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Deploying a Python Application on Azure Kubernetes Service (AKS)

Project Description:

The project focused on deploying a Python-based web application onto an Azure Kubernetes Service (AKS) cluster, enabling cloud-native scalability and accessibility through a browser. The implementation leveraged Azure Cloud Shell for managing resources, ensuring a fully cloud-based workflow without requiring a local CLI setup. The process began by containerizing the Python application using Docker, creating an image that could be stored in Docker hub container registry. Once the container image was available, Kubernetes manifests were prepared, defining the deployment configuration, service exposure, and scaling parameters.

Using Cloud Shell, an AKS cluster was provisioned and configured to run the application. The containerized Python application was deployed onto the cluster by applying the Kubernetes YAML files, which handled replica management and load balancing. To make the application accessible externally, a Kubernetes service of type **Load Balancer** was configured, providing a public IP address that allowed access via a web browser. The project also included monitoring deployed resources and verifying successful application availability through browser-based access. This approach demonstrated the integration of containerization, orchestration, and cloud deployment concepts in a real-world environment.

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- ## Create resource group

Basics Tags Review + create

Automation Link

Basics

Subscription	Azure subscription 1
Resource group name	Thisara-RG
Region	Canada Central

Tags

- ## Create a Kubernetes cluster

Home > Kubernetes services >

Create Kubernetes cluster ...

Kubernetes cluster name * KubeCluster

Region * (Canada) Canada Central

Fleet Manager None

Create new

- ## Create a node pool

Home > Create Kubernetes cluster >

Add a node pool ...

Basics Optional settings

Node pool name * nodepool1

Mode * User

System

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Node pools

In addition to the required primary node pool configured on the Basics tab, you can also add optional node pools to handle a variety of workloads Learn more

Add node pool | Delete

Name	Mode	Node size	OS SKU	Node count	Ava
agentpool	System	Standard_D4ds_v5 (change)	Ubuntu	2 - 5	Nor
nodepool1	User	Standard_D2ps_v6 (change)	Ubuntu	1 - 20	1,2,

- **Deployment complete**

Your deployment is complete

Deployment name: microsoft.aks-1756230306371
Subscription: Azure subscription 1
Resource group: Thisara-RG

Start time: 8/26/2025, 11:07:07 PM
Correlation ID: ead42348-c842-4655-81c1-4ef72695adfb

Deployment details

Next steps

Go to resource

- **Get credentials and get nodes**

```
thisara [ ~ ]$
thisara [ ~ ]$ az aks get-credentials --resource-group Thisara-RG --name Kubecluster1
Merged "Kubecluster1" as current context in /home/thisara/.kube/config
thisara [ ~ ]$
thisara [ ~ ]$
thisara [ ~ ]$ kubectl get nodes
NAME                                STATUS   ROLES    AGE   VERSION
aks-agentpool-84560503-vmss000000   Ready    <none>   16m   v1.32.6
aks-agentpool-84560503-vmss000001   Ready    <none>   16m   v1.32.6
thisara [ ~ ]$
```

- **Create yml file for deployment**

```
thisara [ ~ ]$ nano azure-vote.yml
thisara [ ~ ]$
thisara [ ~ ]$
```

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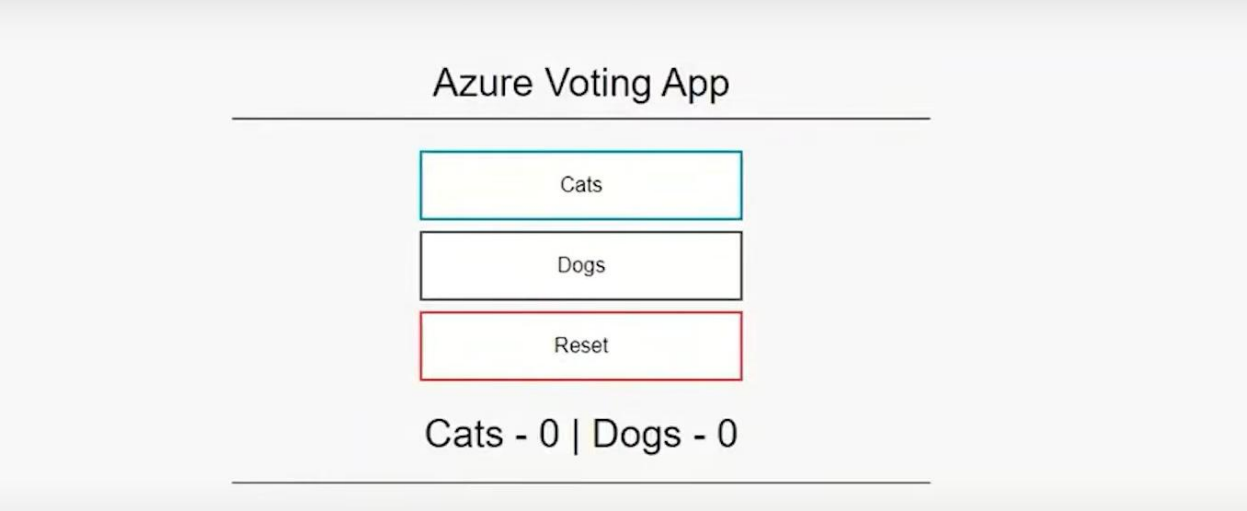
- **deploy the Azure Voting App into your Kubernetes cluster,**

```
thisara [ ~ ]$ kubectl apply -f azure-vote.yml
deployment.apps/azure-vote-back created
deployment.apps/azure-vote-front created
thisara [ ~ ]$
thisara [ ~ ]$
thisara [ ~ ]$
```

- **For Azure voting app accessible via internet**

```
thisara [ ~ ]$
thisara [ ~ ]$ kubectl get service azure-vote-front --watch
NAME               TYPE           CLUSTER-IP     EXTERNAL-IP     PORT(S)        AGE
azure-vote-front   LoadBalancer   10.0.105.209   4.248.210.96    80:30395/TCP   7m58s
```

- **Access application in browser**



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Project Summary:

In summary, this project showcased the deployment of a Python web application on Azure Kubernetes Service using Cloud Shell as the management interface. By building and pushing a containerized version of the application, configuring Kubernetes manifests, and exposing the application through a Load Balancer service, the project successfully delivered a browser-accessible, scalable cloud solution. The exercise emphasized the importance of container orchestration with Kubernetes, highlighted Azure's managed services for simplifying deployment, and provided practical experience with end-to-end cloud-native application deployment. Overall, the project demonstrates the ability to bridge software development with cloud operations, aligning with modern DevOps and cloud engineering practices.