Azure Administrator

# **Introduction**

OS

* What is OS?
* Types of OS
  + Client OS
  + Server OS
* Communication
  + S-C | S-S | C-C
  + Authentication, Authorization
  + MFA or 2FA

Networking

* What is networking?
* Types of networking
  + Geographical location
    - LAN
    - MAN
    - WAN
  + Role
    - Workgroup networking
      * Working networking is logical grouping of network devices, all computers within workgroup network maintains its own, local database and local policy.
      * No centralized administration
    - Domain networking
      * Domain networking is logical grouping of network devices, all computers within domain network shares a centralized directory database and policy.
      * Centralized administration

# **Introduction to Cloud Computing**

## What is Cloud Computing?

* Cloud computing is the delivery of computing services (which includes servers, storage, databases, networking, software, analytics, intelligence and more) over internet.
* Cloud Service Provider
* Azure, AWS, GCP

## Benefits of Cloud Computing

* Cost saving
* Security
* Flexibility
* Disaster recovery
* Mobility
* Quality control

## Types of Cloud Computing

Three different types of cloud deployments are:

* Public cloud
* Private cloud
* Hybrid cloud

## Cloud Service Model

* Infrastructure as a Service (Iaas)
* Platform as a Service (PaaS)
* Software as a Service (SaaS)

<https://azure.microsoft.com/en-au/overview/what-is-cloud-computing/>

# **Understanding Azure Cloud**

## What is Azure Cloud?

* Microsoft’s Public Cloud
* 200+ services (compute, storage, networking, …)

## Azure Global Infrastructure

Azure Datacenter

Azure Regions

Azure Geography

Azure Regional Pair

Azure Availability Zone

## Azure Account and Subscriptions

* The Azure Account is a global unique entity that gets you access to Azure services and your Azure subscriptions.
* An Azure subscription is a logical unit of Azure services or resources.
* Billing for Azure services is done on a per-subscription basis.

## Signing in to Azure

Two types of user IDs to sign-in to Azure:

1. A Microsoft Accounts (Live ID) - @outlook.com or @hotmail.com account)
2. A work or school account (organizational account)

## Getting a Subscription

* Enterprise agreements
* Microsoft partners
* Microsoft resellers
* Personal free account

## Subscriptions Usage (types)

* Free
* Pay-As-You-Go
* CSP
* Enterprise agreement
* Student

## Azure Support Plans

* Basic
* Developer
* Standard
* Professional Direct
* Enterprise support

<https://azure.microsoft.com/en-in/support/plans/>

## Creating Azure Account & Subscription

Requirements:

* Microsoft Live account (outlook.com)
* Mobile number and Credit card for identity verification

**Lab:**

# **Azure Management Tools**

* Azure Portal
* Azure PowerShell
* Azure CLI
* Azure Cloud Shell
* Azure Mobile App

## Managing Azure via Azure Portal

* The Azure portal is a web-based UI
* https://portal.azure.com

**Lab:**

## Managing Azure via Azure PowerShell

**Understanding PowerShell**

* What is PowerShell?
  + CLI-based scripting language from MS
  + Administrative tool
* PowerShell versions
* PowerShell editions
  + Desktop edition
  + Core edition
* PowerShell Commands
  + Cmdlets Parameters Value
  + Cmdlets = Verb-Noun
* PowerShell Module
  + PS Module is a container, which contains PS cmdlets related to specific service or application.

**Azure PowerShell**

* Azure PowerShell is a module that you add to Windows PowerShell or PowerShell Core to enable you to connect to your Azure subscription and manage Azure resource.
* Az is the name of Azure PowerShell module
* The Az module is available from a global repository called the PowerShell Gallery.

**Lab: Installation of Azure PowerShell Module**

**Lab: Connect or Sign-in to Azure via Azure PowerShell**

## Managing Azure via Azure CLI

**What is Azure CLI?**

* Azure CLI is a cross-platform command-line program or tool that connects to Azure and executes administrative commands on Azure resources.
* It can be run on Windows, Linux, or macOS.

**Lab: Install Azure CLI**

**Lab: Sign-in to Azure via Azure CLI**

## Managing Azure via Azure Cloud Shell

**What is Azure Cloud Shell?**

* Azure cloud shell is an interactive, browser-accessible shell for managing Azure resources in your portal.
* It provides the flexibility of choosing the shell experience that best suits the way you work.
* Linux users can opt for a Bash experience, while Windows users can opt for PowerShell.
* Requires a Resource Group, Storage Account, and Azure File Share.

**Lab: Manage Azure via Azure Cloud Shell**

* Configure the Cloud Shell
* Experiment with Azure PowerShell
* Experiment with Azure CLI

## Managing Azure via Azure Mobile App

**Lab: Install Azure mobile app on mobile device**

**Lab: Sign-in to Azure via Azure mobile app and explore**

# **Azure Resource Manager**

## What is Resource Manager?

## Benefits of ARM

## Terminology

**Resource**

* A manageable item that is available through Azure.
* An instance of Azure service
* VM, storage account, web app, database, virtual network, …

**Resource Group**

* RG is a logical grouping of Azure resources
* A container that holds related resources for an Azure solution

**Resource Provider**

* Resource Provider is a service that supplies the resources you can deploy and manage through ARM.
* Some common resource providers are:
  + Microsoft.Compute – which supplies the VM resource
  + Microsoft.Storage – which supplies the storage account resource
  + Microsoft.Web – which supplies resources related web apps

## Creating Resource Groups

**Lab: Creating Resource Group using portal**

**Lab: Creating Resource Group using PowerShell**

**Lab: Creating Resource Group using Azure CLI**

## Creating Azure Resources

**Lab: Creating Azure resources**

## Resource Manager Locks

* You can associate the lock with subscription, resource group, or resource
* Locks are inherited by child resources

There are two types of resource manager locks

1. Read-only locks
2. Delete locks

**Lab: configuring resource manager locks**

## Moving Resources

**Lab: Moving resources between Resource Group**

## Resource Limits (Usage and Quota)

**Lab: Configuring Azure resource limits**

## Resource Tags

* Name and value pair
* 50 tag name/value pairs

**Lab: Create and assign tags**

## Azure Resource Manager (ARM) Templates

**What is ARM Template?**

**Template Benefits**

**Structure of ARM Template**

* ARM templates are written in JSON format.
* A JSON file is a collection key-value pair
* Each key is a string, whose value can be a string or a number or a Boolean expression or an object.
* ARM template consists following sections:
  + Schema
  + Content version
  + Parameters
  + Variables
  + Functions
  + Resources
  + Outputs

**QuickStart Templates**

* Azure QuickStart templates are ARM templates provided by Azure community.

Lab: Using QuickStart templates

**Run templates with Azure Portal**

**Run templates with Azure PowerShell**

**Run templates with Azure CLI**

# **Azure Virtual Networking**

## Virtual Networks

* An Azure VNet is a representation of your own network in the Azure cloud.
* It is a logical isolation pf the Azure cloud dedicated to your subscription.

**Subnets**

**Lab: Create a Virtual Network using Portal**

## IP Addresses

**Public IP Address**

* Is optional
* Is resource
* VM NICs, LBs, GWs
* Allows Azure resources to become reachable from internet

**Private IP Address**

* Is mandatory
* Is not a resource
* VM NICs, LB, GW
* Is used for communication within the same VNet, across multiple connected VNets, or with on-premise networks via VPN tunnel.

**Static vs Dynamic addressing**

**Address SKUs**

* When you create a public IP address you are given a SKU choice of either **Basic** or **Standard**
* Your SKU choice affects the IP assignment method, security, redundancy, and etc.

**Lab: Create Public IP Address resource**

## Network Interface Card (NIC)

**Lab: Create a Network interface**

**Lab: Assign Public IP address to network interface**

**Lab: Adding multiple IP addresses to NIC**

## Network Security Groups (NSGs)

**What is NSG?**

* You can limit network traffic to resources in a VNet using NSG
* A NSG contains a list of security rules that allow or deny inbound or outbound network traffic.

**NSG Rules**

* Default rules
* Custom rules

**NSG Associations**

* NSG can be associated to a subnet or to a network interface (NIC)

**Lab: Creating NSG**

**Lab: Creating NSG rules**

**Lab: Applying or associating NSG to Subnet or NIC**

# **Azure Virtual Machines**

## What are Azure VMs?

## Azure VM Supported Guest OSs

* Windows Servers – 2008 R2 or later
* Windows Clients – Windows 10
* Linux

## Azure VM Sizing

## Azure VM Availability options

* Standalone VMs
* VMs within Availability Set
* VMs within Availability Zone

## OS Image

* Market-place image – provide by Azure
* Custom image – org created image

## Administrator or Root User Details

## Azure VM Disks

Azure supports 3 types of disks for VM

1. OS Disk
   1. One OS disk per VM
   2. C drive
   3. Contains OS
2. Temporary Disk
   1. One temporary disk per VM
   2. D drive
   3. Contains temporary data (page file or swap file)
   4. Size is depending upon VM size
3. Data Disks
   1. To store data (personal or application)
   2. No. of data disks per VM is depending upon VM size

## Storage Options

Azure offers 4 different disk types, each type is aimed towards specific customer scenarios

1. Ultra SSD
2. Premium SSD
3. Standard SSD
4. Standard HDD (Magnetic storage)

## Lab: Creating Virtual Machines with Windows OS

## Lab: Creating Virtual Machines with Linux OS

Lab: Attach or detach Data disk to/from VM

## VM Connections

* RDP – to access VM with Windows OS
* SSH – to access VM with Linux OS
* Bastion – to access VM (Windows or Linux) via portal

**Lab: Access Azure VM using RDP**

**Lab: Access Azure VM using SSH**

## Bastion

**Lab: Creating Bastion host, and accessing VMs via portal (using bastion)**

1. Create a RG = FirstName-RG1
2. Create a Virtual Network (RGName-VNet1) within your RG with one Subnet (Subnet1)
3. Create a VM with Windows Server 2019 Datacenter (RGName-VM1)
4. Create a VM with RHL 8.2 (RGName-VM2)
5. Connect to VM1 using RDP and Verify
6. Connect to VM2 using SSH and Verify
7. Configure Bastion host (VNetName-Bastion) and connect to VMs via portal

# **Azure Active Directory (Azure AD)**

## What is Azure AD?

* AAD is Microsoft’s multi-tenant cloud-based directory and identity management service.

## Azure AD Concepts

**Identity**

* Identity is an object that can get authenticated.
* An identity can be a user with username and password.

**Account**

* Account is an identity that has data associated with it.
* You cannot have an account without an identity.

**Azure AD Account**

* An identity created through Azure AD
* Identities are stored in Azure AD and accessible to your organizations cloud subscriptions.
* Is also referred as Work or school account.

**Azure AD Tenant (Directory)**

* A tenant is a dedicated instance of Azure AD service.
* When you sign-up to Microsoft cloud service (Microsoft Azure, Microsoft Intune, Microsoft 365) one Azure AD tenant will create automatically.
* Each tenant is an independent domain
* Tenant domain name
  + Initial tenant domain name
    - orgdomainname.onmicrosoft.com
  + Custom tenant domain name

**Azure AD tenant and Azure subscription relationship**

* Every subscription must associate with a tenant
* One subscription can associate with only one tenant at a time
* Multiple subscriptions can associate with same tenant

## Lab: Creating multiple Azure AD Tenants, switching between tenants, and Deleting tenants

## Azure AD Management Tools

* Azure AD Portal
  + https://aad.portal.azure.com
* Azure AD PowerShell

## Azure AD Editions

## Azure AD User Account

* Cloud Identity
  + AAD User Accounts
  + Created natively in AAD and stored in AAD DB
  + AAD does authentication and authorization for cloud identity.
* Guest Users
  + To allow external user access to our org cloud application

**Lab: Create Azure AD user account (Cloud identity)**

**Lab: Create Azure AD Guest User account**

## Azure AD Groups

* Security group – for permissions distribute
* Microsoft 365 group – for collaboration

**Lab: Creating and managing Azure AD Groups**

## Self-service Password Reset (SSPR)

**Lab: Enable SSPR and verify**

## Azure AD Device Join

* You can join devices to Azure AD Tenant Domain
* Only Windows 10 devices are supported

**Lab: Join Windows 10 device to AAD Tenant domain**

# **Roles in Azure Cloud**

* Classic subscription administrator roles
* Azure roles (RBAC)
* Azure AD roles

## How the roles are related

* When Azure was initially released, access to resources was managed with just three classic subscription administrator roles.
* Later, Azure RBAC was added. Azure RBAC is a newer authorization system that provides fine-grained access management to Azure resources.
* To manage resources in Azure AD (such as users, group, devices, etc), there several Azure AD roles.

## Classic subscription administrator roles

1. Account Administrator
   1. One per Azure Account
   2. Full control on all subscriptions
2. Service Administrator
   1. One per Azure subscription
   2. Full control on that subscription
3. Co-administrator (delegated administrator)
   1. 200 per Azure subscription
   2. Full control on that subscription, but one co-administrator can’t add another co-administrator
   3. Account administrator and service administrator can add co-administrator

**Lab**

## Azure roles (RBAC)

* Azure RBAC include over 70 built-in roles
* Owner, Contributor, Reader roles

**Lab:**

## Azure AD roles

* There many built-in Azure AD roles
* Global administrator, User administrator, Billing administrator, Password administrator, many more

**Lab:**

# **Intersite Connectivity**

## Azure VNet to Azure VNet

* VNet Peering
* VNet to VNet VPN (V2V VPN)

## Azure VNet to On-premise Network

* Point to Site VPN (P2S VPN)
* Site to Site VPN (S2S VPN)
* ExpressRoute VPN

## VNet Peering

* VNet peering connects two Azure virtual networks
* Two types of peering: Regional and Global
* Peered networks use the Azure backbone for privacy and isolation
* Easy to setup, seamless data transfer, and great performance

**Lab: Implementing Regional or Global VNet Peering**

# **Azure Storage**

## What is Azure Storage?

* Azure storage is a service that you can use to store unstructured and partially structured data.
* You can use Azure portal, PowerShell, CLI, Storage explorer, Azcopy.exe, Visual studio to manage Azure storage.

## Azure Storage Account

* To use Azure storage, you first need to create a storage account.
* 200 storage accounts / subscription.
* Standard storage account (uses magnetic storage) and Premium storage accounts (uses SSD storage)
* Standard storage account = 500 TB | Premium storage accounts = 35 TB

## Azure Storage Services

1. **Blob Storage** – to store unstructured files (media content, VM disks, backup files, logs)
   1. Block blobs – ideal for storing text and binary data, like files, images and videos. Is optimized for sequential access, which ideal for media content.
   2. Append blobs -are optimized for append operations, they are useful for logging scenarios.
   3. Page blobs – are more efficient for frequent read/write operations, which is best suited for VM disks.
2. **File Storage** – similar blobs, these provide storage for unstructured files, but file storage offers file sharing.
3. **Queue Storage** – temporary storage.
4. **Table Storage** – to store nonrelational and partially structured contents.

## Azure Storage Replication

1. LRS
2. ZRS
3. GRS
4. RA-GRS
5. GZRS
6. RA-GZRS

## Storage Access Tier

* Hot – optimized for storing frequently accessed data
* Cool - optimized for storing infrequently accessed data
* Archive - optimized for storing rarely accessed data

## Azure Storage Account Kind or Types

1. General-purpose v1 storage account
   * Legacy
   * Blob, File, Queue, and Table
2. General-purpose v2 storage account –
   * New generation
   * Blob, File, Queue, and Table
3. Blob storage account –
   * New generation
   * Blob

## Storage Account Endpoints

http or https://<storageaccountname>.<storageservice>.core.windows.net

* Blob service – https://prakashrg1sa1.blob.core.windows.net
* File service - https://prakashrg1sa1.file.core.windows.net
* Table service - https://prakashrg1sa1.table.core.windows.net
* Queue service - https://prakashrg1sa1.queue.core.windows.net

## Lab: Create new Azure storage account

## Blob Storage

**What is Blob storage?**

**Blob Containers**

* A container is a logical grouping of a set of blobs (objects).
* Storage account can contain unlimited number of containers
* A container can store an unlimited number of blobs

**Lab: Blob storage**

* Create a blob container
* Upload and download blobs

## File Storage

**What is File storage?**

**File Share**

* Azure files offers fully managed file shares in the cloud that are accessible via industry standard protocol (SMB)
* Azure file shares can be mounted concurrently by cloud or on-premises deployments of Windows, Linux, and macOS.
* 5TB data / file share

**Lab: File storage**

* Create file shares
* Upload or download files
* Mounting file share

## Azure Storage Explorer

Azure storage explorer is standalone app from Microsoft that allows you to easily work with or manage Azure storage data.

**Lab: Download and install Azure storage explorer**

**Lab: Connect to Azure storage account**

# **Data Protection (Azure Backup Solutions)**

* Recovery Services Vault
* Azure data and on-premise data

**Lab: Create Recovery Service Vault**

**Lab: On-premise Files/Folders backup using Azure Recovery Services Vault**

* Download and install MARS agent
* Register on-premise system to Azure RSV

**Lab: Azure Data backup using Azure Recovery Services Vault**

# **Azure Monitoring**

## What is Azure Monitor?

## Activity Log

## Alerts

## Log Analytics

## Network Watcher

* Azure Network Watcher provides tools to monitor, diagnose, view metrics, enable/disable logs for resources in Azure Virtual Network.