**Azure fundamental assignment 3**

1. *What is Azure App Service and when to opt for Azure App Service?*

Azure App Service is an HTTP-based service for hosting web applications, REST APIs, and mobile back ends. You can develop in your favourite language, be it .NET, .NET Core, Java, Ruby, Node.js, PHP, or Python. Applications run and scale with ease on both Windows and Linux-based environments.

App Service not only adds the power of Microsoft Azure to your application, such as security, load balancing, autoscaling, and automated management. You can also take advantage of its DevOps capabilities, such as continuous deployment from Azure DevOps, GitHub, Docker Hub, and other sources, package management, staging environments, custom domain, and TLS/SSL certificates.

With App Service, you pay for the Azure compute resources you use. The compute resources you use are determined by the App Service plan that you run your apps on.

Azure app service can be used where below features is required:

* Multiple languages and frameworks - App Service has first-class support for ASP.NET, ASP.NET Core, Java, Ruby, Node.js, PHP, or Python
* Managed production environment - App Service automatically patches and maintains the OS and language frameworks for you. Spend time writing great apps and let Azure worry about the platform.
* Containerization and Docker - Dockerize your app and host a custom Windows or Linux container in App Service. Run multi-container apps with Docker Compose. Migrate your Docker skills directly to App Service.
* DevOps optimization - Set up continuous integration and deployment with Azure DevOps, GitHub, BitBucket, Docker Hub, or Azure Container Registry. Promote updates through test and staging environments.
* Global scale with high availability - Scale up or out manually or automatically. Host your apps anywhere in Microsoft's global datacenter infrastructure, and the App Service SLA promises high availability.
* Connections to SaaS platforms and on-premises data - Choose from more than 50 connectors for enterprise systems (such as SAP), SaaS services (such as Salesforce), and internet services (such as Facebook). Access on-premises data using Hybrid Connections and Azure Virtual Networks.
* Security and compliance - App Service is ISO, SOC, and PCI compliant. Authenticate users with Azure Active Directory, Google, Facebook, Twitter, or Microsoft account. Create IP address restrictions and manage service identities.
* Application templates - Choose from an extensive list of application templates in the Azure Marketplace, such as WordPress, Joomla, and Drupal.
* Visual Studio and Visual Studio Code integration - Dedicated tools in Visual Studio and Visual Studio Code streamline the work of creating, deploying, and debugging.
* Serverless code - Run a code snippet or script on-demand without having to explicitly provision or manage infrastructure and pay only for the compute time your code uses.

1. *Differentiate Azure Container Instances and Azure Kubernetes Service*

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| **Azure Container Instances (ACI)** | **Azure Kubernetes Service (AKS)** |
| Azure Container Instances (ACI) offers an easy way to run containers in the Azure cloud, eliminating the need to manage virtual machines (VMs) or using more complex container orchestration services. | Azure Kubernetes Service (AKS) simplifies the deployment of managed Kubernetes in Azure. |
| ACI is based on a serverless model (like the comparable AWS service, Amazon Fargate). It starts containers in the Azure cloud in seconds. It is ideal for simple container-based workloads like smaller-scale apps, build jobs, and task automation. | AKS handles most of the complexity and operational tasks related to managing Kubernetes—including tasks like health monitoring, upgrades, and networking. AKS manages Kubernetes master nodes, while customers manage and maintain agent nodes. |
| While ACI does not require the use of Kubernetes or other orchestrators, it does support them, and can be used together with plain Kubernetes or Azure Kubernetes Service. | AKS is a free managed service. Customers are only required to pay for agent nodes used by the clusters. There is no need to pay for any of the masters, which are configured and deployed by AKS. |
| ACI bills you for the time each container group runs. Container groups represent a certain number of vCPUs and memory resources that can be used by one or more containers. | AKS manages your hosted Kubernetes environment at no cost, and only bills for VMs that run your worker nodes, as well as storage and networking resources used by your clusters. The costs will be the same as running the same VMs without AKS. To estimate costs, you need to determine the type of VMs you will run in your clusters, the number of nodes needed and the duration they will run. |
| ACI scales using container groups—a collection of containers running on the same host. Containers in a container group share lifecycles, resources, local networks, and storage volumes. This is like a Kubernetes pod. | AKS leverages the scaling capabilities within Kubernetes. You can scale your AKS pods manually or use horizontal pod autoscaling (HPA) to automatically scale and adjust the number of pods in your deployment based on CPU utilization or other selected metrics. |
| ACI offers access to Azure Virtual Networks, which provide private and secure networking for Azure resources as well as on-premises workloads. | AKS lets you enjoy all the security features of native Kubernetes, with Azure capabilities like network security groups and orchestrated cluster upgrades. |

1. *What is the Azure function? Explain in brief.*

Azure function is a serverless concept of cloud native design that allows a piece of code deployed and execute without any need of server infrastructure, web server, or any configurations. Azure functions can be written in multiple languages such as C#, Java, JavaScript, TypeScript, and Python.

Azure functions are scalable. When demand of execution increases, more resources are allocated automatically to the service and when requests fall, all extra resources and application instances drop off automatically. Azure functions service is a lightweight and serverless compute service that has its own use. You can’t replace a large website with Azure functions. Azure functions are best suited for smaller apps have events that can work independently of other websites. Some of the common azure functions are sending emails, starting backup, order processing, task scheduling such as database clean-up, sending notifications, messages, and IoT data processing.

Here are some of the use cases of Azure functions -

* Scheduled Tasks
* Reminders and Notifications
* Lightweight Web API

Azure functions have the following benefits

* Azure functions app is lightweight and requires very less resources to deploy and execute.
* Azure functions app us serverless and does not require any Web server setup in cloud.
* Azure functions app is compute-on-demand and doesn’t consume resources when not running.
* Azure functions app charges are pay per use, and you don’t pay anything if not using.
* Azure functions app is event driven and executes only when event is fired.
* Azure functions app is independent of other apps and does not affect or interfere with other apps.
* Azure functions app is easy to write and deploy.
* Azure functions app is easy to maintain and support.
* Azure functions app is industry standard and developed and consumed using industry standard language and technologies.

1. *What is Azure Virtual Desktop?*

Azure Virtual Desktop is a full desktop that runs on a remote server. A flexible cloud virtual desktop infrastructure (VDI) platform that securely delivers virtual desktops and remote apps with maximum control. This enables you to securely access work applications and data from wherever you are and on any device. It expands the possibilities beyond the physical desktop screen in the office.

Azure Virtual Desktop is a desktop-as-a-service (DaaS) offering that allows customers to run virtual app and desktop services from the Azure public cloud. Admins deploy the solution through the Azure portal and can leverage Azure Active Directory and a host of operating system options to deliver resources to users. As a DaaS solution, Azure Virtual Desktop goes beyond just virtual desktop infrastructure (VDI) by providing a turnkey offering with Azure virtual machines, templates, cloud services, and more to handle a wide variety of use cases.

1. *What is Azure virtual networking? Explain in detail.*

Azure Virtual Network (VNet) is the fundamental building block for your private network in Azure. VNet enables many types of Azure resources, such as Azure Virtual Machines (VM), to securely communicate with each other, the internet, and on-premises networks.

Some of the major advantages of using Microsoft Azure VNet are as follows:

* It provides an isolated environment for your applications
* A subnet in a VNet can access the public internet by default
* We can easily direct traffic from resources
* It is a highly secure network
* It has high network connectivity
* It builds sophisticated network topologies in a simple manner

The components of Azure Networking are as below-

* 1. Subnets
  2. Routing
  3. Network Security Groups

**Subnets**

* Subnets let users segment the virtual network into one or more sub-networks.
* These sub-networks can be separated logically, and each subnet consists of a server.
* We can further divide a subnet into two types:
  1. Private
  2. Public
* Private - Instances can access the Internet with NAT (Network Address Translation) gateway that is present in the public subnet.
* Public - Instances can directly access the internet

**Routing**

* It delivers the data by choosing a suitable path from source to destination.
* For each subnet, the virtual network automatically routes traffic and creates a routing table.

**Network Security Groups**

* It is a firewall that protects the virtual machine by limiting network traffic.
* It restricts inbound and outbound network traffic depending upon the destination IP addresses, port, and protocol.

1. *Explain Azure VPN gateway.*

Azure VPN Gateway is a cloud-based network gateway that enables in connecting on-premises networks with Azure using site-to-site VPNs. Azure VPN Gateway provides secure connectivity by using industry standard protocols, IPsec, and IKE to secure the connection. To build the connection, Azure requires using its preferred gateway devices vendors for establishing a site-to-site connection. It can also be used to establish connection between virtual networks i.e., VNet to VNet. and it provides two different types of gateways:

**Static Routing** – Delivers policy-based VPN connectivity and routing

**Dynamic Routing** – Provides route-based VPN connectivity and routing

Azure VPN Gateway enables organization to -

* Create a site-to-site VPN connection between on premises IT Infrastructure or from any location with Azure hosted resources
* Create secure VPN connections with on premises and Azure
* Connect on premises servers with virtual machines, SQL Azure or other Azure Cloud resources.