

## AZ900 : Microsoft Azure Fundamentals

### Cloud Computing

#### What is Cloud Computing?

Usage based billing

Efficiency, Predictability, Scalability

### Cloud Models

#### Private Cloud

- Internal Cloud Control

- They manage Infrastructure, Software, Platform

- High level of Data Security

#### Public Cloud

- Azure, AWS, Google Cloud

- Simple to Scale

- Multi-Org Access

#### Hybrid Cloud

- Public / Private Fusion

Public Cloud	Private Cloud	Hybrid Cloud
Capital-Free Scalability	HW Costs	Versatile Scalability
Quick App Provisioning	Sovereign Control	Strategic App Placement
Pay-As-You Go	Maintenance Responsibility	Organizational Governance

Operational Expenditure - Costs incurred for Goods and Services on an ongoing basis, with expenses aligned to usage.

Invoicing is immediate.

Capital Expenditure - Initial investment in physical assets value depreciates over time.

## Cloud-based storage - Google Cloud Storage

### Consumption Based Model Advantages

- Unpredictable traffic - data is stored
- Over paying for unused resources

### Flexible Resource Model

Pay-as-You-Go

Avoid resource lock in.

### Cloud Benefits

High Availability - auto redundant failover

Scalability - Vertical vs Horizontal

Predictability - Usage Patterns

Governance - Built in by Cloud Provider

Elasticity - Traffic Bursts Auto/Immediate Scaling

Reliability - Continuous Accessibility / Disaster Recovery

Security

Management - Operational Efficiency

### Infrastructure As A Service - A plot of land

- Raw Infrastructure - Servers, Network, Storage

Scalable - Can grow or shrink as needed.

### Platform As A Service aka Pre-furnished Apartment

- Application focused - Infrastructure Mgmt Relies

### Software As A Service

- External Software - Subscription Based

## Azure Architectural Components

Regions and Availability Zones

60+ Regions Worldwide

Available in 140 Countries

Data Residency - Some data may only be stored in certain countries

Availability Zones - Mitigate downtime risks

Physical Separation + Redundancy

Robust Connectivity between AZs

Azure Regional Pairs - Disaster Recovery - for data residency, compliance

Subscriptions and Resource Groups

Resources - Virtual Machines, Storage Accounts,

Virtual Networks, App Services, SQL Databases,

Functions

Resource Groups - Placement, Region, Migration, Flexibility

Subscriptions - budgeting, costs, usage

Azure Accounts

Dev Subscription, Test Subscription, Product Subscription

Billing Boundary - keeps track of costs and where they are.

Access Control Boundaries

Management Groups - group multiple subscriptions

- Up to 10,000 allowed

- 6 level hierarchical depth

## Compute And Networking

### Compute Types

Virtual Machines - Software Emulator of Physical Computer

### App Services

#### Container Instances

Azure Kubernetes Services

Azure Virtual Desktops

Function Apps

VMS - Variety of Sizes, Customizable,

Integrated Support, Cost Effective,

Secure & Reliable

Virtual Networks - Public Endpoints, Private Endpoints,

Virtual Network Peering - Connects two networks

privately

Availability Sets - Planned & Unplanned Events

Fault Domain - protects Machine from HW failure

Update Domain - protect Machines from plant maintenance

Increased Availability, Best Practice, Simple to implement

### Virtual Machine Scale Set

Auto-Scaling, Load Balancing, High Availability

Scalability

### Azure Virtual Desktop

Desktop as a Service virtualization based on Azure

Flexible for remote work

Multi-Session Capabilities

Regulated access to company data

## Azure App Services

Building, Deploying, Scaling Web Applications

Python, .NET Core, Java, .NET, Ruby, Node.js, PHP  
Integration with Azure DevOps, CI/CD, Data Hub  
Global Scalability with High Availability

Fully Managed Platform and Integrated Services  
Good for Web Apps, Mobile App Backend, REST APIs

## Azure Container Services

- Lightweight Virtual Environments
- No OS Management Required
- Responsive and Adaptive

- 1) Azure Container Instances - PaaS Offering
- 2) Azure Container Apps - PaaS, Modern, Microservices
- 3) Azure Kubernetes Service - Complex Organization, Scales

## Azure Functions - Serverless Compute Service

- event triggered code

- pay for execution

Azure Virtual Networks - Connectivity, Internet & on-prem  
Isolation & Segregation, Internet <sup>Access Control</sup> Communication

Azure VPN Gateway - Encrypted Traffic, Gateways, Bridge  
Remote Worker Access, Secure On-prem Extension  
Express Route - private connection between  
on-prem network and Azure Services

## Azure DNS - Hosts, Service for name resolution

Global Reach, Secure/Reliable, Fast/Scalable

\* Closest server responds

## Storage Accounts

Storage data in the cloud

Diverse Storage Options, High Durability/Availability, Secure  
Scalable, Accessibility (http or https), Integration  
Versatile Application Support, Unstructured data storage,  
reliable messaging and NoSQL

Locally redundant storage - 11 nines

Zone Redundant storage - 12 nines

Geo- Redundant storage - 16 nines

Geo-Zone-Redundant storage - 16 nines

## Storage Services

Blob Storage - Storing unstructured data

Disk Storage - disks for VMs

Queue Storage - messages between applications

File Storage - Storing managed files (movies, songs)

Azure Tables - semi-structured storage

## Non Storage

### Duration

#### Access Tiers

Storage, Access

Hot Tier - Frequently accessed data, \$\$/ft, f

Cool Tier - Infrequently accessed data, \$\$, \$\$

Cold Tier - Rarely accessed data, \$\$, ff

Archive Tier - Long term storage, p, /fp

## Azure Migrate

Migrate data from on-prem or AWS/GC to Azure

Azure Data Box - Solution to move large amounts of data  
Physical Device(s), Offline

## File Management options

AZCopy / Azure Storage Explorer / Azure File Sync

## Identity, Access, and Security

### Microsoft Entra ID

- Comprehensive identity service, secure user identity management, Access Control Policy
- Single Sign On, Multi Factor Authentication, Conditional Access, B2B Collaboration, Application Management, Device Management

### Microsoft Entra Domain Service

- Managed Domain Service, Scalable & HA, Compatable w/ Win Server
- Domain Join, Group Policy, LDAP & Kerberos/NTLM

### Authentication and Authorization

- Who you are      What is allowed to do

#### Multi Factor Authentication

- Secures Cloud Access, Remote Work Security

#### Conditional Access

- User & Group Policies, Location Based Policies, Device Based Policies, Risk-Based Policies

### Microsoft Entra External Identity - B2B

- Google, Facebook, etc., Self Service Sign up

### Cross Org. Collaboration, Customizable User Experience

### Role Based Access Control - RBAC

who → where → what → how

### Predefined Roles, Custom Roles, Scope of Access

### Zero Trust

- Protect assets anywhere with a central policy
- Segment access by network, user, and device
- Ensure encrypted streams, utilize analytics for threat detection

### Defense in Depth

- Layered defense

### Microsoft Defender for Cloud

- Continuous Assessment, Threat Protection, Secure Score, Regulatory Compliance Dashboards

## Cost Management

### Factors Affecting Cost

#### 1) Type of Resource

- Consumption measured - type of asset

#### 2) Consumption Model

- Pay as you go - # of hours used (USA)

#### 3) Lack of Maintenance

- Regular Surveillance of unused assets

- Proactive System Management

#### 4) Region

- Location impacts cost

#### 5) Ingress + Egress

- Outgoing data transfer is costly

#### 6) Type of Subscription

- PAYG, MSDN, Trials, Students, Dev/Test

### Azure Marketplace

- Custom Applications & Services i.e. WordPress

### Pricing Calculator

- Customizable Estimates, Scenario Based Calculations

- Azure Migration Plans → Most Cost-Efficient

### TCO Calculator - Total Cost of Ownership

- Comprehensive Cost Analysis, Customizable Inputs

### Azure Cost Management

- Bill, Report, Analysis

- Monitor, Allocate, Optimize

- Track Cloud Spending, Manage Budgets

### Azure Resource Tags

- Customizable Labeling, Resource Mgmt, Cost Allocation

- Name:Value based

## Governance and Compliance

### Azure Policies

- Create, Assign, Manage - Standards & Agreements

Example - Create policy for list of resource locations allowed

- Maintain Security Standards, Control Costs
- Enforce Company Policies

### Resource Locks

- Preventing Accidental deletion of resources
- Read-Only, Lock, Delete Lock
- Scope at Application, flexible Locks
- Customizable Security
- Enhanced Governance
- Safeguard key network components

### Service Trust Portal

- Compliance Reports, Trust Policy, Compliance Guidelines + Whitepapers
- Good for IT, Compliance officers, Auditors

### Microsoft Purview

- Data Discovery & Classification, Data Governance
- Advanced Data Security
- Holistic view of data landscape

## Resource Deployment Tools

Azure Portal - Web portal

Azure Powershell - Scripting interface

Azure Cloud Shell - Browser based shell

Azure CLI

Azure Arc Extends Management Capabilities to On-Prem, Multi-Cloud, Edge Resources

Azure Resource Manager

- Create, Update, Delete

Infrastructure As Code

- Available Manual Deployment

- Consistency across Cloud Environments

- Azure Resource Manager Templates - JSON

- Azure Bicep - No Need for State management

- Terraform - HCL - Maintains State

## Monitoring Tools

Azure Advisor - Personalized Recommendations

- Actionable Guidance, Integrated Experience

- Cost Optimization, Performance Improvements

Enhanced Security, High Availability

Azure Service Health

- Ensure Service Health, Platform Independent

- Personalized Guidance + Support

- Azure Service Health - Personalize Alerts, Service Issues

Planned Maintenance, Health History

- Resource Status, Guided Troubleshooters,

Azure Status - Global View, Real Time Status

Azure Monitor

- Application, Infrastructure, Network

- Data Collection, Alerts & Notifications, Dashboards &

Visualizations, Log Analytics, Application Insights