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Microsoft AZURE Cloud with AI Syllabus

Azure Cloud Computing Overview

Learning Objective

- ❖ Understanding Cloud Computing and Azure

Topics Covered

- ❑ What is Cloud Computing
- ❑ Service Model of Cloud
- ❑ Types of Cloud
- ❑ Azure Fundamentals
- ❑ Azure Certifications
- ❑ Azure Regions and Services
- ❑ Azure Domain and Services
- ❑ Azure Subscriptions

Azure Virtual Machine in Compute Domain

Learning Objective

- ❖ Design a compute strategy

- ➢ Design a compute provisioning strategy
- ➢ Design a secure compute strategy
- ➢ Determine appropriate compute technologies
- ➢ Design an Azure HPC environment

- ➢ Identify compute requirements
- ➢ Recommend management tools for compute

- ❖ Create and configure a VM for Windows and Linux

- ➢ Configure high availability
- ➢ Configure monitoring
- ➢ Configure networking
- ➢ Configure storage
- ➢ Configure virtual machine size
- ➢ Implement dedicated hosts
- ➢ Deploy and configure scale sets

- ❖ Implement solutions that use virtual machines (VM)

- ➢ Provision VMs
- ➢ Create Azure Resource Manager templates
- ➢ Configure Azure Disk Encryption for VMs
- ➢ Implement Azure Backup for VMs

- ❖ Automate deployment of VMs

- ➢ Modify Azure Resource Manager template
- ➢ Configure location of new VMs
- ➢ Configure VHD template
- ➢ Deploy from template
- ➢ Save a deployment as an Azure Resource Manager template
- ➢ Deploy Windows and Linux VMs

Topics Covered:

- ❑ Launching VM Instance and Connect
- ❑ Windows Instance
- ❑ Linux Instance
- ❑ VM Types

❑ General Purpose
❑ Compute Optimise
❑ Memory Optimise
❑ Storage Optimise
❑ GPU Optimise
❑ VM Instance Pricing Options
❑ On-Demand
❑ Spot
❑ Reserved
❑ Types of Images to Launch Virtual Machine Instance

❑ Azure Published
❑ Azure Marketplace
❑ Creating from existing Instance
❑ Azure Shared Image Gallery
❑ Azure Service Limits and Support Plans
❑ Summary of Virtual Machine Services
❑ Exam Essentials

Hand-on Lab:
❑ Launch Virtual Machine Instance (Windows) with Standard SSD Storage, Connect to Windows Instance with Remote Desktop Protocol, and make Web Server.
❑ Launch Virtual Machine Instance (Linux) with Standard SSD Storage, Connect to Linux instance with Secure Shell via Putty software and make Web Server.
❑ Create Custom Image using existing Windows Instance to Launch a new Pre-configured Windows Web Server.
❑ Create Custom Image using existing Linux Instance to Launch a new Pre-configured Linux Web Server.

Azure Storage Service

Learning Objective

❖ Design a storage strategy

➢ Design a storage provisioning strategy
➢ Design storage access strategy
➢ Identify storage requirements
➢ Recommend a storage solution
➢ Recommend storage management tools

❖ Create and configure storage accounts

➢ Configure network access to the storage account
➢ Create and configure storage account
➢ Generate shared access signature
➢ Implement Azure AD authentication for storage
➢ Install and use Azure Storage Explorer
➢ Manage access keys
➢ Monitor activity log by using Azure Monitor logs
➢ Implement Azure storage replication
➢ Implement Azure storage account failover

Topics Covered

❑ Understanding Cloud Storage
❑ Advantages of Cloud Storage
❑ Understanding Terminologies of Cloud Storage
❑ Physica Hard Disk
❑ Virtual Hard Disk
❑ Virtual Hard Disk
❑ HDD/SSD
❑ IOPS
❑ Disk I/O
❑ Storage Memory in GiB, MiB, KiB
❑ Azure Storage Accounts
❑ Managed Disks
❑ Unmanaged Disks

❑ Hard Disk Snapshots
❑ Azure Storage Services
❑ Block Blob
❑ Blob
❑ File
❑ Table
❑ Queue
❑ Azure Storage Types
❑ Standard
❑ Premium
❑ Azure Storage Redundancy
❑ Local Redundant
❑ Zone Redundant
❑ Geo-Redundant
❑ Read-Access Geo-Redundant
❑ Summary of Cloud Storage
❑ Exam Essentials

Hands-On

❑ Launch Windows Virtual Machine Instance with Unmanaged Virtual Hard Disk (Default Size).
❑ Create a Virtual Hard Disk in Local Computer and upload the VHD to Storage Account
❑ Implement RAID Configuration in Windows for Data and Application Backup using Disk Management.
❑ Create a File Share in Azure Files and Mount the File Share in Azure VMs.

Azure Virtual Network and Security

Learning Objective

❖ Design a networking strategy

➢ Design a network provisioning strategy

- Design a network security strategy
- Determine appropriate network connectivity technologies
- Identify networking requirements
- Recommend network management tools
- Recommend network security solutions

❖ Implement and manage virtual networking

- Configure private IP addressing
- Configure public IP addresses
- Create and configure network routes
- Create and configure network interface
- Create and configure subnets
- Create and configure virtual network
- Create and configure Network Security Groups and Application Security Groups

❖ Create connectivity between virtual networks

- Create and configure Vnet peering
- Create and configure Vnet to Vnet connections
- Verify virtual network connectivity
- Create virtual network gateway

❖ Implement application load balancing

- Configure Application Gateway

- Configure Azure Front Door service
- Configure Azure Traffic Manager

❖ Integrate on premises network with Azure virtual network

- Create and configure Azure VPN Gateway
- Create and configure site to site VPN

- ➢ Configure ExpressRoute
- ➢ Configure Virtual WAN verify on premises connectivity
- ➢ Troubleshoot on premises connectivity with Azure

Topics Covered

- ❑ Basics of Networking
- ❑ Virtual Networks
- ❑ Subnets
- ❑ Route Tables
- ❑ Network Security Groups
- ❑ Public IP and NICs
- ❑ Virtual Private Gateway,
- ❑ Local Network Gateway
- ❑ V-Net Peering
- ❑ Azure Direct Connect
- ❑ Summary
- ❑ Exam Essentials

Hands-On

- ❑ Create Virtual Network, Public Subnets and Route Table and Launch Virtual Machine Instance.
- ❑ Create Virtual Network Public and Private Subnets, Route table and Launch Virtual Machine instance Windows in Public and Linux in Private.
- ❑ Create Nat Gateway and allow internet access to Private Subnet.
- ❑ Create two different Virtual Networks in different regions and use Virtual Network Peering Connection to Connect.
- ❑ Build Network and Instance Security Between Instances using Security Group and Network ACL
- ❑ Create Customer and VPN Gateway to describe VPN Connection.

Azure CDN Profiles

Learning Objective

- ❖ Understanding Content Delivery Network for Videos and media files.

Topics Covered

❑ Content Delivery Network
❑ Azure Edge Locations
❑ Distributions
❑ CDN Profiles
❑ Summary
❑ Exam Essentials

Hands-On

❑ Create Blob Storage, and Container. Upload videos to distribute to all edge locations
❑ Create distribution in CDN Profile to distribute videos to all edge locations.

Azure Management Tools

Learning Objective

❖ Analyze resource utilization and consumption

➢ Configure diagnostic settings on resources
➢ Create baseline for resources
➢ Create and test alerts
➢ Analyze alerts across subscription
➢ Analyze metrics across subscription
➢ Create action groups
➢ Monitor for unused resources
➢ Monitor spend
➢ Report on spend
➢ Utilize Log Search query functions
➢ View alerts in Azure Monitor logs
➢ Visualize diagnostics data using Azure Monitor Workbooks

Topics Covered

❑ Azure Monitor
❑ Azure alerts
❑ Cost Management
❑ Event Managements
❑ Azure VM Extensions
❑ VM Boot Diagnostics
❑ PowerShell and Powershell Scripts
❑ Summary
❑ Exam Essentials

Hands-on

❑ Monitor Virtual Machine instance with Detailed Monitoring
❑ Monitor Virtual Network
❑ Audit event using Event Management
❑ Create Azure Alert Subscribe Email to get Notifications
❑ Run Powershell Script to Build Azure Resource.

Load Balancingand AutoScalingof Virtual Machines
Learning Objective

❖ Use load balancing in the creation of highly available systems.
❖ Learn scaling Applications/Systems with AutoScaling and its use in Building Fault Tolerant Networks.

❖ Create web apps by using PaaS
➢ Create an Azure app service Web App
➢ Create documentation for the API
➢ Create an App Service Web App for Containers
➢ Create an App Service background task by using WebJobs
➢ Enable diagnostics logging

Topics Covered

❑ Fault Domain
❑ Update Domain
❑ Availability Sets
❑ Load Balancers Types
❑ Application
❑ Network
❑ Load Balancer Configuration
❑ Service Health Check
❑ Launch Configurations
❑ Scaling Groups
❑ Scaling Policies
❑ VMScale Sets
❑ Building Fault Tolerant and Highly Available Applications
❑ Summary of Auto Scaling and Load Balancers
❑ Exam Essentials

Hands-On

❑ Create Availability Sets to build High Availability
❑ Attach a load balancer to Virtual Network and Launching VMs
❑ Create VMScalesets to build AutoScaling.

Azure Identity and Access Management

Learning Objective

- ❖ Understanding IAM in Azure
- ❖ Manage Azure Active Directory
  - ➢ Add custom domains
  - ➢ Configure Azure AD Identity Protection
  - ➢ Configure Azure AD Join
  - ➢ Configure self-service password reset
  - ➢ Implement conditional access policies manage multiple directories

- Perform an access review

- Implement and manage hybrid identities
- Install and configure Azure AD Connect

- Configure federation
- Configure single sign-on
- Manage and troubleshoot Azure AD Connect
- Troubleshoot password sync and writeback

- Implement multi factor authentication

- Configure user accounts for MFA
- Configure fraud alerts
- Configure bypass options
- Configure trusted IPs
- Configure verification methods

- Manage role-based access control

- Create a custom role
- Configure access to Azure resources by assigning roles
- Configure management access to Azure
- Troubleshoot RBAC
- Implement Azure Policies
- Assign RBAC Roles

Topics Covered

- ❑ IAM Principles
- ❑ Understanding Azure Active Directory
- ❑ Creating Users
- ❑ Creating Groups
- ❑ Create RBAC to Set Permissions to Users

❑ Summary
❑ Exam Essentials

Hands-On
❑ Create Users in Azure Active Directory
❑ Assign RBAC access to a Specific Resource Group.

Database Services, Backup and Migration

Learning Objective
❖ Understanding Azure Database services and their use case.
❖ Develop solutions that use a relational database

➢ Provision and configure relational databases
➢ Configure elastic pools for Azure SQL Database
➢ Implement Azure SQL Database managed instances
➢ Create, read, update, and delete data tables by using code
❖ Understanding Site Recovery Services Vault Optimize consumption strategy
➢ Optimize App service costs
➢ Optimize Compute costs
➢ Optimize Identity costs
➢ Optimize Network costs
➢ Optimize Storage costs

Topics Covered

❑ Azure Databases
❑ Create and Manage MS SQL Databases
❑ Site Recovery Services Vault

Hands-On
❑ Create MySql Database.
❑ Taking Backup of VM
❑ Migrating Hyper-V Virtual Machines from On-Premises to Azure.

Introduction to Azure Cloud & AI Ecosystem

- Understanding Cloud Computing & Azure

1. Azure Global Infrastructure & Cloud Models (IaaS, PaaS, SaaS)
2. Core Azure Services Overview (VMs, Storage, Networking, Identity)
3. Azure CLI, SDKs & PowerShell for AI Workloads

- Introduction to AI & Machine Learning in Azure

1. What is AI? Machine Learning vs. Deep Learning vs. Generative AI
2. Overview of Azure AI Services: Cognitive Services, Machine Learning, OpenAI
3. Business Use Cases: AI in Finance, Healthcare, Retail, and Automation

AI & Machine Learning with Azure Machine Learning

- **Azure Machine Learning (Azure ML)**

1. Building & Training AI Models in Azure ML Studio
2. Hyperparameter Tuning & AutoML for Model Optimization
3. Deploying AI Models as Managed Endpoints

- **Azure Cognitive Services for AI Applications**

1. Computer Vision – Image & Video Recognition
2. Text Analytics – NLP, Sentiment Analysis & Key Phrase Extraction
3. Speech Services – Speech-to-Text, Translation & Voice Synthesis
4. Azure Bot Services – Creating AI Chatbots

Generative AI & LLMs with Azure OpenAI

- **Introduction to Generative AI & Large Language Models (LLMs)**

1. How LLMs Work – Transformers, GPT, and Attention Mechanisms

2. Azure OpenAI Service – Deploying GPT, ChatGPT & Codex
3. Fine-Tuning & Customizing AI Models for Business Needs

- **Hands-On Labs & Use Cases**

1. Building AI Chatbots using ChatGPT in Azure
2. Text Generation & Summarization with Azure OpenAI
3. AI-Powered Image & Video Processing using DALL·E & Azure Cognitive Vision

Serverless AI & Real-Time AI Applications

- **Deploying AI Models in a Serverless Environment**

1. Azure Functions for AI Model Inference
2. Azure Logic Apps & Event Grid for AI Automation
3. Azure Kubernetes Service (AKS) for Scalable AI Deployments

- **Edge AI & IoT Integrations**

1. Azure IoT Edge – Running AI Models on IoT Devices
2. Real-Time AI Inference with Azure Stream Analytics

Deploying & Managing AI Models at Scale

- **AI Model Deployment & Monitoring**

1. Azure DevOps for MLOps – CI/CD for AI Pipelines
2. Model Drift Detection & Retraining in Azure ML
3. AI Model Monitoring with Azure Application Insights

- **Security, Compliance & Governance in AI on Azure**

1. Azure Role-Based Access Control (RBAC) for AI Workloads
2. AI Ethics & Responsible AI – Bias Detection & Fairness
3. Data Privacy & Compliance (GDPR, HIPAA, SOC2)

Capstone Project – AI-Powered Cloud Solution

Real-World Project: End-to-End AI Application on Azure

Project Examples:

- ✅ AI-Powered Customer Support Chatbot using Azure OpenAI
- ✅ Predictive Analytics for Sales Forecasting using Azure ML
- ✅ AI-Driven Image Recognition System with Azure Cognitive Services
- ✅ Real-Time NLP-based Chatbot for Business Automation