CH-CH-CH-CHANGES:

TRACING CHANGES IN AZURE COSMOS DB

David Bowie - Changes

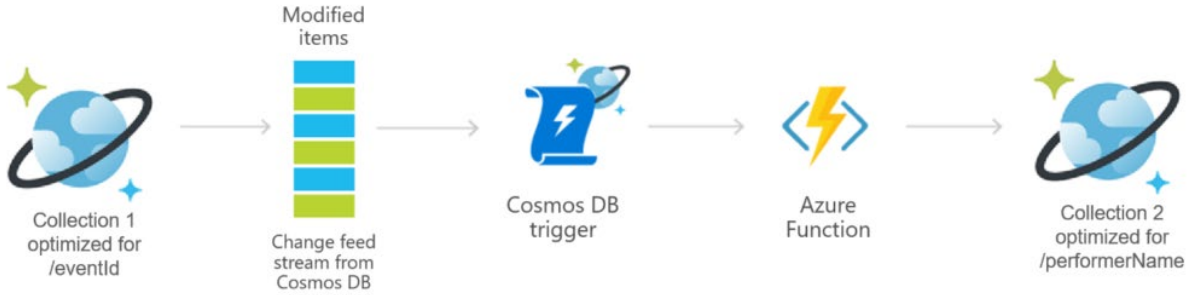
Ch-ch-ch-changes: Tracing Changes in Azure Cosmos DB

Time may change me

But I can't trace time

I said that time may change me

But I can't trace time



Who is Chad Green

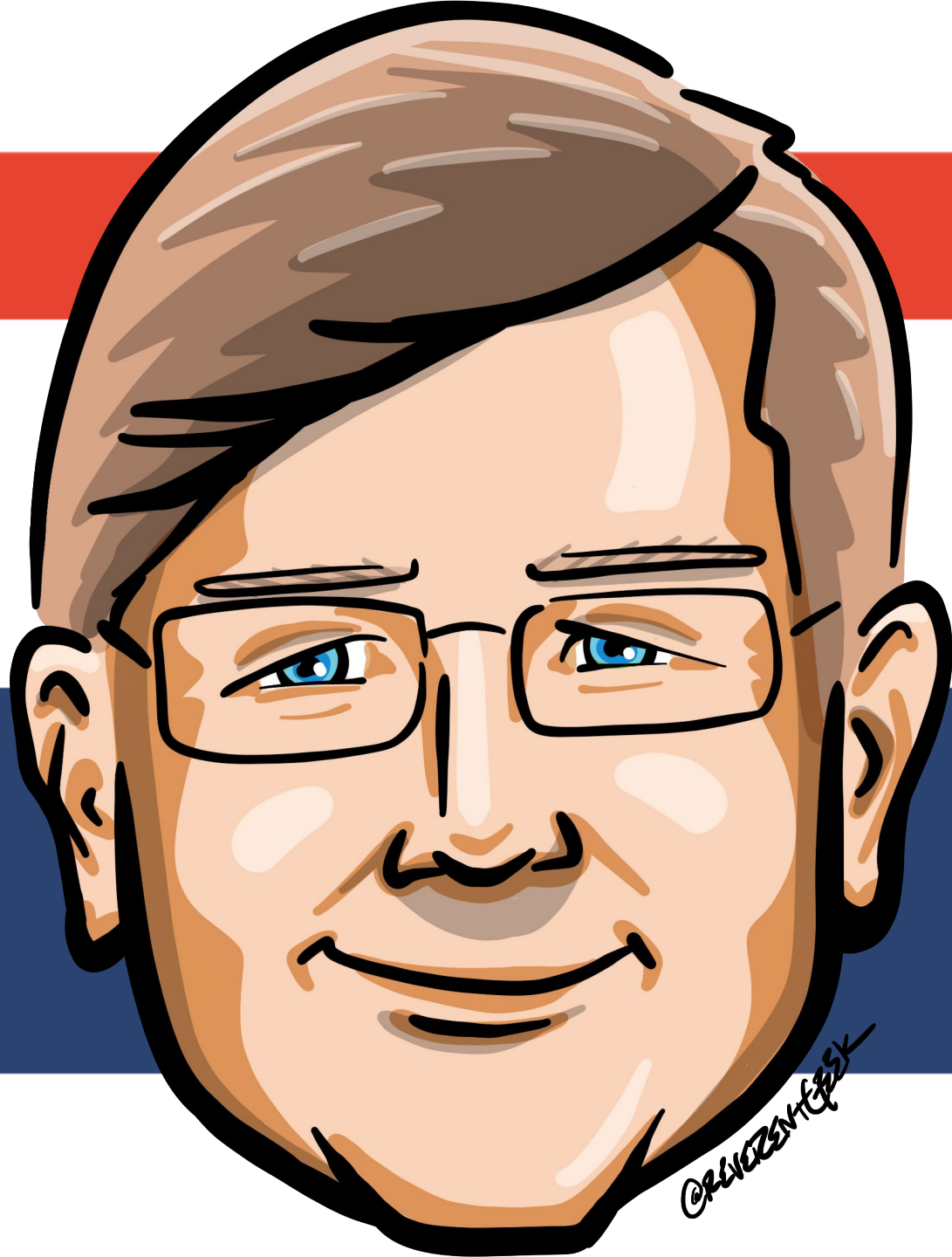
chadgreen@chadgreen.com

TaleLearnCode

ChadGreen.com

ChadGreen & TaleLearnCode

ChadwickEGreen



What is Cosmos DB

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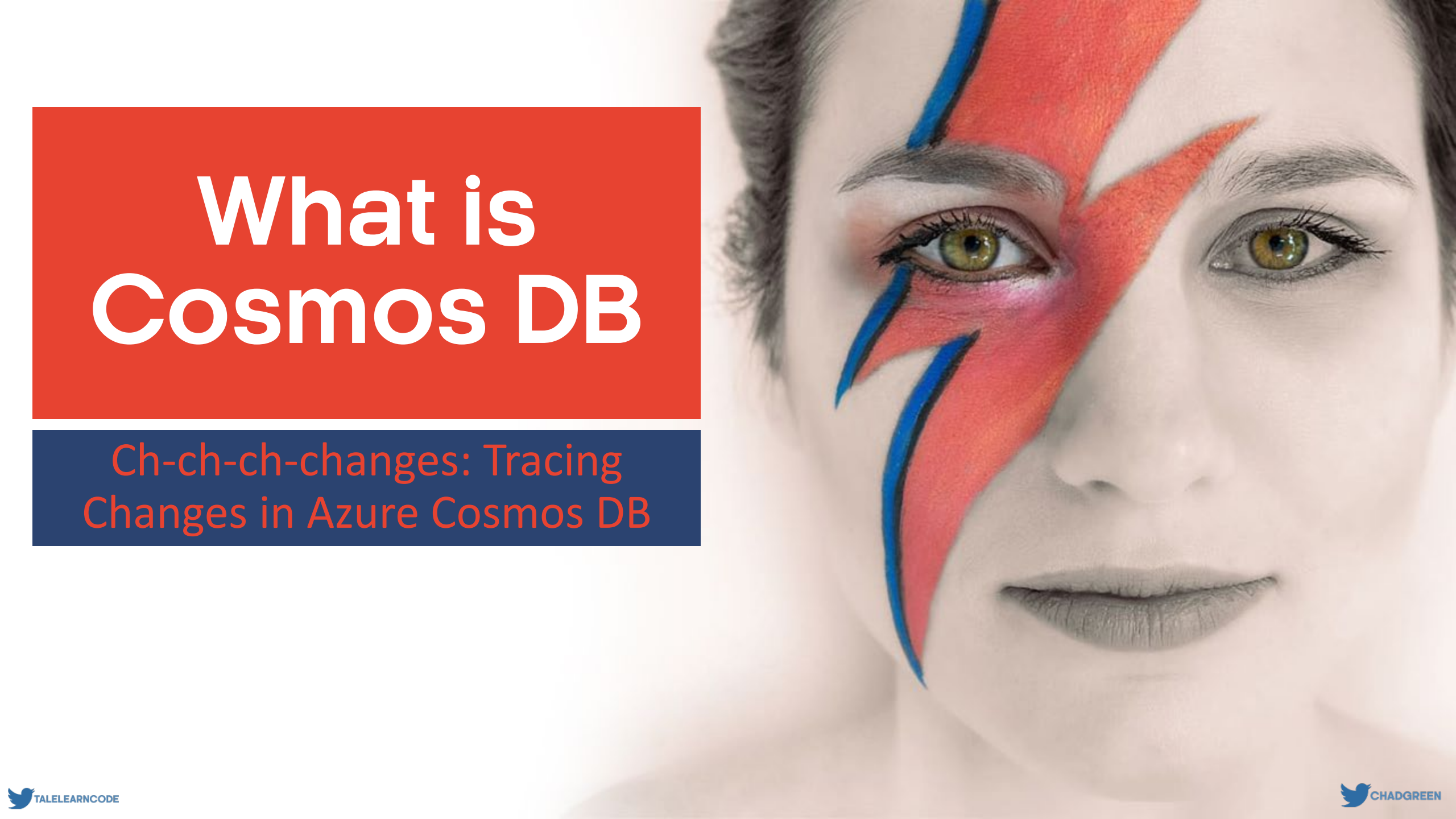
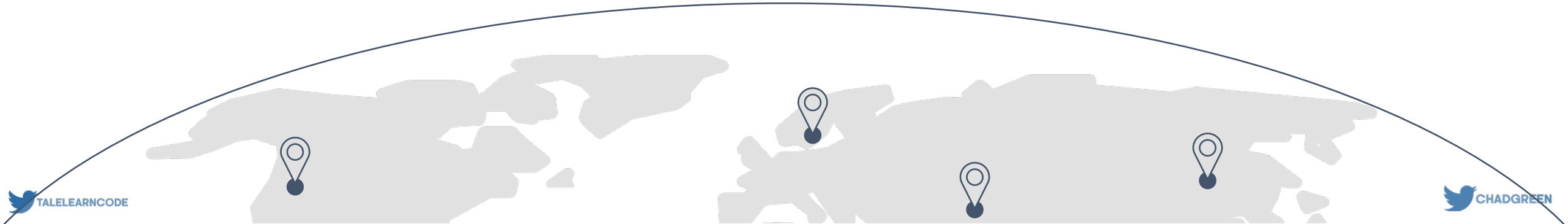


Azure Cosmos DB

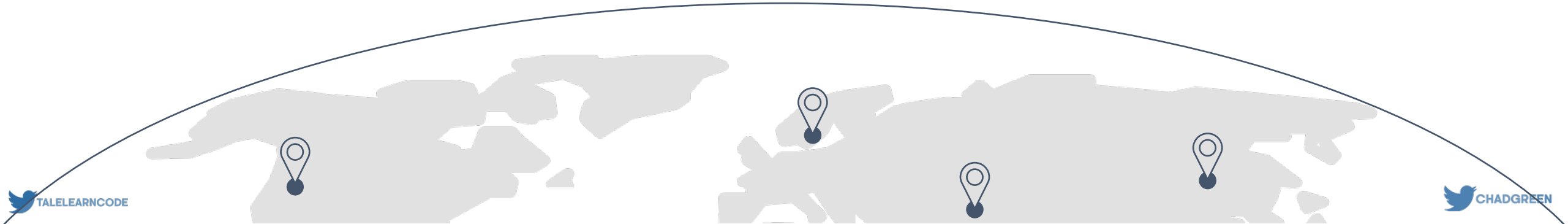
What is Cosmos DB

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

Turnkey global distribution



Turnkey global distribution



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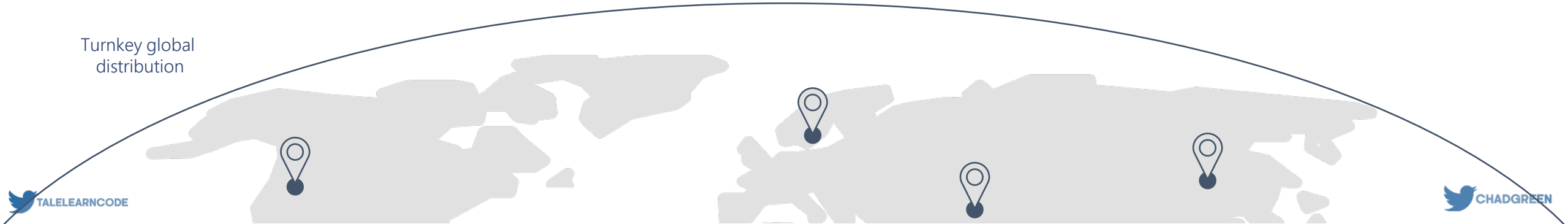

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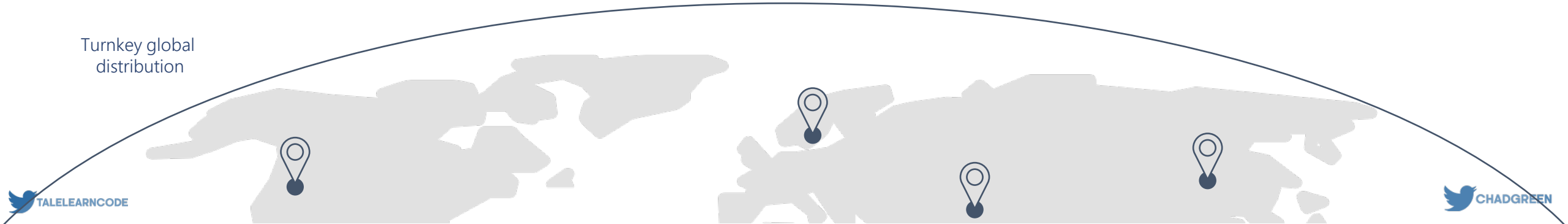

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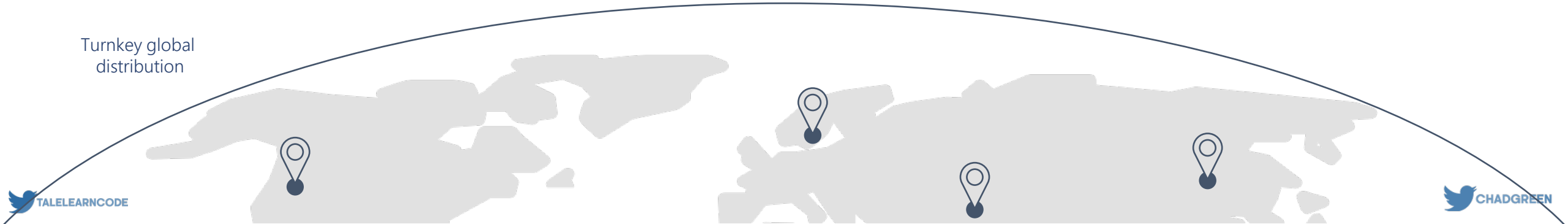

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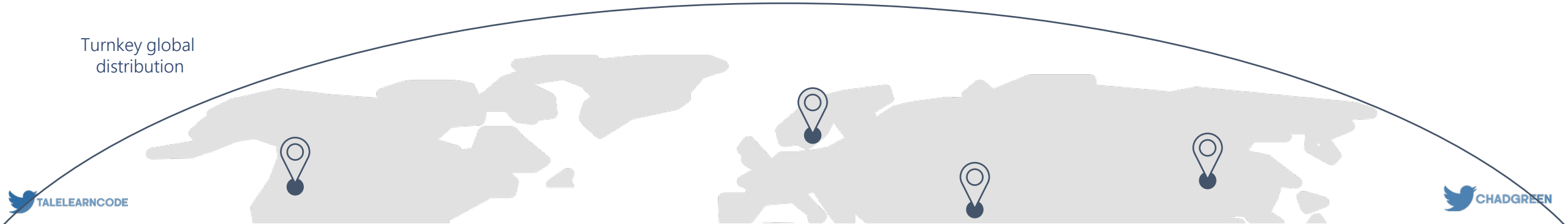

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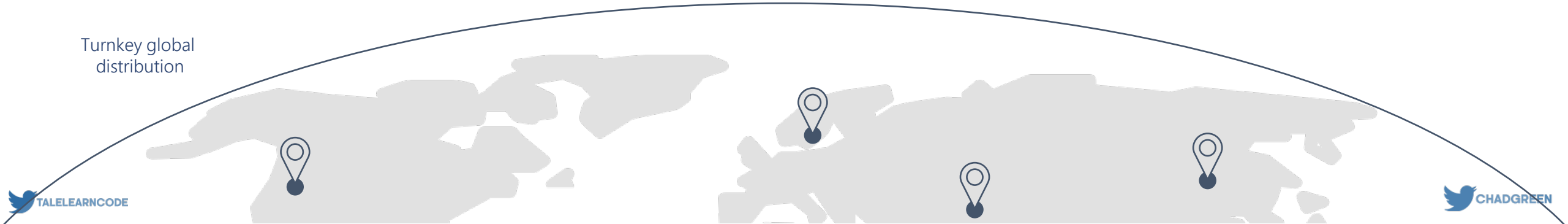

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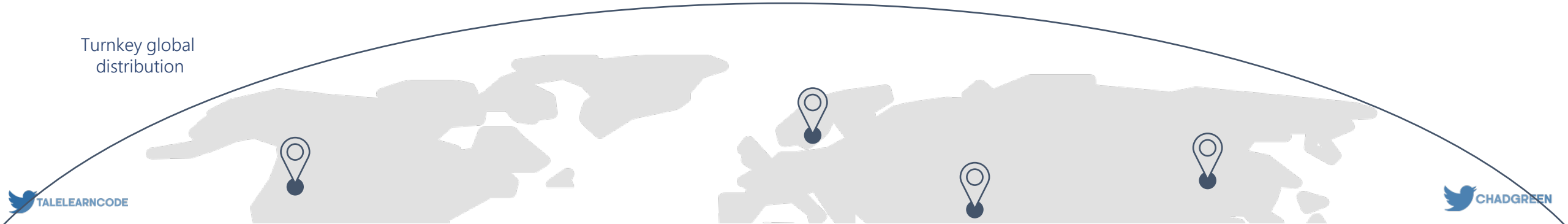

Azure Cosmos DB

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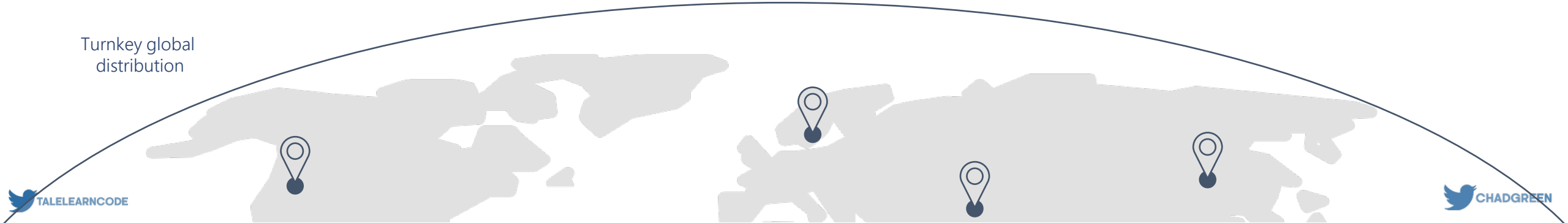

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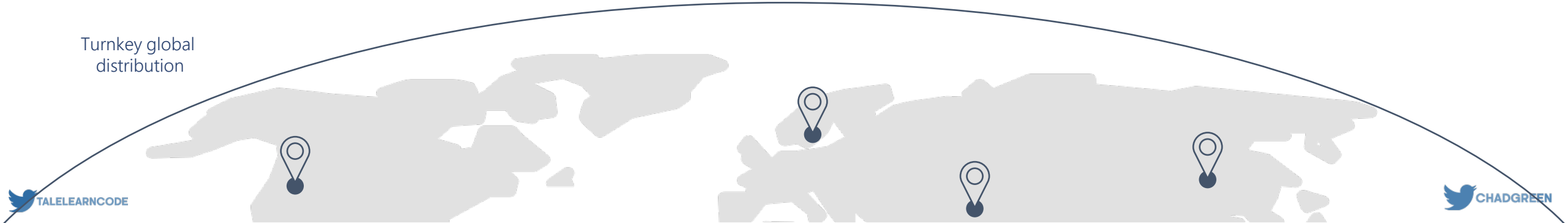

Azure Cosmos DB

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Battle Tested

XBOX LIVE

Office 365

skype™

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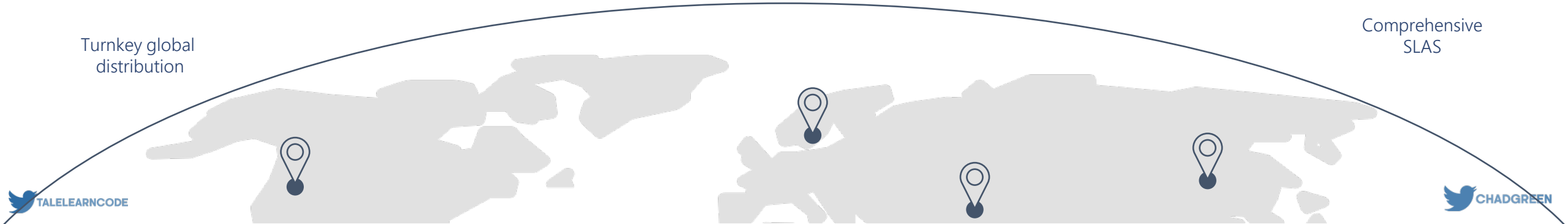
Turnkey global
distribution

Comprehensive
SLAS



Azure Cosmos DB

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Battle Tested

Coca-Cola · AVEVA Schneider Electric · Albertsons SAFEWAY · Johnson Controls · SIEMENS Healthineers · BMI

Liberty Mutual INSURANCE · jet · Rolls-Royce · ExxonMobil · Cincinnati Children's

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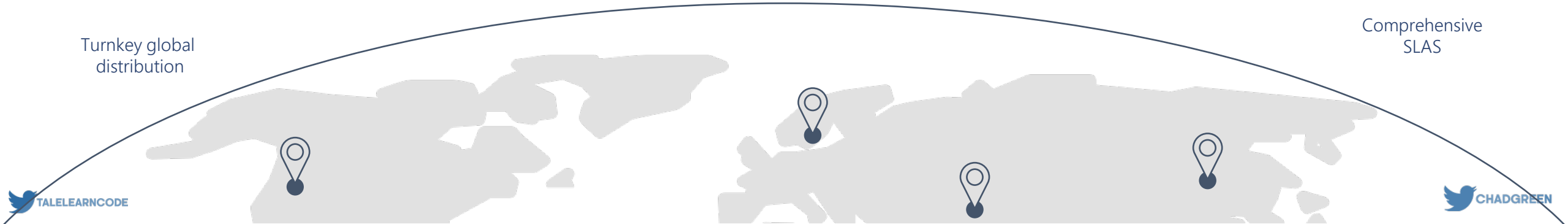

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Ubiquitous Regional Presence

Turnkey globa distribution

Comprehensive SLAS

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Secure by default and enterprise ready

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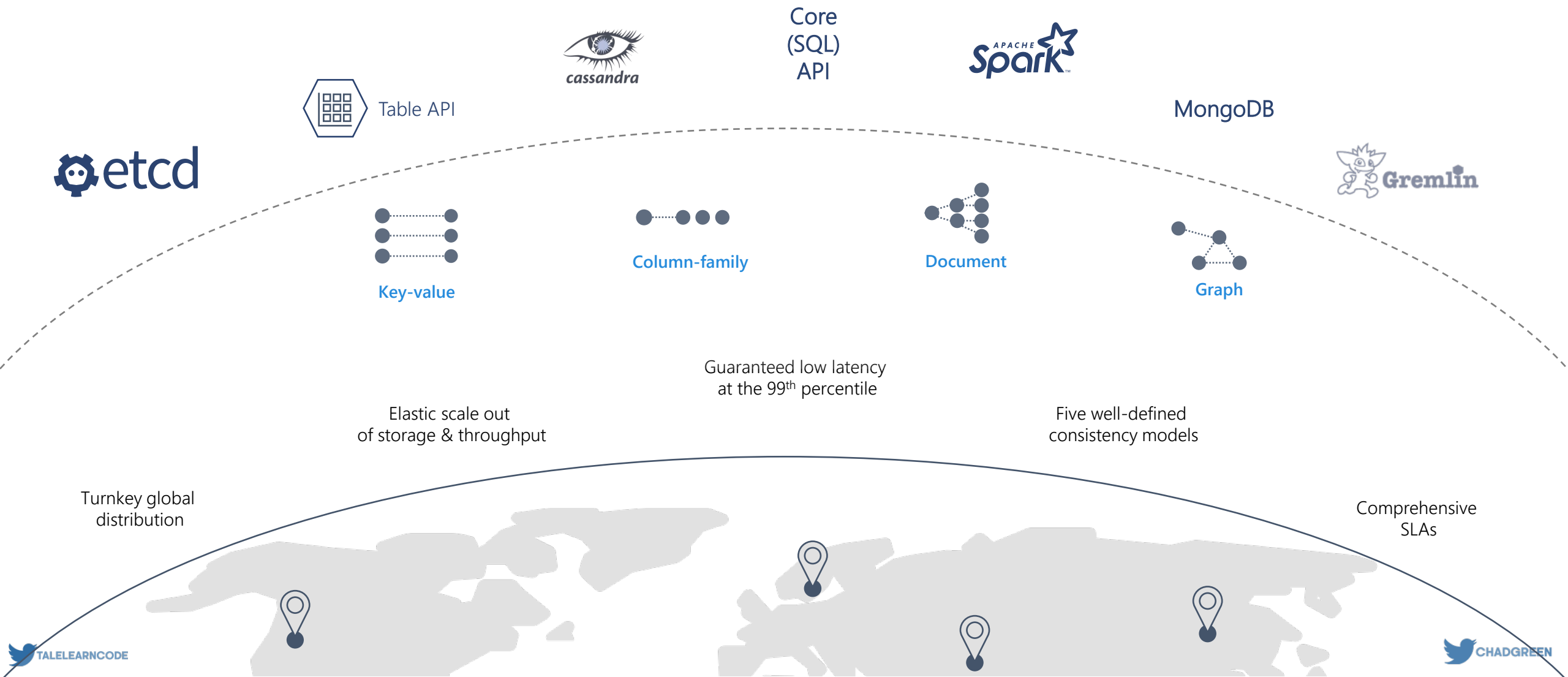


Change Feed

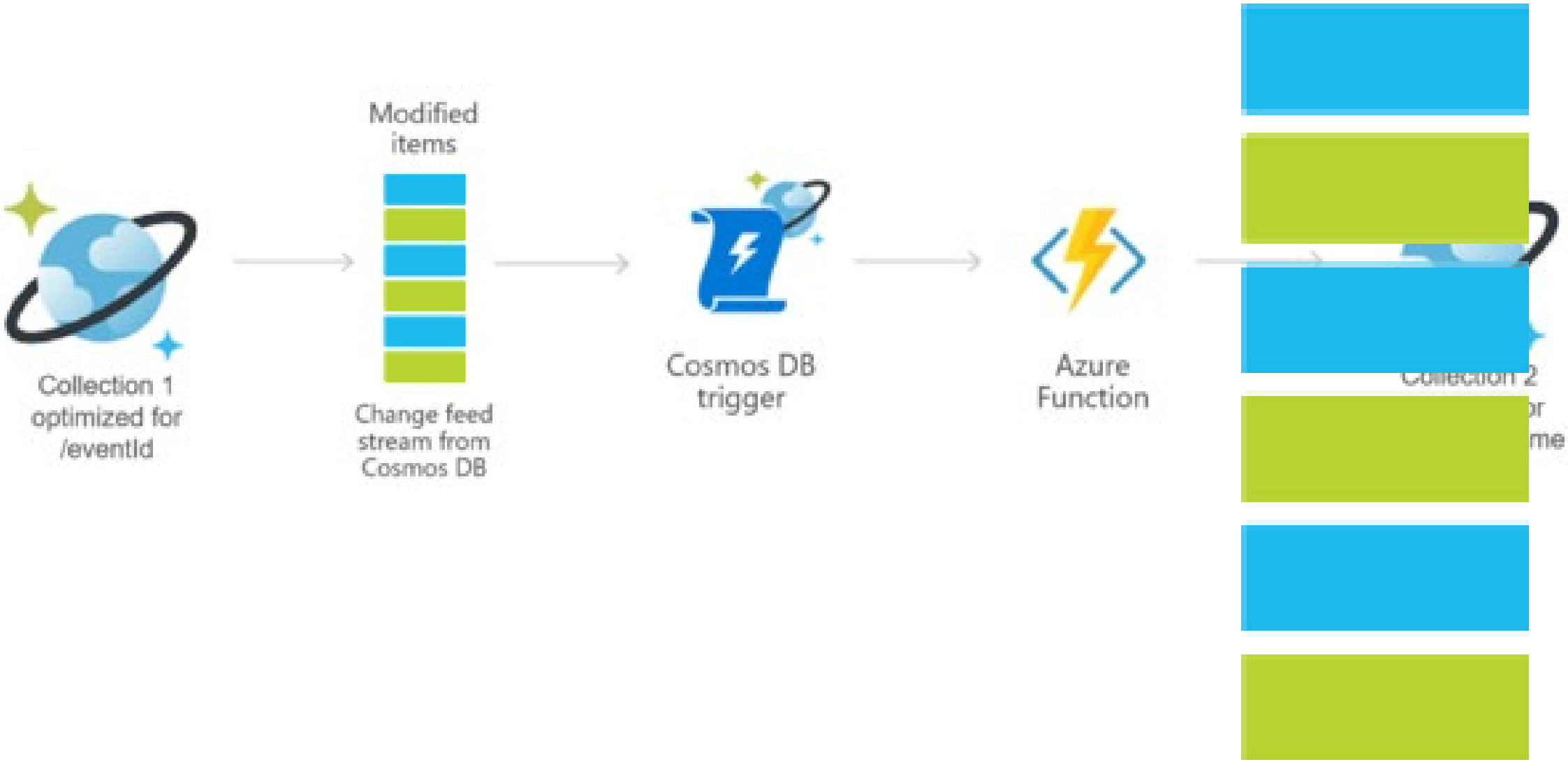
Ch-ch-ch-changes: Tracing Changes in Azure Cosmos DB

Overview

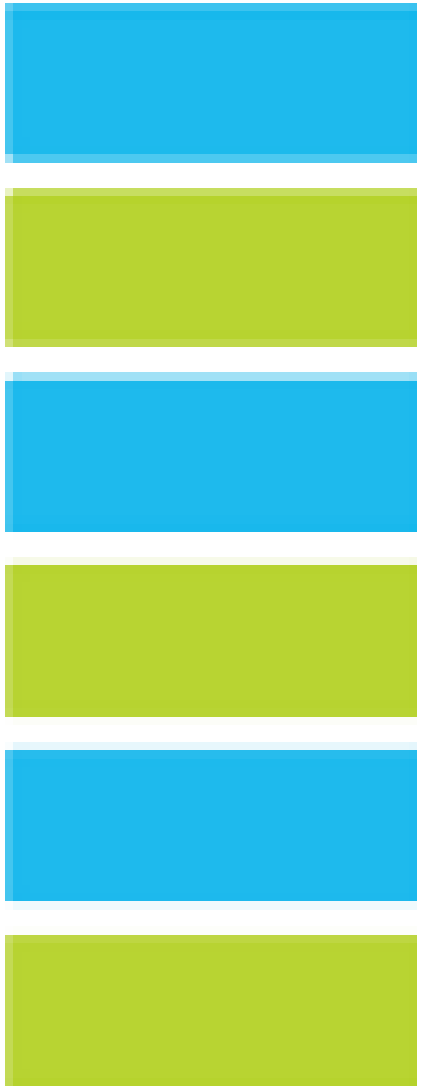
Change Feed

Overview

Change Feed



Unsung Hero of Azure Cosmos DB



Overview

Change Feed

Enabled by default

Overview

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Change Feed

Enabled by default

Includes insert and update operations

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Each change appears exactly once

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Each change appears exactly once

Clients manage checkpointing logic

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Clients manage checkpointing logic

Sorted by order of modification

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No guaranteed order logical partitions

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Synchronized from any point-in-time

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Changes available in parallel for logical partitions

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Change Feed

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Applications can request multiple change feeds

Clients manage checkpointing logic

Sorted by order of modification

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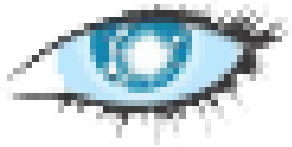
Changes available in parallel for logical partitions

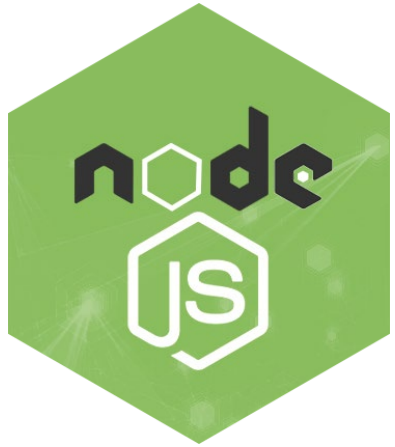
Supported APIs and Client SDKs

Change Feed

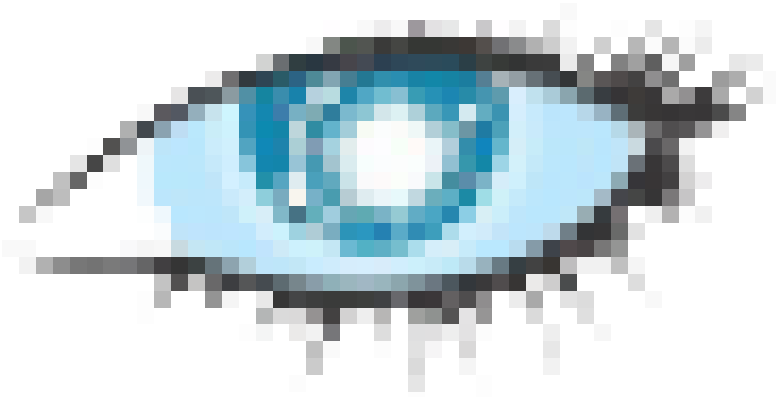




Supported APIs and Client SDKs

Change Feed



Current Limitations

Change Feed

Intermediate Updates

Current Limitations

Change Feed

Intermediate Updates

Current Limitations

Change Feed

Intermediate Updates

Guaranteed Order

Current Limitations

Change Feed

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Guaranteed Order

Current Limitations

Change Feed

Intermediate Updates

Deletes

Guaranteed Order

Change Feed Processor

Ch-ch-ch-changes: Tracing Changes in Azure Cosmos DB

Change Feed Processor Components

Reading the Change Feed

Monitored Container

Change Feed Processor Components

Reading the Change Feed

Monitored Container

Leased Container

Change Feed Processor Components

Reading the Change Feed

Monitored Container

Leased Container

Host

Change Feed Processor Components

Reading the Change Feed

Monitored Container

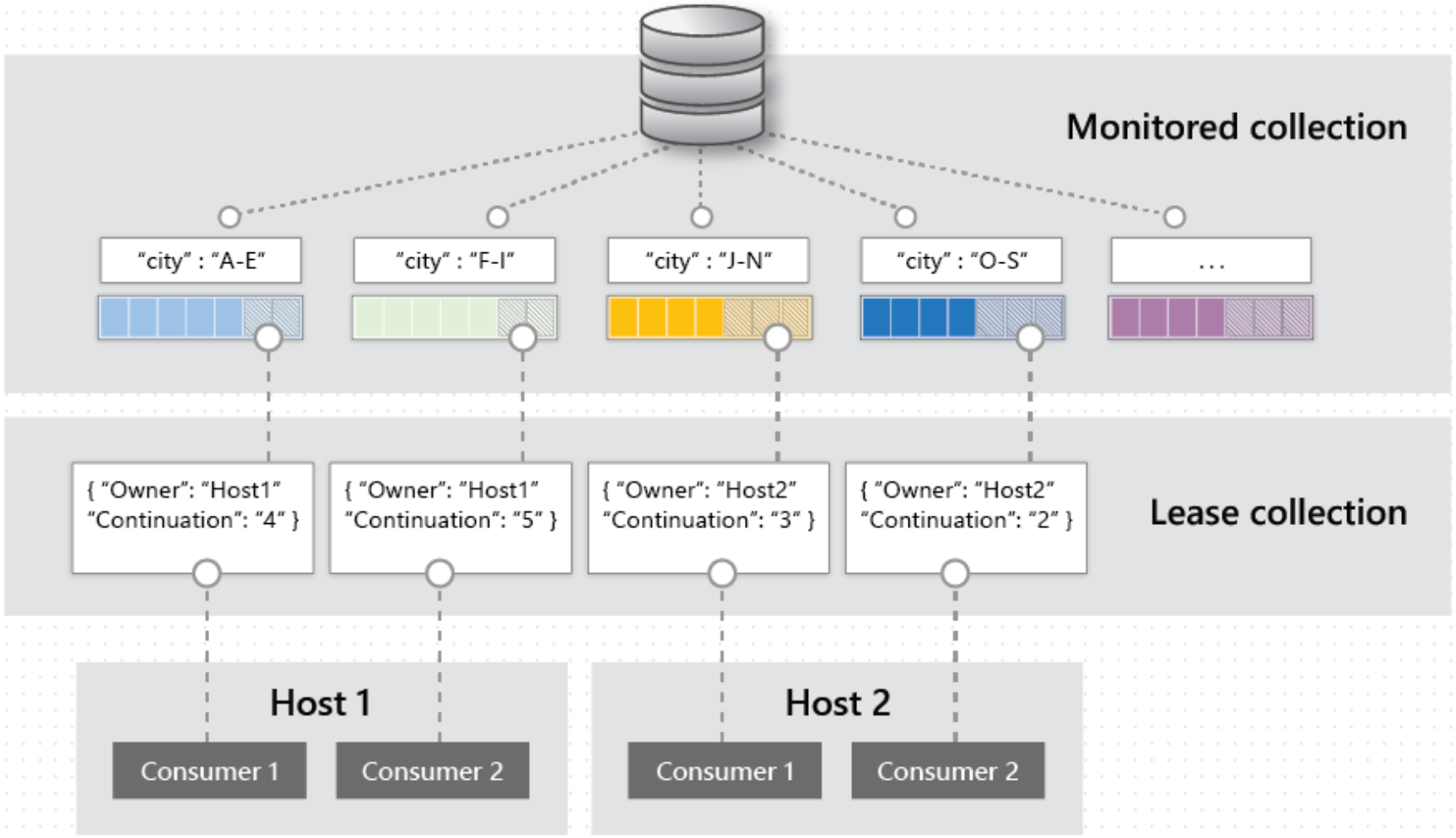
Leased Container

Host

Delegate

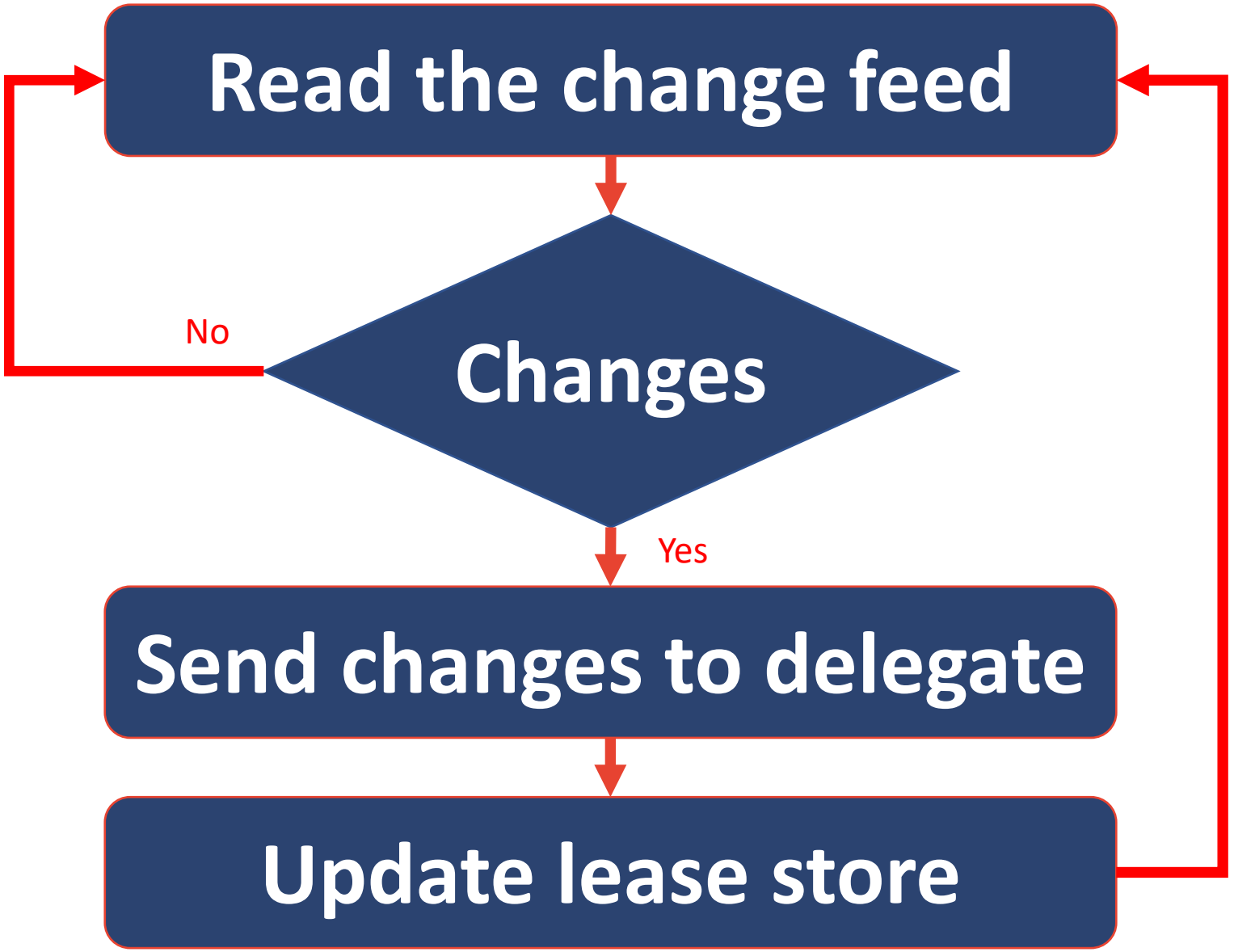
Change Feed Processor Components

Reading the Change Feed



Processing Life Cycle

Reading the Change Feed



Hosting the Change Feed Processor

Reading the Change Feed

- Azure WebJob
- Azure Virtual Machine
- Azure Kubernetes Service
- ASP.NET Hosted Service

Serverless Event-Based Architectures

Ch-ch-ch-changes: Tracing Changes in Azure Cosmos DB

Azure Functions

Serverless Event-Based Archictures

Azure Functions

Serverless Event-Based Architectures

Serverless

Azure Functions

Serverless Event-Based Architectures

Serverless

Language Choice

Azure Functions

Serverless Event-Based Architectures

Serverless

Language Choice

Pay-Per-Use

Azure Functions

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Pay-Per-Use

BYOD

Azure Functions

Serverless Event-Based Architectures

Serverless

Language Choice

Pay-Per-Use

BYOD

Security

Azure Functions

Serverless Event-Based Architectures

Serverless

Language Choice

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BYOD

Security

Integration

Azure Functions

Serverless Event-Based Architectures

Serverless

Language Choice

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BYOD

Security

Integration

Flexible Dev

Azure Functions

Serverless Event-Based Architectures

- Serverless
- Language Choice
- Pay-Per-Use
- BYOD
- Security
- Integration
- Flexible Dev
- **Stateful**

Azure Functions Features

Serverless Event-Based Architectures

Serverless	Language Choice	Pay-Per-Use
BYOD	Security	Integration
Flexible Dev	Stateful	**Open-Source**

What can you do with Azure Functions?

Serverless Event-Based Architectures

HTTP

What can you do with Azure Functions?

Serverless Event-Based Architectures

HTTP

Timer

What can you do with Azure Functions?

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HTTP

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Blob storage

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Queue storage

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Event Grid

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Cosmos DB

Azure Cosmos DB and Azure Functions

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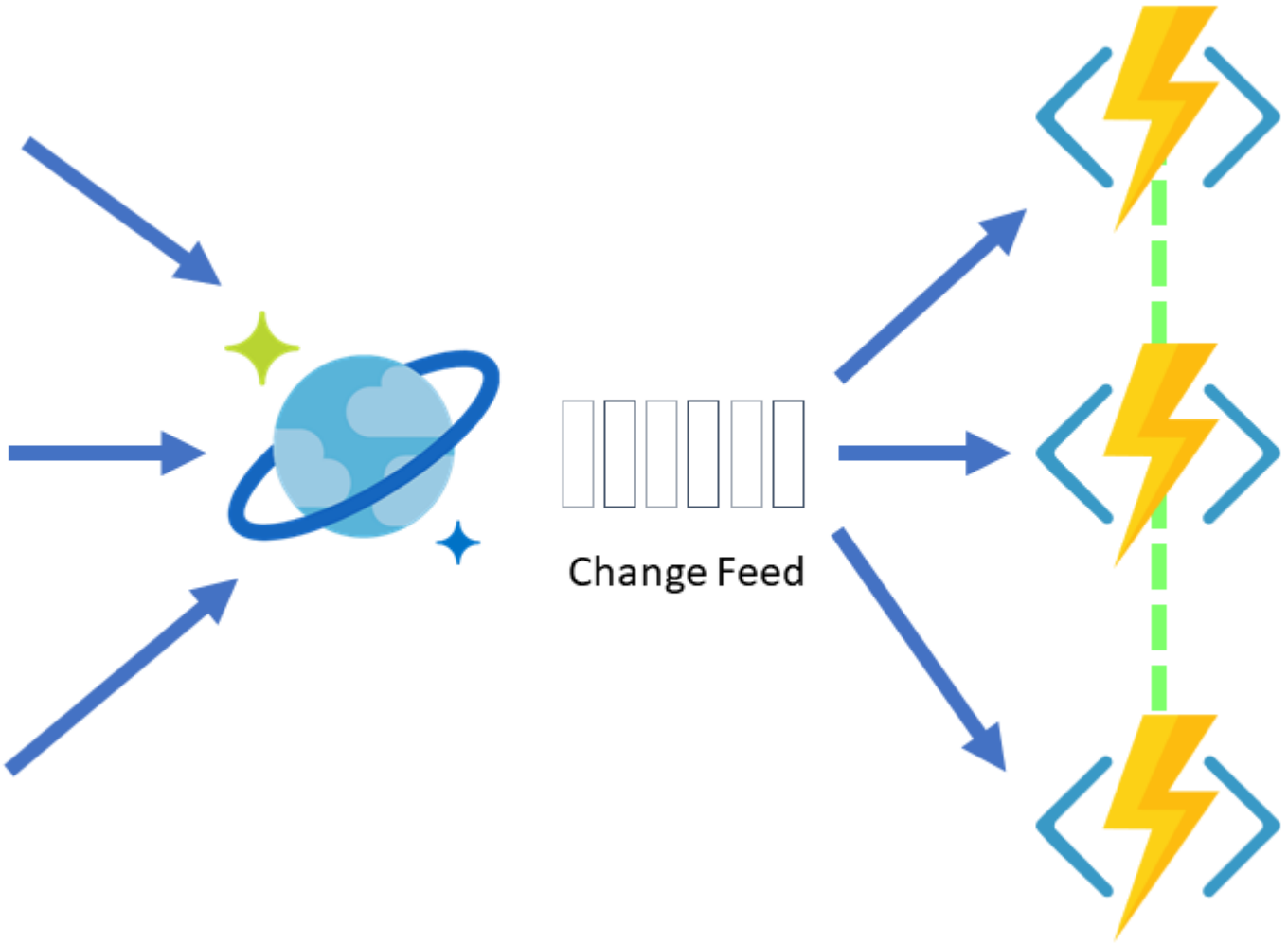
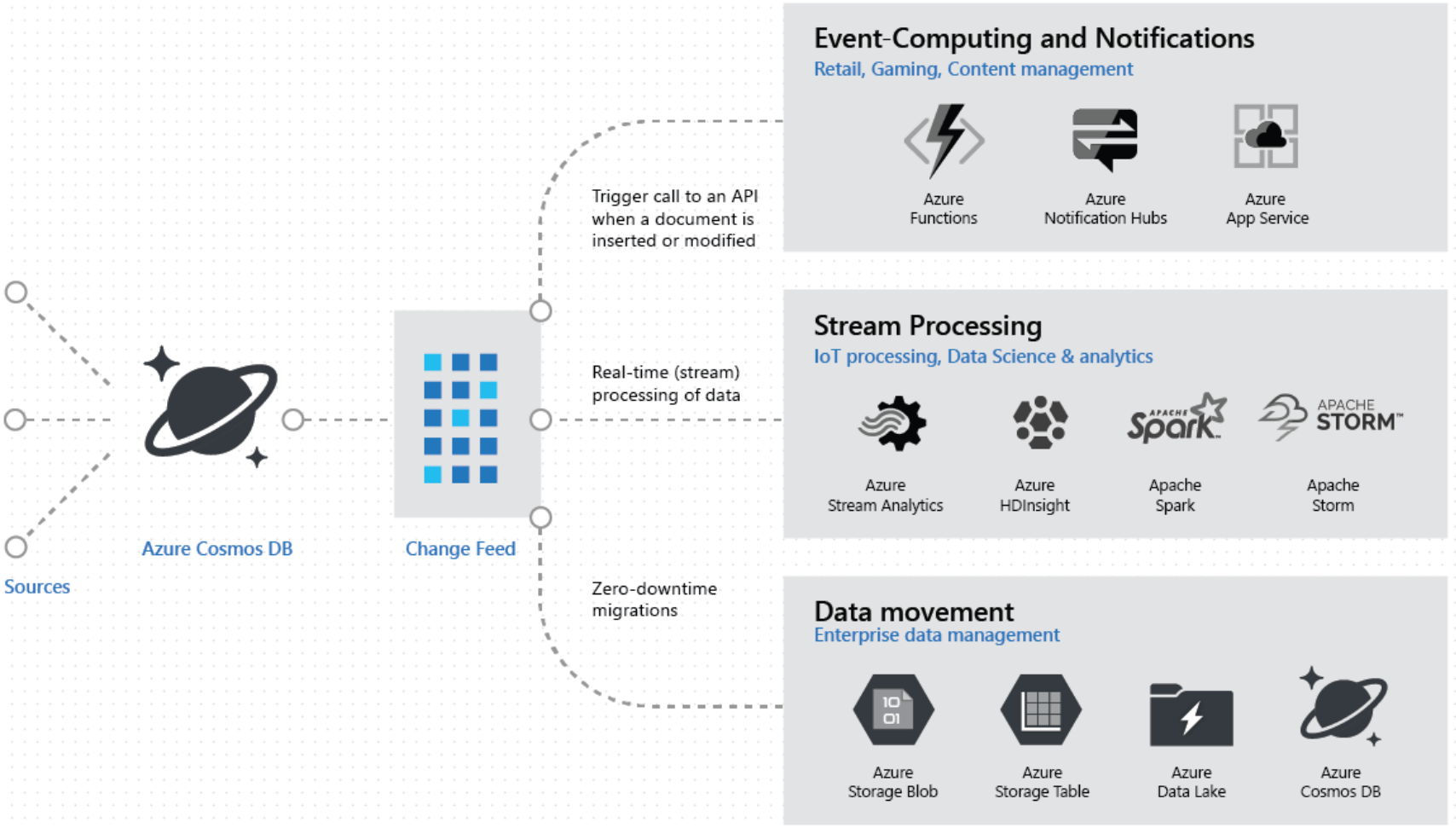


Change Feed Design Patterns

Ch-ch-ch-changes: Tracing Changes in Azure Cosmos DB

Common Uses of the Change Feed

Change Feed Design Patterns



Common Uses of the Change Feed

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Event Computing and Notifications

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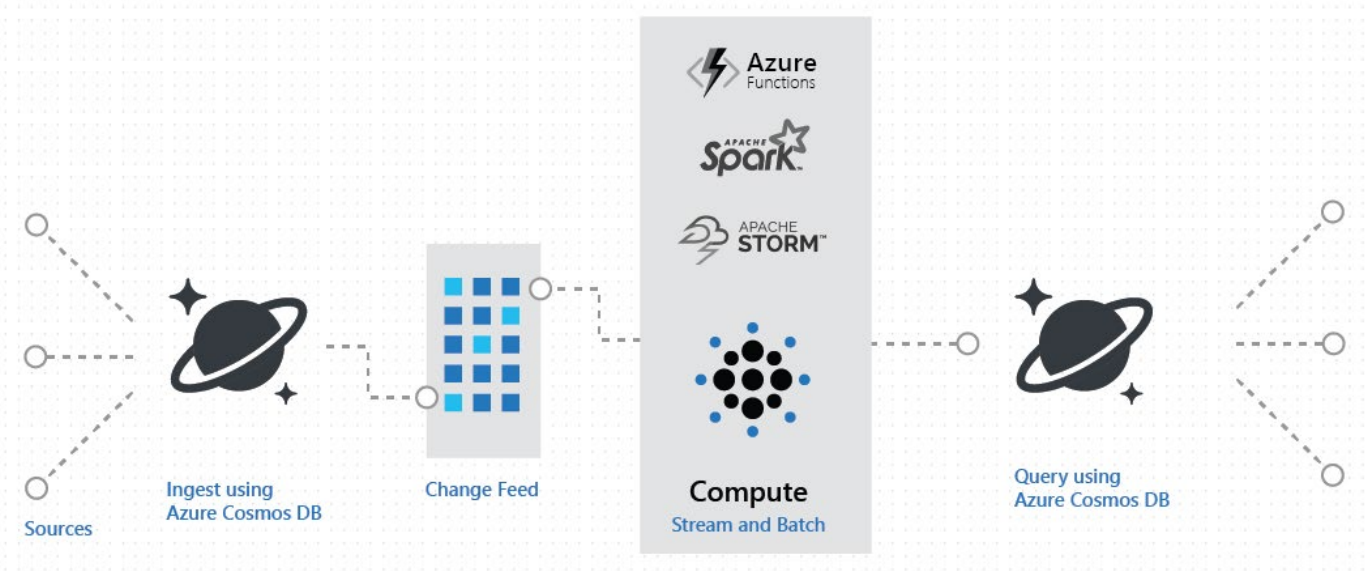
Event Computing and Notifications

Real-Time Stream Processing



Common Uses of the Change Feed

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Data Movement

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Change Feed Design Patterns

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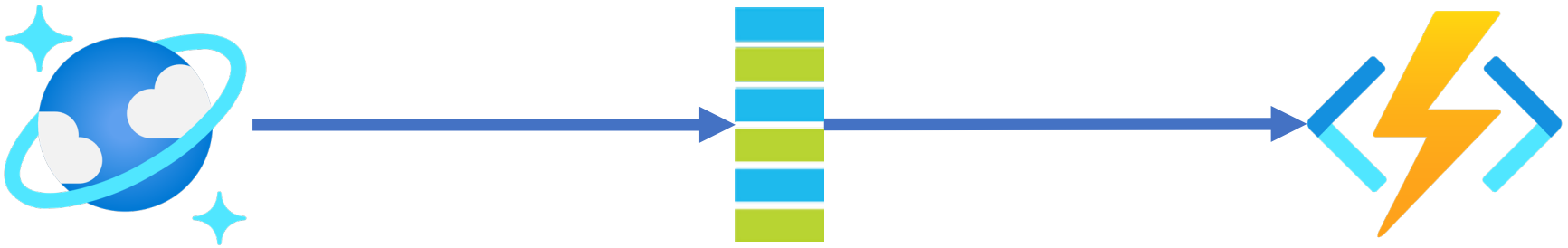
Event Sourcing

Demos

Ch-ch-ch-changes: Tracing Changes in Azure Cosmos DB

Basic Change Feed Demo

Change Feed Demos



Data written to Cosmos DB

Insert/Update recorded in the Change Feed

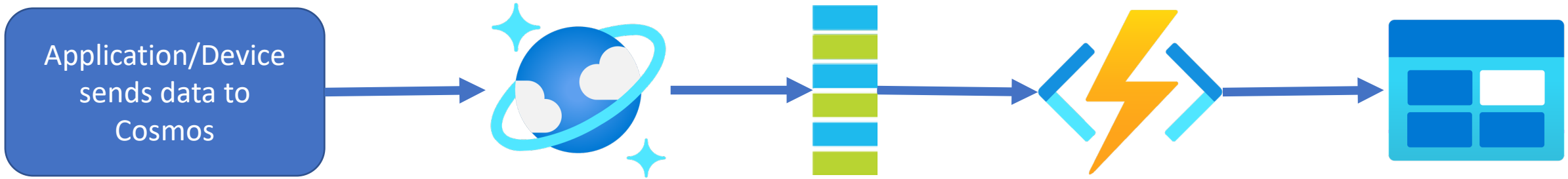
Azure Function is triggered by the item being added to the change feed

Scenario

- Practice test application
- Data is useful for active queries within 30 days (2,592,000 seconds)
- Need to keep archive for historical, compliance reasons
- Demo will process 428k records over 24-hour period
- Real data that has been autonomized

Data Archival

Change Feed Demos

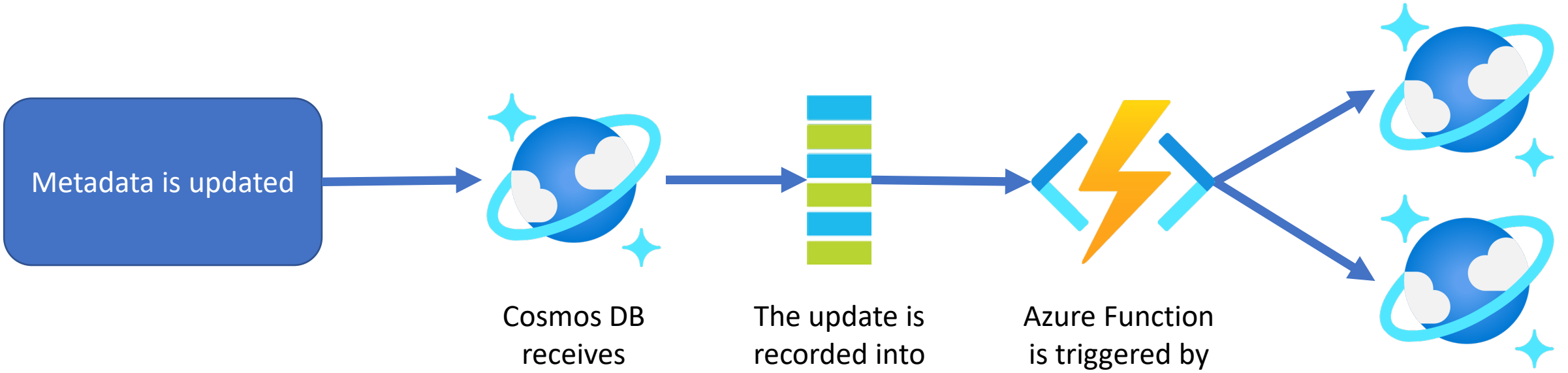


Scenario

- Shindig Manager
- Manages presentations for different shindigs (events)
- Metadata maintained in its own container
- Need way to update denormalized data in shindig (event) partitions

Denormalization

Change Feed Demos



Scenario

- Shindig Manager
- Manages presentations for different shindigs (events)
- Presentations partitioned by shindig
- Want to improve query performance when searching across tags (original partitioning would require cross-partition querying)

Replicating Containers

Change Feed Demos

Presentation data is sent to Cosmos by the application

Cosmos DB receives data

The insert/update is recorded into the change feed

Azure Function is triggered by the item being added/updated to the change feed

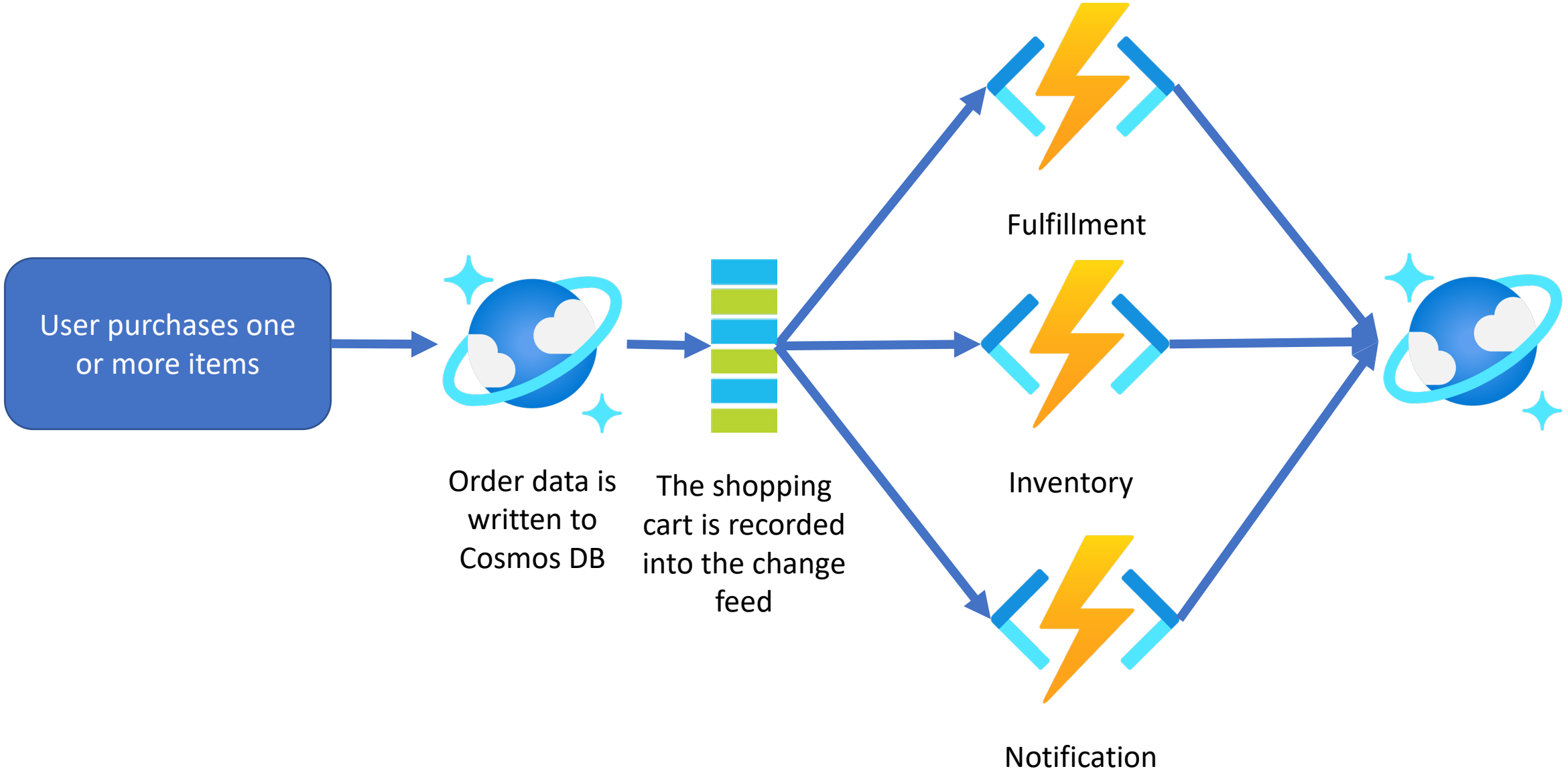
Document is sent to replicated Cosmos container(s)

Scenario

- Shopping cart implementation – Lego store
- Implementing an event-driven architecture to allow for asynchronous processing of an order
- Note: functions are only simulating doing actions

Triggering Event-Driven Architecture

Change Feed Demos



Wrap-Up

Ch-ch-ch-changes: Tracing Changes in Azure Cosmos

Wrap-Up

Ch-ch-ch-changes: Tracing Changes in Azure Cosmos DB

- Azure Cosmos DB

Wrap-Up

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- Change feed is the unsung here of Cosmos DB

Wrap-Up

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Wrap-Up

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- Current limitations
  - Intermediate Updates
  - Guaranteed Order
  - Deletes

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- Three processes for reading the change feed

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- Supported APIs and client SDKs
- Current limitations
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- Three processes for reading the change feed
- Common patterns

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- Three processes for reading the change feed
- Common patterns
- Demos

Thank You!

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