Cosmos DB

Challenges with globally distributed Databases

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

Why Cosmos DB?

- FULLY MANAGED
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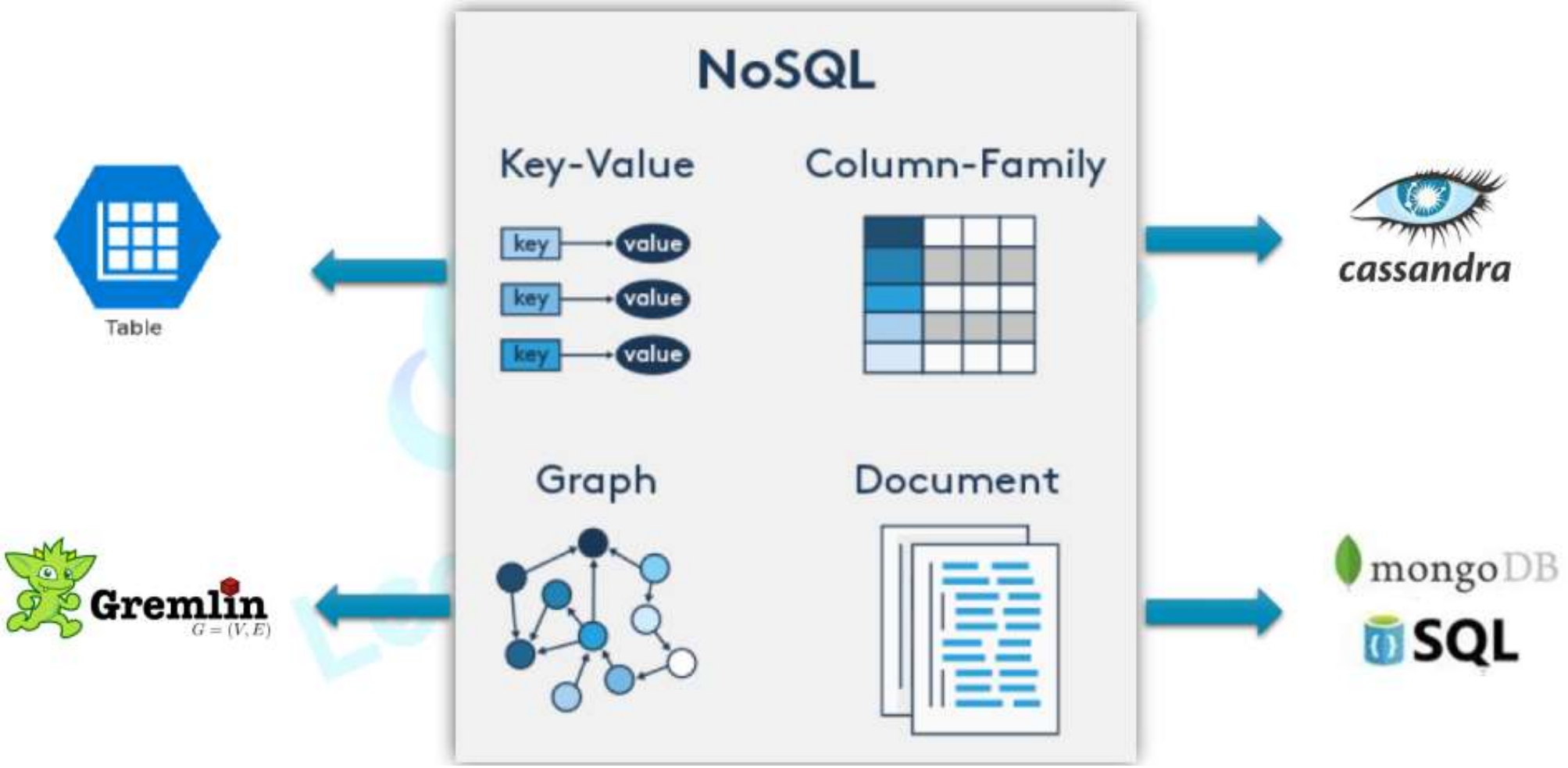
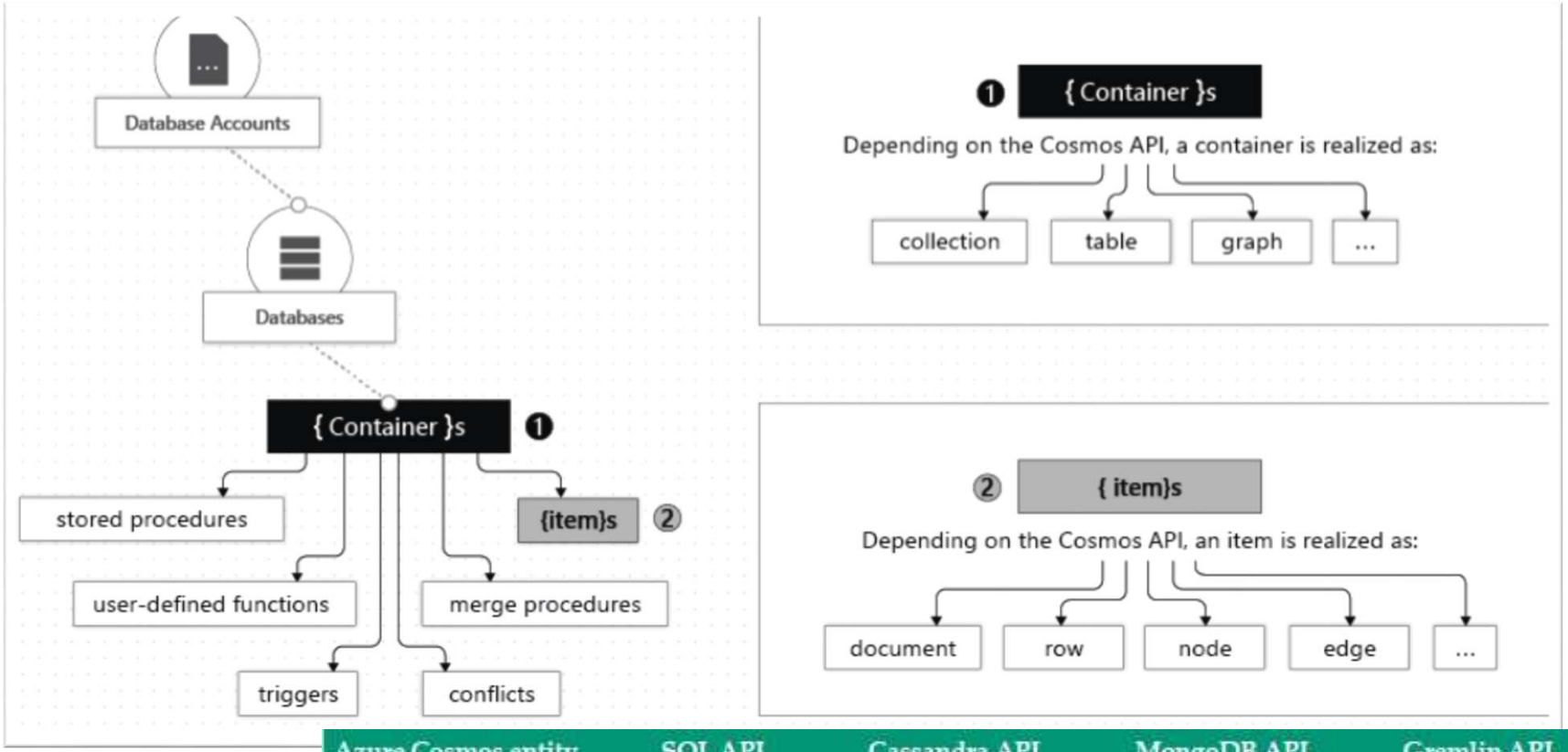
- GLOBALLY DISTRIBUTED
- CONSISTENCY CHOICES
- SCALABLE
- HIGHLY AVAILABLE, RELIABLE & SECURE


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

Analyze the decision criteria

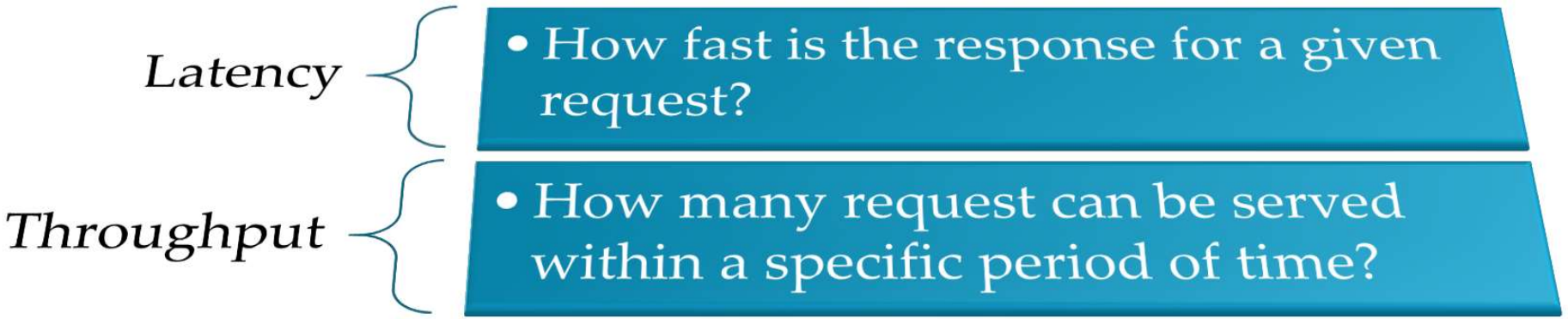
	Core (SQL)	MongoDB	Cassandra	Azure Table	Gremlin
New projects being created from scratch	✓				
Existing MongoDB, Cassandra, Azure Table, or Gremlin data		✓	✓	✓	✓
Analysis of the relationships between data					✓
All other scenarios	✓				

Database Containers and Items

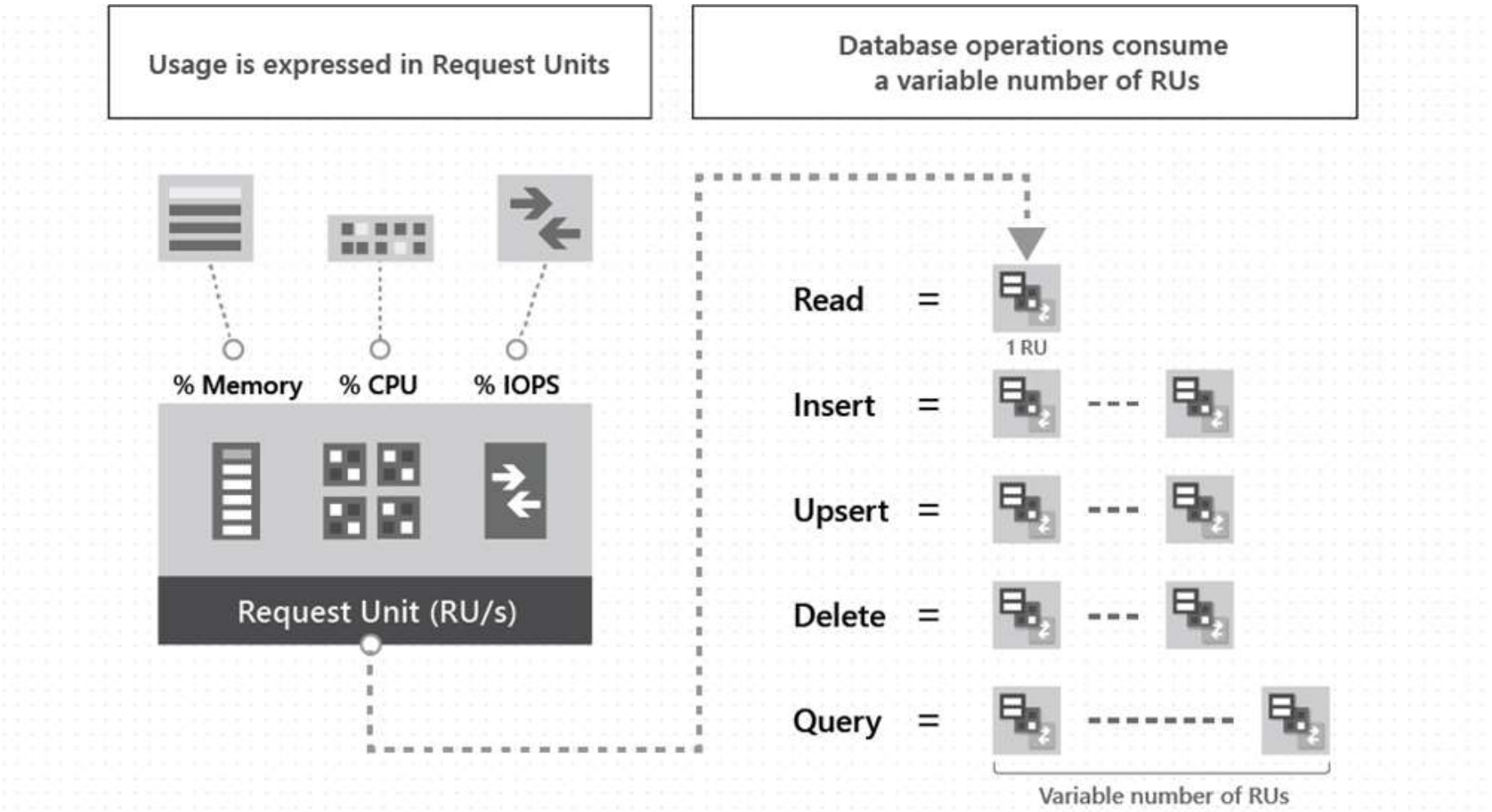


Azure Cosmos entity	SQL API	Cassandra API	MongoDB API	Gremlin API	Table API
Azure Cosmos database	Database	Keyspace	Database	Database	NA
Azure Cosmos container	Container	Table	Collection	Graph	Table
Azure Cosmos item	Document	Row	Document	Node or edge	Item

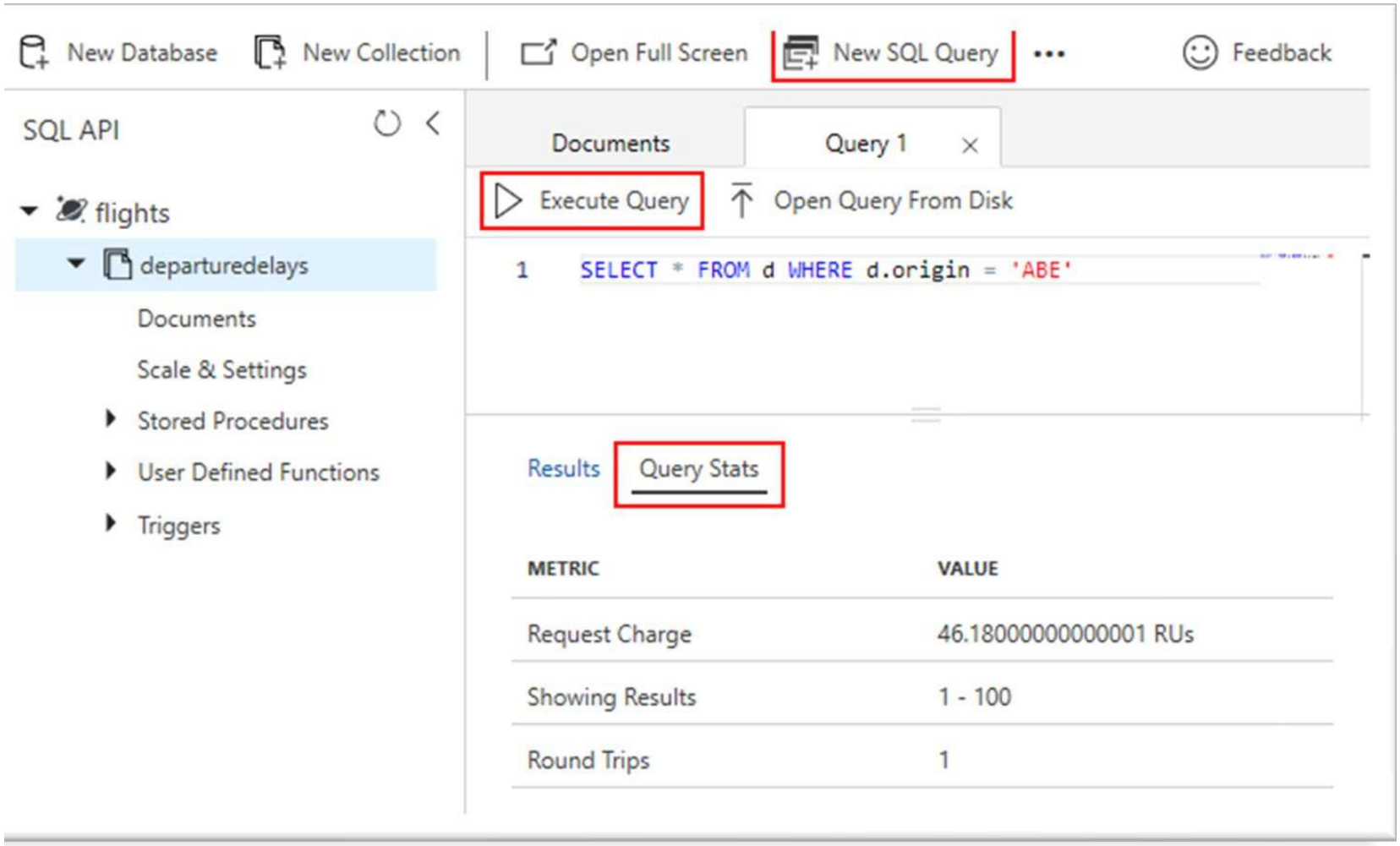
Measuring Performance



Introducing Request Units



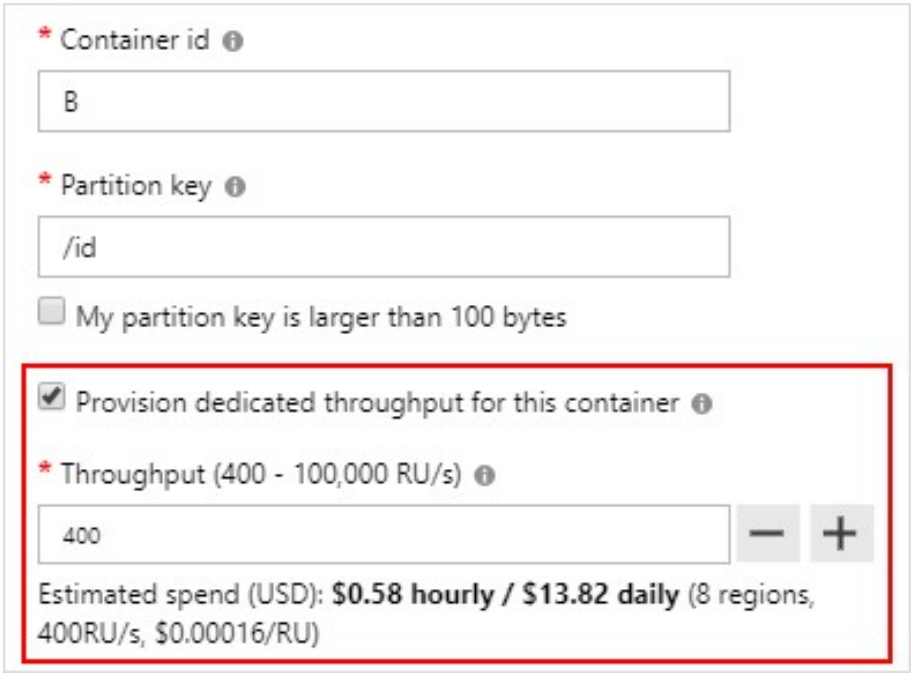
Introducing Request Units



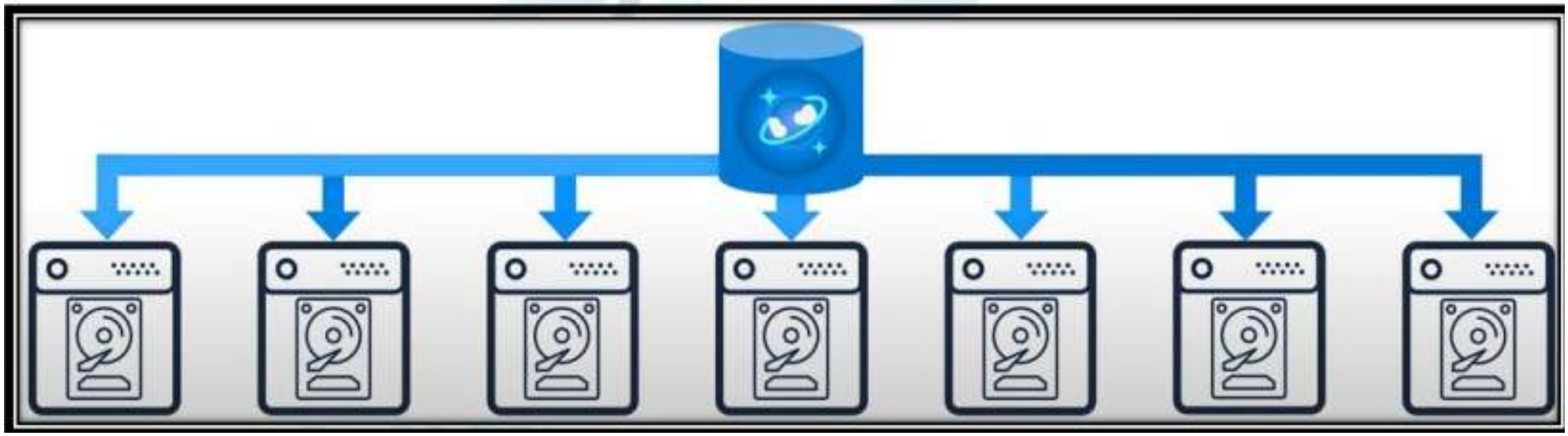
Reserving requests units

- 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)



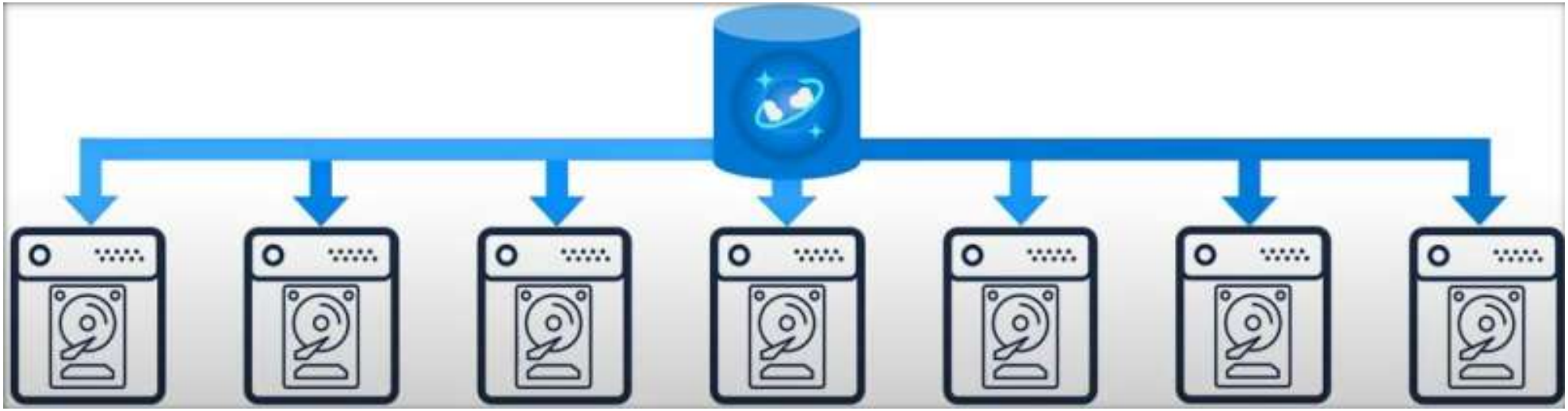
Horizontally Scalable



Unlimited Storage

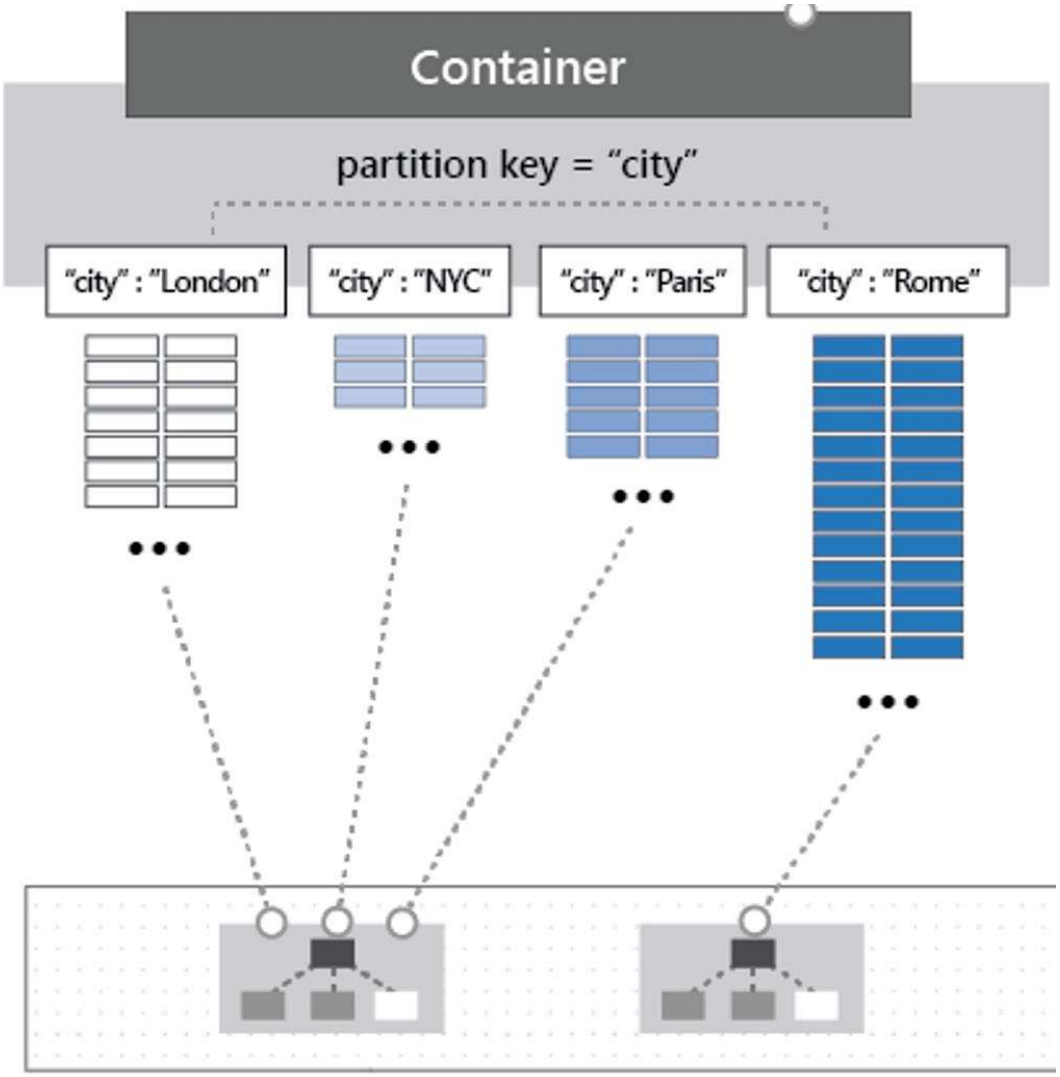
Unlimited Throughput

Partitioning

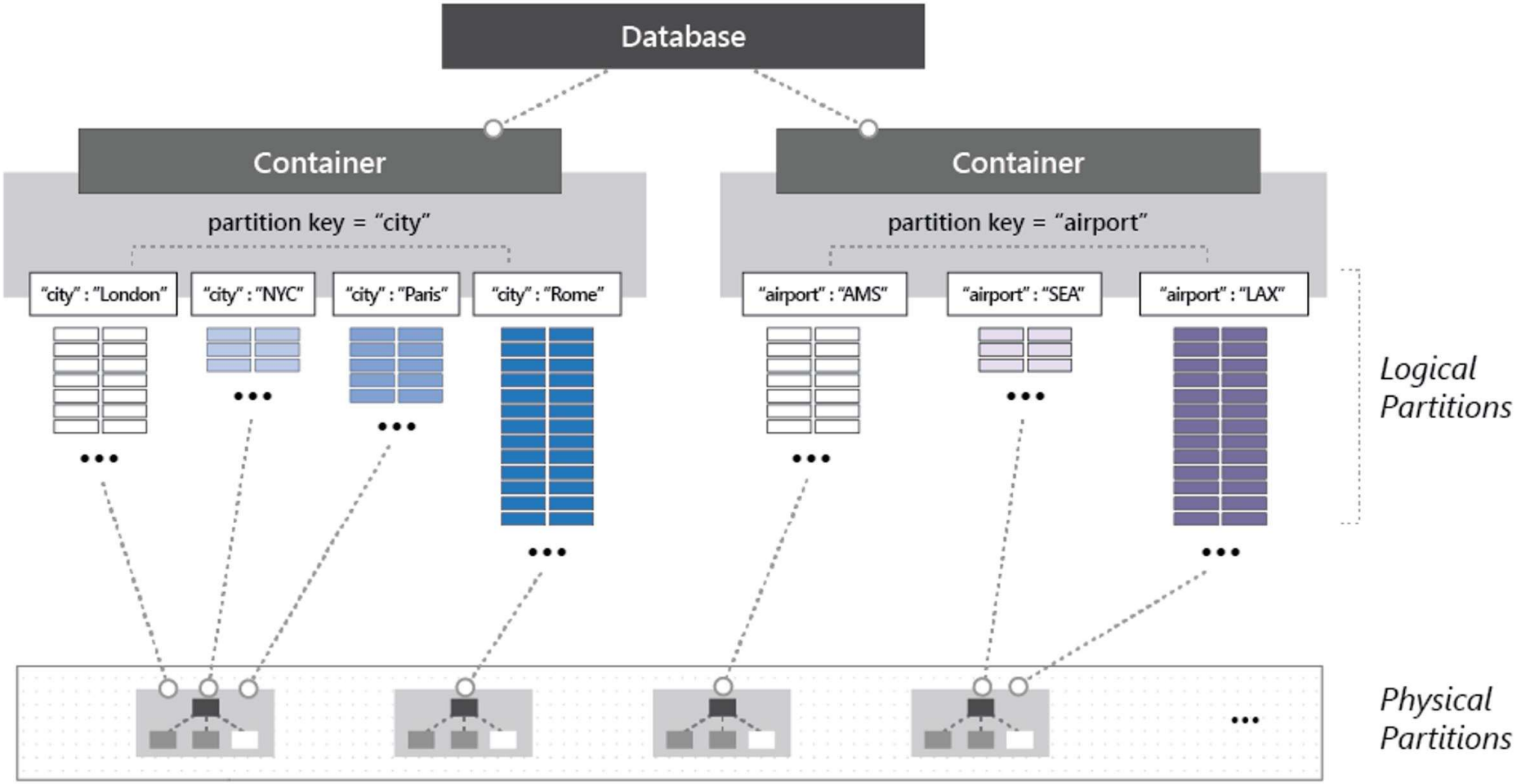


Partitioning

- Partitioning
  - The items in a container are divided into distinct subsets called logical partitions.
- Partition key
  - The value by which Azure organizes your data into logical divisions.
- Logical partitions
  - 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



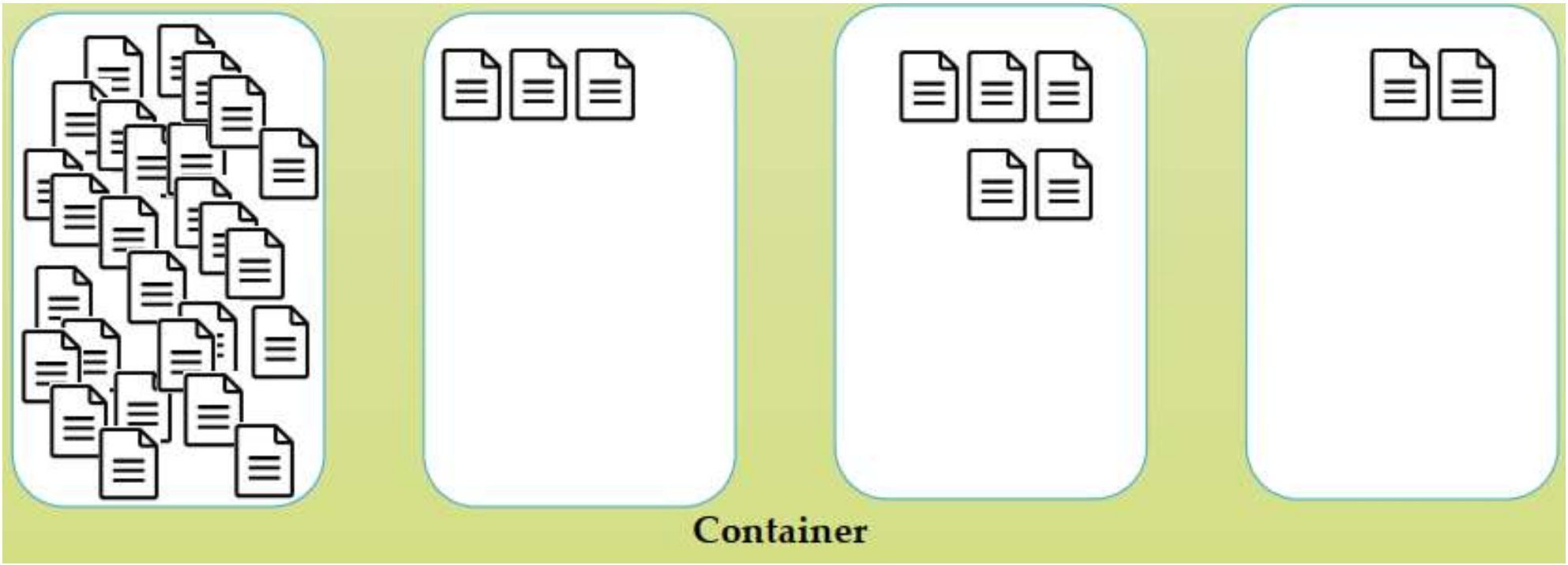
Partitioning



Dedicated vs Shared throughput

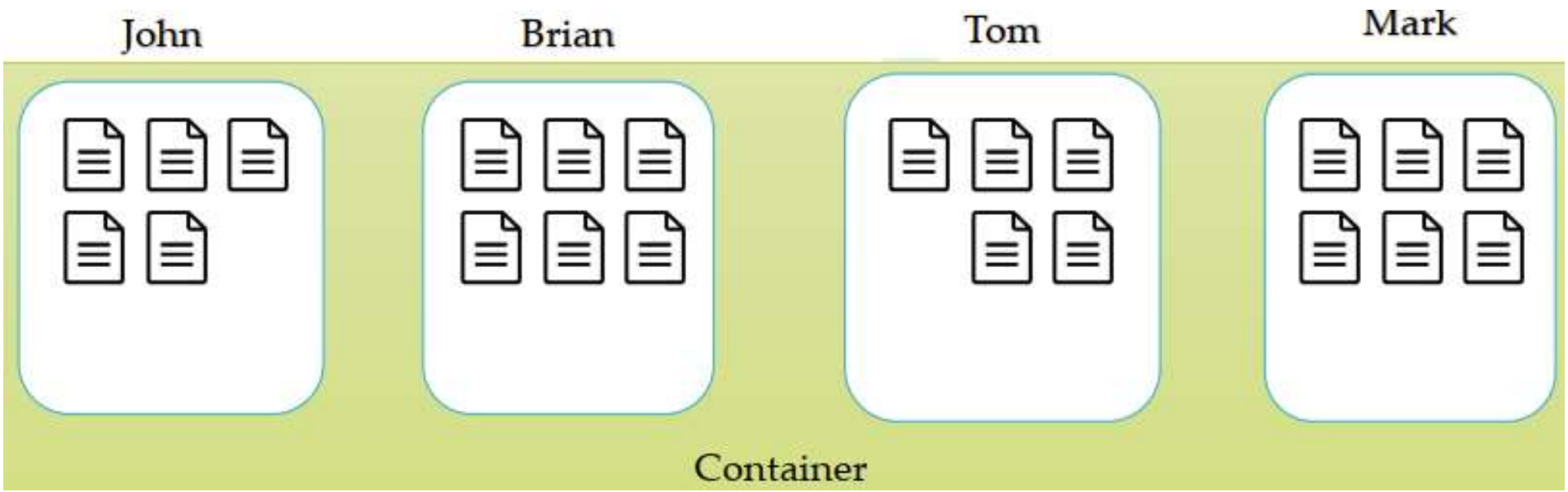
- You can set throughput at:
  - Database level – Shared throughput
  - Container level – Dedicated throughput
- It is recommend to set throughput at container level.
- Choose at the time of creation

Avoid Hot partitions on storage



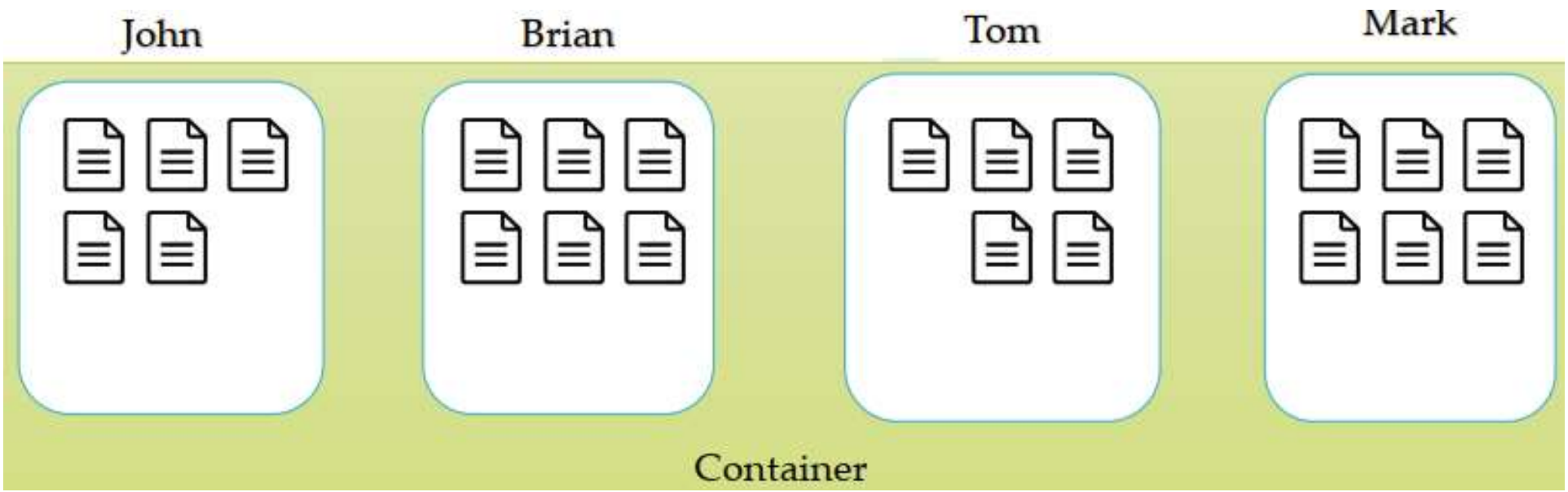
Single partition Query

- SELECT * FROM c WHERE c.username = ‘Brian’



Cross partition Queries (fan out queries)

- SELECT * FROM c WHERE c.favoritecolor= ‘Blue’



Automatic Indexing

- Index all data without requiring Index management
- Every property of every record automatically index
- Index update synchronously as you create, update or delete items
- Not specific for SQL, but available for all APIs

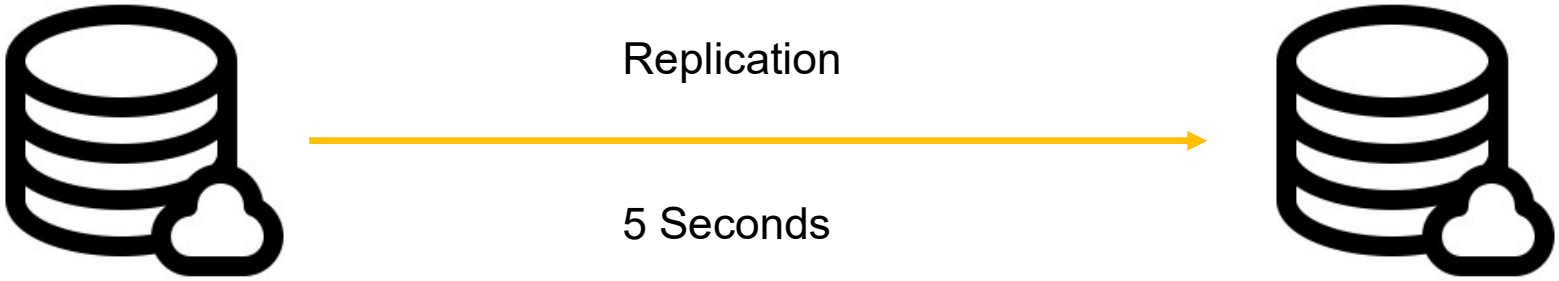
Time to Live (TTL)

- You can set the expiry time for Cosmos DB data items
- Time to live value is configured in seconds.
- The system will automatically delete the expired items based on the TTL value
- Consume only leftover Request units
- Data deletion delay if not enough Request units
- Though the data deletion is delayed, data is not returned by any queries (by any API) after the TTL has expired.

Global Distribution benefits

- Performance
- Business continuity

Data consistency



West US

At 10.00 AM
Update CreditScore = 750

East US

At 10:00:02 AM
Read CreditScore

Stronger consistency
Lower performance/availability

Weaker consistency
Higher performance/availability

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


thanks