10 Azure Services every developer needs to know

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About me

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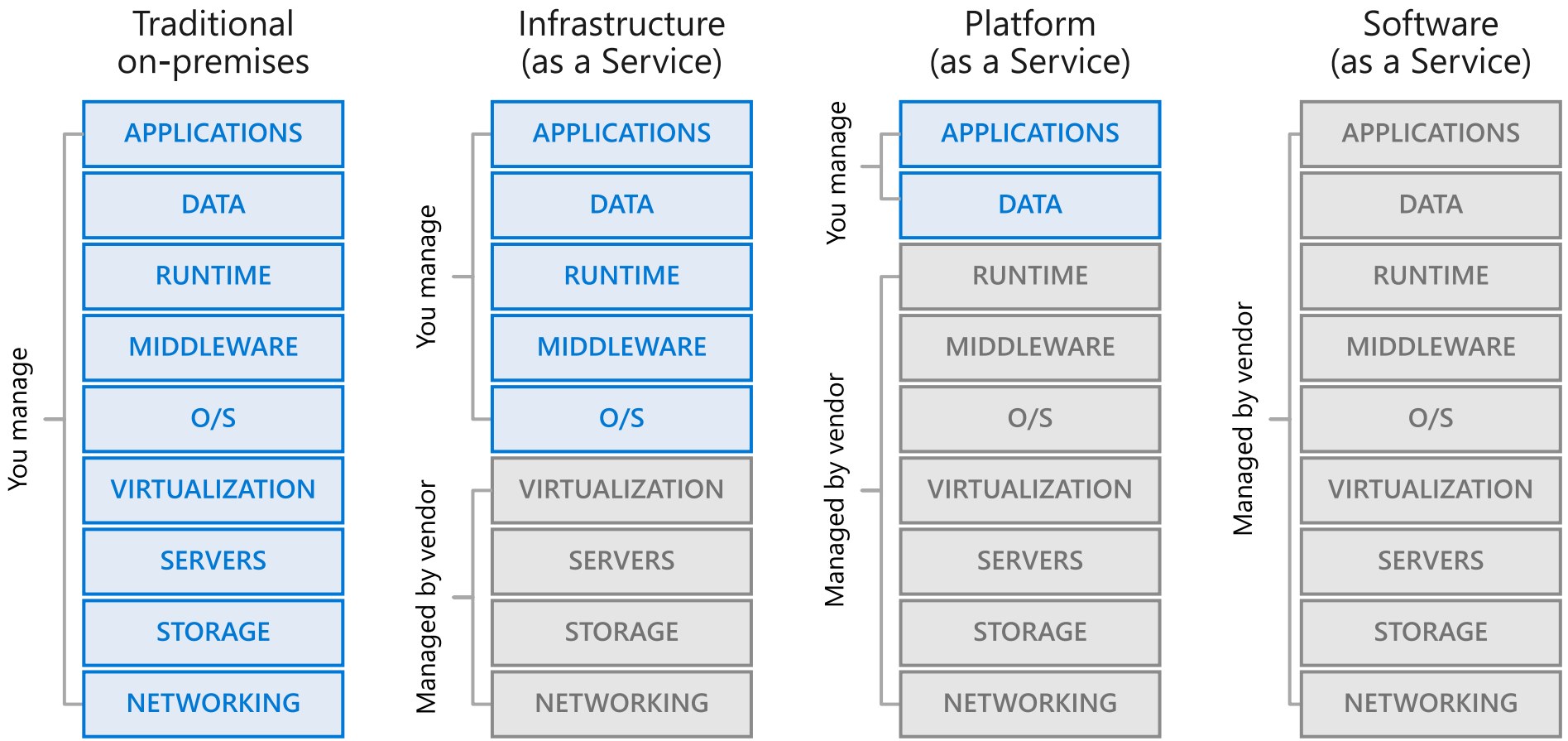
Born and brought up in India and based out of Omaha, NE since 2016

Microsoft Azure MVP since 2020

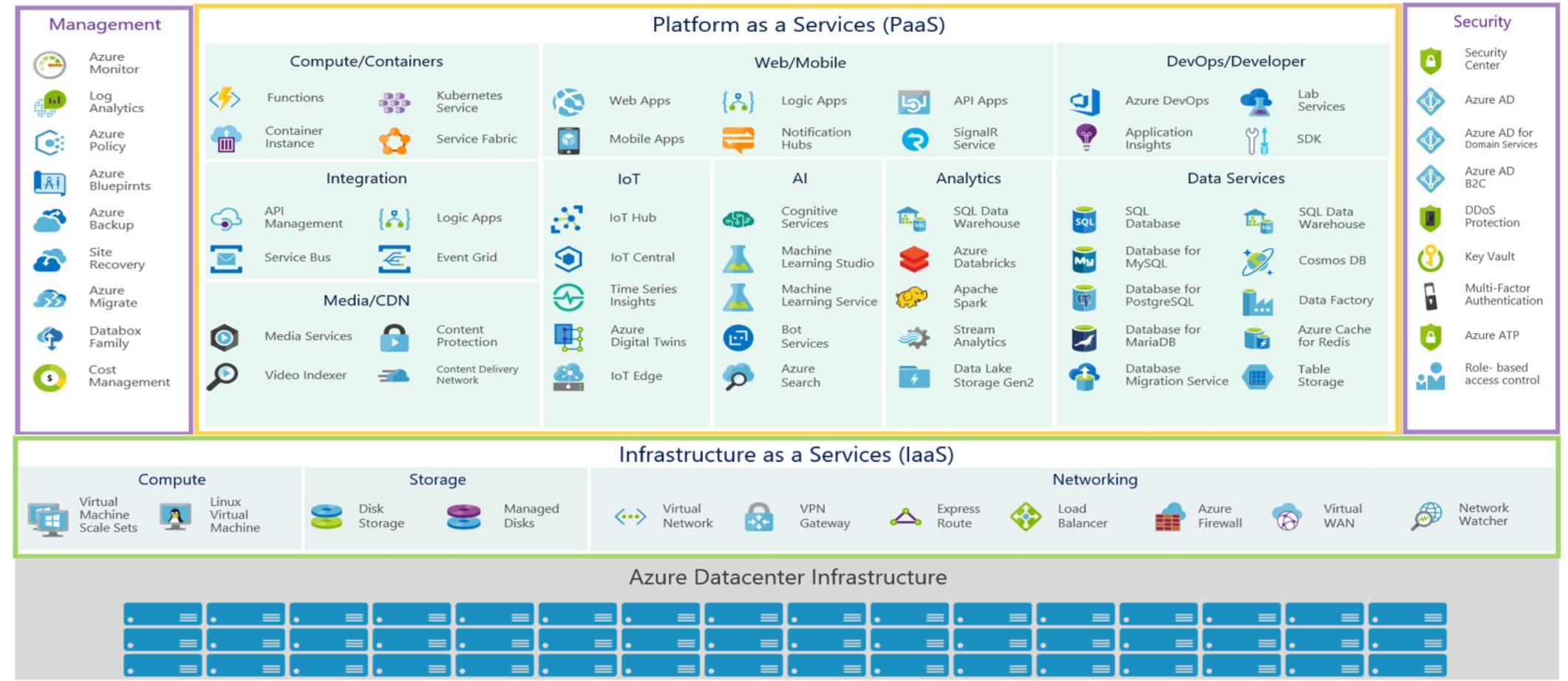
Leader, Omaha Azure User Group(https://omahaazure.org)

15+ cloud certifications and counting…

Deployment Models

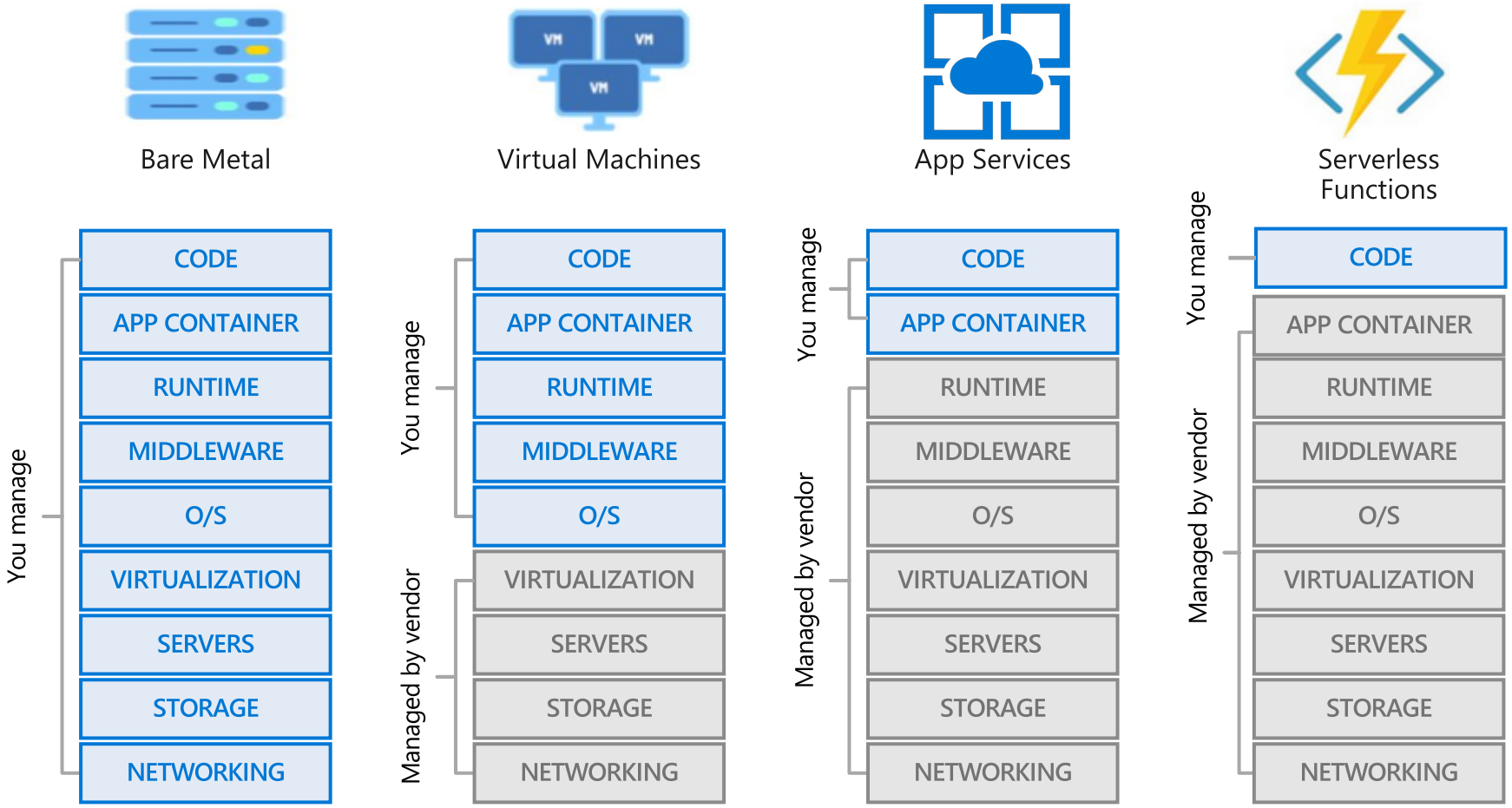


Azure Services



1. App Services

Service Models



App Services

HTTP-based service for hosting web applications, REST APIs, and mobile back ends

Supports .NET, .NET Core, Java, Ruby, Node.js, PHP, and Python

Supports both Windows and Linux

Seamless integration with Azure DevOps, GitHub, Docker Hub and other DevOps tools

App Service Plan

In an App Service (Web Apps, API Apps, or Mobile Apps), an app always runs in an App Service plan

An App Service plan defines a set of compute resources for a web app to run

An App Service plan is similar to a server farm in conventional web hosting terminology

Each App Service plan defines:

- Operating System (Windows, Linux)
- Region (West US, East US, etc.)
- Number of VM instances
- Size of VM instances (Small, Medium, Large)
- Pricing tier (Free, Shared, Basic, Standard, Premium, PremiumV2, PremiumV3, Isolated, IsolatedV2)

App Service Environment

An app service environment is a fully isolated and dedicated environment for running App Service apps securely at high scale

App Service Environments are appropriate for application workloads that require:

- High scale.
- Isolation and secure network access.
- High memory utilization.
- High requests per second (RPS).

An app service environment can host applications from only one customer within one of their virtual networks

An app service environment offers fine grained control over inbound and outbound application network traffic

App Service Pricing

	Free Try for free	Shared Environment for dev/test	Basic Dedicated environment for dev/test	Standard Run production workloads	Premium Enhanced performance and scale	Isolated High-Performance, Security and Isolation
Web, mobile, or API apps	10	100	Unlimited	Unlimited	Unlimited	Unlimited
Disk space	1 GB	1 GB	10 GB	50 GB	250 GB	1 TB
Maximum instances	–	–	Up to 3	Up to 10	Up to 30*	Up to 100
Custom domain	–	Supported	Supported	Supported	Supported	Supported
Auto Scale	–	–	–	Supported	Supported	Supported
Hybrid Connectivity	–	–	Supported	Supported	Supported	Supported
Virtual Network Connectivity	–	–	Supported	Supported	Supported	Supported
Private Endpoints	–	–	Supported	Supported	Supported	Supported
Compute Type	Shared	Shared	Dedicated	Dedicated	Dedicated	Isolated
Pay as you go price	Free	$0.013/hour	$0.075/hour	$0.10/hour	$0.20/hour	$0.40/hour

* In select regions. Read more about scale out limits for Premium v2 plans.

View full details for App Service Plans

2. Azure Functions

What is Serverless?

Doesn’t mean No-Server

Rather, think of it as Less-Server

Abstraction of servers, infrastructure, and operating systems

Function-as-a-Service (FaaS)

- Execute independent code pieces as functions
- Examples-
  - Azure Functions
  - AWS Lambda
  - Google Cloud Functions

What are Azure Functions?

Serverless compute service that can run code on-demand

Run small pieces of code in Azure (call them as “functions”)

Provides out of the box templates for some of the most common scenarios

Useful in common scenarios like –

- Connecting to Storage
- Image processing
- Exposing HTTP based APIs
- IoT
- Running a script or code in response to a variety of events etc

Azure Functions is a serverless evolution of Azure WebJobs

Azure Functions Features

Choice of Language –

- Supports C#, F#, JavaScript, Java, Powershell, Python, Typescript

Pay per use (only for the time the code is executed)

Nuget and NPM support

Integrated Security – Oauth support for Http-triggered functions

Seemless integration with other Azure Services

Flexible Development

Azure Functions runtime is open-source

Azure Functions Runtime Versions

- Language Support

Language	1.x	2.x	3.x	4.x
C#	GA (.NET Framework 4.8)	GA (.NET Core 2.1[1])	GA (.NET Core 3.1) GA (.NET 5.0)	GA (.NET 6.0) Preview (.NET 7) Preview (.NET Framework 4.8)
JavaScript	GA (Node.js 6)	GA (Node.js 10 & 8)	GA (Node.js 14, 12, & 10)	GA (Node.js 14) GA (Node.js 16) Preview (Node.js 18)
F#	GA (.NET Framework 4.8)	GA (.NET Core 2.1[1])	GA (.NET Core 3.1)	GA (.NET 6.0)
Java	N/A	GA (Java 8)	GA (Java 11 & 8)	GA (Java 11 & 8) Preview (Java 17)
PowerShell	N/A	GA (PowerShell Core 6)	GA (PowerShell 7.0 & Core 6)	GA (PowerShell 7.0, 7.2)
Python	N/A	GA (Python 3.7 & 3.6)	GA (Python 3.9, 3.8, 3.7, & 3.6)	GA (Python 3.9, 3.8, 3.7)
TypeScript[2]	N/A	GA	GA	GA

https://docs.microsoft.com/en-us/azure/azure-functions/supported-languages

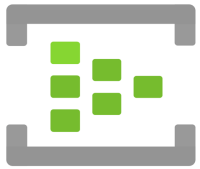
Azure Functions Integrations

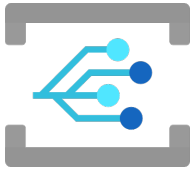
Functions can be integrated with various Azure and 3rd party services

These services can either trigger the function execution or serve as input/output for function code

Azure Functions can be integrated with these services:


Cosmos DB


Event Hub


Event Grid


Service Bus

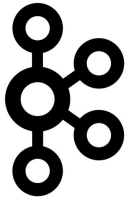

Storage Account


Notification Hub


IoT Hub


Twilio


SendGrid


Kafka

dapr


Webhooks

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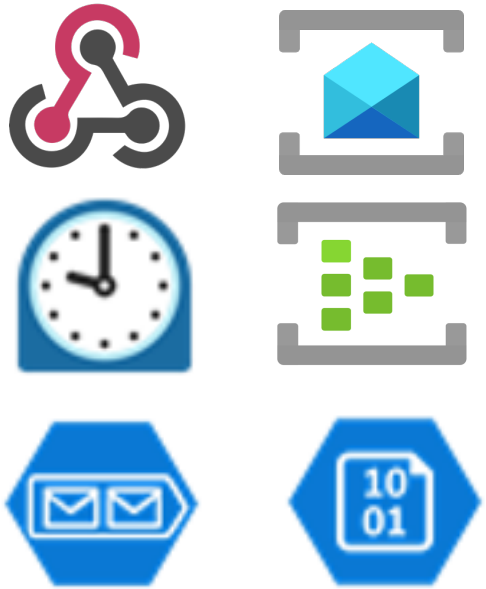
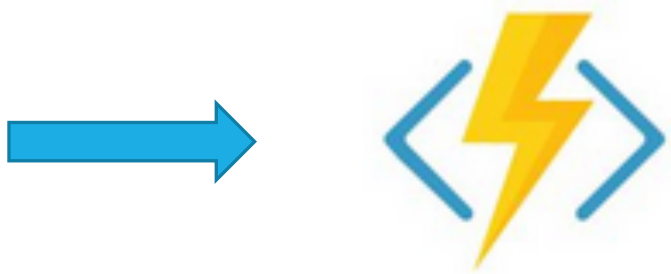
Lifecycle of an Azure Function

An event triggers a function

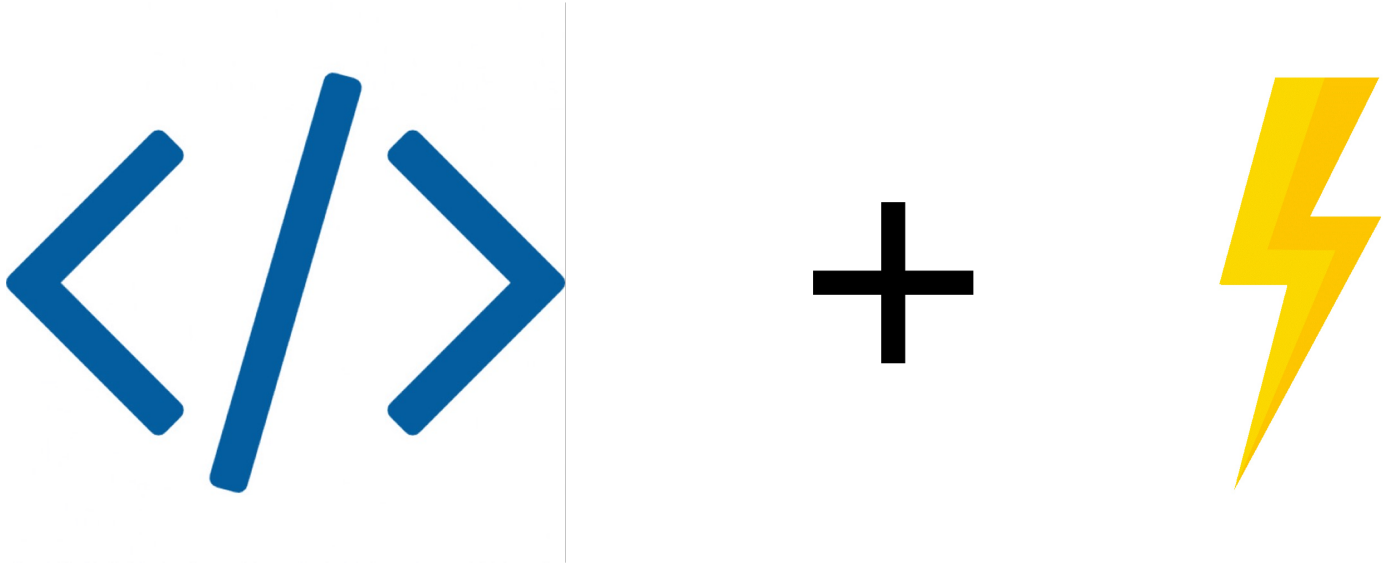
Function execution

Output is returned





Code + Events = Azure Functions



https://www.youtube.com/watch?v=QvaPka0lmdU

Azure Functions Pricing

Three pricing plans:

Consumption Plan

- Pay for the time the code is executed
- Default Hosting plan

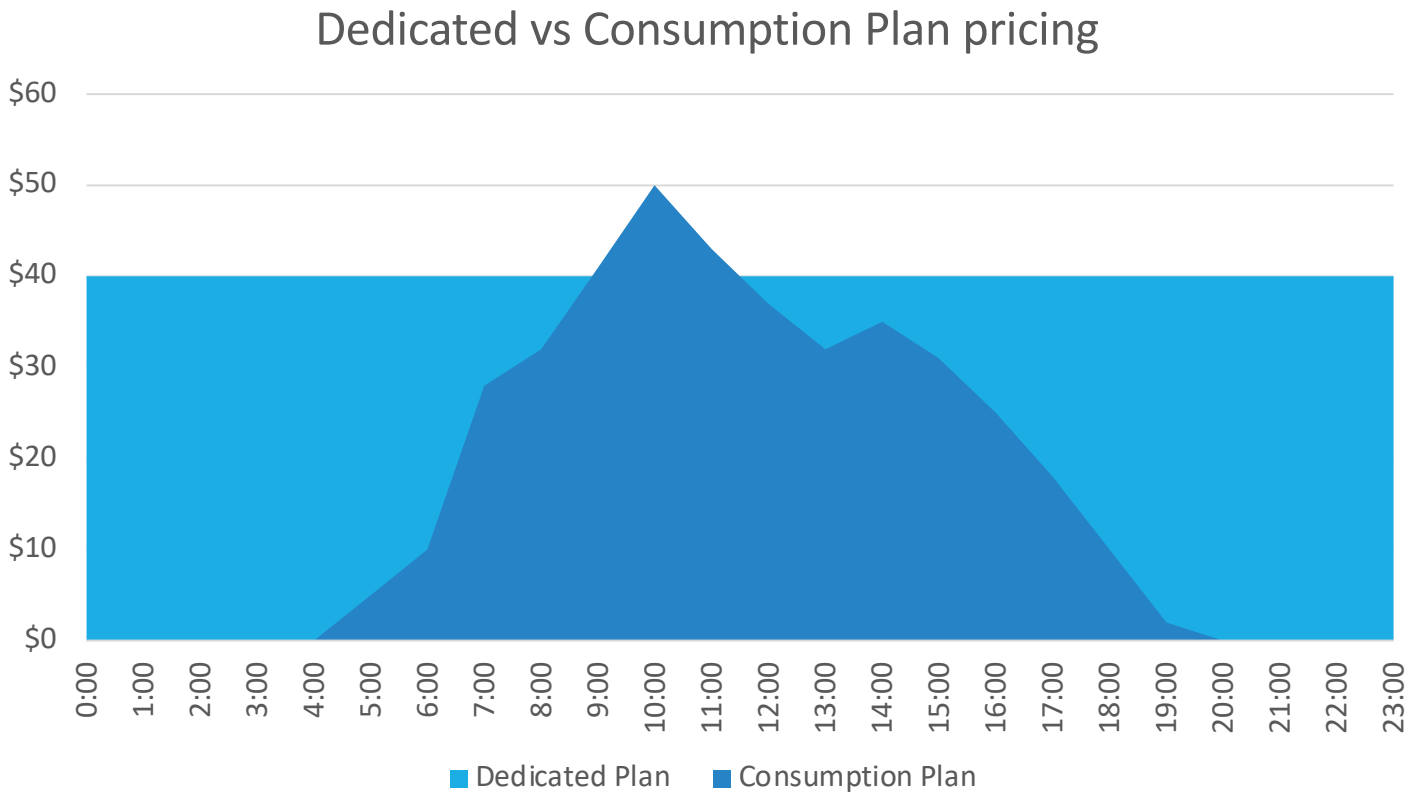
Premium Plan

- Similar to consumption plan
- Perpetually warm instances to avoid any cold start
- VNET connectivity

Dedicated Plan

- Same as an app service plan for a web app
- Enable always on

Azure Functions Pricing



3. Azure Logic Apps

What are Azure Logic Apps?

Integration platform as a Service (iPaaS)

Schedule, automate, and orchestrate tasks, business processes, and workflows

Design and build scalable solutions for

- App integration
- Data integration
- System integration
- Enterprise application integration (EAI)
- Business-to-Business (B2B) communication

Ready-to-use and custom connectors

Benefits

Visually build workflows with easy-to-use tools

First-class support for enterprise integration and B2B scenarios

Write once, reuse often

Built-in extensibility

Pay only for what you use

Triggers and Actions

A *trigger* is the first step in any logic app, usually specifying the event that fires the trigger and starts running your logic app.

Actions are the steps that follow the trigger and perform tasks in your logic app's workflow.

After a trigger fires, Azure Logic Apps creates an instance of your logic app and starts running the *actions* in your logic app's workflow.

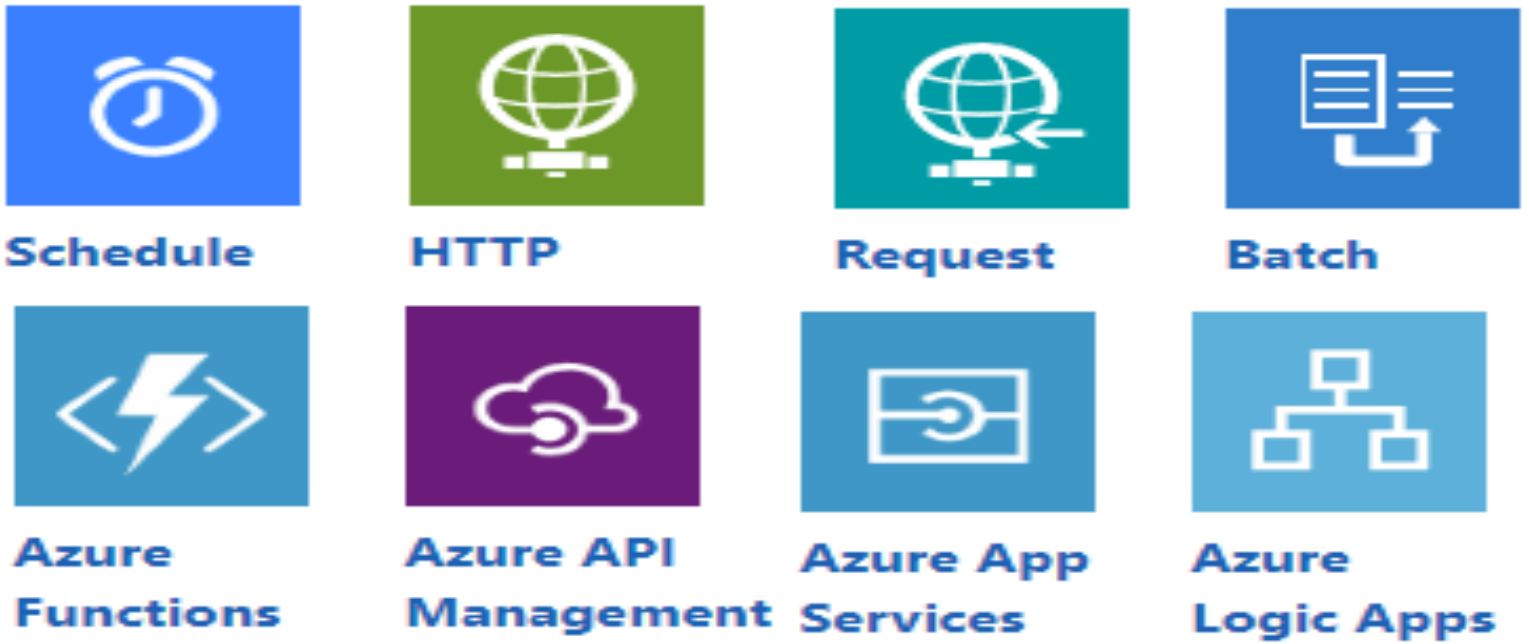
3 kinds of triggers –

1. Recurrence Trigger
2. Polling Trigger
3. Push Trigger

Every time a Logic App definition runs the triggers, action and connector executions are metered.

Built-in Connectors

Triggers

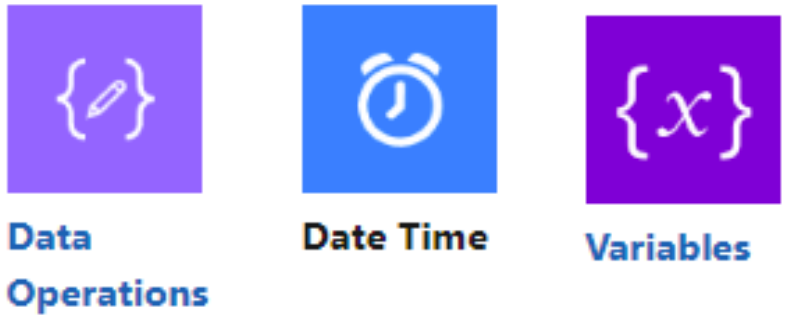


Built-in Connectors

Control Workflow

Built-in Connectors

Data Manipulation



Managed API connectors

Azure Service Bus

SQL Server

SFTP

SharePoint Online

Salesforce

Twitter

Office 365 Outlook

Azure Blob Storage

Dynamics 365 CRM Online

FTP

Azure Event Hubs

Azure Event Grid

On-premises connectors

Integration Account connectors

Enterprise connectors

IBM 3270

IBM MQ

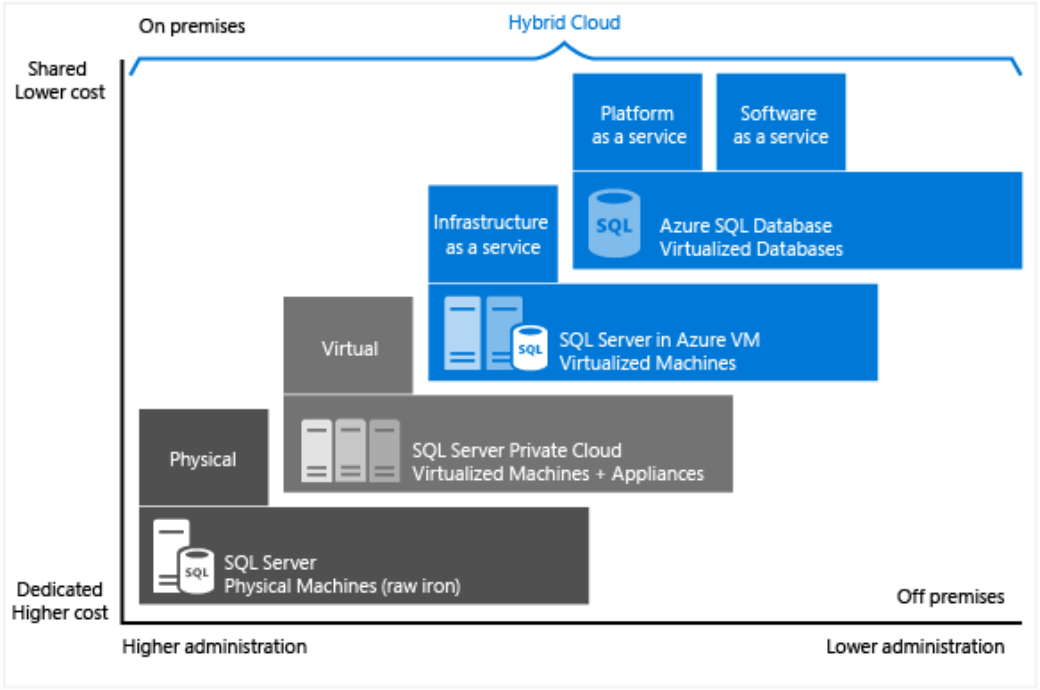
SAP

Logic Apps Pricing

1. Standard Plan – Single Tenant – one workflow per logic app
2. Consumption Plan – Multi Tenant – multiple workflows per logic app (stateful and stateless)
3. Integration Service Environment – Isolated and dedicated environment

4. Azure SQL Database 

Running SQL in Azure



Azure SQL Database: Support modern cloud applications on an intelligent, managed database service, that includes serverless compute.

Azure SQL Managed Instance: Modernize your existing SQL Server applications at scale with an intelligent fully managed instance as a service, with almost 100% feature parity with the SQL Server database engine. Best for most migrations to the cloud.

SQL Server on Azure VMs: Lift-and-shift your SQL Server workloads with ease and maintain 100% SQL Server compatibility and operating system-level access.

Azure SQL Database

Fully managed platform as a service (PaaS) database engine that handles most of the database management functions such as upgrading, patching, backups, and monitoring without user involvement

Always running on the latest stable version of the SQL Server database engine and patched OS with 99.99% availability

Fun fact - the newest capabilities of SQL Server are released first to Azure SQL Database, and then to SQL Server itself

Best for modern cloud applications that want to use the latest stable SQL Server features and have time constraints in development and marketing.

Azure SQL Database

Offers two deployment options-

1. **Single Database** – represents a fully managed, isolated database. It is similar to a contained database in the SQL Server Database Engine. Each single database is isolated from others and is portable. Each has its own guaranteed amount of compute, memory and storage resources and the resources are not shared with other databases.
2. **Elastic Pool** – represents a collection of single databases with a shared set of resources such as CPU or memory. Single databases can be moved into and out of an elastic pool. Promotes maximization of resource utilization and cost savings.

Azure SQL Database Pricing

Two pricing tiers –

1. **vCore-based purchasing model** - lets you choose the number of vCores, the amount of memory, and the amount and speed of storage. You can also utilize Azure Hybrid Benefit for SQL Server under this model. Also includes serverless compute tier.
2. **DTU-based purchasing model** - offers a blend of compute, memory, and I/O resources in three service tiers, to support light to heavy database workloads. Compute sizes within each tier provide a different mix of these resources, to which you can add additional storage resources.

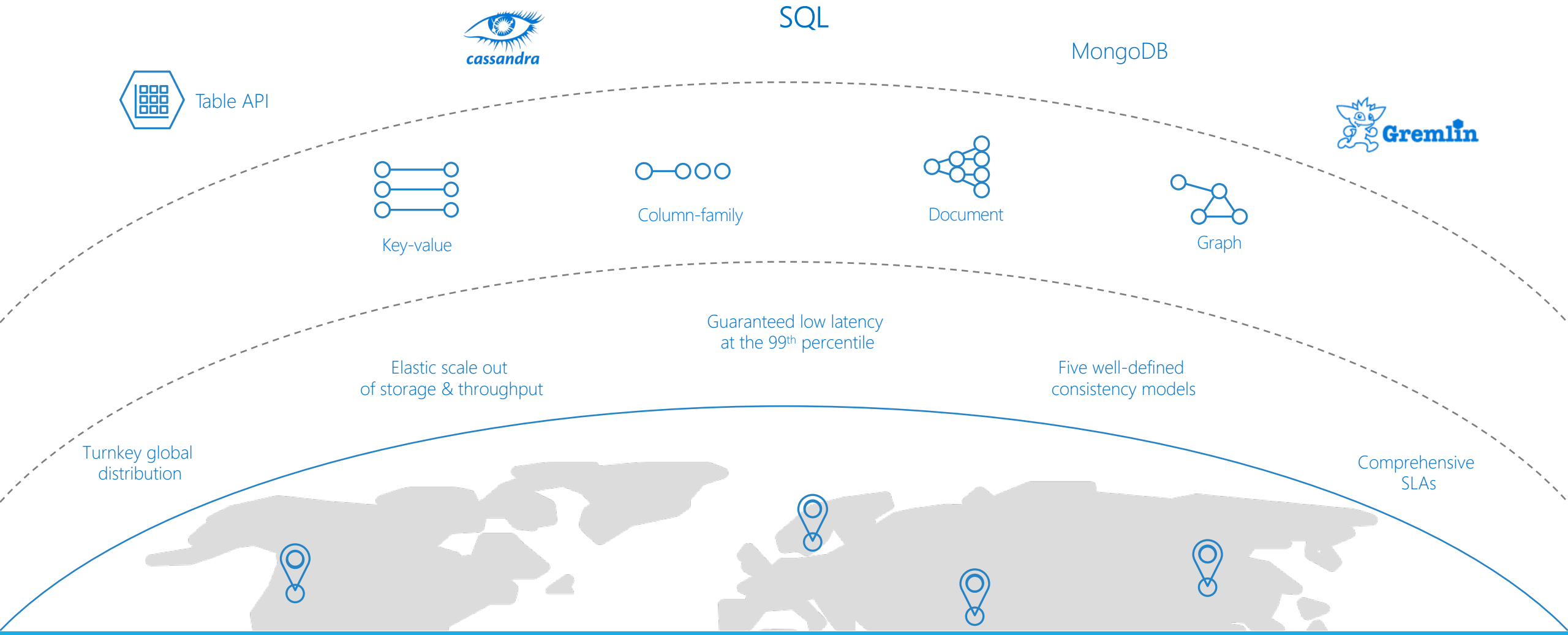
5. Cosmos DB

AZURE COSMOS DB

A FULLY-MANAGED GLOBALLY DISTRIBUTED DATABASE SERVICE BUILT TO GUARANTEE EXTREMELY LOW LATENCY AND MASSIVE SCALE FOR MODERN APPS

AZURE COSMOS DB

A globally distributed, massively scalable, multi-model database service



Multiple Data Models and APIs

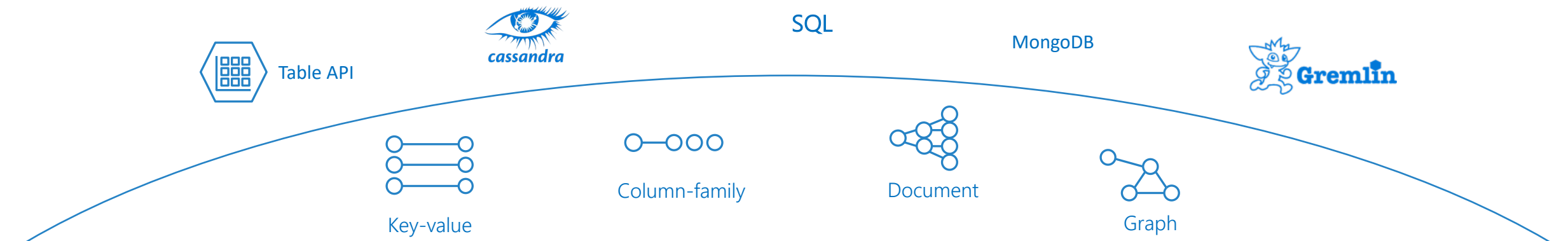
Use the model that fits your requirements, and the APIs, tools and frameworks you prefer

Cosmos DB offers a multitude of APIs to access and query data including, SQL, various popular OSS APIs, and native support for NoSQL workloads.

Use key-value, tabular, graph, and document data

Data is automatically indexed, with no schema or secondary indexes required

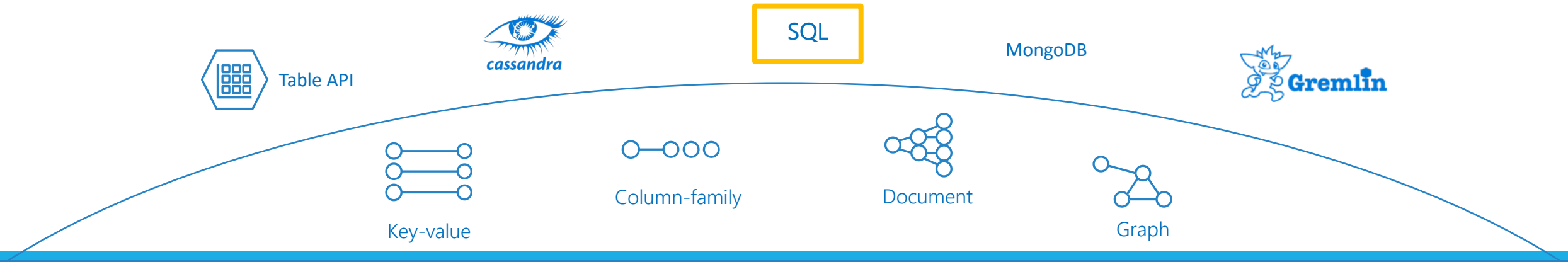
Blazing fast queries with no lag



Which API should I use for my App?

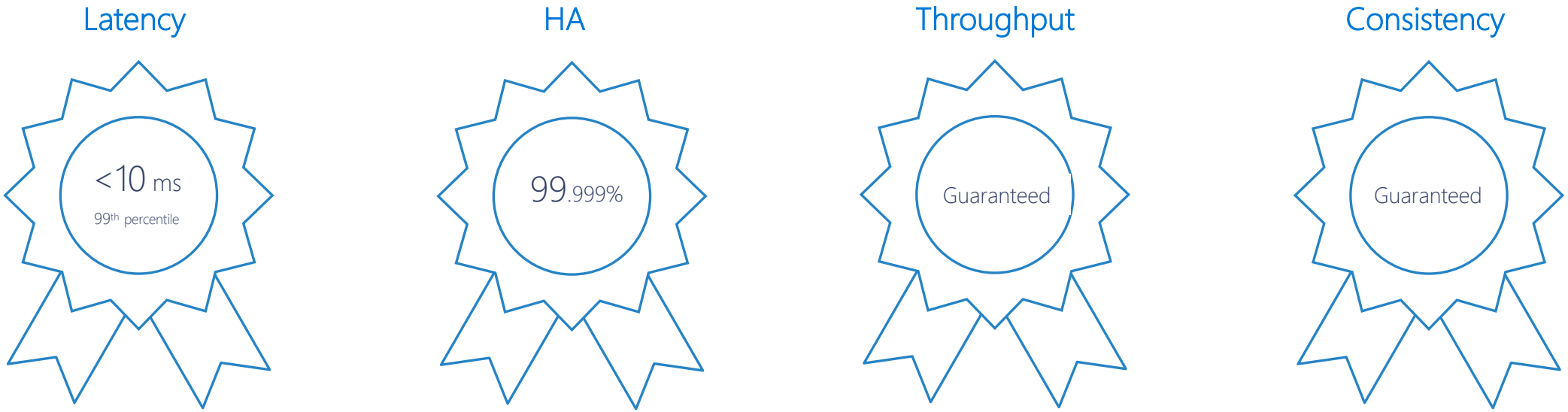
- For all new workloads – Core (SQL) API
  - Best developer experience – Cosmos builds interface, service, and SDKs
  - Gremlin API for graph data

- Other APIs for migration



Comprehensive SLAs

Azure Cosmos DB is the only service with financially-backed SLAs for millisecond latency at the 99th percentile, 99.999% HA and guaranteed throughput and consistency



Five well-defined consistency models

CHOOSE THE BEST CONSISTENCY MODEL FOR YOUR APP

Five well-defined, consistency models

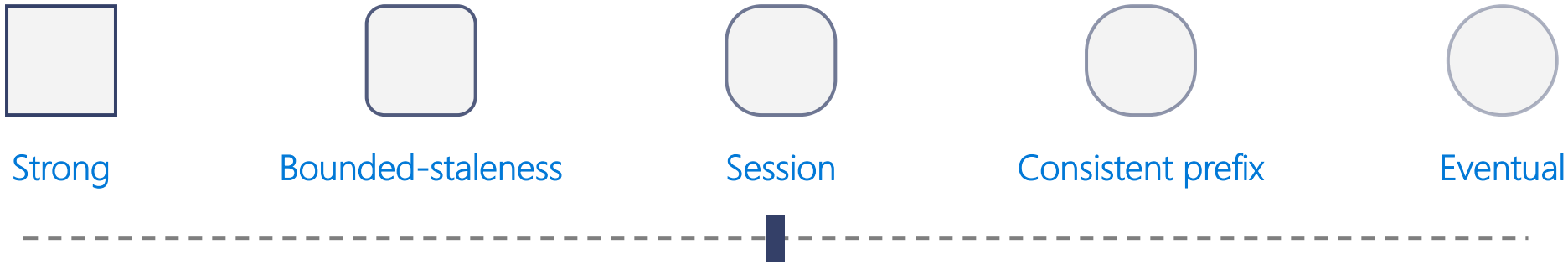
Overridable on a per-request basis

Provides control over performance-consistency tradeoffs, backed by comprehensive SLAs.

An intuitive programming model offering low latency and high availability for your planet-scale app.

CLEAR TRADEOFFS

- Latency
- Availability
- Throughput



Consistency models - breakdown

Consistency Level	Guarantees
Strong	Linearizability (once operation is complete, it will be visible to all)
Bounded Staleness	Consistent Prefix. Reads lag behind writes by at most k prefixes or t interval Similar properties to strong consistency (except within staleness window), while preserving 99.99% availability and low latency.
Session	Consistent Prefix. Within a session: monotonic reads, monotonic writes, read-your-writes, write-follows-reads Predictable consistency for a session, high read throughput + low latency
Consistent Prefix	Reads will never see out of order writes (no gaps).
Eventual	Potential for out of order reads. Lowest cost for reads of all consistency levels.

What are Request Units (RUs)?

In Cosmos DB, you **provision** the expected capacity/performance

Expressed in **Request Units per second** (RU/s)

- Represents the "cost" of a request in terms of CPU, memory and I/O

Performance can be provisioned:

- at the database-level
- at the collection-level
- or both

You can change RU/s **programmatically** with API calls or…

Autopilot to scale based on usage

6. Azure Active Directory

Azure Active Directory

Cloud-based identity and access management service

Provides authentication and authorization service to access Microsoft Services including Microsoft 365, Azure portal, and several other SaaS applications

Can also be used for controlling access to internal resources within your organization

As an app developer, you can use Azure AD as a standards-based approach for adding single sign on to your application, allowing it to work with a user's pre-existing credentials

Azure Active Directory Licensing

1. Free tier
2. Office 365
3. Premium P1
4. Premium P2
5. “Pay as you go”

Partially included ✓ Included + Expand all	Azure Active Directory Free **Free** The free edition of Azure AD is included with a subscription of a commercial online service such as Azure, Dynamics 365, Intune, Power Platform, and others.[1]	Office 365 **Free** Additional Azure AD features are included with Office 365 E1, E3, E5, F1, and F3 subscriptions.[2]	Azure Active Directory Premium P1 **$6.00** user/month Azure AD Premium P1, included with Microsoft 365 E3, offers a free 30-day trial. Azure and Office 365 subscribers can buy Azure AD Premium P1 online.	Azure Active Directory Premium P2 **$9.00** user/month Azure AD Premium P2, included with Microsoft 365 E5, offers a free 30-day trial. Azure and Office 365 subscribers can buy Azure Active Directory Premium P2 online.
+ **Authentication, single sign-on and multifactor authentication (MFA)**	✓	✓	✓	✓
+ **Applications Access**	✓	✓	✓	✓
+ **Authorization and Conditional Access**	✓	✓	✓	✓
+ **Administration and hybrid identity**	✓	✓	✓	✓
+ **End-user self-service**	✓	✓	✓	✓
+ **Identity Governance**	✓	✓	✓	✓
+ **Event logging and reporting**	✓	✓	✓	✓
+ **Frontline workers**			✓	✓

Azure Active Directory

Application Registrations (Application Object) – describes three aspects of an application:

- how the service can issue tokens in order to access the application
- resources that the application might need to access
- the actions that the application can take.

Enterprise Applications (Service Principal Object) - Every Application Object (created through the Azure Portal or using the Microsoft Graph APIs, or AzureAD PS Module) creates a corresponding Service Principal Object in the Enterprise Registration blade of AAD.

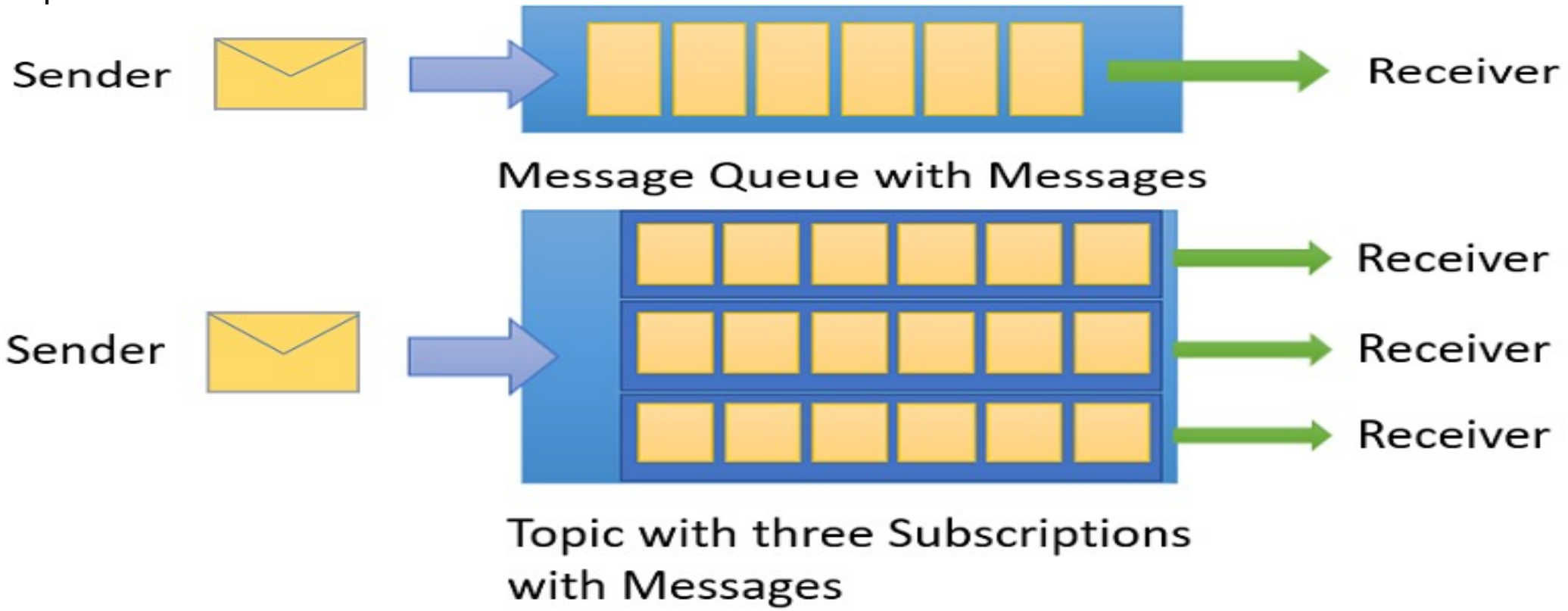
A service principal is created in each tenant where the application is used and references the globally unique app object.

The service principal object defines what the app can actually do in the specific tenant, who can access the app, and what resources the app can access.

7. Service Bus

Azure Service Bus

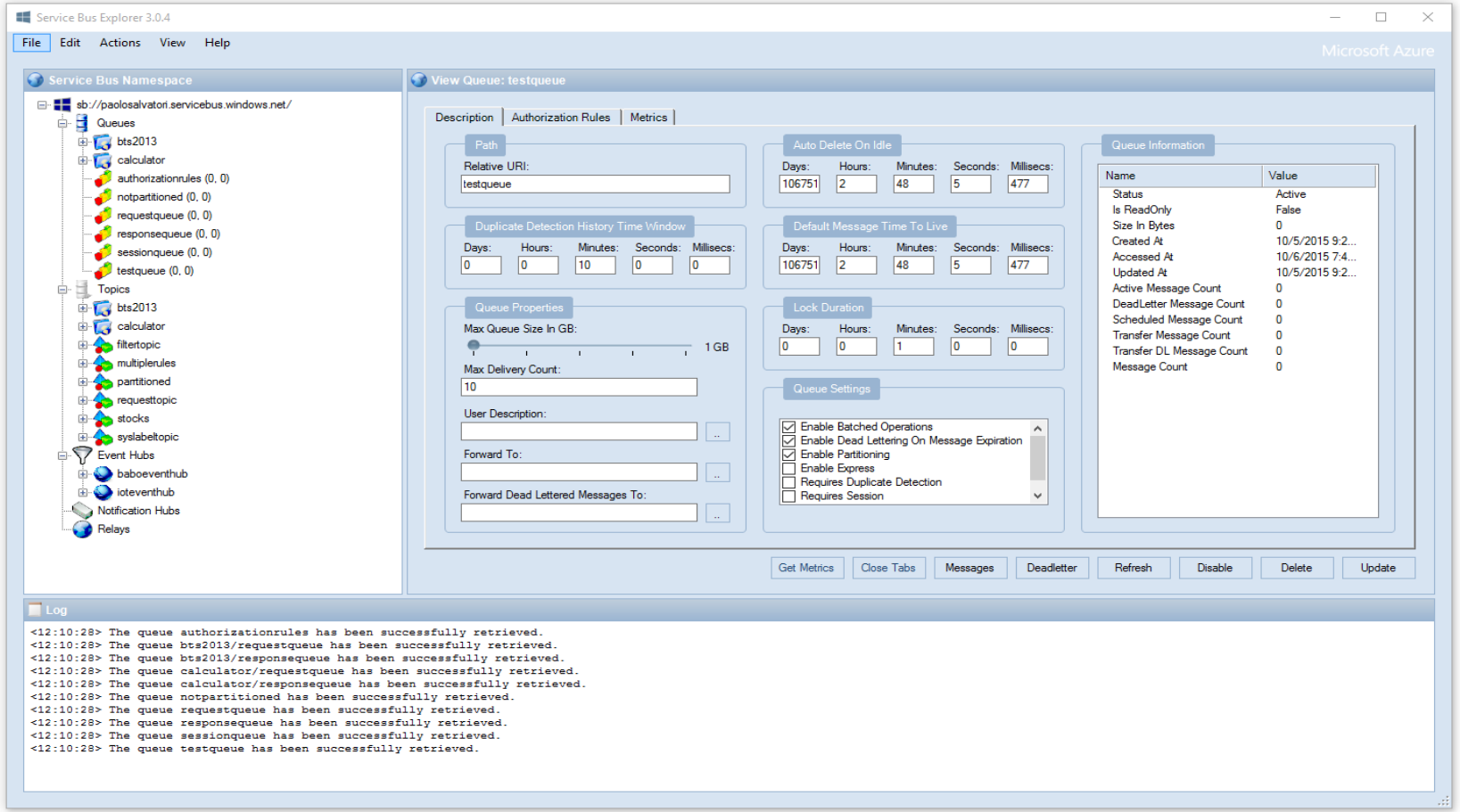
Fully managed enterprise message broker with message queues and publish-subscribe topics



Service Bus Pricing

Feature	Basic	Standard	Premium
Queues	✔	✔	✔
Scheduled messages	✔	✔	✔
Topics		✔	✔
Transactions		✔	✔
De-duplication		✔	✔
Sessions		✔	✔
ForwardTo/SendVia		✔	✔
Message Size	256 KB	256 KB	100 MB
Resource isolation			✔
Geo-Disaster Recovery (Geo-DR)			✔ *Requires additional Service Bus Premium namespaces in another region.
Java Messaging Service (JMS) 2.0 Support			✔
Availability Zones (AZ) support			✔

Service Bus Explorer



Service Bus vs Event Grid vs Event Hub 

Service	Purpose	Type	When to use
Event Grid	Reactive programming	Event distribution (discrete)	React to status changes
Event Hubs	Big data pipeline	Event streaming (series)	Telemetry and distributed data streaming
Service Bus	High-value enterprise messaging	Message	Order processing and financial transactions

8. Azure Monitor

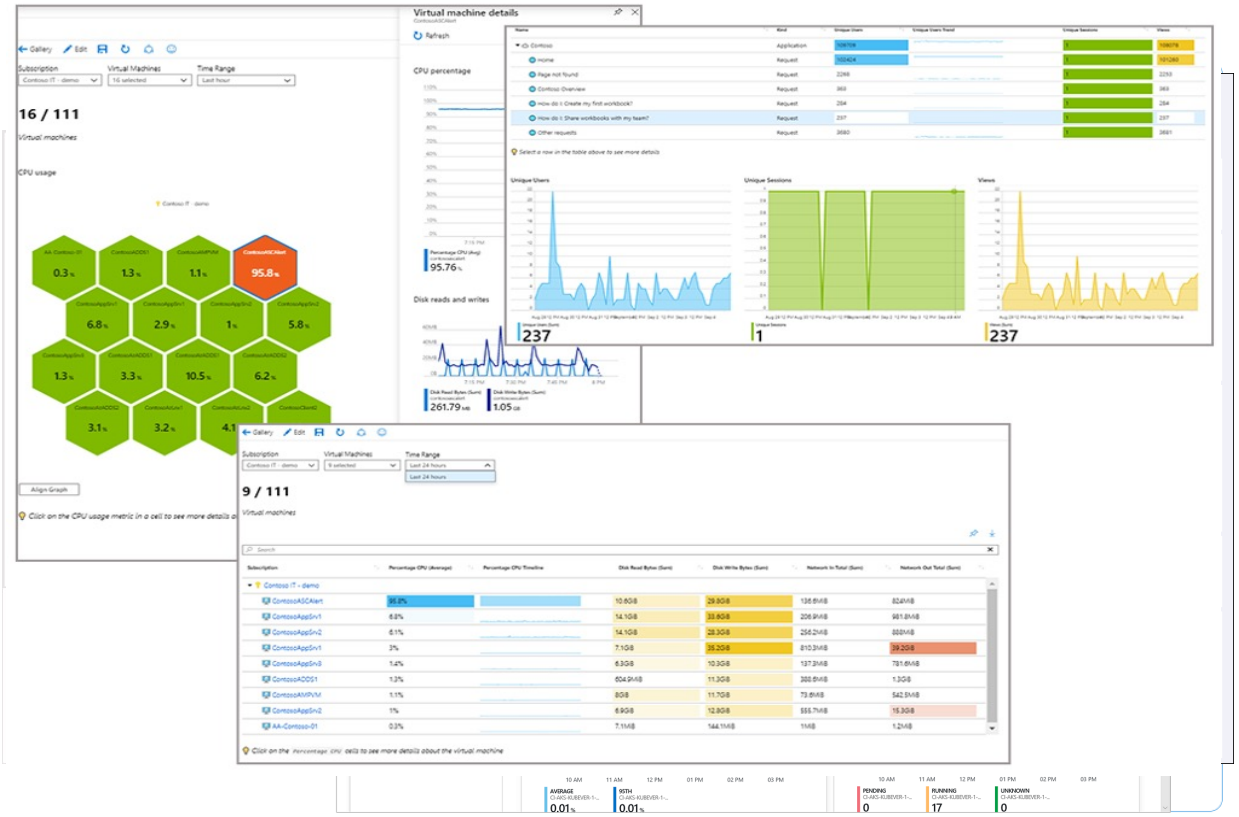
Azure Monitor

Comprehensive solution for collecting, analyzing, and acting on telemetry from your cloud and on-premises environments.

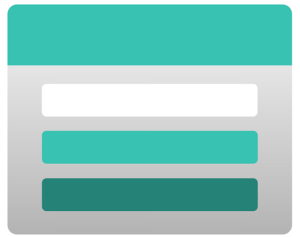
Helpful in understanding how applications are performing and proactively identify issues that affect them and the resources they depend on.

A few examples of what you can do with Azure Monitor include:

- Detect and diagnose issues across applications and dependencies with *Application Insights*.
- Correlate infrastructure issues with *VM insights* and *Container insights*.
- Drill into your monitoring data with *Log Analytics* for troubleshooting and deep diagnostics.
- Support operations at scale with *automated actions*.
- Create visualizations with *Azure dashboards* and *workbooks*.
- Collect data from monitored resources by using *Azure Monitor Metrics*.
- Investigate change data for routine monitoring or for triaging incidents by using Change Analysis.



9. Azure Storage



Azure Storage

Azure Storage services provide massively scalable, secure cloud storage for your data, apps, and workloads

Disk Storage: Scalable and secure storage for your virtual machines

Blob Storage: Massively scalable, secure storage for unstructured data

Azure Data Lake Storage: – Secure, massively scalable data lake storage.

File Storage: Secure cloud file shares

Queue Storage: Secure storage for message-based communication between apps

Azure NetApp Files: Powerful file shares for enterprise workloads, including open-source/Linux

Types of Storage Accounts

Type of storage account	Supported storage services	Redundancy options	Usage
Standard general-purpose v2	Blob Storage (including Data Lake Storage[1]), Queue Storage, Table Storage, and Azure Files	Locally redundant storage (LRS) / geo-redundant storage (GRS) / read-access geo-redundant storage (RA-GRS) Zone-redundant storage (ZRS) / geo-zone-redundant storage (GZRS) / read-access geo-zone-redundant storage (RA-GZRS)[2]	Standard storage account type for blobs, file shares, queues, and tables. Recommended for most scenarios using Azure Storage. If you want support for network file system (NFS) in Azure Files, use the premium file shares account type.
Premium block blobs[3]	Blob Storage (including Data Lake Storage[1])	LRS ZRS[2]	Premium storage account type for block blobs and append blobs. Recommended for scenarios with high transaction rates or that use smaller objects or require consistently low storage latency. Learn more about example workloads.
Premium file shares[3]	Azure Files	LRS ZRS[2]	Premium storage account type for file shares only. Recommended for enterprise or high-performance scale applications. Use this account type if you want a storage account that supports both Server Message Block (SMB) and NFS file shares.
Premium page blobs[3]	Page blobs only	LRS	Premium storage account type for page blobs only. Learn more about page blobs and sample use cases.

Storage Endpoints

Storage service	Endpoint
Blob Storage	`https://<storage-account>.blob.core.windows.net`
Static website (Blob Storage)	`https://<storage-account>.web.core.windows.net`
Data Lake Storage Gen2	`https://<storage-account>.dfs.core.windows.net`
Azure Files	`https://<storage-account>.file.core.windows.net`
Queue Storage	`https://<storage-account>.queue.core.windows.net`
Table Storage	`https://<storage-account>.table.core.windows.net`

10. Azure Kubernetes Service

Azure

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Kubernetes

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Azure Kubernetes Service

Azure Kubernetes service

Hosted Kubernetes service in Azure

Reduces the complexity and operational overhead of managing Kubernetes

The control plane is provided as a managed Azure resource abstracted from the user

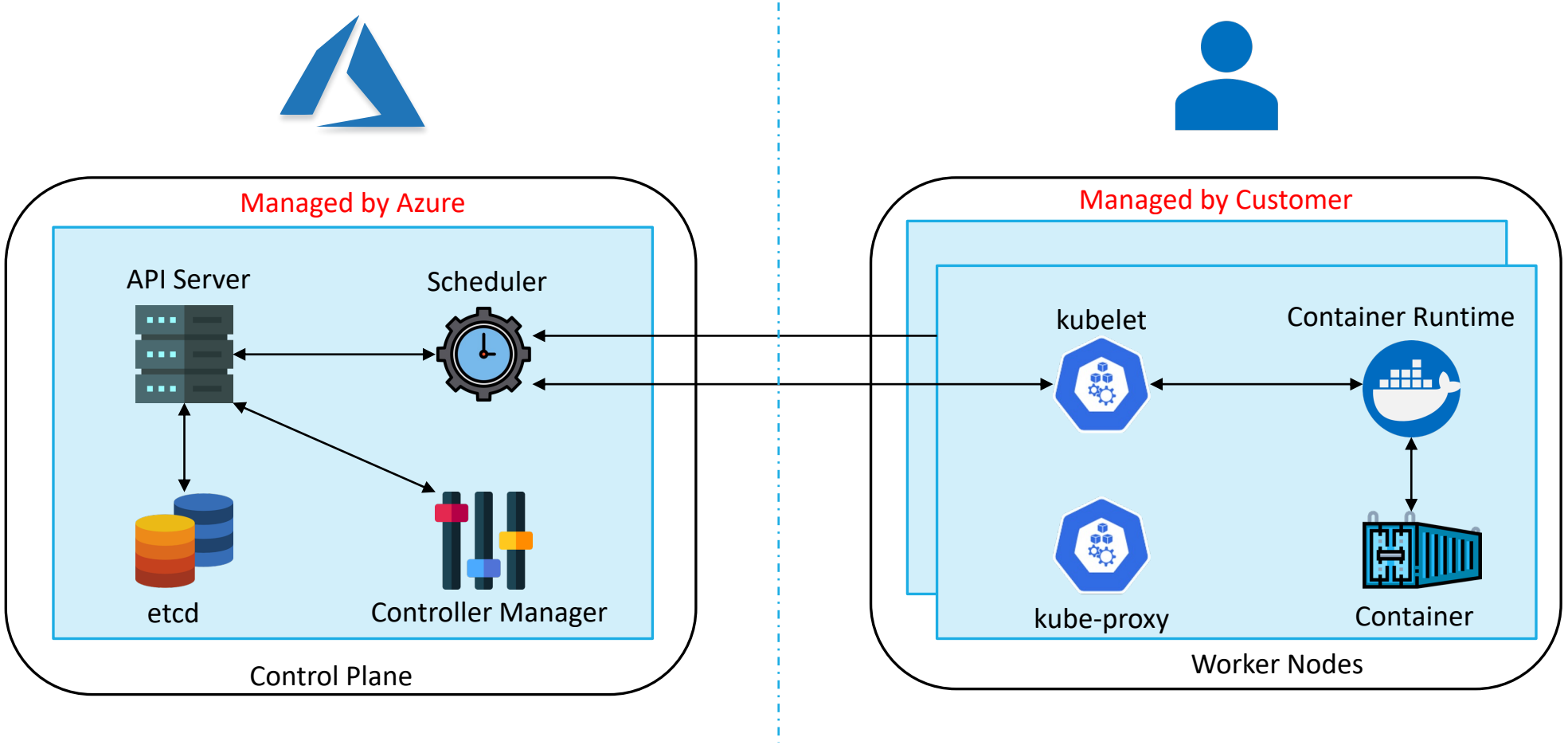
The control plane includes the core Kubernetes components like kube-apiserver, etcd, kube-scheduler and kube-controller-manager

An AKS cluster has one or more worker nodes, which is an Azure virtual machine (VM) that runs the Kubernetes node components and container runtime

You only pay for worker nodes and control plane comes at no charge to you

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

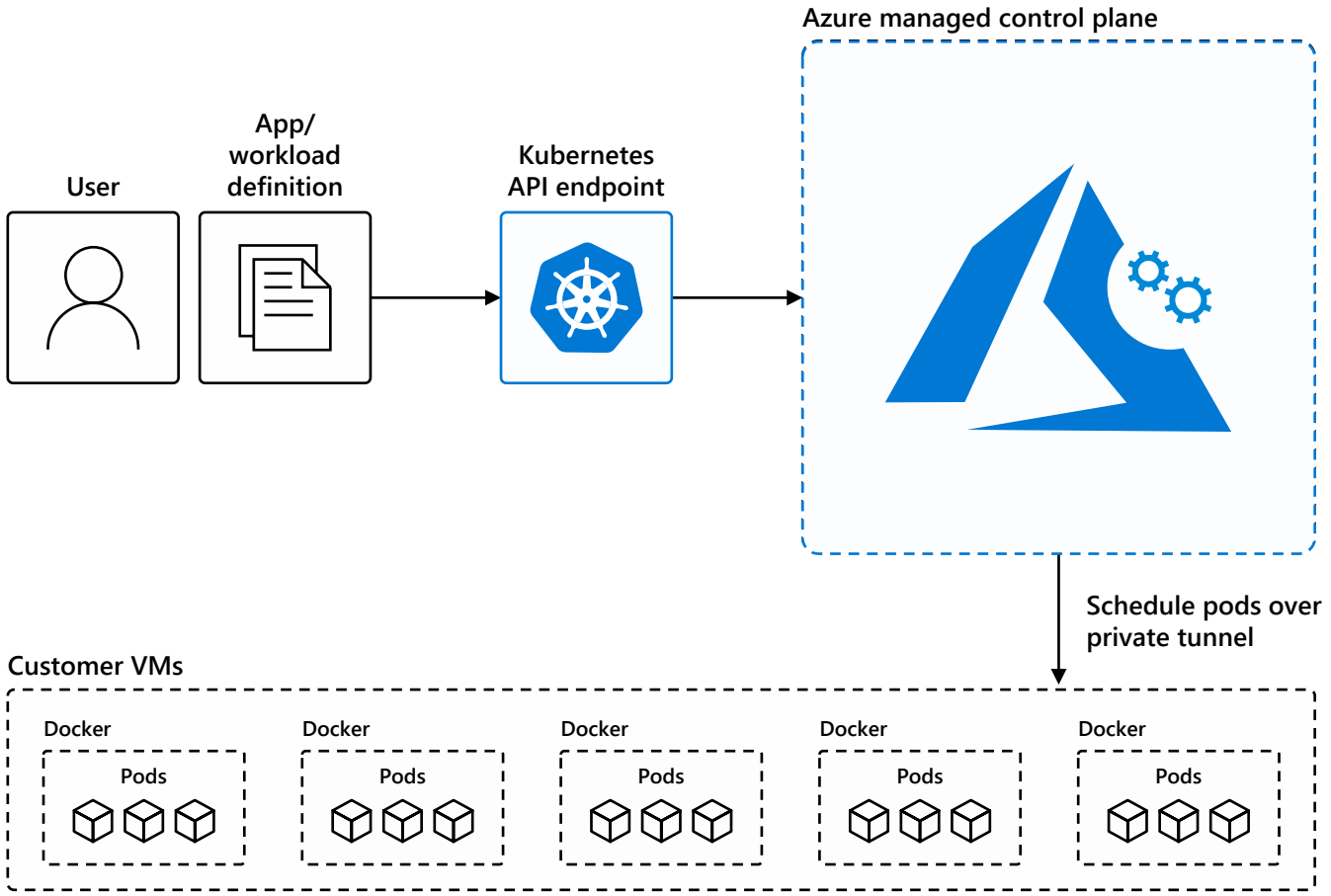
Azure Kubernetes Service



Shared Responsibility

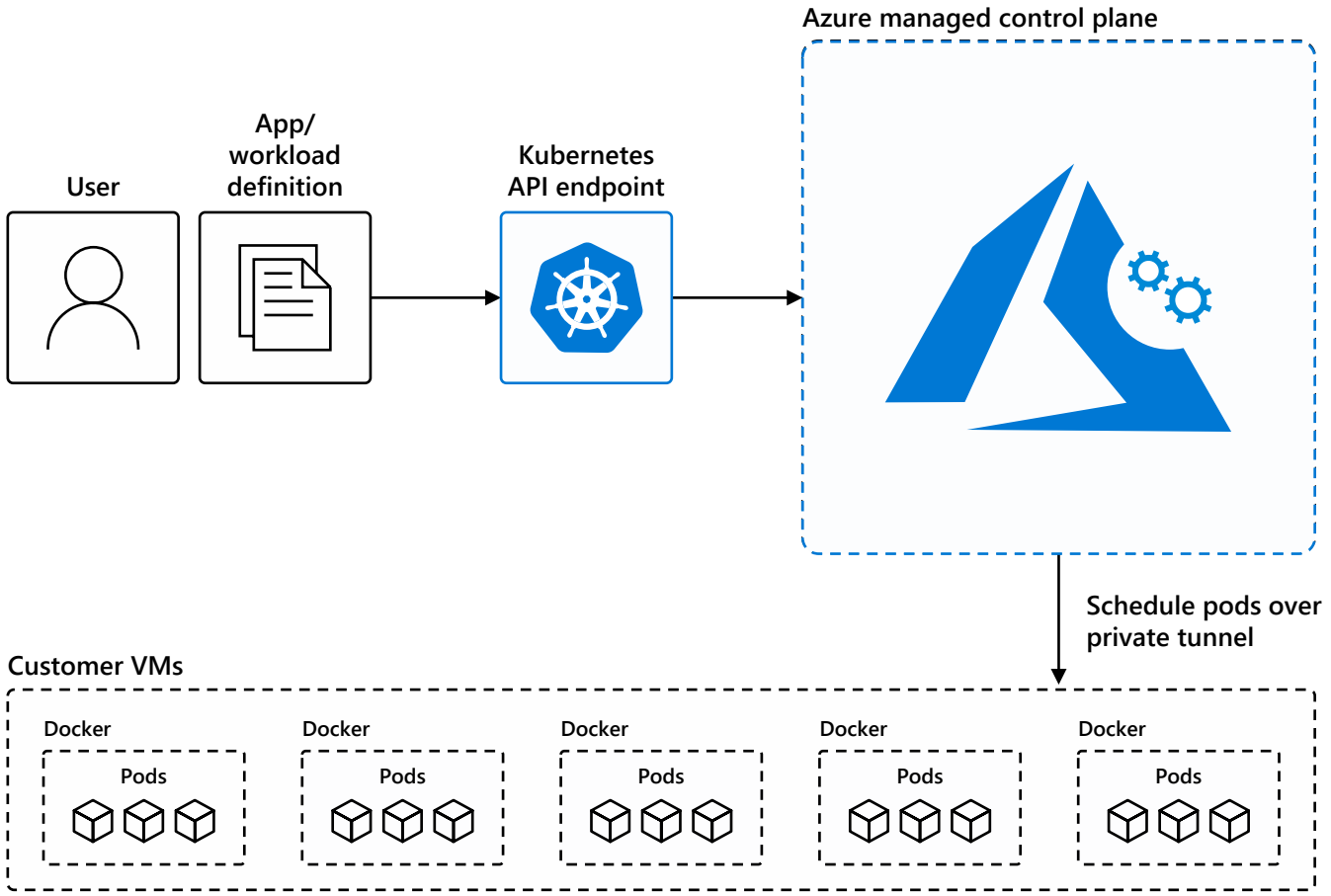
Responsibilities	DIY with Kubernetes	Managed Kubernetes on Azure
Containerization	Customer	Customer / Microsoft
Application iteration, debugging	Customer	Customer / Microsoft
CI/CD	Customer	Customer / Microsoft
Provisioning, upgrades, patches	Customer	Microsoft
Reliability availability	Customer	Microsoft
Scaling	Customer	Microsoft
Monitoring and logging	Customer	Microsoft

Customer Microsoft



Benefits of AKS

- Automated upgrades, patches
- High reliability, availability
- Easy, secure cluster scaling
- Self-healing
- API server monitoring
- At no charge



10 Azure services every developer needs to know

1. App Service
2. Functions
3. Logic Apps
4. SQL Database
5. Cosmos DB
6. Azure Active Directory
7. Service Bus
8. Azure Monitor
9. Storage Account
10. Azure Kubernetes Service


Q&A

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Thank
You!