Automated Patching Security response  
Auto deployment of resources. Reporting workflows

Log Analytics → tool of Az Monitor

Az Monitor Alerts

Az Service Health → tracking, real-time & historical data.

Az Arc → Az mgmt to multicloud, on-prem, hybrid & Edge.  
A Management Platform

Monitoring approach → Proactive & Reactive

Az Monitor action Group → action to be executed

when alert is triggered.

Log analytics → Analyzing & querying data of Az Automation

Application Insights → Performance, availability & usage & Sentinel

Interactive Dashboard, analytics of web application.  
Integration.

Az Service Health → Key areas → Az status, health of service

KQL (Kusto Query Language) → for Log Analytics & Resource