

SANTA'S WORKSHOP: MAGIC WITH AKS AND BICEP!

with Elkhan & Kasun – Microsoft MVP & MCTs



KASUN & ELKHAN

DECEMBER



Santa's enterprise Cloud challenges?

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INTRODUCTION

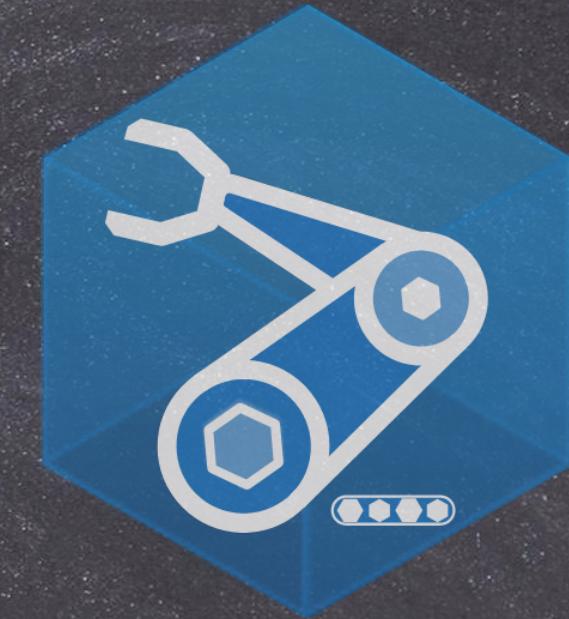
WHAT WILL YOU LEARN?

In this session, we will learn what we should consider when provisioning the AKS cluster using Azure Bicep to help with Santa's enterprise cloud challenges. This includes; what is Bicep, how we choose the right scalability, monitoring, security and other features that you need to know.



What is Azure Bicep?

- Domain Specific Language (DSL) for creators
- Simplified authoring and management of Azure resources
- Transparent abstraction over ARM
- New way of IaC in Microsoft Azure



EXPLORER ...

LEARN-BICEP

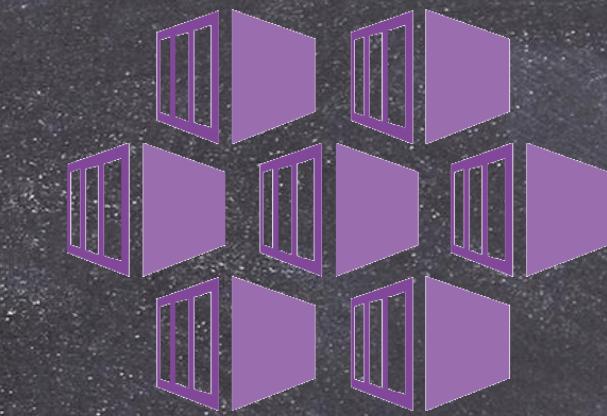
- > .github
- > vscode
- > arm-json-samples
- > deploy
- > modules
- > param-files
- > Pilot-project
- > private-project
- > samples
 - ↳ 1-deploy-rg.bicep
 - ↳ 2-deploy-param-storage.bicep
 - ↳ 3-deploy-storage-w-Lock.bicep
 - ↳ 4-deploy-sub-policy.bicep
 - ↳ 5-deploy-fail.bicep
 - ↳ 6-deploy-vm.bicep
 - ↳ 7-deploy-modules-w-param.bicep
 - ↳ 8-deploy-firewall-w-ip-prefix.bicep
 - ↳ 9-deploy-single-app-module.bicep
 - ↳ 10-deploy-multi-resourceGroups-mo...
 - ↳ 10-deploy-multi-resourceGroups-mo...
 - ↳ 11-deploy-sqlDb-w-keyVault.bicep
 - ↳ 12-deploy-managment-group-scope...
 - ↳ 13-deploy-audit-resourcegroup-tag.b...
 - ↳ 14-deploy-child-parent-scenarios.bicep
 - ↳ 15-deploy-private-repo.bicep
 - ↳ 16-deploy-public-registry.bicep
 - ↳ 17-deploy-event-streaming-app.bicep
 - ↳ 18-deploy-win-VM-with-Bicep.bicep
 - ↳ 19-deploy-tagging-policy-sub.bicep
 - ↳ 20-experiment-Bicep.bicep
 - ↳ 21-test-experiment.bicep
 - ↳ 22-deploy-vm-with-parameters.bicep

```
samples > 2-deploy-param-storage.bicep x
samples > 2-deploy-param-storage.bicep > azureRegion
You, 3 months ago | 2 authors (ElYusubov and one other)
1 // Deployment scope: subscription
2 targetScope = 'subscription'
3
4 @description('Resource Group name for the deployment')
5 @minLength(3)
6 @maxLength(90)
7 param resourceName string = 'rg-BicepDemo'
8
9 @description('Azure region to deploy all resources')
10 @allowed([
11   'eastus'
12   'eastus2'
13   'westus'
14   'westus2'
15 ])
16 ElYusubov, 3 years ago • minor updates to syntax of deployments 1, 2 and...
17 param azureRegion string = 'eastus2'
18
19
20 @description('Resource group declaration for the storage account.')
21 resource myResourceGroup 'Microsoft.Resources/resourceGroups@2021-04-01' = {
22   name: resourceName
23   location: azureRegion
24   tags: {
25     Project: 'Azure Back to School 2024'
26     Environment: 'Dev'
27   }
28 }
29
30 ElYusubov, 22 months ago | 1 author (ElYusubov)
31 @description('Storage declaration from existing module with a preset parameter')
32 module storageModule '../modules/storage-param.bicep' = {
33   scope: resourceGroup(myResourceGroup.name)
34 }
```

PROBLEMS 1 OUTPUT DEBUG CONSOLE TERMINAL PORTS AZURE GITLENS COMMENTS
PS C:\Work\GitHub\Learn-Bicep>

AKS with Bicep

- Using AKS Automatic
- Using Azure CLI/ PowerShell/ Portal
- Using Bicep Kubernetes extension
- Using Bicep template
- Using other IaC tools



The screenshot shows a Bicep code editor with the following template:

```
1-deploy-rg.bicep 22-deploy-AKS.bicep U
samples > 22-deploy-AKS.bicep > clusterName
1 @description('The name of the Managed Cluster resource.')
2 param clusterName string = 'santa21cluster'
3
4 @description('The location of the Managed Cluster resource.')
5 param location string = resourceGroup().location
6
7 @description('Optional DNS prefix to use with hosted Kubernetes API server FQDN.')
8 param dnsPrefix string
9
10 @description('Disk size (in GB) to provision for each of the agent pool nodes. This
11 @minValue(0)
12 @maxValue(1023)
13 param osDiskSizeGB int = 0
14
15 @description('The number of nodes for the cluster.')
16 @minValue(1)
17 @maxValue(50)
18 param agentCount int = 3
19
20 @description('The size of the Virtual Machine.')
21 param agentVMSize string = 'standard_d2s_v3'
22
23 @description('User name for the Linux Virtual Machines.')
24 param linuxAdminUsername string
25
26 @description('Configure all linux machines with the SSH RSA public key string. Your
27 param sshRSAPublicKey string
28
29 resource aks 'Microsoft.ContainerService/managedClusters@2024-02-01' = {
30   name: clusterName
31   location: location
32   identity: {
```

A preview pane on the right shows the resulting AKS cluster configuration. A callout box at the bottom right highlights the 'aks managedClusters' resource.

MANAGED KUBERNETES

- Automatic Upgrades
 - Offers automated upgrades for Kubernetes versions to reduce operational overhead
- Managed Control Plane
 - Azure manages the Kubernetes control plane, including the API server, etcd, and other critical components, ensuring high availability.

```
properties: {
  kubernetesVersion: '1.29.9'
  autoUpgradeProfile: [
    upgradeChannel: 'stable' 1
  ]
  dnsPrefix: 'dnsprefix'
```

```
19:09:27 in ~ using Microsoft Azure Sponsorship at v1.29.9 aks-demo-cluster-01 via v2.17.5
x2 → k get pods -n kube-system | grep -i -e "etcd" -e "api" -e "scheduler"
```

AKS MANGED CLUSTER

KUBERNETES CLUSTER

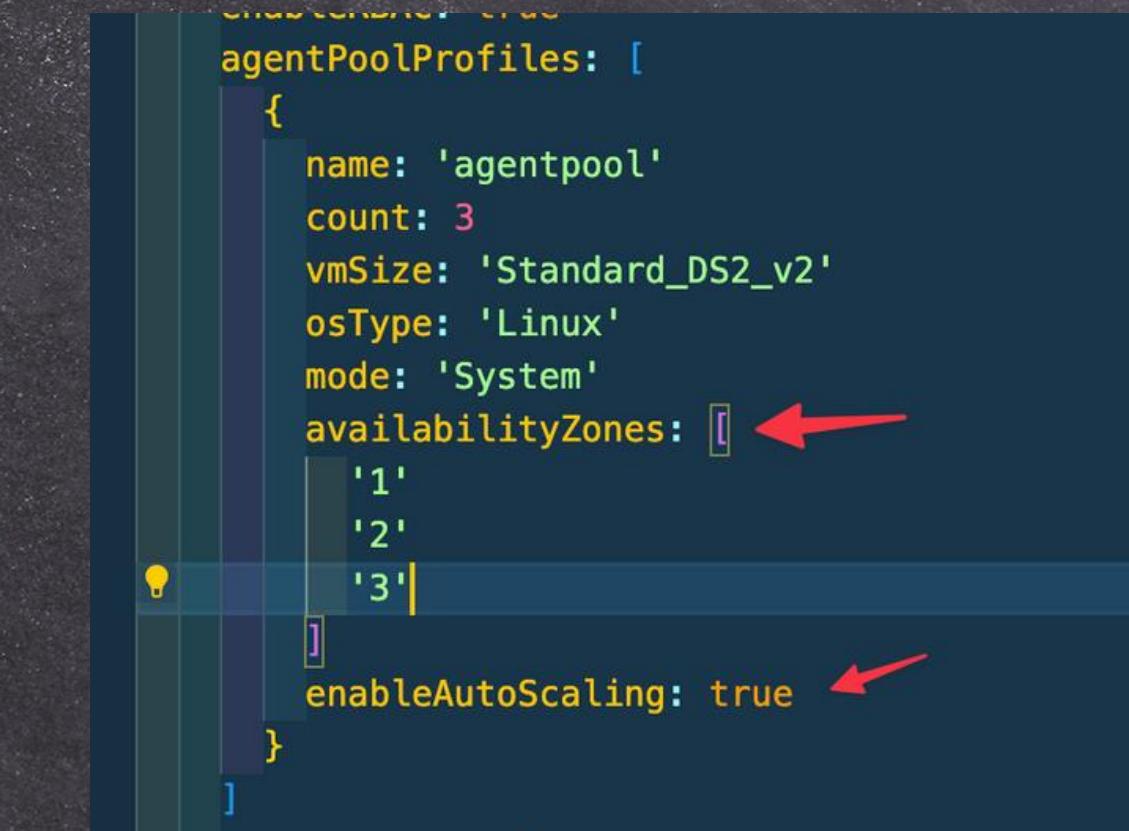
```
19:14:56 in ~ using Microsoft Azure Sponsorship at v1.30.0 k8s-test via v2.17.5 took 2m 55.9s
→ k get pods -n kube-system | grep -i -e "etcd" -e "api" -e "scheduler"
  etcd-k8s-test           1/1   Running   0          6m29s
  kube-apiserver-k8s-test 1/1   Running   0          6m29s
  kube-scheduler-k8s-test 1/1   Running   0          6m29s
```

SCALING AND HIGH AVAILABILITY

- Cluster Autoscaler
 - Automatically adjusts the size of node pools based on application demands.
- Availability Zones
 - Supports deployment across multiple availability zones for high resilience.



```
clusterIdentity: {
  agentPoolProfiles: [
    {
      name: 'agentpool'
      count: 3
      vmSize: 'Standard_DS2_v2'
      osType: 'Linux'
      mode: 'System'
      availabilityZones: [1, 2, 3]
    }
  ]
  enableAutoScaling: true
}
```



ADDON-PROFILE

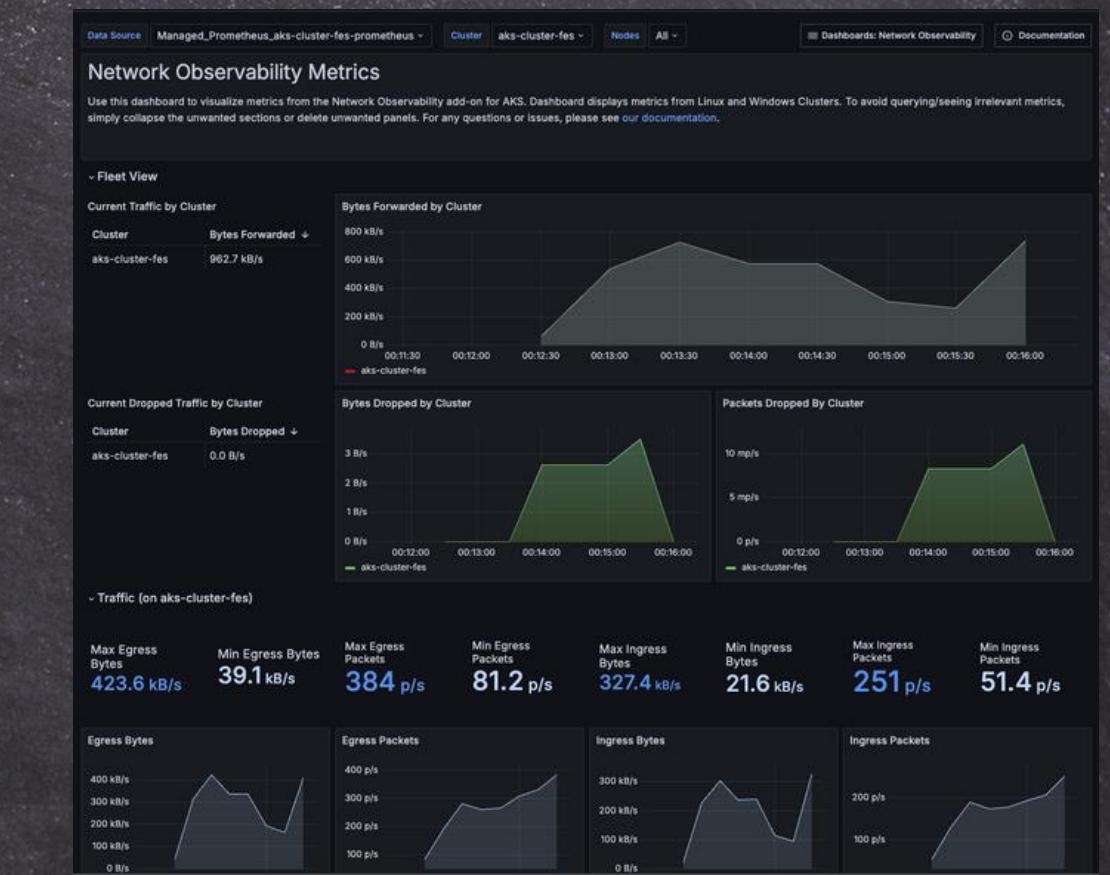
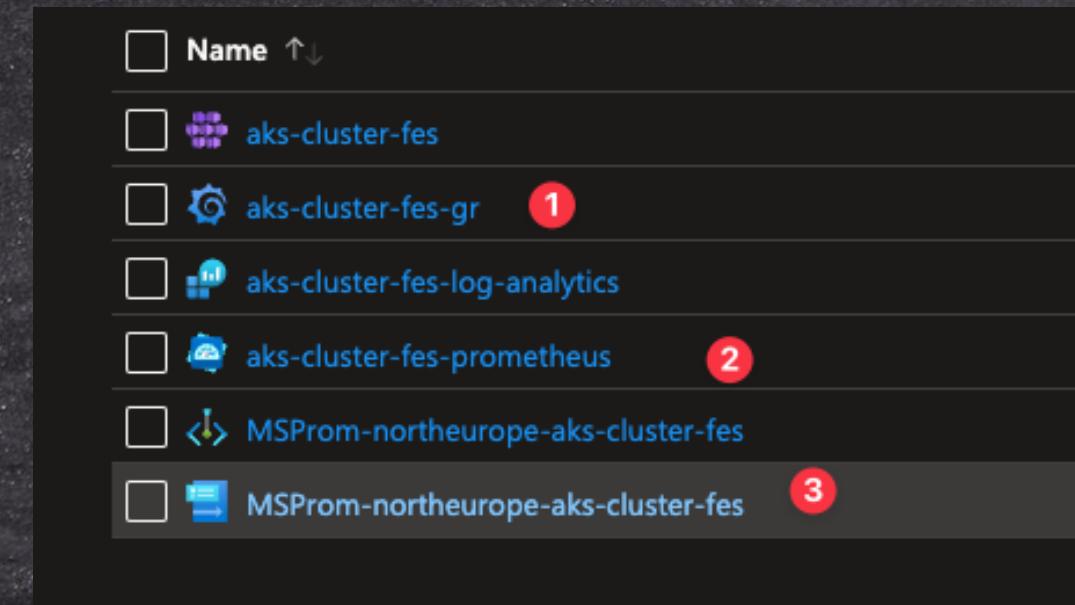
- Azure Managed Add-ons
 - Automatically adjusts the size of node pools based on application demands.
- List of Azure Add-on:
 - <https://azure.github.io/Cloud-Native/cnny-2023/aks-extensions-addons/>



```
addonProfiles: [
  HttpApplicationRouting: {
    enabled: true
  }
]
agentPoolProfiles: [
```

OBSERVABILITY

- AKS Container Insight
- Managed Grafana & Prometheus



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```
74 > resource grafana 'Microsoft.Dashboard/grafana@2023-09-01' = { ... ←
94 }
95
96 > resource prometheus 'Microsoft.Monitor/accounts@2023-04-03' = { ... ←
99 }
100
101 > resource dataCollectionEndpoint 'Microsoft.Insights/dataCollectionEndpoints@2022-06-01' = { ... ←
110 }
111
112 > resource dataCollectionRuleAssociation 'Microsoft.Insights/dataCollectionRuleAssociations@2022-06-01' = { ... ←
119 }
120
121 > resource dataCollectionRule 'Microsoft.Insights/dataCollectionRules@2023-03-11' = { ... ←
156 }
157 }
```

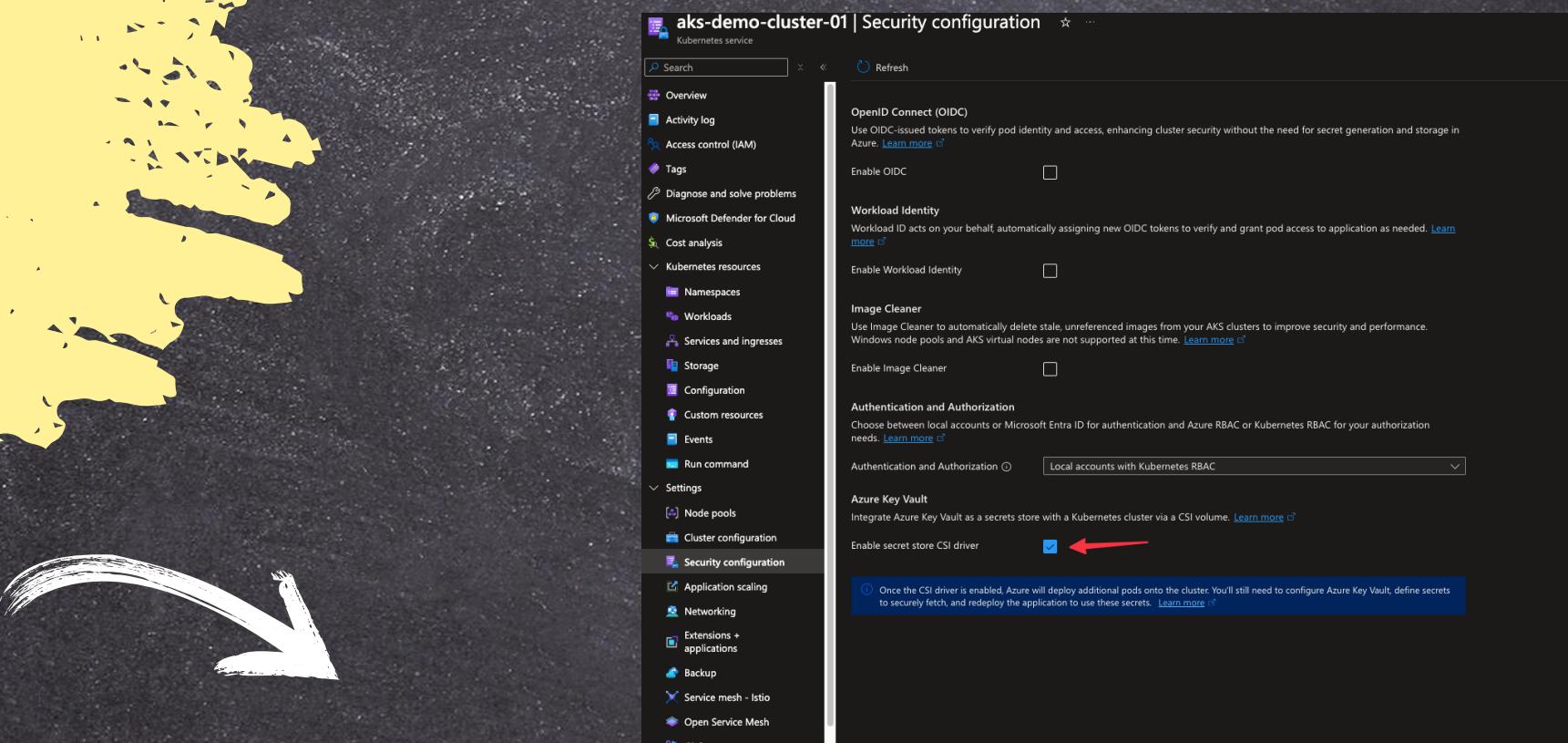
PRIVATE CLUSTER

- Private API Server Access
- Azure Private Link
- Restricted Egress

```
99
100 ]
101 apiServerAccessProfile:{  
102   enablePrivateCluster:true  
103 }
```

Networking	
API server address	aks-pvt-dns-3yax9jth.hcp.northe...
Network configuration	Azure CNI Overlay
Pod CIDR	10.244.0.0/16
Service CIDR	10.0.0.0/16
DNS service IP	10.0.0.10
Cilium dataplane	Not enabled
Network Policy	None
Load balancer	Standard
Private cluster	Enabled
Authorized IP ranges	Not enabled
Application Gateway ingress controller	Not enabled

Azure Key Vault Intergration



- Secure your secrets, certificates and keys
- Integrate with AKS via secret provide

NAME	READY	STATUS	RESTARTS	AGE
aks-secrets-store-csi-driver-rkwbs	3/3	Running	0	41m
aks-secrets-store-csi-driver-z8wqn	3/3	Running	0	41m
aks-secrets-store-provider-azure-6rxdw	1/1	Running	0	41m
aks-secrets-store-provider-azure-7r8tp	1/1	Running	0	41m
ama-logs-9wcwv	3/3	Running	0	41m
ama-logs-nfpv8	3/3	Running	0	41m

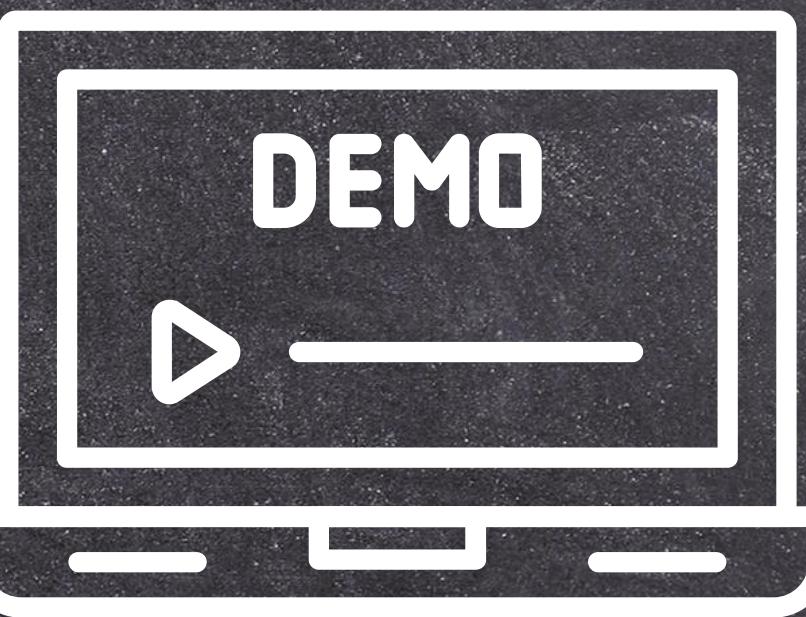
AUTOMATIC CLUSTER

- Automated Cluster Management
- Simplified Configuration
- Serverless Experience

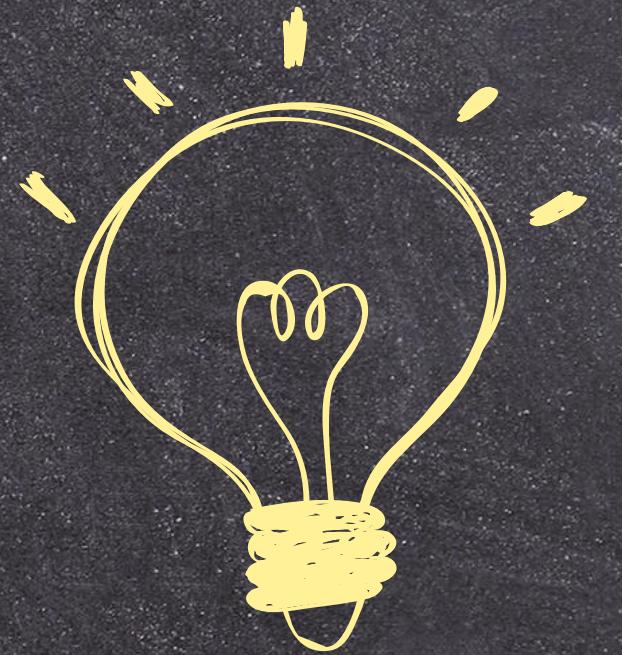


```
azurermResourceGroup("aks-cluster")  
  @description('Name of the AKS Cluster')  
  param aksClusterName string = 'aks-automatic'  
  
  param location string = resourceGroup().location  
  
  resource aksCluster 'Microsoft.ContainerService/managedClusters@2024-03-02-preview' = {  
    name: aksClusterName  
    location: location  
    sku: {  
      name: 'Automatic' ----->  
      tier: 'Standard'  
    }  
    properties: {  
      agentPoolProfiles: [  
        {  
          name: 'system'  
          count: 3  
          vmSize: 'Standard_D2s_v3'  
          osDiskSizeGB: 30  
          osDiskType: 'ephemeral'  
          osType: 'Linux'  
          mode: 'System'  
        }  
      ]  
      identity: {  
        type: 'SystemAssigned'  
      }  
    }  
  }
```

Kubernetes version	: 1.30.6
API server address	: dns-1651109436-qb9kiu1
Network configuration	: Azure CNI Overlay
SKU	: Automatic ----->



DEMO



Festive Questions

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Questions from Studio

1. If Santa's sleigh was powered by AKS, how many reindeer would it take to deploy a cluster?
2. Can we use Bicep to create a virtual North Pole in the cloud?
3. What AKS feature would Santa use to ensure his elves' toy production line never goes down?
4. If Santa's workshop had a Kubernetes cluster, would the elves be considered nodes or pods?
5. Can we use Bicep to automate the delivery of presents, or do we still need Rudolph for that?

