

TECHNOLOGY



Container Orchestration Using Kubernetes

Azure Kubernetes Service



A Day in the Life of a DevOps Engineer

You are working as a DevOps engineer in an organization and have been asked to design a solution to deploy MySQL using the Azure dynamic storage class. You need to check the storage classes provided by the Azure Kubernetes Service (AKS) for deploying the MySQL pods with Azure disks as persistent volumes.

Once the pods are deployed, you need to verify the Pod logs to ensure the MySQL is running without any issues.

To achieve all the above, along with some additional concepts, we will be learning a few concepts in this lesson that will help you find a solution for the above scenario.



Learning Objectives

By the end of this lesson, you will be able to:

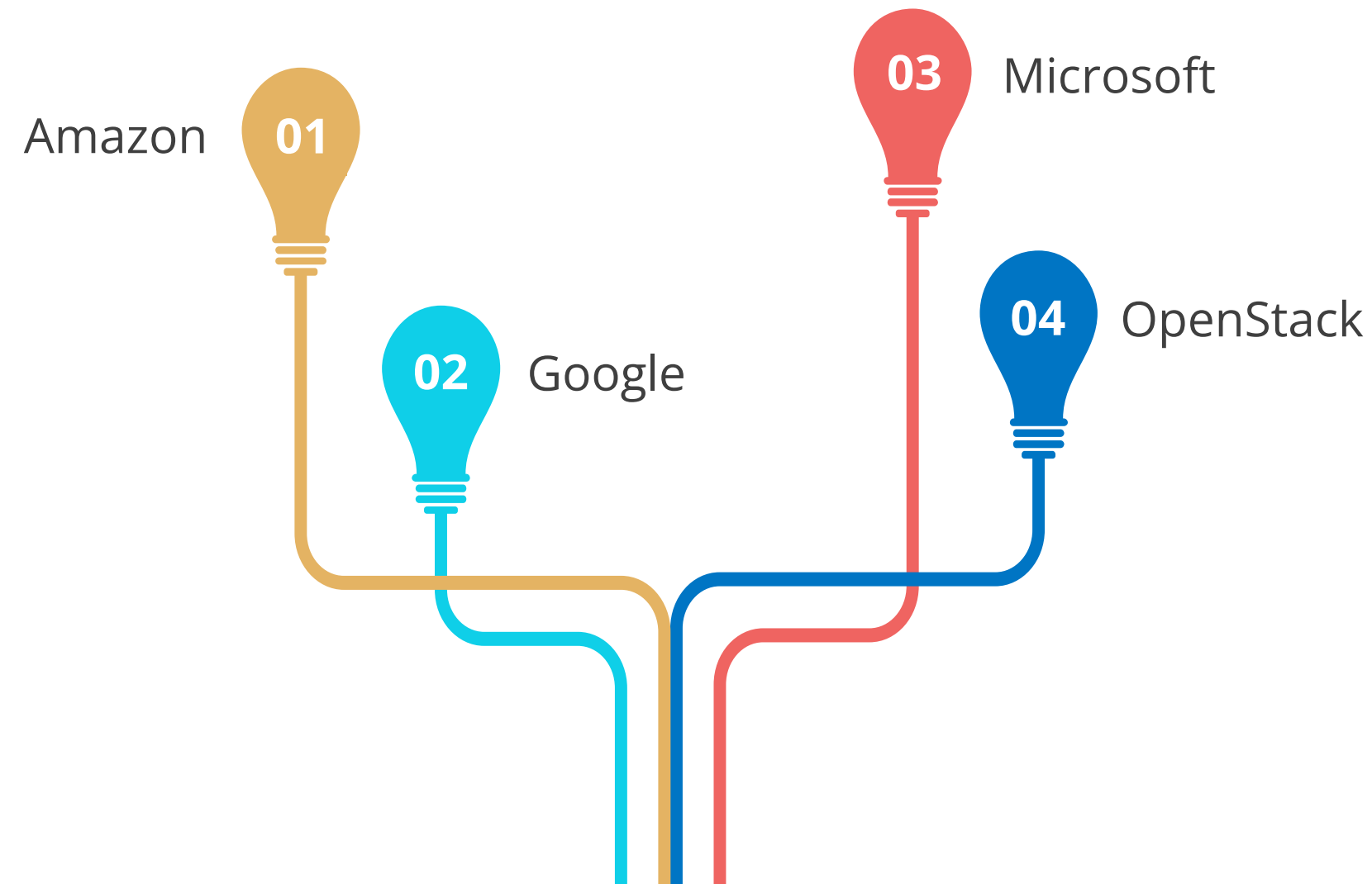
- Create a Kubernetes cluster using AKS to streamline the deployment, management, and scaling of containerized applications
- Deploy Kubernetes workloads in an AKS cluster to manage and distribute containerized applications across cloud infrastructure
- Demonstrate the process of updating the deployment image in Kubernetes for effective image version management
- Demonstrate persistent storage creation on the AKS cluster



Kubernetes in Cloud Environment

Kubernetes in Cloud Environment

Most cloud service providers have integrated Kubernetes as a part of the platform for their clients.
Some of the most important and influential providers are:



Kubernetes as a Service



Kubernetes as a Service (KaaS) assists users in migrating to cloud-native enabled Kubernetes-based platforms and managing the lifetime of K8s clusters.

Kubernetes as a Service (KaaS)

KaaS provides customizable solutions based on an organization's existing requirements and data center scale while keeping budget restrictions in mind. Some of the advantages of KaaS are:

- 1 Security
- 2 Saving in investment for resources
- 3 Scaling of infrastructure



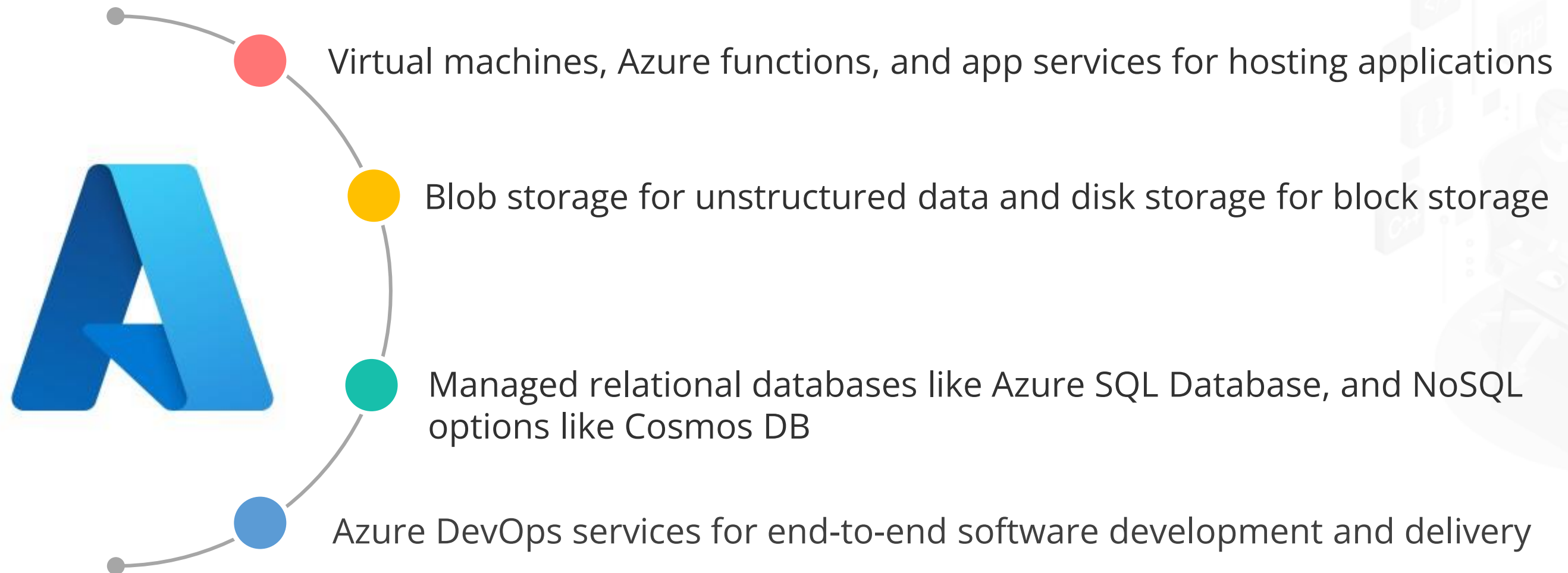
Azure Cloud Platform



- Azure is a cloud computing service created by Microsoft for building, testing, deploying, and managing applications.
- As part of the cloud solution to clients, Microsoft provides special integration of Kubernetes with the Azure Cloud Platform.

Azure Cloud Platform Services

Azure cloud platform is designed to be flexible, scalable, and secure, offering a wide range of tools and services to meet the needs of businesses and developers. Its key services include:



Azure Kubernetes Service

Azure Kubernetes Service (AKS) manages the hosted Kubernetes environment and makes it easy to deploy and manage containerized applications in Azure.

1

The AKS environment is enabled with features such as automated updates, self-healing, and easy scaling.

2

Azure handles vital tasks including health monitoring and maintenance.

3

Azure manages Kubernetes master nodes.

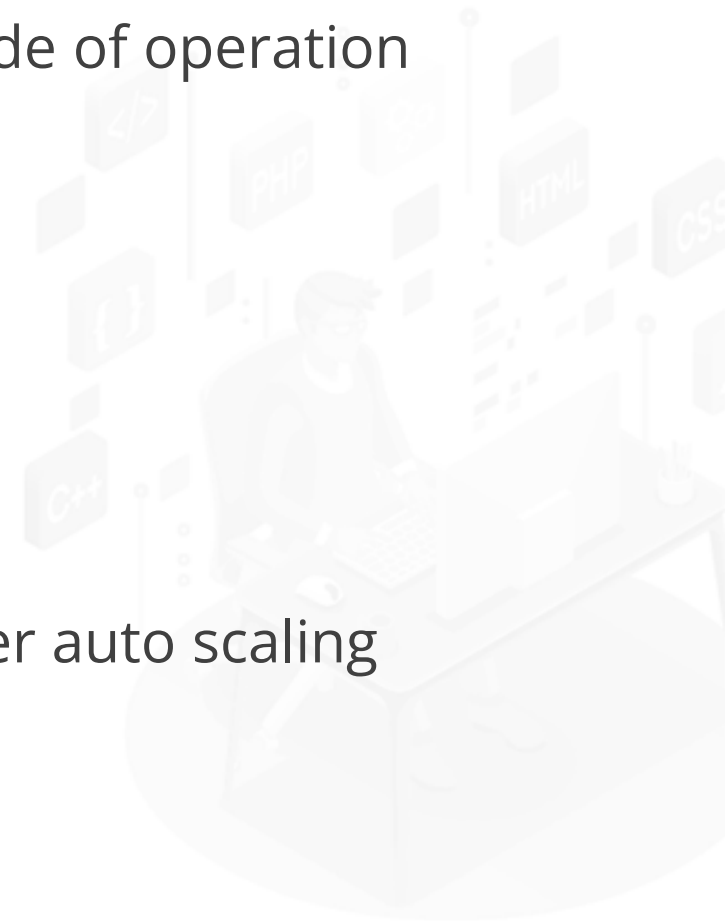
Key Features of Kubernetes on Azure

Enhanced workload and network security

Automated mode of operation

High performance Kubernetes applications

Pod and cluster auto scaling



Azure Container Registry

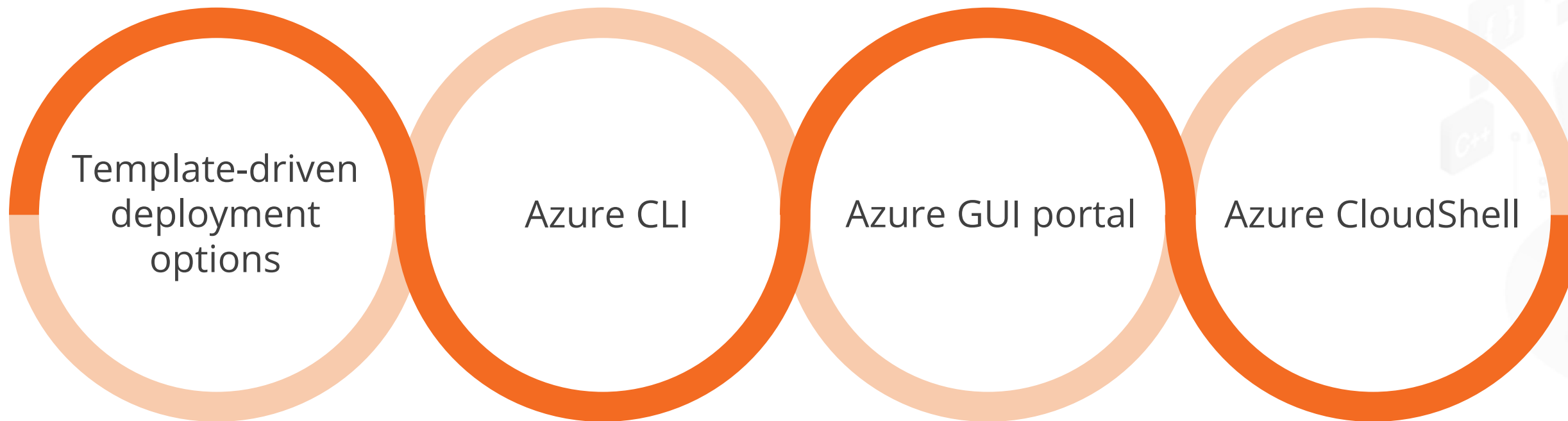
Azure Container Registry is a private registry service that allows users to create, store, and manage container images and related artifacts.



Users can utilize the Azure portal to build an Azure container registry instance and then use Docker commands to push or pull a container image.

AKS Components

AKS provides the following components that help in managing the Kubernetes instance on the Azure instance:



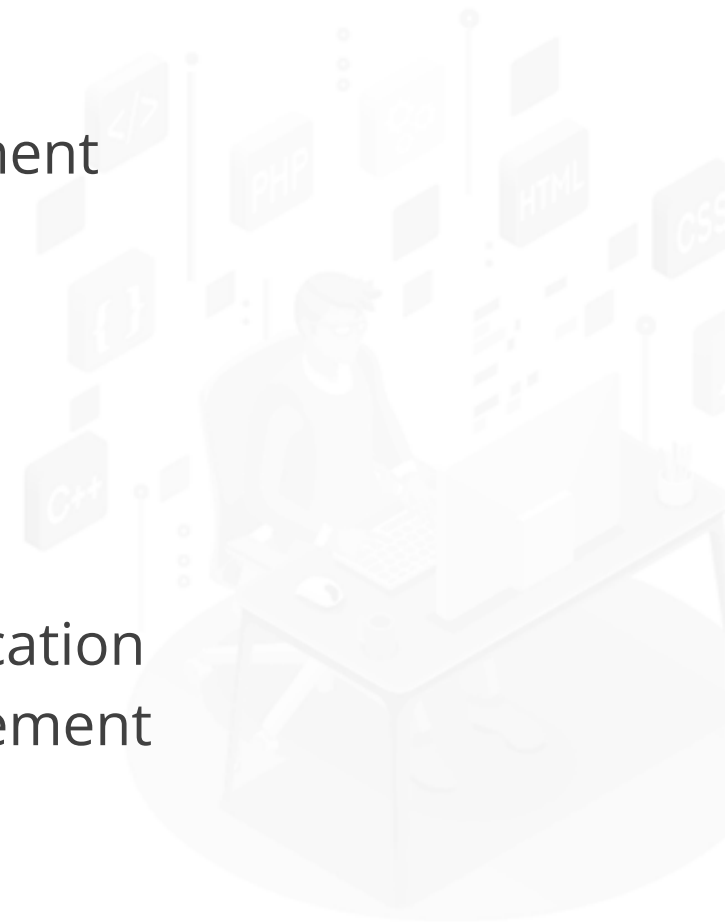
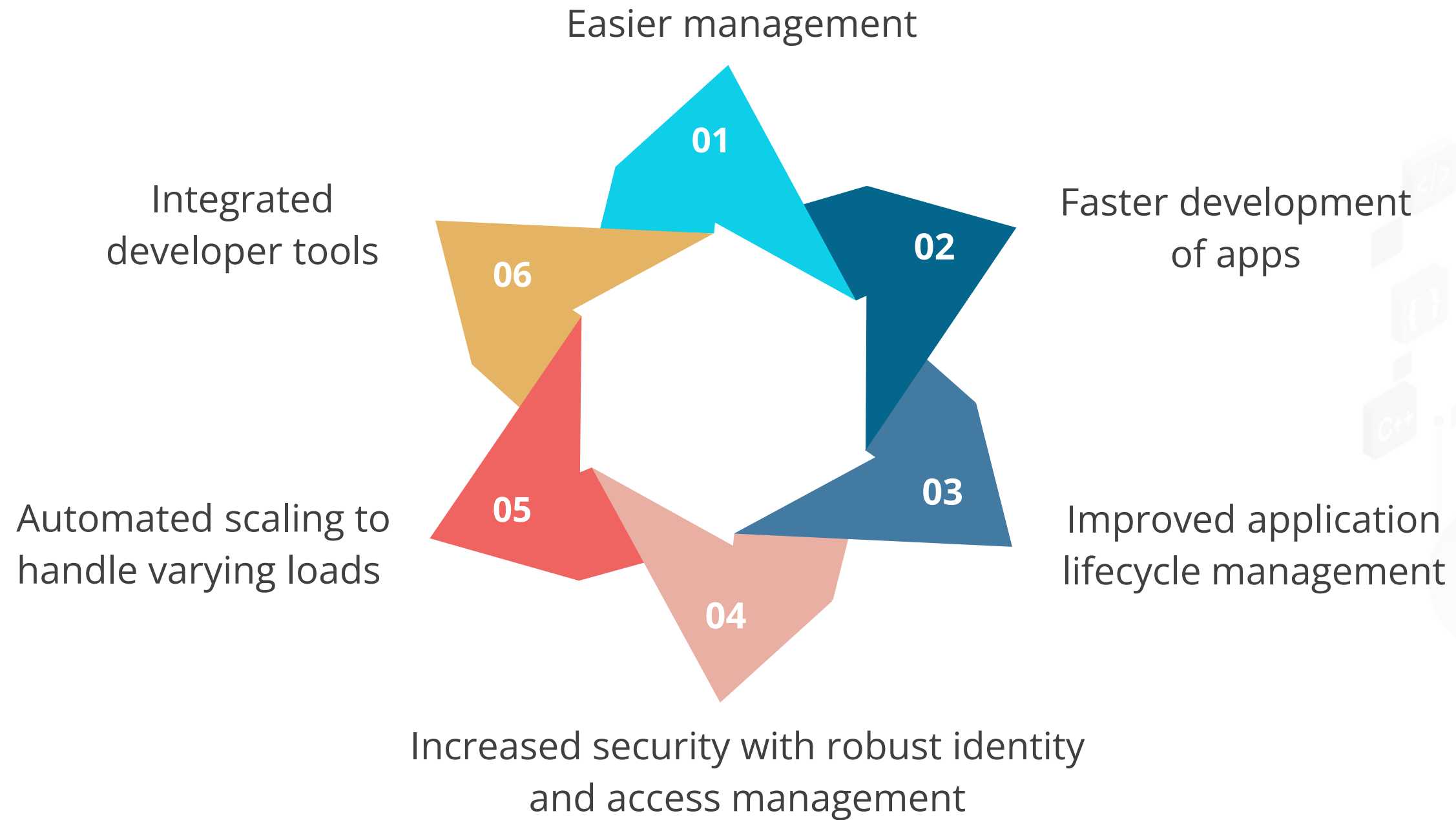
Cloud Interoperability

Cloud interoperability refers to a system's capacity to interact and work efficiently across several cloud platforms.



It involves the exchange of data and applications between various cloud environments while ensuring their functionality and compatibility

Benefits of Leveraging AKS



Advantages of AKS over Local Deployment

1

Reduced management overhead for the organization

2

Option for integrating Active Directory services

3

Multiple forms of access to the cluster

4

Automatic configuration of all Kubernetes master nodes

5

Advanced networking features such as HTTP routing

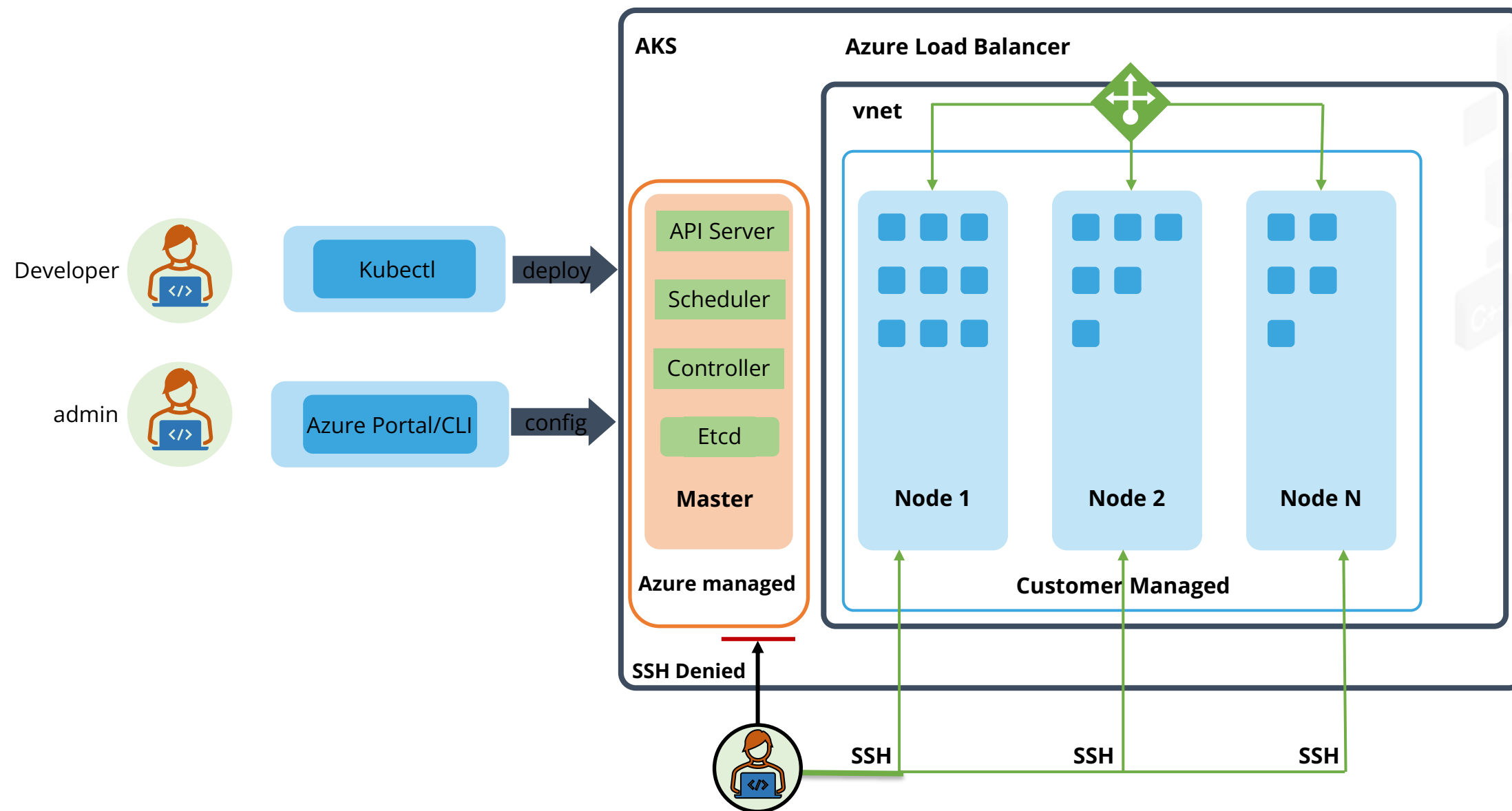
6

Role-based Access Control for increased security

AKS Components

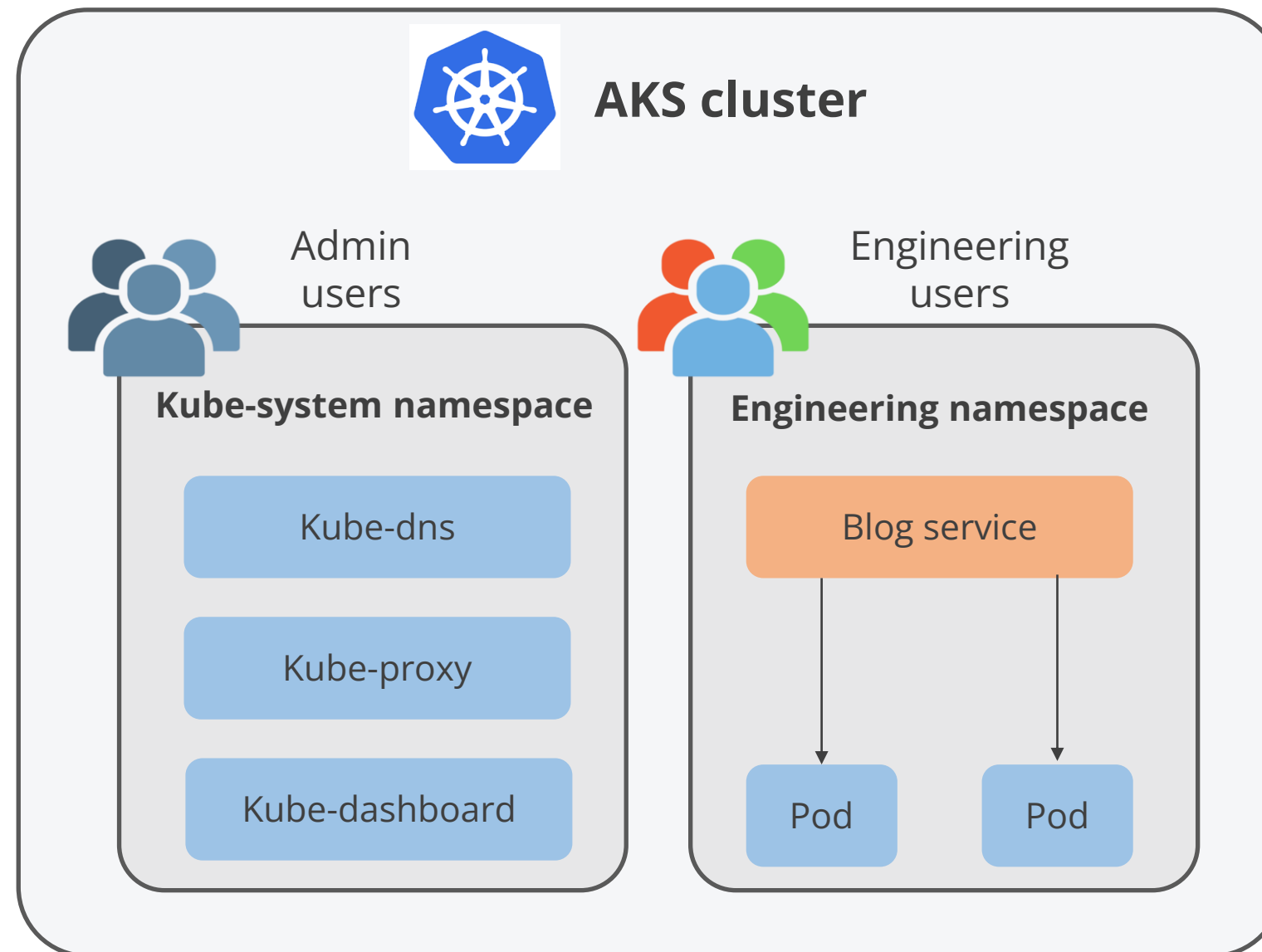
AKS Cluster Creation

Users can either create the cluster in the Azure portal or use the Azure CLI. When users create the cluster, they can use the resource manager templates to automate cluster creation.



Namespaces in AKS

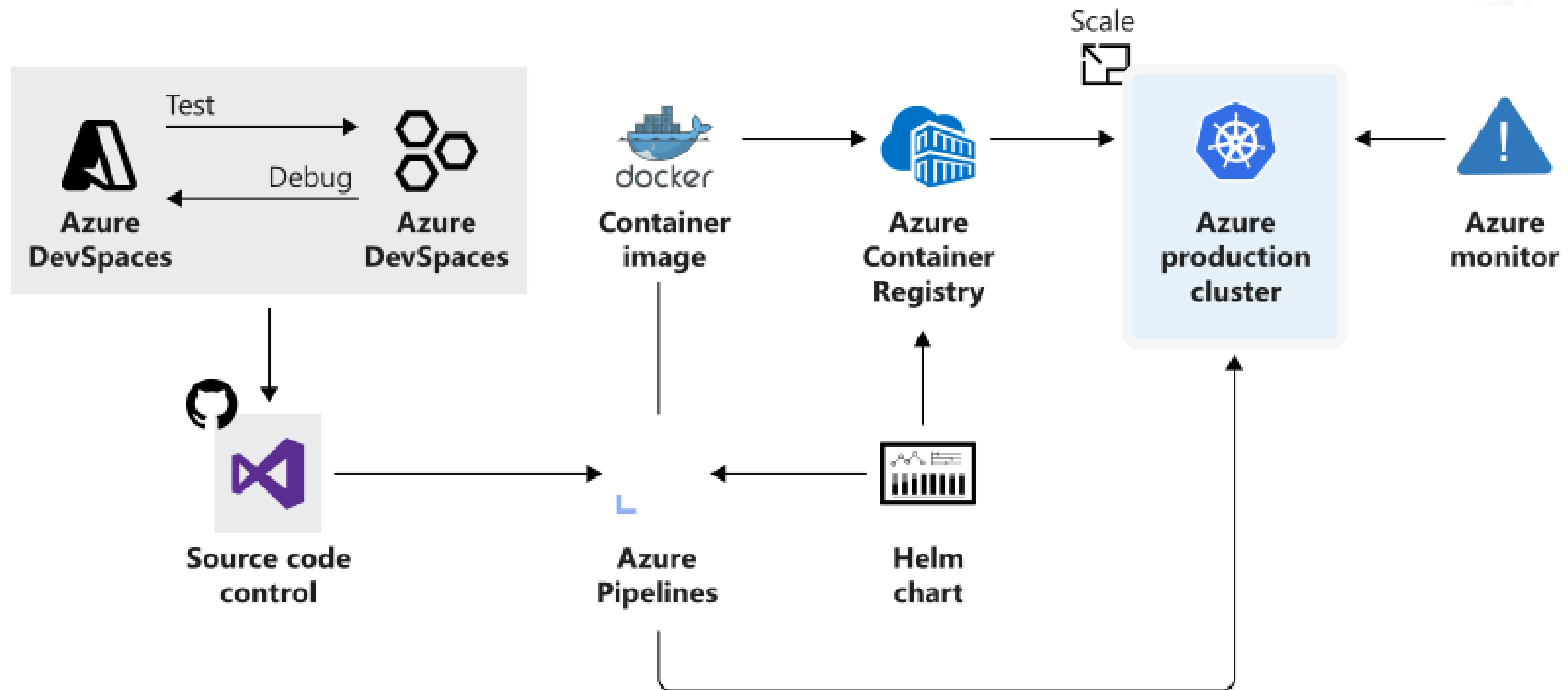
Namespaces in AKS provide a mechanism for partitioning a Kubernetes cluster into multiple virtual clusters.



Kubernetes resources, such as pods and deployments, are logically grouped into a namespace to divide an AKS cluster and restrict create, view, or manage access to resources.

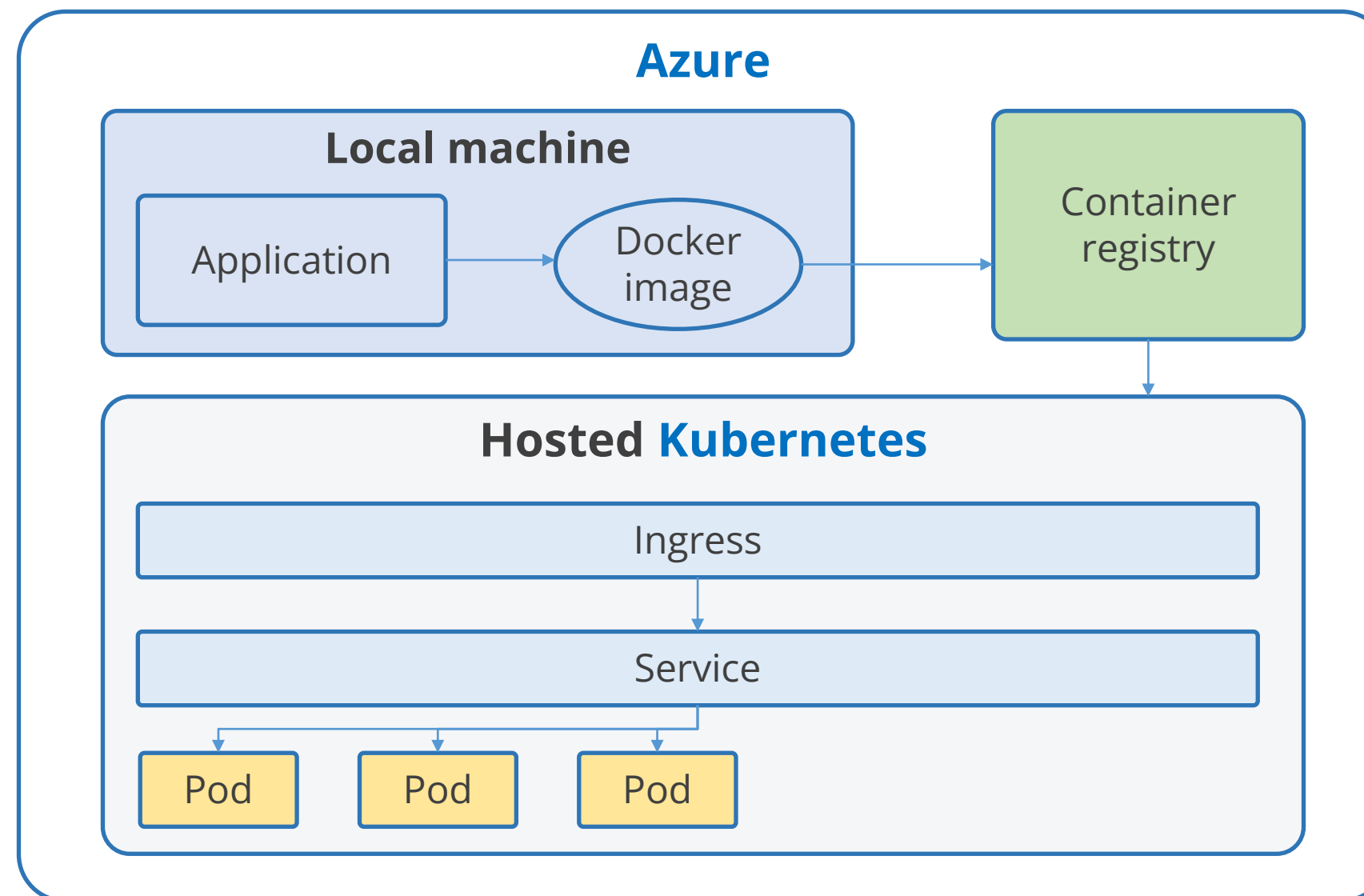
Creating Workloads

AKS supports the Docker image format, which means that the users can create a workload in any development environment, containerize it, and deploy the container as a Kubernetes pod.



Creating and Deploying Pods

The pod creation and deployment in AKS is like the process in the local environment. These pods can then be controlled remotely using the AKS tools.



Storage in AKS Cluster



- To implement a volume in a Kubernetes cluster, users need to define a **PersistentVolumeClaim** for a specific storage class.
- A **storage class** represents the characteristics of the underlying storage, such as performance or support for shared access.
- **PersistentVolumeClaim** includes information about the required **access mode** and **volume size**.
- Azure has storage volume types called **Azure Disk** and **Azure files**.

Creating a Kubernetes Cluster Using AKS



Duration: 15 mins

Problem Statement:

You have been asked to create a Kubernetes cluster using Azure Kubernetes Services (AKS).

ASSISTED PRACTICE

Assisted Practice: Guidelines

Steps to be followed:

1. Set up the prerequisites for configuring an AKS cluster
2. Create a Kubernetes cluster using the AKS service



Creating Namespace and Workloads in an AKS Cluster



Duration: 15 mins

Problem Statement:

You have been asked to create namespaces and workloads such as pods and deployments in an AKS cluster, effectively organizing and managing applications.

ASSISTED PRACTICE

Assisted Practice: Guidelines

Steps to be followed:

1. Create a namespace
2. Create workloads such as pods and deployments



Connecting to an AKS Cluster from Azure Cloud Shell



Duration: 25 mins

Problem Statement:

You have been asked to connect to an AKS cluster from Azure cloud shell to enhance the security and provide a consistent and accessible environment for AKS cluster related tasks.

ASSISTED PRACTICE

Assisted Practice: Guidelines

Steps to be followed:

1. Create a storage account
2. Create a file share for the storage account
3. Set up the Azure Cloud Shell
4. Create a deployment and roll out an update for it



Accessing a Kubernetes Deployment with a Service



Duration: 15 mins

Problem Statement:

You have been asked to understand how to interact with a Kubernetes cluster via Azure Cloud Shell and access a deployed application using a service.

ASSISTED PRACTICE

Assisted Practice: Guidelines

Steps to be followed:

1. Connect Azure Cloud Shell to the Kubernetes cluster
2. Create a deployment as a service



Updating Deployment Image in Kubernetes



Duration: 10 mins

Problem Statement:

You have been asked to update the deployment image in Kubernetes for effective image version management.

ASSISTED PRACTICE

Assisted Practice: Guidelines

Steps to be followed:

1. Create and verify the deployment
2. Scale and verify the deployment
3. Upgrade and verify the image version



Deploying an Application with Load Balancer on AKS



Duration: 15 mins

Problem Statement:

You have been asked to deploy an application with a load balancer on Azure Kubernetes Service (AKS).

ASSISTED PRACTICE

Assisted Practice: Guidelines

Steps to be followed:

1. Deploy the app on AKS with a load balancer



Creating a Persistent Volume



Duration: 15 mins

Problem Statement:

You have been asked to create a persistent volume using Azure disks in Azure Kubernetes Service (AKS).

ASSISTED PRACTICE

Assisted Practice: Guidelines

Steps to be followed:

1. Create a persistent volume claim using AKS bash



Monitoring Clusters and Node Logs



Duration: 10 mins

Problem Statement:

You have been asked to monitor cluster health and inspect node logs in Azure.

ASSISTED PRACTICE

Assisted Practice: Guidelines

Steps to be followed:

1. Monitor cluster health via Azure monitor
2. Inspect the logs of a live pod



Upgrading an AKS Cluster



Duration: 10 mins

Problem Statement:

You have been asked to upgrade an AKS cluster for improved security and performance.

ASSISTED PRACTICE

Assisted Practice: Guidelines

Steps to be followed:

1. Upgrade and verify the AKS cluster



Installing the NGINX Ingress Controller Using Helm



Duration: 10 mins

Problem Statement:

You have been asked to install the NGINX Ingress Controller on a Kubernetes cluster using Helm to manage the installation of the necessary Kubernetes resources.

ASSISTED PRACTICE

Assisted Practice: Guidelines

Steps to be followed:

1. Install the NGINX Ingress controller using Helm
2. Validate the NGINX Ingress controller installation



Key Takeaways

- KaaS assists users in migrating to cloud-native enabled Kubernetes-based platforms and managing the lifetime of K8s clusters.
- Azure Kubernetes Service (AKS) manages the hosted Kubernetes environment and makes it simple to deploy and manage containerized applications in Azure.
- Clusters can be created in the Azure portal or the Azure CLI. When a cluster is created, the Resource Manager uses templates to automate cluster creation.
- Kubernetes resources, such as pods and deployments, are logically grouped into a namespace to divide an AKS cluster and restrict creation, view, or access to resources.



Deploy MySQL Using Azure Dynamic Storage Class

Duration: 25 Min



Project agenda: To implement MySQL deployment using Azure Dynamic Storage in Kubernetes to enhance the scalability and reliability of the database solutions

Description:

You have been asked to set up MySQL using Azure Dynamic Storage in Kubernetes, providing a robust and flexible solution for database management and application scalability in a cloud environment.

Perform the following:

1. Create an Azure Disk for dynamic, persistent volume provisioning
2. Deploy MySQL pods with Azure disks as persistent volumes

TECHNOLOGY

Thank You