Deploy
Azure Kubernetes Service (AKS)

Contents

1   INTRODUCTION

Azure Kubernetes Service (AKS), a managed Kubernetes offering, further simplifies container-based application deployment and management.

A Kubernetes cluster is divided into two components:

Control plane (**Master Node**): provides the core Kubernetes services and orchestration of application workloads.

Nodes (Worker Node): run your application workloads.
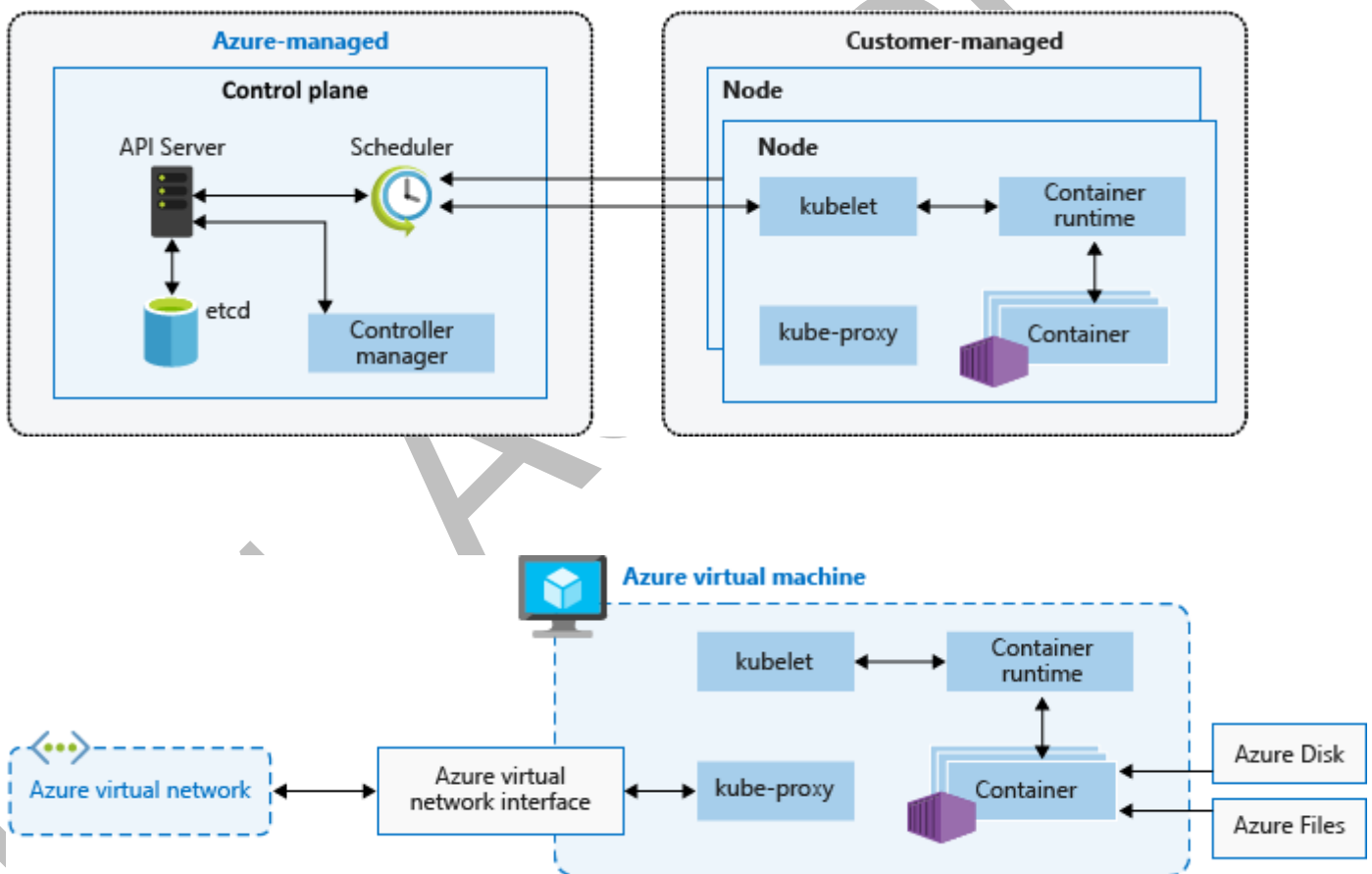
There are 4 ways to deploy an Azure Kubernetes Cluster, which are using:

- Azure Portal
- Azure CLI
- Azure PowerShell
- Using template-driven deployment options, like Azure Resource Manager templates and Terraform

In this Guide we are going to cover How to deploy AKS cluster using **Azure Portal.**

2   AKS DOCUMENTATION

1. Deploy an Azure Kubernetes Service (AKS) cluster.

   https://docs.microsoft.com/en-us/azure/aks/tutorial-kubernetes-deploy-cluster?tabs=azure-cli

2. Cluster Auto scaler

   https://docs.microsoft.com/en-us/azure/aks/cluster-autoscaler

3   PRE-REQUISITE

- To create FREE Azure Cloud account, refer https://k21academy.com/azure02

- Join Community & Ask Questions https://k21academy.com/k8scommunity

- Download Guide referred in this video and details instructions to Install & Configure Azure Kubernetes at https://k21academy.com/k8s78

4   DEPLOY AN AZURE KUBERNETES SERVICE CLUSTER

In this task, you will deploy an Azure Kubernetes Services cluster by using the Azure portal.

1. Sign in to the Azure portal.

2. In the Azure portal, search for locate **Kubernetes services** and then, on the **Kubernetes services** blade, click **Create.**
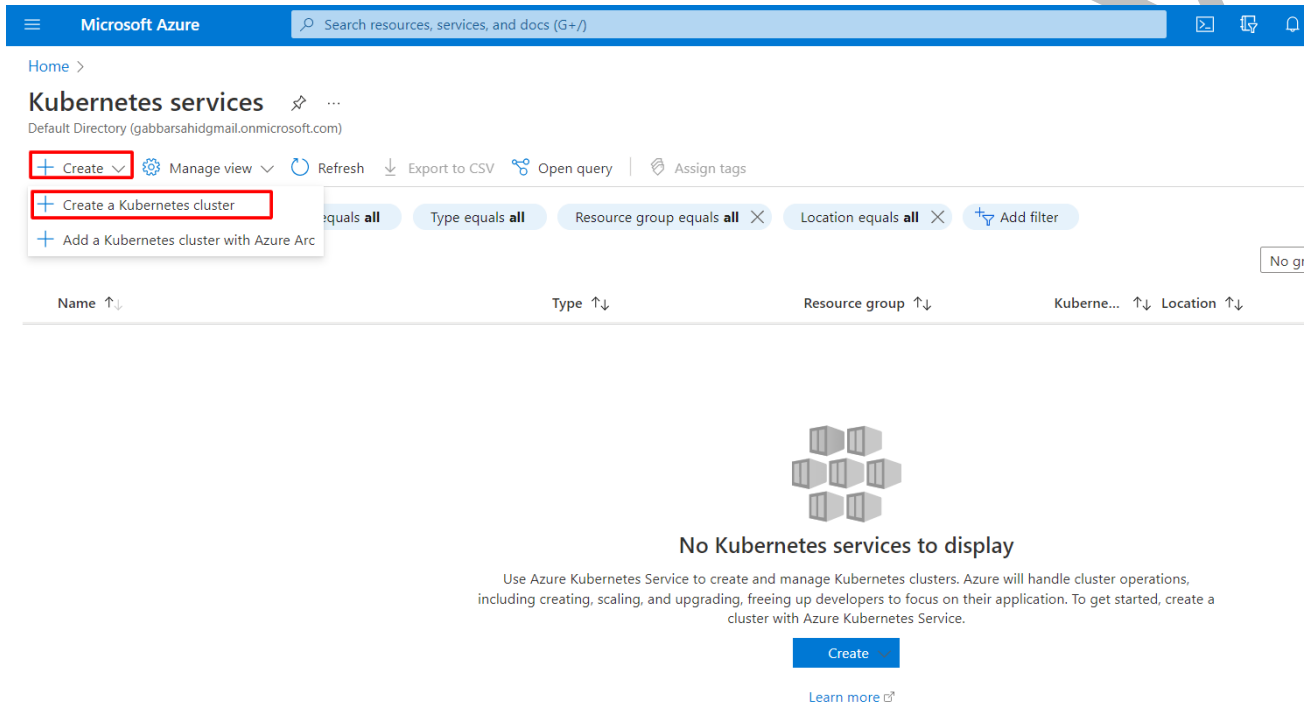
3. On the **Basics** tab of the **Create Kubernetes cluster** blade, specify the following settings (leave others with their default values):

- Give the Resource Group name as per your requirement.

- Specify a name to your cluster in the Kubernetes cluster name field.

- Choose a Region in which you want to create your AKS cluster. In the specified region, our master node will be created.

- Based on the region the select the availability zones.

- Select the Kubernetes Version. Here I am choosing the default, i.e., 1.23.12

Next, comes the size and count of the nodes of the AKS cluster that we are gonna create. These can be updated as per the requirements.

- Select the Node Size. We are choosing Standard Ds2 v2 which has the following configuration: 2 vCPUs, 7 GiB RAM, 8 Data Disks, 14 GiB Temp Storage.
- Give the Node Count value which specifies how many Worker Nodes we want.

Home > Kubernetes services >

Create Kubernetes cluster ···

Project details

Select a subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription * ⓘ   Azure Pass - Sponsorship

Resource group * ⓘ   (New) atulk8s
                          Create new

Cluster details

Cluster preset configuration   Standard ($$)

To quickly customize your Kubernetes cluster, choose one of the preset configurations above. You can modify these configurations at any time.
Learn more and compare presets

Kubernetes cluster name * ⓘ   k8satulclusterdev   ✓   The name can contain only letters, numbers, underscores, and hyphens. The name must start and end with a letter or number.

Region * ⓘ   (US) East US   ✓ Kubernetes service name must be unique in the current resource group.

Availability zones ⓘ   Zones 1,2,3
                               🔷 High availability is recommended for standard configuration.

Kubernetes version * ⓘ   1.23.12 (default)

API server availability ⓘ   ⦿ 99.95%
                               Optimize for availability.
                               ○ 99.5%

[Review + create]   [< Previous]   [Next : Node pools >]

Primary node pool

The number and size of nodes in the primary node pool in your cluster. For production workloads, at least 3 nodes are recommended for resiliency. For development or test workloads, only one node is required. If you would like to add additional node pools or to see additional configuration options for this node pool, go to the 'Node pools' tab above. You will be able to add additional node pools after creating your cluster. Learn more about node pools in Azure Kubernetes Service

Node size * ⓘ   **Standard DS2 v2**
                       🔷 Standard DS2_v2 is recommended for standard configuration.
                       Change size

Scale method * ⓘ   ⦿ Manual
                       ○ Autoscale
                       🔷 Autoscaling is recommended for standard configuration.

Node count * ⓘ   ○——————————————————————   1

[Review + create]   [< Previous]   [Next : Node pools >]

4. Click **Next: Node Pools >** and, on the **Node Pools** tab of the **Create Kubernetes cluster** blade, specify the following settings (leave others with their default values):

Setting	Value
Virtual nodes	**Disabled**
VM scale sets	**Enabled**

- In Azure Kubernetes Service (AKS), nodes of the same configuration are grouped together into node pools. Node pools contain the underlying VMs that run your applications.

- The Virtual nodes are a type of Serverless container instance. As we want to create the Worker nodes as Virtual Machines, so we won't enable this option.

Home > Kubernetes services >

Create Kubernetes cluster   ...

| Basics | Node pools | Access | Networking | Integrations | Advanced | Tags | Review + create |

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 about node pools ☐

+ Add node pool   🗑 Delete

Name	Mode	OS type	Node count	Node size
☐ agentpool	System	Linux	3	Standard_DS2_v2

Enable virtual nodes

Virtual nodes allow burstable scaling backed by serverless Azure Container Instances. Learn more about virtual nodes ☐

Enable virtual nodes ⓘ   ☐

Node pool OS disk encryption

By default, all disks in AKS are encrypted at rest with Microsoft-managed keys. For additional control over encryption, you can supply your own keys using a disk encryption set backed by an Azure Key Vault. The disk encryption set will be used to encrypt the OS disks for all node pools in the cluster. Learn more ☐

Encryption type   [(Default) Encryption at-rest with a platform-managed key   ⌄]

[Review + create]   [< Previous]   [Next : Access >]

5. Click **Next: Access >** and, on the **Access** tab of the **Create Kubernetes cluster** blade, specify the following settings (leave others with their default values):

Note: We can use both RBAC & Azure Active Directory for Authentication.

Home > Kubernetes services >

Create Kubernetes cluster   ...

Basics   Node pools   **Access**   Networking   Integrations   Advanced   Tags   Review + create

Resource identity ⓘ

System-assigned managed identity
By default, Azure uses a managed identity. To use a service principal, use the CLI.
Learn more ⬀

Choose between local accounts or Azure AD for authentication and Azure RBAC or Kubernetes RBAC for your authorization needs.

Authentication and Authorization ⓘ | Local accounts with Kubernetes RBAC   ⌄ |

ⓘ Once the cluster is deployed, use the Kubernetes CLI to manage RBAC configurations. Learn more ⬀

[Review + create]   [< Previous]   [Next : Networking >]

6. Click **Next: Networking >** and, on the **Networking** tab of the **Create Kubernetes cluster** blade, specify the following settings (leave others with their default values):

- Select the Network Configuration. I will be choosing **Azure CNI**
- The Cluster Subnet option is to choose which Subnet you want the Nodes and Containers to be placed in.
- Kubernetes service address range is the **CIDR** notation **IP range** from which to assign server cluster IPs.
- Docker Bridge address is the IP address assigned to Docker Bridge. The Bridge Network is for the container to container communication.
- In Private Cluster, the communication between the nodes and the API server happens internally.

- So, I am **Disabling the Private Cluster**.
- Keep the **Network Policy** to Azure.
- Do not enable **HTTP application routing**.

Microsoft Azure

Search resources, services, and docs (G+/)

Create a resource
Home
Dashboard
All services
★ FAVORITES
All resources
Resource groups
Quickstart Center
App Services
Function App
SQL databases
Azure Cosmos DB
Virtual machines
Load balancers
Storage accounts
Virtual networks
Azure Active Directory
Monitor
Advisor
Microsoft Defender for

Home > Kubernetes services >

Create Kubernetes cluster

Basics   Node pools   Authentication   **Networking**   Integrations   Tags   Review + create

You can change networking settings for your cluster, including enabling HTTP application routing and configuring your network using either the 'Kubenet' or 'Azure CNI' options:

- The **kubenet** networking plug-in creates a new VNet for your cluster using default values.
- The **Azure CNI** networking plug-in allows clusters to use a new or existing VNet with customizable addresses. Application pods are connected directly to the VNet, which allows for native integration with VNet features.

Learn more about networking in Azure Kubernetes Service

| Network configuration ⓘ | ◯ Kubenet |
| | ⦿ Azure CNI |

ⓘ The Azure CNI plugin requires an IP address from the subnet below for each pod on a node, which can more quickly exhaust available IP addresses if a high value is set for pods per node. Consider modifying the default values for pods per node for each node pool on the "Node pools" tab. Learn more

Virtual network * ⓘ   (New) k21academy-rg1-vnet
                             Create new

Cluster subnet * ⓘ   (new) default (10.240.0.0/16)

Kubernetes service address range * ⓘ   10.0.0.0/16

Kubernetes DNS service IP address * ⓘ   10.0.0.10

Docker Bridge address * ⓘ   172.17.0.1/16

Quickstart Center
App Services
Function App
SQL databases
Azure Cosmos DB
Virtual machines
Load balancers
Storage accounts
Virtual networks
Azure Active Directory
Monitor
Advisor
Microsoft Defender for Cloud
Cost Management + Billing

DNS name prefix * ⓘ   k21academy-kbs1-dns

Traffic routing

Load balancer ⓘ   Standard

Enable HTTP application routing ⓘ   ☐

Security

Enable private cluster ⓘ   ☐

Set authorized IP ranges ⓘ   ☐

Network policy ⓘ   ⦿ None
                    ◯ Calico
                    ◯ Azure

Review + create   < Previous   Next : Integrations >

7. Click **Next: Integration >**, on the **Integration** tab of the **Create Kubernetes cluster** blade, set **Container monitoring** to **Enabled**, click **Review + create** and then click **Create**.

Note: Wait for the deployment to complete. This should take about 10 minutes.

4.1 Task 2: Deploy pods into the Azure Kubernetes Service Cluster

In this task, you will deploy a pod into the Azure Kubernetes Service cluster.

1. On the deployment blade, click the **Go to resource** link.

2. On the **k21academy-aks1** Kubernetes service blade, in the **Settings** section, click **Node pools**.

3. On the **k21academy-aks1 - Node pools** blade, verify that the cluster consists of a single pool with one node.

4. Make a note of **Kuberenetes Cluster** Name and **Resource Group** name as we'll need this in next step.

5. In the Azure portal, open the **Azure Cloud Shell** by clicking on the icon in the top right of the Azure Portal.
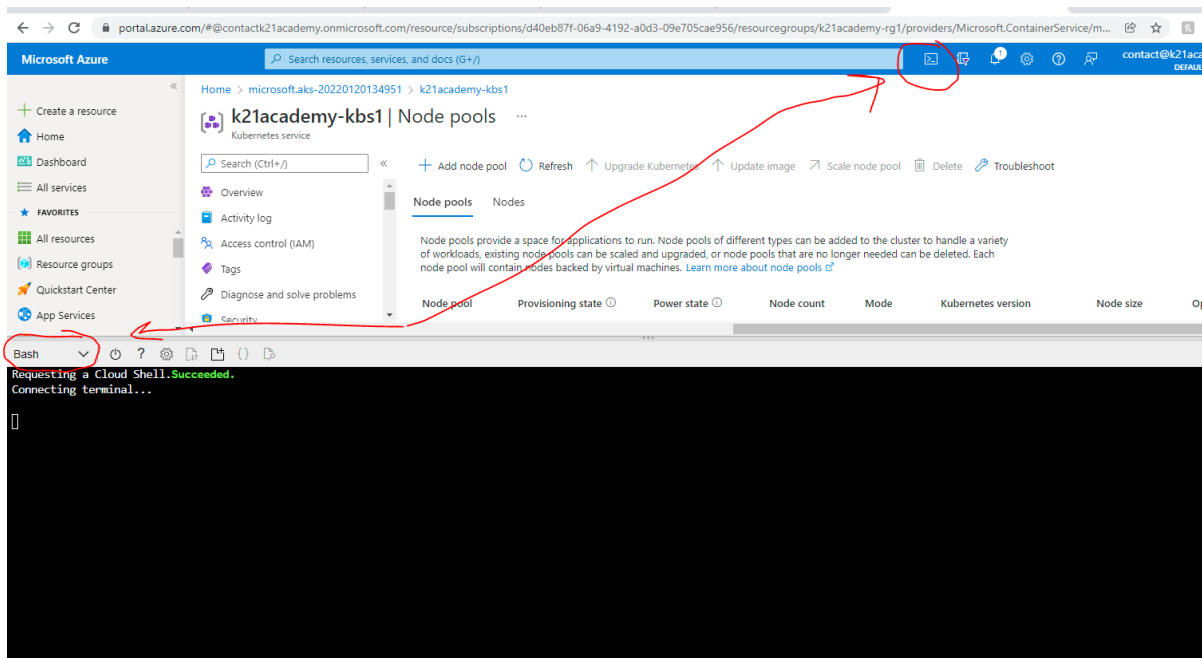
6. If prompted to select either **Bash** or **PowerShell**, select **Bash**.

Note: If this is the first time you are starting **Cloud Shell** and you are presented with the **You have no storage mounted** message, select the subscription you are using in this lab, and click **Create storage**.

7. From the Cloud Shell pane, run the following to retrieve the credentials to access the AKS cluster:

Note: Change names as per your environment

```
$ RESOURCE_GROUP='Your Resource Group Name'
$ AKS_CLUSTER='Cluster Name'
```

```
$ az aks get-credentials --resource-group $RESOURCE_GROUP --name $AKS_CLUSTER
```

k8stestdev 📌 ☆ ...
Kubernetes service

🔍 Search   «

🔷 Overview
▦ Activity log
🔗 Access control (IAM)
🏷 Tags

+ Create ∨   🔌 Connect   ▷ Start   ▢ Stop   🗑 Delete   🔄 Refresh   👥 Give

∧ Essentials

Resource group
atulk8s

Status
Succeeded (Running)

Location

Kubern
1.23.12

API ser
k8stest

Networ

Bash ∨   ⏻   ?   ⚙   📤   📥   { }   📋

```
Requesting a Cloud Shell.Succeeded.
Connecting terminal...

Welcome to Azure Cloud Shell

Type "az" to use Azure CLI
Type "help" to learn about Cloud Shell

rahul [ ~ ]$ RESOURCE_GROUP='atulk8s'
rahul [ ~ ]$ AKS_CLUSTER='k8stestdev'
rahul [ ~ ]$ az aks get-credentials --resource-group $RESOURCE_GROUP --name $AKS_CLUSTER
Merged "k8stestdev" as current context in /home/rahul/.kube/config
rahul [ ~ ]$ ▯
```

8. From the **Cloud Shell** pane, run the following to verify connectivity to the AKS cluster:

```
kubectl get nodes
```

k8stestdev
Kubernetes service

Search «

+ Create ∨   Connect   ▷ Start   Stop   Delete   Refresh   Give feedback

⚙ Overview

📋 Activity log

Access control (IAM)

🏷 Tags

∧ Essentials

Resource group
atulk8s

Status
Succeeded (Running)

Location

Kubernetes version
1.23.12

API server address
k8stestdev-dns-40e

Network type (plug

```
Bash        ∨    ⏻    ?    ⚙    ⤴    ⤵    { }    ⧉

Welcome to Azure Cloud Shell

Type "az" to use Azure CLI
Type "help" to learn about Cloud Shell

rahul [ ~ ]$ RESOURCE_GROUP='atulk8s'
rahul [ ~ ]$ AKS_CLUSTER='k8stestdev'
rahul [ ~ ]$ az aks get-credentials --resource-group $RESOURCE_GROUP --name $AKS_CLUSTER
Merged "k8stestdev" as current context in /home/rahul/.kube/config
rahul [ ~ ]$ kubectl get nodes
NAME                                STATUS   ROLES   AGE   VERSION
aks-agentpool-15033394-vmss000000   Ready    agent   19m   v1.23.12
rahul [ ~ ]$
```

9. In the **Cloud Shell** pane, review the output and verify that the one node which the cluster consists of at this point is reporting the **Ready** status.

5 CLEANUP RESOURCES

Note: Remember to remove any newly created Azure resources that you no longer use. Removing unused resources ensures you will not see unexpected charges.

There are two methods to delete the resource:

- Using the bash shell.
- From Azure portal.

5.1 Deleting resource from using bash shell

1. In the Azure portal, open the **Bash** shell session within the **Cloud Shell** pane.

2. List all resource groups created throughout the labs of this module by running the following command:

```
$ az group list --query "[?starts_with(name,'k21academy')].name" --output tsv
```

3. Delete all resource groups you created throughout the labs of this module by running the following command:

```
$ az group list --query "[?starts_with(name,'k21academy')].[name]" --output tsv | xargs -L1 bash -c 'az group delete --name $0 --no-wait --yes'
```

Note: The command executes asynchronously (as determined by the --nowait parameter), so while you will be able to run another Azure CLI command immediately afterwards within the same Bash session, it will take a few minutes before the resource groups are actually removed.

5.2 Deleting resource from Azure portal

1. Search for **Resource groups**

2. Select the resource group you are using

3. Click on **Delete resource group**

Home > Resource groups >

Resource groups | 1
Default Directory

k21academy-rg1
Resource group

+ Create | Manage view ∨ | ...

🔍 Search (Ctrl+/)

Filter for any field...

Name ↑↓

- cloud-shell-storage-centralindia ...
- DefaultResourceGroup-EUS ...
- DefaultResourceGroup-EUS ...
- k21academy-rg1 | 2 ...
- MC_k21academy-rg1_k21academy-kbs-... ...
- NetworkWatcherRG ...
- NetworkWatcherRG ...

Overview

🗐 Activity log

🔐 Access control (IAM)

🏷 Tags

🔗 Resource visualizer

⚡ Events

Settings

🔵 Resource costs

📤 Deployments

🛡 Security

📋 Policies

📑 Properties

🔒 Locks

Monitoring

+ Create | ☰ Edit columns | 🗑 Delete resource group | ↻ Refresh | ↓ Export to CSV | ✂ Open query | ...
                                    3

∧ Essentials   JSON View

Subscription (move)   Deployments
Azure Pass - Sponsorship   3 Succeeded

Subscription ID   Location
a5913b0a-a9f9-4f87-9915-a5b44e49c27d   East US

Tags (edit)
Click here to add tags

Resources   Recommendations

Filter for any field...   Type == **all** ✕   Location == **all** ✕   ⊹ Add filter

Showing 1 to 2 of 2 records.   ☐ Show hidden types ⓘ   No grouping ∨   ☰ List view ∨

☐ Name ↑↓   Type ↑↓   Location ↑↓

☐ 🌸 k21academy-kbs1   Kubernetes service   East US   ...

☐ ◆ k21academy-rg1-vnet   Virtual network   East US   ...

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6 TROUBLESHOOTING

- https://docs.microsoft.com/en-us/azure/aks/cluster-autoscaler

7 CONCLUSION

In this guide, we have done:

- Deployed an Azure Kubernetes Service cluster.

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