Cosmos DB Introduction

Kamil Nowiński

Principal Microsoft Consultant

Kamil Nowiński

Microsoft Data Platform **MVP**

Speaker, blogger, data enthusiast

Principal Microsoft Consultant at Altius (www.altiusdata.com)

15+ yrs experience as DEV/BI/(DBA)

Member of the Data Community PL

Project member of „SCD Merge Wizard”

Founder of blog SQLPlayer (www.SQLplayer.net)

SQL Server Certificates:

MCITP, MCP, MCTS, MCSA, MCSE Data Platform,

MCSE Data Management & Analytics

Moreover: Bicycle, Running, Digital photography

@NowinskiK, @SQLPlayer

altius

@NowinskiK

Blog

- Technical posts
- Various skill level
- Cheet sheets
- Recommended books
- Many useful other links
- Interviews (Podcast)

SQL Player

Play with data & have fun!

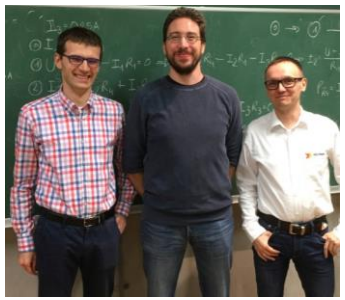
www.SQLPlayer.net

Scan me

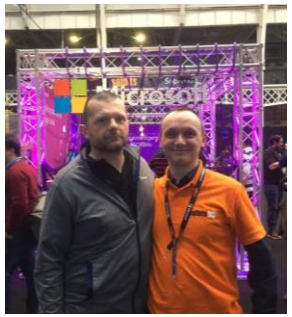
PODCAST – interviews with...














Azure Cosmos DB

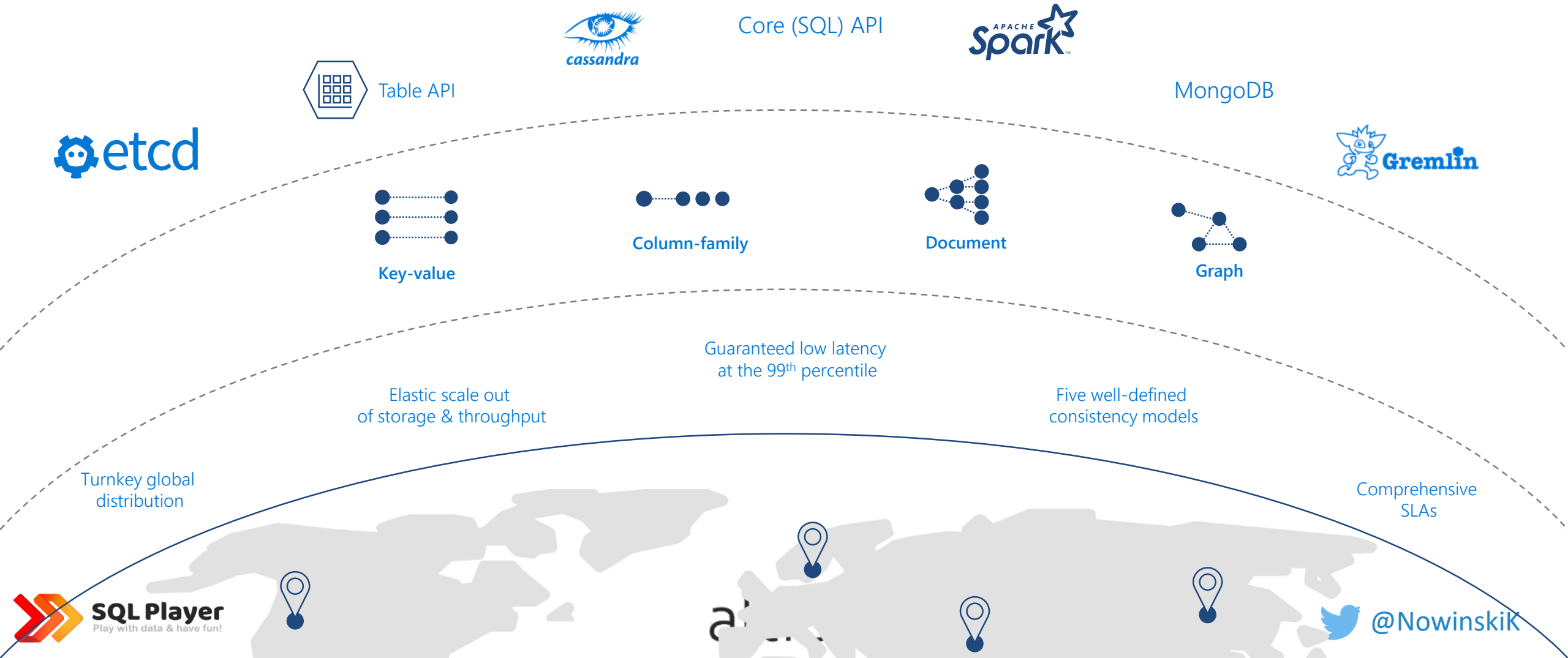
Cosmos DB is NoSQL database

Not

only

SQL

AZURE COSMOS DB



Azure Cosmos DB

- A fully-managed
- Globally distributed database service
- Extremely low latency
- Massive scale for modern apps
- Multi-model (API)

MODERN APPS FACE NEW CHALLENGES

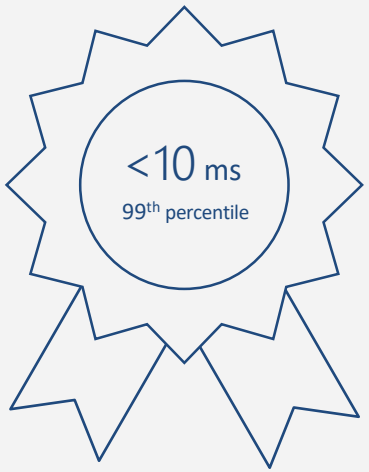
- Managing and syncing data distributed around the globe
- Delivering highly-responsive, real-time personalization
- Processing and analyzing large, complex data
- Scaling both throughput and storage based on global demand
- Offering low-latency to global users
- Modernizing existing apps and data

COMPREHENSIVE SLAs

RUN YOUR APP ON WORLD-CLASS INFRASTRUCTURE

Azure Cosmos DB is the only service with financially-backed SLAs for single-digit millisecond read and write latency at the 99th percentile, 99.999% high availability and guaranteed throughput and consistency

Latency

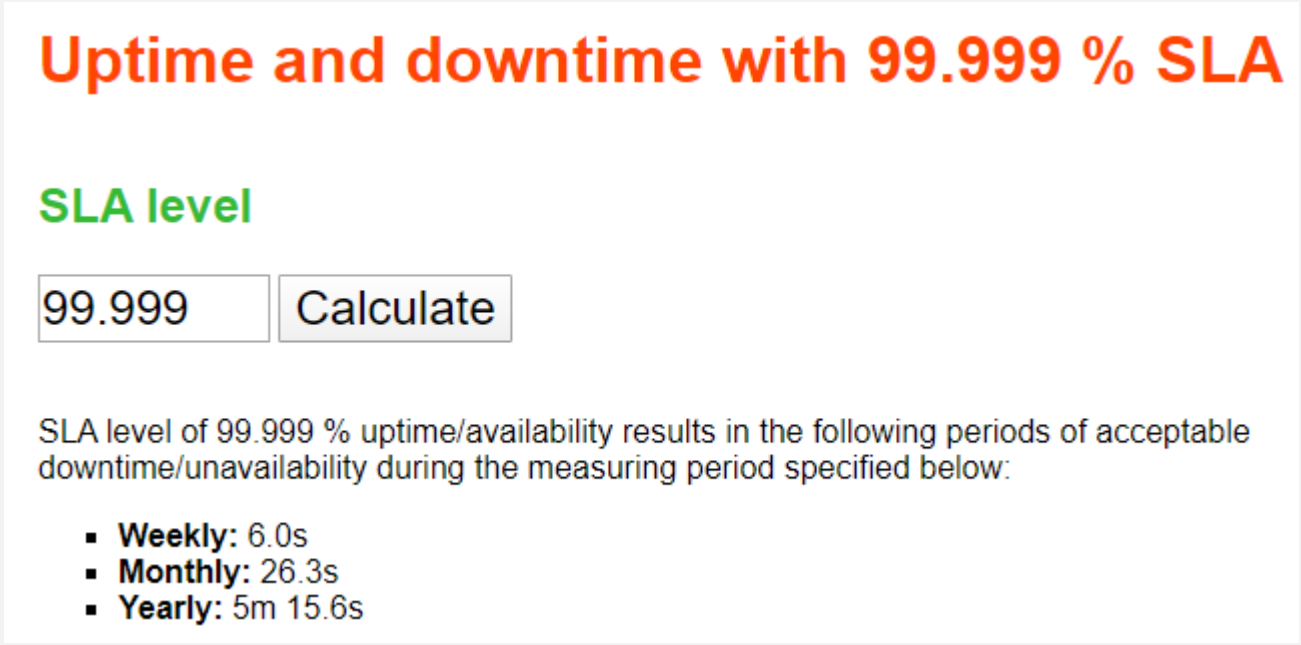


High Availability

Throughput

Consistency

SLA = 99.999%



Uptime and downtime with 99.999 % SLA

SLA level

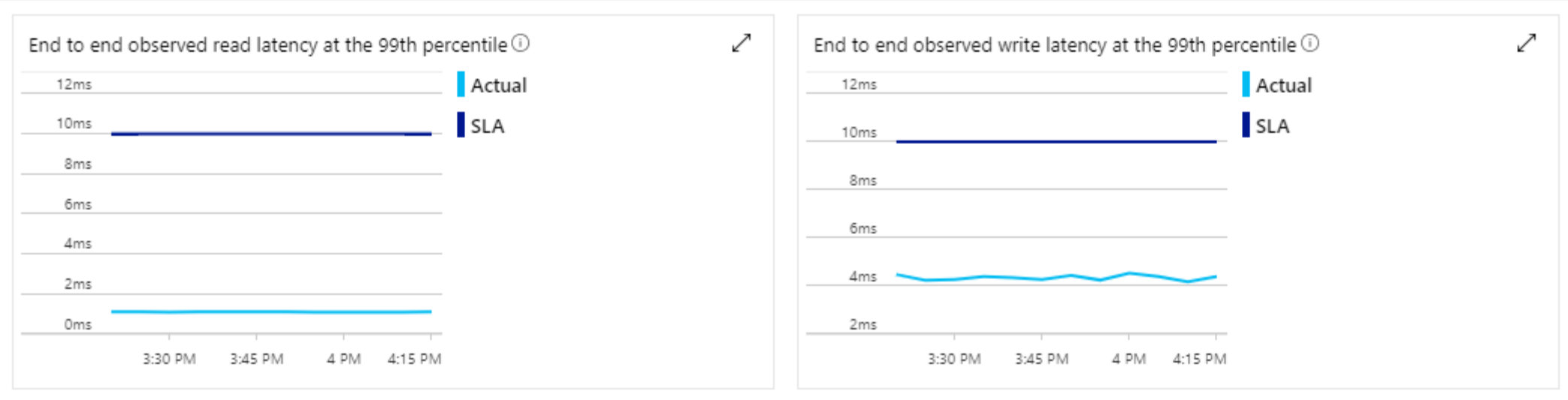
99.999 Calculate

SLA level of 99.999 % uptime/availability results in the following periods of acceptable downtime/unavailability during the measuring period specified below:

- **Weekly:** 6.0s
- **Monthly:** 26.3s
- **Yearly:** 5m 15.6s

https://uptime.is/99.999

Single-digit milisecond latency

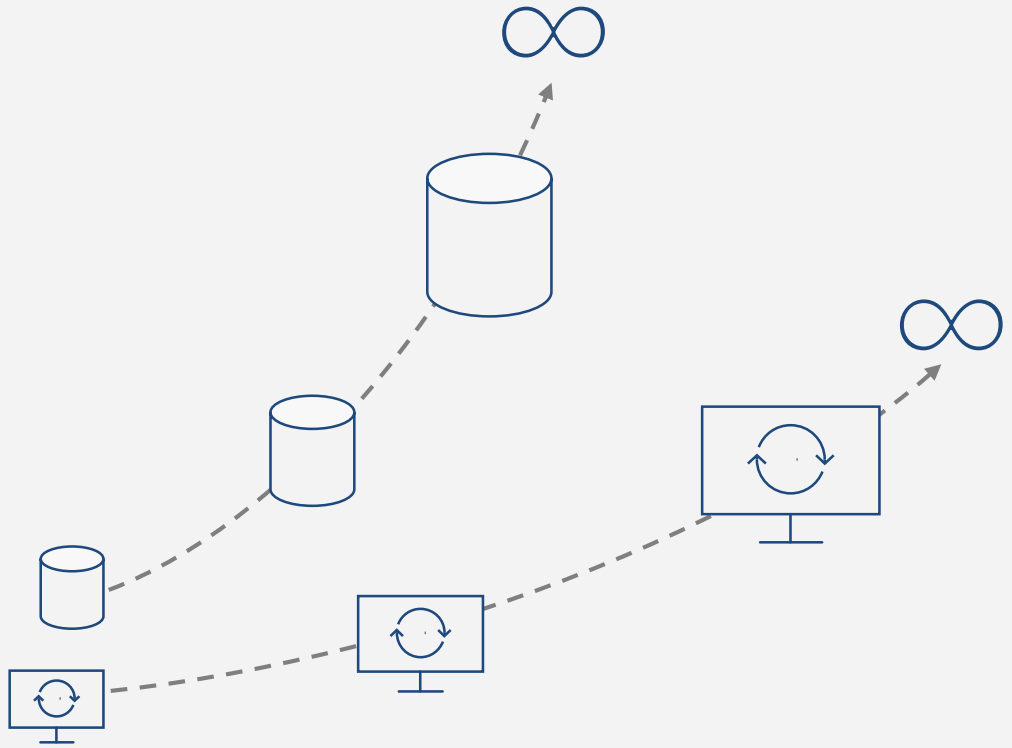


ELASTIC SCALE OUT OF STORAGE AND THROUGHPUT

SCALES AS YOUR APPS' NEEDS CHANGE

Independently and elastically scale storage and throughput across regions – even during unpredictable traffic bursts – with a database that adapts to your app's needs.

- Elastically scale throughput from 10 to 100s of millions of requests/sec across multiple regions
- Support for requests/sec for different workloads
- Pay only for the throughput and storage you need



Regions & replication

Multi-region writes available

Read-only replica for reports

Throughput / cost calculator

Cosmos Account Settings

The simplified Azure Cosmos calculator assumes commonly used settings for indexing policy, consistency, and other parameters. For a more accurate estimate, please sign in to provide your workload details.

Number of regions: 1

Multi-region writes: (•) Disabled ( ) Enabled

Workload per region

For a more accurate cost estimate based on your own data, please sign in and upload your data items.

Total data stored: 10 GB

Item size: 1 KB

Reads/sec per region: 100

Writes/sec per region: 100

Calculate

Cost Estimate

Storage

Cost per GB/month	0.250 USD
Total Data stored per region	x 10 GB
EST. STORAGE COST PER MONTH	2.50 USD

Workload

Cost per 100 RU/s per hour	0.008 USD
EST. THROUGHPUT REQUIRED Show Details	x 595 RU/s
EST. WORKLOAD COST/MONTH	34.75 USD

Number of regions	x 1
EST. TOTAL COST/MONTH	37.25 USD

Sign in to save estimate

SAVE UP TO 65% WITH RESERVED CAPACITY
See here for more details

YOU WILL SAVE UP TO 70% TCO WITH COSMOS
Learn more about Cosmos TCO

https://cosmos.azure.com/capacitycalculator/

Try for free!

Azure Cosmos DB pricing

Fully managed globally distributed, multi-model database service

✔ No upfront cost ✔ No termination fees ✔ Pay only for what you use

Start your Azure free account and get a $200 credit for 30 days, plus get 12 months of free access to Azure Cosmos DB.

Try for free >

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

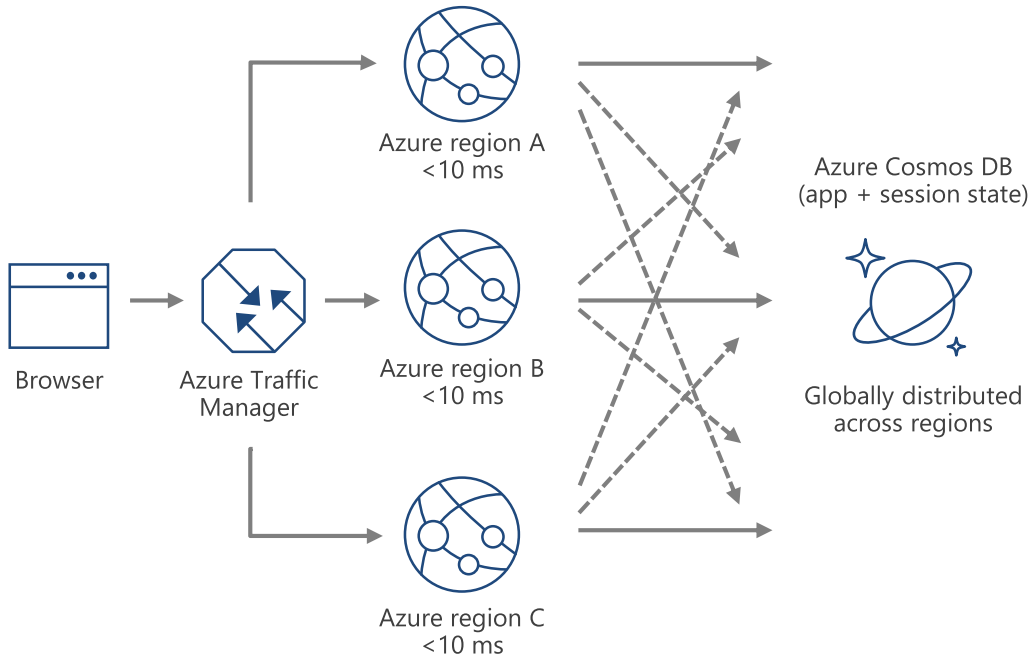
DEMO

Use Cases

Data distributed and available globally

Put your data where your users are to give real-time access and uninterrupted service to customers anywhere in the world.

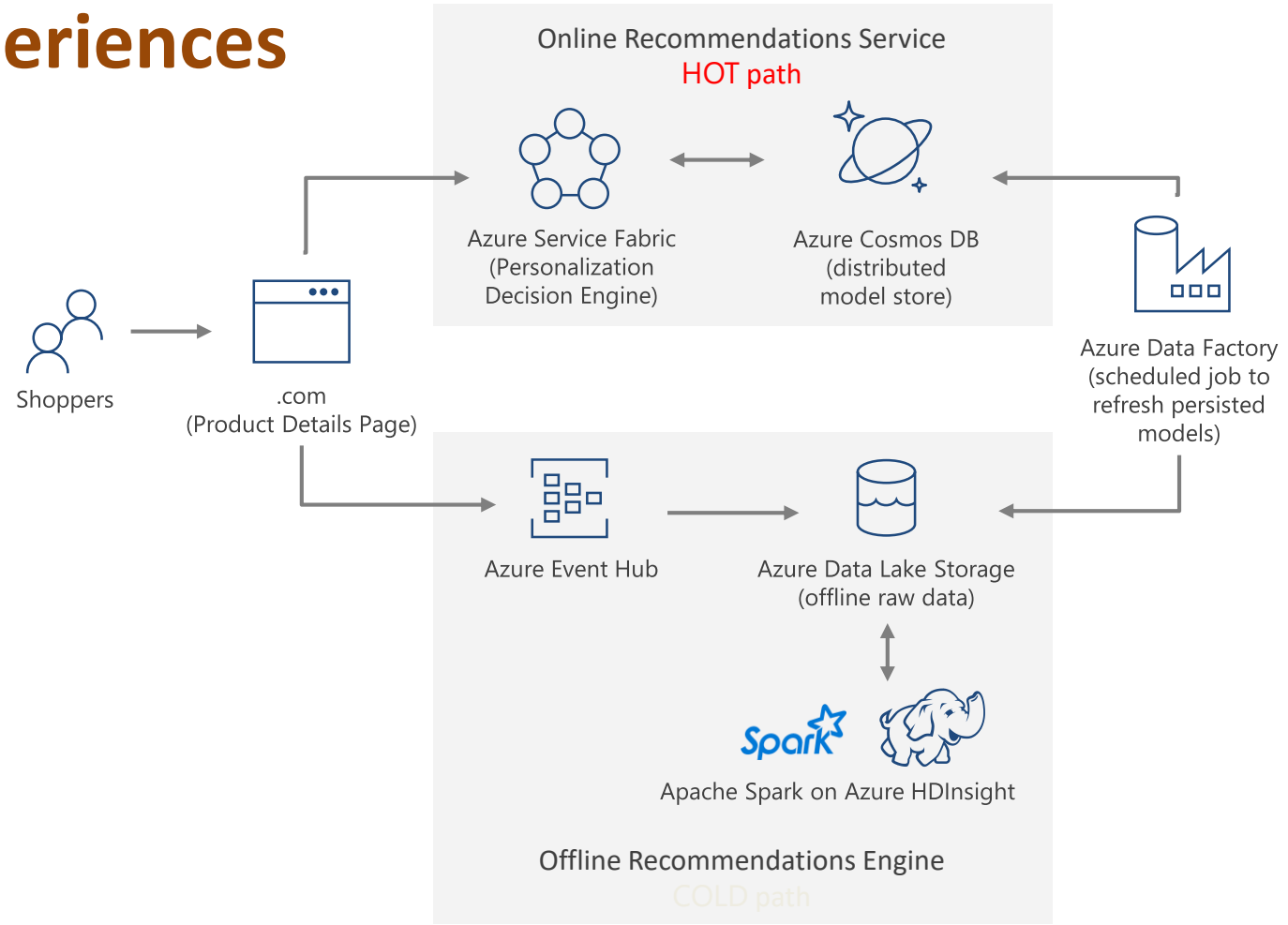
- Turnkey global data replication across all Azure regions
- Guaranteed low-latency experience for global users
- Resiliency for high availability and disaster recovery



Build Real-Time Customer experiences

Offer latency-sensitive applications with personalization, bidding, and fraud-detection.

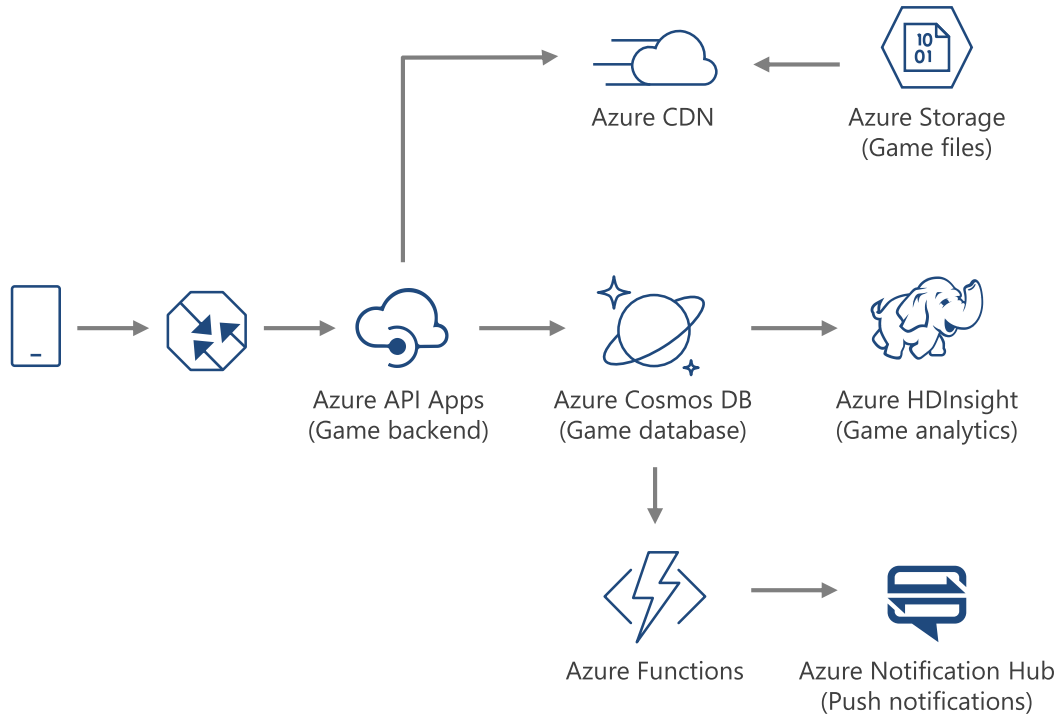
- Machine learning models generate real-time recommendations across product catalogues
- Product analysis in milliseconds
- Low-latency ensures high app performance worldwide
- Tunable consistency models for rapid insight



Ideal for gaming, IoT and ecommerce

Maintain service quality during high-traffic periods requiring massive scale and performance.

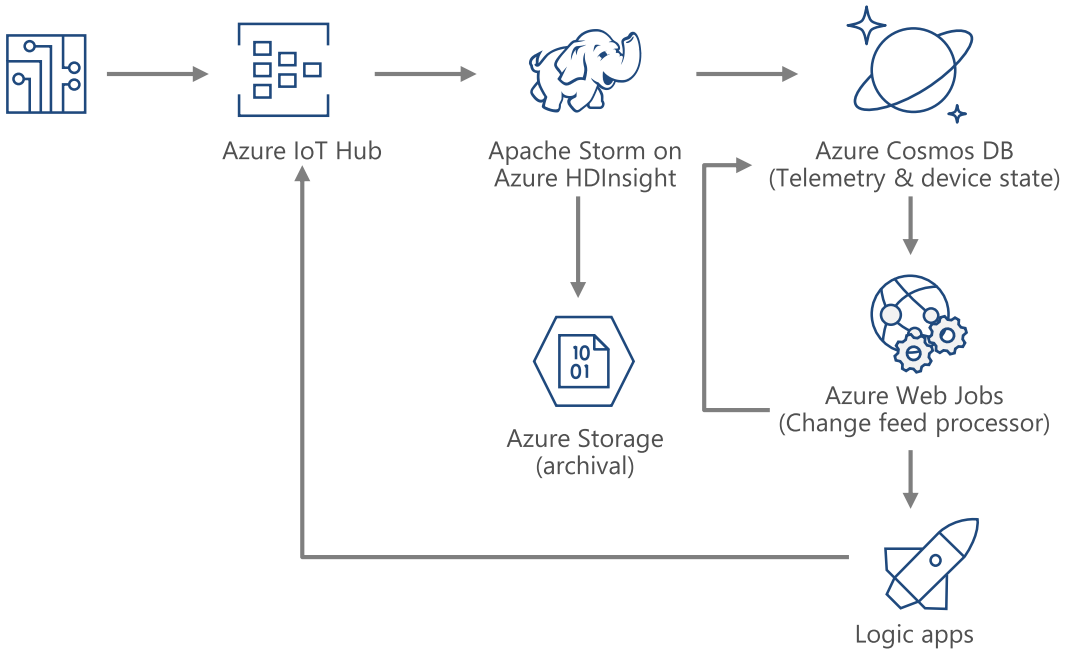
- Instant, elastic scaling handles traffic bursts
- Uninterrupted global user experience
- Low-latency data access and processing for large and changing user bases
- High availability across multiple data centers



Massive Scale Telemetry Stores for IOT

Diverse and unpredictable IoT sensor workloads require a responsive data platform

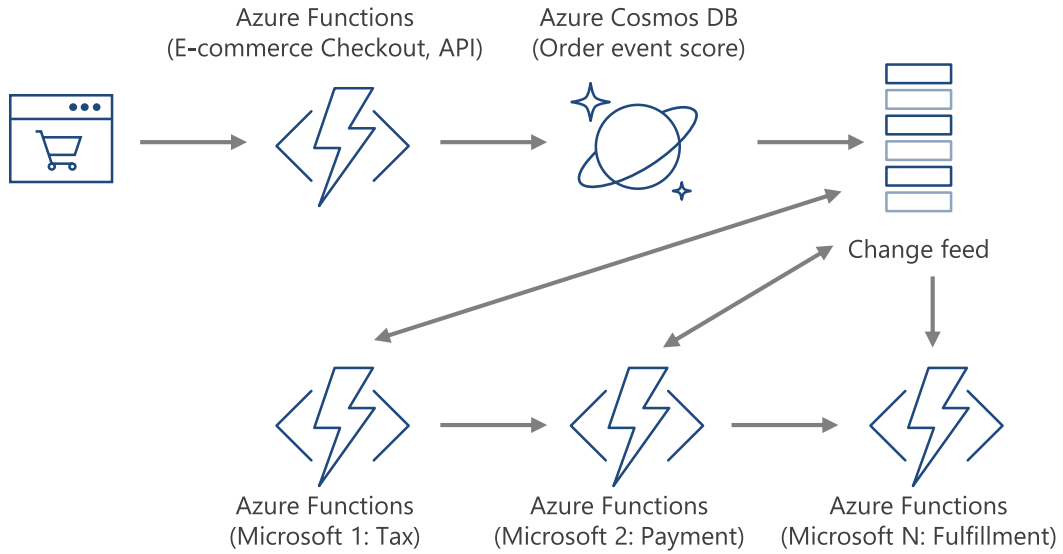
- Seamless handling of any data output or volume
- Data made available immediately, and indexed automatically
- High writes per second, with stable ingestion and query performance



Simplified development with serverless architecture

Experience decreased time-to-market, enhanced scalability, and freedom from framework management with event-driven micro-services.

- Seamless handling of any data output or volume
- Data made available immediately, and indexed automatically
- High writes per second, with stable ingestion and query performance
- Real-time, resilient change feeds logged forever and always accessible
- Native integration with Azure Functions



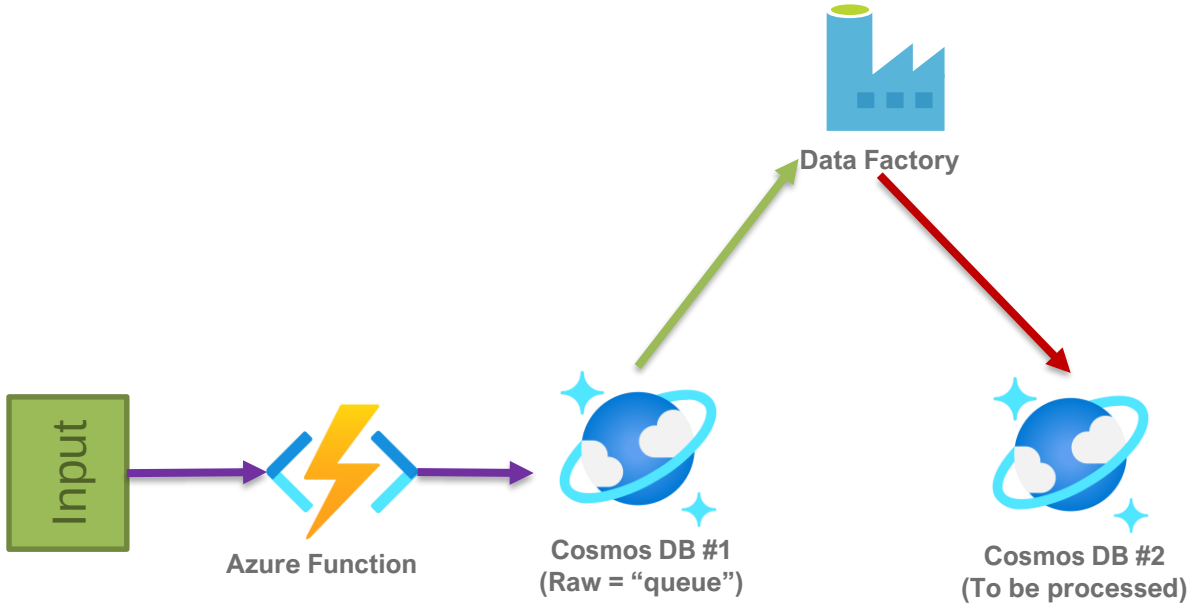
Anti-Patterns

TRY TO AVOID: Deleting documents

- Delete is expensive as much as insert (RU)

- Recommended solution:
- Use TTL (Time-To-Live)
- Add “IsDeleted” field in document

DO NOT USE: Cosmos DB as a Queuing system



- External system ingests Cosmos DB
- Batch processing:
- 1) Reads doc from collection #1
- 2) Writes doc into collection #2
- 3) Delete doc from collection #1

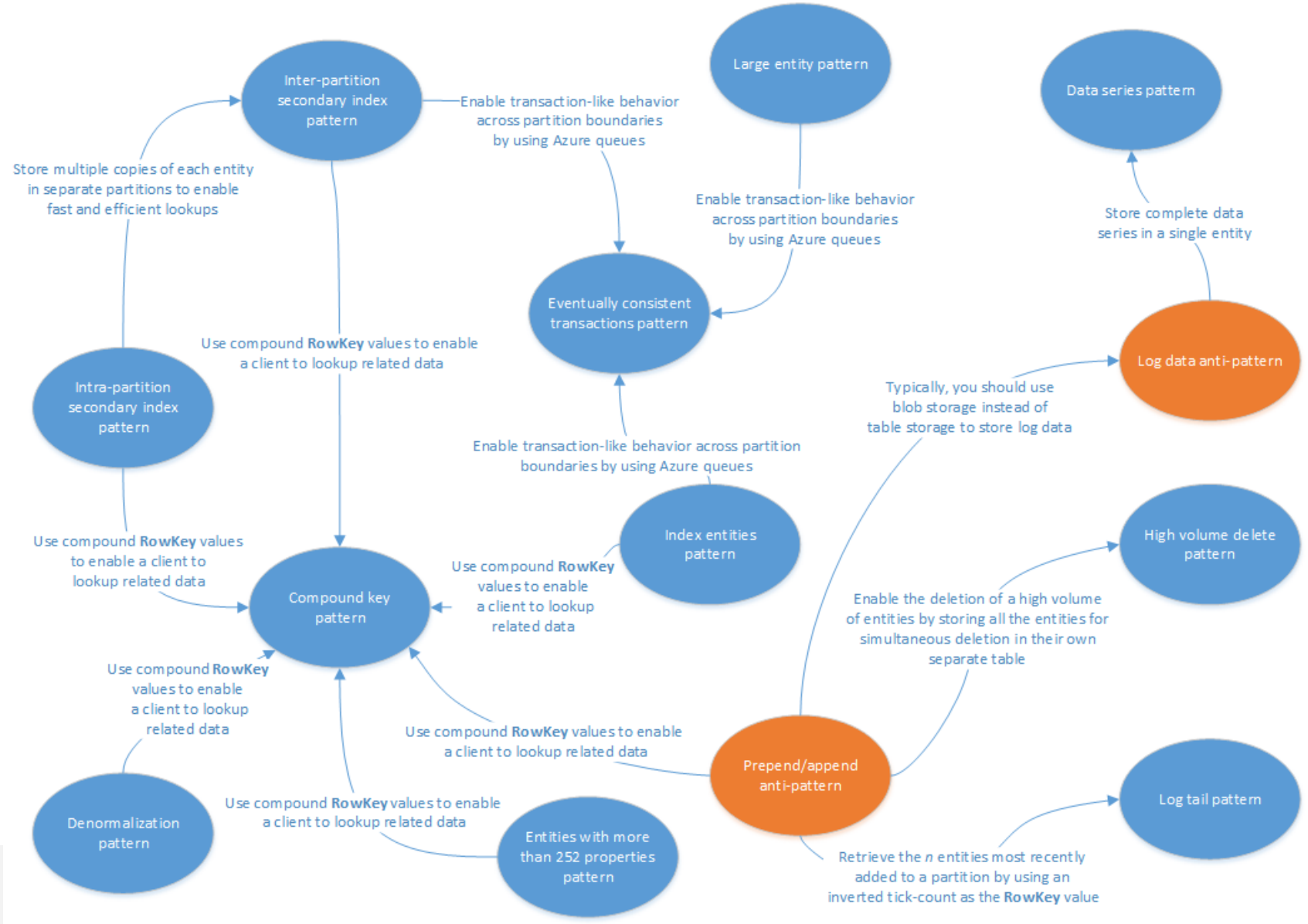
Recommended solution:

- Replace collection #1 by one of these:
- - Service Bus
- - Event Hub
- - Event Grid

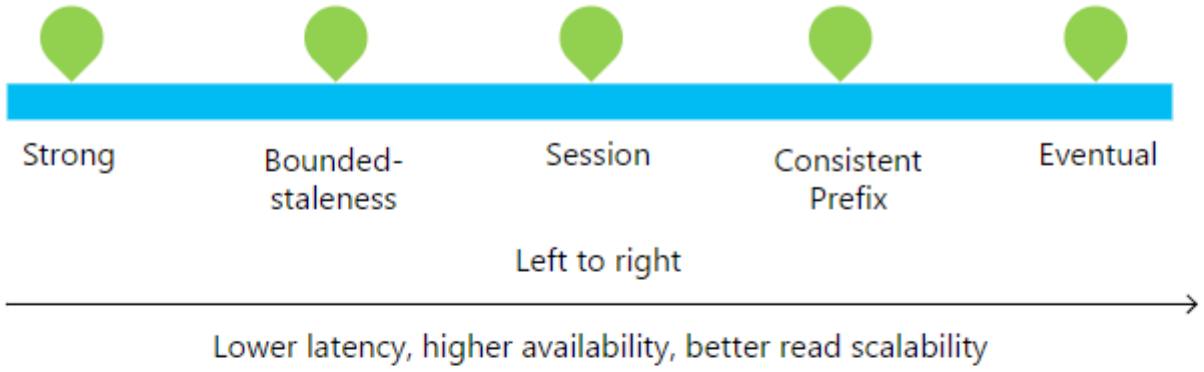
Table design patterns & anti-patterns

80% issues comes from bad design

Anti-patterns:
- Time as partition key



Consistency levels



Guarantees about each consistency level are listed in the following table.

Consistency levels and guarantees

Consistency Level	Guarantees
Strong	Linearizability. Reads are guaranteed to return the most recent version of an item.
Bounded Staleness	Consistent Prefix. Reads lag behind writes by at most k prefixes or t interval.
Session	Consistent Prefix. Monotonic reads, monotonic writes, read-your-writes, write-follows-reads.
Consistent Prefix	Updates returned are some prefix of all the updates, with no gaps.
Eventual	Out of order reads.

Cosmos DB - Resources

Questions?

Thank you!

kamil@nowinski.net

@NowinskiK @SQLPlayer

SQLPlayer.net

https://github.com/NowinskiK/CommunityEvents

Kamil Nowinski
Microsoft Data Platform MVP
MCSE Data Platform & MCSE Data Management and Analytics