AZURE COSMOD DB


SQL
10
01
What is
Azure?

Azure Intro

- Why Cloud Computing?
- What is Cloud Computing?
- What is Azure?
- Azure Services
- Uses of Azure

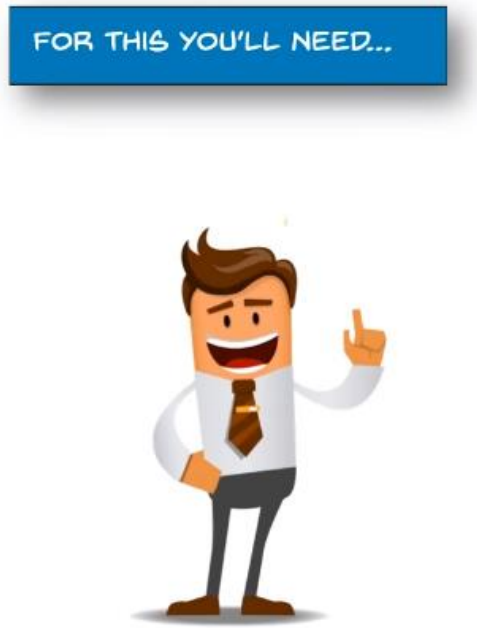
What is Cloud Computing?

ASSUME YOU HAVE AN IDEA FOR AN AMAZING APPLICATION

What is Cloud Computing?

FOR IT TO BE SUCCESSFUL, YOU'LL HAVE TO RELEASE IT ON THE INTERNET

What is Cloud Computing?



Servers

Storage

Developers

Dedicated Network

Application Security

What is Cloud Computing?

But, there are 2 major disadvantages to this approach

What is Cloud Computing?

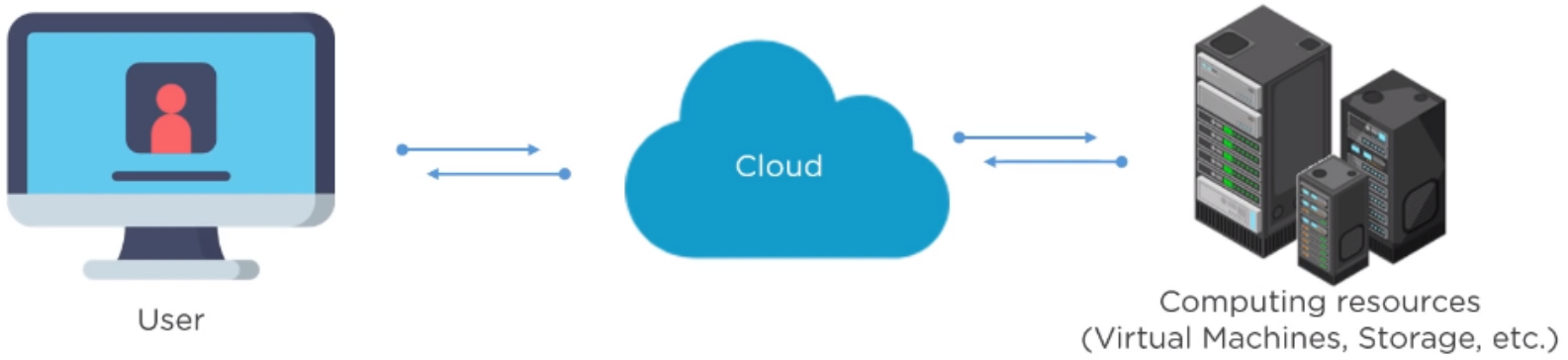
Initial setup is very expensive and risky

If the number of users increase, you will have to buy more servers to keep up with demand


What is Cloud Computing?

What is Cloud Computing?

Cloud computing is a platform that provides access to computing resources over the internet



What is Cloud Computing?

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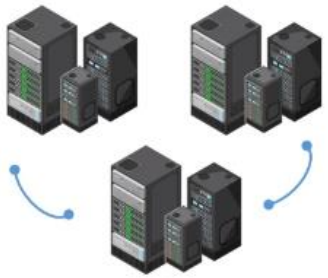


Cloud providers own massive datacenters which have hundreds of servers, storage systems and components critical to the organization's working

Users can access any service based on their requirement

Users only pay for the services they use and nothing else

What is Cloud Computing?

Cloud Computing is used for the following types of services

Machine learning and data analysis

Data storage and backup

Streaming media content

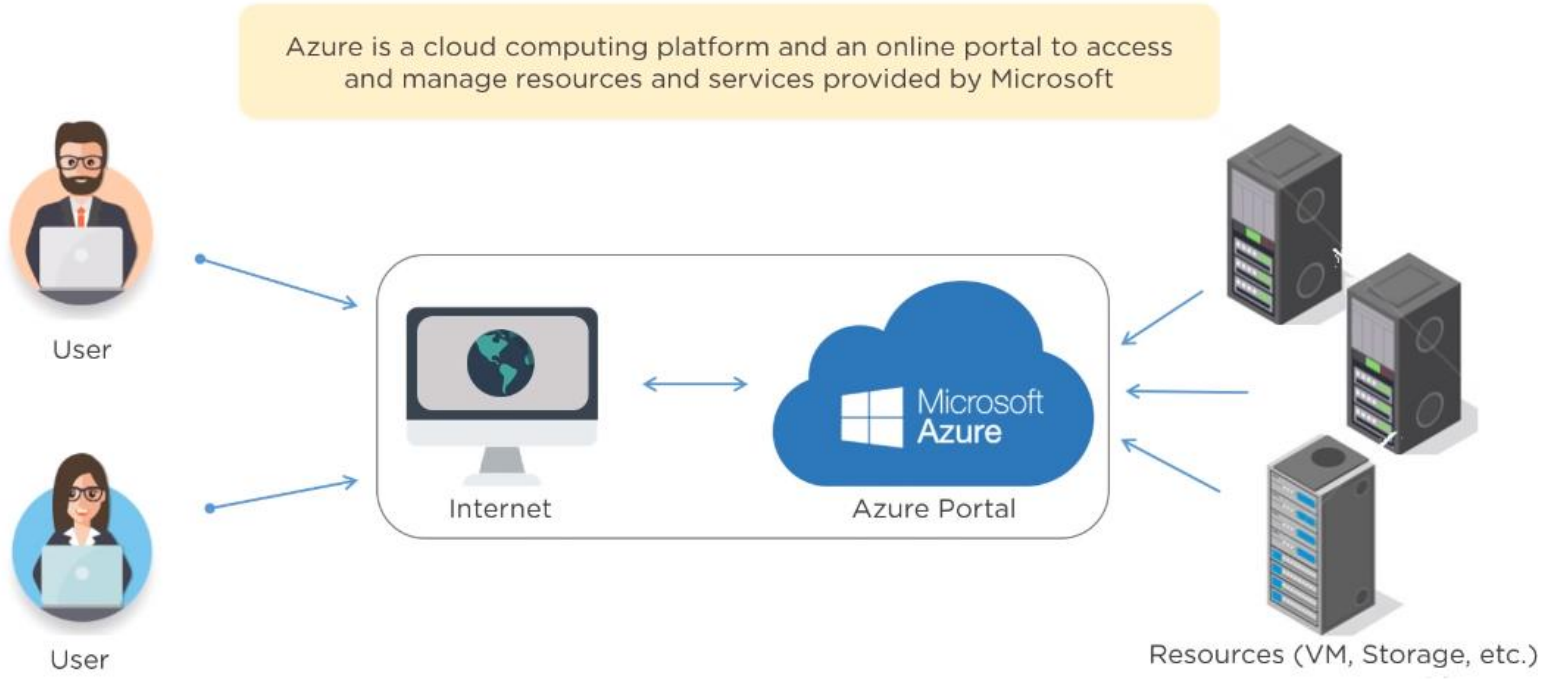
Creating and testing applications

Automating software delivery

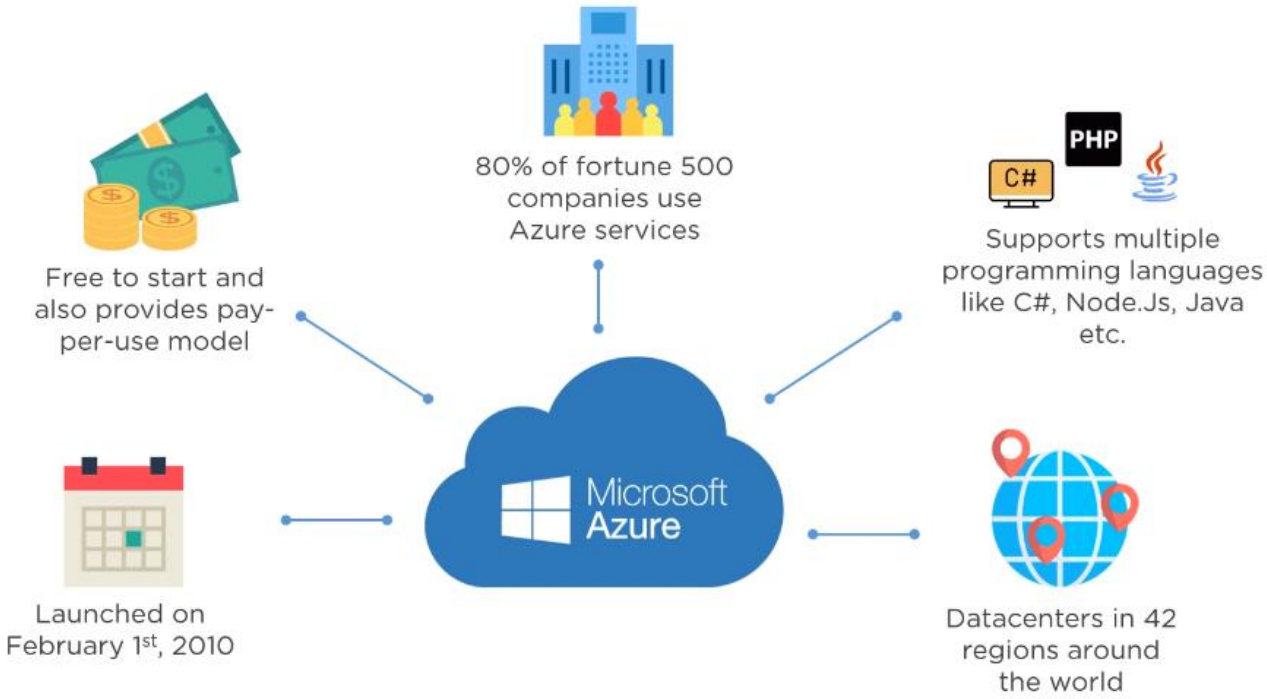
Hosting blogs and applications


What is Azure?

What is Azure?



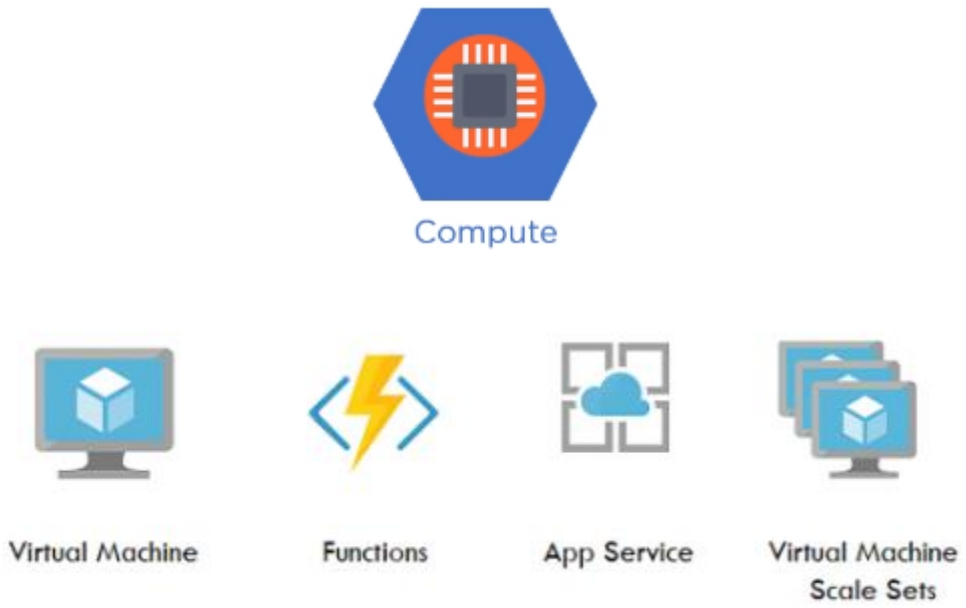
What is Azure?



Azure Services

Azure services are divided into 18 categories and contains more than 200 services

Azure Services : Computing



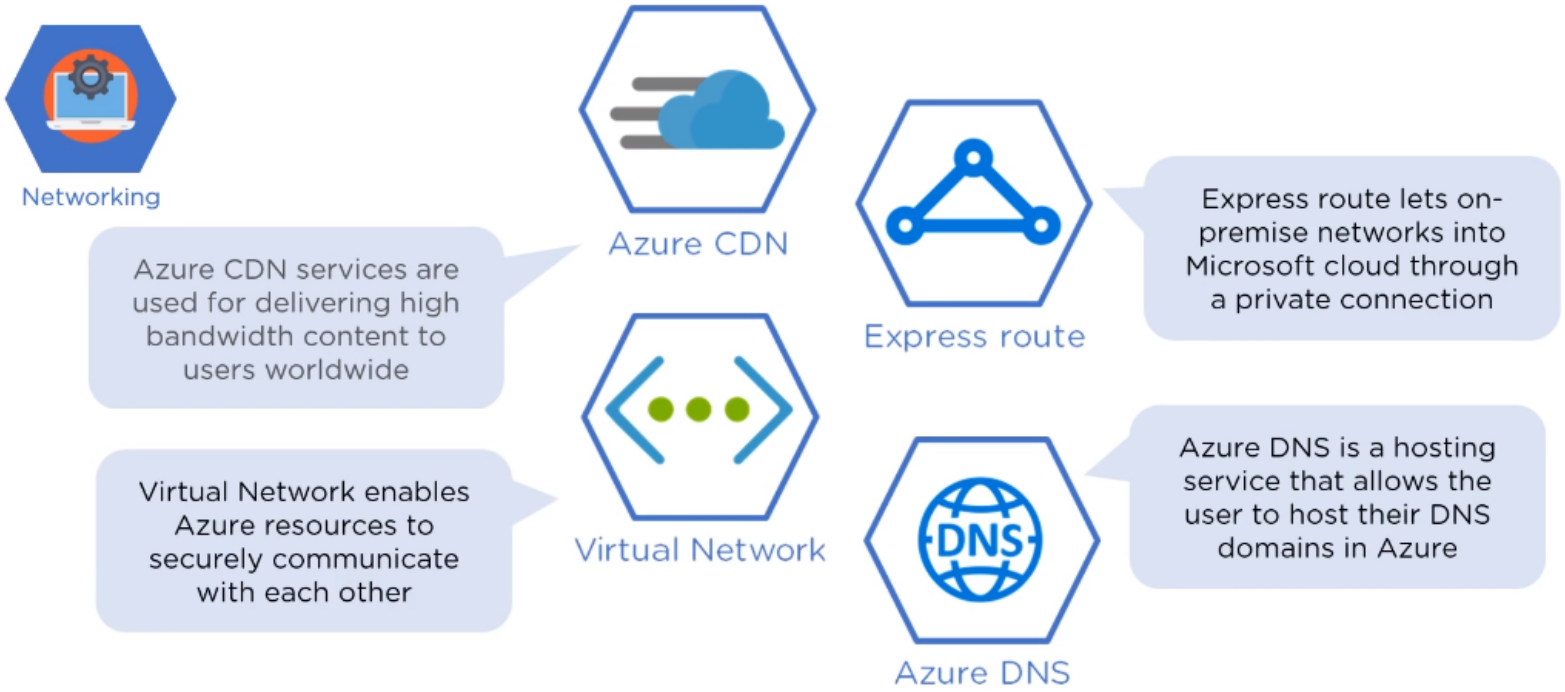
Virtual Machine:
Create Windows/Linux virtual machines of any configuration in a matter of seconds

Cloud Service:
Users Can create scalable applications with in the cloud using the Virtual machine whose provisioning, load balancing and health monitoring are handled by Azure Post-deployment

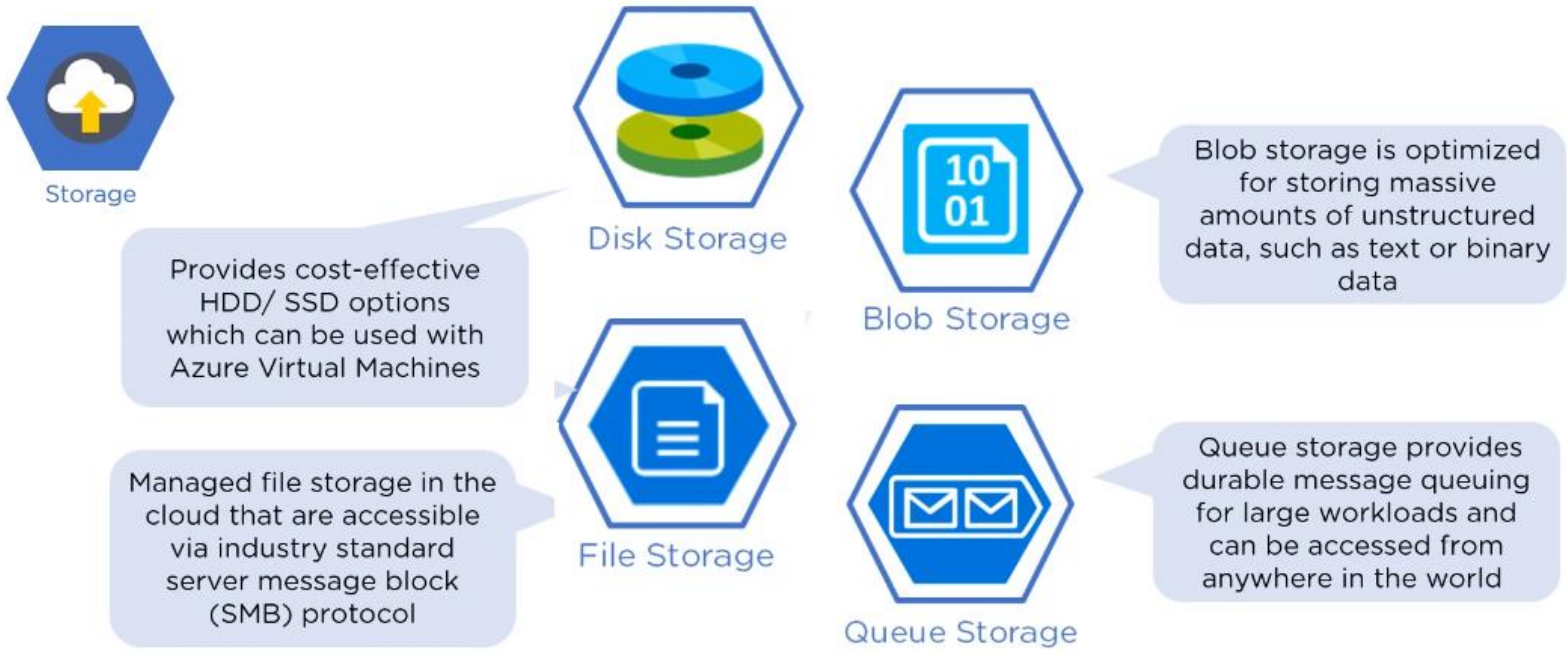
Service: Fabric:
Fabric simplifies microservices development and application lifecycle management

Functions:
Easily build applications using serverless functions in any programming language of the user's choice

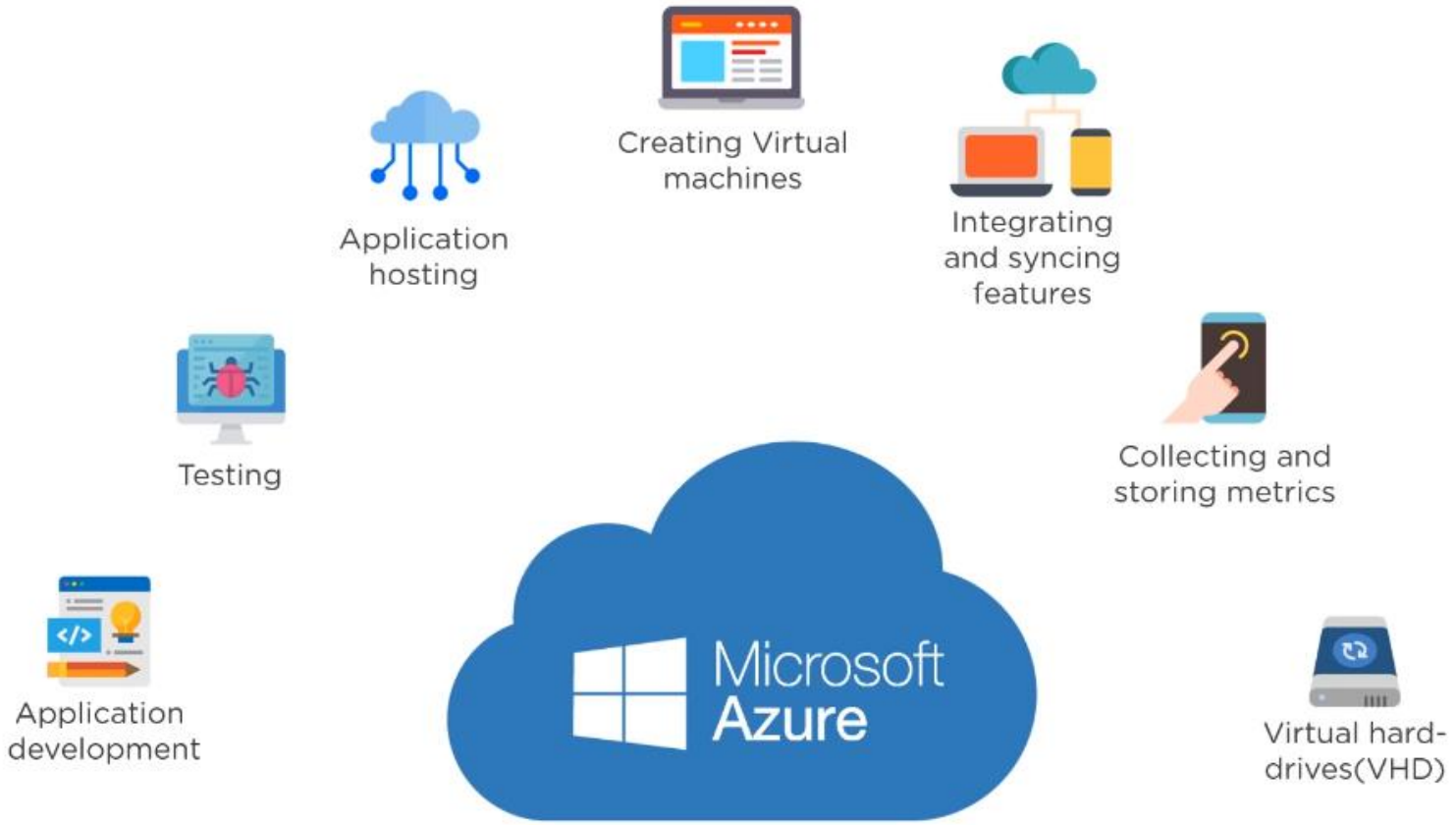
Azure Services : Networking



Azure Services : Storage

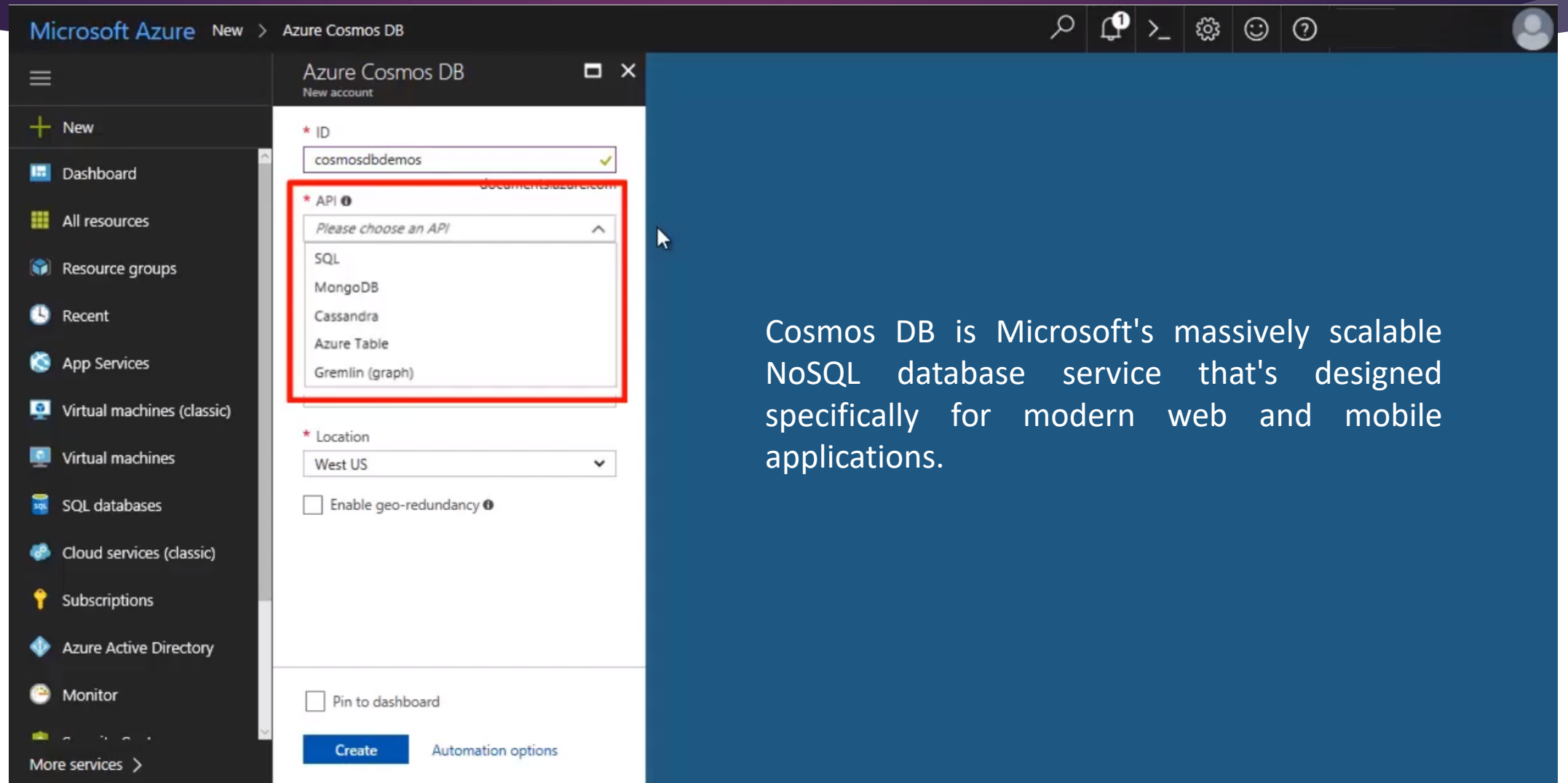


Use of Azure


Application hosting
Creating Virtual machines
Integrating and syncing features
Testing
Collecting and storing metrics
Application development
Microsoft Azure
Virtual hard-drives(VHD)

Overview

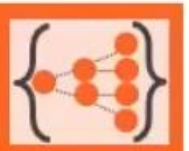
Overview



Cosmos DB is Microsoft's massively scalable NoSQL database service that's designed specifically for modern web and mobile applications.

Multiple API'S [5] and Data Models

Document

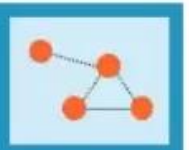


SQL API (JSON)
MongoDB API (BSON)

Key-Value

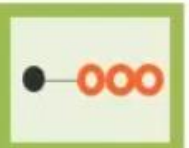
Table API
(replaces Azure Table Storage)

Graph



Gremlin API
(graph traversal language)

Columnar



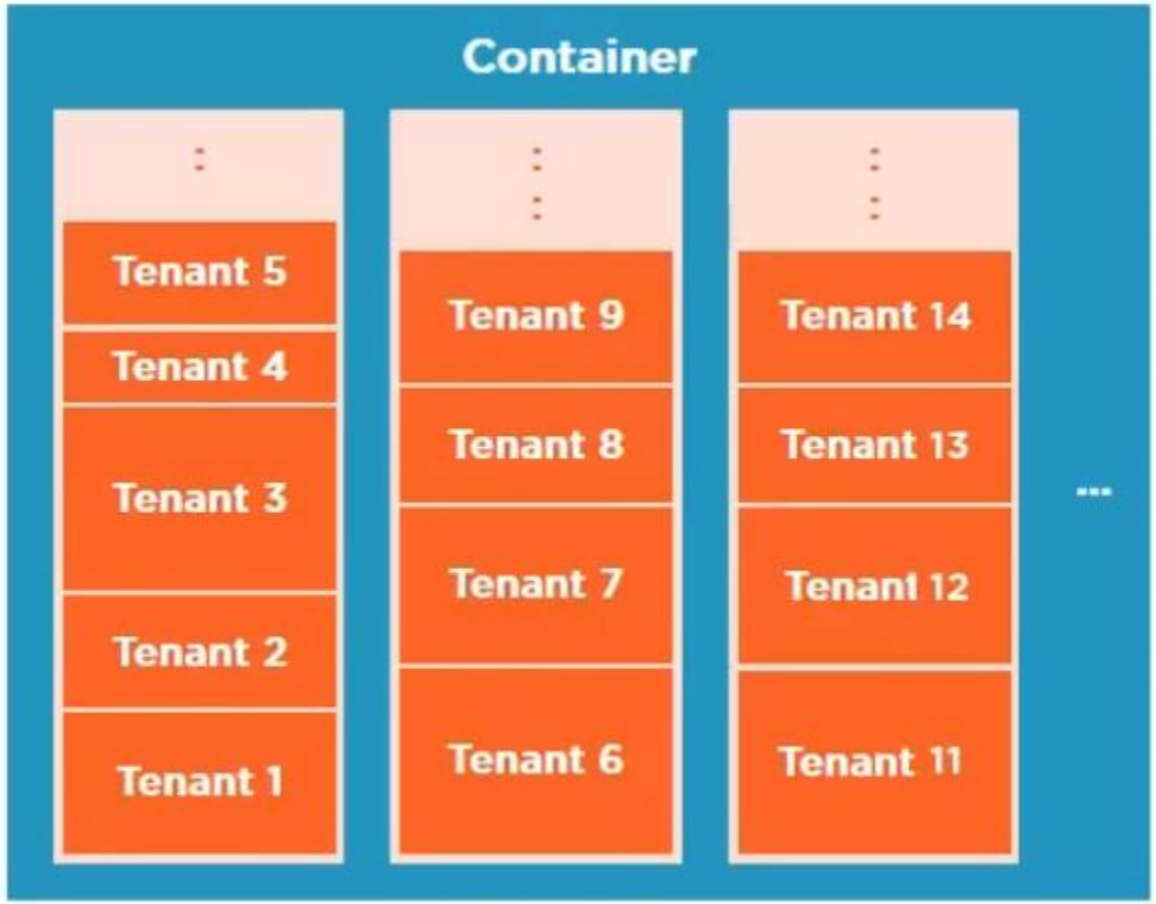
Cassandra API

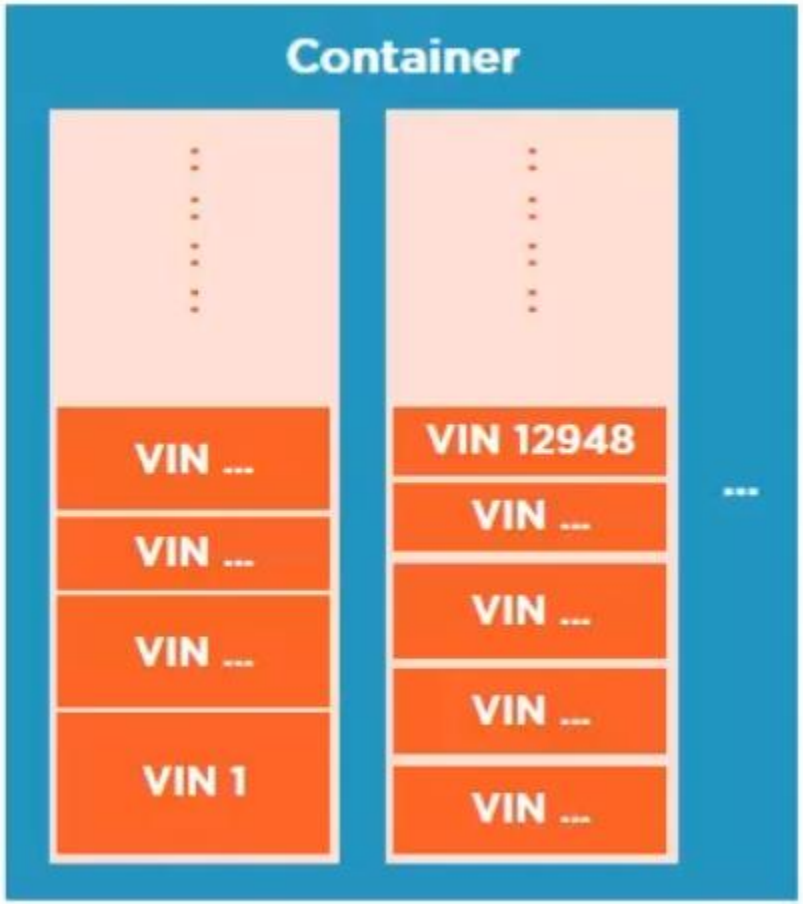
Overview

	Java	.NET	Node.js	Python	Gremlin	Go	Xamarin
SQL API	↗	↗	↗	↗			↗
Azure Cosmos DB's API for MongoDB	↗	↗	↗	↗		↗	↗
Gremlin API	↗	↗	↗	↗	↗		
Table API	↗	↗	↗	↗			
Cassandra API	↗	↗	↗	↗			

https://nordcloud.com/azure-cosmos-db/

Containers


Container
Tenant 5
Tenant 4
Tenant 3
Tenant 2
Tenant 1
Tenant 9
Tenant 8
Tenant 7
Tenant 6
Tenant 14
Tenant 13
Tenant 12
Tenant 11
...


Container
VIN ...
VIN ...
VIN ...
VIN 1
VIN 12948
VIN ...
VIN ...
VIN ...
VIN ...
...

Global distribution

Horizontal partitioning

Provisioning throughput

Multiple APIs and data models

“ You will know everything you need to know to start building with COSMOS DB applications”

Prerequisites?

No Prior knowledge required…!

What Is NoSQL?

3Vs

Oracle, MySQL,
PgSQL …

Volume
Variety
Velocity

Low Latency
High Reliability
Consistency

Every 60 seconds

- **98,000+** tweets
- **695,000** status updates
- **11million** instant messages
- **698,445** Google searches
- **168 million+** emails sent
- **1,820TB** of data created
- **217** new mobile web users

What is NoSQL Database?

Distributed

Replicas ensure high throughput/availability, and low latency

Scale-out

Horizontal partitioning enables virtually limitless storage and throughput

Schema-free

Document, table, graph, and columnar data models

What is COSMOS DB?

Evolution of DocumentDB

Scalable NoSQL document database
Low latency (single-digit millisecond)

Virtually unlimited scale

Scale storage with server-side partitioning
Scale throughput with variable request units

Turnkey global distribution

Point-and-click control over where your data gets geo-replicated

Multi-model / Multi-API

No longer exclusively a document database
Also supports tables, graph, and columnar

History of Cosmos DB?

2010 - 2014

Office, OneNote, Xbox

Internal Microsoft DocumentDB service

Public preview

2015

Azure DocumentDB

General Availability (GA)

2017 - present

Azure Cosmos DB

Global distribution
Horizontal partitioning
99.999% SLAs

SLA: Service Level Agreement

Getting Started

Getting Started

https://signup.live.com/?lic=1

https://azure.microsoft.com/en-in/try/cosmosdb/

https://aka.ms/cosmosdb-emulator

Azure Free Subscription What if I exceed my $200 limit?

- Email message is sent to subscription owner.
- Deployed resources are disabled until next billing cycle.
- Database and storage account become read only.
- Subscription can be upgraded to Pay-as-you-go

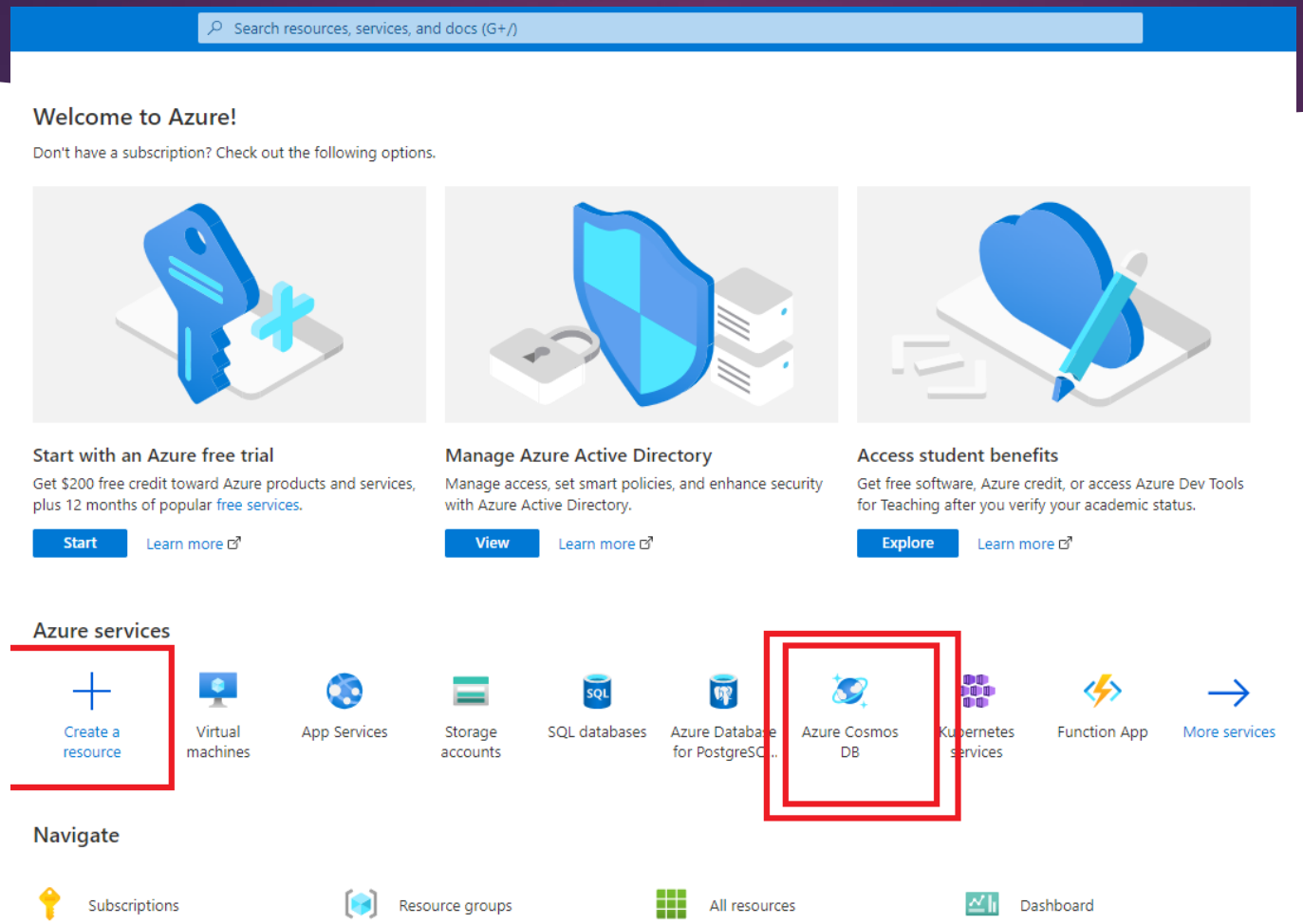
Create an Account

Demo

https://portal.azure.com

Creating a Cosmos DB account

Create Cosmos DB



Welcome to Azure!

Don't have a subscription? Check out the following options.

Start with an Azure free trial

Get $200 free credit toward Azure products and services, plus 12 months of popular free services.

Start Learn more

Manage Azure Active Directory

Manage access, set smart policies, and enhance security with Azure Active Directory.

View Learn more

Access student benefits

Get free software, Azure credit, or access Azure Dev Tools for Teaching after you verify your academic status.

Explore Learn more

1 Your profile

Country/Region

India

Choose the location that matches your billing address. **You cannot change this selection later.** If your country is not listed, the offer is not available in your region. Learn More

First name

venkat

Last name

boggarapu

Email address

bvsrao91@gmail.com

Phone

90353-51965

Organization

Trial

PAN ID

Optional

Next

What's included

12 months of free products
Get free access to popular products like *virtual machines*, *storage*, and *databases* in your first 30 days, and for 12 months after you upgrade your account to pay-as-you-go pricing.

₹13,300 credit
Use your ₹13,300 credit to experiment with any Azure service in your first 30 days—beyond the free product amounts.

25+ always-free products
Take advantage of more than 25 products, including *serverless*, *containers*, and *artificial intelligence*, that are always free. Get these in your first 30 days, and always—once you choose to upgrade.

No automatic charges
You won't be charged unless you choose to upgrade. Before the end of your first 30 days, you'll be notified and have the chance to upgrade and start paying only for the resources you use beyond the free amounts.

Try Azure for free

Follow these steps to get started. We ask for these details to protect your account and information. There are no upfront charges or fees.

1 Your profile

2 Identity verification by phone

A text or phone call helps us make sure this is you.

Country code

India (+91)

Phone number

90353-51965

Text me | Call me

We delivered a code to your phone.

Verification code

167725

Verify code | I did not receive a code

What's included

12 months of free products
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No automatic charges
You won't be charged unless you choose to upgrade. Before the end

3 Identity verification by card

We'll make a temporary authorization on this card, but **you won't be charged unless you upgrade**.

We accept the following cards:

Cardholder Name

Card number

Expires

MM YY

CVV

What is a CVV?

Address line 1

Address line 2 (Optional)

Address line 3 (Optional)

City

State

--Select--

Postal Code

Country/Region

India

your account to pay-as-you-go pricing.

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Microsoft Azure

bvsrao91@gmail.com Sign out

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1 Identity verification by card

2 Agreement

- [x] I agree to the subscription agreement, offer details, and privacy statement.

  I will receive information, tips, and offers about Azure, including Azure Newsletter, Pricing updates, and other Microsoft products and services.

- [x] I would like Microsoft to share my information with select partners so I can receive relevant information about their products and services.

Sign up

What's included

12 months of free products
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Microsoft Azure

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Try Azure for free

Follow these steps to get started. We ask for these details to protect your account and information. There are no upfront charges or fees.

Confirming your information...

Are you satisfied with your signup experience?

☺ ☹

Anything else you'd like to let us know?

Please do not share any personally identifying information such as name, phone number, address, e-mail address or credit card number

Providing your feedback is optional. If you choose to do so, it will be used for product improvement purposes.

By clicking Submit, you authorize Microsoft to optionally contact you via e-mail if we have any additional questions regarding your feedback.

Submit

Quickstart Center

Microsoft Azure

Get started | Take an online course

Start a project

Learn about popular Azure services and create your first Azure project. If you're already familiar with Azure, try a new service below.Otherwise, see All services.

Create a web app
Build and deploy web apps that can scale
Start >

Deploy a virtual machine
Run your workloads in the cloud and reduce the redundancy and maintenance of physical hardware
Start >

Deploy and run a container-based app
Build and run your container-based applications
Start >

Set up a database
Explore options for managing relational or nonrelational databases in the cloud
Start >

Start a data analytics project
Put machine learning and artificial intelligence to work on your apps
Start >

Store, back up, or archive data
Extend data storage to the cloud and leverage it for disaster recovery
Start >

Build, deploy, and operate a serverless app
Focus on coding within an event-driven architecture, while Azure handles infrastructure-related requirements
Start >

Setup guides

Our guides walk you through deployment scenarios to help you set up, manage, and secure your Azure environment.

Azure setup guide
Step-by-step guidance to help admins plan, set up, and secure Azure for your organization
Open >

Azure migration guide
Step-by-step guidance to help assess your current environment, prepare for migration, and make the shift to Azure
Open >

Azure innovation guide
Step-by-step guidance to help build innovative solutions leveraging Azure platform capabilities
Open >

Azure Portal

- Azure Portal is primary graphical user interface (GUI) for controlling Microsoft Azure.
- Alternatively you can do everything using command line tool
- Azure portal is designed in a way to provide continuous availability.
- When you open portal, it get loads from closest location
- Portal continuously maintain behind scene and requires no downtime

Search resources, services, and docs (G+/)

Azure services

Create a resource | All resources | Azure Cosmos DB | Virtual machines | App Services | Storage accounts | SQL databases | Azure Database for PostgreSQ... | Kubernetes services | More services

Navigate

Subscriptions | Resource groups | All resources | Dashboard

Tools

Microsoft Learn
Learn Azure with free online training from Microsoft

Azure Monitor
Monitor your apps and infrastructure

Security Center
Secure your apps and infrastructure

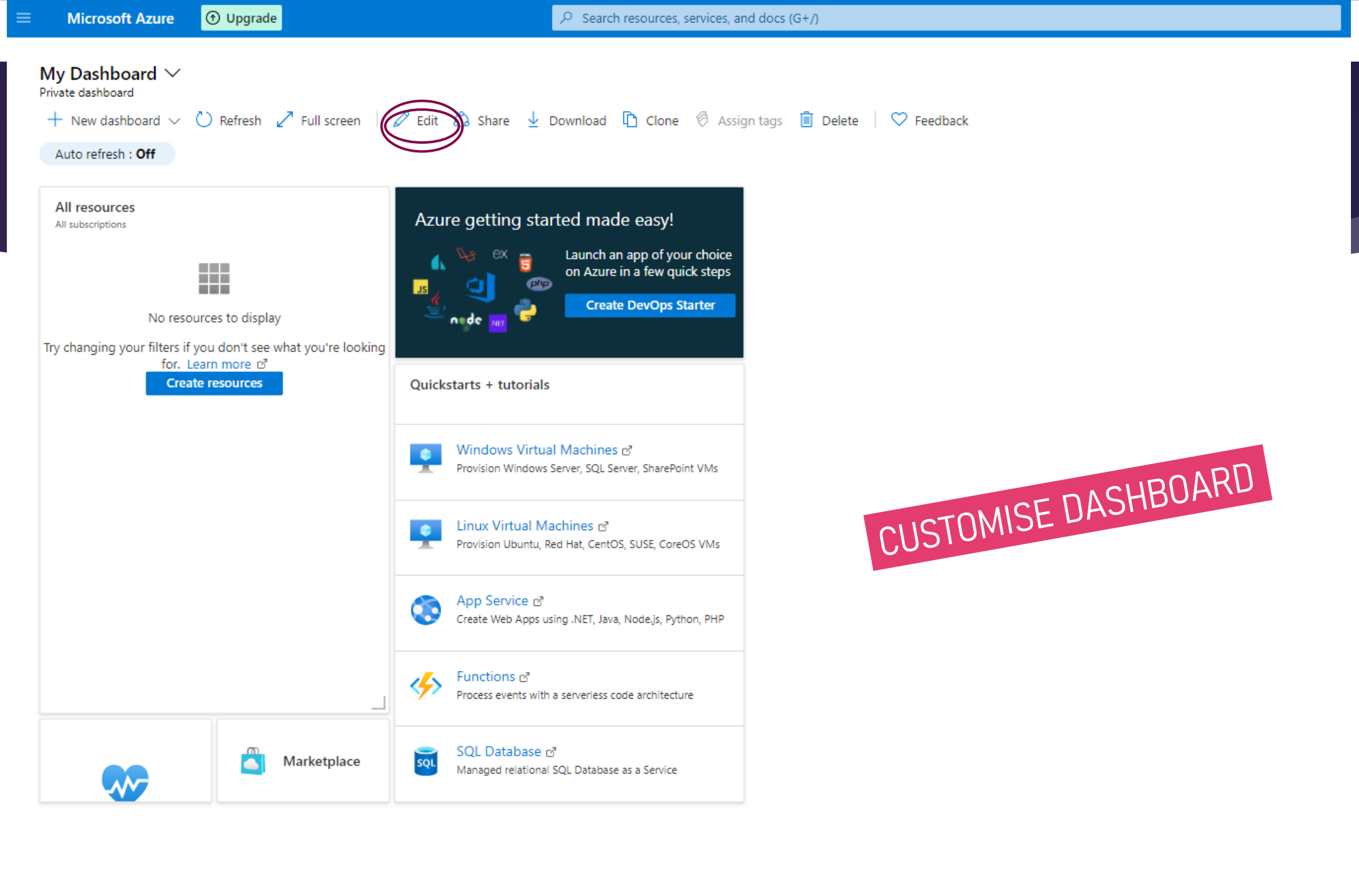
Cost Management
Analyze and optimize your cloud spend for free

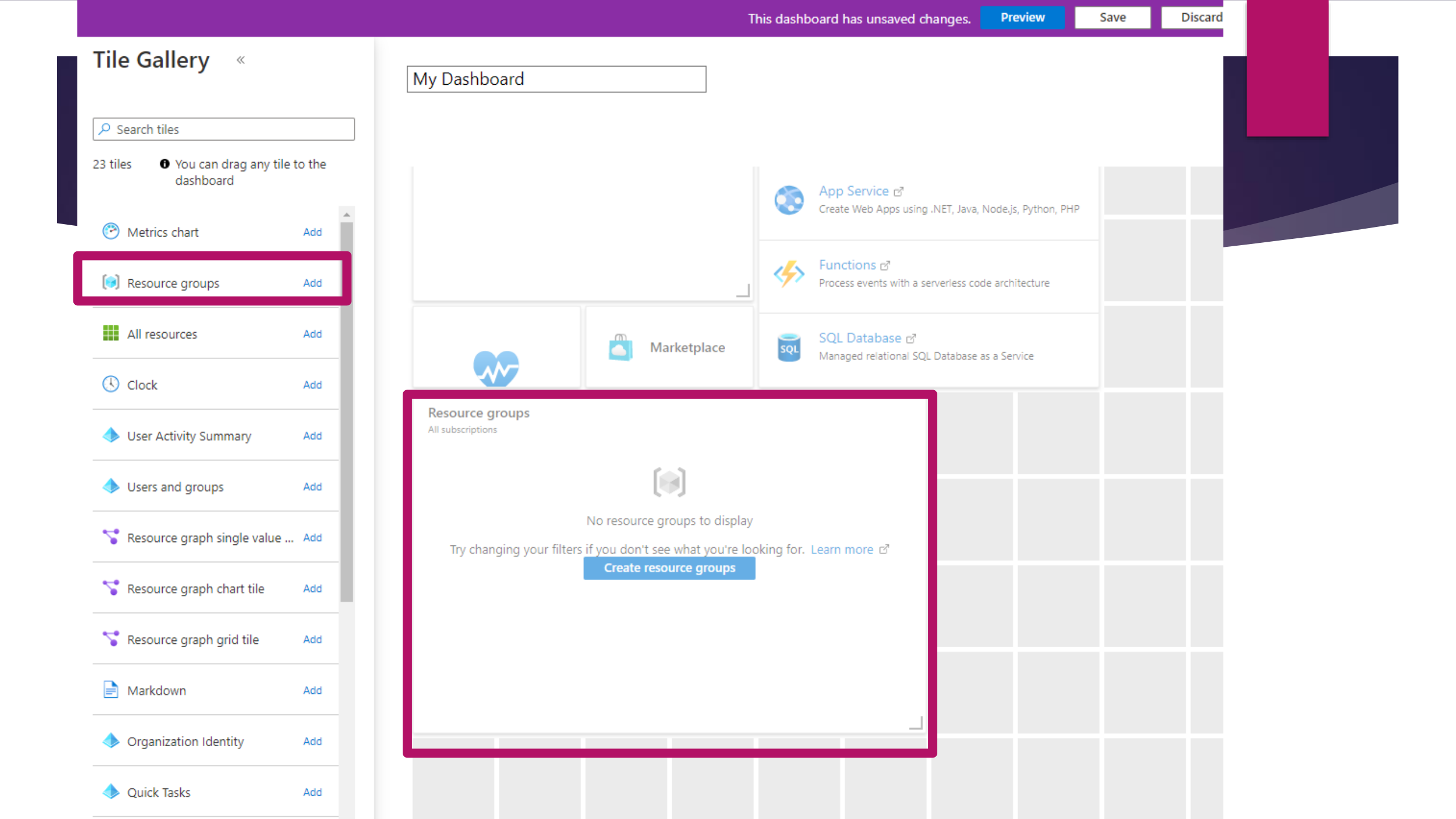
Useful links

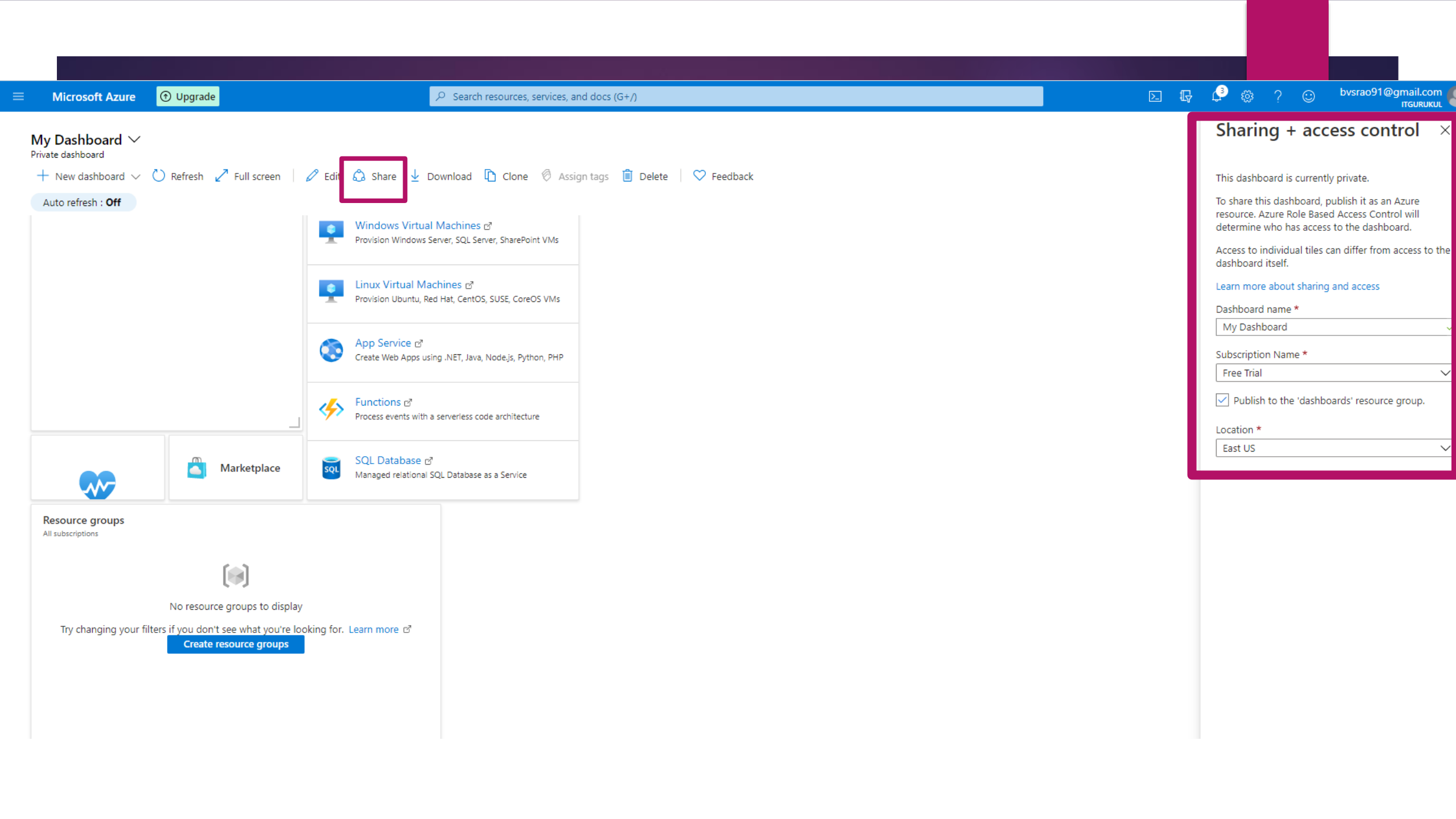
Technical Documentation
Azure Migration Tools
Azure Services
Find an Azure expert
Recent Azure Updates
Quickstart Center

Azure mobile app

Download on the App Store | GET IT ON Google Play


Microsoft Azure
Upgrade
Search resources, services, and docs (G+/)
My Dashboard
Private dashboard
New dashboard
Refresh
Full screen
Edit
Share
Download
Clone
Assign tags
Delete
Feedback
Auto refresh : Off
All resources
All subscriptions
No resources to display
Try changing your filters if you don't see what you're looking for. Learn more
Create resources
Azure getting started made easy!
Launch an app of your choice on Azure in a few quick steps
Create DevOps Starter
Quickstarts + tutorials
Windows Virtual Machines
Provision Windows Server, SQL Server, SharePoint VMs
Linux Virtual Machines
Provision Ubuntu, Red Hat, CentOS, SUSE, CoreOS VMs
App Service
Create Web Apps using .NET, Java, Node.js, Python, PHP
Functions
Process events with a serverless code architecture
SQL Database
Managed relational SQL Database as a Service
Marketplace
CUSTOMISE DASHBOARD


This dashboard has unsaved changes.
Preview
Save
Discard
Tile Gallery
My Dashboard
Search tiles
23 tiles
You can drag any tile to the dashboard
Metrics chart Add
Resource groups Add
All resources Add
Clock Add
User Activity Summary Add
Users and groups Add
Resource graph single value ... Add
Resource graph chart tile Add
Resource graph grid tile Add
Markdown Add
Organization Identity Add
Quick Tasks Add
App Service
Create Web Apps using .NET, Java, Node.js, Python, PHP
Functions
Process events with a serverless code architecture
Marketplace
SQL Database
Managed relational SQL Database as a Service
Resource groups
All subscriptions
No resource groups to display
Try changing your filters if you don't see what you're looking for. Learn more
Create resource groups


Microsoft Azure
Upgrade
Search resources, services, and docs (G+/)
bvsrao91@gmail.com
ITGURUKUL
My Dashboard
Private dashboard
New dashboard
Refresh
Full screen
Edit
Share
Download
Clone
Assign tags
Delete
Feedback
Auto refresh : Off
Windows Virtual Machines
Provision Windows Server, SQL Server, SharePoint VMs
Linux Virtual Machines
Provision Ubuntu, Red Hat, CentOS, SUSE, CoreOS VMs
App Service
Create Web Apps using .NET, Java, Node.js, Python, PHP
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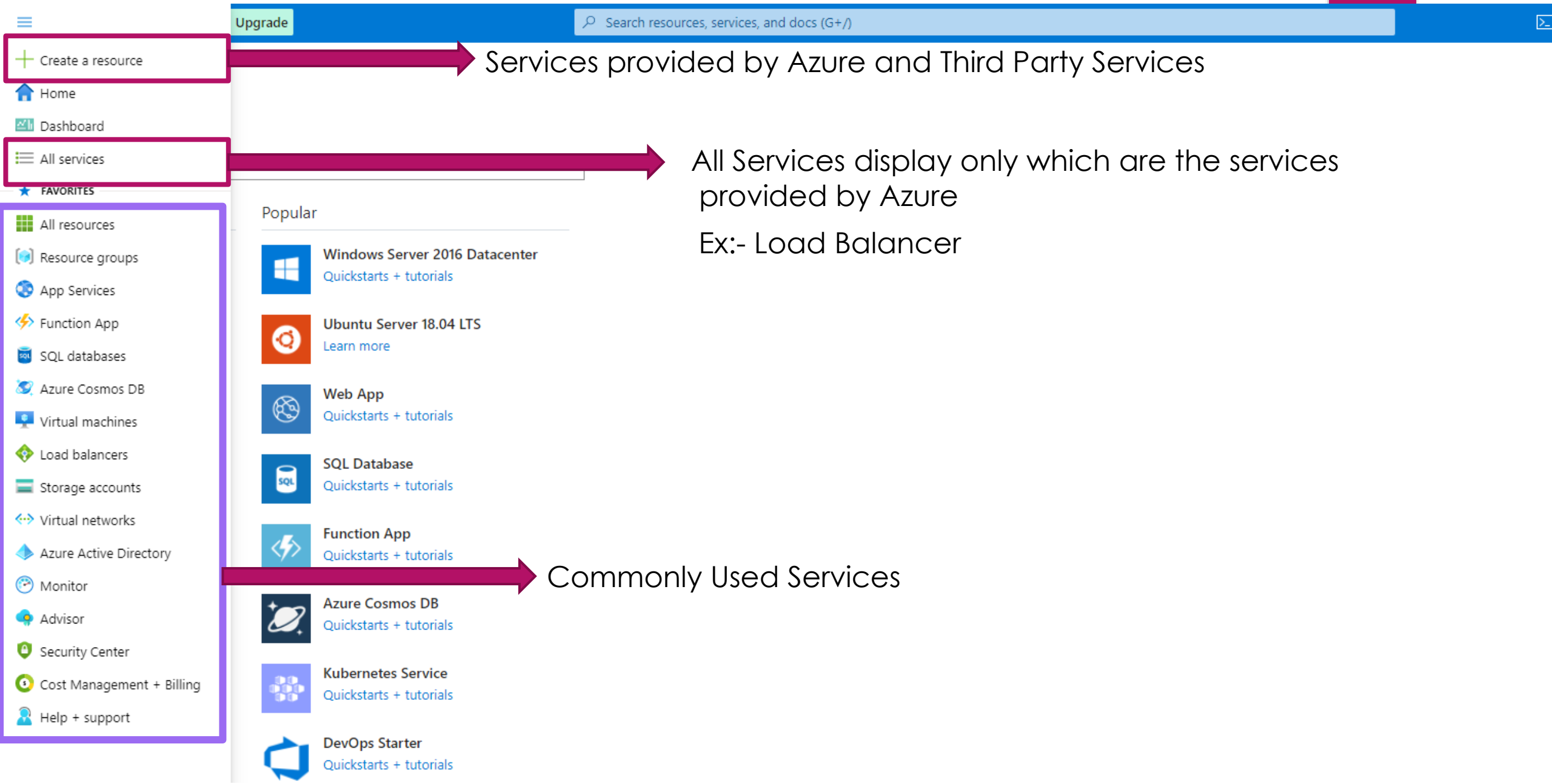
SQL Database
Managed relational SQL Database as a Service
Marketplace
Resource groups
All subscriptions
No resource groups to display
Try changing your filters if you don't see what you're looking for. Learn more
Create resource groups
Sharing + access control
This dashboard is currently private.
To share this dashboard, publish it as an Azure resource. Azure Role Based Access Control will determine who has access to the dashboard.
Access to individual tiles can differ from access to the dashboard itself.
Learn more about sharing and access
Dashboard name *
My Dashboard
Subscription Name *
Free Trial
Publish to the 'dashboards' resource group.
Location *
East US

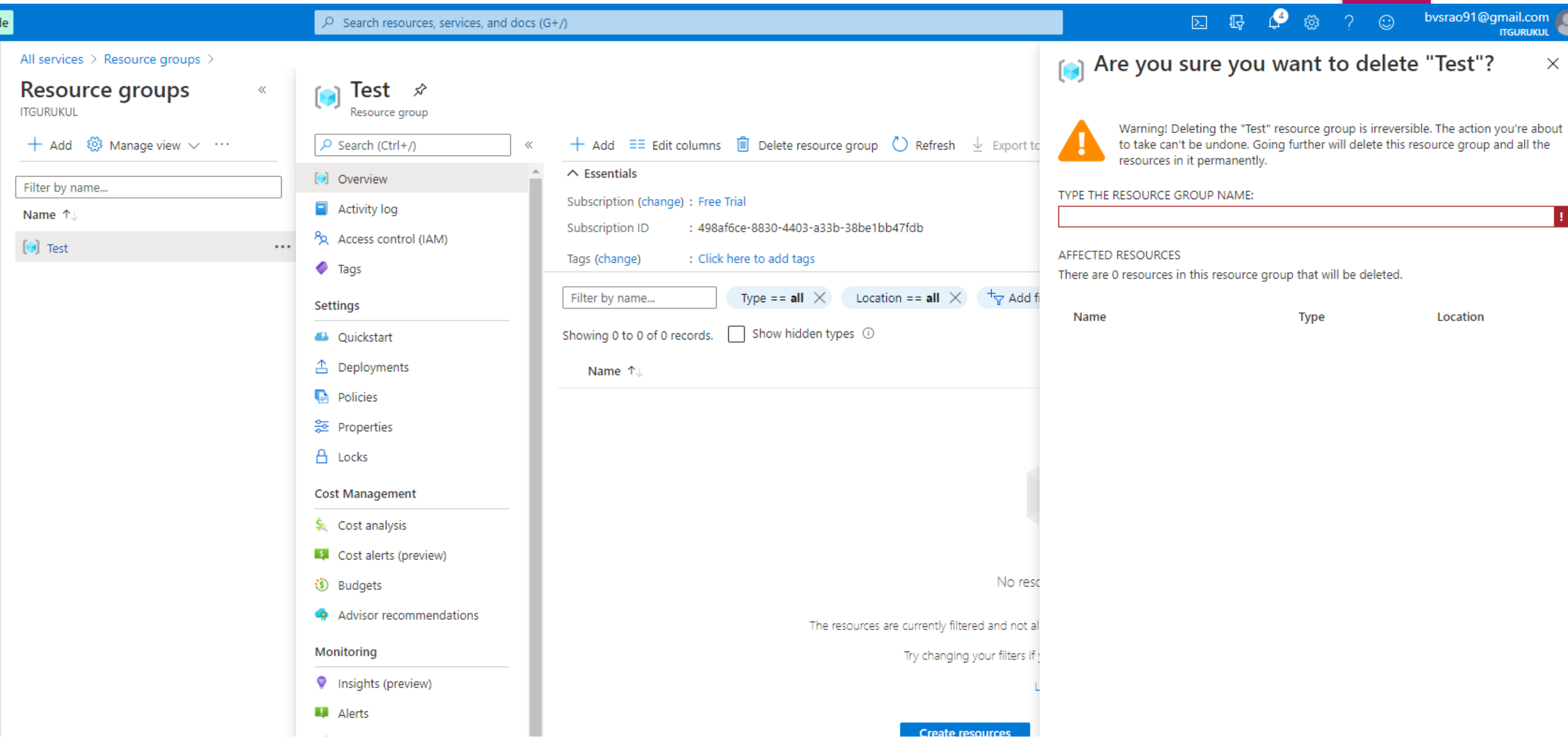


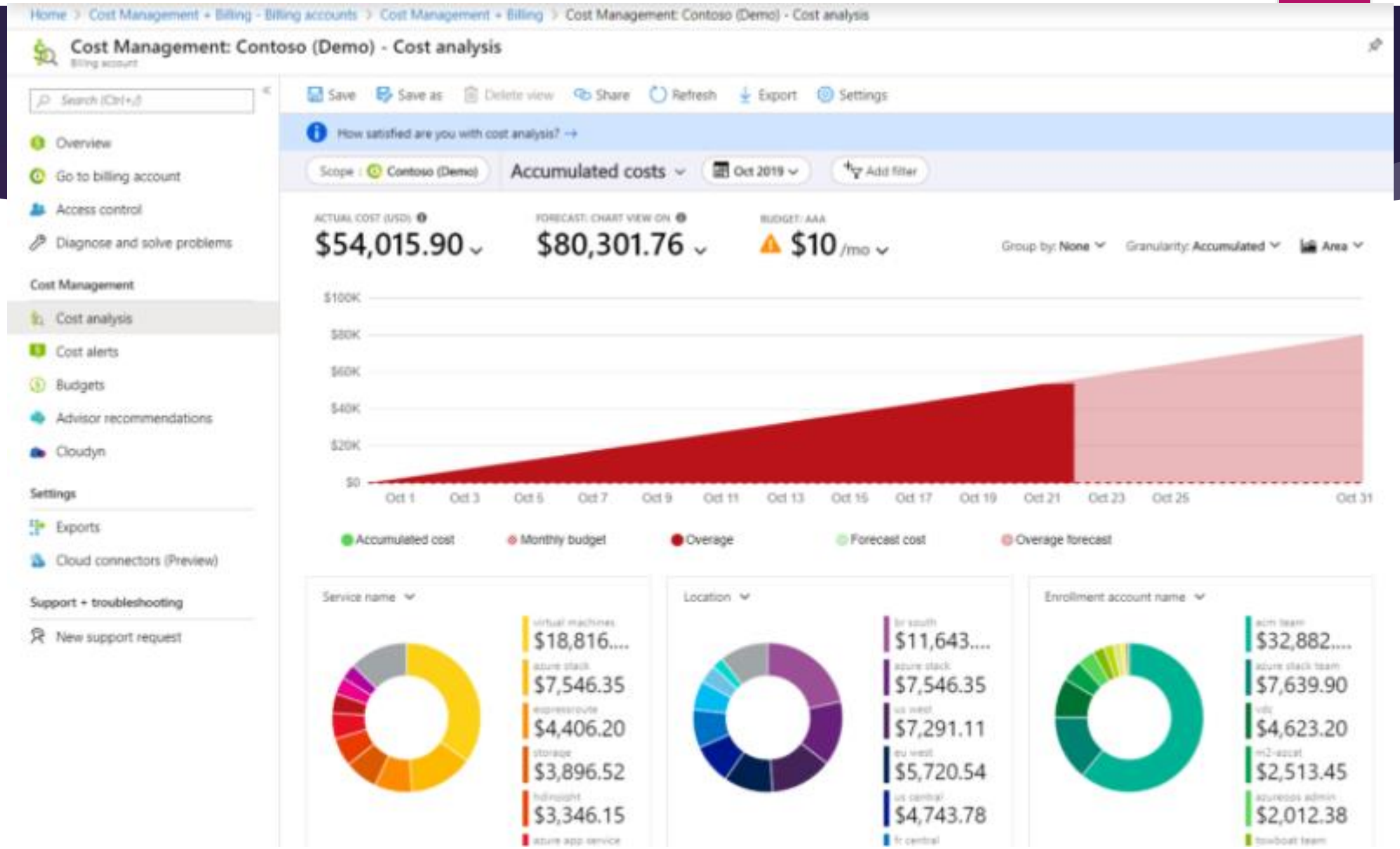
Services provided by Azure and Third Party Services

All Services display only which are the services provided by Azure

Ex:- Load Balancer

Commonly Used Services


Search resources, services, and docs (G+/)
bvsrao91@gmail.com
ITGURUKUL
All services > Resource groups >
Resource groups
ITGURUKUL
Add
Manage view
Filter by name...
Name
Test
Test
Resource group
Search (Ctrl+/)
Overview
Activity log
Access control (IAM)
Tags
Settings
Quickstart
Deployments
Policies
Properties
Locks
Cost Management
Cost analysis
Cost alerts (preview)
Budgets
Advisor recommendations
Monitoring
Insights (preview)
Alerts
Add
Edit columns
Delete resource group
Refresh
Essentials
Subscription (change) : Free Trial
Subscription ID : 498af6ce-8830-4403-a33b-38be1bb47fdb
Tags (change) : Click here to add tags
Filter by name...
Type == all
Location == all
Showing 0 to 0 of 0 records.
Show hidden types
Name
No resc
The resources are currently filtered and not al
Try changing your filters if
Create resources
Are you sure you want to delete "Test"?
Warning! Deleting the "Test" resource group is irreversible. The action you're about to take can't be undone. Going further will delete this resource group and all the resources in it permanently.
TYPE THE RESOURCE GROUP NAME:
AFFECTED RESOURCES
There are 0 resources in this resource group that will be deleted.
Name
Type
Location


Home > Cost Management + Billing - Billing accounts > Cost Management + Billing > Cost Management: Contoso (Demo) - Cost analysis
Cost Management: Contoso (Demo) - Cost analysis
Billing account
Search (Ctrl+/)
Overview
Go to billing account
Access control
Diagnose and solve problems
Cost Management
Cost analysis
Cost alerts
Budgets
Advisor recommendations
Cloudyn
Settings
Exports
Cloud connectors (Preview)
Support + troubleshooting
New support request
Save
Save as
Delete view
Share
Refresh
Export
Settings
How satisfied are you with cost analysis? →
Scope : Contoso (Demo)
Accumulated costs
Oct 2019
Add filter
ACTUAL COST (USD)
$54,015.90
FORECAST: CHART VIEW ON
$80,301.76
BUDGET: AAA
$10 /mo
Group by: None
Granularity: Accumulated
Area
$100K
$80K
$60K
$40K
$20K
$0
Oct 1
Oct 3
Oct 5
Oct 7
Oct 9
Oct 11
Oct 13
Oct 15
Oct 17
Oct 19
Oct 21
Oct 23
Oct 25
Oct 31
Accumulated cost
Monthly budget
Overage
Forecast cost
Overage forecast
Service name
$18,816....
$7,546.35
$4,406.20
$3,896.52
$3,346.15
Location
$11,643....
$7,546.35
$7,291.11
$5,720.54
$4,743.78
Enrollment account name
$32,882....
$7,639.90
$4,623.20
$2,513.45
$2,012.38

Pay-As-You-Go | Create budget

Subscription

Search (Ctrl+/)

- Overview
- Activity log
- Access control (IAM)
- Tags
- Diagnose and solve problems
- Security
- Events

Cost Management

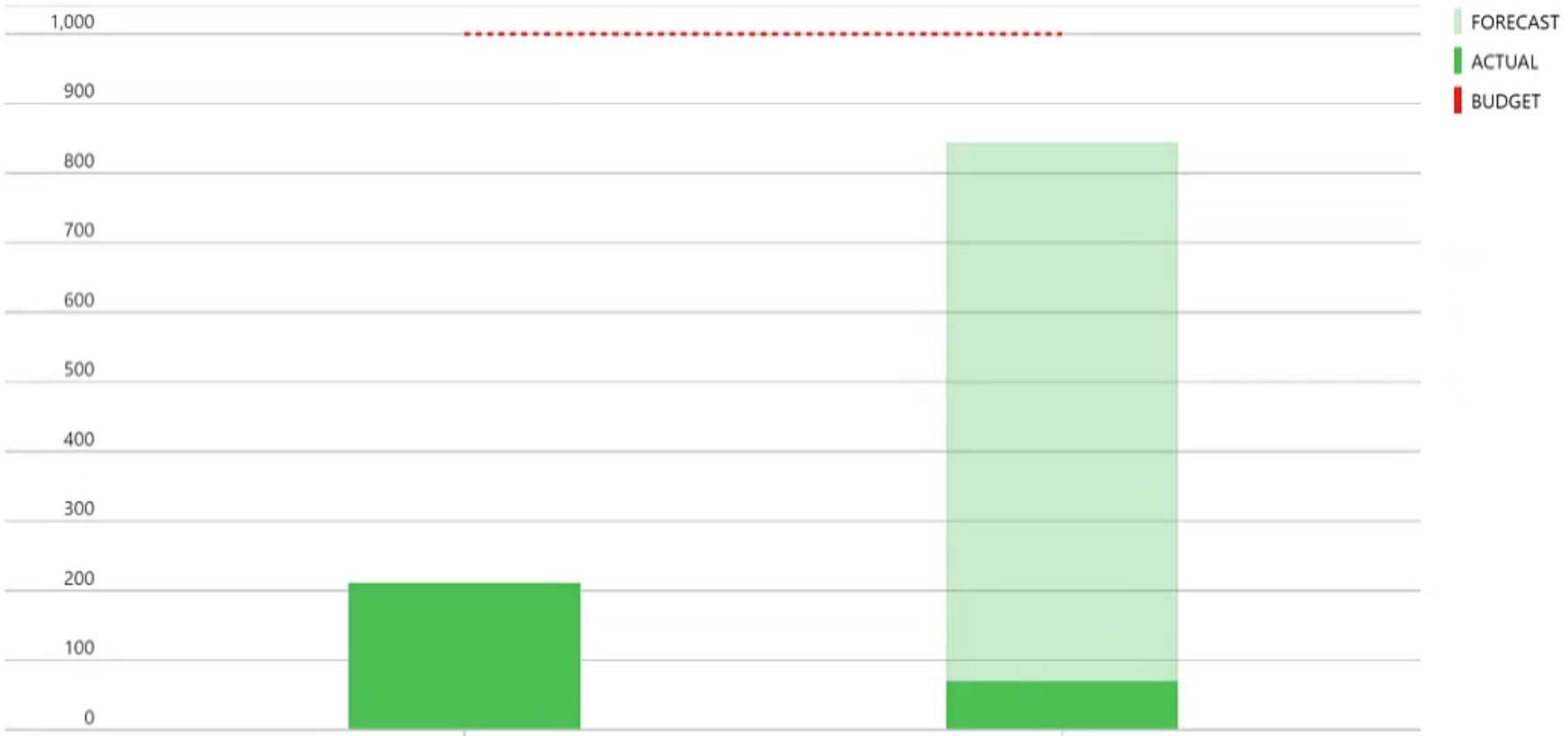
- Cost analysis
- Budgets
- Advisor recommendations

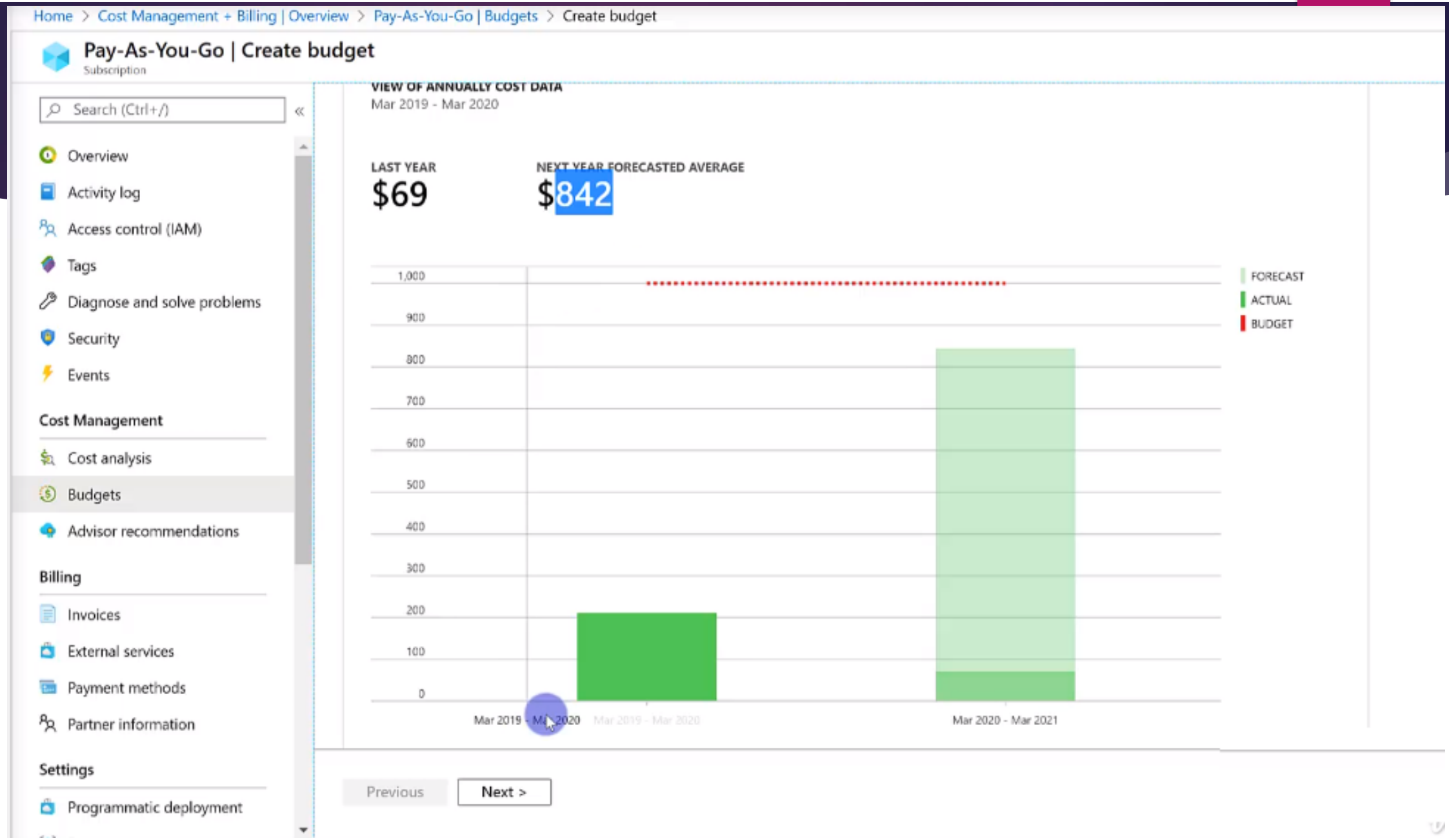
Billing

- Invoices

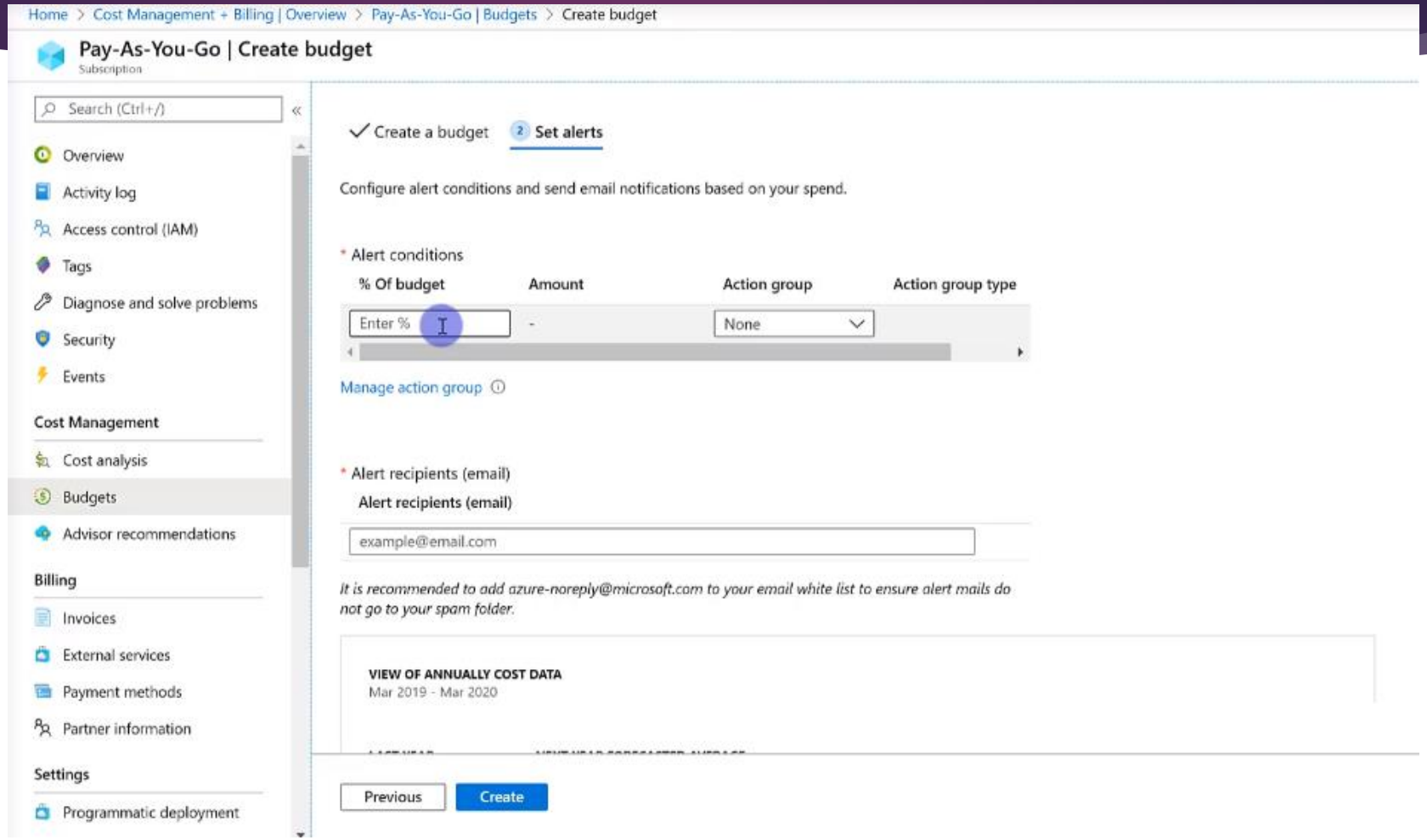
LAST YEAR
$69

NEXT YEAR FORECASTED AVERAGE
$842

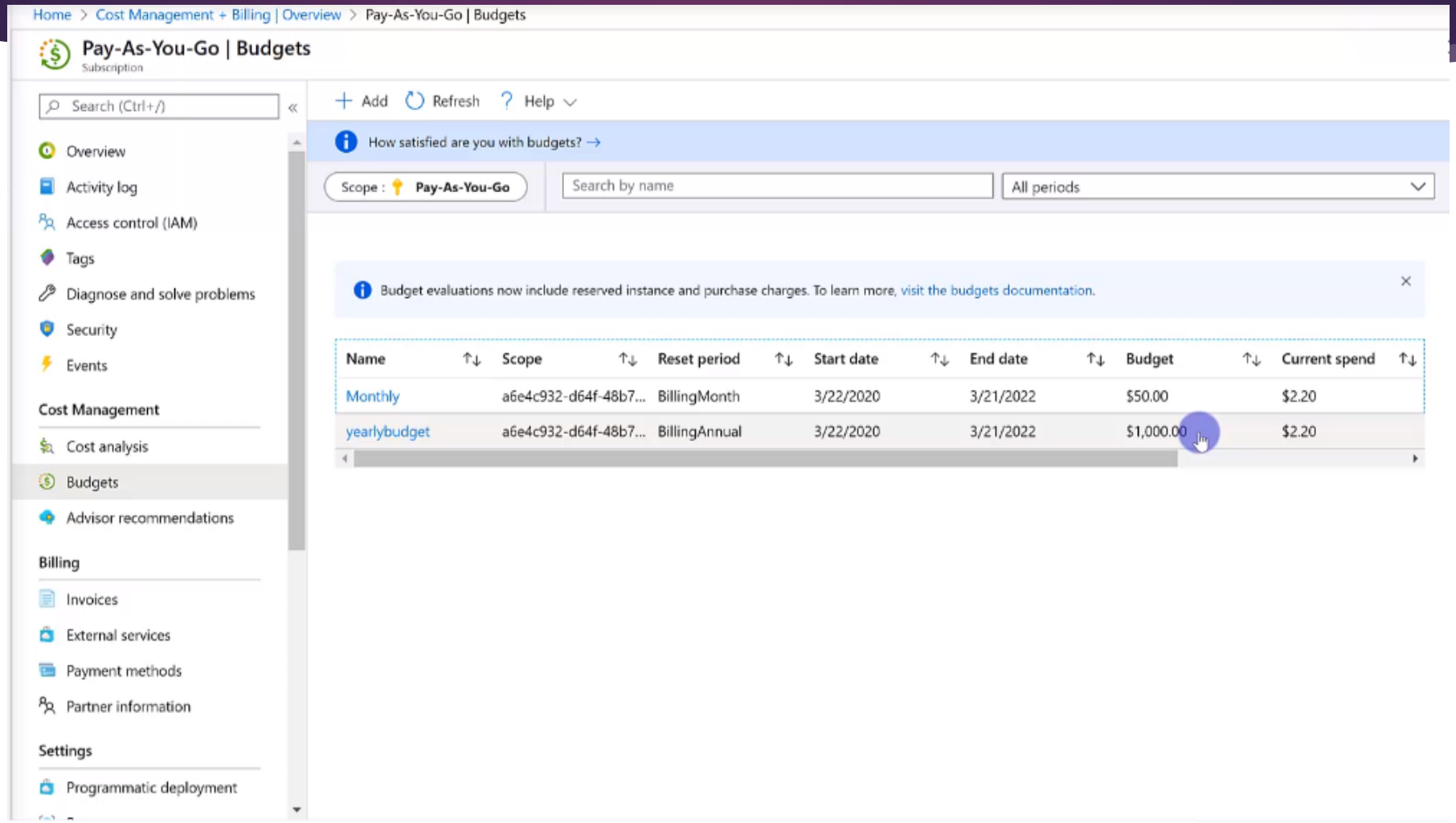



Home > Cost Management + Billing | Overview > Pay-As-You-Go | Budgets > Create budget
Pay-As-You-Go | Create budget
Subscription
Search (Ctrl+/)
Overview
Activity log
Access control (IAM)
Tags
Diagnose and solve problems
Security
Events
Cost Management
Cost analysis
Budgets
Advisor recommendations
Billing
Invoices
External services
Payment methods
Partner information
Settings
Programmatic deployment
VIEW OF ANNUALLY COST DATA
Mar 2019 - Mar 2020
LAST YEAR
$69
NEXT YEAR FORECASTED AVERAGE
$842
1,000
900
800
700
600
500
400
300
200
100
0
FORECAST
ACTUAL
BUDGET
Mar 2019 - Mar 2020
Mar 2020 - Mar 2021
Previous
Next >

Set Budget Alert



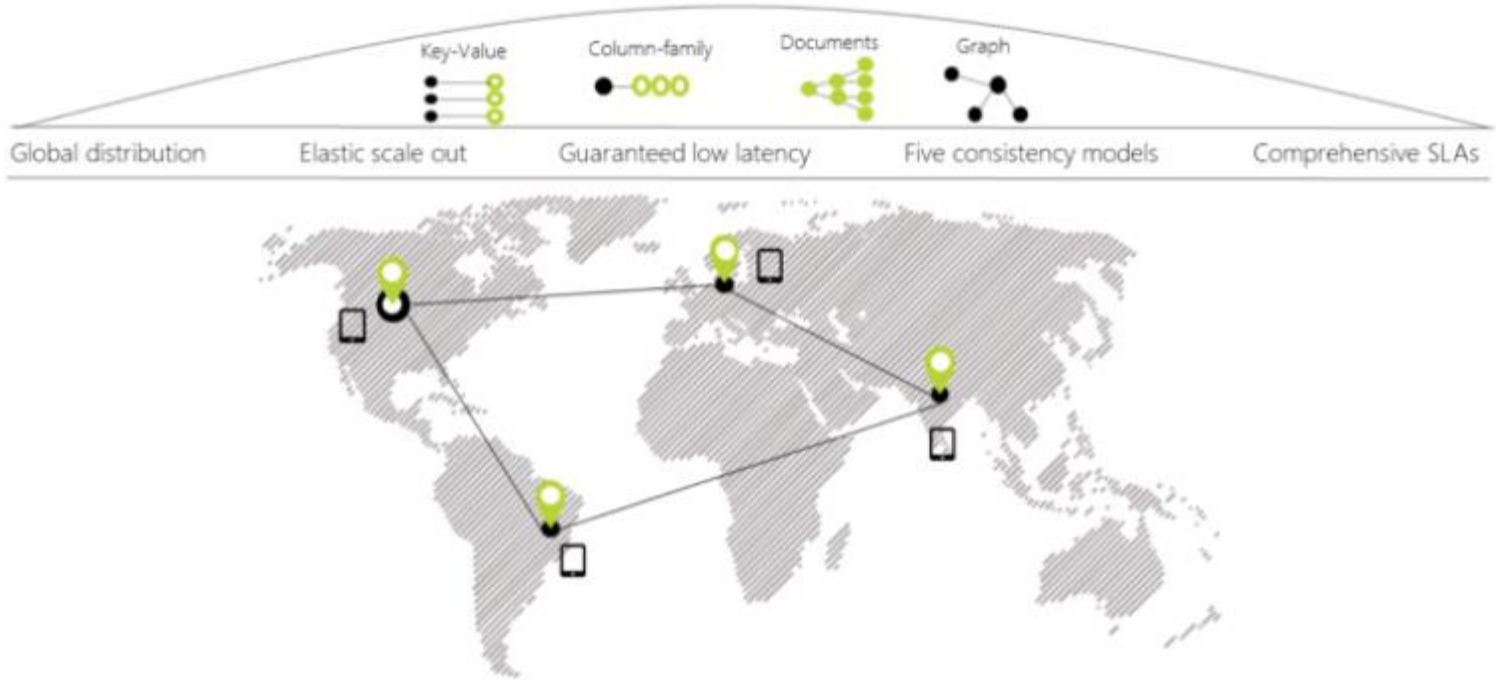
Budgets List



Problem Statement
Why Cosmos DB?

Challenges with Globally Distributed Databases?

- Long time
- Lot of effort
- Need own infrastructure
  - Teams
  - Data centers etc.



Features of Cosmos DB

FULLY MANAGED

- Database as a service (DaaS)
  - Serverless architecture
  - No operational overhead
- No schema or Index management

CONSISTENCY CHOICES

- Azure Cosmos DB's support for consistency levels like strong, eventual, consistent prefix, session, and bounded-staleness.

GLOBALLY DISTRIBUTED

- Turnkey global distribution

SCALABLE

- Unlimited scale for both storage and throughput.

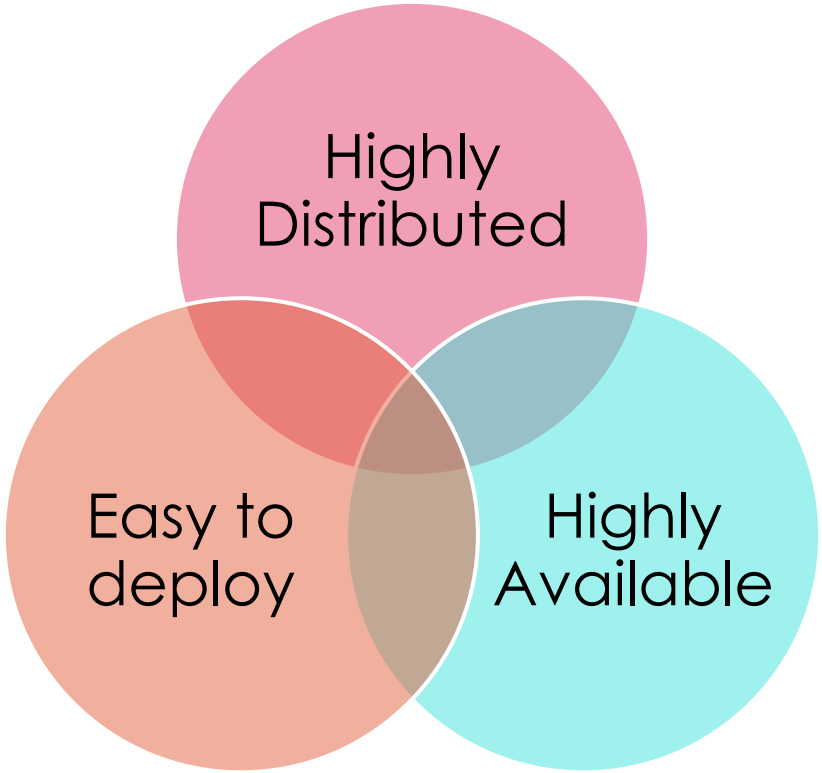
MULTIMODEL & MULTI-LANGUAGE

- Supports Jason documents, table graph and columnar data models
  - Java, .NET, Python, Node.js, JavaScript, etc.

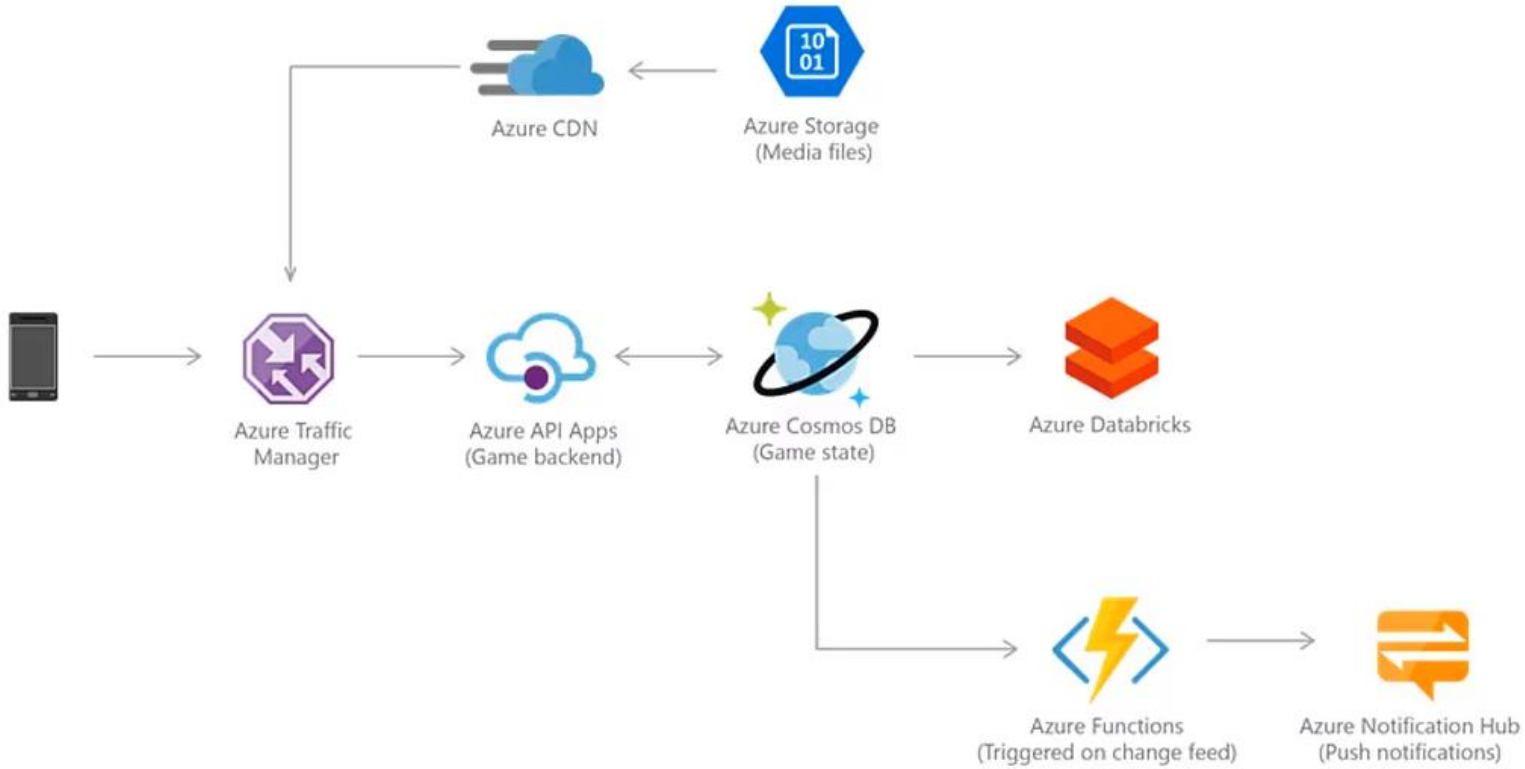
HIGHLY AVAILABLE, RELIABLE & SECURE

- Always on
- 99.999% SLA
- < 10ms latency

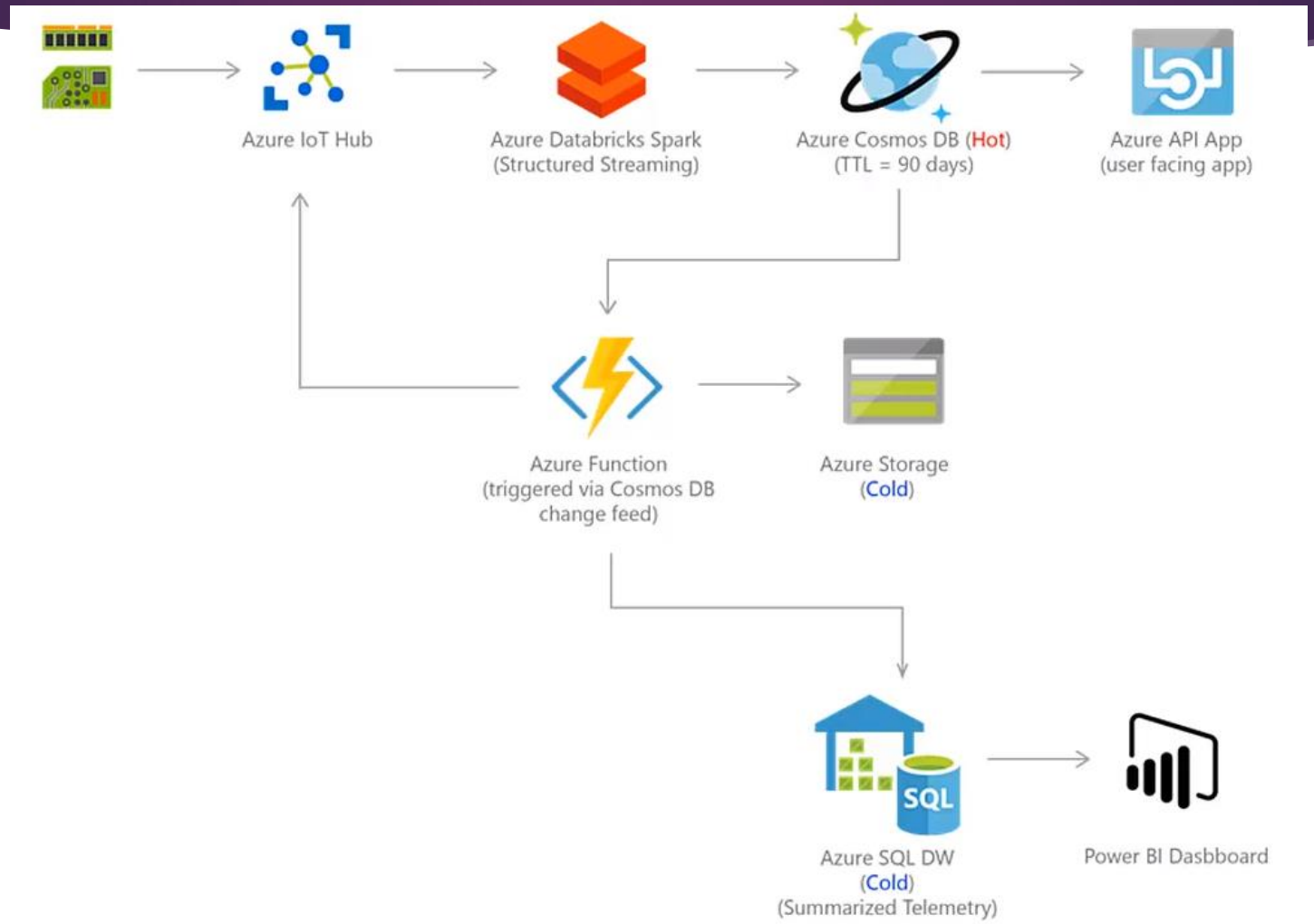
Cosmos DB – Use case scenarios



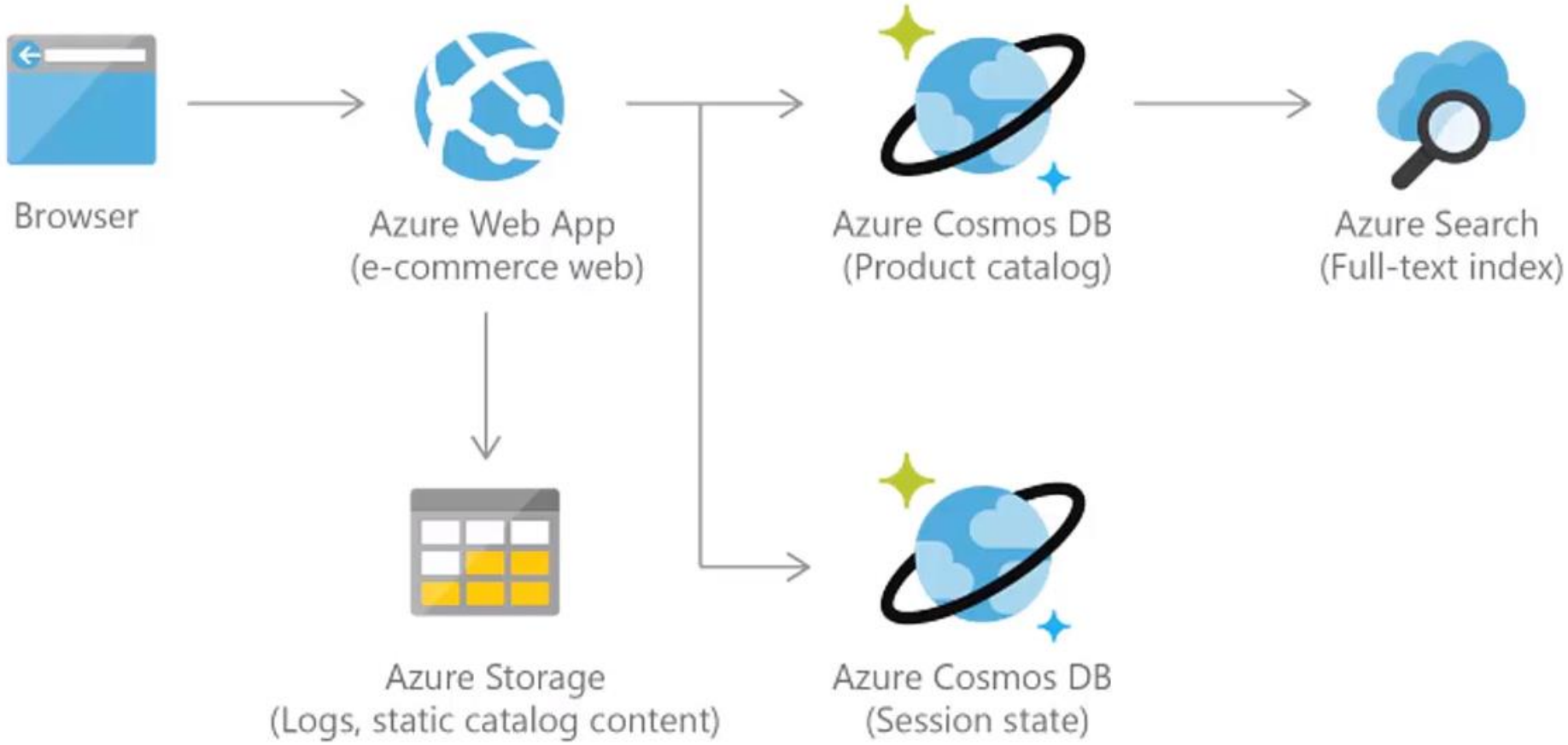
Use case - Gaming



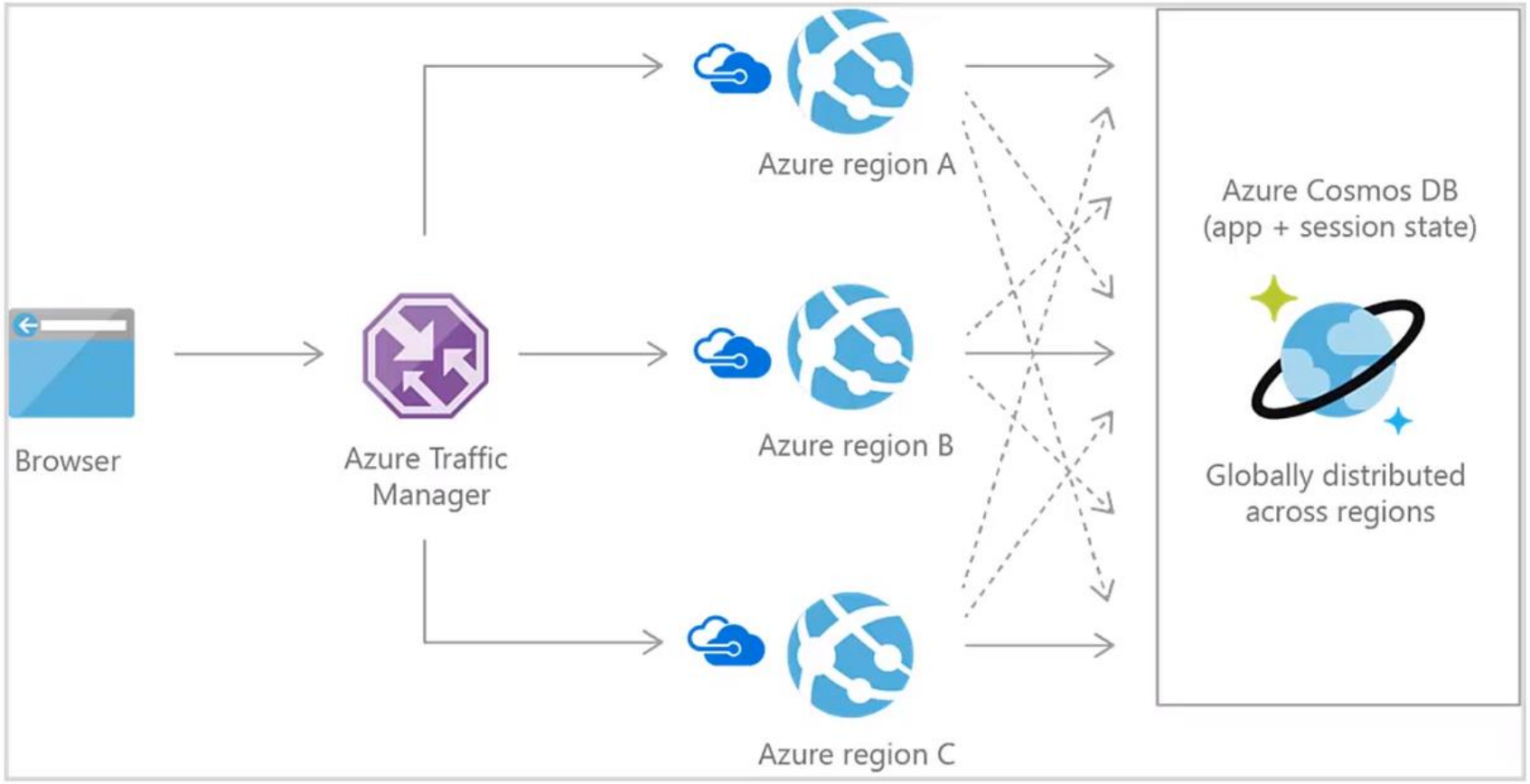
Use case IOT


Azure IoT Hub
Azure Databricks Spark
(Structured Streaming)
Azure Cosmos DB (Hot)
(TTL = 90 days)
Azure API App
(user facing app)
Azure Function
(triggered via Cosmos DB
change feed)
Azure Storage
(Cold)
SQL
Azure SQL DW
(Cold)
(Summarized Telemetry)
Power BI Dasbboard

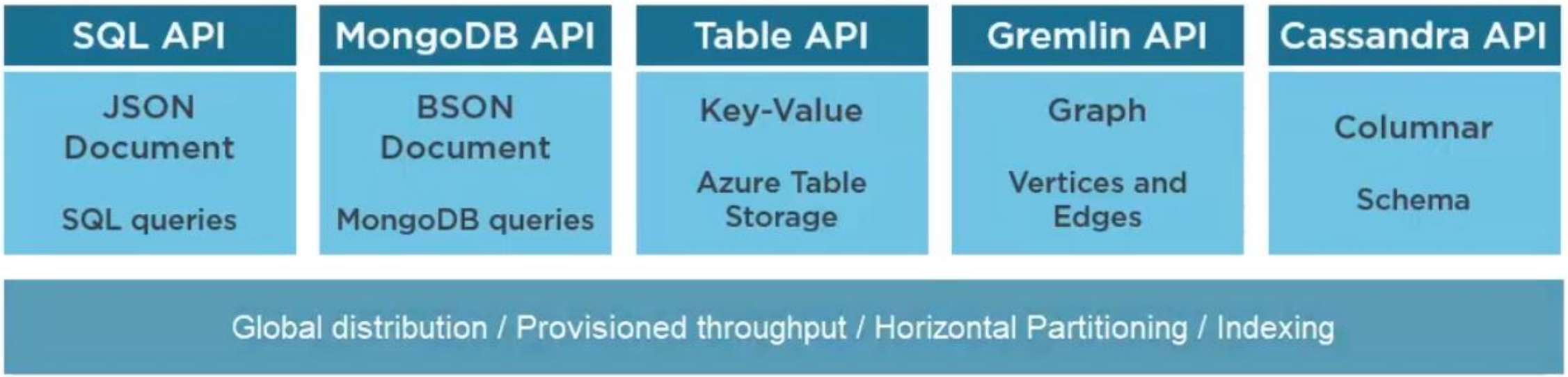
Use Case Retail Marketing

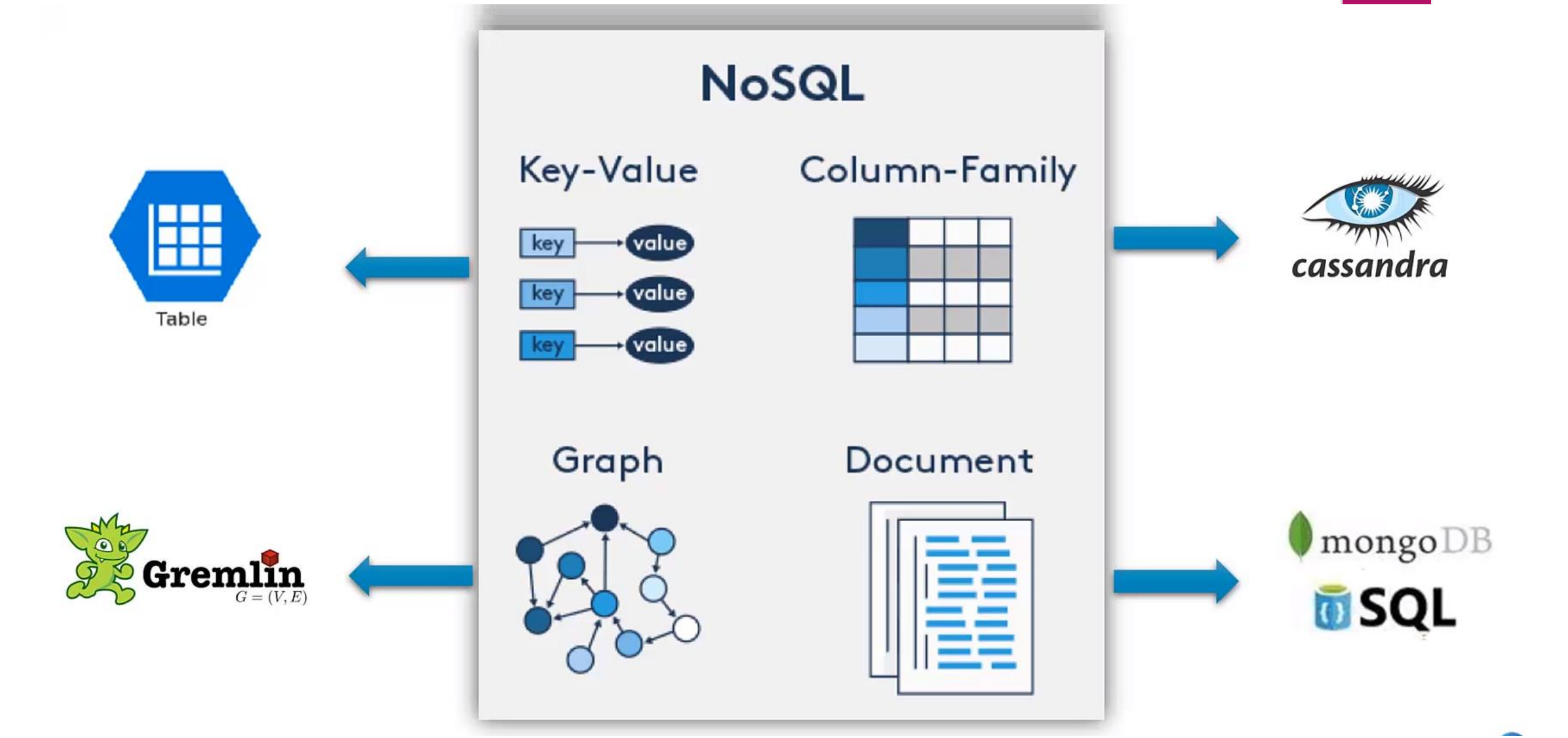


Use Case Web & Mobile



Multiple APIs and Data Models




NoSQL
Key-Value
key
value
key
value
key
value
Column-Family
Graph
Document
Table
cassandra
Gremlin
$G = (V, E)$
mongoDB
SQL

SQL(CORE) API

JSON Documents

Microsoft original Document DB platform
Supports server side programming model

You can use SQL like language to query JSON documents.

MongoDB API

BSON Documents

Implement Wire protocol

Fully compatible with Mongo DB application code

Migrate existing Cosmos DB without much change of logic

Use SQL(CORE) API for new development

BSON is a computer data interchange format. The name "BSON" is based on the term JSON and stands for "Binary JSON". It is a binary form for representing simple or complex data structures including associative arrays, integer indexed arrays, and a suite of fundamental scalar types. BSON originated in 2009 at MongoDB.

JSON	BSON
document	document
array	array
null	null
string	string
boolean	boolean
number	int32
	int64
	float64 (double)
	decimal128
	binary (blob)
	datetime
	regular expression
	javascript code
	javascript code with data
	"object id"
	"minimum key"
	"maximum key"
	"timestamp"
	(3 deprecated types)

JSON	BSON
schema-less	schema-less
key-value pairs	key-value pairs
text	binary
6 types	21 types
unordered	ordered

JSON & BSON Data Example

```
{
  "id": 1,
  "name": "Foo",
  "price": 123,
  "tags": [
    "Bar",
    "Eek"
  ],
  "stock": {
    "warehouse": 300,
    "retail": 20
  }
}
```

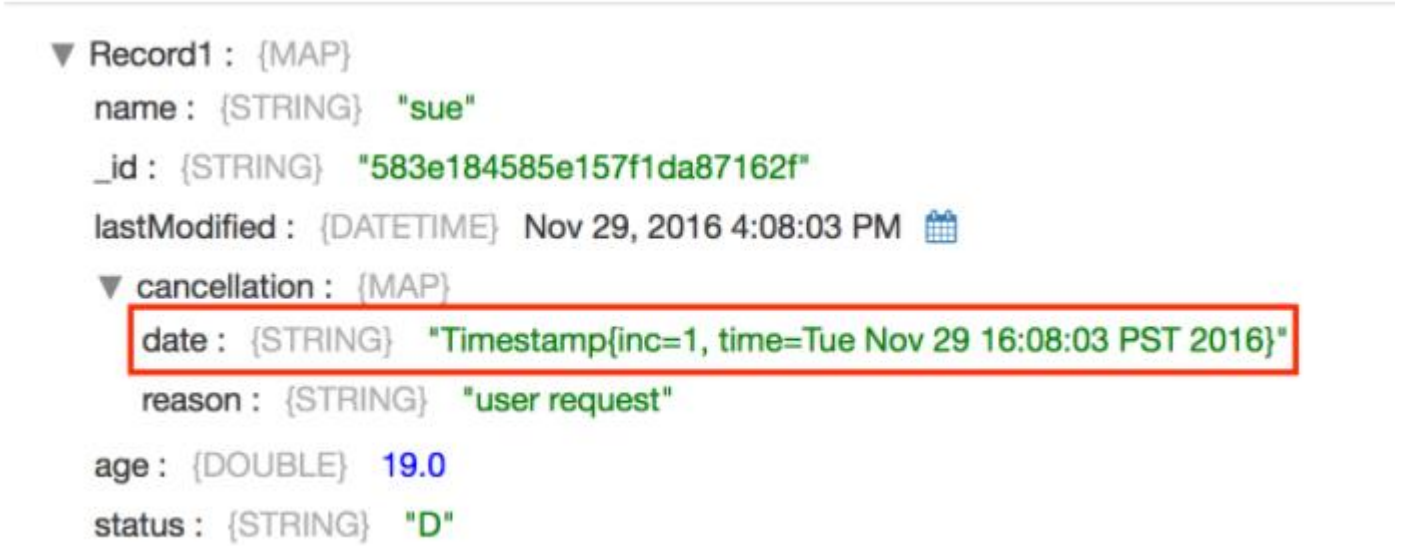
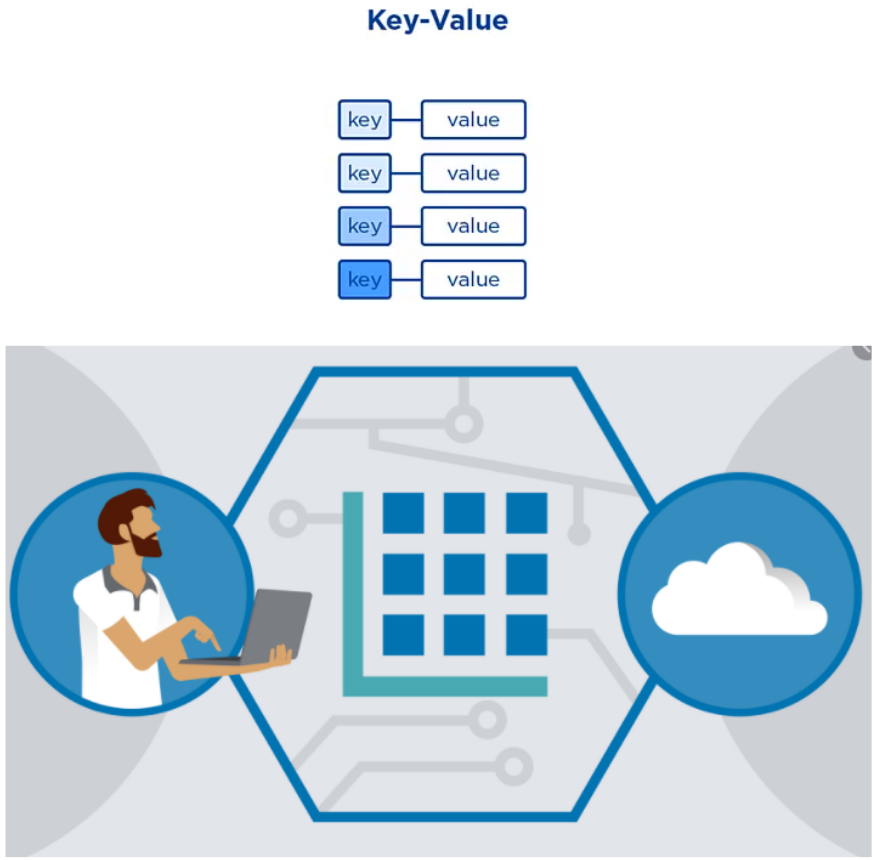


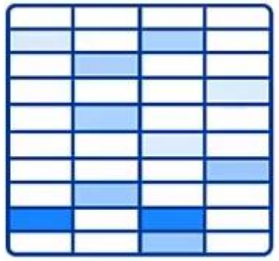
Table API



- Key-Value store
- Premium offering for Azure Table Storage
- Existing Table Storage customers will migrate to Cosmos DB Table API
- Row value can be simple like number or string
- Row cannot store object

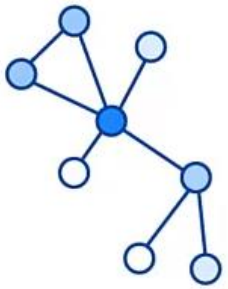
Cosmos DB Cassandra API

Wide-column



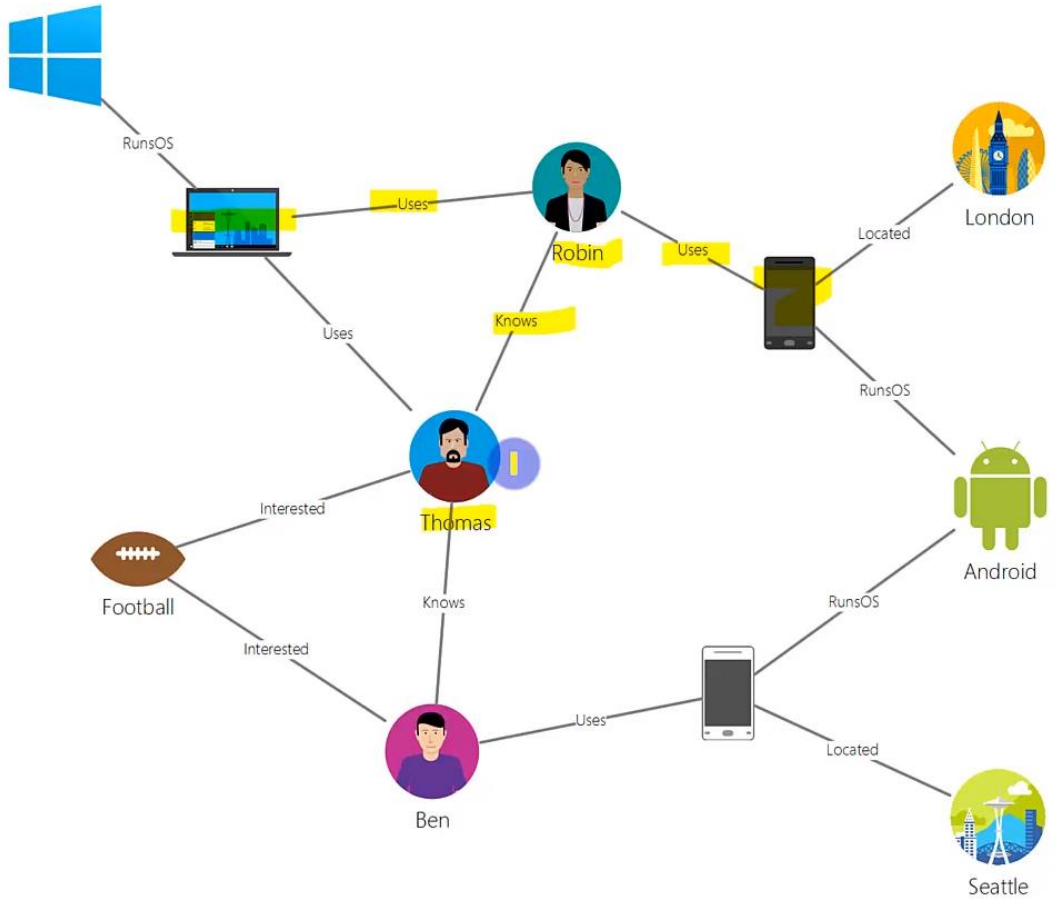
- Wide column No SQL Database
- Name and format of column can vary from row to row.
- Simple migrate your Cassandra application to Cosmos Cassandra API and change connection string.
- Interact
  - Cassandra based tools
  - Data Explorer
  - Programmatically, using SDK (CassandraCSharpdriver)

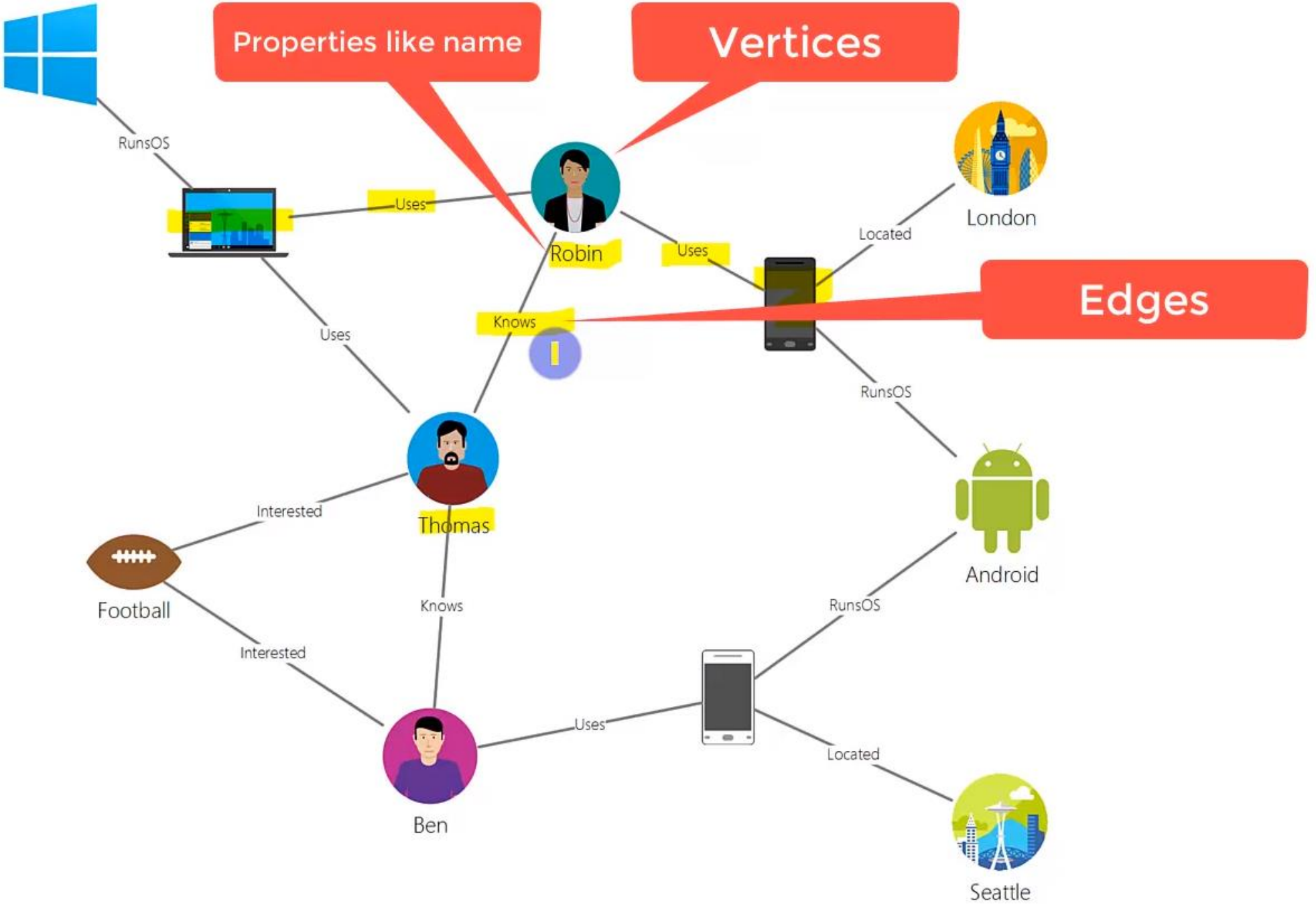
Graph



- Graph Data Model
- Real world data connected with each other
- Graph database can persist relationships in the storage layer

Graph Model


RunsOS
Uses
Robin
Uses
Located
London
Uses
Knows
RunsOS
Interested
Thomas
Android
Football
Knows
RunsOS
Interested
Uses
Located
Ben
Seattle


Properties like name
Vertices
Edges
RunsOS
Uses
Robin
Uses
Located
London
Uses
Knows
RunsOS
Thomas
Interested
Football
Knows
RunsOS
Android
Interested
Uses
Located
Ben
Seattle

Cosmos DB Gremlin API

- Graph Data Model
- Real world data connected with each other
- Graph database can persist relationships in the storage layer
- Use cases
  - Social networks
  - Recommendation engines
  - Geospatial
  - Internet of things
- Migrate existing apps to Cosmos DB Gremlin API
- Graph traverse a language

Analyse the decision criteria

	Core (SQL)	MongoDB	Cassandra	Azure Table	Gremlin
New projects being created from scratch	✓				
Existing MongoDB, Cassandra, Azure Table, or Gremlin data		✓	✓	✓	✓
Analysis of the relationships between data					✓
All other scenarios	✓				

Azure table storage vs Cosmos DB API

Cosmos DB Table API is a prime version of Table storage

Azure Table storage

- Geo replication is restricted
  - 1 additional pair region
- Support for primary key lookups only
- Lower performance
  - Throughput is capped
  - Latency is higher
- No consistency options

Cosmos DB Table API

- Geo replication across your choice of any number of regions
- Secondary index support for lookups across multiple dimensions
- Better performance
  - Unlimited and predictable throughput
  - latency is lower
- 5 consistency options

All services > Azure Cosmos DB >

Create Azure Cosmos DB Account

For a limited time, create a new Azure Cosmos DB account with multi-region writes in any region, and receive up to 33% off for the life of your account. Restrictions apply.*

Basics | Networking | Backup Policy | Encryption | Tags | Review + create

Azure Cosmos DB is a globally distributed, multi-model, fully managed database service. Try it for free, for 30 days with unlimited renewals. Go to production starting at $24/month per database, multiple containers included. Learn more

Project Details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription * : Free Trial

Resource Group * : Test

Create new

Instance Details

Account Name * : cosmos108

API * : Core (SQL)

Notebooks (Preview) : On | Off

Location * : (Asia Pacific) Central India

Capacity mode : Provisioned throughput | Serverless (preview)

Learn more about capacity mode

With Azure Cosmos DB free tier, you will get 400 RU/s and 5 GB of storage for free in an account. You can enable free tier on up to one account per subscription. Estimated $24/month discount per account.

Apply Free Tier Discount : Apply | Do Not Apply

Account Type : Production | Non-Production

Geo-Redundancy : Enable | Disable

Review + create | Previous | Next: Networking

Search resources, services, and docs (G+/)

All services > Azure Cosmos DB >

Create Azure Cosmos DB Account

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Basics | **Networking** | Backup Policy | Encryption | Tags | Review + create

Network connectivity

You can connect to your Cosmos DB account either publically, via public IP addresses or service endpoints, or privately, using a private endpoint.

Connectivity method *

- (•) All networks
- ( ) Public endpoint (selected networks)
- ( ) Private endpoint

All networks will be able to access this CosmosDB account. Learn More

Search resources, services, and docs (G+/)

All services > Azure Cosmos DB >

Create Azure Cosmos DB Account

For a limited time, create a new Azure Cosmos DB account with multi-region writes in any region, and receive up to 33% off for the life of your account. Restrictions apply.*

Basics | Networking | **Backup Policy** | Encryption | Tags | Review + create

Azure Cosmos DB provides two different backup policies. You will not be able to switch between backup policies after the account has been created.

Backup policy ⓘ — Periodic | Continuous

Sign up for enabling continuous backup policy

Backup interval ⓘ — 240 Minute(s)

60-1440

Backup retention ⓘ — 8 Hours(s)

8-720

Copies of data retained — 2

For additional pricing details, please check here

de

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Create Azure Cosmos DB Account

For a limited time, create a new Azure Cosmos DB account with multi-region writes in any region, and receive up to 33% off for the life of your account. Restrictions apply.*

Basics | Networking | Backup Policy | **Encryption** | Tags | Review + create

Data Encryption

Azure Cosmos DB encryption protects your data at rest by seamlessly encrypting your data as it's written in our datacenters, and automatically decrypting it for you as you access it.

By default your Azure Cosmos DB account is encrypted at rest using service-managed keys. At the moment, you will not be able to switch back to service-managed key after opting into using custom-managed key while creating your account. Learn More

Data Encryption

- (•) Service-managed key
- ( ) Customer-managed key (Enter key URI)

Search resources, services, and docs (G+/)

All services > Azure Cosmos DB >

Create Azure Cosmos DB Account

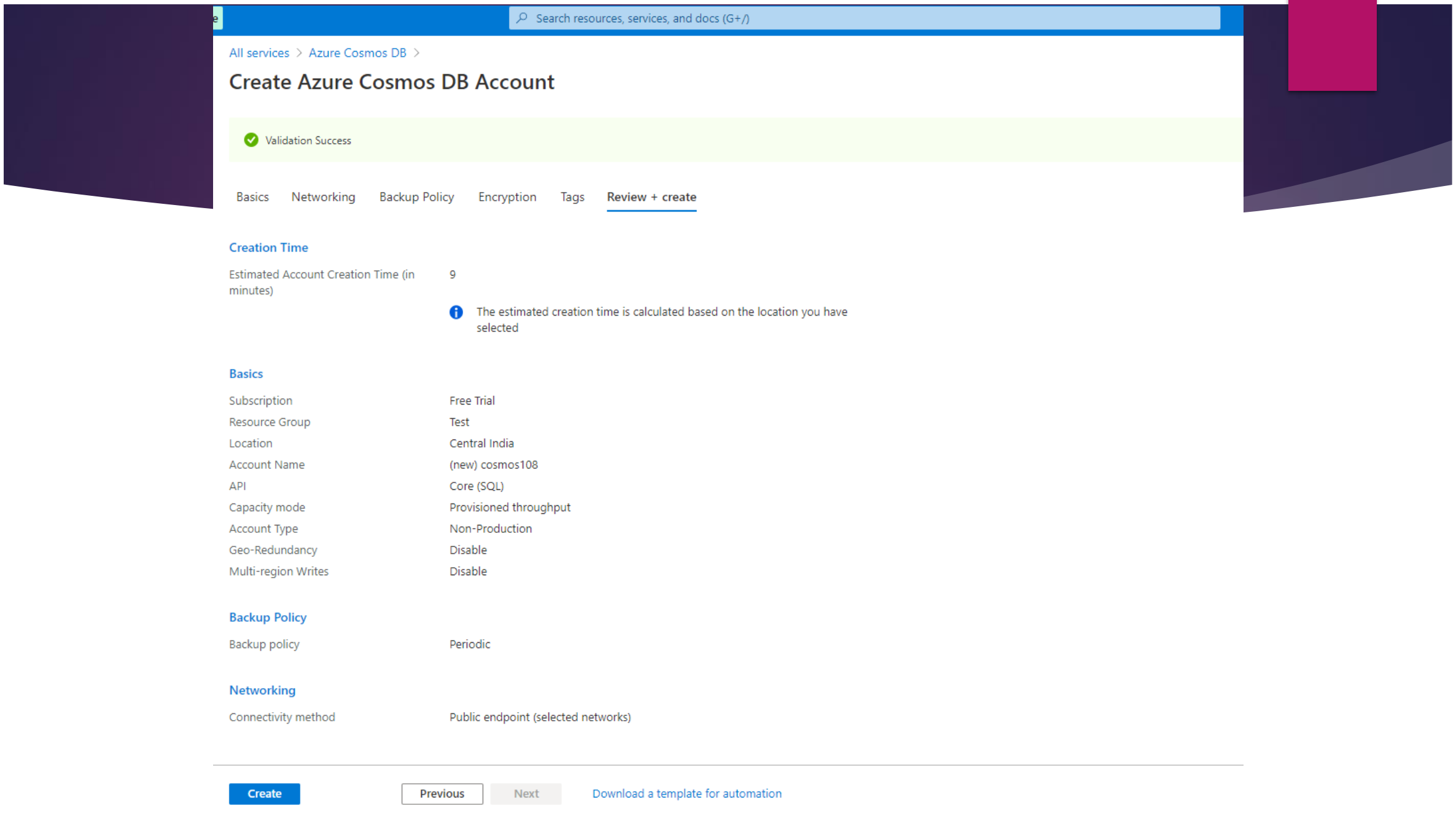
For a limited time, create a new Azure Cosmos DB account with multi-region writes in any region, and receive up to 33% off for the life of your account. Restrictions apply.*

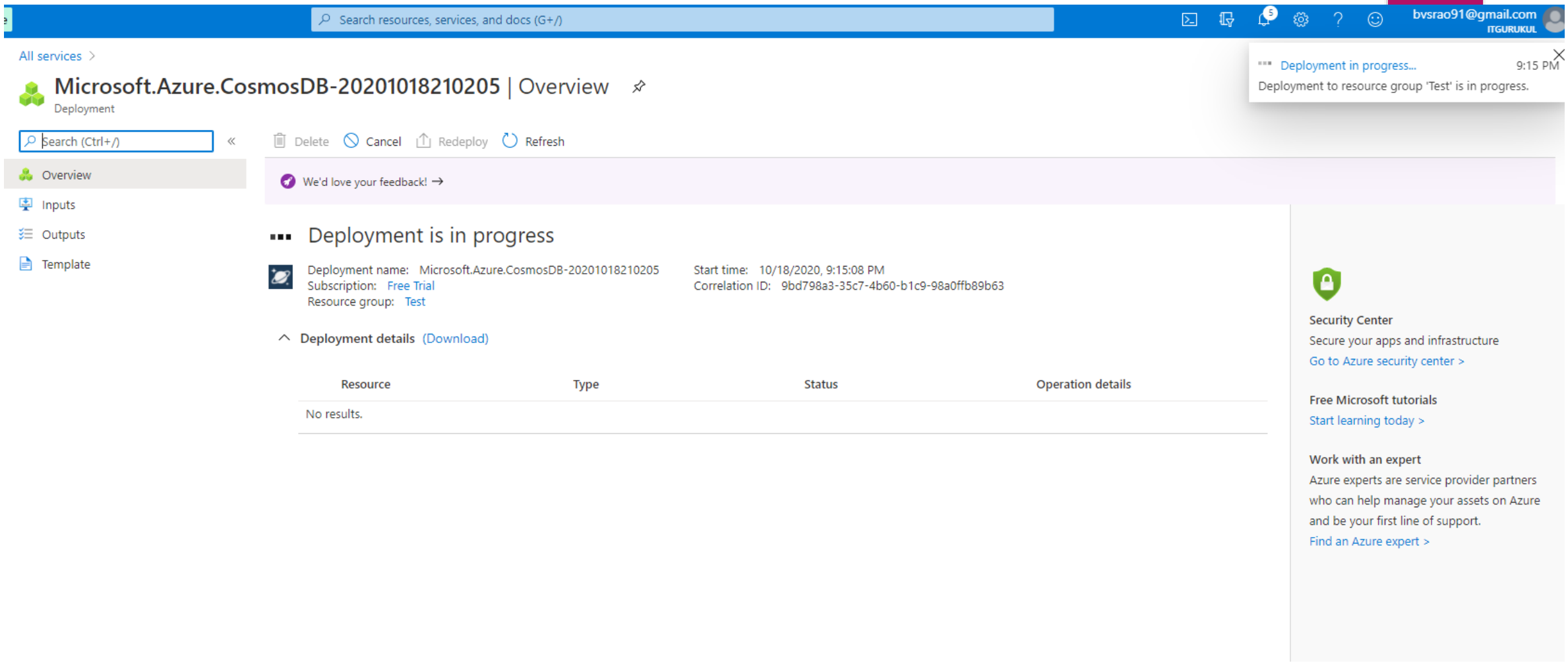
Basics | Networking | Backup Policy | Encryption | **Tags** | Review + create

Tags are name/value pairs that enable you to categorize resources and view consolidated billing by applying the same tag to multiple resources and resource groups. learn more

Note that if you create tags and then change resource settings on other tabs, your tags will be automatically updated.

Key	Value	Resource Type
		Azure Cosmos DB account


Search resources, services, and docs (G+/)
All services > Azure Cosmos DB >
Create Azure Cosmos DB Account
Validation Success
Basics
Networking
Backup Policy
Encryption
Tags
Review + create
Creation Time
Estimated Account Creation Time (in minutes)
9
The estimated creation time is calculated based on the location you have selected
Basics
Subscription
Free Trial
Resource Group
Test
Location
Central India
Account Name
(new) cosmos108
API
Core (SQL)
Capacity mode
Provisioned throughput
Account Type
Non-Production
Geo-Redundancy
Disable
Multi-region Writes
Disable
Backup Policy
Backup policy
Periodic
Networking
Connectivity method
Public endpoint (selected networks)
Create
Previous
Next
Download a template for automation


Search resources, services, and docs (G+/)
bvsrao91@gmail.com
ITGURUKUL
All services
Deployment in progress...
9:15 PM
Deployment to resource group 'Test' is in progress.
Microsoft.Azure.CosmosDB-20201018210205 | Overview
Deployment
Search (Ctrl+/)
Delete
Cancel
Redeploy
Refresh
Overview
Inputs
Outputs
Template
We'd love your feedback! →
Deployment is in progress
Deployment name: Microsoft.Azure.CosmosDB-20201018210205
Subscription: Free Trial
Resource group: Test
Start time: 10/18/2020, 9:15:08 PM
Correlation ID: 9bd798a3-35c7-4b60-b1c9-98a0ffb89b63
Deployment details (Download)
Resource
Type
Status
Operation details
No results.
Security Center
Secure your apps and infrastructure
Go to Azure security center >
Free Microsoft tutorials
Start learning today >
Work with an expert
Azure experts are service provider partners who can help manage your assets on Azure and be your first line of support.
Find an Azure expert >

cosmos108 | Keys

Azure Cosmos DB account

Search (Ctrl+/)

- Overview
- Activity log
- Access control (IAM)
- Tags
- Diagnose and solve problems
- Quick start
- Notifications
- Data Explorer

Settings

- Features
- Replicate data globally
- Default consistency
- Backup & Restore
- Firewall and virtual networks
- Private Endpoint Connections
- CORS
- Keys
- Add Azure Cognitive Search
- Add Azure Function
- Advanced security (preview)
- Locks

Read-write Keys | Read-only Keys

URI

https://cosmos108.documents.azure.com:443/

PRIMARY KEY

CsqpqfC6jXtiAUIU0NCvuNQEMyH2V3KrToZZRg0LTSlsCdUMaoirW3OnSDOEmeIMmHfEjtgG9gnrOjP4k7xIAA==

SECONDARY KEY

lHIkDi5lceFTNeyXNci3H1IinbHQMetAUK8BOZ4OwNWjLFufHcCmYnTGMBTFPqEVEGIRLQ8DE7JYOfFBiaJd6Q==

PRIMARY CONNECTION STRING

AccountEndpoint=https://cosmos108.documents.azure.com:443/;AccountKey=CsqpqfC6jXtiAUIU0NCvuNQEMyH2V3KrToZZRg0LTSlsCdUMaoirW3OnSDOEmeIMmHfEjtgG9gnrOjP4k7xIAA==;

SECONDARY CONNECTION STRING

AccountEndpoint=https://cosmos108.documents.azure.com:443/;AccountKey=lHIkDi5lceFTNeyXNci3H1IinbHQMetAUK8BOZ4OwNWjLFufHcCmYnTGMBTFPqEVEGIRLQ8DE7JYOfFBiaJd6Q==;

Introducing the Local Emulator

- Emulate Cosmos DB in a local development environment
  - Supports identical functionality as Azure Cosmos DB in the cloud

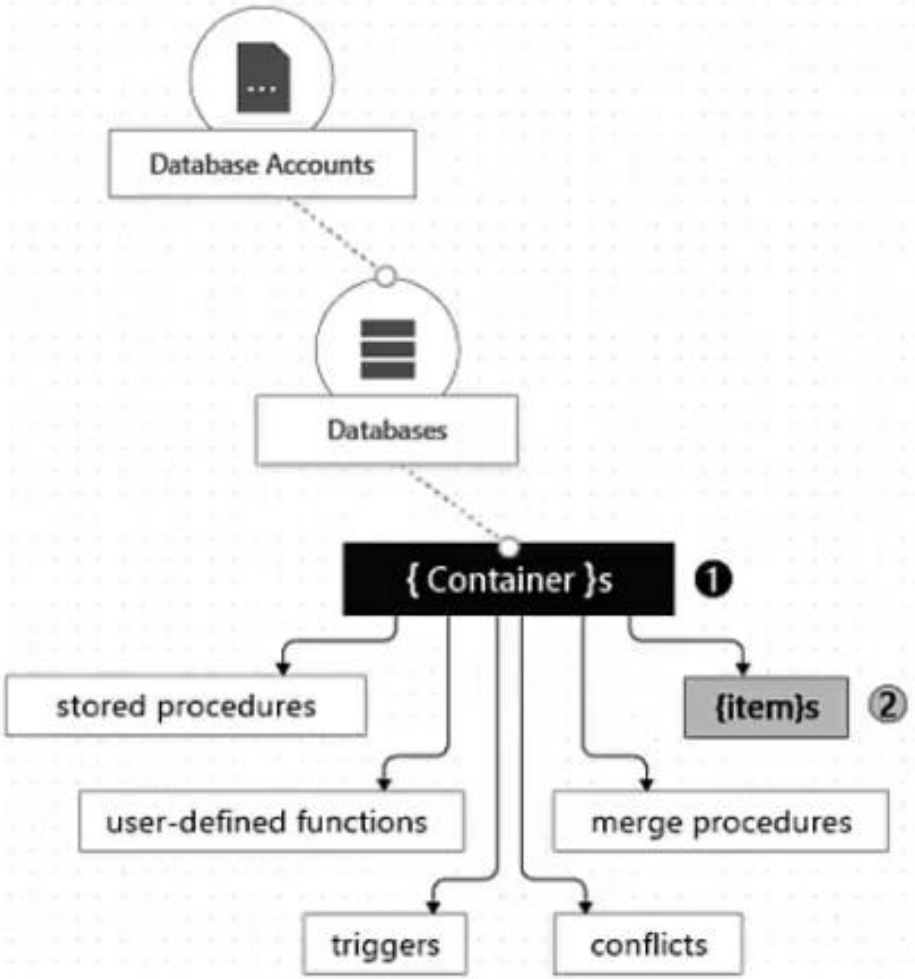
- No need for:
  - Azure subscription
  - Cosmos DB account
  - Internet connection

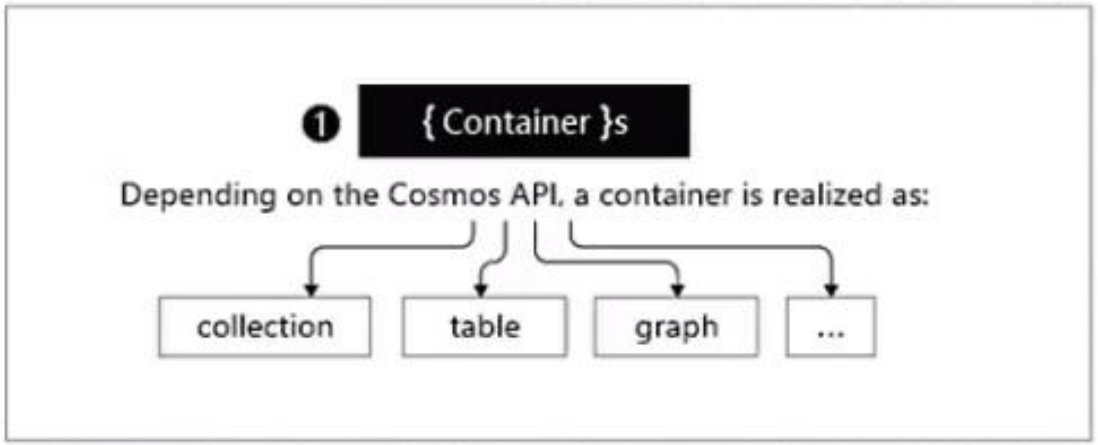
- Develop and test locally
  - Incur no costs
  - Deploy to the cloud when ready

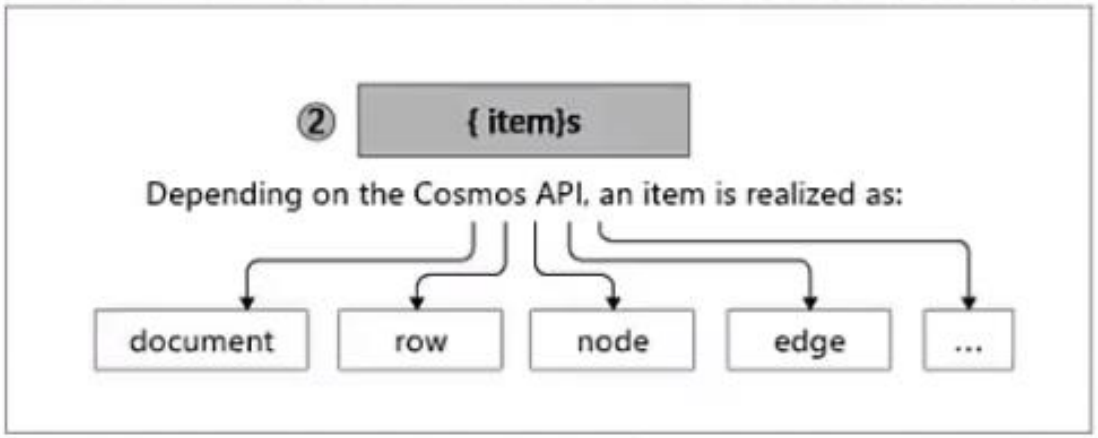
Install emulator

- https://aka.ms/cosmosdb-emulator

COSMOS DB INTERNALS & PARTITIONING







Azure Cosmos entity	SQL API	Cassandra API	MongoDB API	Gremlin API	Table API
Azure Cosmos database	Database	Keyspace	Database	Database	NA
Azure Cosmos container	Container	Table	Collection	Graph	Table
Azure Cosmos item	Document	Row	Document	Node or edge	Item

Measure Performance

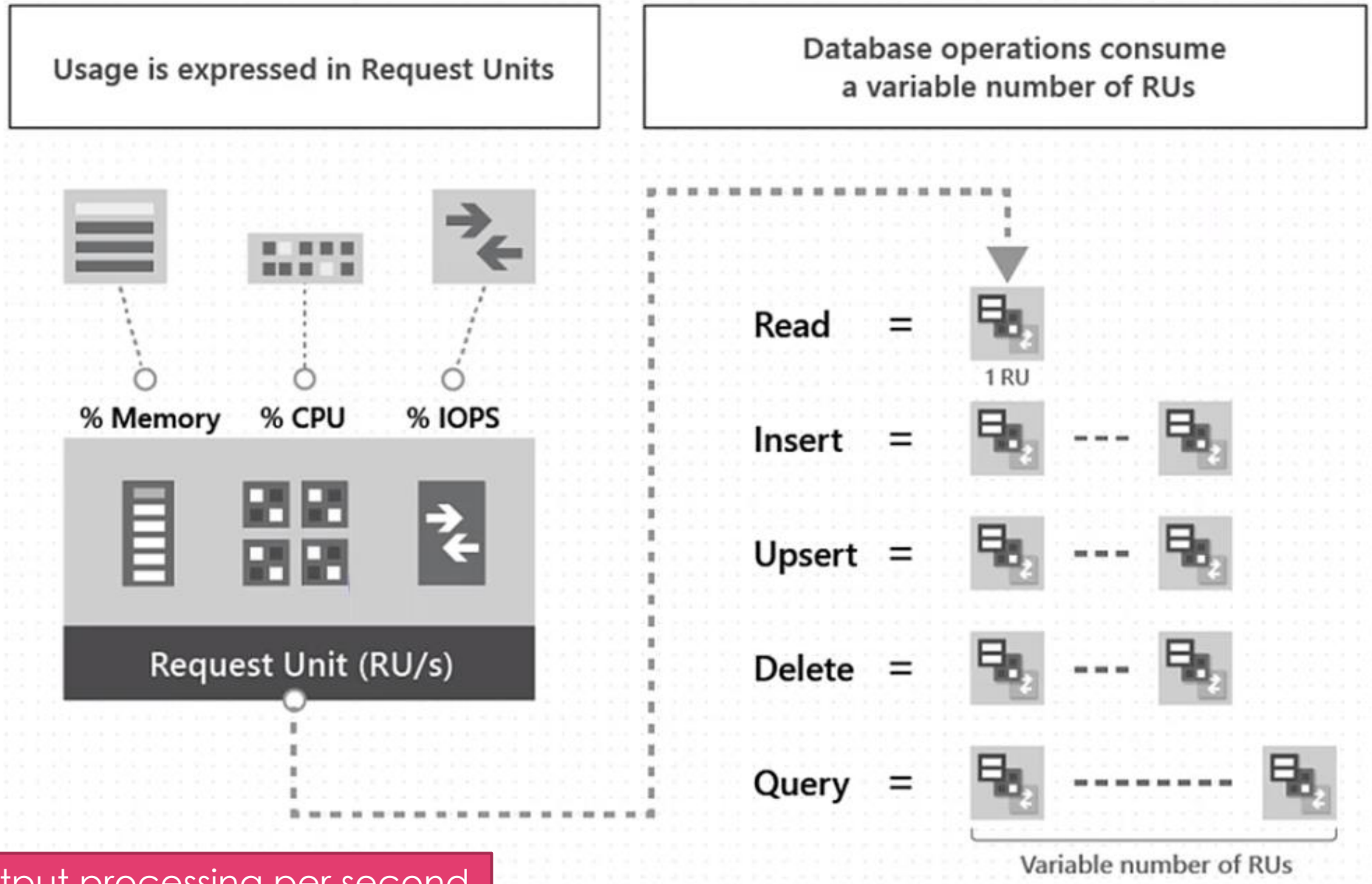
Latency

- How Fast is the response for a given request?

Throughput

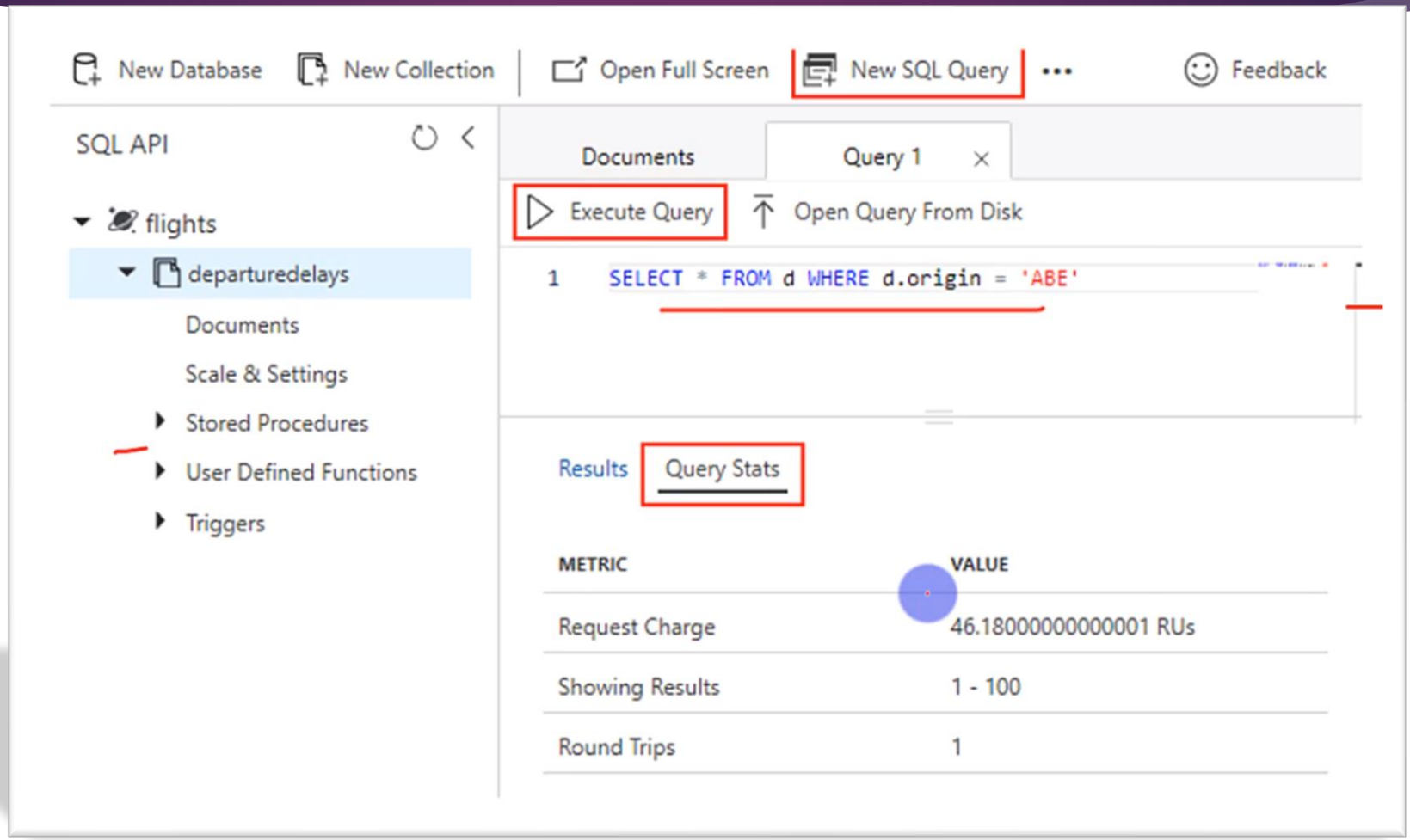
- How many request can be served within a specific period of time?

Introducing Request Units



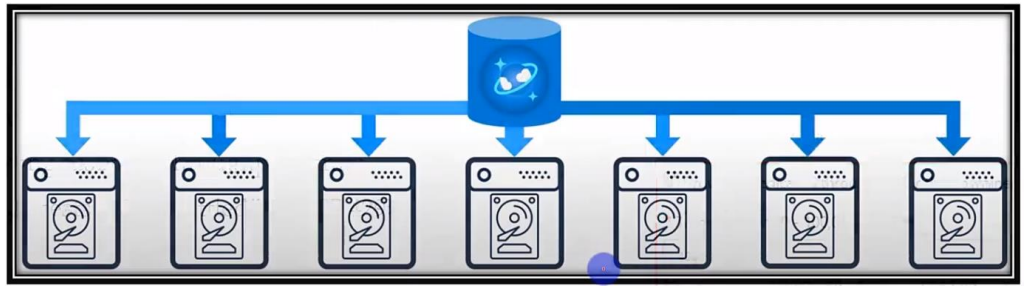
IOPS: input output processing per second

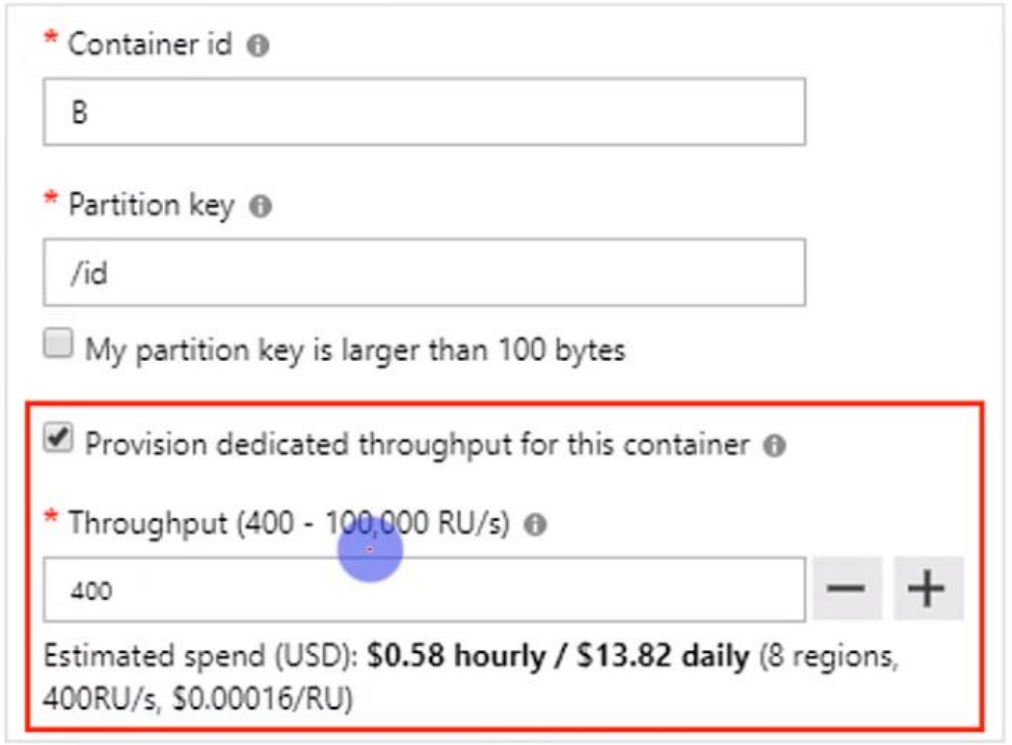
Introducing Request Units



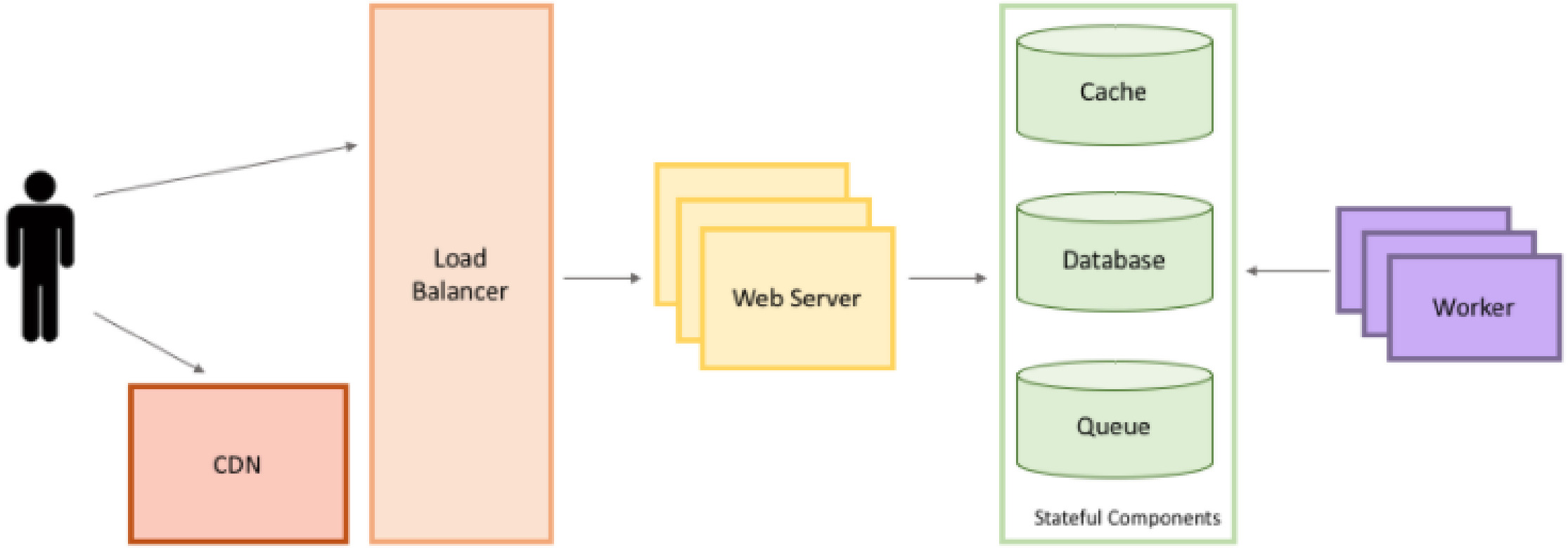
Reserving Request Units

- Provision Request units per second (RU/s)
  - How many request units (not requests) per second are available to your application
- Exceeding reserved throughput limits
  - Requests are "throttled" (HTTP 429)

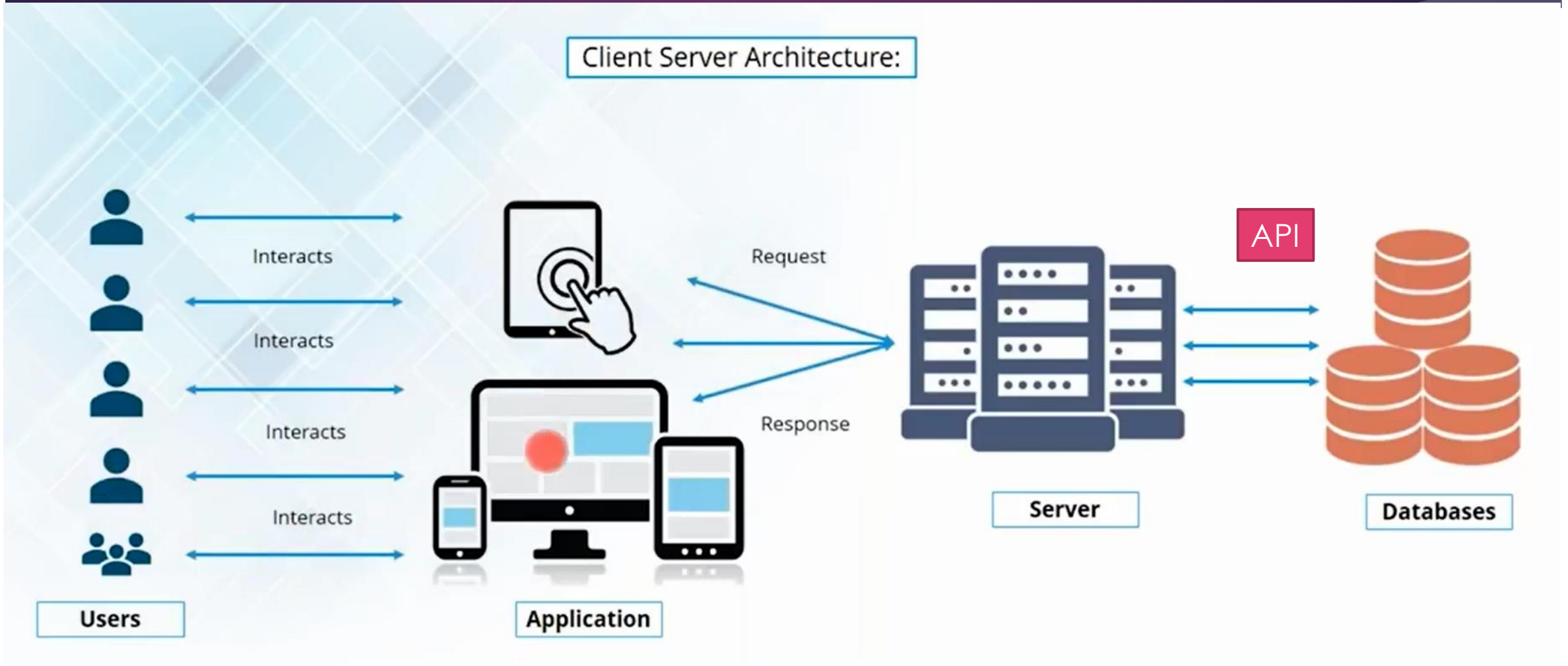




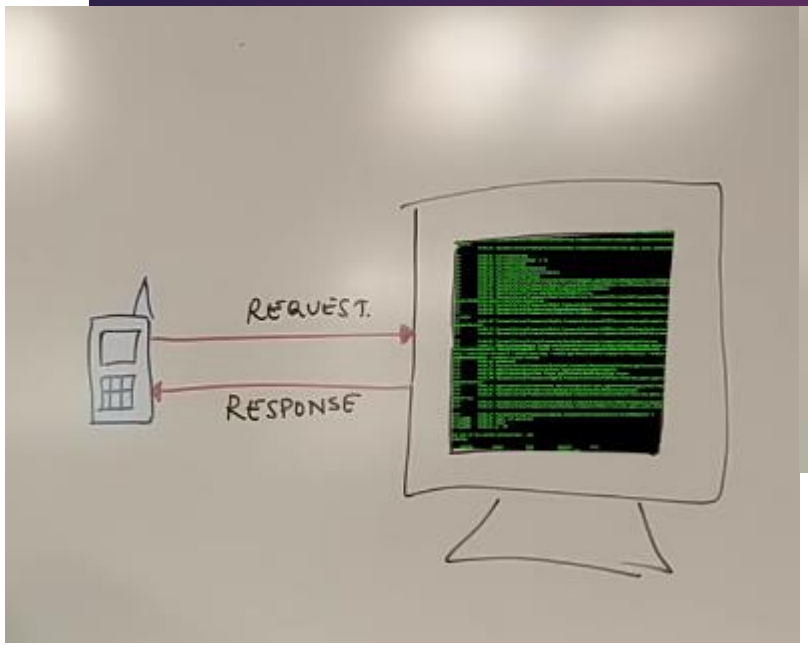
System Design?

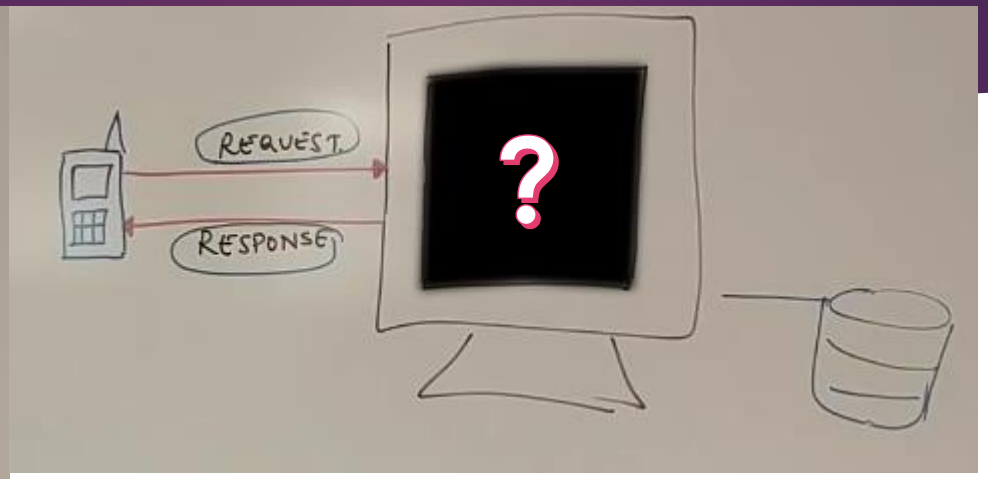


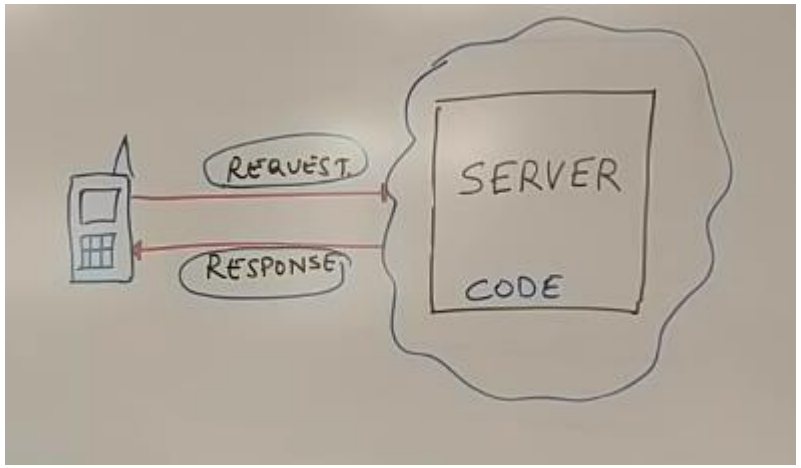
Basic Application Architecture



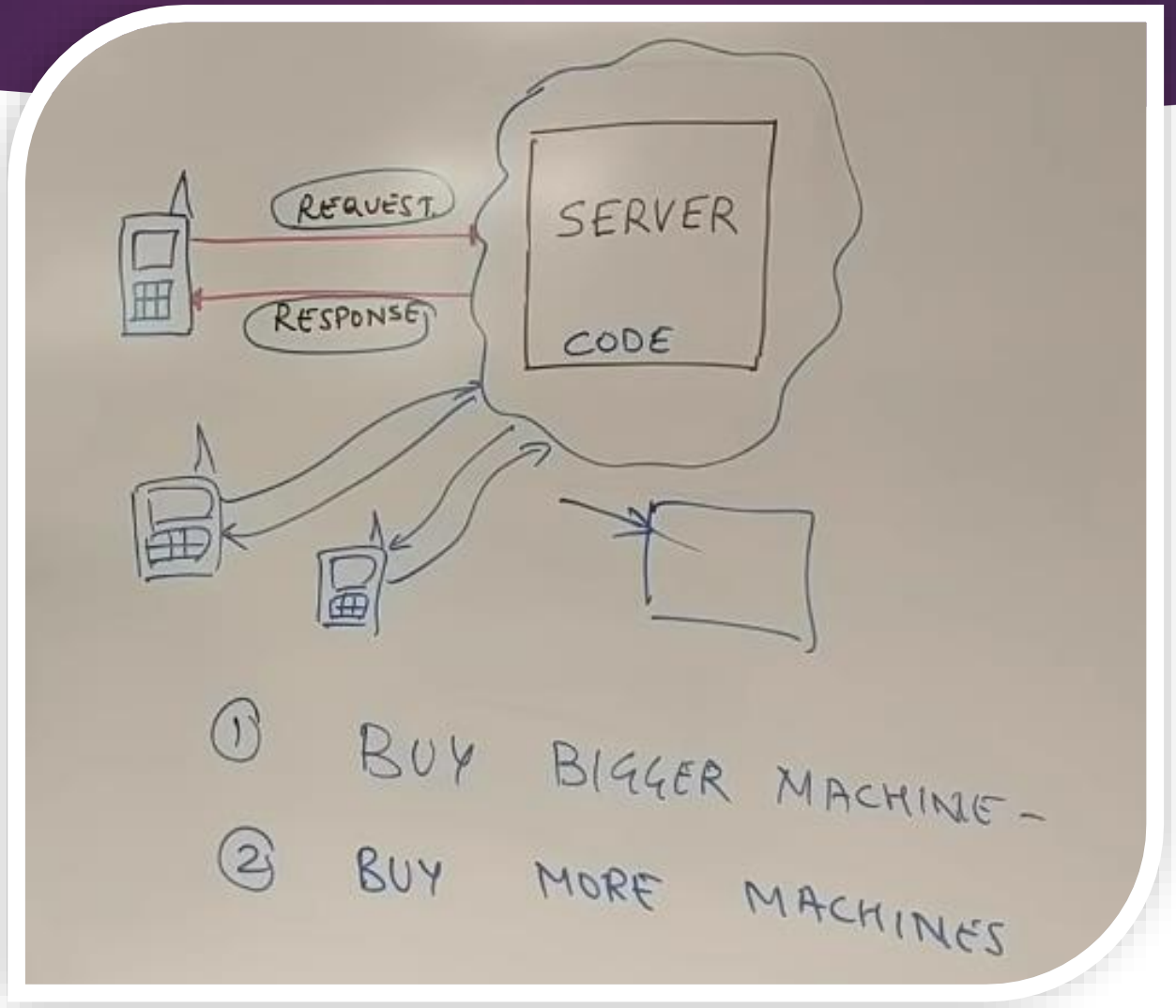
System Design?

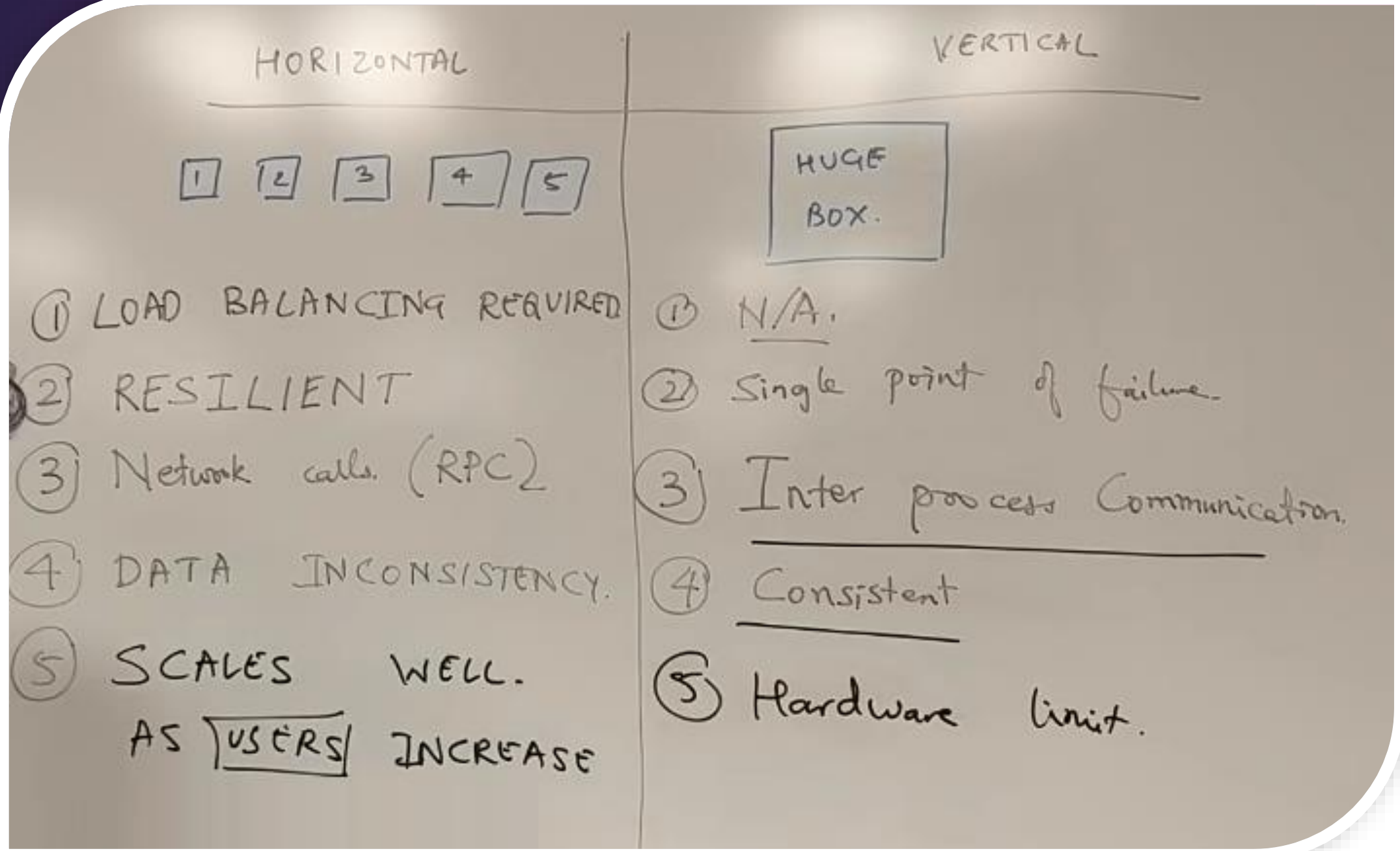




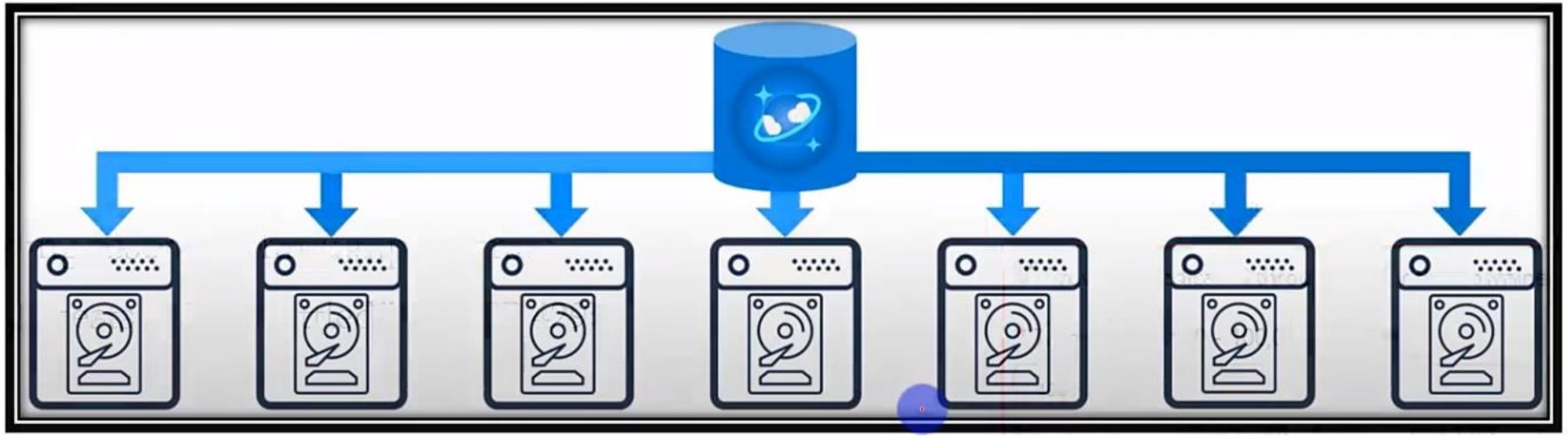


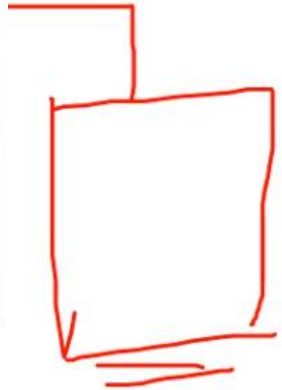
What is Scaling?



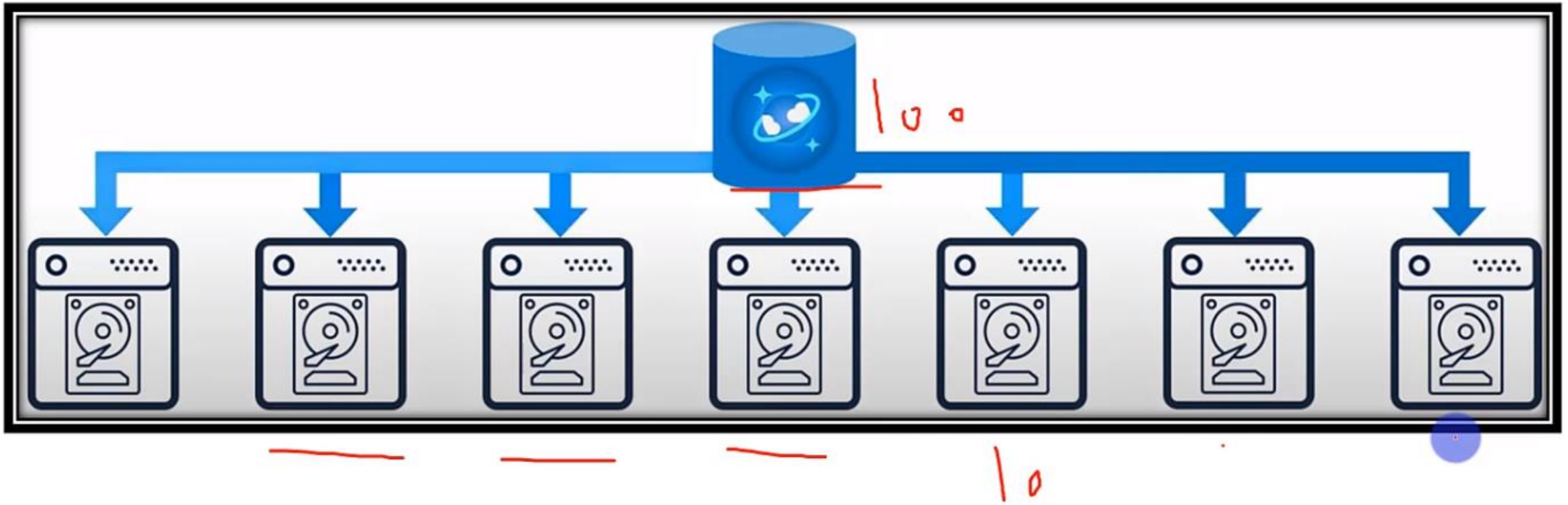

HORIZONTAL
VERTICAL
1
2
3
4
5
HUGE BOX.
1 LOAD BALANCING REQUIRED
2 RESILIENT
3 Network calls. (RPC)
4 DATA INCONSISTENCY.
5 SCALES WELL. AS USERS INCREASE
1 N/A.
2 Single point of failure.
3 Inter process Communication.
4 Consistent
5 Hardware limit.

Horizontally Scalable





Partitioning



Assume there are 100 Documents.
How Cosmos DB decides which document will go into which Machine

Partitioning

Partitioning

The items in a container are divided into distinct subsets called logical partitions.

Partition key

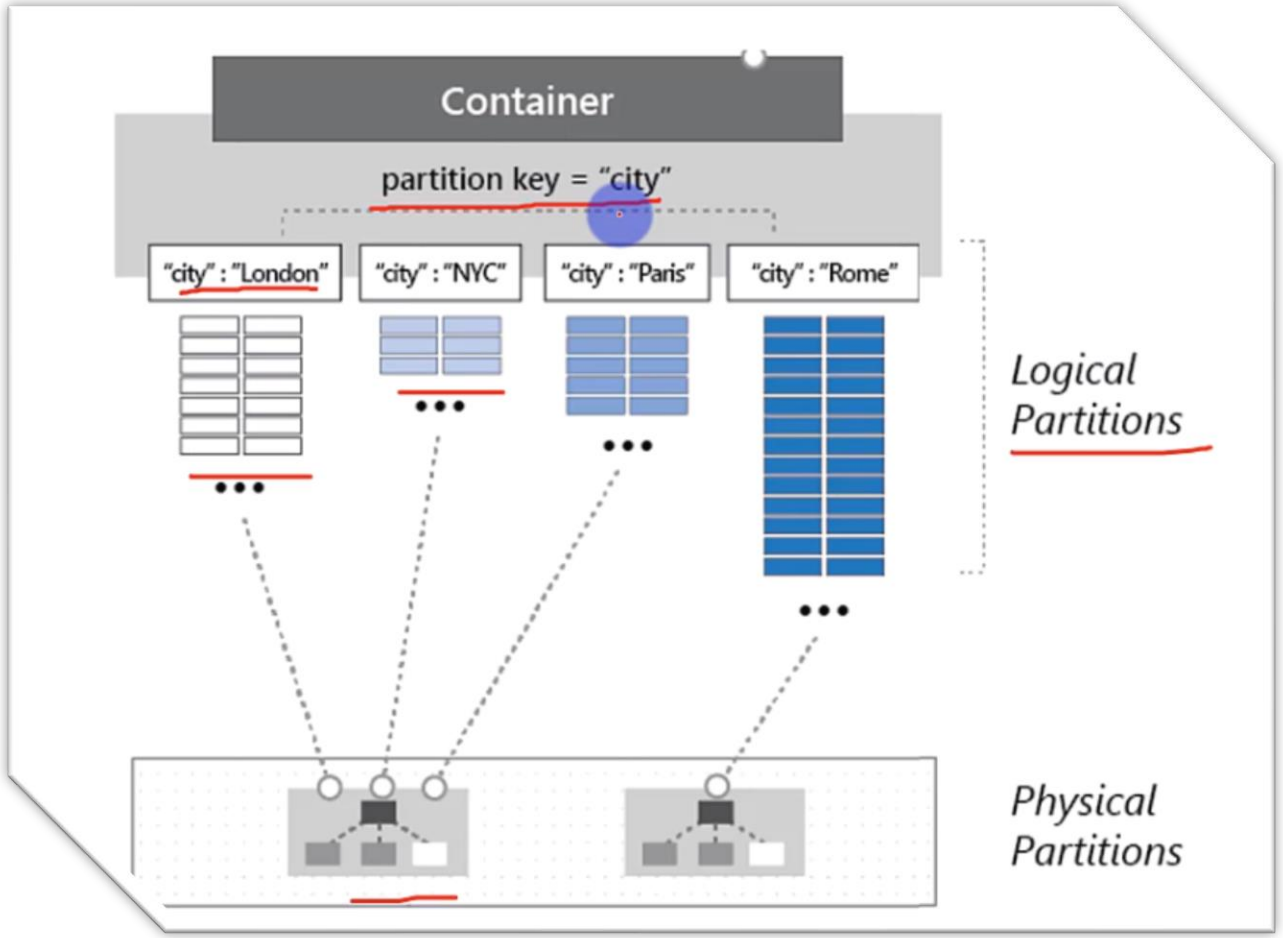
It is the value by which Azure organizes your data into logical divisions.

Logical partitions

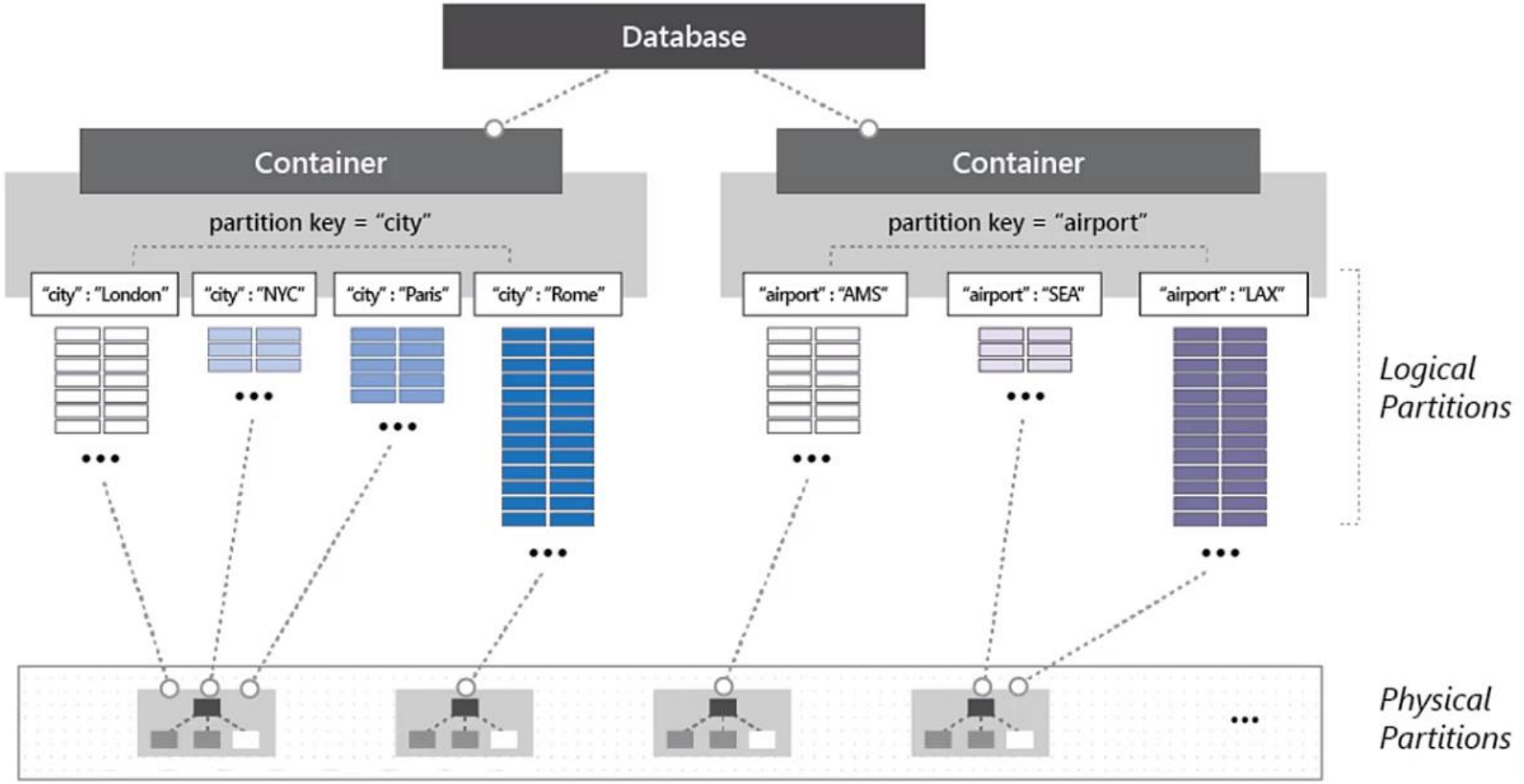
These are formed based on the value of a partition key that is associated with each item in a container.

Physical partitions

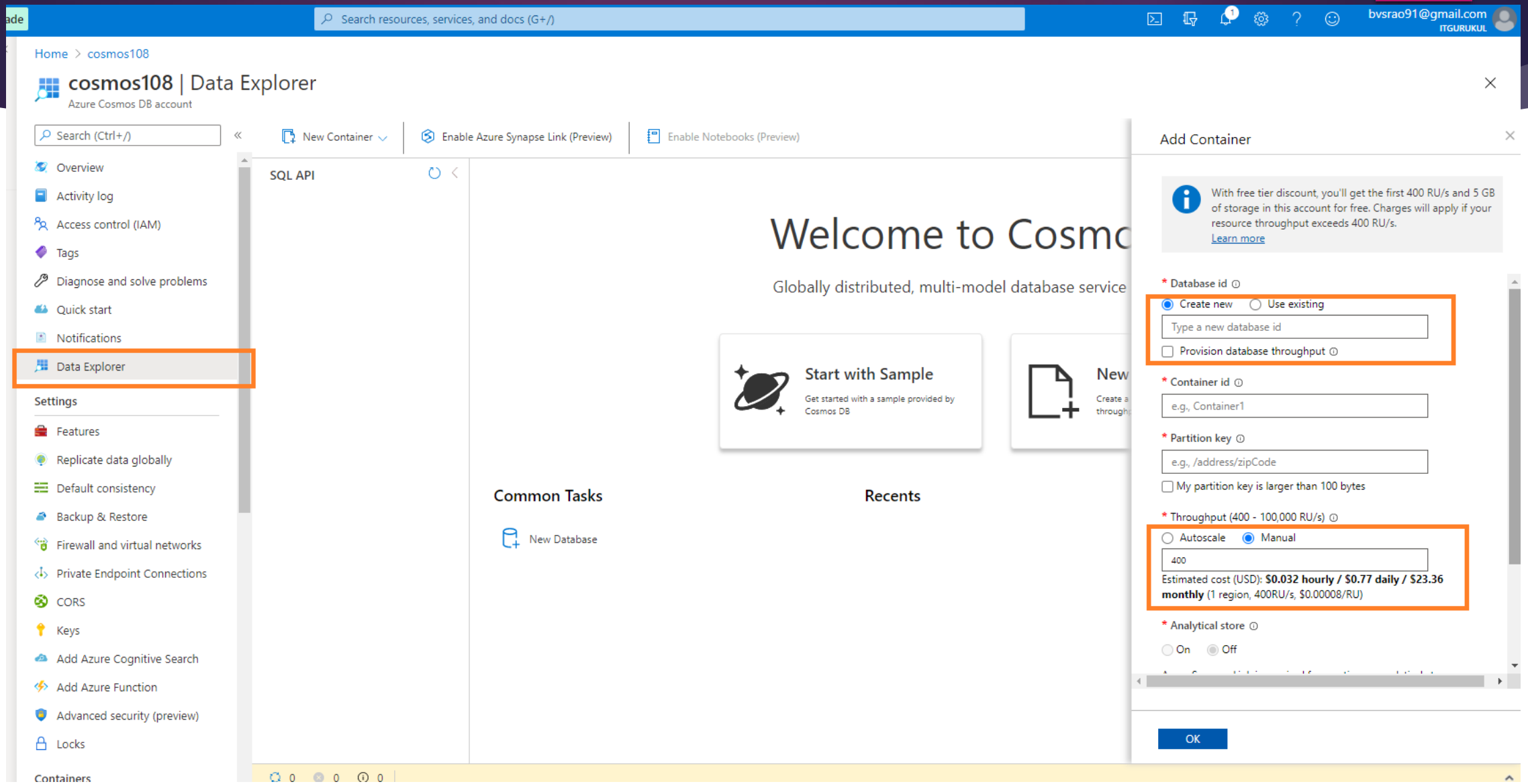
Internally, one or more logical partitions are mapped to a single physical partition.



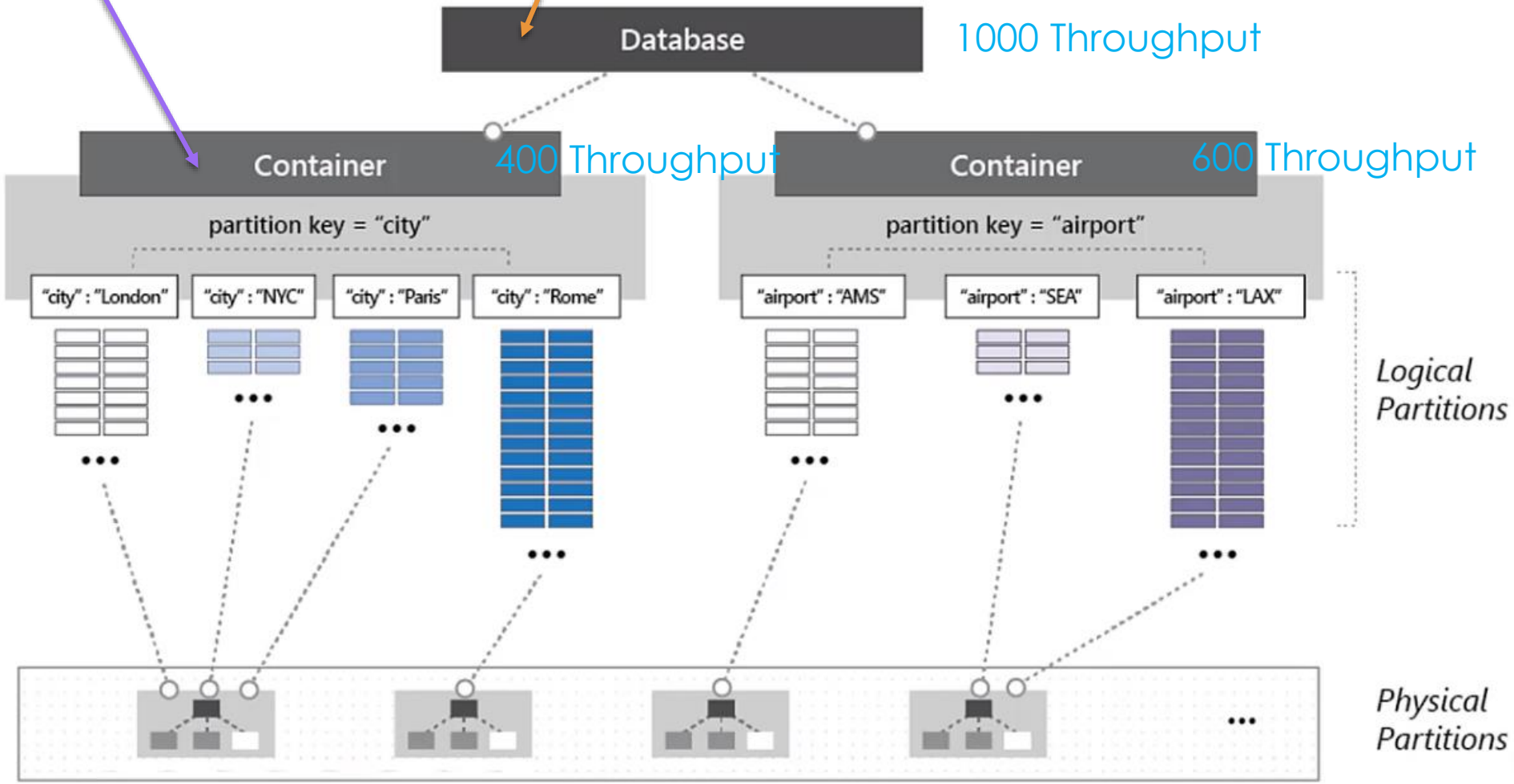
Partitioning



Create Container

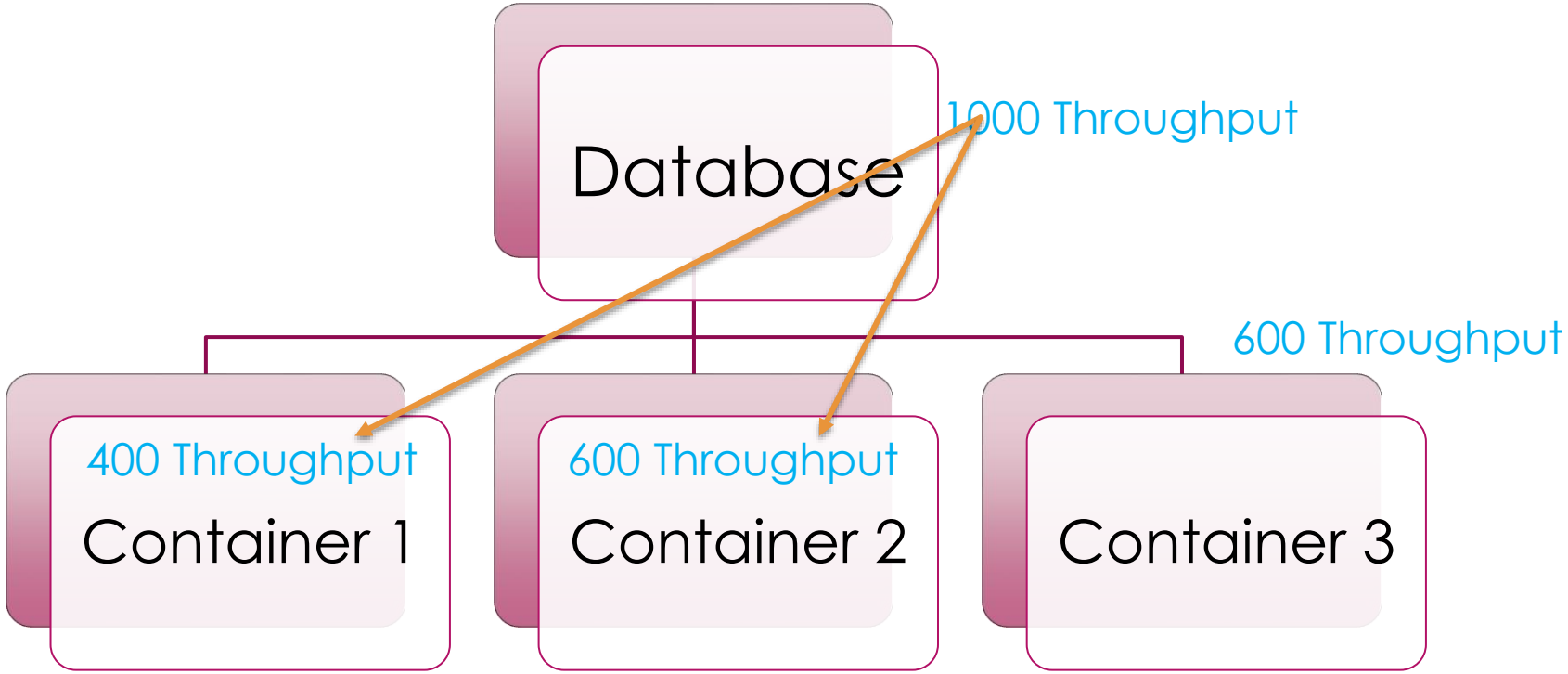


Dedicated vs Shared Throughput



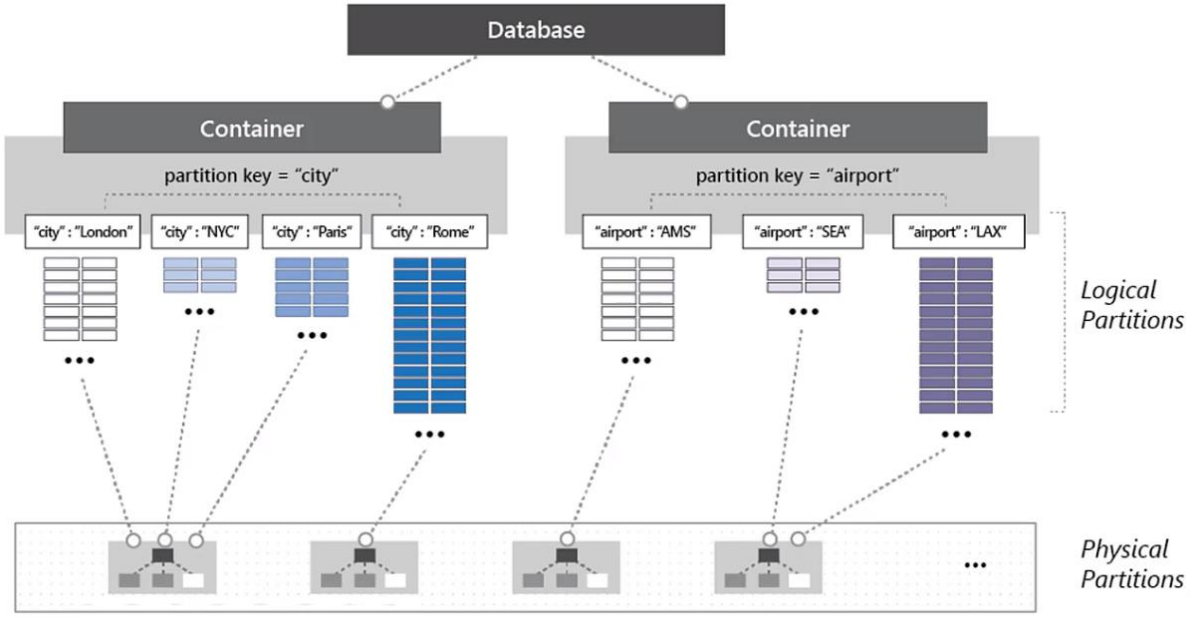
Based on work load, what kind of logical partition

Dedicated vs Shared Throughput

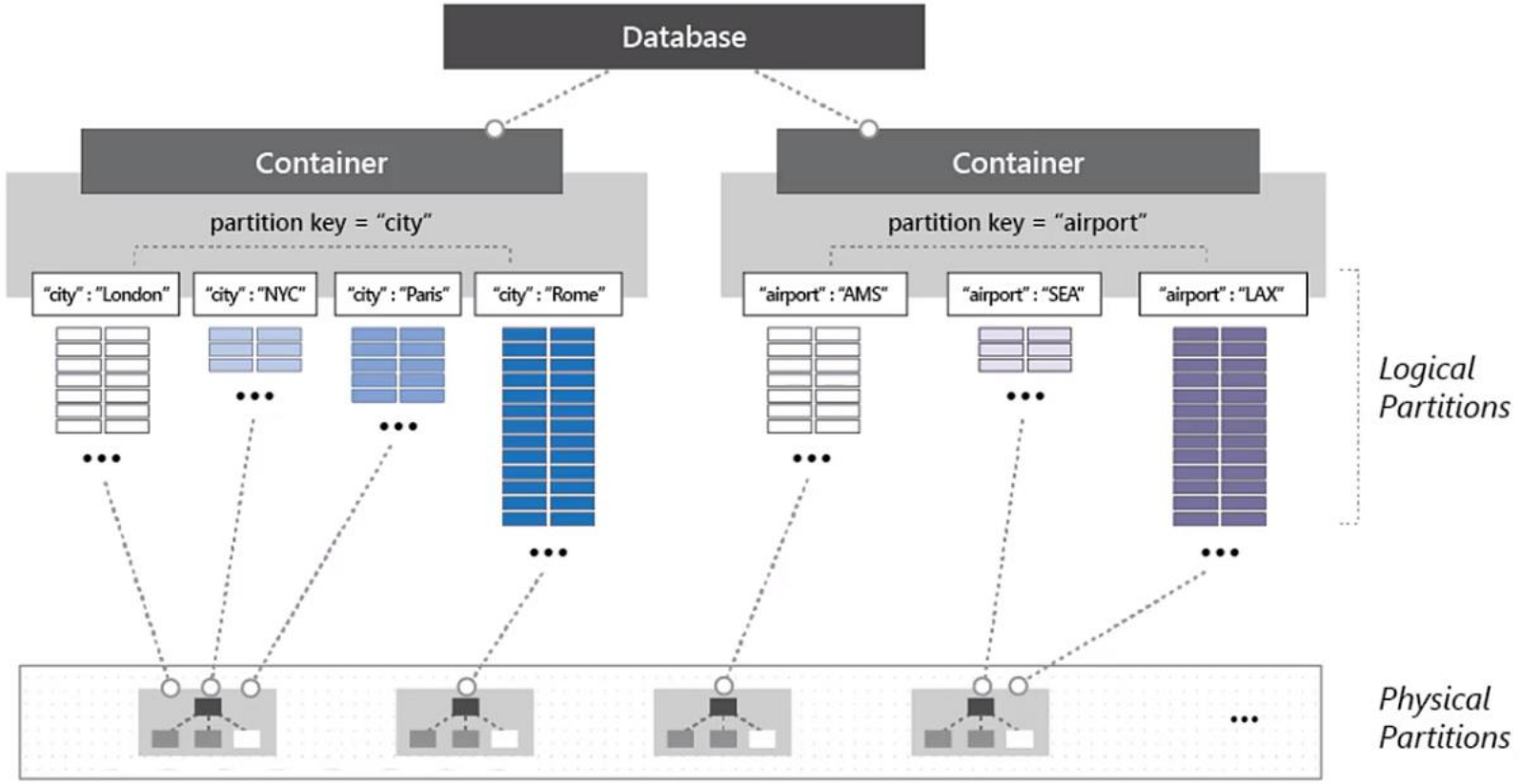


Dedicated vs Shared Throughput

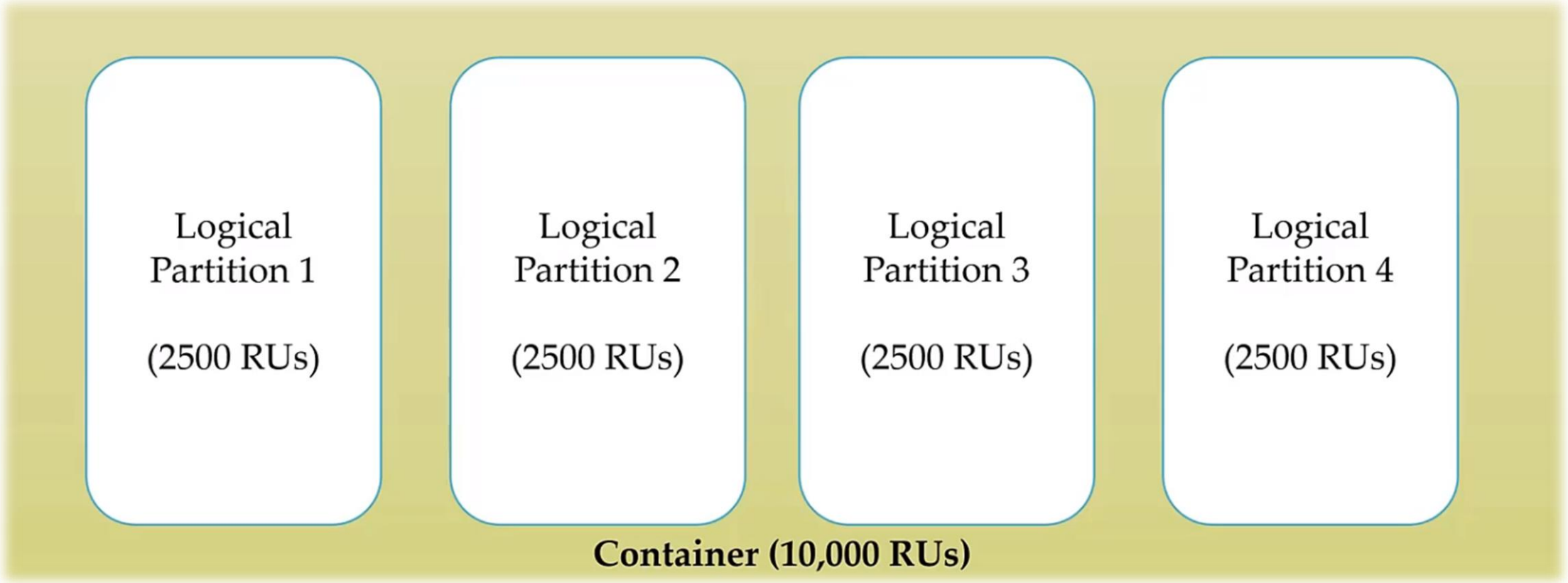
- You can set throughput at:
  - Database level – Shared throughput
  - Container level – Dedicated throughput
  - It is recommend to set throughput at container level.
- Rate-Limited
- Choose at the time of creation



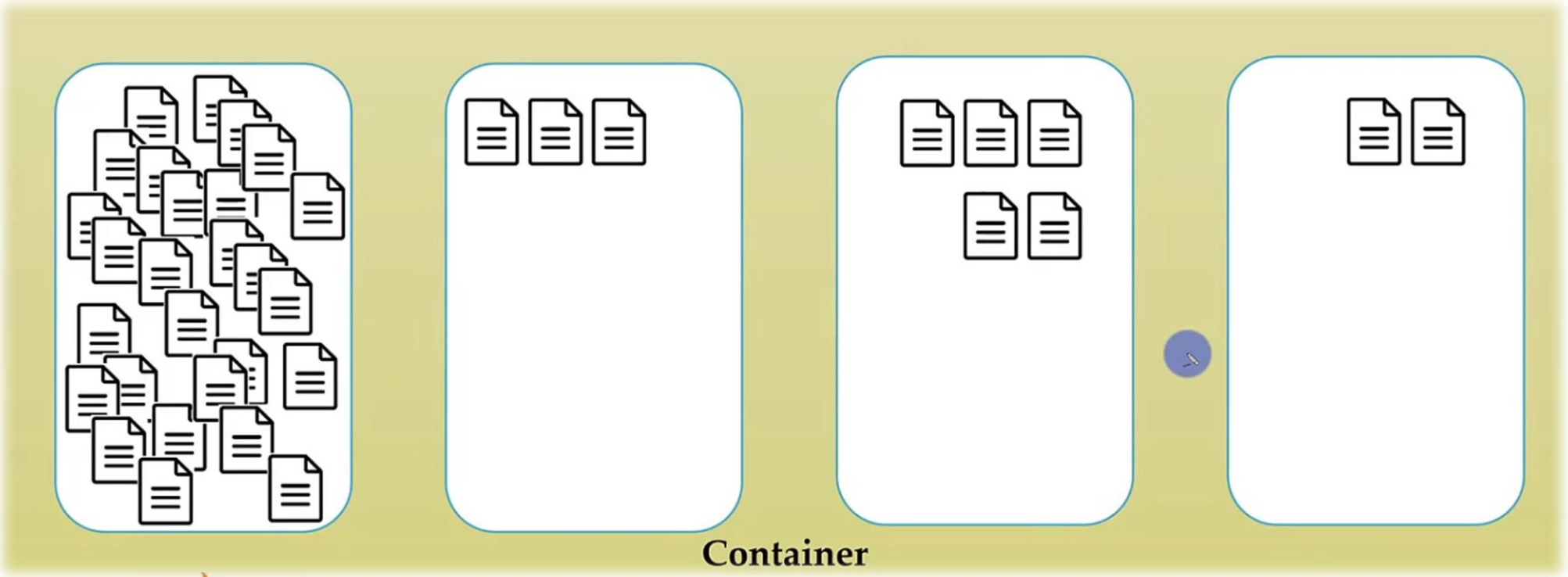
Avoiding hot partition



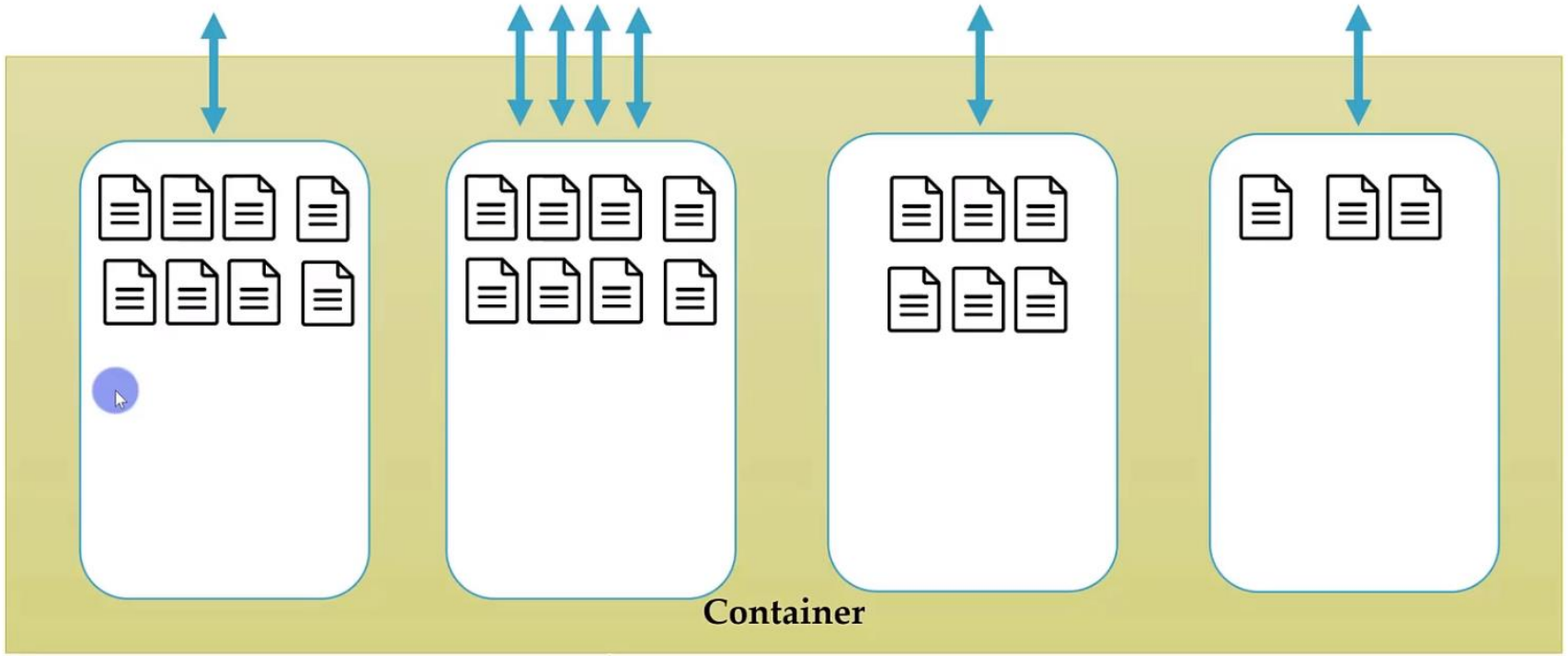
Avoiding hot partition



Avoiding hot partition



Avoiding hot partition on throughput

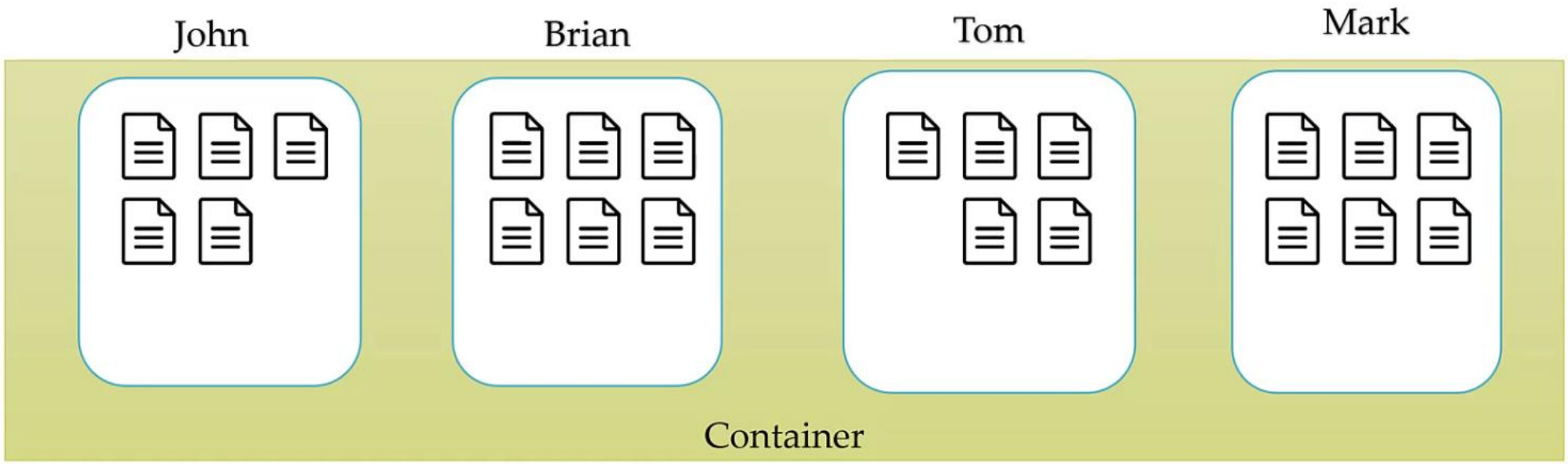


- **Partition key Bad choice:** Current time
- **Partition key Good choices:** User ID, Product ID

“Single Partition vs Cross Partition Query”

Single Partition Query

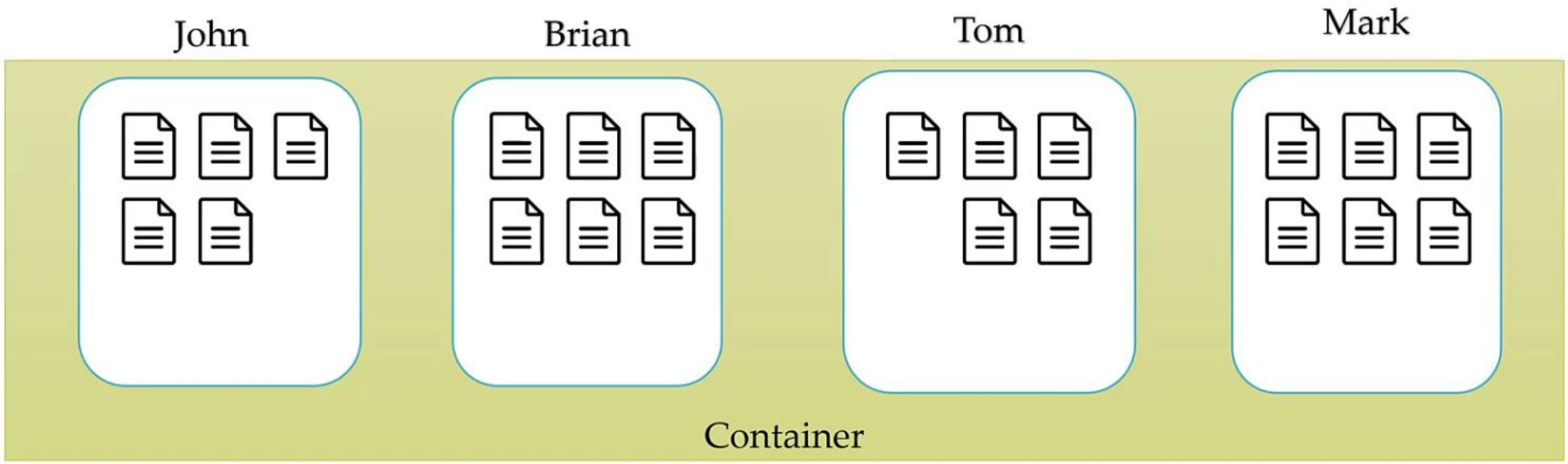
SELECT * FROM c WHERE c.username = `Brain`



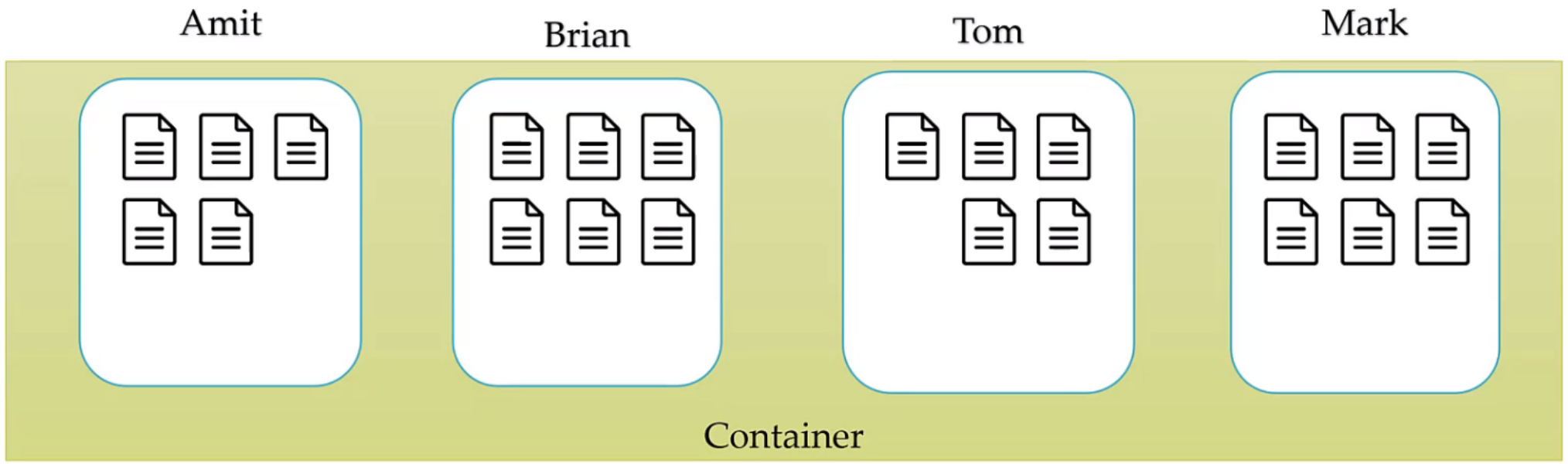
In the last lesion we learnt , user id and product id is a partition key

Cross Partition Queries (fan out queries)

SELECT * FROM c WHERE c.favoritecar = `BMW`



Composite Key



Restrictions in Cosmos DB

1. Each Document can't exceed 2mega bytes of data
2. Every Logical Partition Can't exceed 20 giga bytes of data

Choosing a Partition key

- Evenly distribute storage
  - Make sure you pick your partition key that doesn't result in hot spots within your applications
  - Have a high cardinality
  - Don't be afraid of choosing a partition key that has a large number of values
  - Example User Id & Product Id
- Evenly distribute requests.
  - RUs evenly distribute across all partitions.
  - Review where clause of top queries
- Consider document and partition limit while designing partition key.
  - Max document size – 2 MB
  - Max logical partition size – 20 GB

Choosing a Partition key

Question: Your organization is planning to use Azure Cosmos DB to store vehicle telemetry data generated from millions of vehicles every second. Which of the following options for your Partition Key will optimize storage distribution?

Answer choices:

1. Vehicle model
2. Vehicle Identification Number (VIN) which looks like WDDEJ9EB6DA032037

Choosing a Partition key

Question: Your organization is planning to use Azure Cosmos DB to store vehicle telemetry data generated from millions of vehicles every second. Which of the following options for your Partition Key will optimize storage distribution?

Answer choices:

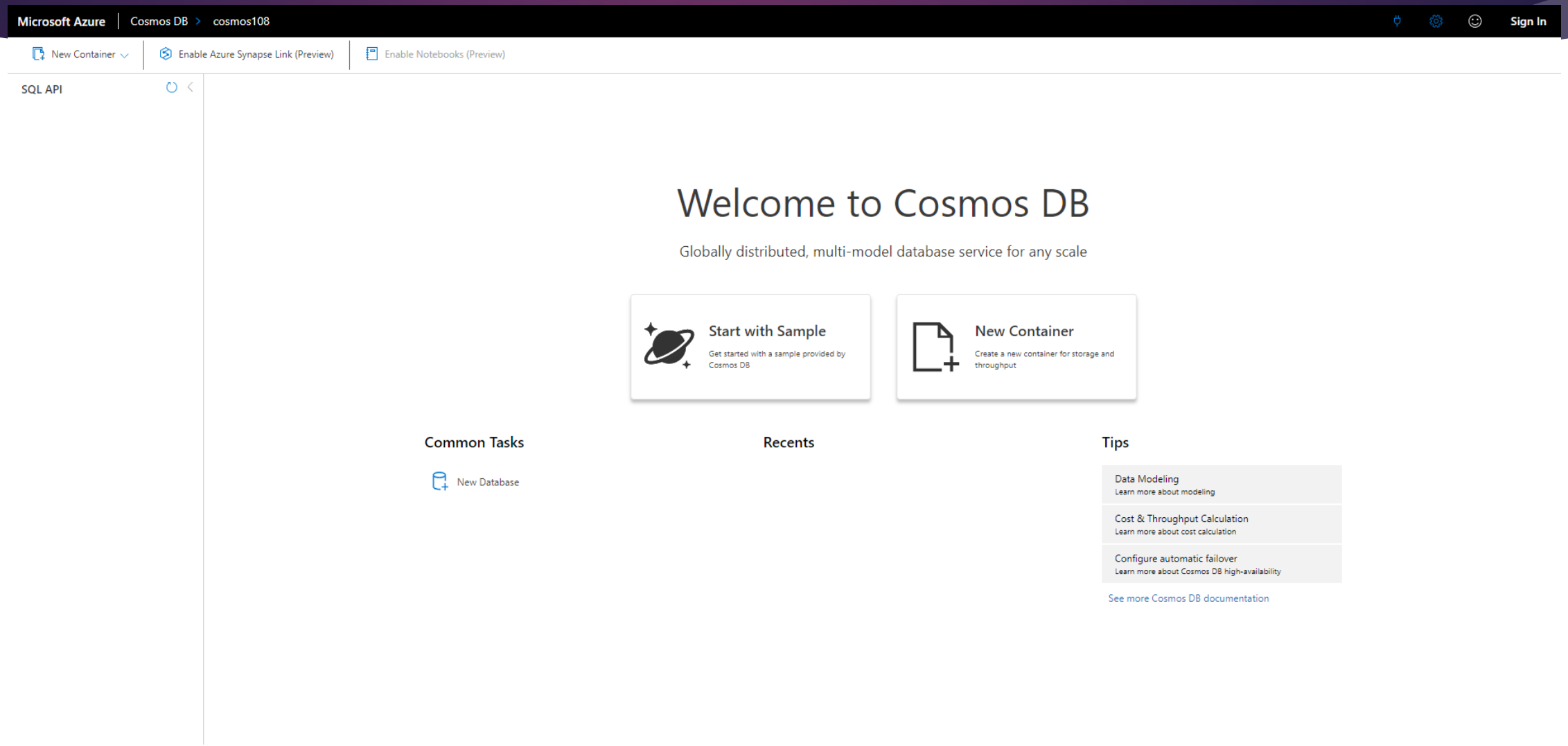
1. Vehicle model

Most auto manufactures only have a couple dozen models. This option is potentially the least granular, will create a fixed number of logical partitions, and may not distribute data evenly across all physical partitions.

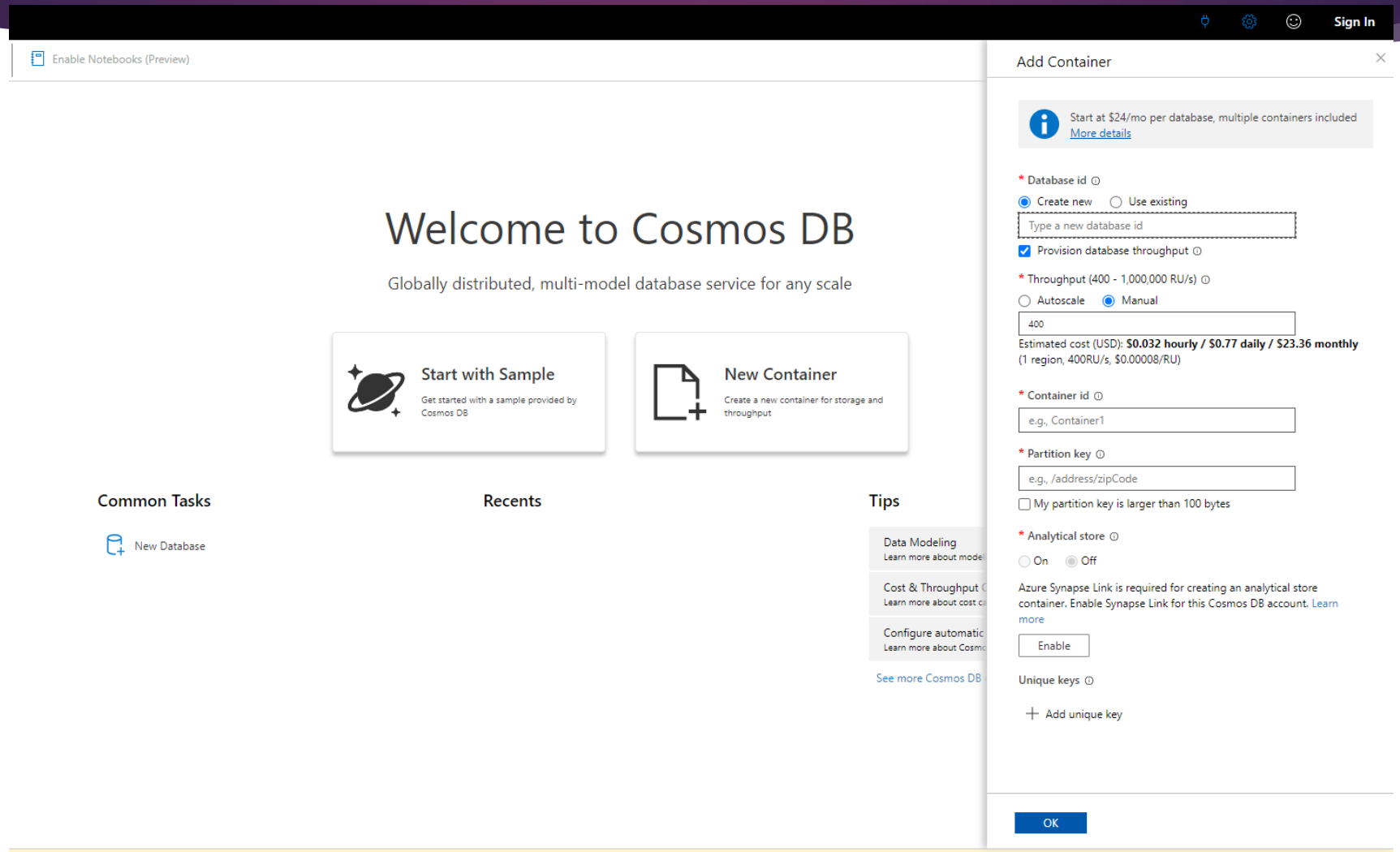
2. Vehicle Identification Number (VIN) which looks like WDDEJ9EB6DA032037

Auto manufacturers have transactions occurring throughout the year. This option will create a more balanced distribution of storage across partition key values

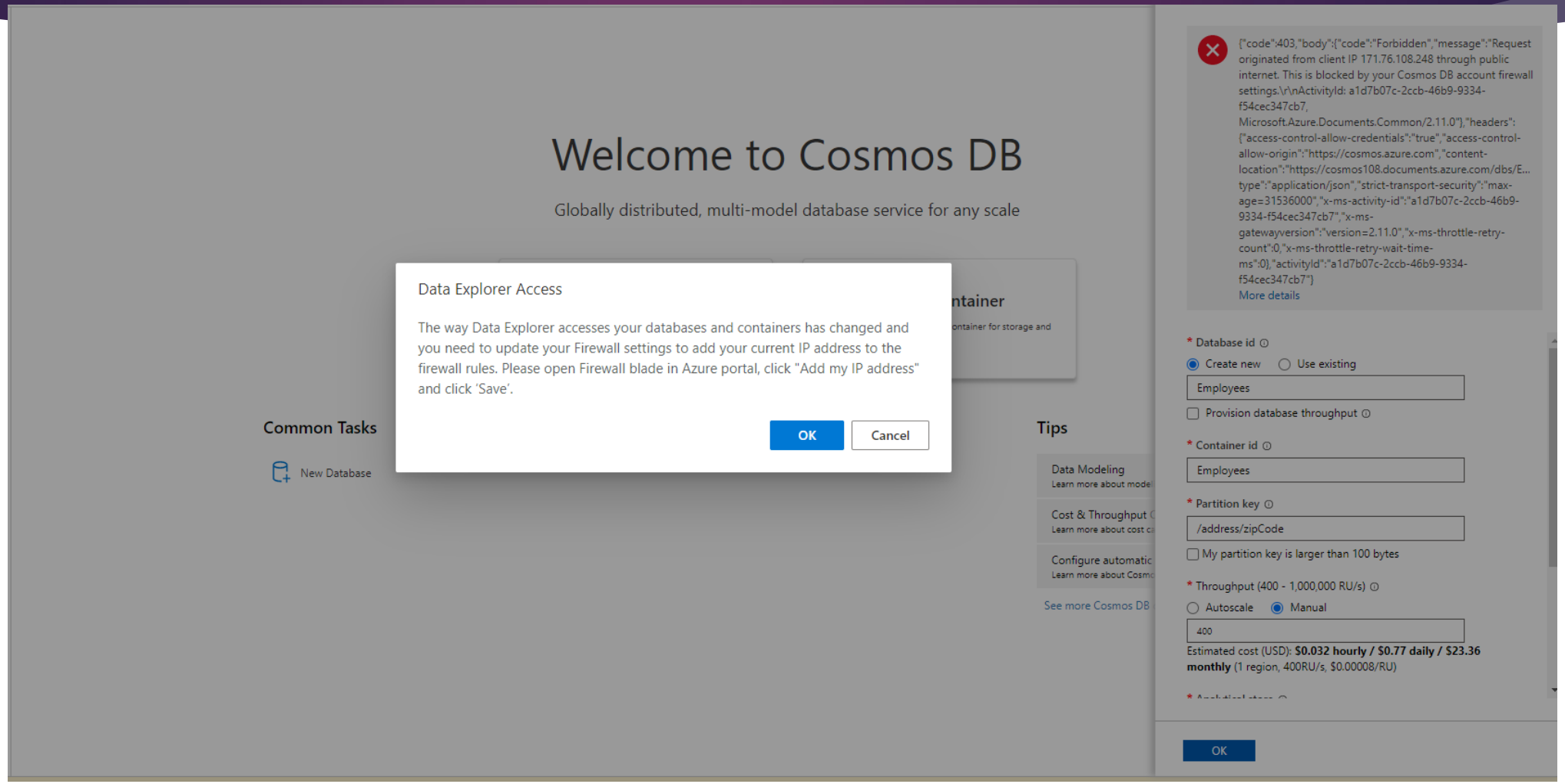
Full Screen Mode



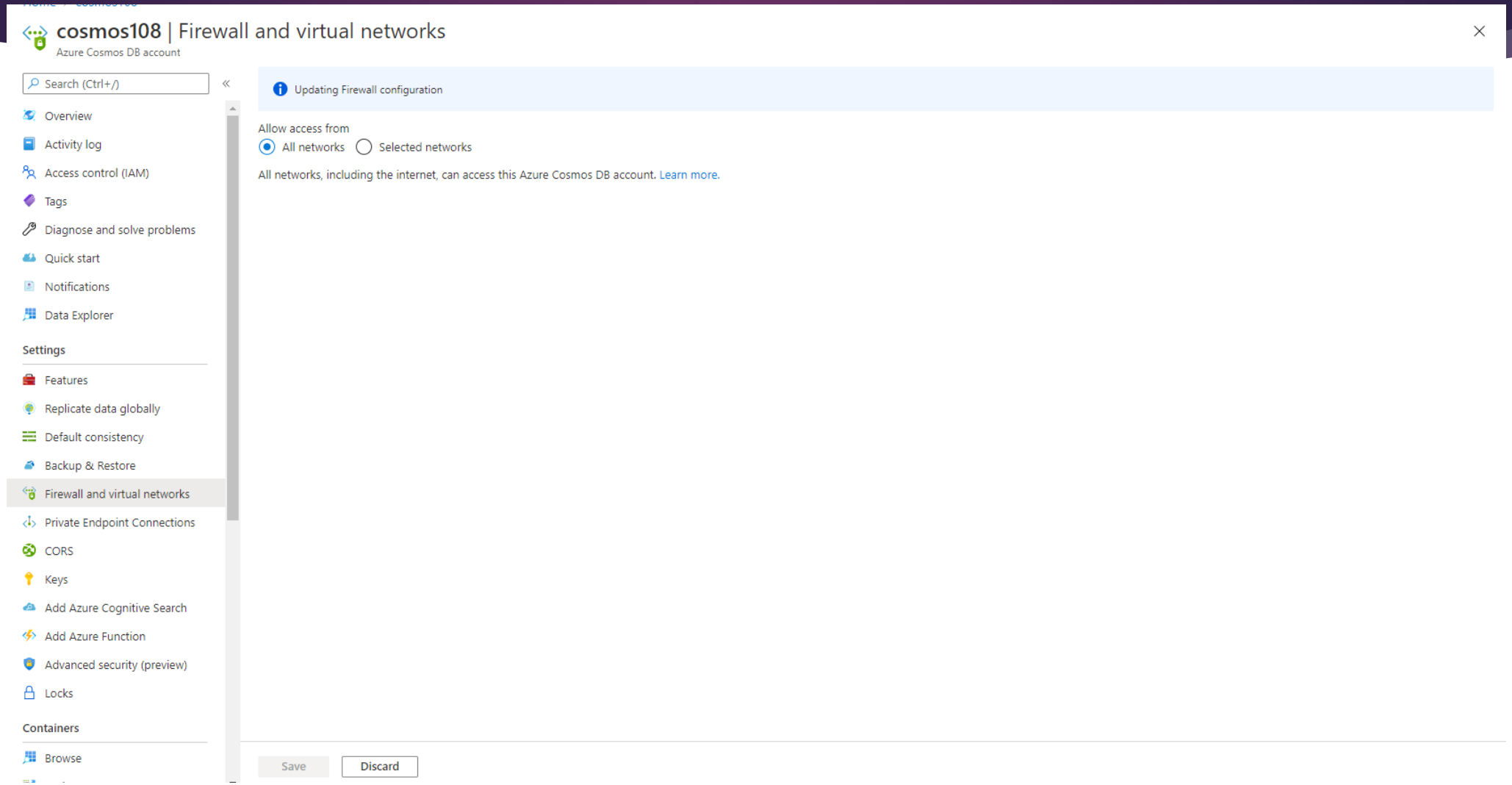
Practical Create Container



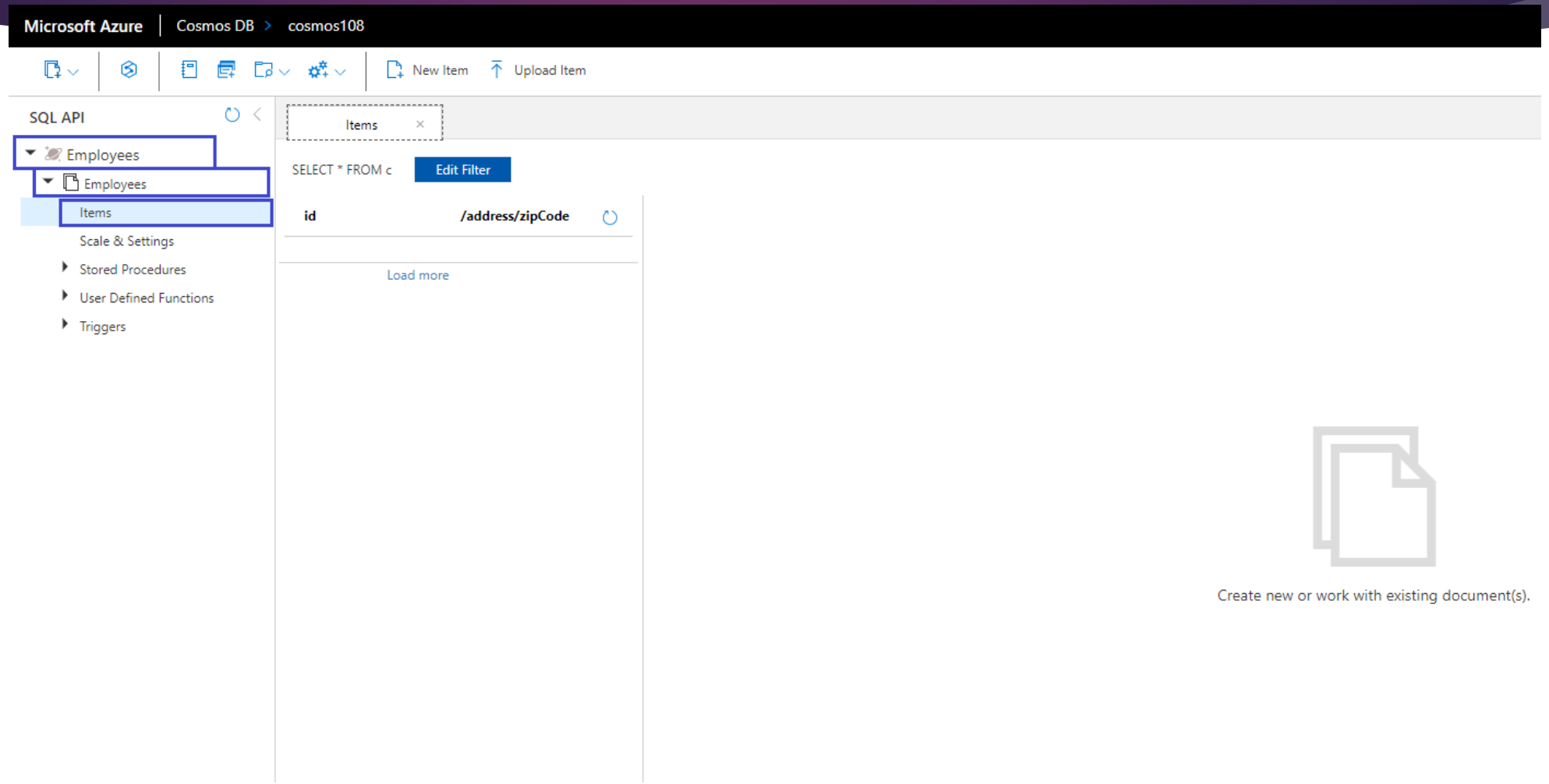
Practical Create Container



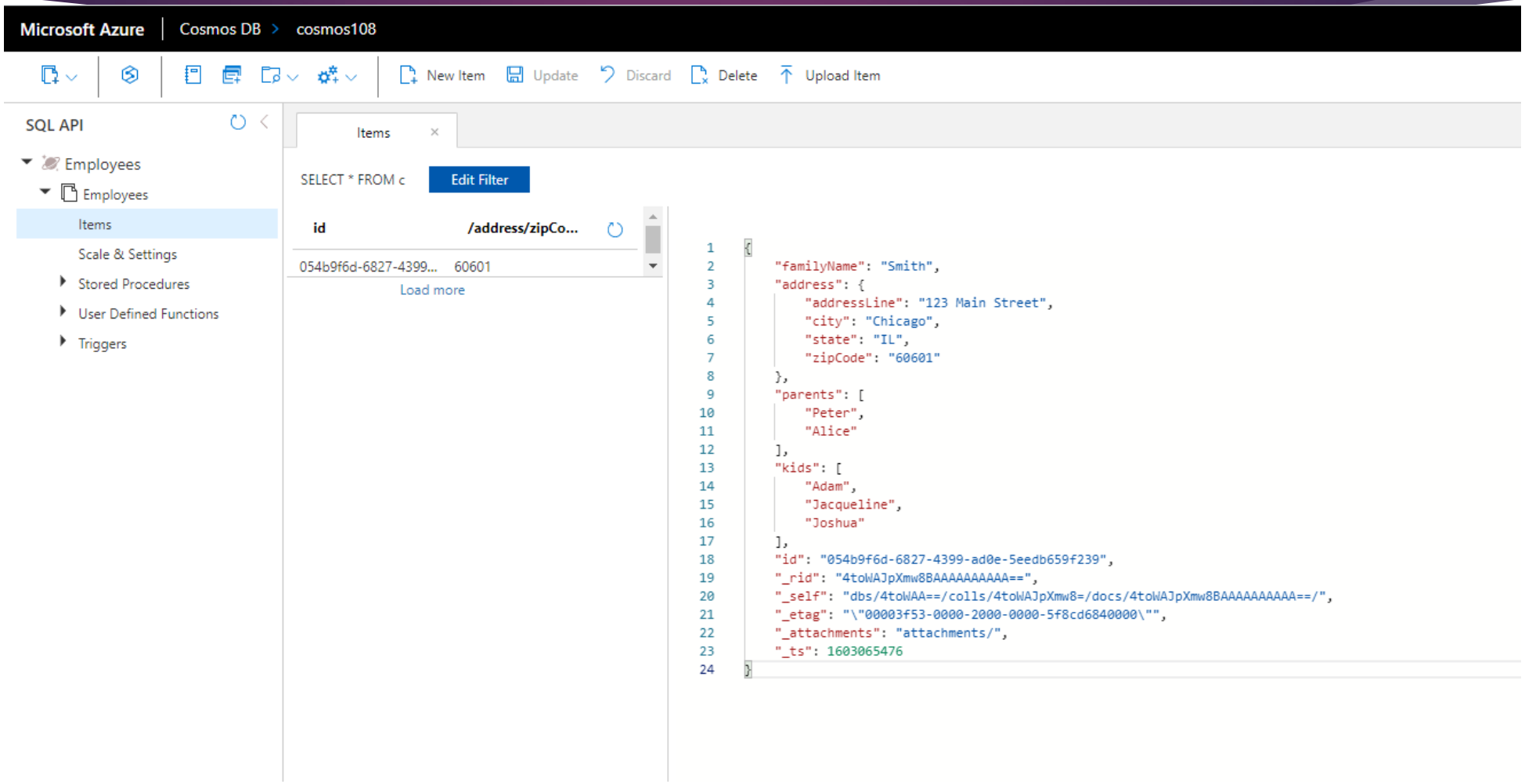
Update Firewall Settings



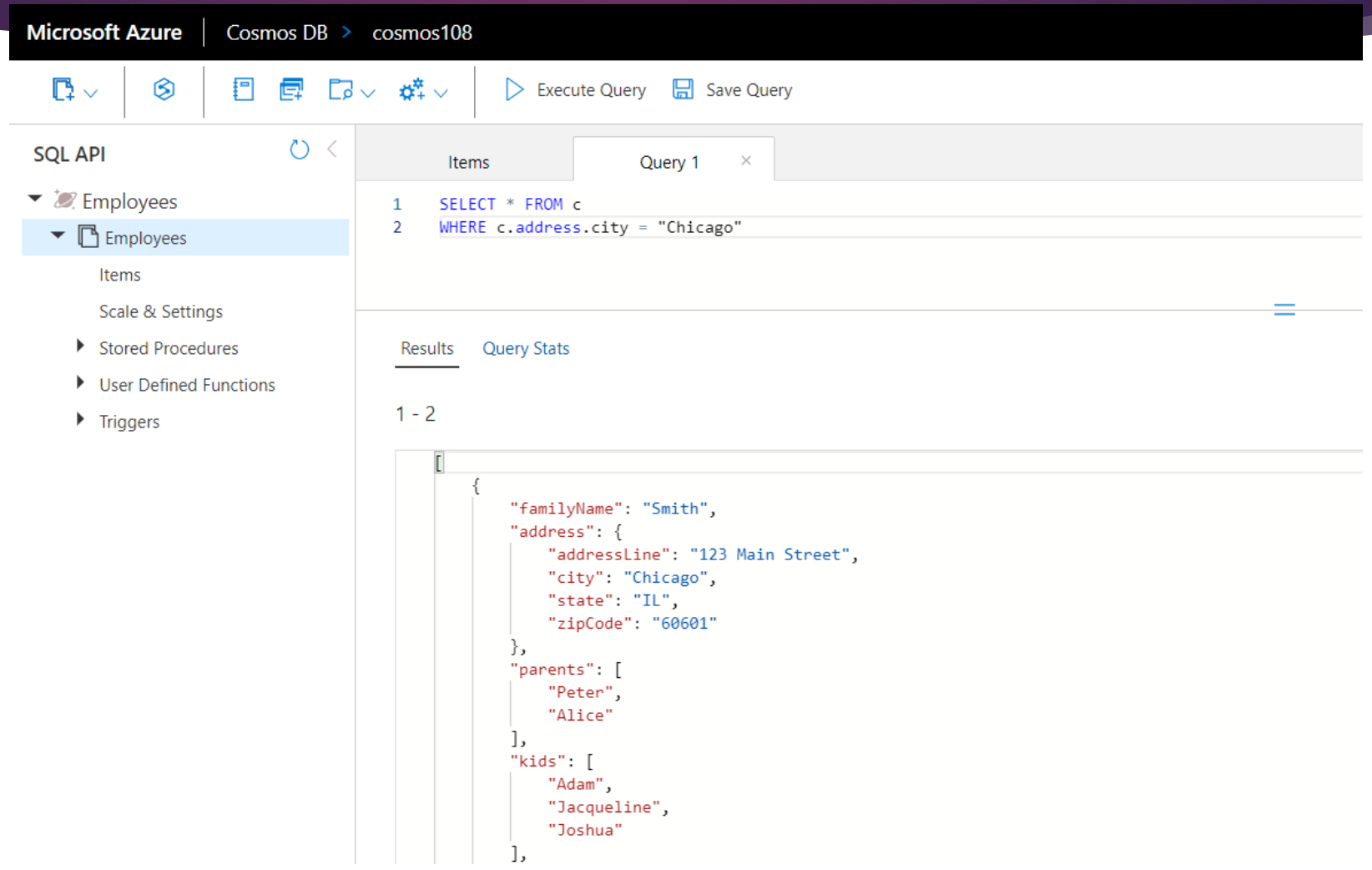
Create Documents



Practical Create Documents



Query Database



Few Queries

```
SELECT * FROM c
WHERE c.address.city = "Chicago"

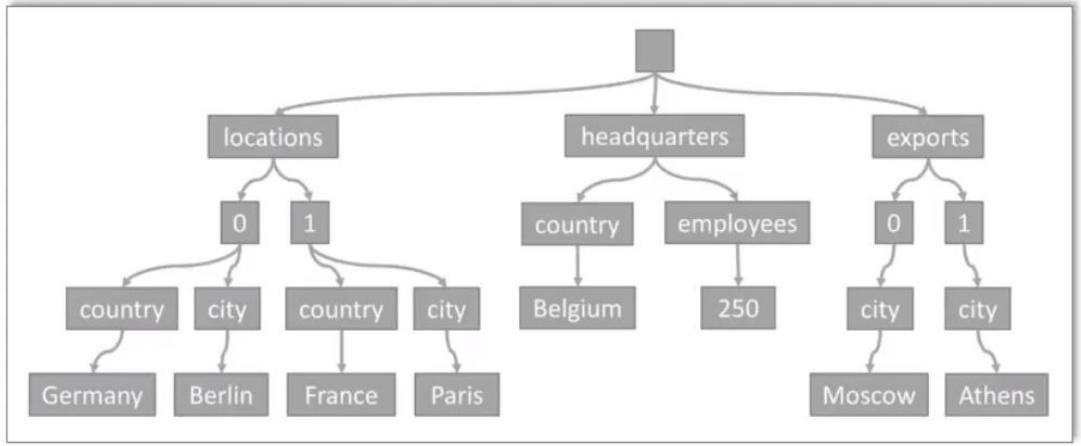
SELECT * FROM c
WHERE c.address.zipCode = "60603"

SELECT * FROM c
WHERE IS-DEFINED(c.pets)

SELECT * FROM c
WHERE ARRAY_LENGTH(c.kids) > 2
```

Automatic Indexing

```
{
    "locations": [
        { "country": "Germany", "city": "Berlin" },
        { "country": "France", "city": "Paris" }
    ],
    "headquarters": { "country": "Belgium", "employees": 250 },
    "exports": [
        { "city": "Moscow" },
        { "city": "Athens" }
    ]
}
```




```
/locations/0/country: "Germany"
/locations/0/city: "Berlin"
/locations/1/country: "France"
/locations/1/city: "Paris"
/headquarters/country: "Belgium"
/headquarters/employees: 250
/exports/0/city: "Moscow"
/exports/1/city: "Athens"
```

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{
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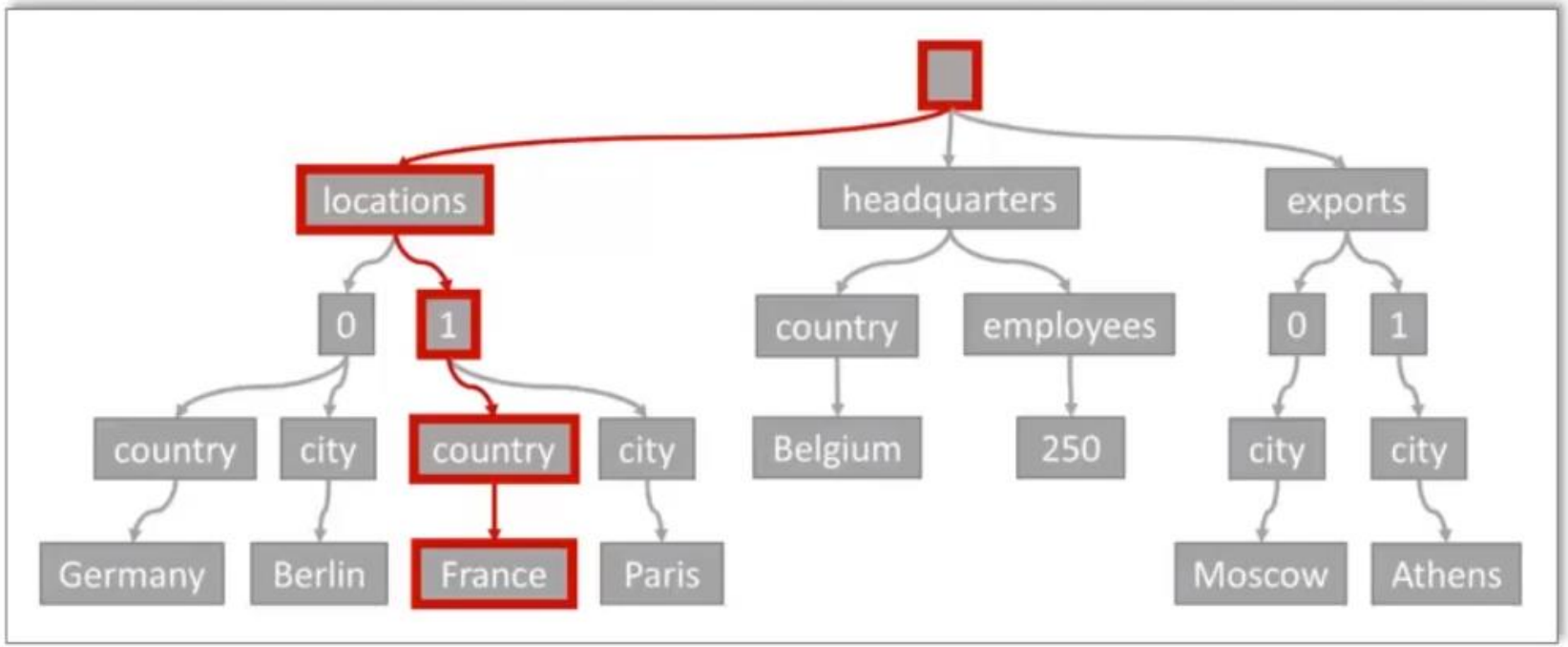
    ],
    "headquarters": { "country": "Belgium", "employees": 250 },
    "exports": [
        { "city": "Moscow" },
        { "city": "Athens" }
    ]
}
```

```
SELECT *
FROM l IN c.locations
WHERE l.country = 'France'
```




```
/locations/0/country: "Germany"
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/exports/0/city: "Moscow"
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```

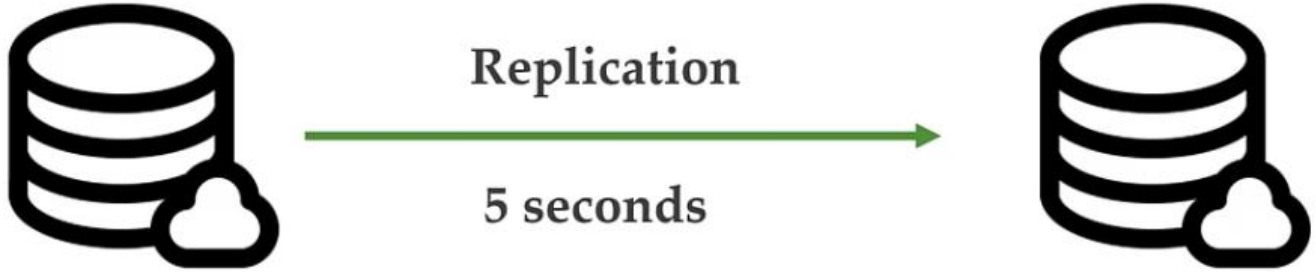
Summary

- Introduction to NoSQL
- Introduction to Cosmos DB
- Getting started
- Local emulator
- Creating a container
- Creating and querying documents
- Multi-model APIs
- Automatic indexing

Other Imp Features

- ✓ AUTOMATIC INDEXING
- ✓ INSERT AND QUERY DATA
- ✓ TIME TO LIVE FEATURE
- ✓ GLOBALLY DISTRIBUTION FEATURE
- ✓ MULTI MASTER FEATURE ?
- ✓ MANUAL VS AUTOMATIC FAILOVER
- ✓ CONSISTENT LEVELS
- ✓ AZURE CLI
- ✓ PRICING

Consistent Levels



West US

At 10.00 AM
Update CreditScore = 750

East US

At 10:00:02 AM
Read CreditScore

5 Consistent Levels

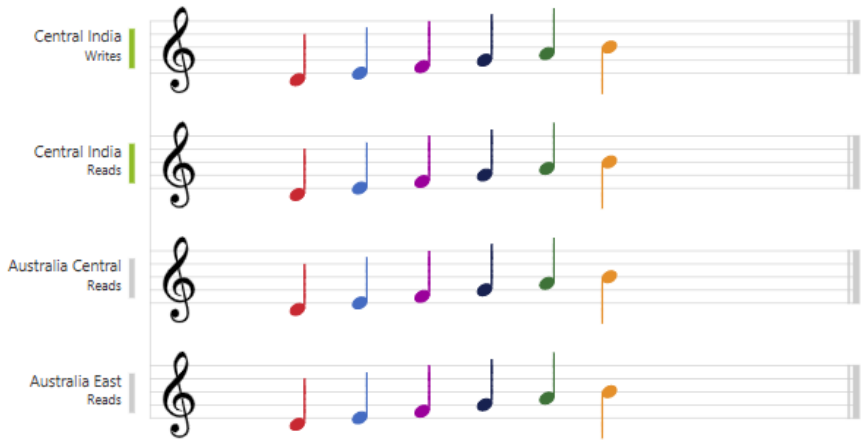
Save Discard

STRONG BOUNDED STALENESS SESSION CONSISTENT PREFIX EVENTUAL

Strong consistency provides the most predictable and intuitive programming model. When you configure your account with strong consistency level, Azure Cosmos DB provides linearizability guarantee.

Understand Strong consistency

This means that reads are guaranteed to see the most recent write.



Five Consistency Levels

Strong: No dirty reads, high latency, cost highest, closest to RDBMS

Bounded staleness: Dirty reads possible, bounded by time and updates

Session: No dirty reads for writers (within same session), dirty read possible for other users

Consistency prefix: Dirty reads possible but sequence maintain, reads never see out-of-order writes

Eventual: No guaranteed order, but eventually everything gets in order

Setting the Consistency Level

Set default for entire account

Can be changed any time

Override at request level

Any request can weaken the default consistency level

Azure CLI

```
az cosmosdb create --name
                   --resource-group
                   [--capabilities]
                   [--default-consistency-level {BoundedStaleness, ConsistentPrefix, Eventual, Session, Strong}]
                   [--enable-automatic-failover {false, true}]
                   [--enable-multiple-write-locations {false, true}]
                   [--enable-virtual-network {false, true}]
                   [--ip-range-filter]
                   [--kind {GlobalDocumentDB, MongoDB, Parse}]
                   [--locations]
                   [--max-interval]
                   [--max-staleness-prefix]
                   [--subscription]
                   [--tags]
                   [--virtual-network-rules]
```

```
reate a SQL API database and container

# Generate a unique 10 character alphanumeric string to ensure unique resource names
uniqueId=$(env LC_CTYPE=C tr -dc 'a-z0-9' < /dev/urandom | fold -w 10 | head -n 1)

# Variables for SQL API resources
resourceGroupName="Group-$uniqueId"
location='westus2'
accountName="cosmos-$uniqueId" #needs to be lower case
databaseName='database1'
containerName='container1'

# Create a resource group
az group create -n $resourceGroupName -l $location

# Create a Cosmos account for SQL API
az cosmosdb create \
    -n $accountName \
    -g $resourceGroupName \
    --default-consistency-level Eventual \
    --locations regionName='West US 2' failoverPriority=0 isZoneRedundant=False \
    --locations regionName='East US 2' failoverPriority=1 isZoneRedundant=False

# Create a SQL API database
az cosmosdb sql database create \
    -a $accountName \
    -g $resourceGroupName \
    -n $databaseName
```

Azure CLI – Example Question

You are a data engineer for your company. You use the following Azure CLI commands to create an Azure Cosmos DB account. You plan to use this account to store sales data.

```
az cosmosdb create --resource-group 'sales-rg' --name 'sales' --kind GlobalDocumentDB \
--locations regionName="South Central US" failoverPriority=0 \
--locations regionName="North Central US" failoverPriority=1 \
--default-consistency-level "Strong" --enable-multiple-write-locations true
```

You need to answer questions regarding sales data queries and updates.

For each of the following statements, select Yes if the statement is true. Otherwise, select No.

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You need to answer questions regarding sales data queries and updates.

For each of the following statements, select Yes if the statement is true. Otherwise, select No.

Statement
You can query data by using Gremlin API.
A client can see partial writes of a sales data record by default.
A client can set the consistency level to Eventual Consistency at connection time.
A client can set a different consistency level during each request to sales data.

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You need to answer questions regarding sales data queries and updates.

For each of the following statements, select Yes if the statement is true. Otherwise, select No.

	Statement
✗	You can query data by using Gremlin API.
✗	A client can see partial writes of a sales data record by default.
✓	A client can set the consistency level to Eventual Consistency at connection time.
✓	A client can set a different consistency level during each request to sales data.

Cosmos DB Pricing

https://azure.microsoft.com/en-in/pricing/details/cosmos-db/

Cosmos DB Monitoring

- **Cosmos DB was build as a Cloud Database – Highly Managed**
- **What we can monitor?**
  - Monitor Partitions and Partitioning key performance
  - Monitor RU's consumption
- **Azure Monitor Service**
  - Insights
  - Metrics
- **Monitoring from Cosmos DB Account**
  - Metrics
  - Alerts
  - Diagnostic Settings
  - Logs

Create a resource
Home
Dashboard
All services
FAVORITES
All resources
Resource groups
Quickstart Center
App Services
Function App
SQL databases
Azure Cosmos DB
Virtual machines
Load balancers
Storage accounts
Virtual networks
Azure Active Directory
Monitor
Advisor
Security Center
Cost Management + Billi...

Monitor | Overview

Microsoft

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Insights

Applications
Virtual Machines
Storage accounts
Containers
Networks (preview)
Azure Cosmos DB
Key Vaults
Azure Cache for Redis
Insights Hub

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Monitor your applications and infrastructure

Get full stack visibility, find and fix problems, optimize your performance, and understand customer behavior all in one place. Learn more

Monitor & Visualize Metrics

Metrics are numerical values available from Azure Resources helping you understand the health, operation & performance of your systems.

Explore Metr...

Query & Analyze Logs

Logs are activity logs, diagnostic logs and telemetry from monitoring solutions; Analytics queries help with troubleshooting & visualizations.

Search Logs

Setup Alert & Actions

Alerts notify you of critical conditions and potentially take corrective automated actions based on triggers from metrics or logs.

Create Alert

Monitor | Azure Cosmos DB

Microsoft

Search (Ctrl+/)

Overview
Activity log
Alerts
Metrics
Logs
Service Health
Workbooks

Insights

Applications
Virtual Machines
Storage accounts
Containers
Networks (preview)
Azure Cosmos DB
Key Vaults
Azure Cache for Redis
Insights Hub

Workbooks | Customize

Subscriptions: Free Trial | Azure Cosmos DB: cosmos109 | Time Range: Last 4 hours

1 / 1

Azure Cosmos DB accounts

Overview | Failures | Capacity | Operations

Search

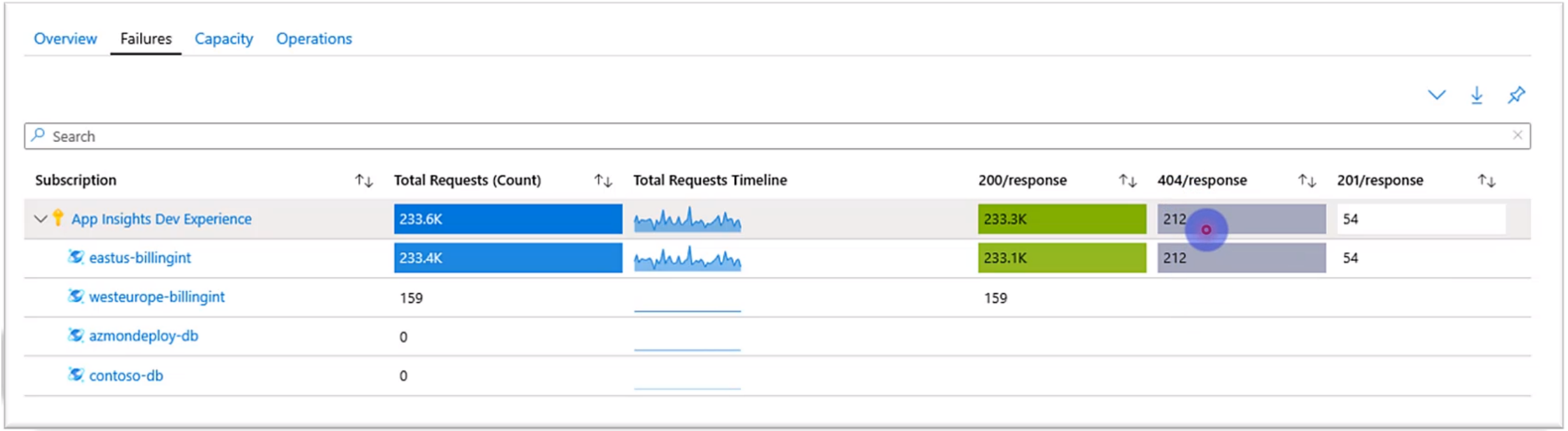
Subscription	Requests	Requests Timeline	Documents	Data Usage	Provisioned thr...
Free Trial (1)	9		3	0B	400
cosmos109 (1)	9		3	0B	400

Overview | Failures | Capacity | Operations

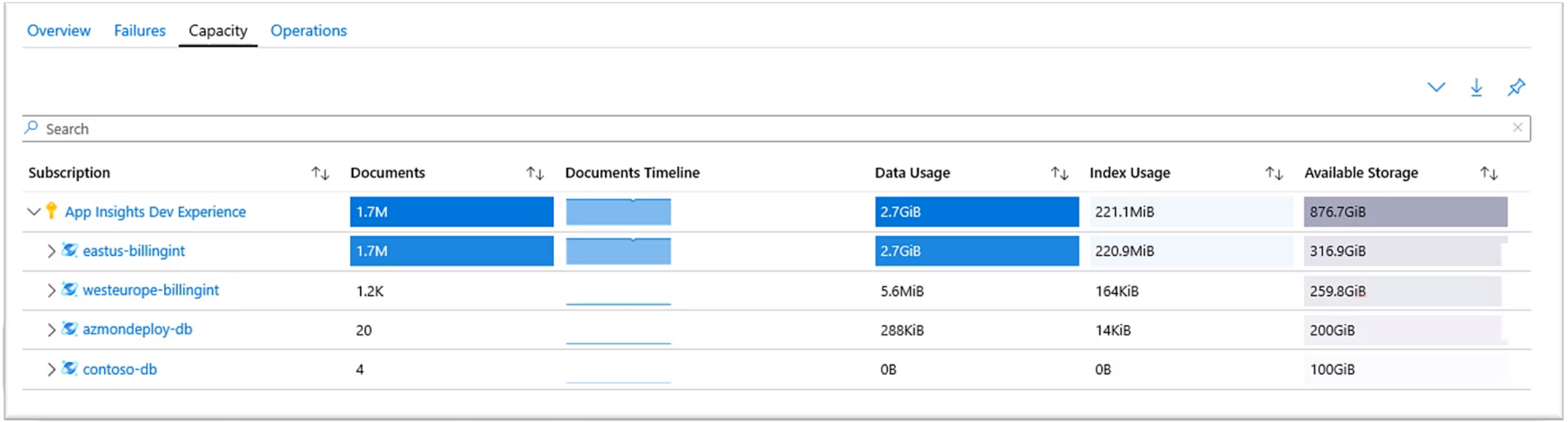
Search

Subscription	Requests	Requests Timeline	Documents	Data Usage	Provisioned thr...
App Insights Dev Experience	231.4K		1.6M	2.7GiB	44.7K
eastus-billingint	231.3K		1.6M	2.7GiB	13.8K
current2	231.3K		497.9K	781.5MiB	5K
history2	25		981.8K	1.6GiB	2.1K
History			96.2K	164MiB	1.7K
Current			65.9K	100.1MiB	5K
westeurope-billingint	81		1.2K	5.5MiB	27.3K
azmondeploy-db			20	288KiB	1.6K
contoso-db			4	0B	2K

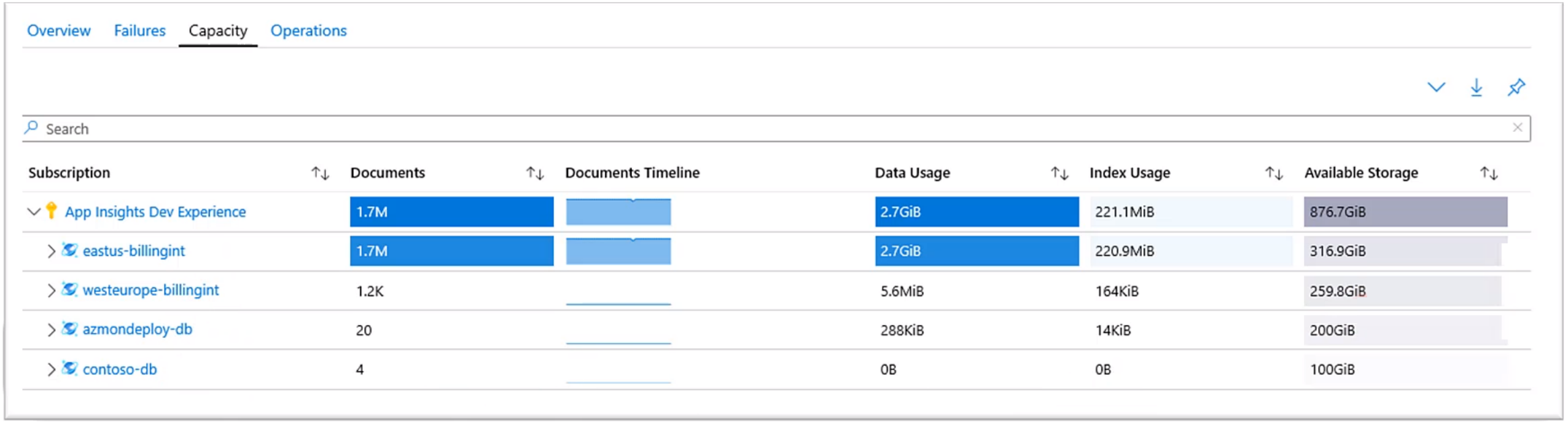
Failures


Overview
Failures
Capacity
Operations
Search
Subscription
Total Requests (Count)
Total Requests Timeline
200/response
404/response
201/response
App Insights Dev Experience
233.6K
233.3K
212
54
eastus-billingint
233.4K
233.1K
212
54
westeurope-billingint
159
159
azmondeploy-db
0
contoso-db
0

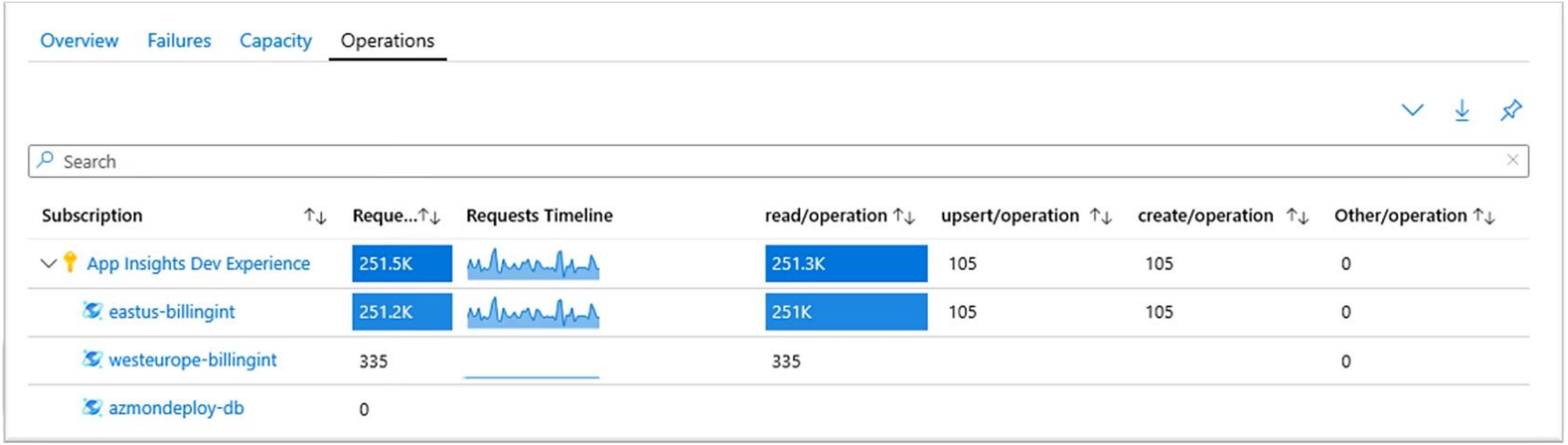
Capacity


Overview
Failures
Capacity
Operations
Search
Subscription
Documents
Documents Timeline
Data Usage
Index Usage
Available Storage
App Insights Dev Experience
1.7M
2.7GiB
221.1MiB
876.7GiB
eastus-billingint
1.7M
2.7GiB
220.9MiB
316.9GiB
westeurope-billingint
1.2K
5.6MiB
164KiB
259.8GiB
azmondeploy-db
20
288KiB
14KiB
200GiB
contoso-db
4
0B
0B
100GiB

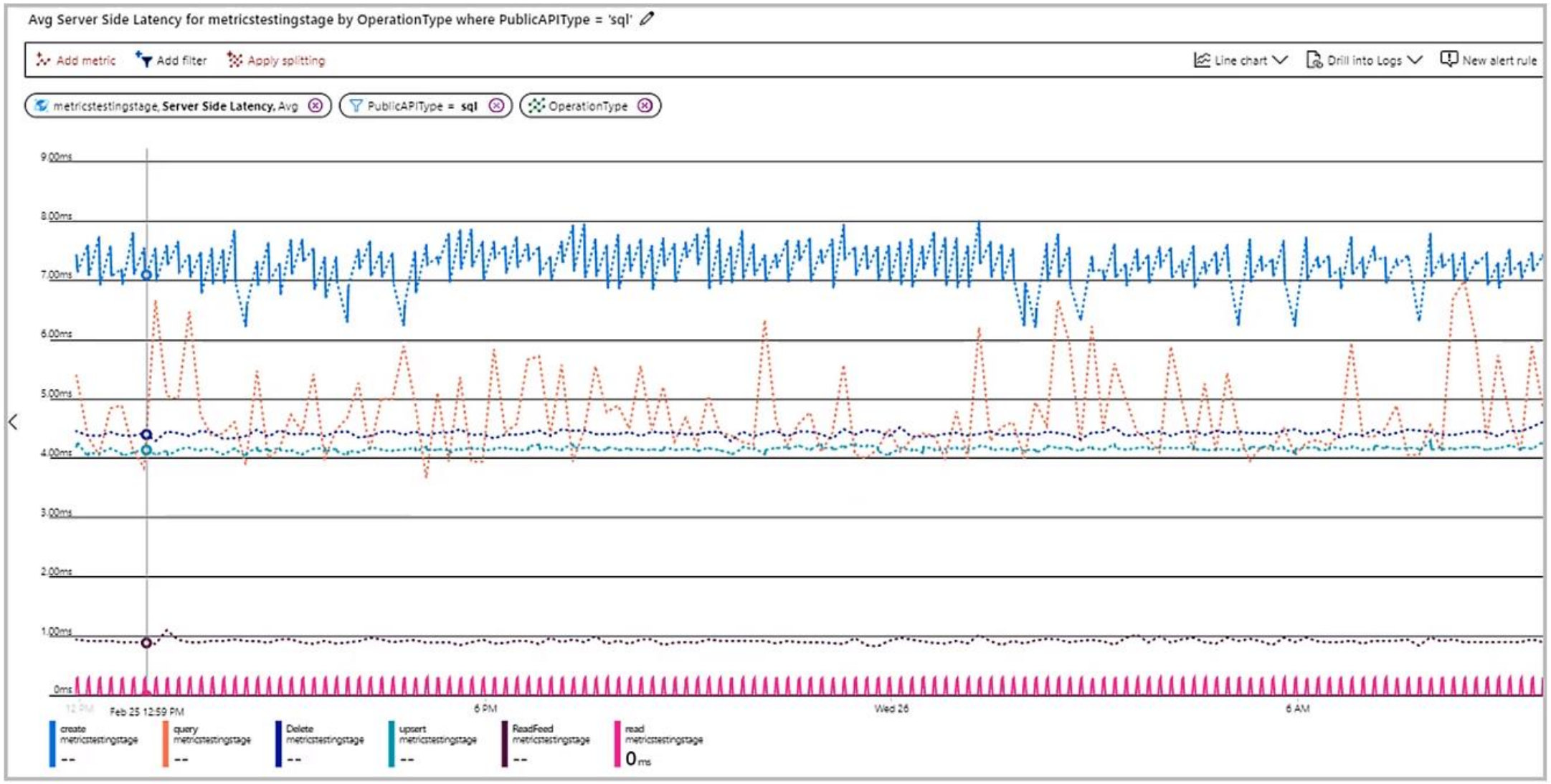
Capacity


Overview
Failures
Capacity
Operations
Search
Subscription
Documents
Documents Timeline
Data Usage
Index Usage
Available Storage
App Insights Dev Experience
1.7M
2.7GiB
221.1MiB
876.7GiB
eastus-billingint
1.7M
2.7GiB
220.9MiB
316.9GiB
westeurope-billingint
1.2K
5.6MiB
164KiB
259.8GiB
azmondeploy-db
20
288KiB
14KiB
200GiB
contoso-db
4
0B
0B
100GiB

Operations


Overview
Failures
Capacity
Operations
Search
Subscription
Reque...
Requests Timeline
read/operation
upsert/operation
create/operation
Other/operation
App Insights Dev Experience
251.5K
251.3K
105
105
0
eastus-billingint
251.2K
251K
105
105
0
westeurope-billingint
335
335
0
azmondeploy-db
0

Cosmos DB – Monitor Service Metrics



Monitoring Through Control Panel

cosmos109 | Metrics

Azure Cosmos DB account

Search (Ctrl+/)

Containers

Browse
Scale
Settings
Document Explorer
Query Explorer
Script Explorer

Monitoring

Alerts
Metrics
Diagnostic settings
Logs

Automation

Tasks
Export template

Support + troubleshooting

New support request

Download as csv | Refresh | Feedback

Overview | Throughput | Storage | Availability | Latency | Consistency | System

Database(s): All | Container(s): All | Region(s): All

Show data for last: 1 hour

Avg Throughput /s*
0 RU/s

Avg Requests /s*
0

Data Size
0 B

Index Size
1.02 kB

* Statistics averaged over the last minute.

WRITES
READS
TRAFFIC IN THIS REGION IS RATE LIMITED

Data and Index storage consumed

Number of requests (aggregated over 1 minute interval)

Logs

AzureActivity

Entries from the Azure Activity log that provides insight into any subscription-level or management group level events that have occurred in Azure. Learn more

Resource Type: Azure Cosmos DB | Category: Azure Resources | Category: Audit | Category: Security | Solution: LogManagement

Preview Data

OperationName	OperationNameValue	Level	ActivityStatus	ActivityStatusValue	ActivitySubstatus	ActivitySubstatusValue
	MICROSOFT.DOCUMENTDB/DATABASEACCOUNTS/BACKUP/ACTI...			Start		
List keys	Microsoft.DocumentDb/databaseAccounts/listKeys/action	Informa...	Started	Started		
	MICROSOFT.DOCUMENTDB/DATABASEACCOUNTS/LISTKEYS/ACTI...			Start		
Microsoft.DocumentDB/databaseAccounts/backup/a...	Microsoft.DocumentDb/databaseAccounts/backup/action	Informa...	Started	Started		
Microsoft.DocumentDB/databaseAccounts/backup/a...	Microsoft.DocumentDb/databaseAccounts/backup/action	Informa...	Succeeded	Succeeded	OK (HTTP Status Code...	OK
	MICROSOFT.DOCUMENTDB/DATABASEACCOUNTS/BACKUP/ACTI...			Success		OK
List keys	Microsoft.DocumentDb/databaseAccounts/listKeys/action	Informa...	Succeeded	Succeeded	OK (HTTP Status Code...	OK
	MICROSOFT.DOCUMENTDB/DATABASEACCOUNTS/LISTKEYS/ACTI...			Success		OK
	MICROSOFT.DOCUMENTDB/DATABASEACCOUNTS/READONLYKE...			Start		
Read database account readonly keys	Microsoft.DocumentDB/databaseAccounts/readonlykeys/action	Informa...	Started	Started		

THANK YOU