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Azure Introduction

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Agenda

- What is Cloud Computing?
- Cloud Models
- Delivery Models
- Azure Services

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Cloud Computing

Delivery of on-demand computing resources
over the internet
on a pay-per-use basis

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Cloud Models

- **Public Cloud**
  - Shared environment operated by a third-party provider
  - Computing resources are delivered on-demand, typically over the internet
  - Lower cost, less maintenance
- **Private Cloud**
  - Used exclusively by a business/organization
  - Services are delivered over a private network
  - Hosted by on-prem datacenters or dedicated hardware hosted by a third party provider – involves CAPEX
  - More control, higher flexibility, higher maintenance

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Cloud Models

- **Hybrid Cloud**
  - Combination of public and private cloud
  - Use existing investments in your datacenters
  - Higher control on resources and data
  - Higher flexibility to choose where to deploy resources

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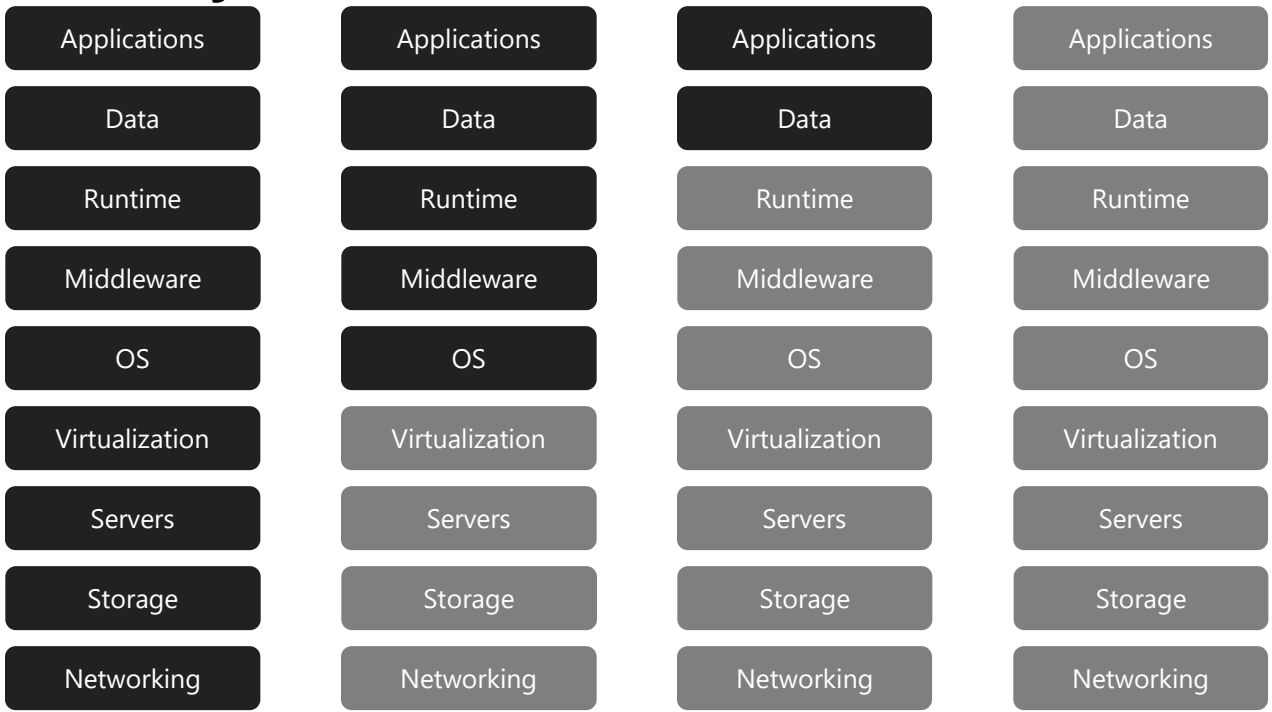
Delivery Models



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Azure

- 140+ countries
- 60+ regions
- 200+ services
- Available as
  - Public Cloud
  - Azure Government
  - Deploy on-prem
- Marketplace

Source: https://azure.microsoft.com/en-in/global-infrastructure/geographies/

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Types of Services

- Compute
- Networking
- Storage
- Databases
- Web
- IoT / Event
- Big Data / Analytics
- Identity
- AI
- Monitoring
- DevOps

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Azure Concepts

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- Azure Components
- Azure Resource Manager
- Azure Portal Walkthrough
    - Create Resource Group
    - Create Storage Account

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Azure Components

- Azure Tenant
- Azure Active Directory
- Management Groups
- Subscriptions
- Resource Groups
- Resources

- Regions
- Availability Zones

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Azure Regions

Source: https://azure.microsoft.com/en-in/global-infrastructure/geographies/

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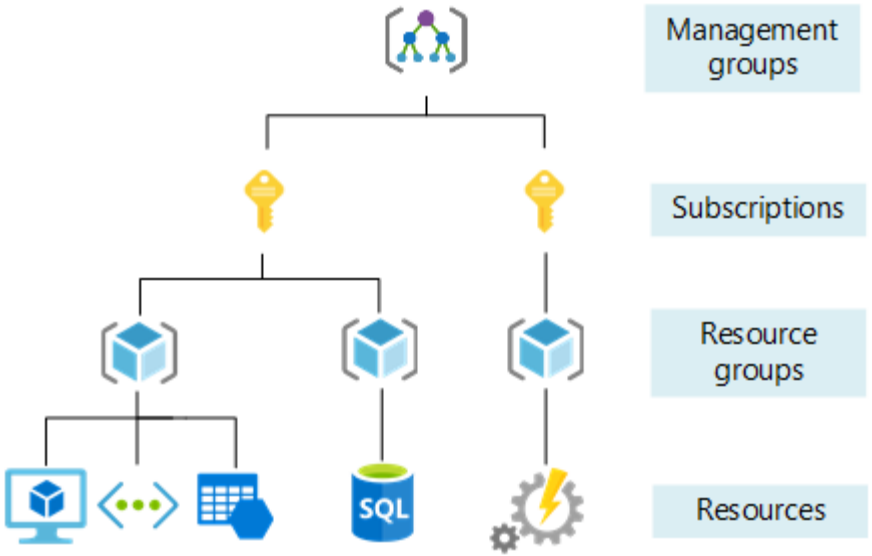
Hierarchy



Source: *https://docs.microsoft.com/en-us/azure/cloud-adoption-framework/ready/azure-setup-guide/organize-resources?tabs=AzureManagementGroupsAndHierarchy*

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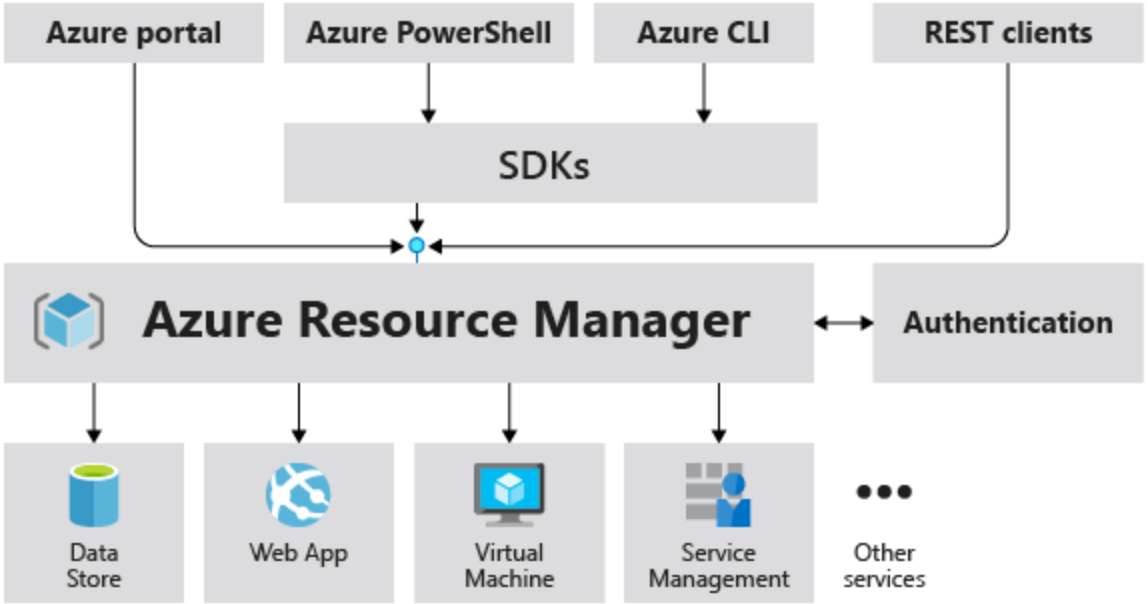
Azure Resource Manager



Source: https://docs.microsoft.com/en-us/azure/azure-resource-manager/management/overview

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Azure Networking Components

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- Understanding network components
  - Using a 3-tier architecture

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Networking Components

- Azure Virtual Network
- Subnets
- Network Security Group
- Public IP Address
- Network Interface Card
- Azure Virtual Machine
- Azure Load Balancer

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Azure Virtual Network

- Allows to create a private network in Azure
- Provides isolation to resources
- Enables secure communication within network & with outside resources
- Handles the inbound and outbound traffic
- Connects to other Azure VNets and to on-prem networks

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Components

- Virtual Network
  - Provides isolation to resources
  - VNet spans an Azure region
  - Defines a range of private IP addresses
- Subnet
  - Network inside a network
  - Resources can be deployed only inside a subnet
  - Each resource is assigned a private IP from subnet’s IP range
- Network Interface Card
  - Allows VM to communicate with outside network
  - Multiple NICs can be assigned to a VM

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Components

- Public IP Address
  - Optionally assigned to NIC *(associated with VM)*
- Network Security Group
  - Set of rules that manages the inbound and outbound traffic
  - Can be applied at subnet or NIC *(associated with VM)* level
- Firewall
  - Assigned at the VNet level only
- Azure Load Balancing options
  - Azure Load Balancer, Azure Application Gateway, Azure Traffic Manager, Azure Front Door

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Azure Virtual Machines

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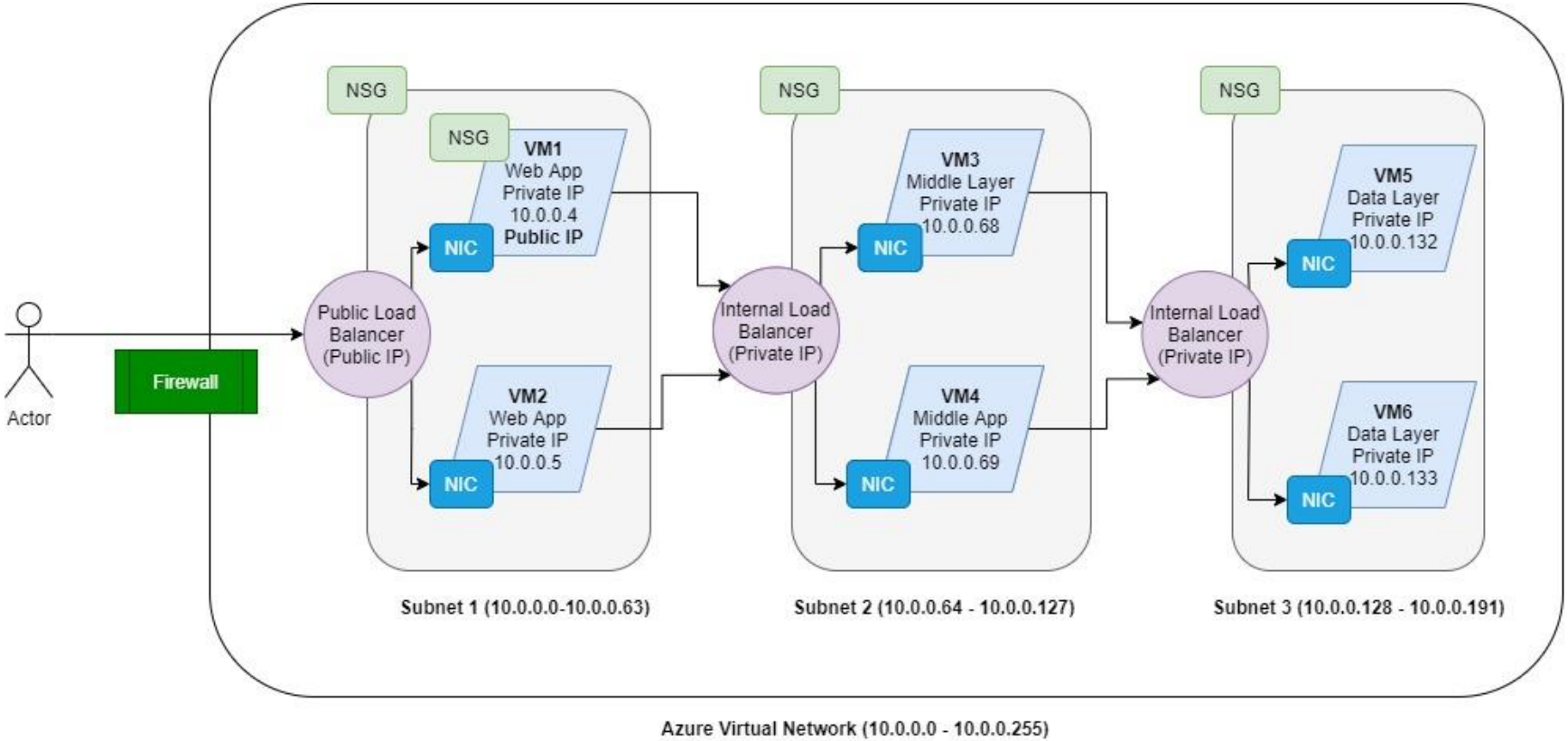
Networking Components



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Agenda

- To create a Virtual Machine, deploy:
  - Virtual Network
  - Subnets
  - Network Security Group
  - Public IP Address
  - Network Interface Card
  - Disks
  - Azure Virtual Machine

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VM Series

- Different series of machines
  - A (entry level)
  - Bs (economic)
  - D (general purpose)
  - E (in-memory, hyper-threaded)
  - F (compute optimized)
  - H (HPC computing)
  - M (memory optimized)
  - N (GPU-enabled)
- Based on configuration of physical servers
- Uses different series of Intel and AMD processors
- Select VM series based on the type of workload

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VM Sizes

- Each VM series has different sizes of VMs
- Size include
  - vCPUs
  - Memory
  - Max number of disks
  - Max IOPS

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Pricing Options

Pay-as-you-go	• Pay-per-usage model • Billed per second
Reserved VMs	• Upfront purchase in a region • Provide cost savings
Spot VMs	• Use unused capacity in Azure. Can be taken back by Azure • Highly discounted
Azure Hybrid Benefit	• Use existing Windows, SQL Server, RedHat Linux, SUSE Linux licenses to save cost

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VM Images

- VM image has OS and other software preloaded
- Variety of images are available in the marketplace
- Build and use your own custom image

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VM Storage

- OS Hard Disk
- Temporary Hard Disk
- Attach multiple data disks (optional)

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High Availability for VMs

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- Availability Sets
- Availability Zones

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Factors affecting availability

- Application failures
- Within Datacenter
  - Hardware Failure
    - Leads to unexpected application downtime
  - Unplanned Hardware Maintenance
    - When hardware might fail or is about to fail
    - Leads to poor performance or downtime
  - Planned Maintenance

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Availability Sets

- Provides high availability for VMs within one datacenter
- Fault Domains
    - Logical grouping of hardware that share common power source and network switch
    - Helps during unplanned hardware events
- Update Domains
    - Logical grouping of VMs and underlying hardware that are updated (and rebooted) at the same time
    - Helps during planned maintenance events
- VM can be assigned to only one Availability Set, and during creation only

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Availability Zones

- Provides high availability for VMs within one region
- VM can be assigned to Availability Zone during creation only
- Availability Zones and Sets options cannot be used together for a VM

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Azure Virtual Machine Scale Sets

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Agenda

- Virtual Machine Scale Sets
- Extensions
- Compare Scale Sets with VMs in Availability Sets/Zones

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Virtual Machine Scale Sets

- Group of identical and load-balanced VMs that are managed together
- Maintain consistent configuration across all VMs
- Provides high availability to the applications
- Allows applications to auto-scale based on demand

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Extensions

- Small applications providing post-deployment configuration and automation tasks on VMs
- Install software, install anti-virus, run PowerShell script etc.
- Available for VMs and VM Scale Sets

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Comparison

VMs in Availability Set / Zone

- Configure Fault & Update Domains
- Each VM to be created separately
- Size/config of VMs may be different
- OS image may be different
- Apps needs to be installed separately
- Manual scaling
- Add VM to load balancer manually
- Same datacenter in Availability Set and different datacenters for Availability Zones

Virtual Machine Scale Sets

- FDs & UDs are auto managed
- VMs can be created as a group
- Size/config of VMs is same
- OS image is same on each VM
- Apps can be installed using Extensions
- Manual and auto scaling
- VM can be auto added to load balancer
- Can deploy in different datacenters (AZ)

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Scaling Virtual Machine Scale Sets

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- Types of Scaling
- Configure Autoscaling in VMSS
- Scaling Profiles
- Protection policy for VMSS
- Scale-in Policy

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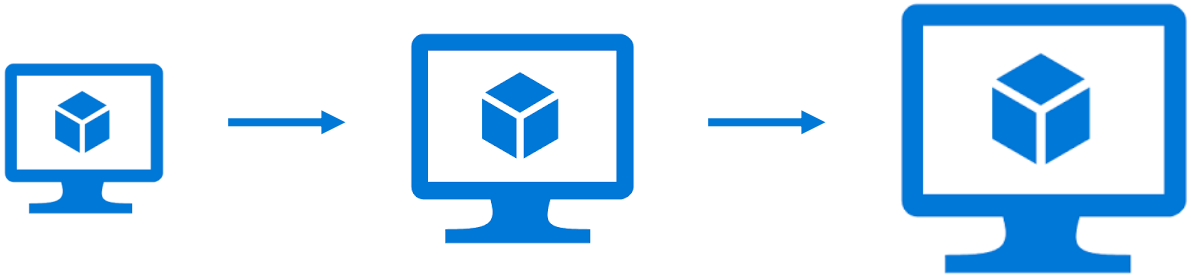
Types of Scaling

Vertical Scaling



Horizontal Scaling

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Scale-in policy: Oldest VM

Event	Instance IDs in Zone1	Instance IDs in Zone2	Instance IDs in Zone3
Initial	3, 4, 5, 10	2, 6, 9, 11	1, 7, 8
Scale-in	3, 4, 5, 10	2, 6, 9, 11	1, 7, 8
Scale-in	3, 4, 5, 10	6, 9, 11	1, 7, 8
Scale-in	4, 5, 10	6, 9, 11	1, 7, 8
Scale-in	4, 5, 10	6, 9, 11	7, 8
Scale-in	5, 10	6, 9, 11	7, 8
Scale-in	5, 10	9, 11	7, 8

Source: https://docs.microsoft.com/en-us/azure/virtual-machine-scale-sets/virtual-machine-scale-sets-scale-in-policy

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Scale-in	3, 4, 5, *10*	2, 6, 9	1, 7, 8
Scale-in	3, 4, 5	2, 6, *9*	1, 7, 8
Scale-in	3, 4, 5	2, 6	1, 7, *8*
Scale-in	3, 4, *5*	2, 6	1, 7
Scale-in	3, 4	2, 6	1, *7*

Source: *https://docs.microsoft.com/en-us/azure/virtual-machine-scale-sets/virtual-machine-scale-sets-scale-in-policy*

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