DevOps with Azure Kubernetes Service

NDC London 2021

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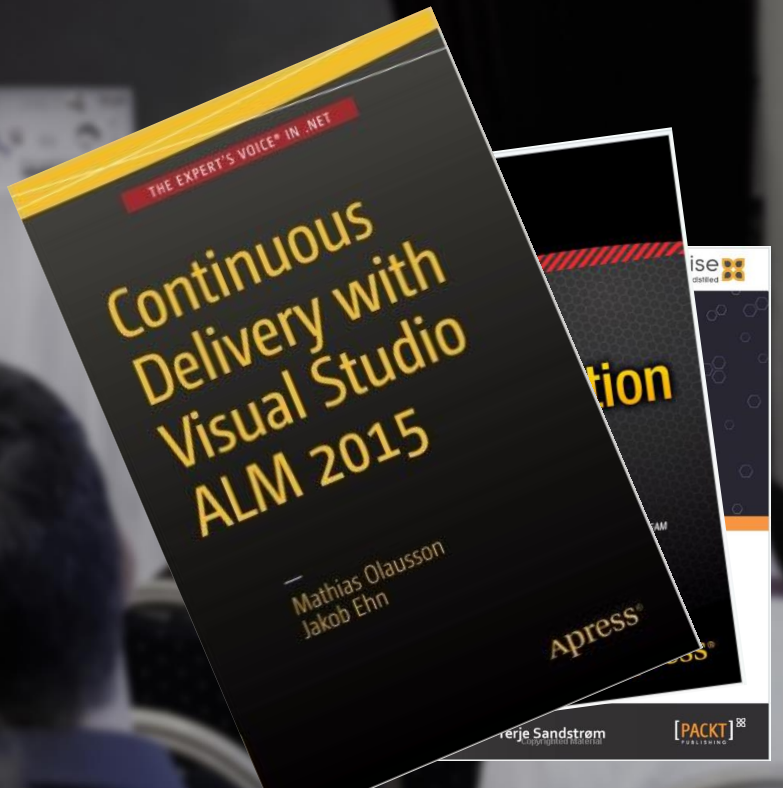
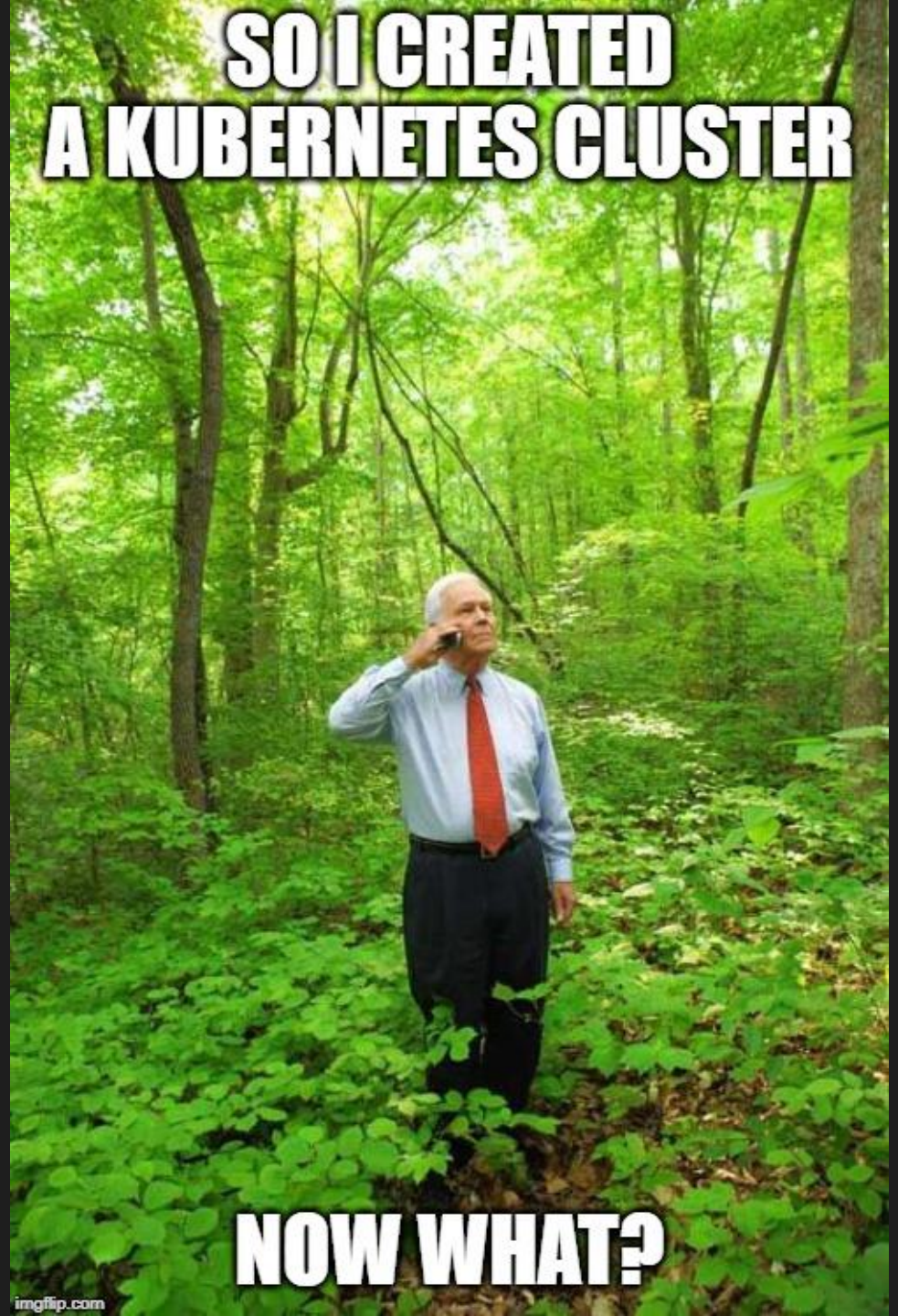


MVP Microsoft® Most Valuable Professional



Infrastructure as Code

Automated Deployments

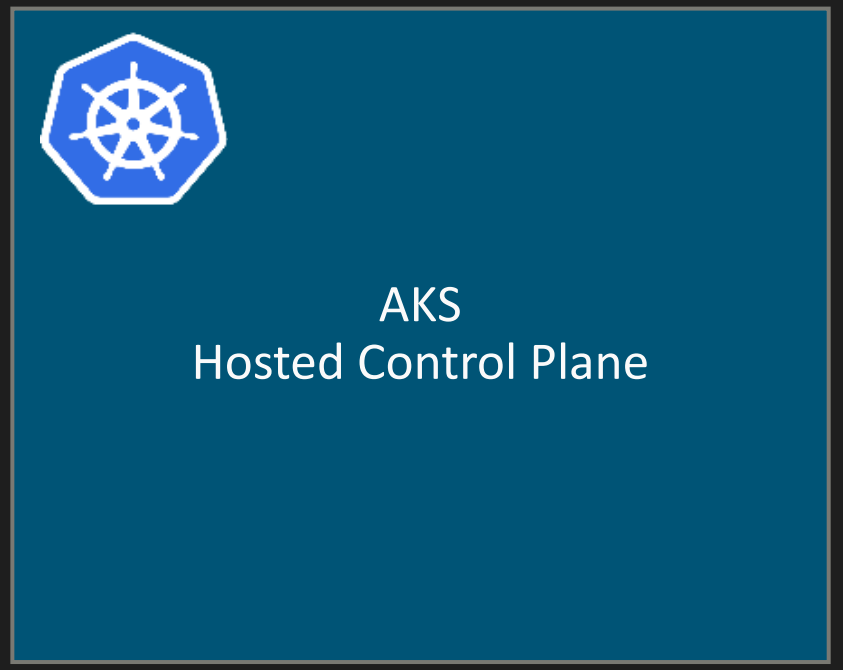
Monitoring

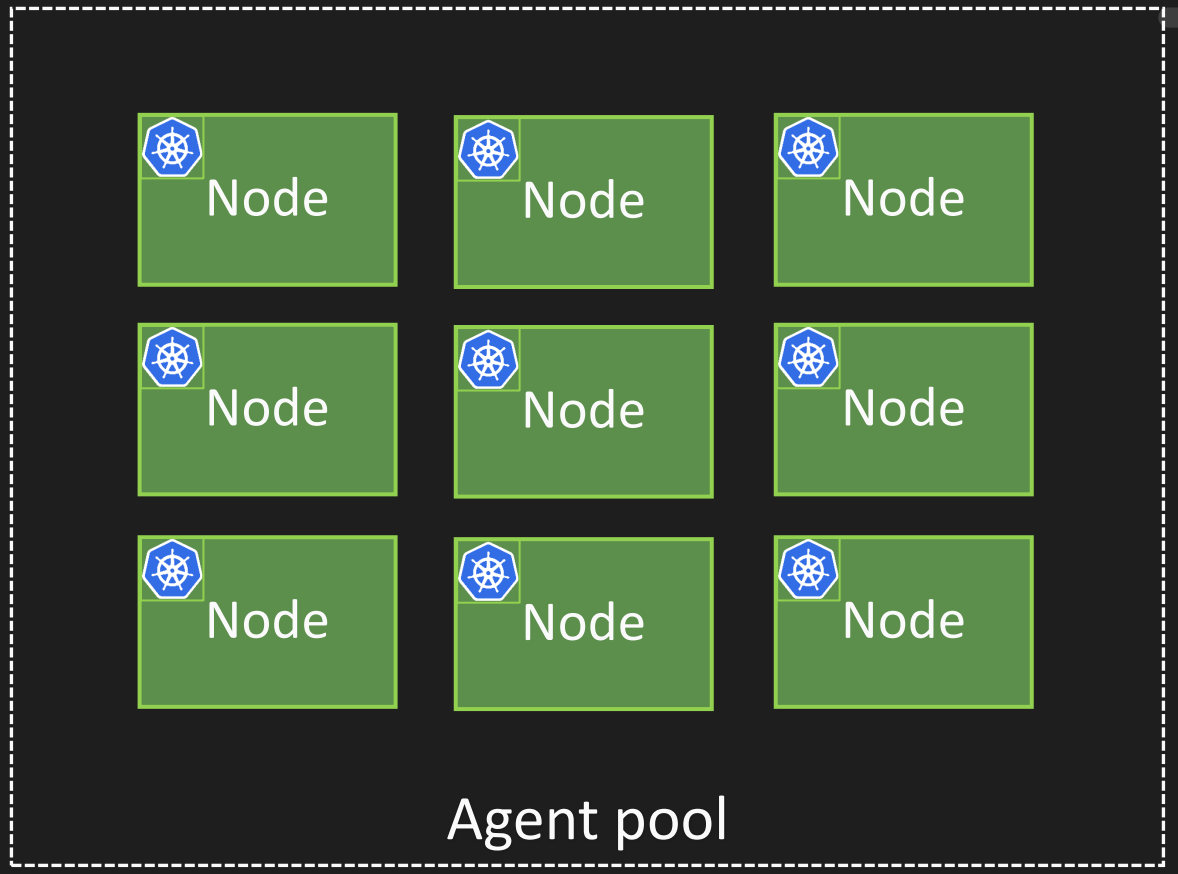
High Availability

Scalability

AKS

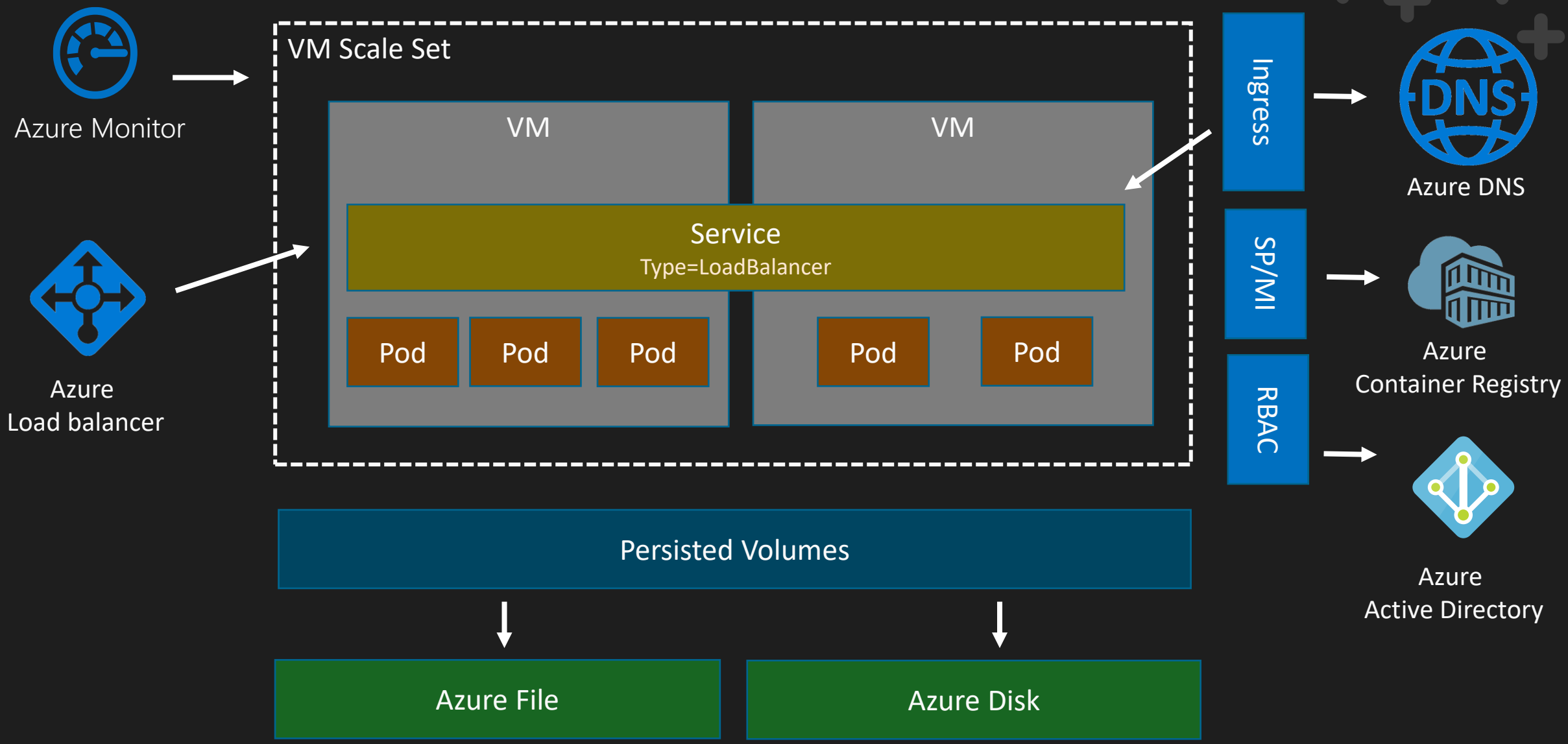
Azure Kubernetes Services

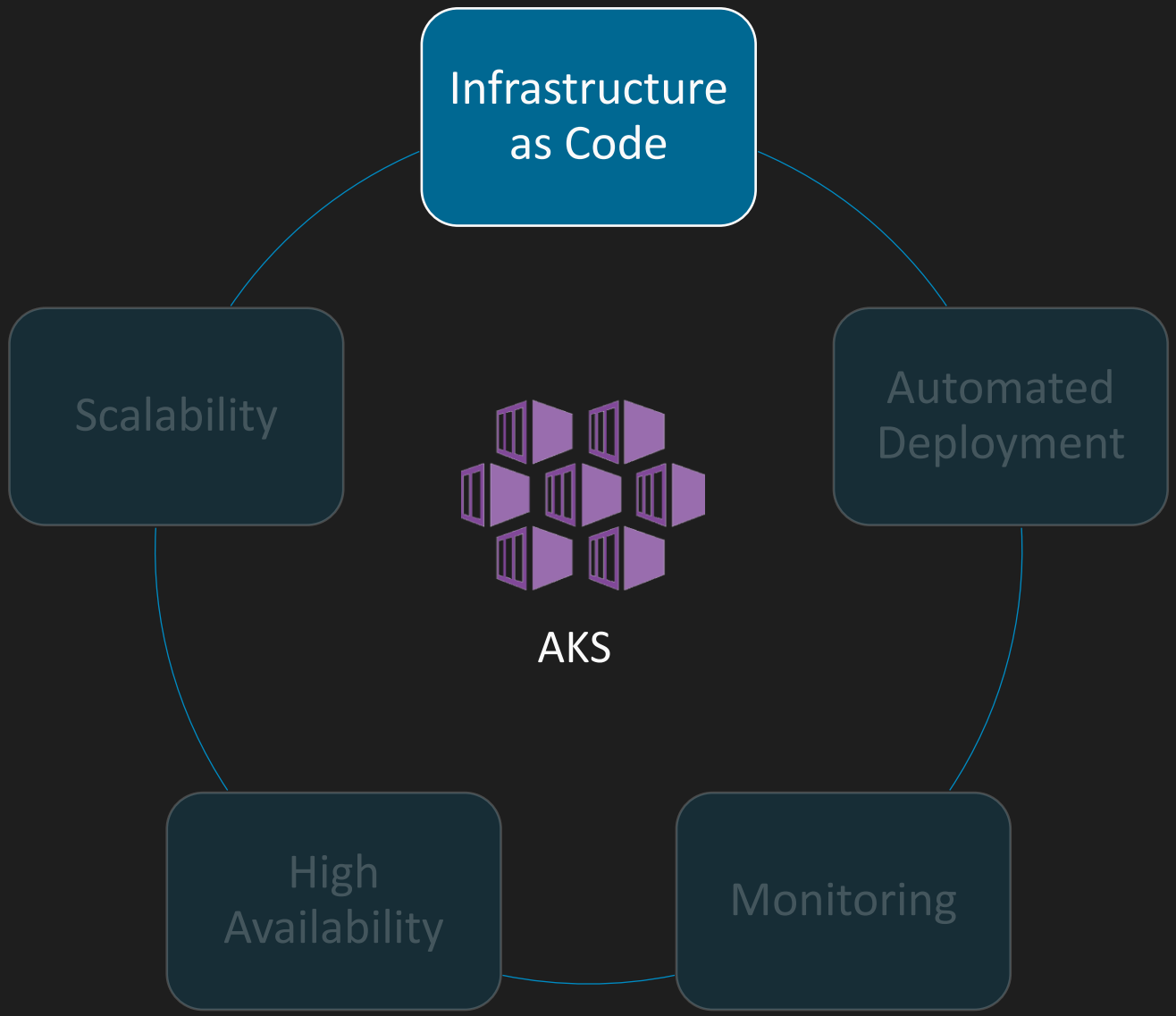




- Automated upgrades and patching
- Cluster (Auto)Scaling
- Self-healing control plane
- Pay for agent nodes only

Kubernetes in Azure




Infrastructure as Code
Automated Deployment
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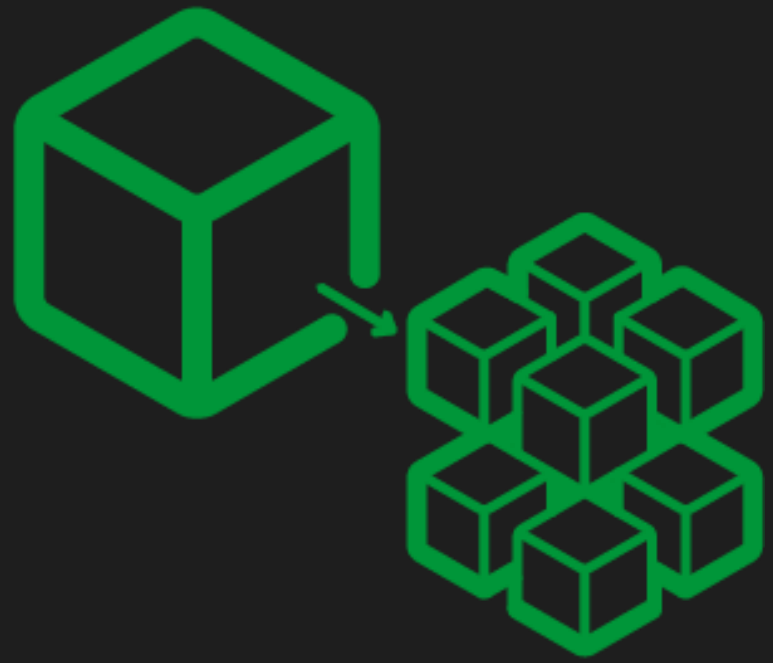
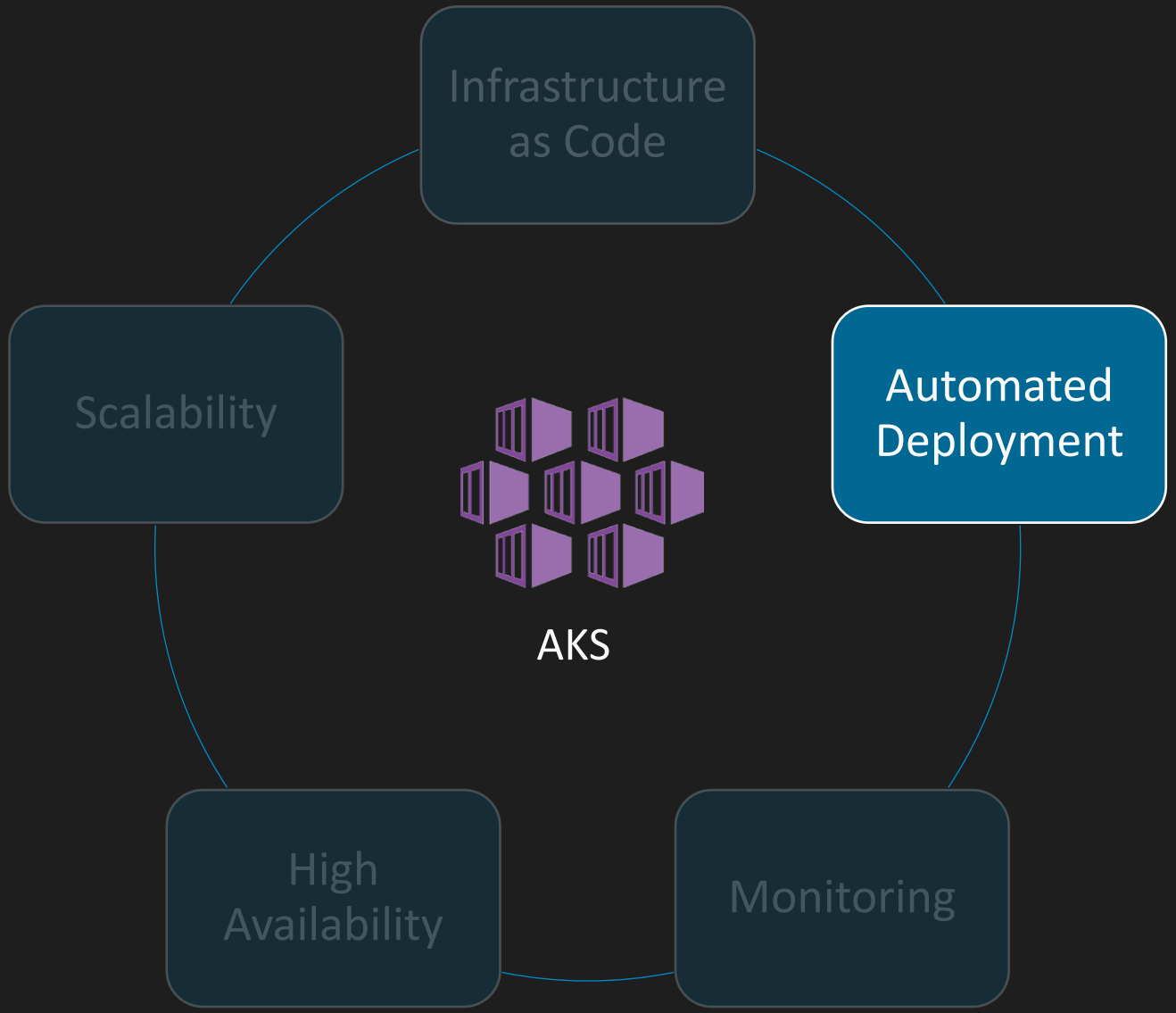
Infrastructure as Code with AKS

- Store cluster definition as code
- Consistent infrastructure
- Repeatable deployments
- Spin up cluster on-demand
- Several options available
  - ARM Templates
  - TerraForm
  - Pulumi
  - Azure CLI



Deploying AKS Infrastructure

- Virtual Network
- AKS Cluster
- Namespaces
- Ingress controller / Cert Manager
- Permissions
  - Service accounts
  - Azure AD groups
  - k8s roles and role bindings
- …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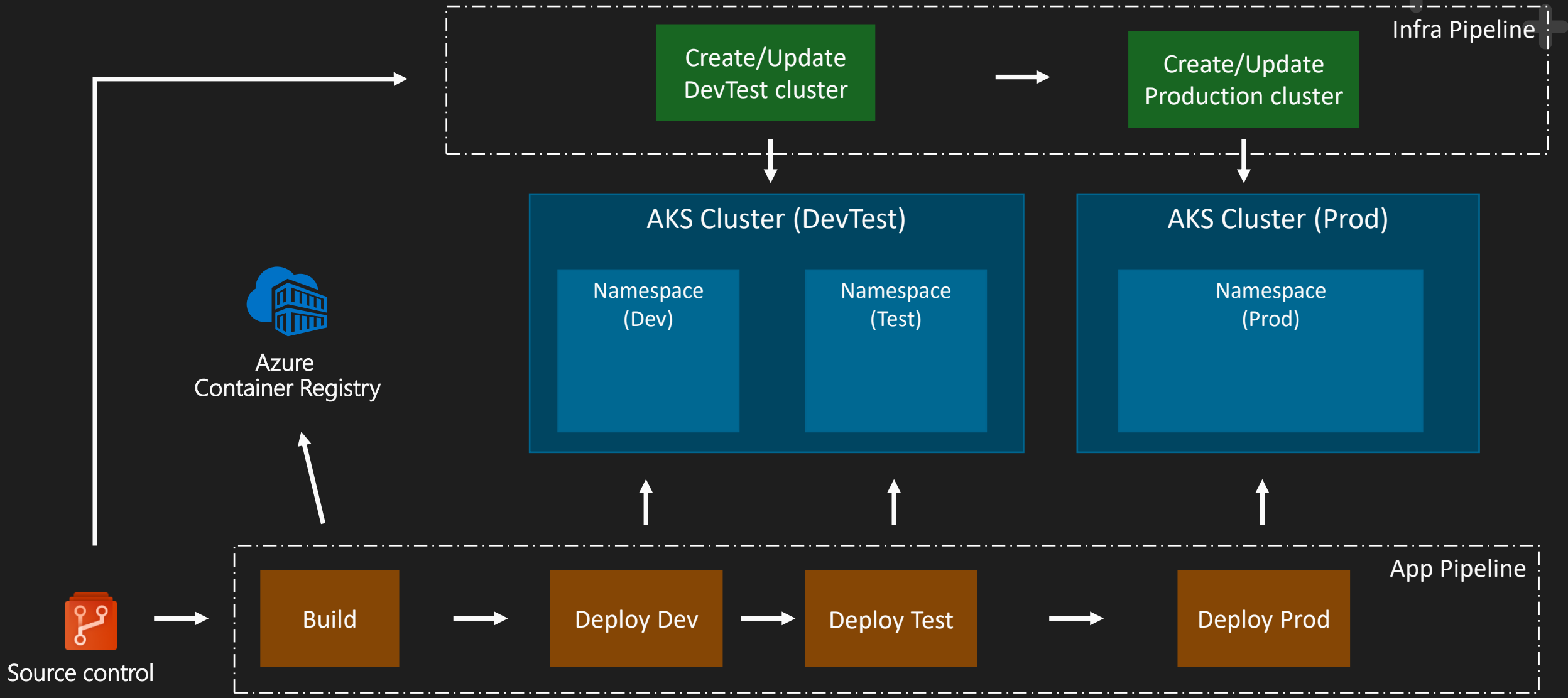
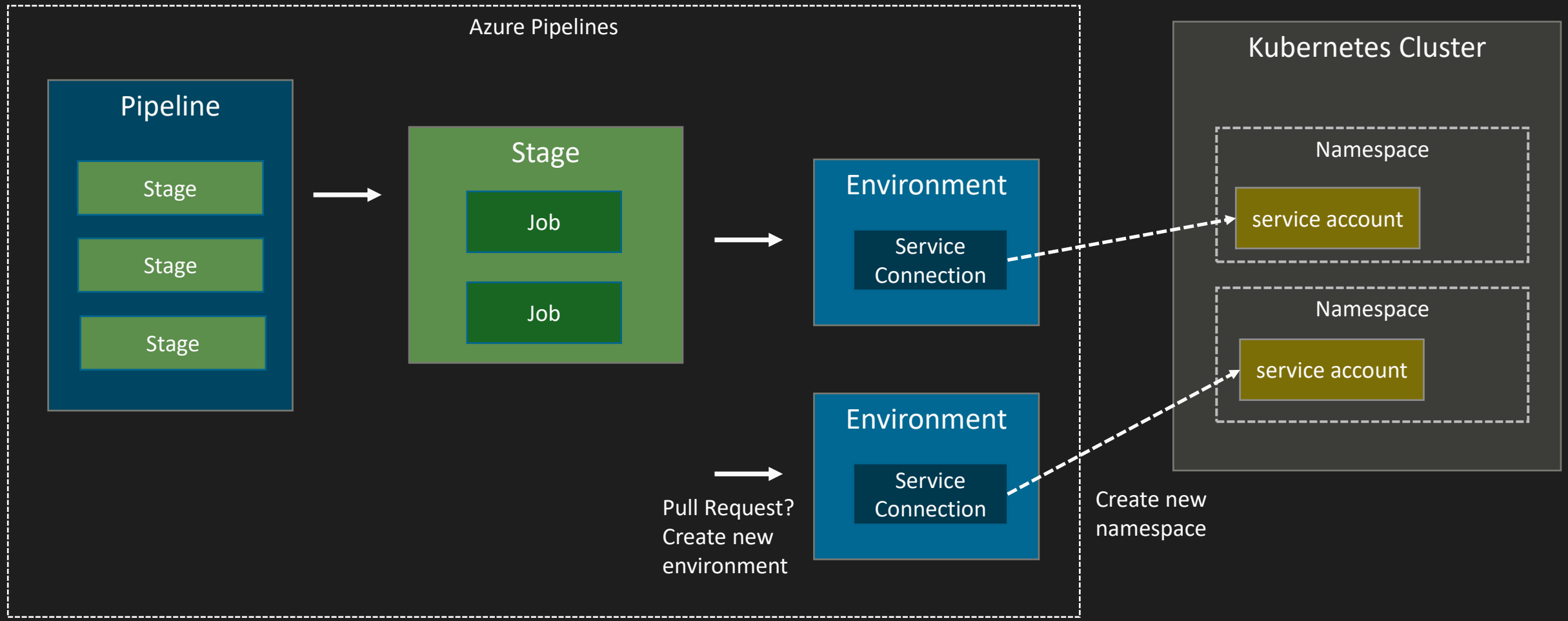
CI/CD with AKS

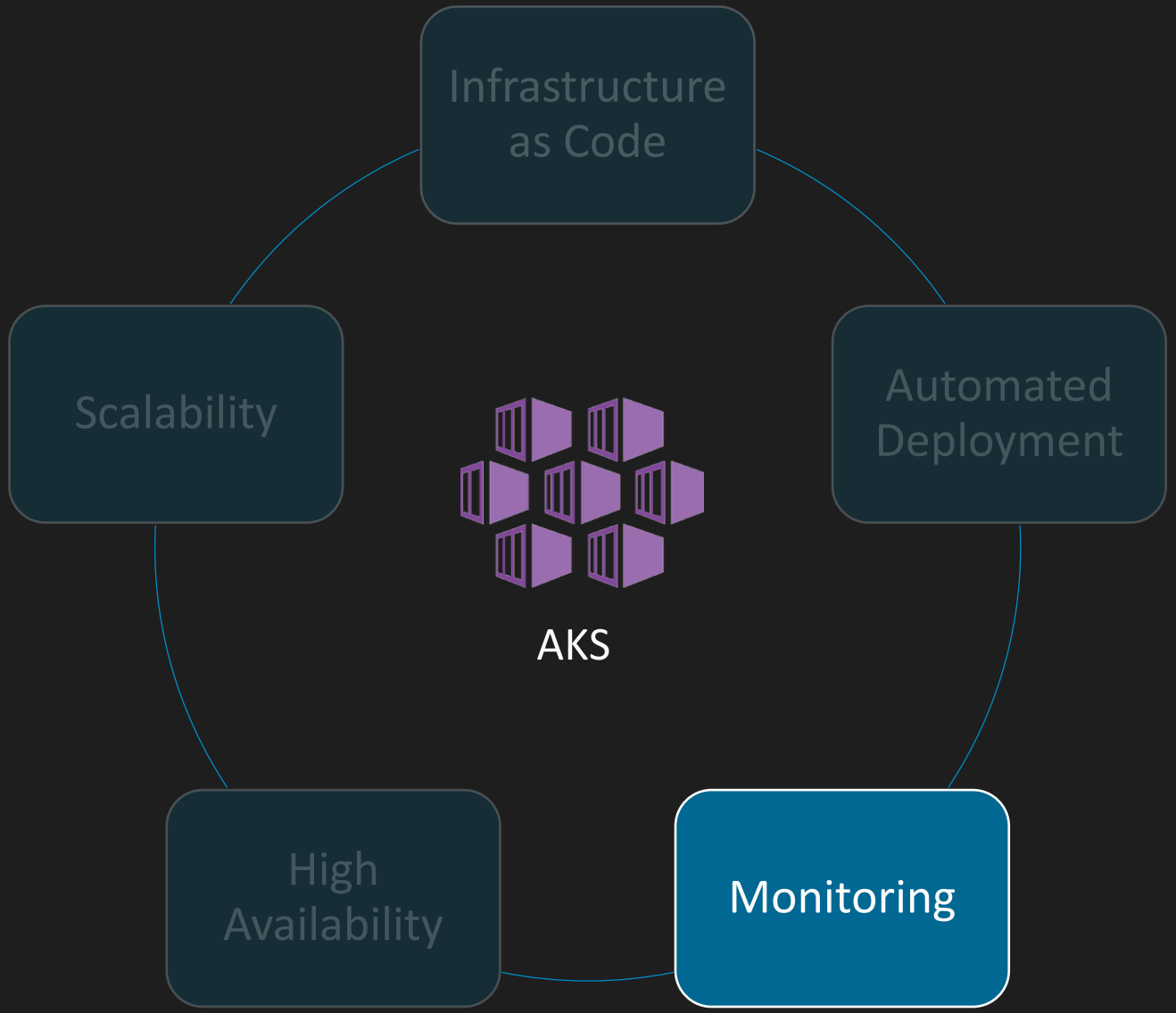


Kubernetes deployments with Azure Pipelines



Demo

Infrastructure as Code
Automated Deployment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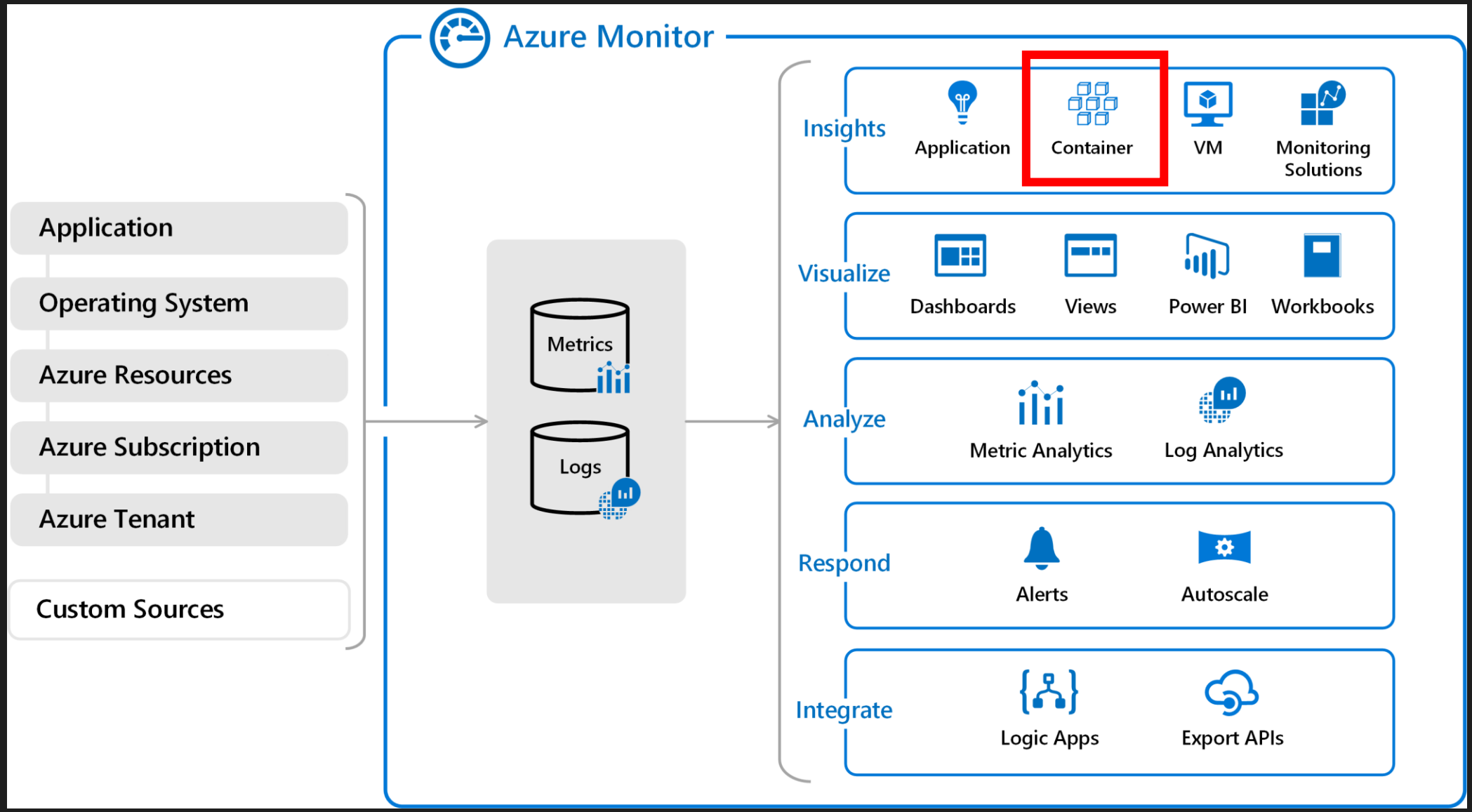
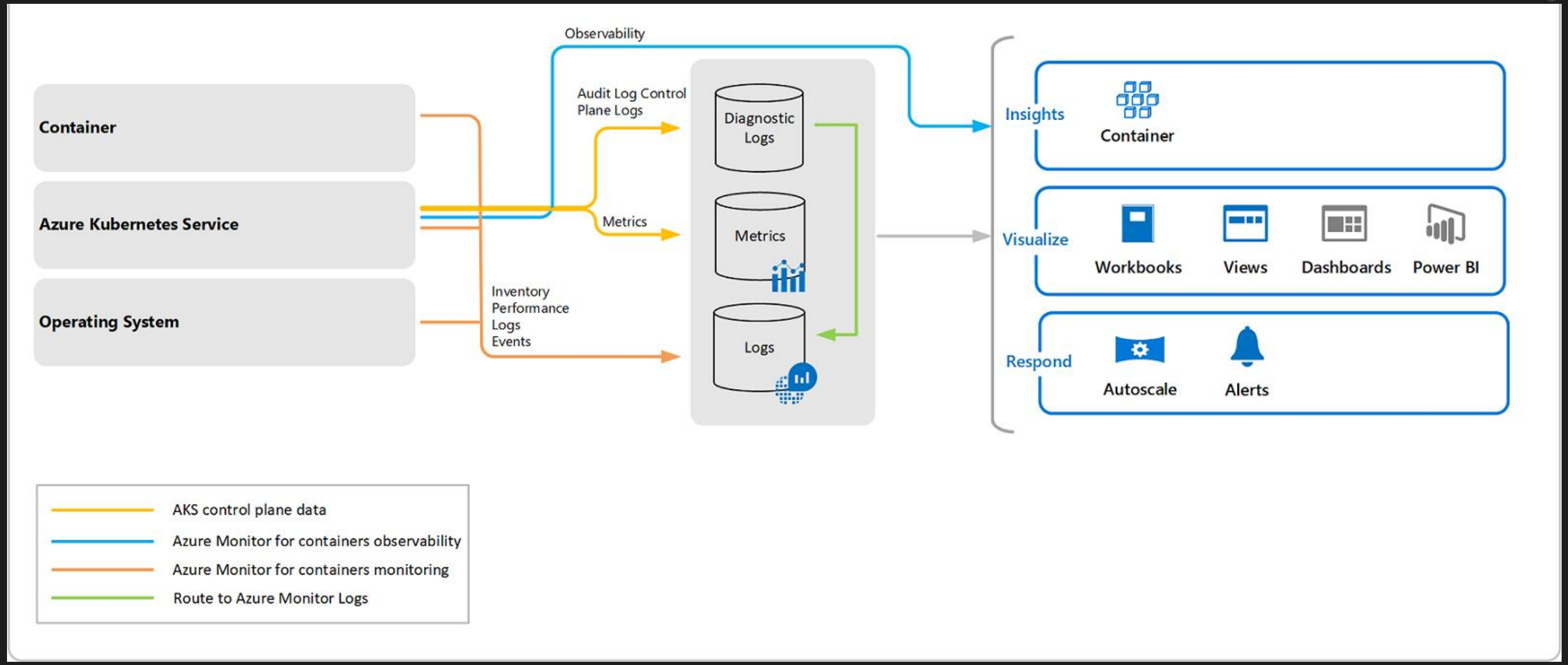
Azure Monitor



Azure Monitor for containers



Azure Monitor for AKS

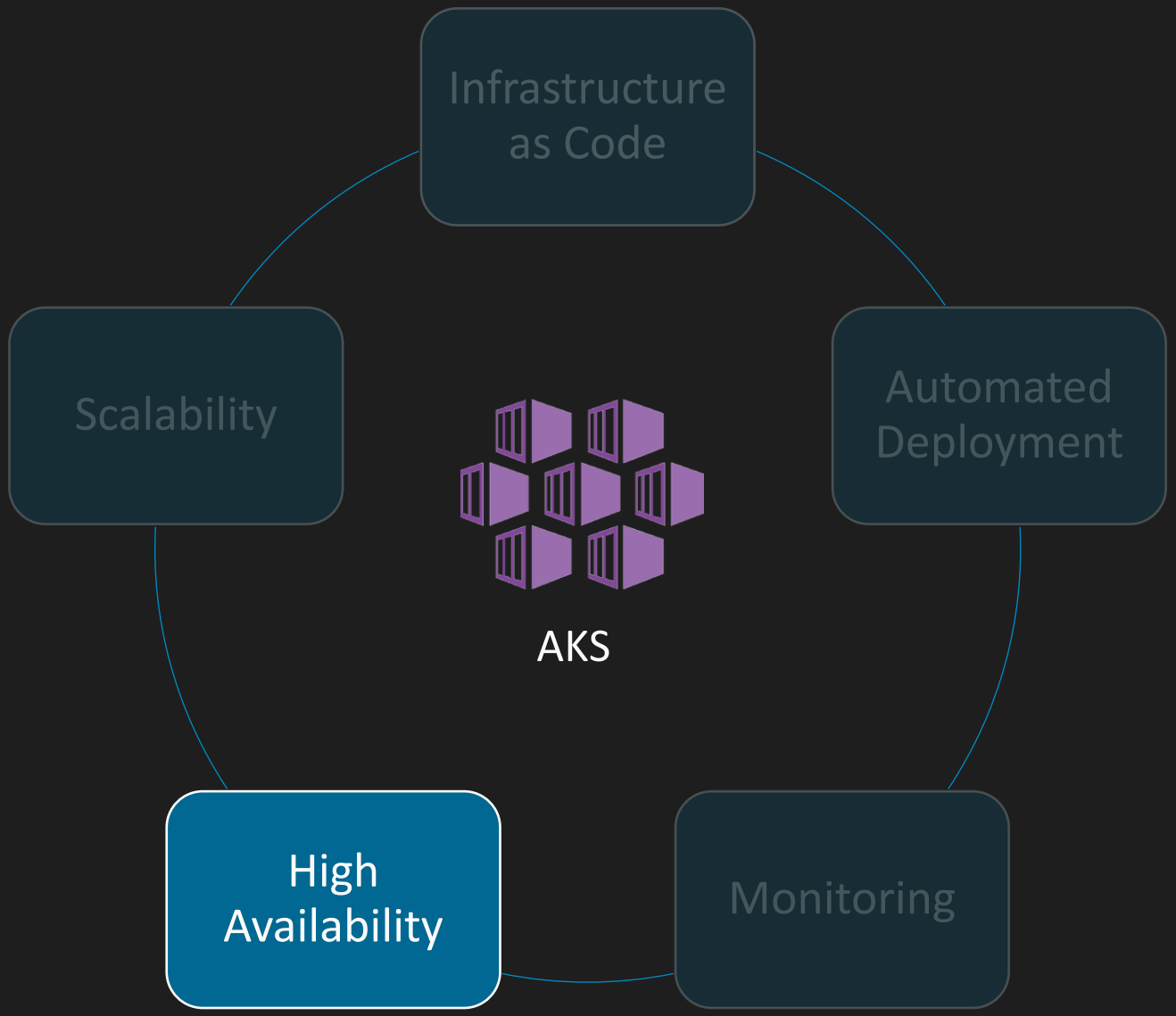
- Deploys Log Analytics agent in cluster
  - Connects to Log analytics workspace
- Collects memory and processor metrics through Kubernetes Metrics API
  - Controllers
  - Nodes
  - Containers
  - Written to metrics store
- Container logs
  - Written to logs store

Enabling Azure Monitor for AKS

```
"resources": [
  {
    "apiVersion": "[variables('apiVersion').aks]",
    "type": "Microsoft.ContainerService/managedClusters",
    "name": "[parameters('clusterName')]",
    "location": "[resourceGroup().location]",
    "properties": {
      "nodeResourceGroup": "[concat(parameters('clusterName'), '-worker')]",
      "kubernetesVersion": "[parameters('kubernetesVersion')]",
      "enableRBAC": true,
      "dnsPrefix": "[parameters('clusterName')]",
      "addonProfiles": {
        "kubeDashboard": {
          "enabled": false
        },
        "omsagent": {
          "enabled": true,
          "config": {
            "logAnalyticsWorkspaceResourceID": "[variables('cluster').workspaceId]"
          }
        },
        "azurepolicy": {
```

Demo

Monitoring & Feedback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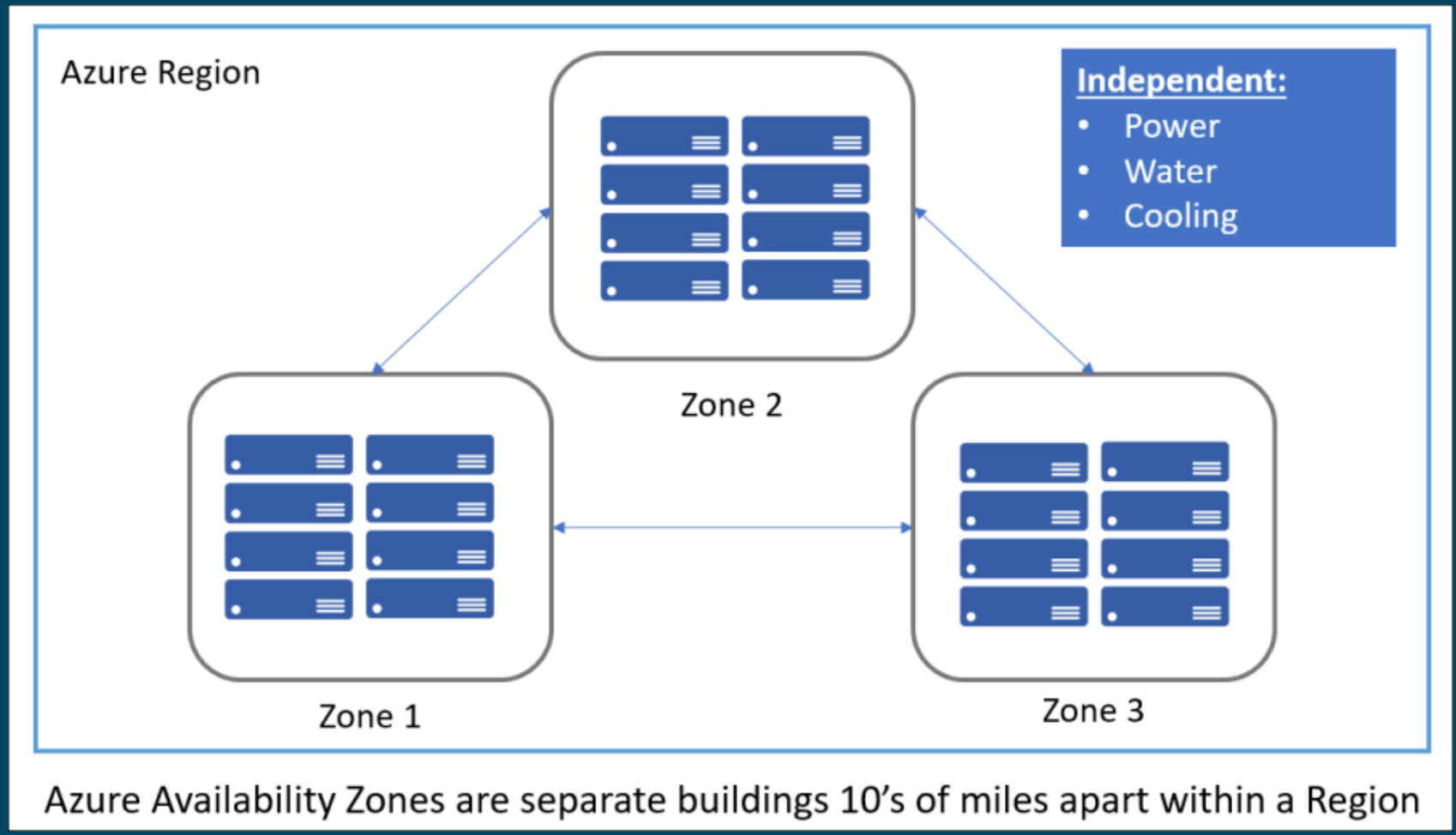
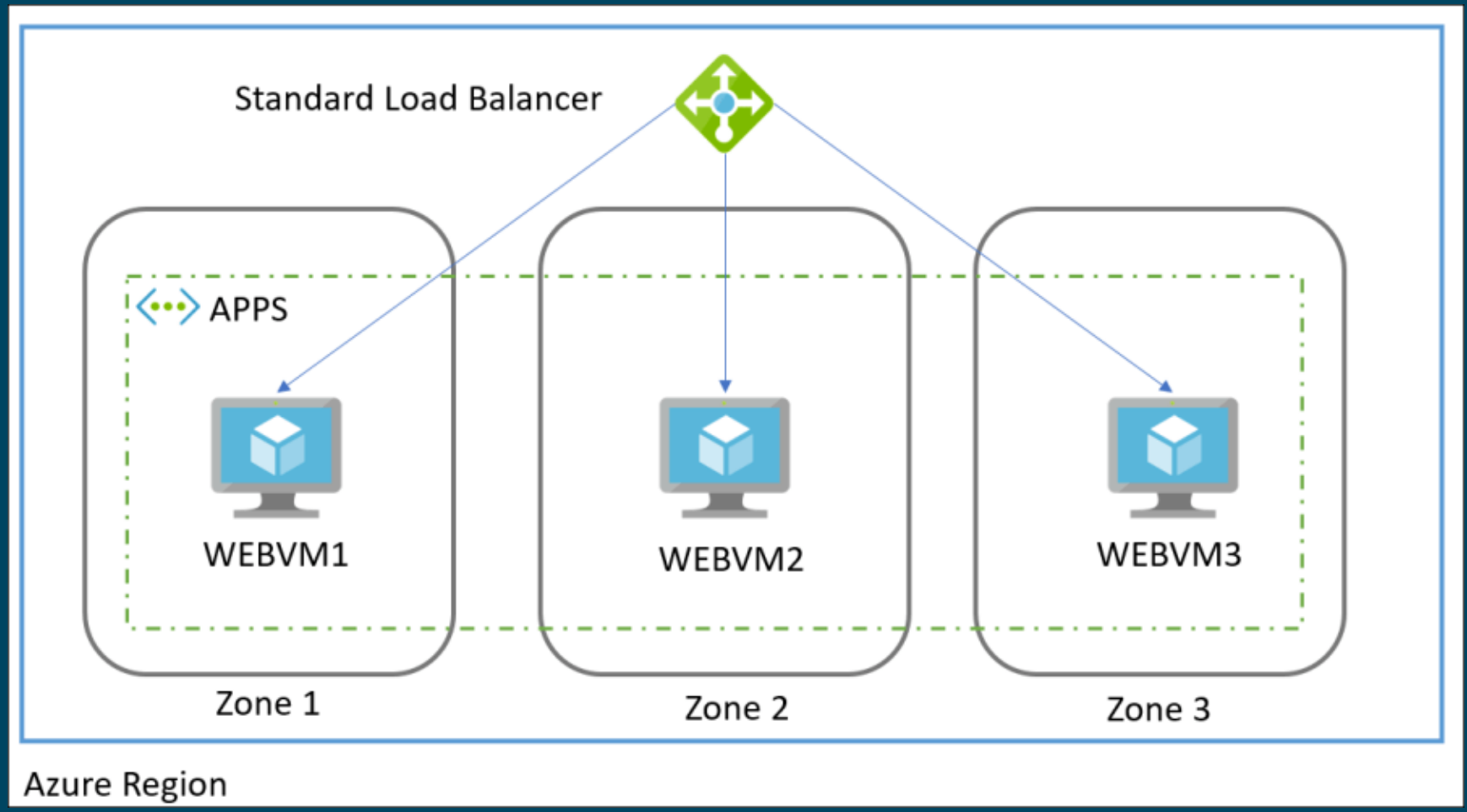
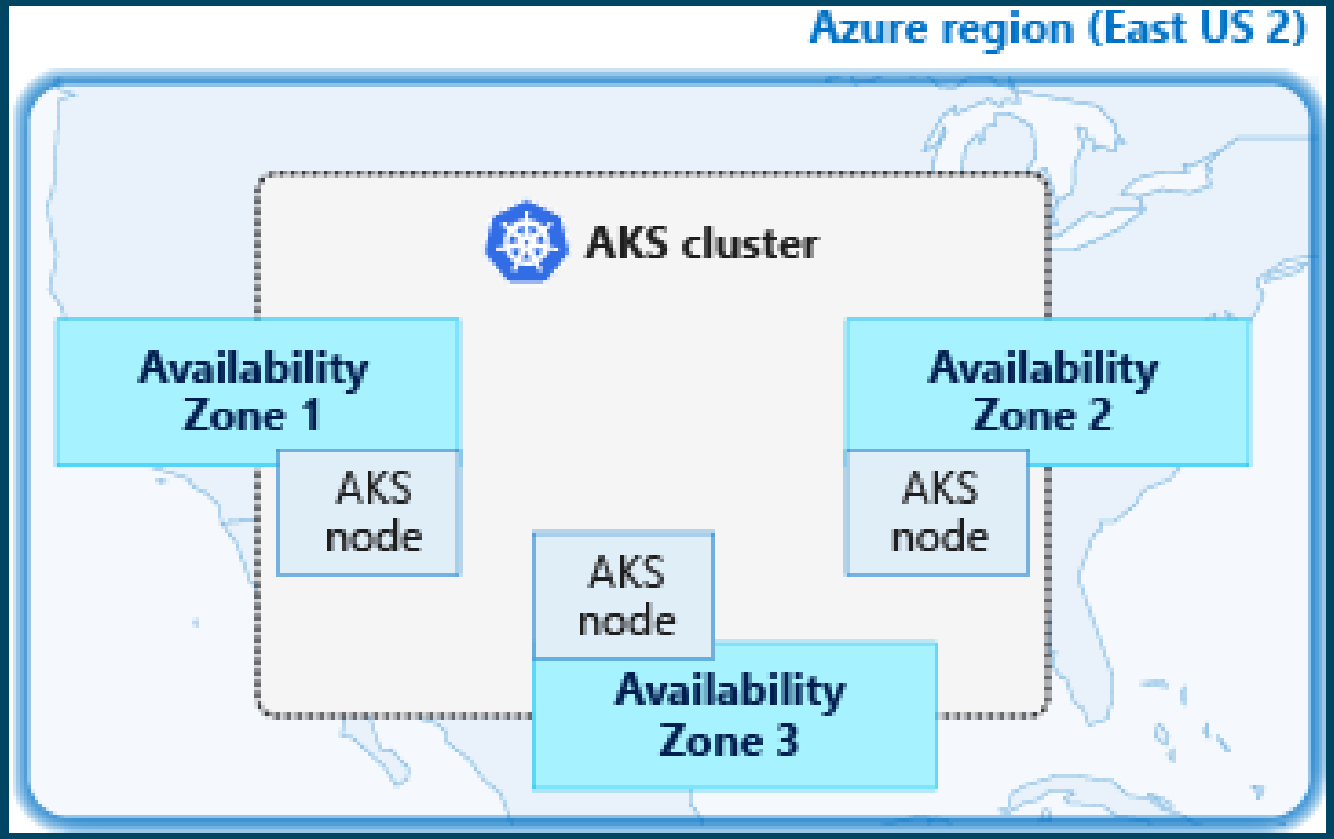
Azure Regions and Availability Zones



Azure Regions and Availability Zones



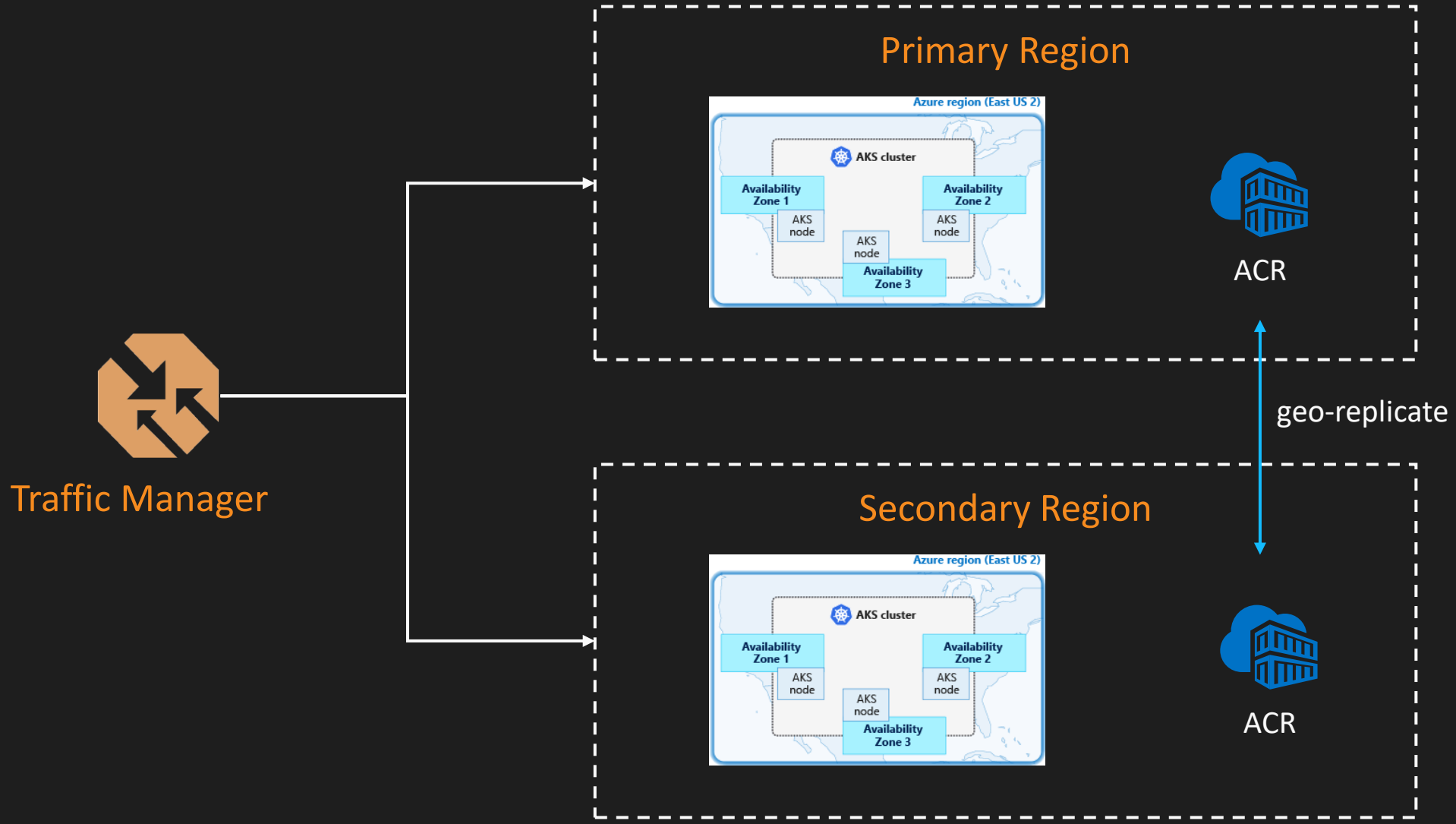
Cluster Availability and Failover

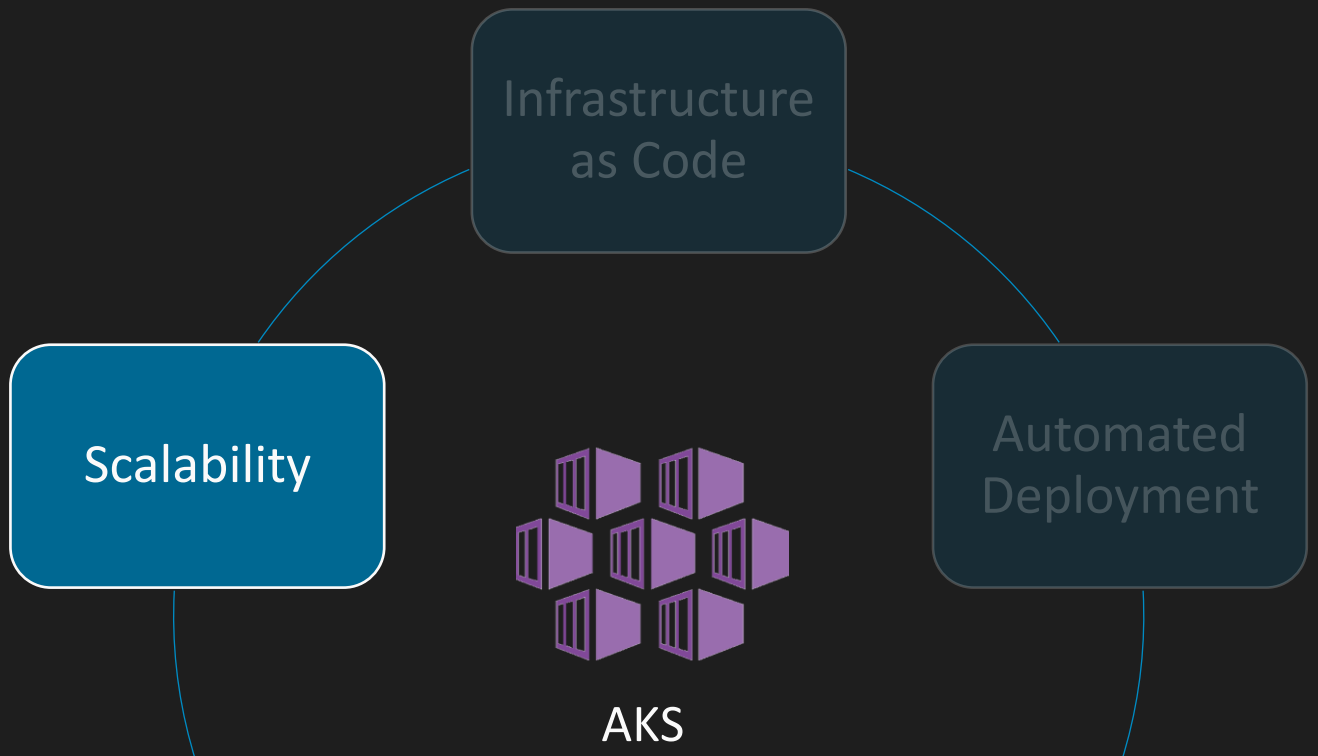


Enabling Availability Zones for AKS

```
"copy": [
  {
    "name": "agentPoolProfiles",
    "count": "[length(parameters('agentPoolProfiles'))]",
    "input": {
      "name": "[if(equals(parameters('agentPoolProfiles')[copyIndex('agentPoolProfiles')].osType, 'Lir
      "orchestratorVersion": "[parameters('kubernetesVersion')]",
      "maxPods": 250,
      "osDiskSizeGB": 128,
      "count": "[parameters('agentPoolProfiles')[copyIndex('agentPoolProfiles')].nodeCount]",
      "vmSize": "[parameters('agentPoolProfiles')[copyIndex('agentPoolProfiles')].nodeVmSize]",
      "osType": "[parameters('agentPoolProfiles')[copyIndex('agentPoolProfiles')].osType]",
      "vnetSubnetID": "[variables('agentPoolProfiles').vnetSubnetId]",
      "enableAutoScaling": "[if(parameters('agentPoolProfiles')[copyIndex('agentPoolProfiles')].enable
      "maxCount": "[if(parameters('agentPoolProfiles')[copyIndex('agentPoolProfiles')].enableAutoScali
      "minCount": "[if(parameters('agentPoolProfiles')[copyIndex('agentPoolProfiles')].enableAutoScali
      "type": "VirtualMachineScaleSets",
      "availabilityZones": ["1","2","3"],
      "mode": "[parameters('agentPoolProfiles')[copyIndex('agentPoolProfiles')].mode]",
      "enableNodePublicIP": false,
      "nodeLabels": "[parameters('agentPoolProfiles')[copyIndex('agentPoolProfiles')].nodeLabels]",
      "nodeTaints": "[parameters('agentPoolProfiles')[copyIndex('agentPoolProfiles')].nodeTaints]"
    }
  }
```

Cluster Availability and Failover

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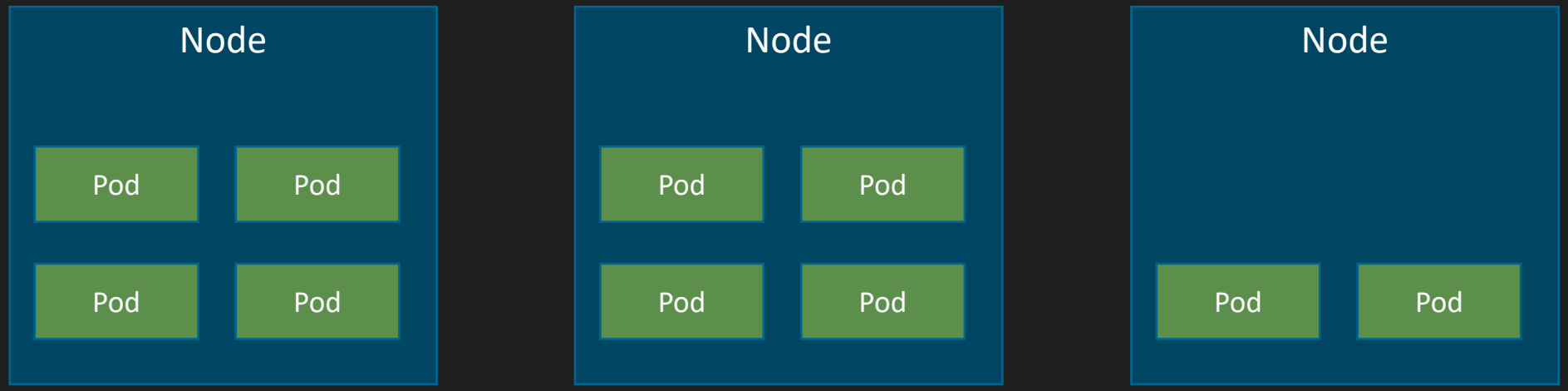
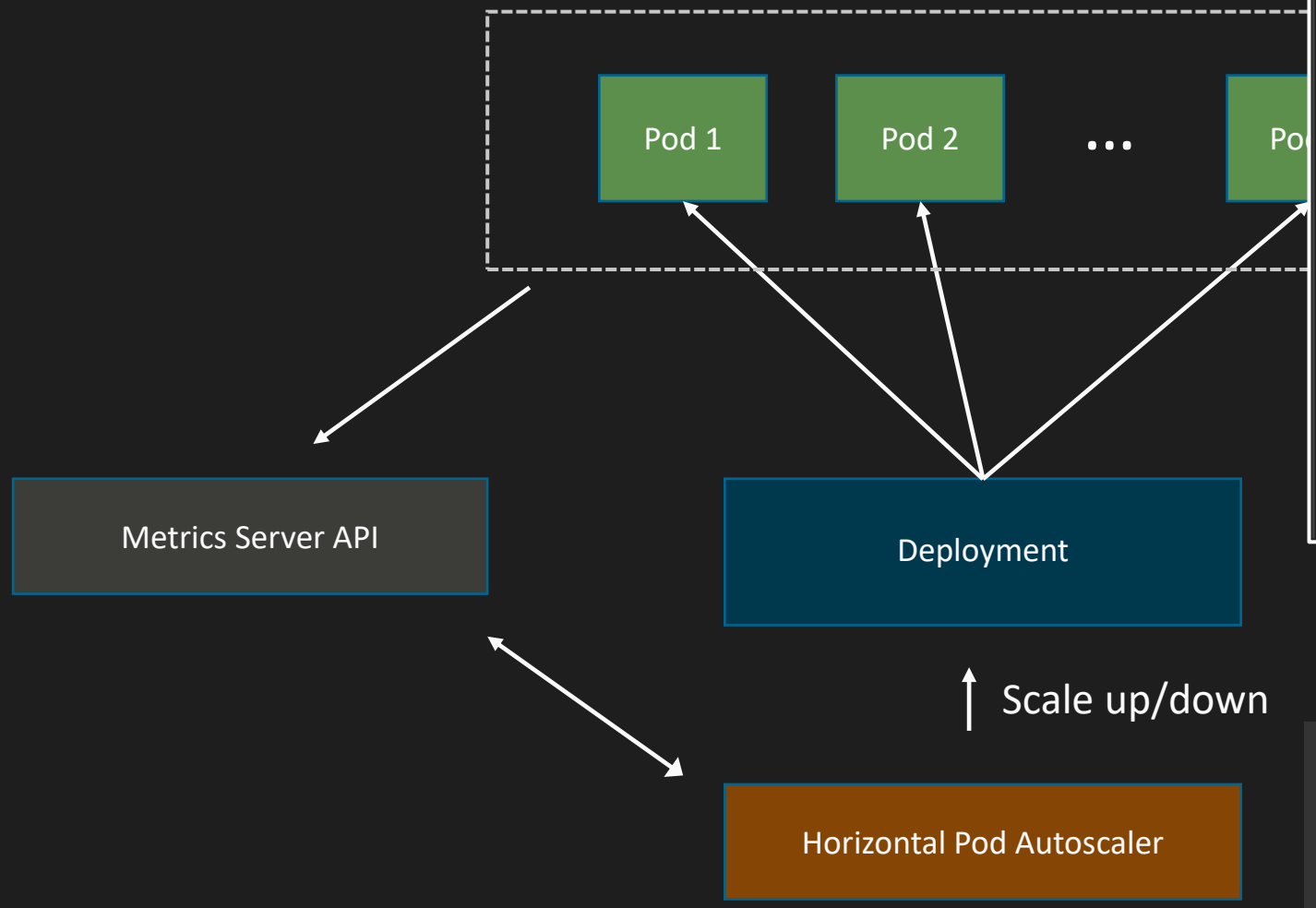
Scaling with AKS



Horizontal Pod Autoscaling (HPA)

Cluster Autoscaler

Horizontal Pod Autoscaler



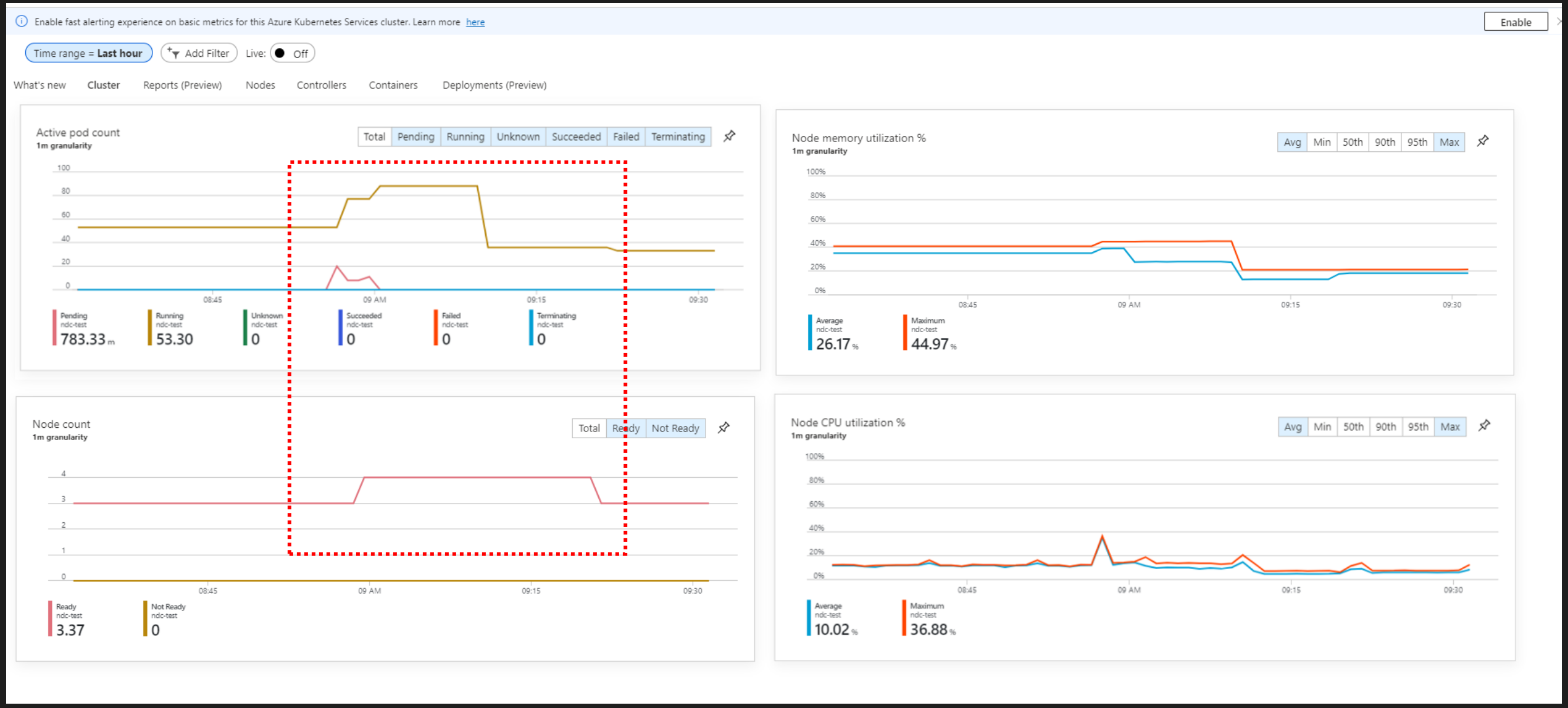

```
      app: qbox
      tier: frontend
  spec:
    containers:
    - name: frontend
      image: qbox.web:1.0
      ports:
      - containerPort: 80
      resources:
        requests:
          cpu: 250m
        limits:
          cpu: 500m
```

```
kubectl autoscale deployment xyz
  --cpu-percent=80
  --min=3
  --max=10
```

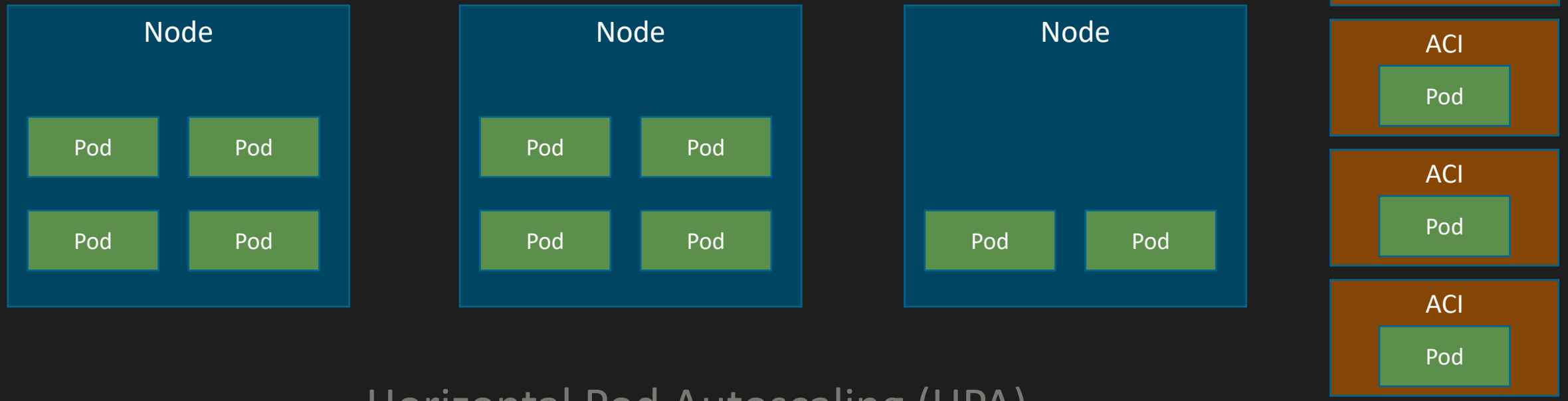
Cluster Autoscaling

```
"copy": [
  {
    "name": "agentPoolProfiles",
    "count": "[length(parameters('agentPoolProfiles'))]",
    "input": {
      "name": "[if(equals(parameters('agentPoolProfiles')[copyIndex('agentPoolProfiles')].osType, 'Linux'), if(lessOrEquals(length(para
      "orchestratorVersion": "[parameters('kubernetesVersion')]",
      "maxPods": 250,
      "osDiskSizeGB": 128,
      "count": "[parameters('agentPoolProfiles')[copyIndex('agentPoolProfiles')].nodeCount]",
      "vmSize": "[parameters('agentPoolProfiles')[copyIndex('agentPoolProfiles')].nodeVmSize]",
      "osType": "[parameters('agentPoolProfiles')[copyIndex('agentPoolProfiles')].osType]",
      "vnetSubnetID": "[variables('agentPoolProfiles').vnetSubnetId]",
      "enableAutoScaling": true,
      "maxCount": 2,
      "minCount": 4,
      "type": "VirtualMachineScaleSets",
      "availabilityZones": "[parameters('agentPoolProfiles')[copyIndex('agentPoolProfiles')].availabilityZones]",
      "mode": "[parameters('agentPoolProfiles')[copyIndex('agentPoolProfiles')].mode]",
      "enableNodePublicIP": false,
      "nodeLabels": "[parameters('agentPoolProfiles')[copyIndex('agentPoolProfiles')].nodeLabels]",
      "nodeTaints": "[parameters('agentPoolProfiles')[copyIndex('agentPoolProfiles')].nodeTaints]"
    }
  }
],
"networkProfile": {
```

Cluster Autoscaling



Serverless scaling with AKS

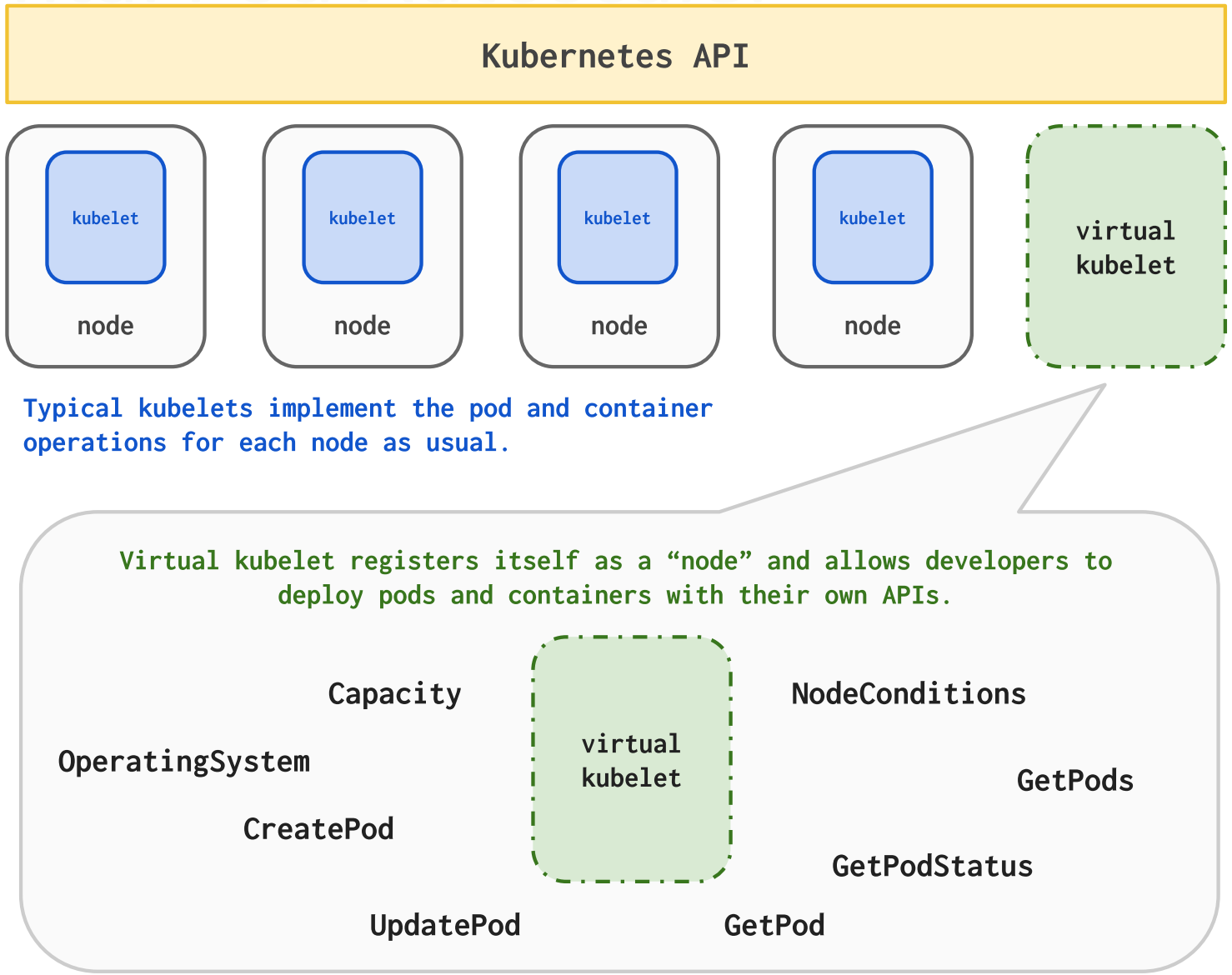


Horizontal Pod Autoscaling (HPA)

Cluster Autoscaler

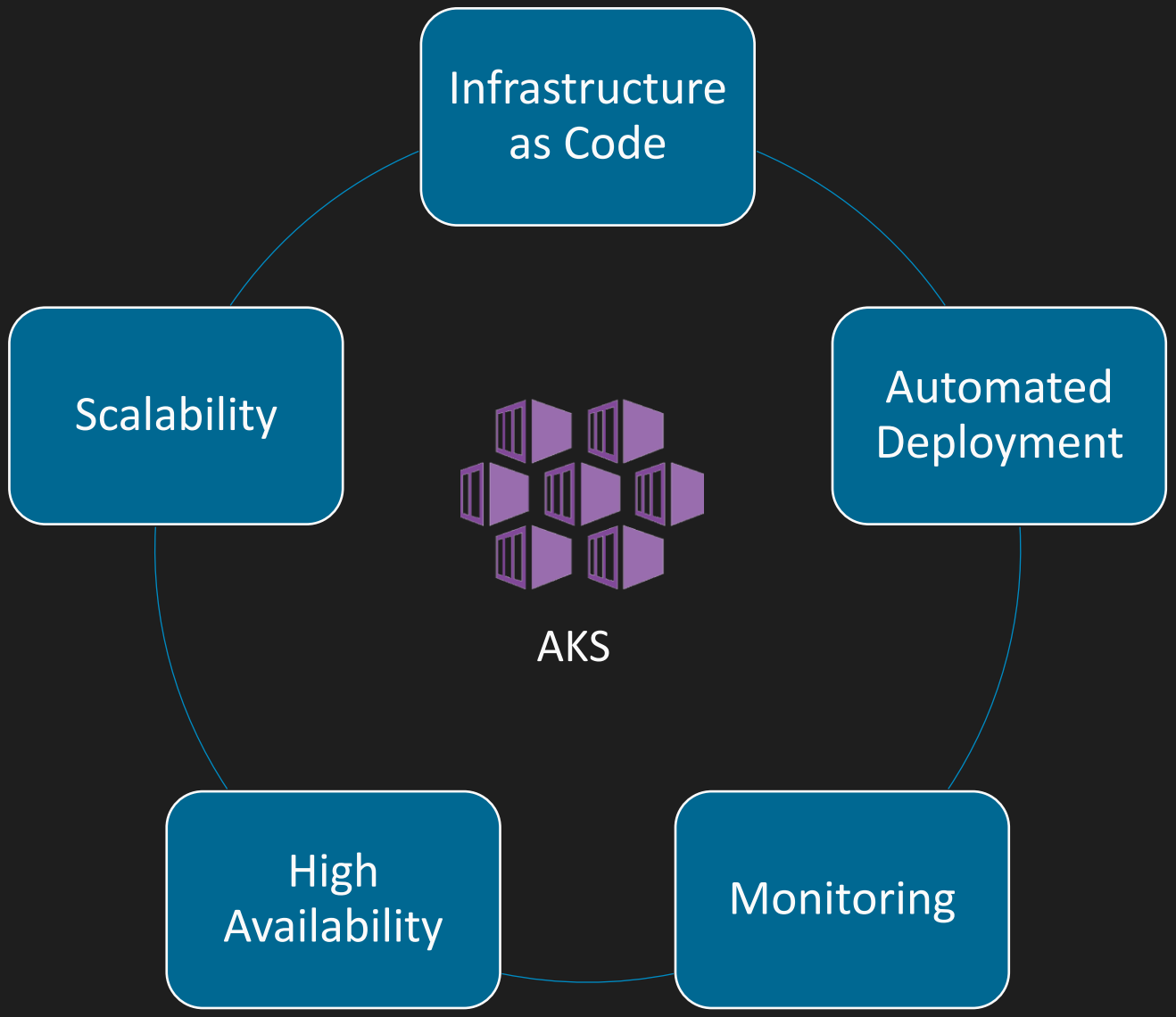
Virtual Nodes

Virtual Node Architecture



Demo

High Availability
Autoscaling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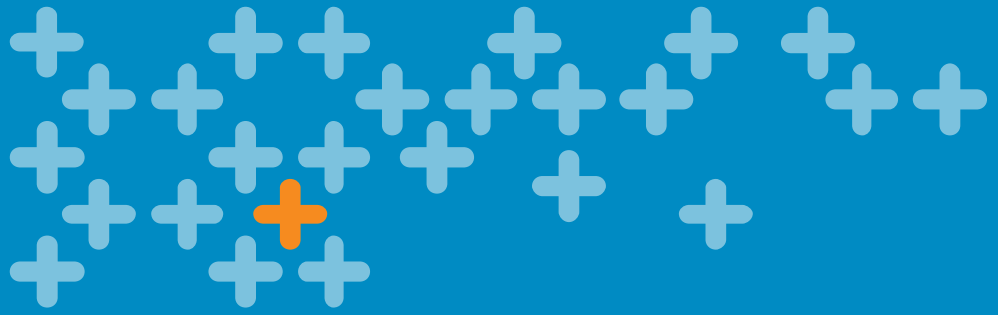

Thank you

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