MICROSOFT AZURE FUNDAMENTALS

Elysium Academy Spark Notes

VERSION 2.7

01. . Introduction to Cloud Computing

What is Cloud Computing?

Cloud computing is the delivery of various services (e.g., servers, storage, databases, networking, software, and more) over the internet, often referred to as "the cloud." Cloud computing enables businesses to rent services, scale on demand, and avoid the cost and complexity of owning and maintaining physical infrastructure.

- **Benefits of Cloud Computing:**

  - **Cost Savings:** Pay for what you use, without investing in physical data centers.
  - **Scalability: Scale resources up or down as per demand.**
  - **High Availability:** Cloud services offer redundancy across global regions.

  - **Disaster Recovery:** Built-in disaster recovery solutions with backups across regions.
  - **Global Reach: Access resources from anywhere, anytime.**
  - **Security:** Built-in security features with compliance for industry standards.

- **Types of Cloud Computing Models:**

  - **Infrastructure as a Service (IaaS):** Provides virtualized computing resources over the internet (e.g., Azure VMs).
  - **Platform as a Service (PaaS):** Allows developers to build and deploy applications without worrying about infrastructure (e.g., Azure App Services).
  - **Software as a Service (SaaS):** Offers applications on the internet (e.g., Microsoft 365).

- **Types of Cloud Deployment Models:**

  - **Public Cloud:** Services are delivered over the public internet, and shared by multiple organizations.
  - **Private Cloud:** Services are maintained on a private network, offering more control and security.
  - **Hybrid Cloud:** Combines public and private clouds, allowing for more flexibility and options for deployment.

02. Core Azure Architectural Components

- **Azure Regions:**

  An Azure Region is a set of data centers deployed within a latency-defined perimeter and connected through a dedicated regional low-latency network. Each Azure region offers different services, and you should choose a region close to your users for better performance.

- **Availability Zones:**

  Availability Zones are physically separate locations within an Azure region. Each zone is made up of one or more data centers equipped with independent power, cooling, and networking. They protect your applications and data from datacenter failures.

- **Resource Groups:**

  Resource Groups are logical containers for Azure resources. All resources in an Azure Resource Group share the same lifecycle, permissions, and policies. They allow you to organize and manage resources more easily.

- **Azure Resource Manager (ARM):**

  The Azure Resource Manager (ARM) is the deployment and management service for Azure. It provides a management layer that enables you to create, update, and delete resources in your Azure account.

- **Subscriptions and Management Groups:**

  - **Subscriptions:** An Azure subscription is a logical container used to provision resources in Azure. It holds information like resource access, policies, and billing.
  - **Management Groups:** Management groups help you manage access, policy, and compliance for multiple subscriptions.

03. Azure Compute Services

- ## Virtual Machines (VMs):

Azure Virtual Machines (VMs) provide on-demand computing resources that can run Windows, Linux, or other operating systems. VMs are an example of IaaS, giving you full control over the OS, storage, and network configurations.

- ## Azure App Services:

Azure App Services is a fully managed platform for building and hosting web applications, RESTful APIs, and mobile backends. It supports various programming languages like .NET, Java, PHP, Node.js, and Python.

- ## Azure Kubernetes Service (AKS):

Azure Kubernetes Service (AKS) simplifies the deployment, management, and operations of Kubernetes. AKS reduces the complexity and operational overhead of managing Kubernetes by offloading much of that responsibility to Azure.

- ## Azure Functions:

Azure Functions is a serverless compute service that allows you to run small pieces of code without worrying about the underlying infrastructure. Functions can be triggered by HTTP requests, timers, or Azure services.

- ## Azure Logic Apps:

Azure Logic Apps provides a way to automate workflows and integrate various systems and services across different platforms using a no-code approach. It enables integration between Azure services, on-premises systems, and third-party services.

- ## Azure Container Instances:

Azure Container Instances (ACI) is a serverless, cost-effective solution to run containers on Azure without managing the underlying infrastructure. You can launch Docker containers without the need to provision VMs.

04. Azure Storage Services

- **Azure Blob Storage:**

Azure Blob Storage is an object storage solution for unstructured data such as images, videos, or large datasets. It is highly scalable and provides three access tiers: Hot, Cool, and Archive.

- **Azure Files:**

Azure Files allows you to create managed file shares that can be accessed by SMB or NFS protocols. It can be used as a cloud-based file system for sharing files across applications.

- **Azure Disk Storage:**

Azure Disk Storage provides high-performance storage for Azure VMs. Disks can be either HDD or SSD, and can be attached to VMs as either managed or unmanaged disks.

- **Azure Queue Storage:**

Azure Queue Storage provides a message queue service for storing large numbers of messages that can be processed asynchronously. It is often used to build decoupled and distributed systems.

- **Azure Table Storage:**

Azure Table Storage is a NoSQL key-value storage service used for storing structured data, providing a flexible schema-less design. It is ideal for storing non-relational data.

- **Storage Tiers (Hot, Cool, Archive):**
  - **Hot Tier:** Frequently accessed data.
  - **Cool Tier:** Infrequently accessed data, but available immediately.
  - **Archive Tier:** Rarely accessed data with longer retrieval times.

05. Networking Services in Azure

- **Azure Virtual Network (VNet):**

Azure Virtual Network (VNet) allows you to create isolated, private networks for your Azure resources. VNets can be connected to other VNets or on-premises networks through VPNs or ExpressRoute.

- ## Azure VPN Gateway:

Azure VPN Gateway provides secure site-to-site or point-to-site connections to your VNet using IPsec/IKE protocols.

- ## Azure Load Balancer:

Azure Load Balancer distributes incoming network traffic across multiple servers to ensure high availability and reliability of your applications.

- ## Azure Application Gateway:

Azure Application Gateway is a web traffic load balancer that includes routing, SSL offloading, and application firewall capabilities.

- ## Azure DNS:

Azure DNS is a hosting service for DNS domains that provides name resolution using Azure's infrastructure.

- ## Azure Traffic Manager:

Azure Traffic Manager is a DNS-based traffic load balancer that allows you to distribute traffic to different Azure regions or endpoints based on various routing policies.

- ## Network Security Groups (NSGs):

Network Security Groups (NSGs) are used to filter network traffic to and from Azure resources based on security rules. NSGs allow you to control inbound and outbound traffic at the subnet or NIC level.

06. Azure Identity, Access, and Security

- ## Azure Active Directory (Azure AD):

Azure Active Directory (Azure AD) is Microsoft's cloud-based identity and access management service. It allows employees to sign in and access resources such as Microsoft 365, the Azure portal, and external applications.

- ## Multi-Factor Authentication (MFA):

Azure Multi-Factor Authentication (MFA) provides an extra layer of security by requiring two or more verification methods during sign-in (e.g., password + phone app or SMS).

- ### Azure AD Identity Protection:

Azure AD Identity Protection is a tool that helps prevent identity-based attacks by detecting and responding to suspicious activity related to user accounts.

- ### Role-Based Access Control (RBAC):

Azure Role-Based Access Control (RBAC) allows fine-grained access management to Azure resources by assigning roles to users, groups, and applications. It ensures the principle of least privilege.

- ### Azure Security Center:

Azure Security Center is a unified security management system that provides advanced threat protection across hybrid cloud workloads. It helps in assessing vulnerabilities and ensuring compliance with security policies.

- ### Azure Key Vault:

Azure Key Vault is a cloud service for securely storing and managing keys, secrets, and certificates. It is commonly used for encryption keys, passwords, and API keys.

07. Azure Database Services

- ### Azure SQL Database:

Azure SQL Database is a fully managed relational database service built on SQL Server. It offers high availability, scalability, and automated backups.

- ### Azure Cosmos DB:

Azure Cosmos DB is a globally distributed, multi-model database service that supports document, key-value, graph, and column-family data models.

- ### Azure Database for MySQL:

Azure Database for MySQL provides a fully managed MySQL database service with high availability, scaling, and security.

- ## Azure Database for PostgreSQL:

Azure Database for PostgreSQL is a managed PostgreSQL database service with features such as automatic backups, scaling, and security.

- ## Azure SQL Managed Instance:

Azure SQL Managed Instance is a fully managed SQL Server instance that offers near 100% compatibility with the SQL Server on-premises version, while being hosted in the cloud.

- ## Data Migration Services:

Azure Database Migration Service (DMS) is a fully managed service designed to help you migrate databases to Azure from on-premises environments with minimal downtime.

08. Monitoring and Analytics in Azure

- ## Azure Monitor:

Azure Monitor provides a full stack of monitoring and telemetry solutions for collecting, analyzing, and acting on data from your Azure environment.

- ## Azure Log Analytics:

Azure Log Analytics is a feature of Azure Monitor that helps you collect and analyze log data from Azure resources.

- ## Azure Application Insights:

Azure Application Insights is an application performance management (APM) service for monitoring live applications, allowing you to detect performance anomalies and diagnose issues.

- ## Azure Service Health:

Azure Service Health provides personalized guidance and notifications about the health of Azure services and resources.

- ## Azure Advisor:

Azure Advisor is a personalized cloud consultant that provides best practices and recommendations to optimize your Azure environment, improve performance, security, and reduce costs.

09.Azure AI and Machine Learning Services

- **Azure Cognitive Services:**

Azure Cognitive Services provides APIs that allow developers to add intelligent features such as vision, speech, language understanding, and decision-making to their applications.

- **Azure Machine Learning:**

Azure Machine Learning is a service for building, training, and deploying machine learning models on the cloud.

- **Azure Bot Services:**

Azure Bot Services allows you to build, connect, and deploy bots across various platforms, including websites, mobile apps, and messaging apps.

10.Azure DevOps and Automation

- **Azure DevOps:**

Azure DevOps provides tools for planning, developing, delivering, and monitoring software in an efficient and automated manner. It includes services like Pipelines, Repos, Boards, Test Plans, and Artifacts.

- **Azure Pipelines:**

Azure Pipelines is a CI/CD service that allows you to build, test, and deploy applications automatically.

- **Azure Repos:**

Azure Repos provides version control for your code using Git or Team Foundation Version Control (TFVC).

- **Azure Boards:**

Azure Boards is an agile planning tool that provides work tracking with Kanban boards, backlogs, and dashboards.

- **Azure Automation:**

Azure Automation is a service that helps you automate the management of your Azure environment using workflows, runbooks, and configuration management.

- **Azure Blueprints:**

Azure Blueprints allows you to define a repeatable set of Azure resources, policies, and role assignments, ensuring compliance and standardized environments.

11.Cost Management and Service-Level Agreements (SLAs)

- **Azure Pricing Calculator:**

Azure Pricing Calculator allows you to estimate costs based on your specific Azure services and usage.

- **Azure Cost Management:**

Azure Cost Management helps you track and optimize your cloud spending by providing insights into costs, budgets, and recommendations for saving.

- **SLAs and Service Lifecycles:**

Azure services come with defined Service-Level Agreements (SLAs) that guarantee uptime and performance. SLAs provide guidance on availability, and you should design your applications to meet SLA requirements.

12.Governance, Privacy, and Compliance

- **Azure Policy:**

Azure Policy helps you enforce organizational standards and assess compliance across Azure environments. Policies can be applied to ensure resources follow required conditions.

- **Azure Blueprints:**

Azure Blueprints lets you define and deploy reusable templates that include resources, policies, and role assignments for consistent environments.

- **Compliance Offerings:**

Azure supports a wide range of compliance certifications, including ISO 27001, HIPAA, and GDPR, to help organizations meet regulatory requirements.

- **Azure Trust Center:**

The Azure Trust Center provides information about Azure's security, privacy, compliance, and transparency to help customers make informed decisions.

- **GDPR and Data Residency:**

Azure ensures compliance with the General Data Protection Regulation (GDPR), and provides features that allow organizations to control where their data resides and how it is accessed.

13. Conclusion

This Elysium Spark Note provides a comprehensive overview of key Azure concepts and services that are essential for mastering Microsoft Azure Fundamentals (AZ-900). From understanding cloud computing models and Azure architecture to diving into specific services like Azure VMs, databases, and security features, this guide helps you grasp the fundamentals of Azure.

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