AZURE COSMOS DB- CONSISTENCY LEVELS

Vishwanath Uppala
vishwanath.uppala@valuemomentum.com

Pooja Banchode
pooja.banchode@valuemomentum.com

CORPORATE FACTS

Established in 2000

90+
Customers Served

2300+
Employees

23%
CAGR since inception

Top 10
NA P/C IT Svs Provider
by # of customers

OUR DIGITAL & CLOUD SERVICES

VALUEMOMENTUM
Deliver Value. Drive Momentum.

Customers trust ValueMomentum to rapidly deliver new experiences and stay competitive in today's digital-centric market.*

App Dev

- Rapid App Development
- Cloud App Development
- Mobile App Development

Integration

- Integration Architecture
- API Development
- Service Modernization

Cloud & Infrastructure

- Cloud Platform Adoption
- Cloud Migration
- DevOps & CloudOps

ITSM

- IT Service Management
- IT Asset Management
- IT Operations Management

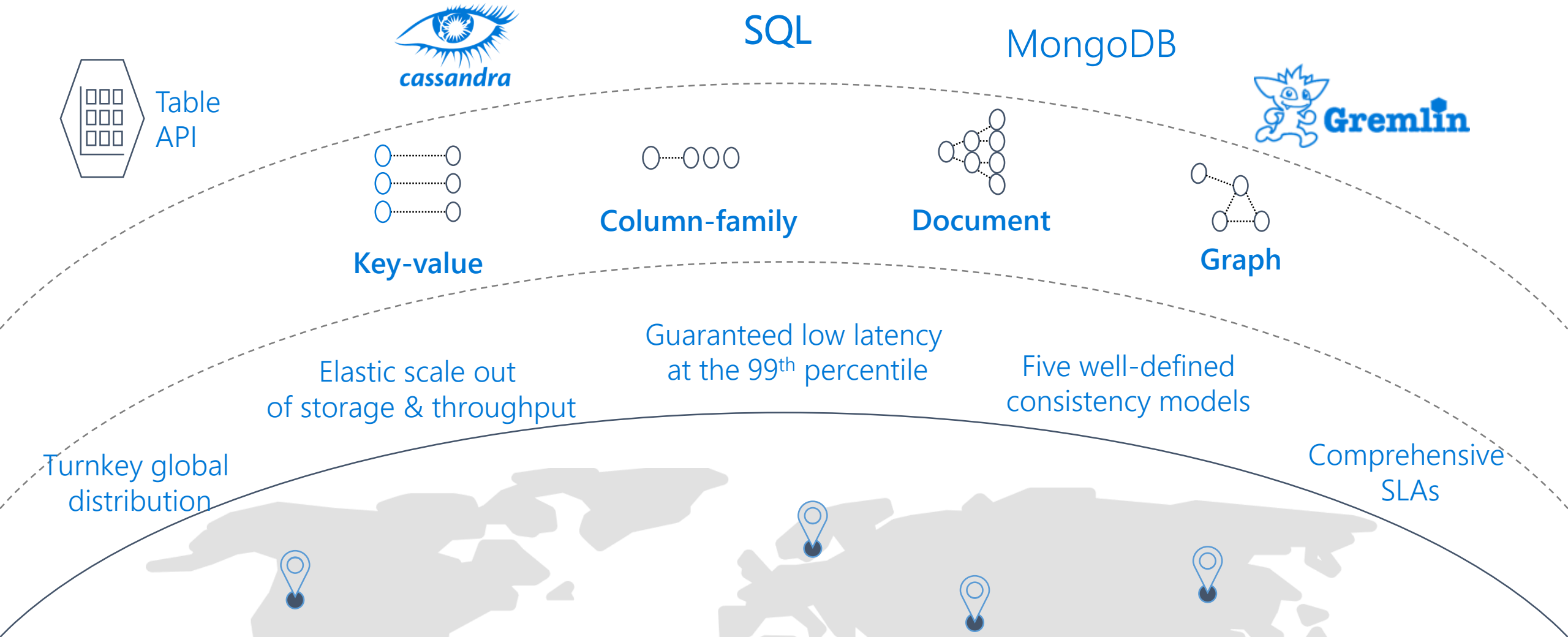
*To learn more, please log on to ValueMomentum – Digital & Cloud Services

2019 Global Azure BOOTCAMP

Azure Cosmos DB

VALUEMOMENTUM
Deliver Value. Drive Momentum

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



CONSISTENCY MODELS

Replication and Consistency

Why replication?

Performance	• Within a region, ensures SLA on RUs purchased • Across regions, brings data closer to the consumer
Business Continuity	• In the event of major failure or natural disaster

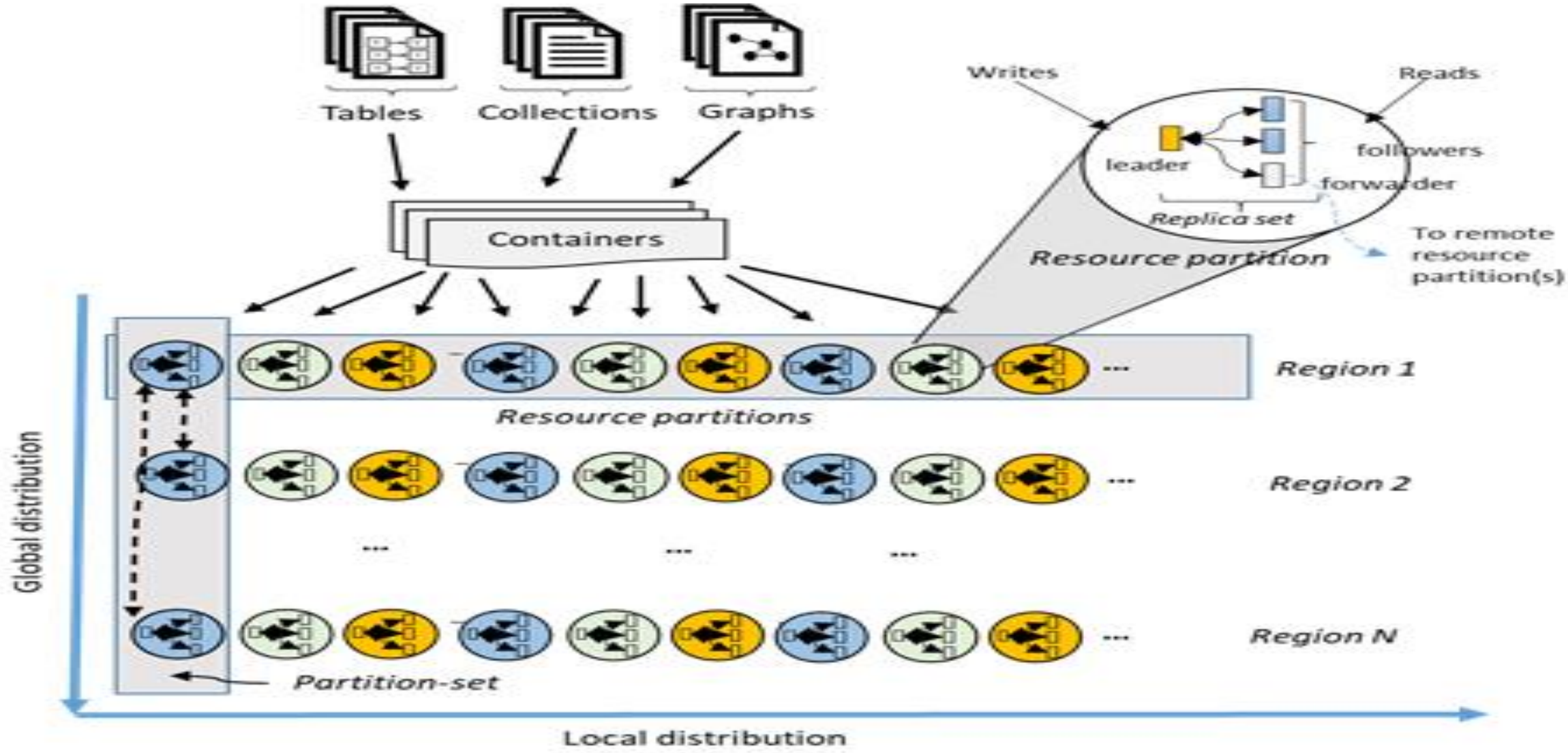
Global replication

- It takes hundreds of milliseconds to move data across continents

How do you ensure consistent reads across replicas?

- Define a consistency level

Cosmos DB Global Distribution



CAP THEOREM

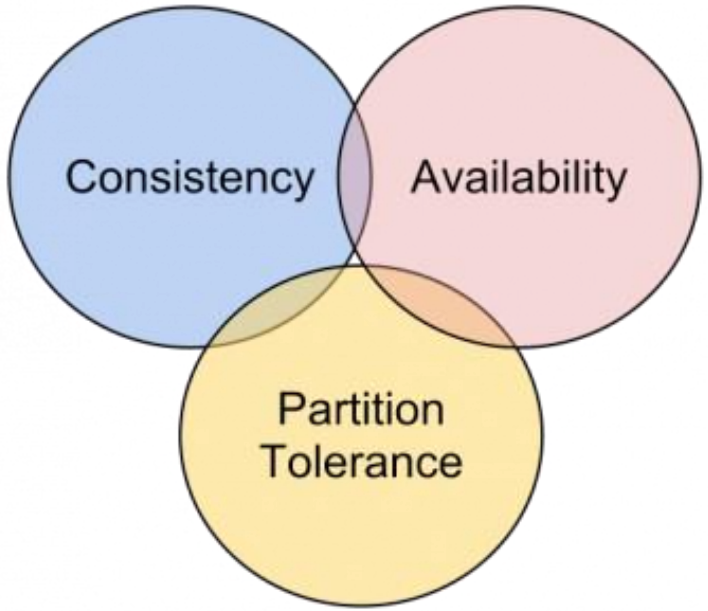
Consistency-Availability-Partition Tolerance Theorem

Consistency: Every read receives the most recent write or an error

Availability: Every request receives a (non-error) response – without the guarantee that it contains the most recent write

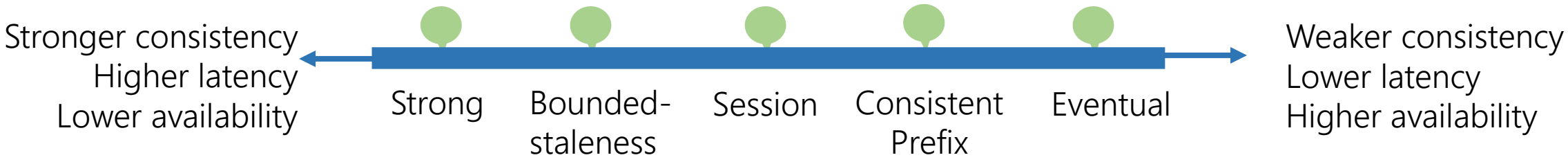
Partition tolerance: The system continues to operate despite an arbitrary number of messages being dropped (or delayed) by the network between nodes

The CAP theorem implies that in the presence of a network partition, one has to choose between consistency and availability

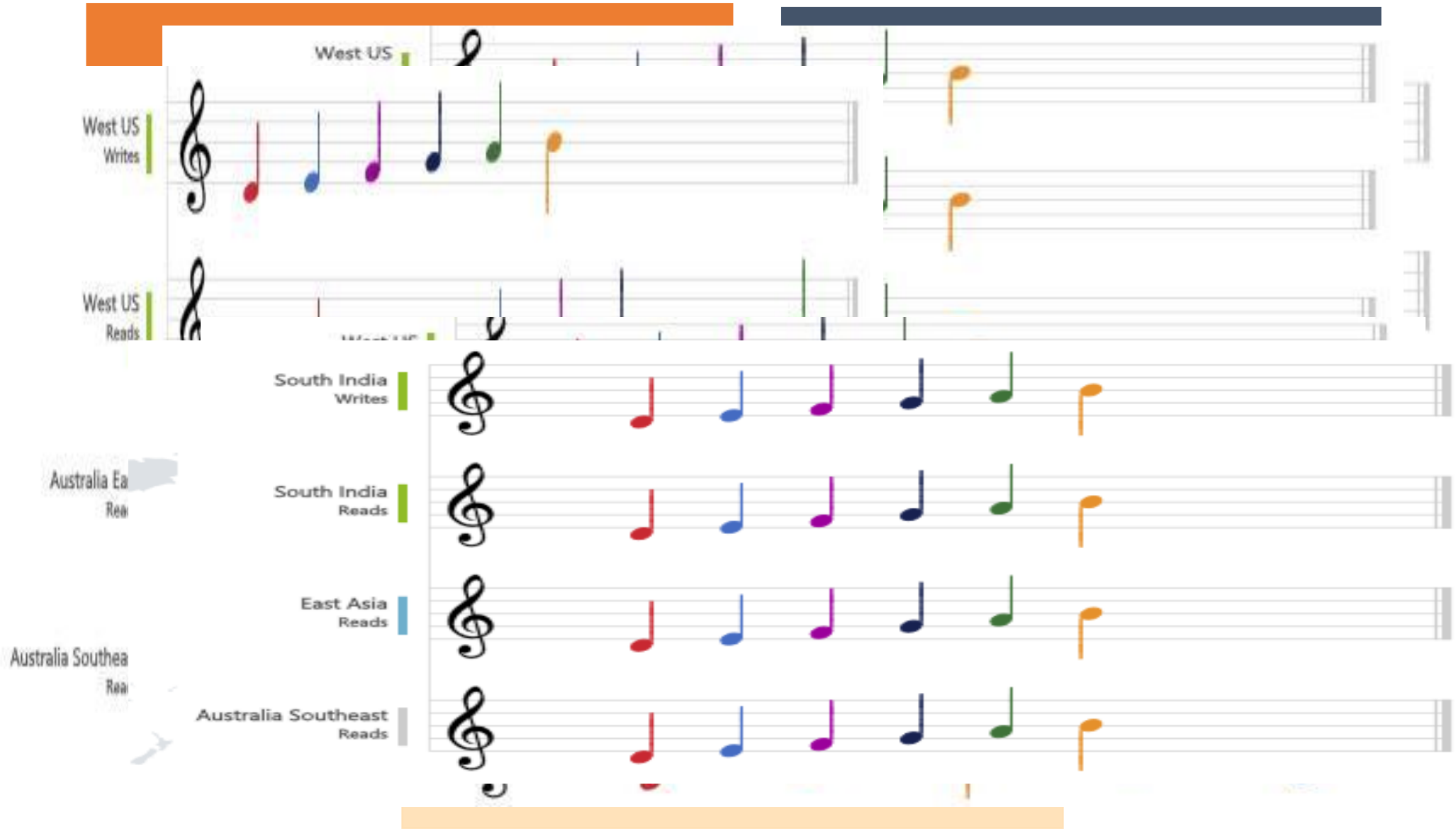


Setting the Consistency Level

- Set default for entire account:
  Can be changed at any time
- Override at the request level:
  Any request can weaken the default consistency level



Semantics of the five consistency levels



Consistency levels Explained Through Baseball

Score Board

	1	2	3	4	5	6	7	8	9	RUNS
Team A	**0**	**0**	**1**	**0**	**1**	**0**	**0**			**2**
Team B	**1**	**0**	**1**	**1**	**0**	**2**				**5**

The Table below lists the complete set of scores that could be returned by reading the Team A and Team B scores

Consistency level	Scores (Team A, Team B)
Strong	2-5
Bounded staleness	Scores that are at most one inning out of date: 2-3, 2-4, 2-5
Session	•For the writer: 2-5 •For anyone other than the writer: 0-0, 0-1, 0-2, 0-3, 0-4, 0-5, 1-0, 1-1, 1-2, 1-3, 1-4, 1-5, 2-0, 2-1, 2-2, 2-3, 2-4, 2-5 •After reading 1-3: 1-3, 1-4, 1-5, 2-3, 2-4, 2-5
Consistent prefix	0-0, 0-1, 1-1, 1-2, 1-3, 2-3, 2-4, 2-5
Eventual	0-0, 0-1, 0-2, 0-3, 0-4, 0-5, 1-0, 1-1, 1-2, 1-3, 1-4, 1-5, 2-0, 2-1, 2-2, 2-3, 2-4, 2-5

Consistency levels Explained Through Baseball

Lets lists the consistencies used by each Participants

Umpire → Strong Consistency

Radio Reporter → Bounded Staleness

Sports Writer → Eventual Consistency

Official scorekeeper → Session Consistency

Stat Watcher → Consistent Prefix

Consistency, Availability, Performance Tradeoffs

Property →	Latency		Throughput		Data Durability
Consistency level ↓	Read	Write	Read (for same RUs)	Write	Durability
Strong	Less than 10 milliseconds at 99th percentile		X (say)	Identical for all levels	DECREASES ↓
Bounded Staleness					
Session			2X		
Consistent Prefix					
Eventual					

Demo