Microsoft Azure - Detailed Notes

# Azure Overview

Microsoft Azure is a cloud computing platform and service created by Microsoft.   
It provides a wide range of cloud services, including computing, analytics, storage, networking, and databases.   
Users can choose and configure these services to build, deploy, and manage applications across a global network of Microsoft data centers.   
Azure helps organizations reduce costs, improve scalability, and ensure business continuity.

# Azure Cloud Computing

Cloud computing is the delivery of computing services over the internet.   
These services include servers, storage, databases, networking, software, and analytics.   
Azure provides on-demand resources, enabling businesses to scale up or down as needed while paying only for what they use.

# Cloud Models (Public/Private/Hybrid)

1. Public Cloud: Services offered over the public internet and shared across multiple customers. (e.g., Azure)   
2. Private Cloud: Cloud infrastructure dedicated to a single organization.   
3. Hybrid Cloud: A combination of both public and private cloud, enabling greater flexibility and optimized workloads.

# Azure Pricing & TCO

Azure pricing follows a pay-as-you-go model, meaning users only pay for the resources they consume.   
It also provides Reserved Instances for cost savings and Spot Instances for unused capacity.   
Total Cost of Ownership (TCO) in Azure helps organizations compare the cost of running workloads in the cloud versus on-premises infrastructure.

# IaaS/PaaS/SaaS

1. Infrastructure as a Service (IaaS): Provides virtualized computing resources over the internet (e.g., Azure Virtual Machines).   
2. Platform as a Service (PaaS): Provides a platform allowing customers to develop, run, and manage applications without worrying about infrastructure (e.g., Azure App Services).   
3. Software as a Service (SaaS): Software is hosted and managed by providers and delivered over the internet (e.g., Microsoft 365).

# Azure Regions & Availability Zones

Azure is available in more than 60 regions worldwide. Each region consists of multiple data centers.   
Availability Zones (AZs) are physically separate locations within a region, with independent power, cooling, and networking, ensuring high availability and disaster recovery.

# Azure Resource Groups & Subscriptions

Resource Groups: Logical containers that hold related Azure resources for management and organization.   
Subscriptions: Define the access, billing, and limits of Azure resources. Multiple subscriptions can be managed under a single Azure account for better governance.

# Azure VMs & Functions

Azure Virtual Machines (VMs): Allow users to run applications, operating systems, and workloads in the cloud. They provide full control and flexibility.   
Azure Functions: A serverless compute service that allows users to run small pieces of code (functions) without managing servers, scaling automatically as needed.

# Azure Storage & Redundancy

Azure Storage offers scalable, durable, and secure cloud storage.   
Types include Blob Storage, File Storage, Queue Storage, and Table Storage.   
Redundancy Options:   
- LRS (Locally Redundant Storage)   
- ZRS (Zone-Redundant Storage)   
- GRS (Geo-Redundant Storage)   
- RA-GRS (Read-Access Geo-Redundant Storage)

# Azure Monitoring Tools (Advisor, Monitor, Service Health)

1. Azure Advisor: Provides personalized recommendations on cost optimization, security, reliability, and performance.   
2. Azure Monitor: Collects, analyzes, and acts on telemetry data from cloud and on-premises environments.   
3. Azure Service Health: Notifies users about Azure service issues, planned maintenance, and health advisories affecting their resources.