


# Microsoft Azure Arc Webinar Series

Webinar TWO:  
Intermediate-Level Practices with Microsoft Azure Arc

- 
- ❖ Introduction (5 min)
  - ❖ Recap of Webinar One (5 minutes)
  - ❖ Advanced Configuration & Management (25 minutes)
  - ❖ Cost Management (20 minutes)
  - ❖ Refreshment Break (10 minutes)
  - ❖ Security Considerations (25 minutes)
  - ❖ Advanced Azure Arc Features [aka DevOps] (20 minutes)
  - ❖ Q&A Time (10 minutes)

# Introduction

(5 minutes)



# About the Webinar

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Elevate your Azure Arc understanding to the next level.

After a quick recap of our introductory webinar, immerse yourself in advanced configuration techniques for managing multiple clusters and ensuring robust policy enforcement

Delve into Azure Arc's potential for cost management, followed by an insightful segment on security considerations.

Experience live demonstrations showcasing the advanced features, particularly focusing on DevOps and Azure Arc-enabled Kubernetes.

We round off this intermediate session with an interactive Q&A session, answering your pressing questions.

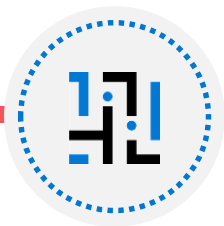
Join us for a captivating 2-hour session, followed by a dedicated Q&A segment to address your queries.

# Recap of Webinar One

(5 minutes)

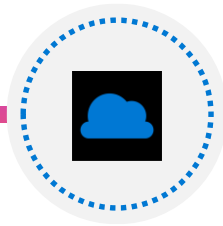


# Quick overview of previous webinar content



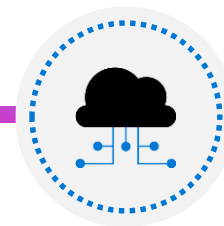
## What is Microsoft Azure Arc?

- An overview of Azure Arc and its concept
- Importance of hybrid cloud environment
- Importance of multi cloud environment



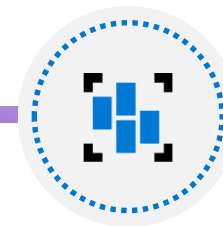
## Basics of Installation & Configuration

- Technical requirements
- Licensing Requirements
- Step-by-Step Installation Guide



## Overview & Flavors of Azure Arc Services

- Overview of the Services & Infrastructure
- Introduction to Azure JumpStart
- Flavors of Azure JumpStart (Agora, IT-Pros, DevOps, DataOps)



## Demo of Basic Use-Case for IT-Pros

- How to manage and organize resources
- Fundamentals of Governance and management



# Advanced Configuration & Management

(25 minutes)



# How to manage multiple clusters | Kubernetes

Azure Arc-enabled Kubernetes allows you to attach Kubernetes clusters running anywhere so that you can manage and configure them in Azure. By managing all of your Kubernetes resources in a single control plane, you can enable a more consistent development and operation experience to run cloud-native apps anywhere and on any Kubernetes platform.

Once clusters are connected to Azure, they're represented as their own resources in Azure Resource Manager, and they can be organized using resource groups and tagging.

Azure Arc-enabled Kubernetes works with any Cloud Native Computing Foundation (CNCF) certified Kubernetes clusters. This includes clusters running on other public cloud providers (such as GCP or AWS) and clusters running on your on-premises data center (such as VMware vSphere or Azure Stack HCI).



# Azure Arc Validate Partners

The Azure Arc team works with key industry Kubernetes offering providers to validate Azure Arc-enabled Kubernetes with their Kubernetes distributions. Future major and minor versions of Kubernetes distributions released by these providers will be validated for compatibility with Azure Arc-enabled Kubernetes.

## Important

Azure Arc-enabled Kubernetes works with any Kubernetes clusters that are certified by the Cloud Native Computing Foundation (CNCF), even if they haven't been validated through conformance tests and are not listed on this page.

# Validated Distributions

Distribution and infrastructure provider	Version
Cluster API Provider on Azure	Release version: <a href="#">0.4.12</a> ; Kubernetes version: <a href="#">1.18.2</a>
AKS on Azure Stack HCI	Release version: <a href="#">December 2020 Update</a> ; Kubernetes version: <a href="#">1.18.8</a>
K8s on Azure Stack Edge	Release version: Azure Stack Edge 2207 (2.2.2037.5375); Kubernetes version: <a href="#">1.22.6</a>
AKS Edge Essentials	Release version <a href="#">1.0.406.0</a> ; Kubernetes version <a href="#">1.24.3</a>

# Validated Providers

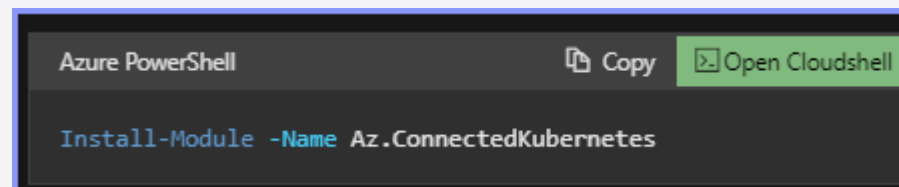
Provider name	Distribution name	Version
RedHat	<a href="#">OpenShift Container Platform</a>	<a href="#">4.9.43</a> , <a href="#">4.10.23</a> , 4.11.0-rc.6, <a href="#">4.13.4</a>
VMware	<a href="#">Tanzu Kubernetes Grid</a>	TKGs 2.2; upstream K8s 1.25.7+vmware.3 TKGm 2.3; upstream K8s v1.26.5+vmware.2 TKGm 2.2; upstream K8s v1.25.7+vmware.2 TKGm 2.1.0; upstream K8s v1.24.9+vmware.1
Canonical	<a href="#">Charmed Kubernetes</a>	<a href="#">1.24</a> , <a href="#">1.28</a>
SUSE Rancher	<a href="#">Rancher Kubernetes Engine</a>	RKE CLI version: <a href="#">v1.3.13</a> ; Kubernetes versions: 1.24.2, 1.23.8
SUSE Rancher	<a href="#">K3s</a>	<a href="#">v1.27.4+k3s1</a> , <a href="#">v1.26.7+k3s1</a> , <a href="#">v1.25.12+k3s1</a>
Nutanix	<a href="#">Nutanix Kubernetes Engine</a>	Version <a href="#">2.5</a> ; upstream K8s v1.23.11
Kublr	<a href="#">Kublr Managed K8s</a> Distribution	<a href="#">Kublr 1.26.0</a> ; Upstream K8s Versions: 1.21.3, 1.22.10, 1.22.17, 1.23.17, 1.24.13, 1.25.6, 1.26.4
Mirantis	<a href="#">Mirantis Kubernetes Engine</a>	MKE Version <a href="#">3.6.0</a> MKE Version <a href="#">3.5.5</a> MKE Version <a href="#">3.4.7</a>
Wind River	<a href="#">Wind River Cloud Platform</a>	Wind River Cloud Platform 22.12; Upstream K8s version: 1.24.4 Wind River Cloud Platform 22.06; Upstream K8s version: 1.23.1 Wind River Cloud Platform 21.12; Upstream K8s version: 1.21.8 Wind River Cloud Platform 21.05; Upstream K8s version: 1.18.1

# Azure Arc-enabled Kubernetes [quickstart]

Get started with Azure Arc-enabled Kubernetes by using **Azure CLI** or **Azure PowerShell** to connect an existing Kubernetes cluster to Azure Arc.

## Requirements:

- Azure Subscription
- Identity (user or service principal)
- Azure Powershell min 6.6.0
- Running Kubernetes cluster
  - or Kubernetes in Docker (KIND)
  - or Kubernetes in Docker for Mac or Windows
  - or self-managed Kubernetes with Cluster API
- kubeconfigfile
- network access (next slide)



```
Azure PowerShell Copy Open Cloudshell  
Install-Module -Name Az.ConnectedKubernetes
```

## Requirements for Agent:

- min 850 mb free space
- be ready for about 7% of utilisation of single CPU

# Azure Arc-enabled Kubernetes [quickstart] Network Req

Azue Arc agents require the following outbound URLs on https://:443 to function. For \*.servicebus.windows.net, websockets need to be enabled for outbound access on firewall and proxy.

Endpoint (DNS)	Description
https://management.azure.com	Required for the agent to connect to Azure and register the cluster.
https://<region>.dp.kubernetesconfiguration.azure.com	Data plane endpoint for the agent to push status and fetch configuration information.
https://login.microsoftonline.com	Required to fetch and update Azure Resource Manager tokens.
https://<region>.login.microsoft.com	
login.windows.net	
https://mcr.microsoft.com	Required to pull container images for Azure Arc agents.
https://*.data.mcr.microsoft.com	
https://gbl.his.arc.azure.com	Required to get the regional endpoint for pulling system-assigned Managed Identity certificates.
https://*.his.arc.azure.com	Required to pull system-assigned Managed Identity certificates.
https://k8connecthelm.azureedge.net	az connectedk8s connect uses Helm 3 to deploy Azure Arc agents on the Kubernetes cluster. This endpoint is needed for Helm client download to facilitate deployment of the agent helm chart.
guestnotificationservice.azure.com	For <u>Cluster Connect</u> and for <u>Custom Location</u> based scenarios.
*.guestnotificationservice.azure.com	
sts.windows.net	
https://k8sconnectcsp.azureedge.net	For <u>Cluster Connect</u> and for <u>Custom Location</u> based scenarios.
*.servicebus.windows.net	
https://graph.microsoft.com/	Required when <u>Azure RBAC</u> is configured.
*.arc.azure.net	Required to manage connected clusters in Azure portal.
https://<region>.obo.arc.azure.com:8084/	Required when <u>Cluster Connect</u> is configured.
dl.k8s.io	Required when <u>automatic agent upgrade</u> is enabled.

# What is Azure Arc Resource Bridge (Preview)

Azure Arc resource bridge (preview) is a Microsoft managed product that is part of the core Azure Arc platform. It is designed to host other Azure Arc services.

In this release, the resource bridge supports VM self-servicing and management from Azure, for virtualized Windows and Linux virtual machines hosted in an

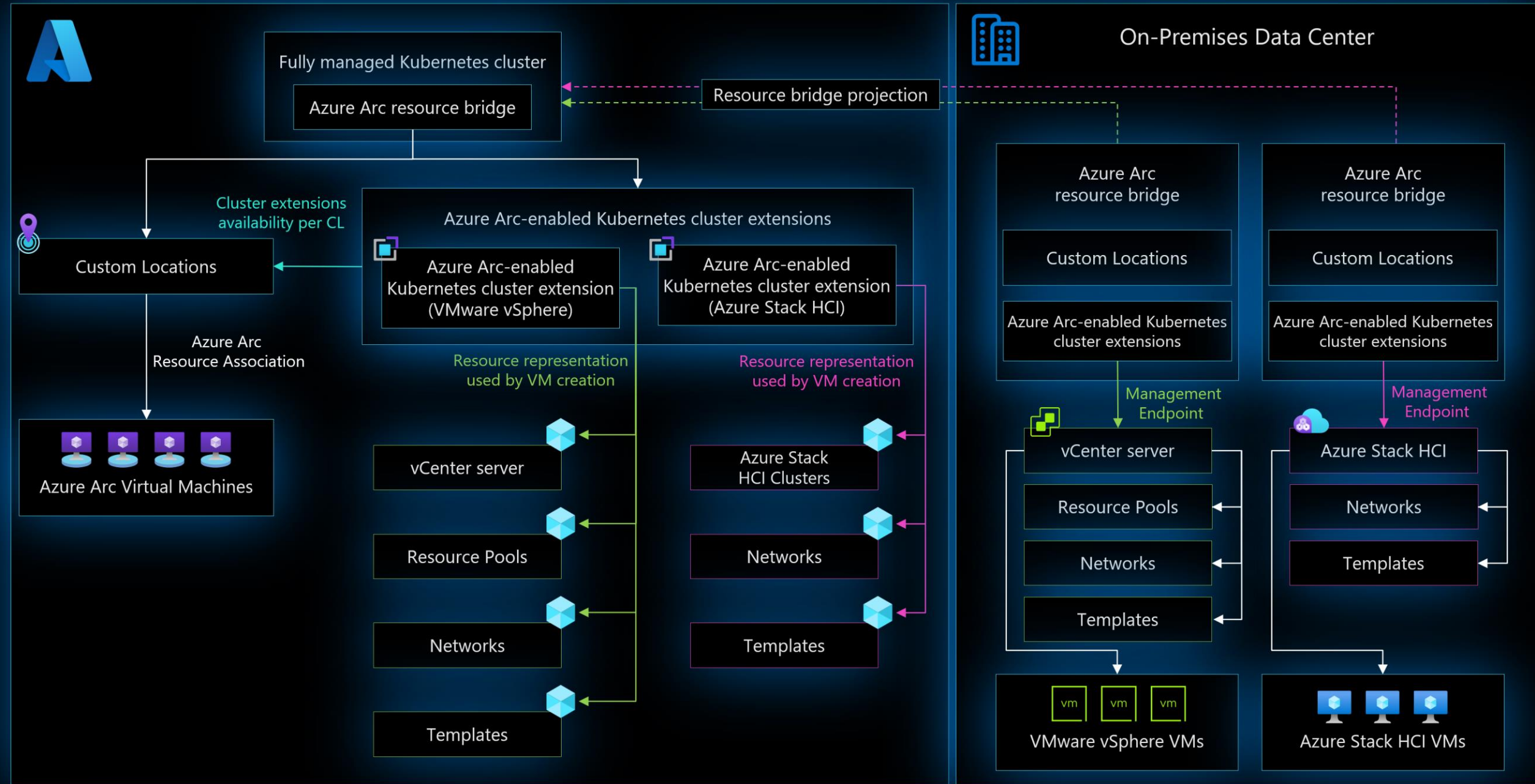
- on-premises environment on [Azure Stack HCI](#)
- VMware ([Arc-enabled VMware vSphere](#) preview),
- and System Center Virtual Machine Manager (SCVMM) ([Arc-enabled SCVMM](#) preview)

Arc resource bridge has the following minimum resource requirements:

- ❑ 50 GB disk space
- ❑ 4 vCPUs
- ❑ 8 GB memory



# Azure Arc Resource Bridge architecture



# Azure Arc Resource Bridge | Two main concepts

## Cluster Extention

The Azure service deployed to run on-premises. For the preview release, it supports three services:

- Azure Arc-enabled VMware
- Azure Arc VM management on Azure Stack HCI
- Azure Arc-enabled System Center Virtual Machine Manager (SCVMM)

## Custom Location

A deployment target where you can create Azure resources. It maps to different resource for different Azure services. For example, for Arc-enabled VMware, the custom locations resource maps to an instance of vCenter, and for Azure Arc VM management on Azure Stack HCI, it maps to an HCI cluster instance.

# Azure Arc Resource Bridge | general benefits

Arc resource bridge delivers the following benefits:

- Enables VM self-servicing from Azure without having to create and manage a Kubernetes cluster.
- Fully supported by Microsoft, including updates to core components.
- Supports deployment to any private cloud hosted on Hyper-V or VMware from the Azure portal or using the Azure Command-Line Interface (CLI).

Azure Arc resource bridge (preview) hosts other components such as custom locations, cluster extensions, and other Azure Arc agents in order to deliver the level of functionality with the private cloud infrastructures it supports. This complex system is composed of three layers:

- The base layer that represents the resource bridge and the Arc agents.
- The platform layer that includes the custom location and cluster extension.
- The solution layer for each service supported by Arc resource bridge (that is, the different type of VMs).

# Azure Arc Resource Bridge | benefits for VMware

By registering resource pools, networks, and VM templates, you can represent a subset of your vCenter resources in Azure to enable self-service.

Integration with Azure allows you to manage access to your vCenter resources in Azure to maintain a secure environment. You can also perform various operations on the VMware virtual machines that are enabled by Arc-enabled VMware vSphere:

- ❖ Start, stop, and restart a virtual machine
- ❖ Control access and add Azure tags
- ❖ Add, remove, and update network interfaces
- ❖ Add, remove, and update disks and update VM size (CPU cores and memory)
- ❖ Enable guest management
- ❖ Install extensions

# Azure Arc Resource Bridge | benefits for SCVMM

You can connect an SCVMM management server to Azure by deploying Azure Arc resource bridge (preview) in the VMM environment.

Azure Arc resource bridge (preview) enables you to represent the SCVMM resources (clouds, VMs, templates etc.) in Azure and perform various operations on them:

- ❖ Start, stop, and restart a virtual machine
- ❖ Control access and add Azure tags
- ❖ Add, remove, and update network interfaces
- ❖ Add, remove, and update disks and update VM size (CPU cores and memory)

# Policy enforcement and governance in complex environments

Azure Policy helps to enforce organizational standards and to assess compliance at-scale. Through its compliance dashboard, it provides an aggregated view to evaluate the overall state of the environment, with the ability to drill down to the per-resource, per-policy granularity. It also helps to bring your resources to compliance through bulk remediation for existing resources and automatic remediation for new resources.

Common use cases for Azure Policy include implementing governance for resource consistency, regulatory compliance, security, cost, and management. Policy definitions for these common use cases are already available in your Azure environment as built-ins to help you get started.

Specifically, some useful governance actions you can enforce with Azure Policy include:

- ☐ Ensuring your team deploys Azure resources only to allowed regions
- ☐ Enforcing the consistent application of taxonomic tags
- ☐ Requiring resources to send diagnostic logs to a Log Analytics workspace

It's important to recognize that with the introduction of [Azure Arc](#), you can extend your policy-based governance across different cloud providers and even to your local datacenters.



# Policy Assignment & non-compliant resources (1)

The first step in understanding compliance in Azure is to identify the status of your resources. Azure Policy supports auditing the state of your Azure Arc-enabled server with guest configuration policies. Azure Policy's guest configuration definitions can audit or apply settings inside the machine.

The process of creating and assigning a policy in order to identify which of your Azure Arc-enabled servers don't have the Log Analytics agent for Windows or Linux installed. These machines are considered *non-compliant* with the policy assignment.

# Policy Assignment & non-compliant resources (2)

Required steps:

- Go to *Policy* in Portal
- Select *Assignment*
- Choose *Scope* (Management Group/Subscription/Resource Group)
- Choose *Exclusion* (if needed)
- Select *Policy Definition* (they could include below)
  - Enforce tag and its value
  - Apply tag and its value
  - Inherit a tag from the resource group if missing

# Policy Assignment & non-compliant resources (3)

## Regulatory Assessments

Australian Government ISM PROTECTED  
 Canada Federal PBMM  
 CMMC Level 3  
 FedRAMP High  
 FedRAMP Moderate  
 HIPAA HITRUST 9.2  
 IRS 1075 September 2016  
 New Zealand ISM Restricted  
 New Zealand ISM Restricted 3.5  
 RBI ITF Banks v2016  
 RBI ITF NBFC v2017  
 RMIT Malaysia  
 SWIFT CSP-CSCF v2021

## Industry Assessments

CIS Microsoft Azure Foundations  
 Benchmark 1.1.0  
 CIS Microsoft Azure Foundations  
 Benchmark 1.3.0  
 CIS Microsoft Azure Foundations  
 Benchmark 1.4.0  
 CIS Microsoft Azure Foundations  
 Benchmark 2.0.0  
 ISO 27001:2013  
 Microsoft cloud security benchmark  
 NL BIO Cloud Theme  
 PCI DSS 3.2.1  
 PCI DSS 4.0  
 UK OFFICIAL and UK NHS



# Rgional Availability ~ [Azure Products by Region | Microsoft](#)

	UNITED KINGDOM		UNITED STATES							
Products	UK South	UK West	Central US	East US	East US 2	North Central US	South Central US	West Central US	West US	West US 2
<a href="#">Azure Arc</a>										
<a href="#">Azure Arc enabled servers</a>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<a href="#">Azure Arc enabled Kubernetes</a>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<a href="#">Azure Arc-enabled PostgreSQL Hyperscale</a>	■		■	■	■	⌵				■
<a href="#">Azure Arc-enabled SQL Managed Instance</a>	✓		✓	✓	✓	✓	✓	✓	✓	✓
<a href="#">SQL Server – Azure Arc</a>	✓		✓	✓	✓		✓	✓		✓
Azure Arc enabled VMware vSphere	■			■	■		■			■
Azure Arc-enabled System Center VMM				□						

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# Cost Management

(20 minutes)



# How Azure Arc can help in cost management and optimization

## **OPTIMIZATON: Extend Azure management and services anywhere**

Azure Arc extends management and services from Azure to any infrastructure. As an extension of Azure, it offers the below core control plane at no cost to customers, while preserving consistent pricing on all management and services originated from Azure.

- ☐ Resource inventory and organisations through Azure resource groups and tags
- ☐ Indexing and searching through Azure Resource Graph
- ☐ Access and security through RBAC and subscriptions
- ☐ Environments and automation through templates and extensions



# How Azure Arc can help in cost management and optimization

## **OPTIMIZATON: Extend Azure management and services anywhere**

Below Azure Arc-enabled services will be charged consistently as in the original Azure services, excluding any customer-provided infrastructure costs.

- ☐ Azure Arc-enabled SQL Server
- ☐ Azure Arc-enabled SQL Managed Instance
- ☐ Azure Arc-enabled PostgreSQL (Preview)
- ☐ Other arc-enabled services that become available

# How Azure Arc can help in cost management and optimization

## **COST:**

Azure Arc is offered at no additional cost for managing Azure Arc-enabled servers and Azure Arc-enabled Kubernetes, though there are charges for add-on Azure management services.

Azure Arc-enabled SQL Managed Instance is generally available for an additional cost. Additional data and application services are in preview and currently offered at no additional cost.

[Pricing – Azure Arc | Microsoft Azure](#)

# How Azure Arc can help in cost management and optimization

## Azure Arc-enabled servers

The following Azure Arc control plane functionality is offered at no extra cost:

- ❖ Resource organization through Azure management groups and tags
- ❖ Searching and indexing through Azure Resource Graph
- ❖ Access and security through Azure Role-based access control (RBAC)
- ❖ Environments and automation through templates and extensions

Any Azure service that is used on Azure Arc-enabled servers, such as Microsoft Defender for Cloud or Azure Monitor, will be charged as per the pricing for that service.

*For information, see the [Azure pricing page](#).*

# How Azure Arc can help in cost management and optimization

## Azure Arc-enabled Kubernetes

Any Azure service that is used on Azure Arc-enabled Kubernetes, such as [Microsoft Defender for Cloud](#) or [Azure Monitor](#), will be charged as per the pricing for that service.

*For more information on pricing for configurations on top of Azure Arc-enabled Kubernetes, see the [Azure pricing page](#).*

## Azure Arc-enabled data services

*For information, see the [Azure pricing page](#).*

# Azure Hybrid Benefits in Azure Arc

## Windows Server VMs on Azure

The license for Windows Server is covered by Azure Hybrid Benefit, so you only need to pay for the base compute rate of the VM.

The base compute rate is equal to the Linux rate for VMs.

## Azure Stack HCI

The Azure Stack HCI host fee and Windows Server subscription fee are waived with Azure Hybrid Benefit.

That is, unlimited virtualization rights are provided at no extra cost. You still pay other costs associated with Azure Stack HCI (for example, customer-managed hardware, Azure services, and workloads).

Software Assurance must be active to use this benefit.

## Azure Kubernetes Services

Run AKS on Windows Server and Azure Stack HCI at no extra cost.

You still pay for the underlying host infrastructure and any licenses for Windows containers unless you're also eligible for Azure Hybrid Benefit for Azure Stack HCI.

With Azure Hybrid Benefit for Azure Stack HCI, you can waive fees for the Azure Stack HCI host and Windows Server subscription.

# Extended Security Updates in Azure Arc

## **Additional year of extended security updates, only on Azure, for Windows Server and SQL Server**

As SQL Server and Windows Server releases end support, many customers are taking advantage of Azure's commitment to security and compliance and have moved to Azure to protect their workloads with free Extended Security Updates.

For those customers who need some more time to upgrade and modernize their SQL Server and Windows Server on Azure, we will now provide one additional year of free extended security updates, only on Azure. This includes other Azure products such as Azure Dedicated Host, Azure VMWare Solution, Azure Nutanix Solution, and Azure Stack (Hub, Edge, and HCI).

### **What dates do I need to keep in mind?**

**July 12, 2022**

SQL Server 2008 and 2008 R2 Extended Security Updates end. SQL Server 2012 end of support.

**Jan 10, 2023**

Windows Server 2008 and 2008 R2 Extended Security Updates come to an end.

**Oct 10, 2023**

The end of support for Windows Server 2012 and 2012 R2.

**Jan 09, 2024**

Windows Server 2008 and 2008 R2 Extended Security Updates on Azure come to an end.



Hey Bing:  
Create Refreshment Break





# Security Considerations

(25 minutes)



# Microsoft Security Approach

Microsoft takes the security of our software products and services seriously, which includes all source code repositories managed through our GitHub organizations, which include [Microsoft](#), [Azure](#), [DotNet](#), [AspNet](#), [Xamarin](#), and [our GitHub organizations](#).

If you believe you have found a security vulnerability in any Microsoft-owned repository that meets [Microsoft's definition of a security vulnerability](#), please report it to us

# Microsoft Security Approach | Report an Issue

## Report an issue

Welcome to the Microsoft Security Response Center (MSRC) Researcher Portal.

[Please sign in](#) to report a vulnerability in a Microsoft product or service. You can track the status of your report as we work with you to investigate and resolve the issue.


① Not sure? Check out MSRC's [definition of a security vulnerability](#).

Microsoft follows [Coordinated Vulnerability Disclosure \(CVD\)](#). We request that you follow these guidelines to help us protect customers and the ecosystem from harm.

To check if your findings are eligible for reward, please review MSRC's [Bug Bounty Programs](#) and [Terms and Conditions](#).

For general information and answers to frequently asked questions, please visit our [FAQs](#).

If you are here to report abuse or a privacy issue originating from a Microsoft-hosted site or service, please go to our [Abuse form](#) to report the issue to our CERT.


 [Sign in to report your vulnerability](#)

# Identity and access control (1)

[Azure role-based access control](#) is used to control which accounts can see and manage your Azure Arc-enabled server. From the [Access Control \(IAM\)](#) page in the Azure portal, you can verify who has access to your Azure Arc-enabled server.

Users and applications granted [contributor](#) or administrator role access to the resource can make changes to the resource, including deploying or deleting [extensions](#) on the machine. Extensions can include arbitrary scripts that run in a privileged context, so consider any contributor on the Azure resource to be an indirect administrator of the server.

# Identity and access control (2)

 **FNPSVR01** | Access control (IAM)  
Machine - Azure Arc

[+ Add](#) [↓ Download role assignments](#) [≡ Edit columns](#) [↺ Refresh](#) [✕ Remove](#) [...](#)

[Overview](#)  
[Activity log](#)  
**[Access control \(IAM\)](#)**  
[Tags](#)  
[Diagnose and solve problems](#)

**Settings**  
[Extensions](#)  
[Properties](#)  
[Locks](#)

**Check access** [Role assignments](#) [Roles](#) [Deny assignments](#) [Classic administrators](#)

**Check access**  
Review the level of access a user, group, service principal, or managed identity has to this resource. [Learn more](#)

**Find** ⓘ  
 [▼](#)

**Add a role assignment**  
Grant access to resources at this scope by assigning a role to a user, group, service principal, or managed identity.  
[Add](#) [Learn more](#)

**View role assignments**

# Identity and access control (3)

To manage the Azure Connected Machine agent (azcmagent) on Windows, your user account needs to be a member of the local Administrators group. On Linux, you must have root access permissions.

The Azure Connected Machine agent is composed of three services, which run on your machine.

- ❑ **The Hybrid Instance Metadata Service (himds)** service is responsible for all core functionality of Arc. This includes sending heartbeats to Azure, exposing a local instance metadata service for other apps to learn about the machine's Azure resource ID, and retrieve Microsoft Entra tokens to authenticate to other Azure services. This service runs as an unprivileged virtual service account (NT SERVICE\himds) on Windows, and as the **himds** user on Linux. The virtual service account requires the Log on as a Service right on Windows.
- ❑ **The Guest Configuration service (GCService)** is responsible for evaluating Azure Policy on the machine.
- ❑ **The Guest Configuration Extension service (ExtensionService)** is responsible for installing, upgrading, and deleting extensions (agents, scripts, or other software) on the machine.

The guest configuration and extension services run as **Local System** on Windows, and as **root** on Linux.

# Local agent security controls

Starting with agent version 1.16, you can optionally limit the extensions that can be installed on your server and disable Guest Configuration. These controls can be useful when connecting servers to Azure for a single purpose, such as collecting event logs, without allowing other management capabilities to be used on the server.

These security controls can only be configured by running a command on the server itself and cannot be modified from Azure. This approach preserves the server admin's intent when enabling remote management scenarios with Azure Arc, but also means that changing the setting is more difficult if you later decide to change them. This feature is intended for sensitive servers (for example, Active Directory Domain Controllers, servers that handle payment data, and servers subject to strict change control measures).



# Extension allowlists and blocklists

To limit which extensions can be installed on your server, you can configure lists of the extensions you wish to allow and block on the server. The extension manager evaluates all requests to install, update, or upgrade extensions against the allowlist and blocklist to determine if the extension can be installed on the server. Delete requests are always allowed.

The most secure option is to explicitly allow the extensions you expect to be installed. Any extension not in the allowlist is automatically blocked. To configure the Azure Connected Machine agent to allow only the Azure Monitor Agent for Linux, run the following command on each server:

If an extension is already installed on your server before you configure an allowlist or blocklist, **it won't automatically be removed.**

It's your responsibility to delete the extension from Azure to fully remove it from the machine. Delete requests are always accepted to accommodate this scenario. Once deleted, the allowlist and blocklist determine whether or not to allow future install attempts.

# Enable or disable Guest Configuration

Azure Policy's Guest Configuration feature enables you to audit and configure settings on your server from Azure. You can disable Guest Configuration from running on your server if you don't want to allow this functionality.

When Guest Configuration is disabled, any Guest Configuration policies assigned to the machine in Azure show as noncompliant. Consider creating an exemption for these machines or changing the scope of your policy assignments if you don't want to see these machines reported as noncompliant.

Bash

 Copy

```
azcmagent config set guestconfiguration.enabled false
```

# Enable or disable the extension manager

The extension manager is responsible for installing, updating, and removing VM Extensions on your server. You can disable the extension manager to prevent managing any extensions on your server, but we recommend using the allow and blocklists instead for more granular control.

Disabling the extension manager won't remove any extensions already installed on your server. Extensions that are hosted in their own Windows or Linux services, such as the Log Analytics Agent, might continue to run even if the extension manager is disabled.

Other extensions that are hosted by the extension manager itself, like the Azure Monitor Agent, don't run if the extension manager is disabled. You should remove any extensions before disabling the extension manager to ensure no extensions continue to run on the server.

Bash

Copy

```
azcmagent config set extensions.enabled false
```

# Locked down machine best practices

When configuring the Azure Connected Machine agent with a reduced set of capabilities, it's important to consider the mechanisms that someone could use to remove those restrictions and implement appropriate controls. Anybody capable of running commands as an administrator or root user on the server can change the Azure Connected Machine agent configuration.

Extensions and guest configuration policies execute in privileged contexts on your server, and as such might be able to change the agent configuration. If you apply local agent security controls to lock down the agent, Microsoft recommends the following best practices to ensure only local server admins can update the agent configuration:

- *Use allowlists for extensions instead of blocklists whenever possible.*
- *Don't include the Custom Script Extension in the extension allowlist to prevent execution of arbitrary scripts that could change the agent configuration.*
- *Disable Guest Configuration to prevent the use of custom Guest Configuration policies that could change the agent configuration.*

# Plan BEFORE deploy Azure Arc-enabled servers

Deployment of an IT infrastructure service or business application is a challenge for any company. In order to execute it well and avoid any unwelcome surprises and unplanned costs, you need to thoroughly plan for it to ensure that you're as ready as possible. To plan for deploying Azure Arc-enabled servers at any scale, it should cover the design and deployment criteria that needs to be met in order to successfully complete the tasks.

For the deployment to proceed smoothly, your plan should establish a clear understanding of:

- ☐ Roles and responsibilities.
- ☐ Inventory of physical servers or virtual machines to verify they meet network and system requirements.
- ☐ The skill set and training required to enable successful deployment and on-going management.
- ☐ Acceptance criteria and how you track its success.
- ☐ Tools or methods to be used to automate the deployments.
- ☐ Identified risks and mitigation plans to avoid delays, disruptions, etc.
- ☐ How to avoid disruption during deployment.
- ☐ What's the escalation path when a significant issue occurs?

# Phase 1 | Build a Foundation

Task	Detail	Estimated duration
<a href="#">Create a resource group</a>	A dedicated resource group to include only Azure Arc-enabled servers and centralize management and monitoring of these resources.	One hour
Apply <a href="#">Tags</a> to help organize machines.	Evaluate and develop an IT-aligned <a href="#">tagging strategy</a> that can help reduce the complexity of managing your Azure Arc-enabled servers and simplify making management decisions.	One day
Design and deploy <a href="#">Azure Monitor Logs</a>	Evaluate <a href="#">design and deployment considerations</a> to determine if your organization should use an existing or implement another Log Analytics workspace to store collected log data from hybrid servers and machines.	One day
<a href="#">Develop an Azure Policy</a> governance plan	Determine how you will implement governance of hybrid servers and machines at the subscription or resource group scope with Azure Policy.	One day
Configure <a href="#">Role based access control</a> (RBAC)	Develop an access plan to control who has access to manage Azure Arc-enabled servers and ability to view their data from other Azure services and solutions.	One day
Identify machines with Log Analytics agent already installed	Run the following log query in <a href="#">Log Analytics</a> to support conversion of existing Log Analytics agent deployments to extension-managed agent: <pre>Heartbeat   summarize arg_max(TimeGenerated, OSType, ResourceId, ComputerEnvironment) by Computer   where ComputerEnvironment == "Non-Azure" and isempty(ResourceId)   project Computer, OSType</pre>	One hour

# Phase 2 | Deploy

Task	Detail	Estimated duration
Download the pre-defined installation script	<p>•Review and customize the pre-defined installation script for at-scale deployment of the Connected Machine agent to support your automated deployment requirements.</p> <p>Sample at-scale onboarding resources:</p> <p><a href="#">At-scale basic deployment script</a></p> <ul style="list-style-type: none"> <li>•<a href="#">At-scale onboarding VMware vSphere Windows Server VMs</a></li> <li>•<a href="#">At-scale onboarding VMware vSphere Linux VMs</a></li> <li>•<a href="#">At-scale onboarding AWS EC2 instances using Ansible</a></li> </ul>	One or more days depending on requirements, organizational processes (for example, Change and Release Management), and automation method used.
<a href="#">Create service principal</a>	Create a service principal to connect machines non-interactively using Azure PowerShell or from the portal.	One hour
Deploy the Connected Machine agent to your target servers and machines	Use your automation tool to deploy the scripts to your servers and connect them to Azure.	One or more days depending on your release plan and if following a phased rollout.

# Phase 3 | Manage and operate

Task	Detail	Estimated duration
Create a Resource Health alert	<p>If a server stops sending heartbeats to Azure for longer than 15 minutes, it can mean that it is offline, the network connection has been blocked, or the agent is not running. Develop a plan for how you'll respond and investigate these incidents and use <a href="#">Resource Health alerts</a> to get notified when they start.</p> <p>Specify the following when configuring the alert:</p> <p><b>Resource type = Azure Arc-enabled servers</b></p> <p><b>Current resource status = Unavailable</b></p> <p><b>Previous resource status = Available</b></p>	One hour
Create an Azure Advisor alert	<p>For the best experience and most recent security and bug fixes, we recommend keeping the Azure Connected Machine agent up to date. Out-of-date agents will be identified with an <a href="#">Azure Advisor alert</a>.</p> <p>Specify the following when configuring the alert:</p> <p><b>Recommendation type = Upgrade to the latest version of the Azure Connected Machine agent</b></p>	One hour
<a href="#">Assign Azure policies</a> to your subscription or resource group scope	Assign the <b>Enable Azure Monitor for VMs policy</b> (and others that meet your needs) to the subscription or resource group scope. Azure Policy allows you to assign policy definitions that install the required agents for VM insights across your environment.	Varies
<a href="#">Enable Update Management for your Azure Arc-enabled servers</a>	Configure Update Management in Azure Automation to manage operating system updates for your Windows and Linux virtual machines registered with Azure Arc-enabled servers.	15 minutes

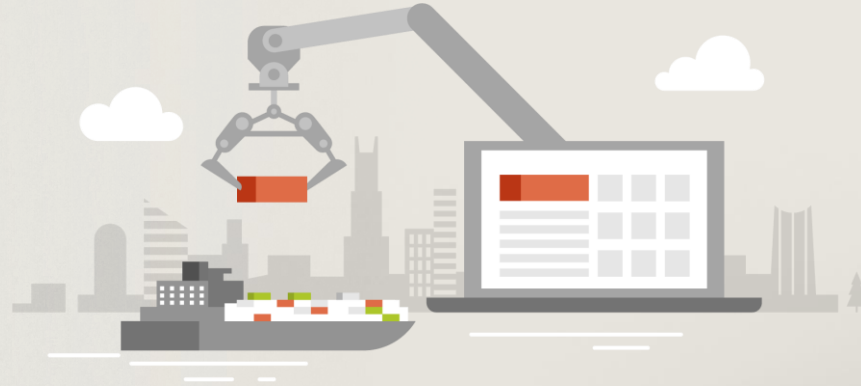


# Advanced Azure Arc Features

(20 minutes)



# Azure Kubernetes Service (AKS) Edge Essentials



# Azure Kubernetes Service (AKS) hybrid options on Windows



Deploy your Linux and/or Windows containerized workloads

## AKS hybrid options on Windows



Azure Arc control plane to manage your cluster in Azure



Standard kubectl to manage your cluster using PowerShell



CNCF-conformant Kubernetes platform



PowerShell cmdlets and agents to enable provisioning and control of VMs and infra

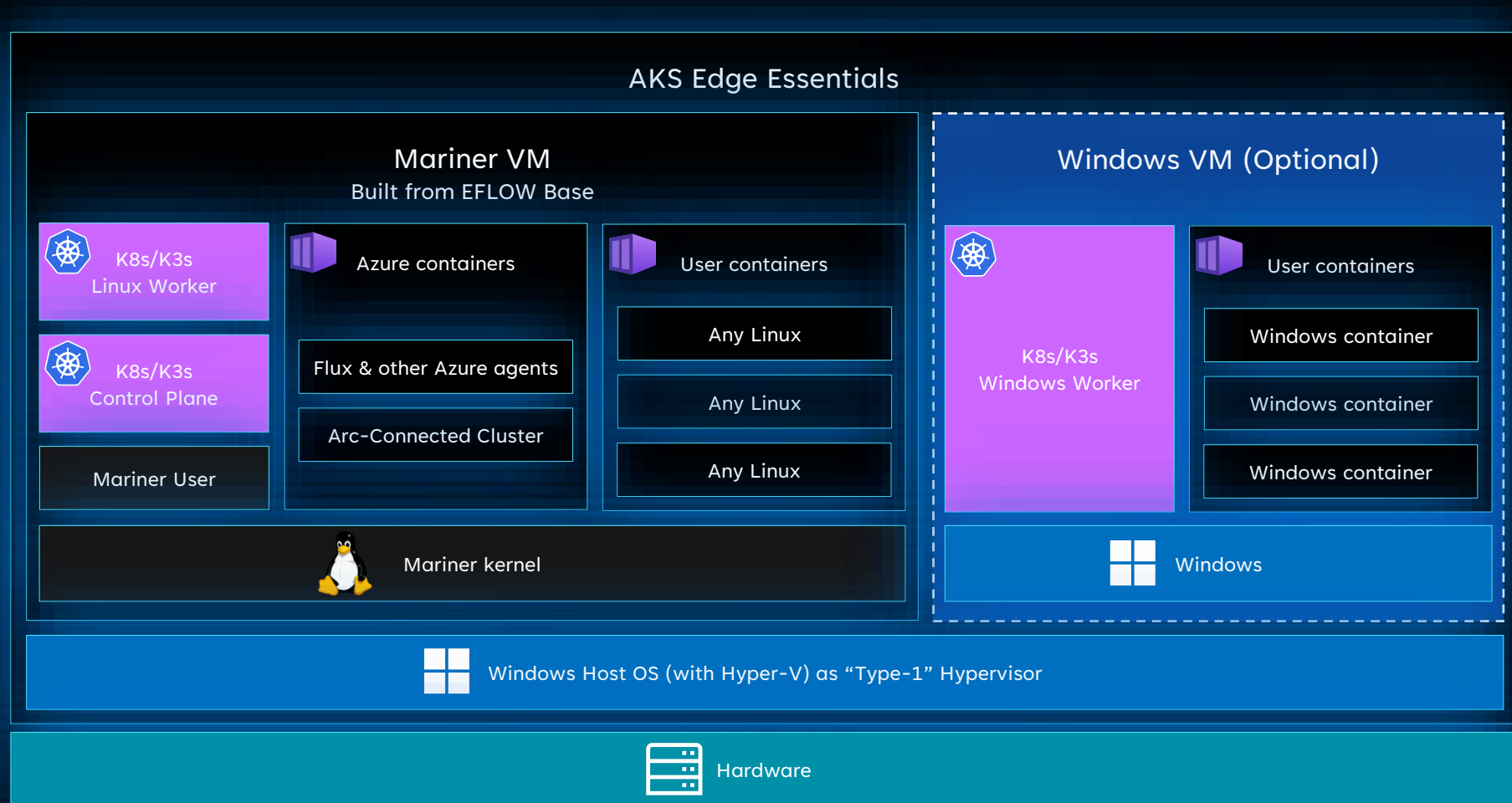


Windows 10/11 ( IoT Enterprise / Enterprise / Pro ) and Windows Server

Edge computing devices (with 8GB+ RAM)



# Azure Kubernetes Service Edge Essentials (AKS EE) architecture



# AKS Edge Essentials architecture



Windows

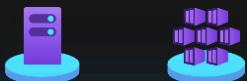
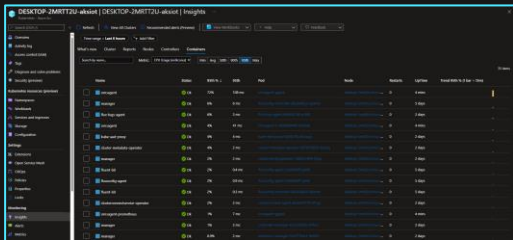


Hardware

## Azure Resource Manager



Build and manage cloud deployments directly from the Azure portal



## Deploy Cluster extensions



### Azure Monitor

Monitor servers in Azure, machines on-premises or at other cloud providers.



### Azure Policy

Enforce organizational standards and assess compliance at-scale.



### Azure App Service

Quickly build, deploy, and scale web apps and APIs on Kubernetes or Azure.

## Deploy your own workloads



PR Pipeline



App repository

### GitOps

Manage your desired state Kubernetes cluster configurations with Git



CI Pipeline



CD Pipeline



GitOps repository



### Microsoft Artifact Registry

Build, store, and manage container artifacts for your deployments

## OS and VM Updates

**Windows Update**  
Get the latest fixes, updates and security improvements



## Azure Arc

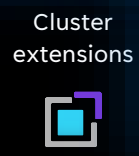


Deploy AKS-IoT on a device like an application

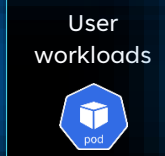


Connected via  
Azure Arc-enabled Kubernetes

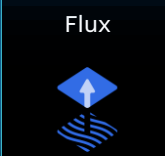
Connected via  
Azure Arc-enabled servers



Cluster extensions



User workloads



Flux

Containerized workloads

AKS EE Kubernetes Platform



K8s/K3s

Linux VM



Windows VM  
(optional)



Windows Host OS (with Hyper-V)



Hardware

Pull cluster desired state

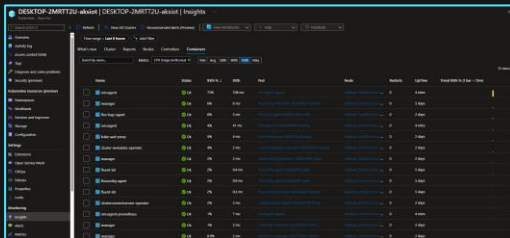
From cloud  
to edge  
and back



## Azure Resource Manager



Build and manage cloud deployments directly from the Azure portal



## Deploy Cluster extensions



### Azure Monitor

Monitor servers in Azure, machines on-premises or at other cloud providers.



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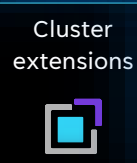
## Azure Arc



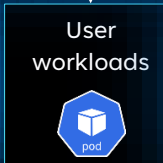
Deploy AKS-IoT on a device like an application



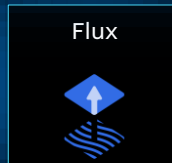
Connected via  
Azure Arc-enabled Kubernetes



Cluster extensions



User workloads



Flux

Containerized workloads

AKS EE Kubernetes Platform



K8s/K3s

Linux VM



Windows VM (optional)



Windows Host OS (with Hyper-V)



Hardware

Cache containers

Cache updates



On-premises, user-owned  
private Container Registry

Pull cluster  
desired state



GitOps repository



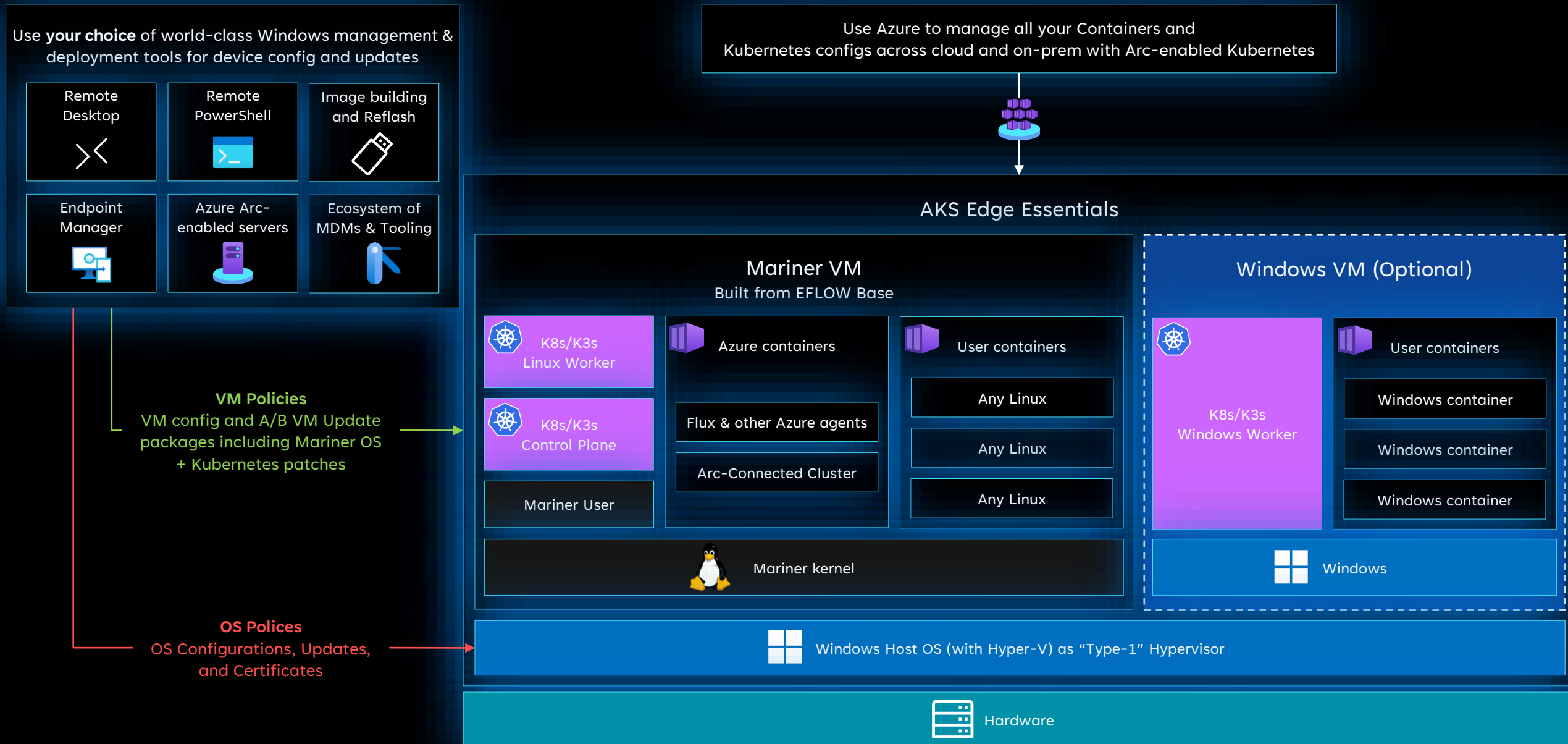
Windows Server Update Services  
(WSUS) enables IT admins to  
deploy Microsoft updates.

Disconnected on-premises

From cloud  
to edge  
and back

# On a managed VM

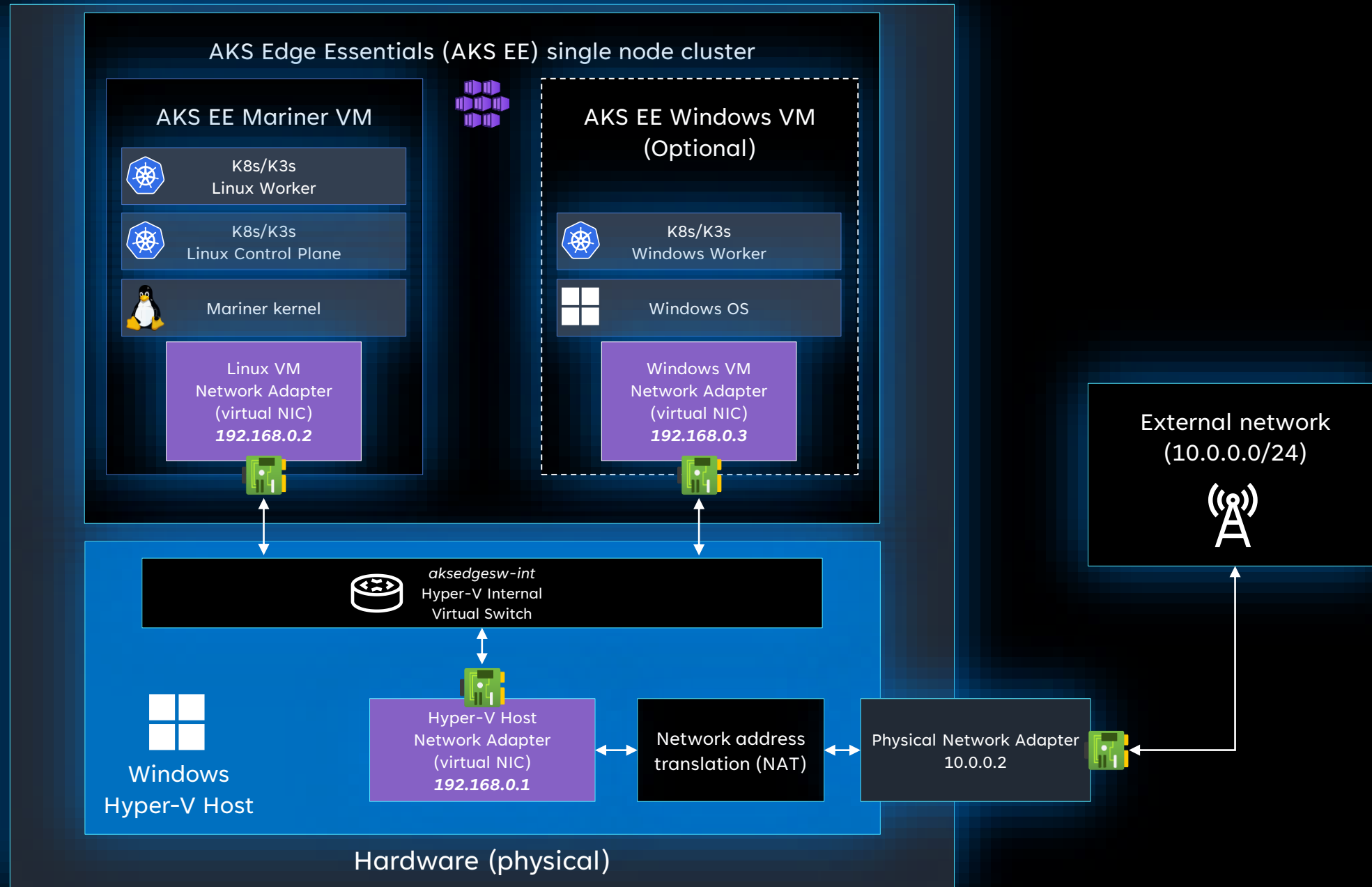
With a managed VM you do not need to manage two operating systems





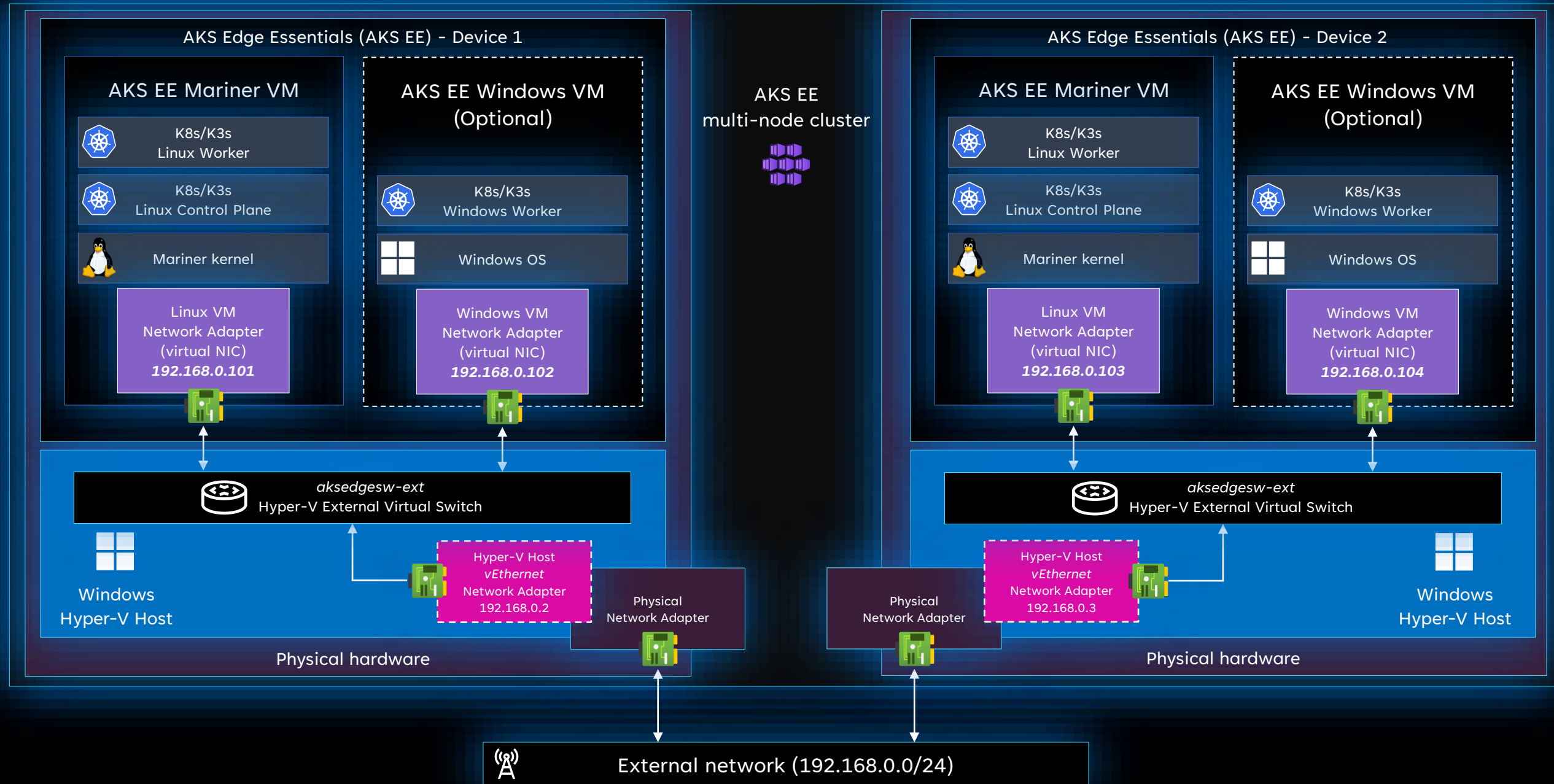
# Azure Kubernetes Service Edge Essentials (AKS EE)

Single Node Cluster with Internal Virtual Switch network architecture



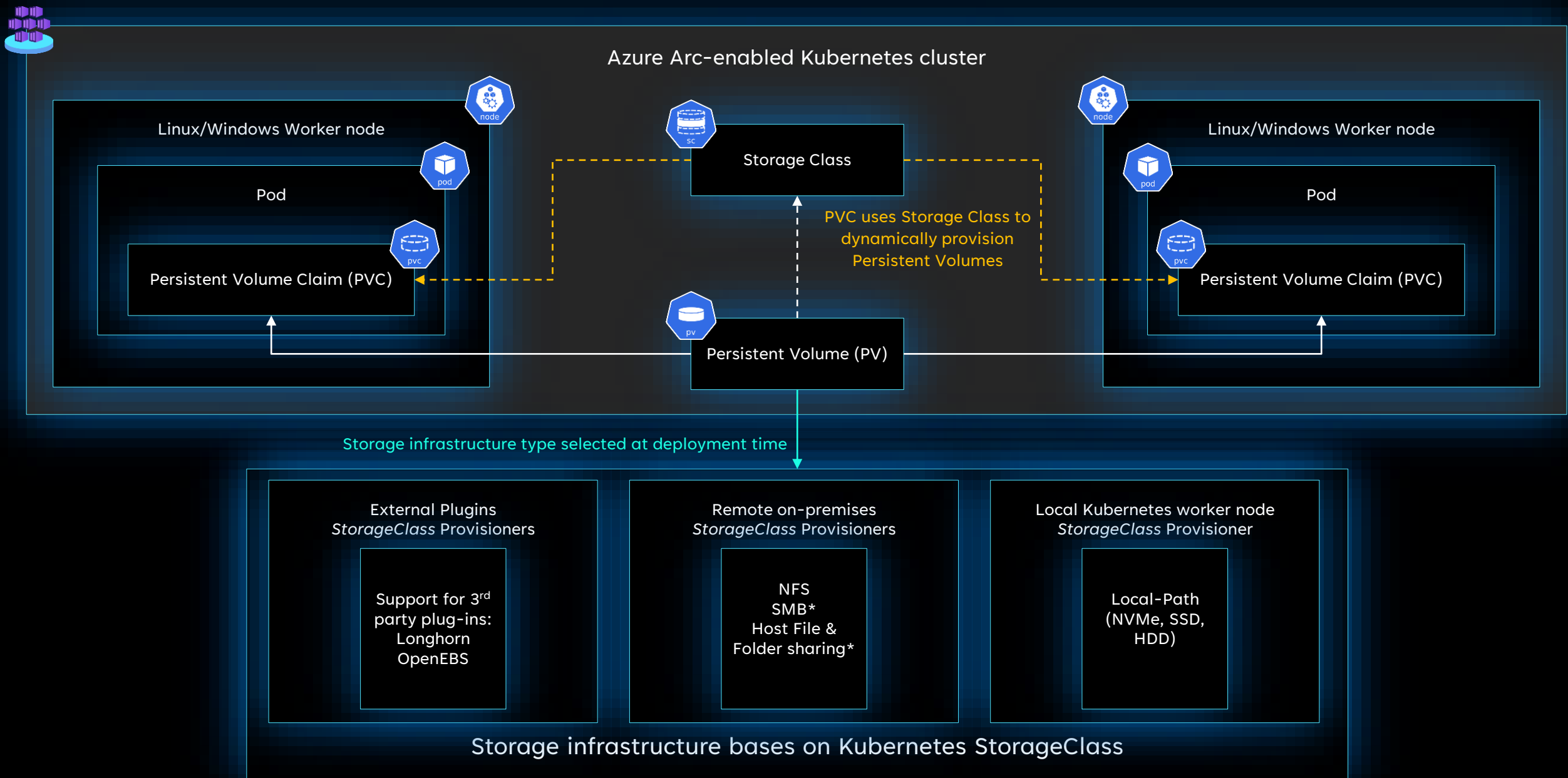
# Azure Kubernetes Service Edge Essentials (AKS EE)

Multi-Machine Cluster with External Virtual Switch network architecture



# Azure Kubernetes Service Edge Essentials (AKS EE)

## Storage options





# AKS EE multi-node cluster

## AKS EE Node 1

AKS EE Mariner VM

RTSP Simulator

OPC UA Publisher

Influx DB

Edge AI Inferencing



K8s/K3s

Linux Control Plane & Worker



Mariner kernel



aksedgesw-ext

Hyper-V External Virtual Switch



Windows IoT Enterprise LTSC

Lenovo

ThinkEdge S30

## AKS EE Node 2

AKS EE Mariner VM

RTSP Simulator

OPC UA Publisher

Influx DB

Edge AI Inferencing



K8s/K3s

Linux Control Plane & Worker



Mariner kernel



aksedgesw-ext

Hyper-V External Virtual Switch



Windows IoT Enterprise LTSC

Lenovo

ThinkEdge S30

## AKS EE Node 3

AKS EE Mariner VM

RTSP Simulator

OPC UA Publisher

Influx DB

Edge AI Inferencing



K8s/K3s

Linux Control Plane & Worker



Mariner kernel



aksedgesw-ext

Hyper-V External Virtual Switch



Windows IoT Enterprise LTSC

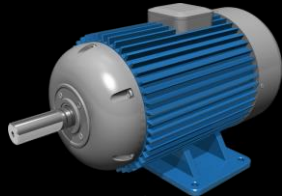
Lenovo

ThinkEdge S30

Industrial Camera



Motor



External Private network

# Akri Architecture

## Edge Cluster

### Control Plane

Kubernetes  
Scheduler

Akri Controller

API Server

etcd

Configuration CRD  
<protocol>  
Configuration

Instance CRD  
<protocol>  
Instance

### Node

Kubernetes  
Scheduler

Akri Agent

<protocol>  
Discovery  
Handler

Custom  
Broker

<protocol>

```
kind: Configuration
metadata:
  name: akri-<protocol>
spec:
  discoveryHandler:
    name: <protocol>
  brokerSpec:
    containers:
      - name: custom-broker
        image: "ghcr.io/..."
```

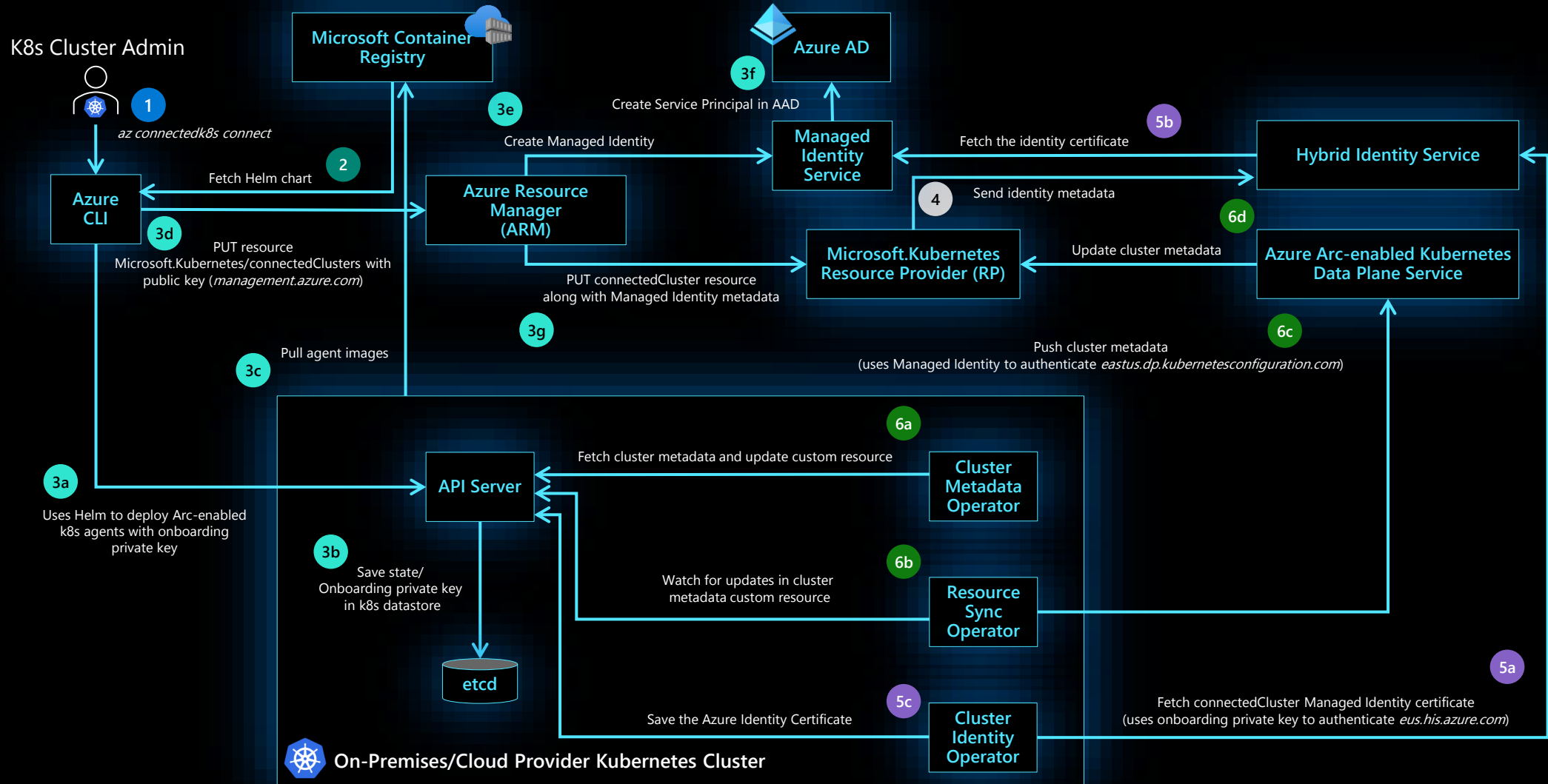
Leaf Device

# Azure Arc-enabled Kubernetes



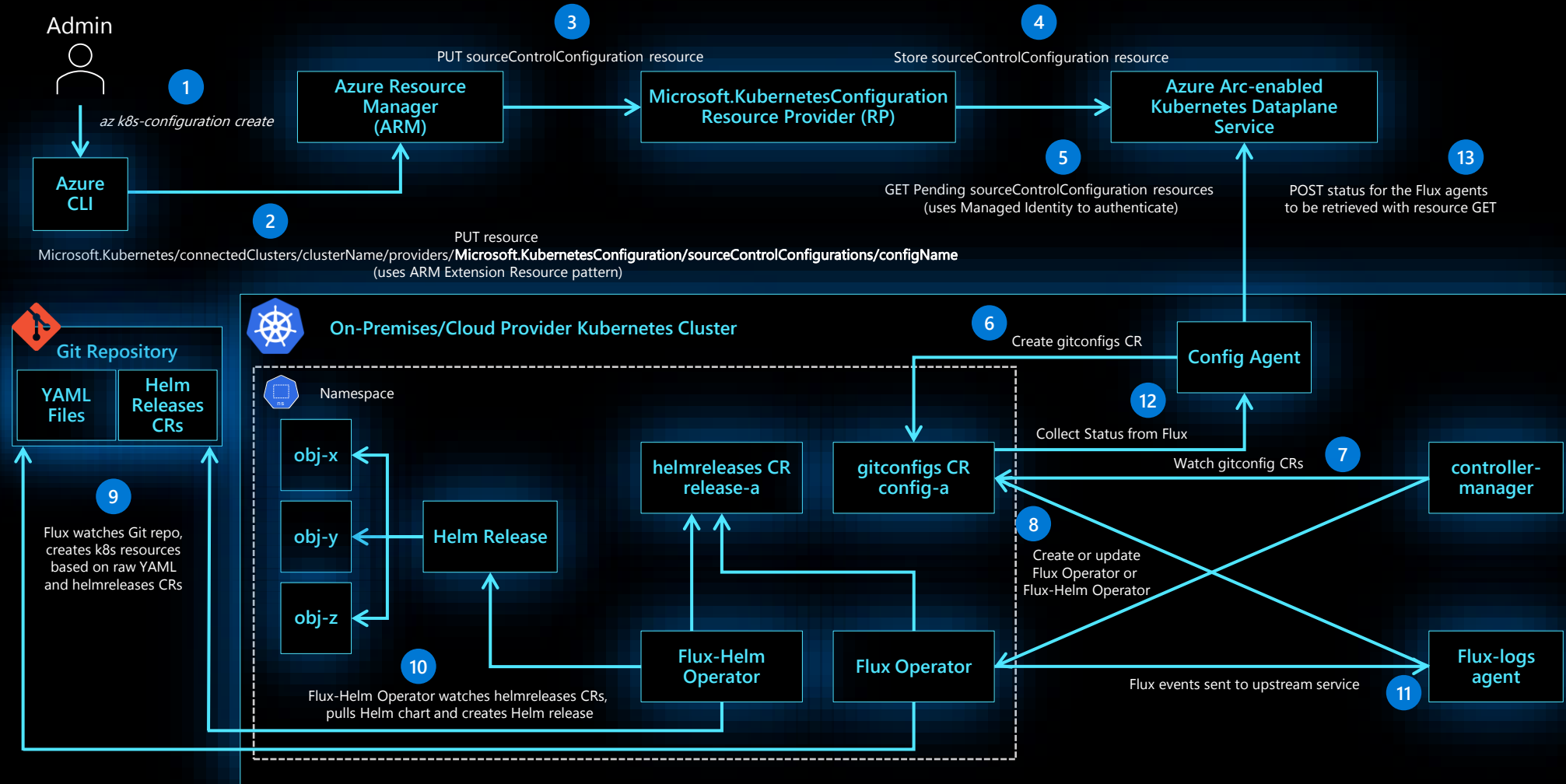
# Azure Arc-enabled Kubernetes

## Onboarding



# Azure Arc-enabled Kubernetes

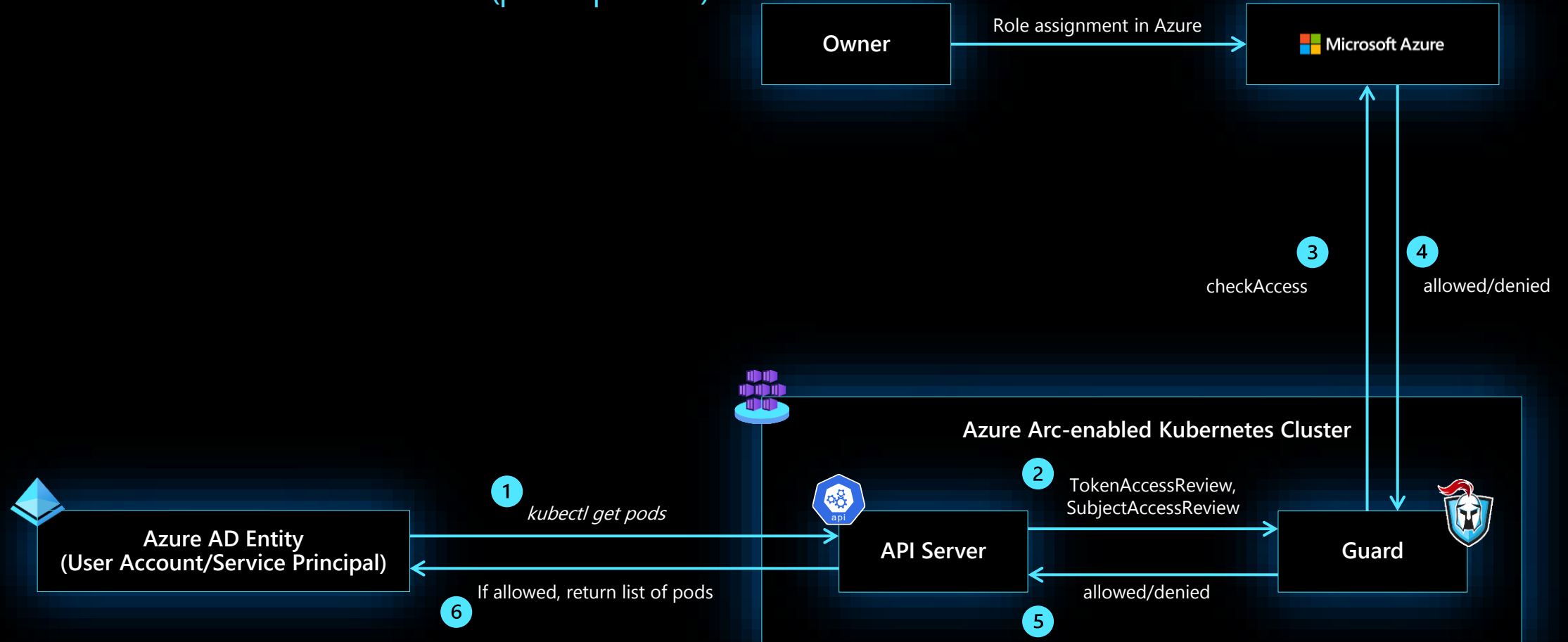
## GitOps Configuration





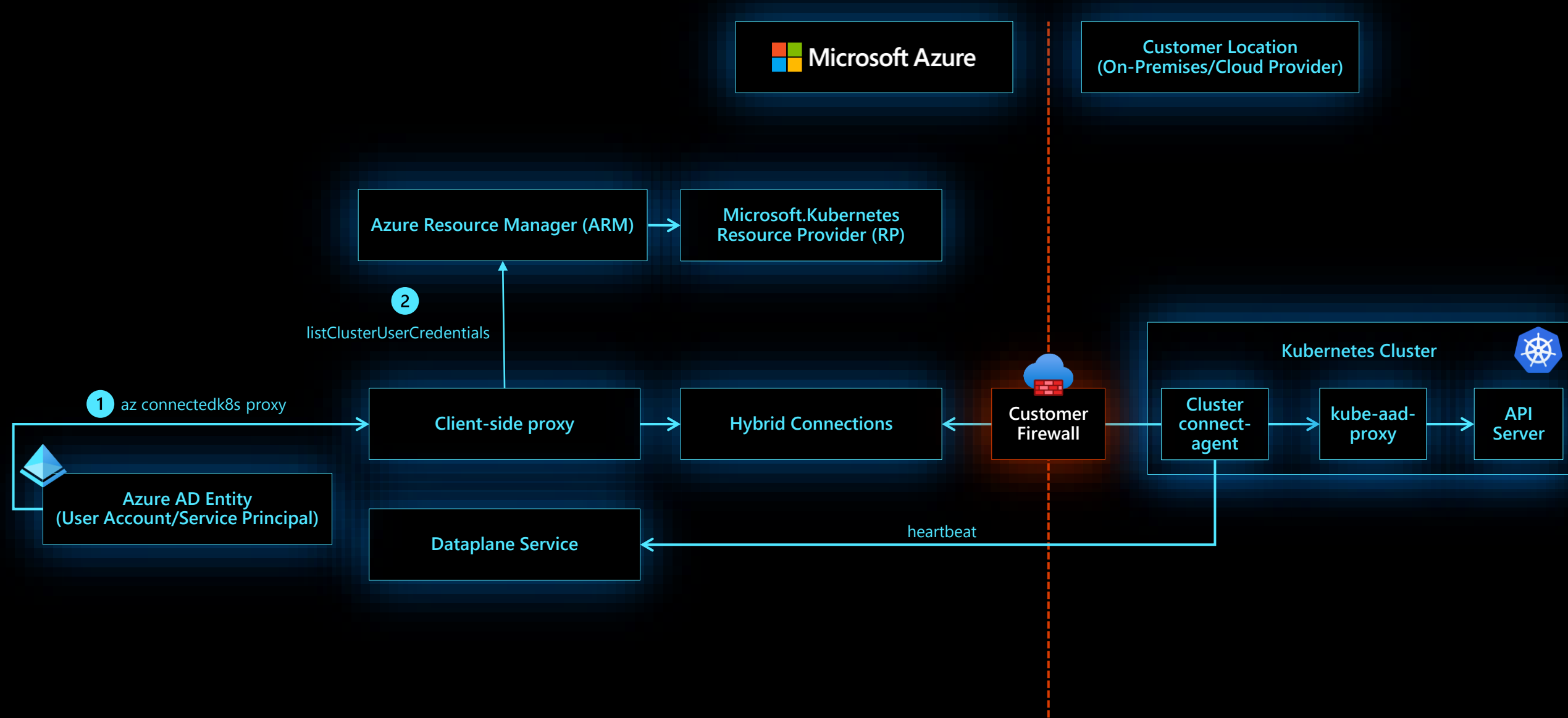
# Azure Arc-enabled Kubernetes

Azure AD Role-based access control (public preview)



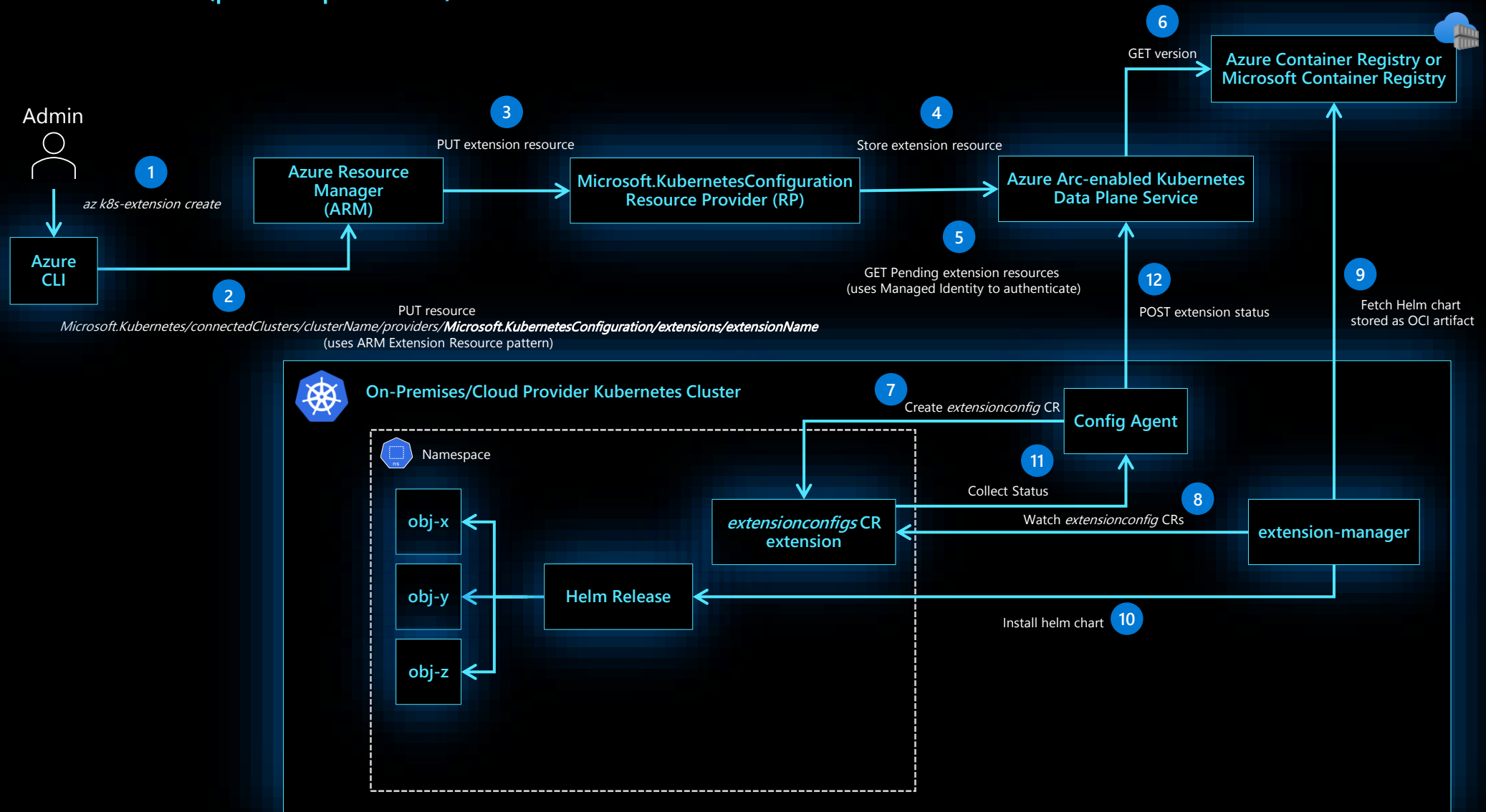
# Azure Arc-enabled Kubernetes

Cluster Connect (public preview)



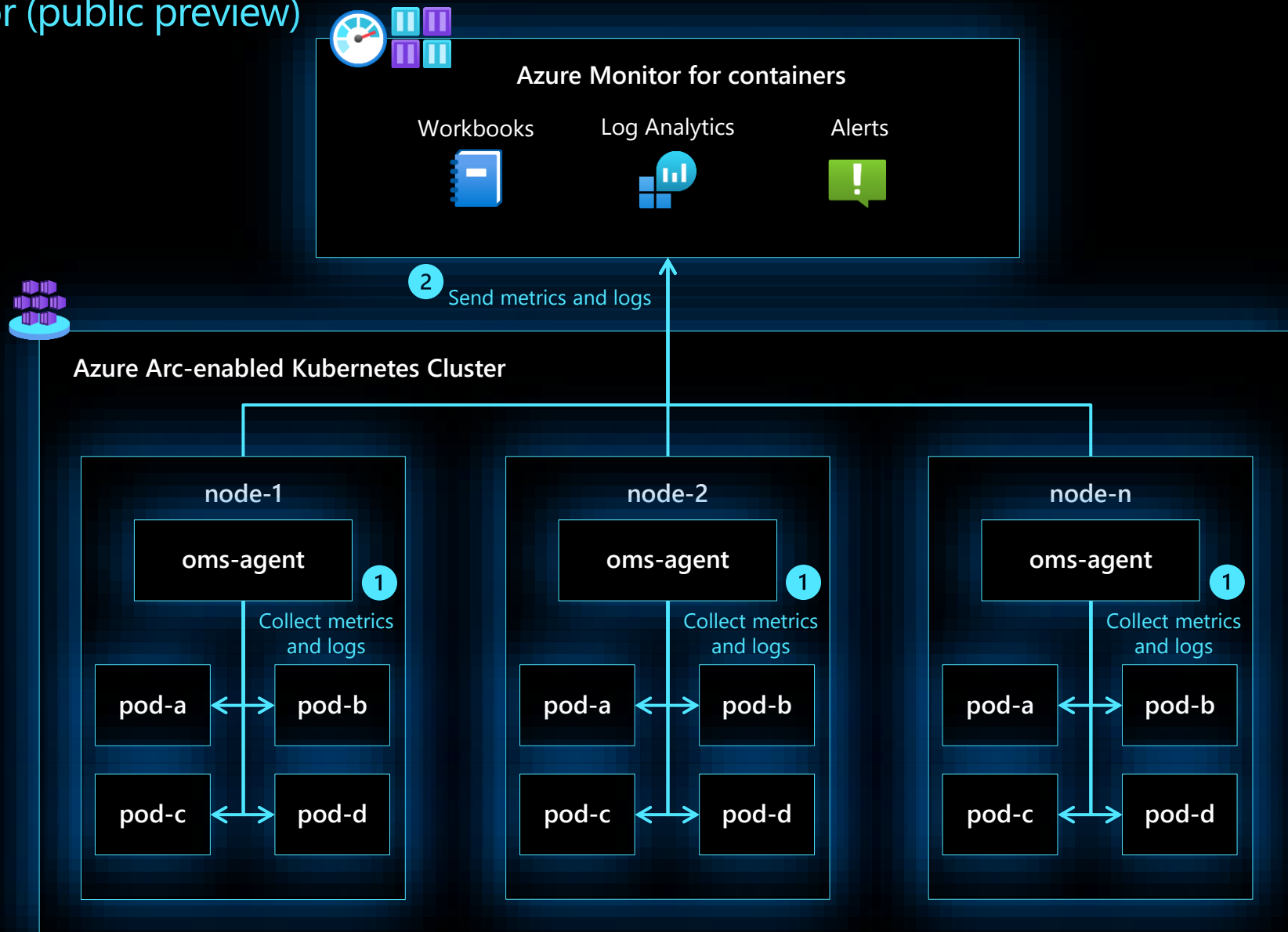
# Azure Arc-enabled Kubernetes

## Cluster extensions (public preview)



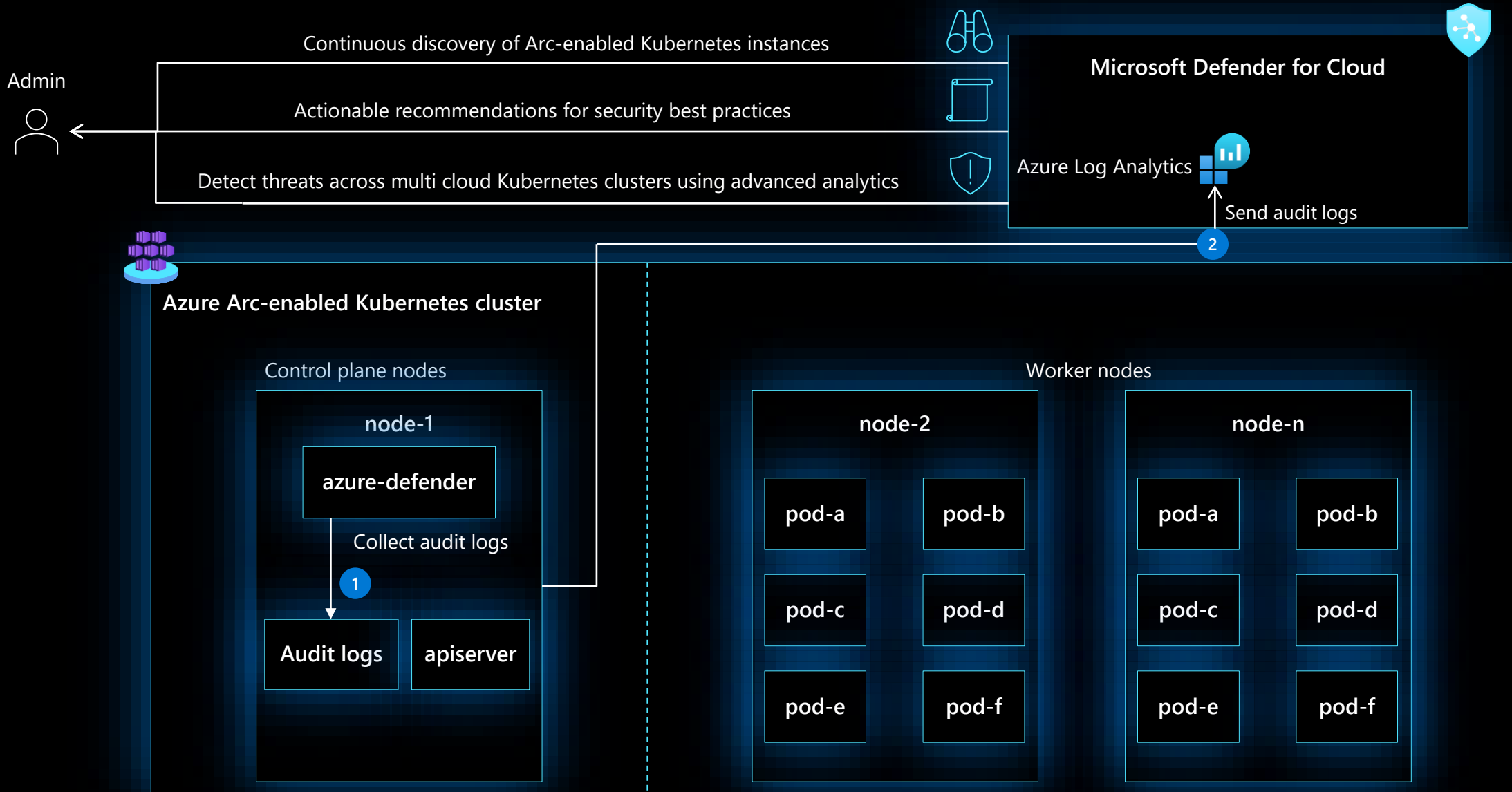
# Azure Arc-enabled Kubernetes

Azure Monitor (public preview)



# Azure Arc-enabled Kubernetes

## Microsoft Defender for Cloud

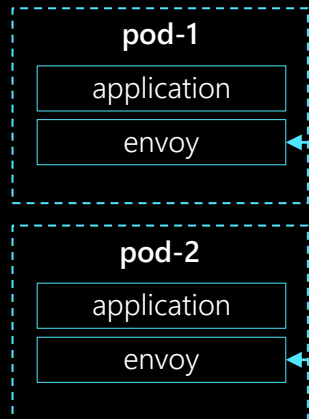


# Azure Arc-enabled Kubernetes

Open Service Mesh (Preview)

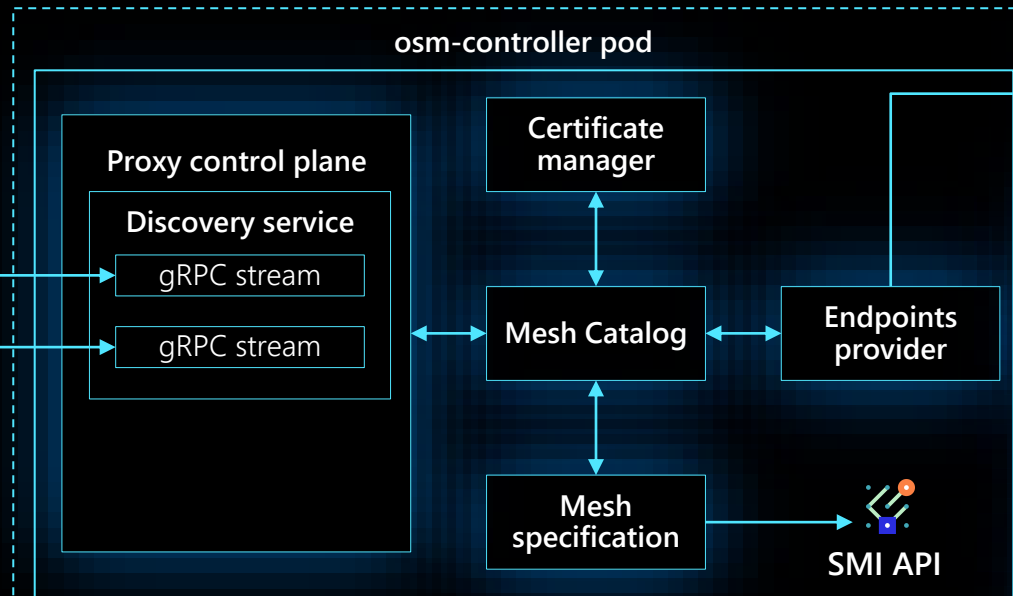


**Azure Arc-enabled  
Kubernetes cluster**



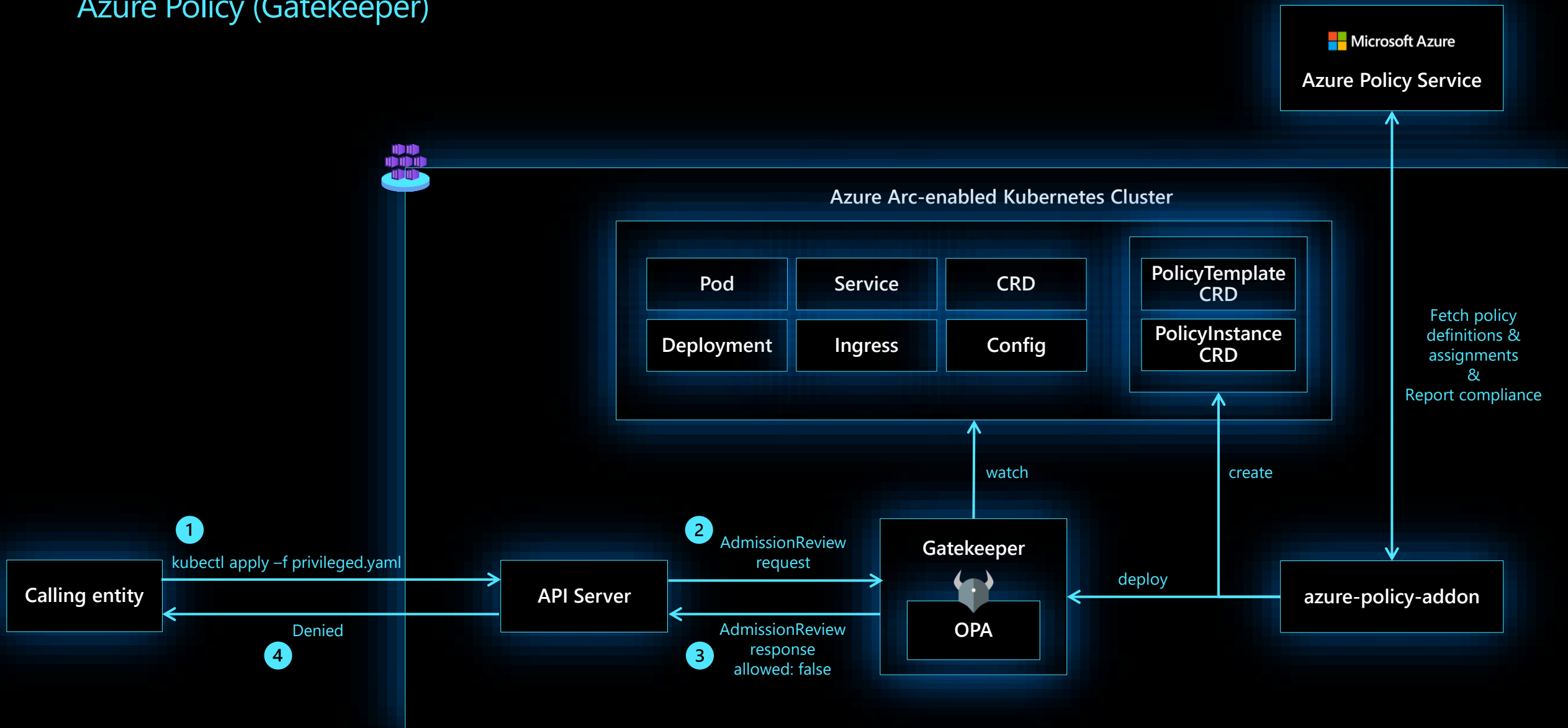
**arc-osm-system  
namespace**

**osm-controller pod**



# Azure Arc-enabled Kubernetes

## Azure Policy (Gatekeeper)



# Resources



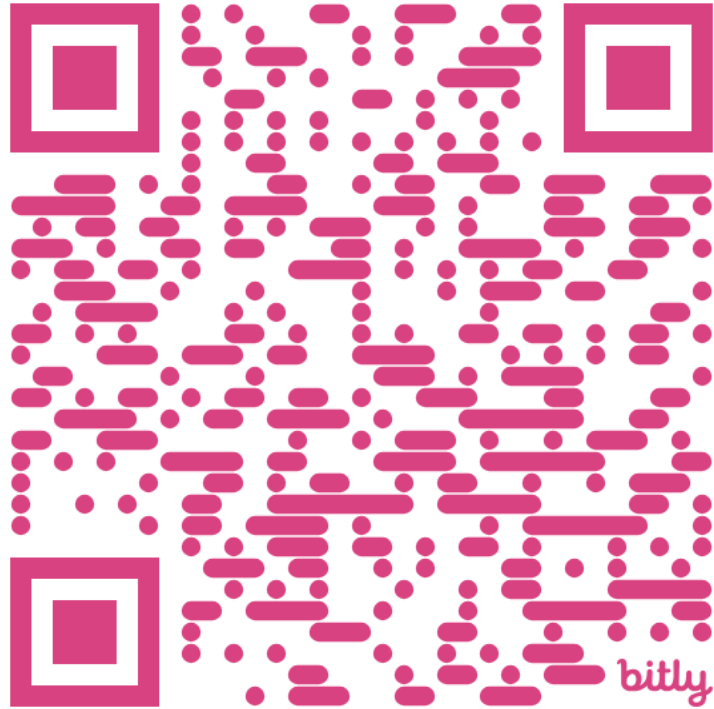


# Presentations from all Webinars

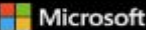
GitHub - KoprowskiT/AzureArcWithQA:

Content from all events about Azure Arc delivered with QA

<https://bit.ly/AzureArcWithQA>



# Observe the Future

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Start time

Session type

Topic

Level

Show 12 results

Relevance

[1](#) [2](#) [3](#) [4](#) [5](#) [>](#)

### Azure Arc-enabled servers onboarding (Windows/Linux)

Lab

In Seattle Only

Will Not Be Recorded

Friday, November 17

1:15 AM - 2:15 AM hora del meridiano de Greenwich

In this lab you will practice: 1. Arc-enabled servers onboarding (Windows/Linux) 2. Azure Monitor integration 3. Microsoft Defender for Cloud Integration

BC

[Braulio Chavez](#) | [Microsoft](#)

LK

[Lior Kamrat](#) | [Microsoft](#)

RW

[Ryan Willis](#) | [Microsoft](#)

Add to schedule

Save to backpack

# Resources



**Microsoft Learn / Docs**

[Azure Arc | Microsoft Learn](#)

**Microsoft Learn / Intro to Azure Arc**

<https://bit.ly/AzureArcIntroMSLearn>

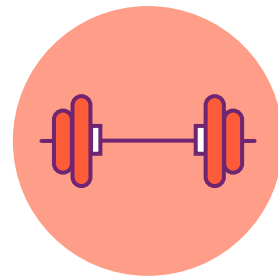
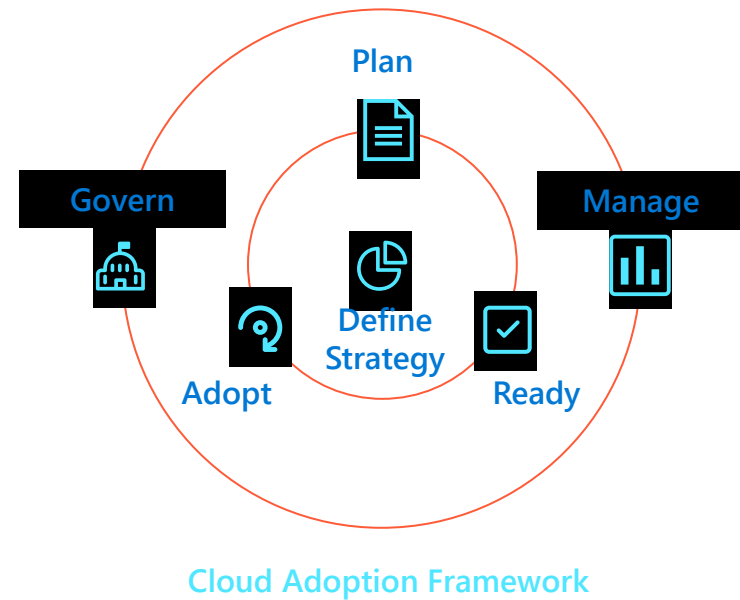
**Microsoft Ignite Conference**

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**Microsoft Azure Arc Jumpstart**

[Overview | Azure Arc Jumpstart](#)

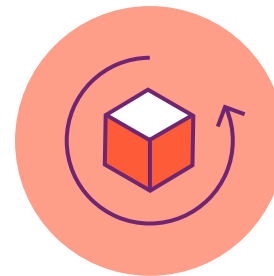
# Complete guidance for hybrid and multicloud approach



Build skills across your team with **Microsoft Learn**



Accelerate deployment with **Reference Architectures**



Optimize workloads with **Azure Well-Architected**



Apply **best practices** to rapidly onboard



Review **technical documentation** on featured products

<https://aka.ms/adopt/hybrid>

# Get started

Azure Arc-enabled servers generally available, get started today: <https://aka.ms/Azure-Arc>

Azure Arc-enabled Kubernetes generally available, get started today: <https://aka.ms/Azure-Arc-Kubernetes>

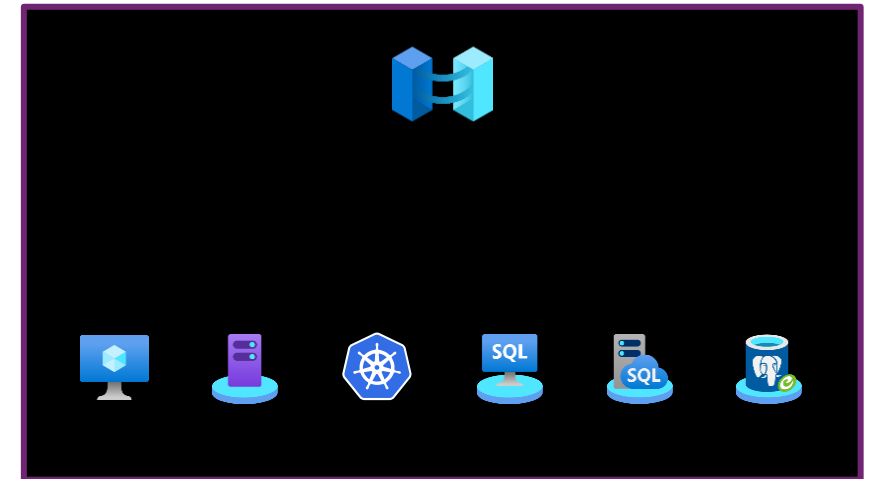
Try Azure Arc-enabled data services: <https://aka.ms/hybrid-data-services>

# Learn more

Azure Arc Jumpstart: <https://aka.ms/AzureArcJumpstart>

Technical documentation: <https://aka.ms/AzureArcDocs>

Azure Arc Learning Path: <https://aka.ms/AzureArcLearn>



# Resources

## Azure Arc complete overview

[aka.ms/arc-introvideo](https://aka.ms/arc-introvideo)

Introducing Azure Arc

[aka.ms/arc-compete](https://aka.ms/arc-compete)

Azure Arc compete deck

[aka.ms/azurearcpricing](https://aka.ms/azurearcpricing)

Azure Arc pricing page

[aka.ms/arc-techcommunity](https://aka.ms/arc-techcommunity)

Deep dives on Azure Arc, best practices and more

[aka.ms/arc-customerstories](https://aka.ms/arc-customerstories)

Learn how customers are implementing Azure Arc

<https://aka.ms/arc-feedback>

Public Q&A forum

[aka.ms/AzureArcJumpstart](https://aka.ms/AzureArcJumpstart)

Azure Arc Jumpstart

[aka.ms/AzureArcJumpstartDemos](https://aka.ms/AzureArcJumpstartDemos)

Azure Arc Jumpstart demos

## Azure Arc-enabled Kubernetes & servers

[aka.ms/arc-blog](https://aka.ms/arc-blog)

Azure Arc: Extending Azure management to any infrastructure

[aka.ms/arc-k8svideo](https://aka.ms/arc-k8svideo)

Kubernetes—Managing K8 clusters outside of Azure with Azure Arc

[aka.ms/arc-serversvideo](https://aka.ms/arc-serversvideo)

Server management—Organize all your servers outside of Azure with Azure Arc

[aka.ms/arc-serversdocs](https://aka.ms/arc-serversdocs)

Documentation for Azure Arc enabled servers

[aka.ms/arc-k8sdocs](https://aka.ms/arc-k8sdocs)

Documentation for Azure Arc enabled Kubernetes

## Azure Arc-enabled data services

[aka.ms/arc-datablog](https://aka.ms/arc-datablog)

Run Azure data services on-premises, at the edge, and multi-cloud with Azure Arc

[aka.ms/arc-data-mechanicsvideo](https://aka.ms/arc-data-mechanicsvideo)

Azure Arc-enabled data services demos including SQL and PostgreSQL Hyperscale

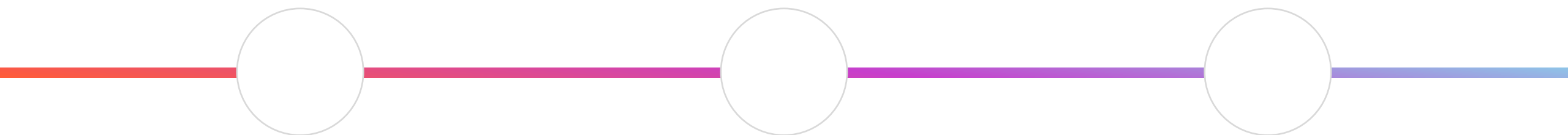
[aka.ms/arc-ignite-video](https://aka.ms/arc-ignite-video)

Ignite 2021: Innovate across hybrid and multicloud with Azure Arc

[aka.ms/arc-datadocs](https://aka.ms/arc-datadocs)

Documentation for Azure Arc-enabled data services

# Continue your journey with Azure Arc Webinar Series



## Introduction for Microsoft Azure Arc for Beginners

Introduction  
Features  
Services  
Flavors

## Intermediate-Level practices with Microsoft Azure Arc

Security  
Governance  
Best Practices  
Cost Management

## Mastering Microsoft Azure Arc for Business

Advanced Features  
Data Services  
Multicloud Environment  
Multispace Environment

# Q & A Time (10 minutes)





# Let's look for the questions!

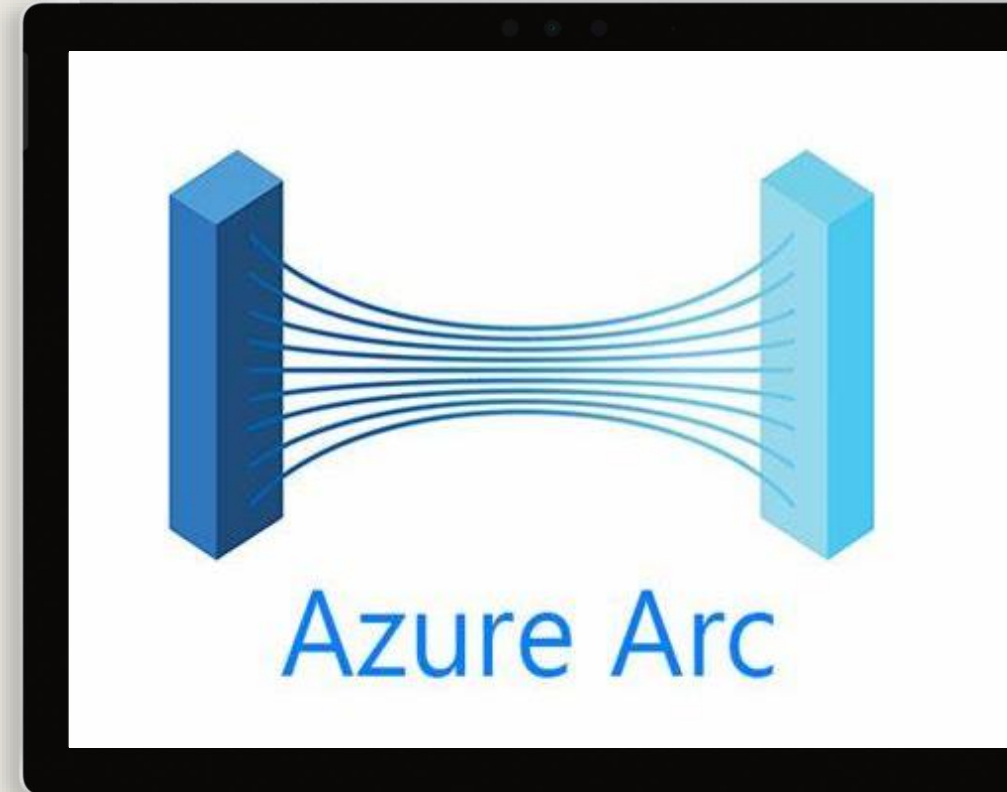
# Webinar build on:

## Materials from Azure Jumpstart Team

Almost all black/blue/colour slides  
Big Thanks for Lior & Jan

## Materials from Microsoft Learn

Microsoft Learn  
Microsoft Docs  
Azure Portal Docs



# Webinar delivered by:

## Tobias Koprowski

Bachelor in: Banking

Higher national diplomas in: European Law & Corporate Governance

Three years in personal and home insurance

Five years in consumer & corporate banking

Ten years in physical Data Center

Microsoft Certified Trainer (MCT) & Educator (MCE)

CertNexus Authorized Instructor (CAI)

Member of:

| **BCS** (The Chartered Institute of IT)

| **IAPP** ( International Association of Privacy Professionals)

| **ISSA** (Information Security System Association)

| **ISACA** (Information Systems Auditing & Control Association)

| **ISC<sup>2</sup>** (International Information System Security Certification Consortium)

| **CSA** (Cloud Security Alliance) – AI Usage Policy Working Group

STEM Ambassador | Royal Voluntary Service

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Thank You for spending  
time with us!

