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| **AZ-900: Microsoft Azure Fundamentals Ultimate Study Guide** | |
| **Domain 1: Describe Cloud Concepts (20 - 25%)**  [**https://docs.microsoft.com/en-us/learn/paths/az-900-describe-cloud-concepts**](https://docs.microsoft.com/en-us/learn/paths/az-900-describe-cloud-concepts) | |
| Identify benefits and considerations of using cloud services | |
| What are the benefits of cloud computing? | 1. Low operating costs 2. Scalable 3. Large amounts of resources 4. Security 5. Flexibility |
| What is capital expenditure (CapEx)? | * Business Expenditures for fixed assets * i.e. Buildings or Equipment |
| What is operational expenditure (OpEx)? | * Operating costs, expenses to run day-to-day businesses * i.e., Domain Registrations, website hosting |
| What are the differences between CapEx and OpEx? | * CapEx is considered an investment, but they also have OpEx costs to maintain. * OpEx gives slightly more flexibility, tax deductible, cause of business debt. |
| What is the consumption-based model? | * A customer pays according to what is used. * The opposite would be a subscription-based model, where the costs stay the same regardless of use. * i.e., The amount of network traffic, compute, storage |
| Describe differences between categories of cloud services | |
| What is the shared responsibility model? | * The division of security responsibility between the cloud user and cloud host. * The cloud user is always responsible for Data, Account, Access management * The responsibilities of the cloud host are dependent on the type of infrastructure. |
| What is IaaS (Infrastructure as a service)? Example? | * A type of cloud computing that offers storage, servers, firewalls/security for cloud user use. * IaaS is an OpEx. * i.e., Azure or AWS compute services, storage services. |
| What is PaaS (Platform as a service)? Example? | * A type of cloud computing that includes IaaS and development tools, such as operating systems, virtual desktops, etc. * PaaS is used for:   + Developing cloud-based applications   + Analytics or business intelligence * Advantages of PaaS:   + Reduces coding time   + Develop for multiple platforms   + Support teams that are separated geographically |
| What is serverless computing? | * Development without worrying about infrastructure. * Advantages of SC:   + No infrastructure management needed   + Dynamically scales to workload requirements   + Efficient use of resources |
| What is SaaS (Software as a service)? | * Is when a user connects to a cloud-based application over the internet. * i.e., Microsoft Office 365, Google Drive |
| Describe differences between types of cloud computing | |
| What is cloud computing? | * The delivery of computing services over the internet (cloud) * i.e., servers, storage, databases, networking, software, analytics, and intelligence. |
| What is the public cloud? | * Services are offered over the internet to those who purchase them * Owned by a third-party cloud service provider |
| What is the private cloud? | * Compute, storage, or other types of resources only in use by one organization |
| What is the hybrid cloud? | * Is when both public and private cloud services are used. |
| What is the difference and similarities between these three? | Public Advantages:   * No CapEx to scale up * Only pay for what is used * Self-service   Private Advantages:   * Complete control over resources and security   Private Disadvantages:   * Hardware must be purchased and maintained   Hybrid Cloud:   * The most amount of flexibility |
| **Domain 2: Describe Core Azure Services (15 - 20%)**  [**https://docs.microsoft.com/en-us/learn/paths/az-900-describe-core-azure-services/**](https://docs.microsoft.com/en-us/learn/paths/az-900-describe-core-azure-services/) | |
| Describe core Azure architectural components | |
| What are regions? | * A set of datacenters deployed within an interval-defined perimeter * They are geographically separated * Each region is connected by high capacity networking |
| What are regions used for? | * “To offer protection against localized disasters with availability zones and protection from regional or large geography disasters with disaster recovery” |
| What are the benefits of using regions? | * Help with cross-region resiliency * Increase fault tolerance -> more reliable application |
| What are region pairs? | * Two regions with the same geography |
| What are region pairs used for? | * They assist with disaster recovery since:   + There is physical separation between datacenters (at least 300 miles)   + Helps with region recovery in the event of an outage   + Automatic platform redundancy between the pair   + Data residency: helps to meet compliance laws and legal requirements |
| What are the benefits of using region pairs? | * They help provided redundancy for cloud users |
| What availability zones (AZ)? | * They are unique physical locations within a region * Each zone contains datacenters which are physically separate and have different sources of power, cooling and networking |
| What are AZ used for? | * Provide redundancy within a region * Protect against facility level issues |
| What are the benefits of using AZ? | * Availibility zones allow automatric transition between zones without interruption * Zones are highly availablem falty toloeraten, and scalable |
| What are availability sets? | * A logical grouping of VMs * Distributes VMs between different racks or “fault domains”, so work will not be lost when a fault domain is under maintenance or has lost power * Update domains allow the user to determine how many machines to be shut down, the order for the machines to be shutdown, and the priority of the machines * 2 or more VMs in an availability set provide a 99.95% uptime |
| What are availability sets used for? | * Availability sets are used to create a highly available application with little to no downtime. |
| What are the benefits of using availability sets? | * They help prevent VMs from being unusable when a fault domain is non-functional. |
| What are resource groups? | * A container that holds related resources for an Azure solution * Logical groups of resources such as VMs, IP addresses, network interfaces, etc. * Stores metadata about the resources * Each subscription can have more than 1 resource groups |
| What are resource groups used for?  **Purpose** | * Makes it easier to apply access controls, monitors activity, and track costs for workloads * Collects metadata from each individual resource |
| What are the benefits of using resource groups?  **Features** | * Allows users to deploy resources using templates * Cost management: Assigns a cost allocation tag to a resource group for separate accounting * Role-based access: manages who has access to Azure resources and what they can do with resources   + There are different types of roles:   + Contributor: Full access to manage resources, but cannot assign roles   + Owner: Grants full access to manage all resources and roles   + Reader: Views all resources but cannot make any changes   + User Access Administrator: Lets you manage user access to Azure resources |
| What are subscriptions? | * A base container that comprises of a group of related business or technical resources * Used and billed together * Acts as an administrative boundary |
| What are subscriptions used for? | * An agreement between an organization and Microsoft to use resources * An account can have multiple subscriptions with different management policies and billing procedures   + Defined by the billing boundary or access control boundary   + There are separate billing resources for each subscription * Ways to organize subscriptions   + Workload separation   + Applications   + Functional (It support finance)   + Business unit   + Geographic region |
| What are management groups? | * Containers that manage access, policy, and compliance across multiple subscriptions * There is a single top-level management group call the root management group   + Global policies and role assignments can be applied to the AD (directory) level   + Cannot be deleted * There can be 10000 management groups in a single Azure AD * A management group tree can have up to 6 levels of depth * Each management group and subscription can only support one parent * Each management group can have many children * All subscriptions and management groups are within a single hierarchy in each directory * Auditing   + Events that happen to a management group will be in the Azure Activity log |
| What are management groups used for? | * They help organize, manage access, policies and compliance for many subscriptions * A management group can have many/multiple subscriptions * All subscriptions within a single management group must trust the same azure active directory tenant |
| What is the Azure Resource Manager? | * Deployment and management service * **You use ARM to modify management groups, subscriptions, resource groups and resources** |
| What is the Azure Resource Manager used for? | * Enables the users to create, update, and delete resources in an Azure account |
| What are the benefits of using Azure Resource Manager? | * Manage infrastructure through declarative templates and not scripts * Deploy, manage and monitor resources as a group * Redeploy a solution with consistency * Define dependencies * Apply access control to all services with Azure role-based access control * Apply tags to resources * Look at billing by using tags |
| Describe core resources available in Azure | |
| What are Virtual Machines? | * Software emulations of physical computers * Uses:   + For testing and deployment   + To create applications in the cloud   + Can connect to local datacenter resources with a VM   + Can be used during Disaster Recovery: Runs applications until the primary datacenter is operational * Gives the flexibility of virtualization without needing to deal with the hardware * VMs provide IaaS * Availability:   + **To get 99.95% VM SLA, there must be two VMs inside of an availability set** * Charging   + Hourly price for the VMs used   + Based on the OS and the VM size   + Storage is separate * VM Limits:   + There can only be 20 VMs per region per subscription |
| What are Virtual Machine Scale Sets | * A group of identical load-balanced VMs * Allows for automatic scaling of applications from 1 VM to multiple VMs * Allows you to centrally manage, configure and update many VMs |
| What is Azure Batch | * Large-scale parallel and high-performance computing batch jobs * What it does:   + Creates a pool of compute VMs   + Installs applications and staging data   + Runs jobs with as many tasks are required   + Identifies failures   + Requeues work   + Automatically scales down as the jobs are completed |
| What are Azure App Services used for? | * Quickly building, deploying, and scaling enterprise grade web, mobile, and API apps running on any platform * App Services is a PaaS * Used for:   + Web apps   + API jobs   + Webjobs   + Mobile apps * Charging   + Pay for the compute resources the app uses   + App service plan determines how much hardware is devoted a host   + Pay as you go |
| What are the benefits of using Azure App Services? | * Supports ASP.NET, Java, Ruby, Node.js, PHP, or Python * Manages the production environment automatically * Containerizes the deployment environment with Docker * Allows for continuous deployment * Automatic scaling |
| What are Azure Container Instances (ACI)? | * Containers are a virtualization environment that contains the application and its dependencies * Offers a fast and simple way to run a container in Azure without managing any VMs or other services * ACI is PaaS |
| What are Azure Container Instances used for? | * Used for   + Launching new containers that are automatically configure and scaled   + Ability to provide access to containers over the internet   + Specify the number of CPU cores and memory required for container instances   + Defined groups that organize multiple containers that share the same host |
| What is Azure Kubernetes Service (AKS)? | * An orchestration service for containers with distributed architectures and a large volume of containers * Charging   + Kubernetes is free to use   + Only pay for the nodes used |
| What is Azure Virtual Desktop? | * Desktop and application virtualization services that runs on the cloud * Allows users to use a cloud-hosted version of Windows from any location |
| What is Azure Virtual Desktop used for? | * Set up a multi-session Windows 11 or Windows 10 deployment that delivers a full Windows experience with scalability * Present Microsoft 365 Apps for enterprise and optimize it to run in multi-user virtual scenarios * Provide Windows 7 virtual desktops with free Extended Security Updates * Bring your existing Remote Desktop Services (RDS) and Windows Server desktops and apps to any computer * Virtualize both desktops and apps * Manage desktops and apps from different Windows and Windows Server operating systems with a unified management experience |
| What is Azure Service Fabric? | * A distributed systems platform for packaging, deploying, and managing microservices and containers * Can be used for stateful and stateless microservices |
| What are Virtual Networks? | * Enables Azure resources to communicate with each other, local on-premises devices, and with users over the internet * Provides:   + Isolation and segmentation     - Create multiple isolate virtual networks   + Internet communications   + Communicate between Azure resources   + Communicate with on-premises resources     - Point-to-site virtual private networks     - Site-to-site     - Azure Express Route: dedicated private connectivity to Azure, does not travel over the internet   + Route network traffic     - Route tables: define rules about how traffic should be directed     - Border gateway protocol: propagate on-premises BGP routes to Azure virtual networks   + Filter network traffic     - Network Security Groups: Inbound and outbound security rules to allow or block network traffic     - Network virtual appliances: used to carry out a network function like a firewall or WAN optimization   + Connect virtual networks     - Peering: Linking virtual networks together     - UDR (user defined routes): control over network traffic flow |
| What is Azure DNS? | * A hosting services for DNS domains * Provides DNS services with Azure infrastructure * It can be used with private domains within a network |
| What is Azure Load Balancer? | * Evenly distributing load (incoming network traffic) across a group of backend resources or servers * Layer 4 of the OSI model * Public Load Balancer: provideds outbound connections for VMs inside a virtual network * Private Load Balancer: Private IPs are needed at the frontend only, load balance traffic inside a virtual network |
| What is Azure Application Gateway? | * Web traffic load balancer to manage traffic to web applications * Layer 4 of the OSI model (transport) * Routing decision based on the attributes of an HTTP request such as URI path or host headers * SLA:   + 99.95% auto-scale and zone redundancy ON |
| What is Azure Front Door? | * A Content Delivery Network (CDN) * Delivers content using a global edge network of POPs |
| What is Virtual WAN? | * Azure Virtual WAN is a networking service that brings many networking, security, and routing functionalities together to provide a single operational interface. |
| What is Azure Traffic Manager? | * DNS based traffic load balancer * Distribute traffic optimally to services across global Azure regions |
| What is a VPN Gateway? | * A type of virtual network gateway * They are deployed in a dedicated subnet * There are multiple types of VPN gateways:   + Policy based gateways: Evaluates every data packet against sets of IP addresses to choose the tunnel where that packet is going to be sent through   + Route-based gateways: IPSec tunnels are modeled as a network interface or virtual tunnel interface * Required Azure Resources for Deploying a VPN gateway:   + Virtual network   + Gateway subnet   + Public IP   + Local network gateway   + Virtual network gateway   + Connection resource * Require on-premises resource:   + A VPN device   + A public facing Ipv4 Address |
| What is a VPN Gateway used for? | * Used to:   + Connect on-premises datacenters to virtual networks through site-to-site   + Connect individual devices to virtual networks through point-to-site   + Connect virtual networks to virtual networks with network-to-network |
| What is Virtual Network peering? | * Seamlessly connect two or more virtual networks in Azure * Traffic between VMs is routed through MS’s private network only * Types of peering:   + Virtual network peering: connect virtual networks within the same Azure region   + Global network peering: connect virtual networks across Azure regions |
| What are the benefits of using Virtual Network peering? | * Low-latency, high-bandwidth connection between resources in different virtual networks * Resources in one virtual network to communicate with resources in a different virtual network * Ability to transfer data between virtual networks across Azure subscriptions, Active Directory tenants, deployment models and regions. * Peer virtual networks create through the resource manager * No downtime to resources in either virtual networks when creating the peering or after the peering in created |
| What is ExpressRoute? | * Extends on-premises networks into Microsoft cloud |
| What are the benefits of using ExpressRoute? | * Layer 3 Connectivity   + Allows for Layer 3 (network) connectivity between on-site to Azure * Built in Redundancy   + There are redundant devices so all connects are high available * There is direct access to MSOffice, MSDynamics, compute services, VMs, and cloud services |
| What is Container (Blob) Storage? | * Object storage solution * Store massive amounts of data * Unstructured data * Stored in containers for organization |
| What are the benefits of using Container (Blob) Storage?  Diagram of hierarchy of a storage account. | * Can be used for:   + Serving images or documents to a browser   + Storing files for distributed access   + Streaming video and audio   + Storing data for backup and restore, disaster recover, and archiving   + Storing data for analysis by an on-premises or Azure-hosted service   + Storing up to 8tb of data for virtual machines |
| What is Disk Storage? | * Provides disks for Azure virtual machines * Allows data to be persistently stored and access from an attached virtual hard disk * IaaS disks and 0% fail rate |
| What are the benefits of using Disk Storage? | * There are different tiering offerings with different types of storage mediums |
| What is File Storage? | * Managed file shares in the cloud that is accessed via SMB and NFS |
| What is File Storage used for? | * Used as a file sharing service * Easy migration of applications * Store configuration files on a file share and access them from multiple VMs * Write data to a file share and process/analyze the data later |
| What are the benefits of using File Storage? | * Can be accessed from ANYWHERE in the world without the need for a VPN * A customizable URL to the file can be used * Shared Access Signature Tokens allow access to a file for a specified amount of time |
| What is Azure Queue Storage? | * Service for storing large numbers of messages * Can be up to 64 kb in size |
| What is Azure Table Storage? | * Stores non-relational structured data, structured no-SQL data * A key-attribute store * Used to store flexible datasets |
| What is Azure Data Box/ Azure Databox Heavy? | * Databox: Lets the user send terabytes of data into and out of Azure   + Best used for sizes larger and 40TBs   + Used for: initial migration of data, periodic uploads, and initial bulk transfer * Data Box Heavy: Send 100+ TBs of data |
| What is Azure Archive Storage? | * Offline tier for storing rarely used data (Cold storage) * Used for long term storage, secondary backup, archives, raw data, and compliance data |
| What is Azure Data Lake Storage? | * A type of blob * Used for Big Data Analytics |
| What are storage tiers? | * Sets the type of tier to store the data |
| What are storage tiers used for? | * There are three tiers:   + Hot tier: Optimized for storing data that is accessed/modified frequently   + Cool tier: Storing data that is infrequently access/modified, stored for a minimum of 30 days   + Archive tier: Rarely accessed, minimum 180 days |
| What are the benefits of using storage tiers? | * Allows the user to save money on data storage depending on the use case |
| What is the Cosmos DB? | * Globally distributed, multimodel database service * Fast data access * No-SQL database for modern app development |
| What is the Cosmos DB used for? | * Automatic management, updates, and patching of databases * Automatic scaling |
| What are the benefits of using Cosmos DB? | * 99.99% SLA * Guaranteed speed regardless of database size * Simplified application development * 99.999% Available * Fully managed and cost effective |
| What is the Azure SQL Database? | * Relational database on MS SQL Server * PaaS database engine * Handles upgrading, pathcing, backups, and monitoring * 99.99% availibility |
| What is the Azure SQL Database used for? | * Used to build data-driven applications and websites without needing to manage infrastructure |
| What are the benefits of using Azure SQL Database? | * Scalable performance and pools * Serverless compute   + Scales automatically to workload demand   + Bills for the amount of compute used per second * Elastic pools, compute is for a pool of databases and not for a single database |
| What is the Azure Database for MySQL? | * Relational database for MySQL * 99.99% Available |
| What is the Azure Database for MySQL used for? | * Used for deploying MySQL databases |
| What are the benefits of using Azure Database for MySQL? | * Built-in high availability with no additional cost. * Predictable performance and inclusive, pay-as-you-go pricing. * Scale as needed, within seconds. * Ability to protect sensitive data at-rest and in-motion. * Automatic backups. * Enterprise-grade security and compliance. |
| What is the Azure Database for PostgreSQL? | * Relational database in the cloud for PostgreSQL |
| What is the Azure Database for PostgreSQL used for? | * Single Server or Hyperscale options   + Built-in high availability with no additional cost (99.99 percent SLA).   + Predictable performance and inclusive, pay-as-you-go pricing.   + Vertical scale as needed, within seconds.   + Monitoring and alerting to assess your server.   + Enterprise-grade security and compliance.   + Ability to protect sensitive data at-rest and in-motion.   + Automatic backups and point-in-time-restore for up to 35 days. * Hyperscale:   + Horizontally scales queries across multiple machines using sharding |
| What is SQL Server on VMs? | * Use SQL server on the cloud running on virtual machines * Simplifies licensing costs with pay as you go |
| What is Azure Database Migration Service? | * Fully managed service for seamless migrations from multiple database source to Azure data platforms |
| What is Azure Cache for Redis? | * In-memory data store based on Redis software |
| What is the Azure SQL Managed Instance? | * Scalable cloud data service * PaaS database engine * 99.99% Uptime |
| What is the Azure SQL Managed Instance used for? | * Migrating on-site server to the cloud using database migration service |
| What is the Azure Marketplace? | * An online store that contains software applications from 3rd party companies |
| **Domain 3: Describe Core Solutions and Management Tools of Azure (10 - 15%)**  <https://docs.microsoft.com/en-us/learn/paths/az-900-describe-core-solutions-management-tools-azure/> | |
| Describe core solutions available in Azure | |
| What is the Internet of Things (IoT) Hub? | * A managed service that acts as a central message hub for communication between IoT application and remote devices * Messaging patterns:   + Device-to-cloud   + Uploading files from devices   + Request-reply methods (to control devices) * Scales to millions of connected devices |
| What is the IoT Central? | * An addition of IoT hub that contains a dashboard for connecting, monitoring, and managing IoT devices   + UI can be used to control devices remotely   + Device templates: control devices without needing to code * Used to quickly connect devices, monitor device conditions, create rules, and manage devices * aPaaS; Application platform as a service |
| What is IoT Edge? | * Processes cloud analytics and logic to the end-devices * Used for:   + Quick responses   + Reduce bandwidth costs |
| What is Windows 10 IoT Core Services? | * Version of Windows 10 that is optimized for small devices without a display and on ARM chips/x86/x64 devices |
| What is the Azure Sphere? | * Creates an end-to-end secure IoT solution * Uses a proprietary micro-controller for processing the signals and OS for the attached sensors * Uses a proprietary Linux OS for communications * Uses a security service to ensure the device is not compromised |
| What is Azure Synapse Analytics? | * Analytics service for big data systems * Brings together SQL technologies and Spark technologies, Data explorer and pipelines for data integration * Is a consumption based model, slowly overcoming HDInsight |
| What is HDInsight? | * Managed, full spectrum, open-source analytics service in the cloud * Makes it easy, fast, and cost effective to process massive amounts of data in a customizable environment * Benefits:   + Cloud native: enables you to create optimized clusters for Hadoop   + Low-cost and scalable   + Secure and compliant   + Monitoring   + Global availability   + Productivity   + Extensibility * Use cases:   + Batch processing: data is extracted from heterogeneous data sources   + Data warehousing: Interactive queries at petabyte scales over structured or unstructured data   + IoT: Process streaming data in real time from different devices   + Data Science: build applications that extract critical insights from data   + Hybrid: extend existing on-premises to Azure |
| What is Azure Databricks? | * Data analytics platform * Databricks SQL: Platform for analysts who want to run SQL queries and create visualization * Databricks Data Science & Engineering: Read data from multiple data sources and turn it into breakthrough insights using Spark * Databricks Machine Learning: Environment for experiment tracking, model training, feature development and management and feature and model serving |
| What is Data Lake Analytics? | * On demand analytics job services that simplifies big data * Can handle jobs of any scale through dynamic scaling |
| What is Azure Machine Learning? | * Platform for making predictions * Tools/Services for training and testing models * Use cases:   + Create a process that defines how to obtain data, handle data, and splitting the data   + Train/evaluate models   + Create pipelines that define where and when to run compute-intensive experiments   + Deploy best-performing algorithm as an API to an endpoint |
| What is Cognitive Services? | * Prebuilt machine learning models that applications can use * Used for general problems:   + Text for emotional sentiment   + Analyzing images * Available as SDKs, REST APIs, and UIs |
| What is Azure Bot Service? | * Create virtual agents that understand and reply to questions * Can be simple or sophisticated |
| What is serverless computing? | * Cloud provider allocates machine resources on demand; the users do not configure or manage the hardware, and only use the hardware. |
| What are Azure Functions? | * Only used for running code without worrying about the hardware behind it * Scales automatically based on demand * Uses:   + When demand is variable   + Building a web API   + Process file uploads   + Build a serverless workflow   + Respond to database changes   + Run scheduled tasks   + Create reliable message queue systems   + Process data in real time * Only charged for the CPU time used when the function runs. |
| What are Logic Apps? | * Execute workflows that are designed to automate business scenarios from logic blocks * For each trigger, a new instance of the logic app is created * Created as a JSON file |
| What does DevOps mean? | * A set of practices that combines software development and IT operations * Goal is to shorten the development life cycle to provide continuous delivery with high software quality |
| What is Azure DevOps? | * A suite of services that address every stage of the software development lifecycle   + Azure Repos: Centralized source-code repository where code is published for review and collaboration   + Azure Boards: Project management suite   + Azure Pipelines: CI/CD pipeline automation tool   + Azure Artifacts: Repository for hosting artifacts   + Azure Test Plans: Automated test tool used in the CI/CD pipeline * Use cases:   + Implementing CI/CD pipelines to ensure consistent and quality code that is readily available to users * SaaS tool |
| What is GitHub? | * A code hosting platform for version control and collaboration * It is the primary remote of Git |
| What are GitHub Actions? | * Automates software development workflows from GitHub * Create workflows so that you can build, test, package, release, or deploy any project on GitHub |
| What are Azure DevTest Labs? | * Easy creation, utilization, and management of IaaS VMs and PaaS environments in labs * Provides an automated method of managing the process of building, setting up and tearing down of VMs that contain builds of software projects |
| Describe Azure management tools | |
| What is Azure Portal? | * A web-based user interface * Can access every feature of Azure |
| What is Azure Powershell? | * A shell that can execute commands called cmdlets * Call the Azure REST API to perform every possible management test in Azure * On Windows, Linux, Mac, and on the browser through Azure Cloud Shell |
| What is Azure CLI? | * Executable program which can execute commands in Bash * Call the REST API to perform every possible management task in Azure * It is the same as Powershell, just a different type of syntax |
| What is Cloud Shell? | * An interactive, authenticated, browser accessible shell for managing Azure resources * Can also edit configuration files |
| What is Azure Mobile App? | * Used to:   + Monitor the health and status of Azure Resources   + Check for alerts, diagnose and fix issues, restart a web app or VM   + Run the Azure CLI or Powershell commands to manage Azure resources |
| What is Azure Advisor? | * Evaluates Azure Resources * Used to:   + Make recommendations to improve reliability, security, performance, achieve operational excellence, and reduce costs   + Reliability: Used to ensure and improve the continuity of your business-critical applications.   + Security: Used to detect threats and vulnerabilities that might lead to security breaches.   + Performance: Used to improve the speed of your applications.   + Cost: Used to optimize and reduce your overall Azure spending.   + Operational Excellence: Used to help you achieve process and workflow efficiency, resource manageability, and deployment best practices. * Available in the Azure portal and the API |
| What is Azure Monitor?  Diagram of the relationship between logging and metric data sources, and how that data is consumed in Azure Monitor. | * Platform for collecting, analyzing, visualizing, and taking action based on the metric and logging data from the entire Azure and on-site environment * Uses sources of logging and metric data to trigger events |
| What is Azure Service Health? | * A personalized view of the health of the Azure services, regions, and resources you rely on * Used to monitor:   + Service issues: such as outages   + Planned maintenance   + Health advisories: such as breaking changes and service retirements |
| **Domain 4: Describe General Security and Network Security Features (10 - 15%)**  <https://docs.microsoft.com/en-us/learn/paths/az-900-describe-general-security-network-security-features/> | |
| Describe Azure security features | |
| What are the basic features of the Azure Security Center? **AZURE SECURITY CENTER HAS BEEN RENAMED TO MICROSOFT DEFENDER FOR CLOUD** | * A monitoring service that provides visibility of security posture across all services   + Monitor security settings across on-premises and cloud workloads   + Automatically apply required security settings to new resources   + Provide security recommendations   + Continuously monitor resources and perform automatic security assessments to find vulnerabilities   + Use ML to detect and clock malware from being install on VMs/other resources   + Detect and analyze potential inbound attacks   + Provide just-in-time access control for network ports |
| What is policy compliance? | * The policy that cloud systems must be compliant with the standards of the cloud user’s company |
| What is security? | * Hardening tasks to improve posture |
| What are alerts? | * Notifications that appear when defender detects threats to resources and workloads |
| What is a secure score? | * A measurement of the security posture * Based on security controls (groups of related security recommendations) * A higher score fulfills more recommendations |
| What is resource hygiene? | * Health of resources from a security perspective |
| What is the difference between Azure Security Center and Azure Advisor? | * Defender protects resources while Advisor recommends different measures for hardening as well as configuration controls * Defender is specific to security; security is a feature of Advisor |
| What is the Azure Key Vault? | * A centralized cloud service for storing an application’s secrets in a single, central location * Capabilities:   + Manage secrets (passwords, certificates, API keys, etc)   + Manage encryption keys   + Manage SSL/TLS certificates * Benefits:   + Centralized application secrets   + Securely stored secrets and keys   + Access monitoring and access control   + Simplified administration of application secrets   + Integration with other Azure services |
| What is the Azure Sentinel? | * Security information and event management (SIEM) system * Capabilities:   + Collect cloud data   + Detect previously undetected threats   + Investigate threats with AI   + Respond to incidents rapidly |
| Defender for the Cloud Vs. Sentinel | * Sentinel is the overall health/security across all Azure services, Defender is the specific response to different security issues |
| What are Azure Dedicated Hosts? | * Dedicated physical servers to host Azure VMs * Benefits:   + Visibility info and control over server infrastructure running Azure VMs   + Helps address compliance requirements   + Choose the number of processors, server capabilities, VM series, and VM sizes |
| Describe Azure network security | |
| What is defense in depth?  A diagram showing each layer of defense in depth. From the center, these layers are: data, application, compute, network, perimeter, identity and access, and physical security. | * Object of defense in depth: to protect information and prevent it from being stolen * Uses a series of mechanisms to slow the advance of an attack * Layers of defense in depth:   + Physical security: first line of defense to protect hardware in the datacenter   + Identity and access layer: controls access to infrastructure; SSO, and MFA; Audit events and changes   + Perimeter: DDoS protection; perimeter firewalls   + Network: Limits communication between resources through segmentation and access controls; Restrict inbound internet access; Secure connectivity to on-premises networks   + Compute: Secures access to VMs; Implement endpo9int protection on devices and keep systems patched and current   + Application: Ensure that applications are secure and free of security vulnerabilities   + Data: Controls access to business and customer data |
| What are Network Security Groups (NSGs)? | * Filters network traffic to and from Azure resources within an Azure virtual network * NSG rules:   + Name   + Priority   + Source/Destination   + Protocol: TCP; UDP; any   + Direction   + Port Range   + Action: Allow or Deny |
| What is the Azure Firewall? | * Managed, cloud based network security service that helps protect resources in Azure virtual networks * It is a stateful firewall; analyzes the complete context of a network connection * A central location to create, enforce, and log application and network connectivity policies |
| What is the Azure DDoS protection? | * Helps protect Azure resources from DDoS attacks * Identifies attacker’s attempt to overwhelm the network and blocks further traffic from them * Helps ensure that network load is not from attackers but from actual user load * Service Tiers:   + Basic: Automatically enable for free   + Standard: Protection policies are tuned through dedicated traffic monitoring and ML algorithms; can protect against: volumetric attacks, protocol attacks; application layer attacks |
| What is Azure Information Protection? | * Is a cloud based solution that enables organizations to discover, classify and protect documents and emails by applying labels to content |
| What is an Application Gateway? | * A Web traffic load balancer that managers traffic to a web application * Makes decision based on HTTP requests |
| What is Advanced Threat Protection (ATP)? **ATP has been renamed to Microsoft Defender for Identity** | * Uses Active Directory Signals to identify, detect, and investigate threats, compromised identities, and malicious insider actions |
| What is Microsoft Security Development Lifecycle (SDL)? | * A security assurance process that is focus on software development * Use” to reduce the number and severity of vulnerabilities in software |
| **Domain 5: Describe Identity, Governance, Privacy, and Compliance Features (15 - 20%)**  <https://docs.microsoft.com/en-us/learn/paths/az-900-describe-identity-governance-privacy-compliance-features/> | |
| Describe core Azure identity services | |
| What is authentication? | * The process of establishing the identity of a person or service that wants to access a resource * Makes sure the user is who they say they are |
| What is authorization? | * The process of establishing the level of access an authenticated person or service has |
| What is the difference between authentication and authorization? | * Authentication proves the identity * Authorization defines what kinds of applications, resources, and data that a user can access |
| What is the Azure Active Directory? | * Identify services that enable users to sign in and access Microsoft cloud applications and 3rd party cloud applications * Who uses Azure AD:   + IT Admins, App Devs, Users to manage identities, etc * Capabilities:   + Authentication: verifying identity to access resources   + Single sign-on: A single identity for multiple logins   + Application management: Manage cloud and on-premises apps by using Azure AD   + Device management: Supports the registration of devices, device based conditional access policies |
| What is Conditional Access? | * A tool that allows or denies access to resources based on identity signals * Based on: who the user is, where the user is, and what device the user is requesting access from * Uses:   + Require multifactor authentication to access and application   + Require access to services only through approved client applications   + Require users to access the application only from managed devices   + Block access from untrusted sources (unexpected locations) |
| What is Multifactor Authentication (MFA)? | * A process where a user is prompted during sign-in for additional form of identification * i.e. Finger prints, texts, etc. |
| What is Single Sign-On (SSO)? | * Allows a user to sign in one time and use that credential to access multiple resources and applications from different providers |
| Describe Azure governance features | |
| What is Role-Based Access Control (RBAC)? | * Only granting users the rights they need to perform their job, and only to the relevant resources * When to use RBAC:   + To grant specific privileges to certain users   + Allow some users to manage resources   + Allow an application access to resources * RBACs can be applied to a management group, a single subscription, a resource group, or a single resource * Azure RBAC follows an “allow” model |
| What are resource locks? | * Prevents resources from being accidentally deleted or changed * A warning system that reminds you that a resource should not be deleted or changed * Types of Locks:   + CanNotDelete: authorized users can read and modify a source, but they can’t delete the resource without first removing the lock   + ReadOnly: authorized people can read a resource, but they can’t delete or change the resource * Can be used with Azure Blueprints, so that if a lock is removed by accident, it will automatically be replaced by Blueprints |
| What are tags? | * Provide extra information (metadata) about the resource * Metadata is useful for:   + Resource management: locate/act on resource for a specific purpose   + Cost management and optimization: Group resources so that costs can be forecasted and properly divided   + Operations management: Allow you to group resources according to how critical their availability is to the business. Used to formulate SLA   + Security: Classify data by security level   + Governance and regulatory compliance: identify resources that align with governance or regulatory compliance requirements   + Workload optimization and automation: visualize all of the resource that participate in complex deployments |
| What is Azure Policy? | * Creates, assigns, and manages policies that control/audit resources * Policies will enforce different rules across of the resource configurations, so it is compliant with the required standards * Uses:   + Define individual policies and groups of policies (initiatives)   + Then evaluates resources and highlights resources that aren’t compliant   + Can also prevent non-compliant resources from being created * Creating a policy:   + Create a policy definition:     - What to evaluate and what action to take   + Assign the definitions to resources     - Implements the policy definitions     - A policy assignment is a policy definition that takes place within a specific scope   + Review the evaluation results     - Each condition is matched against resources     - Each resource is marked as compliant or noncompliant |
| What are Azure Blueprints? | * Instead of configuring a policy for each subscription a blueprint can be used to define a **repeatable set of governance tools** * Capabilities:   + Role assignments   + Policy assignments   + Azure Resource Manager templates   + Resource groups * To implement:   + Create the blueprint     - Each component in a blueprint is an artifact   + Assign the blueprint   + Track the blueprint assignments |
| What is the Cloud Adoption Framework for Azure?  A flow diagram showing the Cloud Adoption Framework stages define strategy, plan, ready, adopt, and govern and manage. | * Helps create and implement the business and technology strategies needed to succeed in the cloud * Stages:   + Define the strategy     - Define and document motivations     - Meet with stakeholders and leadership     - Document business outcomes     - Evaluate financial considerations     - Understand technical considerations   + Make a plan     - Create and inventory of existing digital assets     - Ensure that the right people are involved     - Build a plan that helps users build the skills they need to operate in the cloud     - Build a comprehensive plan   + Prepare the organization     - Azure setup guide     - Azure landing zone     - Expand the landing zone     - Follow best practices   + Adopt the cloud     - Migrate: Migrate the first workload, migration scenarios; best practices; process improvements     - Innovate: verify investments add value; azure innovation guide to accelerate development; best practices; feedback loops   + Govern and manage your cloud environments     - Govern: methodology; benchmark; initial governance foundation; improve the initial governance foundation     - Manage: establish a management baseline; define business commitments; expand the management baseline; advanced operations and design principles |
| Describe privacy and compliance resources | |
| What is Security? | * A set of policies, controls, procedures, and technologies that work together to protect cloud based systems, data, and infrastructure |
| What is the Microsoft Privacy Statement? | * Explains what personal data Microsoft collects, how it is used, and for what purposes * Covers all of Microsoft’s services, websites, apps, software, servers, and devices |
| What are the Online Services Terms (OST)? | * A legal agreement between Microsoft and the customer * Details obligations by both parties with respect to the processing and security of customer data and personal data * Applies specifically to online services |
| What is the Data Protection Addendum (DPA)? | * Further defines the data processing and security terms for online services   + Compliance with laws   + Disclosure of processed data   + Data security   + Data transfer, retention, and deletion |
| What is the Trust Center? | * Showcases the principles for maintaining data integrity in the cloud and how MS implements and supports security, privacy, compliance and transparency in all MS cloud products and services |
| What is the Azure compliance documentation? Examples? | * Provides you with detailed documentation about legal and regulatory standards and compliance on Azure |
| **Domain 6: Describe Azure Cost Management and Service Level Agreements (10 - 15%)**  <https://docs.microsoft.com/en-us/learn/paths/az-900-describe-azure-cost-management-service-level-agreements/> | |
| Describe methods for planning and managing costs | |
| What can impact costs? | * Resource type: i.e. amount of storage, compute etc * Usage meters: The usage of the resource * Resource usage: The usage of storage * Azure subscription type: different types of subscriptions have different usage allowances * Azure marketplace: different 3rd party applications purchased from vendors * Location: Different regions have different associate prices * Network traffic: some inbound transfers are free, all outbound transfers are priced based on the zone |
| What can help reduce costs? | * Use Azure Advisor to monitor usage: identifies unused and underutilized resources * Use spending limits * Use Azure Reservations to prepare; reserving services and resources by paying in advance * Choose low-cost regions/locations * Keep up to date with different offers * Apply tags to identify cost owners * Resize underutilized virtual machines * Deallocate virtual machines during off hours * Delete unused resources * Migrate from IaaS to PaaS |
| What is the pricing calculator? | * Total Cost of Ownership (TCO) Calculator: helps to estimate the cost savings of operation a solution on Azure over time compared to an on-premises data center |
| What is Azure cost management? | * A free service that helps understand the Azure bill, manage the account and subscriptions, monitor and control azure spending, and optimize resource use * Includes Reporting, data enrichment, budgets, alerting, and recommendations |
| Support plans | <https://azure.microsoft.com/en-us/support/plans/> |
| What is Azure Hybrid Benefit? | * Repurposes software licenses on Azure to save money on licensing costs |
| Describe Azure Service Level Agreements (SLAs) and service life cycles | |
| What is a service level agreement? | * A formal agreement between a service company and the customer * Defines the performance standards that Microsoft commits to the customer * Free services:   + Do not have an SLA * Azure statue provides a global view to see if there is an Azure outage |
| What are Service credits? | * Service Credits are the amount of fees that are credited back when the SLA is “breached” |
| What is a service lifecycle? | * Defines how every Azure service is released for public use |