Microsoft

Azure Arc - Hybrid And Multi-Cloud Management

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Azure Arc – Hybrid Scenarios, Arc Overview and Benefits

Hybrid Scenarios: What do we hear from customers?

- Information Security Teams say - We need to manage security and incident management across our entire IT estate through policy enforcement and automation. We also want our on-premises servers to have strong integration with Azure and tools like Security Center and Sentinel.

- Site Reliability Engineers say - We need to have health visibility to all our infrastructure and applications in single pane of glass fashion.

- SQL DBAs say - We do use SQL Server with our mission critical application, but the Database layer must remain on-premises due to sensitive patient data and data availability needs.

Customer environments and application requirements are evolving

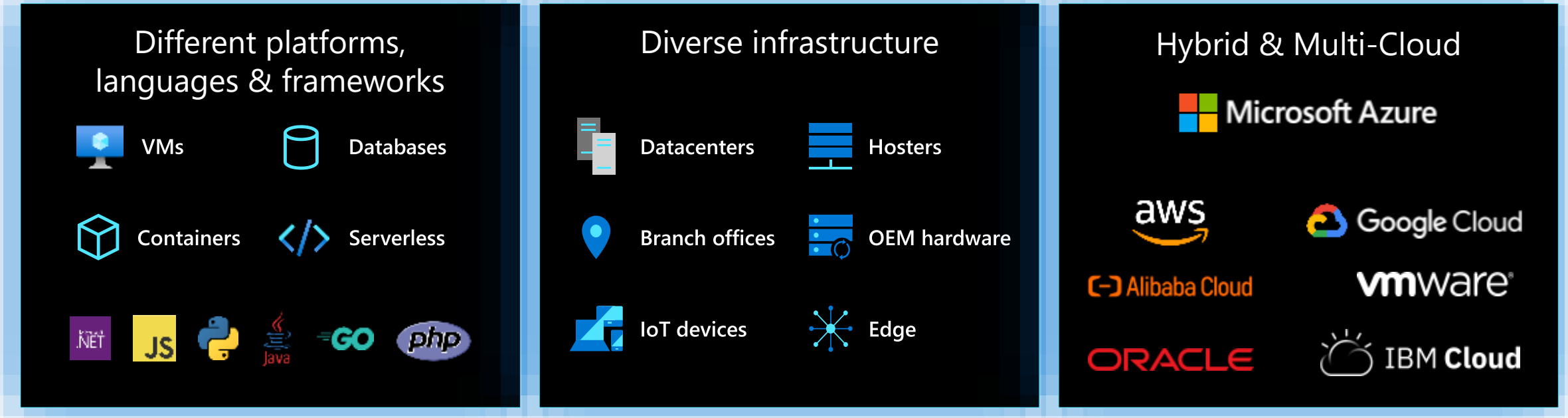
Single control plane with Azure Arc

How to govern and operate across disparate environments?

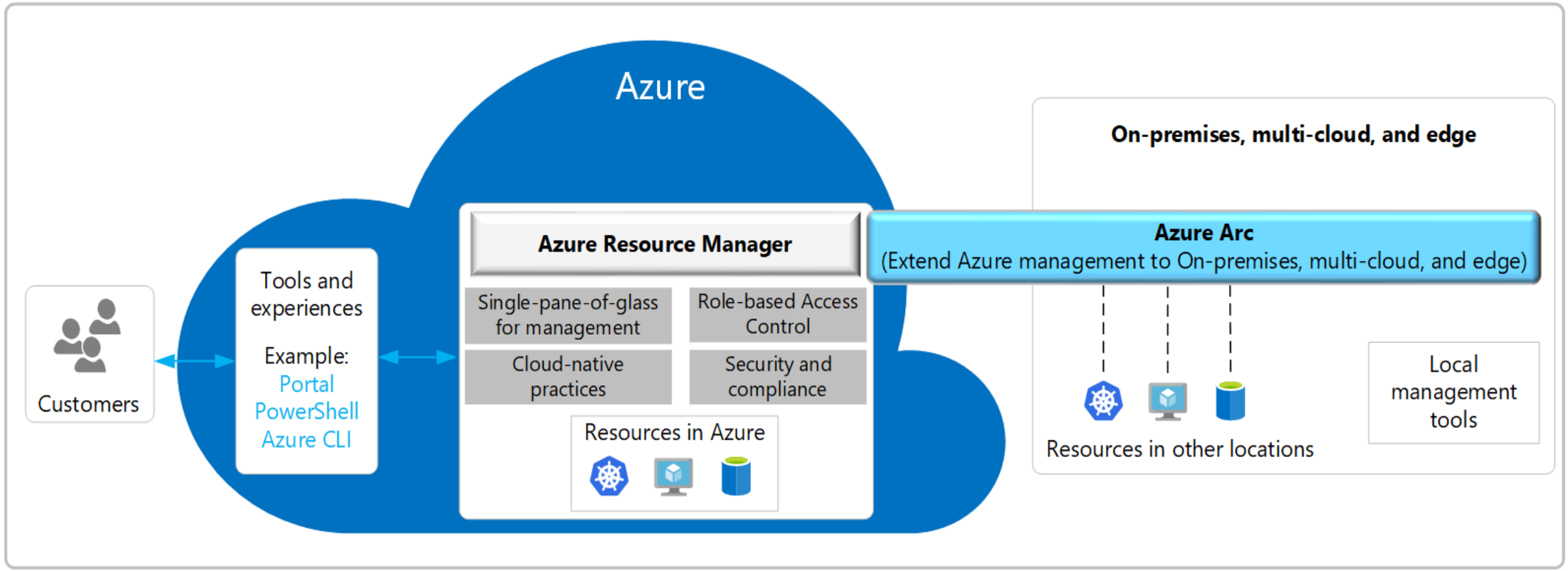
How to ensure security across the entire organization?

How to best enable innovation and developer agility?

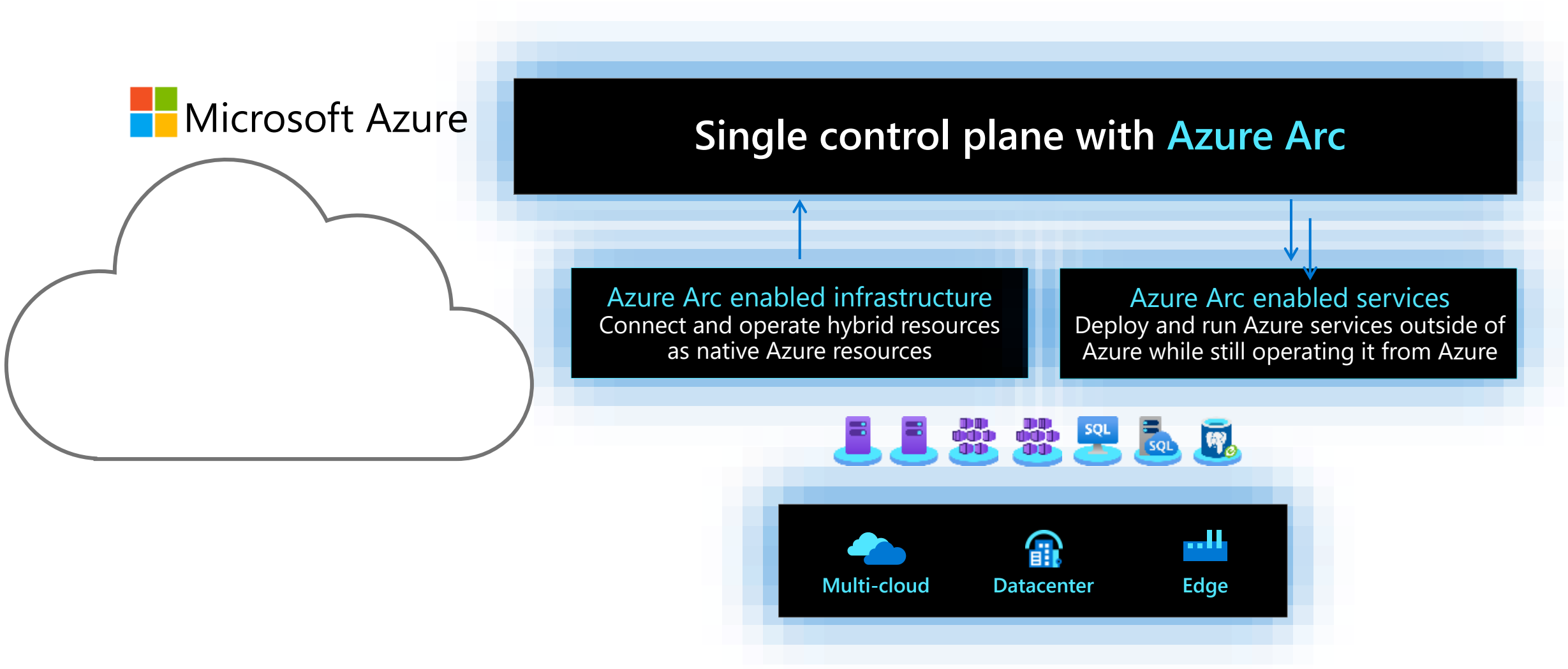
How to meet regulatory requirements and overcome technical hurdles?

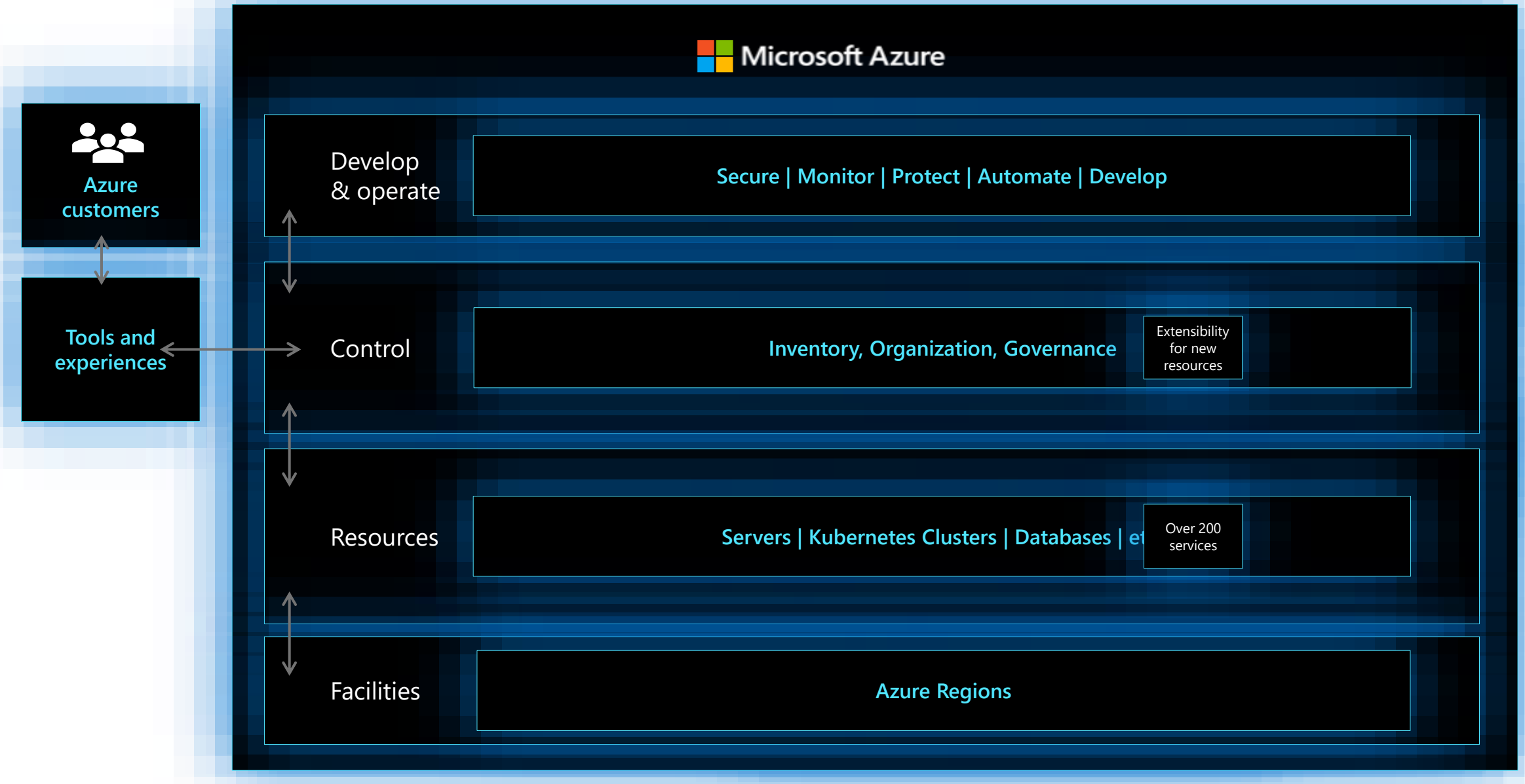


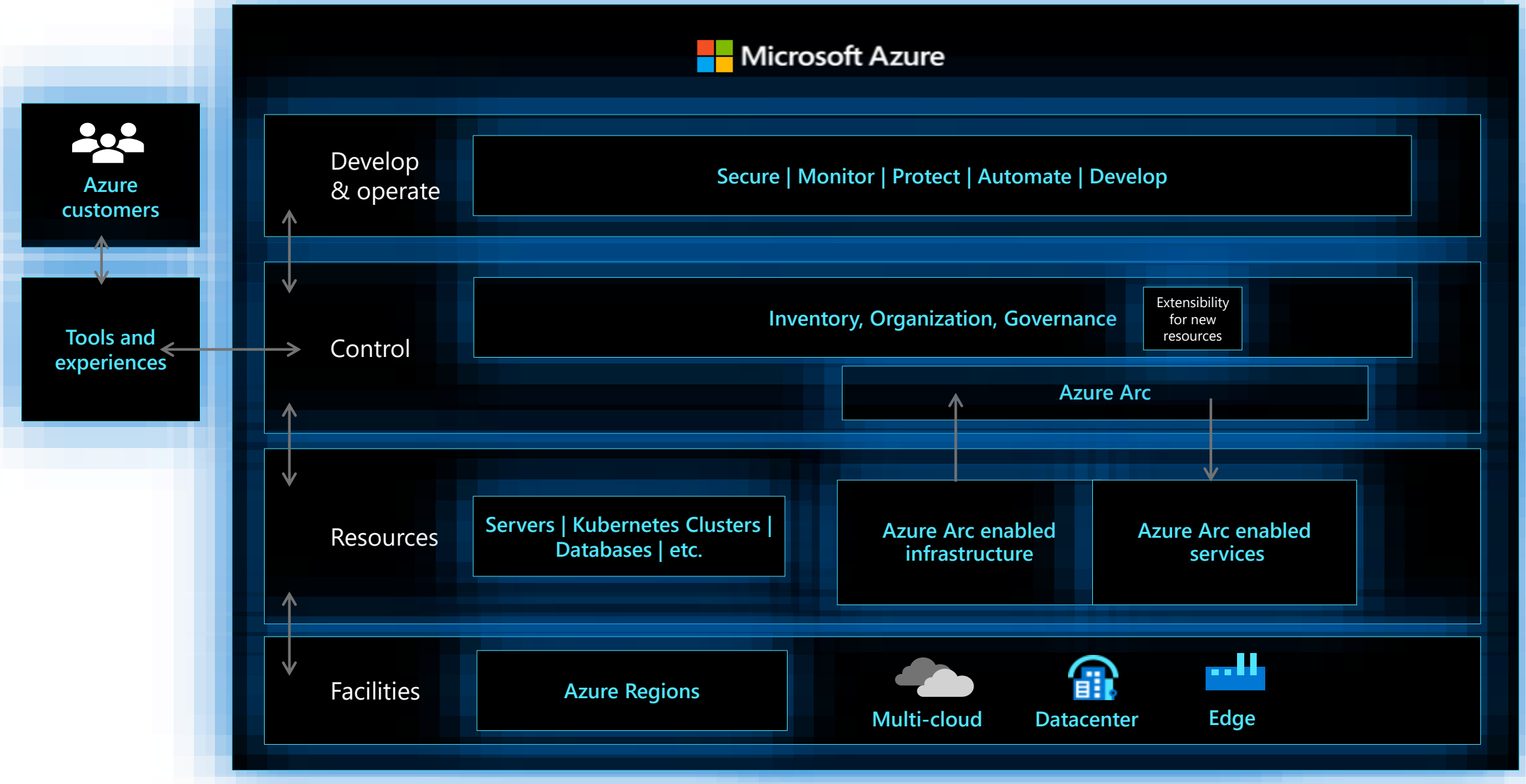
Azure Arc Overview



Azure Arc – Enabled Infrastructure and Enabled Services




Microsoft Azure
Azure customers
Tools and experiences
Develop & operate
Secure | Monitor | Protect | Automate | Develop
Control
Inventory, Organization, Governance
Extensibility for new resources
Resources
Servers | Kubernetes Clusters | Databases | et
Over 200 services
Facilities
Azure Regions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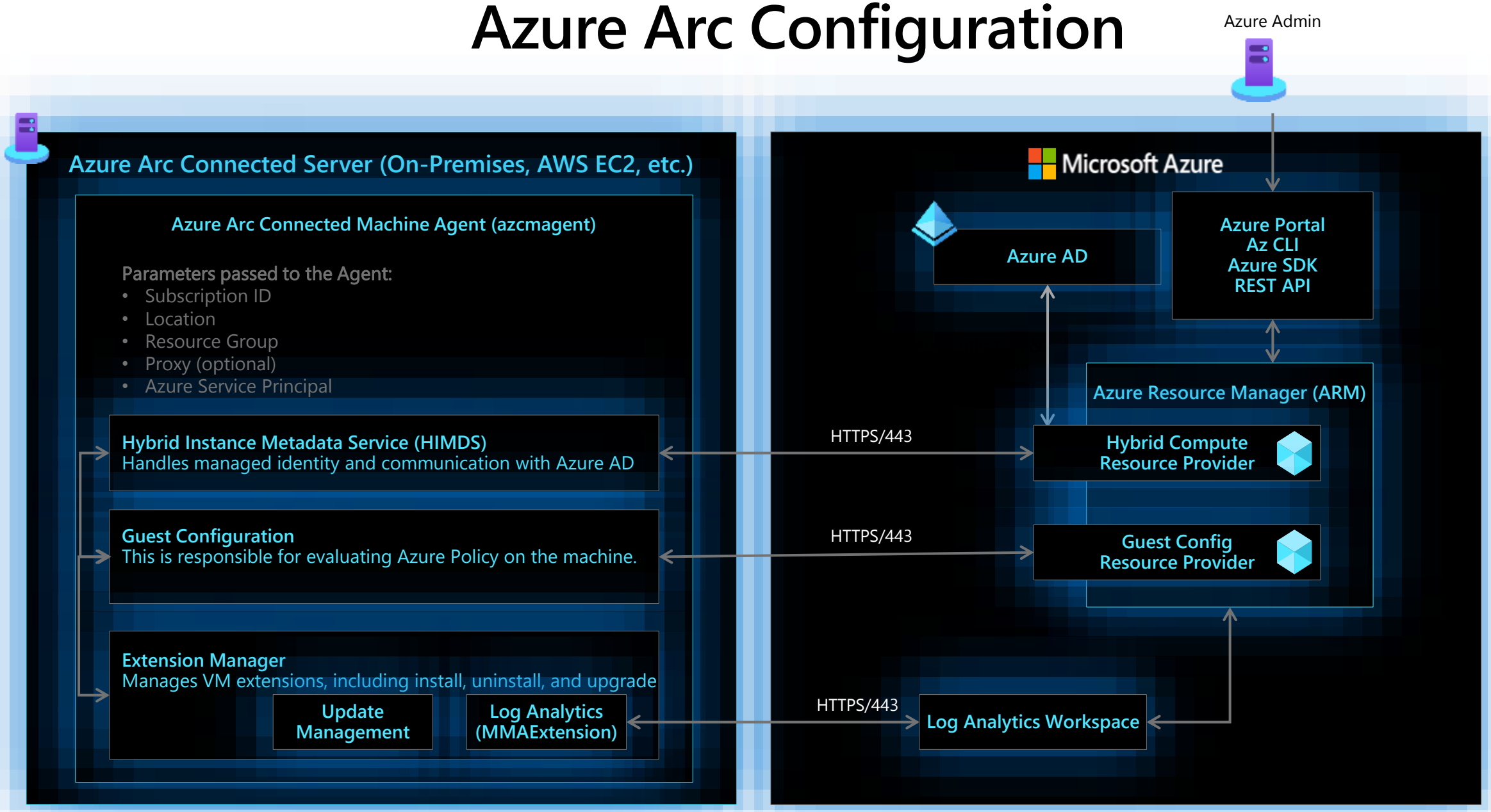
Azure Arc enabled services
Facilities
Azure Regions
Multi-cloud
Datacenter
Edge

Azure Arc Key Benefits

- Vulnerability Scanner
- Antimalware
- Organize all resources using - Azure management groups, subscriptions, resource groups, and tags.
- Consolidated view via - Azure portal, CLI, PowerShell, and REST API.
- Policies
- Update Management
- Inventory
- Change Tracking
- Delegation of permissions using Role Based Access Control (RBAC).
- Extend Azure Monitor to on-premises and other clouds

Azure Arc-Enabled Servers

Azure Arc Configuration



Arc-Enabled Server Extensions (Windows)

Windows Extensions

Extension	Publisher	Type	Additional information
Microsoft Defender for Cloud integrated vulnerability scanner	Qualys	WindowsAgent.AzureSecurityCenter	Microsoft Defender for Cloud's integrated vulnerability assessment solution for Azure and hybrid machines
Microsoft Antimalware extension	Microsoft.Azure.Security	IaaSAntimalware	Microsoft Antimalware extension for Windows
Custom Script extension	Microsoft.Compute	CustomScriptExtension	Windows Custom Script Extension
Log Analytics agent	Microsoft.EnterpriseCloud.Monitoring	MicrosoftMonitoringAgent	Log Analytics VM extension for Windows
Azure Monitor for VMs (insights)	Microsoft.Azure.Monitoring.DependencyAgent	DependencyAgentWindows	Dependency agent virtual machine extension for Windows
Azure Key Vault Certificate Sync	Microsoft.Azure.Key.Vault	KeyVaultForWindows	Key Vault virtual machine extension for Windows
Azure Monitor Agent	Microsoft.Azure.Monitor	AzureMonitorWindowsAgent	Install the Azure Monitor agent (preview)

Arc-Enabled Server Extensions (Linux)

Linux Extensions

Extension	Publisher	Type	Additional information
Microsoft Defender for Cloud integrated vulnerability scanner	Qualys	LinuxAgent.AzureSecurityCenter	Microsoft Defender for Cloud's integrated vulnerability assessment solution for Azure and hybrid machines
Custom Script extension	Microsoft.Azure.Extensions	CustomScript	Linux Custom Script Extension Version 2
Log Analytics agent	Microsoft.EnterpriseCloud.Monitoring	OmsAgentForLinux	Log Analytics VM extension for Linux
Azure Monitor for VMs (insights)	Microsoft.Azure.Monitoring.DependencyAgent	DependencyAgentLinux	Dependency agent virtual machine extension for Linux
Azure Key Vault Certificate Sync	Microsoft.Azure.Key.Vault	KeyVaultForLinux	Key Vault virtual machine extension for Linux
Azure Monitor Agent	Microsoft.Azure.Monitor	AzureMonitorLinuxAgent	Install the Azure Monitor agent (preview)
Azure Automation Hybrid Runbook Worker extension (preview)	Microsoft.Compute	HybridWorkerForLinux	Deploy an extension-based User Hybrid Runbook Worker to execute runbooks locally.

Compatibility matrix – Arc Enabled Servers

The following versions of the Windows and Linux operating system are officially supported for the Azure Connected Machine agent:

- Windows Server 2008 R2 SP1, Windows Server 2012 R2, 2016, 2019, and 2022 (including Server Core)
- Ubuntu 16.04, 18.04, and 20.04 LTS (x64)
- CentOS Linux 7 and 8 (x64)
- SUSE Linux Enterprise Server (SLES) 12 and 15 (x64)
- Red Hat Enterprise Linux (RHEL) 7 and 8 (x64)
- Amazon Linux 2 (x64)
- Oracle Linux 7

Azure Arc-Enabled Servers - Pricing Model

No additional cost

- Azure control plane functionality:
- Attaching servers to Azure
- Resource inventory and organization 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

Paid services

- Azure Policy guest configuration: $6/Server/month.
- Any other Azure service that is attached, for example Azure Defender or Azure Monitor, will be charged as per the pricing for that service. Learn more about billing

SQL Server on Azure Arc-Enabled Servers

SQL Server on Azure Arc-Enabled Servers

- Connected Machine Agent + SQL Arc Extension = SQL Server on Arc enabled Servers.
- It helps us to extend Azure services to SQL Server instances hosted outside of Azure - in our datacenter, on the edge, or in some other cloud environment.

Steps:

- Server onboarding via Registration Script.
- Install SQL Arc Extension.
- It discovers and maps respective SQL Server instance(s) on Azure.

Compatibility matrix – SQL Server on Arc Enabled Servers

SQL Server on Arc-enabled servers supports SQL Server 2012 or higher running on one of the following versions of the Windows or Linux operating system:

- Windows Server 2012 R2 and higher
- Ubuntu 16.04 and 18.04 (x64)
- Red Hat Enterprise Linux (RHEL) 7 (x64)
- SUSE Linux Enterprise Server (SLES) 15 (x64)

Azure Arc-Enabled Kubernetes

Azure Arc enabled Kubernetes

Connect, manage, and operate Kubernetes clusters and applications running anywhere using Azure Arc

Connect

Support for multiple flavors
Deploy to an existing cluster
OSS ecosystem friendly

Configure

Configure GitOps workflows
Enforce desired state across clusters
Cluster & Namespace support

Operate and Monitor

Azure Monitor Integration
Health status reporting
Cluster & App observability

Govern and Secure

Built-in Azure Policies
Cluster security baseline
Role-Based Access Control
Compliance across environments

Any infrastructure, any Kubernetes

kubeadm

AKS

OpenShift

GKE

VMware Tanzu

Azure Arc-Enabled Kubernetes Benefits

- Connect Kubernetes running outside of Azure for inventory, grouping, and tagging.
- Deploy applications and apply configuration using GitOps-based configuration management.
- View and monitor K8 clusters using Azure Monitor for containers.
- Enforce threat protection using Microsoft Defender.
- Apply policy definitions using Azure Policy for Kubernetes.
- Use Azure Active Directory for authentication and authorization checks on your cluster.
- Create custom locations as target locations for deploying Azure Arc-enabled Data Services (SQL Managed Instances, PostgreSQL Hyperscale.), App Services on Azure Arc (including web, function, and logic apps) and Event Grid on Kubernetes.

Custom location & Cluster extension

- Custom location:
  - Custom Locations provides a way to use Azure Arc-enabled Kubernetes clusters as target locations for deploying Azure services instances e.g., Azure Arc-enabled SQL Managed Instance, PostgreSQL Hyperscale, App Services etc.

- Cluster extension:
  - Cluster extension feature builds on top of the packaging components of Helm.
  - It provides an ARM driven experience for installation and management of various Azure capabilities on top of our Arc-enabled Kubernetes cluster.
  - Available extensions - Azure Monitor for containers, Microsoft Defender for Cloud, Azure Arc-enabled Data Services, Azure App Service on Azure Arc, Azure Arc-enabled Machine Learning, etc.

Custom Locations as an abstraction layer

Compatibility matrix – Arc Enabled Kubernetes

Azure Arc-enabled Kubernetes works with any Cloud Native Computing Foundation (CNCF) certified Kubernetes clusters.

Provider Name	Distribution Name	Version
RedHat	OpenShift Container Platform	4.5.41+, 4.6.35+, 4.7.18+
VMware	Tanzu Kubernetes Grid	TKGm 1.4.0; upstream K8s v1.21.2+vmware.1 TKGm 1.3.1; upstream K8s v1.20.5_vmware.2 TKGm 1.2.1; upstream K8s v1.19.3+vmware.1
Canonical	Charmed Kubernetes	1.19
SUSE Rancher	Rancher Kubernetes Engine	RKE CLI version: v1.2.4; Kubernetes versions: 1.19.6), 1.18.14), 1.17.16)
Nutanix	Karbon	Version 2.2.1
Cisco	Intersight Kubernetes Service (IKS) Distribution	Upstream K8s version: 1.19.5
Amazon Web Services	Elastic Kubernetes Service (EKS)	v1.18.9
Google Cloud Platform	Google Kubernetes Engine (GKE)	v1.17.15

Azure Arc-Enabled Kubernetes - Pricing Model

- Billing is based on the number of vCPUs/hour in the cluster.
- Single charge for configuration management no matter how many repositories are connected.
- Kubernetes Configuration: First 6 vCPUs are free, $2/vCPU/month thereafter.
- If the Arc enabled Kubernetes cluster is on Azure Stack Edge, AKS on Azure Stack HCI, or AKS on Windows Server 2019 Datacenter, then Kubernetes configuration is included at no charge.
- Azure Policy for Kubernetes, Azure Monitor for Containers and Azure Defender are in preview – No Cost. However, any data retained by these services may incur charges as per the pricing for that service.

Azure Arc-Enabled Data Services

Azure Arc enabled data services

Cloud PaaS experience for data workloads on-premises, in multi-cloud, and at the edge

Public Preview

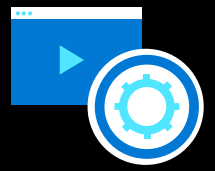
Azure Database for PostgreSQL Hyperscale

Azure SQL Managed Instance (GA)

Support all connection modes

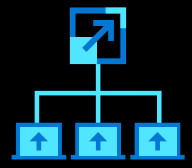
Always current

Automated updates
Evergreen SQL



As-a-Service

Built in HA, backup
Automation at scale



Elastic scale

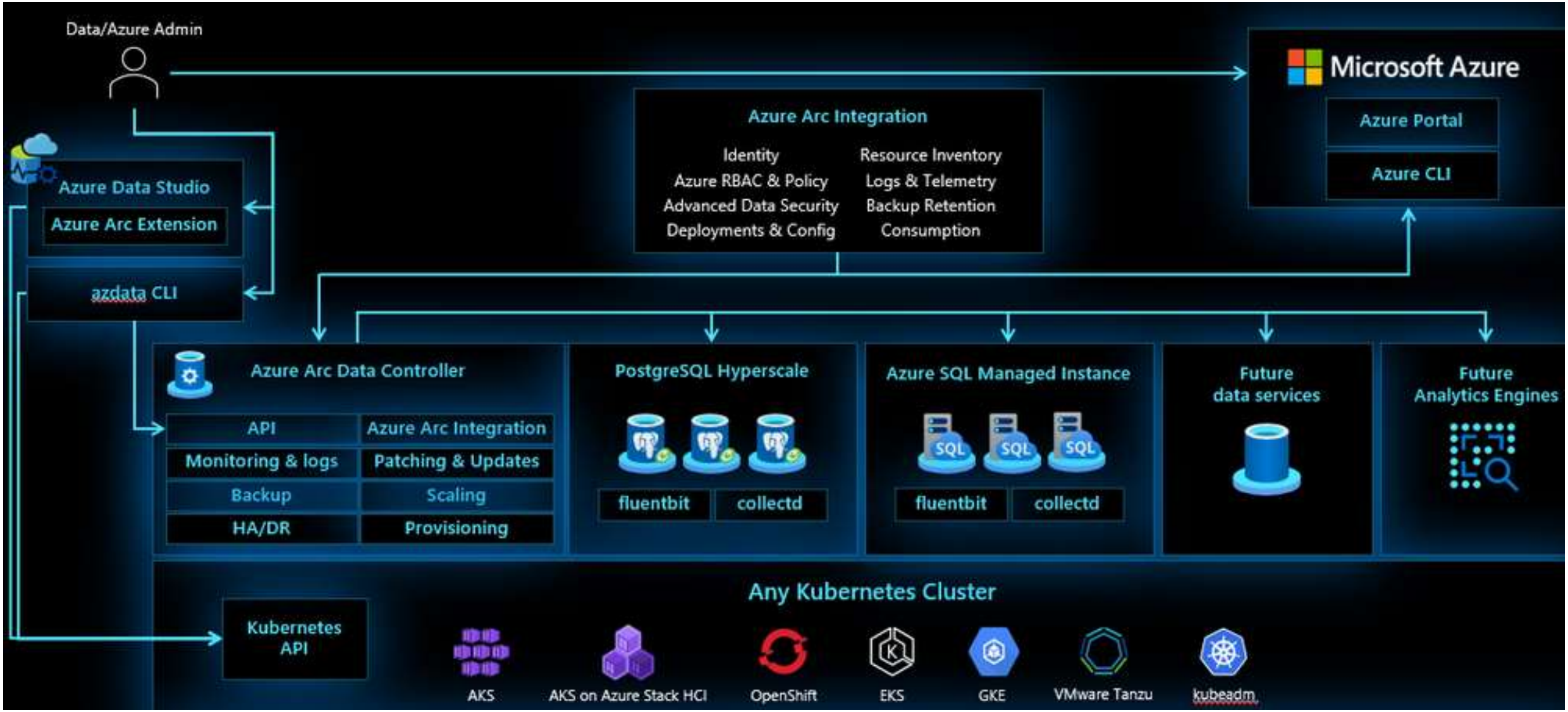
Scale up, scale out
Hyperscale

Unified management

Single pane of glass
Consistent workflows

Any hardware, any Kubernetes

Azure Arc-Enabled Data Services - Architecture



Azure Arc-Enabled Data Services - Pricing Model

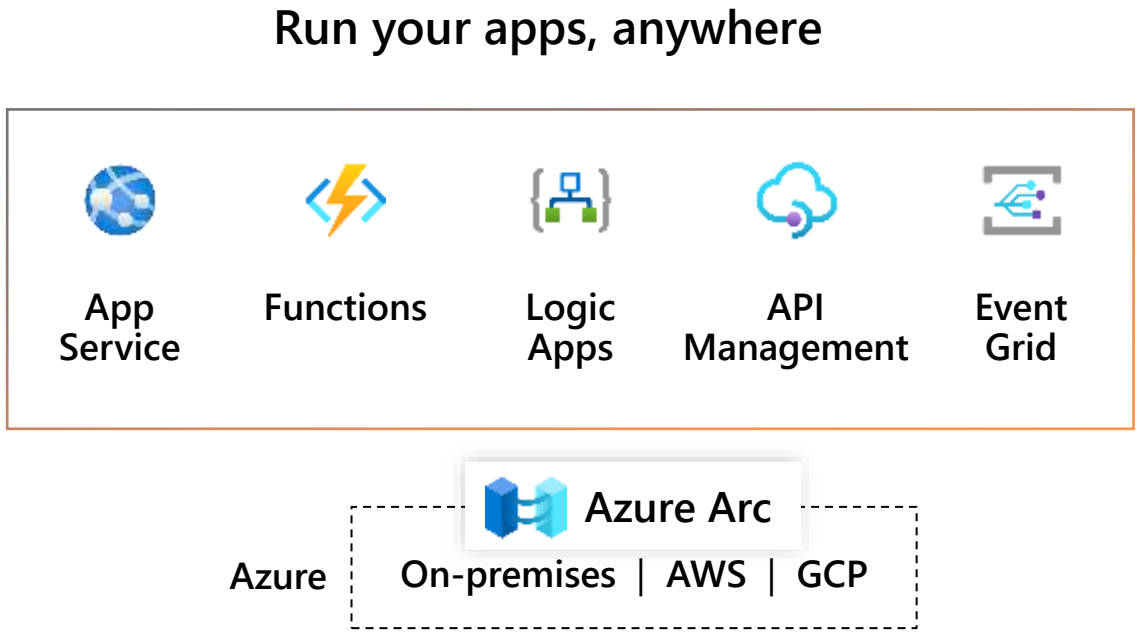
- SQL Server customers can use Azure Hybrid Benefit to adopt Azure Arc-enabled SQL Managed Instance without the need to pay for SQL license again.
- Each instance requires a minimum 1 vCore. Please see the minimum system requirement documented here.

1 vCore / Month	Pay as you go	1 year reserved	3 year reserved
License Included	$153.30	$112.997	$93.002
Azure Hybrid Benefit*	$80.30	$39.997	$20.002

- *Amazon Web Services, VMware on Amazon Web Services, Google Cloud Platform, and Alibaba Cloud.

Azure Arc-Enabled App Services

Azure Arc Hosting - App Service, Functions, and Logic Apps on Azure Arc (Preview)



Accelerate development with turnkey services

Productivity of PaaS with control of Kubernetes

Run your apps anywhere with Azure Arc

Microsoft

Thank you!